

# SYSTEM INNOVATION: CASE STUDIES



FINLAND - Transition to smart transport systems in a city context



# **Transition to smart transport systems in a city context**

## **- The case of Finland**

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### **1. Selecting the Finnish case study of systems in transition**

#### **General economic context**

Finland's economic outlook is quite bleak at the moment. The Finnish economy's growth potential is low due to demographic factors, sluggish investment and rigid export and production structures. In addition to the general economic downturn, Finland also has problems with industrial competitiveness.

The Finnish GDP is expected to grow only 0.1% in 2014. This forecast is lower than in the euro area in general. The forecast includes the assumption of an economic turnaround starting from 2015 with GDP growth at 1.4% and in 2016 1.9%. The forecast for the average unemployment rate in 2014 is 8.4% while productivity, measured in the number of hours worked, also will develop quite slowly. The single biggest driver for economic growth is foreign trade whereby exportability of new products and systems is an overreaching important policy aim. Export forecasts are overshadowed by sluggish international demand and Finnish exports currently grow at a slower pace than world trade growth. Failure to resolve the crisis in Ukraine could worsen the situation further due to Finnish dependency on export revenues from Russia.

A further issue is the general Government budgetary position has been in deficit for five years now, and the same situation will continue in years 2014-2016. The relatively sluggish rate of economic growth and announced adjustment measures will probably not be enough to turn public finances into a surplus in the coming years. The ageing population is also putting a major strain on public finances, reducing the number of people of working age and at once driving up age-related public expenditure. Public debt to GDP will continue to rise and is soon set to breach the 60% limit.

## **Industrial restructuring in Finland**

The dramatic slowdown in Finnish manufacturing production and exports since 2008 is not only due to financial crisis but can be largely assigned to implications from globalization as such. The loss of market shares and shift of production from Finland abroad coincided with the financial crisis.

In a broad picture manufacturing driven exports has historically been the backbone of the Finnish economy. The economic performance is largely based on strongholds and global know-how in several industries, such as forest based products, metals, machinery and high tech, high value added products and industries.

However, during the past years Finland has divested most of its mobile telecommunications production due to the merger between Nokia and Microsoft. Finland is still strong in ICT but the focus is shifting from mobile telecommunications towards network infrastructure and service businesses and this shift has partly compensated for the decline in mobile phone exports. Nonetheless, during the past six years Finland has lost almost 9 billion euro in the value added of electronic industry i.e. mainly due to the decline of mobile phone exports. Furthermore, structural changes due to ICTs have decreased the demand for paper and forest products, another major stronghold of the Finnish economy. A key issue is how Finnish traditional strongholds especially in ICT can find new application areas.

## **Government's push for growth: bio economy, cleantech, and ICT/digitalization**

Largely also due to the current difficult economic situation the Government has put emphasis on finding new sources of growth and business opportunities. The Government has in spring 2014 adopted several strategy documents concerning growth areas where Finland sees its strengths and potential for global demand coinciding. Further, the Ministry of Employment and the Economy has also launched new guidelines for renewal of Finnish industry.

The identified growth areas have been very broadly defined as bioeconomy, cleantech and ICT/digitalization, all of which are considered as important enablers for renewing traditional Finnish strongholds. In these strategies the Government has set very ambitious targets for creating new business and jobs. It has also taken a holistic, system transition type of approach (compare e.g. with Grin et al. 2010). The ambition is to bring together different actors, instruments, emphasize the importance of creating competitive ecosystems, include policies combining supply and demand, and targeting global challenges also as sources of new business opportunities.

In the cleantech strategy the Government emphasizes not only the importance of investment but also the creation of demonstration environments and role of cross-

administration co-operation in the implementation of the strategy. This cross-administration co-operation includes working closely together for promoting cleantech business in various international arenas, speeding up of the license and permit processes for cleantech projects as well as cleantech innovation friendly regulation regardless the type of legislation or the field of administration responsible for it.

For the bioeconomy, which the Government sees as the next major growth wave after (or in combination with) ICT, the aim is to create a competitive operating environment for greener growth, to create new bio economy business activities through risk financing, bold experiments and transcending boundaries between different sectors. In addition, the strategy includes measures to upgrade the bioeconomy knowledge base by developing education and research activities and finally, to secure the availability of biomass, a functioning market for raw materials and the sustainability of use.

Overall the policy guidelines emphasize the use of knowledge base as means of taking better advantage of the new opportunities at the global market. This requires paying more attention to customer requirements and managing the whole value chain.

### **Smart cities and traffic as important themes in recent innovation policy programs**

The holistic approach is also core feature of many new programs launched by Tekes as the main public RDI funder and implementer of innovation policy Finland. In addition to providing RDI funding for collaborative projects and PPPs Tekes programs are also increasingly designed to become platforms, or facilitators, for the exchange of information and networking between businesses and research groups with the aim to create spillovers in various thematic areas. Services that support networking and developing business models are essential elements of the programs.



Figure 1. Examples of new Tekes programs

The best examples of programs with a holistic approach include the Green Growth, Innovative Cities (INKA), Witty City, Electric Vehicles and Systems (EVE) programs. The INKA program is the newest and has the strongest linkage to the government policy level. The INKA program also constitutes the main innovation policy context of the Finnish case study that focuses on the transition to smart transport systems in a city environment.

The overarching aim of the INKA program is to support system level transitions and exportable innovations in a city and regional context in different thematic areas, whereby cities and regions are considered as the main actors and platforms for change. The selected themes are Future Health, Sustainable Energy Solutions, Smart City and Renewable Industry, Bio economy and Cyber security. Five cities were selected to facilitate these themes and for each theme there were also selected partner city regions.

The INKA program started in 2014 and will end in 2020. It was designed by the Ministry of Employment and Economy based on broad consultations with various stakeholders, and includes co-funding from different ministries and Tekes. The more specific objectives of the INKA program is to create attractive innovation hubs as a result of PPP cooperation between largest city regions and the State, and involving also universities, polytechnics, public research organizations and companies. Actions are targeted to development of innovation environments, lead-markets and national and international collaboration of hubs. The idea is to facilitate cooperation between users, companies and public players and the piloting of solutions in genuine development and experimental environments.

With reference the Multi-Level-Perspective on transitions, developed primarily by Geels (2002, 2011, see also Grin et al. 2010) and utilized as an analytical framework in this OECD TIP project, the INKA program thus also has implicit ambitions to put pressure on, impact the current policy mix of cities (i.e. the current regime) to enable the smoother development and uptake of smarter solutions related to the five thematic areas. In the background are broader governmental ambitions to enable a transition towards greener and more sustainable growth in a way that also opens up new innovation and export opportunities (new innovative niches) for smart system innovations on emerging markets.

The more specific case study reported in this paper concerns the city of Tampere with a focus on smart transport systems as part of the broader transitions towards greener and more sustainable (see Figure 2). Tampere is the third largest city in Finland with a population of 221 000 and situated in the central part of the country. The city has the ambition to utilize the INKA program for renewing its traditional industry base. Tampere is also uniquely endowed with ICT competences due to the strong continued presence of Nokia Network Solutions and other ICT and related companies. In addition the city hosts 2 universities, several polytechnics and a large branch of Technical Research Centre of Finland, all of which also add to ICT competencies in the region.

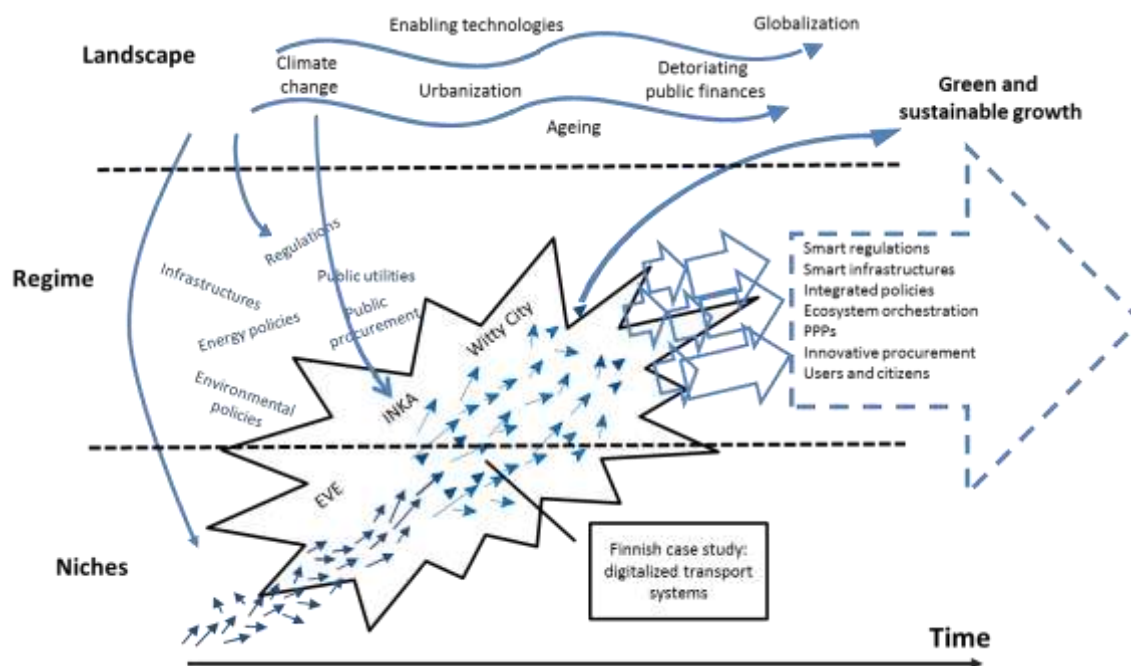


Figure 2. The Finnish case study from a multi-level perspective (based on Geels 2002)

Other smart transport system related programs of relevance to this case study are the Tekes EVE and Witty City programs. The EVE program started in 2011. Within the framework of this program the Ministry of Employment and the Economy, Tekes and private companies are setting up a test environment for about 400 electric vehicles in the Helsinki Metropolitan area in Finland, in order to develop the infrastructure and transportation system, services for users and business models in addition to vehicle technology itself.

The Witty City program started in 2013. Its aim is to provide people with better living and working environments and companies with opportunities to bring new products and services on the market. Cities will play a key role in the program as they are central players in such areas as planning, procurement and the choice of energy sources. The program funds RDI activities, supports networking and connectivity within Finland and towards other smart city hubs globally. The program also integrates demand-side instruments into its policy mix, such as innovative public procurement and challenge-driven competitions. Collaborative PPP projects between business, municipalities and research organizations are prioritized.

## 2. Organization of and Methodologies in the case study

The Finnish case study has relied on the conceptual framework, methodologies and template that the OECD secretariat and the participating countries jointly have agreed on. The methodological approach has covered documentary analysis, participatory group interviews as well as bilateral interviews as indicated in table 1.

Table 1. Approaches and main phases of the Finnish case study work

	2013			2014					
	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
Documentary analysis									
Group interview									
Bilateral interviews									
Synthesis of material									
Drafting of report									
Validation workshop									

The *documentary analysis* has included ministerial level white papers, INKA and Tekes program documentation, Tampere strategy papers as well as research reports etc.

The *group interview* in November was organized as a workshop with key stakeholders from the Tampere city council, public research sector, trade organizations and companies and involving altogether 23 persons. The workshop started off as a general discussion about the development of smart transport systems and related transitions, including the role that policies such as the INKA and Witty City programs could play. Thereafter more specific issues related to leadership, involving businesses and required competencies at the niche level were addressed in smaller groups.

The *bilateral interviews* during December-March mainly involved policy makers and researchers, including a few company representatives, and covered 11 persons. The interviews focused a bit more on regime level, i.e. on the concepts of 'smart city' and 'smart traffic', the role of national and regional policy visions and strategies, the institutional preconditions and barriers for developing smart traffic systems and enabling the transition. They were based on a pre-defined interview structure that was inspired by the common OECD template. A list of interviewees is included in an appendix.

The *synthesis of the material and drafting of this report* has loosely relied on a grounded-theory type of approach where key issues have been identified from the data by highlighting commonly emerging findings. In June a small workshop was organized with the managers of Tekes INKA and Witty City programs for *validating the preliminary findings* reported in this paper. The workshop and interview are mainly used in sections 3,4 and 6 of this report.

### **3. Characterization of the Stage of Transition**

#### **Current and future transport regime in Finland**

Finland is a large country with a small population. Two thirds of Finns live in an area that comprises 5 per cent of Finland. The population is strongly concentrated in cities and their surroundings in the southern part of Finland. The Finnish population is also ageing very rapidly: in 2030 26 per cent of Finnish will be over 65 years old. Although the geography and demography poses challenges, cities also offer possibilities for intelligent use of public and intermodal transport.

The Finnish transport system is heavily based on passenger vehicles: their share (km of transport) is 79 per cent of the total transport. The public transport accounts for 19 per cent and cycling/walking 4 per cent. In 2000's share of cycling and walking has decreased and share of public transport has increased.

The transport creates 20 per cent of GHG emissions, of which the road transport causes 90 per cent. Private cars are the largest source of emissions while freight transport is also a significant emitter. The use of private cars has increased in recent years due to urban sprawl and centralization of services.

The strengths of the Finnish transport system are good traffic flow and low congestion, well-functioning public transport and management of winter conditions. Finland also has high degree of deregulated infrastructure in energy, telecom and transport. The main policies that regulate and steer transport are transport regulation, taxation and subsidies. Innovation policy has traditionally not played a big role but recently the situation has



changed mainly through the launching of programs such as the Tekes EVE, INKA and Witty City programs.

The elements of the future transport regime have been put forward in various strategy documents by the Finnish Government and the Ministry of Transport and Communication. In addition to national policies, transport system is also affected by EU and local transport policies and strategies. In addition to transport policies, also innovation, energy, fiscal, industrial, environmental and land use policies affect the transport system.

The main goal of the Finnish transport policy is *to secure smooth and safe mobility in accordance with the needs of the economy and the inhabitants of Finland, along with measures to reduce transport-related emissions and promote sustainable development.*

Overall Finnish transport policy is quite progressive while the Ministry of Transport and Communications seems to be in a system innovation and transition policy mind-set. However, in practice the policy mix is still quite narrow and in case of innovation policy tools it is focused on supply-sided RDI funding instruments, even though e.g. innovative procurement and competitions are being launched through the new Witty City and INKA programs and through other initiatives. New types of tax incentives and experimental approaches have also been introduced at the niche-level related to electrical vehicles and new public transport services.

In Tampere the transport system is under comprehensive development. The focal point of the smart transport development is the central railway station and its surroundings. The INKA program will provide support in combining RDI activities with competences across the country in thematic clusters. INKA program will also challenge Tampere to take more ambitious and systematic approach to development.

In addition, the overall Tampere strategy is to actively bring together different actors and makes the whole of Tampere a platform for an intelligent city development. Tampere has a strong industry base and particular strength is ICT. Much of this base relates to the strong presence that the major telecommunications company Nokia has in the city. Nokia Research Center in Tampere carries out research in media technologies, including audio and visual technologies, contextual media systems and novel user interface technologies, as well as novel radio technologies. Key collaborators are Tampere University of Technology and University of Tampere. Another important ICT hub in Tampere is ITS Factory, and innovation, experimentation, and development environment co-operated by the city of Tampere and numerous other companies from relevant sectors. These hubs make the Tampere City Region into an important forerunner and ecosystem for testing and developing new smart transport system solutions (see Figure 3).

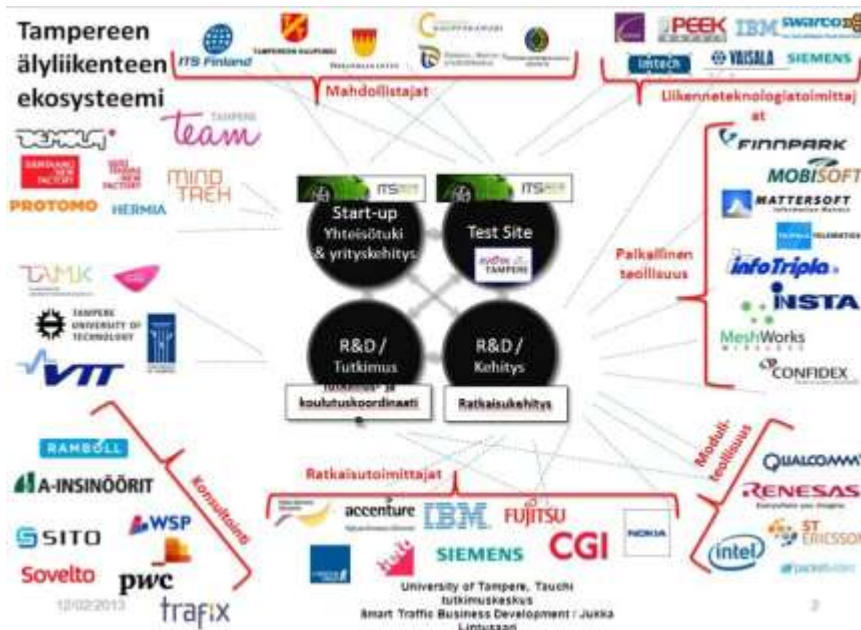


Figure 3. The emerging Tampere smart transport system ecosystem

The key strengths of Tampere smart transport are open data, new data transfer solutions and technologies and recognition of vehicles and users. Solutions for electrical vehicles and city rail transport are seen as most significant smart transport solution from a business point of view. Objective is also to develop new type of solutions for walking and cycling for future city environments.

Thus, the transition in focus in this case study is in a relatively advanced state of policy design although *developments at the regime and niche levels still are in an early phase*. The development towards digitalized transport systems are detectable both at regime and niche levels while the broader transition to green and sustainable growth still may take decades to unfold also in Finland. In terms of an S-curve of a typical transition the current state of these developments could be pinpointed to the early phase of take-off (see Figure 2). This is typically the phase where many new initiatives have been launched and the current regime is coming under pressure but a stronger diversity of policy instruments still are needed to align new niche-level initiatives towards a common goal and system innovation. This applied both to Finland as a whole, as well as to the INKA city of Tampere.

## 4. Identifying Transition Mechanisms and Bottlenecks

### Drivers for developments towards smart transport systems

Drivers for regime- and niche- level change related to the transition to smart transport, both in Finland and the city of Tampere, are mostly similar to those in other developed countries (see Figure 2). They include big societal challenges as climate change, urbanization, ageing, globalization and the prolonged economic crisis. In addition, the Internet is also changing consumer preferences and values while engaging consumers and users for innovation in many new ways. These changes are also pressurizing existing regimes and creating new opportunities for niche innovations.

*Climate change* has led to very ambitious emission and renewable energy targets especially in the EU and these are also in a very concrete way pressurizing current norms and regulations in Finland. *Urbanization in combination with ageing* and the prolonged *economic crisis* is creating urgent needs to effectivize public services especially in health care, transport and other public service areas. The development of smarter and more effective infrastructures and service provision models is a logical response to this. Further, *global competition* is challenging, but also given rise to new, innovations and business models. Meanwhile *emerging and enabling ICT technologies* – especially related to Internet of Things and big data – are creating new opportunities for smarter transport system solutions.

More specific driver for Finland is the aging population. In Finland the population is aging at the most rapid pace in the European Union. The challenges of public finances is also an important driver for transport system to change in to more efficient at the same time allows to maintain the service level or even improve it. Another type of driver is the *availability of qualified persons with high ICT skills*. Since the collapse of Nokia cluster, there has been an abundance of skilled ICT workers at the Finnish labor market. This has meant that other sectors of industries have been able to recruit and absorb them. One concrete example of a facilitator in this context has been the Nokia Bridge program that has succeeded surprisingly well.

As suggested earlier the main *national policy drivers* relate to Ministry of Transport and Communication. In its policies the Ministry has advocated a broad based approach for transforming the transport system regime. Policies advocate a broad set of measures and mark a clear departure from traditional approach where infrastructure development and regulation were the main tools. For example the creation of new niche level business has explicitly been mentioned as one objective. Further, particular emphasis has been placed on co-operation through public private partnerships (PPPs). The role of public sector is seen as an enabler for new types of business ecosystems where also the role of users is important.

Recently, with the new Tekes programs like INKA and Witty City, the portfolio of innovation policy measures is set to widen also in practice. However, the challenge is to link the objectives of the transport policies and the relevant innovation programs to the wider policy discussion on city development. Many experts advocate that the city development needs to be rethought and put in center in policy discussion. Success can only be achieved through concerted effort and converging visions by both public and private sector actors.

### **Barriers for regime and niche level changes**

Barriers for a transition towards smart transport in the context of the INKA program and the city of Tampere can be identified both at the regime and niche levels. *Societal and policy silos* at the government and city levels still prevail and prevent coherence of visions and their cross-sector implementation. Overall it seems that collaboration and coordination especially between the Environment, Transport and Communications, Employment and Economy ministries is increasing and functioning quite well. However, in practice, there are still competing visions and strategies both at government level (.e.g. environment and industrial policies) and at local level (e.g. health and transport). Specifically, policies that are that designed in one vertical of the administration are tend to be implemented in that same vertical, while an overall holistic approach and coherence in implementation is lacking at the horizontal level across ministries.

A similar challenge of vertical strategizing versus horizontal implementation exists at the city level. This challenge comes to the forefront especially in the context of the INKA program that is delegating an innovation policy mandate to city councils. There is some confusion on the role of public authorities in the 'new PPP transport ecosystem' that also comprise of public research organizations and companies of different sizes and from different sectors. For example, a challenges in Tampere is what kind of role the city should play in collecting public data for transport solutions, how this data should be used and which business models should be developed to also engage companies and users. *Uncertainty in the division of labor* hampers niche developments and challenges the existing regime of regulations, norms and other institutional arrangements. At the same time this new innovation policy mandate has to be resourced and organized on top of the existing mandate to develop city services under economic scarcity.

Apart from silos and challenges in the division of labor of actors the 'new' innovation policy mandate also requires new types of competencies at the city level. City officials may often *lack necessary competencies to implement innovation policies* and make use of available instruments for supporting innovation and business ecosystem creation. The cities are no longer only producers of services but also active operators and enablers whose task is to support market formation and provide platforms for companies to experiment. An especially important and new competence relates to innovative public procurement that is seen as major new innovation policy instrument in cities and municipalities in Finland. Nonetheless, innovation public procurement requires a new mindset, new capabilities to define innovative needs and services, new ways to collaboration with producers and

insights into the legal barriers and opportunities. There is awareness of the potential of public procurement supporting innovation but the implementation is hampered by lack of clear mandate for procurement units and necessary skills. Other measures such as urban planning, land use is on the table, but they are measures with long time horizon and results can only be seen later.

As new types of 'PPP transport ecosystems' the cities also need to find *new ways to collaborate with companies* beyond procurement. An underlying objective of the INKA and Witty City programs is to support test-beds, foster new business ecosystems and entrepreneurship, growth and system-level solutions for new markets locally and globally. Cities have to provide sufficient incentives for companies to enter these new partnerships e.g. by creating markets and engaging citizens as lead users for new solutions and in some sense act as system integrators and stepping stones for exports. Accordingly, there is an ongoing discussion about which actors should and can take on the role as a systems integrator. Should this be the role of the city administrator, public utilities, research organizations or companies? What is the role of foreign multinationals who already may be system integrators, for how long should national ecosystems and niches be supported?

The issue of *system integrators* is important from various other perspectives as well. The role of standardization was discussed quite extensively in the interviews and there was concern that cities may create their own black-boxed smart transport system solutions which may not be aligned with emerging international standards and markets. Collaboration should thus not only be constrained to the city or regional levels, nor to Finland alone, and Tampere is actively developing partnerships also with other foreign cities e.g. in Sweden. Standardization is a prerequisite for market formation. There was also concern that the smart transport visions are too technology focused while less attention at the government and city levels has been given to *integrate users* of new transport services and creating lead markets (e.g. through innovative public procurement).

An overall implication for policy both at the government and city levels is that the stimulation of new 'PPP transport ecosystems' by new innovation policy actors (e.g. city councils) also need new types of RDI policy instruments. Currently *the array of policy instruments remains rather narrow* and dominated by RDI project funding, despite some new elements especially in the INKA and Witty City programs. In the future innovative public procurement should play a much more significant role. In addition, there would be a need for new types of policy instruments that define needs rather than solutions or thematic areas (e.g. like traditional RDI calls) and are more effective in engaging new and even unexpected actors of emerging ecosystems. For example the merits innovation competition should be considered in so far as they can open up for completely new types of standards, innovations and actor constellations. Such competitions could also extend beyond national borders.

Finally, institutional and cultural factors are also important. The new type of organizational innovations and partnerships that are needed require also new types of working methods

and change in the mind set. This is in particular true for the public sector. Public sector has new roles and responsibilities but not necessarily capabilities and right incentives to match them. There were also calls for more risk-taking and experimentation within the public sector. A more outspoken experimental attitude in the public sector could also mandate others to experiment more. For example, according to some interviews there could be more experimentation related to certain kinds of regulation or taxation to boost innovation.

## **5. The National, Regional, Local Policy and Measures regarding Smart Cities**

### **Government strategies and policies on smart and sustainable transport**

Policies potentially influencing socio-technical change in transport systems include transport strategies and policies of the European Union, the Government and municipalities. In addition, other policy domains (innovation, environment, land use) have impact for the stability and transformation of the transport system.

The framework conditions and policies at national level for transport system and smart cities are regulated by the Parliament, Government and the Ministry of Transport and Communication. Other ministries like the Ministry of Employment and the Economy and Ministry of Environment also have their role in formulating policies in their respective fields (e.g. energy, innovation, environment, housing and land use, taxation, subsidies).

In 2012 the Government adopted the guidelines for the future transport policy in a strategy called *Competitiveness and Well-being through Responsible Transport*. The strategy is based on a broad analysis taking into account land use, housing, service structures, sustainable development and requirements of businesses and regional development. The challenges in the public finances, pressure to improve the competitiveness, climate policy, structural changes in economy and need to provide quality public services all require more efficient and impactful means to develop the transport system.

The objective of the transport policy is to ensure smooth and safe transport for both businesses and citizens. In addition to smooth operation of the transport system more attention is paid to reducing transport emissions and supporting sustainable development in the transport policy. In order to ensure the smooth everyday mobility, the functionality and safety of commutation and public transport needs to be improved. The role of ICT in improving growth and productivity is crucial.

In 2013 the *Ministry of Transport and Communication* adopted the *Environmental Strategy for Transport in 2013-2020*. The strategy aims at sustainable and technically advanced transport. The main instruments include not only low emission vehicle technologies and alternative power sources, but also changes in ways citizens move around. One premise

in the strategy is that transport policy for environment can support opportunities for green growth. The Ministry sees alternative power sources and intelligent services for transport as future growth areas for business.

In 2013 the Ministry of Transport and Communication published a second generation intelligent strategy for transport in Finland: *Towards a new transport policy - Intelligence in transport and wisdom in mobility*. To achieve the ambitious objectives of the transport policy, new solutions and diverse range of measures are needed. The strategy continues to integrate intelligent transport services into all modes of transport and into the wider scheme of Finnish transport policy. Particular emphasis is placed on the importance of cooperation between public and private sectors.

The Government budget proposal for 2014 include 1,980 million euro to be used for transport infrastructure, transport related government services and subsidies for the transport sector. This accounts for 3,5 per cent of the whole government budget. Road transport receives both direct and indirect subsidies in the form of tax benefits (e.g. exemptions to vehicle and fuel taxes, tax exemptions for work related travel). The Finnish transport Agency has reported that the tax benefits for road transport exceed taxes collected from road transport.

A working group chaired by the *Ministry of Employment and the Economy* published a report on Electronic Vehicles in 2009. The report set an ambitious objective that by 2020 the production of electronic vehicles, their components, software and design has become a significant export sector in Finland. This was based on estimation that by 2020 the sectors turn over would be 1-2 billion euro and 20 percent of new vehicles would be chargeable and 40 percent of those fully electronic vehicles. The on-going technological shift, structural changes in the automobile industry as well as obligations relating to the containment of the climate change were seen to make electric vehicles a significant alternative both in private as well as in public transport and logistics. The working group saw a substantial potential also for the Finnish companies in electric vehicle and charging infrastructure sectors.

The measures proposed by the working group related to developing an electronic vehicle cluster, starting pilot and proof of concept projects for electronic vehicles, incentives for procuring and using electronic vehicle and developing charging infrastructure. The potential for developing an electric vehicle cluster was seen pretty good due to the traditionally strong metal, engineering and electricity industry.

The report emphasized that the public sector role is to support, through the means industrial and innovation policy, the investments required to build the cluster, strengthen the development of networks and share the risk relating to the development of technology and skills. In addition, the report recommended other measures to ensure skills base and availability of work force. The working party also proposed pilot projects in partnership with companies, municipalities and central government. Further, the working party encouraged

the Government to consider whether direct financial support and new types of tax incentives should be given to procurers of electric vehicles

The working group report was influential in raising awareness about and expectations for potentials of smarter transport solutions and systems on a general level, and was therefore an important milestone. The report of the working party also generated a new wave of private action. The developments received a lot of attention in the media. After some disappointments experienced in both car and component manufacturing, the actors reframed the field from cars and components to infrastructure and services. The Tekes EVE program was launched on the basis of this.

Beyond electric vehicles the main focus has been on smart cities in the context of the Witty City and INKA programs, which have been discussed above.

At *regional and local levels* there are some developments (in addition to INKA, EVE, Witty City, where cities and regions participate). E.g. six largest cities in Finland have developed a joint Open and smart services-strategy. In addition, several cities have put strong emphasis on smartness in their strategies.

## **6. Analysis of the Role of Policy and Policy Measures**

The Government Communication on Transport Policy in 2012 forms the basis for the new Finnish transport policy. The formulation of the transport policy is based on a broad analysis of different contributing factors, involves various arms and levels of administration as well as emphasizes the importance of long term strategic public private partnerships. The new Finnish transport policy represents a clear departure from mere transport infrastructure development and includes many interesting new tools and approaches. E.g. the transport policy lists as one of its objectives creating opportunities for new business along with recognizing that role of ICT is important in improving productivity of the transport system.

The overall goal of the transport policy is presented in terms of services rendered to end user i.e. smooth and safe transport for both business and citizens. This requires taking into account not only strictly transport related issues but more broadly factors contributing to delivering “smooth and safe transport”. The goal of a more holistic transport policy that takes into account the whole society i.e. a policy that takes into account the multifaceted and cross sector effects.

As suggested the commitment and co-operation of three ministries in particular is becoming increasingly evident and important (Transport and Communication, Employment and the Economy and Environment). This co-operation requires the development of working methods and steering to create conditions for a comprehensive and deeper



integration of relevant policies (e.g. housing, urban planning, transport policies, innovation). One way to do this is through broad based co-operation early in the policy design to ensure coherent co-ordination of measures.

Regarding the implementation of the new kind of transport policy, it is no longer feasible to solve the transport problems in traditional ways and means. More cross-sector administrative co-operation, use of multitude means and tools and participatory working culture are necessary for the effective implementation. In particular, the bold use of innovations and new technologies is important.

In practice the transport system is still largely governed by the established mechanisms and tools. E.g. in the budget allocation in 2014, the objectives of transport emissions reductions, sustainable development and improvement of public transport are not featured very prominently. The current support measures are mainly targeted at innovations to reduce vehicle and fuels emissions. Policies aimed at innovations for modal change in transport or travel demand reduction have been fewer. There are also policy gaps and only limited set of instruments are covered. The policy gaps relate in particular to knowledge development and diffusion, market formation and entrepreneurial experimentation.

Consequently, the full potential of the new national transport policy is yet to be realized and cannot be fully assessed yet. Regarding the development of the smart transport systems, the policy contains all the essential elements. In particular important is the multi sector and multi-level policy approach combined with the effort to implement the policy across different sectors. The Finnish Ministry of Transport and Communication has been very forward looking and has widened the transport policy to include other fields of policies. This has not only taken place at the level of strategies and policies but the Ministry has also actively developed new tools and governance models for cross sector implementation. These tools are based on co-operation and public private partnerships.

E.g. for the regional level implementation of the national transport policy the Government has developed an operative governance tool based on contracts. The Government has signed letters of intent with the biggest urban areas. The letters of intent cover land use, housing and transport. The Government commits on its behalf to certain financing and cities, in their turn, commit to the urban development according to the jointly agreed plans. In addition to transport investments, the letters include agreement on the division of tasks and ways of arranging the public transport and transport in general. This co-operation tool allows for the implementation of a broad vision on the transport system, highlights measures needed and their prioritization. It also allows to co-ordinate national and regional plans and needs.

Another new type of governance approach for implementing multi-sector, multi-level and multi-stakeholder policy was piloted in planning transport corridor E18. The pilot process was successful and it produced a broad based co-operative way of working together. Using this co-operative approach the transport administration can together with other fields

of administration more efficiently create preconditions for the smart development of businesses, cities and regions. The experiences and lessons learnt from this pilot can be used in further implementation of the transport policy.

The hypothesis is that broad sector policies can facilitate system change. Putting strong emphasis on innovation, ICT, public-private partnerships and market formation and creating business opportunities requires e.g. new type of collaboration and concrete actions from policy makers to remove and overcome administrative silos and administrative barriers.

In the area of innovation the transport policy includes the use of “new ways and technologies”, and ICT in particular, as an important way to make the transport system more productive, safe, smooth and environment friendly. The policy tools must go beyond development of new technologies to realize this objective. In an ideal case the innovation policy is seamlessly integrated into transport policy. In the Finnish policy the focus is on the establishment of piloting areas for smart transport for supporting the development of innovations, research and transport system. Further, long term commitment and efforts from both public and private sector are emphasized. The role of public sector as a forerunner in advancing development and taking into use of new technologies is important. The public sector also has an important role in the opening up of the public sector data to create incentives for developing completely new type of interactive services as well as increasing demand for new solutions through public procurement.

New types of innovation programs are important in developing shared goals and objectives between various stakeholders. E.g. EVE, INKA and Witty City programs all have strong focus on public private partnerships, creating platforms, supporting experiments and public procurement of innovation.

In the particular case of smart city development, the cross-administrative co-operation at the Government level has not yet been sufficiently active. The smart city theme has only recently been appearing at the national policy discussion. However, there are many positive signs. The Witty City and INKA programs have activated the discussion between different ministries, agencies, municipalities, researchers and companies. Within the Witty City program the various stakeholders are jointly developing a Smart City -vision for Finland.

While the policy mix for transport innovations thus has progressed towards a systems innovation and transition approach a recent research report suggests the following to develop the policy mix even further (see Temmes et al. 2014):

- A more holistic approach to mobility and transport in policy design and implementation is needed (going beyond the strategy level and across levels of governance)
- New policies and instruments are particularly needed for transport demand reduction and modal change (from the perspective of absolute GHG emission reductions) and for

market formation and entrepreneurial experimentation from the perspective of new niche creation and development.

- Policy mixes for transport system transformation imply a need for not only new policies but the alteration or removal of existing policies in cases where they create significant barriers to new niches or present system level change towards sustainability.

In addition, the development of new types of indicators and evaluation practices that could monitor developments simultaneously both at the regime and niche level is also needed (compare with Figure 2). For a public RDI funding agency like Tekes programs to support niche level development will not be effective if the broader set of institutions and norms that comprise the regime does not adapt sufficiently. For example, innovations funded and developed in RDI programs will face slower diffusion paths if regulations, procurement practices, land use arrangements, taxation and other institutions outside the traditional scope of innovation policy do not support their diffusion. Better indicators and new evaluation practices would be pivotal for measuring system change and transitions and could also contribute by pressurizing current regimes in so far as they can reveal bottlenecks and enables at those levels.

## 7. References (to be extended...)

### *Journals and scholarly papers*

Geels, F. 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy* 31 (8), 1257-1274

Geels, F. 2011. The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions* 1 (1), 24-40

Grin, J, Rotmans, R & Schot, J. 2010. *Transitions to sustainable development*. Routledge.

Temmes, A, Virkamäki, V, Kivimaa, P, Urpham, P, Hildén, M & Lovio, R. 2014. Innovation policy options for sustainability transitions in Finnish transport. *Tekes Review* 306/2014.

OECD DSTI/STP/TIP(2013)3. *System innovation: concepts, dynamics and governance*.

### *Policy documents*

Numerous policy documents and strategies by the Transport and Communication and Employment and Economy ministries...

Tekes INKA and Witty City program material...

### *Interviews*

Altogether 23 persons from government, agencies, City of Tampere, research sector, companies