

**Flexible Services
Strategic Research Agenda
TIVIT**

**Finnish Strategic Centre for Science, Technology and Innovation:
for Information and Communications Technology (ICT) services,
businesses and technologies**

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Executive Summary

The **Flexible Services (FS)** is the **Strategic Research Agenda (SRA)** towards new service ecosystems that mobilizes a notable R&D effort of key industry, academic actors, SMEs and public agencies under the umbrella of the Finnish ICT-SHOK (Strategic Centre for Science, Technology and Innovation). It covers years 2008-2015. It boosts Finland's global competitiveness by developing internationally competitive ICT-based services and services architectures that promote flexible services interoperability. The FS has a short and simple breakthrough target; to create a **Web of Services**. This target provides strong motivation to Finnish and international collaboration of firms, universities, public agencies and user communities. It enhances globally competitive flexible service ecosystems which cooperate widely with global networks of ICT-related services and services architecture research, development and innovation (RDI).

The breakthrough target of Flexible Services (FS) SRA means that in year 2015 the programme has developed and put into practice a modular service infrastructure and related ICT-enablers, service functionalities and tools which leverages the growth in service business. User driven approaches, technologies, and context centric use cases are combined to create a set of tools and infrastructure components to form a platform for developing innovative services. These run across application areas and sectors; they are business-to-business, public and everyday life services for people. The breakthrough target benefits of wireless, mobile and Internet technologies and also of ubiquitous and ambient technologies that are socially and physically embedded everywhere in human life.

The multi-disciplinary research approach combined with business interest provides the amount of research cases needed for relevant assumptions for the research. Furthermore, it provides proof of the competences needed for service business ecosystems in the following areas: (1) **user experience and user context information** for personalized user-experience-based services production with (2) **underlying tools for services and technology interoperability** and (3) **underlying technologies such as ubiquitous and ambient technologies** for flexible services production.

In years 2008-2010, the main target is to identify the globally potential breakthrough services (per application area or sector) or services' combinations (across application areas or sectors) and their requirements on underlying service architectures and technologies. **From 2009 onwards**, the current application areas are broadened in order to generate, experiment, and scale up for new services, businesses, and SMEs with a potential for international growth. **From 2010 onwards**, the experimentation for rapid international market entry, scalability and cross-cultural user and developer community RDI is conducted through the major Finnish, European and global projects and networks for ICT-based services and business creation. **From 2013 onwards**, the RDI on international service-to-service interoperability and underlying technologies is conducted.

In addition, during 2008-2011, the interfaces with user and developer communities and the consequent methodologies to conduct user-centric and user-driven RDI in real-life contexts will be established. **In years 2011-2015** the user and developer community panels in Helsinki, Finland and Europe with global reach are established in terms of user interfaces, and real-life context RDI-methodologies and services for wide-scale user experience R&D for services innovations that has an impact also on underlying enabling technologies.

By 2015, the **ICT-related services and services architectures are a major growth engine for the Finnish economy that contributes more than 2/3 of the yearly growth of GDP.** The growth is an outcome of increased ICT-related services businesses in Finland as well as of increased exports of ICT-related services businesses from Finland. The part of the growth is based on productivity improvements with consequent process, institutional and structural changes in public and other services. The FS SRA has impact **globally in the ICT-development and take-up, especially in wireless, mobile and Internet technologies that facilitate services production** The Finnish firms in ICT industry have created a stronger local, European and global hold based on the FS-related open and flexible service ecosystems for new local and international business networks creation in ICT.

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1. INTRODUCTION

The **Flexible Services (FS) Strategic Research Agenda (SRA) of Tivit** provides the background, strategic goals, themes, and challenges for the ambitious work, which will be done in collaboration of business, academics, people, and public agencies. Flexible services are user and service centric and they are often build upon both networked ICT infrastructure and cross domain business ecosystems. Flexible services can to their nature be collaborative, ubiquitous, interoperable, context aware, profiled, adaptive and networked agnostic. They form a **Web of Services**.

The document updates the Flexible Services Strategic Research Agenda¹. It provides more insight into the positioning of the FS SRA and Programme in the programme external changes. It emphasizes the importance of experimentation in service creation and the need for several business focused approaches (projects) which are concretized in the FS Programme. Furthermore, the document describes the strategic guidelines giving direction and motivation for the concrete Flexible Services Programme and its projects.

The **Flexible Services (FS)** boosts Finland's global competitiveness by developing internationally competitive ICT-based services and services architectures that promote flexible services interoperability. The FS creates, through Finnish and international collaboration of firms, universities, public agencies and user communities, globally competitive Flexible Service ecosystems that cooperate widely with global networks of ICT-related services and services architecture research, development and innovation (RDI).

The FS strategic research agenda covers years 2008- 2015. It will be updated whenever strategic changes are needed in order to achieve the breakthrough target.

In 2015, the **Flexible Services has created** a globally well-recognized open innovation ecosystem for ICT-related services, business and technology development in Finland. It is demand and market-driven and deploys human-centric and user-driven RDI-methodologies, services, tools and processes. Thus, Flexible Services Programme has world-class capabilities to bring about new innovations and to renew market and industry dynamisms. **Flexible Services Programme provide an open, demand and user-driven innovation environment where modular ICT-based services and services architectures can be created, prototyped, tested, piloted, and validated even for rapid market entry and scalability over the global market place.** This means that **the Programme is widely globally connected in its RDI-activities**. It may also bring about understanding of growth and productivity of services and of new socio-economic, technological, and institutional mechanisms of value and wealth creation based on ICT, locally and globally.

The FS is services and business application oriented; it emphasizes the need for experimentation with a wide range of services and business models. This yields annually to **exploitable results** while simultaneously maintaining the **long term research consistency**. The research work will be **cost effective**, because well-managed, carefully planned execution process carries less failure and the industry and academia partners allocate the best resources available for the ICT SHOK activities.

In 2009-2015, the Finnish firms benefit of increasing growth in ICT-related new services business opportunities in Finland and from Finland internationally. The FS attracts also international firms, research institutes, public agencies, researchers and other parties to participate and invest in the international ICT-related services innovations RDI in and from Finland.

In this document, chapter 2 provides background for Flexible Services positioning. Chapter 3 describes the service economy vision for the year 2015. Chapter 4 describes the SRA-level breakthrough target, which is further concretized in the FS Programme. The strategic challenges in chapter 5 provide insight into aspects met when the FS programme is conducted. Flexible Service

¹ ICT SHOK Focus area Flexible Services "Towards value-added service ecosystems", Strategic Research Agenda 2.11.2007 ed. Pertti Hölttä Elisa, Lea Kutvonen HU

Ecosystem (chapter 6) with a roadmap and especially the competences needed for creation of ecosystems and strategic themes (chapter 7) are guidelines for project work. The importance of collaboration cannot be stressed enough and these topics are included into chapter 8, Modes of collaboration.

The Flexible Services Programme 2008 -2010 describes at concrete level how the Strategic Research Agenda is tackled at operative research and collaboration activities.

2. BACKGROUND

2.1 Global Growth of Services and ICT

The services sector² accounts for over 70 % of total employment and value added in OECD economies. It also accounts for almost all employment growth in the OECD area. This growth is based on ongoing structural changes; the share of industrial production in OECD countries is constantly diminishing. However, the productivity growth in services has been slow in many OECD countries. OECD countries are also confronted with the growing globalisation of services and manufacturing based of rapid technological change. In order to strengthen the potential of services, many measures are proposed to foster the employment, productivity, and innovation based on services sector. They are such as: (1) **Internationalisation of services markets** for new jobs, productivity, and innovation, (2) **wider take-up of modern ICT in services sector firms**, (3) investments in **research, development, and innovation (RDI) that address the importance of services innovation** and 4) **diffusion of services innovations to other industries**.

The growth potential provided by services is significant due to **digitalisation**.

Finland promotes services sector innovations³ in business, civil, citizen, and public services. They should benefit of user, customer and consumer approach. However, in Finland, the growth of services innovation and digitalisation needs to be seen in the wider context of globalisation of ICT.

Finland has been one of the leading countries in the world either in development or in take-up of modern ICT, especially in wireless and broadband technologies. In 2007, EU broad band rates vary from 35.6 % of inhabitants in Denmark to 7.6 in Bulgaria (US: 22.7 %, OECD). The leading countries in Europe 2007 were Denmark, Finland, Sweden, and Netherlands. However, IBM lists the top five wired nations in the world; they are Singapore, Denmark, Canada, Sweden, and US. IBM has taken into account the Information Society Index (ISI 2004) IDC's study that combines 15 variables in four infrastructure pillars (computers, the Internet, telecommunications and social factors) to calculate and rank each nations (53) ability to access and utilize information and communication technologies. It also considers the "E-readiness" based on several factors including e-business climate, Internet connectivity, penetration of hot spots, technology infrastructure and policy environment. The World Economic Forum (WEF, 2008) argues that Finland's position in ICT-global leadership is weakening; Finland is currently no 6.

The studies argue that Finland has underutilized benefits of the take-up of ICT, especially in public services, people's everyday life as well as in other sectors such as traditional industries. This may inform that we still underestimate human, social and productivity factors in service, business and technology development even though the National Knowledge Society Strategy 2007-2015 (2006) emphasizes the human-centric approach and need for productivity improvements in the development and take-up of ICT.

The studies (WEF) indicate that Finland is generally lacking in creation of new services and in bringing about new SMEs as well as in benefitting of public-private partnerships. We do not know how to take the real benefit out of networking between companies and public agencies in service

² Growth in Services: Fostering Employment, Productivity and Innovation (OECD, 2005)

³ About the Importance of Services Innovations, Confederation of Finnish Industries, EK (Kekkonen, 2006) and Finnish National Agency for Technology and Innovation (Ahola, 2006)

and business creation. Denmark's strong competitive position is based on high-level ICT-skills of all the people and public organizations, and on networking of firms, public sector, and people in work and everyday life. In Denmark, the public services are mostly transferred to the net and people are highly skilled to operate through the net.

Flexible Services (FS) SRA meets these challenges. It promotes open RDI networks and public-private partnerships that involve also people for services innovations. This brings together the RDI and take-up of ICT-related services and businesses. It assumes that services and services architecture innovations are also to bring about technological innovations. Consequently, the Finnish firms in ICT industry have an opportunity to create a stronger local, European and global hold based on the FS-related open and flexible service ecosystems for new local and international business network creation in ICT. This contributes strongly to the international business success of firms.

2.2 European Policies on ICT-related Service and Technology Development

The European ICT strategy for global competitiveness and innovation, based on renewed Lisbon Strategy (2008) and i2010 policy (2007), argues that Europe may still be a global stronghold in ICT. However, it should reinforce private and public investments in ICT-related research, development and innovation (RDI), pool the resources better and to stimulate the uptake and best use of ICT.

The i2010 policy aims at boosting a **European-wide Information Space** that is a high-capacity and easy-to-access for anybody at any time and anywhere broad band. That is an all-empowered Future Internet that is an outcome of convergence of different ICT, media, and other technologies, including the ubiquitous technologies that are embedded in social and physical structures and processes and provide opportunities for ambient living and smart spaces – let them be homes, offices or public spaces. European Technology Platforms (ETPs) and Joint Technology Initiatives (JTIs) help the industry to join their forces towards these directions; among others Artemis is a JTI for embedded technologies, eMobility for wireless technologies and Nessi for service-related ICT. Finland invests among others in Artemis (JTI) and ubiquitous technologies.

The European Information Space promotes inclusion of all the citizens into ICT-related human, education, media, financial, culture, entertainment or other services, including the public services such as healthcare, and sustainable social and environmental development, including the energy efficiency. This is promoted with the concept of a European-wide universal service platform. It emphasizes cross-border service and business creation and interoperability. Through these measures, Europe aims at creating a Single European Market for ICT-related services, businesses and technologies.

EU promotes also **opening of public services for RDI**. The public services comprise more than 1/3 of GDP in Europe; consequently even 2-7% of public spending would create a major boost worth of billions for RDI-activities in Europe. The public investments of China and India in ICT are currently very significant which attracts firms to move their RDI and other activities to Asia.

With European-wide Information Space, Universal Service Platform and opening of public services for ICT-related RDI, EU aims at promoting **Global Lead Market development through ICT in Europe**. Europe should allocate in a focused way its RDI resources and activities into some domains of ICT-related services where the global leadership can be achieved and maintained.

It has been widely argued that the **transformative power of modern ICT** in the development of knowledge and innovation-based societies is still yet to come. It changes the ways of working, doing business, managing and administrating, as well as ways of participating in social, societal and political life. All of this has a major impact on the ways of how our modern societies and economies operate – and on our people's wellbeing and quality of life.

Finland has a strong potential to benefit of the transformative power of ICT in corporate, public and “consumer” services alike. This can be done based on Finland’s global profile as a competitive, human-centric, networked, digitalized, high-performance, ubiquitous and globalised knowledge and service-based economy that promotes quality of life, sustainable development, new forms of wellbeing, and value and wealth creation that take care of nature and human life.

FS SRA takes into account the opportunity that Finland can take the lead in some focused services and services architecture–related RDI in some focused services and business areas, in Europe and globally. The FS SRA invites the relevant European and global players to cooperate in the FS services and services architecture RDI in Finland, and from Finland in Europe and globally.

2.3 Finnish Innovation Policy

Flexible Services Strategic Agenda follows the Finnish Innovation Policy. In spring 2008, Finland announces⁴ its **new innovation policy that emphasizes the importance of services innovation and creation of entrepreneurship and growth firms**. Besides services innovations, **the new innovation policy emphasizes the demand and market-driven approach to innovations**. There is a need for competitive incentives that make the players combine the outcomes of science and technology with the demand, market, and user needs. The innovation policy also promotes new forms of public-private partnerships that involve people. However, there is the need for **new institutional, funding, and other competitive incentives and instrumentation for demand, market and user-driven research, development and innovation (RDI)**. This means also new forms to organize, manage, and govern for RDI. **The competitive incentives relate among others to (1) involvement of user communities, (2) benefiting of Living Labs methodology, (3) having VC (Venture Capital) and user tax incentives, (4) deploying green procurement, (5) opening public services for R&D and innovation which brings about (6) innovative public services. There is also a need for (7) new standards, norms and regulation.**

The Finnish innovation policy recognizes also the need for **horizontal ways to conduct R&D for innovation**. Especially the services need business models and services architectures that recognize the horizontal network structures and processes through which the services are produced and delivered.

2.4 Strategic Centres for Science, Technology and Innovation

The Finnish National Agency for Technology and Innovation (Tekes) and the Academy of Finland (SA) view that in addition to the Strategic Centres for Science, Technology and Innovation (SHOK) cooperating with each other also **international partners could be involved in the collaborative research**. Strategic Centres may also be instruments for **domestic and international technology transfer**. Through cross-industrial and international cooperation the complementary new elements for ICT-related services, businesses and technology development may be accessed and created.

During 2008-2015, the FS SRA creates a **Flexible Services ecosystems based on the needs of the application areas**. **The Flexible Services ecosystems** in Finland are globally well-recognized open innovation ecosystems for ICT-related services, business and technology development operating in Finland. They have world-class capabilities to bring about new services and services architecture innovations and to renew the consequent market and industry dynamisms. **Flexible Services ecosystems are open innovation environments where ICT-based services and services architectures can be created, prototyped, tested, piloted and validated even for rapid market entry and scalability over the global market place.**

⁴ Peltonen, Petri (2008): Towards the next generation innovation policy, Director General of Ministry for Economic Affairs in the conference on Mobilizing Knowledge: Towards The Next Generation Innovation Policy in Espoo Dipoli in January 29, 2008

This takes place in cooperation of firms, public agencies, universities, research institutes and researchers in a way that people as users of services are involved in the whole process of RDI. In order to become internationally competitive, the FS will be widely connected to European and global firms, universities, research institutes and researchers in RDI that relates to ICT – services, businesses and technologies.

3. VISION

The programme is based on the vision that in the year 2015 we live in a service economy with more networked, communication, and knowledge-intensive society providing adaptive and trustworthy services. The Flexible Services Programme will boost business in the ICT market allowing a notable share of the national income to be derived from ICT-based services and especially from ICT-based networked business on a global arena.

The transition to a service oriented economy requires a number of major transition steps to be taken in the service producing ecosystems:

- change in the nature of business processes due to the new possibilities created by ICT support and ubiquitous facilities for accessing services, and the new challenges rising from regulative, contractual, and socio-economical aspects of globalisation of business
- change in the user (or customer) role in the processes of systemic service creation, service use, service collaboration management, and feedback of service usability and business value
- moving towards flexible, competitive services and service ecosystems that inherently support interoperability, service lifecycle, and collaborative business.

As a consequence of these transitions, we will witness new rules and business dynamism. The new business network models can be flexibly defined and taken in use. Furthermore, the investment structures do change. The users invest effort and information to the services they use, and the users adopt self-service processes. All this means that totally new ICT enabled cross sectorial business networks are emerging offering new business opportunities for actors of these value networks.

The vision of Finland as a strong competitor on the global arena as a developer of service ecosystems is in alignment with “The National Knowledge Society Strategy 2007-2015” supporting the transformation of Finland into an internationally attractive, human-centric and competitive knowledge and service society. The Flexible Services SRA is thus very plausible and provides good motivation for an ambitious breakthrough target.

4. BREAKTHROUGH TARGET

The breakthrough target of Flexible Services (FS) SRA is to develop and put into practice a modular service infrastructure and related ICT-enablers, service functionalities and tools which leverages the growth in service business. That can shortly be described as a Web of Services. User driven approaches, technologies, and context centric use cases are combined to create a set of tools and infrastructure components to form a platform for developing innovative services. FS aims at development of leading competencies and creation of new cross-domain global business networks that generate new services and businesses and bring about new elements into ICT- technology development. These run across application areas and sectors; they are business-to-business, public and everyday life services for people. The breakthrough target benefits of wireless, mobile and Internet technologies and also of ubiquitous and ambient technologies that are socially and physically embedded everywhere in human life. FS may provide crucial stimulus for creation of Future Internet.

Personalized mobile webX.0 services and collaborative service architectures are designed to **combine (1) user experience and user contexts information** for personalized user-experience-

based services production with (2) **underlying tools for services and technology interoperability** and (3) **underlying technologies such as ubiquitous and ambient technologies** for flexible services production, including Future Internet

Parallel to personalized services RDI, the experimentation for open and flexible services architecture and services ecosystem creation takes place.

By 2015, the **ICT-related services and services architectures are a major growth engine for the Finnish economy that contributes more than 2/3 of the yearly growth of GDP.**

In 2015, Finland is a **globalised service and knowledge-based economy that is strongly networked, communication and knowledge-intensive and benefits of flexible, adaptive and trustworthy services.** A notable share of the national income is derived from ICT-based services. The share of ICT-enabled networked international services and businesses is rapidly increasing and provides opportunities for scaling up the developed services and businesses onto the global market place.

The FS SRA breakthrough target will be discussed in the Flexible Services Programme from the research focus area and concrete projects point of view.

5. STRATEGIC CHALLENGES

The breakthrough target, strategic SRA, and ways to conduct RDI through wide networks of open, flexible services ecosystems pose among others the following strategic challenges:

- moving in services and services architecture creation **from vertical business domains to horizontal networked open services domains** changes ways of conducting and measuring of success of RDI activities
- identifying the **new emerging services and services interoperability factors that reside rather at the horizontal interfaces** raises requirements for the collaboration, cost sharing and clear IPR rules.
- conducting R&D for service innovations through **new Internet-based paradigms together with the Finnish skills set on mobility** promote the need for new set of activities, means, and metrics.
- developing **key enablers of services infrastructure and common services architectures that is matching service creation methods and tools**
- creating **new ways of gaining user & customer experience knowledge from real-life contexts and getting the users involved and mobilized in co-creation and co-innovation for services creation**
- **deploying flexible, effective and agile research, development and innovation methods in Living Labs- type environments that take into account also the social and institutional processes** involved in the development and adoption of new services – the challenge of **multi-methodological RDI**
- creating strong, sustainable and beneficial **RDI-cooperation with foreign firms, universities, research organizations and other players** that work in the field of ICT-related digitalised services, services architecture and services ecosystem creation (Digital Business/ICT)
- developing **world-class competences leading to a globally successful and networked flexible services, businesses networks and ecosystems**
- knowing how to **apply the created competences in order to define, modify, and benefit of created services architectures and ecosystems on selected service domains of global importance**

- having an **impact on education curriculums to maintain and enhance globally competitive skills for the future needs related to the RDI for services productivity and innovations in Finland.**

In addition, there is a challenge of providing **an integrated view and methodology of how to conduct RDI for modern services and service platforms in a way that benefits of demand, market, human and user-driven approach about the functionalities needed for service-to-service interoperability.** This may help also to construct machine-to-machine interoperability that reflects the qualities of service-to-service interoperability. FS has also developed a methodology of how to conduct RDI that provides an integrative approach across all the FS SRAs.

The demand, market, human and user-based integrative approach of productivity, efficiency, mass customization, personification, confidentiality and other functionalities has an impact across the four layers: (1) services and business models that are developed based on demand, markets, and user-driven RDI, (2) service-to-service architectures that reflect demand-driven, human and user-centric understanding of services interoperability, and (3) consequent machine-to-machine interoperability including ubiquitous, ambient and socially and physically embedded technologies as well as (4) the underlying functionalities of Future Internet that meet the above-mentioned qualities.

The strategic challenges in mind, the Flexible Service strategy targets to create and put into practice globally well-recognized open innovation ecosystems for ICT-related services, business, and technology development operating in Finland. FS will have globally competitive capabilities to bring about new services and services architecture innovations and to renew the consequent market and industry dynamisms. As outcome the ICT-based services and services architectures can be created, prototyped, tested, piloted and validated even for rapid market entry and scalability over the global market place.

By 2015, the world-class research has been conducted on socio-techno-economic, structural and institutional changes caused by ICT-based globalization, digitalization and adoption of new ICT-related services and technologies. This may include issues of new sustainable forms of production and consumption patterns, multiculturalism and new mechanisms of value and wealth creation based on ICT, locally and globally.

6. FLEXIBLE SERVICES ECOSYSTEMS

6.1 Players of Ecosystem

The Flexible Service provides an open and flexible RDI ecosystem for ICT services and services architecture development that takes place in collaboration of companies, public agencies and academics. FS stands for sustainable competences to co-create, co-design, co-innovate and co-produce internationally competitive services through means of business-to-business and public-private cooperation that also involves users, developers, citizens and other people citizens as co-innovators. FS provides a context and processes that provide means, methodologies, services, expertise and experiences for and about open, human-centric, user-driven and user-centric RDI-methodology development, including related tools and services.

FS involves in a multidisciplinary way the players for world-class RDI in services business: ICT - operators, service providers, IT service providers, platform and software modules developers, applications developers, media companies and organizations, content and information providers, research institutes and universities. This includes collaboration of businesses, public sector organizations, industry forums, standardisation forums and user and customer communities etc.

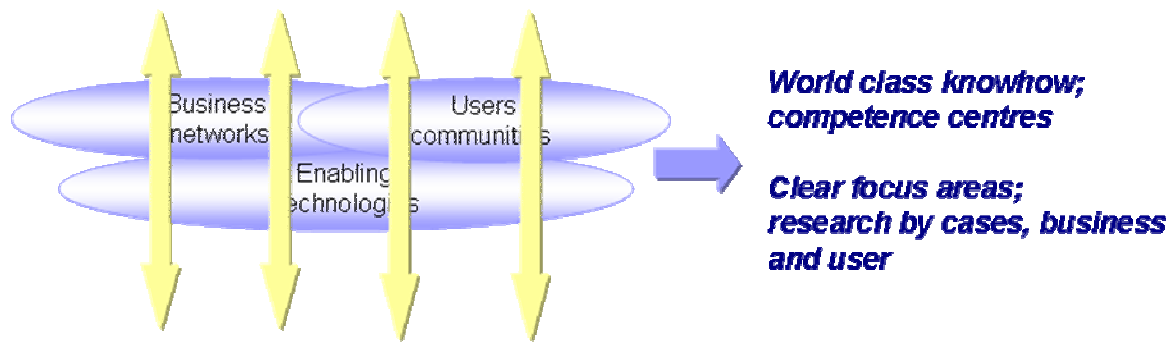


Figure 1: Basic elements of Flexible Services

6.2 World-class Competences of ecosystem

FS creates new services and services architectures through vertical application areas such as social and participative media services, location services based on ubiquitous environment and services for environmentally sustainable development and energy efficiency, real-time financial transaction, funding and banking services, life management services and services based on mobility in intelligent traffic. For FS, the ecosystems provide a set of world-class competences to conduct flexible services and services architecture development (1) with user and developer communities, (2) within Finnish and international business networks based on underlying (3) enabling technologies (Figure 1).

6.3 Flexible Services as Enabling Technologies

Flexible Services benefit of conscious shared efforts of bringing Finland to be one of the global hot spots for ICT-related RDI in services, businesses and technology development. This is done by (1) developing modular and flexible services architectures with enabling network, interface and collaborative technologies that provide flexible service interoperability, reliability, confidentiality, openness, variability, trust, means of minimizing risks as well as efficiency of experimentation and venturing with many services and business models at the same time within many RDI-networks. FS's service-to-service architecture (with collaborative technologies) work provides underlying service architecture with relevant enabling technologies. FS also develops open, human and user-driven RDI methodologies, tools and services with which the services creation can take place in real-life contexts with users. This constitutes the service-centric, networked and modular ICT infrastructure that provides additional technology-related and modular Flexible Services. This is run on top of the existing distribution and computing platforms.

The FES includes among others enabling intelligent service discovery, matchmaking, and orchestration functionalities; as well as interoperability and collaboration management functionalities. It is also capable to support of collaboration between public, private and user domains on services innovations and services creation. There is a possibility to create and use services independent of time and location based on multi-channel services delivery and mobile services usage, and targeted and interactive media services.

The FES mirrors the RDI activities of service processes and working processes (such as e-commerce, e-health, e-learning etc.). It also reflects processes and methods of services and business model and software creation. It may also help to adapt ICT-based services and contents to the user needs or qualities and functionalities based on contexts. FES is needed for creation and changes of adaptive and networked, cross-domain business scenarios that further deploy ICT-supported services and for services innovations through new internet based paradigms based on mobility.

6.4 Competences for Ecosystem Creation

The development and maintaining of a flexible and open service ecosystem for world-class ICT-related services, business and technology innovations is a challenging task. That task needs its ecosystem specific competences. These relate especially to ecosystem creation for demand and market-driven, human and user- and customer-centric services creation, based on ubiquitous service access and services infrastructures.

The following necessary competences have been identified: (1) ecosystem and architecture design, (2) multidisciplinary service design, (3) service lifecycle management, including adaptability and personification, (4) means of user-involvement in service life cycles, (5) interoperability and (6) collaboration management as well as understanding of (7) regulatory, IPR, contractual, socio-economic and organisation, management and governance aspects of open business networks for RDI (Figure 2).

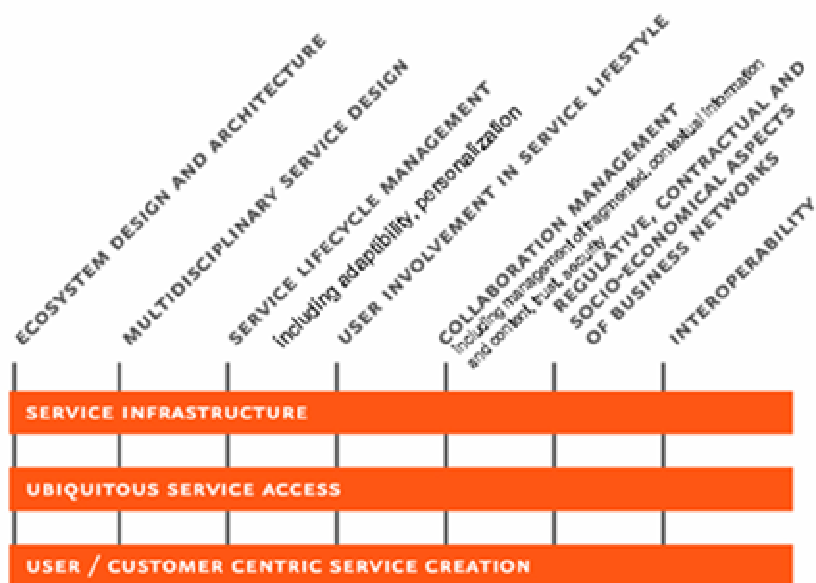


Figure 2: Competences needed for Flexible Service ecosystems

1) *Multidisciplinary service design*

Creating service concepts and services for the Flexible Services ecosystems. The properties to be addressed must be derived from multiple research disciplines, including aspects of business, economy, psychology, social sciences, computer science, and software engineering. The properties shall be relevant for systemic service creation, user experience, service lifecycle management, collaboration management, and facilitate interoperability and sustainability.

2) *Service lifecycle management*

Creating tools and supporting services to complete the lifecycle management of services on the following areas: a) systemic service creation b) use and configuration, including adoption to multi-channel access, user preferences, and context; c) feedback on usability, and business value. An essential challenge is to identify the relevant non-functional aspects to be managed on standalone services, and on collaboratively produced services.

3) *User involvement in service lifecycle*

Involving users, customers and the actors of specific service domains to the systemic service creation process, to the adaptation of services when used, and validation of service usability. The

methods of involvement, needs for adaptation and criteria for validation are aspects with significant effect on the service markets.

4) Collaboration management

Composing services to loosely-coupled business networks governed by contracts. The management facilities involve service selection, orchestration or choreography control, breach detection and management, feedback collection for business value and management of fragmented content and information. Infrastructure support on these questions is relevant theme on service-oriented computing approaches, while open challenges involve for example trust. In open service ecosystems, methods for establishing and maintaining reputation-based trust relationships are essential.

5) Interoperability

Interoperability means effective capability of mutual communication of information, proposals and commitments, requests and results. It covers technical, semantic and pragmatic interoperability. Technical interoperability means that messages can be transported from one application to another, as well as addresses service roaming and multi-access services. Semantic interoperability means that the message content becomes understood in the same way by the senders and the receivers. This may require transformations of information representation or messaging sequences. Finally, the pragmatic interoperability captures the willingness of partners for the actions necessary for the collaboration. The willingness to participate involves both capability of performing a requested action, and policies dictating whether the potential action is preferable for the enterprise to be involved in. For these purposes, it is essential to create a service design architecture against which the so called non-functional aspects can be defined, such as quality of service, privacy needs, and business rules.

6) Regulatory, contractual, and socio-economical aspects of business networks

Facilitating the evolution and creation of business models and business networks in such a way that regulations, contractual requirements, and socio-economical principles are covered. Such principles require for example cultural neutrality of business models; it that way global collaboration is possible, with localization to the user culture or regulatory system. Especially information management, or information as a service, should be analyzed and evolved through the requirements of the business models. Another important challenge is to provide facilities to guarantee privacy in service use and collaborations

6.5 Ecosystem Dynamism: Road Map Evolving through Experimentation

FS starts in June 2008 with the first research areas and projects. The Flexible Service Programme provides a description of the work planned and the partners included into to work.

In years 2008-2010, the main target is to identify the globally potential breakthrough services (per application area or sector) or services' combinations (across application areas or sectors) and their requirements on underlying service architectures and technologies. **From 2009 onwards**, the current application areas are broadened in order to have a strong enough services ecosystem to generate, experiment, and scale up on sustainable basis for new services, businesses and SMEs that have a potential for international growth and global market place. **From 2010 onwards**, the experimentation for rapid international market entry, scalability and cross-cultural user and developer community RDI is executed through the major Finnish, European and global projects and networks for ICT-based services and business creation. **From 2013 onwards**, the RDI on international service-to-service interoperability and consequent underlying technologies is conducted.

In addition, during 2008-2011, the interfaces with user and developer communities and the consequent methodologies to conduct user-centric and user-driven RDI will be established. **In**

years 2011-2015 the user and developer community panels in Helsinki, Finland and Europe are established in terms of user interfaces, RDI-methodologies for wide-scale user experience R&D for services innovations as well as underlying enabling technologies.

FS deploys a cascade model where the magnitude of experimentation grows parallel to already ongoing projects in time. That is why the Road Map describes only the emphasis of the FS RDI operation within certain period of time.

FS foresees the continuous change of service ecosystems thus having moving targets. The FS will tackle these challenges by following a step-by-step progress in an iterative way in the domains of business networks, users and user communities, and ecosystem enabling ICT-technologies.

The FS is a living entity that changes over time its constellation of partners, experimentation focus, mode of operation, network structure, including local, application area-specific, international and global networks of firms, universities, people, cities and public agencies. However, the very core may remain the same: **FS as an ecosystem is thus a dynamic constellation for collaboration in ICT-related services and services architecture R&D for innovation. It operates in Finland and aims at promoting services innovations that are globally competitive.**

7. STRATEGIC THEMES

The FS program **defines and puts into practice** the enablers to **create flexible services ecosystems**, where **business, open service platforms** and **user and customer involvement** meet to make Finland the leader in service innovation, production, and experimentation.

R&D work of Flexible Services focuses at the first phase on **three main strategic themes**: (1) **Service Infrastructure** that is about architectural and process design and common service space to address, (2) **Ubiquitous access to services; exploiting the Finnish strengths and competences on** that is about mobile and ubiquitous technologies, and aims at enabling entirely new ways for service use. and (3) **User and Customer centric Service Creation** that involves the users and user groups, service providers, operators and applications developers in order to gather empirical and experience-based data about user cases.

7.1 Strategic Theme 1: Services Infrastructure

This theme is included into the projects and activities which aim to research, specification, implementation, and deployment of service oriented ICT infrastructure, tools and common services.

Expected outcomes from this theme at Flexible Services Programme level include:

- definition of the overall architecture and its networked computing facilities
- definition of a common architecture for services as artefacts using the input from other themes and disciplines;
- realisation of commonly accessible basic services suitable for general use (such as billing, certification);
- creation of service-oriented software methodologies and tools to be used in the systemic service creation.

Several challenges are involved, such as overcoming:

- A. **barriers to interoperability across organisational boundaries** addressing technical, semantic, pragmatic levels of interoperability. This includes regulatory and privacy restrictions on sharing information and willingness to provide service under the threat of loss of control over information, processes, intellectual property, privacy, business opportunities, reputation, or privacy.

- B. **technological challenges to adaptability.** This includes selecting collaborating parties, and configuring services based on the user preferences, context, and multi-channel access methods.
- C. **need to support sustainability, dependability and ease of use of services by tools and structures** that are relevant for user experience, business logic, and socio-economical principles. These aspects enhance the control of services beyond the traditional quality of service aspects to a wider set of non-functional properties.
- D. **need for service-oriented software engineering processes, tool and design aspects.**
- E. **need for collaboration management facilities that address the needs of networked, fragmented business, especially including:**
 - o issues on trust, such as trust and reputation systems, single sign-on, anti-spam and anti-virus solutions, privacy properties, and trusted systems like micropayments and mobile payments.
 - o management of fragmented information on areas of context awareness, semantic web, mobile search and web services.
 - o good quality metadata (and in more general semantic web technologies) is a critical success factor for creating new services and improving access to the media content. It also has an important effect on the way media content will be used. Different methods for gathering, filtering and exploiting metadata should be studied.
 - o scalable servers and wireless environments.

The solutions provided by projects under this theme should create a mature, evolving base of ICT support for businesses and customers to create innovative business processes and services, creating especially information-intensive digital services. Digital services are often associated with process improvements in enterprises, and can thus significantly improve the business productivity and efficiency (for example, banking service met 10-fold improvement in 1990-2005, and travel agencies have benefited remarkably from the use of Web). Other areas where significant improvements are to be expected are governmental services, hospitals, open health services, marketing and payment management, logistics and traffic, private-domain services.

7.2 Strategic Theme 2: Ubiquitous Access to Services

This theme aims at preparing and enabling entirely new ways of action and service use in the everyday life of people. Finnish strengths and competences on mobile and ubiquitous technologies can be put in use on this area. However, care has to be taken to allow flexible integration of services to a meaningful whole over the multiplicity of applications for different user roles simultaneously in effect. The future vision for Internet services should become context-aware, adaptive and personalized. In addition, they need to be run, in a reasonable and secure manner, on variety of execution environments: anywhere, anyhow, anytime, and by anyone.

The Flexible Services provides a world class environment where it is easy to innovate and try new services. Flexible Services will concentrate on cases where mobility will bring enhanced value to the customers –superior compared to pure fixed Internet experience.

The expected outcomes from this theme at Flexible Services Programme level are services for mobile devices that bring their users a full Internet experience. Flexible Services wants to repeat the Finnish success story of mobile voice enhancing it to Internet services. Strong mobility understanding is the basic competence we are relying on but lot of new “Internet Thinking” is needed to make this a big success.

The work will be based on existing knowledge on mobility, sensing, mobile internet protocols, and mass service customization via operators.

To guarantee superior user experience new value adding enablers are developed. These enablers include new technologies and algorithms to context and location based services, data intensive services and ubiquitous services. The concrete research aspects are related to different projects

and described in Flexible Services programme document. However, in each of these the user experience is taken into account: usability, ubiquitous service user interfaces, trust, privacy and security, adaptability and context awareness, user generated content.

7.3 Strategic Theme 3: User and Customer-driven Service Creation

The key research question in this theme is “How to design and realise a service to meet user and customer needs?”. This involves:

- understanding user and customer behaviour, needs and service usage both in qualitative and quantitative measures;
- emerging business logics and models for socially and culturally driven global economy;
- promotion of user and customer engagement to the service (biz model) and its development through the service lifecycle;
- understanding how the different elements of the service, such as the equipment, location and context, social environment and the context of other services used simultaneously, affect the user experience and the service requirements.

These questions can be approached using the disciplines of user and community research, user-centric design principles and requirements engineering. However, this SRA facilitates collaboration of Research, Development and Innovation in a unique way and allows a multidisciplinary approach involving for example human and social sciences, computer science, software engineering, services sciences, organisation and management sciences, sciences on sustainable and socio-economic development, and network economics.

This approach can be applied by launching a number of very different innovative trials and observing them in Living Lab style. In the creation, and testing of flexible services the ecosystems will eventually take a role of a hub that connects between multiple Living Labs for larger scale pioneering cases, and providing ecosystem infrastructure services. The Finnish society is very competent to take an active role in organizing Test Beds in collaboration with developing countries, to create really Global Test Beds, or Living Labs.

The creation of Flexible Services necessitates that in addition to the multidisciplinary R&D where there is active collaboration between different lines of businesses, public organizations and users/customers to understand the needs and hurdles driving for digital services.

The business ecosystem actors are given opportunities for global and scalable business development by contributing in creation of a service and collaboration platform for the ecosystem and creating new service enablers for cross-sector ICT deployment. Public-private collaboration and partnership is an important driving force for ICT based service deployment (e.g. e-government, e-health, e-learning, environmental information) and shall support this development. Among other actors on the field, users of the service are taken as true innovators and creators of services. While this development will rise Finland as a global test bed for ICT based service innovations it moreover accelerates the development of new business and public ICT based services with public-private collaboration. In addition, it increases interoperability and service roaming between different technology and service domain.

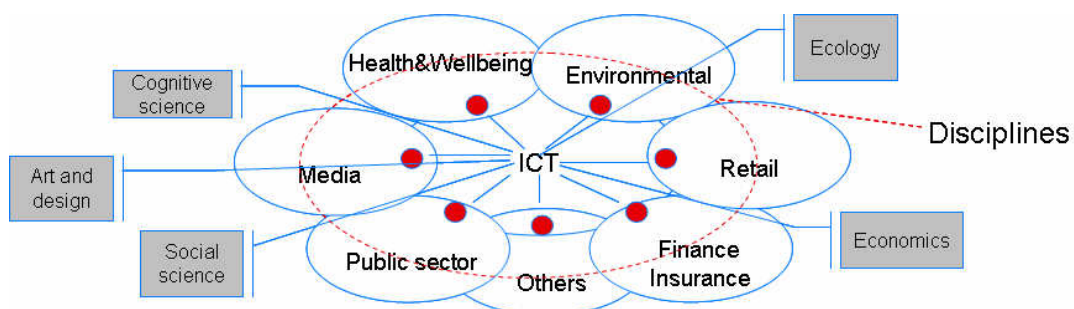


Figure 3: Multidisciplinary R&D collaboration

The expected outcomes from this theme at Flexible Service Programme include:

- creation of new pioneer services and changed value chains (value webs) that benefit or become enabled by the Flexible Services
- new service design principles that cover technical, human, socio-economical etc viewpoints
- methods for service modelling and mass-customization,
- open service models;
- practices for user involvement in service innovation and development;
- new research methods for analysing effect of the new methods and practices;
- measurement and analysis of business and service success factors, such as measurements of mobile service adoption;
- feedback on the success of the ecosystem practices and infrastructure;
- identification of challenges for laws on the areas of privacy and data protection and management of intellectual property rights (IPR). The growing number of privacy issues on the open service markets and ad-hoc collaborations pose a challenge to the privacy and data protection law. Similarly, the copyright and patent systems do not address intangible services properly, not digital rights management (DRM). Furthermore, effects on the consumer protection law are to be expected.

Each Research Area and project included into the Flexible Services Programme contributes to all three strategic theme in several ways.

7.4 Concrete Outcomes of Program

The concrete outcomes of the FS program are such as:

- **Roadmaps.** A variety of different kind of short term, mid term and long term roadmaps to cover the life cycle of FS
- A **sufficient and coherent set of Services** that allow the flexible and dynamic discovery, selection, composition, substitution and monitoring of services.
- **Ontologies** in order to ensure interoperability of services and Service Ecosystem infrastructure services on various application domains and to allow continued evolution of new domains and business domains.
- **Requirements, methods and tools for management of security and trust** in the Flexible Services.
- **Service concepts and specifications for business implementations; new business models.**
- **New methods and tools** for service creation involving customers and users; these methods are fundamentally different from traditional software engineering disciplines.
- **Service pilots and feedback from users and other stakeholders.**

The early phases of the SRA work must establish the Flexible services enablers, architecture and infrastructure specifications, addressing the relevant interfaces and allowing a development roadmap for new innovations on the practices and for further maturing the architecture in terms of quality properties. This includes also the evaluation and use of internet based methods.

Information, content and software as service addresses the use of fragmented, contextual information and innovative models for creating sources of data, processing it in value-adding

business networks, and providing more complex outcomes to different audiences. This area forms an important case within the other new business models; on this area the Finnish research community has world-class knowledge in data mining and other disciplines.

Pilots and testimonies for business networks and personalised mobile services include the major outcomes from the project relating to piloting and experimenting with the users and customers.

Global R&D networks relate to the building up with the relationships and collaboration with leading edge R&D groups on the field, and membership in a majority of leading international communities. These include e.g. the NESSI (Networked European Software and Services Initiative), the NEM (Networked and Electronic Media), eMobility, SoCoNet (Society of Collaborative Networks), Digital Business Ecosystems in EU FP7 and leading edge universities on Service Science.

Practices for user and customer involvement opens up the ICT supported services for adaptability, context-awareness, personalisation, and cultural and regulatory considerations. Understanding the potential on this area requires studies on the fields of service sciences, economy, business models, psychology, and others.

The tools for systemic service creation must adopt the results from the new practices, and also, support service creation practices by using the ecosystem infrastructure and services.

The new business models and practices are envisioned to mature in three phases. The first phase is open for early breakthrough models that can be exploited particularly on the existing ICT facilities. The established practices will provide tools and analysis methods for understanding the quality of the business models. For example, the early trials will need revisions in terms of separating the culturally neutral business processes and the localisation aspects used, before the business model can be placed on the global markets. Furthermore, the established practices phase should provide understanding of the correct metrics for measuring the success of a business model, usability of the services, and providing tools for analysing the collaboration and service models in this respect.

The success on the Flexible Services Strategic Agenda itself can be monitored e.g. with the following metrics:

- Global success; e.g. mobile web 2.x mass service
- Commercial profitability achieved by exploiting the developed solutions
- Agility to create new service innovations
- Accessibility to services with ubiquitous mobile devices
- Standardized service interfaces and methods of service usage
- Roaming of services between different domains
- The level of automatization of the service process and the grade of self service through e-services channels
- The presumed increase of the productivity
- Impact to the regulatory framework to allow the changes in the society
- Ease of use and excellent user experience through well managed user interactions and user research
- The amount of the users and the time of usage of new services
- The interest amongst the top ranking international R&D actors to join the Flexible Services Programme
- The number of new type of business opportunities or earning logics to be created
- Publicity

- Creation of education programs on the field

The strategic agenda for Flexible Services will be up-dated if needed in order to add to the programme those critical research domains which:

- add value to the competences important to reach the breakthrough target
- add business aspects providing new insight into the research add value to the horizontal themes

8. CONCLUSIONS

8.1 Modes of Collaboration

Going beyond the state-of-the-art enhances the leading position of Finnish companies and academic. The FS SRA tackles these challenges by following a step-by-step progress in an iterative way in the domains of business networks, users and user communities, and ecosystem enabling ICT-technologies. The Flexible Services Programme follows several kinds of research methods and approaches in the projects towards the breakthrough targets.

The collaboration provides us opportunity to learn to manage, organize, orchestrate and redefine, modify, and benefit of dynamic evolution of services and services architecture innovations as well as of emerging open and innovative flexible services ecosystems.

The short rhythms as working periods and periods for evaluating the progress of Research Areas and projects are combined with mid and long term targets. This increases opportunities for knowledge sharing and learning of continuous user experimentation. This is very important for the iterative work. The multidisciplinary approach followed helps to spread the knowledge between different theoretical discourses, and thus expands the perspective and cognitive boundaries for innovation.

However, the spread of innovations is business-driven and requires clear business owner in order to reach success. The Flexible Services program approach frames the gap between theory and practice, the distinct kind of knowledge contributing in a significant way to breakthrough results in both these domains.

The Flexibles Services programme includes an ecosystem of research activities in different research areas, which contribute to the strategic objectives of the Flexible Services SRA. The work is visible in projects in each of these RA:s. The Flexible Services takes both horizontal and vertical approaches to the Flexible Services and service related ecosystems. The vertical approach is related to business aspects and horizontal approach is related to generalised knowledge providing thus a path for leveraging and exploiting the understanding and learning to all projects included in the Flexible Services Research programme. This structure follows the Strategic Research Agenda guidelines and is defined accordingly.

The success factors of the work are related to the business aspects, and business targets driven approaches. Therefore, the business related project themes provide the core and data for the work. The benefits for actors come through the novelty of individual services and their user acceptance, learning, knowledge transfer and options for new business.

The success of future services depends on how well we understand the changes in the use context of the services, user needs and experience affecting the adaptation of new services. In order to understand this, the co-operation with business related projects are needed. The user involvement provides feedback on the success of services, and ways of delivering the digital services over multiple types of technology.

User involvement aspects provide multiple ways of delivering the digital services over multiple types of technology. The Flexible Services Research Agenda addresses themes on adaptive, trusted service infrastructure. In addition, it research adequate, easy-to-use management tools enabling competitive maintenance of the business ecosystems.

The new innovations do not mean only entirely new patents, or technology solutions. The new innovations are created in the interfaces of different kind of insights, providing new kind of combinations of technology, services/applications, new methods and working processes. As a result of the work the new competences created provide opportunities for world class position, e.g., in mobile financial services, environmental information services, user/business driven trials and tests in service creation.

All new innovations have a life cycle, from the idea level to the final market launch. It is valuable to recognise the differences between the lifecycles in different kind of businesses. The collaborative way of working can decrease the risk of technology development in the business driven research cases, the verticals. The used aspects can decrease the commercial uncertainty. Together they can shorten the time from idea to markets.

8.2 International Collaboration and Impact

In order to become internationally competitive, the FSs should become widely connected to European and global firms, universities, research institutes and researchers in RDI that relates to ICT- services, businesses and technologies. **FS operates among others through Tekes, university, corporate and other international networks in Europe, at Berkeley, Stanford and MIT in US and in science, technology and business parks in China (Beijing, Sanghai), India (Bangalore), South Africa, Brazil and Japan.**

The FS Programme has an impact on national and international level on ICT-related services and services architecture innovations. It improves the global competitiveness of Finnish firms and economy. However, it has also an impact on improved collaboration of Finnish and international firms, universities, public agencies and research institutes in RDI where business development related RDI of firms is in close interaction with science and basic and applied research-related RDI of universities and research institutes. Moreover, the new forms of public-private partnerships with public agencies and people, where the ICT-related services innovations are off-springs of opening of RDI in public services, enrich and improve even more players' world-class competence of collaborative ways to conduct RDI for services innovations.

On the international level, the programme has impact on the position of Finland in the ICT-related RDI communities. This paves the way for new businesses as well. The international impact will be reach by:

- creating links between the research communities in different universities, innovation ecosystems, research institutes and business and sciences parks in the main focus areas, collaborating in international research projects
- attracting world-class research institutes, researchers and the R&D units of international firms to join the FS operation in Finland and invest in RDI in ICT in Finland.
- participating in international networks of RDI, such as the European Network of Living Labs (ENoLL) that plan to establish a European User and Developer Panel for RDI in ICT-related services and businesses.

The programme will also have impact on the policy level instruments. European policies on ICT-related services and technology development may benefit of Finnish experiences. The demand, market and user-driven approach adopted by FS may also contribute to the European Technology Platforms (ETPs) such as Artemis, eMobility and Nessi. The FS Program may even contribute to standardization, norms and regulation in the field.

Moreover, the new Finnish Innovation Policy that emphasizes demand, market and user-driven services innovations may benefit of experiences derived through FS program experiences. They may be used in developing new competitive incentives for organizing, managing, governing, funding and regulating the demand open and user-driven RDI for ICT-related services innovation. These may relate to Living Labs methodology and funding as well as to new forms of Venture Capital (VC) and taxation incentives for new growth firms to take off or even to research institutes and universities to participate in big projects with fundamental risks. There is a need also to reconsider the program funding for horizontal projects as well as for venturing and experimentation funding for project portfolios of interrelated projects; including new forms of risk management of collaborative RDI.

However, the major impact of the FS program may be to create globally competitive open and flexible services ecosystems, which are networks of Finnish and international firms, universities, research institutes and public agencies for ICT-related services and services architecture RDI.

8.3 Business Networks and User Communities

Through FS, the firms, universities and public agencies have also project collaboration in EU-funded and other international projects.

The collaboration may benefit also of the European Network of Living Labs (ENoLL) RDI-collaboration and of European EU-funded City-Pilot projects with Helsinki, Amsterdam, Brussels, Paris, Lisbon, Barcelona, Rome and Budapest. The European cities are about to develop European-wide user and developer communities that promote European-wide RDI for services, businesses and technology development in EU with global reach. From Finland, the Helsinki Living Lab, Oulu Living Labs and the Open Lite-Network of Finnish Living Labs (17) are offering their RDI-experimentation opportunities in real-life contexts such as Living Labs. They are about to develop Helsinki Panels, Oulu Panels and the Finnish Panels for user and developer community-based RDI. The application domains may be such as social and digital media, intelligent traffic, smart space (public, homes, offices), energy efficiency, environmental sustainability, and eHealth.

8.4 Synergies between SRAs of Tivit

FS is strongly synergetic with other Tivit SRAs: machine-to-machine interoperability and Future Internet. The findings concerning the flexible services processes, user interfaces as well as the interfaces related to collaborative modes of services production, delivery and consumption are about to provide design factors for service-to-service interoperability. These design factors may prove to be of help also in designing for machine-to-machine interoperability.

FS concentrates on wide-scale experimentation with services and business models that informs of underlying demand and market dynamism, user experiences, contexts and needs, factors of mass customization, scalability and rapid market entry, and functionalities that improve services' efficiency and productivity from users' point of view. These include factors of confidentiality, trust and personification. FS provides strategic design rules for service interoperability, machine-to-machine interoperability and even for network, structural, process and interface efficiency of the Future Internet.

The above-mentioned factors are shared RDI-goals over the applications domains of FS.

FS applies open, demand and user-driven approach to R&D for ICT-related services and services architectures innovation; they can be created, prototyped, tested, piloted and validated even for rapid market entry and scalability over the global market place. This means that **Flexible Services are widely globally connected in its RDI-activities.** This emphasizes the necessity to bring about understanding of growth, employment, innovation and

productivity impacts of services and of new socio-economic, technological and institutional mechanisms of value and wealth creation based on ICT, locally and globally.

The FS plans to incorporate, through Tekes and Academy of Finland, additional funding for research programs that tackle the well-justified research needs concerning wider social, cultural, economic, socio-economic, structural and institutional impacts of ICT-related services, businesses and technologies in modern service and knowledge-based economies, locally and globally.

8.5 Future Challenges

The **Flexible Services (FS) SRA addresses the strategic challenges of services innovations for jobs, growth, and productivity of services sectors, public and private alike, locally, in Europe and globally.** FS SRA aims at breakthrough services innovations, services architecture and interoperability innovations as well as open services business ecosystem creation that all may have impact on ICT as a technology. They are supposed also to improve the global competitiveness of Finnish firms and economy. However, even more important **may be the impact on productivity of services, on new services business creation and on wider social, structural, institutional caused by improved productivity and renewal potential offered by services innovations.**

The future challenges of FS SRA may relate to following issues:

- What are the positive impacts of the replacement of old physical processes by digital service processes, impacts on e.g. to environment, health care and well being, and security?
- What are the new paradigms rising from the Internet-based market place; are we to witness :
 - Replacement driven by e.g. cassette>iPod, encyclopaedia>Google, Wikipedia, compass-n-maps>navigator
 - New need-driven ways to produce and provide services (e.g. extremely connected, anonymity, virtual security).
- How could we support with ICT-related services the Quality of Life. Can we do that by offering ICT enabled services for helping every day routines?
- The service production in traditional service areas (e.g. financial & insurance; public sector, media, health, environmental, etc) will face new and more flexible business networks and business models. How does this take place and have an impact on services industries?
- Do the globalization of business and every day life of the people mean that the globally designed common service processes must be adapted to the specific cultural contexts? This has a great influence also to the services in terms of regulation, personalization and adaptation to the contextual usage.
- How to take care of managing trust as a prerequisite for business collaboration, and having infrastructure services supporting the knowledge on which trust relationships can be formed. Flexible services will make it possible to do business in the prevailing atmosphere of trust. In low trust environment the services are facilitated with trust maintaining and enabling infrastructure and mechanisms.
- It may be demanding to adapt to a new way of making services and business through service ecosystems where innovation, use and feedback (re-engineering) processes are interactive and involve customers. Services will no longer be developed by a single producer but within an interactive service ecosystem. Services will not only be produced and sold but the service lifecycle will become a cycle in which:
 - the user creates the value to the service (e.g. information);
 - the service will be adapted to the context (e.g. a connection to the services used in the same situation); or
 - the feedback about the QoS can be continuously reported to the service process

The Flexible Services Strategic Agenda addresses these issues necessary for utilising the ICT industry investment and provisions to the dynamics of the rapidly growing service industry and businesses that can be boosted by the use of ICT support. The plain ICT support in itself is reaching its magnitude in terms of providing basic backbone and basic technology provision; the growth of the field is dependent on the ability to provide agility in business and user involvement at the service markets and in enhancing the ubiquity of service usage.

However, the technology changes. We may see new dominant designs as the Internet dominant design– combined with mobile 3G as another dominant design that are with us currently. May we find element for new dominant designs from the services innovations that are demand, markets and user-driven? The market place has a great influence on new services structures and processes both for consumers and business. While growing, the service sector is also transforming through globalization and especially through digitalization. The service processes are not only resourced by ICT, but the nature of the service processes and business networks must be reconsidered and redesigned.

The challenge of transition to a service oriented economy requires a number of major steps to be taken in the service producing ecosystems: These may change in the nature of business processes due to the new possibilities created by ICT support and ubiquitous facilities for accessing services, and the new challenges rising from regulative, contractual and socio-economical aspects of globalisation of business. We may learn to know the impact of:

- change in the user (or customer) roles in the processes of systemic service creation, service use, service collaboration management, and feedback of service usability and business value;
- moving towards sustainable services and service ecosystems that inherently support interoperability, service lifecycle, and collaborative business.

As a consequence of these transitions, the **silos of old business domains (industry, healthcare) loose their position.** Instead, business network models that can be flexibly defined and designed and taken in use take a structuring role across these traditional domains.

Furthermore, the services businesses and technology **investment structures do change: the users invest effort and information to the services they use, and the users adopt self-service processes.**

All this means that totally new ICT enabled cross sector business networks are emerging offering new business opportunities for actors of these value networks. That is why the breakthrough target of FS SRA is to develop among the Finnish companies and academics sustainable competences to define, modify, and benefit of open flexible service ecosystems in services innovation that have an impact of services businesses and related technologies.

Flexible Services programme mobilizes a notable R&D effort of key industry and academic actors towards continuous learning, development, and renewal of the sources of competitive advantages of Finnish ICT enabled services in Europe as well as globally. This will be concretized in experimenting for new forms of service innovation and service production and consumption. Finland is a good place to conduct R&D for innovations in services; even in a way that addresses the issues of mankind; the issues of nature and climate change as well as those of wellbeing and quality of life of human beings.

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