

An Example to Follow

An Infrastructure for Interoperability and Governance in the Tuscan Public System for Digital Preservation

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Abstract

For years, Tuscany has promoted several projects of digitization of administrative procedures. These projects are based on a technological and organizational pre-existing substrate: a territorial system that involves government agencies of that region and private. Entire community uses that same technological infrastructures that are shared across regional territory and which allows the creation of cooperative services using normalized and standardized rules and languages. On this basis the project DAX (Digital Archives EXtendend) was started. This project has led to the creation of an infrastructure for long-term preservation for digital archives. It serves all the regional administration of Tuscan territory. DAX is an accountable system to describe and manage non-current and historical archives, and to storage singles records. DAX is an example of cooperation and interoperability policies pursued for years in Tuscany, in the field of innovation.

Authors

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1. Introduction

This report provides an overview of the system for long-term preservation of digital archives¹ by the Region of Tuscany. The system will store the archives by all different government agencies within the region. This is one of the first experiences in this branch in Italy and it is a meaningful experience for at least four reasons, generally speaking and not specific to digital preservation.

The first reason concerns organization and descends from the choice of creating a territorial system involving all the various government agencies of the region, under the coordination of the main administration. The second reason is based on political choices that encourage the development of public government networks sharing many technological innovation projects. The third reason, of a technical nature, provides a valuable contribution to the entire system: the technological infrastructures the system uses, work for the entire community. These infrastructures implement the interoperability and interchange channels for many other services.

Furthermore, the fourth reason, it obeys the Italian legislation on digitization² and, at the same time, interprets the State law which delegates each public administration to maintain their own archives, introducing a new perspective where a single regional archive assembles them.

2. The Context

It is important to underline that the long-term preservation system, a project created, commissioned and planned by the Region of Tuscany and called DAX (Digital Archives eXtended), was conceived in an advanced administrative, archival and technological context.

Regione Toscana is a territorial administration created in 1970, like all the other regions located all over the Italian national territory, and it is one of the five kinds of institutions constituting Italian Republic. The task of each Region is the government and the growth of its territory; this is possible thanks to its strong legislative power and to an administrative and planning organization, which are both exercised in complete independence from the central power, but with a strong link with local authorities. In comparison with other Italian Regions, Tuscany made a stronger use of tight cooperation with local institutions³ to exercise its governance through agreements on many different topics. Regione Toscana has been the main driving entity for its territory concerning the themes of innovation mainly through the Information and Communication Technology (ICT) project. For this reason, Regione Toscana is a national model and a reference point regarding e-government.⁴

¹ In this report we intend to speak about archive like a whole of the records organically created and accumulated by a public corporate body in the course of that creator's administrative activities.

² The term dematerialization indicates the gradual increase in the computerized document management - within public and private administrative structures - and the consequent replacement of traditional media in favour of electronic documents. Dematerialization is one of the central topics of the Italian legislation on reform and innovation in public administration (see Codice Amministrazione Digitale – Dlgs March 7, 2005, n. 82). Since 1997 the Italian national legislation recognizes full legal value to electronic documents.

³ In the Italian legal system a local authority (ente locale) is a public body whose jurisdiction is limited within a specific territorial area. The local authorities are opposed national bodies whose competence extends over the entire national territory. In Italy, the term has a specific meaning referring to local authorities such as municipalities, provinces and metropolitan cities, under the Italian Constitution.

⁴ E-Government (short for electronic government) is digital interactions between Governments or Agencies, and between government and the Citizens or businesses. It is defined as “The employment of the Internet and the world-

Since 2004 Regione Toscana, through a regional law,⁵ has established a community network that includes all of the public institutions forming the regional territory, i.e. local administrations, Tuscan universities and public bodies dealing with public healthcare. Following this law the Community Network has its own managing structure, and promotes cooperation among different administrative entities, according to his own skills and necessities. Operational tools and functioning bodies of this network involve politicians and technicians of all the administrations: a Strategic Committee, which plans and coordinates the program and subjects, drives the choices implemented by a Technical Direction through the promotion and the realization of projects and services for every joining member; at last a general Assembly gathers all the administrations and, once a year, introduces and evaluates the results. The Network gives legal identification to systems of administrative interoperability, of instruments and contents sharing, of data and information and of administrative processes.

The kind of relations created among public institutions and different subjects⁶ form a complex system, managed through ICT systems and architectures.

The computerization process started to yield significant results thanks to the new transversality and interoperability of technologies, which give concreteness to the interoperability and transversality of administrative effort, to which we are referring.

Italian national rules, concerning public administration technologies, have been promoting and stimulating the use of interoperable systems and infrastructures for years; the aim of these technological infrastructures is the integration of procedures used by different subjects of the same territory (both national or regional). Through these technological infrastructures it is possible to achieve data and information interchange and interaction among different entities allowing them to cooperate.⁷ In Tuscany this is supported by a unique technological infrastructure that carries out applicative cooperation assuring an extremely advanced interoperability.⁸

Every dematerialized administrative process becomes part of a meta-system that allows the sharing of tools and information, coming from different administration systems included in the same Community. This technological choice comes from an organizational and archival need, because information, documents and administrative processes have a transversal role among more entities that are often part of the process, at the same responsibility level.

The Tuscan system perfectly responds to the recommendations of European Interoperability Framework for Pan European e-Government Services (EIF)⁹ which identifies different levels of

wide-web for delivering government information and services to the Citizens.” (United Nations Department of Economic and Social Affairs, "United Nations E-Government Survey 2012").

⁵ Regional Law of Tuscany Region 26 January 2004, No. 1, “The promotion of electronic administration and of the information and knowledge society throughout the regional system. Rules for the “Tuscany Region Data Communication Network”.

⁶ Since the administrative reforms of the late nineties has been introduced, in the functioning of the Italian public administration system, a kind of institutional relations network, which reconciles the need for autonomy and accountability with the need for integration based essentially on the system of local government and in accordance with the principle of subsidiarity. The Italian public administration today is seen as a unique network of subjects that intersect powers and functions, subjects who are no longer part of a hierarchy but are coordinated in a network system in which each element is a sibling node.

⁷ <http://www.progettoicar.it/Home.aspx>

⁸ <http://www.cart.rete.toscana.it>

⁹ For European Interoperability Framework the dimension of interoperability are: *Political Context* - Cooperating partners having compatible visions, and focusing on the same things; *Legal Interoperability* - The appropriate synchronization of the legislation in the cooperating MS so that electronic data originating in any given MS is

interoperability and emphasizes the importance of cooperation among organizations and processes coordination.

On archival and normative sides, the Region of Tuscany declared, with its regional law of 2009, to “take necessary measures for the de-materialisation of administrative documents, encouraging their storage in digital format with methods which enable preservation and use over time”.¹⁰ Moreover Regione Toscana “provides for and maintains a technological platform and digital services for the preservation of computer documents which enables joint management of the documents in both hard copy and digital format...”¹¹ With the same law, and consistently with what is established by the territorial governance, the Region “promotes the establishment of the regional administration and regional agencies archive network in order to favour the sharing of tools and information in a coordinated manner, as well as access to the archive documentation and the development of documentary assets” and the improvement of documental heritage.¹²

Through DAX Region of Tuscany has materialized regional law 2009, n. 54.

3. Motivations and Goals

Within this organizational and technological context, the regional Community Network has delegated the Region of Tuscany to build a platform for the preservation of administrative records¹³ produced in digital form by Tuscan public administrations. So, DAX arose in response to the needs of a variety of subjects, even if the major administration – the Region - has played a larger role in coordinating the activities: it has the responsibilities in the design and implementation of the system. In particular the Region takes care of the dissemination of the culture of these issues. It should not be forgotten that such a complex system would be difficult to achieve for small administrations as Italian municipalities are. A coordinated project helps the costs with a considerable saving in terms of human resources and management.

It seemed also important for the growth of the area and its public administration, in this moment of transition from traditional to digital documents, to develop the culture of these issues and also provide support to smaller organizations, creating a common cultural fabric and shared rules. In addition to the uniformity of treatment of digital archives, a single storage system would have reached a higher level of performance in the efficiency of public administration and most of all, the easier relations with citizens, and with all users interfacing with a unique system.¹⁴

accorded to proper legal weight and recognition wherever it needs to be used in other MS; Organisational Interoperability - The processes by which different organisations such as different public administrations collaborate to achieve their mutually beneficial, mutually agreed eGovernment service-related goals; Semantic Interoperability - Ensuring that the precise meaning of exchanged information (concept, organisation, services, etc.) is preserved and well understood; Technical Interoperability - The technical issues involved in linking computer systems and services (open interfaces, interconnection services, data integration, middleware, data presentation and exchange, accessibility and security services, ...). Cfr. <http://ec.europa.eu/idabc/en/chapter/5883.html>.

10 Regional Law of Tuscany Region, 5 October 2009, n. 54, “Establishment of the regional information and statistical systems. Measures for the coordination of infrastructures and services for the development of the information and knowledge society”, art. 10 (“Documentary activities”), comma 2.

11 Regional Law of Tuscany Region, 5 October 2009, n. 54, ... art. 10 (“Documentary activities”), comma 3.

12 Regional Law of Tuscany Region, 5 October 2009, n. 54, ...”, art. 14 (“Regional Archives”).

13 With the expression "administrative document" we intend to indicate any graphic, fotocinematografic, electromagnetic or any other species of the content of documents, including internal or not related to a specific process documents. They are held by a public authority and related public interest activities.

14 "Access right" means, in accordance with current Italian legislation, the right of interested parties to consult and take copies of administrative documents. All citizens, companies and associations, including those of public or

We cannot forget that the archive has an important role in identity and memory of the activities of its producer, and that the necessity to preserve documents has to be respected, according to traditional archivist science rules and Italian archival laws.

For these reasons a system able to preserve already formed, arranged and structured archives, the noncurrent and historical ones, was conceived. They consist of records, no longer useful for their producer. DAX does not deal with current records and archives whose creation and management are delegated to the specialized systems. The current archives will be sent to DAX as they become non-current. Therefore, the task of this platform should be to maintain archives, in compliance with national and international standards, and in compliance with national and European archival law.

4. Technological Foundations

The Tuscan platform for the long-term preservation, as we mentioned, was devised using pre-existing organizational and technological infrastructures. Among those the telematic network, called RTRT (Rete Telematica Regionale Toscana - Tuscan Regional Telematics Network), plays a key role. It is a network with large capacity, spread throughout the region, connected to the Internet, and compliant to the national standards. The other fundamental infrastructure is the technological infrastructure for interoperability called CART (Cooperazione Applicativa Regionale Toscana - Tuscan Regional Applicative Cooperation). These enabling infrastructures comply with the Italian national legislation in terms of Public Administration standards. They have been certified and accredited at the national level, provide higher quality services than the standard market ones, realizing a multi-supplier model. Particularly for the entire Community they provide and ensure:

1. A set of connectivity services shared by the Tuscan public administrations;
2. Interaction with all the other subjects of Italian government connected to the Internet, as well as the networks of other institutions; they promote the delivery of quality services for citizens and private companies;
3. Shared exchange infrastructure that enables interoperability of information systems with external agencies;
4. The development of interoperable systems, according to the model of applicative cooperation, safeguarding data security, confidentiality of information, respecting the autonomy of the information assets of each administration and the current rules about privacy.

Of particular relevance, in the context of the just mentioned infrastructures, is the implementation of interoperability¹⁵ among the different network actors. In Tuscany, we stated, it is performed through a framework called CART. CART achieves the interoperability of applications of different organizations

common carriers, can exercise access right (see http://www.governo.it/Presidenza/DICA/4_ACCESSO/). The access right to administrative documents is a right granted to citizens on the basis of relations with the state and public administration, in order to ensure transparency of the governments. In Italy the access right is enshrined in Italian law, 7 August 1990, n. 241 “New Rules Regarding Administrative Procedure and the Right of Access to Administrative Documents”.

¹⁵“Interoperability within the context of European Public Services delivery, is the ability of disparate and diverse organizations to interact towards mutually beneficial and agreed common goals, involving the sharing of information and knowledge between the organizations, through the business process they support, by means of exchange of data between the respective ICT systems”: http://ec.europa.eu/isa/documents/isa_annex_ii_eif_en.pdf.

that decide to work together to **get common supplying of public services**. CART uses a set of software tools and defines a set of shared elements: management services, vocabulary, concepts, principles, policies, guidelines, recommendations and practices. These common elements become part of documents arranging standards of interoperability among systems, and these documents are named "RFC e.Toscana". Those standards are proposed by the technicians of the various domains and are open to public discussion. The negotiating process to produce interoperability standards involves public government, universities, research centres and private companies. These entities define the set of rules and specifications to ensure the interoperability of systems for a specific application domain. The standards take into account previous national and regional decisions or choices, as well as national and regional experiences. In particular, the Community recommends interoperability agreements, collaborates on the definition of services interfaces and on the process of accreditation of software systems and standards-compliant solutions (e.Toscana Compliance). The e.Toscana Compliance Committee, consisting of universities, research centres in Tuscany and local authorities representatives, ensures the governance of the process, by supporting the dissemination of approved standards, accrediting conformity of the software products with the standards and provides support to entities of the territory.

All this corresponds to the recommendations on EIF (European Interoperability Framework for the Pan-European e-Government Services)¹⁶ contained in the attachment "Towards interoperability for European public services" by the Social Committee and the Committee of Regions of European Commission. This last one suggests the creation and deployment of infrastructure to support interoperability. It also emphasizes the role of open standards and interfaces for the implementation of interoperability systems between applications and business processes related to e-government public services.

The sharing of interoperability standards for services means that the different administrations of the region operate in the same way approaching entities outside territory. On one side, this approach allows Regione Toscana to achieve full interoperability and governance issues; on the other side provides value for citizens and agencies, which perceive the Tuscan government as a single entity, rendering their access to services easier. These methods contributed to the growth of an eco-system of public services and created a culture of interoperability. The services can be submitted and proposed by any administration, and they are experienced as an opportunity by other members in the Community, to improve their services. The entire Community participates in the creation of a real eco-system; it benefits from the resulting new services, or, in from the improvement or integration of already existing services. A process aimed at the full sharing of interoperability specifications assists the emergence of new services.

5. Architectural Components

DAX is deployed in the regional territory through information architecture fully distributed coherently with the structuring of the regional network infrastructures. The central components of the platform are deployed at the regional data centre called TIX (Tuscany Internet eXchange),¹⁷ which provides services to all administrations that are part of the regional Community Network.

Among the services that TIX data centre provides, DAX uses:

¹⁶See footnote number 3.

¹⁷You can find news about all infrastructures on the site <http://www.e.toscana.it> where there are also links to sites specifically devoted to individual technical infrastructure.

- *Storage*, or rather the ability to extend incrementally the size of data storage and their backups. The chance of expanding the system is a key feature because of the impossibility to determine, a priori, the maximum capacity of storage required. Another significant quality of DAX is its ability to store separately the archives of several administrations of Tuscany. This ensures that the different administrations retain their responsibilities on archives and their descriptions;
- *Disaster recovery*, which is the guarantee of saving information on different sites and the subsequent recovery from an unforeseen incident at a Data Centre. This quality is essential in a system such as DAX aiming to preserve documents and information;
- *Operational or business continuity*, namely to ensure that DAX is able to operate even in the case of adverse events. This quality is desirable for a conservation system: access to information becomes strategic with serious emergencies.

The central components of the storage system at the TIX, receive packages of documents from the administrations of the territory. These send groups of documents from their applications by using the CART infrastructure that gathers, validate and submit them. The process of collecting, validating and transmission of packages takes place through standard device components of DAX. Those components, called Proxy-DAX and deployed on CART infrastructure, interact directly with the local applications of entities. The choice to implement specific Proxy guarantees:

- The distribution of the platform workload;
- The selected forwarding packages that are effectively to keep stored;
- Minimization of the use of network bandwidth between local applications and central components of the DAX,
- An effective security policy for communication between applications and DAX;
- The possibility of storing data and information in the proximity of each entity; this guarantees excellent response times in document and information retrieval;
- A significant improvement in quality of fault-tolerance of the system.

Another important task of the Proxy-DAX is to break large packages into smaller ones that will be reassembled by the central components of DAX. This option allows local applications to send virtually unlimited size packages.

The application interfaces made available, to the local software applications, by the Proxy-DAX are defined in appropriate RFCs e.Toscana.¹⁸ In line with the process e.Toscana Compliance, the RFCs e.Toscana concerning DAX were discussed inside the technical community, with the participation of many local and national companies, and finally they were approved by the e.Toscana Compliance Committee and have become regional standards. The four RFCs e.Toscana standard, about DAX, are technical documents that companies should consult to implement software and adapt their applications to the use of DAX.

¹⁸The RFC e.Toscana , describing the application interfaces realized by Proxy DAX, are: n° 188 (<http://web.rete.toscana.it/eCompliance/portale/mostraRFC?idRev=682&idRfc=188>); n° 206 (<http://web.rete.toscana.it/eCompliance/portale/mostraRFC?idRev=681&idRfc=206>); n° 176 (<http://web.rete.toscana.it/eCompliance/portale/mostraRFC?idRev=642&idRfc=176>); n° 189 (<http://web.rete.toscana.it/eCompliance/portale/mostraRFC?idRev=629&idRfc=189>).

In addition to the access control decision by the document management service providers, DAX supplies and facilitates consultation to records and content information by the side of users in response to a request. The access has to take place using the application safely through an identification Smart Card.¹⁹ These cards are distributed to all citizens of the region: they are associated with a user profile and about that profile DAX combines its application roles. In practice this means that each person may have access to some features rather than others or have visibility of a portion of the archive and not others.

6. Archival Fundamentals and Standards

From the archival perspective DAX applies the principles of archival science and the rules of traditional archives arrangement and description, transferring them to digital archives. The basic principle from which the analysis took the place is that the archive of an administration is a *unicum* and all documents, produced in the history of that administration, are part of this unitary system. The platform describes and manages digital documentation but it describes also traditional paper records (or more generally analogue objects). We thought this was a good way to ensure the uniqueness of the archive according to its provenance. At the same time, we kept in mind that preservation and description of digital records and archives require to highlight the peculiarities and keen differences between the two worlds.

In the first place DAX provides a solution to two problems that, although closely related, are not completely comparable:

1. The long-term preservation of digital records;
2. Archive management - depository and historical level - both analogue and digital.

The choice to manage, through this system, the hybrid archive, and not only digital, follows from the fact that the archives and single practices of our administrations are still largely produced on paper.

The platform DAX is based on the ISO OAIS (Open Archival Information System),²⁰ and in compliance with OAIS standard focuses on the preservation of information packages. In addition it describes the documental and archival context of creation, conservation and preservation, and identifies an application area. The decision to build a system OAIS compliant depends on we are in agreement with principles and topics of the standard, and we have considered the standard next to our reality: a community of well-defined baseline, share knowledge, standardization well tested tools, languages and methods. In fact it provides theoretical and interpretive trends not only for archives and its forming objects, but also for their context, and it suggests organizational answers.

With regard to relations with the environment, three types of entities or systems interface DAX: "producer" that creates and sends to the system the records and archives to be preserved, "user" who consults the archives by distance, in space and time; "manager" who, structured into several kinds with different responsibilities, takes charge of the management, maintenance and updating of the system as a whole. And finally, the objects to be preserved.

In this initial phase of the system's use we decided to begin maintaining two broad categories of objects: general administrative records and health records. According to the several stages that OAIS

¹⁹ It is a hardware device, similar to a credit card, which contains all the information related to the digital certificates of the subject and which allow a certain authentication.

²⁰ Open Archival Information System is the name of the standard ISO: 14721:2003 which defines concepts, models and functions related to digital and aspects of digital preservation.

contemplates, records are processed and aggregated in packages, logical containers of records and information about records and their preservation. The packages distinguish themselves depending on the stage and type of entities (respectively called SIP and AIP)²¹ (*Figure 1*).

The system stores records in several digital formats that are made known to the community through a "list of allowed electronic formats" that can be expanded over time as needed. DAX also intends to keep any type of documents and files: text, database, image, e-mail or e-mail archive, map etc.²²

DAX has all the features of feeding, managing and finding of intermediate and historical archives, as regards both paper and digital objects, and it manages:

- *Ingest process* from the creation to preservation phase by receiving packages of documents and their metadata, from document production systems. The metadata sets forming the packages for the ingest process and keeping, are compliant with the national Italian standard UNI-SInCRO.²³ The ingest process occurs through the acquisition of "packages" (SIP-OAIS) consisting of a number of archival aggregates²⁴ and / or single record²⁵. As DAX manages the intermediate and historical archives, these packages must contain no-active archival units and closed files or, at most, single non current record;
- *Logical organization and description* of the archives, in compliance with international standards for archival description²⁶. The policy of the system is that the records description, required at the moment of ingest, is a dynamic description, enriching during the phase of preservation and at the request of access. The metadata sets, to describe and holding archives, were enhanced and compared with the sets worked out numerous international research projects, we held out as a model²⁷. One of the great efforts of this project was, indeed, to try interpreting standards and best practices, with the aim to exploit the rich outcomes of many international projects;

²¹ We are speaking about the packages provided by the OAIS. There are three different types of information package: SIP (Submission Information Package) that is made at the time of ingest to the archive by the creator, the AIP (Archival Information Package), for storage in the DAX, the DIP (Dissemination Information Package), which is composed with the data relating to the distribution and access.

²² It was decided, in the phase of the activation of DAX, to start the system on certain types of archives and then specific formats, but through small changes and stepwise refinement, based on the needs of the government, will expand the range of sizes and the types of storable.

²³ This is the Italian national standard UNI 11386: UNI 11386:2010 - interoperability support in the Storage and Retrieval of Digital Objects (sync). It is the result of the National Italian unification (UNI), which was established within Subcommittee DIAM/SC11 (Management of archival documents), in 2009; it was a special working group, called Synchro.

²⁴ This archival unit is a consistent set of documents, grouped by a person for the purposes of its business, according to the common reference to the same subject.

²⁵ See footnote number 9.

²⁶ We are speaking about ISAD (G) (General International Standard Archival Description) and ISAAR (CPF) (International Standard Archival Authority Record For Corporate Bodies, Persons and Families) are standard adopted by the International Council on Archives, in order to define unique tools for the description of archives, for the registration of documents produced by organizations, individuals and families (www.icacds.org.uk/eng/). The first edition was published in 1994. These set of metadata are returned to the user organized according to the model EAD (Encoded Archival Description) and EAC (Encoded Archival Context of). Developed and published (1998) by the Society of American Archivists in partnership with the Library of Congress for encoding tools appropriate archival.

²⁷ Among these especially InterPARES - The International Research on Permanent Authentic Records in Electronic Systems (<http://www.interpares.org/>), PREMIS - Preservation Metadata Implementation Strategies

- *Appraisal and selection* and subsequent retention of predestined records; this phase includes implicit request for authorization by the Ministry of Cultural Heritage, in accordance with Italian law;
- *Access and rendering* of records and aggregated records and files by internal and external users of the system;
- *Access and consultation* by the Auditor (e.g., State offices: Ministry of Cultural Heritage – Soprintendenza Archivistica, Ministry of Innovation etc.) or justice organization;
- Clear definition of *roles and responsibilities*.

From the point of view of technological capabilities, the platform preserves digital documentation and, in order to cope with obsolescence of technology and software, enforces a continuous activity of control and migration.

Furthermore DAX has another very important feature: it produces a complex auditing system that keeps the memory of all the logs occurred, both automatic and manual. This is an excellent method to control the functioning, processes and reliability of system, to preserve memory of operations and to assure safety of the archive. Based on this auditing system, as well as a continuous check on the data, it will be possible to make an assessment of the procedures put in place for storage. The audit data, obtained and organized by all the features of the platform, allow to measure the compliance of processes and procedures with respect to the characteristics of the system and their application, with reference to what has been defined in the analysis as a guarantee of reliability of the system and what is required by the certification systems.

7. The Architectural Features of DAX

An initial choice has set that the system was articulated into two connected but independent subsystems, playing different but complementary roles, since the system is logically unique. On the one hand, we have the part which governs the real archive, that focuses on the organizational and use aspects carried out in accordance with the OAIS reference model. On the other hand, a complex storage that focuses on aspects of the Italian law topic called "conservazione sostitutiva".²⁸ This kind of preservation is a legal and technological procedure that is regulated by the Italian law, to ensure, over time, the legal validity of an electronic document. According to the current laws, the digital document is "locked / closed" in form and content through the digital signature and time stamp, which, by setting the exact date and time of its crystallization, anchor it temporally and guarantee the fixity of information.

Thanks to this division into two subsystems, platform DAX is able to satisfy two requirements that initially seemed difficult to conjugate:

- Preserve digital objects "freezing" by hashing techniques and asymmetric key cryptography, according to the Italian law (bit-preservation);

(<http://www.oclc.org/research/activities/premis-rlg.html>), METS - Metadata Encoding and Tradition Standard (<http://www.loc.gov/standards/mets/>).

²⁸It is a set of rules laid down by a decision of the Authority for Informatics in Public Administration (AIPA) of 2004, n. 11. This rule is in the process of substantial change and the changes can be found at <http://www.digitpa.gov.it/gestione-documentale>.

- Preserve packages formed with records and metadata, assuring they can be changed over time (package-preservation), according to the OAIS reference model.

The system, as a whole, is responsible for ensuring that, in medium and long-term, records retain: integrity and authenticity, accessibility - as long as needed – and availability, legibility and intelligibility, reproducibility.

Each of the two subsystems has some peculiarities but in general, giving those guarantees, DAX takes charge of:

- Implement, manage, historicize tools and data about the organizational, archival, procedural and technological context. These contextualization is functional to the description of the stored documentary heritage: organizational structure of producer, classification plans and indexes, content types, appraisal plans, vocabularies to interpret specific metadata, encodings or terms, associated with documents;
- Provide services and references to search and browse the preserved documentation;
- Prevent the obsolescence of hardware and software through continuous adjustments and through processes of migration of digital stored documents²⁹;
- Record and store - in a unique audit system that returns summary data queried at multiple levels of detail - the tracking of each access, change and activity on the system (access, technological changes, and updates the metadata of digital documents);
- Keep alive the digital signature, in compliance with the Italian law (by the application and renewal of timestamps or by logging ingested package into the system);
- Receive, update and maintain metadata about the document in the archive.

As mentioned several times, the platform is designed as a system of long-term preservation at the service of the Region of Tuscany, but also local government of the community. Which is why both of the two subsystems are designed as multi-entity, i.e. the only installation maintains complete logical distinction, even if it can manage archives and contextual archival metadata of several entities.

8. Governance

Such a many-sided system requires governance able to ensure effective control and management. The system is complex in nature because of the role that it aims to perform, because of the plurality of treated subjects, the many different involved responsibilities, the complexity of functions at stake.

Consequently, the working group on DAX focused on what would be the best form of government of the system, moving from the organizational context of departure. A strong point was that the system had to be co-managed by the entities that produce the archives with a direct involvement in the Community. Every administration would have to retain full responsibility for its archive, even if the system has to be managed and conducted through a board of experts with appropriate skill. This board has to be a qualified and a recognized group, equipped to manage digital preservation system, supervising it from every point of view: organizational, technological, legal, political and about diffusion process. A

²⁹ In particular, CNIPA - Centro Nazionale per l'Informatica nella Pubblica Amministrazione, Deliberazione 2004, 19 February, n. 11, “Regole tecniche per la riproduzione e conservazione di documenti su supporto ottico idoneo a garantire la conformita' dei documenti agli originali”, art. 3 and 4.

group able to provide appropriate security guarantees, effectiveness of technology, accessing to adequate technical equipment and to professional training.

Since the beginning of the project, a number of activities and meetings have been scheduled, to support different subjects involved in the management of platform DAX. The idea was to encourage public administrations and their technicians to discuss and test the system according their need, experiences, and resources.

These activities are coordinated by a highly specialized team that has been entrusted with the management of the system, called Centro di Responsabilità per la Conservazione Digitale (CRCD) (Responsibility centre for digital preservation). The CRCD ensures the process of long-term preservation and, especially, it takes charge of the definition of meta-information and archival rules. The board has the responsibility for the necessary adjustments of the system to international standards of long-term preservation, and for the updating of the system to any possible change in the Italian legislation. The CRCD is also in charge of the accreditation of DAX to the National Agency for the Digitization of Public Administration, as well as of the possible subsequent adjustments of the system to their requirements or to new international standards. The CRCD ensures consistency and compliance with safety plans, also in respect to privacy policies. Finally, as regards new applying institutions, the CRCD coordinates the deployment process and the activation of organizational process, as well as its operative start.

Four are the institutions which play an important role in the management of the DAX platform, each one with clear responsibilities: Soprintendenza Archivistica per la Toscana, Regione Toscana and the ICT companies involved in the project. In this respect, the CRCD encourages and coordinates the relationships among all these entities so that they can operate together consistently, sharing a common goal. Among these four, Soprintendenza Archivistica per la Toscana plays a crucial role, as it is an office of the central State which, according to the Italian law, is in charge of monitoring and protecting historical archives of all public bodies, disregarding their political level. Further relevant institutions participating in the project are, as mentioned, Regione Toscana and the ICT companies, which deal with the functioning of the technological components, according to the directions issued by the CRCD. A fifth fundamental partner adds to these four basically stable partners: the public institution that decides to use the DAX platform for the long-term preservation of its archives.

In order to have all these entities operating consistently under a defined articulation of tasks, a formal subscription of an agreement is required. This agreement states roles and responsibilities of each partner, as it also states the rules for the common governance of the system and the compliance guidelines for interoperability. Further relevant documentation is the technical documentation provided for the activation and management of DAX, the manual for conservation, standards and the necessary repertories: all of this proves to be crucial for digital preservation of archives.

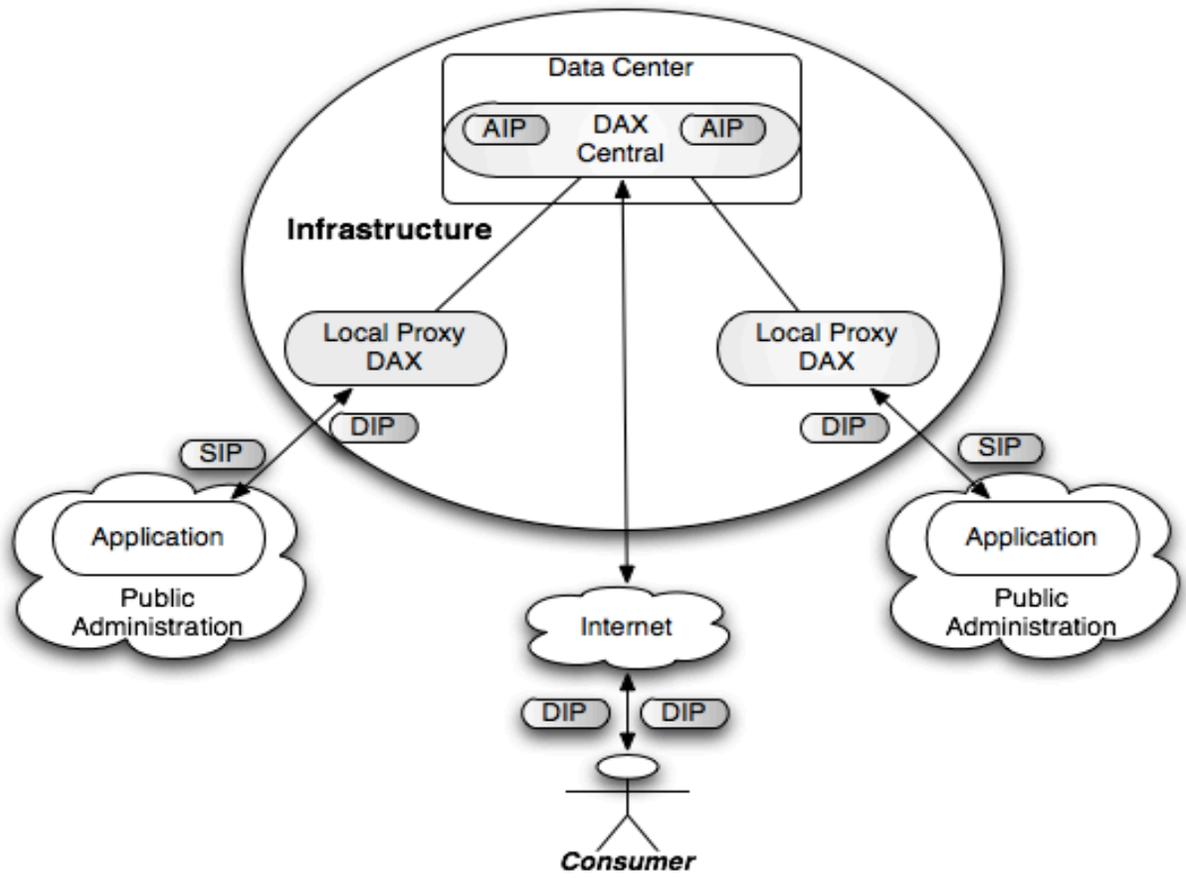


Figure 1 - DAX architecture overview

