

## **Information Management: a Systemic Model**

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### **1 – Introduction**

The project “Integrated Management of the Municipal Information System”, centred on a local government institution, was set in a context of profound changes, bearing in mind the necessary procedures for successful integration in the Information Society, the structural changes that are required within Portuguese Public Administration, the growing concern for the quality of public services, and the efforts that public and private organizations have made and still have to make so as to achieve these aims<sup>1</sup>.

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<sup>1</sup>For a more detailed description of the project see: PINTO, Maria Manuela Gomes de Azevedo – O novo paradigma da Arquivística: um estudo de caso. In CONGRESSO NACIONAL DE BIBLIOTECÁRIOS ARQUIVISTAS E DOCUMENTALISTAS, 7, Porto, 2001 - *O desafio do futuro*. Porto: Associação Portuguesa de Bibliotecários, Arquivistas e Documentalistas, 2001; IDEM – Gestão integrada do Sistema de Informação Municipal. *Páginas a&b: arquivos & bibliotecas*. Lisboa. ISSN 0873-5670. 12 (2003) 91-109; e IDEM – Modernização administrativa e qualidade: uma ferramenta chamada CAF. *Cadernos de Biblioteconomia Arquivística e Documentação*. Lisboa. ISSN 0007-9421. 2 (2004) 66-77.

The project was developed in the Municipality of Vila do Conde, between the end of 1998 and the beginning of 2002. Two essential, interconnected ideas were at the basis of its development: on the one hand, a new perspective of Archives and Archivistics, as considered within the scope of Information Science; on the other hand, the global context of change mentioned above, underlining the need for administrative modernization and a culture of quality in public services, reducing unnecessary bureaucracy when it comes to organizational procedures, improving the internal systems of management, organization and operation, promoting the adoption of methods of team work, internal communication and cooperation among the various sectors, giving the "clients" the chance to be heard and implementing an information system geared towards management.

The project's main concern was directed at the key areas related to information (ways of production / acquisition, processing, circulation, retention / disposal, storage, dissemination and future preservation), which is "the central nervous system" of a public service, and at the effective application of new information technologies, focussing first on the back-office services and afterwards on the front-office areas. Besides the technical change involved (networks, hardware and software, etc.), it was above all a question of changing the organization's culture, essential as a basis supporting the new strategies (involving organizational structure, processes and people – agents / actors). This transformation was an unavoidable and direct result of the need for this organization's successful integration in the Information Society, where information and knowledge have come to play a key role in practically every aspect of human activity, due to the development of digital technology (and particularly of the

Internet), materialized, in this case, in the development of the "Electronic Public Administration" and the "Electronic Government".

The model of "Management through Projects" associated to a "business process approach" (mainly transversal and which further builds on the initial organic, functional and vertical perspective) applied to an information service seemed to be the best option in this case, in line with the view put forward by Robert Taylor when he states that "information products and services and information systems in general should be developed as groups of activities that add some value to the information that is being processed in order to help the users to make more informed decisions and to make them understand the situation better so that they can act in a more efficient way"<sup>2</sup>.

Since the project aimed to implement an integrated Information Service in an institution of local government, the following aspects were defined as central from the outset:

- the quality of the "government" (understood as the relation between the city council and its townspeople);
- organizational quality (understood as the relation between the organization and its context/environment, namely, how systems, processes and activities are structured and developed, resources are used and the level of receptivity);

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<sup>2</sup>TAYLOR, Robert S. - *Value-added Processes in Information Systems*. Norwood, NJ: Ablex Publishing Corp, 1986, cited by CHOO, Chun Wei - *Gestão da Informação para a organização inteligente: a arte de explorar o meio ambiente*. Lisboa : Editorial Caminho, 2003. ISBN 972-21-1506-5. p. 77-78.

- and the “commercial” dimension (understood as the relation between those responsible for a given service and their clients).

It was the team’s duty to participate actively and creatively in the improvement of the organization and in its progressive drive towards meeting the expectations of its clients –the townspeople and the population in general and, in a stricter sense, the expectations of the users of the Municipal Archive service (the municipal administration and services).

It is deeply believed that the project was able to effectively accomplish the necessary changes in the organization without losing sight of its fundamental strategy. The city council had “produced” an growing number of electronically-based domains and processes and was increasingly more dependent on digital information – either already acquired in digital format or that resulting from the conversion of existing analogical material –but was also keenly aware of issues related to the vulnerability of the digital environment and to the need to ensure the authenticity, integrity and reliability of the information to be preserved. It was an organization which felt the importance of the information producers’ aims and of the context of production, which took into consideration the means, media and actors involved in the information production process within the municipality and also the related administrative, legal, political, social, economic and financial implications.

In fact, it was very clear for all those involved that, from the conception of the project to the post-implementation phase, it was not a question of the simple automation or application of an

Electronic Document Management System (EDMS), but really the beginning of an integrated ERMS (Electronic Records Management System) / EDMS solution, from a systemic approach.

It is not our aim here to go into the details of the conception and development of the project. The time that has passed between its implementation and this reflection has allowed us to develop a clearer perspective and to focus our attention, on the one hand, on the consequences and theoretical reflections that we are able to derive today from a project built upon a new paradigm, and, on the other hand, on developments that took place internationally in similar areas in that period, such as, for instance, initiatives and projects that give us today different international standards, as well as a greater level of sustainability for the lines of action assumed.

The digital era, a new view of public administration and of the relation between the State and the citizen, both in the national and the European contexts, and the post-custodial, dynamic, informational and scientific paradigm, were the master lines of a project that received a prize at the time, due to its innovative character, despite the doubts (not ignored!) to which, day after day, the team strove to find solutions and answers, but which would inevitably raise new questions, in a dialectic that is strongly related to the development of scientific knowledge and to the progress of organizations.

## **2 – Information Management**

If we look at the brief description of the project, the main ideas underlining our analysis are immediately clear: Information

Management and Information Science in Organizations that are an integral part of this Information Society.

A Municipality, as with any other organization, produces/receives, accumulates and uses information. The information that it creates and receives entirely reflects its nature and aims, which not only involve the provision and maintenance of infrastructures and public facilities, economic and social development, urban renewal and spatial planning, but also the management of the townspeople's expectations, the internal organizational structure, the municipal decision flow, relations with external entities, both public and private, the municipal budget, among many other aspects.

When faced with the competences required and the demands of the Information Society, a Municipality must find response to certain needs, such as:

- implementing e-government strategies;
- decentralizing its activities, and, consequently, its offices and public reception areas;
- rationalizing/redesigning processes and distributing activities and tasks in a consistent and balanced manner;
- documenting the policies, decisions and results of all the parts involved;
- eliminating redundant information;
- conceiving and managing an information system in which analogical and digital media can exist together;
- guaranteeing greater control over the authenticity, integrity and reliability of the transactions and also of the information system;

- increasing control over access to the information system;
- complying with the legal and standardized requirements;
- protecting the interests and rights of the organization, of its collaborators, of the citizens and other agents;
- avoiding emergency or disaster situations;
- assuring the continuous use of information, in any medium, in the mid- and long-term;
- preserving the institutional memory;
- controlling costs;
- providing a quality service.

Technological platforms (hardware and software) and the use of digital media permit greater interaction with citizens and other agents, without physical limitations or frontiers, supporting, moreover, the organization's activities with increased efficiency and effectiveness.

But what does in fact come to mind, in our Information Society, when we talk of information management?

At the outset, we have the management of the information and communication technological platform, the management of information resources and the management of the information lifecycle and underlying activities, which leads us to another characteristic, essential in our perspective: its crucial interconnections with the organization and its evolutionary dynamics. This aspect is not always obvious or present, because the challenges that are faced by organizations clearly imply significant technological

investment, and thus the focus on technology becomes almost natural.

Also the role of the information manager is frequently associated to the IT/IS professional and the information system to the computing system/technological platform.

Consequently, a situation of unbalance among the variables mentioned can arise which can be easily identified with some common situations, such as:

- the lack of planning of the "information system";
- the lack of integration;
- the information needs are not identified;
- the existence of repeated information;
- the information is not evaluated;
- the dispersion of information on different media;
- the fact that standardization is not practised;
- the loss of productivity;
- the unnecessary rise in maintenance and digitization costs;
- the possibility of not complying with legal requirements;
- the difficulty in implementing a quality management system;
- the use of information that is not directly related to the strategy of the organization;
- the failure to accomplish the organization's mission and aims.

Thus, it really is not enough to:

1. have / manage the electronic means (hardware and software) involved in capturing / producing, processing, storing and accessing information;
2. have / manage information resources;
3. make the information available;
4. "manage" the information.

It is necessary to go a little further and, thus, we must:

1. plan the technology strategically, and also its capacity, performance, standards, compatibility, longevity, etc.;
2. plan the production of information strategically, including the standards of data formats, export / import methods as well as access and preservation in the long-term, etc.;
3. plan the administration of the system, the security systems, access -multilevel and through different means (local, distributed, VPN, Internet) and media-, control and evaluation of access time and the retrieval of information;
4. analyze / know, evaluate and plan the structure which produces the information / actors, the business processes / production of information, the consumers / users, the internal and external context.

As Chun Wei Choo once said "an organization learns if, through its information processing, the range of its potential procedures is changed. Thus, the main aim of information management is to take advantage of the information resources and information capacities so

that the organization can learn and be adapted to its environment which is changing constantly”<sup>3</sup>.

The real challenge that organizations face is thus a more wide-ranging. It implies questioning and “rebuilding” the entire organizational structure, the management models, the organizational processes, the resources used, and, obviously, the organizational culture itself.

In fact, the dominant feature of our society – Information – is the product of human action in society, and it reflects the structural conditions (political, technical, economic, social or cultural) in which that action is developed in order to fulfil the different aims. It is “modelled” by the producer structure, it depends on the processes that produce it, it has to be related to the operational means and to be considered in the systemic interaction inherent to the informational and historical process.

Information, as a phenomenon and a process, imposes itself “on” and “in” the organizations. Its “management” involves the entire organization and its collaborators, it accompanies the organization’s daily routine and it includes the full information lifecycle: its conception and planning, its creation, information flow and appraisal, classification, storage, preservation and retrieval. It is increasingly more related to Quality Management, with strategic business planning

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<sup>3</sup>CHOO, Chun Wei - *Gestão de informação para a organização inteligente: a arte de explorar o meio ambiente*. Lisboa: Editorial Caminho, 2003. ISBN 972-21-1506-5. p. 57.

and with organizational processes, be they management processes, production processes or technological implementation processes.

It is unthinkable to structure a Quality Management System, directed at organizational processes and its evaluation so as to satisfy more internal and external clients (and their implicit and explicit needs), make constant improvements and promote team work, without considering "Information Management" strategic to the organization. Why?

First, we must analyze the management of organizational processes, which involve information/documents, meaning that processes have to be documented to be correctly managed. The quality with which this is done is controlled with records (evidences) involving: process analysis, analysis of clients' needs, analysis of the value of each activity and task in the process and its possible reformulation. As intrinsic components of the process and, thus, of its analysis and evaluation, there are agents, tasks, rules, time frames, sequences, flow diagrams, transaction types, documents typologies used, standards and access control. Also important is controlling its implementing/execution (workflow) and its integration with other processes.

To achieve a strong organization, through organizational innovation, the following must be ensured:

- promotion of interconnections between technology, processes, people and information management;

- conception and management of a well-structured "Information System" in an integrated approach;
- removal of artificial divisions that could result from the technological, technical or spatial platforms;
- promotion of the effective use of the concept of "network" (an internal and external "network"), based on which answers to the challenges posed can be found, whether they arise from the capacity of initiative itself or as an answer to government requirements.

If the importance of information management to the organization was, in our view, unquestionable, practice revealed that its accomplishment could not be reduced to the random application of methodologies of management, of computer systems management and of information resources management.

It was also impossible to maintain the traditional documental division of information in the institutional and technological space where it is kept (archive service, library service, computer system), because this is a superficial criterion which does not take into consideration the context of dynamic production (organicity), of retention/memory and the use/consumption (functionality) of information.

A *Praxis* without a theoretical grounding that could bestow it a degree of sustainability would mean a number of occasional actions, which -- are insufficient to fully respond to the complex challenges of the Digital Era.

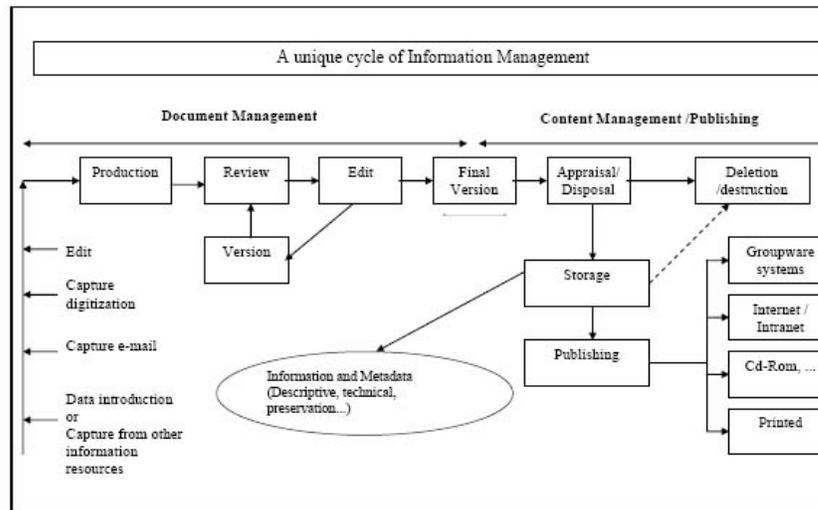
### **3 – Information Science**

Each organization must find its own model of information management, bearing in mind a common set of principles: information as a raw material; the idea that the added value is more in the process itself than in its product/service, without ignoring the complexity, dynamism and continuity that may characterize it; the key role of information and communication technologies, not forgetting the equally important dimension of innovation.

It is necessary to have a model that takes into account a cycle that begins in the conception phase of the technological platform (hardware and software), includes the production, circulation, appraisal, storage, retrieval and preservation of information, involving the organization as a whole and its business processes, which makes use of, for example, "data warehouse" technologies (information storage) and, possibly, "data mining" tools (repository with relevant information), as well as working areas which are very often separated into Document Management, Content Management and Archives Management, when indeed we are dealing with the same management cycle.

Working with "subgroups" of information, with current transactions which disregard past ones, without "synchronizing" the service to the citizen through the different means of communication using multiple technologies, hinders the development of a fundamental and integrated view of the "clients" and their relation with the organization.

Thus, a holistic view was required, that could sustain an “organizational strategy of action” and guide the creation of a systemic model that would allow the organization to be transformed, in a first moment, into a “learning” organization. This would naturally give rise to an “intelligent organization” involving the active participation of an “information manager”, fully integrated in a multidisciplinary working group, and bearing in mind that, among the organizational resources, whether they be human, material or economic, there are also the informational ones.



**Figure 1<sup>4</sup>**

Before conceiving and establishing the model to be applied, the design of the Vila do Conde Municipal Council project was based on the above-mentioned theoretical groundings, which were deeply

<sup>4</sup>Adapt. from Timothy Sprehe, J. Enterprise Records Management: Strategies and Solutions (Hummingbird Ltd)  
[http://www.hummingbird.com/alt\\_content/binary/pdf/collateral/wp/rmstrategies.pdf](http://www.hummingbird.com/alt_content/binary/pdf/collateral/wp/rmstrategies.pdf).

inspired by the authors of "*Archivistics: theory and practice for an information science*"<sup>5</sup> (published at the same time as the project's implementation), as well as on later contributions, leading to the definition of information (here understood as synonymous of explicit or materialized knowledge) in which the project was rooted, as "a structured set of encoded mental representations (signs, symbols), which are socially contextualized and can be registered on any material medium (paper, film, magnetic tape, compact disc, etc.) and communicated in a synchronic and multidirectional way"<sup>6</sup>, and the view of information management, or materialized knowledge, as a segment of Information Science<sup>7</sup>. As far as the latter is concerned, the definition put forth by Harold Borko, quoted and upheld by the above mentioned authors, is the one that best illustrates the needs the project team truly felt<sup>8</sup>. Basically the approach included:

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<sup>5</sup>See SILVA, Armando Malheiro da [et al.] – *Arquivística: teoria e prática de uma ciência da informação*. Porto: Edições Afrontamento, 1999. ISBN 972-36-0483-3. vol. 1.

<sup>6</sup>See SILVA, Armando Malheiro da; RIBEIRO, Fernanda - *Das "ciências" documentais à ciência da informação: ensaio epistemológico para um novo modelo curricular*. Porto: Edições Afrontamento, 2002. ISBN 972-36-0622-4, p. 37.

<sup>7</sup>See SILVA, Armando Malheiro da – *Conhecimento / Informação: sinonímia e/ou diferenciação?* In *Organização e representação do conhecimento na perspectiva da Ciência da Informação*. Org. Georgete Medleg Rodrigues e Ilza Leite Lopes. Brasília: Thesaurus Editora de Brasília, 2003. ISBN 85-7062-399-2. p. 23-41.

<sup>8</sup>"Information Science is that discipline that investigates the properties and behaviour of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation, and utilization of information. This includes the investigation of information representations in both natural and artificial systems, the use of codes for efficient message transmission, and the study of information processing devices and techniques such as computers and their

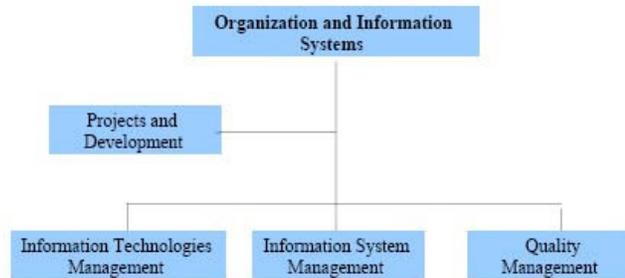
- the adoption of a scientific-informational model, characterized by the definition of social information as an object of study;
- the use of the systemic theory as an interpretative/explicative "tool" for the phenomenon called "information";
- the application of a research method;
- the use of the concept of archive as a "semi-closed system of social information".

Thus, we were able to go beyond the traditional functions attributed to Archives, Libraries and Documentation Services - to collect, to store, to retrieve -, and go further, showing what exists "upstream", in the margins and underlying these procedures, that is, the organizational structure and the agents that produce, manipulate and control information, from a retrospective and prospective angle, which is integrated and transversal to the organization as a whole. This view is absolutely essential to the correct prosecution of its aims and mission, giving rise to a new context for the information professional, who becomes a "builder" and a manager of the information system.

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programming systems. It is an interdisciplinary science derived from and related to such fields as mathematics, logic, linguistics, psychology, computer technology, operations research, the graphics arts, communications, library science, management, and other similar fields. It has both a pure science component, which inquires into the subject without regard to its application, and an applied science component, which develops services and products (...) Librarianship and documentation are applied aspects of information science".

### Proposal of Organic contextualization



What we are dealing with here is knowledge that supports an operational component that can only be strongly built if we take into consideration that, since information is transversal to the entire organization, it has to necessarily rely on interdisciplinary knowledge, a concern that had direct bearing on the formation of the working groups created throughout the project<sup>9</sup>. The interdisciplinary dimension that comes from the analysis of the multifaceted object that is information further justifies an proposal of organic contextualization that includes the sector of Information Technologies Management (ITS – Information Technologies System), the sector of Information System Management (the so-called Archive Service), the sector of Quality Management, and a Projects and Development

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<sup>9</sup>The following were considered permanent elements in these groups: Municipal Archive professionals, IT/IS professionals, a designer and a jurist who was also in charge of coordinating applications to European and national programs/projects. Besides these, there were elements from the organization: councillor, heads of department and office workers.

sector. They would all be an integral part of a new area: the "Organization and Information Systems".

At this point, it should be noted how a "four-dimensional" methodology was applied to the scientific study of Information Management, which, in this case, involved a concrete set of issues for which answers and practical solutions had to be found, without losing sight of the essential theoretical reference that would uphold the project's integrating character and strategic view.

Besides the "**epistemological dimension**" that announces the paradigm supporting the approach followed (Module 1 of the model that will be presented next), the systemic theory is at the core of the "**theoretical dimension**", inspired by holistic and complex reflection and which is specifically applied to the understanding and to the organization of information as a phenomenon and a process inside the organization. Contact with reality is done through the "**technical dimension**" including the full lifecycle of information, whose understanding is inseparable from an analysis of the results, based on prior direct, indirect and even participated observation (mainly in case studies, like this one) of the Information System and its corresponding problems<sup>10</sup> (Module 3 of the model). As we have already mentioned, the results obtained are analyzed and then evaluated in a retrospective and/or prospective way, and consequently, the concepts applied, as well as the underlying

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<sup>10</sup>The complete collection of institutional, historical, legal and regulatory elements is fundamental, as is the analysis and description of the nature and internal functioning of the Information System, and corresponding producing structure, through procedures or techniques, such as: inquiries, interviews, participated observation and the development of "operational databases" built upon the institutional memory collected.

hypotheses and theories, could be confirmed or annulled. As "products" which resulted from the focus on the structure and on the informational content, as formalized in the "**morphological dimension**", we have: the organizational charts, context tables, the classification plan (which represents the organic and functional contextualization of production and its evolutionary dynamics), flowcharts, the authority control, indexation, inventory, cataloguing, information management plan, security plan, preservation plan, etc. (Module 3 of the model). These results incorporate the investigative process developed and represent the object of study – the informational and communicational cycle / flow -, giving rise to knowledge "about" and "for" the organization in its most essential vectors: the **structure and the context of production**, the **functional service/use** of information and the **organizational memory**.

Through this "four-dimensional" method, a procedure of information management is guaranteed which permanently links five basic variables:

- efficient and effective production;
- efficient circulation of the current and future informational flow;
- prospective collection of information that can be important in the future;
- quick and exhaustive retrieval of stored information;
- access to and preservation of information in the long-term.

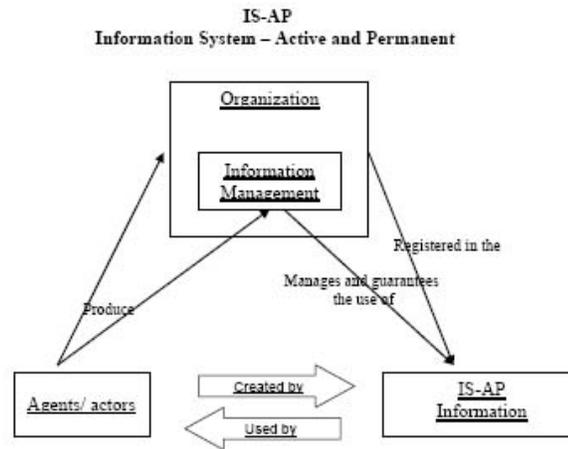


Figure 2<sup>11</sup>

Full and integral information management is essentially based on in a systemic and interactive model, the so-called IS-AP (Information System – Active and Permanent)<sup>12</sup>. It is possible to say that an integral organizational information system is, obviously, active and permanent in nature, a system with memory, which “boosts” access and has a special focus on “organicity” (structure). A system with an integrating management perspective: “e-mail management”, “image and audiovisual management”, “Internet content management”, “groupware management”, “workflow management”, “database management”, etc.

<sup>11</sup>Adapt. from "Describing Records in Context: the Recordkeeping Metadata Schema (RKMS)", p.14 - <http://www.archiefschool.nl/docs/rkmsdesc.pdf>.

<sup>12</sup>For a more developed approach, see the paper: PINTO, Manuela Azevedo; SILVA, Armando Malheiro da – Um modelo sistémico e integral de gestão da informação nas organizações. In CONTECSI - CONGRESSO INTERNACIONAL DE GESTÃO DA TECNOLOGIA E SISTEMAS DE INFORMAÇÃO, 2º, São Paulo, 2005 – Actas do congresso. [CD-ROM]. São Paulo : TECSI-FEA-USP, 2005.

At the same time, the continuous management of the information lifecycle will be structured in the following way:

1. Planning for information management
2. Creation, capture and collection
3. Organization
4. Appraisal
5. Storage
6. Use and dissemination
7. Maintenance and preservation

#### **4- The (integral) IS AP model**

In this context, and considering that the project "Integrated Management of the Municipal Information System" of the Vila do Conde City Hall was initiated and developed before the conception of the *(integral) IS AP Model*, it is extremely interesting to see how the actions developed were integrated in their different "Modules", clearly revealing the positive impact of having assumed the post-custodial, dynamic, informational and scientific paradigm and the "four-dimensional" methodology as a theoretical and practical basis for the project.

<b>1<sup>st</sup> Module</b>	
<b>Theoretical guidelines</b>	<b>Practical Execution – Case Study</b>
Scientific research (technical and theoretical) focussed on an organization and on the infocommunicational phenomenon and process that was occurring within it and/or the natural	- The entire theoretical and institutional path followed was considered and related with Information Science (epistemological dimension). - In methodological terms, a rational and

<p>interaction of the organization with its external environment.</p>	<p>inductive perspective was used, taking as a reference the new paradigm which is post-custodial, dynamic, informational and scientific (theoretical dimension) and on the "four-dimensional" methodology.</p>
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<b>2<sup>nd</sup> Module</b>	
<b>Theoretical guidelines</b>	<b>Practical Execution – Case Study</b>
<p>Adjustment or practical suitability of the theoretical research (taught and learnt in the context of University training, at under- and postgraduate level, and in technical and professional training, both continuous and by e-learning) to the concrete challenge of the implementation model.</p>	<p>- The aim was to conduct a case study (technical dimension) in a retrospective and prospective process of analysis/evaluation that would permit and serve as a basis for the development of a project (morphological dimension), based on the organization of the "Vila do Conde City Hall" and its information/archive system (paying particular attention to the current functioning of the organization and its optimization within the Information Society and Administrative Modernization).</p> <p>- The project's working group comprised the following permanent elements: Municipal Archive professionals, IT/IS professionals, a designer and a jurist who was in charge of coordinating applications to European and national programs/projects (funding programs).</p>

<b>3<sup>rd</sup> Module</b>	
<b>Theoretical guidelines</b>	<b>Practical Execution – Case Study</b>
<p>Implementation of the (integral) IS-AP model.</p>	<p>Detailed description of the implementation phases and corresponding tasks:</p> <p>a) Preliminary inquiry - an organic and</p>

functional analysis (from the 15<sup>th</sup> to the 21<sup>st</sup> centuries), involving formulating and filling in of Context Tables, specifying: aims, abilities and functions of the different organic units (involving: collecting and systematizing regulatory tools and legislation; analyzing historical, sociological and demographical research works, etc.; developing questionnaires and interviews directed at office workers in the producer services);

b) A census of the Information/documentation produced in the Organization (in different formats) and consequent intersection with the contents of the Context Tables, which permitted quantifying and typifying the informational production and its corresponding physical supports;

c) Identification, analysis and representation of organizational processes, defining processes, sub-processes, activities, tasks, time frames, agents, flowcharts, rules, standards, transaction types, types of access, types of documents used and informational production. This phase was crucial to the thorough understanding and description of the Organization in its various aspects and it was the basis for the analysis and conception of the new processes, where aspects requiring redefining, improved operation, etc., were identified, and which moreover, provided an excellent mean of discussion, control and dissemination of organizational knowledge;

d) Analysis of the existing technological information system (hardware, software,

automation/computation degree and automated processes);

e) Interconnections among all the processes (whether they were automated or not) followed by their reformulation (this action was developed in workshops in which the interested parties/agents and the project team participated);

f) Specification of the requirements for conceiving and developing an integrated information system, supported by the application of CIT (communication and information technologies);

g) Identification of the policies, strategies, regulatory and standardizing tools and architecture of the model (computer application) to be implemented, defining the areas considered and the process of priority implementation (Administrative Department and Urban Planning and Management Department);

h) Project conception and the constitution of an interdisciplinary working group: permanent elements – Municipal Archive professionals, IT/IS professionals, a designer and a jurist who was in charge of applications to European and national programs/ projects (funding programs); – temporary elements– representing the sector under analysis (councillor, heads of department and office workers);

i) Organization of the new service of Information Management / Municipal Archive that was to establish a preferential partnership with the IT/IS Service;

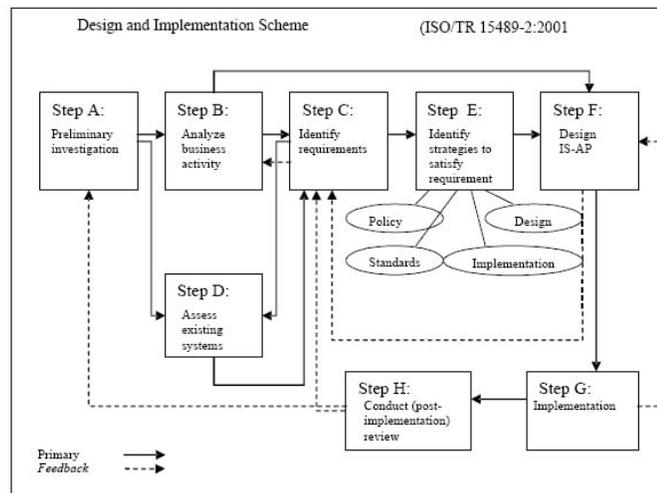
j) Ensure uniformity of the manual and automated tables that were to support the

	<p>introduction of data and the administrative, technical and descriptive metadata;</p> <p>k) Ensure uniformity of the models of documents and their transformation into an electronic format/template;</p> <p>l) Control of the entire informational production (in the different physical media), the complete lifecycle of information and the creation of metadata;</p> <p>m) Creation of users profiles for about 230 employees (producers/clients of the system);</p> <p>n) Creation of a network (LAN and WAN) linking 7 buildings (rented and dedicated data circuits, optical fibre and, afterwards, wireless);</p> <p>o) Technological/computing platform update (production, storage –including the optical support– and information retrieval);</p> <p>p) Acquisition of Electronic Documents Management software (databases and images) that was to be integrated with the organizational management software, a central point of the different means of communication/interaction with the citizens (mail, fax, e-mail, etc.), supporting, moreover, an internal system of semi-“workflow”;</p> <p>q) Installation of 11 digitization and registration workplaces, “inputs” and “outputs”. This action was done together with the acquisition of digitization equipment (till AO formats) that would sustain a retroactive transfer of media;</p> <p>r) Construction of the Intranet and of the Internet Portal;</p> <p>s) Creation of a front-office supported by the</p>
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	<p>technological and informational platform that was built;</p> <p>t) Follow-through of the producers services and their participation in the processes of organizational change;</p> <p>u) Consolidation of the team work, with greater involvement and motivation;</p> <p>v) Introduction of the CAF application (a common structure to evaluate the quality of European Union Public Administration) as an instrument of self-evaluation within the Organization;</p> <p>w) In order to guarantee the maintenance and preservation of the system created, a proposal was presented that had to do with a new sector in the organization chart that would include the sector of Information Technologies Management (ITS – Information Technologies System), the sector of Information System Management (the “common” Archive Service), the sector of Quality Management, and a Projects and Development sector. They were all to be an integral part of an area called “Organization and Information Systems”.</p>
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<b>4<sup>th</sup> Module</b>	
<b>Theoretical guidelines</b>	<b>Practical Execution – Case Study</b>
Evaluation of the model applied.	The evaluation of the project implementation made use of the CAF self-evaluation tool, as the model design was still inexistent

It is also worth noting that, when considering the unavoidable importance of international standards in this area, it is possible to establish a parallel with the guidelines proposed in the standard ISO 15489-1:2001 and ISO/TR 15489-2:2001, published after the project's end, which provides the perfect setting for the proposed model, as can be seen in the following diagram:



## 5 – Open issues

The project was developed between the end of 1998 and the beginning of 1999, at a time of rapidly growing interest in issues related with digital archives and libraries, the integrated management of the documents lifecycle, ERM (Electronic Records Management), digitization, the fragility of storage media for digital information, among many other questions, giving rise to initiatives and projects

that were crucial to the success of the answers provided to the challenges that were set by the Information Society.

The project made every effort to go as far as possible in finding answers and solutions, although it remained open to the possibility of integrating new ideas in the future, bearing in mind the fragilities/necessities identified at the time, such as:

- specification models of functional requirements for the conception and implementation of information management systems, as well as international standards that were applicable to information in both analogical and digital media (the existing tools had to do essentially with the description of the information and with the archival authority record of the producers);
- ensuring the authenticity, integrity and reliability of the stored information;
- metadata models;
- e-mails, web sites and intranet treatment;
- standardized data formats and formats that would assure the compatibility and interoperability of the systems;
- standards that can be applied to the creation, management and preservation of digital images;
- universal access tools;
- access and preservation methods in the long-term (even though the optical disk WORM was already in use).

From the projects developed between 1995/1996 and 1999, particularly noteworthy are those dedicated to diagnostic efforts and the reports consequently published, such as the one produced in

1996 by the *Task Force on Archiving of Digital Information*, created by decision of the CPA (*Commission on Preservation and Access*) and the RLG (*Research Libraries Group*) in the USA, to investigate and recommend measures that would assure the future, permanent and undefined access to stored resources in electronic format. It was the first initiative of its kind and gave rise to debates throughout the world. The project *Arches - Archival Server Infrastructure*, developed between 1996 and 1998, created an infra-structure that currently supports the RLG (*RLG Archival Resources*, *RLG Cultural Materials*, and *The AMICO Library*), as well as research that has to do with long-term preservation. Also noteworthy is the final report of the project *Digital Archiving - Early Priorities* by the RLG<sup>13</sup>.

Furthermore, the *National Archives of Australia* started, in 1995, a *Digital Records Bibliography*, periodically updated by the *National Archives*, and which aims to include the main requirements related with the management, maintenance and preservation of "digital records"<sup>14</sup>. Equally important was the establishment of the standard AS 4390-1996 *Records Management* (ISO 15489:2001 was substantially based on AS 4390), developed by the *IT/21 Committee of Standards Australia* and published in February 1996. Also in Australia the *Public Record Office of Victoria* began that same year the project *VERS - Victorian Electronic Records Strategy*, together with *CSIRO - Australian Commonwealth Scientific and Industrial Research Organisation* and *Ernst & Young*, focussing on "Digital recordkeeping". This project aimed to show the viability of capturing,

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<sup>13</sup>[Accessed on 12 Mar. 2005] [http://www.rlg.org/en/page.php?Page\\_ID=8141](http://www.rlg.org/en/page.php?Page_ID=8141).

<sup>14</sup>*Digital Records Bibliography* [Accessed on 12 Mar. 2005]  
<http://www.naa.gov.au/recordkeeping/er/biblio/summary.html>.

managing and preserving “*electronic records*”, and it also served as a basis for a group of functional descriptions of electronic archives (“*standard format for electronic records*”) within a strategy of preservation in the long-term, including a group of standards, guidelines and implementation projects whose aim it is to ensure the authenticity of the “*electronic records*” of the Australian government’s archives. The results of the project, the functional descriptions and a general overview of the demonstration system were published in the *Victorian Electronic Records Strategy Final Report*, in 1998. The *VERS@DOI Pilot Implementation Project*, developed between 1999 and 2002, became the first initiative to implement (*Department of Infrastructure*) the VERS Standard – *Management of Electronic Records and Specifications* (the most recent version dates from July 2003, and is currently spread internationally<sup>15</sup>). In 1996, the *National Library of Australia* started *PANDORA - Preserving and Accessing Networked Documentary Resources of Australia (Australia's Web Archive)*, a project aimed at the storage of digital resources in the area of the NLA, from a perspective of digital preservation in the long-term, including publications and dynamic or static web site archives based on the intervention and intellectual work of the deposit library, once the unit responsible for the resource has showed no interest in the deposit.

In the area of “*records management*”, there is the project *EROS - Electronic Records from Office Systems*, developed between 1995 and 2004 by the *PRO - Public Record Office* of the United Kingdom (called *The National Archives* from 2003 onwards) and was directed at setting guidelines in this area for government departments, including

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<sup>15</sup>[Accessed on 12 Mar. 2005]. <http://www.prov.vic.gov.au/vers/pdf/final.pdf>.

the tasks of appraisal and selection, access and preservation of electronic documents, as well as the development of access strategies in the long-term. Also worthy of note is the functional requirements project focussing on the conception and implementation of electronic documents management system, RERMS - *Requirements for Electronic Records Management Systems*, which is the result of cooperation between institutions in central administration and whose first version was published in 1999 (the last version is from 2002).

In 1996, the *University of Pittsburgh* (US) concluded a project called *Pittsburgh Project - Functional Requirements for Evidence on Recordkeeping*, which was supported by the *National Historical Publications and Records Commission*, and involved the development of functional requirements ("recordkeeping requirements") for the conception, implementation and management of "electronic information systems", including detailed specifications on metadata following the BAC model "Reference Model for Business Acceptable Communications", produced with basis on this project.

Furthermore, there was the creation, in 1996, of the DLM FORUM (*DLM-NETWORK: Electronic Records*), an initiative of the European Commission. Its primary aims included unifying the community of public archives and all those interested in archives, in the management of the information lifecycle and also in the management of documents and resources throughout Europe.

Still in Europe, the Archives of Antwerp City initiated, in 1999, the DAVID Project -*Digitale Archivering in Vlaamse Instellingen en Diensten* (Digital Archives of the Flemish institutions and

administrations), which arose from collaboration between the Archives of Antwerp City and the ICRI (*Interdisciplinary Centre for Law and Informatics of the K.U.Leuven*). It aimed to investigate digital preservation in governmental entities, as well as the establishment of good practices in order to preserve electoral and demographic data, e-mail and web sites. One result was a handbook on archiving documents electronically that was only published in January 2004.

As far as digitization is concerned, the *Cornell University Library* (US), through its *Department of Preservation and Conservation*, created in 1990, developed research from the very outset on the digitization of archival and library materials, including electronic documents as from 1996. The creation of the DIPPR (*Digital Imaging and Preservation Policy Research*) reflects the high level of importance given to digital preservation and its inclusion in the CUL projects. Between 1997 and 1998, with the support and experience of the *Cornell University* and within the scope of the project *Digital Imaging Project Preparation Tools*, the *RLG Worksheet for Estimating Digital Reformatting Costs*, the *RLG Guidelines for Creating a Request for Proposals (including text conversion and encoding)*, the *RLG Model Request for Information* and the *RLG Model Request for Proposals*<sup>16</sup> were produced.

Of particular relevance in Europe was the European Commission's IST PROGRAMME - *Information Society Technologies*, (Technologies Research Programme directed at the development of the Information Society in the European Union), especially in the domain of DIGICULT

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<sup>16</sup>[Accessed on 12 March 2005]. [http://www.rlg.org/en/page.php?Page\\_ID=408](http://www.rlg.org/en/page.php?Page_ID=408).

activities (*Digital Heritage and Cultural Content*), initiated under FP5 (1998-2002). DIGICULT focussed on resources related to digital Heritage, whether they were traditional or digital (digitized or created in a digital environment), promoting the development of technologies and innovative systems, which are necessary not only for its availability but also for its preservation in the long-term, involving archives, museums, libraries, research centres, universities, and so on.

In 1998, the project CEDARS (*Curl Exemplars in Digital Archives Project*) was initiated, centred on digital preservation (concluded in March 2002), under the general direction of the CURL (*Consortium of University Research Libraries*) and funded by the JISC/CEI through the *eLib Programme*. Its primary aim had to do with the strategic, methodological and practical aspects of digital preservation.

The NEDLIB *Harvester*, which was also initiated in 1998, was more directed at the archiving of web resources and aimed to produce freeware technologies to capture materials that were published on the web. The *Helsinki University Library* and the *Center for Scientific Computing* were in charge of the maintenance of the application.

A number of issues related to the authenticity of electronic records were the object of a project directed by the SSHRC-MCRI - *Social Sciences And Humanities Research Council* under Canada's *Multidisciplinary Collaborative Research Initiative*, called InterPARES - *International Research on Permanent Authentic Records in Electronic Systems*. The first stage of InterPARES 1 took place between 1999 and 2001, focussing on preserving the authenticity of the "records"

created and/or kept in databases and document management systems across the administrative activities. Moreover, a specific component of the project was dedicated to exploring questions related to the preservation of digital sound in the long-term. It aimed at establishing the means that would guarantee access and the preservation of authenticity of electronic records when inactive, following the selection process for permanent preservation. It involved partners from universities, archives and entities related to the industry from countries such as Canada, the United States, the United Kingdom, Australia, China, Hong Kong, France, Ireland, Italy, the Netherlands, Sweden and Portugal.

In 1999, in the United Kingdom, the experimental stage of the *Archives Hub* project was started, funded by the JISC (*Joint Information Systems Committee*) and controlled by the CURL - *Consortium of University Research Libraries*, which created a unique access point to descriptions of existing archives in about 90 higher education institutions in the United Kingdom. The access site is hosted at the *University of Manchester* and its development is the responsibility of the *Cheshire Development Team* of the *University of Liverpool*. It is worth mentioning that this experience involves the use of the protocol Z39.50, as well as of the ISAD(G) and the EAC standards.

In that same year, *The Cornell University Library / Department of Preservation and Conservation* initiated PRISM (*Preservation, Reliability, Interoperability, Security, Metadata*), a joint project that ran until 2002 involving the CUL and *Cornell's Computer Science Department* and was aimed at investigating and developing the necessary policies and mechanisms to assure the integrity of

information within the architecture of digital libraries. The main research areas included the preservation of digital information, the authenticity and integrity of the sources and information services, interoperability, security (the right to privacy of the information users and intellectual property rights of contents creators and the metadata that made it possible). The "core" of the project comprised transporting traditional preservation strategies into the digital sphere, so as to support the development of tools and mechanisms of digital preservation, involving a great variety of formats.

Project EVA - *European Visual Archive* was launched by the ECPA - *The European Commission on Preservation and Access*, running from 1999 to 2001. It aimed to ensure easy and protected access to photographic collections kept in European archives. The SEPIA - *Safeguarding European Photographic Images for Access* project (which ended in 2004), was also created at that time and also involved the preservation of photographic collections.

In terms of standardization, the following ISO standards should be highlighted:

- ISO/TR 12654:1997 - *Electronic imaging - Recommendations for the management of electronic recording systems for the recording of documents that may be required as evidence, on WORM optical disk.*
- ISO/TR 12037:1998 - *Electronic imaging - Recommendations for the expungement of information recorded on write-once optical media.*

- ISO 12639:1998 - *Graphic technology - Prepress digital data exchange - Tag image file format for image technology (TIFF/IT)*.
- ISO/IEC 10918-4:1999 - *Information technology - Digital compression and coding of continuous-tone still images: Registration of JPEG profiles, SPIFF profiles, SPIFF tags, SPIFF colour spaces, APPn markers, SPIFF compression types and Registration Authorities (REGAUT) - Part 4*.
- ISO/IEC 14495-1:1999 - *Information technology - Lossless and near-lossless compression of continuous-tone still images*.

In the Portuguese context, the SIADE - *Sistemas de Informação de Arquivo e Documentos Electrónicos* (AISED - *Archive Information Systems and Electronic Records*), initiated in 1998, was an initiative resulting from a *Cooperation Agreement* established between the IAN / TT - *Instituto dos Arquivos Nacionais / Torre do Tombo* (National Archives) and the *Instituto de Informática- Ministério das Finanças* (*Computing Institute - Finance Ministry*). As a consequence, a working group was formed under the cooperative administration of these two institutions and functioned under the authority of the *Comissão Intersectorial de Informática* (*Computing Intersectorial Commission*). The aims of the program were the following: to make general recommendations for the management of "electronic records", particularly within Public Administration; the presentation of proposals / recommendations related to the production and updating of specific legislation; the development of actions to motivate the production of Portuguese Standards that complied with the national, European and/or international guidelines and directives; the definition of an integrated model of archive systems in the information systems of Public Administration Agencies; the promotion of specific training

that complied with the programme's aims. In the mean time, the *Caderno de Recomendações para a gestão de documentos de arquivo electrónicos: Contexto de Suporte (Recommendations Handbook for electronic records management: Support Context)* (2000) and the *Caderno de Recomendações para a gestão de documentos de arquivo electrónicos: Modelo de requisitos para gestão de arquivos electrónicos (Recommendations Handbook for electronic records management: electronic records management model requirements)* (2002) were published.

## **6 – Final notes**

The perspective of information management described here, seen as the management of materialized knowledge and as a segment of Information Science, joining theoretical groundings and practical needs, bestowed a distinctive character on the project developed. Particular focus was placed on an overall strategic view, the integration and the inter- and multidisciplinary nature of a professional practice that expresses the need for an important investigative component when approaching simultaneously singular and complex realities, especially in an era where the Society's "engine" is precisely its object of study/work – information.

The period when this project took place does to some extent coincide with a period of important changes in the "sphere of electronic information", although the way in which the organization involved was regarded and the priority given to a systemic and prospective view regarding the analysis of the results and the proposals presented, laid the ground, on the one hand, for the appearance of

future evolutionary perspectives and opened the way to a wide range of questions/situations to be solved. Some of them have already been answered and some are still waiting for a concerted effort that should involve not only the class of information professionals, but also all the organizational actors, institutions, governments and industry, in a global movement set in a context of an Era that is progressively less dependent on institutional/spatial delimitations and increasingly more digital and potentially “ephemeral”<sup>17</sup>.

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<sup>17</sup>For a more thorough analysis of this matter see: PINTO, Maria Manuela Gomes de Azevedo – Do “efémero” ao “sistema de informação”: a preservação na era digital. *Páginas a&b: arquivos & bibliotecas*. Lisboa. ISSN 0873-5670. 15 (2005) 63-178.

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