Strategic Research Agenda Document
Version 1: June 2011

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Versioning and Contribution History:

Version	Date	Modification reason	Modified by
v.0.0	May 28th	Initial draft version based on contributions of working group leaders: - Mr. Pablo Caroca, **GECHS/NECTIA**. - Mr. Mario Bruno, **Universidad de Playa Ancha.** - Mr. Esteban Améstica, **GECHS/NECTIA**. - Mr. Gerardo Rivas Perlwitz, **AIE/Addere**. - Mr. Hugo Durney, **Universidad Tecnológica Metropolitana.**	Mrs. Luz Ledesma Clavell Mrs. Silvina Bidart Mrs. Silvia Bidart (ALETI)
v.0.1	June 3rd	Document distributed to MACHI members	ALETI
v.0.2	June 6th	Second version, quality check performed and indications for further development	Mr. Antonio Alfaro (Rose Vision)
v.0.3	June 10th	Correction and Revision. Third version.	Mrs. Silvia Bidart Mrs.Luz Ledesma Clavell (ALETI)
v.0.3	June 11th	Indications for further development	Mr. Julián Seseña (Rose Vision)
v.1.0	June 17th	Final version for MACHI approval. Version 1.0 integrates proposed modifications by: - Mr. Gerardo Rivas Perlwitz, **AIE/Addere**. - Mr. Nicolás Grandón, **Transport Subsecretariat, ITS area.** - Mr. Pedro Vidal, **Transport Subsecretariat, ITS area.** - Mr. Gary Burns, **Secretaría de Desarrollo Digital, Ministerio de Economía, Fomento y Turismo**. - Mr. Mario Bruno, **Universidad de Playa Ancha**. - Mr. Hector Torres, **ProteinLab UTEM**.	Mrs. Luz Ledesma Clavell Mrs. Silvia Bidart (ALETI)

Foreword

Internet and globalization are close phenomenons that shaped, together with other factors, an environment of global competition, characterized by a rapidly changing dynamics that influences our countries behavior. In parallel, the worldwide marketplace demands "rapid product change, higher quality, lower costs and shorter time to market"[1]. This circumstance results in a continuous challenge in the sense that countries need to adapt themselves in order to be globally competitive.

With the new technologies and its applications, a new range of businesses and opportunities rounding Internet will appear and should be capitalized on by Chilean stakeholders. If the country takes advantage of the Future Internet possibilities, this will be for sure a fundamental key enabler for the progress of Chile.

Chile must plan to capitalize on the use of new technologies and the associated new paradigm of internet-based businesses and opportunities. Competitiveness in these fields will play a key role in the development and progress of the country.

MACHI Internet del Futuro brings together stakeholders from a broad spectrum of industry, academia and interested organizations, with the aim of shaping future international cooperation in relevant R&D activities.The main purpose of this initiative is to reinforce Chile's future competitiveness.

This document, **MACHI Strategic Research Agenda,** is a baseline document that identifies mid- and long-term R&D priorities for collaboration between Chile and the European Union.

[1] EPoSS SRA, page 7.

Contents

1. Executive Summary

The new global system is given by the Future Internet – an Internet that serves in a more dynamic and proactive way its users in their everyday life. This Future Internet has to be open, scalable, and trustworthy and there should be no central control and uncoordinated governance. Due to its complexity it will not be fully predictable in its overall behavior.[2]

MACHI Internet del Futuro is Chile's first Technology Platform, an output of the FIRST project, funded by the Seventh Framework Programme of the European Commission.

In Europe, the Technology Platform concept aimed to "bring together technological know-how and stakeholders with the aim of producing a long-term strategic plan for research and development of specific technologies with a significant economic and societal impact"[3].

The main goal of the FIRST project is to establish the basic pillars and infrastructures for the promotion of cooperation between Europe and Latin America in the field of Future Internet. The Technology Platform was assessed as an ideal tool to enhance this cooperation.

MACHI is made up of Thematic Working Groups, linked to European Technology Platform counterparts. MACHI will be a driving force behind product innovation in Chile. R&D activities are crucial for the competitiveness of ICT companies and the entire industry sector.

The Technology Platform methodology proposed by the FIRST project also brings forward a tool for promoting the ICT Supply and Demand Meeting. It intends to help and support the *Digital Development Strategy* goals, as well as to build a model for fostering competitiveness by gathering Information and Communication Technologies (ICT) R&D stakeholders in the same scenario.[4]

The Strategic Research Agenda (SRA) constitutes a basis for future joint R&D activities between Chile and the European Union. It is a document with a detailed list of technological research themes that Chile and the European Union have in common. In the Chilean case, the themes are based in the European SRA of five platforms that matches with the Thematic Working Groups that MACHI has constituted: ARTEMIS, NESSI, NEM, E-mobility and EPoSS.

In addition, the Strategic Research Agenda is thus essential for shaping the landscape of the future international cooperation within the framework of EU funding in the field of .

Although technology platforms in Europe have followed their own pathway, the major portion of them have produced a SRA in order to set out research and technological development priorities in the mid and long-term perspective since this document is crucial to conduct their activities and achieve their main objectives.

[2] SRA NESSI, May 2011.
[3] Document of Work of the FIRST Project.
[4] MACHI Vision 2020 < http://www.latin-american-technology-platforms.eu/uploads/MACHI_VISION.pdf >

2. About Chile

Chile has become a regional leader due to a solid, stable democratic system that guarantees a safe business environment. Its economy emphasizes trade and investment and is recognized around the world for openness and stability.

In this context, "*Chile emerges as a preferred destination, given its superb political stability, economic growth, business conditions, and state of the art telecom infrastructure. These advantages are further enhanced by Chile's open economy (trade agreements with almost 90% of the world's GDP), solid banking sector, and availability of qualified human resources, which have favorably impressed foreign investors"*[5].

Chile, with an estimated population of 17,224,200 habitants, has a well-educated population, skilled professionals, efficient companies, the confidence of the world and an outstanding country image.

Telecommunications are fully digital, with 3.5 million landlines and 12 million cell phones in service. Chile's Internet user rate -Latin America's highest- is expected to grow to 1.5 million lines in 2010. The World Economic Forum has cited Chile's information and communications technology as Latin America's most competitive in 2007[6].

Following the D2.1[7] *National reports on potential areas for cooperation between Europe and Latin America in the field of Future Internet* of the FIRST Project, in addition to this demand of telecommunications expansion in the region, Chile presents a strong economy based on exports. The government is solid and the political environment enhances a good business climate. There is a national Digital Strategy (DS) for Chile which tries to define the actions needed to improve the ICT sectors. The main objectives of the DS are: increase business competitiveness through a more intensive use of information and communication technologies; create and promote a new ICT culture to increase transparency and civic participation; promote the development of quality digital government; increase intensity and sophistication of ICT utilization by students and civil society.

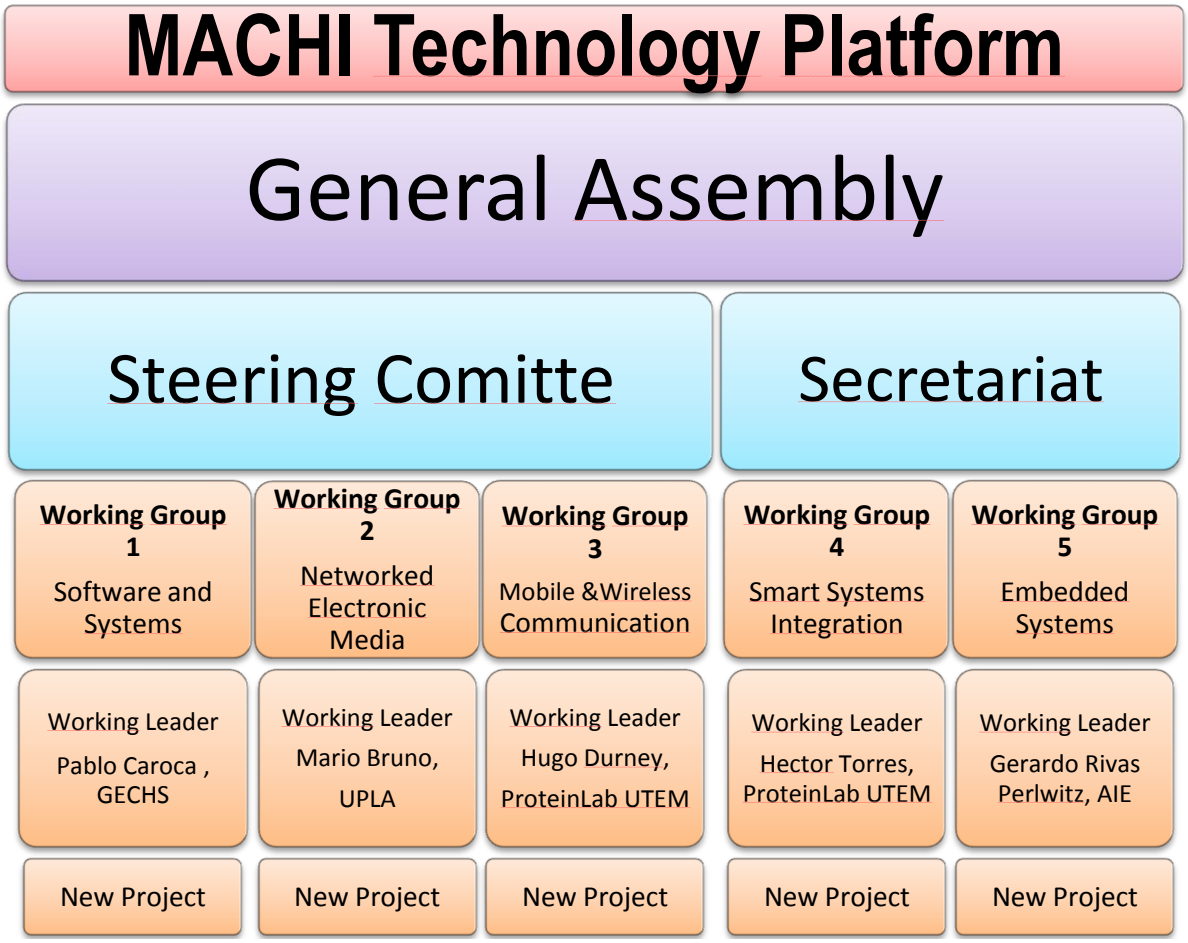
[5] ICT Business Directory. Developed by: Fundación Chile, 2007 < http://www.chilexportaservicios.cl/CES/Portals/18/ICT_BusinessDirectory_v5.pdf>
[6] <**http://chileabroad.gov.cl/en/**>
[7] < http://www.latin-american-technology-platforms.eu/documents-en >

3. MACHI Future Internet, the First Chilean Technology Platform

MACHI Future Internet has born between December 2010 and April 2011. In December 2010, a meeting of the founding members was held at *Universidad Tecnológica Metropolitana* (UTEM), where the Steering Council was constituted. In this meeting it was agreed the name of the platform: MACHI, which it is the spiritual healer and leader of the Mapuche community[8].

MACHI and the other technology platforms constituted in Latin America, PLATA in Argentina, BRAFIP in Brazil, RECIIF in Colombia and MTP in Mexico, are an initiative supported by the FIRST project, which is a support action funded by the FP7.

MACHI is formed by stakeholders from industry, academia and government. The platform internal structure has five working groups (WG) as it can be seen in the following figure:



[8] Mapuches are the group of the earliest indigenous community that lived in Chile and Argentina. Today they are the largest autochthonous group in Chile.

MACHI has the following scope and objectives:

- Provide a unified view for research in the field of Future Internet;
- Identify a shared Strategic Research Agenda based on technological and economic considerations;
- Demonstrate the potential application of research results to existing business processes as well as in new products and services;
- Continuously analyse relevant state-of-the-art technologies, including the opportunities offered by available approaches and the appearance of new paradigms;
- Continuously analyse the state of the Future Internet industry and the economic impact of the research undertaken;
- Establish the strategies to speed up the realization of the vision of the MACHI, including support to public policies;
- Ensure that the MACHI members have a solid manner of interaction; and
- Act as a facilitator to establish complementary and cooperating research projects and related activities.

The principles that govern MACHI activities are:

- *Awareness-raising*: the objectives and activities of MACHI should be disseminated to all stakeholders involving a wide range of actors such as policy makers, regulators, business sector in order to position R&D activities, industry-academia bond, innovation, etc
- *Industry-driven*: to support the Chilean private research investment by bringing research closer to industry and improving markets for innovative products.
- *Collaboration*: MACHI aims to strengthen the collaboration between industry, academia and government.
- *Openness and Transparency*: MACHI is open to all interest groups and it is not dominated by narrow interest groupings or lobbies.
- *Coherence*: to align MACHI with Chilean socio-economic and the Future Internet sector reality and needs.
- *Internationalization*: MACHI is a platform for international cooperation since the interaction, collaboration and the relationship with foreigner's countries are crucial. Today the market is global.

4. The Vision 2020 of MACHI[9]

One of the more strategic initiatives in the Information and Communication Technologies and in the Future Internet field in the country is the *Digital Development Strategy* that has been launched by the Chilean Government. This strategy is intended to ensure the impact of a more intensive and sophisticated use of ICT, as a driver for economic growth, development of knowledge and social inclusion. The goal is clear: developing a digital country to introduce more development[10] and equality[11]. In order to turn this challenge into an achievement, one of the objectives set out in the Strategy is to "increase competitiveness and productivity of the national ICT sector".

One fundamental path to fulfill this goal is increasing the "availability of funds for R&D in the ICT field in universities and research centres". Nonetheless, the relation between academia, industry and business opportunities is also essential: "The link between university and business is an area to be greatly strengthened. Although there are successful Business-University collaborative experiences, their occurrence is very scarce compared to desired standards. In contrast, leading countries in ICT industry development have strongly developed collaboration, coordination and joint university-business initiatives."[12]

The main goal of the vision of MACHI technology platform is to **increase the international cooperation in R&D ICT projects between Chile and the European Union**. The rationale is that Chile needs to turn its outstanding ICT R&D potential into successful product development in order to be competitive worldwide. A key factor for success is bringing together a wide spectrum of ICT players in Chile: research centres, universities, industries and associations, in order to produce a common vision and a research strategy. Therefore, it can be concluded that MACHI's vision is aligned with the country objectives.

[9] The complete Vision document is online: < http://www.latin-american-technology-platforms.eu/latin-american-technology-platform-chile-en >

[10] In the last step, it is a *Social Development*, which will be brought by the development of more products, applications and services thanks to R&D fostered by the work of the Chilean Technology Platform.

[11] In this case, equality is taken in terms of opportunities for the private and academic sectors. Private includes Large Enterprises and Small & Medium Companies.

[12] Digital Development Strategy 2007-2012 < http://www.agendadigital.cl/sites/default/files/documents/Libro_Estrategia_2007%202012.pdf >

5. Worldwide Trends

The 2011 NESSI SRA[13] confirms the overall trends that influence the software and services area, inclinations that can also be translated to the Future Internet field. In the following paragraphs, these trends are quoted for a deeper understanding of the need to develop a Future Internet Agenda in Chile:

- ***The connected world***. *People, devices, sensors, machines, and business get increasingly interconnected in the Future Internet. In 2020, there will be around 3 billion Internet users and trillions of those devices, sensors, and machines.*
- ***Explosion of digital information***. *The amount of structured and unstructured data is increasing at an annual rate of 57%.*
- ***Changing life style***. *People spend more time online. They not only consume services, but produce increasingly content and even applications. They expect that services will be accessible from everywhere and that they are pervasive and personalized.*
- ***Fast business and technology cycles***. *Internet commerce is growing at an annual rate of 18%. New services can be easily deployed and can replace older ones at a faster pace. Falling prices of storage and processing power and increased performance will enable services to rely on huge amount of stored information, and to become faster and to operate in real-time.*

The preface of the book *Future Internet Assembly 2011: Achievements and Technological Promises*[14] confirms the data stated above. For instance, the authors quote that "Cisco state that the average monthly traffic in 2014 will be equivalent to 32 million people continuously streaming the 2009 Avatar film in 3D12". The world is already connected*:* "the Internet can now be accessed from a wide variety of mobile devices including smart phones, Internet radios, and vehicle navigation systems, which is a radically different environment from the initial Internet based on physical links. Data traffic for mobile broadband will double every year until 2014, increasing 39 times between 2009 and 2014".

[13] NESSI SRA was uploaded at FIRST website: <http://www.latin-american-technology-platforms.eu/documents-en >

[14] Lecture Notes in Computer Science 6656, Springer. Online< http://www.springerlink.com/content/m5x1126v48t0/front-matter.pdf >

6. International Cooperation: WHY?

In the connected world, it is of major relevance to reinforce international cooperation activities. In the case of MACHI, its focus is to strengthen the R&D relation between Chile and the European Union. It is necessary to clarify some aspects of why it is relevant for the countries to develop this kind of cooperation.

Following an IADB report[15], international cooperation is as a way of facing, in a more efficient way, the challenges that social, economic and productive agents are facing. International Cooperation can help to adapt local public policies to the global context. Many global problems that currently affect the society can be resolved by R&D&i activities if they have a transnational character.

University and **research centres** are unable to be "*self-sufficient, since they need cooperative practice that able benefit from knowledge and experiences developed in other countries*". **Enterprises** are inserted in global value chains and are dealing with shorter products lifecycles and quicker technology changes. Therefore, productivity and competitiveness increase need of R&D&i agendas in collaboration with international enterprises networks organized to be competitive.

Benefits of International Cooperation

Following the IADB report, the benefits of international cooperation are:

- Lower costs and resource optimization.
- Increase of the presence and visibility of researchers in the international environment (reputation), enhancing the position in the scientific and economic aspects.
- Domestic markets expansion and opportunity to access international markets.
- Facilitates technology absorption and new sources of knowledge of countries with lower development.

In a nutshell, based on the statements of the IADB report, it can be expressed that international cooperation is a basic pillar of MACHI technology platform to position Chile in the international scenario and to increase local competitiveness and capabilities.

[15] IADB Report for "Reunión de Diálogo Regional para las Políticas de Cooperación Tecnológica Internacional", Document for preliminary discussions, Buenos Aires, November 16-17, 2010, IDOM Consulting
< http://idbdocs.iadb.org/WSDocs/getDocument.aspx?DOCNUM=35516177 >

7. Challenges and Applications

MACHI agrees with the challenges of the Regional Strategy EU-LatAm Vision, translated in D4.2[16]:

- Energy demand
- Efficient and secure distribution and access
- Global healthcare
- Food quality and production
- New security strategies to reduce conflicts and terrorism
- Demographic changes such urbanization, rural inclusion
- Well being and ageing (AAL: Ambient Assisted Living)
- Sustainable, efficient and safe mobility
- Disaster management and rapid response to natural crisis
- Sustainable industries and climate change
- Environment monitoring
- Contributing to a greener world
- Competitiveness and new employment with high added value
- Digital Divide towards social inclusion and equal access to opportunities

Regarding the application areas for ICT R&D activities, Chile has key fields that will improve its productivity and management capabilities by the incorporation of ICT. The Chilean vision document points out the following ones:

- Mining
- Fish farming
- Wine production
- Forestry
- Astronomy
- Tourism
- Agricultural production
- E-government
- E-learning

On the other hand, Chile is already having smart city experiences in Puerto Montt (Los Lagos Region), fact that demonstrates that the Future Internet is already taking place in the country. Here, this concept is seen as a strategic tool to enhance the citizen's quality of life since it is a combination of innovations and applications of the most technology vanguard, that is complemented by physical, social and environmental issues. In a first stage, Puerto Montt will be implementing improvements form the transportation perspective, implementing ITS solutions (Intelligent Transport System) that aim at improving the traveling efficiency, effectiveness, safety and experience of the several means of transportation through the use of Advanced Information Systems for Travellers (ATIS) before and during the trip. However, in the future there are expectations to integrate other components such as business, utilities and telecommunications that will complete the Smart City of Puerto Montt.

[16] On Line: <http://www.latin-american-technology-platforms.eu/uploads/Vision-2020_Regional-LATP-Vision-2020.pdf >

Lastly, it is of main relevancy to remark that Chile must work in the path of a "Smart Energy, Smart Growth" (energy demand, efficient and secure distribution, food production, demographic changes, sustainable industries and climate change, greener world, competitiveness), which is a global aim. The resolution of the energy problem in Chile is largely dependent on the convergence and integration of the different working groups: EPoSS (Smart systems, the Internet of Things, IPv6), NESSI (eEnergy services), NEM (cloud & storage, availability, power management technologies) and ARTEMIS (smart grid, energy-efficient buildings, electric vehicles).

8. SRA Methodology

The definition of the first version of MACHI SRA is a fact of the major relevance for the Chilean research community. Coherently with the guide "Reference document for the production of the Strategic Research Agendas of the LATPs", delivered by FIRST coordinator, *"the idea was to devise a mechanism that would lead to the setting up of national Technology Platforms, each dealing at large with Future Internet themes"*[17].

The information showed in the current SRA is product of MACHI's member priorities in the R&D field of Future Internet. All the content is based on the member's inputs; therefore it is not a state-of-art document, but a sample of the Chilean interest in R&D activities and in the participation in the MACHI technology platform community.

In order to identify the Future Internet research priorities in Latin America and their alignment with the EU research areas, a matrix of thematic priorities was delivered to MACHI members[18], as well it was performed an open call to invite to all stakeholders to participate.

The type of organizations that participated was:

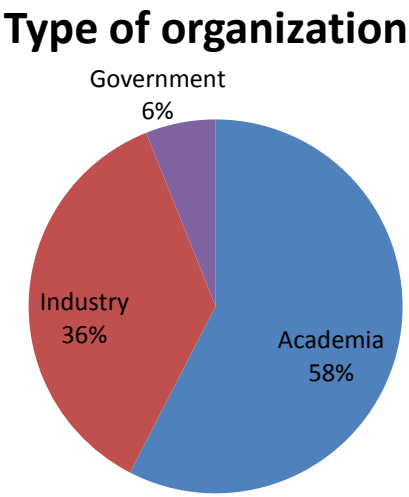


Figure 1: Type of organizations that participated in MACHI's SRA

In order to guarantee that the resulting list of research topics was a joint EU-Chile SRA with topics of common interest, the initial list of thematic priorities were taken from the following European Technology Platforms SRAs: ARTEMIS, NESSI, NEM, Emobility (now Net!Works) and EPoSS, that are the ETPs which were replicated in MACHI's Working Groups.

In December 2010, a questionnaire was completed by some members of the Steering Council where they indicated some of their priorities out of the previous list. Later on April-May 2011, an open call for contribution was launched focusing on the Steering Council but also open to the rest of the members of the platform. Besides, an open call was issued through

[17] FIRST_Specs_for_LATPs_SRAs_production_v01, document delivered by FIRST coordinator.
[18] See *Research-Priorities table* chapter at page 44 of this document.

CONICyT and through ALETI's database in order to get major impact and more reliable results.

To increase the rate of responses, ALETI coordinated a follow-up activity that gathered three main channels: e-mails, phone calls and the social media (Linkedin).

The sample comprised organizations from academia, the industry and public institutions, most of them interested in ICT related activities and/or involved in R&D policies.

- **327 e-mails**
- **40 phone calls**

ALETI promoted the SRA production in three Linkedin Groups, scoping 7792 experts:

- 126 experts: Ingeniería Industrial Universidad de Chile Alumni.
- 98 experts: IAB Chile
- 7568 experts: Empleos y Negocios en Chile

In order to validate the SRA, ALETI delivered the draft document to all the participants so they could send their comments. The written contributions received were indicated at "Contributions". The list of participants is displayed at the chapter *Research Priority Table*; the list of organizations contacted is in the Annex. Besides, ALETI kept informed the key Government areas of the whole process.

Finally, 306 Future Internet-related areas were chosen in total. For comparison and easier understanding these research areas were classified and grouped following the European SRAs, as shown in the following chart:

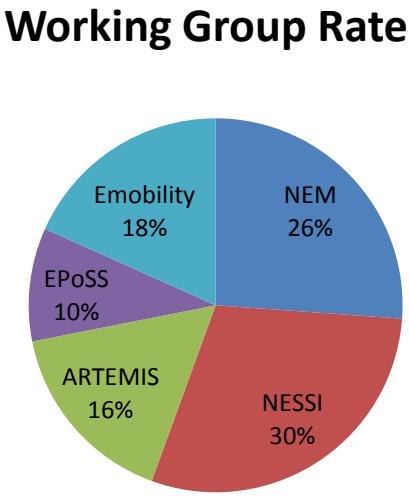


Figure 2: Rate of Working Groups participation at SRA

9. Research priorities in the Future Internet field

9.1 NESSI Chile

State of art of NESSI and future trends in Chile

One of the numerous Working Groups of MACHI Future Internet is NESSI Chile, which embraces software and services area. The software industry enables the development of other industries, therefore, in order to make Chile a more competitive country, it is needed to internationalize the Chilean industry, and this implies the internationalization of the Software and Services field. Investing in R&D becomes very necessary because global supply is becoming increasingly complex and high-tech.

Another crucial point is the development of IT services for vertical industries thus making them more dynamic, competitive and global. It can be pointed out:

- Services of animation, content, post-production and digital content.
- eHealth services: Medical analysis like X-rays, ultrasound scans, disease monitoring, clinical trials, clinical research and healthcare.
- eEnergy services.
- eBusiness services: online stores, online purchase systems, online payments.
- eLearning services

The trends exposed above shows two independent facts:

1. The policy adopted by Chile in recent years about being a services exporting country, as well as a place to outsource; this fact turns Chile to face the service development areas, therefore an important point of this agenda matches with R&D priorities of Europe.
2. People that spend more time online. They not only consume services, but produce increasingly content and even applications and demand a wider spectrum of regular services to be online. They expect that services will be accessible from everywhere and that they are pervasive and personalized.

Both statements would be based on "massive computing tasks, high demanding in energy and full scalability". Cloud computing crosses the major part of the technologies since it gives the infrastructure to run the wide spectrum of services. "Be it internet-based services, software as services, infrastructures or platforms as services, cloud computing services will provide a more scalable, robust, flexible, cost and energy efficient alternative to today's IT"[19].

NESSI Chile R&D priorities are based in the following type of stakeholders:

[19] NESSI Research Priorities for FP7, Vol. 3.2, May 2009, page 9.

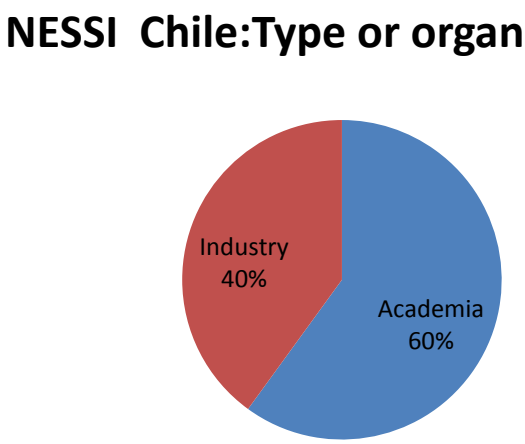


Figure 3: Type of organizations that participated in NESSI Chile chapter.

Research priorities on NESSI Chile[20]

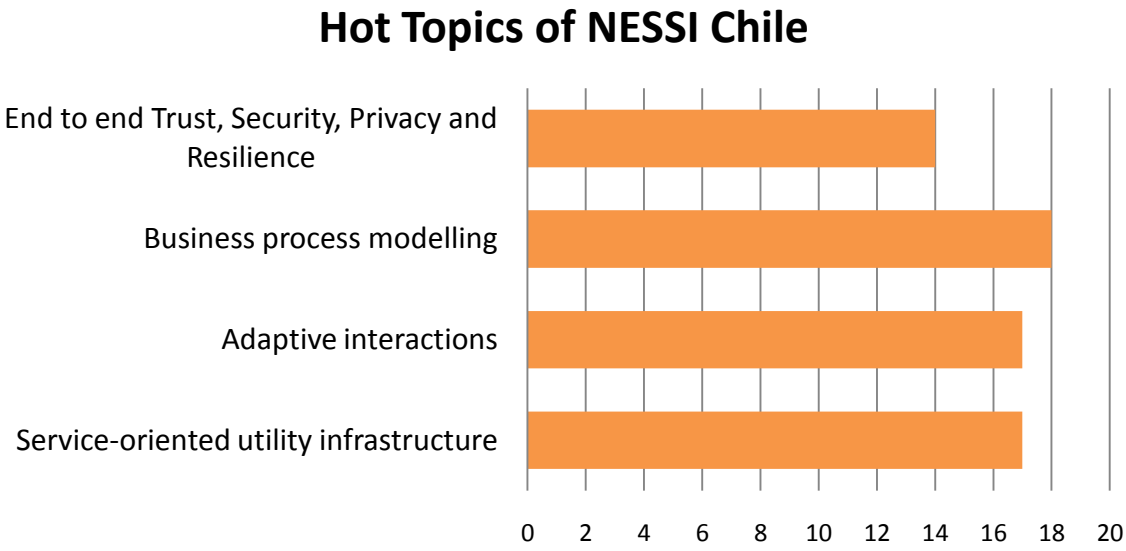


Figure 4: Hot Topics of NESSI Chile

Business Process Modeling

The goal of this field is to pave the way towards the collaborative executable enterprise. Chile remarks two fields to work in:

- Models for integration services of horizontal business processes for small and medium industries.
- Collaboration models of vertical processes by industry and transactional expertise to state companies and public institutions.

Business Process Modeling includes:

[20] All the contents are from: NESSI Research Priorities for FP7, Vol. 3.2, May 2009

- Dynamic formalization, management and interaction of business processes implemented through services. This necessitates (i) the transition from business processes to IT applications: modeling of functional and non-functional properties, modeling of mediators to support negotiation; supporting round-trip management of business processes, supported by simulation of end-to-end business processes based on a multi-model approach; (ii) executable enterprise engine i.e. an application engine capable of running modeled enterprise architectures being used as "teaching applications" through a full featured interface (the personal interface for the IS).
- Support for long-term and transactional business collaboration. Here (i) long-running activities are orchestrated and controlled in terms of operational goals and compliance regulations, business rules etc (represented in the form of unconventional atomicity criteria); (ii) business interactions are conducted in an "all or nothing" manner according to formalised rules, procedures and standardised communications in applications that require complete end-to-end operational integration, e.g. manufacturing, logistics and distribution.
- Support for event orientation. Here (i) the events flowing through the IT layers of an enterprise are monitored, event patterns detected, complex events generated and business process steps triggered in real-time; (ii) underlying service and SW architectures take into account event-orientation and proper techniques are applied to describe event patterns and to model event engines which are adaptable and scalable to business requirements.

Service-oriented utility infrastructure

This area looks to provide a flexible infrastructure to support the networked economy. An area, among others, that are being fostered is the Astro-informatics. Chile has detected the following focuses:

- Models of virtualization and energy efficiency in micro grids hardware and operating systems on chip.
- Service-oriented utility infrastructure is mainly constituted by advanced infrastructure technologies in (i) hardware which needs to be virtualised and able to be allocated flexibly, encouraging efficient hardware utilisation, in turn enabling energy efficiency; (ii) middleware which needs to be designed on a multi-tier model, with virtualization at each layer and the ability to replace components at each layer without disturbing the whole stack, (iii) reliable, high performance and low latency cloud services that make the virtualized resources available over the Internet and (iv) related programming models need to support flexible middleware and application software, and for loosely-connected parallel execution environments.

Adaptive Interactions

This field aims to add the dimensions of knowledge and reasoning to the interaction between users and (business and societal) services. Chile prospective points out to:

- Services for semantic processing of content.
- Models and languages for audiovisual services: content creation and development of adaptive contents.
- Services of semantic processing for custom applications and for decision making in health care cases.

End to end Trust, Security, Privacy and Resilience

The objective of this area is aim for a secure, reliable, resilient, compliant and trustworthy (hybrid) service-based systems.

- Security by Design. Service-based systems and Future Internet (not limited to FI of Services) calls for further advancement in security engineering and in architecture paradigms from a security perspective (e.g. Secure SOA+EDA) to achieve built-in security by design. This includes approaches and mechanisms to ensure and balance confidentiality, integrity and availability of information and knowledge in the context of Future Internet.
- Protection against threats: Means for proactive identification and protection from arbitrary attacks such as Denial of Service and Intrusion detection.
- Enabling users to understand security, privacy and trust: service consumers have to be educated in order to make informed decisions so as to be tuned as real FI user (so security-, privacy- and trustaware when making decision using FI).

Besides, Chile showed interest for "Chain of trust across all levels and trust zones achieving security by design" and "Embed user-centric intuitive security mechanisms".

Reference Architecture and Implementations

The goal is to define open architectures for intranet- to internet-scale service delivery. The focus in Chile aims to:

- Align infrastructure and SOA architecture in models of scalable and reliable architectures for government services (eGovernment), aimed at social and business, adopting heterogeneous technologies.

Service and System Engineering

The goal here is to provide coherence to the composition of uncoordinated services across all layers and all providers.

Chile aims to develop and research in Engineering Service Model for the engineering design and processes of copper (and its subproducts) or any other metal/mineral and of primary fruit farming/other agro product:

- Modelling, construction and management of hybrid service-based systems (situational, spontaneous and goal-based) including: (i) the management of increasing complexity and variability of requirements; (ii) product line engineering approaches for services; (iii) evolvability of services and systems; (iv) the migration approach to help users to move from one technology to the other; (v) modernize existing legacy code base to become service-centred; (vi) release planning; (vii) spontaneous creation of applications from pre-existing services; (viii) semantic- and goal-based automatic service discovery and composition (ix) smart repositories to support the automation of required on-the-fly discovery and composition of services.Refining semantics to become appropriate across hybrid service-based systems. (i) The semantic approach for services uses ontologies to fully describe goals and both functional and non-functional characteristics. (ii) The semantic approach for processes requires: declarative choreography languages; semantic business process descriptions; improved

maintenance and updating; improved reasoningProduct Line Engineering applied to services. (i) Guidance and decision criteria for dividing an application into a set of services. (ii) Orchestration and composition of services for different customer environments. (iii) Variability of applications and service runtime environment e.g. regarding hardware platform, footprint, reliability, level of dynamism (binding at design time / start-up / runtime), communication protocol, etc.

Services Pervasiveness

Its goal is to materialize the ubiquitous service availability. It embraces:

- Service-web models that are executed in embedded and mobile devices.
- Services of suggestions and recommendations for client-side hardware in mobile devices.
- Turn devices into enablers of services by embodying SOA principles into embedded systems
- Link collaborative devices to services.

Systemic foundation for a Service Economy

This area's objective is to ensure social, economical, legal and cultural viability. MACHI stresses out:

- Financial Analytic Services. Support emerging business models through (i) services for the marketplace (e.g. accountability, Charging, payments, risk analysis and financial research),
- Service models for research on natural phenomena such as earthquakes and tsunamis, astronomy, copper mining, biotechnology, information technology and energy, etc.
- Multidisciplinary research to build a theory describing the relationship between organizations and social networks in regards to hybrid service-based systems

Building NESSI Chile

The objective of this specific area is to provide the business context for services in hybrid service-based systems:

- Build business decision making systems based on collaborative services for small and medium industry.
- Process integration services, technologies and tools connected to the business goals of mining (copper in Chile), primary fruit, fishing and tourism.

9.2 EPoSS Chile

For a pervasiveness and ubiquitous Internet

State of art of EPoSS and future trends in Chile

EPoSS Chile is the Working Group that works around Smart Systems, which are defined as "intelligent, often miniaturized, technical subsystems with their own and independent functionality evolving from microsystems technology. Smart Systems are able to sense and diagnose complex situations. They are *predictive*, they have the capability to decide and help to decide as well as to interact with the environment. They may also be energy autonomous and networked. Utilizing a functional design approach, Smart Systems use properties of devices and materials in completely new ways. Smart Systems are or will be indispensable for the competitiveness of future products and even entire industry and business sectors"[21].

EPoSS Chile is one of MACHI's smaller groups, but since its promising future and its high potential in Chile, its interdisciplinary and since it can help to address some of Chile's challenges since a new spectrum of product applications. For instance, smart systems can decrease the carbon emissions in a 23% thanks to a better management and distribution of energy and a smarter control of electrical drivers. Chile stands in the first generation of Smart Systems:

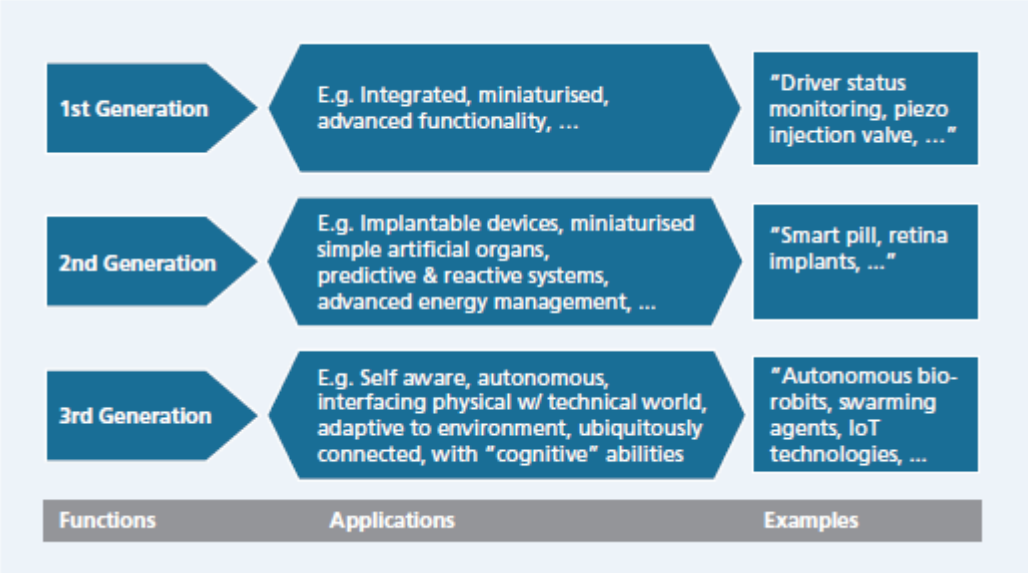


Figure 5: Continuing revolution of Smart Systems Integration[22]

Maybe because of time-to-market of this area is highest that other applications and products, the highest percentage of interests belongs to the Academia; this is not seen as a negative point, but a very positive one since the fact that Chile is starting to cover these future technologies.

[21] EPoSS SRA, page 9.
[22] Idem

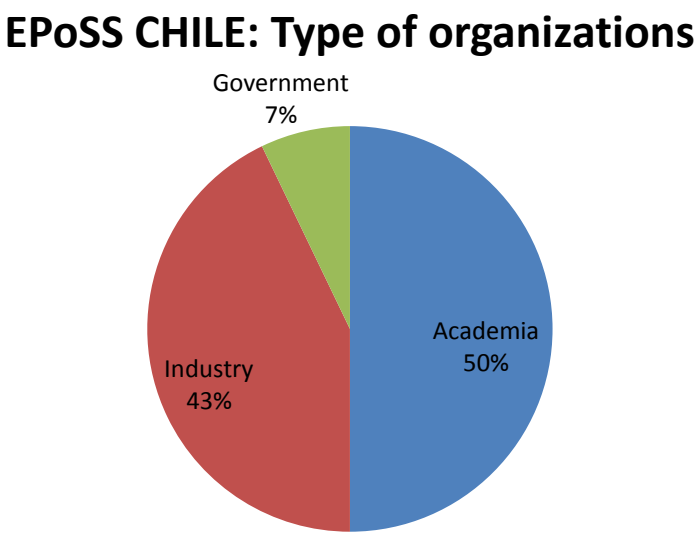


Figure 6: Type of organizations that participated in EPoSS Chile chapter.

Research priorities on EPoSS Chile[23]

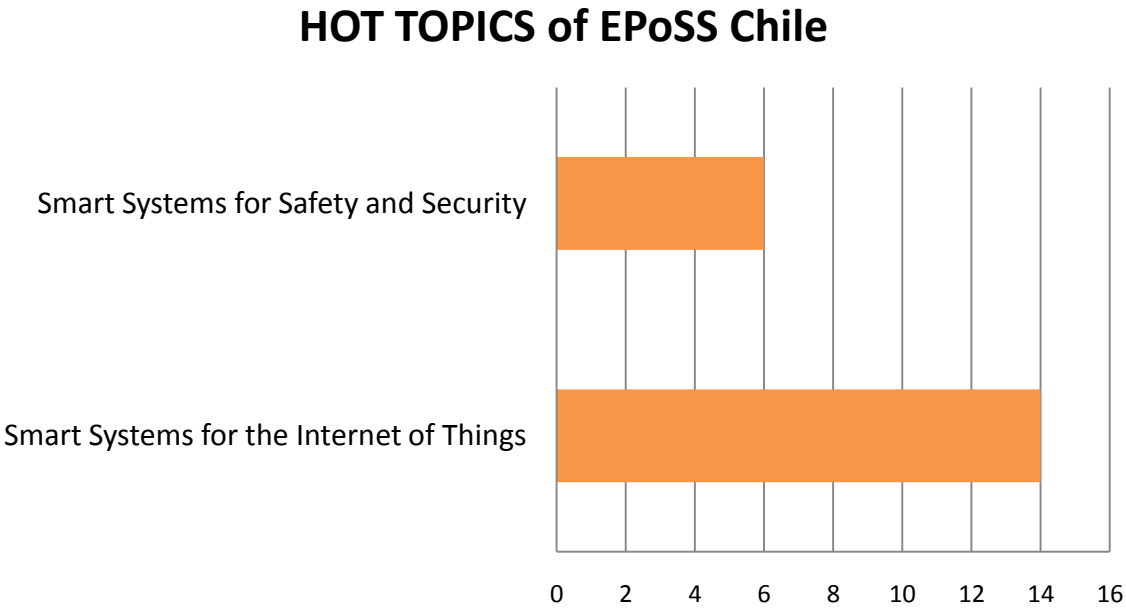


Figure 7: Hot Topics of EPoss Chile

1.	Smart Systems for the Internet of Things (IoT)

While the current Internet is a collection of rather uniform devices, heterogeneous in some capabilities and very similar in terms of purpose and properties, the future IoT will exhibit a much higher level of heterogeneity, as totally different objects, in terms of functionality, technology and application fields will belong to a common communication environment.

Chile showed potential in two fields:

[23] All the contents are from EPoSS SRA

- Intelligent Systems: Context-awareness / inter-machine information exchange / IoT global architecture / peer-to-peer communication models / bio-inspired approaches from a centric view to a distributed one / development of autonomous devices able to generate automatic code and behaviours / integration of sensors and actuators / new power efficient hardware/software security architectures / highly efficient, multistandard and adaptive communication sub-systems / adaptable antennas (smart beam steerable phased array antennas, multi frequency band antennas, on chip antennas (OCA), coil on chip, printed antennas, embedded antennas and multiple antennas using different substrates and 3D structures) / miniaturised smart RFID readers supporting multi standards to be used with mobile devices for different applications.

- Energy Sustainability: it refers to energy efficient and self-sustainable systems, new ways of energy harvesting need to be explored and developed in order to create systems that require little external energy, if any. Efficiency in processing and in communication must also be achieved through novel programming paradigms and the further development of energy efficient protocols and smart antennas. Research efforts will focus on: multimodal identifiable sensing systems enabling complex applications such as implants monitoring vital signs inside the body and drug delivery using RFID / printed batteries manufactured with sensor / thin film solar (thermal) cells for energy harvesting / vibration and piezoceramic devices for energy harvesting / (or even micro fuel cells for long term power generation) wireless power supply to sensors and thin batteries with lifetimes of 10 years / Hybrid energy generation, storage and transmission based upon a combination of RF / piezoelectric / battery power generation.

Energy efficiency and the use of non-conventional energy sources is a declared priority of country development in Chile.

2.	Smart Systems for Safety and Security

- Smart systems can provide the necessary sensors, computing power and reliability at cost levels that allow safety and security to be built into the fabric of our environment.

- Detection, Authentication and surveillance: Biometrics are one approach to allow authentication or identification of persons to access their private and personal devices, but also to improve access control at border checkpoints, within countries and at critical infrastructures. The technique should increase the efficiency of security checks while giving comfort to the end user. Data related to individuals needs to be preserved so secured.

- Personal emergency and home security systems: Biometrics (facial, fingerprint, iris, retina recognition) / mm-wave to THz imaging systems, enabling hidden objects detection at low cost and without the risks associated to the current solutions based on X-ray imaging / Spectrometry sensors, which can detect gases and chemical agents prior to accidents / High resolution / large number of pixels cameras, enabling precise identification by large field of view cameras / Fast, high sensitivity IR sensors, for global scene analysis without light-dependent artefacts / All weather day/night imaging sensors, avoiding collisions and/or enhancing site protections /

Active and passive systems for individual protection / Mobile scanning devices for container screening / RFID tags, for tracking of identified of authorized objects / Sensor fusion, as precise detection or identification without unacceptable false alarm rate will generally be obtained only by cross-checking information coming from different type of sensors / Localisation technologies

- Secure IT for Infrastructure (IT Security): Information and communication systems have come to play a crucial role in every walk of life. But certain types of organisation are more vulnerable than others to the consequences of a data security breach. Governments and institutions are good examples, as are financial institutions and operators of critical infrastructure. Research priorities: Smart secured devices / Packaging and technology against counterfeits and security threats to the device / Anti-tampering coating and encapsulation / New materials to counter invasive and non invasive attacks / Embedded microsensors and reactive devices / Smart Systems in 3D packaging offering high performing signal processing, flexible interconnect and communications capabilities / Vulnerability analysis to counter new hackers and attacks (physical analysis + reverse engineering, …). Failure analysis capabilities / Design methodology / Security Insurance and related capabilities.

9.3 ARTEMIS Chile

State of art of Artemis and future trends in Chile

In the framework of MACHI, the members of the Artemis working group have established the research priorities according to the members' goals and technological capabilities.

Some years ago, the spread of controllers in Chile opened the door to this new market[24] and to the possibility that "All systems, machines, and objects will become digital, self-managed, interconnected resources. Embedded Systems will make real the dream of Ambient Intelligence in which intelligent support for people will be embedded in everyday objects, such as furniture, clothes, vehicles, buildings, roads and smart materials. Embedded Systems will increase our quality of life, alleviating the pressure on our environment by reducing pollution and increasing energy savings. They will help to make life healthier and more secure"[25].

For many years embedded design in Chile has been improving productivity and quality of the goods (exports) and Chilean natural resources sectors(mining, food, forest).
The current challenge for the Chilean companies involved in embedded design is going global and export electronic systems as well as intellectual propriety and to establish international networks in order to remain competitive and enlarge the markets beyond the Latin American region.

The strategy is differentiating the designs (versus high volume producers such as China) by the high quality, the capability to work in hard environments and by incorporating higher levels of "intelligence" in the systems and certifications.

Thus, Artemis Chile has also detected the relevant challenges that match with the FP7

[24] http://www.slideshare.net/labarrosc/la-industria-del-software-en-chile-141457
[25] Artemis Draft, page 5.

priorities[26]:

Regarding catastrophic events as earthquakes, embedded systems can support/collaborate in the developing of trusted networks in order to assure the connectivity. Optimizing the use of networks combining wireless, PLC and public infrastructure is an issue that can be performed. This has to be with Pervasive and Trusted Network and Service Infrastructures.

Regarding the ICT for a low carbon economy (Challenge 6), the members of the Chilean working group are willing to put forward initiatives in:
ICT-2011.6.3 ICT for efficient water resources management. Developing conceptual models as well as new electronic devices and communications to monitor in real time water resources and to provide forecasts. The particular characteristics of the Chilean geography, from the driest dessert in the North to the glaciers in the South, offer a natural laboratory to develop and validate the outcomes.

ICT-2011.6.1 Smart Energy Grids. In particular, "developing automation and control systems that support decentralized electricity generation, enabling smaller scale electricity supply sources to contribute to the grid in a secured and reliable manner, incorporating the production from intermittent sources, protection of equipments, fault alerting and self-healing, high power electronics building blocks, featuring the protection of equipments, fault alerting and self-healing."

EEB-ICT-2011.6.4 ICT for energy-efficient buildings and spaces of public use (FP7-2011-NMP-ENV-ENERGY-ICT-EeB). The characteristics of the Chilean geography offer a plurality of environments to develop and validate the application of ICT to energy efficiency.
Regarding ICT for Enterprise and Manufacturing, this priority covers a wide range of possibilities of projects. The copper mines in Chile are a hazardous environment where the results can be developed and validated, even though the applications are not limited to the mining.

ICT-2011.8.1 Technology-enhanced learning (call 8). Artemis Group prioritize this line of research since being education one of the key aspects of individual's development, the creation of high-tech tools to facilitate teaching and learning could lead to a more productive and competitive country in order to fulfill world's needs.

Type of organizations that participated in the research priorities:

[26] The following companies have participated in this identification: Addere, Axys, Citec, CONCABLES, EKO MAIKO, RED GLOBAL, TECNOCAL and the University Diego Portales.

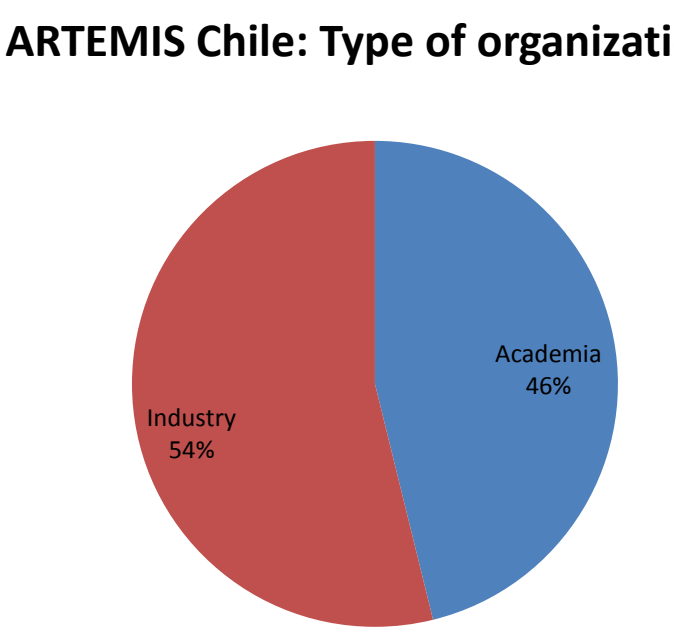


Figure 8: Type of organizations that participated in ARTEMIS Chile chapter.

Research priorities on Artemis Chile[27]

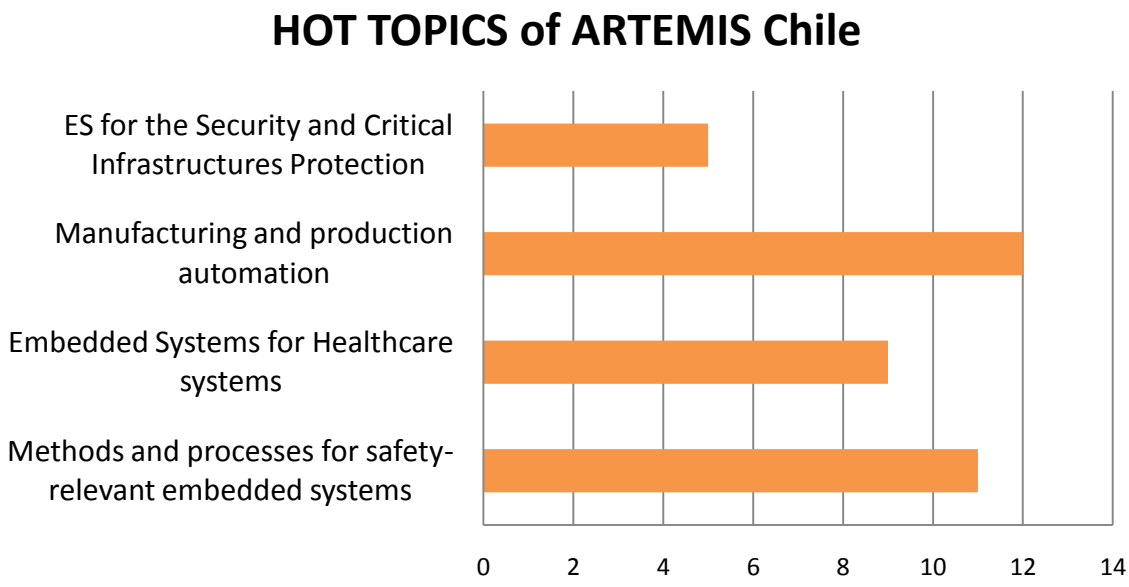


Figure 9: Hot Topics of ARTEMIS Chile

1.	Methods and processes for safety-relevant embedded systems

Systems that must operate in situations where failures may result in harm or damage must be ultra-reliable and predictable (e.g. meeting hard real time constraints) or there must be sufficient redundancy so that a subsystem failure does not lead to a safety related system failure: design assurance methods and processes are required to guarantee hazard-free designs. The main theme and results of this sub-programme are therefore embedded systems

[27] All the contents are from Artemis Draft SRA.

for enhanced safety and efficiency in the transport domains (i.e., automotive, aerospace, rail), industrial process control, medical domains and public infrastructures and utilities. The focus is on the cost-effective design and integration of systems with adequate dependability used in safety-critical applications.

- Requirements management will be improved to ensure completeness, consistency, correctness, verifiability and traceability of functional and extra-functional requirements across the supply chain based on requirements formalization and management.

- Architecture modelling and exploration solutions for systems/multi-systems and systems of systems architecture choices against business and operational criteria.

- System analysis methods have to provide a usable suite of analysis methods covering all phases and all viewpoints in the development of safety-critical embedded systems, including cross-viewpoint dependencies, enabling cost-efficient certification.

- Component-based design has the objective of providing techniques, methods and tools to design, validate, verify, certify/qualify products made of available or new components in the context of safety-critical systems.

- Platform technologies for safety-relevant embedded systems are required (e.g., communication services, diagnostic services, robustness services, security services) as a stable baseline for the development of safety-relevant embedded applications.

2. Manufacturing and production automation

Chile is a country with many industries which could greatly benefit from the development of tools to allow better control of all manufacturing processes. The main themes of this area are embedded systems supporting sustainable, competitive, flexible, reconfigurable manufacturing and delivery of products, and the support of products over their complete life-cycle.

Mastery of these is essential in assuring that manufacturing know-how for efficient and sustainable production of products and services is further advanced, and that product lifecycles can be completely, sustainably and efficiently managed. These aspects contribute to the competitiveness of European industry, both directly (improving manufacturing and product efficiency without compromising the environment) and indirectly, by supplying equipment and know-how to international partners as a business in its own right.

- Discrete Manufacturing (characterized by individual or separate unit production e.g. of vehicles, computers, ...),

- Batch and Continuous Process (continuous flow, e.g. oil and gas, chemical industries, pharmaceutical, food and beverage, power generation, ...),

- Utilities (the infrastructure for public services including electricity/gas supply, fresh and waste water, district heating, ...),

- Manufacturing logistics (internal logistic processes across the whole manufacturing chain, emphasizing the value-adding processes) and

- Multimodal logistics management (planning, implementation and control of efficient flow and storage of goods, services and related information).

3. Embedded Systems for Healthcare systems

It addresses embedded systems technology in the context of healthcare, to enable solutions that reduce the rising costs of healthcare and help to cope with the shortage of professional staff. The solutions are oriented to the use at the patient's homes, on the move and in hospitals or other care institutions and cover applications in the area of (remote) patient monitoring, tracking of people and equipment, tele-medicine, imaging technology for diagnostic as well as treatment purposes (e.g. minimal invasive surgery).

- Dynamically configured networks of sensors and actuators for in-home and mobile and institutional situations
- Networked, distributed control systems
- New sensors and actuators are required including new type of sensors for capturing biological and molecular data;
- Multi system integrated workflows

4. ES for the Security and Critical Infrastructures Protection

One of the most promising directions that will enhance the features provided by the Internet of Future is the so called "Internet of Things", which aims to more effectively integrate the world of Internet with the physical world. ES technologies play a key role in the accomplishment of this, as they will represent the smart interconnected objects, or they will constitute the interface between the real world and its virtual representation over future networks.

Services exposed by the embedded systems over the "nets" of the future will transform the underlying networks from merely a communication means to become proactive, servicebased infrastructures. With this comes an increasing reliance on their dependable operation, with consequent concerns about privacy and trustworthiness in cases of accidental or malicious disruption.

- Enhanced technology for fault mitigation and recovery of ES clusters;
- Sensing, control and automatic decision making functions;
- Real-time support for efficient interactions;

5. Human-centred Design of Embedded Systems

It covers User Centred Design approaches and solutions for Human Machine Interfaces (HMI) of Embedded Systems(...)The aim is to promote technology development that supports designers to build intuitive HMIs that integrate naturally into operational environments and that are effective and easy to use, especially in safety critical domains.

- New knowledge on human performance in association with new and innovative assistance and information systems
- Human Machine Interfaces (HMI) of Embedded

6. Embedded Systems in Smart Environments

The overall goal is to provide methods, tools, technology and models with which developers will be able to build 'smart environments', i.e. ecosystems of smart and heterogeneous devices interacting with each other and with the environment, and cooperating together to provide a foundation for rapid local applications and service innovations.

- Interaction technologies and solutions for different environments and user groups.
- System design and application development tools and methods that address very different kinds of domains and systems, including legacy, and the different programming
- Interoperability solutions including a semantic platform that can address scalability, performance, security and evolvability requirements arising from different kinds of environments and usage scenarios.

9.4 Emobility Chile

State of art of Emobility and future trends in Chile

The Emobility Working Group maintains, in the meanwhile, the original name of Net!Works Technology Platform. In Chile, the mobile communications market is quite mature and wireless communications is widely spread but is still not reaching all sectors of society. Demand is also limited by the size of the population.

The participants of this group were from:

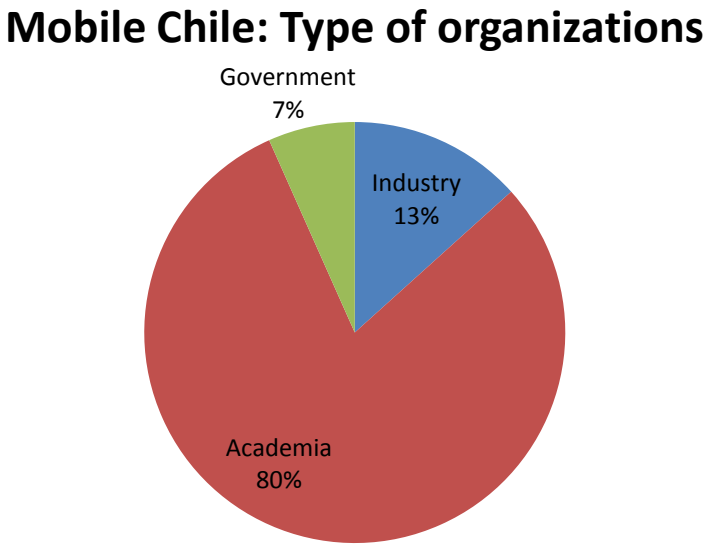


Figure 10: Type of organizations that partipated in Emobility Chile chapter.

Transportation resulted to be the application area with more potential, following the participants.

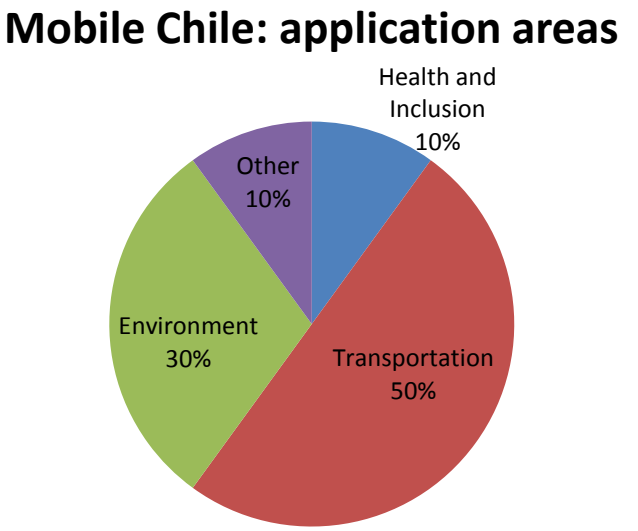


Figure 11: Application areas of Emobility in Chile

Research priorities on Emobility Chile[28]

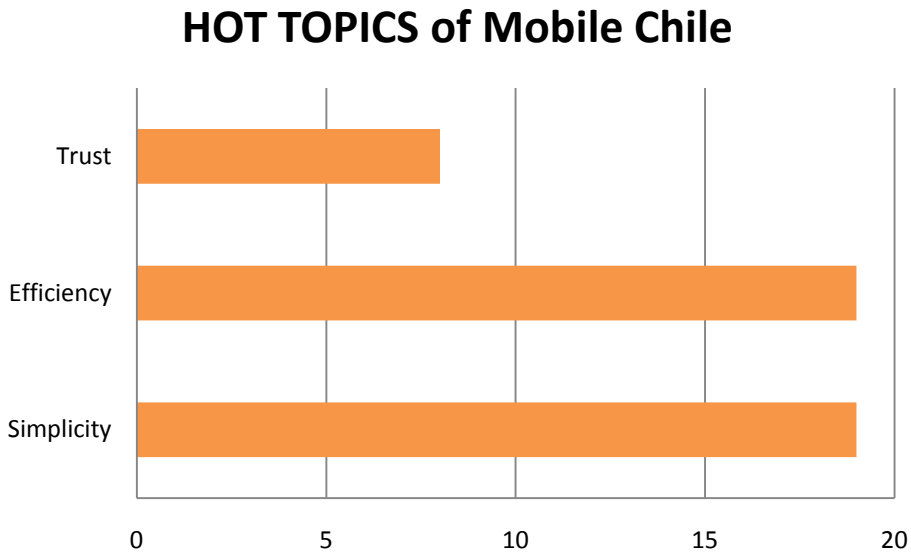


Figure 12: Hot Topics of Emobility Chile

The research priorities of Emobility Chile are focused on the principle of Simplicity, which "emphasises research into new solutions for managing complexity seamlessly on behalf of service providers and for hiding complexity from a user in accessing, using and creating services. Complexity is delegated from a user to the communication system which must adapt to the individual's life stage preferences and situation, and a variety of other contexts".

[28] All the content is from Emobility SRA.

- Ubiquitous connectivity and session continuity through auto-connectivity between legacy and new types of networks: WSN, PAN, LAN, Home Network, Moving Networks, Wide Area Networks and techniques which facilitate self-(configuration, organisation, healing)and management of heterogeneous and dynamic networks and services.
- A network agnostic service execution platform that interacts with networks and terminals and also facilitates the deployment, adaptation and management of services on the various(including mobile) devices.
- Innovative services based on a user's ambient intelligent and streamlined context classifications methodology. It is well suited for interdisciplinary work.
- Enabling techniques for user-created content facilitating peer-to-peer communication.
- Smart user interfaces and interactions with learning capabilities to evolve with a user interests and age, for all types of users and in particular elderly with emphasis on portable personalisation of services and networks. It could also be included in this cathegory the multicultural characteristics, for instance in Chile the adaptation of user interfaces for the Mapudungun languaje
- New mobile device form factors, included embedded wireless chip connectivity. New technologies such as Software Defined Radio, made available for us the possibility of designing and implementing ad-hoc hardware without the need for big or complex manufacturing infrastructure.
- Radically simplified mechanisms and technologies for context capturing, processing, distribution and integration into intelligent services.

Regarding the Efficiency principle, it is pointed out that in Chile there is a permanent need for improvements in coverage optimization and coexistence of several services in a more spectral efficient way. About the alternative deployment concepts and system architectures beyond the classical cellular approach, in Chile the new generations of mobile communication systems have been integrated very fast and nowadays the different emerging technologies do not replace the older ones but coexist simultaneously. This introduces several problems especially in big cities which deserve special and particular efforts in order to solve their spatial and frequency saturation.

9.5 NEM Chile

State of art of NEM and future trends in Chile

In the Networked and Electronic Media Field, the topic "content creation" has been identified as the main research priority, this fact determines that the NEM group will follow "a unique path into the future because it deals with 'content' from both the users' point of view and the technical perspective. Both views are essential if new services, with new commercial opportunities, are to work well and to be attractive to a wide range of users."[29] The "content creation" topic involves working on content creation in order to ensure the availability of innovative new services regarding Chilean's society needs.

The topics "Technology drivers and enabling technologies" and "Content search and media presentation" follow "Content Creation" regarding the importance as research priority topics in Chile. "Content Search and Media Presentation" topic is related with new way of presenting services and of interacting with users. The topic "Technology drivers and enabling

[29] Strategic Research Agenda "Networked and Electronic Media" European Technology Platform

technologies" is related to Chileans policy and societal concerns that shape technological development.

The Networked and Electronic Media group in Chile needs to develop and adapt the opportunities and possibilities of the media industry (value web creating, storing, adapting, aggregating, delivering, and consuming 'content' – understandable information made available to a user at any stage of the value chain. Content includes both the 'essence' – the data representing text, audiovisual services, games programs, and 'apps' that is the object of the value chain – as well as the metadata that describes the essence and allows it to be searched, routed, processed, selected, and consumed) to Chilean Society challenges.

The Chilean NEM sector need to find the way to make Networked and Electronic Media advantages available to all users with different purposes such as personal, professional and educational purposes.

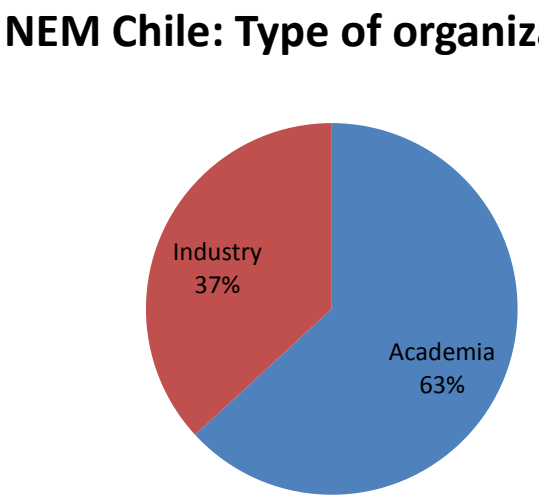


Figure 10: Type of organizations that partiCIpated in NEM Chile chapter.

Research priorities on NEM Chile[30]

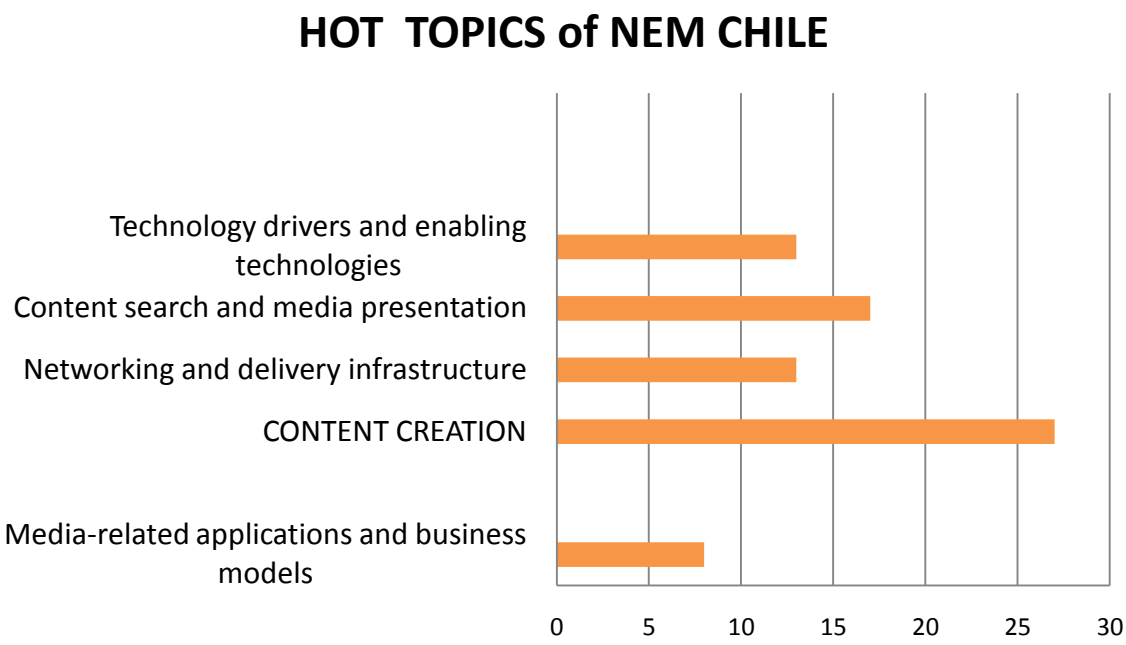


Figure 14: Hot Topics of Emobility Chile

1. Content creation

It means the creation of content to guarantee the offer and availability of new and innovative services. This research theme has a wide interest from Chilean side:

- New forms of content: How to manage and promote the adoption of new services and how to adapt networked media technologies for wider purposes, such as games with "more serious" purposes.
- Representation of content – file formats for the audio, 3D video and data that are the active constituents of services, plus the metadata that describes them and allows them to be processed; modelling formats for avatars are included, with auralisation formats to represent realistic sound fields; video coding will be based on the objects in the scene; new tools must be developed to classify metadata.
- Modelling formats – There are different types of modelling formats such as synthetic models, multi-view-video; light-field, believable virtual characters or avatars and auralisation.
- Scene-based content description – A scene is a combination of different audio and video objects – or a composition of scenes itself. The scene can be described by describing the most important elements of it and how they should be rendered to generate the presentation. This description is then independent of any specific output device that might be used to reproduce the scene, and of any scenario for using it. The content creator or assembler can prioritise specific elements (objects or scenes) and can thereby influence the rendering process. Simple alternative elements, objects and scenes can be provided that can replace more complex low-priority content if necessary.
- Metadata (data about data) can be classified as 'descriptive metadata', describing the structure and meaning of the different components of audiovisual content, 'functional metadata', specifying, at a high level of abstraction, the processing operations that

[30] All the contents are from the NEM SRA.

can be performed on the content depending on system conditions, and 'semantic metadata' providing descriptions that can be understood and processed not only by human users, but also by machines.

- Tools for content creation and manipulation – including transducers for capturing content (not just audio and video, but other human senses as well); manipulation of audiovisual content must be easier than using today's word processors, and content once created must be easily and automatically adaptable to the changing circumstances of users on the move; metadata must be automatically captured.
- Content Capture – Traducers for capturing content include sensors and actuators for human senses: audio, video, taste, smell, touch, and for other parameters (temperature, position, motion, force, etc.). Today the only transducers that can be considered relatively mature and massively deployed are the audio and video ones together with certain very specialised applications – keyboards, mouse, joystick. Metadata parameters such as time and position can be captured through satellite services such as GPS.
- Content manipulation Authoring tools – It is crucial that content developers have better access to more economical and more easily usable technology that enables them to create content and implicitly opens the way to distribution channels. A new generation of authoring tools is needed, taking into account the increasing relevance of user-generated and community-generated content. One example emerges in the gaming industry, where there are barriers to market entry similar to those of early film or television. The production of interactive content will become the most important element of content production. Content produced by organisations for public consumption will ask for contributions from individuals; and individuals will wish to personalise and adapt content produced by others and to make it available to third parties. This includes metadata creation and adaptation for the interactive content, by means of both automated and collaborative methods: content becomes useless without metadata. Collaborative tools for metadata production, in particular for video (social segmentation and tagging of video material) is necessary.
- Content adaptation – Is the ability to tailor content to the current circumstances of the user. The adaptation required is determined by the capabilities of the terminal(s) and equipment available at the user's current location, the capabilities (such as bandwidth) of the communication networks at the user's disposal, and the physical circumstances of the user - who may, for instance, be visually impaired. Such adaptation must be transparent to end users, so that they do not need to know all the technical parameters that may be of influence. Content adaptation is related to content personalisation, which is concerned with tailoring content semantically to the user's requirements.
- Overcoming human language barriers – For all citizens to become e-included in the information society, the products and services of that society must be accessible in their languages.

Content search and media presentation

There will be new ways of presenting services to users, and new ways for users to interact with services.

- Automated semantic annotation – to generate metadata automatically from new or existing content using semantic techniques.

- Virtual reality – interactive technology for communication, business applications such as remote action, and entertainment applications including games.
- User-system interaction – multimodal user interfaces aiming at mimicking human communication skills that use several modes of communication could offer a natural and transparent way to deal with the complexities of interaction while hiding them from the user.
- User number measurement and user behaviour logging – to allow service providers to measure audiences and how they are using the service.

Technology drivers and enabling technologies

- Multimedia middleware – Is a software layer providing a stable architecture and application programming interface (API) dedicated to multimedia and accessible by service developers and providers. This middleware layer is used to allow application software to execute multimedia functions with a minimum knowledge of the inner workings of the multimedia terminal – which may be used for generating content or for reproducing it.
- Identity management and AAA – methods for authentication, authorisation and accounting while taking account of privacy.
- Security privacy and trust – to provide services and their content securely between all users, guaranteeing the privacy of each participant in a media transaction and securing networks against breakdown and malicious attack.
- Contextual awareness – for services to be context-aware, means are needed to capture contextual information and standardize its representation.
- Personalisation/profiling – will personalised services be seen as useful, or as an invasion of privacy?
- Charging and payment – a reliable, low cost system of micropayments is needed.
- Power management technologies - energy saving: how the networked electronic media technologies can help save energy in all sectors of the economy

Networking and delivery infrastructure

Networks underlie all the services and applications described in chapter. But in normal operating conditions the user should not have to configure the network to suit an application and should not even need to know how the signal is routed. To achieve that goal, current network technologies need much improvement. The size and complexity of the internet is growing very fast, both in terms of volume of traffic and the numbers of users (not only human users but also inanimate devices). Human users increasingly demand services that are

real-time, simple, secure and personalized. Accommodating these requirements presents the main challenge for the Future Internet.

- Network intelligence: Services must be created and delivered to end-users much faster, and constituents of an application (the service components) may come from a larger community of providers in partnership. Service logic will be highly geographically distributed. The end-user experience will be highly individualised based on user context, role, preference, behaviour.

  Networks may soon all be multi-provider and multi-service. In this scenario the network provider will sell connectivity to service providers in fair competition with other network providers. The user will no longer buy connectivity but services, and new business roles like 'service brokers' will appear in the market.

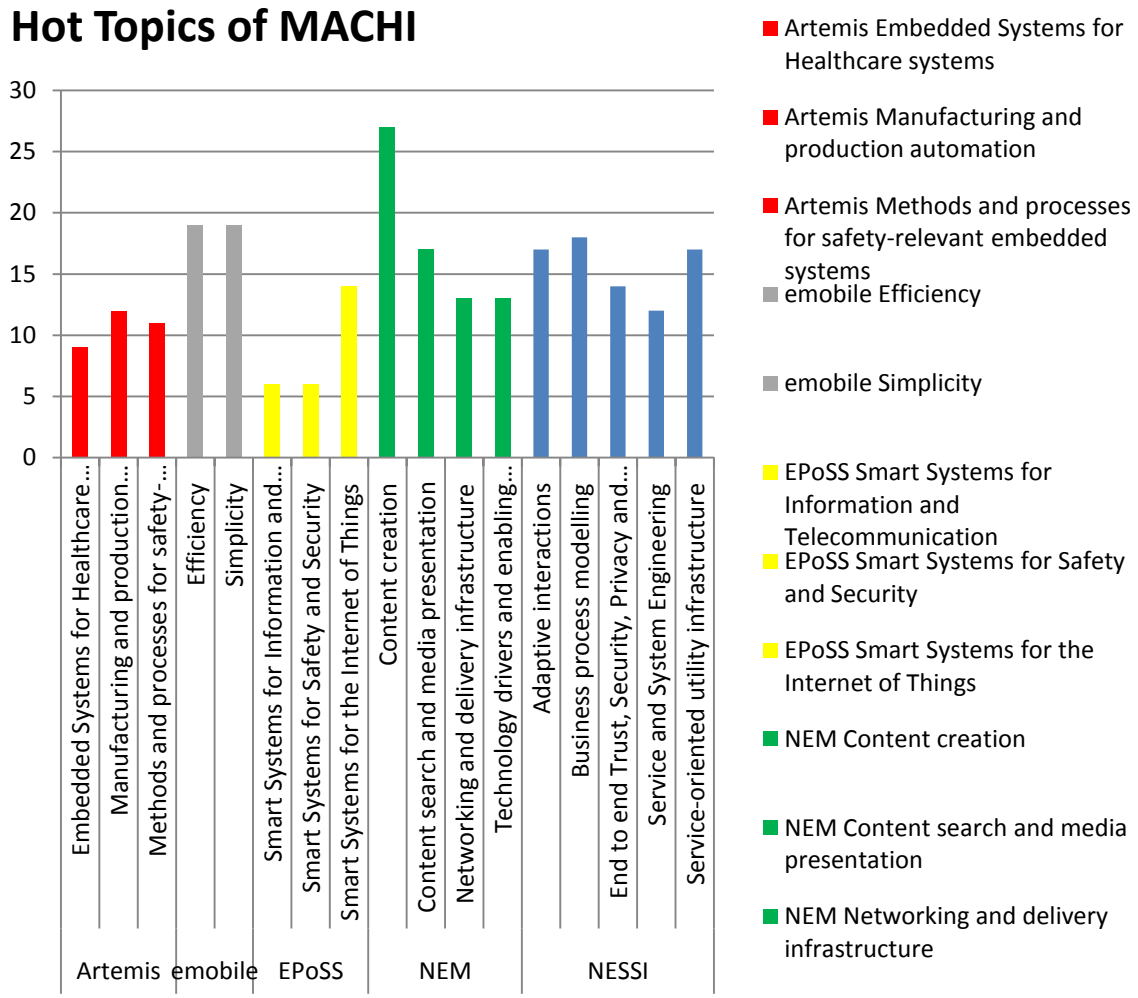
Media-related applications and business models

If new technology is to be adopted, advances are needed in understanding applications and how they create value.

- Value web – to understand how value is created, and how can it be protected.
- Social networking and media sharing – to see how social networking can have a positive impact on the content industry.
- User satisfaction and quality of experience – to develop methods of measuring quality of experience which could replace quality of service metrics.

10. Conclusions

There are different potential areas were Chile and the European Union can perform R&D activities together. In a nutshell, these are the main important research areas:



Regarding the composition of participants in the current document, even the average of academia is still higher than industry; MACHI technology platform has an active participation of the ICT local industry associations: GECHS, AIE and ACTI.

The universities and research centres include participation not only from the capital city, but also from other regions such as Concepción, Valparaíso and Antofagasta and Arica. In this sense, MACHI received the support of REUNA, the Chilean academic network.

MACHI is an evolving and a dynamic platform, where new actors are being involved so strategic research agenda should be revised periodically. This SRA revision should also consider European ETPs priorities changes, as they are also in a constant evolution. This dynamic will allow more stakeholders the possibility of participating and of paving the way for a more structured R&D cooperation between Chile and the European Union.

Finally, this SRA will provide the inputs for developing the common EU-LatAm Future Internet Strategic Research Agenda, where the local priorities will be synthesized in a regional level.

11. Research-Priority tables

Table of participants

1	Academia	UMCE
2	Industry	SOLVIT
3	Academia	ProteinLab
4	Industry	My friend
5	Industry	Ingeflow SA
6	Academia	Fundacion ciencias para la Vida
7	Academia	Universidad de Concepción - UdeC English Online Program
8	GOB	ITS
9	Academia	Universidad de Tarapacá
10	Academia	Universidad Técnica Federico Santa María - Departamento de Informática
11	Industry	GECHS
12	Academia	PUC - Departamento de Ciencia de la Computacion - Grupo de Investigacion en Inteligencia de Maquina
13	Academia	Universidad Federico Santa Maria - UTFSM-Toeska
14	Industry	MKD Embedded
15	Industry	AKTION TECHNOLOGY
16	Academia	NIC CHILE
17	Academia	USACH - Ing. Inf.
18	Industry	NECTIA
19	Industry	Proyecto Digital
20	Academia	Universidad Central de Chile - Escuela Ing. Civil en Computacion e Informática
21	Industry	RED GLOBAL
22	Industry	ADDERE
23	Academia	Universidad Católica del Norte - Centro de Informática Aplicada
24	Industry	EUROCHILE
25	Academia	Universidad de Concepción - (MARIO)
26	Academia	Universidad Tecnológica Metropolitana
27	Academia	Universidad Técnica Federico Santa María
28	Academia	Universidad de Santiago de Chile
29	Academia	Universidad Diego Portales
30	Academia	UPLA
31	Academia	Computer Systems Research Group (CSRG)- Universidad Técnica Federico Santa María
32	Industry	TASTETS
33	Industry	AXYS SA

Research Table

NESSI

Area:	Topic	TOTAL
NESSI Software and Services	**Service-oriented utility infrastructure**	
	Advanced infrastructure technologies in:	
	Hardware (flexible allocation, virtualization, advanced storage, energy efficiency)	3
	Operating Systems (merge physical- and virtual-machines execution with service-oriented application execution at OS level)	2
	Desktop Virtualization (access private/secure desktops from anywhere, over the web,)	2
	Middleware (new composite system designs, harmonized virtualization)	3
	Related programming models	3
	Related power-aware software design methods	2
	Transparent deployment of cloud services	2
	Service and System Engineering	
	Modelling, Construction and Management of hybrid servicebased systems (situational, spontaneous, goal-based)	3
	Mapping quality of experience of the services to non-functional properties of components	1
	Refining semantics to become appropriate across hybrid servicebased systems	1
	Product Line Engineering applied to services	2
	Suitable platforms to fulfil future trends and challenges for different levels of the automation pyramid	4
	Vertical Integration between different layers of the automation pyramid	1
	Adaptive interactions	
	Social and business intelligence service provision	5
	Knowledge- and situational-driven personalization of interfaces and services	2
	Embodiment of intelligent access to services	6
	Embodiment of educating principles in services	4
	Business process modelling	
	Dynamic formation, formalization management and interaction of business processes implemented through services	7

	Support for long-term and transactional business collaboration	6
	Support for event-orientation	5
	Reference Architecture and Implementations	
	Harmonize SOA and SOI architectures to support all kinds of:	
	Business and provisioning models	3
	Applications and hardware environments	1
	Stakeholders	1
	Services pervasiveness	
	Turn devices into enablers of services by embodying SOA principles into embedded systems	3
	Link collaborative devices to services	2
	End to end Trust, Security, Privacy and Resilience Implementing Privacy, Identity Management and Trust in servicebased systems and in the FI society through:	0
		0
	A chain of trust across all levels and trust zones achieving security by design	2
	Security by Design	4
	Embed user-centric intuitive security mechanisms	2
	Protection against threats	3
	Enabling users to understand security, privacy and trust	3
	Systemic foundation for a Service Economy	
	Make services accessible to all	0
	Multidisciplinary research to build a theory describing the relationship between organizations and social networks in regards to hybrid service-based systems	2
	Support emerging business models for innovation	0
	Understanding OS community collaborative processes	0
	Understanding OS business models and the impact on the Service Economy	0

ARTEMIS

Area:	Topic	TOTAL

ARTEMIS Software Embedded	**Methods and processes for safety-relevant embedded systems**	
	Requirements management will be improved to ensure completeness, consistency, correctness, verifiability and traceability of functional and extra-functional requirements across the supply chain based on requirements formalization and management.	3
	Architecture modelling and exploration solutions for systems/multi-systems and systems of systems architecture choices against business and operational criteria	3
	System analysis methods have to provide a usable suite of analysis methods covering all phases and all viewpoints in the development of safety-critical embedded systems, including cross-viewpoint dependencies, enabling cost-efficient certification.	1
	Component-based design has the objective of providing techniques, methods and tools to design, validate, verify, certify/qualify products made of available or new components in the context of safety-critical systems.	3
	Platform technologies for safety-relevant embedded systems are required (e.g., communication services, diagnostic services, robustness services, security services) as a stable baseline for the development of safety-relevant embedded applications.	1
	Embedded Systems for Healthcare systems	
	Dynamically configured networks of sensors and actuators for in-home and mobile and institutional situations	3
	Smart power management	1
	Networked, distributed control systems	1
	Safe and secure ambient identification and authentication	1
	Massive reliable medical (image) data processing in a distributed network obeying latency, bandwidth security and privacy.	0
	New image detectors are required for enhancing medical imaging applications and supporting image guided interventions.	0
	Comparison of the patient condition with models of the physical and biochemical of the normal and abnormal behavior of living organs are needed to ensure right and personal centric treatment.	0
	New sensors and actuators are required including new type of sensors for capturing biological and molecular data;	1
	New embodiments of sensors suitable for new types of deployment (e.g. injectable, swallowable);	0
	Implantable but also non-invasive sensors.	0
	Multi system integrated workflows	1

Multimodal interaction technologies (speech, vision and gestures) for diagnostic and surgical equipment.	1
Remote system life-cycle management.	0
Embedded Systems in Smart Environments	
Common analysis and design tools and methods that can capture requirements from different domains, and describe the domain and context specific information in common, shared formats	1
Interoperability solutions including a semantic platform that can address scalability, performance, security and evolvability requirements arising from different kinds of environments and usage scenarios.	1
Interaction technologies and solutions for different environments and user groups.	2
System design and application development tools and methods that address very different kinds of domains and systems, including legacy, and the different programming environments and application areas.	1
Manufacturing and production automation	
Discrete Manufacturing (characterized by individual or separate unit production e.g. of vehicles, computers, …),	1
Batch and Continuous Process (continuous flow, e.g. oil and gas, chemical industries, pharmaceutical, food and beverage, power generation, ...),	3
Utilities (the infrastructure for public services including electricity/gas supply, fresh and waste water, district heating, …),	3
Manufacturing logistics (internal logistic processes across the whole manufacturing chain, emphasizing the value-adding processes) and	2
Multimodal logistics management (planning, implementation and control of efficient flow and storage of goods, services and related information).	3
Computing platforms for Embedded Systems	
New architectures for embedded systems, addressing key challenges such as very high throughput (multi-core) embedded systems, low power (power management) solutions including physical architecture and installation, as well as HW / SW architecture strategies.	4
New design paradigms that render the practical implementation of multi- and many-core solutions tractable, allowing them to truly contribute to market innovation.	0
ES for the Security and Critical Infrastructures Protection	

	Seamless and secure communication/cooperation of heterogeneous ES over telecommunications infrastructures;	0
	Models/Methods/Tools for predicting complex, dynamic behaviour in distributed and cooperating ESs, including their SPD characteristics;	0
	Spontaneous (ad-hoc) yet trustworthy cooperation between smart objects;	0
	Enhanced technology for fault mitigation and recovery of ES clusters;	1
	Virtualization of resources exposed by the ESs in a network;	0
	Capability to measure and enforce Quality of Service across heterogeneous domains;	0
	Robust, predictable and self adaptive protocols in large-scale, dynamic ES networks;	0
	Sensing, control and automatic decision making functions;	1
	Real-time support for efficient interactions;	3
	Trustworthiness and High Dependability features;	0
	Advanced methods for improved confidentiality.	0
	Embedded Technology for Sustainable Urban Life	0
	Human-centred Design of Embedded Systems	
	Human Machine Interfaces (HMI) of Embedded	1
	New knowledge on human performance in association with new and innovative assistance and information systems	2
	New methodologies for agile HMI prototyping enabling the user centric design approach at all stages of product development	0
	New methodologies for building cognitive user models, both as a support to usability design and refinement, and at product level as references for adaptive and context aware interfaces	0
	New technologies for intelligent multi-modal interactive systems, which are intuitive and easy to use and adapt to the user state, context and capabilities	1

EPoSS

Area: EPoSS	Topic	TOTAL
EPoSS - Inteligent Integrated Systems	**Smart Systems for Automotive Applications**	
	Safety	0
	Driver Assistance	1
	Convenience	0

	Energy efficiency	2
	Smart Power Train	0
	Smart Systems for Medical Applications	
	Energy Management Systems	0
	Intelligent Power	0
	Vehicle2Grid	1
	Active Control Units	0
	Smart Systems for the Internet of Things	
	Intelligent Systems	9
	Energy Sustainability	3
	Integration Into Materials	0
	Energy Harvesting	2
	Smart Systems for Information and Telecommunication	
	Ultra broadband, spectrum agile wireless access	2
	Energy efficient base stations	1
	Ultra compact handset transceivers	0
	Small form-factor base stations	0
	Wide-area sensor networksCompact	2
	Energy autonomous sensorsImplantable	1
	Implantable BAN transceivers	0
	Smart Systems for Safety and Security	
	Secure Personal Devices, including Smart Cards	0
	Secure IT for Infrastructure	1
	Personal emergency and home security systems	2
	Full Security	0
	Detection, Authentication and surveillance	3
	Vital Infrastructure Security	0
	Emergency and security	0
	Smart Systems for Aerospace	
	By-light functions	0
	Fuel Cell APU	0
	By-wire functions	0
	Electrical Power Management	0

Emobility

Area	Topic	TOTAL

Net!Works / Emobility	**Simplicity**	
	Ubiquitous connectivity and session continuity through auto-connectivity between legacy and new types of networks: WSN, PAN, LAN, Home Network, Moving Networks, Wide Area Networks and techniques which facilitate self-(configuration, organisation, healing)and management of heterogeneous and dynamic networks and services.	3
	A network agnostic service execution platform that interacts with networks and terminals and also facilitates the deployment, adaptation and management of services on the various(including mobile) devices.	3
	Innovative services based on a user's ambient intelligent and streamlined context classifications methodology.	4
	Enabling techniques for user-created content facilitating peer-to-peer communication.	1
	Smart user interfaces and interactions with learning capabilities to evolve with a user interests and age, for all types of users and in particular elderly with emphasis on portable personalisation of services and networks.	3
	New mobile device form factors, included embedded wireless chip connectivity.	2
	Radically simplified mechanisms and technologies for context capturing, processing, distribution and integration into intelligent services.	2
	New and efficient search engines with automatic zero-configuration and complexity management (including the management of privacy and trust).	0
	Intelligent customer care and provision of smart support in real-time in case of echnical difficulties.	0
	Seamless user experience for all age groups with emphasis on portable personalisation for both the services and the connectivity.	1
	Efficiency	
	Joint optimisation of coverage, capacity and quality techniques through cooperation and adaptation techniques.	2
	Efficient mechanisms for joint exploitation and operation of available diversities in time/space/frequency/code/power domains.	2
	Investigation of alternative deployment concepts and system architectures beyond the classical cellular approach.	2
	Efficient cross-layer operation and optimization.	1
	Intelligent resource (frequency, battery, power, hardware, software) discovery and management techniques.	2

	End-to-end content and media adaptation techniques such as time-shifting, intelligent catching, opportunistic transport/transmission, rate/quality adaptation.	1
	Centralised and de-centralised self-organising network topologies for both operator based and operator-less radio access network concepts for special application areas (e.g., disaster relief and campus networks).	1
	Seamless convergence between fixed and mobile at both service and network levels, exploiting broadband optical technologies.	0
	Innovative transceiver architectures and jointly optimized RF and baseband hardware designs, matching the nano-electronics roadmaps and exhibiting new degrees of scalability, flexibility, security, energy-aware performance, cost efficiency and design productivity.	2
	Evaluation of Network Information theoretical limits of cooperative and self-organising networks and research into advance coding design and signal processing schemes to achieve these limits.	1
	Investigation of the impact of new frequency bands for future systems on the radio	1
	propagation and specification of appropriate output power levels to ensure compliance with relevant guidelines and regulations related to human exposure to radio frequency electromagnetic fields.	1
	New methods of frequency usage, coexistence, cooperation and sharing techniques for/between exiting and newly identified frequency spectrum and radio access technologies, based on cognitive and spectrum-agile radios to select the most appropriate radio access technology for a given environment.	3
	Trust	
	Secure data management, and synchronization and private exchange of user profile and context information.	2
	Efficient encryption and cryptographic mechanisms and algorithms suitable for different types of devices and networks.	0
	Identity management & privacy.	0
	Secure and dependable end-to-end network protocols and applications enabling a simple-to-use trusted transaction environment.	2
	Unified Digital Rights Management.	0
	Transparent and flexible Service Level Agreements.	0
	Combined multi-layered mobility support and authentication/authorization across diverse networks and support of simultaneous use of multiple access technologies.	1

	Secure software and execution environment including O/S.	1
	Device and network protection against (virus, trojan, DoS attacks) and intrusion detection.	2
	Safe and secure software download enabling networks and device re-configurability.	0
	Application Areas	0
	Health and Inclusion	1
	Transportation	5
	Environment	3
	Other	1

NEM

Area	Topics	TOTAL
NEM Networked Electronic Media	**Media-related applications and business models**	
	Value web	1
	Social networking and media sharing	6
	User satisfaction and quality of experience	3
	Content creation	
	New forms of content	3
	Representation of content	6
	Modelling formats	1
	Scene-based content description	2
	Metadata	4
	Tools for content creation and manipulation	2
	Content capture	2
	Content manipulation	2
	Content adaptation	4
	Overcoming human language barriers	1
	Networking and delivery infrastructure	
	Intelligent delivery	1
	Network intelligence	3
	Quality of service	2
	Network architecture	4
	Home and extended-home networks	3
	Content search and media presentation	
	Automated semantic annotation	4
	Authentic, true-to-original media reproduction	0

	Virtual reallity	4
	User-system interaction	3
	Effective recommendation systems	4
	User number measurement and user behaviour logging	2
	Technology drivers and enabling technologies	
	Security privacy and trust	2
	Rights management	0
	Federated virtual devices	0
	Federated services	0
	Contextual awareness	2
	Location	0
	Identity management and AAA	2
	Personalisation/profiling	2
	Charging and payment	1
	Multimedia middleware	3
	Assited Living	0
	Power management technologies - energy saving	1
	Spectrum economy	0

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- Strategic Research Agenda "Networked and Electronic Media" European Technology Platform, September 2009
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Websites:

www.gechs.cl
www.aie.cl
www.acti.cl
www.reuna.cl
www.proteinlab.cl

14. Annex

1. Acronyms

Acronyms	Spanish	English
R&D	Investigación y desarrollo	Research and development
ICT	Tecnologías de la Información y Comunicación	Information and Communication Technologies
SRA	Agenda Estratégica de Investigación	Strategic Research Agenda
ARTEMIS	Iniciativa para los sistemas informáticos embebidos o empotrados	Embedded Computing Systems Initiative
NESSI	Iniciativa europea de Software y Servicios	European software and services initiative
NEM	Tecnologías audiovisuales en red	Networked Electronic Media
Emobility	Comunicaciones móviles e inalámbricas	Mobile and wireless communications
EPoSS	Sistemas inteligentes integrados	European Technology Platform on Smart Systems Integration
EU	Unión Europea	European Union
GDP	Producto Bruto Interno	Gross Domestic Product
D	Entregable	Deliverable
DS	Estrategia Digital	Digital Strategy
WG	Grupos de Trabajo	Working Groups
GECHS	Gremial Empresas chilenas de Sofware	Association of Chilean Software Companies
AIE	Asociación de Industrias Eléctricas-Electrónicas de Chile	Association of Electronic Industry
ACTI	Asociación Chilena de empresas de tecnologías de la Informacion	Chilean Association of Information Technology
CONICyT	Comisión Nacional de Investigación Científica y Tecnológica	National Commission for Scientific and Technological Research
CORFO	Corporación de Fomento de la Producción	Corporación de Fomento de la Producción

2. Inputs sent by leaders of ARTEMIS (Gerardo Rivas) and NESSI (Mario Bruno and Pablo Caroca):

ARTEMIS

Research priorities on ARTEMIS

For many years embedded design in Chile has been improving productivity and quality of the goods (exports) Chilean natural resources sectors (mining, food, forest).

The current challenge for the Chilean companies involved in embedded design is going global / export electronic systems as well as intellectual propriety / to establish international networks / in order to remain competitive and enlarge the markets beyond the Latin American region.

The strategy is differentiating the designs (versus China) by high quality, the capability to work in hard environments, incorporating higher levels of "intelligence" in the systems and certifications.

In the framework of Machi - Chile , the members of the embedded working group have established the research priorities according to the members goals and technological capabilities.

The challenges relevant for the embedded working group are defined in order to match the PF7 priorities.

Research priority 1: Networks and Service Infrastructures.

Challenge 1: Pervasive and Trusted Network and Service Infrastructures
ICT-2011.1.1 Future Networks
a) Wireless and mobile broadband systems
b) High capacity end-to-end infrastructure technologies
c) Novel Internet architectures and management and operation frameworks

Developing trusted networks in order to assure the connectivity even in catastrophic events as earthquakes.
Optimizing the use of networks combining wireless, PLC and public infrastructure.

Research priority 2: ICT for natural resources management and energy efficiency.

In the strategic definition of Challenge 6: ICT for a low carbon economy the members of the Chilean working group are willing to put forward initiatives in:

ICT-2011.6.3 ICT for efficient water resources management.
Developing conceptual models as well as new electronic devices and communications to monitor in real time water resources and to provide forecasts. The particular characteristics of the Chilean geography, from the driest dessert in the North to the glaciers in the South, offer a natural laboratory to develop and validate the outcomes.

ICT-2011.6.1 Smart Energy Grids
In particular, "developing automation and control systems that support decentralized electricity generation, enabling smaller scale electricity supply sources to contribute to the grid in a secured and reliable manner, incorporating the production from intermittent sources, protection of equipments, fault alerting and self-healing, high power electronics building blocks, featuring the protection of equipments, fault alerting and self-healing."

EEB-ICT-2011.6.4 ICT for energy-efficient buildings and spaces of public use (FP7-2011-NMP-ENV-ENERGY-ICT-EeB)
The characteristics of the Chilean geography offer a plurality of environments to develop and validate the application of ICT to energy efficiency.

Research priority 3: ICT for Enterprise and Manufacturing.

This priority covers a wide range of projects. The copper mines in Chile are a hazardous environment where the results can be developed and validated, even though the applications are not limited to the mining.

Challenge 7: ICT for the Enterprise and Manufacturing FoF-ICT-2011.7.1 Smart Factories: Energy-aware, agile manufacturing and customization (FP7-2012-NMP-ICT-FoF)
a) Demonstration and benchmarking of novel process automation and control (for discrete, continuous or batch industries)
b) Large-scale validation of advanced industrial robotics systems
c) Applications based on factory-wide networks of intelligent sensors and new metrology tools and methods, demonstrating management of manufacturing information in real time, including planning, scheduling and dispatching)

- FoF-ICT-2011.7.3 Virtual Factories and enterprises (FP7-2011-NMP-ICT-FoF)
c) Component-based tools and architectures enabling the innovative dynamic composition of services for product operation.

"Chile is a country with many industries which could greatly benefit from the development of tools to allow better control of all manufacturing processes".

Challenge 8: ICT for Learning and Access to Cultural Resources
- ICT-2011.8.1 Technology-enhanced learning (call 8)
a) Technology Enhanced Learning systems endowed with the capabilities of human tutors
c) Advanced solutions for fast and flexible deployment of learning opportunities at the workplace (targeting SMEs in particular)
d) Computational tools fostering creativity in learning processes

"Being education one of the key aspects of individual's development, the creation of high-tech tools to facilitate teaching and learning could lead to a more productive and competitive country in order to fulfill world's needs".

NESSI

Software and Services Chile

1. Service-oriented utility infrastructure
   - Modelos de virtualización y eficiencia energética de hardware en micro grids y sistemas operativos en chip.
2. Service and System Engineering
   - Modelos de Servicios de ingeniería: diseño y procesos de ingeniería para minería del cobre y subproductos, y fruticultura primaria.
3. Adaptive Interactions
   - Servicios para procesamiento semántico de contenidos
   - Modelos y lenguajes para servicios audiovisuales : creación y desarrollo de contenidos adaptativos,
   - servicios de procesamiento semántico para aplicaciones de cuidado de la salud
4. Business Process Modelling
   - Modelos para servicios de integración de procesos de negocios horizontales para pequeña y mediana industria
   - Modelos de colaboración de procesos verticales especializados por industrias y transaccionales para empresas del Estado e instituciones públicas
5. Reference Architecture and Implementations
   - Armonizar arquitectura de infraestructura y SOA en modelos de arquitecturas escalables y confiables para servicios del Estado (eGovernment) dirigido a lo social y los negocios, adoptando tecnologías heterogéneas.
6. Services Pervasiveness
   - Modelos para servicios Web que se ejecuten en dispositivos embebidos y móviles
7. End to end Trust, Security, Privacy and Resilience
   - Modelos de seguridad por diseño
8. Systemic foundation for a Service Economy

- Servicios analíticos financieros: análisis de riesgo e investigación financiera.
- Modelos de servicios para investigación en fenómenos naturales, como terremotos, etc., astronomía, minería del cobre y subproductos, biotecnología, tecnologías de información y energía

9. Building NESSI
    - Construir sistemas de toma de decisiones de negocio basados en servicios colaborativos para pequeña y mediana industria
    - Servicios de integración de procesos, tecnologías y herramientas conectadas a las metas de negocio de la minería del cobre y subproductos, fruticultura primaria, pesca y turismo.
10. Mercados verticales
    - Servicios de animación, contenido, pos producción y contenido digital.
    - Servicios eHealth: Análisis médicos tales como radiografías, ecografías y monitoreo de patologías, ensayos clínicos, investigación clínica.
    - Servicios eEnergy
    - Servicios eBusiness: tiendas en linea, sistema de compra en linea, sistema de pago en linea,
    - Servicios eLearning

3. Representative stakeholders contacted to produce the SRA

	Organización	Contacto
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28	LEBOX	Mauricio Uribarri
29	MICOMO	Gurovich, Andres
30	MKD Embedded	Juan Carlos Orellana
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