The Electronic Government of St.-Petersburg as Relevant Experience of Construction of Digital Economy

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Abstract. In given article it is shown how in the Russian Federation in whole and in St.-Petersburg in particular there was an environment for digital transformation of sphere of allocation of the state services and a technological platform and how now on the basis of this platform interaction of subjects (executive powers of the government of St.-Petersburg (further – EPG) and receivers of the state services) is carried out.

Keywords: Computer technologies · Digital economy · The state services · The electronic government

1 Introduction

According to United Nations research «the Electronic government 2018» the Russian Federation (further – the RF) is included into number of the countries with very high EGDI (an index of development of the electronic government (the metric includes development of online transactions, tendencies in sphere of the open government and transportable services, and also involvement of the public in rendering of innovative state services), including:

- Very high OSI (the online service index, represents a composite metric of usage of informational-communication technologies the states at rendering of the public services (further – PS));
- Very high EPI (an index of electronic involvement on the basis: electronic informing or availability of the information online; electronic listenings or public listenings online and electronic decision-making or direct implicating of citizens in decision-making processes).

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Since 2016 of the RF has risen on three positions in a rating of the countries on development of the electronic government, having passed from group with high EGDI in group with very high EGDI. St.-Petersburg in turn traditionally is included into number of leaders on development of the electronic government in the country according to various federal ratings.

It is important to mark that the digital government is included in the program «Digital economy» as one of federal projects, thus, the experience stored in this sphere is to relevant tasks of construction of digital economy as a whole. Uniqueness of the Russian experience in this sphere is caused by the big territorial remoteness, high autonomy of locales and presence of serious regional specificity at saving of control action of the federal authority. Locales essentially differ each other not only a degree of development of an informational-technical infrastructure, but also the legislation, structure PS, powers of authorities and their allocation between departments.

2 The Main Problems of Construction of the Electronic Government and Digital Economy as a Whole

Construction of the electronic government, as well as construction of digital economy, represents the multifactor, many-dimensional task. At its solution it is possible to select two main groups of problems:

- Scientifically-methodical problems;
- technical and technological problems.

In sort of the extremely extensive subject domain of one of the main scientifically-methodical problems at construction of the electronic government is its formalization, structurization, framing of criteria of the estimation of its components and, on their basis, methods of planning, an estimation and rise of efficiency of actions. It is necessary to carry out on the basis of the common theoretical approaches ranking of directions, actions, projects, up to separate administrative processes taking into account their social, economic, organizational, legal and other characteristics.

Besides, in practice chances when resource allocation on those or other actions is carried out by advanced rates, and before performers there is an atypical task of as much as possible effective mastering of the selected resources, that is a choice of projects and separate processes which will provide the greatest social and economic effect not at the least expenses, but at the fixed.

Separately it is necessary to mark that such tasks as the electronic government and digital economy are cross-industry, system and demand the comprehensive approach, unlike tasks of local automation of activity of those or other structures, however at their solution it is impossible to neglect branch interests because of risks to paralyse the smoothly running departmental business processes.

In the present article it is shown, how research and formalization of a subject domain and ranking of its components at the initial stages of construction of the electronic government in St.-Petersburg with usage of following methods were carried out:

- The system-target approach, methods of definition of the purposes, estimations of their significance, decomposition, and also definition of their interrelations;
- Multicriteria optimization;
- The process oriented approach, application of quantitative measures of the information.

In group of technical and technological problems the problems of identification of the person in digital space and creations under tasks of the electronic government of a necessary informational-technical infrastructure have the greatest value. In the present article experience of solution of the given tasks in St.-Petersburg is briefly reflected.

3 The Purposes of Construction of the Electronic Government

The purposes of construction of the electronic government are:

- Support of allocation to applicants PS in electronic form, improvement of quality of service of applicants;
- Support of implementation of a principle of one window in territory of St.-Petersburg, that is a principle, at which:
  - Interdepartmental informational interaction is hidden from the applicant, all necessary actions carry out authorities independently;
  - For the applicant there is one entry point where he accesses behind allocation of service and where receives result;
- Support of interaction of multifunctional centre and executive powers of the government of St.-Petersburg, the organizations subordinated to them, federal public authorities, local governments;
- Reduction of paper document flow;
- Minimization of expenses of resources of the budget of St.-Petersburg;
- Rise of a transparency of activity of executive powers of the government of St.-Petersburg and local governments, the organizations.

4 Overcoming Departmental (Branch) Isolation of Informational Resources at Construction of the Electronic Government in St.-Petersburg

At the moment of the beginning of construction of the electronic government many departmental informational resources existed only on a paper, departmental intelligence systems were absent. Existing systems thus formed and developed absolutely independently from each other both with legal, and with technical the points of view. It has led to departmental (branch) isolation of informational resources.

Thus PS (function) being fixed to certain department represents cross-industry process of acceptance of solution on the basis of a collection of data bases, collection, actualization and which storage in one departmental (branch) system are inexpedient,

and in certain cases – are impossible. For support of solution of these tasks the information from various external in relation to departmental (branch) system of the sources distributed territorially is required. The given information belongs to the various organizations and departments, can be stored in the intelligence systems which in any way have been not integrated with each other, or in general to be absent in electronic form.

Thus, for support of process of decision-making call to external sources of the information behind necessary data according to certain algorithm which depends on concrete process of decision-making should be carried out.

After decision-making, the sequence of reception of data bases from the external sources, derivated at realization of the given algorithm, ceases to exist as sequence, преобразуясь in the distributed collection of the data bases which have been not linked among themselves.

For overcoming of departmental isolation the interdepartmental automated information system of electronic public services of allocation in St.-Petersburg the state and municipal services in electronic form (IAIS EPS) which realises reception of data bases from independent departments and departmental intelligence systems in electronic form has been created.

Cross-industry systems such, namely functioning in the conditions of the distributed data bases, are not selected in a separate class owing to what practical and theoretical questions of their designing are poorly taken up. Development of such systems is carried out in the conditions of absence of the common bases and theoretical approaches to creation of their supply with information [1–3].

In this connection theoretical and practical aspects of designing of system were formed in a parallel way. For framing of design solutions of system it was necessary to select at once "pilot" package PS, and also to work out the common approaches to their choice further, to define criteria of selection. In spite of the fact that "the pilot" project has been initially limited only by services in the social policy sphere, all set of processes of rendering of services could not be captured at once, without preliminary structurization which has allowed to lower uncertainty and to make over processes various operations (for example, an expert estimation on various characteristic).

For structurization of social PS, given to the population of St.-Petersburg, following tags of structurization have been used:

- Result of allocation of service, namely:
  - Monetary payment (single monetary payment (the manual, compensation), regular monetary payment (the manual, compensation);
  - Document output (the document of disposable usage (help, other documents), the document of reusable usage (help, the certificate and the permission);
- Sort of the legislation regulating allocation of service (the regional legislation, the federal legislation);
- The organization, making solution on service allocation (department of social protection of the population of administration of area (DSPP), other organization).

According to these tags of structurization 54 social PS have been divided into 20 classes. Further expert estimations of the specified classes of services in following groups of criteria have been spent:

- The significance of group PS for citizens (a demand, requirement for automation from the point of view of convenience of citizens, etc.);
- The significance of group of services for the organizations, rendering the given services (labour input of allocation PS, requirement for optimization, etc.).

By results of expert estimations for the further analysis 2 groups PS have been selected:

- The single allowances assigned in DSPP (5 pieces);
- The regular allowances assigned in DSPP under the regional legislation (7 pieces).

Thus, it was possible to lower uncertainty with 54 PS to 12, necessity of further ranking of processes was thus obvious. Solution on what processes is necessary for researching first of all, should be accepted not only taking into account opinions of experts which can be contradictory, but also on the basis of the certain quantity indicators which values can be installed without engaging of experts.

For the specified purposes the mathematical model including of some criteria on which basis solution on can be accepted what decision-making processes from those classes which have been selected at the previous stage on the basis of expert estimations has been generated, are priority for further research. The criteria included in model, and their interpretation are presented in Table 1.

Table 1. Characteristics of decision-making processes

The characteristic name	Semantic interpretation
Quantity of the standard documents regulating performing of process of decision-making	Characterises the significance of the given process for higher instances
Quantity of changes of the standard documents regulating performing of given process, for the certain period	Characterises "modifiability" of processes. Their is more often the standard base varies, the it is necessary to finish subsequently an intelligence system for automation of a supply with information of process of decision-making is more often
Quantity of the organizations involved in decision-making process	Characterises requirement for automation of collection of the information for consumers of result of decision-making. The more the organizations represent the documents necessary for decision-making, the more desirably for the consumer of result automation of process of collection of the given information for it. Besides, that above an organizational fragmentation, that the costs above linked to it
Relative period of decision-making (the ratio of the minimum period of decision-making, namely time necessary on decision-making, to maximum period of decision-making, that is by time which has been taken away on decision-making)	Characterises requirement for automation of collection of the information for the persons, making solution. The more the given ratio, there are more risks to delay decision-making. Thus, automation of collection of the information, accelerating this process, reduces the minimum time necessary on decision-making, and "liberates" an extra time

The given criteria have been formalized and presented in the form of relative characteristics of decision-making processes. As decision-making process cannot be a part of a finite package partially or more once, the given multicriteria task represented the task of integer programming with booleans. The task consisted in finding solution (schedule), that is collection N of decision-making processes values of the specified criteria for which are maximum (are minimum) taking into account limitations. The criteria, maximised (minimised) in a task in view, are relative, dimensionless, therefore their rationing for convolution of criteria is not required. Convolution of criteria has been applied to task solution.

Following the results of ranking from 12 SS have been selected 5.

Depending on a reality situation each service could have some variants of implementation.

The choice of variants of implementation in the conditions of limitations was the following task of designing. Informational processes have been presented in the form of the digraphs which tops were data bases, and each path represented a variant of implementation of service. Everyone PS included following steps:

- Identification of the applicant;
- Identification of the object of the statement;
- Confirmation of a category of the applicant;
- Side conditions of allocation PS.

The example of the count for PS «the Lump sum at a birth of the child» is presented on Fig. 1.

The data bases entering into informational process possess two main characteristics: a demand and availability.

Availability of those or other data bases is defined by presence or possibility of support of reception of the array in electronic form. It depends on a degree of automation of a source of the information. Following degrees of automation of a source of the information have been selected:

- Absence of an intelligence system for an information source. Necessary data bases are presented for an information source only on paper carriers;
- Presence of an intelligence system for an information source, however the intelligence system has no web tools on allocation of a necessary data base;
- Presence of an intelligence system for an information source. The source intelligence system has web tools on allocation of a necessary data base.

Each degree of automation assumed requirement for performance of certain operations that has allowed to calculate the resources necessary on support of availability of a data base, and to consider their limitations.

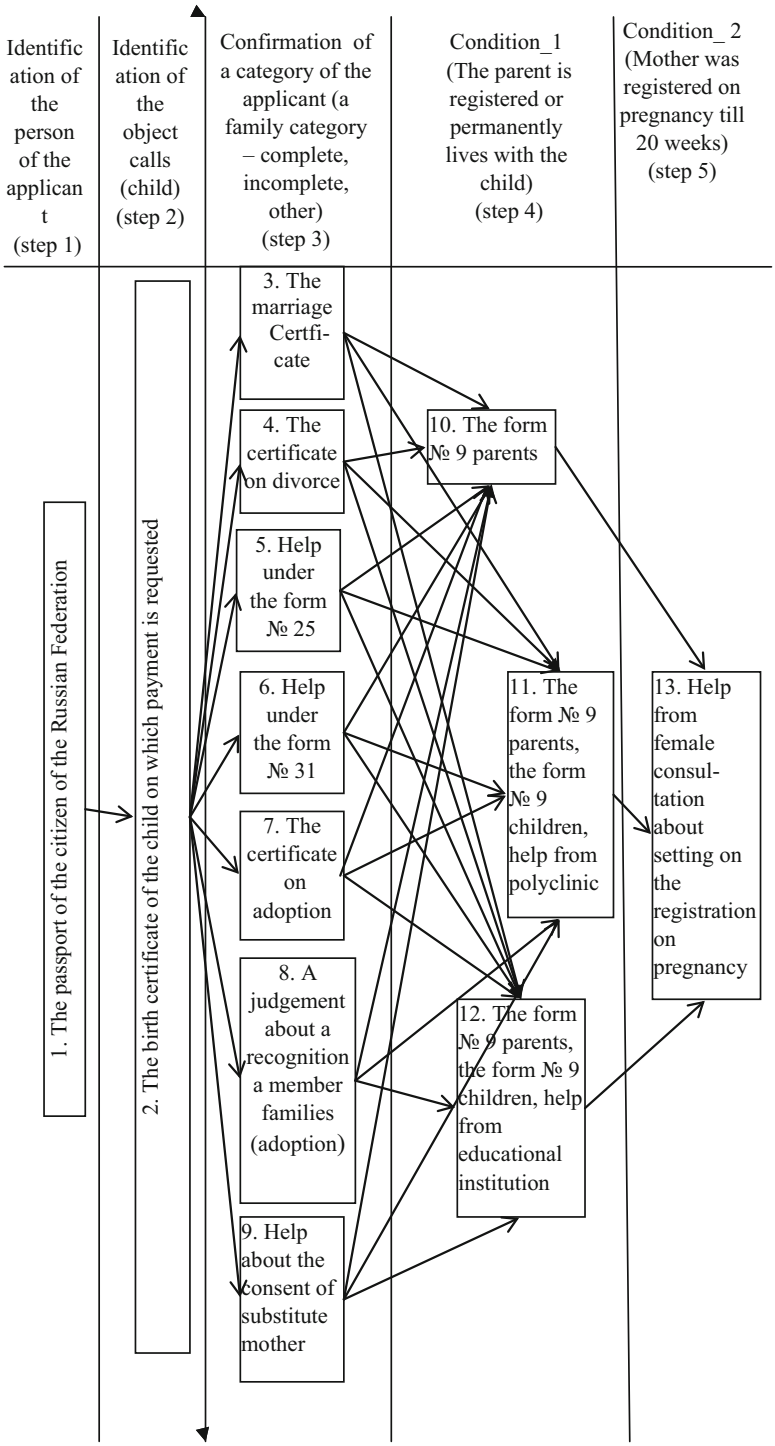

Fig. 1 Informational process at decision-making on the state service «the Lump sum at a birth of the child»

The data base demand represents probability of its claiming for decision-making. For example, probability of claiming of the array “Marriage certificate” above probability of claiming of the array «the Consent of substitute mother» . It can be defined statistically or expertly.

Availability and demand of a variant of implementation of service (path on the column) is defined on the basis of availability and a demand of the data bases entering into its structure.

As a result of calculations it has been revealed that, for example, for SS «the Lump sum at a birth of the child» (Fig. 1) priority for automation are variants 1-2-3-10-13, 1-2-4-10-13, 1-2-5-10-13. The sources giving following data bases should be for this purpose automated:

- The passport of the citizen of the RF (a source – office of the Federal migration service OFMS);
- The birth certificate (a source – the bodies of records of acts of civil status BRACS);
- The marriage certficate (a source – BRACS);
- The form № 9 – (a source – housing and communal services);
- Help about setting on the registration on pregnancy till 20 weeks (a source – female consultations);
- The certificate on divorce (a source –);
- Help under the form № 25 (a source – BRACS, is produced in case the father in the birth certificate is written according to mother).

In a parallel way with modelling of informational processes and creation of theoretical approaches to a supply with information of cross-industry systems of the electronic government concrete technical solutions were formed. They included, including, solutions on rise of availability of data bases and on collection and analytical data processing for definition of a demand of data bases. Besides, it was required to realise tools which will allow to refuse completely in due course expert estimations, leaning only against the facts.

On the basis of “pilot” the current complex solution including following main making (Fig. 2) has been worked out:

- **For the applicant:**
  - Portal «the State and municipal services (function) in St.-Petersburg» https://gu.spb.ru (further – the Portal);
  - The transportable application «the State services in St.-Petersburg (further – the Transportable application);
  - The multifunctional centre, which activity is completely automated in a subsystem «Internal electronic document circulation and office-work of multifunctional centre».

In system exterritorialities and omnichannel are realised. The applicant can access through the Portal, the Transportable application or multifunctional center (MC) and receive the information on all stages of processing of its statement in one place and without dependence from a way of call.

- **For Executive bodies of the state (EBS):**
  - Electronic office of the official – the unified solution intended for reception and processing of electronic statements, arrived through the Portal, the Transportable application or MC, and also for involvement support in the electronic interdepartmental interaction EBS, not having own departmental intelligence systems or not having possibility to realise in the systems of necessary electronic tools. It provides an availability of data bases;
  - Office of approvals – the solution intended for automation of difficult processes of interdepartmental negotiation during rendering of services in which the considerable quantity of participants (for example, warrants on production earthen, building and repair work is involved);
- **For handle of informational processes:**
  - Creation and performing of regulations of electronic interaction – a subsystem providing routering of data bases and performing of electronic regulations of allocation of service (business logician), including internal link between subsystems;
- **For heads and controllers:**
  - The register of the state and municipal services (functions) of St.-Petersburg (the Register of credentials) – the tool of the registration which contains detailed descriptions of all powers EBS, all state functions and services, allows to carry out their analytics. Provides refusal of expert estimations and an objective estimation of a demand of data bases;
  - Statistics – the analytics and registration tool intended for centralised collection, the analysis and storage of the statistical data about allocation of the state services without dependence from a way of their allocation. Provides refusal of expert estimations and an objective estimation of a demand of data bases;
- **For interdepartmental interaction:**
  - System of interdepartmental electronic interaction of St.-Petersburg (SIE SPb) – the unified complex solution intended for integration of departmental (branch) intelligence systems of regional and federal levels on a basis tools-oriented of the architecture and the concept of the uniform integration bus. It provides an availability of data bases.

At program level the main mechanism of interaction is the web tools (web services) providing an informational exchange by XML-messages. At interaction with external IS by means of web tools the tools-adapters – the special Javas-units intended for support of necessary transformation of transferred informational objects can be used in a format corresponding IS.

- **For safety:**
  - The information security system – complex solution on protection of the personal data, protection against unauthorized access etc. Distinctive feature of the given solution is usage of means and the software of domestic developers.

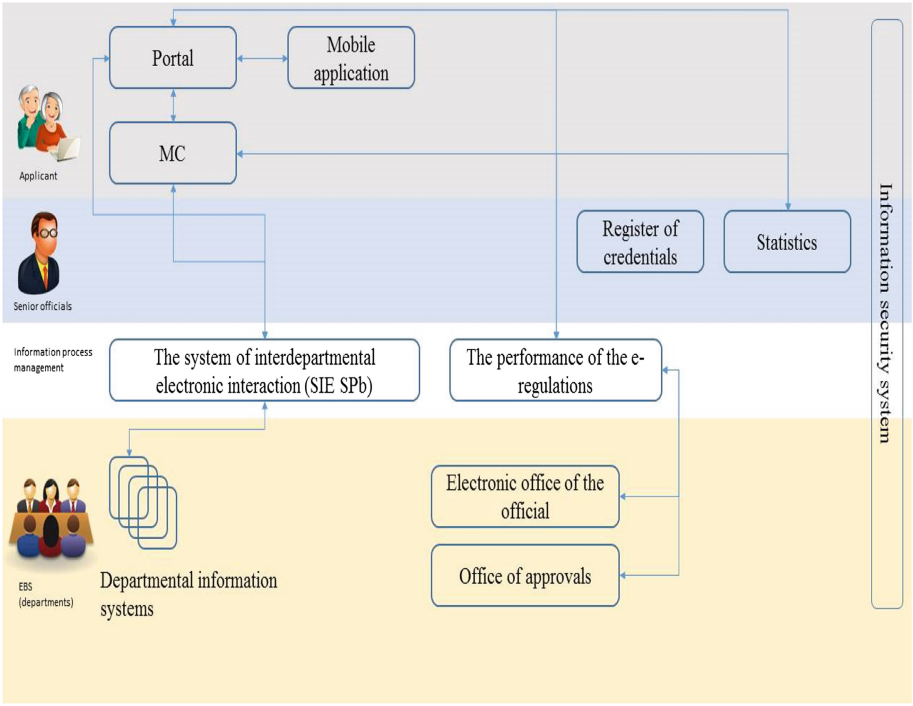

Fig. 2 The common architecture of system

5 Authentification of the Applicant

Authentification of the applicant – one of key tasks of construction of the electronic government as the electronic government assumes performing of legally significant operations in electronic form.

At the moment of the beginning of construction of the electronic government in St.-Petersburg the problem of authentification of officials has been solved. In 2005 has started operation Certifying centre of executive powers of the government of St.-Petersburg successfully functioning till now (certifying center EBS). Certifying center EBS provides representatives of persons EBS and the subordinated organizations with keys of the electronic digital signature under which certificates, including, identification and authentification of the authorised persons is carried out. Domestic algorithms of enciphering (now – State Standart P 34.10-2012 «Information technology are thus used. Cryptography protection of the information. Processes of creation and check of the electronic digital signature») and the domestic software of company KriptoPro.

However usage of mechanisms of a digital signature by the citizens who are not employees EBS and the subordinated organizations, is inexpedient. For this purpose it is required to equip a workstation of the user with resources of reading of carrier EP and to instal specialised program supports that demanded, first, special skills, secondly, essential financial expenses (about 5000 rbl.).

Nevertheless, in 2010 at federal level it has been declared the project beginning the Universal electronic card (UEC) in this connection all regional initiatives have been prohibited. Idea UEC has been borrowed, including, from foreign experience, for example, experience of an ID-card of Estonia, however such features of the RF, as huge territory and a considerable quantity of subjects thus have not been considered. UEC contained, including, the qualified digital signature, however the project has not been claimed (all in St.-Petersburg it is produced less than 3000 cards) and has stopped the existence since January, 1st, 2017. The project failure is linked by that specificity of locales has not been considered, thus financing of output of cards should be carried out at the expense of resources of the budget of subjects.

During existence UEC card technologies of identification and authentification have become outdated, having given way to transportable and biometric technologies.

Successful alternative became created with 2011 Uniform system of identification and authentification (USIA). Usage USIA does not demand from citizens presence of the additional equipment and the software, skills of their usage.

The main functionality USIA:

- Identification and authentification of users, including:
- Support of various methods of authentification: under the password, on a digital signature, and also two-factor authentification (under the constant password and the disposable password sent in the form of a sms);
- Support of levels of reliability of identification of the user (the simplified account, the standard account, the confirmed account).
- Conducting the identification data, namely – conducting registers physical, legal bodies, bodies and the organizations, officials of bodies, the organizations and intelligence systems;
- Authorization of authorized persons BS at access to the following functions USIA.

Call of participants of informational interaction to USIA should occur only on HTTPS protocol (to use HTTP protocol it is forbidden).

Developers of the state sites, portals and other web applications can give to the users possibility to enter into system, using account USIA. It saves developers of necessity to do own storage of accounts, to provide safety of storage of passwords, to develop mechanisms of registration, authentification of users, to support them in working order.

USIA uses standard SAML of version 2.0. SAML is based on language XML and defines ways of information interchange about authentification of users, their powers and the identification data. According to the terminology accepted in this standard, USIA appears in a role of the entrusted supplier of identification (Identity Provider), and the system appears in a role of the service provider (Service Provider). In ЕСИА the mechanism of authentification of the users, grounded on specifications OAuth 2.0 and OpenID Connect 1.0 extension is created.

For authorisation support in any intelligence system through USIA it is necessary:

- To register an intelligence system in the register of intelligence systems USIA and in the test environment;

- To fulfil finishings of integrated system for the purpose of support of support of the selected mechanism of identification and authentification;
- To connect the productive version of integrated system to productive USIA environment.

In open access on a site of the Ministry of communications and link all necessary regulations and methodical guidelines are placed. Now USIA is the main tool of identification and authentification of applicants at reception of the state services. One of foreign clones USIA is SingPass Singapore. IAIS EPS uses USIA for identification and authentification since 2013.

For today on change to card technologies transportable technologies and technologies of operation with biometric given (fingerprints, retinas of an eye, the person) come. Projects on application of these technologies already are spent today MasterCard, by the Savings Bank, Aeroflot, the World food programme of the United Nations and many other things.

In Russia since July, 1st, 2018 the Uniform intelligence system of the personal data has earned. The system provides processing, including collection and storage, the biometric personal data, their check and an information transfer about a degree of their correspondence to the given biometric personal data of the citizen of the Russian Federation. From the end of 2017 possibility to use for identification of the client the data of uniform system of identification and authentification (USIA), and also the data of the above-stated Uniform intelligence system of the personal data is given banks.

6 The Common Software and Development Tools

At the moment of the beginning of creation of the electronic government the domestic software market was слаборазвит. At creation of the state intelligence systems it was widely applied proprietary the software of the western production, mainly Oracle and IBM. Besides, resources of business modelling and software engineering of production of IBM were applied, however practice has shown inexpediency of their usage which demanded too big financial, time and human resources.

However in 2014, in connection with a new wave of the antirussian sanctions, in the country the course on import substitution has been taken that has caused necessity of intensive refusal from proprietary the western software.

By the current moment the domestic software market is in a creation stage is one of priority directions of Digital economy, the market of the domestic software and means of protection of the information is thus most developed. As intermediate solution in all other directions the domestic electronic government has been translated to the software with an open initial code. Translation was carried out without lowering of rates of the extension and functional development of systems, without the termination of their commercial operation. Operating systems of Linux set, database management system PostgreSQL, mySQL, MongoDB, a server of Apache applications, development language – Java are widely used.

7 Means

In sort of the big territorial remoteness of locales and separate objects in the locales sometimes remote, the problem of creation of an informational-technical infrastructure in the Russian Federation is actual to this day. The important feature of an infrastructure of the electronic government is necessity to provide high level of informational safety as electronic the governments assumes processing of the personal data.

Since 2002 in St.-Petersburg successfully develops and the Uniform multiservice telecommunication network of executive powers of the government (further – UMTNEBS), serviced by subordinated establishment of Committee on information and link by the St.-Petersburg state unitary firm "automatic telephone exchange Smolnogo" functions. By means of UMTNEBS the uniform protected telecommunication space which allows to provide safe access to the state intelligence systems is created and to connect city objects to the Internet.

Besides, in St.-Petersburg the Regional distributed data-processing centre (DDPC) – a technological platform for allocation of informational resources of St.-Petersburg functions. On powers DDPC, since 2012, expansion of the state intelligence systems is made. Now in DDPC 47 state intelligence systems are placed and the archive of city system of the video observation, 28000 observation cameras covering more with depth of archive of 7 days is stored.

IAIS EPS it is placed in DDPC. For its functioning it is selected over 50 virtual servers from 2 to 16 kernels and from 2 to 128 Gb of the RAM on the basis of Linux set operating systems. The system functions daily and round the clock.

8 The Reached Practical Results

For today the electronic government of St.-Petersburg unites more than 3 million users and represents a uniform platform of interaction of citizens, MC and authorities. Allocation more than 200 regional electronic services, more than 60 online payments and 18 online tools of transportable applications is realised. For representatives of business in building sphere for today on the Portal well already 63 services given in the electronic form.

In the Private office access to which is carried out through USIA, besides feed of electronic statements on the state services following possibilities are given to the user:

- Monitoring of the status of the put in statement without dependence from a way of feed;
- The information on the calculated penalties and payments;
- Subscriptions on notices on the various events linked to reception of the state services, for example, about possibility to pass prophylactic medical examination or approach of record to the doctor.

For today it is fixed an order of 100 million visitings of the Portal. The share of electronic calls from a total number of the statements submitted citizens has made 81,36%.

For today network MC, 350 services giving more, includes 57 stationary MC, 6 centres «My business» and 4 transportable MC. In 2018 development of network MC for business is started.

By means of a subsystem «Office of approvals» in 2018 it is spent more than 424 thousand negotiations.

By means of a subsystem «Electronic office of the official» in 2018 it has been handled more than 292 thousand interdepartmental inquiries.

By means of the automated system «the Register of the state and municipal services (functions)» (Register of credentials) and subsystems of Statistics the analysis of activity EBS is carried out. For today in the Register it is presented more than 3000 powers of authorities of St.-Petersburg, more than 300 types of data, 455 state services. 163 authorities in St.-Petersburg quarterly give statistics on the state and municipal services. Thanks to integration with state automated system data "Handle" are automatically transferred to federal level.

Users of SIE SPb are 83 regional enforcement authorities, 19 agencies of employment, 46 federal enforcement authorities and 111 local governments. The integration service bus of St.-Petersburg handles 130000 inquiries in day.

For metrics of success and efficiency of the electronic government are including results of annual monitoring of quality of the services, from year to year satisfactions of citizens showing high common level quality of rendering of services – in 2015 it made 89,2%, in 2016–90,9%, in 2017–91%, in 2018–92,41%.

9 Prospects for the Development of E-Government

Currently, a large-scale digital transformation of the interaction of the state with citizens and business is being carried out.

Digital transformation is based on the following basic principles:

1. Proactivity

Currently, the process of providing public services begins at the moment when a citizen applies to the EPG with an application and a package of documents.

In the proactive provision of public services, the initiator of the process is the state, which, on the basis of an analysis of the data known to it about the citizen, itself offers him to receive the services due to him.

The concept of "proactivity" is closely related to the concept of superservice. Superservice is a set of public services provided to a citizen upon the occurrence of a particular life situation (birth of a child, moving to another region, etc.). In the future, all public services included in the superservice should be provided on the basis of one application, formed proactively.

2. Expanding the boundaries of interaction with public services to public services and other commercial and non-commercial electronic services

The interaction of the state with citizens and business needs to be understood more broadly than regulatory public services. It is necessary to create and develop social

electronic services that citizens can use in their daily activities, as well as to enable businesses to promote their services in a trusted, state-guaranteed digital environment.

It is obvious that other services in addition to public services should also be provided to citizens proactively.

3. Direct participation of citizens and business in solving city-wide problems

Must be created by tools of direct participation of citizens and businesses in solving city problems, to create new projects, the development of "smart" cities and the solution to any problems of improvement, including needs to be implemented integration with social networks.

Currently, the development of a methodological framework for the introduction of a proactive approach, which will require the introduction of self-learning system and elements of artificial intelligence in the process of providing services. The final implementation of proactivity is planned to be completed by 2024.

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