

CATALYSING INNOVATION IN THE KNOWLEDGE TRIANGLE

Practices from the EIT Knowledge and Innovation Communities



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This publication has been prepared by the Technopolis **|group|**
Rebecca Allinson
Kincsö Izsak
Elina Griniece

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FOREWORD

BY THE EIT DIRECTOR



This EIT publication is the first in a series that aims to create an inventory of practices emerging from our Knowledge and Innovation Communities (KICs) and making these available to audiences beyond the KICs. These publications will also serve in the future as an input to developing the EIT's future agenda on innovation practices and new approaches generated by our KICs, thus providing concrete evidence on the EIT's contribution to the European innovation landscape to those not yet benefiting from our activities, and strengthening our role as an Institute for Europe.

This publication contains an overview of the EIT, the three first KICs and their co-location centres (CLC), looking at how they have in practice set about fostering innovation. It outlines the EIT's pioneering role, established in 2008 to increase European sustainable growth and competitiveness by reinforcing the innovation capacity of the EU within a dynamic and shifting global context.

In completing my first year at the helm of the EIT, it is a pleasure to present this first publication developed by the Technopolis Group with great professionalism. I would like to express my sincere appreciation to the European Commission as well as to the first EIT Governing Board, Martin Schuurmans and Alexander von Gabain in particular, for their contributions. And last but not least, my special gratitude goes to the CEOs of the first three KICs, Mary Ritter (Climate-KIC), Willem Jonker (EIT ICT Labs) and Diego Pavia (KIC InnoEnergy). With their strong commitment to shaping our 'living' partnerships, we are demonstrating that with a good dose of creativity, determination and willingness things can be done differently in Europe!

José Manuel Leceta

EIT Director

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Introduction

This publication is the first in a planned series that aims to create an inventory of practices emerging from the three Knowledge and Innovation Communities (KICs), which are worthy of being shared more widely.

The publication has been compiled to showcase the approach - its 'what' and its 'how' - taken by the European Institute of Innovation and Technology (EIT) to catalyse the knowledge triangle in Europe. The models of governance and the activities emerging from the Institute's first three KICs are innovative and experimental and these experiences should be of particular interest to policy-makers, innovation practitioners and analysts, as well as to the new generation of KICs.

The EIT is new and its mission is ambitious and the same is true for the first three KICs, which launched their first activities in 2010. **KICs are long-term investments in Europe's innovation potential and they will be encouraged to become sustainable in the future.** They have all set themselves short, medium and long-term objectives to achieve this.

Whilst it is too early to evaluate the impact of the EIT's and the KICs' results, the validity of the EIT approach has already been recognised. Thus, **the emphasis in this publication is on the additional value that the EIT's approach brings to innovation support** and this is based on observations and reflections from the practices that are emerging.

The main thrust of this publication is to:

- Present the innovative elements of the governance model of the KICs

- Highlight KIC practices that illustrate how the EIT model is helping to solve some of the innovation challenges that Europe is facing

- Explore the role of the EIT in the landscape of European innovation support and the potential links with other policies relevant to innovation

The publication begins with an overview of the EIT, the Knowledge and Innovation Communities and their Co-location Centres (CLC), and presents their practices to foster innovation from all three sides of the knowledge triangle.

Subsequent chapters highlight the emerging governance model of the KICs in more detail. They also analyse some of the practices of the EIT and the KICs in support of entrepreneurship and innovation. These include nurturing talent, bridging the innovation gap between ideas and the market and accelerating business development.

Finally, the publication looks at the EIT in the wider innovation and research landscape in Europe and explores the future of the EIT under Horizon 2020.

The publication is based on a literature review, desk research and executive summaries of co-location visits conducted in summer 2011, and also interviews with the KICs' CEOs and CLC Directors conducted in spring 2012.

The EIT in a nutshell

The EIT was established in March 2008¹ as a body of the European Union and its mission is **"to increase European sustainable growth and competitiveness by reinforcing the innovation capacity of the EU"**.

A major driving force in research and innovation has traditionally been the pursuit of knowledge itself, pushing out the existing boundaries of what is known and understood in a multiplicity of domains. In much of the modern world, this force has been systematically harnessed to policies of economic growth and the associated innovation and technological change has produced impressive, and sometimes unexpected, value in terms of prosperity and quality of life.

Europe, as well as the rest of the world, is responding to the changing patterns of global competition and it is clear that there is **a new imperative to address urgent societal challenges, such as sustainable energy and transport and climate change mitigation**, which goes beyond a simple speeding up of the pace of technological change. This has led Europe, in particular, to reconsider how the framework for conducting research and fostering innovation can best tackle complex societal problems. In fact, **Europe is "reinventing innovation"² by coupling academic research and knowledge production with an entrepreneurial spirit and a greater interdisciplinary focus on social and organisational practices and innovation end-users³**. This coupling is underpinned by the notion of the knowledge triangle of research, education and innovation.

As a first step, Europe identified the considerable deficiencies that need to be addressed and these include: fragmentation of the innovation system; underuse of existing research strengths

to produce economic or social value; a failure to sustain and renew enterprises; a lack of entrepreneurial culture leading to a low level of innovative activity; and a poor record of developing, attracting and retaining talented individuals.

The EIT is a timely response to these innovation challenges and, in itself, it exemplifies innovation. It is novel in the sense that its main activities are implemented through a distributed network of Knowledge and Innovation - Communities (KICs). **The KICs gather together close-knit partnerships of European education, research and business entities – the so called knowledge triangle – and also involve public authorities in these partnerships.** The EIT provides physical sites, called Co-location Centres, in which the partners can meet to work together on shared innovation challenges. Thus, the EIT aspires to scale-up the concentration of knowledge and skills, to share ideas and resources, to create and sustain businesses and to trigger the entrepreneurial spirit. The overall objective of all these activities is to develop solutions to the grand societal challenges whilst, at the same time, improving Europe's competitiveness on the global stage.

The EIT can also be regarded as a model of innovation governance and financing in the European Union. It has been given an important role as part of Horizon 2020, the framework programme for research and innovation for the period 2014-2020, with **the objectives of addressing societal challenges and assisting the EU to gain leadership in enabling and industrial technologies⁴**. Horizon 2020's proposed financial contribution to the EIT is €3.18bn over 2014-2020. The plan is to increase the budget to enable the first three KICs to consolidate and grow, and to pave the way for the creation of six new KICs by 2018.

1 The idea of the EIT has been on the policy-makers' agendas since 2005. In April 2008, the EIT regulation came into force and after two years it began its operational activities with the establishment of the EIT headquarters in Budapest

2 Expert group to the European Commission (2007). Taking European Knowledge Society Seriously. Report

Knowledge and Innovation Communities at the heart of the EIT

The Knowledge and Innovation Communities are the main vehicles through which the EIT undertakes its activities. The concept of the KIC represents an innovation in itself, as **there is no other similar initiative combining such large trans-European and thematic partnerships** organised in committed legal entities. All three KICs are structured around a partnership of 20-30 core partners from all sides of the knowledge triangle. Each KIC also includes a large number of affiliated, associated or network partners that contribute to the KIC's activities but do not participate directly in its governance. KICs apply a very open entry and exit strategy with regard to the affiliated partners and so the wider KIC community is a living network with evolving membership.

KICs operate by networking the partners that carry out specific activities in the three focus areas of Innovation/Research, Education and Business Creation and by building a pipeline of projects through a bottom-up approach. Each KIC is led by a Chief Executive Officer (CEO) appointed by the board of the KIC partnership. The main aim of the KIC is to provide a platform where ideas, skills, business models from a wide range of partners with a common thematic focus can be translated effectively into innovations. KICs aim to foster the creation of new businesses and to establish favourable conditions that will accelerate their growth.

The first three KICs were designated in December 2009 and started work in 2010. **The KICs' themes reflect the challenge-led realms in which a boost of innovation is needed** if smart, sustainable and inclusive growth is to be attained in Europe.

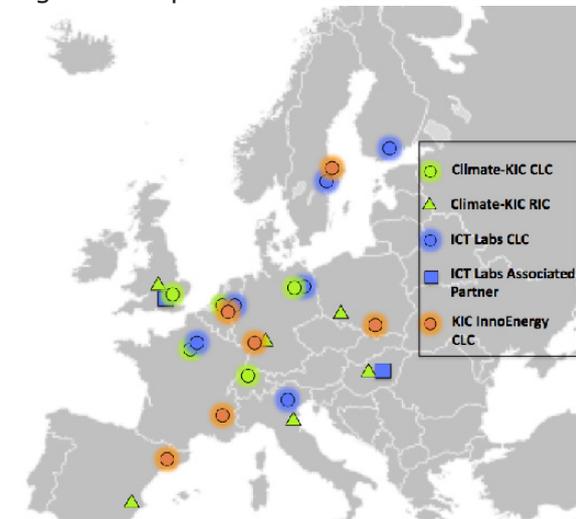
They are:

1. KIC InnoEnergy - sustainable energy
2. EIT ICT Labs - future information and communication society
3. Climate-KIC - climate change mitigation and adaptation⁵

Co-location Centres as operational units

The backbones of the KICs are their **Co-location Centres (CLCs)**. **These CLCs are the operational units that bring together groups of people, regional and local clusters and nodes of excellence.** CLCs are an important element in the distinctive EIT approach to the integration of the knowledge triangle. Each KIC has five or six Co-location Centres. In line with each KIC's substantial overall autonomy, the CLCs are organised and structured according to their respective national and regional innovation context to include partners from research, education, business and at times from local authorities. A number of the Co-location Centres involve science parks, existing clusters and regions of competitiveness, which provides much wider access to start ups and SMEs with a potential interest in either engaging with, or using the results of, the KIC activities. **The CLCs are regional, networked eco-systems with a global outreach.**

Figure 1 Map of the Co-location Centres



Each KIC structures its co-location to best suit its objectives. In the case of Climate-KIC and KIC InnoEnergy, the partnerships of the Co-location Centres are not limited to their regions of origin, as several partners collaborate directly with various CLCs and engage directly at

3 The European Science Foundation and COST (2011). Responses to Environmental and Societal Challenges for our Unstable Earth (RESCUE)

4 http://ec.europa.eu/research/horizon2020/pdf/press/horizon_2020_budget_constant_2011.pdf

5 For more information on the KIC objectives, Co-location Centres, themes and partners see KIC Fact-sheets pp 35-37

the KIC level. For instance, institutions from Hungary participate in the activities of the Co-location Centre in Poland. In the case of EIT ICT Labs, Co-location Centres tend to be tighter geographical nodes⁶ with key partners located within 50 kilometres of each other⁷. The Co-location Centres' offices are usually in the premises of one of the core partners, or on a campus.

Even if there is a differentiation between the levels of the EIT Headquarters, the Knowledge and Innovation Communities

and the Co-location Centres, in practice artificial distinctions should not be drawn between these levels and **the EIT should be seen as a seamless organisation for innovation**. The EIT gives the vision, the KICs provide the forum for strategy-making in the selected areas of societal challenges and the Co-location Centres are the primary delivery mechanisms for the KICs, an essential system by which the range of activities in terms of education, research and innovation, are implemented.



6 ICT Labs refers to its Co-location Centres as nodes throughout its documentation

7 ECORYS (2011). Study on the concept, development and impact of co-location centres using the example of the EIT and KIC. Report commissioned by the European Commission, DG Education and Culture

Developing Governance Practices in the Knowledge Triangle

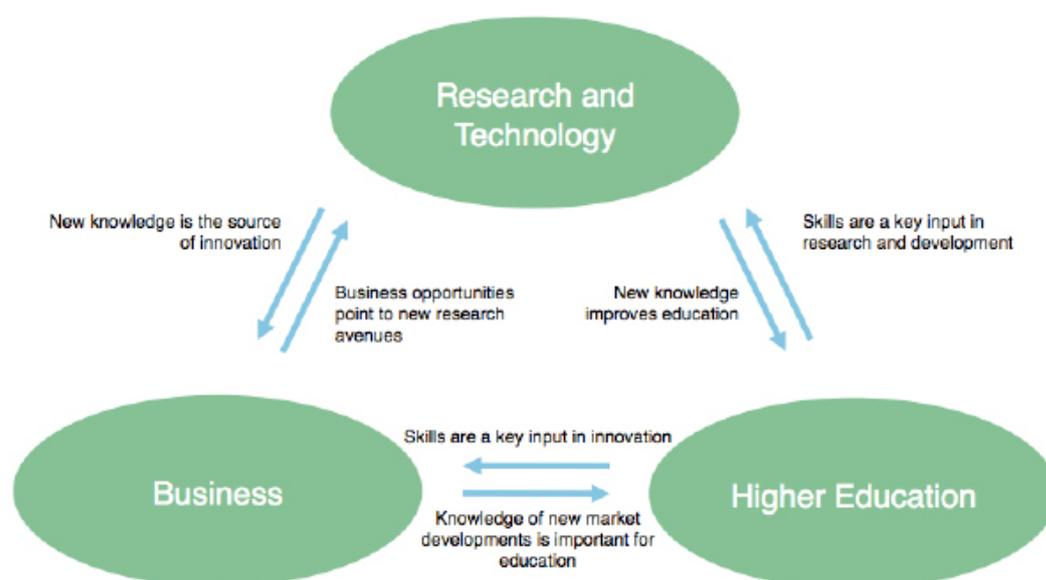
One of the main purposes of the EIT is to create eco-systems that can breed world-class businesses. The KICs are anchored in regional and local communities via their Co-location Centres and the EIT is a new mechanism to link the **knowledge triangle components of education, research and businesses** across Europe and into the wider world.

Several concepts have emerged in recent decades to interpret and illustrate the process of knowledge creation and its application through innovation and these have come from a number of different disciplines. However, they share several core conclusions about the **non-linear nature of innovation** and the **multiple input and feedback loops that exist between the actors** in an innovation system. For example, a skilled workforce is the basis for undertaking research and development activities, as well as for

bringing new products and processes to the market. In return, knowledge and new market developments should have a feedback loop to educational programmes. Similarly, new knowledge is the source of innovation and in return, new market prospects for innovation can point towards new avenues for research. This process is captured by the concept of the knowledge triangle (figure 2).

The knowledge triangle concept highlights the positive benefits that can be derived from such strong links. This has led to an acknowledgement that policies in support of innovation should foster systemic interaction between the three forms of activity — education, research and business. The knowledge triangle has also been strongly embedded in the 2020 Vision for the European Research Area⁸ and this has increased the importance of its role in European policy-making.

Figure 2 The Knowledge Triangle



This chapter will explore how the KICs have addressed the issue of governance in the knowledge triangle. As governance practices are constantly revisited and refocused in the process of learning by doing, this publication initially presents a brief review of the organisational challenges and managerial dilemmas that KICs are facing and then looks at how the resulting governance models can fit into the landscape of innovation hubs and networks.

Organising a Knowledge and Innovation Community

The KICs have a mission to foster innovation and entrepreneurship and to deliver solutions to societal challenges. In fulfilling this mission, **they are also bringing about organisational innovation.**

The core principle that distinguishes the KICs from other, more traditional, research and innovation arrangements is **the explicit link between all the elements in the full innovation cycle**, from education and knowledge creation to new market opportunities and innovative business support. Whilst Europe has made numerous attempts to bring research and business organisations into closer partnerships, **the addition of the higher educational dimension represents distinct progress**⁹. In addition, a concerted effort has been made to integrate sets of diverse stakeholders, from the outset of the partnership, and to develop with them a shared vision of entrepreneurship. **This is a robust response to the perceived fragmentation in Europe's existing innovation system.** In essence, the KICs are innovative webs of excellence that are testing the practical application of the knowledge triangle across Europe.

Setting-up the Partnership and Promoting Community Building

The EIT gives a substantial degree of flexibility to the KICs to allow experimentation and break new ground in understanding how such large-scale, public-private networks can best operate. Each KIC defines its

own strategy for its activities through the preparation of an annual business plan. This reflects the **autonomy** that the KICs have to steer their approaches and their **flexibility** to develop innovation models through learning by doing.

The KIC concept is new and the setting-up process for the first three KICs has demonstrated the **complexity of establishing such partnerships** when members are all independent, highly successful organisations that are geographically dispersed and also dispersed across the fields of education, research and business. Stakeholders admit that the process has been much more difficult than was anticipated at the outset. One major obstacle stemmed from a low level of understanding amongst the partners of the implications of creating a KIC structure. This highlights some of the main challenges in forming a KIC, namely, how the partners can come to an understanding of each other's motivations for involvement, how to align interests and overcome any risks of competition and how to build trust within the partnership. The danger is that in aligning diverse strategic interests, the result might be the lowest common denominator and that simply does not fit with the urgent need to address major innovation challenges.

An important factor in this respect is that **the KIC partners are legally and financially committed for a period of 7 years**, which is longer than other trans-European networks, such as the consortia in FP7 projects. Members' awareness that they have to work with the same partners for a considerable period of time may lead to changes in their attitudes and in decision-making. Early results indicate that the EIT approach has brought more long-term stability to existing cooperation, as partners do not have to shift between the roles of competitor and collaborator. For example, KICs reported that **certain industrial partners who were in competition across CLCs came together as partners** in the KIC Steering Committee – a move which may have a positive impact on common standards in the European market. The Innovation Radar¹⁰ of EIT ICT Labs is seen

9 For a comparison of the existing instruments see Haegeman, K. and Cagnin, C. (2011). Priority Areas for the Next Waves of Knowledge and Innovation Communities: Exploration of Critical Success Factors, Alternative Options and Characteristics for Design. JRC-IPTS report, p.11

10 Thom, N. (2011). Foresight in Innovation Networks: The EIT Innovation Radar Example. Paper presented at 4th ISPIM Innovation Symposium

as another positive example of potential competitors coming together in an open innovation network. Organisations such as Siemens, Ericsson and other industrial players have joined forces through the EIT ICT Labs with the objective of identifying future market trends in ICT.

Another important aspect of the KIC partnerships is their result-oriented nature where **partner accountability is assessed not by the efforts invested, but by the innovation results achieved.** This is another defining feature of the EIT, a shift from the input and expenditure control approach to a much more **trust-based system in which partners join forces** to attain a commonly agreed impact. Research in the social economy has proved that mutual trust reduces the transaction costs associated with forging new collaboration between diverse groups¹¹. Thus, the accumulation of social capital¹² within KIC networks, as a consequence of the trust-based system, is a crucial factor in achieving the desired results.

One mechanism for creating this trust is community building. **The core task of the EIT and the KICs is to engage in community building** through targeted networking initiatives and common iterative learning processes. This involves a range of activities such as the proactive organisation of formal and informal encounters between stakeholders to foster communication, share ideas and instigate new KIC activities. For example, in the preparation of its annual business plan, Climate-KIC organises large-scale meetings in several of its Co-location Centres to gather and crystallise all the stakeholders' ideas for improvements to the KIC strategy. Such a bottom-up approach to strategic initiatives vests the ownership and responsibility for the process in the community and increases the sense of a common identity. KICs are also practising mobility in the deployment of members of their executive teams. One example of this is holding regular meetings at different CLCs, to ensure a common understanding of the organisational and cultural differences and the challenges that partners face.

IMPLEMENTED BY THE EIT, THE KICs ARE:

...the first European innovation initiatives that links all sides of the knowledge triangle: research, business and education.

...characterised by a long-term commitment of partners based on trust and a sense of community.

...maintaining flexibility in organisation, management and the degree of partner involvement.

...adopting an entrepreneurial funding model.

...linking regional innovation hubs into trans-European and to global networks.

Adopting a Business-oriented Approach

From the outset, it was agreed that the KIC structure should be "*light, transparent and efficient*" with an entrepreneurial corporate culture to ensure rapid and coordinated responses to market developments. **Each KIC has its own legal entity and an appointed CEO** who, together with the Executive Board, is responsible for the coordination of the KIC strategy and the consolidation of the KIC business plan. The KIC **business plan** sets out concrete short-term and long-term targets and includes a set of **key performance indicators**. **An entrepreneurial culture is clearly woven into the KIC structure**, as the KICs must develop a portfolio of assets with market value.

Whilst sharing many features of a business organisation, the KIC also reflects a trust-based network of diverse partners. **In short, a KIC is a business-oriented entity, but it does not own all the resources with which it works.** This requires a particular management style and, as KIC InnoEnergy CEO indicated, "*it is about finding the right balance*" in aligning partner interests to achieve results.

The first three KICs have chosen different approaches to their legal set-up and organisation. KIC InnoEnergy is established as a commercial company under Dutch law and managed as a business, with shareholders. The development of a portfolio of assets with market value and

11 e.g. Dyer, J. (2002). Effective Interfirm Collaboration: How Firms Minimize Transaction Costs and Maximize Transaction Value. MIT Libraries

12 Refers to features of social organisation such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit; see: Putnam, R. (1995). Bowling Alone: America's Declining Social Capital. Journal of Democracy 6 (1): 65-78

economic sustainability is embedded in all the decisions and accountability is embedded in all the roles. KIC InnoEnergy is profit oriented, but has a 'not for dividend' financial strategy re-investing its profits in its future activities.

Climate-KIC and EIT ICT Labs have chosen the legal form of Dutch and Belgian limited liability non-profit associations, respectively. EIT ICT Labs aspire to develop into a not for profit company at a later date¹³, and also Climate-KIC has indicated the possibility of re-considering its legal set-up¹⁴.

The choice of the country and the form of legal entity for the first three KICs turned out to be a crucial aspect in framing the partners' commitment. Climate-KIC, for example, was initially established as a Dutch Stichting¹⁵. It faced profound problems, as this legal form was overly complex and could not be fully aligned with the main KIC objectives. After the appointment of a new CEO in 2011, the KIC changed its legal status to Association Climate-KIC. This simplification of the legal and organisational structure re-attracted many of the initial partners and encouraged new organisations to join.

The business-type model ensures the commitment and the full engagement of the KIC partners and also helps to guarantee that the people who are around the table are the real decision-makers. It is seen as a more efficient method than other approaches to network formation and sustainability. However, the complexity of the KIC network and its community-driven philosophy raises important managerial dilemmas, namely, how to steer such a multi-stakeholder innovation ecosystem to deliver concrete innovation results.

Underpinning Management and Leadership in a Knowledge Community

The management structure of a KIC is not markedly different from that of a business organisation. All KICs have a General Assembly in which core members are represented and have voting rights. **The day-to-day management is**

delegated to a smaller Governing Board comprising equal sectoral representation of partners from all the CLCs or Regional Innovation and Implementation Communities (RICs) in the case of Climate-KIC. This supervisory body ensures that all members' interests are embodied in the KIC strategic objectives, vision and mission and it has the power to appoint or remove the KIC CEO. There is a small executive team composed of the CEO, Pillar Directors of Education, Innovation and Business Creation and CLC Directors. This team is in charge of all operational activities and is responsible for harmonising co-location activities and integrating the knowledge triangle principle.

However, the KIC is not an organisation, but a community-driven form of collaboration between academic and business partners who can put forward strategic initiatives and lead their development. This poses new challenges to management and leadership that lie beyond the traditional mode of organisational decision-making. To achieve common ground amongst so many diverse actors with their own strategic interests, it is essential to create mutual trust and a sense of unity. In other words, it is only through a sense of community and common purpose that the network can use all its diverse resources and knowledge. There is an undeniable need for leadership in this respect. Thus, **KIC CEOs must continually balance partner interests, handle dilemmas, build trust and ensure the delivery of the strategy.**

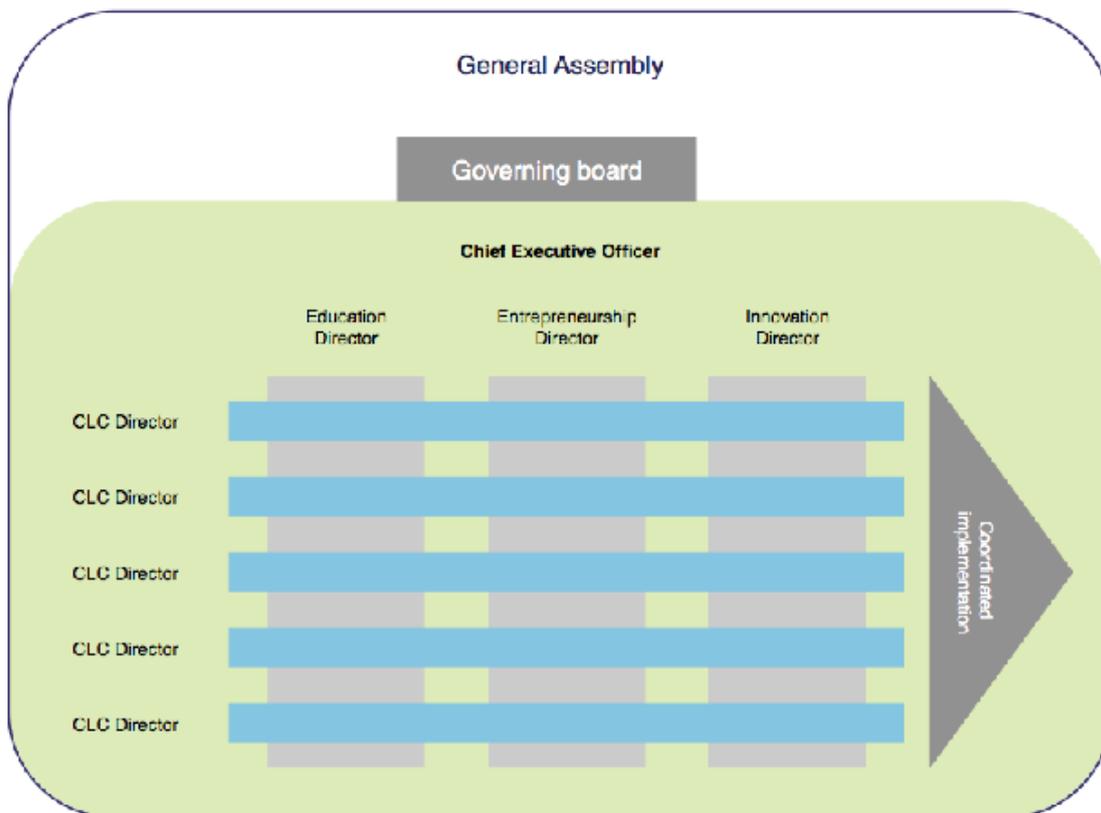
The current **KICs are adopting a lean administration system following a matrix management** logic to ensure the coordination of network activities through a central management team and cross-cutting working platforms. In the planning phase, there is a convergence of the top-down approach driven by the KIC Education, Entrepreneurship and Innovation agendas and a bottom-up approach emanating from partner initiatives and CLC project ideas. In the decision phase, and within the rules agreed by the partners, it is the KIC level that decides where the investments should go. In the execution or implementation phase, the projects are subject to a contract between each project and the KIC and the

13 ECORYS (2011). External Evaluation of the European Institute of Innovation and Technology - Framework Contract on evaluation and related services. (EAC 03/06), European Commission, DG Education and Culture

14 Climate-KIC Business Plan 2012

15 Foundation under Dutch law

Figure 3 Matrix Management Scheme of Climate-KIC



Source: Climate-KIC Business Plan

accountability for its implementation rests with the project leader, the CLC manager and the KIC.

The literature on matrix management practice¹⁶ suggests that it is **particularly well-suited for sharing information across internal organisational boundaries** and thus, it more readily embraces the challenge of multi-stakeholder governance. The CLCs are more exposed to local knowledge and within a matrix management scheme, they can share this experience with the KIC level. This supports the concepts of open innovation and user-driven innovation. However, it is widely acknowledged that while a matrix structure is more dynamic and innovative than a managerial hierarchy **its effectiveness is dependent on the existence of a shared culture and mindset**¹⁷. This reinforces the importance of community building and provides further food for thought, especially as KICs comprise partners that are organisationally, geographically and also culturally diverse.

Building an Entrepreneurial Funding Model

The financial model of the EIT Knowledge and Innovation Communities follows an 'entrepreneurial logic'. While **the EIT provides a seed investment of up to 25%** of the total KIC budget, **the KICs seek to raise the remaining funds** from private sources, from other EU instruments such as FP or the Structural Funds or from income generated by their own activities. Between 2010 and 2012, the KICs managed to attract 78.5% of the total budget, of which partner contributions constituted 38.5%, funding from national and regional governments represented 21.5% and other EU funding provided 13.5%¹⁸. The EIT co-funding remains available for 7-15 years and hence over this time, KICs are required to become self-sustainable, world-class innovation hubs.

In contrast to the majority of existing R&D co-funding instruments, which provide additional financing to attain certain research goals, the EIT philosophy is

16 Bartlett, C. and Ghoshal, S. (1990). Matrix Management: Not a Structure, a Frame of Mind. Harvard Business Review

17 <http://www.philipatkinson.com/matrix-organisation-management-culture-virtual.htm>

18 For more information see KIC Funding Figures page 38

to make a purposeful investment in the innovation capacity of KICs to achieve positive socio-economic impacts. Thus, the purpose of the additional EIT funding is to catalyse and exploit the synergies between innovation and the entrepreneurial and business activities that KIC partners and the wider community are undertaking. The intention is also to maximise the impact of these synergies on the EU's economy and the well-being of its citizens. This purpose is particularly evident in the approach taken by EIT ICT Labs which describes its funding approach as a catalyst-carrier model. The idea is to add the EIT funds (the catalyst) to existing activities (the carrier), selecting those activities that have a high innovation potential. *"To be eligible for inclusion into the EIT ICT Labs portfolio, the transformation of a carrier activity by the application of an EIT ICT Labs catalyst should create significant added value for the European innovation agenda and the goals of EIT"*¹⁹.

In order to ensure the long-term viability of KICs, it is important to understand and continually monitor the attitude and positioning of industry towards the proposed innovation model. The EIT Governing Board assumed, from the outset, that the private sector would adopt a wait-and-see approach, as the EIT financing logic may run contrary to the usual experiences of companies. The KIC model implies that businesses agree to pool resources in a partnership with limited co-funding and to produce significant innovation results and, at the same time, accept a considerable degree of guidance from a KIC CEO²⁰.

While the wait-and-see attitude still exists, the first two operational years of the EIT have demonstrated significant private sector interest in, and commitment to, the KIC model. The low share of co-funding provided by the EIT tends to filter out those partners who might otherwise have been attracted simply by the money and leaves the partners who are really interested in contributing to the venture. All of the three current KICs have managed to involve important industrial players, well positioned in the European and global market²¹, that now take an active part in the KICs' governance. Overall, the financial contribution of industry to the KICs' budgets has varied between 20%-31% during the period 2010-2012²².

While participating in a KIC incurs costs in terms of money and other resources, it may also lead to significant savings as a result of resource pooling, infrastructure sharing and knowledge creation. The existing activities and innovation projects are closely aligned with market developments. They identify promising possibilities for new forms of collaboration and pioneer new value chain configurations in emerging sectors, in the case of Climate-KIC, or in emerging niches of already consolidated sectors, as happens in KIC InnoEnergy and EIT ICT Labs. Within a KIC ecosystem, industrial partners are advantageously positioned to be early adopters of new technologies and can benefit from ready-made market analysis to commercialise the innovation. A particular gain for industry from its involvement in the KICs is easy access to a network of talent and expertise in cutting-edge research and to novel ideas from innovative SMEs and entrepreneurs.



19 <http://eit.ictlabs.eu/ict-labs/catalyst-and-co-funding-model/>

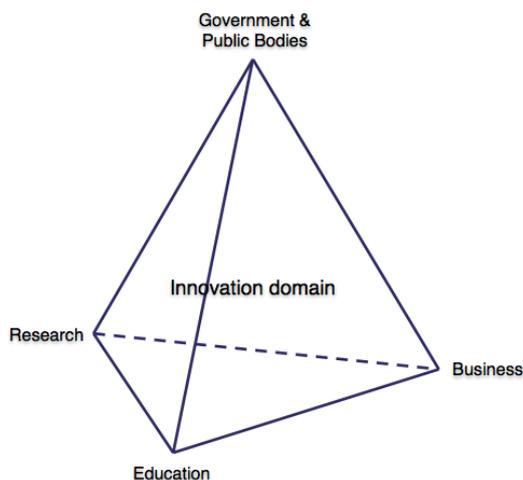
20 EIT (2011). Strategic Innovation Agenda: Investing in Innovation Beyond 2014

21 See KIC Factsheets pp 35-37

Tapping into the Wealth of Networks

The configuration of the KIC network reflects the landscape of European, regional and national initiatives. **KICs are "networking and reconfiguring existing networks"** by connecting with cluster initiatives and business support organisations and regional associations. For example, KIC InnoEnergy Alps Valley Co-location Centre is building upon the clusters in the energy sector in France. EIT ICT Labs Stockholm Co-location Centre is situated in the Kista Science City and has access to over 1,100 ICT companies. EIT ICT Labs forge alliances with other organisations in the Kista environment, including Kista Science City AB, Stockholm Innovation and Growth, ACREO and Stockholm University. In Paris, a part of EIT ICT Labs' activities are carried out in cooperation with two regional competitiveness clusters. Within this network of networks, there is access to over 24,000 ICT companies.

Figure 4 The Innovation Pyramid.



Source: Climate-KIC Business Plan

Recognising the need to tailor the KIC structure to meet the specific requirements of climate innovation, **Climate-KIC has integrated an extended network of Regional Innovation and Implementation Communities (RICs)** into its governance model. RICs build upon the European Regions Research and Innovation Network (ERRIN), which is a dynamic network of more than 90

EU regions. This network was initially an FP7 project in the Regions of Knowledge Initiative that recognised the value of continuing the cooperative relationships that had been established. The network comprises partners from city and regional authorities, as well as from research and the private sector in six European regions²³.

In reality, climate innovation is driven by regions and cities that are the main actors, which are currently experimenting with new approaches. In comparison to the Co-location Centre partners, the focus of RIC actors is primarily on context-driven knowledge and practice-based competences and learning. Climate-KIC has recognised that regions are indispensable to their innovation system, as they can highlight local needs and point to innovation challenges. In addition, regions can also be test-beds for climate innovation pilot initiatives and become the first customers of the products and services that are developed. Thus, Climate-KIC extends the innovation model that is conceptualised as an **innovation pyramid**.

Searching for a Modern Collaboration Model for Europe

As indicated above, the EIT KICs provide a test bed for growing collaboration mechanisms amongst innovation actors in Europe. The partners of the KICs are closely connected via the Co-location Centres and through joint actions and these connections represent a novel way of strengthening innovation hubs in Europe and of creating new innovation networks between them that can also be extended globally.

Knowledge creation and diffusion is highly localised and entrepreneurship thrives best in areas of concentrated skills and capital, notably in clusters that represent regional groups of interconnected companies and associated institutions in related industrial fields (Porter, 2003). At the same time, business innovation arises from collaboration in increasingly complex networks (e.g. Ernst and Young, 2008; OECD, 2008). Companies find it harder to achieve results and produce cutting edge innovation in an era of dispersed knowledge and technology (Esade, 2011). This

22 EIT (2011). Information note on business involvement in the activities of the EIT and its Knowledge and Innovation Communities (KICs)

23 See KIC Factsheets pp 35-37

changing nature of business development is often referred to as open innovation. Chesbrough (2003), coining the term, described it as the understanding that "*not all the smart people work for us; we need to work with smart people inside and outside our company*" wherever they might be.

Innovation and research are not just more open, they are increasingly becoming global activities, as innovators draw upon technologies and ideas developed in multiple locations (Santos, 2003). There are more extensive groups of stakeholders that include users and civil organisations, wider topics such as societal challenges and more inter-disciplinary activities and cross-sectoral collaboration. Today's economy is determined by extended relationships, wider geographical outreach and more sources of talent. In this environment, **European clusters generally lack the critical mass to compete at global level, and so need to create links to other clusters** in order to exploit complementary strengths and economies of scale²⁴. Successful clusters rely not only on the local wealth of social capital but are also well connected to the wider world. As several authors have pointed out, **what companies actually need is access to both a thriving local environment and to global markets and technology** (e.g. Ketels, 2011; Camagni, 1991; Becattini and Rullani, 1996).

In the context of these changing innovation processes, the EIT Knowledge and Innovation Communities are integrated initiatives that support regional innovation hubs and also strengthen their trans-European and global links through the Co-location Centres. **The potential of the KIC and CLC approach lies in demolishing the silos and lock-ins in national and regional innovation systems.**

The co-location approach creates the environment for the robust governance of the KICs, tapping into the existing provision in Europe's regions and strengthening the approach through its long-term commitment to international collaboration. A recent study on the impact of co-location, using the example of the EIT²⁵, highlighted the fact that the Co-location Centres have a significant impact on bringing people together "*conceptually through shared goals and operationally through shared infrastructure, capacity and activities...*" There is reported evidence of the importance of creating both trust in networks and a sound legal basis for the integration of partners.

As has already been highlighted, CLCs are fundamental pillars in the architecture of the KICs and not entities in their own right. The co-location approach creates the environment for the robust governance of the KICs, tapping into the existing provision in Europe's regions and strengthening the approach through its long-term commitment to collaboration.



24 See also the final report of the high-level European Cluster Policy Group available at <http://www.proinno-europe.eu/ecpg/newsroom/ecpg-final-recommendations>

25 *ibid*

Promoting Practices in Support of Entrepreneurship and Innovation

In the quest for a more entrepreneurial Europe, **the KICs have taken up the challenge of experimenting with activities that reduce fragmentation, accelerate innovation and change mindsets.** Their overall mission is to deliver solutions to the grand societal challenges by integrating higher education, research and business across Europe and entrepreneurship is the thread that runs through the KICs' practices:

For 'education' European Masters and PhD programmes and programmes for professional development have been established

For 'innovation' innovation support projects are being co-funded

For 'entrepreneurship' support services for business development are being facilitated

The activities are results-oriented and respond to the often cited concerns about the fragmentation of the innovation landscape in Europe. The EIT ICT Labs Master Class programme is, for instance, the first European-wide ICT Master's School that is business-driven. As such, it educates a new brand of innovators with entrepreneurial skills and global ambitions. KIC InnoEnergy's innovation projects aim to produce tangible outcomes. Already, they have filed 11 patents and brought 23 new products to the market in 2011, which means 1 patent per €1m invested²⁶.

KICs and CLCs are experimenting with new types of approaches, partnerships and delivery mechanisms. There is recognition that over the coming years much will be learned in the course of their implementation and that they will need to be continuously fine-tuned or

even drastically altered, to take account of the valuable experience gained. Thus, **after only eighteen months of active operation, it would be inappropriate to undertake an assessment or evaluation of the KICs' practices and performance.**

The rest of this chapter highlights

KIC ACTIVITIES ARE ...

... integrated actions of education, innovation and business development which link the elements of the full innovation cycle.

... embedded into a committed innovation community and not only project-based.

... building upon existing initiatives and strengthening synergies among European, national and regional level policies.

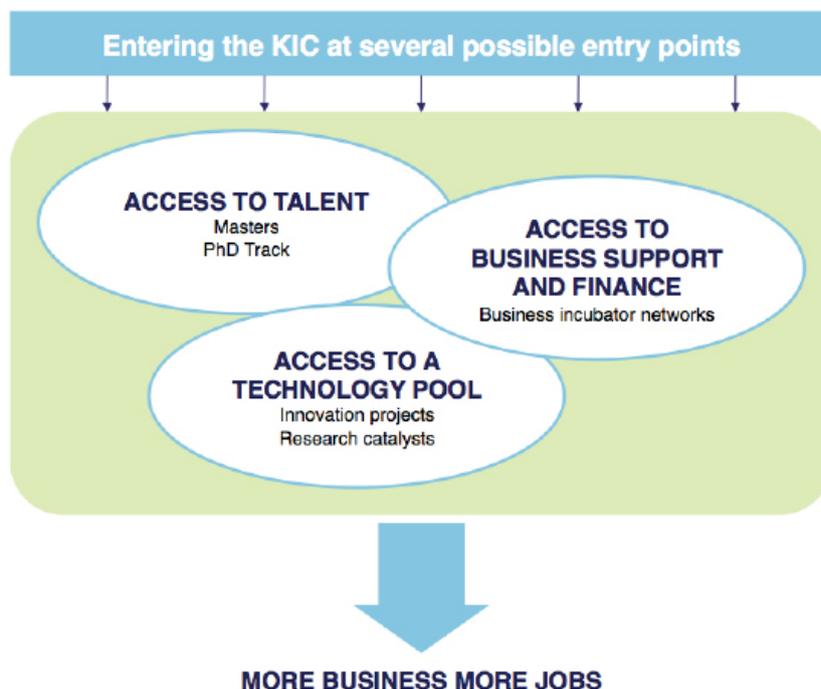
the most important KIC activities and illustrates how their practices can contribute to solve certain challenges, especially in the areas of:

- Nurturing Europe's entrepreneurial talent
- Bridging the innovation gap between ideas and the market
- Accelerating business development

Taking an integrated approach

A first important observation is that the practices of the EIT and its KICs should not be viewed in isolation, as **their strengths lie in their integrated approach that gives partners and other beneficiaries access to talent, to finance, to knowledge and business support at the same time.** This access is available through one integrated community of actors and thus the activities are embedded in the KIC and are not simply single, project-based initiatives.

Figure 5 The Holistic Approach of the KICs to Innovation



The three areas of innovation, education and business development are also bundled together into a single package. For example, PhD candidates represent the bulk of the 'work force' inside several InnoEnergy projects. They are the people who are driving a significant number of the innovation projects, and they participate in industrial projects of different kinds, ranging from the design of highly specialised components to overall system studies related to future energy systems.

Similarly, Climate-KIC innovation projects are tightly integrated across the project portfolio and within the education and entrepreneurship activities. If a student follows one of Climate-KIC's educational courses, he or she can then conduct research within an innovation project and the results of this research will be nurtured, in Climate-KIC entrepreneurship ecosystem, to become a real business.

An additional point to be noted is that the activities of the KICs are not completely new and nor are they detached from what is already going on at European, national and regional level. They **tap into existing seeds of initiatives and existing networks of institutions and organisations of excellence.**

The novelty of these activities lies in the coupling together of the education-research-business development activities and in the realignment of the key innovation actors to act with a common purpose to solve specific societal challenges. These approaches are presented in more detail in the following sections.

Nurturing Europe's Entrepreneurial Talent

Education is a key area of investment and development for the Knowledge and Innovation Communities and there is strong commitment in their business plans to the production of EIT graduates. The KICs and the EIT have to overcome fragmentation in Europe if they are to attract top talent and produce the next generation of European entrepreneurs. **Investment in education and skills constitutes a wider key policy area for the EU and it is essential to economic growth and to the development of a knowledge-based economy.**

In 2010, there were over 93 million people aged from 25 to 64 in the EU human resources science and technology field (HRST)²⁷. Of these, 38 million were

27 Eurostat (2012). Key Figures on Europe

28 <http://www.kic-innoenergy.com/education.html>

'senior' HRST or between 45 and 64 years of age, and they represented 41 % of the HRST in the EU. This illustrates **the need for more urgency in Europe's efforts to educate and produce more talent**. However, higher education is an international industry with a world market. Europe needs not only to nurture its own top talent but **also to attract talent from across the globe** and so it must develop outstanding courses and opportunities with a strong and recognisable branding. The educational reputation of Europe in the field of entrepreneurship must be developed, with input coming from all the partners in research, education and business.

Throughout Europe the development and implementation of entrepreneurship education is very uneven. A European Commission survey in 2008 on entrepreneurship in higher education highlighted the disparities in student access to entrepreneurship education, which is often determined at institutional level. This was confirmed during the 2011 Budapest high-level symposium on entrepreneurship education.

All three KICs have strong, focused approaches to education, which is often considered to be the weaker side of the knowledge triangle. KIC InnoEnergy²⁸ offers a specialised Master Programme, an Executive Master Programme, a PhD programme with thematic tracks and a Post-Master programme, as well as life-long learning modules. Climate-KIC²⁹ provides mobility programmes and professional education courses on climate innovation. It is also preparing to launch Masters and PhD tracks. EIT ICT Labs³⁰ has already launched innovation and entrepreneurship education for Master's and Doctoral programmes.

The education programmes of all the KICs have a very strong focus on the delivery of entrepreneurship and innovation skills, which are more tailored to the needs of the European innovation system. KIC InnoEnergy Masters, for instance, has a specific MSc in Innovation and Entrepreneurship targeted at participants from various

academic backgrounds. It aims to facilitate multidisciplinary innovation and has a special track for those students who want to follow a professional career in the field of sustainable energy. Taking advantage of the diverse mix of participants with backgrounds ranging from engineering and science to management, the venue provides a forum for the exchange of ideas on multidisciplinary innovation. The EIT ICT Labs Master School has used the knowledge and expertise of European Business Schools to help develop the modules that are necessary to deliver innovation and entrepreneurial skills.

EDUCATION/ KEY FEATURES

Strong focus on the delivery of entrepreneurship and innovation skills and involving industry in curricula development

Aim at breaking fragmentation through Europe-wide masters and doctoral schools

Nurturing a 'game changer' attitude of young people who dare to think differently

The courses of the KICs being devised at Masters and PhD level are **exploiting the networks of the Co-location Centres and using the higher education institutes, researchers and industry partners to design and deliver the courses**. This implies new working relationships, as well as new course content. Climate-KIC's educational initiatives all capitalise on the strengths of the partners and the Co-location Centres to deliver new skills and competences. During five weeks, the Journey programme leads students through several Co-location Centres where each node overlays its field of expertise on top of the core entrepreneurship theme. In a similar manner, the Pioneers into Practice initiative uses the RIC network to provide internship placements.

In the EIT ICT Labs Master School, students can pick their entry university for the first year and their exit university for their second year, from amongst the top technical universities in Europe, and the Co-location Centres provide an environment for students, researchers, and business partners to share and stimulate ideas.

29 <http://www.climate-kic.org/academy/>

30 <http://eit.ictlabs.eu/evsgl/education>

Offering a Real-life Experience of Innovation

All the educational approaches of the KICs are driven by excellence and involve learning by doing. From day one, students at all levels deal with industrial and commercial product developments for which they will have to devise innovative and entrepreneurial solutions.

Both in KIC InnoEnergy and the EIT ICT Labs Master Schools, there is significant industrial involvement in the development of the learning outcomes. Although the KICs maintain overall responsibility for the design of the curriculum and its quality assurance, the industrial partners advise on their skills needs and provide structured placement opportunities for students. KIC InnoEnergy PhD Clean Coal track involves industrial partners from the very beginning. Partners from Poland, Germany, Sweden and Portugal helped to develop the PhD track, giving lectures and participating in the students' business plan development exercises. In return, these industrial partners have access both to new ideas and to an expanding pool of talent.

The partners in the KICs believe that the involvement of industry in such a structured manner is an aspect that is particularly new. The KIC model has enabled the AGH University of Science and Technology in Krakow to improve, deepen and extend its existing industrial collaboration on the basis of being considered as an equal partner by the industries concerned.

There are many opportunities for PhD students to access innovation projects. KIC InnoEnergy and Climate-KIC connect the students in their PhD programmes with innovation projects that are happening in the field. This access to real innovation projects can be regarded as something new in that it seldom happens in a structured way in traditional university education.

Realising a Multidisciplinary Approach

The societal challenges addressed by the KICs also require multidisciplinary and cross-sectoral approaches to education and skills training. There is also associated up-skilling required in businesses, government departments and research institutions. **The European higher educational and research landscape is still much too oriented towards individual academic disciplines and the narrow specialisation of many businesses is unsuited to the demands of systemic innovation.**

KICs are changing this environment and offer networks for accumulating, sharing and exploiting a body of knowledge that otherwise would not be accessible to individual students and entrepreneurs. Such an experience can empower them to become change agents. KIC InnoEnergy points out that **educational activities are about nurturing the future's 'game changers'** - people who do not think in traditional ways, but have a new vision and the courage to dare to deconstruct and restructure current methodologies. An example of this 'game-changer' attitude and mindset is provided by the students from Italy, US, South Africa, Canada and Argentina who participated in KIC InnoEnergy's Master's SELECT programme. They have developed a solution for Solaraid, a UK-based NGO that is involved the mass implementation of micro solar products in Africa. This solution called, Sunny Money, offers solar technology to poor African families through a specific credit system that is operated through mobile phones.

Another example is Climate-KIC's Pioneers into Practice. It is a programme which requires participants to undertake two one-month internship placements, over a twelve-month period, in one of the regional partners of Climate-KIC. The variety of locations enables participants to understand

the challenges of applying innovation in very diverse contexts and sectors of activity. The programme aims to develop a new generation of specialists, entrepreneurs and policy-makers which will be equipped to shape systems and processes for the transition to low carbon economy.

Cross-disciplinary approaches to teaching still vary greatly in European universities and they are invariably shaped by a number of factors such as: organisational aims and structures; existing courses; government funding; location; heritage; national/local government agendas; and links with industry.

The creation of completely new programmes that are unencumbered by existing institutional and faculty structures helps to break down some of the artificial barriers. In the USA, for example, new universities such as Arizona State have been reorganised around societal challenges. However, in Europe, cross-disciplinary education is more likely to be provided through small modules attached to existing programmes and mostly this happens within a single institution and not on the scale foreseen by the KICs. The EIT approaches taken in the area of education showcase the changes that are taking place in educational delivery, content and structure and the growing emphasis on new skills combinations for the future economy.

Spotlighting the Journey of Climate-KIC

Developing a Community of Climate Innovators

The scale of the climate change challenge and the urgent need to address it necessitates the active development of talented and skilled people, who can conceive new climate-neutral solutions, bring them to the market and promote their uptake in wider society. The scope of the competences needed for climate innovators is very broad and includes knowledge from multiple scientific disciplines, entrepreneurial skills and an understanding of the broader context for the transition to a low-carbon society. Climate-KIC has set-up a programme called the Journey that addresses the heart of this problem, namely, how to reinvigorate the innovative and entrepreneurial instincts of young Europeans and provide them with the necessary interdisciplinary knowledge to develop approaches to mitigating global warming and adapting to its effects. In other words, the Journey seeks to inspire and equip the future 'game changers.'

Offering Climate-focused Education

Climate-KIC ecosystem provides a unique setting for the development of cross-cutting and multidisciplinary educational opportunities. The approach brings together students from a large variety of disciplines, backgrounds, cultures and academic levels and sets them off on a five-week, context-rich journey across Europe to experience the realities of climate change. The students learn about the scientific theses that underpin climate change and gain an understanding of how different regions and countries respond to the challenge. They visit three Climate-KIC Co-location Centres where the partners provide their particular expertise through lectures and on-site visits. Without the KIC network, it would be very difficult to deliver such a cross-disciplinary and practice-driven programme.

A Hands-on Approach to Climate Innovation

Entrepreneurship is an overarching theme in the programme. During the Journey, students work together in teams to develop practical climate solutions that can be translated into potential business ventures. They are supported by business coaches to enhance their entrepreneurial skills. The Journey gives students an opportunity to meet, network and learn from industry representatives who are operating in climate-related fields. The lecturers and mentors have included representatives from GDF Suez, a multinational energy company, and UPS, a global transport business. The interaction between the industry experts and students forges the knowledge triangle, which is largely absent from most university-led programmes.

Achievements so far

The positive outcomes of the Journey have been affirmed both by the organisers and the participants. Since its launch, demand has significantly exceeded the places available. There were 200 applications for 45 places in 2010 and, in 2011, Climate-KIC increased the intake to 65 students. This year it hopes to extend the programme to participants from non-partner organisations. The 'Alumni' survey has confirmed the positive effects of the programme. The participation in the Journey has inspired and enabled students to embark on new careers in industry, undertake further doctoral studies or launch their own companies. Four start-up companies have been created as a result of the Journey in sustainable farming (DECO!) and urban mobility (ElectricFeel), reversing deforestation (Arboreal). These companies have managed to attract external funding and are currently developing their businesses while benefitting from Climate-KIC's network expertise and entrepreneurship support.

Further developments

The Journey attempts to address important gaps in the current educational offering. It provides students with an opportunity to learn about the multifaceted context of climate change, to experience climate innovation in action and to try it out in practice. Climate-KIC plans to integrate elements of the Journey into its new Master's and Doctoral programmes. This will extend the scope from a summer school to an integrated educational approach that develops those essential skills that can turn the grand societal challenges into new opportunities.

Continuing the Support after School

The KICs all make significant efforts to follow-up their students after the courses finish. Some of the most significant impacts of the Framework Programmes have been related to the networks and relationships which have formed through research projects working on common problems. Learning from the experience, the KICs are all committed to sustaining the communities of students through follow-up activities and fledgling alumni networks.

Climate-KIC **actively supports its students after graduation from their programmes to foster a well-connected network of young professionals.** Students are monitored in terms of their performance and any changes in their geographical location. An emphasis is placed on giving these graduates access to more developed Entrepreneurship and Innovation and Pathfinder opportunities. Climate-KIC's graduates have created a vibrant **Alumni Association to "inspire climate entrepreneurs in Europe to create a climate resilient society"**.

EIT ICT Labs Masters School also set up an alumni network at the same time as its first programme. Alumni are encouraged not just to stay in touch with each other but also with the communities within EIT ICT Labs. There are also plans for the industrial network to extend beyond KIC partners in the EIT ICT Labs Master School by providing wider access to mentoring and placement opportunities.

Promoting the EIT Label

The EIT promotes a Learning Enhancement Quality Assurance Model (EIT-LE-QA model) in the form of an EIT label. The Quality Assurance Model fulfils a number of key objectives for the EIT, including ensuring that Master's and Doctoral students associated with EIT programmes and activities achieve the right kind of learning outcomes. **The learning outcomes set in the EIT-LE-QA reflect all three sides of the knowledge triangle.** Therefore, it combines quality and accreditation with the need to recognise creativity, innovation and entrepreneurship.

This is not all, because as a quality assurance model, the label is aiming at facilitating a common framework to foster the skills required for linking the different sides of the knowledge triangle in an effective way. At the same time, it also

enables European mobility by defining a European learning outcome approach.

From the outset, all three KICs have expressed a strong interest in applying the EIT label to their courses as a quality brand. A key activity for the coming period is to work with the KIC university partners to implement coherent quality criteria for an EIT label that can be applied to degree courses³¹.

KIC InnoEnergy education programmes have already been designed in accordance with the EIT label guidelines. The new EIT ICT Labs Masters School will provide a certificate at the end of study which will summarise the EIT label and the specific characteristics of the course. Climate-KIC Scholars and Fellows programmes will also award an EIT label.

As an international market, Europe needs to not only nurture its own top talent but also to attract talent from across the globe. An element in the business model of the KICs **seeks to ensure that any student, irrespective of their country of origin, will ultimately create some benefit for the European innovation landscape.** For example, there are already many students on KIC InnoEnergy programme from non-European countries, and there are also a number of scholarships to attract overseas students. One of the reasons for subsidising

Spotlighting the EIT ICT Labs Master School

The EIT ICT Labs Master School has been set up as a joint venture between 21 out of 28 of the KIC's universities and business schools and 200 students will be admitted in 2012. One of the reasons for the Master School and the other ICT Lab education programmes is that Europe is facing a considerable shortage of engineers and ICT practitioners with the right combination of skills. The EIT ICT Labs Master School distinguishes itself from other Master's programmes through:

- The scale of the partnership and structure, and the sustainable commitment
- The creation of a new set of Master's courses designed to work across Europe
- The course structure across institutions
- The integration of innovation and entrepreneurship content into the engineering curricula
- The interactions and involvement with the Co-location Centres and industry

31 The EIT has to work closely with the partner institutions to put in place the label as it can only be awarded by participating higher education institutions in accordance with national rules and accreditation procedures

The EIT ICT Labs Master School is one of the largest joint European ventures in higher education. The institutions involved have developed an agreement to deliver seven technical majors and the course includes a fully standardised minor in Innovation and Entrepreneurship. There are also mentoring, internships and partnering from research and industry.

The Creation of a new Set of Master's Courses designed to work across Europe

The EIT ICT Labs created the ICT Master School as a new venture. This did not mean that institutions could not use some of their existing course material but one completely new element is the Innovation and Entrepreneurship aspect of the course. Now 19 institutions have signed formal agreements on common structures and policies and this means that when there is further expansion, much of the groundwork has already been done, with clear roles and responsibilities set out in these partnership agreements.

The EIT ICT Labs Master School has courses where students enter at one of the 19 institutions and exit at another. The course is built on existing core MSc programmes covering: Digital Media and Content Delivery; Internet Technology and Architecture; Cloud Computing; Embedded Systems; Trust, Security and Privacy; Human Computer Interaction; and finally a Service Design and Engineering Programme. The programmes have a uniform common structure, wherever they are delivered. The Master School also has a common infrastructure for student support, a common recruitment process and a systematic quality assurance process.

The fully standardised minor in Innovation and Entrepreneurship is part-funded by the EIT and has been created from scratch. The minor has been devised in cooperation with associated business schools and is also linked to the business of the Co-location Centres. Students have access to these multi-disciplinary environments that also offer a meeting place for students, researchers, stakeholders and members of the academic faculties.

The Interaction and Involvement of Industry and other KIC Partners

The EIT ICT Labs Master School intends to capitalise fully on cross-node knowledge, access to facilities and access to companies and high quality teaching. In addition to the academic environment and relationships, the students will cross borders to be educated in a number of institutions and will have access to a wide range of active links with the industrial base. There are guaranteed industrial internships in the partner companies and there are plans to extend these to other companies that are working with the EIT ICT labs network but are not actual members of the formal partnerships.

Further Developments

The EIT ICT Labs Master School is about to enter its first year of operation, with over 800 applicants for around 200 places in the first year. There are plans to widen the industrial involvement from the existing 25 main industrial partners of the KIC. In future, the Master School aims to offer student internships at KIC supported start-ups and small companies.

Two other issues to be considered in the longer-term are branding and communication. As the Masters Education market in Europe is crowded, it is important for the EIT ICT Labs Master School to stand out from the crowd and this will happen more easily once its reputation is established. The innovative bottom-up approach to the development of the ICT Master School is risky, but equally it should stand more of a chance of achieving excellence than a simple reinvention of existing Masters courses would have.

- 32 "European paradox" refers to the perceived failure of European countries to translate scientific advances into marketable innovations
- 33 European Commission (2012). Report from the Commission to the European Parliament and the Council on the evaluation of the Union's finances based on the results achieved. COM (2012) 40

non-European students is to attract the best talents from all over the world towards Europe as well as to extend the future potential influence of KIC networks. These networks, the contacts and partnerships will remain long after the course has ended and this can foster international market access later on for the companies that the students might create.

Bridging the Innovation Gap between Research and the Market

The KICs play an important role in coupling research and business actors with the aim of creating more marketable products from research activities. They are committed to this objective and set ambitious targets in terms of the number of new products marketed and the patents that are filed. As it is often highlighted, the European innovation paradox³² still prevails, as **Europe continues to be strong in creating knowledge but lags behind in turning these research results into practice.** However, much has already been done in terms of supporting technology transfer and the commercialisation of emerging technologies is still a cornerstone of European research and innovation policies. Europe has gained a technological lead in many key areas, but has not been successful enough in translating knowledge into innovation and competitive advantages. *"A timely and targeted European policy is needed for bridging the valley of death if Europe is to remain competitive"* (Horizon2020, 2011).

The trends show that industrial participation in collaborative research through the EU framework programmes has declined over the years. It was 39% in FP4 and 31% in FP6 and to date it has only reached 25% in FP7³³. **This decline is coupled with a growing tendency to see the results of European research being integrated into the manufacture of new products by third countries.** Such a situation seems even more difficult to understand when the targets for these products are actually European consumers³⁴. By and large, these concerns can only be alleviated by an improvement in the climate for

private investment in European research and innovation.

The 'Innovation Union' flagship stresses the need to get more innovation from research activities and projects. This requires the policies, which foster the supply of state-of-the-art knowledge and skills, to become more closely linked to the demands and needs of society, including those of the business world. Innovation theory and practice have shown that this is not a linear process and, as early as the 1980s, the concept of innovation was commonly accepted to be an interactive and chain linked model, with many feedback loops (please see, for instance, Kline and Rosenberg, 1986). The KICs are important vehicles to promote these links across the whole chain from blue-sky research by their university partners, to the dissemination of knowledge through training and mobility and finally to the commercialisation of the research outcomes and knowledge by industry partners and start-up companies.

The KIC model clearly aims to bridge the innovation gap between research and the market. A market-led approach is inherent in the design of both the EIT and the KICs and is ensured by the high level of industry participation in the KIC consortia. The KICs link research and business through their innovation project portfolios. One of the objectives of the EIT ICT Labs is to generate world-class ICT business via the broader and faster industrialisation of research results. In addition, Climate-KIC offers a framework for identifying and implementing a portfolio of projects and activities, including assessing potential markets for climate innovations.

The KICs' activities in the area of demonstrators, pilots or proofs of concept and the assessment of the potential of the projects to be translated into businesses, stimulate the participating research institutes and universities to begin to think in terms of realistic, marketable products. The KIC CEOs highlighted that their industrial partners were triggered to undertake future innovative activities because the existence of EIT seed funding makes it easier to convince top management to invest in innovation.

34 Graça Carvalho, M. (2012). Opening speech at the Horizon 2020 working panel on Industrial Leadership and Small and Medium-Sized Enterprises, European Parliament

35 Energy from chemical fuels, sustainable nuclear and renewable energy convergence, renewables, clean coal technologies, intelligent energy efficient cities and buildings, European smart electric grid and electric storage

Selecting Market-oriented Innovation Projects

Both KIC InnoEnergy and Climate-KIC have launched a set of innovation projects and EIT ICT Labs complements the research and innovation activities of its partners.

KIC InnoEnergy supports 35 innovation projects in six thematic fields³⁵ and four cross-thematic projects. Climate-KIC's project portfolio currently includes 16 projects that comprise 12 research projects and 4 complementary projects that aim to find ways to market for the new technologies that are developed. The number of projects is planned to double in 2012 and then reach a steady state of 20-25 projects being launched annually by 2014. EIT ICT Labs is running 49 innovation and research activities in 2012. They are specifically co-funding existing European, national or regional projects and complementing them with additional dimensions such as mobility or access to testing and simulation platforms.

INNOVATION/ KEY FEATURES

Innovation project generation with a market analysis, where the innovation projects are connected to business development activities

Fostering new market development by a thematic, cross-sectoral approach

Catalysing national and regional research and innovation programmes by adding a European dimension

Successful commercialisation involves a number of critical factors such as links between technological discoveries and opportunities, demonstration of technology, incubation, resources and equity, market acceptance and selection of proper business development. The KICs bring added value in this respect, as they are designed to connect technological opportunity with the market.

The projects are characterised by the strengthened voice of industry and demand-led project generation. **All projects are required to develop clearly identified products that address a specific**

business opportunity that is supported by a market study. This is the difference in the practice of the innovation projects compared for instance to the traditional FP7 type of call for proposals.

For instance, KIC InnoEnergy issued a call for proposals for research and technology projects that would start in 2012. The topics in the call were based on the input gathered by the Business Working Group composed of industrial and research representatives. Following careful screening, the projects were selected. They are all oriented towards really innovative products and services and, in total, 45 industries are represented across these projects. Altogether 56 patents have been pre-identified in the projects and 9 patents have already been filed. The funding for these projects is allocated to the Co-location Centres on the basis of their attainment of pre-defined performance indicators and benchmarking processes.

The market analysis is seen as being a powerful tool for self-assessment, which helps partners to identify the most promising approach from amongst several possible technologies and/or to increase the focus of a project by breaking it down into more concise target areas.

CLC Iberia's experience demonstrates that starting innovation projects is not a straightforward process. At the beginning, there was the question of how these innovation projects would differ from traditional research projects. A lack of uniformity in the approach of the business schools that were involved added to the challenge. The projects also included both technologists and business people and the different partners in the process did not start from a common understanding and, in addition, there were cultural and organisational barriers to overcome. However, with time and effort, differences and problems were resolved and the projects started to take shape. A new work-package was able to analyse the market potential of the technology and gradually a product-oriented approach emerged, as distinct from a traditional research approach.

The Swedish CLC's experience highlighted the advantage of the speed of these initiation projects as they produced results faster than more traditional approaches. SMEs are also more attracted to these innovation projects, which appear to be less bureaucratic, although there are still complex issues to address in the area of IPR agreements. In Poland, the AGH University of Science and Technology confirmed that the CLC played a crucial role in terms of IPR and in overcoming difficulties related to licensing and sharing knowledge.

Another feature worth noting is that **the KIC innovation projects are directly connected to business development activities**. For instance, Climate-KIC creates specific opportunities for spinning-out climate innovation businesses from their innovation projects and it gives support to demonstration and test bed activities. The integration of **the regional dimension provides an excellent setting in which new businesses can find their first customers**, for example municipal authorities. In addition, a business and coaching network in CLCs will shortly be used to assist the teams working in the innovation projects.

KIC InnoEnergy SECoal³⁶ project is dedicated to delivering innovative approaches to the co-use of multi-fuel inputs and coal-based power generation. It is developing innovative, co-firing technologies that help reduce the operating costs of power generating utilities and have resulted in the creation of a dedicated spin-off company. A market has already been identified, in that EDF, a leading energy player in France, Belgium and the UK, is now committed to buying the new technology.

The collaboration across Co-location Centres is also important in increasing the added value of the innovation projects. **The existence of the KICs enables a transnational approach to be taken to information, advice and guidance. Such an approach may also be needed to exploit and commercialise research results across national boundaries.** The innovation projects use a specialised pool of agents for specific actions, as the feedback from KIC InnoEnergy indicates.

For instance, a spin-off from the University of Krakow has been created and this involves a new solution for extending the lifetime of wind turbine bearings. The patent was issued in Poland but there was a lack of knowledge about legal and certification issues and how the product could best be marketed in Europe. Through the network, KIC InnoEnergy's Spanish CLC that specialises in renewable energies was able to provide relevant advice and now, the KIC InnoEnergy Holding is a 10% shareholder in the start-up.

Climate-KIC Smart Urban Adapt project aims to support the development of novel systemic decision tools for the planning, management and operation of cities. It is the first applied research programme between Imperial College London and the Swiss Federal Institute of Technology and the business partners include IBM and Microsoft. The project received in-kind support from the Swiss CLC including coaching, an invitation to participate in an entrepreneurial workshop and contacts to business partners.

Forging new Value Chains in Emerging Markets

While KIC InnoEnergy has a well-defined demand sector with well-known companies, EIT ICT Labs relies on an established and focused knowledge base with many competing market actors. The idea is not to penetrate old markets but to try to create new ones through innovation. Climate-KIC does not have an established market and its innovation base is, by and large, scattered across various fields and areas of science. This climate area involves a large number of small and early stage companies and has a lack of regulatory mechanisms. The challenge is much more to find new connections between related sectors, to forge new value chains and to deliver systemic innovation.

Climate-KIC aims to create market value chains through an innovation project pipeline that spans the entire innovation chain including market identification and development, innovation development, testing and deployment. It also focuses

36 <http://www.kic-innoenergy.com/innovation-projects/secoal.html>

on the creation of new pathways to low-carbon prosperity by fostering conditions for on-going innovation.

The development of the innovation project portfolios follows both a bottom-up and a top-down approach. High-quality proposals are generated through the Co-location Centres, while a top-down approach is used to define the focus areas of strategic importance to Climate-KIC.

Future markets for climate change mitigation and adaptation technologies are too complex for most companies or institutions to evaluate or understand. There are no pre-existing value chains in climate innovations and so the climate market still needs to be discovered. The associated uncertainty is a major barrier to large-scale investment.

Climate-KIC's focus on systemic innovation differentiates it from most other public and private innovators. Due to the fragmentation of market value chains, there is **a need for systematic innovation that involves policy-makers, many industries and the civil society, representing both the supply and demand sides.** The road-mapping work stream of Climate-KIC addresses this need for systematic innovation by creating a platform for businesses, governments and NGOs to discuss research and innovation priorities on a pan-European basis. The platform also identifies key features of effective regulatory and industrial frameworks and develops promising innovation pathways.

For example, the aim of the Smart Urban Water project is to develop effective urban water management services that lower costs and limit the impact of floods and droughts on cities. These services could be delivered by using sensing and computing technologies and such technologies have already been developed but have not yet been used for urban water management on such a large scale. Climate-KIC partners detected the business opportunity for larger companies to build such an ICT solution for local governments, which at the same time could provide a market niche for SMEs to develop specialised support services. The

project gathers actors in a value chain that enables the type of innovation that would not have been possible without the existence of the network.

Another example is the project Off4Firms³⁷ – Reducing Emissions in Private Households that has recently been launched. An effective way of triggering change in households can be through the employers of household members. If designed and implemented effectively, subsidising and initiating programmes that offer a set of measures to reduce energy consumption and CO₂ emissions, such as insulation or solar panels, can offer a 'win-win' situation for both households and firms. Households benefit financially and the firms can enhance their reputations. Off4Firms is compiling and evaluating existing voluntary measures that aim to reduce energy use and CO₂ emissions in employees' private lives. Proposed surveys of employees in several companies should reveal the potential attractiveness and uptake of different measures.

Leveraging and Accelerating National Programmes

The EIT ICT Labs have chosen a model of catalysing on-going national and regional innovation initiatives by complementing them with mobility programmes, networking activities and access to test beds or to living labs. The EIT ICT Labs support projects that have already been funded by an industrial or an academic partner, by a Member State funding agency or by the European Commission. Through collaboration between several partners from different co-location nodes, it also funds new research actions on promising topics that have manageable risks and high innovation potential.

The novelty of the catalyst concept is the coupling of targeted activities, to existing European, national or regional programmes and to the EIT ICT Labs additional, complementary services such as test beds, access to living labs or mobility programmes.

The research projects are linked to ten selected thematic action lines in areas

such as computing in the cloud, digital cities of the future or ICT-mediated human activity. To receive funding a proposal has to highlight its links with what is being, or has been, done in the carrier project and the added value of the new research to be undertaken.

One of the EIT ICT Labs' research projects, FITTING (Future Internet of THINGS), is an example of a carrier project which originated in a Co-location Centre and has now been extended to include partners across the KIC. The project started out in the French Co-location Centre and it is about providing a facility, which will enable academics and industrialists to experiment with innovative services, such as mobile wireless communications. The project promotes commercial exploitation through its release of free open source software with a non-contaminating license. The project initially won support from the French Government, when it was granted €5.8m for the development of a test bed federation in France³⁸. Through the EIT ICT Labs, the project will offer new integrated test beds and tools, invite and engage more users, and also open and promote its offerings to the other Co-location Centres and associated partners.

Accelerating Business Development

Creating more business and more jobs through fast-growing, innovative firms is one of the key objectives of the Innovation Union (EC, 2010). A cornerstone of the KIC's activities is to support innovation in existing companies and also the creation of new business opportunities. The vital ingredients in fostering entrepreneurial activities are access to finance and support for enhancing business skills. A wide-range of innovation support measures has been put in place at European, national and regional levels. These are designed to support the growth and competitiveness of companies through a range of specific measures such as business incubation, access to finance or technology transfer (EC, 2009).

However, bringing an idea from the concept stage to the stage of setting-up a real company can be a lengthy

and complex process. Promoting the rapid commercialisation of emerging technologies is hampered by various obstacles such as insufficient support for early-stage development, pre-investment and proof-of-concept work. There is a crucial equity gap for new start-ups and spin-offs and it is sometimes difficult to acquire the skills needed for a successful commercialisation process (BIS, 2011).

Business development and entrepreneurship is at the heart of the KIC activities, where the higher educational programmes and research and innovation projects are put into a business context with the aim of stimulating new business creation. **All three KICs offer a range of business support services that help entrepreneurs to translate their ideas into successful businesses.** These services focus on areas such as support for technology, market assessment, access to human resources and, last but not least, seed and venture capital through specific KIC innovation funds.

Although support is available for new business creation in several Co-location Centres, this support can be reinforced by the addition of a stronger European dimension. For example, it might be possible, and also desirable, to present and explain innovative ideas to potential collaborators in research or in finance within other regions.

Specialising Business Support

KIC InnoEnergy, EIT ICT Labs and Climate-KIC rely on a specialised network of business incubators and business development centres building upon the existing business development services offered in each Co-location Centre.

Climate-KIC **Co-location Centres deliver entrepreneurial support and services** based upon Climate-KIC incubators, 'valorisation' centres and technology transfer organisations. In 2012, a system is being developed for a Climate-KIC label that can be applied to the incubators and the 'valorisation' centres that attain the required standards. Ten centres are expected to receive this label by the end of 2012.

38 The project built on the results of existing French projects and also one European FP7 project (OneLab2)

KIC InnoEnergy has launched a programme called 'KIC InnoEnergy Highway' that supports business development (please see the spotlight for more details).

EIT ICT Labs have appointed one Business Developer to each Co-location Centre who delivers strategic and intensive business coaching to a selected list of entrepreneurs and businesses. A total of 21 companies received coaching in the course of 2011.

BUSINESS DEVELOPMENT/KEY FEATURES

Organising a European-wide specialised business support which is committed to the first customer

Accelerating time to market of innovations through demonstration actions, facilitating experience labs and demand-side measures

Fostering the development of new businesses

The main added values of the KICs' business support activities are best seen in **their specialised nature, their pan-European network and their access to the best players in their respective fields**. The novelty of the approach lies in catalysing a network of incubators by integrating their capacities and re-orienting them to innovation in climate change or sustainable energy or ICT. The development of activities is usually centralised but is adapted to local needs and circumstances.

Climate-KIC incubators offer specific services to climate start-ups. The incubators provide a programme that students and researchers can join, in addition to carrying out their day-to-day jobs, which helps them to develop business models based on their research activities in the climate area. If the start-up finishes the programme successfully, it can get access to the 11 Climate-KIC grants, apply for office space and business support in the incubator and attend Climate-KIC entrepreneurship Master classes. Climate-KIC Incubation Programme supports entrepreneurs with a grant ranging from €25.000 to a maximum of €50.000.

Climate-KIC incubation programme is explicitly linked to national initiatives. For

instance, future start-ups involved in the Climate-KIC activities are advised by the Swiss CLC to apply for the support from VentureKick. This is a Swiss programme to double the number of spin-offs from Swiss academic institutions and to improve the quality of start-ups and their attractiveness to professional investors. The prospective entrepreneurs and leaders of the innovation projects who are linked to Climate-KIC are obviously profiting from the excellently organised innovation ecosystem at national level. According to members of the CLC's staff, the CLC provides this "*leverage effect*" with access to coaching and contacts to business partners from the private sector.

The Entrepreneurship Support System of the EIT ICT Labs supports and nurtures SMEs and academic entrepreneurs. The main goals are to increase the volume of successful start-ups and to stimulate SMEs to grow faster, especially at international level. The Co-location Centres support cross-fertilisation between themes and different geographical areas and offer partners access to the EIT ICT Labs-wide network of Business Developers. The EIT ICT Labs assists the birth, and then, stimulates the speedy international growth, of SMEs. Through a variety of mechanisms, the young SMEs are supported in capturing new business opportunities, in reducing the time to market and in extending their business to other geographical regions and growing internationally. Local support is also given to introduce the entrepreneurs to wider networks and to provide advice about European regulations.

Assistance is targeted at early-stage growth businesses, where the co-location dimension should open up new markets. In Stockholm, around one company per month is graduating through the CLC's local incubators and this rate is expected to double in the immediate future through the KIC's promotional activities.

Another support given to businesses is market information. The Innovation Radar of the EIT ICT Labs has an established cross-co-location network of experts in ICT who are working together to identify future market trends. The Innovation Radar is overcoming

barriers to foresight activities and to open innovation. Partners such as Siemens, Ericsson and other industrial players are involved in this development and so **it brings together competitors in a collaborative environment, which, in turn, may help to trigger more innovation.**

The potential for cross-co-location centre cooperation is huge. As indicated by KIC InnoEnergy, many opportunities exist for establishing technology links or providing access for entrepreneurs from one location to the laboratories and facilities of another location based on their specialism. For instance, European business initiatives working on wave energy from the sea have been connected to the Iberia CLC that specialises in renewable energies.

Reducing time to market

All three KICs have the objective of decreasing the average time to market of innovations and they have established specific activities to fulfil this objective such as the Climate-KIC Market Accelerator scheme or the EIT ICT Labs Technology Transfer Programme.

The Market Accelerator scheme is a systemic model to accelerate the routes to market for climate change adaptation and mitigation solutions. The scheme brings together organisations that have climate change targets to meet with suppliers of innovation products and services who are seeking markets. The programme aims to create business opportunities for the innovation projects and climate innovation start-ups, and to deliver demonstration and test bed climate change technology for public and private organisations. The programme has three foci: organisations demanding or buying innovations in the European marketplace; organisations supplying innovations; and activities to accelerate the interface between them.

A specific aspect of the Market Accelerator programme is that it provides a range of demand-side measures such as support for pre-commercial procurement and public procurement; demonstration and deployment management; buyer networks to inform user-driven innovation projects;

and challenge-led competitions. The first pilots are being launched in 2012.

The Market Accelerator has three main elements, namely:

Market analysis and foresights, developing a live market segmentation model

Market mobilisation, supporting the market engagement of the existing Climate-KIC projects and increasing the innovation absorption capacity by demand side stakeholders in CLCs/RICs - working 'inside-out'

Buyer engagement and clustering, proactively engaging the demand-side to inform new market led Climate-KIC activity - working 'outside-in'

EIT ICT Labs plans to give sub-grants of up to €50.000 to start-ups, SMEs or individuals for innovation and research. This support can be combined with business incubation activities. A key goal is to create an open market for problems and solutions by matching research results with potential entrepreneurs or industry partners. Another key aspect is to focus not only on start-ups, but also on established ventures that have an international dimension.

An important added value of the KIC business support networks is that, for example, **a start-up in the Netherlands can be facilitated by partners involved in other Co-location Centres**, thus breaking down boundaries and providing market introductions in other countries. This is something that has not happened previously.

Spotlighting KIC InnoEnergy Highway

Incubating new Global Businesses

KIC InnoEnergy Highway™ is a specialised business creation process in the field of sustainable energy that takes a business opportunity through different evaluation stages with the aim of creating new start-ups and spin-offs. Highway™ was developed together with the KIC's business development partners and it became operational in June 2011. Entrepreneurs see the following unique benefits of Highway™:

1. It gives access to a European network
2. It specialises in sustainable energy
3. It commits itself to finding the first customer
4. It delivers added value services rather than just financing projects
5. It is a very specialised European investors' network

Established as a one-stop shop, the strength of the concept lies in combining the richness of the local partners with access to a European and global network. Although Highway™ is centralised at the KIC Holding level and quite homogenous in its selling propositions, the regional innovation systems were taken into account at the design stage.

Once a Service Agreement is signed, the entrepreneur entering Highway™ also enters the whole of the KIC network. The Service Agreement establishes the principle of service-for-equity, under which KIC InnoEnergy provides services to the entrepreneur in return for a stake in the new business.

There are a number of gates through which a business or business idea can enter Highway™: Gate 0 is about opportunity analysis; Gate 1 is the assessment of the business idea; Gate 2 is about industry discovery, Gate 3 is the second part of incubation; Gate 4 is about commercialisation; and Gate 5 is post-incubation. Highway™ is connected to the other parts of the KIC. A masters student can spend an internship in one of the incubators, while PhD students can enter the incubator and further develop their business ideas. The movements between Highway™ and innovation projects are bi-directional: if there is a spin-off opportunity from an innovation project it can enter Highway™ and if there is business in Highway™ that needs further research in terms of technology development, it can be turned into an innovation project.

The potential customers are involved from the very beginning through the industrial partners of Highway™ and the commitment to the first customer is ensured through this initial engagement. Highway™ offers entrepreneurs access to: experts in any field of sustainable energy from the European network; European markets and customers through the KIC's network and contacts; and excellent premises and labs. Many opportunities exist for establishing technology links or providing access from one location to laboratories and facilities in another location. Highway™ is complemented by its own venture capital funds - an Accelerator Fund, an Investment Fund and an Equity Fund. The amount of EIT funding is leveraged with co-funding from KIC InnoEnergy SE's own resources. In some cases the business opportunity may be so promising that KIC InnoEnergy would like to invest its own funds in return for shares in the new venture.

During the first five months of activity, 82 entrepreneurs with business ideas in the field of energy have asked to join Highway™. Of this number, 27 have fulfilled the minimum criteria and are currently on the pathway towards starting their own businesses.

A pool of entrepreneurs will be created to be used when complementary profiles are needed in the team creation phase. Experience shows that most success is driven by committed people, so KIC InnoEnergy plans to respond with a community of entrepreneurs to complement the team in providing the experience, skills and capabilities needed for the successful launch of a new venture.

The local incubators go through an annual strategic auditing process and there are also monthly meetings to monitor progress in the different branches. Then, there is an annual Business Creation Convention where the members of staff of all the incubators exchange experiences. In addition, training is organised when a need has been identified. In order to ensure a greater degree of homogeneity between the incubators, common databases, templates, contracts and a joint dashboard have been created.

The EIT in the European Innovation Policy Landscape

The EIT is the first initiative at European level to fully integrate the knowledge triangle with the aim of generating world-class innovation and boosting the EU's competitiveness. Thus, the **EIT has an important role to play in strengthening the European innovation landscape** by delivering policy responses to the key innovation challenges. This chapter briefly explores the role of the EIT and highlights some of the most relevant opportunities offered by the EIT and by the approaches of the KICs.

The EIT is responding to the grand societal challenges and creating new business opportunities through its focus on entrepreneurship and innovation. Its function as a test bed for new kinds of innovation support and collaborative practices is also an important component. The uniqueness of the EIT lies in integrating the knowledge triangle actors into a long-term common effort and in adopting a result-oriented approach. At the same time, the approach that has been taken provides substantial leeway for the KICs to establish their own governance models and to operate under a relatively flexible set of financial rules. **The EIT also constitutes a shift from a traditional project-based approach in innovation policy to a partnership-based approach**, where the seed-funding provided by the EIT is not simply given to projects but invested in an innovation community.

The EIT constitutes an important part of the 'better society' objective of the Horizon 2020 framework programme for research and innovation. It has an important part to play in showcasing the knowledge triangle approach, primarily through the KICs. The experiences of the KICs are expected to be shared with wider stakeholder groupings in a targeted

dissemination process. Through the careful planning of its activities, the EIT will also strongly contribute to the objectives set out in Horizon 2020.

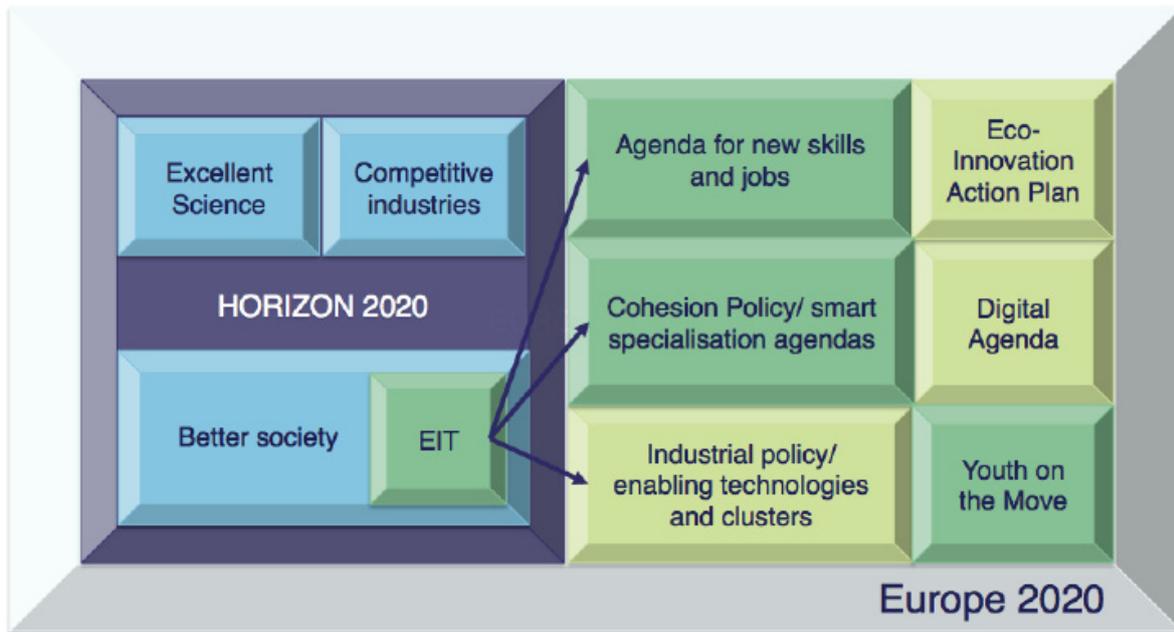
The EIT is mentioned in key European research and innovation policy documents. It is featured explicitly in the flagship initiatives of 'Innovation Union' and 'Youth on the Move' and is highlighted in the 'Agenda for New Skills and Jobs' and in the Communication on Regional Policy contributing to smart growth. Interestingly, there is no reference to the EIT made in the 'Industrial Policy' flagship. The links between the EIT and other European initiatives are, as yet, not clearly defined but are developing on a more ad-hoc basis. As Kuhlmann (2011) finds "*the embedding of the EIT and the KICs in the European landscape of higher education, research, business and public policy is far from ideal*". Similarly, the recent evaluation of the EIT states that it has not yet engaged with organisations involved in promoting innovation (ECORYS, 2011).

Given the unique features in the EIT and their KICs and the fact that the EIT is a cornerstone of European innovation policy, **there are important synergies emerging between the EIT and other policies relevant to innovation** (see Figure 6.).

Based on the key features of the KICs identified in the previous chapters, this publication sees the EIT as being potentially instrumental in:

- Establishing synergies amongst European, national and regional innovation programmes in Europe
- Strengthening world-class innovation hubs and clusters
- Modernising education policies

Figure 6 EIT and its Potential Links to other Policy Initiatives relevant to Innovation



Establishing Synergies amongst European, National and Regional Innovation Programmes

As innovation systems are becoming more complex and are involving more diverse interactions between universities, research, business and public institutions at European, national and regional levels, innovation policies in Europe have been experimenting with different approaches to coordination. As Arnold et al (2011) describes, the future European research and innovation policy is expected to become more holistic combining innovation and research with an increasingly important role for coordination between Member States. At the same time, coordination will become more decentralised. The first chapter of this publication (EIT in a nutshell) details the governance model of the EIT, which is an innovative approach as it introduces a new method of coordinating innovation activities that are taking place at different levels.

The KICs’ strengths lie in exploiting and catalysing existing national and regional initiatives by giving them a European dimension and establishing a cooperation and coordination mechanism

between the national and regional actors through the model of Co-location Centres. The EIT ICT Labs explicitly build upon national and other European programmes through its catalyst carrier model whilst both Climate-KIC and KIC InnoEnergy strategically exploit on-going European, national or regional initiatives.

One example is the Software Campus Germany³⁹. This is a national initiative supported by the German Federal Ministry for Education and Research. It aims to train promising students with an industry-oriented education in the field of IT. EIT ICT Labs positioned itself as the management agency for this project. The goal of the Software Campus is to establish a top-ranked qualification programme at the highest scientific level in which industry and academia work together to create first-class curricula. In this way, a programme which originally was purely national obtains an international dimension and accesses a pool of recognised international actors. The KIC community can become the basis for mutually reinforcing policy initiatives at European, national and regional levels – a principle that can strengthen their effectiveness through exploiting the opportunities for synergies.

39 <http://www.softwarecampus.de/en/>

KICs also have a contribution to make to the smart specialisation strategies that EU regions are preparing for the next period of the Cohesion Policy 2014-2020⁴⁰. For instance, KIC InnoEnergy Co-location Centres are specialised in selected themes and in offering experimental test beds. These Co-location Centre regions can harness their strengths in specialisation and their connections to other complementary specialised areas that the KIC offers. The support to the smart specialisation strategies delivered through the Smart Specialisation Platform⁴¹ could also provide information about the practices of the KICs in catalysing the knowledge triangle, launching entrepreneurial education programmes and supporting innovation. This could be built upon to extend the approach of the 'Regional Innovation Communities' (RIC) model of Climate-KIC that is presented in the section on governance practices.

For further consideration: The KIC-CLC governance and funding structures can create synergies between European, national and regional policies and provide a model for coupling different programmes together to work towards common goals. The potential of the EIT to foster coordination between research and innovation activities might be further explored. In addition, the KIC experiences of the Co-location Centre approach could be shared with a wider circle of regions through the expansion of the RIC model.

Strengthening World-class Innovation Hubs

Fostering world-class innovation ecosystems that can spin-off globally successful companies is a popular policy objective. As a consequence, cluster-based economic policies have become increasingly widespread and have promoted the organisation of research, innovation and industrial policies around clusters. Although Europe has many different types of clusters, it needs more world-class clusters to be able to compete globally (EC, 2008). **European clusters often lack the critical mass to compete at**

the global level, and so they need to create links to other clusters in order to exploit complementary strengths and economies of scale (ECPG, 2010). As the 'Industrial Policy' flagship points out, there is a need to develop more globally competitive clusters and networks for both traditional and innovation clusters. Through clusters that are connected across European regions, a critical mass can be achieved for R&D and innovation, skills, funding, the cross-fertilisation of ideas and entrepreneurial initiatives.

The KIC Co-location Centres are building upon existing clusters and, in certain cases, they are partnering with cluster management organisations. The concept of the KICs and their Co-location Centres opens an interesting debate on how to support clusters to become world-class: **Co-location Centres are re-wiring traditional relationships in clusters and creating new networking opportunities across borders and so they are playing a role in breaking path-dependency and regional lock-in.** Lock-in means that the cluster remains much too inwardly focused and thus, misses emerging opportunities and does not react quickly enough to the changing economic context. KICs are also reshaping clusters by fostering cross-sectoral connections and forging new lead markets on societal issues. As the Strategic Innovation Agenda of the EIT also indicates, **KICs are expected to create lead markets, whilst driving innovation in a multi-disciplinary way (SIA 2011).**

For further consideration: The KIC approach is strongly market-driven and has the potential to strengthen clusters so that they become world-class. The model of the Co-location Centres links regional clusters to a pan-European network and thus increases their critical mass through such European links so that they can step out jointly on to the global stage. In order to reinforce these connections, more direct links between the EIT and European industrial policy initiatives could be considered.

40 European Commission (2010). Regional Policy contributing to smart growth in Europe 2020. COM(2010) 553.
 41 <http://s3platform.jrc.ec.europa.eu/home>
 42 www.proinno-europe.eu/eca
 43 European Commission (2006). Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation. COM(2006) 208

However, the KICs could exploit existing cluster programmes to a better extent by building, for instance, on the European Cluster Alliance (ECA)⁴². The ECA involves national and regional public authorities responsible for cluster programmes and aims to develop new ideas and practical tools for improving cluster policy in Europe. It might be possible to create spill-overs between the EIT KICs and the ECA members and to jointly explore ideas on how the KIC approach could improve cluster policies.

Modernising Higher Education Programmes

An important area in which the EIT can make a difference is its role in modernising European higher education. It is a multi dimensional role and includes the capacity to improve governance, teaching, entrepreneurial and multi-disciplinary skills development, quality systems, mobility and outreach. The modernising higher education agenda was adopted in a Communication in 2006⁴³ where the Commission listed the challenges which universities faced at that time.

The 2006 Communication identified a number of problems faced by higher education in Europe: fragmentation of HE; over-detailed national regulation; a tendency to uniformity; under-use of the knowledge produced by universities due to the dislocation between academia and enterprise; difficulty in competing in an increasingly globalised world; a lack of funding; and a need to increase access rates to higher education in line with other leading world regions.

The EIT was welcomed by the 2006 Spring Council as an initiative which could specifically address these challenges *"contributing to improving Europe's capacity for scientific education, research and innovation, while providing an innovative model to inspire and drive change in existing universities, in particular by encouraging multi-disciplinarity and developing the strong partnerships with business that will ensure its relevance"*⁴⁴.

Since 2008, the European Commission's annual University-Business Forum has

also brought higher education institutions, companies, business associations, intermediaries and public authorities together. It has provided them with a space in which to interact in an effort to modernise higher education so that it might meet the real-world needs of the European job-market. Since 2010, the EIT has been represented at, and involved in, many forum events.

The Council's conclusions on developing the role of education in a fully functioning knowledge triangle⁴⁵ highlight the need to improve the impact of investments on education, research and innovation through systemic and continuous interaction. In practice this means **there is a need to consider closer policy alignment and cooperation between education, research and innovation at EU and Member State levels, something the EIT could be well placed to address.**

The updated 2011 modernisation agenda⁴⁶ which includes *"supporting growth and jobs"* in its title continues to highlight the central role, which the EIT plays in strengthening the higher education systems throughout Europe. The European Commission is also further encouraging the support and interaction between higher education and business through the 'Knowledge Alliances' pilot actions to develop structured partnerships to create results-driven cooperative ventures between universities and companies. In particular, the Knowledge Alliances initiative recognises the need for a truly two-way process, with higher education and business joining forces to design innovative, sustainable ways of increasing human capital. The first three alliances are in the areas of 'the European film and audiovisual sector', 'the type of educational programmes required by industry and manufacturing' and 'how to best foster an entrepreneurial spirit through new approaches to education'. The alliances include both higher educational and industrial partners, and the overall pilot scheme has a funding envelope of €1 million for the period 2011-13.

'An Agenda for new skills and jobs' calls for entrepreneurial skills to be built

44 ibid

45 The Council of the European Union (2009). Conclusions on developing the role of education in a fully-functioning knowledge triangle. 2009/C 302/03

46 European Commission (2011). Supporting growth and jobs – an agenda for the modernisation of Europe's higher education systems. COM(2011) 567

into all training and education systems, thus fostering entrepreneurship. The introduction of entrepreneurship into the school curricula is seen to be a way of creating a critical mass of entrepreneurship teachers and promoting cross-border collaboration between universities and research centres (EC, 2011). The modernisation of the skills base is necessary to enable European industries to find employees who possess the skills that they require. The current skills mismatch is a challenge and modernising industrial structures will need new skill sets including entrepreneurial and multi-disciplinary skills.

For further consideration: The EIT is a leading example in the modernisation of education practices through integrating entrepreneurship elements and promoting a multi-disciplinary approach. The EIT has the capacity to influence governance, teaching, mobility, outreach and quality and this role of the EIT should be further developed.

The reference to the EIT in the flagship initiative 'An Agenda for new skills and jobs', indicates that it is expected to foster business creation and development through innovation-driven research and particularly, through a strong emphasis on entrepreneurship. **The EIT education activities implemented in the Co-location Centres of the KICs are nurturing such entrepreneurial mindsets.**

As the section on practices in support of entrepreneurship and innovation explains, all of the KICs have a strong educational dimension in their activities and are extending entrepreneurial curricula and international mobility. **The EIT label is a mechanism to ensure a certain number of high-quality criteria in line with the mission of the EIT.** These activities have created new structured partnerships between academia and industry in the areas of education and curriculum design. The EIT and the KICs build upon and catalyse existing initiatives in entrepreneurial education such as those financed through Erasmus Mundus and through regional and national programmes. For instance, the EIT KIC InnoEnergy drives the master's programme in Environmental Pathways for Sustainable Energy Systems⁴⁷ that also offers scholarship opportunities provided by Erasmus Mundus.

The EIT has to live up to the high expectations, which accompany it. Though, what has to be kept in mind is, "Do not ask what Europe can do for the EIT but what the EIT can do for Europe."

KIC Factsheets

KIC InnoEnergy

Objective: KIC InnoEnergy aims to become the leading engine of innovation and entrepreneurship in the field of sustainable energy.

Co-location Centres and their themes:

Alps Valleys: Sustainable Nuclear and Renewable Energy Convergence

Benelux: Intelligent Energy-efficient Buildings and Cities

Iberia: Renewables (Wind, CSP, Photovoltaics, Wave and Tidal Energy)

Germany: Energy from Chemical Fuels

Poland Plus: Clean Coal Technologies

Sweden: European Smart Electric Grid and Electric Storage

Partners: It brings together the leading European partners from the whole energy community – energy production, energy transportation and storage, energy supply and efficient energy use. It is organised as a partnership of 55 top rank industries, 15 research centres and 30 universities and business schools with a reputation for world-class excellence. The partners include organisations such as the University of Technology Eindhoven, EDF, ABB, KTH, Total, Vattenfall, Karlsruhe Institute of Technology, Energie Baden-Württemberg (EnBw), Catalonia Institute for Energy Research, Eandis, GDF Suez, EDP, ESADE, Gas Natural Fenosa, Tauron, KU Leuven, Areva, CEA, Stuttgart University, G-INP and the AGH University of Science and Technology

<http://www.kic-innoenergy.com/>

EIT ICT Labs

Objective: EIT ICT Labs fosters innovation in information and communication technologies driving the transformation towards the future information society and enhancing the quality of life for everyone.

Co-location Centres:

- Berlin (Germany)
- Eindhoven (The Netherlands)
- Helsinki (Finland)
- Paris (France)
- Stockholm (Sweden)
- Trento (Italy)

Themes:

- Smart Spaces
- Smart Energy Systems
- Health & Wellbeing
- Digital Cities of the Future
- Future Media and Content Delivery
- Intelligent Mobility and Transportation Systems

Partners: EIT ICT Labs is composed of 27 core partners and 44 affiliate partners. In the partnership are respected European universities such as Technical University Berlin, Aalto University, Université Pierre et Marie Curie and the Royal Institute of Technology. There are also excellent research centres like DFKI, Fraunhofer, INRIA, Novay and VTT and leading companies in ICT research are involved including Deutsche Telekom Laboratories, SAP, Siemens, Philips, Nokia, Alcatel-Lucent, France Telecom, Ericsson and Telecom Italia.

<http://eit.ictlabs.eu/>

Climate-KIC

Objective: Climate-KIC intends to accelerate the reduction in the carbon intensity of the European economy, which is critical to Europe's response to climate change.

Co-location Centres and RICs:

Paris (France)
London (UK)
Zurich (Switzerland)
Berlin (Germany)
Randstad area (The Netherlands)

And six Regional Innovation and Implementation Communities (RICs) in Hessen (Germany), Valencia (Spain), Emilia Romagna (Italy), Lower Silesia (Poland), Central Hungary and the West Midlands (UK).

Themes:

Assessing climate change and managing its drivers
Resilient, low-carbon cities
Adaptive water management
Zero carbon production systems

Partners: Climate-KIC community has 20 core and 91 affiliate partners spanning highly successful businesses such as Bayer, EDF, GDF, Suez, DSM and Schipol. Its academic institutions include Swiss Federal Institute of Technology Zurich, Imperial College London, Potsdam Institute for Climate Impact Research PIK, Technische Universität Berlin, Forschungszentrum Jülich Gmb, GFZ German Research Centre for Geosciences, Atomic Energy and Alternative Energies Commission, INRA, Université de Versailles de Saint-Quentin-en-Yvelines, Delft University of Technology, Utrecht University and Wageningen University. There are also three public bodies as core partners - TNO, Deltares and the Port of Rotterdam. The Regional Innovation and Implementation Communities (RICs) are also partners.

<http://www.climate-kic.org/>

KIC Funding Figures

The total budgets of the KICs in 2010-2012 were €777.4 m, coming from the following sources:

EIT grants: € 167.4 million (21.5%)

Contribution from partners: € 299.1 million (38.5%)

© of which industry partners: 20-31% depending on the KIC

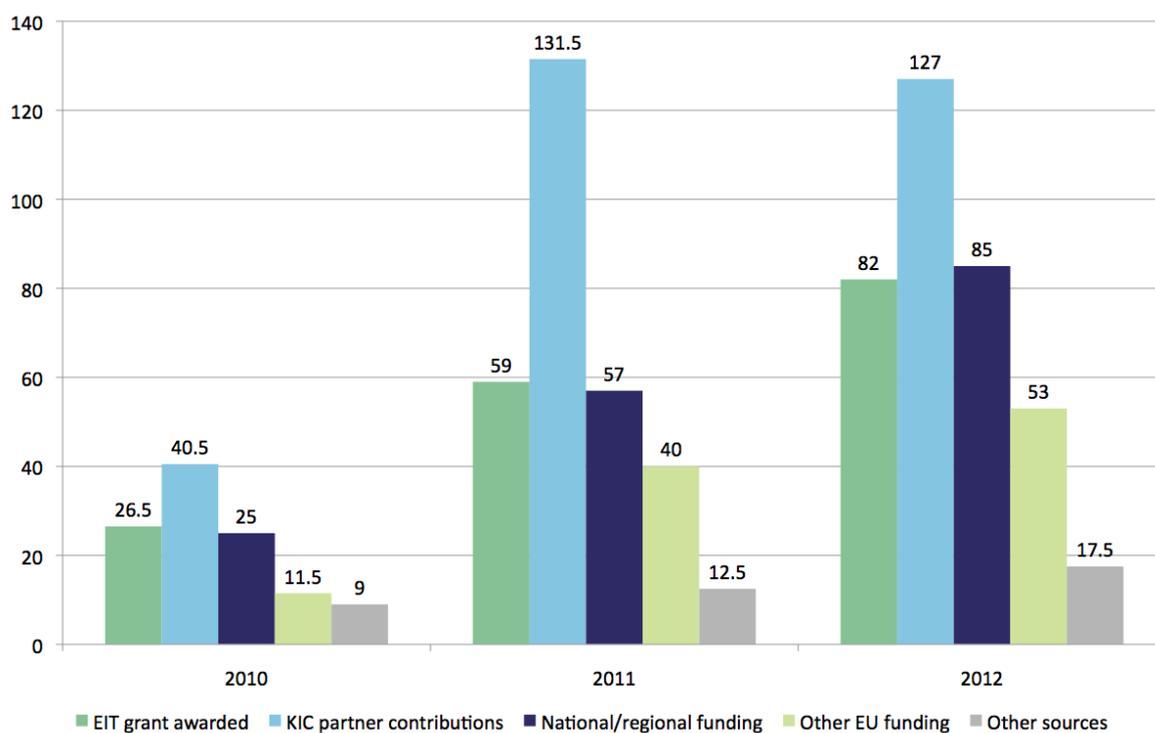
Contribution from national/regional government: € 167.2 million (21.5%)

Contribution from other EU budgetary sources (e.g. FP7, CIP, Structural funds, Erasmus Mundus): € 104.6 million (13.5%)

Other sources (e.g. equity, royalties, investment from VCs, consultancy services): € 39.2 million (5%)

Through its three KICs, the EIT managed to attract 78.5% of the total budget (€610m out of €777.4m bringing a leverage effect of around 4).

Figure 7 KIC funding sources (in million €)



Source: EIT Fact Sheets

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