

# World Social Security Forum

31st ISSA General Assembly

Doha, 10 – 15 November 2013

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## **ICT: Cornerstone of an integrated and citizen-centered social security** Summary report 2011-2013

**Technical Commission on Information and Communication Technology  
International Social Security Association  
Geneva**



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# **ICT: Cornerstone of an integrated and citizen-centered social security**

## **Summary report 2011-2013**

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### **1. The strategic role of ICT in social security**

Over the last years, the Technical Commission on Information and Communication Technology (ICT) has played a strategic role in the implementation of social security systems. The application of ICT has enabled not only the automation of specific processes, but the transformation of operations and services, enabling improvements in the performance and service quality of social security organizations. This has been shown through a number of innovative experiences carried out by social security institutions, notably the implementation of advanced service delivery mechanisms and the integration of social programmes.

The advent of economically accessible advanced technologies, mainly based on internet and mobile devices, has facilitated the implementation of new service delivery mechanisms that promote self-service and user empowerment. In addition, currently available high-performance data processing technologies have enabled institutions to improve not only the efficiency but also the quality and accuracy of processes by increasing their ability to perform reliable validations, controls and calculations. Moreover, the growing implementation of shared information resources and operational platforms is enabling the design of new organizational models based on multi-actor configurations, which enable to improve operational effectiveness and efficiency of complex processes managed by several institutions while keeping responsibilities and jurisdictions of participant institutions.

With these very positive results, choosing the appropriate ICT applications has become all the more important for social security institutions. Implementing new larger systems, beyond the boundaries of traditional desk-based services, pose relevant challenges to institutions, not only on technical aspects but also concerning the management of the overall ICT-related activities. For example, while integrating systems and sharing information offer important advantages, they bring collateral issues related to data privacy and institution's ICT security.

A social security institution may address these challenges through a number of approaches, often involving:

- the adoption of advanced technologies, such as interoperability, mobile and data security, based on standards and good practices;
- the application of ICT governance and management practices, which address the overall organization, implementation and operation of ICT systems;

- the use of common models and ICT-related solutions based on sectorial standards, which would improve the cost/effectiveness and reduce risks of large ICT-based projects by reusing already proven solutions and by increasing the economies of scale of ICT products.

This report summarizes the results of the work of the ISSA Technical Commission on ICT during the 2011-2013 triennium. It covers the ISSA Guidelines on ICT, which provide a comprehensive guide to social security institutions on a number of key ICT issues, as well as the results of the project ICT as enabler of social security policy and programme integration, which provide background and state-of-the-art information on the application of key technologies in social security, particularly interoperability, mobile, and data security and privacy. Preliminary results were discussed during the 13th International Conference on ICT in Social Security held in Brasilia in April 2012.<sup>1</sup> The report concludes with a brief overview of the relevant topics to be addressed in the next triennium.

## 2. ICT as a key enabler of integrated, safe and accessible social security systems

The application of ICT has enabled the implementation of increasingly comprehensive social security systems throughout the world. By facilitating the integration of individual programmes, innovations in ICT are extending the scope and impact of social policies and at the same time, simplifying and enhancing service delivery.

### 2.1. Integrating social security policies and programmes

Integration allows institutions to improve the effectiveness and efficiency of social programmes by simultaneously reducing fragmentation and overlap as well as by enabling the seamless connection of the business processes of multiple actors. This increased connectivity facilitates, for example, the validation of eligibility conditions across different institutions as well as the sharing of strategic information resources and operational platforms. These approaches can be applied in a wide variety of social security contexts, not only for operational purposes but also for programme evaluation and policy design.

In **social protection programmes**, which provide specific benefit packages (mainly economic and health services) to low income populations, integrated systems enable the identification of beneficiaries, determine benefit eligibility (especially in conditional cash transfer programmes) and reduce the risk of fraud and wrongful payments by cross-referencing data held by the different institutions. Information systems focused on beneficiaries' data and eligibility validation mechanisms are standard features of ICT-based integrated social protection programmes, both based on connections to other institutions or social programmes.<sup>2 3</sup>

In the area of health, ICT-based integration facilitates the implementation of **integrated health insurance systems**, which generally consist of a coordinated structure of public and private institutions providing different types of services (e.g. medical service providers, insurance administration, etc.). The implementation of these systems involves sharing information resources, particularly related to beneficiaries and the health benefits to which they are entitled and the characteristics of the health services provided. In addition, institutions that participate in the integrated system are able to seamlessly share key functions and information (e.g. service provided to a beneficiary by a medical institution) that would otherwise be institution-specific.<sup>4 2</sup>

Along with integrated programmes, it is worth highlighting the role played by **integrated social information systems**, which aim at ensuring accessibility and quality of the information about beneficiaries. While the information system for Belgium's Crossroads Bank for Social Security (CBSS) has long been renowned, similar systems have been implemented in other countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, France, Honduras, Mexico and Uruguay).<sup>2 3</sup>

With respect to cross-border interactions, ICT-based integration is a critical ingredient in the implementation of **international social security agreements** which provide coverage to migrant workers who work in a foreign country. The implementations of these agreements require the exchange of the relevant data (e.g. beneficiary personal data, worked periods, dates of a temporary relocation, etc.) among the signatory institutions. This involves using standardized mechanisms for data exchange as well as data encryption and the use of electronic signatures (based on digital certificates) to authenticate the exchanged information. The enabling technologies consist mainly of standardized data formats (XML) and system interconnection (web services) (WS Security).<sup>2 5</sup>

The implementation of **contribution collection and compliance** mechanisms likewise benefits from the use of integration techniques. Collecting social security contributions, which includes not only collecting payments but also maintaining historical information to determine the appropriate entitlements, often involves interaction among several actors (employers, other contribution collection institutions, financial entities, etc.). Currently, the most frequent forms of integration in this area are based on the direct exchange of data among the aforementioned actors. However, there are emerging and highly interesting developments in the implementation of multi-institutional ICT platforms shared by the institutions.<sup>2 6</sup>

To date, experience with the **integration of information and services within institutions** shows significant improvements in management especially in preventing system fragmentation and isolation (also known as "system silos"). This type of integration is being implemented through corporate systems based on Service Oriented Architectures (SOA), interoperability frameworks,<sup>7 8</sup> and packaged Enterprise resource planning (ERP)-like systems.

Notable experiences across the world are described in the ISSA Development and Trends reports,<sup>6 3 9</sup> and in the ISSA technical report on "Integration of social security programmes and the role of ICTs: case studies".<sup>2</sup>

## 2.2. Improving the delivery of social security services

Improving the quality of service delivery constitutes another important priority for social security institutions. The overall goals are to bring the institution's services closer and faster to citizens and to empower users to carry out an increasing set of operations which, a few years ago, could be performed only through face-to-face transactions with functionaries.

Responding to these goals, e-Services enable a 24/7 access to social security services, with the possibility to carry out inquiries and transactions even from remote areas or outside national boundaries. These approaches are transforming the way in which institutions interact with users, whether they are members of the social programme, external partners participating in service delivery or the internal staff.<sup>10 9</sup>

While web-based technologies have been the most utilized by social security institutions worldwide to implement e-Services, mobile technologies are fast emerging as promising

mechanisms as well. The World Bank report “World Development Indicators (2013)” shows the tremendous change in access across the world in the last decade: almost a third of the world’s population has online internet access, with almost one mobile cellular subscription for every person (if distributed equally worldwide) as of end-2011.

Internet access and mobile-based access are evolving in different ways. While the number of internet users worldwide has been increasing steadily, internet access rates show a greater “digital divide” between developing and high-income economies than in the case of mobile subscriptions. However, developing regions are quickly catching up with high-income economies in the use of mobile phones to access the internet.

The use of mobile technologies in social security constitutes a notable trend, especially in Africa and Asia- Pacific. In many ways, mobile technologies overcome geographical isolation in these regions, including the limited infrastructure that supports traditional (wired-based) data communications as well as the high costs of traditional bank transactions.

While mobile-based notification and information services have been in use for quite some time by a number of institutions, the implementation of mobile-based payment services is more recent. In payment systems, mobile phones enable citizens to easily interact with services, while money transfers are implemented through partnerships with companies such as mobile phone providers and mail corporations.

In addition to enhancing services for citizens, advanced e-Services and mobile technologies can be used to improve decision making and institutional performance. Events involving critical processes (e.g. administering the purchase/supply of drugs, collection of contributions, etc.) can be notified and treated immediately by the staff and the management.<sup>11</sup>

Mobile technologies are also increasingly being used in health services (the so-called m-Health), not only through mobile phones but also via patient monitoring devices, personal digital assistants (PDAs), and other wireless devices. The most frequently reported types of initiatives are health call centres and telephone help lines, emergency toll-free telephone services, and mobile telemedicine.

More detailed descriptions about these applications are provided in the ISSA Development and Trends reports,<sup>8 9 10</sup> and in the ISSA technical report on e-Services.<sup>12 13</sup>

### **2.3. The key technologies: Interoperability, mobile and data security and privacy**

Implementing integrated, safe and accessible social security systems involves using three main technologies:

- interoperability, which addresses the issues of connecting independent ICT-based systems;
- mobile technologies, which address mechanisms to implement ICT-based services to be used through mobile devices (phones, tablets, etc.);
- data Security and Privacy, which addresses issues related to the security and privacy of data when integrating ICT platforms of social security programmes.

In addition to the summaries below, more detailed descriptions are provided in the ISSA Technical Reports on “Interoperability in Social Security”,<sup>14</sup> “Applying Mobile Technologies

in Social Security”,<sup>15</sup> “Data Security and Privacy in Social Security”.<sup>16</sup> The ISSA Guidelines on ICT provide guidance on the application of these technologies in social security.

## Interoperability

Interoperability techniques have a fundamental role in the implementation of data exchange and integrated social security systems. Institutions must use interoperability techniques to integrate the information systems of individual social programmes as well as to construct information services and systems to be shared among the different institutions or bodies which operate social policies. Moreover, applying interoperability techniques would improve the institution’s internal capabilities and quality of services.

Interoperability is characterized by five dimensions: political, legal, organizational, semantic and technical:

**Political:** Participants must have compatible visions, aligned priorities and the same objectives. To promote the coordination of social programmes in an inter-institutional context and leveraging existing operational capacities, inter-institutional interoperability requires not only agreement among the institutions involved but also sharing similar if not identical policies at the highest level.

**Legal:** Adequate coordination of the legislation between collaborating entities (which can eventually extend to different countries) must include enabling regulations, notably to ensure that electronic data generated in one country will be properly recognized when used by the receiving country. Since legal interoperability is driven by objectives decided at the highest political level, the political agreements should lead to a common legislative or statutory framework which covers given areas of interoperability among the organizations involved.

**Organizational:** Organizational interoperability refers to the development of compatible administrative and procedural models, regardless of their internal organization and structure. Some social security procedures that are commonly involved in organizational interoperability are: the administration of common data (e.g. on individuals and businesses); interaction with beneficiaries and/or contributors (enterprises and workers); calculation of benefits and/or contributions; validation of conditions concerning eligibility for the allocation of benefits or the calculation of contributions; issuance of records; and the registration of businesses and their staff members.

**Semantic:** Semantic interoperability ensures that the precise significance of the information exchanged is understandable for any other application not initially developed for this purpose. This allows systems to combine the information received with information from other sources and to process it in a coherent way. In social security, semantic interoperability is fundamental to properly define the meaning of data processed by several institutions. Social security operations involve a wide range of concepts which, despite the use of the same terms, may be interpreted differently (e.g. family group, members of the same household, unemployed person, old age pension, health benefits, social security contributions, etc.).

**Technical:** Technical interoperability addresses critical aspects of linking computer and service systems such as open interfaces, interconnected services, the integration of data and middleware, the presentation and exchange of data, security and the accessibility of services.

Relevant examples of Interoperability in social security can be found in the technical report<sup>2</sup> as well as in technical documentation describing interoperability frameworks implemented in different countries.<sup>7 8 17</sup> However, while these efforts are noteworthy in and of themselves, paradoxically, they are not connected and thus ignore some of the basic tenets of interoperability.

Despite the promising results, challenges remain in assisting institutions in the adoption of the technologies and methodologies. These issues were discussed in the ISSA International Conference of ICT in Social Security<sup>1</sup> by representatives from more than seventy countries worldwide.

## Mobile technologies

In recent years, mobile technologies have become the preferred platform for personal communication, covering traditional telephonic exchanges, short messaging and Web-like interactions. Market abundance of powerful, feature-rich smartphones, tablets, and other mobile devices, coupled with the availability of high-speed network bandwidth at affordable costs, has made it irresistible for people to use mobile devices, not only as phones, but also for work and “infotainment” (information + entertainment).

Today’s mobile devices are multifunctional devices capable of hosting a broad range of applications for both business and consumer use. While mobile phones enable message exchange through the Short Messaging Service (SMS), smartphones are able to access email, instant messaging, text messaging and Web browsing as well as documents, contact lists and more. Furthermore, the most recent development – tablets – provides a wide spectrum of interaction and multimedia functionalities in a mobile and user-friendly device.

**Mobile phones** have evolved through four generations. The first generation of mobile telephony (1G) was based on analogic technology. The second generation (2G) turned to the digital telephony based on protocols such as Global System for Mobile communications (GSM) and providing services that have persisted, notably the SMS, and Internet connection using, at this time, the General Packet Radio Service (GPRS) protocol. The third generation mobile telephony (3G) was based on standards like Universal Mobile Telecommunications System (UMTS) which transmits voice and data at high speeds. The fourth generation (4G) is entirely based on the Internet Protocol (IP).

**Smartphones** combine mobile phone and handheld computers into a single device, allowing users to store information (e.g., e-mail) and execute software. In the last years, smartphones have become part of the lifestyle across generations, and people find it convenient and productive to use them for both personal and work activities.

Within this category but with more sophisticated capabilities, **tablet PCs** are a type of notebook computer that has a liquid-crystal display (LCD) screen on that can be written on with a stylus. The handwriting is digitized and can be converted to standard text through handwriting recognition, or it can remain as handwritten text.

In addition to telephony, modern mobile phones provide other services: SMS (Short Messaging Service), Internet services, secure corporate local area network (LAN) access.

**Short Messaging Service (SMS)** enables sending and receiving short text messages to and from mobile phones, and with other systems such as internet email and the web by using gateways. Although SMS is one of the most common and affordable messaging tools, it has important limitations: messages are up to 160 alphanumeric characters and do not provide a secured environment. This means that SMS can be used for notifications but are less adequate for business operations involving confidential data.

**Internet Services** can be based on GSM as well as on GPRS, which may be considered as an overlay network using GSM resources on GSM networks. EDGE is a higher bandwidth version of GPRS, which enables transmission speed up to 384 kbps.

To promote the reliable use of mobile technologies, institutions have to establish mobile security policies which protect users against risks related to the use of mobile devices such as loss or theft of devices, mobile device malware, mobile software vulnerabilities, phishing, and Bluetooth and WiFi related risks.

## **Data security and privacy**

While ensuring ICT security, especially regarding the risks of fraud, has always been part of social security responsibilities, the generalized development of web-based citizen services has required the implementation of security measures to protect an institution's systems against external risks.

Social security institutions collect and store huge volumes of information about employees, employers, beneficiaries, social security programmes, etc. Most of this information are collected, stored and processed by ICT-based processes, and transmitted via networks. Regardless of the type of information involved (public, internal, confidential or secret), information security and the protection of data are among the key concerns in ICT.

Social security institutions have addressed information security and data privacy issues in different ways. While ICT and data security have been motivated by the use of Web-based communication channels, data privacy has been addressed mainly in compliance with regulations.

Security mechanisms rely mainly on firewalls, anti-virus software, e-mail filters and secure communication channels. Some institutions have also started using digital certificates and intrusion detection systems. In addition, most of the social security institutions use database management systems which provide a powerful set of security mechanisms to protect the stored data (user identification, rights on specific data, control and logging operations, etc.). The most common security practices consist of corporate computer controls and audit, regular review of logs, and disaster recovery procedures in connection with business continuity plans.

In turn, the implementation of mechanisms to control data privacy depends mainly on existing regulations. The balance between protecting personal data privacy and increasing data exchange between agencies to improve social security effectiveness is still an open question. Many of the impediments which prevent the achievement of both goals are brought on by the complexities and costs of implementing data privacy protection mechanisms, especially when implemented on a case-to-case basis. However, a systematic and

infrastructure-based approach would make feasible the implementation of practical mechanisms for the protection of privacy.

In order to provide a comprehensive framework covering Data Security processes, several standards have been developed, notably ISO/IEC 27002. This standard, which proposes a set of controls to implement information protection, may be applied combined with other management practices, such as Control Objectives for Information and Related Technology (COBIT) and Information Technology Infrastructure Library (ITIL), to provide a general framework to address data security issues in social security institutions.

### **3. Addressing the complexity of systems and services through ICT governance and management practices**

The corporate application of Information and Communication Technologies (ICT) in social security institutions requires establishing policies and practices to carry out the wide range of ICT-related activities in a consistent and systematic way. Such policies and practices are addressed by the ICT governance and management disciplines.

ICT governance consists of principles and processes that ensure the effective and efficient use of ICT in enabling an organization to achieve its goals. It addresses two major aspects:

- (i) ICT demand-side governance, to align ICT strategy with the business; and
- (ii) ICT supply-side governance.

In turn, ICT management focuses on planning, building, executing and monitoring activities aligned with the direction set by the ICT governance.

Although these goals are shared with other large and citizen-based service-oriented organizations, especially public ones, certain governance and management aspects are particularly relevant for social security institutions.

First, the socio-economic impacts as well as the increasing complexity of social programmes generate a need for reliable and rigorously managed ICT services, aimed at maximizing the quality and continuity of services. Second, the multiplicity of actors, products and services involved in the development and operation of social security software applications requires rigorous and standardized approaches to achieve adequate coordination and the required quality of services. Finally, the size and complexity of social security projects require a standards-based strategy to manage technologies and methodologies.

A fundamental part of ICT governance relies on the overall governance principles and the role of the institution's authorities. An institution that has a board and management that are attuned to and well-informed about the potentials of ICT is in a much better position to appreciate not just what can be delivered but also the possibilities that can be achieved through ICT, all with a view to providing social security benefits and services in the most efficient, effective and equitable manner.

The definition of ICT strategies – a key task in ICT management – is especially relevant for social security institutions as it aims at aligning ICT plans with the institution's strategic objectives and plans and enabling businesses to benefit from innovation.

Management practices also involve the administration of data and information, which constitute fundamental assets for social security, aiming at achieving effective and efficient

planning, control and exploitation of the data and information resources throughout its life-cycle, and quality management of data/information.

The critical nature of social security services calls for addressing ICT service delivery as a specific theme. The purpose is to provide agreed levels of service to users, and to manage the technology that supports the application of administrative procedures implemented by the institution. This includes the management of service continuity (business continuity management) which aims at ensuring the continued operation of key processes, especially those involving critical operations.

Finally, social security institutions have to face the challenges of managing ICT investments, acquisitions and contracts of ICT-related elements, which consist of a complex mix of hardware, software licenses, software applications and services. Frequent concerns of the board and management often arise not from the size of the investment per se but from issues that stem mainly from the degree of confidence that can be attached to, for example: The suitability of the recommended technology vis-à-vis the needs of the institution and its strategic plan. Therefore, for social security institutions, managing the ICT portfolio in a systematic way is crucial for achieving the expected Return on Investment (ROI) for ICT-related investments and to satisfy cost-benefit relationships.

A more detailed description is included in the ISSA Guidelines on ICT, which provide guidance on the application of these practices in social security.

## **4. Towards common ICT-based products and services**

In the context of the various challenges posed by the growing complexity of social security systems and by the dynamics of technology, institutions aim at reducing costs and risks associated with ICT systems. To move in this direction, institutions may use standardized and, ideally, shared solutions, to take advantage of similarities between core processes in social security as well as on emerging service-based technologies. This approach would reduce development time, risks and costs, and increase economies of scale and quality by reusing validated assets.

Such standardized and reusable assets may consist of data formats, information models, process models, quality insurance practices, component and software service interfaces, and software components among others. In turn, common solutions and services may be based on shared systems and ICT platforms, eventually based on the software as a service paradigm.

While sharing ICT-based solutions would be the most desirable goal, achieving this requires the standardization of processes and information processed by the shared software. In addition, reusing non-executable objects (e.g. data formats and information models) would also save on resources involved in their development.

However, putting this approach into practice requires important efforts, not only to develop the standards and shared solutions but also to use them, notably involving the adaptation of other systems as well as to understand these external solutions. Furthermore, a careful analysis should be done to identify standards and solutions that match requirements in social security institutions.

In order to achieve these goals, the ISSA ICT Technical Commission sees three main approaches which may be followed by social security institutions:

- defining standards related to ICT-based activities in social security;

- developing a strategic cooperation with ICT Industry;
- providing a support and cooperation environment.

Existing experiences, while still limited in social security, show the feasibility of carrying out these kinds of initiatives and provide useful lessons for their implementation.

The development of international social security agreements and data exchange systems constitute a relevant step forward on standards development as they already involve agreed solutions between two or more institutions.<sup>18 19 5</sup> Furthermore, national standards and integration platforms for social security have been developed in France<sup>7</sup> and by the CBSS in Belgium.<sup>8</sup> In other areas, comprehensive standards have been developed in Health by Health Level Seven International<sup>20</sup> and in Tax administration by the Organisation for Economic Co-operation and Development (OECD).<sup>21</sup> Interesting experiences on public repositories of specifications and software have been carried out in Brazil<sup>22</sup> and in the European Union.<sup>23</sup>

These experiences have also shown the importance of the support and cooperation environments in order to overcome the barriers for reusing external solutions and adopting standards. Such environments usually provide practical support and up-to-date documentation, organize capacity building activities and promote the application of standards and assets by disseminating experiences and good practices.

The ISSA Centre for Excellence is foreseen to play a key role in facilitating and promoting exchange in the implementation of solutions that work. The ISSA Guidelines provide solid ground on which to develop additional more innovative products. The 2014 – 2016 workplan of the ICT Technical Commission includes specific projects that would address the specification of standards and the development of a strategic coordination with the ICT Industry. In addition, while the ISSA Centre for Excellence will provide support services on the ISSA Guidelines and cooperation activities for their application and improvement, the ISSA Academy will focus on capacity building on the application of ISSA Guidelines by member organizations.

#### **4.1. Sectorial standards**

Standardization is a strong form of establishing an agreement. It is an effective and well-recognized way to achieve the correct use of key technologies. It requires the concerned institutions to build consensus in the setting of standards, and eventually ensuring its uniform implementation.

The development of new standards for specific use of social security, especially in the field of information exchanges, is seen to improve administrative effectiveness and efficiency.<sup>1</sup> Technical standards have a longstanding and proven role in ICT, enabling, for example, the interoperability between different vendor products and improving the cost/effectiveness of adopting advanced technologies and practices.

These standards refer to the data required by international social security agreements worldwide (employee basic data and working history), more extensive social security information in the standards developed in France and Belgium, and by the OECD. In addition, providing pre-designed standardized information models and quality insurance processes for Master Data Systems would enable important improvements in the effectiveness and efficiency of the implementation of corporate ICT platforms.

In turn, standards on component models and architectures for social security systems would provide a crucial input for the implementation of portable packaged applications covering the

main social security functions. Finally, the specification of standard Key Performance Indicators (KPI) models for social security, in addition to providing pre-built specifications, would facilitate the exchange of performance outcomes.

## 4.2. Strategic cooperation with the ICT industry

The development of a transparent and constructive working relationship between the ICT Industry and the ISSA could deliver more cost-effective outcomes for ISSA member institutions and also benefit the industry. A joint development of standards could reduce risks and generate economies of scale as well as facilitate partnerships in adopting innovative business models.

There is an emerging recognition of the potential synergies between Social Security institutions and the ICT Industry. By sharing ideas, visions and concerns under the coordination of the ISSA Secretariat, both parties could work together in identifying how best to respond to the growing needs of social security institutions, and the capabilities and technologies that can respond to these in an effective and cost-efficient manner.

Specific objectives include the development of standards specially to be used in COTS (packaged software components) solutions in line with the general goals, the definition of new business models for clusters of institutions that could profit from economies of scale, and technical capacity building in social security institutions.

Initial discussions between the ISSA and representatives from the ICT industry took place at the 2012 ICT Conference<sup>1</sup> and which were further discussed and validated by the ISSA Technical Commission on ICT.

A first working meeting between the Technical Commission and industry representatives was held in Geneva in June 2013.<sup>24</sup> The meeting confirmed common interest on the topics, with an agreement to carry out further analysis on the development of common information models for master data; standards for data exchange and service-based platforms to support international agreements; the opportunities, challenges and applicability conditions of cloud computing platforms in social security as well as on business models for mobile-based operations.

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<sup>23</sup> *Share and reuse interoperability solutions for public administrations. European Union.*  
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