Information Flow Modeling. A Tool to Support the Integrated Management of Information and Knowledge

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Abstract: This paper discusses the importance of information flows in information management context and presents methodological aspects and a summary of information flow modeling results, part of Knowledge and Information Management Model (KIMM), a proposal developed and applied in the regulatory agency for land transport sector in Brazil. In order to achieve proposed objectives, this paper presents a brief background of KIMM project and the concepts and definitions formalization used such as: information assets, information flows and information life cycle. Aspects such as the characteristics of good information aligned to organizational characterization were also considered in the concepts and definitions section and how it was applied in information flow methodology modeling. The results indicated that the information flows are an important diagnostic tool for the evaluation of the organizational information management status and the basis for the proposition of other models such as knowledge management.

1 INTRODUCTION

Due to the growing use and the easy access to information and communication technologies, information volume produced in any type of organization has increased substantially in quantity and complexity. In this scenario, organizational information and knowledge management have become essential in the organizational management model, especially in public organizations, in which information transparency has been increasingly a significant requirement. For any type of organization information has become important raw material for the activities and tasks development, and knowledge represents a valuable asset that, being intangible, is difficult to measure and manage (Davenport, 1998). The author contends that this management is valuable because the information that gave rise to knowledge was interpreted and increased by meaning from interference of the environment and the people who manipulated it, adding wisdom to it.

In this regard, it is noted that the information management is one of the concerns and challenges that are present in scientific literature in many knowledge fields. Well-known authors who address information management issue, such as McGee and Prusak (1994), Marchiori (2002) and Choo (2002) refer to information management as a set of processes that identify information needs, collect and create, classify, store, treat, provide and use information.

This work, however, allied this information management concept with recommendations by information science and defined by the Institute of Information Scientists (2001), that clarifies that the information management consists of routines and procedures for the creation, identification, collection, validation, representation, retrieval and use of information and has taken the following steps: collection, validation, processing, storage, retrieval, distribution and dissemination as procedures and routines for managing organizational information, which is understood as information life cycle.

Choo (2006) claims that, an organization that uses information strategically, does it in order to create "knowledge organization". The organizational information contains multiple meanings resulting from individuals or groups cognitive and emotional interpretations that process it in everyday life. Thus, the information management needs to create

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information structures and processes that are flexible and permeable. The major challenge in information management in organizations is to clearly define the role of information in processes management. Hence information management implies in mapping their flows, define what information is valuable and to check how it processes information quality.

For Rezende and Abreu (2006) managers cannot ignore how the organization uses the information, what are their main information flows, what are the information needs for each hierarchical level and managers competence to administer informational resources. For these authors, the use and information management concept encourage decisions, solutions and customers satisfaction (external and internal).

In this sense, it was proposed a project to develop a knowledge and information management model (KIMM) to a regulatory agency in Brazil, where one of its phases is the identification and mapping of information flows in the context of information management.

KIMM starts from the premise that knowledge can be generated from structured information and thus, presents a modeling approach focused on an organization's information assets. From the information flows models of each information asset, it is possible to acknowledge the organization work routine, workflow, and provide knowledge and skills that are required to manipulate information assets. By means of the proposed models, it is also possible to know organization business requirements from where system requirements can be derived for information systems development, and also an ontology conceptual model and glossary of terms inherent to the field of the organization studied. (Bastos et al., 2011; Rezende et al., 2013, 2012).

The objective of this paper is to present and discuss the information flow modeling, a part of a wider research project, conducted in technical cooperation with the Brazilian National Transportation Agency that aims to develop an integrated model of knowledge and information management (KIMM). The information flow model is the used basis for the generation of knowledge management models.

Information flow modeling, used in KIMM project has its foundation in the information life cycle and is oriented by information assets, having as guiding principles the characteristics of good information according to the operation model of each organizational unit mapped in the Agency. The flow models constitute fundamental tools to reveal the informational treatment of an organization's information assets and the operation of its organizational units (departments or divisions), and that is its main contribution.

The paper is organized as follows: Besides this introduction, the first section briefly describes KIMM. The second presents important concepts and definitions for information and knowledge field and an approach about information assets, the core of KIMM project. In the third section, methodological aspects of information flow modeling are presented and how modeling was developed in the studied organization. A results summary and the benefits to the organization are also presented. The fourth section presents a conclusion from the results analysis obtained from information flow modeling, bringing indicative for KIMM improvement and continuity in the organization.

1.1 KIMM

The methodology applied in KIMM project includes the organization study through five multidisciplinary teams in five interactions and an interaction among internal teams, called integration meeting. The purpose of this meeting is to consolidate and integrate models generated through individual interactions of each team resulting in a holistic view.

Each interaction with the organization is led by one of the specialized teams and, from the information gathered, their specific models are produced. The five interactions are supported by distinct areas of knowledge, namely: land transport, information flow, business requirements, knowledge management and ontology.

The transport team interaction aims to identify the information assets of the organizational units resulting in a list of information assets and its main features. Other products of this step include a list of references, research and benchmarking process results, best practices related to main business of each organizational unit in the land transport field.

The information flow team interaction is the target object of this paper and is explained in detail in the following section.

The business requirements team has as main product business use cases models that are derived from business global information model. The models in the business requirements area are built taking into account the information flow.

The knowledge management team has as its main objective the study of knowledge, skills and professional related to information assets. Information flows are a prerequisite for knowledge models generation and there is a strong dependency between KM Models and information flow map. For

building KM model, formal models are produced:

- A knowledge model based on mapping skills, knowledge and professionals, related to IAs processing. Knowledge models identify the forms of knowledge construction and mobilization skills by professionals, relevant to business processes and information flow. KM Model map and represent knowledge/ skills/professionals (Bastos et al, 2011; Rezende et al, 2012), analyze knowledge flow, the steps of collecting and mobilizing knowledge to generate innovation (Sabbag, 2007) and the processes of knowledge conversion (Nonaka and Takeuchi, 1995), supporting the construction of an architecture and propose tools and practices that may support KM in the organization.
- The workflow construction of the current situation, detailing the procedures used by employees to conduct activities in the IAs processing, enables a better understanding of the functioning of the organization. We can identify gaps in knowledge flow, associated to the steps of capturing, mobilization and innovation, and the processes of knowledge conversion (Bastos et al., 2011, 2013; Rezende et al., 2012, Rezende et al.,2013).
- A Knowledge Tree that allows visualize in a hierarchical way all knowledge identified, showing all expertise that can be shared (Lévy and Authier, 1995).

Ontology team has as main products organizational terms glossary and ontology conceptual model that formalizes the relationship between terms and serves as input for the development of ontology based systems.

At the end of information survey and specific models construction, the consolidation and integration of these models are performed and as a product of this integration, five iterative and integrated models are produced: information assets model, information flow model, business use cases model and information architecture, knowledge / competence/ professional mapping and ontology conceptual model.

2 CONCEPTS AND DEFINITIONS

2.1 Information Assets

In this work, to understand the generated models and the logic of its construction and how to manage them and keep them is essential to understand information assets concept and how it is used in KIMM project.

For Oppenheim, Stenson and Wilson (2003), tacit knowledge cannot be formally communicated; and explicit knowledge is actually information. Thus, knowledge assets should also be considered as information assets. According to Carlucci e Schiuma (2007), knowledge assets are the employees skills and expertise, the organization culture and image and authors also add that companies that are able to continuously develop their knowledge assets tend to be successful.

The information asset definition adopted by the KIMM project follows the definition presented by Higgins, Hebblethwaite and Chapman (2006), from Queensland Government, Australia, that describes the information assets as a set of identifiable data stored somehow, and recognized as having value to the organization, allowing the execution of their business functions, satisfying the acknowledged one or more of your business requirements. Several authors agree that information asset is a set of data and that has potential value to the organization. (Caralli et al, 2010; Higgins; Hebblethwaite; Chapman, 2006; Oppenheim; Stenson; Wilson, 2003; Davenport; Prusak, 1998; KPMG/IMPACT, 1994). An information asset is well organized information that has value, so it should be easily accessible to those who need it. (IAD, 2012).

Develop an information asset requires the definition of the issues to be solved: the identification of the necessary information, the information capture through documented processes and the building of a structure to allow easy access to those groups that benefit from the information. This is the information life cycle logic.

Aligned to literature on the subject, in KIMM the information assets are materialized by information flows, which were built in the light of the information life cycle. This means that the processes of collection, validation, processing, storage and retrieval, distribution and dissemination and use of information can be properly formalized as the stages of the information life cycle represented in flows.

Each information asset has a specific purpose and is strategically positioned within the institution organizational structure, so that the established information assets architecture form an umbrella layer that includes data, information and explicit knowledge, that can be structured, communicated and transferred according to need of each hierarchical level, agreeing with several authors idea (KPMG/IMPACT, 1994; Davenport; Prusak, 1998).

2.2 Information Flows and Information Life Cycle

Information flow definitions, according to Barreto (1998), Jacoski (2005) and Altíssimo (2009) converge on three points: _ subsidies to decision-making processes, organizational diagnosis facilitation and improvement opportunities. For Barreto (1998), information flow corresponds to a sequence of events from the information generation by the issuer until its uptake / assimilation / uptake receptor, generating individual and collective knowledge, supporting the decision making. Jacoski (2005) says that information flow is the integrating element of supply chains that are precarious, originates failures enabling organizational diagnosis in the light of information management. Altíssimo (2009) says that information flow is an information process disseminator that mediates communication favoring continuous improvement initiatives. Valentim (2010) says that organizations have different informational environments, consisting of information flows that permeate all activities, tasks, decision-making, that is, the action of the individual in the workplace. In this sense, information flows constitute fundamental elements of information environments, so that there isn´t an information environment without the existence of information flows and vice versa.

In KIMM project, one of the essential purposes of information flows is to equip managers with fundamental inputs to decision-making process, since flows comprise information assets which are considered strategic organizational information repositories.

The absence of a policy on information management makes information flows that cross the organizational environment occur without a direction, wasting relevant information to the generation and dissemination of organizational knowledge. It would also contribute to the increase in operating costs, hindering communication and interaction between individuals and organizational units, hampering understanding of the strategic role of information and scope of institutional goals. (Greef, AC, Freitas, M. C. D, 2012)

Some authors cite some adversity, regarding the absence of information management, which can compromise the performance and achievement of the objectives of the organizations:

a) Redundancy of information and consequent increased cost of development; inconsistency of information obtained from various sources; fragmentation of information communicated between organizational units (Beal, 2008);
b) Communication barriers, decreasing their efficiency in order to increase the effort to fulfill the mission and make real use of the information; difficulty in accepting risks associated with new ways to make the information flow in the environment; attempts to increase the flow of information that impair their objectivity ideal (Freire, 2006);
c) Disruption of flow and resulting inefficiency (Le Coadic 1996 apud Altissimo, 2009); and
d) Disqualified and disordered information; poor distribution of tasks between employees (Canova; Picchi, 2009).

As recommended in several models of information management, in general, information management consists of routine and systematic procedures for the collection, validation, processing, storage and retrieval, distribution, dissemination and use of information, which can be understood as the lifecycle information. (SMIT and Barreto, 2002; LESCA and ALMEIDA, 1994; Davenport, 1998; McGee and Prusak, 1994; Beal, 2004). From these models, the information must be managed through appropriate organization information flows.

An effective and efficient flow of information has a multiplier effect with the power of mobilizing all organizational units turning into a driving force of organizational development. In this sense, the improvement of routines and procedures in the light of the information life cycle has become an organizational need meeting the challenges posed by information and knowledge management.

As mentioned above, information life cycle is characterized by seven steps shown in Figure 1.

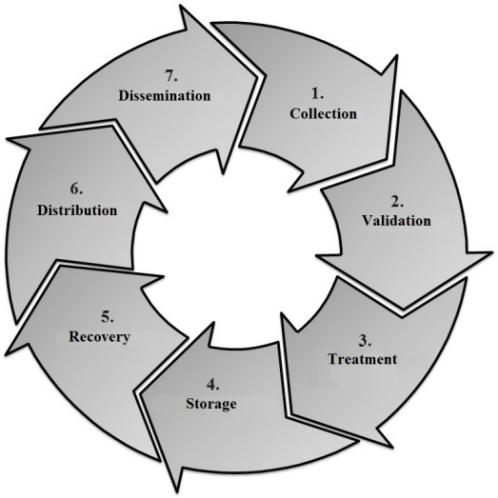

Figure 1: Information Life Cycle
Source: KIMM Project

The collection stage is a set of activities aimed at obtaining data and information that are translated as the initial input for the generation or maintenance of an information asset. For this step, worth questions are: what I want to get in terms of information? Where can I, or should I acquire this information? What search criteria should be used?

The validation step is a set of activities designed to ensure that the information collected meet established standards for cycle information. For this step, the worth questions are: the search criteria were set correctly? These criteria were followed, that is, all information obtained meets the criteria? The format of the information is as expected? The sources are identified, and are competent to provide the information?

The treatment step is defined as a set of activities that embody the transformation of inputs for generation or maintenance of information asset. For this step, the worth questions are: partial results are directed to the end result (waste)? Partial results may be needed for use / reuse? If so, is being stored for later retrieval? The regulatory requirements are being met, regarding the form and content? The criteria for confidentiality, availability and integrity are being defined, or are already in the rules that guide the development of information asset?

An information asset, by definition, must also exist in digital format, in order to facilitate subsequent search and retrieval. In this sense, the step of storage should be concerned with issues such as: the information security requirements are being met? The information is being stored in order to be possible the recovery from parameterized queries? Those who have interest on information have the possibility to access it when need?

The recovery stage is the time when the information asset and data used in its construction, can be accessed and retrieved according to search criteria that enable the refinement of information and re-use for other purposes. In this step, the assumptions are the same as storage, since they are interdependent steps.

The distribution stage is the time when information asset is made available in appropriate format to be handle, i.e., becomes available for those interested. For this step, worth asking: what form of the distribution is appropriate to potential users? The criteria for confidentiality, availability and integrity are being met? The information asset is kept up to date throughout its life?

The dissemination step is the final stage of the life cycle, in which information asset will fulfill its goals. For this stage, worth questions are as: are there controls on the use of information assets (number of accesses, who accessed, etc...)? The target audience of information asset is being reached? Direct dissemination actions were planned, if deemed necessary?

According Tarapanoff (2001), the stages of the life cycle of information provide the structure to support the growth and development of an intelligent organization, adapted to new requirements and the environment in which it lies.

2.3 Characteristics of Good Information

According to Beal (2004) for the effective information management it is necessary to constitute a set of policies that allow access to relevant, accurate and quality information. This information must be submitted on time, with appropriate costs and easy access to stakeholders. This statement brings up what it says Stair et al (2006) about the characteristics of good information. According to the author, the information to be valuable for managers must possess the following characteristics: accurate, complete, economical, flexible, reliable, relevant, simple, and verifiable in time, which is consistent with a study by Beverly K. Kahn Diane M. Strong, and Richard Y (2002) that describes the dimensions of information quality.

Analyzing table 1, it is possible to relate the characteristics of good information on the stages of the life cycle of information.

For example, accurate information is the result of the actions of the treatment phase, because the inaccuracy can be generated by the entry of incorrect data in the transformation process, while reliable information is directly related to the method of collection, i.e., its source of origin. It is important to identify the sources of origin to guarantee the reliability and authenticity of the information collected. In turn, the time information is dependent on the methods and tools related to the stages of storage and retrieval so that information is available when needed and in an appropriate format. For validation step, the issues of format, integrity and compliance with legal and regulatory (compliance) precepts must be verified and confirmed. To distribution step important considerations are confidentiality, availability and integrity of information processed in previous steps as the collection, storage, retrieval and distribution.

The lack of quality information in an organization can provide social and business impacts, and should be diagnosed, and efforts should

Table 1: Dimensions of quality information in accordance to Beverly et al (2002).

Accessibility	The extent to which information is available, or easily and quickly retrievable.
Appropriate Amount of Information:	The extent to which the volume of information is appropriate for the task at hand.
Believability	The extent to which information is regarded as true and credible.
Completeness	The extent to which information is not missing and is of sufficient breadth and depth for the task at hand.
Concise Representation	The extent to which information is compactly represented.
Consistent Representation	The extent to which information is presented in the same format.
Easy of manipulation	The extent of which information is easy to manipulate and apply to different task.
Free-of-error	The extent of which information is correct and reliable.
Interpretability	The extent of which information is in appropriate languages, symbols, and units, and the definitions are clear.
Objectivity	The extent of which information is unbiased, unprejudiced, and impartial.
Relevancy	The extent of which information is applicable and helpful for the task at hand.
Reputation	The extent of which information is highly regarded in terms of its source or content.
Security	The extent of which information access to information is restricted appropriately to maintain its security.
Timeliness	The extent of which information is sufficiently up-to-date for the task at hand.
Understandability	The extent of which information is easily comprehended.
Value-added	The extent of which information is beneficial and provides advantages from its use.

be directed towards its solution. Information with multiple sources, use of subjective judgments, systematic errors in the production of information beyond storage lot is some of the factors that influence the quality of information (Strong, Lee, Wang, 1997).

As a mechanism to mitigate the impacts of the lack of quality information, the information flow modeling made use of analysis of information assets in the light of the life cycle of information that resulted in a set of propositions for improvements in order to cover the gaps identified at each stage of the life cycle of information.

3 INFORMATION FLOW MODELLING IN A REGULATORY AGENCY – CASE STUDY

Information management in a public organization must be supported by the vision, mission and institutional values, which should be aligned to the principles of public administration. The policies for information management should have as premises the future vision of the top management, the institutional objectives expressed in regulations and also its strategic goals defined in the strategic plans of the organization. They should also provide quality information to promote assertive decisions resulting in services that meet efficiently the needs of citizens, achieve public confidence and eliminate the waste of resources. For this purpose (providing quality information) that KIMM was planned.

The proposed model was constructed in the light of an organization's information assets, and considering aspects of organizational structure and mode of operation of the regulatory agency.

In this sense, capturing the organizational model should be directed towards the identification of the information model, enabling the development and construction of internal architectures (from the perspective of systemic thinking from Zachman, 1997) that support organization, management and technology (under the contingency perspective of Laudon and Laudon, 2000).

Duties and responsibilities of an organization are, in a sense, distributed by virtue of its organizational structure, which directly impacts the communication processes and management of organizational information. The processing and generation of information from the perspective of information management have to minimize asymmetries, ambiguities and redundancies of information and mitigate the impacts of the weaknesses of the environment in which the organization operates, and especially developing products and services in order to meet its institutional mission.

KIMM scoped and aligned to what brings organization theory, the study of organizational design characterization rests on a set of four variables that are crucial to them. The first variable refers to how to structure the organizational units, information perceived through the preliminary

studies of the organization and documented in an organizational vision that is input to start the modeling work of other teams. The second variable refers to the operation of each organizational unit, which can be identified through the analysis of information assets and its purposes in relation to the organization's business model. The third variable concerns how resources for products and services development are applied; this information is visible in information flows. And the fourth variable refers to how people are managed in relation to their skills to meet organizational characteristic, perspective studied by knowledge management modeling.

3.1 Methodological Aspects of Modeling Information Flow

As described in 1.1, information flow modeling is initiated after information assets identification. Importantly, information assets are identified and validated together with organization staff. The first approach to information flow modeling is the identification of future vision which is understood during a meeting with organizational unit leaders. During this meeting longings and desires for a future in a medium and long term are declared, ignoring resource constraints. On this occasion information assets previously collected are restated and prioritized. This is the main input to understand the characterization of the organizational unit under study. Through main information assets it is possible to know its workings and identify operation model.
Analysis of organizational characterization is done to identify similarities between models of operating units, their points of convergence and hence procedures that could become a performance standard in the regulatory agency. It is also important to identify the characteristics of information assets that are most relevant for each type of transaction identified.

After identify future vision and organizational characterization, the second approach is mapping information flows for each information asset. For information flows generation, meetings with actors directly involved in information assets are carried out. In addition to meetings, methodology includes document analysis, to study key documents used and produced by organizational unit beyond the regulations governing organization duties. Exchange of information among project teams is an important interaction design for leveling the understanding and knowledge about organizational unit under study.

For modeling and representation of information flows and other models, it was adopted Enterprise Architect (http://www.sparxsystems.com.au/) as a tool, using UML language and adopting stereotypes developed specifically for the project.

Mapping of information flows has two moments: one to understand the current situation of the information flow and other representing the desired situation considering the future vision and the elimination of problems and deficiencies found.

Flows in current situation information contain three essential parts while flows of desired situation contain four parts, as shown in Figure 2.

The first part represents information life cycle and explains how information is produced, showing resources that are being consumed and products generated for information asset. Information life cycle is illustrated by the hexagons in the center of the model. They are colorful and also identified by numbers and that is associated with a stage of life cycle, as can be seen in figure label. The second part identifies actors and workers, stereotype developed for the project, which interact directly with manipulation of information depicted in the flow. It allows clarify which actors can manipulate the flow and the role played by each one. The third part represents the inputs used for the information handling throughout the construction of information asset and the outputs resulting from the processing of each stage of the life cycle. All the legal foundation and documentary are also represented as an entry in the information flow in this third part. The fourth part, presented only in models of the desired situation, represented by rectangles linked by a dotted line spread over the flow of information, indicates the propositions of improvement and in which stage of information life cycle these will impact directly, if implemented. The rectangles with a folded corner are present to help the understanding of the figure. They are not part of the model.

Regarding the stages of information life cycle on the scope of the project, the collection step corresponds to actions to collect, acquire and seek information. The validation includes actions to verify, compare, analyze, demonstrate and validate information. The treatment is related to actions as clean, sort, consolidate, index, build and develop, that is, the treatment step is where the processing of information occurs. Storage corresponds to action to save the information processed in a particular media. In the recovery step is where the information stored is reused. The availability of information occurs in the distribution step and it is necessary to establish appropriate mechanisms for distribution. On dissemination step is where spread occurs, in fact, the rational use of information produced and

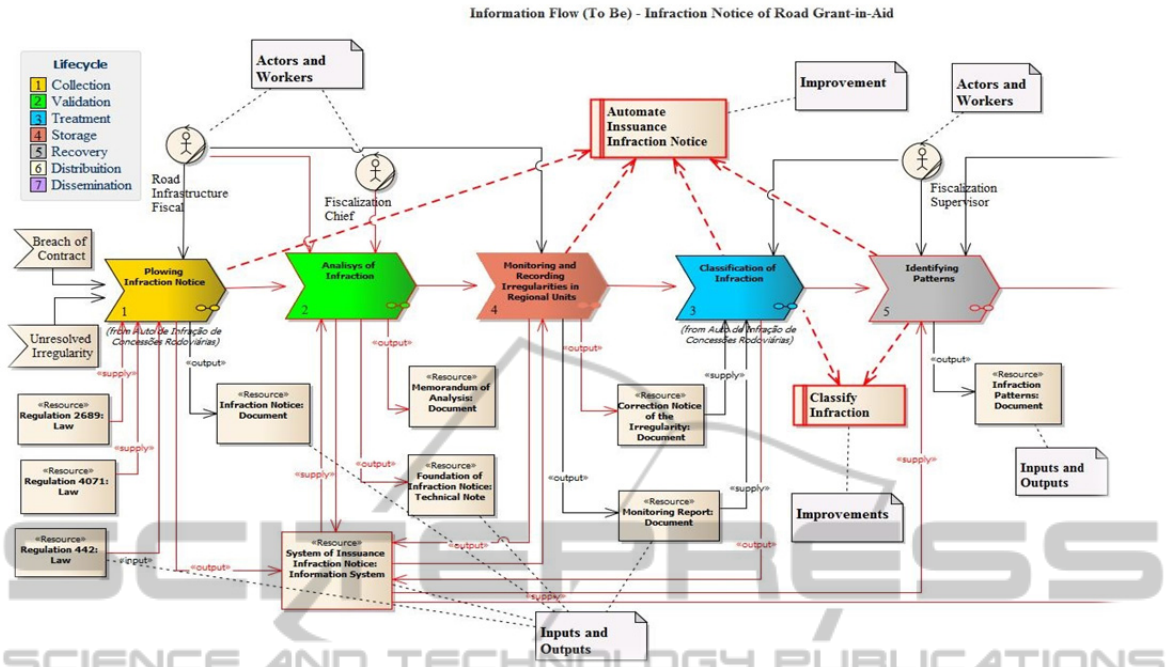

Figure 2: Information Flow Model of the Future Situation – Part A - Source: KIMM Project.

processed. This last step is where information asset fulfills its role in the organization. Dissemination strategies should take into account the characteristics of the organizational unit and the quality dimensions of information relevant to the organizational context and purpose of information asset.

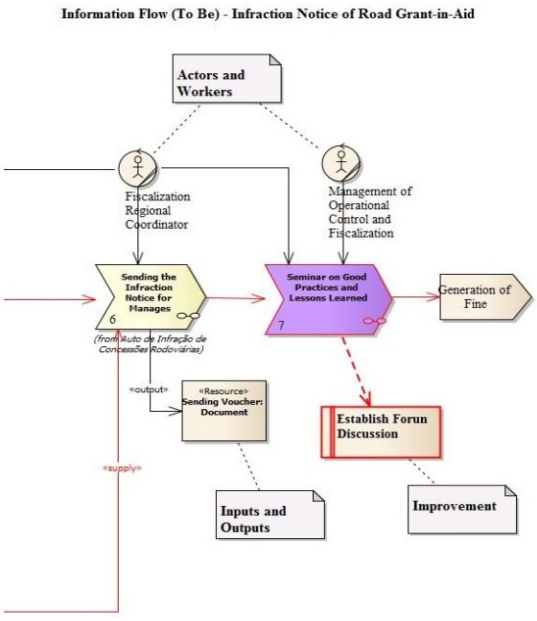

Figure 2: Information Flow Model of the Future Situation Part B - Source: KIMM Project.

Among models of the current situation and the desired situation, a diagnosis in the light of information management, information flows mapped in the current situation are analyzed in order to identify gaps or nonconformities in each step of information life cycle and under these deficiencies or nonconformities or gaps, improvements are proposed and they origin information flows modeling for desired situation.

In the project, improvements have been categorized into four thematic classifications: information management, knowledge management, people, organization/procedure for information and knowledge management. In this paper we present only those referring to information management and organization/procedure for information management (IM).

The main results of the modeling of information flow are described in the following section.

3.2 Summary of Results Obtained from the Modeling of Information Flow

Fifteen organizational units were modeled. For each of them, top management future vision was obtained and organizational characterization was identified.

Regarding future vision, three concerns were stood out, according to statements of leaders: need for information technology solutions, such as business

intelligence tools implementation; automation of routines and procedures to make faster documentary proceeding, internal communication and real-time answers to questions, mainly from other government agencies; and issues inherent to intelligent surveillance, aiming organizational efficiency.

Figure 3 shows part results of organizational characterization analysis of three organizational units dealing with core activities of the regulatory body: regulation and monitoring of international and national road transport of passengers, the railway infrastructure and road infrastructure. From the analysis of their information assets were perceived similarities in their operating models, represented by three small circles on the figure, which allowed to define main characteristics of these organizational units that are responsible for the grants in the agency and, in this sense, could be characterized as managing sourcing organizations, as illustrated by the larger circle in Figure 3. For this type of organization, free-of-error, completeness, timeliness and reputation are key information characteristics to ensuring the quality of information produced. Efforts should be made to ensure that these dimensions are present in the treatment of gaps identified in information life cycle of an information asset.

Complete and error free information is essential for negotiation and drafting of contracts as well as time information is important for management and review of contracts and service levels established in the concession contracts. Maintaining a good reputation of the organization through quality information is essential to the credibility of the organization. In this sense, the stages of validation, processing, storage and retrieval of the information life cycle should include procedures and routines to ensure the presence of these features on informational treatment of organizational units' information assets.

The organizational characteristics, in another perspective, can be used as an important indicator for identifying best practices in organizational knowledge management, appropriate to each organizational unit and planning personnel training, and indicative for benchmarking best management practices. This issue appears as a suggestion for improvement but has not been fully explored in our methodology.

84 information assets were identified and that led to one hundred and seven current situation information flows and 105 information flows to the desired situation. The desired situation flows were generated from the diagnosis made considering aspects of cohesion and coupling in connection with restructuring, which explains the difference in quantity between the current and desired situations.

Figure 3: Part of organizational characteristics analysis result - Source: KIMM Project.

The analysis of life cycle through information flows reveal situations as below, where the values do not directly represent the data in the agency:

Table 2: Percentage of information assets that do not meet fully and systematically each step of information life cycle.

Collection	10%
Validation	30%
Treatment	20%
Storage	25%
Recovery	30%
Distribution	15%
Dissemination	40%

The analysis of the stages of information life cycle on each information flow aims to identify lack of activities and/or systematic procedures that can ensure compliance, accordingly the objectives of relevant step. The table, shown in isolation, does not mean necessarily that the step is not being considered by organizational unit, but that could be optimized.

In the table is shown that for 40% of information assets no dissemination projected in its information life cycle activities, this means that there is no control and monitoring on the use of information assets (number of access activities, who accessed, etc...) and identification of the target audience. And yet, 30% of all information assets do not meet validation step with fully systematized activities and so the completeness of information may be compromised, as there are not always technical and / or a set of logical- time organized tasks so that the information collected undergo a validation process smooth and consistent. The importance of these

results should be analyzed considering the characteristics of the organizational unit

540 improvements recommendations were listed in four predetermined categories. For information management (IM) and organizational/procedures for IM categories, 411 improvement opportunities were identified. These two perspectives, automation of procedures, systems integration, defining storage activities, implementation of systems based on ontology are part of the main improvement recommendations established. Improvements were made available along with other project results through reports and those related to information lifecycle were represented in information flows in the desired position, to indicate which stage of the life cycle information would be impacted if they were implemented. Other improvements were represented in each specific model.

4 CONCLUSIONS

It was presented the information flow modeling part of a project to propose a knowledge and information management model (KIMM), developed for a Brazilian regulatory agency.

Information Flow Modeling proposed as a part of the project proved to be an important diagnostic tool for assessing the state of information management in organizations and a basis for the proposition of other models such as knowledge management one.

Life cycle analysis of organization information assets has clarified several issues of non-compliance relating to steps.

The representation of flows as they are today and how they should be in the future along with the associated improvements facilitate improvements implementation planning and their impact upon implementation record.

Assessing the quality of information along with the organizational characteristics also proved to be useful tool to help in prioritizing improvements to be implemented.

The EA tool was adequate for representation of flows, allowed to visually record how these flows occur and all aspects related to modeling them.

An important benefit of modeling information flow is the information whose production is continuing in the organization in all levels: operational, tactical and strategic, though each of these levels has specific needs and demands regarding the use and application of the information.

The modeling of information flow showed that, in most of the stages of the information life cycle, information assets are not systematically enforced. This implies that the implementation of KIMM involves the adoption of new practices for the collection, validation, processing, storage, retrieval, distribution and dissemination of information and mechanisms for the application of knowledge in the organization. This is a change in organizational culture and the relative strengths of the cultural factors that act as facilitators and those that act as inhibitors will determine the feasibility, robustness and speed of change in organization.

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