

## PLACING THE ARCHIVE ON MATHEMATICAL MEANING<sup>1</sup>

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### ABSTRACT

A comparative study will be undertaken in order to unveil a set of affinities perceived between the history of numbers and awareness of the value of the archive in an organization. Two hypotheses are investigated: 1) the archive has to be perceived by the agents involved in it as an asset in the organization; and 2) electronic work environments include multiple challenges and significant possibilities for an archive and/or its management system for documents to be treated in an organization. An analytical method of descriptive nature is used based on comparison, with the aid of normative and bibliographic sources of archive. Using this method the assumptions made were checked and new actions were suggested due to continued change.

**Keywords:** Records Management; Electronic Document Management; Business Archives; Standardization; Digital Information Environments.

### 1 INTRODUCTION

A reflection on the title might lead us to mistakenly think that we are creating a research space for the countable documentation or to the context of numerical information and the electronic work environments from the archive. The latest assumptions regarding the numerical qualification are not wrong, because basically the goal is to make a comparison between the numerical evolution and position which should defend the archive immersed in an organization.

In order to do this, we conducted a study "with numeric character" meeting the evolution of the numbers and linking such progress to some similar situations which are possible to be seen in the archive. We intend, first of all, to expose certain affinities among the history of numbers and of the awareness taken about the value of the archive in an organization. We will do this through:

- 1) A path that begins with the knowledge of the Babylonian zero to finalize with the imaginary numbers;

- 2) A trail leading to the discovery of the binomial of visibility-invisibility of the archive in an organization.

We understand that any unknown implies a major effort from the people when searching for answers to new questions. We start from the assumption that this question is not always successful. Nevertheless, we believe despite considering the potential failures, that somewhere in the path of this research new ways to understand the archive arise or why not to state, new ways to "archivalizar", as Ketelaar reminded us (2001).

We intend, later on, asserting that to face certain challenges often can mean the arising of new opportunities. And so:

- 1) We enumerated some of the challenges related to the electronic work contexts;
- 2) We related part of the normative architecture designed to face them.

Our task is intended to be an invitation to reflection, to the awareness of the professional to assume an active role in front of the contexts of uncertainty. An open attitude towards change will allow him to face what is unknown starting from what he knows, as Peters (2004, p.23) advises on these contexts.

We proposed two work hypotheses: the first one we formulated as follows: in the first hypothesis, the archive should be realized by the agents involved as an asset in the organization. Understanding by asset, "[...] any property that has value to the organization" (ISO 30300, 2011, section 3.1.2).

The second hypothesis is related to the work environment, we specifically refer to the electronic context, and we formulated this way: in the second hypothesis, the electronic work environment includes multiple challenges and significant opportunities to an archive and/or management document system to be implemented in the organization.

For its proof we will use an analytical method based on the comparison and on the exploratory-descriptive nature, aided by normative and bibliographic sources of the Archivology. We created three linked statements, two of them for each one of the hypotheses, allocating a third one for a final reflection, allowing us to detail the reaching of the hypotheses and the overall goal proposed, which is showed about the

following problem: *Where to locate the archive in an organization in the knowledge society?* We expect as result to boost consciousness, to aware the reader and, if possible, invite him to place the archive in the whole organization focused on learning.

## **2 THE PERCEPTION OF THE ARCHIVE AS ASSET IN THE ORGANIZATION**

### **2.1 Pre-Numeric Systems and Archive Emptiness**

We begin the proof of the first hypothesis, transporting ourselves to very remote times, in other words, to the birth of the universe. Regardless of the definition that a theoretical physicist gives to the *Big Bang* (always qualified), any average citizen is able to express that, before this phenomenon, there was not, if I may use the expression, 'nothing', except accumulated energy. The universe, we might think that, arises from this 'nothing'. It is possible to quantify the nothing? It is possible to quantify the energy accumulated creator of the *Bing Bang*? Let's do an imagination exercise, placing ourselves in the organization and think: *What does the archive represent in an organization? Can we establish a similarity with the Big Bang? What is its value from the perspective of the organization?*

We encourage you not to lose heart before any negative answer and for this nothing better than to research the value of this 'nothing'. Let's do it from the beginning, going back in time to ancient times (without going back to the *Big Bang*, despite of having used it), in which there was no writing and therefore much less the numbers (nor, obviously, the archive). We confirmed that there was a pre-numerical age, in which, using the '*calculus*', in other words, small stones, people could count through the technique of pairing objects. So the shepherd saw 3 (three) sheep and kept 3 (three) '*calculus*' in his bag. This primitive technique was very operational, though people were unable to pronounce and represent the number 3 (three). Enumerating and counting were mistaken, since it turned out impossible to speak strictly about enumerating.

The Sumerian shepherd used a pairing technique to control the cattle. *What technique is observed in the archive when we can qualify its value in the organization with the term 'nothing'?* The archive and the organization are objects paired through linking named documents. The archive counts the documents and it usually does it in linear meters; but it does not seem to have in itself the excessive acknowledgment since the focus of the producer and, in innumerable occasions, since the point of view of society. Let us speak it out loud: the archive is there, in a way, flushed with the organization by a weak, boring multiform element, known as document. How to represent its value? When something does not count, it lacks value, let us think about it in the empty, into nothingness. This fact is not new; it has already been noted as a problem among the dissemination and the use of the documentation by Rhoads (1989) and analyzed in a second – Records and Archives Management Programme (RAMP) –, when studying the gap between the interests of the organization and the service provided by the archive.

It seems a futile subject, but pay attention, this thought on emptiness – since a mathematical focus – kept many peoples entertained for centuries. It turns out very difficult to define the 'nothing'. Although it took us almost as many years to conceptualize the archive as to confirm the nothing.

The Sumerians adopted additive systems or enumeration summations which were improved by the Babylonians, generating the numbers. The Babylonians had the cuneiform writing and of numbering performed with marks, based on a sexagesimal system. In the wide Babylonian period the natural numbers and their two basic functions are recognized. The cardinal numbers appear through the creation of symbols which represent a unit and which have an ordinal logic, as the numbers are arranged, respecting a position (first, second, etc.) according to an ordered sequence. What position would the archive have in an organization, if they had to establish a positional sequence by an ordinal number?

The boards or Babylonian tablets are authentic records, where the assets of an organization were accounted, 'the asset' of a company or an institution. The real asset – cash or quantified asset. There are numerous documents on which the assets and the nothing were expressed. In other words, in the mathematical sense, a

positive number (the asset) and empty one (the nothing). *What does the archive represent in an organization? The positive, the empty, or both?* The answer requires that we understand the role an archive can play in organizations and that we reflect on opportunities of visibility of it.

## **2.2 The Importance of Emptiness in a Numeric System and in the Organization**

Researching the archive and its operability in the organization, the work of the archive should be considered a macro process of support or a cross macro process in any organization. In this macro process two basic functionalities for every corporation are highlighted: the one of diffusion – and conservation therefore – of information in a punctual way, the demand and the time, as well as the function of the documentation conservation, ensuring, at all times, business continuity and compliance of the requirements of preservation and archive required by the producing agency, society and other parts and interested ones. In the archive multiple processes are realized, and it is possible to understand it as a system in itself, on which it is possible to discern several subsystems, as has been pointed Robèrge (1985) Jardim (1987) and other authors in an operational way: legislative and normative structure, technological structure, structure of active documentation, structure of the semi active documentation, etc.

If we increase the lens to see where the knowledge of the archive management is in the organization, as well as we commented on in another study, citing Bailey (2011), we will find it positioned at the intersection of three important corporate dimensions that conform a Venn diagram on which converge: the regulate and legislative dimension, understood as facilitator mark of the corporate hygiene; it is on itself evidence of the compliance and of the corporate transparency, and secondly, the business mark, evidence of the actions and activities of corporate business, and thirdly, the basic component of processing and of recovery-preservation of information, the technological infrastructure.

Nevertheless, in our view, there are other dimensions that interact in an entity, such as the knowledge management, the way the human capital is leaded and

the corporate culture is articulated, for example. All of them can focus directly on the informative model and of corporate needs of documental management.

The levels of corporate information may be found mediated by these dimensions. In this sense, the model of evolution of information in organizations, offered by Davis, Miller and Russell (2008) provides five levels of information management: the task level, department, corporate entity and open entity to global markets, as well as the level of full innovation. These authors point out that 70% of the entities oscillates at the second level, in other words, the information is managed by considering the cycle of a function or of a department in the organizational structure. Of course, if we add dimensions and hypothetical levels, taking as reference the levels of Davis, Miller and Russell (2008), we will understand that the informational necessities will vary from one level to another and that large variations will be produced on each one of the conclusive dimensions in an entity. This fact allows us to glimpse the degree of informative complexity and the straining that needs to be done to collaborate in an active way in an organization, since the perspective of information management and documentation. Incidentally, is not it competence of the archive?

As an example, when considering a vital requirement as the risk control – that archivists have been managing and constantly improving, as the technical report project on identification and risk assessment shows (ISO/PDTR 18128, 2012) – and associate it to an element such as the information security (ISO 27000 Series, aimed to standardize the system of information security management), the relation of risks about information security and non-compliance appears clearly when we differentiate the basic objectives and the role played by the essential corporate areas: continuity business mark, technological infrastructure mark, the legal and lawful area, and our area of information management and archive documentation.

Undoubtedly, the example shows that the *archive can play an important role in the organization*.

Returning to the evolutionary history of the numbers, we can observe that the Babylonian system in which the ciphers succeed each should be interpreted through the discovery of the values assigned to each cipher, respecting a common sense.



Sometimes this sense – the sequence of marks – had its limitations, causing confusion: similar ciphers were mistaken due to small changes of position, or the positional empty between cipher and cipher was not respected in the most desirable occasions before a numbering that we could qualify of ‘imperfect’. It was necessary a tool that would avoid misunderstandings, differences in terms of quality. Several centuries before Christ, the mathematicians of Lower Mesopotamia invented a sign that represented nothing. Some authors date the archival practice in these cultures from the Far East. Is it possible to flash the nothing and the archive? How at this point we reflect with so much skepticism? There is a reason: the nothing is much more important than it seems at first glance. In the Eastern cultures, the term ‘*shuniata*’ was being used to describe what lacks reality, identity, in other words, that “[...] what is not, the uninhabited, the emptiness” (RODRÍGUEZ-SERRANO, 2011; ROONEY, 2012).

Thus, we see that, for some African cultures, what you do not see does not exist. We mention explicitly Senge (1996, p.3) and Lundin and Nelson (2010, p.18) when they state:

Among the tribes of northern Natal, South Africa, the most common greeting, equivalent to our ‘hello’, is the expression *sawa bona*. It literally means ‘I see you’. The tribe members respond saying *sikkhona*, ‘I’m here’. The order of the dialogue is important: while you do not see me, I do not exist. It’s like when you see me you give me the existence.

Let us apply this idea to the archive: many organizations despite their existence were not able to view the archive, and this collaborated many times been an obstacle to its own vision. Would not the archive and the referenced invisibility be part of a fiction, imaginary, unreal territory? Has not the archive been considered a zero on the left in a large number of organizations? We require perseverance and determination to realize the archive as the unit in which information and documentation are managed from and to the organization. Could the archive be included under the concept of ‘*shuniata*’? Thinking about that, at the beginning, seems nonsense, however, let us follow the course of reflection.

Thanks to the existence of the ‘*shuniata*’ concept, it is possible to explain the appearance of a number representative of the concept: the birth of zero, called

'sunia', the ZERO, yes, with capital letters, that insignificant cipher in appearance, this cipher, almost identical to how it is known at present, which is born revolutionizing the whole numerical mathematic, data which allows the positional system to work perfectly. We start with an idea, the archive its value zero. The zero does not seem so insignificant in a number system. Think you in the binary system used in computer science, integrated exclusively of zeros and ones. Impossible to doubt the value of zero! The Hindu zero becomes number with proper meaning. The Hindu ciphers – unlike the marks used in the Old East – represent authentic numeric symbols. As we see, the nothing can be very important, although the cultures show (in case you thought about the archive) that the zero, so valuable, is not necessarily essential. This idea was demonstrated by the Romans, who raised an empire without zeros. This is not only about zeros. Although we found out that the Hindu zero is our zero, therefore very persistent, at least in time. *And what is a collection?* Do not we talk about an accumulation of documents that respect a positional sequence and are persistent in time? Let us consider the archive fulfilling in the organization the positional work of a zero. Undoubtedly, we will not see it so insignificant.

Brahmagupta (Century VI) was the author of the first mathematical treatise, on which it is explained the operation of zero (ROONEY, 2012, p.21). Although, when he wrote such booklet, the zero was already consolidated since several decades. We cite the author, because this philosopher-mathematician was the first who related the concepts of the nothingness and the emptiness. The zero appeared in India as a barrier which separated two opposing and parallel worlds: positive and negative numbers. Brahmagupta stated that the opposite of a debt is an asset (the opposite of the passive is the active); the opposite of a negative number (less than 0 or a 'debt') is a positive number (greater than zero or a 'credit') and vice versa. *Is it possible to apply to the archive of an organization the parallelism proposed by Brahmagupta?* In other words, are we able to observe it as the result of two opposites: positive or negative?

In the history of the evolution of the numbers, we understand that they help us to find answers to the riddles of the world. Since an archival focus, based on the consideration of the value of the archive as a 'zero on the left', we understand that



even so, the archive can take up the challenge of information needs of organizations and show itself as an opportunity. Its value is therefore considerable. The potential role they may have to face at the management of individual and corporate knowledge is vital, both as archivist – human capital which knows the facts, which knows the procedures and the needs – and a growing body of information and documents that conforms the basis to talk about competitive intelligence. This is possible whenever we are able to articulate competencies, skills, information, documents and requirements in any organization.

The archivist has a way to overcome the obstacles of invisibility. The archivist can place the archive in the organization as a positive factor, in other words as active. In short: it is about a professional who subject to change, often reduced to an unfortunate image in the organization, has at the present moment the opportunity to place himself in the entity, even being a servant of numerous requirements, given that the latter needs more specific performances, according to the archive work. Similarly a new approach of document management contributes to this integration: the standard model ISO 30300 (2011), which defends the incorporation of elements through the recognition of a management system for the documents in the organization, as it is represented in the Attachment of the cited standard.

In order to systematize ideas since the archival perspective, the evolution of the numbers allowed us to confirm that:

- The zero on a numerical system is of great importance.
- The archive in an organization is essential if it is viewed as a unit that collaborates with the corporate knowledge management.
- The archivist manages information and documents that are basic in the knowledge management.
- It is possible to combat the invisibility of the archive at the change management.
- The standard model ISO 30300 (2011), of systems management for the documents, provides an integrated view of the system of documental management in an organization.

- The competence and professional skills management, the participatory leadership and the documents management allow talking about archive of organizational competitive intelligence.

As D'Alós-Moner points (2012) when reflecting on the reasons to talk about the knowledge management:

We, Documentalist professionals, have the knowledge and we are able to cover, within the organizations, and mainly in the companies, the wide range of activities that goes from the management of information, the knowledge management, passing through the documental management. The organizations, the people who work on them, and mainly those who take decisions need something more than information, they require knowledge.

### **3 CHALLENGES AND OPPORTUNITIES FOR THE ARCHIVE IN ELECTRONIC ORGANIZATIONAL ENVIRONMENT**

#### **3.1 The Greek Incommensurability and the '*Continuum Record*'**

With the intention to investigate the second hypothesis proposed on the effects of multiple challenges and significant opportunities existing for an archive and/or management documents system, we begin the research stretching back to the Roman civilization. Although despite that precisely the Romans, who gave us so much culture, did not excel in Mathematical Science, comparing with other cultures. Their numerical system prevented them from having a minimally operational accounting. How did they solve this problem considering the trade volume of a whole empire? They ended the obstacle by adopting the expanding a very simple machine: the abacus, this one which is considered the first existing computer in an era that we qualify pre-computing.

We rely on the abacus to introduce a major actor of mathematics in our days, the so-called binary system; known in the environment of information and documentation under the name of information technologies and communication (ITC) or of technological infrastructure, as defined in the previous statement. The first observation about its existence is the one that it affects in a direct way the archive, forcing it to theorize its conceptual, regulamentary and normative models, although in

principle, it presents itself as an opportunity, despite the large and numerous challenges that it drags, data that focuses on the archive as a factor generator of visibility.

Unlike the Romans, the Greeks were great lovers of Mathematics. For them, mathematics represented an essential subject to aspire to wisdom. On this passion, we can find a veiled relation between the Mathematics and the archive, because the last one manages the knowledge of an organization and aspires to preserve the memory of the peoples who we consider part of the wisdom. In this regard, Delgado-Gómez (2007, p.29) tells us that "The archive document is a communication process that, among other things, contains evidence of actions, for purposes of responsibility and memory" and Cox (2003) understands that in the process of valuing an act of memory is realized, by defining precisely this last concept, the memory, as an 'element' that is possessed (at the interpretation of history) and that passes from generation to generation, being interpreted as a sacred set of meanings that constitute the heritage or the identity of a community.

Nevertheless, in spite of their research in mathematics, the Greeks started from some wrong knowledge for the calculation, because they did not know the applied use of a positional system, employing instead a technique of division into segments in the form of numbers, because they believed in the permanent availability of a common measure for the realization of their calculations. Therefore, entertained with the invention of prime, composed, odd and even, square, cubic numbers, etc., they ended up blinded with an emerging unknown factor: the incommensurability, as they believed in the permanent availability of a common measure unit (operation that we know as commensurability). This fact led the Greek mathematicians to face a complete review of their mathematical foundations around the incommensurability, since it forced them to renounce their system based on the numerical proportionality used with the natural numbers.

They had to learn to recognize and to differentiate the indivisible units (in other words, the rational numbers) and the infinite reducible magnitudes (the irrational numbers). The number PI is a famous irrational number, worked by them.

In the archives, as it happened to the Greek mathematicians, the electronic environment forced us to make a thorough review of the founding and empirical knowledge. The geometry – through the obstacle of the Greek incommensurability – taught us that not all things are indivisible units. There are objects that exist in a continuous way and cannot be divided into separate parts or isolated bodies. We archivists have recently learned that the cycle of life should not necessarily be interpreted – and worked – as separable but, on the contrary, there is a continuing way to analyze it. The *Continuum Record*, designed in an electronic environment, includes a way to understand and work the data, the information and the document to meet the information needs of a task, of a position and the organizational needs in order to allow the evidence and to know the requirements of the documental management, since the document creation to the constitution of the social memory of the peoples. It is over 25 years that we can speak of a new configuration in the way to understand the management of documents in electronic work environments. This configuration proposes the identification of the documents, its intellectual control, and its analysis of access to availability, its physical control before, during and after the creation of the document and its capture in an electronic system. Such configuration is identified with a model based on '*Continuum Record*', which features the new proposal. At this time, we invite the reader to answer the following question: *Do we live in a separate or continuous universe?* The continuous magnitudes surround us everywhere and constitute the incessant and continuous extension of nature.

The view of the continuous document in an organization becomes more complex if we consider as potential the several levels of information management existing in an organization, on which converge organizational culture, technologies, regulamentary marks, etc. How to guarantee that information? Through careful examination of the flows, of the needs in each one of the environments and among their connections. Through the calculation and the prediction of what may happen; through the control of each indicator which reveals vulnerabilities, income, confidentiality, compliance, conformity, etc.

Euler, of Swiss origin, lived in the XVIII Century. He was a brilliant mathematician, who looked for useful solutions to everyday problems. He proposed,

among many other contributions, to represent the *number e*, which is an irrational number (its approximate value is 2.71828182...). This number usually appears in the operations of infinitesimal calculation, which is a very important section of Mathematics in Science today, as it is in charge of the study of the magnitudes variation. You must be already thinking in a similar situation with the archive, because we are part of these changes and we saw the *number 'e'* recorded on a boulder. The *letter 'e'* – of electronic, from permanent archive – used as logo by the Australian archivists, so concerned about guiding the management of documents in their administrations, interested in essence in the numerical archival knowledge and in its preservation on time.

The electronic work environments assume new challenges and opportunities for the archive and the documents. The technological advancement enables the archivists to design and explore several models of 'archives' that can live together in a harmonic way and be present in all organizations. We have background in physical format – conventional from the pre-computer era – from background derived from machines and automated functions in traditional format, electronic documents, scanned documents and virtual archives. The technological advances have favored the arising of new forms of information visualization and its availability. That fact brings an advantage about how to design the archive, to manage documents, to provide information *when and how it is needed*. In essence, advantage about how to communicate with the user through a direct and virtual service. In turn, such advances favor a higher concentration of documents and more complex information flows, realizing the volume, the flows and the information needs in a way more integrated with the business processes. Binary system, informative need, documental system and business processes must be harmonized.

### **3.2 Identification of the Main Challenges**

Nevertheless, the opportunities are accompanied by major challenges. Multiple problems and foci emerging from obstacles associated to any of its functions are observed, but rather to its maintenance, conservation, access-restriction and

availability in time. Bustelo-Ruesta (2011) exposes clearly through a brief analysis of the main challenges related to the information supports, the availability of information in time, the access restrictions, the safety and the protection of the documents and/or of the information and the existence of a cybernetic user who considers increasingly necessary in his work, the availability of the document in electronic support.

These challenges multiply today, when we think of a concept that we still situate in the imaginary land, called 'digital preservation'. It is that the archivist faces challenges, not only from the functional focus or of service, but also numerous risks related to the implementation of any informatics application in the business processes and in the processes of documental management.

The first part of the standard about electronic document management in administrative environments (ISO 16175-1, 2011) establishes a relation of related risks: to the software selection; to its execution; to technical compatibility; to the lack of communication on advances or problems with end users; to the ability to apply an appropriate program of documental management; to the training; to the initial yield of the productivity associated to the lack of familiarity, scalability, or even with no the consideration of organizational change, among others.

In this same production environment, although it is about the scanning process, the technical report on implementation of scanning (ISO/TR 13028, 2010) includes a listing of risks linked to this process in administrative working environment, among which we highlight: the longevity and the ability in reusing scanned documents, the technologies themselves and their evolution, the risk of loss of documents authenticity, as well as other unforeseeable circumstances linked to legislative or documental requirements.

Certainly, the risks of digital preservation are detailed by Keefer and Gallart (2007, p.55), showing their incidence on the vulnerability of digital resources linked to both the dependence of these elements of computer resources, as to the independence of the physical support; such aspect which facilitates its change and even its elimination. It is what these authors named as volatility and virtuality. These traits, which in principle are not negative, entail certain risks. Citing Smith (2001), the



mentioned authors indicate that the digital resources lack firmness, stability and durability characteristics.

The combination of these elements focus on the possible loss of digital information, whose causes can be grouped into three categories: technological obsolescence, fragility of digital support and volatility of digital information. Likewise, Voutssás-Márquez (2011) specifies other types of threats or factors affecting the preservation, such as: documental (linked to the authenticity and integrity of the document), those associated to the loss of significant properties of the components of digital resources or those associated to the user community (social).

The impact of these risks focuses on the access and the use of the document (obsolescence), on the loss of information and the appearance of errors in the data (fragility information), about the sudden change of data or its disappearance (information volatility), on the modification of contents and the consequent nullity of the evidence value (documental authenticity), on the modification of the resource essence and its production context (significant properties) or on the types of constitutive elements to be preserved depending on the user (social) (DIRECTRICES..., 2003; VOUTSSÁS-MARQUEZ, 2011).

### **3.3 Structure of Document Management Applications in Electronic Environments and Normalization for its Management**

Three modules or informatics structures of documental management tend to be differentiated in electronic environments: module of electronic document management, module of the document lifecycle management, module of historical management or permanent fund.

The first captures, describes, digitizes and favors the documental management in electronic and hybrid environments, with computer development workflow and Business Process Management (BPM) or with availability of web environments. This module facilitates the creation and management of data, information and dynamic documents, ensuring their registration and identification. The second classifies, evaluates, controls the level of access, indexes the documentation and streamlines the conservation calendar. It also allows the

maintenance and management of archive documents during its life cycle. The third module is intended to store the documental information in long term and to manage its technological upgrade. The module is aimed at the preservation of historical documents and digital repositories. The essential function is the one of conservation and service. The applications of these systems are focused on the preservation of open digital repositories.

Duranti (2004) and his team, through the project InterPares, observe two phases in the lifecycle documents management, which are: the phase of creation of active documents and of control of semi active documents and the phase of control of historical documents. The transit of documents between the two phases occurs through the conservation calendar, which as a management tool of the life cycle becomes critical. In this perspective, the project InterPares theorizes a model which will be widely developed. In the series of standards ISO 30300 (2011), about administration of systems of documents management, the processes based on these phases are outlined, generating very clear goals for their achievement.

A reading of the standard, designed to the requirements of this series (ISO 30301, 2011), allows us to recognize four essential objectives during the document creation<sup>2</sup>, to which are linked ten processes<sup>3</sup> and other many goals to the treatment phase<sup>4</sup>. On this phase eighteenth cases are listed<sup>5</sup>, I mean, twenty eighth cases are listed linked to both phases, which are considered strategic or key and that should be documented. Moreover, other processes are listed derivatives from the system management (control objective)<sup>6</sup>.

The complexity of objectives detail and processes can be understood, as the standard aims to be factor of integration, highlighting its trend towards the harmonization, as it is reflected on its Annex B (ISO 30301, 2011, Annex B) on which it is incorporated the identification of the interactions of the design and control processes of the model ISO 30300, about the documental requirements of the standards ISO 9001 (2008), ISO 14001 (2004) and ISO 27001 (2005).

Observing the basic structure of the informatics applications, designed to the documental management and to the importance and volume of processes derived from the same, we understand that the trend in the management of conventional

documents and/or electronic derives from the normalization of the management and coordination of standards. In fact, we have a series of standards for the management of documents in a computerized administrative environment (ISO 16175, 2010), of standards that facilitate the implementation of projects of documents scanning in computerized offices and of their management; of technical reports which allow the analysis of the business processes (ISO/TR 26122, 2008). We have standards which rule the implementation of management systems for the documents and allow controlling the whole lifecycle of documents series ISO 30300 (2011) about Founding and Vocabulary and ISO 30301 (2011) about Requirements; It was completed a series of standards on the management of metadata (ISO 23081-1, 2006 - Foundations), (ISO 23081-2, 2009 - Guidelines) and (ISO 23081-3, 2011 - Assessment). In the module of permanent management rules are applied, such as: ISO 26102 (2007) about requirements of document management in long term; ISO/DIS 13008 (2012) about migration and conversion; ISO formats 19005, part 1 (2005), part 2 (2011) and part 3 (2012); ISO/DTR 17068 (2012) about verification by a third part of repositories for digital documents.

#### **4 MAIN CONCLUSIONS**

The comparison of the numerical evolution, regarding the challenges that the archive and its consequences had to face has allowed us to offer a response to the problem proposed, besides proving both hypotheses. Upon the first, around the assignment of positional numerical systems and the articulation of the number zero, we see the potential value that an archive can acquire to the organization, given the need that the corporations have of information management and of the degree of complexity that this entails.

In turn, we see how the Greeks and Swiss contributed in the numerical evolution. Thus, we understand the power of the advances in the documental management in binary contexts. This way they were identified the main challenges that the electronic environments brought to the archives, being also pointed out the advances in the structure of informatics applications, as well as in the arising of

specific standards which help and regulate the work in each module and in the system administration of the document management. The phases, the objectives and the specific procedures were listed for each one of them, with the aim to demonstrate that, despite the unresolved problems found, a very detailed methodology was developed.

We conclude by proposing again the question: *What is the importance of the archive in an e-administration?* If we refer to a gear of archive in the binary system – composed by zeros and ones – could this be contemplated as positive and/or negative? Let us remember that the mathematician Brahmagupta stated that the opposite of a debt is an asset (the opposite of the passive is the active); the opposite of a negative number (less than 0 or than 'debt') is a positive number (higher than zero or than 'credit') and vice versa. Finalized this comparative raid through the way of the numeric archive, would it be possible to place it in the organization, making a parallelism with what was proposed by Brahmagupta? Let's see, considering their proposals, let us prove their maximum applied to the archive. Like that:

- a) When the Hindu points out that "The sum of zero and a negative number is negative", we highlight the following: the sum of the archive, to which was assigned a value of zero, in a positional corporate system, and a negative number (understood as any negative perception of the organization on the archive, when depreciating it and considering it passive value, compared to other tangible values, such as money) is negative for both: for the archive not valued by the organization and for the entity that does not enjoy an informative organized level and that therefore has it passed on about its information and documental management process.
- b) Therefore, before the maximum that the sum of a positive number and zero is positive, in other words, the sum of the archive and a positive number (the positive perception of the archive by the organization, considered as an intangible asset) is positive for the archive and for the organization. Undoubtedly, the negative perception will disappear as the archive meets the information needs of the organization, including those

derived from the electronic environments, or perhaps like as it happened to the Greeks, we will note precisely that this binary system forced the archive to the review of its grounds, setting up itself as its main dynamic factor and therefore as the converter of zero (negative) to a higher figure (positive). On this line of thought, we give reason to D'Alós-Moner (2012), when reflecting on the reasons for the invisibility of the archivist in the organization and the role he plays, when stating that the professional has "[...] a somewhat 'theoretical' view of the profession, a little accustomed to having to explain the value he brings to the organizations. When in reality what he offers is a lot".

- c) Before the last proposal of Brahmagupta, which states that the sum of zero and zero is zero, we think about the following: the sum of the archive with the archive (understood this as the unit that the organization does not consider) is the emptiness, because it is canceled all the service option for the organization.

The mathematical formulation of the continuous, of the continuity is represented by the real numbers and the units of measure. A simple view of the evolution of the numbers reminds us that mathematicians drew imaginary lines to understand the world, translating it into numbers, words and symbols, but this does not imply that they can probe the smaller particles or the infinitely higher ones. It is possible that the same happens to the archive, we give answers to the challenges, creating opportunities however we must go on reflecting. Euler and other mathematicians worked on the invention of other types of numbers, the imaginary ones, which are represented by the letter 'i' and, in our view, are the strangest and the most disconcerting numbers. The mathematicians employ the 'i' of imaginary to refer to impossible numbers, and thus learning about the evolution of the numbers, we find that on this comparative becoming the impossibility is often outdated. Observing on a plan to e-society, e-administration, the paperless office, the archive on the network, the virtual archive, or e-archive, and why not i-archive? Let us not lose the practice and let us give continuity to the other maxims, no longer announced by a Hindu, but by those mathematicians who formulated challenges based on a

'guess', in other words, in the imaginary; riddles as the following: *an arithmetic rule states that a number negative multiplied by another negative number always produces a positive result*. The archive, considered with a corporate value of zero, reinvents itself and from its emptiness creates a potential positioning in the organization. If we were able to re-imagine the archive, that is, to build an 'i-archive', imagine where we will arrive tomorrow if we set? Nothing better to invite to action rather than ending with the reflections of Manguel (2012, p.60), to which we often refer to and make them ours:

Every group that is object of prejudice have this to say: we are the language in which they speak to us, we are the images on which they recognize themselves, we are the story that we're doomed to remember because we were excluded from an active role ... But we are also the language in which we question these assumptions, the images with which we invalidate the stereotypes. And we are also the time in which we live in, an age to which we cannot be absent. We have a proper existence and we are no longer willing to continue being imaginary.

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## NOTES

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<sup>1</sup> Conference given on September 19, 2012, in São Paulo State University (Unesp), Marília Câmpus, to the students of Postgraduate Program in Information Sciences.

<sup>2</sup> The following objectives are formulated: Objective 1: What, when and how many documents should be created and captured. Objective 2: What content, context and information should be included. Objective 3: What support and structure should the documents have. Objective 4: What technologies are appropriate for the documents (ISO 30301:2011, Annex).

<sup>3</sup> The following processes are identified (P): To the objective 1: P1-identification of information needs; P2- Definition of management requirements. P3- Design of reliable Document; P4- Decision on retention deadlines. P5- Application of conservation rules. P6- Definition of methods of integrated capture. For Objective 2: Identification P7-contextual and descriptive identification. P8- Identification of capture points. For Objective 3: Identification of P9- Identification of specific requirements. To objective 4: P10- Selection of technologies.

<sup>4</sup> The following objectives are formulated: Objective1: Control of meta-data. Objective 2: Provisions of use. Objective 3: Availability and Objective 4: Provision.

<sup>5</sup> The following objectives are formulated: Objective1: Control of meta-data. Objective 2: Provisions of use. Objective 3: Availability and Objective 4: Provision. The following processes are identified (P): To objective 1: P1-registration. P2- Rating. P3- Implementation of the frame. P4- Selection of meta-data. P5-Determination "Even History". P6- Control of documents in the organization. For Objective 2: P7Design of access rules. P8 -. Implementation of access table. For Objective 3: P9- Integrity and availability management. P10-Maintenance and availability. P11- Implementation of availability. P12- Restrictions management. For Objective 4: P13- Implementation of the provision. P14 Authorization of disposal. P15 Transfer to another system. P16- Relocation or "remove". P17- Destruction Management. P18- Evidence of destruction Management.

<sup>6</sup> The following processes were identified: P1- Systems identification. P2- of Implementation decisions evidence Management; P3- Management of access to the documents systems to; P4- Ensuring the availability of documents; P5- Ensuring of the system effectiveness; P6- Ensuring and Integrity and P7- Changes management.

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