Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014 – 2020)

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1 Executive summary

Encouraging economic growth, boosting competitiveness, enhancing economic with a higher value added and increasing effectiveness of public administration are among Slovakia's key priorities. The strategy presented in this document considerably contributes to accomplishing these priorities.

The present document defines a strategy for further development of digital services and next generation access infrastructure in Slovakia and focuses on the fulfilment of the ex-ante conditionalities by means of which the European Union evaluates readiness of Member States to implement investment priorities of their choice. The document particularly discusses the fulfilment of the two ex-ante conditionalities defined under thematic objective 2 "Enhancing access to and use and quality of information and communication technologies".

The thematic objective for Slovakia was defined by the European Commission in its position paper [1] in which the European Commission describes its view of the main development challenges and the selection of thematic objectives and priorities to be funded from European structural and investment funds in Slovakia. Under Government Resolution No. 139/2013 of 20 March 2013, a body in charge of the fulfilment of the aforementioned thematic objective is the Ministry of Finance of the Slovak Republic which is responsible for the development of information society in Slovakia, including eGovernment development [2].

The proposed development activities defined in the strategic part of this document are also based on the seven pillars of the Digital Agenda for Europe 2020 (including taking account of new priorities under the revision of the Digital Agenda of December 2012). The Digital Agenda for Europe thus serves as the basis for further considerations on the future development of information society in Slovakia. The proposed measures are also based on analyses and benchmarks defining Slovakia's position and its weaknesses and strengths against other countries under review.

Slovakia wishes to build information society on the same level as the most advanced European Union countries. Information society leaders are currently those countries whose governments make considerable investments in innovative technologies and solutions in order to revamp economic growth muffled by the crisis, thus ensuring their sustainable development. A majority of advanced countries have already implemented the crucial eGovernment services and they now focus on their further development, comfort of use, and possibilities for their citizens to participate in their further improvement.

One of the most prominent trends in building information society is the trend of open and shared data which may contribute to increasing the overall welfare and freedom in society. Deployment of open and interoperable solutions has a positive economic and social impact on the entire ecosystem of information society. The use of IT tools and instruments is also prerequisite to further increasing effectiveness of public administration and moving towards a customer-centric interaction between public servants and citizens. Crucially essential to further development of information society is an overall broadband availability to enable full participation of citizens in a digital single market of the European Union.

Thanks to the Operational Programme Information Society implemented under the 2007-2013 programming period, Slovakia expects a considerable progress in the implementation of eGovernment services. Projects are currently implemented to ensure the provision of eGovernment services at the transaction level. eID cards will start to be issued for citizens' authentication and authorisation purposes. Basic registers have been centralised and common modules of the central public administration portal implemented, which will serve as a single point of access to eGovernment services. These services will also be available, in an assisted manner, through integrated service points. The implementation of such extensive changes has

[1] Commission position paper: http://www.nsrr.sk/sk/programove-obdobie-2014---2020/pozicny-dokument-europskej-komisie-k-partnerskej-dohode-a-programom-sr-na-roky-2014---2020/

[2] §7 of Act No. 575/2001 Coll. on the organisation of the government activities and the organisation of central government administration

not been and is not absolutely flawless but Slovakia has learnt priceless lessons and built the necessary capacities and competence to further improve this process. The present Strategic Document draws on experiences from the previous programming period and also takes them into consideration in proposals for further development activities for the new period.

Investing in eGovernment considerably facilitates the development of digital economy which has strong prospects to substantially contribute to a growth in GDP, employment and overall competitiveness of the economy. Slovakia is aware of its weaknesses, including, in particular, the delayed completion of the missing fixed broadband lines, as well as slow deployment of eGovernment services and/or limited capacities to implement ICT-based solutions in public administration. Development activities proposed under this strategy seek to eliminate these weaknesses while utilising the opportunities for further development of digital economy at the same time. One of the key purposes of this strategy is to contribute to creating agile society able to flexibly respond to a changing environment and emerging opportunities.

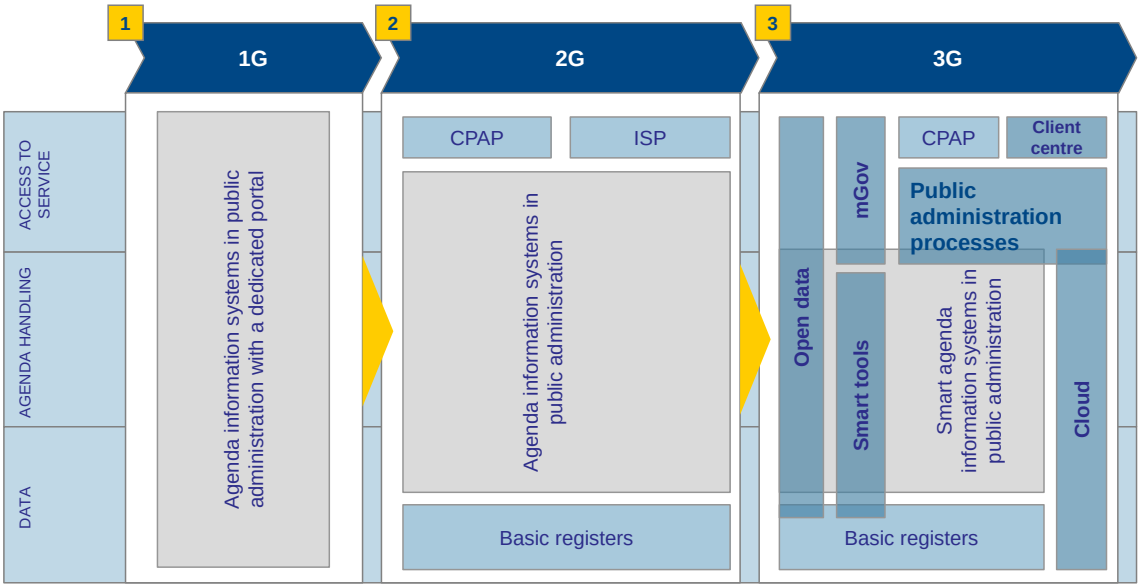
In order to identify trends and obtain inspiration, strategic documents of advanced countries were analysed. Crucial trends identified include an increased public engagement and participation, transfer of innovation from the private to public sector, building a common platform for services and information sharing, as well as a general change in the eGovernment approach towards smart systems and applications for public administration. As far as concrete models are concerned, Slovakia gets inspired by Austria and Scandinavian countries, for example.

The vision of further eGovernment development in Slovakia until 2020 includes actions to move towards functioning information society and building of Smart Government. Information technologies will become inherent in people's everyday life and an essential driver of Slovakia's competitiveness. This vision should be accomplished through the following strategic objectives:

- Moving towards electronic services to improve the quality of life;
- Moving towards electronic services to boost competitiveness;
- Constant improvements in services in using modern technologies;
- Creating a secure environment for citizens, businesses and public administration;
- Bringing public administration closer to the maximum use of data in customer-driven processes;
- Optimum use of information technologies in public administration through a shared services platform.

The meeting of these objectives must lead to an increase uptake of eGovernment services. Slovakia plans to introduce the third generation eGovernment in the upcoming programming period, as illustrated in Figure 1, which is characterised by more advanced data sharing, process optimisation, and increasingly sophisticated services, all of which help relieve citizens and businesses of administrative burden. The aim is to provide optimised and integrated ICT-based processes for the performance of public authority. This advanced eGovernment approach supports all channels, including mobile devices for which complementary services are planned to be developed.

Figure 1: Stages in eGovernment development in Slovakia



The following investment priorities are proposed to be actively addressed to facilitate eGovernment development in the 2014-2020 period:

Services for citizens and businesses

In services for citizens and businesses, it is necessary to continue increasing the level of these services in line with progressive trends and possibilities of information society. Slovakia will prefer disclosing public administration data in an open data form for their further use and processing. The process of improving services and implementation of new systems must take into consideration the importance of cross border interoperability to increase labour mobility.

In the context of building a fully functional digital market, Slovakia will actively participate in improving the quality of eBusiness (ICT-based applications to support business activities and corporate processes) and eCommerce (electronic exchange of goods and services). The key factor of success is security of electronic services and systems with respect to information and network security and protection of citizens' personal data.

Benefits of eGovernment services must be accessible to all citizens. Demographic development and the current bad situation on the labour market, however, result in a constantly increasing number of vulnerable groups which need be better engaged and their IT skills actively improved in order for them to participate in social and professional life. Equally important is to adapt certain electronic services and digital content to the needs of this part of population.

Effective public administration

With respect to increasing effectiveness of public administration, its reform will need to be facilitated by means of information technologies. An important aim of the reform is to cancel territorial jurisdiction, and separate services provided to citizens in a customer centre from administrative proceedings as such. The aim is that citizens do not have to visit all administrative authorities one by one but a visit to the nearest customer centre will suffice. Standard processes for servicing citizens in individual life events/situations will need to be implemented in information systems to introduce optimised procedures into practice.

To coordinate activities and processes of public administration personnel, effective ICT-based task assignment is necessary, along with a system for their monitoring and management to ensure a transition towards result-oriented public administration. In addition to process optimisation, the level of working with knowledge and information needs also be systematically improved. An eGovernment innovation centre should be set up to reinforce the ability to develop and manage the eGovernment project in a coordinated and conceptual manner. It will provide a management system for information society projects, their implementation and

operation in order to increase quality and economic benefits of applications in public administration. A service sharing platform must also be designed and introduced to address the optimum operation of information technologies in public administration.

Broadband / NGN

As far as broadband access is concerned, it is necessary to further build on both the past and existing activities aimed at expanding the coverage by broadband internet in white and grey areas. A long-term objective is to provide broadband coverage at the speed above 30 Mbit/s for the entire population by 2020, whereas broadband coverage below 30 Mbit/s will be provided to people living in remote rural areas in exceptional cases only. Prior to the launch of actual activities, the relevance of the methodology to determine white areas needs to be evaluated against the modified objectives and a list of white area needs to be updated.

Access networks should be funded from private sources. A driving force of private investment should on the one hand be the support for the building of backhaul networks and, on the other hand, stimulation of a broadband uptake by end users. An important tool to increase demand for broadband is further development of eGovernment services and support for eCommerce development.

An upcoming auction of 800, 1800 and 2600 MHz frequency bands will enable a nation-wide coverage by mobile broadband internet. Favourable propagation characteristics of the 800 MHz frequency band create conditions for providing a wide mobile broadband coverage, with speed above 1 Mbit/s. A regulator's strategy should focus on setting conditions to encourage competition, thus enabling effective and fast investment in wireless broadband networks and affordable services. To ensure their effective utilisation, these frequencies should be assigned as soon as possible before the end of 2013.

Synergy with a smart specialisation strategy

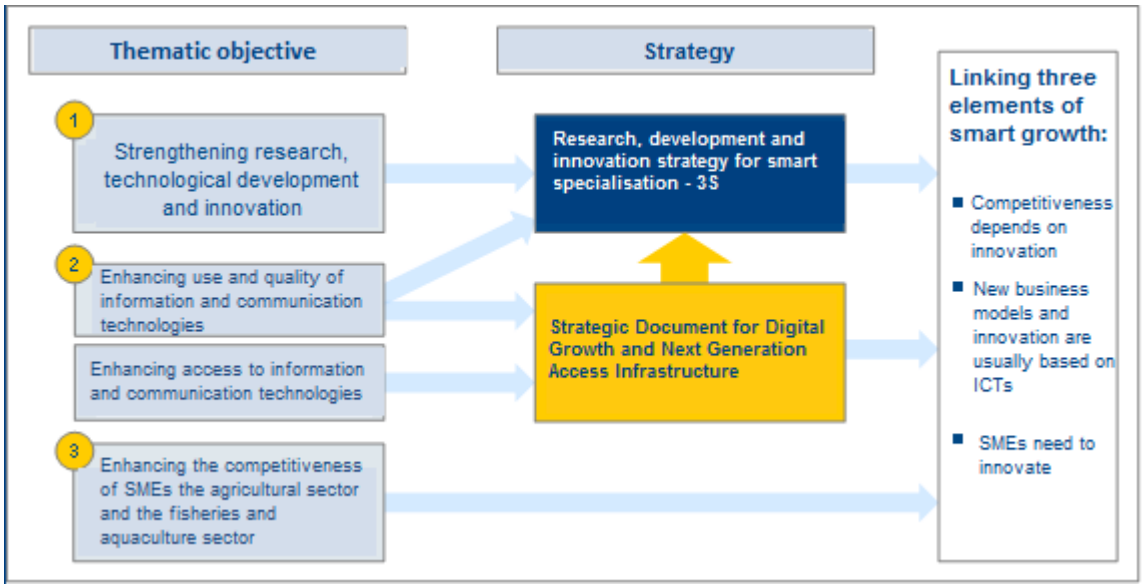
Activities supported under the aforementioned investment priorities contribute to three pillars of smart growth: science, research and innovation; ICT; competitiveness. A desired progress can only be achieved if they are aligned. Long-term competitiveness is impossible without innovation in business models and products. A majority of innovation is today driven by information and communication technologies and flexibility of small and medium-sized enterprises.

Creating an environment for smart growth is encouraged by the three thematic objectives defined in the Commission position paper regarding the Partnership Agreement and programmes for the Slovak Republic for the 2014-2020 period:

- Thematic objective 1: Strengthening research, technological development and innovation;
- Thematic objective 2: Enhancing access to and use and quality of information and communication technologies;
- Thematic objective 3: Enhancing the competitiveness of small and medium-sized enterprises, the agricultural sector and the fisheries and aquaculture sector.

These thematic objectives for the next period will be fulfilled under the proposed national strategies. National and regional research, development and innovation strategies for smart specialisation (in short S3 documents; a Strategy for research, development and innovation in the Slovak Republic until 2020 is a Slovak S3 document) represent an integrated agenda for economic transformation related to a particular region. An S3 document must therefore be in keeping with the Strategic Document for Digital Growth and Next Generation Access Infrastructure so that maximum synergies are ensured, thus actual achievements in the form of outcomes and results.

Figure 2: Correlation between the Smart Specialisation Strategy (S3 document) and the Strategic Document for Digital Growth and Next Generation Access Infrastructure



The Strategic Document supports research, development and innovation directly and indirectly through the measures proposed under individual priority themes.

Direct assistance concerns the field of open data where support is proposed to be provided to university research activities working with open data and to innovative communities (including SMEs) that implement open data solutions.

Indirect assistance is much broader. It is based on an idea of creating demand for innovative solutions and products with a high added value which will primarily be used in public administration. Extended opportunities can thus be expected in the following areas:

- research and development of applications and algorithms capable of processing large volumes of data for the purposes of predictive and risk analyses;
- development of systems capable of evidence-based optimisation of decision-making;
- development of smart and automated systems;
- development of innovative mobile solutions;
- development of advanced security solutions;
- deployment of advanced cloud-based technologies;
- development of solutions working with spatial data;
- development of collaborative and information sharing systems.

This represents a considerable increase in demand for innovative, ICT-based solutions.

As far as solutions to the most important problems identified in the S3 document are concerned, a contribution will be made towards:

- increasing the share of businesses using their own (non-imported) innovation in products, technologies or procedures;
- creating conditions to solve current and future problems of society (societal challenges) with own resources.

2 Issues addressed under this strategy

This chapter discusses the following areas:

- *A summary of basic benefits of digital economy boost high-skill jobs and competitiveness of the Slovak Republic and effectiveness and productivity of the commercial and public sectors;*
- *An explanation concerning the requirements for the fulfilment of ex-ante conditionalities under thematic objective 2: "Enhancing access to and use and quality of information and communication technologies";*
- *Explanations concerning the framework and structure of this Strategic Document.*

2.1 Digital economy as a way towards growth

The internet has contributed to forging a new dynamic sector - digital economy – in which information and communication technologies create a global platform for people and businesses to implement their business plans, communicate, collaborate and search for information. Megatrends[3] such as mobile technologies, cloud computing, business intelligence and social networks not only release innovation potential in businesses and public administration, but also support customers' pressure for the price, quality, parameters and availability of services.

J. P. Morgan expects the volume of eCommerce product and service sales to jump from $572 billion in 2010 to over $1 trillion by 2014, nearly a 100-percent increase (excluding online travel and business-to-business sales, which constitute the far bigger slice of the total eCommerce pie)[4]. Successful companies on this market are able to effectively respond to fast-changing market conditions and, thanks to online channels, play on the international market from the very first day of their functioning.

According to the European Commission, 50% of economic growth posted over the past 15 years can be attributed to digital economy, which even the crisis has not dampened completely. The income of world's top ICT companies grew at an annual pace of 6% between 2000 and 2011. ICT-based services, growing at a rate between 5 and 10%, even outperformed production of ICT devices[5]. However, according to OECD surveys, Europe-based ICT companies only account for 20% of total global sales and employment in the sector. Europe lags behind the United States and Asia not only in sales and employment, but also in investments in development, in research and development activities and overall productivity. In addition, considerable disparities can be seen in conditions of the ICT sector, its structure, quality and capacities across individual EU Member States.[6] In order to overcome the period of slow growth, or even stagnation, the European Commission has decided to continue investing considerable funds in removing these disparities and enhancing Europe's competitiveness in digital economy. Slovakia has also applied for a portion of available funding, as digital economy has recently gained substantial importance, thanks also to Government's support to information society development. Digital economy contributes towards:

- economic growth and GDP formation;
- creation of high-skill jobs;
- country's competitiveness.

[3] Oxford Economics: The new digital economy: How it will transform business

[4] J. P. Morgan: Nothing But Net: 2011 Internet Sector Outlook

[5] OECD: Internet Economy Outlook 2012

[6] ITAS: Digital Economy programme 2014-2020, *programme proposal, November 2012*

Economic growth

GDP generated by digital economy sectors increases dynamically. The share of digital economy in GDP (expressed as a gross value added) represented 4.6% in the first half of 2012, making digital economy outperform such sectors as agriculture, banking and construction industry and level up with the retail sector. The digital economy sectors produced a gross value added (GVA) in the amount of EUR3 billion for the last two quarters in Slovakia, which represents EUR400 per capita per year.[7] Employees in the digital economy sectors thus have the largest value added in the national economy. In addition, they considerably contribute to the application of the newest technologies into practice and to innovation. Slovakia's digital economy has a considerable potential for a further growth to approach the level of such countries as Hungary, Finland, Sweden and Estonia, where digital economy accounts for 5-5.5% of their GDP.

Employment

Since 2009, employment in the digital economy sectors has posted an average annual growth of 9.5%. The share of digital jobs in overall employment has also been growing. At the end of the second quarter of 2012, the digital economy sectors employed 56,000 individuals in Slovakia, with more than 2/3 of them working for small and medium-sized enterprises. Within the EU, Slovakia can boast an above-average growth in employment in digital economy, albeit its share in overall employment is below average – at 2.5% of overall employment.[8] Slovakia's digital economy has a considerable potential for a further growth in this area, to approach the level of such countries as France, Germany, Sweden and Finland, where digital economy accounts for 3-4% of overall employment.

Competitiveness

Digital economy represents the basis of knowledge society as it contributes to the development of communication technologies that connect people, and to effective exchange of information, products and services. ICT deployment has a strong potential to increase labour productivity both in the private and public sector, thus enhancing competitiveness. Despite the relevance of the ICT sector, the indicator showing the importance of ICT to government's vision[9], prepared by the World Economic Forum, indicates that the Slovak Government gives an insufficient emphasis to ICT. Slovakia ranked 113th in this indicator. Innovation capacities remain insufficient and largely affected by a poor business environment and underdeveloped research and innovation system. Slovak economy has to focus more on knowledge-intensive economic activities and diversification in the services sector. Properly targeted and planned investments in next generation broadband networks are equally important.

Development trends

The impact of information technology on society will be even more prominent in the future than ever before. A successful public administration has to flexibly take advantage of new trends in a manner that will enable an effective accomplishment of objectives and implementation of policies. The following trends that will define development until 2020 and affect the way our society, private and public sectors function can be considered most decisive:

- the use of analytical tools to support decision-making ("big data");
- anything provided as a service;
- transformation of healthcare and education sectors;
- an increased uptake of mobile internet;
- linking physical reality with digital one.

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[7] ITAS: Digital Economy programme 2014-2020, *programme proposal, November 2012*

[8] ITAS: Digital Economy programme 2014-2020, *programme proposal, November 2012*

[9] World Economic Forum: The Global Information Technology Report 2012

The use of analytical tools to support decision-making

The volume of data generated in digital economy doubles every two years. At the same time, remarkable advancements have occurred in tools and methods for information processing, data storage, knowledge visualisation and artificial intelligence. They are ever more increasingly provided in the form of cloud-based services. A proper employment of analytical tools has become the key competitive advantage in the private sector. In the public sector, this gives rise to a considerable potential to increase the quality of policies and operative decision-making, to better manage risks and more flexibly respond, for example, to citizens' preferences. Sophisticated analytical tools will enable pattern recognition in a set of data; a number of tasks can be automated. One of the major challenges will be to transform corporate culture in individual institutions towards decision-making based on data, evidence and facts.

Anything provided as a service

The existing business models are gradually transformed and new ways are sought to provide virtually anything as a service. In this respect, an excellent example is in particular *cloud computing* where clients only pay for services and do not have to care about the actual purchase of hardware, personnel or maintenance. Similar models, such as car sharing services, for example, when you only pay for use (of a service), are becoming more common in other areas as well. This way, customers are relieved of all the other subsidiary activities and can fully concentrate on achieving their plans and intentions. Using this trend to transform itself into an effective provider and user of services, public administration will be able to fully concentrate its efforts on the performance of important and highly specialised tasks.

Transformation of healthcare and education sectors

Thanks to the decoding of the human genome, the role of information technology in the medical sector is becoming ever more important and another major breakthrough is expected in so-called personalised medicine which uses an analysis of large amounts of information to provide patients with a treatment tailored to their individual needs. Deployment of information technology in the healthcare sector represents a solution to the constantly growing costs because telemedicine can actively support a healthy life style and prevention and help cut costs related with the provision of healthcare services.

Educational models have been changed by online courses that make the best quality content generally available. Students have access to personalised content through their smart mobile devices, while positive effects of online collaborations in knowledge exchange and sharing are far more than marginal.

An increased uptake of mobile internet

Internet access through mobile devices is expected to outmatch fixed line connections by 2015, driven by the introduction of fourth generation mobile networks and increased uptake of smart mobile devices. Services provided through mobile applications have become a commonplace. Public administration may thus provide its services in similar ways, having a significant potential to increase productivity of services.

The increase in mobile uptake will further continue, including through introduction of new types of devices such as wearable computers in the form of wristwatches, glasses, etc.

Linking physical reality with digital one

Boundaries between the physical and digital world will continue disappearing. The way the virtual space enables simulation of the real world, the number of real activities accompanied with digital information will grow, including with the use of mobile internet. This trend will be supported by augmented reality (AR) technologies that allow obtaining physical characteristics of a space in which a person is by means of smart mobile devices or gadgets such as Google Glass.

Public administration will gradually perform a majority of its activities by electronic means and the difference between electronic and hardcopy public agenda will cease to exist.

2.2 Development of digital economy in Slovakia

Enhancing access to information and communication technologies

In the position paper, the European Commission highlights the need to refocus spending towards research and innovation, support to SMEs, quality education and training, inclusive labour markets fostering quality employment and social cohesion, and delivering the highest productivity gains. The position paper builds on the Europe 2020 strategy whose targets are reflected in 11 thematic objectives defined in a draft regulation of the European Parliament and of the Council. These targets are achieved through investment priorities set in draft regulations of the EU for specific cohesion policy funds (the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Agricultural Fund for Rural Development).

The position paper further specifies the key development needs for Slovakia that are aligned with the current situation in digital economy and defined in selected thematic objectives and priorities to be funded from European structural and investment funds in Slovakia. The paper serves as the basis for negotiations with the European Commission concerning the Partnership Agreement for 2014-2020.

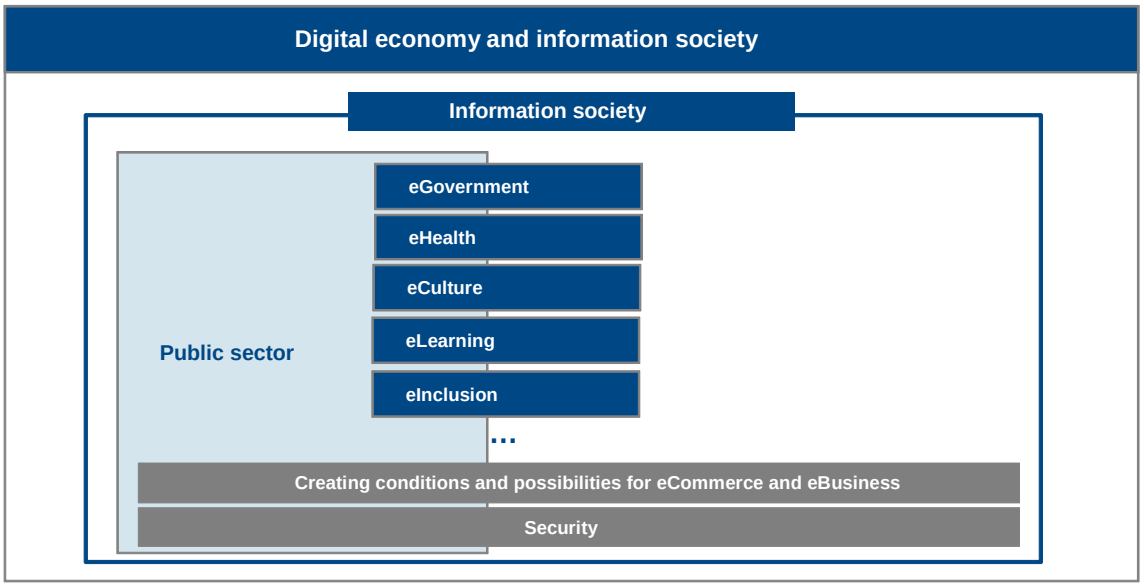
The preparedness of EU Member States to implement selected investment priorities is assessed through the evaluation of the so-called "ex-ante conditionalities". Ex-ante conditionality is a pre-defined necessary criterion with a direct link to and impact on the effective and efficient meeting of a particular target under an investment and/or EU priority. Under Government Resolution No. 305/2012 of 27 June 2012, the Ministry of Finance is responsible for the fulfilment of two ex-ante conditionalities under thematic objective 2, "Enhancing access to, and use and quality of information and communication technologies", which has the following three thematic sub-objectives:

- Strengthening ICT applications for eGovernment, eLearning, eInclusion, eCulture and eHealth;
- Developing ICT products and services, eCommerce and enhancing demand for ICT;
- Extending broadband deployment and the roll-out of high speed networks and promoting adoption of future and emerging technologies and networks for digital economy.

The method for evaluating ex-ante conditionalities is also described in the body of Government Resolution No. 305/2012 of 27 June 2012.[10] The present strategic document discusses the possibility and success factors for their application to particular activities supported under investment priorities, focusing on the public sector and creation of conditions and opportunities for eCommerce and eBusiness development (see figure below). The public sector provides a number of tools and services aimed at the development of information society in a secure and trusted environment in such areas as eGovernment, eHealth, eCulture, eLearning, eInclusion, etc. The European Commission will subsequently assess factual alignment and adequacy of information provided by Slovakia as regards the relevance and fulfilment of ex-ante conditionalities.

[10] The method of application of ex-ante conditionalities in the preparation of the implementation mechanism of the EU cohesion policy in Slovakia beyond 2013: http://www.rokovania.sk/Rokovanie.aspx/BodRokovaniaDetail?idMaterial=21210

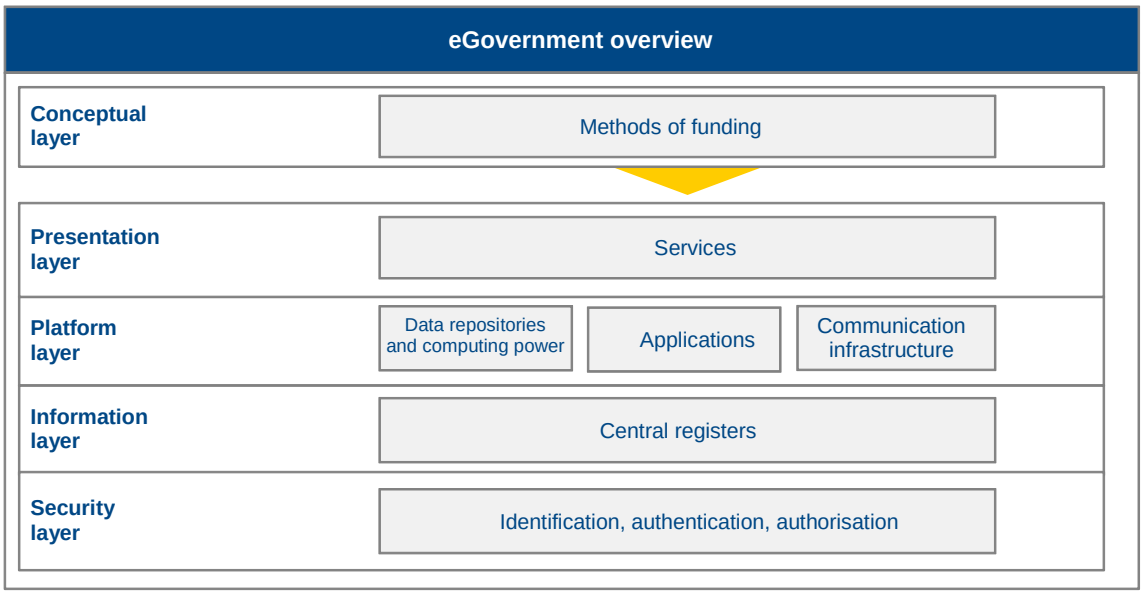
Figure 3: Digital economy and information society



In information society, public administration services and tools are delivered by means of an eGovernment system which must be developed along the following five layers (see figure below):

- Conceptual layer which must propose sustainable methods of funding eGovernment services and tools based on a clear strategy;
- Presentation layer visible to citizens and businesses through user interface;
- Platform layer which defines standards, norms and technologies for deployment of data repositories and communication infrastructure, and for application development;
- Information layer responsible for the integrity and security of key eGovernment data, in particular those stored in central registers;
- Security layer which should provide a secure digital environment with the focus on the protection of citizens' identity and their personal data. Identification, authentication and authorisation tools are used for this purpose.

Figure 4: eGovernment overview



2.3 Structure of the document

The present Strategic Document defines a strategy for eGovernment development for the 2014-2020 period which is based on an analysis of trends and best practice examples from abroad, and an analysis of the current situation in Slovakia. The strategy also constitutes a background document for the preparation of a new operational programme for 2014-2020 for which the Ministry of Finance has been appointed an intermediate body under the managing authority for the Integrated Infrastructure operational programme, based on Government Resolution No. 139/2013 of 20 March 2013.

Analytical part

The output of the analytical part of the document is a set of recommendations for future development of information society in Slovakia. Slovakia's position relative to other countries needs to be known in order to identify areas for improvement. This is discussed in the chapter entitled *Situation and trends in information society in the world compared to Slovakia*. The chapter entitled *Operational Programme Information Society* provides evaluation of the progress and results achieved under the Operational Programme Information Society (OPIS) so far. The next chapter, *SWOT analysis and recommendations for Slovakia*, discusses the analysis of Slovakia's strengths and weaknesses and resulting recommendations.

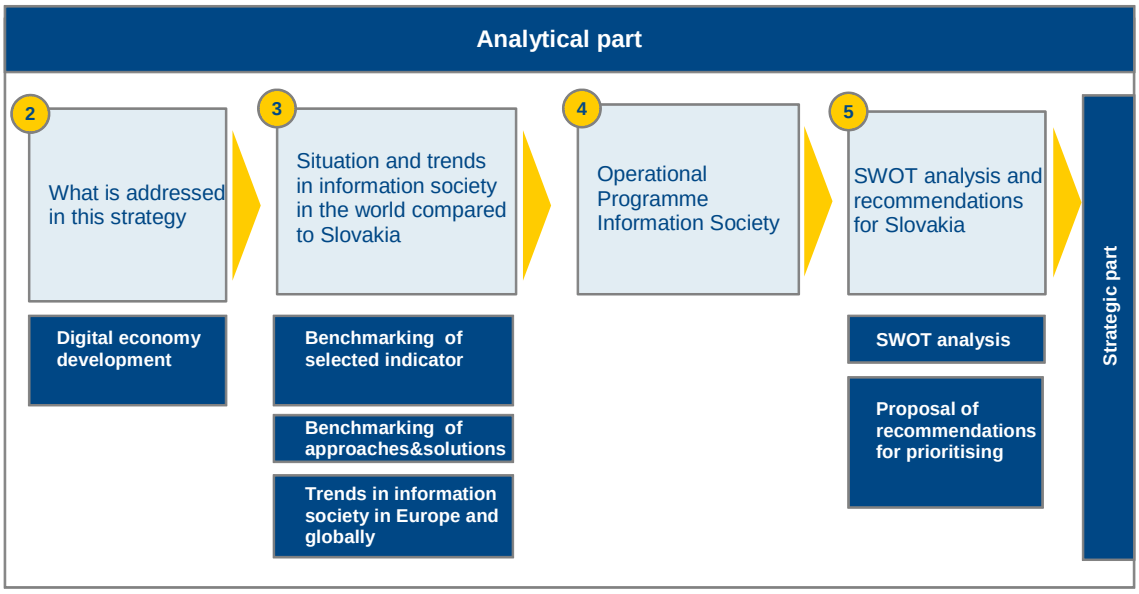
The recommendations take into account Slovakia's weaknesses, the possibility of utilising defined opportunities and the potential to address identified threats. Alignment with European Commission's strategic documents, namely the Digital Agenda for Europe and the Commission position paper [11], is also important for defining recommendations. Based on the recommendations, priorities have been set and further elaborated on in the strategic part of this document, which follow on the priorities with the largest growth potential, as identified in the position paper for the following areas:

- Innovation-friendly business environment;
- Infrastructure for economic growth and jobs;
- Human capital growth and improved labour market participation;
- Sustainable and efficient use of natural resources;
- A modern and professional administration.

The following figure provides a summary overview of the structure of the analytical part of the document.

[11] Commission position paper: http://www.nsrr.sk/sk/programove-obdobie-2014---2020/pozicny-dokument-europskej-komisie-k-partnerskej-dohode-a-programom-sr-na-roky-2014---2020/

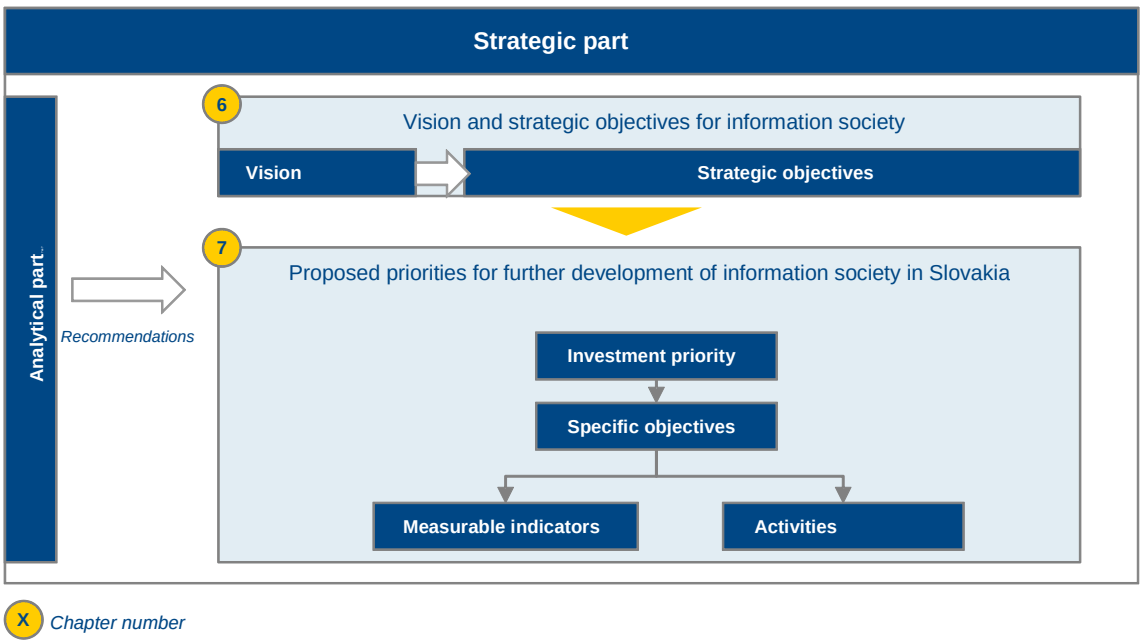
Figure 5: Structure of the document - Analytical part



Strategic part

The strategic part of the document starts with a vision for the development of information society and strategic objectives derived therefrom (Chapter 6). One of the purposes of this part is to lay down the bases for the preparation of a proposal for the next operational programme. They can be implemented through investment priorities. For each priority, specific objectives have been defined to be met under the relevant investment priority. For each specific objective, measurable indicators have been set to monitor the meeting of particular objectives. The emphasis was placed on selecting indicators monitored under the Digital Agenda for Europe. Subsequently, a list of actions to be performed has been prepared.

Figure 6: Structure of the document - Strategic part



3 Situation and trends in information society in the world compared to Slovakia.

This chapter discusses the analysis of the current situation in eGovernment development in the world and in Slovakia, and concentrates on the following issues:

- *Slovakia's position compared to other countries as regards information society development;*
- *Approaches to eGovernment solutions applied by individual countries;*
- *Trends in eGovernment development;*
- *Areas of eGovernment development currently in the focus of advanced countries;*
- *How the Digital Agenda for Europe facilitates a coordinated approach to information society development.*

In order to correctly propose recommendations for Slovakia, the best possible understanding of Slovakia's position in the context of global trends is needed. Information society has been developing for several decades and the development of eGovernment services mainly depends on concrete policies pursued by individual countries.

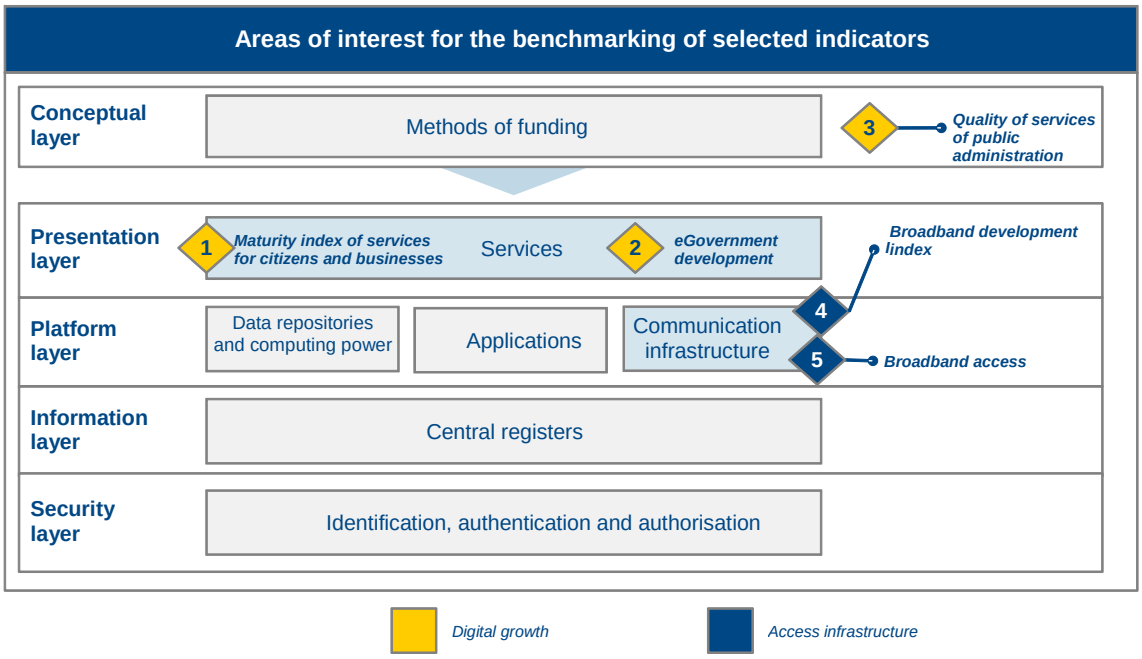
3.1 Benchmarking of selected information society indicators

For the proper assessment of our starting position with respect to thematic objective 2: "Enhancing access to, and use and quality of information and communication technologies", we need to know our position relative to other EU Member States. It will provide a clear picture of the real development of information society in Slovakia, where we can move in the nearest future, and what the basic premises for considering the priorities for the next period are. The Government's objective of enhancing access to information and communication technologies can cover two areas:

- digital growth, primarily determined by the application of information and communication technologies in eGovernment, eLearning, eInclusion and eHealth with respect to reinforcing demand for information and communication technologies;
- access infrastructure, depending on the extension of broadband deployment and the roll-out of high speed networks and promoting the adoption of future and emerging technologies and networks for digital economy.

Creating suitable conditions for the development of information society is extremely important.

Figure 7: Areas subject to benchmarking



Both areas have been subject to separate analyses. For each area, a summary index has been proposed, combining selected data to provide a basic overview of individual Member States' positions. The index is supplemented with matrix comparisons to clarify important aspects of the final outcome.

For digital growth, a maturity index of services for citizens and businesses (1) is evaluated. This is followed by the comparison of eGovernment development (2) (use and accessibility of eGovernment services). In the conceptual model of eGovernment, these benchmarks can be attributed to the Services theme (see Figure 7). To better understand the internal situation of a service provider – public administration – another comparison has also been proposed, assessing the quality of public services (3).

For access infrastructure, the broadband development index has been proposed (4), complemented with a comparison based on the relation between broadband coverage and user connection rate (5).

3.1.1 Digital growth

High-level advanced electronic services for citizens and businesses enhance the quality of life and competitiveness of economy.

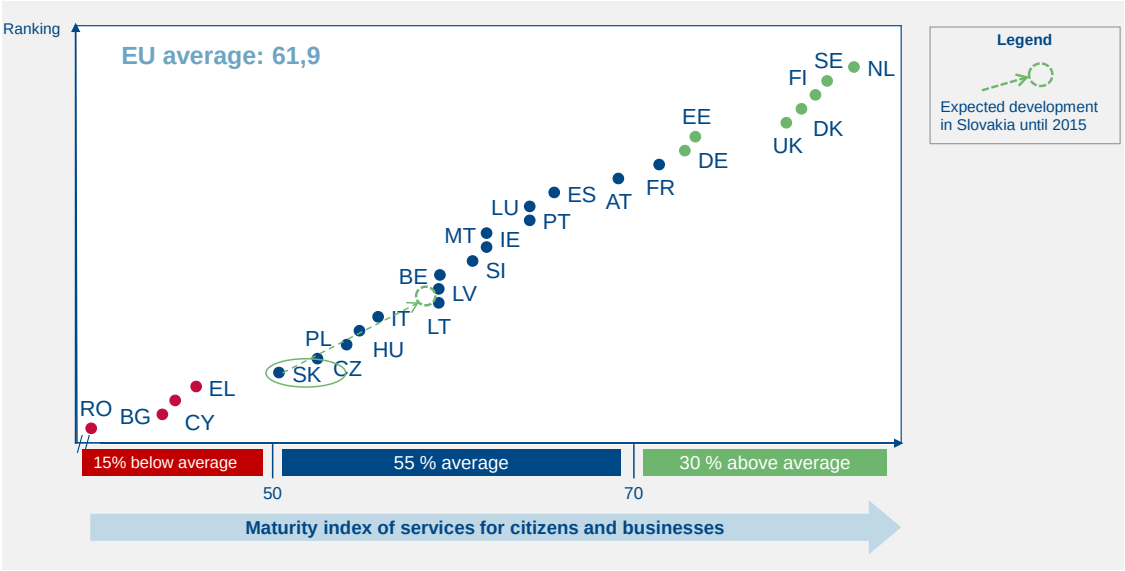
According to the United Nations EGovernment Survey 2012, the global eGovernment leader is the South Korea (with eGovernment development index of 0.9283), followed by the Netherlands (index of 0.9125), UK and Northern Ireland (index of 0.8960) and Denmark (index of 0.8889). The leaders were particularly acknowledged for innovative technological solutions they use as a means to revitalised the private and public sector. For the sake of comparison, Slovakia ranked 53rd, scoring 0.6292 in this index.[12]

3.1.1.1 Maturity index of services for citizens and businesses

For the purposes of a comprehensive comparison and assessment of the maturity of individual countries with respect to the provision of services for citizens and businesses, a maturity index of services for citizens and businesses has been designed, combining data from several relevant fields such as functionality, transparency and rate of utilisation of services.

[12] United Nations: E-Government for the People - E-Government Survey 2012, www.unpan.org/e-government

Figure 8: Maturity index of services for citizens and businesses – country comparison



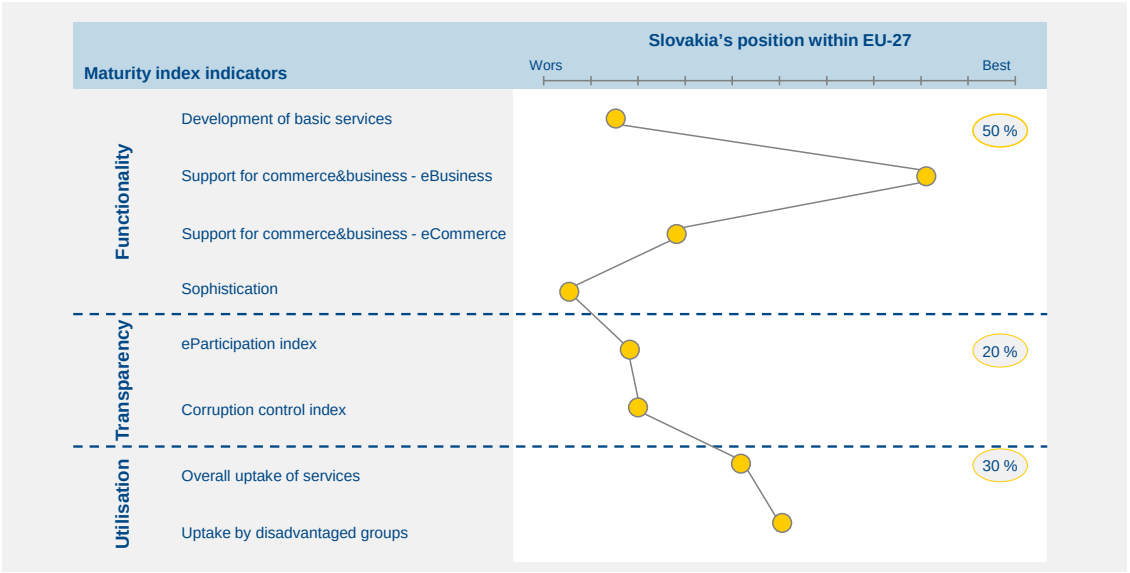
Source: Eurostat, World Bank, OECD, UN, Gartner, IDC
Notes: Only countries with the best in results in all indicators would score 100% in this index.

Maturity index of services for citizens and businesses for individual EU countries shows Slovakia in the bottom section of the average interval. Successful implementation of OPIS projects (Operational Programme Information Society) should help move Slovakia slightly upwards, closer to where countries such as Belgium and Italy are today.

Traditionally, Scandinavian countries and the Netherlands are among the best scoring countries. Austria can be seen as inspiration from among Slovakia's neighbouring countries.

The worst scoring countries under the maturity index include Romania, Bulgaria, Cyprus and Greece.

Figure 9: Maturity index of services for citizens and businesses – index components



Source: Digital Agenda for Europe, Eurostat, World Bank, OECD, UN, Gartner, IDC

After evaluating individual index components for Slovakia (see figure above), the following observations can be made:

- Basic eGovernment services are currently underdeveloped, improvements can be expected following the completion of OPIS projects;

- With respect to ICT applications to support business activities and corporate processes (eBusiness), Slovakia's position is better than average; Slovakia is one of Europe's leaders and further development may reinforce its competitive advantage;
- Major room for improvements exists in supporting electronic exchange of goods and services (eCommerce);
- Sophistication of eGovernment services is low at this moment, an improvement can be expected in the near future;
- Large room for improvements exists with respect to transparency of public administration;
- Overall utilisation of e-services is low compared to other countries, their use by disadvantaged groups is where Slovakia also falls behind; increased attention should be paid to eInclusion and the overall promotion of eGovernment services.

The current state of eCommerce has also an impact on Slovakia's average score under the maturity index. There are several factors influencing this area:

With respect to ICT applications to support business activities and corporate processes (eBusiness), Slovakia's position is better than average. Major room for improvements exists in supporting electronic exchange of goods and services (eCommerce).

- Misleading information about products and services;
- The lack of confidence among citizens and businesses in online sellers and contractual relations with them;
- Insufficient protection of personal data;
- Insufficiently developed digital single market with a plurality of payment methods. Current trends include new forms of payment, for example, mobile payments through SMS, NFC, etc.;
- The lack of information about products and services, especially in Slovak language.

3.1.1.2 Development of eGovernment

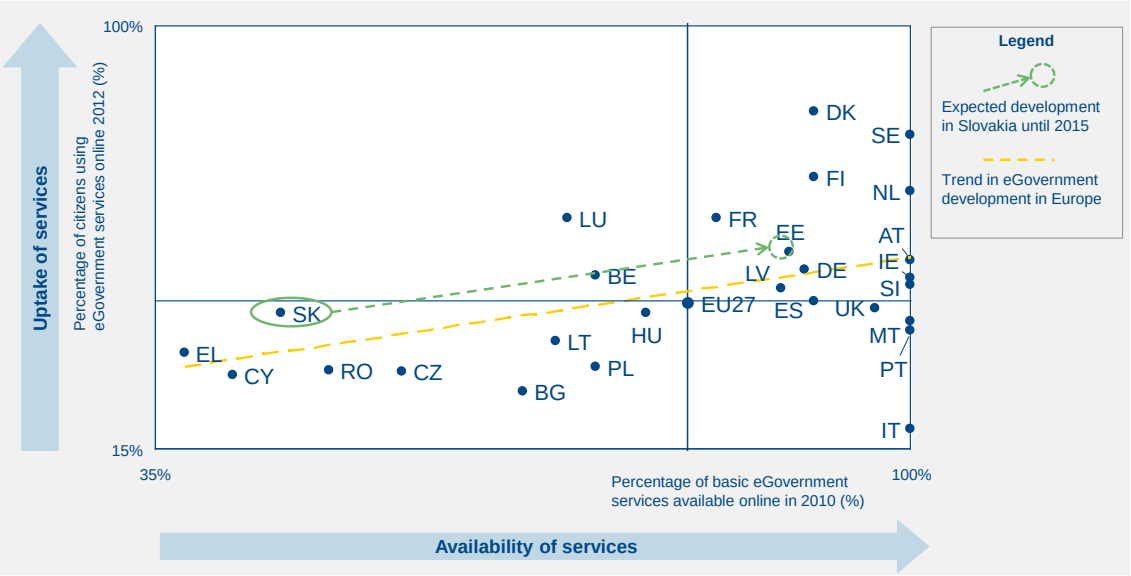
The availability of eGovernment services in individual countries considerably facilitates uptake of the internet among citizens and encourages them to learn ICT-related skills so they could fully use all the benefits delivered by public administration.

The following figure shows leading countries in eGovernment development. Availability and utilisation of eGovernment services by citizens has been chosen as variables. The Netherlands and Scandinavian countries – Denmark, Sweden and Finland – are leaders in this respect. As far as Slovakia's neighbouring countries are concerned, Austrian can boast excellent conditions in this context.

Slovakia's position is outside the main trend of eGovernment development in Europe. Despite the low availability of services, Slovak citizens use eGovernment services to a similar extent as the EU-average.

Generally, it is advisable to focus on enhancing popularity of eGovernment services among citizens, and on their further development. The eGovernment services are already extremely popular with businesses – 96% of businesses use this type of services, which is the second best result in the EU in 2010 (the EU average is at 83.3%). Prerequisite to utilising eGovernment is to properly advise citizens on working with the services.

Figure 10: Use and accessibility of eGovernment services – country comparison



Source: Digital Agenda for Europe
Notes: Expected development in Slovakia until 2015 is based on the expected acceleration of OPIS projects and deployment of basic eGov services.
Country codes are explained in Annex 1 to this document.

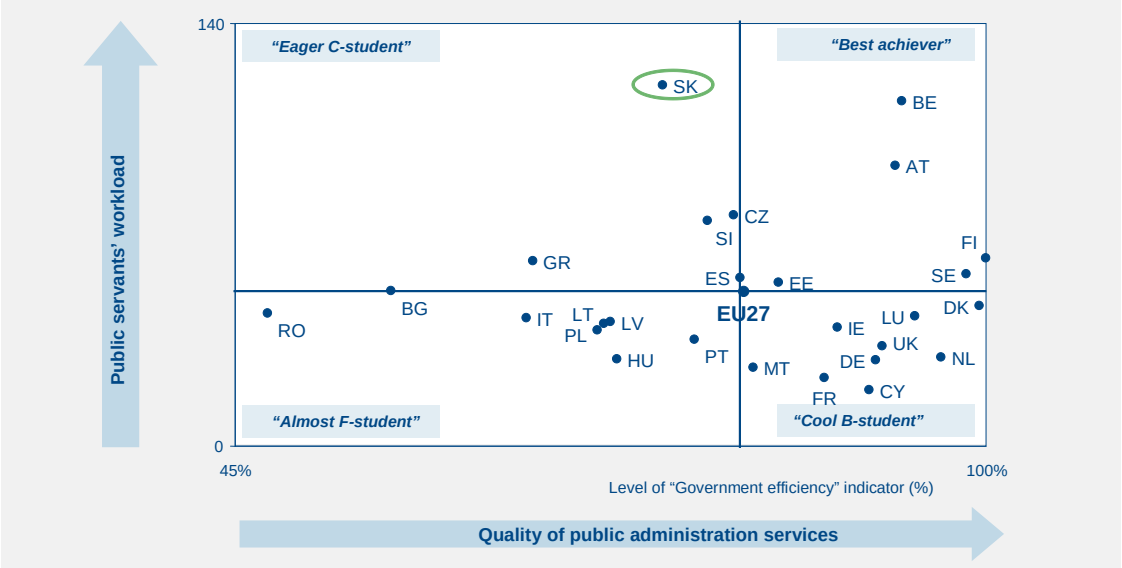
A considerable improvement in the availability of services can be expected in Slovakia by 2015. It is assumed that Slovakia could exceed the EU average and move closer to advanced countries such as Estonia or Germany. The availability of basic eGovernment services is expected to reach 90% in 2015 in Slovakia. This assumption is based on the following facts:

- Projects are implemented under the Operational Programme Information Society to introduce electronic services in individual public administration institutions. A decisive majority of eGovernment services should thus be available at the transaction level;
- All common modules of the Central Public Administration Portal are expected to be deployed. Access to e-services and their use will thus be provided from a single point;
- Communication channels, especially integrated service points in 1,200 locations, will be established to enable an assisted access to electronic services. The use of electronic services will be simple for large groups of citizens;
- An electronic identification card will enable clear and secure identification of citizens in public administration electronic systems using the mechanisms of an advanced electronic signature. This will lay the ground works for the implementation and using of electronic signature and electronic services.

3.1.1.3 Quality of public services

The goal of eGovernment development is not only to deliver services in a more comfortable manner and with added value, but also in a more cost-effective way to avoid wastage of public funds. The aim is, therefore, to encourage people to use e-services for their better availability, as well, which is not limited by the number of public clerks assigned for customer services and their office hours. An indicator showing the number of citizens per public servant in relation to the quality of public services (measured by the “Government efficiency” indicator published by the World Bank) has been chosen to analyse the amount of funds spent on the delivery of quality services for citizens and businesses through personal contacts with public servants.

Figure 11: Number of citizens per public servant vs. quality of public services



Source Eurostat, OECD, World Bank, Ministry of presidency, Spain

The previous figure shows that the quality of public services in Slovakia is comparable to their quality in other countries included in the survey. However, as far as the number of citizens per public servant is concerned, Slovakia has the highest rate of all countries under review. This indicates that the introduction of new and development of existing eGovernment services towards proactivity is extremely important for citizens' satisfaction because the existing capacities cannot ensure the same quality of services as that in advanced countries through personal contact and manual processing.

To the contrary, public servants need be given more room to perform their internal agenda. The high number of citizens per public servant also indicates that no considerable cuts in labour costs are possible, even though the contribution of public administration to GDP in Slovakia is similar to that in the UK or Finland, for example.

3.1.1.4 Summary

- Slovakia is expected to rank among progressive countries with respect to availability and use of eGovernment services by 2015;
- Slovakia's current weaker position with respect to the availability of e-services is primarily caused by the fact that the implementation of a majority of eGovernment projects is scheduled to be completed over the next two years;
- Room still exists to increase the uptake of electronic services, especially by supporting different communication channels and promoting their use.

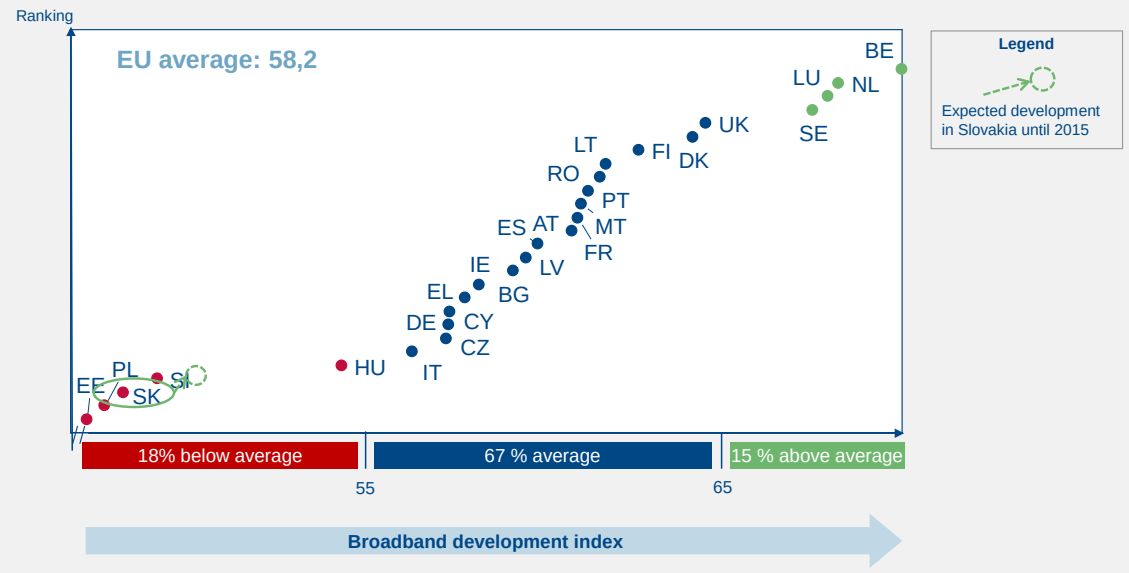
3.1.2 Access infrastructure

Based on the broadband coverage, it is possible to determine the possibilities for citizens and businesses to fully utilise the potential of digital economy. If a country lags behind in development, further investment and a clear-cut strategy for further progress are necessary to retain its competitiveness and create conditions for smart growth.

3.1.2.1 Broadband development index

For the purpose of comparing the situation with broadband access, an overall index has been calculated, combining data from relevant areas: coverage, investment in development, market liberalisation rate and development of new technologies.

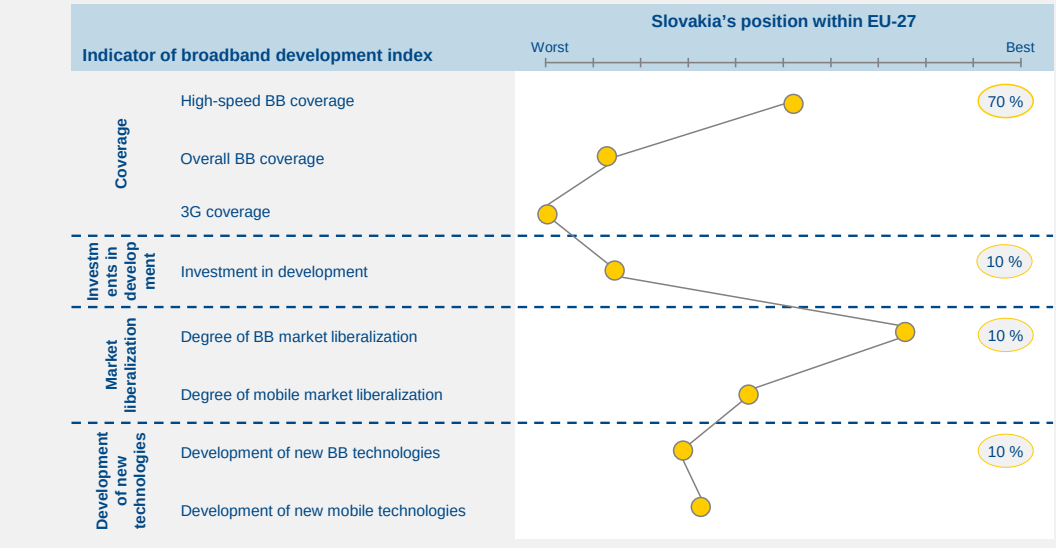
Figure 12: Broadband development index - country comparison



Source: Eurostat. World Bank, OECD, UN, Gartner, IDC
Notes: Only countries with the best results in all indicators would score 100% in this index

Within the broadband development index for individual European Union countries, Slovakia was the third worst in the EU. The best scorers include the Benelux (the Netherlands, Belgium, and Luxembourg) and Sweden. Austria can be seen as inspiration from among Slovakia's neighbouring countries. Hungary scored only slightly better than Slovakia. The Czech Republic made it to the average rankings.

Figure 13: Broadband development index - index components



Source: Digital Agenda for Europe, Eurostat, World Bank, OECD, UN, Gartner, IDC

Relative weight of indicator

The following conclusions can be drawn from the analysis of individual index components:

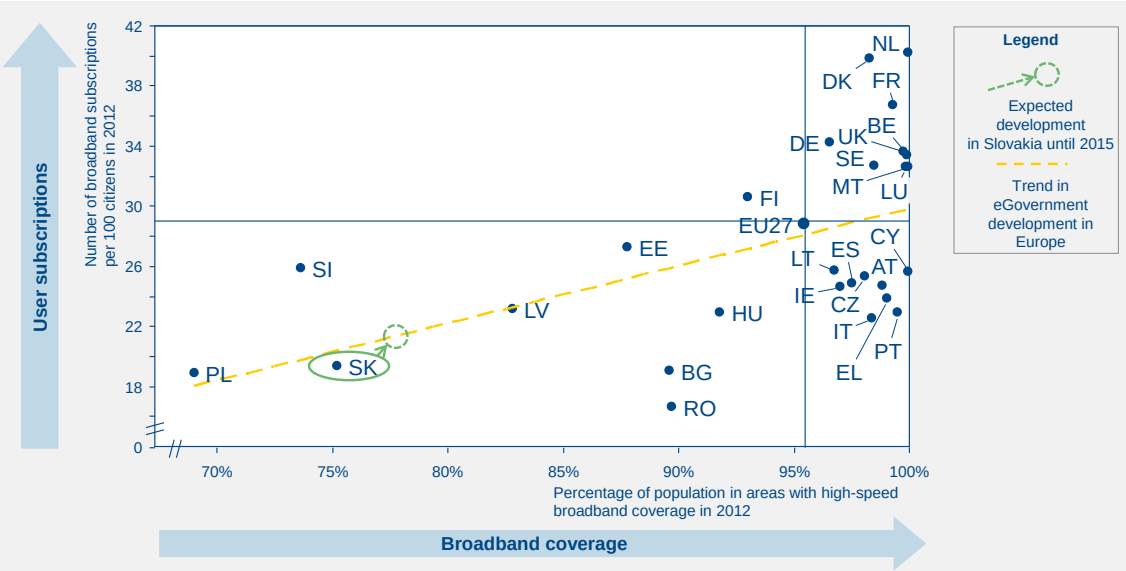
- Broadband coverage with speed above 30 Mbit/is quite good relative to the EU average;

- Slovakia lags behind in overall basic broadband coverage (with speed at 1 Mbit/s at least) and 3G coverage;
- Investments in network development are relatively low;
- The degree of market liberalisation is sufficient.
- Slovakia lags behind in the development of new technologies in mobile and fixed broadband connection.

3.1.2.2 Broadband

In the next step of our analysis we focused on assessing the relation between the number of active connections and broadband availability, which is prerequisite to using eGovernment services.

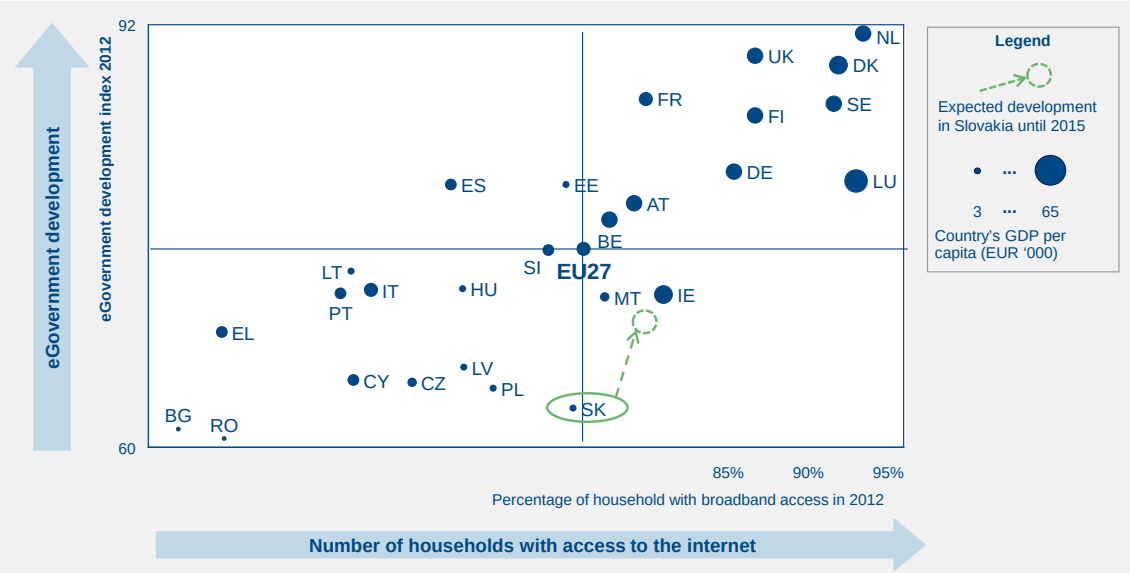
Figure 14: Broadband coverage vs. user subscriptions,



Source: Eurostat, Digital Agenda for Europe

In the figure above, the horizontal axis shows the share of population with access to broadband internet, the vertical axis shows the number of active subscriptions per 100 citizens. The leaders in eGovernment development such as Denmark and the Netherlands take the top places in both indicators. Even after the OPIS is completed, Slovakia will not move much closer towards such more advanced countries as Lithuania and Estonia.

Figure 15 – Number of households with access to the internet vs. eGovernment development



Source: UN eGovernment survey, Digital Agenda for Europe, World Bank

Generally speaking, efficiently and effectively communicated eGovernment services encourage citizens' interest in internet uptake. But it also works the other way around – affordable and available internet enhances the use of eGovernment services and their development. This correlation can be seen in the previous figure – a high level of eGovernment development corresponds to the number of connected households.

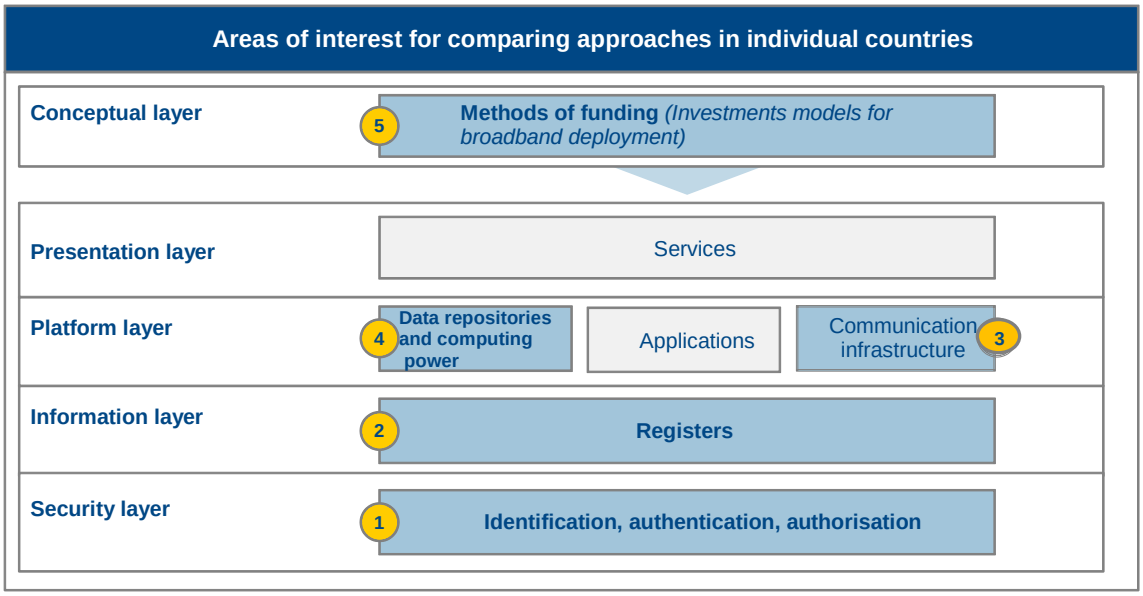
In terms of the number of households with broadband Internet, Slovakia is slowly approaching the EU average and, in the next programming period, plans to complete the objectives set under OPIS priority axis 3 with respect to the development of backhaul networks (backhaul infrastructure) using the structural funds. The development of eGovernment envisaged for the upcoming period has the potential to increase the demand for broadband among the population.

Efforts will also be made to promote broadband and improve its affordability in order to increase the number of households connected to fixed broadband internet. Complementary possibilities of connecting to mobile broadband, with the current penetration at 7.4 percent, moderately fall behind the European average at 8.8 percent. The planned auction of free 800, 1800 and 2600 MHz frequency bands should also contribute to increasing availability and penetration of mobile broadband.

3.2 Approaches taken by individual countries

Different countries apply different approaches to the building of information society and eGovernment. The following section examines the aspects of solutions applied in relevant areas, according to the set eGovernment concept. The analysis concentrates on the area of identification, authentication and authorisation (1); registers (2); communication infrastructure (3), data repositories and computing power (4) and investment models for broadband deployment (5).

Figure 16: Areas for comparing approaches



3.2.1 Identification, authentication and authorisation

As the eGovernment services develop, a need has arisen to verify users' identity online in order for them to be able to access different groups of services based on their authorisation and to perform verified transactions. Users' identity verification consists of three basic stages: identification, authentication and authorisation. In the first stage, a user is identified, for example, by entering a user name or by means of an eID card. The second stage is authentication, i.e., actual verification of the identity entered by the user. The verification may be performed, for example, by a password, advanced signature or certificate issued by a competent third-party entity (e.g., a certification authority or the state). The identity is verified by a certificate issuer. The last stage involves authorisation, that is, assigning user roles and authorisations to a particular user whose identity has been verified in the previous stage. The whole process is commonly referred to as *Identity and Access Management* (IAM).

The method for implementation of identification, authentication and authorisation procedures differs across individual European countries both in terms of technological solutions and the level of security. Individual implementation models mainly differ in the manner of identification and authorisation for which a central-level solution is often based on the "once only" rule. Authorisation (i.e., assignment of user's right) is then addressed specifically, at the level of individual public administration information systems. Therefore, a part of the comparison concentrates particularly on the identification and authentication stages.

Implementation models for electronic identity verification.

Three basic types of models for electronic identity verification are currently used for eGovernment services:

Username and password

A document is authenticated and electronically signed by entering a username and corresponding password. The password may be either static, or dynamic (the so-called "one-time password" or "OTP"). A one-time password may be obtained from a list, through SMS, or token generated.

Four basic models are used under this type of verification:

- Username and static password/username, static password and grid card and/or other element;
- One-time dynamic password obtained from the list of passwords;
- Token-generated one-time dynamic password;
- One-time dynamic password delivered through SMS.

Public Key Infrastructure

The PKI is a set of technical and administrative actions to manage digital certificates by means of cryptographic methods. This solution uses a certificate (and a corresponding private key) to clearly identify a particular person. Certificates are issued by a certification authority and serve for the verification of the physical identity of a certificate holder. PKI is required for generating and verifying electronic signatures.

PKI solutions for electronic identity can be divided as follows:

- a software certificate;
- a PKI smart card;
- a PKI SIM card
- a PKI token.

Attribute-based Credentials

The *Attribute-based Credentials* (ABC) solution provides strong user's authentication with the highest level of privacy protection. The user remains anonymous to a third-party service provider. On the other hand, an identity provider does not learn about websites visited and services used by the user. This technology is based on a new method of identity verification by means of user's characteristics - the so-called attributes. User's identity is not verified by a password and/or certificate but by means of a special authentication component that only contains certain attributes of the user. During transactions with a service provider, user rights are assigned by verifying and comparing a selected attribute only, without the provider having a chance to know the true identity of a particular user. A typical example is providing access to a service for users over 18 years of age only.

Examples and trends in the implementation of models for electronic identity verification

Individual countries may use different models for different types of services. A majority of countries even use a combination of several models or several alternative solutions. A summary overview of the application of individual models is shown in the figure below.

Figure 17: Overview of the application of models of electronic identity implementation

Source: UL Transaction security analysis, Arthur D. Little analysis

Examples of the implementation of models for electronic identity verification in the world:

- The use of national ID cards to implement the electronic identity functionality is a prominent trends in this respect. The solution was implemented, for example, in Finland (1999), Estonia (2002), Italy (2002), Belgium (2004), Spain (2006) or Portugal (2006). A higher rate of eID solution adaptation has been reported for countries where the implementation of electronic identity on national ID cards was mandatory. Estonia boasts the highest adaptation rate.
- In Austria, eID is not implemented on national identity cards. Citizens obtain their eID based on an application and activate it subsequently on their bank cards, professional ID cards, public official ID cards and similar ID documents that meet security requirements (SSCD).
- Some countries, such as Sweden and Italy, even issue special cards that serve the electronic identity verification purposes only.
- An interesting trends in the use of already established electronic identity solutions in cooperation with the commercial sector (banks, telecommunication operators, ...). This is typical of the countries in the north of Europe, which often use so-called BankID issued by banks.
- UK, Ireland, France, US or Australia have no sophisticated electronic identity solution in place, access to eGovernment services is secured through username and password only.
- The Netherlands also uses a username and password solution, called DigID. An interesting thing is that the same password is also used as an electronic signature on documents; this is considered a rather unsecure, yet very popular solution.
- Some countries use a combination of username/password and certificate solutions. The username and password serve for the verification of access and the certificate is used for signing electronic documents. Countries that follow this approach include, for example, Hungary, the Czech Republic, Slovenia and Malta.
- National PKI card projects are prepared to be launched across Central and Eastern European countries. Discussions and national-level projects are underway in Bulgaria, Poland, Romania, Russia and Slovenia.

The Czech Republic launched its own concept of PKI cards in 2012. Due to legislative reasons, however, authentication can yet not been performed by means of a certificate on a card chip but only using the card number and a security persona code.

The Attribute-based Credentials model is a recent trend. Germany is a leader in this area, having launched this concept in 2010 already. Some other countries, such as the Netherlands, currently implement pilot projects.

As the penetration of mobile electronic devices increases, mobile identity becomes ever more widely used; this means that verification is performed either by means of a one-time password delivered through SMS or using PKI implemented on a SIM card. Mobile electronic identity solutions are widely spread in Scandinavian and Baltic countries. These countries provide a good example of successful cooperation among the state, mobile operators and banks. It also applies to mobile PKI solutions, first implemented by private companies. In Finland and Latvia, this solution was introduced by telecom companies, in Norway, Sweden and Lithuania they were also joined by banks. In Estonia, the implementation of the mobile electronic identity solution was initiated by public administration, encouraged by the success of a national eID card that led to the subsequent introduction of its mobile version.

Table 1: Mobile solutions for electronic identity

Mobile identity solution	Country
Username and password One-time password delivered through SMS	Netherlands
	Lithuania
	Norway
	Austria
	Switzerland
PKI PKI implemented on a mobile SIM card	Estonia
	Finland
	Lithuania
	Latvia
	Norway

Recommended use for individual models

The aforementioned example clearly indicate that no single solution for the implementation of electronic identity is applied across the different countries; its choice always depends on country-specific circumstances, offered services and security requirements. The below tables show under which conditions a particular solutions is recommended to be implemented.

Table 2: Recommended use for electronic identity models

Type	Model	Recommended use
Username and password	Username and static password	The most fundamental concept suitable for a solution that does not require a higher level of security.
	OTP obtained from a list of passwords	The oldest one-time dynamic password concept. Suitable for a limited number of accesses without too stringent security requirements. Practically not used in today's new solutions.
	Token-generated OTP	Unlike the limited number of accesses using the previous model, a token-generated OTP offers an unlimited number of one-time generated accesses. This OTP model is generally suitable where no PKI is developed and only limited financial resources are available. Today, it is mostly used to complement the model using an OTP delivered through SMS.
	OTP delivered through SMS	A more recent OTP model, gradually replacing all the aforementioned models. Ideal in cases with limited financial resources and lower security requirements.
PKI	Software certificate	An excellent concept for secured signing of electronic documents. Unlike other PKI models, no HW distribution is necessary.
	PKI smart card	An ideal solution where chip-equipped smart cards are widely used, to which qualified and commercial certificates can be uploaded. Its disadvantages include high costs of card distribution and the need to use

Type	Model	Recommended use
		card readers.
	PKI SIM card	A suitable solution for countries with a high per capital penetration of SIM cards and with high security requirements. Ideally used as a complementary solution to other PKI solutions.
	PKI token	An alternative solution to a PKI smart card. Recommended in cases where security requirements are stringent and the use of smart cards is not economically feasible.
Attribute-based Credentials		A recent trend suitable in situations where there are stringent regulatory requirements concerning the protection of users' privacy.

Implications for Slovakia

IAM-related projects are currently being implemented in Slovakia. One of them is a project to introduce an electronic identification card system, using contact chip cards (a *PKI Smart Card* model). Lessons learned from similar projects implemented abroad have shown that a key to a successful project is, in addition to the quality of its implementation, its user adaptation rate. Situation analyses performed on individual countries indicate that the adaptation rate is affected by several basic factors on which Slovakia should focus when implementing an electronic identity card system:

- **Availability of services:** The more services can be used through a particular solution, the higher adaptation rate can be expected.
- **Ease of use:** The easier is the use by end users, the higher adaptation rate is more likely. Experience from abroad shows a relatively low adaptation rate for solutions that require the use of complicated reading devices, or additional manual installation of security components. A typical example of a very simple solution with a high adaptation rate is the Netherlands' DigID project.
- **Existence of alternative solutions:** Where several electronic identity solutions exist simultaneously, it might be difficult to convince users to switch over to a new solution, especially if alternative solutions have already been well established and are widely used.
- **Costs of the use of solution:** The use of a particular solution must not place an excessive financial burden on its users. A compromise between the price and possibilities for use must be struck when setting the price for using the solution. Where the costs are too high (purchase of a token, card reader, etc.), a low adaptation rate is more likely.
- **Perceived benefits for users:** The more the users think the solution is of benefit to them, the more likely is its use. Project publicity and PR are extremely important in this context.
- **Mandatory nature:** Where the proposed solution is mandatory (e.g., ownership of an eID card), the adaptation rate is higher, however, provided only that the previous factors have been met.
- **Mobile identification:** Owing to a massive uptake of smart mobile devices, identification requirements have considerable changed and the search for new models is advisable to enable the use of mobile devices for identification purposes. If an adequate security level is maintained, mobile-based identification and authentication may provide a high standard of comfort to end users.

In addition to the electronic identity implementation, a central-level IAM system is planned to be developed within the central public administration portal. The project was only re-launched less than a year ago (August 2012) and is scheduled to be completed in April 2014. Only the basic concept of this solution can therefore be evaluated. The IAM system will ensure centralised identification, authentication and subsequent federation of identities on individual public administration information systems. The actual authorisation and access right management will be delegated to individual public administration information systems (or their existing IAM solutions). In general, this concept is in line with the recent international trends where

identification and authentication is performed at the central level, while authorisation is performed at the level of individual public administration information systems.

To make the project an overall success, it will be necessary to ensure a maximum degree of integration with IAM solutions of individual public administration information systems once the central system is launched and to complete individual registers in SR. Taking into account the a priori defined National Concept of eGovernment and ex-ante integration conditionalities for national OPIS projects, the reverse integration of the IAM system into the currently developed public administration information systems should not be a problem.

3.2.2 Registers

To function effectively, state authorities need to have at their disposal information and data about citizens, companies, sole traders, real estate, lands, public health and many more. All the different types of information are gathered in various registers that constitute one of the fundamental components of an eGovernment system.

The currently prevailing global trend is to use and implement information systems for central registers that collect the necessary data at the central government level. Federation-like countries (such as Germany, US, Australia, ...) build central registers at the level of their individual federal states only.

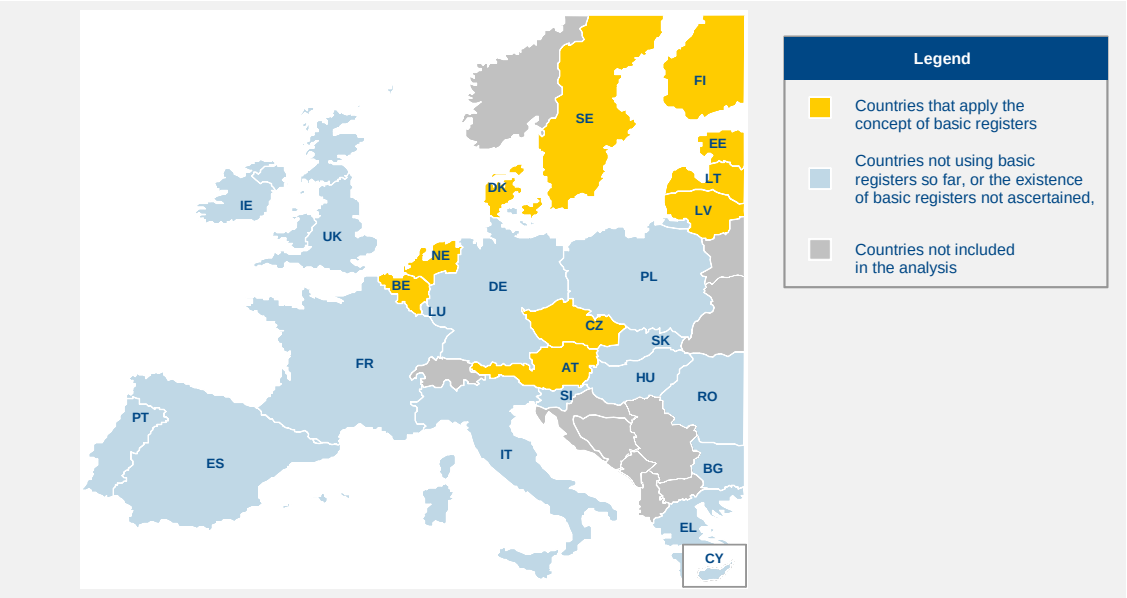
Basic register model

Introducing basic registers is a relatively recent trend among eGovernment leading countries. In terms of eGovernment functioning, it is a very important component that serves not only for data collection but also ensures that the data are as accurate and up-to-date as possible. In addition, basic registers ensure data integrity. Information systems used in public administration institutions gain an automated access to updated and accurate information through a basic register platform. It results in savings due to the elimination of duplicate data entries when registering information, removal of inaccuracies, and reduction of administrative burden in the form of required notification of changes in relevant data to several different authorities. The significance of basic registers and their positive impacts on information society development is also uphold by the fact that all the four top scoring countries in the chapter 3.1.1.1 maturity index of services for citizens and businesses (Sweden, Finland, the Netherlands, Denmark) use the basic registers.

Examples of basic register implementation

The figure below shows those EU countries that currently apply the concept of basic registers. They are Scandinavian countries (Sweden, Finland and Denmark), Baltic states (Estonia, Lithuania and Latvia), the Netherlands, Belgium and Slovakia's neighbouring countries the Czech Republic and Austria.

Figure 18: Countries with basic registers in place



Source: Arthur D. Little analysis, National Public Administration Portals, Interoperability Solutions for European Public Administration

Examples of the use of basic registers:

- Denmark: Denmark operates an advanced system of basic registers. At this moment, further databases are being made accessible, namely map data, cadastral maps, central register of economic operators and company data. An emphasis is also placed on ensuring that registers contain open data that can be used by citizens and commercial entities.
- Sweden: Sweden, for example, maintain a population register; the Sweden's 2001 population census was performed using the data from central registers only. This approach brings considerable savings in terms of both time and finance.
- Finland: From as early as 2001, Finnish citizens only report a change in their place of residence to the central population register or at a post office, and this change is subsequently communicated to all other government institutions. They can choose whether they want to report the change by means of a printed form, via phone or the internet. Printed forms are currently used by one third of residents only, while more than a half of notifications are submitted online.
- Estonia: One of the leaders in the implementation of basic registers, Estonia begun building this system more than a decade ago. This approach has resulted in the establishment of several basic registers (population register, address register, etc.) and their integration with a number of public administration information systems through the X-Road decentralised communication infrastructure.
- The Czech Republic: The Czech Republic launched its basic registers on 1 July 2012.Four registers were put into operation (population register, register of persons, register of lands and real estate, and register of rights and obligations) that together provide 120 reference data guaranteed by the state.
- Large developed federative countries (US, Australia, ...) as well as the BRIC countries have so far not implemented the concept of basic registers. One of the reasons is that these countries do not operate central registers at the federal level but only at the level of individual federal states.

Implications for Slovakia

Slovakia follows the recent trends as far as registers are concerned. Public administration information systems are developed under the OPIS that introduce and/or integrate into individual central registers (vehicle register, patient register and many more). In addition, Slovakia has joined progressive countries in this respect, as it currently implements the concept of basic registers. They include a register of legal persons, register of natural persons and address register which can be integrated into individual public administration information systems via the central public administration portal. The establishment of a register of spatial data is also considered. The implementation of basic registers is scheduled to be completed in 2015.

When implementing the basic registers, Slovakia may draw inspiration from countries that already have a fully functioning system of basic registers in place, and should take the following measures:

- **Integration with PAIS:** The degree of integration with individual public administration information systems and their registers is an important success factor for basic registers, affecting the potential of delivered benefits. The high degree of integration can in particular be achieved by:

– a simple, yet secure way of integration;

– using the same, open technology standards for all registers;

– interconnecting the registers using a Master Data Management approach;

– creating a system with a sufficient amount of data in order for all institutions to be willing to integrated with the basic registers;

– preventing duplicate data entries.

- **Register data available as open data:** An analysis of international trends has shown that making the data from the basic registers available to the public, in compliance with the applicable legislation and regulatory measures, as open data also contributes to delivering expected benefits, namely the following:

– time savings for the public;

– development of business environment;

– review of data and elimination of duplicate entries.

3.2.3 Communication infrastructure

Another of the key areas of eGovernment is the public communication infrastructure. In this context, communication infrastructure can be understood as:

- Centralised public administration infrastructure which one may imagine as a centralised supra-sectoral information network. A typical example of this type of network is Slovakia's *Govnet*;
- Procurement of communication and data services used by public administration, provided by telecommunication service operators.

Both approaches have been subject to a comparative analysis.

Models of central infrastructure of public administration

The central infrastructure of public administration may be regarded as a so-called government intranet that provides services to all government users, and connects and ensures mutual communication among the central eGovernment components and individual public institutions. Approaches to the central public administration infrastructure can be divided as follows, by the type of network owner and network operator:

Network owner

- Government owned infrastructure

Infrastructure owned by the state. The key advantage is its security, mainly due to its isolation from other networks and users. High costs of its development are the main disadvantage.

- Infrastructure owned by a private operator

Considering the costs and other circumstances, countries which have no sufficiently developed own infrastructure in place may decide to use the existing infrastructure owned by a private telecommunication operator. In this case, the operator is responsible for the operation of the infrastructure, as well as for the meeting of all requirements concerning its security and technical support.

Network operator

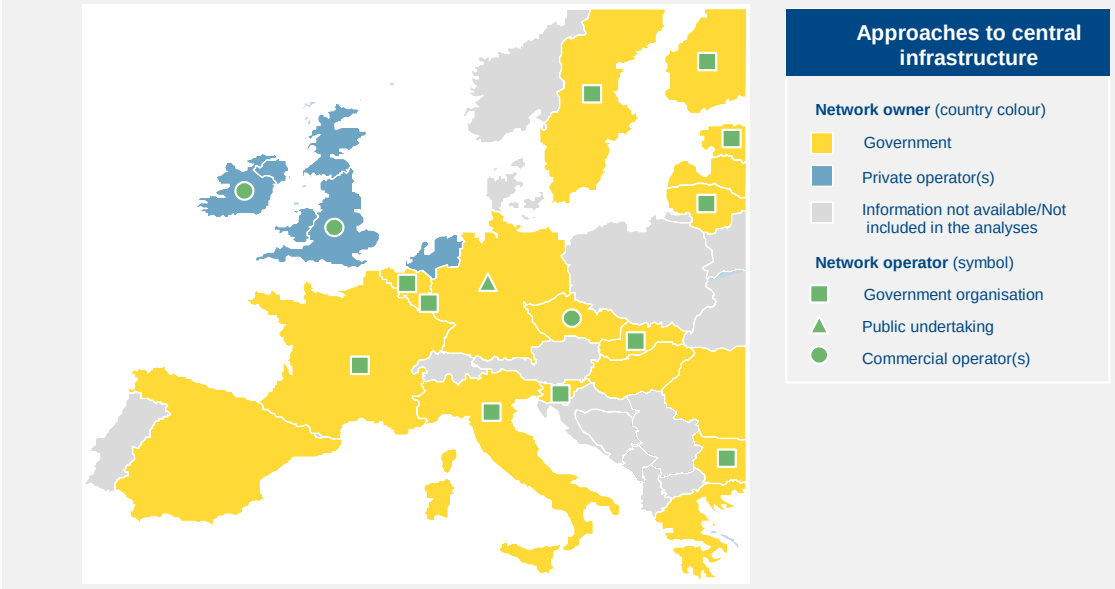
A network may be operated by the following entities:

- a government organisation;
- a public undertaking;
- a private operator or group of operators.

Examples and trends in approaches to central infrastructure of public administration

Considering that the central communication infrastructure of public administration is one of the key components in national critical infrastructure, the government owned infrastructure model prevails throughout Europe, with Slovakia being no exception to the rule. A summary overview of the application of individual approaches is shown in the figure below.

Figure 19: Models of using the central infrastructure of public administration in Europe



Source: eGovernment fact sheets, national eGovernment portals, European Commission
Note: Networks in France and Romania are under construction

Examples of using the central communication infrastructure in the world:

- Government owned infrastructure:

– Belgium: Several component of central communication infrastructure can be identified in Belgium. One of such components is *BELNET*, an optical network connecting public institutions, universities and research centres. *BELNET* is operated by a federal government organisation. Another such component is the Federal Metropolitan Area Network (*FedMAN*) that connects the various federal government services while

providing them with central access to the internet. This network is also operated by a government organisation.

- The Czech Republic: The Czech Republic operates Centrální místo služeb (CMS) that provides mutually managed and secured connections among public and government authorities and enables their communication with other entities in external networks such as the internet or the EU's communication infrastructure. CMS is operated by Česká pošta, a state-owned postal services provider.
- Germany: Infrastructure supporting internal communication among public authorities is called *Berlin-Bonn Information Network*. The network provides the main federal authorities with access to the internet and network services. In addition, the *Federal Administration Information Network* serves as an intranet for various public administration departments. A new network, *Federal Networks*, is being prepared to replace the two aforementioned networks, while considerably increasing effectiveness and security.
- Hungary: *Elektronikus Kormányzati Gerinchálózat* (EKG), a broadband network put into operation in 2004, represents the basic infrastructure of Hungarian eGovernment. EKG provides the central government authorities and regional institution with secured and monitored communication infrastructure, auxiliary data communication, internet access, email services and government intranet services. It also provides access to the EU's TESTA network.
- Sweden: Sweden has the Swedish Government Secure Intranet (SGSI) network in place, connecting Swedish government authorities in a secure environment separate from the internet. SGSI is operated by a government organisation, the *Swedish Civil Contingencies Agency*.
- Estonia: Estonian central communication infrastructure consist of the PeaTee broadband network that connects government institutions and provides access to the internet. The network is operated by government organisation RIA (*Estonian Information System's Authority*). Unlike the PeaTee, another network, XROAD, ensuring data communication among public administration information systems over the internet, is a decentralised network without a single owner and operator.
- Japan: Communication infrastructure connecting individual ministries consists of the *Kasumigaseki WAN* network, launched into operation in 1997. Local authorities are connected though the *Local Government WAN*. Both networks are interconnected and connected to the internet.

  - Infrastructure owned by a private operator:

- United Kingdom: The *Public Services Network* (PSN) is a central infrastructure network consisting of a number of privately owned and operated networks. Its core network is the *Government Conveyancing Network* (GCN), run by selected operators only. The PSN programme is managed by the Cabinet Office.
- Ireland: Central infrastructure comprises a network made up of several private operators' networks. This complex infrastructure is referred to as the *Government Networks* (GN). The whole process is managed by the Department of Public Expenditure and Reform.
- The Netherlands: The Dutch central network is called *DigiNetwerk* and is based on the utilisation of the existing infrastructure owned by private operators.

Procurement of telecommunication services

Two basic approaches are distinguished with respect to the procurement of telecommunication services by public administration:

- **Centralised:** Under this model, government procures telecommunication services in a centralised manner for all and/or majority of public administration institutions. An

obvious benefit of this approach is the government's strong negotiating position a major service customer with an possibility to win a more advantageous offer;

- **Decentralised:** Individual institutions procure telecommunication services on their own. A benefit of this model is that it encourages competition because in the case of centralised procurement there always are only several suppliers having the capacity to meet the complex supply requirements.

Examples of procurement of telecommunication services in the world

Examples of the procurement of telecommunication infrastructure in the world:

- The Czech Republic: The Czech Republic gradually moves away from the centralised procurement (procurement of services for the entire public administration was managed by the Ministry of the Interior) towards a decentralised system. The changeover from the centralised to decentralised system has increased savings in certain institutions in tens of percent on average. It has turned out that negotiating capacities of the government as a whole are much weaker than negotiating capacities of individual institutions despite the fact that the state has a much better starting position.
- Ireland: Ireland applies a centralised procurement model. Services are procured by the Department of Public Expenditure and Reform which concludes framework agreements with selected suppliers. Individual institutions are then obliged to conclude particular contracts with those suppliers.
- United Kingdom: The United Kingdom applies a similar model as Ireland. Suppliers are chosen from among PSN providers with a framework agreement.

Implications for Slovakia

Considering that the central communication infrastructure of public administration is one of the key components in national critical infrastructure, the government owned infrastructure model prevails throughout Europe, with Slovakia being no exception to the rule. In addition, similarly to a majority of countries, infrastructure is operated by a government organisation. On the other hand, countries considered leaders in eGovernment implementation and development (UK, EE, NE, ...) use a distributed network consisting of a number of commercial networks without a single owner and operator to connect individual information systems in public administration. Taking into account that central components of the Slovak eGovernment system are still in the development stage, when defining the future eGovernment concept in Slovakia it is necessary to consider switching over to a distributed model of central communication infrastructure.

In terms of the use of telecommunication services, a centralised procurement model may appear as a more advantageous solution at first sight. However, an analysis have shown a clear tendency to move towards a decentralised model in the former Easter Block countries. The trend is also substantiated by comparing savings between the centralised and decentralised model. In light of the above, it can be observed that Slovakia follows the recent trends as the Slovak public administration currently uses a decentralised model for procuring telecommunication services.

3.2.4 Data repositories and computing power

The development of ICT-enabled public administration has logically resulted in an increase the volume of eGovernment data. Moreover, analyses prepared by renowned companies engaged in IT market trend modelling expect a sharp increase in the volume of data to further continue over the next years. Therefore, data repositories and effective data storage solutions are another key component in eGovernment development.

With respect to data repositories (not limited to public administration only), the most interesting question is to what degree such repositories should be centralised in order to enhance their effectiveness and reduce unit costs. A recently prevailing trend is the use of cloud-based solutions. At the EU level, the potential of cloud technology is promoted through the European Cloud Partnership. As this is a new topic, a large majority of countries are at the initial

stage in addressing this issue, especially at a strategy level. The following analysis therefore compares trends occurring with respect to data repositories especially at the level of cloud strategies. A cloud-based data repository solution is also discussed in terms of its fitness for public administration purposes. Impacts this solution may have on Slovakia are examined as well.

Trends in individual countries

- United Kingdom: UK is a leader in cloud computing deployment for eGovernment services. The *G-Cloud Programme* designed to adopt cloud computing for public services is one of the key components of the ICT strategy for the UK public sector. Government authorities use both public and private cloud infrastructure. The adoption of this solution is primarily driven by cost-saving efforts. Infrastructure optimisation and maximum utilisation of data centres are among identified benefits of the cloud-based solution. The government believe it will contribute to streamlining and consolidation to achieve large economies of scale.
- France: France has been developing its cloud strategy since 2009. In 2011, the French government announced it would invest EUR135 million in a joint venture with the industry sector. Their joint *Andromede* project will involved the building of cloud-based data centres and providing hosting services to public and private entities.
- Germany: Despite continued fears of storing data abroad, the German government's ICT *Strategy of the German Federal Government: Digital Germany 2015*, prepared in 2010, committed to speed up development and deployment of cloud-based solutions.
- Ireland: A national cloud computing development strategy was introduced in 2009. The strategy identified cloud computing as one of the six pillars for the building of a *smart* economy. Under the strategy, the government committed to reducing the number of computer and data centres from potentially hundreds to approximately 10 primary facilities.
- The Netherlands: In 2010, the government approved a proposal to build a private cloud, referred to as *Rijkscloud*. The Dutch approach to cloud computing sees a cloud-based solution as a means to develop *smart* workflow in government administration, as well as in communication between government authorities, the private sector and citizens. Much attention is paid to data security. The strategy requires that sensitive data be stored in the territory of the Netherlands.
- Denmark: A European leader in cloud computing initiatives. Denmark's cloud development programme follows a governmental *digital working programme* defined in a document entitled *Digital Routes to Growth – The Ministry of Science's digital working programme*. Denmark actively investigates the ways to deploy cloud-based solutions, including shared data centres, with an emphasis placed on economic and ecological benefits.
- Poland: Poland is currently building one of the largest data centres in the country to serve as an infrastructure platform for the Ministry of Finance and other related government authorities, such as tax and customs authorities. In cooperation with Fujitsu, the Polish Ministry of Foreign Affairs is building a data centre for its own purposes and for the needs of all Polish embassies and consulates around the world.
- Canada: In 2011, the Canadian government adopted a plan to switch down more than 90 percent of the three hundred government data centres. Once the plan is fully implemented, some 20 data centres are expected to exist. In addition, the government has announced streamlining of e-mail services to replace the currently existing 100 different platforms by a single system. All activities related to the operation and management of data centres, e-mail and networking services will be transferred from 44 government departments and agencies to a new entity, *Shared Services Canada*.
- Brazil: The government is aware of the significance of cloud computing and has tasked the Ministry of Science, Technology and Innovation to prepare a cloud computing strategy. At the same time, legal requirements concerning the functioning

of a cloud-based solution are under discussion, especially with respect to data protection. This concerns, for example, sensitive financial data governed by stringent rules of the Brazilian national bank that prohibit storing such data outside the country's territory, thus representing an obstacle to using cross border cloud services.

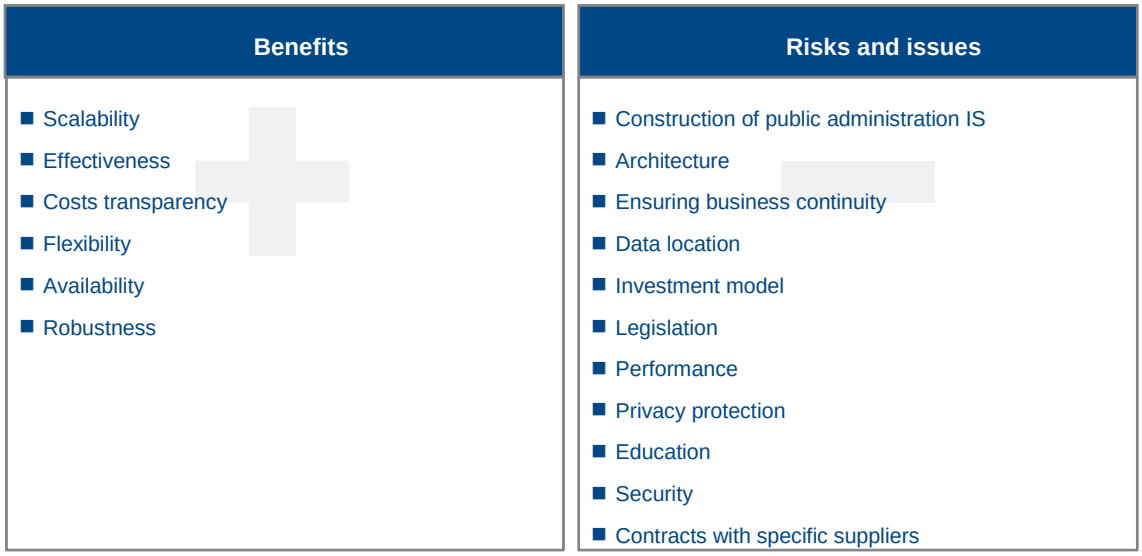
Benefits and risks of cloud

In terms of global development, further progress in cloud computing is mainly driven by expected benefits in the form of:

- more flexible and scalable information systems;
- faster deployment of services (higher agility);
- potential cuts in expenditure on information technologies and related transformation of investment costs into operating costs of information technologies;
- enhancing availability and robustness of public administration information system solutions.

No benefits can, however, be achieved without eliminating possible risks and resolving outstanding issues as illustrated in the figure below.

Figure 20: Benefits of cloud solutions and possible risks to be addressed

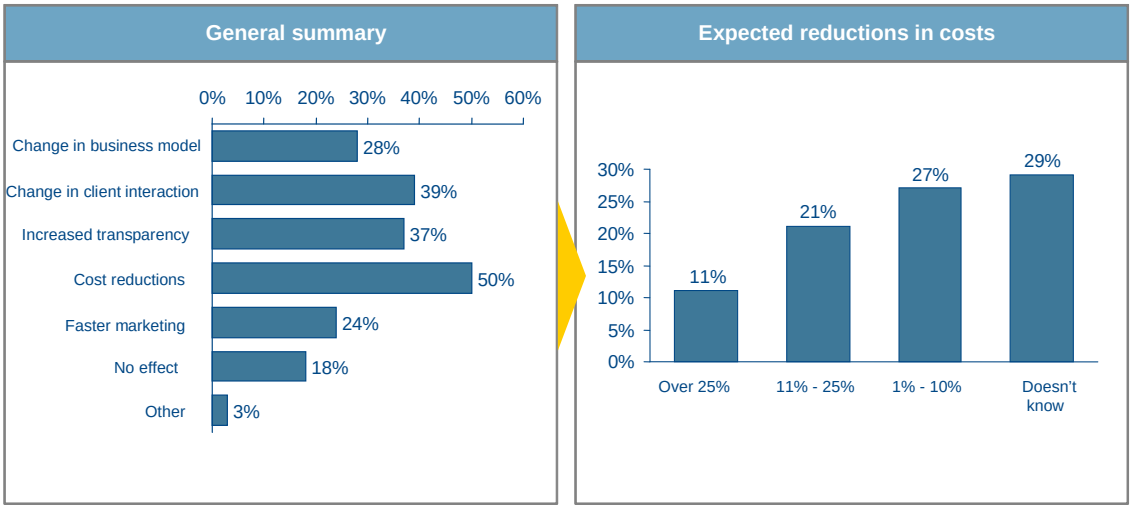


The current trends in the use of cloud solutions in public administration are based on the ability to implement simple and pilot projects. By analysing these projects, four main areas of use have been identified:

- cooperation and sharing of information;
- next level of infrastructure virtualisation;
- hosting of non-critical applications and non-sensitive data;
- computing power and capacity intensive projects.

Given the early stage of development of cloud services in public administration, real impacts of the implementation of cloud services cannot yet be assessed; it is necessary to analyse expectations of individual stakeholders of public institutions. The results indicate that the main benefits of cloud implementation will be savings in IT costs. Even though the requirement for cuts in expenditure remains a key issue, it seems that individual institutions are rather cautious in their expectations (savings in IT costs in the single digit percentage range) and that this is necessarily not the only and key factor in terms of benefits from their implementation. There are other notable expectations and requirements, especially with respect to increased agility and transparency.

Figure 21: Expected impacts of cloud on the functioning of public administration institutions

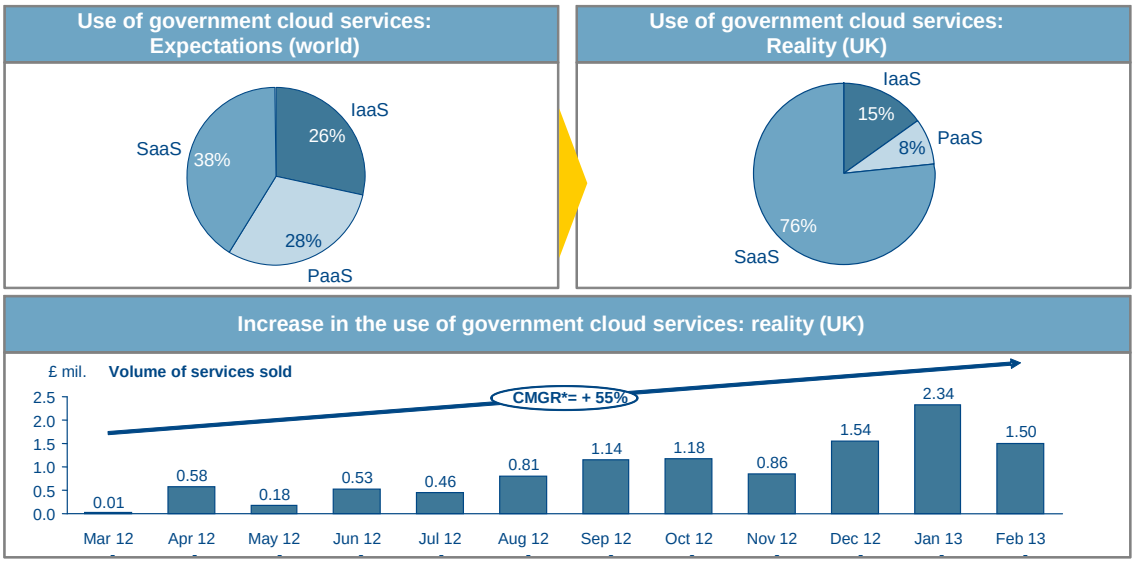


Source: The G-Cloud Programme, KMPG Government Cloud Survey 2012, Arthur D. Little analysis

The expected increased uptake of a SaaS (Software as a Service) model is based on a strategy set for the UK G-Cloud programme, especially in the area of delivery of accredited services that can directly be used by public administration. A lower level of use of IaaS (Infrastructure as a Service) and PaaS (Platform as a Service) models primarily relates to the fact that these services are largely interesting for migration and system development purposes; in this case, the process is a rather lengthy one (planning for a longer period of time, finishing the existing support). It means the results will be visible over a longer term.

That these expectations will match the reality has been confirmed by the first actual data obtained under the UK G-Cloud programme, launched into trial operation in March 2012. It has confirmed the expectations (following from the same analysis) that the key portion of services provided will consist of SaaS solutions (see figure below). The implementation of the UK G-Cloud programme has also indicated that public institutions show a real interest in using cloud services as the volume of services sold in the first year of operation grew at a rate of nearly 55% on monthly basis.

Figure 22: Cloud related expectations and trends in the public sector vs. reality

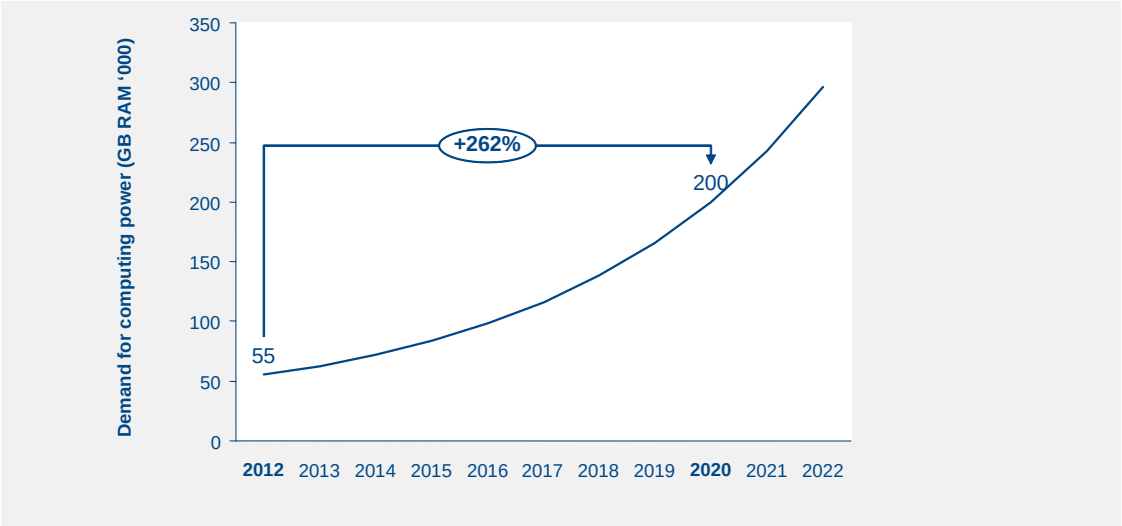


Notes: *) CMGR = compounded monthly growth rate
Source: The G-Cloud Programme, KPMG Government Cloud Survey 2012. Arthur D. Little analysis

Implications for Slovakia

At the beginning of 2013, the Ministry of Finance conducted an analysis of the needs of public administration for data repositories through a questionnaire survey. Overall capacities can be derived from the results of this analysis, along with the existing possibilities in terms of computing power and volume of stored data, and serve as input data for the projection. The following figures illustrate the projected development over a period of the next ten years.

Figure 23: Estimated increase in demand for computing power over the next ten years

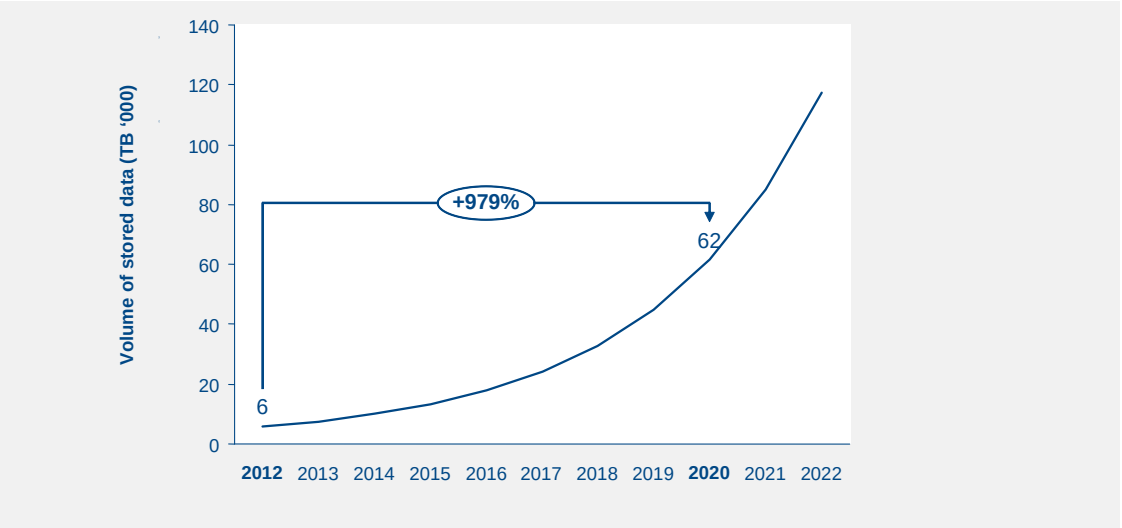


Source: Arthur D. Little analysis, Eurostat

The demand for computing power in public administration in Slovakia is estimated to increase by 262% by 2020:

- RAM capacity (thousands GB RAM) has been chosen as a measure of computing power;
- The estimated deployed computing power in public administration in 2012 was equivalent to 55,000 GB RAM.
- In 2020, the demand for computing power will be equivalent to 200,000 GB RAM, and growing;
- The demand for computing power will grow exponentially (determined using the CAGR methodology). The demand can be estimated using the index we have proposed, combining external requirements estimated through the growth in the uptake of eGovernment services and internal requirements estimated on the basis of the expected global growth in computing power.

Figure 24: Estimated increase in demand for data storage capacities



Source: Arthur D. Little analysis, Eurostat, IDC

The demand for data storage capacity in public administration is estimated to increase by 979% by 2020:

- Estimated data storage capacity in public administration represented 6,000 TB in 2012.
- The demand for storage capacity will increase to 62,000 TB by 2020, and keep sharply growing;
- The demand for data storage capacity will grow exponentially. The demand can be estimated using the index we have proposed, combining external requirements estimated through the growth in the uptake of eGovernment services and internal requirements estimated on the basis of the expected global growth in demand for data repositories.

The figure below shows projected growth in total costs of information and communication technologies in public administration over a period of the next ten years for two basic alternative solutions:

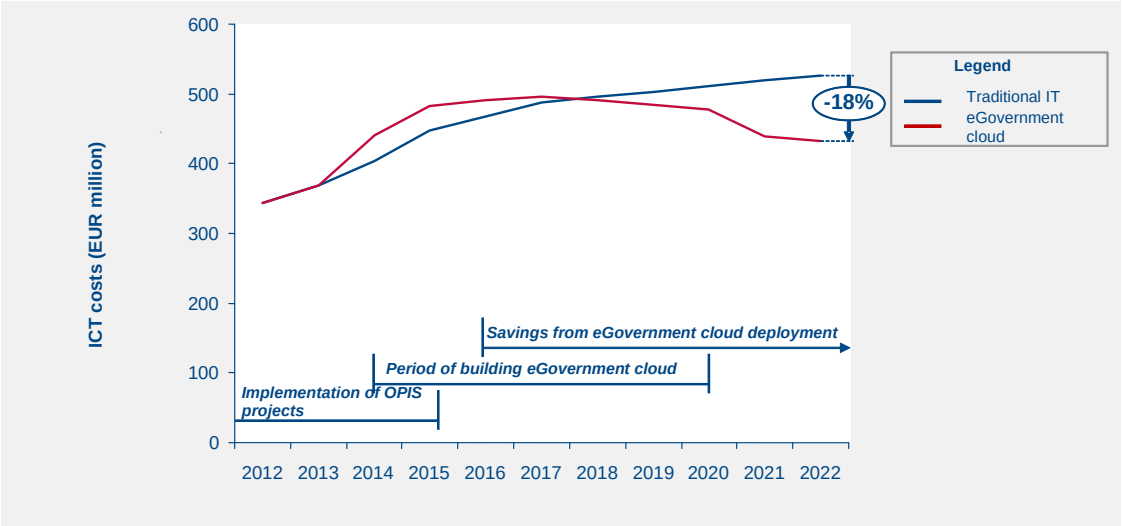
- traditional IT infrastructure - continuing the current model when each public institution manages the development and operation of its own information technologies alone;
- eGovernment cloud - a proposed solution using a shared platform of IT services in public administration.

Total costs mean the sum of investment and operating costs covered from the state budget and structural funds. The initial value for 2012 was determined using the results of a cost analysis for information and communication technologies in public administration.

The future development under the traditional IT infrastructure alternative will be affected by the gradual launch of OPIS projects into operation, considerably contributing to a growth in operating costs. On average, operating costs represent nearly 10% of total investment costs. Other growth components are estimated using the expected development on the global market.

Under the eGovernment cloud alternative, increased investments will be required during the period of building resources and platform (approximately EUR 250 million evenly distributed over the 2014-2020 period). As early as two years from the start benefits can be expected in the form of savings on investment and operating costs. For the first five years, operating costs of OPIS projects will be the same as under the previous alternative, but the OPIS projects can migrate to cloud afterwards. At the time when the full potential of this solution becomes apparent, a difference of 18% can be expected. A turning point when the costs of traditional IT infrastructure exceed the costs of eGovernment cloud can be expected as early as the beginning of 2018.

Figure 25: Projected development in costs of information and communication technologies in public administration



Source: Arthur D. Little analysis, IDC, Gartner, analysis of countries that implemented eGovernment Cloud

3.2.5 Investment models for broadband deployment

According the previously mentioned broadband development index, Slovakia is the second worst of EU countries in terms of internet development. The issue of funding broadband deployment is therefore extremely urgent.

Models for broadband deployment by public sector

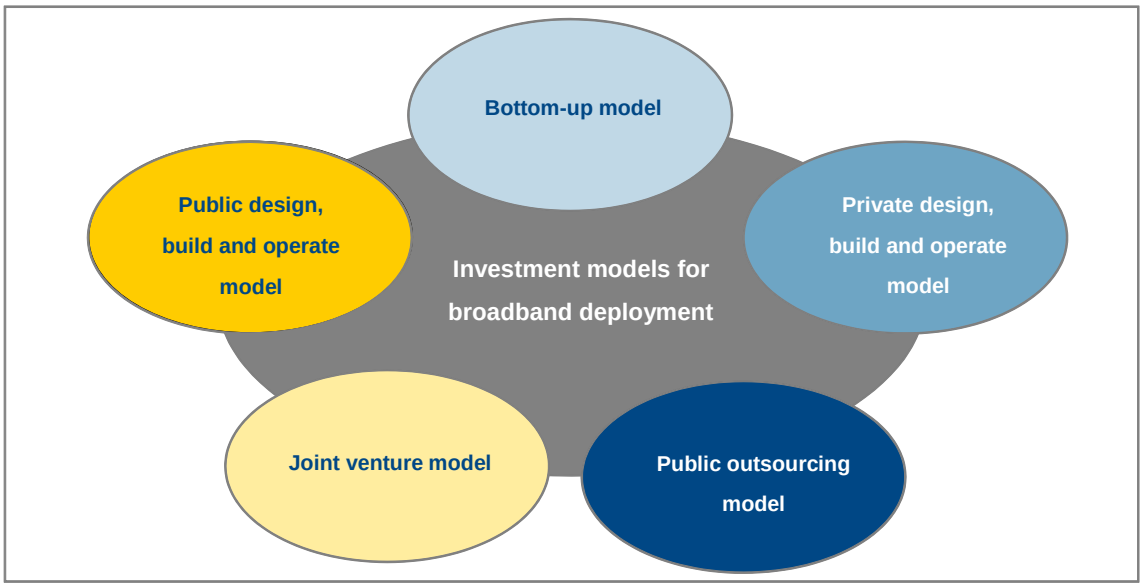
According to the *Guide to broadband investment – Final report*[13], five basic models are used across the European Union for deploying broadband networks by the public sector. All of these models combine engagement of public and private entities and investment sources to a different degree. The suitability of each of the models depends on specific initial circumstances, the scope of the required infrastructure, the specific aims, and the investment capacities and risk appetite of private sector partners.

- **Bottom-up model:** The bottom-up model is based on cooperation of end users organised into jointly owned and democratically controlled groups. These groups of end users are responsible for overseeing the contract to build and operate their own local networks.
- **Private design, build and operate model:** This model involves the building of private networks owned by private sector entities, co-funded by a public managing authority. The construction projects are often funded through grants. The public sector does not own or run the new networks but, when grants are used for their funding, may define requirements and impose obligations in return for the funding.
- **Public outsourcing model:** Under the public outsourcing model a single contract is awarded for all aspects of the construction and operation of the network. The major characteristic of this model is that the network is run by the private sector, but the public sector retains ownership and some control of the network.

[13] Guide to broadband investment – Final report, September 2011
http://ec.europa.eu/regional_policy/sources/docgener/presenta/broadband2011/broadband2011_en.pdf

- **Joint venture model:** Under this model, the ownership of the network is split between the private and public sector. Construction and operational functions are usually undertaken by the private sector.
- **Public design, build and operate model:** This model is based on the public sector exclusively owning and operating the networks without any involvement of the private sector. All aspects of network deployment are managed by the public sector. A public sector operating company may operate the entire network, or may operate the wholesale layer only (with private operators offering retail services).

Figure 26: Investment models for broadband deployment

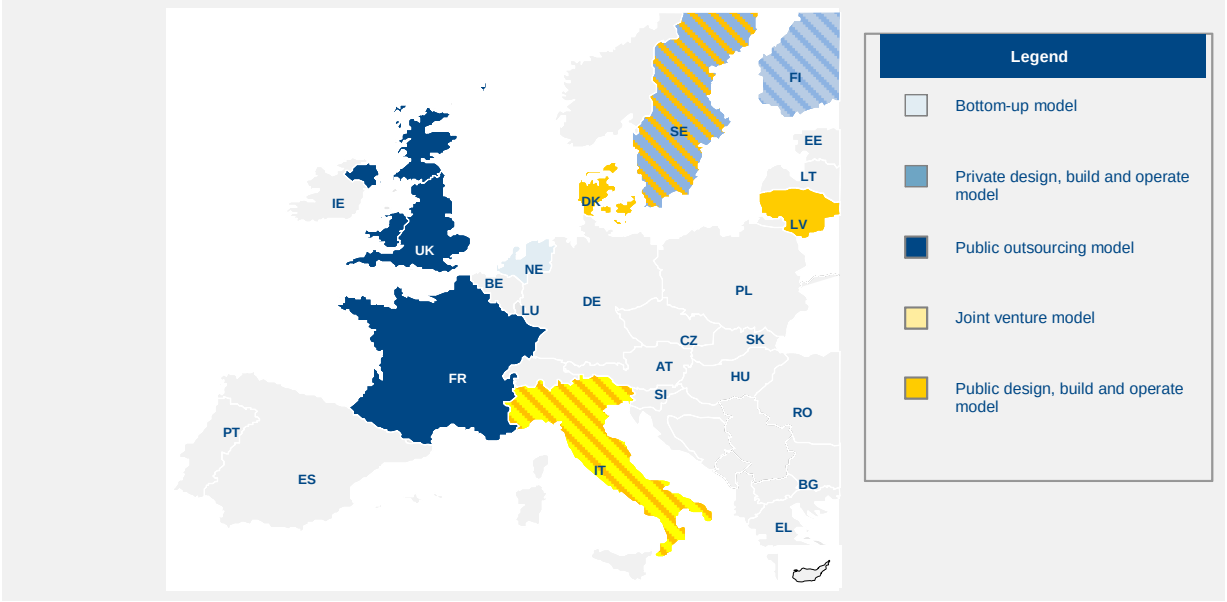


Source: Guide to broadband investment – Final report, September 2011

Examples and trends in broadband deployment abroad

All the five aforementioned investment models have been applied in the European Union. A summary overview of the application of individual models is shown in the figure below.

Figure 27: Examples of investment models for broadband deployment in the European Union



Source: Guide to broadband investment – Final report, September 2011

Examples of the application of investment models for broadband deployment:

- Bottom-up model:
  - Sweden: State-funded co-operatives under the rural development programme;
  - Finland: Combination of the bottom-up and private design, build and operate model in the North Karelia region. Grants to build network to within 2 km of homes;
  - The Netherlands: Co-operative-based fibre-to-the-home (FTTH) programme in the Nuenen area.
- Private design, build and operate model:
  - Finland: Combination of the bottom-up and private design, build and operate model in the North Karelia region. Grants to build network to within 2 km of homes;
- Public outsourcing model:
  - France: Construction of cabinet-based ADSL for very long lines in the Auvergne region;
  - France: Investment in backbone networks, DSL and WiMAX under the DORSAL project. Under DORSAL, a WIMAX network has been deployed in the mountainous region, and satellite serves those premises which are unable to obtain a terrestrial connection.
  - United Kingdom: Partnership arrangement for network management in South Yorkshire.
- Joint venture model:
  - Italy: A joint venture to build FTTH to 50% of households.
- Public design, build and operate model:
  - Lithuania: Nation-wide backhaul and core network under the RAIN project;
  - Italy: Construction of wireless and fibre networks to households and businesses in the Alto Adige region;
  - Italy: Investment in infrastructure in order to inspire investment from the private sector that feared of the low potential of the Piemonte region;
  - Denmark: Investment in fibre connection between city halls in partnership with electricity provider for FTTH in the Midtsoenderjylland region;
  - Sweden: The STOKAB project to provide fibre connection to end users, through a management company set up by the city. The management company procures services under framework contracts.

Recommended use for individual models

These examples indicate that there is no single, generally best, funding model for broadband deployment used in practice. The selection of any given model should reflect the specific initial circumstances, the scope of planned investment and other specific aims of a particular project. The suitability of individual models to different context is given in the table below.

Table 3:Suitability of investment models for broadband deployment

Model	Recommended use
Bottom-up model	For projects targeting localised areas and for gaining the most benefits from small amounts of funding. The model puts an emphasis on local demand and supports social cohesion at the local level.
Private design, build and operate model	For larger-scale investment projects, where sufficient funding is available, for instance in the form of state grants to make the investment sufficiently attractive for the private sector, and where the operations and risks of the local networks can be confidently transferred to a private operator.
Public outsourcing model	Where the public sector requires a high level of control and monitoring of the network and where the private sector deems the projects as having a high risk-profile.

Joint venture model	Where the interests of the public and private sectors can be closely aligned. An effective mechanism must be in place to resolve potential conflicts of interest that may block successful operation of the project.
Public design, build and operate model	Where the public sector requires the absolute control of the operations of the networks. The model is also suitable in situations where a certain amount of public sector investments may inspire further investments from private sources.

Implications for Slovakia

Slovakia may draw inspiration from a project carried out in the Piemonte region in Italy. The project included a range of broadband investments. Investments were primarily funded from the public sources and covered the following areas, among others:

- a regional backbone with cloud computing infrastructure at regional nodes;
- a public-sector-only wireless network, which later inspired investment by the private sector to the private networks.

Initially, the project was funded solely from the public sources. The main reason was a low level of interest among private telecommunication operators to invest in networks in the rural areas. At a later stage, however, the involvement of the private sector in the project increased, especially in more populated areas with a higher potential for revenue generation. Overall, some 60 to 70% of total infrastructure costs were funded by the public sector.

3.3 What are the trends in the information society development

3.3.1 Analysing strategic documents of advanced countries

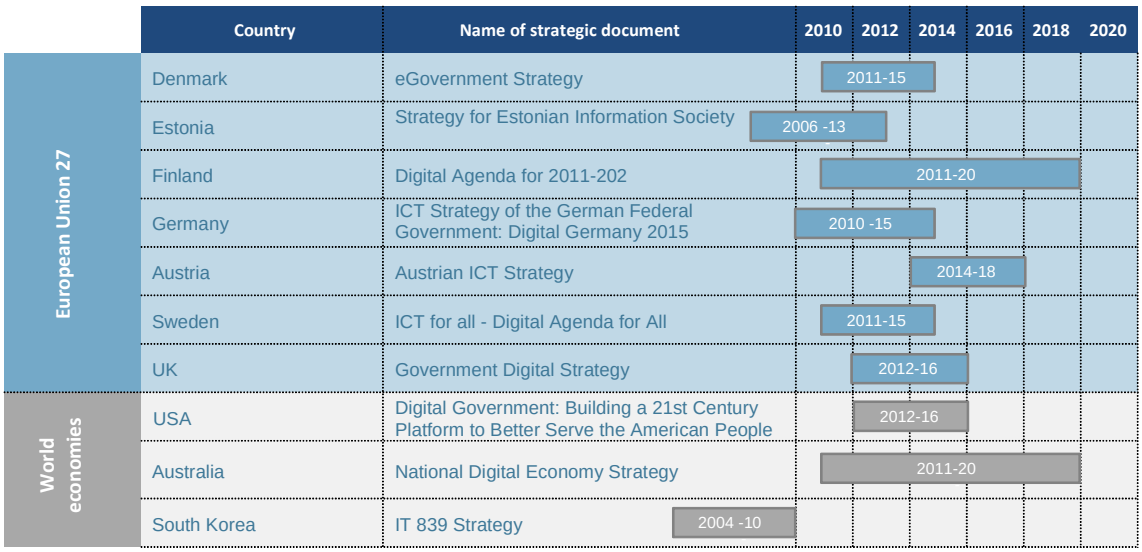
In order to identify trends, 10 strategic documents of advanced countries were analysed and the following suggestions drawn:

1. To improve business environment by reducing administrative burden on businesses, effective law enforcement through the introduction of eJustice, and transparent and reliable public administration services;
2. To modernise the public procurement platform to encourage effective participation of small and medium-sized businesses;
3. To engage citizens in the process of improving services and feedback through a number of different channels;
4. To ensure a personalised contact with public administration through reliable, practical and secure identity using tools comfortable for end users in order to encourage a massive uptake of eGovernment services, on mobile devices in particular,
5. To promote national and cross border movement of goods on the digital single market;
6. To create eDemocracy tools to enable participation by the citizens, including disadvantaged groups, in public affairs and decision-making;
7. To support development of online communities focusing on the inclusion issues and creation of simplified and customised services for disadvantaged groups;
8. To establish an innovation centre;
9. To create and develop a central access point to public sector services and information;
10. To draw up legislative, organisational and process measures to build joint infrastructure and platform in cloud;

11. To seek lower-cost innovation through coordinated development across the entire public administration using common standards and architecture, open-source communities and public crowdsourcing;
12. To encourage broadband market development based on the state-of-the-art fixed and mobile broadband technologies;
13. To create conditions for effective creation, sharing and use of openData.

Slovakia's strategy draws inspiration, as well as corroboration of its objectives, from the strategic documents of selected countries. The list of countries and relevant documents is given in the figure below.

Figure 28: Relevant strategic documents

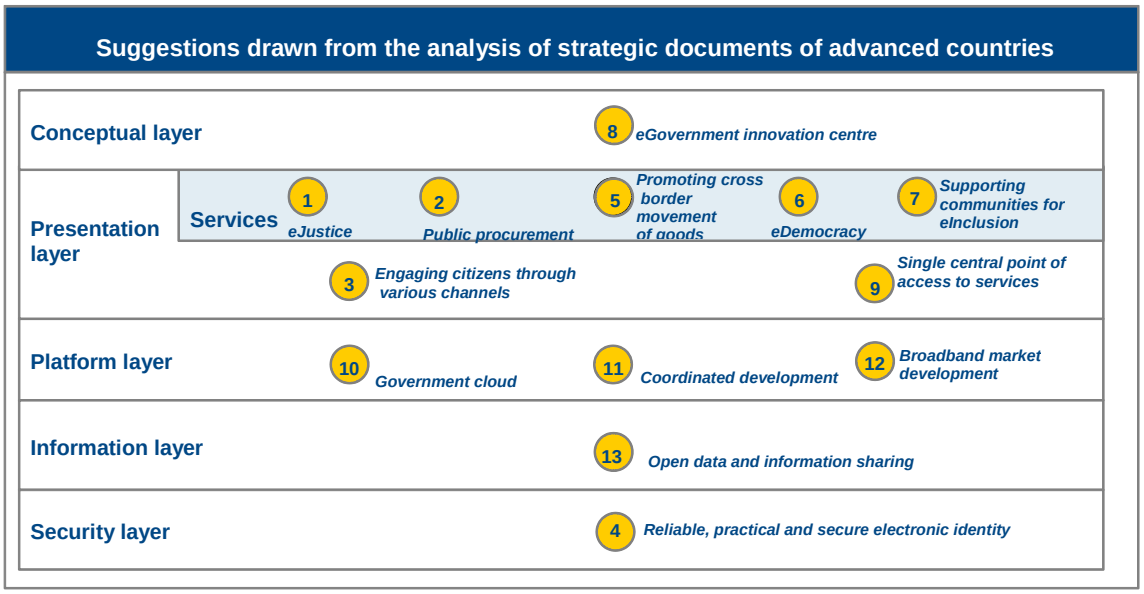


These documents were prepared throughout the 2010-2012 period. This period was affected by a slow recovery of the post-crisis economy, or even stagnation. In their efforts to restore economic growth, the countries decided to invest in modern technologies and advanced services. In addition, they wanted to reform public administration to more effectively use financial, energy, information and human resources and contribute to the sustainability of the entire system. An analogy between the access to information and the use of natural resources has emerged as a new trend in the countries' strategies. Both the information and natural resources must be made available to citizens and businesses in order for society to prosper. Unlike natural resources, the information have an advantage of being inexhaustible, their volume is exponentially growing. Only a real progress in the methods of information management will show the actual potential contained in the data.

In light of these trends, it comes as no surprise that the analysed strategies primarily focus on efforts to enhance effectiveness of public administration, improve the quality of citizens' life and create favourable conditions for business and innovation. Amidst the irreversible megatrend in the form of demographic changes sweeping through the Western civilisation, it is increasingly important to concentrate on inclusion of the elderly population and development of silver economy. Dilution of power and reinforced position of an individual need also be taken into consideration in the future, which makes eDemocracy and crowdsourcing tools ever more significant.

The recommendations for Slovakia derived from the strategies of other advanced Western countries are spread across five layers which shape the room for functioning society capable of further advancement. The figure below provides a summary overview of the suggestions drawn.

Figure 29: Suggestions drawn from the analysis of strategic documents of advanced countries



→ Suggestion 1: To improve business environment by reducing administrative burden on businesses, effective law enforcement through the introduction of eJustice, and transparent and reliable public administration services

→ Suggestion 2: To modernise the public procurement platform to encourage effective participation of small and medium-sized businesses

The key objective defined by the European Commission for the 2014-2020 period is to exit the crisis and ensure sustainable growth. The Digital Agenda sees the way out in the ICT sector as a main driver of future economic growth which had a 50-percent share in Europe's economic growth over the past 15 years. ICT and new technologies create a vivid environment full of new ideas and innovation. The world is excited by companies like Google and Facebook. According to the business management theory, large established corporations find it extremely difficult to propose any disruptive innovation because it almost always means a disruption to their original business model. Start-ups, on the other hand, are able to bring such a progressive idea to the market promptly and effectively. For many innovations, time plays an important role, therefore a favourable legislative framework with the minimum administrative burden should be set up.

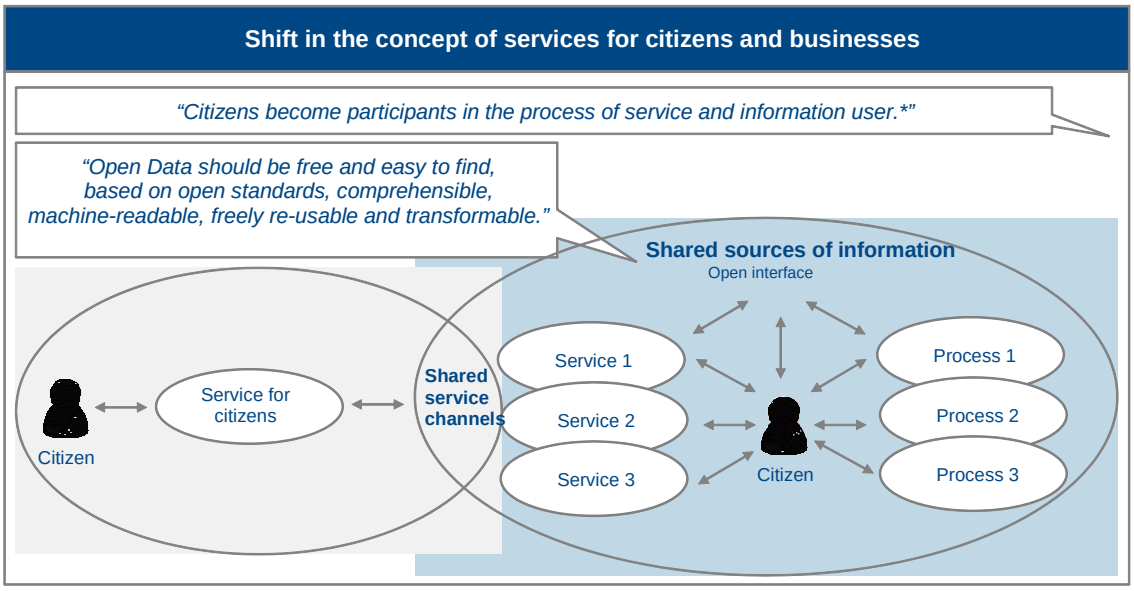
There is a large room for small and medium-sized businesses in the area of public contracts as well, since they often can propose an elegant and fresh solution based on open standards and tailor-made to client's requirements. Higher competition resulting from a more robust engagement of the commercial sector in the creation of solutions for public administration has a positive impact on the quality of a final product. With respect to procurement, it is therefore advisable to split projects into small parts with less stringent criteria to enable participation of start-up businesses with excellent ideas, too. Small businesses, however, are often faced with the problem of winning confidence on the one hand, and of enforcing their rights with large suppliers or customers on the other. The protection of rights of all involved stakeholders and more effective enforcement of justice are crucial in this respect. For example, the problem with claiming payments under a signed commercial contract is a frequent obstacle to establishing new partnerships. According to the World Economic Forum, it may take 565 days from filing an action with a court to the resolution of a dispute, which puts Slovakia in the 76th place in the global ranking. Singapore has the shortest period of 150 days. Simplifying and facilitating resolution of cross border disputes through electronic services is also important.

→ Suggestion 3: To engage citizens in the process of improving services and feedback through a number of different channels

→ Suggestion 4: To ensure a personalised contact with public administration through reliable, practical and secure identity using tools comfortable for end users in order to encourage a massive uptake of eGovernment services, on mobile devices in particular

Driven not only by the adverse economic conditions enduring since 2008, citizens have become more interesting in getting to know what is going on in their countries, especially in relation to reasonable public spending. Citizens and businesses wish to be more engaged in decision-making and have an opportunity be express their opinions. The progress in the Web 2. 0 technology (social networks, blogs, video sharing services, wikis, web applications, mashups, folksonomy) enables creating a new interactive environment within public administration portals, integrating social networks. Citizens and businesses cease to be passive recipients of the services only and become actively involved in the process of creation of services and their continuous improvements (figure 8). The solutions for active participation must be built in compliance with the concept of "lighter" public administration (as discussed in the section on effective public administration) and concentrate on so-called "influencers" whose activities have the greatest influence on the operation of the system and public opinion. The trend towards more personalised services will ensure an adequate level of citizens' involvement in the contact with public administration.

Figure 30: Shift in the concept of services for citizens and businesses



*Source: Finland: Digital Agenda for 2011-2020

With citizens' growing exposure, more frequent transactions and information sharing over the internet, concerns for the privacy and identity of an individual are increasing as well. A clear-cut strategy must therefore be defined with respect to electronic identity which should also be applicable to cross border eGovernment services. In addition to introducing eIDs, replaced in cycles corresponding to the end of validity of the currently valid national personal identity cards, introduction of alternative identities is also recommended, with a certification authority being responsible for overseeing their authenticity.

→ Suggestion 5: To promote national and cross border movement of goods on the digital single market

The state is responsible not only for promoting the internet as a means of citizens' participation in public affairs and interaction with public administration, but also for encouraging citizens to use services generating a direct economic value. Many countries have high hopes for the development of eCommerce on the European digital single market to boost demands for their products both at home and abroad. Activities in this area aim at ensuring reliable information

about products and services on the internet, especially about their final price. Innovative and comfortable methods of online payments must also be promoted and supervision over the credibility and reliability of online vendors ensured.

→ Suggestion 6: To create eDemocracy tools to enable participation by the citizens, including disadvantaged groups, in public affairs and decision-making

→ Suggestion 7: To support development of online communities focusing on the inclusion issues and creation of simplified and customised services for disadvantaged groups

Western countries cannot be successful and progressive without satisfied citizens who feel they can live their lives without fear of what fate might have in store for them. Social certainties may have different forms today, including access to eGovernment services, but their essence remains the same – to give disadvantaged citizens a chance to participate in public affairs and enjoy benefits of information society. This does not concern the disadvantaged individuals only, but also those who take care of them and whose economic activities are, therefore, limited. Telemedicine and assisted living services are considered beneficial in this respect, as they provide remote monitoring and assistance to older and/or chronically ill people, thus reducing requirements for non-stop care.

→ Suggestion 8: To establish an innovation centre

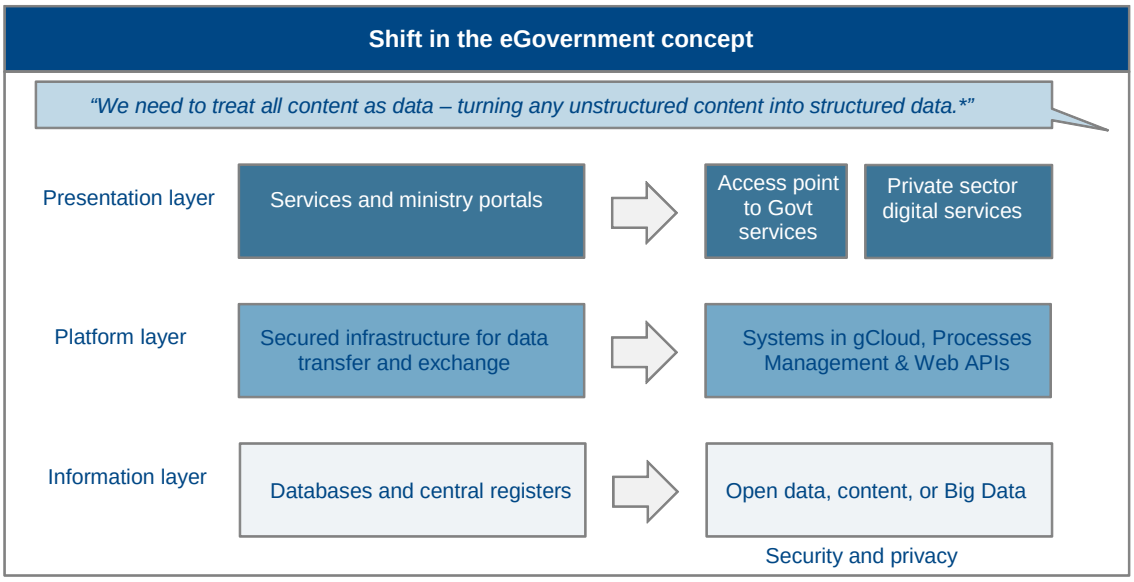
Citizen-oriented and transparent effective public administration is a must in order to have satisfied citizens and businesses. To overcome these challenges, a shift occurs in the three-tier concept (figure below) as part of the next wave of eGovernment development.

- The presentation layer defines the manner in which information is organised and delivered to end-users;
- The platform layer includes hardware, software and process tools serving for effective processing and delivery of information;
- The information layer stores and protects both structured data and unstructured content.

Further sub-chapters discuss particular examples of this updated approach where the creation of the information is separated from its presentation, thus allowing to create data and content only once and then use them many times in a number of different ways. The re-usability of data, however, increases requirements on privacy protection and data integrity and security.

The entire transformation must be supervised in terms of processes and organisation. It is recommended to set up a competence centre for eGovernment reform and innovation which will be able to implement the priorities under this strategy and create room for the accomplishment of all objectives.

Figure 31: A shift in the eGovernment concept



* Source: Digital Government: Building a 21st Century Platform to Better Serve the American People

3.3.1.1 Presentation layer

→ Suggestion 9: To create and develop a central access point to public sector services and information.

One of the trends supporting the new eGovernment concept is the migration of public administration portals to a single central access point to services and information (for example, www.borger.dk, www.government.se, www.gov.uk, http://www.usa.gov/). The functioning of integrated portals is possible due to the inter-sectoral eGovernance systems which also administer, among other things, the back-ends of such portals. Their major benefit is that they share a single, state-of-the-art platform which presents a multitude of different information in a well-arranged manner, organised either by topic, life cycle or other preferences.

Using the single sign-on technologies, this type of portal can be made into a "single point of contact" for all eGovernment services. People wish that their interaction with public administration be as simple and effective as possible so that they can complete all administrative formalities without any additional burden. Users can be kept duly updated about the status and outcomes of relevant procedures by means of all available communication channels, if they request so. Countries like the United States, South Korea, Australia, Norway and Denmark have already come very close to this solution. This new concept of servicing changes the citizen-to-government relationship and will ensure a higher quality of services at lower total costs by minimising red tape.

3.3.1.2 Platform layer

→ Suggestion 10: To draw up legislative, organisational and process measures to build joint infrastructure and platform in cloud.

On the platform layer, a shift occurs from the secured data exchange towards, where necessary, system and database sharing, inter-sectoral process integration, centralised management and application communication interfaces for external services, including from the private sector, which connect to the platform and deliver their output on the presentation layer.

The most effective location of the massively growing eGovernment solution appears to be the cloud (cloud-computing) using IaaS because in that case the systems are scalable throughout their development in terms of storage and computing capacities. Major challenges with respect to the across-the-board implementation of cloud-based eGovernment services is the integrity of the service, protection of data and privacy, as well as the regulatory framework which will have to be designed in compliance with supra-sectoral connections and IT governance.

Cloud computing may be defined as "an instrument enabling a simple, on-demand network access to IT services provided in the virtual environment of configurable computing resources which can be rapidly provisioned or released with minimal efforts and without interaction with any service provider." Cloud computing is a logical outcome of technology trends of the past two decades, in particular reduction in price of computing power and memory capacity, increase in throughput and decrease in price of internet connection, virtualisation and a growth of complex services such as outsourcing. Cloud computing moves away from user-owned dedicated systems towards the use of services and payment for their actual use. Cloud computing first appeared and spread across the commercial sector, but is today included in a majority of national eGovernment development strategies (US, UK, Germany, the Netherlands, Australia, Hong Kong, etc.), as well as on the EU level.

One of the trends is to build eGovernment cloud using a Platform as a Service and/or Software as a Service model which allows cloud service providers to offer their services to public institutions. Establishing such a platform requires a number of legislative, organisational and process measures, in particular for the purpose of complying with prescribed norms and standards with respect to quality assurance of provided services. Not all countries have decided to go this way because the use of centralised, standardised cloud services does not always have to be beneficial, given the unique processes applied by individual institutions.

→ Suggestion 11: To seek lower-cost innovation through coordinated development across the entire public administration using common standards and architecture, open-source communities and public crowdsourcing.

Individual countries have also identified ineffectiveness in the procurement of ICT products and a low rate of their re-use. A solution in this respect is to define generic services and products (which may but do not have to be located in the cloud) whose parameters can easily be configured, as well as the application of open standards. Estonia has even established a competence centre and repository for software with a public source code which is often considered more secure than standard commercial solutions.

→ Suggestion 12: To encourage broadband market development based on the state-of-the-art fixed and mobile broadband technologies.

High-quality communication infrastructure and NGN development create grounds for eGovernment development at the presentation and information layers. It is a basic prerequisite for the use of services and access to a shared platform in the cloud, therefore for the satisfaction of end users, as well. The objective set for the next period is, therefore, to support the trend of infrastructure building without disruption to competition and the attractiveness of market for commercial (private) investment in order not only to accomplish the more ambitious targets under the Digital Agenda for Europe, but also to reduce the costs of ICT services gradually. Public administration at all levels, the industry and citizens' initiatives must work together towards the largest possible broadband coverage at the nation-wide level. According to a World Economic Forum survey[14], Slovakia ranks 104th in terms of costs of accessing ICT. The quality and speed of internet connections contribute to the development of services and use of the internet, for example, for personalised video content (including 3D), real-time services and video streaming, and for working with huge data files. Having an access to an affordable internet connection is equally necessary to enhance the uptake of eGovernment services by a majority of population. A growth in the mobile market and increased availability of mobile data connections thanks to the digital dividend auctions throughout Europe have enhanced the citizens' demand for services optimised for mobile devices.

Germany created an infrastructure atlas for coordinated development of broadband lines.

3.3.1.3 Information layer

[14] The Global Information Technology Report 2012

→ Suggestion 13: To create conditions for effective creation, sharing and use of openData.

The information layer does no longer involve digitising data into databases and creating central registers only, but also transforming stored data into structured content and creating dataset suitable for re-use as Open Data.

Figure 33 indicates that the entire eGovernment concept is based on the information layer storing huge amounts of data. The question is what the economic value of these data is. A partial answer can be derived from the following views:15

- Data contain in the US health system have a potential annual values of USD30o billion;
- Information from the European public sector may potentially bring EUR250 billion a year;
- Global use of personalised spatial data has a potential to bring the customers a surplus of more than USD600 billion a year;
- Big data promise an increase in vendors' operating profits by 60 percent.

The trend is to share information within an institution, among sectors, as well as towards citizens and businesses. Pressures have also occurred towards commercial enterprise to publish various information, for example, about their energy efficiency. The aim of open data efforts is not only to ensure the right of access to information, but also to contribute to creating new or improved services, either in the public or commercial sector.

3.3.2 Digital Agenda for Europe

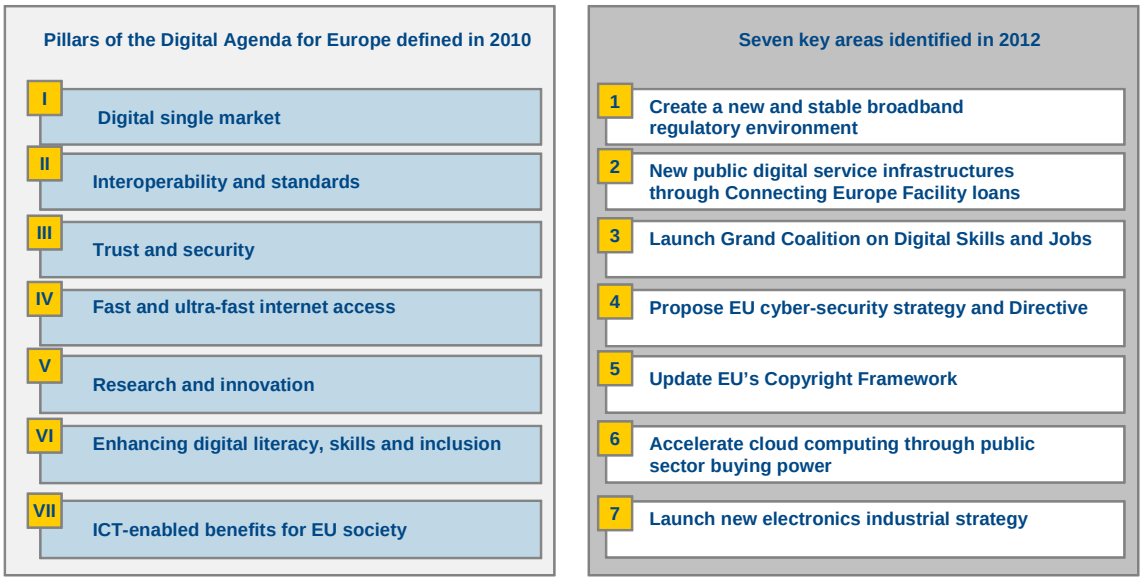
3.3.2.1 Pillars of the Digital Agenda for Europe

In the general framework policy Europe 2020, the European Union identified new mechanisms to boost growth and jobs to help the EU economy exit the crisis and prepare for the challenges of the next decade. Smart, sustainable and inclusive growth relies on a vision of achieving high levels of employment, productivity and innovation primarily through digital economy, low carbon economy and social cohesion. For smart growth, the Digital Agenda for Europe was proposed as one of the seven flagship initiatives under the Europe 2020 strategy, describing the trends in the development of information society in Europe. It is set out to define the key enabling role that the use of ICT will have to play if Europe wants to succeed in its ambitions for 2020.

The objective of the Agenda is to chart a course to maximise the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity. The Digital Agenda for Europe defines 101 recommendations based on seven pillars (figure 34) which should be implemented. Each Member State should choose a group of recommendations that correspond to the level of its development and optimise synergies between its national strategy and the content of the Digital Agenda to achieve the desired progress in the coming period. A Digital Champion is appointed in each Member State to oversee the progress towards the Digital Agenda. A state secretary at the Ministry of Finance serves as the Digital Champion in Slovakia. The Ministry of Finance is competent under the law for overall coordination of eGovernment development and responsible for the general eGovernment architecture.

[15] Quoted from Manyik et al., 2011.

Figure 32: Pillars of the Digital Agenda for Europe



In the new programming period, Slovakia is set to enable effective implementation of the selected recommendations from the Digital Agenda for Europe which it has committed to undertake. The strategy for Slovakia builds on all the seven pillars of the Digital Agenda described in the figure above.

The strategy also takes into account a digital list of prioritised tasks for the 2013-2014 period stemming from the December 2012 revision of the Digital Agenda for Europe:

- Create a new and stable broadband regulatory environment - addressed under the theme;
- New public digital service infrastructures through Connecting Europe Facility;
- Launch Grand Coalition on Digital Skills and Jobs;
- Propose EU cyber-security strategy and Directive;
- Update EU's copyright framework;
- Accelerate cloud computing through public sector buying power;
- Launch new electronics industrial strategy.

The aforementioned priorities and selected recommendations under the Digital Agenda have served as the basis for the proposal of recommendations listed in Chapter 5.2 and for implementation of specific objectives under investment priorities listed in Chapter 7.

3.3.2.2 Delivering objectives under the Digital Agenda

The Digital Agenda for Europe indicators considerably contributing to the assessment of the current situation in the information society development in Slovakia can be divided into four areas:

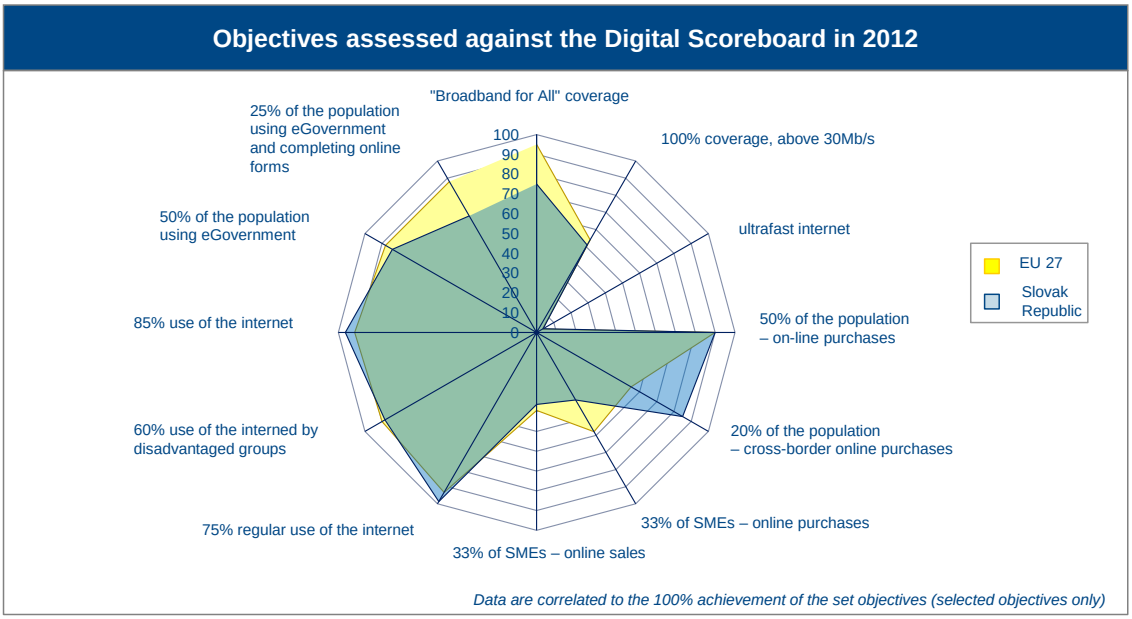
- Broadband coverage and speed;
- State of eCommerce;
- Internet uptake;
- The use of eGovernment services.

The figure below indicates that Slovakia slightly falls behind in eCommerce in the case of small- and medium-sized entrepreneurs; however, the results are excellent for online purchases of the population. Furthermore, Slovakia more markedly fails to meet the broadband targets, compared to the EU average. However, the rest of Europe also has problems to provide broadband of at least 30 Mbit/s for all, or ensure that 20% of the population should buy cross border online or 33% of SMEs should conduct online purchases/sales. The next programming

period will therefore concentrate on improving these indicators. Another challenge is to stimulate the use of internet lines with speed higher than 30 Mbit/s because even though Next Generation Access (NGN) networks account for 12% of the broadband market in the EU, only 8.1% of customers pay for connections faster than 30 Mbit/s[16].

Nearly 42% of the Slovak population use eGovernment services, an value that brings Slovakia closer to the EU average. Denmark and Sweden have a higher number of eGovernment users, theoretically closing on saturation, if we assume that eGovernment services are most beneficial to the middle-age population. Nevertheless, they have still posted a growth in the single digit percentage range in the recent period.

Figure 33: Objectives assessed against the Digital Scoreboard in 2012



Source: the Ministry of Finance of the Slovak Republic

[16] https://ec.europa.eu/digital-agenda/sites/digital-agenda/files/KKAH12001ENN-PDFWEB_1.pdf

4 Operational Programme Information Society

The following chapter describes Slovakia's approach to the development and roll-out of eGovernment services and summarises the results expected to be achieved under the Operational Programme Information Society (OPIS) by 2015.

4.1 Results of the Operational Programme Information Society

The building and development of eGovernment services are funded from the Operational Programme Information Society. The introduction of public e-services, digitisation of cultural heritage and broadband development are supported from structural funds. The global objective of this operational programme was to create inclusive information society as an instrument for the development of a high performance knowledge economy. The progress made under individual OPIS objectives is continuously monitored and assessed. Interim evaluation reports imply conclusions to better understand and interpret the implementation process.

In terms of the overall competitiveness index, Slovakia still falls behind at the regional level, with its position even slightly deteriorating. Though the global OPIS objective has not been met as at evaluation date, expected acceleration in OPIS implementation along with envisaged completion of planned projects create conditions for its early fulfilment.

Priority axes under the OPIS:

- Development of eGovernment and ICT-based services;
- Development and renewal of the national infrastructure of repository institutions;
- Improvement of broadband internet access.

A specific objective under the Development of eGovernment and ICT-based services priority axis is effective public administration. This specific objective is currently fulfilled with certain limitations. However, the accelerated OPIS implementation is likely to contribute to its early accomplishment. Yet, the fulfilment of some of the indicators for this specific objective may be partially endangered. Possible risks exist with respect to indicators related to time savings, the number of institutions introducing eGovernment systems and the number of new jobs. Efforts are currently being made for an overall revision of how the existing projects contribute to the fulfilment of these indicators in order to increase the rate of accomplishment of indicators and to reduce the risk that endangered indicators will not be achieved.

The OPIS is based on and fully compatible with the objectives of European Commission strategic documents until 2008. The objectives defined therein are continuously being met and expected to be fully accomplished by 2015. The objectives defined in the documents drawn up after 2008 are met partially and will adequately be assessed in the present document and transformed into measurable targets for the new programming period. Slovakia adopted 100% of commitments under the Digital Agenda for Europe.

A specific objective under the Improvement of broadband internet access priority axis was to increase broadband penetration. This objective will not be accomplished and has gradually been re-defined to creating engineering projects for broadband fibre networks which will contribute to increasing broadband penetration.

4.2 Progress in information society development in Slovakia

In 2008, the Government of the Slovak Republic approved the National eGovernment Strategy which outlined a vision for eGovernment development in Slovakia. Based on this vision, the Ministry of Finance prepared the National Concept for Informatisation of Public Administration which defined a concept-level approach to the deployment of information and communication technologies in public administration, specified the architecture of the integrated public administration information system and set out the principles for the development of eGovernment services for citizens and businesses in Slovakia. One of the key objectives of the new concept was to focus on electronic services for citizens and ensure a standardised approach to the implementation of ICT-enabled services and processes in public administration.

The national concept then served as a key architecture document to define detailed projects for eGovernment development. Individual components of eGovernment development were defined at three levels: i) at the level of common modules and access components; ii) at the level of information systems for central government; and iii) at the level of information systems for local governments. The funding of eGovernment projects was ensured through the Operational Programme Information Society that enabled the drawing of EU structural funds for the purposes of information society development in the 2007-2013 period.

In keeping with the national concept, the Ministry of Finance prepared and subsequently launched several dozens of eGovernment implementation projects in 2008 and 2009. Before their implementation, a detailed feasibility study was prepared for each project, containing the specification of new electronic services, feasibility assessment of their deployment, cost-benefit analysis and detailed project plan.

After the June 2010 general election, the previous three-party ruling coalition was replaced by a new government of four centre-right parties. The new government suspended implementation of a majority of eGovernment development projects funded from the OPIS and started working on the revision of the running eGovernment initiatives. The year 2011 witnessed deceleration or even discontinuance of most eGovernment projects; it even was often unclear whether the original eGovernment vision, as defined in the national concept, was still applicable and accepted at the government level.

Another government change occurred in 2012 when the SMER - Social Democracy party won the early election and returned to the original eGovernment concept and re-launched a majority of suspended and stagnating projects. The critical changes in a policy strategy and approach to eGovernment development that occurred between 2010 and 2012 had negative impacts on time-schedules of individual projects whose implementation was delayed for two years. This delay is the main reason why the evaluation of the current state of implementation of eGovernment initiatives provided in this document focuses on 2015 when the majority of the planned projects are expected to be completed.

Throughout 2013, eGovernment development efforts have continued in accordance with the still applicable national concept which defines the data layer through a system of basic registers and codebooks; it means that a majority of critical master data are registered in a single primary location and individual agenda information systems are updated about changes. These basic registers will include a register of legal persons, register of natural persons and address register. Modern identifiers will be introduced for person registers.

Services for citizens and businesses, to be continuously deployed until 2015, have transaction-level sophistication to a large degree. It means that applications/requests can be submitted and subsequent decisions delivered by electronic means. Exact reports will be available to citizens about the exact course of each transaction.

Services can be accessed through the Central Public Administration Portal. A set of common modules will be used in service implementation that enable performance of individual steps in a process, from the preparation of an application, its electronic submission, payment of administrative fees through to the delivery of a decision. The portal will also contain an eDesk module which will allow citizens to view all of their communication with public administration, including electronic versions of documents which can be used for legal purposes. A uniform manner of the provision of electronic services makes communication with public administration

considerably easier for citizens. Identification and authentication in the Slovak eGovernment environment is ensured through electronic identity cards (eID cards), using the IAM module of the central portal. Integrated service points are being built in 1,200 locations to enable assisted use of the central portal. A law on eGovernment services should make ICT-enabled communication with public administration possible in practice.

Special attention has be paid to ICT-enabled local government services. Electronic services will gradually be introduced for higher territorial units and municipalities. A data centre for municipalities and towns (DCOM) will be available for smaller municipalities and towns, providing centralised, cloud-based electronic services.

However, not even the completion of the Operational Programme Information Society will solve all the aspect of eGovernment:

- services will be accessible through electronic forms that cannot conveniently be completed by means of mobile devices and do not enable full transaction-level communication;
- Since the ICT deployment in agenda system preceded the implementation of basic registers in certain cases, some registers of the public administration information systems will not be interconnected with the basic registers to a full degree;
- No comprehensive optimisation of public administration processes has not taken place, therefore, addressing life situations of citizens and businesses will not be possible; services will not be pro-active and public administration information services will not be fully integrated at the process level;
- Most public administration data will not be published as open data;
- Synergies among information systems in public administration are not utilised, resulting in a low rate of service sharing. For example, each sector (ministry) runs its own email system, accounting system, etc.

However, the number of implemented services is not the only important factor in the process of introducing ICT-enabled public services; equally important is the quality of their design and configuration to match the need of citizens and businesses that use such services. To measure the quality of their implementation, the Ministry of Finance has since 2009 been running a survey project entitled “Customer satisfaction with selected eGovernment services”. The survey provides a true picture of citizens’ knowledge, use, quality perception and satisfaction with twenty basic eGovernment services. The results also reflect the willingness to use eGovernment services, degree of confidence in ICT-based solutions, users’ expectations and, of course, citizens’ and businesses’ satisfaction with the current state of play in eGovernment development.

Assessment of the 2012 survey has revealed major shortcomings in the publicity of eGovernment services. Ten percent of respondents claim to know eGovernment, with a majority of them understanding this term as “electronic state administration”. The percentage of those who claim to know eGovernment services even moderately decreased on the annual basis. Virtually no year-on-year change occurred as regards the use electronic services to handle administrative matters; 38% of respondents say they use eGovernment services. As much as 34% of respondents say they do not see/know about any disadvantages in handling administrative matters over the internet. Some 10% of respondents say the disadvantages of electronic services are their incompleteness in that a personal visit to an administrative authority is nevertheless necessary, security risks associated with such a procedure, incomprehensibility of procedures and poor publicity/lack of information about electronic services. As much as 56 of respondents say they do not have sufficient information about eGovernment services. They expect to receive such information primarily through the internet, television and personal visits.

Further development in eGovernment services will concentrate on improving access to services (for example, through mobile devices) with no need to visit administrative authorities in person, improving the quality of dissemination of information about the services and manner of their use, enhancing sophistication of information systems in public administration, a shift in working with data and standardisation of processes in public administration. The next generation of eGovernment is discussed in the following chapters of this document.

4.3 Lessons learned from the 2007-2013 period

4.3.1 Information society development

If the currently implemented plans and projects are completed by 2014, the information society development can be considered a success. In the course of their implementation, however, certain problems surfaced; their detailed identification and examination of their causes may considerably contribute to effective implementation of programmes and projects in the next programming period, by proposing appropriate measures.

The key problems are as follows:

- insufficiently prepared legislation and applicable standards;
- project coordination and interdependence;
- capacities of liable stakeholders to implement projects;
- public procurement procedures are excessively lengthy and demanding;
- suspension of information society programmes and programme between 2011 and 2012, resulting in a two-year delay in their implementation.

Legislation and standards

Electronic services have often been defined prior to a legislative procedure. Feasibility studies have defined legislative requirements that need to be complied with at the time of launching information systems into real operation. However, during the preparation of legislative standards, these requirements have often not been fully incorporated in relevant legislative drafts. Another issue is the lengthy preparation of the law on eGovernment services mainly driven by political changes (on May 30, the Government approved the Draft Act on the performance of public administration activities in electronic form and on amendments to certain acts (the eGovernment Act).

The law itself has already been submitted to the Government's legislative council at the time of preparation of this document. This has given rise to uncertainties, with respect to functional requirements in particular, in terms of programme and project management. A major problem with defining the standards related with the development of information society consisted in insufficient capacities to handle the task in the required quality and time. As a result, many solutions had been developed and deployed before the necessary standards were put in place.

Key lessons learned:

- preparations of a legislative process should be included in projects that require changes in legislation;
- applicable legislation has to be approved before a detailed functional specification of a project is adopted;
- if a project introduces any standards, their preparation needs be part of the project;
- considerable support needs be provided to standard-setting capacities and monitoring their compliance;
- an emphasis should be placed on the flexibility and robustness of systems to enable their simple and cheap reconfiguration to match the changing legislative requirements.

Project coordination

Preparations of projects under the Operational Programme Information Society were quite well managed. Coordination of ongoing problems has turned out to be a bigger problem, as many of the projects are closely interdependent. A functioning programme office was only set up as late as 2012. A situation where individual liable stakeholders (project implementers) are responsible

for integration has turned out to result in creation of isolated functionality islands which only can interoperate with great difficulties. The Central Public Administration Portal delayed by political changes has only made things worse.

Key lessons learned:

- responsibility for the eGovernment central architecture needs be clearly assigned – a shift in modelling in a Metainformation System toward a comprehensive architecture at all levels (business, application, technology).
- management at the level of the eGovernment programme needs be further strengthened, in particular with respect to project coordination; deliverables from each project stage must be available to all stakeholders involved; a system to test solutions must be set up; etc.
- an eGovernment testing environment needs be created that should be dynamically reconfigurable, secure and cost effective.

Project implementation

Implementation of complex project has proved to exceed the capacities of liable stakeholders. Problems and deficiencies have been apparent at each project stage. Successful implementation of projects has already been hindered in the phase of public procurement, with year-long delays between the approval of a national project and its launch. Project requirements and terms of reference have often been unclear. Subsequently, project implementation has been delayed. Contractors have been unable to meet project schedules and deliver in the quality required under contracts.

Key lessons learned:

- pressure should be put on liable stakeholders to constantly improve performance of their IT departments and enhance their expert capacities (in terms of both the quality and quantity);
- experience sharing among individual liable stakeholders should be reinforced, especially with respect to the project output quality management – results of all analytical works should be available;
- reinforcing a central level control should be considered, especially with respect to the quality of analysis, proposal for the architecture and technology of a public administration information system solution, and possibilities of liable stakeholders' technical assistance extended;
- increased openness towards technology innovation and approaches is desirable, which would lead to simpler and less expensive solution variants than originally planned;
- public procurement processes and rules need be made more effective.

4.3.2 Improving broadband internet access

Measures under this priority axis 3 "Increasing broadband internet access" have not been successfully implemented to a full extent in the 2007-2013 programming period, in particular due to the following:

- initially, the project implementer did not have sufficient capacities;
- the preparatory stage has turned up to be more difficult than expected.

Building sufficient administrative and technical capacities capable of implementing such demanding projects as the construction of national backhaul networks must be among the top priorities. The National Agency for Networking and Electronic Services (NASES) is currently in charge of the project. Adequate organisational structure to ensure preparation and implementation of a broadband access project is expected to be set up in the near future.

The process of preparing projects to improve broadband internet access has shown all important steps that need be taken. These steps are now known and have largely been taken (methodology for determining white areas, state aid notification, coordination of planning with operators, etc.), that is, the groundwork of this process has already be laid. Lessons learned from the preparatory process:

- construction of regional networks should be coordinated at the central level, close cooperation of all stakeholders, network operators in particular, should be encouraged;
- backhaul networks constructed with government support must be accessible to all potential operators wishing to build last-mile connections;
- optic fibres are currently preferred technology used in the construction of backhaul networks;
- demand for broadband access needs be sufficiently encouraged to ensure long-term sustainability of the solution – for example by providing local government e-services;
- the methodology to determine white areas needs to be updated to correspond to the updated objectives; the list of white areas should continuously be modified using updated information.

5 SWOT analysis and recommendations for Slovakia

This chapter examines the current state of information society building in Slovakia and provides recommendations for further development:

- *SWOT analysis concerning digital economy, eGovernment, public administration and broadband access;*
- *Summary of recommendations.*

5.1 SWOT analysis

The efforts to build information society in Slovakia were taken in a dynamically changing environment in the past three years, both in economic and political terms. Foreign direct investment and EU support helped to overcome a difficult period throughout which modern technologies continued being deployed in society and public administration. Baselines for the next period of information society development in Slovakia are provided in the SWOT analysis described in the following chapters.

5.1.1 Strengths

Table 4: SWOT analysis - strengths

Strengths
Digital economy
▪ Economy rebounded from the bottom in 2011 ▪ Imports of modern technology induced by foreign direct investment were a major source of productivity gains. ▪ Development of digital economy ▪ Flexible and skilled labour ▪ Introduction of electronic public procurement
Public administration
▪ Absolute increase in eGovernment development at a speed exceeding the EU average in certain years ▪ Sufficient skills for working with information technologies in public administration After 2015: ▪ Public administration institutions have modern information systems in place to deliver their tasks
eGovernment
▪ Demand for eGovernment services ▪ Availability of eGovernment services for businesses is closing on the EU average ▪ An open data based solution for the business register After 2015: ▪ Public administration services will be ICT-enabled at the partial transaction level: ▪ Electronic services will be accessible through ISPs

Strengths
Access to high-speed internet based on modern technologies
▪ Meeting the parameters for internet usage by population ▪ Online business-to-customer engagement of Slovak companies is relatively high – More than 20% of businesses offer the possibility of online orders, which represents 118% of the EU average (17%) ▪ The highest percentage of IPv6 ready websites (8.7%)

The following sections explain individual statements from the SWOT analysis in more detail; numbers in brackets refer to the source of relevant data).

Digital economy

- Economy rebounded from the bottom in 2011 (1):

  The Slovak economy was badly hit by the crisis but rebounded in 2010 and grew again by 3.3% in 2011, one of the best performances in the EU.

- Imports of modern technology induced by foreign direct investment were a major source of productivity gains (1):

  In addition to the positive effect of this stimulus, the economy must be diversified, in particular in the services sector.

- Development of digital economy:

  Development (in the ICT industry, in particular) continued even during the crisis, especially in the form of development of "ICT service centres".

- Flexible and skilled labour:

  Wages of ICT specialists are lower than in Western countries.

- Introduction of electronic public procurement:

  The launch of the EVO system (https://evo.gov.sk/), a public procurement portal ensuring electronic communication of individual steps at different stages of a public procurement process, especially the entire phase of awarding a contract, including electronic auctions.

Public administration

- Absolute increase in eGovernment development at a speed exceeding the EU average in certain years (2):

  This increase, however, was not driven by OPIS projects which, quite to the contrary, picked up speed only slowly and later.

- Sufficient skills for working with information technologies in public administration

After 2015:

- Public administration institutions have modern information systems in place to deliver their tasks

  The projects implemented under the OPIS introduce modern technologies and procedures for registration transactions when working with administrative agenda.

eGovernment

- Demand for eGovernment services (5):

Ninety-six percent of businesses use eGovernment services, which is the second best result in the EU (the EU average is at 83.3%).

- Availability of eGovernment services for businesses is closing on the EU average (4)
- An open data based solution for the business register (6)

After 2015:

- Public administration services will be ICT-enabled at the partial transaction level (2):

  As a result of the implementation of OPIS projects, a large majority of services will be accessible through electronic forms. This fact constitutes a good basis for considerations on further development of services.

- Electronic services will be accessible through ISPs (4, 9):

  An assisted access to electronic services will be provided at 1,200 locations (4). Eighty-four percent of respondents in customer satisfaction survey said they would welcome integrated service points. A majority of respondents would expect such points to be established at municipal offices. In case of waiting times at ISPs, 42% of respondents expect to be informed about progress in their matter via SMS and by email (26%), while 40% of respondents expect their administrative matters will be solved instantly (9).

Access to high-speed internet based on modern technologies

- Meeting the parameters for internet usage by population (5)
- Online business-to-customer engagement of Slovak companies is relatively high (5):
  - More than 20% of businesses offer the possibility of online orders, which represents 118% of the EU average (17%)
- The highest percentage of IPv6 ready websites (8.7%) (5)

5.1.2 Weaknesses

Table 5: SWOT analysis - weaknesses

Weaknesses
Digital economy
▪ Lack of ICT-skilled labour ▪ Falling behind in the competitiveness index relative to other countries in the region, even moderate deterioration – Insufficient orientation on knowledge-intensive economic activities
Public administration
▪ Limited capacities of IT departments in public administration to support the provision of services ▪ Low degree of consolidation in support operations and transactions in public administration ▪ Unclearly defined processes and standards for the performance of public agenda ▪ Low level of citizens' engagement in public affairs ▪ Low level of transparency ▪ The level of information and knowledge sharing among public administration institutions
eGovernment

Weaknesses
▪ Uncomfortable and non-personalised communication with public administration ▪ No information sharing between public administration and citizens ▪ eGovernment services provided to citizens remain underdeveloped ▪ Low rate of eGovernment use by disadvantaged groups ▪ Slovak eGovernment system isolated from other EU Member States ▪ eGovernment management system ▪ Specific objectives under OPIS PA1 accomplished at a slower pace than expected ▪ Poorly outlined concept for local eGovernment in contrast to central government ▪ No system-level solution for publication of open data is in place, sufficient capacities in public administration institutions not built. ▪ eGovernment development was almost exclusively performed through the OPIS
Access to high-speed internet based on modern technologies
▪ Low level of fixed broadband usage, at 66% of the EU average ▪ Most broadband lines (63%) have capacity between 2 and 10 Mbit/s ▪ Incomplete mobile and fixed broadband coverage[17], including WiFi (98.85% of total Slovak population with minimum 1 Mbit/s) ▪ Below-average basic broadband coverage (82.7% total of population)

The following sections explain individual statements from the SWOT analysis in more detail; numbers in brackets refer to the source of relevant data.

Digital economy

- Lack of ICT-skilled labour (1)

  The Slovak educational system does not produce enough of skilled graduates demanded by the digital industry.

- Falling behind in the competitiveness index relative to other countries in the region, even moderate deterioration (1):

  The overall competitiveness position of Slovakia is low and hampered by a weak business environment. Slovakia's regulatory policy environment is restrictive and scores poorly in product market indicators for barriers to entrepreneurship, in particular for regulatory and administrative capacity and administrative burdens on start-ups.

  – Insufficient orientation on knowledge-intensive economic activities

Public administration

- Limited capacities of IT departments in public administration to support the provision of services represent a major problem. The structure and size of IT personnel do not correspond to the requirements induced by the deployment of modern technologies and may also put at risk the development of targets for the new programming period. IT experts in public administration are considerably worse paid than IT specialists working in the commercial sector. The lack of qualification leads to

[17] Fixed access: DSL, cable modem, WiFi, WiMAX, FTTx

Mobile access: Flash-OFDM, 3G/HSPA

a knowledge asymmetry between suppliers and investors in project implementation, in particular with respect to strategies, architecture, business processes, etc.

- Low degree of consolidation in support operations and transactions in public administration. Between 2007 and 2013, eGovernment development efforts primarily focused on the introduction of ICT-enabled services and agenda. The manner in which support operations and operating activities are performed has a considerable impact on effectiveness of public administration, as well. The situation is unconsolidated in this respect, each institution takes its own approach. There is only minimum solution and knowledge sharing.
- Unclearly defined processes for the performance of public agenda. The description of the processes for the performance of public administration agenda is based on legislative and implementing regulations. No process maps are in place which could be interpreted in an automated way, with clearly and specifically defined responsibilities, activities, links between institutions, decision-making points and follow-ups.
- Low level of citizens' engagement in public affairs
- Low level of transparency (3)

Slovakia came in the 78th place in terms of transparency in law making. More than 19 percent of respondents quote corruption as the second largest problem for doing business in Slovakia, with ineffective public administration being the first one.

- Poor information sharing among public administration institutions: Agreements on interconnecting certain process agendas exist (e.g., for population census), but their actual interconnection is bureaucratically intricate. There is no general overview of which institution works with what data and why. Collaboration based on modern content sharing tools is rare.

eGovernment

- Uncomfortable and non-personalised communication with public administration (9)

Services provided through applications and forms are complicated. Personal contact is the most preferred way of communicating with administrative authorities, but the number of people wishing to communicate by electronic means increases. Formal barriers to communication with public administration exist, discouraging citizens from using the services. The possibilities of contact in certain life situations are limited to office hours. Discomfort in the use of electronic services is also caused by the fact that the information systems are no mobile ready and the identification, authentication and authorisation process is too complicated (by means of an advanced electronic signature); this makes individual public administration institutions use alternative solutions.

- No information sharing between public administration and citizens – accessing the information in the desired quality is excessively time consuming. One of the causes is that information systems in public administration are not linked with relevant registers.
- eGovernment services provided to citizens remain underdeveloped (5, 9):

Situation in 2011: only 45.8% of basic services for citizens were available online (EU average: 80.9%) and 87.5% of services for businesses (100% in most of EU countries)(5). The declared eGovernment service advancement index increased moderately year-on-year, but the prevailing opinion is that electronic services do not match users' needs (9).

- Low rate of eGovernment use by disadvantaged groups (5)

Approximately only one half of disadvantaged citizens use the internet. This means that the number of disadvantaged people using eGovernment services is even lower, with the services being insufficiently adapted to their needs.

- Slovak eGovernment system isolated from other EU Member States

- eGovernment management system

– eGovernment development was not an obvious policy priority;

– Competence issues have appeared in eGovernment management;

– Low capacities of programme management for implemented projects.

- Specific objectives for the first OPIS programming period are accomplished at a slower pace than expected (2)
- Poorly outlined concept for local eGovernment in contrast to central government (2)
- No system-level solution for publication of open data is in place, sufficient capacities in public administration institutions not built (6).
- eGovernment development was almost exclusively performed through the OPIS – eGovernment development by liable stakeholders of their own initiative and using their own resources was limited.

Access to high-speed internet based on modern technologies

- Low level of fixed broadband usage, at 66% of the EU average (8):

  Based on a European Commission report of 18 February 2013 (COCOM broadband report), the fixed broadband take-up (lines as a percentage of population) stood at 18.5% in Slovakia as at 1 July 2012, quite below the EU average at 28.2%. Slovakia along with Poland, Romania and Bulgaria are the only four Member States with the value of this indicator below 20%.

- Most broadband lines (63%) have capacity between 2 and 10 Mbit/s (7)

  98.85% of total Slovak population covered by mobile and fixed lines [18] with the minimum speed of 1 Mbit/s, including Wi-Fi

- Below-average basic broadband coverage (82.7% of total population) (5)
- Incomplete mobile and fixed broadband coverage*, including Wi-Fi (98.85% of total Slovak population with minimum 1 Mbit/s) (7)

  Based on the data available in the databases of the Ministry of Transport, Construction and Regional Development for the accomplishment of medium-term objective 2 for broadband coverage with speed above 1 Mbit/s, which has already been met to a large degree.

5.1.3 Opportunities

Table 6: SWOT analysis - opportunities

Opportunities
Digital economy
▪ Using best practice from abroad ▪ A change in the educational system ▪ Emerging innovative ecosystem ▪ Engaging public administration in digital economy ▪ New innovative information technologies capable of enhancing output quality
Public administration

[18] Fixed access: DSL, cable modem, WiFi, WiMAX, FTTx; Mobile access: Flash-OFDM, 3G/HSPA

Opportunities
▪ The ongoing public administration reform aimed at optimising organisation and processes ▪ Engaging creative individuals in public administration ▪ Gaining value from open data ▪ An increased use of alternative financial instruments is advisable
eGovernment
▪ New innovative technologies to expand possibilities of services ▪ OPIS acceleration and expected further progress may still create conditions for the accomplishment of specific objectives ▪ A comprehensive review of indicator accomplishment under the existing projects needs be conducted immediately
Access to high-speed internet based on modern technologies
▪ Announcement of a tender for digital dividend in 2013 which may provide for – Increase in broadband coverage – Decrease in price for connection – Technological innovation ▪ Building the "next-to-last mile" by the state ▪ New electronic services under the OPIS

The following sections explain individual statements from the SWOT analysis in more detail; numbers in brackets refer to the source of relevant data.

Digital economy

- Using best practice from abroad

  There is always room for improvement in public administration. One of the best ways to seek inspiration for reforms and innovation is to examine the results achieved by other countries.

- A change in the educational system

  Training a sufficient number of qualified specialists at tertiary and secondary schools considerably accelerates development of digital economy.

- Emerging innovative ecosystem

  An innovative ecosystem has good prospects for growth and competitiveness of digital economy. Its development may be facilitated by promoting relevant programmes under the smart specialisation strategy, business-friendly environment (for example, a Business Code supportive of start-ups), financial assistance and, especially, creating opportunities for SMEs to engage in eGovernment projects (small demand-driven projects on open data, mobile applications, knowledge systems).

- Engaging public administration in digital economy

  The government may actively support electronic public procurement, modern forms of payments (bank cards, mobile and/or phone payments), moving towards electronic ordering and invoicing.

- New innovative information technologies capable of enhancing output quality. Public administration may deploy new technologies such as cloud computing, mobile solutions, customer relationship management (CRM) systems, etc., which have considerably enhanced productivity of the private sector.

Public administration

- The ongoing public administration reform aimed at optimising organisation and processes. Development in public administration information systems may considerably contribute to achieving reform targets.
- Development of human resources in public administration – the coming years create opportunities for further development of human resources; deployment of modern technologies and concept of continuous innovation can attract professionals.
- Gaining value from open data – the data generated by public administration have a value which remains hidden and unutilised in a majority of cases. Communities that are capable of working with open data carry potential to use this value for society.
- An increased use of alternative financial instruments is advisable (2):

One of alternative financial instruments is the Connecting Europe Facility (CEF), a new addition for the next 2014-2020 programming period. The total amount of funds allocated for CEF's ICT leg represents EUR 1 billion to support investment in European cross border services such as eProcurement and eInvoicing.

eGovernment

- New innovative technologies to expand possibilities of services (smart mobile devices, social networks and the like)

  Information technology development continuously creates new opportunities to deliver services and create values for society, especially mobile technologies and/or social networks can contribute to a considerable progress in this regard. Massively available, user-friendly eGovernment services on mobile devices can be expected.
- OPIS acceleration and expected further progress may still create conditions for the accomplishment of specific objectives (2)
- A comprehensive review of indicator accomplishment under the existing projects needs be conducted immediately (2):

  The target values of indicators were set in accordance with the i2010– A European Information Society for growth and employment initiative. These documents are already obsolete and the targets defined therein will gradually be omitted from the evaluation because these targets were set to be accomplished by 2010. Even Slovakia, scoring below average in the results achieved, is very likely to meet these targets by the end of 2015.

Access to high-speed internet based on modern technologies

- Announcement of a tender for digital dividend in 2013 which may provide for:
  - Increase in broadband coverage
  - Decrease in price for connection
  - Technological innovation
- Building the "next-to-last mile" by the state (broadband to white areas)
- New electronic services under the OPIS.

5.1.4 Threats

Table 7: SWOT analysis - threats

Threats
Digital economy
▪ Insufficient innovation capacity

Threats
▪ Ineffective public administration ▪ eGovernment will increase societal differences – a digital divide
Public administration
▪ Pressure towards budgetary cuts for public administration institutions ▪ Pressure towards increasing operating costs of information technologies ▪ Problems to coordinate the deployment of ICT-enabled systems and processes among individual institutions
eGovernment
▪ eGovernment will not be introduced as planned ▪ Political support to ICT deployment ▪ Complications in eGovernment management ▪ The lack of publicly available information on the possibilities of open data and their poor use in practice.
Access to high-speed internet based on modern technologies
▪ Weak purchasing power ▪ Weak market for lines with speeds above 30 Mbit/s ▪ Non-existent market for services on lines with speed above 100 Mbit/s

The following sections explain individual statements from the SWOT analysis in more detail; numbers in brackets refer to the source of relevant data.

Digital economy

- Insufficient innovation capacity (1):

  There is overall a low level of innovation and capacity for advanced technology solutions, in particular in SMEs. Existing instruments and incentives, mostly relying on direct subsidies, are ineffective in encouraging innovation.

- Ineffective public administration (1):

  In spite of improvements in transparency, the overall inefficiency of public administration still impacts on the productivity of enterprises, and remains a major obstacle for improving the business environment. Public administration suffers from weak human resources management, high turnover of staff (often linked to the political cycle) and underdeveloped analytical capacities. This hampers policy development and implementation and the efficient delivery of public services and the construction of important public infrastructures.

  There is a need to enhance the efficiency of the civil justice system. Existing backlogs and delays impair the access of citizens and businesses to legal recourse, leaving many legal disputes unsolved. The limited use of alternative forms of dispute does not allow the freeing up of judicial resources.

- eGovernment will increase societal differences

  Any advancement has its reverse side, too; eGovernment development increasingly favours groups that are capable of moving around the digital market over the others. This aspect will have to be addressed systematically (eInclusion).

Public administration

- Pressure towards budgetary cuts for public administration institutions.

The volume of funds available in the public administration sector for its operation and agenda processing is expected to gradually decrease.

- Pressure towards increasing operating costs of information technologies.

The operation of modern solutions may come at a dear cost. The average operating costs of information systems built under the OPIS represent 10% of the total investment, a situation unsustainable in the long term.

- Problems to coordinate the deployment of ICT-enabled systems and processes among individual institutions.

eGovernment

- eGovernment will not be introduced as planned.

If the implementation of OPIS projects fails to meet the plan, considerable flaws in eGovernment development will surface and the baselines for 2015 can no longer be applied. The strategy will have to be revamped.

- Political support to ICT deployment

If no support for eGovernment development is secured from top political representatives, projects are likely to be implemented merely as IT projects rather than as business projects designed to change the actual functioning of public institutions.

- Complications in eGovernment management

As the issue becomes more complex, the eGovernment management system needs be reinforced and any competence issues among individual institutions resolved.

- The lack of publicly available information on the possibilities of open data that results in their poor use in practice.

Access to high-speed internet based on modern technologies

- Weak purchasing power
- Weak market for lines with speeds above 30 Mbit/s (5, 3)

  According to the COCOM broadband report of 18 February 2013, the existing demand for broadband lines with speed below 30 Mbit/s is also poor. According to the Digital Scoreboard (2011), an above-average number of population at 14.4% have access to broadband lines with speed above 30 Mbit/s (the EU average is 8.1%).

- Non-existent market for services on lines with speed above 100 Mbit/s (5)

  The long-term target of ensuring that 50% of households have access to broadband with speed above 100 Mbit/s by 2020 was not incorporated in Slovakia's National Broadband Strategy, largely on grounds that its accomplishment cannot be guaranteed.

5.1.5 Information sources used for SWOT analysis

The following sources were used for the preparation of the SWOT analysis:

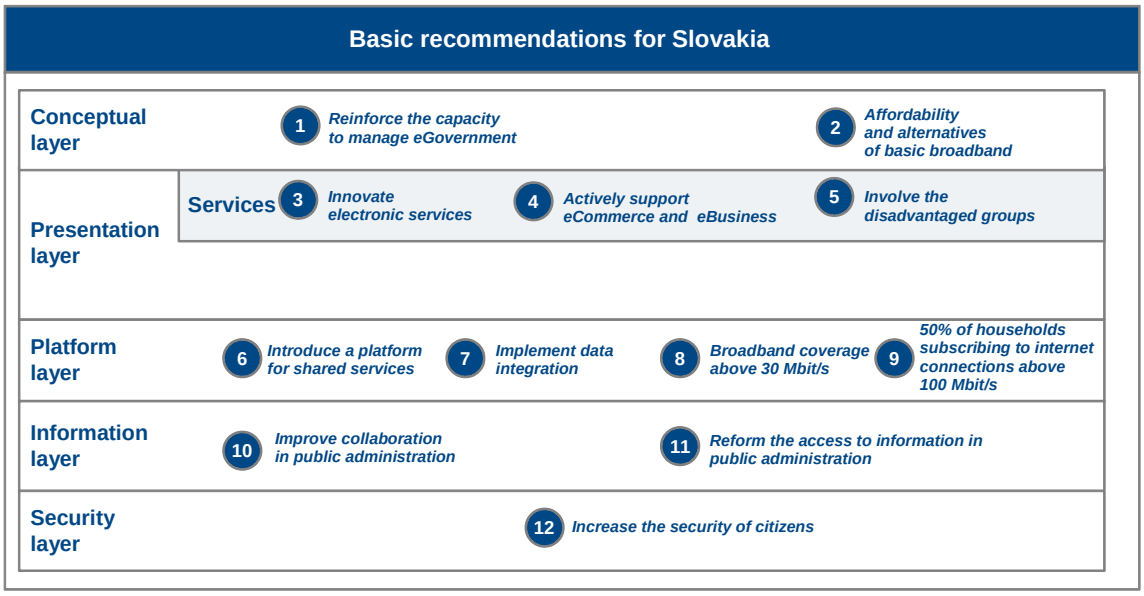
1. Position of the Commission Services on the development of the Partnership Agreement and programmes in SLOVAKIA for the period 2014-2020
2. Ad hoc evaluation: OPIS revisions' impact in continuity of preparation of "the second phase of OPIS" within the new 2014-2020 programming period
3. World Economic Forum: The Global Competitiveness Report 2012–2013.
4. State of play in information society development in Slovakia (the Ministry of Finance)
5. Digital Agenda Scoreboard: http://ec.europa.eu/digital-agenda/en/create-graphs

6. www.informatizacia.sk
7. Interim evaluation of the National Broadband Strategy of the Slovak Republic
8. The COCOM broadband report of 18 February 2013
9. Results of the "Customer satisfaction with selected eGovernment services" survey project: http://www.informatizacia.sk/ext_dok-e-gov_vysledky_2012-/15482c

5.2 Summary of recommendations

This chapter deals with the basic recommendations for Slovakia which are based on previous analyses and identified for all of the five layers as shown in the figure below.

Figure 34:Overview of recommendations



5.2.1 Conceptual layer

1. The capacity to manage eGovernment development should be significantly reinforced.

Coordination problems between individual institutions in ICT development issues have been defined as a threat to the future eGovernment development (see the SWOT analysis). This issue is also addressed by strategies of other countries seeking lower-cost innovation (Suggestion 10 and Suggestion 12).

The eGovernment Action Plan 2011-2015 also promotes a more effective management of eGovernment development by exchanging experience and implementing successful solutions. As regards the planning and management of new projects, Slovakia will continue to seek inspiration from the ePractice.eu portal.

2. Slovakia should take active measures towards increasing the affordability of broadband at speeds above 30 Mbit/s and providing more methods and possibilities for subscriptions

In meeting the target of adequate broadband coverage at speeds of at least 30 Mbit/s thanks to the building of national backhaul networks, the follow-up effort will also have to focus on increasing its affordability and on providing more possibilities for subscriptions. This will

address the weakness associated with the insufficient use of broadband as identified in the SWOT analysis. In terms of modern infrastructure, EU countries are already including among their objectives the support for broadband market development (Suggestion 13).

At present, Slovakia is already laying the groundwork for increasing the affordability and for providing more possibilities for the subscriptions of fast broadband. This includes, in particular, the release of frequency spectrum in the 800 MHz band, the so-called digital dividend, and its use for the building of high-speed mobile networks as an alternative to the fixed "last mile" connection.

5.2.2 Presentation layer

3. Slovakia should start innovating electronic services

Further sophistication of services needs to be continued in the upcoming period. The eGovernment services will be implemented at the transaction level; however, this solution is not sufficiently convenient in particular as regards the recent developments in information and communication technologies. Citizens and entrepreneurs are required to permanently initiate contacts in every situation and to have a deep understanding of ICT-enabled agenda. This recommendation will therefore resolve the weakness associated with low comfort level and personalised communication with public administration. Electronic services should also address insufficient involvement of citizens in public affairs (the tools which they could be directly using from the comfort of their homes are not yet available) in line with the eGovernment Action Plan 2011-2015[19].

The intention to develop services is facilitated by the possibilities brought by new technology (social networks, smart mobile devices, open and linked data, etc.) as they are becoming part of everyday lives of the citizens and businesses. Since services are becoming increasingly sophisticated, it is necessary to simplify their use to ensure their usability on a massive scale, which will require a simple and widely used identification system.

Data and interfaces of services (API) should be open for use by third parties to enable the development of useful applications outside the public administration institutions.

More sophisticated services and comfort of their users is a trend typically seen advanced countries. In proposing a strategy for the development of electronic services, it is possible to get inspired by advanced countries (Suggestion 3, Suggestion 4, Suggestion 6 and Suggestion 7, in particular).

4. Slovakia should actively work towards increasing the eCommerce and eBusiness level.

Digital economy is an important domain of the national economy and Slovakia has already been using modern information technologies to its benefit. At present, however, the market faces threats in the form of insufficient innovation capacity and weak labour market (see the SWOT analysis). This problem can be tackled by improving the business environment which can generate innovation and create new jobs thanks to healthy competition and support.

Public administration should actively support eCommerce by incorporating it in its processes: electronic public procurement, modern payment methods (credit cards, mobile payments), as well as electronic orders and invoices.

Inspiration in terms of intensifying support for SMEs and foreign exports can also be found in EU countries (Suggestion 1, Suggestion 2 and Suggestion 5).

[19] http://ec.europa.eu/digital-agenda/en/european-egovernment-action-plan-2011-2015

5. Slovakia should encourage participation of the entire population in the digital single market

Insufficient ability to use the internet and its services have an impact on any person's career options, education, creative work, involvement and understanding of public affairs. This implies the need to constantly encourage disadvantaged groups to use the internet and its services, thus addressing the weakness associated with unsatisfactory participation of disadvantaged groups in the activities of the digital world (see the SWOT analysis). For the most part, disadvantaged groups consist of people between 65-74 years of age, low-income persons, the unemployed and low-qualified people or people with disabilities. As is the case with other advanced countries, Slovakia is facing the demographic trend of ageing population as well. The share of people above 65 years of age is expected to reach 20-25% by 2025. The wealthier and more advanced countries are much better prepared for this problem than Eastern Europe. Therefore this recommendation is aimed at fending off the threat posed by increasing disparities in society due to ICT development.

As regards the E-Participation index (as a measure of quality, number and relevancy of eInclusion tools and services), Slovakia ranks 105th with its 0.07 score[20]. Such unfavourable ranking is also due to the low quality of education, assessed by the Economic Forum with the index of 3 (the maximum index is 7) because of insufficient emphasis on state-of-the-art technology, computer literacy and lifelong learning. The above recommendation addresses this problem as well. Interestingly, Switzerland - as the leading country – is followed by Singapore which received the same score as Switzerland - 5.9. Singapore may serve as an example of how a country can build ICT competences, infrastructure and business environment.

5.2.3 Platform layer

6. Shared platform is an advisable solution for Slovakia to addresses information and communication technologies

The idea behind the shared platform is to partially eliminate the threats identified by the SWOT analysis in the form of pressure on curtailing the budgets of public administration institutions and an increase in operating costs of information technologies. The results of an analysis of expectations from the implementation of the shared platform indicate that savings in IT costs would represent the main benefits. Even though the expectations of institutions are relatively cautious (savings in IT costs in the single digit percentage range), the savings might not necessarily be the only one and the key factor in terms of benefits expected from their implementation.

Although the cloud solutions applied in individual countries vary in degree of implementation, the strategies share common ground with respect to the need to prepare an environment for shared ICT resources and a platform for the implementation of systems and services (Suggestion 9).

7. Data integration of public administration information systems needs to be implemented

In terms of efficient implementation of the public administration services, it is necessary to make accessible any information that is available at any given moment. Because such information circulates only within the individual public administration information systems, it is imperative that these systems and registers are interconnected at the data level (master data management concept). This will considerably simplify the processes and the needs associated with their integration Data integration should not be seen as a mere technical solution; organisational and process changes should be introduced as well.

[20] The Global Information Technology Report 2012

8. Achieving nation-wide broadband coverage above 30 Mbit/s

The recommendation addresses the threat of a weak market and insufficient offer of broadband internet at 30 Mbit/s as identified in the SWOT analysis. In order to meet this ambitious target, it is necessary to combine measures aimed at stimulating the supply of and the demand for fast broadband connection. On the supply side, it is necessary to focus on building backhaul networks which will connect the relatively well developed backbone network with local access networks.

In order to ensure a sufficient use of the built networks, the demand for broadband-oriented services needs to be stimulated. One of the tools to do so is the extension of eGovernment services.

In projects geared towards nation-wide broadband coverage, it is necessary to take into account and make decisions on the basis of socio-economic benefits that can be delivered by broadband[21]:

- Support for economic development in regions (regional development, in particular in rural areas, as a result of increasing competition and more investment opportunities.
- Removing the digital divide and fostering local communities.

Support for economic development primarily implies:

- Contribution of broadband to GDP growth and productivity gains – based on academic work for the World Bank by Christine Qiang[22] (2009), a 10% increase in basic broadband penetration may enlarge GDP growth by an additional 1.21% in high-income countries. Considering the actual penetration, this figure is estimated to 2,3% in the Slovak Republic;
- The creation of new jobs or businesses – this may be expected in the telecoms sector which will be responsible for ensuring broadband access; the size of the population with access to the digital single market will increase as well;
- An increase in consumer surplus – based on realised investment, access to cheaper and faster services for citizens, particularly in rural areas, may be expected.

Thanks to a growing supply of digital services described in this strategy, broadband will also make it possible to narrow the digital divide and enrich the life of local communities because the quality of services will be acceptable in the entire territory. This will be primarily facilitated by such services as:

- eHealth and telemedicine;
- better options of maintaining contact with the family and friends;
- telework;
- lifelong eLearning.

9. Actively creating the prerequisites for attaining the target of 50% of households subscribing to internet connections above 100 Mbit/s

The recommendation addresses the threat of a non-existent 100 Mbit/s market as identified in the SWOT analysis. Even though the fulfilment of this ambitious target is difficult to guarantee, the broadband strategy should create the prerequisites and take active steps towards attaining it in the long term.

In Slovakia's case, the target of 50% of households subscribing to broadband connections above 100 Mbit/s implies the need to ensure sufficient transmission capacity in the backbone and backhaul networks roughly for all municipalities with population of 5,000 and above.

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[21] Guide to broadband investment – Final report, September 2011
http://ec.europa.eu/regional_policy/sources/docgener/presenta/broadband2011/broadband2011_en.pdf

[22] Qiang, C. Z. and Rossotto, C. M., Economic Impacts of Broadband, Information and Communications for Development: Extending Reach and Increasing Impact World Bank (Washington, DC, 2009), pp. 35–50

The building of backhaul networks with a sufficient capacity should be accompanied by actions aimed at maintaining the affordability of above-standard broadband connection which is currently on par with the EU average. These actions should focus on maintaining a competitive environment in the wholesale and retail fixed broadband market.

5.2.4 Information layer

10. Public administration tasks should be performed by electronic means in Slovakia

ICT-enabled processes, agendas and tasks represent an integral part of the ESO reform (Efektívna/Efficient, Spoľahlivá/Reliable and Otvorená/Open administration) which optimises, inter alia, the administrative proceedings for citizens and businesses. In the commercial sector, the management of tasks proved to be crucial for balancing the workload of employees and for their collaboration across departments and branches. The management of tasks is also facilitated by the following recommendation which is based on the strategy of EU countries (Suggestion 9).

The EC assumes that eGovernment can reduce the costs of administration by 15-20% [23]. In addition to cost-saving, a suitable eGovernment model can also help considerably reduce the administrative burden for citizens and entrepreneurs who think that the best public administration would be that which works in the background and stays out of sight. The principle of "once only" registration of data in the systems[24], whereby the information needed from citizens is only collected once, may be implemented if collaboration of public administration institutions in the handling of proceedings is optimised. In order for such collaboration to be implemented, tools for the management and assignment of tasks, including their delegation, must be provided.

11. Slovakia should publish public administration data as open data

Public administration generates and stores a large quantity of valuable information that is currently not available for further use (see the SWOT analysis). Public administration institutions do not even exchange sufficient data between each other. The lack of data in information society prevents them from making optimal decisions and to take stock of the situation. The potential of open data to create added value thus remains untapped, albeit it could help increase, for example, the level of transparency. Considering that the market value of open data in public administration is estimated at EUR 32 billion in Europe, it is quite understandable that this issue reverberates in all EU strategies. In Australia, for instance, public information has become the central objective.

All public administration data that is not subject to secrecy or does not contain sensitive information should be published as open data through publicly available interfaces (API) which will allow its processing in a machine-readable format.

5.2.5 Security layer

12. Slovakia should increase the security of electronic services and systems

The users of services must have trust in their integrity and security in order to be willing to readily accept innovative technology such as eHealth and submit their personal and sensitive data online. The right to privacy and the protection of personal data represent one of the fundamental rights of the European Union, therefore the development of services and systems will require significant resources to ensure their implementation in the upcoming period. In

[23] Digital Agenda revision, December 2012 http://europa.eu/rapid/press-release_IP-12-1389_sk.htm

[24] Also published in the eGovernment Action Plan 2011-2015 http://ec.europa.eu/digital-agenda/en/european-egovernment-action-plan-2011-2015

order to build trust and promote openness, every citizen should have the right to know who processed his/her data and for what purpose.

In the upcoming period, it will also be crucial to focus on the security of systems and communication infrastructure. In February 2013, the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy published the cybersecurity strategy along with the draft directive concerning network and information security (NSI) submitted by the Commission. This strategy, which will be adopted and applied by the Slovak Republic in the upcoming period, represents a comprehensive vision of the EU offering the best way of preventing cyber breaches and attacks and the measures to combat them. The goal of the specific measures is to increase cyber resilience of information systems, reduce cybercrime and reinforce the EU's policy in the area of international cyber security and defence.

6 Vision and strategic objectives for information society

The vision of eGovernment development in Slovakia until 2020 includes actions to move from the process of eGovernment development to a functioning information society, with public administration alone having the features of Smart Government. Information technologies will became inherent in people's everyday life and an essential driver of Slovakia's competitiveness.

In the previous 2007-2013 period, the focus was on a systematic development of eGovernment. This will give us a clear basis for the planned development in the future. As the next step, the changes should win support of the population. Modern technology can make the use of services a pleasant experience, the bureaucracy as we know it today will soon become a thing of the past and the benefits of a customer-driven public administration will prevail. A positive feedback will therefore exist between the individual spheres of society.

The status of the public sector will thus change. A relatively obsolete, hierarchical structure may turn into an innovative network, the components of which are designed to meet their purpose in a pragmatic and inspiring way. The key public administration characteristics will include openness, transparency and optimised performance of activities. Public administration is sharing, disseminating and applying the best practice. The strategy presented in this document is based on an identical principle of drawing inspiration from the best ones and on the transition to an innovative network.

This vision may come true if the proposed strategic objectives are observed. Each of them represents the direction which the desired changes should take to meet the objective. The first four objectives focus on services which create the basic linkage between people, society and public administration. The following two objectives focus on public administration and its possible reform thanks to a creative use of information technology.

Figure 35:Strategic objectives and their primary focus

A	Moving towards services to improve the quality of life	Citizen
B	Moving towards services to boost competitiveness	Business environment
C	Constant improvements in services in using modern technology	Innovation
D	Creating a secure environment for citizens, businesses and public administration	Security
E	Bringing public administration closer to the maximum use of data in customer-driven processes	Knowledge
F	Optimum use of information technologies in public administration through a shared services platform	Platform

Moving towards services to improve the quality of life

The value added of new services and enhanced versions of existing services will improve the quality of life of citizens. This means shifting the philosophy of services from the submission of electronic forms to a proactive, interactive and personalised approach to handling life situations of citizens. (Life situations cannot be limited by country borders). Every contact between a citizen and public administration will be supported electronically while laying emphasis on qualified assistance and the use of modern communication channels such as mobile phones and social networks.

As another component, the new services make available high-quality digital content, thus contributing to high-quality and rich life of people. The focus will therefore be on promoting the creation and digitisation of valuable content across the commercial and public sector. This should entail, for the most part, the presentation and dissemination of digitised artefacts forming Slovakia's national heritage while respecting copyright restrictions applicable to accessing them by electronic means.

The services will be accessible with ease and applicable on a massive scale at any time and place.

Moving towards services to boost competitiveness

High quality business environment currently ranks among the key competitive edges of economies. It is advisable to provide public administration services of a higher quality compared to the neighbouring countries, thus stimulating a creative competition in the economic area. New services should therefore continue to reduce the administrative burden and promote compliance with regulations. On top of that, they should also stimulate the development of the digital single market by increasing trustworthiness of entities, streamlining transactions and promoting the movement of services and goods.

Constant improvements in services in using modern technologies

Public administration will become an environment capable of generating innovation. The principle of constantly improving services means that, rather than static services, it should be the dynamic process that will provide, in the end, constantly increasing value during routine operation of the service. Innovation can be achieved at every level – all the way from the process level to the technological level. At the technological level, eGovernment cloud will contribute to a significant increase in productivity and the quality of services.

Creating a secure environment for citizens, businesses and public administration

The importance and volume of data collected about every citizen is gradually increasing. The protection of the citizens' integrity, sensitive data and identity is paramount. The take-up of services is directly linked to the feeling of security which eGovernment can offer. It will be necessary to ensure active and coordinated protection against the threats of cybercrime. An adequate involvement of the private sector can widen the possibilities of protection and the usability of identity in the digital space. One of the most important factors in terms of the provision of eGovernment services will be that all data are stored in an optimal secure zone accessible by means of highly-available services.

The security of citizens must be tackled in a comprehensive manner while also addressing non-cyber aspects. The entities responsible for the security of citizens will have modern information technologies at their disposal to significantly enhance their analytical and operative capacities. Information technologies will support law enforcement and the rule of law.

Bringing public administration closer to the maximum use of data in customer-driven processes

Making competent decisions at the right time and in the right place can be achieved by standardised public administration processes, whereby the tasks necessary for individual activities will be carried out by electronic means. The key criterion for the Smart Government is to use the data and information in the best way possible and to transform it into knowledge. Knowledge that is transparently shared with other government agencies while ensuring continuous training of public servants will provide a multiplication effect.

Optimum use of information technologies in public administration through a shared services platform

The manner in which information technologies are used represents another important conceptual change. The use of technology should be based on two principles: professional and centralised performance of the individual public administration activities allowing every

institution to focus on its own agenda and key competences, while seeking the best solutions through openness and competition. The public administration institutions will create a platform – eGovernment cloud – where they can exchange services on an as-needed basis and combine them into their own solutions. The services of information infrastructure and platform will be the responsibility of selected public organisations - eGovernment cloud operators.

The platform will also provide tools for the implementation of individual processes, such as book-keeping, public procurement, etc.

The use of eGovernment cloud as a shared platform will streamline and minimise the resources necessary for the administration and maintenance of information systems in public administration.

eGovernment Cloud will become a tool to effectively build and operate information systems while achieving a high level of security, protection of personal data and other sensitive information. The basic building blocks of the platform will comprise infrastructure services (storage and computational resources, as well as backup services) which will utilise only those resources that are really necessary at any particular moment. Through gradual expansion, a more complex software will be provided as a service.

7 Proposed priorities for further information society development in Slovakia

This section of the strategy presents an outline for meeting the specific objectives under indentified priorities, including:

- *The mapping of strategic objectives to the fulfilled specific objectives;*
- *Method for the implementation of the Digital Agenda for Europe*
- *Definitions of indicators designed to measure specific objectives.*

7.1 Proposal of priorities

7.1.1 Priorities and specific objectives

When considering the recommendations identified for Slovakia in Chapter 5 based on the results of analyses, two categories can be applied: the recommendations addressing broadband development and the recommendations addressing information society development.

Broadband development can be considered a clearly defined priority.

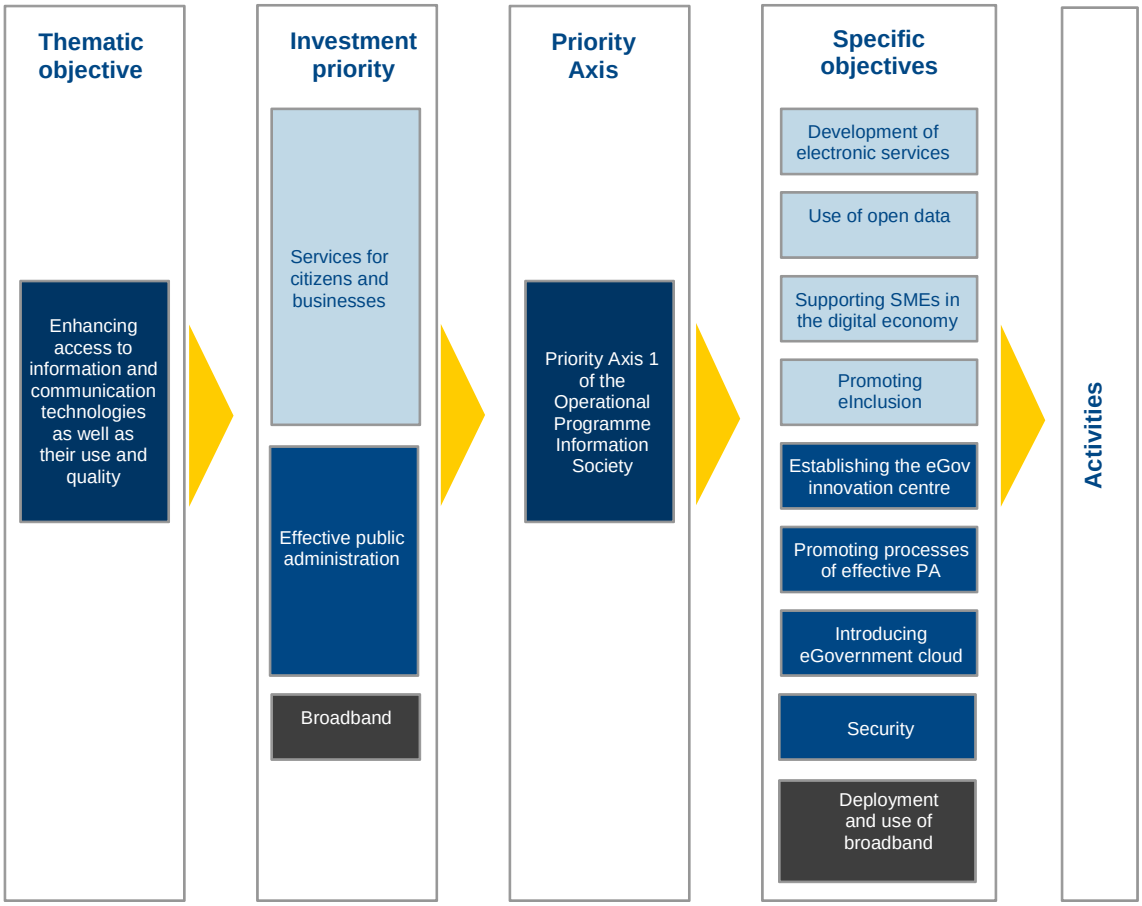
In terms of information society development, it is the interaction with the public (in the form of services) and internal eGovernment development that should logically be addressed separately. The ongoing reform entitled “Effective, Open and Reliable Public Administration” represents an excellent opportunity in this respect.

The individual recommendations make it possible to define the basis for specific objectives.

- Services for citizens and businesses:
  - Development of electronic services;
  - Use of open data;
  - Supporting small and medium-sized enterprises in the digital economy;
  - Promoting eInclusion.
- Effective public administration:
  - Establishing the eGovernment innovation centre;
  - Promoting processes of effective public administration;
  - Introducing eGovernment cloud;
  - Security
- Broadband:
  - Deployment and use of broadband

The chapter below proposes a method to comply with the above objectives, including a proposal of measurable indicators.

Figure 36:Proposed priorities and their specific objectives



7.1.2 Funding instruments

Slovakia is keen to invest in the above investment priorities with the help of the EU's funding instruments, the state budget, as well as private funding.

Table 8: Planned financing of priorities

Investment priority	Estimated funding from the Structural Funds(ERDF, EAFRD) [EUR million]	Estimated cofunding from the state budget on top of funds from the ERDF and EAFRD [EUR million]	Estimated funding from the state budget [EUR million]	An estimate of private funds and investments [EUR million]
Services for citizens and businesses	300	52,94	2300	165
Effective public administration	500	88,24		-
Broadband	161,5	28,5	-	1700
Total:	**961,5**	**169,68**	**2300**	**1865**

The Common Strategic Framework presented by the European Commission on 14 March 2012[25] is a single platform for five structural funds (ESF, ERDF, EAFRD, EMFF and CF) with the ambition to provide, in the upcoming period starting 2014, common and simplified access to coordinated fulfilment of thematic objectives which will make it possible to maximise synergy and eliminate duplication. The funds referred to above represent the main source of investment in the development of Member States at European level with a view to ensuring economic growth, sustainable development and creation of jobs in line with the Europe 2020 strategy.

In terms of investments necessary for Thematic Objective 2, ERDF seems to be the most suitable instrument as it focuses on creating an environment where enterprises and public administration can pursue their activities (infrastructure, services for businesses and public administration, support for businesses and public administration, innovation, ICT and research). It also focuses on investments in the development of services for citizens in certain areas such as online services, education, healthcare, inclusion, social services and the environment.

Connecting Europe Facility is an instrument falling outside the Common Strategic Framework and covers, inter alia, the development of broadband and electronic services. Following a decline in allocated funds, the focus has been in particular on such services as eID, electronic procurement, eJustice, eHealth and Europeana (in culture) where pan-European infrastructure and interoperability enabling to interconnect the national systems bring added value in the form of enhanced access to information and reduction in expended funds.

The table below indicates the use of instruments for the individual specific objectives.

Table 9: Planned use of European funds for the funding of priorities

Investment priority	Specific objective	Instrument
Services for citizens and businesses	Development of electronic services	ERDF, CEF
	Use of open data	ERDF
	Supporting small and medium-sized enterprises in the digital economy	ERDF, CEF
	Promoting eInclusion	ERDF
Effective public administration	Establishing the eGovernment innovation centre	ERDF
	Promoting the processes of effective public administration	ERDF
	Introducing eGovernment cloud	ERDF, CEF
	Security	ERDF
Broadband	Deployment and use of broadband	ERDF,CEF*

** If resources under Community programmes become available for the financing of broadband access, their use may come into consideration.*

7.1.3 Legislative requirements

The development of information society will require gradual legislative amendments in support of the proposed strategic intentions. The table below indicates the key legislative requirements to be implemented between 2014 and 2020.

Table 10 – Basic legislative requirements for the period between 2014 and 2020

Piece of Legislation	Requirements	Estimated date

[25] http://ec.europa.eu/regional_policy/sources/docoffic/working/strategic_framework/csf_part1_en.pdf

Piece of Legislation	Requirements	Estimated date
Amendment to the Act on eGovernment (Act No. 305/2013 Coll.)	▪ Use of mobile applications (for identification and authentication, access to services); ▪ Comprehensive handling of life situations; ▪ Support and legal relevance of interactive communication with public administration; ▪ Enabling the use of proactive services (the individual laws governing the performance of tasks on the agenda will need to be amended); ▪ Allowing the exchange of information and a solution to the personal data protection in the case of cross border life situations. ▪ Setting the data exchange between public administration institutions.	From 2016
Amendment to the Act on the Freedom of Information (Act No. 211/2000 Coll. on free access to information)	▪ Creating the requirements for the publishing of open data related to the exercise of public authority and the setting of basic processes..	From 2016
Amendment to the Act on information systems in public administration (Act No. 275/2006 Coll.)	▪ Defining the rules for the provision and use of shared services; defining the stakeholders and their responsibilities (eGovernment cloud); ▪ Determining the rules concerning the responsibility for the operation and quality of an information system in public administration.	From 2015
New act on information security	▪ Setting the rules of information security; ▪ Categorisation of information systems.	From 2016
Amendment to the Act on Critical Infrastructure (Act No. 45/2011 Coll.)	▪ Optimising the scope of critical infrastructure; ▪ Setting the rules for securing critical infrastructure.	From 2016
Legislative changes in connection with the reform Effective, Reliable and Open Public Administration (ERO)	▪ Changing the organisation and processes of the state administration.	Pending since 2012
New Building Act	▪ Required installation of high-speed networks (NGN) upon the issuance certificates of occupancy for new buildings or during their reconstruction; ▪ Sharing the costs of engineering networks and ensuring effective coordination of civil-engineering works in compliance with draft Regulation (EC) COM(2013) 147 final.	Effective from July 2014
Implementation of legislative measures to promote e-commerce		From 2015

7.2 A Digital Agenda for Europe

The specific objectives in this chapter are linked to the Digital Agenda activities in all of the seven pillars as shown in table below.

Table 11: Compliance with the Digital Agenda in terms of priority themes

Pillar	Key actions	Specific objectives
I. Digital single market	▪ Providing public data sources for reuse ▪ Rules on data protection	Use of open data
	Measures to stimulate a European online content market ▪ Migration to Single European Payment & eInvoicing, Regulation on electronic identification and trust services for electronic transactions in the internal market, eCommerce Directive ▪ Data protection rules ▪ Simplifying entrepreneurship in the European Union	Supporting small and medium-sized enterprises in the digital economy
II. Interoperability and standards	▪ Promoting interoperability by adopting a European Interoperability Strategy and Framework ▪ Adoption of legislative measures, standards, common frameworks, implementation of generic tools and reusable technical blocks enabling cross-border interoperability of services and systems ▪ Mutual recognition of eID and trusted services for electronic transactions	Development of electronic services
III. Trust and security	▪ Combating cyber-attacks, European cybercrime platform ▪ Provision of security breach notifications ▪ Development of the National Alerts and Notifications Platform ▪ Creating a better Internet for kids (responsible use of the internet)	Security
IV. Fast and ultra-fast Internet access	▪ Strengthened and streamlined financing of high-speed broadband from EU funds ▪ Facilitating investment in competitive NGN networks	Deployment and use of broadband
V. Research and innovation	▪ New generation of web-based applications and services	Development of electronic services
	▪ Supporting joint ICT research infrastructures and innovation clusters ▪ EU cloud computing strategy primarily for public administration and science	Introducing eGovernment cloud
VI. Enhancing digital literacy, skills and inclusion	▪ Introducing eLearning and eSkills services for developing ICT skills ▪ Supporting on-line tools for re-training and constant professional growth ▪ Participation of women in the ICT workforce ▪ Ensuring the accessibility of public sector websites and helping disabled people to access content	Promoting eInclusion
VII. ICT-enabled benefits for EU society	▪ Achieving widespread telemedicine deployment ▪ Streamlining health care ▪ Fostering EU-wide standards, interoperability testing and certification of eHealth ▪ Technologies of Ambient Assisted Living in telecare and on-line support for social services	Development of electronic services

	▪ Building alert systems for notifying dangerous events ▪ Supporting seamless cross-border eGovernment services in the single market	
	▪ Supporting seamless cross-border eGovernment services to promote SMEs	Supporting small and medium-sized businesses in the digital economy

7.3 Services for citizens and businesses

7.3.1 Development of electronic services

Table 12: Strategic objectives supported by results

ID	Strategic objective	Expected results
A	**Moving towards services to improve the quality of life**	▪ A comprehensive solution to life situations (including cross-border life situations) ▪ Deployment of proactive services (Level 5) ▪ Introducing the principle of "once only" registration – citizens will not have to provide additional information which can be found in public administration records ▪ A multi-channel access to services
B	**Moving towards services to boost competitiveness**	▪ Mobile applications ▪ Use of spatial data in services
C	**Constant improvements in services in using modern technologies**	▪ Communication between public administration and citizens through social networks
D	**Creating a secure environment for citizens, businesses and public administration**	▪ Various types of trusted identities ▪ Trusted mechanisms for the protection of personal data ▪ A transparent use of sensitive data in public administration

7.3.1.1 Specific objective concept

Based on the eGovernment development strategy, most of the public administration agendas were ICT-enabled during the 2007-2013 programming period. These activities focused on the deployment of electronic services for citizens and businesses by implementing information systems in public administration. This means that 2015 should see the launch of partial transaction services which will make it possible to submit applications and receive decisions by electronic means. To provide easy access to these services, the Central Public Administration Portal is being set up. Assistance with the use of this portal will be provided at integrated service points at 1,200 locations. Citizens will gradually start using electronic identification cards (eID).

Progressive policies, such as required support for mobile applications, "cloud ready", or "openData ready" approaches, are starting to be used in the implementation projects. This provides further elbow room for the future evolution of eGovernment as described in this strategy.

The focus on citizens proved to be a suitable approach, forcing the public administration to reassess its mission and come up with ways to better meet the needs of citizens as their clients. However, despite many considerations, it did not manage to enhance its services so that they could offer more comprehensive solutions to life situations.

The following section discusses the ways to develop eGovernment services and digital content in a manner that will increase the quality of life of citizens and the quality of the business environment, while at the same time being innovative and interoperable within the framework of the EU Member States. The individual areas of development will be combined and

supplemented in new projects in order to be able to achieve the above results and, therefore, meet the strategic objectives.

Proactive services

As soon as transaction services and basic registers are implemented, it will be possible to push the services to a proactive level. Citizens will gradually be relieved of duties to initiate communication with the public administration but, quite the opposite, it will be the public administration itself which will actively seek to improve the quality of life of citizens. Communication will be interactive, making use of threads where citizens will only provide new information and guide the handling of their matters. This requires a gradual redesign of services in terms of their content and formal requirements.

Implemented in the relevant public sector information system, specific agenda logic will serve as the basis for providing the relevant service to citizens. This system must have the capability to interact with other systems which contain the data necessary for making decisions as part of the relevant agenda. This will make it possible to ensure the accessibility of the proposed services through all channels in the same quality.

Web services provided by information systems in public administration allow for creating comprehensive combinations capable of handling an entire life situation. The new services offered by the Central Public Administration Portal will be able to provide this functionality. The provision of service will therefore be separated from the handling of the agenda itself. The transfers between individual agendas will not be visible to the users of the service, who will thus experience uniformity and comprehensiveness. This principle also applies to life situations handled across the borders of the EU countries. The aim is to move towards a single space of electronic services in the context of the digital single market, which should be fully operational by 2015. Well-defined interfaces of web services in public administration will also make it possible to design own services for the public and the commercial sector.

With a view to continuously improving the quality of services, support of the use of automated smart wizards for the implementation of services is proposed.

The possibilities associated with alerts and warnings represent a special area of proactive services. Selected public administration institutions are tasked to monitor the factors influencing the lives of citizens in individual locations, and make such information available to them also in the form of alerts and warnings, if necessary. Automation of processes for the collection of the necessary data will be supported, thus laying the groundwork for a unified system enabling to communicate such information to citizens.

Social networks will be supported as another channel of communication with the public administration. They are particularly suitable for the publishing of content, involvement of citizens in public affairs, as well as the inclusion and formation of communities for sharing experience and knowledge, such as manuals for handling various types of life situations.

Electronic referenda will simplify the involvement of people in public affairs in the fast-changing times. Participation will also be supported by electronic petitions and the possibility to post comments to proposals and resolutions, as well as by publishing the minutes from meetings on social networks.

Mobile government

A shift from the use of personal information technologies towards smart phones represents one of the key trends over the recent period. Smart phones and other mobile devices have enough computing power to handle intensive tasks and are best suited for work with cloud applications. They are personalised and ensure permanent availability of their users for communication and interaction, therefore these devices lend themselves to be used for handling certain life situations in a new way.

These features of mobile devices will be used in the design of new forms of services in addition to creating their classic forms. The mobile device itself will be used as an identification and authentication tool. Camera and video recording capabilities will be employed to create content. GPS will make it possible to readily provide local services and interpret spatial data. Interactive communication with public administration can be handled on an ad-hoc basis, thus significantly

improving the process of granting permissions and consents by citizens. Citizens will always be updated on the status of their proceedings or in case of emergencies. Thanks to mobile payments, simplification and savings can also be expected in the area of payments for public administration services.

Development and dissemination of information concerning digitised cultural heritage artefacts

Useful information and interesting content raises public interest in new services and internet access. Repository institutions are the most important source of quality digital content which can significantly boost the development of the entire knowledge industry and e-Government. However, the availability and marketing of quality digital content is not at a satisfactory level in repository institutions (libraries, museums, galleries, archives, and other specialised institutions). For this reason, it is necessary to implement the technical conditions for the promotion and dissemination of the cultural and audiovisual heritage in digital form and for making available digitised cultural heritage artefacts while respecting copyright. If culture-related services are promoted by electronic means, they will be more accessible for the general public and there will be more compelling content that may be used in education and scientific activities, all of which will enable an even faster transition to a knowledge-based society in line with the Innovative Development Strategies of the Slovak Republic, the Lisbon Strategy and Minerva. In doing so, it is necessary to place emphasis on long-term and safe storage of data on various media and promote their widest application in research, development, innovation, local and regional development and strategic planning at national or regional level.

It is also crucial to recast the licensing system for authors of copyrighted works (copyright holders) in a way that the potential authors be motivated to create either free or paid content without having to worry that their author credits could be stolen.

Areas for the development of services

As far as eLearning is concerned, the development will focus on the standardisation of credits and the assessment of completed education, as well as on the creation of interactive eLearning content for primary and secondary and tertiary education institutions with respect to the acquisition of those skills which students need to succeed in the labour market. A unified system for the assessment of skills and completed education must make it possible to compare learning outcomes, competencies and the level of teaching at home and abroad, as well as to allow easy mobility of students. It is also essential to focus on the possibility of obtaining credits for external courses which are provided by domestic and foreign public and commercial institutions, while also being able to record them transparently in the information system. As regards the creation of electronic content, the focus will be on setting up eLearning courses for the acquisition of ICT skills for students of all disciplines, especially the humanities. The effort to create new electronic textbooks for all levels of education will be encouraged as well. In updating educational content, it will be necessary to take into account the requirements of the commercial sector as regards the competencies of graduates who will be able to extend, verify and consolidate their knowledge within a practical environment during their studies.

It is also important to modernise eHealth services in order to pursue those priority themes which are capable of increasing the efficiency and quality of care and, therefore, the quality of life of citizens. These areas include public health, personal genomics, telemedicine and integrated health care. With electronic public health in place, citizens can be provided, through different channels, information on all forms of health hazards and can be advised on healthy lifestyle and encouraged to care about their health and the health of their loved ones. Thanks to information and communication technologies, telemedicine systems can transmit health information between physicians and patients in real time, thus allowing to remotely diagnose, provide medical care and supervise the treatment and lifestyle of any particular patient. In the upcoming period, it will be necessary to design a pilot solution, which should be subsequently fine-tuned based on experience gained. Personal genomics will be used primarily to allow the use of patients' genetic information in the healthcare process and to precisely target prevention and personalise the treatment and medication procedures. Thanks to integrated health care, chronic patients will be able to easily obtain information on the intended and actual course of

their treatment, and the provision of adequate and quality health care will be guaranteed across the entire territory based on common standards.

In the future, the focus will be on developing eJustice in order to accelerate and streamline the legal and judicial proceedings to ensure transparent and simple law enforcement. In particular, business environment will have to improve in such areas as consumer protection and recovery of claims arising from contracts. In accordance with the European framework, eJustice services will have to be compatible across borders in order to optimise the proceedings in international litigations.

Protecting citizen's identity

Creating a secure environment for citizens and businesses within the digital single market represents a basic strategic objective. Given the constantly increasing volume of data to be available on any citizen in public administration systems and the entire digital space, it is necessary to deploy trusted mechanisms for the protection of personal data and identity against misuse. Cyber-attacks are a source of concern for many users and discourage them from reaping the benefits of the internet and the digital single market to the maximum extent possible.

As regards identity itself, eGovernment will use many types of trusted identities for accessing its services. In addition to electronic identification cards, which are being implemented, private identity providers should also be given adequate opportunities, thus allowing the users to use the means of identification from other European Union countries as well. Promoting the use of mobile authentication represents an important option.

As regards security and trust, it is essential for citizens to be able to keep track of their data maintained by public administration, as well as of the persons who worked with such data and for what purpose.

Making use of spatial data

The deployment of services based on location and spatial data interpretation, using the content and layers of public administration, is proposed with a view to establishing new ways for innovation and making life easier for citizens and businesses. In addition to creating a single register for spatial data, this means that public administration institutions will seek to expand their possibilities in the use of spatial data and make the results available to the public and other institutions. As a result, there will be more options for effective decision- and policy-making based on a detailed local context in such areas as public health care, energy sectors, agriculture, protection and security, building and development of infrastructure, environment and landscape management, etc.

Cross-border interoperability of services

In creating more proactive services and implementing new services, cross-border interoperability will be taken into account to make selected services available to the population of the European Union. A study[26] for the European Commission identified 25 priority cross-border services which will deliver maximum benefits to EU citizens.. During their implementation, Slovakia's focus will be on overcoming a number of organisational, conceptual, economic, political, legislative, technological and semantic barriers. Cross-border eGovernment services will be based on interoperable identification and authentication in line with legislation proposed at EU level. A cross-border solution to electronic identity will bring new ways of interaction between citizens or businesses and public administration in a trustworthy and secure environment, while considerably increasing the number of available electronic services for citizens and businesses, as well as contributing to the development of the single market or the creation of new business models. In order to meet the aims of the Digital Agenda for Europe, Slovakia will participate in international initiatives in this area.

7.3.1.2 Implementation of the Digital Agenda for Europe

[26] D1.3 Inventory of cross-border eGovernment services & D2.1 Analysis of existing and future needs and demand for cross-border eGovernment services

The recommendations of the Digital Agenda may be directly applied through the improvement of individual services:

- In the case of **Pillar I: Digital single market,** European licensing system for on-line cultural works is being implemented in particular as regards music and films, obstacles are being removed with respect to the publication and digitisation of works created by copyright holders who cannot be identified or works that are not in print anymore, the support for publishing the cultural heritage through Europeana will be increased, and effective dissemination of audiovisual material will be promoted, including actively combating copyright infringement.
- As part of **Pillar II: Interoperability and standards**, this will include the adoption of legislative measures, standards, common frameworks, implementation of generic tools and reusable technical blocks enabling cross-border interoperability of services and systems Services deployed in compliance with new standards will be personalised and designed to monitor the course of transactions with public administration in accordance with the eGovernment Action Plan 2011-2015[27].This will facilitate free movement of EU citizens who will be able to study, work, live or receive health care and pension benefits in any country of the European Union. By thoroughly observing the European Interoperability Strategy[28], the risks associated with incompatibility of services, insufficient level of authentication and authorisation (for instance, through eID/eSignature) and ineffective use of resources during the implementation will be attenuated. Mutual recognition of eID and trusted services for electronic transactions will be important as well.
- **Pillar V: Research and innovation** will be indirectly supported through the introduction of next generation web applications and services offering higher quality and performance in an innovative digital environment in support of the European digital single market. New applications and services will support different language versions and proven standards and will be based, where applicable, on open platforms that are conducive to European interoperability and speed up the modernisation of public administration and information society.
- As part of **Pillar VII: ICT-enabled benefits for EU society**, the focus will be on making the benefits of information society available to all. The main priority will involve the support of ICT-enabled dignified and independent living. Telemedicine services such as online consultations, emergency care and monitoring of the health condition of people suffering from chronic disease or disabilities will be provided in a broader scope. Technologies of Ambient Assisted Living in telecare and on-line support for social services will be extended as well. As regards the environment, it will be possible to report environmental information and warn against dangerous events related to climate change.

The roll-out of public digital services in particular as regards their cross-border interoperability is highlighted in the digital "to-do" list of the revised Digital Agenda prepared in December 2012 and its Priority No. 2: "New public digital service infrastructures through Connecting Europe Facility" which will be applied primarily in eIDs and eSignatures, business mobility, eJustice, electronic health records and cultural platforms. The revised Digital Agenda also underlines the importance of modernising copyright so that authors are sufficiently motivated to create digital cultural content within the digital single market:

- Updating the EU's copyright framework.

The need to build the world's safest online environment, valuing user freedom and privacy, will be addressed in Priority No. 4 "Propose EU cyber-security strategy and Directive" based on which Slovakia will evaluate its preparedness and lay the groundwork for an online platform to prevent and counter cross-border cyber incidents and for the reporting of incidents.

7.3.1.3 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 13: Specific result indicators

Specific result indicators for the development of electronic services				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2012**	**Target value**
1	Overall satisfaction of citizens/businesses with eGovernment services *In this indicator, the satisfaction of citizens and businesses is measured by means of a survey concerning time savings, flexibility, comfort, simplicity, added value, availability of information, the level of innovation and reliability. Also, a simplified three-level satisfaction indicator which can be simply clicked on a website after having used the service or upon leaving the customer centre is planned to be introduced. In this manner it will be possible to respond more flexibly to possible dissatisfaction of citizens and entrepreneurs, if any.*	Survey, Mystery Shopping	Citizens: 59.9 Businesses: 64.2	Citizens: 71 Businesses: 71
2	Increase in the use of eGovernment services *For citizens, this indicator defines the percentage of individuals aged 16 to 74 who have interacted online with public authorities within the last 12 months – obtaining information from websites, downloading forms or sending completed forms.* *For businesses, the indicator measures the percentage of companies with more than 10 employees that have interacted online with the state government for the past calendar year – obtaining information and forms from websites, sending completed forms, handling administrative affairs electronically, or offering their products by means of electronic public procurement.* *The indicator may be adjusted or measured in the future with the help of tools implemented on the portals where services are provided.*	Eurostat statistics	90.7% Business 42.2% Citizens	98% Businesses 70% Citizens

Table 14: Specific result indicators for eHealth

Specific result indicators for eHealth				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2011[29]**	**Target value**
1	Percentage of individuals using the internet for seeking health information *The indicator captures the percentage of individuals aged 16 to 74 who have used the Internet for seeking health-related information within the last three months (injury, disease, prevention, nutrition). Special emphasis will be on monitoring the visits to the public health portal. The national health portal, its Facebook website, including the Twitter and mobile versions, will identify and record unique visitors accessing these websites.There will be a monthly statistics on the number of unique visits, as well as an annual statistics. The ratio between unique visits and the number of citizens with internet access will be measured. The initial value of the indicator is based on the statistics reported by Eurostat[30].*	Eurostat statistics, Survey, Generated automatically	37.9%	75%

Table 15: Specific result indicators for eLearning

Specific result indicators for eLearning

[29] The most recent Eurostat data

[30] Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tin00130&plugin=1

ID	Indicator definition	Measurement method	Baseline in 2011[31]	Target value
1	Individuals using the Internet for doing an online course *The indicator shows the percentage of population aged 16 to 74 who actively attended any type of course online within the last three months. For courses provided through public administration, the visitor rates are collected automatically. For other types of third party courses, an online survey will be carried out. At present, the statistics reported by Eurostat for three months preceding the survey is being used[32].*	Eurostat statistics, Survey, Generated automatically	1.4%	10%

Table 16: Specific result indicators for eCulture

Specific result indicators for eCulture				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2013**	**Target value**
1	Percentage of individuals using digital content by visiting specific locations which provide access to cultural heritage *The indicator shows the number of individuals who, throughout the year, visited the given location where access to cultural heritage is provided. The indicator indirectly monitors an increase in the visiting rate of regions by measuring the number of visitors in each location.*	Survey	2%	15%

7.3.2 Use of open data

Table 17: Strategic objectives supported by results

ID		
A	**Moving towards services to improve the quality of life**	▪ Introducing a central open data platform for convenient access to open data
B	**Moving towards services to boost competitiveness**	▪ All data related to the activities of public administration will be made available by public administration institutions as open data. ▪ Open data will be used by a sufficiently large community of developers, in university research and by small and medium-sized entrepreneurs for commercial purposes
C	**Constant improvements in services in using modern technologies**	▪ Applications which will be designed to process and interpret open data will be used by public administration to improve the quality of its services
E	**Bringing public administration closer to the maximum use of data in customer-driven processes**	▪ Applications to enable decision-making with the use of open data

7.3.2.1 Specific objective concept

As far as information publication policy of the public sector is concerned, Slovakia is currently shifting its focus from a passive to proactive approach based on open data principles. In doing so, the Ministry of Finance of the Slovak Republic plays an important role as the leader of eGovernment development.

This strategy hopes to continue the ongoing initiatives with a view to gradually introducing the use of open data in public administration. Its goal is to achieve that the individual public administration institutions are required to publish in this form all of their data; this, however, will have to be governed by legislation. Confidential information, personal and sensitive data will be the only exception. The data maintained by public administration will be approached as

[31] The most recent Eurostat data

[32] Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tin00103&plugin=1

valuable resources, and the best ways of using them will be determined through publication. In addition to the presentation and gaining access to data, it is also the processing, exchange, interpretation and the creation of new data that are equally important.

Open data concept

In the first step, the concept of the use of open data in public administration will have to be defined in detail, followed by the adoption of legislation and the selection of standards, rules and licensing policies for the publication of open data. Linked-data is considered to be the final shape of open data.

A platform for open data

Also proposed is the creation of a single central platform with a catalogue available for all open data. Implemented interfaces for accessing the data and the possibility to store the data for those institutions which will not avail themselves of their local options will be included in the platform as well. Institutions with centralised data storage will be provided methodological support and transformation tools for working with data. As a result, a uniform and standardised procedure to publish the method of accessing open data, including a data model for such data, will be in place for the users.

The platform will also include visualisation tools and functionalities for establishing a community that works with open data. The openData platform will be part of the eGovernment cloud.

Creating open data

One of the key requirements for the creation of open data is a thorough analysis of the systems at the level of processes, applications and technologies in order to determine which data can be created and how efficiently it can be created. First of all, it is necessary to identify the sources of data which may or should be created. At the same time, the quality of sources will be determined as well. Furthermore, the priority of data sources will have to be identified in terms of their usability, with preference given to data related to the public administration, be it the reference data in the form of registers or data on transactions effected.

This analysis will make it possible to determine the steps necessary for each institution. All of this will pave the way for an overall conceptual, process-related and organisational change in the functioning of an organisation which will be capable of creating open data, as well as for an adequate deployment of information technologies. A shift towards creating open data is thus becoming an important component of the overall public administration reform at the process level.

Based on their “open-data-ready” design, the new information systems will be able to post information about their data to the central platform while simultaneously being able to provide content (including interfaces - API). Other systems will be modified in a way that will enable them to generate the required data in a suitable format and shape and to automatically communicate with the platform. The open data creation process will also make use of the correction and analytical tools to ensure correct publication of data. At the same time, it will be necessary to ensure a sufficient quality of existing data by consolidating the data sources, by interlinking or cleaning the data, etc. On the outside, these public sector information systems will contain interfaces that will make data available in well-arranged processes.

As open data publication initiatives have already been launched, the individual public administration institutions are currently at different stages of preparedness, with majority of them being in initial phases. The aim is to ensure that all public administration institutions undergo a process that will make it possible to publish all data as open data. However, there are many options and needs of the individual institutions which must be taken into account and which are specific for local governments and state administration; they are also related to the size of the institution and the complexness of its agenda. For the most part, it will be the smaller institutions which will be allowed to upload their data to the central platform where further processes of their distribution and publication will be ensured.

Monitoring the use of open data

In addition to positive effects, the large-scale publication of new types of data for public use poses new challenges, such sensitive data protection (e.g., citizens' personal data) or the correct use of the data itself. For instance, the protection of personal data may be breached in cases where different datasets are combined, even though they do not disclose personal data on their own. To address these and similar problems, a partially centralised monitoring of the use of open data must be introduced, thus ensuring a thorough monitoring of sensitive data and the supervision over the use of data.

Innovative communities

There is no sense in publishing open data as such. In order for the data to play its role, an innovative community must be created to actively use open data, create applications, as well as discuss innovative approaches and new ideas. Such communities will be encouraged. At the same time, potential university research concerning open data is highly interesting.

Open data will also be used by third parties for commercial purposes, and new applications will be able to provide real value to their users. Small and medium-sized enterprises will be able avail themselves of the possibilities under Specific Objective "Supporting small and medium-sized entrepreneurs" in developing applications that are capable of working with open data of public administration.

Public administration can find inspiration in such innovation and use the new and emerging applications in its own processes, while also being able to design new applications tailored to its own decision-making needs and the public as new types of services.

7.3.2.2 Implementation of the Digital Agenda for Europe

By publishing public administration data for further use, Slovakia will implement the following actions in compliance with the Digital Agenda for Europe:

- As part of **Pillar I: Digital single market**, Slovakia will focus on innovative uses of public data for generating new opportunities for businesses and job creation and for designing tools that will allow them to make better decisions. Open data will also be published at a European portal in a machine-readable format based on commonly used standards.

The issue of data sharing is also discussed in the eGovernment Action Plan 2011-2015 which emphasises the need to publish public data not containing personal data (geographic, demographic, statistical, environmental data, etc.) in a machine-readable format. Slovakia will focus on implementing proven procedures in the area of data sharing not only domestically, but also within the European Union, provided that semantic interoperability is ensured.

7.3.2.3 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 18: Specific result indicators

Specific result indicators for use of open data				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2013**	**Target value**
1	Share of public administration data described by means of metadata in the overall number of data *In a given category, the Indicator shows the ratio between data, which is described by metadata, and the total number of structured data generated by public administration in that category. The types of data described by metadata are reported by a liable stakeholder.These data sources will also be the subject of analytical projects in the new period.*	Report	0.92%	80% of data that can be structured

7.3.3 Supporting the small and medium-sized enterprises in the digital economy

Table 19: Strategic objectives supported by results

ID	Strategic objective	Expected results
B	**Moving towards services to boost competitiveness**	▪ All business transactions will be done electronically (payments, invoicing) ▪ Small and medium-sized enterprises will be more viable with possibilities that will be made available to them through: - access to shared infrastructure (communication, AAA, PKI); - access to cloud services of the public sector
C	**Constant improvements in services in using modern technologies**	▪ A higher demand for innovative ICT-enabled solutions will increase the number of SMEs participating in the development of such solutions
D	**Creating a secure environment for citizens, businesses and public administration**	▪ Companies will use electronic identity ▪ The published digital content will be effectively protected

7.3.3.1 Specific objective concept

Between 2014 and 2020 the Slovak Republic will be systematically supporting business opportunities for SMEs:

- E-commerce will be simpler and more trustworthy, thus facilitating the transfer of activities to the digital economy, including their development;
- SMEs will gain access to shared services developed in eGovernment for commercial purposes (databoxes, AAA platform, cloud services);
- The public administration will step up demand for innovative solutions in such areas as mobile government, visualisation, data analyses, etc. which lend themselves to be provided through the services for SMEs;
- Incubators and cluster organisations will be established in smart specialisation and high-tech areas and the necessary modern information technologies will be provided for that purpose;
- Information technologies will facilitate the growth and innovativeness of SMEs: a register for SMEs consultants, a platforms for e-commerce and an information system to monitor the business environment will be set up;
- A system of innovation vouchers and other financial instruments for the funding of innovative SMEs will be established, allowing them to gain comprehensive insight into the services offered through the portal concerning financial instruments.

Promoting electronic commerce

- Trusted electronic commerce

The basic building block of trust is the availability of information on the history of the partner and a certainty that the partner's identity is authentic and that the transactions effected will be undisputable. Therefore, the support for securing identity in the digital space is paramount. Business registers will gradually evolve into interactive tools which, in addition to supporting the trustworthiness of entities, will also bring more information on their products. Another issue to be effectively tackled and addressed is the protection of digital content so that it could be published without any fears while essentially preventing its illegal distribution. In a similar vein, industrial property rights (of patents, utility models, designs or trademarks) for goods sold on the internet will have to be ensured by using smart instruments. Efficient instruments for the

protection of customers will also be put in place within the framework of the digital single market.

- Simple electronic commerce

A shift towards the simplicity of electronic commerce means reducing transaction costs and process barriers. It will be crucial to participate in such initiatives as the uniform system of payments, etc. The development of electronic and mobile payments is a clear priority (also in the public administration). Electronic invoices will be available in all areas of business, hand in hand with improved payment recovery process.

Promoting the internationalisation of SMEs and their expansion to new and growing markets represents a considerable potential for improving the foreign trade balance. Customs procedures and supervision over the movement of goods is an important aspect influencing the competitiveness of Slovak importers and exporters. In the upcoming period, proactive services will be designed for the preparation of customs, imports and exports documents, as well as for simplified a transport of goods. The portal will facilitate access to a plethora of information on administrative and technical burdens, import restrictions of various countries outside the EU, certification-related rules and procedures, distribution channels, customary procedures concerning investment and lending opportunities, export insurance, collaboration events, foreign competition, etc.

Also available will be information on e-security, business databases and electronic markets which entrepreneurs are still lacking despite the upswing of electronic commerce.

Shared services platform for SMEs

Designed to ensure effective functioning of the public administration, the platforms and technological solutions will also be provided for promoting SMEs and for commercial purposes to the maximum extent possible in order to multiply the effect of invested money. There are three areas contemplated for the use of the built infrastructure by businesses.

- Communication platform and electronic delivery

When looking at entrepreneurs as clients of public administration, it is also important to facilitate communication and ensure electronic delivery by introducing such solutions as data mailboxes and a single account for a legal entity (similar to eDesk module in the Central Public Administration Portal which serves the citizens, but not businesses). In addition to streamlined processes, the benefits associated with the introduction of electronic delivery also include an incomparably higher reliability of delivery and hence better law enforcement. The databoxes platform and the related infrastructure can be used for mutual communication between entrepreneurs and citizens (B2B, B2C and C2C models). The electronic delivery solution should be open to competition.

- Sharing AAA and PKI infrastructure

In the future period, building a trustworthy and secure digital environment will be given significant attention. Therefore, further synergies brought by this effort are desired. When defining clear rules, the PKI and AAA infrastructure can be shared with small and medium-sized enterprises which will thus be able to effectively create a secure digital environment for their business and customer services. The operators of internet services will be able to use authentication and authorisation features in their solutions, including tools that have been developed for the needs of eGovernment, which can have a major impact on trusted, secure and convenient use of services.

- Cloud services

Another method for supporting SMEs in the future is through the provision of ICT infrastructure for scaling their business activities and innovation in the provision of services. The rented eGovernment cloud services may be used by entrepreneurs as a springboard to conveniently start their business in the digital economy (for instance, a standardised solution for electronic commerce) or, where applicable, to make their functioning more effective by deploying optimised electronic back-office processes. By starting a business in a trusted cloud complying with strict standards, the companies will have a better chance to be widely accepted and to swiftly launch the sale of their services and products online, all of which will indirectly

contribute to a higher turnover on eCommerce. Cloud services may also be used to temporarily deliver more computing power, for instance, in cases where large quantities of data need to be processed quickly. This will also pave the way for a better take-up of cloud-based solutions by SMEs, thus encouraging innovation in the area of cloud services. Cloud services will also be available to scientific-technical incubators and start-up accelerators. The eGovernment cloud, as described under investment priority "Effective public administration", will be available to the University Scientific Park which will create the conditions for the establishment of new start-ups capable of bringing the results of the applied research into practice. Cloud services will be part of the package of comprehensive services for SMEs which will be provided by the Business Centre all in one place and for all lifecycle stages of SMEs.

Creating suitable conditions for promoting the growth and innovativeness of SMEs

Specialised and expert consultancy services for SMEs will be facilitated by modern information and communication technologies. The focus will be on higher value added electronic services (such as e-learning). The support will primarily be targeted at the development of SMEs possessing innovative potential while encouraging businesses active in the area of industrial design or information and communication technologies. All electronic services for SMEs will be available in one place.

The implementation of an information system for the register of consultants for SMEs, which will contain information on the network of independent consultants, is also planned. An accreditation and monitoring system for the recognition of experts for SMEs and their professional growth will be set up as well.

Furthermore, better conditions will be created for the use of services of information a communication technologies by SMEs. This will involve, in particular, a wider use of electronic commerce tools by SMEs by improving their skills and by developing electronic commerce solutions for SMEs.

There are plans to set up an information system for the monitoring of the business environment, on an ongoing basis, with a view to mapping the existing situation and bringing solutions in accordance with the "think small first" principle, and for the monitoring of alternative regulations for SMEs (based on the testing of SMEs) in order to support their growth and innovativeness.

Innovation vouchers and information system on financial instruments for SMEs

The limited innovation capacity of small and medium-sized enterprises is typically associated with a lack of expertise in a specific field and certain institutional prejudice against a certain type of innovation which, in many cases, does not have much in common with the company's primary line of business. Professional assistance may be provided to help effectively remove these limitations with a low administrative burden. Innovation vouchers represent one of the means necessary for flexible micro-grants which stimulate innovation in small and medium-sized enterprises. These vouchers can be allocated to companies or public institutions which may use them for external innovative services. In this way, both the recipient of the voucher and its issuer are forced to cooperate more closely and, in the best case, participate in the development of new or enhanced products or services. The supported SMEs may use the vouchers to purchase external innovation services (creative services, research and development, business consultancy, mentoring, etc) and overcome their systemic innovation limitations. In order to increase their share in success and collaboration, the SMEs will be required to pay, in some cases, a small financial contribution.

In addition to the aforementioned innovation vouchers, other financial instruments – such as those provided by the Venture Capital Fund or directly by business angels or through crowd-sourcing – will be in place as well. It will be crucial to revamp the information systems of such funds in order to automate the processes for the allocation of financial resources and the monitoring of supported SMEs, as well as to reduce the administrative burden on investors and beneficiaries, while enabling to create suitable combinations of financial instruments. This system should work in unison with a portal where information on all available financial instruments and the ways to use them will be clearly and interactively published, so that every

company seeking financial support could find a tailor-made solution with ease. The portal should also publish information on start-ups which seek money, including an objective risk rate of their business plan, as well as individual companies' potential to generate profits and expand abroad. The data on supported businesses should be continuously updated in order to spread the news about their successes and to share useful information and advice. Preventing the ineffective spending of financial resources is paramount. The success rate of supported ideas is known to be quite low; therefore, the failure of any financial support must be objectively documented. The supported business will have to join the open data initiative and publish data on their economic performance; their decisions will be open for comments from the expert community in order to avoid potential failures, if possible.

Supporting incubators and cluster organisations by information technologies

The SMEs with a potential for innovation and internalisation will be able to reside in technology incubators which will provide them with the necessary office, technical, laboratory and testing premises, administrative and infrastructure services, ICT support (locally and remotely from the eGovernment cloud), as well as the conference, meeting and training rooms. Moreover, they will be able to access the repositories of traditional and electronic knowledge and information resources capturing the most recent developments in the given area. The portal will provide information on the location, equipment and the list of resident companies, as well as on the organisation of any particular incubator, its activities and unoccupied capacities. The calls for the building of new incubators and their detailed specifications will be published in a similar manner. The incubator accreditation process will be enhanced and standardised in order to contribute to their development and facilitate quality improvement.

Cluster organisations will represent an integrating element for activities focused on stimulating investment; these organisations will be supported primarily in the smart specialisation and high-tech areas to bring together highly innovative companies even in the emerging branches of the digital economy and services. The clusters will thus support the establishment and development of new and existing companies which will be able to easily obtain information on cooperation, as well as on the possibilities of using the aforementioned shared services within the platform (electronic delivery, AAA and PKI infrastructure, cloud services for start-ups).

The creation of a collaboration platform for the effective functioning of the future industrial research & development centres will be of key importance as well. These centres should operate as consortiums led by a single industrial company which needs research and development capacities in a particular area that concerns its line of business, with at least one research institution acting in the role of its partner (Slovak Academy of Sciences, universities). With the help of a central source of information about clusters and centres, and with a collaboration platform in place, the unnecessary duplication of innovation efforts will be removed while at the same time facilitating competition from alternative solutions.

Support for online education concerning successful innovation projects, their publicity domestically and abroad, as well as their popularisation will provide further synergic effects which may help other entrepreneurs and have a positive impact on the profits generated by the existing solutions. The portal and the collaboration platform will also form a basis for a mutual exchange of knowledge related to advancements in technology and innovation between research organisations, academic institutions and civic associations.

The proposed measures are in line with the Smart Specialisation Strategy of the Slovak Republic which describes in more detail manner objectives, resources and funding for the comprehensive support for SMEsin all economy sectors.

Indirect support for SMEs through the public administration demand for innovative solutions

As part of projects in the upcoming programming period, new possibilities will be created for the utilisation of domestic innovation solutions to improve the functioning of the state and public administration. The modalities of electronic public procurement will be updated in order to easily implement demand-driven projects in public administration in the form of innovative

solutions in such areas as open data, mobile applications for eGovernment services, green information and telecommunication technologies and applications for social networks. As applicants, public administration institutions may implement projects such as contests of designs by SMEs and clusters in order to seek appropriate solutions.

7.3.3.2 Implementation of the Digital Agenda for Europe

By implementing the selected actions of the Digital Agenda for Europe, the development of business environment will be promoted in the following scope:

- In the case of **Pillar I: Digital single market**, entrepreneurship across the EU will be simplified by cross-border services, by addressing semantic barriers and by interlinking the public tendering systems.
- As part of **Pillar VII: ICT-enabled benefits for EU society**, a list of cross-border services will be prepared in order to allow entrepreneurs to establish and operate a company anywhere in Europe regardless of its original location.

The Digital Agenda revised in December 2012 in the form of the digital "to-do" list calls for developing ICT skills, support for web-based businesses and establishment of a friendlier environment for start-up workers and entrepreneurs:

- The formation of the Grand Coalition for Digital Skills and Jobs which should prevent, also in Slovakia, unfilled ICT-related vacancies due to the lack of sufficiently qualified workforce.

The revised Digital Agenda also underlines the importance of modernising copyright so that entrepreneurs are sufficiently motivated to create digital content for eCommerce within the digital single market:

- Updating the EU's copyright framework.

7.3.3.3 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 20: Specific result indicators

Specific result indicators for supporting small and medium-sized enterprises in the digital economy				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2012**	**Target value**
1	Selling and buying goods and services online *For citizens, the indicator shows the percentage of individuals aged 16 to 74 using the internet to buy or order online content within the last 12 months for private use.* *For businesses, the indicator shows the number of entrepreneurs whose sales through computer networks accounted for at least 1 % of their total turnover (excl. VAT) within the last calendar year.*	Eurostat statistics	12.2% Businesses 44.7% Citizens	40% Businesses 70% Citizens
2	Turnover on e-commerce *The indicator represents the receipts of enterprises with at least 10 employees from sales on digital market from their total turnover excluding VAT. The indicator is reported by Eurostat and covers all sectors of industry and services apart from the financial sector.*[33].	Eurostat statistics	11.6%	30%

[33]Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tin00110&plugin=1

7.3.4 Promoting eInclusion

Table 21: Strategic objectives supported by results

ID	Strategic objective	Expected results
A	**Moving towards services to improve the quality of life**	▪ Disadvantaged groups can make use of instruments supporting assisted living ▪ eGovernment services are available in simple versions
D	**Creating a secure environment for citizens, businesses and public administration**	▪ Training materials are provided to disadvantaged groups in a suitable format to help them navigate the digital space

7.3.4.1 Specific objective concept

eInclusion of disadvantaged population requires, on the one hand, developing skills to use new technology such as smart phones and, on the other hand, a sufficient offer of services enabling such people to participate in the digital world. Despite all previous efforts, the groups of population not able to reap the benefits of information society still prevail in Slovakia. The reason is that disadvantaged people:

- are not sufficiently educated and competent to use new technologies;
- do not have enough money to purchase and use modern technological conveniences;
- fail to recognise the satisfactory benefits and think it is useless for them to participate in the digital world.

The chances of these people being able to land a job and participate in the social and public life are thus getting slim. Moreover, they cut themselves off of a large quantity of information available on the internet and, therefore, cannot make adequate decisions and have an opinion. Such people are not able to use eCommerce, eBusiness and eGovernment services from the comfort of their homes and must either rely on local institutions and companies, or travel long distances which, in many cases, they cannot afford or undertake for other reasons. Paradoxically, in many situations it would be this group of citizens who would greatly appreciate the benefits of information society.

The strategy follows up on the initiative of inclusive eGovernment where nobody should be left behind. Everybody should have access to the benefits of eGovernment even if they do not own state-of-the-art information and communication technologies or are unable to use it efficiently.

Promoting education in particular for older people and disadvantaged groups

First of all, it is necessary to ensure that disadvantaged groups have access to educational content in a suitable format and that they learn to efficiently use information and communications technology and navigate the internet safely. eLearning content must be prepared in many forms: as audio files and video files with subtitles or sign language, or as text accessible to people with various disabilities. There are several standards available for the web environment, such as Web Content Accessibility Guidelines (WCAG) 2.0 which can make website content accessible to people with various disabilities, such as blindness or visual impairment, deafness, hardness of hearing, impaired cognitive function, impaired mobility, speech disorders, photosensitivity and combinations of the above impairments.

In order to improve citizens' skills in using information technology, the European Computer Driving Licence (ECDL) could be made available to all students of secondary schools as an optional subject. It would also be advisable to make ECDL available to other people belonging to disadvantaged groups.

Simplified services for disadvantaged groups

The services suitable for implementation under the "Design for All" information technology concept will be identified in the future. This concept applies the principles, methods and tools for creating a universal design covering the whole range of human abilities, skills, requirements and preferences. Furthermore, all existing channels will be supported in the provision of

services and the national support centres will provide comprehensive assistance for the use of eGovernment.

Tools to promote inclusion

Support for e-Inclusion should be seen as a wide range of solutions for life on-line: teleworking, applications and technologies for disabled people, simple focus on the most vulnerable groups living at the periphery who can greatly benefit from information technologies which will improve their lives and increase their mobility.

Another aim is to provide ICT-based tools to increase the participation of disadvantaged groups and, where applicable, their care-takers, in the social and working life. This purpose can be served, in particular, by Ambient Assisted Living tools, telemedicine, as well as assisted social networks where people can present their problems and seek advice from people facing similar life situations or from professionals.

Ambient Assisted Living technologies are designed to extend the period of time during which individuals can live autonomously in the preferred environment where their feel secure, confident and sufficiently mobile. The resources in ageing populations may also be effectively tapped through this objective. These tools focus in particular on preventing and detecting critical situations and on social and health care. Telemedicine can be also included in this category of tools, because it makes it possible to remotely provide certain health care procedures, in particular monitoring the health condition of people with chronic diseases.

Activities, which are proposed to be implemented with a view to supporting eInclusion, can be broken down into two basic areas focusing on both the creation of simplified content and services for the disadvantaged groups (implementation of simpler services, preparation of an analysis of possible changes to the existing content and services, setting the rules and standards for the creation of content and services for the disadvantaged groups, creating content for the disadvantaged groups, including support for this groups on social networks) and on the introduction of tools for assisted living and telemedicine tools (implementation of programmes for providing the assisted living and telemedicine tools for use by citizens in their homes).

7.3.4.2 Implementation of the Digital Agenda for Europe

Inclusion of disadvantaged group will be supported through the Digital Agenda recommendations as part of:

– **Pillar VI - Enhancing digital literacy, skills and inclusion**, which will make new electronic content, including the development of digital skills, fully available to people with disabilities. Public websites and on-line services, which are crucial for a full-fledged participation in public life, will be aligned with international standards on accessibility for people with disabilities.

7.3.4.3 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 22: Specific result indicators

Specific result indicators for supporting eInclusion				
ID	**Specific programme indicators**	**Measurement method**	**Baseline**	**Target value**
1	Percentage of individuals with insufficient ICT skills for the labour market *The indicator represents the percentage of economically active population who do not possess sufficient ICT skills for the labour market needs. The indicator is measured based on answers (yes or no) given by employed individuals, self-employed and care-takers aged 16 to 74 when asked whether they consider their*	Eurostat statistics	24.7% (in 2011[34])	10%

[34]The most recent Eurostat data

Specific result indicators for supporting eInclusion				
ID	**Specific programme indicators**	**Measurement method**	**Baseline**	**Target value**
	computer and Internet skills sufficient for the market if they were to look for a job within a year. The indicator may further be broken down based on occupation, gender, age, place of residence, etc.			
2	Disadvantaged individuals using the internet *The indicator shows the percentage of the disadvantaged people who are using the Internet regularly (at least once a week). Disadvantaged population is understood to mean individuals meeting at least one of the following characteristics: aged between 55 and 74, low education level (ISCED 0-2) and/or without employment (unemployed, not in active service, or retired).*	Eurostat statistics, Survey	52.8% (in 2012)	70%

7.4 Effective public administration

7.4.1 Establishing the eGovernment innovation centre

Table 23: Strategic objectives supported by results

ID	Strategic objective	Expected results
B	**Moving towards services to boost competitiveness**	▪ The functional sharing of services and open data between public administration institutions
C	**Constant improvements in services in using modern technologies**	▪ Prepared standards; ▪ The functional control of compliance with standards; ▪ Demonstrable development of services and an increase in their quality when it comes to the forms and possibilities of their provision

7.4.1.1 Specific objective concept

In the Slovak Republic, the Ministry of Finance is the sponsor of eGovernment development through its Information Society Section. In the upcoming period, it will be necessary to reinforce the capacities of this section so that it will be able to play the role of the eGovernment innovation centre.

The eGovernment innovation centre will be able to plan constant development of electronic services, monitor the quality of individual services as regards the form and possibilities of their provision, ensure the supervision over the sharing of services between public administration institutions, and provide guidance on the publication and use of open data.

The eGovernment innovation centre will be responsible for the preparation of standards and the monitoring of their compliance. It will also propose the overall conceptual architecture and guide the implementation of public sector information systems development projects to ensure that they are in line with the proposed architecture.

In terms of planning, its capability to generate innovative ideas and promote competition among institutions to provide the best services possible will be important as well. This entails the building of liable stakeholders' capacities in terms of architectural management of their systems.

By reinforcing professional capacities in public administration, information asymmetry between contracting entities and contractors in the implementation of projects will be minimised, and the public sector will thus become a relevant partner for other sectors. The eGovernment innovation centre will provide training courses for professionals from the individual public administration institutions.

7.4.1.2 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 24: Specific result indicators

Specific result indicators for establishing the eGovernment innovation centre				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2013**	**Target value**
1	The number of centrally used support systems of internal administration within the information systems of public administration (as services in the SaaS cloud) *The indicator shows how many support systems, such as EDMS and Enterprise Resource Planning, are used by public administration institutions in their internal environment as SaaS cloud services.*	Report	5	12
	The share of public administration institutions with information environment described as enterprise architecture (centrally shared) *The indicator expresses the share of public administration institutions which describe their IT systems using three layers of enterprise architecture. This model must also be shared centrally.*	Report	0%	75%

7.4.2 Supporting the processes of effective public administration

Table 25: Strategic objectives supported by results

ID	Strategic objective	Expected results
E	**Bringing public administration closer to the maximum use of data in customer-driven processes**	▪ The assisted access points to services (80) will be set up to help the citizens with all agendas of public administration ▪ The created process maps implemented in the information system of the shared platform, containing all individual steps of an optimised service provision process. ▪ Robust information systems to support quality management in public administration. ▪ Established procedures for sharing and using data in processes and policy-making
F	**Optimum use of information technologies in public administration through a shared services platform**	▪ An established system for the management of ICT-enabled tasks to ensure overall coordination of activities performed by public servants; ▪ Centralised support processes and operations, building professionalism ▪ Cross-border interoperability of key systems

7.4.2.1 Specific objective concept

In the period between 2007 and 2013, eGovernment development almost exclusively focused on services for citizens and on ICT-enabled agenda and the corresponding processes. However, the efficiency of public administration is significantly affected by methods used in the performance of support operations. In terms of eGovernment development, these operations were left unnoticed. For this reason, every institution handles the support operations in its own way, which results in duplicity and the absence of consistency. This creates a bottleneck which needs to be systematically removed in order to be able to proceed with further modernisation of public administration.

The situation is better when it comes to agenda information systems in public administration. Most of the agendas should be ICT-enabled by 2015 at registration level with a focus on allowing

transactional electronic communication. In majority of cases, agenda information systems in public administration include a certain set of reporting tools; however, their real use is not systematic and the relevant knowledge is not collected. The situation is similar with respect to the integration of processes. It is the targeted and coordinated effort which can facilitate the design of smart public administration systems in these areas.

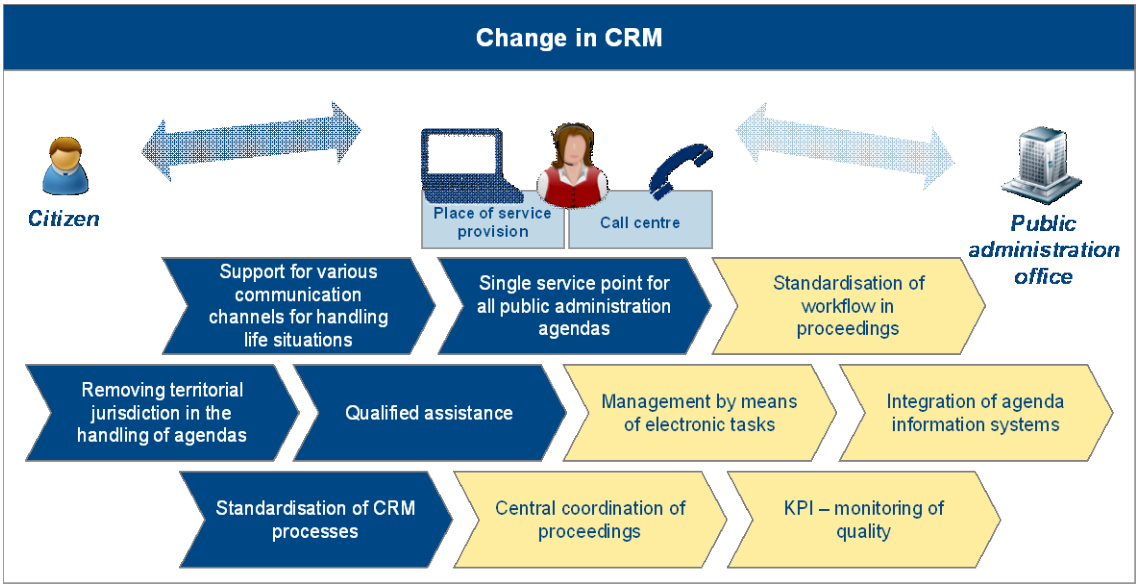
The public administration reform, also known as the Efficient, Reliable and Open administration, is one of the most important structural reforms that are underway in Slovakia. The reform framework and the respective organisational changes and changes in terms of competences and processes, hand in hand with the follow-up legislative requirements, are addressed by a separate operational programme “Effective Public Administration” falling within the ambit of the Ministry of the Interior of the Slovak Republic. The objectives of the proposed reform include higher efficiency and quality of public administration, better transparency and access to services, reducing administrative burden, setting up assisted access points to public administration services and the corresponding reduction in the costs of public administration.

One of the aims of this strategy is to support this reform through modern information technology while at the same time enabling the implementation of best practice in public administration as a whole. The issue of setting up information systems to support public administration processes will be addressed by the Ministry of Finance of the Slovak Republic as the central sponsor of eGovernment development.

Within the reform, services provided to citizens at customer centres will be separated from administrative proceedings as such. The entire process will be optimised in a way that only a minimum of steps and inputs would be required from citizens and that the entire proceedings could be attended to in one place without having to make any additional visits to public administration offices. The individual steps of the optimised process will be described in the so-called process maps implemented in the information system of a shared platform. The process map will thus represent a structured network chart of possible standardised routes composed of the individual steps necessary for handling any particular life situation of a citizen. The process maps for optimised processes of agendas, handled in the background by specialised units of offices which must cooperate with each other, will be implemented in a similar way. The overall coordination of activities performed by public servants requires ICT-enabling of tasks and the introduction of task management systems which will pave the way for shifting to a result-oriented public administration. The electronic tasks system will assign the particular activities within the proceedings to the corresponding responsible employees.

This means that public administration processes must be redesigned in a way that will lead to their optimisation, removal of duplication, more transparency and better decision-making within these processes. In order to be successful, this activity will have to be directly interlinked with the public administration reform, as part of which optimised processes will be designed, the organisational structure will be changed and the capacities of human resources will be reinforced. The introduction of systems with optimised workflow and ICT-enabled tasks will therefore be coordinated with other activities performed as part of the reform.

Figure 37:Public administration reform supported by ICT



Introducing uniform provision of services to citizens through customer centres

Electronic communication is only one of many possible channels. In many cases, qualified assistance services of the public administration will remain necessary and sought-after. After reshaping integrated service points into single contact points for the entire public administration, the services requiring physical presence will, in essence, become electronic as well.

Integrated service points will be implemented during the 2013 – 2014 period. They are the first step towards creating the *customer centres* and will allow citizens and businesses to gain assisted access to electronic services published on the Central Public Administration Portal. Integrated service points are particularly suitable for those users who do not have the technical means or professional competence to communicate directly with public administration. The staff working at ISPs are not employees of the competent public administration bodies responsible for the relevant administration areas and only act as persons authorised to communicate with the client on behalf of public administration at the given moment of communication.

Further development of these contact points in line with the global customer service trends is proposed. Instead of assisted access to electronic services, the citizens will receive comprehensive professional guidance to handle their matters. In selected locations, service zones will be created, with qualified personnel being gradually hired for all public administration agendas. A uniform system of the provision of public administration services will be established. The focus will be on the quality and professionalism of the assisting staff and a customer-oriented approach towards the visitors. Simultaneously, the possibility to visit the individual offices during the hours of attendance for the citizens will be limited. The aim is to achieve that the customer centre be able to handle any problem related to public administration.

The proposed customer centres (also referred to as Citizen's Contact Administrative Points in projects falling under the Ministry of the Interior) will employ employees of integrated state administration entities, i.e., persons competent to act within the relevant area of administration and its agendas.

In order to manage the services provided to clients, modern information technologies such as queue management systems and a centralised citizen relationship management system will be used. Through this system, qualified assistants will be provided standardised processes for addressing every life situation, a history of contacts and visits made by any particular citizen, access to communication channels and knowledge database for helping the citizens to handle their life situations. During the provision of service itself, automated communication with

agenda information systems in public administration will be ensured, while generating electronic tasks for employees handling the practical agenda in the background.

The required technology and the implementation of CRM management systems in customer centres are included among the proposed activities.

Tools for optimising operations

The public administration reform will be geared towards the gradual centralisation of support processes and operations, bringing more professionalism into a centralised environment. As a result, organisational units specialising in the particular competence of support will be created and equipped with ICT instruments to handle queries. In addition to the provision of support services, the created consolidated information systems are proposed to be provided to other interested parties in public administration based on the *software-as-a-service* approach. In this manner it will be possible to share, for instance, document management systems, registries and case-file management services; human resources management services and employee attendance systems; contract management systems, real estate management systems; movable property and warehouse management systems; bookkeeping, etc. A central e-mail system will be introduced for public administration employees as a cloud service. An electronic public procurement system, operated by a contracting authority and capable of handling the entire process by electronic means while communicating with the information system of the Office for Public Procurement, is another interesting example.

Standardisation of optimised processes and ICT-enabled tasks in handling the agenda

In order to be able to efficiently handle the proceedings requested through the front office processes, it will be necessary to standardise the tasks performed by public administration. During the proceedings, selected agendas will be handled by a series of tasks performed by individual employees. An efficient delegation and management of such tasks requires the introduction of process maps for every agenda. These process maps will be transparent and based on applicable legislation and directives, so that every citizen and public servant will be able to keep track of the proceedings. The monitoring of the actual deliveries during the proceedings will make it possible to gradually improve and optimise the performance of the agenda.

Correct use of information is central to **combating corruption** which is identified as one of Slovakia's essential problems. Centralised systems for the management of penalties and offences are considered suitable solutions to facilitate transparency in the public sector as well.

In customs and tax areas, analytical tools can significantly help detect and handle evasion and suspicious transactions and support international exchange of information and development of cooperation.

Information systems in public administration will be optimised in a way that will allow working with electronic tasks and performing the steps outlined in the process maps, or will be implemented in accordance with these rules.

As a result, a coordinated and collaborating eGovernment will be up and running.

Collaboration and efficient cooperation within public administration, as well as between public administration and private sector, is conditional upon effective integration at multiple levels. In the upcoming period, the focus will be on the integration of processes and data.

During the current eGovernment development, the individual agenda information systems in public administration were equipped with their own integration platforms. After the processes are standardised for the individual agendas, it will be possible to proceed with the real integration of processes which will allow the exchange of tasks. The communication of several platforms will be controlled by the central integration platform for eGovernment processes. This platform must also be designed in accordance with initiatives on cross-border interoperability of services.

Creating basic registers from the previous period will represent the first step towards an effective exchange and synchronisation of data between the individual public administration

institutions. In the upcoming period, a platform and applications for tools facilitating the exchange and synchronisation of master data and transaction data will be created. The individual information systems will have permanent access to data in other systems on an as-needed basis. The exchange of data between systems will be managed from the official communication module which will also offer a comprehensible picture of the public administration database. There will be no doubt as to who is working with what data and who is responsible. At the same time, clear rules will be specified for access to data, including technical means facilitating the actual exchange of data in real time.

Promoting quality management

With tasks performed by electronic means, it will be possible to keep track of individual activities performed within public administration proceedings. The same will apply to shared operations in support processes. The management will have unprecedented options for designing systems for the monitoring of various performance indicators for economic and process-related areas.

The proposed activities include building information systems to support quality management in public administration.

Use of information and knowledge

Better decision-making, which has a considerable impact on the quality of outputs, can be achieved by maximising the use of knowledge. There is a gradual shift towards using knowledge based on advanced analytical and statistical methods rather than relying on the views of experts. Such knowledge can be applied at all decision-making levels, from day-to-day activities in the decision-making stages of a process through to the creation of policies and simulation of their impacts. The building of systems enabling to comprehensively work with information and large quantities of data, in particular as regards the detection of frauds and risk analyses, is proposed. The data should be treated as a source, while at the same time managing its value.

It will also be possible to share the entire pool of knowledge generated by public administration. This will facilitate the exchange of best practice and speed up the delivery of high-quality outputs. The possibility to provide the outcomes of projects will be an important aspect of this system as well.

The competences of the public administration can also be reinforced through systematic training. In this area, the central eLearning instrument for public administration may be helpful.

Uniform data interpretation across the entire public administration will also be an interesting problem to tackle. In this respect, Estonia's strategic intention is quite inspiring: *"In order to achieve that data have a single meaning, the following actions will be undertaken: development of mechanisms for the re-use of semantic assets; elaboration of XML-based descriptions for main types of public sector documents; development of a common thesaurus for the indexing of services and websites; standardisation of the structure of public sector websites and development of mechanisms for their re-use."*

A case-file system where the police, the Prosecutor's Office and the courts can exchange information throughout the entire life-cycle of a case may serve as an example of process integration and collaboration between public administration institutions. Integration and collaboration of customs authorities and police is a similar case.

International administrative cooperation

Public administration in Slovakia is gradually becoming an integral and organic part of the European Public Space. Cooperation between peers in many countries and between their agenda information systems will soon be commonplace. It is therefore necessary to implement the individual international European initiatives for interoperability and harmonisation of standards.

Promoting the use of ICT by local authorities

Forming a part of public administration, local authorities are facing specific problems which must be addressed comprehensively. They include, in particular, poor ICT infrastructure and insufficient resources for operating complex information systems. Therefore, the local authorities will be encouraged to make the maximum use of software applications hosted by eGovernment cloud with a view to ensuring a sufficient supply of applications and services for supporting and administrative processes, quality management, information sharing and services provided to citizens, etc..

7.4.2.2 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 26: Specific result indicators

Specific result indicators for supporting the processes of effective public administration				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2013**	**Target value**
1	Number of tasks handled by an individual office per unit of time per employee *The indicator shows how many tasks of a given level of difficulty were handled by an office in a day, month and year on average per employee. The indicator includes only those offices that are part of the ESO reform. Information concerning this indicator is generated directly from the central task management system.*	Automatically generated	100%	150 %

7.4.3 Introducing eGovernment cloud

Table 27: Strategic objectives supported by results

ID	Strategic objective	Expected results
D	**Creating a secure environment for citizens, businesses and public administration**	▪ Standardised categorisation of services based on the level of security
F	**Optimum use of information technologies in public administration through a shared services platform**	▪ A deployed and functioning eGovernment cloud process model ▪ A deployed and functioning eGovernment cloud financial model ▪ Standardised categorisation of services on the basis of quality (availability, response time, etc.) ▪ Reduction of ICT operation costs in public administration A single environment for the consumers of eGovernment cloud ensuring the following functionality at the least:: ▪ Provision of information on the current portfolio of cloud services ▪ The possibility to order cloud services and keep track of the orders placed, all the way from their processing to the setting up of services ▪ Reporting of issues and keeping track of their removal ▪ Keeping track of the amount of consumed resources ▪ Selecting the method of payment for the consumed resources

7.4.3.1 eGovernment cloud model

With respect to the development of eGovernment in Slovakia, ICT infrastructure remains a problem because every institution had built it in its own way. The operating costs of information

systems in public administration represent a burden for the budget, and therefore it is advisable to address this problem in a systematic way. ICT infrastructure in public administration is proposed to take the form of shared services at all levels.

This represents an essential conceptual change in the functioning of ICT infrastructure in public administration. The draft of such concept is described below, followed by activities aimed at its implementation.

As the basic characteristics, eGovernment cloud will be built in the form of a private cloud set up at selected public administration institutions with certain experience and a certain level of data centres.

Another aim is to provide all types of cloud services, i.e., infrastructure-as-a-service (IaaS), platform-as-a-service (PaaS), software-as-a-service (SaaS), and, in order to make their use easier for the consumers, the services will be listed in a catalogue. These services will involve central public procurement or information technology management (PC, printers, e-mail, internet access, etc.).

Information systems to be set up as part of new projects will be implemented within the framework of the eGovernment cloud platform (the "cloud only" rule).

Effective and productive ICT operation

The basic idea behind eGovernment cloud is to provide an efficient and productive ICT operation in public administration. The main factors affecting the productivity and effectiveness of services in a cloud environment are as follows:

- Resource sharing – one of the main attributes of cloud computing and an important instrument for reducing the costs and boosting effectiveness. When designing eGovernment cloud, the focus should be on simple access to resources and their allocation.
- Consumption management – simple access to data should be combined with allocation management and consumption monitoring.
- Deployment/availability of services – eGovernment cloud will be a dynamic environment in terms of the need to deploy new or update existing services (due to legislative changes or due to necessary improvements in the quality of services provided). In comparison with the standard "on premise' computing model, the cloud-based model brings new challenges for the deployment of services. Quality infrastructure and tools for the deployment and updating of services represent important factors affecting the productivity of eGovernment cloud operation.
- Standards – the design of eGovernment cloud architecture will place greater emphasis on the use of standards to ensure interoperability of services.
- Organisational measures – in connection with eGovernment cloud introduction, it will be necessary to deploy new or update the existing organisational processes.
- Responsibility for services - the many services operated and provided by individual state administration bodies must comply with specific qualitative requirements. The definition and division of responsibility for the quality of services is typically declared in the form of the so-called Service Level Agreement (SLA). The deployment and operation of various categories of services must be taken in account in the eGovernment cloud design in terms of quality requirements.

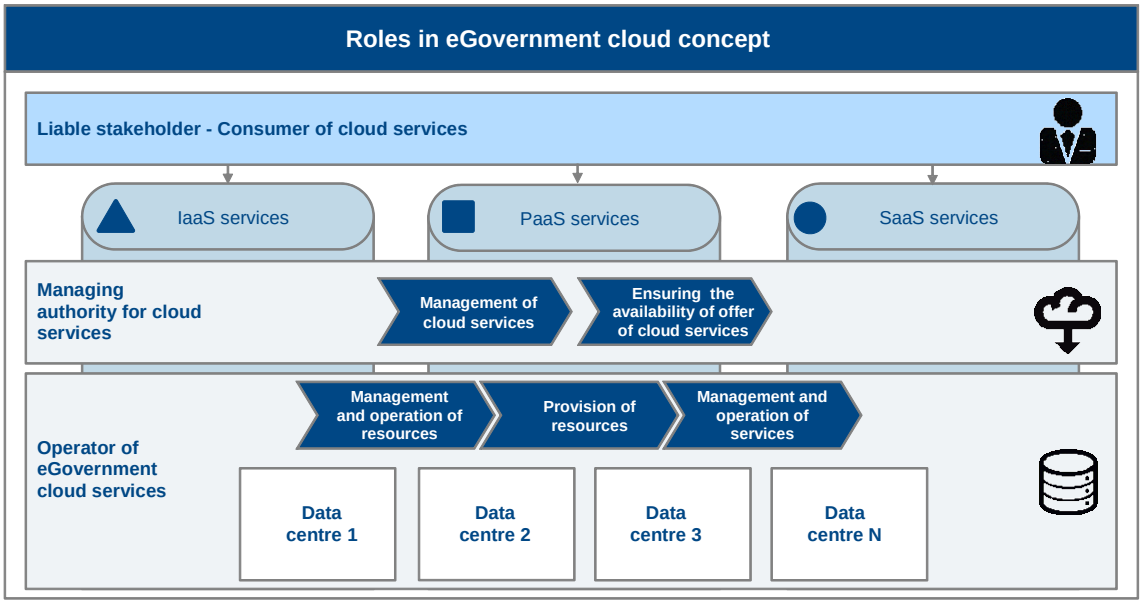
Roles and their responsibilities

At present, the following types of roles are applied in cloud computing:

- Consumer of eGovernment cloud services - a legal or natural person using the services of the operator of eGovernment cloud services based on a contract.
- Operator of eGovernment cloud services - a legal person responsible for arranging the provision, operation, connectivity and transmission of cloud services for the consumer. In the context of standardised terminology (applicable to both hybrid and public cloud), this means a merged role of a cloud provider and carrier.

- The managing authority for eGovernment cloud services - a legal person responsible for maintaining the relations between the operator and the consumer of eGovernment cloud services, while at the same time managing their use, performance and delivery. In the context of standardised terminology (applicable to both hybrid and public cloud), this corresponds to the role of a cloud broker.
- Cloud auditor - a legal or natural person responsible for a systematic, independent and documented process of obtaining and evaluating evidence in order to determine the scope in which audit criteria are complied with. The specific examples of such audit will focus on assessing cloud services and the related information systems in terms of their performance, security and other parameters agreed in the terms of use.

Figure 38: eGovernment cloud concept



eGovernment cloud process model

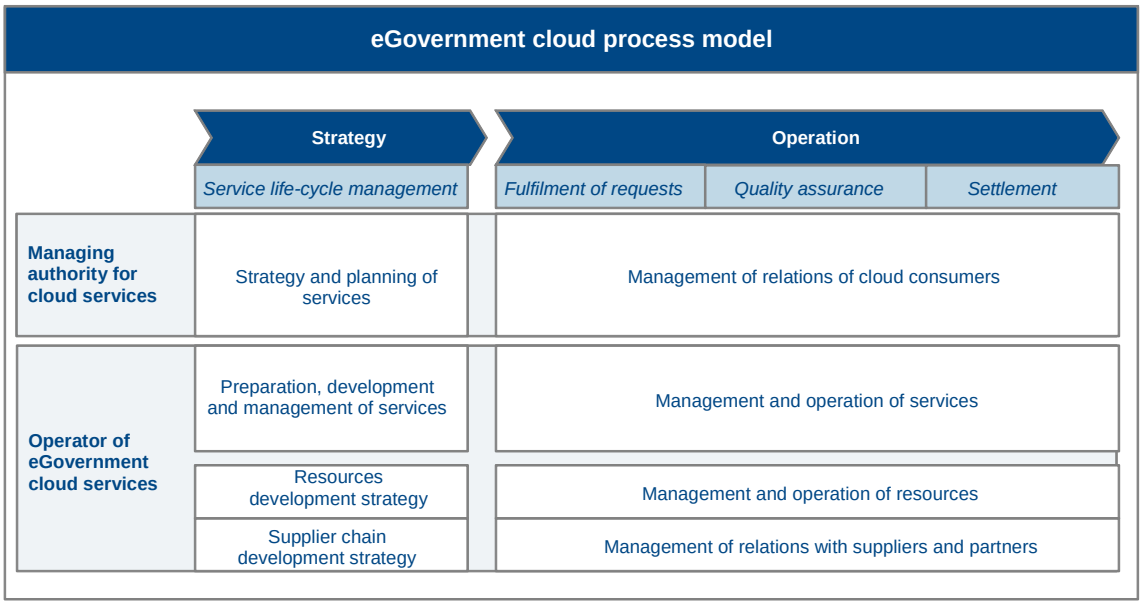
When looking at eGovernment cloud from the perspective of processes, there are two basic tasks which must be implemented:

- Strategy - service life-cycle management in the planning of new services, modifications of the existing services and the development of resources necessary for the operation of these services.
- Operation – related to the fulfilment of consumers' requests, quality assurance and the settlement of professional relations.

With regard to strategy, the managing authority for cloud services will be responsible for the planning and preparation of the offer of services. The operator will be in charge of the development and management of services, which translates into a systematic development of resources and the supply chain through which these resources will be ensured.

In terms of operation, the managing authority will focus on the management of relations with the consumers of cloud services (liable stakeholders). It will be necessary to manage orders placed with respect to the provision of services, resolve problems associated with the operation of services and prepare a settlement on the basis of measuring the actual consumption for the individual services. The operator will be directly providing selected services to the consumer, while managing its resources in an optimal manner and ensuring their development through its suppliers.

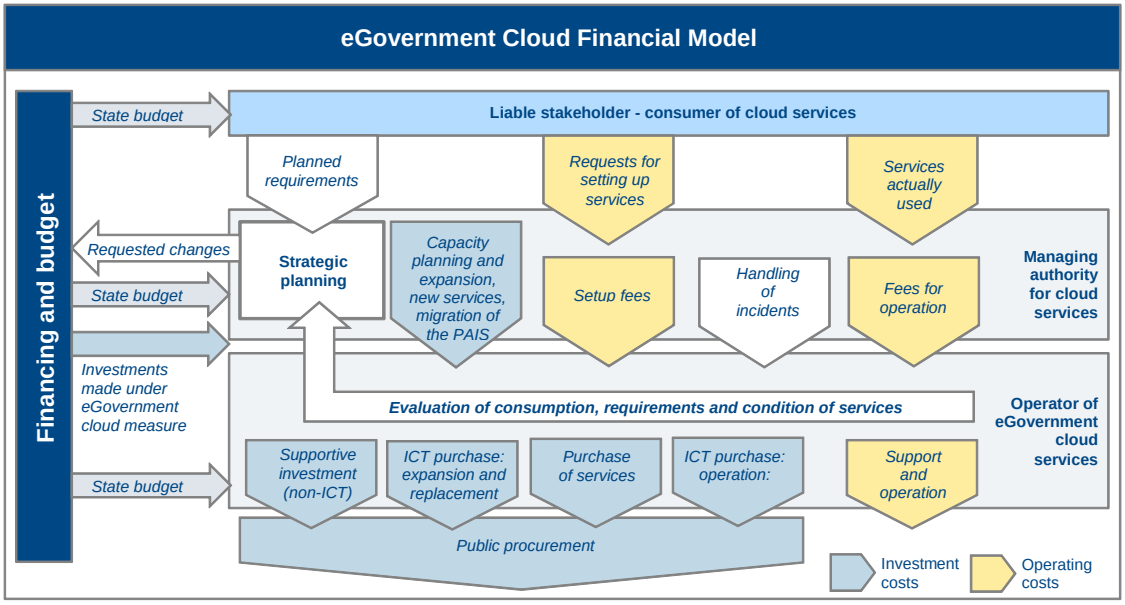
Figure 39:eGovernment cloud framework process model



eGovernment cloud financial model

The basic areas to be considered in terms of financing for the proposed concept are shown in the figure below. The figure depicts all proposed roles and the expected financial flows, while also showing their investment or operational character.

Figure 40:Financial model for eGovernment cloud



The overall dynamics of these actives is based on one-year intervals (budgetary planning) for investment expenditure flows and on one-month intervals or shorter for operating expenditures (which are gradually spent from budgeted funds as well).

The basic principle of the model is to ensure strategic planning for the financing of ICT infrastructure development and operation in public administration which is performed by the managing authority for cloud services. One of the key elements for ensuring effectiveness is feedback through the activity entitled “Evaluating the consumption, demand and condition of services”, the primary role of which is to provide outputs for the preparation of the budget and

the effective allocation of funds based on the planned and actual consumption of cloud services (services used by information systems in public administration).

For processes involving gradual migration of public administration information systems to the eGovernment cloud, this implies the importance of planning with respect to the requirements of the (future) consumers of eGovernment cloud services vis-à-vis the managing authority of eGovernment cloud services so that they could be included in the budget.

The key principle in determining the settlement model is based on the fact that the providers of eGovernment cloud services do not provide these services to generate profit (as the basic paradigm for commercial providers), yet the expenditures for services must be determined so as to cover the operating costs, the quality and the level of security. Considering the fact that the services will be prepared for the operators and financed as part of the managing authority's activities, it will be the managing authority which will determine the price component related to the quality and security level of services, while also counting in investment expenditures.

Division of the portfolio of services

The requirements of the individual public sector information systems for the quality of services (depending on how important and critical the system is) and the level of security (depending on the category of data processed by the information system) will vary.

A standardised categorisation of services is proposed to be made on the basis of quality (availability, response time, etc.) and the level of security. The individual operators of eGovernment cloud services will prepare their portfolios to fit the above categories. The selection of the right category by the consumer of cloud services, i.e., suiting the needs of the public sector information system, has a significant impact on the effective functioning of the solution. Investments in building the providers' capacities should be made in a way that generates a balanced portfolio of services in the individual categories.

7.4.3.2 Specific objective concept

Ensuring the provision of cloud services in public administration

The preparation of a detailed strategy defining the particular activities conducive to the provision of cloud services in public administration is the key requirement. It will be necessary to amend legislation, as well as define the roles and responsibilities.

In the next step, detailed standards and rules for the provision of services should be proposed. This will in particular address the features of provided services, the terms of the provision of services, enforcement of the rights and obligations, etc. This will make it possible to subsequently prepare a process model for the functioning of cloud services (the method of procurement, etc.) – assigning the role of the managing authority for eGovernment cloud services, and to establish competences in order to supervise their use – assigning the cloud auditor role. In order for this solution to be sustainable, a pricing model is necessary to serve as the basis for the billing of the individual types of services. The goal is to find a mechanism that will ensure economic operation of the infrastructure – it will be more advantageous to use cloud services than operate one's own infrastructure at one's own cost; at the same time, there will be no waste of resources. Designation of an arbiter for deciding the disputes and matters involving the breaches of SLA will be a specific task to be tackled.

The role of the providers of eGovernment cloud services should be played by selected public administration institutions with certain experience and a certain level of data centres. Afterwards, these data centres will be further scaled up to be capable of providing cloud services based on the proposed requirements.

Services will be accessible through a single environment in the form of a catalogue of available services. The single environment should have at least the following functionalities available for the consumers of eGovernment cloud services:

- Provision of information on the current portfolio of cloud services.
- The possibility to order cloud services and keep track of the orders placed, all the way from their processing to the setting up of services.

- Reporting of issues and keeping track of their removal.
- Keeping track of the amount of consumed resources.
- Selecting the method of payment for the consumed resources.

Prior to inclusion in the catalogue, individual services will have to be certified and verified within a process controlled by the managing authority for eGovernment cloud services. As an output of this process, a list of technical and functional parameters of the service and supporting documents will be prepared for the cloud auditor. However, the role of this system will reach even further. In order to be able to develop a shared services platform, it will be necessary to coordinate, on a centralised level, a further increase in computing capacities of the individual providers, the management of load between the individual providers and of the overall demand for, and supply of, infrastructure services.

Support for measures aimed at reducing ICT operation costs in public administration

In case the operators of eGovernment cloud services start hosting the information systems of the individual institutions, the question remains as to what will happen to the infrastructure they currently have at their disposal. If possible and economically feasible in terms the individual institutions' organisational structure, such infrastructure will be consolidated and reused in the data centres of the providers of eGovernment cloud services.

The individual information systems in public administration will gradually be migrated to the eGovernment cloud. The steps will be taken gradually, starting with less important applications and ending with the critical ones.

Desktop virtualisation and the deployment of simple terminals and clients instead of PCs represent further options for reducing the operating costs of information and communication technologies.

A comprehensive solution to data security

There are certain issues and risks associated with the proposed solution. The infrastructure is more vulnerable when concentrated in one place, and any attack, if successful, may cause much more damage when compared to the existing, distributed solution. The security of the eGovernment cloud should be addressed with special care.

This issue is closely related to the Categorisation of Data in Information Systems in Public Administration in terms of the sensitivity and criticality of data. Based on a detailed categorisation of data, the types of safe repositories and the related security requirements will be proposed. Information systems in public administration working with a certain types of data may only by migrated to the solutions of those providers who meet the relevant security requirements.

Implementation of the communication infrastructure

The proposed eGovernment cloud platform solution will considerably increase the need for communication between the operators and consumers of eGovernment cloud services. High-speed connection between the terminals and the providers of eGovernment cloud services will be necessary.

Promoting education and awareness

Education and popularisation of the eGovernment cloud among public servants at various levels of management will be an important aspect of its deployment. From this perspective, the following levels must be distinguished at the least:

- Popularisation of eGovernment cloud services prior to the deployment/migration of the ISPA.

- Technical IT training in connection with migration and support of the introduction of a new method for the provision of services.
- Training for users.

Training will have to focus on providing sufficient explanation as regards concerns associated with a transition to the provision of services through eGovernment cloud and on providing relevant technical and economic indicators related to a different mode of operation.

7.4.3.3 Implementation of the Digital Agenda for Europe

The Digital Agenda for Europe places an emphasis on the support of cloud computing:

- **Pillar V: Research and innovation:** Sufficient funds for supporting joint ICT research infrastructures and innovation clusters. By observing the EU Cloud Computing Strategy, the effort to reduce ICT costs in the future will be stepped up.

Priority 6 in the digital "to-do" list of the revised Digital Agenda of December 2012 highlights the need to accelerate the take-up of cloud computing also through public sector buying power:

- Accelerate cloud computing through public sector purchasing power, in which Slovakia is advised to join the European Cloud Partnership[35].

7.4.3.4 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 28:Specific result indicators

Specific result indicators for establishing the eGovernment cloud				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2013**	**Target value**
1	Reducing the operating costs of public administration information systems (incurred by liable stakeholders) *The indicator shows the percentage reduction in liable stakeholders' annuals costs incurred in connection with the operation of public administration information systems. The cloud will provide a service for the monitoring of operating costs.*	Report	0%	10%
2	Reducing power consumption (per unit of computing power, transaction, etc.) *The indicator shows the percentage reduction in annual power consumption in connection with the operation of public administration information systems. The cloud will provide a service for the monitoring of power consumption.*	Report	0%	30%

7.4.4 Security

Table 29: Strategic objectives supported by results

ID	Strategic objective	Expected results
D	**Creating a secure environment for citizens, businesses and public administration**	▪ Implemented tools for navigating the internet safely ▪ Implemented early warning system Critical infrastructure is protected by seamless processes for handling security breaches in the following areas: ▪ Identification and analysis of a security breach ▪ Preparation and deployment of counter-actions ▪ Putting the systems under control, ensuring business

[35] European Cloud Partnership: http://easi-clouds.eu/

		continuity and the removal of consequences

7.4.4.1 Specific objective concept

As the first step on the path towards a safer information environment, Slovakia will adopt the European Cybersecurity Strategy based on the network and information security (NIS) directive submitted by the Commission. The national competent authority for NIS will be designated as well. As presented in this strategy, the EU vision for cybersecurity is articulated in the following five priorities:

- Achieving cyber resilience;
- Drastically reducing cybercrime;
- Developing cyberdefence policy and capabilities related to the Common Security and Defence Policy (CSDP);
- Developing the industrial and technological resources for cybersecurity;
- Establishing a coherent international cyberspace policy for the European Union and promote core EU values.

The proposed NIS directive forms key part of the overall strategy and will require all Member States, key internet enablers, and operators of critical infrastructures, such as e-commerce platforms, social networks, as well as providers of services in such areas as energy, transport, banking and healthcare to ensure a secure and trustworthy digital environment in the entire EU. Operators of critical infrastructures in certain industries (financial services, transport, energy, health care), key providers of information society services (especially: e-commerce platforms based on the so-called application stores, internet payment gateways, cloud computing services, search engines, social networks) and public administration bodies are required to adopt appropriate steps to manage security risks and report serious security incidents detected in their primary services.

Security must be addressed from two perspectives – from the perspective of the user who must adhere to the rules of safe use of the internet and digital space, as well as from the perspective of the operator who is required to ensure the security of the central systems and critical infrastructure and perform oversight over activities in the digital space in a manner that prevents manipulation and misuse of information.

One of the facets of security is the security of citizens who must be informed about any threats early enough. In such crisis situations, the citizens and security forces must be mobilised early enough to minimise casualties and damage to private and public property, including intellectual property.

Safe internet navigation

Over the past few years, the manner in which children and young people use the internet and mobile technologies has changed significantly. Despite vast opportunities for development, there are also dangers associated with the use of internet. Safer internet is therefore an important initiative which will be supported from the user's perspective. This initiative will entail better instruments for setting various privacy configurations based on age, wider application of electronic content classification, convenient use of parental control and effective removal of illegal content from the internet.

Modernisation of security forces and critical infrastructure

In order to be able to protect individuals and society in the upcoming period, technological modernisation of the individual public administration units is necessary, hand in hand with improving the possibilities of their collaboration in relevant issues, as well as collecting the necessary data. In order to protect citizens, biometric identification will be used in the databases of the members of security forces.

Data collection tools are extraordinarily important in particular as regards the protection of critical infrastructure and, for this reason, a single monitoring system is proposed to be set up. By analysing data, systems and their functioning, as well as by keeping pace with global trends in terms of security, the mechanisms of early identification of incidents and measures for handling emergency situations will be prepared. As regards the protection of critical infrastructures, it will be necessary to set up seamless processes for handling security breaches in the following areas:

- Identification and analysis of a security breach
- Preparation and deployment of counter-actions
- Putting the systems under control, ensuring business continuity and the removal of consequences.

Information on any security incident must be fully collected and assessed, and security measures must be continuously updated on its basis. In order to collect a large quantity of data in time, attacks against adequately prepared systems should be simulated.

Another facet of the protection of population is early warning in emergency situations, such as natural disasters, a breach of national security or an epidemic. In order to manage such situations, an early warning system will be implemented to send the people relevant information and instructions in several formats (SMS, e-mail, etc.).

7.4.4.2 Implementation of the Digital Agenda

The recommendations of the Digital Agenda may be directly applied through the improvement of individual services:

- **Pillar III: Trust and security,** within which Slovakia will focus on combating cyber attacks, protection of critical infrastructure, integration of the European platform for warnings against cybercrime, the design of systems for security breach notifications and the development of an early warning system. Slovakia will also actively participate in internationally-coordinated activities tackling security threats and reinforce risk management in the physical and digital world. One of the actions also involves the simulation of large scale attacks against new critical and shared systems and the testing of mitigation strategies.

7.4.4.3 Indicators for compliance with the specific objective

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 30: Specific result indicators

Specific result indicators for security				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2012**	**Target value**
1	Percentage of early-detected and mitigated security incidents in public administration information systems *The indicator shows how many security incidents (real and simulated) in critical public administration systems were* detected *early enough to ensure business continuity of processes and services following the minimisation of consequences.*	Report, Generated automaticallly	90%	95%

7.5 Broadband/NGN

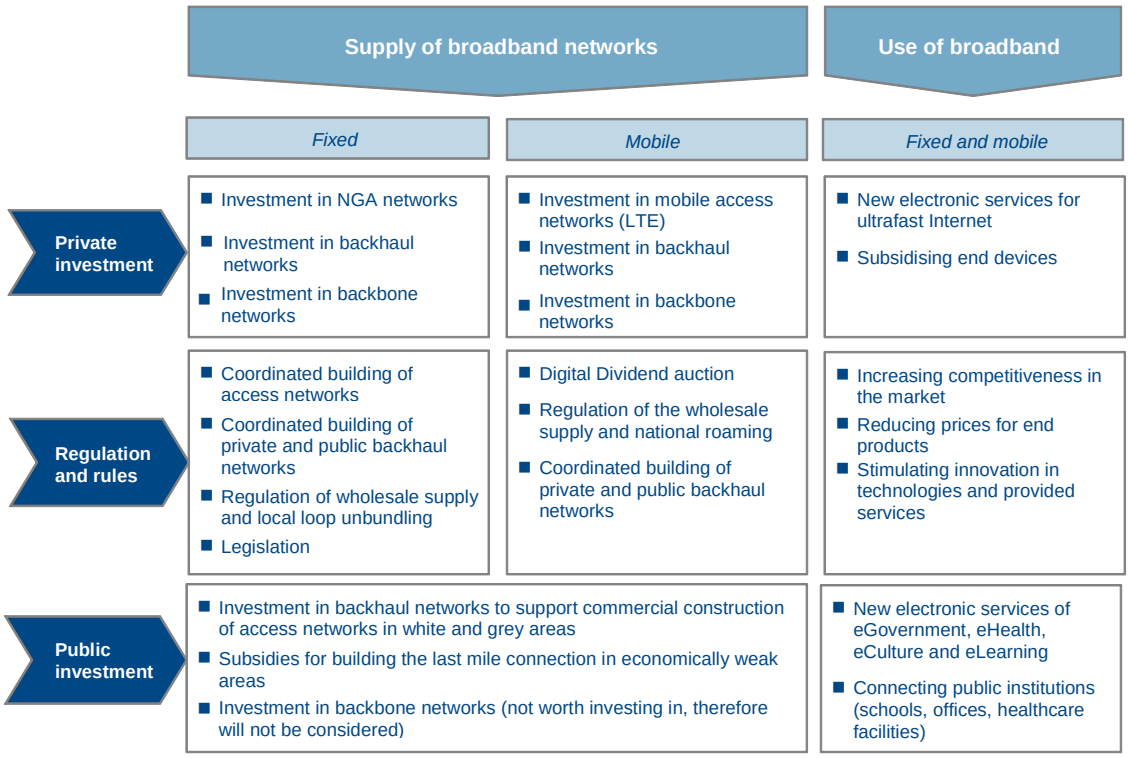
This chapter describes the specific objective “Deployment and use of broadband”

7.5.1 Specific objective concept

The basic framework to be considered in the deployment and use of broadband is to meet a Digital Agenda target of 100% coverage of 30 Mbit/s high-speed internet and the preparation for meeting the target concerning the subscriptions of high-speed internet above 100 Mbit/s. Both targets will support innovation in networking technology and the supply of new broadband services. The instruments for creating a supply of broadband networks and the conditions for the use of broadband above 30 Mbit/s and 100 Mbit/s can be broken down into three categories as shown in the figure below:

- Private investment in the supply of fixed and mobile broadband networks and products for end users;
- Regulation and rules for the building and sharing of infrastructure and for pricing and innovation;
- Public investment in the supply of fixed regional broadband networks and products for end users, as well as support for the building of the last mile connection.

Figure 41: Instruments for meeting the specific objective "Deployment and use of broadband"



As far as private sector is concerned, investments will focus in particular on access networks, i.e., LTE technology for mobile access and the support for NGN networks for fixed access. In both types of access, investments in regional and backbone networks will be continued due to an increased flow of data and the need to renew active infrastructure. Investment in ultrafast networks will pay back through a higher number of subscriptions by end users as a result to subsidies provided for advanced end devices (smart phones, tablets, modems, sensors, etc.) and the offer of new electronic services which can be created by other businesses.

In the public sector, investments will flow into backhaul networks to cover white and grey areas, as well as into demand-driven projects for the building of the last mile connection in areas that are not economically attractive for broadband providers even if the relevant backhaul network is built by the state. As regards the demand for broadband services among end users, financial resources will be earmarked not only for the provision of new eGovernment, eHealth, eCulture and eEducation services (supported under the investment priority "Services for citizens and

businesses), but also for connecting public institutions where the quality of service provision will thus increase considerably.

The target of 100% coverage of high-speed internet above 30 Mbit/will be met by means of the following instruments:

- Regulation and rules for the supply of fixed connection:
  - Promoting legislative changes to reduce the costs of rolling out high-speed networks (the Building Act introducing a requirement that new or renovated buildings must be high-speed-broadband-ready, sharing of the costs of utility networks and effective coordination of civil works, simplifying and speeding up permit granting for masts and antennas in accordance with the proposal for a EC regulation COM (2013) 147 final;
  - An analysis and a subsequent shift towards introducing an obligation for undertakings with significant market power to grant access to their utility networks, including the last mile based on the NGN technology and the masts for antennas as recommended in the proposal for EC regulation COM (2013) 147 final, is proposed;
  - In the same vein, an analysis and a subsequent shift towards introducing an obligation for undertakings with significant market power in the fixed and mobile markets to notify the regulatory authority of the topology of their network and of the free capacity to which they will provide non-discriminatory access based on a proposed wholesale price reflecting the return on investment, is proposed.
- Public investment in networks:
  - Sufficient capacity of state-subsidised new backhaul networks to ensure speeds higher than 30 Mbit/s for end users;
  - Obligation of operators accessing state-subsidised backhaul networks to offer broadband internet above 30 Mbit/s;
  - Financing the demand-driven projects to build last mile connections on technology-neutral basis in areas with insufficient economic incentives even after the completion of a subsidised backhaul network.
- Regulation and rules for the use of broadband which will ensure sustainability of public investments in access to speeds above 30 Mbit/s for all:
  - Regulation conducive to competition and, therefore, affordability of high-speed internet connections;
  - Stimulating the demand for high-speed internet, in particular through targeted information campaigns promoting the benefits of broadband and through the support of eGovernment, eHealth, eEducation and eCulture services;
  - Connecting public institutions (schools, offices, healthcare facilities) at speeds of 30 Mbit/s and above or 100 Mbit/s;
  - Ensuring convenient and effective business environment which will support and stimulate investments in new electronic services for speeds of above 30 Mbit/s.

The target involving internet connection above 100 Mbit/s for 50% or more households by 2020 will be supported by active steps using the following instruments:

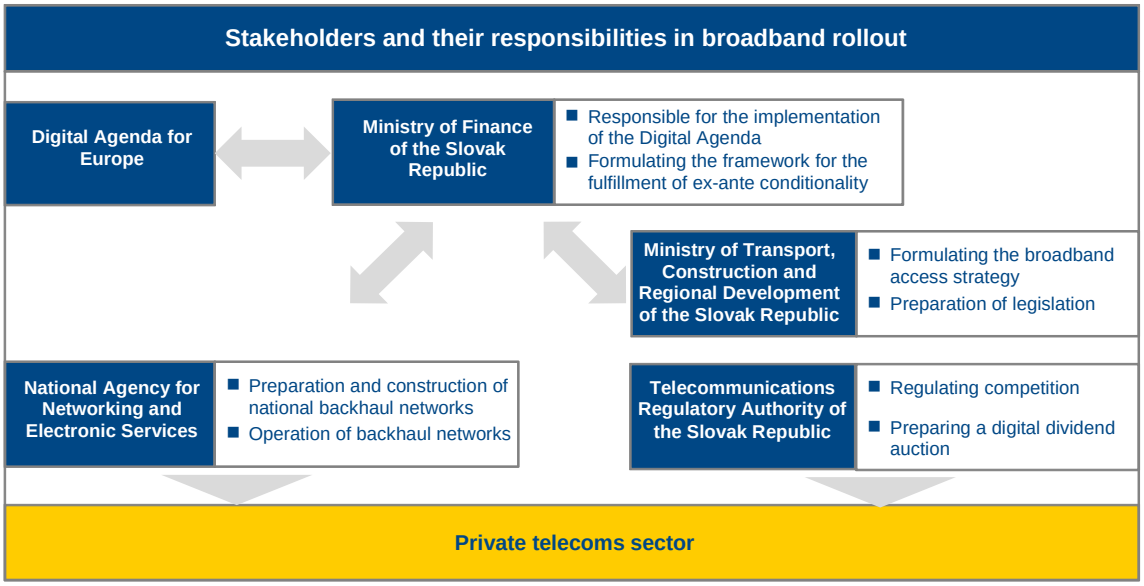
- Regulation and rules for the supply of fixed connection:
  - Support for legislative changes to reduce the costs of rolling out high-speed networks (the Building Act introducing a requirement that new or renovated buildings must be high-speed-broadband-ready, sharing of the costs of utility networks and ensuring effective coordination of civil works, simplifying in accordance with the proposal for EC regulation COM (2013) 147 final, etc.);
- Public investment in networks:
  - Sufficient capacity of state-subsidised new backhaul networks to ensure speeds higher than 100 Mbit/s for end users;

- If there is considerable demand by end users, operators offering broadband internet at speeds above 100 Mbit/s for access to state-subsidised backhaul networks should be preferred;

- Regulation and rules for the supply of broadband:
  - Regulation conducive to competition – for instance, through a digital dividend auction – and, therefore, affordability of high-speed internet;
  - Stimulating the demand for high-speed internet, in particular through targeted information campaigns promoting the benefits of broadband and through the support of eGovernment, eHealth, eEducation and eCulture services;
  - Connecting public institutions (schools, offices, healthcare facilities) at speeds above 30 Mbit/s or 100 Mbit/s;
  - Ensuring convenient and effective business environment which will support and stimulate investments in new electronic services for internet speeds above 100 Mbit/s.

The meeting of the above targets will be coordinated by four institutions (the Ministry of Finance, the Ministry of Transport, Post and Regional Development, the National Agency for Networking and Electronic Services, the Telecommunications Regulatory Authority of the Slovak Republic), the responsibilities of which are shown in the figure below.

Figure 42:Stakeholders and their responsibilities in broadband rollout



The Ministry of Finance of the Slovak Republic is a central government body responsible for the coordination of activities arising from the Digital Agenda for Europe which defines both targets in the framework of the "Broadband/NGN" specific objective. The Ministry of Finance is also required to ensure the fulfilment of two ex-ante conditionalities under thematic objective 2, "Enhancing access to, and use and quality of information and communication technologies" and, therefore, must perform oversight over all activities under this investment priority.

The Ministry of Transport, Construction and Regional Development of the Slovak Republic is responsible for the preparation, review and, based on department-level competences, approval of strategic documents and strategy documents relating to the national policy for electronic communications, digital TV and radio broadcasting, broadband internet access, the development of new services, as well as for monitoring their implementation. . It is in charge of ensuring the preparation of generally binding regulations on electronic communications which must be consistent with the proposed strategy. In implementing the policy for electronic communications, it cooperates with the Telecommunications Regulatory Authority of the Slovak Republic, the Ministry of Finance and other organizations. In order to implement this investment priority, the Ministry of Transport, Construction and Regional Development will cooperate with entities active in the electronic communications market and with interest organisations in order to achieve an optimal development of the sector.

The National Agency for Networking and Electronic Services is responsible for planning the development of regional and local broadband networks in areas unattractive for commercial operators. Based on the proposed strategy under this investment priority, it prepares analyses and materials for the procurement of the construction of national and backhaul networks and prepares their financial model. After the construction of these networks is completed, it will be responsible for their operation.

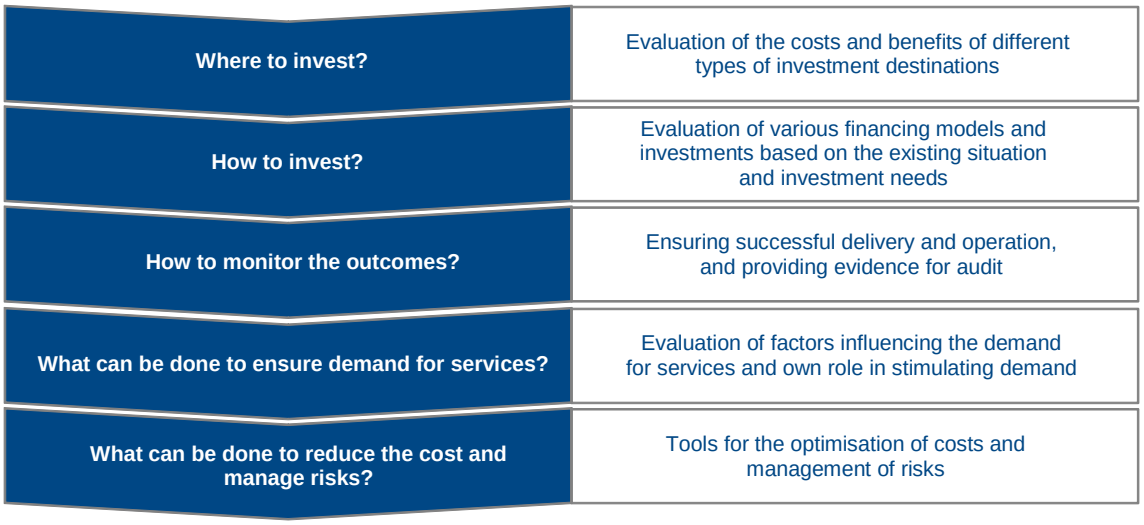
The basic task of the regulator - the Telecommunications Regulatory Authority of the Slovak Republic – with regard to the broadband strategy will be to regulate the competition in the mobile and fixed broadband segments. The Telecommunications Regulatory Authority is already actively regulating competition in these areas. In terms of mobile broadband, its main instrument is the upcoming auction of the 800, 1800 and 2600 MHz frequency bands, the terms of which are being set (at the time of drawing up this document) in a way that promotes competition while at the same time supporting the investment plans of private operators. As regards broadband in general, the Telecommunications Regulatory Authority prepared an analysis of relevant market No. 5 entitled "Broadband over 256 kbit/s", arriving at a conclusion that competition in this market was insufficient. Based on this output, it established several proposed obligations for major market players in order to improve competition, including an obligation to set regulated prices for access.

7.5.2 Public investments

The activities aimed at ensuring broadband internet coverage included measures under Priority Axis 3 of the Operational Programme Information Society (OPIS PA3) aimed at bringing broadband to white and grey areas. However, the measures under this Priority Axis were not implemented with a total success (only the preparation of project documentation). The plan is to carry out these activities in the period between 2014 and 2020 while updating the original requirement of broadband coverage at the minimum speed of 1 Mbit/s by a new, more ambitious requirement of speed above 30 Mbit/s in accordance with the targets under the Digital Agenda for Europe.

In defining the future priorities in terms of public investment in the development of broadband, the following five aspects must be taken into account in accordance with the recommendations provided in the Guide to Broadband Investment – Final Report, of September 2011.

Figure 43: Key aspects of broadband development



Source: Guide to Broadband Investment – Final Report, September 2011

7.5.2.1 Targeting investments

The selection of the network infrastructure for the future targeting of investments is based on the recommendations for the broadband strategy and the current situation in the network infrastructure development.

The priority for targeting investment to infrastructure should entail meeting the ambitious target for nation-wide broadband coverage with speed above 30 Mbit/s. In this context it is necessary to focus on building regional fibre networks which will connect the relatively well developed backbone network to local access networks. The transmission capacity of these networks should be sufficient for meeting the targets by 2020 as well as for trouble-free use of broadband in the long term.

In order to comply with the target of ensuring fast broadband for all, it is necessary to focus the state aid on bringing broadband to white areas, i.e., rural and sparsely populated areas without access to broadband, at regular prices. Grey areas where broadband is already provided in the absence of competition or where its quality is not satisfactory will be another priority to be tackled.

The selection of a technological platform for the building of backhaul networks should be based on the principle of technological independence, and the built networks should be capable of ensuring the necessary capacity and transfer rates for the provision of broadband services to end users. Backhaul networks built with the help of public funds must be open to all providers of broadband services. The goal is to incentivise commercial operators to complete the building of the necessary access networks.

In laying the groundwork for achieving the 50% take-up target for broadband above 100 Mbit/s until 2020, it is also necessary to stimulate, in the next phase, investment in broadband capacity in geographical areas with high potential demand for above-standard broadband connection and relatively low costs of the building of networks per connected household, that is, cities in particular. In Slovakia's case, the 50% take-up of broadband above 100 Mbit/s in households implies the need to ensure sufficient transmission capacity in the backbone and backhaul networks roughly for all municipalities with population of 5000 and above.

Investment in building backhaul networks to cover white areas will be further propped by measures supporting the connected access networks. In order to ensure speeds above 30 Mbit/s, it is necessary to build next generation access networks (NGN). The basic prerequisites is to have backbone and regional fibre networks of sufficient capacity in place. NGN networks can be built using various technologies and network architectures, the selection of which predetermines the final maximum transfer rate. The currently used NGN network architectures are as follows:

- Fibre-to-the-home (FTTH or FTTP) provides higher capacity than FTTC (as mentioned below) by employing passive optical splitters and optical passive aggregators (Passive Optical Network), whereby achieving optical connection on both ends between the customer's living space and the operator's central office. The FTTP technology is capable of the speed of 30 Mbit/s symmetrically or 300 Mbit/s for downlink and 30 Mbit/s for uplink;
- Fibre-to-the-Cabinet (FTTC), where fibre connects the telephone exchange and local cabinets. The remaining portion of the route consists of copper cables (xDSL access), however, due to their shorter length, it is possible to achieve higher bandwidth and network availability. The FTTC technology is capable of reaching the maximum speed of 20 Mbit/s symmetrically or 80 Mbit/s for downlink and 20 Mbit/s for uplink. This technology is proposed to be used only in places where high-quality copper line exists between the telephone exchange and end user's premises, supporting transfer rates of more than 30 Mbit/s, in which case it would not be economic to replace copper cable by optic fibres used in the FTTH or FTTP technology.

In many cases, especially in areas with lower economic activity, it makes sense to support the development of access networks as Open Access Networks (OAN). This type of network allows any authorised operator or service provider to access passive or active connectivity over the OAN from designated Points of Presence to deliver broadband services to end users. The principle behind the OAN is that the network provides aggregated connectivity to a large customer base spread across large areas which would not otherwise attract competing operators to build access networks. The established network operators can thus access a new customer base from any PoP point and their capital expenditure for network will be limited to building network connectivity to that point.

Another way to ensure ultrafast broadband in access network is through the development mobile broadband. This technology will be encouraged by public administration primarily through the prepared auction of free frequencies suitable for the deployment of the LTE broadband technologies. The above auction hopes to allocate free frequencies by the end of 2013.

7.5.2.1.1 Analysis of investment priorities in broadband development

Backbone networks provide sufficient bandwidth for meeting the broadband development targets

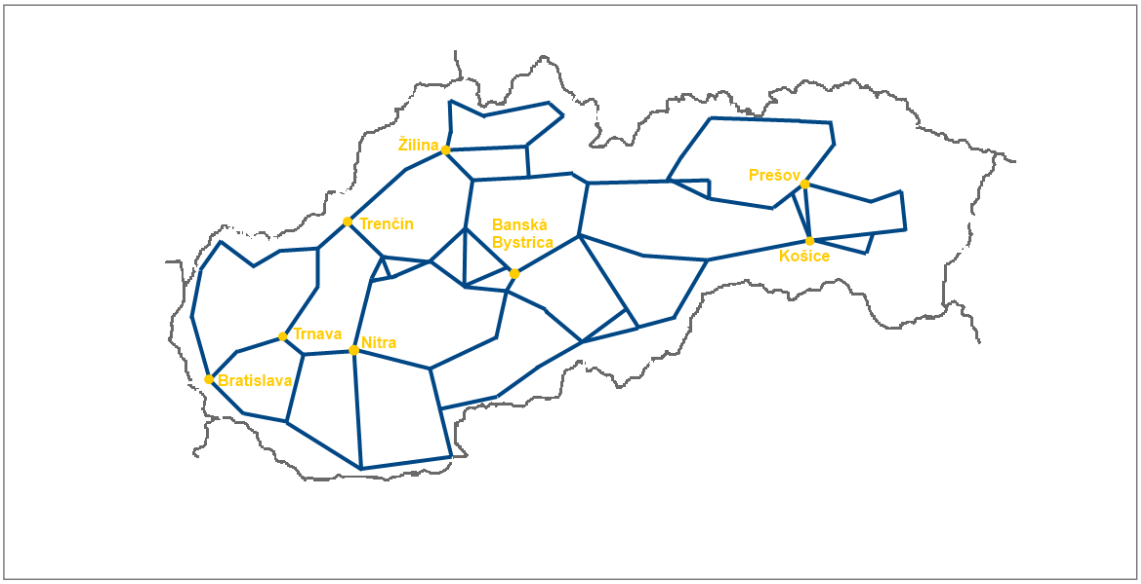
At present, there are several backbone networks with nation-wide coverage operated in the Slovak Republic.

The companies Slovak Telekom and Orange Slovensko are the leading private operators of nation-wide backbone networks in the Slovak Republic. The private operators' backbone networks are built primarily for bringing broadband to end users based on FTTH. At present, the FTTH-based services are mainly used by customers in urban agglomerations. However, access points of these backbone networks are sufficiently geographically diversified and make it possible to connect backhaul networks in less populated regions as well.

Another operator of a backbone network is the Železničné telekomunikácie (railway telecommunications) company controlled by the state. This backbone network builds on the existing infrastructure of the Železnice Slovenskej republiky (Slovak Railways) company and is designed to cater to the internal communication needs of the company, as well as the needs of other external customers through the provision of ICT services. The fibre channel follows the southern route from Bratislava through Košice to Čierna nad Tisou. According to the "Study on the possibilities of efficient use of electronic communication infrastructure owned by entities controlled by the state", the Slovak Railways company is capable of utilizing the capacity of this fibre channel at roughly 50%. Given the 24 fibres of the optical cable, the capacity of the network is sufficient for extending the Slovak Railways' communication services, as well as for the provision of services to external customers

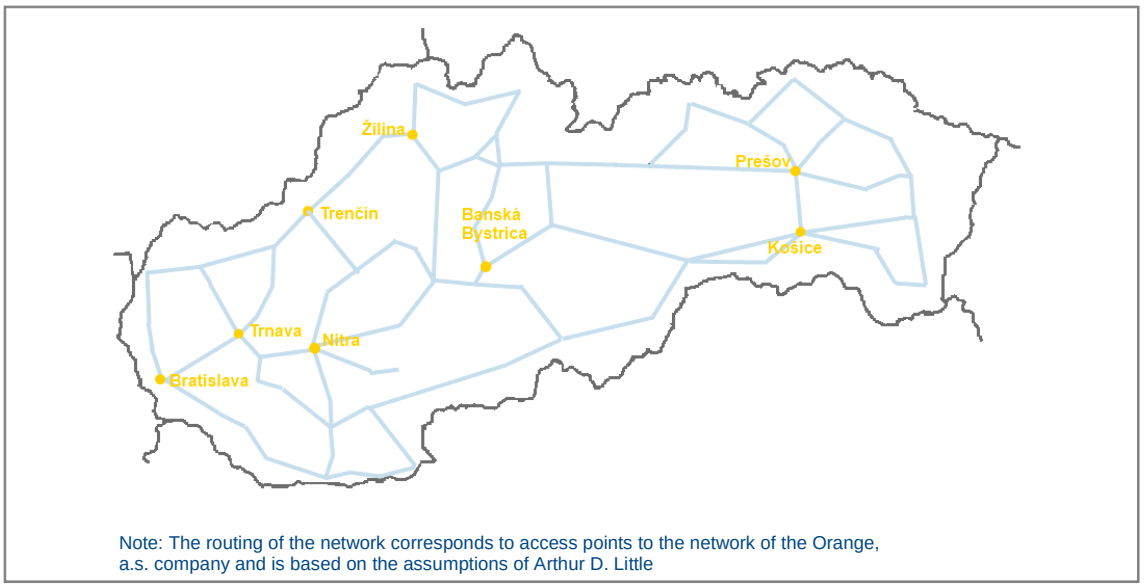
Another nation-wide backbone network is that operated by the Energotel company, which is owned by major energy companies. The backbone network is using the telecommunications infrastructure of the major shareholders. Energotel's backbone network is approximately 3,000 km long and connects 8 regional and 65 district capitals. Optical cables are typically integrated with electricity distribution and transmission networks, oil pipelines and gas pipelines. The capacity of the key lines is approximately 10 GBit/s.

Figure 44:Backbone network of the Slovak Telekom, a.s. company



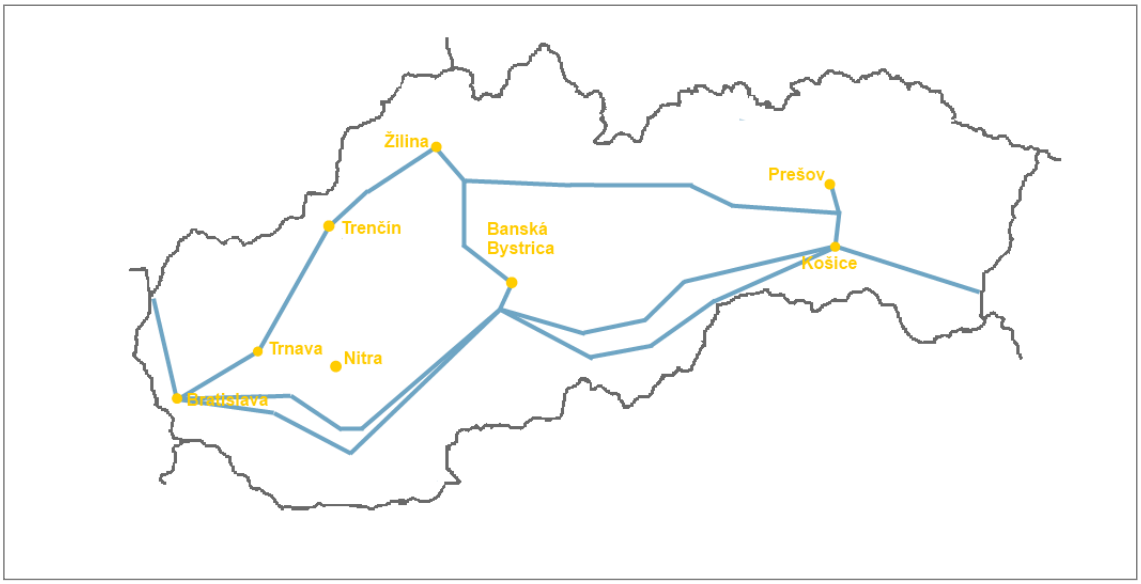
Source: Source: Improving broadband internet access - Operational Programme Information Society, Priority Axis 3: Partial feasibility study - A State of Play Analysis

Figure 45:Backbone network of the Orange, a.s. company



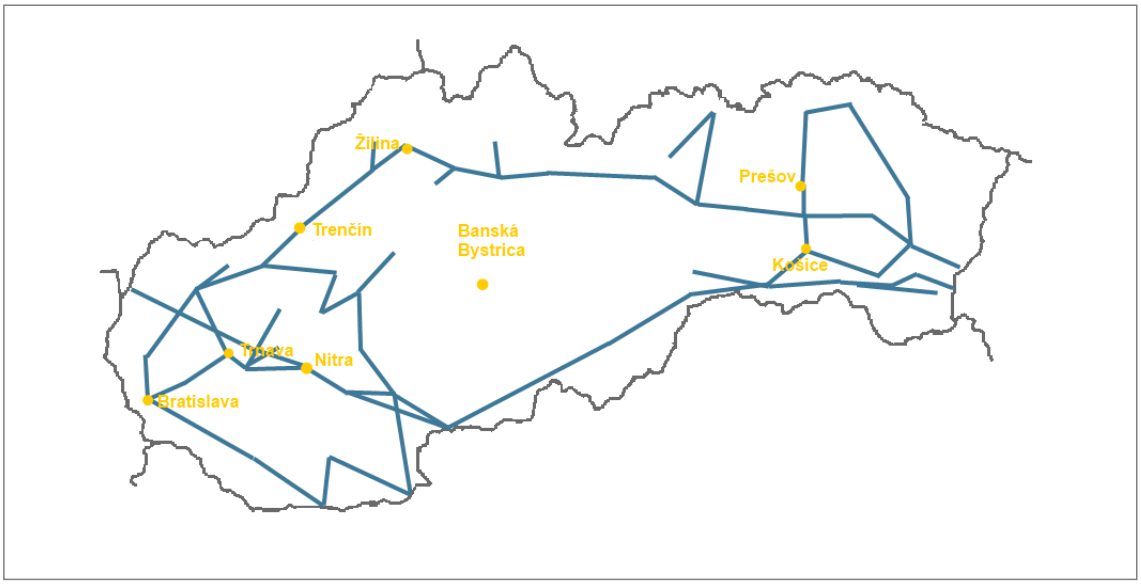
Source: Improving broadband internet access - Operational Programme Information Society, Priority Axis 3: Partial feasibility study - A State of Play Analysis

Figure46:Backbone network of the Železničné telekomunikácie, o.z. company



Source: Improving broadband internet access - Operational Programme Information Society, Priority Axis 3: Partial feasibility study - A State of Play Analysis

Figure 47: Backbone network of the Energotel, a. s. company



Source: Presentation entitled "The possibilities of using Energotel's optical network under the OPIS PA3"

In addition to nation-wide backbone networks and the SANET academic backbone network, there are also local backbone networks operated mainly in cities. The operators of such networks include GTS Slovakia, SWAN, a. s. and UPC Broadband Slovakia.

The need to invest in the coverage of white areas

The list of white areas in the Slovak Republic was updated in 2011 and approved by the European Commission as part of state aid. It also includes locations with no possibility of getting basic broadband access. According to the list, coverage is not available in 729 Slovak municipalities with an aggregate population of some 306,000 people. The numbers of white areas and their populations are given in the following table structured by region.

Table 31: White areas in the Slovak Republic.

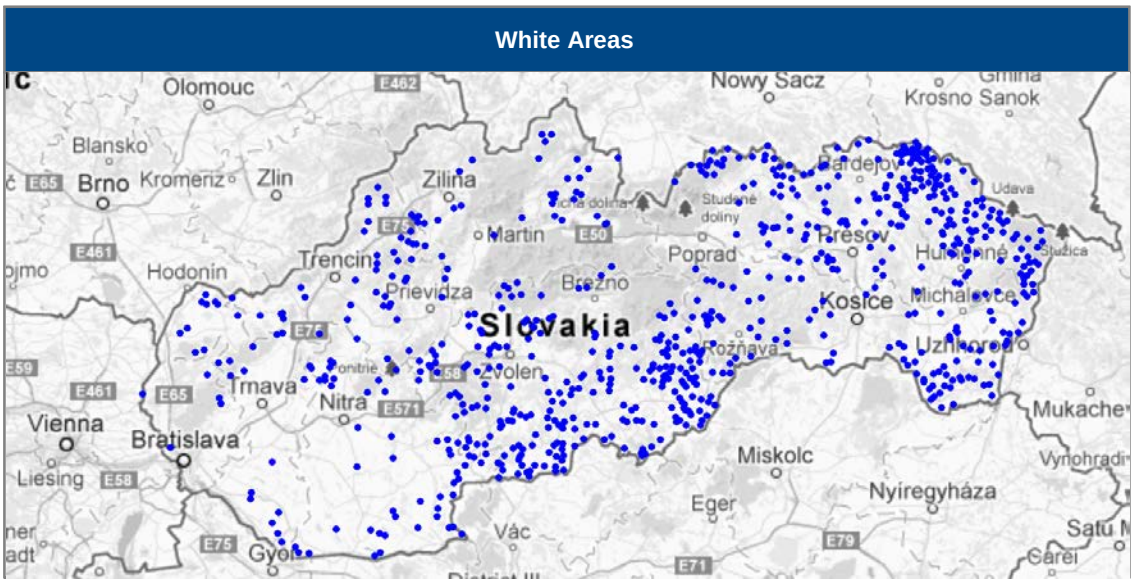
Area (NUTS 2)	Region (NUTS 3)	Number of white area municipalities	Population in white area municipalities
Bratislava region		**2**	**1 354**
	Bratislava region	2	1 354
Central Slovakia		**269**	**105 319**
	Banská Bystrica region	237	83 409
	Žilina region	32	21 910
Eastern Slovakia		**335**	**128 285**
	Košice region	114	61 174
	Prešov region	221	67 111
Western Slovakia		**123**	**70 975**
	Nitra region	51	29 361
	Trenčín region	46	24 078
	Trnava region	26	17 536
Total		**729**	**305 933**

The Banská Bystrica region, the Košice region and the Prešov region are the regions where the most people live in white areas. As implied by an analysis of backbone networks, all of these regions have sufficient high-capacity backbone networks available. Investment should therefore be targeted to the building of backhaul networks which will make it possible to connect white areas to the developed national backbone networks. The building of backhaul networks will stimulate the development of private access networks for end users financed by investors from their own funds.

State support will be provided for building backhaul networks to cover white areas

The evaluation of financial costs of building backhaul networks to cover white areas is contained in the "Analysis for the implementation of national projects under Priority Axis 3 of the OPIS".

Figure 48: Map of white areas



Source: Feasibility Study, Priority Axis 3 of the Operational Programme Information society

According to this document, the areas eligible for state aid for the building of backhaul networks will consist of white areas of the highest priority and grey areas of the medium priority. State intervention in grey areas will be applied in line with Community Guidelines 2009/C 235/04 after a thorough review.

As part of the supported national projects, backhaul networks will be routed to the catchment municipalities within white and grey areas. When routing backhaul networks to the catchment municipalities of the individual micro-regions (clusters), the municipalities n the clusters situated along the line will be connected as well. Backhaul networks will be connected to the backbone networks operated by Orange, Slovak Telekom, Železničné telekomunikácie and Energotel.

For the purposes of building backhaul networks, the individual clusters within white and grey areas are prioritised in accordance with the so-called cluster categorisation criterion (**CCC**). The **CCC** parameter is calculated as the ratio of the length of backhaul network route from the backbone network access point to the central point of the cluster catchment municipality $\boldsymbol{l_{MOK}}$ and the number of households in all white area municipalities within the cluster (**NHC**).

$$CCC = \frac{l_{MOK}}{NHC}$$

The CCC parameter corresponds to the length of the route per household and the lower figure means more advantageous conditions for routing the backhaul network to the given cluster.

The basic indicators based on the calculation of compliance with objectives are as follows:

- The average expected price for constructing 1 km of regional fibre network (connecting the catchment municipalities falling under the white area and grey area categories with the higher communication layer) is EUR 28,200 incl. VAT;
- The expected length of an average backhaul network line routed to the catchment municipality is 21.1 km;
- The average number of municipalities in a cluster is 3.5; typically between 2 to 7 municipalities;
- The average number of people per household (the ratio between the expected number of people and households, the connectivity of which will be supported through the OPIS PA3): 3.5 persons per household.

The NUTS2-based targeting of planned investment costs associated with the building of backhaul networks takes into account the number of people living in white areas in the individual regions. Most of the investments should be spent in the eastern Slovakia with a share of as many as 42% percent of the population living in white areas.

7.5.2.2 Funding and implementation of investments

The implementation of investments in backhaul networks to cover white and grey areas should be based on the foundations laid by the OPIS PA3. In terms of extending the objectives regarding broadband rollout and the development of technologies, it is necessary to assess the relevance of the methodology for identifying white areas and update their list. This will lead to subsequent changes in the relevant documents for the preparation of state aid notification as well.

The year 2011 saw the preparation of a feasibility study for the implementation of national projects under the OPIS PA3 which

- identifies the existing clusters of white and grey areas
- defines the cluster prioritisation method
- defines the recommendations applicable to the financial model for the operation of backhaul networks
- provides a legal analysis in terms of investment preparation, construction and operation of telecom networks as part of national projects
- specifies the terms of reference for the selection of suppliers of engineering and designing works.

This analysis was prepared based on data available on clusters in the documents of the individual telecom operators and contains an overall map showing those clusters where backhaul networks are to be built as a priority. The prioritisation of clusters is based on the length of the necessary backhaul network per household within the relevant area.

The initiative for the coverage of white and grey areas will be addressed on the basis of the proven public design, build and operate model. Considering the character of projects that are being prepared, this model is considered suitable because it will:

- raising public interest in market failure areas;
- allow to handle administrative and technical issues associated with building a large number of networks simultaneously.

At present, the owner of this the initiative is the National Agency for Networking and Electronic Services (NASES) which continues the activities performed under the OPIS PA3.

Administrative arrangements

In terms of administrative affairs, the broadband strategy will fall under the authority of the Ministry of Finance as the sponsor and intermediate body for the financing of investments.

The fulfilment of the actual broadband strategy will be the responsibility of the NASES which will act as the national coordinator for the building of backhaul networks.

Building and construction of networks

In building backhaul networks to cover the white and grey areas, the prepared project documentation, as well as an updated methodology and the list of white areas can be used; therefore, the networks will be built only in those locations where they are needed. The backhaul networks will be built by private construction companies on the basis of public tenders.

The building of backhaul networks is expected to require financial resources worth EUR 105 million. Some EUR 100 million will be necessary to cover 91% of the identified white areas,, however, bringing fibre to the remaining 9% of municipalities (approximately 0.5 of the population) would require an additional EUR 100 million.

The reason behind the disproportion in investment costs of coverage for 0.5% of the population lies in the fact that covering remote areas requires significantly higher capital expenditures.. The British regulator Ofcom arrived at a similar conclusion in its study entitled "*Technical analysis of the cost of extending an 800 MHz mobile broadband coverage obligation for the United Kingdom*" carried out by the Real Wireless company. According to the study, an increase in the costs of coverage is relatively linear up to the level of 95%, however, the curve gets very steep beyond this value. In the UK, for instance, the study estimates that increasing coverage from 97% to 98% would cost about £100 million and, with every additional percentage point, the costs would require a further £200-290 million.

Because of such high investment costs and a minimum return on investment, wireless microwave transmission through radio relay links (RR links) is proposed for extending coverage to the remaining 9% of white areas. In order to cover an average distance of some 50 km between municipalities, two active hops will be used, requiring a total of EUR 5 million in investments. In this way the municipalities will be able to enjoy an aggregate speed of 300 Mbit/s. For individual households, this will ensure compliance with the 30 Mbit/s target for 10 existing connections which can be expected on average in such small municipalities.

Local access networks will be built by operators. It is expected that, by building backhaul networks, a sufficiently attractive competitive environment will be created for private investment which will be encouraged by:

- allowing every operator that meets the relevant requirements to access backhaul networks on a wholesale basis, which will stimulate competition;
- the price for access to the national backhaul networks will be cost-oriented.

In the first phase, the construction of access networks will be promoted by an information campaign to raise the awareness of private operators and local end users. In particular, private operators will be informed about the benefits in terms of lower capital expenditures thanks to state-subsidised construction of backhaul networks for connecting white areas. The information campaign for end users will focus on promoting the benefits of broadband. In the second phase, wholesale access to backhaul networks will be preferably provided to private operators bringing broadband to end users at speeds above 30 Mbit/s. In areas where building access networks will not be sufficiently attractive for private investors even after the completion of backhaul networks, the state will prepare subsidised demand-driven projects or instruments for the provision of repayable aid. As part of these projects, state aid will be provided through public tenders for the construction of Open Access Networks which will be operated by private operators, while allowing them to make adequate profits. The criteria of public tenders (demand-driven projects) will be set in a way that will stimulate the provision of broadband internet at speeds of 30 or 100 Mbit/s.

The basic requirements to support the building of the "last mile" access networks through demand-oriented projects will be as follows:

- FTTH and FTTC as supported technologies;
- compliance with the principle of technological neutrality;
- a minimum transfer rate of 30 Mbit/s;
- supported networks will constitute open access networks (OAN);
- intervention will focus on white areas and grey areas;

- Support for the construction of the “last mile” networks will be incorporated in the new state aid notification based on the following aspects:

– procurement: open procedure;

– structure of contracts: single contracts, framework agreements, partnerships and PPP projects;

– mode of operation: the management of suppliers will be the responsibility of the contractor;

– duration of the contract: more than 7 years;

– beneficiaries: private operators, associations, self-government;

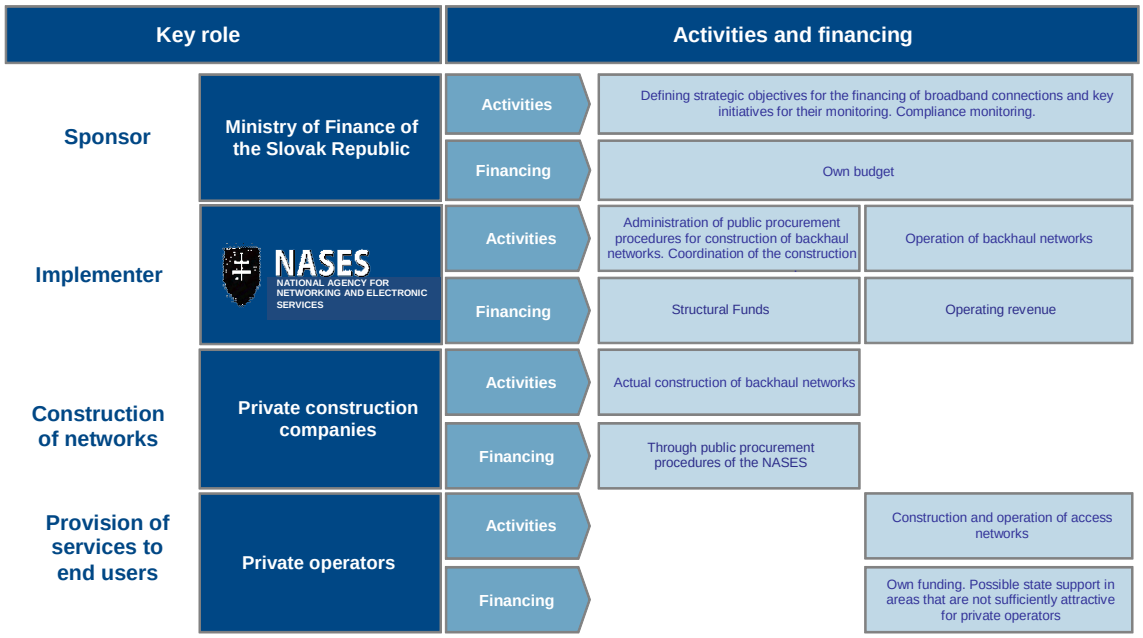
– specification: services.

Operation of networks

Backhaul networks will be operated by the NASES. The connected access networks will be operated by private operators. Revenues will not be the primary factor in the provision of wholesale access. However, the business model of wholesale access should be capable of covering the eligible operating costs of the national backhaul networks.

The scheme of roles and financing is shown in the figure below.

Figure 49: Organisational arrangements of the broadband strategy



Rural development

In the upcoming period, measures will be taken to make rural areas more attractive. Bringing the basic and fast broadband internet into all areas will be the most important step. The financing of backhaul networks alone will not automatically guarantee the completion of the last mile connection by the private sector. In the least populated rural areas, demand-driven projects will support small entrepreneurs who consider such territories an interesting business opportunity.

The socio-economic impacts of building broadband networks and the subsequent provision of broadband access are vast, in particular as regards less developed territories where white areas are situated. At present, access to broadband internet is increasingly perceived in Europe as

basic infrastructure. Regions with white areas face a long-term lack of investments and jobs, and the construction of backhaul networks may significantly improve their economic situation:

- In the short term, the actual construction of backhaul networks will represent an investment and economic incentive with a positive impact on employment in the region, particularly in the construction sector and telecom services;
- In the long term, broadband access will increase the competitiveness of these regions and facilitate the influx of further investment, either from Slovakia or from abroad, because most of these areas are situated near the border.

7.5.2.3 Monitoring project outcomes

In order to be able to monitor the compliance with objectives, a system for the accurate collection of statistical data on real coverage and the actually available transfer rates in the individual locations will be necessary. The evaluation of compliance with the strategic objectives can be achieved by monitoring the measurable indicators in two areas:

- Improving the broadband internet coverage
- Increasing the use of the internet

The indicator measurement methods are described in Annex 2, Chapter 12.

Table 32: Specific result indicators

Specific result indicators for the introduction and use of broadband/NGN				
ID	**Indicator definition**	**Measurement method**	**Baseline in 2012**	**Target value**
1	Percentage of households living in areas with access to the broadband internet at 30 Mbit/s or more *The indicator expresses the percentage of households living in areas enabling access to NGN based on the following technologies: FTTH, FTTB, Cable Docsis 3.0, VDSL and other broadband internet technologies at the speed of 30 Mbit/s or more for downloads.*	Eurostat statistics	50.1%	100%
2	Number of white areas *The indicator shows the number of white areas as territorial units where broadband services with speeds of at least 1 Mbit/s are not available or are not provided at affordable prices. The indicator is currently based on a NASES study..*	NASES statistics	729 (coverage)	0
3	Percentage of the population regularly using the internet *The indicator shows the percentage of individuals aged 16 to 74 regularly using the internet at least once a week. This indicator is reported by Eurostat[36].*	Eurostat statistics	74%	80%
4	Percentage of individuals never having used the internet *The indicator shows the percentage of individuals who have never used the internet, whether at home or from anywhere else. The indicator is reported by Eurostat for individuals aged 16 to 74. [37]It may be further broken down based on gender, age, place of residence, etc..*	Eurostat statistics	17.7%	12%

7.5.2.4 Stimulating demand for services

Support for a sufficient use of access networks linked to publicly funded backhaul networks will help stimulate private investment in access networks. An important tool to stimulate demand for broadband is the further development of eGovernment services in such areas as:

- Education,

[36] Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tin00091&plugin=1

[37] Eurostat: http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&language=en&pcode=tin00011&plugin=1

- Integrated service points,
- eHealth,
- Other public administration offices.

eGovernment services should focus on increasing the quality of public life of citizens and on improving the business environment.

The tools aimed at fostering interest in broadband services also include support for eCommerce, i.e., by building trust in the digital single market and by increasing the simplicity of use.

Awareness of the possibilities of broadband access should be raised by targeted information campaigns.

Sufficient demand for the broadband internet among people living in rural areas can be stimulated by central eGovernment services, as well as through the provision of such platform for regions which will enable them to implement with ease the local services that are attractive for the community.

7.5.2.5 Reduction of costs and management of risks

When planning the public investment projects for the building of backhaul networks, it is necessary to consider the risks associated with negative market trends. For this reason, the contracts with external suppliers should be structured in a sufficiently flexible manner to provide certain elbow room for additional changes. A due diligence will be carried out as part of the public investment planning project to ensure that its plan is credible and will not be subject to significant delays, cost increases or other potential difficulties. In the course of its implementation, the project will be thoroughly monitored by a qualified team of the NASES agency which will propose interventions to mitigate the risks and resolve problems. Major incidents, if any, will be handled in coordination with the Ministry of Finance.

The issue of cost reduction is discussed in Chapter 7.5.3 “Regulations and rules” which also defines the rules for the coordinated construction of networks to avoid the risk of double investments from the public and private funds. An agreement between private operators and the public sector on the construction of backhaul networks by the state in identified locations has been executed as part of memorandum.

Also inspiring are the principles applied by Lithuania in order to reduce costs and manage risks in the building of networks as part of the RAIN project:

- Cables only to be laid to areas where no other cables existed. Information on planned routes is provided to operators, allowing them to highlight any doubling of lines;
- Ensure coverage of knowledge centres (schools, libraries, etc.);
- Install fibre connection points in all settlements the line passes, allowing future connections to network;
- Fibre lines to terminate at locations agreed by the municipalities and the operators;
- Minimise the total distance of cable, while considering how to avoid natural obstacles and use protective zones such as those under roads.

7.5.3 Regulation and rules

The measures for effective investments in supporting fixed and mobile broadband can be broken down to four areas:

- legislative amendments to simplify the building of networks
- coordinated construction of the network in order to mitigate risks and reduce costs;
- regulated prices and access to completed networks to increase competition in the market and optimise the profitability of realised investment;
- auctions to facilitate innovation in mobile broadband access.

The specific instruments which comply with the draft regulation on measures to reduce the cost of deploying high-speed electronic communications networks [38] in individual areas will be discussed in sub-chapters below.

7.5.3.1 Legislation

An up-to-date legislation will create conditions for efficient planning and the construction of broadband networks by means of:

- simplifying administrative procedures in the granting of permits for the building of electronic communication networks (excavations for laying cables; construction of masts, placement of antennas)
- Central publishing of planned public infrastructure works, with a view to informing companies about opportunities related to the building of networks, thus reducing the construction costs (an atlas of passive infrastructure);
- the obligation to install high-speed-ready infrastructure in new and renovated buildings.
- the obligation to leave clearance for future cabling in the passive infrastructure (the minimum cable conduit diameter);
- the requirement to draw up a map of infrastructure in new buildings.

7.5.3.2 Coordination of network construction

Costs can be greatly reduced if reusing existing infrastructure. For instance, making use of the existing ducts eliminates the need to perform excavation works for laying optical fibre infrastructure. In the future, the obligation to leave clearance in every duct for additional cables that may be laid by other providers will be incorporated in the legislation as well.

Another efficient instrument is the coordinated building of broadband networks along with the construction of other public utility networks, as well as communications networks by various entities.

Atlas of passive infrastructure

The basic requirement for an effective network management and planning is to create a centralised atlas of passive infrastructure mapping the individual elements of the existing and planned infrastructure and allowing to optimise investment decisions. According to Directive 2002/21/EC, national regulatory authorities are authorised to obtain the relevant information on the placement, capacity and availability of ducts and other infrastructure access elements. In this respect, cooperation among operators should be stimulated and coordinated by the state. When creating a map of existing and planned infrastructure, it is advisable to use the existing standardised geographical information generated in accordance with the INSPIRE directive[39] which must be fully implemented by 2019. The atlas of passive infrastructure will be implemented by the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

In order to make the maximum use of synergies in building the technical infrastructure, it will also comprise – in addition to telecom lines (for mobile and fixed networks) – the most recent data on other lines and facilities of technical infrastructure:

- transport networks;
- utility networks:

– water management systems and facilities (water supply and sewerage);
– electricity facilities;
– gas facilities (gas pipelines, connections, technical stations);
– heat distribution facilities.

[38] COM(2013) 147 final: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2013:0147:FIN:EN:PDF

[39] INSPIRE directive: http://inspire.jrc.ec.europa.eu/index.cfm/pageid/48

The atlas of passive infrastructure will be linked to the cadastral information system and the register of spatial data.

The project entailing the implementation of the atlas is estimated to take 4 years beginning from 2014; therefore, the following activities can be expected:

- developing the core of the geographic information system;
- integration with the data sources and the relevant geographic information systems;
- creation of a portal enabling access to the atlas and search for infrastructure facilities;
- configuring the data population processes;
- migration and digitisation of passive infrastructure data: every facility must be recorded (optic fibres; cable conduits and pipelines; distribution lines; masts, antennas, towers, etc);
- bringing the atlas into practical use.

7.5.3.3 Regulation of prices and access

In order to ensure sufficient competition in the provision of NGN-based broadband, undertakings with significant market power will be required to make accessible their civil engineering networks including the last mile connection (local loop unbundling) in such geographic areas where such an undertaking with significant market power has been identified and where such obligation would contribute to the development of competition. The undertakings will also be required to notify the regulatory authority of the topology of their networks and of the free capacity to which they will provide non-discriminatory access based on the proposed wholesale price reflecting the return on investment.

7.5.3.4 Auction of free digital dividend frequencies

In the case of mobile broadband, an upcoming auction of 800, 1800 and 2600 MHz frequency bands will enable nation-wide coverage. The principle of technological neutrality which will serve as the basis for the allocation of these frequencies, favourable propagation characteristics of the frequencies in the frequency band of 800 MHz and a high availability of LTE-based devices operating in these frequencies create the prerequisites for achieving a wide mobile broadband coverage with speeds above 1 Mbit/s.

Simultaneously, fast developments seen in mobile broadband services (such as the LTE-A technology, hybrid modems, the possibility of the reframing of the 900 MHz frequency band currently used for GSM or the planned release of frequencies in the 700 MHz band as part of Digital Dividend 2, etc.) pave the way for significant improvements in terms of coverage as well as the actual data transfer rates in the medium term. The quantity of frequencies that will be up for sale in the upcoming auction is sufficient for increasing the availability of broadband in the country, as well as for stimulating competition in the broadband market. The conditions of the auction will be set in a way that will attract as many bidders as possible and encourage the entry of the fourth operator on the market; this have a positive effect on competition in the mobile broadband market and broadband market in general. In this manner it will be possible to ensure effective and fast investments in access and transit wireless broadband networks while keeping the prices for services at an affordable level.

7.5.4 Private investment

7.5.4.1.1 Fixed broadband

In fixed lines, data traffic increases, NGN technologies are increasingly more attractive and investments in access networks are necessary because DSL services are no longer able to meet the current speed requirements:

- In 2012, Orange posted a growth in revenues from fixed line services, accounting for 2.2% of its total income. These services are provided through one of the largest optical

networks using the FTTH (fibre-to-the-home) technology, which Orange plans to further expand, as well as via a leased DSL network. Digital services provided via the Orange optical network, either separately or as a package, had over 55,000 customers in 2012.[40]

- Approximately EUR50 million is planned to be invested in networks annually, both for technology upgrades and transformation and development projects that expand the possibilities of electronic communication for customers and further improve their user comfort.
- Slovak Telekom promotes services based on a modern optic fibre technology on the fixed broadband market and has moved towards gradual and managed migration of customers to this technology. These services were available to more than 368,000 households at the end of 2011.

7.5.4.1.2 Mobile broadband

Private operators are also active on the broadband market:

- All the three existing operators has indirectly expressed their interest in participating in an auction for the 800, 1800 and 2600 MHz frequency bands to provide broadband services using the LTE technology.
- T-com continues expanding a mobile data network with speeds up to 21 or 42 Mbit/s.
- Orange has earlier obtained an individual permit to use the 872 – 876/917 – 921 MHz bands to expand its services to less populated areas. The company's strategy also counted on funds from the third axis of the OPIS. Since delays occurred in this programme phase, Orange waived the individual permit. Its efforts have however illustrated operators' interest in expanding their services to less attractive areas, as well as the need of government support for these activities.
- Slovanet begun to provide broadband services based on a second generation WiMAX technology at the beginning of 2013. The initial operation primarily targets remote areas in the vicinity of larger cities (around Bratislava and Trnava, the Ilava basin); following the assessment of the network operations in these areas, the operator plans to extend coverage.

7.5.4.1.3 Stimulating demand for services

A business-friendly environment and promotion of a digital single market under the "Services for citizens and business" investment priority will create favourable conditions for new services to be offered by existing and new market players that will required a reliable and fast broadband access. A good example are eCommerce services through which educational materials, music, entertainment or videos can be purchased on demand. A growth in video-monitoring services is also expected, either for household protection or assistance to older and chronically ill people who want to live in their home environment. Demand for broadband is also driven by a portfolio of High-Definition TV services.

7.5.5 Planned activities in broadband / NGN

The 2007-2013 activities

In the 2007-2013 programming period, a plan to create conditions to provide internet services to all was prepared, under which steps were taken to commence procurement of backhaul networks to cover white areas: The following activities were actually performed:

- preparation of a feasibility study;

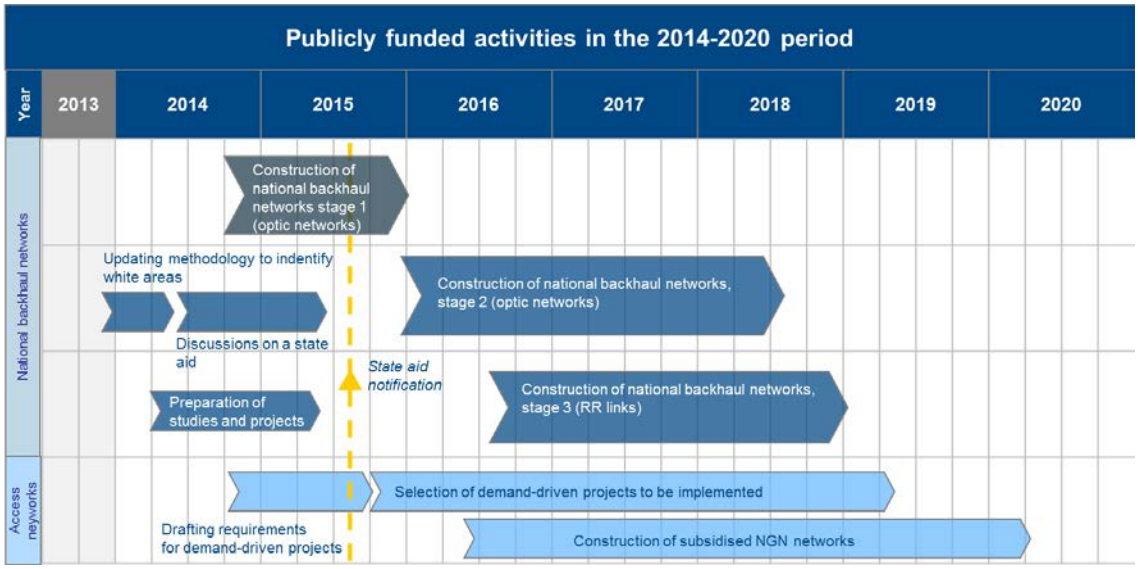
[40] Orange annual report: http://img.orange.sk/orange_sk/data/annual_report/vyrocna_sprava_2012_sk.pdf

- public procurement of projects for the building of national backhaul networks to cover white areas;
- a proposal for project documents for the building of national backhaul networks;
- ensuring administrative capacities for the building of national backhaul networks.

An auction for the allocation of frequencies of the digital dividend will take place in 2013, enabling construction of fourth generation (4G) mobile networks.

Planned investments from public funds

Figure 50: Activity schedule



Public investments will be spent on the construction of backhaul networks; the actual implementation will be divided into three stages:

- In stage one and two, optic networks will be built to cover 91% of white areas. Indicative costs represent EUR 100 million and this stage should be completed over four years between 2014 and 2018. Stage one will last until the end of 2015 based on the applicable state aid SA.33151 (2011/N) – Slovakia- Basic broadband deployment in white areas of Slovakia. The implementation of stage two requires an update to the methodology for the identification of white areas and the subsequent discussion concerning the state aid notification.
- In stage three, additional investments will be made to cover the remaining white areas and meet the target of providing 30 Mbit/s broadband access. Previously mentioned RR links represent a good way to construct these backhaul networks. Implementation of stage two will take place over the 2016-2018 period, with indicative investment costs at EUR 5 million.

Even though the construction of access networks to cover the white areas should primarily be funded by the private sector, sufficient interest among private investors cannot be expected in all locations In disadvantaged locations, the construction of mobile and fixed NGN networks will be subsidised through demand-driven projects, repayable grants and regional investments:

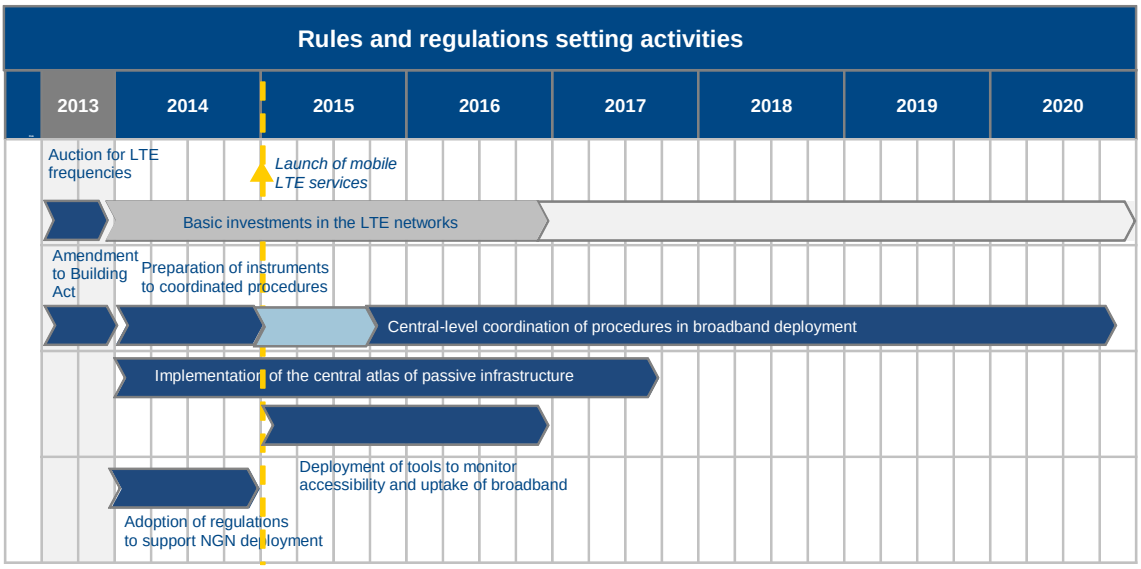
- Broadband possibilities will continuously be assessed;
- Requirements for demand-driven projects will be prepared in 2015;
- Subsequently, starting from 2016, projects will be selected; the actual construction of subsidised NGN networks will take place until the end of 2020.

Table 33: Planned public investment budget

Activity	Budget (million EUR)	Planned time schedule	
		From	From
Construction of national backhaul networks – stage 1 (optic networks)	100	2014	2015
Construction of national backhaul networks – stage 2 (optic networks)		2016	2018
Preparing project-engineering documentation	13	2013	2015
Updating methodologies to indentify white areas	0,5	2014	2014
Preparing studies and projects for stage 3 in the construction of national backhaul networks	0,5	2014	2014
Construction of national backhaul networks – stage 3 (RR links)	5	2016	2018
Preparing and discussion on a state aid notification	-	4Q 2013	2015
Preparing requirements for demand-driven projects	0,5	2015	2015
Selecting demand-driven projects to be implemented	0,5	2017	2017
Implementing the “last mile” links in the areas of market failure (Integrated Infrastructure Operational Programme)	10	2019	2020
Implementing the “last mile” links in the areas of market failure (Rural Development Program)	15	2014	2015
	25	2014	2019
Promoting the use of broadband internet at 30 Mbit/s and 100 Mbit/s or more for schools in the selected locations	2	2016	2020
Promoting the use of broadband internet at 30 Mbit/s and 100 Mbit/s or more for healthcare facilities in the selected locations	1	2016	2020
Promoting the use of broadband internet at 30 Mbit/s and 100 Mbit/s or more for public administration institutions (ISP) in the selected locations	1	2016	2020

Planned activities in the area of regulations and rules

Figure 51: Activity schedule



The following activities will be performed with respect to regulation and rules for the broadband market in 2013:

- preparation of legislation to enable coordinated procedures in the provision of broadband services to reduce costs of network construction (amendments to the Building Act, etc.);
- an auction for the available frequencies of the digital dividend.

Throughout 2014 and 2015, private investments are expected to be primarily spent on the preparation and rollout of the fourth generation mobile services on obtained frequencies. Regulations to promote the deployment of NGN networks will be proposed and adopted in this period. Subsequently, procedures for broadband deployment will be coordinated at the central level

An atlas of passive infrastructure, including relevant procedural modifications, will simultaneously be implemented from 2014 and the quality in the monitoring of real accessibility and uptake of services will considerably improve.

Table 34: Planned budget

Activity	Budget (EUR million)	Planned time schedule	
		From	To
Preparation of the passive infrastructure atlas	20	2014	2017
Support for the system designed to collect data on the state of affairs with respect to broadband	3	2015	2016
Introduction of measures for coordinated building of networks – amendment to the Building Act and relevant regulations	-	2013	2014
Introduction of regulation to support NGN deployment	0,2	2014	2014
Centralised coordination of procedures	1	2015	2020

Funding

Broadband deployment will largely be funded from private sources. Telecommunication operators are expected to invest some EUR 1,700 million between 2014 and 2020 (the estimate

is based on an expected trend in the growth of investment, estimates of similar countries and an average size of past investments).

Table 35: Planned budgetary funds

Source of funding	Planned budget (million EUR)
ESIF (ERDF, EAFRD)	161,5
National funding (cofunding)	28,5
Other (Private funding, Community programs)	1700

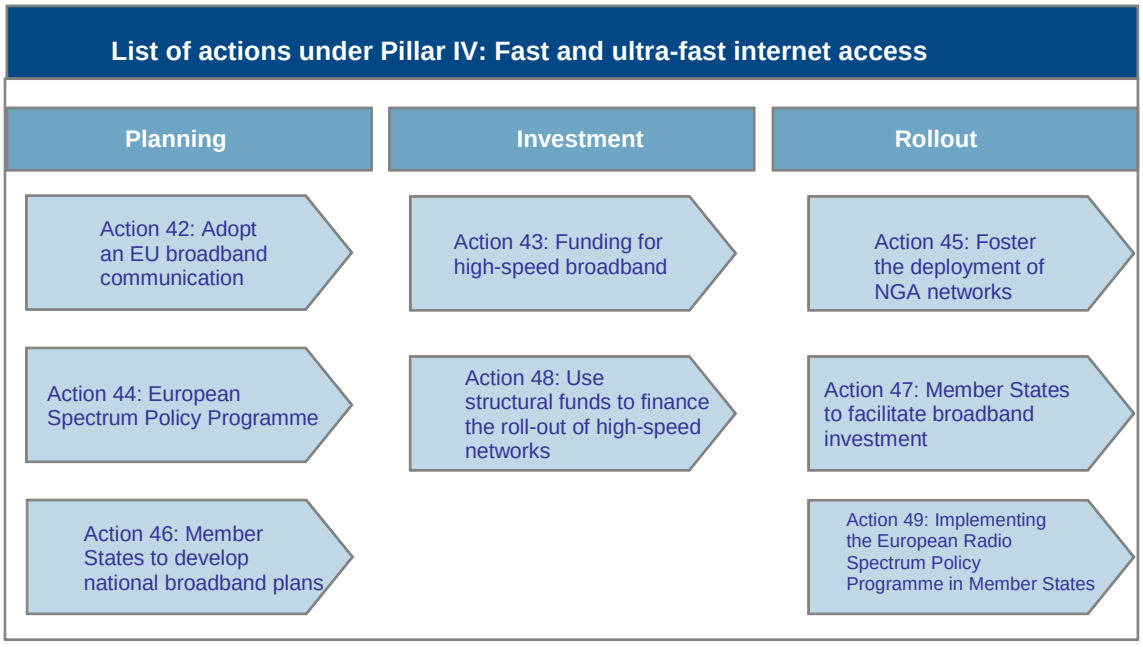
7.5.6 Implementation of the Digital Agenda for Europe

By suitable investments in increasing the availability of fast and ultrafast broadband, the Digital Agenda recommendations can be applied in the following area:

- As part of **Pillar IV: Fast and ultra-fast internet access,** efforts will be taken to intensify and streamline the financing of high-speed broadband from EU's instruments and to encourage investment in competitive NGN networks.

Ambitious targets of the Digital Agenda will also be delivered by following the recommended actions in the area of planning, investment and network rollout as illustrated in the figure below.

Figure 52: List of actions under Pillar IV: Fast and ultra-fast internet access



8 Regional dimension of priorities

Table 36: Regional dimension of priorities for proposed measures

Measure	Territory of the measure							
	BA	BB	KE	NR	TN	TT	PO	ZA
Development of electronic services	✓	✓	✓	✓	✓	✓	✓	✓
Use of open data	✓	✓	✓	✓	✓	✓	✓	✓
Promoting eBusiness and eCommerce	✓	✓	✓	✓	✓	✓	✓	✓
Promoting eInclusion	✓	✓	✓	✓	✓	✓	✓	✓
Effective public administration	✓							
Establishing the eGovernment Innovation Centre	✓	✓	✓	✓	✓	✓	✓	✓
Introducing eGovernment cloud	✓	✓	✓	✓	✓	✓	✓	✓
Deployment and use of broadband/NGN		✓	✓	✓	✓	✓	✓	✓

9 Acronyms and terminology used

3G	Third generation of mobile telecommunications technology
AAL	Ambient Assisted Living
ABC	Attribute Based Credentials
ADSL	Asymmetric Digital Subscriber Line
CF	Cohesion Fund
CEF	Connecting Europe Facility
CRM	Customer relationship management
Digital Champion	A Digital Champion is appointed in each Member State to oversee the progress towards the Digital Agenda.
EAFRD	European Agricultural Fund for Rural Development
eBusiness	ICT-based applications to support business activities and corporate processes
eCommerce	Electronic exchange of goods and services
ECDL	European Computer Driving Licence
eID	Electronic identification card
EHR	Electronic health records
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
ESF	European Social Fund
ESIF	European Structural and Investment Funds
EU	European Union
FTTH	Fibre-to-the-home
GB	Giga Byte
GDP	Gross domestic product
GSM	Global System for Mobile Communications
IaaS	Infrastructure as a Service
IAM	Access and Identity Management
ICT	Information and communication technologies
ISP	Integrated service point
IT	Information and communication technologies
LTE	Long Term Evolution
LTE-A	LTE advanced
Mbit/s	Megabit per second
MHz	Megahertz
NASES	National Agency for Networking and Electronic Services
NFC	Near Field Communication

NGN	Next Generation Networks
OECD	Organization for Economic Cooperation and Development
OPIS	Operational Programme Information Society
OPIS PA3	Priority Axis 3 of the Operational Programme Information Society
OTP	One Time Password
PaaS	Platform as a Service
PAIS	Public administration information systems
PKI	Public Key Infrastructure
PPP	Public Private Partnership
S3 documents	National and regional research, development and innovation strategies for smart specialisation
SaaS	Software as a Service
SLA	Service Level Agreement
SMEs	Small and medium-sized enterprises
SMS	Short Message Service
UN	United Nations Organizations
WiMAX	World Interoperability for Microwave Access

10 Assessment grids

Table 37: A.2-1 Digital growth

Criteria for fulfilment	Criteria fulfilled?	
	YES / NO	**Elements of non-fulfilment**
A strategic policy framework for digital growth, for instance, within the national or regional innovation strategic policy framework for smart specialisation is in place… ▪ The relevant operational programme contains a reference to the name of the framework and indicates where it is or its different elements are published (in form of a link).	Yes (the present document)	
…that contains:		
– *budgeting and prioritisation of actions through a SWOT or similar analysis consistent with the Scoreboard of the Digital Agenda for Europe:* ▪ There is evidence that a SWOT or a similar analysis has been conducted in order to establish priorities for investment. o There is a description of the methodology and data sources used for the analysis. o There is a description of the prioritisation / elimination process that was used to identify investment priorities, including the involvement of stakeholders. ▪ The framework outlines available budgetary resources for ICT interventions and indicates various sources of finance [and indicative amounts] (EU, national and other sources as appropriate).	Yes (Chapter 5: SWOT analysis and recommendations for Slovakia, Chapter 7.5.2.1: Targeting investments and Chapter 7.1.2: Funding instruments)	
– *an analysis of balancing support for demand and supply of information and communication technologies (ICT) should have been conducted:* ▪ There is evidence that an analysis of balancing support for demand and supply of information and communication technologies has been conducted. o There is a description of the methodology used for identifying demand and supply of ICT and for balancing the support for them. o The analysis covers all the relevant socio-economic issues related to demand for ICT (such as age structure, education, income, level of ICT training/skills, employment status, affordability of service, productivity, Internet penetration and the use of and demand for ICT services and applications in households, businesses and public administrations, increase eskills, etc.) and supply	Yes (Chapter 3.2.4: Data repositories and computing power)	

measures (availability of equipment and infrastructures, services and applications, and of ICT professionals/practicioners). o Where appropriate, the analysis also covers ICT as a sector (e.g. a concentration of manufacturing of ICT hardware and equipment, IT service and application providers, R&D in ICT, living labs, etc.). o There is a summary of the results of this analysis.		
– *indicators to measure progress of interventions in areas such as digital literacy, e-inclusion, e-accessibility, and of e-health within the limits of Article 168 TFEU which are aligned with existing relevant sectoral national or regional strategies:* ▪ A monitoring mechanism has been set up to measure the progress of ICT use and its impact (e.g. productivity gains) at national or regional level: o There is evidence that the monitoring mechanism covers all the areas of ICT interventions arising from existing relevant sectoral EU, national or regional strategies. When the strategic policy framework for digital growth is part of a national or regional innovation strategic policy framework for smart specialisation, its monitoring will be carried out as part of the monitoring of this framework. o The monitoring mechanism uses the same indicators as those used by the Digital Agenda Scoreboard but can contain additional indicators to track the progress of the implementation measures.	Yes (Chapter 7.3: Services for citizens and businesses -Sub-chapter 7.3.1.3: Indicators for compliance with the specific objective)	
– *assessment of needs to reinforce ICT capacity-building:* o The strategic policy framework for digital growth contains an analysis of the weaknesses to identify and deliver ICT interventions. o It identifies, where appropriate, an adequate description of measures to be taken or already in place to ensure the capacity of intermediate bodies and beneficiaries to identify and deliver those interventions.	Yes (Chapter 5: SWOT analysis and recommendations for Slovakia)	

Table 38: A.2-2 Next Generation Access

Criteria for fulfilment	Criteria fulfilled?	
	YES / NO	Elements for non-fulfilment
A national and/or regional NGN Plan is in place … ▪ The relevant operational programme contains a reference to the name of the plan and indicates where it is published (in form of a link).	Yes (Chapter 7.5: Broadband / NGN)	
… *that contains:*		
– *A plan of infrastructure investments based on an economic analysis taking account of existing infrastructure and published private investment plans:* ▪ There is evidence that an economic analysis has been conducted including : o a description of the methodology and data sources used for the analysis; o a map of existing and planned private and public infrastructures, as well as data on coverage and take-up. ▪ The plan outlines available budgetary resources for broadband interventions (EU, national, regional and other sources as appropriate). ▪ The plan is operational : o It contains coverage and take-up targets and indicators allowing a comparison with the related indicators of the Digital Agenda for Europe; o It contains a list of planned investments during the programming period (including estimated cost), aimed at reaching the high-speed targets foreseen for 2020 in the Digital Agenda for Europe.	Yes (Chapter 7.5: Broadband / NGN – Sub-chapter 7.5.2: Public investment, 7.5.4: Private investment and 7.5.5: Planned activities in broadband / NGN)	
– *sustainable investment models that enhance competition and provide access to open, affordable, quality and future proof infrastructure and services:* ▪ The plan includes a presentation of the envisaged investment models at national or other level: o There is a description of the prioritisation / elimination process that was used to identify investment priorities (e.g. considering the geographical features of the territory; population density; elements affecting demand such as levels of income, education, ICT training, employment status, ageing structure, etc.); The envisaged "investment models" are in line with the categories listed in the Guide to Broadband investments; o There is a description of how the envisaged models optimise the use of public resources (e.g. use of financial instruments and/or grants).	Yes (Chapter 7.5: Broadband / NGN - Sub-chapter 7.5.2: Public investment, and 7.5.3: Regulation and rules)	
– *measures to stimulate private investment:*	Yes	

▪ The plan describes all relevant measures (already in place or foreseen) for the stimulation of private investment (e.g. coordination of planning; rules for sharing physical infrastructure and in-house equipment; cost reductions measures)[41]. ▪ The plan includes the planned schedule for the implementation of these measures. ▪ The plan contains the schedule for the authorisation of EU harmonised bands for Wireless Broadband in line with the Radio Spectrum Policy Programme.	(Chapter 7.5.2.3: Monitoring project outcomes)	

[41] See Section 4 of the Commission Staff Working Document (SWD(2012) 68 final/2) on the implementation of national Broadband Plans of 23 March 2012

11 Annex 1 – Methodology to determine indexes for country comparisons

To measure and monitor the overall level of development and maturity of information society there are currently a number of partial indexes and indicators available, published by renowned institutions (the World Bank, the European Commission, the International Monetary Fund and many more).Statistical authorities and other organisations in individual countries in addition monitor a great many other relevant indicators. There is a plenitude of partial data available for this purpose. On the other hand, no uniform official methodology exists to provide an overall picture of the issue.

On that account, and in order to allow comparing individual countries, the Arthur D. Little company has proposed consolidated indexes that aggregate individual partial indicators to provide a comprehensive picture of the development and maturity of information society in individual countries. When designing these indexes, an emphasis was primarily placed on their overall integrity, more relevant indicators have been given more weight.

Indexes have been designed for the following areas:

- services for citizens and businesses;
- broadband and mobile technology development.

The following scheme illustrates in detail the structure of individual indexes, including proposed weights assigned to their individual components (weights in the figures are rounded up, they do necessarily not add up to 100%) and descriptions of partial indicators.

Figure 53: Structure of the maturity index of services for citizens and businesses

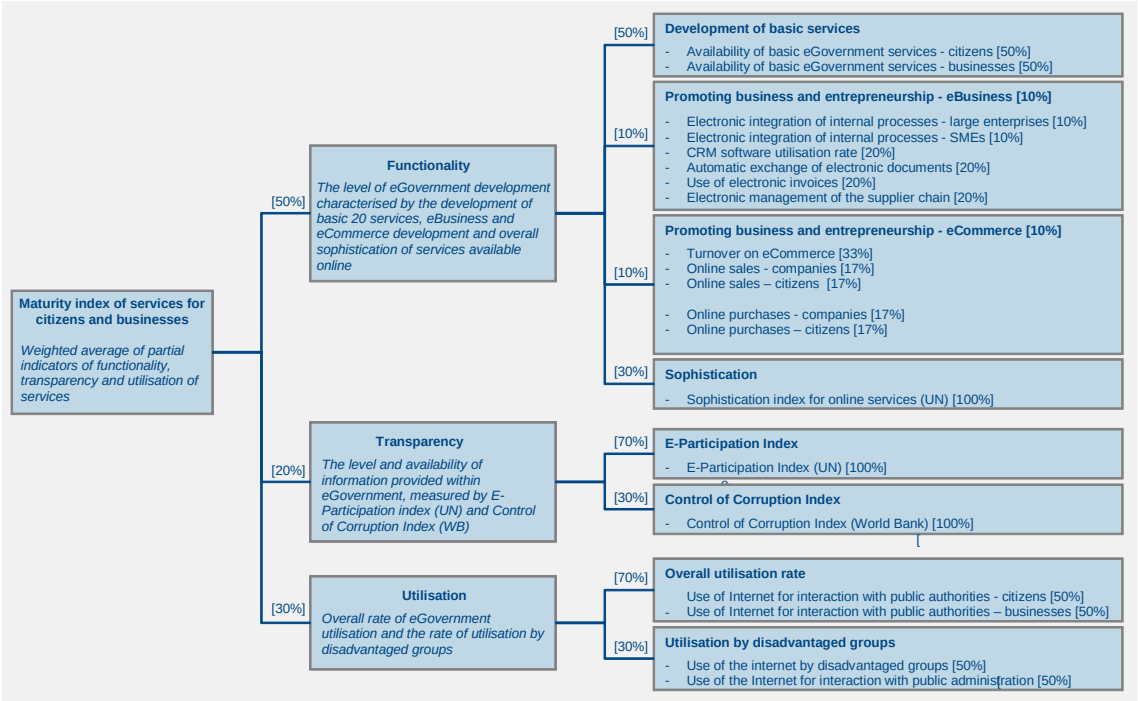
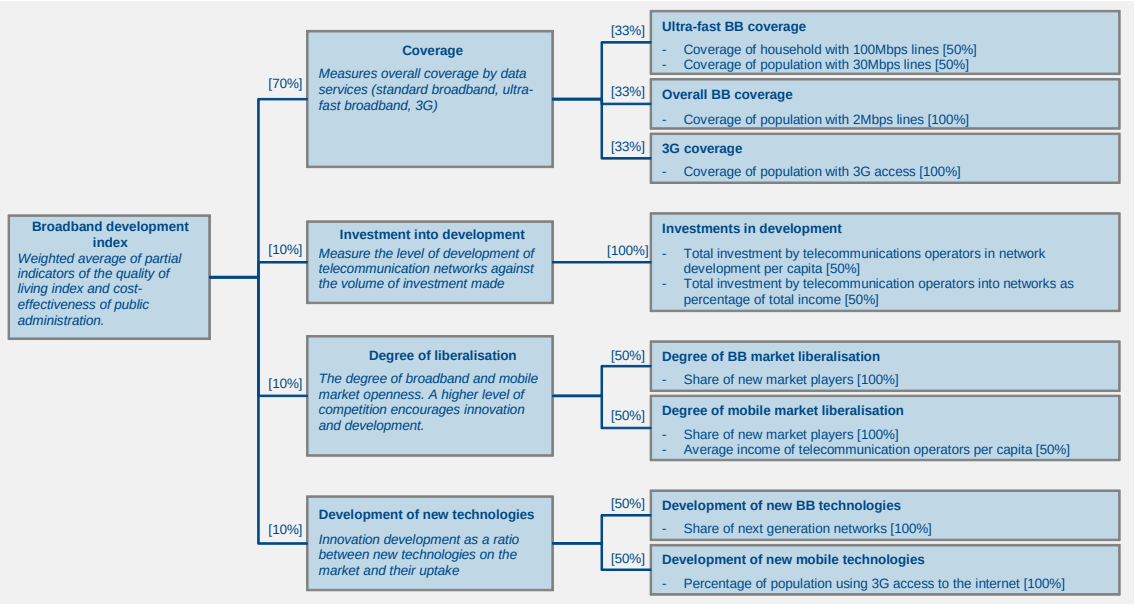


Figure 54: Structure of the broadband development index



Individual partial indicators are based on various sources of data. These sources are always included in the figure showing the particular index. Unless specified otherwise, the indexes use data from the following sources: Eurostat, the European Commission, Gartner, IDC, the International Monetary Fund, the Ministry of Finance of the Slovak Republic, The Ministry of Transport, Posts and Telecommunications of the Slovak Republic, national eGovernment coordination authorities, national statistical authorities, the OECD, the UN and the World Bank.

The most recent available data (2012) served as an input for the analysis. The missing data were extrapolated by an Arthur D. Little analysis.

12 Annex 2 - Methods to measure indicators of the fulfilment of specific objectives

For indicators, the following measurements can be used:

- Surveys (**Survey**) in the form of collection and processing of data obtained from a representative sample of participants, or from all project or programme participants; surveys may also be conducted through online questionnaires, feedback and/or reports from legal persons or liable stakeholders;
- Automated assessment (**Automatically generated**) of an indicator by means of IT tools implemented for a liable stakeholder under the project (for example, analytical tools of social media) that automatically collect data for the given indicator;
- Mystery Shopping (**Mystery Shopping**) during which trained and well informed buyers observe and evaluate, against their personal experience, a progress achieved in the delivery of services and the functioning of public administration. A detailed and objective evaluation checklist is used as a reference;
- Reporting (**Report**) by liable stakeholders of the results achieved after the completion of a project, spent resources and labour effectiveness, or conduct studies to analyse project impacts.

In addition, existing or new statistical sources created using one of the two following methods can also be used to measure impact indicators:

- Existing statistical data (**Eurostat statistics**) collected and assessed either by the Slovak Statistical Office or Eurostat on which additional extrapolation may be performed, if necessary, or they are published by the European Commission at the Digital Agenda website[42];
- New statistical data (**National statistics**) for which a method of their collection needs be defined and introduced in the processes of liable stakeholders, or legal and natural persons, and the Slovak Statistical Office and/or another institution that is liable to process statistical data and design indicators. A final indicator may also be calculated using the existing statistical data.

[42] http://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/indicators

13 Annex 3 - List of white areas

Table 39: List of white areas

Municipality	District	Population
Ábelová	Lučenec	229
Abovce	Rimavská Sobota	618
Babinec	Rimavská Sobota	74
Bacúrov	Zvolen	156
Bačka	Trebišov	651
Bačkov	Trebišov	625
Baďan	Banská Štiavnica	218
Bajany	Michalovce	489
Bajerov	Prešov	446
Bajerovce	Sabinov	310
Bajtava	Nové Zámky	408
Baláže	Banská Bystrica	202
Banský Studenec	Banská Štiavnica	462
Bara	Trebišov	341
Bartošovce	Bardejov	703
Belejovce	Svidník	15
Beluj	Banská Štiavnica	130
Beňadikovce	Svidník	221
Beňadovo	Námestovo	756
Beňatina	Sobrance	221
Beša	Michalovce	356
Bielovce	Levice	239
Bílkove Humence	Senica	205
Bíňovce	Trnava	667
Biskupová	Topoľčany	228
Blatné Remety	Sobrance	558
Bodiná	Považská Bystrica	490
Bodovce	Sabinov	329
Bodružal	Svidník	59
Boheľov	Dunajská Streda	354
Bory	Levice	301
Boťany	Trebišov	1282
Bottovo	Rimavská Sobota	213
Bôrka	Rožňava	494
Bracovce	Michalovce	966
Brehov	Trebišov	630
Brestov nad Laborcom	Medzilaborce	92
Brezina	Trebišov	703
Breznička	Stropkov	116

Municipality	District	Population
Brezovec	Snina	49
Brezovička	Sabinov	423
Brhlovce	Levice	309
Brieštie	Turčianske Teplice	151
Brusník	Veľký Krtíš	98
Brutovce	Levoča	198
Budikovany	Rimavská Sobota	42
Budiná	Lučenec	270
Buková	Trnava	662
Bukovce	Stropkov	517
Bulhary	Lučenec	279
Buzica	Košice - okolie	1173
Bystrá	Stropkov	25
Cakov	Rimavská Sobota	299
Cernina	Svidník	585
Cigeľka	Bardejov	522
Cigla	Svidník	91
Čáry	Senica	1248
Čavoj	Prievidza	553
Čelkova Lehota	Považská Bystrica	143
Čelovce	Veľký Krtíš	443
Čermany	Topoľčany	380
Černochov	Trebišov	218
Čertižné	Medzilaborce	373
Červená Voda	Sabinov	480
Červeňany	Veľký Krtíš	37
Čičarovce	Michalovce	852
Čičava	Vranov nad Topľou	1151
Čičmany	Žilina	188
Čierna Lehota	Bánovce nad Bebravou	129
Čierna Voda	Galanta	1448
Čierny Potok	Rimavská Sobota	145
Čifáre	Nitra	626
Čiližská Radvaň	Dunajská Streda	1248
Čoltovo	Rožňava	497
Čukalovce	Snina	158
Dačov Lom	Veľký Krtíš	415
Dargov	Trebišov	581
Davidov	Vranov nad Topľou	823
Dedačov	Humenné	167
Dedinky	Rožňava	303
Dekýš	Banská Štiavnica	217
Demjata	Prešov	1102

Municipality	District	Population
Dlhá Ves	Rožňava	590
Dlhoňa	Svidník	73
Dobrá Voda	Trnava	838
Dobroč	Lučenec	668
Dobroslava	Svidník	36
Dolná Mariková	Považská Bystrica	1420
Dolná Poruba	Trenčín	838
Dolné Semerovce	Levice	548
Dolné Zahorany	Rimavská Sobota	204
Dolný Badín	Krupina	256
Dolný Harmanec	Banská Bystrica	230
Drábsko	Brezno	219
Drahňov	Michalovce	1336
Dražice	Rimavská Sobota	236
Drienčany	Rimavská Sobota	250
Drnava	Rožňava	693
Držkovce	Revúca	520
Ďubákovo	Poltár	109
Dubinné	Bardejov	338
Dubno	Rimavská Sobota	148
Dubovce	Skalica	647
Dubové	Zvolen	250
Dubovec	Rimavská Sobota	567
Dúbravica	Banská Bystrica	370
Dúbravka	Michalovce	683
Dulovo	Rimavská Sobota	210
Duplín	Stropkov	464
Ďurďové	Považská Bystrica	162
Ďurková	Stará Ľubovňa	261
Ďurkovce	Veľký Krtíš	127
Fačkov	Žilina	707
Falkušovce	Michalovce	679
Figa	Rimavská Sobota	408
Fijaš	Svidník	144
Gemerská Ves	Revúca	965
Gemerské Michalovce	Rimavská Sobota	102
Gemerské Teplice	Revúca	373
Gemerský Sad	Revúca	308
Glabušovce	Veľký Krtíš	108
Golianovo	Nitra	1338
Gribov	Stropkov	204
Gruzovce	Humenné	129
Hačava	Košice - okolie	217

Municipality	District	Population
Hajná Nová Ves	Topoľčany	343
Hajtovka	Stará Ľubovňa	90
Haligovce	Stará Ľubovňa	665
Hankovce	Bardejov	397
Hatalov	Michalovce	750
Havaj	Stropkov	404
Havka	Kežmarok	45
Havranec	Svidník	11
Henckovce	Rožňava	460
Henclová	Gelnica	107
Hiadeľ	Banská Bystrica	503
Hnilec	Spišská Nová Ves	457
Hodejovec	Rimavská Sobota	196
Hokovce	Levice	553
Hontianske Moravce	Krupina	906
Hontianske Tesáre	Krupina	922
Hontianske Trsťany	Levice	332
Horná Breznica	Púchov	460
Horná Lehota	Dolný Kubín	532
Horná Mariková	Považská Bystrica	648
Horná Mičiná	Banská Bystrica	520
Horná Poruba	Ilava	1069
Horná Strehová	Veľký Krtíš	185
Horné Hámre	Žarnovica	641
Horné Mladonice	Krupina	176
Horné Plachtince	Veľký Krtíš	209
Horné Strháre	Veľký Krtíš	254
Horné Turovce	Levice	595
Horné Vestenice	Prievidza	620
Horné Zahorany	Rimavská Sobota	144
Horný Badín	Krupina	184
Horný Tisovník	Detva	222
Hostišovce	Rimavská Sobota	206
Hosťovce	Košice - okolie	183
Hostovice	Snina	310
Hrabičov	Žarnovica	588
Hrabkov	Prešov	687
Hrabová Roztoka	Snina	61
Hrabovčík	Svidník	331
Hrabské	Bardejov	568
Hradisko	Kežmarok	102
Hrachovište	Nové Mesto nad Váhom	735
Hraničné	Stará Ľubovňa	211

Municipality	District	Population
Hrišovce	Gelnica	304
Hrlica	Revúca	76
Hrochoť	Banská Bystrica	1457
Hromoš	Stará Ľubovňa	501
Hronská Breznica	Zvolen	270
Hronská Dúbrava	Žiar nad Hronom	423
Hruboňovo	Nitra	490
Hrubov	Humenné	510
Hrušov	Rožňava	345
Hrušov	Veľký Krtíš	885
Hrušovo	Rimavská Sobota	196
Hubošovce	Sabinov	440
Hubovo	Rimavská Sobota	133
Hucín	Revúca	831
Hunkovce	Svidník	333
Husák	Sobrance	159
Husiná	Rimavská Sobota	535
Huty	Liptovský Mikuláš	198
Hýľov	Košice - okolie	456
Chanava	Rimavská Sobota	698
Chľaba	Nové Zámky	701
Chlmec	Humenné	561
Choňkovce	Sobrance	592
Chrastince	Veľký Krtíš	234
Chropov	Skalica	363
Chrťany	Veľký Krtíš	148
Chvalová	Revúca	172
Chvojnica	Myjava	373
Chvojnica	Prievidza	245
Ihľany	Kežmarok	1407
Ihráč	Žiar nad Hronom	564
Inovce	Sobrance	223
Ipeľské Predmostie	Veľký Krtíš	625
Ipeľské Úľany	Levice	319
Ivanice	Rimavská Sobota	231
Jabloň	Humenné	418
Jablonov	Levoča	969
Jabloňovce	Levice	197
Jakovany	Sabinov	344
Jakubovany	Liptovský Mikuláš	401
Jakušovce	Stropkov	46
Jalová	Snina	84
Janice	Rimavská Sobota	207

Municipality	District	Population
Jankovce	Humenné	267
Jarabá	Brezno	39
Jasenovo	Turčianske Teplice	157
Jelšovec	Lučenec	294
Jenkovce	Sobrance	430
Jestice	Rimavská Sobota	157
Jezersko	Kežmarok	109
Kalinov	Medzilaborce	292
Kalná Roztoka	Snina	563
Kalša	Košice - okolie	691
Kaluža	Michalovce	363
Kameňany	Revúca	767
Kapišová	Svidník	349
Kapušianske Kľačany	Michalovce	840
Kašov	Trebišov	277
Kazimír	Trebišov	856
Kečkovce	Svidník	216
Kečovo	Rožňava	372
Kesovce	Rimavská Sobota	200
Keť	Levice	676
Kiarov	Veľký Krtíš	317
Kľak	Žarnovica	237
Kleňany	Veľký Krtíš	307
Klenová	Snina	525
Klenovec	Rimavská Sobota	3218
Klieština	Považská Bystrica	349
Klin nad Bodrogom	Trebišov	209
Klížska Nemá	Komárno	539
Klubina	Čadca	543
Kľúčovec	Dunajská Streda	372
Kobeliarovo	Rožňava	447
Kobylnice	Svidník	97
Koceľovce	Rožňava	257
Kochanovce	Bardejov	255
Kolačkov	Stará Ľubovňa	1093
Koláre	Veľký Krtíš	277
Kolbasov	Snina	102
Kolonica	Snina	578
Komárovce	Košice - okolie	372
Konrádovce	Rimavská Sobota	291
Konská	Liptovský Mikuláš	219
Kopernica	Žiar nad Hronom	439
Korejovce	Svidník	61

Municipality	District	Population
Kosihovce	Veľký Krtíš	612
Kosihy nad Ipľom	Veľký Krtíš	435
Kostoľany pod Tribečom	Zlaté Moravce	369
Kostolec	Považská Bystrica	250
Kostolné	Myjava	625
Košecké Podhradie	Ilava	1047
Kotmanová	Lučenec	344
Kováčová	Rožňava	70
Kováčovce	Veľký Krtíš	374
Koválovec	Skalica	154
Kozelník	Banská Štiavnica	178
Kozí Vrbovok	Krupina	175
Kožuchovce	Stropkov	72
Krajná Bystrá	Svidník	365
Krajná Porúbka	Svidník	55
Krajné Čierno	Svidník	76
Kráľovce - Krnišov	Krupina	173
Kraskovo	Rimavská Sobota	145
Kremná	Stará Ľubovňa	113
Kremnické Bane	Žiar nad Hronom	260
Krišovská Liesková	Michalovce	911
Krivá	Dolný Kubín	819
Krivé	Bardejov	210
Krížovany	Prešov	357
Krná	Poltár	53
Krokava	Rimavská Sobota	35
Krškany	Levice	745
Krtovce	Topoľčany	304
Kšinná	Bánovce nad Bebravou	504
Kubáňovo	Levice	300
Kučín	Bardejov	307
Kunešov	Žiar nad Hronom	253
Kunova Teplica	Rožňava	668
Kusín	Michalovce	357
Kvačany	Prešov	260
Kvašov	Púchov	670
Kyjatice	Rimavská Sobota	76
Lackov	Krupina	109
Ladmovce	Trebišov	339
Ladomirov	Snina	322
Lakšárska Nová Ves	Senica	1068
Lastovce	Trebišov	1079
Látky	Detva	552

Municipality	District	Population
Lažany	Prešov	157
Legnava	Stará Ľubovňa	142
Lehota nad Rimavicou	Rimavská Sobota	306
Leľa	Nové Zámky	395
Lenartovce	Rimavská Sobota	543
Lentvora	Lučenec	87
Lesíček	Prešov	330
Lesnica	Stará Ľubovňa	532
Leváre	Revúca	103
Levkuška	Revúca	236
Licince	Revúca	699
Lipová	Bardejov	80
Lipovany	Lučenec	288
Lipovce	Prešov	506
Liptovský Ondrej	Liptovský Mikuláš	601
Lišov	Krupina	259
Litmanová	Stará Ľubovňa	622
Livov	Bardejov	93
Livovská Huta	Bardejov	54
Lom nad Rimavicou	Brezno	296
Lomná	Námestovo	820
Lomnička	Stará Ľubovňa	2237
Lontov	Levice	709
Lošonec	Trnava	543
Ľubiša	Humenné	842
Ľuboreč	Lučenec	323
Ľuboriečka	Veľký Krtíš	163
Lúč na Ostrove	Dunajská Streda	775
Lúčina	Prešov	151
Lúčka	Levoča	125
Lúčka	Rožňava	203
Lúčka	Sabinov	673
Lúčky	Žiar nad Hronom	226
Luhyňa	Trebišov	298
Lužany	Topoľčany	213
Magnezitovce	Revúca	440
Majere	Kežmarok	87
Makovce	Stropkov	203
Malá Čalomija	Veľký Krtíš	228
Malá Čausa	Prievidza	665
Malá Čierna	Žilina	334
Malá Franková	Kežmarok	188
Malá Lehota	Žarnovica	923

Municipality	District	Population
Malá Poľana	Stropkov	103
Malá Tŕňa	Trebišov	415
Malé Borové	Liptovský Mikuláš	185
Malé Kosihy	Nové Zámky	373
Malé Ludince	Levice	190
Malé Ripňany	Topoľčany	535
Malé Straciny	Veľký Krtíš	128
Malé Trakany	Trebišov	1214
Malé Zlievce	Veľký Krtíš	278
Málinec	Poltár	1440
Malý Kamenec	Trebišov	450
Malý Lipník	Stará Ľubovňa	448
Markuška	Rožňava	169
Martinová	Rimavská Sobota	202
Matiašovce	Kežmarok	786
Matovce	Svidník	133
Matysová	Stará Ľubovňa	67
Medovarce	Krupina	261
Medvedie	Svidník	54
Merašice	Hlohovec	429
Mestisko	Svidník	469
Mičakovce	Svidník	145
Michajlov	Snina	108
Miková	Stropkov	154
Miroľa	Svidník	79
Mlynárovce	Svidník	225
Mlynky	Spišská Nová Ves	588
Mníšek nad Popradom	Stará Ľubovňa	659
Modrany	Komárno	1479
Mojtín	Púchov	526
Mokrý Háj	Skalica	684
Moravany	Michalovce	1043
Motyčky	Banská Bystrica	106
Môlča	Banská Bystrica	356
Mudroňovo	Komárno	117
Muľa	Veľký Krtíš	325
Muránska Dlhá Lúka	Revúca	887
Muránska Huta	Revúca	191
Muránska Lehota	Revúca	216
Muránska Zdychava	Revúca	268
Mútne	Námestovo	2808
Nechválova Polianka	Humenné	114
Nemcovce	Bardejov	263

Municipality	District	Population
Neporadza	Rimavská Sobota	286
Nevoľné	Žiar nad Hronom	440
Nižná Jablonka	Humenné	193
Nižná Pisaná	Svidník	97
Nižná Sitnica	Humenné	342
Nižná Slaná	Rožňava	1174
Nižná Voľa	Bardejov	289
Nižné Ladičkovce	Humenné	358
Nižné Repaše	Levoča	189
Nižný Komárnik	Svidník	152
Nižný Lánec	Košice - okolie	416
Nižný Tvarožec	Bardejov	498
Norovce	Topoľčany	324
Nová Bašta	Rimavská Sobota	519
Nová Polianka	Svidník	65
Nová Ves	Veľký Krtíš	394
Nové Hony	Lučenec	192
Oborín	Michalovce	705
Obručné	Stará Ľubovňa	43
Olejníkov	Sabinov	393
Oľka	Medzilaborce	332
Olováry	Veľký Krtíš	318
Oľšavce	Bardejov	162
Oľšavica	Levoča	293
Oľšavka	Spišská Nová Ves	185
Oľšavka	Stropkov	232
Oľšinkov	Medzilaborce	27
Omastiná	Bánovce nad Bebravou	39
Ondavka	Bardejov	25
Opátka	Košice - okolie	89
Opatovská Nová Ves	Veľký Krtíš	666
Opava	Veľký Krtíš	125
Oravce	Banská Bystrica	191
Oravské Veselé	Námestovo	2836
Oravský Biely Potok	Tvrdošín	670
Oreské	Skalica	351
Orešany	Topoľčany	272
Orlov	Stará Ľubovňa	706
Osádka	Dolný Kubín	138
Osadné	Snina	195
Ostrý Grúň	Žarnovica	571
Osturňa	Kežmarok	332
Otročok	Revúca	292

Municipality	District	Population
Ozdín	Poltár	353
Pača	Rožňava	643
Padarovce	Rimavská Sobota	140
Pakostov	Humenné	473
Palota	Medzilaborce	180
Panické Dravce	Lučenec	746
Paňovce	Košice - okolie	581
Papín	Humenné	1019
Parihuzovce	Snina	29
Pataš	Dunajská Streda	872
Patince	Komárno	418
Pavlová	Nové Zámky	260
Pčoliné	Snina	577
Petrova Lehota	Trenčín	173
Petrovce	Rimavská Sobota	232
Petrovo	Rožňava	107
Píla	Lučenec	281
Píla	Žarnovica	147
Pinkovce	Sobrance	181
Pitelová	Žiar nad Hronom	675
Plášťovce	Levice	1658
Plavecké Podhradie	Malacky	723
Plavecký Peter	Senica	632
Pleš	Lučenec	238
Ploské	Revúca	81
Počarová	Považská Bystrica	143
Počúvadlo	Banská Štiavnica	119
Podbranč	Senica	615
Podhorie	Banská Štiavnica	376
Podhoroď	Sobrance	398
Podhradík	Prešov	356
Podskalie	Považská Bystrica	126
Pohronský Bukovec	Banská Bystrica	86
Pokryváč	Dolný Kubín	179
Poľany	Trebišov	539
Polianka	Myjava	390
Polichno	Lučenec	143
Polina	Revúca	140
Poniky	Banská Bystrica	1590
Poproč	Rimavská Sobota	16
Popudinské Močidľany	Skalica	924
Poráč	Spišská Nová Ves	1025
Poruba pod Vihorlatom	Michalovce	627

Municipality	District	Population
Potok	Rimavská Sobota	37
Potôčky	Stropkov	65
Povina	Kysucké Nové Mesto	1129
Povrazník	Banská Bystrica	144
Prašník	Piešťany	839
Prenčov	Banská Štiavnica	605
Príbelce	Veľký Krtíš	562
Pribiš	Dolný Kubín	463
Prihradzany	Revúca	80
Príkra	Svidník	12
Príslop	Snina	63
Prochot	Žiar nad Hronom	591
Pstriná	Svidník	50
Ptičie	Humenné	638
Ptrukša	Michalovce	502
Pucov	Dolný Kubín	756
Pusté Pole	Stará Ľubovňa	228
Rad	Trebišov	572
Radnovce	Rimavská Sobota	734
Radobica	Prievidza	550
Radoma	Svidník	440
Rákoš	Revúca	436
Rakovčík	Svidník	183
Rakytník	Rimavská Sobota	260
Rašice	Revúca	135
Ratková	Revúca	550
Ratkovská Lehota	Rimavská Sobota	47
Ratkovská Suchá	Rimavská Sobota	61
Ratkovské Bystré	Revúca	385
Ratvaj	Sabinov	139
Regetovka	Bardejov	22
Rejdová	Rožňava	735
Reľov	Kežmarok	343
Renčišov	Sabinov	182
Repejov	Medzilaborce	134
Repište	Žiar nad Hronom	298
Riečka	Rimavská Sobota	239
Roškovce	Medzilaborce	197
Roštár	Rožňava	539
Rovňany	Poltár	252
Rovné	Svidník	494
Rúbaň	Nové Zámky	953
Runina	Snina	57

Municipality	District	Population
Ruská Bystrá	Sobrance	120
Ruská Kajňa	Humenné	117
Ruská Poruba	Humenné	264
Ruská Voľa nad Popradom	Stará Ľubovňa	101
Ruská Volová	Snina	116
Ruský Hrabovec	Sobrance	337
Ruský Potok	Snina	133
Ružiná	Lučenec	871
Rykynčice	Krupina	334
Sádočné	Považská Bystrica	160
Santovka	Levice	771
Sása	Revúca	156
Sazdice	Levice	485
Sebedín - Bečov	Banská Bystrica	402
Sečianky	Veľký Krtíš	398
Sedlice	Prešov	1023
Seľany	Veľký Krtíš	213
Sihla	Brezno	193
Sikenička	Nové Zámky	458
Silica	Rožňava	554
Silická Brezová	Rožňava	178
Silická Jablonica	Rožňava	220
Sirk	Revúca	1137
Sirník	Trebišov	621
Sklabinský Podzámok	Martin	197
Sklené Teplice	Žiar nad Hronom	420
Skýcov	Zlaté Moravce	1032
Slanská Huta	Košice - okolie	208
Slatina	Levice	366
Slatvina	Spišská Nová Ves	309
Slavkovce	Michalovce	620
Slavoška	Rožňava	123
Slivník	Trebišov	777
Slizké	Rimavská Sobota	142
Slovenská Volová	Humenné	502
Slovenské Kľačany	Veľký Krtíš	169
Slovenské Krivé	Humenné	135
Slovinky	Spišská Nová Ves	1901
Smolinské	Senica	982
Snakov	Bardejov	655
Soboš	Svidník	147
Soľnička	Trebišov	246
Soľník	Stropkov	38

Municipality	District	Population
Sopkovce	Humenné	120
Spišské Hanušovce	Kežmarok	748
Stakčínska Roztoka	Snina	326
Stará Bašta	Rimavská Sobota	328
Stará Huta	Detva	344
Stará Lehota	Nové Mesto nad Váhom	249
Stará Voda	Gelnica	225
Staré	Michalovce	788
Staré Hory	Banská Bystrica	536
Starina	Stará Ľubovňa	55
Staškovce	Stropkov	254
Stráňany	Stará Ľubovňa	202
Stráňavy	Žilina	1838
Stratená	Rožňava	135
Strážne	Trebišov	680
Strekov	Nové Zámky	2115
Strelníky	Banská Bystrica	799
Strihovce	Snina	153
Studená	Rimavská Sobota	282
Stuľany	Bardejov	586
Sudince	Krupina	58
Suchá Dolina	Prešov	187
Suchá Hora	Tvrdošín	1359
Sucháň	Veľký Krtíš	263
Suché Brezovo	Veľký Krtíš	115
Suchohrad	Malacky	631
Sukov	Medzilaborce	115
Sulín	Stará Ľubovňa	376
Sútor	Rimavská Sobota	482
Svätá Mária	Trebišov	598
Svätý Peter	Komárno	2759
Svetlice	Medzilaborce	130
Svidnička	Svidník	126
Svrbice	Topoľčany	208
Šambron	Stará Ľubovňa	417
Šarbov	Svidník	13
Šarišské Sokolovce	Sabinov	513
Šarišský Štiavnik	Svidník	284
Šarkan	Nové Zámky	359
Šašová	Bardejov	137
Šávoľ	Lučenec	583
Šemetkovce	Svidník	86
Šiatorská Bukovinka	Lučenec	317

Municipality	District	Population
Šindliar	Prešov	557
Šípkové	Piešťany	333
Širákov	Veľký Krtíš	224
Šivetice	Revúca	384
Šmigovec	Snina	88
Šoltýska	Poltár	136
Špania Dolina	Banská Bystrica	197
Španie Pole	Rimavská Sobota	79
Štefanov nad Oravou	Tvrdošín	656
Štefurov	Svidník	110
Šuľa	Veľký Krtíš	81
Švošov	Ružomberok	812
Tachty	Rimavská Sobota	527
Tašuľa	Sobrance	201
Tatranská Javorina	Poprad	226
Temeš	Prievidza	271
Teplička	Spišská Nová Ves	1161
Tepličky	Hlohovec	283
Teplý Vrch	Rimavská Sobota	280
Točnica	Lučenec	319
Tokajík	Stropkov	110
Torysky	Levoča	371
Trávnik	Komárno	725
Trebichava	Bánovce nad Bebravou	38
Trebušovce	Veľký Krtíš	187
Trenč	Lučenec	435
Trenčianske Bohuslavice	Nové Mesto nad Váhom	921
Tŕnie	Zvolen	372
Trpín	Krupina	110
Tuhár	Lučenec	393
Turčok	Revúca	248
Turecká	Banská Bystrica	136
Turová	Zvolen	370
Údol	Stará Ľubovňa	406
Uhliská	Levice	207
Úhorná	Gelnica	152
Uhorské	Poltár	591
Uhrovské Podhradie	Bánovce nad Bebravou	36
Uňatín	Krupina	192
Utekáč	Poltár	1035
Uzovská Panica	Rimavská Sobota	715
Uzovské Pekľany	Sabinov	395
Vaďovce	Nové Mesto nad Váhom	720

Municipality	District	Population
Vagrinec	Svidník	123
Valaská Belá	Prievidza	2217
Valentovce	Medzilaborce	39
Valice	Rimavská Sobota	327
Valkovce	Svidník	220
Vápeník	Svidník	45
Varechovce	Stropkov	167
Včelince	Rimavská Sobota	783
Večelkov	Rimavská Sobota	265
Veľká Franková	Kežmarok	356
Veľká Hradná	Trenčín	682
Veľká Lehota	Žarnovica	1191
Veľká Lesná	Stará Ľubovňa	487
Veľká Tŕňa	Trebišov	446
Veľké Borové	Liptovský Mikuláš	71
Veľké Pole	Žarnovica	422
Veľké Revištia	Sobrance	538
Veľké Straciny	Veľký Krtíš	148
Veľké Zlievce	Veľký Krtíš	500
Veľkrop	Stropkov	204
Veľký Kliž	Partizánske	914
Veľký Lom	Veľký Krtíš	227
Veľopolie	Humenné	322
Vernár	Poprad	609
Vernár	Poprad	625
Vieska	Veľký Krtíš	217
Vieska nad Blhom	Rimavská Sobota	154
Viničky	Trebišov	520
Virt	Komárno	309
Vislava	Stropkov	218
Višňové	Revúca	67
Víťazovce	Humenné	333
Vladiča	Stropkov	59
Vlkyňa	Rimavská Sobota	354
Vojka	Trebišov	546
Vrbnica	Michalovce	939
Vrbová nad Váhom	Komárno	584
Vrbovka	Veľký Krtíš	377
Vrchteplá	Považská Bystrica	251
Vrícko	Martin	471
Vtáčkovce	Košice - okolie	948
Vydrná	Púchov	348
Výrava	Medzilaborce	165

Municipality	District	Population
Vysoká	Banská Štiavnica	142
Vyškovce	Stropkov	142
Vyšná Boca	Liptovský Mikuláš	93
Vyšná Jablonka	Humenné	52
Vyšná Jedľová	Svidník	203
Vyšná Pisaná	Svidník	79
Vyšné Ladičkovce	Humenné	222
Vyšné Nemecké	Sobrance	244
Vyšné Repaše	Levoča	106
Vyšné Valice	Rimavská Sobota	328
Vyšný Komárnik	Svidník	70
Vyšný Slavkov	Levoča	324
Zábiedovo	Tvrdošín	823
Zádiel	Košice - okolie	176
Zádor	Rimavská Sobota	138
Záhor	Sobrance	684
Záhorce	Veľký Krtíš	695
Zárieče	Púchov	698
Záskalie	Považská Bystrica	180
Zatín	Trebišov	806
Zbojné	Medzilaborce	178
Zbudská Belá	Medzilaborce	114
Zbudské Dlhé	Humenné	616
Zemianske Podhradie	Nové Mesto nad Váhom	748
Zemiansky Vrbovok	Krupina	105
Zemplín	Trebišov	396
Zemplínska Nová Ves	Trebišov	948
Zemplínske Hámre	Snina	1271
Zemplínske Jastrabie	Trebišov	646
Zlatá Baňa	Prešov	423
Zlatá Idka	Košice - okolie	380
Zlatníky	Bánovce nad Bebravou	681
Zlatno	Zlaté Moravce	247
Zliechov	Ilava	572
Zombor	Veľký Krtíš	139
Zubné	Humenné	375
Žakarovce	Gelnica	724
Žbince	Michalovce	969
Železná Breznica	Zvolen	516
Žiar	Revúca	148
Žibritov	Krupina	63
Žíp	Rimavská Sobota	234
Žipov	Prešov	266

Municipality	District	Population
Žitná - Radiša	Bánovce nad Bebravou	450
Župkov	Žarnovica	732