# STRATEGIC RESEARCH AGENDA

# for

# Services

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# 1 EXECUTIVE SUMMARY

Virtualization of services and the emergence of mobile internet access have brought new opportunities to the ICT services sector. Reduction of investment barriers in service infrastructure and access terminals have enabled new classes of services to be developed. With these developments future SME's will have a radically new service reach. This SRA suggests that services for small and medium size enterprises, with specific thematic focus on financial services, education and wellness are where the Finnish economy is best suited to grab an advantageous position in the global market.

This Strategic Research Agenda describes the research targets for the Tivit Services Program. Tivit Services Program is an ecosystem effort to pool service enablers and platforms to rapidly launch, horizontalize and ensure maintenance of new services. The program will deliver enablers and support to service developers and amazing new focused services to end customers. Work is done in a true partnership mode.

The program is funded partially by Tekes through the ICT SHOK framework (TIVIT) and partially by the participating companies. The program is initially funded nationally. The implementation will utilize the global partners' assets for best impact. A EU expansion (FI-PPP) is imminent.

The programs mission is to implement service enablers and new vertical services based on existing and new enablers, in currently underserved sectors where Finland can gain a distinctive edge. Key national benefits are obtained from channeling research findings into production rapidly through existing companies and the creation of several new start-ups.

Partners get access to a pool of complimentary platform and enabler assets, innovation pool and execution power.

# 2 INTRODUCTION

The rising economic significance of Services is a strong global trend (Tivit 2010). Long term development is moving the weight of economic value creation from agriculture to goods and then services. Globally the trend is clear, which can be seen in the plot of IBM's 2009 Economists survey (Figure 1). Finding ways to ride this trend is the key target of this Strategic Agenda. Regional variations also provide interesting opportunities to jump steps in the development.

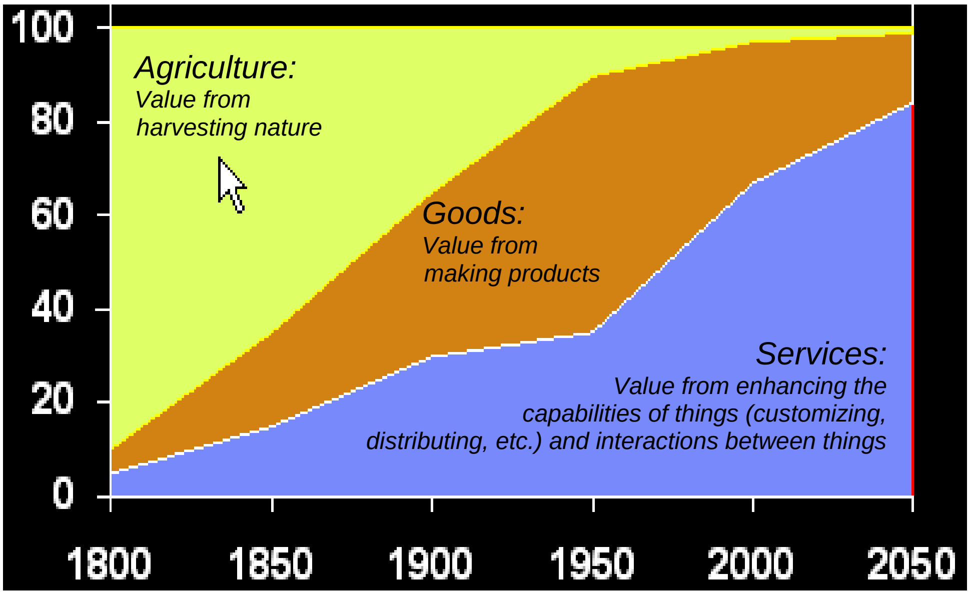


Figure 1. Long term industry trends, Source: IBM Economists Survey 2009

**Thematics based on rising trends**

The explicit task of this Services SRA is to choose and describe what is in the scope and what is not addressed in this agenda. The fundamental target is to select areas of work that give the best possible chance for the Finnish ICT Services industry to gain an edge on the global market.

The approach that is taken is based on an analysis of the service sector assets and motivation in Finland as well as an analysis of what service sectors seem to be under served globally. IBM's 2009 Study on the size of service systems globally, highlights a few discrepancies in the global offering in respect to need and societal importance of service sectors.

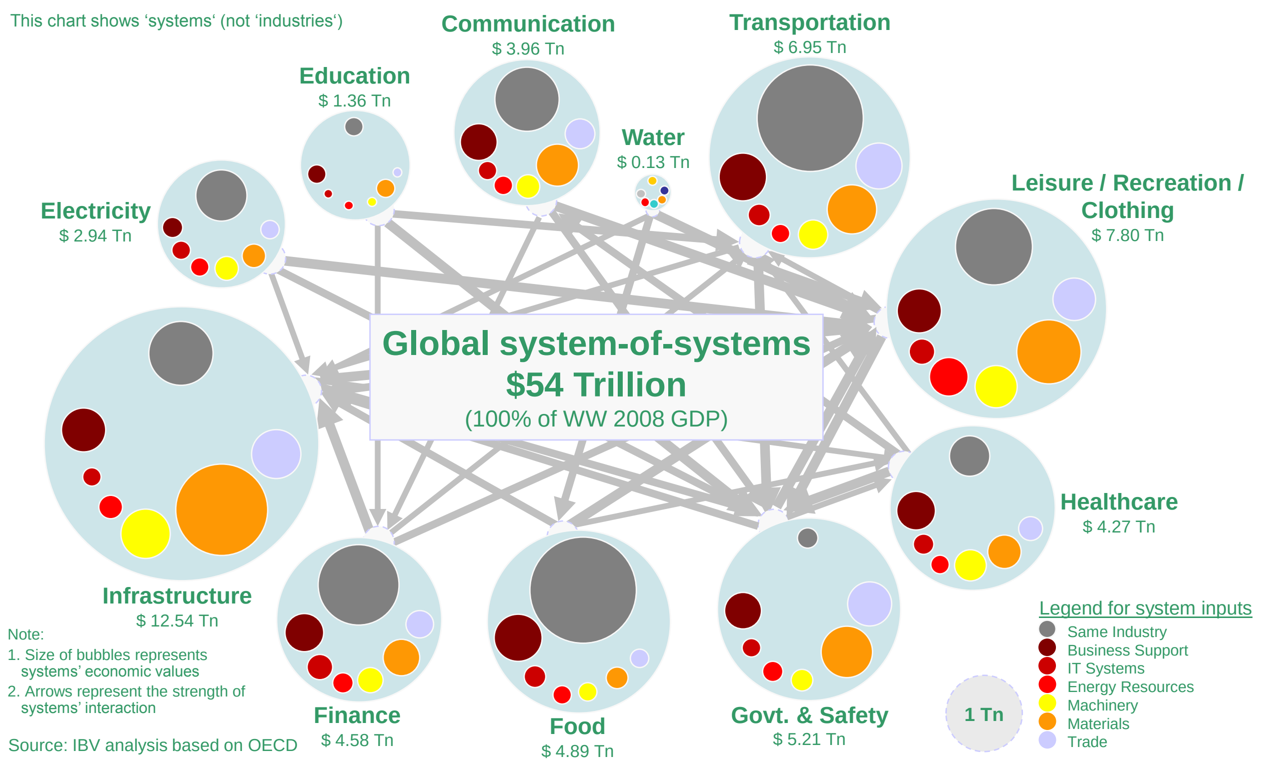


Figure 2. Global service system volumes, Source: IBM Economists Survey 2009

From the workshops with Finnish industry and academia arose several themes of which four were selected:

1. SME Services
2. Financial Services
3. Education Services
4. Wellness Services

The three latter ones are clearly large sectors in the society as a whole, but are notably small in size in the IBM study (see Figure 2). SME Services is not addressed in the study which is due to the sector not being recognized generally as an independent Service sector. In terms of the SRA this should be seen as an opportunity to define a new playing field and gain the first mover advantages.

The following sections will outline some of the reasoning, bounds and the rationale of the selected themes.

### SME Services

Basic business ICT services have been commonplace in corporations for several decades. These services, however, have eluded small and medium size companies (SMEs) due to the large investment needs, both in time and financial terms. ICT business services have been based on corporate back-ends and integration projects often done by a thriving ICT consulting sector. Smaller SMEs have mostly relied on services originally designed for consumers.

Recently developments in the cloud services sector are opening up new possibilities for distributed and shared back-ends. This cloudification of business services is potentially a key element in lifting the investment barrier for SMEs.

Mobile computing is another key trend that brings business services closer to the SME sector. This is a key enabler in the smaller end of the SME sector, where the nature of the business has often not enabled the use of desktop computers or computing systems. Mobile computing together with cloud services is a key unused enabler in providing ICT services to the SME sector.

With these developments the services SME's offer will be radically expanded in the future. New focused verticals can be developed in areas that have previously been too niché or technology adverse such as elderly care, volunteering, micro level social services and publishing, to name a few. Additionally the ICT augmentation of very small business services such as reservations, social media customer relationship management and promotions of a local barber shop or a pizzeria shows great potential.

### Financial Services

Mobile financial services are getting attention globally, as a part of the mobile ecosystem wars where 3-4 major players are competing with their platforms. Forthcoming technologies are just a small part of the whole picture. For example, the architectural and business options in Near Field Communication (NFC), which will lay out a field where companies need to choose whether to seize the opportunity. Mobile payment can be incorporated to a model pushed by GSMA, but there is not a clear de facto road to go ahead.

Global business is facing a fundamental change from document-based purchase to eEcosystem-based collaborations that are based on visibility of consumption (i.e. forecasting) and automated warehouse replenishment and shipments. With transactions being such a critical part of any business, it's no surprise that transaction banking is an incredibly important area for financial institutions to be involved in. In the global market banks have lost significantly their market share on transaction banking products, due to the increased use of electronic data interchange (EDI) between companies and available information on companies online. Thus, banks have lost their traditional role in dispatching documents and acting as a reliable middleman between trading parties. Globally opportunity lies in the emerging trend of *visibility enabled structured finance solutions for SMEs* that leverage their possibility to interact in these new global business networks with large corporations and at the same time provide sufficient funding mechanism that rely on the quality and accuracy of information from SME's transactions.

### Education Services

Traditionally, studying has meant sitting at the desk, listening to the teacher and working on school books. Advances in mobile education services can make it possible to access information resources anywhere anytime. Why not take the biology, geography or even math lesson to the next level and free pupils from their desks? School book publishers have already made text books and exercises available online. However, the potential of mobile technologies have not been exploited much. Besides, the school children already spend far too much time on their computers playing games and chatting with their friends online. Thus, learning freely at our everyday environment might be good both for their education and physical health. Mobile technologies also enable new forms of education in developing countries.

Advanced multimodal, mobile technologies provide a number of options for implementing solutions for pervasive learning. Even when pupils stay in classrooms, these technologies allow richer direct interaction between the pupils and the learning materials as they are not tied to their books or desktop computers. For example, when the learners are out of school, multi-modal conversational virtual companions could motivate and support learners. New interaction technologies make it possible to use speech, touch, gestures, gaze direction, or even movement of the whole body to interact with the virtual companions. Combined with online learning resources and mobile technologies, physiological data could well be utilized in teaching how the human body functions, e.g. by showing how it reacts to physical or psychological stress. Study material could also be associated with everyday objects with a number of technologies (e.g., NFC technology, augmented reality). These examples illustrate how learning can be integrated into our environment and context.

### Wellness Services

Wellness services using ICT have been a nascent business sector for the last few years. Drivers for wellness services have been the emergence of mobile data collection technologies and the need to bring analytics and descriptive deciphering of the data output to the non-professional market. In these terms the Wellness sector is the little brother of the health sector. However, the opportunity for a personal and continuous customer connection also adds motivational and sustentative aspects to the wellness services.

The opportunity of the wellness ICT sector in conjunction to SME services lies in the expansion of the Wellness ICT systems to enable third party wellness players to add value to the customer. Traditional wellness services have been mostly data logging and display, but third parties enable deeper expert services to be incorporated. These third parties can range from providers of analytics tools, or sport specific services to occupational safety and health providers.

## Ecosystem

The match of the abovementioned fields into the Ecosystem approach of Tivit Oy is further highlighted by heterogeneity and interdependence of actors in these fields in general. It is evident that a single entity gaining dominance of any of these fields globally would be highly unlikely. This provides additional advantage to an ecosystem approach which best supports the provision of services on multiple levels of abstraction, and complexity. The approach enables seeding of economic growth by creation of "evolutionary pockets" for companies to incubate their business at market niches best suited for them.

The framework of the ecosystem visualizes the different layers of research and development that allow companies to create economic value and their businesses. Figure 3 below shows the Services platforms as the base layer on top of which connectors or "super APIs" can be built. This connector layer combines the platform offerings of multiple players in meaningful packages for developers to use in application or vertical service creation. Ecosystem members can also create their business by developing additional elements or new technologies for commonly used features and enablers. These can be new UI styles or algorithms for creating features such as augmented reality elements in the services.

This framework of role division in implementing the Services SRA allows for different players to find their business in the ecosystem. The role division strengthens the ecosystem identity in creating mutual interdependencies. This interdependency necessitates defining the interfaces between the offerings allowing alternate and branching solutions to be created to these interfaces ensuring redundancy and back-up options, but also new opportunities. The different roles also allow companies to focus their offering development to areas where they can add the greatest value and novelty.

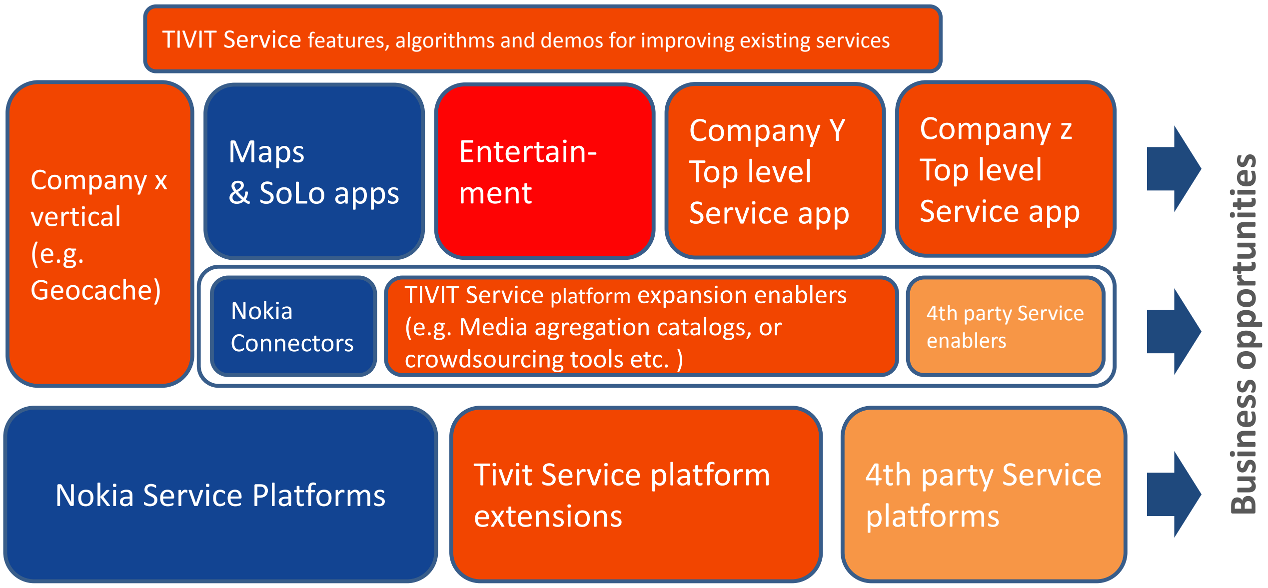


Figure 3. Abstraction and layers of the Tivit Services Ecosystem framework

Tivit Services Program will strive to incorporate tools for the ecosystem developers to gain speed by jumping some of the development hurdles. This is done by a set of platform services for the developers. Access to enablers is promoted by compiling searchable enabler packages, with information on enabler maturity, implementation cases, common single documentation databases and peer support. General licensing terms and product risks from use of external component will be highlighted and mitigated where possible. Tools envisioned include FRAND licenses, escrows and back-up maintenance arrangements. The program will also work towards a comprehensive delivery system of service enablers for the developers as well as the channels to deliver services to end users. These ecosystem platform services can also be utilized for supporting the building of ties between developer networks globally and helping the globalization of service development. It is also foreseen that these ecosystem services will promote profiling of the Tivit Services developer ecosystem as the premier platform for global service developer collaboration.

# 3 BACKGROUND

## *3.1 Global state-of-the-art*

### 3.1.1 Finnish market

The "reticent" Finns have been among the forerunners in the world in the use of the telephone. Today, people of all ages use mobile phones actively, and the use of mobile services has also increased in all age groups. According to the Official Statistics of Finland (2011, Appendix table 7), more than 20% of all people (incl. all age and social groups) have browsed Internet, read emails and/or used location services with their mobile phones during the last 3 months. Looking at the young adults and students, these percentages are even higher, with almost half of those around 25-34 years old browsing the internet with their phones at least occasionally.

Even though about 90% of Finns of all ages use internet regularly (Official Statistics of Finland 2011), computers and technology in general are still largely underused in many areas, including health and education. For example, at schools computers are seen as useful tools for administration but not so much in education. Most typical uses include traditional word processing and Internet (Kankaanranta, 2011). Even though school book publishers have put educational materials and exercises available online, those have mostly been transferred in static form. The added value offered by new interaction technologies is mostly underused. At the same time, there is a growing interest among educators towards the social media that has revolutionized informal learning. However, teachers also feel that learning to use the new technology is too hard and time consuming. Simply transferring the educational materials from books to computers may not be an optimal solution. There is also one extra value for using mobile or interactive technologies that engage the learners physically: going out for the homework, or educating oneself on the move, might be good both for education and health of people who otherwise sit too much, and gain weight. This can link the Educational services with the Tivit Wellness services. In fact, the same applies widely to mobile and eServices in general: Finland has the technology and the know-how but we need joint efforts in implementing cross-platforms and common enablers that lower the entry barrier for SMEs and content providers who could offer services to the currently underserved areas.

Put together these facts indicate real need and great potential for the underexplored market of mobile services. The platforms and services to be developed in this program can offer new possibilities for the content providers for integration of all kinds of content into methodologically sound interactive materials that can serve learners, educators, health service providers, the ICT sector, etc. with a wide variety of skills and needs. For example, the new cross-platform environments offer more flexibility for publishers who wish to create and combine, for example, new learning or health related self-monitoring packages from existing off-line and on-line learning materials by utilizing the modern multimodal, interactive, mobile technologies. This can lead to saving in society as well as better productivity of the local as well as global services. Mobile services can also have a high societal impact, as they provide a way to reach those who may otherwise be outside of the system, as described in the Global market section below.

### 3.1.2 Global market

The four theme areas of this SRA have very different market prospects.

**SME Services**

SME Services are a huge market globally. The majority of global businesses are small or medium in size. Typically the services that SMEs use are specialist services relating to enabling their core business. However, most SME services are currently not ICT Services, and SME ICT Services can be seen as a nascent market. Key opportunities lie in the trends discussed before. Business back ends moving to the cloud and reduced cost of terminals with mobile computing.

Currently only accounting services and to some extent web marketing and stores have penetrated into the SME sector leaving plenty of room for new SME service sectors to take root.

Understanding the technical expertise and the ability of SMEs to put time and resource into ICT service as well as showcasing the benefits they gain will be core assets in opening the SME market. Different SME sectors will require tailored niche solutions. This brings opportunities to a number of players in creating SME services.

The Finnish market supports global SME services development by acting as a living lab for first soft trials of new concepts. The high education level of Finnish entrepreneurs will help in solving initial issues with the services before going global.

### Financial Services

Finnish companies have actively been developing technologies for mobile financial services. The technical know-how is available and companies are equipped with multiple options on how to create the services in mobile and in back-end. In order to develop as an ecosystem, a cooperative push is needed; Services SHOK is such a push. Business oriented mindset in companies and cooperation in value networks is the only way to establish knowledge both on technical basis and what kind of added value the cooperative networks can create.

In the area of Supply Chain Service collaboration manufacturers are confronted with the problem of spending considerable time and effort on coordinating services across multiple tiers of their supply chain. These challenges have been met with industry-wide collaborative networks that seamlessly tie companies into eEcosystems. In transaction banking the global state-of-the-art comprises commercial banking products and services for corporate clients, including domestic and cross-border payments, professional risk mitigation for international trade and the provision of trust, agency, depositary, custody and related services. Thus the state-of-the-art in finance has conceptually nothing new under the sun since providing trade and banking services in Venetian maritime trade. Only the risk calculations and practices have been refined in past centuries. Finnish industries have been active facilitators for mobile and business process standardization, including banking sector in SWIFT and SEPA standardization. There is huge potential of combining Finnish knowledge across industry domains to create new innovative supply chain services that seamlessly tie innovative transaction banking products and supply chain operations for new global state-of-the-art.

### Education Services: developing countries offer great potential for mobile services

Companies can create significant economic value by innovating the design of products and services to serve more effectively the needs of the lowest income segments of the population in developing economies. This is especially true in the growing economies in China, India and increasingly in Africa. For example, a large market opportunity exists for businesses to tap at the bottom of the pyramid (BoP) in India (Prahalad & Hart, 2002). However, accessibility to the large rural market is a huge challenge for services. The distribution channels for products have been established with large investments by some of the large consumer product companies but services have been a hitherto more or less unexplored category for this market. A notable exception to this service drought in rural India has been telecommunication services. Mobile phone penetration in India in general, and rural India in particular, has been growing at a breakneck pace. According to TRAI's (Telecom Regulatory Authority of India) latest Telecom Subscription Data (dated 31st Aug 2011), the total number of mobile phone connections in India is 865 million of which 295 million connections are in rural India. As the service prices have dropped drastically, the market in rural India has now opened up and the growth is much higher than that in urban India. It is expected that by 2013, the number of mobile phone subscribers will be 1 billion, with a rural teledensity of 35%. In rural India the mobile phone is not a personal device but a shared device across the entire family. Thus, the addressable market size is even larger than suggested by the teledensity.

Typically value added services through mobile phones have been delivered through text and web platforms. Both of these require the service consumer to be literate. Whereas literacy is a given in developed markets, it is not necessarily the case in developing countries. For example, the illiteracy rate in India is 26%, with 31% illiteracy in rural India and 15% illiteracy in urban India. This creates a need for services that can be delivered on other platforms than text or web, e.g., on voice or tablet platforms. In addition to service needs for these BoP markets it also provides a platform to create and develop first in developing countries context and then "reverse" the innovation to developed countries (Govindarajan & Trimble 2011).

Currently, spoken services are used successfully in many areas in many countries. Typical examples of speech applications include transport information services, such as automated train and bus timetable services. The current trend is that DTMF (*colloq.* touch-tone) inputs are replaced by speech inputs. Telephony applications also include information services, such as weather forecasting and banking services, e-mail applications and voice portals. When collected together, they create voice portals which integrate several applications into a unified speech interface. The lack of internet access limits access to the World Wide Web while voice-sites can be accessed by dialing a phone number. This enables services such as the Spoken Web by IBM Research Labs (Agarwal et al. 2010). It stores the web content in local dialects, making it much easier for illiterate people to access the information. Conventional voice portals, however, do not support user created content, which makes some services impossible.

In addition to mobile phones, another promising approach is computing by tablets. The current tablet ecosystem is dominated by the Apple iOS line (2/3 market share) and the multi-vendor Google Android product family (27% market share). IDC forecasts that worldwide shipments will grow to 46 million units in 2014. Tablets are still fairly expensive. However, affordable tablets based on the Android OS, launched recently by many Chinese and Taiwanese manufacturers, and especially the $35 Aakash tablet by the Indian government, provide an entry point to the markets in developing countries. The low hardware requirements and the intuitive touch operation make tablets an appealing alternative to full scale laptop PCs. The proliferation of tablets in developing markets creates exciting possibilities for the implementation of both public service/governmental, commercial, financial, health-related and educational services leveraging the strengths of the platforms, such as low power requirements, touch screen input combined with symbolic user interfaces (for illiterate/low literacy users from low-technology background) and wireless connectivity through mobile networks that diminishes the reliance on wired internet.

Speech technologies and mobile devices create together a great promise for BoP services. Most importantly, spoken and symbol-based interfaces make services available for illiterate people, and studying these interaction techniques both in mobile phones and tablets makes numerous novel service scenarios possible.

**Wellness Services**

The ICT wellness sector is experiencing a major growth spurt in the developed countries. The growth is driven by a plentitude of wellness data gathering and sharing services and a boom of do-it-yourself wellness business. The traditional wellness products such as, workout videos and home gym accessories is rapidly being augmented with collaborative and motivational services.

This segment is currently populated by a plentitude of small companies, but is expected to grow and attract larger players in the near future. However, the heterogeneity of the segment "something for everyone" makes an ecosystem approach viable, with the bigger players providing base platforms and innovation happening on top of these in the ecosystem.

Finnish wellness industry is in a unique situation of having an emerging network ecosystem structure, with many players collaborating with existing platform providers such as Polar and Nokia. Additionally the Finnish occupational health system provides a natural path of extending and monetizing the wellness services. A further boost is gained from political pressure to lengthen work life to counter the pension deficit. One of the key tools for this is in increasing the wellness of the population.

## *3.2 Global trends*

The Services SRA is driven by two sets of trends. The first one is driving the theme selection. These themes are global societal trends that are used for grounding thematic of the SRA. The second set of trends is related to answering the question of "why now?" These are industry trends in the ICT sector and provide reasoning back-drop for the structuring of the SRA.

Global trends affecting theme selection (wording and bundling of trends done to support illustrative purpose)

- Economic growth and employment is driven by SMEs.
- Financial services in turmoil and resulting reorganization of the field.
- Ubiquity of mobile internet and information access changing school work.
- Wellness, driven by ageing of the "baby boom" generations and rocketing health care costs, with issues such as obesity, in the developed world.

ICT services sector trends driving the structure of the SRA framework.

- Service Platformization (including cloudification of services)
- Service domain cluster formation (e.g. Finnish wellness cluster)
- Service democratization (DIY services for individuals and SMEs in niche domains e.g. geo-caching)
- Globalization of service value networks
- Service personification (focus on individual person or company / service co-creation)

## *3.3 Strategic challenges & opportunities*

The implementation of the thematic solutions and services described in this SRA pose a number of challenges that need to be addressed in order to take full advantage of the strategic challenges. Some of them are common to all or most services while some are specific to the thematic area.

**General ecosystem opportunities and challenges**

Finland is in a position where we can define where the mobile services will go in the future. We need to think globally and think big if we wish to maintain or improve our world-class competence and competitiveness. Below we list a few strategic opportunities and challenges addressed by Tivit Services:

- Developing the specific next billion services; what are the "killer" services for education, health, finance or SME services (e.g. "Life Tools")
- Service SDK -> EU FI-PPP
- Platform & enabler visibility
- Transformation of the mobile ecosystem towards smarter platforms, and consumer and B2B services.
- Opportunities in evolving infrastructures, such as reader devices in retail, transportation, Internet of Things in buildings, and cities.
- Cross-platform services and service-to-service interoperability are pre-requirements for flexible and user-friendly services for masses.

- Reuse of current solutions, cost sharing and IPR rules are issues to be solved (e.g. among current network service providers) to ensure affordable, sustainable, and easy maintenance of the services that use the common platforms.
- Infrastructures and common architectures to support implementation of services.
- Agile research, development and innovation methods that enable quick and flexible reaction to the specified needs and processes of both industrial and (public) institutional customers.
- Support for low cost or open source services and DIY by customers and SMEs.
- Tools, processes and models to support both technical and societal exportation of services (platform independence, sector crossing, internationalization).
- Empowering the customers with services that enable them to experience the mobile internet in a whole new, engaging level using new interaction technologies. Implementing this with low-cost mobile devices, in varying contexts globally, will be an interesting challenge to meet.

**Thematic opportunities and challenges**

SME services with specific focus on very small businesses and their use through mobile interfaces open up the market not only in the developed world but also in the developing world. Challenges lie in simplicity of use, focusing on local relevance. Creating the visibility and the delivery channels will require significant effort and partnering with key players and local entities.

The constellation of service creation is vital for the whole Finnish technological development. Value networks can be created by companies in small quantities, one-by-one contracts, while large collaboration for emerging business setting is impossible without cooperation. In Japan, a horizontal industrial cooperation has brought up a whole new service genre, mobile financial services. This approach cannot be copied directly, but something similar can be done. Developments in France (Cityzi brand) and USA (ISIS) are efforts to tackle ecosystem of cooperation. Finland must be in the forefront in this development; otherwise financial services are routed via foreign actors. At worst, this could mean uncomfortable market situation for all the Finnish major players, operators, banks, or even retail chains.

A threat and the opportunity lies in the cooperation of companies and competitive edge of Finnish solutions when customer services need either cost cutting or new activities are brought to value chain.

Financial services' transactional payment ecosystems enable new approaches to funding and monetization of service offering. Financial institutes see potential in providing business analytics in service structures. Strengths are also in the potential to bring transactional payments every ware regardless on availability of financial institutions. Financial services may have challenges in globalization due to varying legislative structures.

Educational Services aim to create interoperable platforms that are based on existing components and technologies. The mLearning and eLearning solutions developed in projects provide selected users with solutions that will meet their individual needs. The pilots will be developed with global markets in mind, so that the pilot services can evolve into exportable products. Reaching this goal requires that the educational services support education curriculums and procedures in such a level that they fluently become part of the everyday activities of the educational system.

Wellness services offer a lot of potential for the health system in meeting the challenge of aging explosion. Mobile personal wellness tools are needed for implementing the prevention, early diagnostic and self-care that enable a cost-effective way to handle the increasing amount of people requiring health-related services. Data handling, privacy and security issues are challenges that need to be taken into account and built into the system from the very beginning. Wellness opportunities are currently based on data collection of active sports enthusiasts. Future opportunities lie in expanding the use base to occupational health services, the elderly and other mainstream demographic groups. Challenges to be tackled are in legislative framing of the wellness verses health data. Other challenges arise from the fragmentation of the health field, between different sports and types of operatives, business or volunteer.

# 4 VISION 2016

By 2016:

- We have built a leading service development ecosystem with common language, superior palette of common enablers, platforms and mutual trust.
- The ecosystem supports several layers of economic activity in its value chain and has a low entry barrier for new players.
- Ways of working enable radically new service launches and scaling at speeds that cannot be matched. We have a first-to-market advantage, enabling sustainable cash flows from a billion new customers.

# 5 BREAKTHROUGH TARGETS

The target of the program is to:

> ***Implement*** *service* ***enablers*** *and new* ***vertical services*** *based on existing and new enablers, in currently* ***underserved sectors****.*

We aim to do this by:

- Creating new innovative services in selected sectors and recognizing the need for enablers in their context. Packaging the developed enablers as common platforms.
- Providing ecosystem support for development and scaling and visibility to the service building blocks in the ecosystem.

In addition to the systemic targets of the SRA, the thematic content has its own target setting which is summarized below:

### SME service target

Platformize key enablers, components and tools for easy use by the SME sector. Create several key vertical services to be developed in sectors and domains where segment size or nature does not enable large players to effectively compete.

**Financial services target**

Facilitate Finnish companies to make breakthroughs in global services using financial service enablers. Such enablers are components, architectures and platforms, which are an integral part to service development processes (e.g., retail, transportation).

Kick-off self-evolving enterprise networks enabling opportunities for creative companies. Such enterprise networks have the advantage of being able to identify and dynamically exploit global business opportunities.

**Education services target**

Educational services and platforms aim to develop mobile services that are not bound to location or time and can take the learning to a new level. These pilot enablers can evolve into flagship services that will take Finland into a leading role in the international market for educational services. This is done by combining two areas where Finland is especially strong: mobile technologies and education.

**Wellness target**

The aim is to create a thriving wellness services ecosystem and industry sector that utilizes common platforms, which allow rapid innovation and launch of new wellness services.

# 6 RESEARCH STRATEGY

## *6.1 Research methods*

The research in the Tivit Services is driven by needs, coming from both the end-users and the industry. Thus, an extensive industry involvement is required to meet the specified needs of the different theme areas targeted in this SRA. In addition, also key societal players such as select health organizations and educational institutions will be involved from the very beginning to ensure that the pilots developed in this program will not contradict with educational needs and policies, and on the other hand, to facilitate a fluent take-up and distribution of the services in the target ecosystem.

Tivit Services will use a multidisciplinary approach in carrying out the research, especially for the definition of user requirements and evaluation of the implemented services. Co-creative design approaches, concerning both value networks, and user modeling, are applied in order to develop and implement services, which adapt to different user profiles.

Agile service creation methods and piloting will be used as tools for rapid development, evaluation and iteration of the solutions. Tivit Services wants to avoid the pitfall of slowing down the development by the heavy procedures of traditional methods that force phased iteration. Lightweight agile methods will enable quick reaction to the evolving needs of the customers by enabling responsive collaboration between the users, developers, researchers and the industry.

Quality of the solutions and services will be based on the technical and methodological excellence of the multidisciplinary team. The development work builds on strong constructive competence in developing new interfaces and new interaction techniques. Empirical research, controlled experiments as well as field studies will be used as appropriate for evaluation of the individual applications built on the common platforms.

## *6.2 International co-operation*

Tivit Services will foster partnerships with similar activities globally, for example the Dutch program on service innovation (Service Innovation). Service ecosystems, programs and funding structures similar to the Tivit Services Program outside of Finland will be identified as possible partners in selected markets. Collaboration will also be sought on a more local level.

The key co-operation partner is the European Commission's Future Internet Public-Private Partnership Programme (FI-PPP). Its main goal is to advance a shared vision for harmonized European-scale technology platforms and their implementation, as well as the integration and harmonization of the relevant policy, legal, political and regulatory frameworks. As set forth in the Digital Agenda for Europe, these are considered to be prerequisites for realizing a European online Digital Single Market (DSM) and, more broadly, an inclusive knowledge society.

FI-PPP PROGRAMME AIMS:

Increase the effectiveness of business processes and infrastructures supporting applications in areas such as transport, health, and energy.

Derive innovative business models that strengthen the competitive position of European industry in sectors such as telecommunication, mobile devices, software and services, and content provision and media.

FI-PPP PROGRAMME APPROACH:

The FI-PPP follows an industry-driven, holistic approach encompassing R&D on network and communication infrastructures, devices, software, service and media technologies;

In parallel, it promotes their experimentation and validation in real application contexts, bringing together demand and supply and involving users early in the research lifecycle.

The new platform will thus be used by a range of actors, in particular SMEs and Public Administrations, to validate the technologies in the context of smart applications and their ability to support «user driven» innovation schemes.

Further partnering and collaboration in service enabler platformization with key corporations who own core service platforms (e.g., Google, Microsoft, etc.). See Figure 4 for co-operation relationships.

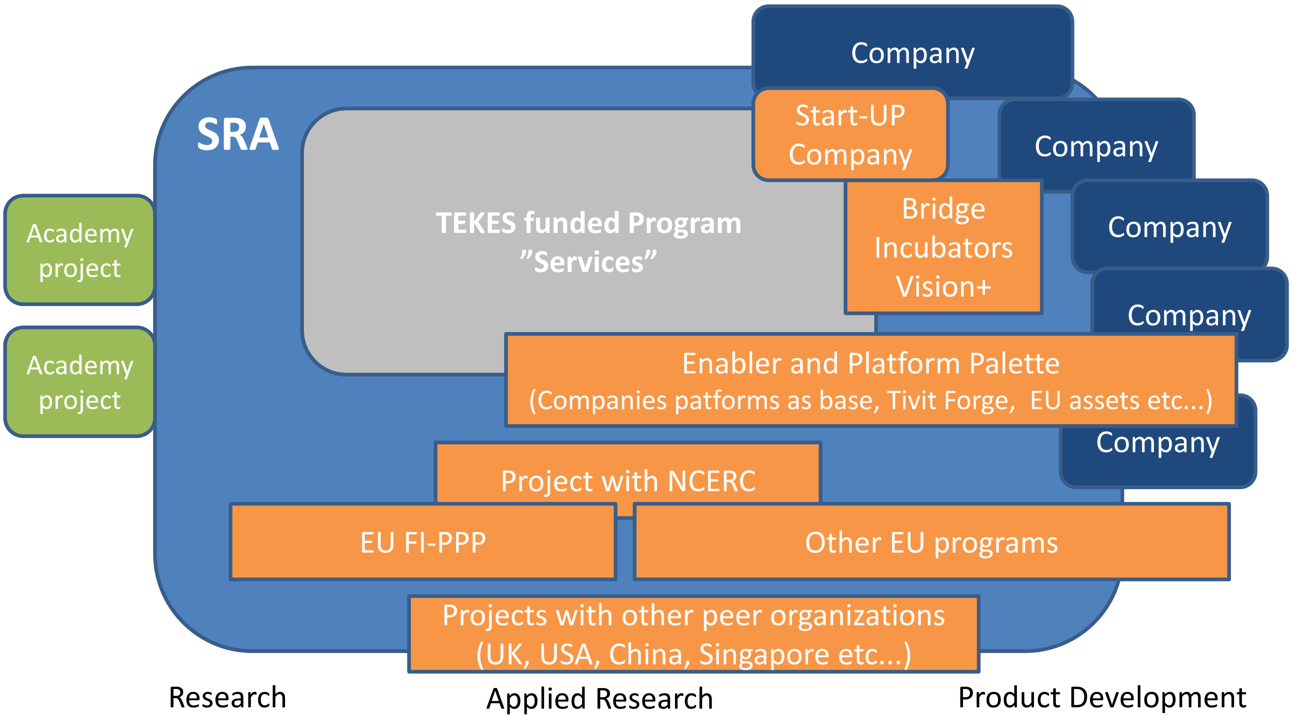


Figure 4. The Services SRA scope in view of the TIVIT Services program and other co-operative activities.

# 7 RESEARCH THEMES

## *7.1 Theme 1: SME Services*

### 7.1.1 Description

The vast majority of companies globally are small and medium-size enterprises. The SMEs also account for a large portion of employment, economic growth and innovation. SMEs focus on activities that offer direct financial benefit and the services they offer are often down to earth and practical. SMEs at large have not been able to access or offer ICT services due to the relatively large investments required for the installations as well as in technical competency. Cloud services lift by large the investment barrier as does the use of mobile devices as terminals to the services. This already enables some SMEs to take an active role in using and developing ICT services. However, further opportunities lie in simplification of service creation and access.

Optimizing service creation tools for SMEs and sharing of know-how in service building will enable a new class of service development. As well as a sizzling use driven down to earth innovation ecosystem.

The SME theme targets on creation of a pool of companies implementing key services by or for the SME sector. SMEs support the whole services ecosystem by utilizing and trialing service platforms offered by the program. They create a pull of additional platform features. SMEs act to create new service products for their business. They do this by rapidly producing a plethora of compelling service alpha releases.

In this Tivit Program we plan to create tools for SME's ICT service creation. We will incubate new service creation by SMEs, through ecosystem support, in know-how, technology and new research as well as financial tools.

### 7.1.2 Focus areas

The foci of the SME services will be in the following five areas.

- Media and advertising service solutions for / by SMEs.
- Communication and business ICT services for SMEs.
- Services for very small SMEs.
- Service platform / enabler aggregation.
- New enablers for service creators, using mixed reality.

Though the topics are diverse they all have ties to the common platforms and enablers. Many of the SMEs will be creating vertical services in market segments that may be initially hard to define. Much of the new approaches will work on a trial, error and pivot way of working, providing surprising and innovative service solutions.

### 7.1.3 Goals

SME Services have the following goals:

- Create a tool to make the program platform enablers easily visible and usable to the SME field.
- Use ecosystem benefits to boost several new start-ups in developing their services.
- Enable a new class of ICT services in the small SME area.

### 7.1.4 Results

The expected results from the SME theme relate to the program's offering to the SME sector service developers and the society as a whole. The top level results can be categorized as follows.

- Provide SME's visibility and relevant usability to programs enabler platforms.
- 3 new start-ups per year.
- Several new services developed annually.

# *7.2 Theme 2: Financial Platforms & Services*

## 7.2.1 Description

Internet and services in general are moving more and more to the mobile platforms due to the increasing use of smart phones. It is evident that application stores by major players do not provide only applications to the users but services such as ticketing, loyalty cards, couponing, referred sometimes as mobile wallet, thus changing the face of financial services in mobile.

Currently, we can see a strong market effort to find ways on how payment and ticketing are incorporated to the consumers' mobile phones. These solutions are popping up as offerings from small and large enterprises, more or less working in collaboration with other parties in the ecosystem. There are now cases that all the players of the ecosystem, banks, transport operators, mobile operators, etc. are brought together around one table to create an interoperable service environment. Mobile device can be a mediator for many service segments: retail, payment, ticketing transportation. The means to serve these segments can be service vouchers, mobile credit card, coupons, or customer loyalty solutions. Smart Mobile Wallet can provide a framework to manage these elements in a user friendly manner.

It is possible to identify benefits to individual users, companies, and financial institutes. 1) For individual user, additional value of a service, whether mobile or not, is only as relevant as the service components, processes, and information put together can generate. 2) Visibility to collaborative processes of industry opens up new opportunities to companies to create additional value to a service. Consequently, this creates new business for SMEs when opportunities in collaborative processes are identified and opened. For 3) financial institutes, services mean new aspects to create and evaluate relevant information. Finally, since financial services are under consideration, also 4) security aspects come under the loop.

The aim of 'Financial services' in Services SHOK is to enable SMEs to position their future product offering along the lines of value network, technologies i.e. components and architectures and tools of financial services, and use cases which make these functionalities concrete.

## 7.2.2 Focus areas

Following activities have been identified as the focus areas:

- Mobile Financial Services and related technological architectures
- Visibility enabled structured finance solutions for SMEs
- Operational risk-driven security assurance technologies for services

**Mobile financial services and related technological architectures.** Any SME that needs financial solutions in their services need a way to use the components and libraries connecting to the financial institutes or service providers. The mobile financial service concentrates on bringing together the services provided by the mobile technology, banking, and ticketing and commerce, available to the SME ecosystem. In addition, it aims at developing and providing trust services that enable secure usage of the novel services. Great emphasis is put on user-centered product development practices offering to ensure a usable and good user experience for products and concepts.

For example, one of the currently emerging payment technologies is the use of Near Field Communication. Frost and Sullivan (2011) expect the handset sales to be in 863 million units in 2015, which means 53 % of new handsets will be NFC-enabled. The total payment value for

NFC globally will exceed €110 billion in 2015. Thus, on one hand, the first main obstacle for services to appear, i.e. the lack of handsets will be solved in time. On the other hand, the second main obstacle, the lack of infrastructure, is now disappearing. For instance, in Finland, Helsinki city transportation and K-market stores are both already now equipped with readers enabling NFC-based ticketing and payment.

**Visibility enabled structured finance solutions for SMEs.** The aim of the *Visibility enabled structured finance solutions for SMEs* (see Figure 5) is to provide unique visibility between the physical and financial transactions (i.e. pre-shipment), and provide right asset levels to enable faster production cycle times for SMEs. Increasingly, automation is playing a larger role in a traditionally manual environment that enables greater levels of information exchange among trading partners (i.e. visibility) and data standardization and integration opens effectiveness, from supply-chain to demand-supply network. By utilizing visibility and collaboration it is possible to create new visibility-enabled structured finance solutions for SMEs, as shown below.

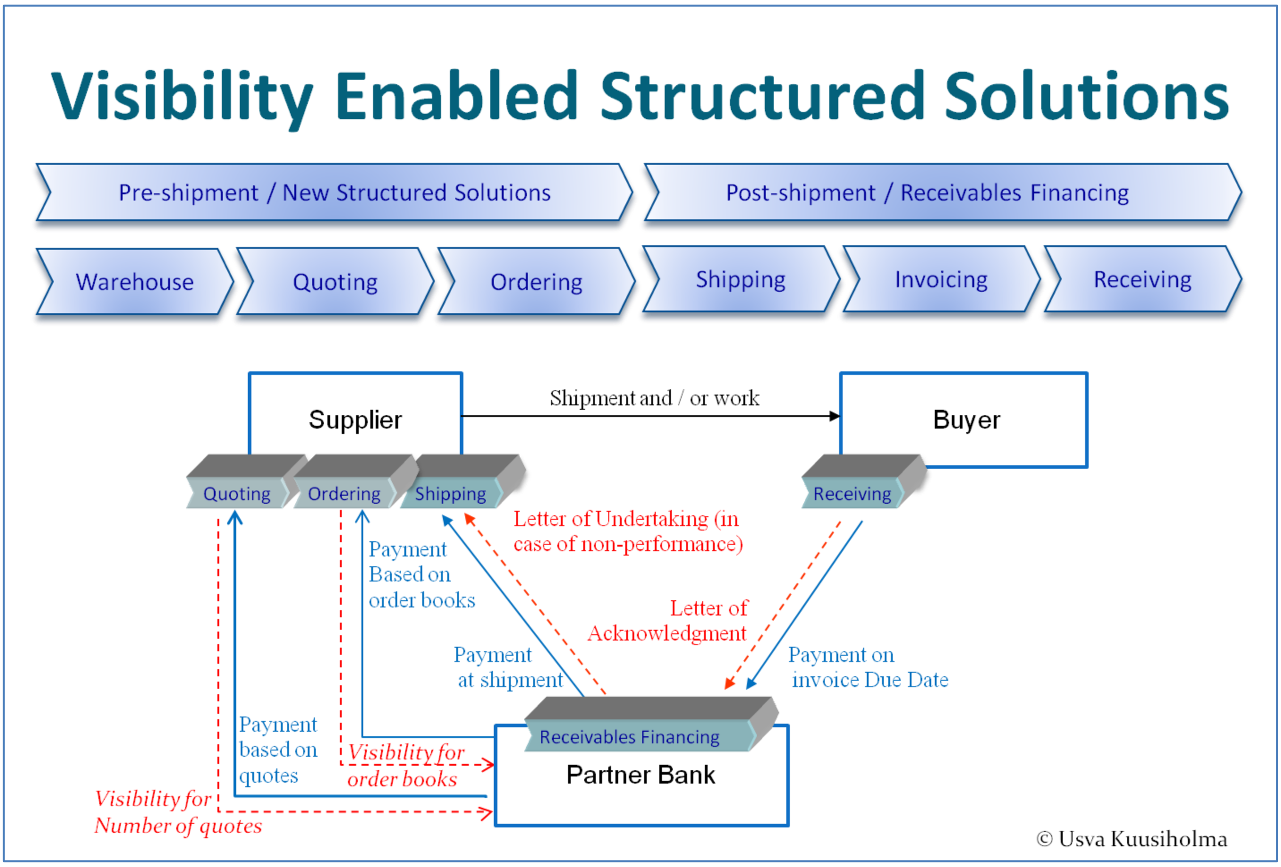


Figure 5. Visibility enabled structured finance solutions for SMEs

**Operational Risk-driven Security Assurance Technologies for Services.** Ensuring that mobile financial services are sufficiently secure is vital for their acceptance. Systematic risk-driven assurance of sufficient and credible security and privacy effectiveness and efficiency is important for critical services such as the ones connected with finance and payment activities. It is a remarkable challenge to obtain enough security evidence from practical services due to the complexity of underlying systems and the dynamically evolving nature of security risks. Practical operational security and privacy assurance methods and tools, and reference architectures to build them into services, are needed. Decision-makers need early visibility of effectiveness and efficiency of security solutions, and mechanisms to manage and visualize the evidence. It is of utmost importance to develop future technologies and platforms in a way that enough support for the operational monitoring and measurement of security and privacy is possible, and evidence is available and attainable. The new solutions should support building-in solutions for security and privacy during design and operation of services. They also support security and policy management in a way that suitable technical, administrative and operational security and privacy controls can be designed, implemented and deployed based on them. The ultimate goal is to be able to find close-to-optimal security effectiveness / efficiency ratios for different types of services, resulting to **better security level with less cost**.

### 7.2.3 Goals

**Mobile financial services.** The goal of mobile financial services is to introduce mechanisms and platforms for service developers enabling financial transactions in the services. As an example, take platform for "wallet in a mobile phone" concept that replaces or complements the traditional wallet with cash and credit cards, and to enable Single Sign-On authentication to mobile services. Focus is to develop safe and flexible trust enablers as well as cost-efficient banking and payment tools for both existing and new innovative mobile services. Furthermore, the goal in mobile financial services is to identify and specify the existing financial services value networks, e.g. retail, banks; identify, plan and exploit national and global business opportunities in mobile financial service value networks; and establish a set of service components for services. New opportunities of combining business-critical transaction data with open and personal data are evaluated, and novel concepts for retail customer users are identified, designed and validated.

**Visibility enabled structured finance solutions for eEcosystem** The goal of the visibility enabled structured finance solutions for eEcosystem is to leverage SME's possibility to interact in global business networks with large corporations and at the same time provide sufficient funding mechanisms (i.e. transaction banking products) that rely on the quality and accuracy of information from SME's transactions. Focus is on the integration of collaborative supply chain –eEcosystem– and finance service platforms to enable service development concepts and tools for new and innovative structured products.

**Operational Risk-driven Security Assurance Technologies for Services.**

- Building novel systematic, practical and risk-driven tools and methods to gather, manage and visualize security and privacy evidence during service operation aiming at better security level with less cost.

### 7.2.4 Results

**Mobile Financial Services**

- A set of methods, components, tools and platform architectures to create secure mobile financial services in their domain areas.
- Agile service development processes are introduced in a value network.
- Mobile financial service solutions with high usability as a product of careful user experience evaluation.
- novel concepts for utilizing transaction data to create value for retail customers

**Visibility enabled structured finance solutions for eEcosystem**

- Process models to enable visibility for the financial institutes in demand-supply networks (i.e. extensions to the Universal Business Language – UBL),
- Collaboration framework to deploy new services to eEcosystem,
- Risk models to manage pre-shipment financing (i.e. financial risk modeling for number of quotes and order book), and
- Interface descriptions to communicate with banks (i.e. SWIFT extensions to the ISO-20022, Universal financial industry message scheme)

**Operational risk-driven security assurance technologies for services**

- Risk analyses and security and privacy requirements for mobile financial services, including design and operational issues.
- Methods for operational security and privacy quantification emphasizing effectiveness and efficiency objectives.
- Tools and methods for the management/monitoring and visualization of security and privacy evidence.
- A reference architecture for evidence gathering in selected service platforms.

## *7.3 Theme 3: Education Platforms & Services*

### 7.3.1 Description

We live in a technological world, surrounded with social media and mobile technologies that require substantially different reading and information processing skills. However, education at school, universities and in work life is still mostly based on linear reading. This gap has resulted in the deterioration of motivation and learning results of today’s youth (Luukka et al. 2008). On the other hand, multimedia materials and smart spaces enrich printed media (Seisto et al. 2010). New technology enables natural interaction with learning materials, utilizing the full sensory capabilities of the human learner. Instead of studying indirect, passive materials, the student can directly interact with the phenomenon, which can give a huge motivational boost for the student. For the illiterate or people with learning difficulties or sensory disabilities, new technologies can open access to a level of understanding that would be totally unavailable using traditional teaching instruments that do not take into account their individual challenges.

mLearning and eLearning can activate students in new ways. Playful learning materials enable learning by exploration and educational exercise games can activate the student physically. However, the potential offered by new technologies is still largely underused at schools, universities and in work life. There is a lot of unexploited potential for mobile educational services. Teachers also feel that the current educational software are hard to use and do not optimally integrate into the teaching institution´s everyday processes.

Education services to be developed in this TIVIT program aim to create mobile services that enable innovative new ways of teaching and learning. Mobile technologies enable learning that is not bound to location or time. Moreover, natural interaction also frees the learners to interact with each other, with other people and with the smart learning environment during the learning activities. These characteristics offer new potential for life-long learning and transferring of the educational services to third parties. Added value will be brought through technology by enabling individual learning styles via adaptation to the users’ abilities and individual learning needs as well as to the devices used. Services may support, for example, schoolwork, life-long learning, or training in companies. Below, we will describe focus areas for this theme.

### 7.3.2 Focus areas

### a) Pedagogically sound learning technologies and platforms

**Pervasive cross-platform environments for mobile content sharing**. The aim is to build online/mobile services that support easy content creation for cross-device/platform applications. The platform allows the same content to be created and unified for different devices and supports mobile solutions for teaching and learning, utilization of the learning material in different contexts, e.g. in the field, homework assignments etc. This also includes flexible media delivery solutions enabling e.g. scalable streaming of multimedia and 3D representations to a variety of end user devices.

**Context aware services for informal and formal learning.** The aim is to develop solutions for different devices and varying learning spaces. The goal is to find out best methods to support different (existing) tools and content in the learners' or teachers' own (current) environment, including informal and formal learning environments (school, homework, social activities). The aim is to extend and complement formal learning. Thus, the attempt is to facilitate collaborative learning outside classrooms on both individual and communal levels. The success of any product or service in international markets requires a good knowledge of customer needs in the planned variant market areas and appropriate localization of the product to fit the local needs and culture (Aykin, 2005). Therefore in designing context aware services for learning it is vital to take into consideration also the cultural aspects in order to create truly exportable products. Cross-cultural research and design ensures that products are easy to use and provide good user experience across cultural boundaries.

**Collaborative knowledge environments**. Development of collaborative knowledge solutions that are device independent, customizable to fit the customers' needs and support content creation and adaptation by a wide selection of content providers. In order to enable customization of collaborative knowledge environments in different variant markets, it is important to internationalize the solutions, i.e. to ensure that products/services are designed and developed free of any culture-specific attributes, so they can be easily localized and adapted for local needs.

**Learner modeling and personalization.** The goal of personalized learning is to offer opportunities to learn when and where we need to, with learning resources delivered just for us and taking into account our existing knowledge and preferred ways of learning. This would enhance learning experience and the effectiveness of learning, because learning resources fit better to the needs and context of learners. The aim is to develop learner models and methods that support personalized, context-aware learning services.

**Adaptable services.** Services should be built in a way that they automatically adjust to the skill, cognitive and activity level and contextual needs of the user. They should enable the user to learn new, helpful features on their own pace. The program encourages moving towards highly personalized services and perceptual user interfaces, i.e., the user does not anymore have to adapt to the information system, but the system adapts to the user.

A novice user usually needs and requires only a reduced set of features. As the novice user gains skills and experience, the service evolves to the next level and offers more advanced features. A parallel would be the levels on a computer game. Any features should always be available also for novices when needed, and the system should help the user to get them.

Such an adjusting, evolving service would be especially useful e.g., for educational applications, for the elderly, or for emergency staff.

Some ways to accomplish such advanced user interfaces would be to observe the user's voice, face, gaze, brainwaves and other multimodal cues, in addition to the implicit commands to the user interface. Also assisting systems such as speech recognition technologies (iPhone Siri etc.) or context awareness may be useful.

**Services to support teachers' adaptation to technology**. The high potential of technology is often underexploited because teachers feel it is hard to use and maintain. Furthermore, the technological solutions may not easily integrate into the everyday processes of an ordinary school day. The goal is to build services that support easy take-up and adaptation to technology.

**Support for teacher's content creation and management**. The aim is to develop teacher's support for selection and adaptation of materials as well as tools for creating and adding content. Especially, the same content should be unified for different devices and be available online (tele-content).

**Social media in learning.** There is a growing interest among educators towards the social media, which has revolutionized informal learning. On the other hand, many teachers feel that the currently available tools and applications are hard to use. Therefore, the high potential and added value offered by social media and new mobile learning technologies is largely underexploited. Social media can be applied in education in a wide variety of subjects. However, there are areas where it is considered especially relevant, such as language education since social interaction is a natural element of language.

**Active learning spaces for teaching natural sciences.** There is high potential for the utilization of mobile and active learning spaces especially in themes that are hard to be taught with current methods. Multisensory perception and immersive simulation of the dynamic phenomena can be key factors in understanding difficult concepts such as electricity, magnetism, gravitation or centrifugal force – to mention a few. The aim is to develop and evaluate new mobile techniques (such as smart phones, different sensors, NFC readers and tags, cameras, projectors etc.) in pilots that utilize a common platform in education of difficult concepts in natural sciences.

**Mixed reality solutions in learning.** Mobile learning and augmented reality offer high potential for interactive materials that could enrich the learning experience. Smart phones with location awareness and access to online information could offer great tools for getting educational information on our surroundings. For example, camera-equipped smart phones could provide educational lenses that augment the current view with history of a building or location.

**3D Internet.** Like mixed reality, 3D Internet offers potential to rich, interactive learning materials. Learners can move in a 3D virtual reality concretizing the study topic. As the whole environment is simulated, the learners' view to it can be controlled freely. The learners can zoom in to microscopic level to see atoms, to macroscopic level to see the galaxies and speed up time, for example. Moreover, with tools for content creation, teachers and schools can create their own content. Web-like linking between 3D spaces and other study material enables efficient information retrieval and content management.

## b) Interactive mLearning and eLearning services

**Educational exergames.** Playful learning is an effective way to reach children and teenagers. In addition, exercise games (exergames) have positive impact on the youth's health and they can also increase their overall physical activity level. However, very little is known about the importance of the experiential aspects on the motivation for exercising and learning. This theme combines two interesting and challenging research areas: exercise education and playful interaction by utilizing mLearning technologies.

**Adaptive educational social games.** The aim is to develop mobile platforms that enable implementation of social games that the whole class or school can play. The idea is to support learning of content that is useful for all players and on the other hand, support social engagement and the feeling of solidarity within classmates.

**Mobile homework.** Mobile services for learning could allow school children to enjoy outdoors while doing homework. For example, learning biology and local flora could be more interesting by studying the plants instead of reading about them from a book. A mobile botany game could replace the traditional biology homework to collect and dry plant samples by making a social game of it. The aim is to implement and evaluate services for mobile homework and build tools that allow teachers to easily build, modify and monitor the tasks.

**Personal development advisor services**. Lifelong learning and different kinds of personal life coaches are becoming popular. Similar personal development procedures could be applied to lifelong professional development. Instead of—or in addition to—supplementary courses, the professionals could learn on the move by utilizing mobile and eLearning services.

**Adaptive textbooks.** Tablet PCs and other mobile devices can transfer textual and picture materials into formats that are accessible to students with varying levels of learning difficulties. Using higher level user modeling, all learning materials could be adapted to match the user's special needs.

**mLearning and eLearning technology in selected subjects.** This focus area includes any targeted mLearning or eLearning solutions for specified areas such as health, sports education, biology, mathematics, languages. Even though the pilot is focused on a specified topic, the implemented service should ensure sustainable solutions and easy transfer of the services.

**Multidisciplinary team learning**. Each member of a multidisciplinary team has skills that the others lack. Together they can operate optimally and are more than the sum of the elements. Each student can learn different subjects while also learning together as a team. The aim is to study how to support this kind of distributed learning and develop mobile services to support team learning.

## c) Packaging educational services into exportable products

**Investigation of key players for sustainable services.** Sustainable services need long-term commitment from the local players who will be responsible for the maintenance and local training. On the other hand, the level of computer literacy and knowledge of technologies varies greatly. To make sure the solutions and services developed in this project will not be left into pilot stage but will develop into exportable and sustainable services, we need to identify key ecosystem players and work with them from the very beginning. This focus area aims to (1) identification of service providers, (2) competitor analysis, (3) benchmarking the state-of-the-art for the field in the target area (e.g. developing countries).

**Services to support technology transfer to developed and developing countries.** The aim is to develop services (e.g. online portal) to support Finland–third countries experience transfer. Innovations developed in Finland could be transferred to both developed and developing countries, provide new possibilities, an easy way to buy the service, distributing the whole package.

**Services for Mobile School.** Mobile school is a concept for primary education enabling children in developing countries to achieve literacy and societal competence in their daily environment. The aim of this focus area is to implement customizable educational services for urban slum environments. The Asian Green Megacities Association of Finland provides a test bed for the pilot services (www.asiangreenmegacities.fi).

**Unified, common foundation platform for business oriented education solutions**. There are plenty of pedagogical innovations that lack a unified common platform, which prevents commercializing the ideas into products. The aim is to implement solutions that can include separate services, reproducible, business-oriented solutions for teachers, and an IT platform solution that can glue separate innovations into a unified offering.

**Culture wizard services.** Development of services to support learning to adapt to culture. The aim is to develop global cultural content platform, based on ubi/mobile services that know the location of the user. The services help to adapt to the current culture; this might be useful for example for educating businessmen before/during a business trip.

**Commercially viable open source solutions for mLearning and eLearning.** In the business model affordable distribution, the price of the licenses is usually not the issue but the overall costs and long guarantee for recycle etc.

**Quality assurance support service for education**. The aim is to provide technology that supports quality assurance at all levels, including business solutions as well as open educational content quality assurance services. Peer reviewing could be one possible way to implement the quality assurance as part of educational service.

### 7.3.3 Goals

The high potential offered by new multimodal, mobile and social technologies is largely underexploited in education today. The Finnish Ministry of Education and Culture defined the vision for education and information society in 2020 (Opetus- ja kulttuuriministeriö, 2010). One of the four goals defined in the memo is to *increase the utilization and availability of e-learning materials and services in education*. TiVit Educational Services will meet the challenge by implementing technological platforms and mobile services that ensure Finland will be able to live up this vision.

The program aims to services that can be implemented into products which are transferrable to the global market. This can open new market areas and enhance Finland's international competitiveness. From a societal point of view, mobile learning services can offer more equal learning opportunities, e.g. for pupils with special needs and the poor.

The goal is to develop new learning services and procedures that not only support mobile and pervasive learning but can be easily integrated into everyday processes of the ordinary school day. We aim at high quality services, with easy take-up and maintenance. User perspectives will be taken into account in all phases of the project; this is especially important in cases that aim at global market or developing services for challenged learners.

The services for different focus areas will include support for learning at all levels, from basic education to professional training, including informal learning that happens during leisure time and social activities with peers. We aim at fostering pedagogical solutions. Interdisciplinary project teams will ensure the work is based on the most recent research results of both pedagogy and technology.

In summary, the Educational Services theme aims

- To create interoperable learning platforms based on existing components and TIVIT enablers.
- To provide the selected users with new mLearning and/or eLearning solutions.
- To make educational services into exportable products.

### 7.3.4 Results

Finland is one of the leading countries in mobile technologies. Finland is also referred as an exemplar of excellent educational system. The pilots developed in this project will combine these two high expertise areas into flagship services that will boost the competitiveness of Finnish educational solutions in international markets.

Results will be service pilots in Finland, India, Europe and Africa. Multimodal and mobile learning technologies will be exploited in various learning environments, covering a wide scope of topics. Results will be reported in scientific publications as well as through public media. Best practices and guidelines will be gathered into reports for the benefit of future practitioners.

By working with the whole ecosystem (the school system, individual teachers, the commune, ICT industry and local distributors) we will make sure the research pilots can grow into sustainable services that can be adapted and transferred to international markets.

## *7.4 Theme 4: Wellness services and Ecosystems*

### 7.4.1 Description

The target of the wellness theme is to develop an open wellness ecosystem for value-adding service and device innovations. The wellness theme will take a holistic lifecycle wellness approach but keeping short of medical solutions. Dual utilization of medical health platforms for wellness purpose will however be on the agenda.

### 7.4.2 Focus areas

The wellness theme has three key focus areas.

Platforms for wellness services enable basic health service creation without major investments into basic wellness ICT elements. Platform capabilities include elements such as wellness databases, developer APIs, basic analytics, data collection as well as a number of other commonly needed platform features to be shared with the other themes.

Personal wellness services, applications and devices are the elements of the wellness theme that are visible to the end users. Wellness services are focused verticals that enable users to access specific use cases. The specific services may also be developed as wellness devices that encompass or augment the service delivery.

The third focus area is wellness services and applications within the occupational health framework. This area looks at bridging the gap between personal health services and professional wellness services, paving the way towards further integration of wellness and health systems in the future.

### 7.4.3 Goals

The aim is to create a wellness ecosystem with common platform access and the capability to develop enablers and tools for integrating different categories of value adding services and technologies.

The wellness technology package will target in developing components and capabilities for integrating technologies for automatic wellness data collection. A common interoperable platform of enablers and database capabilities is compiled. Common wellness data storage will provide the opportunity to leverage all the user wellness data for a holistic coaching approach, as well as for preventive occupational health services.

Data analysis will be facilitated by developing and enabling the integration of tools for professional wellness data analysis and content delivery.

Different feedback and coaching services and motivational tools will be developed and their integration into to service will be made simple.

### 7.4.4 Results

- Thriving wellness ecosystem, with multiple companies and segmentation of wellness businesses to enable successful monetization opportunities for platform, analytics tools, and application business models.
- Tools and ways of working to easily bring in new wellness operators and companies. With low entry thresholds.
- Package of enablers for wellness and health enablers, such as privacy tools, delivery channels and monetization mechanisms.
- Selection of wellness applications and a rich user experience for end users.
- Wellness data storage tools with verified legal framework.
- Occupational health.

# 8 WHAT WILL BE CHANGED

## *8.1 Research ecosystem*

The research agenda described in the SRA will focus on applying research to practice. The aim is to create a sustainable channel of research findings to business implementation. This is done by creating two-way visibility between companies and research entities. Researchers are given visibility to real-life problems as well as a bird's-eye view to the service industry ecosystem. Real-life problems ask for real-life solutions from researchers. The birds'-eye view allows researchers to identify gaps in the platform, enabler or service offering. This gives raise to new startup opportunities in the academic sector. To facilitate spin-offs from universities, angel and funding partners will be kept within arm's length of the Services program, to help possible formation of new businesses.

## *8.2 Business ecosystem*

Radical changes in the business ecosystem are put forth with the creation of common palettes of service platforms and enablers. Traditionally each company has been left alone or as a side kick to large ecosystem players promoting their own platforms. The services program will facilitate the creation of a neutral platform and enabler palette. The neutrality helps in creating trust in the ecosystem and its peer support structures. It's easier to get advice from a peer developer on what platforms to choose.

The ecosystem will also provide de-facto examples of different business models and provide developers and researchers a good test bed to propose new business models into the palette.

An ecosystem approach enables true global targeting by even smaller players, as the ecosystem can provide marketing and customer visibility support in markets that would not have been accessible by the companies alone. The ecosystem also provides stepping stones for smaller businesses to expand their products and global markets when their offering has been sufficiently verified in the Finnish "safe haven".

## *8.3 Paradigm*

The core paradigm shifts in Services development are:

- Fragmentation, self-work, direct case-by-case contracts and local business move to an ecosystem service implementation approach.
- Service Businesses are traditionally local platformization of enabler elements allow for first truly global business.
- The ecosystem approach allows for cohesive value chain creation supporting specialized ecological boxes for companies to thrive in.

Finnish service business is broadly global with capability to target global markets from all players. This brings us a new customer base of 1 billion people.

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