



D3.2 – PUBLIC SECTOR STUDY

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* PU = Public, CO = Confidential
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** R = Report, P = Prototype, D = Demonstrator, O =

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EXECUTIVE SUMMARY

As reported in D3.1: *"the main objective of the Work Package 3 (WP3) "Gap Analysis" of the Cloud for Europe project is to determine the position and perception of the European public sector about Cloud Computing and the vendor's Cloud services offering". "More specifically, WP3 should identify the gaps between the current market offering and the requirements of European Public Administrations in terms of cloud services". "The identification of the main gaps to be addressed enables a more effective selection and evaluation of the research and development services to be procured by the Cloud for Europe PCP".*

With D3.2 we recognise the need for analysing how the public sector in Europe is going to organize itself in the cloud computing environment. Firstly the cloud ecosystem in which we're going to work with pre-commercial procurement (PCP) is examined, including descriptions of future possible scenarios. Then we focus on "EU cloud strategy and policies", looking specifically how some EU governments are going to develop their own strategies or governmental cloud applications.

Following the description of the organization of public ICT sector, with particular attention to the ICT procurement, we describe marketplaces of cloud services for governments and public tenders of cloud services. Finally, we record lessons learned which - due to limited experience are rather immature at this time - but can give to us relevant instructions.

It is important to emphasise that in the Annexes you can find additional detailed information regarding the topics of particular chapters.

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ABBREVIATIONS

DA	Digital Agenda
G2B	Government to Business
G2C	Government to Citizen
G2G	Government to Government
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
INFS	National Institute of Social Security
IS	Information Services
MEF	Italian Ministry of Economy and Finance
MIS	Romanian Ministry of Information Society
PA	Public Authority
PaaS	Platform as a Service
PCS	Public Connectivity System
RAS	Rijks Application Store
SaaS	Software as a Service
SIFC	Integrated System Boards Functions

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1 INTRODUCTION

1.1 SCOPE AND GOALS OF DELIVERABLE

The scope of WP3 includes the assessment of the state of the art in the national and international context of cloud computing in public administrations, including research in the area of: projects and initiatives, commercial solutions and services, cross-border e-government services, procurement models and standards used in public sector and for specific public sector application domains.

In the context of the project, the output of D3.2 aims to be a contribution to the state of cloud adoption in the European public sector. We will describe how some European governments move in the cloud computing environment and the strategies and policies deployed in order to achieve their intended purposes.

D3.2 will provide the description of the degree of autonomy for each level of government in the countries examined: autonomy in the organization of both ICT systems and procurement.

In particular this work will focus on European public procurement with regard to providing an important linkage between the demand and the supply side of cloud computing services. (This should be a prerequisite to carrying out a correct "gap analysis".)

Initially the declared objective of WP3 was the analysis of the gap between the current market offering and the requirements of European public administrations in terms of cloud services.

As already declared in D3.1, we felt the need to go beyond the declared objective. First of all, we recognized the existence of the complex interrelation between the actors in a cloud system. Moreover, we felt the need to analyse not just the existing scenario, in which we find ourselves today in times of economic crisis, but also to perform an assessment of possible future scenarios.

This additional scope provides a gap analysis between the existing ecosystem of ICT services and a future cloud ecosystem that fulfils the strategic objectives of the European Commission, of the member states and of each actor in that scenario.



1.2 SCOPE OF THE DELIVERABLE IN THE DOW

In the following, we report the scope of the deliverable as defined in the Description of Work.

Deliverable D3.2 Public Sector Study. This deliverable includes information of the European public sector from the organizational and functional perspective; it describes the level of knowledge of cloud computing and the degree of implementation and acceptance of the cloud model in the public sector, the economic costs associated with the implementation of the model, the decision model followed to carry out the adoption of the service, requirements requested to suppliers, the risk analysis carried out, the means of monitoring the quality of the service, as well as the reasons that have influenced the non-adoption of the model. It describes key benefits for organizations that have adopted cloud computing, challenges experienced by public bodies after the cloud services implementation, degree of satisfaction of the organisations with the services provided by the vendors, next steps of the organisations and possible future implementation of cloud models

1.3 DOCUMENT STRUCTURE

The document is structured by chapter as follows:

- 1 The introduction describes the scope and the goals of the deliverables and the methodology used to pursue those goals.
- 2 A glossary of relevant terms.
- 3 A reference model to describe cloud ecosystems
- 4 Strategies for the development of cloud in public sector: EU policies and strategies focusing on the developments achieved by some EU member states.
- 5 The organization of public ICT sector: the degree of autonomy (especially for procurement) of public sector in every scale of government, from local to central level.
- 6 Experiences of cloud adoption in public sector: the infrastructures adopted by EU governments, the EU marketplaces of cloud services and some related public tenders.
- 7 Lessons learned

The final section provides a set of conclusions.

2 GLOSSARY OF TERMS AND CONCEPTS

C

Cloud marketplace	Online storefront operated by a cloud service provider, through which customers may subscribe to software applications.
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E

European Cloud Partnership	European Commission's initiative that aims to bring together public authorities and industry consortia to advance the objectives of the strategy towards a digital single market for cloud computing
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F

Framework agreement	An agreement between one or more contracting authorities and one or more economic operators, the purpose of which is to establish the terms governing contracts to be awarded during a given period, in particular with regard to price and, where appropriate, the quantity envisaged.
Free and open source software	Computer software that anyone is freely licensed to use, copy, study, and change in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software.

M

Multi-tenant	Cloud-based architecture where customers, organizations, and consumers are sharing infrastructure and databases in order to take advantage of price and performance advantages that come with economies of scale.
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P

Pay-per-use	Services tracked with usage metrics. The payment plans are based on the amount of the service used by the consumers, which may be in terms of hours, data transfers or other user-based attributes delivered.
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S

Single sign on

User authentication process that permits a user to log in once in order to access multiple applications.

3 A REFERENCE MODEL TO DESCRIBE CLOUD ECOSYSTEMS

As a consequence of the re-definition of the “gap” concept we have given in section 1.1, we felt the need to clarify what is meant by an “ICT ecosystem”. The definition of a model of ICT ecosystem described in this section is coherent with the principles of the “C4E Vision of cloud in Europe 2020” described in D3.1 section 3.4.1

Referring to D3.1 section 1.1, an ICT service ecosystem has the following properties:

- It is a complex community of clearly identifiable customers, businesses and institutions that work together to enable ICT services.
- It recognises autonomous organizations that behave like service providers, service consumers, organizations having both consumer and provider behaviours (intermediates, brokers ...) and organizations with special roles, as developers.
- In the existing scenario, most of the ICT services are provided as outsourcing services or as on-premise services; commercial cloud services from a public cloud provider cloud has a lower market share because market share of the internal on-premise cloud (as a replacement of traditional IT) is rapidly growing.
- Government, intended in a broad sense to include central and local administrations, schools, hospitals etc, is a subset of the actors in the ICT service ecosystem.

3.1 MODELLING THE SERVICE IMPERATIVE

The vision of Cloud for Europe embraces the definition of servicification, according to which everything is a service that a party supplies to another party. Figure 1 shows the service as the basic component of a model ICT ecosystem. It is a simple graph containing nodes and graphs. Nodes represent actors of the ICT service ecosystem, edges represent an ICT service contract.

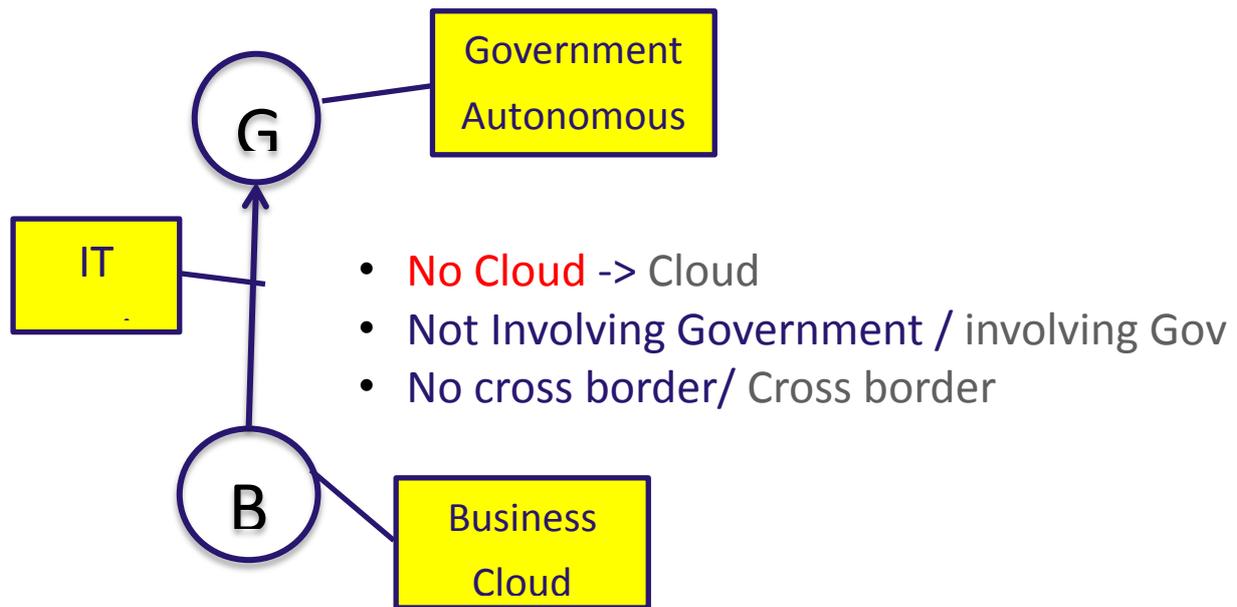


Figure 1: The contract as the basic component of the IT service ecosystem.

Figure 1 represents two actors: B in the role of ICT service provider, and G in the role of ICT service consumer, linked by a directed edge. The edge represents a contract for the provision of an ICT service. The figure shows some relevant properties of the contract (for example, the fact that the ICT service is cloud-based or not, that the two parties are established in different legal domains, as, by examples, different countries). Each link is implicitly associated to the value of the contract it represents.

3.2 MODELLING THE SERVICE COMPOSITION

In the Cloud for Europe vision, the future information system of a given public administration established in a given country could be modelled as a composition of services provided by different economic operators.

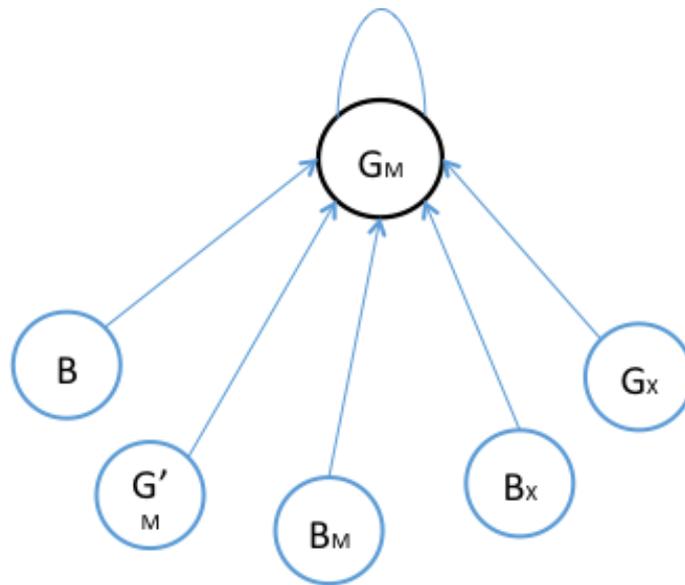


Figure 2: Modeling the service composition imperative.

Figure 2 shows the model of such public information system. G_M represents a government actor G established in country M . In this model, G_M behaves mainly as a cloud consumer. Its information system is built as a composition of ICT services self-provided or provided by the other actors in the model. Each edge is a representation of a contract for the provision of an ICT service with the following categories of cloud providers:

- B is a generic industry provider of ICT service;
- G_M is a government entity, established in the same country M , acting as an ICT service provider;
- B_M is an industry provider of ICT service, established in the same country M ;
- B_X is an industry provider of ICT service, established in a country X that is different from M ;
- G_X is a government entity, established in a country X that is different from M .

Each edge is a representation of a contract for the provision of an ICT service. The edges can be classified as follows:

- ICT services provided on premise (just legacy systems or as a consequence of a critical decision)
- ICT services provided via traditional outsourcing
- ICT services provided via private clouds, owned by the government of country M acting as a cloud provider



- services of private clouds owned by public administrations, acting as cloud providers, established in other countries
- services of public cloud providers established in country M
- services of public cloud providers established in other countries

3.3 MODELLING GROUPS OF ACTORS

In this document, a community is formed by a group of actors having common business requirements and common shared concerns (security, policy, compliance) in terms of ICT services. A community can include homogeneous actors having the role of ICT service providers, ICT service consumers or actors having a different role.

It is supposed that the (homogeneous) demand for ICT services could be aggregated.

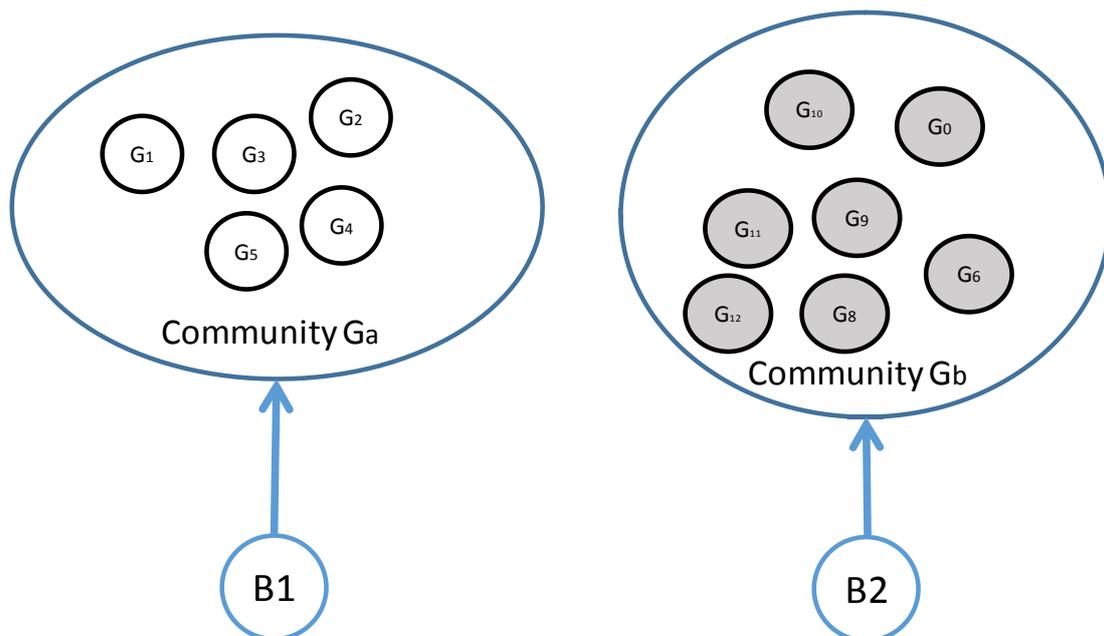


Figure 3: Modelling community based demand aggregation.

Figure 3 shows the modelling of two contracts, respectively between Community Ga and an ICT service provider B1 and between Community Gb and an ICT service provider B2. The proposed model does not explicitly state, how the community is formally represented as a party in the contract.

3.4 MODELLING SUBCONTRACTING AND DATA PROTECTION GUARANTEES

It is important to focus, at this point, on cloud contracts ecosystem, describing each player involved and emphasizing the importance of one of the main cloud barriers - the data protection issue.

The cloud computing technologies involve a range of different players. It is important to assess and clarify the role of each of these players in order to establish their specific obligations with regard to current data protection legislation.

- *The cloud client* (public administration in our case) determines the ultimate purpose of the processing and decides on the outsourcing of this processing and the delegation of all or part of the processing activities to an external organisation. The Data Protection Directive 95/46/EC defines a controller as "the natural or legal person, public authority, agency or any other body that alone or jointly with others determines the purposes and means of the processing of personal data". The cloud client, as controller, must accept responsibility for abiding by data protection legislation and is responsible and subject to all the legal duties that are addressed in Directive 95/46/EC.
- *The cloud provider* is the entity that provides the cloud computing services in the various forms discussed above. When the cloud provider supplies the resources and the platform, acting on behalf of the cloud client, the cloud provider is considered as a data processor i.e., according to Directive 95/46/EC "the natural or legal person, public authority, agency or any other body that alone or jointly with others, processes personal data on behalf of the controller".

Furthermore cloud computing services may entail the involvement of a number of contracted parties who act as processors. It is also common for processors to subcontract additional *sub-processors*¹ who then gain access to personal data. If processors subcontract services out to sub-processors, they shall be obliged to make this information available to the client, detailing the type of service subcontracted, the characteristics of current or potential sub-

¹ "Sub-processor" means any processor engaged by the data importer or by any other sub-processor of the data importer who agrees to receive from the data importer or from any other sub-processor of the data importer personal data exclusively intended for the processing activities to be carried out on behalf of the data exporter after the transfer in accordance with the data exporter's instructions, the standard contractual clauses set out in the Annex, and the terms of the written contract for sub-processing. (Decision 2010/87/EU, clause 1, let. (d)).



contractors and guarantees that these entities offer to the provider of cloud computing services to comply with Directive 95/46/EC.

All the relevant obligations must therefore apply also to the sub-processors through contracts between the cloud provider and subcontractor reflecting the stipulations of the contract between cloud client and cloud provider.

"Nothing in the Directive prevents that on account of organisational requirements, several entities may be designated as processors or sub-processors also by subdividing the relevant tasks". "However, all of them are to abide by the instructions given by the controller in carrying out the processing".

"In such scenarios, the obligations and responsibilities deriving from data protection legislation should be set out clearly and not dispersed throughout the chain of outsourcing or subcontracting, in order to ensure effective control over and allocate clear responsibility for processing activities".

*"A possible model of assurances that can be used to clarify the duties and obligations of processors when they subcontract data processing was first introduced by the **Commission Decision of 5 February 2010 on the standard contractual clauses for the transfer of personal data to processors established in third countries**". "In this model sub-processing is permitted only with the prior written consent of the controller and with a written agreement imposing the same obligations on the sub-processor as are imposed on the processor". "Where the sub-processor fails to fulfil its data protection obligations under such written agreement the processor shall remain fully liable to the controller for the performance of the sub-processor's obligations under such agreement". "A provision of this kind could be used in any contractual clauses between a controller and a cloud service provider, where the latter intends to provide services through subcontracting, to assure required guarantees for the sub-processing".*

"A similar solution regarding assurances in the course of sub-processing has been proposed recently by the Commission in the proposal for a General Data Protection Regulation. The acts of a processor must be governed by a contract or other legal act binding the processor to the controller and stipulating in particular that, among other requirements, the processor shall enlist another processor only with the prior permission of the controller (Article 26(2) of the proposal)"².

² Article 29 WP: "Opinion 05/2012 on Cloud Computing", pagg. 9-10.

3.5 THROUGH CLOUD ECOSYSTEM: MEASURABLE INDICATORS

In the framework described above, we can identify some **measurable objectives** of the Cloud for Europe project. The key indicators to measure the status and the evolution of an ecosystem of cloud government services are the following:

- cloud services market share: the market share of cloud services with respect to other legacy forms of ICT service provisioning;
- government cloud services value: the value of cloud services involving government as a party (acting in any role, provider, consumer or other);
- cross-border government cloud service value: the value of cloud services involving government and another party established in a different country (cross-border cloud services).

In other words, the goal of the project is to contribute to creating the conditions in order to accelerate the growth of the key indicators in the brief time.

3.6 EMERGING ICT ECOSYSTEMS

In a study prepared for the European Commission: *"Unlocking the ICT growth potential in Europe, Enabling people and businesses - Using Scenarios to Build a New Narrative for the Role of ICT in Growth in Europe"* [411], the following four different types of ecosystem have been identified and described:

1. **The digital savannah;**
2. **The digital rainforest;**
3. **The digital glasshouse;**
4. **The digital desert.**

Ecosystems 1 and 2 refer to scenarios with robust global economic growth (that is not, unfortunately, the current situation), while ecosystems 3 and 4 refer to scenarios characterized by a slow global economic growth (this is the current case).

In particular the main difference between the digital glasshouse and the digital desert is that in the first case we have an integrated EU digital single market.



The short-term goal is to switch from the risk of failing in the digital desert to a higher probability of creating a digital glasshouse ecosystem. This could be a better situation in order to switch, once the period of economic crisis is past, into the digital rainforest.

If we were able to aggregate demand, we could better participate in this ecosystem model, developing a European supply model that knows well its requirements, creating a more competitive European digital single market.

What will happen? Four plausible scenarios for the role of ICT in European economic growth

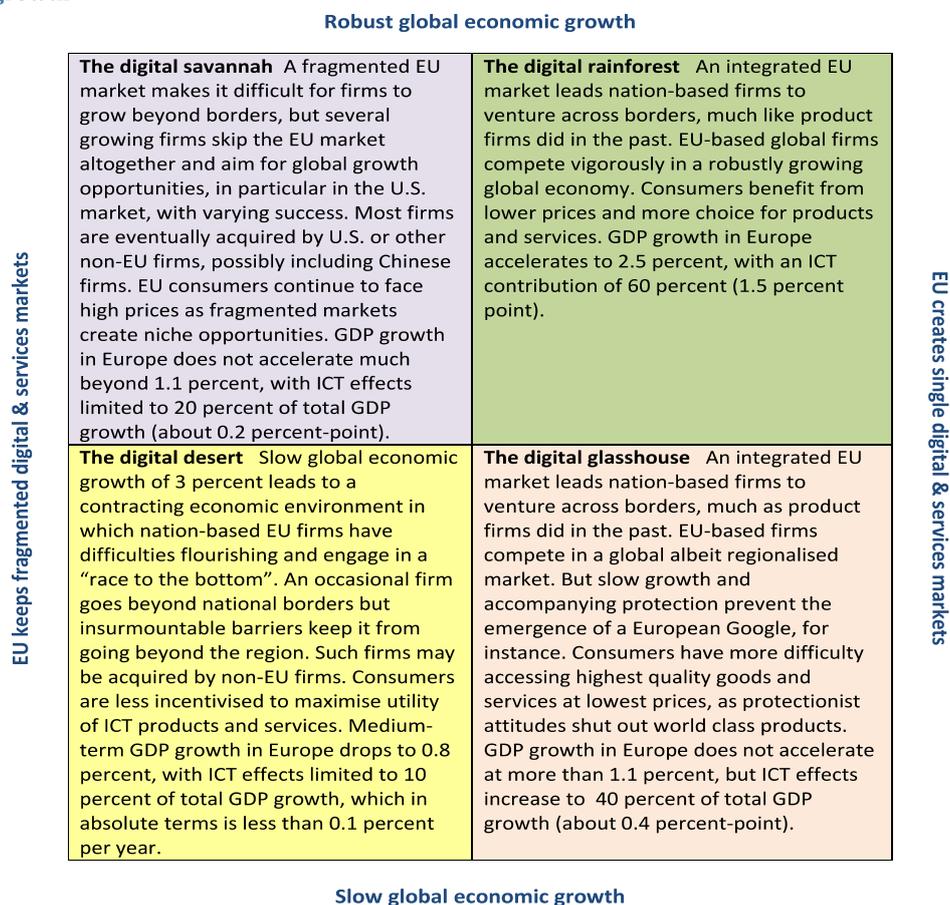


Figure 4: Four ICT ecosystem configurations.

4 STRATEGIES FOR THE DEVELOPMENT OF CLOUD IN PUBLIC SECTOR

4.1 EU POLICY AND STRATEGIES

"The European Commission has long been interested in the cloud computing industry, conducting public consultations as early as 2011 and as participants in earlier debates regarding the costs and benefits of cloud technologies. As already reported in Deliverable 3.1, in 2012 the European Commission announced its commitment to embracing cloud computing through a comprehensive strategy that lays out a framework for conducting research and exploring policy options to facilitate faster adoption of cloud computing in Europe. The strategy seeks to establish a common set of rules to develop a cohesive market structure among the EU member states for cloud service providers. Although the European Commission's strategy does not immediately foresee the creation of a 'European Super Cloud' – a dedicated cloud system for use across Europe in the public sector – one aim of the strategy is to ready the cloud market for public sector use. More specifically, the strategy states the EU policies will focus on 'enabling and facilitating faster adoption of cloud computing throughout all sectors of the economy which can cut ICT costs, and when combined with new digital business practices, can boost productivity, growth and jobs'. As part of the effort, the European Commission plans to address several key areas related to harmonizing laws across borders, consumer protection, contracts and transactional fairness, and standards development".³

Moreover, as reported in the previous paragraph, **Decision 2010/87/EC** was adopted and focused **"on the standard contractual clauses for the transfer of personal data to processors established in third countries"**. Furthermore it states that: *"This Decision should contain specific standard contractual clauses on the sub-processing by a data processor established in a third country (the data importer) of his processing services to other processors (sub-processors)⁴ established in third countries". "In addition, this Decision should set out the*

³ Urs Gasser and David R. O'Brien, THE BERKMAN CENTER FOR INTERNET & SOCIETY AT HARVARD UNIVERSITY, "Governments and Cloud Computing: Roles, Approaches, and Policy Considerations", Research Publication No. 2014-6 March 17, 2014, pag. 5.

⁴ "Sub-processor" means any processor engaged by the data importer or by any other sub-processor of the data importer who agrees to receive from the data importer or from any other sub-processor of the data importer personal data exclusively intended for the processing activities to be carried out on behalf of the data exporter



conditions that the sub-processing should fulfil to ensure that the personal data being transferred continue to be protected notwithstanding the subsequent transfer to a sub-processor". The sub-processing should only consist of the operations agreed in the contract between the data exporter and the data importer incorporating the standard contractual clauses provided for in this Decision and should not refer to different processing operations or purposes so that the purpose limitation principle set out by Directive 95/46/EC is respected (compare with "Clause 11" of Decision 2010/87/EU).

However, as cloud technology goes faster than the activities of the legislature, this issue is not only for the European Union and each member state, but is also a global issue. It still lacks a revised legal framework (within the context of privacy, but also within civil and criminal codes) that takes into account the innovation introduced by cloud computing and is able to provide adequate protection in respect of legal categories related to the adoption of distributed computing and data storage services.⁵ Just think, for example, that European legislation on data protection dates back to 1995. Furthermore in 2013 the "Data Retention Directive" was considered incompatible by the Court of Justice with the article 7 of The Charter of Fundamental Rights.

To solve the problem of legal fragmentation, an important policy change for the entire sector of electronic communications should have taken place by 2014, with the approval of a new general regulation on data protection **COM 2012 11 Final** [105] proposed by the European Commission. The new regulation will introduce the same rules in Europe and in relation with non-European states (hence rewriting the code of privacy) and this should help to make it less complex and risky to use cloud services. One of the important innovations of this reform will concern the extension of the notification of security breaches that relate to personal data to all holders of data processing such as, for example, banks, insurance companies, local health authorities, local public bodies. When required, the persons concerned will be informed without delay of loss or theft of their data.

after the transfer in accordance with the data exporter's instructions, the standard contractual clauses set out in the Annex, and the terms of the written contract for sub-processing; (Decision 2010/87/EU, clause 1, let. (d)).

⁵ GARANTE PER LA PROTEZIONE DEI DATI PERSONALI, "Cloud Computing, proteggere i tuoi dati per non cadere dalle nuvole", 2012, pag. 12.

4.2 PER COUNTRY POLICY AND STRATEGIES

This section contains public cloud policy and strategies from six European countries that have developed an initial approach to cloud computing technology. The goal is to **identify policy drivers** that boost cloud implementation and the **objectives to reach** by some EU Governments.

Country	Date of Strategy	Policy Drivers	Main Objectives
Portugal	2012	<ul style="list-style-type: none"> • Cost savings • Economic impact for the private sector • Improvement of existing public services 	<ul style="list-style-type: none"> • The introduction of cloud services in public administrations • Establish a framework agreement for the procurement of cloud computing services • Implementation of the GO-Cloud (Governmental Open Cloud), a platform with shared cloud services;
Italy	2013	<ul style="list-style-type: none"> • Cost savings 	<ul style="list-style-type: none"> • Rationalization of data centres
Netherlands	2011	<ul style="list-style-type: none"> • Improved and new modes of working for the central government • Cost saving 	<ul style="list-style-type: none"> • Closed cloud • Phased implementation • Cloud first policy
Spain	2011	<ul style="list-style-type: none"> • Cost savings • Economic impact for the private sector • Improvement of existing public services • Development of new public services 	<ul style="list-style-type: none"> • The SARA network is a national network interconnecting national, regional and local administrations. It is connected to sTesta. It is now evolving to provide cloud services, in a private cloud model. This network includes a datacentre dedicated to common services provided to administrations. This datacentre is currently growing over time, as the number of cloud services is growing.
Slovakia	2013	<ul style="list-style-type: none"> • Cost savings • More flexible and scalable information system • Faster deployment of public services • Robustness of public administration information system solutions 	<ul style="list-style-type: none"> • Creating a secure environment for citizens, businesses and public administration • Optimum use of information technologies in public administration through a shared services platform • Provide all type of cloud services • In order to make the use of cloud services easier for the consumers, they will be listed in a catalogue • 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)



Slovenia	2014	<ul style="list-style-type: none"> • Cost savings • Economic impact for the private sector 	<ul style="list-style-type: none"> • Increased innovation opportunities for service providers, including SMEs and public administrations, evidenced through implementations of advanced cloud infrastructures and services • Promotion of the reuse of open data and open service solutions in cloud environments, in particular published by public administrations • Reaching the high level of standardization by setting up secure Reference Architecture for Cloud Computing along the development the appropriate Reference Development Environment with priority on security
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Table 1 - Per Country Cloud Policy Drivers and Strategic Objectives.

Therefore, it is advantageous to build up a visualization, consisting of defined development steps, which shows the different stages of "depth", as illustrated below:

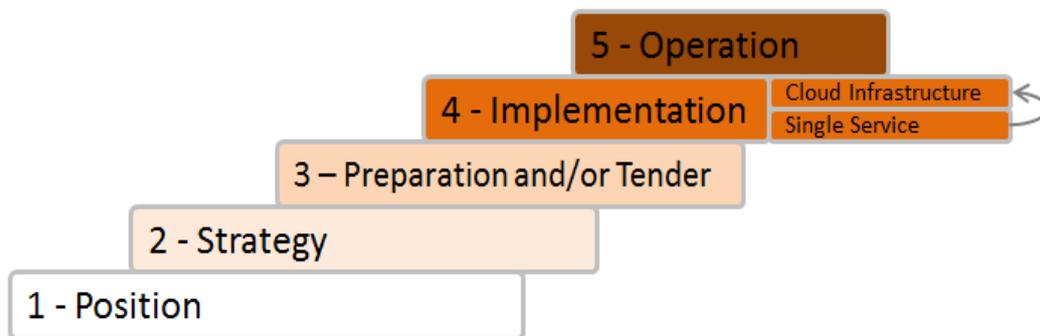


Figure 5: Development stages of a cloud strategy.

The government of a country or one of its regions:

- **Position:** has established and published a position on cloud computing that defines the main topics of the cloud-ecosystem.
- **Strategy:** has established and published a comprehensive strategy for cloud computing with full planning on how the cloud system will be realized. This stage is described above in chapter 3.
- **Preparation:** has made major preparations to implement cloud computing for government(s) as an internal action (direct integration) or within a tender process. Examples for this stage are described in section 6.4.
- **Implementation:** has reached the level of technical implementation of cloud computing, with or without a tender, differentiated either as "cloud standalone-applications" as described in section 6.2, or a centralized "cloud computing infrastructure" as described in section 6.1.

- **Operation:** runs a cloud computing-infrastructure or cloud standalone-applications. Some aspects of the operation are described in sections 7.3 and 7.4.

The currently relevant position of "G-Cloud" in UK could serve as a role model for the implementation of governmental cloud computing throughout Europe. Thus, some early adopters, for example in Belgium and Italy, are attempting to roll out G-Cloud infrastructures and service delivery. These attempts will enrich the European governmental cloud ecosystem with important insights and lessons.

Zwattendorfer (*et al*) has described in 2013 a comparison of cloud adoption in eight European countries: Austria, Denmark, Finland, France, Germany, Ireland, Spain, United Kingdom. From the results in the article it could be stated that almost all countries have described a position or even a strategy (5 out of 8) and some of them have already adopted and rolled out (2 out of 8) further steps towards implementation. As depicted in the model above, Europe's overall cloud adoption is between the second stage (Strategy) and the third stage (Preparation and/or Tender).⁶

An interesting fact is that almost all countries are focussing on a complete cloud-technology-stack – from IAAS, to PAAS and SAAS. Furthermore, it could be stated that the implementation of the project Cloud for Europe is running alongside development within the European member states and the project results could raise some important new aspects for the next developments in this field.

4.2.1 PORTUGAL

Facing the economic crisis in Portugal, the ICT modernization is perceived as a means to stimulate economic growth while realizing cost savings.

The council of ministers in Portugal has set up a group called GPTIC (Project Group for Information and Communication Technologies) in order to develop a global strategic plan to rationalize and decrease ICT costs in public administration. The plan was presented in 2012 and included 25 rationalization measures.

The cloud initiative is one of these. The intention is to take advantage of cloud computing to provide a more effective use of ICT resources at **lower costs** and **higher security levels**. Today the focus is to **create a national consensus for the use of the cloud computing**, to explore the possibilities and anticipate the fears from the users.

⁶ Zwattendorfer (*et.al*): *Cloud computing in E-Government across Europe – A Comparison* (https://online.tugraz.at/tug_online/voe_main2.getvolltext?pCurrPk=71140)



The objectives of the initiative are the introduction of cloud services in public administrations. Currently, AMA (the Agency for the Modernization of Public Administration) is undertaking this work to establish a framework agreement for the procurement of cloud computing services.

As part of the initiative, AMA has also considered the implementation of the GO-Cloud (Governmental Open Cloud), a platform with shared cloud services (though, currently on standby).

Main strategic objectives of Portuguese cloud initiative are:

- **Cost savings.** The cloud is an opportunity to reduce expenses in public administration, since it permits the consolidation of infrastructures, applications and benefits from the large scale effect;
- The **improvement of existing public services.** The centralization of systems in one single point contributes to creating new paradigms for existing public services;
- The important analysis of **the economic impact for the private sector** and the development of new public services.⁷

4.2.2 THE NETHERLANDS

The Netherlands' Cloud Computing Strategy provides an implementation and management strategy of the use of cloud computing within the Netherlands' civil service. The strategy is described in the *Letter on Cloud Computing* by the Ministry of the Interior and Kingdom Relations. This document mentions that "although cloud computing could certainly offer a number of useful facilities, at this point problems involved in implementing it tend to outweigh the benefits provided. Therefore, the Dutch Central Government promotes the implementation of Cloud Computing with certain caution." The **main identified problems** of cloud computing are the **immaturity of the market and data protection requirements**.

There are three main elements in the Dutch cloud computing strategy:

1. **The 'closed' cloud** – given the high uncertainty and data protection requirements, cloud computing will only be implemented within the central government internally. A closed cloud will be set up within the private network of the central government, which is managed by the central government's own ICT staff.

⁷ "Analysis of cloud best practices and pilots for the public sector", Appendix C to the Study Report – Country reports, Technopolis Group, September 20, 2013.

2. **Phased implementation** - when initial experiences have proved to be satisfactory, the central government will encourage the use of cloud computing on a larger scale. The cloud strategy does not make explicit criteria or indicators of when this phase of implementation will be entered.
3. **'Cloud First' policy** - Before making any new investments in ICT, central government departments, agencies, etc., will be required to assess whether there are any suitable services already available in the central government cloud, and, if not, to consider any safe, secure cloud computing options before adopting non-cloud solutions.⁸

4.2.3 SPAIN

The overall cloud strategy is managed by the general directorate of administrative modernization, procedures and for the promotion of eGovernment. The directorate depends on the Ministry of Finance and Public Administration and in particular gives advice regarding the administrative operational tasks, for eGovernment and services for citizens. In addition to a cloud strategy, it is also developing an open data strategy with the Ministry of Industry, Energy and Commerce.

Spain has considered two kinds of cloud services:

- **Infrastructure as a Service:** administrations will be able to benefit from on demand ICT infrastructures in order to implement their own applications and services.
- **Software as a Service:** these services are applications provided "in the cloud" by the Ministry of Finance and Public Administrations to potentially all administrations and citizens.

The SARA network is a national network interconnecting national, regional and local administrations and is connected to sTesta. It is now evolving to provide cloud services, in a private cloud model. This network includes a data centre dedicated to common services provided to administrations. This data centre is growing, as the number of cloud services grows. SARA provides the platform on which some eGovernment applications are currently provided in a cloud-based model (SaaS). IaaS services are also available on this platform for any administrations in Spain on a pay-per-use basis (billed to the subscribing administration). An on-demand database is currently the only IaaS service available, but on-demand processing and storage capacities will be provided soon.

⁸ *Ibidem.*



The main strategic objectives are, in the order, as follows:

1. **Improvement of existing public services**, by providing it on an easier shape: online.
2. **Cost savings**: the cloud model allows reducing costs by rationalizing ICT infrastructures (among others)
3. Analysis of the **economic impact of the private sector**: the cloud may involve additional players, especially private small businesses.⁹
4. **Development of new public services**, especially on the cloud that ease the deployment of new online public services.

4.2.4 SLOVENIA

The mission statement "Cloud Computing in Slovenia is a base for economic growth" was written in a long-term strategy document on cloud computing and issued in April 2014 by the Secretary of State in the cabinet of the Prime Minister.

Throughout the document there is a clear vision of different goals:

- Increased innovation **opportunities for service providers, including SMEs** and public administrations, evidenced through implementations of advanced cloud infrastructures and services.
- **Promotion** of the re-use of open data and **open service solutions in cloud environments**, in particular those published by public administrations.
- **Reaching the high level of standardization** by setting up a secure reference architecture for cloud computing alongside the development of the appropriate reference development environment with a **priority on security**.

There are three different deployment models of cloud services:

1. **State cloud** (D-r-O) represents infrastructure as a service, which is state owned and managed by the state as well. Infrastructure services are deployed on this, using sensitive and personal data as well as other data and information, which the state does not want to leave the state environment. D-r-O enables all state institutions (state budget beneficiaries) to quickly achieve their goals based on flexibility offered through cloud computing. It also offers a more price competitive approach compared

⁹ *Ibidem*.

with building their own data centres. The state will not charge those beneficiaries, although monthly reports on usage of resources will be provided for better transparency.

2. Hybrid cloud (H-r-O). IaaS will be set up according to recommendations and standards, and will be provided by the state. The state also does security measures and compliancy control. The difference with D-r-O is that this cloud is provided by industry but the data is still not allowed to leave the state. The service is paid by users, which in this case are indirect state beneficiaries, such as municipalities, institutes and agencies. Services deployed there can even be given in a deployment on D-r-O. Costs are dramatically lowered, as these are large-scale deployments and services or components that are interoperable can be even re-deployed on D-r-O. Savings on the state level are obvious, as these users are currently a burden on the state. Usage and payments are transparent in this case.
3. Innovative development cloud (I-r-O). Platform as a Service (PaaS) is targeting the development of new cloud solutions/services through the help of open data and open standards.

All these three clouds deployment models are using the same cloud concepts and its advantages, but are shown separately, as they are targeting different user groups and are supported through different business models and consequently the financial schemes behind them are different.

The Slovenian government could quickly shift citizens (beginners such as start-ups, young people, hardly-employable, invalids, unemployed) into new jobs with higher added value and into developing services, which are interesting for users and markets. Initial investments (in creating a service/program) are minimized (developers would only need their own computer and an internet connection). All other services are running within the "I-r-O" cloud environment, where the entire necessary infrastructure for developing and testing is given. Also the state will offer accessibility towards open data (portal NIO – national interoperability framework for data), with a strong leaning towards mobile applications and similar. On this cloud platform, the Slovenian government would also gather all services developed through state aid and start-ups, so the state would gain control of all the outputs provided by beneficiaries at one single point.



4.2.5 ITALY

The Italian Digital Agenda (ADI) was instituted in 2012 in order to deploy the European Digital Agenda. At the same time the Agency for a Digital Italy (AGID) was established with the operative task to develop the objectives of ADI. The ADI's strategy has been updated this year, and between the key points that will develop, it focuses on an issue regarding cloud computing in the Italian public administration: "The large number of government departments, and even more so the large number of locations in which they operate, and the layering of information needs and technologies adopted gradually over time,, has created a proliferation of data centres, particularly bearing in mind the constraints of administrative autonomy". "These, in most cases, consist of accommodation in which the installed server and network equipment are housed in conditions which compromise reliability and physical security". "These structures are highly inefficient in several respects: energy consumption, operating costs, the difficulty of updating and the use of less efficient technologies, inappropriate use of human resources and infrastructure resources, fragmentation and sometimes inadequacy of services offered to citizens and businesses". "The number and dispersion of the data centres makes it more difficult to implement policy management software and application sharing". "The particular uniqueness of the data, the different times of the various administrative actions and the lack of specialized skills, makes it difficult for a policy of interoperability between information systems, with further negative consequences in terms of the overall efficiency of the processes of the entire public sector and services for the citizens and businesses".

As shown in a survey, digital services are now being provided by public administrations on at least **10,000 points servers**, which **do not possess the minimum safety or guarantee requirements**. In addition, according to data produced by *Assinform* and *NetConsulting*, the Italian public sector system, for this set of inadequate infrastructure, **bears a current expenditure of more than 10 BEUR a year**.

For this reason AGID has developed a "*National Plan for the rationalization of data centres*" that provides for the **construction of new data centres consolidated in order to achieve levels of performance and security** necessary for the provision of such services, to date fragmented even for users. It is estimated that the potential savings achievable with the unification and rationalization of data centres could result in a **reduction in operating costs of 30% for the first two years and 50% in the following years**.¹⁰

¹⁰ http://www.agid.gov.it/sites/default/files/documenti_indirizzo/strategia_italiana_agenda_digitale_0.pdf.

4.2.6 SLOVAKIA

During period 2006-2013 the main objective of the Slovak Government was building basic eGovernment services on level G2G, G2C and G2B. An extensive set of e Government services has been accomplished.

In 2013 the Ministry of Finance SR, responsible for strategy and governance of Public Administration Information Systems (PA IS), prepared a "Strategic Document for Digital Services Growth and Next Generation Access Infrastructure (2014-2020)". This document defined services further developing G2C, G2B including SME support, Open Data, eInclusion, *et al* and services for effective and efficient public administration. It also defined a New Generation Access strategy. An important part of this document has been the strategy of government **cloud adoption as a basis for all PA services: so new services which are going to be implemented in period 2014-2020 as well as gradual migration** of services being operated so far. There is a **strong principle of "Cloud only" apart for MoD and National Security Agencies.**

This strategic document was approved by the Slovak Government in January 2014.

The Government Cloud strategy has been built on following principles:

- The Public Administration Cloud will be **built as a Government Private Cloud within the first period** in order to guarantee high security and privacy protection and legal restrictions.
- Services on level of IaaS, PaaS and SaaS will be provided
- The highest quality government data centres will be converted to Government Cloud Service Providers (GCSP). In May 2014 Slovak Government already approved that two GCSP will be established on the basis of DC of Ministry of Finance and DC of Ministry of Interior).
- **The Government Cloud will be built on standards** compatible with EU recommendations in order **to achieve interoperability**, portability and security within the Government Cloud as well as cross-border with other MS PA Clouds.
- **New processes will be created in relation to government cloud** in area of cloud development **planning, budgeting, procuring** and operations including metering of services by particular PA bodies (instead of billing in a commercial pay-per-use model since government bodies cannot pay each other).
- High service quality and availability given by **SLA will be guaranteed by GCSPs and audited by independent auditors.**



- **Only certified services will approved for use in the government cloud.**

The strategic document including Government Cloud Strategy has been incorporated into a Partners' Agreement between the Slovak Republic and the EC for 2014-2020. Preparation work including detailed architecture, governing methodologies and a road map of concrete project have been running. Some pilots have started: Cloud for Municipalities and Consolidation of PA IS to DC of Ministry of Finance.¹¹

¹¹ Strategic Document for Digital Growth and Next Generation Access Infrastructure (2014 – 2020)- Slovakia, pag. 105.

5 THE ORGANIZATION OF PUBLIC IT SECTOR

Chapter 1.4 in Deliverable 3.1 identified the key areas where the gaps are concentrated, as they can be derived from the existing literature. One key area concerns organizational issues.

This chapter provides an overview of the organization of the public sector in the following countries: Austria, Italy, Netherlands, Portugal, Romania, Slovakia, Slovenia and Spain.

Section 5.1 provides a quantitative overview of the institutional organization in each selected country and its different administrative layers. In section 5.2 the organization of the information services within the different layers of public sector per country is discussed. The focus is on the relative autonomy of the public bodies per governmental layer. Finally, section 5.3 is about ICT procurement within the public sector. The focus in this paragraph section is also on the relative autonomy of the public bodies per governmental layer with regard to ICT procurement.

The selected member states are the procuring countries of the project and three additional countries are involved in the project:

- Procurers: Italy, the Netherlands, Portugal, Romania, Slovakia
- Additional: Austria, Slovenia, Spain

In terms of population, they count in total about 165 million inhabitants, one third of EU citizens, so they represent a significant sample of the situation in the European Union.

5.1 ORGANIZATION OF THE PUBLIC SECTOR

The Tables 2 and 3 below provide an overview of the selected countries in terms of their total population, the number of ministries and its citizens (table 2). Table 3 provides information about the various levels of public sector and about the number of hospitals and schools.

Each level of the public sector, the group of hospitals in a country and the group schools in a country are supposed to be examples of communities, as defined in section 3.3.

Some clarifying remarks can be made. Not all countries have "regions". The number of schools mentioned is often an aggregate of the various schools like primary and secondary



schools, higher schools and universities. The number of hospitals mentioned in Spain is for the large hospitals only, the smaller ones are not included. Aruba, Curaçao, Sint Maarten are countries within the Kingdom of the Netherlands. Bonaire, Sint Eustatius and Saba are “special municipalities” of the Netherlands. They are not included in the tables.

Country	Population	Area km2	Government	Ministries	Citizen/Ministries
Austria	8.150.835	83.858,00	Federal Semi-Presidential Republic	13	626.987
Italy*	59.394.207	301.340,00	Parliamentary Republic	13	4.568.785
Netherlands*	16.851.246	41.526,00	Parliamentary Democracy	11	1.531.931
Portugal*	10.514.800	92.212,00	Unitary semi-presidential constitutional republic	13	731.084
Romania*	20, 020,100	237.500,00	Semi-presidential Republic	17	1.177.652
Slovakia*	5.410.836	49.035,00	Parliamentary Republic	13	416.218
Slovenia	2.060.805	20.273,00	Unitary Parliamentary Constitutional Republic	13	158.523
Spain	46.725.164	505.990	Parliamentary Monarchy	13	3.594.243

Table 2 - Country information (*Governmental organizations of these countries are procurers of the joint PCP).

Country	Administrative Divisions				
	Level 1** (forms of devolution to territorial, e.g. länder, regions, ect.)	Level 2** (forms of devolution to territorial, e.g. departments, districts, provinces, ect.)	Level 3** (forms of devolution to territorial, e.g. municipalities, cities, Regions, ect.)	Schools**	Hospitals**
Austria	9	84	2.381	5.913	285
Italy*	20	110	8.071	12.000	730
Netherlands*		12	403	8216	351
Portugal*	18 + 2 Autonomous regions (Islands)	308	4.260	3.638	207
Romania*	-	41	2951	no data	381
Slovakia*	8	79	2.933	2.649	126
Slovenia	13	211	-	830	87
Spain	17	52	8.117	no data	96 (level 3, large)

Table 3 - Public administration data per country (* Governmental organizations of these countries are procurers of the joint PCP).

Detailed results are in the Annex I to this Deliverable.

5.2 ORGANIZATION OF INFORMATION SYSTEMS IN PUBLIC SECTOR

This section provides an insight in the organization of information systems in the public sector per country. For this purpose, an ad hoc survey has been performed, by means of interviews and desktop research.

Figure 6 presents the result of the survey for each target country. Specifically, it represents a raw estimation of the level of autonomy of each public body in different levels of public sector, with regard to the following dimensions: policy definition, strategies, long-term planning, budgeting of the information system.

The autonomy of an organization is evaluated according to the following three levels:

- 0: no autonomy, all the decisions are taken by other organizations;
- 1: the organization perceives a certain level of autonomy, or it is involved in the decision process regarding the Information system (for example, through negotiation, a proposal-approval process);



- 2: the organization perceives a high/full level of autonomy.

Country	Ministries	Administrative Divisions					Citizens / autonomous IS
		Level 1**	Level 2**	Level 3**	Schools**	Hospitals**	
Austria	13	9	84	2.381	5.913	285	1293
Italy*	13	20	110	8.071	12.000	730	2836
Netherlands*	11	-	12	403	8216	351	1833
Portugal*	13	20	308	4.260	3.638	207	1257
Romania*	17	0	41	2951	N/A	381	345174
Slovakia	13	8	79	2.933	2.649	126	932
Slovenia	13	13	211	-	126	87	4510
Spain	13	17	52	8.117	N/A	96	5553

Figure 6: Distribution of autonomous IS in the target countries.

For each country and for each community, Figure 6 shows the number of actors in the community and the level of autonomy of each actor in that community. The level of autonomy is represented by a colour, according to the following:

- green coloured communities: the information systems are not autonomous. Usually the Information Systems (IS) belonging to this class of communities are managed according to common rules and common policies established by other organisations;
- yellow coloured communities: the information systems are partially autonomous, even if, at the end, Information Systems (IS) belonging to this class of communities are managed according to common rules and common policies established by other organisations;
- red coloured communities: the information systems are substantially autonomous.

According to the result of the survey, in most of the EU countries, most of the government bodies manage their information systems with a high level of autonomy, that is, their information systems are autonomous.

Finally, the projection of the collected data on the whole European Union brings to estimate the existence of about 200.000 autonomous government information systems.

Detailed results of the survey are in ANNEX II: Survey on Public information systems.

5.3 ORGANIZATION OF ICT PUBLIC PROCUREMENT

This paragraph provides insights into the organization of ICT procurement in the public sector per country. For this purpose, an ad hoc survey has been performed, by means of interviews and desktop research. For each targeted country Figure 7: Distribution of autonomous ICT procurement centres in the target countries. presents a raw estimation of the level of autonomy of each public body at different levels of the public sector, with regard to the following dimension: procurement of supplies and services for the development of their own Information System.

The autonomy of an organization is evaluated according to the following three levels:

- 0: very limited autonomy, most of the procurement processes are centralised, performed by other organizations
- 1: the organization perceives a certain level of autonomy
- 2: the organization perceives a high/full level of autonomy

For each country and for each community, Figure 7 shows the number of actors in the community and the level of autonomy of each actor in that community. The level of autonomy is represented by a colour, according to the following:

- green coloured communities: the procurement processes are not autonomous. Procurement could be centrally managed;
- yellow coloured communities: the actors belonging to these communities are partially autonomous. By example, part of the IT services are procured centrally, the other part are procured autonomously;
- red coloured communities: each actor of the community procures IT services autonomously.

According to the result of the survey, in most of the EU countries, most of the government bodies procures IT services autonomously. Finally, the projection of the collected data on the whole European Union brings to estimate the existence of more than 150.000 autonomous procurement authorities.



Detailed results of the survey are ANNEX III: Survey on Public procurement.

Country	Ministries	Administrative Divisions					Citizens / autonomous procurers
		Level 1**	Level 2**	Level 3**	Schools**	Hospitals**	
Austria	13	9	84	2.381	5.913	285	1293
Italy*	13	20	110	8.071	12.000	730	2836
Netherlands*	11	-	12	403	8216	351	1833
Portugal*	13	20	308	4.260	3.638	207	2224
Romania*	17	0	41	2951	N/A	381	6653
Slovakia	13	8	79	2.933	2.649	126	257659
Slovenia	13	13	211	-	126	87	4510
Spain	13	17	52	8.117	N/A	96	5553

Figure 7: Distribution of autonomous ICT procurement centres in the target countries.

5.4 KEY FINDINGS

The evident result of the survey is that the public demand and the procurement of IT services in the European Countries are still very fragmented.

Fragmented demand, which often results from weakly integrated markets, can be a strong inhibitor of entrepreneurial activity as it reduces the size of the potential market (and even more so for those operating in a niche), and consequently limits the rewards for risk taking relative to the required investments. This can apply in particular to cases where large initial investments may be needed upfront in development and marketing but where the subsequent marginal cost of production is very low.

6 EXPERIENCES OF CLOUD ADOPTION IN THE PUBLIC SECTOR

The present section describes how governments and administrations in Europe are involved in the adoption of cloud computing services currently. The adoption of commercial (third party provider) public/or private cloud services is at an early stage in Europe. But in most countries public administrations are implementing or already using on premise private/community cloud services, hosted in public administration data centre. UK G-Cloud is a "first mover" and there are some first steps from early adopters. This means that the experiences in cloud computing are scattered and rather fragmented and within the single approaches in different depth within the European countries.

To obtain an additional "in-depth"-insight in recent attempts in government cloud computing in Europe, in the following section 6.1 a description is provided on how member states, which are involved in the project "Cloud for Europe" are handling cloud computing in several field of activities, such as tender-preparation, marketplace-offerings, cloud-infrastructures and applications, and the lessons learned. In sections 6.2, 6.3 and 6.4 the focus is on descriptions of available examples. In addition to the member states selected to be the project's procuring countries, there are three additional countries involved in the project:

- Procurers: Italy, the Netherlands, Portugal, Romania, Slovakia
- Additional: Austria, Slovenia, Spain

6.1 GOVERNMENT CLOUD INFRASTRUCTURES

6.1.1 ITALY

The ICT reference architecture of the Italian public sector is represented by the Public Connectivity System (PCS), which consists of a "*set of technical rules, shared infrastructure and basic services, complying with the rules for the creation of interoperable services on the network*" (Digital Administration Code, Legislative Decree no. 82/2005). In the face of prevailing historical association of PCS aspects of the network, a renewed vision of the same places more emphasis on the context of interoperability and co-operation at the application



level: PCS becomes the ICT architecture for the interoperability of the Italian public administration, including a framework of rules and guidelines.

It is possible to identify two main categories of stakeholders involved in the definition architecture first introduced: *users* and *subjects of the system*. *Users* are individuals who do not contribute to the actual constitution of the architecture but use the services offered by the same. Included are citizens, professionals and private companies. *Subjects of the system* are all those people who contribute to the establishment and governance of the ICT reference architecture. Included are the public administration, ICT companies operating in the market, managers of public services and bodies involved in governance.

Concerning the infrastructure, the model is structured according to the traditional "stack" of cloud computing paradigm (i.e., IaaS, PaaS and SaaS) where the emphasis is placed on the service and not on the product, even for levels of infrastructure. In general, the hardware and software infrastructure is "multi-tenant" (i.e., in multi-property) and shared among multiple users; resources are managed in a pool in order to guarantee savings and high scalability even in the face of a higher number of accesses to the services in the network. In fact, they are assigned and re-assigned depending on the actual application. Each level exposes a set of interfaces to the level above. The interfaces are open, possibly multi-standard, so as to allow ubiquitous access, and unified reliable services at all levels, as well as strong re-use and interoperability. The model and interfaces at each level are defined through specific technical rules and guidelines issued by AGID, with monitoring by the aforementioned bodies of governance of the use of these interfaces, according to the technical regulations.

The PCS includes a framework of rules and guidelines that allow for the completion of the following past processes to:

- improve the relations of exchange between public administrations and businesses and citizens;
- make electronic payments through the use of any digital instrument;
- effectively implement the process of dematerialization and retention of documents;
- manage the entire computer protocol with possibilities for files across multiple administrations;
- improve access to network services, also through the use of federated identification mechanisms and the exchange of data through the use of databases of national interest (Article 60 of the DAC), so that the citizen can avoid providing their personal data more than once and get access to a wider plethora of available services;

- increase the level of security of information systems of the public sector, with the ability to respond promptly and effectively to the various threats and attacks on security (Articles 50, 51 DAC); digital identities; the platform of intelligent communities; the services sector verticals (e.g., electronic health dossier); databases of national interest; open data; data centres.¹²

6.1.2 THE NETHERLANDS

The data centres of the Dutch central government are an important part of the (cloud) infrastructure. In 2013 and 2014, 66 data centres were merged into four new and modern data centres. Migration from the old data centres to four have been completed over the last two years. The four data centres will in the first phase organize their own redundancy (twinning, backup, contingency). Early 2014 preparations have started to further consolidate and rationalize the data centres (data, hosting and applications). These data centres will form the heart of the closed governmental cloud (see 4.2.2). In 2014 the RAS, (Rijks Application Store), platform for distribution of apps, will be in place (see 6.3.3).

Connectivity between the datacentres and between central government institutions is part of a vision that is currently in place. Implementation of this vision will be harmonized with the consolidation of datacentres as an overall programme for the realisation of the governmental cloud. The vision provides for connectivity in a closed virtual network (RON2.0), composed of some existing main networks, for central government data, voice and video and connection of the four datacentres. It also offers through standards and interfaces the option for secure connectivity with other governments (provinces and municipalities), citizens and businesses, even across national borders (sTESTA network). Due to the fact that the existing networks have a national coverage, this infrastructure, in combination with a new secure wifi technology, gives the opportunity to the government of total digital connectivity without dependency on the internet.

6.1.3 ROMANIA

Since 2010 Romania has assumed the development and implementation of the requirements of the Digital Agenda for Europe. The DA comprises all the domains that need to be developed within the European Union until 2020, including Action 1 – “eGovernment, interoperability, network security, information system security, cloud computing and social

¹² http://www.agid.gov.it/sites/default/files/documenti_indirizzo/architettura_it_pa.pdf.



media". The Ministry for Information Society (MIS) is the responsible authority for the implementation of the Digital Agenda within Romania, therefore the cloud computing strategy for our country is represented within the general document which encompasses all the discussion points from the DA. In July 2013, the position paper concerning the Romanian Cloud Strategy was published by MIS. The paper also states the current situation of cloud implementation within Romania, what needs to be done in the short-term and what is envisioned for governmental cloud in the near future.

Current situation:

Cloud adoption by public organizations/institutions is not very much different from cloud adoption by private organizations/institutions. The public sector expects - by adopting cloud computing Infrastructures – to significantly reduce costs and increase the quality of services delivered through cloud platforms. As the benefits of cloud use are quite relevant, the implementation of such infrastructures in Romania is desideratum and in order for economic development to be at its utmost efficiency and rapidly introduced to the public sector, three main conditions have been set to place – in accordance with the *"Unleashing the Potential of Cloud computing in Europe"* [101] document published by the European Commission:

- Standardization of data series and application;
- Lawfulness of terms and conditions for contracts;
- Establishing a European Cloud Partnership to support innovation and growth in the public sector.

Infrastructure:

The scope of infrastructure is related to one or a few services, shared service infrastructure, central service infrastructure. The governmental cloud in Romania has a double role and thus there is a need for implementation of a public cloud infrastructure for the management of the G2C and also the need for the implementation of a hybrid cloud infrastructure – public and private cloud - for the management of G2B and G2G.

Currently in Romania the governmental cloud infrastructure is being developed through the implementation of the project entitled ICIPRO – cloud infrastructure for public institutions from Romania.

The objectives of this project are as follows:

- to develop a cloud computing platform in support of the Romanian public institutions, promoting the efficiency, the transparency, and the development of public services for citizens and business community.
- to develop a cloud platform, based on professional standards, safe and secure infrastructure, etc.
- to host various public institutions' information system (such as ERPs, budgeting, etc.)
- the delivery of an interoperability platform (SOA) for the public institution system;
- a user and access rights management platform for public bodies;
- the hosting of public data;
- to host a digital library for various public documents (public documents digitalized) delivered by different public administration bodies.

Stakeholders (owner, operator, customers, beneficiaries):

- Public institutions (ministries, agency, etc.)
- The business community
- Citizens

6.1.4 PORTUGAL

With its intention to implement its "Global Strategic Plan" during the period 2012-2016, the Portuguese government is strongly committed to rationalizing and decreasing ICT costs in public administration.

According to the plan, ICT rationalization must actively contribute to the reduction of public administration costs in general.

Besides the emphasis on cost reduction and the rational use of ICT, namely by the adoption of common platforms for horizontal solutions to all PA, the plan further references three relevant dimensions that must be taken into account: the enhancement of administrative change and modernization in PA, the improvement of governance mechanisms and the stimulation of economic growth.

As a primary issue, Portugal is facing a heavy fragmentation of ICT structures in its PA. It is common for every entity to have its own technical area or data centre which in most cases is entirely owned by the entity itself with a strong lack of synergies regarding the sharing of data centres or the services needed for their maintenance.



With the objective of greatly reducing such practices, the plan aims, first of all, to create a governmental cloud, taking advantage of technological innovations to have more flexible, transparent and better managed ICT solutions, with higher security levels at lower cost and providing a more effective use of ICT resources (both technical and human). Further, it intends to ensure the existence of conditions for a better integration and standardization of data and applications — Governmental Open Cloud (GO-Cloud). This Governmental Open Cloud could be private, community or hybrid.

At the same time, ESPAP, the Portuguese governmental central purchasing body, is completing the preparation of a model for the launch of a framework agreement with the objective of delivering cloud computing solutions to PA. Initially, the proposal intends to consider the deployment of e-mail, file-sharing, storage, e-IDM and housing services.

6.1.5 SLOVAKIA

The first project compliant with the Slovak Government cloud adoption strategy was “DCOM” (Data Centre of Municipalities) launched at the end of 2013 after a preparation and tendering process.

Municipalities were selected as the most suitable customers of cloud-based services due to the high number of public administration subjects with an almost generic set of services, differing only in regard to the intensity of exploitation related to municipality size. DCOM was built jointly by ZMOS (Association of Municipalities) and the Ministry of Finance, which is responsible for public administration IS governance.

DCOM is going to serve most of the 2,900 municipalities, ranging from less than 500 citizens to 20,000 citizens with more than 1,000 municipality offices. DCOM will provide services based on life-events for citizens, services for businesses, services supporting municipality back-office processes including most frequent ERP-systems and will provide access to eGovernment services. All services will be provided as certified, multi-tenant SaaS.

DCOM will go live in 2016.

The first DCOM operational experience is expected after tests later in 2015.

DCOM will offer some important benefits:

- Reduced demand for office ICT staff and local ICT support
- Reduction of office staff-provided services and reduction of corresponding costs
- Services integrated to central eGovernment services and registers

- ICT infrastructure cost reduction in municipal offices

6.1.6 AUSTRIA

A comprehensive Austrian Cloud infrastructure, such as a central Cloud-platform or a central Cloud marketplace still does not exist. The “Corporate Network Austria Next Generation” – the CNAX – represents a central solution for a governmental network as a service (NaaS), therefore it represents a main component of an infrastructure as a service (IaaS) and could be defined as a pre-cloud solution. The CNAX represents a service for all institutions of the public authorities and legal entities. It offers an economical and efficient communication infrastructure for all authorities, a platform for universal data exchange and shared services (SAP, DNS, Portal Austria, etc) and a support for multimedia services such as data, voice and video transmissions. The technology is based on a MPLS technology (multi-protocol label switching), with well-defined, separated and protected address ranges and a classification in different domains:

- “Federal Domain (private network for authorities)” and
- “Global Domain” (internet access)

The internal network of BRZ (CNBRZ) and finance (CNF) are in the same network for historical reasons. There are firewall systems on every network transition. At critical points intrusion prevention systems (IPS) are installed. Every customer has its own network label. All branch offices of the same customer with the same label are able to communicate directly over the can. All other network communication has to be allowed on the firewall systems. Every CNA customer has access to the shared services in the Providing Area BRZ (Federal Domain). Particularly sensitive networks get their own firewall systems (CALs). The CNA connectivity also allows access to the Internet (Global Domain) for our customers.

Number of customers:

- 50 customers with hundreds of subordinated departments
- 500 access routers and leased lines
- Approximately 100 firewall systems

Major customers are:

- Federal Ministry of Justice (172 law courts and prisons)



- Federal Ministry of Finance (141 tax and customs offices)
- Federal Office for Metrology and Surveying (82 departments)
- Federal Ministry of Labour and Social Affairs (31 labour and social security offices)
- Universities and school inspectors (25 locations)

The future plans for CNAX are a further expansion of the bandwidths and the full IPv6 implementation. Therefore, the backbone routers and firewall systems will be replaced to get 100% IPv6 functionality. The implementation of multi-cast routing (e.g., for video streaming) and the encrypted MPLS connections to the core (IPsec) will be additional modernisations.

6.1.7 SPAIN

The Spanish public administration favours a model of private cloud, taking as the starting point the use of its own technology infrastructure resources. This infrastructure has as its cornerstone the private "Red SARA" network, the Spanish Public Administrations Network, which is connected to the sTESTA Network deployed by the European Commission. "Red SARA" network provides the interconnection of physical offices of all the government layers within Spain (national, regional and local). Currently, it covers 90% of the Spanish population. Several shared services are provided to the administrative units connected to SARA, as the platform of validation of electronic certificates and the eDelivery platform. As a consequence of this solid reality, the Spanish High Council for eGovernment in its meeting held on 15 January 2013, declared SARA as a strategic project and the basis for the Spanish Public Administration private cloud. As the meeting was chaired by the Ministry of Finances and Public Administration, this declaration gives the project an unprecedented political backing.

The initial decision, to rely on its own technological infrastructure to build the Spanish public administration cloud, is not incompatible with the use of public cloud solutions. Furthermore, the government supports exploring the use of virtual private cloud adapted to the specific needs of public administrations.

The adoption of SARA as the cornerstone of the Spanish public administration cloud will be accompanied by future legislative actions. Thus, in the foreseen reform of the national interoperability framework, which is part of our legal framework, are included provisions that aim to encourage the adoption of cloud-computing by government, extending to the cloud model the concept of sharing, re-use and collaboration, which are quite traditional in the open source development model in its application by the public administrations.

Some of the services already provided are enablers of the eGovernment, such as the eInvoice services, eDelivery services, and eID and eSignature services. Most of the services provided in cloud are provided as SaaS. Future plans include IaaS but a more flexible architecture of server/storage/network will be needed. There are also plans for providing cloud-based services also for the citizens (similarly to the ones provided in SARA to the private companies).

The Ministry of Finance and Public Administration is responsible for the "red SARA" upgrade and maintenance. The users of the cloud services provided by "Red SARA" are all the administrative public bodies within Spain. However, the usage of the majority of these services relies on a voluntary basis. The beneficiary of the implementation of the Spanish Public Administration Cloud is the administration, as it can benefit by huge savings as a consequence of centralizing the ICT, but also the citizens, as they will be able to access public services by internet.

6.1.8 SLOVENIA

The current state analysis performed in 2014 confirmed that the ICT resources in Slovenia (applications, data and technology) are too dispersed, and inefficient budget spending due to the lack of commitment to common goals was identified. Therefore, a strategy for ICT consolidation and cloud computing was developed and approved by the government. Unfortunately, the change of the government and the upcoming early parliamentary elections has slowed down the necessary reforms.

The strategic documents of Slovenian government favor a hybrid cloud approach as explained in Chapter 4.2.4. The infrastructural bases for the private (State) part of the cloud are the existing hosting capabilities and the private "HKOM" network, the Slovenian Public Administrations Network. "HKOM" network interconnects physical offices and governmental institutions from 1,100 different locations with more than 2,368 LAN and 1,580 hire connections. Various core services are provided to the administrative units, economic sector and citizens such as e-Signature with time-stamping, e-social security interoperability platform, IPP/ITDL system (E-democracy), eGovernment portal with over 70 web applications etc. This existing PaaS and SaaS should be readily integrated into the private cloud and complemented from the SaaS developed by the public cloud provider.

The Ministry of the Interior is responsible for "HKOM" network and two larger data centres providing hosting, PaaS and SaaS. The prime beneficiary is the central public sector. Some of the services provided for the citizens are also free of charge (e.g., digital certificates).



6.2 GOVERNMENT CLOUD SERVICES

The full description of the experiences in each member state in realizing cloud standalone applications is in Annex IV.

6.3 MARKETPLACES OF CLOUD SERVICES FOR GOVERNMENT

“A cloud marketplace is an online storefront operated by a cloud provider.”¹³ The second way a marketplace could be established represents a centralized storefront to other cloud providers, e.g., the UK G-CloudStore. Both shapes of cloud marketplaces are established in the governmental cloud world. The initiatives of the Flemish G-Cloud or the attempts from Singapore’s G-Cloud can be cited as examples of the first kind of cloud. An example of the second kind of cloud would be the first mover, UK G-Cloud. Due to the fact that the majority of European countries run their own computing centres it should be taken as granted that most countries will move towards the first kind of G-Clouds, presumably mixed with hybrid versions, in which the state-owned computing centres are strongly involved.

However cloud marketplaces nowadays, and more and more in the line with “Cloud Brokers”, provide more than the access to cloud services; they offer additional services, which provide legal, organisational, technical or operational added value services. For example, the UK G-CloudStore offers an inclusive process to apply services to the G-Cloud, as it is described below (6.3.1). Other services are in the commercial area, meaning a centralized accounting or billing service.

The main reason cloud marketplaces have been established are twofold: first and foremost to reach higher market share, such as the GovCloud from Amazon (AWS-Cloud), or the vendor- or integrator-owned marketplaces, e.g. Microsoft, IBM, HP and many other companies. This applies more to the providers’ own market. Presumably the more interesting points for governmental organisations are the higher legal certainty and the cost-effectiveness, and presumably the ease (time to service) of participation in a G-Cloud environment. To receive an overview on “certified” services in a fast moving ICT-ecosystem as filtering system of high-quality applications could be another reason. G-Clouds offer the opportunity for all kinds of enterprises, but especially for SMEs, to enter a very important market and thereby making it

¹³ <http://searchcloudprovider.techtarget.com/definition/cloud-marketplace>

empirically stable and solvent. Thus, both sides could hope for advantages by getting closer to a cloud marketplace.

Advantages of cloud marketplace	
<u>Government</u>	<u>Companies</u>
Legal certainty	Scope and visibility (eg sales)
Overview on services	Benchmarking
"Time to service"	Added value services
Comparison and higher quality	
Pricing advantages	
Added value services	

6.3.1 UK G-CLOUD

The UK G-Cloud represents the central cloud market store for the UK Government. The main focus of G-Cloud lies in the easy and proven provision of cloud services for the governmental agencies. The service of G-Cloud consists of "framework agreements", which allow the supplier to offer their services to the government and for the government to use these services directly without a time-consuming tender or other procurement. The framework agreements are based on calls/tenders in G-Cloud with a defined timeframe for the opportunity to offer the services. The services are visible in the Cloud Store, with a classification in four categories. The third aim is the data centre consolidation, an "an ongoing effort to close unused or underused data centres across UK government agencies to reach an optimal number of data centres."¹⁴

On 23 May 2014, G-Cloud 5 went online with 1,132 suppliers and a total of 1,518 suppliers in the Cloud Store and over 17,000 services. 88% of these are SMEs.¹⁵

Link: <http://govstore.service.gov.uk/cloudstore/>

6.3.2 THE ITALIAN MARKETPLACE - MEPA

The Electronic Market P.A. (MEPA) is a digital marketplace where enabled administrations can buy, for values below the EU threshold, the goods and services offered by providers

¹⁴ <http://searchcloudcomputing.techtarget.com/definition/G-cloud-government-cloud>

¹⁵ <https://digitalmarketplace.blog.gov.uk/2014/05/23/cloudstore-update-2/>



authorized to submit their catalogues on the system. The MEPA marketplace is managed by Consip, the main national procurement authority.

Consip defines specific calls with the types of goods and services and the general conditions of supply, manages the qualification of suppliers and the publication and update of catalogues. By accessing the showcase Electronic Market or browsing the product catalogue, the administration may apply the provision of goods and/or services and, once enabled, make purchases online, comparing the proposals of several suppliers and choosing the one best suited to its needs.

This method of purchase, because of its peculiarities, is more suitable for fractional purchases and needs.

The main advantages of Electronic Market for the Government are:

- Time savings in the process of acquiring goods and services under the threshold;
- Transparency and traceability of the entire buying process;
- Widening of choice for the government, allowing the comparison of products offered by suppliers across the whole country;
- Satisfaction of both general and specific needs, through a broad range of products available and the ability to issue requests for bids.

For suppliers:

- Decreasing trade costs and time optimization sale;
- Access to the market of the public administration;
- Opportunity to enhance their own business even if small;
- Competitiveness and direct comparison with the reference market;
- Opportunity to present itself on the whole national territory;
- Lever for the renewal of the sales process.

On 19 November 2009, as part of the event European eGovernment Awards 2009, the Electronic Market was proclaimed winner of the "eGovernment empowering Businesses". The European eGovernment Awards aim to promote the implementation of policies and strategies of eGovernment, rewarding the most innovative solutions developed in the context of public services to citizens and businesses.

The motivation is expressed as follows: the MEPA is a highly innovative initiative. The impact to government institutions is high, but it is equally important to SMEs. The project has also secured the engagement of users through training and communication plans that include,

among other things, the formation of branches; the award is given to CONSIP as recognition of the value of the APRM in improving access to public services by businesses, creating business opportunities and generating savings for businesses, in particular SMEs.

The process of development of the Electronic Market, along with that of its conventions, has the quality certification ISO 9001: 2008.

Currently in MEPA's catalogue, public administrations can find only an "IaaS services' Tag" through which they can buy cloud services. There isn't a dedicated e-Marketplace for this purpose.

6.3.3 THE NETHERLANDS APP MARKETPLACE - RAS

The Dutch central government is experimenting with an internal marketplace for apps. This marketplace is called RAS (Rijks Applicatie Store), a platform for the distribution of apps. The RAS runs on the closed governmental cloud (see 4.2.2). The RAS and the Apps in the RAS are to support the mobile working civil servants of central government. The RAS can also be used as a distribution mechanism for functionality in general, to push software to other devices (pc's, notebooks) if needed. The RAS is maintained and managed by a central government ICT department.

The RAS, as application store for central government, is accessible to the civil servant (with access control). It is a software system from which a set of software is offered with various functionalities. This software can be installed on a device by the civil servant. The apps offered are for business or general support.

As previously stated, the RAS is currently in an experimental phase and it is expected that it will be fully operational by the end of 2014.

In addition, some public bodies have placed apps in commercial app-stores. P-Direkt is the HRM service organisation for central government, serving 123,000 civil servants. An iOS and Android app is available in the commercial stores for civil servants. With this app people can manage or book leave. Managers can use the app for administrative HRM tasks.

6.3.4 HELIX-NEBULA (SCIENCE CLOUD)

Helix Nebula represents the central science cloud for the use of European scientists – overall as co-operation for data intensive science. Helix Nebula doesn't focus only on scientists. It also attempts reach out to governments, businesses and citizens as well. The cloud has been



established as co-operation between big scientific players and big economic players (overall 23 organizations). Helix Nebula was generated from a European project lasting two years (mid 2012-mid 2014) with an EU-funding of 1.8 million Euro. The research within Helix Nebula is based on Use-Cases in the scientific world – from CERN, EMBL, ESA and PIC.

Helix Nebula intends to run a marketplace called "HNX".

Link: <http://www.helix-nebula.eu/>, HNX=<http://hnx.helix-nebula.eu/>

6.3.5 AWS GOVCLOUD

AWS GovCloud represents the G-Cloud efforts from Amazon Web Services as an isolated AWS Region. The service addresses the governmental organizations' need for "specific regulatory and compliance requirements".¹⁶ AWS GovCloud received an ATO (an Agency Authorization to Operate) from the US Department of Health and Human Services for utilizing a FedRAMP-accredited third party assessment organization: "The Federal Risk and Authorization Management Program" (FedRAMP) is a government-wide program that provides a standardized approach to security assessment, authorization, and continuous monitoring of cloud products and services."¹⁷

Link: <https://aws.amazon.com/de/govcloud-us/>

6.4 PUBLIC TENDERS OF CLOUD SERVICES

Mainly considered as a tender of a whole ICT system, which effectively means a cloud system, it seems obvious these kinds of tenders exhibit additional characteristics. Alongside the technical and system-oriented parts of the tender, there are business- and consulting-related topics, which enhance the overall implementation and operation of all-inclusive cloud systems.

Nonetheless it is fair to say, that despite the cost-driven necessity of cloud computing, the number of public tenders is rather low today, which could be indicative of different causes. It would presumably mainly be the novelty of cloud computing as a new technology approach and the uncertainty with the operational handling of this new technology, as well as the obvious and often-stated lack of trust and uncertainty that exists with respect to the

¹⁶ <https://aws.amazon.com/de/govcloud-us/>

¹⁷ <http://cloud.cio.gov/fedramp>

application of inter-European regulatory frameworks. Cloud computing nowadays apparently means quite a multi-dimensional paradigm shift, even when preparing a public tender. But, nevertheless, the early adopters have already made great steps in the tendering for cloud computing. It seems that, now or at least quite soon, the momentum from the lessons learned from the UK G-Cloud could be absorbed by these early adopters, and eventually formalized into the preparation of "standards".

The following chapter describes the first attempts in public tenders from the following cases:

- The tender mechanism in the UK's "G-Cloud" project
- The tenders in Belgium – Flanders
- The tender in Italy
- The tender in the Netherlands
- The tender of Singapore as an example from abroad

6.4.1 TENDER MECHANISM IN UK'S G-CLOUD PROJECT

The cloud computing marketplace from UK's "G-Cloud", the CloudStore, continuously opens procurement tenders from which new services are evaluated and subsequently, via frameworks, are included into the marketplace. On 23 May 2014, Tony Singleton stated in his blog entry on G-Cloud: "G-Cloud 5 is now live with 1132 suppliers. This brings the total number of suppliers on CloudStore to 1518 and over 17,000 services. 88% of these are SMEs."¹⁸ The mechanism of the calls, as the tenders are called in G-Cloud, means that all suppliers (new and existing ones) have to apply to the next round of tendering to enter the new framework (G1, G2, G3, G4, G5, and so on into the future)¹⁹ The timeframes of the frameworks are overlapping, so it is necessary to apply again, when an earlier framework runs out.²⁰ Right now the G5-stage is open and G3 is over.

The application process of G-Cloud consists of the following steps:²¹

¹⁸ <https://digitalmarketplace.blog.gov.uk/2014/05/23/cloudstore-update-2/>

¹⁹ „Framework“ in this context means a list of services

²⁰ "A new version of the G-Cloud framework is released about every 6 months. Each version of the framework runs for 12 months so frameworks will overlap." (From the G-Cloud website)

²¹ <https://www.gov.uk/government/publications/apply-to-supply-services-through-g-cloud/apply-to-supply-services-through-g-cloud#email>

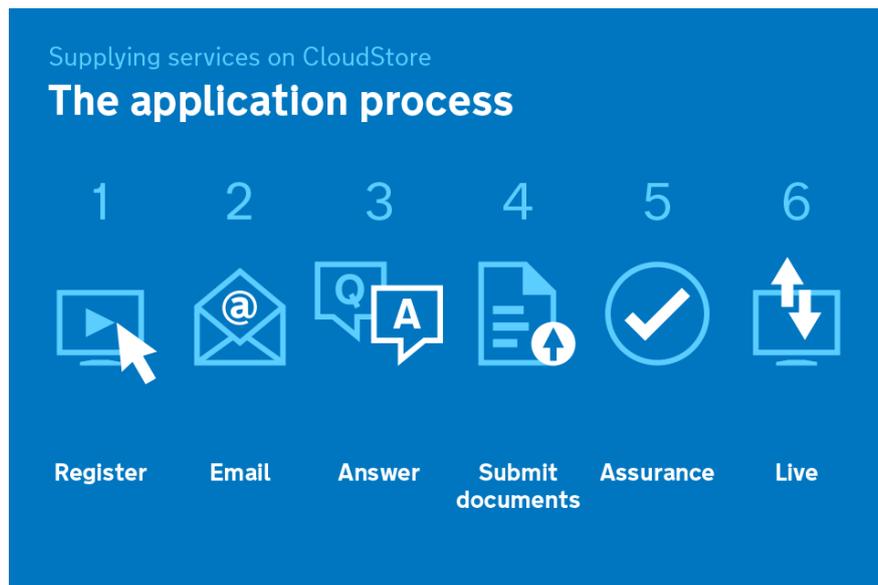


Figure 8: The application process in G-Cloud.

The first step is to register as a potential supplier on the "GPS eSourcing Suite" (including "Data Universal Numbering System" DUNS) to become a "known" entity in G-Cloud (1). New suppliers have the opportunity to express their interest by sending an email to expressionofinterest@gps.gsi.gov.uk (2) at which point an application is opened. After login and acceptance of the invitation to tender, some information on the proposed service has to be answered following NIST's²² definition of cloud computing services in the GPS eSourcing-system (3). The next step consists of the submission of service details and documents in the service submission portal (SSP) within the four existing categories IaaS, PaaS, SaaS and specialist cloud services (4). Following this, the GPS checks the information provided is aligned with the "G-Cloud definitions"²³ within the assurance process which consists of a maximum of two rounds. First, the quality of the description of the service, and, if that is approved, the service management and commercial details (5). If the tender process is passed successfully, the supplier receives an approval that the applied services are accepted in the framework agreement and the services will be available in the CloudStore "as soon as the framework goes live".²⁴

Existing suppliers can make major updates to services already included or apply new services after a new G-Cloud framework is published.

²² <http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>

²³ <http://gcloud.civilservice.gov.uk/supplier-zone/assurance/g-cloud-definitions/>

²⁴ from the G-Store-website

For example: The tender process in G4 had the following timetable:

Planned tender milestones:

DATE	ACTIVITY
06.08.13	Publication of the OJEU Contract Notice
06.08.13	Clarification period starts
06.08.13	e-Sourcing Portal opens
04.09.13 at 15:00	Clarification period closes
13.09.13 at 15:00	Deadline for the publication of responses to Clarification questions
23.09.13 at 15:00	Deadline for submission of Tenders to the Authority (Tender Submission Deadline)
16.10.13	Intention to award notification issued to successful and unsuccessful Potential Providers.
17.10.13 to 28.10.13	10 day standstill (in accordance with Regulation 32)
29.10.13	Expected Commencement Date for Framework Agreement(s)

Figure 9: Schema and timetable of the tender process.

6.4.2 THE TENDERS IN BELGIUM

THE FLEMISH TENDER

In April 2014 the Flemish Government granted an operating framework contract to HP Belgium and Belgacom (together known as “HBplus”) for service delivery from April 2014 to the end of the year 2015. The contract has a value of 400-500 MEUR and is expected to offer services to the whole Flemish region. The government intends to receive services as ICT as a service, meaning that they will pay the effective costs for the use of the services. “Thanks to the flexibility in the consumption of services at fixed unit prices, the government is able to reduce operating costs”.²⁵ HP and Belgacom have already been the government ICT provider for ten years. The solution (IaaS, PaaS and “Workplace as a Service”) will be provided as a virtual private cloud.

²⁵ http://www.belgacom.com/group/eu-en/newsdetail/ND_20140410_contract_hbplus.page?



THE BELGIUM TENDER

In 2012 the Belgium government introduced a G-Cloud with a budget of 15-20 MEUR.²⁶ The Belgium variant consists of a hybrid cloud with a mix of public and private providers. This means that the existing data centres of the Belgium Government are players along with commercial cloud service providers. The front-end will be a self-service portal,²⁷ seemingly similar to the UK's CloudStore. At the beginning of 2014, the Belgium government had to scale back the G-Cloud's services due to security reasons presented by the National Security Agency. The tender to find an integrator for the Belgium G-Cloud was opened in March 2012 but there was no eventual selection of a company. The necessary certainty for security seemed not to have been given prominence at this stage. Due to this fact the Belgium Government has recently been considering developing the G-Cloud solution internally.²⁸

6.4.3 THE TENDER IN ITALY²⁹

CONSIP S.p.A. is a public joint stock company held by the Italian Ministry of Economy and Finance (MEF), which is the sole shareholder. The company operates in keeping with the MEF's strategic goals, working exclusively to serve the public administration sector. The company carries out activities in consulting, assistance, and support in procuring goods and services for public administrations through MEPA (see paragraph 7.3.2). In its role as a central purchasing body, CONSIP realizes the program of rationalization of purchases in public administrations; furthermore, on the basis of specific agreements, it supports the administration on all aspects of the supply process.³⁰

Recently an Italian tender, made by CONSIP under the supervision of AGID, was assigned almost 2 BEUR. The tender, which aims to stipulate a framework agreement, consists of a restricted procedure divided into four lots:

1. **Cloud computing services;**
2. Services of digital identity management and application security;
3. Services for data interoperability and application co-operation;
4. Services for implementation and management of portals and on-line services;

²⁶ <http://www.telecompaper.com/news/belgium-puts-g-cloud-project-on-hold-for-security-reasons--990756>

²⁷ <http://www.timelex.eu/en/blog/detail/belgium-develops-a-government-cloud-similar-to-the-uk>

²⁸ <http://www.telecompaper.com/news/belgium-puts-g-cloud-project-on-hold-for-security-reasons--990756>

²⁹ All data from the tender document

³⁰ http://www.consip.it/en/about_us/.

The objective of the first lot is the conclusion of a framework agreement to provide cloud computing services for public administrations, in particular:

- a) **IaaS services**
- b) **PaaS services**
- c) **SaaS services**
- d) **Cloud-enabling services**

Each tender offer, related to the first lot, cannot exceed the amount of 500 MEUR. Offers above this threshold will not be considered.

6.4.4 THE TENDER IN THE NETHERLANDS

National and European tenders of Dutch Government (all layers) are published on the Tendered site (www.tendered.nl). Recently an internal central government ICT department has published a tender for a high availability database platform that will be operated as an on-premises private cloud. The platform will become part of the closed governmental cloud (see 5.2.2). Other government layers like provinces, municipalities and the education sector are or have been publishing tenders for cloud solutions as well. Some of these tenders are about outsourcing and within that, the option for cloud-based outsourcing is seriously considered.

6.4.5 THE TENDER IN SINGAPORE

As early as 2012, SingTel won the G-Cloud tender. The G-cloud SaaS store and an IaaS-infrastructure are part of the eGovernment master plan (eGov 2015). The services offered are quite similar to those from the UK Cloud, as shown in figure 10.

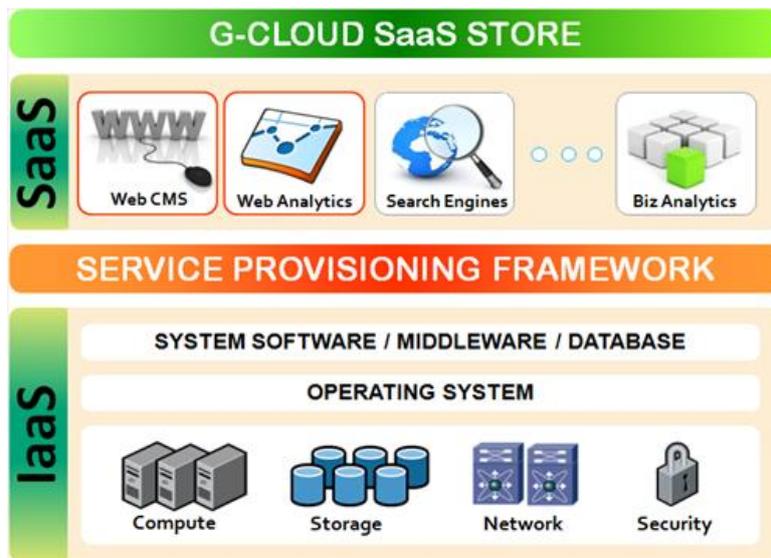


Figure 10: Cloud services provided in Singapore.

SingTel intends to provide all governmental agencies with subscription-based cloud services.³¹

³¹ <http://www.egov.gov.sg/egov-programmes/programmes-by-government/cloud-computing-for-government>

7 LESSON LEARNED

Due to the limited experience with existing infrastructures or cloud applications, the lessons learned from those experiences are still rather immature which in any case are often based on the subjective knowledge of acting persons or organizations. Thus, it will be necessary to intensify the “lessons learned” process, such as that integrated by the UK’s G-Cloud at the end of each framework period.

In May 2014 the US magazine *On The Frontlines* outlined the main topic of lessons learned in “Cloud Computing In Government”.³² Some of the findings are (in short):

- From Matt Goodrich (GSA FedRAMP)
 1. *“It’s all about people”*: security issues and management of people, because the work is mainly hard and “unsexy” in the security field, means configuration and patching
 2. *“Executive Commitment to Security”*: security is crucial and expensive, a clear commitment is necessary
 3. *“Monitor Vendor Reliance and Risk Posture”*: it is necessary to monitor the products and service-delivery from technology vendors that the technologies in place are updated and best maintained. Otherwise it lacks of security or the cloud provider risk a warranty problem if solving it on its own.
 4. *“Be Available and Secure”*: when it comes to government data confidentiality and integrity are more important than availability.

- From Kevin Jackson (GovCloud Network)
 1. *When considering the model of Government Cloud, then evaluate, starting with the functional requirement. Not always it is necessary to choose the “private” cloud*
 2. *A Government Cloud represents the purchase of a service, not a purchase of technology. This is a fundamental change*
 3. *The transition to cloud computing is not only an ICT project, the business managers have to be involved as well. Important are standardized processes also in the field of business management and procurement*
 4. *Cloud transition is a cultural change and needs a change management plan*

³² <http://digital.onthefrontlines.net/i/319551>



5. *Cloud transition needs a focused agency leadership to improve the maturity of existing architecture*

Regarding the recent “Beacon Report” from MeriTalk (USA) the first lessons learned from governmental cloud computing are the following.³³

1. *“Define your objectives”: it is necessary to specify their own objective for moving to the cloud, and this should be done very clearly*
2. *“Do the math”: it is necessary to calculate and to plan*
3. *“Reality check”: control the math if everything is included to be considered*
4. *“Manage the procurers”: it is necessary to manage the procurements more explicitly, even in this early stage of cloud adoption*
5. *“Expect challenges”: a change to the cloud is not a fire-and-forget, it is full of considerable challenges*

The three main conclusions from the US experiences stated above are:

1. *It is necessary that the change to the cloud is considered as a holistic change to the organization, not only a technology change*
2. *Planning and controlling the change is a crucial must*
3. *Not everything can be anticipated, some unexpected challenges will evolve and should be treated with seriousness*

Some interesting lessons are also available in Europe and from the partners in the Cloud for Europe project and are stated in addition to the US experiences as a beginning or even as the basis for following evaluation processes in Europe.

7.1 CASE 1 – SLOVENIA E-LEARNING

The Slovenian Public Administration Academy started to use a cloud-based eLearning platform (based on Moodle) in 2013. Cloud services are provided by the “Academic and Research Network of Slovenia” (ARNES).

Key findings:

- Portability of e-learning content due to open standards

³³ MeriTalk: Beacon Report, Cloud First Consumer Guide (<http://www.meritalk.com/CFCG>, 2014)

- No need for complex security models
- No need for long term data preservation
- There was no complex contracting involved, just simple and easily understandable terms of use.

7.2 CASE 2 – SLOVENIA ARCHIVING

A long-term preservation service for electronic documents was used by certain ministries. The service was provided by a private company that went bankrupt after operating for just two years.

Key findings:

- A government representative must be a member of the provider's steering board
- An exit strategy must be in place before contracting services
- Data and application portability ease the exit procedures
- In case of sensitive data, the location of the servers and data storage must reside on government premises.

7.3 CASE 3 – THE NETHERLANDS

The Dutch central government does have limited experience with public cloud services: central government is building an internal private cloud that runs on on-premise data centres owned by the government.

Key Findings:

- The limited experience with public cloud services is for providing open data to the public (weather satellite data, geo-data, automobile data).
- Public bodies using those public cloud solutions are very satisfied with the services provided, because of the well-known advantages such as scalability, and only having to pay for actual usage etc.



7.4 CASE 4 – DEDUCTIONS FROM THE UK “G-CLOUD”

7.4.1 THE DEFINITION

The UK’s G-Cloud governmental programme has a defined budget, defined staff and defined responsibilities. It is governed directly from the political level to the administration (vertical decisions). That is the reason why it is working well: right now G-Cloud 5 has more than 17,000 services, more than 1,000 suppliers, a good share of earnings and, presumably in parallel, savings for the government.

One important decision could have been that they had a strong political mandate, i.e., every government organisation has to use G-Cloud. But, in most other countries, to date, there have been no political decisions to oblige administrations to use cloud computing; it is not vertically-defined (politics – administration - application), which could also be the reason why they are still at the stages of either “position” or “strategy” (see section 5.2).

7.4.2 THE PROGRAMME

The UK’s G-Cloud should not be considered as an attempt to demonstrate an easy win. It has a well-defined programme as well as adequate resource allocation. Furthermore, it has defined processes, which means that it had to be designed. So it is a good idea to have a look at the UK G-Cloud processes within the release cycles.

7.4.3 THE LEGAL BASIS

One big success factor for building up a G-Cloud is an existing legal basis with clear and understandable legal regulations. Therefore the UK G-Cloud experiences are also very important, not only from the data security perspective, but also from the procedural regulations. The political will and the formulated deductions for the acting stakeholders provide a strong handle to work with. The objective is to build up a momentum of action controlled by firm regulations.

7.4.4 THE OPENNESS

Openness and the ability to learn from mistakes seem to be necessary criteria as well. When looking at the UK G-Cloud, it is apparent that a strong spirit exists among the acting stakeholders. For example, the G-Cloud blog (available on the website) opens up decision-

making processes for transparency reasons and a continuous improvement process is visible within the statements and discussions. One good example of that process is the recent discussion on the duration of the framework periods. More exactly, a discussion was started as to whether or not the actual one-year frameworks should be defined for longer periods. Due to this open discussion and decision-making process it is possible for stakeholders to get more deeply involved in this process.



8 CONCLUSIONS

Deliverable D3.2 has focused on the current state of cloud computing in the European public sector. The specific goal is to acquire knowledge about how governments behave within their current ICT ecosystems and how they could probably behave in a mid-term future.

It has initially provided information about how a number of governments are organized in Europe and how their information systems are modelled. The deliverable includes an overview of how these countries manage ICT procurement. Strategies, policies as well as emerging implementation initiatives have been given. Examples of different tender procedures, cloud computing marketplaces, applications and implementations are provided as well as lessons learned.

The state of play in Europe about cloud computing is patchy. While there are pioneering countries with innovative strategies, policies and implementations, other countries act more slowly in the transition to cloud computing. It is the aim of the European Commission to bridge these gaps and bring about a thriving cloud computing marketplace throughout Europe. While some states may be lagging behind due to the lack of initiatives, know-how and resources, others deliberately delay cloud computing migration due to trustworthiness and security concerns or simply to adjust their cloud strategy

An important point to make is about what constitutes an instance of cloud computing. Very often data centre consolidation or virtualized applications or web services are classified as cloud computing. While these concepts may go hand-in-hand with cloud computing, they do not always represent the essential characteristics of cloud computing which, as given in the well-recognized US NIST definition, include on-demand self-service, broad network access, resource pooling, rapid elasticity and measured service. Generally speaking, traditional implementations of e-government services do not automatically qualify for cloud computing labelling. Very often data centre consolidation becomes a first step towards cloud migration but, even though it may constitute a pre-requisite, it needs to go beyond that. Accordingly, European countries in general may be somewhat less advanced in the adoption of cloud computing than they might claim to be.

When the organizations of the public sector in different countries are studied, it is observed that the level of autonomy of a government entity has a direct bearing on its ability to transform its ICT infrastructure. However, it might be equally difficult to co-ordinate among

such autonomous entities to adopt common solutions or frameworks that would bring about the economies of scale that would enable cloud computing to demonstrate its biggest impact. From the examples in this deliverable, it might be concluded that municipal governments have a high degree of freedom as they have relatively high autonomy from central governments. Usually, they have their own budgets with independence from the central state budget; they have less legal and regulatory burdens and can act quickly with cloud deployments. They also have the ability to organize and co-ordinate among themselves to pool their resources together for solving common problems. Therefore municipalities as test-beds could be a good starting point to improve cloud adoption.

ICT assets are among the most valuable assets for governments that now depend on them to function and provide services. As such whoever owns or controls these assets potentially and theoretically have control over the government and its services. Accordingly, government entities feel reluctant to relinquish such control to non-public commercial providers. Concerned governments either delay their cloud implementations or they opt for private and/or on premise cloud solutions. This prevents cloud computing from reaching its full potential since private clouds would provide limited resource pooling and elasticity as compared to community or public clouds. However, a proper risk assessment and data classification analysis would put such perspectives in the right context and lead to the selection of appropriate cloud service and implementation models.

It has often been stated that there are significant legal and regulatory hurdles to cloud transition projects and initiatives. Countries with successful implementations mitigate or overcome such hurdles. Many governments try to roll out cloud computing but successful ones focus on supporting elements such as legal, regulatory, oversight, transparency and trust elements as much as the central technical capabilities. Therefore, frameworks covering these aspects would offer significant benefits. One way of achieving this goal is the creation of centrally organized government entities (also acting as cloud service brokers), responsible for building and managing government cloud computing services and implementations that could solicit external input (tenders, etc.). Different forms of marketplaces managed by such entities are successful examples. Availability of certified cloud solutions and applications on such online marketplaces as seen in the case of the UK G-Cloud would have a big impact on the uptake rate of such services and applications by individual government departments and agencies. Such marketplaces also provide support for contract details as well as legal and regulatory aspects that take the burden of such issues away from users.

Diversity is a key enabler of innovation, competition and equitable growth. Cloud solutions endorsed by the EU should promote diversity. Streamlining ICT operations, (open) standard



solutions and harmonised application requirements should be done at an appropriately level so that solution providers could still find the opportunity to compete and provide diverse solutions. This would help improve the market share of cloud solutions. If cloud vendors, service and solution providers think that *de facto* solutions of large companies are forced onto public sector entities by decrees or frameworks that go beyond requirement and specifications to solution details, this will stifle the market competition and cloud uptake. Cloud on-line, self-service marketplaces with well-defined certification schemes provide opportunities for SMEs and potentially, a level-playing field with big companies.

Since cloud computing represents a major change from traditional in-house ICT infrastructures, proper transition management is a key element to ensure continuity of services and applications. Good project management is needed in both prototype and live deployments to demonstrate the benefits of the cloud, which in many cases will be the organisational change undergone. This requires qualified PM resources to be allocated. It is also difficult to quantify the economic benefits of cloud transitions with examples often stopping at general estimates. It would therefore be beneficial to measure and report on such benefits to base policy and strategies on hard evidence. Prototypes would help if they include measurement and comparison aspects.

Cloud computing is seen to be at its early adoption stages in Europe. While most governments are keen to adopt cloud solutions, creating sustainable policies, strategies and implementation plans has been difficult in many cases. Being a major transition in operations and responsibilities, they might be faced with reluctance. Yet, there are good examples that can be followed and improved on. There are incentives from governments to support this transition. Trustworthiness and security as well as legal and regulatory aspects need to be handled seamlessly among countries as an enabler. One solution or framework will not fit all organizations, as one cloud model will not match all risk profiles. Therefore, a service or solution selection methodology based on a risk assessment model would be a key benefit for organizations keen on adopting cloud computing. Some organizations may nevertheless choose not to adopt cloud computing but as long as the best possible potential of this paradigm is approached, then this would be an achievement. The cloud market seems to be quite far from that point at the moment. As has been the case with IPv6 transition, the road might be long and rather difficult.

9 ANNEX I: LIST OF MINISTRIES

Italy	Austria	Netherlands	Portugal	Spain	Slovenia	Slovakia	Romania
Ministry of Foreign Affairs	Austrian Federal Chancellery	Ministry of Defence	Ministry of State and Finance	Ministry of Presidency	Ministry of Labour, Family, Social Affairs and Equal Opportunities	Ministry of Finance of SR	Ministry of Administration and Interior
Ministry of Internal Affairs	Federal Minister for Arts, Culture, Constitution and Public Service	Ministry of Health, Welfare and Sport	Ministry of State and Foreign Affairs	Ministry of Foreign Affairs	Ministry of Finance	Ministry of Interior of SR	Ministry of Agriculture and Rural Development
Ministry of Justice	The Austrian Foreign Ministry	Ministry of Economic Affairs	Ministry of National Defence	Ministry of Justice	Ministry of Economic Development and Technology	Ministry of Economy of SR	Ministry of Communication and Information Society
Ministry of Defense	Federal Ministry of Labour, Social Affairs and Consumer Protection	Ministry of Infrastructure and Environment	Ministry of Internal Administration	Ministry of Defense	Ministry of Infrastructure and Spatial Planning	Ministry of Foreign Affairs of SR	Ministry of Culture and National Cultural Heritage
Ministry of Economics and Finance	Federal Ministry of Education and Women's Affairs	Ministry of Education, Culture and Science	Ministry of Justice	Ministry of Finance and Public Administration	Ministry of Education, Science and Sport	Ministry of Transport, Construction and Regional Development of SR	Ministry of Economy, Trade and the Business Environment
Ministry of Economic Development	Federal Ministry of the Internal Affairs	Ministry of the Interior and Kingdom Relations	Ministry of Parliamentary Affairs	Ministry of Interior	Ministry of Culture	Ministry of Agriculture and Rural Development of SR	Ministry of Education, Research, Youth and Sports
Ministry of Agriculture, Food and Forestry	Federal Ministry of Justice	Ministry of Finance	Ministry of Regional Development	Ministry of Education, Culture and Sport	Ministry of Agriculture and the Environment	Ministry of Defence of SR	Ministry of Environment and Forests
Ministry of Environment, Land and Sea Protection	Federal Ministry of Agriculture, Forestry, Environment and Water Management	Ministry of Security and Justice	Ministry of Economics	Ministry of Employment and Social Security	Ministry of the Interior	Ministry of Justice of SR	Ministry of European Affairs
Ministry of Infrastructure and Transport	Federal Ministry of Defence and Sports	Ministry of Foreign Affairs	Ministry of Environment, Spatial Planning and Energy	Ministry of Agriculture, Food and Environmental Affairs	Ministry of Defence	Ministry of Labour, Social Affairs and Family of the SR	Ministry of Foreign Affairs
Ministry of Labour and Social Policy	Federal Ministry of Health	Ministry of Social Affairs and Employment	Ministry of Agriculture and Sea	Ministry of Public Works	Ministry of Justice	Ministry of Environment of SR	Ministry of Health
Ministry of Health	Federal Ministry of Family and Youth	Ministry of General Affairs	Ministry of Health	Ministry of Economic Affairs and Competitiveness	Ministry of Health	Ministry of Education, Science, Research and Sport of the SR	Ministry of Justice
Ministry of Education, University and Research	Federal Ministry of Finance		Ministry of Education and Science	Ministry of Health, Social Services and Equality	Ministry of Foreign Affairs	Ministry of Culture of SR	Ministry of Labor, Family and Social Protection
Ministry of Cultural Heritage and Tourism	Ministry for Transport, Innovation and Technology		Ministry of Solidarity, Employment and Social Security	Ministry of Industry, Energy and Tourism	Government Office for Slovenians abroad	Ministry of Health of SR	Ministry of National Defence
	Federal Ministry of Science, Research and Economics						Ministry of Public Finance
							Ministry of Regional Development and Tourism
							Ministry of Transportation and Infrastructure

Table 4 - List of Ministries per country.



10 ANNEX II: SURVEY ON PUBLIC INFORMATION SYSTEMS

This Annex provides insight into the organization of information services in the public sector per country. For each targeted country a table is presented that reflects a raw estimation of the level of autonomy of each public body in different levels of the public sector, regarding the following: policy definition, strategies, long-term planning, and budgeting of the information system.

- 0: no autonomy, all the decisions are taken by other organizations
- 1: the organization perceives a certain level of autonomy, or it is involved in the decision process (for example, through negotiation, a proposal-approval process)
- 2: the organization perceives a high/full level of autonomy

10.1 AUSTRIA

AUSTRIA	LEVEL OF AUTONOMY
Ministry	1
Level 1	1,2
Level 2	1,2
Level 3	0,1,2
Schools	0,1,2
Hospitals	0,1,2

Table 5 - Grade of autonomy of public information systems in Austria

In Austria, at a federal level there is only eGovernment / standardization, which is located at the Federal Chancellery and underlies a specific structure (Federal-Region-County-Municipality). At level 1, the central administration is composed of 13 ministries and the Federal Chancellery, which are autonomous in their ICT provision. A lot have multiple public bodies (as agencies or public organizations under certain legal forms) in charge of them, and the level of ICT dependency on each ministry may vary according to their size. Despite each ministry's or public body's independence to provide ICT services, there is an eGovernment co-ordination body within the Austrian Chancellery to co-ordinate the standardization together with public organizations throughout Austria. It comprises ICT directors

representing all ministries and is responsible for the preparation of standards for the eGovernment strategy and ICT policy for Austria's administration.

At level 2, each region has the independence to provide ICT services themselves. There is not a single ICT organization for all regions. Four different configurations can be found:

- 1) each functional department in the region (economy, education, etc.) has its own ICT unit
- 2) a single ICT unit for the region which provides the ICT for all the regional government
- 3) a single unit providing common ICT services to the regional government, but each department has its own ICT unit for micro-informatics and sectorial ICT services
- 4) ICT is outsourced and there is one ICT unit dependent on the regional government for procurement and to monitor contracts.

Regarding the ICT co-ordination for eGovernment between the central administration and the regions, there is a co-ordination body within the Austrian Chancellery, together with stakeholders from other territorial authorities and elsewhere. It is responsible for defining standards for eGovernment solutions. At the level of municipalities (level 3), most are autonomous, though some are bound to other definitions, some of which are pre-defined.

Public schools in Austria depend on either the federal or regional government. There is some diversity in school management; some are quite dependent on the governmental department, while private schools, are mostly independent in their resource control, but subject to some common regulations. Because of this variety it is difficult to structure ICT strategy or planning.

Public hospitals in Austria depend on the regional government. There is a huge diversity in hospital management; again some of them are quite dependent on the governmental department related to health or to regional unions, while private hospitals, are independent in their resource control. Because of this variety it is similarly difficult to structure ICT strategy or planning.

10.2 ITALY

ITALY	LEVEL OF AUTONOMY
Ministry	1
Level 1	2
Level 2	2
Level 3	2



Schools	2
Hospitals	2

Table 6 - Grade of autonomy of public information systems in Italy.

Ministries in Italy, in general, have a good level of autonomy in planning the development of their own information systems, with the following constraints: some specific areas (e.g., research, military defence *et al*) have a complete level of autonomy. The highest level of autonomy in the regions (level 1) is established by the constitution (art. 114 and following). The co-ordination of statistical and computerized data from state, regional and local administrations is the sole responsibility of the state and is excluded from the autonomy of the regions. Provinces (level 2) are organizations established by the constitution and have a high level of autonomy, including financial.

Most of the municipalities (level 3) have a high degree of autonomy, even if it comes with limited economical and financial resources. Municipalities with less than 5,000 inhabitants (5,700 municipalities out of a total of 8,100) have some obligations to pool ICT services with other small municipalities. In general they have a high level of autonomy, including financial.

Schools in Italy are substantially autonomous.

Public hospitals in Italy depend on about 140 special administrations of the health sector called ASL (Azienda Sanitaria Locale). Most of the hospitals have a high degree of autonomy. A minority of the hospitals have centralised their information systems in the ASL.

10.3 THE NETHERLANDS

NETHERLANDS	LEVEL OF AUTONOMY
Ministry	1
Level 1	1
Level 2	2
Level 3	2
Schools	2
Hospitals	2

Table 7 - Grade of autonomy of public information systems in Netherlands.

The ministry, together with its 200 implementing organizations, and level 1 are considered the same in this table: central government level. The information systems that are to be supported are: operational management, secondary (supporting) processes. For generic ICT, there is less and less autonomy per ministry as the strategy, planning, procurement, development and operation of these information systems are centralized. The Ministry of Defence, being highly autonomous, is the exception. The ICT for supporting the primary tasks of the ministries are the responsibility of each ministry. The level of autonomy is high regarding that type of ICT. There are some autonomous agencies with legal personality (in Dutch ZBO). However, they are still considered part of the central government because ministers are responsible for those agencies. Those ZBO's have a high level of autonomy.

Provinces (level 2) and municipalities (level 3) are autonomous. Certain registrations that are centralized at a country level have to be used by municipalities.

Schools and hospitals are substantially autonomous.

10.4 PORTUGAL

PORTUGAL	LEVEL OF AUTONOMY
Ministry	2
Level 1	2
Level 2	2
Level 3	2
Schools	2
Hospitals	2

Table 8 - Grade of autonomy of public information systems in Portugal.

In Portugal, the ministries perceive a high level of autonomy regarding ICT policies, strategy and budgeting. In this particular area, however, the guidelines of the Portuguese "Global Strategic Plan to Rationalize and Decrease ICT Costs In Public Administration" should be considered. On level 1, central public administrations (such as public schools, public institutes or universities), there is a strong level of autonomy. Universities are the most autonomous, from the technological planning and strategic standpoint, alongside the public institutes with more sensitive considerations. Decentralized public administrations, such as municipalities, public enterprises, most hospitals and public companies, are organizations with the highest level of technological and financial autonomy.



Schools have a high level of autonomy. Most hospitals in Portugal are public enterprises with full autonomy.

10.5 ROMANIA

ROMANIA	LEVEL OF AUTONOMY
Ministry	1
Level 1	
Level 2	1
Level 3	1
Schools	0
Hospitals	0

Table 9 - Grade of autonomy of public information systems in Romania

The Ministry of Information Society is the main policy and strategy provider for the domain, and serves as the specialized body of central public administration in the ICT sector. Regional and local authorities are subordinate to the Ministry of Administration and the Interior. Each county is administered by a county council responsible for local affairs.

10.6 SLOVAKIA

SLOVAKIA	LEVEL OF AUTONOMY
Ministry	1
Level 1	1
Level 2	0
Level 3	1
Schools	1
Hospitals	1

Table 10 - Grade of autonomy of public information systems in Slovakia.

The national strategy and the national concept of eGovernment was approved by the government as a strategic document (drafted by the Ministry of Finance), which addresses the principles for the building up of eGovernment. The document lays down the principles, priorities and architecture of integrated information systems in public administrations to

safeguard their interoperability and independence from technology platforms. Every subject of the state administration has to adopt their own development concept of the public administration information systems within the bounds of the national concept. The development concept has to be submitted to the Ministry of Finance for approval.

At level 1 this principle applies to every self-governing region. At level 2 the districts' departments incorporate special public authorities which lie within the authority of the Ministry of the Interior. At level 3, every municipality with an information systems administrator has to adopt their own public administration information systems development concept within the bounds of the national concept. The municipality information system development concept does not have to get approved by the Ministry of Finance.

The development concept of schools information systems is incorporated into the Ministry of Education, Science, Research and Sport. and for hospitals into the Ministry of Health.

10.7 SLOVENIA

SLOVENIA	LEVEL OF AUTONOMY
Ministry	2
Level 1	2
Level 2	2
Level 3	
Schools	1,2
Hospitals	

Table 11 - Grade of autonomy of public information systems in Slovenia.

The central administration is composed of 12 ministries and one government office for Slovenians abroad, which is led by a minister without portfolio. They are autonomous in their ICT provision. The ministries plan their information systems in line with the needs of their processes and the legislative requirements. All 12 ministries also have numerous affiliated bodies, whose level of ICT autonomy depends on their size. Bigger organisations (e.g., the tax administration) are completely autonomous in their decision and planning in relation to the responsible ministry.

Slovenia has an inter-ministerial body for ICT co-ordination within the central administration called "project co-ordination", where all ICT projects (current and future) are discussed. The group also takes strategic decisions on ICT services. Members of this group are heads of ICT



sectors in ministries and affiliated bodies. This group works in line with the strategy on ICT and electronic services development, the connection of official records and its action plan. This year a new central government ICT strategy is being prepared which is still pending.

The municipalities (211) are the level 2 of Slovenian administration. They also have their own budget. Therefore, they are completely autonomous in their planning of information systems. It is possible for them to access state central services, but it is not obligatory. However, in the case of a small municipality, in terms of population and the area that it's responsible for, it could have only basic ICT services and also one or two associated personnel. Such a municipality doesn't run an ICT strategy or significantly plan its information systems. The bigger municipalities have their own ICT departments and also plan information systems and services.

With regard to schools, the Ministry of Education, Science and Sport runs the ICT services strategy. Some services are introduced as central and obligatory for use. Information systems are planned and developed by the schools themselves.

With regard to hospitals, the Ministry of Health runs the ICT strategy. Some services are introduced centrally and are obligatory for use. Information systems are planned and developed by the hospitals themselves.

10.8 SPAIN

SPAIN	LEVEL OF AUTONOMY
Ministry	
Level 1	1,2
Level 2	0,2
Level 3	
Schools	
Hospitals	

Table 12 - Grade of autonomy of public information systems in Spain.

The Spanish central administration is composed of 13 ministries, which are autonomous in their ICT provision. Each of them is in charge of multiple public bodies (as agencies or public organizations under certain legal forms), whose level of ICT dependency on the ministry may vary depending to their size. Despite each ministry or public body's independence to provide ICT services, there is an inter-ministerial body for ICT co-ordination within the central

administration: the CSAE. It is comprised of ICT directors representing all ministries and is in charge of the preparation, design and development of the eGovernment strategy and ICT policy for Spain's central administration. Moreover, in September 2013, the government created the Directorate of Information and Communication Technologies of the General State Administration with its director having the rank of undersecretary, functionally under the Minister of the Presidency and the Minister of Finance and Public Administrations. This role is effectively a CIO (Chief of Information Technology) whose main purpose is the development, co-ordination and management of the strategy on information technology and communications of the general state administration.

At level 2 are the regions, each of which is independent to provide their own ICT services. There is not a single ICT organization for all regions. Four different configurations can be found:

- 1) each functional department in the region (economy, education, etc.) has its own ICT unit
- 2) a single ICT unit for the region which provides the ICT for the whole regional government,
- 3) a single unit which provides common ICT services to the regional government, but each department has its own ICT unit for micro-informatics and sectorial IT services,
- 4) ICT is outsourced and there is one ICT unit dependent on the regional government for procurement and to monitor contracts. The sectorial committee enables co-operation between central government, the autonomous communities and local government for eGovernment. It is responsible for ensuring the interoperability of the applications and systems in use within public administrations and for preparing joint action plans in order to improve eGovernment development in Spain.

Municipalities are at the third level in the Spanish administration and are also autonomous in some competencies. However, depending on the size of the municipality, in terms of population, they are autonomous to provide ICT services themselves, or are dependent on a greater municipality, that is in the province. At this level, we can find also, as in the regions, a great diversity of configurations, from self-provision of ICT services in each business department, to a centralized ICT department in the province.

On schools there is no information. Public hospitals in Spain depend on the regional Government. There is a huge diversity of hospital management approaches; some are quite dependent on the governmental department related to health, while others are independent in their resource control. Because of this variety, it is difficult to structure ICT strategy or planning.



11 ANNEX III: SURVEY ON PUBLIC PROCUREMENT

This annex provides insight into the organization of ICT procurement in the public sector per country. For each targeted country, a table is presented that reflects a raw estimation of the level of autonomy of each public body at different levels of the public sector, regarding the following: procurement of supplies and services for the development of information systems.

- 0: very limited autonomy, most of the procurement processes are centralized, performed by other organizations
- 1: the organization is perceived to have a certain level of autonomy
- 2: the organization is perceived to have a high/full level of autonomy

11.1 AUSTRIA

AUSTRIA	LEVEL OF AUTONOMY
Ministry	1
Level 1	1,2
Level 2	1,2
Level 3	0,1,2
Schools	0,1,2
Hospitals	0,1,2

Table 13 - Grade of autonomy on public procurement in Austria.

At the ministry and central administration level, some developments are legally defined and determined, for example by the Federal Procurement Agency. ICT services can be procured in regions (level 2) in two ways: each ICT unit procures its own services or there is a centralized unit which makes the procurement. For municipalities it depends on the procedure: most are autonomous, some are bound to other definitions, and some are pre-defined.

There is quite some diversity in schools and the level of autonomy with respect to ICT procurement. The same applies to hospitals.

11.2 ITALY

ITALY	LEVEL OF AUTONOMY
Ministry	1
Level 1	2
Level 2	2
Level 3	2
Schools	1
Hospitals	2

Table 14 - Grade of autonomy on public procurement in Italy.

Ministries in Italy have quite a high level of autonomy, although there are some constraints due to the legal obligations to use the national interoperability infrastructure (SPC). SPC includes mostly "infrastructural and basic services" (connectivity, managed hosting, messaging) that are procured by Consip and AGID through national framework agreements. Regions (level 1) have a high level of autonomy. Most of the municipalities have a high degree of autonomy, also with regard to ICT procurement.

For what regards schools, several ICT services are provided centrally by the Minister for Instructions (for example, school enrollment).

Public hospitals are independent procurement authorities and are highly autonomous.

11.3 THE NETHERLANDS

NETHERLANDS	LEVEL OF AUTONOMY
Ministry	1
Level 1	1
Level 2	2
Level 3	2
Schools	2
Hospitals	2

Table 15 - Grade of autonomy on public procurement in Netherlands.

Procurement of ICT is to support: operational management, secondary (supporting) processes or generic information systems where there is less and less autonomy. At a central



government level, there are shared procurement organizations, the Ministry of Defence being highly autonomous is the exception. Procurement of ICT for supporting the primary tasks of ministries belongs to the responsible ministry. The level of autonomy is high regarding procurement of that type of ICT. Provinces, municipalities, school and hospitals have a high level of autonomy when it comes to ICT procurement.

11.4 PORTUGAL

PORTUGAL	LEVEL OF AUTONOMY
Ministry	0
Level 1	0
Level 2	2
Level 3	2
Schools	0
Hospitals	1

Table 16 - Grade of autonomy on public procurement in Portugal.

The ministries have relative autonomy. Any engagement within the information systems should be preceded by a preliminary opinion issued by the agency for administrative modernization (AMA), under the scope of the "Global Strategic Plan to Rationalize and Decrease ICT Costs In Public Administration", whose decision is mandatory. The national public procurement system, managed by ESPAP, requires that the entities must purchase equipment and solutions under ESPAP's framework agreement whenever there is a need to be covered by them. In addition, the national public procurement system assigns, by law, to each ministry, responsibilities in centralization and aggregation of purchases, which means that, for some areas, it is mandatory that the purchasing ministerial units take charge of the purchasing processes.

Decentralized public administration such as municipalities, public enterprise entities, most hospitals, and public companies can make acquisitions outside the ministerial purchasing unit's scope. These entities may, however, choose to purchase under the framework agreements of the national public procurement system. The hospitals, which operate on a network, are in some crossover areas subject to a public institute of the ministry of health that manages the cross-systems for the national health system.

For schools, usually there aren't any systems provided by the ministry of education. But the national public procurement system assigns, by law, to each ministry, mandatory responsibilities in centralization and aggregation of purchases for schools and universities. Any engagement within the information systems should also be preceded by a preliminary opinion issued by AMA. For hospitals, autonomy is limited only in some crossover areas that are subject to the co-ordination of a public institute in the scope of the ministry of health, such as, for example, electronic prescriptions.

11.5 ROMANIA

ROMANIA	LEVEL OF AUTONOMY
Ministry	2
Level 1	
Level 2	1
Level 3	2
Schools	0
Hospitals	0

Table 17 - Grade of autonomy on public procurement in Romania.

In Romania, ministries have a high degree of autonomy in procurement and development of information systems, but depending on the service/process procurement, some of them might be centralized. For counties (level 2), the level of autonomy depends on the origin of the finances. If there are public funds allocated by the government through the county council, the procurement process might be centralized.

11.6 SLOVAKIA

SLOVAKIA	LEVEL OF AUTONOMY
Ministry	2
Level 1	2
Level 2	0
Level 3	2
Schools	2
Hospitals	2



Table 18 - Grade of autonomy on public procurement in Slovakia.

In Slovakia, all levels of public administration are quite autonomous when it comes to procurement of ICT, except the district departments.

11.7 SLOVENIA

SLOVENIA	LEVEL OF AUTONOMY
Ministry	2
Level 1	2
Level 2	2
Level 3	
Schools	1,2
Hospitals	

Table 19 - Grade of autonomy on public procurement in Slovenia.

The ministries procure information systems themselves. In some cases joint procurements (e.g. software licences) are made, carried out by the Ministry of Finance, Public Procurement Directorate. Municipalities carry out the procurement themselves. They are completely autonomous as to what and when to procure. For schools, those ICT services planned by the Ministry of Education, Science and Sport are also procured by it. Otherwise they are autonomous. Similarly for hospitals, ICT services planned by the Ministry of Health are also procured by it. Otherwise they are autonomous.

11.8 SPAIN

SPAIN	LEVEL OF AUTONOMY
Ministry	
Level 1	2
Level 2	0,2
Level 3	
Schools	
Hospitals	

Table 20 - Grade of autonomy on public procurement in Spain.



Depending on the price bidding and the object of the contract (eGovernment services or not), the procurement may be carried out by a central organization, the Directorate General for Rationalization and Procurement Centralization, which depends on the Ministry of Finance and Public Administration, or by the ICT unit of each ministry. When the object of the contract is an eGovernment service that has a particular economic limit, the procurement is centralized and the Directorate General for Rationalization and Procurement Centralization is the procurer. In the other cases, the ICT unit of each ministry is independent to procure ICT services. In both cases, during the procurement process, it is necessary to get a positive report from the CIO office and from the CSAE inter-ministerial body.

ICT services can be procured in the Spanish regions (level 2) in two ways: each ICT unit procures its own services, or there is a centralized unit which makes the procurement. At the municipality level, we can also find different configurations for procurement: from self-provision of ICT services in each business department, to a centralized ICT department in the province. Public hospitals in Spain depend on the regional government. There is a huge diversity of hospital management: some are quite dependent on the governmental department related to health, while others are independent in their resource control. Because of this variety, it is difficult to indicate the level of autonomy with regard to ICT procurement.



12 ANNEX IV: STANDALONE CLOUD APPLICATIONS

12.1 ITALY

12.1.1 *DEPARTMENT OF TREASURY CLOUD*

The Department of Treasury of the Minister of Economy and Finance has a cloud platform (*DT Cloud*) providing services that can be used internally and by other public administrations, with the prospect of creating a national cloud.

12.1.2 *MINISTRY OF FOREIGN AFFAIRS*

The Ministry of Foreign Affairs has developed a private Cloud ("**Maecloud**" project) to ensure service continuity for Italian citizens and enterprises residing abroad, by strengthening active and passive security as well as the ICT safety of diplomatic consular offices located in areas of high conflict. Public administrations communicate with each other through networks of public connectivity: S-RIPA and SPC. Public administrations, foreign offices and central offices of the ministry are connected by **SIFC (integrated system board functions)**, a platform that integrates the management of services for citizens abroad and for enabling co-operation between public administrations, to increase the effectiveness of communication with and from the public abroad. In terms of services to citizens, there is "**SECOLI**", the online portal of consular services. In this framework, "**LIMES**" is a line computer dedicated to communication and migration for data security in all situations of emergency where you can find the registered diplomatic consular.

12.1.3 *INSTITUTE FOR SOCIAL PROTECTION - INPS*

The National Institute of Social Security (INPS) has implemented a private cloud, offering a catalogue of services provided in the cloud direct to internal and external users, and to public and private entities with a view of subsidiarity.

12.1.4 *EMILIA ROMAGNA REGION*

A first example of a regional approach to cloud is the “**fedERa system**” (Federation of Organizations for the authentication of **Emilia-Romagna Region**). It was created to make it possible for citizens to have access to all the online services of organizations and the public of the Emilia-Romagna region through a single access credential. The objective is therefore to be a technical and organizational infrastructure, common to public agencies in the Emilia-Romagna region, to manage shared access to online services provided by the federated entities.

Currently the federation involves the municipalities of the region of Emilia-Romagna, but also some universities, local health authorities, professional associations, WISP (service providers of connectivity over wifi). All online services that expose these individuals the citizen accesses with the same credentials in a way that allows the access provider to be certain of the identity of the citizen and to allow the citizen to secure access to all the data and services on display. FedERa is a project promoted by the Emilia-Romagna region telematic plan 2007-2009.

12.1.5 *TUSCANY REGION TIX 2.0*

The **Tuscany region** has inaugurated the “**TIX 2.0 project**” which aims to transform the data centre physical infrastructure to a virtual mode service centre in order to deliver on-demand services, selected from a catalogue service, to public administration bodies in Tuscany. In particular its goals are to create:

- a service centre and technical support centre for the more than 400 public entities constituting the Tuscany region telecommunications network (RTRT), tasks previously performed by the regional structures;
- an interchange point between the network operators' commercial internet (internet service provider) networks and public administrations. This is to allow the communication infrastructure of the RTRT to evolve into becoming multi-supplier, anticipating the purposes of the public connectivity system, as defined in legislative decree no. March 7, 2005 n. 82 Digital Administration Code (CAD).

12.1.6 *MARCHE REGION CLOUD*

The **Marche region** in collaboration with the National Institute of Nuclear Physics started a new, open source-based/private cloud infrastructure called “**MCloud**” (currently in the pilot phase). The region intends to adopt a cloud computing infrastructure (hybrid and SaaS)



through the creation and strengthening of the data centre. Using the most advanced computer techniques, in accordance with the emerging paradigm of green ICT and in order to make the system more efficient and overall safer, it delivers modern and innovative digital services to high-tech enterprises, public institutions and civil society by fostering:

- Efficiencies and innovation, new product development, productivity growth, business opportunities for the Marche region;
- Realization of economies of scale in the use of public and private resources;
- Attraction and diffusion of advanced skills in a strategic sector such as ICT;
- Progress in the exchange of information and knowledge, in the aggregation and social quality of life for citizens and businesses.

The main application areas identified for the MCloud services concern:

- Public administration and health: more efficiency, lower costs, greater proximity to citizens;
- Innovative services to companies: implementation of ICT solutions that optimize business processes;
- Services for citizens: improving urban mobility, management and conservation of energy, the general conditions of safety, the ability of home care for the elderly and vulnerable population groups;
- Services for the territory and the environment (land, sea and air): to improve the control and monitoring by the managing authority (civil protection, environment, veterinarians, etc.).
- Innovative systems and integrated control of the territory (alarmist 'real-time' - Sense-and-Response);
- Network of research, innovation and development of innovative ICT technologies, in collaboration with research institutes, universities regional, national, international and business leaders in the sector;
- Advanced training for the qualification and specialization of researchers, managers and public enterprise in the ICT sector to increase skills, knowledge and capacity for innovation.

12.2 THE NETHERLANDS

12.2.1 *OPEN DATA PORTAL*

Open data is offered by central government to society and is supported by various public cloud-based solutions.

For example:

- <https://www.pdok.nl/en>
- <http://www.nationaalgeoregister.nl/geonetwork/srv/eng/search>
- <https://data.overheid.nl/english>

12.2.2 *INTERNAL COLLABORATION: YAMMER*

For informal internal communication a group of civil servants (but certainly not all) use Yammer. Cloud-based social media platforms like Facebook and Twitter are used for formal and informal communication.

12.2.3 *MOBILE SERVICES*

Within the central government, multiple cloud-based mobile device management platforms are in use. Those platforms run at their own on-premise data centres.

12.2.4 *CLOUD-BASED DISASTER RECOVERY*

The government site crisis.nl is will be used in case of a disaster or national emergency. Crisis.nl runs on the Microsoft Azure cloud.

12.3 ROMANIA

It is intended that the following services are to be offered by using governmental/public cloud infrastructures:

- Easy and rapid information exchange with the public
- Participative governing
- Sharing points of view, news and events within the government



- Internal messaging
- Rapid intra-governmental messaging
- Faster, more efficient technical support
- Standardization
- Interoperability
- Migration of previous systems to a SOA
- Web-hosting for the government

12.4 PORTUGAL

Despite not being pure cloud solutions, commercially speaking, since those are merely internet portals whose features are accessible without the need to install software on the user computer, Portugal has several applications available for citizens and public administration entities, in the scope of social security, fiscal services, as well as financial and human resources management.

Regarding citizens, the Portuguese public administration provides internet portals with information, features and services for key administrative areas, particularly in the context of social security, taxes and customs administration:

- <http://www.portaldasfinancas.gov.pt/>
- <https://www.seg-social.pt/consultas/ssdirecta>

Note that currently the majority of citizens manage their affairs and submit their tax declarations electronically. Likewise, communications between the tax authorities and citizens are preferably electronic.

The access to these services is achieved by user authentication (login/password) or by using the Portuguese citizen card that has on-chip integrated digital signature and authentication certificates.

In the services domain where stakeholders are central and decentralized public administration entities, the Ministry of Finance, through ESPAP, provides several tools such as shared services finance (GeRFiP) or human resources management (GeRHuP).

The GeRFiP (<https://mfap.gerfip.gerap.gov.pt>) integrates logistics, financial, budgeting and assets management and has 310 user entities. It processes 13,150 invoices or documents per month. The system aims to provide quality services and contribute to the reduction of costs

supported by integrated, standardized and best practices in financial (budgetary accounting, general accounting, receivable and payable accounts, assets or contract managements) and logistics management (goods and services purchases or sales and distribution management).

For its part, the GeRHuP (<https://gerhup.gerall.pt/>) supports the processes of the life cycle of the public servant, in the context of administrative human management, particularly in the areas of organizational management, employee archives and temporary or permanent work suspension.

Currently, 1,820 public servants have their salaries processed by GeRHuP. There are around 600 participating entities that achieved, using the application, more than 151,000 workers' performance evaluation processes.

12.5 SLOVAKIA

As mentioned in 7.1.5, DCOM is the major project for the establishment of a Slovakian cloud infrastructure in 2016. The specific benefits of DCOM regarding application are manifold. Within the DCOM infrastructure 138 SaaS services will support the competencies of municipalities through unified services delivery even to small villages, e.g., certified back office solutions for municipal offices, central support and upgrades.

12.6 AUSTRIA

12.6.1 *E-GOVERNMENT PORTAL - PORTAL.AT*

One of the best known cloud infrastructures, which plays a major role in Austrian eGovernment (and governmental ICT) comes through the shared service portal "Portal Austria – portal.at", based on the enterprise "eGov Portal Services" portal solution. This central governmental portal solution represents a shared-ICT-service portal and has been running since 2001.

Portal Austria offers a central web-based entry point (single sign on) for more than 130,000 governmental users and works as an overarching organisational access management system for more than 400 applications and more than 40 intranet and internet portals. Examples of services, accessible through Portal Austria are the central federal personal management, the federal billing allocation, the system of resident registration or the central land registry. The



Portal Billing service automatically performs the accounting task for all applications to the user organisations on a quarterly basis and is connected directly to the federal SAP and printing facilities.

Moreover, the constitutive technology – the “eGov Portal Services” – is the basis for the most frequently visited governmental citizen portals, such as “HELP.gv.at” (for citizens), “USP.gv.at” (for the economic) and “Gesundheit.gv.at” (Health services).

The standardized shared-ICT-service portal supports the attempt of the Austrian Government to make sustainable savings in ICT development and operation. A central aspect in reaching this goal is the interplay of high security standards on the one hand and a highly automated self-administration of the organisations and users of the concerned administration organisations on the other.

Portal Austria received the EuroCloud Award in 2012.

12.6.2 *WORKFLOW MANAGEMENT - ELAK*

ELAK represents the central federal filing and workflow management within and between central federal agencies (over all federal ministries). ELAK is deployed as an application service provider (ASP), but has restricted additional functionalities, such as a central administration and a shared infrastructure and security concept, which brings the application closer to a cloud application. A self-provisioning would be possible, but, due to legal restrictions, this functionality has not yet been rolled out.

ELAK is deployed on a shared infrastructure for all federal ministries and their subordinate agencies. The infrastructure exhibits a high elasticity and scalability, as it would be needed within a specific cloud solution.

In contrast to pure cloud solutions, ELAK does not yet have dynamic accounting.

12.6.3 *OPEN DATA CATALOGUE - DATA.GV.AT*

Since 2012, data.gv.at has been the central Austrian open data catalogue that allows Austrian public authorities to use self-administration via portal group protocol (PVP) and has been built on open source software.

data.gv.at came third at the EuroCloud Award in Austria in 2012.

12.6.4 *MAILBOX AS A SERVICE - MAAS*

Mailbox as a Service (MaaS) includes the provision and operation of Microsoft Exchange 2010 mailboxes as a shared service for ICT workspaces. Customers acquire, use and administer their own mailboxes that are provided in a central, highly available and multi-tenant infrastructure. Secure client access is possible either using the Outlook client or Outlook Web App (OWA) via a hardware load balancer on the underlying HUB/CAS array. Data management is redundant in a data availability group in the central storage. Each active database has three passive copies that are distributed across two sites. A multi-stage anti-spam/anti-virus solution is also part of the platform.

The multi-tenant Exchange on-premise installation is operated in a resource forest, from where there is a connection to the trust-account-forest of the customer, in which the user's access management takes place, to ensure that no additional login to the mailbox is required.

12.7 SPAIN

12.7.1 *SARA APPLICATION SERVICES*

In Spain, there are several services provided in a cloud model through the SARA network. Examples are the eInvoicing platform, the application registry, email, the civil servants payroll system, the eDelivery platform and the eSignature platform.

In chapter one, the rationale for cloud services is explained as being due to the high impact of savings within the three levels of Spanish public administration. This service is a virtual face-to-face office that can be provided as a SaaS service or as an IaaS service, depending on the necessity of the user. It was born as a cloud service, as it didn't exist before. The provider of the service is the Ministry of Finance and Public Administration, and the user would be in any administrative face-to-face office, independent of the level of administration, whether central, regional or local.

Over the "Red SARA" network, an infrastructure for the exchange of electronic documents, called SIR, was developed as the interoperability infrastructure to exchange citizens' applications in a common format. This infrastructure is part of the national interoperability framework that is also part of the eGovernment legal framework.

Some public organizations used the SIR network as an IaaS service, so they could provide their employees in the face-to-face offices with the final software application to register



citizens' applications. However, due to the fact that not all of them could afford the integration with the IaaS service, and because of lack of investment possibilities or technical difficulties, the Ministry of Finance and Public Administration provided a SaaS solution to public organizations with face-to-face offices, called ORVE. The idea of this cloud service is the digitization of citizen forms presented in hard copy in a face-to-face office in order to be included in the electronic back-office of the administrative unit. The citizens' applications are sent, following the interoperability standards defined in the national interoperability framework, via the SIR platform to the destination administrative unit that analyses the forms.

Both solutions can be implemented in any country with an internal administrative network, as it has a high level of modularity and is based on open source platforms.

Currently, there are 314 municipalities covering 3,149 face-to-face offices that already use some of these two cloud services. The estimated savings of this usage are of €997,329.

12.8 SLOVENIA

The decentralised ICT in Slovenia provides services to the administrative units, economic sector and citizens from independent data centres located at ministries, agencies and similar. Standalone applications are also hosted independently and huge savings are expected after consolidation and their evolution into cloud services. However, most of the applications hosted by the Ministry of the Interior are cloud-ready, due to the standardised platforms and clear development strategy. Several international award-winning portals already exist, which will be used as the main entry points for end customer services within the hybrid cloud.

12.8.1 ONE STOP SHOP FOR BUSINESSES – E-VEM

The United Nations Public Service Award UNPSA 2009 (improving the delivery of services, first place Europe & North America) "Good practice label" in the "European eGovernment Awards 2009".

The portal e-VEM - one stop shop has been operating since 1 July 2005. The basic purpose of the e-VEM project is to provide a suitable information support for the future entrepreneur and enable him/her to start business operations in the shortest time possible. The project covers two types of activities and relationships: state - legal persons (G2B) and state - state (G2G). The e-VEM portal was co-financed by the European Social Fund.



12.8.2 THE E-DEMOCRACY SYSTEM

The United Nations Public Service Award UNPSA 2012 (fostering participation in public policy-making decisions through innovative mechanisms, second place Europe & North America).

The preparation and the final formation of regulation is a process, in which the ministries, the public, the government offices, the government and the national assembly are actively involved. The system allows coverage of all essential steps in the process of adopting a legal act, operating uniformly in all spheres of competence, which are involved in the process of preparing and adopting legislation. The portal e-Democracy was co-financed by the European Social Fund.



12.8.3 ELECTRONIC DATA GATHERING FOR E-SOCIAL SECURITY

The United Nations Public Service Award UNPSA 2013 (promoting whole-of-the-government approaches in the information age, first place Europe & North America.)

With the constructive collaboration of all members and stakeholders, a system of multi-purpose interoperable components TRAY, IO-MODULE, ASYNCHRONOUS MODULE and SECURITY PLATFORM was developed that efficiently gathers data from 15 institutions with 29 data sources (population register, households register, tax administration, ownership of vehicles, ships and boats, ownership of land, companies, dematerialized securities, data on enrolment in education programmes, data on health insurance, pension insurance, employment/unemployment status) plus 21 banks and 10 investment funds.

The data gathered enables social work centres to make efficient and transparent decisions on social rights such as child benefits, cash social assistance, income support, state scholarships, reduced kindergarten fee, lunch subsidy, snack subsidy and transport subsidy for students, exemption of payment of social security services, contribution to the payment of a family assistant, rent subsidy, the right to cover the difference to the full value of health care services, and the right to the payment of contribution for compulsory health insurance. For the processing of the data gathered, the social work centres use the ISCS2 system that



functions as a client in relation to the interoperability components. Improvement of data gathering procedures and especially the development of interoperability components as technological building blocks for reducing the complexity of data gathering is co-financed by the European Social Fund.

12.8.4 *NIO - NATIONAL INTEROPERABILITY FRAMEWORK AND OPEN DATA PORTAL*

NIO is the basic cornerstone of the national interoperability framework in Slovenia. The NIO portal allows different stakeholders to publish standards and guidelines, information, and assets relating to interoperability that are important at the national level and encourage the publishing of open data and applications, developed in the re-use of public sector information.

The NIO portal was launched and a number of measurements were taken to promote and implement interoperability. Slovenia adopted the action plan for eGovernment development until 2015, introducing a number of horizontal projects to enhance interoperability. The interoperability governance was started in April 2011, by nominating 27 authorized representatives of government institutions and technical experts to the editorial board of the NIO portal. The NIO portal allows stakeholders to discuss all interoperability levels (legal, organisational, semantic and technical) to stimulate the common use of policies and semantic methodologies (e.g., XML-schemas, naming and identification principles for data elements and e-documents). The NIO portal is co-financed by the European Social Fund.



12.8.5 *CENTRAL AUTHENTICATION SYSTEM*

The Slovenian central authentication system, SI-CAS, is being developed as the central service for all eGovernment service providers. It will integrate the STORK concept and in this way enable foreign users to access the services offered electronically. It will bring many benefits to service providers and users. The central authentication system will handle different e-identification solutions, including digital certificates issued by different certification authorities. Based on the central solution for authentication, the interoperability on the national as well as the EU level will be readily available. SI-CAS system is co-financed by the European Social Fund.

Improved authentication system in the SI-CAS form is one of the cornerstones of the cloud development and will provide authentication solutions for all cloud-based projects.

12.8.6 *INFORMATION SUPPORT FOR ADMINISTRATIVE PROCEDURES OF INSPECTORATES*

Recently, EUPP application was developed as a service hosted on a J2EE platform. EUPP supports the inspectorates' activities – the inspections of the implementation of laws and executive acts, administrative procedures, misdemeanour regulatory violations etc. Using http-based clients, the appropriate aggregation of relevant data from supported national registries is provided in-line with the administrative procedures and integrated into the state eDocument system. In future it is expected that it could be offered as a service accessible over the cloud portal, where potential users will present authorisation proofs and obtain a scalable solution which will combine and aggregate data from selected sources.

12.8.7 *PIS - LEGAL INFORMATION SYSTEM*

The PIS portal provides free access to legislation documents, a number of other public sector related documents, and documents released by the institutions of the European Union and the EU Council. This register of regulations of the Republic of Slovenia is linked to the collection of regulations of other state bodies and the official gazette of the Republic of Slovenia. From the technical perspective, this system is very important as it is the first system based on the NoSQL MongoDB database.

12.8.8 *SMA - THE SURVEYING AND MAPPING AUTHORITY*

The Surveying and Mapping Authority of the Republic of Slovenia (SMA) is a body within the Ministry of Environment and Spatial Planning. The SMA is responsible for the basic data on physical space and real estate in the final databases and provides services pertaining to the registration of changes in physical space and on real estate properties, performing the role of a co-ordinator in the real estate system and the spatial data infrastructure. In co-operation with the Ministry of Finance, it introduces mass real estate valuation with the objective of creating foundations for successful and efficient real estate administration and the provision of data for objective and comprehensive real estate taxation, as well as increased efficiency of the real estate market. It creates conditions for implementing land surveys and ensures the compliance of the national co-ordinate system with the European co-ordinate system.



The SMA is responsible for providing reference spatial data, which enable the referencing, and linking of other phenomena and objects into space as well as displaying and understanding them. Spatial data are an important component of decision and policy making in a number of fields. They are also important in connection with other data to which they contribute a spatial element, thus creating high added-value data. The SMA is actively involved in various European and international professional associations related to its field of operation. In addition to its active role in certain associations and the co-operation in European surveying events, it also takes part in projects of professional international partnerships, linking of databases, data exchange and transfer of knowledge and skills into other professional environments.

The competence of the SMA comprises the assignments of the national land survey service, which includes the creation, administration and updating of databases pertaining to the basic geodetic system, real estate, state border, spatial units and addresses, and to the topographic and cartographic system. The databases have been established for the entire territory of the country and their daily updating has been ensured throughout the territory.

SMA is cloud-ready and will bring in a huge added value due to its comprehensive list of integrated databases: land cadastre, land register, land parcel, digital cadastral maps, building cadastre, real estate register, consolidated cadastre of public infrastructure, real estate market register, a vector database of topographic data etc.

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