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# Documents in Knowledge Management Support: A Case Study in a Healthcare Organization

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## 1. Introduction

Documents are entities of great importance, both in the social context and in the organizational environment. The very ordinariness of the term "document" masks the complexity involved in defining what a document is, and belies their significance in the Knowledge Management scope. This article is intended to focus on the pragmatic dimension to the study of documents with the aim of characterizing them in ontology-based systems. A historical account of the origins of documents is outlined, together with a development of the theory of document acts – a theory which treats of what humans can do with documents. The pragmatic characterization is reached through a template to be followed with the aim of analyzing examples derived from a case of study about medical organizations.

## 2. Documents in healthcare organizations

Defining Knowledge Management (KM) is no trivial task. The meaning of KM is neither straightforward nor consensual. On the one hand, one can claims that KM is not possible, since knowledge is what the individual knows and involves mental processes, like understanding and learning, which take place in one's mind only. On the other hand, one can consider that KM consists of the set of administrative practices whose objective is to deal with corporate knowledge and which are aimed at providing for business needs. We follow here the latter perspective approaching the knowledge recorded in documents, which are employed in organizational communication processes.

Documents are valuable entities for KM initiatives, once they are pervasive entities in the everyday life, in different sorts of organizations, acting as endpoints of information flows. A wide variety of documents is used in a multitude of fields of human activity, which makes complex the task of seeking systematic approaches to characterize them. In seeking an introductory understanding of the role of documents in KM, we present a fragment of text extracted from a medical standard[1], which illustrates the multiplicity of documents required to carry out an ordinary activity in healthcare organizations:

[1] Adapted from HL7 version 3 Standard: Blood, Tissue, Organ; Donation, Release 1, Committee Ballot 2. Retrieved August 22, 2010, from http://www.hl7.org/

*"Eve Everywoman arrives at a blood bank collection center and fills out the donor questionnaire including common identifying information: name, gender, etc. Additional information is collected, such as: blood type, recent surgeries, recent illnesses, diagnosed diseases, etc.*
*Horace Helper verifies that Eve is a new donor and registers her as a candidate in the blood bank system. Nancy Nurse evaluates Eve's donor questionnaire answers and determines that Eve does meet the initial eligibility requirements for blood donation.*
*At this time, a unique Donation Identification number is assigned, which will distinguish Eve's blood samples and blood products from this donation event throughout the entire process. This blood donation ID has been established as mandatory by International Regulations. Then, Nancy Nurse enters a new blood donation order into the blood bank system.*
*Nancy Nurse asks Eve to read a blood donation consent form, which informs about the possibilities of adverse events which can follow a donation. Nancy Nurse draws a sample of blood from Eve, which is taken to the blood bank laboratory for hematological tests.*
*Dr. Boris Bleeder uses the blood bank system to query the lab system for the results of the lab test done on the blood samples. He evaluates the lab results, determines that Eve meets all donation requirements, and asks her to sign the consent letter to continue the donation process.*
*Nancy Nurse positions Eve and performs the activities associated with the blood donation itself. Nancy Nurse enters all the donation event information into the blood bank system and delivers the labeled and identified whole blood bag to the Blood Bank Laboratory for further testing, analysis and manufacturing."*

The text above describes an everyday situation in which a person wanting to donate blood triggers certain procedures in a healthcare organization, more specifically in a blood bank. Throughout the whole process, data are employed to fulfill forms, reports and labels. Further, data are recorded in information systems (e.g. the *blood bank system*) and in documents (e.g. the *donor questionnaire*). From a practical point of view, it is to such recording function that documents primarily serve. Some documents, though, are bearers of additional properties and not merely record data. This is already true for simple documents aforementioned, for example the donor questionnaire, in which a donor sign thus testifying the validity of the information therein provided. Those documents reveal other aspects, insofar as they give rise to new sorts of commitments. Through a document, one can create obligations to others, as in the case of a *blood donation order*; acquit an institution of legal problems, as in the case of a *consent letter*; induce the adoption of certain procedures, as in "[…] *established as mandatory by International Regulations*". Hence, documents exhibit a variety of ethical and legal powers, playing an essential role in many human interactions within organizations.

In this chapter, we argue that KM in healthcare organizations can take advantage of an appropriate characterization of documents according to pragmatic aspects. In order to explore the significance of documents as organizational agents, we build upon the *document acts* approach. Document acts, roughly, concern to *what humans do with documents* in their interpersonal activities into organizations: from signing or stamping them, to depositing them in registries, to using them to grant or withhold permission, and to establish or verify identity (Smith, 2010).

In what follows we outline the importance of such document acts in the organizational environment, seeking to shed new light on two main issues: i) how to reach a pragmatic characterization for documents regarding the effects they cause in the organizational routine; ii) how to identify the role of documents in organizations according to the pragmatic approach. As the main contribution, we develop such template grounded on well-founded theories, providing to the KM practitioner a tool to formally distinguish

documents. The investigation takes place within the scope of a KM project underway in a medical organization specialized in hematology and blood transfusion (Almeida et al, 2010).
The chapter is organized as follows: following a brief historical account of the origins of document, we describe theories to manage the complex phenomena arising from the usage of documents into everyday life and, eventually, in the organizational environment. After emphasizing the relevance of documents as economic entities, we present a case study in which we provide a template for characterization of documents in a medical institution. Thus, we explain the rationale underlying the template and provide examples of its use in real situations. Finally, we discuss findings and present our conclusions, as well as perspectives for future work.

## 3. Documents as social and economic entities

In this section we advance the theories capable of enabling a more comprehensive view of the phenomena that take place in organizations from the usage of documents. First, we bring a historical overview about what a document is. We explain documents as social entities, and so as economic entities, seeking a better understanding of the document role in organizational scenarios.

### 3.1 Prior approaches to define documents: A brief historical account

The Greek word associated with the term *document* is the verb *δοxεiv*, whose sense is most closely conveyed by the English verbs "to show", "to represent", and "to prove". The Latin term *docere*, "to educate", was derived from this Greek root, with the senses of "explaining something through a narrative" and "proving a fact or a conclusion through logical argumentation". *Docere*, in turn, gave rise to the Latin term *documentum*. The present-day term *document* keeps the sense of "instruction regarding an action with the aim of confirming a fact" (Fernandez & Arroyo, 1982). Taken literally, a document is a kind of example, instance or warning that teaches us something. With this slant, the term document also acquires a deontic-normative connotation, that is, denotes something concerning duties or obligations.
During the nineteenth century, a field of study called *documentation theory* emerged in the face of the rapid increase in the number of scientific publications. This increase was due to the appearance of periodicals in addition to books, as well as of technological fields in addition to natural sciences. Hence, the necessity arose for the continuous publication of articles in periodicals, as scientists had to be kept informed of the latest research; and with this came the need for the analysis of such publications. This analysis came to be known as *documentation*, a word that replaced *bibliography* to nominate the field concerned with the management of documents. The pioneers of this field were Paul Otlet[2] and Suzanne Briet.[3]
A document is also extensively studied in the archival field. *Archival documents* are created or received by a physical or juridical person, that is, a person or a group of persons having the right to act in a legal capacity, in the course of a practical activity to accomplish specific purposes. The primary purpose of archival documents is to serve legal and evidentiary roles in public and private organizations. Their secondary goal is make possible historical and cultural investigation.

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[2] Paul Marie Ghislain Otlet, Belgian documentalist, 1868 – 1944
[3] Renée-Marie-Hélène-Suzanne Briet, French librarian and historian, 1894 – 1989

Nowadays, a document is defined as: "a written or printed paper that bears the original, official, or legal form of something and can be used to furnish evidence or information" (American Heritage Dictionary, 2000). Such a definition leaves some questions unanswered when applied to documents of the sorts which we have to deal with in current organizations. Schamber (1996), for example, points to questions that arise in the context of the emergent technologies of the late twentieth century: Do linked portions of documents constitute a single document? Does a thread of email messages, or a set of records in a database, constitute a single document? Who owns the intellectual rights to the contents of a set of documents created through collaboration?
It is beyond this chapter goals to discuss the full extent of the complexity of the aforementioned fields of study. Some useful references one might consult to know more about this matter are Buckland (1997) and Schellenberg, (1956).

### 3.2 Documents as social entities
In this section we advance the theories capable of enabling a more comprehensive view of the phenomena that take place in organizations from the usage of documents. Thus, we first explain how very ordinary obligations are created from the use of human speech through the framework of the speech acts theory. Then we present a unifying view called *document acts*, which creates a bridge between speech acts and documents.

#### 3.2.1 How obligations are created
Since Aristotle, the study of language had been viewed as pertaining only to uses of a language of the statement-making sort. The discovery of speech acts in the 20th century matches the recognition that we can use language to do other things beyond merely describing reality. Thomas Reid[4] and Adolf Reinach[5] are recognizes as responsible by the initial efforts to advance in a theory which explains other uses of language (Smith, 2003).
Reid employed the expression *social acts* to explain uses of language – such as giving promises, issuing warnings, granting forgiveness and so forth – that must be directed to other people. Reinach, in turn, developed a systematic theory of the performative uses of language – that is, the uses which are performances of acts of certain kinds – with emphasis on the act of promising applied to the analysis of legal phenomena (Mulligan, 1987). However, Reinach´s theories remained without influence and the main developments of speech act theory, as we know it nowadays, were first set out by Austin.[6]
Austin realized that some sentences do not describe anything in the world at all, that is, they are neither true nor false. Instead, they seem to enable something to get done, that is, they are performances of acts of certain kinds (Austin, 1962). These sentences are named *performatives*, by contrast with sentences in which something true or false is being stated, which are called *constantives*. The speech acts theory establishes that, in any ordinary language, a speaker performs acts of three different kinds: *locutionary acts*, in which, more than merely uttering sounds, one is speaking the words with the meaning they really have; *illocutionary acts*, in which one is using the words in order to ask a question, give an order, make a promise, and so forth; and *perlocutionary acts*, used so that one can draw someone's attention to something, or to convince someone to do something.

[4] Thomas Reid, Scottish philosopher, 1710 – 1796
[5] Adolf Bernhard Philipp Reinach, German philosopher, 1883 – 1917
[6] John Langshaw Austin, British philosopher of language, 1911 – 1960

Morris (2005) explains that the most important language features depend on the illocutionary acts being performed, rather than on the meaning of words and sentences. Examples of the effectiveness of speech acts are obligations and claims to which promises and orders give rise and the behavior which certain speech acts are intended to bring about. Austin's general speech acts theory was consolidated into a theoretical framework due to Searle[7], in which the dimensions of utterance, meaning and action could be seen as being unified together. The key aspects of Searle's framework are *constitutives rules*, *institutions* and *collective intentionality* (Smith, 2003).

Searle (1985) makes a distinction between *regulative rules* and *constitutive rules*. The former merely regulate existing forms of behavior, but the latter, in addition to regulate, also create new forms of behavior. Thus, a constitutive rule has the form *x counts as having status y in a context c*, where the y term marks something that has consequences in the form of rewards, penalties, or actions that one is obliged to perform in the future. Constitutive rules made possible, for example, games like chess, football or basketball. Speech acts are performed by uttering expressions in accordance with certain constitutive rules.

The constitutive rules themselves rarely occur alone, but within the scope of a certain rules system. The *institutional facts* are the facts whose existence presupposes the existence of certain systems of constitutive rules called *institutions*. When a speech act is performed, certain institutional facts are created because one treats the world in certain cognitive ways, within certain contexts. There could be *observer-independent features*, such as force, mass, and gravitational attraction; and *observer-relative features*, which could include money, property, marriage, and government. The latter are examples of institutions in Searle's parlance, that is, they are systems of constitutive rules.

The constitutive rules also allow knowing how an utterance can give rise to an obligation for one who makes a promise, insofar as a promise affects people's behavior. Where such rules exist, one can perform certain specified activities and in virtue of that behavior, be interpreted in terms of certain institutional concepts. In principle, this approach had an individualist character; but it could be generalized through the so-called *collective intentionality* – the form by which people engage themselves in collaborative behavior insofar as they share certain kinds of beliefs, desires and intentions.

The notion of collective intentionality distinguishes between *brute facts* (Anscombe, 1963) on the one hand, which are those facts that can exist independently of human intentionality, and *dependent facts* of different sorts. The most important distinction, however, is between *subjective dependent facts*, which depend on individual intentionality, and *social facts*, which depend on collective intentionality. Within this framework, one can explain acting powers, functions, states, properties, relations, organizations and special objects which describe the world but do not pertain to the realm of brute facts.

Within the context put forward in this section, language is believed to be the fundamental social institution because it enables new forms of collective intentionality to exist at ever-higher levels of complexity.

### 3.2.2 How documents produce action: The document acts

Documents may be thought, roughly, as a set of sentences organized and recorded in some medium. Documents can gather sentences together, which work as means of

[7] John Rogers Searle, American philosopher, 1932 –

communication. We are not concerned here with the semantic meaning of documents though. What interest us here are either the effects that documents might have within certain contexts or the combined effect of a sentences-set, rather than the particular form of communication adopted. Speech acts, as we have seen, produce additional effects in the social environment; through the use of language we can do things with words (Austin, 1962).

Accordingly, we claim that acts produced by documents also generate additional social effects which are worth to be accounted. As documents perdure through time, these effects turn into other ones not directly observable whereas they manifest themselves in other temporal and geographical contexts. The notion of intentionality is the key to clarifying the connection between speech-acts and document-acts. The meaning of the word "intentionality" here must not be confused with the ordinary meaning of the word "intention". Intentionality is the power of minds to be about, to represent, or to stand for things, properties and states of affairs (Jacob, 2010). Intentionality means to be directed towards a goal or a thing.

In order to understand the role of intentionality here, one should consider that, in certain circumstances, documents record information required for performing actions. Such circumstances are associated with the official usage of a document. Following Heining (2005), we claim that such usage can be assessed through *function* and *practices*. The *function* of a document defines it in the context of playing a certain role in a complex action. This complexity is explained in terms of intentional behavior, whereby one segments an action into parts according to steps that display an order of reasoning. To specify the function of a document it is necessary to specify its standard use, the kind of action in which it plays its role. Such general types of action are named *practices*, which are actions reflected in their instances. This means that in order to instantiate a practice, one needs to know how to do it. Ultimately, there are not accidental executions of practices: they are all intentional.

Indeed, documents may function in unorthodox ways, which do not correspond to their real function. But in the context of their official use, documents acquire the capacity to concretize the relevant kinds of human intentionality, to occupy the relevant kinds of positional roles within larger corporate wholes, through which the actions of countless individuals become coordinated (Smith, 2010). At this point, one can notice that document acts, as well as speech acts, correspond to what humans are able to do through an intentional behavior. Speech acts are events existing only in their execution, but documents are objects which perdure through time retaining a history of changes. Thus, they can serve to create new kinds of enduring social and organizational orders, which can in turn allow the human beings involved to create new kinds of value.

A document acts theory is widely inclusive and able to accommodate different types of documents, a variety of media and of documents´ provenance. With a document we can: i) do many things as fill in, sign, stamp, copy, transfer, invalidate, destroy; ii) achieve different goals as create organizations, record deliberations, initiate legal actions and so forth; iii) take actions in different institutional systems to which documents belong as property, law, commerce, trade, credentialing, identification, to mention but a few. Examples of documents acts may be clearly found in so-called economic entities.

### 3.3 Document as economic entities

When making economic decisions, individuals view the world as composed of economic facts. Tables and chairs, mountains and trees, minerals and rain, dogs and cats – ultimately all real things in the world – remain the same as clearly apprehensible to one as these real things are when he is not acting as an economic agent. Similarly, all phenomena in the world are viewed by the economic agent as constituents of a reality articulated through economic considerations (Zuniga, 1998).

However, there is a difference in how the individual, *qua* economic agent, divides the reality he perceives. He orders things in the world according to their role in the economic conditions which affect his plans. As a result, a thing of natural beauty such as a tree may acquire an economic character if one perceives a causal connection between the tree and his need for a shelter. The most evident example is money: materially, a piece of paper or of metal, but which exerts vast powers over people's life.

The question which arises in this context is what makes any object or thing an economic entity. According to a clarification due to Carl Menger[8], the chief point is that economic entities are not reducible to either beliefs or to some intrinsic property of things. Economic objects, as social phenomena, are the product of beliefs and objective properties of things, some of which are physical facts and others are social facts. Knowledge and beliefs play an important role in social phenomena. For example, a dollar bill is treated as money because of people's beliefs that it is an instance of a universal medium of exchange. Money is not reducible to a physical description of the paper, metal, plastic, or electronic components which comprise the various kinds of money we recognize as money.

One must also consider that people are frequently mistaken in their beliefs. Accordingly, an economic entity is not arbitrarily designated to be an instance of a type because one merely believing it to be so. Although economic judgments are subjective, they are not arbitrary. There are conditions for each economic category in order that the truth or falsity of a belief about an economic entity can be objectively settled. Within the economic realm, Menger (2004) describes some essential aspects of characterizing something as an economic entity:

- Economic good: an economic good exists as such by virtue of putative features that an individual attaches to a thing in relation to a goal the individual has in mind;
- Commodity: a thing is a good or commodity if an agent perceives it to be in direct connection with the fulfillment of a want or need.
- Money: economic entities have to hold the widespread acceptance of a medium as exchange and legal orders which legitimize them;
- Value: to be a value, a good must be characterized as an interested evaluation since the agent perceives a causal connection between the possession of the good and the fulfillment of an end;
- Price: something must be quantifiable according to a numerical magnitude that can be measured exactly and objectively.
- Exchange: consists in the situation which occurs if two individuals contemplate a mutual transfer of commodities such that they assess their needs to be better satisfied with the transfer than it would be the case in the absence of such a transfer;

There are several other relevant initiatives describing elements of social reality. Those who are interested would be wise to refer to the works of Lawson (2008) in economy, of the aforementioned Reinach in law, of Koepsell (2000) in economic rights, and of Pouivet (2010) in forgery, to mention but a few.

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[8] Carl Menger, Austrian economist, 1840 – 1921

## 4. Case study: Pragmatic characterization of documents in a healthcare organization

Entities of the economic world are putative examples of the power retained by documents, in the sense of theories presented thus far. Such power enables documents to leverage people and organizations, as illustrated by economic entities. Within the healthcare segment, documents carry extensible economic, legal and medical entailments. Healthcare institutions possess documents of numerous sorts, including management, regulatory, and technical documents. Indeed, there are uncountable kinds of medical documents, which are complex instances employed for several purposes in healthcare processes (Almeida e Andrade, 2011), such as:

- to support patient care: to remind staff of information, to help in organizing the care process (e.g. care information, clinical decision making, patient demographics);
- to fulfill external obligations: legal requirements, accreditation, reimbursement regulations (e.g. procedure coding), order documentation (e.g. exams, medication), and events (including adverse events, surgeries, sample collections);
- to support administration: in planning, controlling, and refunding the healthcare institution's services (e.g. medication and medical materials, equipment use, procedure coding, diagnostic coding);
- to support quality management: by enabling critical assessment and systematic monitoring of processes (e.g. clinical outcomes);
- to support scientific research: by enabling patient selection and statistical analysis (e.g. possibly relevant clinical information, not yet used in clinical reasoning);
- to support clinical education: by providing information for critical review and case examples (e.g. contextual information about consultation setting).

As a consequence of those multiple uses, medical documents are a aggregate of facts, impressions, measurements and knowledge recording. Classification of these kinds of information is required for automatic processing by computers and for system interoperability. Nevertheless, it is as yet unclear how one is to characterize a document regarding its effects in order to improve the effectiveness of KM initiatives.

In the remainder of this section we step toward a complementary characterization by taking documents from the medical segment as our working material. First, we describe a template for characterizing documents, and then we provide examples of documents of healthcare institutions.

### 4.1 Template and examples of its use

The first step in developing a template consists in selecting, from the scope of documents under analysis, those that are bearers of document acts. Such selection is made by considering documents which do more than merely record data: in addition to be economic entities, these documents trigger organizational actions. In fact they trigger document acts, which can be assessed by a performativity test for verbs (Morris, 2005). Then, the document act is characterized according three components: the *context*, the *content* and the *force*. The complementary characterization of a document is obtained by describing each of these components as follows.

The *context* concerns conditions of the world in which a document act is manifested. In order to characterize the context of a document, at a minimum the following questions should be considered: who issues the document? Who receives the document? What is pertinent concerning the temporal aspect? What is pertinent concerning the geographical aspect? In addition, other contextual features that contribute to the success of the document act are gathered under the label *possible situations*.

The *content* consists of the proposition underlying the document act, that is, the common element that characterizes the effect of that document, independently of the form in which this element is presented. For example, there is a common element in the sentences "Is the door shut?", "Shut the door!", and "The door is shut". This common element is the proposition that the door is shut, queried in the first sentence, commanded to be made true in the second, and asserted in the third (Green, 2007). In analyzing a document, one can see that such a common element is regarded to its official usage. For example, the underlying proposition of "The debts are paid" could be the content component of different economic documents, namely checks, credit cards, and so forth.

The component named *force* aims to determine the commitments, that is, the organizational relationships established, and the way in which the content is related to the company´s environment. We rely on Searle (1985) to define the components used to describe the force of document acts:

- *Point*: corresponds to the purpose of document acts, namely, whether it is an assertive, a commissive, a directive, a declarative, or an expressive;
- *Degree*: corresponds to the strength of a point, which is defined according to the taxonomy proposed by Searle and Vanderveken (1985);
- *Content conditions*: corresponds to conditions required by the propositional content in order that the document act can be achieved;
- *Preparatory conditions*: states of affairs that an entity must address for the success of the document act.

Once presented the basic issues, we summarize the elements for the characterization into a template where some additional details and examples are added (Fig. 1).

The template is now applied to examples of documents extracted from the healthcare organization use case described at the beginning of this paper. Some documents pertaining to the scope of healthcare institutions can be identified: demographic patient questionnaires, reports of tests, donation orders, consent letter, to mention but a few. The latter two documents were selected because of their capacity to produce effects. Indeed, they are documents inherent to any healthcare organization in which blood donation process takes place, that is, independently of specific characteristics, their purpose is the very activity of blood transfusion. The Figs. 2-a and 2-b depicts the analysis form created according to the proposed list of topics.

The examples just mentioned are typical of management and the effects of documents are not limited to data recording. In the first case, the document commits a set of employees to the execution of tasks: laboratory tests, sample collecting, medical analysis, and so forth. In the second case, the effects may involve legal demands insofar as, in consenting, one declares that knows the procedures and agree that they are suitable.

Other kinds of documents can be included in our analysis, such as: policies, documents of regulatory agencies, documents of trade and professional organizations, legislations, officially recognized classification systems, and standards (Almeida et al, 2010). Examples are specific instances in the healthcare organizations, like the International Society of Blood Transfusion's (ISBT) 128 standard (ISBT 128, 2010), and the Food and Drug Administration's quality requirements for blood donation establishments.

| Step | How to execute |
|---|---|
| Selecting document bearers of document-acts | Identify actions triggered by the document in its official usages<br>Identify economic entities |
| Describing the context | Identify who issues and who receives the document<br>Identify what are the related temporal and geographical aspects |
| Defining the content | Identify the underlying proposition of the document<br>Identify the general purpose of the document |
| Assigning the point | Identify the point according to the content defined. The point can be:<br>• An assertive point, which tells how the world is, for example, predicting.<br>• A commissive point, which commits one to doing something, for example, promising.<br>• A directive point, which tries to get the hearer to do things, for example, ordering.<br>• A declarative point, which changes the world, for example, declaring.<br>• An expressive point, which expresses attitudes, for example, apologizing. |
| Assigning the degree | Identify the degree according to the point defined, here presented in ascending order:<br>• Assertives: assert > claim > state > deny > > assure > argue > inform > suggest …<br>• Commissives: commit > promise > threaten > accept > consent > refuse > offer …<br>• Directives: direct > request > require > demand > forbid > advice > recommend …<br>• Declaratives: declare > resign > appoint > approve > confirm > endorse > name …<br>• Expressives: apologize > thank > congratulate > complain > protest > greet ... |
| Assessing content conditions | Identify premises that assure the point and degree feasibility, for example, invoicing can only refer to payments and not to salaries. |
| Assessing preparatory conditions | Identify premises that assure the success of the point and degree, for example, in placing an order the buyer presupposes that the supplier still sells those products. |

Fig. 1. Template for the pragmatic document characterization

| | | |
|---|---|---|
| **Context** | **Who issues** | A blood bank clerk |
| | **Who receives** | A blood bank nurse |
| | **Temporal aspect** | Daily, during blood bank business hours |
| | **Local aspect** | Locally, inside the blood bank facility |
| | **Possible worlds** | -Purpose: starting a blood donation procedure<br>-Institutional system involved: healthcare<br>-Actions possible on the document: sign, stamp<br>-Role of the agents: clerk and nurse |
| **Content** | | Donating blood |
| **Force** | **Point** | Directive |
| | **Degree** | Command |
| | **Content conditions** | Donor to fulfill the requirements for donation |
| | **Preparatory conditions** | The clerk is authorized to start a donation process |

Fig. 2. a. analysis form for the document *blood donation order*

| | | |
|---|---|---|
| **Context** | **Who issues** | A candidate to donor |
| | **Who receives** | A physician |
| | **Temporal aspect** | During the donation procedure |
| | **Local aspect** | Locally, inside the blood bank facility |
| | **Possible worlds** | -Purpose: consent in medical procedures<br>-Institutional system involved: healthcare<br>-Possible actions on the document: sign<br>-Role of the agents: physician and volunteer |
| **Content** | | Donating blood |
| **Force** | **Point** | Commissive |
| | **Degree** | Consent |
| | **Content conditions** | The donor consents to procedures to be carried out |
| | **Preparatory conditions** | The physician is legally able to perform those procedures |

Fig. 2. b. analysis form for the document *consent letter*

| | | |
|---|---|---|
| **Context** | **Who issues** | International Council for Commonality in Blood Banking Automation (ICCBBA) |
| | **Who receives** | Hospitals, blood banks, transfusion services, healthcare services in general |
| | **Temporal aspect** | Frequently updated |
| | **Local aspect** | Worldwide |
| | **Possible worlds** | -Purpose: standardize the terminology for blood in information systems and equipment<br>-Institutional system involved: healthcare<br>-Possible actions on the document: read, suggest<br>-Role of the agents: international non-profit normalization institution; healthcare services |
| **Content** | | Provide safety for patients submitted to transfusion |
| **Force** | **Point** | Directive |
| | **Degree** | Recommend |
| | **Content conditions** | The healthcare institution should agree with ISBT data structure and terminology |
| | **Preparatory conditions** | The ICBBAA gather medical authorities recognized worldwide, as well as lab equipment vendors. |

Fig. 3. a. Analysis form for the document *ISBT 128 standard*

In the FDA's document, the point is a directive and the identified is *direct*, which corresponds to the primitive for English directives (Searle & Vanderveken, 1985), exhibiting the higher degree. In the case of ISBT standard, the point is still a directive, but the degree identified is *recommend*. Once the national context is considered (United States), *direct* is more powerful than *recommend*. On the other hand, if considered in the international context, the preparatory conditions are not valid and the force falls. In each context the document receives a different characterization regarding the effect it may provoke. From this analysis, we are able to identify relevant aspects as discussed in the next section.

| | | |
|---|---|---|
| **Context** | **Who issues** | Food and Drug Administration (FDA) |
| | **Who receives** | Blood banks, transfusion services, and plasmapheresis centers |
| | **Temporal aspect** | Determined by law |
| | **Local aspect** | Nationwide, United States (U. S.) |
| | **Possible worlds** | -Purpose: assist manufacturers of blood components in developing a quality program<br>-Institutional system involved: healthcare<br>-Possible actions on the document: read<br>-Role of the agents: U. S. government authorities; U.S. blood banks and transfusion services |
| **Content** | | Provide safety for patients submitted to blood transfusion |
| **Force** | **Point** | Directives |
| | **Degree** | Direct |
| | **Content conditions** | The healthcare institution must agree with FDA guidelines |
| | **Preparatory conditions** | Institution’s authority supported by national laws |

Fig. 3. b. Analysis form for the document quality requirements for blood establishments

### 4.2 Discussion

Since we have presented the template and examples, we now discuss the results, aiming to elucidate the contributions proposed to the field of KM. First, we discuss the effects that some kinds of documents can have on information systems focusing in ontology-based systems, which are intensively employed nowadays in the biomedical field. Then, we discuss the usage of the proposed characterization of documents to classify documents in ontologies. The use of ontologies for KM it is a well-founded topic (Almeida & Barbosa, 2009).

The first topic to be discussed regards to the effects that certain kinds of documents can generate in another contexts. Consider, for example, the ISBT standard mentioned in section 4.1. The ISBT is a worldwide standard which aims to provide safety for patients submitted to blood transfusion. The point assigned to the respective document act is *directive* and the degree is *recommend* (Fig. 3a). Thus, ISBT is a standard that recommends forms of standardizing blood samples around the world, providing a common ground for labeling and automatically processing them.

Despite its worldwide acceptance and use, ISBT lacks the ontological ground that permits information systems to be interoperable. Its data-structure composed by classes, modifiers and attributes (ISBT 128, 2010) can deal with short-term questions of standardization in a federated approach, but it is not grounded on principles that allow interoperability on a large scale among blood manipulation equipment, support decision medical systems, healthcare management systems, and other systems present in healthcare institutions.

While these issues may not be problematic in a limited landscape, they prevent the integration and interoperation of information systems on a large scale. A data-structure organized in such a way contributes to the well-known "data-silo problem", requiring the construction of middleware among systems and preventing expertise reuse along medical institutions. Such a problem is also present in other documents of the medical field, as in the HL7 – a set of standards for electronically defining clinical and administrative data in the healthcare industry – as demonstrated by Vizenor and Smith (2004). These are examples of the utility of the proposed approach in making explicit the effects that a document act can have in another context different from that in which it was created, as illustrated in the information systems realm.

The second topic under discussion involves how the proposed template can be used classify entities in an ontology for documents. One is able to use the template´s characterizations in ontology development once it has been provided some way of formalizing them. This can be done through the establishment of the notions called *strong* and *weak illocutionary commitment* (Searle & Vanderveken, 1985). *Strong commitment* regards to acts that maintain the same conditions – point, preparatory conditions and content conditions – except by their degree, when determining its force. If an act has a stronger degree than the other, the former is required for the latter to occur. Once generalized, this notion is called *strong commitment*. On the other hand, there is a *weak commitment* in the cases where all mentioned conditions are exactly the same, that is, the four parameters are exactly the same.

Such distinctions, obtained through assessing the degree of force, are not propositional but illocutionary regarding their effects. Such notions of strong and weak commitment are pertinent to logical relations of entailment and there are tableaus depicting inferential relations among acts (Vandeveken, 1990). Then, these distinctions allow the formulating of new axioms for an ontology development, providing a useful dimension of analysis once documents acts are identified according to criteria adopted in prior examples.

## 5. Summary and conclusions

We have presented a proposal towards a complementary dimension to characterize documents. In order to reach the proposed results, we have presented a brief historical account of the origins of the term *document* that identifies some functions of a document in the societal context. Following this line of thought, we have presented developments of the speech acts theory and that of an extension called the document acts theory – a theory to deal with acts raised by the power of documents – showing in what aspects the former can be used to aid the formulation of the latter. We have proposed a template to reach the claimed complementary characterization successfully. Finally, we have discussed the use of the pragmatic characterization in building ontologies and pointed out how one can identify the effects of such characterization on the information systems realm.

We conclude, through our approach summarized in a template, that is possible to recognize a distinct action level embedded into documents by human acts. In identifying this level, one is able to detect other relevant manifestations within an organizational environment. Although defining documents is not trivial undertaking, we advocate that the complementary dimension proposed should be incorporated in a proper analysis of them. For the development of ontologies, this additional consideration may be useful by obtaining well-shaped representations. Moreover, such characterization reveals other facets of documents' power, as shown in the case of medical standards. In looking at the situation from this point of view, one can see how documents accepted worldwide can generate undesirable long-term effects.

Finally, we mention some topics for future work. Among them, there is an investigation aiming to implement illocutionary acts, complementing initiatives that already exist (Auramaki, Lehtinen, & Lytinen, 1988; Vanderveken, 1990). Moreover, we intend to propose a more detailed account of transcription from the speech acts level to the document acts level in order to clarify how different propositions inside the same document can be conciliated.

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Due to the development of mobile and Web 2.0 technology, knowledge transfer, storage and retrieval have become much more rapid. In recent years, there have been more and more new and interesting findings in the research field of knowledge management. This book aims to introduce readers to the recent research topics, it is titled "New Research on Knowledge Management Applications and Lesson Learned" and includes 14 chapters. This book focuses on introducing the applications of KM technologies and methods to various fields. It shares the practical experiences and limitations of those applications. It is expected that this book provides relevant information about new research trends in comprehensive and novel knowledge management studies, and that it serves as an important resource for researchers, teachers and students, and for the development of practices in the knowledge management field.