D.4.4(a) - Consolidated Roadmap for ICT research collaboration, together with FORESTA and FIRST

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1 INTRODUCTION

This deliverable is part of the cluster activities and collaboration between PRO-IDEAL PLUS, FORESTA and FIRST in order to identify ICT research priorities and roadmaps, as described in DoW*:*

> "Based on the results of past and currently running projects (e.g. PRO-IDEAL, Solar-ICT, WINDS-LA), the clustered projects will identify ICT research priorities in the target countries. This is "work in progress" as the priorities may change depending on the policy approach and real needs identified.
>
> These priorities will be fed into the ICT research roadmaps of each of the three projects. Given the difference in approaches and partially, geographical coverage, the roadmap activities of the three projects are seen as three working groups that will result in different findings. However, an additional "Consolidated Roadmap" will be drafted that will reflect the results of all three projects".

The consolidated report (D4.4a) presents a summary of the approaches and main results of the three projects recommendations and roadmaps for enhancing EU-Latin America collaboration in ICT. The report is based on the following documents/deliverables:

PRO-IDEAL PLUS:

- D.4.4 – Roadmap for ICT research collaboration.

FORESTA:

- D3.3 Strategic recommendations on key research priority issues, opportunities and challenges to be jointly addressed by EU and Latin American countries.

- Policy Dialogue Council Europe-Latin America. Position paper on International Cooperation in the Common Strategic Framework.

- The ICT Policy Dialogue Council recommendations for an enhanced EU-LA cooperation.

The above documents were publicly available at the FORESTA website and distributed as working documents in its conference "Fostering EU-Latin America ICT Policy Dialogue" held in Brussels on 28-29 November 2011. The last version of D3.3 was provided by ROSE, the FORESTA partner in charge of the deliverable.

FIRST:

- D4.4 Common EU-LatAm roadmap towards implementation of Future Internet Strategic Research Agendas.

This deliverable was kindly provided by ROSE, the coordinator of the FIRST project.

The following sections show the approaches and methodologies followed by the three projects, and a summary of main findings and recommendations by project and conclusions.

2 APPROACHES TO ICT ROADMAPS

PRO-IDEAL PLUS, FORESTA and FIRST have carried out different approaches and strategies to reinforce ICT R&D cooperation between Latin America and Europe and the three projects have built roadmaps for future research collaboration in the field of ICT. The roadmaps provide shared insights and long-term visions for ICT cooperation. They adopt a regional scope and integrate country-specific research priorities in ICT and stakeholders' prospective visions of ICT policies for cooperation with the EU. While PRO-IDEAL PLUS and FORESTA address a broader set of ICT topics, FIRST focuses on Future Internet, in line with the projects' objectives. The methodology of the three projects roadmaps are summarised below.

2.1 PRO-IDEAL PLUS

PRO-IDEAL PLUS followed a five-step approach to road mapping:

- **Step 1:** Understanding current ICT landscape in Latin America target countries (Mexico, Colombia, Cuba, Costa Rica, Argentina, Brazil, Chile), which provides an outlook of structural elements for ICT R&D (people, programmes and projects), priority areas, talent/capabilities and infrastructure.
- **Step 2:** Challenges for collaboration. Based on the assessment of the current ICT situation in target countries, it identifies the top 10 ICT R&D priority areas and available resources to execute them (people and infrastructure).
- **Step 3:** Vision and strategy to enhance EU-LA cooperation in ICT, which prioritise ICT research priorities and identifies the potential focus areas for developing the ICT roadmap.
- **Step 4:** Define scenarios for action, which includes a review of necessary supporting ICT policies and programmes for ICT R&D collaboration and the selection of 3-6 focus priority areas and related scenarios for roadmap.
- **Step 5:** Develop recommendations for selected focus areas, which includes also strategic elements for monitoring the implementation of the ICT R&D roadmap.

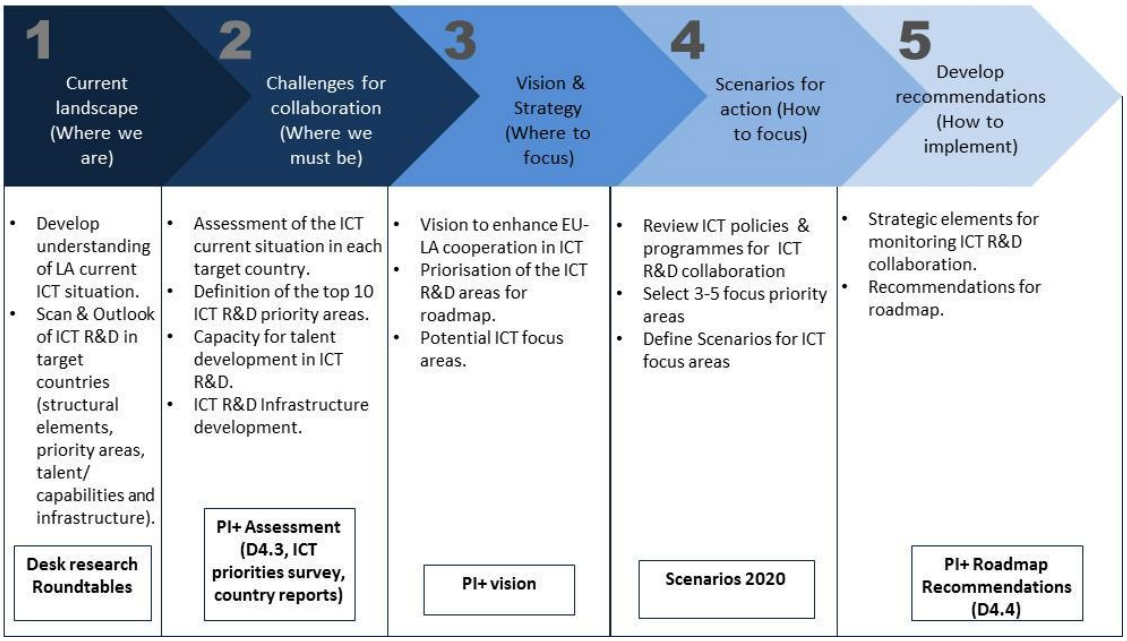

Figure 1: PRO-IDEAL PLUS roadmap approach

The methodology for the roadmap combines partners´ views and expert opinion through continuous interaction with key stakeholders, including government institutions, universities, industry, and ICT experts.

The analysis of the ICT situation, challenges and ICT priorities in Latin America (Step 1 and 2 of the roadmap) is based on previous work performed by the partners in the context of WP4, namely:

- The report on ICT Research Priorities in Latin America. Results from PRO-IDEAL PLUS Survey (June 2010).
- Country reports (Argentina, Brazil and Chile) on the status of ICT policy development, carried out by PRO-IDEAL (April 2011).
- D4.3 Identification and Analysis of ICT research priorities (July 2011).

This work does not rely solely on partners views. The roadmap approach has been supported by discussions during the ICT Fora held in Chile, Cuba, Argentina, Mexico and Brazil, and particularly by expert opinion gathered through a set of Round Tables with policy makers and stakeholders from the academia and industry held in Mexico, Colombia, Costa Rica and Cuba between May-October 2011. Participants to the Round Tables were selected on the basis of their support to ICT policy dialogue, contribution to ICT research, potential to foster LA-EU cooperation, industry leadership, and influence and reputation in their countries.

The discussions of the Round Tables focused on pre-selected topics for the roadmap: priority areas of interest for ICT R&D cooperation; actions required to improve talent management and training for ICT R&D; and infrastructure (e.g. data centres and telecommunications) to support ICT R&D.

Overall, about 500 experts were consulted (350+ through the ICT priorities survey and 130+ in Round Tables) and provided insights and inputs for the different phases of the roadmap.

2.2 FORESTA

In March 2011 FORESTA set up a Policy Dialogue Council to strengthen and support the ICT policy dialogue between Europe and Latin America in the ICT domain. Since then, the Policy Dialogue Council produced:

- a position paper on "International Cooperation in the Common Strategic Framework – CSF" (May 2011), describing a common Latin America cooperation strategy with Europe in the field of ICT research in the mid-long term period. FORESTA position paper includes recommendations in answering to the specific question number 26 of the European Commission consultation Green Paper towards CSF Programme (Horizon 2020).
- a set of recommendations in the short-medium term period, identifying the key issues to enhance the cooperation between Europe and Latin American in the ICT research field.

The FORESTA Policy Dialogue Council is conceived as "an independent Latin America Council of experts, with the objective of harmonizing LatAm ICT research policies and instruments with special attention to the EU-LAtAm cooperation practices".

Currently, 35 experts from the industry, academy and government are members of the Council. They have been selected on the basis of their well-reputation and act as individual experts independently on their position in their organizations. The LA FORESTA partners take part of the Council Secretariat that is chaired by ROSE.

With regard to the process of formulating recommendations, the Council discussions on policy, technology and applications to empower the cooperation between Europe and Latin America in the ICT domain followed the foresight studies approach. The foresight method enhances future oriented thinking by gathering anticipatory intelligence from a wide range of knowledge sources in a systematic way and linking it to today's decision making.

Thus, FORESTA used open foresight as a systemic instrument in which all relevant stakeholders are represented. Actually, expertise and knowledge from the Policy Dialogue Council members represent key stakeholders from public and private sector. Also, discussions with stakeholders at the"policy conferences" held in Argentina, Brazil, Chile, Colombia and Mexico, contributed to FORESTA recommendations.

The exercise of selecting the research priorities based on a variety of sources:

- previous related projects like WINDS-LA
- research agendas of the European Technology Platforms
- draft research agendas of the Latin American Technology Platforms on specific topics (like Future Internet and ICT Components)
- policy actions by the European Commission (like the standardization-related cooperation)
- individual views and ideas from the Council members.

Particular attention has been paid to WINDS-LA roadmap "as a strategy to improve existing collaboration among researchers, research stakeholders and policy makers from Europe and Latin America in the field of ICT research". The FORESTA Council members, among them the Coordinator of the WINDS-LA project, were given the previous results of this project in order to pick up those research priorities which are still considered as very relevant from their point of view.

The actions and recommendations proposed by WINDS-LA roadmap for 2008-2013 are considered by the FORESTA Policy Council as the starting point for target horizon 2010-2015 recommendations.

2.3 FIRST

The FIRST roadmap focus is the implementation of Future Internet strategic research agendas (SRA). It takes into account national strategies developed by LATPs (PLATA, BRAFIP, MACHI, RECIIF and MTP), as well as European strategies and priorities developed by ETPs, FIA, FIRE, and other relevant European groups in the field of Future Internet. The final joint EU-LatAm roadmap shall be validated and approved by an expert's advisory group.

The roadmap is the third phase of the LATPs lifecycle: Common Vision, Common SRA and Roadmap to implement the Strategic Research Agenda.

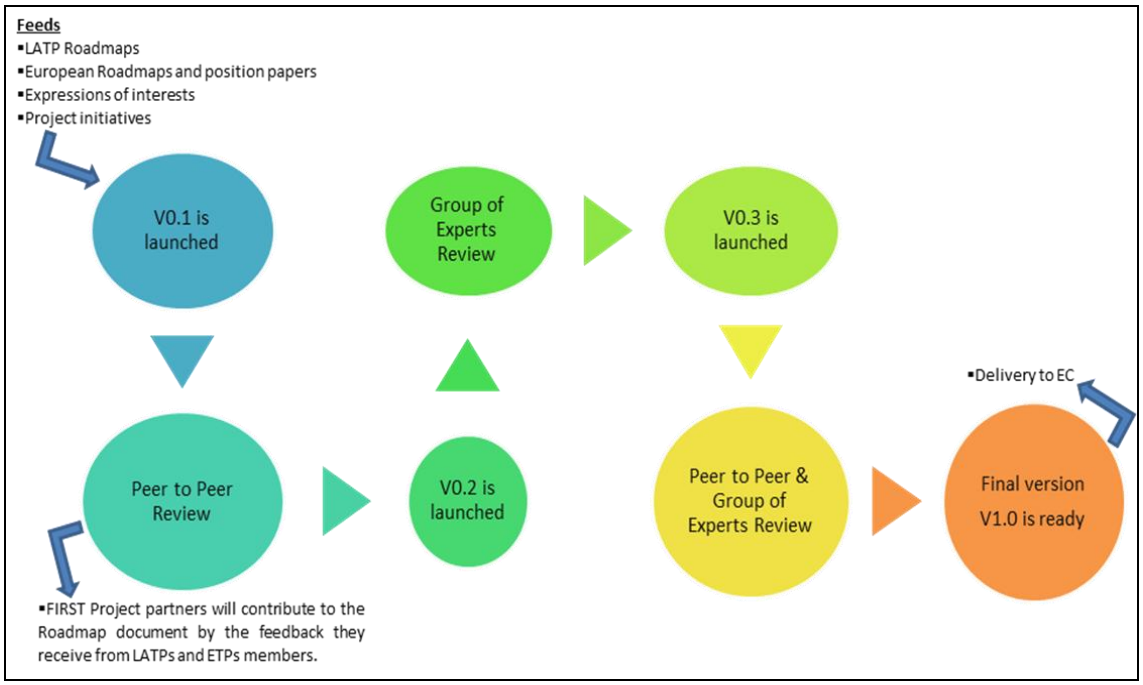

Figure 2: FIRST Roadmap process

The roadmap presents shared research themes and ideas of R&D cooperation projects between European and Latin American Technology Platforms.

The process of FIRST roadmapping includes consultation to EU-LA experts groups. A list of 33 experts (19 from LATPs and 14 from ETPs) and 26 Observers is provided in the document.

3 MAIN FINDINGS AND RECOMMENDATIONS

3.1 PRO-IDEAL PLUS

To support future vision where Latin America becomes an **ICT hub** to undertake and promote research cooperation with Europe, the PRO-IDEAL PLUS Roadmap proposes to adopt a focused approach in a few ICT priority areas where Latin America has the capacity and resources to boost ICT research. The process of selecting ICT R&D priority areas involves four phases:

Phase I: Identification of the top ten ICT priorities for EU-LA R&D cooperation, based on the PRO-IDEAL PLUS survey, national ICT priorities defined by the institutions responsible for R&D policies and validated by expert opinion through Round Tables with key stakeholders and decision makers.

Phase II: splitting up the top ten ICT R&D priority areas for research cooperation into technology focused areas and technology as enabler areas. Technology focused areas are mainly devoted to develop and integrate emerging hardware, digital devices, communications, and networking technology, as well as technologies and services for knowledge management and information processing. In contrast, Technology as enabler areas plays a crucial role in applications of high socio economic impact in such a way that could cause an important shift in the society.

I. Technology focused areas:
1. Intelligent Information Management,
2. Computing Systems,
5. Future Networks,
6. Smart components and smart systems integration,
7. Technology-enhanced learning,
8. New paradigms for embedded systems, monitoring and control towards complex systems engineering,
9. Manufacturing solutions for new ICT products.

II. Technology as enabler areas:
3. ICT solutions for governance and policy modelling,
4. ICT for efficient water resources management,
10. ICT systems for energy efficiency and emission reduction.

Phase III: Filtering from 7 potential technology focused areas to 3 ICT focus areas. The selection was based on the analysis of the ICT landscape in Latin America target countries and discussions with key stakeholders and experts through Round Tables, taking into account the potential benefit for Latin America development and alignment with current ICT plans. The 3 technology focus areas selected are the follows:

- Future Networks
- Computing systems
- Intelligent Information Management

Phase IV: Focus areas refinement and final selection. Three ICT technologies (one for each technology focused areas) were selected, based on the following criteria: their potential capacities for research in Latin America, in terms of talent and infrastructure, and their relevance to the development of both ICT technology focus and ICT technology as enabler areas:

- Wireless and mobile broadband systems (Future networks, Challenge 1)
- Parallel and concurrent computing (Computing systems, Challenge 3)
- Intelligent integrated systems (Intelligent information management, Challenge 4).

The prioritization of ICT focused areas is the basis to map and define potential **scenarios**, built upon ICT core competences in the Latin America targeted countries and used to identify a number of possible alternative paths for EU-LA cooperation in the ICT field. The following figure shows the proposed mapping taking the selected technology focused areas in relation with their pertinence as viewed through the technology as enabler areas for Latin America.

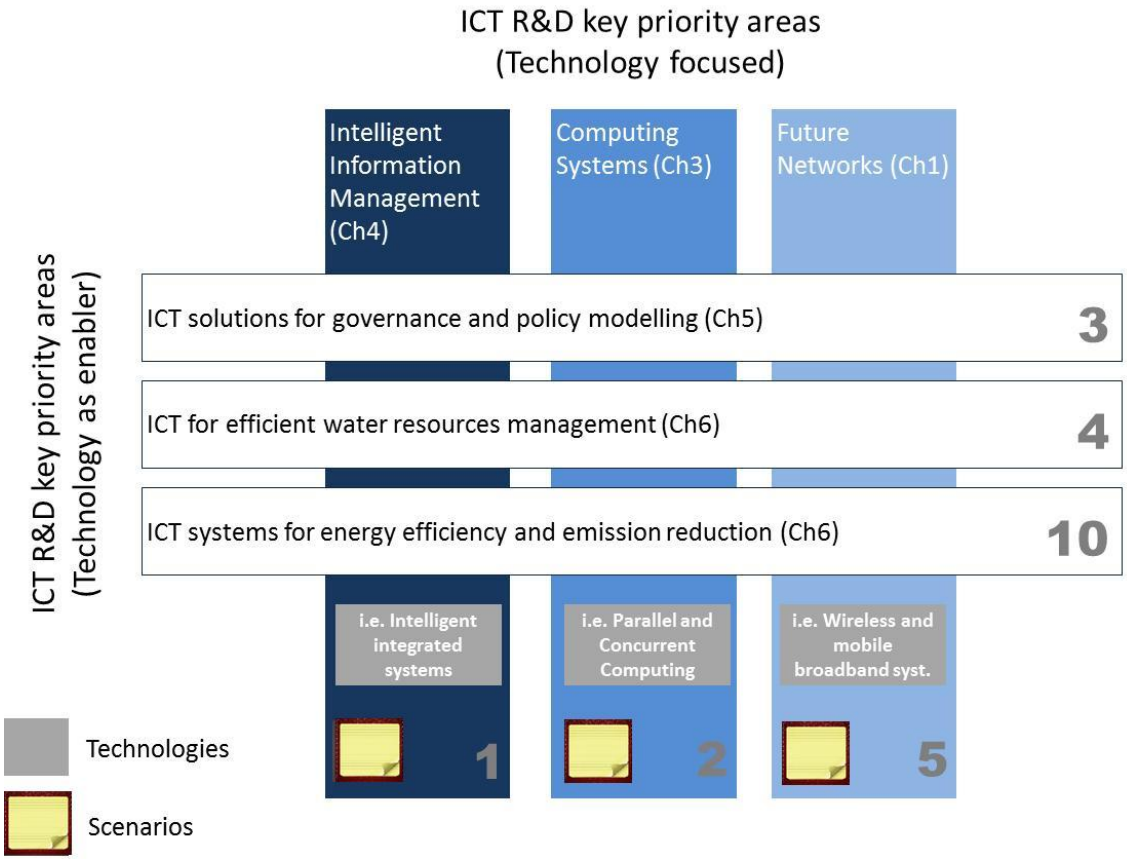

Figure 3: ICT R&D technology focused areas versus technology as enabler areas. (Numbers in grey are the respective ranking in the top ten ICT R&D priority areas, resulting from the PRO-IDEAL PLUS survey).

SUMMARY OF SCENARIOS

The envisaged scenarios arise from cross-cutting the two sets of the above focus areas where joint efforts should be undertaken. The nine scenarios described below are intended to develop application examples and possible pathways that could be undertaken to explore the talent, the infrastructure and the institutional coordination necessary to achieve Latin America future visions and to strengthen the foundation of EU-LA ICT R&D cooperation in the medium term (2020).

Scenarios for Future Networks
Wireless and mobile broadband systems (selected technology)

Scenario 1. ICT solutions for governance and policy modelling: Wireless Access and Delivery of Next Generation Public Services.

Latin American governments are facing a double challenge: on the one hand, the need to reach international standards of services coverage as in developed countries, and on the other hand the need to integrate the delivery of these services into the Latin America context.

Thus, it is necessary to find an immediate way to manage through insufficient resources while keeping pace with increasing demands. Single-Window Government is a solution to overcome these challenges, creating more service-oriented governments while achieving significant operational efficiencies and savings.

Moreover, the easy delivery and multichannel access to public services could be involved in Latin American democratic processes and help to overcome the Digital Divide. Current research focus is on access problems resulting from digital divide, covering different user needs (broadband access, ICT security, etc.).

Scenario 2. ICT for efficient water resources management: Mobile GIS in real time hydrological models in agriculture.

The contribution of ICT to agricultural development could be observed in two ways: to help raise rural incomes and to ensure sustainability.

In Latin America, there are several agricultural zones having a great potential wealth because of its good land, abundant water, and proximity to the markets of big cities. Nevertheless, the inhabitants of these zones have little or no access to public services and the communications infrastructure available to them is at best precarious. There is a connection between the lack of communication and services and the fact that farmers tended to grow the same crops regardless of market prices.

Scenario 3. ICT systems for energy efficiency and emission reduction: e-waste management and energy generation

Latin America is facing a rapid increase in internet use along with fast growing computer sales. Penetration with electronic equipment is in some countries approaching the level of industrialized countries. There is an evident need to resolve the management of end-of-life computers and other electronic equipment.

Several studies in Latin America assessed the increasing e-waste quantities and confirmed the importance of a sustainable e-waste management. The combination of refurbishment and recycling will offer an opportunity to link socially motivated educational initiatives addressing the bridging of the digital divide with resource recovery and generation of economic activities. At the same time, Latin America is the region with the highest share of renewable sources in electricity production.

Scenarios for Computing Systems
Parallel and Concurrent Computing (selected technology)

Scenario 4. ICT solutions for governance and policy modelling: Access and Delivery of Next Generation Public Services. Massive government clouds.

Although current research is focusing on cloud computing and assesses its impacts, it is still in its initial stages. Clouds are today a reality and available on demand and in Latin America continue its development. In particular the Open Governance and the Privatised Governance landscape outline a lot of positive arguments for cloud computing such as rapid collaboration for incident handling. Major features rely mainly on: cloud service level requirements, business models in the cloud, cloud interoperability, security & authentication in the cloud, data confidentiality & auditability, and regulatory compliance.

Because of the intrinsic characteristics of cloud computing, while the client perceives the cloud as a single entity, the implementation typically requires one or more data centres, composed of potentially huge numbers of service instances running on a large amount of hardware.

Scenario 5. ICT for efficient water resources management: high performance computing for real time hydrological models in agriculture

There are many challenges in developing effective and integrated water recollection management solutions for hydrology and water quality issues, in particular in desert areas as in Northern part of Mexico.

Such solutions will rely on high performance computing (HPC) simulations. They should ideally build on current scientific evidence to inform policy makers and regulators and additionally allow stakeholders to take rights of local and/or national issues, bringing together communities of practice.

Scenario 6. ICT systems for energy efficiency and emission reduction: Energy-Efficient Management of Data Centre Resources

In Latin America growth in internet usage between 2000 and 2010 was 1032.80% with a penetration of 34.5%, contrasted with Europe, with a 352% and 58.4% respectively. All over the world, IT is consuming ever greater amounts of energy and is therefore the source of significant CO emissions.

Data centres have grown proportionally to internet usage; nevertheless they now drive worldwide more in carbon emissions than both Argentina and the Netherlands. High energy costs and huge carbon footprints are incurred due to massive amounts of electricity needed to power and cool numerous servers hosted in these data centres. Cloud service providers, Google, Microsoft, and Yahoo are building large data centres in barren desert land surrounding the Columbia River, USA to exploit cheap and reliable hydroelectric power. There is also increasing pressure from Governments worldwide to reduce carbon footprints, which have a significant impact on climate change. For example, the Latin America governments can establish own or shared LA Data Centre Council to address the soaring energy consumption of data centres.

Scenarios for Intelligent Information Management
Reactive algorithms, infrastructures and methodologies (selected technology)

Scenario 7. ICT solutions for governance and policy modelling: Access and Delivery of Next Generation Public Services. Information visualization and analytics

In Latin America it is difficult to model for successful development as well as the implementation of e-government. This need leads decision makers to fill a void in the study of e-government in less developed nations, most of which are trying to catch up with their developed counterparts in this crucial aspect of digital governmental development.

There is still the need for entirely new visualisation approaches and technologies to be developed in order to simplify the analytical process of text mining, for instance, or policy analysis, in general. Due to these intersections in the two research fields, the connectivity between the topics has to be enforced. The results of these efforts are, on the one hand, new solutions and tools for the governance and policy modelling processes. On the other hand, visual analytics will benefit from special challenges and use-case scenarios arising from governance and policy modelling.

Scenario 8. ICT for efficient water resources management: real time hydrological models in agriculture, based on efficient intelligent modelling techniques.

Several countries in Latin America have constructed strong competencies in primary industries, including agriculture, as a strategy to reinforce their historical comparative advantages in these areas. In recent decades, however, the emergence of some technological paradigms (ICT, biotechnology, nanotechnology) permeating different industries challenged the former structures and systems.

To develop a knowledge-intensive agriculture means to construct a globalized, yet differentiated, and sustainable activity. All these characteristics demand access to massive amounts of information. This makes the incorporation of ICT critical in virtually all segments of the agricultural production and distribution chains. As a result, the evolution of agriculture is now decisively affected by the way ICT supply evolves and by the effectiveness and efficiency of ICT incorporated, not only in technical equipment, but in a broader way in investment, marketing, institutional and even educational and cultural activities linked to agriculture and rural development.

Scenario 9. ICT systems for energy efficiency and emission reduction: Development of algorithms for Energy-Efficient Management.

Latin America is characterized by a wide range of different economic and social levels. Given the different conditions and present energy management practices, an efficient implementation cannot be based on a single model approach which is universally applied to either a data centre or country.

There are key open problems that can be addressed at the level of management of system resources in data centres. Virtualisation technologies, which cloud computing environments heavily rely on, provide the ability to transfer Virtual Machines (VMs) between physical nodes using live of offline migration. This enables the technique of dynamic consolidation of VMs to a minimal number of nodes according to current resource requirements. As a result, the idle nodes can be

switched off or put to a power saving mode (e.g. sleep, hibernate) to reduce total energy consumption by the data centre. To do so, it is possible to develop resource allocation algorithms in order to find the trade-off between energy consumption and performance delivered by the system.

PRO-IDEAL PLUS RECOMMENDATIONS

The key recommendations of the PROI-DEAL PLUS Roadmap could serve as inputs of the strategic policies, programmes and plans to intensify the EU-LA cooperation in ICT R&D for the near and intermediate terms (2015 and 2020).

The list of 15 recommendations fall into the structural elements and resources that defines the ICT R&D landscape in Latin America: Institutional coordination (policy makers and stakeholders, programmes and funding instruments), Talent development and Infrastructure development.

- ***Institutional Coordination Recommendations***
  - **R1**. To promote the development of ICT-focused research policies and to align LA national policies in ICT R&D in their shared key priority areas within EU.
  - **R2**. To build a detailed map of the ICT R&D capacities in LA countries in terms of talent and infrastructure.
  - **R3**. To continue the development and coordination of support mechanisms and specific funding instruments for research and innovation in ICT priority areas.
  - **R4**. To foster existing collaboration between the ICT industry (business associations, clusters and enterprises chambers) with government agencies in order to focus research and innovation collaboration in ICT key priority areas.
  - **R5.** To empower actual and future PhDs and MSc in Academia and in Industry in the direction of innovation and technological development, in order to enhance the research capacities.
  - **R6.** To reinforce the promotion of ICT opportunities for research and innovation, particularly the FP7-ICT programme stimulating EU-LA collaborative research among Universities, Research Centres and enterprises.

- ***Talent Pool and Capability Development Recommendations***
  - **R7.** To promote multilateral mobility of researchers and students between LA-EU (e.g. through FP7 People: Marie Curie Actions), increasing the exchange of scientists and technologists among countries (sabbatical leaves, postdocs, double MSc and PhD diploma).
  - **R8.** To promote ICT R&D Master and PhD education programs in order to increase the number of researchers in the selected key priority areas.
  - **R9.** To support training mechanisms in how to submit proposals to FP7 and Horizon 2020 calls to potential participants from academia, industry and government. Government interactions with NCPs and Liaison Offices LA-EU should be increased.

- **R10.** To stimulate (incentive) the insertion of ICT high level talent with degrees of MSc. and PhD in enterprises, in order to have a continuous technology transfer.
- **R11.** To reskill/training of existing talents with competences, such as innovation, entrepreneurship, leadership and problem solving approaches.
- **R12.** To promote a culture of Intellectual Property and patents among researchers and technology expert staff in Academy and Industry, in order to increase the number of patents.

- ***Infrastructure Development Recommendations***
  - **R13.** To create a set of shared R&D Infrastructures. This could take the form of a core capacity and capability service for EU-LA researchers allowing institutions and projects to access computing resources on demand.
  - **R14.** To establish a LA Knowledge Repository Shared Facility to provide a multi-year perspective, identify best practices and facilitate coordination of funding mechanisms and stakeholders´ investment.
  - **R15.** To foster collaboration between ICT and e-Infrastructures projects and initiatives to enhance R&D cooperation in ICT focus areas that require the use of e-Infrastructures, such as high-performance data storage, multidisciplinary groups, smart analytics, transmission and mining, to solve cross-disciplinary problems.

3.2 FORESTA

The FORESTA Policy Dialogue Council issued a set of 30 key recommendations identifying common R&D priorities, opportunities and challenges, in order to strengthen and support the ICT policy dialogue between Europe and Latin America in the ICT domain.

The first 6 recommendations refer to the FORESTA position with regard to international cooperation in the new CSF (Horizon 2020):

1. Label Latin American Region as a business priority for Europe, thus, enhancing the research cooperation, as a tool to set fruitful and long term partnerships.
2. Develop common strategic research agendas with Regions, as basis for research cooperation.
3. Launch a specialized International Cooperation Action Line to coordinate all activities regarding international cooperation.
4. Promote the attractiveness of the European CSF through dissemination and information to best researchers around the world.
5. Discriminate the benefits of international cooperation partners on the basis of potential business for Europe. Reciprocity should be applied for competing Regions.
6. Launch an International Cooperation Research Forum to exploit synergies among all European activities at European, National, Regional and Local level. Exploit complementarities among European programmes.

With regard to the other recommendations (initially 22), they have been prioritized and grouped in 3 categories:

Policy recommendations on **research priority trends.** They involve a number of research topics which are considered as more relevant for the European and Latin American research cooperation initiatives:

- Software engineering
- Cloud computing
- Mobile and ubiquitous computing
- Grid Computing
- Intelligent Transportation Systems
- Gaming
- Hybrid-broadband broadcast applications

The Policy Dialogue Council consider that these priorities may result in further Joint Calls among those Latin American interested countries and the European Commission research programmes.

Policy recommendations on **major societal challenges**. Technologies should be developed to provide solutions to these priority challenges.

- e-Inclusion and Wellbeing
- Enhanced Learning
- e-Health
- e-Government
- Environmental protection and sustainable use of natural resources
- Green ICT
- Energy efficiency and renewable energies
- Security and prevention systems

Policy recommendations on the development of **tools and instruments** which can facilitate the highest efficiency on the European and Latin American cooperation.

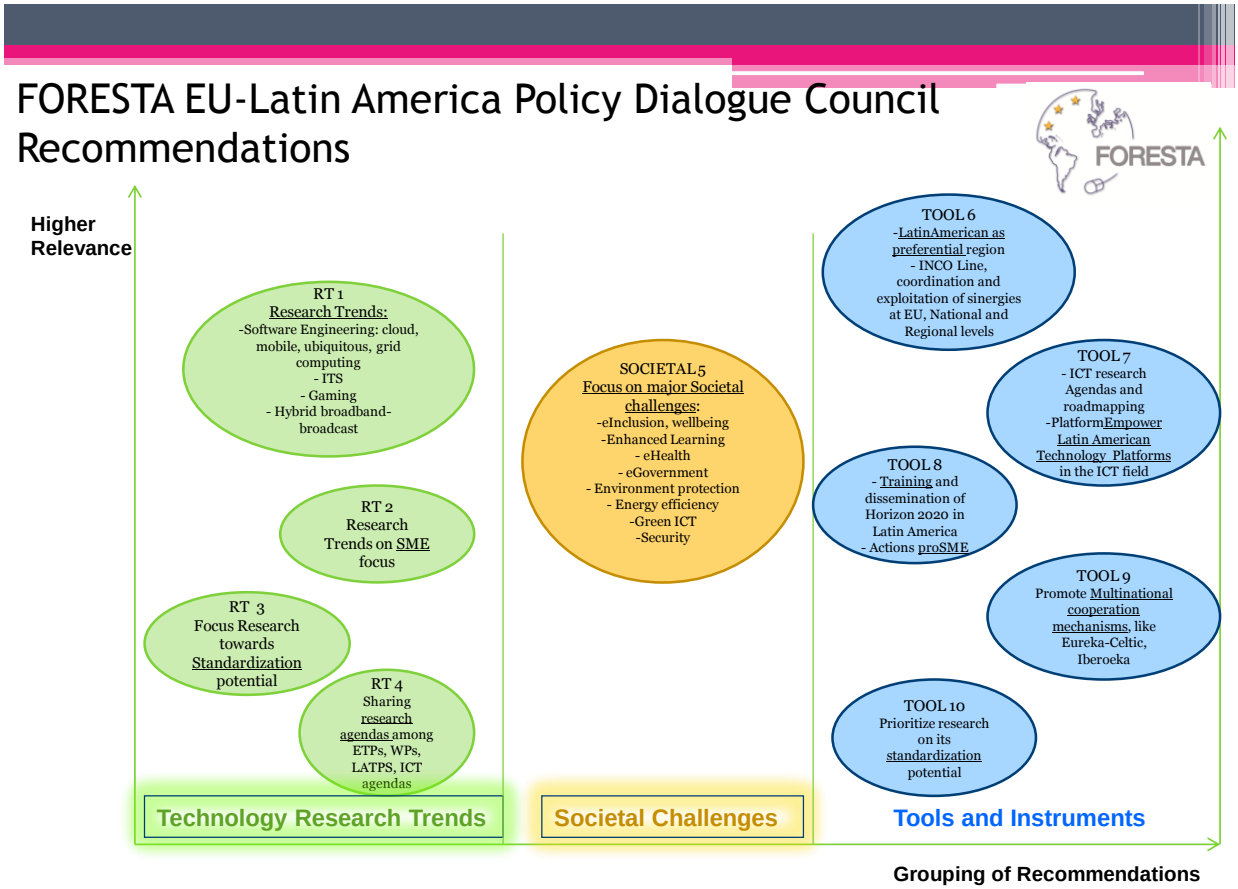

Figure 4: FORESTA EU-Latin American policy recommendations

3.3 FIRST

The roadmap identifies 8 research topics in the field of Future Internet:

- Internet of users and knowledge
- Internet of content
- ITS: Connected Car & Road
- Cloud Computing.
- Autonomic computing.
- Ambient Assisted Living
- ICT for a Low carbon economy
- Trust

These topics are related to FP7-ICT work programme challenges and are described in detail in the document. Moreover, the roadmap gathers 31 research initiatives, of which 6 are related to "building Future Internet" and 25 are linked to "using Future Internet".

These project proposals come from Argentina (11), Chile (10), Brazil (5), and Colombia (5), they include the following issues:

- LATP and ETP counterpart, if available
- If is Building FI or Using FI
- Research Theme
- Work Programme Challenge & Topic
- Description of the initiative

These research initiatives feed the common EU-LA roadmap towards the implementation of Future Internet Strategic Research Agendas. Some of them already have identified potential European partners.

The roadmap concludes that while most project initiatives identified are based on the use of Internet for all, Latin America needs to develop more high tech-focus projects that will be the corner stone of building Future Internet, such as infrastructure topics.

4 CONCLUSIONS

The roadmaps propose a set of ICT research priorities for future EU-LA cooperation. PRO-IDEAL PLUS focuses on 6 priorities, FIRST, on 8 and FORESTA on 15. The differences in selecting ICT priorities reflect the existence of a fragmented ICT landscape and the lack of convergence of the research and innovation policies and funding mechanisms in Latin America. As of today, the fragmentation of the Science and Technology systems is still a major obstacle for the development of ICT policies and strategies at regional level and consequently for developing the potential for research cooperation with Europe.

Overall, there are certain coincidences among the three projects teams in the selection of priorities related to the ICT Work Programme: Challenge 1, in particular Future Networks, Cloud computing, Internet of Services, Software Engineering and other Future Internet topics; Challenge 5 ICT for Health, Ageing Well, Inclusion and Governance; and Challenge 6 that cover environmental and efficiency energy issues. All these priorities represent a great potential for future development of ICT in Latin America and thus to enhance R&D cooperation with Europe.

		ICT R&D priorities for EU-LA collaboration		
Challenge No.	**Challenge Objectives**	**PRO-IDEAL PLUS**	**FORESTA**	**FIRST**
Challenge 1: Pervasive and Trusted Network and Service Infrastructures	Future Networks	Wireless and mobile broadband systems		
	Cloud Computing, Internet of Services and Advanced Software Engineering		Software engineering	Cloud Computing
			Cloud computing	Autonomic computing
			Mobile and ubiquitous computing	
	Network Media		Hybrid-broadband broadcast applications	
	Internet-connected objects			Internet of users and knowledge
				Internet of content
	Trustworthy ICT		Security and prevention systems	Trust
Challenge 3: Computing systems		Parallel and concurrent computing (including cloud computing)		

Challenge No.	Challenge Objectives	ICT R&D priorities for EU-LA collaboration		
		PRO-IDEAL PLUS	FORESTA	FIRST
Challenge 4: Intelligent information management		Intelligent integrated systems		
Challenge 5: ICT for Health, Ageing Well, Inclusion and Governance		ICT solutions for governance and policy modelling,	e-Government	Ambient Assisted Living
			e-Inclusion and Wellbeing	
			e-Health	
			Gaming	
Challenge 6: ICT for a low carbon economy		ICT for efficient water resources management,	Energy efficiency and renewable energies	ICT for a Low carbon economy
		ICT systems for energy efficiency and emission reduction	Grid Computing	Intelligent Transportation Systems: Connected Car & Road
			Intelligent Transportation Systems	
			Environmental protection and sustainable use of natural resources	
			Green ICT	
Challenge 8: Technology-enhanced learning			Technology-enhanced Learning	

Recommendations to enhance R&D cooperation in the selected topics are in the context of on-going international cooperation in FP7 and Horizon 2020 that will continue with the principle of general openness, while encouraging reciprocal access to third country programmes, on the basis of common interest and mutual benefit. That includes cooperation with three major country groupings: (1) industrialised and emerging economies; (2) enlargement and neighbourhood countries; and (3) developing countries, and thus involves Latin America countries.