Content Analysis of Business Processes

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***Abstract*-BPM identifies, comprehends and manages business processes both within and across organizational units. This requires understanding of the totality and interrelationships of an enterprise process suite – a complex undertaking, given a number of processes involved. We suggest a method for supporting the management of a business process suite from action- and object-based perspectives. We abstract the action verb and the object noun from each process descriptor, and perform a frequency analysis. Through a Pareto approach, those common to a large number of processes are identified. Semantic analysis of significant actions provides three directions for BPM support: locating actions in the planning, execution and control domains; identifying common procedures to be implemented; and ascertaining where operational coordination and consistency is required between organizational units. The corresponding analysis of significant nouns provides further directions: locating objects in the origination, modification, authorization, retrieval and transfer stages; and ascertaining and coordinating object flows between organizational functions.**

Keywords- Business Process Management; Business Action Analysis; Business Object Analysis; Process Content Analysis; Pareto Analysis

I. INTRODUCTION

An enterprise process model encompasses a set or suite of business processes implemented in that enterprise. However, there is a lack of an enabling science to apply the model directly to guide the formulation of procedures, specifications and standards within a BPM framework. In this paper we create a direct connection between the model and BPM, based on the following perspective: Business process management is the identification, comprehension and management of business processes that interact with people and systems both within and across organizations [1]. Conscious process management involves addressing processes in context, rather than in isolation, by seeking to understand the totality of processes, their boundaries and interrelationships [2]. Therefore we must research, develop and apply conceptual tools for analysing processes, particularly approaches to integrating the visioning and provisioning of organizational strategies and process perspectives [3].

The central problem in grasping the "totality" of a process suite is its size – a suite may contain several hundred to several thousand processes [4, 5], for example, offers in the region of 2,500 processes to its customers; and the ProcessGene [6] business process repository consists of 3,000 processes in all industrial areas. The conventional solution is to view the enterprise more abstractly in terms of its business functions, as evidenced by SAP's business solutions for industrial sectors (http://www.sap.com/solutions); a typical solution contains 8 major functions and 40 main functions. However, BPM is intended to act at the process level [7], rather than at the function level.

In order to confront these concerns, we: (1) demonstrate a methodology for perceiving a process suite through semantic understanding of two components of its descriptor: the action activated in each process and the object acted upon by the process; (2) examine the sets of actions and objects to determine those common to a large number of processes; and (3) interpret and exploit these significant actions and objects in order to guide the formulation of procedures, specifications, standards and coordination mechanisms for BPM. The methodology applies techniques of content analysis [8] and object role modelling [9] to business process descriptors.

The outcome of the process descriptor analysis is a study of:

- *Management domains*: Determination of the management field to which the action belongs (plan/execute/control), thus enabling better assignment of management responsibility;
- *Elaboration stages*: Determination of the stage of evolution of the object from origination through authorization and *transfer*, thus enabling better assignment of worker's responsibility;
- *Significant actions*: Identification of significant actions which should be the focus of business process activity management and formulation of procedures and standards for performance quality;
- *Significant objects*: Identification of significant objects which should be the focus of business process input/output management and formulation of specifications and standards for formatting quality;
- *Cross-functionality*: Noting which actions occur and objects are handled within and across several functionalities and therefore require operational consistency and coordination between organizational units or sub-units.

We define process-descriptor content analysis and a procedure for carrying out the analysis (section II); and convey our ideas by detailing a case study to which the methodology is applied (section III). Section IV summarizes the methodology and

its application to business process content analysis.

II. BUSINESS PROCESS CONTENT ANALYSIS

The unit of analysis in our research is the business process, represented by its descriptor and the set of basic linguistic units constituting the descriptor: predicate, object and qualifiers.

- *Process suite*: a set of business processes linked to a given business function;
- *Process descriptor*: a verb phrase used to describe the content of a business process;
- *Process content*: lexical and semantic interpretation of the set of basic linguistic units comprising the descriptor;
- *Predicate*: one of the two main constituents of a process descriptor, containing an action (verb) and its qualifiers;
- *Action:* something done or carried through;
- *Object*: the second main constituent of a process descriptor, containing an artefact (noun) that is acted upon and its qualifiers;
- *Information object*: an entity comprising a collection of data, information and/or knowledge [10]; this is the object class described in this paper;
- *Qualifier*: a complementary constituent of a process descriptor, being a mechanism for refining, describing or limiting the action or artefact or providing further information for understanding the process;
- *Process content decomposition*: separation of the process descriptor into its constituents;
- *Pareto analysis*: selection of a limited number of process actions or objects that produce a significant overall effect, based on the principle that not all of the causes or results of a particular phenomenon occur with the same frequency or with the same impact;
- *Pareto action list*: a list of process descriptors sorted in descending order of the frequency of the action verb within the process suite;
- *Pareto object list*: a list of process descriptors sorted in descending order of the frequency of the object (noun) within the *process* suite.

We exemplify process content decomposition using processes from two functionalities: “Hotel hospitality” (a specific function) and “Procurement” (a generic function):

Process descriptor	Offer multiple rate types and rates during a single stay
Action	offer
Action qualifier(s)	during a single stay (temporal)
Object qualifier(s)	multiple (quantitative)
Object	rate types and rates
Process descriptor	Issue urgent purchase order to local supplier
Action	issue
Action qualifier(s)	urgent
Object	purchase order
Object qualifier(s)	to local supplier

General process content analysis comprises a set of procedures for collecting and analysing descriptors of all business processes within a given suite and making inferences about the characteristics and meaning of the actions realized and the objects created or modified by these processes within the context of the suite. *Action-based* content analysis focuses on the action verb; *object-based* content analysis concentrates on the object noun.

For example, the process “Negotiate purchase order conditions with supplier” indicates the action of “negotiating”. We search the process suite being analysed to find all negotiation processes. If many processes concern “negotiate”, a general negotiation protocol needs to be established, specifying the necessary authority for workers to set conditions and make decisions, and training them how to negotiate (e.g., with customers, suppliers, sub-contractors and potential employees). In addition, we search the process suite being analysed to find all processes dealing with purchase orders. If many processes handle “purchase orders”, a multifunctional form needs to be specified, allowing a common and consistent reference for all those involved (e.g., product designers, material suppliers and cost accountants) in formulating, tracking and fulfilling the order.

We stress that “frequency”, in the context of content analysis, refers to the rate of occurrence of a given action or object within the process suite; it is unrelated to the frequency of execution of processes or appearance of objects within the operational framework.

Our three-phase procedure comprises the following steps:

(a) Create a Pareto list of action verbs and object nouns from process descriptors

(1) Assemble a process suite related to a business function or sub-function.

(2) Compile a list of verbs (nouns) extracted from the process descriptors.

(3) For the verbs, check for operational synonyms (e.g., approve / authorize; evaluate / rate) and unify if necessary.

(4) Count of the number of processes in which each verb (noun) occurs.

(5) Order the verbs (nouns) in descending count order.

(6) Using the Pareto principle, determine which verbs (nouns) are common to a significant number of processes ("significant action" or "significant object").

(b) Carry out the following action-based analyses:

(7) *Management domains*: determine to which manage-ment field each significant action belongs (plan / execute / control). This influences factors such as the action time window, the vocabulary of a procedure or specification, and the category of managers, workers and even customers involved.

(8) *Significant actions*: Identify significant actions to be the focus of business process management. This pinpoints areas for creating procedures and standards for process execution and quality control.

(9) *Cross-functionality*: Note which actions occur within and across several functions or sub-functions. The corresponding processes will require operative consistency between organizational units or sub-units.

(c) Carry out the following object-based analyses:

(10) *Elaboration stages*: determine the stage of evolution which each significant object has reached (originate / modify / authorize / transfer / retrieve). This influences factors such as the object flow and routing; intrusion effects of authorizations; structure and composition of the object; and the category of managers, workers and even customers involved at each stage;

(11) *Significant objects*: Identify significant objects to be the focus of information flow management. This pinpoints the necessity for structuring the make-up of the object and specifying the relationship and coordination between the various roles involved in handling the object;

(12) *Cross-functionality*: Note which objects flow between functions or sub-functions. The corresponding processes will require flow synchronization and information consistency between organizational units or sub-units.

III. CASE STUDY: PROCUREMENT/PURCHASING

Our case study concerns a general business function – "Procurement or Purchasing Management". The process suite was developed through an extensive Internet search using terms such as "procurement (purchasing) management systems" and "purchasing agent job description". The resultant suite of 98 processes, categorized by procurement sub-functionalities, is detailed in Table 1. It constitutes a superset of procurement processes and reflects a high degree of commonality as evidenced by the recurrence of sub-functions and processes in the various sites accessed.

TABLE 1 PROCUREMENT DESK PROCESSES – FUNCTIONAL VIEWPOINT

1 Procurement strategy	• Develop procurement strategy • Develop sourcing strategy • Develop procurement program • Develop procurement budget • Develop procurement authorization program • Develop rating system for order completeness • Develop rating system for on time delivery • Develop rating system for quality performance • Identify critical purchase items • Monitor purchasing budget status
2 Requisition management	• Authorize employees to issue purchase requisitions • Issue purchase requisition • Monitor purchase requisition status • Approve purchase requisition • Change purchase requisition • Consolidate purchase requisitions • Block purchase requisition
3 Procurement planning	• Develop catalogue-based procurement plan • Develop BOM-based procurement plan • Evaluate purchase item quality • Maintain purchase item price history • Authorize make-or-buy

4 Bid planning	• Prepare bid package • Select possible suppliers • Issue bid • Negotiate bids • Monitor bid status • Analyze bids • Select bids • Authorize bid by client
5 Procurement contract management	• Develop procurement contract conditions • Develop procurement contract template • Negotiate procurement contract • Authorize procurement contract • Issue procurement contract • Monitor procurement contract status
6 Supplier management	• Review current market prices • Register supplier • Maintain supplier master data • Maintain supplier catalogues • Maintain supplier prices and discounts • Maintain supplier credit conditions • Maintain supplier purchasing history • Maintain supplier performance history • Rate supplier performance history • Identify supplier capacity • Calculate supplier ratings • Accredit supplier • Cancel supplier accreditation • Maintain approved supplier list
7 Procurement operations management	• Issue purchase order from bid • Issue purchase order from requisition • Authorize ERP-generated purchase order • Select supplier for purchase order • Negotiate purchase order conditions with supplier • Authorize purchase order • Issue regular purchase order to local supplier • Issue urgent purchase order to local supplier • Issue regular purchase order to foreign supplier • Issue urgent purchase order to foreign supplier • Receive purchase order confirmation from supplier • Monitor purchase order status • Issue supplier performance letter • Issue supplier corrective action letter • Change/correct purchase order • Monitor changed/corrected purchase order status • Handle advanced shipment notification • Handle delayed shipment notification • Manage compliance with regulations • Determine import duties • Issue import documents • Receive shipment from customs
8 Receiving operations management	• Receive purchase order • Inspect purchase order • Log receipt of fully or partially delivered orders • Analyze receiving discrepancies • Issue goods received note • Issue return note for rejected items • Route accepted items for storage • Route rejected items for return • Cancel supplier invoice • Handle treatment of undelivered items • Authorize accepted items by client • Notify client of purchase order delivery • Analyze invoice discrepancies • Approve supplier invoice for payment • Close purchase order • Block supplier invoice • Transfer supplier invoice to accounts payable
9 Catalogue management	• Maintain own catalogue • Match own and supplier catalogues • Maintain item assortment and substitutes • Maintain base prices

10 Spend analysis	• Classify spend across multiple dimensions and categories • Maintain supplier database for spend analysis • Maintain item database for spend analysis • Maintain spend data for spend analysis • Analyze spend across multiple dimensions and categories

A. Procurement: verbs (actions)

1) *Create a Pareto list of verbs from the process descriptors:* An investigation of the verbs in Table 1 reveals that there are operationally 32 distinct actions (Table 2). The ratio 98/32 indicates that an average of 3.1 processes exhibit a common action. The six most frequent verbs (19%), covering 59 processes (60%), are: issue (14 processes = 14.3% of all processes); maintain (14, 14.3%); develop (12, 12.2%); authorize (9, 9.2%), monitor (6, 6.1%); and analyze (4, 4.1%).

TABLE 2 PARETO DISTRIBUTION OF THE VERBS FOR THE "PROCUREMENT" FUNCTION

#	Verb	Processes
1	Issue	14
2	Maintain	14
3	Develop	12
4	Authorize	9
5	Monitor	6
6	Analyze	4
7	Handle	3
8	Negotiate	3
9	Receive	3
10	Select	3
11	Block	2
12	Cancel	2
13	Change	2
14	Identify	2
15	Route	2
16	Accredit	1
17	Calculate	1
18	Classify	1
19	Close	1
20	Consolidate	1
21	Determine	1
22	Evaluate	1
23	Inspect	1
24	Log	1
25	Manage	1
26	Match	1
27	Notify	1
28	Prepare	1
29	Rate	1
30	Register	1
31	Review	1
32	Transfer	1

The overall Pareto distribution of the 32 verbs is:

Frequency	#	Verb %	#	Process %
14	2	29	28	29
12	1	12	12	12
9	1	9	9	9
6	1	6	6	6
4	1	4	4	4
3	4	12	12	12
2	5	10	10	10
1	17	18	17	18
Σ	32	100	98	100

In Table 1 we present the functional viewpoint of the procurement process suite; in Table 3, the action viewpoint of the same suite is shown for the six most common actions. Juxtaposition of these tables clearly shows the contribution of the action viewpoint in helping to grasp the "totality" of the operations carried out within these processes.

TABLE 3 PROCUREMENT PROCESSES – ACTION VIEWPOINT (SIX MOST FREQUENT VERBS)

Issue	• Issue urgent purchase order to local supplier • Issue urgent purchase order to foreign supplier • Issue supplier performance letter • Issue supplier corrective action letter • Issue return note for rejected items • Issue regular purchase order to local supplier • Issue regular purchase order to foreign supplier • Issue purchase requisition • Issue purchase order from requisition • Issue purchase order from bid • Issue procurement contract • Issue import documents • Issue goods received note • Issue bid
Maintain	• Maintain supplier purchasing history • Maintain supplier prices and discounts • Maintain supplier performance history • Maintain supplier master data • Maintain supplier database for spend analysis • Maintain supplier credit conditions • Maintain supplier catalogues • Maintain spend data for spend analysis • Maintain purchase item price history • Maintain own catalogue • Maintain item database for spend analysis • Maintain item assortment and substitutes • Maintain base prices • Maintain approved supplier list
Develop	• Develop sourcing strategy • Develop rating system for quality performance • Develop rating system for order completeness • Develop rating system for on time delivery • Develop procurement strategy • Develop procurement program • Develop procurement contract template • Develop procurement contract conditions • Develop procurement budget • Develop procurement authorization program • Develop catalogue-based procurement plan • Develop BOM-based procurement plan
Authorize	• Authorize purchase order • Authorize procurement contract • Authorize make-or-buy • Authorize ERP-generated purchase order • Authorize employees to issue purchase requisitions • Authorize bid by client • Authorize accepted items by client • Authorize supplier invoice for payment • Authorize purchase requisition
Monitor	• Monitor purchasing budget status • Monitor purchase requisition status • Monitor purchase order status • Monitor procurement contract status • Monitor changed/corrected purchase order status • Monitor bid status
Analyze	• Analyze bids • Analyze invoice discrepancies • Analyze receiving discrepancies • Analyze spend across multiple dimensions and categories

2) Carry out an action-based analysis on the significant actions:

(1) *Plan/execute/control*: The six most frequent actions encompass all three fields: plan (develop), execute (issue, maintain), and control (authorize, monitor, analyze). BPM support is thus required to empower planning, development and authorization activities and facilitate documentary flows associated with procurement and its interfaces to suppliers and clients.

(2) *Manage*: The following procedures and specifications should be established for the significant actions:

- *Issue (purchasing and goods reception documentation)*: set up a procedure to ensure that all documents involved in a purchasing transaction (requisition, contract, order, reception report) are consistent, integrated, up to date and cross referenced to enable rapid and comprehensive access by all organizational units;
- *Maintain (supplier and purchase goods records):* implement a procedure to ensure that all records (static: e.g., item,

supplier, contract; and dynamic: contracting, analyzing bids, supplier selection, purchasing, receiving) are properly processed, updated and checked for integrity and consistency;

- *Develop (plans and programs)*: set up a master plan for the organization, with policies and guidelines, for developing plans and programs; appoint planning forums for auditing and authorization; specify the recipients of plans and programs; specify performance feedback mechanisms;
- *Authorize (documents and items):* balance employee empowerment against the necessity for authorization when issuing, changing or finalizing transaction entities or documents;
- *Monitor (purchase order progress status*): establish and maintain a procedure to ensure regular status monitoring and feedback to organizational units involved; set up a procedure for appropriate responses to unacceptable situations;
- *Analyze (discrepancies and spending):* establish adequate and reliable procedures for evaluating unacceptable situations and revealing the causes which can then point the way to effective resolution.

(3) *Cross-functionality*: The cross-functionality matrix (Table 4) indicates the functions within which the actions take place.

TABLE 4 CROSS-FUNCTIONALITY MATRIX (SIGNIFICANT ACTIONS) FOR THE PROCUREMENT EXAMPLE

Action/function	1	2	3	4	5	6	7	8	9	10	Total
Issue		1		1	1		9	2			14
Maintain			1			7			3	3	14
Develop	8		2		2						12
Authorize		2	1	1	1		2	2			9
Monitor	1	1		1	1		2				6
Analyze				1				2		1	4

(1: procurement strategy; 2: requisition management; 3: procurement planning; 4: bid planning; 5: procurement contract management; 6: supplier management; 7: procurement operations management; 8: receiving operations management; 9: catalogue management; 10: spend analysis)

At the *functional* level, we see that:

- *Issue (purchasing and goods reception documentation)*: implement a procedure to ensure coordination and cooperation between the various functions creating documents; and prescribe a modus operandi for streamlined flow of documents within and interfacing the various functions;
- *Maintain (supplier and purchase goods records):* implement an ERP module or purchasing management system to provide reliable and user-friendly access to creating, modifying, authorizing and retrieving records by the various functions;
- *Develop (plans and programs)*: development activities and records are mainly handled within the procurement strategy function;
- *Authorize (documents and items):* implement a procedure to ensure coordination and cooperation between the various functions authorizing documents; and prescribe a modus operandi for streamlined sequencing of authorizations within and interfacing the procurement function;
- *Monitor (order progress status*): establish a procedure for tracking the progression of orders through the various functions; set up a mechanism for intervention when unsatisfactory situations occur;
- *Analyze (discrepancies and spending):* analysis activities and records are mainly related to the receiving operations management function.

In summary, we see that the procurement process suite can be partitioned into those with actions common to several processes (60%) and those with relatively singular actions (40%); the number of highly frequent actions based on the Pareto principle, is relatively small (6 actions covering 59 processes). Procurement management can therefore focus on developing a reasonable number of procedures, specifications and standards which will encompass about 60% of the procurement processes.

B. Procurement: nouns (objects)

1) Create a Pareto list of nouns from the process descriptors

An investigation of the nouns in Table 1 reveals that there are operationally 18 information objects (Table 5). The ratio 98/18 indicates an average of 5.4 processes generating or utilizing a specific type of information object. The six most frequent nouns (44%), covering 72 processes (74%), are: purchase orders (17 processes = 17.3% of all processes); suppliers (16, 16.3%); purchase items (9, 9.2%); bids (7, 7.1%); purchase requisitions (7, 7.1%); procurement contracts (6, 6.1%); invoices (5, 5.1%); and spend data (5, 5.1%).

TABLE 5 PARETO DISTRIBUTION OF THE INFORMATION OBJECTS FOR THE "PROCUREMENT" FUNCTION

#	Object set	Processes
1	Purchase order	18
2	Supplier	16
3	Purchase items	9
4	Bid	7
5	Purchase requisition	7
6	Procurement contract	6
7	Spend data	5
8	Goods receipt	4
9	Invoice	4
10	Procurement plan	4
11	Catalogue	3
12	Rating system	3
13	Shipment	3
14	Budget	2
15	Import documents	2
16	Prices	2
17	Strategy	2
18	Regulations	1

The overall Pareto distribution of the 18 nouns is:

Frequency	#	Noun %	#	Process %
18	1	6	18	19
16	1	5	16	16
9	1	5	9	9
6-7	3	17	20	20
4-5	4	22	17	17
1-3	8	45	18	19
Σ	18	100	98	100

Table 3 presents the *functional viewpoint* of the procurement process suite; in Table 6, the *object viewpoint* of the same suite is shown for the six most common actions. Juxtaposition of these tables clearly shows the contribution of the object viewpoint in helping to grasp the "totality" of the data, information and knowledge flow and requirements of the process suite.

TABLE 6 PROCUREMENT PROCESSES – OBJECT VIEWPOINT (SIX MOST FREQUENT NOUNS)

Purchase order	• Notify client of purchase order delivery • Close purchase order • Issue purchase order from bid • Issue purchase order from requisition • Authorize ERP-generated purchase order • Select supplier for purchase order • Negotiate purchase order conditions with supplier • Authorize purchase order • Issue regular purchase order to local supplier • Issue urgent purchase order to local supplier • Issue regular purchase order to foreign supplier • Issue urgent purchase order to foreign supplier • Receive purchase order confirmation from supplier • Monitor purchase order status • Change/correct purchase order • Monitor changed/corrected purchase order status • Receive purchase order • Inspect purchase order
Supplier	• Issue supplier corrective action letter • Select possible suppliers • Register supplier • Maintain supplier master data • Maintain supplier catalogues • Maintain supplier prices and discounts • Maintain supplier credit conditions • Maintain supplier purchasing history • Maintain supplier performance history • Rate supplier performance history • Identify supplier capacity • Calculate supplier ratings • Accredit supplier • Cancel supplier accreditation • Maintain approved supplier list • Issue supplier performance letter

Purchase item	• Authorize accepted items by client • Identify critical purchase items • Evaluate purchase item quality • Maintain purchase item price history • Authorize make-or-buy • Route accepted items for storage • Route rejected items for return • Cancel supplier invoice • Handle treatment of undelivered items
Bid	• Authorize bid by client • Prepare bid package • Issue bid • Negotiate bids • Monitor bid status • Analyze bids • Select bids
Purchase requisition	• Block purchase requisition • Authorize employees to issue purchase requisitions • Issue purchase requisition • Monitor purchase requisition status • Authorize purchase requisition • Change purchase requisition • Consolidate purchase requisitions
Procurement contract	• Monitor procurement contract status • Develop procurement contract conditions • Develop procurement contract template • Negotiate procurement contract • Authorize procurement contract • Issue procurement contract

2) Carry out an object-based analysis on the significant information objects

(1) *Originate / modify / authorize / retrieve / transfer*: The six most frequent nouns encompass almost all object stages: originate, modify and authorize (bid, contract, requisition, order); and retrieve and transfer (all objects). As expected, procurement deals with a considerable number of business documents; BPM support is required to ensure that these are properly formulated, validated and authorized, are mutually consistent, and are coordinated with the variegated activities of the procurement staff.

(2) *Manage*: The following procedures and specifications should be established for the significant objects:

- *Purchase orders*: ensure layout and formatting to facilitate the sequencing of the various elaboration stages and monitoring of the progress of the order within and outside the organization.
- *Suppliers*: maintain a database of supplier capability and performance parameters such as capacity, quality, pricing, financial stability, delivery; implement a regular procedure for analysing and reporting on performance; ensure coordination and cooperation between design, production and purchasing when interacting with and evaluating suppliers.
- *Purchase items*: ensure that specifications are clear, and unambiguous and understandable to all organizational units; maintain a database of sourcing parameters such as alternative suppliers, obsolescence and upgrades, current market prices; and a database of operational parameters such as actual lead times, quality inspections and outcomes.
- *Bids:* establish unambiguous criteria for bid comparison and selection; for involving other departments in evaluating and selecting or rejecting bids; and for permitting or eliminating bids in terms of discrepancies between item specifications and supplier offerings.
- *Purchase requisitions:* create layouts and formatting to facilitate the sequencing of the various elaboration stages and monitoring of the progress of the requisition within the organization.
- *Purchase contracts*: ensure that all contracts accord with organizational and legal policies and principles; set up a procedure for contract lifecycle management; specify the legal representatives of the organization and supplier; place special emphasis on risk evaluation and mitigation; ensure that contracts are easily accessible to those in the organization involved in their realization.

(3) *Cross-functionality*: The cross-functionality matrix (Table 7) indicates the functions handling each type of object.

TABLE 7 CROSS-FUNCTIONALITY MATRIX (SIGNIFICANT OBJECTS) FOR THE "PROCUREMENT" FUNCTION

Object/function	1	2	3	4	5	6	7	8	9	10	Total
Purchase order							14	4			18
Supplier				1		13	2				16
Purchase items	1		3					5			9
Bid				7							7
Requisition		7									7
Contract					6						6

(1: procurement strategy; 2: requisition management; 3: procurement planning; 4: bid planning; 5: procurement contract management; 6: supplier management; 7: procurement operations management; 8: receiving operations management; 9: catalogue management; 10: spend analysis)

At the *functional* level, we see that:

- *Purchase orders*: these are originated within procurement operations and implemented within receiving operations. Management must ensure that the delivery and inspection performance is correctly and effectively registered in order and that all interfacing organizational units are made aware of any discrepancies.
- *Suppliers*: supplier-related activities and records are mainly handled within the supplier management function.
- *Purchase items*: item-related activities and records are handled within procurement planning and receiving operations. Management must ensure that there is coordination and consistency between planned acquisitions and the items actually received.
- *Bids*: bid-related activities and records are handled within the bid management function.
- *Purchase requisitions*: requisition-related activities and records are handled within the requisition management function.
- *Purchase contracts*: contract-related activities and records are handled within the contract management function.

In summary, we see that the procurement process suite can be partitioned into those with objects common to several processes (60%) and those with relatively singular objects (40%); the number of frequent objects based on the Pareto principle, is relatively small (6 objects cover 59 processes). Procurement management can therefore focus on developing a reasonable number of transaction architectures and information databases (computerized and hard copy) which will encompass about 60% of the procurement processes.

IV. CONCLUSIONS

Interpretation of business process content is one fundamental for the modelling, implementation, operation and monitoring of groups of business processes. Action-based content analysis describes in general what the business does (“contract”, “order”, “receive”); object-based content analysis describes in general what the business produces (“contracts”, “requisitions”, “orders”). Through the “Pareto effect” – which we have shown to exist – the organization can focus on a restricted number of actions and objects and implement a limited number of common procedures and formats that can produce a significant overall effect. These encompass: coordination and cooperation between organizational units, consistency of cross-enterprise procedures, decisions regarding generalization or specialization of employee training, employee empowerment, training for interactions with external agents (e.g., suppliers and clients), prevention of duplicate or inconsistent transactions, and specification of an integrated and streamlined infosystem for process support. It is hoped that BP practitioners and managers will be able to use the approach to understand the totality of a business suite and characterize the content profile of the organization as part of their services to the ERP/CRM/SCM communities.

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