EIT ICT Labs

BLENDED LIFE IN A CONNECTED WORLD
European Leadership in ICT Innovation

Strategic Innovation Agenda
2014-2016
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Management Summary

**BLENDED LIFE IN A CONNECTED WORLD**

Today, we live a blended life. We experience a world where physical and virtual encounters seamlessly merge. We blend our private and professional lives due to the flexibility to work at any time from different locations. We see industry disruptions as a result of flexible production as well as personalised service and product offerings. We see a blending of work and education in lifelong learning amongst others facilitated by distance learning platforms offering us ways to a personalised approach in fulfilling our life and career goals. This blended life is a direct consequence of the deep penetration of ICT into our society through ubiquitous connectivity and information access and enables disruptive innovative solutions to address societal megatrends like demographic changes, urbanisation, increased mobility and Privacy-Security-Trust. This selection is motivated by the fact that areas offer clear opportunities for Europe due to the combination of European strengths and values when it comes to healthcare, sustainable energy production, manufacturing of high quality products, and quality of life in our cities and environment. Towards 2016 we expect major breakthroughs in Trusted multi-Cloud infrastructures and Services, Cyber-Physical Systems for Production Systems, Preventive Healthcare solutions based on the Quantified Self and Smart Grids, to name a few.

**DRIVE ENTREPRENEURIAL EDUCATION VIA BLENDED EDUCATION AND MOBILITY**

The EIT ICT Labs education adheres to a systematic “Schools & Tools” approach providing blended programmes that deliver T-shaped talents who are able to combine deep technical ICT knowledge with broad entrepreneurial skills. The “T-shaped” metaphor refers to professionals with deep skills and expertise in a single technical field as well as a set of broadly applicable non-technical abilities, e.g. related to innovation and entrepreneurship or to collaboration and communication. The Master-, Doctoral- and Professional Schools build their programmes on Tools, such as the EIT ICT Labs partner university education programmes, Co-location Centres and online learning platforms. The ambition is to set a strong example for Europe by demonstrating excellence and by operating lighthouse initiatives that stimulate entrepreneurship and mobility, thereby inspiring a structural change in the European education landscape. Towards 2016 the Master- and Doctoral School will be upgraded in scale, the Professional School will be established and blended education will be fully integrated in all programmes. Integration of education activities within the Action Lines will be strengthened via thematic Summer Schools and Master and doctoral student participation in Action Line activities. By 2016 EIT ICT Labs will be a recognised brand for ICT education leading to privileged access to top ICT talent for employers and a wave of new entrepreneurs creating successful ICT ventures.

**DEVELOP THE EIT ICT LABS ECOSYSTEM AND ITS IMPACT**

The current EIT ICT Labs ecosystem consists of seven core Nodes and two Associate Partnerships. During 2014-2016 London will be maturing as a full Node and the profiles of both Associate Partnerships (Madrid and Budapest) will be strengthened. EIT ICT Labs will engage and share with the EU-28 via its X-Europe Outreach programme and it will establish a bi-directional link with Silicon Valley. Opportunities within the BRIC countries will be explored towards 2016. Various initiatives will be taken to further stimulate the flourishing community of researchers, students, business developers, researchers, teachers and entrepreneurs in the EIT ICT Labs Co-locations.

This Strategic Innovation Agenda (SIA) describes the essential strategic steps to be taken by EIT ICT Labs to enhance effectiveness and increase global impact for Europe. By 2016 the European ICT innovation culture will have further shifted towards "value creation" witnessed by new services and products, innovative solutions and future ICT entrepreneurs driving new start-ups and growth of companies towards European and global excellence.
**BLENDED LIFE**

The deep penetration of ICT into the veins of our society has provided ubiquitous communication and information access resulting in a blended life. A blended life in the sense that the physical and virtual world are merging into one where physical encounters with friends and family are seamlessly integrated with virtual encounters on social networks. A blended life in the sense that it allows us to combine work and private life in a way that offers the flexibility to work at any time from different locations. A blended life for our industries that see ICT deeply embedded into their products and services, allowing them to deliver flexible services and products tailored to specific customer needs. A blended life for our industries that use ICT for cost-effective production at many locations leading to situations where producers are consumers and turn into ‘prosumers’.

Blended life is a reality and as such it brings both opportunities and challenges. On the one hand it allows us to maintain better contact with people we care about and at the same time it brings us a level of transparency that raises concerns about the ability to keep information in the privacy of our own life. The blending of private life and work brings clear advantages of combining private and professional obligations and at the same time brings the challenge of keeping the right balance between private and professional life.

The blending of products and services leads to personalisation of offerings, and at the same time leads to consumers that are confused about the huge variety of offerings. Blended production leads to shorter supply chains and cost-effective production and at the same time disrupts existing business models.

**BUILD UPON EUROPEAN STRENGTHS**

Europe has an excellent ICT infrastructure, a highly skilled and trained population and advanced know-how in key areas of ICT. World leadership in enterprise software applications, embedded systems, access networks and several industry sectors like health and energy puts Europe in a favourable position in these areas. The strong historic and cultural links of the 28 sovereign EU member states contribute the multilingual and multicultural skills necessary to succeed in the global marketplace. Moreover, European industry, traditionally strong in manufacturing innovation, will be able to profit from the early adoption of digital intelligence in existing industrial manufacturing facilities.

**UNLOCK THE POTENTIAL OF BLENDED LIFE IN A CONNECTED WORLD**

A high level of agility is needed to cope with the fast pace of change in ICT itself and in many of the ICT application areas. Barriers to entry are highly dynamic and may suddenly disappear. Newcomers leveraging a disruptive innovation can quickly overrun companies that are successful today. EIT ICT Labs is at the heart of these developments and is committed to bring the best of blended life to European citizens and industries. Building on the European strengths as well as the European values on quality of life, equal opportunities and economic prosperity, EIT ICT Labs will in a responsible way select and deploy its education and innovation efforts to drive the opportunities of a blended life. EIT ICT Labs does this by creating a pan-European ecosystem that brings together key players from education, research and business to create a true open innovation and education environment. Mobility of talents, ideas, technologies and investments drives the necessary sharing of know-how in order to create a European network of vibrant hotspots that drive ICT innovation focusing on European needs and strengths in order to drive leadership.

**ICT**

- Broadband territorial coverage of 80%.
- 24% share of the global ICT market.

**Some key facts on Europe**

- Mobile penetration of 1.2 contracts per capita vs. 0.9 in the US and 0.8 in Asia.
- Double investment in telecom services sector compared to nearest competitor (Japan).
EIT ICT Labs: A Pan-European Innovation and Education Ecosystem

EIT ICT Labs has been established in 2010 to drive European leadership in ICT innovation and education. The creation of EIT ICT Labs is motivated by the fact that, although Europe has world-class ICT research and education, the societal and economic impact needs to be improved in order to guarantee European competitiveness in the global economy.

EIT ICT Labs’ mission is to drive European leadership in ICT-related innovation to foster economic growth and enhance the quality of life of European citizens. The objective is to accelerate innovation by:

- Inspiring the innovation spirit and renewing innovation processes within the existing ICT industry,
- Accelerating the transformation of innovations into marketable products, services and businesses,
- Educating a new breed of entrepreneurial ICT engineers,
- Catalysing the development of potential SMEs into future global ICT leaders,
- Strengthening the European ICT ecosystem with a sustainable network built on world-class reputation.

2.1 Blended Life in a Connected World: Europe’s Needs and Opportunities

EIT ICT Labs is committed to bring the best of blended life to European citizens and industries and to drive European leadership. This requires a careful selection of areas to target. Building on Europe’s strengths as well as recognising Europe’s vital interest guides the selection of areas where EIT ICT Labs invests in order to create maximum impact.

The ICT industry itself has seen enormous growth and huge disruptions over the past decades. Next to that ICT has penetrated almost all aspects of society and has drastically impacted people’s lives as well as heavily impacted or even disrupted all kinds of industries. In order to have sufficient critical mass behind its innovation actions EIT ICT Labs has decided to focus on a limited number of areas. These areas have been selected based on a careful SWOT analysis of the European ICT position in a global perspective.

When it comes to ICT-enabled developments, five areas have been selected: Health & Wellbeing, Energy, Urban Life and Mobility, Smart Manufacturing and Critical Infrastructures, and Smart Spaces. By addressing these areas, new innovative solutions will be enabled for societal megatrends like drastic demographic changes, urbanisation, increased mobility and scarcity of natural resources. When it comes to core ICT developments, the areas that have been selected to focus the efforts are: Future Networking, Future Cloud, and Privacy-Security-Trust. This selection is motivated by the fact that Blended Life is driven by the efficient handling of big and real-time data volumes and therefore needs a future generation of secure and trusted network and Cloud infrastructures. Since these technologies are key it is of vital European interest to have a strong position.

When it comes to ICT-enabled developments, five areas have been selected: Health & Wellbeing, Energy, Urban Life and Mobility, Smart Manufacturing and Critical Infrastructures, and Smart Spaces. By addressing these areas, new innovative solutions will be enabled for societal megatrends like drastic demographic changes, urbanisation, increased mobility and scarcity of natural resources.

2.2 EIT ICT Labs: Building the Pillars

The mission is implemented via an integral strategy that builds on three core pillars:

- Research-based Innovation and Entrepreneurship
- Entrepreneurial Education
- A pan-European ecosystem of innovation hotspots

Bringing education, research and business actors together creates a vibrant innovation and education ecosystem where the flow of talents, ideas, technologies, and investments is driving economic and societal impact. The crucial element of the strategy to blend Research, Business and Education in a pan-European ecosystem has meanwhile resulted in a partner network consisting of more than 600 leading European ICT companies, universities, research institutes and local innovation networks and incubators.

Acting as a Catalyst through Focused Action Lines

EIT ICT Labs’ approach is to act as a catalyst, in the sense that it builds on the existing strengths of its partners in the ecosystem and accelerates the development of talents and technologies via targeted investments and intelligent creation of value-chains in the ecosystem. This is done via application of acceleration instruments called Catalysts. These Catalysts are applied to existing partner activities that are called Carriers. Carriers can be education programmes of the EIT ICT Labs university partners that are augmented with Catalysts which focus on entrepreneurial skills. The combined Carrier-Catalyst actions lead to the development of the so-called T-shaped talents. Carriers can also be technologies that have been developed by the research partners. In order to accelerate the route to market, Catalysts are added for maturation, access to finance and business development. The Catalysts are shown in Figure 2.1, where they are mapped onto the phases of the EIT ICT Labs innovation funnel to illustrate how they facilitate transitions “from idea to product”, “from lab to market”, and “from student to entrepreneur”.

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<th>Explore</th>
<th>Mature</th>
<th>Experiment</th>
<th>Display</th>
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<td>Technology scouting</td>
<td>Technology maturation</td>
<td>MSc/PhD projects</td>
<td>Open Source</td>
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<td>Access to finance</td>
<td>Technology Transfer</td>
<td>IDE Education events</td>
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<td>Business modelling</td>
<td>Innovation opportunity scouting</td>
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<td>Research Catalyst</td>
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Carrier-Catalyst activities are carried out in so-called Action Lines. Action Lines are the EIT ICT Labs approach to drive innovations to the market and education of entrepreneurial talents. EIT ICT Labs makes strategic choices with respect to the most attractive areas for driving European ICT innovation and education leadership and selects its Action Lines accordingly. Action Lines themselves are portfolios of Carrier-Catalyst activities. These activities are carefully selected during the annual business plan development.

The key criteria for selecting the research-based innovation Action Line activities are: 1) strategic fit with the strategic Action Line priorities, 2) potential in terms of societal and economic impact, and 3) ability for the EIT ICT Labs ecosystem to successfully execute both in terms of technological strength as well as ability to create access to the market.

Value extraction and access to market is realised in a variety of ways, such as catalysing new ventures, growing existing SMEs to European level and world-class scale and facilitating the strategic development of established large industries.

The present Action Lines are expected to remain in place for the mid-term future. New Action Lines may be incubated on the basis of societal needs, European strengths, partner interests and/or technology and business foresight.

Education Action Lines implement the entrepreneurial education in EIT ICT Labs. Here we find three Action Lines that drive the Master, doctoral and professional education. Education Action Lines combine Education, Research and Business activities to deliver the T-shaped students that combine deep technical knowledge with entrepreneurial skills.

Since its conception in 2009 and its start in 2010, EIT ICT Labs has consistently built its pillars as can be seen from Figure 2.3 that shows EIT ICT Labs’ evolution together with its most significant achievements.

EIT ICT Labs started out based on the original Knowledge and Innovation Community (KIC) proposal outlining the overall vision and strategy, which included as key elements the intention to invigorate the innovative spirit within the existing European ICT industry, to create a new generation of entrepreneurial engineers, and to catalyse new ventures that can grow to become future world leaders.

By now, EIT ICT Labs has firmly established itself and several core elements of its innovation engine are fully operational. The pan-European ecosystem of ICT innovation Co-location Centres stimulates the mobility of talents, ideas, technologies and investments. The pan-European Master and Doctoral Schools are set up in a scalable way and focus on excellence, on systemic change through technical programmes with deep embedding of innovation and entrepreneurship, and on delivering T-shaped talents with a passion for innovation. The EIT ICT Labs Action Lines integrate education, research and business and drive research-based innovations to the market. Several Action Lines provide leading examples for setting up business-oriented Summer Schools and postmaster education programmes. The pan-European Business Development Accelerator drives value extraction and entrepreneurship. Strategic collaborations with established players such as the European Investment Fund, Future Internet PPP, ITEA, and the European CIO Association are in place and can be leveraged. Outreach activities have begun to set up new connections across Europe and to Silicon Valley.
2.4 2014 – 2016: THE WAY AHEAD

Lessons that have been learnt during the process lead to further improvements towards the coming years. The leading role of the Action Lines as the main value creation mechanism as well as for the integration of Education, Research and Business is further emphasised. Based on experiences in the Action Lines, the research activities will be further aligned with the EIT ICT Labs innovation funnel with more emphasis on technology maturation and technology experimentation. Targeted High Impact Initiatives are being defined to further focus efforts and maximise impact. The Outreach ambition is embedded within the management agenda for the Action Lines. The role of the physical Co-location Centres is strengthened and emphasised further.

The unique qualities of EIT ICT Labs for Europe:

**Agility:** From opportunity spotting to execution across the network in vibrant Co-location Centres, efficient and effectively, with the right and motivated partners, accountable on impact and results.

**Capacity:** Logical and coherent approach in providing key players both within and outside the ecosystem access to promising technologies, pan-European facilities and expertise of EIT ICT Labs partners.

**Quality:** Top talent with entrepreneurial spirit through innovative blended learning programmes on Master, doctoral and professional level.

**Coverage:** Policy makers, entrepreneurs and investors gain privileged access to best players, technologies and services in Europe.

**Focus:** Investments and activities targeted towards innovation areas that have high impact on European economic growth and quality of life.

EIT ICT Labs will further increase its effectiveness by moving towards a more output-oriented organisation focused on deliverables and meaningful results. Towards 2016, EIT ICT Labs strives for an appropriate balance between top-down and bottom-up management driving European innovation leadership by facilitating partners and creating new leaders. To further increase the value of the network, EIT ICT Labs will actively invest in:

1. Boosting research-based innovation by focusing on High Impact Initiatives within the priority areas of the Action Lines,
2. Driving entrepreneurship and mobility by establishing a recognized EIT ICT Labs education brand based on blended learning.

A summary of the main strategic targets within these domains is seen in Figure 2.4 and will be detailed in the following Chapter.

**Figure 2.3 Evolution of EIT ICT Labs between 2009 and 2014**

**Figure 2.4 Main strategic targets towards 2016**
14

3.1 Research-Based Innovation: Drive Innovation Leadership

Focused on major breakthroughs with high impact on European Competitiveness

As explained in the previous Chapter EIT ICT Labs focused its investments on a limited number of innovation areas. These have been selected with respect to European relevance and leadership potential. The activities in these domains have been grouped into eight research-based innovation Action Lines that are described in more detail below. For each Action Line two or three priority areas have been identified that will determine the selection of the Action Line activity portfolio for the 2014-2016 timeframe. A more elaborate description of these Action Lines can be found in Annex 2.

\[ \text{Achievements 2016} \]

- **Health & Wellbeing – Prevention through the Quantified Self**: Avoiding serious health problems by suitable lifestyle interventions.

  **Mission**: Reduce the demand for expensive healthcare by detecting small physical and mental health issues early and avoiding larger health problems by suitable lifestyle interventions.

  **Motivation**: EIT ICT Labs partners own “quantified self” and “activity of daily life sensing” technology and especially the large core industrial partners have access to the world market.

- **Mental Deterioration: Stress / Burn-out**: Solutions commercialised in B2C and B2B markets (initial annual revenue plan of €6M), Dementia: Solutions commercialised in B2C and B2B market, in total at least three solutions introduced, via start-ups and transfer of activity of daily life sensing, smart algorithms, (big) data mining and applications to existing companies.

  **Societal Impact**: Improve quality of life through early treatments and by avoiding life-threatening health issues as well as through early treatments and extended labour participation & independent living due to reduction of burnout & early development of dementia.

  **Economic Impact**: Lower healthcare costs due to less hospitalisation and due to less residential care. The combined markets are estimated at ~18€ in 2020 and EIT ICT Labs partners will gain a significant share.

- **Cyber-Physical Systems – European Leadership in Production and Infrastructures**: Increase the efficiency and reliability of industrial production systems and critical infrastructures by combining embedded systems, sensors, control systems, and data aggregation and analysis technology into smart systems-of-systems.

  **Mission**: Improve efficiency and robustness through the deployment of Cyber-Physical Systems (CPS) technology. Reference architecture with harmonised process and data interfaces; An integrated engineering environment covering the complete product life-cycle: design, simulation, production, operation, maintenance, evolution; New start-ups and new business within existing companies implementing new business models.

  **Critical Infrastructures**: Matured and validated technology components for communication and information aggregation; Larger-scale demonstration of the federated deployment and management of heterogeneous CPS infrastructures; At least four companies (start-ups, SMEs) exploiting new market opportunities as component/system suppliers or providers of (Cloud-based) information and management services.

  **Societal Impact**: Competitive and expanding manufacturing industr in Europe providing a broad range of leading edge employment opportunities; Enhanced quality of life as well as excellent preconditions for industry due to high quality critical infrastructures.

  **Economic Impact**: Competitive, cost-effective manufacturing. Accelerated market growth for providers of core CPS technologies and derivative solutions by common data formats. Emerging European CPS ecosystem boosting business creation along complete value chain large manufacturing industries, SME tool providers, system integrators, and service providers, De-facto CPS engineering standards.

- **Smart Energy Systems – Defining Europe’s Future Energy Market**: Contribute to the creation of an open European energy market by testing and deploying ICT solutions for decentralised power generation infrastructures and user-centric services for smart energy systems.

  **Mission**: EIT ICT Labs partners combine their strengths in energy and infrastructure to meet the needs of decentralised network elements (generation & storage), to support European consumers in optimising their energy usage and to create exportable concepts.

  **Achievements 2016**

- **Physical Wellbeing / Cardio Vascular**: Productionisation and commercialisation of a B2C Cardio Fitness solution via start-ups and transfer of sensors, smart algorithms and applications to existing companies; Evidence for effectiveness of solution; At least three solutions introduced, via start-ups and transfer of activity of daily life sensing technology into smart systems-of-systems.

  **Achievements 2016**

- **Infrastructure**: At least one new technical high capacity virtual power plant set up; Creation of start-ups (e.g. derived from new regulated market roles) and support of SMEs which fulfill key roles in the Virtual Power Plant ecosystem; Relevant standards defined and adopted.
User-centric Services: Planning and simulation tools for user-centric infrastructures; SMEs supported and start-ups created; Test beds and living labs infrastructure usable by third parties; ICT solutions proven as a key building block to achieve the EU 2020 climate change objectives.

Societal Impact: Reduced environmental impact by reduced need for traditional power plants; More efficient use of renewables; Reduced consumer energy bills; User awareness on energy efficiency and measurable improvement in energy consumption behaviour.

Economic Impact: Reduced business risk; Business models for sustainable economic success; Thriving ecosystem for ongoing innovation; Virtual power plant export business opportunity; Acceleration of market development via large scale pilots.

Future Urban Life & Mobility – Informed Citizens and Revolutionised Urban Mobility

Mission: Turn ICT breakthroughs into new up-scaled urban services to develop new mobility behaviours as well as citizen empowerment via the validation of new business models in the context of European cities; Improved relation between citizens and governance bodies; Improved asset utilisation (e.g. work productivity in smart offices, resources in office spaces, etc.).

Achievements 2016

Mobility Paradigm Shift: Mobility marketplace application allowing stakeholders (citizens/users, urban service providers, governance bodies) to propose and access new mobility services and develop new mobility behaviours; Urban services and mobility applications and services based on collaborative citizens generated data; Mobility marketplace platform that can be duplicated for dissemination in other urban areas.

Citizen Engagement and Empowerment: A trusted Big/Open Data platform in place for the development and deployment of collaborative services; Big/Open Data based products and services released on the market by new start-ups. Emergence of local communities and empowerment of cities’ governance bodies.

Societal Impact: Modal transfer increase; Reduction of CO2 emissions from personal transport; Reduction of transport fatalities in European cities; Improved relation between citizens and governance bodies; More options for urban planning authorities; Open access to data and information as an emerging right for citizens.

Economic Impact: Reduced costs related to traffic congestion, pollution and accidents (~ 502 B€ per year in Europe); Innovation ecosystem around Big/Open Data platform; Reduced costs due to value created by engaged citizens.

Smart Spaces – Blending the Physical World and the Virtual World

Mission: Create comfortable experiences for users and efficient resource optimisation solutions for businesses via applying advanced ICT to everyday working and living environments.

Motivation: EIT ICT Labs partners own a variety of advanced interaction and blending technologies as well as market channels (e.g. large industrial companies, SMEs, start-ups) that are capable of installing and managing complex systems and can act as solution or component providers.

Achievements 2016

Smart Retail Experience: One or few SSP initiated companies offer analytics services globally to retail industry. A number of SSP originating SMEs provide smart retail services to consumers globally and to major retail brands.

Smart Urban Experience: Public interactive screens used by advertisers to reach customers, starting from malls and busy public areas; Content creation and user experience for augmented reality solutions proven and first commercial services starting. Outdoor gaming companies have launched their first games.

Smart Buildings: New SMEs or large system integrators providing ICT-based indoor analytics solutions and flexible asset management for facility operators and large corporations; SMEs with co-working tools for office workers.

Societal Impact: Mainstream solutions and services for multi / Omni-channel retail, open street spaces and private as well as public buildings. New, virtually enhanced experiences of interacting with physical environments; Revitalisation of public spaces; Healthier and more comfortable work and living environments; Productivity gains.

Economic Impact: European companies gain market share in the addressed areas; Differentiation opportunities for innovative companies (new entrants possible, growth takes place via new business creation and via additional transactions stimulated by the new solutions); Improved asset utilisation (e.g. work productivity in smart offices, resources in office spaces, etc.).

Future Networking Solutions – Building Europe’s Communication Infrastructure of Tomorrow

Mission: Help to ensure the European lead in solutions and standards based on cost-effective as well as energy-efficient networking technology, which supports the traffic demands resulting from an ever increasing and variable set of applications.

Motivation: Establish global leadership of EIT ICT Labs partners and secure participation in high-growth (40% annually) market for network infrastructure. EIT ICT Labs partners can utilise Software Defined Networks to disrupt the market, reduce overseas dominance and enable European stakeholders to benefit from a horizontal approach to Internet of Things technology to efficiently address diverse societal challenges.
Achievements 2016

Green Mobile Access Networks: Demonstrated capability to manage 1000-fold traffic increase by 2020 in an energy-efficient way. Successful standardisation initiatives, incl. energy metrics standards adopted by regulatory agencies; Simulation tools for energy metrics; Substantial technology transfer and knowledge adoption.

Software Defined Networks (SDN): Successful feasibility demonstrations; Initial market introductions of technology components; Portfolio of created and/or coached start-up companies; Deployment of SDN and virtualised networks prepared for 2018.

Internet of Things (IoT): Demonstration of generic IoT communications platform and its use in key application areas; Readiness for broad deployment by 2018; Active start-up network “surrounding” the platform; Standardisation to achieve M2M support in networks.

Societal Impact: High-quality communications infrastructures, such as green high bandwidth mobile services are crucial for a good functioning of society as a whole. Services demanded by users for a “Digital Europe” provided at affordable network costs; Potential of IoT unleashed for widespread deployment, addressing societal challenges and user demands.

Economic Impact: Global lead of European network system vendors secured; Head start of 1-2 years for European players for “5G”; Successful standardisation as a market creating activity, potential for significant licensing income; Increased market share for the European SDN vendors, e.g. due to evidence for decreased CAPEX and reduced OPEX for operators and due to improved support for novel services and applications; EIT ICT Labs IoT communications platform recognised as leader (easy-to-adopt, attractive functionality, fast development for users), with a long list of active partners from several vertical segments.

Future Cloud – A Secure Data and Service Infrastructure for Europe

Mission: Drive European competitiveness in the area of Cloud services and Big Data via the deployment of trusted Cloud technologies and Big Data Analytics Cloud infrastructures.

Motivation: Europe’s companies can benefit from a robust and efficient mission-critical Europe-based Cloud computing infrastructure that is established by leveraging Europe’s strong position as trusted Cloud service provider as exemplified by European solutions such as unique Stratosphere platform. This infrastructure requires real-time performance with the guarantee of the highest level of security and privacy and includes the establishment of a European value-driven ecosystem and a user community for Big Data in the Cloud.

Achievements 2016

Trusted Clouds: European multi-Cloud platform over Telco network; New innovative trusted real-time Cloud services are validated and several market introductions are under preparation.

Big Data Analytics in the Cloud: Ecosystem and user community for Big Data and Cloud is established; Start-up with 3-5 ME sales; Number of successful Big Data / Cloud solution transformations in businesses across Europe.

Societal Impact: Solutions are trusted by businesses and end-users; Security, privacy and persistence of European citizen and business data will be preserved; Enhanced access to and value generation on Big Data results in better services for public sectors, healthcare, traffic, etc. used by the European citizens.

Economic Impact: New profitable innovative European businesses have been built around trusted multi-Cloud platforms and Big Data analytics services in the Cloud and are recognised, trusted and deployed in global markets.

Privacy, Security & Trust – A Protected Blended Life

Mission: Support users and businesses in protecting their digital assets and transactions, promoting robust and safe products and services that realise data privacy and security.

Motivation: Strong need (with continuously rising awareness) for cyber-security solutions currently not met by existing market offers, often due to fragmentation of solutions and regulations or due to lack of trust of current (e.g. US-based) providers. A perceived lack of safety slows down business operations and requires extensive and expensive risk management. EIT ICT Labs’ partnership (e.g. with mobile operators, technology providers) has suitable expertise and can place service offerings on the market and the European providers have trust advantage over US-based providers.

Achievements 2016

Digital Identity Management: Europe-wide federated identity platform; Privacy-aware and cost-effective EIT-ICT-Labs-endorsed e-authentication and identity management services and products to be commercialised, real-world testing in selected application scenarios, including e-payment, e-government, e-health, and smart spaces.

Data Privacy: Creative Commons licenses incorporating data privacy; Concrete technical solutions, in terms of software & hardware security tokens, for data privacy in selected application scenarios, including user profiling, e-voting, smart energy, and Cloud computing. Feasibility studies of end-to-end protection in data communications; market preparation and first commercially successful products and services.

Mobile Cyber-Security, addressing malicious software in mobile and online applications: Demonstrate problems with existing solutions; Innovative and cost-effective solutions for anti-malware protection, especially for mobile devices, e.g. by combining efficient client agents and Cloud-based services; Feasibility study of massive and privacy-aware anti-malware scanning of devices connected to the Internet.
In the EIT ICT Labs philosophy education and innovation go hand in hand. Master School students are exposed to the most recent innovations in the priority areas of the Action Lines. Master School Talents bring entrepreneurship.

3.1.1 Education: Feed the Action Lines with Talents

Master School Talents bring entrepreneurship

In the EIT ICT Labs philosophy education and innovation go hand in hand. Master School students are exposed to the most recent innovations via participation in Action Line activities via internships, idea competitions and start-up creation. At the same time, Action Line activities benefit from the ideas and skills Master School talents bring to the Action Line activities.

Summer School drive innovation uptake

As part of the dissemination strategy, Action Lines organise Summer Schools to educate students, researchers, and practitioners on the most recent innovations in the priority areas of the Action Lines.

Doctoral School Talents bring cutting edge technology

Doctoral students participate in Action Line activities by bringing results from their research to the Action Lines as well as getting inspired by Action Line challenges to pursue their research in specific directions. The Doctoral Training Centres play a specific role in bringing together doctoral students, teachers and business developers to target the research at the most promising opportunities in terms of impact.

3.1.2 | Research: Feed the Action Lines with Technology Insights and Opportunities

Underpin strategy planning of Action Lines

EIT ICT Labs’ ambition is to fulfil a meaningful role in accelerating time-to-market of innovations with tangible and relevant results. Towards 2016 the focus will be on underpinning the Action Line strategies with insights in mid-term techno-trends as well as through systematic consultation with Core Partners. In close collaboration with Core Partners the strategic plan and one or two (long-term) High Impact Initiatives will be defined.

Scout promising technologies early

EIT ICT Labs accelerates innovations based on research performed by its partners. To attract more researchers with promising projects, EIT ICT Labs will encourage and support partners’ consortia in relevant Horizon 2020 projects. Furthermore, the mechanism for scouting technologies will be improved. Evidence-based maturity evaluation criteria are to be integrated in the mechanism to assess opportunities and timely detect technologies that are ready to be pushed to the market. Additionally, the monitoring process of application & implementation of the Research Catalysts will be strengthened.

Drive utilisation of the Experience & Living Labs and testing infrastructures

Experience & Living Labs will play a major role in recruiting and involving stakeholders and end-user communities, executing experiments and analyzing data and results. EIT ICT Labs’ role here is to validate the user-related added value of new services and business models.

The main goal towards 2016 is to strengthen the existing infrastructures with focus on user-oriented Experience & Living Labs. By 2016, EIT ICT Labs will launch a brokering platform for partners to access and select the Experience & Living Labs and/or testing-related services that suit their needs. The brokering platform and the brokering approach will more generally also play an important role in EIT ICT Labs sustainability strategy.
into concrete success stories, meaning establishment of new ventures, market introductions of new business and growth towards European scale.

Enhance Action Line investments
Currently BDA activities are mostly directed to the local ecosystem around the Nodes. The main BDA goal towards 2016 is to align with EIT ICT Labs investments in innovation activities in the Action Lines supporting the commercialisation of the Action Line results. Scouted start-ups and SMEs will be clustered in business communities per Action Line. Additionally, the BDA will expose students from the EIT ICT Labs schools to Action Line-related business opportunities and support them with tools to create their own relevant start-ups.

Attract potential ideas and companies for Action Line activities and ecosystem
EIT ICT Labs will start in 2014 to execute an “EIT ICT Labs Idea Challenge” for each Action Line. The main aim is to enrich the Action Line portfolios with new complementary partners and ideas and to establish contact to entrepreneurs and innovators in their domain. Towards 2016, EIT ICT Labs will strengthen the entrepreneurial community and significantly improve the entrepreneurial spirit within the Action Lines as well as the Key Performance Indicators on new business creation. Crucial success factors are ensuring proper follow-up of the challenge, integrating received ideas and connecting companies to Action Lines activities and the partner ecosystem.

Ensure access to finance through portfolio of attractive contacts
To be able to quickly scale beyond national markets and compete against global players, it is essential to have access to specialised loans and investment capital. The main arm towards 2016 is to utilise the opportunities offered by the collaboration agreement signed with the European Investment Fund (EIF) in 2013. Additionally, EIT ICT Labs will extend its strategic relations with the investor community this transition by systematically connecting them to the European innovation strategies towards a more open innovation approach. To be able to quickly scale beyond national markets and compete against global players, it is essential to have access to specialised loans and investment capital. The main arm towards 2016 is to utilise the opportunities offered by the collaboration agreement signed with the European Investment Fund (EIF) in 2013. Additionally, EIT ICT Labs will extend its strategic relations with the investor community.

Table 3.1 Example T-shaped job profiles and selection of associated competence areas

<table>
<thead>
<tr>
<th>Cyber-security Engineer</th>
<th>Security Technology</th>
<th>Cyber-physical Architect</th>
<th>Sensors &amp; Actuators</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Database Technology</td>
<td>- Programming</td>
<td>- Network Technology</td>
<td></td>
</tr>
<tr>
<td>- Privacy</td>
<td>- Statistics</td>
<td>- Domain Knowledge</td>
<td></td>
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<tr>
<td>- Business Modelling</td>
<td>- Mathematics</td>
<td>- Embedded Systems</td>
<td></td>
</tr>
<tr>
<td>(Inter-)National Legislation</td>
<td>- Visualising &amp; Communicating</td>
<td>- Internet of Things</td>
<td></td>
</tr>
<tr>
<td>Big Data Analyst</td>
<td>- Programming</td>
<td>Urban Systems Architect</td>
<td>- Converging Technologies</td>
</tr>
<tr>
<td>- Statistics</td>
<td>- Domain Knowledge</td>
<td>- Policy</td>
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<tr>
<td>- User Experience</td>
<td>- Embedded Systems</td>
<td>- User Experience</td>
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<tr>
<td>- Internet-of-Things</td>
<td>- Business Modelling</td>
<td>- Complex System Design</td>
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<td></td>
<td>- Multi-disciplinary Teams</td>
<td>- Networks &amp; Services</td>
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<tr>
<td>Interaction Designer</td>
<td>- Interface Technologies</td>
<td>Health Architect</td>
<td></td>
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<tr>
<td>- User-driven Design</td>
<td>- User Experience</td>
<td>- ICT Innovations</td>
<td></td>
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<tr>
<td>- Living Labs</td>
<td>- Domain Knowledge</td>
<td>- Ethics</td>
<td></td>
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<tr>
<td>- Multi-disciplinary Teams</td>
<td>- Network Technology</td>
<td>- Business Modelling</td>
<td></td>
</tr>
<tr>
<td>- Visualising &amp; Communicating</td>
<td>- Domain Knowledge</td>
<td>- Convincing Stakeholders</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.2.1 Education: Deploy Innovative Blended Learning Programmes

*Strengthen the innovation possibilities of established large ICT corporates*
It is vital for Europe that the established ICT companies change their innovation strategies towards a more open innovation approach. Towards 2016, EIT ICT Labs will support its large corporate partners in this transition by systematically connecting them to the European start-up and entrepreneurial scene and developing methodologies and tools to quickly integrate start-up and entrepreneurial teams into their business models. It is crucial for the results of the Action Lines as well for the European SME community to get access to the Merger & Acquisition and scouting departments of the large corporates. The BDA will establish these connections and organise match-making events in order the establish a European deal flow on technologies, SMEs, ideas and talents.

3.2.2 ENTREPRENEURIAL EDUCATION: EMPOWER ICT TOP TALENTS FOR THE FUTURE

Educate Technical Entrepreneurs
Via its education programmes, EIT ICT Labs intends to improve the availability of excellent T-shaped professionals for the European industry. These “Technical Entrepreneurs”, as they may also be described, combine technical skills with domain expertise. They also offer innovation skills, entrepreneurial skills and creativity skills. Table 3.3 provides examples for T-shaped job profiles that are expected to become relevant in the context of the EIT ICT Labs Action Lines.
Mission: Create T-shaped professionals with state-of-the-art technical excellence in key ICT areas, especially in those addressed by the EIT ICT Labs Action Lines. The goal is to establish a world-renowned Masters Level Education brand.

Achievements 2016
Consolidated Education of T-shaped Professionals: Strong interest in the programmes as demonstrated by growing number of completed applications, Strong study performance ratios and growing number of graduates per year; Critical mass of students at all EIT ICT Labs nodes, Sustainable balance between paying students and students with scholarships.

Establishment of a Strong Masters Level Education Brand: Scoring system established and used for continuous improvement towards better scores (student satisfaction, partner satisfaction). Regular evaluation of public perception (e.g. via press articles) shows progress towards brand establishment; Suitable measures established and monitoring started for career success for alumni (including new ventures) and strong indications for career success of alumni (shorter time to job / to promotions, better average salary, better entry-level salary). Growing number of bilateral agreements with non-partner universities.

Societal Impact: EIT ICT Labs alumni are hired quickly into attractive positions and move fast towards their first promotion(s); EIT ICT Labs alumni stimulate innovation within Europe; Other Education programmes within Europe are adjusted to follow the lighthouse approach created by EIT ICT Labs; Students across Europe are aware of the EIT ICT Labs programmes and posit their alma mater.

Economic Impact: Key industry positions can be filled without delays with excellent candidates; EIT ICT Labs alumni create new companies, with positive economic impact as well as attractive employment opportunities; European ICT industry is aware of the EIT ICT Labs programmes as an excellent source for highly skilled staff with unique innovation and entrepreneurship capabilities; European ICT industry gradually achieves a higher rate of innovation successes.

Doctoral School – Tomorrow’s ICT Leaders
Mission: Create world-class ICT Leaders with deep technical expertise in key ICT areas, especially in those addressed by the EIT ICT Labs Action Lines, in combination with strong background in Innovation & Entrepreneurship and establish a world-renowned Doctoral School brand.

Achievements 2016
ICT Leaders: 120 doctoral graduates with innovation and entrepreneurial skills and competences per year (from 2017 or 2018 onwards). First cohort of doctoral candidates finish the entire cycle and receive the EIT certificate (2015).

Doctoral School Brand: Being recognised as a valuable resource by business partners and as a valuable education programme by thesis directors for their doctoral candidates; Employability of Doctoral School graduates confirmed and well-known by partners and throughout the ecosystem; Proven excellence of the innovation and complementing the traditional disciplinary- and technology-focused tracks with more hands-on innovation and entrepreneurship skills, the Doctoral School can play a unique role in generating European ICT leaders that are equipped with the capability to identify innovation and business opportunities.
entrepreneurial education becomes a role model for other scientific domains not covered by EIT ICT Labs.

Societal Impact: EIT ICT Labs alumni are hired quickly into influential leadership positions, from where they stimulate innovation and business creation. Concept of the Doctoral School education is adapted by European Higher Education Institutions to follow the lighthouse approach created by EIT ICT Labs. Students across Europe are aware of the EIT ICT Labs programmes and consider them for their Doctoral Level ambitions; Educators advise students to consider the EIT ICT Labs Doctoral School.

Economic Impact: Leadership positions within the European ICT industry can be filled without delays with excellent candidates; EIT ICT Labs alumni create a more innovative European ICT industry, which leads to positive economic impact; European ICT industry is aware of the EIT ICT Labs programmes as an excellent source for highly skilled leaders with unique innovation and entrepreneurship capabilities and gradually achieves a higher rate of innovation successes.

Professional School – Certified ICT Competence

Mission: Raise the ICT competence level of Europe’s professionals, especially in those key ICT areas that are covered by the EIT ICT Labs Action Lines, via blended learning packages of technology updates with peer-education. The offerings will have a multimodal approach created by EIT ICT Labs. Students across Europe are aware of the EIT ICT Labs programmes and consider them for their Doctoral Level ambitions; Educators advise students to consider the EIT ICT Labs Doctoral School.

Economic Impact: Leadership positions within the European ICT industry can be filled without delays with excellent candidates; EIT ICT Labs alumni create a more innovative European ICT industry, which leads to positive economic impact; European ICT industry is aware of the EIT ICT Labs programmes as an excellent source for highly skilled leaders with unique innovation and entrepreneurship capabilities and gradually achieves a higher rate of innovation successes.

Motivation: The high relevance and dynamism of ICT in most areas of life and business leads to a strong need to stay current for professionals on all levels, no matter whether they are working in ICT or in other sectors that apply ICT. Companies and societal organisations need to learn how major ICT technology trends may change their business, will have to adapt their workforce and HR strategy to new technologies. The target group of professionals and executives is subject to time constraints, prefer on the job learning and is heavily stimulated by learning from peers. EIT ICT Labs can assist the European workforce with critical knowledge and skills especially in those areas that are covered by its state-of-the-art Action Lines. Building on its toolset of the partner network, Co-locations and Online Platform, EIT ICT Labs can develop and operate the blended education programmes that optimally match the needs of busy professionals and their employers, incorporating peer education elements and providing relevant certifications.

Achievements 2016

Certified Professionals Accelerate Innovation: Continued strong interest in the professional education programme offerings; Accepted pricing levels cover costs; Broad range of programmes operational and key Action Line content fully covered; Close relationship with innovation departments of EIT ICT Labs partners; Flawless operation of programme platform and processes.

Establishment of a Strong Professional-Level Education Brand:
EIT ICT Labs programme certifications are recognised as positive differentiator for professionals and the EIT ICT Labs programme is preferred outlet for education partners; Positive feedback received in programme satisfaction surveys, both from learners as well as from their employers; Regular evaluation of public perception (e.g. via press articles) shows progress towards brand establishment; Suitable measures established and monitoring started for involvement of programme participants in innovation activities within their companies.

Societal Impact: European employees have an additional effective option to improve their employability and marketability; European workforce capable of establishing innovation leadership in areas addressed by EIT ICT Labs Action Lines; Further improved innovation culture and skills within European society.

Economic Impact: Programme participants work on successful key innovation programmes within their companies; Increased innovation rate (and resulting positive economic effect) within companies that utilise the programmes; Companies can innovate effectively as participants in the EIT ICT Labs Action Lines and allocate their best team members in combination with suitable professional education programmes.

3.3.2 Establish a Recognised EIT ICT Labs Brand based on Blended Learning

The main ambition of the education domain towards 2016 is to establish EIT ICT Labs as a recognised brand for ICT education for students and employers by scaling up the Master- and Doctoral Schools, developing a Professional School, and deploying novel ICT online learning platforms to deliver a blended combination of virtual and physical presence education. The start of an EIT ICT Labs Alumni network should result in a vibrant and active community.

The education activities should lead to global competitive access to top ICT talent for employers, and enable a wave of new entrepreneurs to create successful ICT ventures. Towards 2016 EIT ICT Labs will focus on blending the education activities even stronger with the research- and business activities within the Action Lines. To this end Master and Doctoral students will be stimulated to participate in innovation activities.
Strengthen integration of business experience

Strong industrial presence in the different Master Programmes is a crucial success factor. Therefore, thematic Summer Schools will be organised in all Action Lines, to increase industrial partner commitment and involvement as well as introduce students to real-life business cases. Furthermore, commitment of industry will be sought for project courses, mentorships and internships.

Doctoral Training Centres are established as hot spots where doctoral students, industrialists and academic faculty meet and together develop the doctoral students to two-tiered PhDs; academic and industrial with a solid business experience. The involved business schools and industrial partners will participate in the governance and operation of the Doctoral Training Centres. They will ensure the definition of the addressed themes, providing scientific and business challenges as well as funding for doctoral candidates. A critical mass of 200 doctoral students participating in the school should be reached by 2016.

Towards 2016, the Doctoral School will actively work on the development of innovation and entrepreneurial content, course deployment across the participating Higher Education Institutes and closely monitor the progress. Intensive efforts, both centrally and locally, within the Doctoral Training Centre framework will be made to ensure strong business engagement in the actual operations to host the final requirement of the innovation and entrepreneurial certification, called the Business Development Experience.

**Inject Online Learning Platform**

Towards 2016, the Professional School will be further developed towards a large-scale initiative consisting of online learning platforms with a growing portfolio of technical, science and business modules. Having access to an online learning platform enables EIT ICT Labs to provide blended education programmes that combine the benefits of classroom learning with the advantages of online learning. The online learning platforms will align the skills of students and needs of employers effectively with the offerings of the education providers and can easily be complemented with different social platforms. Underlying scientific work will be performed on optimising e-Learning processes based on promises for improved pedagogy and increased effectiveness of students and teachers. The online courses facilitate a broader outreach for the Master School and help EIT ICT Labs to promote selective lifelong learning. Instruction videos on various topics (e.g. High Impact Initiatives, Master School registration process, activity proposal submission process, etc.) can be offered via the platform as well.

**Monitor uniformity and quality of the Schools**

Monitoring the uniformity and quality of the innovation and entrepreneurial modules of the schools will be one of the priorities towards 2016. The EIT label is essential for the quality brand of the schools and of particular importance to safeguard that the innovation and entrepreneurship skills hold the highest quality. New concepts and an internal Quality and Learning Enhancement (QALE) system will be introduced by 2014. This assessment will involve students, Alumni and the partner companies. Comparing the forthcoming results with “good practices” from other existing KICs will further improve the Schools and inform the newly created KICs on how they should design their own education lighthouses.

3.3 | Pan-European Ecosystem: A Vibrant Ecosystem of Innovation Hotspots

The physical EIT ICT Labs ecosystem consists of seven Interrelated Core Nodes and two Associate Partnerships. These EIT ICT Labs Nodes are regional anchor points for involving and empowering the partner network (see Figure 3.8). They represent local ICT communities with strong links to leading national stakeholders creating impact on (and synergies with) national programmes and initiatives while providing each of them a window to Europe. Within the Nodes, physical Co-location Centres (CLCs) are established. These CLCs act as meeting places for all those engaged in ICT education and innovation. They are the core of EIT ICT Labs strategy driving the desired change in European ICT innovation culture from “knowledge investment” to “value extraction” through on premise execution of activities stimulating the mobility of people, ideas, technologies and investments.

3.3.1 | Strengthen Excellence of the Ecosystem

**Strengthen strategic industrial footprint**

Towards 2016, EIT ICT Labs will further improve the commitment of industrial partners who are endorsing the adopted open innovation principle. Existing business contacts with the Core Partners will be strengthened at executive level by involving them in the strategic dialogue on EIT ICT Labs’ future. New prominent industrial partners from the local ecosystem will be attracted. To increase impact and market penetration, application partners and partners from outside the ICT industry, the end-user community (see paragraph 4.2), will also be involved.

**Co-location Centres as stimulating innovation environments**

With its Co-location Centres (CLCs), EIT ICT Labs has created physical spaces in which innovation and entrepreneurship are brought to life through a portfolio of catalysing activities. The CLCs are the physical representation of the integration of Education, Research and Business. Professionals with different backgrounds, from different organisations and from different countries come together, united by a common mission of collaboration and openness, to work and learn together in a stimulating environment. When professionals return to their original organisations after spending a period of time at a Co-location Centre, they will have broadened their networks and gained experiences they otherwise would not have had access to. In this way, the CLCs provide an excellent opportunity for personal development and growth for professionals, who are exposed to this environment for a longer period.

Towards 2016, the strategic intention is to further emphasise the role of the CLCs by shifting more activities towards these physical collaboration spaces, including a significant percentage of the High Impact Initiatives, and by further improving their infrastructure and thus their attractiveness.
regions (Regional Innovation Schemes) and thematic focal areas to reach out to after 2016.

Connect to the USA via a true two-way street
EIT ICT Labs ambition is to set up an outpost at Silicon Valley in collaboration with its partners to establish a two-way, equal-base, Europe-USA connection. EIT ICT Labs Nodes and their partners are already tightly connected with the ecosystem in the Silicon Valley. Many EIT ICT Labs partner universities have collaborations with universities like Stanford or UC-Berkeley. Large companies from the EIT ICT Labs network have their own facilities there, as well as a focus on research collaboration and technology scouting. In addition, many European ICT-related SMEs and start-ups are setting up offices and/or seeking investment capital in Silicon Valley. Main targets towards 2016 are: 1) to enhance mobility of ICT innovators (researchers, doctoral students, entrepreneurs, SMEs and investors) between the Nodes and Silicon Valley, 2) to stimulate joint work on selected initiatives, and 3) to improve access to finance. Opportunities within the BRIC countries will be explored towards 2016. More intense collaboration is envisioned after 2016.

Communication as a strategic tool
EIT ICT Labs uses communication as a strategic tool to interact with its stakeholders on the established strategy, operations, achievements, and brand. The strategic communication objective is to establish EIT ICT Labs as a recognised brand in education and research-based innovation and to build trust amongst stakeholders and better understand their needs and demands. For the period towards 2016, EIT ICT Labs will further improve its communication performance by evaluating the impact it has on its target audience.
A Longer-term Perspective on the EIT ICT Labs Environment, Innovation Opportunities, Impact Measuring, IP Policy and Sustainability

4.1 RELATIONSHIP BETWEEN EIT ICT LABS AND THE ENVIRONMENT

Shaping future European innovation activities through strategic collaborations

So far, EIT ICT Labs has contributed to several international platforms, initiated structural partnerships and has established high-level contacts in the USA and China in order to set its footprint and impact across its Research, Business and Education activities (see Figure 4.1).

Connect to application partners in the innovation areas of EIT ICT Labs

For EIT ICT Labs to be as relevant as possible, it is very important to identify the exact ICT needs within the end-user community. Several of these communities are (or will be) engaged through other KICs. The current Action Line “Smart Energy Systems” will serve as a pilot of these communities are (or will be) engaged through other KICs. For EIT ICT Labs to be as relevant as possible, it is very important to identify the exact ICT needs within the end-user community. Sever-

“Cyber-Physical Systems” and “Future Urban Life & Mobility” will connect to the related future KICs (see figure 4.2). Collaboration with end-users will be sought on a project-by-project basis. The EIT ICT Labs Summer Schools and deployment of Catalysts in all application areas will further strengthen the ecosystem.

Connecting to ICT related ecosystems worldwide

EIT ICT Labs’ unique feature is that it creates a system of ecosystems. By connecting physical innovation hotspots (EIT ICT Labs Nodes), EIT ICT Labs has been able to leverage proven successful approach-

es and instruments in a short time. On a global scale, there successful ICT related innovation ecosystems can be identified which could be considered as innovation ecosystems of a similar - or larger - scale (see figure 4.3). In maturing over the years they have built up experi-

ence in how to organise complex ICT ecosystems with considerable impact. By connecting to these ecosystems EIT ICT Labs will be able to learn from these lessons learnt, facilitate access to their resources and benchmark its progress giving insight in possible improvements and supporting strategic decisions towards the future.

4.2 LONGER-TERM PERSPECTIVE: OPPORTUNITIES ON THE HORIZON

Via its Innovation Radar EIT ICT Labs continuously monitors tech-

no-socio-economic trends in order to steer innovation and to be well prepared for disruptions that profoundly change our lifestyles or industries. Given the EIT ICT Labs mission to bring technolo-
gies to the market, timing is of utmost importance. The strong EIT ICT Labs research partners drive technology development and enable early detection of innovation opportunities. Via precise tim-
ing, the EIT ICT Labs business partners can accelerate valorisation,

3-D Printing: Next to challenges in mechanics and material science, 3-D printing also needs ICT to reach its maximum potential, e.g. to optimally utilise the flexibility resulting from a highly decentralised production infrastructure, integrating this into supply chain management and supporting new business models.

Supercomputing: Computing paradigms based on optical methods, carbon nanotubes and/or quantum principles may once again allow further extension of Moore’s law and lead to a next revolution in available computing power, further commoditising “regular” computing capabilities. This enables previously unimaginable high-end applications and generating even higher data transmission bandwidth demands.

Collaborative Consumption: A society, in which sharing becomes part of the culture, requires robust and secure tools (potentially

| Highlights of main strategic collaborations |

| Access to finance: Through the collaboration with the European Investment Fund, EIT ICT Labs will leverage the investment tools of the European Investment Fund with the investment cap-

| Market pull: Through its connection with EuroCIO, EIT ICT Labs will promote ICT as an innovation accelerator in a broad area of application areas by introducing engaged partners, relevant ed-

| Accelerate innovation: Future Internet PPP will accelerate the development and adoption of Future Internet technologies in Europe, advance the European market for smart infrastructures, and increase the effectiveness of business processes through the Internet. EIT ICT Labs will collaborate with this European pro-

| Figure 4.2 Interconnection between EIT ICT Labs and other KICs |

| Figure 4.1 Strategic Alliances across Research, Business and Education activities |

| DG-Connect | Directorate General for Communications Networks, Content & Technology |
| SIF | European Investment Fund |
| EuroCIO | The European CIO Association |
| FI-PPP | Future Internet Public-Private Partnership |
| FIRE | Future Internet Research & Experimentation |
| ETSI | European Telecommunications Standards Institute |
| ERI | European Research Council |
| ITEE-2 | Information Technology for European Advancement - 2 |
| GSMA | GSM Association (Association of Mobile Operators and related Companies) |
| TDL | Trust in Digital Life partnership |
including virtual currencies) to manage common ownership and usage.

Brain Understanding: Truly understanding the human brain as a biological supercomputer, as intended by the €1.8 Human Brain Project, requires a combination of ICT and Biology. This interplay is expected to create new ICT paradigms via biology-inspired engineering.

Technological Singularity: Further advances in computing power and effective machine learning techniques lead to the point where artificial intelligence surpasses human intelligence for an increasing number of knowledge-intensive tasks for which automation becomes possible. Next to new opportunities, this development leads to profound questions as to whether man or machine is in control.

Ambient Computing: As sensors that are connected to the Internet of Things continue to get smaller and less expensive, ever more measurement data becomes available for interpretation.

Context-based Interfaces: Systems that learn to anticipate their user’s intentions are more efficient, but also cause concerns about privacy and fault tolerance.

Graphene material science: Optimally creating new materials based on graphene and using them for innovative applications is the second €1.8 project supported by the EU for which ICT skills and tools (e.g. for simulation) are needed.

Work-Life Integration: Rather than just balancing work and life, employees will increasingly blend their private, social life with their work life. They and their employers need fitting solutions to facilitate and manage this.

Aging Population: This inevitable demographic trend has far reaching consequences throughout society and economy. ICT-supported solutions become increasingly important to support seniors and their families and to help with managing the associated challenges.
While the current set of EIT ICT Labs KPIs regularly measures the output in a number of important categories, it does not yet truly measure the longer-term impact for the European ICT economy. For example, the number of created start-ups is measured, but neither their long-term success nor their economic impact in terms of jobs created. Similarly, the number of graduates is measured, but not their positions with European ICT companies and their success in the marketplace. Without neglecting the current parameters, EIT ICT Labs will shift further towards measuring its long-term impact.

EIT ICT Labs’ ambition is to create impact through excellence. Excellent tools to stimulate innovation acceleration will create successful companies, products and services with significant market impact. Excellent education programmes with a lighthouse character will breed graduates that will move into key roles within the European ICT industry and create a reputation for themselves – they will be noticed, talked about and reproduced. This is what EIT ICT Labs intends to accomplish and progress towards this desired state should be measured at all appropriate times. This includes ensuring at the start of each activity and to consider IP protection measures at all appropriate times. This includes ensuring at the start of each activity and to create a safe collaborative environment.

4.4 | TOWARDS AN IP POLICY STIMULATING OPEN AND COLLABORATIVE INNOVATION

Intellectual Property (IP) is a critical element in innovation management, which is especially true in the field of ICT. IP-related concerns can have a limiting and decelerating effect on open and collaborative innovation. In this context, the EIT ICT Labs IP Committee has developed a set of IP policy guidelines with the main objectives of supporting an open and collaborative innovation approach, creating a trusted environment for knowledge exchange and sharing and facilitating a fair profit sharing model.

This IP policy builds on existing IP schemes for base activities (carriers) and develops own guidelines for the KIC added value activities (Catalysts), with the intention to provide clear guidance on all relevant IP aspects to EIT ICT Labs’ partners as well as the KIC Legal Entity itself. The policy addresses sharing of information, ownership and access rights and return on investment.

EIT ICT Labs supports all types of open innovation and expects from ICT Labs partners and the KIC Legal Entity will be used for the further transparency with respect to the handling of IP at the start of each activity and to create a safe collaborative environment.

With the current IPR policy, an important step has been made towards an open and collaborative innovation practice. EIT ICT Labs will further elaborate on this through a strengthening of the IP function and the IPR management in the coming years. This will take place in an iterative way of working, where the experiences of the EIT ICT Labs partners and the KIC Legal Entity will be used for the further evolution of the guidelines.

4.5 | TOWARDS A SUSTAINABLE FUTURE

EIT ICT Labs is financially supported by the EIT. The EIT financial support constitutes 25% of the EIT ICT Labs budget while the remaining 75% is raised from the ecosystem. In order to create a more sustainable future with reduced dependency on EIT financial support EIT ICT Labs has investigated the subject of sustainability in 2012 EIT ICT Labs together with external consultants. In order to fundamentally explore sustainability of a novel entity like a Knowledge and Innovation Community it is key to analyse current investment of the EIT financial support. The EIT financial support is exclusively invested in the catalysing activities that broadly fall in four categories: 1) the Catalyst activities to run the ecosystem including its Co-location Centres, 2) the Research Catalyst activities focused on maturing and experimenting promising technologies, 3) Education Catalysts focusing on entrepreneurship and mobility (to a large extent via scholarships) and 4) Business Catalysts focusing on bringing technologies to the market and providing access to finance for start-ups and SMEs.

These different investment categories offer different opportunities for alternative financing. Running the ecosystem for example might be financed via service offerings to players in and outside the ecosystem. While the investment into scholarships can be addressed by a combined approach of fewer scholarships, as a result of growing reputation of the EIT ICT Labs education, and scholarship fundraising where also the EIT Foundation could play a role.

Based on the 2012 investigation, in 2013 a number of schemes have been developed that will be deployed in 2014. Example schemes are Brokering platforms for Experience & Living Labs, Support services for growing companies, Professional education activities and services provided to the pan-European ICT ecosystem.

In a strategic dialogue with EIT, EIT ICT Labs will further develop its sustainability schemes in the coming years, incorporating experiences from its current schemes.
In 2009, EIT ICT Labs set out to radically accelerate ICT innovation in Europe by:
- Invigorating the innovative spirit within the existing European ICT industry;
- Creating a new generation of entrepreneurial engineers;
- Catalysing new ventures that can grow to become future world leaders.

By 2013, after the conclusion of its start-up phase, EIT ICT Labs is established, recognised and well on its way towards realising its ambitions by delivering:
- A pan-European ecosystem of ICT innovation Co-location Centres stimulating the mobility of people, ideas, technologies and investments;
- Scalable Pan-European Master and Doctoral Schools focused on excellence, systemic change through technical programmes with deep embedding of innovation and entrepreneurship, and delivering T-shaped talents with a passion for innovation;
- A portfolio of Action Lines integrating Education, Research and Business and driving research-based innovations to the market;
- A pan-European Business Development Accelerator driving value extraction and entrepreneurship;
- Strategic collaborations with established players such as the European Investment Fund, Future Internet PPP, ITEA, and the European CIO Association.

For the period 2014 - 2016, EIT ICT Labs will further step up by pursuing specific and ambitious goals, including:
- Expanding its impact through London as full Node, by rolling-out X-Europe EU-28 and by connecting to Silicon Valley;
- Scaling the Master and Doctoral Schools, building and running the Professional School, and via deployment of online platforms, bringing European universities the future of blended education;
- Carrying out a balanced portfolio of top-down High Impact Initiatives as well as bottom-up activities in a set of focused Action Lines that target vital European interests;
- Expanding the pan-European Business Development Accelerator for value creation and further drive of entrepreneurship amongst others via idea competitions.

EIT ICT Labs will be established as a renowned vibrant pan-European ICT ecosystem that is a recognised entrepreneurship and innovation driver as well as an established educator of Technical Entrepreneurs. Continuing on this journey that is characterised by a passion for innovation, a focus on quality and a drive for results, EIT ICT Labs has the ambition to be a lighthouse and a desired ICT innovation partner. Through its societal and economic impact EIT ICT Labs wants to be a continuous driver of innovation that, on a European scale, opens new avenues for the consistent creation of economic growth and enhancement of quality of life.

Acknowledgement

The creation of this Strategic Innovation Agenda has been supported by many contributors from inside and outside of the EIT ICT Labs organisation.

EIT ICT Labs very much appreciates these efforts and thanks everybody, who has been involved, for their very valuable contributions and for their invested time.

The creation of this Strategic Innovation Agenda has been assisted by PwC Consulting, which conducted the stakeholder interviews and led the information collection as well as the writing of the document.
A.1 Synthesis External Stakeholder Perspective

LIST OF INTERVIEWEES
1. Alexander von Gabain, Chairman of EIT Governing Board
2. Anton Schaal, CEO at Océ
3. Axel Kupper, Professor for Service-centric Networking at Telekom Innovation Laboratories, TU Berlin
4. Diomenico La Fiorenza, Director Institute for Informatics and Telematics of the Italian National Research Council
5. Erik Redderus, Managing Director Information Society at TNO
6. Fred Bloehorst, Senior Vice President Philips Research at Philips
7. Guido Stephan, Head of Research Networks and Communications Technologies at Siemens
8. Heinrich Arnold, Senior Vice President Innovation and Laboratories at Deutsche Telekom AG
9. Henning Kagermann, Chairman EIT ICT Labs Executive Steering Board
10. Henry Tirri, CTO at Nokia
11. Zoltán Horváth, Professor and head of Informatics faculty, Eötvös Loránd University
12. Ilkka Niemelä, Professor and Deputy President at Aalto University
13. Jean-Charles Pomerol, Professor of computer science at Université Pierre et Marie Curie of Paris
14. Jordi Curell, Director higher education and international affairs at DG Education and Culture
15. Manuelo Hermenegildo, Professor and director Instituto Madrileño de Estudios Avanzados
16. Marko Erman, CTO Thales Group
17. Michel Cosnard, Professor and Chairman & CEO of Institut national de recherche en informatique et en automatique (Inria)
18. Olivier Stock, Director of Centro per la Ricerca Scientifica e Tecnologica
19. Oscar Cicchetti, VP Strategy Telecom Italia
20. Pär Hedberg, CEO Stockholm Innovation & Growth (STING)
21. Paul Jenkins, head of Strategic Programmes at British Telecom
22. Peter Gudmundsdotn, President at KTH Royal Institute of Technology
23. Sara Mazur, Vice President and Head of Ericsson Research
24. Tatu Koljonen, Professor and Vice President VTT Technical Research Centre of Finland
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INTERVIEW QUESTIONS

Introduction/background
1. What is your role in your organisation? What is your involvement within EIT ICT Labs?
2. What is the motivation of your organisation to be part of EIT ICT Labs?
3. How is this involvement organised within your organisation? Is this effective?

Perspective on EIT ICT Labs
4. What are the most important ICT developments and challenges in Europe the coming 3 to 5 years from the perspective of your organisation?
5. Where can EIT ICT Labs make the biggest impact with regard to these developments and challenges?
6. Which role do you expect EIT ICT Labs to play in overcoming these challenges given its mission to speed up the market uptake of research-based ICT innovations? What should be the anticipated results in 2016?
7. How would you describe the main added value of EIT ICT Labs for your organisation? Which key mechanisms and/or activities are supportive in creating this added value?
8. How do you see the role of (life-long) education within EIT ICT Labs?
9. Which of the existing thematic Action Lines of EIT ICT Labs are relevant for your organisation? If you could define one additional Action Line, which one would it be?
10. What do you believe are the biggest achievements of EIT ICT Labs to date? How did your organisation benefit from them?
11. What would your top three suggestions be to further strengthen the impact of EIT ICT Labs?
12. How can your organisation contribute to this? What is needed to enable your organisation to realise this contribution?

SYNTHESIS OF EXTERNAL STAKEHOLDER PERSPECTIVE

Approach:
− 24 stakeholders (selected by EIT ICT Labs) interviewed during October 2013
− 9 Common questions have been asked to all interviewed partners regarding the focus and impact of EIT ICT Labs
− Common denominators and discrepancies have been analysed and synthesised in the figure below
− Key words in the inner circle are those that are most strongly supported by partners
HEALTH AND WELLBEING

Mission of the Action Line: Reduce the demand for expensive healthcare by detecting small physical and mental health issues early and avoiding larger health problems by suitable lifestyle interventions.

Opportunities that EIT ICT Labs invests in: Global and societal trends, like the aging population and growing consumer empowerment, demand an innovative and entrepreneurial ICT-enabled and supported approach. The EU28 population’s annual healthcare expenditure has risen to €1,085 billion, a substantial share of which arises through secondary prevention, long-term care and home-care (€90 billion). These costs are increasing towards 2030, while the available budget and the number of caregivers are shrinking. The Action Line will act on this challenge by offering ICT-based solutions that respond to the consumer demand for self-monitoring (quantified self), while these solutions will also reduce the costly demand for secondary prevention, cure and care for caretakers and insurers. Effectiveness is ensured by focusing on primary prevention areas where regulations are less strict, which allows for the application of a more diverse set of ICT-enabled solutions and consequently encourages entrepreneurship.

The Challenges addressed by EIT ICT Labs: In order to realise these ambitions, EIT ICT Labs faces three key challenges: 1) ensure the availability of affordable unobtrusive vital signs sensors, in order to mature these primary prevention product service combinations and bring them to the market; 2) overcome the fragmentation of the European domestic market, which in healthcare is an even bigger challenge than in other sectors due to the cross-member state differences in legislation, healthcare financing and healthcare processes; and 3) leverage on the European lifestyle and wellbeing businesses that have competitive advantages opposed to their US counterparts with regards to their IPR portfolios, partnerships with traditional health care sector and ecosystems of innovative SMEs. However, European businesses need to increase their consumer-orientation compared to non-European competitors.

EIT ICT Labs achievements to date: The past achievements of the Action Line have been the founding of one start-up company (Mirror Mirrors in Stockholm) and eight technology / knowledge transfer cases with established companies like Philips and Human Capital Care. The results of these cases included: 1) a CE-certified wristband (IT/2) for the measurement of Skin Conductivity for experiments and concept validation in two business-oriented application areas (B2B and B2C), 2) a patch-based sensor device to measure heart rate, 3) a remote sensor device (a sleep mirror in Stockholm) and eight technology / knowledge transfers. The Action Line have been the founding of one start-up company (Mirror Mirrors in Stockholm) and eight technology / knowledge transfer cases with established companies like Philips and Human Capital Care. The results of these cases included: 1) a CE-certified wristband (IT/2) for the measurement of Skin Conductivity for experiments and concept validation in two business-oriented application areas (B2B and B2C), 2) a patch-based sensor device to measure heart rate, 3) a remote sensor device (a sleep mirror in Stockholm) and eight technology / knowledge transfers. The Action Line have been the founding of one start-up company (Mirror Mirrors in Stockholm) and eight technology / knowledge transfers.

EIT ICT Labs strategy for 2014 – 2016: Open up the market of active healthy ageing by providing affordable unobtrusive ICT-enabled mental, physical and social wellbeing services. Focus on common or consumer-level devices. Leverage on EIT ICT Labs partner-owned “quantified self” technology, market access and connected business communities. Focus on two priorities with maximum societal and relevance.
economic impact: early detection of physical (cardiac) anomalies and early detection of mental anomalies.

**Priority 1: Early detection and treatment of physical anomalies with a focus on cardiovascular diseases (physical wellbeing)**

**Description:** Cardiovascular disease is estimated to cost the European economy €196 B a year, 54% due to healthcare costs, 24% due to productivity losses and 22% due to the costs of informal care. Unhealthy lifestyle factors among individuals at risk of heart disease were found to cause 17-18% of the attributed costs. There is a need for mature product/service combinations intended to prevent, detect and monitor cardiac anomalies in an early stage and that will slow down physical decline. EIT ICT Labs partners own “quantified self” technology and have access to the world market amongst others via Philips and Siemens.

**Strategic steps:** Focus on avoidance of cardiac events via cardio fitness programmes, early detection services for preventive healthcare and cardiovascular monitoring solutions for early detection of anomalies; Mature solution out of research prototypes; Create awareness about potential of primary prevention (target group is one third of adult population with cardio vascular condition); Collection of long-term evidence data; Generate effectiveness evidence; Build a complete (“closed loop”) B2B solution; Professional claim validation.

**Results/deliverables 2016:** Production and commercialisation of a B2C Cardio Fitness solution via start-ups and transfer of sensors, smart algorithms and applications to exiting companies; Evidence for effectiveness of solution; Introduction of at least three solutions (e.g. lifestyle / health, sports and high risk jobs).

**Impact 2016:** Societal Impact: Improved quality of life through early treatments and saving lives due to reduction of fatal strokes.

**Economic Impact:** Reduced productivity loss and related (medical and informal) care costs due to less hospitalisation; EIT ICT Labs partners gain market share of the €300 M Market in 2020.

**Priority 2: Early detection and treatment of mental deterioration with a focus on stress and dementia (mental wellbeing)**

**Description:** Mental decline (dementia) is a key challenge modern western societies are facing. The total estimated worldwide costs of dementia were €504 B in 2010. In high-income countries, informal care (40%) and formal social care (40%) account for the majority of costs, while the proportionate contribution of direct medical costs (15%) is much lower. There is a need for product/service combinations for the early detection of cognitive decline by means of unobtrusive wearable sensor technology, aiming to slow down mental decline. EIT ICT Labs partners own “activity of daily life sensing” technology and have access to the world market amongst others via Philips and Nokia.

**Strategic steps:** Focus on avoiding burn-out and dementia care. Stress / burn-out: Productionisation of matured and validated stress management solution via an “internal crowd funding” approach; Pilot production (revenue €35K), stimulate B2B and B2C roll-out (stress is one of the top five diseases by 2020); Collection of long-term evidence data. Dementia: Mature the 2013 solutions generate evidence for detection and prevention effectiveness; build complete (“closed loop”) detection solution and lifestyle advice system for B2B market; productionisation and commercialisation for B2C market (target group one third of the population age 45-70); Collection of long-term evidence data.

**Results/deliverables 2016:** Stress / burn-out: Solutions commercialised in B2C and B2B markets, initial annual revenue plan of €6M. Dementia: Solutions commercialised in B2C and B2B market. In total at least three solutions introduced, via start-ups and transfer of activity of daily life sensing, smart algorithms, (Big) Data mining and applications to existing companies.

**Impact 2016:** Societal Impact: Improve quality of life through early treatments and extend labour participation & independent living due to reduction of burnout & early development of dementia. Economic Impact: Lower healthcare costs due to less residential care; EIT ICT Labs partners gain market share of the €400 M market in 2020.

**EIT ICT Labs overall impact in 2016:**

- **Technology development/development:** Six (three per target area) unobtrusive (ICT-based) lifestyle solutions in the primary prevention area developed to prevent or slow down the development of multiple chronic diseases (like stress, dementia, heart condition); Improved quality of life with the intention to extend the labour participation and the timeframe of independent living.

- **Initiation of start-ups/growth of SMEs:** Three (up to six in total) start-ups deployed the matured product / service combination resulting from the Action Line’s activities (including the education-related activities) and/or new business lines initiated in existing companies. Three SMEs grown by connecting them to the Action Line technologies and markets and offering them international expansion.

- **EU policy objectives:** The Action Line targets at least three solutions introduced, via start-ups and transfer of activity of daily life sensing, smart algorithms, (Big) Data mining and applications to existing companies.

- **Collaboration with other (European) initiatives:** Ambient Assisted Living (AAL) programme and the (future) KIC Active and Healthy Ageing. The relationship will be structured during the next years.

- **Synergy with Horizon 2020:** playing a key role in the solution space for the active Health and Ageing domain by offering ICT solutions within H2020 consortia and the KIC Active Living & Healthy aging.

**CYBER-PHYSICAL SYSTEMS**

**Mission of the Action Line:** Combine embedded systems, sensors, control systems, and data aggregation and analysis technologies into smart systems-of-systems to increase the efficiency and reliability of industrial production systems and critical infrastructures.

**Opportunities that EIT ICT Labs invests in:** Cyber-Physical Systems (hereafter CPS) refers to interconnected systems whose core functionality intrinsically relies on a tight coupling of physical processes with computational processes. Such systems consist of embedded hardware and software which interacts with physical objects using sensors and actuators. CPS bear a disruptive potential; new markets will likely emerge and new business models will be required to seize opportunities for new players in established markets. Therefore, EIT ICT Labs aims to utilise CPS to create innovations and business opportunities in critical infrastructures and production systems. An indication of the overall economic impact of CPS can be estimated based on productivity gains and energy savings enabled through CPS when applied in manufacturing, transportation and healthcare. These sectors account for...
almost half of the world’s GDP (€54 T). Based on this, productivity gains may amount to €12 T annually, by 2030. The foundation of this will be in hardware, solutions and services for sensing, monitoring and control. A detailed study by the European Commission puts the economic benefit of CPS at over €330 B in 2014, assuming growth rates of 7%. The largest application areas are process industries, manufacturing industries, and embedded systems for vehicles (two thirds of the total). The critical infrastructure segment is most established, while environmental monitoring has one of the largest growth rates. With a more mature but otherwise similar profile as the world market, the European market leverages the strong position in embedded systems and factory automation, resulting in a growth rate of 6.5% and one third of the global market, roughly €112 Bn 2014. Market players of European origin like Siemens, ABB, Schneider Electric, and telecommunication carriers command a combined European market share of 50%-80% in most segments. Healthcare (25%) and household appliances (30%-40%) are weaker.

The Challenges addressed by EIT ICT Labs: CPS is a rather new field, and the integration of ICT in traditional domains promises huge benefits in terms of cost reduction, resource efficiency, and scalability. Though a lot of technology is already available, there is lack of systematic efforts to engineering and deployment of CPS. CPS are inherently large-scale “systems-of-systems”. Interfacing and orchestrating the (sub-) systems and ensuring the reliability and resilience of the systems architecture is challenging. Risks arising from complexity of CPS-based solutions need to be adequately managed.

EIT ICT Labs achievements to date: CPS started in an incubation mode in 2012. Since 2013, 14 partners from six EIT ICT Labs countries carry out activities that focus on 1) mastering the engineering of complex CPS, 2) test-bed support for CPS applications, and 3) transfer of technology of two specific developments in typical CPS domains. The first one is a sensor system that can be integrated with the natural environment and the second development is related to the acquisition of medical information in a clinical environment. These activities delivered business results through product offerings to a first customer in one case, and the commercialisation of technology by a spin-off company in the other. The CPS Summer School has been established to educate students and practitioners on fundamental and applied aspects of CPS, of which the first edition was successfully held in July 2013.

EIT ICT Labs strategy for 2014 – 2016: The focus areas are CPS for production systems, recognising the importance of manufacturing for the European economy (addressing 47% of the monitoring and control market), and CPS for critical infrastructures where the added benefit of CPS is most relevant for society (it addresses 8% of the market).

Priority 1: CPS for Production systems
Description: European manufacturers need improved production system efficiency and robustness through more flexible, automated production, cheaper maintenance, and more efficient logistics. EIT ICT Labs core industrial partners are leaders in industrial automation (technology and market) and therefore well positioned to take advantage. EIT ICT Labs can link technology providers (incl. SMEs, start-ups) with system integrators to realise most effective solutions.

Strategic steps: Develop platform integrating CPS technology (e.g. digital product memory, system anomaly detector) with production monitoring and planning, workflow management and business intelligence systems; Define and implement reference designs and architectures for engineering environments and tool chains; Pilot implementation of CPS in real-world production plants; Develop and implement new business models leveraging production process data by providing analytics and services; Bootstrapting of ecosystem along process and value chains integrating tools and service providers (SMEs, start-ups); Develop and execute education programmes transferring required multi-domain knowledge.

Results/deliverables 2016: Feasibility study demonstrating economic value of augmenting existing production processes with CPS technology; Reference architecture with harmonised process and data interfaces; An integrated engineering environment covering the complete product life-cycle: design, simulation, production, operation, maintenance, evolution; new start-ups and business within existing companies implementing new business models.

Impact 2016: Societal Impact: High-value jobs through improved competitive position of manufacturing in Europe. Economic Impact: Production efficiency improvements; emerging European CPS ecosystem boosting business creation along complete value chain: large manufacturing industries, SME tool providers, system integrators, and service providers; de-facto CPS engineering standards.

Priority 2: CPS for Critical Infrastructures
Description: CPS should create business opportunities for (net- works of) EIT ICT Labs partners for 1) reliable operation and intelligent management of large-scale infrastructure systems and 2) improved service and resource efficiency for the maintenance of the critical and aging infrastructures of Europe. EIT ICT Labs partners can use their demonstrated strength “at home” to create export opportunities.

Strategic steps: Focus on water management and traffic networks: Maturation of reliable wireless communication technology, Development of communication reference platform for traffic network connectivity and road-side applications; Define and implement reference architecture of information backbone for integrated monitoring and control of water network infrastructures; Development of larger-scale real-world demonstrators (living labs) for federation of CPS deployments; integration of complementary stakeholders (e.g. business information systems providers); Create spin-offs to market derivative solutions (visualisation, intelligent information aggregation and management).

Results/deliverables 2016: Maturity and validated technology components for communication and information aggregation; Larger-scale demonstration of the federated deployment and management of heterogeneous CPS infrastructures; At least four companies (start-ups, SMEs) exploiting new market opportunities as component/system suppliers or providers of (Cloud-based) information and management services.

Impact 2016: Societal Impact: European CPS solutions benefit key stakeholders, such as city authorities and urban planners. Economic Impact: Lower cost, faster adoption by increased scalability of infrastructure deployments and standardisation of architectures and platforms; accelerated market growth for providers of core CPS technologies and derivative solutions by common data formats across the monitoring and control industry.

EIT ICT Labs overall impact in 2016:
Technology development/deployment: Matured technologies deployed in new fields, integrated technologies, components and services on an architectural level. Advanced interoperability by standardised interfaces, communication.
Initiation of start-ups/growth of SMEs: New opportunities for business creation for start-ups and SMEs as providers of dedicated
CPS technologies or in niche markets. Used potential in deriva-
tive markets, e.g. for system integrators, tool providers and espe-
cially concerning exploitation of the data that these CPS will pro-
duce. New business models developed and market roles defined
for SMEs and start-ups in these areas.

EU policy objectives: Demonstrated potentials and benefits of
CPS. Requirements pinpointed in terms of research and innova-
tion, policies, and regulations.

EU citizen and/or society at large: Better quality of life by ad-
dressing the increased demand for (urban) resources through de-
veloping resource-efficient solutions. The production systems pri-
ority addresses one of the cornerstones of European industries.
Maintained leadership in manufacturing technologies and pro-
duction in certain areas brought back to Europe.

Collaboration with other (European) initiatives: Artemis-IA,
ITEA, EFFRA.

Synergy with Horizon 2020: CPS is a rather new topic; dedicated
CPS projects are just starting and will influence future H2020 calls
to form the Carrier projects that are needed to develop the re-
quired research results.

SMART ENERGY SYSTEMS

Mission of the Action Line: Contribute to the creation of an open
European energy market by testing and deploying ICT solutions
for decentralised power generation infrastructures and user-cen-
tric services for smart energy systems.

Opportunities that EIT ICT Labs invests in: Meeting EU’s cli-

mate change and energy policy objectives for 2020 and beyond
will require a major reform of our electricity infrastructure.
A smart grid and its coordination/regulation at a European level is
needed to make decentralised energy supply from renewable en-
ergy work. Europe is a worldwide forerunner in making its en-
ergy supply more renewable and sustainable. Tremendous progress
has been made in the production of environmentally friendly elec-
tricity. This Action Line will leverage EIT ICT Labs’ unique position
as a trusted third party for industry, academia, and politics alike. In
a market where regulation will continue to play an important role
this central position of EIT ICT Labs is destined to make a pivotal
difference for the necessary energy turnaround.

The Challenges addressed by EIT ICT Labs: Large-scale renewa-
ble energy generation has an inherent variability and weather de-
pendence, while at the same time there is limited capacity for en-
ergy storage. The integration of distributed energy resources is
therefore extremely challenging both from a market and a techni-
cal point of view. Current distribution grids do not sufficiently con-
tribute to the stabilisation of the decentralised energy supply. This
way, electricity that is generally free has to be shut off occasion-
ally to give way to fossil fuel-generated electricity (negative ener-
gy prices in the market). Smart Energy Systems will ensure that this
waste, which costs the economy and consumers many billions of
euros, will be reduced and eventually completely avoided. Moreo-
ver, it is imperative that consumers understand and trust the pro-
cess and receive clear benefits.

EIT ICT Labs achievements to date: In the initial years of this Ac-
tion Line "user experience” and hypothetical trading systems were
key topics. Small systems were networked across Europe in a “user
experience lab”. In the future, the Action Line will move away from
these topics, which are more basic research oriented, and handle
more market-relevant topics. To achieve this it builds upon the out-
standing competence of partners and current surveys of experts in-
cluding managers in both the industry and in start-ups who have

financial responsibility for smart energy solutions. As a first step, a
business development study has been started. 1) EIT ICT Labs has
identified several promising inventions/patents from its partner or-
ganisations as well as start-ups. 2) Challenging and urgent practical
needs in the field that have not been addressed sufficiently by re-
searchers have been identified.

The results will be used to drive the 2015 call for proposals much
more towards application and innovation. Through the study, we
have identified one start-up that was created about 3 years ago
and is operating a virtual power plant with more than 1 GW per
year and employs more than 80 employees. This start-up is inter-
ested in becoming part of EIT ICT Labs.

EIT ICT Labs strategy for 2014 – 2016:

Priority 1: ICT for decentralised and aggregated power

-generation infrastructure

Description: Addresses the need for reliable and secure com-
munication of decentralised units (generation & storage) to meet
power quality and commercial exploitation requirements. EIT ICT
Labs partners can combine their strengths in energy and infra-
structure to meet the need for reliable and secure communication
between and management of decentralised network elements
(generation & storage), facilitating the establishment of large-scale
virtual power plants as an exportable concept.

Strategic steps:

Initiate pioneering High Impact Initiatives; Estab-
lish formal partnership with, e.g. virtual power plant start-ups
or leading industry player with more than 1 GW marketable;
Ensure involvement of key partners (large companies, start-ups, state
monitoring centres and testing authorities); Analyse and over-
come key challenges (cost of communication & hardware) for imple-
mentation; Work towards standardisation, e.g. [IEC61850]; Be a first

Results/deliverables 2016: At least one new technical high ca-
pacity virtual power plant set up; creation of start-ups (e.g. derived
from new regulated market roles) and support of SMEs which fulfil
key roles in the Virtual Power Plant ecosystem; Relevant standards
defined and adopted.

Impact 2016: Societal Impact: Reduced environmental impact by
reduced need for traditional power plants, more efficient use of renewables, reduced consumer energy bills. Economic Impact:
Reduced business risk through demonstrated technical viability;
business models for sustainable economic success defined; thron-
ing ecosystem for ongoing innovation; virtual power plant export
business opportunity.

Priority 2: User-centric services for SES

Description: Addresses the consumption side of the energy sys-
tem; create user friendly services and devices to increase trans-
parency and manageability of consumption (mainly home sys-
tems, but also electric vehicles). Why: Increase transparency and
manageability of energy use (mainly in home systems, but also by
electric vehicles) for European consumers through user friendly
services and devices; leverage existing awareness and the (higher)
European energy prices to accelerate market adoption, creating an
advantage for European players.

Strategic steps: Promote interoperability of systems and devic-
es and work towards standards; Collaborate with urban planning
offices and municipal energy utilities; Conduct innovation con-
test; Develop apps and user interfaces and test user acceptance;
Provide validated energy transparency and management products and services that keep the user active (through additional use cases or social involvement); the focus shall be on a continuous user involvement to raise energy efficiency.

Results/deliverables 2016: Planning and simulation tools for user-centric infrastructures; SMEs and start-ups created; test beds and living labs infrastructure usable by third parties; ICT solutions for personal mobility and validate new business models in the context of citizen-centric infrastructures; SMEs and start-ups created; test beds have been done in recent years on the overall paradigm of Smart Cities and new usages and behaviour. Action Line activities will enable the emergence of new product and service providers, capitalising on platform resources and infrastructure developments.

The Challenges addressed by EIT ICT Labs: EIT ICT Labs is facing several key challenges: 1) Most of the technological breakthroughs developed over the past 20 years, have been pushed to the market using a vertical approach, and were mainly aimed at advancing developments in the urban scene. This was done with poor understanding of medium and long term societal challenges. There is a clear need for a global, systemic and holistic approach to tackle the rising societal challenges which Europe is facing. ICT providers, for instance, have multiple independent mobility support applications for all the transportation systems, but there is no global multimodal solution. A shift to a technology-pull orientation results in solutions that better match societal problems. 2) Territorial governance bodies have leadership roles and European cities (e.g. Helsinki, Paris, London, Berlin) are at the forefront of Digital / Smart City exploration. The evolution of Future Urban Life & Mobility (ULM) will be focused on holistic approaches based on citizen-centric models, in which technology should be developed and used based on the citizen aspect.

EIT ICT Labs achievements to date: The ULM Action Line was formed out of the former Action Line Digital Cities and some topics of former Action Line Intelligent Mobility Systems, which were created in April 2010. Previous EIT ICT Labs results in this domain included: 1) the demonstration of a mesh network with open network features for citizen safety at CeBIT exhibition; 2) technology transfer of the Voice2Social application from DFKI to two SMEs; 3) a new product put on the market by the start-up “Data Publica”; and 4) a demonstration of Flash Poll and crowdsourcing activities at “Future en Seine”. In 2013, outputs included a new application, two new platforms, and one new product. The evolution of Future Urban Life & Mobility (ULM) will be focused on holistic approaches based on citizen-centric models, in which technology should be developed and used based on the citizen aspect.

The ULM Action Line was identified as common characteristics of many Smart City initiatives. The Action Line will aim to provide governmental and economical stakeholders with the necessary tools and support to boost and catalyse existing territorial projects, to foster and allow the emergence of 21st century new usages and behaviour. Action Line activities will enable the emergence of new product and service providers, capitalising on platform resources and infrastructure developments.

The Challenges addressed by EIT ICT Labs: EIT ICT Labs is facing several key challenges: 1) Most of the technological breakthroughs developed over the past 20 years, have been pushed to the market using a vertical approach, and were mainly aimed at advancing developments in the urban scene. This was done with poor understanding of medium and long term societal challenges. There is a clear need for a global, systemic and holistic approach to tackle the rising societal challenges which Europe is facing. ICT providers, for instance, have multiple independent mobility support applications for all the transportation systems, but there is no global multimodal solution. A shift to a technology-pull orientation results in solutions that better match societal problems. 2) Territorial governance bodies have leadership roles and European cities (e.g. Helsinki, Paris, London, Berlin) are at the forefront of Digital / Smart City exploration. The evolution of Future Urban Life & Mobility (ULM) will be focused on holistic approaches based on citizen-centric models, in which technology should be developed and used based on the citizen aspect.

EIT ICT Labs strategy for 2014 - 2016: The two priorities listed below are interdependent. These are projections of the same societal evolutions that are enabled due to current progress in ICT technologies. Each of these projections will focus on a specific business aspect, or specific class of actors.

Priority 1: Mobility paradigm shift
Description: Integration of mobility services in a seamless approach (classical transportation means and alternative transports). Adaptation of mobility services to personal profiles, either as a matter of preference or to address special needs. Profitable mobility services business models are usually possible when a significant mass of users is reached. The field of mobility is extended to goods logistics in combination with or as an alternative to personal mobility. European technology (e.g. Siemens, Thales, Nokia) and service (e.g. AtoS, Orange, Telecom Italia, Deutsche Telekom) companies have leadership roles and European cities (e.g. Helsinki, Paris, London, Berlin) are at the forefront of Digital / Smart City exploration.

Strategic steps: Focus on mobility planning integrating multiple transport means, crowd-sourced information and services (holistic approach). Integrate stakeholders in advisory groups and deeply associate urban living areas and stakeholders within ULM activities. Realise rapid (up-scaled) deployment of solutions in cities. Consolidate the deployments and deliver products and services to the market. Empower citizens.

Results/deliverables 2016: A new mobility ecosystem is set in place on the territories to overcome and handle mobility challenges. Modal transfer can be measured as a result of new mobility service availability. Technical efficiency and societal impacts can be measured. Business model allocating revenue to contributors according to their respective service value contribution.

Impact 2016: Societal impact: modal transfer objective: 3% (4M inhabitants urban area); reduction of CO2 emission from personal transport by 8%; reduction of number of transport fatalities in European cities by 5% (40k deaths on European roads per year). Economic impact: Reduced costs due to traffic congestion, pollution and accidents (estimated at €502 B annually in Europe).

Priority 2: Citizen engagement and empowerment
Description: Integration of mobility services in a seamless approach (classical transportation means and alternative transports). Adaptation of mobility services to personal profiles, either as a matter of preference or to address special needs. Profitable mobility services business models are usually possible when a significant mass of users is reached. The field of mobility is extended to goods logistics in combination with or as an alternative to personal mobility. European technology (e.g. Siemens, Thales, Nokia) and service (e.g. AtoS, Orange, Telecom Italia, Deutsche Telekom) companies have leadership roles and European cities (e.g. Helsinki, Paris, London, Berlin) are at the forefront of Digital / Smart City exploration.
Description: how to turn passive and consumer-minded individuals into active and sharing-oriented citizens; address trust issues and create confidence; manage the impact on business and governance. Strong democratic traditions in many European countries are a catalyst for crowdsourcing initiatives related to policy making and government decision making processes; citizen engagement as an underutilised resource in Europe.

Strategic steps: Integrate collaborative behaviours as a cardinal item in the activities scope (e.g. gamification, crowd-sensing / sourcing), establish contacts towards larger scale deployments. City governance bodies are to be associated in advisory groups. Deeply associate urban living areas and stakeholders with UAM activities. Perform real-size experiments. Consolidate business models and deliver products and services to the market.

Results/deliverables 2016: Open Data platform in place for the development and deployment of collaborative services. Products and services are released on the market; Emergence of local communities and empowerment of Cities governance bodies.

Impact 2016: Societal impact: new relation/confidence between citizens and governance bodies; urban planning authorities can adapt service to usage on a quasi-real-time basis; open access to citizens and governance bodies; urban planning authorities can impact 2016: Societal impact: new relation/confidence between communities and empowerment of Cities governance bodies.

SMART SPACES

Mission of the Action Line: Apply advanced ICT to everyday working and living environments and create comfortable service experiences for users and efficient resource optimisation solutions for businesses.

Opportunities that EIT ICT Labs invests in: The big opportunity of using the data collected from the everyday actions and working and living environments is still largely untapped. Smart Spaces (SSP) solutions help industries like retail and mobile operators or internet service providers better serve their customers.

Businesses benefitting from smart space solutions include e.g. mobile and out-of-home advertising and info services, lighting, digital signage, and home and office automation. European industries is leading and active in many key technologies, equipment and services like outdoor advertising, telecom operators and telecom equipment manufacturers. The added intelligence and enabled new services business can increase competitiveness of European industries providing systems. Completely new digital services are also opportunities to extend for instance media industries to new areas or to enforce existing industries to gain when value chains will be reformed. The European landscape has many languages so the localisation aspect of local smart service can be built into the solution from the beginning, making it easier to expand to non-European markets. Also, the limited inner city office space creates increased need to utilise. EIT ICT Labs is engaging key European players in these domains.

The Challenges addressed by EIT ICT Labs: Context-relevant information and services are not easy to reach and use in work situations outside the desk and while performing daily activities. People spend time and effort every day trying to find relevant items, information and places. This results in lost opportunities, lower productivity of office work and unsatisfied retail customers. In retail, brick and mortar retail is challenged globally by online shopping and e-commerce. Large international players introduce products (especially other than fast-moving-consumer-goods) online globally. It is widely believed that consumers still want to go to physical shops to explore the products. Furthermore, for this Action Line to realise its desired effect, the following conditions have to be fulfilled: 1) Development of a network of companies around the priority areas Smart Retail, Smart Urban Experience, and Smart Buildings; 2) Involvement of all partners in the value chain, including retailers, media houses, public sector (regarding use of public buildings and places), and facility management companies, etc.; 3) Intense collaboration between Nodes; 4) Direct involvement of BDA staff in Action Line activities with involvement of SMEs with innovative technologies and solutions.

EIT ICT Labs key achievements to date: SSP Action Line activities have already resulted in the founding of the following start-ups: 1) Screenio provides an audience participation tool and background chat channel for events; 2) VideoCafé provides a 24/7 online social media space that enables people at different public places to meet each other in casual encounters, like chats, games or sharing information; 3) Cellryder with an educational game Handorino, which estimates motivations, emotions and cognitive capabilities of the learners; 4) Fifth Element with a Remote Therapy service using motion-based touch-less interaction solutions for educational or therapeutic purposes. Also, the Action Line contributed audience measurement technology to Deutsche Telekom AG spin-off MotionLogic. Technology transfer of following results have been made: 1) an augmented reality service for construction visualisation to Finnish Consulting Group, 2) BTLE-based beacons for location-based media player apps in museums. Furthermore, the activities helped the introduction of advanced indoor positioning for retail analytics services and large screen interaction technologies by innovative SMEs.

EIT ICT Labs strategy for 2014 – 2016: Priority 1: Smart Retail Experience

Description: ICT (e-commerce) challenges “brick and mortar” stores. Smart retail environments can offer “best of both worlds” integrated online and in-store service experience increases sales and in-store purchases (“conversions”). EIT ICT Labs partners (e.g. large industrial companies, SMEs, start-ups) have already created key technical enablers for indoor-positioning, consumer analytics and innovative user interaction solutions. They have the potential to provide the solutions globally to retail industry.

Strategic steps: Run a series of trials of smart retail services with EIT ICT Labs SMEs for both retailer- and brand-driven in-store services. Facilitate the creation of scalable retail analytics solution and business with SMEs and European system integrators (within the EIT ICT Labs partnership). Integrate payment to combined online in-store solutions.

Results/deliverables 2016: One or few SSP initiated companies
offer analytics services globally to retail industry. A number of SSP originating SMEs provide smart retail services to consumers globally to major retail brands.

Impact 2016: Societal Impact: Multi/Omni-channel retail has become mainstream; new ways of buying are increasing. Economic Impact: European companies gain market share in the area of smart retail solutions and services (€ 40M sales in 2016); differentiation opportunity for innovative retailers (new entrants possible).

Priority 2: Smart Urban Experience

Description: In a smart urban environment, the users can smoothly see the information they need or search in just a few seconds. EIT ICT Labs partners can offer innovative ICT-enabled and on-site experiences using context-sensitive information services, public interactive screens or augmented reality solutions (e.g. data glasses) in urban environments. EIT ICT Labs partners have already developed most advanced technologies to build these services.

Strategic steps: Create the content creation software tools for smart urban information services (advertising) and engage the content creation industry (including outdoor gaming) for the creation of the new channel; Run trials with advertising business model with outdoor screen manufacturers and advertisement companies. Introduce outdoor game-type services to consumers with SMEs.

Results/deliverables 2016: Public interactive screens used by advertisers to reach customers, starting from malls and busy public areas, Content creation and user experience for augmented reality solutions proven and starting of first commercial services; Outdoor gaming companies have launched their first games.

Impact 2016: Societal Impact: ICT-based services in open street space are well-known, accepted and considered as attractive; increased urban activity and social use of public spaces; City space gaming experiences take place. Economic Impact: Growth takes place via new business creation and via additional transactions stimulated by the new solutions (€20 M sales).

Priority 3: Smart Buildings

Description: Smart Buildings: offer flexible use of office space and intelligent services to users, office tenants and visitors. Large industrial EIT ICT Labs partners are capable of installing and managing complex systems, own key technologies (e.g. sensors, lighting) and can market new solutions offering improved control possibilities, to optimise work support for teams and individuals as well as natural resource utilisation (energy, water, etc.).

Strategic steps: Create trial infrastructure solutions for office space and building analytics based on past results of indoor positioning, machine vision systems and heads-up user interaction; Engage facility operators and large system providers (among the EIT ICT Labs partners) in service trials.

Results/deliverables 2016: New SMEs or large system integrators are providing ICT-based indoor analytics solutions and flexible asset management for facility operators and large corporations; SMEs with co-working tools for office workers.

Impact 2016: Societal Impact: Increased level of comfort or new experiences in houses and public buildings; healthier work and living environments; productivity gains. Economic Impact: Improved asset utilisation (work productivity in smart offices, resources in office spaces, etc.); €15 M sales.

EIT ICT Labs overall impact in 2016:

Technology development/deployment: SSP-initiated companies have grown to offer analytics globally and in-store e-commerce services to retail industry, and information services and service platforms to urban space information services. Use of ICT-based solutions in urban environments has created new innovation platforms for game-type, entertainment and information services in city spaces. ICT-based building management and intelligent services have increased productivity and asset utilisation of European assets.

Initiation of start-ups/growth of SMEs: Significant contribution to fast overall growth of Action Line-related business ecosystems in Europe. It has been instrumental in creation and acceleration of more than 100 start-ups and SMEs through its activities.

EU policy objectives: The Action Line has directly addressed the high-level goals of the European Digital Agenda by boosting the creation of digital services that are deployed across EU member states, and has strengthened European ICT industry leadership in the area of location-based digital services. The Action Line has contributed to guidelines of the use of digital services (especially visual technologies) in public places.

EU citizen and/or society at large: The experiences created by widely and easily accessible SSP services improve the quality of life of EU citizens and vitalise our living and working environments, common urban spaces and retail premises through means of ICT. The services are used by large amounts of EU citizens, and have become a part of their everyday computing practices.

Collaboration with other (European) initiatives: National and EU-level initiatives strengthened such as Smart Cities, Future Internet, Electronic Components & Systems, Digital Services programme in Finland.

Synergy with Horizon 2020: Action Line activities have catalysed the creation of several SSP-related Horizon 2020 research projects with strong leadership from EIT partners within the following areas of the ICT programme: Digital Single Market, Inclusive, innovative and reflective societies, Electronic Components & Systems and Resource Efficiency.

FUTURE NETWORKING SOLUTIONS

Mission of the Action Line: Help to ensure the European lead in solutions and standards based on cost-effective as well as energy-efficient networking technology which support the increasing traffic, new traffic profiles and the flexibility to manage large demands for instantaneous traffic.

Opportunities that EIT ICT Labs invests in: Network traffic is growing exponentially. Mobile data traffic, for instance, is expected to grow at a CAGR of around 40% (2019-2019). This will result in a tenfold increase by the end of 2019. Novel ways of supporting the growing demand of traffic as well as new traffic patterns, new traffic types and devices supporting M2M communication in a cost-effective and energy-efficient way are needed to prevent sky-rocketing costs for communications that would also, directly and indirectly, be detrimental to the economy and the environment. Europe is currently world leading in mobile networking. To remain in this position and break open the US/Chinese dominance in the backbone, the Action Line focuses on energy-efficient networking solutions to support the increasing traffic, access networks, inclusion of Internet of Things and making use of Software Defined Networking/Virtualisation as well as improving flexibility to support large demands for instantaneous traffic.

The Challenges addressed by EIT ICT Labs: EIT ICT Labs faces several key challenges: 1) Scaling up the capacity in the access network by densification of cells and by providing cost-effective
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priority 1: green mobile access networks

Description: Maintain European leadership in access network infrastructure via driving standardisation related to high-bandwidth solutions (e.g. "5G"). Maintain the global leadership of EIT ICT Labs partners (50% market share) in access network infrastructure, securing participation in high growth (annual 40%) market.

Strategic steps: Push energy efficiency related to high-bandwidth solutions (e.g. "5G"). Develop energy metrics for access networks as business driver. Demonstrate smart cell deployment concepts, including backhaul. Continue standardisation activities: establish liaison with ETSI; trigger regulatory agencies to push take-up of energy metrics; Ensure systematic technology transfer.

Results/deliverables 2016: Successful feasibility demonstrations; Initial market introductions of technology components; Portfolio of created and/or coached start-up companies; Deployment of SDN and virtualised networks prepared for 2018.

Impact 2016: Societal impact: "Contributing to the realisation of a Digital Europe by providing the user-demanded services at affordable network costs." Economic impact: Increased market share for the European vendors; evidence for decreased CAPEX and reduced OPEX for operators; improved support for novel services and applications.

Priority 3: user-friendly generic internet of things (IoT)

Description: Accelerate the introduction of IoT solutions by reducing hurdles via horizontal and modularisation of the communication layer; extending cellular networks support for M2M communication. IoT is an emerging market where European stakeholders will benefit from a horizontal approach to efficiently address diverse societal challenges and by extending cellular networks support for M2M.

Strategic steps: Investigations of new business models; Definition of generic IoT communications platform supporting applications development; Create and stimulate a partner network of platform users; Identify concepts for supporting M2M in cellular networks.

Results/deliverables 2016: Demonstration of generic IoT communications platform and its use in key application areas; Readiness for broad deployment by 2018; Active start-up network "surrounding" the platform; Standardisation to achieve M2M support in networks.

Impact 2016: Societal impact: Potential of IoT unleashed for widespread user demand driven deployment in diverse applications addressing societal challenges. Economic impact: EIT ICT Labs IoT communications platform recognised as leading (characteristics: easy-to-adopt, attractive functionality, fast development for users); long-list of active partners from several vertical segments offering end user services in their respective application fields.

EIT ICT Labs overall impact in 2016:

Technology development/deployment: Models for energy optimisation covering the complete access network, network management tools based on SDN and virtualisation, generic IoT platform.

Initiation of start-ups/growth of SMEs: Multiple technology transfer and knowledge adoption cases (related to access networks) to existing partner companies helping them to stay globally competitive. For the SDN Backbone the gravity will also be on technology transfer. In addition, in both these two areas a few start-ups will be generated. For the IoT part there should be many more opportunities for start-ups. At least 3 start-ups are to deploy the mature product-service combination resulting from the Action Line activities (including the education-related activities), or initiate new business lines in existing companies. Next to that, the growth of 5 SMEs is stimulated by connecting them to the Action Line technologies and markets and offering them international expansion.

EU policy objectives: Standardised energy metrics for access networks improving energy efficiency.

EU citizen and/or society at large: Technology for scaled-up, improved and business-viable access network provided, resulting in continued affordable networking with better functionality and flexibility for end-users. All industry segments and society are relying on the robustness and cost-effectiveness of the networks to be able to perform their business, whether this is in smart grid, health and well-being or any other sector.

Collaboration with other (European) initiatives: 5G PPP on Advanced infrastructure for Future Internet, Standardisation organisations (ETSI, IETF, ITU).
Synergy with Horizon 2020: Liaison with DG CNECT e.g. the 3G PPP on infrastructure, conferences for dissemination

**FUTURE CLOUD**

Mission of the Action Line: Accelerate the use and development of trusted Cloud technologies to create brand new innovations and leverage Big Data infrastructures so that businesses and public administration in Europe will reach the full potential of the digital economy.

Opportunities that EIT ICT Labs invests in: Cloud-based business specifically including Big Data Analytics, will become a driver of the European economy and society. Many services and applications will become Cloud-based and businesses and key infrastructures are becoming increasingly dependent on it. Moreover, Cloud enables highly impactful technologies like Internet of Everything (IoE) and Big Data Analytics. This importance is reflected in the total economic impact of Cloud technology, estimated to become $1.7 trillion to $6.2 trillion annually between now and 2025. The economic impact of Cloud technology, estimated to become $1.7 trillion to $6.2 trillion annually between now and 2025. The importance is reflected in the total economic impact of Cloud technology, estimated to become $1.7 trillion to $6.2 trillion annually between now and 2025. The importance of these fields are: 1) Stratosphere: the only advanced analytics system that combines essential features for wider adoption and the only open source software for Big Data Analytics developed in Europe. The platform is already used in several companies, including Deutsche Telekom, the Internet Memory Foundation, and Mediaplus and inspired the creation of a start-up company in 2014 that intends to commercialise and bring the Stratosphere open source platform to the market; 2) Enhancement of open source platform ConPaaS, for development, deployment and management of applications that runs across multiple Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone.

EIT ICT Labs achievements to date: The focus of the Action Line so far has been on three areas: Big Data Analytics platform, Cloud Infrastructures, and Innovative Cloud Services. Some of the achievements in these fields are: 1) Stratosphere: the only advanced analytics system that combines essential features for wider adoption and the only open source software for Big Data Analytics developed in Europe. The platform is already used in several companies, including Deutsche Telekom, the Internet Memory Foundation, and Mediaplus and inspired the creation of a start-up company in 2014 that intends to commercialise and bring the Stratosphere open source platform to the market; 2) Enhancement of open source platform ConPaaS, for development, deployment and management of applications that runs across multiple Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone; 3) Development of a number of standards for multi-Clouds. Currently a business case is being prepared together with Vodafone.

**EIT ICT Labs strategy for 2014 – 2016:**

**Priority 1: Establish leadership as a trusted Multi-Cloud Infrastructures and Services**

**Description:** EIT ICT Labs will need Cloud services, infrastructures and solution offerings, best practices and examples, which address European businesses and public administrations security, privacy and trust requirements across domains. Multi-Cloud platforms provide basis for new innovative real-time Cloud services with the guarantee of the high level of security and privacy. Leverage the strong position of the Europe as trusted Cloud service provider.

**Priority 2: Cloud with Big Data Analytics**

**Description:** Business and application driven applied research and technology development, require cross-technology contributions (Cloud, IoE and Big Data). EIT ICT Labs will facilitate the establish ment of cross-technology communities through a European value-driven ecosystem and user community for Big Data in the Cloud. Europe’s position in the growing markets will be leveraged with European solutions such as unique Stratosphere platform.

**Strategic steps 2014:** Main technology layers for Big Data platforms are established and start-up for Stratosphere development is operational. 2015: Value-driven ecosystem and user community around Big Data and Cloud is established. 2016: New Big Data / Cloud solutions and services based Big Data analytics are piloted.

**Results/deliverables 2016:** 1) Ecosystem and user community for Big Data and Cloud is established. 2) Start-up with €3.5 M sales. 3) Successful Big Data / Cloud solution transformations in businesses across Europe.

**Impact 2016:** Societal Impact: Enhanced access to - and value generation on - Big Data resulting in better services for public sector, healthcare, traffic, etc. used by the European citizens. Economic Impact: Innovative new services based on Big Data analytics in the Cloud are deployed by European companies in global markets. European Cloud platforms and solutions for Big Data analytics will be recognised, trusted and applied globally.

**EIT ICT Labs overall impact 2016:** Technology development/deployment: Methods, tools and infrastructures for Cloud and Big Data/IoE integration have been taken into use successfully by businesses and start-ups. Activities are focused on cross-technologies and driven by business and application needs. This results in new innovations and market opportunities specifically for high-tech SMEs.

**Initiation of start-ups/growth of SMEs:** Business Development activities and VC integration into Action Line activities have been
realised. A value driven deployment approach creates increasing number of VC-funded start-ups based on Cloud technologies. New innovations in Cloud/Big Data/SDI together bring significant business benefits to businesses and the public sector.

EU policy objectives: Trust and transparency requirements drive Action Line activities. EIT ICT Labs results are used as best practice cases by businesses and in Europe. Requirements come from the European Cloud Computing Strategy, resulting in increased trust and Cloud adoption.

EU citizen and/or society at large: Awareness is raised amongst businesses and the public sector on best practices and possibilities of the Cloud.

Collaboration with other (European) initiatives: ENISA, ECP, EGSIL, ITEA2, CelticPlus.


**PRIVACY, SECURITY AND TRUST**

Mission of the Action Line: Support users and businesses in protecting their digital assets and transactions, promoting robust and safe products and services that realise data privacy and security.

Opportunities that EIT ICT Labs invests in: Lack of appropriate and timely technical solutions ensuring data security and privacy of new products and services facilitated by ICT may endanger the growth of ICT businesses and put privacy and liberty of citizens at risk. These potentially adverse developments need to be countered by the widespread use of data protection techniques. These will reduce costs and provide incentives to the ‘privacy & security by design’ paradigm, which, together with appropriate certification procedures, is expected to significantly increase trust in digital technology. This will stimulate adoption of new ICT products and services and may significantly improve the quality of life in Europe and beyond. The worldwide ICT security technology and services market is projected to reach €92 Billion in 2017 (17% growth annually). The European market share in industry solutions for data security and privacy (about 16.3%) is considerably lagging behind the global ICT market share of Europe parties (about 25%), possibly due to fragmented national regulations. However, European technology solutions generally do have a comparative advantage with respect to trustworthiness. Accordingly, business opportunities and potential in Europe are significant. EIT ICT Labs is expected to create paradigm shifts, stimulate business activities and increase market, particularly in the areas of e-authentication, digital identity management and protection of data privacy in online and mobile applications, services, and communications, as well as supporting manufacturing industries.

The Challenges addressed by EIT ICT Labs: Enormous amounts of data may allow attackers to build detailed user profiles enabling various criminal, illegal or illegitimate activities. Cyber-crime is growing in number, sophistication, and objectives while the knowledge/ability of cyber-criminals is rarely known. The security of practical technical solutions depends on the design, architecture and specification implementation and has to be assessed by experts and accreditation bodies. Implementing data security and data privacy techniques for protection may affect product/service functionality and usability and can therefore be costly and impractical. National and European Laws on data privacy & security need improvement and harmonisation. Appropriate protection might require massive data storage/analysis by governments. Lastly, government agencies and enterprises collecting data on citizens or clients can be unwilling to employ large-scale data privacy techniques.

**EIT ICT Labs achievements to date:** In 2012, the Privacy, Security and Trust (PST) Action Line started in incubation mode, with two activities focused on privacy. One was on privacy for smart spaces, with the focus on understanding different threats regarding the privacy of collected data and user perception of those threats. The other activity, which continued in 2013, had a focus on privacy of geo-localisation of mobile devices and achieved: 1) Open source tools for the offline analysis of the collected data; 2) An Android application available on Google Play. In 2013, the Action Line was expanded by security and trust topics to include four topics covering various privacy and security aspects.

**EIT ICT Labs strategy for 2014 – 2016:**

**Priority 1: Secure and privacy-aware e-authentication and digital identity management.**

**Description:** There is a strong need for widespread e-authentication. Existing digital identity management solutions are fragmented. EIT ICT Labs’ partnership (mobile operators, technology providers) has suitable expertise and can place service offerings on the market.

**Strategic steps:** Cooperate with experienced companies and selected mobile operators (focused on EIT ICT Labs’ industrial partners). Make use of privacy-aware techniques for identity federation and attribute-sharing, Public Key Infrastructure (PKI), and strong authentication, as well as technologies including hardware security tokens, physically embedded digital signatures, Near Field Communication (NFC), and Quick Response (QR) codes. Performance is tested in Living Labs and/or Security Operations Centre (SOC) environments.

**Results/deliverables 2016:** Europe-wide federated identity platform; EIT ICT Labs-endorsed e-authentication and identity management services and products to be commercialised (privacy-aware, cost-effective). Real-world testing in selected application scenarios, including e-payment, e-government, e-health and smart spaces.

**Impact 2016:** Societal Impact: authentic and more trustworthy mobile services and products; more trust among people and organisations in Europe. Economic Impact: successful (European) digital identity management business; less economic damage due to cyber-crimes (e.g. online identity theft, fraud, fake services and products); lower costs compared to proprietary protection solutions.

**Priority 2: Protection of data privacy in online and mobile applications, services and communications.**

**Description:** There is a large gap between available techniques and practice. Fragmented and partial national regulations and continuously growing concern for sensitive data slow down business operations. EIT ICT Labs partners have trust advantage versus US-based players.

**Strategic steps:** Assess practicality of currently available techniques and technologies for protecting or enhancing data privacy. Make use of data-centric and user-centric techniques, multi-party computation, privacy-preserving data mining, attribute-based encryption and anonymous authentication. Exploit hardware security tokens. Work on raising social awareness and improving and harmonising EU laws and policies.

**Results/deliverables 2016:** Creative Commons licenses incorporating data privacy; Concrete technical solutions, in terms of software or hardware security tokens, for data privacy in select application scenarios, including user profiling, e-voting, smart...
Energy, and Cloud computing. Feasibility studies of end-to-end protection in data communications; Market preparation and first commercially successful products and services.

Impact 2016: Societal Impact: raised social awareness; less abuse of sensitive data; more trust in digital technology. Economic Impact: new business opportunities for European companies; significant market share for European companies in multi-billion-euro market for online and mobile privacy solutions; lowered obstacles catalyse business transactions.

Priority 3: Mobile Cyber-Security, addressing malicious software in mobile and online applications

Description: There is an extraordinary amount of malware activities. Mobile devices are often unprotected. Mainstream solutions are partial and insufficiently effective. European companies have strong positions in this still fragmented market. EIT ICT Labs partners and their clients are at risk for damages from attacks, potentially slowing down growth.

Strategic steps: Raise social awareness, e.g. in synergy with ENISA. Organise international contest(s) in the area. Stimulate behaviour-based anti-malware solutions, especially for mobile devices. Stimulate competition and more effective (less partial) solutions. Encourage usage of e-signed software applications. Explore collaboration opportunities with European providers outside of current EIT ICT Labs partnership.

Results/deliverables 2016: Demonstrate problems with existing solutions; Innovative and cost-effective solutions for malware protection, especially for mobile devices (e.g. by combining efficient client agents and Cloud-based services); Feasibility study of massive and privacy-aware malware scanning of devices connected to the Internet.

Impact 2016: Societal Impact: raised social awareness; trusted applications and services; less cyber-crimes, improved security. Economic Impact: widely used, robust commercial anti-malware products and services, especially for mobile devices; lower costs (data/ productivity loss) via effective protection; safer environment supports growth of European mobile operators.

EIT ICT Labs overall impact in 2016:

Technology development/deployment: New hardware and/or software products developed and deployed building upon the currently available techniques and approaches that will enable new applications and services offering or using data privacy and data security. Incentive will be provided to the ‘privacy & security by design’ paradigm in industry.

Initiation of start-ups/growth of SMEs: Growth of existing SMEs. As (high quality) privacy and security technical solutions typically require high levels of competency and experience, short-term results will be yielded by leveraging on the already existing companies (including SMEs). Especially from 2016 onwards, there is also space and opportunity for start-up companies.

EU policy objectives: National privacy regulations in Europe improved by pushing for a unified approach that will reconcile the existing differences and fragmentations. Paradigm shift induced, by enforcing or enhancing data privacy by technical measures and not only by regulations.

EU citizen and/or society at large: Increased social awareness about the need for and value of data privacy and security in modern society at large, through appropriate dissemination and outreach activities and education programmes in EIT ICT Labs Master-, Doctoral-, and Professional Schools.

Collaboration with other (European) initiatives: TDL, ENISA, and other related initiatives.

Synergy with Horizon 2020: Increased focus on market needs and business opportunities in the areas of privacy and security through influencing the objectives of R&D&E projects.
A.3 Strategic Planning 2014-2016 of the Schools

1. Master School
2. Doctoral School
3. Professional School

MASTER SCHOOL

Mission of the School: Create T-shaped professionals with state-of-the-art technical excellence in key ICT areas, especially in those addressed by the EIT ICT Labs Action Lines, in combination with strong expertise in Innovation & Entrepreneurship. The goal is to establish a world-renowned Masters Level Education brand.

Opportunities that EIT ICT Labs invests in: The EIT-labelled EIT ICT Labs Master School is the first systematic effort on a European scale to combine technical education in ICT on Masters Level with training in skills of Innovation and Entrepreneurship. The intended outcome is a new generation of ICT entrepreneurs and a well-skilled workforce that can boost the innovation rate and address societal challenges. This is facilitated via a standardised entrepreneurship education deeply integrated with ICT technical programmes at top European technical universities. Differentiating features of the programme include strong industrial stakeholder involvement, cross-node mobility, linkage with the EIT ICT Labs Action Lines, and hands-on interdisciplinary experience on innovation and entrepreneurship. Especially the connection to the Action Lines, which adjust dynamically to stay at the forefront of relevant ICT developments, ensures that the technical majors will always be close to where the radical innovations appear.

The Challenges addressed by EIT ICT Labs: The European market has a strong demand for Masters Level engineers that can contribute to innovation in companies of all sizes. For some decades, Masters Level Education in Europe has drifted in a theoretical direction, becoming a baseline for PhD studies rather than a breeding ground for technically highly skilled innovators and entrepreneurs eager to approach the market. The EIT ICT Labs Masters School is leading the way towards a more industrially relevant Masters education.

EIT ICT Labs achievements to date: The EIT ICT Labs Master School has seven M.Sc. educational programmes combining technical majors with a standardised innovation and entrepreneurial minor. Nineteen universities have signed formal cooperation agreements. Two cohorts of students have been enrolled and the recruitments for 2014 are currently prepared. The first cohort is currently preparing for their internships in industry and thesis work and will graduate in the summer of 2014.

EIT ICT Labs strategy for 2014 – 2016: During the coming years, key steps towards realising the mission of the Master School include: 1) Securing the highest quality of the education. This is absolutely necessary for building a strong brand and it includes the quality of the technical courses, the quality of the innovation and entrepreneurial courses, industrial presence and industrial commitment to the education, the strength of teambuilding activities, a high study performance and a high ratio of awarded degrees. 2) Increasing the industrial involvement. The degree of industrial presence in these programmes is a specific and crucial success factor. 3) Reaching critical mass and growing to the target size. The current recruitment objectives are as follows: 2012->100, 2013->200, 2014->300, 2015->400, 2016->500 new registered students. Lower numbers during one year will raise the level of the objective for the coming years. In the steady state (2017), 1000 students should be in the system. 4) Creating an Alumni Association to support recruitment efforts, brand building and outcome monitoring.

Priority 1: Consolidating the Education of T-shaped Professionals

Description: Develop and operate the EIT ICT Labs Master School education programme that creates graduates with excellent ICT skills, who are trained especially in the topics that are addressed by the EIT ICT Labs Action Lines. In addition, the graduates will have expertise in Innovation and Entrepreneurship. They are extraordinarily well positioned to create and accelerate innovations and they will reach key positions within the European ICT industry.

Strategic steps: Strengthen industrial partner commitment for project courses, Summer Schools, mentorships and internships; improve collaboration with all Action Lines; launch the Alumni Association (contributing to recruitment efforts); intensify recruitment efforts at partner universities and ensure recruitment support from selected non-partner universities and from economically strong applicant groups; focus on study performance ratios (ambition to achieve nominal study times despite high demands on the students); optimise the admission processes and establish scalable payment/scholarship schemes.

Results/deliverables 2016: Strong interest in the programmes as demonstrated by growing number of completed applications; strong study performance ratios and growing number of graduates per year; critical mass of students at all EIT ICT Labs Nodes; sustainable balance between paying students and students with scholarships.

Impact 2016: Societal Impact: EIT ICT Labs alumni are hired quickly into attractive positions and move fast towards their first promotion(s). EIT ICT Labs alumni stimulate innovation. Education programmes within Europe are adjusted to follow the lighthouse approach created by EIT ICT Labs. Economic Impact: Key industry positions can be filled without delays with excellent candidates. EIT ICT Labs alumni create new companies, with positive economic impact as well as attractive employment opportunities. European ICT industry gradually achieves a higher rate of innovation successes. Master School attracts a high percentage of paying students.

Priority 2: Establishing the Masters Level Education Brand

Description: Establish EIT ICT Labs as a world-renowned education brand for ICT master students. Ensure that the differentiating skills of the EIT ICT Labs Master School graduates are well recognised.

Strategic steps: Secure the basis for the brand through the establishment of a systematic quality assurance scheme make subsets of the master school programme courses available to a larger audience by transformation to on-line form; utilise the Alumni Association for brand building; collaborate with other KICs and with the EIT towards brand building.

Results/deliverables 2016: Scoring system established and used for continuous improvement towards better scores (student satisfaction, partner satisfaction); regular evaluation of public perception (e.g. via press articles) shows progress towards brand establishment; suitable measures established and monitoring started for career success of alumni (including new ventures) and strong indications for suitable measures established and monitoring started for career success of alumni (shorter time to job / to promotions, better average salary, better entry level salary); growing number of bilateral agreements with non-partner universities.

Impact 2016: Societal Impact: Students across Europe are aware of the EIT ICT Labs programmes and prioritise them for the fulfilment of their Master Level ambitions. Economic Impact: European ICT Industry is aware of the EIT ICT Labs programmes as an excellent source for highly skilled staff with unique innovation and entrepreneurship capabilities.
The Challenges addressed by EIT ICT Labs: Today’s ICT leaders, who increasingly occupy key roles also outside of the core ICT sector, often lack a truly entrepreneurial mind-set as well as hands-on innovation experience. They are strong managers and they can successfully work with an existing portfolio of products and services, but they are cautious innovators. They have earned their PhDs either via a deep scientific engagement or while working on tasks related to the management of “big business”. The Doctoral School provides a unique opportunity for a different focus, emphasising entrepreneurial, innovation, industry experience, and pan-European mobility. A key challenge for a successful programme is to attract both academic (supervisor) and business (middle manager) interest to engage actively and provide high-quality topics with real potential for a truly integrated mode of working.

EIT ICT Labs achievements to date: The Doctoral School is in operation with the first groups of students (~100) now participating in the programme. Several Doctoral Training Centres (DTCs) have been set up to support the Doctoral School and its candidates.

EIT ICT Labs strategy for 2014 – 2016: The main goal for the Doctoral School towards 2016 is to establish the EIT ICT Labs brand so successful that student enrolment across Europe is ensured. The Doctoral School is positioned to manage the creation and the acceleration of innovations in Innovation and Entrepreneurship. They are extraordinarily well positioned to manage the creation and the acceleration of innovations. They are extraordinary well positioned to manage the creation and the acceleration of innovations and they reach leadership positions within the European ICT industry.

Strategic steps: Work actively with the people, who are responsible for innovation and entrepreneurial content development and course deployment across the participating Higher Education Institutes. A business development experience (BDexp) will be the first year where the size of the cohort of new doctoral candidates enrolled in the EIT ICT Labs Doctoral School will be equal to the targeted steady flow of 120 innovation and entrepreneurial Doctors per year.

During the coming years, key steps towards realising the mission of the Doctoral School include: 1) Establish a common and robust innovation and entrepreneurial education across EIT ICT Labs. Part of the innovation and entrepreneurial education can be organised centrally, but most has to be attended locally to be compatible with the scientific technical part of the education and the local business involvement. Thus, monitoring the uniformity and quality of the innovation and entrepreneurial elements will need specific attention. 2) Building communities of doctoral candidates, thesis directors and business partners. Since completing the thesis cycle takes about four years, a sufficient level of stability needs to be provided by the network of partners.

Priority 1: ICT Leaders

Description: Develop and operate the EIT ICT Labs Doctoral School education programme that creates graduates with ICT leadership skills, who are trained especially in the topics that are addressed by the EIT ICT Labs Action Lines and who also have substantial expertise in Innovation and Entrepreneurship. They are extraordinarily well positioned to manage the creation and the acceleration of innovations.

战略步骤：在2014-2016年，EIT ICT Labs的战略目标是建立一个共同的和强大的创新和创业教育，覆盖所有EIT ICT Labs。部分的创新和创业教育可以在中央组织，但大部分需要在本地参加，以适应科学和技术部分的教育和本地商业参与。因此，需要监控创新和创业元素的统一性和质量。2）建立博士候选人、论文导师和企业合作伙伴的社区。完成论文周期大约需要四年，因此需要提供足够的稳定性。合作伙伴网络需要提供支持。

在接下来的几年里，将采取以下关键步骤来实现博士学校的使命：1）建立一个共同的和强大的创新和创业教育，覆盖所有EIT ICT Labs。部分的创新和创业教育可以在中央组织，但大部分需要在本地参加，以适应科学和技术部分的教育和本地商业参与。因此，需要监控创新和创业元素的统一性和质量。2）建立博士候选人、论文导师和企业合作伙伴的社区。完成论文周期大约需要四年，因此需要提供足够的稳定性。合作伙伴网络需要提供支持。
Position within the European ICT industry can be filled without delays with excellent candidates. EIT ICT Labs alumni create a more innovative European ICT industry, which leads to positive economic impact.

Priority 2: Doctoral School Brand

Description: Establish EIT ICT Labs as a world-renowned education brand for ICT doctoral students. Ensure that the differentiating skills of the EIT ICT Labs Doctoral School graduates are well recognised.

Strategic steps: Establish an EIT ICT Labs doctoral community via the alumni association, e.g., via shared online interactive innovation and entrepreneurial events, via mentorship and via networking across Europe. Communication about the Doctoral School will primarily take place through the DTCs and their events organised in collaboration with their local Co-location Centres as well as through TC-level events. Such events will serve to attract industry and academic supervisors as well as the agencies providing financial support. (Financial support from national sources might be established as well, to make this doctoral education sustainable.) Describe the EIT ICT Labs doctoral education in a charter, complying with the European programme quality must be built and communicated already right from the start.

Impact 2016: Societal Impact: Students across Europe are aware of the EIT ICT Labs programmes and consider them for their Doctoral Level ambitions. Educators advise students to consider the Doctoral School. Economic Impact: European ICT industry is aware of the EIT ICT Labs programmes as an excellent source for highly skilled leaders with unique innovation and entrepreneurship capabilities. European ICT industry gradually achieves a higher rate of innovation successes.

EIT ICT Labs overall impact in 2016:

- The employability of graduated EIT ICT Labs doctors will be confirmed in 2016 by partners and by other companies of the ecosystem. DTCs are established as hot spots where doctoral students, industrialists and academic faculty meet. The involved business schools and industrial partners will participate in the governance and operation of the DTCs and ensure the definition of the addressed themes, providing scientific challenges and financial support for doctoral candidates. A critical mass of 360 doctoral students participating in the School should be reached by 2016. The most interesting measures (how long to get a job, how many start-ups/innovative new businesses are being created, how many persons are employed by these creations) will still not be available for several years. Meanwhile, temporary indicators include: 1) number of ICT innovation doctors produced per year; 2) number of innovation and entrepreneurial doctoral candidates that apply for the Doctoral School, reflecting the demand for the programme; 3) number of involved Higher Education Institutions, thesis directors and business partners, representing the attractiveness of the Doctoral School.

Initiation of start-ups/growth of SMEs: EIT ICT Labs alumni lead the creation of start-up companies and the growth of existing companies of all sizes.

EU policy objectives/EU citizen and/or society at large: Equipping Europe’s doctoral students optimally for their leadership careers and preparing them to have significant impact on the future of Europe.

EU citizen and/or society at large: Better educated European workforce, well prepared for some of the most important challenges.

Synergy with Horizon 2020: EIT ICT Labs alumni are trained in the topics addressed by the EIT ICT Labs Action Lines, many of which are very relevant also in the context of Horizon 2020.

PROFESSIONAL SCHOOL

Mission of the Action Line: Raise the ICT competence level of Europe’s professionals, especially in those key ICT areas that are covered by the EIT ICT Labs Action Lines, via blended learning packages of technology updates with peer-education. The offerings will have a modular format, combining university-grade content and online modules with hands-on skills building and certification, to establish a world-renowned Professional Education brand. The target group is professionals, executives and decision makers.

Opportunities that EIT ICT Labs invests in: With the state-of-the-art innovation programmes that are carried out within its Action Lines, EIT ICT Labs has access to highly relevant knowledge. Companies that intend to innovate in the areas addressed by the Action Lines need their employees to apply this knowledge. The Professional School targets employees on all levels, from decision-making executives to entry-level professionals, with an educational background in science, technology, engineering, and mathematics (STEM), who need to either sharpen their existing skills or acquire new skills. These employees may either work in ICT or in other sectors that apply ICT.

The Challenges addressed by EIT ICT Labs: The dynamism of ICT requires technology updates in various fields. Also, the convolution of different ICT technologies requires integrated knowledge in application domains currently not delivered by generic ICT programmes (e.g., systems knowledge for architects in urban development, where telecommunications, citizen engagement, mobility and environmental sustainability come together). But today’s professionals have only limited flexibility in their schedules and continuous education often makes it only on the lower levels of the priority list. Intensive programmes that require a very significant time investment with limited flexibility do not match their needs. Instead, suitable education programmes will need to be wrapped around the existing commitments. Together with its partners, EIT ICT Labs can develop and operate blended education programmes that optimally match the needs of busy professionals and their employers, combining on-line elements that can be followed asynchronously whenever a suitable amount of time becomes available with focused presence modules that offer opportunities for collecting hands-on experience. Both online as well as presence modules can incorporate peer-education elements. EIT ICT Labs provide relevant programmes independently certified, documenting successful programme participation.

EIT ICT Labs achievements to date: The Professional School started in 2014. In 2013, initial progress has been made with respect to the choice of a suitable platform for the online learning component. Investigations about possible business model scenarios are also ongoing. A consortium for the development of the first blended professional education programmes has been formed and the development of the first courses will commence in early 2014.
EIT ICT Labs strategy for 2014 – 2016: Towards 2016, the Professional School will be further developed towards a large-scale initiative, with a growing portfolio of technical, science and business modules. The needs of professional learners and their employers will be matched through blended programmes leveraging the toolkit as delivered by the EIT ICT Labs education partner network, the Co-location activities and the Online Education Platform. Social features will be included to facilitate peer education also during the online parts of the programmes. New pedagogic modalities will be included to optimise e-Learning processes, targeting increased effectiveness of learners and teachers. A mid-term goal is to position EIT ICT Labs as a key European player in the global trend of online education or Massive Open Online Courses (MOOCs). The developed online learning platform will also be implemented as a tool for the Doctoral and Master School, resulting in the desired blended combination of online learning and physical presence education.

 Priority 1: Certified Professionals Accelerate Innovation

Description: Develop, establish and operate the EIT ICT Labs Professional School education programme that enables employees to acquire critical ICT knowledge and skills that enable them to run successful innovation activities for their employers, especially in the areas that are addressed by the EIT ICT Labs Action Lines. Successful programme participants will receive a diploma and a European certification.

Strategic steps: Select online education platform and make it operational; define professional education programme (content) strategy and develop suitable professional education programmes; create online education content and presence education modules; establish Professional School operational model and business model; monitor key parameters and set up continuous improvement process.

Results/deliverables 2016: Continued strong interest in the professional education programme offerings; Accepted pricing levels covering costs; Broad range of programmes operational and key Action Line content fully covered; Close relationship with innovation departments of EIT ICT Labs partners; Flawless operation of programme platform and processes.

Impact 2016: Societal Impact: European employers have an additional effective option to improve their employability and marketability; European workforce capable of establishing innovation leadership in areas addressed by EIT ICT Labs Action Lines; Further improved innovation culture and skills within European society. Economic Impact: Programme participants work on successful key innovation programmes within their companies; Increased innovation rate (and resulting positive economic effect) within companies that utilise the programmes; Companies can innovate effectively as participants in the EIT ICT Labs Action Lines and allocate their best team members in combination with suitable professional education programmes; Europe’s leading 2xeMBA is in operation.

Priority 2: Establishment of a Strong Professional-Level Education Brand

Description: Establish EIT ICT Labs as a world-renowned education brand for professional ICT education. Create awareness for the possibility to acquire knowledge and skills in the areas addressed by the EIT ICT Labs Action Lines. EIT ICT Labs Professional School are recognised (accredited) at the European level, and are internationally well reputed.

Strategic steps: Define and execute marketing strategy; Monitor brand recognition and brand reputation; Ensure high quality of available material, especially for the online learning modules; establish a feedback loop to incorporate any kind of feedback into a continuous learning process; position Professional School as sufficiently differentiated from competitive offers.

Results/deliverables 2016: EIT ICT Labs programme certifications are recognised as positive differentiator for professionals; EIT ICT Labs programme is preferred outlet for education partners; Positive feedback received in programme satisfaction surveys, both from programme participants as well as from their employers; Regular evaluation of public perception (e.g. via press articles) shows progress towards brand establishment; Suitable measures established and monitoring started for involvement of programme participants in innovation activities within their companies; EIT ICT Labs certified programmes recognised as a career differentiator for professionals.

Impact 2016: Societal Impact: Professionals across Europe as well as their employers are aware of the EIT ICT Labs programmes and utilise them frequently for their professional learning needs. Economic Impact: European companies are well aware of the topics of the EIT ICT Labs Action Lines and use the Professional School to improve their innovation power in these areas.

EIT ICT Labs overall impact in 2016:

Initiation of start-ups/growth of SMEs: Professional School will contribute to increased “Entrepreneurialism”, i.e. new business initiatives coming out of existing companies.

EU policy objectives: Improved knowledge and skills within the European workforce, especially in the critical areas that are addressed by the EIT ICT Labs Action Lines.
A.4 From Strategy to Implementation: Strategy-driven Business Plan Development

The Strategic Innovation Agenda 2014-2016 forms the basis for the Call for Activities for 2015 and the Business Plan for 2015. The Call for Activities will be published in March 2014, several weeks prior to the 2014 EIT ICT Labs Partner Event.

Received proposals for activities in the area of Research-driven Innovation will be reviewed per Action Line by teams of experts. Each team includes around ten experts, half of which are representatives of EIT ICT Labs partners and the other half external experts (mainly industry professionals). Two representatives from EIT ICT Labs management will also participate in the review for each Action Line.

Review criteria are:
- Strategic match of the proposals with the priorities of the Action Line and Strategic Innovation Agenda 2014;
- Innovation and valorisation potential of the Carriers;
- Identified business impact potential;
- Quality and feasibility of the activity plan;
- Partner commitments;
- Industrial involvement;
- European dimension.

Reviewers will be expected to provide their overall evaluation and to assess their confidence in the proposal and the team. For each Action Line, all reviewer teams will discuss the outcome of the reviews during joint consensus meetings in June 2014. The results of these meetings, a ranking of the various proposals and the recommendations for all submitted proposals, will be presented as a proposal to the Management Committee meeting in June 2014, during which the members will decide on the selection of the proposals to be taken into Business Plan 2015.

After the Management Committee has decided on the activity proposals in June 2014, the Business Plan 2015 will be drafted in August and reviewed by the Management Committee and Executive Steering Board. Finally, the General Assembly will approve the plan at its September meeting, prior to its submission to the European Institute of Innovation & Technology.

The Business Plan 2015 will include the activities that will be carried out in 2015 and that have been selected from the activity proposals that were submitted in reaction to Call for Activities 2015. Ongoing activities can be extended during this process and can thereby run for multiple years. The Business Plan will provide the business rationale and the business underpinning for each activity. It also includes the financial setup for each activity and the balance between the various types of work within the activity (Research, Business and Education).

Activities in the area of Education as well as the activities related to Strategy and design of Research, Business and Education Catalysts will be developed in close collaboration with the Management Committee. Those areas consistently work on their multi-year programme and are, by nature, less dynamic.

The Business Plan will include the activities that will be carried out in 2015 and that have been selected from the activity proposals that were submitted in reaction to Call for Activities 2015. Ongoing activities can be extended during this process and can thereby run for multiple years. The Business Plan will provide the business rationale and the business underpinning for each activity. It also includes the financial setup for each activity and the balance between the various types of work within the activity (Research, Business and Education).

After the Management Committee has decided on the activity proposals in June 2014, the Business Plan 2015 will be drafted in August and reviewed by the Management Committee and Executive Steering Board. Finally, the General Assembly will approve the plan at its September meeting, prior to its submission to the European Institute of Innovation & Technology.

Figure A4.1 shows the annual call process that will be carried out in 2014 to determine the activity portfolio for 2015.

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<tr>
<th>Strategic Innovation Agenda</th>
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<tr>
<td>January 1</td>
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<td>Launch of the Strategic Innovation Agenda</td>
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<td>May 16 – May 30</td>
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<td>Quality check of submitted Activity Proposals</td>
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<td>Evaluation of submitted Activity Proposals</td>
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<td>June 9 – 13</td>
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<td>Consensus meeting Paris</td>
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<td>June 24 – 26</td>
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<tr>
<td>Management Committee meeting Brussels</td>
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<td>June 30</td>
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<td>Feedback to proposers</td>
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<td>June 30 – July 25</td>
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<td>Revision of activity plans</td>
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<th>Call for Activities (activity definition and selection process)</th>
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<td>Submission of Activity Proposals in response to the Call for Activities</td>
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<td>Partner Event Berlin</td>
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<th>Business Plan</th>
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<td>May</td>
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<td>June 26 – Aug 8</td>
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<tr>
<td>Preparation of Business Plan</td>
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<td>Aug 4 – 7</td>
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<td>Business Plan writing workshop</td>
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<td>Aug 8 – 23</td>
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<td>Improvement and finalisation of Business Plan</td>
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<td>Sep 29 – Oct 1</td>
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<tr>
<td>Business Plan submission</td>
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<td>Nov 24</td>
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<td>Submission to General Assembly (meeting September 6)</td>
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<td>Oct 23 – Dec 1</td>
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<tr>
<td>Submission of final Business Plan to EIT</td>
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<td>Dec 24 – early December</td>
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<tr>
<td>Preparation of EIT General Board (GB) hearing</td>
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<td>Early December</td>
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<td>EIT GB hearing and decision</td>
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<th>Figure A4.1 Timeline of Mechanism Call for Activities 2015</th>
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| Nov 24: Submission to General Assembly (meeting September 6) |
| Oct 23 – Dec 1: Submission of final Business Plan to EIT |
| Dec 24 – early December: Preparation of EIT General Board (GB) hearing |
| Early December: EIT GB hearing and decision |
| Late December: Final Business Plan approved by Executive Steering Board and submitted to EIT |

| End of December |
| Selection of High-Impact Initiatives |

| September – December: Selection of High-Impact Initiatives |
| End of December |
| Selection of High-Impact Initiatives |

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### A.5 Partners EIT ICT Labs

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<th>Node</th>
<th>Beneficiary</th>
<th>Partner Type</th>
<th>Classification</th>
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<tr>
<td>Berlin</td>
<td>Deutsche Telekom AG</td>
<td>Member</td>
<td>Industry</td>
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<td></td>
<td>Deutsches Forschungszentrum für Künstliche Intelligenz GmbH</td>
<td>Member</td>
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<td>EICT GmbH</td>
<td>Affiliate</td>
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<td>Node LE</td>
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<td>Fortsicht GmbH</td>
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## Node Beneficiary Partner Type Classification

### Paris

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