STRATEGIC INFORMATION REQUIREMENTS ELICITATION
Definition of Aggregated Business Entities

Gianmario Motta and Giovanni Pignatelli
Information and Systems Department, University of Pavia, Via Ferrata n.1 I-27100 Pavia, Italy

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Abstract: This paper presents a universal meta-model for Strategic Information Requirements Elicitation and a methodology to generate and use strategic information models. The framework fits the methodological gap that exists in the Strategic Information Requirements and supports the analyst in (a) define structured high level information requirements and (b) assess informational support from a variety of perspectives. The meta-model enhance the e-TOM Aggregate Business Entity concept by the adding the concepts of specialization and decomposition. The methodology uses several perspective to assure the robustness of information requirements, their coverage on the IT infrastructure and the ownership of information. Specifically the methodology includes various steps, namely the selection, customization, refinement and validation of the ABEs, evaluation of the informative support and sensitivity analysis. The model can be used for analysis, audit and strategic planning and may be leaned to CASE tools.

1 INTRODUCTION

In engineering, a requirement is a singular documented need of what a particular product or service should be or do. It is most commonly used in a formal sense in systems engineering or software engineering. It is a statement that identifies a necessary attribute, capability, characteristic, or quality of a system in order for it to have value and utility to a user (*Wikipedia*).

Strategic Information Requirements analysis describes high-level information requirements of the whole enterprise or of a major portion. Strategic requirements are aggregated and independent from technology. The key point is to get not only a framework where to accommodate requirements collected by interviewing people, but to have a rationale to define the information domains of a given enterprise. This normative approach shortens time and allows a better quality. Of course normative framework should be refined, however it provides a robust starting point. The output of analisys is a schema that describes aggregated information to be further analyzed. Actually, no current methodologies or models define a structured approach to strategic information modelling. The aggregated schema can be the first step of a top down strategic design or be used in IT strategic planning to assess the coverage of information needs by existing databases or the impact of business and Technological discontinuities on information domains.

2 STATE OF ART AND POSITION

The need of a structured approach to identify a business information strategy emerged in the early years of IT, when IT started to automate entire business processes, such as the production cycle, or became a real tool for management. In short we can identify some main approach categories.

In integrated approaches the analyst identifies the information used by business processes. This approach provides a cross-organisational view and enables the identification of global information requirements.

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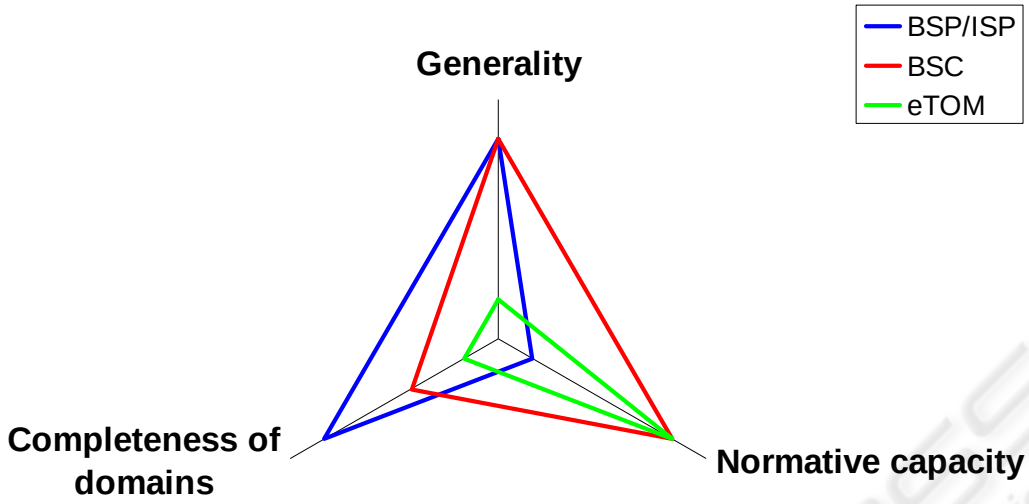

Figure 1: Approaches comparison.

This approach provides a cross-organisational view and enables the identification of global information requirements. These methods are effective to define inter-functional requirements. An old timer and very popular in Eighties is **Business Systems Planning** (**BSP**), that uses extensively double entry grids. BSP identifies data classes and associates processes and data classes in a grid, that shows which data are used by which process. BSP is a comprehensive but time consuming methodology, and, specifically, does not provide a normative framework to define what data classes consider. The subsequent **Information Strategy Planning** (**ISP**) by James Martin dominated the Eighties and Nineties; it is an integration of BSP, ER modelling and DFD and other requirements engineering models. The integration is based also on specific CASE. Therefore, ISP extended but did not give a normative approach for strategic information requirements.

In the Nineties and New Century the success of ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) software suites has generated normative models both for IT processes and database schemas. Enterprise buy a solution, that can be customized by high level tools as workflow etc. **ARIS** is a well known example of an integrated analysis methodology developed for ERP that models data, organization and business processes. At a more strategic level, normative industry models have grown. Specifically **eTOM - Shared Information Data Model (SID)** addresses information needs of shared information/data in telecommunications industry. SID uses within a real strategic view the Business Entities and Attributes concepts. A Business Entity is a thing of interest to the business, while Attributes are facts that describe the entity. eTOM meta-model is very promising, but it is not general, since it is exclusively oriented on telecommunications, nor provides an axiomatic approach to identify Entities.

Last not least business and management oriented approaches have the objective of selecting key information needs. In Eighties and Nineties **Critical Success Factor** (**CSF**) has been a popular approach to spot information for management. In the Nineties and in New Century, **Balanced Score Card (BSC)** and **6Sigma** had an enormous success not only as models for overall strategic and management control but also as models for management information needs. However, these models are partial, since they analyze the management side and not the operations.

The orientation of these approaches modelling are represented on three axes (Figure 1). The axis of generality represents the suitability of the approach to the whole range of industries: the wider the range the higher the generality. The axis of normative capacity measures the ability to suggest the “right” information requirements. The axis of completeness of domains shows the capacity of considering all information uses, namely management, analytic, and operational. Each approach family excels on some axis, but does not offer a comprehensive coverage. This is specifically the aim of our approach.

3 THE ABE MODEL

An Aggregate Business Entity (ABE) is a well-defined set of information and operations that characterize a highly cohesive, loosely coupled set of business entities (*TMForum,2003*).

However, **what candidate ABEs** an organization has? You need a **guide to discover** them. This is precisely our purpose.

The guide combines several concepts. First is a generalization of the business entity concept. These include a hierarchy of classes, where the first level is stakeholders, resources, context, output.

Second comes a classification of information in three levels according to the time variability, namely **Master Data** (structural the entity properties), **Transaction Data** (properties of events) and **Analisys Data** (properties for management and governance). The result of the combination is a level zero grid (Table 1) that crosses the two main information classification criteria, elaboration level and business domain. Each cell of the grid represents a standard ABE that could be seen as a couple (**D,E**) where D is the domain and E is the elaboration level.

Table 1: The ABE standard grid.

			INFORMATION TYPE		
			Master Data	Trans-action Data	Analysis Data
INFORMSTION DOMAIN	Stakeholders	Law	LAM	LAT	LAA
		Competitor	COM	COT	COA
		Customer	CUM	CUT	CUA
		Supplier	SUM	SUT	SUA
		Broker	BRM	BRT	BRA
		Shareholder	SHM	SHT	SHA
	Resources	Personnel	PEM	PET	PEA
		Plants	PLM	PLT	PLA
		Raw materials	RAM	RAT	RAA
		Cash	CAM	CAT	CAA
	Con-text	Structure	STM	STT	STA
		Project	PJM	PJT	PJA
		Region	REM	RET	REA
	Output	Process	PRM	PRT	PRA
		Product	PDM	PDT	PDA
		Service	SEM	SET	SEA

4 THE ANALYSIS METHODOLOGY

Our approach enhances the e-TOM ABE concept by the adding the well known concepts of specialization and decomposition; itincludes:

1. Developing the ABE grid:
   a. Step 1 Selection
   b. Step 2 Customization, refinement and validation
2. Using the ABE grid:
   a. Step 3 Assessment of the information support
   b. Step 4 Sensitivity analysis

4.1 Step 1: Selection

The analyst starts with the standard list of Table 1, and (1) defines the scope of analysis on the standard domain and grid levels and (b) adds properties to the selected ABEs, that are labelled with a P_{xxx} in Table 2. Of course the analyst ca use a knowledge base of normative models.

Table 2: An example of personalized grid.

			ELABORATION LEVEL		
			Master Data	Transaction Data	Analysis Data
DOMAIN	Stakeholders	Law			PLAA1 PLAA2 PLAA3
		Competitor			PCOA1 PCOA2
		Customer	PCUM1 PCUM2	PCUT1	
		Supplier	PSUM1	PSUT1 PSUT2	
		Broker	PBRM1 PBRM2	PBRT1 PBRT2 PBRT3	PBRA1 PBRA2

4.2 Step 2: Customization, Refinement and Validation

The step customizes the set of ABE that is specific to the individual enterprise within the analysis scope. An example of such customization is Table 3 where the standard domain “customer” has been specialized in the domains “private” and “enterprise”. Similarly master data have been

specialized in “Identification and “Social” and the same happens with Transaction data.

In short the output grid is obtained by primitives of Creation, Specialization, Decomposition on standard information levels and domains. In the grid, a cell identifies a candidate ABE of an individual enterprise. The process is iterative, with refinement and validation sessions with key business representatives. The output grid can be used for a variety of purposes, such as assessing the functional coverage of ABE by actual database systems, the impact of business discontinuities etc.

Table 3: An example of specialization of the domain “Customer”.

		INFORMATION TYPES				
		Master Data		Transaction Data		Analysis Data
		Identification	Social	Man-Machine transaction	Machine-Machine transaction	
Customer	Private					
	Enter-prise					

4.3 Step 3: Assessment of the Information Support

To evaluate how ABE are actually supported and / or used, we cross ABEs with business processes, organizational structures, IT applications and IT architecture. The grids describe relations **G** information classes **I** to information users **U** (business processes, organizational structures, IT applications and IT architectural elements):

$$\mathbf{G = \{U,I,A\}} \quad (1)$$

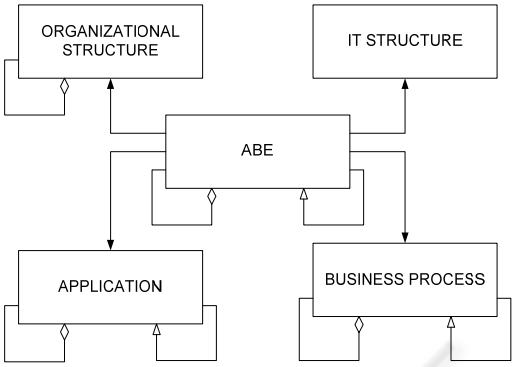

Figure 2: ABE Relations Metamodel.

As shown in (Table 4) each entity of the resulting information meta-model contains also two self-relations, representing decomposition and specializations. The meta-model may be used to assess both as-is and to-be scenarios from a variety of perspectives.

The Information and Database grid assesses to what extent databases cover a domain of ABEs. In Table 4 the coverage given by actual databases (Laboratory, Financial, Reservation) of a healthcare institution is assessed. The coverage looks poor and no integrated of patient and service data are possible. Of course assessment metrics is qualitative and reflects a joint evaluation by analysts and user, but, management know where gaps are.

Other grids allow other and complementary analyses. The Information and Application grid assesses the use of information by applications in terms of information lifecycle and/or qualitative metrics

The Information and Organizational structure grid identifies information ownership and it is a key point to set up the growingly important data policies of enterprises.

The grid of Information and processing levels identifies where information is distributed in the different levels of processing architecture (client, server, mobile devices) and it is a key to define security and privacy strategies (who really manages data?).

Table 4: Assessment of ABE coverage (absent, poor, average and good) in a generic Healthcare Institution by using qualitative evaluation scale (**M** = Master information ; **T** = Transaction Information; **I** = Indicators information).

					LAB			FINANCIAL			RESERV		
					Completetness	*Crrrectness*	*Timeliness*	*Completetness*	*Crrrectness*	*Timeliness*	*Completetness*	*Crrrectness*	*Timeliness*
Regulation		**M**	Regulation ID	Privacy Laws Healthcare regulations									
		T	Certification Events	List of Certifications									
		I	Certification KPIs	Certification levels									
Customer	*Emergency*	**M**	ID	Master data									
			Properties	Patient Record									
		T	Emergency events	Reception									
				Prescriptions									
				Treatments									
				Other									
			Release	Referral & payments									
		I	Process KPIs	Quality - Service -Cost									
	Hospital	**M**	ID	Master data									
			Properties	Patient Record									
			Care process events	Reservation									
				Check-in									
				Prescriptions									
				Treatments									
				Patient management									
			Release	Referral & payments									
		I	Process KPIs	Quality - Service -Cost									
	Day hospital	**M**	ID	Master data									
			Properties	Patient Health Record									
		T	Day hospital events	Reservation									
				Check-in									
				Treatment									
			Release	Referral & payments									
		I	Process KPIs	Quality - Service -Cost									
Commissioner	*Healthcare authorities*	**M**	ID	Master Data									
			Properties	Financial data									
		T	Events	Advance payments									
				Reimbursements									
		I	Process KPIs	Quality - Service -Cost									
Personnel	*Financial*	**M**	ID	Master data									
			Properties	Job data									
				Skill and education									
		T	Events	Presences & Payroll									
			Certifications	Education									
		I	KPIs	Performance & potential									
	Technical & Medical	**M**	ID	Master data									
			Properties	Job data									
				Skill and education									
		T	Events	Presences & Payroll									
				Career									
			Certifications	Skill certificates									
		I	KPIS	Performance & potential									

4.4 Step 4: Sensitivity Analysis

The objective of the sensitivity analysis is to identify which information domains are involved by strategic actions or discontinuities, by assessing impact of a variety of business variables e.g.:

1. **Business Discontinuity**: it evaluates the impact of the enterprise strategies e.g. mergers, acquisitions, new products, new services (which ABE will be affected and how much?)
2. **Technology Discontinuity**: it evaluates the impact of technology changes on information
3. **Sensitive information**: it evaluate the impact of regulations e.g. privacy, security etc.

5 CONCLUSIONS

The paper proposes a universal meta-model for strategic information modelling and a methodology based to generate and use strategic information models. The model generalizes some normative concepts born in an industry normative model (eTOM) . In short:

- It is normative, and guides the analyst and management to identify the "right" information requirements
- It is cross- industry
- It is strategic and avoids useless details
- It easy to understand for management and supports a what-if analysis of business strategic alternatives
- It can be linked to detailed information requirements analysis

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