UNIVERSIDAD POLITECNICA DE MADRID

ESCUELA TECNICA SUPERIOR DE INGENIEROS DE TELECOMUNICACION

“Shifting Paradigms for European Innovation Policy: From Trans-National Collaborative
Projects in R&D to Pan-European Entrepreneurial Ecosystems”

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ESCUELA TECNICA SUPERIOR DE INGENIEROS DE TELECOMUNICACION

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DOCTOR INGENIERO DE TELECOMUNICACION

2020

Tribunal nombrado por el Magfco. Y Excmo. Sr. Rector de la Universidad Politecnica de Madrid

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TO MY SWEETEST KREMENA AND MARINA,
AND DEAR PARENTS TRINI AND LUIS,
FOR THEIR LOVE AND FAITH IN ME.

"Much of the way we train managers and do research about management is based on a flawed paradigm: the belief that decisions should be grounded in solid analysis of data. The problem with this paradigm is that when managers attempt to do something that has not been done before, or when the future is going to be different from the past, the paradigm breaks down. Data is only available about the past." – Christensen, Clayton M., Anthony, Scott and Roth, Erik A. (2005). *Seeing what's next: Using the Theories of Innovation to Predict Industry Change*.

"In short: will the greatest strength of the EU, its cultural diversity, be the greatest creative asset of the European Institute of [Innovation and] Technology, as it seems to be in Airbus, Galileo and other cross European industrial initiatives at the leading edge; or will it be seen as the EIT's greatest problem, as it is in the wrangling over control and direction that is publicly destructive in Airbus, Galileo and other cross-European industrial initiatives at the leading edge. Europe needs the EIT be a winner" – David White, *Lisbon Strategy Conference on the EIT* (Brussels, 2007).

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1 ABSTRACT

In Europe, most of the public support to R&D is managed at national level, while the corresponding policies that EU institutions foster still today were conceptualised in the 80's around (trans-national) collaborative projects in R&D involving academic and business partners, an instrument that is prevailing. Paradoxically, a holistic innovation policy for Europe is far from realised, among other things because the choice of innovation strategy and policy instruments is still being researched. Consistent with the grand challenges of the 21st century in general and for Europe in particular, the dissertation researches a shift from EU-level interventions fostering trans-national collaborative projects (in R&D) towards next generation policies fostering pan-European entrepreneurial (innovation) ecosystems. The dissertation is inspired by the experimentation and learning by the author as former Director of the European Institute of Innovation and Technology (EIT) from 2011 to 2015, following the conceptualisation of its first Knowledge and Innovation Communities (KIC) and their early operational developments. The research cover three interrelated topics. 1. Underlying rationales for European policies fostering cooperation in R&D and their added value for business, SMEs in particular, when they take part in trans-national collaborative projects. 2. EIT-specific features regarding governance, management and content that make its partnership operations through its KICs distinctive in fostering pan-European entrepreneurial innovation ecosystems. 3. Empirically testing the effectiveness of one of EIT's first three KICs (EIT Digital) for what concerns overcoming barriers to growth experienced by new, potential high growth firms. The concludes with a policy discussion and research agenda about EIT in view of a future holistic innovation policy for Europe.

Keywords

European Research Area; multi-level innovation governance; innovation policy learning; knowledge triangle integration; high growth potential firms; entrepreneurial innovation ecosystems.

Resumen

En Europa, la mayor parte del apoyo público a la I+D se gestiona a nivel nacional, mientras que las correspondientes políticas que las instituciones de la UE fomentan todavía hoy se conceptualizaron en los años 80 en torno proyectos (transnacional) de colaboración en I+D con participación académica y empresarial, un instrumento predominante. Paradójicamente, una política de innovación holística para Europa está lejos de realizarse, entre otras cosas porque la elección de la estrategia de innovación y los instrumentos públicos es en si misma un objeto de investigación. Consistentemente con los grandes desafíos sociales que presenta el siglo XXI globalmente y también para Europa, la tesis investiga un cambio de intervenciones al nivel de la Unión Europea (UE), desde el fomento de proyectos de colaboración transnacionales (en I+D) hacia una nueva generación de políticas que fomentan ecosistemas emprendedores (de innovación) transfronterizos. La disertación está inspirada en la experimentación y el aprendizaje del autor como director del 'Instituto Europeo de Innovación y Tecnología' (EIT) de 2011 a 2015, tras la conceptualización y operaciones tempranas de las primeras 'Comunidades de Conocimiento e Innovación' (KIC) del EIT. La investigación cubre tres temas interrelacionados: 1. La justificación de las políticas europeas que fomentan la cooperación en I+D y su valor añadido para las empresas, PYME en particular, cuando participan en proyectos colaborativos transnacionales. 2. Las características específicas del EIT en materia de gobernanza, gestión y contenido que hacen que las operaciones de sus KICs resulten distintivas en el fomento de ecosistemas de innovación emprendedores pan-europeos. 3. Probar empíricamente la eficacia de una de las tres primeras KIC del EIT (EIT Digital) en lo que respecta a la superación de las barreras al crecimiento que experimentan las nuevas empresas de alto potencial de crecimiento. La tesis concluye con un debate sobre las actuales políticas y una propuesta de investigación motivada por el EIT con vistas a una futura política de innovación holística para Europa.

Palabras clave

Espacio Europeo de Investigación; gobernanza multinivel de innovación; aprendizaje en políticas de innovación; integración del triángulo del conocimiento; empresas con alto potencial de crecimiento; ecosistemas emprendedores de innovación.

2 INTRODUCTION

2.1 BACKGROUND

Notwithstanding sometimes disproportionate talking about innovation policies for Europe, particularly since the Lisbon Strategy was launched in the year 2000, the European Union (EU) has made visible progress over recent years in putting together the foundations of a Knowledge-based Economy and Society. More recently, the notion of the 'Knowledge Triangle' emerged as a new constellation in European governance, including Higher Education, Research and Business (Chou and Gornitzka, 2014) – See Figure 1- . Interestingly, the so-called European Higher Education Area (EHEA) was made possible through voluntary coordination via inter-governmental networks (Elken and Vukasovic, 2014) while much less progress has been registered so far in building up a European Research Area (ERA) where *'knowledge can move freely across European borders'* (ERAC, 2020). Moreover, Europe lacks a holistic EU-level Innovation Policy beyond traditional rhetoric of knowledge transfer. Consequently, authorised voices stress it is high time to *'take innovation out of the ghetto of a too narrow focus on science and technology'* (Mazzucato, 2013) to ultimately *'transform innovation policy'* with *'a new social contract for a second modernity'* (Schot, 2014).

The above is critical at least for two reasons. On the one hand, considering the true nature of innovation compared, on the other, with the actual profile of most public policies in place today *'beyond rationales about competitiveness and growth'*; indeed, *'many policies are still based on an old supply-driven innovation model which takes support for R&D as the main entry point for policy making without thinking more creatively about the broader suite of innovation policies available'* (Schot, 2014). Significant time has elapsed since the publication of the first OECD Frascati Manual in 1963 to measure R&D and also since the first OECD Oslo Manual in 1997 which considers, in addition to technological innovations, also non-technological (organisational and market) ones. On the other, the so-called 'linear model' assumes that innovation emerges from science while we know science is neither always needed nor sufficient to make innovation happen (Borrás and Edquist, 2013). Surprisingly, technological innovation and the linear model are more pervasive in governmental policies than in today's business practice. It is therefore time to develop a new narrative to foster and shape next generation of innovation policy instruments (Borrás and Edquist, 2019).

Figure 1: The Knowledge Triangle as seen by the European Institute of Innovation and Technology (EIT), emphasises the partnership side of its Knowledge and Innovation Communities (KICs), thus mentioning business instead of innovation (Source: www.eit.europa.eu)

In Europe, most of the public R&D support is managed at national level, while the corresponding public policies that EU institutions foster still today were conceptualised in the 80's around the then prevailing policy instrument of (trans-national) collaboration in R&D involving academic and business partners. More recently, with the setting up of a European Research Council (ERC) already a decade ago, the EU could be in a position to consider a true Research Policy (Gornitzka and Metz, 2014a) should its full implementation be accompanied by much stronger cooperation and coordination also with National Research Organisations and Councils. In that connection, also the European Commission has committed to make its own role evolve from pure project implementation to policy advice also, thus assessing national research strategies, national programmes and performing organisations, thereby sponsoring reforms in member European States (EC, 2014).

Considering the three vertexes of the Knowledge Triangle, a holistic innovation policy for Europe is far from realised, among other things because the choice of innovation strategy and policy instruments are still being researched (OECD, 2010; Flanagan et al. 2011; OECD, 2015). On the other hand, innovation policy instruments are *'designed and combined into mixes in ways that address the problems of the innovation system. These mixes are often called "policy mix". The problem-oriented nature of the design of instrument mixes is what makes innovation policy instruments "systemic"* (Edquist and Borrás, 2013). Unsurprisingly, there are more studies

on the many specific facets of innovation than holistic attempts to conceptualise what a true Innovation Policy should mean for Europe. Obviously, there are periodic evaluations for established EU and inter-governmental support to European collaboration in R&D like the Eureka, Cost and the Framework Programme (FP) and 'programmatic reflections' publicly issued with every edition of the FP (Caracostas et al. 2004; Muldur et al. 2006; Delanghe et al. 2009; etc). However, the basic model has remained practically intact with few notable exceptions like ERC and few new instruments like the Future Emerging Technologies (FET) - particularly FET flagships -, and more recently, the European Innovation Council (EIC) that supports single-researcher/firm projects.

Also, comprehensive scholars' work on European Innovation Policy is scarce except some few cases (Peterson and Sharp, 1998; Borras, 2003) notwithstanding well-intentioned declarations of intend on 'a broad-based innovation for Europe' (EC, 2006), since the publication of the European Green Paper of Innovation (EC, 1995). More recently, (Granieri and Renda, 2012) fundamentally question whether there is such a Policy at EU level, beyond widespread and linear support for R&D in collaborative projects, stressing that a clearer division of labour is needed in the multi-level governance system that characterises Europe. This is surprising taking into account growing interest in a new agenda for innovation (Fagerberg, Martin and Andersen, 2013; Cox and Ribgy, 2013; Borras and Edquist, 2019).

Consistent with the innovation policy challenges of the 21st century in general and for Europe in particular, this dissertation researches a shift from former EU-level interventions on trans-national collaborative projects (in R&D) as the predominant policy intervention still today. And positions that shift towards an emerging focus at fostering Pan-European entrepreneurial (innovation) ecosystems, building upon the EIT / KIC model. A shift that stresses human capital and entrepreneurial attitudes via 'enabling spaces' in the quest of a better overall performance and place for Europe in the global innovation arena, whereby "European added value" in knowledge-based partnerships and interventions would be more about talented teams than project consortia, and competition rather than cooperation at EU level.

Indeed, notwithstanding early policy experimentation with the 6th edition of the Framework Program (FP) intensified with the 7th edition through a plethora of new policy instruments (ERANETs, JTIs, JPIs, PPPs, etc.), few exceptional schemes target individual researchers or single firms alone. Exceptions are ERC and, more recently, a new "SME instrument" which is at the basis of the new EIC, both part of the running and forthcoming FPs (Horizon 2020 and Horizon Europe). Consequently, trans-national cooperative R&D projects remain the norm, also for most of the new policy instruments and, consequently, "bringing together" science and

business to foster technological innovation remains at the heart of the current generation of European innovation policy instruments characterised by (Muldur et al., 2006):

- Member states principally responsible for capacity building (including Structural Funds);
- EU and inter-governmental cooperation fostering connections across borders;
- Increasing emphasis on large business and easing access for SMEs firms;
- Collaboration principally framed by disciplines and business sectors.

Regarding innovation, evidence shows that in spite of Europe's aggregate public support, business investment in R&D is far from international good practice with enormous differences among EU member States in public vs. private funding (in fact, closer to 1:1 in many member States compared to the Barcelona targets for the Lisbon Strategy, continued with the EU2020, namely 1:3 for public vs. private investment in R&D) while the EU is not generating enough "young leading innovators" as it did in the early part of the 20th century (Veugelers and Cincera, 2010). Responding to this, a new generation of European innovation policy instruments emerges, like the European Institute of Innovation and Technology (EIT), around not projects cooperation but rather long-term partnerships for entrepreneurial ecosystems, meaning:

- Capitalising on existing capabilities and alignment of public support available in Europe;
- Bottom-up community-driven support for co-creation and multilevel synergies;
- More focus on emergence and growth of young dynamic firms ('yollies');
- Acceleration through societal challenges and tacit knowledge.

The dissertation is inspired by the experimentation and learning by the author as Director of the EIT from 2011 to 2015, following the conceptualisation of its first partnerships, so-called, Knowledge and Innovation Communities (KIC) and their early operational developments. Beyond the interest of this case study, the dissertation can be seen also as a contribution in shaping a research agenda for the EIT itself. Interestingly, not many know that first ideas to build a 'European Institute of Technology' date back to the 80's (Pease, 1983) and similar 'Knowledge Integration Communities' (KICs) were experimented by the pilot Cambridge-MIT Institute (Acworth, 2008) before the EIT got political green light in 2008.

To critically test the hypothesised shift mentioned above, I focus the empirical part of this dissertation on one particular sector and derive recommendations for policy: Information and Communication Technologies (ICT). The reasons for the choice at least three: it is a 'not to miss field', considering its implication for productivity; also, it has attracted significant support at national, EU and inter-governmental levels; and most importantly, it is probably the domain where Europe urgently needs to successfully generate "missing yollies" to face other world

regions, most notably the US (Veugelers, 2012). Considering the transversal character of ICT, resulting recommendations help formulate views such as:

- To associate regulation (including EU Single Market);
- Articulate lead users beyond the ICT arena;
- To facilitate 'born global' connections;
- Secure sufficient value-for-money.

2.2 MOTIVATION AND OBJECTIVES

The need for policy experimentation in Europe is evident considering European businesses' relative weak commitments and dynamism regarding R&D and innovation, particularly for what concerns ICT-enabled sectors and activities (Veugelers, 2012). On the public support side, however, if one excludes Defence, Europe's governmental expenditure per capita in R&D is larger than that of the US; also, regarding new firm creation, Europe has a surprisingly large number of spin-offs emerging from Universities (Mazzucato, 2013) while the Old Continent's aggregate incubation/acceleration infrastructure is comparable to that of the US (Telefonica, 2013 – cited by Mazzucato, 2013). Consequently, one can induce that not only public and infrastructure support are important, but increasingly also the design of more efficient and effective policies that better match the actual dynamics of business in general and those of new firms in particular, to leverage growing private investment.

On the structural side, Europe does not lack 'national champions' many of which started as 'natural monopolies', including large system integrators, extractive industries, utility operators, network infrastructure, service providers, etc. many of which managed to successfully develop global business footprints. However, we know from (Baumol, 2010) that small new businesses are responsible of an incredible wide range of breakthrough innovations. In other words, large business (firms) today do not necessarily mean sustainable (impact) innovations in the longer run: according to the theory of 'disruptive innovation' (Christensen, 1997) large established (incumbent) firms and their (established) customer base bring about inertia also, which can be disadvantageous for breakthrough innovations.

In view of the above, next generation EU-level policies need to create the conditions for sustainable sources of growth, hence the interest to research a first paradox: the large (EU polices) and small (new businesses). Vice versa, policies designed decades ago could hardly optimise Europe's innovation performance, hence the need of bottom-up, experimental and co-

created new policies that capture emerging trends in innovation and today's understanding of knowledge. More precisely, the research objectives of this dissertation are:

1. Assessing underlying rationales for European policies fostering cooperation in R&D and their added value for business, SMEs in particular, when they take part in trans-national collaborative **projects**.
2. Discussing the EIT specific features regarding governance, management and content that make its **partnership** operations through its KICs distinctive in fostering cross-border entrepreneurial innovation ecosystems.
3. Empirically testing the effectiveness of one of EIT's three first KICs (EIT Digital) and its carrier-catalysis model (i.e. existing support schemes and new models) for what concerns overcoming **barriers** to growth for potential high growth firms.

All in all, my underlying motivation is rooted also on a profound personal belief, namely, that not only innovation practices can be entrepreneurial at the firm level, but also innovation policies can and need to be much more entrepreneurial using the EIT as a case study in line with the thesis of (Mazzucato, 2013) about the role of the State. With its lights and shadows, EIT was an attempt to operationalise the "Entrepreneurial State" vision. And as John Maynard Keynes eloquently presented the nature of public action – cited by (Mazzucato, 2013):

"The important thing for governments is not to do things which individuals are already doing, and to do them a bit better or a little worse; but to do things which at the present are not done at all" (Keynes, 1926)".

This is particularly relevant in Europe if Governments wants to recover an innovation ambition and entrepreneurial dynamism for the after Covid19 age.

2.3 STRUCTURE AND METHODOLOGY

The dissertation involves conceptual research, case studies and empirical work on the more established vs. next generation interventions rolled out by the EIT, using its ICT KIC (EIT ICT Labs, later renamed EIT Digital) to test EIT in practice. More precisely:

1. **Section I** discusses how to possibly widen the trans-national web of 'project links' created by long-standing European programmes. This first Section results in a couple of

policy recommendations within the boundaries of the existing European support networks targeting SMEs (Eureka in particular) and funds available (Structural Funds) in order to enlarge the coordination of policies targeting business-led R&D in Europe and, vice versa, making participation by SMEs potentially easier.

2. **Section II** reflects how to strengthen the set of 'partnerships hubs' made possible through the EIT and identifies its distinct features regarding what, how and where its 'living partnerships' KICs operate. As the EIT is still under-researched, this is a novel contribution to the innovation policy studies taking advantage of my direct experience with and insider view within EIT from mid-2011 to 2015.
3. **Section III** considers EIT Digital's 'carrier-catalysis' model and 'cross-border acceleration' model, inquiring whether and which barriers to growth are actually removed in practice by this KIC's network of business development managers in supporting potential high-growth digital firms.

The research expands a number of years, starting with my former Diploma of Advanced Studies, which helped me set up the conceptual basis for Section I. Regarding the EIT case study in Section II, the core of the gathered insights were constructed while working for the EIT in the day to day interaction and engagement with EIT's constituencies and stakeholders from 2011 to 2015, namely, EIT Governing Board members, KIC CEOs and EIT staff in Budapest, where EIT Headquarters is located. On the other hand, while action research, and the case study methodology in more general is suitable for describing new phenomena, it is also subject to interpretation biases and contingency factors not present or transparent in the final case description. Therefore, findings were also attested by proofs documented in empirically grounded materials developed by the EIT and KIC partners as well as semi-structured interviews with EIT Digital stakeholders to develop Section III.

2.4 OUTCOMES AND RELEVANCE

The work carried out has resulted in a number of research outputs, which are further detailed in the introductory Chapter of each Section; these are in summary:

From Section I. Two policy recommendations emerged from the dissertation regarding R&D collaborative networks involving SMEs. In preparation to that, I presented three short papers to international Conferences organised yearly by the International Society of

Professional Innovation Managers (ISPIM)¹ in Warsaw (in 2007), New York (in 2008) and Singapore (in 2009) as part of my Diploma of Advanced Studies.

From Section II. A critical discussion on the entrepreneurial rationale and systemic approach ambitioned by the EIT was presented at the Annual EuSPRI Forum in Manchester in 2014². Also, I contributed to a joint paper with my PhD Director focused on the educational dimension of the experience of the Technical University of Madrid with EIT (Leon, Leceta and Tejero, 2018). Thereafter, I presented a paper at a conference organised by SITRA in Helsinki in 2016³, that was later published in June 2019 (Leceta and Könnölä, 2019):

- León, G., Leceta, J.M. & Tejero, A. (2018). Impact of the EIT in the creation of an open educational system, *International Journal of Innovation Science*. Vol. 10 Issue: 2, pp.178-206, DOI: [10.1108/IJIS-09-2017-0090](https://doi.org/10.1108/IJIS-09-2017-0090)
- Leceta, J.M. & Könnölä, T. (2019). Fostering entrepreneurial innovation ecosystems: lessons learned from the European Institute of Innovation and Technology”, *Innovation: The European Journal of Social Science Research*, DOI: [10.1080/13511610.2019.1612737](https://doi.org/10.1080/13511610.2019.1612737)

Section III on ICT. At the end of mandate as Director of the EIT, I was invited by the European Think Tank CEPS to chair a Task Force on European Policies for Innovation and Entrepreneurship which resulted in a book (Leceta et. al, 2017). Also, a working paper on barriers to growth for scale ups was finalist in a paper competition organised by the Accenture-UAM Chair in 2015, from which, a paper was later published (Leceta and Könnölä, 2020):

- Leceta, J.M., Renda, A., Konnola, T. & Simonelli, F. (2017). *Unleashing Innovation and Entrepreneurship in Europe: People, Places and Policies*, CEPS, 2017. <https://www.ceps.eu/ceps-publications/unleashing-innovation-and-entrepreneurship-europe-people-places-and-policies/>

¹ <https://www.ispim-innovation.com>

² <http://www.euspri-manchester2014.com/>

³ <https://tem.fi/en/ecosystems>

- Leceta, J.M. & Könnölä, T. (2020). EIT Digital: Leveraging Ecosystems for International Entrepreneurial Innovation, *Innovation: The European Journal of Social Science Research*, <https://doi.org/10.1080/13511610.2020.1842177>

Among the conferences I took part in, I would point out at a couple where I organised debates with distinguished thought leaders and researchers at CIRCLE and SPRU:

- The 2016 Annual Conference of the EuSPRI Forum, organized by the CIRCLE Centre of the University of Lund (Sweden) "Exploring New Avenues for Innovation and Research Policies" <http://www.euspri-circle2016.org> where I organised a Special Session on '(Re) searching the critical' meso 'level: learning innovation agencies and entrepreneurial ecosystems' - Document available at <http://if-institute.org/wp-content/uploads/2016/01/Special-Track-2016-EuSPRI-Agencies-and-Ecosystems.pdf>
- At the 50th Anniversary Conference, organized by SPRU at the University of Sussex (UK) from 7 to 9 September 2016 'Transforming Innovation' - Program <http://www.sussex.ac.uk/spru/newsandevents/2016/talks/anniversary-conference> I organised a Special Track on 'Learning innovation agencies and entrepreneurial ecosystems' with eminent professors and practitioners like Prof. Mariana Mazzucato, Ben Martin, Josep M. Pique, Charles Edquist and former CDTI DG Francisco Marin.

Later, I published a couple of working papers in Spanish and a book, capturing learnings from the dissertation for dissemination to a wider audience:

- Leceta, J. (2019). A vueltas con la sociedad de la información: la transformación digital como "innovación posible". *Boletín Económico De ICE*, (3108). <https://doi.org/10.32796/bice.2019.3108.6759>
- Leceta, J. (2019). Regreso al futuro: nuevas políticas para la innovación en la era digital. *Boletín Económico De ICE*, (3111). <https://doi.org/10.32796/bice.2019.3111.6821>
- Leceta, J. M. (2020). *Innovación Fractal*, Madrid.

After an introductory discussion about the rationales for EU-level policy interventions, the dissertation aims to fill a gap by codifying EIT early practices and reflecting on the lessons learned from 2011 to 2015 for a broader scholarly debate. In fact, research papers about EIT are very few and, on the other hand, the few existing concern the foundational years of the EIT (from 2008 to 2010). Also, they miss insider-researcher's critical work with KICs like EIT Digital. Notwithstanding the fact that I don't focus so much on later developments, the KIC model remains basically intact and, consequently, the research is thus valid and relevant.

3 SECTION I – PROJECTS AND LINKS - European policies fostering trans-national R&D cooperation involving SMEs: assessing prevailing policy instruments

Trans-national R&D cooperation is well rooted in both European Communities/Union and Inter-Governmental Treaties at the basis of programmes, organisations and support schemes such as EU Framework Programmes (FP) and the EUREKA network. Notwithstanding respective emphasis on pre-competitive and close-to-market R&D, both interventions aim at fostering industry's competitiveness.

On the beneficiary side, SMEs are the largest community of business firms in Europe which also explains the R&D gap with the USA: US small firms invest on average more in R&D than European small firms, are more successful in translating R&D results into innovation and proportionately more of them become successful global market players.

In this Section I first examine existing European policy instruments relevant to SMEs that foster trans-national R&D cooperation as well as policy rationales favouring the participation of SMEs in the above-mentioned European programmes. I then develop a comparative analysis of existing cooperative R&D support policies, programmes and instruments available in Europe that promote trans-national inter-firm technology collaboration involving SMEs. Finally, by characterising SMEs, their needs and potential for cooperation at European level, I identify existing difficulties to access such support opportunities.

Seamless support to cross-border business-led R&D partnerships can be improved, taking into account Europe's multi-level, fragmented innovation support system and public interventions at national and sub-national level. Consequently, the Section concludes with a couple of policy proposals aimed at creating the conditions for an easier access of SMEs in general and a wider policy of trans-national support favouring SMEs in particular thus enlarging the level of coordination of Europe's business R&D fabric.

3.1 WHY EUROPEAN COOPERATION IN R&D AND SMEs?

Trans-national R&D cooperation is well rooted in both European Communities/Union and Inter-Governmental Treaties at the basis of long-standing and well established programmes, organisations and support schemes in place in Europe. While governance and management of the two families of policy interventions (community and inter-governmental) are quite different, the logic behind both is that of European cooperation in R&D. Also, notions such as “big science” and “critical mass” dating back to the mid-20th century, played a role, as it was felt that no single European State alone would be able to successfully rival the formidable scientific and technological achievements of the US (Servan-Schreiber, 1967).

In facing challenges and opportunities made possible by technological change in new fields at the time like aeronautics and space or high-energy physics, just to mention some cases, specialised Research Agencies, Organisations and Infrastructures were created in Europe in the late 50s and early 60s. With a prevalent “faith in science” as the major tool for technology breakthroughs (Bush, 1946), the role of industry was seen to be that of “exploiting” the later outcomes and results of research conducted in big laboratories funded and operated collectively by States (or Federations of States) that would, at most, partner with few “natural” monopolistic firms able to conduct significant intramural research⁴.

In the early the 70s, the paradigm started to shift from science policy to technology policy (see Figure 2 below) as opening market economies and increasing worldwide competition required “key technologies” for the long-term profitability of business. On the other hand, parallel to first privatisation moves, governments needed to secure conditions for cutting-edge

⁴ A non-academic but illustrative description of the evolution of the R&D landscape in the US during the second half of the 20th century can be found in The Economist May 1st, 2007: “The rise and fall of Corporate R&D. Out of the dusty labs: Technology firms have left the big corporate R&D laboratory behind, shifting the emphasis from research to development. Does it matter?” <http://www.economist.com/node/8769863>

technologies be made available to larger population of firms and value chains: the age of “industrial R&D” started to flourish. Subsequently, a wider notion of innovation policy (Lundvall and Borrás, 2005) gained sufficient momentum, backed by evidence about its interactive, non-linear nature captured in systems theories (Freedman, 1995, Nelson, 1993, Lundvall, 1992) and increasing awareness that innovation needed more than ‘just R&D’ to actually occur.

Historically, as the first European Treaties did not include strong references to cross-border cooperation in R&D (apart from earliest actions in the European Coal and Steel Community following the 1951 Treaty of Paris). But in March 1965 the Short-term Economic Policy Committee (*‘Comité de politique économique à moyen terme’*) established a Working Party on Scientific and Technical Research Policy (*‘Politique de la recherche scientifique et technique’* – PREST). Thereafter in the early 70s, a standing Committee was created to advice the European Council and the Commission: CREST or *‘Comité de la Recherche Européen Scientifique e Technique’* in French (re-named ERAC in 2010 or European Research Area Committee).

Also since 1971, an inter-governmental framework was put in place to promote coordination of nationally-funded research projects, information and mobility named COST (Cooperation of Science and Technology). Thereafter, Viscount Davignon (then Commissioner responsible for the internal market and industrial affairs from 1977 to 1981) fostered the first elements of what emerged later in the 80s as the ‘Framework Programme for Research and Technology Development’ (FP), merging the few pre-existing thematic programs and focussing on wider strategic areas of science and technology for the competitiveness of Europe (Georghiou, 2001). The actual design of the FP followed consultations with stakeholders and centrally funded through EU pluri-annual budget implemented by the European Commission (and Executive Agencies), via open calls that end up in selecting and co-funding projects.

Parallel to the building-up of the FP and encouraged by the success of early mission-oriented Agencies (like ESA) and research Infrastructures (like CERN) governed by States, in the mid-80’s French and German leaders François Mitterrand and Helmut Kohl agreed on an inter-governmental scheme for bottom-up, market-oriented, industry-led cooperative projects in R&D proposed and managed by industrial firms themselves: EUREKA was thus born in 1986 with the so-called ‘Hannover Declaration’. Initially conceived by France as a “networked programme” with a central budget (like ESA and CERN), Germany turned it into a “labelled programme” financed on a project-by-project basis. The scheme was presented as a more agile means to position European industry in the fast-growing fields of information technologies and microelectronics where not only the US but also Japan were clearly leading the field.

Figure 2: Key drivers in the evolution of public policy in R&D. Source: G.León.

Since then, both schemes (FP and EUREKA) coexist notwithstanding their very different principles and approaches in supporting European R&D collaborative projects; while the competitiveness of European industry is the primary goal for both, certainly for EUREKA and at least also in principle for the FP, though FP has adopted other goals, particularly in more recent editions. And as the focus of our interest concern European-sponsored industry-oriented trans-national partnerships in general, and the role of SMEs in particular, we will concentrate in FP and EUREKA. This is also justified by the fact that access to other European Agencies, Research Infrastructures and Programmes, while enjoying favourable conditions for SMEs, do not require a priori that SMEs apply in trans-national partnerships or consortia (see Table I below).

Budget and management	Trans-national consortia	
	1. Mandatory	2. Possible
1. Centralised	FP (excluding ERC Proof-of-Concept)	ESA (and ERC Proof-of-Concept)
2. Decentralised	Eureka	National, SF

Table I: European R&D programmes relevant to firms and SMEs: budgets/management vs. consortia/project geometry requirement. Source: own elaboration

Concerning institutional coordination between both “worlds” (EUREKA and FP), in spite of some concrete, but somehow anecdotal coordination initiatives such as a cooperation agreements set-up between the EUREKA network and DG Enterprise of the European Commission regarding IRC (‘Information Relay Centres’, now part of the ‘European Enterprise Network’ promoting cross-border technology transfers), only since the EUREKA Ministerial Conference of Paris in June 2004, concrete attempts were made to exploit the respective strengths and complementarities of the FP and EUREKA.

At the governance level, although the European Commission is formally a member of the EUREKA network since the very beginning of this initiative, thereby representing ‘the European Communities’ (the entity that had legal personality for what concerns the European Union until the Lisbon Treaty) the opportunity to move from dialogue into action emerged in the context of a new FP goal: creating and structuring a “European Research Area” (ERA). This concept, launched in 2000 called for the Commission to adopt another role, that of a facilitator, on top of its traditional implementing role for its own programme, the FP.

The ERA vision was first launched by Commissioner Busquin as an open space for European research, cutting across borders and able to secure what was referred to as “the fifth freedom” (i.e. the circulation of knowledge across Europe) thereby making the FP not just an R&D programme of projects, but increasingly also an instrument of public policy fostering

coordination of national and inter-governmental programmes. That is the case of the COST scheme⁵ which, though inter-governmental in nature (like EUREKA⁶), is now basically funded by the EC and its running managed by a specific legal entity called the ‘COST Association’.

During its 7th edition, the most important tool for European R&D cooperation across Europe, the EU Framework Programme – principally managed by the DG Research of the European Commission – run in parallel with the “Competitiveness and Innovation Programme” (CIP) – managed by DG Enterprise. CIP saw just one edition, resulting also from merging previously existing EU programmes for eco-innovation, adoption of information technologies by firms and easier access to finance for SMEs. CIP was later on integrated in the EU programme for the “Competitiveness of Small and Medium-sized Enterprises” (COSME) launched in 2014. Also with Horizon 2020, a new ‘SME instrument’ has been introduced.

It is important to stress that already with the 6th and particularly with the 7th edition, the FP entered a phase of significant policy experimentation, launching a significant number of new and different policy coordination and project cooperation instruments. Two of them affect EUREKA, notably new large R&D public-private partnerships (the so-called ‘Joint Technology Initiatives’, whereby two of them built-upon EUREKA Clusters on information technologies, which has traditionally been a focus for EUREKA) and cooperative projects led by research-intensive SMEs with high-growth potential: the EuroStars initiative, with co-funding support being institutionalised by interested EUREKA States and the EC itself via the FP.

Although such developments are important pilots for policy, their relative weight against the overall public expenditure in industrial R&D in Europe is modest (see Figure 7 later one). Consequently, realising the vision of a true ERA able to provide ‘seamless support’ to cross-border R&D partnerships, remains to be seen, thus matching the competitive needs of business in general and SMEs in particular as we will see later. On the other hand, articulating synergies and complementarities among European regions and countries are needed to reduce unnecessary duplications. To that aim, we analyse current policy instruments at European level

⁵ <https://www.cost.eu>

⁶ <https://www.eurekanetwork.org>

in order formulate policy recommendations, first within the established paradigm, namely, that of fostering European R&D collaborative projects mentioned above.

For our analysis, we differentiate categories of SMEs, in particular, research-performing SMEs and research-outsourcing SMEs. However, SMEs might participate in European R&D projects not only to develop or outsource technologies but also to use, learn or exploit the knowledge associated to the conduct of R&D collaborative projects involving other players, be them customers, suppliers, competitors or Universities, Research Institutes or Technology Centres. Additionally, SMEs can also provide ideas for future projects, thanks to their closeness to markets, flexibility and rapid response (Narula, 2001).

3.1.1 Scope and objectives of this Section

SMEs are the largest community of business firms in Europe and a key driver for economic growth and job creation. However, the R&D expenditure gap between the EU and the USA is also about business and SMEs: US small firms invest on average 4 to 6 times more in R&D than European small firms, are more successful in translating R&D results into innovation and proportionately more of them become successful global market players ([Veugelers and Cincera, 2010](#)). More policy attention for SMEs with high growth potential in Europe is therefore required as reported by the HicroSME project, a specific support action sponsored by the former 6th FP⁷.

Also, the critical importance of SMEs is being highlighted by empirical evidence gathered since 1992 by the European Observatory of SMEs sponsored by DG Enterprise. Special reports of the said Observatory already in 2003 / No. 4 and No. 5 concentrated⁸ precisely on cooperation and internationalisation involving SMEs, which are both basic components of long-standing

⁷ <http://www.higrosme.org/public> including materials from the Madrid 2006 Conference.

⁸ http://ec.europa.eu/enterprise/library/lib-entrepreneurship/series_observatory.htm

European trans-national R&D policies which are basically in place still today
:http://ec.europa.eu/invest-in-research/pdf/download_en/omc_and_smes_and_research.pdf)

“... Access to know-how and technology is a frequent motive for going abroad. As many as 38 % of the SMEs with subsidiaries abroad do not have any exports. The creation of subsidiaries abroad is thus not merely a question of getting a sales platform. Moreover, 48 % of exporting SMEs export at least partly, in order to acquire knowledge. Export activity may thus imply co-operation with buyers on product development or technologies. The decision to go international is therefore an important means of gaining know-how and insight into useful technologies...

... Internationalisation, and especially co-operation, increases competitiveness. The survey along with national studies support the theory that internationalisation has a positive impact on competitiveness. However, co-operation as an activity is perceived by the SMEs to have an even greater positive effect on competitiveness than internationalisation. This finding strongly underlines the fact that internationalisation has to be viewed in a very broad perspective including not only trading but also international collaborative activities...

... Half of the European SMEs co-operate with other SMEs... The most frequent motives for SME co-operation is access to new and larger markets, broader supply of products, access to know-how and technology, additional production capacity and reduced costs... Policy makers mostly regard SME co-operation as an instrument to reach other objectives such as innovation, research and development, internationalisation, etc. Therefore, most policies identified do not directly address the barriers to co-operation... Measures directed towards improving information on potential partners could build on current EU programmes for business-to business meeting places, supplemented by national programmes...

... The rationale for SME co-operation is specific to individual enterprises and the current context in which they operate. It is therefore difficult to use the reasons to co-operate indicated by enterprises as criteria for targeting policy measures. It is probably more efficient for public authorities to address removal of hindrances and barriers to co-operation (e.g. lack of information on suitable partners and fear to lose independence) in order to stimulate SME co-operation.”

Consequently, considering the weight of SMEs in the European economy, in line with the EU's Lisbon and Europe 2020 Strategies' focus on growth and jobs, I will first examine existing instruments relevant to SMEs that foster European R&D cooperation as well as policy rationale favouring the participation of SMEs in existing European R&D programmes. This examination would lead to a set of policy proposals aimed at creating a more favourable architecture thus allowing an easier access and more pervasive trans-national support to SMEs in Europe, including new funding sources made available to disadvantaged member States like Structural Funds that could be mobilised to help them converge.

On the other hand, moving away from the currently large array of public support available for R&D through national programmes to a more visible "concertation" of such efforts at EU level should not deprive SMEs to participate in publicly sponsored R&D at EU level. Quite the opposite, the thesis of this first Section is that a wider involvement of SMEs in European trans-national R&D cooperative projects at European level is key, particularly for new firms as well as for Europe overall.

Our arguments build-upon CREST Expert Group report on "SMEs and research" of 2004 namely: "*Think small enterprise first*" to enable easier access and to avoid over-burdening SMEs"⁹. This might be seen as challenging established dogmas or policy rational for Community criteria" in particular, named after the German Minister (Georghiou, 2001):

"In essence, these [criteria] argued that support should come where the scale and cost of co-operation was beyond that affordable by a single country, where complementarity in national work could achieve results for the whole Community, and where research contributes to development of the common market, laws and standards, or to the unification of European science and technology.

In 1987, "cohesion", meaning reduction of regional (or national) disparities in the Community, was added to the initial criteria. These criteria formed the basis for the principle of subsidiarity and, at least in principle, mark the delineation between national and the Community level policy"

⁹ http://ec.europa.eu/invest-in-research/pdf/download_en/omc_and_smes_and_research.pdf

Consequently, in the first Chapter of Section I, I spell out the objectives of the work and the conceptual tools to be used in developing policy recommendations, which will serve to frame the rest of the Section. This first Section exploits available reports and data in order to:

1. Develop a comparative analysis of existing cooperative R&D support policies, programmes and instruments in Europe that are aimed at fostering trans-national inter-firm technology collaboration involving SMEs.
2. Characterise SMEs, their needs and potential of R&D cooperation at European level to serve them, thereby identifying existing difficulties.
3. Formulate proposals able to resolve some of those difficulties and barriers.

Figure 3: Scope of the dissertation and potential future research. Source: G.León

3.1.2 Research questions and methodology

Consequently, the scope of the first Section of this dissertation covers a set of complementary research questions, with potential theoretical and practical implications for policy:

- What is the rationale for European policies to foster collaboration in R&D in general and SMEs' participation therein in particular?
- Vice versa, what is the added value for business firms in general and SMEs in particular to take part in European R&D collaborative projects?
- How could EU-sponsored variable geometry projects be best organised with inter-governmental schemes in order to provide an easier access to SMEs?
- What use could be made of EU cohesion funds in fostering more collaborative R&D that benefit firms and SMEs while avoiding the risk of further fragmentation?

This Section is structured in four Chapters, which are all based on available theoretical evidence, thereby preparing for subsequent Sections of the dissertation:

- Chapter 2 reviews existing literature regarding explanatory concepts like Open Innovation, Internationalisation of R&D, Strategic Technology Partnering, etc. in order to derive a strong rationale for trans-national R&D and European policy intervention relevant to SMEs.
- Chapter 3 analyses established European instruments supporting inter-firm technology cooperation in R&D involving SMEs. Use will be made of available information and relevant reports available from the Framework Programmes, Eureka, ESA, etc.
- In Chapters 4 and 5, a series of policy recommendations are formulated to be thereafter developed within the boundaries of the established European paradigm.

All in all, this Section is a descriptive but critical analysis on SMEs' participation in existing European R&D cooperation programmes. A methodology is presented in ANNEX I.1 as an inspiration for future research in this area regarding profiles and motives for SMEs involvement at EU level.

3.1.3 Conference engagements and publications

As already indicated, this Section serves to frame the rest of the dissertation by combining the following two perspectives, which provide also the basis for subsequent Chapters:

- From the viewpoint of public policies supporting SMEs in cross-border R&D projects: comparing current European policies in order to identify a systemic approach able to resolve some of the problems identified so far, particularly, for what concerns SMEs with high growth potential, their contextual needs accessing global market, knowledge, etc.

- From the viewpoint of innovation management in European business firms in general and Spanish firms in particular, in order to derive sectorial profiles of participating SMEs, composition of the consortia, drivers of consortia formations, benefits, etc.

The papers produced and presented so far to academic Conferences, Seminars and Workshops resulting from this work are summarised hereafter:

- A paper on European R&D cooperation policies and SMEs presented Annual Conference of the “International Society of Professional Innovation Managers” (ISPIM – in www.ispim.org) in Warsaw, Poland, June 2007: Leceta, J.M. and Leon, G. (2007) *‘Intergovernmental R&D Organisations and Networks in Europe and their potential for ERA: some lessons from Eureka and the European Space Agency’*. See http://www.ispim.org/members/proceedings/ISPIM2007/files/Leceta_Jose_Paper_1.pdf

- A poster on the management of trans-national R&D projects involving SMEs using the methodology presented in ANNEX I.1, prepared for the PhD Conference that took place in Budapest in June 2007 organised by the PRIME Network of Excellence (see www.prime-noe.net) and thereafter the PRIME Winter School in Rome in November 2007, for which it was selected.

Both contributions were presented for feedback and discussion at the European Summer School organised by the Bocconi University in Italy in early September 2008 (see <http://www.unibocconi.it/index.php?frnav=@62,257>) and a special panel of the PRIME NoE in Mexico organised in late September 2008 with Prof. Laredo, Kulhmann, Malkin and Borrás (see http://prime_mexico2008.xoc.uam.mx/index-2.html).

In addition, two more papers inspired by the above research were presented to subsequent Conferences of the ISPIM network reaching out beyond Europe, where the rational of Eureka as a 'network of networks' was extrapolated to the Latin-American region and its model extended to bilateral programs effectively established by the national innovation agency of Spain (CDTI or 'Center for the Development of Industrial Technology') with counterpart agencies in other countries, from Asia in particular.

- Extending the reflection to the Latin-American region: Leceta, J.M., González, L. and Serrano J.A. (2009): 'Comparative dynamics of inter-firm technology partnering in Europe and Latin-America: a Spanish perspective on Technology Platforms', New York, US. See http://www.ispim.org/members/proceedings/NewYork09/commonfiles/files/20726387_Paper.pdf

- And cooperation with third countries: Leceta, J.M., Martínez, A. and Martín, I. (2008): "Beyond Europe and Latin-America: the Spanish Innovation Agency's cooperation experience and technology programmes with China, India and Korea", Singapore. See <http://www.ispim.org/members/proceedings/Singapore08/commonfiles/files/9152497Paper.doc>

3.2 INCREASING RELEVANCE OF INTERNATIONAL R&D COOPERATION FOR THE BUSINESS. EXPLANATORY CONCEPTS AND EVIDENCE

“International R&D” collaboration results from an interplay of a very wide set of driving factors within a more complex phenomenon, that of the “internationalisation of R&D” which has attracted the attention of academia, business leaders and policy makers alike from many different and complementary angles. Interestingly, both internationalisation of R&D and international cooperation in R&D, were first seen as contradicting somehow traditional views of business firms according to which, industrial R&D was too sensitive to be decentralised far away from the HQ of the firm and, more widely, to be shared with other players (Archibugi and Michie, 1995).

But, as for many other business activities, globalisation is changing the way firms operate, compete and innovate, both at home and abroad (OECD 2008 b); vice versa, technology advancements and innovations are also allowing new forms of business relations world-wide (Narula 2003) stresses the mutual interdependence of nations and firms. Factors driving internationalisation of R&D and international collaboration in R&D are political and economic on the one hand, and technological and social on the other hand:

- Among political and economic factors are the opening-up of non-domestic markets as well as the adoption of common patterns and regulations for international trade, foreign direct investment and use of IPR.
- Parallel to that, technological progress makes new forms of communication and transportation possible resulting in wide-spread diffusion of innovations, consumer patterns and new demands of economic and social progress.

Governmental attention and support to industrial policy and international trade entered a new age with the advent of globalisation since the early 70's and, in Europe, accelerated certainly with the Single Market since the late 80's. Interestingly, widespread policies fostering international R&D collaboration appears precisely in that same period onwards which has links with both policy domains.

A new geography of S&T is emerging : “Open Innovation in Global Networks” (OECD)

Figure 4: Factors and drivers of international R&D cooperation. Source: Narula (2003) and own elaboration

For the purposes of this Section, as illustrated in Figure 4 above, international R&D collaboration can be studied as the interaction between the drivers of the internationalisation of R&D by the firm and its motivations when collaborating with other entities to jointly undertake R&D:

- On the one hand, among the key drivers of internationalisation of R&D (i.e. firms investing and performing R&D elsewhere than their country or origin) according to the literature (Cantwell and Molero, 2003), one can point the following: 1) proximity to local markets' needs (which explains the so-called 'Home-Base Exploiting' or 'Market Seeking Strategies'), 2) access to new sources of knowledge (explaining so-called 'Home-Base Augmenting' or 'Assets Seeking Strategies') and 3) an alternative way to markets for cross-border knowledge transfers.

- Cooperation in R&D, be it national or trans-national, is driven according to (Heijs and Buesa 2007) by: 1) shared costs and risks as innovations become increasingly expensive and uncertain; 2) search of complementarities as products are more and more complex, making

difficult for a company to manage all the necessary expertise and competence; 3) learning opportunity from others to the benefit of the firms' innovation capacities, according to the absorptive capacity theory (Cohen and Levinthal, 1990); and 4) spill-over internationalisation among project partners.

3.2.1. Internationalisation of R&D and the growth of Strategic Technology Partnering

In order to tackle a complex phenomenon such as the Internationalisation of R&D, (Archibugi and Michie, 1995) elaborated a very well established, widely and useful seminal "taxonomy", including three different components, categories or levels, namely:

- the global exploitation of technology;
- the global technological collaboration; and
- the global generation of technology (by MNE).

The global exploitation of technology allows profit-seeking organisations to increase their turnover by trading products with embodied technologies (exporting them to foreign customers) or to disembodied technologies (licence of patents to partners) in international markets. Empirical evidence of this first category can be found in the growing importance of high-tech products in worldwide trade as well as the increasing relevance of domestic patents that are being extended to foreign countries by firms.

The global technology collaboration covers two distinctive communities, business and academia, which can partner within or across them. Public researchers are more prone to collaborate and share knowledge. Academia has long been international, something further facilitated by the mobility of researchers in recent decades. Increasing number of co-authored scientific papers from different countries demonstrate the relevance of this phenomenon.

Collaboration between business firms was first considered heterodox by economists (Cantwell and Molero, 2003) as it was supposed to be part of the central corporate functions that firms would not willingly share. However, as countries have progressively achieving different strengths and the speed of technical change has accelerated, requiring firms to master multiple technologies that no single company can master location (Chesborough, 2003 and 2006), national (home) firms find it increasingly interesting to share knowledge and undertake

joint R&D with other firms without necessarily creating a new entity or investing in a foreign (host). Actors and economic equivalents are summarised in Table II below.

	Actors	Economic equivalents
a) Global <u>exploitation</u> of technology	Profit-seeking organisations. Uni- and multi-national firms	International trade flows (as opposed to foreign direct investment)
b) Global technological <u>collaboration</u>	b.1) Business sector	International joint-ventures
	b.2) Academic and public research communities	Non-profit cultural exchanges
c) Global <u>generation</u> of technology	Multinational corporations	Foreign direct investment (as opposed to trade flows)

Table II: Archibugi's taxonomy in a nutshell. (Archibugi and Michie, 1995).

In that connection, extensive work by (Hagedoorn, 2001) et al. with the MERIT-CATI database studied the nature and evolution of "Strategic Technology Partnering", meaning formal inter-firm R&D partnerships, both contract-based and joint ventures (equity-based). R&D partnerships are one group of inter-firm relationships in between standard market transactions (trade) and integration through mergers and acquisitions (foreign direct investments). The database includes domestic or international partnerships, but not those supported by public funding.

The evidence gathered during more than 40 years by the said author and associates with the said database MERIT-CATI shows a significant increase in inter-firm R&D partnerships during the 80's and growing importance of contract-based agreements (projects) vs. joint

ventures, particularly, in high-tech and dynamic sectors. This can be explained by a wider application and enforcement of IPR and relevant international legislation, which allow firms to establish more quickly their strategic partnerships in keeping pace with rapid technological change worldwide.

The sector distribution reveals the dominance of information technology, biotechnology and new materials in strategic technology partnering. Also, as increased international competition has led many firms to follow a strategy of internationalisation, one can assume that this experience gradually also opens up the way to non-domestic R&D (Hagedoorn and Narula, 1996).

The global generation of technology is a particular phenomenon of multinationals business firms (MNEs) as they can obviously take advantage of their global presence to manage knowledge across borders within the firm. This means challenges to State-based policy in innovation. However, although the literature is vast, globalised R&D has been confined to a small number of very large firms carrying out research in small number industrialised countries within the Triad (Casson, 1991). This might be changing now with the emergence of countries like China and India as new players in the new atlas of science and innovation, OECD (2008 a).

Although in this work, I will focus on trans-national technology collaborations by the firm in the European context, all three dimensions of the internationalisation of R&D are relevant to SMEs as reported by the European SME Observatory. Concerning the global exploitation of technologies, SMEs need to access foreign markets to sustain their businesses, and this might obviously be more intensive for high-tech SMEs based on small countries. Trigger by technoglobalism forces, also regarding the global generation of technology, SMEs will also invest and establish themselves abroad not just to market or manufacture, but increasingly also to access know how and technology considering their resource limitations (Narula, 2001).

3.2.2. Open innovation and the need to generate and share new knowledge

Collaboration in R&D stresses the importance of innovation and knowledge produced beyond the firm's operational and geographical origins or national borderlines of its home country, including not only institutions (Universities and Research Institutes) but also, customers, suppliers and, to a certain extent, also competitors. Indeed, collaboration with competitors might be particularly relevant to develop and gain worldwide acceptance to new standards.

The above is increasingly evident considering the blurring of national borders and blending of technologies in a globalised world. Taking Spain as an example, scientists and researchers are responsible for a bit more than 3 % of the annual production of knowledge worldwide, while innovations originated in Spain accounts for less than 0,3 % of the overall innovations produced annually in the world (OCDE, 2008 b). Consequently, keeping pace with new developments is a strong motivation to share knowledge: firms might decide on foreign direct investment when technology is easily appropriable, but on partnerships when it is not (Archibugi and Michie, 1995).

The literature explains the growth and openness of the firms to collaborate in R&D alluding to motives that “force” companies such as: 1) the complexity of scientific and technological development, 2) the higher uncertainty surrounding R&D, 3) increasing costs of R&D projects and 4) shortened innovation cycles that favour collaboration. Another complementary perspective is to identify the “determinants”, i.e. factors that will increase their propensity of the firms to collaborate with others in R&D.

What is therefore new in the Open Innovation concept (Chesbrough, 2003 and 2006) compared with the more “traditional” notion of collaboration in R&D or strategic technology partnering?

First the view point that innovation is a dynamic process of organisational change in business firm, therefore, beyond its own technology and R&D capabilities. Companies adopting Open Innovation strategies enjoy at least three sources of benefits:

- reduction in costs (crowdsourcing), compared to the closed innovation model;
- acceleration of innovation, facilitating them to remain up to date concerning new information and knowledge produced by the overall innovation ecosystem,
- enlargement of the creativity, as the firm accesses a larger source of knowledge from the outside, the collective process of generation of ideas is more diverse and richer generating more and different services, processes and products.

Secondly, Open Innovation emphasises a wider portfolio of exchanges beyond the traditional scope of inter-firm collaborations in R&D, including technologies developed elsewhere but procured by the firm, as well as R&D produced by the firm which is outside the firm’s current market but can generate additional income through licensing – see Figure 5 below.

Figure 5: Comparing closed and open innovation models. Source: Chesbrough, H. (2006).

The Open Innovation extends beyond collaboration in R&D for the firm's current market, to consider also products that can generate new markets for the firm as well as products that can generate income through other firms operating in other markets. All income and cost factors in the closed and open models are illustrated in Figure 5 above.

(OECD 2008 b) has processed a number of case studies to assess the importance of Open Innovation for the internationalisation and innovativeness firms. The sample includes insights from 50 companies across 12 countries, including manufacturing and services, high and low tech as well as MNEs and SMEs. The report stresses evidence that Open Innovation in Global Networks is indeed relevant also for SMEs:

"The internationalisation of the innovation process requires important investments and resources that smaller companies typically do not possess. Previous research has largely indicated that the most valuable knowledge is hard to codify and knowledge transfer is typically very sticky, hence often requiring the establishment of R&D-subsidiaries abroad. SMEs may be

constrained by the high and increasing costs of searching and negotiation because of their weaker and smaller international networks.

Open innovation however could be an important answer to the challenge of globalisation (of innovation) especially for this category of smaller companies. Open innovation (especially the inbound side, i.e. the sourcing of knowledge and technology) may form a less costly alternative to local R&D facilities in order to get quick access to local centres of knowledge across in the world.

Open innovation may speed up the internationalisation of innovation in smaller (high tech) companies without having to incur the investments of setting up full-scale R&D facilities locally. Especially new “infrastructure” like innovation intermediaries (some of them government-sponsored) may help SMEs to develop and integrate in global innovation networks.”

3.2.3. Rationales for public intervention in R&D in general and at the supranational level, in particular

Having described the trends in both the Internationalisation of (business) R&D and the increasing Opening-up of the traditional borders and modes of innovation for the firms, and before entering into the analysis of the European public policies and instruments promoting R&D we should ask ourselves the question about the rationales for both public intervention in general, as well as at supranational (European level) in particular.

General rationales for public intervention and policies in promoting R&D include “market failure” arguments and of “system failure” arguments developed respectively by the Neoclassical and Evolutionary schools of Economics of Innovation – see Table III below.

According to the Neoclassical school, governments must (re-)establish perfectly competitive markets for knowledge production. Knowledge is defined as “codified” technical information whose generation requires high levels of investments and involves many risks and uncertainties, while markets either do not exist or do not function properly. Rationales for government intervention are thus linked to ‘appropriability problems’ (“public good” nature knowledge), indivisibilities in the production of knowledge and (asymmetric) information failures.

School	Neoclassical	Evolutionists
Key rational for public intervention in R&D	Market failure	System failure
Explanatory concepts	<ul style="list-style-type: none"> - Knowledge=codified information - Aggregation effects (large infrastructures) - Additionality of public support - Up-stream level (global effects) - Economies of scale 	<ul style="list-style-type: none"> - Knowledge is also tacit - Network effects (learning in joint projects) - Connectivity - Down-stream (local effects) - Economies of scope

Table III: Neoclassical and Evolutionists' rationales. Source: Falk, R. et al (2007) and own elaboration.

The innovation systems approach championed by Evolutionary seminal scholars like (Freedman, 1995; Nelson, 1993; Lundvall, 1992) explains technological progress within a constant interplay and mutual learning among actors. Interactions take place between firms, government institutions, universities and other players in the innovation ecosystem. Mismatches, locked-in or 'inertia' between the elements in an innovation system are called "system failures". These are related to missing bridges between organisations or related to dysfunctional institutions and provide further rationales for public intervention.

Surprisingly, while there is very extensive literature on the rationales for public intervention in R&D, not that much is known on rationales for a supranational R&D policy (Falk et al, 2007). However, most arguments are centred on: 1) cost/scale justifying collective action by governments through international set ups and 2) trans-national spill-overs emerging from R&D collaboration undertaken by actors from different geographies.

Table IV below further elaborates these basic arguments as seen by both schools of the Economics of Innovation. Like in social sciences, the arguments of both schools of thoughts represent complementary perspectives, though with different levels: the Neoclassical focuses on the microeconomic (firm) level and the Evolutionary focuses also on the overall (system) level, taking regions and nations as the unit of analysis for policy intervention.

Attitude of public stakeholders	Neoclassical	Evolutionists
-Proactive (collective response to common challenges)	- Economies of scale	- Global public goods
- Reactive (due to the specific nature of knowledge)	- Trans-national spill-overs	- Trans-national policy learning

Table IV: Arguments for public intervention at supranational (European) level. Source: own elaboration

Consequently, in Europe one also needs to discuss the level at which policy intervention ought to take place: from an extreme whereby EU institutions would simply play a facilitating role in fostering “policy learning” by nations and regions, to the other extreme, whereby EU institutions would exert also implementing functions at project or “instrument level” –see (Kuhlmann and Edler, 2003) for an informed discussion-. More importantly, (OECD, 2008 b) offers evidence of both trends and needs of firms in general and SMEs in particular when they collaborate:

“The data from the 4th Community Innovation Survey (CIS-4) shows that collaboration is an important part of the innovation activities of many companies: around one in ten of all companies (or one in four innovating companies) in Europe collaborated with a partner for their innovation activities during 2002-04.

Large companies were four times more likely to collaborate in innovation than small and medium-sized enterprises (SMEs). Among SMEs, the rate of collaboration is fairly similar across

countries (between 10 and 20% of all firms in more than half of the countries surveyed), but it varies widely for large companies. Nevertheless, it should be kept in mind that the data only reveal the existence of some sort of collaboration, not its type or intensity...”

In line with other empirical evidence (Hagedoorn, 2002), the choice of innovation partners seems to privilege those that are geographically close. Despite highly improved communication possibilities, collaboration with external partners requires extra investments and resources especially on an international level. This directly also explains why SMEs which have typically less resources, display in average a lower intensity of collaborating with external parties, overall and internationally. Knowledge is often tacit and person-embodied and this explains why language and distance are barriers to collaboration.

In responding to the challenges and opportunities offered by open innovation in global networks, action may be needed at both extremes indicated above in Europe (policy learning and project implementation). Also, concrete actions are needed to help Europeanize existing national and regional R&D programmes, as highlighted by the Lisbon Expert Group (León et al, 2008) that found that *“the intra-European perspective is more and exceptional case than the common approach”* as, notwithstanding policy experimentation, the European Commission acknowledges that the relative shares of R&D funded at EU and national levels remain stable.

I will come back to this when drawing-up policy recommendations in Chapters 4 and 5, not only for the agenda of European institutions, but also for nations and regions to adopt new “bottom-up policy initiatives within their respective programmes involving SMES. Such a move would contribute to the building-up of ERA by strengthening the European dimension of, today, domestic programmes available. Before that, in Chapter 3 I would describe the present “status quo” of European trans-national R&D collaboration policies and programmes relevant to SMEs.

3.3 EXISTING EUROPEAN POLICY INSTRUMENTS FOSTERING TRANS-NATIONAL, INTER-FIRM R&D COLLABORATIONS. OPTIONS FOR SMEs

In the previous Chapter I have discussed inter-firm collaborations in R&D, first as a self-standing phenomenon in the search for complementarities with potential partners abroad, be it to access knowledge and/or markets beyond the country of origin of the firm. Regarding policy, we have also assessed the rationales for public intervention in R&D at national and supranational levels in Europe.

In this Chapter I will further focus on the specificities of the European approach to R&D at supranational and intergovernmental levels. Up until recently, European R&D policy has been characterised by collaborative research projects (FP and Eureka) or infrastructures under community or inter-governmental control for big science (JRC, ESA, CERN, etc.). This is now changing in the perspective of a 'European Research Area', which should also motivate business, should the rationale for European programmes remain that of fostering the competitiveness of European industry.

The design of the Framework Programme in the 80's was inspired in similar policies for collaborative R&D projects in the US and, particularly, in Japan considering its impressive success at the time (Georghiou, 2001). The situation remained somehow stable in Europe with the first five editions of the FP, although FP5, had more emphasis in applied R&D than previous editions which had strictly been centred on "precompetitive" R&D. Concerning SMEs, an FP7 inter-service "Task Force" was set up to assess the SME participation rates across themes as well as to provide regular overviews of the various actions fostering SME participation (EC, 2008). With Horizon 2020 (the 8th FP), the emphasis on innovation has grown and thus also the array of policies and experimental programmes to involve businesses.

3.3.1 Europe and ERA: from Cooperation to Coordination; from Coexistence to "Concertation"

Back in 2000 with the Lisbon Strategy, the then Research Commissioner Busquin proposed to use part of FP 6 to help structure a "European Research Area". A significant shift took place as the FP was able to provide support, not only trans-national collaborative projects, but also programme coordination at European level. In other words, the FP ambition (now Horizon 2020) to become also an instrument of policy alignment and 'concertation', realising the competences that the Commission had gained since the Maastricht Treaty in 1992, namely the ability to take initiatives to ensure coordination between Member States' and respective Community activities.

Consequently, CREST (renamed "European Research Area Committee" or ERAC since 2010) was turn-out into an advisory body of the European Council and the Commission, with the idea of fostering cooperation between national and European programmes and policies through the so-called "Open Method of Coordination", fostering exchange of information, identification of good practices, benchmarking of policies, mutual learning, etc.

At the end of the 6th FP, a number of new instruments were introduced to support networks of programmes managed by national and regional Agencies or authorities: among them ERANETs, whereby the Commission provides support to the coordination, not the funding of programmes nor projects, with the requirement that national or regional authorities would organise joint-calls for proposals or even “common pots” for the funding of selected applicants.

With the 7th FP, the structure of the previous FP 6 was basically maintained incorporating some additional new instruments. Most notable developments concerned the ERC (European Research Council) ¹⁰ – where participation from individual research groups or individuals became eligible, contrary to the usual practice in FP which required trans-national consortia - and the JTIs (Joint Technology Initiatives) – where the management is entrusted to EU new executive Agencies. In policy terms, that means incorporating a ‘frontier research’ component into the FP (previously non-existent), and closer links with ‘leading industries’ to achieve market impacts (in spite of the “established” discourse of pre-competitive support only through the FP). In 2008, the European Institute of Innovation and Technology (EIT) ¹¹ was agreed to ‘integrate the knowledge triangle’ thereby approaching innovation fundamentally different with a focus on people a learning by doing examine in Section II.

Also, already with the Financial Perspectives for the period 2007-2013 and more even with the new Financial Perspectives for the period 2014-2020, increasing requirements have been introduced for Member States to consider targeting also Structural Funds (SF) for R&D and innovation, but not necessarily trans-national cooperation which is not practiced that much once in the SF operational programmes. These new possibilities offered create both challenges and opportunities for policy makers in devising the most appropriate policy mix and sensible division of labour for the future ERA: opportunities to coordinate new investments but also challenges to avoid undue duplications.

In 2007, the Commission revitalised the interest in the building-up of ERA through the publication of a “Green Paper”, followed by a wide consultation on the basis of which a set of

¹⁰ <https://erc.europa.eu>

¹¹ <https://eit.europa.eu>

five initiatives were proposed for “partnership” between the Commission and Member States, forming the so-called “Ljubljana Process” launched in mid-2008. The target was initially set for 2014 to fully realise the ERA, although progress appears modest still today and the ERA vision remains to be fully realised.

All in all, the evolution described above means a significant shift in the EU approach and institutional role in R&D and innovation: from support granted to topical, rather ‘top-down’ cooperation (in projects) to ‘bottom-up’ coordination (of policies). The challenge ahead concerns how to build paths from today’s co-existence of national, intergovernmental and Community programmes to future concerted actions within a more integrated, coherent and effective system overall for participants (see Figure 6).

Figure 6: Current architecture of publicly-sponsored collaborative R&D fabric in Europe.
Source: G.León, PhD courses.

The above is particularly important for SMES considering their limited resources and knowledge about potential partnerships. In that connection, although a thorough, econometric evaluation of the participation, profile and determinants of SMES in the programmes above is outside the scope of this work, a methodology is presented in ANNEX I.1 for FP and Eureka in particular taking into account different modes of generation of knowledge per sectors, the type of collaboration (vertical, horizontal, etc.) and the firm international partnership strategy (home-base augmenting vs. home-base exploiting).

On the other hand, Research Infrastructures and Networks like CERN or COST will not be discussed, as their primary goal is to promote cooperation among States for scientific progress. Obviously, this does not exclude their capacity to leverage business interests, certainly via public procurements of Infrastructures where industrial firms' may be both enablers and 'by products', though such contributions are instrumental for science. This is probably more evident with mission R&D through European Agencies like ESA or, more recently with the Lisbon Treaty, EDA (European Defense Agency) which include as part of their mission also the promotion and development of European industry as an induced objective. As EDA, was created only recently, I will use ESA as an example to illustrate the role and place of SMEs in the conduct of procurements and technology developments of these kind within mission-oriented Agencies.

3.3.2. Publicly-sponsored Research Joint Ventures in Europe

As our focus concerns European R&D trans-national collaborative projects involving firms (SMEs in particular) that are promoted either by EU institutions or collectively by national Governments in stimulating Strategic Technology Alliances (non-equity based in particular), I will refer to so-called Research Joint Ventures (RJVs) as defined and studied in detail for Europe by (Caloghirou, Vonortas and Ioannides, 2004 – Chapter 1 – Introduction, pg. 1 to 12 reflecting the paradigm at the time for the FP to finance more applied research). Subsequent European instruments are in this logic including 'Public-Private Partnerships' (PPP) and 'Joint Technology Initiatives' (JTIs) which have gained increased space in the EU portfolio of instruments in an effort to motivate business firms to participate and contribute:

"RJVs are defined as (temporary) organizations controlled by at least two participating entities, whose primary purpose is to engage in cooperative R&D. Equity investments may or may not be an issue and usually it is not. Most of the examined RJVs are essentially contract-based agreements between independent entities. Member entities may include firms, universities and other government organizations.

The study only dealt with RJVs involving at least one participant from the private sector. When more than one firm is involved, both horizontal RJVs (between competitors) and non-horizontal RJVs –vertical (upstream downstream) and conglomerate (other combinations not vertically related) – were included.

While this definition is broad enough to include both government–subsidized and private, non-subsidized cooperative R&D agreements, in practice our data sets include RJVs subsidized by government funds, at least in part”.

In this Chapter I thus review existing policy instruments in Europe fostering R&D collaborations open to SMEs participation, thereby setting-up the basis for policy recommendations able to widen the current perimeter of coordinated R&D efforts in Europe which we will discuss later on in Chapters 4 and 5. In framing our analysis, it is useful to classify existing instruments in categories. This is done by (Caloghirou, Vonortas and Ioannides, 2004) distinguishing governance principles and funding sources of European programmes which dictate the nature of R&D collaborations sponsored (i.e. more or less close to market) as well as the management of projects (i.e. centralised or decentralised) as follows:

1. “EU-funded cooperative R&D, primarily of a pre-competitive nature, generated by a top-down procedure, traditionally activated by the Commission, and implemented through the FP. This does not exclude ex ante consultations with stakeholders which, in the case of PPPs may be rather complex and for what concerns JTIs, consultations are outsourced to ad hoc Executive Agencies. Also, the involvement of member States (so called ‘comitology’) for the different ruling Committees regarding Work Programmes.
2. Cooperative R&D for the development of marketable products and services, generated by a bottom-up procedure, selected by EUREKA, and usually subsidized by national governments. Getting the “Eureka label” for a project and granting public funding public funding for its implementation differs between EU countries.
3. Nationally-funded cooperative R&D, generated by a top-down procedure, where part of the subsidies may be EU Structural Funds channelled through national agencies.”

Obviously, the three categories mentioned above reflect historical and institutional developments. Both the EU Framework Programme of Research, Technology Development and Demonstrations (through its seven editions, followed by Horizon 2020) and the Eureka inter-governmental network promoting pan-European close-to-market industry-led projects were both

launched in the mid-80s and continue coexisting in the European R&D landscape. Their relative weight of publicly-funded trans-national R&D vs. total public R&D funding in Europe, however, remains modest as illustrated in Figure 7 till 1995 and remains so as acknowledged frequently by the European Commission.

Figure 7: Historical evolution and relative weight of publicly-funded trans-national R&D vs. total public R&D funding in Europe. Source: Mustar, P. & Esterle, 2006) cited by Deubner, C. (2007). No data is publicly available for the more recent history of the Framework Programme.

The 6th edition of the FP represented roughly 6 % of the overall European R&D public expenditure (Mustar, P. & Esterle, 2006); it has increased during the FP 7 due to the fiscal consolidation in some member States which has affected national public investments in R&D combined with increased resources for R&D in the EU budget. Notwithstanding this trend in H2020, at least in the mid-term, while the contribution of Eureka had stagnated (Deubner, 2007) and projects are funded nationally, one should explore the potential in the third category of

instruments mentioned (Structural Funds) in order to activate further intra-European level partnerships (at project, micro-level) while, at the same time, contributing to widen the current perimeter of coordinated R&D efforts in Europe (at policy, macro-level).

Notwithstanding the modest weight of FP and Eureka sponsored projects and activities, one should consider the wide-spread understanding of the socio-economic significance of knowledge-based associations on the one hand, as well as increasing evidence that Europe is becoming too small within a booming new world of science and technology where many other actors and countries are emerging. This is now a common understanding of both regional and national Governments. The question remains, however, to what extent this common understanding would result in more or less policy coordination.

Once I would described the current panorama of EU-sponsored RJVs and EUREKA that are available to SMEs, I will elaborate on workable options to help coordinate new networks (industry-oriented ERANETs in particular, which is the purpose of Chapter 4) as well as on how to activate latent potential from new EU member States in particular, exploiting cohesion policies in building-up of the 'European Research Area' (ERA), while minimising risks of unnecessary duplication or further policy fragmentation (the purpose of Chapter 5 where I will explore new avenues using also EU Structural Funds).

3.3.3. EU programmes and funding instruments: FP7 and CIP.

In describing policy instruments for SMEs, one can take “ex ante” the participant’s profiles as presented the European Commission former “SME Techweb” which splits SMEs into research “producers” and “demanders” of technology developments – see Figure 8 here below.

We use this categorisation is justified by the fact that FP7 was the context on which the rationale for a European Institute of Innovation and Technology (EIT) was developed, the latter being the scope for the remaining two Sections of this dissertation. On the other hand, Horizon 2020 basically continued the policy experimentation that had been piloted in the later part of FP7 to attract business in general and SMEs in particular. Consequently, reference to FP7 structure is perfectly valid for our purposes notwithstanding the time elapsed since then.

Figure 8: Summary of options available to SMEs in EU-sponsored R&D activities. Source: SME TechWeb in 2008 to which the new ‘SME instrument’ within H2020 should be added.

There are two remarks to the statement above. On the one hand, one should stress that the ‘FP Cooperation’ includes also SMEs as “users” (including firms from traditional sectors) and therefore, the distinction “ex post” is not that clear cut (see ANNEX I.1). In addition, with the H2020 a new ‘SME instrument’ was added to the policy portfolio of interest to ‘research performers’; inspired in the US SBIR/STTR program¹² and implemented by the European

¹² <https://www.sbir.gov>

Commission Executive Agency for SMEs (EASME)¹³. In the later part of Horizon 2020, the ‘SME instrument’ was embedded in the newly created European Innovation Council (EIC) and might likely be significantly expanded with the successor programme Horizon Europe. The rational and interface of EIC with EIT is obviously outside the scope of this dissertation, though I will present some views in view of a future research agenda in the Concluding Section of the whole dissertation.

i.) Research-performing SMEs, i.e. those that have the capability to conduct in-house research can access three funding sources within the FP7:

- COOPERATION: this programme is the “heart of FP7” (which includes four parts: Cooperation, Ideas, People and Capacities), representing 2/3 of its overall budget. Forming trans-national R&D consortia is a precondition for participation. Regular calls are issued for its ten strategic themes, each including SME specific, but different approaches. Overall, at least 15 % of the funding is targeted to SMEs.

- PEOPLE: the “Marie Curie Actions” (People programme of FP7) are focussed on training, mobility and career development of researchers. Open to both individuals and institutions, be them public or private. There are not thematic priorities. In particular, the so-called “Industry-Academia Partnerships and Pathways” (IAPP) scheme promotes long-term public-private cooperation, including SMEs. In practice, however, this option is not so much used by SMEs as highlighted in FP Evaluations.

- EuroStars: this is a relatively new and joint initiative of FP7 and Eureka. Formally an initiative based on Article 185 the new EU Treaty, it targets R&D-performing SMEs (investing more than 10% of their income or having more than 10 % staff employed in R&D) ready to lead trans-national R&D projects. EuroStars combines traditional features of Eureka (bottom-up proposals) with synchronised and guaranteed access to mixed national and FP7 funding (from the Capacities programme), based on regular calls and evaluations by an independent panel of international experts.

¹³ <https://ec.europa.eu/easme/en>

ii) Research-acquiring SMEs, which outsource research to Universities or research Centres that will perform the research on their behalf, can choose in FP7 among:

- The “Research for SMEs” scheme (also known as CRAFT projects in the former FP editions), supports projects proposed by SMEs provided they fit into their overall business and innovation needs and render clear exploitation potential and economic benefits to them.

- EraSME, a network of 19 national and regional research programmes supporting SMEs, currently funded under the previous FP6. Formally and ERANET, it therefore supports the coordination of national and regional Agencies’ calls which, in the end, might result in synchronised support for trans-national SME-initiated cooperation projects. There is no “top-up” of funding to projects by the EC, however.

- The “Research for SME associations” scheme supports the development of technical solutions to problems common for a large number of SMEs in specific industrial sectors or segments of the value chain through EU-funded research not being addressed under the “Research for SMEs”.

- In the same logic as the EraSME/“Research for SMEs” tandem above, CORNET (“Collective Research NETworking”) is an ERANET in the field of collective research, gathering national and regional programmes that benefit all or most of the SMEs across Europe working in the same sector or branch of industry. Intellectual rights generated through the projects are typically distributed throughout the firms in target sectors. Like in EraSME, there is no “top-up” or funding to projects by the EC.

Beyond FP7 but still within the boundaries of the EU budget, there are also new funding possibilities connected to the “Competitiveness and Innovation Programme” (CIP). This is “another” Framework Programme, though it just saw one edition packing formerly separated programmes, it stresses innovation and growth of business firms through a number of actions that structured in three work streams: IEE (Intelligent Energy Europe), ICT PSP (ICT Policy Support Programme) and EIP (Entrepreneurship and Innovation Programme). SMEs are the primary goal of CIP which might provide both financial and non-financial support (continued in Horizon 2020 and COSME):

iii) Financial support instruments: new facilities and services are being set-up by CIP in order to provide SMEs with private equity and loan guarantees:

- Risk capital instrument for High Growth and Innovative Companies: GIF2 - “bridging the valley of death”.

- Securitisation of banks' SME loan portfolios - free up lending capacity.

iv) Other instruments and services (business support services, policy advice, etc.). As both CIP and FP7 run in parallel from 2007 to 2013, CIP provided SMEs with access points for information and advice on European programmes (FP7 in particular), single market and EU regulations through the "Enterprise Europe Network" (EEN).

Concerning trans-national collaboration at policy level, there are possibilities for SMEs networking and bench-marking through regional Clusters, for instance, but CIP does not require consortia of partners to apply jointly at project level. Support is therefore "de-centralised" as in the Eureka network which I examine hereafter.

3.3.4. Intergovernmental support to SMEs: Eureka and ESA

In addition, and parallel to EU institutions' support to cross-border R&D undertakings, projects and activities, inter-governmental schemes and agencies also promote trans-national R&D at European level, where SMEs can and do also participate. Moreover, through the combined action of participating Governments, such networks of variable geometries represent a different route in the building-up of European cooperation in R&D relevant to business firms and are also components of a future 'Europe Research Area' (ERA).

In Eureka, contrary to the FP7 and CIP, there is no "common pot" of funds for projects nor central budget assembled by its 40 member States governing the network (apart from their modest funding contributions to the functioning of the Brussels-based Eureka Secretariat). With direct advice of National Eureka Offices in each capital, led by the corresponding "National Project Coordinators" (or NPCs), Eureka encourages spontaneous proposals of at least two partners from two different States, this being a fundamental requirement. On the other hand, as projects are close-to-market, trust between partners is a must and, consequently, many consortia originate from already existing business relations that wish to undertake a technology co-development.

In principle, "bottom up" and decentralised support to the building-up of application-oriented projects should make Eureka very easy for SMEs. Indeed, as demonstrated by the successive evaluations of Eureka (Georgiou, 2005), SMEs have increasingly gained weight over the years in the overall Eureka project portfolio, a fact which is confirmed steadily in the regular analysis of the projects portfolio by the Eureka Secretariat (see <http://www.eurekanetwork.org/>).

Unfortunately, however, labelled projects are not always funded and when they are, may experience problems to synchronise national funding.

All in all, it may be interesting to assess the profile of participating firms in both FP and Eureka, as well as to determine whether the increasing presence of SMEs in the later is connected to the fact that the FP 6 and 7 have both focussed more attention in larger and larger 'integrated projects' plus long-term undertakings ('Joint Technology Initiatives' some of which build-upon former Eureka Clusters) and the fact that SMEs enjoy a special place in practically all national and regional policies and programmes, thereby facilitating support by the Eureka NPCs.

On the other hand, for the purpose of our discussion of policies and instruments promoting trans-national R&D collaboration projects at European level, one should stress that, while the management of Eureka is assigned to one single authority per country (the said NPCs are also points of contact for the rest of the network), the decentralised approach to funding allows for multiple funding sources. In other words, while there is only one NPC per country, funding can be provided by the NPC or other programme owners, which can be one or several per country. The decentralised and flexible functioning of the Eureka network is presented in Figure 9 comprising two levels: the National Project Coordinators that promote project generation and the actual project participants. Eligible projects require entities from at least two countries to partner and set up a technology alliance agreements that target world markets.

In fact, most Eureka members do not have specific Eureka budget lines but use national and regional programmes for projects and all NPCs use a common methodology (PAM or "Project Assessment Methodology"). However, so much flexibility for managers and funding authorities might also become a disadvantage for participants when there are disparities in support or lack of synchronism across nations, this being a structural problem with Eureka. Consequently, the challenge for Eureka is not the customer SME base but how to go from coordination to "concertation" of public efforts thereby consolidating a seamless supporting network to participants, SMEs in particular.

Comparing the 'European Space Agency' (ESA) approach to SMEs with that of Eureka is worth doing, taking into account that both are governed by inter-governmental Treaties, not EU laws and regulations. Contrary to Eureka, ESA does have a central budget built-around some mandatory components (administration, science and basic technologies) and a variable geometry array of optional programmes that I will see later in Chapter 4. However, action by ESA is aimed not only at promoting development (capacity building) but also at procuring technology supplies to develop its space satellites and launcher programmes resulting in

programmes and activities that indirectly foster competitiveness of European industry as a front-runner (market shaping).

Figure 9: Eureka network functioning at public (inter-Agency) and inter-firm levels. Source: own elaboration.

Concerning instruments, SMEs enjoy a “special place” in ESA procurements (as is also the case in a number of European large scientific facilities including CERN, ESRF, etc.). Measures have progressively been introduced and are now in place to provide a “balanced access” of SMEs to the Agency’s technological activities as well as to offer them technical support by Agency’s experts and laboratories thereby complementing SMEs’ own internal capacities. With such measures ESA recognises the dynamism and flexibility of innovative SMEs with the aim of enabling ESA and the European space industry to tap into their potential thereby opening up opportunities for them to work more extensively together.

Interestingly, comparing Eureka and ESA, one finds that Eureka (which does not have a centralised budget to promote “technology developments” - the offer side) requires SMEs to

apply jointly with other partners. Vice versa, for ESA which does have a centralised budget in order to procure “technology supplies” (the demand side), SMEs can apply in isolation as part of the special measures decided for this category of firms, although the budget is rather small.

Last but not least, one should refer to the SBIR and STTR programmes of the US because both programmes are funded and run by a number of Federal Agencies following also a “decentralised” approach, while all Agencies apply comparable management rules and regulations. Federal agencies reserve a % of their budget for such programmes whose attractiveness is not only linked to the access to finance but, more importantly, to the access to the federal procurements. It is therefore a very smart way of ‘demand side’ innovation support, particularly attractive to small business firms.

Inspired by the US SBIR/STTR, Horizon 2020 programme has put forward a new ‘SME instrument’ which is presented, not as a R&D programme but as accelerator for market introduction of promising technological or not technological innovations. Again, the experience gathered so far is limited to the first calls; an important added value is that participation is open to single companies, no need to apply in consortia like in Eureka. Future research could assess and compare other SME-oriented programmes like EuroStars¹⁴ managed by Eureka and requires also that SMEs to build up consortia while the financing conditions for the projects are more attractive in the new ‘SME instrument’ whose funding is also centrally managed by EASME¹⁵.

All in all, coming back to the issue of trans-national R&D collaboration which is the focus of our research, Europe potential “customers” of the very wide array of collaborative R&D programmes (SMEs in particular) would appreciate not so many additional administrative layers or small networks on top of the existing ones, but probably more coherence and accessibility in getting-passed the “last mile”, thereby reaching the interesting parties with the already existing schemes at European level, particularly, taking into account the potential synergies between the EU’s FP and Eureka. This will be focus of the following Chapters in this Section to identify

¹⁴ <https://www.eurostars-eureka.eu>

¹⁵ <https://ec.europa.eu/easme/en/eic-accelerator-sme-instrument>

suitable intra-preneurial policy recommendations could be put in place to easy participation of business in general and SMEs in particular in the trans-national programmes which are at the basis of the established paradigm for cross-border R&D collaboration in Europe.

3.4 INTERGOVERNMENTAL ORGANISATIONS AND NETWORKS AND THEIR POTENTIAL FOR ERA: A PROPOSAL FOR A “CLEARING HOUSE” FOR INDUSTRIAL ERANETs

In facing increasing competition from well established (US and Japan) and emerging new players (China and India), the importance of trans-national R&D collaboration in Europe is clearly growing for policy makers and business in order to exploit synergies and complementarities among European States and regions (Carlsson, 2006).

Also, as the enlargement of the European Union (EU) has increased its diversity and a number of reforms are being encouraged in Universities and Public Research Organisations in order to foster their responsiveness to and links with European businesses, it seems appropriate that European policies are also adapted in order to offer European businesses the best of intra-European cooperation in R&D, across administrative borders.

In order to reach this goal, initiatives to coordinate more closely national and regional Governments' R&D investments with those provided by the EU's R&D Framework Programme (FP) are being sketched. The overarching vision is that of a “European Research Area” (ERA), as a dynamic space for the generation, exchange and diffusion of knowledge and innovation in Europe.

Within Europe, between the EU Framework Programme and Member States' actions and programmes, intergovernmental organisations and networks play a significant role in Europe's R&D landscape. Eureka and ESA are examples of 'concerted' action by Governments that have proven their success for more than 20 years. Moreover, they have valuable experience in and potential for gathering further contributions to help coordinate European R&D efforts, beyond the EU's own programme FP.

In fact, in making ERA a reality, the European Commission (EC) is eager to enlarge the perimeter of the currently coordinated intra-European R&D efforts, beyond its own budget. To that aim, the EC put in place supporting arrangements like ERANETs (covering some

coordination costs for national programme owners) and European Technology Platforms (ETPs) that encourage industry-led coordination, similar to structures that have been in existence for many years within the Eureka context: so-called Eureka Umbrellas and Clusters. These instruments invite regional and nationally-managed activities to be pooled together in order to reduce the frequently criticised “fragmentation” of national public support to R&D in Europe.

On the other hand, ERA does not mean a “European R&D fortress” and in fact FP and Eureka are both very much open to non-European partnerships under certain conditions. On the public side, however, it seems reasonable for public authorities and programme owners to try to “align” their support system in Europe towards the needs of business across borders. Also, even at the time of the globalisation in general and business R&D in particular, there are reasons for European level action to be preferred to global undertakings. Following (Georghiou et al. 2008) these reasons are at least three:

1. “The first concerns governance. The governance and management of global projects can be highly complex and it is more efficient to work towards single European representation where there are not significantly conflicting interests within Europe.
2. The second reason follows on, in that Europe may gain more weight in negotiations from a combined position. Similar arguments also pertain for applied research but here considerations of competitiveness are also present.
3. A third reason is that the global approach may not emerge until there is regional leadership”.

Against that background, the goal of this Chapter is to conceptually reflect on practical mechanisms for the building-up of a future ERA increasingly open to firms in general and SMEs in particular. Vice versa, through concrete policy recommendations, firms and SMEs will be more conscious about the political and practical interest of ERA. To that aim, I examine the European Space Agency (ESA, an organisation in itself) and Eureka (a collaborative network) to conclude how Europe and ERA could benefit. Both ESA and Eureka are intergovernmental in nature, hence the impact of governance when it comes to differentiate between EU and European schemes supporting collaborative R&D and innovation.

Before doing so, although the concept of “variable geometry” has been introduced in the EU environment only in the last decade of the 20th century (beyond the pioneer experience of research infrastructures at the time like CERN), and more formally, since the Maastricht Treaty, this concept it is very much inherent to both ESA and Eureka, although the former applies it at programme level (a collection of projects with a common goal) and the latter at project level. Following (Kuhlmann and Edler, 2003) variable geometry initiatives are those where:

“...interested groupings of regional, national or transnational authorities may seize at their own cost transnational strategic initiatives aiming at the creation of attractive and productive conditions for economic investment in “their” parts of Europe of “their” sectors – also if only a restricted number of EU member states is willing to join such efforts. This concept has been entitled “géometrie variable” (in Brussels “Eurospeak”).

3.4.1. The European Space Agency makes variable geometry work

ESA was founded in 1975 combining two former organisations (ESRO and ELDO, both created in the logic of the “big science” accelerated after the Second World War and European efforts to regain some leadership in emerging new fields of science and technology). Like other European public R&D undertakings at the time, the idea was to secure a critical mass to position Europe in space exploration, including a common scientific and technology effort funded through mandatory contributions. In the 80’s, the Agency evolved also into a forerunner of space applications serving European citizens and essential policies in satellite telecommunications networks, Earth observation and, more recently, satellite positioning and navigation. All in all, through the implementation of these programmes, ESA has become a key partner of European industry to compete in worldwide commercial markets.

Interestingly, for market-oriented programmes, the Agency’s activities are based on optional (variable geometry) contributions by interested Member States which decide to invest on given preoperational satellite system developments, consistent with their respective interests therein. In addition, to define and implement such programmes, consultations and cooperative arrangements are sought with satellite system operators like EUMETSAT (concerning satellite Earth observation for meteorology and climatology), EUTELSAT, INMARSAT, etc. Beyond the European borderlines, collaboration has also taken place with non-European Agencies, most notably NASA, however, most frequently for exploration and scientific missions.

At the foundation of ESA’s success in securing support from participating States is the principle of “fair return”, meaning a fair distribution of contracts placed by the Agency with each country’s industry, proportional to the funding provided for the programmes to which each of them contributes. Collected funds are managed centrally, although money “keep the colour” of each contributor, so to say. This pragmatic principle has secured confidence and support by States with optional programmes representing typically between 70 and 80 % of ESA’s overall budget (totalling several Billion euros per year).

SMEs gained a “special place” in ESA through the measures introduced by Ministers in 1997 concerning industrial policy including an “SME initiative”¹⁶. In other words, ESA while European in nature and having its own budget does not systematically impose SMEs to apply for funding in consortia for the services or supplies that the Agency plans for its satellites or industrial prime contractors in Europe. However, system and sub-system leaders are typically required to construct consortia in order to match the contributions of each State. A background motivations for SME measures, was to easy also the participation of SMEs from smaller contributing States, but is more difficult in the case of larger ones which need to balance their large industrial capabilities with the access of smaller firms also in their borders.

Contrary to Eureka and FP instruments, although ESA’s programmes represent a fundamental support to European space industry responsible for satellites and launchers (Ariane), its primary mission is to provide for cooperation among European States for the peaceful use of space, notwithstanding the potential for double use of many technologies. By responding to the collective demand of its Member States and institutional partners in Europe like EUMETSAT, the EU, etc. it is more a competence developer than a promoter of trans-national cooperation in industrial R&D. Indirectly, at macro level, the fair return secures the conditions for a balanced distribution of competences to be maintained across Europe.

3.4.2. The Eureka network aligns national support schemes

Conceived originally in Europe in response to the US Strategic Defence Initiative (SDI) and the emergence of Japan in strategic domains like microelectronics, Eureka presents itself a “pan-European” network for close-to-market industrial R&D, extending well beyond the administrative borders of the EU member States, with 40 participating States of wider-Europe. Projects are initiated, organised and proposed “bottom-up” at any time by partners from at least two different countries.

¹⁶ <http://www.esa.int/SPECIALS/SME/index.html>

Interestingly, Eureka was proposed by France in 1986 as an Agency (not a network) to which countries would provide financial contributions (like with ESA). After the first Conference, however, Germany turned Eureka into a “quality label” and network, with which high-quality projects would presumably enjoy better access conditions to public support available in each country. While political support was strong for Eureka, the scheme worked well for labelled projects to be actually supported, though funding was ultimately decided by each Member country according to its rules and regulations and that, on a project-by-project basis. Such a “decentralised funding” scheme means “de facto” some sort of “fair return” as there is no exchange of funds among States. However, as many countries lack dedicated “Eureka funds”, “lack of synchronism” and uneven support to different project partners due to different regulations across the nations present in each project are structural difficulties.

In spite of that, Eureka has built a significant number of success stories not only on individual firm-to-firm cooperative projects, but also through so-called “Cluster projects”, meaning arrays of strategic projects led by big firms in given technology fields. Most successful “Clusters” concern ICT and enjoy a certain degree of autonomy in “labelling” projects on their own without referring back to the Eureka network of Member States and, more importantly, a stable flow of public support over the years, as many States have dedicated funding lines and programmes for ICT R&D activities. Additionally, so-called “Umbrellas” (thematic networks) gather national experts and interested players in generating projects within sectors of economic importance which might be labelled and supported by Eureka.

Also, SMEs have been gaining terrain in “firm-to-firm” Eureka projects (so-called “individual” projects) as illustrated by regular reviews undertaken by successive Chairs (Georghiou et al, 2005). Obviously, its bottom-up procedures, permanently open call and decentralised management make Eureka very accessible to potential participants, SMEs in particular. On the other hand, as the FP has expanded its commitment to large undertakings (already through the so-called “Integrated Projects” (IP) launched in FP 6 and more recently through the “Joint Technology Initiatives” (JTI) sponsored in FP 7 continued in Horizon 2020), Eureka is trying to reposition itself as the “reference initiative” or “service hub” for Pan-European R&D cooperation involving SMEs (<http://www.eureka.be/files/4854325>).

Obviously, although there is room for specific measures targeted particularly to the needs of SMEs, as a general policy, it would be a mistake to deprive both corporations and SMEs of the synergies which can be made possible via cooperation with other partners, be them large or small, private or public, customers or suppliers. On the contrary, as (Georghiou et al, 2008) I stress that:

“The European research ecology requires the pathways between small and large firms to be reinforced. Support initiatives should follow the supply chain and not attempt to target SMEs separately from their main customers.”

Also, seen from the user viewpoint, (OECD, 2008 b) stresses the importance of supporting innovation of firms in (global) value chains, while but seen from the user viewpoint more can be done to facilitate the access of SMEs:

“Streamlining and simplifying access to business R&D and innovation schemes. Another implication of globalisation and open innovation is that firms, especially large firms can “forum shop” for the best conditions and schemes available in different countries. For them but also for SMEs which are less internationalised, improving access to and “easy of use” of government support becomes more important”.

3.4.3. It’s all about willingness to pool resources

Similar in Eureka and ESA is their inter-governmental architecture, with many decisions concerted by member States on the basis of the principle of “one State, one vote”. The status of ESA as a fully-fledged organisation and the power of initiative of its Director General according to its founding Treaty (so-called “ESA Convention”), however, has allowed it to set-up significant technical and managerial services compared to Eureka, particularly for what concerns optional programmes in ESA.

Around several thousand staff report to ESA’s Director General, who has also the right to propose programmes to interested ESA member States. Quite differently, the Eureka network “owns” only a modest Secretariat charged with a facilitating role vis-à-vis, the central data base maintenance and “ad hoc” support as required by the rotating Eureka Presidency that is in fact the highest authority, not only to organise the already established business of the network but also to propose new political initiatives.

A common feature to both Eureka Clusters and ESA optional programmes is the need to motivate member States thereby attracting support for projects of interest to leading industries. The difference at first sight is that member States allow ESA to manage a centralised common budget, while they keep direct budget control in Eureka, which they decide to “align” around labelled projects, however. Also, in administering its budget, ESA employs sophisticated mechanisms able to satisfy expectations of contributing States in particular areas of mandatory and optional programmes.

In any of both cases, ESA and Eureka, the net result is pooling together “willingness” of interested States in Europe in jointly undertaking particular programmes or projects on variable geometries or “reinforced cooperation”, as it would be called in the EU/EC’s environment. Moreover, the difference between both schemes would vanish if “labelling” a Eureka project would bind all States, both to support and fund the corresponding projects – which often is not the case. Therefore, the challenge with Eureka is not about administering resources centrally, but rather, about how to secure public commitment to Eureka following the labelling of projects. This has worked well in the early days of Eureka, when political support was high.

In the following pages, I will examine recent developments in ESA and Eureka in order to derive recommendations for the “European Research Area” (ERA) advocated by the EC for what concerns business participation in general and SMEs in particular, considering their inherent limitations and needs I have already discussed in the preceding pages. In particular, one could get inspiration from recent cooperative experiences and differentiated roles with the EU/EC regarding ESA and Eureka, thereby identifying further potential within new forms of public-private partnerships (PPPs like Galileo and more recently Copernicus) and inter-governmental schemes (both existing, like Eureka, and new ones).

3.4.4. Relevant experiences with space PPPs: Galileo and Copernicus

Within the 7th FP, a number of new public-private partnerships were agreed and put in place in order to attract increasing business participation and commitment in areas of particular strategic importance: the so called JTIs (Joint Technology Initiatives) were set up using Article 187 of the Lisbon Treaty. The Galileo system was the first experience in the practical application of that Article, while its political acceptance and architectural management, have not been easy at all considering the novelty of ESA’s partnership with the EU in the practical applications of space. In learning by doing, many complications emerged from the setting-up of dedicated management structures which took a lot of time, public money and administrative energy: first a technical coordination office called ‘Galileo Project Office’ and later the ‘Galileo Joint Undertaking (GJU)’ http://europa.eu/legislation_summaries/other/l24098_en.htm set up in May 2002 by the European Community and ESA to manage the development phase of Galileo – transferred later to the “European GNSS Agency” in Prague <http://www.gsa.europa.eu/>

Fortunately, the further joint initiative of the EC and ESA in space, the initially called GMES system (Global Monitoring for Environment and Security, later renamed ‘Copernicus’) which was identified also as a potential candidate for the application of Article 187 of the Lisbon Treaty,

did not set up separate management structure, but rather used existing arrangements or an ad-hoc Agreement between both institutions. In fact, this has been the practice of EUMETSAT (an important player also in GMES/Copernicus), which has always delegated to ESA the development of its space satellites through “ad hoc” cooperation agreements.

Worth noting is that ESA has been charged with coordinating and pooling together all voluntary contributions and technical resources of motivated States, both in cash and in kind (the “offer” of available space assets and resources beyond the 6th FP “minimum common denominator” that is agreed at EU level), leaving to the EU/EC the fostering of common European interests, the consolidation of user requirements for future missions relevant to European citizens and EU-wide policies, and the promotion of European interests and standards in international negotiations and fora (the “demand” side).

Such a “division of labour” is ratified within the so-called ‘European Space Policy’ that was defined and endorsed by Ministers responsible for space. Moreover, according to this Policy, the EC delegated to ESA the carrying out of space-related parts of the EU’s FP, that are managed by ESA following EU rules. In this connection, it would be interesting to assess the Galileo experience with the first wave of ‘Joint Technology Initiatives’ launched by the EC in 2007 continued in Horizon 2020 as well as the measures put in place by each of those JTIs to secure an equitable access for European SMEs thereby securing their innovation and dynamic input.

3.4.4.1 Eureka as service hub or “clearing house” for joint calls

The evolution is quite different with some other policy initiatives already launched through the 6th edition of the Framework Program (FP) and intensified with the 7th and Horizon 2020: the so-called ERANETs using Article 185 of the Lisbon Treaty, whereby the EC provides support for the coordination of regional and national programmes, represented by programme owners or managers, national Agencies in particular. The original intention was obviously a good one, that of reducing fragmentation of the European R&D system by gathering stakeholders responsible for the remaining 95 % of public support to R&D, beyond FP.

Interestingly, the Eureka network produced in 1999 a path-finding Strategic Review which proposed, among other issues so-called “Eureka satellites”, meaning focused groups of stakeholders meeting in more reduced settings in order to work more efficiently to generate and agree targeted Eureka projects. This proposal was unfortunately ruled out by the Eureka network at that time. The EC being a member of the Eureka network, one wonders to what

extend the Commission could have gathered inspiration from the idea of the “Eureka satellites” for networks which have developed over the time like ERANETs, PPPs and JTIs.

All in all, taking into account the traditional disconnect between European research and innovation, it is good news that the EU/EC consider supporting European firms to respond to global competitive challenges, thereby adopting successful Eureka-like models. However, it is unfortunate that existing and experienced management European structures like the Eureka network remain underutilized. For the time being, however, the EC has actively sponsored the setting up of a joint support scheme for collaborative projects led by high tech SME’s, i.e. those investing at least 15 % of their income in R&D or employing at least that ratio of their staff in R&D: EuroStars, launched in the context of FP7 and continued with Horizon 2020,

Encouraged by EuroStars, both EC and Eureka could intensify cooperation also in the numerous bottom-up calls for industry-oriented ERANETs (that is to say, those gathering national programmes and Agencies promoting and funding business R&D) – see Figure 10 Eureka could then become a “clearing house” for joint calls whenever business firms are involved. And, on behalf of participating States and Agencies, the clearing house would provide a service to the said ERANETs handling applications, evaluations, etc. fostering progressively synchronisation and harmonisation of public funding offered across nations to firms in general and SMEs in particular, considering their important presence in the Eureka environment. The mechanism of the ‘clearing house’ would work in practice as follows – as illustrated in Figure 10:

- Proposals could come from different channels, both “standard” Eureka and ERANET calls, with support and involvement of (national, regional, horizontal or sectorial) Agencies for awareness, promotion, compliance checks (ex ante), release of funding and monitoring of projects (ex post).
- Some functions will be centralised by the Eureka Secretariat such support to the planning of calls and organisation of independent evaluators panels, etc. in coordination with national agencies.
- Reporting will also be easy, as there could easily be one single repository of all approved projects.

Complementary views around a “Clearing House” of calls

Figure 10: Eureka as a “clearing house” for industry-oriented ERANET: a conceptual overview. Source: G. León, PhD Courses and some own elaboration.

Also, life could be much easier for applicants using a common framework for joint calls, generic rules for funding, selection, IPR, monitoring and the like for the bottom-up calls which are widespread across the numerous ERANETs populating Horizon 2020. A ‘clearing house’ would reduce the need for coordination at system level and progressively embedding the said common framework in the agencies would help rationalise the current call landscape. The present speed of developments on global markets requires nothing less from Europe and European policies, particularly for SMEs which have, by definition, more limited resources and information.

Figure 11: Eureka as “clearing house” of industry-oriented Eranets, exploiting the management flexibility of the former and assuming willingness of the latter.

Figure 11 above displays a tentative division of labour in the life cycle of ERANETs showing that most of the support functions could be shared among sectoral agencies per country while handling of calls, independent evaluations and reporting would be controlled by NCPs. Benefiting from this structure, the EC could further amplify its action and reach more easily SMEs building upon existing Eureka Clusters and Umbrellas, thereby activating the generation of projects of European relevance. Indeed, support to Eureka match-making events, more regular interactions, etc. will add value, not reinventing existing fora or structures but rather building on existing ones cutting across business sectors, administrative and geographical boundaries, thus fostering innovation along value chains benefiting SMEs in particular (OCDE, 2008).

3.4.4.2. Potential benefits for Europe and ERA

In summary, added value for European coordination of such the approach proposed would be ample, both for Eureka and the EU/EC. On the other hand, there is no reason why good projects generated by industry-oriented ERANETs (and by PPPs through Eureka Clusters and Umbrellas) could not get the Eureka label on conditions to be jointly agreed with Eureka member States, similarly as Eureka Clusters enjoy significant autonomy to label projects.

In view of the above it seems appropriate to draw lessons learned so far regarding future ERANETs and JTI future initiatives on the basis of, respectively, articles 185 and 187 of the Lisbon Treaty. A first one is that in dealing with business-led R&D cooperative projects through intergovernmental settings, national tax-payer's contributions are expected to be invested back to foster national growth and jobs; in that context, the "fair return" principle of ESA has successfully motivated member States to continue investing in optional programmes. Implicitly also, the said principle creates suitable conditions to raise also "fair contributions". Secondly, as compared to "larger consortia" required to successfully apply to FP calls, simpler and more adapted variable geometry Eureka-like projects are also worth investigating for its "relevance" to partners. On the other hand, notwithstanding the "excellence" principle of the FP, variable geometry initiatives should also be sponsored by the EU/EC to help face common competitiveness problems to groups of countries, in particular, concerning to modernise more "traditional" sectors.

Thirdly, the European Commission being a full member of Eureka, it would be wise to make full use of it thereby entrusting it with a coordinating function of calls from interested industry-oriented ERANETs and maybe in the longer run also PPPs through Eureka Clusters and Umbrellas, without the need to construct separate arrangements, lengthy and costly new networks. A "clearing house" role for the Eureka represents a first policy to widen the perimeter of the currently coordinated R&D efforts in Europe, building a more integrated ERA able to get the best from intra-European cooperation.

3.5 STRENGTHENING THE EUROPEAN DIMENSION OF NATIONAL AND REGIONAL R&D PROGRAMMES RELEVANT TO SMEs: NEW POSSIBILITIES OFFERED BY THE EU STRUCTURAL FUNDS.

Innovation has increasingly gained weight in the Structural Funds (SF) as these are 'by definition' closely associated to the needs of less favoured regions where, not only innovation, but more general economic development policies play a key role, including SMEs considering, once again, their economic and societal significance. With the wide acceptance by regional stakeholders of the 'smart specialisation' concept put forward by (Foray, David and Hall, 2009).

Notwithstanding resulting difficulties for governance, 'smart specialisation' strategies operationalised by all requesting regional authorities in the current programming period 2014-2020 represents a good basis to aim at a more coordinated landscape of supporting R&D policies for SMEs in particular. In this connection, two rather unexplored avenues are in principle open to synergies and complementarities across Europe through trans-national R&D collaborative projects involving business beyond Eureka which I have already discussed. These avenues are:

- Mutual opening-up of (national and regional) R&D programmes on the basis of clear rational and conditions for the parties.

- Using Structural Funds (SF) for R&D activities and projects relevant to European collaboration thereby activating latent innovation potential in less favoured regions and, particularly, from new EU members States.

Key to exploring and exploiting the above is the willingness of national authorities concerned to foster European R&D collaborations and, in so doing, to ultimately contribute also to the building-up an integrated European Research Area (ERA). This is also the case for what concerns SF, as once their intended use is approved by the European Commission within the guidelines set as per the so-called "Operational Programmes", they become very much part of the portfolio of national and regional authorities' instruments and programmes for R&D.

In this connection, very limited experience exists about the use of SF for trans-national R&D collaborations aside from INTERREG and some few good practices in Eureka. Among those few, the National Innovation Agency of Spain (CDTI) has supported Eureka projects with SF when participants come from less favoured regions (CREST, 2007). Also, at regional level, the experience of ADER in La Rioja with the Globaltech programme launched in 2007 (a small but open region) was rather unique as it decided to use SF to procure advice and support also from Centres of Excellence located in Europe and beyond (including China already at that time, when most considered that country as a market or factory, not so much as a technology partner).

Moving around the world in searching for inspiration concerning practices with national-wide programmes, one can refer to the US SBIR and STTR programmes. For this dissertation, the interesting feature of those programmes is principally linked to their multiple budget sources and distributed management, a robust approach in spite of differences of Federal Agencies that implement them. Similarly, more intense and frequent trans-national R&D collaborations in Europe to the benefit of SMEs could take place by cutting across established (national and regional) Agency names and programme owners in Europe. Here, there are obviously more bilateral than multilateral experiences. To make both possible and likely to scale up beyond the good but limited practices, it would suffice if national and regional authorities would incorporate some sort of “supporting modules for European R&D collaborations” thereby embedding this form of collaborations within their toolbox of programmes and instruments.

Building on the analysis by (Fonfría, 2002) and proposals by (Georghiou, 2008) some sort of “gateway” to European trans-national R&D collaboration or even “one-stop-shop” functional support system would facilitate the participation of firms in general and SMEs in particular – as per Figure 11 above. More importantly, as many SMEs do not have the resources to investigate the technologies and partners that would best meet their needs, foresight and guidance services should be promoted by public authorities using modern tools, as these might leverage a larger knowledge of synergies and complementarities at firm level and that, across borders, thereby inducing further collaborative partnerships and projects with a European dimension.

In other words, instead of creating new structures or schemes, be them supranational or variable geometry, on top of the existing ones, one should try to incorporate the European dimension into existing national and regional programmes thereby creating a seamless and easier access to trans-national R&D collaboration to the benefit of business in general and SMEs in particular. Opening-up national and regional programmes to the logic of ERA will always be more difficult if not impossible particularly for what concerns business R&D as the geographical frontiers also determine the legitimacy of the corresponding interventions.

On the other hand, as regards financial means, an influential report by (Aho et al., 2006) suggested that Structural Funds (SF) could double the volume of EU-sponsored R&D in the subsequent period 2007-2013, thereby leveraging latent potential in (new) EU member states and regions both for capacity building and trans-national cooperation if this is properly fostered and facilitated. This trend will be further amplified as the use of SF for R&D becomes increasingly wide-spread in the 2014-2020 period, what represents both a challenge (of further fragmentation) as well as an opportunity to access excellent talent and emerging capabilities already existing in Europe, should appropriate mechanisms be established – see Exhibit I.1.

below. Indeed, EU regional policy accounts for the single largest chunk of the EU budget for 2014–20 (€351.8 billion of a total €1 082 billion) and is thus the Union's main investment arm.

2007–13 — Budget: €347 billions (of which 25 % is earmarked for research and innovation and 30 % for environmental infrastructure and measures to combat climate change). These resources have helped to improve the quality of life of EU citizens, to create jobs and to promote research, development and innovation. For example, between 2007 and 2012 alone, EU regional policy: supported 77 800 start-ups; funded 61 000 research projects; provided almost 5 million more EU citizens with broadband coverage.

2014–20 — Budget: €351.8 billions, with a particular focus on and innovation, the digital agenda, enhancing the competitiveness of SMEs and shifting towards the low-carbon economy. Around €100 billion will be dedicated to these sectors, of which €26.7 billion will support the shift to a low-carbon economy (energy efficiency and renewable energies). It is worth to remind that the whole EU “Horizon 2020” budget is euro 70 billion. The resources allocated to these four priorities depend on the category of region: at least 80 % of ERDF spending in more developed regions must focus on at least two of these priorities; this focus amounts to 60 % of ERDF spending in transition regions and 50 % in less developed regions.

Exhibit I.1 - Extracted from “The EU explained: Regional Policy - Making Europe's regions and cities more competitive, fostering growth and creating jobs”.
http://ec.europa.eu/regional_policy/index.cfm/en/information/publications/brochures-factsheets/2014/the-eu-explained-regional-policy-making-europes-regions-and-cities-more-competitive-fostering-growth-and-creating-jobs [accessed 27 February 2015].

Consequently, in the next pages, I will focus on new opportunities offered by this EU instrument not only for R&D in general but in fostering trans-national collaboration in Europe in particular, to the benefits of economies, business firms and SMEs. Overall, as all EU Member States, both old and new ones support economic development policies linked to SMEs, a wide-spread use and application of these new opportunities in SF allocated to regions and new member States can potentially contribute also with further coordination and support necessary to build a cohesive ERA for what concerns access by business in general and SMEs in particular.

3.5.1 Activating potential beyond the EU FP: new instruments with SF

A non-paper tabled by the European Commission in July 2007 at the EU Competitiveness Council included among the four main obstacles to increase investment in research that of *“insufficient intra-European cooperation beyond the Framework Programme”*. Also, the widening of the EU to the East has increased heterogeneity regarding their national innovation systems, different levels of technological opportunities and absorptive capacity (Falk, R. et al. 2007). Taking it more positively, the enlargement of the Union offers also room to leverage latent potential in (new) EU member states and regions.

However, as anticipated above, the budget increase available also represents a risk, i.e. that in the absence of more intense and tightly coordinated trans-national overall European effort, SF could further amplify the already wide diversity of programme instruments for R&D and innovation support to public and private stakeholders, thereby enlarging even further current “policy fragmentation” in the European Union. Moreover, the crisis has visibly widened the research and innovation divide among European Union member States (Veugelers, 2014) and this is also a source of considerable concern.

Against that background, inter-governmental and variable geometry initiatives of different forms represent powerful bridges and leveraging tools between national & regionally-funded programmes on the one hand, and European & Community-funded programmes on the other hand, thereby contributing further coordination beyond the FP. Also, our focus on business in general is justified by the relative underinvestment of private stakeholders and SMEs in particular, by their importance for growth and jobs, while their participation requires simple schemes however which we have already discussed before.

On the other hand, new financial means available allows new R&D instruments that can be designed whenever they are relevant to European and international R&D collaboration and compatible with SF and the EU State Aid rules. Taking into account relevant work by (CREST, 2007) and the European Association of National Innovation Agencies (TAFTIE, 2008), several options exist as discussed later on. More recently also, a task force within ERAC has identified synergies between SF and Horizon 2020 through a mutual learning exercise involving several countries – see <https://rio.jrc.ec.europa.eu/en/policy-support-facility/mle-national-practices-widening-participation-and-strengthening-synergies>

Figure 12: EU Structural Funds distribution in the Financial Perspectives 2014-2020.

These references show that, until now, only a minuscule sample of projects funded by the SF was actually related to cooperative R&D at European level – see the pioneer example of CDTI with Eureka projects. Obviously, SF key role is capacity building, which is important both to facilitate access to the FP as well as to create absorptive capacities for dissemination of results (Cohen and Levinthal, 1990). Hence, using new SF funding for cooperative international RTD and innovation activities represents a novelty and challenge. In defining new instruments, three steps need to be covered which we discuss later in the following pages:

1. Clarify the legal basis regarding the EU framework of Structural Funds to be used both for R&D, in general, and complementary to Horizon 2020, in particular.
2. Examining the INTERREG programmes, identify features of relevance for the use of SF in future trans-national R&D cooperation projects.
3. Define a common understanding and tools to use Structural Funds for R&D and Innovation cooperative activities at European level.

3.5.2 Legal basis regarding SF both for R&D, in general, and complementary to Horizon 2020, in particular

According to Article 65.11 of the ESIF Common Provisions Regulation (European Regulation 1303/2013), the possibility of co-financing of the same operation (project, contract, action) is allowed by ESIF and Horizon2020, provided that the same item of expenditure does not receive double funding from both ways: *"An operation may receive support from one or more ESI Funds or from one or more programmes and from other Union instruments, provided that the expenditure item included in a request for payment for reimbursement by one of the ESI Funds does not receive support from another Fund or Union instrument, or support from the same Fund under another programme."*

Article 70.2, letter b), of the same Regulation 1303/2013 allows that the 15% of ERDF Operational Programme to be dedicated in operations (projects) out of the area of the Operational Programme within the European Union. This imply, as required by Article 70.2, to implement agreements and coordination mechanisms between the managing authorities of Operational Programmes of regions in different countries to perform the management, control and audit tasks of these operations (projects) carried out outside their programming area.

In any event, it is crucial that interested Member States secure the insertion of a specific measure in their national or multi-regional Operative Programmes financed by the SF –with its corresponding budgets- for financing their share in international R&D cooperation projects at European level, possibly to be managed and implemented in collaboration with other national public authorities or Innovation Agencies in Europe.

3.5.3 Practices and features of relevance for SF management in trans-national R&D cooperation

Structural Funds represent an important source of finance for actions and investments related to R&D and innovation. According to the European Commission estimates derived from the examination of SF Operational Programmes, during the 2007-2013 period for instance almost 11 Billion € of Structural Funds were invested in these kind of activities. However during the same period only a marginal % concerned cooperative R&D and innovation activities at European level with a business/market orientation. Consequently, good practices are very limited (see www.interact-eu.net a repository of the INTERREG experiences, programmes and projects).

25 years ago this year, INTERREG was developed as a Community Initiative with a budget of just EUR 1 billion covering exclusively cross-border cooperation. Over the years, INTERREG has become a key instrument of the European Union to support cooperation across borders. INTERREG programmes are funded by the European Regional Development Fund to support the harmonious development of the European Union's territory at different levels. Interreg has three types of programmes: cross-border, transnational and interregional.

Obviously, new funding instrument for cooperative R&D at European level through SF may share some common features with INTERREG programmes, while being supported by Operational Programmes under the 'Growth and Job Investments' objective of the SF, and whose geographical scope will be given by the number of Operational Programmes across Europe that finally include such a provision. However, the main difficulties are found in the limited scope for business participation which represents an opportunity for new SF instruments.

2014-2020 period – Interreg V: The fifth programming period of Interreg has a budget of EUR 10.1 billion invested in over 100 cooperation programmes between regions and territorial, social and economic partners. This budget also includes the ERDF allocation for Member States to participate in EU external border cooperation programmes supported by other instruments (Instrument for Pre-Accession-IPA and European Neighborhood Instrument-ENI): 60 Cross-border – Interreg V-A, along 38 internal EU borders. ERDF contribution: EUR 6.6 billion.

- 12 IPA Cross-border: for Pre-Accession and European Neighborhood Instrument. 16 ENI Cross-border :International Cooperation and Development. 15 Transnational – Interreg V-B, covering larger areas of co-operation such as the Baltic Sea, Alpine and Mediterranean regions. ERDF contribution: EUR 2.1 billion.

- The interregional co-operation programme (INTERREG VC) and 3 networking programmes (Urbact III, Interact III and ESPON) cover all 28 Member States of the EU. They provide a framework for exchanging experience between regional and local bodies in different countries. ERDF contribution: EUR 500 million.

2007-2013 period – Interreg IV : The fourth programming period of Interreg had a total budget of EUR 8.7 billion (2, 5 % of the total 2007-13 allocation for cohesion policy). This budget includes the allocation for Member States to participate in EU external border cooperation programmes supported by other instruments (Instrument for Pre-Accession-IPA and European Neighborhood Instrument-ENI). The budget was distributed as follows:

- 60 Cross-border – Interreg IV-A, along 38 internal EU borders. ERDF contribution: EUR 5.6 billion. 13 Transnational – Interreg IV-B, covering larger areas of co-operation such as the Baltic Sea, Alpine and Mediterranean regions. ERDF contribution: EUR 1.8 billion.

- The interregional co-operation programme (INTERREG IVC) and 3 networking programmes (Urbact II, Interact II and ESPON) cover all 28 Member States of the EU. They provide a framework for exchanging experience between regional and local bodies in different countries. ERDF contribution: EUR 445 million.

Exhibit I.2. – European Territorial Cooperation from European Commission DG REGIO web.
http://ec.europa.eu/regional_policy/index.cfm/en/policy/cooperation/european-territorial/

On the other hand, direct participation by private companies as project partners was avoided by the managing authorities of INTERREG III programmes (2003-2006). In INTERREG IV (2007-2013) only some business partners were approved, on a case by case, timely and minority status. Further on, in INTERREG V (2014-2020), "A-Border " (e.g. Spain -Portugal) and " B-Crime" (e.g. Atlantic Arc) depending on the investment priorities addressed in each program and/or transnational business firms were exceptionally allowed as beneficiaries in some priorities and sometimes not, as the decision was left to each individual program of territorial cooperation. For INTERREG V "C Interregional " (exchange of good policy practices across the EU territory) only private not-for-profit entities are authorised.

3.5.4 New instruments using Structural Funds for R&D and innovation cooperative activities at European level

Consistent with the legal analyses above, there are several options to use Structural Funds for concerted financing instruments compatible with the legal framework both for Structural Funds and State Aids rules for R&D. In some case the financing option suggested will require to design a specific financing instrument to use the SF resources, in other cases the use of SF will supplement the resources of existing financing instruments.

Main options identified for financing international technological and innovative cooperation activities are the following three which, in any event, need to be reflected by the national authorities in their respective regional/national Operational Programmes dealing with R&D and innovation support, in greater or lesser detail.

3.5.4.1 International demonstration projects of European relevance

These kinds of projects are derived from the Community RTD Framework Programmes, including demonstration installations needed by companies and large installations required by academic and research organisations. This financing option will require designing an ad hoc instrument. The strategic objective would be to enhance the technological capabilities and competitiveness of Europe's industry by supporting the funding of demonstration projects performed by firms and strategic partnerships of relevance for Europe.

Funding would target technology development projects of experimental nature, aiming to develop new technologies into pilot plants, prototypes or demonstrators which will help the future economic and commercial impact of the new technology at international level, and also represent a technological and industrial step forward for a sector.

It is important to stress that prototypes or pilot plants need to remain at the pre-commercial stage. The EC State Aid rules for R&D and Innovation allows support for 'experimental development' as the closest stage to commercialisation that can be publicly subsidised. Accordingly, development of commercially usable prototypes and pilot projects is included (within the category of 'experimental development') provided that the prototype is necessarily the final commercial product and where it is too expensive to produce for it to be used only for demonstration and validation purposes. In case of a subsequent commercial use of demonstration or pilot projects, any revenue generated from such use must be deducted from the eligible costs. For the above purposes, the project proposal should clearly show:

- Added value through transnational cooperation at European level.
- The setting up of prototypes or pilot projects at a pre-commercial stage with a significant degree of innovation.
- Expertise of the projects partners in their respective fields of competence.
- Scale of socio-economic impact of the new technology (expected in the market and in the competitive positioning of participants).

The proposals could be evaluated by the national authorities managing SF assisted by European peers in line with the geometry of the project proposals. Consequently, a decentralised evaluation procedure could be envisaged without the need to create an International Coordination Committee. This could be based solely on information and assessment exchange among Member States of the respective proposers.

Concerning SMEs, as all national authorities and Agencies have active policies in order to compensate the drawbacks associated to their relative size and limited available resources, it will be easy and appropriate to incorporate specific provisions in the design of the instruments in order to facilitate their participation in international demonstration projects, i.e. considering not only their size but also the transaction and opportunity costs that this category of firms face. By associating them to the implementation of such projects, working together with leaders and

large players, these projects could very well precede and shape the participation of SMEs in future FP IP, potential JTIs and PPPs as well as Eureka Clusters ¹⁷.

3.5.4.2 Application of SF to ‘classic’ multilateral international R&D programmes such as Eureka (and similarly, industry-oriented ERANETs).

In this case, it is neither necessary to propose nor design an organisational and managerial structure since the financing instrument already exists and are operational. Therefore, the suggestions refer to possible financing intensities and modalities which could be made more attractive for “Convergence” regions, respecting State Aid rules. On the other hand, the current portfolio of EUREKA projects shows a significant “clustering” within neighbouring members on the one hand, as well as a moderate participation of new States of the EU which have difficulties in funding their share in projects. A wide-spread use of Structural Funds could therefore create new bridges for firms from old and new members while enriching the current portfolio of projects.

In summary, taking advantage of Eureka’s flexibility and simplicity for SMEs, the application of SF funds for Eureka will promote an even larger participation of these communities of firms, particularly from new EU member States. Similarly, industry-oriented ERANETs could benefit from resources made available through Structural Fund, thus widening the participation and, in exchange, foster coordination of national policies.

3.5.4.3 Financing regional initiatives to stimulate participation in the Framework Programme and other international R&D schemes.

The overall aims would be use SF to reinforce cooperation/communication/coordination between the respective National Contact Points of FP specific programmes and national managers of other international R&D schemes; and on the other hand, regional public agents promoting, financing and stimulating R&D and Innovation, could access additional resources in order to “Europeanise” their regional policies thereby helping innovation stakeholders to access

¹⁷

<https://rio.jrc.ec.europa.eu/en/policy-support-facility/mle-national-practices-widening-participation-and-strengthening-synergies>

FP and other international R&D schemes. This measure is not affected by the Community Framework of State Aid for R&D since it targets regional public agents and is not aid for business. Therefore, funding ceiling are those stated in the SF general regulation.

3.6 DISCUSSION AND CONCLUSIONS FROM SECTION I

Before presenting the outcome of our analysis, one should recall again the goal of this Section, namely to investigate the rational and added value of European R&D collaborative projects involving SMEs both for the firms themselves as well as for European Union policies at large. Or, in other words, assess how to enlarge coherence for both participants and policy.

Conceptual research in the preceding pages allowed to formulate two policy recommendations aimed at reducing the innovation **gap** and the **fragmented** policy landscape. Firstly, a practical proposal to help coordinate industry-oriented ERANETs through EUREKA acting as a ‘clearing house’ and easing access for firms, particularly SMEs (including those with the potential for jobs and growth, thus narrowing down the innovation **gap**) while their resources and knowledge are more limited; and secondly, to further exploit the potential offered by Structural Funds available in order to foster more trans-national R&D partnerships at European level (thus potentially reducing the currently **fragmented** research and innovation policy landscape). This concluding section discusses the relevance of such recommendations.

Both proposals might appear as challenging the natural division of labor and criteria behind EU main instruments, namely, “excellence” for the FP and “cohesion” for SF. In fact, with Horizon 2020 ‘*a stronger differentiation between the research funding in Horizon 2020 and the EU Structural Funds*’ has been introduced with a ‘*strong demarcation point as concerns the distributional aspects of the funding approach*’ (Frietsch, Rammer and Schubert, 2015). This explains growing ‘tensions’ already present before Horizon 2020 among member States and now also visible in the literature. For instance, two papers based on available evidence, end up pointing out in radically different directions regarding the merits of the above-mentioned delineation:

- On the one hand, (Frietsch, Rammer and Schubert, 2015) stress that: “There is considerable heterogeneity of the science and innovation systems in Europe, not only with respect to their resource endowment but also with respect to their efficiency in producing scientific and innovative outputs... Horizon 2020 will likely increase the heterogeneity of innovation systems in Europe, while its impact on growth and jobs will

hardly target those countries that would need them most urgently... In the longer perspective, a general upgrade of science and innovation and an increase in the number of research and innovation-oriented member states is a worthwhile pathway.”

- While (Pelle, 2015) strongly invites EU stakeholders to ‘*Mind the gap: arguments in favor of judicious constructivism in providing Horizon for all*’ stressing that for what concerns lagging regions ‘implementation of cohesion policies is place in the members States’ hands, which does not necessarily serve the targeted purpose, given the poor institutional quality in many of these countries. Indeed, this is one of the main reasons that they are lagging behind”.

The question is how to resolve such growing ‘tensions’? In this Section I tried to address that question within the limits of the ‘established paradigm’ for European Union-level policy interventions in R&D which, with few notable exceptions like ERC and EIT (and more recently also the FET ‘flagships’ and the ‘SME instrument’ that is now embedded in the newly created EIC operationalised by EASME), is built around the canonical notion of value added as a synonym of trans-national collaboration projects in R&D. Within this paradigm, the recommendations formulate ways and means to optimize policy coordination through project cooperation.

3.6.1 Creating a ‘intermediate’ space for coordination

Combining the two policy recommendations I have put forward in the preceding pages would open an ‘intermediating’ space between the EU and national budgets providing on the one hand the good practice exchange and value added in coordinating national support and, on the other, flexibility in aligning respective agendas. Using a long-standing network like Eureka combined with new means available through the SF the tension of ‘excellence’ and ‘cohesion’ can be eased as Eureka provides its network capital and the Structural Funds additional funding means. This would also address one fundamental challenge of ‘smart specialization’ which is the governance by engaging professional funding agencies and widening participation. Last but not least, I have focused on Eureka and industrial-oriented ERANETs (and eventually also JTIs and public-private partnerships PPPs) taking into account our particular focus on SMEs; but obviously, similar schemes could be envisaged and potentially feasible also around COST regarding academic-oriented ERANETs (including JPIs or P2P public-public partnerships).

- i.) More intense and efficient networking using existing schemes like Eureka.

The first recommendation is aimed at avoiding further fragmentation of the ERA and divergence among member States by using well established and experienced intergovernmental structures to help implement EU instruments (ERANETs in particular and potentially future JTIs/PPPs based on Eureka Clusters): Eureka as a “clearing house”. This is so as most publicly funded R&D is national and intergovernmental schemes have the potential to attract national and regional funding support, thereby contributing to widen the current perimeter of coordinated R&D efforts at European level. As such, they should be further explored and exploited by EU institutions and national Agencies in the revitalised ambition to build a more integrated ERA.

On the governing side, the European Union being a full member of EUREKA, it makes sense that it makes full use of its potential by empowering the EUREKA network and Secretariat with a coordinating function of calls emerging from industry-oriented ERANETs: a “clearing house” role for the EUREKA Secretariat as a service organisation would be straight forward. Evidence backing that this is possible is provided in ANNEX I.2. documenting some pioneering calls that were actually managed through the Eureka Secretariat.

On the operational level, information services should be set up and encouraged by public authorities in order to serve SMEs in particular with the best possible information available about potential technologies and partners of their interest across Europe, thereby creating favorable conditions for more frequent and intense cross-border partnerships in Europe (micro-level) thereby furthering also increased coordination of the European R&D fabric (macro-level), via ‘bottom-up’ spontaneous proposals, this being a characteristic of Eureka.

Last but not least, increasing pressure for business in general and SMEs in particular derived from globalization forces and more rapid innovations means a growing use of non-internal technology developments, both by outsourcing and strategic alliances (Narula, 2001). Also, products are increasingly multi-technology, leading to a growing use of networks by all firms, increasingly international networks (OECD, 2008 b). Combining the features of Eureka and industry-oriented ERANETs would serve more firms with knowledge and assets which might not necessarily be available within their national borders of the firms, SMEs in particular.

ii.) Structural Funds to activate latent potential for trans-national collaboration

Further identify and exploit latent research and innovation potential in cohesion regions and new EU Member States, exploiting synergies and complementarities through more intense intra-European cooperation. Structural funds are aimed at reducing the disparities among regions and nations, also in science, technology and innovation. To do so, Operational

Programmes need to focus on measures able to create and consolidate the necessary infrastructure and interrelations within the corresponding National / Regional Systems of Innovation. This is in line with the widespread adoption of 'Regional Smart Specialization Strategies' (RIS3)¹⁸.

A number of countries have used Structural Funds in the past to create or modernise scientific infrastructures as well as to better equip Universities and Research Institutes. Similarly, it seems interesting to further promote the use SF also for technology demonstration purposes of relevance to industry in cohesion regions securing, at the same time, a European dimension in their implementation, including eventually also relevant partners.

3.6.2 Feasibility and potential of the policy recommendations

Both policy recommendations above are complementary, as one concerns the implementing network (EUREKA) and the other increased funding means (SF). However, it could be argued that SMEs are very numerous across Europe, their needs too diverse and their potentialities so heterogeneous to realistically allow for some sort of "critical mass" of such a community of actors to the building-up of the ERA. Moreover, building even further that logic and translating it within the FP (the European Commission contribution to ERA), there could be a temptation to confine SMEs into "ghettos" or to segment them in the FP themes, thereby loosing much of the connectivity that SMEs can provide to the system, precisely because of their diversity.

Further to economies of scale, SMEs can also input economies of scope to the overall European R&D fabric through their flexibility and rapid response to prospective market trends. The proposals concern the firm level, as innovation comes increasingly from multi-technology and interdisciplinary interactions (Narula, 2001). Also, at policy level, concepts like "related

¹⁸ <https://s3platform.jrc.ec.europa.eu>

variety” support the rationale for ERA to involve firms and SMEs from across sectors and regions (Georghiou et al., 2008). In short:

- most innovation is outside the firm (and beyond, across-borders),
- increasingly, innovations are multi-disciplinary and cross-sectorial.

Consequently, diversity can be an asset for Europe and trans-national, cross-sector, multi-technology fertilisation in R&D increasingly necessary in building up the European Research Area (ERA). Creativity can often come from the periphery. And consequently, Europe should further open-up ERA to the whole European population of firms and SMEs establishing the right balance between “big science”-based innovations (agglomeration) and network-based innovations (connectivity).

Our critic is that the advocates of a too strict and narrow application of the “subsidiarity principle” for R&D support policies to SMEs, that is to say, having primarily or exclusively national and regional policies supporting research and innovation by and for SMEs at that same level, would deprive large European undertakings of the creativity, dynamism, potential and market proximity of SMEs (including future “Joint Programming Initiatives” i.e. public-public partnerships – as well as industry led undertakings or “Joint Technology Initiatives” i.e. public-private partnerships).

On the other hand, excluding SMEs from R&D at EU level, would reflect a somehow limited vision of Neoclassical economists and “market failures”. Evolutionary economists have demonstrated that innovation results not only from the scale of the research and innovation resources but also from the linkages in the whole system. Consequently, policies need to be set-up also at national and European level in order to compensate for “system failures”. The importance of Open Innovation in Global Networks for firms as advocated by (OECD 2008 b) is an additional argument.

Consequently, by participating in European R&D collaborative projects, SMEs cannot only learn but also expand the connectivity across Regional and National Innovation Systems thereby contributing to the European R&D effort. In short, European policies need SMEs as much as SMEs need European policies, including support to R&D collaborations, trans-national partnerships and innovation-friendly ecosystems, a subject matter we will explore in subsequent Sections of this dissertation.

As the number of synapses is key for the intelligence of a human being, linkages built-into the system are relevant to Europe’s competitiveness, thorough appropriate trade-offs between

specialisation and diversification, as well as a balance between excellence and cohesion. To that aim, policy learning and commitment to the building-up of ERA could be encouraged with new incentives by the EC. Such a rationale is reflected conceptually in the Figure 13 below.

Regarding scope, EUROSTATS started to produce 'R & D budget statistics - transnationally coordinated research' with data from 2012 in a experimental data collection [http://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_budget_statistics -
_transnationally_coordinated_research#Data_sources_and_availability](http://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_budget_statistics_-_transnationally_coordinated_research#Data_sources_and_availability) from which, basically three conclusions are drawn, confirming that that coordination is stagnated recently:

- "On average, about 3.8 % of EU Member States' R & D budget was directed to 'transnationally coordinated research' in 2010
- The share of countries' R & D budget directed to 'transnationally coordinated research' decreased slightly in 2010 compared to 2009
- Framework Programme instruments for coordinating national R & D programmes and other Europe-wide R & D programmes are a major driving force for transnationally coordinated research activities".

Figure 13: Conceptual summary of recommendations. Own elaboration

Looking ahead, NETWATCH established by the European Commission in the JRC-IPTS <http://erawatch.jrc.ec.europa.eu/> stresses that *‘One way to enhance the participation of countries in Public-public partnerships (P2P) such as Joint Programming Initiatives, ERA-NETs, Article 185 initiatives is to deploy European Structural and Investment Funds (ESIF). This goes for all EU Member States; it could however be especially beneficial for new Member States’*. ESIF will invest up to 90 billion euros in innovation and research in the period 2014-2020. Moreover, Article 17a of the Horizon 2020 Regulation and Article 31 of the Rules for Participation encourage synergies between Horizon 2020 and other European Union funds, such as ESIF. The principles to use ESIF for ERA-NET, Article 185 initiatives and JPIs:

- Article 185 initiatives (like EuroStars): Member States may use ESIF, however only purely national contributions will be taken into account for the calculation of the Union’s contribution from Horizon 2020.

- ERA-NET: Part of a co-funded joint call could receive funding from ESIF but only the part involving purely national contributions will be included in the calculation of the funding from Horizon 2020. Individual projects funded under the call can however receive support from ESIF in compliance with national and ESIF funding rules.

- Joint Programming Initiatives (JPIs): There is no limitation to use ESIF in JPIs provided that respondents to Joint Calls observe the rules for ESIF funding. The only exception is if the Strategic Research Agenda (or part of it) is implemented via ERA-NET or an Article 185 initiative. In those cases, the conditions to combine Horizon 2020 and ESIF applicable for ERA-NET and Article 185 initiatives have to be met.

In summary, in spite of all the policy experimentation with new instruments since the FP6, continued with FP7 and Horizon 2020, the level of policy coordination through project collaboration beyond the FP itself has not grown. Building new instruments takes enormous time and effort, which is a strong argument to simplify the landscape as proposed in this Section by using existing networks and funds. In this connection, since 2008 Eureka has ‘de facto’ acted as a ‘clearing house’ for two pilots ERANETs, EraSME and CORNET which adopted the EuroStars model of evaluation to the satisfaction of respective stakeholders, demonstrating that this function is feasible. Moreover, since 2012 the Eureka network has further explored the regional dimension of innovation to help fund its projects which indicates there is further potential to be exploited.

Within the 'established paradigm' in the Europe of knowledge (trans-national cooperation in R&D) one can conclude that acceptance and implementation the policy recommendations put forwards in this Section would further the level of transnationally coordinated R&D and thus contribute to the attainment of the ERA mobilizing business in general and SMEs in particular.

4 SECTION II – CONTEXT AND HUBS: Building Pan-European Innovation Ecosystems: The European Institute of Innovation and Technology's co-creation approach to innovation

Notwithstanding long standing public support to R&D across the EU in general and collaborative R&D in particular since the 80's discussed in Section I, evidence shows that Europe is struggling to narrow down the innovation gap with global leaders (notably the US) and emerging players. Interestingly, taking aside defence sector, European citizens already invest publicly per capita in R&D more than their US counterparts by 2010, the target year for the Lisbon Strategy. Consequently, this means not only the level of public support but also the design of smarter policies is key in attaining the objective of narrowing down the innovation gap. In fact, a large part of this gap is explained by the lack of young, dynamic new firms i.e. not all SMEs but a specific subset of them can bring about disruptive and growth potential.

The 'European Institute of Innovation' (EIT) is a relatively recent policy experiment to foster entrepreneurial mind-sets in general and new business creation in particular as these are two areas where Europe has been clearly lagging behind. Formally agreed in 2008 at EU level jointly by the European Council and Parliament, the EIT crystalizes Europe's political will to approach innovation radically different through a focus on people. Recognizing the nature of knowledge and systems of innovation theory, EIT operates through so-called 'Knowledge and Innovation Communities' (KICs) integrating excellent partners from the Knowledge Triangle of Higher Education, Research and Business, for bottom-up 'co-creation' of new innovation models and, ultimately, Pan-European cross-border ecosystems.

This Section discusses EIT-KIC 'living partnerships' as a novel innovation policy paradigm compared to previous support schemes at EU level, considering features like: 1. KICs' role as forerunners of communities-driven innovation schemes for grand challenges, 2. Innovative governance and management of EIT-KIC partnerships and 3. KIC's co-location centres as meeting points of knowledge, skills and entrepreneurial attitudes. Also, distinctive issues on how EIT operates and what it actually does is critically assessed and learned.

4.1 WHY A NEW APPROACH FOR INNOVATION? THE EIT

The ‘European Institute of Innovation and Technology’ (EIT) is formally a ‘body’ of the European Union created in 2008 by a legislative act jointly passed by the European Parliament and Council of the EU, its so-called ‘Regulation’¹⁹. Proposed first by the former Commission President José Manuel Durao-Barroso mid-term review of the Lisbon Strategy in 2005 in an effort to overcome the so-called ‘European paradox’ whereby Europe was good with scientific research but did not managed to get this translated in innovative products and services. EIT was ‘inspired’ by US ‘Massachusetts Institute of Technology’ (MIT)’s success with entrepreneurship-driven innovations, successfully impacting and shaping new world markets, as well as by its focus on people and ecosystems capturing the human and social factors of innovation.

However, EIT is a distinctive European set up as, unlike MIT, EIT is not a University but aims at mobilizing European Higher Education institution in fostering their ‘Third Mission’ (in addition to Education and Research which constitutes the XIX century Humboldt model), thereby reaching out to business and, ultimately, to society. In so doing, EIT associates also business and research centres together with Higher Education institutions. Its web presents EIT as:

“A new initiative at Community level, the European Institute of Innovation and Technology should be established to complement existing Community and national policies and initiatives by fostering the integration of the knowledge triangle — higher education, research and innovation — across the European Union.”

Further, its Regulation frames EIT’s activities in so-called ‘grand societal challenges’ which are taken as opportunities for entrepreneurs, thus departing from long-standing European and national policy schemes that target either disciplinary knowledge or sectorial business. Facing ‘grand societal challenges’ was first put forward in a report to the Commission by

¹⁹ <https://eit.europa.eu/regulation>

(Georghiou et al., 2008) in order to focus research and innovation efforts in areas of significant value to society, beyond an economic discourse only. However, EIT's approach is to complement and leverage existing innovation-related capacities and public support available. In other words, EIT does not replace action at EU or national/regional level, rather builds upon them and adds a novel EU-level agenda for Higher Education Institutions previously non-existent. EIT Regulation says:

“...contribute to sustainable European economic growth and competitiveness by reinforcing the innovation capacity of the Member States and the Community. It shall do this by promoting and integrating higher education, research and innovation of the highest standards.”

In the early days already, its Governing Board stressed that EIT was not ‘another research institute or funding council’. Rather, its goal was to unlock Europe’s innovation potential through the integration of the ‘Knowledge Triangle’ and existing capabilities which Europe does have. Far from a mere grant giving agency, the EIT vision was to become a ‘Entrepreneurial Impact Innovation Institution’ focusing on seeding and on fostering Pan-European innovation eco-systems through its KICs, the first three were designated in 2009 and set up during the course of 2010. They are addressing societal challenges like climate change mitigation and adaptation (through **Climate KIC**), sustainable energy (through **KIC InnoEnergy**) and future information and communication society (through **EIT ICT Labs**) indicated in the Regulation.

According to the EIT, KICs enable top-class European education, research and business by forming, in principle, 5 to 6 entrepreneurship-driven **innovation hotspots called “co-location centers”** spread across Europe but aimed to work closely together across borders in education, business creation and innovation. **KICs** integrate public and private research organisations, innovative industries, higher education institutions, investors, etc. The KICs are legal entities led and managed **by a CEO** and operate on the basis of **business plans**. The EIT and the KICs are designed to continuously learn from each other as well as to consolidate the **EIT as a knowledge pool** for future KICs based on the experience with this first round of KICs.

The EIT is financing the KICs with **25% seed money**, whilst expecting them to **counter-finance 75%** of their activities from other public and private sources. It is also expected that the KICs would become self-sustainable in the long-term, notwithstanding continuous support to some elements of public interest, including in particular education and good practice learning. The EIT managed about 300 million € over the period 2010-2013. Taking into account the novelty and potential of its approach, but also early **evidence of first results and successes emerging from KICs**, the European Parliament and Council decided in 2013 to endow the EIT with further 2.7 billion € for the period 2014 to 2020.

Already in 2011, the European Commission proposed a 'Common Strategic Framework for EU Research and Innovation Funding' bringing together the Framework Programme for Research (FP7), the innovation actions of the Competitiveness and Innovation Framework Programme (CIP) and the European Institute of Innovation and Technology (EIT). Since 2014 EIT's action is actually part of Horizon 2020, the EU's new framework program for research and innovation contributing with its emphasis on **education and entrepreneurship**, although EIT maintains its legal status as a 'EU body' and specificity.

That means that EIT benefits from simplifications introduced for the overall H2020 but can also put forward derogation requests. Formally, the EIT's action is inscribed within the 'Societal Challenges' pillar of Horizon 2020; KIC partners take part in all Horizon 2020 calls and activities on equal footing with other applicants. With the practice, the first three KICs have 'populated' many other policy instruments of the Horizon 2020 becoming active players also in agenda setting, new platforms and recent partnerships set up by the EU such as 'Strategic Energy Technology Plan' (SET Plan) or Future Internet Public-Private Partnership (FI-PPP). Also, KICs have increasingly gathered private and public stakeholders' trust considering, respectively, the growing number of business firms joining KICs and national/regional funds pulled together. Data backing this will be presented in the following Chapters. Regarding practices and synergies with other instruments, EIT has produced a couple of publications (EIT, 2012 and 2013).

Overall, the enlarged EU budget for the EIT would allow scaling up its first three KICs as well as to prepare new waves of KICs through a gradual portfolio increase with 5 new KICs. A first call for two more KICs was successfully launched in 2014 resulting in two more KICs designated by the EIT Governing Board in December 2014 (Raw Materials and Healthy Leaving and Active Aging). Two more joined in 2016 (Advanced Manufacturing and Food) and another one in 2018 (Urban Mobility) after the mid-term evaluation of the EIT and Horizon 2020 that was undertaken in 2016-2017 ²⁰. The choice of the themes was closely aligned with the societal challenges of the Horizon 2020 corresponding pillar.

²⁰ https://ec.europa.eu/info/publications/staff-working-document-european-institute-innovation-and-technology-eit_en

In addition, EIT tried to **codify and disseminate good practice** beyond KICs partners of interest to other stakeholders. This is a critical task if EIT wants to be ‘more than the sum of its KICs’ and inspire novel innovation models as ‘an Institute for Europe’ overall. Indeed, in policy terms, EIT’s ultimate success will depend not only on whether KICs actually produce innovations, but also innovation models resulting from ‘Knowledge Triangle Integration’ other stakeholders can potentially emulate thus amplifying the institutional impact of the EIT beyond its own budget. Indeed, considering the multiplicity of agencies and administration units at the EU level and in the light of the additional complexity resulting from innovation policy programs in a multilevel contexts, one can ask like Susana Borrás²¹ in 2015 citing (Granieri and Renda, 2012) “*whether an innovation policy can aspire to be really disruptive without disrupting its own organizational framework*”. To what extent EIT will be able to achieve both efficiency and effectiveness is still to be seen considering its limited time span and experience still today.

Following (Jayaratna and Wood, 2008) “every innovation is a new thing but not every new thing is an innovation”, as any innovation requires a combination of a good idea and successful market entry. In this connection, some define innovation as ‘invention plus commercialization’ (Domingo, 2013 - citing Ken Morse). Ultimately, innovation faces a **double uncertainty**: that of novelty plus a second one, linked to its ultimate impact (Borrás and Edquist, 2013). In so doing, beyond projects and links (Section I), one needs hubs and context (Section II) where innovation can thrive, hence the need for ‘Holistic Innovation Policies’ (Borrás and Edquist, 2019) when targeting Pan-European Innovation Ecosystems.

With Section II, I critically assess the **first uncertainty**: what makes the EIT unique as new paradigm for European innovation policy by introducing activities aimed at shaping Pan-European Innovation Ecosystems in the policy portfolio of the EU. I target this first question on what is new about EIT support to innovation examining its governance, management and content agendas, from which I spell out some policy principles on what the EIT is and not, which might be useful to assess the **second uncertainty**, obviously too early to say as this would

²¹ <https://susanaborras.com/2015/02/21/transforming-innovation-policy/>

require time for EIT to develop its potential. However, Section III will scratch the surface with a case study, namely, EIT Digital's business accelerator.

4.1.1. Scope and objectives of this Section

The EIT is policy experiment to get the EU back on track for entrepreneurial innovation and crystalizes Europe's political will to approach innovation radically different with an increased focus on people as vehicles of change, which is very much stressed by its focus on education for entrepreneurship, meaning a novel agenda at EU level for European Higher Education. On the other hand, EIT's operations through its KICs ultimately result in a Pan-European cross-border network of hotspots encompassing bottom-up 'co-creation' of novel innovation models. Inspired by the successful US 'Massachusetts Institute of Technology' (MIT), EIT aims at capturing two fundamental elements of MIT success: entrepreneurial talent and enabling spaces, notwithstanding fundamental difference with the EIT's Pan-European dimension of its operations: KICs actually interconnect local ecosystems (so-called 'Co-Location Centers' or CLCs). The emphasis is on learning by doing, constructive mind-sets and risk appetite.

Up until today, there has been very little research focused on the EIT model and the few published papers focused on the period before its foundation in 2008 (Jones, 2008; Jofre et al, 2009; Gornitzka and Metz, 2014b). Notwithstanding the intense debate which preceded its actual set up (Didier, 2010; Tindemans and Soete, 2007), there has been no substantive research about the EIT's "infancy" (2009-2010) and, particularly, "adolescence" (2011-2015) period which correspond, respectively, to the designation of the first three KICs and the consolidation of their relations with EIT. A first evaluation of the EIT was published in 2011²² as a precondition for the scaling up of its former operations with a significant budget increase proposal for the EIT within Horizon 2020 2013-2020. Consequently, the motivation and focus of this Section is about the period when the concept of the KICs was formed and tested in practice by EIT from 2011 to 2015 when the author was Director of the EIT.

More precisely, regarding the scope of Section II, I investigate the distinctive features of EIT-KIC 'living partnerships' compared to any other pre-existing offerings at EU level, regarding

²² https://eit.europa.eu/sites/default/files/eitreport_en.pdf

its architectural foundations and added value for European innovation policy, as well as in overcoming the problems identified in Section I. In so doing, I focus not so much in support to existing business (SMEs was the target of Section I) but, rather, setting up the conditions for young, dynamic innovative new business firms to start-up and, ultimately, at least some of them to scale up globally. In addition, I discuss in more detail the novelty of the management approaches and critically assess the content of EIT regarding both the way it operates and what it actually does, to finally draw policy conclusions and observations.

As the EIT is still under-researched, this dissertation represents a novel contribution to the field of innovation policy studies – see ANNEX II.1 for a brief description of EIT and the so-called ‘KIC model’. The following pages try to expose the foundational novelties of the EIT, on the basis of how and what KICs actually partner with and operate for the EIT overall. The discussion emerges from the author’s direct experience with the EIT and its first three KICs from 2011 to 2015 and aims at triggering academic interest about the EIT as a policy experimentation for innovative governance (Leceta and Konnola, 2019). Further, ANNEX II.2 provides building blocks for potential future research agenda on the EIT.

4.1.2. Research questions and methodology

While focusing on the 2011-2015 period, the research questions of this Section concern a number of issues with theoretical and practical implications, the overarching question being ‘what is’ new about EIT’s cross-border support to innovation at European level compared to previously existing EU policy offerings. I address this at three levels: foundational features of the EIT, the way KICs partnerships are managed and the content of the agendas EIT/KICs foster:

- What foundational features of EIT partnerships with KICs are distinct regarding societal challenges, governance architecture and local presence through its CLCs?
- How does the EIT intend to make a difference in the way it manages its partnerships and operations through its KICs?
- What new value propositions does EIT generate through the ‘pillar agendas’ of its KICs?

While the PhD candidate engaged in open-ended and semi-structured interviews across the EIT community, the core insights were constructed while working for the institution in day to day interaction and engagement in the development of the EIT and building upon testimonials and experience gathered from EIT’s constituencies, namely, EIT Governing Board members,

KIC CEOs and EIT staff in Budapest. However, while action research, and the case study methodology in more general, is suitable for describing new phenomena, it is also subject to interpretation biases and contingency factors not present or transparent in the final case description (Yin, 2003). Therefore, in the research the findings are attested by proofs documented in empirically grounded materials developed by the EIT. Also, former literature is useful to the extent that it may capture the expectations formulated around the decision to set up the EIT in 2008 (2009-2010), i.e. before the period that the dissertation focus upon.

The Section is structured in three Chapters and based on the available documentary evidence, interviews and testimonies gathered by the author as indicated above:

- Chapter II.2 reviews EIT's pioneer role of communities-driven innovation schemes for grand challenges; the governance and management approach to EIT-KIC partnerships and KIC's co-location centers as meeting points of knowledge, skills and entrepreneurship.

- Chapter II.3 discusses the novel approaches adopted by the EIT in managing its partnerships with KICs regarding monitoring of results, simplification and dissemination.

- Chapters II.4 discusses EIT education, entrepreneurship and world-class innovation agendas.

4.1.3. Conference engagements and publications

Two draft papers have been published as a result of the work undertaken for Section II, the first in collaboration with my PhD Director Gonzalo Leon and the later led by the PhD candidate setting up the basis for the empirical part of the dissertation in Section III:

- León, G., Leceta, J.M. & Tejero, A. (2018) "Impact of the EIT in the creation of an open educational system". *International Journal of Innovation Science*. Vol. 10 Issue: 2, pp.178-206, DOI: 10.1108/IJIS-09-2017-0090
- Leceta, J.M. & Könnölä, T. (2019) "Fostering entrepreneurial innovation ecosystems: lessons learned from the European Institute of Innovation and Technology", *Innovation: The European Journal of Social Science Research*, DOI: 10.1080/13511610.2019.1612737

In addition, I presented working papers to research Conferences and Universities which helped mature the above mentioned papers and where I also gathered useful comments for this dissertation and above mentioned papers:

- The ‘European Forum for Studies of Policy for Research and Innovation’ (EuSPRI) created by Prof. Stephan Kulhman of the University of Twente, The Netherlands, organized its Annual Conference in Manchester from 18th to 20th of June, 2014 <http://www.euspri-manchester2014.com/> including a ‘Special Focus Session on STI Policy in Practice’ chaired by Prof. Salles-Filho from the University of Campina, Sao Paulo and Prof. Fagerberg from the University of Oslo (TIK), University of Lund (CIRCLE) and Aalborg University (IKE). My presentation available here <https://drive.google.com/file/d/0B86C-xQccTcKZGIDRzNWeWk0aDA/edit>
- SPRU (Science Policy Research Unit of the University of Sussex, probably the most experience research unit in Europe, created by Prof. Chris Freeman almost 50 years ago and led today by Prof. Johan Schot) where I was invited to a Wednesday seminar in July 9th, 2014 to present the case of the EIT and its rationale <https://www.sussex.ac.uk/webteam/gateway/file.php?name=spru-wednesday-seminars-abstract---9th-july.pdf&site=25>
- “*Instituto de Gestión de la Innovación y el Conocimiento*” (Ingenio), created jointly by Technical University of Valencia and the Spanish National Research Council (CSIC) led by Prof. Jordi Molas, invited me also to a research seminar on December 19th, 2014 to present the experience with the EIT. <http://www.ingenio.upv.es/en/seminars/co-creating-cross-border-innovation-ecosystems-lessons-european-institute-innovation-and#.VICrqlJ3sc8>

Further, a couple of high profile academic activities emerged in connection with the above-mentioned presentations that I was responsible to organise myself:

- During my research fellowship at the European University Institute from mid 2014 to mid 2015, I organised an Academic Workshop on the subject “Transforming Innovation Policy for Europe: Towards a New Theory” at the Robert Schuman Centre for Advanced Studies (RSCAS) jointly with Prof. Johan Schot (Director of SPRU) and Prof. Brigid Laffan (Director of RSCAS) that took place on the 17th and 18th of February 2015. https://apps.eui.eu/Events/download.jsp?FILE_ID=7578
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- A Special Session on 'Transforming Innovation Policy' including also non -academic partners that I jointly organized with above-mentioned Prof. Kulhmann and Prof. Schot at the EuSPRI Annual Conference in Helsinki on the 10th-12th of June 2015. <http://www.euspri-helsinki2015.org/> hosted by VTT "Innovation policies for economic and social transitions: Developing strategies for knowledge, practice and institutions" <http://euspri.globalcomunica.com/helsinki-annual-conference-10-12-june-2015/> where I also presented myself a working paper on 'European Institute of Innovation and Technology: Policy Experimentation for Pan-European Innovation Ecosystems'.

4.2 WHAT MAKES THE EIT UNIQUE? RELEVANCE

Building upon its rapid establishment and the selection of its first KICs in December 2009 just 18 months following the adoption of its founding Regulation in 2008, the EIT managed to attract increasing support to its vision and mission, not free from criticism at some instances²³. This was visible in the EU decision on EIT's Strategic Innovation Agenda (SIA) and budget for the 2014-2020 period²⁴, allowing EIT to scale up its KIC portfolio and promote overall institutional impact, an essential task for the EIT to be more than what its KICs are, thus realizing the vision of a true Innovation Institute for Europe.

Indeed, unlike other European programs and initiatives, the EIT is “an Institute and not just a budget line”. Pure administration, no matter how efficient it may be was not sufficient. Similarly, providing added value to the KICs is a necessity yet not ambitious enough for the EIT as ultimately, the Institute had to generate benefits across Europe and its citizens through its emerging practices and learnings. In this light, the Conference that the EIT organized in June 2012 under the auspices of the Danish Presidency of the Council of the European Union, took a true outward looking view while mobilizing its overall set of ‘constituencies’ (Governing Board, Director team in Budapest, three running KICs at the time and their innovation hotspots, the co-location centers (CLCs) directors and partners) to critically review progress.

Why is the EIT architecture unique in innovation policy terms is the focus of this Section. In other words, beyond achievements such as setting up its first KICs and first evidence on results, as well as practices emerging from the first three KICs, we look first at the intrinsic features of the EIT-KIC partnering architecture in the way they were conceptualized by the founding EIT Governing Board. Subsequently, I examine other aspects on how EIT engages with KICs, such as their co-creation approach through the co-location centers of KICs and the EIT–KIC innovative governance approaches.

²³ <https://science.sciencemag.org/content/333/6046/1090>

²⁴ <https://eit.europa.eu/news-events/news/eits-strategic-innovation-agenda-sia-investing-innovation-beyond-2014>

This Chapter examines key issues of the innovative design the EIT adopted and its significance for European innovation policy against the background analysis set by (Ernst & Young / CEPS, 2011) report on *“Next Generation Innovation Policy: the future of the EU innovation policy to support market growth”*. The report, amplified thereafter by (Renda and Granieri, 2012) questioned former EU’s approaches to innovation, forecasting that *“without a radical change [...] Europe in 2020 will be only slightly different, in terms of goals achieved, from Europe in 2011, but it will cost more.”*

The authors describe a rather gloomy outlook for the future of Europe's innovation, “unless EU institutions and Member States decide to streamline existing policies and build a “layered” model of innovation, in which: 1. governments act as investors in key enabling infrastructure such as ICT and education; 2. as enablers of large technology markets where researchers and entrepreneurs can meet; 3. and as purchasers of innovation when key societal challenges are at stake. “ Notwithstanding the novelty of EIT, the report favourably positioned its KICs amongst the most promising innovation policy developments in the world together with the UK Technology Strategy Board’s Innovation Platforms on the one hand, and on the other, US Department of Energy’s Innovation Hubs on the other as simple but holistic innovation approaches pointing out:

“The initiatives launched by the EIT are indeed promising, because they also take a pan-European perspective in a setting in which national prerogatives tend to prevail over an otherwise obvious case for centralization. With a strengthened EU legal framework for venture capital, cross-border investment and dispute resolution, Intellectual Property protection and university-industry partnerships, these types of knowledge communities can really bring Europe to higher levels of competitiveness.”

Regarding foundational features, one can distinguish at least three distinctive ones of the EIT’s bottom-up co-creation way which I discuss in detail hereafter in this Chapter: 1. communities-driven innovation focused on societal challenges; 2. co-location centers working across European borders; and 3. EIT-KIC innovative governance. In discussing these key features, I will substantiate EIT’s specificities within the overall European innovation support fabric in order to ultimately underline why a new approach to foster innovation in the EU was indeed needed through the setting up of the EIT.

4.2.1 Communities-driven innovation for societal challenges

The European innovation policy landscape of instruments is already very populated if not crowded with numerous policy support networks, programs and players at different levels that have developed over several decades. As I discussed in Section I, first efforts to foster cooperation at European level in Science and Technology date back to the 1960's, including first inter-governmental agencies and organizations like ESA and CERN. Coordination of nationally funded R&D activities is encouraged since the beginning of the 1970's by COST and since the 1980's through Eureka, particularly within the ICT field. However, as outlined in retrospect by (Borras, 2003), it was only during the 1980's that agendas were backed by European Communities funding with the advent of the EC/EU Framework Program for R&D. Since the 6th edition of the Framework Program but particularly with the 7th edition and Horizon 2020, the EU has entered a period of experimentation resulting in a very complex tool box of instruments – see Figure 14

On the other hand, such policy interventions co-exist with many other national and sub-national schemes promoting R&D in research establishments and innovation in firms, public intervention being well anchored in economic rationales. Driven by globalization forces, the dynamics of the knowledge generation, translation and exploitation are becoming blurred, as they go far beyond traditional academic disciplines and business sectors. Against this background, with the Horizon 2020 framework program the EU has put a renewed focus on 'Societal Challenges' which, together with 'Excellent Science' and 'Industrial Leadership' form the three pillar structure of Horizon 2020 since 2014.

Also, there is a growing consensus that, from previous emphasis in markets and the firm, project-based networks and geographically-rooted clusters, 21st century challenges require new sort of policies. (E&Y, 2011) and work published thereafter by (Granieri and Renda, 2012) stress that community-driven innovation reflects the changing structure of certain markets and the complex dynamics of competition in many industries, new enabling technologies and transformative services, which are characterized by the following:

- “• Modularity. Products are composed of several “complementary units”, often produced by different companies, which must interoperate to enable use of the product. In many cases, there is a need to pool different patents and other IPRs (intellectual property rights) in order to enable the creation and marketing of those products.

- Interoperability. The increasing complexity of value chains in many markets and the modularity of modern system goods lead mostly to the predominance of incremental innovation

- Complexity/convergence. The challenge in many markets is to merge inventions and technological solutions developed for sectors that were previously separate. Ideally, the cluster of the future may merge competences and skills developed in different areas of specialization, and different geographic regions. “

4.2.1.1. Community-driven, co-creation schemes

By bringing together ‘Knowledge Triangle’ partners from Research, Higher education and Business through its KICs, the EIT is actually fostering communities to “co-create novel innovation approaches”, better adapted to their corresponding knowledge and competitive dynamics. In other words, EIT-KIC partnerships emerge from the shared belief that no hierarchy can possibly dictate top-down what novel schemes collective intelligence can possibly co-create bottom-up from KICs’ partners. Notwithstanding the need for ‘policy entrepreneurs’ (Huisman and De Jong, 2014) in forwarding and sustaining the decision to set-up the EIT, once in place, through its KICs, the EIT expects to co-create new innovation models for Europe. Contrary to pre-existing innovation schemes and “executive” funding agencies, the ideation, searching and “shaping” of such new models through its KICs is a distinctive feature of the EIT – See Figure 15 below.

Figure 15. The EU’s array of instruments and platforms (Granieri and Renda, Innovation Law and Policy in the EU. Towards Horizon 2020, Springer, 2012). To the left of the figure, one finds capacity building, ‘enabling schemes’ and to the right, ‘market take-ups’ at least potentially.

The report on new rationales for a European Research Area (ERA) commissioned by the former Directorate General for Research of the European Commission in 2008 (now DG Research and Innovation), was amongst the first to mention 'Grand Societal Challenges' in the search of a renewed mission for European science. Interestingly, since 2009 the EIT pioneered de facto such 'Grand Societal Challenges' such a novel approach which has resulted in one of the three pillars of Horizon 2020 only since 2014. The approach is very different, however: while other ERA instruments see Challenges as an opportunities to establish a renewed 'contract' between society and science through mission-oriented research (with similarities with what US Federal Agencies have done for decades), the EIT considers such Challenges as 'inspiring frameworks' where European rooted ecosystems working strategically together across borders may help foster and grow next generation entrepreneurship-driven innovations in Europe.

4.2.1.2. Grand challenges as entrepreneurial opportunities

On the other hand, former European policies for innovation at EU level were unnecessarily constrained by the 'sacro-saint' principles of precompetitive research on the one hand, and 'subsidiarity' regarding what innovation projects to support, on the other. Fortunately, as the case for more integrated and pervasive innovation policies at EU level is clearly gaining momentum with Horizon 2020, the EIT represents a focused contribution in trying to set enabling conditions for a more holistic and creative approach to policy shaping in order to narrow down the innovation gap with the US where young, world-class and high growth innovative firms have characterized innovation performance since the 1990's.

In order to do so, the focus of EIT is definitively on talented people and dynamic ecosystems. Like start-ups or entrepreneurs, themselves, and consistent with its vision as an 'Entrepreneurial Impact Investment Institute' the EIT Governing Board formulated, the EIT embraced a learning by doing 'credo' as EIT was about exploring new innovation models, not just implementing instruments and funding. Likewise, KICs are not simple 'beneficiaries' but partners to the EIT, something captured both in the way their operations are structured around co-location centers as well as their innovative governance which examine hereafter.

4.2.2. KIC co-location centers: a meeting points of knowledge and skills

In stressing the experimental and creative nature of the EIT, the legislating EU institutions gave ample margin to the EIT in translating the political mandate for the EIT down into an operational model for the KICs. In fact, the 2008 Regulation did not a priori specify all the

requirements of the 'KIC model'. Instead, it was the founding Governing Board of the EIT who conceptualized key issues like setting up KICs as autonomous legal entities and the structuring of their activities around so-called 'Co-Location Centers'. Similarly, the EIT Regulation did not specify that each KIC should be run by a CEO nor the principle of 25% EIT 'seed' funding; this principle requires 75 % of a KIC's funding to be gathered from non-EIT sources, including not only contributions by KIC partners themselves but, equally important, also by other regional, national and European programs, thus aligning multilevel innovation agendas.

4.2.2.1. Integrating explicit and tacit knowledge in practice

The first observation concerns the structuring of KICs' CLCs which the founding Regulation did not mention and the amended Regulation in 2013 finally defined as: *'a "co-location centre" means a geographical area where the main knowledge triangle partners are based and can easily interact, providing the focal point for the KICs' activity in that area'*. Contrary to most European-level R&D support schemes, managed through consortium agreements, the EIT's KICs offer 'spaces' where partners collaborate, together with higher education institutions working towards their 'third mission'. In other words, KIC CLCs provides the environment to unite and merge both explicit and so-called 'tacit knowledge', a key concept in cognitive science and entrepreneurial innovation (Polanyi, 1958).

Leveraging on capabilities available in Europe is also distinctive feature of the EIT which reflects on the one hand the 'sticky' nature of knowledge, and on the other hand, the fact that the EIT could hardly contribute to creating new capacities 'ex novo' with the financial means available to it through the EU budget only. In that connection, the founding Board members rightly stressed that the EIT should not become 'another funding instrument' but rather an intelligent broker or 'Impact Investment Institute' catalysing partners and resources. This was put forward in the Governing Board proposal for a Strategic Innovation Agenda 2014-2020²⁵ and budget proposal submitted by the Commission to the European Council and Parliament for EIT in that period.

²⁵ https://eit.europa.eu/sites/default/files/EIT_Strategic_Innovation_Agenda_Final.pdf

In fact, former EU-level support for innovation policy design to regional stakeholders has essentially been limited to promoting mutual learning and exchange of good practices among regional Clusters (Pro-Inno, e.g.) or, more generally, Smart Specialization Strategies. This is very far away from a strategically aligned and shared programme of action across borders of the scale that the EIT ambitions. On the other hand, as I discussed in Section I, most of the EU centralised budget today still concerns trans-national R&D collaboration through contractual agreements amongst project partners. Such collaboration concerns research and business in particular, much less Higher Education Institutions. Consequently, by operating through CLCs, the KICs are novel approaches to ‘networked excellence’ across borders focused on generating entrepreneurial mind-sets, ecosystems and education within Universities’ third mission.

Figure 16. Composite map of the CLCs of the first three KICs in 2011-2015 – source EIT.

4.2.2.2. Beyond talent mobility, trans-national incubation and acceleration

Once KICs as designated, their governance is set by the partners of each KIC community which rules also synergies across the three pillars agendas linked to the integration of the Knowledge Triangle (Research, Higher education and Business). And while mobility of professors, practitioners, researchers and students is extensively and actively promoted at both European and national level, new business creation has until recently remained very much a

locally rooted policy. This is due, not only to the ‘sticky’ nature of knowledge again, but also to the obvious limits of public intervention with national funds.

In a study promoted by EIT’s parent Directorate General of the European Commission (DG Education and Culture), ECORYS (2011), presents the content, definition and impact that differentiate co-location centres (CLCs) from mere incubation, whose wide spread use is raising efficiency questions (NESTA, 2011), hence the emergence of accelerators that EIT pioneered in recent years. An additional motivating factor for the EIT is that, as support to the KICs comes from EU budget and legislation, the overall ambition must be at least European or even global, beyond actual ‘presence’ in the US that EIT ICT Labs (renamed EIT Digital) established²⁶ or agreements like Climate KIC with China²⁷. In other words, business plans nurtured by KIC should ideally drive ‘new to the world’ innovations and at least some new ventures nurtured by KICs should eventually scale up to become global, young leading innovators.

While CLCs work together within the KIC governance and management structures, they at the same time exploit and take advantage of their diversity regarding themes, partners and local ecosystems, thereby fostering actual synergies and complementarities across European borders. This has several advantages over pure national policies fostering intra- and entrepreneurship, including wider accessible end-market and therefore larger potential demand, exploiting the ability of CLCs to facilitate ‘soft landing’, mutual exchange of support, exposure of the start-up business plans to other market environments, match-making international partners along the value chains to scale up trans-national impact, etc. In the end, KICs aim at facilitating opportunities to high growth potential ventures which can be nurtured and their growth accelerated with large corporations in the KIC partnerships as these later may become first launching customer to new ventures, opening innovation up in exchange to global footprint.

Literature on the economics of innovation regarding the internationalization of business R&D, particularly multinational corporations, presents two key drivers: ‘Market access’ (linked to asset exploiting strategies of those firms) and ‘Knowledge access’ (linked to asset

²⁶ <https://www.eitdigital.eu/about-us/locations/silicon-valley-hub/>

²⁷ <https://www.climate-kic.org/news/climate-kic-ceo-signs-partnership-agreement-in-beijing/>

augmenting strategies). However, as business firms increasingly need open innovation in global networks to remain competitive (OECD, 2008), new forms of knowledge production and exploitation are needed. In principle, the EIT represents a novel avenue for Europe to spin-off and spin-out successful business models by scaling them up through the combined value propositions and cross-border dynamics of KIC's partners communities. In a way, KICs are interesting forms of 'collaborative open innovation' I study in detail in Section III with EIT Digital.

4.2.3. Innovating innovation governance: the EIT's facilitating role

To conclude, the partnership approach conceptualized by the EIT founding Governing Board and successfully exemplified with its first three KICs (Climate-KIC, EIT ICT Labs and KIC InnoEnergy) presents also unique specificities regarding their governance and management. Here I refer to foundational features, like the requirement for KICs to be set up as Legal Entities, to be run as a business, funded by 'smart financial support' competitively allocated by the EIT to the KICs yearly against 'long term framework partnership agreements', etc. All these issues considered, one finds that inspiration for the way in which the EIT allocates annual grants may come from business and venture capital worlds, an issue to which I will return in the concluding part of this Section.

Indeed, while firms are obviously key to make innovation happen, the EIT is unique as it has also adopted business and portfolio management practices in shaping the way KICs are organised and their relations to EIT. Partnership is about agenda setting so as to shape new 'innovation models' in the operations of the KICs and not just about more traditional project call and implementation. KICs are therefore unique partnerships, not traditional R&D project consortia, as they also form a Board which appoints a CEO with clear targets, hence simplified term of KICs as 'innovation factories'.

4.2.3.1. Most dynamic sectors opt for contract-based partnerships

A first, paradoxical observation comes from the literature on strategy technology alliances, extensively studied by Hagedoorn (2002); which on the basis of evidence collected by MERIT Maastricht University since the 1960's proves that, high tech and dynamic sectors opt principally for pure contractual arrangements to undertake collaborative R&D, while joint ventures (and new joint ventures with legal personality) are more frequent in relatively mature and traditional sectors.

Consequently, the requirement for KICs to establish themselves as legal entities could appear at first sight as contradicting the natural choice for the EIT to establish its KICs are these

are requested and supposed to gather excellent partners. It was a deliberate choice, however, on the understanding but also the expectation that the effort and time invested to set up KICs partnerships will then be offset by their long-term accountability, autonomy and flexibility in their future operations and running as businesses. On the other hand, once fully set-up and mature, their prospect for results should scale up as KICs are very much 'living partnerships', dynamic networks and open communities. As it is still early to express an opinion about 'value for money' first evidence about the actual attractiveness of the KIC model can be found in the growing number of partners, particularly from business but also national/regional stakeholders. Available data presented hereafter can be interpreted as increasing trust in the KIC model.

Indeed, parallel to the on-going efforts to foster a seamless 'European Research Area' I discussed in Section I and which is being the subject of so much policy experimentation (joint programming initiatives, ERA-NETs, JTIs etc), the KIC model has been smartly engineered also to help both leverage private and academic resources around partnerships (i.e. their economic logic), as well as to contribute in aligning 'bottom-up' available sources of public support (i.e. their social logic) that characterizes Europe's multilevel innovation fabric: EU, intergovernmental/national and regional/local level.

Leverage of private support and increased commitment of business to knowledge and innovation, both by existing and new firms, is key in order to narrow down the 'innovation gap' compared to the US demonstrated leadership with high growth firm's entrepreneurial talent and ecosystems generate and scale up. Interestingly, if one excludes defense, public R&D support per capita in Europe is already larger than that provided by US citizens: the challenge therefore lies also in the definition of better policies able to leverage more successfully much larger private support. Business growing involvement in KICs is promising, contrary to the trend observed for the overall former FP7 – Data is presented in Figure 17 below

If one challenge for Europe is narrowing down the 'innovation gap' involving business a second one is to reduce 'fragmentation' of the public overall enterprise through more policy alignment and reduction of undue duplications. In this connection, the title of a follow-on report by (Ernst&Young, 2012) Ernst and Young report issued in May 2012 is very illustrative: *"The power of simplicity: Towards a smarter and streamlined innovation policy in the EU"*. The report underlines the urgency to radically change the limited approach the EU has taken so far in fostering innovation at a European level. Furthermore, the report positions the EIT promisingly, as KICs synergy with other instruments, not through top-down programming but through bottom-up policy alignment. Data is presented in Figure 18 below.

KIC PARTNERS EVOLUTION: 2010-2013

Message 1: KICs are gaining business trust

In 2013, the three KIC brought together over **350 partners**

25

Figure 17. Business trust in the growing path (EIT, 2014 Annual Report) – business firms were in the (2011-2015) timeframe the largest growing number of partners in the first three KICs.

By putting the KICs in the ‘driving seat’, the EIT facilitated community-driven innovation to decide themselves on the offerings at different levels matching their actual knowledge dynamics. In exchange, national governments find it increasingly interesting to entrust management of their relevant programs to ‘neutral’ partnerships while they benefit from KICs as European ‘gateways’. This is illustrated, for instance, by the German ‘Software Campus’. Software Campus is an initiative of the German Federal Government to promote and educate the future leaders of the ICT industry. Management of this nationally funded program was entrusted to the EIT ICT Labs through its Berlin CLC thereby giving it a European dimension (Seibel, 2013). Other Governments followed course resulting that EIT investment helped to align national and regional agendas through the KICs, and interesting insight for policy, considering the fragmented policy landscape we have discussed in Section I.

EIT FUNDING EVOLUTION: 2010-2013

Message 2: KICs are also gaining public trust

Figure 18. Public confidence on the growth path also (EIT, 2014) as shown by the leverage effect of EIT to national/regional public schemes voluntarily gathered around the KICs activities. Note a factor of 3 for regional public support leveraged by EIT's budget in 2013).

4.2.3.2. Co-creation requires facilitating, yet demanding support

Business taking part in KIC governance is certainly one of its attractive factors. On the other hand, EIT's profile and approach 'by design' is that of a broker and facilitator, hence very far away from a traditional or simplistic relationship between beneficiaries and administrator of grants. This is consistent with the emphasis on results and simplification of EIT's operations. In other words, compliance of public expenditure is a necessary but not sufficient condition, as ultimately EIT's partnership with its KICs is about investment for impact.

Once again, the EIT is not 'another' grant or funding agency. Nor are partners in a KIC mere 'beneficiaries' of a subsidy, as they are expected to contribute beyond co-funding with their intellectual and operational excellence as well as to mobilize resources and support beyond their own means, including projects and activities competitively gathered by the partners through

other European/intergovernmental and national/regional schemes. In 2013, each euro invested by the EIT has resulted in roughly three euros of national/regional support aligned by the KICs which demonstrates the increasing confidence of public stakeholders – See Figure 18 above.

All in all, the EIT remains a somehow ‘minority’ but ‘smart’ supporter providing up to 25 % of the KIC’s total budget to catalyze KIC operations to ultimately foster ‘behavioural additionally’ (Gök, A. and Edler, J. 2012), as communities of this size and ambition could not form without catalytic help. EIT role as an **Investor** and corresponding support would be minimized and eventually discontinued at some point in the long term as the KICs mature enough, their operations scale up and each of them develops sustainable sources of income beyond the minimum 7 years of their preferential relation and partnership with EIT.

Compensating for the fact that relative support is rather limited compared to other European schemes where 50% co-financing of collaborative R&D projects has traditionally been the norm (e.g. with the former FP 7), significant autonomy is allowed to the KICs. This autonomy makes governance and accountability challenging enough for EIT as the Institute does not fully ‘master’ the communities but, rather, strategically steer, facilitate progress and fosters cross-KIC synergies closely. Interestingly, KICs themselves mirror the EIT’s governing structures, as each CEO reports to a General Assembly or Board of partners which organize their collaborative activities around annual Business Plans.

Figure 19. Overview of the EIT’s governance and management structured dialogue with KIC (own elaboration during my term as Director of the EIT): the Chairman of the Governing Board leads strategic discussions assisted by an Executive Committee (a subset of the Board); the Director is the legal representative of the EIT and responsible for the operations a facilitating space, the ‘EIT KIC Forum’ facilitate with KIC legal entities own representatives, i.e. KIC CEOs.

At a strategic level, the EIT Governing Board interacts with the KICs twice per year since 2012. Informally first, every mid of the year through a Spring Workshop to which KIC CEOs as well as General Assembly Chairpersons and members are invited, thereby respecting their independence while steering developments of common interest (education, entrepreneurship and innovation). Secondly, a formal Hearing in December that influences the EIT Governing Board's yearly KIC grant allocation decision. Facilitating support and dialogue at executive level has been eased since 2011 with the setting up of a 'EIT KIC Forum' composed of the KIC CEOs and the EIT Director that meets one month ahead of each regular meeting of the EIT Governing Board to foster progress on issues of corporate interest.

Complementing its role as Investor, EIT has a second role as an **Institute**, which EIT started fulfilling by codifying emerging practices of the KICs in publications. A first one focused on *"Catalysing innovation in the knowledge triangle: practices from the EIT Knowledge and Innovation Communities"* (EIT, 2012) followed by a second one with an *'Analysis of potential synergies fostered by the European Institute of Innovation and Technology (EIT) in the EU innovation landscape'* (EIT, 2013). Such publications are first offerings of EIT's outreach strategy aimed at creating benefits beyond partners in KICs. Its future alumni community, stakeholders forum and regional innovation scheme, are other elements included in the Strategic Innovation Agenda (SIA) that should prove EIT is more than 'the sum of its KICs'.

Looking at the evolution of the KICs partnerships so far, there are two salient messages. On the one hand, as we have seen above business is increasing trust in KICs, a decisively important group of partners having joint KICs with the time; similarly, also national/regional program owners and policy makers are increasing their trust, considering the leverage effect of the EIT investments with voluntary public contributions aligned through the KICs. Last but not least, the EIT is also consolidating its double role as an **Investor** in KICs and **Institute** for Europe codifying emerging practices and increasing exposure to European stakeholders. Data presented in Figure 17 and 18 reflects a positive trend, that should be continuously monitored.

4.3 EIT's 'HOW TO' / MANAGEMENT AGENDAS

Having addressed the foundational features of the EIT as conceptualised and practiced with its first Knowledge and Innovation Communities (KICs), I now examine the Institute's agendas regarding the way those partnerships have been managed and in so doing, to what extent changes and inspiration may have been brought about to the European innovation landscape within Horizon 2020. In so doing, one should explain both what the EIT is and does

as well as what it should ultimately become in achieving the full potential of its KIC partnerships to not only create something new but also to deliver new innovation models compared to pre-existing public support offerings to innovation available in Europe.

One needs to stress that setting up EIT is a ‘journey’ all its constituencies (Governing Board, EIT staff in Budapest and, last but not least, the KICs themselves) and therefore it is equally important to learn as it is to share the learnings and experiences gathered along the way . This concerns both the EIT’s specific ‘how’ (management) and the ‘what’ (pillar) content agendas. In this connection, (Edler and Nowotny, 2015) argue that *‘an appropriate understanding and design of policies to support innovation need to understand conceptually the connection between the underlying innovation model (the “how”) and the normative claim of innovation policy (the “what for”).’* Indeed, formulating the right questions is key, as EIT and KICs are about ‘learning by doing’ within the margins of the Regulation first, without excluding also amendments to the Regulation in future financing periods. Concerning the ‘how’, one can distinguish three corporate agendas, the three of them in different stages of development centrally at EIT – see Figure 20 below:

Figure 20. ‘ EIT’s ‘How to’ / management agendas

4.3.1 Monitoring

A monitoring agenda reflects the Institute’s results orientation, this being a real ‘obsession’ for the EIT in its living partnerships, notably with the first KICs as EIT is not ‘another grant giving’ Institute but, an ‘engaged investor’; or, in the words of the founding Governing Board and brilliant

Chairman Martin Schuurmans when formulating their first proposal for a Strategic's Innovation Agenda, EIT should be an 'Entrepreneurial Impact Investment Institute'.

And as investors invest for impact, already in the early days the EIT Governing Board set a working group of members to define an EIT Scoreboard. Building upon that work following the designation of the three running KICs, a 'Task Force' was set up in late 2011 reporting to the 'EIT KIC Forum' composed of the three KIC CEOs and EIT Director with an external facilitator and Commission support in an observer status. Through a series of workshops, the group successfully defined a comprehensive 'Performance Measuring System (PMS) in early 2012. Thereafter, the PMS was declared operational end 2012.

More precisely, between December 2011 and February 2012, the 'Task Force' designed the EIT's strategy map outlining the Institute's strategic objectives and related performance indicators. Thereafter, implementation of the performance indicators – started in May 2012 and finalized in December 2012 -, completed the definition of the indicators and the plan to measure and evaluate performance. Obviously, indicators are output indicators, which set up a basis for future societal and economic impact indicators should be derived – see ANNEX II.2.

4.3.1.1. EIT Key Performance Indicators, funding and dynamics

Consistent with KICs enjoying a significant level of autonomy from the EIT, they also have set up a number of KIC-own indicators, reflecting the specificities of their respective thematic, knowledge dynamics and value creation portfolios. EIT's PMS is structured around three strategic lines and corresponding statements: 1. Enabling innovation/value creation (what EIT does); 2. Operational excellence (how EIT does it); and 3. Positioning (where EIT is).

For each strategic line, strategic objectives allocated to four dimensions (social, client, internal and learning) were defined jointly with the KICs through intense working sessions. Figure 21 displays the resulting strategic map and three strategic lines integrating the PMS and KPIs, whereby the second level provides for the common set of KPIs across the KICs (so called 'Core KPIs' focused on Enabling Innovation/Value Creation) and the third reflects EIT institutional impact (namely, Operational Excellence and Positioning).

Parallel to the above, EIT was able to set up clear criteria in early 2012 also in consultation with KICs in order to realize the ambition initially spelled out as part of the KIC Call in 2009, whereby annual funding to the KICs by EIT would be composed of a 'support funding' part and a 'competitive funding' part. This was successfully piloted in the 2013 grant cycle allocation decided by the Board for the first time and continued thereafter on each annual cycle.

However 'Core KPIs' supporting the EIT PMS have only certain weight in the competitive annual allocation of funding as KICs are all different and their results can only be partially compared. More importantly, KICs are expected to 'co-create' new innovation models and bring about a systemic change to the European innovation landscape both through direct deliverables as well as through new innovation models emerging from their operations. On the other hand, statistics can hardly capture the quality of results, regarding both long term impact as well as useful good practice.

Figure 21: Strategic map and strategic objectives of the EIT Performance Monitoring System (PMS) in 2013.

All in all, with the PMS the EIT aims to 'smartly steer' KIC operations while respecting their autonomy, governance and management. Reflecting the maturity of the relations through the PMS the Spring Workshop/Review in 2012 strategically considered also how to formulate future orientations to KICs regarding sustainability, balance between public and public interests and positioning, turning attention from 'infrastructural' discussions to actual 'content'.

4.3.1.2. EIT's PMS in the context of Horizon 2020

Data gathered and validated through the PMS is edited into a report of output of the EIT and its KICs that is attached to each EIT Annual Report, formally issued every year N+1 in June. In March of year N-1 tentative targets are estimated for the subsequent year N as part of the updating rolling Tri-annual Work Programme (TWP) of the Institute. In addition, a Working Group of the Board was set up in 2013 to investigate what methodologies could be considered for future impact evaluation.

Figure 22: EIT Performance Monitoring System (PMS) developed by EIT in 2013 and its four accountability levels.

Indeed, next steps are about elaborating methodologies to evolve from measuring outputs into evaluating impact in both societal and economic terms, ie. growth and job potential as well as to incorporate latest trends in capturing 'public value' of the EIT interventions including input, output and 'behavioural additionality'. All in all, the rationale was to position the Institute for the 2016-2107 mid-term evaluation of the EIT within the context of H2020 by self-evaluating KICs and EIT overall beforehand. In this connection, a pluri-annual programme of studies should be

put in place, mobilizing internal and external stakeholders, both on evaluation as well as good practice and learnings – see ANNEX II.2.

In line with Horizon 2020 and EIT's Strategic Innovation Agenda (SIA), the PMS is structured along four layers, supporting the needs of different constituencies, KICs themselves, EIT (with a double layer reflecting its double role as an **Investor** and as an **Institute**) and Horizon 2020, the EU framework programme for research and innovation where EIT is embedded since 2014 – see Figure 22 above. Interestingly, EIT PMS may have inspired parallel developments in Horizon 2020 as the new framework programme has also increased emphasis on resulting impact which was also aligned with the times.

4.3.2 Simplification

Simplification is a second agenda of interest on 'how' does the EIT manage its unique partnership with KICs at strategic and operations level. An integral part of EIT's overall mission which its founding Governing Board already stressed using the image of EIT as an 'ice breaker' in the European innovation landscape, in an effort to capture its ambition to foster behavioural change in institutions and a new mind-set in individuals. But, if "*innovation is the display of the ultimate achievement of human brain power*" which ecosystems can help thrive, "*the challenge for managers is to make their organisations break with tradition for generating innovative ideas, whilst ensuring that group cohesion and values are maintained*" (Jayaratna and Wood, 2008). In a multi-stakeholder, multi-level innovation environment such as the EIT's this is a very challenging task. Consequently, only first ideas and achievements can be sketched.

Naturally, as KICs are complex partnerships regarding both their diverse composition of business, higher education institutions and research actors, as well as the significant level of autonomy allowed, strategically steering and managing relations with EIT is also rather complex. Subtle structuring links between EIT and KICs at governance and management level were established in an effort to preserve KICs 'enabling role' whereby their creativity and contributions of partners can work bottom-up without undue constraints. Through an entrepreneurial 'learning by doing' approach from 2010 to 2013, increasing guidance was formulated by the EIT to the first three KICs. Path dependency also applies while development stages are clearly identifiable:

- Early expectations. In very early days, the delay in signing the framework partnership agreements to 2010 with the first three KICs following their designation in 2009 had to be offset with 'promises' of an enlarged flexibility to fundamentally remove administrative

red tape. During the maturation period till 2013, while maintaining that goal of making access to EIT and KICs simpler than was the case to other European programmes, a shared understanding emerged as to the need to secure an adequate balance between compliance and flexibility in order to make the EIT KIC partnerships sustainable by setting corresponding levels accountability.

- Identifying and operationalizing improvements. Thereafter in 2011 a Task Force reporting to the EIT KIC Forum of CEOs was put in place to help handle 'Finance' issues, thereby setting up a meeting point for KIC CFOs. The remit of the Task Force was further enlarged to cover 'Simplification and Finance' in 2012. And in 2013 a Working Group of Experts designated by KICs CEOs and EIT Director helped mobilize KIC partners' further ideas and experts from KICs day to day operations as well as to set up the basis for more impactful, breakthrough simplification measures in the longer run at the EIT.

4.3.2.1. Top down and bottom-up simplifications

In an effort to describe the simplification space, one can distinguish three dimensions which together compose an 'working space' where EIT needs to position itself in pushing the frontier thus minimizing red tape and maximizing partnership trusts through a co-creation process with the KICs:

i. Financing dimension: This concerns achieving incremental accountability in responding to early audits findings on EIT regarding initial years of operations of the first KICs. Technical and incremental improvements were targeted in order to prepare the basis to fully empower KIC Legal Entities proper controls vis-a-vis their corresponding KIC Partners. The above mentioned advisory group of experts assessed latest developments in grant management simplification in the Horizon 2020 context and provided concrete proposals for the 2014 grant cycle.

ii. Management dimension: To realize the ambition of EIT as a "icebreaker" more qualitative improvements to the former EIT / KIC interactions paradigm on planning and reporting were thereafter targeted e.g. setting up criteria to select projects at KIC level instead of controlling for actual projects at EIT level. A framework contract with a top consulting company was proposed in order to review the state of play regarding operational processes and readiness both at EIT and KIC Legal Entity levels.

iii. Legal dimension: In order to create radical flexibility, suitable derogations are needed to be thereafter reflected in the framework and annual grant agreements. Building together an ambitious but feasible "simplification Agenda" with EIT and the Commission benefited from the

transition to Horizon 2020 and was the subject of a working party connected to the 2014 KIC Call. Eventually also future amendments to the Regulation could and should incorporate the corresponding lessons learned.

Figure 23. Simplification space and dimensions for the EIT in partnership with its KICs. Own elaboration.

In its Tri-annual Work Program 2015-2017 (TWP), EIT stresses that simplification, “implemented in a responsible and accountable manner, is a must for the EIT to achieve effective results, promote innovation breakthroughs and for the involvement of the academic and business community in particular”. Overall, as a ‘smart investor’ in KICs, the EIT considers simplification as a dynamic process, embedded in the EIT-KICs partnership operations and administration reflecting a ‘learning by doing’ approach. As per its TWP, the overall objective of the EIT’s simplification agenda was to:

- reduce unnecessary administrative burden for the KICs as regards planning, implementation and reporting requirements by further exploiting current and future derogations;

- ensure predictability, timely decisions, coherence and clarity as regards requirements;
- align and optimise EIT/KIC business processes;
- achieve a result-oriented approach.

Like in any institution in the making, there is always room for the EIT to push simplification further within the remit of the Regulation. Some features are already built ‘top down’ into the system; for instance, access and exit of partners in KICs as ‘living partnerships’ which is basically decided by KICs themselves. Moreover, the EIT enjoys some derogations from the legislator whereby SMEs and individuals do not need to become formal partners to participate and receive financial support in the activities of the KICs within certain margins.

Bottom up, in close co-operation with the first three KICs a risk management and assurance strategy was been developed by EIT also to cope with the future scaling up of operations and funding to the KICs in the mid- to long-term. Further flexibility by the EIT requires a holistic system of criteria financing, monitoring and evaluation of KICs results which were formulated in broad lines early 2014²⁸ in connection with the 2014 KIC Call. Indeed, simplification and scaling up go hand in hand as the Institute prepares for an impressive growth of its KIC portfolio, operations and budget no other institution, certainly in Europe, has ever gone through before: from 3 to 8 KICs backed with a budget increase scale up from roughly 300 Million euros in the 2008-2013 period to aprox. 2.7 Billion in 2014-2020 period.

4.3.2.2. Simplification in the making: further potential

As an integral part of Horizon 2020 from 2014 onwards, the EIT consolidated and aligned its operating procedures within the new legal set up. In addition, the EIT is continuously reviewing and exploring opportunities whenever KICs may benefit from additional improvement. In this connection, the EIT reflected about a ‘trusted partner’ concept as a way to optimize its management in view of its growing number of future KICs through full empowerment to the

²⁸ <https://eit.europa.eu/sites/default/files/EIT-Principles-financing-monitoring-evaluating-KIC-activities.pdf>

Legal Entities. As a first step, the feasibility of such a concept was explored with the first three KICs in 2015. Furthermore, the use of simplified costs was further widened to converge towards a fully-fledged result-oriented approach. The use was extended in 2015 and would be gradually widened in subsequent years.

Concerning funding flows with a view to ensuring the quality of KIC financial reporting, a thorough risk assessment strategy was further improved in order to strike an optimal balance between systematic ex post in addition to ex ante verifications. This canvas of measures to ensure quantitative and qualitative aspects (at the planning, monitoring and reporting stages) achieved by the KICs was aimed at incentivizing them to outperform. Additionally, the EIT explored the potential benefits and implications of other financial instruments either alone or in combination with grants. Also, multi-annual grants will be examined in future financing periods.

Obviously, the KICs had put emphasis in the early days in producing first evidence of results and with the time, increasingly mature reporting has become available. In any event, simplification remains open to experimentation which requires the creativity and determination that is in the DNA of an 'entrepreneurial impact investment institute'. Through its annual grant cycles, the EIT can introduce learnings and be responsive but ambitious in realizing also expectations in this important domain. In summary, simplification has different meanings for different stakeholders. Obviously, taxes payers' money needs to be invested responsibly but, on the other hand, public intervention is ultimately about realizing what individuals cannot realize, appetite for experimentation is key (Mazzucato, 2013).

4.3.3 Dissemination

Early analysis about the EIT stressed that with the network approach finally decided by institutions, ruling out other options (Tindemans and Soete, 2007) and its focus on 'Knowledge Triangle Integration', the EIT could hardly become a reference model for Universities (Didier, 2010). Still, the founding Governing Board vision as per EIT 2011 Strategic Innovation Agenda (SIA) as an 'Entrepreneurial Impact Investment Institute' underlines a double role of the EIT as an investor in KICs and institute beyond the KICs, meaning both direct and induced deliverables from its KIC partnerships:

- Direct deliverables: **Breakthrough Innovations & Entrepreneurial People** fostering European excellence and competitiveness through KICs' CLCs as world-class

innovation hubs, working across borders and leveraging entrepreneurship-driven innovation, from local to global.

- Induced deliverables: **Reflecting EIT's role as an Institute for Europe overall**, which requires critical mass to position EIT Budapest as a knowledge pool and intelligent investor in KICs plus wide dissemination of KIC novel innovation models and practices across Europe.

The above means that also stakeholders beyond partners in KICs, not taking part directly in the activities of KICs, be them policy makers or innovation practitioners should ideally perceive some kind of benefit from the EIT's activities. After all, the Institute receives EU public funding which means an Institute for Europe and its citizens. This is very much a must if EIT wants to be more than the sum of its KICs. And as the profile of a funding entity, program or 'executive agency' is not enough, there is a strong need to create additional value. Hence this third 'How to' agenda on dissemination of models and practices.

The EIT KIC Forum in 2011 had the intuition that a meeting point for Chief Communication Officers was needed and consequently decided to set up a Task Force initially focused on communicating early results. Collaboration with KICs was very timely to shift discussions from 'container' to 'content' among stakeholders, which greatly contributed to achieve the enlarged budget for the EIT in H2020. The results were very encouraging by publishing good practices regularly which helped change the perception, particularly in the eyes of Parliament thus preparing the basis for the 2014-2020 budget discussions that ended up so successfully.

4.3.3.1. Individuals vs. stakeholders engagement

Obviously, the best way to get to know what KICs are is to get involved and experience their ecosystems. Partners with a long-term interest can apply to join this 'living partnerships'; SMEs can receive funding without complicated procedures whenever their contribution adds to KICs' success; and also individuals can access the KIC through the education, entrepreneurship or innovation agendas.

Taking into account the unique governance approach of the EIT whereby Member States in particular are not directly involved, the issue is how to best foster 'knowledge exchange' and disseminate emerging practices which public stakeholders in particular can then adopt and put in place with their own resources, including not only nations but also regions. The overall aim is clear in a multi-level EU of innovation, the EIT would effectively 'leverage' support and amplify the likely effect of its operations beyond its own budget.

The above is possible by aligning support to the current KICs, which countries such as Germany have done through EIT ICT Labs (EIT Digital) by entrusting the management of the 'Software Campus' (Seibel, 2013) as well as France and Hungary via different arrangements with this same KIC. Alternatively, the KIC model could also be reproduced at a national scale for other thematic domains better adapted to the strength, resources and dynamics of corresponding national innovation system. This is a trend which is gaining momentum in the policy portfolio of a number of countries, if one looks at the Innovate UK Catapults, Tekes Ecosystem instruments, Vinnova Strategic Partnership Programme and, at the other side of the Atlantic, more recently, the Super-Clusters²⁹ that Canada intends to pursue. More holistic innovation policies focused on ecosystems seems to be an emerging international trend.

4.3.3.2. Success stories, practices and future offerings

More or less tailored schemes for dissemination are also more or less complex to put them in practice, considering the nature of knowledge involved, both codified and tacit. Consequently, since 2011 the EIT has developed first offerings in its ambition to positioning itself as a knowledge pool and Institute for Europe. Such offerings include both codified success stories of KICs and few studies complemented with direct exposure to its learnings in the annual Conferences organized by the EIT in the ramp up of the negotiations for the future budget perspectives in the Horizon 2020 that culminated successfully in 2013.

- **Studies.** A first study published in 2012 focused on the KIC as the first level of analysis in order to identify and describe the co-creation of novel schemes and innovation models undertaken by the KICs across their content agendas: '*Catalysing Innovation in the Knowledge Triangle: Practices from the EIT Knowledge and Innovation Communities*'. A second study in 2013 took the European level of analysis assessing how KICs build upon schemes and programmes available in the European multi-level innovation panorama, thereby building synergies and complementarities in practice from the EIT: '*Analysis of Synergies fostered by the EIT in the EU Innovation Landscape*'.

²⁹ <https://www.ic.gc.ca/eic/site/093.nsf/eng/00008.html>

- **Conferences.** A first truly ‘outward looking’ event was organized in Copenhagen in June 2012 during the Danish Presidency of the EU with the motto ‘*Good Practice and Learnings*’; focused on what EIT had achieved so far and how was it achieved, the EIT was able to showcase its first results and thus increase understanding on how it could help advance innovation in Europe. A second major event during the Irish Presidency of the EU focused on ‘*Fostering Innovation and Strengthening Synergies within the EU*’ and showcased how the first three KICs had found ways to best organize their excellent partnerships, innovative funding models and project portfolio.

4.3.3.3. Research and future engagements in Horizon 2020

EIT being an institution in the making through its KICs’ focus on ‘learning by doing’, there is ample room to research the innovation models emerging from the practice of the KICs. In so doing, the EIT would not only be able to prepare the basis for dissemination but would also achieve increased recognition. A research agenda for the EIT could mobilize the KICs research partners interested in innovation policy studies. Also, the different dynamics of the first three KICs constitute a very interesting initial set up:

- Climate KIC change is not a business sector yet, though it is increasingly attracting interest in particular from public stakeholders; to create impact, it has been particularly active in creating a growing population of new business which can bring about disruptive innovations.
- EIT ICT Labs (EIT Digital) is a sector Europe cannot miss, as a fundamental lever of competitiveness and productivity to many others; national champions in Europe operate in telecom network equipment supply and service provision, not so much in emerging apps and platforms.
- KIC Innoenergy (renamed EIT Innoenergy) focuses on in a sector where there are large capital investment and value chains, many innovations happening in the intersections between players.

In other words, all three KICs are all very different animals and their results can only be partially compared. On the other hand and most importantly, KICs are expected to co-create new innovation models and bring about a systemic change to the European innovation landscape in line with EIT’s overall mission and vision. This is capture in the EITs Strategic Innovation Agenda (SIA), which foresees a series of institutional offerings to outreach and create institutional impact beyond the direct impact from KICs: a Stakeholders Forum (including

a special configuration of Member State), a Regional Innovation Scheme and an Alumni network. In addition, a repository of practices should be gathered and available via EIT web.

All in all, the three building blocks of the Performance Monitoring System, namely 'Enabling Innovation', 'Operational Excellence' and 'Positioning' nicely correlate with the three series of Chapters on 'How to' agendas, namely, Monitoring, Simplification and Dissemination. Also, they provided stable focus and structured meeting points for management in KICs in their relations with the EIT, respectively, through COO, CFO and CSOs meeting corresponding leading services of the EIT office in Budapest. The above summarises developments in the period 2011-2015 with corresponding policy recommendations.

4.4 EIT's 'WHAT TO' / PILLAR AGENDAS

Having examined above both foundational features of the EIT's operations through its first Knowledge and Innovation Communities (KICs) partnerships as well as 'how' EIT intends to make a difference in the way such partnerships operate, this Chapter discusses the Institute's pillar agendas, meaning content and value propositions from the 'Knowledge Triangle Integration'; in other words, 'what is' new about EIT's approach to innovation at EU level compared to previously existing policy offerings.

The 'what to' agendas concern Education, Entrepreneurship and World-class Innovation which the EIT actively developed in partnership with its first KICs during the period 2011-2015. Obviously, the EIT distinct mission is integrating the 'Knowledge Triangle', therefore, while the agendas will be presented separately hereafter, synergies are created in practice through the daily activities put in place by KICs on the one hand, and the strategic oversight of the EIT Governing Board on the other.

Also, agendas are discussed every year, taking stock of progress and identifying any need for strategic guidance through the Spring Workshop organised with the KIC CEOs and their corresponding Board members.

Figure 24: EIT's 'What to' / pillar agendas. Own elaboration

4.4.1 Education

Amongst the three agendas, Education is probably the one closest to EIT's singular mission, that of mobilizing Higher Education institutions to provide graduates with the skills and competences well beyond disciplinary knowledge. Education programmes envisaged by the EIT and operationalized through its KICs are designed with the objective of inciting creativity, sparking the desire to lead, to interact and provide an entrepreneurial drive. The EIT believes that students should acquire the necessary skills to not only 'do' science and research, but also to apply its results in the world of business and society at large.

Such an approach is indeed new as at EU level, notwithstanding developments and policies aimed at fostering the so-called 'Third mission' of Universities at European level. Indeed, the EIT brings about a new and powerful agenda at European level which is made possible by combining existing capacities and diversity ultimately inspiring entrepreneurial innovation and collaborative education programmes across the EU, jointly created by partners from the higher education, business and research fields.

Figure 25: Knowledge Triangle integration in practice at the EIT / KICs. Unpublished, own elaboration during my term as Director of the EIT 2011-2015.

4.4.1.1 Educating for entrepreneurship and innovation

Entrepreneurship is a cornerstone of the EIT strategy of promoting innovation. The set of skills needed to enhance innovation, starting with entrepreneurship skills, and skills to work confidently across European and disciplinary boundaries is still in shortage.

Part of the EIT's mission is to create the conditions and framework that will allow a fresh entrepreneurship culture to flourish – both as a mind-set and as an action. Its strategy is therefore based on a two-pronged approach: 1) by way of education, to create a cultural shift in the perception of entrepreneurship and risk taking; and 2) by encouraging and supporting entrepreneurship through concrete entrepreneurship activities.

Thus, the EIT strategy for education entails that students that enrol in KIC-run educational programmes acquire strong T-shaped skills. The stem represents a profound disciplinary knowledge; the cross-bar represents a breadth of entrepreneurial, business and commercial. The EIT believes that theory should be complemented with hands-on training - educational programmes should enable students to acquire practical experience in innovation and entrepreneurship by contributing to actual innovation projects of SMEs or larger companies.

Even though they only started operations in 2011, EIT's first KICs developed and launched education programmes to educate on entrepreneurship, creativity and leadership. Their success in attracting more than 14.000 candidates (i.e. roughly 13 candidates per position offered) till the end of 2013 proved there was a strong interest in this type of innovative education. Programmes address different target groups and are different in focus and format:

- Master and PhD schools focus on educating excellent master students, engineers and researchers while putting strong emphasis on creativity and entrepreneurship skills.
- Short-term, intensive courses that contribute to competence development, celebrate mobility and incite to working together across boundaries for creating innovations.
- Executive trainings for more experienced or high-level innovation practitioners. Master classes with top speakers meant for practitioners from all sides of the Knowledge Triangle.

The attractiveness of such programs compared with other offerings can be illustrated with KIC Innoenergy (source www.kic-innoenergy.com). An inquiry among the first cohort of master students showed six reasons for their choice of programmes compared to other alternatives:

- 1.the high quality of the programme which is equal to the best available
- 2.the high scholarship level
- 3.the mobility concept, which means that students spend the 1st year in one country, the second year in another and their internship in a third country
- 4.the students' freedom to choose what to do after the second year: indeed, they are not obliged to stay at the university after graduation
- 5.the double degree
6. last but not least, the reputation of the partners within the KIC consortium.'

Relevant developments regarding Education in the period of interest to this dissertation (2011-2015) for each of the three first KICs are presented in Exhibit II.1. here below.

- First examples of KIC education programmes include Climate KICs' (EIT Climate KIC) Journey, bringing together students from a large variety of disciplines, backgrounds, cultures and academic levels and setting them off on a five-week, context-rich journey across Europe. They visit three Climate-KIC Co-location Centres where the partners provide lectures and on-site visits. Students work within multidisciplinary teams supported by business coaches to develop and pitch their own ideas as potential business ventures.

- The new Master School of EIT ICT Labs (EIT Digital) has been set up as a joint venture more than 20 universities and business schools to address the shortage of engineers and ICT practitioners with the right combination of skills. Students have access to mentoring and guaranteed internships at the KIC partner companies. The co-location centres provide the multi-disciplinary environment for this interaction, offering a meeting place for students, researchers, stakeholders and members of the academic faculties.

- KIC InnoEnergy's (EIT Innoenergy) Master School students receive classes in at least two different European Universities acquiring knowledge of sustainable energy technologies or one of the fields offered by KIC InnoEnergy. The success of a group of KIC InnoEnergy students which become second in the HULT Global Challenge venture competition provided one of the first acknowledgements for the KICs' education efforts.

Exhibit II.1. – Developments with KICs Educational agendas in the period 2010-2014.

4.4.1.2 Creating and promoting the 'EIT label'

In parallel with the first education programmes set up by KICs, work was undertaken by an EIT 'Education panel' (composed of leading GB members, EIT HQ staff and KICs Education Directors) to establish the set of characteristics that will define the "EIT label" as a brand of excellent education in Europe that is responsive to both business and societal demands. The understanding was that the "Label" should mark excellent and bold education programmes at Master and PhD levels that respond to criteria deemed important to support innovation and innovative spirit. Thereafter, the EIT "label" passed its conceptual phase and was awarded to many of the KIC education programmes.

The label puts a strong focus on the delivery of entrepreneurship and innovation skills, foster creativity, involve industry in curricula development, try and nurture a "game changer" attitude and value people who dare to think differently. The brand marks programmes where

students work in trans-disciplinary, multicultural teams coached in an interactive way by academics and practitioners. The programmes implement Europe-wide Masters and doctoral schools, international mobility and placements forming an essential part of the curriculum.

Thereafter the was to test the concept of the “EIT label”, showing that it is possible to fully apply its criteria, to prove in practice that these criteria benefit students and businesses and contribute to producing innovation successes. This was critically important for the education programmes benefiting from the “Label”, to develop and make the EIT labelled degrees known and wanted in Europe and beyond.

4.4.2 Entrepreneurship

EIT's 'what to' agendas comprise Education, Entrepreneurship and World-class Innovation, to ultimately create a 'seamless support web' at KIC level, thereby providing people with an enabling environment for innovation. On the other hand, Entrepreneurship is an embedded value in the overall construction of the EIT as an 'Entrepreneurial Impact Investment Institute'.

In an overall context, Entrepreneurship can be understood as the fundamental attitude to take initiative, manage the risk and persevere. Citing Steve Blank when he refers to start-ups, EIT and KICs do not implement known business models, rather they search for new business models. In other words, EIT partner with its KICs not to implement a predefined programme of activities or policy interventions, but to 'co-create' novel innovation schemes and models bottom-up from the collective will of partners in each community, exploiting their capacities coupled with a desire to experiment, to learn by doing.

At the strategic level, KIC communities have formed their governing and management structures exploiting the flexibility and encouragement by the EIT to adopt and shape the 'KIC model' as a radically different innovation policy delivery mechanism. At the operational level, KICs have thereafter set up pillar agendas, including one on Entrepreneurship meaning both business creation and development, i.e. fostering new firms and adding value to existing ones. Setting up and scaling up new firms is key as they are responsible for a large share of disruptive innovations, thus creating new markets and value; on the other hand, a small set of new firms are responsible of a large share of net job created (NESTA, 2009).

The Entrepreneurship agenda is different in many respects, realising EIT's focus on people and ecosystems. On the practical side, KICs provide a 'cross-border continuum' via 'interconnected ecosystems' where individuals' attitude can be nurtured by communities. People may enter the KIC as students through the Education programmes operated by Universities and Business Schools, or as entrepreneur in setting up a start-up via KICs' business acceleration programmes and/or facilitate market take up through large partners in the KICs as launching customers or partners of successful start-ups.

Such an end-to-end approach is new compared to numerous incubation and acceleration programmes run in local, regional and national contexts: on the one hand, the EIT obviously brings about and implements a dynamic cross-border agenda at European level which can not only exploit diversity around promising ideas but also accelerate their growth as new businesses; on the other hand, by design this pillar is aimed at operating with the other two as a whole, end-to-end support web. Indeed, KICs' action extends across countries where other nationally rooted incubation and acceleration would stop with just 'exchange of good practices'. Soft landing into other market environments, matchmaking of partners to the new firm and personalised support from across the KIC community are among their unique value propositions.

4.4.2.1 Incubation, Acceleration, Business

Entrepreneurship is a cornerstone of the EIT vision and strategy which has been cascaded down to the interaction with KICs and that of relevant activities within Co-Location Centers. In fact, the way KICs interact with EIT is inspired by start-up practices like 'elevation pitches' by KIC CEOs every year in a top-level, strategic Hearing with the EIT Governing Board or annual rendering of results and next year plans influencing the subsequent funding allocation. Also, within the KICs, Co-Location Centres play a key role in actually structuring and orchestrating activities across the Pillar activities, integrating in practice the 'Knowledge Triangle' which is present at EIT and KIC levels.

Figure 26: Acceleration Programme of Climate KIC (EIT Climate KIC)

Since 2011, EIT's first three KICs developed and launched Entrepreneurship programmes benefiting from their value propositions in facing corresponding societal challenges and resulting approaches to translate them into potential business opportunities. A example of those early approaches is shown in Figure 26 above with the entrepreneurial model of Climate KIC.

Their success in the period of interest to this dissertation (2011-2015) is illustrated by the creation till end 2014 of more than 100 start-ups with some kind of formal link, in many instances a share into the new firm and/or a contract offered by a KIC business partner. Also, KICs have so far nurtured more than 300 business plans in the period 2010-2014.

Other developments regarding Entrepreneurship in the period of interest to this dissertation (2011-2015) for each of the three first KICs are presented in Exhibit II.2. here below

- EIT ICT Labs (EIT Digital) organizes its Business Creation Programs around its Business Development Accelerator ran by Business Developers located across Europe (Berlin, Eindhoven, Helsinki, Paris, Stockholm, Trento), who help turn research results into successful innovations not only through start-ups and entrepreneurs, but also SMEs for further European growth and large European partner companies. Main tools of the Accelerator are Soft Landing, Business Modelling, Technology Transfer, Strategic Coaching and Access to Finance. Since 2014 the Accelerator activities are organized around thematic Actions Lines: Cyber-Physical Systems, Future Cloud, Future Networking Solutions, Health & Well-Being, Privacy, Security & Trust, Smart Energy Systems, Smart Spaces and Urban Life & Mobility.

- KIC InnoEnergy (EIT Innoenergy) organizes its Business Creation Programs around its 'Highway' and 'Boostway' services. These services take entrepreneurs from the idea stage to finding the first customer by first conducting an assessment of the opportunity (innovation novelty and technology, market potential, team competences, access to finance), and then assigning a business coach to help design a specific roadmap, and deliver additional by KIC InnoEnergy network of partners (Business Modelling, Technology enhancement, Team creation, additional non-traditional sources of Funding). Boostway Services are being introduced in 2014 to more mature SMEs and start-ups that have successfully been supported by Highway services in the previous years and are now looking to further scale up their offerings and operations. KIC InnoEnergy Accelerator Program offers a wide European coverage, and focuses on 6 thematic fields: Smart cities, Renewables, Convergence Renewables – Nuclear, Smart grids, Clean Coal, and Chemical Fuels.

- Climate KIC (EIT Climate KIC) organizes its Business Creation Programs around a series of activities offered to entrepreneurs and start-ups: Acceleration Program, Incubator Network, Masterclasses, Venture Competition, Professional Placement, and European and International Start-up tours. It scouts and coaches opportunities and entrepreneurs in the following thematic fields: Greenhouse gas monitoring, Adaptation services, Making transitions happen, Sustainable city systems, The built environment, Land and water, Industrial symbiosis, and Developing a bio-economy. It also offers vouchers for SMEs through the Climate Market Accelerator (CMA) to bring together the suppliers and end-users of climate innovations in this nascent market. It offers these different Business Creation Programs through its Incubation Centres, National Centres and Regional Centres spread across Europe.

Exhibit II.2 – Developments with KICs Entrepreneurship agendas from 2010-2014.

4.4.2.2 Life beyond the KICs : Awards, Roundtable and Funds

EIT commits to create 'added value' to KIC's own operations thereby facilitating cross-fertilization and identity building. In that connection, an EIT Award competition was organized for the first time early 2012 and thereafter again in late 2013 celebrating entrepreneurship, exposing the successful ventures identified by KICs and providing them with high calibre mentoring opportunities, etc. The EIT Award events served to honour highly talented members of the EIT community and, at the same time, demonstrated and celebrated the successes of the EIT and its KICs. Concrete examples, success stories and testimonies to inspire individuals followed thus leveraging action beyond EIT own support and that of its KICs.

Secondly, an EIT Roundtable of Entrepreneurs created in 2012 bringing together stakeholders from the 'Knowledge Triangle' to identify gaps and opportunities in the European landscape. Making KICs attractive to Business Angels and Venture Capitalists was the focus of the July 2013 edition of the Roundtable, contributing to brand the EIT, and to reflect on the practices of the EIT and its KICs with selected topics of interest. Scholars and practitioners beyond KIC partner communities from larger corporations, SMEs and research institutes were associated in Roundtables. Outcomes were aimed at demonstrating thought leadership and act as a stepping stone in building a strong pan-European network of stakeholders (i.e. entrepreneurs, educators, innovators, etc.) committed to the EIT and its objectives.

Last but not least, EIT's institutional opening doors role was also primed with the European Investment Fund (EIF) pilot cooperation with EIT ICT Labs (EIT Digital) to help KICs leverage private funding not only to secure 'smart funding' into the start-ups emerging from the KICs but, ultimately, to facilitate sustainability of the KICs themselves in the longer run. The signature of an MOU ³⁰ was facilitated by EIT ³¹. Associating and mobilizing networks and multiplier organizations from the business angel, private equity and venture capital communities

³⁰ https://eit.europa.eu/sites/default/files/EIT_Roundtable_of_Entrepreneurs_2013.pdf

³¹ <https://www.eitdigital.eu/newsroom/news/article/top-level-meeting-with-eif-and-eib/>

to benefit KICs is key to create 'life beyond EIT'. Indeed, the success of EIT through its KICs should mean not only new firms are created but also some scale up to globally leading positions.

4.4.3 Innovation

All three EIT's 'what to' pillar agendas ultimately build up together 'seamless support webs' integrated through KICs where people can access cross-border Pan-European ecosystems bringing results to markets. In discussing the Innovation pillar agenda, the OECD Oslo Manual is useful as it distinguishes innovations new to the world, new to the country/market of reference and new just to the firm. On the other hand, the scale of impact determines the rationale for public intervention. And as EIT's aim is to globally position the Europe of innovation in the world (Didier 2010), should all activities end up in just local or national successes, one could question the rationale for a European level intervention. Consistent with the European remit of the EIT, KICs target World-Class innovation impact via value propositions which are scalable beyond European borders, including at least some globally leading success stories.

For the purpose of our discussion, one may differentiate what EIT's Innovation agenda is at KIC level and what kind of added value EIT could provide on top through technical, financial or institutional incentives, though its ultimate impact could only be prospective at the developmental stage of the first three KICs in 2011-2015, however. Indeed, like the other two previous agendas, Innovation is also 'work in progress' but it represents the largest share of KICs budgets and EIT support therein. Consequently, codifying its novelty is rather important

4.4.3.1. Platforms, projects and actions by KICs

Regarding what it currently is at KIC level, the Innovation agenda covers actions and projects to accelerate research results to the market. The three first KICs worked heavily in the design and implementation of ecosystems and programs to select their activities on a competitive basis, through various degrees of internal and external assessments, cutting across disciplinary, sectorial and geographical borders consistent with KICs' focus on societal challenges.

Each KIC assembled a specific set of partner competences and domains which drive the focus of their portfolio of research and innovation projects, experimenting and refining respective selection mechanisms. Relevant developments in Innovation in the period of interest (2011-2015) for each of the three first KICs are presented in Exhibit II.3. here below.

- Climate-KIC (EIT Climate KIC) innovation helps both business and government to develop new products, services and policy and ultimately foster high-growth European firms delivering to global markets. The Innovation pillar agenda provides a creative environment for students, entrepreneurs and innovators through projects that deliver climate impact, high value innovation, open new markets and ultimately create new jobs for Europe. The two types (Pathfinder and Innovation) of projects create a pipeline spanning the entire innovation chain including market identification and development, innovation development, testing and market deployment. Projects build on a large array of complementary activities in education and entrepreneurship, and the know-how and creativity of the KIC community. The capabilities of Climate-KIC are thematically aligned in the eight Challenge Platforms – See Fig. II.15.

- KIC InnoEnergy (EIT Innoenergy) selects innovation projects within the European Strategic Energy Technology (SET) Plan according to their degree of improvement or disruptiveness in terms of impact (cost-efficiency, security, CO2 emission, European autonomy), competences of all partners are mapped, and this create the final layer of innovation that allow new products and services to be delivered in due time at the right cost. No basic research is pursued as the objective is to cover the “last mile”, in order to transform the existing technology assets into tangible new commercial opportunities. Projects need to fall in one of the six thematic fields: smart grids & storage, energy efficient buildings & cities, renewables, chemical fuels, clean coal technologies, nuclear and renewable convergence. KIC InnoEnergy targets also projects that focus on enabling knowledge and technologies applicable to all the six thematic fields, and thus with an indirect impact on the market.

- EIT ICT Labs’ (EIT Digital) approach to world-class innovation covers the entire innovation cycle: 1. Set the agenda; 2. Mobilize actors and resources; 3. Execute and 4. Deliver which the two other pillar agendas contribute to. The Research pillar of EIT ICT Labs is responsible for identifying mid-term technology trends to enable agenda setting within the action lines, timely scouting of promising technology to mature or scale up through large living lab pilots and test-bed-based experiments, while contributing to standardization for international deployment and open source advancement. The action line set-up is reviewed on an annual basis and new action lines may be incubated on the basis of societal needs, partner interests, and technology and business foresight. Value is optimized via a balanced portfolio of high-impact initiatives for breakthroughs combined with targeted innovation activities.

Exhibit II.3 – Developments with KICs Innovation agencies in 2010-2015

Figure 27: Climate KIC Challenge Platforms

Working hand in hand with entrepreneurs and business in ‘problem solving’ projects is a good way to develop a new mind-set within academia; also, MSc and PhD students can take part in innovation activities substantiating KICs’ ‘learning by doing’. Further on, there is also room for prospective Cross-KIC collaboration in broader thematic fields and exchange of emerging practices across all Co-Location Centers. In this connection, Sustainable Cities is a target which the three first KICs are already addressing; further articulating KIC actions could help position European capacity and potential in this rapidly emerging field of interest across the world.

Enabling impact through collective intelligence

Close-to-market R&D requires balancing excellence and relevance which discipline in assigning resources and monitoring of activities by KICs can help reconcile. On the other hand, the statutory flexibility provided to the KICs by the EIT to experiment in managing their portfolios is an asset while yearly support is influenced by their evidence of successes. Ultimately EIT avoids “R&D for the pleasure of it” as it is not another funding tool and its support is linked to KIC-selected activities that lead to clearly visible results. However, moving from outputs to

impact is a fundamental challenge that requires examining to what extent resulting innovations are radical or disruptive i.e. with a significant impact on a market and on the economic activity of firms in that market (Christensen, 1997). Impact can change the structure of existing markets, create new markets or render existing products obsolete; however, it might not be apparent whether an innovation is radical or disruptive until long after it has been introduced.

A challenge for the EIT is how to critically select projects by KICs against world-class standards, taking into account not only codified but also tacit knowledge. For instance, notwithstanding sectorial limitations, patents signal global trends. The OECD Oslo Manual stresses that patents, applications and grants are intermediate output indicators for innovation activity and also provide information on the innovative capabilities of the firm. For example, a firm that has applied for patents can be assumed to be capable of developing innovations that are new to the world (occasionally only new to the market, depending on the patent strategy of other firms). This could be complemented by pooling together world-class experts and tacit knowledge centrally at EIT in helping KICs benchmark and select most promising projects.

Last but not least, incentivising that KIC innovation projects are not only ‘state of the art’ but real breakthrough and ‘new to the world’ innovations with potential global impact is key. Orchestrated by EIT, suitable methodologies can be developed and thereafter cross-fertilized among KICs, mobilising their innovation research partners through surveys, case studies, econometrics, etc. – see ANNEX II.2. with some thoughts about a future research agenda -. Also, assessing the learning and job trajectories of students going through the KICs and start-ups in terms of investment, for instance, can help size KIC ecosystems and EIT support overall. Beyond Europe also, the EIT may also use its institutional remit to facilitate ‘opening doors’ in other world regions targeted by KICs through their three agendas e.g. with exchange of students/professors in their educational programmes, exchange of support for cross-border incubation of new firms and benchmarking of innovation projects. In so doing, potential global partnerships benefiting existing and future KICs could be forged thereby exposing the EIT to the world.

4.5 DISCUSSION AND CONCLUSIONS FROM SECTION II

In 2011, three years after the political agreement to set up the EIT, its Governing Board formulated a vision for the Institute, more precisely: *“To be the catalyst for a step change in the European Union’s innovation **capacity** and **impact**”³²*. A vision which resonates with the double challenge for the Europe of knowledge to reduce the currently fragmented policy (capacity) and narrow down the innovation gap (impact). To what extent the original vision was realised with the first three KICs through their first operational years (2011-2015) can only partially be assessed, as like any innovation, also a new policy to be innovative needs to successfully face a double uncertainty: its novelty of approach (one can already assess) and ultimate success.

In this Section I have addressed issues with theoretical and practical implications thus setting the basis for empirical research in Section III where we focus on one particular KIC and agenda. In so doing, I have tried to address the first of those uncertainties in order to codify for the first time ‘what is’ new about EIT’s support to innovation at European level compared to any other previously existing EU policy offerings as it was conceptualised by the founding Governing Board. I have addressed the research question at three levels: foundational features of the EIT, the way KICs partnerships are managed of and the content value of its agendas.

This Section served to identify and elaborate on the particular foundational features of the EIT’s partnerships with its KICs in innovation policy terms (community-driven innovation schemes for societal challenges, innovative governance architecture and local presence through KICs’ CLCs). It has further identified distinctive approaches in the way it manages its partnerships and operations with its KICs (monitoring of results, simplification and dissemination) as well as relatively new value propositions that the EIT intends to generate through the ‘pillar agendas’ of its KICs (education, entrepreneurship and world-class innovation).

³²

<https://eit.europa.eu/news-events/news/eits-strategic-innovation-agenda-sia-investing-innovation-beyond-2014>

All in all, EIT and KICs are new constructs replacing traditional arrangements around 'project consortia' and virtual connections which have characterized so far EU's approach to innovation (see Section I), with a potentially new paradigm based on 'community partnerships' that includes also 'physical presence' (KICs' CLCs) linking local to global innovation hot spots. A challenge for KICs is integrating the 'Knowledge Triangle' through CLCs across borders.

Two overarching concepts may help stress the creative undertaking of the Institute compared to other policy offerings: KICs are set up following a 'business logic', on the one hand, and their relationship with EIT are shaped following an 'investment logic', on the other. These are challenging departures combining the public status of the EIT as an EU body with the political will it reflects for Europe to approach innovation differently by embracing a stronger entrepreneurial policy culture. This is presented telegraphically hereafter and captured in Exhibit II.4.

KICs' 'business logic' means in particular:

- High level of integration: each KIC is set up as an independent legal entity, gathering world-class knowledge triangle partners, based on a contractual relationship with the EIT.
- Long-term strategic approach: each KIC is set up for a minimum of 7 years to eventually become self-sustainable.
- Sufficient autonomy and flexibility: to determine organisational structure and activities governed by a Board of KIC partner organisations.
- Effective governance: run by a CEO and a lean management team.

EIT-KIC 'investment logic' means

- Smart funding and high degree of commitment of partners: EIT funding to KICs is max 25 % of their total budget over time with 75 % from other sources, both public and private
- The co-location model: each KIC consists of 5-6 world-class innovation hotspots building and leveraging on existing European capacities.
- Results and high impact oriented activities: KICs implement a Business Plan with measurable deliverables, results and impact.
- Culture: KICs are shaped by strong entrepreneurial mindsets and cultures.

•High degree of integration: each KIC is organized around an independent legal entity, gathering world-class KIC partners from all the innovation dimensions. The specificity of the KICs is to integrate, for the first time at EU level, education and entrepreneurship with research and innovation. The EIT does not address education, research and innovation independently but instead simultaneously, as constitutive elements of a single innovation chain, to deliver incremental and disruptive innovation.

•Long-term perspective: each KIC is set up for a minimum of seven years to contribute to overcoming fragmentation via world-class, long-term, integrated partnerships. This long-term perspective enables partners to commit to a strategic initiative for a longer time than in traditional innovation policy initiatives. It also ensures that the KIC is able to focus on short-, mid- and long-term objectives, remaining agile enough to adapt to emerging needs from the field in which they operate.

•Efficient governance: strong leadership is a pre-requisite; each KIC is driven by a CEO and KIC partners are represented by single legal entities for more streamlined decision-making. KICs must produce annual business plans, including an ambitious portfolio of activities from education to business creation, with clear targets and deliverables, looking for both market and societal impact.

•The co-location model: each KIC consists of five or six world-class innovation hotspots, building and leveraging on existing European capacities. A co-location centre brings together diverse teams of individuals from across the Knowledge Triangle together in one physical place (usually within partners' universities or companies), acting as a hub for many KIC activities, and combining competences and skills developed in different areas of specialisation at a pan-European level.

•KICs culture: Europe needs to embrace a true entrepreneurial culture, which is essential for capturing the value of research and innovation, for setting-up new ventures and actual market deployment of innovations in potential high-growth sectors. KICs are doing just this by integrating education and entrepreneurship with research and innovation and operating according to business logic and a results-oriented approach.

Exhibit II.4: What makes a KIC a KIC. Source EIT web

4.5.1 Clusters of Innovation (COI) and Networks/Super-COI

In order to critically assess the novelty of the EIT/KIC/CLC model and its effectiveness to foster pan-European Ecosystems, I found useful to use the 'Clusters of Innovation' (COI) by (Engel and del-Palacio, 2009) as a tool further compiled in (Engel, 2014):

“COI are defined as “environments that favour the creation and development of high potential entrepreneurial ventures. COI are characterized by heightened mobility of resources (principally people, capital, and information—including intellectual property); increased velocity of business development; and a culture of mobility that leads to an affinity for collaboration, development of durable relationships, and the formation of Networks of Clusters of Innovation (NCOI). These networks are distinct sets of relationships. When the connections progress to the point of mutual dependence and business integration among participating enterprises, such covalent bonds form tightly interrelated business communities, or Super-Clusters of Innovation (Super-COI).”

Against this framework, Michael Porter's former Clusters theory (Porter, 1990) focused on frequently observed concentrations of interconnected organizations including suppliers, service providers, universities, trade associations and so forth whereby “*proximity leads to shared advantages through the aggregation of expertise and specialized resources*” and thus explained the structure of certain industrial concentrations around the world.

In Cluster of Innovation (COI) “other agglomeration benefits dominate, defined not by industry specialization, but by the stage of development and innovation” to explain “why new and apparently unrelated industries have emerged in specialized clusters, already existing... as well as how new technology clusters... have emerged so rapidly and robustly in indigenous environments, attracting large concentrations of venture capital...accelerated through interactions with other clusters”.

Consequently, Engel's framework questions and reviews Porter's as the latter did not predict how new sectors emerged in places where there was no tradition (biotech in Silicon Valley, for example, and not in Boston) or how some countries like Korea or Taiwan have been able to find their place so quickly in the global innovation map without prior preconditions. Interestingly, Engel recommends a policy based more on 'behaviours' rather than 'assets', convinced that values set the course certainly for people and, by extension , for institutions.

Figure 28: COI (Clusters of Innovation), NCOI (Network of COI), Super-COI, and the linkages among COI (Engel and del-Palacio, 2009) further elaborated in (Engel, 2014).

Differences between Porter and Engel's views illustrate also the trend to refer more and more to ecosystems. Against 'systems of innovation' as a set of elements connected through collaborative R&D or 'institutional collaboration', there is growing interests in 'ecosystems'. These two ideas coincide in the importance of connections while nuances concern scope, actors and policy interventions. Indeed, while the widespread unit of analysis for systems of innovations is national, the focus of ecosystems is decisively local (Isenberg, 2011). The actors are more institutions than people as creators of 'synapses' in the dynamics of systems vs. ecosystems. Regarding policy, if public interventions by Agencies has been focused on 'financing and coordinating', the work of the Schumpeterian innovation agencies like EIT of the 21st century will be 'facilitating and orchestrating', a hypothesis we hold for the Section III.

COI are characterized by mobile assets— such as money, people, and information, including know-how and intellectual property (IP)—which facilitate rapid innovation utilizing new venture formation, experimentation, scaling and, if necessary, failure... Entrepreneurship is the core competence of COI, where innovation is augmented and accelerated through new firm creation, and urgency demanded by competition and limited resources.

This culture of innovation and new venture development, based on mobility of resources, gives rise to business practices whereby mobile assets frequently cross regional boundaries in order to foster international collaborations far earlier in the venture development cycle than the historical norm. In COI new start-up ventures are said to be 'born global' taking advantage of international markets and resources extraordinarily early in their development. As a result, new and complementary industry clusters have emerged in different regions around the world, and a network of formal and informal collaborations among their entrepreneurial firms has been created. This multidimensional web of interrelationships includes weak ties, durable bonds, and covalent bonds, and constitutes the global Network of Clusters of Innovation (NCOI) and - in certain highly interrelated circumstances - Super-Clusters of Innovation (Super-COI). NCOI and Super-COI may emerge in geographically close but distinct regions... [which] exhibit indications of the ability of these dispersed COI to bridge the spatial divides that are most strategically significant to business leaders and policy makers...

Previous studies have identified Silicon Valley as an example of a COI, and have described the impact of migrations in the transfer of venture creation and innovation processes. What has not been clear is how the continuing linkages among COI form a robust framework for ongoing collaborations—or NCOI—and how these linkages can at times become so strong that elements of the two clusters become mutually dependent on the other, operate in a highly coordinated fashion, and form a network that operates as a single community as a Super-COI. We postulate that these connections go beyond the entity level, and operate through interrelationships between the clusters more generally.

Exhibit II.5 – Characteristics of COIs and relations in the NCOIs space/Super COIs.

4.5.2 Critical discussion on KICs/CLCs as Pan-European Entrepreneurial Ecosystems

The said 'Clusters of Innovation' (COIs) framework postulates four key characteristics of COIs (Mobility of Resources – Money, People and Know-how/Technology-, Entrepreneurial Process, Global Strategic Perspective and Alignment of Interests, Incentives and Goals; and four key behaviours of NOI/Super-COIs (Mutual Dependency, Tight interrelations, Business Integration and Unified Values). Comparing these criteria with CLCs and KICs as described in this Section, one finds very strong similarities with, respectively, COI and NOI/Super-COIs as summarised in Table V.

EIT's role in fostering pan-European networks of inter-connected ecosystem through the CLCs in the KICs resembles the organic developments conceptualised by Engel in his framework – see Figure 28. In this connection, one should stress that, notwithstanding the fact that the EIT was set up top-down via 'political entrepreneurship' by President José Manuel Durao-Barroso (Huisman and De Jong, 2014), the founding Governing Board of the EIT conceptualised the KIC model and thereafter, the dynamics of the communities developed bottom-up (Granieri and Renda, 2012 – see also Figure 15).

Also, evidence in Figure 18 substantiates the 'brokerage' role of the KICs (leveraging three times the level of public resources from regions) one can also induce that these communities could bring about a relative novel response to overcome the currently fragmented innovation policy landscape that characterises Europe's approach to research and innovation, discussed in Section I. However, regarding its ultimate impact, it remains to be seen to what extent the KIC-drive ecosystems would be capable of fostering high growth entrepreneurship. This is precisely the focus of Section III.

In summary, the way EIT/KIC/CLC model was conceptualised is in itself a policy innovation in Europe but its ultimate impact will only be determined and measurable with time. In that connection, learnings and practices of new innovation models should be codified to maximise overall impact; hence, first elements of a future research agenda for the EIT in its double role as an Investor and Institute is suggested in ANNEX II.2. A stylized set of statements about what EIT is and is not can also be found in ANNEX II.3 which could be exploited and expanded further to consider developments of EIT regarding strategy and operations.

COI characteristic	CLC level
1. Intra- and inter-firm mobility of Resources (Money, People and Know-how/Technology)	KICs gather communities of practice and partners open to investors, human capital and ideas whenever it adds to their success - see Chapter 2 above.
2. New firm creation - Entrepreneurial Processes	Embed in the KIC model and operations, KICs actively implement a business creation agenda - see Chapters 3.1 (Monitoring) and 4.2 (Entrepreneurship).
3. Early Global Strategic Perspective	KICs gather excellent partners with the ambition to foster world-class successes (firms, hotspots, research and innovation) – See Chapter 3.3 and 4.3.
4. Alignment of Interests, Incentives and Goals	Alignment of partners expressed in its long term commitment facilitated by management of the KIC as a Legal Entity and its CEO – See Chapter 2.3.
NOI/Super COI relations	KIC level
1. Mutual Dependency	CLCs within a KIC are interdependent, integrated within the same Legal Entity and working actively together across borders – see Chapter 2.2.
2. Tight Interrelations	CLCs are tightly interrelated through the governance and management of the KIC – see Chapter 2.3
3. Business Integration	CLCs partners jointly define and implement annual Business Plans – see Chapter 2.3
4. Unified Values	Partners in CLCs live up (and shape) the vision, mission and values of the KIC – see Chapter 2.

Table V: Critical assessment of KICs against the COI framework. Own elaboration.

5 SECTION III – TEST CASE: Overcoming barriers to high-growth firms in Europe: the start up to scale up approach of EIT Digital

Created in 2008, the ‘European Institute of Innovation and Technology’ (EIT) operates through so-called ‘Knowledge and Innovation Communities’ (KICs) integrating partners from across Europe and the ‘Knowledge Triangle’ composed of higher education institutions, research centers and business to educate future entrepreneurs, create new business and accelerate them to globally successful ventures. The first three KICs were launched in 2010 including a KIC on ICT called EIT ICT Labs (later renamed EIT Digital). In this Section, we examine the particular case of EIT Digital and investigate the characteristics and limitations of its business accelerator in helping new firms overcome barriers to growth to ultimately scale up.

The importance of entrepreneurship in Europe is growing, hence the relevance of the topic. However, creating new business may be a necessary but not yet sufficient condition for growth as *‘most of firms start small, but most small firms are old’* (Coad et al, 2014). The need for high growth firms in Europe is particularly compelling in the ICT sector considering its contribution and leverage effect on productivity. Literature emphasizes that high growth firms would not be useful vehicles for public policy, while *‘removing barriers to growth of new firms in industries... is a no-regret policy’* (Coad et al, 2014), hence our policy focus on ecosystems.

Building on earlier work on entrepreneurship and innovation-driven ecosystems and related policy measures, this Section elaborates on the novel concept of ‘entrepreneurial innovation ecosystem’ and applies it in the empirical analysis of the EIT Digital and thereby providing further understanding especially on the international dimension of the governance of entrepreneurial innovation ecosystems.

5.1 TOWARDS AN ENTREPRENEURIAL EUROPE? THE CASE OF ICT

Following World War II until the 1970s and alongside the growth of national and global champions, most public policies were oriented to supporting science and technology, based on the belief that research was capable of triggering miracles. So were set the roots of the “social contract” with science, traditional “technology transfer” modes through codified knowledge (publications, patents, etc.) and the university-business tandem seen from a linear perspective: from the lab to the market. Such a paradigm was valid for the majority of the 20th century, exploiting economies of scale and scope for the production of a relatively homogeneous set of goods through “creative accumulation” in larger and larger business firms (Thurik, 2009).

With the revolution of ICT (information and communication technologies) in the 1980's, a change of trend can clearly be observed, whereby new firms and SMEs became again vibrant agents of innovation in many developed economies. This is backed by ratios of self-employment (business owners per workforce) compiled by OECD (Stel, 2005 quoted by Thurik, 2009), hence we observe a resurgence of Joseph Schumpeter's ‘creative destruction’ and comeback to the “entrepreneurial economy” over the “managed economy” (Audretsch and Thurik, 2004).

If creative destruction implies the return to the original entrepreneur, unfortunately, the Nobel and Siemens of the ICT era, are more visible at the other side of the Atlantic with names like Gates and Jobs. This has obvious implications for growth and employment, taking into account that new firms are responsible for the large proportion on new jobs (NESTA, 2009). Interestingly, regarding policy interventions in this area, infrastructure network for incubation and acceleration of new firms available in Europe is comparable to that existing in the US (Telefonica, 2013). However, the need for high growth firms in Europe is particularly compelling in the ICT field considering its contribution and leverage effect on productivity on other sectors. In any case, creating new business may be a necessary but not yet sufficient condition for growth as *‘most of firms start small, but most small firms are old’* (Coad et al, 2014).

Since the advent of Information and Communication Technologies (ICT), new business firms have become vibrant agents of innovation in many developed economies (Brown and Mason, 2014). Also, evidence shows that some new firms play an increasingly visible role in prompting so-called ‘disruptive innovations’ that is able to challenge former business models as well as to create new markets (Christensen, 1997). Consequently, policy-makers are increasingly aware of the role of such high-growth firms (HGFs) as major drivers of innovation, productivity and employment growth (NESTA, 2009).

Figure 29: Age distribution of companies' contribution to innovation: Europe vs. US and others, Reinhilde Veugelers, Bruegel policy brief (March 2009). Elaborated by EIT.

5.1.1 Scope and objectives of this Section

Europe faces an aging problem, not only with the workforce but also with its overall innovation business fabric. (Veugelers, 2009) notes that the number of leading corporate innovators created in last 25 years is ten times lower in Europe than in the USA. This is largely due to the lack of young fast-growing innovative firms ('yollies') in Europe (Veugelers and Cincera, 2010) – See Figure 29 above. For policy, it is particularly difficult to directly target

'yollies', or more in general high growth firms (HGF³³), as neither their profiles nor their growth trajectories are homogeneous. Consequently, policies may be better off by adopting a systemic and holistic approach to policy (Mason and Brown, 2014) thus removing barriers hindering (potential) HGFs.

Still, in Europe many national and regional level initiatives target specific support measures for new ventures, rather than offering holistic policy measures and international networking (Borras and Edquist, 2019). Only few European-level funded schemes target improving the overall conditions for spin-offs and start-ups to scale them globally (EIC, 2018). A notable exception is the European Institute of Innovation and Technology (EIT), a policy experiment aimed at stimulating high-impact innovative entrepreneurship through a "holistic policy approach" integrating higher education, research and business activities (i.e. *via* knowledge triangle integration) (Allinson, Izsak, & Griniece, 2012).

This Section focuses on one of the EIT partnership operations or so-called Knowledge and Innovation Communities (KIC), namely, EIT Digital, and the way this particular community leverages ecosystems for international innovative entrepreneurship through its network of co-location centers (CLCs). Our ecosystem analysis of the case study indicates clear mismatches between the designed EIT response, the intended services by EIT Digital and the perceptions from EIT Digital startups and other stakeholders. The future performance of the EIT Digital acceleration ecosystems depends on overcoming such mismatches.

We first develop theoretical premises and an analytical framework on ecosystems for innovative entrepreneurship. Then, the framework is applied in an empirical case study on EIT Digital with semi-structured interviews and desk research on secondary information sources. The resulting findings are further discussed concluding with key policy recommendations.

³³ OECD (2007) defines a 'high-growth enterprise' as all enterprises with average annualized growth greater than twenty percent per annum, over a three-year period, and with ten or more employees at the beginning of the observation period. Growth is thus measured by the number of employees and by turnover. See also Daunfeldt et al. (2015) for discussion on the definition.

5.1.2 Research questions and methodology

Literature emphasizes that high growth firms would not be useful vehicles for public policy as their profiles and trajectories change over time, while '*removing barriers to growth of new firms in industries... is a no-regret policy*' (Coad et al, 2014). Our research aims at discussing what practical measures EIT Digital is taking to support new firms, precisely:

- What is the policy rationale for EIT regarding cross-border incubation/acceleration? To what extent does EIT Digital represents a new model for Europe?
- What policy recommendations to consolidate EIT Digital current offering? Which other measures are necessary to ultimately help new firms scale up?

More precisely, using structured interviews with business development managers of EIT ICT Labs (renamed later on EIT Digital) supplemented with contrasting views from stakeholders and start-ups and business plan owners nurtured through this KIC, I inquire whether and how its accelerator program may help new business firms overcome barriers to growth and to ultimately scale them up. Also, as we have seen, focusing on ICT is relevant considering its disruptive force, not only for the sector itself as we know it today but, most importantly, as a source of industrial removal for entirely new economic domains.

This rest of this Section is organised as follows:

- Chapter III.2 elaborates on the theoretical premises on ecosystems for innovative entrepreneurship, with the corresponding rational for policy interventions at EU level through the EIT regarding cross-border incubation/acceleration of new business firms.
- Chapter III.3 describes in much more detail the case study approach and data sources, introducing in more detail the methodology, the case selection and analysis of the data.
- Chapter III.4 presents the findings on EIT Digital entrepreneurial innovation ecosystems.

5.1.3 Conference engagements and publications

Together with another two PhD candidates I produced a case study paper that received the second award in the 6th UAM-Accenture Annual Award competition in October 2014 entitled: "Overcoming barriers to high growth firms in Europe: The star-up to scale up approach by EIT ICT LABS KIC" co-authored by Leceta J.M, Tosina, A., y Dévora-Quintero N. <http://fuam.es/entrega-del-vi-premio-de-la-catedra-uam-accenture-en-economia-y-gestion-de-la-innovacion-2/?lang=es>

Later on, in 2015-2016 I was invited by CEPS to chair a Task Force on Innovation and Entrepreneurship that met several times in Brussels, gathering policy makers and practitioners resulting in a book I co-authored 4. Leceta, J.M., Renda, A., Konnola, T. & Simonelli, F. (2017), *Unleashing Innovation and Entrepreneurship in Europe: People, Places and Policies*, CEPS, 2017. <https://www.ceps.eu/ceps-publications/unleashing-innovation-and-entrepreneurship-europe-people-places-and-policies/>

In addition, taking advantage of the research I participated in several dissemination activities which helped inspired some of the conclusions of this dissertation:

- I took part in a Session chaired by Nobel Laureate Edmund Phelps during the high level conference 'Removing obstacles to innovation: Europe vs the US' co-organised by the European think tank 'Center for European Policy Studies' (CEPS) and the US 'Center of Capitalism and Society', that took place in Brussels on 20th-21st of November 2014, http://www.ceps.eu/sites/default/files/civicrm/persist/contribute/files/InnovationConferenceNov_2014.pdf .
- I supported the project developed by the 'World Economic Forum' on 'Collaborative Innovation' for the Davos 2015 edition, building upon the report released in 2014 on 'Enhancing Europe's Competitiveness: Innovation-Driven Entrepreneurship in Europe' <http://www.weforum.org/reports/enhancing-europes-competitiveness-fostering-innovation-driven-entrepreneurship-europe> .
- Following-up from that, I also co-organised a Special Session on 'Transforming Innovation Policy' jointly by Prof. Kulhmann and Prof. Schot at the EuSPRI 2015 Annual Conference in Helsinki on 10-12 June 2015 <http://www.euspri-helsinki2015.org/> organised by VTT "Innovation policies for economic and social transitions: Developing strategies for knowledge, practice and institutions"

<http://euspri.globalcomunica.com/helsinki-annual-conference-10-12-june-2015/> where I also presented a working paper on the 'European Institute of Innovation and Technology: Policy Experimentation for Pan-European Innovation Ecosystems'.

- Also, I participated to the 2016 Annual Conference of the EuSPRI Forum, organized by the CIRCLE Centre of the University of Lund (Sweden) "Exploring New Avenues for Innovation and Research Policies" <http://www.euspri-circle2016.org> where I organised jointly with UPM Prof. Totti Konnola a Special Session on '(Re) searching the critical' meso 'level: learning innovation agencies and entrepreneurial ecosystems' - Document available at <http://if-institute.org/wp-content/uploads/2016/01/Special-Track-2016-EuSPRI-Agencies-and-Ecosystems.pdf>
- At the 50th Anniversary Conference, organized by SPRU at the University of Sussex (United Kingdom) from 7 to 9 September 2016 'Transforming Innovation' - Program <http://www.sussex.ac.uk/spru/newsandevents/2016/talks/anniversary-conference> I organised a Special Track jointly with UPM Prof. Totti Konnola on 'Learning innovation agencies and entrepreneurial ecosystems' with eminent professors and practitioners like Prof. Mariana Mazzucato, Ben Martin, Josep M. Pique, Charles Edquist and former CDTI DG Francisco Marin.
- At the Conference "Growth ecosystems as a tool in the new industrial and innovation policy" organized by SITRA and the Ministry of Economy and Employment took place in Helsinki (Finland) in November 2016 I developed with UPM Prof. Totti Konnola a working paper on "Co-creating Pan-European Innovation Ecosystems: reflections from the EIT" - Document available at http://if-institute.org/wp-content/uploads/2017/03/Jose_Manuel_Leceta_Totti_Konnola_Pan-European_Entrepreneurial_Innovation_Ecosystem.pdf that served to inform the paper that I got finally published by *Innovation: The European Journal of Social Science Research*, DOI: [10.1080/13511610.2019.1612737](https://doi.org/10.1080/13511610.2019.1612737) reported in Section II.

5.2 ECOSYSTEMS FOR INNOVATIVE ENTREPRENEURSHIP

The importance of HGFs for innovation, economic growth and employment is well anchored in the literature (Baumol, 2010). Also Coad et al. (2014) emphasize that HGFs are not useful direct targets for policy as HGFs are difficult to identify *ex-ante*, and their high growth episodes lack persistence. But even if it is prohibitively difficult to predict which individual firms will be HGFs, and give them targeted support ahead of time, broad-based support could be offered to potential HGFs in the form of supporting conditions by removing the barriers to the growth of new firms (Coad et al., 2014). With a similar line of thought, Coad and Leceta (2017) argue that *“policy should better focus on the broader system of supporting policy measures to help remove barriers to growth for potential HGFs, rather than chasing in vain after elusive unicorns”*.

Herein, Lee (2014) identifies six obstacles for HGFs, including obtaining finance, cash flow, recruiting staff, skills shortages and availability and cost of premises. Empirica (2013), in turn, depicts the barriers such as access to finance, bureaucratic/regulatory barriers, skilled labour, strong competition, difficult customers, lack of support from the State, complicated taxation/high taxation, unfavourable business cycle, high labour cost, non-entrepreneurial culture and market size.

Furthermore, the notion of ecosystem is increasingly used to address the supporting conditions for entrepreneurship and assess their complex operational environment. Moore (1993) and more recently Teece (2016) applied the ecosystems to complex configurations of agents, thus making an analogy between the business ecosystems and the biological ecosystems observed in nature³⁴. In line with Papaioannou, Wield and Chataway (2007) we recognise shortcomings of this analogy and the difference between the ecosystems in the realm of biology and in social sciences, namely, as the human action inherently encompasses the

³⁴ In ecology (e.g. Odum 1969), the biological ecosystem ‘community’ is considered to *emerge* with relatively few pioneering plants and animals and to *expand* through increasing complexity until it becomes stable or self-perpetuating as a *mature* community. The “engine” of succession, the cause of ecosystem change, is the impact of established species upon their own environments.

presence of intention and the role of governance. The use of this analogy³⁵ does not automatically claim business networks to be ecosystems, but it provides a source of terminology and, an invaluable bridge to the complexity³⁶ literature.

This biological metaphor of ecosystems has attracted attention also in other managerial domains; Thomas and Autio (2014) have elaborated on platform-centric ecosystems, Russell et al. (2011) on innovation ecosystems and Ács et al. (2014) on entrepreneurial ecosystems, for instance. While the somewhat vague use of the notion in different domains is confusing, most commonly it relates to co-evolving networks of stakeholders (Brandenburger & Nalebuff, 1996) and the articulation of joint value propositions (Adner, 2016).

Accordingly, ecosystems of entrepreneurship involve inter-relations between businesses and their social, political, academic and economic environment that are more fluid in environments where all the elements are aligned. As it is difficult to determine relationships, it is more appropriate to address them all together. Herein, Ács et al. (2014) crystallise a national system of entrepreneurship to encompass dynamic, institutionally embedded interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures.

Isenberg (2011) argued that each entrepreneurial ecosystem arises under a unique set of conditions and circumstances encompassing policy, finance, culture, supports, human capital and markets, stressing the local nature of such ecosystems. In a similar manner, Feld (2012)

³⁵ For more on the value of ecology as a metaphor for industries, see (Harte, Shireman, Burke, & Lynn, 2001). See also (Oh, Phillips, Park, & Lee 2014) for a critical view on the term of 'innovation ecosystem'.

³⁶ In line with (Wang & Von Tunzelmann, 2000), we consider complexity' to mean the 'depth' as well as 'breadth' of a phenomenon. Complexity in 'depth' refers to the analytical sophistication of a subject, which becomes complex because of the cognitive difficulty of pushing the particular matter to its logical extremes. On the other hand, complexity in 'breadth' refers to the range of areas that have to be investigated to develop a particular subject.

identified key factors for developing startup communities to include leadership, intermediaries, network density, government, talent, support services, engagement, companies and capital.

Stam (2015), in turn, distinguished in entrepreneurial ecosystems, on the one hand, framework conditions (demand, informal and formal institutions, culture and the physical conditions enabling or constraining human interaction) and, on the other hand, systemic conditions (networks of entrepreneurs, leadership, finance, talent, knowledge and support services). This construct relates to the work of scholars on innovation (eco-)systems.

In line with Stam (2015), the authors focused on innovation (eco-)systems (Russell et al., 2011; Gomes, Facin, Salerno, & Ikenami, 2016; Vasconcelos Gomes, Salerno, Phaal, & Probert, 2018; Walrave, Talmar, Podoynitsyna, Romme, & Verbong, 2018) pay particular attention to knowledge creation and diffusion, which has received less attention in the works on entrepreneurial ecosystems. Russell et al (2011, p. 3), for instance, define the concept of innovation ecosystem³⁷ to entail:

“... the inter-organizational, political-economic, environmental and technological systems of innovation through which a milieu conducive to business growth is catalysed, sustained and supported. An innovation ecosystem is a network of relationships through which information and talent flow through systems of sustained value co-creation.”

To build the bridge between these two streams of research (the one on entrepreneurship and the other on innovation), we elsewhere (Leceta & Könnölä, 2019, p.3) define the **entrepreneurial innovation ecosystem** as...

“... the dynamic, inter-organizational, political, economic, environmental and technological milieu of interaction between entrepreneurial attitudes, ability, and aspirations, by individuals, mediated by institutions, which drives knowledge and value creation towards a structural change with the enhanced allocation of resources.”

³⁷ See Oh, Phillips, Park, and Lee (2014) for a critical view of the concept of ‘innovation ecosystem’.

Herein, building on both the entrepreneurial and innovation ecosystem studies, we propose the entrepreneurial innovation ecosystem model entailing firms, investors, academia, media, public administration and society at large engaging in inter-related areas of (see also Figure 30):

- Finance; encompassing access to broadly different forms of external sources from subsidies and loans to venture capital and capital markets.
- Knowledge; relating to both to creation and diffusion of knowledge, independent of its source (e.g. R&D or markets).
- Talent; referring both to performance of the education and training ecosystems to produce talents but also the openness of the system to attract talent beyond the ecosystem.
- Governance; encompassing strategic leadership, coordination, federation and regulatory measures.
- Market access; dealing with the drivers and barriers in the markets influencing on the commercialisation of innovation.
- Culture; referring to both the general perceptions on entrepreneurship and risk-taking as well as perceived capacity and capability to starting up.

Figure 30. Key dimensions and actors of entrepreneurial innovation ecosystems (modified from Könnölä et al. (2017)).

Such ecosystems can be found in different overlapping levels and focus areas. For instance, businesses and universities may form their ecosystems that interact within the ecosystems of cities and regions, which in turn form national and international networks of intertwined ecosystems (Engel & del-Palacio, 2009).

5.3 CASE STUDY APPROACH AND DATA SOURCES

5.3.1 Introduction to methodology

A case study is the preferred methodology, as we focus on a contemporary event whose main sources of evidence are the direct observation of the objects under study and interviews to the key players and people involved (Yin, 2003). Nevertheless, we also follow an approximation in line with (Eisenhardt, 1989), who proposes a slightly different approach, without theories or hypotheses for processes and realities without present valid reference frameworks *ex ante*, as the present study aims to propose new explanations, considering the novelty of EIT Digital and its limited operational track record.

As a starting point for the methodology, existing literature and recent research was reviewed in detail (Yin, 2003), thereby identifying theoretical models. From these models, theoretical propositions were drawn up to develop the research approach and the framework for analysis with the six ecosystem dimensions of the entrepreneurial innovation ecosystem that provided also the basis for semi-structured interviews. Once the interview data was gathered, it was classified according to the defined ecosystem dimensions. These same dimensions were then used to structure information from different sources in order to comparing the views of supplier and recipients of acceleration support services.

The next step was to find a right definition of the unit of analysis, which comes from the proper case definition (Yin, 2003). This helped frame the case study limits. In this context, the units of analysis are the different policies and measures EIT Digital Business Development Accelerator (BDA) managers carry out in their daily work to support nascent companies throughout their access to potential growth opportunities across Europe. After the definition of the unit of analysis, the case selection was based on a theoretical sampling, rather than a statistical one, selecting those occurrences and cases which can provide more learning opportunities and allow an analytic generalization of the study results.

Thereafter, the standardized definition of the data gathering processes was done. This definition guarantees the validity and reliability of the research. First, structured interviews with selected BDAs of the EIT-Digital KIC and its CLCs were carried out using a relatively open questionnaire covering the main barriers identified in the literature hampering high growth firms' evolution. Once the interview data was gathered, it was classified in a database under the defined data protocol. This same database was thereafter used to structure information from the different sources, including also the views of stakeholders and new firms from the Madrid Node. The database keeps all the recorded interviews with the identified BDA managers, stakeholders and start-ups / spin-offs. After this data organization, the ultimate step was the analysis of all collected evidence, individually and comparatively, linking them to EIT-Digital's declared mission.

5.3.2 The case selection and the analysis of the data

In Section 2, we described the entrepreneurial innovation ecosystem model with its six dimensions and pinpointed the importance of international connections in the development of the successful ecosystem. Only a few European-level funded schemes target improving the overall conditions for spin-offs and start-ups to scale them up to international opportunities and markets (EIC, 2018). A notable exception is the European Institute of Innovation and Technology (EIT), a policy experiment aimed at stimulating high-impact innovative entrepreneurship through a "holistic policy approach" integrating higher education, research and business activities (i.e. via knowledge triangle integration) (Allinson, Izsak, & Griniece, 2012).

The paper focuses on one of the longest-standing EIT KICs, namely EIT Digital, and the way this particular community leverages ecosystems for innovative entrepreneurship with a global mindset. We examine the EIT Digital as a policy experiment by applying the above-defined framework. The structured interviews were conducted in EIT Digital Co-location Centres (CLC) with a total of 18 key persons from supply, supporting and recipient roles:

- i) EIT Digital (Business Development Accelerator (BDA) managers: In July 2014, at the EIT Digital CLC Eindhoven, 10 Business Development Accelerator (BDAs) managers³⁸ from the different CLCs across Europe were interviewed.
- ii) Stakeholders: In January 2016, all 5 supporting partners³⁹ from the Madrid Node were interviewed.
- iii) New firms (startup ventures): In April 2016, all 3 nurtured start-ups⁴⁰ in the Madrid Node were interviewed.

All interviews were based on the same set of questions in order to facilitate later comparability and exploitation of results. Interviews lasted for 30 to 60 minutes with each person, all interviews were recorder and tabulated identifying salient ideas and their frequency using key words to capture results. The approach was a highly structured, not ethnographic in order to balance the in depth knowledge of the authors of the basic operations of EIT with the necessary independence in order to devise potentially relevant views.

Notwithstanding the original design of the EIT KICs (The European Parliament & The Council of the European Union, 2008), the authors challenged the initial perceptions of EIT Digital BDA managers across Europe in 2014 in contrast with the more recent views of new firms and stakeholders from Madrid Node in 2016. Quotes from all three groups of players (i, ii and iii indicated above) are used in the next Section while preserving the necessary individual anonymity.

³⁸ Alain Leloux (Netherlands), Bertrand Lejeune (France), Eric Dubois (France), Fabio Carati (Italy), Filip Coenen (Belgium), Julia Schmalenberg (Germany), Kai Rose (Germany), Paolo Magni (Italy), Raoul Stubbe (Sweden), Tobias Vahlne (Sweden) and Klaus Beetz (Germany).

³⁹ Manuel Hermenegildo from IMDEA Software, Gonzalo Leon from Technical University of Madrid, UPM, David Pascual from Indra, Pasic Aljosa from Atos Origin and Estanislao Fernandez from Telefonica.

⁴⁰ Ricardo Jimenez from LeanXcale, Oscar Corcho from Localiata and David Moreno from Coowry.

5.4 FINDINGS ON EIT DIGITAL ENTREPRENEURIAL INNOVATION ECOSYSTEMS

5.4.1 Introduction and background

Created in 2008, EIT aims to foster a new generation of entrepreneurs through its Knowledge and Innovation Communities (KICs) – see (EIT, 2012). To that aim, since 2010, EIT's first three KICs (EIT ICT Labs, renamed EIT Digital, Innoenergy and EIT Climate-KIC) engaged to develop and launch Entrepreneurship programmes. According to its vision for 15 years, EIT Digital in particular, aims to create new business as well as to transform existing ones.

KICs structure their operations around innovation hotspots, Co-Location Centres (CLCs), where the integration of the 'Knowledge Triangle' (Figure 31) takes place, giving local ecosystems a European dimension. Individuals may be supported by KICs as students in the Education programmes run by Universities and Business Schools or, later on, as entrepreneurs in new ventures via KICs' business acceleration programmes that facilitate also market take-up by national/regional public authorities and larger business partners more broadly.

Figure 31 – Knowledge Triangle as seen by EIT Digital (EIT Digital, 2019).

In principle, new ventures nurtured by KICs may access knowledge available in the community (on the supply side) coupled with soft-landing to non-domestic markets (on the demand side). Also, personalised support by KIC business developers is expected to facilitate structured access to investors and venture capital. Large corporate partners of EIT Digital may

also help set up strategic alliances to support global outreach for the new ventures. Such a local-to-global reach as an institutionalised European-wide network has been designed to link ecosystems across-borders to scale up ventures.

Legally, EIT Digital consists of entities and agreements run by an association under Belgian law. Partners are members of this association while other organizations are linked to EIT Digital through different legal agreements. EIT Digital is distributed throughout the EU by nine locations currently in Berlin, Eindhoven, Helsinki, London, Paris, Stockholm, Trento, Budapest and Madrid providing access to local ecosystems through the corresponding CLCs.

Annually, a Grant Agreement is signed between EIT and each KIC specifying objectives, activities and indicators. The EIT funding on average may not exceed 25% of a KIC's overall funding, which means that the remaining, minimum 75% must come from non-EIT sources, including public and private contributions and funding. Also, KICs are encouraged to become financially self-sustainable over the years and must thus identify structural sources of income in the longer run.

Subsequently, for each dimension defined in the ecosystem framework in Section 2, the reported achievements of EIT Digital are compared with interview results, and perceptions by a representative set of Business Development Accelerator (BDA) managers from across all EIT Digital locations compared with the partners and all the start-ups nurtured in the Madrid node of EIT Digital at the time.

We assume that HGF and 'entrepreneurial innovation ecosystems' are mutually interdependent but question to what extent the 'knowledge triangle integration' fostered by the EIT represents a performing policy intervention in leveraging cross-border ecosystems to accelerate new business growth beyond juxtaposing already existing national / regional hubs (built around CLCs) – see Figure 32 -.

Figure 32. Intervention logic underlying the heuristic approach of the paper. Source: own elaboration

5.4.2 Access to finance and capital for scaling up

To cover access to broadly different forms of external funding sources from subsidies and loans to venture capital and capital we invited interviewees to describe both direct EIT Digital support well as indirect support available in the network. We asked questions like: *“What does EIT Digital offer entrepreneurs regarding access to finance and cash flow? How do KIC finance-related offerings differ and improve non-KIC operators’ offerings e.g. local, national and European programmes? Why would an entrepreneur opt for EIT Digital?”*

Access to funding being a key step for new firms, particularly in technology domains, EIT-Digital BDA managers promote contacts with investors through some initiatives (investor dinners, events, informal contact, etc.) trying to mediate and help select the right company for the right investor in a neutral way.

Regarding views from Madrid CLC partners and start-ups, practically all interviewees acknowledged that EIT Digital is a unique professional network and neutral European gateway for national schemes and operations, as: *“No other has a group of people from most active countries working as an organization (business logic), compared to other associations which work via ‘exchange of local practices’ but don’t work for each other: they are not an organization. Professionalism and neutrality are distinctive features of the KICs.”*

Start-ups considered finance to be less important than market access for new business and found access to finance through the KIC rather illusory if not elusive. As one start-up entrepreneur put it: *“The idea to offer a ‘pan-European’ offering and speak to other stakeholders like EIF or large VC as a broker is a very good idea, because many new firms do not have the means, also in the Spanish case because the maturity of VC is low, same for the EU. That is the theory.”*

While another start-up entrepreneur put it: “The EIT Digital network can be better structured: it is still a very ‘federated’ approach to investment, each Node focusing on their local start-ups” and recommended that: “Cooperation between BDAs should be better articulated including incentives to assist non-locals.”

Consequently, interests were expressed for further development of activities, including cross-CLC KPIs (Key Performance Indicators) demonstrating European-wide operations, which could facilitate access to finance and capital for scaling-up. In this connection, a majority considered a stronger EIT brand would make a big plus, particularly to facilitate access to corporate venture financing, with a stronger large business commitment and faster response.

5.4.3 Knowledge, competences and skills

Relating to both creation and diffusion of knowledge, the findings indicated the heterogeneity of the responses among the three interviewed groups. Questions addressed were: *“What does EIT Digital offer entrepreneurs to properly address organisational factors like managerial skills and availability and cost of premises? What competitive advantages do they gain? How do KIC organisational offerings differ and improve non-KIC operators’ offerings, e.g local, national and European programmes? Why would an entrepreneur opt for EIT Digital?”*

A first observation comparing BDAs’ responses is that national activities and support lines are highly influenced by the local executives and their background at each CLCs / nodes. Their own skills, professional profiles and even personal beliefs frame what kind of support nurtured ventures get. This may be explained by the relatively short track record of the network, but also the proximity of CLCs to the corresponding national environments on which BDAs operate.

As with access to finance, progress regarding access to knowledge, competence and skills via top-level management also appeared insufficient, with little cross-border mobility for mentors and experienced managers: “The mentoring is today ‘ad hoc’ by the BDAs own contacts.” Some partners stressed that: *“Mentors in the current division of labour is more with*

the partners and while BDAs could structure the offering in accessing experienced managers, this is hypothetical.”

Feelings were mixed within the sample of start-ups. One stressed “*Coaching is great for companies with a university/technology background*” while a second one whose founders were former corporate executives disregarded this service while “*The possibility to have an office in other countries through CLCs is also very much appreciated and have the facilities for a videoconference.*” On the positive side one interviewee said that “*Compared to other DG CNECT initiatives, EIT Digital is at least 5 years ahead!*” while a second one found that: “*Many hosts promise to have a lot of leeway for exchange of service and expertise but in reality, it is more theoretical than practical. It still needs a lot of ‘handwork’, in the absence of processes and tools, it will be hard to scale!*”

Consequently, interviewees suggested mutual learning and ultimately some sort of matching to be encouraged by EIT Digital, including cross-fertilizing of good practices and harmonization of local experiences at European level.

5.4.4 Development of and access to talent

Referring to performance of the education and training programmes to produce talents and the openness of the system to attract talent beyond the ecosystem, questions were: “*What does EIT Digital offer entrepreneurs to adequately recruit staff, address skills shortage and skilled labour in setting up new firms? How are complementary teams put together? How do KIC human capital offerings differ and improve non-KIC operators’ offerings, e.g local, national and European programmes? Why would an entrepreneur opt for EIT Digital?*”

In 2014, BDA managers considered critical for start-ups access to talent, especially they considered finding top-level managers as a difficult point to be solved. Therefore, an “entrepreneur in residence” initiative was thereafter set up in some CLCs to stimulate access to this sort of experienced profiles and to get them involved with interested in start-ups. After some collaboration, the intention was that those executives could eventually decide to join the teams and even take shares as professional management was considered indispensable by BDAs. However, in 2016 interviews in Madrid CLC there were no references to the ‘entrepreneur in residence’ program some BDA managers identified in 2014.

Entrepreneurial education is often considered a key factor to help boost innovation in the European economy. In this connection, the contribution of EIT-Digital master/doctoral schools is much valued by BDAs, although they also believe more practical experience should be provided to alumni. Certain student internship programs are being carried out with the collaboration of new firms and large corporations. Consequently, BDAs considered it might be too early to value education and entrepreneurship synergies combined as the focus of the KIC is today in fostering basic entrepreneurial education.

Against the view of BDAs, stakeholders and start-ups were rather sceptical about linking the entrepreneurial education promoted by EIT Digital with the practical recruitment requirements of new businesses nurtured through the KIC. More precisely, while stakeholders praised KIC Master content, and stressed that access to talent was a strong motivation to join the KIC, particularly for what concerns PhDs at EU level as these not easily accessible locally, important questions remained open regarding the actual level of integration across pillars as well as across borders in practice. Also here, one interviewee suggested to introduce cross-CLC indicators as: *“All the Nodes have competing indicators e.g. not how many start-ups receive every Node from the rest rather than how many start-ups do each Node run independently.”*

Another entrepreneur pointed out more critically that: “Local Nodes were supposed to be the “meetings points” where the integration of the knowledge triangle would take place: but in practice, there is not a ‘whole thing’ but three separate value-adding streams. We need to think about how to further integrate at the more practical and routine level.”

The start-ups from the Spanish node confirmed this view going even further in saying that *“Recruiting of co-workers will not necessarily benefit from KIC educational programs.”* More important in their view is former experience, particularly for business developers. Some found the structure of the Master not adequate as a one-month intern is not enough and said that there may be “too much inertia” with the initial structure of Master programs. And for recruitments: *“In fact, the start-up prefers local people and advice.”* They work with partners in other countries, *“more as a collaboration rather than joining the start-up”*.

5.4.5 Innovative and enabling governance

Encompassing strategic leadership, coordination, federation and regulatory measures, questions addressed were: “What does EIT Digital offer entrepreneurs to address context factors like bureaucratic/regulatory barriers, strong competition, lack of support from the State,

complicated taxation/high taxation, unfavourable business cycle, high labour cost, non-entrepreneurial culture?”

From the responses, it emerges clearly that the attention devoted to contextual factors (regulation, taxation, labour, culture, and the role of the State therein) is the weakest part of the EIT-Digital value proposition, as BDA managers considered those factors as “boundary conditions” to be managed, more than influenced. Therefore, more active interaction with local, national and EU-level authorities appears fundamental in the view of BDAs to help EIT-Digital succeed and ultimately to help shape a more efficient European innovation fabric in ICT.

Similar realistic views were also echoed by stakeholders and start-ups from the Madrid CLC, as interviewees agreed that contextual factors like regulation, taxation, labour, etc are “boundary conditions” to be managed more than influenced. Some thought that *“the EIT is not talking enough to Governments”* and considered that: *“KICs do not have the capacity as “think tanks”. The EIT/KIC is a very flat set up, more an implementer than a system shaper.”*

Stakeholders however concurred with BDA managers that a more active link to local, national and EU-level authorities in those areas could add value. Start-ups were more sceptical and in favour of EIT-Digital to focus on *“influencing big corporations rather than governments”*. Unaware of the MoUs that EIT Digital has established with EIF or DG CNECT back in 2013, they stated that: *“EIT Digital may not be powerful enough to influence administrations. Identifying innovators in business ecosystems (both large and SMEs) and try to systematically offer them solutions requires ‘scouting efforts’ from BDAs.”*

5.4.6 Market access across Europe

Market access deals with the drivers and barriers in the markets influencing on the commercialisation of innovation. Questions addressed in this connection were: *“What does EIT Digital offer entrepreneurs to engage first customers and address a sufficient market size? How do large existing firms in EIT Digital engage in helping scale up new firms? How do such KIC demand-related offerings differ and improve non-KIC operators’ offerings e.g local, national and European programmes? Why would an entrepreneur opt for EIT Digital?”*

From the community of EIT Digital BDA managers, it emerged clearly that “soft landing” is perceived as a key tool to support new businesses growth through internationalization. This function was seen as an umbrella covering many actions to facilitate access to European

destinations, addressing several “barriers”, from venture capital funding to market access or alliance creation.

Interviewed start-ups would welcome business-boosting events: “There should be an event to pitch for the large firms: partners events are targeted to prepare for EIT grants;” as well as more active services by the network: “Access to corporations is there, though they are more ‘reactive’: you need to ask. Then the network responds. Once you identify who you want to meet, it takes place.”

Moreover, as one stakeholder interviewee from Madrid put it: “We need the people having “bleeding pain” to solve problems and take the risk to engage a start-up: EIT Digital needs to work harder to identify the demand of the corporations and build the whole pipeline.”

5.4.7 Entrepreneurial culture with global ambition

Culture can be broadly understood to refer to both the general perceptions on entrepreneurship and risk-taking as well as perceived capacity and capability to starting up. Questions addressed were: *“How does KIC’s approach to addressing cultural factors differ and improve non-KIC operators’ offerings e.g. local, national and European programmes? Why would an entrepreneur opt for EIT Digital?”*

BDAs’ overwhelming opinion was that one of the main advantages of EIT-Digital over local national initiatives of the same kind is its European dimension, not only for what concerns students’ mobility but also entrepreneurs’ potential footprint and support from partners within the community particularly as launching customers. Their access to a broad international network and the KIC deployment in many countries is seen as by BDA managers a key point in the EIT value proposition, thus allowing new ventures to successfully deal with their singularities. In this sense, they also see EIT is more a complement to the national / initiatives than a competitor.

Notwithstanding the time since the interviews with BDAs, both contrasting groups confirmed the observation about the local influence in the operations perceived by stakeholders and start-ups from the Madrid CLC. Many of them concurred with this view indicating that critical mass might be missing and that EIT Digital was still “work-in-progress”. Most critical comments stressed that innovation is more than theory, and *‘we need to distinguish between the conceptual and the implementation, as EIT and KICs are still start-ups’ themselves.*

Compared with BDA managers' consensus about the European dimension as one of the main advantages of EIT-Digital for market access, there was a mix of frustration and expectations among stakeholders and ventures. Explaining factors mentioned include an insufficient commitment by large business as launching customers as well as a not too visible global strategy that should go much further than the Silicon Valley hub that EIT-Digital established in 2014. One entrepreneur noted that *"The biggest value proposition of the EIT/KIC was precisely this access to markets through 'soft landing': the BDAs have a clear role but should leverage more on the companies and partners working on the Nodes. On the other hand, the KIC should move outside Europe!"*. Moreover, he continued that *"EIT Digital cannot and is not actually adding that much to market prospects of newcomers, as more and more companies are born global: EIT Digital cannot do much in the US to help start-ups access and develop the market. Silicon Valley is more an antenna to understand that ecosystem."* Finally, he concluded that: *"In the current circumstances, it is difficult to raise interest in the EIT Digital when H2020 is offering support also to customers and users. This is a bit perverse. As H2020 is moving more and more into innovation, the EIT is diluting."*

The practical experience with EIT Digital in its Madrid CLC indicates that such integration is work in progress. Probably due to the actual configuration of the node as part of a University campus (Montegancedo of the UPM, Technical University of Madrid), the entrepreneurial education value stream seems to be more clearly visible and embedded than business creation and innovation.

5.5 CONCLUSIONS FROM THE FINDINGS

The interviews provide first-hand evidence about the intended acceleration support services as seen by EIT Digital BDA managers across Europe compared to the perceptions of those services by players in the Madrid CLC. In this connection, the value proposition of EIT Digital across entrepreneurial innovation ecosystems seems to be adapted by EIT Digital BDA managers to their local contexts and influenced also by own practices and local culture. Furthermore, the perceptions of the stakeholders in Madrid CLC on EIT Digital depart from those of the EIT Digital DBA managers and from the designed EIT mission to leverage ecosystem challenges. In Table VI the findings are related to the originally designed policy responses in the EIT Regulation to address each of the six dimensions of the entrepreneurial innovation ecosystems above.

Dimensions	Designed EIT response as per its Regulation (2008)	Intended services by EIT Digital as seen by BDA managers (2014)	Perceptions from EIT Digital Madrid CLC startups and other stakeholders (2016)
Finance	“... should seek to raise an increasing financial contribution from the private sector and from income generated by its own activities.”	In principle, EIT Digital could become a reference network as a unique professional and neutral intermediary for trans-national operations.	Neutrality valued but access to finance through EIT Digital illusory as each BDA works locally.
Knowledge	“...foster knowledge-sharing, mentoring and networking among the recipients of EIT- labelled degrees and training;”	A 'Entrepreneur in Residence' scheme will incorporate highly professional managers, and this from a European perspective.	Mixed feelings regarding mentoring depending on the start-up/spin-off. No mention to 'Entrepreneur in Residence'
Talent	“...expand the Union's talent base, promote the development of innovation-related skills;”	Master and doctoral schools do have great potential for access to networks and training equipment.	Sceptical on the potential of EIT Digital educating staff for new ventures nurtured by EIT Digital.
Market	“...successfully introduce into an existing market or that are able to create new markets and that provide value to society”	'Soft Landing' is perhaps the most distinguishing feature of services provided by EIT / KICs compared to other initiatives in Europe.	The mix of frustration and expectations due to insufficient commitment by large corporations: too reactive
Governance	“...readiness to establish concrete measures to interact and cooperate with the public	Focus on business relations rather than policy and changing framework conditions	EIT Digital not powerful enough to influence administrations. Better targeting big corporations.

	and third sectors, as appropriate;”	(e.g. regulation, labour, tax).	
Culture	“... to develop a common innovation and knowledge transfer culture, and encourage participation in outreach activities;”	In theory, the European dimension of EIT Digital key for students’ mobility and entrepreneurs’ international footprint. EIT complements national initiatives.	Local influence in operations. Critical mass missing and insufficient commitment by large business. Not too visible global outreach strategy.

Table VI. Perceptions on EIT Digital response to challenges in ecosystem dimensions.

Notwithstanding the limited practical experience and timespan of EIT Digital, our case study confirms its potential value as a “seamless support web” for stakeholders and nurtured startups. In particular, the findings indicate the added value of the CLCs as neutral intermediaries. However, the EIT regulation and BDAs aspirations to attract international funding opportunities were not experienced by startups and other stakeholders. The mentoring services promoted by the BDAs receive also mixed responses among startup and other stakeholders. Furthermore, while BDAs see the value of master and doctoral schools for access to networks and training equipment, the startups and other stakeholders are skeptical on the existing and future benefits.

In addition, while the EIT regulation sets KICs a clear role to interact and cooperate also with the public sector and the civil society, it appears that both the BDAs and the startups with other stakeholders all expect EIT Digital to focus namely on business relations rather than on policy and changing framework conditions (e.g. regulation, labour, tax). EIT regulation also addresses the access to markets and even creation of new markets, which relates to the BDAs positive assessment of their ‘soft landing’ services. However, the startups and other stakeholders raise concerns on their value and note the insufficient commitment by large corporations. This lack of commitment appears to hamper also the development of EIT Digital-wide entrepreneurial culture together with excessive focus on local activities and lack of global outreach strategy.

One can note that these findings across the six ecosystem dimensions indicate clear mismatches between the designed EIT response as per its Regulation, the intended services by EIT Digital as seen by BDA managers and the perceptions from EIT Digital Madrid CLC startups and other stakeholders. Fundamentally, the performance of the EIT Digital depends on overcoming these mismatches and on their alignment in CLCs operations. Towards this end, our research identified the following three critical areas for EIT Digital.

Integration vs. juxtaposition:

Our work shows that the actual practical integration is more a theory than practice as students are not the primary source of founders for the new ventures which means that end-to-end, “seamless support web” does not find a continuum in the actual lifecycle of the ventures supported. The EIT has adopted a new monitoring system in 2017 (EIT, 2017) thus reviewing its former decision of 2015 (EIT, 2015) whereby it distinguishes, among other issues, new ventures created by students from any other venture nurtured from the KIC.

Moreover, concerning other value streams aside from new business creation, little attention is given to assess the overall cost-benefits of integrating the Knowledge Triangle in practice that would help to see if 'the sum is greater than the individual parts' considering missing links evidenced in the Madrid CLC between EIT Digital educational programmes and actual recruitment needs of the new ventures.

European vs. local approaches

Our research has shown also inertia in the service provision by BDAs managers at CLCs regarding their profiles and national context in which each operates. Consistent with the European dimension of EIT Digital, cross-fertilizing of good practices and more homogeneous services within the BDA network have not been addressed sufficiently to overcome the persistence of local cultures and to overcome risks for CLCs competing among them. Only limited cross-CLCs KPIs (Key Performance Indicators) exist among BDAs and CLCs consistent with the EIT wider European-wide remit.

Furthermore, a majority of the interviewed considered that the nascent EIT brand limits access to corporate venture financing. Also the role of corporations as launching customers should be better exploited. Finally, international leveraging seems difficult because local connections, trust and cultural differences are ‘sticky’ and tacit.

Anecdotal vs. decisive governance

Our work has shown that in EIT Digital little attention has been given to contextual factors (regulation, taxation, labour, etc.) to shape an efficient and effective network of entrepreneurial innovation ecosystems. Although early cooperation agreements were passed by EIT Digital with European institutions i.a. the European Investment Bank and EU's Future Internet Public-Private Partnership (FI-PPP), the actual impact and value of them are not visible to stakeholders and ventures. It is not clear how the early partnership agreements set by EIT Digital are implemented and how they influence European and national authorities regarding innovation-friendly regulations, capturing leading users and early demand.

Despite the challenge of the Digital Single Market and the will of EU authorities to overcome barriers, the EIT Digital have not positioned itself enough as a European-wide operation capable of helping national and European policy-makers to co-design more innovation-friendly regulation. EIT Climate KIC and EIT Innoenergy have taken more proactive role in governance. EIT Climate KIC talks about 'Knowledge Pyramid' as the partnership involves also national and regional authorities. EIT Innoenergy also is present in the SET Plan.

5.6 DISCUSSION AND CONCLUSIONS

As we focused on EIT Digital being a contemporary and complex phenomenon, we considered an in-depth single case study a preferred methodology. The case study attested the value of the developed six-dimensional framework for the structured analysis of entrepreneurial innovation ecosystems. It provided an improved understanding of the dynamics and intertwined dimensions in EIT Digital activities leveraging ecosystems for international entrepreneurial innovation. We stress the importance of future research on the alignment between the different ecosystem dimensions at CLC level but also across borders thus integrating the Knowledge Triangle at EU level. Furthermore, the research identified three critical areas in EIT Digital and, in more general in entrepreneurial innovation ecosystems, that should be a subject of further research; namely, i) ecosystem integration ii) international networking and iii) governance.

Ecosystems integration

The case study on EIT Digital revealed that gaining synergies between different agents and activities may be difficult. For instance, students were not the primary source of founders for the new ventures and educational programmes came short in responding to the recruitment

needs of new ventures. To enhance ecosystem-wide interactions, effective entrepreneurial training could be extended also towards corporate professionals.

The further integration of diverse agents in an ecosystem can benefit the research on business ecosystems (Moore 1993; Iansiti & Levien 2004; Teece 2016) underlining, especially, the commercially motivated co-evolution of interconnected organizations. In effect, ecosystem governance approaches characterized by informal self-organizing social systems have been developed elsewhere to coordinate diverse interconnected agents in uncertain environments (Jones, Hesterly, & Borgatti, 1997; Kash & Rycroft, 2000). Notably, in participant-driven network governance, participants are responsible for managing complex network relationships and for designing partnerships in product development, for instance (Provan & Kenis, 2008). Such a broader view of the integration and connectivity brings several beneficial qualities to the ecosystem, which should be addressed in future research.

International networking

Our case study on EIT Digital indicates that international leveraging of cross-border ecosystems is difficult at EU level, because local connections, trust and cultural differences are 'sticky' and tacit. Further understanding on international networking of ecosystems could be obtained by examining related initiatives and instruments, for instance, in Europe it could be considered RIS3 – Interreg, European Clusters and n-Helix networks (Boekholt et al. 2013) in order to gain an improved understanding about the suitability of the 'Knowledge Triangle integration' fostered by the EIT as overarching policy response in fostering entrepreneurial innovation in Europe in general and high growth in particular.

Stakeholder networks or physically-anchored clusters can be directed to accelerate innovation through interconnected hubs working together, not necessarily locally (Hansson, 2007; Majava, Leviäkangas, Kinnunen, Kess, & Foit, 2016). In similar lines, Granieri and Renda (2012) refer to 'network spaces', as domains in various degrees of physical and intellectual proximity where knowledge, skills and experience are mediated by a professional operational structure. Hollingsworth (2009) provides further rationales for such co-location centres for radical innovation by way of bringing together financial resources, diverse disciplines and leadership. In line with Hämäläinen (2017) and Engel and del-Palacio (2009), we suggest considering international collaboration, beyond market opportunities (Mathews & Zander, 2007), crucial also for enhancing cognitive variety and ultimately innovativeness of firms and their ecosystems. Future research work would benefit from collecting EIT Digital data on a wider EU scale in order to evaluate additionality. Furthermore, it would be worth assessing to what extent

EIT Digital exposure to the US with its antenna in Silicon Valley has been successful in order to derive the best strategy to effectively help new ventures become world-leaders.

Adaptive governance

Our case study also found governance among different institutions crucial to co-design suitable contextual factors for firms and other agents in the ecosystem. It is worth noting that EIT Digital decided to orchestrate partners by so-called national Nodes, which may create rigidities in exploring and exploiting the full potential of integrating the local Knowledge Triangle players at European level rather than juxtaposing national interests.

Against this backdrop, we suggest exploring new forms of governance as an alternative to the command and control driven approaches that are amplified by the trends of new public management (Gruening, 2001) or lean government (Janssen & Estevez, 2013). We argue that the nurturing of business ecosystems requires policies that are aligned with and responsive to the complexity and uncertainty in these ecosystems. Herein, our work connects to adaptive and participatory governance; for instance, to the work of Ostrom (2004), Dietz et al. (2008) and Chaffin et al. (2014), who have applied complex adaptive systems approach in the sustainable governance of socio-ecological ecosystems.

5.7 FINAL REMARKS

In this Section III, we argued that it is particularly difficult to target high growth firms with direct policy measures and suggested that policies may be better off by adopting a systemic and holistic approach with an emphasis on international networking. Building on earlier work on entrepreneurship and innovation-driven ecosystems and related policy measures, this Section builds upon the concept of 'entrepreneurial innovation ecosystem' (Leceta & Könnölä, 2019) and applied it in the empirical analysis of the EIT Digital. The semi-structured interviews and desk research allowed the analysis of how the EIT Digital is managed and how this community leverages ecosystems for international entrepreneurial innovation.

The findings from the interviews provide first-hand evidence on the perceptions among EIT Digital managers around Europe and among stakeholders in Madrid co-location centre. In particular, we analyse how EIT Digital BDA managers adapt the overall design of the EIT to their local contexts of entrepreneurial innovation ecosystems influenced by local practices and

culture. Furthermore, we found out that the perceptions of the stakeholders in Madrid co-location centre on EIT Digital depart from those of the EIT Digital accelerator managers around Europe and from the designed EIT response to ecosystem challenges. Based on the findings, we stress the importance of future research on the interconnections and dynamics between the different ecosystem dimensions with particular attention to ecosystem integration, international networking and adaptive governance.

6 DISCUSSION AND CONCLUSION

To conclude, I first recall the general objectives and methodology against the scope of the dissertation to place it within the field of innovation policy studies. I then recap briefly the results and policy recommendations from the three Sections. Finally, I end up with a general discussion and conclusions with suggestions for further research work, particularly on the EIT but more broadly also, in search a holistic EU innovation policy and the EIC.

6.1 INTRODUCTION

To start with, let's recall that the dissertation involved conceptual research, subsequent case studies and empirical work on the more established EU vs. the newer policy interventions rolled out by the EIT, using its ICT KIC (EIT ICT Labs, later renamed EIT Digital) to test the EIT/KIC model in practice. Three general objectives were formulated as follows:

1. Assessing underlying rationales for European policies fostering cooperation in R&D and their added value for business, SMEs in particular, when they take part in trans-national collaborative **projects**.
2. Discussing the EIT specific features regarding governance, management and content that make its **partnership** operations through its KICs distinctive in fostering cross-border entrepreneurial innovation ecosystems.
3. Empirically testing the effectiveness of one of EIT's three first KICs (EIT Digital) through its carrier-catalysis model (i.e. existing support schemes and new models) for what concerns overcoming **barriers** to growth for potential high growth firms.

6.2 RESULTS AND POLICY RECOMMENDATIONS

The precise results of each Section were presented separately which I recall also here to the extent that they met each of the three objectives formulated above:

4. **Section I** identified underlying rationales for European policies fostering cooperation in R&D and their added value for business, SMEs in particular, when they take part in trans-national collaborative **projects** concluding with a discussion on how to possibly widen the trans-national web of 'project links' created over the years by well established European programmes. This resulted in a proposal for a 'coordination space' using support networks targeting SMEs (Eureka) and funds available (Structural Funds) which we recap later below.
5. **Section II** discussed the EIT specific features regarding governance, management and content that make its **partnership** operations through its first three KICs distinctive. The discussion focused on how to strengthen the 'partnerships hubs' made possible through the EIT and concluded by identifying its particular governance and management model thus documenting what, how and where its 'living partnerships' KICs operate in practice.
6. **Section III** considered EIT Digital's 'carrier-catalysis' model for what concerns its 'cross-border acceleration' model, in order to assess removal of **barriers** to growth by this KIC network of business development managers when supporting potential high-growth digital firms. The Section identified limitations of the model and formulated recommendations.

Policy implications and recommendations resulting from the corresponding discussions can be summarized as follows for each Section:

In concluding **Section I** investigation on the rational and added value of European R&D collaborative projects involving business in general and SMEs in particular, I assessed how to enlarge coherence for both participants and governance resulting in two policy recommendations to help reduce the innovation **gap** and the **fragmented** policy landscape. Firstly, a practical proposal to help coordinate industry-oriented ERANETs through EUREKA should this intergovernmental network be mandated to act as a 'clearing house' thus easing access by firms, particularly SMEs (including those with the potential for jobs and growth, thus narrowing down the innovation **gap**); and secondly, to further exploit the potential offered by Structural Funds (SF) available in order to foster more trans-national R&D projects at European level (thus potentially reducing the currently **fragmented** policy landscape).

If implemented, the said recommendations could optimize policy coordination through project cooperation by creating an ‘intermediation’ space between the EU and national programs and budgets. By using a long-standing network like EUREKA combined with new means available through the SF, a balance between ‘excellence’ and ‘cohesion’ could be eased. This is so as EUREKA brings about its long-standing network capital while the Structural Funds brings about additional funding means. Although I had focused on EUREKA and industrial-oriented ERANETs (eventually also JTIs and public-private partnerships PPPs, taking into account our focus on SMEs), a similar recommendation could be envisaged around COST regarding academic-oriented ERANETs (progressively including JPIs or P2P public-public partnerships) thus resulting in a radically simplified architecture for policy instruments in the longer run, built upon (Granieri and Renda, 2012 ; Leceta et al., 2017) as follows:

1. **Governments** principally responsible as enablers and funders, certainly for human capital and capacity building, including basic infrastructure (education, regulation, etc.).
2. **Intergovernmental level**, pooling together nationally funded programs, the largest share by far of public support in Europe - whereby trans-national collaboration is not just established at EU-level but embedded in nationally funded programs, and projects via:
 - EU-sponsored ‘public-public partnerships’ and ‘publicly-led R&D cooperation’ with business cluster around COST, progressively including ‘Joint Programming Initiatives’
 - EU-sponsored ‘private-private partnerships’ and ‘privately-led R&D cooperation’ with academia, cluster around Eureka, progressively including ‘Joint Technology Initiatives’
3. **Longer run EU/community level** policy support interventions are substantiated in a new interpretation of the ‘European added value’, namely, ‘*the added value which comes from competition at EU level*’ (Lukkonen, 2014 citing Communication from the Commission ‘Europe and Basic Research’ (European Commission 2004a) that justified the establishment of the ERC) thus replacing the traditional interpretation of ‘European added value’ as a synonym of trans-national collaboration (Muldur et al. 2006). The same argument applies also to the much recent European Innovation Council (EIC).

Regarding relevance, in spite of all the policy experimentation with new instruments since the FP6, continued with FP7 and Horizon 2020, the level of policy coordination through project collaboration beyond the FP itself has not grown significantly. Building new instruments takes enormous time and effort, which is a strong argument to simplify the much discussed and fragmented policy landscape using existing networks and funds. In that connection, already since 2008 Eureka had ‘de facto’ acted as a ‘clearing house’ for two pilots ERANETs (EraSME and CORNET) which adopted the EuroStars model of evaluation to the satisfaction of respective stakeholders, demonstrating that this service is feasible. Moreover, since 2012 the Eureka network has further explored the regional dimension of innovation to help fund its projects, which indicates there is further potential to be exploited. One can thus conclude that a wider acceptance and implementation of the recommendations put forward in this Section would further the level of transnational coordination of national R&D programs and contribute also to the attainment of ERA in mobilizing business in general and SMEs in particular.

Section II thereafter discussed the EIT specific (how to and what to) features in creating cross-border entrepreneurial innovation ecosystems. In framing the conclusions of this Section, I considered (Engel & del-Palacio, 2011) ‘Clusters of Innovation’ (COI) framework, critically analysing the characteristics of CLCs and relations at KIC level. From the comparison, I found very close similarities, concluding that that ‘born global’ mind-sets and connections are critically important for a vibrant entrepreneurial innovation ecosystem and recommended a more determined global agenda for KICs coupled with a research agenda to ‘expose the EIT to the world’. From the research a number of questions emerge:

1. First of all, why are (eco) systems relevant? On the more general level, one observes widespread success and presence in policy discourses of Innovation Systems theories (Freedman, 1995; Nelson, 1993; Lundvall, 1992) stressing the critical importance of interdependencies. However, in practice, Governments focus more on top-down ‘building blocks’ of those systems while the more recent focus on ‘entrepreneurial ecosystems’ puts increased emphasis on ‘shared values’ by mobile resources and collective attitudes, driven by people that are better nurtured in particular ‘enabling spaces’ (Engel and del-Palacio, 2009 and Engel, 2014). However, to what extent the experimental policy innovation that EIT represents would ultimately result in ‘value for money’ is to be seen as outsourced operations to KICs through Legal Entities, autonomous governance and CEO-suite management structures plus Europe-wide CLC presence represent altogether a very heavy over-head.

2. What is mission critical for EIT success? Considering experience so far, the ultimate ‘value for money’ relation the EIT might be able to achieve, including both direct deliverables by KICs and induced system change by the Institute overall, remains uncertain in the longer run. Consequently, a fully-fledged programme for monitoring and evaluation is critically important. Indeed, identification of innovation models and good practices emerging from KICs for wider dissemination and also active engagements by EIT with stakeholders beyond KICs’ own partners and participants is key to increase overall impact (as stressed in preparation of the forthcoming programming period i.e. and EIT 2021-2027 strategic innovation agenda within Horizon Europe⁴¹). This would substantiate ‘public value’ by the EIT as an “Institute for Europe” beyond the economic and social rationales that might otherwise be applied mainly to the KICs as they are asked to become sustainable in the longer run.

3. What might be missing in the EIT/KIC approach? Among the three content agendas of the KICs, the one concerning innovation projects continues to be responsible for the largest budget share compared to entrepreneurial education and new business creation (EC, 2017). This can be partly explained by the fact that innovation is more costly. However, the relation between this agenda and scale ups is also important and that relation remains unclear. In other words, how can new firms benefit from new-to-the-world innovation models? Vice versa, how can new-to-the-world innovation projects for KIC partners benefit from potentially disruptive new firms can bring about? This latter question took us to test a KIC that targets growth in a particularly critical domain for Europe: EIT Digital.

Consequently, in **Section III** I focused on EIT Digital acceleration for an in-depth single case study. The case study attested the value of the ‘entrepreneurial innovation ecosystem’ concept merging two formerly separate strands of the literature; as well as the use of its six-dimensional framework developed in (Leceta and Konnola, 2019) for the structured analysis of ecosystems, resulting in a second paper (Leceta and Konnola, 2020). Indeed, the said framework provided an improved understanding of the dynamics and intertwined dimensions in

⁴¹ <https://eit.europa.eu/who-we-are/eit-glance/eit-strategy-2021-2027>

EIT Digital activities leveraging ecosystems for international entrepreneurial innovation. Furthermore, the research identified three critical areas for further research regarding EIT Digital, EIT itself and, in more general, entrepreneurial innovation ecosystems; namely, i) ecosystem integration ii) international networking and iii) adaptive governance:

1. **Ecosystems integration.** The case study on EIT Digital revealed that gaining synergies between different agents and activities may be difficult. For instance, students were not the primary source of founders for the new ventures and educational programmes came short in responding to the recruitment needs of new ventures. Also, to enhance ecosystem-wide interactions, effective entrepreneurial training could be extended towards corporate professionals.

2. **International networking.** The case study on EIT Digital indicates that international leveraging of cross-border ecosystems is difficult at EU level, because local connections, trust and cultural differences are 'sticky' and tacit. Further understanding on international networking of ecosystems could be obtained by examining related initiatives and instruments, for instance, in Europe one could consider RIS3 – Interreg, European Clusters and n-Helix networks (Boekholt et al. 2013) in order to gain an improved understanding about the suitability of the 'Knowledge Triangle integration' at EU level fostered by the EIT as overarching policy response in fostering entrepreneurial innovation in Europe in general and high growth in particular.

3. **Adaptive governance.** The case study also found governance among different institutions crucial to co-design suitable contextual factors for firms and other agents in the ecosystem. In this connection, it is worth noting that EIT Digital decided to orchestrate partners by so-called national Nodes, which may create rigidities in exploring and exploiting the full potential of integrating the local 'Knowledge Triangle' players at European level rather than juxtaposing national interests.

6.3 POLICY DISCUSSION

To help frame my contribution against most relevant innovation theories and studies, I illustrate in Figure 33 below the heuristic trajectory of the dissertation and interrelations between the three Sections. The underlying logic connecting the three Sections of the dissertation is briefly presented hereafter followed by a longer policy discussion.

Business and Collaboration intersection: Policies aimed at involving ESTABLISHED BUSINESS in COLLABORATIVE R&D acknowledge that firms can carry out projects considering the double role of R&D (Cohen and Levinthal, 1990) i.e. to increase absorptive capacity and competitive advantage. But also, that, taking into account the new geography of knowledge, business themselves should do R&D in increasingly open environments involving other actors in the innovation system (Chesborough, 2003 and 2006). In this connection, the main policy instrument used by the EU so far to encourage collaborations involving business are institutionalised, trans-national projects, via time-limited consortia associating established firms. This includes standard calls by the European Commission as well as public-private partnerships (PPPs, sometimes operated via so-called 'Joint Technology Initiatives') in the Framework Program, the participation of SMEs has gained space considering their number and relative place and role regarding current employment. Consequently, conceptual research in Section I focused on EXISTING FIRMS and how to modulate current European policies in associating more the SMEs fabric.

Collaboration and Ecosystems intersection: Increasingly, the systems of innovation theory (Freeman, 1995, Nelson, 1993, Lundvall, 1992) has stressed the iterative nature of innovation to the extent that not only punctual COLLABORATION feeds into and, in exchange, is facilitated within ECOSYSTEMS where the actors therein interact through a variety of channels, not only institutionalised trans-national projects but also more informal forms of individual and social interaction. This is particularly important for what concerns novel forms of innovation fostering new business creation. The importance of NEW FIRMS is well known not only as net job creators but also as potential disruptors (Baumol, 2010). Hence, Section II focused on a subset of SMEs, namely, new businesses – notwithstanding the fact that participation by large firms in EU-level understandings has been a continuous area of attention and large firms are also involved in EIT KICs - inquiring the EIT governance, management and content for entrepreneurial innovation.

Ecosystems and Business intersection: Finally, new businesses may comprise potential disruptors (Christensen, 1997). Unfortunately, potential high growth firms can hardly be the target of innovation policy (Coad et al. 2014) while the extent to which ECOSYSTEMS successfully engage EXISTING BUSINESS for sector renewal and growth is key. Indeed, alliances between established firms and new ones can be a way to help start-ups scale (WEF, 2014). I thus focused Section III on ICT - a sector that Europe cannot miss – and ask to what extent the business development accelerator network of EIT Digital is actually helping REMOVE BARRIERS to growth.

Figure 33 Cognitive and heuristic trajectory followed in the dissertation

To introduce the policy discussion, let's recall that the starting point of the dissertation was noting two structural problems for **policy and innovation** in Europe, namely, the fragmented policy landscape and the outstanding innovation gap with other world leaders (the US in particular). Recent literature shows that these problems are largely correlated and explained, respectively by missing enabling conditions (ecosystems) and few innovative world-leading firms (yollies) in the Old Continent. Thereafter, the case study and empirical part focused on a policy shift that the EIT illustrates from the former emphasis of EU-level interventions via Transnational collaborative projects (in R&D) to fostering Pan-European entrepreneurial (innovation) ecosystems - see Table VII – inquiring EIT response represents a holistic innovation policy. In fact, if we started the dissertation inquiring whether a European innovation policy actually exists (Granieri and Renda, 2012), a concluding statement from our research with the EIT could be that it is more a **policy innovation** in the quest of a holistic EU **innovation policy**.

Established EU-level policy set up: trans-national collaborative projects	
Structural innovation policy problems <ul style="list-style-type: none"> - Fragmentation - Innovation gap 	European underperformance explained by: <ul style="list-style-type: none"> - Missing enabling ecosystems - Few innovative world leading firms
Emerging policy set up illustrated by the EIT: Pan-European ecosystems	
EIT response parallel roles: <ul style="list-style-type: none"> - As an Institute - As an Investor 	EIT effects targeted <ul style="list-style-type: none"> - Induced system change - Direct through the KICs

Table VII. Summary response and targets the emerging policy set up illustrated by EIT.

To elaborate on the above, I build upon my contributions at the CEPS Task Force that I chaired on the theme “*Unleashing innovation and entrepreneurship in Europe: People, Places and Policies*”, published in a book (Leceta et al., 2017). From that, I pick up the most relevant points corresponding to the three intersections mentioned above (**Business and Collaboration, Collaboration and Ecosystems, Ecosystems and Business**) resulting in three key messages on what EU policies should shape i.e. what collaborations from business, what ecosystems from collaboration and what businesses from ecosystems.

6.3.1 Reframe policy for established and new firms (rather than large and small firms)

Section I concluded with a proposal for a policy coordination space through project cooperation as there is too often a sad disconnect between innovation policymakers’ intentions and actual the implementation of well-intended new policies. It is thus time to rethink innovation policies through co-creation spaces, rather than mechanistic instruments too often focused on funding and linearity (Edquist, 2014). Regrettably, most innovation policy interventions focus on R&D even though most European governments claim their innovation policies and strategies are holistic (Edquist, 2014). At EU level, most policy interventions foster public-private

partnerships between academia and businesses, including SMEs. This is sub-optimal for two reasons. On one hand, preferred partners for business in R&D differ across sectors and countries, not necessarily academia; on the other, policies fostering inter-firm collaboration typically favour consortia that involve just both large and small businesses.

Regarding the first observation above, we know that collaboration with academia is useful to science-based innovation and specialised suppliers, less so to scale-intensive and supplier-dominated sectors (Pavitt, 1984). Regarding the second, focusing on firm size rather than age is suboptimal for policy (Mazzucato, 2013), because “*most of firms start small, but most small firms are old*” (Coad et al., 2014). In the wake of the crisis, more experimental innovation models of innovation are thus emerging, coupled with evidence that disruptive innovative models can displace long-established firms. More and more voices from the World Economic Forum, the OECD and the International Monetary Fund (IMF) are calling for new policy interventions, replacing emphasis on cooperation between large and small partners with more focused efforts between established (both large and small) and new ventures.

Debunking the myth of the role of the state and focusing on the real issues (Mazzucato, 2013) are pre-requisites. Regarding corporate ventures and entrepreneurship, for instance, trends such as FinTech and digitisation of manufacturers (Industry 4.0) aim at associating new firms with established businesses in emerging open innovation corporate ecosystems. Indeed, Europe does not lack national champions, network operators, utilities and service providers with global footprints, but their competitiveness is at stake and requires radically open and more disruptive sources of innovation. Because their traditional revenue sources will not necessarily grow, quite the opposite, in fact: traditional business models in ‘extractive industries’ are increasingly exposed to and eroded by international competition from new entrants. On the other hand, sustainability is not guaranteed either (as evidenced by Veugelers, 2009), since the average knowledge and technology intensity of European firms is lower. Hence, Europe needs to narrow the innovation gap both for what concerns disruptive innovation (particularly market-creating innovative models) and radical innovation (based on new breakthrough technologies); while linking start-ups and established firms.

Indeed, life expectation of large firms is dropping and that is why many are willing to transform and even to reinvent their business model. For that to happen, new forms of collaboration between the established firms (either large or small) and new (start-ups and spin-offs) is a rather unexplored area for innovation policy, advocated by WEF (2014). Vice versa, new firms can find ‘launching partners’ among established firms, helping the former grow and accelerate market uptake through the latter’s global business footprints. Suitable arrangements

need to be established to secure balanced and sustainable alliances, including IP (WEF, 2015). More widely, governments also need to engage in next generation policies, as too of them focus on (not necessarily new) SMEs; on the one hand, and on partnerships between (not necessarily established and new) large and small firms, on the other hand.

Interestingly, in 2015 OECD strongly advised governments to stop sponsoring just established companies and to consider providing more resolute support also newcomers as well as to achieve more balance between direct and indirect aid. In this connection, evidence shows that direct aid is more effective for launching innovation in companies that have yet to innovate, while direct aid ‘builds loyalty’ in companies that are already innovating, especially larger ones (Pereiras & Huergo, 2006). Another advantage of direct aid is the directionality to meet major challenges (Mazzucato, 2013). Also IMF (2016) finds that “*tax preferences should target new firms, not small ones*”, arguing that preferential tax treatment of small firms should be avoided; it may actually hurt growth by creating a ‘small-business trap’ as a result of the higher taxes firms would face once they cross a certain size threshold. Well-designed tax relief for new firms can better promote innovation. In summary, a suitable balance between direct support measures and indirect support measures (tax incentives) should also be achieved, as new/small and established/large firms do not benefit equally from them.

Overall, there seems to be a surprisingly unanimous opinion among international organisations and fora (WEF, OECD and IMF reported above) that next generation innovation policies require a different focus. Maybe the crisis brought about a much-needed shift from more widespread generic public/private R&D-focused innovation policy to more targeted but transversal and contextual policies for high-growth potential. Indiscriminate interventions for cooperation between large and small firms require more targeted partnerships between existing and new firms also at the EU level, whereby the former may provide the scale and the latter the disruptive potential. In such a context, also, a suitable balance needs to be established within national Member States of the EU between direct and indirect support schemes in consideration of their different implications.

6.3.2 Set up a simpler division of labour for multi-level innovation policy in Europe

Section II reflected on the EIT governance and management and the contribution of its KICs to help align multi-level policies. This is relevant in view of the modest pace in creating a

European Research Area (ERA) and meeting the Barcelona objectives, hence the need for more radical policy shifts, particularly in countries that are lagging behind (Veugelers, 2014). However, the structure and rules of Framework Programmes for R&D are probably too rigid and the strict application of principles such as subsidiarity and competition law still limits the EU's ability to engage with more dynamic and open platforms and partnerships.

Concerning the mainstream of the Framework Programmes' operations, i.e. transnational calls, the question is why does Europe still need to invest so much in 'getting partners together' via trans-national collaborative projects. Most know themselves enough already, and through repetitive public-private partnerships the EU may risk sponsoring the reputation of given partners more than the actual excellence of projects. A different notion of European added value is thus needed, allowing individual competition at European level and not the geometry of collaboration projects *per se*; national governments could then embrace transnational collaboration as part of their national programmes and interventions, including structural funds which would help new member States to better position themselves.

On the other hand, decisive regulatory and experimental efforts are urgently needed in order to encompass policy action commensurate with the challenges of our time. This is a must to end the dichotomy in discourse and practice, in between the macro-level policy-setting (government and governance) and micro-level performance (firms and entrepreneurs). In this connection, as the need for policy experimentation becomes more acute to face grand societal challenges, the 'meso level' efforts of learning innovation agencies and programmes (Breznitz & Ornston, 2013; Chesbrough, 2012) are asked to play a different role: from 'funding and coordinating' (Lepori, 2011) to 'facilitation and orchestration' (Clarysse et al., 2015; Chesbrough, 2012). These are some of the key words in this new era of entrepreneurial ecosystems (Mason & Brown, 2014; Isenberg, 2011) and global clusters of innovation (Engel & del-Palacio, 2009). Hence the motivation to study EIT governance and management.

All over the world, an emerging wave of entrepreneurs, technological advancements and investment are co-creating radically new innovation models through new business-like vehicles for policy delivery in shaping entrepreneurial innovation ecosystems, e.g. KICs of the EIT and university-business structures such the IP Group in the UK. Also, firms are reverting more and more to intra-preneurial and open innovation schemes such as IP licensing, academic partnerships, open-source platforms and venture capital. Corporate and university ventures are among the fastest-growing strategies (Dushnitsky & Lenox, 2005; Napp & Minshall, 2011; Sahaym et al., 2010). In the quest for the most effective policies for this new reality, learning is key not only to implementing programmes but also to shape smarter interventions in terms of

efficiency and impact. This will also help policy evolve from ‘managing current systems’ (top-down) to helping ‘shape new ecosystems’ (bottom-up), with more focus on knowledge dynamics and value generation. Policy experimentation of this sort could help operationalise more successful and holistic interventions and to scale them up.

Mutual learning among policy-makers and the research community provides a good basis for further developments. While successful ecosystems (Silicon Valley, Israel, Singapore, etc.) demonstrate that entrepreneurial talent and global ambition are key. Hence the need for next generation policies that can hopefully remake Europe again a continent of entrepreneurs and innovators. In this connection, there is room for consolidation of the various communities, instruments and spaces offered by the EU Horizon 2020: KICs, EIPs, EITs, JTI, etc. Notwithstanding their experimental merit and interest for given stakeholders and participants, the whole set together multiply transaction costs and reduce opportunities for entrepreneurs in the periphery – precisely those who can potentially be more disruptive.

I thus argue that a new paradigm is needed for EU-level policy whereby the Commission would adopt a more strategic role by focusing only on those interventions that make sense at EU level, such as ERC, EIT, FET, etc.; while progressively delegates collaborative undertakings, such as ERANETs, JPIs, JTIs, etc., to longstanding and experienced intergovernmental networks, like Eureka (for business-led, collaborative R&D) and Cost (for academy-led collaborative R&D) presented above. Frontier-research is the aim of ERC - on top of existing scientific infrastructures and laboratories (ESFRI) -, while the EIT aims to shape pan-European ecosystems for people-driven innovation – an social infrastructure on which the European Innovation Council (EIC) can tap -. In this connection, the debate and future task for the European Innovation Council (EIC) is rightly focused on scale-ups, which a synthetic indicator to monitor Europe’s innovation policy performance.

6.3.3 Europe should embark in transformative but simpler innovation policies.

Acknowledging that the current division of labour in the European landscape is far too complex, with so many regional, national and transnational institutions and programmes, the result being that coordination unfortunately is often left to the actual cooperative applicants (Granieri & Renda, 2012). But, as evidenced by data collected by EUROSTAT on ‘transnationally coordinated research’ since 2012, policy coordination through pure project cooperation at EU level through the FPs has also shown its limitations.

Notwithstanding the above and all the recent experimentation (ERANETs, JTIs, JPIs, etc.), with very notable exceptions such as the ERC, the paradigm for EU-level interventions remains that of promoting transnational collaboration in R&D; and collaboration, essentially an instrument, has become a goal in itself, neglecting its ultimate aim of creating value and impact. Also, the proliferation of too many well-intentioned EU-level instruments has further complicated the overall fabric, both for policy-makers and participants. It is thus time for a simplified and stable policy framework. Beyond simplification, our discussion on Section III also stressed that it is high time for demand-side versus supply-side policies at EU level.

In short, the research advocates a transformation of policies for innovation and entrepreneurship if Europe wants to find its approach and place in an increasingly competitive and complex knowledge world. Obviously, a fundamental change is always more challenging than adding additional layers to the already complex innovation policy landscape that characterises Europe. On the other hand, many new instruments address given stakeholder groups, e.g. rather than reforming the FP to make the whole more user-friendly for firms, large ones in particular; JTIs were put in place precisely to attract such participants. In contrast, I argue that rather than targeting given stakeholders, policies should focus on the right dynamics, e.g. addressing the lack of young leading innovators (Veugelers, 2009).

With the emergence of societal challenges as a focal point of policy interventions in Europe, compared to the persistence of mission research in the US, the EU has gained a sense of purpose beyond fostering the competitiveness of European industry (the theoretical logic of the FP in the early days) or shaping the European Research Area (more recently since the Lisbon strategy). With this opportunity, there may be a risk of populating the landscape with too many instruments. Among them, KICs try to coordinate programmes following a 'business logic', resulting in a significant leverage factor as 'professional brokering' structures to help entrepreneurs. In this same spirit, should the multilevel coordination be facilitated by existing intergovernmental networks (Cost and Eureka as we presented above), the European innovation fabric would be made much simpler and easily accessible with the ERC and EIT as operational/infrastructure providers (frontier research and innovation hotspots) coupled with the EIB and EIC as more fluid investors leveraging finance and ventures:

- To capture tacit nature of knowledge and wisdom, two councils (ERC and EIC) should be tasked to create an interface between R&I and policymaking, critically contributing to including roadmaps in future impact analysis and solving emerging policy problems, such as the need to amend legislation to incorporate new technological developments or to encourage efforts in basic or applied research to address long-term societal

challenges. In particular, the new EIC should promote, not only capacity-building, but also regulatory, policy and funding coherence.

- On the more operative front, a limited number of agencies, e.g. the EIB and the EIT, would be called on to launch and orchestrate challenge-led, streamlined platforms where research, development and demonstration are tackled for specific societal challenges in a multi-stakeholder fashion, open to new entrants, new technologies, new business models and citizens. There would be only one such platform for every emerging societal challenge, with cooperation across platforms in case of overlapping issues, thus reducing the large array of policy instruments at EU level.
- Widespread action on the ground by open and dynamic institutions should address innovation and entrepreneurship at the regional and local level. These institutions should be designed to include intra-preneurs and exchange ideas and practices with the private sector, securing high-level commitments. At the same time, they create suitable environments for entrepreneurship to flourish, and as such involve citizens, academia, civil society, small and large, new and established companies to harness the potential of local knowledge and talent in combination within smart specialisation.

Coherence is thus needed to orchestrate EU-level interventions while strengthening the European dimension within national programmes (empowering Eureka and Cost) in order to focus on what makes sense at national and EU level (ERC, EIT, EIC and EIB). From our research with EIT Digital acceleration, we stress that while KICs are working to create enabling environments and infrastructure by inter-connecting local innovation hot-spots across borders, the EIC should not just be another supply-side intervention; rather it should have regulatory power to effectively help potential high growth firms overcome barriers.

Overall, beyond working papers and inputs to the said Task Force (Leceta et al, 2017) my most relevant contribution is framed in the two papers published in 2019 and 2020, starting with the conceptual framework coined 'Entrepreneurial Innovation Ecosystems' in (Leceta and Konnola, 2019) and tested in practice with the early experience of EIT Digital in Spain (Leceta and Konnola, 2020). However, there are also limitations to the research and, consequently, room for further work. First, due to the fact that I focus on the 'adolescence period' of the EIT from 2011 to 2015 coincident with my mandate as Director of the EIT as I try to provide an insider view from EIT HQ regarding governance and management practices that was missing in

the few academic contributions about EIT before. Second, I do not evaluate EIT until the present day, nor more subsequent developments after my mandate. Last but not least, I do not carry out any comparative assessment with the European Innovation Council (EIC) which will operate in parallel to the EIT in future. Consequently, assessing respective roles and impact of EIT and EIC using representative and comparable venture groups is outside the scope of my work but could very well be an interesting topic for future research.

Further to the suggestions presented in each Section and notably Annex II.2. (derived from Section II (namely **KT integration in practice; Exploiting EIT PMS and KPIs; Exposing EIT to the world**) and three topics mentioned in Section III (namely **Ecosystems integration; International networking; Adaptive governance**) a worth reference for a fully-fledged research agenda about EIT is (Tindemans and Soete, 2007). Therein, a 'hybrid model' for EIT was put forward including a larger number of KICs with manageable number of partners: a '**Cluster EIT**' model in between a fully centralised EIT - which was apparently never meant by the European Commission former President Barroso, following (Huisman & de Jong 2014) and (Jones, 2008) - and the fully decentralised model actually implemented in practice since 2008 with the first three KICs and maintained thereafter. One could imagine a very different set up compared to the EIT we know today should KICs be closer to the logic of CLCs, resulting in a larger portfolio of '**mini KICs**' competing for EIT support and smarter links to national and regional stakeholders. Note (Tindemans and Soete, 2007) proposed '*up to maybe 20*', closer to the logic of University Institutes as '*such a Cluster EIT [model] combines for each area features of physical concentration of graduate training, research, industry cooperation and technology transfer in one or only a small number of locations with an active networking between such well recognized centers of excellence*'.

6.4 FINAL CONCLUSIONS AND FUTURE RESEARCH BEYOND EIT

After the mid-term evaluation of the EIT undertaken in the Horizon 2020 context⁴², the Strategic Innovation Agenda (SIA) for the 2020-2027 period acknowledges insufficient attention thus far in codifying and disseminating good practices and learnings from the EIT and its KICs

⁴³ Notwithstanding the risk of oversimplification, one can observe promising indications, visible achievements but also structural limitations in the model:

1. **EIT's experimentation** looks promising regarding business participation in KICs which has been increasing, particularly for what concerns SMEs somehow contrary to the trend registered in former FPs. Also, the leverage of funds by EIT funds is particularly worth noting regarding nations and regions.

2. Visible achievements concern the level of **understanding and support** the EIT has successfully gathered for its mission and value proposition. This is most impressive in the budget increase achieved from the first period (300 Millions) to the former Horizon 2020 (with 2,7 Billions) but also the wide-spread acknowledgement of the potential of the KICs/CLCs model as novel co-creation operations/spaces.

3. However, EIT and KICs need to achieve parallel action of innovation-friendly **regulation and demand** which KIC themselves cannot provide: examination of EIPs, PPPs and 'innovation deals' would be timely and wise should the EIT want to become the innovation powerhouse of Europe. In the end, the Institute still need to provide sufficient 'value for money' notwithstanding the overheads caused by its distributed KIC model and consequential need of governing, C-suite management and delivery structures.

⁴² <https://publications.europa.eu/en/publication-detail/-/publication/7415ff23-db2d-11e8-afb3-01aa75ed71a1/language-en>

⁴³ <https://ec.europa.eu/education/sites/education/files/document-library-docs/proposal-decision-eit-2021-2027-annex.pdf>

To conclude, I offer own reflections on **Governance, Management** and **Trends** inspired from the dissertation and discussion. Reflections hereafter are, however, just suggestions for future work and research inspired by the EIT beyond its own remit and boundaries.

6.4.1 Governance

(Kulhmann and Edler, 2003) conceptual work on three scenarios for the Europe of Knowledge, which included ‘a vision of a centrally “mediated” mixture of competition and cooperation between diverse regional innovation cultures and a related governance structure’ is worth recalling. In that context, the EIT can be seen an experiment in trying to match the actual nature of knowledge for innovation and competition, resulting in local to global tensions:

Figure 34: Tensions between local and global dimensions of innovation and competition. Own elaboration from (Leceta et al., 2017).

- In a way, innovation happens locally, linked to ‘agglomeration’ effects which very much explain public policies’ focus on clusters and incubation. In this logic, it would make sense that funding and management of policies matching the nature of innovation is more national/local than international or trans-national: this is Europe’s established view.
- On the other hand, however, competition is increasingly global, requiring innovation to be scaled up and accelerated across national borders: indeed, both knowledge and markets become increasingly global, and in this logic, policy interventions should maybe be less national/local and more international (trans-national or supranational in Europe).

The fundamental question remains on the best possible architectural model to reconcile local vs. global dynamics, partnership composition and level of integration for what concerns the particular case of EIT and its KICs. My observations are threefold:

i) On the local vs. global knowledge dynamics of the KICs/CLCs₁ we know that ‘strong ties’ in geographically close environments are key but might be principally responsible for incremental innovations (Fitjar and Rodriguez-Bose, 2011) while ‘weak ties’ made possible through global pipelines may bring about more radical innovations. The results also highlight that the roots of the later, namely, that greater innovative capacity lie in a combination of firm (i.a. size, share of foreign ownership and sector) -- and cultural (the level of open-mindedness of managers e.g.) characteristics for which KICs are in principle well equipped. However, the trade off and balance between local roots (CLCs) and global ambitions (of KICs) remains an open issue each.

ii) Regarding partnership composition of the EIT/KICs, (Jones, 2008) discusses the evolution of the compromise resulting from the original, rather vague ideas that he qualifies as ‘*more than a network but rather less than a university*’. First Commission ideas evolved over the course of 2006 through two consecutive Communications followed by negotiation and consensus with Council in 2007 and Parliament in 2008. His conclusion is that ‘*the EIT which emerged after long and difficult negotiation had far more in common with the EU Research Framework networks than the ambition for a new kind of university*’. On the other hand, the distributed model by the EIT through the KICs represents just a modest incentive to reform actual Universities.

iii) Modes and level of integration more generally (Zachari, 2007, 72-73) cited by Huisman & de Jong, 2014) points out that ‘*less-integrated networks are more competitive for ideas, but can easily be accessed than strongly integrated networks, generally being more consensus-oriented, but less open to ideas*’. In contrast to the finally retained solution, the idea

of a 'Cluster EIT' by (Tindemans and Soete, 2007) proposed actual research, training and innovation Institutes, smaller but more numerous (20 as mentioned before) but the report arrived simply too late to be considered in the decision making. Prompted by Climate KIC's 'Regional Implementation Centers' and EIT's 'Regional Innovation Scheme', a number of nations and regions are now considering to adapt and adopt the model of the KIC also beyond Europe: Australia is a point in case⁴⁴.

Within Europe, in particular, the widespread adoption of 'Regional Smart Specialization Strategies' (RIS3) could make it possible in principle, to adapt the Knowledge and Innovation Communities (KICs) model at a sub-national level using Structural Funds at the disposal of regions. Indeed, European regions have specific assets to deploy public-private partnerships to catalyse the talent, creativity and determination of people, particularly young people. Regions' interest is reasonable as entrepreneurship is a 'contact sport' which requires suitable spaces combining both knowledge and appetite for innovation, in learning by doing on the ground.

6.4.2 Management

At a more operational level, we stressed the dilemma of those responsible of public policies, taking into account the local nature of innovation versus the natural international ambition to achieve impact, including world class entrepreneurs. In the implementation of policies another type of tension appears, independently that its focus is ecosystems, agencies like EIT or talent. The division between contexts mechanistic and organic organizations, formulated in the early 1960s by Tom Burns and G.M. Stalker to analyse the management of innovation in the practice of firms, is very close to the literature most current on the policies that guide the development of assets or behaviors within ecosystems; corresponding then to the agencies to solve market failures or system failures; Y respectively focusing talent on innovation sustained or disruptive:

⁴⁴ <https://climate-kic.org.au>

- In the logic of mechanistic structures, it seems logical that the policies guide to promote specialization of existing sectors in markets in competition. Known models of business, help improve its effectiveness will be the natural focus of organizations Hierarchical business and agencies centralizers that we could call «Weberian» (Karo & Kattel, 2015), commissioned of economic development and update capabilities.

- In the logic of organic structures, policies will be geared towards identifying and mature differential business models, including those susceptible of create new sectors and markets. It is the creative vision of new companies that "Schumpeterian" agencies will come to drive to achieve «innovate in the periphery» (Breznitz & Ornston, 2013) in a disruptive way. This is true if beyond doing what because (to improve something) we want the possible (something new).

Mechanistic vs Organic tensions!

Fig. 35: Tensions between ‘mechanical’ and ‘organic’ structures on the basis of different policies for Agencies that mobilize ecosystems. Own elaboration

Comparing both agency paradigms, we could establish a parallel reflections at micro and macro levels. At the micro level, one can recall the distinction between entrepreneurs and

established business firms by Steve Blank⁴⁵, who emphatically defends that a new firm (start-up or agency) it's not a small version of a big one, but «a temporary organization to search a repeatable and scalable business model »; and in the macro level, the different nature of the challenges to which both face finds a parallel also in transit from the so-called "managerial economy" to the «entrepreneurial economy» (Audretsch & Thurik, 2014), with the emergence of the notion of ecosystem thus revisiting most traditional notions like systems or clusters.

6.4.3 Trends

As we have discussed above, a new geography of innovation and entrepreneurship is emerging where regional ecosystems play an increasingly important and visible role. This is so as co-location enables both formal and informal meeting of talent and knowledge in places where people want to live and which can be reached easily (see East Berlin, East London Tech City or Boston Innovation Districts). There are three trends of interest to regions which can be reformulated for sub-national KICs moving away from partner entities in the Knowledge Triangle (see Figure 1 in the Introduction) and closer to the processes than outcomes. This is consistent with the fact that within complex systems, focusing on processes is better than outcomes to capture not just direct but also indirect outcomes (Molas-Gallart et al, 2002). The three emerging trends and practices that I postulate and rationale for policy interventions are:

1. Educate for innovation and entrepreneurship. While the connection between research and innovation is very much worked out (perhaps too much if we want to overcome the linear model) the relationship between education and innovation is about to explode. Because human capital is the main product of the university and the most effective force for the transmission of knowledge. However, nurturing attitudes needs to focus efforts not only on students and the incubation of companies, but also on teachers. In short, a new 'social contract' of research and education that requires new formulas and 'spaces' of co-creation with the business world and society to develop entrepreneurial skills and innovative culture.

⁴⁵ <https://steveblank.com/2010/01/14/a-startup-is-not-a-smallerversion-of-a-large-company/>

2. Open innovation and intra-entrepreneurship. Open innovation broadens the horizon of possibilities for companies, including not only customers, suppliers and even competitors in their own sector, but also other companies, both new and established in existing and new sectors. Spain has large companies (networks, logistics, services, etc.) that can benefit particularly from open innovation and collaboration with start ups and spin offs among all SMEs. At the same time, it is necessary to imbue the established and large companies and SMEs with innovative culture and intra-entrepreneurship.

3. Radical and disruptive innovation. Finally, the promotion of world class projects is urgent to shorten the worrying business deficit in medium and high technology sectors (radical innovators) and also business models (disruptive as the so-called GAFA: Google, Apple, Facebook, Amazon) . Both Europe and Spain have a deficit in the technological intensity of their companies compared to the US, which is one of the keys to the post-Atlantic gap. In addition, the platforms play a decisive role in helping to scale up new companies in global markets.

The above explains the many tensions in deciding the ideal intervention level in the particular case of EIT, namely, where the Legal Entities/CEO would be most effectively set, be this at the CLC level (the ‘hybrid model’ of a ‘Cluster EIT’ proposed by Tindemans and Soete, 2007) or the level actually implemented at the whole KIC level. Only time will say was is the best balance between the large and the good. All in all, innovation is a journey, and that is also the case of innovation policies, an task that is never fully accomplished: even MIT wants to do better with its ‘MIT Innovation Initiative’⁴⁶.

To conclude on a more personal basis, I refer to Corbett (2005), a book that I found a little bit by chance during my fellowship at the EIT at the Robert Schuman Centre for Advanced Interdisciplinary Studies, part of the European University Institute (EUI) in Florence. More precisely, I got to find the book while visiting the archives of the European Union where I found the personal notes of the visionary and willing Director at the European Commission, David

⁴⁶ <https://innovation.mit.edu>

White⁴⁷, who had the courage and wisdom to negotiate the EIT when few believed in the project - a quote of him can be found as a preamble of the dissertation -. In the said book, the author Corbett (2005) analysed the decades-long struggle of setting the EU in Florence which was a '*a pale reflection of the original European University proposal for a full university*'. Likewise (Huisman & de Jong, 2014) consider '*EIT was a watered-down compromise in which the most controversial elements were taken out and replaced by acceptable alternatives*'. Whether the inspiration for President Barroso was MIT or EUI, as some actually think, would probably remain an issue for future historians visiting the archives of the European Union in Florence.

⁴⁷ <https://archives.eui.eu/en/isaar/126>

7 ANNEXES

7.1 Annex I.1: A methodological framework for empirical research

A large part of the literature on “Research Joint Ventures” at European level does not segment patterns of knowledge and innovation production – see for instance (Marín & Siotis, 2008) which focuses precisely on Eureka vs. FP institutional programme design and resulting participation in consortia - . Such kind of research provides interesting but general and aggregate understanding about the suitability of such policies, but not much practical nor actionable information for the purposes of both policy implementers (National Innovation Agencies, for instance, when promoting participation in European R&D cooperation) and firms themselves. In an attempt to obtain more useful results concerning the actual share of SMEs in FP and Eureka, their profiles and determinants, through the exploitation of the available data, a possible empirical methodology would be as summarised in the Figure 36 attached here below.

The methodology is inspired in the very extensive literature examined for the dissertation regarding sectorial patterns of innovation, determinants of cooperation in R&D and, thirdly, internationalisation of R&D, thereby proposing three steps. And as the data in FP and Eureka cover more than 20 years of partnerships, it is expected that in spite of all the segmentations, data will be ample enough to guarantee that the results area representative. These steps are:

1. Following (Pavit, 1984), a first classification in SECTORS appears necessary as the participating firms might be more or less science and technology-intensive and therefore, the need will be more or less evident for them to collaborate with others, particularly across borders. This seems particularly relevant for SMEs considering the transaction costs involved. By exploiting FP and Eureka databases per sectors, one could then obtain a first idea about the frequency of their participation vs. the relative technology intensity of sectors and firms, ranging from the most advanced and dynamic in innovation terms to more traditional ones. The above would help develop corresponding differences regarding economic sectors or research themes which might induce differences in the participation of more or less research-performing SMEs vs. research-outsourcing SMEs. In other words, whether SMEs participate more or less in projects to produce results or, rather, to learn about and from partners in such projects.

2. The second steps will consist on segmenting again projects according to the different MODES or types or collaboration, as the motivations and determinants of SMEs when they participate in consortia might obviously change depending on the profile of the rest of partners:

knowledge producers (Universities, RTOs), customers and suppliers (vertical collaborations, along the value chain) or competitors (horizontal cooperation). Also, as the FP has increased the size and number of partners in projects over the years, it is expected that the Eureka database will provide a larger granularity and information concerning the motivations of firms. This is also in line with the “user-driven” nature of the later compared to the former one.

3. Thirdly, one would consider the international partnership strategies of firms, it is to say, whether SMEs participation in FP and Eureka projects is explained by home-base augmenting strategies (knowledge search) or home-base exploiting (market search). This will serve judge whether, in the view of SMEs, all projects where they participate in FP are actually “precompetitive” as well as whether all Eureka projects are actually “close-to-market”.

Figure 36 – A methodological framework for empirical research. Own elaboration.

7.2 Annex I.2: Policy recommendations acceptance

i) Inter-networks coordination

The official **Eureka 2009 Annual Review**, pages 25 and 26 (available that http://www.eurekanetwork.org/c/document_library/get_file?uuid=7ea8b9c8-e624-4223-bdb3-8f2cd504359d&groupId=10137) reports that *“CORNET decided to use the Eurostars evaluation system (2 international assessments per applicant, a cover note provided by each National Project Coordinator, an Independent Evaluation Panel and ranking list) for its 7th Call (April 2009) and 8th Call (October 2009). The EUREKA Secretariat implemented the call management, allowing the CORNET network to focus on generating more applications and supporting participants with their applications. This allowed CORNET to generate 23 applications in the 8th call compared with 10 applications in the 7th call. Thanks to the good partnership established between EUREKA and CORNET, ERA SME decided, in September 2009, to also use the Eurostars model for its 7th call (March 2010) and 8th call (October 2010)”*.

ii) Regional and European dimensions

Also, the official **Eureka 2013 Annual Report**, pages 28 and 29 (available http://www.eurekanetwork.org/c/document_library/get_file?uuid=a78cc883-c513-4601-bc00-fa047d68956e&groupId=10137) also reports that *“Encouraging and supporting regional excellence in innovation is a key component to ensure that European research continues to flourish. As with the EUREKA network, the European Union plays a critical role in giving researchers from every corner of the EU the opportunity to develop their competences and to find suitable partners to collaborate with. But successful R&D in the regions generally requires funding – and this is where the EU Structural Funds come in, along with EUREKA’s interest in promoting to its members the opportunities available to gain a slice of the Structural Funds pie, to finance EUREKA and Eurostars R&D activities. This is of particular importance in times of economic crisis, when national budgets have been subject to strict austerity measures.*

EUREKA-CORNET Partnership

Figure 37: EUREKA – CORNET partnership, workflow and task sharing (worth comparing with the proposal put forward in Figure 36 above).

Of its 41 members, 28 EUREKA countries are EU Member States, potentially eligible to benefit from a huge EU budget to be spent regionally: the EU Structural Funds. For the 2014-2020 period, the new EU Cohesion Policy agenda set by the European Commission foresees conditions regarding innovation, which allow for the most developed regions to spend at least 80% of their budget on innovation – and the least advanced (but who are the biggest recipient countries), 50%. Under the EUREKA Hungarian Chairmanship (2011-2012), these major financial opportunities were identified and member countries who were also EU Member States were urged to investigate their exploitation.

To provide an idea of the level of investment concerned, based on information provided by Managing Authorities of the Member States and regions during the planning phase, the EU investment for innovation and research in 2007-2013 was around 86 billion euros, which corresponds to almost 25% of the total new envelope for the 27 Member States [Croatia did not

join the EU until mid-2013]. Virtually all research and innovation actors (enterprises, universities, technology transfer bodies, cluster organisations, higher education institutes, etc.) can apply, depending on the programmes and initiatives that the Member States and regions provide for the relevant area and type of applicant.

The way in which Structural Funds are spent is through a decentralised system of shared responsibility between the European Commission and Member States. The Commission negotiates and approves the operational programmes proposed by the Member States and allocates resources. The Member States and their regions manage the programmes, implement them by selecting projects, control and assess them.

7.3 Annex II.1: EIT in a nutshell

EIT – European Institute of Innovation and Technology

- The EIT mission is to be the catalyst for a step change in the European Union's innovation capacity and impact.
- The EIT is the first initiative of the European Union bringing together the three sides of the knowledge triangle (higher education institutions, research centres and businesses).
- The EIT is not designed as another research institute. Its mission is to unlock Europe's innovation potential with the **entrepreneur in the driver seat**.
- The EIT's overall goal is to create a new European way of delivering essential economic growth and societal benefits through innovation.
- The EIT values are leadership, simplicity and flexibility, can-do approach, and output added value to the EU innovation landscape.

KIC – Knowledge and Innovation Community

- EIT operates via Knowledge and Innovation Communities (KICs). KICs are highly integrated, creative and excellence-driven autonomous partnerships, established as **legal entities**, managed under the **leadership of a CEO** on the basis of **business plans**.
- The first three KICs were selected on a competitive basis in December 2009 in less than 18 months after the setting up of EIT: Climate-KIC(climate change mitigation and adaptation), KIC InnoEnergy (sustainable energy) and EIT ICT Labs(the future of the information and communication society).
- The KICs' innovative "webs of excellence" consist of five or six regional innovation hotspots (named 'co-location centers') where all the elements of the Knowledge Triangle are co-located and not only codified but also **tacit knowledge and skills development** can be fostered.
- The relationship between the KICs and the EIT is organised on a contractual basis, leaving a great degree of autonomy to the KICs to define their own legal, organisation and working methods.
- All three running KICs are delivering their first results, illustrated by the newly launched 'EIT Success Stories' series, including very successful summer schools, popular post-graduate programmes, and award-winning and seed funded start-ups of world-class.

- **EIT uniqueness and added value** is fostered by its main office in Budapest, positioning itself as a knowledge pool benefiting Europe overall through its drive to administrative simplification, result orientation (Scoreboard/KPIs) and good practice learning and dissemination from KICs operations.

EIT – Vision and mission for the future (Strategic Innovation Agenda 2014-2020)

- EIT is an “Entrepreneurially-driven Impact Investment Institute”.
- EIT deliverables are more innovations and more entrepreneurial people for Europe, thereby contributing to narrowing down the innovation gap between Europe and other world regions.
- To secure impact and critical mass, EIT needs to scale up its support and number of KIC, including an increased budget request for 2014-2020, leveraging all KICs and their co-location centres as hotspot driving innovation effectiveness focusing on results and impact.
- The EIT should be part of the **Horizon 2020 EU programme** while maintaining a strong link with the European Higher Education Area (EHEA). However, at the same time, any rules applying to the EIT will have to remain tailor-made and fully flexible to fit the EIT’s mission.
- EIT contributes both to European competitiveness and cohesion by fostering entrepreneurship and innovation locally through co-location centres and Regional Innovation and Implementation Centres as well as by **wide and systematic dissemination of KIC innovation results and models across Europe**.

7.4 Annex II.2: Building blocks for a potential research agenda

1. KT integration in practice

A crosscutting perspective to research EIT could be focusing on the students, start-ups and innovation projects nurtured through the KICs. Taking those outputs as units of analysis and their corresponding personal trajectories, investment attracted and newness to the world, one could then size the additionality of KIC and EIT support overall.

In other words, what advantages do talent, new firms and project teams experience going EIT KICs instead of choosing other policy offerings? For instance, measuring and comparing the time-to-job for students or relative salaries; similarly, measuring start-ups in growth and employment compared with a control group; and measuring innovation projects, at least partly, through patents and experts to figure out to what extent they are not just 'state of the art' but real breakthrough and 'new to the world' with potential global impact.

2. Exploiting EIT PMS and KPIs

The Performance Monitoring System (PMS) in place defines three dimensions for the Institute in delivering added value, namely, Enabling Innovation/Value Creation through the KICs plus two others at the EIT level, namely, Operational Excellence and Positioning. Consequently, a potential research agenda could be structured with this in mind.

- Enabling Innovation/Value Creation (what EIT does): attractiveness of educational programmes, number of new graduates, number of business ideas incubated, number of start-ups created, knowledge transfers/adoption, new or improved products/processes/services into the market, EIT initiatives having a positive impact on the KICs, EIT codified knowledge.
- Operational Excellence(how EIT does it) comprises issues such as: talent on the job, % of processes formalised, level of satisfaction on EIT services, due dates for GA completion, reporting acceptance and payment execution.
- Positioning (where EIT is) comprises dissemination, maintaining a constant dialogue with external stakeholders, recognition of EIT innovative practices, processes and models by external stakeholders and EIT brand valorization.

In addition to the PMS KPIs data, further evidence should be gathered via surveys, case studies, etc. Also, orchestrated by EIT suitable methodologies should then be developed

collaboratively and thereafter cross-fertilized among KICs mobilising their innovation research partners in studies econometrics, social network analysis, etc.

3. Exposing EIT to the world.

In the longer run, EIT should position the Europe of knowledge in the world. Positioning KICs can be facilitated in other world regions against the three pillar agendas e.g. with exchange of students/professors in their educational programmes, exchange of support for cross-border incubation of new firms and benchmarking of innovation projects.

Further to the first two annual studies undertaken by the EIT on the KICs, which took respectively the KIC-EIT as a first level of analysis “Catalyzing innovation in the knowledge triangle: practices from the EIT Knowledge and Innovation Communities” (EIT, 2012) and EIT-Europe for an ‘Analysis of potential synergies fostered by the European Institute of Innovation and Technology (EIT) in the EU innovation landscape’ (EIT, 2013) a third one should focus on a global agenda for the EIT ‘Accelerating EIT global exposure benefiting its KICs and Europe’

Objectives:

- Describe exploratory contacts undertaken by the first three running KICs
- Identify clearly respective interests for EIT, KICs and third countries
- Set up a selective roadmap to scale for EIT’s global exposure
- Foster world-class innovation agenda for the EIT

Potential content:

KIC level – descriptive part

1. Map first contacts, experiences and partnerships established with third countries so far by the first running KICs.

2. Further detail and precise current and prospective interest to engaging against EIT/KIC’s three strategic/pillar agendas

- a. Education (students scholarships, professors mobility, etc.)
- b. Entrepreneurship (cross incubation support)
- c. World-class innovation (benchmarks)

3. Deepen analysis based on desk research regarding national innovation systems analysis of third countries most promising for EIT and its running and future KICs

- a. National innovation systems description
- b. Main players in those systems
- c. Potential synergies
- d. Recommendations

EIT level – prospective part

4. Develop EIT policies and vehicles to expose the Institute to the world

- a. Policy experimentation and learning
- b. Projects cross-participation
- c. Exchange of support

5. Benchmarking best policies and good practices (OECD, WEF, etc.)

- a. EIT HQ Knowledge Pool
- b. KIC journey for practitioners

6. Accelerating global successful leaders: Narrowing EU's innovation gap

7.5 Annex II.3: What EIT is and what it is not about

As 'business as usual' or 'more of the same' are not options for the EIT, it may be more eloquent to describe what the Institute is by emphasising what it is not. More precisely, I discuss the paradigm shift EIT represents both for policy and for people in Europe, from its mission statement about nurturing people's attitudes and building Pan-European Ecosystems, down to EIT governance, EIT-KIC relationship management and actual KIC operations.

1. Implications for European innovation policy and policy makers are:

Regarding governance, an entrepreneurial EIT is clearly about a new 'agenda shaping' and ultimate 'game changing':

- not prescribing, but learning by doing;
- not linear 'pipeline', but holistic 'seamless' webs;
- not about top down programming, but about bottom up alignment;

And EIT-KICs partnership management is about 'living partnerships', 'managing complexity' for co-creation, hence:

- not project co-funding, but partnership catalysis;
- not annual work programs, but business plans;
- not research grants, but seed investment;

2. And implications for European people and citizens:

Overall, it is about 'believing in people's talent and courage', inducing a new mindset and risk appetite, hence:

- not about educating employees, but nurture employers;
- not about institutional talking, but individuals' walking;
- not just R&D collaboration, but knowledge integration

KIC built inter-connected cross-border hubs and dynamics are 'end to end' value generators, thus:

- not explicit knowledge only, but also tacit one;
- not about closed, but managed ecosystems;
- not about input/capacity, but output/impact.

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BDA	Business Development Acceleration
CERN	European Organisation for Nuclear Research
CIP	Competitiveness and Innovation Framework Programme
CLC	Co-Location Centre
Climate KIC	KIC of the EIT focused on Climate Mitigation and Adaptation
COI	Cluster of Innovation
COST	European Cooperation in the field of Scientific and Technical Research
CREST	EU Scientific and Technical Research Committee (renamed ERAC)
EC	European Commission
EIT	European Institute of Innovation and Technology
EIT Digital	KIC the EIT focused on Information Society (former EIT ICT Labs)
ERA	European Research Area
ERAC	European Research Area Committee
ERC	European Research Council
ERANET	European Research Area Networks of Coordination
ESA	European Space Agency
ETP	European Technology Platform
EU	European Union
EUREKA	European-wide Network for Market-oriented Industrial R&D
FP	European Union R&D Framework Programme

HQ	EIT head office
GB	EIT Governing Board
IRC	Information Relay Centers
ISPRA	EC Joint Research Center
JPI	Joint Programming Initiative
JTI	Joint Technology Initiative
KIC	Knowledge and Innovation Community
KIC IE	KIC of the EIT focused on Innovative Energy
MNE	Multi National Enterprise
NCOI	Network of Clusters of Innovation
NESTA UK New Endowment for Science and Technology Agency	
OECD	Organization for Economic Cooperation and Development
RJV	Research Joint Venture
SBIR	US' Small Business Innovation Research Programme
SME	Small and Medium Enterprise
STTR	US' Small Business Technology Transfer Programme
TWP	Tri-Annual Work Programme (of the EIT)
US	United States (of America)
VC	Venture Capital
WEF	World Economic Forum

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