



secovia

Analysis of best practices on cloud computing
and development of a Good Practice Guide

Activity 3.2.2

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TECLA

Jointly for our common future

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Document Summary

This report is the deliverable of task T3.2.2 of the SECOVIA project, "Analysis of best practices collected and development of a Guide of Best Practices", which is the second part of the Activity A3.2 "Identification, collection, analysis and exchange of best practices on shared public IT infrastructures and services". The main purpose of this report is to highlight the most successful implementation cases of cloud based, advanced IT solutions in the public sector, that were identified on the basis of the proposed methodology, as described in the preceding SECOVIA deliverable T3.2.1, and to provide useful information and basic guidelines regarding the transferability and uptake of these practices by the other countries and interested stakeholders.

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Abbreviations

| | |
|-------|---|
| ASL | Local Health Authorities (Azienda Sanitaria Locale) |
| BM.I | Austrian Ministry of Interior (Bundesministerium für Inneres) |
| BRZ | Austrian Federal Computing Centre (Bundesrechenzentrum) |
| CEOD | Central Europe On – Demand |
| CST | Territory Service Center (Centro Servizi Territoriale) |
| DAE | Digital Agenda for Europe |
| EIA | Environmental Impact Assessment |
| EIS | Environmental Impact Study |
| EKT | National Documentation Center of Greece |
| ERDF | European Regional Development Fund |
| EU | European Union |
| FTTH | Fiber to the Home |
| FSZH | Hungary’s Office for Employment and Social Affairs (Foglalkoztatási és Szociális Hivatal) |
| GRNET | Greek Research and Technology Network |
| GSN | Greek Schools Network |
| HWRS | Hungarian Water Rescue Service |
| IaaS | Infrastructure as a Service |
| ICT | Information and Communication Technologies |
| IT | Information Technology |
| MAE | Italian Ministry of Foreign Affairs (Ministero degli Affari Esteri, MAE) |
| NAIS | National Agency for the Information Society of Abania |
| NOC | Networks Operations Center |
| OGDI | Open Government Data Initiative |
| PA | Public Administration |
| PaaS | Platform as a Service |
| SaaS | Software as a Service |
| SAP | Systems Applications Products |
| SEE | South East Europe |
| SLAs | Service Level Agreements |
| SQL | Structured Query Language |
| VM | Virtual Machine |

The SECOVIA consortium: List of the SECOVIA partners and countries

| Partner | Abbreviations | Country |
|---|-----------------|------------------------|
| Association of Albanian Municipalities | AAM | Albania |
| Centre for public administration cooperation | ZVK | Austria |
| Sarajevo Economic Region Development Agency-SERDA | SERDA | Bosnia and Herzegovina |
| Regional Authority Kyustendil | RAK | Bulgaria |
| Centre for Development of Skopje Region | CDSR | FYROM |
| Region of Western Greece | WGR | Greece |
| Institute for the Management of Information Systems / "Athena" Research and Innovation Center in Information, Communication, and Knowledge Technologies | IMIS | Greece |
| Institute of communication and computer systems / national technical university of Athens | ICCS/NTUA | Greece |
| Pannon Novum West-Transdanubian Regional Innovation Nonprofit LTD. | Pannon Novum | Hungary |
| Lepida S.p.A. | LEPIDA | Italy |
| TECLA - Association for the Transregional, Local and European Cooperation | TECLA | Italy |
| The Development Centre for Small and Medium Sized Enterprises Maramures | CDIMM Maramures | Romania |
| Regional Development Agency of Gorenjska, BSC Business Support Centre, Kranj | BSC | Slovenia |

1 Introduction

The main issue the SECOVIA project seeks to address is the promotion of cloud based, advanced IT solutions in the public sector, through examining and identifying the potential they have in offering cost effective and scalable digital services to governments and citizens. In order to achieve this goal, one of its main concerns is the exchange of experience and transfer of knowledge among project's partners on related issues. Thus, the gathering and diffusion of relevant best practices is one of the main tasks to be delivered.

This report is the deliverable of task T3.2.2 of the SECOVIA project, "Analysis of best practices collected and development of a Guide of Best Practices", which is the second part of the Activity A3.2 "Identification, collection, analysis and exchange of best practices on shared public IT infrastructures and services".

The main purpose of this report is to highlight the most successful implementation cases identified on the basis of the proposed methodology, as described in the preceding SECOVIA deliverable T3.2.1, and to provide useful information and basic guidelines regarding the transferability and uptake of these practices by the other countries and interested stakeholders.

Good practices refer to cases concerning the use of shared IT infrastructure and services exclusively in the *public* sector, with emphasis given to the territorial administration authorities, in SEE. Special attention is given in the SECOVIA partners and countries. Nevertheless, at the end of the report a reference is also made to other countries of the South East programme area, even if they do not belong to the SECOVIA consortium (e.g. Croatia). The methodology produced in the deliverable of task T3.2.1 is the basis for the identification and the classification of the collected practices as "good". These practices along with the key lessons learned from their implementation are analytically presented in the Good Practice Guide.

2 Good practices on public shared IT infrastructure and services: terms and definitions

Before going ahead with the analysis, we first have to define the terminology used throughout this report regarding good practices and public shared IT infrastructure and services.

In general, a **good practice** is defined as an initiative (project, process, method or technique) which has been realized and proven successful and which has the potential to be transferred and applied elsewhere. The proven success of a good practice is of major importance for its definition and it should be based on some evidence of effectiveness, which optimally concern tangible and measurable results superior to those accomplished with other means for the achievement of a specific goal. A good practice is intended to be used as a benchmark for other practices.

Good practice: *an initiative (project, process, method or technique) which has been realized and proven successful and which has the potential to be transferred and applied elsewhere*

In the SECOVIA context, the good practices to be collected should concern cases of public shared IT infrastructures and services. For the purposes of this document, and in order to comply with and serve best the objectives set by the SECOVIA project, **public shared IT infrastructures and services** are defined as cloud computing based IT solutions implemented in and / or used by the public sector.

Public shared IT infrastructures and services are defined as cloud computing based IT solutions implemented in and / or used by the public sector

Because “cloud computing” is a very general and ambiguous concept, it is of high importance to be well defined. Its definition is used as a base, for the methodology developed for the identification, collection and further analysis of “good practices”.

Although cloud computing has many names (like grid, utility and on demand computing), and there is a vast disagreement over what it is or isn't (IBM, 2009), it is generally agreed that a cloud based solution has characteristics that exceed the mere offering of a web based service (SATW, 2012). A most

Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

comprehensive and common-ground definition for the concept of cloud computing is provided by the National Institute of Standards and Technology (Mell and Grance, 2011). According to this definition, **cloud computing** is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

This cloud model promotes availability and is composed of **five** essential characteristics, **three** delivery models, and **four** deployment models, which are briefly described below.

A cloud offering should have all five essential characteristics, described in the following table:

Table A. Essential characteristics that a cloud offering *should* have

| Characteristic | Short description |
|-------------------------|--|
| On-demand self-service: | IT is used as service and is readily available on demand without requiring manual intervention |
| Broad network access: | The service is made available via a network independently of the user end device. The network connection must be of sufficiently high performance and available for that particular service. |
| Resource pooling: | The provider makes the necessary resources available to multiple consumers using technologies such as virtualization and multi-tenancy. |
| Rapid elasticity: | The resources necessary can be provisioned rapidly and released without manual intervention when no longer needed. |
| Measured Service: | A service consumed must be measurable in terms of the resources used. In this way, consumption-based billing becomes possible. |

Depending on the services delivered, a cloud offering can be classified into three service models, as follows:

Table B. Service models to which a cloud offering *could* be classified

| Service model | Short description |
|-------------------------------------|---|
| Infrastructure as a Service (IaaS): | The capability provided to the consumer is the provision of processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure, but has control over operating systems, storage, deployed applications, and possibly select networking components (e.g., firewalls, load balancers). |

| Service model | Short description |
|-------------------------------|---|
| Platform as a Service (PaaS): | The capability provided to the consumer is deployment onto the cloud infrastructure consumer-created applications using programming languages and tools supported by the provider (e.g., java, python, .Net). The consumer does not manage or control the underlying cloud infrastructure, network, servers, operating systems, or storage, but has control over the deployed applications and, possibly, application hosting environment configurations. |
| Software as a Service (SaaS): | The capability provided to the consumer is the use of the provider's applications running on a cloud infrastructure and accessible from various client devices through a thin-client interface such as a web browser (e.g., web-based e-mail). The consumer does not manage or control the underlying cloud infrastructure, network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings. |

According to the user requirements and market availability, a cloud offering could be classified to the following deployment models:

Table C. Deployment models to which a cloud offering *could* be classified

| Deployment model | Short description |
|------------------|---|
| Private Cloud: | Here the user of a solution is an explicit organization or an organization unit. A private cloud can be run internally or by a (third-party) provider. |
| Community Cloud: | The service is used by several members of a defined group. The services may be offered by several providers who are either internal or external to the community |
| Public Cloud: | The service is available to the public, and in general provided by a single provider. |
| Hybrid Cloud: | Hybrid clouds offer a combination of various organization forms, combining their respective advantages and disadvantages. For example, data that need to be protected can reside in a private cloud, whereas public data and/or applications can run in the public cloud. |

For the conduction of this Good Practice Guide, all the collected practices in order to be defined as **cloud based practices** and be set under evaluation:

- had (at least to some extent) *all* the characteristics summarized in table A, while,
- they were *any* possible combination of the models described in tables B and C.

3 Purpose and use of this Good Practice Guide

The main purpose of this Good Practice Guide is to gather and present in a useful and effective way all the main characteristics and success factors of cloud computing practices in the public administrations of SEE. The ultimate goal is the gathered information to guide the implementation and adoption of future cloud computing practices by stakeholders in the programme area.

More analytically, the Guide serves a dual purpose:

1. To highlight the most successful cases of cloud based IT solutions in the public sector in the SEE counties :

- Through an evaluation process based on specific criteria

2. To provide insights on issues of their transferability and uptake :

- By determining under which circumstance these practices can be adopted by other organizations

The broader strategic goals of this guide are to provide empirical evidence on questions such as the following:

- What is the degree of usage concerning cloud based IT solutions in the SEE countries?
- How successful is the implementation of this kind of solutions in the public sector?
- Is there a consistent set of guidelines for the successful adaptation of cloud based IT solutions?
- How transferable are these kinds of initiatives?
- What lessons can be learnt from the relevant experience of public administrations?
- Can the public sector set the example for successful cloud based IT services?

4 Methodology

4.1 Collection of practices

The collection of the practices was implemented both through desk research and primary survey. Extensive desk research was conducted for the identification of relevant practices of cloud computing services in the public sector in all the countries of the consortium. Main sources of information were the national and/or territorial administrations' sites of the SECOVIA countries, European and international institutions and past projects, academic journals, as well as ICT multinational companies' sites and special reports.

Primary survey was conducted through a purpose made on-line questionnaire, addressed to selected IT field experts and key actors in the decision making process and organization of public administrations. The replies were gathered through the network of the SECOVIA partners. The survey focused on individuals with knowledge, exposure and involvement in IT and digital service provision from the public sector. Special emphasis was given to territorial administration and central government agencies. The survey questionnaire gathered information regarding the following main issues:

- Type and short description of the cloud computing practice
- Identity of the organizational unit / units involved
- Maturity and expectations regarding the implementation of the practice
- Main objectives of the practice
- Difficulties and problems encountered in the implementation of the practice
- Operational impact of the practice
- Main lessons learned from the implementation and operation of the practice
- Possibility and degree of transferability of the practice

In total, the research period lasted from mid-July to mid-November 2013, during which 44 practices were collected both through desk research and through the questionnaire. These practices were further examined and set under an evaluation process (described in next section), in order to decide based on the definitions and criteria set, whether they are **cloud computing good practices** in **public administrations**.

4.2 Evaluation of practices

The first stage of evaluation involved the identification of the collected practices as cloud computing practices. Among all the collected cases only those that were identified as cloud computing practices, were further evaluated and analyzed. The identification of the practices was based on the definitions presented in section 2. More analytically, as cloud computing practices were identified those that had (at least to some extent) **all** of the following characteristics:

Chart A. Identification guidelines for cloud computing services in the public sector

- 1. On-demand self-service:**
 - IT is used as service and is readily available on demand without requiring manual intervention
- 2. Broad network access:**
 - The service is made available via a network independently of the user end device. The network connection must be of sufficiently high performance and available for that particular service.
- 3. Resource pooling:**
 - The provider makes the necessary resources available to multiple consumers using technologies such as virtualization and multi-tenancy.
- 4. Rapid elasticity:**
 - The resources necessary can be provisioned rapidly and released without manual intervention when no longer needed.
- 5. Measured Service:**
 - A service consumed must be measurable in terms of the resources used. In this way, consumption-based billing becomes possible.

In addition, only cloud computing practices implemented or adopted by **public sector organizations** were further analyzed. The collection and identification of cloud computing practices concerned the SEE countries, and especially the countries of the SECOVIA project¹.

Out of the 44 collected practices, 35 were identified as cloud computing practices in the public sector, based on:

¹ Austria, Bulgaria, Greece, Hungary, Italy, Romania, Slovenia, Albania, Bosnia and Herzegovina, FYROM.

- (a) the cloud computing definitions set above (chart A)
- (b) their proven applicability in and adoption by the public sector
- (c) the availability and quality of information gathered (both through secondary and primary research)

The 35 identified cloud computing practices were further processed before their final evaluation. More particularly, the next actions took place:

- 3 of the practices were consolidated into only 1 (and thus evaluated as such), as they were all cloud computing services provided under the same framework².
- 3 of the reported practices through primary survey were duplicates (i.e. they were already reported) and thus were excluded from the evaluation

Hence, out of the 35 identified cloud computing practices, 29 passed to the final stage of evaluation.

For the final stage of the practices' evaluation and their classification as *good*, good practice definitions and quality criteria were set according to the methodology produced in the deliverable T3.2.1 of the SECOVIA project.

More particularly, seven fields were initially proposed so as to match definitions and prerequisites of what should be considered a good practice of cloud computing, taking into consideration the specificities and objectives of the SECOVIA project. Eventually, only six out of the seven fields were used for the final evaluation of practices (Table D). The field that was excluded was "Problems encountered in the implementation" (number 4), mainly due to the fact that there was not enough information (both through primary and secondary research) for the evaluation of the practices within the specific field.

In each field a set of evaluation criteria, as well as of objectives were used to facilitate the evaluation process.

² These services refer to the "BresciaGov – A service portal di Provincia di Brescia" practice, analytically presented in the Guide.

Table D. Evaluation fields, criteria and objectives of cloud computing practices in the public sector

| Evaluation fields | Evaluation Criteria | Objectives |
|--|--|--|
| 1. Solution impact | Level of Solution impact | Assess whether an implemented practice addresses widely acknowledged issues and problems also shared by other organisations in different regions and settings |
| 2. Achieved objectives and produced results | Number / type of achieved objectives and produced results | Identify the number, type and character (e.g. measurable, validated) of objectives' achieved and results produced by a specific practice |
| 3. Previously applied evaluation | Type and level of previously applied evaluation | Identify the type and level of any previous validation and evaluation (e.g. internal, external, preliminary, systematic) |
| 4. * Problems encountered in implementation | Extent of problems encountered in implementation | Assess the extent of encountered problems and difficulties that have hindered a practice's implementation |
| 5. Scalability of practice | Number of involved organisational entities. | Identify the potential scalability of a practice to evaluate the scale/scope economies achievable |
| 6. Organisational impact | Degree of organisation impact in the involved administrations | Assess the final level of impact in operational efficiency , the potential resistance encountered and the side-effects of the transition |
| 7. Transferability | Level of transferability | Assess a practice's potential or proven record of being transferred to different geographic contexts and organisational settings |

** The field was not used in the final evaluation of the practices due to lack of data*

In order to be classified as good or not, each of the identified cloud computing practices received a score from 1 to 5 for each of the fields described above. The good practice criteria that were used, along with the setting of scoring and their thresholds are analytically presented in table E. As it is already mentioned, the criterion of “Extent of problems encountered in the implementation” was not used in the final evaluation of the practices, mainly due to lack of data. The setting of the evaluation criteria as well as their scoring and thresholds are based on previous studies on practice evaluation, as described in the relevant (academic and non-academic) literature.

Table E. Evaluation criteria and thresholds of cloud computing good practices in the public sector

| Criteria | Lowest score (1) interpretation | Score (2) Interpretation | Score (3) interpretation | Score (4) interpretation | Highest score (5) interpretation | Threshold |
|--|---|--|---|---|--|-----------|
| Level of Solution impact | The practice relates to a unique problem encountered within the boundaries of the specific organization/geographical scope. | The practice relates to more than one problem encountered within the boundaries of the specific organization/geographical scope. | The practice relates to a unique problem encountered by more than one organization | The practice relates to more than one problem encountered by more than one organization | The practice relates to generic, widely encountered problems by many organizations. | 3 |
| Number / type of achieved objectives and produced results | The practice has not produced tangible results or measurable benefits for the organization. | The practice has reached some objectives but not produced measurable results | The practice has reached most of the objectives but not produced measurable results | The practice has reached most of the objectives and produced measurable results | The practice has resulted in significant and measurable results for the organizations. All planned objectives were met and tangible results were produced. | 3 |
| Type and level of previously applied evaluation | No evaluation has been applied. | The practice has been evaluated only on a preliminary stage | Practice has been internally evaluated | Practice has been externally evaluated | Thorough methodological evaluation has been performed by external, independent evaluators. | 2 |
| * Extent of problems encountered in implementation | <i>Significant problems were encountered during the implementation of the practice. Implementation was never completed.</i> | <i>Some problems were encountered that hindered the implementation of the practice.</i> | <i>Only occasional problems were encountered that did not hinder the implementation of the practice</i> | <i>Almost no problems were encountered during the implementation of the practice.</i> | <i>No problems were encountered in the implementation of the practice. It was completed within budget and schedule.</i> | 3 |
| Scalability of practice. Number of involved | The cloud based solution involved individuals in the | The cloud based solution involved a department of | The cloud based solution involved more than one | The cloud based solution involved more than one | The cloud based solution involved many | 2 |

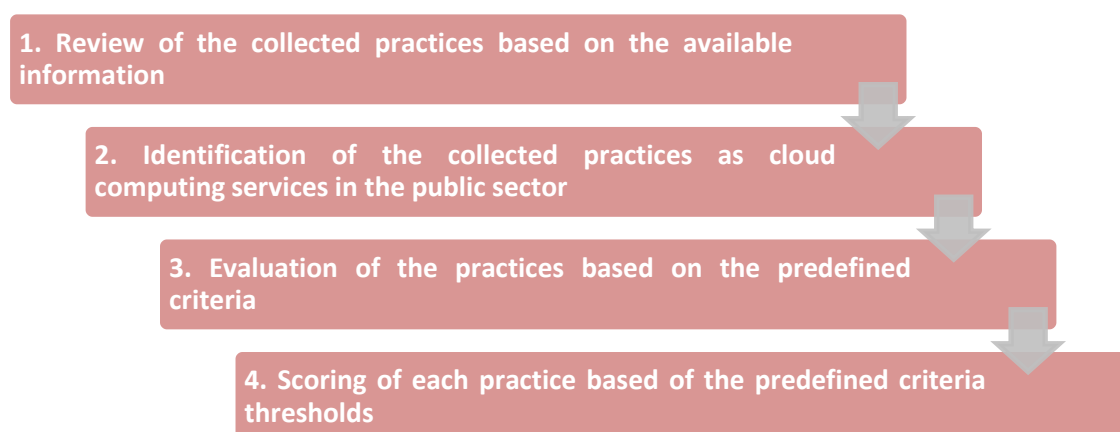
| Criteria | Lowest score (1) interpretation | Score (2) Interpretation | Score (3) interpretation | Score (4) interpretation | Highest score (5) interpretation | Threshold |
|--|--|---|--|--|--|-----------|
| organisational entities. | same organization. | the same organization | department in the same organization | organization | organizations geographically distributed. | |
| Degree of organizational impact in the involved administrations | The practice resulted in loss of operational efficiency, or was not adopted due to organizational resistance. | The practice was adopted but had neutral results regarding operational efficiency | The practice had low but positive results regarding operational efficiency | The practice had positive results regarding operational efficiency | Practice resulted in improved operational efficiency and had significant positive impact on organization operations. | 2 |
| Level of transferability | Practice has not been transferred or tested in other context/settings. Specific attributes prohibit transferability. | The practice has not been transferred but has some attributes that show potential of being replicated in other context/settings | The practice has not been transferred but shows strong potential of being replicated in other context/settings | The practice has been transferred to another context/setting. | Practice has been successfully transferred to multiple other contexts/settings without significant hurdles. | 3 |

** This criterion was not used in the final evaluation of the practices due to lack of data*

A cloud computing practice was classified as **good** only if it scored above the threshold in at least **4 out of 6** criteria used, as described above. The overall score of each practice was calculated as the average of the criteria used. Only 25 out of the 29 cloud computing practices passed the final stage of the evaluation process and were classified as **good**. These practices are analytically presented in this guide and used for the extraction of useful information and conclusions regarding cloud computing services in the public sector.

Summarizing, for the identification and presentation of a good practice in this Guide the following implementation stages were followed:

Chart B. Evaluation stages for the identification and presentation of a good practice in this Guide



Hence, the final outcome from all the evaluation stages presented above was the analysis of 25 good practices on cloud computing in the public sector of the countries in the programme area.

The identified cloud computing good practices are analytically presented in the following section **categorized into (a) regional / local cases and (b) national cases**. Finally the case of Croatia, being a country of the SEE area but not of the SECOVIA consortium, is presented separately in the Annex A of the report.

In principal, each practice description is divided into the following parts:

- **Situation:** background information and brief description of the problem addressed
- **Solution:** description of the main characteristics of the cloud service
- **Main results achieved / objectives / benefits:** brief presentation of the practice's evaluation outcomes thus far (qualitative and/or quantitative results)
- **Transferability:** brief report on the practice's transferability issues
- **Sources:** main source of the information gathered

Nevertheless, the above categorization of information was not always feasible, mainly due to lack of data. In these cases, only the categories that enough information was available are presented. In addition, it is worth mentioning that in the case of Croatia and due to the nature of the practice (i.e. the fact that it is a pilot international project) an additional category is presented, regarding a general brief description of the project's background.

5 Good practices

5.1 Regional and local practices

5.1.1 Amtsweg.gv.at – A centrally operated form server for the Austrian municipalities

Solution:

Amtsweg.gv.at was created as part of an inter-municipal cooperative project of several cities and communities with the support of the Austrian Association of Cities in 2006. In particular, it was developed by IT-Kommunal GmbH, a privately operated IT service provider, in cooperation with the Austrian Association of Cities and Towns and six municipalities from the region Lower Austria, namely St.Pölten, Wiener Neustadt, Krems, Waidhofen/Ybbs, St.Valentin and Schwechat. **It is an electronic form service that provides municipal forms and form blocks on a centrally operated form server.**

With amtsweg.gv.at the municipalities in Austria get the chance to provide forms for electronic applications which can also be signed electronically with the Austrian citizen card (e.g. ordering of a voting card, birth certificate, etc.). The municipalities can use pre-built and standardized forms (according to Austrian e-government standards and conforming to the laws of Austria's federal states) or create individual ones with an on-line form designer. Each municipality gets access to an electronic post-office box, where they have the possibility to administer all the applications. The electronic form service is provided for all municipalities throughout a data processing center.

Main results achieved / objectives / benefits:

The main benefit from providing the form service centrally is that the individual municipal administrations have **no need for infrastructure** (physical presence or management) at all. The municipalities using the pre-built and standardized forms receive the links to the single electronic forms and access the electronic post-office box from the service provider (IT-Kommunal GmbH). The project started in 2004 with six cities from the Lower Austria region. Currently, almost 170 municipalities are using these pre-built and standardized electronic forms, and furthermore approximately 20 municipalities are using the online form-designer to build individual electronic forms. According to field representatives, the project has adequately addressed most of its objectives, which were cost savings and access to better infrastructures and services. In addition, **the outcome of the project is overall positive in operational terms, especially in terms of service quality and process improvement and automation.**

Transferability:

According to field representatives, the practice **has already been transferred** to similar contexts and adopted by other groups of public organizations. The main characteristic that constitutes the practice transferable is the fact that it **addresses problems that are common among many organizations and different countries.**

Sources:

<http://it-kommunal.at/index.php/amtsweg-gv-at>

SECOVIA T321 survey Jul-Nov 2013 results

5.1.2 Amtstafel.at - Local Authorities network for exchange of knowledge and experiences

Solution:

Amtstafel 2.0 (Office panel 2.0) is a **knowledge and social networking platform (community cloud)** provided by the Association of Austrian Cities and Towns, free of charge to all local authorities. The technical partner for the realization of the project was Public Management Consulting. The platform provides the employees of the administration of Austria's cities and communities the opportunity to exchange knowledge, experience and information. It is among others an active tool of communication and interaction between administrative staff.

Upon subscription, the users of Amtstafel 2.0 have the possibility to join in conversations or archives regarding local issues and projects or report new ones. For each topic, various questions as well as other written material can be shared and / or directed to the other users. Prerequisite for the use of the Amtstafel 2.0 is a one-time registration, ensuring that users are active within the municipal sector. Tools such as discussion forums, documents, directories, news, or traditional links assist in efficient topic specific exchange. Furthermore, it is possible to provide personal profile information and make direct contact with other users.

Main results achieved / objectives / benefits:

The most important objectives of the Amtstafel platform are:

- Focus on knowledge exchange among users in community-related issues and project fields in a most efficient way
- Cross-regional and inter-municipal cooperation through a digital platform

According to field representatives, the practice **has adequately addressed its objectives and has an overall positive outcome regarding its operations**. In particular, it is considered most beneficial in terms of productivity and service quality.

Transferability:

The practice has been recorded to have already been adopted by other groups of public organizations. Its most prominent characteristic in terms of transferability is the fact **that it addresses problems that are common among many organizations and different countries**.

Sources:

<http://amtstafel.at/ueber-amtstafel-20>

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5.1.3 CNC communities – The corporate network of Carinthia

Solution:

“CNC communities” (Corporate Network of Carinthia Communities) is a **unified and centrally managed network of authorities, aimed to facilitate the Carinthian municipalities**. It provides a highly available and secure broadband connection to the communities, based on a MPLS³ mechanism, and serves as the basis for modern governance (i.e. e-government). Through CNC, the Carinthian municipalities use central IT security infrastructure (i.e. firewalls, proxies, content filter etc.). The project was initiated in 1999 by the State of Carinthia (the Municipality Unit and the Regional of Office of Directors), whereas the management and supervision is implemented by the computer science community center of Carinthia.

Main results achieved / objectives / benefits:

“CNC communities” is in full operation since 2001. According to field experts **the project has addressed all of its objectives and has an overall positive impact to the operations of Carinthian municipalities**. More specifically, the project is estimated to be particularly beneficial in terms of cost savings.

Transferability:

According to field representatives, the practice has already been adopted by other groups of public organizations. The fact that the practice **addresses problems that are common among many organizations** is mainly what constitutes it highly transferable.

Sources:

<http://www.giz-k.at/cnc.php>

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³ Multiprotocol Label Switching (MPLS) is a mechanism in high-performance telecommunications networks that directs data from one network node to the next based on short path labels rather than long network addresses, avoiding complex lookups in a routing table. The labels identify virtual links (*paths*) between distant nodes rather than endpoints. MPLS can encapsulate packets of various network protocols (“Building MPLS-based Broadband Access VPNs”, Kumar Reddy, Cisco Press.com, 2005).

5.1.4 CNC E-mail service for the municipalities of Carinthia

Solution:

The CNC (Community Network of Carinthia) **E-mail Service provides all Carinthian municipalities connections with an Exchange server, including automated backup and mobile access functionality.** All municipalities are sharing one general domain (.ktn.gde.at), but have also the possibility to use a self chosen domain as “alias”. The organizations can share mailboxes, calendars and archives at their own will, as well as a central managed address book with distribution list's etc.

Main results achieved / objectives / benefits:

The service was initiated in 2010 and is currently in full operation. Its main objectives were **cost savings and access to better infrastructures and services for the municipalities involved.** According to field experts, the practice has adequately addressed its objectives and presents a positive outcome in operational terms, especially regarding the **improvement of process automation and reduction of process complexity.**

Transferability:

The practice is estimated to be transferable to other organizations, mainly due to the fact that it uses **standardized technology solutions.**

Sources:

<http://www.giz-k.at/mail.php>

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5.1.5 Management of public land for the administrations of FYROM

Solution:

Gradezno-zemjiste (www.gradezno-zemjiste.mk) is a **SaaS, public cloud application aiming at the management of public building land by the administrations of FYROM**. The application includes two major modules:

- E-Registry, i.e. a database of available public building land, and
- E-Auction, i.e. a module for online auction of public building land

The cloud service involves all the country's municipalities, and it is implemented by the Association of the Units of Local Self Government of FYROM (ZELS, <http://www.zels.org.mk/>).

Main results achieved / objectives / benefits:

According to field representatives, the practice was initiated in 2011 and **it is by now in full operation**. The main objective addressed adequately by the practice is **cost savings**, whereas the overall impact of the practice on the operations of the organizations involved (FYROM municipalities) is estimated to be positive, especially in terms of **service quality, process automation and reduction of process complexity**.

Transferability:

The practice is considered to have transferable characteristics with most prominent the fact that **it doesn't require big changes in daily operations and it involves low risk of organizational resistance**.

Sources:

<http://www.gradezno-zemjiste.mk/>

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5.1.6 BresciaGov – A service portal of Provincia di Brescia

Solution:

BresciaGov is a SaaS public cloud service of the Province of Brescia addressed to citizens, businesses, as well as organizations in the area. The provided services offered through the portal are divided by type of user and are navigable according to different categories: alphabetically, by topic of interest, by type of services, etc.

Each service corresponds to a service guide that describes it briefly, indicating the regulations it refers to, the requirements to access it and the practices to be forwarded to the institution. The services on BresciaGov are of different types: in some cases there are simply the information and forms that one has to download in order to start a process, while in others it is possible to carry out a process (compilation, sending the form, payments) entirely on- line.

The services currently available are issued by 61 local authorities in the Province of Brescia for a total of 1,964 services, broken down according to whom they are addressed as follows:

- Citizens (1,214 services)
- Businesses (574 services)
- Public bodies (176 services)

An example of a service provided to public bodies, is the **“Conservazione Digitale a Norma” (Digital Preservation Service)**. The service is open to all municipalities participating in the Center for Innovation and Technology of the Province of Brescia and is a service dedicated to the storage and protection of official documentation, through the process of their digitization. Essentially, it constitutes an introduction to the use of electronic documents, as it involves the replacing of the original paper documents with e-documents. The conservation service aims to provide municipalities with a tool dedicated to the mandatory retention of electronic documents produced by the institutions and digitally signed. As required by the Digital Administration Code (Legislative Decree no. March 7, 2005, n. 82) updated by Decree Law of 30 December 2010 no. 235.

Another example of a cloud service provided through BresciaGov is **the digital stamp service (Timbro Digitale)**. The digital stamp is a technology used in the Italian Public Administration of Brescia and private companies to allow the creation of electronic documents (e.g. certificates of registry) legally valid even after being printed. The document produced includes a code graph (two-dimensional code) that contains information related to the electronic document and the digital signature on the original document. The service is available to 20 municipalities in the Province of Brescia.

A third example of a SaaS service provided through BresciaGov is the **Disaster Recovery (DR) service**. The solution basically involves a migration from a tape local full backup to a new remote disk based incremental backup. The remote site is useful for disaster recovery purposes. The service is currently in pilot operation and its target maturity date is placed in 2014.

Main results achieved / objectives / benefits:

The BresciaGov practice is in full operation since 2010 and according to field representatives its main objectives were economic benefits, access to better services and operational efficiency. **The overall impact** of the practice on the operations of the territorial government of Province of Brescia is estimated to be **positive, especially in terms of productivity, service quality and process automation**.

Transferability:

According field representatives the practice is considered to be transferable to other organizations and similar contexts, mainly due to fact that **it uses standardized technologies**. In fact, it is reported that the practice has already been adopted by other groups of public organizations.

Sources:

<http://www.bresciagov.it/portal/page/portal/bresciagov>

<http://innovazione.provincia.brescia.it/portal/page/portal/bresciagov/gas/bresciagovpa?idscheda=AAjI3AAhAAA6k4AAA&tipogas=3&nav=elenco>

<http://www.bresciagov.it/portal/page/portal/bresciagov/gas/bresciagovpa/?idscheda=AAjI3AAhAAEWccAAB&tipogas=3&nav=elenco>

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5.1.7 On-line payments in the Province of Brescia

Solution:

In 2012, the Province of Brescia developed Cpay™, **an on-line payment platform (SaaS) for the public bodies of the Province**. Through the platform, the public administration of Brescia offers to its citizens an innovative on-line payment system, involving payments made towards the public organizations of the Province. The available types of payment are by credit card or bank account (using a system of secure identification based on smart card). The Cpay™ allows a number of other services (like e.g. access to the debt position of the citizen), it integrates with back-office systems of each municipality and it provides periodic reports.

Main results achieved / objectives / benefits:

The practice is in full operation since 2012. According to field representatives, its main objectives were the cost savings, as well as access to better infrastructures and services. The project is estimated to have adequately addressed most of its objectives and **the overall impact of the practice is estimated to be positive, especially in terms of productivity and service quality**. In addition, the practice has been evaluated by external independent experts. The main metrics used were simplicity of the transaction and the quality of reports of payment and the overall outcome was positive as a satisfactory degree.

Transferability:

The practice is recorded to have been transferred to similar contexts and adopted by other groups of public organizations. The main characteristic that constitutes the practice transferable is the fact that **the demonstrated benefits achieved significantly outweigh the investment and transition costs**.

Sources:

<https://www.cpay.it/home/index.html>

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5.1.8 CSTPU: Territorial Service Center of Pesaro and Urbino

Situation:

The Province of Pesaro and Urbino lies in a geographic area of 2,564 square kilometers and has a population of 363,388 inhabitants. It is composed of 60 municipalities, out of which 48 are in mountainous areas, organized on 4 Mountain Communities and 4 Union Communities. **The characteristics of the Province enhance the role of Provincial Administration in the coordination and support of the territory's development** in various areas. During the past years, the Provincial Administration has taken a series of initiatives, regarding the following issues:

- The coordination and development of the information society at the provincial level
- The development of training programs at the local level and the transfer of "best practices" among territories
- The balance of the differences between the strong and weak areas of the Province
- The promotion of data transmission through a wide-area network and application integration among the local public administrations
- The provision of technical support centrally regarding the development of e-government at the local level.

Solution:

Within this framework, the Province of Pesaro and Urbino has developed a project called CSTPU (Centro Servizi Territoriale Pesaro e Urbino), which involves **the provision of services to local public authorities through a Territorial Service Center placed in the cloud.**

The main services provided through the CSTPU are the following:

- Internet connectivity, web hosting and management of email systems: currently 72 agencies are served and 2,500 mailboxes are managed
- Virtualization of physical servers: currently 6 municipalities and 30 virtualized servers are managed virtually
- Management of the municipal System of Information (SIT, Sistema Informativo Territoriale): currently 54 municipalities are connected and managed
- Supply management (like e.g. salaries) through a cloud Application Service Provider (ASP): 20 related entities
- Management and development of portals that provide on-line services to citizens and enterprises (e-government): currently 40 municipal portals are managed
- Training and project consulting on ICT: 800 people are currently trained in e-learning

- System support and remote management of LAN and WAN municipalities: currently 40 municipalities are interconnected.

In total, 69 organizations participate in the CSTPU, including the Province of Pesaro and Urbino that is the coordinator of the initiative. More particularly, the participating organizations include:

- 60 out of 60 municipalities (including the towns of Pesaro and Urbino)
- 4 out of 4 Mountain Communities
- 4 out of 4 Municipalities Unions

Main results achieved / objectives / benefits:

The practice is in full operation since 2012. Its main objectives were the improvement of technical and operational performance and efficiency of IT resources, cost savings, the focus on core business and operational efficiency. According to field representatives the project has adequately addressed most of its objectives and the **overall impact of the practice is estimated to be positive in operational terms, especially regarding the Province's cost savings target.**

Transferability:

The practice is considered to be transferable to other organizations and similar contexts, mainly due to fact that **it uses standardized technologies.**

Sources:

<http://www.cst.pu.it/>

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5.1.9 The case of Emilia Romagna

Situation:

Emilia-Romagna region brings a very specific practice in the context of the Italian Digital Public Administrations (PA). The practice is based on the **networking of all local administrations** via connectivity, interoperability and dematerialisation.

This direction was taken in 2004 with the adoption of the regional law on the implementation of information society (LR11/2004). The law defines very specific targets such as: the realisation and management of a private ultra broadband network (named Lepida) for the regional public administration (i.e. the regional government, 348 municipalities, 9 provinces, 4 universities etc.), the simplification of procedures and the integration of the public services, the increasing of PAs' efficiency and the simultaneous reduction of costs, the valorisation of public data, interoperability, accessibility, security, as well as research and development and e-inclusion.

More specifically, the law identifies 3 elements / initiatives for the promotion of IT in the territory of Emilia Romagna:

1. Lepida SpA, an in-house company whose shareholders are all the local authorities of the region (i.e. 348 municipalities, 9 provinces, all Local health districts, Universities etc.), summing up to 412. The company's objective is the implementation of strategies and policies in the field of Information Society.
2. "Community Network Emilia-Romagna (CN-ER)", a formalised community in which all local administrations participate. It aims to make local administrations work as a system, to guarantee an equal territorial development, to give value to local best practices, as well as to consolidate the regional PAs as a network.
3. The Regional IT Plan (PiTER), which constitutes a 3 years' plan (based on yearly operational programmes) and the main programming instrument for all Emilia-Romagna local authorities. It aims at supporting simultaneously and evenly the local development and the information society. It is the Regional Digital Agenda, currently at its 4th edition. The present PiTER is structured in coherence with the European Digital Agenda and is built around 4 rights of "digital citizenship" in Emilia-Romagna: (a) the right to access technological networks; (b) the right to access information and knowledge; (c) the right to access services; (d) the right to access public data. In addition, a 5th guideline is focused on smart territories.

The Digital Agenda of Emilia-Romagna aims at these ambitious targets, since it is based on a system that can provide a homogeneous approach and co-participation from all local authorities, structured in the Community Network of Emilia-Romagna (CNER).

In practice, CNER is translated into the sharing of common rules (e.g. standards, guidelines etc.), the sharing of infrastructures and technologies (the ultra broadband network Lepida, common platforms etc.) and the sharing of organisational models (network of people, local thematic communities etc.). This initiative was kicked off by the decision to link all local authorities via an ultra broadband network (i.e. Lepida) so that shared services could be deployed.

Lepida is an ultra broadband network that connects all local authorities of the area with a backbone network of over 60.000 km optic fibre (plus various MAN linked to it). It is the result of a vision born at the beginning of the century. The network was realized in 2008, with a relevant impact not only on public administrations but also on the overall local society. Lepida has proved to be an asset also for telecom operators when tackling the issue of digital divide. **Lepida is the network that sets the territory of Emilia Romagna as a potential candidate to develop a shared cloud infrastructure for the whole regional administration.**

A number of applications and services can be deployed and used via the network. In particular, within the CNER, two pillars were identified for the promotion of interoperability and dematerialisation: registers and common platforms both of which can be used for the creation of services or applications.

The actors who participated in the realisation of this system are:

- **Regione Emilia-Romagna**, which co-ordinates a territorial and institutional system where all participants are engaged in a common project defined by the will to cooperate and share.
- **Lepida SpA**, the technological partner of the public administration
- the **CNER** , as a way of working together
- **PiTER**, the Regional Digital Agenda.

In this framework a number of services were born, with a double purpose: to give life to a network which puts together its technological and “human” aspects while providing solutions that could satisfy different needs.

Some of the services which compose the CNER portfolio of services that represent the concept of a “horizontal platform” and enable the production of further vertical services are the following:

- **FedERa**: the system for federated authentication in use in Emilia-Romagna. It makes digital identities available for the usage of e-government services. It is already integrated with some front end services and is going to be integrated with all e-government services deployed, as a single sign on function. It is managed by Lepida SpA.

- **PayER**: it is an e-payment platform for online payments for public administration services such as sanctions for traffic violation, local taxes, etc. It is multichannel and it also allows for checks on amounts, both due and already paid. It is managed by Lepida SpA.
- **SuapER** is a centralized implementation of an online services front office, related to the One Stop Shop of the productive activities, managed by Lepida SpA. SuapER brings together some 200 municipalities, while other municipalities have chosen to rely on local installations, often managed by the relevant territorial Province. Lepida SpA, with the support of the CCD and Productive Activities Department of the Emilia-Romagna Regional Government, has implemented an add-on to the suite of services PEOPLE, called the Database of Shared Knowledge, which puts in practice a model of inter institutional collaborative management of forms of the One Stop Shop at regional level. The Database of Shared Knowledge allows the interconnection with various installations of PEOPLE in the territory and makes it easier for all the One Stop Shops to access certified forms at the regional level, strongly facilitating their spread and promotion.

Solution

In this effort to develop and provide shared services in 2008 a tender was made for the creation of a remote services' Data Center from a private operator, with a common directory and same prices for all local authorities of Emilia-Romagna. The completion of the network Lepida, that connected all local authorities to an ultra broadband network was an enabling condition for the usage of the remote Data Center's services, such as data storage, data ware housing, backup/disaster recovery etc. The availability of these services in remote mode would allow PAs to simplify the management of IT internally, reducing costs and increasing the security level.

This decision and relative services on offer was not a success mostly because the offer was not a very flexible one (i.e. contracts were for a fixed period which was considered too long, services were not to be offered in smaller units etc.). In addition, costs were considered too high and, the location of the DC was considered not appropriate (a matter of trust was raised).

Emilia Romagna is currently working on the creation of a Data Centre in the region, through consolidating resources of different local authorities and moving towards a public - private partnership, sharing premises and connectivity. In that framework it is also moving towards the definition and provision of **cloud services too**, namely the **CloudNet project (included into the PiTER)**, which can answer to the need for more flexible services. With CloudNet Emilia-Romagna is first of all checking the actual needs of its PA and then defines a model in which different actors can collaborate bringing their contribute to the community cloud.

Last but not least the aim is to implement applications of cloud community, using the network Lepida, starting from specific working areas: local authorities, schools, businesses etc.

Sources:

http://demetra.regione.emilia-romagna.it/al/monitor.php?vi=nor&dl=b0513031-a241-959a-6bc6-4e4cc182331c&dl_t=text/xml&dl_a=y&dl_id=10&pr=idx,0;artic,1;articparziale,0&ev=1.

www.lepida.it.

<http://www.regionedigitale.net/community-network>.

<http://www.regionedigitale.net/piano-telematico-2011-2013/piano-telematico-2011-2013>.

5.2 National practices

5.2.1 Albania standardizes Government IT with cloud computing services

Situation:

During the last decade, the large and rapid effort of the Albanian government to adopt and extensively use technology to support its needs, resulted in a greatly decentralized and often unmanaged variety of technology platforms. The over 300 server computers that were scattered across 14 ministries and agencies, as well as the variety of infrastructure services (such as email, directory services and networking) were making it almost impossible for the government to achieve economies of scale that would extend the reach of its technology while reducing its cost.

The Albanian's National Agency for the Information Society (NAIS) – the agency tasked with coordinating the government's technology initiatives – started to operate in 2008 with the purpose of bringing centralization and standardization to the government's scattered systems. It began by offering hosted basic infrastructure and technology services to any government entities that wanted them and by 2010 was managing 100 services widely used throughout the government. As a consequence, the next challenge involved the centralization, standardization and hosting not only of the infrastructure services but also of the line of business applications and solutions through which the government increasingly conducted its activities.

This challenge meant, managing hundreds of server computers that were (then) located at and managed by different ministries and agencies throughout the government. With those applications and solutions running on a variety of platforms, it would be difficult for consolidation to be achieved. A new data center would have to be built to support NAIS and the agency's staff of 35 would likely struggle to manage the additional hardware. In addition, the high levels of application availability that ministries and agencies needed could be at risk and the planning proposals for new computers could take almost a year's time, distracting IT staff from core business.

Solution:

For the solution of this IT challenge, NAIS decided the adoption of **a cloud computing model (IaaS), in which computing resources could be provided as an online service**, freeing business users and application owners from the need to manage underlying hardware. With this model NAIS could increase, decrease or redirect the computing resources of the government's ministries and agencies based on the current needs, without having to take into account the mix of platforms that those

entities used. The two key ingredients in this cloud solution were virtualization and centralized management: the former contributed to the underlying flexibility of computing resources that the solution needed, and the latter contributed to the tools with which NAIS could control those resources for the maximum benefit of the government's ministries and agencies.

The cloud environment is nowadays in full operation, hosted by NAIS in a new 450 square meter data center with about 150 racks for blade servers. Because the data center was originally designed for physical (and not virtual) servers, it now has enough space to host three times its current capacity, eliminating the need for expansion anytime soon.

Main results achieved / objectives / benefits:

Through the use of cloud technologies, NAIS has succeeded in centralizing and standardizing the application servers that are used throughout the Albanian government. As a result, ministries and agencies **get better, more responsive service that delivers resources when they need them**, which enables application owners **to focus on core business rather than on infrastructure**. Meanwhile, the IT professionals accomplish their increased workloads while **minimizing overtime work** and they still gain time to help solve government technology challenges.

In addition, transforming line-of-business applications into cloud services has significantly **reduced the time-to-market**. It is estimated that, the process of planning and provisioning of a new system in the cloud environment takes approximately one month, whereas in the previous traditional way it would have taken up to eight months.

Apart from the Albanian ministries and agencies, NAIS and its IT staff are also beneficiaries of the cloud environment, as they can manage the workloads faster, less expensively, and more productively than they could manage physical servers. NAIS estimates that the more efficient management of workloads would **result in a 50% to 70% increase of productivity**.

Transferability:

The cloud environment solution the Albania government and NAIS chose is a **standardized technology solution**. It is based on the **Hyper-V technology, providing interoperability with the existing (Microsoft) technologies** used and shows strong potential of adoption from other organizations.

Sources:

<http://www.akshi.gov.al/>

<http://www.microsoft.com/casestudies/Microsoft-System-Center-Virtual-Machine-Manager-2008-R2/Government-of-Albania/Albania-Standardizes-Government-IT-with-Cloud-Services-Lifts-Productivity-70-Percent/230000000081>

5.2.2 Austrian Ministry of Interior uses virtualization

Situation:

The movement of the Austrian Ministry of Interior (known as Bundesministerium für Inneres, or BM.I) into a cloud environment is an ongoing process that has begun as early as 2005. **The need for a cloud solution has arisen from the fact that the Ministry supervises and manages all public security activities throughout Austria.** In particular, its domain covers the federal police, the local law enforcement, the border security, the prevention of drug trafficking and issues associated with domestic and international terrorism. Currently, the Ministry employs 32,000 members scattered in 1,200 locations. As a consequence, the Ministry required an extensive IT infrastructure.

In 2005, the Ministry had as many as 2,500 servers in its (1,200) locations. To reduce server acquisition and management costs, the Ministry's IT staff began consolidating computer power and locations, while starting to consider the idea of server virtualization. By 2008 the consolidation results was already impressive, as the number of servers was reduced to about 900, located in approximately 140 branches. Nevertheless, the management of 900 servers was still challenging. The fact that a significant percentage of servers were in field offices, was an additional problem, as it created the constant need for IT resources, present whenever and wherever a technical issue occurred.

The global recession that began in 2007 put extra pressure to the Ministry to reduce its costs. The economic driver for the restructuring of the IT infrastructure became stronger, while at the same time the Ministry was not willing to sacrifice the availability of the services due its aggressive servers' cutbacks.

Solution:

In order to further reduce the number of servers and minimize the management and maintenance costs of its IT infrastructure, the Ministry began upgrading its operating system and **consolidating its data centres by using Hyper – V virtualization technology.** Working with local representatives of Microsoft services, it deployed **a mix of cloud infrastructure that mainly involved the creation of about 150 virtual machines hosted in 60 servers, located in 10 data centres across the country.** The Ministry has virtualized a wide range of workloads (including databases running on the Microsoft SQL Server 2008 data management software), web servers, management servers, print servers, and security servers, using the Microsoft System Centre solutions to manage its virtual (and physical) infrastructure. The IT staff is now able to create and manage the virtual machines running all over the country from a single console in Vienna.

Main results achieved / objectives / benefits:

By virtualizing its server holdings, the Austrian Ministry of the Interior has been able to **reduce its server holdings and avoid approximately \$1.7 million in server expenditures, as well as reduce server setup travel time**. It will also be able to deliver servers faster and improve service availability.

By the end of 2011, the Ministry estimated that the number of physical servers would have been reduced to approximately 300 servers, a 66% reduction to the previous situation. Additionally, it is estimated that the Ministry **saves approximately \$170,000 per year on operating system licenses** by taking advantage of Microsoft licensing efficiencies.

The adoption of the cloud solution was also beneficial in terms of staff efficiency. It is estimated that, the time of server setup was reduced by six hours per server. During the initial rollout of the virtualization technology, the Ministry's IT department virtualized 16 servers per week, saving approximately 100 hours per week, while the previous deployment rate was about one or two servers a week. That can be translated into a **time savings of 10 to 12 hours per week, which now the IT staff can use on tasks of higher value to the organization**. In addition, the ability to create virtual machines from a central console in Vienna also means that the travelling needs of IT staff have been eliminated. It is estimated that a total of eight weeks annually have been freed up and are now available for more important tasks.

Transferability:

The solution adopted by the Austrian Ministry of Interior is based on **highly standardized technology** and is thus easily transferable. It is based on the Hyper-V technology, **providing interoperability with the existing (Microsoft) technologies used**. In addition, its implementation has been recorded to other organizations, such as the Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management (see next practice).

Sources:

<http://www.microsoft.com/casestudies/Windows-Server-2008-R2-Datacenter/Austrian-Ministry-of-the-Interior/Ministry-Uses-Virtualization-to-Save-1.7-Million-in-Server-Costs-Save-Time/4000010128>

5.2.3 Server virtualization in the Austrian Ministry for Agriculture, Forestry, Environment and Water Management

Situation:

The Austrian Federal Ministry for Agriculture, Forestry, Environment and Water Management plays an increasingly important role in the governance of the country. It is responsible for many of the country's natural resources, which are continuously coming under competing pressures from industry and conservationist groups. **The increasing challenges the Ministry faces, create the need for greater productivity and energy efficiency, as well as better level of services to the citizens.**

The IT infrastructure which serves the main office in Vienna and 40 brand offices nationwide is of crucial importance for the quick responding to enquiries and for providing people with information fast. Over time, the IT infrastructure has been expanded through significant resources invested in it. That was especially true when the (then) Ministry of Environment merged with the Ministry of Agriculture and Forestry to become what it is today, acquiring in total 1,200 end users. In order to support the its new users, the Ministry had already since then took steps towards creating a virtualized environment based on Microsoft Virtual Server 2005 which supported applications such as Microsoft Exchange Server, Microsoft SQL Server data management software and file and print.

Despite the environment being a success, its hardware and software were superseded by newer, better-performing versions and eventually needed updating. The main goals of the updating project were to increase management efficiency and reduce power consumption whenever possible, as well as to move to a new environment without any disruption to the end users.

Solution:

The Ministry decided to migrate **to a new cloud environment by running Windows Server 2008 R2 with Hyper-V and Microsoft System Center Virtual Machine Manager 2008 R2 on HP hardware.** In collaboration with Microsoft and HP representatives, the Ministry firstly built a test environment, so that the IT staff could learn more about the new technology used. Their first impressions were excellent, and thus the Ministry began to expand the test environment over a period of three weeks, until it effectively became the production environment, taking over the role of the previous infrastructure.

Main results achieved / objectives / benefits:

The ministry has achieved all its goals which namely include the creation of a higher performance infrastructure that is simpler to manage and more energy efficient. **Not only has it consolidated server**

numbers by **33 per cent (the IT team has removed 20 physical servers from the data center)**, but it has also cut power use by **15 per cent and increased availability to 99 per cent**. The adoption of the new cloud environment has boosted the productivity of IT personnel, and, crucially, the ministry completed the project without any disruption to end users.

In addition, with the new environment in place, administrative workloads have decreased and personnel can focus on higher-value tasks. According to Ministry's representatives, the success that they had from this project has triggered a re-assessment of their whole IT landscape, and has led to the desire to virtualize more systems (particularly some non-redundant systems) so that they can gain the same kind of efficiencies and performance improvements in other areas.

Transferability:

The solution adopted by the Austrian Ministry of Interior is based on **highly standardized technology (Microsoft) Hyper-V technology** and is thus easily transferable. In addition, **its implementation has been recorded to other organizations**, such as the Austrian Ministry of Interior (see previous practice).

Sources:

http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000007966

5.2.4 Portal Austria wins European cloud computing award

Situation:

During the EuroCloud Europe Awards ceremony that took place in Luxembourg on the 8th of October in 2012, the Austrian Federal Computing Centre (Bundesrechenzentrum - BRZ), won in the “Best Case Study Public Administration” category for their cloud computing services. The cloud practice of the BRZ was selected among more than 50 cloud providers from 12 countries that participated in the event. The winners of the Eurocloud Europe Awards were selected by a twelve – member jury of international cloud computing experts, while all the participants in the competition had already won one of the national EuroCloud awards in their own country.

The main challenge for the BRZ was the consolidation of the federal IT in the Austrian public administration. According to the managing director of BRZ, with this cloud solution the Center was aiming for the standardization, virtualization and automation of federal administration, and its success provides a further incentive to implement the public administration cloud at full capacity.

Solution:

Founded in 2001, portal.at is Austria’s central on-line platform for public administration and civil services such as: help.gv.at, USP.gv.at, gesundheit.gv.at. The portal provides almost 130.000 users with inter-organizational and web-based access to more than 400 public administration services and more than 40 intranet and internet portals. The provided services range from information on human resources management and allocation of the financial budget, to citizens cards and land registries. The specially developed portal billing programme processes all applications automatically on a quarterly basis and is linked directly to SAP (Systems Applications Products) and the printing facilities of BRZ.

Main results achieved / objectives / benefits:

Since it started, the portal has reduced the operating costs of the Austrian administration and has enabled the maintenance of high safety standards. Moreover, it is estimated that these e-Government Portal Services have produced **IT cost savings of around €133 million between 2008 and 2012** through standardization and consolidation of the Austrian federal administration, and have contributed significantly in the continuous effort towards improving the public services.

Transferability:

The main problem the Austrian administration is trying to address through this public SaaS solution (i.e. the consolidation of a wide range of provided IT services) **is common and of high importance among many organizations and different countries**. In addition, although it requires the synchronization of many administrative public departments for its success, it is estimated that **the implementation risks are rather low and the achieved benefits outweigh significantly the transition costs**.

Sources:

<http://epractice.eu/en/news/5403746>

https://signon.portal.at/Content.Node2/ssl/public/euroclowdaward/PA_BRZ_Gewinner_EuroCloudAward_20121011.pdf

<http://www.portal.at/Content.Node2/public/index.php?SMSESSION=NO>

5.2.5 The Private Cloud of the Council of Ministers of Bosnia and Herzegovina

Solution:

In 2013, the General Secretariat of the Council of Ministers of Bosnia and Herzegovina⁴ decided to develop a **private cloud that involves the centralization of its IT resources on the state level**. More particularly, the practice regards the centralization of the IT resources of 40 governmental institutions, which are used for the provision of all government services. The created platform is based on Windows Server 2012 Data Center Edition and Hyper – V 3.0 technology. The decision mainly involved the building of new foundations from the beginning rather than multiple migrations from physical to virtual situations. This was considered as a better solution for the avoidance of problems in the transformation process. Whether directly transferred or rebuilt from scratch, all Council databases from all of the integrated institutions have been migrated to Microsoft SQL Server 2012. The outcome was a new centralized management platform, used to deliver all software updates, data protection, management of configurations, optimization of the Hyper-V virtualized server infrastructure, services orchestration, and much more.

Main results achieved / objectives / benefits:

The solution is currently in full operation. According to field experts **the practice has met all the objectives originally set**, which involved the improvement of technical and operational performance and efficiency of IT resources, economic benefits and focus on core business and operational efficiency. Overall, the impact of the practice is considered to be positive, especially in terms of productivity, service quality, process automation and reduction of errors.

Transferability:

According to field representatives, the practice has been already transferred to other public organizations. Its high transferability is mainly contributed to the fact that **it uses standardized technology solutions**.

Sources:

<http://www.vijeceministara.gov.ba/>

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⁴ The council of Ministers of Bosnia and Herzegovina is comprised by the Chairman and the following nine Ministers: Minister of Foreign Affairs, Minister of Foreign Trade and Economic Relations, Minister of Finance and Treasury, Minister of Communications and Transport, Minister of Civil Affairs, Minister of Human Rights and Refugees, Minister of Justice, Minister of Security, Minister of Defence.

5.2.6 The cloud transformation of the Bulgarian Ministry of Finance

Situation:

Before moving to the cloud, the IT department of Bulgaria's Ministry of Finance managed a number of servers, many of which were often underutilized. This created costly and unnecessary issues for the Ministry, including hardware maintenance and energy consumption. It also created productivity issues, as it prevented the IT staff from focusing on core business. More specifically, instead of innovating and driving improvements in performance and reliability, as well as the daily tasks of the IT department, the employees often had to spend time maintaining servers and legacy systems. At the same time, the Ministry's open source operating system (OpenStack) was no longer meeting the needs of the organization.

The Ministry wanted to optimize the number of physical servers in its infrastructure and enable the flexible management of these resources. It also wanted to improve the quality and increase the reliability as well as scalability of its information resources, by deploying server resources as fast as possible whenever it was needed.

Solution:

Based on the Ministry's business requirements, the IT department decided that it needed a complete integrated package that included operational management software and better support for its data center and workloads. The deployment of a private cloud solution was decided that would best serve the aforementioned needs. This decision was of high importance as this cloud environment would be the first-of-its-kind in the Bulgarian government.

The task was assigned to the account team of Microsoft Bulgaria, which in turn invited specialists from the ministry's IT department to a Private Cloud Value Day event, followed-up by a Private Cloud Immersion workshop where the Microsoft Private Cloud story was introduced together with the approach towards better process automation and IT services standardization, as well as faster application deployment and monitoring.

Finally, **the organization switched from OpenStack to Hyper-V**, and was thus able to enhance the virtualization and **create a scalable and elastic private cloud environment** that was able to handle the continuously growing needs of the Ministry. Currently, the Ministry is upgrading to Windows Server 2012 and target at an even more flexible, cost-effective IT infrastructure that can support e-government initiatives in new directions.

Main results achieved / objectives / benefits:

The cloud solution is by now in full operation, and has proven to be of great success for the Ministry. More specifically, since making the move, the Ministry records large benefits, such as the following:

- **Centralization of its IT resources and faster deployment time:** By managing the IT systems from a single location, the organization has reduced the required response time by 50%. Furthermore, the time needed to deploy the new systems has been reduced by 75%.
- **Cost and maintenance savings:** The Ministry is estimated to be saving about €15,000 each year after reducing the number of physical servers by 25%.
- **Improved efficiency:** The IT department can now deliver services about 60% faster (to the organization as well as the public) because of the infrastructure's improved reliability and better performance. This has led to more opportunities for rapid and effective deployment of new IT systems and services.
- **Less complexity:** the solution has allowed increased availability of the infrastructure with no downtime. This allows the Ministry to respond to inquiries more quickly to business needs and the IT department to devote less time in managing their infrastructure in comparison to the past.

Transferability:

The transferability of the practice is greatly enhanced by the fact that **is based on standardized technology (Hyper – V)**, which provides and insures (among others) **interoperability with the existing technologies used**. According to the Ministry, the success of the practice has sparked a lot of interest and has resulted in numerous visits from other Ministries to see how the solution can be adapted to their own needs.

Sources:

http://www.microsoft.com/canada/casestudies/Case_Study_Detail.aspx?casestudyid=71000001812

5.2.7 "Okeanos" - A cloud service for the Greek academic community

Solution:

"Okeanos" is an IaaS, hybrid cloud service, designed and developed by the Greek Research Technology Network (GRNET) for the benefit of the Greek academic community. The service began in 2008 and after a preparatory and test phase, **it is now in full operation**. The "Okeanos" service is run from the GRNET datacenters, over their fiber network.

"Okeanos" includes the provision of two kinds of services: the Cyclades and the Pithos+ services. Cyclades is the Virtual Compute and Network service of "Okeanos", through which users can build their own virtual machines, always connected to the Internet, manage them, destroy them, connect to them and take a handful of other actions, from inside their preferable web browser. Pithos+ is the Virtual Storage service of "Okeanos". Pithos+ enables the users to store their files online, share them with friends and access them anytime and from anywhere, including from inside their virtual machines.

Main results achieved / objectives / benefits:

According to IT sector representatives, it is estimated that the "Okeanos" service **has managed to improve the technical and operational performance and efficiency** of available IT resources to the academic community, **reduce the cost of similar services** provided to the users otherwise, as well as **provided access to better infrastructures and services** to the users. According to the "Okeanos" service's statistics, until now, there have been:

- 159,145 spawned VMs
- 5,528 active VMs
- 43,284 spawned networks

Transferability:

The "Okeanos" cloud service is estimated to have strong transferable characteristics, mainly due to the fact that it **uses standardized technologies**. IT sector representatives report that the practice has been already adopted by other groups of organizations.

Sources:

<https://oceanos.gnet.gr/home/>

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5.2.8 ViMa of the Greek Research and Technology Network

Solution:

The ViMa (**Virtual Machines**) service is a **community cloud** aiming to provide to the educational and academic community access to **shared computing and network resources** that can be used for production or experimental purposes. In particular, the service is addressed to the Network Operations Centers (NOCs) of the GRNET community or to laboratories involved in national and European funded projects that have short-term needs for computing resources.

In order to be able to ensure high availability, the service is hosted on multiple computing clusters on more than one datacenters, while for the safe storage of data an external Storage Area Network (SAN) unit is used. The network infrastructure ensures seamless connection to the backbone network and the commercial internet at very high speeds. The software chosen for the implementation of the service is based solely on open source.

Main results achieved / objectives / benefits:

The service supports a variety of benefits tailored to the needs of potential users. Users are able to use the Internet Protocol (IP) addresses of their institutions to virtual machines using L2VPN, as well as using IPv6.

According to field representatives, the practice has adequately addressed its objectives, namely the improvement of the technical and operational performance of GRNET, and the access to better infrastructures and services for its community members. Overall, the practice records **a positive operational outcome**, mainly in terms of **cost savings, service quality and reduction of process complexity**.

Transferability:

According to field representatives, the practice has already been adopted by other groups of public organizations. The most important characteristic that makes the practice transferable is estimated to be that the **standardized technology solutions and the software chosen for the implementation of the service is based solely on open source**.

Sources:

<https://vima.grnet.gr/about/info/en/>

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5.2.9 The pilot project of the Greek School Network

Situation:

The Greek Schools' Network (GSN, www.sch.gr) is the educational Intranet of the Greek Ministry of Education and Religious Affairs (www.ypepth.gr), which interlinks all schools and provides basic and advanced telematics services. The primary objective of GSN is **the provisioning of a network infrastructure for the interconnection of school PC laboratories** so that modern educational methods and pedagogical models can be applied to the school community. The implementation of the Greek Schools' Network is funded by the Framework Programme for the Information Society (www.infosoc.gr), in close cooperation between the Ministry of Education as well as 12 Research Centers and Highest Education Institutes, specialized in network and Internet technologies.

Solution:

The present pilot project involves the **provision of the users of the Network - i.e. the school and administrative units of primary and secondary education - with virtual machines (VMs)** in order to cover their needs for interconnection. The pilot concerns **the creation of a community cloud using PaaS solutions**.

The current design and implementation of the Greek Schools Network focuses in providing useful services to all members of the basic and middle education community, fulfilling among others the following goals:

- Access to telecommunication and informatics services
- Access to digitized educational material
- Distance learning, e-learning
- Encourage collaboration
- Information and opinion exchange
- Conduct of thematic discussions, seminars, lectures, etc.
- Access to digital library services
- Communication and Cooperation of all educational degrees
- Communication with European educational networks
- Facilitate complimentary educational programs
- Provide education to individuals with special needs or disabilities
- Inform, educate, entertain

Main results achieved / objectives / benefits:

The project is currently at a pilot and testing stage, although its target is to be fully deployed. According to field representatives the project's main objectives are cost savings and access to better infrastructures and services and most of them have already been adequately addressed. Overall the impact of the practice is estimated to be positive in operational terms, especially as regards service quality, process automation and reduction of errors and complexity.

Transferability:

According to field experts, the practice is considered to be transferable mainly due to fact that **it uses standardized technology solutions.**

Sources:

<http://www.sch.gr/en/index.php>

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5.2.10 The National Documentation Center of Greece organizes its digital content

Situation:

Apart from offering a wide range of services to individual users, the strategic goal of the National Documentation Center (EKT) of Greece is to provide comprehensive services to a broad range of cultural and scientific institutions, at no extra cost for them. Thus, the development of **modern tools and services for the organization and provision of its digital data through the use of technology** is of great importance and comprises a high priority for the center. The access to open data in the areas of culture and research aims at enhancing the collaboration among prestigious Greek institutions and at developing a sustainable ecosystem for the management and delivery of authoritative digital content. In this context, EKT's aim is to develop an innovative national practice in the field of cultural data, which ideally will also have an international impact.

Solution:

The National Documentation of Greece is currently developing through the use of **SaaS services**, a national research e-infrastructure which has the following mission:

- to support scholarly communication
- to promote research and innovation
- to develop, manage and optimise the use of reliable digital content in science, education and culture
- to offer open access to the results of scientific research
- to enhance the re-use of scientific and cultural content
- to carry out national and international collaborations in order to achieve long term preservation of the digital content and interoperability with other similar national infrastructures

More analytically, the cloud computing services that EKT plans to provide in the framework of this initiative are:

A. Repository Services:

By using the **SaaS Repository Service**, organizations and institutions will be able to create their own digital repository for the storage, management and online dissemination of their digital content. All procedures and technical specifications will follow international standards so as to ensure interoperability with a wide range of infrastructures. During this process, EKT plans to co-operate with institutions and organizations and offer supplementary services (e.g. technical support) for the deposit, management and delivery of quality digital content. Data would be safely stored in the cloud

infrastructure provided by EKT. Users will have remote access to the repository via a user-friendly interface, designed to meet their needs. The Repository may contain any type of content, such as image, text, video, sound, multimedia and 3D representations as well as metadata. It will be used for performing a number of activities related to content management, such as e.g. mapping metadata according to international standards, exporting of the data to selected digital platforms and search engines. The repository may also include advanced functionalities for searching and browsing. End-users will gain access to the repository both via the institution's website or, directly, from the repository via a configurable interface.

B. OpenABEKT

ABEKT stands for **Library Automation and Data Management System**. It is a service that the National Documentation Centre of Greece (EKT) develops since 1986 and provides it to more than 2000 users, mostly Greek libraries. OpenABEKT is a follow-up release of ABEKT software based on Cloud technologies and planned to be delivered as a business application which runs according to Software as a Service (SaaS) delivery model. It will include enhanced configuration capacities, thus, responding better to each institution's needs. OpenABEKT is compliant with international standards and processes for automating and managing in one place the whole range of library activities. Through this system deposit, organisation, administration and delivery of bibliographic data will take place in a fully configurable and easy-to-use environment. OpenABEKT also provides management and interlibrary loan functionalities.

Main results achieved / objectives / benefits:

The main expected benefits for the institutions through the adoption of SaaS Repository Service can be summarized as follows:

- safe long-term storage of the digital content and data
- risk-proofing against physical and technical disasters
- remote access and full control over the institution's own user-friendly and easy-to-configure administrator environment
- no need for software installation, upgrades and specialized technical knowledge
- enhanced online visibility for the institution and its contents
- mapping functionality for export of data according to international standards
- access to e-learning services
- remote technical support
- no extra cost involved for Greek cultural and scientific institutions

- advanced search, browsing and downloading functionalities for end-users

Respectively, **the main expected benefits for the institutions through the adoption of OpenABEKT are estimated to be as follows:**

- reduction of time-consuming bibliographic documentation processes
- enhancement of bibliographic metadata quality thanks to the use of and compliance with international documentation standards and practices
- improvement of interlibrary collaboration for the delivery of content and services to the users
- guarantee of a viable low cost library automation and organisation system.

Transferability:

According to field representatives, the practice has already been adopted by other groups of public organizations. Its most prominent characteristic in terms of transferability is that it addresses issues **that are widely acknowledged as important problems by many similar organizations.**

Sources:

<http://www.ekt.gr>

<http://www.ekt.gr/news/releases/130312.htm>

<http://www.epset.gr/el/node/851>

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5.2.11 Hungarian Water Rescue Service strengthens emergency response

Situation:

Headquartered in the resort town of Zánka by Lake Balaton, the Hungarian Water Rescue Service (HWRS) is a public sector organization providing first-response lifesaving and rescue operations across Hungary with a staff of 350 swimmers, lifeguards, and rescue technicians, the majority working as volunteers. The Service was founded in 1999 as a non-profit organization by 30 volunteers. By 2006, HWRS operated six lifeboat stations around the lake and had expanded activities to a national level. By 2009, the Service had over 300 members and had rescued almost one thousand people from water emergencies.

The growth that the Service experienced the last years and **the extensive network of volunteers and sponsors created great challenges to the communications and back-office infrastructure at the Service command center in Zánka**. Until then, the Service had no integrated solution to manage their staff database, no shared calendar to schedule lifeguard shifts or training, and no unified communications scheme. On the contrary, everything was done manually across different platforms, creating major efficiency problems.

In order to gain in terms of efficiency, the HWRS needed a unified communications platform for its first-responder staff, including lifeguards, medical, emergency and diving units. The platform had to be easy to operate even by volunteer staff that features high turnover. In addition, the platform had to be accessed in a secure way for multiple devices, both mobile and desktop. The Service also wanted to synchronize its contacts and calendars while giving shared access to important documents. Low cost of ownership and the compliance with national laws governing public sector service providers were high priorities for the HWRS.

Solution:

The HWRS in collaboration with Microsoft Gold Certified Partner Central Europe On – Demand (CEOD), concluded that **a cloud-based software-plus-services platform** would be able to meet the needs of the Service while simultaneously not exceed its budget. By selecting a hosted solution, the Service was able to take advantage of the full potential of the cloud, providing the necessary infrastructure to connect all HWRS communications with familiar user interface across multiple screens, including the mobile devices of the life-saving teams. CEOD rolled out a suite of tightly integrated services around **Microsoft Exchange, Microsoft Office Outlook with Communication Services, Live Meeting, and Windows SharePoint® Services** that could also accommodate pre-existing IT infrastructure and solutions.

In June 2010, the platform mastered its first real-life disaster situation during the HWRS's response to the flooding in north-eastern Hungary which caused more than €32 million in damages and destroyed more than 310 homes. The HWRS in collaboration with the provider was able to effectively provision and deliver complete communications services to 20 rescue volunteers who joined the Water Rescue Service for three days to support crisis response.

Main results achieved / objectives / benefits:

Through the cloud solution the HWRS was able to **strengthen its emergency response**, keeping all its highly mobile rescue specialists closely connected. In addition, **all of the related costs have been reduced** (telephone costs due to implementation of Microsoft Office LiveMeeting, training sessions that have now gone virtual, paper trail and carbon footprint minimized due to automated SharePoint reports etc.).

Another major benefit arises from the fact that **a number of resources that were previously tied up in back office administration are now free to focus on the Services core mission**. It is estimated that within the first six months of implementation, the Service was able to cut tens of thousands of euros in travel costs, integrate staff communications and free up more than 1,500 man-days in staff resources.

Transferability:

The solution that the HWRS has chosen could be implemented at a short turnaround with a 100% adoption rate, mainly due to the fact that **it uses a very standardized and familiar technology (built around Microsoft Outlook)** that almost all volunteers can use with a minimum amount of training.

Sources:

<http://www.microsoft.com/casestudies/Microsoft-Office-Communications-Server-2007-R2/Hungarian-Water-Rescue-Service/Hungarian-Water-Rescue-Service-Strengthens-Emergency-Response-with-Hosted-Communications-Services-Solution/4000007960>

5.2.12 Hungary's office for Employment and Social Affairs reduces cost through virtualization

Situation:

Hungary's Office for Employment and Social Affairs (Foglalkoztatási és Szociális Hivatal, or FSZH) is an agency of the Ministry of Social Affairs and Labor that manages the professional work and the IT requirements of the Public Employment Service. Its tasks involve the approval, account and distribution of unemployment compensations, the management of job incentive programmes, the provision of adult education and training, and the offer of several labor market services. All these tasks are scattered among seven regional employment centers and 190 offices throughout Hungary with approximately 4,500 Public Employment Service employees.

The agency's network server environment is managed by the Infrastructure Section of the FSZH System Operations Department at a data center in Budapest, while only directory and file servers are located at the regional centers and offices. By 2007, the Infrastructure Section had deployed applications on dedicated servers and the FSZH was managing more than 300 physical servers in the Budapest data center, which strained the space, power and cooling capacity of the facility. According to representatives of the System Operations Department, the operation of these servers had become a significant cost factor in terms of purchasing and power consumption. In addition, the agency's servers that run smaller applications were being utilized inefficiently and the infrastructure also lacked versatility. **Operating and maintaining a large number of individual servers became burdensome** for the 10 person IT staff of the agency, and thus fulfilling Service Level Agreements (SLAs) and providing continuous availability for FSZH systems also became more difficult and costly.

Solution:

When the agency began planning its upcoming server procurement, it focused on a cloud computing solution as a way to enhance system capacity and efficiency, while remaining within its budget. The FSZH evaluated and adopted **a virtualization solution from Microsoft, Windows Server 2008 R2 Datacenter and Hyper – V virtualization technology**, as a way to create a cost – effective and reliable server environment. By using this technology, the Infrastructure Section deployed 65 virtual servers running more than 40 applications on two blade servers.

Main results achieved / objectives / benefits:

By moving to this cloud solution, the FSZH was **able to reduce costs, enhance service reliability, and developed a more flexible IT infrastructure**. It is estimated that the agency **improved IT hardware utilization by almost 40% and it also reduced the time to deploy new servers from two months to 15**

minutes. In addition, by moving its server machines into a significantly smaller server room (almost 30% smaller) and by consolidating 65 virtual servers on just 2 blade servers, the FSZH is expected to reduce power costs and to save the purchase costs of physical hardware.

Transferability:

The transition to a virtualized server environment was easy for the staff at the Infrastructure Section of the Agency, as it was already experienced in running Microsoft technology. The fact that the Agency **uses a very standardized and familiar technology, as well as the fact that the solution addresses a rather common problem** (the virtualization of the IT environment) enhances the transferability of the practice.

Sources:

http://www.microsoft.com/casestudies/Case_Study_Detail.aspx?CaseStudyID=4000007569

5.2.13 The Romanian Ministry of Education copes with exam results

Situation:

The Romanian Ministry of Education wanted an essential website to perform well each July, when high school entrance exam results were posted there. Every summer, approximately 200,000 Romanian eighth graders submit their high school choices, and then automatic assignments are made based on student preferences and school capacities. The final entry scores are posted on the Ministry's high school admission application, namely ADLIC, a website developed by the Ministry's long-time technology partner, SIVECO Romania. The project was developed in the framework of the IT-Based Educational System (SEI - from Romanian "Sistem Educational Informatizat"), that implements the Romanian government's strategy in the field of ITC and computer assisted education.

The proper function and availability of the site during the assignment period is of high importance, considering that it is the fastest way of communicating the results to a number of anxious students. In addition, it consists proof of the Ministry's capacity to completely automate the distribution process. In practice however, when up to 200,000 students and their parents rushed to the site to check their assignment, the site had difficulty responding, and the candidates had to revisit the site repeatedly, sometimes over a period of days, before they could see their results.

During this process, **the Ministry proved to have insufficient hardware infrastructure to properly support peak traffic loads**. In addition, during the peak periods, the Ministry was experiencing denial-of-service, which meant that the IT department staff had to monitor the servers around the clock to safeguard them. Adding to the server workload, the exam results site used static webpages, which required vast computing power.

Solution:

As a first solution, SIVECO wanted to convert the ADLIC website to use dynamic webpages. Nevertheless, a dynamic architecture would require even more powerful and expensive servers, for which the ministry had no budget, especially when the servers were meant to be used only for one or two months per year. Finally, SIVECO recommended the movement of the ADLIC website to **Windows Azure for its cloud compute resources, using SQL Azure as the cloud database service (PaaS)**. This was scheduled for the busy summer months only, whereas the rest of the year the website would run in the ministry's data center. In that way, the Ministry was able to adjust the cloud platform's resources as needed and pay only for the resources that they used.

Main results achieved / objectives / benefits:

July 2011, was the first summer that the Ministry delivered the high school distribution results using the cloud computing service. By moving to this solution, the Ministry was able to upgrade the site from a static to a dynamic architecture, while only paying for the resources that it used, and avoiding spending for a comparable on-premises infrastructure (servers, software and management) of approximately \$100,000 worth. **It is estimated that the cloud solution of Windows Azure was almost 10 times less expensive.**

By adopting the cloud solution the Ministry was able to offer new capabilities, such as a better search interface and richer data presentation, leading to an improved user experience. In addition, during the first summer that ADLIC website was run on the cloud, the Ministry recorded zero downtime for the first time, which among others **reduced the time the IT staff had to spend watching the ADLIC servers. It is estimated that the reduced staff costs was approximately \$10,000.** Last but not least, the adoption of the cloud solution improved the reliability and the reputation of the Ministry to the public.

Transferability:

By adopting a **standardized technology solution (Windows Azure)**, the transferability of the cloud computing practice is enhanced. It has been recorded that other organizations have used the same or a similar cloud computing solution in order to face similar IT challenges.

Sources:

<http://www.microsoft.com/eu/transforming-business/multimedia/making-ministry-of-education-website-cope-when-exam-results-are-out.aspx>

<http://blogs.msdn.com/b/windowsazure/archive/2012/04/04/real-world-windows-azure-interview-with-florin-anton-advanced-elearning-department-manager-at-siveco-romania.aspx>

<http://portal.edu.ro/index.php/articles/c1473>

<http://admitere.edu.ro/2013/>

<http://portal.edu.ro/index.php/articles/578?catid=111&lang=/en>

5.2.14 G-Cloud: An alternative for e-government in Romania

Solution:

G-Cloud is an alternative for e-government services in Romania, meant to address needs and issues of employees of the country's local and national public administrations. More particularly, it is **an open platform based on cloud computing technology, offering a full range of services tailored to the needs of public administrations** employees and allowing maximum scalability for future development. The provided services are categorized according to the employees needs as follows:

- Daily work package:
 - Open office suite of applications for editing documents
 - Archiving
 - E-mail
- Specific activities dedicated packages:
 - Internal Portal
 - Document Management
 - Management of office
 - Videoconference
 - Budget and Accounting Applications
 - Billing
 - Fleet management
 - Legislation

Main results achieved / objectives / benefits:

According to field representatives, the practice was initiated in 2012 and it is not yet on full operation. The main objectives of the practice that have by now been adequately addressed are the **improvement of technical and operational performance and efficiency of IT resources, economic savings, as well as access to better services.**

Transferability

The practice is considered to be transferable to other public organizations mainly due to the fact that **it uses standardized technology and it addresses problems common among many organizations** and different countries.

Sources:

<http://www.cloudgouv.ro/>

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5.2.15 E-community in Romania

Situation:

The Romanian government has launched in 2005 an ambitious programme, the “Knowledge Economy Project” that aims to fulfill the requirements of the information society and the Digital Agenda for Europe 2020. The purpose of this programme is to **facilitate the progress of Romania to an economy based on knowledge and reduce the digital divide** in accordance with other European countries. Funded by the World Bank, the programme has specific requirements that have to be addressed by the government, as follows:

- Increase the use of electronic public services that have already been developed by the government
- Improve the digital literacy through access to ICT technologies and skills for building inclusive society
- To promote learning that is supported through technologies in primary and secondary education

Solution:

In this context, the project of “**E-community**” started in 2005 and was developed by the personnel of the Romanian Ministry of Communications and Information Society. It involves the creation of **a SaaS public cloud, a local electronic network, comprised of 255 local communities and 510 knowledge specialists**. Its main aim is to contribute to the members’ professional development and increase of the knowledge.

The members of the network started as specialists in different domains of work, from teachers, IT experts, public servants, to journalists or graduates. Every one of them was introduced into a massive training programme when entering the project, which offered them access to domains of knowledge and performance unattainable before; practically, they were the first beneficiaries of the Knowledge Society. They were trained in project management, marketing and communication, risk management and change management, quality and environment, human resources management and institutional design, writing projects for European funding, web design and ICT use in business. Along with the central team of the project, who had the role of the initiator and energy catalyst, the experts stand for a wide national knowledge network, adapted to the present time, that is citizen and community development orientated.

The Project Management Unit of the Ministry of Communications manages the whole project at a strategic (central) level and consists of a team of specialists in the fields of education and training, e-governance, business management, communication and public relations, procurement, financial accounting and human resources. At the operational (local) level, management is provided by the 255 Local Community Electronic Networks (RECL) and the 510 knowledge specialists placed locally (a RECL manager and an IT administrator in each community).

Main results achieved / objectives / benefits:

The practice is by now in full operation. According to field representatives, its main objective was to ensure **access to better infrastructures and services**, which is estimated to have been already adequately addressed. The overall impact of the practice is estimated to be positive in operational terms, especially regarding the quality of the provided service.

Transferability:

According to field representatives, the practice is estimated to **be transferable** to similar contexts and other groups of public organizations, mainly due to the fact that **it involves low implementation risks**.

Sources:

<http://www.ecomunitate.ro>

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5.2.16 Slovenian Railways adopts a cloud-based IT system

Situation:

Slovenian Railways operates more than 1,200 Km of railway track, transports 15.3 million passengers and carries 15.8 million tonnes of cargo each year. Being an important link in the pan-European transportation corridor, the Railway was recently found facing **the need for modernizing its IT infrastructure in order to handle the growing amount of people and goods it transports**. Due to its wide and diverse range of business (from freight transport services to passenger and commuter rail and infrastructure management), the Railway needs a flexible IT environment that can respond to the different requirements of each group and separate IT service desks.

Solution:

Towards the end of 2012, the Railway decided to adopt **a new cloud-based centralized IT system, based on IBM SmartCloud Control Desk and IBM Endpoint Manager** (part of the IBM MobileFirst Management solutions). The aim was to unite the users of all the affiliated Slovenian Railways companies under a uniform IT service desk, which will comprise a single point of contact, available across the entire organization. Through the cloud IT platform, the railway officials will be able to automate and manage systems in real-time and help secure mobile devices and other end points such as servers. This will provide to the organization's employees the possibility to use the device of their choice, while ensuring that usage policies are followed and security risks are minimized.

Main results achieved / objectives / benefits:

The adoption of this new cloud based centralized IT system is expected to give the company **a better and complete view of all its freight, passenger and logistics operations** so that it can manage the railway traffic in a more efficient way across its network. **Better coordination among the company's different departments** is expected to lead to improved customer services like e.g. less waiting time for commuters, fewer train delays and faster response to customer queries. In addition, the Railway is estimated to have better control over its costs, IT equipment supplies and compliance requirements.

Transferability:

The centralization and consolidation of IT infrastructure is **a common challenge** that many organizations face. In addition, the fact that Slovenian Railways chose a **standardized cloud based**

solution (from IBM SmartCloud), increases the chances of it being transferred to a similar concept or organizational environment.

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6 Guidelines and lessons learned

6.1 Understanding all core issues of the problem

One of the most important factors for the adoption and the implementation of a successful cloud computing solution is to understand the need and problem the service has to address, i.e. why moving to the cloud? By understanding the problem, the organization is able to set clear objectives which in turn help in the search of similar problems, as well as in the selection of the best fitted solution for the organization.

Why moving to the cloud?

Understanding the problem helps determining the objectives to be reached, the finding of the right means and actions towards achieving these objectives, as well as the evaluation of the project's success.

In almost all of the examined cases, the problem or the challenge that the public organizations had to address was well understood and well defined.

6.2 Understanding the solution before adopting it

The successful adoption and implementation of a cloud computing service implies that the service is well understood, both in technical and management terms. Understanding the solution means that the organization should be able to understand the transformation this solution requires.

On the one hand, the organization should be able to recognize the technical issues it involves like e.g. the type of data and information the service will be handling, the level of integration required, the supporting IT services it involves etc.,

and, on the other hand, the change it brings in daily operations and management, like e.g. who is responsible for the deployment of the service, how it affects the distribution of tasks and working hours, how many resources are freed up or required, etc.

*The successful adoption of a cloud computing service implies that the service is **well understood**, both in **technical and management terms***

Understanding how the solution works and what changes it involves helps in the evaluation of its impact after or during its implementation.

6.3 Join forces: the consolidation of public administration IT resources

The centralization and standardization of scattered systems and IT resources is one of the main challenges the public administrations aim and manage to address through the creation of a cloud based environment. One of the most common problems various organizations seem to face is the greatly decentralized and often mismanaged or unmanaged technology platforms. This problem mainly stems from the fact that national and/or territorial public agencies and administrations are usually responsible for a vast number of resources and tasks, dispersed to a respectively large number of offices, usually located in different geographic areas.

One of the most common and preferred cloud computing solutions implemented and/or adopted by public administrations are IaaS and PaaS services that involve the consolidation of their servers and their provision as an on-line service that is managed from one single location. Through the consolidation and virtualization of their IT infrastructure resources, administrations manage to reduce their IT maintenance costs and the need for travelling for the

IT staff, allowing them to focus on core business, rather than on setting up physical servers. They also manage to create a higher performance infrastructure that is simpler to handle and more energy efficient. The final outcome is usually increased operational efficiency, as administrations can get better and more responsive services that deliver resources when they need them, saving up a lot of working hours that can be used on higher value tasks.

Another common cloud solution in this field concerns the simplification and consolidation of the

The provision of new on-line channels of communication and collaboration among PAs through the creation of community and/or public clouds, foster interaction among PAs, improve their technical and operational efficiency, while rationalize public spending on ICT

communication and management system of public organizations, especially in the regional and local level of administration. Given the high degree of complexity and fragmentation the regional administration system usually involves, the provision of new on-line channels of communication and collaboration among PAs through the creation of community and/or public clouds, foster interaction among PAs, improve their technical and operational efficiency while rationalizing public spending on

ICT.

6.4 Be ready for the change

The organization has to be ready for the change, especially if the adoption of the cloud service requires the use of specialized technologies and entails big changes in daily operations. Hence, the organization must make sure that:

- (a) it has the qualified IT staff able to understand and to implement / adopt the practice, and
- (b) the personnel affected from the adoption of the practice is prepared and / or educated enough for the technological change.

Some characteristic examples in this area, stemming from the collected practices, are the creation of a test environment before the full operation of the service, so that the IT staff can learn more about the new technology used (the case of Austrian Ministry for Agriculture, Forestry, Environment and Water Management), and the participation in educational events like the Private Cloud Value Day and the Private Cloud Immersion workshop (the case of the Bulgarian Ministry of Finance).

*The organization has to be **ready for the change**, especially if the cloud service requires the use of specialized technologies and entails big changes in daily operations*

6.5 Estimating the cost effectiveness of the solution

Cost reduction is among the main reasons for a transition to a cloud computing environment.

*In order to **estimate the cost-effectiveness** of the solution, one has to consider and analyze the costs it implies... Of equal importance is the estimation of the potential cost reduction*

Nevertheless, the adoption/implementation of a cloud computing service does not by default mean that it is the most cost effective solution. In order to estimate the cost-effectiveness of the solution, one has to consider and analyze the types of costs that it implies like e.g. the fee to the provider and technical support fees, the staff training and operating costs, management and administrative costs etc.

Of equal importance is the estimation of the potential cost reduction that the organization targets to with the adoption of the new service and if possible validated upon the completion of the project so as to evaluate its overall cost effectiveness.

6.6 Assessing the impact of the practice

The organization should be able to regularly evaluate the progress and impact of the adopted solution, even if the practice is at a pilot or initial stage. The conduction of an evaluation depicts a clear picture for the actual impact of the practice, pinpoints its strengths and weaknesses and thus facilitates its success and transferability.

*The conduction of an **evaluation** depicts a clear picture of the actual impact of the practice, pinpoints its strengths and weaknesses and thus facilitates its success and transferability*

The benefits of the practice must be well understood and well defined i.e. it is preferable that the results are as precise and measurable as possible. An external and independent evaluation is most desired, though most of the good practices in this guide are evaluated internally by the organizations that have adopted them. At any rate, being able to estimate and /or isolate the outcome of the cloud service is of most importance for the improvement of the service as well as for its transfer and further development and integration.

High interoperability and integration with existing IT infrastructure are most important for the **easy and rapid adoption** of the new technology into the organization

6.7 High interoperability with existing infrastructure

One of the most common characteristics of the good practices examined is the use of standardized technology solutions that ensure a high degree of interoperability and integration with the existing infrastructure. This usually involves the adoption of widely used commercial cloud computing solutions (like the cloud services provided by commercial vendors like Microsoft and IBM) that can be in-line with and accommodate pre-existing technologies. High interoperability and integration with existing IT infrastructure are most important for the easy and rapid adoption of the new technology into the organization.

6.8 Transferability of the practice

The most important factors for the transferability of a practice seem to be that it is based on standardized technologies and that it addresses problems common among many organizations and different geographic locations. These characteristics are obvious in almost all of the cases examined and presented in the guide, and especially true for practices adopted by territorial public administrations.

*The most important factors for the **transferability** of a practice seem to be that it is based on **standardized technologies** and that it addresses **problems common** among many organizations and different geographic locations.*

The implementation of a cloud computing service that aims to be widely used, addressing a variety of problems of a large community is much more difficult and complicated than when limited to small problems and small groups of people. Nevertheless, its degree of impact, sustainability and transferability is directly and positively connected with these characteristics. In addition, the use of standardized technologies (as already mentioned) provides interoperability with the existing IT infrastructure and shows strong potential of adoption from other organizations, as it can be widely used with low implementation risks and barriers.

*Having a reliable provider or understanding the degree of **reliability and security** offered is of major importance for the adoption and use of the cloud service*

6.9 Having a reliable commercial provider

The majority of public organizations examined, preferred commercial cloud computing services to in-house developed ones. In general, it is agreed that in-house developed IT can rarely match the service levels provided by commercial cloud providers (Waxer 2009). One of the most important decisions when moving to the cloud is the choice of a provider, and one of the principal associated concerns is the question of reliability. In general, one of the major reasons for reluctance to shift core, mission-critical data storage or applications to cloud environments (especially to public ones), is the concern about the reliability and security of the cloud offerings. Having a reliable provider or understanding the degree of reliability and security offered is of major importance for the adoption and use of the cloud service. The degree to which any organization engages in cloud computing certainly depends on its need for reliability and security.

6.10 Maturity level: how does it matter?

The maturity level of the practice (design, planning, pilot/testing operation, full deployment) does not seem to be directly related with the success of the practice. The full deployment/use of the practice is not a necessary condition for its success, although it does usually mean lack of formal evaluation and of course limited impact of its operation.

*The **maturity level** of the practice (design, planning, pilot/testing operation, full deployment) doesn't seem to be directly related with the success of the practice*

Pilot projects especially when tested in a number of countries with similar problems (like the case of EnviPer) can provide useful insights and understanding of how they work, and estimate their impact and their results at an early (even if preliminary) stage.

7 Annex A: Other cases from the SEE area

7.1.1 Environmental permits in the cloud – eEnviPer – The case of Croatia

Background and general information about the project:

According to the EU legal framework, member states have to ensure the protection of the environment as early as the planning stages of projects and activities, by taking into account all the necessary measures for environmental protection and the mitigation of any negative impacts. For this purpose, the issue of environmental permits is obligatory for a number of situations, including regulation industrial emissions, waste management and prevention and control of pollution.

Although the implementation of the legislation at the national level varies both within and outside of the EU, it usually involves the next steps:

1. The enterprise applying for the permit recruits an expert to conduct an Environmental Impact Study (EIS)
2. The enterprise compiles and submits the application together with the EIS
3. The permitting authority verifies the application
4. Unless the project is smaller than a certain size, the authority starts a consultation period. During the consultation, stakeholders submit comments on the application.
5. Taking into account all comments the authority issues the permit, imposing conditions if necessary.

EISs are carried out by applicant organisations or persons. Public authorities assess the expected impacts and measures and issue the relevant environmental permits for approved actions. In addition, citizens or their representative bodies can exercise their constitutional rights for environmental protection by monitoring the adequacy and effectiveness of the administrations decision-making process.

Considering the complexity of the process, and the fact that it involves the participation of many parts (enterprises, public authorities, citizens, representative bodies etc.), European public authorities decided to improve the quality and cost of the provided services through a common initiative Involving the use of cloud computing technology. This initiative falls under the framework of Europe's Digital Agenda and it is supported by the European Commission's ICT Policy Support Programme. The goal was to make the environmental permits process more transparent, more accessible and more efficient, through the use of modern web technology, and ultimately help public authorities reduce the environmental impact of economic activities in the European area in a cost effective manner.

eEnviPer platform is an integrated web-based platform for the application, administration and consultation of environmental permits. The eEnviPer platform offers many services relevant to the

environmental permit processes of eEnviPer users. These services range from submitting a new application for a permit by an investor/environmental consultant, to moving the application through the various legal steps on the side of the public authority issuing the permit, and from commenting on an Environmental Impact Assessment (EIA) by a citizen, to using GIS to check the location and proximity of the project/activity to e.g. Natura 2000 sites.

A pilot execution of eEnviPer platform started in April 2013 across five European regions, namely Greece, Italy, Serbia, Croatia and Turkey and is expected to be completed on March 2014. In what follows, we examine analytically the up to now pilot of eEnviPer in the county of Croatia Krapina-Zagorje, as it appears to have the most fully realized evaluation.

Krapina-Zagorje County of Croatia

Situation:

The Croatian Government has recently adopted a national strategy that among others requires environmental protection to be integrated into the economic development programmes. The strategy is based on the principles of sustainable growth, modern spatial and tourism development and satellite monitoring and aims to link governmental accountability and environmental protection by focusing on the interactions between citizens and public authorities in a democratic context.

As a regional public authority, Krapina-Zagorje County is responsible for a range of issues aimed at improving the citizens' standard of living such as education, health, urban planning, traffic, energy efficiency, infrastructure, economy and civil society. Its portfolio includes many projects and actions, like the financing of schools, clinics or local roads, the conduction of public – private dialogue about nature, the support of local economy, the improvement of procedures' transparency, and the participation of citizens in decision-making processes.

The pilot in Krapina-Zagorje County aims to provide the vehicle to achieve these objectives in a timely manner. The official portal of the Ministry for Environmental and Nature Protection offers until now basic information about the organizational structure and the responsibilities of the Ministry with details about applicable laws. The existing e-government portal at national level provides application development guidelines and action plans with pilot development projects, but no infrastructure for managing the normal EIA process. **County representatives hope that by using the eEnviPer system and other available technologies, the whole permitting process will become more efficient and effective.**

Solution:

As already mentioned, **eEnviPer is a cloud-based e-government solution for the application, administration and consultation of environmental permits.** The eEnviPer pilot in the Croatian Country Krapina-Zagorje aims at building a communication channel for all stakeholders groups related to the permitting process (investors, permitting authorities, other relevant public administration, consultants, interest groups and citizens) using the existing platforms (the county web site and other official portals).

The platform integrates existing systems that provide digital services for environmental permits procedures, including:

- **Geographic Information System:** all permits are location-based and their evaluation requires data on the use of the surrounding environment, natural resources and protected areas and potential hazards.
- **Knowledge Management System:** easy access to relevant laws, academic studies and similar permits processes by environmental experts and authorities in order to prepare the EIA and to evaluate the application.
- **Workflow Management System:** these systems help the authority to move the application along the required steps in a smooth manner.
- **Participation System:** citizens will be able to review current applications online, access information in a secure environment and provide relevant comments.

Each client installation manages multiple grouped services related with the life cycle of environmental permits. This allows eEnviPer to integrate relevant processes and services for public authorities and agencies. In addition, basic operational services will be offered to citizens as e-services (e.g. for consultations and data access).

More specifically, the identified stakeholder groups and users of eEnviPer are:

- **Investors (applicants):** individuals or legal entities applying for a permit
- **Environmental consultants:** the agents who submit applications on behalf of investors. They are expected to be the main users of the eEnviPer system
- **Public authorities:** the county level administrations responsible for the permitting process
- **Other agencies:** public administrative bodies at other levels (national, ministry, agency or municipality) or other agencies involved in the permitting process (e.g. the Ministry of Environmental and Nature Protection, the Directorate of Physical Planning, etc.)
- **Interest groups:** representatives of different civil society groups or citizens with an interest in the outcome of the permitting process.

Main results achieved / objectives / benefits:

According to the first formal evaluation that has been implemented through primary survey on the views of the eEnviPer's users, **the predominant benefit of eEnviPer is that different agencies with distinct roles and responsibilities within the process can cooperate easily**. Users found the platform through which agencies can collaborate, share their opinions and inform other interesting parties, a critical success factor for the environmental permits process.

Other benefits of the system that result from the first stage of the pilot test **include**:

- The inclusion of all activities in a **single workflow** that is driven by an enforced timeline proved to be very useful for organizing the input of all users.
- Officers from the public authorities at national and county level found the notification function extremely useful. It serves as a reminder of the next step to be taken for each application and thereby **supports the planning and inclusion of the agencies next-in-line in the process**.
- **The availability of all relevant information and legislation through a user friendly interface** allowed a more effective use of time and resources, and the spatial and non-spatial data that are available online in an electronic format are more suitable for browsing, querying and search.

On the downside, users felt that the use of an advanced system like eEnviPer requires some getting used to, along with some degree of training and assistance, at least in the first year or so of implementation. Moreover, users pointed out that they will have to fight against the old paper-pushing routine that everyone is familiar with, and invest time and effort in learning how to use the system for their long-term benefit. As a result, the Croatian implementation team is determined to use the time remaining for their pilot to build their knowledge of and familiarity with the system, and to acquire the necessary skills for using the system.

Transferability:

The eEnviPer of the Croatian County Krapina-Zagorje is one of the five pilot projects across five different European regions (Greece, Italy, Serbia, Croatia and Turkey). This implies that **it has been designed in such a way that it can by default be transferred to similar contexts and similar European regions**. Its implementation to the other European regions is in progress.

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