

## SERBIAN NATIONAL INTEROPERABILITY FRAMEWORK

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### ABSTRACT

Serbian National Interoperability Framework intends to be a set of policies, standards and guidelines that the government uses to specify the preferred way, how its agencies, citizens and partners interact with each other. The aim of the National Interoperability Framework is to increase public sector efficiency by improving the quality of services provided at local, national and later on, in accordance with the EU regulations, at cross-border level, in the benefit of the citizens and businesses, and increasing the competitiveness of the country.

This paper presents the process of creation of the Serbian National Interoperability Framework and analyses the current state of the National Interoperability Frameworks in Europe and in the SEE region.

### I. INTRODUCTION

In the Information Age, public administrations are striving to leverage modern information and communications technologies (ICT) to improve radically the quality of their services to customers and the efficiency of their operations. Action on interoperability is essential to maximise the social and economic potential of ICT. ICT helps to create a collaborative model in which all public authorities are working together in order to offer better services, create more efficient and effective internal processes etc. The use of ICT in the Government is commonly referred to as electronic Government (e-Government). E-Government serves are an instrument of change to improve organisational processes in administrations and limit cost.

Republic of Serbia recognized the importance of e-Government outlining it in all key strategic documents of the Government. The reform and modernization of Public Administration, based on a wide use of information and communication technology (ICT) is seen as one of the key elements of the overall transition of Serbia into a modern knowledge society. The basic objectives, principles and priorities for improvements in the field of e-Government are defined in the strategic document "Electronic Government Development Strategy in the Republic of Serbia from 2009 to 2013" [1].

Providing better public services, tailored to the needs of the citizens and businesses, requires seamless flow of information across Government. This can be achieved through interoperability, which is "the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable sharing of information and knowledge" [2]. Government interoperability is the mix of policy, management, and technology capabilities needed by a network of organizations to deliver coordinated government programs and services [3].

Interoperability allows governments to manage their internal operations better. It also promotes international cooperation known as inter-government interoperability, which can help create the infrastructures necessary to solve cross-border problems.

### II. INTEROPERABILITY IN EU

In order to make a step forward towards achieving its goal to become most dynamic knowledge economy in the World, at the same time trying to address its most accurate societal challenges, the European Union through several initiatives (part of Europe 2020 Strategy) stresses the importance for European public administrations to provide efficient and effective cross-border e-Government services. Such services can be provided only through close collaboration, streamlined cross-border processes and trusted information exchange, based on interoperable ICT infrastructures and systems.

Although ICT has the potential to improve public services and democratic processes, and strengthen support to public policies, in order to maximize its social and economic potential lots of attention is paid on the interoperability. Interoperability has been recognized as crucial for effective and efficient delivery of European public services in all EU policy frameworks. In eEurope Action Plan 2005 for example, the Commission is called "to issue an agreed interoperability framework to support the delivery of pan-European e-Government services to citizens and enterprises". As a result of this, European Interoperability Framework (EIF) v.1.0 was created in 2004.

European Interoperability Framework defines a set of recommendations and guidelines for e-Government services so that public administrations, enterprises and citizens can interact across borders, in a pan-European context.

Acting as a driver for fostering modernisation of public services throughout Europe, the European Commission issued several programmes and policy frameworks, contributing towards ensuring interoperability in support of electronic information exchange among European public administrations. Some of the most important policy frameworks and programmes are:

- The IDABC programme - Interoperable delivery of pan-European e-Government services to public administrations, businesses and citizens, adopted by the European Parliament and the Council on 21 April 2004.
- i2010 - EU policy framework for the information society and media (2005-2009) [4]. It promoted the positive contribution that information and communication technologies (ICT) can make to the economy, society and personal quality of life;
- Digital Agenda for Europe (part of Europe 2020 Strategy) – successor of i2010 initiative with a goal to deliver sustainable economic and social benefits from a digital

single market based on fast and ultra-fast internet and interoperable applications

- ISA programme - Interoperability Solutions for European Public Administrations, adopted by the European Parliament and the Council on 16 September 2009 [5].
- e-Government Action Plan 2006-2010 [6]
- e-Government Action Plan 2011-2015 [7]

As a result of these activities, following its strategy to provide user-centred e-Services by facilitating the interoperability of services and systems between public administrations, as well as between administrations and the public (citizens and enterprises), at a pan-European level, the European Commission at the end of 2010 created the European Interoperability Strategy (EIS) and the European Interoperability Framework (EIF) for European public services. These two documents are two key elements in the Digital Agenda for Europe. Together, they promote interoperability among public administrations.

#### A. European Interoperability Strategy (EIS)

European Interoperability Strategy (EIS) [8] aims to provide guidance and to prioritise the actions needed to improve interaction, exchange and cooperation among European public administrations across borders and across sectors for the delivery of European public service. It sets out a common, coherent approach to interoperability with an agreed vision is that by 2015, interoperability will have significantly fostered European public service delivery through:

- appropriate governance organisation and processes in line with European Union policies and objectives;
- trusted information exchange enabled by commonly agreed, cohesive and coordinated interoperability initiatives, including completion of the legal environment, development of interoperability frameworks, and agreements on interoperability standards and rules.

The Strategy stressed out that the activities at EU and Member State level should be coordinated and interoperability governance at EU level should be established.

#### B. European Interoperability Framework (EIF)

The European Interoperability Framework supports the European Union's strategy of providing user-centred e-Government services by facilitating, at a pan-European level, the interoperability of services and systems between public administrations, as well as between administrations and the public (citizens, businesses). It is an action of the eEurope2005 Action Plan, under the e-Government heading. The European Interoperability Framework is based on the premise that each Member State has, or is in the process of developing, its national Government Interoperability Framework (GIF). Consequently, the European Interoperability Framework focuses on supplementing rather than replacing, National Interoperability Frameworks are established by adding the pan-European dimension.

### III. NIFS IN THE SEE REGION

In order to better define the scope of the Serbian Interoperability Framework we analysed several existing Interoperability Frameworks in order to identify the range of potential goals and components of an interoperability framework. Since specific goals and policies for interoperability may be defined differently by different countries, it should be possible ideally to derive the contents and character of an Interoperability Framework from an explicit set of such goals and policies. We therefore sought to identify a mapping from the goals of an Interoperability Framework to its composition, and we used this mapping to help develop recommendations specifying which components should comprise a Serbian Interoperability Framework.

In order to choose a small but representative sample of existing IFs for detailed analysis, we briefly examined a more comprehensive set, which we identified by a combination of literature search, web search, and input from the client. A good source was the National Interoperability Frameworks Observatory (NIFO) [9] project and its website. The objective of the NIFO is to provide an observatory of national interoperability frameworks (i.e. government interoperability frameworks) based on an analytical model allowing a comparison of different aspects of these frameworks.

The following table summarises the basic characteristic of the different National Interoperability Frameworks in SEE.

Table 1: Status of the NIFs in SEE.

Country	NIF Status	Version	Release Date
Croatia	Published	1.0	June 2010
Macedonia	Not Published		
Slovenia	Published		June 2009
Turkey	Published	2.0	February 2009
Romania	under adoption		
Greece	Published	2.0	May 2008
Bulgaria	Published	2.0	November 2008
BIH	Not Published		
Montenegro	Not Published		
Albania	Not Published		

### IV. GENERAL PRINCIPLES OF THE SERBIAN NIF

Serbian National Interoperability Framework intends to be a set of policies, standards and guidelines that the government uses to specify the preferred way, how its agencies, citizens and partners interact with each other. The aim of the National Interoperability Framework is to increase public sector efficiency by improving the quality of services provided at local, national and later on, in accordance with the EU regulations, at cross-border level, in the benefit of the citizens and businesses, and increasing the competitiveness of the country.

The National Interoperability Framework covers the interactions between government systems based on defined set of policies, standards and guidelines; it covers also the interactions between:

- Serbian Government and citizens
- Serbian Government and businesses

- Serbian Government and other institutions of the public sector and
- among the different institutions of the Serbian Government

The National Interoperability Framework will be applied in accordance with the following general principles relevant to the process of establishing interoperability on the Government level.

- Security and privacy;
- Transparency;
- Preservation of information;
- Openness & reusability;
- Technological and vendor neutrality;

#### V. LEVELS OF INTEROPERABILITY

Following the best practices from the European Interoperability Framework (EIF) v.1.0 [10] and the UNDP e-Government Interoperability Study Group [11], as well as the European Interoperability Framework v.2.0 [12], the Serbian National Interoperability Framework handles four levels of interoperability.

- Governance interoperability. Governance of interoperability accompanies the other three dimensions of interoperability and covers the political, legal, managerial, economic and technical aspects of interoperability. It provides continuous support for interoperability between legal instruments, business processes of the organisations, methods of information exchange, the services and components that support the delivery of a public service.
  - Political commitment; Strong leadership and political commitment are required for successful implementation of interoperable services and for ensuring interoperability across different administrative entities and levels.
  - Legislation; Changes in the existing legal framework must address the new requirements imposed by interoperability between Public Administration institutions as well as the use of electronic identity and digital signature. However, the most important issue is in the legislative area the change in the way quality, how the service is provided for the citizens and businesses, which implies all other necessary changes.
  - Coordination; Central coordination for strategy and the development of a National Interoperability Framework with participation from representatives from national, regional and local levels ensures leadership and at the same time inclusion of all stakeholders. Of course, there is a need for appropriate background support of this coordination activity.
  - Federalism; Institutions on the local, regional and central level are responsible for their own systems in order to ensure adherence to national strategies and the national interoperability frame-work
    - Cultural issues; Cultural issues must be addressed on a structured way by providing

more information, transparency and participation in the on-going efforts, discussions and implementation of processes.

- Human resources; In order to prevent shortage of staff who will understand the on-going changes and will have a proper technical background necessary to transform public administration, employees with specific knowledge needs to be looked after early enough. There is a need for supporting community, knowledge in the public administration, but even the awareness raising by the potential users is a key success factor of the interoperable service provision and usage.
- Organisational interoperability. Organizational interoperability is “concerned with the coordination and alignment of business processes and information architectures that span both intra and inter-organizational boundaries” [13]. It aims to bring about “the collaboration of administrations that wish to exchange information and may have different internal structures and processes” [14]. Specifically, business process or organizational interoperability “deals with common methods, processes and shared services for collaboration, including work flow, decision making and business transactions” [15].
  - Horizontal and vertical integration; Clear responsibility, ownership and management, as well as legal restrictions and organisational capabilities have to be taken into account.
  - Cross-organisational processes; Agreement is required on the ownership, management and responsibility of the processes. It should be used as an opportunity to reform all involved administrative processes making them more transparent and efficient.
  - User-centricity in service provision; Life-event model is the most widely adopted paradigm supporting the idea of composing a single complex e-Government service that corresponds to an event in a citizen's (businesses) life. One-Stop-Shop – supported by single sign on services - is a service method that horizontally integrates services of central and local level by establishing an integral information system with a common (single) point for access.
- Semantic interoperability. Information or semantic interoperability is “concerned with ensuring that the precise meaning of exchanged information is understandable by any person or application receiving the data” [16]. Information interoperability “enables systems to combine received information with other information resources and to process it in a meaningful manner” [14]. It also “provides a common methodology, definition, and structure of information, along with shared services for retrieval” [17]. This level of interoperability now does not exist in Serbia, and because of the lack of traditions, even its necessity is not commonly accepted.

- Technical interoperability. Technical interoperability is “concerned with the technicalities of connecting computer systems for the purpose of exchanging information or using functionality” [14]. It refers to standards and specifications that would enable coherent exchange of information among computer systems and involves setting principles, standards and guidelines for a common transfer mechanism, developing standardized meta-data and using a common language.

In order to facilitate the interoperability with and within Public Administration institutions, the starting point for the technical interoperability will be a catalogue of standards which contains a list of open standards and, when necessary, complementary applicable standards. On the other hand, it reflects again to the necessity of regulation, which has to ensure the following of the collected standards, and the mechanisms for the maintenance of this entire system.

#### VI. LEVELS OF INTEROPERABILITY

The foundations upon which the interoperable administrative services are built is the use of common infrastructure elements, which consists of common basic infrastructure elements, middleware and support services. Basic infrastructure refers to hardware, software and network resources that support the communication between people and organisations, access to information systems, and use of services. Support services and middleware ensure interoperability, security and re-use of resources

Following the European recommendations (in particular the European Interoperability Framework v2.0 ), the creation and operation of the developed, implemented and maintained e-Government services by the Serbian Government and different Public Administration institutions will be organized according to a defined conceptual model of public services presented on the Figure below.

The model highlights the need for using modular, loosely coupled components interconnected through infrastructure and working together to deliver public services. It can be divided in three layers each of which has its own internal modularity:



Figure 1: Conceptual model of interoperable public services (EIF v2.0).

- Basic public services layer; This layer groups three types of components: interoperability facilitators, services based on base registries, and external services. Some basic public services have been developed primarily for direct use by the Public Administration institutions that

created them, or by their direct customers, i.e. businesses and citizens, but are made available for reuse elsewhere with a view to providing aggregate public services. Others are generic and/or infrastructural by nature, while the remainder represent external services, i.e. services provided by third parties

- Secure data exchange/management layer; The exchange of official information that usually involves access to base registries should go through a secure, harmonized, managed and controlled layer allowing regulated information transfer between administrations, businesses and citizens. Since all access to basic public services passes through the secure data exchange layer, this layer is considered as central to the conceptual model.
- Aggregate services layer; by grouping a number of basic public services that can be accessed in a secure and controlled way, users (public administration, businesses, or citizens) can be offered aggregated public services. The coordination and arrangement of those multiple services exposed as a single aggregate service is done using service orchestration. Service orchestration support the automation of business processes by coupling loosely services across different applications and institutions.

#### VII. RECOMMENDATIONS FOR IMPLEMENTATION

The implementation of the National Interoperability Framework consists of several steps in which different instruments will be used, resulting with several outcomes:

The following instruments for the interoperability have to be developed in the coming years:

- Inventory of administrative procedures and provided services: it will contain procedures and services information classified by their computerization level, as well as information about the interfaces with the aim of favouring the interaction, or when it is necessary the integration, of the processes.
- Directory of semantic interoperability of the Administration: it will publish the models for exchange data, both common and sectorial, as well as the relative ones to common infrastructures and services, together with the associated definitions and codes.
- Directory of free reusable applications: it will contain the list of applications for its free reuse, including at least, the descriptive data relative to the application name, a brief description of its functionalities, use and characteristics, the in and output data, the license, the main applied open standards and development state.
- Catalogue of standards: it will establish a set of standards in a structured way and with the indication of the applied selection criteria. (The first proposal is in the annex of this document).
- Enterprise Service Bus for e-Government services: it will manage and log secure, harmonised processes for data exchange and service provision, it will be connected to the governmental portal and to other channels of communication with the public authorities, to provide the services according the requirements of the potential users.

The following technical regulations of interoperability have to be developed for the effective usage of capabilities of the interoperable service provision:

- Policy for digitization of records: it will include the applicable formats and standards, the technical conditions and metadata related to the digitization and the adequate, applicable for both paper based and electronic documents records management process.
- Policy of ensuring the authenticity and evidentiary force in the Administration: it will deal with the interoperability issues including the formats of signatures and other evidences, the creation and validation rules, the management of the policies as well as the use of time stamp references.
- Common data models: it will include data models that have a common character in the Administration and those that refer to subjects related to exchange of information with the citizens and with other administrations.
- Connection requirements to the communication network and service bus of Serbian Public Administration
- Procedures of authentic conversion among electronic and between electronic and non-electronic records.

#### VIII. MAINTENANCE AND SUSTAINABILITY

Achieving interoperability is an on-going and long process, which consists of many activities and involves many parties. It requires substantial investment in infrastructure, technology, human resources and knowledge. National Interoperability Framework and interoperability standards defined in it are not a static concept. They will change and grow as technology changes and as the need for the new organizational changes emerges. Therefore, a proper governance and decisive control over this process is important for the sustainability and maintenance of the Interoperability Framework. Appointment of a leading entity, which will be in charge and empowered to govern the interoperability development and implementation, is crucial for successful introduction and sustainability of interoperability and globally for the more effective public administration. The entity responsible for interoperability should be:

- separate from sectorial domains, which is necessary for the finding of commonly acceptable solutions;
- commonly accepted as expert in the field of interoperability;
- capable of working as a collaborative partner with all Public Administration institutions and other interested parties;
- proactive in the promotion and promulgation of standards, common solutions, and their use;
- responsible for monitoring usage of standards, guidelines, policies and protocols and for controlling of adherence to them;
- an advisory body to support Public Administration institutions in developing strategies, implementing solutions, coordinating cross-institutional aggregated services.

It should ensure that the common functionalities are developed once and used by all, and that common best

practices are developed (if it is more effective, accepted as standards), sustained and their implementation is monitored.

The transition process indicates the time during which current information systems, software applications, or electronic data/information resources will become compliant with the NIF. The transition strategy should be defined based on the current situation in the Public Administration, and its distance from the NIF specifications. During implementation of this strategy, the following will be considered:

- Changes occurring in the organization – there is a need to consider how much change is necessary in the Public Administration, the people involved in the changes and the thresholds for accepting change.
- Workshops have to be organized for all Public Administration institutions to create the awareness, to clarify the importance of NIF and the need for every Public Administration institution to comply with the set standards and policies.
- Establishment of a supporting team: there is the need to set up a team of IT and public administration professionals that will ensure the successful implementation of the NIF. The NIF Supervisory Board must be set up to monitor the process of implementation.

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