Cohesion of Enterprise Models

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Abstract: The paper provides the rationale and concept for integration of models and modeling objects of Business, IT Strategy, Enterprise Architecture and Project Management. The cohesion between and within Business and IT is achieved by means of services. Among other applications this concept justifies inclusion of Enterprise Architecture as perspective in Balanced Scorecards used for IT Strategy management and measurement. Then the relations between BSC objects and EA objects can be maintained in a single modeling repository thus providing an integrated environment for methods, processes, models and variants of objects and enabling holistic strategy, project and architecture management.

Introduction

The globally increasing maturity of information society, the ICT technology development and the ubiquitous networks trends make businesses of all sectors progressively more dependant on Information Technology (IT). There are many efforts towards creation of means for successful management of this dependence. These include methods for assurance of the value of IT, the management of IT-related risks and increased requirements for control [1], standardisation of IT processes and service management [7, 26], frameworks and methods for Enterprise Architecture management [4,5,6,9] and various performance measurement systems [13,14,15,16]. However, IT is still generally recognised as failing to meet business expectations [16, 28] the reasons being mainly found in the lack of IT- business alignment [2, 24], problems with IT Strategy (ITS) execution [25] and inadequate and control mechanisms.

The holistic approach has been applied to many engineering and management domains related to IT searching for solution of the a.m. problems. The pure IT architecture domain has been broadened to include business architecture objects thus creating the paradigm of the Enterprise Architecture. The traditional performance systems based on ROI (Return on Investment) and other financial performance indicators (KPI) have been balanced with leading indicators to improve execution and control of IT strategies.

This paper suggests a concept that could be applied to bring together the objects of various enterprise models supporting strategy, architecture and project management.

Cohesion by means of services

The alignment of business and IT has been a major concern in the last 20 years and has driven a lot of efforts and investments in creation of unified notations and languages for better communication of business and IT aspects and their relations (Rumbaugh, Booch, Scheer), improvement of IT Governance e.g. by better definition of control objectives [1], standardisation of IT processes and services [7,26], extending the information system architecture to provide a holistic view including business tier and environment [4,5]. The starting point of such an alignment should be sought in the rationale behind business investment in IT. What the business actually “buys” is the value created by IT. The “value” is a universal indicator for motivation at all levels. Business exists to add value in the value chain which is created internally in business processes, which use the value provided by software

applications which use the value of the ICT infrastructure. The value is created within different domains of an enterprise and exchanged between domains. The service concept is very well suited to represent value exchange between these domains. A service is defined as a unit of functionality that some entity makes available to its environment, and which has some value for certain entities in the environment [9]. Thus, if we look at the enterprise structure as divided in layers, the ICT infrastructure layer provides infrastructure services (processing, storage, communication) to application layer which provides application services to business layer which provides business services to its clients [9]. Business clients are using application and IT services as part of the business services but more often they use application services directly interacting with business through internet and other media. Likewise they can use directly IT services provided by IT personnel such us helpdesk for e-services.

The business makes use of IT services to achieve its objectives. Those IT services are basically two types: (1) Organisational IT services realised by the IT processes, some of them directly (e.g. maintenance) some of them indirectly (e.g. application development) the latter being consumed in information systems lifecycle and used by the business in the form of (2) Application Services (See Figure 1). Application Services are, realised by software applications using ICT Infrastructure Services (e.g. storage) realised by the ICT infrastructure [9, 10].

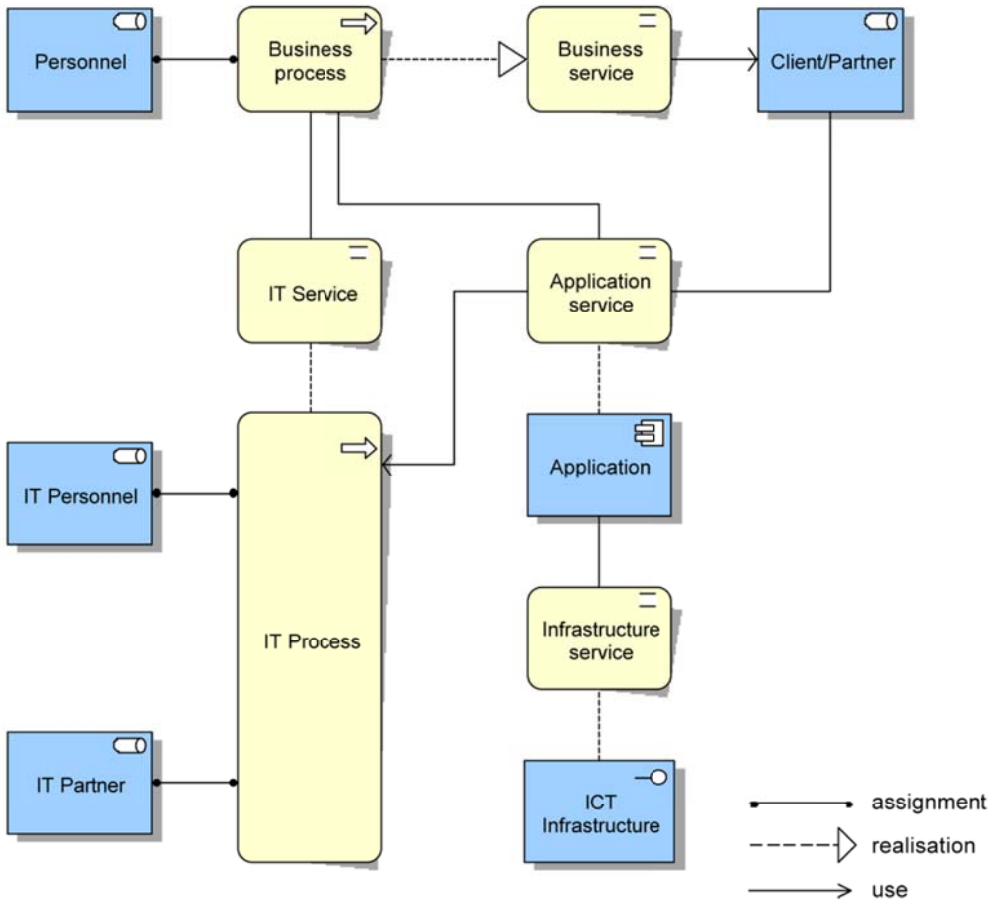

Figure 1. Cohesion by means of services

IT Processes could also be classified in two groups: those that describe the nature of IT operations, let's call them “O-processes” or “OP”, and those that are instantiated by IT projects, called the “P-processes” or “PP”. Both OP and PP could by assigned to the in-house IT organisation or outsourced. Organisational services are actually directly realised by OP while PP either produce a change in part of the Enterprise Architecture and thus their added value is consumed by the business as Application Service, or change OP e.g. in an instance of the process improvement cycle. The relation PP-Application Services is bi-directional as in any organisation smaller or bigger part of IT processes are automated i.e. they use Application

Services in the same manner as the non-IT business processes.

The coherence model in Figure 1 could be used for IT Strategy management along with other models and techniques to help solving aforementioned problems with alignment, execution and performance control. One such application is the definition of perspectives when a Balanced Scorecard method is used for IT Strategy management.

Perspectives in the balanced scorecard for it

Kaplan and Norton [11] have introduced the balanced scorecard at the enterprise level. Their basic idea is that the evaluation of an organisation should not be restricted to a traditional financial evaluation but should be supplemented with measures concerning customer satisfaction, internal processes and the ability to innovate. These additional measures should assure future financial results and drive the organization towards its strategic goals while keeping all four perspectives in balance. They propose a three-layered structure for the four perspectives: mission, objectives and measures. The balanced scorecard can be applied to the IT function and its processes as Gold [20] and Willcocks [21] have conceptually described and has been further developed by Van Grembergen [14, 15, 16] and Timmerman [26]. For IT as an internal service provider, the generic perspectives should be changed accordingly. Prof Grembergen suggests a model for IT Scorecard including the following four perspectives: 1. Corporate contribution perspective to evaluate the performance of the IT organisation from the viewpoint of executive management; 2. Customer orientation perspective, to evaluate the performance of IT from the viewpoint of internal business users; 3. Operational excellence perspective evaluating the performance of the IT processes from the viewpoint of IT management; and 4. Future perspective showing the readiness for future challenges of the IT organisation itself. Although this model has proved successful in a number of organisations, the research of the IT Governance Institute made in 2004 [22], in conjunction with Lighthouse Global, showed that BSC is evaluated as effective by only 48% of the surveyed 200 IT professionals. The respondents included chief information officers from 14 countries in the Americas, Asia-Pacific and Europe with a turnover in excess of US $50 million. It also appears that most value is assigned to methods developed in-house, which 98% indicated as very to fairly effective. This motivates research for improvement IT Balanced Scorecards systems to increase their adaptability and applicability. Based on the cohesion concept explained earlier, another set of perspectives might be considered as an option to existing models [13, 14, 15].

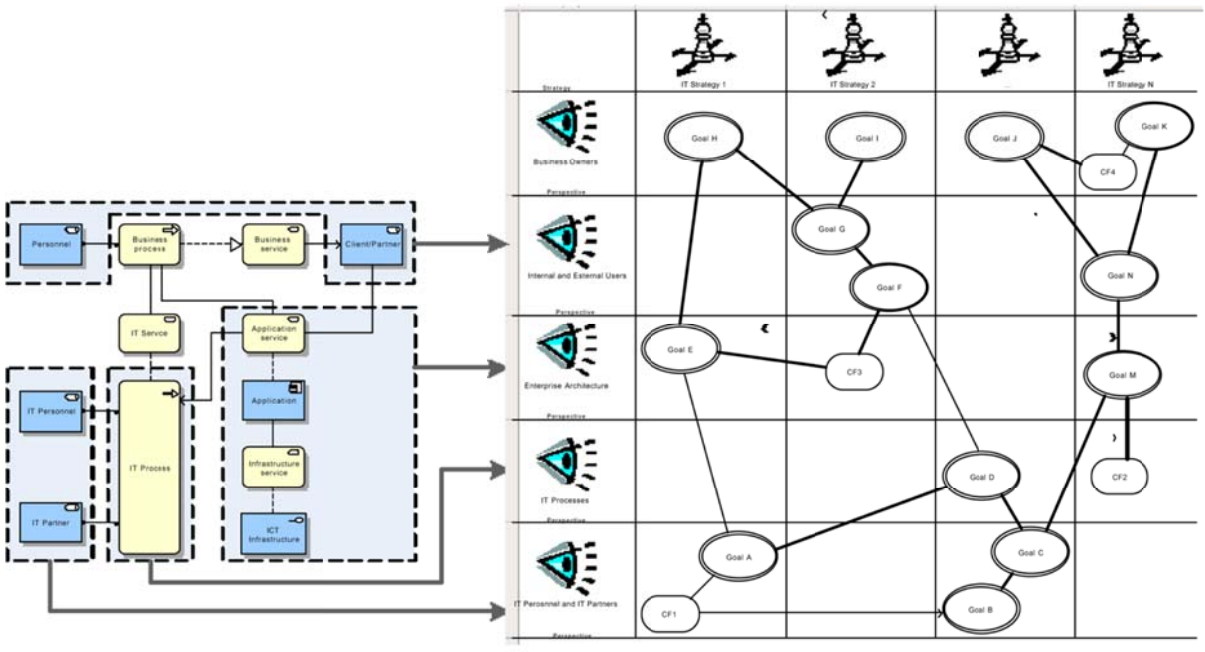

Figure 2. Perspectives in a Balanced Scorecard for IT

Going from bottom-up, KPIs of IT Personnel and IT Partners lead to change in KPIs of IT Processes which then enable changes in the Enterprise Architecture (EA). (The actual changes are mainly within IT Architecture domain but evaluating it from EA perspective reduces the risk of misalignment with Business Architecture.) Thus IT Personnel and Partners can be defined as a bottom perspective in the BSC for IT followed by IT Processes perspective and Enterprise Architecture perspective (Figure 2). The forth perspective is that of direct users of IT services – both internal and external to the organisation. Thus naturally the cause-and-effect relationships between IT goals flow in parallel with the value chain expressed by the services in the cohesion model (Figure 1). The fifth perspective is that of the business owners which is actually the ultimate "way" for the lower perspectives. The objectives, success factors and KPIs in it a taken directly from the business BSC.

Integration of EA and ITS modeLS

The cause-and-effect diagram of the aforementioned IT BSC system provides causal relationships between leading and lagging objectives and KPIs on the perspectives dimension and balance between different strategic themes on the strategies dimension of the matrix. For similar business BSC systems the data source for the KPI values, where automated, is generally a data warehouse or business intelligence system. This gives a lot of benefits in the control phase of the management cycle but not much in the planning and the implementation phase. An integrated single repository for models of objects pertinent to each perspective together with the strategy objects like objectives, success factors and initiatives could provide an environment for decision making, communication, planning, evaluation, analysis and control on various levels and from various viewpoints. Figure 3 shows a concept of such a repository with examples of IT strategy, Project Planning and Enterprise Architecture models.

The business strategy defines business goals which together with their relationships and metrics are modeled in a RDBMS repository such as that used in ARIS tools of IDS Scheer. Among business goal there are defined goals for IT or IT initiatives to support pure business goals. In both cases causal relationship providing means for calculation and aggregation of KPIs can be created along the causal chains. The same applies to objects such as Risks and Critical Factors (CF) which could not be controlled directly by the organisation but influence the achievement of objectives and could be measured, monitored and updated together with the planned pertinent control and mitigation actions.

The IT goals belong to perspectives and strategies for IT and relate to each other in causal chains modeled in diagrams like the one shown in Figure 2. They have their attributes like planned, target and actual values and are related to each other, measured by (systems of) KPIs, supported by initiatives and under responsibility of organisational units. Those goals belonging to the EA perspective are supported by initiative in most of the cases realised as IT (BA or EA) programs and projects. IT projects' products are planned in a controlled manner using models such as Product Breakdown Structure and Product Flow Diagram [8]. Each object of the PBD is a project deliverable, which in the EA projects is some kind of EA artefact. The actual objective of an EA project or program is to bring part of the EA to a state which will better support certain business objective. Thus the causal chain between the KPI's of the delta between start and end state of the EA and the project objectives, initiatives, EA strategic objectives and the supported by them objectives in users and business perspective contributing (Figure 2) goes up to the achievement of the higher business goals. The part of the EA in a given moment t1 is modeled with modeling architectural object occurrences which participate in views and viewpoints providing different architecture descriptions according to the stakeholders interests [27]. Different variants of those can be used for what-if analysis, simulation, communication, decision making and planning. Thus variants of EA (t1) are produced until one of them is used for implementation in the real world – EA (t2).

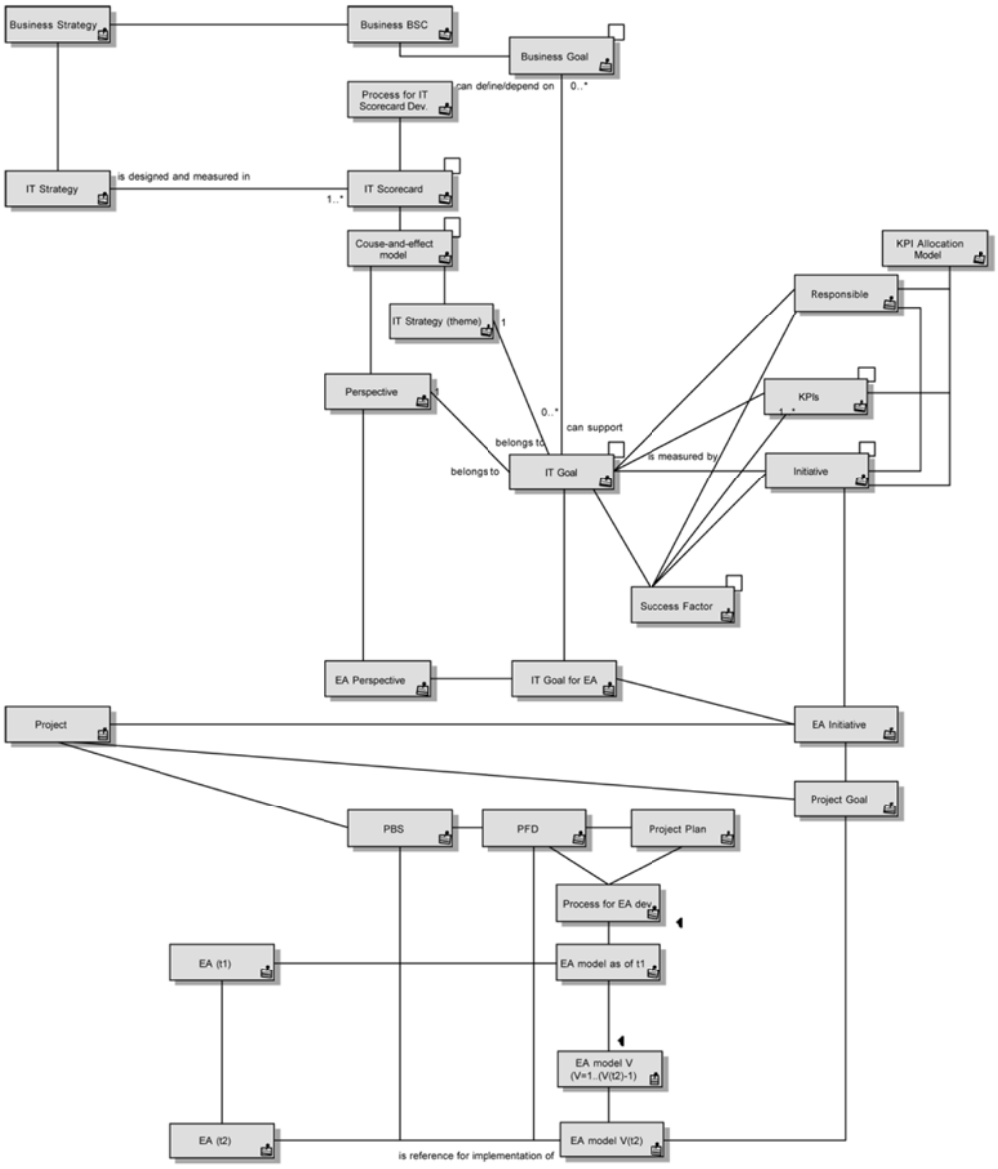

Figure 3. Integration of ITS, PM and EA models

Let's for example[1] have a Government Agency X (GAX) which has defined its 4 year strategy. The strategic objectives are created as objects in a single enterprise model repository with attributes containing planned and actual values, period, tolerances etc. These objects a linked in models such cause-and-effect diagrams and KPI allocation diagrams. The latter shows allocation of responsibility, the way they a measured by different KPI, the relative KPI weight and data sources as well as initiatives supporting objectives and responsible business unites for these initiative. The IT objectives are derived from the business strategy (1), the IT architecture analysis (2) and the external factors (3) such as those shown on Figure 4 , all done again in a single model repository.

[1]This example is taken from a real case where a part of the framework described in this paper was implemented.

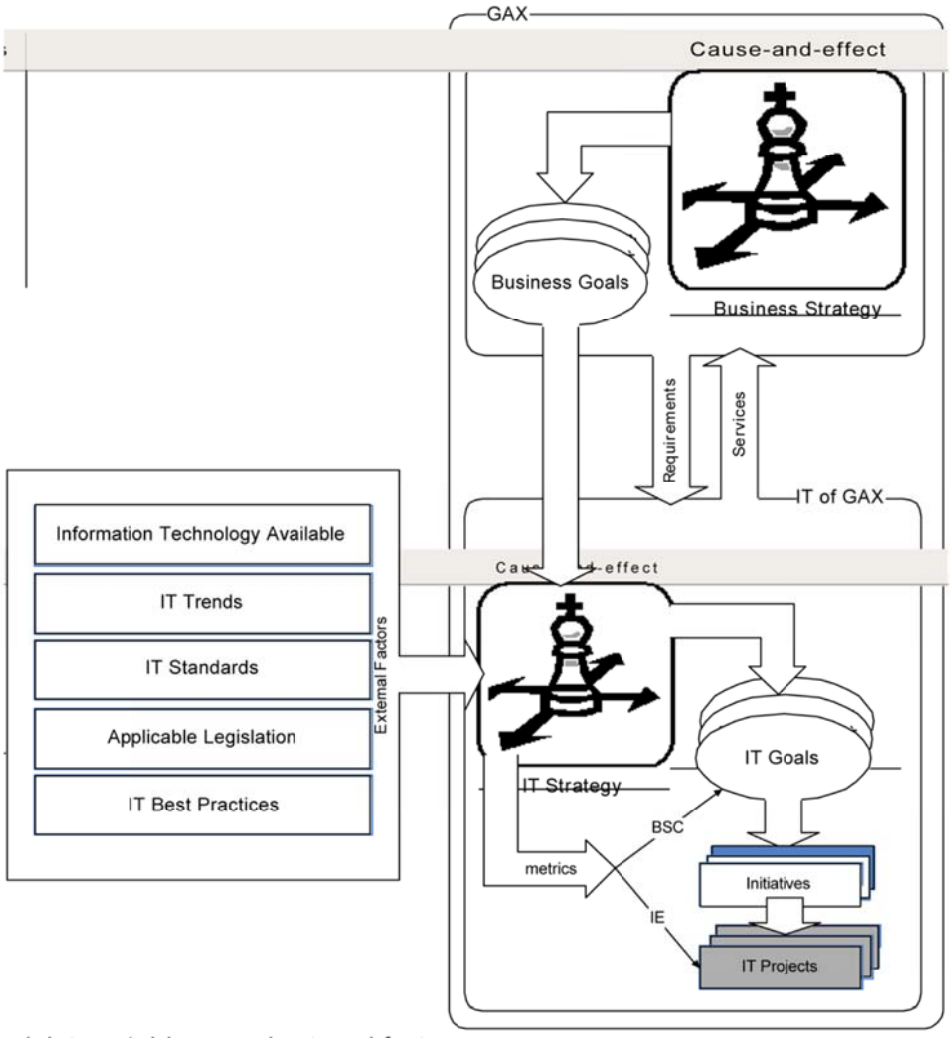

Figure 4. Internal drivers and external factors

Then the same relations as in business BSC are created between IT Strategy objects in the Balanced Scorecard for IT. However, instead of the Learning&Grouth, Internal Processes, Client and Finance, the perspectives here are (again form bottom-up) People & IT Partners, IT Processes, Enterprise Architecture, Internal and External Users and Business Owners as explained earlier in this paper. If we look at on IT objectives modeled in the repository it is measured by several KPI and achieved by one or several initiatives. If we take one initiative which is an IT project, it is modeled in the repository as a product breakdown structure model, showing decomposition of all project artefacts and each object in it is an external product, a product group or a project product which is to be produced in the IT project in question. It has attributes such as name, code, description, responsible, derivation, quality criteria, tolerance and others as appropriate. The same object has occurrence in Product Flow Diagram model, this time showing order of production and dependencies between products. If we take a product which is an architectural description, this is actually decomposed in the PBS into several products representing states, variants and within them different views and aspects. Each one of them is linked with an EA model in the same repository.

To follow one path of relations between different enterprise objects from top-down, we'll start from the models within business BSC. The GAX has four strategic themes. In one of them there is a strategic objective "Improve client services", decomposed (supported by) to 8 sub-objectives, three of them being "Introduction of new channels" and "Improvement of existing e-services" and "Implementation of new e-services". The latter business objective is supported by two IT Strategy themes, one of them "Electronic management of client and partner" relations where "Implementation of new e-services" belongs, now as an IT objective. It is measured by KPIs such as number of implemented electronic services, total complexity index

(completeness of transaction), ratio between on-line and front-office usage of the service, number of registered users of e-services etc, and supported through a number of initiatives. One of them is realised through “eGAX” project which products are modeled as PBS and PFD as explained above. One product is an EA set of models belonging to Business, Application and Technology domains together with cohesion views showing interplay of EA objects belonging to different domains. Some of them, such as an implementation viewpoint of portal for e-services are designed as the current state and two variants of future state which are compared and evaluated. The chosen variant for real implementation is superimposed to the current state description feeding transition plan, impact analysis and requirements definition.

On the other side the objective “Implementation of new e-services” in the Cause-and-effect BSC model is supported by IT objectives belonging to IT Services and People & IT Partners perspectives. For example it is supported by “Improvement of ICT infrastructure” belonging to EA perspectives and “Improvement if IT Risk management process” and “Improvement of Data Exchange Capacity”, both belonging to IT Processes perspective. The objective “Improvement of IT Risk management processes” is supported by several objectives from People and IT partners perspectives such as “Improvement of IT Service capacity” and “Improvement of Portal Technology capacity”.

Conclusions and future work

The described method could be used together with appropriate supporting tools to help closing together the gap between strategy definition and execution and between business and IT at strategic and operational level. The relations of different modeling objects of IT Strategy and Enterprise Architecture for example could support planning, implementation and control objectives taking into account the impact of changes on objects belonging to different domains. There are some very promising results from the first applications of the described method which are being analysed and used for its future improvement.

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