White Book of e-Government Interoperability for Latin America and the Caribbean

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White Book of e-Government Interoperability for Latin America and the Caribbean

Contents

Executive Summary

As part of the effort to develop effective mechanisms for regional cooperation, the countries of Latin America and the Caribbean included, within the Plan of Action for the Information Society in Latin America and the Caribbean (eLAC 2007), goals for coordinating their electronic government projects. They defined actions such as strengthening RED GEALC, the e-government network coordinated by the OAS, forming working groups to develop interoperability standards, using ICTs for disaster prevention and environmental protection, modifying legislation to guarantee data protection and privacy, and providing the technical and legal instruments needed for ICTs to develop in a manner consistent with democratic principles and respect for citizens' rights. All of these actions contribute to making e-government systems interoperable, i.e., providing the political, institutional and technical capacity needed for e-government systems to interact efficiently and with sufficient security. By its nature, interoperability must be the product of collaboration between the countries, as they develop concrete solutions to the problems that concern them.

The White Book of e-Government Interoperability for Latin America and the Caribbean has been presented and discussed at joint events organised by the Inter-American Development Bank, the OAS and ECLAC, including two Red GEALC workshops: Interoperability and Intranet Government —one in Bogotá in November 2006, the other in San José, Costa Rica in April 2007— and the Working Days on Government Intranet and Regional Interoperability, at ECLAC, in Santiago, Chile on 10-11 September 2007.

The White Paper draws on interoperability experience and projects in Brazil, Chile, Colombia, Mexico and Trinidad and Tobago, which provided the basis for the architecture of the Latin America and Caribbean interoperability platform designed by ECLC.[1] The European Union's experience with interoperability —in the form of studies, practices and agreements that are potentially useful to the Latin American and Caribbean countries as they discuss interoperability— has also been instructive.

The Paper provides definitions to serve as a framework for discussion, and as a starting point for exploring solutions to organisational, semantic, technical and governance issues that must be addressed to secure an efficient exchange of information between the countries. These definitions are the foundation for an interoperability architecture designed to implement successful interoperability in the region.

The major organisational factors to be considered include the importance of country-specific realities such as legal and regulatory environments, and the use of multiple channels (e.g., Internet and mobile telephony), so as to make available identical e-government services to all who need them.

In regard to semantic problems, the Paper stresses the need for solutions in Spanish, Portuguese and English —the region's main languages. It also advocates the creation of global metadata repositories for applications as they are implemented. Thus, as countries and interoperable solutions are added, existing semantic specifications will serve, or can be extended

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[1] See Moreno H., Silveira-Netto S, Sin H., Conceptualización de arquitectura de gobierno electrónico y plataforma de interoperabilidad para América Latina y el Caribe. Document No. 21, Information Society series, ECLAC, July 2007. On e-government architectures, see Moreno, H. et al., E-Government architectures, technical and political situation in Latin America. Document No. 19, Information Society series, ECLAC, April 2007.

to address, specific cases. In this way, overlapping efforts will be avoided, and the scope of interoperability will be expanded.

As regards technical requirements, the Paper proposes that interoperability be defined on the basis of various standards that the countries already use for technologies affecting the structure and semantics of information and services. It also suggests that countries be permitted to participate in the network on a partial basis, so that countries with different levels of development in their e-government systems can enter the network without waiting until they are in total compliance with all of the network standards. Furthermore, the Paper proposes that the network's standards provide for the diversity of the region's software and hardware platforms, allowing each country to retain autonomy over its information. The use of agreed, highly reliable digital signatures and certificates will guarantee that only data authorised for a particular type of operation are transferred, that they are transmitted only to persons or entities explicitly authorised to receive them, and that the online transactions do not violate the legislation of the countries involved.

In terms of governance, the Paper stresses respect for the autonomy and equal rights of the participating countries, by creating a non-centralised architecture based on multiple distributed platforms, so that each country can establish its own internal rules to govern the functions that it makes available. For the same reasons, it is important to design platform components so that they can be adapted to the features of existing information systems. The knowledge and technology developed —technical specifications for the development of the interoperability architecture and platform, specifications for data, metadata and XML specifications, specifications for electronic documents, standards and methodologies, IT solutions— will constitute a regional patrimony of knowledge. The ownership and use rights of this stock of knowledge must remain as "regional public goods". This will ensure free access, facilitate their adoption by governments in the region wishing to use them, and prevent their becoming the exclusive property of any of the parties involved in developing them or being appropriated or patented by private third parties.

To achieve regional interoperability, the Paper proposes:

- Creating mechanisms and foray to address coordination for regional interoperability

- Defining the methodology to be used in establishing standards

- Adopting a framework for measuring achievements in the field of e-government and interoperability

- Initiating efforts toward establishing regional interoperability around concrete solutions that serve all of the region's countries

Finally, the Paper proposes that clear national policies guarantee citizens' confidentiality and privacy. This is not an attempt to create a specific standard for the protection of personal data, but rather an effort to establish a common recognition of certain basic principles and practices to guarantee respect for the individual and his/her privacy rights as e-government develops.

I. Introduction

The willingness expressed by governments of Latin America and the Caribbean to achieve the objectives proposed in this White Book of e-Government Interoperability for Latin America and the Caribbean comes at a time when subregional integration schemes are being reorganised, highlighting the importance of giving serious thought to what type of regional integration will prevail in the future. Integration, in Latin America, is in a difficult period. After gaining and then losing ground, integration in the region is still being debated, as the region searches for a common vision on which to create an economic union capable of enhancing all of the countries' opportunities for development and social well-being. The great challenge remains that of reducing the gap between the apparent political will on the part of the region's governments (reflected in the fact that integration processes have persisted) and concrete action; between the integration discourse and its everyday practice. Against this background, governments understand that information and the technology available to process it represent a strategic resource that must be used to full advantage before it is too late. Developing mechanisms for the countries to coordinate information exchange and integrate their governmental processes will help reduce the cost barriers that have traditionally impeded the pursuit of common objectives in this field.

From the perspective of this challenging period in the Latin American integration process, integration is not a black and white matter, as the example of the Caribbean and Central America illustrates —a situation in which the Central American Common Market is seeking to use trade negotiations with the United States, and imminent partnership agreements with the EU, as a stimulus to update and modernise its own subregional integration scheme. None of this is easy, but the efforts underway suggest that there is a willingness to address the challenges collaboratively.

There have also been advances in South America, including social development programmes in Competitive Analysis of Nations (CAN), the Fund for Structural Convergence in MERCOSUR, and efforts to achieve uniform customs codes and comprehensive enforcement of the common external tariff. Nevertheless, the slow pace of the region's integration process, combined with the urgency and importance of insertion in the globalized market, makes such progress insufficient, and at times highlights the weaknesses of the integration process.

The enormous possibilities created by new information and communication technologies (ICTs) have been spotlighted in the efforts of the Latin American and Caribbean countries to develop effective coordination and cooperation mechanisms. Through ICTs, the countries have found a new form of regional coordination and cooperation, which is already at work in numerous activities promoted by international organisations, such as the European Union, the IDB, the Institute for Connectivity in the Americas (ICA), the Organisation of American States (OAS) and ECLAC.

Meanwhile, in order to harmonise their efforts and improve the overall effectiveness of support that the countries have been provided for using ICTs to strengthen democracy, international development agencies have created a collaborative mechanism known as the e-Government Effectiveness Inter-Agency Task Force (EgE IA TF), whose members include the OAS, the IDB, the United Nations Department for Economic and Social Affairs (UN DESA), the World Bank, the

Development Gateway Foundation, the Institute for Connectivity in the Americas (ICA) and the United Nations Economic Commission for Latin America and the Caribbean (ECLAC).

It was against this background that the region's countries approved the Rio de Janeiro Commitment and eLAC 2007 in June 2005. The latter includes, among things, goals and measures for coordinating the various countries' e-government projects —e.g., strengthening regional mechanisms such as the e-government network (GEALC) coordinated by the OAS; creating working groups to set priorities for establishing interoperability standards; promoting national regional networks for cooperation in science, technology and innovation; using ICTs to avert disasters and protect the environment; and modifying legal frameworks to guarantee privacy and protection of data and to provide the technical and legal instruments needed to ensure that the use of ICTs proceeds in a manner that respects democratic principles and citizens' rights.

Individual countries, by focussing on better methods for information exchange, will be in a position to develop IT solutions that take account of lessons already learned. One need only recall how, when computers were first introduced in public administration, government agencies' adoption of ICTs focussed only on their own particular needs, leading to what today are isolated "islands of information" with no bridges of communication to connect them —making it practically impossible for citizens to transact their business with government at a single site. In order to overcome this problem, governments now seek to provide single electronic windows through which citizens can interact with their government.

To achieve integration and provide for coordination between their internal information systems, governments must solve semantic problems, such as: the incongruities created when one agency's computer systems are incomprehensible to another's; organisational problems caused by disjointed administrative processes that force citizens to repeat procedures unnecessarily and wait in endless lines at windows; technical problems caused by incompatible computers and computer programs; and governance problems due to a lack of standards and the absence of institutional arrangements to establish protocols for exchange of information between agencies —protocols that could eventually provide for uniform practices and standards throughout government.

Europe's extraordinary progress in integration makes it a basic point of reference for reflection and debate in our region. There is a clear recognition that the European experience can provide valuable lessons applicable to Latin America's structural and institutional realities. Thus, in the field of interoperability, studies, practices and agreements already in place in the European Union must be examined, as discussion in Latin America and the Caribbean proceed. The European experience, of course, is not necessarily replicable in our region, in part because Latin America has no equivalent to the European Union and its institutions. However, the lessons learned in building the EU deserve careful study. The EU's pursuit of the broadest possible objectives has always included policies to reduce economic asymmetries among members and between regions, encourage social cohesion in the nations' societies, and provide institutions that are sensitive to the concerns of all of the member States.

The first stop on the roadmap proposed in the White Book of e-Government Interoperability for Latin America and the Caribbean is consensus on the definitions and concept of interoperability architecture emerging from the research conducted at ECLAC (with support from the @LIS programme, of EUROPE AID —the European Union's cooperation agency— and with the invaluable collaboration of the Brazilian and Colombian governments).

Based on these definitions, priority activities have been planned to ensure that an efficient regional interoperability environment and platform can be implemented in the short term. This effort is intended to support growth with equity in our countries' expanding markets, provide legal security in an environment of converging standards and disciplines, and foster progress in infrastructure and connectivity. In this context, interoperable e-government systems should be viewed as one additional tool for achieving trade integration, and as an element capable of contributing to policies and standards in other areas, such as telecommunications infrastructure, regulatory frameworks in a variety of areas (including telecommunications), migration, pension systems, health, education, technological innovation, the environment and macroeconomic cooperation.

Interoperable e-government has the potential to multiply the benefits of harmonisation in areas such as customs, verification of rules of origin, trade protection, human health and phytosanitary measures, technical standards and conflict resolution. Thus, a multitude of actors can assist in achieving the objectives outlined here. These include members of the eGe Task Force, CAN (which could play a major role), ALADI, CARICOM and MERCOSUR, all of which have carried out serious, comprehensive work and have produced documents in furtherance of these efforts. Thus, the main technical inputs needed to move forward appear to be at hand —at least insofar as integration is concerned. E-government interoperability will be positioned to take a major step forward, leading to major improvements in information management for regional integration, provided that political will and effective leadership can be deployed.

Much work lies ahead. Integration has, to date, been far from easy, and future progress can be expected to face similar challenges. The tasks that lie ahead are complex, and it will require determination to define common institutional standards for the region and incorporate them in national legislation and practices. ICTs offer our countries vast opportunities for cooperation in the areas of trade transactions, joint learning, coordinated work on issues of supranational interest, and improved political dialogue. Having interoperable e-government systems —i.e., systems with common technical, semantic and organisational standards, established through dialogue, with agreed and mutually respected governance protocols— is a prerequisite to achieving these objectives. This can only occur with the concerted collaboration of national governments determined to achieve the objectives outlined here, and with the financial support and coordination of international organisations.

The participants in the Red GEALC workshops: Interoperability and Intranet Government —held in Bogotá in November 2006, and in San José, Costa Rica in April 2007— discussed the interest that countries in the region have in finding efficient mechanisms by which their government agencies can exchange information and knowledge through their information systems. Current national projects designed to accomplish this were presented by Brazil, Chile, Colombia, Mexico and Trinidad and Tobago; ECLAC also presented its work on an interoperability architecture and platform for the region.[2] During the Working Days on Government Intranet and Regional Interoperability, held at ECLAC headquarters in Santiago, Chile on 10-11 September 2007, there was a third round of discussions on the present White Book of e-Government Interoperability for Latin America and the Caribbean, and there was consensus among the countries in attendance on recommending that the Paper be presented for discussion at the ministerial meeting in Buenos Aires on 4-5 October 2007, as lead-up to the Ministerial Meeting on the Information Society, to be held in El Salvador on 6-8 February 2008. The goal is to have the Paper —with whatever changes are deemed necessary— included in the eLAC2010 e-government goals.

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[2] See Moreno H., Silveira-Netto S, Sin H., Conceptualización de arquitectura de gobierno electrónico y plataforma de interoperabilidad para América Latina y el Caribe. Document no. 21, Information Society series, ECLAC, July 2007.

II. Interoperability as a key to progress

The concept of interoperability involves issues that are vital to the region's inhabitants, such as the ability to provide adequate health services, mitigate the impact of natural disasters, ensure the security of our countries, and facilitate foreign trade for our firms. Interoperability can, for instance, help governments ensure that pensions are not paid to deceased persons and that their identity numbers are not used to cast fraudulent votes at general elections; that tax-collecting agencies are able to prevent abuses, e.g., a luxury beach house owner filing a tax return that fraudulently claims status as a member of a low socioeconomic bracket; and that people with criminal records are not hired as teachers in the schools our children attend.

At the national level, a number of Latin American and Caribbean countries have made significant progress in the interoperability of their e-government solutions. Colombia, Chile, Brazil, Mexico and Trinidad and Tobago are probably the most advanced in this regard, and are becoming points of reference for the region's other countries. With assistance from ECLAC, Brazil and Colombia have begun to develop interoperability in their foreign trade systems. The members of MERCOSUR have also begun developing interoperable applications.

It is clear that this effort is being embraced by government leaders committed to providing high-quality services for their citizens and to efficiently managing the apparatus of government. The risks of failing to act are simply too great.

Citizens stand to benefit directly from interoperability, gaining time for productive activity or recreation as they are freed from having to spend their time providing duplicate information to different government agencies or responding to government requests for information it already possesses.

All of this makes interoperability a key element not only in providing high-quality public services, but also in doing so in a cost-efficient manner, since inefficiencies and duplications not only create frustration for citizens, but also generate extra costs for government.

The same benefits apply to relations between countries in the region. When a Guatemalan citizen becomes ill in Peru and needs emergency treatment, interoperability is the only way of ensuring that information about allergies to medications is communicated, in order to avoid potentially dangerous consequences to the patient.

Turning to the topic of productive activity, it should be noted that small and medium-sized firms, which are responsible for 60% of jobs in Latin America and the Caribbean, lack the human and other resources that large multinationals are able to deploy to deal with domestic government procedural demands, and requirements to provide multiple countries with the same documentation each time firms conduct business in the country concerned. If small and medium-sized firms are to exploit the potential of the trade agreements being signed in the region, serious efforts must be made to provide interoperability among countries' customs agencies, trade registries, lists of government providers, etc.

While the positive incentives for developing interoperability, both nationally and transnationally, are compelling, the potential consequences of ignoring it are dire, as illustrated by events in the wake of the tragic attack on New York's Twin Towers on 11 September 2001, when lack of interoperability in the communications systems of police, emergency medical services and fire fighters cost the lives of many fire fighters.

Thus, interoperability not only saves financial resources for government, but also saves human lives. Many political leaders in Latin America and the Caribbean have discovered that their nations cannot progress without serious efforts toward implementing e-government. It is essential that these leaders recognise that e-government cannot exist without interoperability, and that interoperability requires political will.

III. Definitions

The interoperability achieved by the European Union serves as an example for Latin American and Caribbean countries, as they face similar challenges. It is for this reason that the White Book of e-Government Interoperability for Latin America and the Caribbean draws on the methodology, definitions and typology of the European Interoperability Framework (EIF), and on the study of local and regional interoperability published by the European Commission in December 2006.[3]

1. Interoperability

The European Commission defines interoperability as *"the ability of information and communication technology (ICT) systems and the business processes they support to exchange data and to enable information and knowledge to be shared".* The European studies examine interoperability in terms of a typology with four major categories: semantic, organisational, technical and governance elements.

2. Semantic interoperability

Semantic interoperability ensures that the precise meaning of information that is exchanged is unambiguously communicated in all of the applications involved in a given transaction, and that systems are able to combine information received from other information sources and process it properly.

3. Organisational interoperability

Organisational interoperability entails defining business objectives, modelling processes, and facilitating collaboration among governments wishing to exchange information, even when their organisational structures and internal processes differ. In addition, it means addressing the requirements of the user community and defining the services that need to be made available and made easily identifiable, accessible and user-friendly.

4. Technical interoperability

Technical interoperability entails addressing the technical issues (hardware, software, telecommunications) involved in interconnecting computer systems and services, including key elements such as open interfaces, interconnection services, integration of data and middleware, presentation and exchange of data, accessibility and security services.

5. e-Government interoperability governance

Governance in this context refers to agreements between governments and other actors involved in interoperability, and to ways of achieving them, including the creation of fora for establishing such agreements. Governance activities are designed to provide government entities the institutional structures needed to establish interoperability standards and ensure that they are

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[3] Study on Interoperability at Local and Regional Level, Interoperability Study Final Version. eGovernment Unit DG Information Society and Media, European Commission, 31 December 2006.

adopted, and to provide government agencies the organisational and technical capacity needed to implement them.

6. Interoperability architecture

Choosing an architecture helps to define the way in which applications, components and services will be developed and —most importantly— how they will interact with other information systems. Interoperability architecture provides an overall view of the technological design of the interoperability system. It does not address specific design problems, dealing instead with technological difficulties from an overarching perspective, taking into account general factors such as flexibility and scalability. Ultimately, each application must interact transparently with the others, using pre-established standards and forms, facilitating the flow of information, organisational growth, and a natural evolution toward emerging technologies.

Using the European study as a starting point, ECLAC undertook a project that has received decisive support from the governments of Brazil and Colombia, leading to the proposed vision or architecture for the region's interoperability shown in figure 1.[4] This scheme embraces the concepts of the European typology and an approach to the interoperability platform aimed at addressing, designing and implementing concrete solutions in the short term. The roadmap presented in the White Paper is based on this architecture.

Figure 1
INTEROPERABILITY ARCHITECTURE
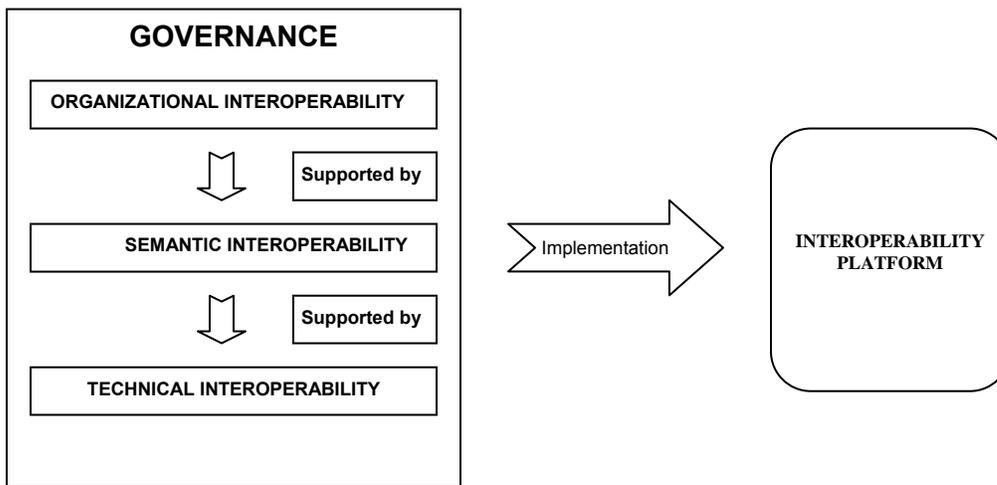
Source: Moreno H., Silveira-Netto S, Sin H., Conceptualización de Una Arquitectura y Plataforma de Interoperabilidad para América Latina y el Caribe. Document no. 21, Information Society series, ECLAC, July 2007.

7. Interoperability platform

In order to create the interoperability platform, IT tools that incorporate the definitions of the interoperability architecture, and that are designed to facilitate the exchange of information between countries, must be developed.

A number of the region's countries have made progress in three facets of the architecture: interoperability typology, governance and platform. In some cases, this simply involves definitions, but in others it includes complex systems already designed and built,

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4   Moreno H. et al., op. cit.

permitting interoperability between systems based on modern service-oriented architectures (as detailed in the annexes).

However, there does not appear to be any evidence of interoperable computer applications in Latin America that involve two or more countries using mechanisms based on hardware and software specifically designed for interoperability. It is for this reason that ECLAC decided to undertake the present study.

The most significant and advanced case of cross-border interoperability architecture, to date, is the European case (as explained in greater detail in an annex to the present document). For interoperability to be viable, information (identification, government registries, certifications, health coverage, etc.) must be available to the region's countries without jeopardising security and access policies designed to safeguard personal information, while asserting the authority of government agencies to maintain and access information.

Defining the technical and technological factors needed to develop interoperability architecture requires coordination among different countries, making use of the venues for dialogue mentioned above. Figure 2 shows the elements that will be vital to establishing the multilateral agreements needed for regional interoperability —elements requiring intense coordination and articulation (shown in the central circle of the figure). These elements concern the technical and semantic aspects of interoperability.

The following points highlight the importance of these coordination- and articulation-intensive issues relating to the language used for information exchange and the importance of having a service-oriented architecture.

- **Language to be used for information exchange:** A standard language for exchange and interpretation of data and documents must be precisely defined. Given the diversity of languages used in Latin America and the Caribbean, and the different ways in which government information systems describe data (syntax), as well as the different ways of interpreting data and documents (semantics), the language used for exchanging information must be agreed upon, taking account of the following:

Critical factors in semantic interoperability:

- Common and generally used definitions and means of presenting data applicable to e-government
- Rigorous definition of common elements
- Rigorous documentation of definitions
- Promotion and dissemination of definitions
- Reliability of definitions

Priority elements for standardisation:

- Data and metadata
- Document formats
- Authentication and digital certificates

- **Service-oriented architecture (SOA):** Define precisely the components, standards and versions of the SOA, as well as regional differences in adoption of the architecture. The elements to be implemented must be consistent with a strategy designed to respect country differences in terms of the levels at which the architecture is adopted. The following, in particular, must be considered.

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Critical factors in technical interoperability:

– Appropriate technology for managing the structure of the information
– Appropriate technology for managing the structure of services
– Appropriate technology for managing the semantics of the information
– Appropriate technology for managing the semantics of web services

In figure 2, the elements on the left and right sides relate to developments within the countries. When countries need to interoperate, they link through the interoperability platform, using the components of the *service-oriented architecture*, and employing the *information exchange language.*

Figure 2
COORDINATION- AND ARTICULATION-INTENSIVE ELEMENTS
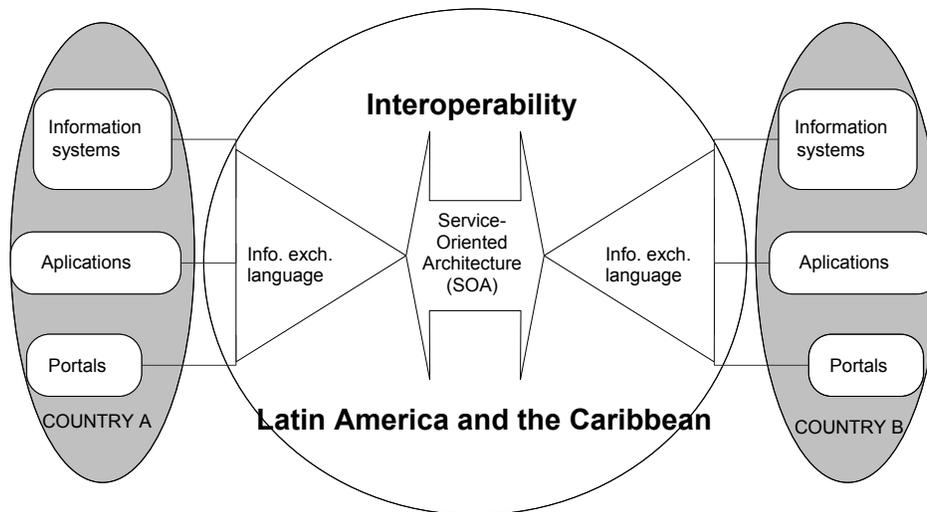
Fuente: Moreno H., Silveira-Netto S, Sin H., Conceptualización de Una Arquitectura y Plataforma de Interoperabilidad para América Latina y el Caribe. Document No. 21, Information Society series, ECLAC, July 2007.

In this approach, the countries continue developing their own information systems, but direct some of their technological development effort to providing services that can be used by other countries, in order to facilitate the desired exchange of information. Meanwhile, fora and coordination mechanisms provide the opportunity for articulating and coordinating elements that must be defined multilaterally.

In formulating the technological infrastructure, consideration must be given to the fact that individual countries' government agencies will be responsible for the actual information and processes involved, and that the purpose of the infrastructure is simply to facilitate interoperability, not to store information (except for limited periods of time) or process it. In this way, each country's autonomy remains intact.

The platform serves strictly as a channel for services or functionalities that one country chooses to make available to other countries. The platform is not responsible for processing information or performing services that it makes available. It serves, rather, as a country's point of access, with authentication mechanisms to verify users' authorisation.

This approach will facilitate the system's adoption by the countries, since it ensures that their information will be made available only to those for whom they authorise access.

(a) Clients/accessibility

The clients of the technology developed for the interoperability platform are information systems. Except for those administering the platform, individuals do not have access to the platform directly, but only to the countries' government agencies whose services they are seeking.

The platform must also have administrative tools that make it possible for responsible parties in the countries to establish which services are to be made available, and to design the authorisation process for using those services.

(b) Administration

Interoperability involves exchanging, not updating, information, since activities involving changes to the databases and information systems are handled directly by each country's government agencies.

Thus, administration of the interoperability platform's solutions is limited to ensuring that agreements are observed, and that access to services is provided only for those authorised to use them.

(c) Security

Information must be exchanged via virtual private networks (VPNs), and authentication schemes must be based on digital certificates issued by the countries' certification authorities.[5]

(d) Operation

The components developed in the context of this platform operate on a distributed basis, with individual countries being responsible for operating the computer solutions that make interoperability possible. Thus, no centralised entity operates the solutions.

There must, however, be a forum for dialogue and discussion regarding the technical and operational elements, in order to ensure normal functioning of the technological components of the solutions. The mechanisms for coordinating elements that, in order to manage and operate the architecture, require centralisation, are to be created through the architecture's governance process.

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[5] This is why it is so important for these certificates to be recognised in the different countries of the region.

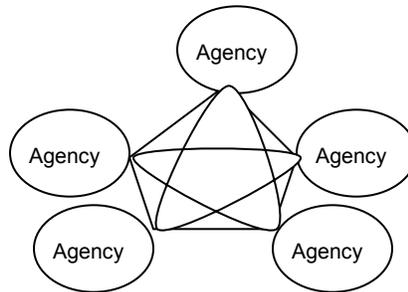# IV. e-Government interoperability challenges

1. Domestic interoperability

To understand the problem of information exchanges between nations' e-government systems that interoperability seeks to address, one must understand the problem that interoperability poses within a country. Government agencies' information systems have evolved at different times and in different ways. Therefore, when two agencies need to exchange information to provide a public service, they must agree on what data are to flow between them (personal records, addresses, visas, approvals, etc.); how to represent and interpret the data (e.g., how a person's name is recorded, how an organisation is identified and what codes are used); and what security arrangements will be used to ensure that information is neither lost nor altered in the exchange process and that only authorised persons in the two agencies will have access to the information, with clear protocols establishing who has the right to modify —as opposed to merely view— information.

When a number **n** of agencies needs to exchange information, then, **n*(n-1)/2** bilateral agreements are required. For each of these bilateral relationships, there is a set of semantic, technical, operational and governance definitions set forth in an agreement between the parties. This means that a given entity will have **n-1** agreements (forms of information exchange, and hence issues to resolve), and will be faced with the associated problems of overseeing compliance and of carrying out the technical and operational steps required.

Figure 3 shows the relationships among five agencies, each of which needs to exchange information with all of the others. Each connecting arc represents an individual effort between two agencies to agree on the features and schemes governing the exchange of information between them. There are 10 arcs, or bilateral relationships (5(5-1)/2), with each agency requiring four different agreements and, potentially, different solutions for each.

Figure 3
**SCHEME OF RELATIONSHIPS AMONG AGENCIES**

Source: The authors.

The interoperability challenge facing **n** government agencies exchanging information is to find mechanisms that can drastically reduce the complexity and cost of defining and managing the **n-1** bilateral agreements that each has, and to replace these with a universal standardised

agreement. Figure 4 shows this solution, in which each agency is at the end-point of only one arc, since it requires only one solution to relate to any other government agency.

Figure 4
RELATIONS SIMPLIFIED BY THE EXISTENCE OF A UNIFIED SCHEME
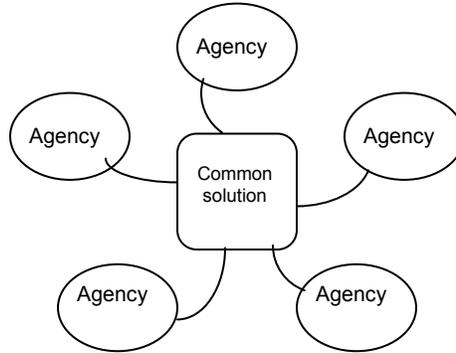
Source: The authors.

The "unified scheme" is a set of standards for representing information, for common processes, for information-exchange mechanisms, for security arrangements implemented by all parties, and for other measures needed to optimise and ensure the security of the information flow within the government.

Constructing a unified scheme is an initial step. The complexity of this process depends on factors that vary from country to country, producing, in all cases, network externalities, as additional countries subscribe to the scheme in the short and medium term. In other words, the cost of the solution depends on how many agencies adopt it, since the greater the number of participants, the greater will be the economies of scale for government agencies and the simpler the effort required of each.

2. Regional interoperability

The problems within a country, as described above, can be extrapolated to the interaction of different countries within the region. In an environment in which a number of countries need to interoperate, the "natural" solution is a heterogeneous model in which bilateral relationships are developed, each with its own definitions and rules. This model is ineffective, however, since it produces pairs of information "islands" that have difficulty communicating with other islands or pairs. Under such a model, a country with greater opportunities and needs for interaction requires multiple bilateral arrangements, and its use of resources to achieve its objectives will be inefficient. Similarly, subregional multi-party islands may be created through dialogues in which groups of countries agree on a variety of issues.[6] For example, addressing a need for information exchange between two countries' foreign trade systems involves creating agreements to solve semantic, organisational and technical problems between their information systems, which may have different ways of handling lists of products, certificates of origin and tariffs. Bilateral agreements seek to overcome barriers to understanding (i.e., barriers to equivalent interpretation of data and information) —barriers that, in the absence of standards and secure methods and mechanisms for the exchange of information, are inevitable. If this type of problem with **n** countries that have mutual trade relations is solved through a system of interoperable standards, costs are reduced and the complexity of handling **n-1** relationships is reduced to the complexity of

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[6]   E.g., MERCOSUR, CAN, G3, among others.

handling one. Figure 5 compares the inefficient set of multiple bilateral solutions (left) with the interoperable solution (right), which is **n-1** times more efficient.

Figure 5
OPTIMISING RELATIONS AMONG DIFFERENT COUNTRIES' GOVERNMENT AGENCIES
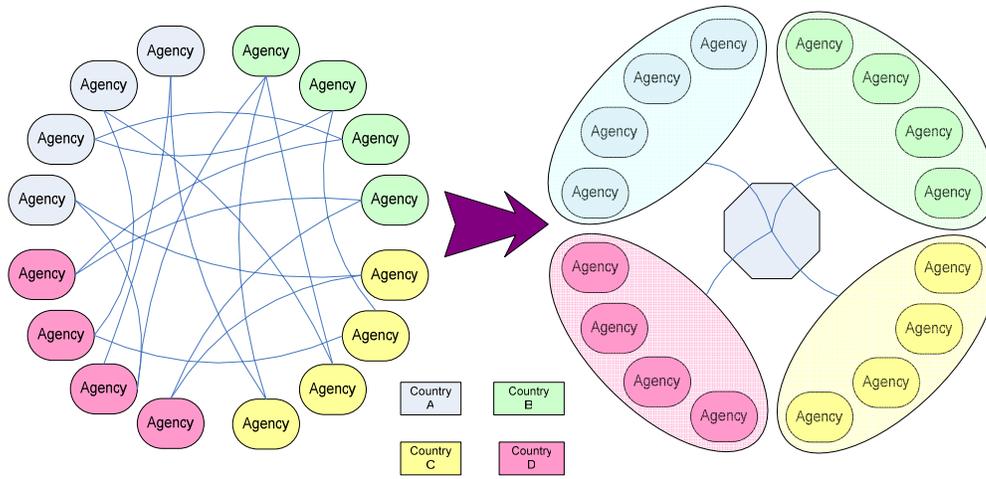
Source: The authors.

Thus, it is essential for the countries to move toward setting standards for information exchange, as well as to setting policies governing such exchange, while establishing a technological platform that ensures the security of information and the efficient investment of public funds.

For effective results, articulated, coordinated action is required. Decisions and approaches (architecture) defined at the regional level will be easier to implement now than some years from now when —in the absence of region-wide decisions— some countries will inevitably have implemented varying (unstandardised) bilateral interoperability mechanisms.

3. Semantic interoperability

Semantic interoperability means that information in different languages, with different meanings or with different purposes, can be exchanged electronically in such a way that, once exchanged, the information remains accurate and unambiguous, as well as compatible with and comprehensible to system users. For governmental electronic contracting, for example, semantic interoperability includes: (i) having a precise and unambiguous common vocabulary to characterise what is being contracted for and the conditions under which this is being done; (ii) designating standard ways of identifying the phases and horizontal stages of the contracting process; and (iii) creating a typology for existing contracting processes when different national contracting systems are involved.

A system of governmental electronic contracting may be considered interoperable with other computer systems in the government, systems in other nations, local citizens and citizens in other countries, when the contracting process uses and produces information that is understandable to all of these actors. An example is the European Union's "common procurement vocabulary" (CPV), which is a dictionary and classification system common to the member States, which serves as the linguistic standard for government contracting on a pan-European basis, under conditions set by the Community's directives and regulations.

To develop semantic interoperability for government e-contracting, work on the following should be undertaken:

- Standardising, cataloguing and classifying goods, services and works, needed by contracting governments, which may potentially be supplied by providers offering such goods/services/works to the State
- Identifying and establishing nomenclature for those responsible for administering and managing electronic contracting procedures
- Accurately defining the phases and sub-phases of the contracting process, and making these conceptually consistent with the phases and sub-phases of other jurisdictions' government contracting systems
- Developing an appropriate system for designating contracts and associated documents as they are produced, or when they are needed for substantiation
- Harmonising and matching the experience and abilities required of potential government contractors, as well as the contents of provider registries when such exist.

4. Organisational interoperability

Organisational interoperability requires agreements to collaborate among governments and organisations that need to interconnect but do not have common or similar organisational structures or workflows. It is important to analyse the various institutional entities involved in government contracting in different countries, in order to determine the scope of the organisational interoperability agreement needed. In other words, the principal actors in the government contracting process must be identified —first within each of the contracting entities, and then in entities outside the government. Examples include private organisations that oversee bidder registries, companies that provide electronic security systems and protocols (PKI infrastructure), the banking and insurance system, etc. The agreement must therefore cover:

- Information flows among contracting entities, and governmental and private entities that play a role in the contracting process
- Redesign and adaptation of procedures and their components or phases, in order to coordinate information flows
- Inputs and outputs that are executed within a government entity in the process of exchanging information for contracting purposes, and means of connecting with other public and private actors involved in the process
- Charging individuals within the contracting government entities, and within other participating entities, with managing the events and sequences of the contracting process (dissemination of information, data storage, management of e-mail account and system user profiles, workflow design, etc.).

At the local level, the agreement involves establishing an entity responsible for interoperability within the government, and creating a standards committee, while at the regional level it means creating coordinated bodies to promote interoperability standards within the countries.

5. Technical interoperability

The technical interoperability objectives involve developing technological solutions that facilitate connectivity and make it possible to transmit data between computer systems and services. These include key elements such as open interfaces, middleware, accessibility and security services. Under the assumptions of the proposed strategy, minimum infrastructure must be created to support the system at the national level, and information handling, security and management policies must be developed within organisations to make information highly visible without slowing down elements of the contracting process (controls, etc.).

It is also important to develop a basic frame of reference that includes specifications, standards, guidelines and methodologies for the technological architecture of e-government services, so that their development, coordination and management, as well as joint publication of their features, can proceed in an orderly fashion and achieve the desired results.

This frame of reference might include the following chapters:

1. Methodology for the Analysis of e-Government Services
2. Methodology for web services-based definitions
3. Security Guidelines and Standards
4. User Identification and Authentication
5. Guidelines for Information Exchange and for Structuring User Data
6. Guidelines for the Development of e-Government Services
7. Guidelines for the Publication of Electronic Services and Web Services
8. Guidelines for email controls

6. Interoperability governance

As a complement to the technical requirement of defining and adopting standards, there must be governance to ensure, on an ongoing basis, that these are being observed. This requires multilateral mechanisms for discussion and consensus building. Practical success stories will generate the trust and momentum needed to gradually overcome resistance and advance toward concrete results and benefits.

V. Determinants of regional interoperability in e-government

The following basic parameters must be considered in conceptualising the architecture of the interoperability platform. These parameters are developed further in the following chapters of the present reference document.

Some of the determinants emerge from constraints in the common environment —constraints, arising from experience with e-government and interoperability in Latin America and the Caribbean, that were covered in the foregoing chapter. Others are policies or strategies recommended here as one facet in constructing and implementing a solution.

1. Requirements for organisational interoperability

The essential determinants involved in organisational interoperability are:

- **Country-specific factors.** Political and governance structures vary from one country to another within the region, thus making it impossible for a single scheme to adequately serve all. The architecture developed must therefore be flexible, so that the countries remain free to follow the path of development called for by their current situations.

- **The principle of legality.** Government action is subject to national legal frameworks, which shape what governments must do and how they must do it. At times this principle is in conflict with the implications of global technological development, for as technology presents opportunities for government agencies to modernise their processes and provide electronic services, a country may make changes that are not applicable or valid in another national context. One example of this is the annual income tax statement process that has been in place in Brazil since 1995 for individuals and firms, which allows electronic tax documents to be sent via the Internet without electronic signatures or digital certificates —a procedure not legally permissible in other countries. Any regional platform that is developed needs to provide for such specificities, ensuring the autonomy of the region's governments in such matters.

  Other important requirements to consider involve:

- **Horizontal services and applications.** The integration of information from different areas and systems within the government, in order to provide for complete interaction oriented to the external user, is important locally, but is even more critical in interactions between users from one country and the government of another. Interoperability between countries should envisage and provide mechanisms for composite services with "one for many" and "many for many" relationships.

- **Identifying business processes.** The flow of processes in a given type of business may be different in each of the region's countries. This makes it necessary to have intermediation mechanisms that can render information compatible to different parties with a minimum of adjustment, and without requiring the flows in the different countries to be redesigned.

- **User and community requirements.** Because of cultural differences, local needs, and established practices in different countries, analysis of semantic, organisational and technical compatibility is necessary before two countries implement interoperability applications, so as to provide channels for quickly solving problems that users may have with the services at any given time.

- **Multi-channel services** (face-to-face, online, fixed and cellular telephony, fax). It is essential to remember that the usefulness of a country's various channels, which tend to emerge as a natural result of technological progress and opportunities for synergy, may extend to international interactions. The implementation of interoperability should provide for conversion gateways, so as to establish bridges for channels that originate in one country and are not present in another.

- **Services for the disabled.** This worldwide demand for social inclusion must be considered, and mechanisms to serve the disabled must be found.

- **Equitable and efficient service.** Government should be available to all at any time, and from any place, and citizens should not be required to supply information that government already possesses. Services should be of consistent quality

2. Semantic interoperability requirements

The essential factor in semantic interoperability is:

- **The issue of multiple languages.** Governments in Latin America and the Caribbean use Spanish, Portuguese and English. In the interfaces through which citizens and firms interact with government (websites, written documentation, voice communications), language is an important factor in ensuring the effectiveness of cross-border services. Agreement is needed on basic rules for the presentation of texts, and on the use of intelligent technologies such as XML semantic schemes. Automatic translation could contribute to solving the language problems.

    Other important requirements to consider include:

- **Creation and management of metadata.** In order to achieve increased benefits, reusable metadata repositories must be created from the start. Thus, when a new country is incorporated, or a new application is put in service, previous semantic specifications may need to be supplemented to avoid overlapping efforts and to expand the scope of interoperability. Implementing regional repositories requires developing or acquiring technological support mechanisms and jointly defining the processes and responsibilities for managing them.

3. Technical interoperability requirements

The essential determinants that have been identified in the area of technical interoperability are:

- **Differing and evolving degrees of adoption.** Given countries' differing stages of technological development, it is important to allow them to adopt the architecture at differing paces, so that they can take partial advantage of the interoperability available, without delay, even if they are not prepared to adopt the entire package at a given time. This means, for example, that a country should be able to operate with a limited number of the available functionalities or services. As the country implements technologies that it did not initially have, it will be able to adopt additional features of the architecture, gaining increasing benefits as it advances toward complete adoption. Such evolution through levels of the architecture is described in the chapters below.

- **Security and privacy.** Interoperability between two countries does not imply that the databases of each are open, in their entirety, to the other. On the contrary, all

transactions provided for must be under the autonomous control of each country or local information provider using the interoperability platform, ensuring that only data authorised for a particular transaction are able to be transmitted in that transaction.

In addition, any given interoperability transaction between two countries must be open only to persons or entities explicitly authorised to execute it —a condition that depends on the use of highly reliable digital signatures and certificates, in accordance with agreements established between the two countries. There should also be an historical record of all transactions, whether executed or blocked, so that each country can independently monitor and audit all activity.

- **Definition and adoption of technical standards.** There must be wide-ranging consideration of existing standards —specifically, those in use by countries participating in the development of the strategies being discussed here, and particularly those employed by leaders in the field— governing technologies related to information structuring and semantics, as well as standards governing the use, and publication of information regarding, services. Insofar as possible, some form of alternative standards should be provided for countries whose technical or organisational conditions make it problematic for them to immediately adopt the recommended standards. Such alternative standards could be used for a pre-defined period, making it possible for some countries to join the network earlier than would otherwise be possible, even if their initial participation is only partial.

- **Diversity of platforms and open code.** Some of the region's countries have created policies to promote the gradual adoption of open code systems. At the same time, countries have different technological platforms in use for operating systems, databases and service-oriented architecture. This diversity must be considered in such a way as to make the implementation of multiple platforms possible in the future.

4. Interoperability governance requirements

The essential requirements for interoperability governance are:

- **A non-centralised system.** In order to respect the autonomy and equal rights of the participating countries, regional interoperability must be based on a non-centralised architecture with multiple distributed platforms, so that each country can establish its own internal rules governing the functions it makes available. For the same reasons, the components of the architecture should be adaptable to the specific characteristics of existing information systems.

- **Regional public goods.** Building an interoperability solution for the region involves: establishing the technical specifications for developing the architecture and interoperability platform; developing the specifications for data, metadata and XML schemes; defining technical specifications for electronic documents, standards and methodologies; and creating the computer applications and other intermediate components needed for the project. The results of this work, which will constitute a wealth of knowledge —an "asset" (in business terms) of great economic and market value— will be achieved only through a significant investment of resources and time..

The ownership and use of this patrimony should be based on its being deemed a "regional public good" that can be freely used without cost by Latin American and Caribbean countries, provided that they observe a set of commonly agreed rules. This patrimony must not become in any way the exclusive property of any of the parties involved in developing it or become the property, or be patented by, any private third party.

One international paradigm of a "public good" is the open technical standards that, by definition, may be freely used without remuneration to their authors or to the public or private organisations that originally participated in their design.

Another such paradigm is the open source systems model (also known as free software or open-code systems), which involves the definition of intellectual property rights and patent registration procedures different from those employed in traditional copyright arrangements. Some of these legal registries of public goods have been referred to as "CopyLeft" arrangements,[7] and the contractual basis for their use is called GPL (general public license). In the European Union, the FLOSS (Free/Libre/Open Source Software) project includes a specific initiative in this field.

- **Cooperation and reuse.** Cooperation and reuse, under a broad, integrative and lasting approach, will make it possible for each newly participating country to advance more quickly, with less cost and effort than their predecessors, leveraging the process by which the exchange of information between different applications in the countries involved is automated and made interoperable.

  Other important requirements in regard to interoperability governance include:

- **National e-government interoperability strategies and programmes.** One of the lessons that emerges from analysing international experiences and "good practices" is that having a specific work programme is a prerequisite to successful implementation of any process seeking interoperability. In order to make it easier for new countries to join the region's network, consideration should be given to providing help to governments through multi-country institutional support groups.

- **Dissemination of digital signatures and certificates and electronic identities.** The task of disseminating knowledge concerning the importance of electronic signatures as an essential step toward freeing government processes from paperwork —and of making these modalities more widespread— represents a challenge involving more than mere technical factors. It is important that governance entities take a "sponsorship" role in promoting development of the institutions, standards and investment needed to expand use of this form of authentication. Only in this way can a critical mass of public servants, citizens and firms be expected to make this a truly viable resource.

- **Leadership, sponsorship and transparent management of interoperability.** Study of prior experiences and "good practices" in governance suggests that collective effort in this area is driven by defining the roles of those responsible for the various aspects of governance, and by monitoring the activities involved.

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[7] The term "CopyLeft" has been adopted as a symbolic device, in which the playful substitution of "left" for "right" solves the semantic problem of there being no concise opposite for "right" in the sense embodied in the term "copyright".

VI. A roadmap for e-government interoperability

Based on the EU typology, the following major components are recommended as part of a prospective work agenda:

1. Creating mechanisms for dialogue and coordination

International experience (both the experience of the EU and of individual countries) shows that creating interoperability is an ongoing process. Thus, if agreements are to be reached, a favourable environment for dialogue must be fostered. Using some of Latin America's existing fora could obviate the need to create new ones specifically for this purpose. Such existing fora include MERCOSUR, CAN, ALADI, CARICOM, the OAS and ECLAC, among others. Determining which are appropriate depends on the particular issues to be addressed. The periodic meetings of government representatives, under the auspices of international organisations such as the OAS, CAN, MERCOSUR, ALADI and ECLAC, should be used as an opportunity to move toward establishing regional integration agreements in a range of areas, including education, health, statistics, fiscal affairs, foreign trade and customs issues.

2. Identifying or defining a general coordinating venue

There must be a central venue for coordinating and linking work on different issues that the governments of participating countries are carrying out in various fora. Such a venue could also serve as technical secretariat for regional e-government interoperability, and could facilitate discussion and agreement on different aspects of governance necessary for coordinating all of the actions, activities and mechanisms involved in achieving interoperability in the region.

3. Defining issues for discussion, and creating groups of experts to explore them

The countries must define areas for discussion, in order to work toward standards that guarantee secure exchange of information in the selected areas (foreign trade, education, health and statistics, etc.). As the areas are defined, the appropriate groups of experts to address them must also be determined, while forming teams to study the technical, semantic, organisational and governance issues related to each area.

4. Conducting topic-based discussions on interoperability

Dialogue should be undertaken, at a pace suitable to the countries involved, on the elements to be included in the region's interoperability architecture, such as coordination mechanisms and standards and platforms to ensure semantic, technical, organisational and governance interoperability between e-government systems.

5. Defining a methodology for adopting the standards

A methodology must be established to ensure that the standards are actually adopted and incorporated by the region's e-government systems.

6. Adopting a framework for measuring e-government achievements

(a)   Efficiency

This variable is measured as financially quantifiable value generated in the process of optimising the use of public resources through ICTs. Such value takes the form of:

The actual financial gains resulting from governmental use of electronic procurement methods, as in the cases of Chile's Chilecompra and Brazil's Comprasnet, which have demonstrably enabled these governments to acquire goods and services at lower prices than they paid before ICTs were incorporated in the procurement process.

The actual gains attributable to improved organisational architecture, which make it possible to achieve greater coverage through ICTs. An example of this is increased tax revenues, as individuals and firms that previously went unnoticed are brought into the tax structure through a system of electronic invoices that must be reported by all buyers and sellers of goods and services, thus facilitating cross-checking by tax authorities.

The actual monetary gains resulting from the reduced cost of producing goods and services due to increased capacity of public servants, involving decreased use of paper, more efficient use of office space, reductions in communication costs, and other cost reductions from using online services.

The use of ICTs may lead to a combination of:

- Fewer hours of work needed in government agencies to carry out the same number of operations and provide the same amount of services (doing the same with less)
- Increased productivity, i.e., more production in a given number of work hours (doing more with the same)

There are two corresponding indicators for measuring these gains:

(i)   Gains expressed as "full-time equivalents", based on figures for a baseline year
(ii) Increased number of cases handled, using "full-time equivalents" as a baseline

In cases that fall under category (i), the indicator may be expressed monetarily, without necessarily implying that there are actual gains, since the gains will only be "actual" if there is a budget reduction due to a reduction in the number of employees. Otherwise, the indicator will be a measure of opportunity cost attributable to employees who previously did routine work and now have more capacity to add value.

In cases that fall under category (ii), the indicator measures combined efficiency and effectiveness, since the gain is the consequence of shorter processing times, which inevitably result in shorter wait times for citizens and firms. In our model, this improvement is seen in the form of faster and shorter queues.

(b)   Effectiveness

This variable measures the increased value to citizens and firms resulting from more effective governmental activity. In carrying out mandatory government processes, citizens and firms incur various direct costs, in the form of personal transportation, mailing and communications costs. If these costs decline due to e-government, citizen satisfaction will rise.

The typology for describing the impact of improvements in the effectiveness of public administration through the use of ICTs is as follows:

Reduction of administrative burden. This is a direct gain for citizens, and can be measured monetarily in terms of reduced transportation, mailing and communication costs. It may also entail indirect gains in the form of opportunity costs, as citizens gain free time as a result of faster service from government.

Increased value for, and satisfaction of, citizens. This occurs with the elimination of long queues, and with the simplification of procedures and the ability to carry out procedures from any location, at any hour of the day or night.

More inclusive public services. This category refers to the provision of services of equal quality to all citizens, including disabled persons who previously went unserved.

The value generated by these three types of improvements in effectiveness is measured, respectively, by: thousands of hours saved by citizens and firms; index of satisfaction with e-government; and number of inclusive services provided online.

(c) Democracy

This variable includes political values in the form of openness, transparency, accountability, citizen participation and enforcement of the law. The values proposed by the European Measurement Framework also include protection of citizens' personal information against improper use, whereas in our model this value falls under "effectiveness".

The European Commission's typology and indicators for the impact of e-government on democracy are:[8]

Openness of government: Percentage change (Δ%) in the number of policy documents available to the public; Δ% in number of government websites with systems to handle relations with constituent citizens; Δ% in response time for online requests; Δ% in number of government websites providing digital platforms for interaction and consultation (online fora, online requests, etc.); Δ% in the "aggregate measure of openness".

Transparency and accountability: Percentage of government entities that publish their organisational charts online, with an indication of functions and responsibilities; percentage of regulatory documents online; percentage of online information that is clear and accurate.

Participation: Percentage of pubic services available online; percentage of requests and consultations submitted electronically; percentage of interactive electronic fora; percentage of downloads of policy documents; percentage of administrative procedures, appeals and mediations carried out electronically.

It should be noted that the democracy indicators outlined here primarily measure results (output) of online processes, rather than actual impact on democracy. To measure real impact on the quality of democracy, considerations of a political nature would have to be taken into account, and this type of consideration is not addressed in the European Commission document that we are commenting on here. Though the final version of the European Measurement Framework does not take the typology of the European framework for e-government interoperability into account, we believe that it is possible and useful to combine these two conceptual frameworks in defining the qualitative and quantitative measurements of e-government achievements in the three above-mentioned variables, with reference to semantic, organisational, technical and governance factors.

Defining a system for measuring e-government is not easy. The first difficulty, common to nearly all public policy areas, results from the fact that their output or results do not have market

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[8] EUROPEAN COMMISSION., op. cit., pp. 3 and 54.

prices, and that there is no direct way of establishing a market value equivalent. In addition, since public affairs are at issue, citizen satisfaction with the results must also be taken into account.

At the same time, the ultimate impact of e-government is not the result of a single agency's activity. When an administrative process is carried out or a public service provided, the efforts of various agencies are generally involved, and the agencies usually have different management systems and objectives. In making quantitative measurements of e-government, it is impossible to clearly determine either the costs incurred by each of the agencies involved, or precisely what each contributed to the final benefits and value. The same problem arises in trying to establish qualitative impacts, and in determining who is responsible —and to what extent— for the level of citizen satisfaction attained.

Finally, measuring e-government means assessing the degree to which government agencies fulfil the mission or purpose for which they were created, deliver public value, and are accountable to citizens, who have interests as:

- **Constituent citizens,**[9] to whom e-government seeks to provide democratic empowerment through open and transparent government that allows citizens to participate in policy making.
- **Consumer citizens,** whom e-government seeks to satisfy by delivering online services that are secure, reliable, timely, non-discriminatory and of consistent quality across all government agencies.
- **Taxpayer citizens,** for whom e-government seeks to provide services more efficiently through dynamic, productivity-oriented public administration designed to optimise the use of taxpayers resources.

In this conceptual context, e-government interoperability projects should establish methods to evaluate the public value of investments made, starting with the design stage. Democracy, effectiveness and efficiency, as forces capable of realizing the objectives of e-government, are the dimensions along which such an assessment can be made.

e-Government measurements and indicators on the dimensions of efficiency, effectiveness and democracy

There is no single valid or comprehensive way of measuring the impact of e-government. Thus, the White Paper proposes that, as the region's governments develop interoperability projects, a framework be established with measurements and indicators that are sufficiently general to be adaptable to the differing realities of the various countries.

The following table is intended to suggest areas of impact that could be analysed, and the indicators that could be used to make measurements along the three dimensions.

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[9] The European model makes reference to the "voting user", but here we replace this term with "constituent citizen" to emphasise the citizen's fundamental and dual role as the ultimate guiding force of the State, and as the overseer of accountability.

Table 1
**AREAS OF IMPACT, AND INDICATORS OF EFFICIENCY, EFFECTIVENESS
AND DEMOCRACY**

EFFICIENCY	
Areas of impact	Measurement indicators
Actual financial gains	Full-Time Equivalents, in thousands of euros
Public servants with greater capacity for action	Number of public servants who have been trained and who have appropriate ICT resources[10]
Improved organisational architectures	Number of cases handled in a given period of time
EFFFECTIVENESS	
Areas of impact	Measurement indicators
Reduced administrative burden	Thousands of hours saved by citizens and firms
Increased value to, and satisfaction of, citizens	Index of e-government satisfaction
More inclusive public services	Number of inclusive services online
DEMOCRACY	
Areas of impact	Measurement indicators
Openness	Number of governmental business processes open to the public (bids, purchases, hiring, etc.)
Transparency and accountability	Number of two-way interactive services available to users
Participation	Number of online consultations made

Source: EUROPEAN COMMISSION. DG Information and Media. eGovernment Unit. eGovernment Economics Project (eGEP) Measurement Framework.

7. e-Government interoperability and protection of personal data

Finally, one of the proposals for developing interoperability initiatives is to work toward a consensus regarding the appropriate levels of protection for personal data involved in exchanges of information in e-government processes, and regarding the techniques and practices to be employed for such protection.

The interoperability of national and international information systems will depend on clear national policy to guarantee citizens' confidentiality and privacy, since some may be reluctant to interact electronically with governmental entities, fearing that the data they provide or confirm in each procedure or relationship with a government agency may be handled irresponsibly or carelessly, to the detriment of their individual rights.

When two or more systems lack clear policies or rules on the handling of personal data exchanged or inputted, those systems cannot interoperate, since doing so would create problems vis-à-vis the governance and organisational aspects of interoperability, which require collaborative agreements between interconnecting governments and organisations. Thus, the lack of appropriate and accepted levels of data protection affects inputs and outputs in the information exchange process within each public entity, creating a barrier, as systems that place priority on complying with protocols to protect citizens' personal information —the principal input involved in their activity— prohibit or refuse interaction with systems that do not.

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[10] Availability of resources does not appear in the European Measurement Framework. It is included here, because ICT resources for government are scarce in Latin America and the Caribbean. Thus, if public servants are trained but not provided with adequate ICT resources, the benefits of e-government will not be realised.

This does not mean that government agencies should not promote the greatest possible transparency and accountability, broaden mechanisms for citizen participation as tools in the fight against corruption, improve public administration, and advance the cause of democracy and pluralism. On the contrary, it means delimiting the line between the right to information, and the right to privacy. As e-government projects move forward, there is increased risk that citizens will lose control over their personal information, and hence over their privacy and their private affairs, which are the expression of their individuality and humanity.

Despite differences in Latin American regulatory frameworks,[11] informed consent by the individuals whose personal information is at issue, and special protections for sensitive data, are recognized as pillars for a common scheme of data protection in which the line between the right to information and the right to privacy is well defined.

In addition to clarity on these two pillars of data protection, it is evident that irresponsible handling of personal data may lead to lack of confidence on the part of citizens, many of whom opt not to use e-government systems, fearing that their privacy will be violated when they provide personal information. Other possible scenarios include ones in which e-government projects stall, are slowed down or become the target of lawsuits, or circumstances under which other nations or international organisations refuse to interact with them, causing them to become information islands shunned by local or supranational organisations because of their irresponsibility, deficiencies or negligence in protecting personal information. Such a situation eliminates any possibility of inter-State collaboration or of distribution of functions within a government, thus ending any chance for interoperability.

These risks are more than reason enough to work toward a consensus that recognises legal principles, minimum regulatory principles and good practices, and that, moving beyond setting standards for protecting personal data, establish a practical basis for respecting the individual and individual privacy in e-government projects, while addressing factors that could impede or slow e-government projects.

Protection of personal data in the e-government context is a challenge that must be addressed if e-government initiatives are to be successful. Nevertheless, there is no totally harmonised regulatory system in the region, and some countries have not even begun to pass legislation protecting individual privacy and personal or confidential information.

Thus, the region needs to identify alternatives that, together, can provide these protections. Though legislation is clearly one such tool, the region's countries should be urged to develop a data protection toolkit that includes principles, existing law, good practices, and an established protocol for evaluating governmental work that involves the handling of personal data. Such measures could serve as a self-regulating tool.

The data protection toolkit must not, however, be seen as a final objective, but rather as a means for countries to establish public policy and regulations that protect the privacy of the end users of e-government services. It will be the task of each of the region's countries to update, redesign and supplement the toolkit as technology advances, regulatory frameworks change, and interoperability among government agencies increases.

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[11] Latin America does not have homogenous regulatory frameworks regarding the protection of personal data, thus leading to a semi-vertical model that combines sectoral with horizontal protections.

VII. Concrete proposals for interoperability initiatives

In order for the roadmap of activities set forth here to lead to actual projects with tangible benefits for the citizens of Latin America and the Caribbean, a learning process must occur —one that makes it possible in the short term to define strategies and practices to optimise the success of e-government integration and interoperability in the region. This means developing interoperability in a way that results in the best solutions to problems affecting citizens and firms.

One example of such problems is the procedures and paperwork involved in conducting trade between countries, which ultimately make consumer products more expensive. The OECD has estimated that paperwork and red tape for business represent at least 14% of final product cost. E-government interoperability for international trade can achieve great economies of scale that will ultimately represent benefits for citizens.

With technical assistance from ECLAC, the governments of Brazil and Colombia have created a design by which Brazil's SISCOMEX system can interact with the single window for foreign trade in Colombia's VUCE system, in order to optimise procedures, improve the security of transactions and provide better service to firms and citizens. The two countries intend to implement their interoperability platform in the short term, along with the mechanisms for dialogue necessary to facilitate the integration of the two systems. They also intend to offer the benefits of their knowledge and practices, as well as use of the platform, to any of the region's countries that wish to take advantage of them.

Using this same approach, interoperability can be advanced through applications in:

- Foreign trade. Initial case: Brazil and Colombia, and other countries that wish to participate
- Electronic government procurement. Transparency and regional interoperability
- Disaster management
- Education

Bibliography

Moreno H., Silveira-Netto S, Sin H. (July 2007). Conceptualización de arquitectura de gobierno electrónico y plataforma de interoperabilidad para América Latina y el Caribe, LC/W.140, ECLAC.

Moreno H. et al. (April 2007) E-Government architectures, technical and political situation in Latin America, LC/W.129, ECLAC.

European Commission (December 2006). Study on Interoperability at Local and Regional Level, Interoperability Study Final Version.