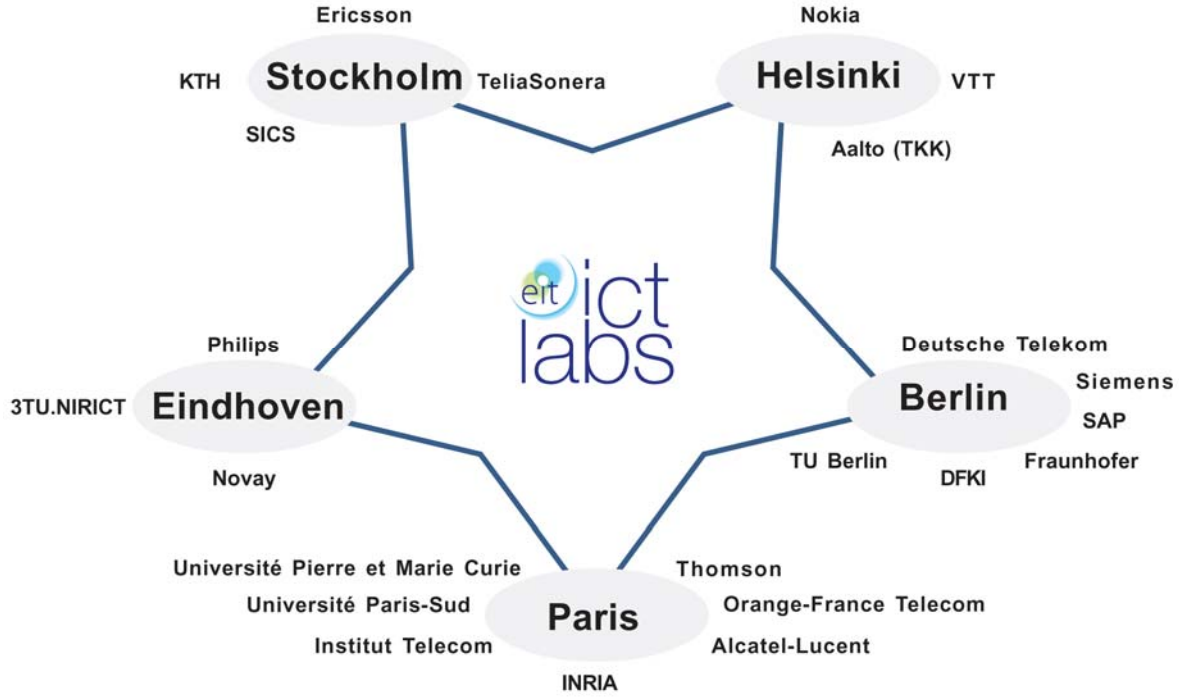
EIT ICT Labs - Towards the Future Information Society



Executive summary

EIT ICT Labs, an EIT KIC for the future information and communication society, aims at the radical transformation of Europe towards a knowledge-based society. EIT ICT labs is committed to a new digital economy for Europe that is also open to small businesses, offering playful and people-friendly services, empowering users as active contributors, improving their quality of life and enabling economic growth with frugal use of natural resources.

EIT ICT Labs will equip students, researchers, academics and business people with skills for creativity, risk taking spirit and entrepreneurial capacity, by re-aligning the existing activities in European Higher Education Area, European Research Area and high growth ICT companies, thus leveraging existing regional, national and EU-level funding instruments. The target is a new level of European trust based on physical and intellectual mobility of people across geographies, disciplines, businesses and employments.

EIT ICT Labs will build upon five Co-location Centres – Berlin, Eindhoven, Helsinki, Paris and Stockholm – and turn these already excellent regional clusters into world-class innovation hotspots. The Co-location Centres represent five leading European countries in ICT, including global companies, leading research centres, and top universities. Cohesion will be achieved by strong CEO-type management with clear IPR policies for open innovation.

EIT ICT Labs' work program applies emerging innovation models for reinventing innovation in Europe. Combining excellence, agility, passion, and trust in a well managed, business minded process creates a local buzz, where innovations are generated at an accelerated pace and utilized more efficiently. By an interdisciplinary and entrepreneurial approach we build international top talent playing fields and involve currently under-utilized innovation and entrepreneurial resources such as non-core IPR, women, students, retirees and cost-driven innovations for the next billion users.

EIT ICT Labs - Towards the Future Information Society: Part B

1 Vision

EIT ICT Labs Vision

EIT ICT Labs, the EIT KIC for the future Information and Communication Society, aims at the radical transformation of Europe towards a knowledge-based society through

- joint European innovation clusters promoting future world class business;
- innovative and disruptive service based applications for the citizens of Europe and beyond;
- transformed higher education promoting creativity, risk taking and entrepreneurial spirit;
- international top talent playing fields for researchers, innovators and entrepreneurs;
- European trust based on mobility of people across countries, disciplines and organisations;
- five world-class innovation hotspots in Berlin, Eindhoven, Helsinki, Paris and Stockholm.

Our approach aims at establishing a Knowledge and Innovation Community (KIC) in ICT. Our proposal, EIT ICT Labs, will create a dynamic and self-reinforcing ICT innovation ecosystem within Europe. **EIT ICT Labs will pursue a broad initiative in software technology and services,** including communication, networks and applications, always open to new developments and areas where software and services will be the innovation drivers. The EIT ICT Labs will build upon five Co-location Centres –Berlin, Eindhoven, Helsinki, Paris and Stockholm – and turn them into world-class innovation hotspots and model hubs for proliferation throughout Europe. The Co-location Centres form local centres of excellence and innovation comprising leading universities, research organizations, companies, science and technology parks, as well as intermediaries, venture capital firms, other investors and their networks. Through this, **EIT ICT Labs will invigorate the innovative spirit within the existing European ICT industry, create a new generation of entrepreneurial engineers, and catalyze new ventures that can grow to become future world leaders.** In particular, it will enable the emergence of trust and self-confidence in Europe of its capability to shape the Future Information and Communication Society.

Driven by this vision EIT ICT Labs will change the innovation culture in Europe by achieving:

- **Efficient open innovation:** The open innovation approach of EIT ICT Labs will significantly enhance the efficiency in utilizing every small piece of innovation and provide means for exploiting even the “non-core ideas” by the participating organizations and will favour spin offs and further business development.
- **New European trust:** Globally competitive innovation ecosystem needs a high level of trust between different stakeholders. EIT ICT Labs Co-location Centres will be a significant step in building up the system of values for an enhanced trust between different categories of stakeholders.
- **Changing attitudes and skills:** Individuals working at EIT ICT Labs Co-location Centres will develop an aptitude to live across boundaries of any kind be it geographical, between scientific disciplines or related to organizations. The EIT ICT Labs culture will encourage a mindset wherein total flexibility and risk taking automatically become part of the individual “comfort zones”.
- **Scientific breakthroughs:** New breakthroughs will be enabled by improved modelling, powerful scientific computing and processing of vast amounts of data collected with sensors or already available in data bases. A more profound long term impact of ICT is visible through its offer of tools and capabilities in self management, semantic and context awareness and learning abilities.

- **User-centric perspective:** Empowering new user groups has always proved to be instrumental in driving market growth through new products and service concepts. EIT ICT Labs will play a key role in integrating multidisciplinary knowledge streams and in enhancing mobility across organizational, social, geographical and business boundaries.
- **ICT based sustainable growth:** Multifaceted ICT Innovations have been and will be vital for sustainable economic growth and productivity. New breakthroughs will continually impact our mode of life and provide crucial help in tackling grand challenges of our time, in counter-acting effects of climate change, in ensuring efficient supply of energy, in safeguarding food chains, in supplying solutions for ageing populations as well as for health, safety and security of citizens.

2 Partners

EIT ICT Labs is fully supported by a host of leading organizations in Europe and the world as well as smaller actors in the local innovation ecosystems. Their profiles are described in detail in part C. Core partners are depicted in the cover page picture and listed in bold below.

Companies: ***Alcatel-Lucent, Deutsche Telekom, Ericsson, Orange-France Telecom, Nokia***, ***Philips, SAP, Siemens, TeliaSonera, Thomson***; BT Research, Cisco, GE Healthcare, HP Labs, IBM, Intel Labs Europe, Microsoft Research, Opera Software

Research Institutes: ***DFKI, Fraunhofer***, ***INRIA***, ***Novay, SICS, VTT;*** Acreo, IT Center for Science (CSC), CWI, Embedded Systems Institute (ESI), Fondazione Bruno Kessler (FBK-irst)**,** Max Planck Institute for Informatics

Universities: ***Aalto(TKK*) *Univ., TU Berlin***, ***KTH***, ***Institut Telecom***, ***Univ. Pierre et Marie Curie Paris 6, Univ. Paris Sud 11***, ***3TU.NIRICT (Univ. Delft, Univ. Eindhoven, Univ. Twente)****;* Budapest University of Technology and Economics (BME), TU Darmstadt, Eötvös Lorand University of Sciences (ELTE), Helsinki Univ., Imperial College London, Karlsruhe Institute of Technology (KIT), TU Luleå, Lund Univ., TU München, Univ. Nice-Sophia Antipolis, Oulu Univ., Univ. Rennes 1, Saarland Univ., Stockholm Univ., Trento Univ., Tampere Univ., Turku Univ. , Univ. College London

Other Innovation System Actors: Cap Digital, COMICT, Digiteo, EICT, Electrum, Investitionsbank Berlin, Hermia, Images & Réseaux, KTH Chalmers Capital, Point One, Oost VC, Oulu Innovation, Secured Communication Systems, SITRA, STING, System@tic, Technology Circle Twente, Technopolis Ventures, TIVIT, TNO-ICT, Trento RISE, 3TU Innovation Lab

3 Reinventing ICT innovation in Europe

Information and Communication Technologies (ICT) have an ever-increasing influence on all aspects of society, from government and businesses to individuals, groups, and communities. Ubiquitous computing and communications and the convergence of nanotechnology and biotechnology with ICT will further reinforce this. The fundamental role of ICT in fuelling the progress and productivity of its stakeholders in particular, and society in general, is widely recognized. Facilitated by ICT, new services for a knowledge-based society are rapidly emerging. ICT-based innovations, stemming either from the progressive application of new technologies or from using ICT in novel application domains to create radically improved services, are crucial concerns of all leading regions of the globe.

At the same time, ICT is seriously challenged by its very own success. The gap between the opportunities for useful applications and services and the range of actual services ICT can conveniently offer is widening rather than narrowing. Today's ICT services, applications, and products are characterized by massive **scale** and **complexity** in various dimensions. In the technical dimension, we are dealing with massive amounts of data derived from complex situations used to drive artificial reasoning and decision-making. In the business dimension, we are dealing with dense networks of autonomous entities cooperating through interlinked processes to deliver increasingly

advanced services tailored to highly varying customer needs. In the social dimension, we are dealing with large and diverse sets of information producers and users, groups, and communities that often use communication services, information, and knowledge-based services, applications and products in unforeseen and surprising ways.

All this has severely challenged the skills and competences of the traditional ICT community, to the extent that its ability to provide timely and cost-effective services has become jeopardized and its ability to address new opportunities constrained. In short, ICT is now facing an **innovation bottleneck**. The foreseeable continuing development of basic IC technologies - information processing, data storage, networking, and interactive sensing and acting - and the challenges posed by global issues such as climate change, the transition to renewable energy, and the general human condition in a "post-postmodern" world, will only make the innovation bottleneck more critical. This bottleneck is especially critical in Europe, where its impact is reinforced by specific structural weaknesses and social challenges.[1,2,3] As a result, European strengths in knowledge generation and research are not being equally translated into competitive new products and services, especially compared with other regions such as North America and Asia.

Responses to these challenges have generally emphasized the role of multidisciplinary R&D for ICT services, applications, and products. Indeed, ICT has become so important and complex that it cannot be viewed as a just another technology. New paradigms such as **user-centric design** and **open innovation** have emerged, attempting to create R&D methodologies, processes, and practices that make it possible to integrate competences from the behavioural and social sciences, business and economics, humanities, law, design, and art with engineering to address the use of ICT throughout the lifecycle of engineering artefacts. Recent examples show that compelling and highly successful products can indeed emerge from such an approach.

At the same time, it has become clear that the conditions for the sustained success of multidisciplinary and innovative R&D - in short, the emergence of **innovation hotspots** - are complex and not easily transferable. These conditions seem to include a sufficient concentration of diverse world-class skills and brainpower in a limited physical space, intensive and sustained interaction between various specialists across organizational and disciplinary boundaries, and excellent infrastructure. All these are needed to turn ideas rapidly into a tangible form as prototypes that can be subject to experimentation, evaluation and communication to others. Moreover, practitioners of multi-disciplinary innovations must share a mindset characterized by mutual trust and respect, openness to new ideas, willingness to take risks and accept failures, and burning desire to change the world. To accommodate open innovation and to compete successfully with innovation hotspots in the world (e.g., Silicon Valley, Boston, and Singapore), Europe will need to reconfigure its education, research, and innovation activities to create a synergistic **knowledge triangle** enabling the fast transformation of ideas into real services, products, and businesses.

4 Global outlook and European needs

4.1 Current international trends for the ICT empowered society

The ICT domain exhibits an enormous drive for growth and change. ICT is not only an important sector of economic activity in its own right; it also permeates all aspects of our lives and has become the primary driver of innovation within all knowledge-intensive domains in our society. Mobile ICT

[1] *Facing The Challenge. The Lisbon strategy for growth and employment.* Report from the High Level Group chaired by Wim Kok, November 2004. Office for Official Publications of the European Communities, ISBN 92-894-7054-2, http://ec.europa.eu/growthandjobs/pdf/kok_report_en.pdf.

[2] *Creating an Innovative Europe.* Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit and chaired by Mr. Esko Aho, 2006. Office for Official Publications of the European Communities, ISBN 92-79-00964-8, http://ec.europa.eu/invest-in-research/action/2006_ahogroup_en.htm.

[3] The Helsinki Manifesto: *We have to move fast, before it is too late.* Presented at Launching Event—European Network of Living Labs: A Step Towards a European Innovation System, 20.11.2006, http://elivinglab.org/files/Helsinki_Manifesto_201106.pdf.

will soon reach the "next two billion users" whose needs and practices require novel products, services and applications. Digital convergence will open new opportunities and accelerate the speed of economic and social change. Future Internet and mobile communication will strongly impact the way of life and revolutionize global economy by enabling pervasive availability of content and services. Fusion between the physical world and digital world (ubiquitous computing, sensors, "internet-of-things") will radically modify our living environment. New applications will open up from purely commercial (where is the nearest Italian restaurant?) to more private (medical monitoring, banking) and public (social networks, e-government, and e-learning). However, developing services also assumes social innovation, new business models, prototyping or user testing to find out which services will get general acceptance. Spearhead technology is needed to address issues in network capacity, security and safety but must be combined with expertise to understand the users and markets.

For those reasons, industry and business tend to seek favourable conditions for innovation generation and management when locating their R&D facilities. Silicon Valley (Stanford, Berkeley) and the Boston area (Harvard, MIT) are well-known hotspots. Several new actors with strong capabilities have also emerged in Asia and Latin America. In such areas, focused R&D investment by governments has proven to be a determining factor in their advancement.

4.2 The European situation

The ICT industry is important for Europe as both a major industrial sector and a driver of productivity and improved quality in virtually all industrial sectors and public services. Europe is the world leader in enterprise software applications, embedded systems, mobile devices and telecommunications markets. Approximately 40% of productivity growth in Europe is attributed to ICT, and 80% of innovations in key European industries, including automotive, medical, logistics, and automation, are ICT based. Europe today has excellent ICT infrastructure with over 80% broadband territorial coverage, a skilled population, and technology know-how in ICT key areas.

However, compared with several other regions in the world, Europe has a significant disadvantage due to its cultural, political, and regulatory fragmentation. Together with the relative scarcity of venture capital, this limits the scaling and growth of start-up companies compared for example to the USA. As ICT becomes more deeply embedded into the fabric of Europe's economy and society, a lack of ICT specialists threatens to become an important barrier for European industry. In top-notch universities such as MIT, Stanford, or CMU, the ICT programmes traditionally attract more than 30% of all engineering students, which is much more than typical in Europe. Yet another European weakness is the gender imbalance of engineering students that leaves half of the potential talent pool untapped.

The EU is currently renewing its instruments for higher education, research, and innovation so as to more effectively tackle the global challenges of the twenty-first century. Restructuring has already led to improved mechanisms for human mobility and for basic, curiosity-driven, high-risk research, and to significant investments in new public–private partnership (PPP) structures for pre-competitive, industrial R&D in the form of Joint Technology Initiatives (JTI's). At the same time, there is still a general understanding that Europe is lagging when it comes to knowledge transfer from research to education and business environments, leading to a lack of innovation in established companies and to fewer fast-growing enterprises in emerging new sectors. The EIT was indeed created to address this situation and the EIT ICT Labs proposal aims at a concrete set of tools to implement a change in European culture in this respect.

4.3 Social challenges

ICT systems are among the most critical types of infrastructure in our modern society, and their future will transform Europe by influencing all aspects of life for its citizens. ICT is expected to bring extraordinary increases of diversity, availability, and productivity to both commercial and public operations and to empower individuals in their lifestyle choices, everyday communication behaviour, travelling patterns, and legal and economic conditions. However, a number of social and economic challenges also need to be faced. These include an ageing population, high quality-of-life expectations (especially regarding healthcare), environmental and transportation concerns, and safety and security.

Furthermore, society changes enabled by ICT in developing countries and emerging markets can radically improve the quality of life in those countries. Europe can pave the way to these changes.

As society becomes more dependent on ICT, a number of vulnerabilities become apparent through problems in usability, traceability, security, and privacy. For example, the future Internet could eventually mean very flexible service markets for individual persons "in the innovation long tail", but this also requires that highly personalized information be properly protected.

4.4 Complexity and bottlenecks in innovation

While ICT innovation is crucial to addressing the above industrial, social, and cultural challenges, several barriers limit the success of ICT innovation in Europe.

Public research is currently fragmented and universities and institutes are competing for limited resources and application opportunities. The university research landscape is difficult for companies to monitor. Research results are not systematically transferred to interested parties and PhD projects often end without valorisation. As the "innovation paradox" states, top research does not always guarantee high productivity in innovation.

Currently, education is primarily focused on careers in engineering and research and does not have an interface with markets and companies. Simply adding a few "business" courses to engineering curricula is not enough to create an entrepreneurial mindset.

Innovation is a complex process that easily fails because it involves more than just technical considerations; products are increasingly part of complex networks of communication and usage, where network effects, "lock-in" mechanisms, and "winner takes all" principles limit open competition. As many ICT technologies are infrastructure-dependent, de facto standards often define the playing field. Content development and content availability are also crucial in establishing standards and formats. As product complexity increases and successful marketing requires ever better knowledge of the markets, it becomes more difficult for companies to handle all aspects of innovation.

Furthermore, innovation is coupled to risks. Of the many promising ideas that arise, only a few lead to the demonstrator or prototype stage, and even fewer make it to the marketplace. Start-up companies must find venture capital and pass through the "valley of death" before achieving enduring success. For many of the separate activities in this process, there is support in the form of experimental labs, consultants, venture capitalists, IPR consultants, and incubators, but a coherent innovation ecosystem is often lacking that would encourage the exchange of best practices, provide role models, and inspire new initiatives.

4.5 Open innovation

To address these barriers, companies are increasingly turning to open innovation. While in earlier days, they relied mainly on internal knowledge bases, research, and product development, they now see themselves as part of a network of private and public parties, cooperating in exchanging both technology (i.e., the IPR portfolio) and inspiration for marketing and product concepts. Open innovation provides the multi-disciplinary setting that brings together a range of stakeholders and expertise, covering different aspects of the innovation chain.

Social innovation and empowering new user groups will be of major importance. In earlier days, ICT was tucked away from the crowd in air-conditioned computer centres. Nowadays, ICT permeates everybody's daily lives and work situations. ICT innovation therefore entails the active involvement of industrial designers; it builds not only on technology, but also on input from social sciences on new business models and service concepts. User testing, user-driven development and real world pilots for bringing services and solutions to fruition in an intuitive, enjoyable and playful way will be key competitive factors.

The next two billion users of ICT are likely to come from developing regions of the world (especially Asia and Africa) whose needs and use practices will provide a fertile ground of new types of applications and services, often driven by the requirements of extremely low cost and ability to cope

with hugely varying environments and infrastructure. This makes these regions not only interesting business landscapes, but also increasingly important sources of practice-driven innovation.

4.6 The role of IET ICT Labs in the European innovation landscape

In order to cope with the digital revolution that is currently changing the world we need to speed up the production of knowledge, methods and tools, to train people in new skills and to develop ecosystems for innovation. To be successful, open innovation requires new attitudes and practices in the research–education–innovation nexus. Education will have to be geared more towards fostering an entrepreneurial mindset, and research should be better linked to the market. In addition, a more collaborative approach to innovation would favour value growth. EIT ICT Labs aims to unify the three aspects of the knowledge triangle by creating a network of **innovation hotspots**, five co-locations, where universities, research institutes, industry, incubators, and venture capital organizations work together on innovations. EIT ICT Labs involving sufficient critical mass will build on existing best practices to mitigate regional fragmentation. The focus will be on implementing a European ecosystem for innovation and cooperation in both research and business, to attract top talent from around the world - promising young students, top researchers, innovative businesses, and public and private funding organizations.

Cornerstones of the EIT ICT Labs activities are co-location and integration of concurrent processes: creating excellence and capturing the opportunity; stimulating continuous encounters between scientists, engineers, entrepreneurs and students beyond their main contact spheres in a challenging and entrepreneurial environment. The key competitive factors will be agility and speed in the continuously changing innovation competition. EIT ICT Labs will set up “innovation networks” where business and market forces are as important drivers as technology. A multidisciplinary approach with adequate partnering, user involvement and in-situ testing facilities during the development phase will provide other elements of market success. A user-centric methodology will help in opening up a new understanding of usability and will ultimately lead to novel services and innovative functionalities. EIT ICT Labs will also provide the often-missing glue in terms of business models, service enablers and access to capital.

5 Mission and actions

5.1 EIT ICT Labs Mission: Inventing the economy of tomorrow

The mission of EIT ICT Labs is to generate wealth, jobs, and brain-gain in Europe through addressing the innovation bottleneck by implementing a radically new approach to integrating the **knowledge triangle** of education, research, and innovation.

Mission of EIT ICT Labs

Creation of a fast, dynamic, self-reinforcing and self-reinventing innovation ecosystem based on excellent ICT-oriented research and education:

- Inspiring the innovation spirit within the existing European ICT industry.
- Faster transformation of ideas and ICT technologies into real products, services and business.
- Fostering entrepreneurship, creating a new breed of entrepreneurial engineers.
- Catalyzing the birth of strong SMEs and help them to grow to become the future world leaders.

The main goal will be the creation of laboratories focusing on excellence in education, research, and innovation based on a co-location of the best academic and industry researchers. These Co-located Centres will enable the creation of a European structure encompassing thematic research programmes, internationalized thematic graduate schools and profiled business development labs that will allow:

- **Attraction and fostering of brilliant students,** both men and women, in ICT for industry and research in Europe through close linkage between doctoral and master's level education with research and innovation.
- Systematic and intensive generation of innovations in **hotspots** through **exploratory, empirical and experimental research** carried out in close interaction with users and applications, on the basis of experimental platforms, and creation of new culture for co-creativity.
- Close **interplay between industry and academia** by creating structures well suited for knowledge exchange and innovation, to stimulate the creation of labs of major international high-tech companies in the vicinity of the EIT ICT Labs co-locations.
- Development of multidisciplinary research into **computing environments**, where the basic aim is to understand the interaction between ICT and its users, various stakeholders, and society.

It is essential to understand that there is an ecosystem where large industries, SMEs and academia all play a complementary role for an efficient innovation and value creation process: large industrial groups bring access to the global market, SMEs bring adaptability, reactivity and innovation and academia bring long term and disruptive ideas for future innovations. In this context, it will be crucial for the success of the EIT ICT Labs to foster interactions between large industrial groups, SMEs and academic partners both nurturing and exploiting this ecosystem. Therefore, EIT ICT Labs will leverage existing structures, education, research, and innovation agendas at European and national levels to increase the joint focus on innovation, and add new instruments within these existing systems to put innovation in the top gear.

5.2 Towards a new innovation ecosystem

To overcome the traditional barriers between education, research and marketable innovations, EIT ICT Labs will create a new innovation ecosystem (Figure 1). Particularly the Co-location Centres will serve as innovation hubs bridging the gaps between birth of innovation initiatives and their development in the industrial or entrepreneurial innovation systems. In addition, they facilitate the interaction between industry and entrepreneurs, with meeting places, clubs and social networking, allowing for a free flow of innovations between the two domains.

To manage the complex task of creating breakthrough innovations, EIT ICT Labs will build a set of twelve tools which facilitate innovations at points where innovation barriers exist.

The **Innovation Nucleus**: three tools to increase the market-pull and help to define R&D priorities:

- **Innovation Radar:** Mapping of innovation opportunities in the ICT domain. Prioritization is done jointly by experts from public research and industry. The innovation radar will help EIT ICT Labs to create thought leadership and contribute to shaping Europe's R&D agenda in ICT.
- **User-driven Innovation Lab:** Trend analysis, user clinics, large beta-labs and other tools will be used to identify emerging needs and problems that can be solved with the help of ICT (services and products) and that will have significant social and/or market impact.
- **Living Lab:** will be used as creative think tanks where new products and services are prototyped. Lead users will be invited as co-developers and early adopters will be invited to get early customer insights and pave the way for commercial success. As the "embeddedness" of ICT increases and ICT is deployed in a broader range of application contexts, it is important to examine the impact of new applications, services and processes early enough in this real-life environment.

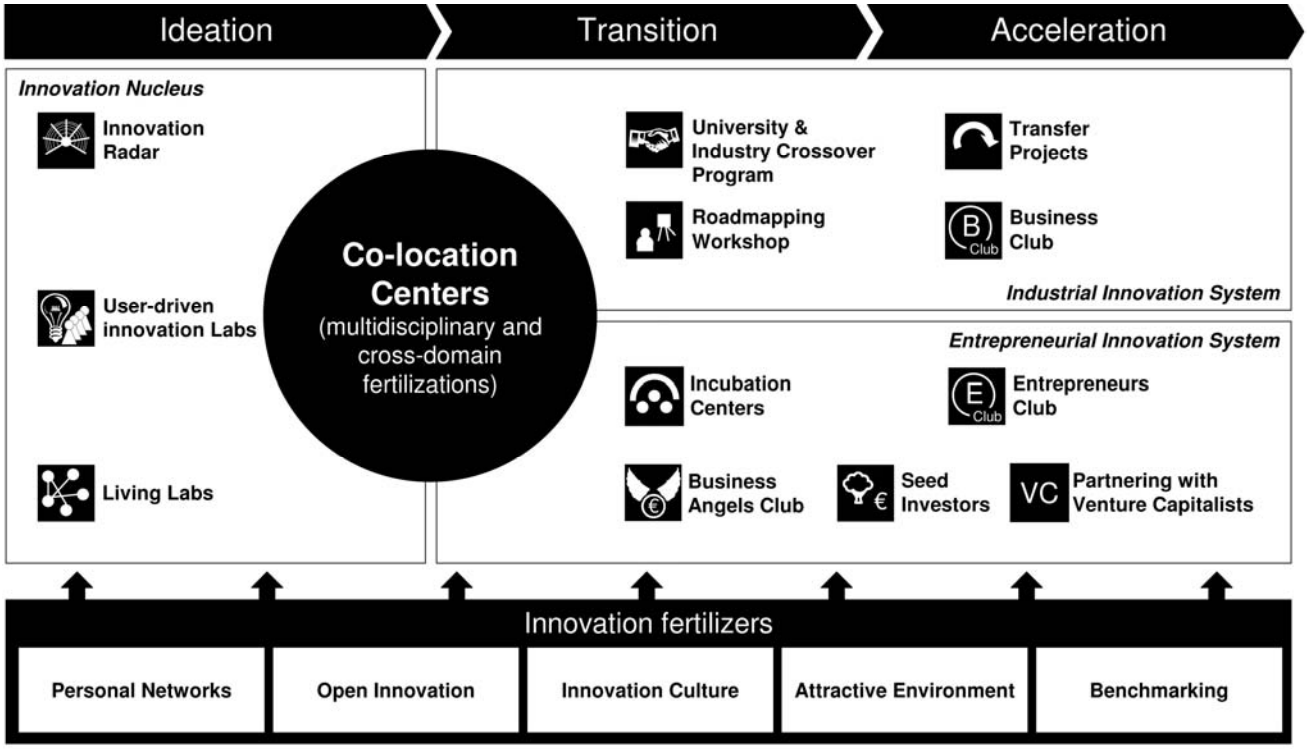


Figure 1: EIT ICT Labs' Innovation Ecosystem

The **Industry Innovation System**: four tools to bring SMEs and large companies closer to research, research results into the corporate development labs and academic and industry innovators closer to each other.

- **University-Industry Crossover Program:** The exchange between industry, including SME´s, and academia will be facilitated and promoted through different mechanisms while making full use of EU and national programmes for mobility and collaboration that are already in place. Among other mechanisms industry employees will be offered Ph.D. and Professional Doctorate Programmes (Ph.D.Eng.) and post-docs will be invited into industry R&D for 2 and 4 year work.
- **Road Mapping Workshops:** Will be organized and moderated to link technologies from research with product needs from industry. Within these intensive sessions, joint innovation initiatives will be identified and new collaborations forged.
- **Transfer Projects:** EIT ICT Labs will support initiatives for knowledge transfer from public research to industry both financially and by project management.
- **Business Club:** To further expand the industry network, the EIT ICT Labs business club invites any interested company including SMEs and entrepreneurs to participate in technology transfer events. These events reach from road mapping workshops to playful events such as "dragons & wizards" where academic researchers have 10 min to present their research results in order to interest the industry audience to start an innovation initiative.

The **Entrepreneurial Innovation System**: five tools to bring capital, knowhow and mentoring to academic entrepreneurs and existing start-up companies closer to EIT ICT Labs:

- **Incubation Centre:** Provide facilities and coaching for fast spin-out generation.
- **Business Angel Club:** Offers a platform for successful entrepreneurs and experienced serial entrepreneurs to take up the role as mentor and investors.
- **Entrepreneurs Club**: Forum for exchange of experience, cross fertilization and promotion
- **Seed Investors**: Providing easy and rapid access to small funding at the very early stages
- **Partnering with Venture Capital for All Stages:** EIT ICT Labs will provide the entrepreneurial researchers with best practice knowledge to set up their own company and with capital in all stages of their spin-out life-cycle.

The **innovation fertilizers** help to create a unique innovation culture built on five activities:

- **Personal Networks:** both virtual and face-to-face and through exchange programmes.
- **Open Innovation:** through actively reaching out to leading innovators.
- **Innovation Culture:** promote multidisciplinary projects and failure tolerance.
- **Attractive Environment:** Create a research/business environment that inspires.
- **Benchmarking:** to continuously improve innovation management.

5.3 Transforming education for innovation excellence

The technology needs of a global knowledge economy are changing the nature of engineering practice, demanding a far broader range of skills than simply the mastery of scientific and technological disciplines. Many of today's global challenges can only be addressed through researchers and engineers working collaboratively in international networks. A new type of scientific and engineering leadership is required. EIT ICT Labs will take up this challenging mission and inspire many more European actors to take it up too, and go beyond the efforts of EIT partners. EIT ICT Labs will also educate new ICT professionals, providing them with skill sets for the future. It will foster a culture and structure that encourages risk-taking and entrepreneurship. It will help people become mobile across traditional geographical, disciplinary, and employment boundaries.

Although various instruments will be developed, tested, and adapted for EIT ICT labs, the purpose of these EIT "fringe" activities is to foster excellence and increase the preparedness of graduating PhD and MSc candidates to tackle the regional, national, and global engineering challenges they will face in their new working lives. Basic requirements for a successful career after graduation will be:

- Strong research or engineering **excellence**.
- **Entrepreneurial mindset**, encompassing a grasp of innovation basics and hands-on experience through close interaction with industry and business.
- Openness and **leadership**, to promote activity renewal and adaptation to rapid technology and socioeconomic changes in the ICT sector and our changing globalized world.
- Willingness and skills for intellectual and physical **mobility**, to move effectively between different actors and stakeholders such as industry, business, the public sector, venture creators and investors, and decision makers.

To achieve the above learning outcomes, education in EIT ICT Labs is organised primarily through joint **Graduate Schools** and **Master Programs** with the aim to develop the following "embedded" educational forms:

- Integrating **dual degree** engineering-economy programs and other strongly cross-disciplinary programs as well as integrated Ph.D. and MBA programs for EIT ICT Labs Graduate School.
- Combining academic education with **deep exposure to and experience of** industrial R&D and innovation environments from early on (e.g., via summer internships) and in a consistent and systematic fashion, supported by **just-in-time** teaching and coaching.
- Defining the learning outcomes, reference implementations, and quality requirements for EIT ICT Labs certified education and establish an **accreditation** process for curricula.
- Fostering **entrepreneurship** through mentoring and internship programmes, joint EU projects, and outreach activities to rapidly growing global economies, to gain a hands-on global perspective.
- **International and open** graduate education at the master's and PhD levels to attract and encourage the highest-level students to the master's and PhD programmes of EIT ICT Labs.
- **Lifelong learning** to keep engineers and innovators up to date and provide them with tools for intellectual mobility and job content transformation.
- **New ICT-based learning techniques** for effective teaching and education, including distance/collaborative/blended learning, intelligent tutoring systems, knowledge management, and digital libraries.

- Finding suitable **role models** by populating the co-location with successful young entrepreneurs and increasing entrepreneurial drive by competitions such as the Venture Cup jointly organized by universities, business incubators, and public authorities.
- Improving the **gender balance** of engineering students by eliminating systematically barriers for women's participation in engineering education, including cross-disciplinary study programmes specifically aimed at talented women with basic education in behavioural and social sciences.
- **Two-way student and teacher mobility** between the Co-location Centres and stakeholders; students are expected to have a longer stay at another node of the KIC as part of their studies.

5.4 Research challenges: combining technology push and application pull

Research in ICT has been and will continue to be a major driving force of innovation and value creation. An important development is the growing scale and complexity of the problems at hand and the need for interplay between research and new applications to master this situation. As ICT "embeddedness" increases and ICT is deployed in a broader range of application contexts, ICT researchers will have to collaborate with actors who better understand the social, individual, economic, and organizational contexts in which ICT will be deployed. Methodologically, research should emphasize multi-disciplinary, exploratory, empirical, and experimental research that complements analytical-constructive engineering and systems research. Qualitatively, it should aim at an agile and iterative process where the cycle of basic research, engineering research, experimental studies in lab or field, and data analysis of the results can be executed in weeks, not years.

The main research aim for the coming ten years includes the following challenges:

- Digitally empowered everyday life management characterized by ubiquitous access to information and ubiquitous and cognitive mobility-based services.
- Innovative services based on the merge of the physical and digital worlds for instance in environmental monitoring, health-care, ambient assisted living, transportation and intelligent control. This will be driven by the increasing capability to measure and collect data on a widening range of phenomena and to analyse these data to build increasingly sophisticated computational models for understanding and controlling the phenomena. Specific solutions will be needed for developed and growth markets.
- Future media and contents - new and interactive media, augmented and virtual reality, and games; applications in e-learning and training. Playfulness and superior user experience.
- Novel forms of traffic and transportation arising with the advent of self-organizing networks for traffic control and safety and compliant with the pressing need to switch to the sustainable generation and use of energy.
- Enabling technologies for ICT including security, trust, and privacy, central issues that might require a "clean slate" approach to the design of the Internet, holistic power management and power aware software generation, and cross-domain interoperability solutions.
- Process industry, manufacturing, logistics, and distribution, characterized by the RFID revolution.
- Enterprise information and computing, characterized by the end-to-end digitalization of business networks, 24/7 operation, and real-time command-and-control systems.
- Design of an affordable and sustainable / green ICT.
- Slightly further in future, there is the explosive potential of the convergence of ICT with nano- and biotechnology, opening dizzying vistas for novel applications, including interfaces between neurons and ICT systems.

To address these challenges, EIT ICT Labs research will focus on core ICT, and on specific transverse problems with key implications on our societies, always guaranteeing secure and safe environments. Main ICT core research themes to be covered by the EIT Labs are:

- **Web of People:** explosion of new social web applications (with augmented reality, virtual worlds, real time games, tele-presence) and user created content; search engines, particularly within the context of semantic web; design of new kinds of intuitive user interfaces, facilitated by advances in

multi-modal human-technology interaction and embedding artificial intelligence. EIT ICT Labs will incorporate some top scientific teams in fields like psychology, semiotics, and media theory to address the traversal issues with respect to human-computer interaction.

- **Web of Smart Things:** interconnection of the Internet with the physical world through sensors and agents, and tagging of industrial production by RFID. Major challenges are in new technologies, new traffic and architecture (hundreds of billions connected objects); new routing paradigms (search, naming, maintenance, data survival) and interoperability.
- **Web of Services**: service creation and provisioning environments leveraging existing services from SMEs and large corporations as well as from other sources like community-based information sources, to provide new business services tailored to particular needs; the notion of service composition; model driven service-based software engineering; interconnection of Web of Smart Things and Web of Services; new and ubiquitous services (home, healthcare, security, distribution, traffic, ecology); Multimodal interaction with services; industrial deployment and business models.
- **Web of Knowledge:** diversification of content formats (2D/3D and audio) and of the localization of content (each user becomes a content producer, peer to peer applications), new interactions with data (Web 3.0, semantic web), user-created services, service mash-ups. Major challenges concern the volume, distribution and heterogeneity of contents; the respect of both IPR & individual freedom; content updating and obsolete content discarding; network neutrality and security.
- **Networks**: IP networks over simple, super-fast optical core networks, architectures with massive performance and reliability, with a redesign of security or naming, with new forms of routing and new paradigms such as semantic routing and virtualization. Variety of wireless access networks, Fibre To The Home (FTTH) and To The Office (FTTO), home networking: improvement of spectral utilization and self organized wireless networks, infrastructure-less wireless multi-hop communication networks. Mathematical models to manage network complexity.
- **Software** and **algorithms**: complex self-managing systems; distributed and networked systems, resource management, resource allocation and scheduling; data base algorithms (content storage, update and retrieval, replication, consistency); exploration and validation of new paradigms via shared distributed computing infrastructures, large network emulators, grids, clouds, power-ware software.

Traversal challenges in the ICT context will be addressed by:

- **ICT Applications:** Spearhead technology innovation research programs focusing on health and wellbeing, digital medicine; ambient assisted living; mobile computing and communications, intelligent network and service infrastructures, internet of the future for a sustainable digital society, and empowering people. These programs are closely linked with the innovation nucleus tools described above in Section 5.2.
- **ICT Economics**. For a wide variety of new innovation based processes, such as open networks and location-based services, proper economic understanding is crucial. There is also a need for a better understanding of the economics of interconnection, security, and trust and of the circumstances allowing for application deployment. The political economy itself may see deep changes because of the information era.
- **ICT Sociology**. Almost unlimited information availability, intelligence on synthetic environments, and ubiquity of connectivity will change society in unforeseeable ways. New usages and behaviours will emerge. People will be understood as actors and transformers making use of ICT, not only as consumers of services.
- **ICT Business Science**: New models and concepts fostering product- and business-centric innovation research together with organizational and product development innovation in ICT. EIT ICT Labs will actively cooperate with the most recognized European **business schools** active in ICT innovation and entrepreneurship to advance innovation education, ICT business models, and

independent benchmarking and to improve the impact and efficiency of EIT ICT Labs operations.

5.5 International Cooperation for Global Impact

The stakeholders of EIT ICT Labs have been pioneers in creating active and bilateral educational, innovation, and R&D contact with growing economies in Asia, South America, Russia, Africa, and North America. Due to the importance of the USA in our field, EIT ICT Labs have incorporated close and organized collaboration with several globally active, US-based companies in the ICT field like Cisco, HP, IBM, Intel and Microsoft as well as with key US universities with strong ICT profiles. This will significantly enhance the chances that EIT ICT Labs results and practices will have a global impact and will promote human resource exchange with key US hotspots. In addition, we will continue to build on established contacts and cooperation with the leading players in ICT field and to empower stakeholder interactions with rest of the world. For example, in education, all partners have strong international recruitment and close cooperation with partners outside the EU for joint programmes, double degrees, and faculty exchanges. The concentration of well-known researchers will be a major asset when it comes to attracting top students from around the world. The low threshold for international mobility within EIT ICT Labs will be a great additional attraction: a feeling of “being welcome and having friends everywhere in different European cultures” balances the geographical diversity of EIT ICT Labs. All the industrial stakeholders have global outreach in R&D efforts and marketing. Examples of this are PhD/post-doctoral exchange programmes with Silicon Valley (e.g. ICSI) and embedded coaching program for SMEs in the same region, both of which foster the entrepreneurial mindset of researchers and stimulate the rapid growth of young spin-off companies. The strength of EIT ICT Labs lies in bringing together these close global interactions across the knowledge triangle, making EIT ICT Labs the most attractive partner of world-class institutions. We envisaged using the EIT ICT Labs Office mechanism to boost the KIC International cooperation by launching offices in the USA, Asia and Latin America (see section 5.6).

5.6 Dissemination and outreach

Dissemination and outreach are essential elements in creating a sustainable European knowledge base and for contributing significantly to the European Higher Education Area (EHEA) and "European Research Area (ERA) initiatives. EIT ICT Labs will share its results publically through a set of activities: web presence, printed materials, public conferences, workshops and events, network activities, continuing education programmes, and active participation in other European and international forums. Specifically, EIT ICT Labs will establish an annual conference dedicated to the role of ICT in innovation, where our experience and best practices will be shared. Furthermore, the Partners of EIT ICT Labs are members of many different networks and organizations, for example, cluster university networks, the Association of Living Labs, regional competitiveness clusters’, the European Consortium of Innovative Universities, several relevant European Technology Platforms, the associations for R&D actors in the ARTEMIS and ENIAC joint undertakings, the EUREKA clusters Catrene and ITEA2 and the Future Internet Forum. These networks will be exploited as key channels for disseminating and promoting the acceptance of results achieved and of procedures and quality assurance methods developed by EIT ICT Labs. By supporting both educational (e.g., the activities of Erasmus Mundus) and industrial outreach activities at the European and national levels as well as in key developing markets globally, the Co-location Centres of EIT ICT Labs will become the natural, most attractive hubs in the global ICT innovation web.

To maximize the dissemination of the EIT ICT Labs spirit throughout the whole of Europe, EIT ICT Labs will establish in countries which wish so (excluding the five nodes), an **EIT ICT Labs Office responsible for spreading EIT ICT Labs good practices**, organizing training sessions or seminars, establishing proper links (Innovation, Research, Education) between local stakeholders and EIT ICT Labs, preparing applications as associate members. This EIT ICT Labs Network Offices will truly represent the KIC through the whole of Europe and also overseas. As such, these offices would be sheltered by institutions (ideally Associate Partners) particularly motivated to promote EIT ICT Labs activities and best practices.

The need for outreach activities, including continuing education, in regions and population segments currently lacking sufficient technical ICT competence or infrastructure is recognized. Through supporting such activities, EIT ICT Labs can address the factors currently limiting the greater adoption of ICT in general, resulting in the inclusion of more citizens and regions in European development—for which ICT is so crucial. This is enabled through the well-established and long-term academic contacts of the core Partners with the best institutions in the new member states and through the strong R&D presence of several industrial stakeholders in new member states. Similarly, already existing links with key developing markets will act as a springboard for new types of innovations which may give an immense opportunity to European industry.

The active outreach and interaction policy will enable efficient dissemination to actors outside EIT ICT Labs, open dialogue with prospective Partners, and improved coordination and synergy between various national or European-level actions in the ICT innovation, research, and education sectors. New ideas for "innovation journalism" will be pursued to help changing the general view of innovation and risk taking in the society. In all of its activities, EIT ICT Labs will try to inspire the establishment of new innovation hotspots, thus leveraging EIT efforts towards full innovation impact at the European level.

6 Co-location plan

6.1 Selecting excellence in innovation

EIT ICT Labs is built upon five Co-location Centres and will turn these already existing excellent regional clusters into model **innovation hotspots** linked in a coherent effort to stimulate ICT innovation. The Co-location Centres already constitute some of Europe's most active local innovation ecosystems with a clear focus on ICT. They form centres of excellence in innovation comprising universities, research organizations, large companies, SMEs, and science and technology parks as well as intermediaries, venture capital firms, and their networks. Through tight "triple helix" collaboration with government agencies, regional and local authorities, and cities, these environments have remarkable global track records for generating both new business in established companies and many fast-growing start-ups.

Each Co-location Centre will bring together a number of Partners with world-leading competence in both the technical and business application domains and will have a unique thematic profile generating added value for EIT ICT Labs. Each Co-location Centre will encompass the complete education, research, and innovation activity portfolio. These three key aspects of the knowledge triangle will each have a designated coordinator in order to provide the strong leadership needed by EIT ICT Labs.

The Co-location Centres are concentrated in **campus areas hosting a diversity of organizations** and resources that map to various stages in the innovation chain. The Partners of EIT ICT Labs have a strong presence in their corresponding Centres, a presence that will give rise to natural collaboration arenas, providing the most stimulating intellectual environment and the required facilities, including the needed office, classroom, laboratory, and administrative space and facilities.

6.2 Partnership network and collaboration

The Partners of EIT ICT Labs are organized in five Nodes, where each Node is responsible for operating the activities of its physical Co-location Centre as well as for interaction with the other Co-location Centres. With respect to the central KIC level, each Node will also have initiating, coordinating, and monitoring functions. The prime purpose of the Node networks is to engage not only large core partners but also a broad spectrum of local innovation system actors, such as high-tech SMEs, start-ups, incubators, science parks, venture capital funds, public organizations, and cities. The Co-location Centre activities will ensure that the Partners systematically contribute to building a sustainable innovation hotspot based on ICT.

Many local innovation actors are typically rather small and have difficulties reaching out to the European level. **An important mission of EIT ICT Labs is therefore to support business connectivity to the European and international levels.** This will be accomplished through a range of cooperative activities aimed at mitigating the fragmentation of Europe. Specifically, joint KIC-level systems for matchmaking different kinds of actors will be implemented to create an enhanced, virtual home-market for these actors. Systematic sharing of best practices will also be pursued in the interest of ongoing improvement.

Another important purpose of the Co-location Centre networks is to **enlarge the competence base** contributing to the activities of EIT ICT Labs. The Node Partners commit themselves to participating with staff, students, and other resources in their Co-location Centre, but are also expected to participate in activities at other Co-location Centres. The complementary profiles of the Centres and the cross-disciplinary nature of many activities of EIT ICT Labs will give rise to a dense web of collaborations between the Co-location Centres. Cross-disciplinarity is also likely to contribute positively to achieving better gender balance in Co-location Centre personnel and thus widening the recruitment pool.

6.3 Complementary profiles

Our Co-location Centres have complementary experience and unique profiles in several dimensions, each adding value and competitiveness to the overall EIT ICT Labs collaboration.

In **education,** *Berlin* has established a track record for new truly multidisciplinary education programmes integrating Berlin-area universities to form a joint virtual university. *Eindhoven* has pursued two-year Professional Doctorate Programs with one year embedded in industry, and entrepreneurial tracks within M.Sc. programmes. *Helsinki* has been very active in bringing students (from engineering, business, and design) and industry actors together in multidisciplinary teams through its Design Factory, Media Factory, and Service Factory, and by providing a campus-wide platform for new mobile social interaction services. The Aalto University, to be launched on January 2010, combines engineering, business, art and design to offer further opportunities for multi-disciplinary education. Universities in *Paris* are excellence oriented top universities attracting the very best students. *Stockholm* has a very active globalization policy: over 60 % of master level students and over 80 % of Ph.D. students have foreign background and the campus image at KTH is starting to resemble that of the best US universities. In ICT, all the advanced education is already given in English, and KTH is a core partner of the flagship program, the Nordic Master School in Innovative ICT, that systematically integrates EIT-style innovation and entrepreneurship with existing engineering programmes for over 900 master's students in ICT.

For **research**, EIT ICT Labs stakeholders have actively defined the national and European R&D landscape over a long period. As a result each Co-location Centre has already a unique and internationally very strong research profile. To enhance the impact of its research efforts still further, EIT ICT Labs has defined five thematic research areas of great importance to society, which will be pursued through activities involving the whole knowledge triangle (E/R/I). Each Co-location Centre will act as a champion of a specific theme; the other nodes participating according to their interests and capabilities, so thematic programmes will include groups and activities from several nodes. Each thematic spearhead technology innovation programme will have a specific focus, concrete goals, a limited lifetime, and will use relevant publicly funded projects in regional, national, and European R&D programmes.

Key and timely **innovation** agenda issues have been identified where each Co-location Centre will initially assume specific lead responsibilities for pushing the innovation frontier. *Berlin* forms an avant-garde hotspot for design, culture and innovations integrating media, art, and services in a multidisciplinary way. Systematic university-industry collaboration and integration with leading research institutes is well established practice for stake-holders in the *Berlin* Co-location Centre. Public Private Partnerships (PPP) like Deutsche Telekom Laboratories (T-Labs), DFKI, and EICT give well running examples to further build upon. The *Eindhoven* Co-location Centre has been already

prototyping the Co-location Centre concept with its High-Tech Campus based on the open innovation concept. Dutch Partners have been very successful in turning research into new ventures and in fostering global growth. Partners in the *Helsinki* Co-location Centre have developed a co-location model with research institutions and university laboratories over a long period, and have recently enhanced its profile with a new concept for integrating industrial labs into this open innovation environment. A new public-private-partnership for the creation of new business ecosystems was established as TIVIT Oy last year. The *Paris* Co-location Centre is an excellent example of very large-scale science park that integrates all stakeholders in the knowledge triangle, coordinating these with "pôles de compétitivité" (Competitive Clusters). The *Stockholm* Co-location Centre is globally recognized for its very efficient use of triple helix models of innovation and technology transfer programmes.

Node	Education	Research	Innovation
Berlin	Virtual University	Internet of Things and Services	Entrepreneurial Campus with Capital for all Stages
Eindhoven	Embedded Education	Health and Well-being	Growing Ventures for a Global Market
Helsinki	Multidisciplinary Teams in Education	Empowering People – Enabling User Creativity	Fast Spin-Off Models New Business Creation
Paris	Innovation and Basic Science	Internet of the Future for a Sustainable Digital Society	Capitalizing on Joint Academia – Industry Research Labs
Stockholm	International M.Sc. programmes	Mobile Computing and Communications	Tech Transfer Models for Open Innovation

Table 1: Examples of Node complementary profiles

6.4 Operation of a Co-location Centre

The Co-location Centre networks will be operated by the Partners according to the Governance and Management processes described below and in Part C. Here, only the specific issues of personal mobility and the role of Associate Partners are discussed.

6.4.1 Principles for Personnel Management at Co-location Centres

Typically, EIT ICT Labs will use the EIT financial contribution to leverage the impact of selected co-funded activities by covering the additional cost of co-location and, in some cases the actual costs related to the innovation or entrepreneurial parts of the activity. Staff will retain their home employment and students their home university enrolment, which greatly simplifies the legal requirements and increases the flexibility of EIT ICT Labs involvement. It also ensures that the knowledge generated will spread outside the Co-location Centres as well. In a few key cases, EIT funds will be used to cover the actual personnel cost, i.e., for graduate school grants and overseas post-doctoral fellowships. This is deemed necessary in order to give the incentive to the talented young people as opposed to the receiving organizations or projects.

Mobility is an essential feature of EIT ICT Labs. All Partners will involve on an activity basis both short-term (weeks) and long-term (6-12 months) stays at the host Co-location Centre. Many activities, notably the educational ones, will be open to any applicant on a competitive basis. Industrial and academic participation will be mandatory, the degree of involvement varying depending on the nature of the activity. Participation from other Co-location Centres will in general be required. EIT ICT Labs will support both student and staff exchanges, emphasizing longer exchange programmes to maximize the impact on the new generation of researchers. Apart from internal mobility schemes, every effort will be made to promote joint funding from other mobility programmes at both the national and EU

levels. EIT ICT Labs will also support a number of specific mobility programmes to attract overseas talents connecting staff and students at EIT ICT Labs centres.

Improved gender balance is an important objective for the people management processes to achieve a larger recruiting pool and to tap available talent. In cooperation with university departments in behavioural and social sciences, humanities, and arts, attractive opportunities for talented female researchers will be actively offered.

6.4.2 The role of Associate Partners

A number of activities should be carried out in a more effective way outside the current Co-location Centres e.g. outreach programmes, international contacts, extended labs and test-bed experiments. EIT ICT Labs have selected a small number of partners located outside the co-location sites' countries as Associate Partners having a direct mission from central EIT ICT Labs management, though they are also connected through one of the Nodes and, of course, expected to contribute significantly to co-location activities. Initial examples of such missions are outreach programmes to enhance ICT competence (ELTE), scaling the living labs concept to a regional setting (Trento), monitoring the performance of EIT ICT Labs from a business school perspective (Imperial College) or improving cooperation with major international actors (Microsoft Research, Intel). An important role for the Associate Partners will also be to host the local EIT ICT Labs Office and thereby contribute to the spreading of EIT ICT Labs activities, results and best practices at European and world wide level (see section 5.6).

7 Business Plan

7.1 Business concept

EIT ICT Labs is intended to create a pan-European flagship uniting Education, Research and Innovation in the area of Future Information and Communication Society. This task is crucial for the social and economic future of Europe. This will be achieved by establishing and executing the Strategic Innovation Agenda (SIA), of which this application can be viewed as the first version. The outcome of this effort will generate multiple social and economic benefits for European society, citizens, and businesses. The target of EIT ICT Labs is **to generate a leverage factor of five for the public funds over the next decade** by stimulating substantial R&D investments of the private sector. This will lead to an economic growth and additional jobs, so that there is a significant return of investment for the tax-payers' money.

The EIT ICT Labs will operate in a complex ecosystem of independent actors, financing schemes and business models. Hence, most of the financial return of investment is likely to end up in organizations other than EIT ICT Labs. Nevertheless, EIT ICT Labs has the clear goal of becoming a sustainable community. Achieving this will require internal investment in the activities of co-located EIT ICT Labs at least two to three times as large as that currently envisioned for a KIC. The route to business success is clear: EIT ICT Labs will provide globally renowned excellence, a track record of business inception, and entrepreneurial drive to attract the best people, the most dynamic businesses, and the smartest financing partners to ultimately support a sustainable financial operation.

7.2 Market prospects

EIT ICT Labs will provide its stakeholders with competitive advantage at both the national and global levels. These include exploiting market disruptions by applying ICT to other business domains, identifying and opening new research areas for others to follow, and adapting to the social changes arising from open innovation and various new employment and business models, in order to provide a better and more sustainable quality of life for European citizens.

EIT ICT Labs will deliver increased coherence in research, better generation and reuse of innovations, and, most importantly, people with new mindsets and skills. The direct beneficiaries are the Partners,

through better products, technologies, and services as well as better-prepared employees. Indirectly, in a broad sense, European society benefits through increased competitiveness leading to more business opportunities, more jobs, and higher quality services for the citizens of Europe. For these reasons, the stakeholder community will grow and provide ongoing investments in EIT ICT Labs activities and concepts. Once established, EIT ICT Labs will attract internal investments from both old and new Partners, sustaining the operations based on excellence in business generation.

Seizing opportunities in the ICT sector is systematically associated with simultaneous development and innovation in business concepts, market outreach, and product and service technologies. The unique position of EIT ICT Labs will be its broad excellence in the **universally enabling software and network technologies** that constitute the core of its technical content and that make it possible to penetrate almost any application or business sector and to adapt to changing market demands.

EIT ICT Labs is clearly distinguished among other European activities and possesses unique competitive advantage beyond its excellence and profiled Partnerships:

- Well structured local micro-governance and reaching out on a European scale through the macro-governance between co-location nodes in order to ensure the free flow of ideas, innovations, business, venture capital and expertise across geographical, organizational and cultural borders.
- Early penetration into the idea side of innovation by working more closely with students and researchers from different industries at a much earlier stage of ideation and, in so doing, creating an innovation flow where without artificial boundaries between different stakeholders in the innovation web.
- Providing various Expertise-on-Time help and service through the whole co-location network and facilitating better and more profiled expertise focus for each actor in the innovation chain in each local Co-location Centre.
- Systematic and relentless integration of excellence creation and opportunity capture.

The stakeholder value of the combined offer of EIT ICT Labs described above will increase over the years, as results and a track record are generated and due to the operational flexibility and continuously revised SIA. EIT ICT Labs will therefore become a global asset, attracting support from new and old core Partners. It is estimated that a financially sustainable operation will be possible after approximately a decade, with significantly increased private and regional support becoming available after the first five years. The current Core Partners fully support such a development.

7.3 Key performance indicators

EIT ICT Labs has defined very ambitious goals in order to provide social, economic, and business impacts at different stages of its lifetime. Applying well-known quality assurance measures involving external auditors and a set of agreed key performance indicators (KPIs) can guarantee a new level of innovation excellence. To guide measures and benchmark the impact of EIT ICT Labs, we have defined a flexible KPI management framework as a regular, iterative process as follows:

- Define KPIs: using a clear matrix of quantitative and qualitative measurable indicators focusing on the processes and enablers of desired outputs. These complement and detail the KIC Performance Scorecard measures to be established at whole EIT level.
- Measure and analyze KPIs on a yearly basis, comparing with competing initiatives as well as results from previous years.
- Re-define/adapt KPIs based on lessons learnt of previous phase.

The KPI Management framework will contribute to the realization of economic and non-economic goals. An initial overview list of expected KPIs clustered into the triangle of education, research and innovation is provided below and further detailed in the activity table in section. With respect to qualitative factors, the following KPIs will be monitored:

- High reputation through breakthrough achievements in education, research or innovation. .
- High visibility through PR and dissemination activities.

- Commercial impact increasing European competitiveness and growth.
- Ability to attract top talent and mitigate brain drain.
- Follow up of career development (job paths, variation of tasks).

Clearly, EIT ICT Labs is committed to creating a systematic process for:

- Evaluating, benchmarking, and using EIT ICT Labs as a research object in itself for EIT ICT Labs quality and impact improvement efforts and for continuous monitoring at the scientific level.
- Providing research based insight to Innovation and Entrepreneurship content in EIT ICT Labs research and education activities.
- Integrating accreditation best practices with the EIT ICT Labs Work Programme.

EIT ICT Labs Quantitative KPI		
Education	**Research**	**Innovation**
# M.Sc. and Ph.D. graduates # accredited education programmes	Critical mass (staff and project volume) # publications in top int. conferences, journals and standardization bodies # of patents & licenses # of large beta-labs	#Spinoffs # Engaged SME # Jobs created # of technology/ concept/service transfers to product in companies
Intellectual capital created (patents, design, trademarks etc) Amount of VC and business angel capital invested Share of private funding Share of foreign staff and students Society return on investment (financial and non-financial)		

Table 2: EIT ICT Labs KPI Management Framework

7.4 Competitive benchmarks

The main sources of competition come from current innovation hotspots (e.g., Silicon Valley), renowned universities (e.g., MIT and Cambridge) and growth economies (especially in Asia). These competitors will not just stand still and wait to be overtaken. Having the brightest ideas and swiftest execution are key. The key assets of EIT ICT Labs are EU recognition of the need and the foresight to build the EIT with a new approach and the insight of those in charge of preparation. Key competitors are evident in the areas of corporate R&D investment in academia, student and faculty recruitment, and the acquisition of venture capital. The strategies and policies employed by the above key competitors and their results in terms of impact and potentials realized will need to be closely monitored by EIT ICT Labs. A process for regularly reviewing these will be implemented as part of the management structure of EIT ICT Labs. This will provide guidance and indicators for the adjustment of its own policies and strategies for promoting education, research, and innovation in Europe.

7.5 Risk analysis

Risks for the operation of EIT ICT Labs can be identified on a political level, in financial planning and in organizational and management issues. The most obvious risks are listed below together with appropriate monitoring and mitigation actions.

Risk	Response
Political risks	
EU and local national policies are not aligned to support coherent actions in education, innovation, and research	Deep analysis of the divergences and increase of the contacts at the political and operational levels in both EU and national authorities

Financial risks	
Too limited scale of activities in terms of number of individuals, R&D investments, and investments in new ventures in EIT ICT Labs.	Intense work towards results to attract internal investments Better use of all partner networks to assist in securing sustainable resources.
Inability to pursue the Strategic Innovation Agenda due to lack of coordination of national and EU investments and R&D funding.	Review of the process leading to new activities. Better coordination of activities. Increase the support to the Chief Science and Technology Officer in coordinating EIT ICT Labs actions towards different funding sources.
Localization of venture capital according to national or even Node boundaries and lack of interest in maximizing business potential throughout the EIT ICT Labs community.	Establish dense and trusted inter-Node networks. Establish an EIT ICT Labs VC fund operating across borders with > 100 M€ capital.
Organizational risks	
Fragmentation and inability to horizontally scale activities between Co-location Centres despite EIT ICT Labs plans.	Appointment of coordinators at the EIT ICT Labs level for integrative education, research, and innovation activities at the European level.
Lack of profiling in Co-location Centre operation for innovations, business model and idea generation, venture capital and investment.	Strategic Innovation Agenda with clear requirements. Strong CEO and management functions.
Innovation web broken and unable to collect "every potential innovation drop" for best suited innovation/business environment.	Dense networking locally and at the European level
Lack of speed and agility due to high bureaucracy	Lean organization, clear and transparent decision-making, clear responsibilities.
Unable to capitalize the strong combined IPR portfolio of universities, research institutes, and corporations within EIT ICT Labs for generating new innovations	Clear and transparent IPR policy with the right type of incentives Concentrate IP Committee work to quickly handle individual cases.

Table 3: EIT ICT Labs risks and identified responses

7.6 IPR policy

The EIT ICT Labs will appoint an IP Committee to facilitate the rapid handling of IP policy issues and to pursue maximum use of the IP generated. This paragraph sets out the guiding principles for the IP policy of EIT ICT Labs that will be drafted by the IP Committee and is to be approved by the General Assembly. (The management structure is described in greater detail in Part C).

These principles have been drafted in line with common practice for collaborative R&D projects. They are intended to facilitate a better use of the results of such R&D projects in education activities and ease the valorisation/exploitation of non- or underutilized technologies and related IP packages as to be identified by the IP Committee and the creation of more favourable IP licensing regimes for such packages to enable better exploitation of such technologies.

It however should be borne in mind that most of the co-funded EIT ICT Labs projects will be carried out by the EIT ICT Labs Partners under existing collaborative legal schemes. Most of these will already have legal IPR frameworks, such as in FP7. The principles described below are not meant to replace such frameworks or existing arrangements but are explicitly intended to keep the burden of additional rules on R&D co-operations of Partners as low as possible. However, the IP policy to be based on the principles set out below aims to remove some of the most blocking situations for further valorisation/exploitation of the results of these co-operations by promoting a more preferential treatment of IP generated in co-funded activities or in other KIC activities as laid down below.

Key Principles:

Definitions: Foreground shall mean any IP resulting from work done during and in the context of a fully funded or co-funded EIT ICT Labs R&D activity. Background shall mean any IP, other than Foreground, resulting from work done prior to the start or independently of an EIT ICT Labs activity. IP shall mean intellectual property rights and know how.

1. Foreground shall be owned by Partners that did the work from which the Foreground resulted.
2. To the extent a license under a Partner's Background is technically necessary to do the work that needs to be done in the context of an EIT ICT Labs activity; such license shall be royalty free.
3. Licenses under a Partner's Background to other Partners, to the extent technically necessary to authorize permitted utilization of the Foreground, shall be available on fair and reasonable and non discriminatory (FRAND) terms, unless such Background is on a list of Background for which such license shall not be available. The list for any particular EIT ICT Labs activity is to be disclosed to the other Partners prior to the start of that EIT ICT Labs activity.
4. Non-sublicensable, non exclusive access to Foreground shall be available on FRAND or royalty-free terms for Partners who are participants in the same project. In relation to the grant of such access rights on FRAND terms, one of the circumstances which shall be taken into account in agreeing the FRAND terms, to the potential benefit of the requesting party, is the fact that such party and the granting party have collaborated in the same project to mutual benefit. Partners who are participants in the same project shall be offered conditions which are preferable to those offered to external third parties.
5. Non-sub licensable, non-exclusive access to Foreground shall be available on FRAND terms for other Partners in EIT ICT Labs, but subject to material business interest of the Partner owning the relevant IP.
6. Partners in EIT ICT Labs activities shall be prepared to license Foreground on FRAND terms to Partners requesting such license, including SMEs and start ups, wishing to use such Foreground in exploitation/valorisation activities funded or otherwise actively supported by the KIC.
7. Subject to material business interest of the Partner owning the relevant IP, licenses to Foreground will be granted to any Partner on a royalty-free basis for education and research purposes. Such licenses shall exclude any commercial use.
8. All principles above are subject to the requirements of any relevant co-funding entities, e.g. FP7, and all existing arrangements between parties in the relevant projects with respect to such project.

7.7 Activities and Resource Requirements

New EIT ICT Labs specific tools will be developed and deployed to implement the work program of the KIC. These tools are organised into four categories: **People, Science and Technology, Innovation and Organisation.** These are described below and presented together with tables (**Table 4 a-d)** of initial tools and activities. These are listed for year 2011, together with Milestones, KPIs, and cost estimates. The number of activities and their total cost will increase over the subsequent years according to the ramping up of the financial resources as indicated in the financial section below. All activities will be subject to the approval of detailed plans by the Executive Steering Board.

People: Knowledge development in EIT ICT Labs is organized according to: (1) master's programmes, including new EIT ICT Labs joint programmes and transformed existing master's programmes; (2) EIT ICT Labs Graduate School where PhD studies are integrated with MBA studies; and (3) outreach programmes to enhance advanced ICT skills in particular regions and organizations and to integrate new innovation-oriented post-doctoral fellows into EIT ICT Labs activities. The specific EIT ICT Labs instrument to bring tangible innovation and entrepreneurship to programmes is the business development laboratory located in each Co-location Centre. EIT ICT Labs will provide two to three new joint master's programmes, together hosting 200 students per year, and will enhance existing master's programmes with EIT-specific content and work methods for 2000 students using models like those already deployed (e.g., in the Nordic Master Program in Innovative ICT). EIT ICT Labs Graduate School will provide a unique PhD study opportunity for 100 PhD students per year on

an excellence basis and will orient an additional 500 PhD students from existing programmes and projects towards EIT objectives.

Tool	Activity	Milestone	KPI	Cost 2011 (k€)
People	**Targets:** Attracting top innovative talent, stimulating student entrepreneurship, empowering users			
Innovative Masters Program	New Joint Innovation Master programs	Start 2011	# students (>150/yr)	3 000
	Renewal of existing Master Programs	Complete 2013	# programs # students	3 000
	Accreditation of educational programs	First 2011	# programs	500
Graduate School ICT& Innovation	One GS track for each of the Themes, 50 PhD	Start 2011	# graduates	5 000
Internship Program	Internships for M.Sc. and Ph.D. students	Start 2011	# internships	1 000
Innovation Post-doc program	Overseas candidates 25 positions	Start 2010	# positions	5 000
Outreach program	Enhance advanced ICT skills in specific regions	Start 2011	# students	2 000
	Empower specific user populations	Start 2011	# students	2 000
	Adapt to new market needs	Start 2011	# students	1000
Sum costs				**22 500**
EIT contribution				**6 000**

Table 4 a: Initial tools and activities for year 2011, People

Science and Technology: Research is organized and consolidated according to thematic spearhead technology innovation programs, each coordinated by one of the Co-location Centres. The focus of these programs is on spearheading technology and open innovation programs as well as integrating the business dimension and business schools and other multidisciplinary themes with these and promoting active SME participation. Each thematic program will involve approximately 100 academic and industrial senior researchers in addition to graduate and master's students. An international collaboration program complements these programs by facilitating researcher mobility globally.

Science and Technology	**Targets:** Scientific breakthroughs, Business renewal, Increase user involvement, understanding socio-economic development			
Core research Program	Regular research funding	Ongoing	# publications # tech transfers #patents/licenses contributions to standards	15 000
	Research infrastructure coordination	Start 2010	Share of usage	500
Spearhead technology innovation program	Thematic multidisciplinary research programmes aiming at business paradigm changes	Start 2010	Volume new innovation business	10 000
	Business School Joint studies of the KIC as an innovation driver	Start 2010	Reports # PhD´s	3 000
	International collaboration program	Start 2010	# visits	2 000
SME´s in research program	Living Labs participation	Start 2010	# companies	1 500
	SME– academia exchange program	Start 2010	# exchanges	2 000
Sum costs				**34 000**
EIT contribution				**5 000**

Table 4 b: Initial tools and activities for year 2011, Science and Technology

Innovation: Innovation enhancement is carried via three EIT ICT Labs-specific programmes: (1) business development programmes, consisting of the innovation radar, innovation incentive, and business inceptor programmes; (2) a venture capital access program; and (3) the "Attract" program for new internal investments in EIT ICT Labs activities. The opportunities offered by the EIT Academy of Entrepreneurship and the proposed EIT Foundation will be linked in EIT ICT Labs' own activities The target of the innovation programme is a significant increase in the number of innovations and to speed-up the time from idea to concrete business.

Innovation	**Targets:** Systematic Hotspot creation, Efficient Open Innovation, Mitigating European fragmentation, Improved access to VC´s,			
Initiating innovation	Innovation Radar, thematic actionable foresight service	First version 2011	# subscribers	500
	Innovation incentive program	Oper. 2010	# grants	1 500
	KIC level *Business inceptor process* as a match maker between ideas and entrepreneurs	Inter-node database 2011	# db searches # start-ups	1 000
	Integrating Business Development Labs in education	Evaluated 2013	# projects # start-ups	1 500
	SME´s Go Global	Start 2010	# participant	1 500
Entrepreneurial innovation	Facilitate establishing VC funds with 100 M€ capital base coupled to EIT ICT Labs	In operation 2013	# capital # deals	1 000
	Fast spin-off creation model with coupled VC fund(s)	Operative 2011	# deals	1 000
	Seed money program	Oper. 2011	# deals	3 000
	Business angel network	Start 2011	# members	200
	Investment forum	Start 2010	# attendees	500
Industry innovation	Local support to the innovation ecosystems	Ongoing	Hot spot ranking	10 000
	Recruiting companies to co-locate their R&D	Evaluation 2013	# co-located "lablets"	500
	International marketing	Start 2011	# shows	500
	Business –academia crossover program	Started 2010	# exchanges	2 000
Innovation system	Benchmarking study	First 2011	# reports	500
	Public workshop series on innovation best practices	Started 2010	# attendees	300
	Innovations in emerging markets and developing countries	Start 2011	# visits	1 000
Sum costs				**26 500**
EIT contribution				**7 000**

Table 4 c: Initial tools and activities for year 2011, Innovation

Organization: The management of the KIC and Nodes will be kept as lean as possible while maintaining a rapid decision and reporting structure. Co-location Centre as a physical innovation hub will integrate research, innovation and education. Co-location Centres provide coordination and management for both regional and European activities within EIT ICT Labs as well as the physical places for the new culture of co-creativity where stakeholders throughout the innovation web can meet and collaborate.

Organization	Targets: Building strong Co-location Centres, strengthening the EIT brand			
EIT ICT Labs Organization	Management	Oper. 2010	# employees	1 000
	IPR Committee	Operative 2010	# patents # licenses	200
	Co-location Centre management	Established 2010	Activity volume	2 000
	Network offices	Start 2010	# events	300
Recognition program	European ICT Innovation & Entrepreneur week	Launched 2011	# attendees	500
	Innovation awards	Start 2011	# awards	500
	Entrepreneurial club	Start 2010	# members	500
Sum costs				**5 000**
EIT contribution				**4 000**

TOTAL COST EIT ICT Labs, 2011 (k€)	**88 000**
Total EIT contribution, 2011 (k€)	**22 000**

Table 4 d: Initial tools and activities for year 2011, Organisation and Total Cost

7.8 Finances

EIT ICT Labs is supported by very strong Partners fully committed to its success. Several Partners have already secured strong support from their national and regional funding bodies, specifically, dedicated co-funding for the EIT ICT Labs SIA. Furthermore, all Partners have outstanding track record in obtaining support from EU collaborative instruments and despite the fact that the detailed conditions for eligible EIT co-funding still has to be worked out, the Partners can already assert that the EIT initial co-funding requirements will be fully satisfied and that the long term evolution towards a larger co-funding fraction is a realistic business goal for the EIT ICT Labs. Hence, once the EIT ICT Labs will have been established and gained momentum a sustainable and growing business for the next couple of decades is foreseen.

The overall budget for the EIT ICT Labs operation for the initial period with extrapolations over a 15 year horizon is given in the table below with figures in million € per year. Funding fraction from the EIT is expected to remain stable in the first project phase (2010-13) and then slowly decrease. In parallel, funding from private sources will increase. More detailed figures can be found in the set of A3 forms.

Income (M€)	2010	2011	2012	2013	2014	2019	2024
EIT	12	22	32	40	40	30	10
National/Regional	12	22	33	39	39	40	40
Community funding (non-EIT)	9	16	23	30	30	60	60
Private funding	2	4	7	9	9	30	60
Participants own resources	13	24	33	42	42	50	60
Total Income	**48**	**88**	**128**	**160**	**160**	**210**	**230**
EIT fraction	25%	25%	25%	25%	25%	14%	4%

Table 5: Sources of KIC financing brought in by the participant organisations

Costs (M€)	2010	2011	2012	2013	2014	2019	2024
Co-funded project costs	36	66	96	120	120	180	220
EIT funded costs	12	22	32	40	40	30	10
Personnel, activities	*3*	*8*	*12*	*17*	*16*	*12*	*0*
Personnel co-location costs	*4*	*6*	*9*	*11*	*11*	*7*	*2*
Running costs	*2*	*5*	*6*	*7*	*7*	*5*	*2*
Co-location Centre mgmt and facilities	*2*	*2*	*3*	*3*	*4*	*4*	*4*
EIT ICT Labs management	*1*	*1*	*2*	*2*	*2*	*2*	*2*
Total costs	**48**	**88**	**128**	**160**	**160**	**210**	**230**

Table 6: Use of resources by category

8 Impact and Potential of EIT ICT Labs

8.1 Contributions to Europe

ICT has ubiquitous applicability in our daily lives, ranging from enabling the most critical services to supporting the most trivial activities. Its huge potential and our increasing reliance on it expose us as individuals and societies to its impacts, opportunities, and threats. Europe still holds a leading position in the communication and embedded systems fields, developed through strong research and supported by global open standards. EIT ICT Labs will help Europe to secure this position and meet the multiple challenges affecting the economic, environmental, social, and innovation landscapes. Environments which enable multidisciplinary collaboration and participation from various actors in the innovation chain will lead to technological and non-technological breakthroughs which will drive Europe's growth and contribute to its competitiveness.

In the context of the economic downturn there is a renewed urgency to strengthen Europe's knowledge triangle. EIT ICT Labs will bring together Europe's best higher education institutes, public research units and industries. It will create long-term growth and spur continuous renewal by enabling innovative use of ICT, turning ideas into innovations with economic, social and environmental benefits. EIT ICT Labs will educate new professionals with novel skill sets and entrepreneurial capacity fit for the future digital society. The EIT ICT Labs culture encourages risk-taking and entrepreneurship, moving people across traditional boundaries of geography, scientific discipline, and forms of employment. This mode of operation will force people to collaborate, be mobile, form bonds and ultimately create a new level of European trust. In this way the partnership type shifts from the level of individual actors and groups to the level of renewed operational modes of European institutions.

8.2 Benefits to Stakeholders

Society and government: The 2008 Renewed Social Agenda brings together various policies to address the rapidly changing social realities of Europe. EIT ICT Labs will actively contribute to the Agenda's mission for social innovation by designing and implementing creative ways to meet social needs. Themes to be addressed by EIT ICT Labs range from harnessing new models of web-based social networks to the delivery of healthcare at home, from improving the efficiency of public services to delivering more environmentally-friendly products. As Europe's population ages, the need for a qualified and entrepreneurial workforce will continue to grow. EIT ICT Labs addresses these challenges, facilitating staff mobility to avoid skill shortages, and retraining and reallocating new and experienced graduates across sectors. Also systemic changes in developing counties and emerging markets enabled by ICT will benefit society worldwide.

Companies: Since Europe cannot compete on costs or with the number of well educated people against emerging countries such as China and India, it must gain competitive advantage by inventing the new technologies and industries that will define the future. As new models for innovation and business emerge, there is an urgent need to strengthen ICT to transform ideas, competences, venture capital, and trust into businesses. Since more innovations occur outside companies, an open innovation mindset, environment, and legal framework encompassing IPR policies is essential. EIT ICT Labs will provide such a framework for cooperation involving partnerships, joint projects, and exchange of people. Thanks to a deeper integration with industry and business practices, EIT ICT Labs will better prepare graduating students and outgoing post-docs for society and industrial needs while also allowing companies to tap talent from non-traditional backgrounds. EIT ICT Labs will systematically detect, attract and involve the best talents in cooperation with industrial initiatives.

Universities and Research Organizations: Master and PhD level curricula will be enhanced and renewed with an emphasis on increasing interdisciplinary elements and on developing an entrepreneurship and mobility culture among students and researchers. Collaborative work with industry will be acknowledged as equally important as academic tasks like publishing for academic advancement and compensations. Overall mobility between disciplines, sectors and research settings as well as infrastructure utilization will be improved.

8.3 Contributions to the EIT objectives

It is envisioned that EIT ICT Labs will create and nurture a culture encouraging innovation, structured risk-taking, and entrepreneurship. To this end, it will facilitate research output, improve technology transfer, provide professionals and researchers with novel skill sets and competences, enable academic linkages and industry exchange programmes, enhance public awareness, and motivate user participation. Through multidisciplinary education and research initiatives, it will achieve an improved gender balance in students and researchers, and hence increase significantly the available talent pool for established companies, start-ups, research organizations, and universities.

EIT ICT Labs will assume a European level of responsibility and implement radically new tools, environments, and a governance model for coordinating, co-locating, and integrating ICT activities in education, research, and innovation. Furthermore, EIT ICT Labs will leverage innovation and facilitate knowledge transfer at a European scale in areas such as health and wellbeing, user empowerment and social interaction as well as energy efficiency and sustainable development.

EIT ICT Labs will establish an innovative balance between the fundamental and applied aspects of science and technology, better interaction between the global and local environments, linking public and private interests, and encompassing non-technological issues leading to the full exploitation of innovation opportunities. EIT ICT Labs will nurture and spread an innovation and entrepreneurship culture in Europe

In summary, EIT ICT Labs will provide the EIT with a highly integrated Knowledge and Innovation Community in the area “Future Information and Communication Society”. EIT ICT Labs represents a unique opportunity for setting up a pan-European flagship uniting Education, Research and Innovation in a sector of prime importance to the economic future of Europe. In its operations EIT ICT Labs will provide speed and agility in innovation creation unprecedented by anything seen in Europe or elsewhere, actively growing and capitalising on the innovation capacity and capability of the best individuals and stakeholders in higher education, research, business and entrepreneurship from the Europe and the worldwide ICT community.