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Canadian Journal of Information and Library Science, Volume 34,
Number 4, December / décembre 2010, pp. 365-390 (Article)

Published by University of Toronto Press

DOI: <https://doi.org/10.1353/ils.2010.0010>

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Bridging Functions and Processes for Records Management

Comblant le fossé entre les fonctions et les processus dans la gestion documentaire

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Résumé : Étayé par notre expérience dans le développement de systèmes de classification fonctionnelle, cet article expose les défis inhérents à cette approche et propose une méthodologie qui réconcilie le point de vue organisationnel (c'est-à-dire le modèle fonctionnel) avec le point de vue de l'utilisateur final (c'est-à-dire les tâches quotidiennes qui appartiennent à un processus d'affaires). La première partie identifie les défis théoriques et méthodologiques propres au développement et à l'usage des classifications fonctionnelles. La seconde partie propose d'enrichir les concepts usuels issus du domaine des affaires par une théorie des « types d'actions ». Finalement, nous illustrons comment cette approche théorique peut être utilisée en pratique, avec une méthodologie adaptée à l'analyse du contexte d'affaires dans une perspective de gestion des documents courants et des archives.

Mots-clés : gestion documentaire, classification à facettes, classification fonctionnelle, processus de travail, méthodologie d'analyse des processus d'affaires

Abstract: Drawing on our experience in developing business classifications, this article identifies and discusses the challenges related to function-based approaches while proposing a methodology that reconciles the organizational perspective (i.e., the function model) with the end-user perspective (i.e., the day-to-day tasks within a process). The first part addresses the practical and theoretical limitations encountered while developing and using functional classification. The second part proposes to enrich current business concepts with a theory of “action types.” Finally, we illustrate how this theory is being applied in practice, with the adoption of a consistent methodology tailored for analyzing business context for records management.

Keywords: records management, faceted classification, functional classification, work process, business analysis methodology

Introduction

Although classifying records on the basis of their subject remains a common practice, current best practices put forward by recordkeeping experts suggest that there are benefits from basing classification on a rigorous analysis of business functions and activities—their business context—rather than on their content (Library and Archives Canada 2006–10). Recent approaches such as DIRKS (National Archives of Australia 2007–10), BASCS (Library and Archives Canada 2006–10), and the Quebec government’s activities and processes thesaurus (Québec 2005–7) reflect this growing trend in records management. The goal of such business classification is to provide a structure that accurately represents the core functions of an organization in a stable form. This in turn provides a framework for linking information resources produced in an organization with the context in which they were created.

The main benefits of this approach are a reduction in the change management of the classification, a consistent way to comply with RM-based legislation, and provision of a reporting tool for auditing and accountability. However, even if the value of functional classification is undeniable, organization-based records managers as well as end-users encounter difficulties when creating and dealing with such classification systems.

Given these considerations, this article will consider possible causes for the difficulties in creating and using functional classification and propose that the benefits of functional classification can be maximized and the challenges minimized through an improved theoretical understanding of the conceptual underpinnings and relationships among function, activity, and process. We will also demonstrate how this theoretical understanding may be translated into a solution for records management focused on end-users through a faceted classification system.

The first part of the article addresses the practical and theoretical limitations encountered while developing and using functional classification. The second part proposes to enrich business concepts with a theory of “action types.” Thirdly, we illustrate how this theory is being applied in practice, with the adoption of a consistent methodology tailored to analyzing business context for records management.

Practical and theoretical limitations of functional classification

Although functional classification is considered as a best practice for a “planned, rational, and logical approach to appraisal” (Bailey 1997, 110), several challenges must be overcome when developing and using such classification systems.

Practical limitations of functional classification

The challenges of developing functional classification

Overlapping records management and content management set new requirements in the development of electronic document and records management systems (EDRMS). Guercio (2002, 432) states the traditional role of the archivist “was active at the end of the record producing chain, while in the digital environment it should be present at the phase of conception and the design of the record system itself.” In this context, records managers must present a new set of skills that also comprise those of business analysts, in order to adopt a more encompassing and overarching approach for efficient management of the document’s life cycle.

For creators of function-based classification schemes, apprehending how organizations work, how systems will support this work, and how to use this knowledge in development of the classification scheme is paramount. Although creating functional classifications does not require a complete understanding of organizational and business process theories, the construction of a comprehensive, functional classification does require some knowledge of concepts related to organizational analysis—in particular, process analysis. This business approach constitutes a drastic shift from the traditional classification by subject, object, or end product (Sabourin 2001, 142).

Despite this growing trend, practitioners lack theory and methodology when developing functional classification systems, so they produce schemes that can be subjective, unclear, or artificial (Orr 2005, 108, 110). It is true that, generally, functional classification takes pains to distinguish between functions and processes, emphasizing that functions are not sequential and that processes are sequential. As well, functions are also characterized as being high level and constant, while processes are low level and may change.

However, as noted by Yeo (2007), records managers frequently have difficulty in determining what constitutes a record in a particular context and how records are connected to the activities that produce them. Consistent with this observation, in our experience this distinction between functions and processes is largely artificial and difficult to apply in practice. In information sciences, those who develop functional classification lack a consistent theoretical background and methodology, so they design schemes that are relatively arbitrary, since different analysts can produce dissimilar functional representations. This suggests that more effort must be made to clarify these concepts and their relationships.

The challenges of using functional classification

The lack of theoretical and methodological foundation seriously affects the usability of functional classification systems, which users consider to be unintuitive and time consuming (Orr 2005, 108). Our findings support Foscari's (2009) claims that classifications that accurately reflect organization functions nonetheless fail to reflect the way that end-users of such systems carry out their daily work. In reality, it appears that information workers have difficulty relating their work with the functional model, and the result is poor user adoption and low-quality classification.

Implementing a functional classification system within an institution requires a significant cultural shift. It is less difficult for users to relate to the organizational structure, which is easily understood, than to a corporate file structure organized by functions, which appears to be an intellectual abstraction rather than a practical tool. The major hurdle to be overcome is the perception that employees' work is personal or belongs to their work unit rather than pertaining to a higher business function. There is often a feeling that losing control over the file taxonomy structure will make retrieval more difficult.

Furthermore, information sharing and retrieval is not always well supported by functional classification systems. In a digital context, the value of a classification system for end-users should take into account their needs to share with multiple users in different parts of the organization. In reality, functional systems tend to create information silos in an organization by making it more difficult to produce horizontal views of information. For instance, when horizontal processes are carried out at a higher level in the organization—horizontal processes being sequences of

activities crossing multiple functions—the information created cannot be grouped together, since processes and functions do not always overlap.

Because functional classification allows for a document to be organized into a single location, users also have limited searching capabilities. Reflecting a common flaw with hierarchical taxonomy systems, functional classifications do not provide access to information from other useful perspectives such as content type, case, project, or subject. For instance, within a function such as *real property management*, documents related to a specific building might be dispersed among four files: a planning file, an acquisition file, a maintenance file, and a disposition file. If this limitation is explicable in a world where paper used to be an imperative, it has yet to be bypassed in digital environments using appropriate metadata.

Theoretical limitations of functional classification

Adopting the “proper” concept at the “right” level of abstraction

As mentioned earlier, practical limitations while creating and working with functional classifications are in part due to a struggle in reaching theoretical agreement about the use of basic concepts such as *function*, or *process*, or *activity*. As Hurley (1993) states in his earlier essay about the “science or methodology of function analysis,” questions such as “What rules (if any) determine the taxonomy and naming of functions?” “How broad or narrow should the scope of a function be?” and “What distinguishes variations within a function from differences which characterize a new function?” have not been properly answered.

For instance, comparing two dominant approaches for functional classification—DIRKS (National Archives of Australia 2007–10) and BASCS (Library and Archives Canada 2006–10)—provides an insight into the definition challenges affecting the concepts used for functional classification. As illustrated in figure 1, if there seems to be an agreement on the use of *function* at the first level of the hierarchy, subsequent levels diverge with the use of different concepts such as *transaction* or *sub-function*, as well as the use of the same concept (*activity*) at different levels of abstraction.

If the concept of *function* is similarly defined as the “largest unit of business activity” (DIRKS) or “any high-level purpose, responsibility,

Figure 1: Comparing concept hierarchy for functional classification

task or activity” (BASCS) carried out by an organization to fulfill “its goals” (DIRKS), or because it has been “assigned to the accountability agenda of an institution by legislation, policy or mandate” (BASCS), there is a fundamental difference in the rationale underlying the use of this concept. This difference dictates the logical arrangement of term sequences at the lower hierarchical levels, while providing distinct representations of the business of an organization.

Choosing between a process-based approach and a non-sequential hierarchical approach

DIRKS advocates the use of different levels of abstraction to develop functional classification, where activities and transactions can be organized in a non-sequentially (a *transaction* being the “smallest unit of business activity” and *activity* being “tasks performed by the organization to accomplish each of its functions”). On the other hand, BASCS adopts a process-based approach at the higher level of the hierarchy. Following this perspective, *sub-functions* are “major and unique steps of the business process an institution puts in place to fulfill a function” while *activities* “are derived from the major tasks or actions performed by the institution to accomplish each step (i.e., sub-function) of the business process.” Simply put, processes appear at a higher level of the hierarchy and are nested in each level within BASCS, while processes are reflected only at the lower level in DIRKS as organized sequence of transactions (see Sabourin 2001 for details).

Although both DIRKS and BASCS involve the adoption of a process-based approach to functional classification, they provide no theoretical guidance or methodological tools on how to address the notion of *process* or how to perform process analysis. While process-related concepts are used widely in disciplines such as systems engineering or business sciences, they have not been fully adopted by records managers. Nevertheless, our experience dealing with implementation of EDMRS has brought to light the critical need to adopt an approach based on the analysis of business processes, at the level of the transaction, such as prescribed by DIRKS. We therefore advocate the need for a better alignment between business theory and records management theory.

One benefit of adopting an approach focused on the analysis of lower business processes is improved compliance with the preservation of business activity evidence for accountability. In that respect, the analysis of information resources at the lowest level of the functional hierarchy better supports the appraisal of their value, especially in the case of less formal information, which cannot be captured by a high-level functional approach (such as email or significant draft). Standardization efforts such as ISO 9001 for quality management as well as the Directive on Recordkeeping put forward by Treasury Board of Canada (2009) abound in this direction.

Because business processes clearly represent an organization's information assets, the analysis and the resulting map allow valuable resources to be targeted, rather than relying on time-consuming activities such as "cleaning the hard drive" to triage important information. Additionally, understanding the circulation of information during its entire life cycle helps assign proper custodianship and set proper version control. In that sense, performing business process facilitates reconciliation of content management with records management perspectives, providing better visibility and credibility to recordkeeping by linking them directly to business and system requirements.

However, in the development of a functional classification scheme, process analysis faces similar challenges such as a lack of standardization and methodology in the modelling approaches, as well as the identification of levels of process abstraction (Induslka et al. 2009). Although Weidlich et al. (2009) advocate that "process models are created to answer a specific purpose" and "mismatches are a natural result of the different focus of these models," we still believe that process developed

for records management should be based on more solid theoretical background. In the following section, we suggest that the concepts of “function” and “process” should be enriched with a new theory of “action types.”

A theoretical discussion of functional and process analysis

It is important to keep in mind that the goal of a functional classification is to capture the context in which an information object was created, rather than simply focusing on the content. This in turn leads to a broader question: how do we describe the context in which an information object is created? Generally speaking, we can describe the context in two ways. First, we can describe the action of creating the information object in terms of the actions preceding and following the creation of the document—the process. Second, we can ask about the motivation for creating the document in the larger context of the organization’s purpose—the function.

While working with organizations to develop functional classifications as a component in broader classification schemes, we have developed several working definitions to assist in creating these contextual classification schemes, focused on organization activity and an understanding of the connection between organization functions and the processes that the organizations carry out. To clarify the role of each type of action we have developed definitions of function and process that clearly show the connection between these two types of action descriptions and explain how each type of action may be used at any level. At the same time, we suggest that it is useful to use stand-alone actions, or functional descriptions at higher levels, and transition into sequences of actions or process descriptions when moving to lower levels of granularity.

Action: The basic building block

Before discussing either processes or functions it must first be appreciated that both describe an organization in terms of actions. Thus, to achieve a clear process description and a clear functional description, the concept of an action must first be understood. We define an action (description) as follows: an action has a subject, a verb, one or more objects and possibly adverb phrases—*[Subject] is [verb]ing [object], [Subject] is [verb]ing [in order to . . .]*. This definition has some similarities to the understanding

of action provided by action theory, which also considers the subject, object, and purpose as major components of an action (Bedny, Seglin, and Meister 2000).

It is useful to note that, when using this definition, a verb alone is not an action. Thus *planning* is not an action, as understood in this discussion, unless the other aspects of the activity are implicitly understood. *Finance* is also not an action. The subject and the objects may be implied for convenience, but it must be possible to make them explicit if required. As well, there must always be an object, even if it is just the self (I am running—implied “myself”). If the subject, object, or verb phrase is unknown, the action is not fully understood.

A key concept when discussing actions is the level of abstraction involved. Each part of the action—subject, verb, or object—may be more or less abstract. For example, *moving* is a more general and abstract verb than *walking* (because walking is a type of moving). Similarly, *vehicle* is a more abstract object than *car*. Thus the action phrase “The vehicle moves on the paved surface” is more abstract than “The luggage-loader drives on the runway.”

This has implications when constructing functional classification systems. From a practical perspective, when constructing such classification systems it is important to realize that, because different parts of an action description can exist at different levels of abstraction, different pathways can be taken to go from a more abstract description to a more concrete description. For example, starting with the general action “I am getting a beverage,” I may move in three different directions to make this more explicit: “I am brewing a beverage” (more explicit action), “I am boiling water” (an action I am taking in order to get the beverage), and “I am getting a cup of tea” (more explicit object). This variability can be one source of the apparent subjectivity that arises when different people attempt to construct functional classification hierarchies for the same organization.

Actions can have semantic relationships to other actions, just as objects may have semantic relationships to other objects. A collection of actions may relate to each other in several different ways:

- One action can be a more abstract description of another action, or a collection of other actions (subtype–super-type relationship: walking, running, and hopping are all subtypes of ambulating).

- A series of actions, combined, can have a result that can be described as another, more abstract action (part–whole relationship: cleaning the tub and cleaning the sink are part of cleaning the bathroom; scrubbing the tub and rinsing the tub are part of cleaning the tub).
- Actions may take place in parallel with other actions, only before or after other actions, or may cause other actions or states to occur (causal dependence relationships: the cup was pushed and then the cup fell off the table).
- A collection of actions may all be performed on a particular object or performed by a particular entity (common object relationship: eating cookies, sharing cookies, storing cookies; common subject relationship: today our family went for a walk and ate dinner at a restaurant).

Each of these types of relationships becomes important when considering the distinction between functions and processes, and also when creating classification schemes that must be consistently structured and comprehensible. In particular, as will be discussed below, subtype–super-type relationships play a key role in functional decomposition and part–whole relationships play a key role in process analysis. Grouping actions on the basis of the object with which they interact also becomes relevant as a possible alternative way to classify activities. Perhaps as important as the type of action relationships chosen when making contextual classification schemes is the ability to explicitly state these choices and apply the relationships consistently.

States and goals: A precursor to understanding functions

Contextual classification is concerned with the ways in which documents are generated within an organization. Thus, in addition to discussing the basic concept of an action before addressing the concepts of process and function, it is also important to briefly discuss the nature of organizations and the conceptualization of an organization as having states and goals.

Considered holistically, organizations have structures, properties, and states (Anderson 1999). Thus an organization may be characterized in terms of its current and desired states. In addition, an organization may take action—on itself and on the world—that will change its state and/or the state of the world, in both more and less predictable ways (McDaniel Jr., Lanham, and Anderson, 2009).

Because an organization can take actions, it may define goals or objectives, and then take actions in order to meet these goals or objectives,

Figure 2: An example of the subtype–super-type relationship between actions

where a goal or objective is simply defined as “something”—an action, a state, an occurrence—that the organization wants to (cause to) happen. It might refer to:

- a particular input from or output to the environment (get money, provide housing)
- a particular (internal) state of the organization (remain solvent, keep employee numbers stable)
- an effect on the environment at large (crush competitors, promote world peace)

It should be noted that, while goals are frequently described as actions, these actions reflect the desired end state arising from the action, either explicitly or implicitly. For example, if the goal is “to clean my house,” the desired end state is a clean house, which is obtained through the action of cleaning. Thus, the goal may also be described simply as the end state: my goal is a clean house. Furthermore, attainment of a goal may be decomposed into attainment of sub-goals that, when taken together, result in the attainment of the main goal. For example, the goal of a clean house may be achieved by obtaining the sub-goals of a clean living room, a clean bathroom, etc., or it may be obtained by washing the floors, dusting surfaces, etc.

It becomes apparent, when considering definitions of function provided within the functional classification literature, that the notion of states and goals is implicit in the notion of function. As already demonstrated,

the definitions by DIRKS and BASCS of a function are linked to the notion of responsibility and purpose, which in turn implies goals and states.

Function

The discussion of organization objectives or goals leads naturally to a discussion of functions, because, generally speaking, a function places actions in the context of the objects and goals of the company. Specifically, as we define it, a function is an action description that emphasizes the group carrying out the action, their responsibility, and how their action supports a general goal or organizational state. For example, the function of the finance department might be to manage (which is to say oversee, obtain information concerning, coordinate, provide advice and direct actions concerning) the money in the organization so the organization stays solvent.

Having said this, it should be recognized that a function is still a type of action, and like any action type, may be abstract. Thus, my personal function may be to mop and wax the floors on the second floor, in order to keep the building clean. We argue that the specificity of this action description does not make it less of a functional description. At the same time, my function can also be described more abstractly, in the context of my larger group: the function of the building services group as a whole (of which I am a member) may be to keep the infrastructure of the organization in good working order so that organization employees can have a safe and productive place to work. This is not surprising when considered in the context of goals and sub-goals, as discussed in the previous section. A functional classification is essentially an action taxonomy organized on the basis of identified goals and sub-goals, which in turn reflect desired states of the organization.

When creating such decompositions it is also important to distinguish between a functional action description and a common object action description, as discussed in the section on actions, above. In the case of a common object description, the focus is on a particular object. For example, “financial actions” might be a collection of any actions that have money as their object: spending money, collecting money, tracking expenditures. By contrast, a functional description focuses on the goal of the action: to keep the company solvent.

Within organizations it is common for a particular group to be assigned responsibility for a collection of actions because of their capabilities

or expertise in a particular object—the financial department comprises people who are experts in dealing with money. Although a function also emphasizes the person or group doing the function—the function of the financial group is to manage money in the organization—it is important not to assume that this function is limited to this group, just as it is important not to assume that the ordering of an organizational chart represents a functional grouping. For example, in the case of money management, the managers of all departments may have a role in creating budgets for their departments, and individuals within the company who are authorized to spend company money must also manage it by deciding how to spend it appropriately within the contexts of their authorized spending. Thus, while the financial department is a source of expertise in a particular object—money—and a primary function of the people with that department might be to oversee and manage how money is used in the organization, it would be inaccurate to say that no other people in the organization have money management as one of their functions.

Processes

A functional description of an action places that action within the larger objectives of the organization. However, because functions are stand-alone actions, they cannot address questions about the flow of information through an organization. In contrast, processes can describe how information objects move through an organization and are embedded in its actions. Consequently, processes are an important type of description for understanding and identifying information objects within an organization and defining their context.

For practical purposes, we define a process as a sequence or flow of multiple actions (as defined above) at the same level of abstraction. The process shows the order in which the actions can or must happen. Different actions within the process may be carried out by different actors. Inputs and outputs of actions should also be indicated in a process. Thus a process may be described by stating:

- Who participates in the process
- The inputs and outputs of the process (for example, the documents produced by the process)
- The actions (or type of actions) performed on these key objects or relating to these key objects

Figure 3: Example of a process, including steps, inputs, outputs, and the groups involved in the process

Having said this, an entire process can itself be described, or given a label, using a single more abstract action description, which may then be used to include that process in a process description at a higher level. For example, putting coffee in the coffee maker is a part of making coffee, and in turn, making coffee may be part of making lunch. This type of relationship between actions can be understood as the part-whole action relationship discussed in the Action section: putting coffee in the coffee machine is a step, or part, of making coffee.

At the same time, this labelling of processes with a single action description provides a connection between functions and processes. Because any single action description may also be incorporated into a functional description—the function of Edward in Catering is to make coffee in the morning so that the employees stay awake and get their work done—a link is created between the process and the function it supports. Processes can be associated with functional descriptions within or across levels of abstraction. More abstractly, the function of Catering is to provide food and drinks to employees so they can be productive. Because making coffee is a type or way of providing food and drink to employees, the process may be linked to this higher-level functional description as well.

In fact, just as functions may be fairly concrete action descriptions, processes may be a collection of fairly abstract actions, so long as the order of

the actions, who participates in the process, and the inputs and outputs are indicated. For example, at a very abstract level the main process of a car company might be described very simply: car company makes cars, car company attracts customers, car company sells cars. However, at this level of abstraction the value of the process description is questionable; describing the actions of the company functionally would likely be more informative from a contextual perspective.

If both functions and processes can be supplied at any level of granularity, and connected to each other across levels of granularity, decisions must be made when creating a business-oriented classification system about the desired levels of granularity. As will be discussed in the next section, we propose that combining a functional description of an organization at a high level of abstraction with process-level descriptions at lower levels of granularity provides the most useful contextual description of document creation.

Developing a business-oriented, faceted classification system

As can be seen from the previous discussion, creators and users of a functional classification system encounter difficulties. A better understanding of the notion of functions, processes, and actions provides the basis to develop a framework that can more clearly define how to approach creating a functional model—one that is actually rooted in a real understanding of how an organization actually works. However, there are still important steps required before the main problems are solved. First, a standardized approach to developing the functional and process models is required. Second, a structured way of relating the two perspectives is required. Third, the problems of end-users adopting the functional classification must be dealt with.

In order to address these problems, along with others, a novel approach to classifying documents and records was developed. Integrated semantic information services (ISIS) represents our attempt to unify the disparate approaches used for information management, such as file plans, metadata frameworks, thesauri, business-process mapping, knowledge maps, and documentation standards. The integration of the file plan, metadata framework, and business-process mapping provides the foundation for dealing with the problems of developing and using a functionally organized approach to records management by building on the function-process-action theory introduced above.

Specifically, ISIS addresses the first two issues by introducing a business-oriented, faceted classification framework along with a structured methodology to produce an instantiation of the abstract framework. The framework provides the structure to represent the process and functional models as well as a set of business rules that relate the two perspectives to each other. The methodology provides a systematic, replicable process of analysis to produce an instance of the framework, and thereby the functional and process models. We therefore address the problems of functional classification from the end-user's perspective by showing how a software system that uses a model implementing the framework can simplify interaction with the functional classification system.

ISIS comprises three components:

1. *The ISIS framework* defines a business-oriented classification system from a conceptual standpoint. The framework defines the abstract structure of the classification system along with the structure of the business rules that govern the classification system. When the ISIS framework is actualized for a particular organization, the resulting structure is called an "ISIS model."
2. *The GenISIS methodology* defines a process of analysis that enables organizations to produce an instantiation of the ISIS framework.
3. *The ISIS software suite* provides automation for the business rules defined by the ISIS model.

Overview of the conceptual framework

At the core of the ISIS framework is the use of faceted classification, which provides the basis for integrating multiple perspectives into a unified classification scheme. Each facet represents a particular perspective that can be taken when describing information resources in an organization. The ISIS framework defines categories into which these facets can be organized, as well as a core set of facets from these categories that accurately describe information in an organization.

There are three broad categories of facets: content facets, context facets, and bridging facets. *Content facets* describe what information objects are about. Content facets can include location, people, topic, and time.

Context facets describe the context in which information objects are created or are used. Context facets include function, role, activity, process, and content type. *Bridging facets* connect context facets to content facets in an ISIS model, by making use of the fact that particular instances of how people organize their work are linked to a business process and also contain a particular set of semantic content. Concepts such as project, initiative, program, and committee are used to span this divide, allowing information objects to be described from both content and context perspectives.

For the purposes of this article, the most important type of facet is the set of context facets, because they provide the foundation for linking the process and function perspectives together. In ISIS, different facets represent the same organizational activities from multiple perspectives, including task, process, and function. There are five main context facets defined by the ISIS framework:

1. The *function* represents the business functions of an organization (as defined above).
2. The *task* represents the actions performed by individuals from a process perspective (although the values in the facet may be reorganized to be more usable).
3. The *role* defines groups of actions performed by individuals in an organization. Roles are defined whenever different individuals perform the same sets of actions in the organization.
4. The *content type* represents the inputs and outputs of the actions identified by the process model.
5. The *organizational structure* represents the traditional hierarchical chain of responsibility perspective of an organization.

The context facets represent both the functional and process perspective on actions. In order to effectively deal with the problems of implementing and using a functional classification system, these perspectives must be linked together. Building on the core faceted classification system, the ISIS framework defines layers of business rules that provide the basis of a number of information management services, such as a multilingual thesaurus, semi-automatic metadata creation, automated file-plan mapping, and context-specific appearance of facets.

The most important service in relation to this article is the *semi-automatic metadata creation service*, which defines the allowable combinations of values from different facets. The set of business rules from the metadata creation service are used to encode how the function and process perspectives are related to one another by ensuring that once a process-based action is selected, the corresponding function is selected. In order to consistently and effectively create the structure of the context facets, and the business rules that relate them to one another, a methodology is required. The next section describes a process of analysis that generates the data required to build this structure.

Methodology to collect business data

We create business-oriented, faceted classification systems using the GenISIS methodology. This methodology is a four-phase approach to discover an optimal set of facets and build semantic relations within the model according to the specification of the ISIS framework. The methodology uses a set of tools and strategies to gather information about the content and the business context in which information resources are produced within an organization. The result is the creation of an ISIS model, which comprises a set of facets as well as controlled vocabularies tailored to each organization.

Figure 4 summarizes the steps in the development of a business-oriented, faceted classification system. In this article, the discussion will focus on the collection of data related to the business. Data collection comprises three phases, which are generally performed cyclically: functional decomposition, process mapping, and identification of related facets. Each phase is described below.

Functional decomposition

Functional decomposition is the first phase in the creation of a business-oriented, faceted classification system. Functional classification development consists of the creation of a two- to four-level hierarchical representation of the core operational, decisional, and administrative functions, sub-functions, and activities of the organization. To functionally decompose an organization, the analyst uses different data-collection tools and strategies.

Figure 4: GenlSIS overview

The first strategy consists of reviewing business documentation that pertains to the enterprise, in order to target useful information to develop the model. A first draft of the functional model is generally produced, consisting of a taxonomy of potential functions, sub-functions, and activities, as well as key stakeholders for each of them. With this first draft in hand, the analyst will meet with senior management for high-level interviews and workshops, to refine this high-level perspective of the enterprise as well as gather additional facet information. During these meetings, the analyst will ask a series of questions about how the organization achieves its goals. Mind mapping is also used to document the tacit knowledge of organization members.

Using similar information gathering techniques, the analyst will also interview middle managers, when the upper level of the hierarchy appears to be stable enough. The lower levels of the functional model, as well as specific work processes, are then identified. These middle-level interviews and workshops are also the opportunity to gather more facet information as well as additional documentation and stakeholder names, as performed during the high-level interviews.

The result of this phase is a functional model of the organization—an active description of how the organization works to achieve its goals. The analyst will end the functional decomposition when theoretical

Figure 5: Example of draft functional model

saturation is reached, when no more functions, sub-functions, or activities are required to describe the business of the organization. Figure 5 provides an example of a draft functional model, where functions constitute the top of the hierarchy. Below, groups of actions are decomposed down to the “activity” level, which generally corresponds to the naming of a process. Below the activity level, actions and their sequential arrangement are further analyzed and mapped using a second set of methodological tools and strategies.

Process mapping

Process mapping constitutes the second phase in the creation of a business-oriented, faceted classification system. A business-process map is a visual representation of a process—illustrating each step in the process, who completes each step, what resources are used during each step (inputs), and the outcome of the process (outputs). The mapping

also captures information flows throughout the organization, from one process to another.

With the methodology, process maps are produced mainly to support identification of information resources in their context of creation. During the process-mapping exercise, the analyst will reach the “proper” level of granularity, which is the level that allows identification of the resources as well as their value for the organization. At this stage, the analyst assesses information value in collaboration with the process sponsor(s). Criteria for identifying records are based on the analyst’s expertise in archival evaluation as well as industry-specific standards and specifications, such as the Directive on Recordkeeping (Treasury Board Secretariat 2009) or ISO 9001 Quality Management System.

Strategies used to collect process-related data are process-mapping workshops and questionnaires. Under the supervision of the analyst, small groups of experts in specific areas of the functional model are invited to map their processes. A questionnaire is also distributed at the end of the workshop to gather additional information on work organization and content facets. These questionnaires are designed to obtain specific facet values that cannot be easily gathered by interview or workshop techniques.

Resulting from this phase is a set of process maps generally linked to the lower branches of the functional decomposition. As depicted by figure 6, a map focuses on the representation of the information resources (such as documents, emails, webpages, or systems) symbolized by the curved shape above each step. The resources assigned with important or critical value for the organization are highlighted. The role of the actor performing each step is also identified on the left side of the map. The person who adopts this role will normally be the custodian of the critical resources within that area.

Other facet identification

Finally, essential data required to build the ISIS model that could not be fully identified during the workshops or interviews, or with the workshop questionnaires are also gathered via more ad hoc methods. Constituting the third phase in the creation of a business-oriented, faceted classification system, other facet identification entails questionnaires designed for

Figure 6: Example of process map

specific groups or Web-based surveys that are adapted to organizational cultures and needs.

Once data are collected by using the GenISIS methodology, the analyst starts to create a working ISIS model comprising the following elements:

- *Enterprise facets*, which are relevant to everyone in an organization
- *Specific facets*, which are relevant for only a particular group in an organization
- *Facet values*, which are controlled values for specific and enterprise facets
- *Facet relationships*, which are relationships between facet values
- *Specific facet logic*, which determines when specific facets will appear and disappear in the classification system.

It is from these elements that a metadata scheme will be derived, allowing users to interact with the business-oriented, faceted classification system—to describe or retrieve documents—transparently and more intuitively.

Translating business data into a usable metadata scheme

GenISIS provides the elements needed to implement a user-friendly functional classification scheme. Specifically, the output from the methodology includes the functional classification system and the process model. However, the relationship between these two systems is latent in the output and has to be made explicit in order to be used by individuals classifying information. This is important because the structure of the model produced by the methodology must be translated into the business-oriented, faceted classification system that allows end-users to classify information without interacting with the functional model.

As was defined earlier, the core facets that describe the functioning of an organization are function, task, role, content type, and organizational structure. The output from the methodology must be translated into these facets and the business rules defining the relationships among them. The notion of actions is used as the core element to define the business rules, including the link between the functional and process perspectives.

Figure 7: Business rules

The actions from the process point of view are translated into the task facet, although the process-based actions may be reorganized in terms more familiar to end-users, such as the roles they play. The business rules are defined by using the values from the task facet as an anchor to link the values from the other facets to which they are related. This results in a set of business rules that for each task (action) define the following:

- The business function fulfilled by the action
- The role that performs the action
- The content types required by the action (the inputs and outputs of the action).

Additionally, the positions from the organizational structure can be linked to the roles performed by each position, thus providing a link between individuals and the actions that they perform in the organization. As depicted by figure 7, the resulting business rules can be interpreted as stating that the position in the organization structure determines a set of roles played by that position. The role played in turn limits the set of actions performed by that role. The action performed limits the set of content types used to perform that action and uniquely determines the business function being performed.

These business rules are interpreted directly from the process model; however, they need to be put into a form of that can be used by the ISIS software system to provide the benefits to end-users of the classification system. The structured output from GenISIS is encoded through a design tool so that the ISIS software suite can use this model to automate these processes for end-users. Once in the proper form, the system can use the business rules to deduce facet values based either on a user's selection or on the identity of the user. For example, the organizational structure can be deduced from the identity of the user, and the roles and

tasks presented can be limited to those that he actually performs. The user can then select from any of the business-context facets, specifically the ones he feels most comfortable with. Because the rules determine the allowable combinations, they determine the values available in the other facets. Specifically, once the task is determined, the business function will also be determined. This significantly simplifies the complexity of the navigation of the classification model for the end-user.

Conclusion

As the recent publication of the Directive on Recordkeeping sets new pressure on Canadian public administrations to effectively “manage and protect the integrity of resources of business value” (Treasury Board of Canada 2009), we believe there is a need to further address issues related to function-based classification. Function-based classification may provide organizations with a powerful tool for compliance with information management and recordkeeping requirements, but it will fail to be used if such classifications cannot be consistently created, justified, and explained by records managers and if users cannot readily apply the classification scheme to their documents on a day-to-day basis. With this article, we propose better distinctions among basic concepts such as *process*, *function*, and *action*, which are essential for the development of business-oriented classification systems.

We also introduce a novel framework—ISIS—that augments the functional classification system by including a process-based view of the organization. The process and function views on actions are linked by a set of facets and business rules defining the business function of an action, the role that performs the action, and the inputs and outputs required to perform the action. We believe this systematic approach to reconcile the organizational perspective on record management with the end-user perspective on day-to-day information practices will support long-term, consistent, and usable business-classification systems.

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