Service Oriented Enterprise Engineering
applying viable system approach (vSa) in Enterprise Engineering for corporate strategy decision making

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Abstract. Componentization and service orientation are two key firm's behavioral orientations to transform the traditional (rigid) enterprise model into a flexible (dynamic) one in order to support making successful corporate level strategic decisions like sharing services, in-outsourcing, centralization-decentralization and globalization. According to these enablers, a subjective and dynamic view is needed to interpret the complex emerging phenomena of componentization and service orientation such as dynamic configuration of resources (dynamic capabilities), internal and external interaction between components, service exchange and value creation. In this paper, our solution is applying viable system approach (vSa) in Enterprise Engineering; 1) as an interpretive approach to qualify the concepts of the complex emerging phenomena of componentization and service orientation; 2) as a governance approach to investigate the implications of the complex emerging phenomena for corporate level strategic decision making like sharing, in-outsourcing, centralization-decentralization and globalization.

Keywords: Service Oriented Enterprise Engineering, Viable System Approach, Service Orientation, Componentization, Corporate Strategic Decision Making.

1 Introduction

In today's enterprises, componentization and service orientation can be applied to transform an enterprise model to a flexible one in order to respond to several important trends such as globalization (Palmisano, 2006; Baldwin, 2006), deconstruction (Hagel & Singer, 1999), sharing (Arnold et al., 2005), insourcing and outsourcing (Davenport, 2005), offshoring (Grossman & Rossi-Hansberg, 2006) and collaborating in value nets (Heck & Vervest, 2007; Peppard & Rylander, 2006). Since the business environment is undergoing rapidly changes in competitive environment, transforming the traditional enterprise models is one of the best solutions for an organization to simultaneously attain all three imperatives of today's economy;

Differentiation (focusing on key differentiators and relying on a network of expert partners for non-differentiating operations), responsiveness (responding rapidly to customer needs, marketplace changes and external threats), and efficiency (maintaining productivity and reducing risk by adapting cost structures and business processes in a flexible manner) (IBM, 2003a). Hence, the change in business environment has opened the boundaries of organizations. Therefore, traditional structures are being replaced by adaptive network-type organizations (dynamic structures).

Componentization and service orientation have been introduced as two key enablers to address all three attributes. Componentization offer a proven approach to driving a specialized focus, both internally and externally. Internally, componentization help firms rethink the leverage they can achieve with the assets and capabilities they own. Externally, componentization help firms source specialized capabilities that they cannot feasibly create themselves. Combining these types of componentization allows firms to redefine their competitive positions in the face of the sweeping changes in their industries, while simultaneously achieving the competing benefits of scale, flexibility and efficiency. On the other hand, for a on demand interaction with their external partners in a collaborative network, companies are beginning to explore actively what business services to provide and how to develop them rapidly in order to be responsive, innovative and grow margins. Service orientation provide a very useful paradigm for extended enterprise level standardization, modularity and specialization. Nonetheless, componentization by itself is not sufficient. Interactions between business components need to be seamlessly and tightly integrated across the value net. The need for flexibility across the value net requires that the component network be flexible; that is, the enterprise can ‘‘in-source’’ an outsourced component and vice versa; replace, on demand, a current partner with a different partner; change the terms of the contract between the two components, and so on (IBM, 2003b; 2005). In other words, componentization is a way of deconstructing an enterprise in order to reconstruct it into value nets with key partners whereas service orientation is a way of seamless integration between business components both internally and across the firm’s boundaries with best-of-breed components provided by external partners. (Cherbakov et al., 2005)

2 Research goal: corporate strategy decision making

Organizations are facing exciting and dynamic challenges. In the globalized business, companies require strategic thinking and only by evolving good corporate strategies can they become strategically competitive. Strategy is the direction and scope of an organization over the long term, which achieves competitive advantage for the organization through its configuration of resources within a changing environment and to fulfill stakeholders expectations. (Rajput et. al., 2012)

Furthermore, strategy is concerned with matching a firm’s resources and capabilities to the opportunities that arise in the external environment. (Grant, 2002) Corporate Strategy is the organization’s positioning in terms of responsiveness (reliability; quickness; flexibility), cost leadership (price) and differentiation (quality;

uniqueness) requirements, i.e., the sought competitive advantages. (Reveliotis, 2004) The resources of the firm are seen as the main factors driving the firm's strategy and performance. When the external environment is subject to rapid change, internal resources and capabilities offer a more secure basis for strategy than market focus. Fig.1 (Grant, 2002).

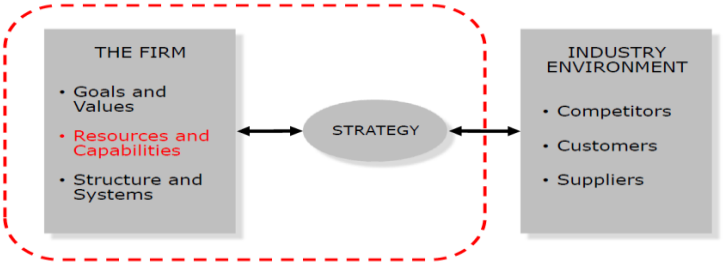

Fig. 1. Role of Resources and Capabilities in Strategy Formulation Grant (2002)

Strategy formulation based on resources and capabilities implies strategic directions that: 1) Exploit the key resources and capabilities of the firm (static); 2) Develop the resources and capabilities through which the firm creates value and deals with competition (dynamic). Resources are productive assets owned by the firm and capabilities are what the firm can do. Individual resources do not confer competitive advantage. They must work together to create organizational capabilities which are the firm's capacity to deploy resources for a desired end result. In other words, the firm's capacity of doing things, implementing strategies, achieve results. Fig.2 (Grant, 1991; 2002)

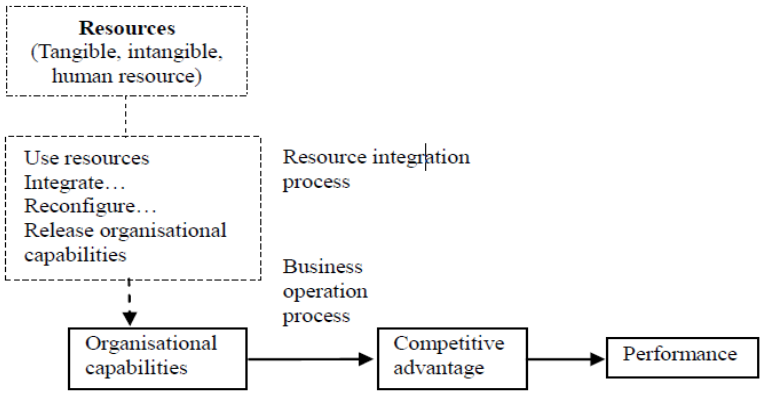

Fig.2. Relationships among resources, capabilities, and competitive advantage Grant (2002)

In our research, componentization and service orientation have been considered as two firm's behavioral orientations (enablers) to integrate, reconfigure, gain and release resources to match and even create market change. Our research goal is to facilitate (corporate-level) strategic decision making to gain a competitive advantage for enterprises. Here, resources and capabilities are the primary source of profitability.

Sourcing decisions like sharing, in-outsourcing, centralization-decentralization and globalization are high level, often (corporate-level) strategic decisions include the commitments, decisions and actions required for a firm to achieve strategic competitiveness on resources and organizational capabilities. Referring to the corporate strategy decisions, sourcing models (e.g. shared services models, strategic alliance-joint venture models and outsourced models) are useful conceptual, communication and analytical tools to make right (corporate-level strategy) decisions about the sourcing of an enterprise's capabilities to increase efficiency, responsiveness and differentiation. According to our goal, to facilitate corporate strategy decision making, the key requirement is a well-defined sourcing conceptualization of componentization and service orientation for sourcing modeling of enterprise to support corporate strategy decision making. This conceptualization should be a high level conceptualization adequate to strategy level of enterprise, not to operational level. Organizational theory classifies decision making into fundamentally three different types: strategy, tactical and operational: 1) Strategic decision making is concerned with long term goals and policies for resource allocation to meet defined objectives; 2) Tactical decision making is concerned with the acquisition and efficient utilization of resources to achieve defined goals; 3) Operational decision making is concerned with the effective and efficient use of resources for execution of specific tasks. (Mallach, 1994)

Therefore, in this research, our focus will be on corporate strategy decisions and sourcing models based on the complex emerging phenomena of componentization and service orientation such as i) dynamic configuration of resources or dynamic capabilities; ii) internal or external interaction between components and service exchange; iii) value creation through resource integration and reconfiguration and also service exchange.

3 Enterprise Engineering and research questions

The only meaningful way to study and develop an enterprise is viewing it as a system (Von Bertalanffy, 1969). A system can be defined as "a set of different elements so connected or related as to perform a unique function not performable by the elements alone" (Maier & Rechtin, 2002) or "a set of elements standing in interrelation among themselves and with the environment" (Von Bertalanffy, 1969).

According to the Enterprise Engineering Manifesto (EEM), Enterprise Engineering (EE) is a discipline - domain of knowledge, concepts, theory and associated methodology- for the analysis, design, implementation and governance of enterprises which have been viewed as systems (Dietz, 2011). Also Dietz defines something as a system (fig.3) if and only if it has: a) Composition: a set of elements of some category (red nodes); b) Environment: a set of elements of the same category, disjoint from the composition (blue nodes); c) Production: things produced by elements in the composition and delivered to the environment; d) Structure: a set of influence bonds among the elements in the composition, and between them and the elements in the environment (connections between blue and red nodes). Together, these properties are called the construction of a system. (Dietz, 2008)

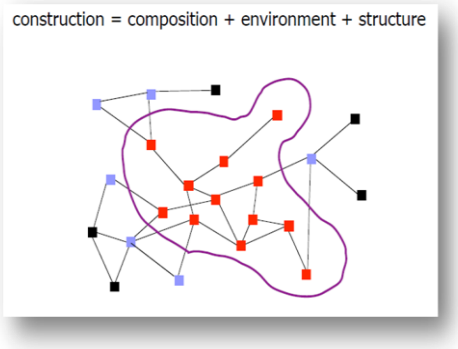

Fig. 3. The construction of a system

According to the EE discipline, there are two perspectives on enterprise (as a system), each with its own value, its own purpose, and its own type of model (Fig.4): the teleological and the ontological one. The teleological perspective is about the function and the (external) behavior of a system. The corresponding type of model is the black-box model. This perspective is adequate for the purpose of using or controlling a system. The ontological perspective is about the construction and operation of a system for the purpose of building and changing a system, The corresponding type of model is the white-box model. (Dietz, 2006), (Dietz & Hoogervorst, 2008)

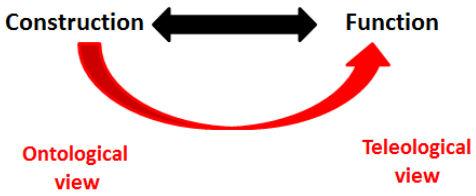

Fig. 4. Ontological-Teleological view of a system

Furthermore, Dietz and Hoogervorst introduced the Generic System Development Process (GSDP) as a framework for Enterprise Engineering (fig.5). The GSDP framework has two processes; 1) Design process to change existing [enterprise] conditions into preferred ones that result into the functional and constructional models of the enterprise, and 2) Engineering process to create an enterprise that is the activity of constructing the implementation model of an enterprise from its ontological model. Enterprise Ontology and Enterprise Architecture are two crucial notions in the GSDP framework, in order to ensure that the engineering of the enterprise as a system is performed coherently and consistently, such that the resulting system is a truly integrated whole. According to GSDP, DEMO's ontological models are introduced as the highest construction models of the enterprise that are founded on the Ψ-theory as a fundamental theory about the operations of an enterprise and also focused on the use of language to achieve agreement and mutual understanding. Furthermore Enterprise Architecture has been introduced conceptually as the normative restriction of design

freedom and practically as a consistent and coherent set of design principles that embody general requirements. (Dietz & Hoogervorst, 2007)

According to EE and GSDP, the most focus is on design of an enterprise based on its constructional (architectural) principles and also implementation of enterprise based on its constructional model. Therefore an enterprise has been studied and developed more based on its construction view rather than its function view. Though the Enterprise Engineering Manifesto (EEM) says that both the function and the construction perspective are needed for developing enterprises, almost all attention goes to the construction perspective. (Op 't Land & Pombinho, 2012); (Pombinho et al. 2012) Consequently, the complex emerging phenomena of componentization and service orientation can't be studied and interpreted based on the current construction-function view in order to make sourcing decisions. Current conceptualization of EE discipline, Enterprise Ontology (EO), is meant the 'highest' constructional model of an enterprise as a system. It shows the essential construction and operation of the enterprise. EO conceptualization is an useful conceptualization to support tactical and operational decision making. Therefore EO, is not focused on sourcing modeling and (corporate-level) strategy decision making. Hence, our research questions are:

1. *How complex emerging phenomena of componentization and service orientation (e.g. resources integration and dynamic capabilities, interactions between components, service exchange and value creation) can be modeled in the discipline of Enterprise Engineering?*
2. *How (corporate level) strategy decisions can be managed and governed based on the complex emerging phenomena of componentization and service orientation in the discipline of Enterprise Engineering?*

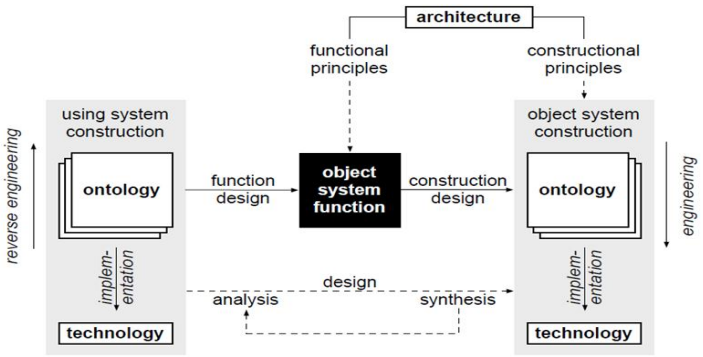

Fig. 5. General System Development Process

4 Proposed solution: to introduce a dynamic and subjective view

According to the research questions, our position statement is:

1. Viewing an enterprise as a viable system.
2. Applying viable systemic paradigm to investigate the componentization and service orientation of enterprise.

First, a viable system is a system that survives, is both internally and externally balanced, and has mechanisms and opportunities to develop and adapt, and hence to become more and more efficient within its environment. (Beer, 1972; 1984) Therefore, the firm as viable system is an organization based on interconnections and interdependence among its internal components (sub-systems) and the components of other systems (supra-systems) to evolve, develop and improve over time its conditions of survival. (Saviano & Berardi, 2009)

Second, the viable systemic paradigm is the conceptual distinction between 'structure' and 'system'. (Saviano & Berardi, 2009) The advantages of the "Structure-System" view of viable systems include a more effective ability to show the evolutionary dynamics of a firm. A structure is a set in which the elements are qualified as components recognized as having the capacity to contribute to perform specific functions (necessary to carrying out specific roles in the context of an emerging system). The components can be put in relation respecting specific constraints (rules). Every system is constituted by individual elements that have assigned roles, activities, and tasks. The passage from structure to system involves a passage from the static to the dynamic, as the focus moves from individual components and relationships to an holistic view of the observed reality (Fig.6). In defining structure and system, the terms relation and interaction are used with great emphasis. With reference to the structure, it can be conceived as an environment in which the components are in relation; as regard the system, it can be conceived as the components interact. The concept of relation (structural) has a static nature and can be qualified as objective, requires an environment of reference and it is not dependent on what emerges from activating the relation itself. The concept of interaction (systemic) requires a context, has a dynamic nature and depends on the observer and what is observed from the observer's specific perspective of the investigation of reality. (Barile & Saviano, 2011a) For example, in a library system, there are components like 'book' and 'catalogue system'. A book 'is listed in' the catalogue system is an example of a relation. A book 'is entered into' the catalogue system by a librarian is an example of an interaction between book, catalogue system and librarian.

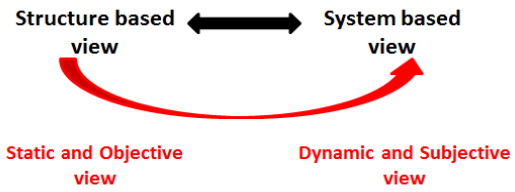

Fig. 6. Structure-Systemic view of a viable system

The structure-system paradigm is a useful scheme for investigating emerging phenomena by focusing on a structure-based view (StBV) or a systems-based view (SyBV) according to the nature of the phenomenon. The StBV is a static and objective perspective that is useful for describing and measuring a phenomenon. The SyBV is a dynamic and subjective perspective that is useful for interpreting the system dynamics. In other words, any phenomenon can be described by objectively focusing on its static components (parts) and relationships (structure); however, to understand its dynamics, the phenomenon's context of interaction (its contextual internal/external interactions) must be interpreted (system). Since, every organization is an open system characterized by components, both tangible and intangible; the interdependence and communication between these components; the activation of these relationships with subsystems and supra-systems to pursue the system finalities. Therefore, the structure-system view of viable system enables the analysis of relationships among enterprise's internal components (sub-systems), as well as the analysis of relationships between enterprises and other influencing systemic actors of their context (supra-systems). (Barile & Saviano, 2011a)

According to the first question and based on our position, the first solution is: *Applying viable system approach (vSa) as an interpretative approach to qualify the concepts of the complex emerging phenomena of componentization and service orientation such as resource integration and dynamic capabilities, interactions between components, service exchange and value creation in the discipline of Enterprise Engineering*.

According to the viable systemic paradigm, complexity refers to a particular combination of multiplicities and autonomies in a given context. A system is a phenomenon that can generate chaos, complexity or simply complication, depending on the interpretative capacity of the observer (decision maker), not on the characteristics of the phenomenon. In other words, a system cannot be examined and understood as a single phenomenon, but it should be contextualized within the framework of interconnections and interdependences with the external environment, from which the same system derives the degree of complication or complexity of its representation. (Saviano & Berardi, 2009)

The interpretation of complex emerging phenomena requires interdisciplinary approaches, and should synthesize both a reductionist view (analyzing elements and their relations) and a holistic view (capable of observing the whole). (Barile & Saviano, 2011b) Systems theory is also receiving increasing attention in service research due to its contribution to understanding complex emerging phenomena such as value co-creation, service exchange and service systems. (Barile & Saviano, 2010a; 2010b) The (general) system theory later developed into: (i) 'open system theory' (OST), which focused on the dichotomy between the system and its environment; and (ii) the 'viable systems approach' (vSa), which adopts a behavioral approach to business and its interactions with its environment. (Beer, 1972; 1984) vSa offers general reference schemes that are useful in interpreting the concept of complexity, highlighting its systemic (dynamic) nature. (Barile & Polese, 2010a; 2010b); (Barile & Saviano, 2010); (Barile et al., 2012); (Golinelli, 2010)

Referring to the second question and based on our position, the second solution is: *Applying vSa as a governance approach for investigating the implications of complex*

emerging phenomena for (corporate-level) strategy decision making in the discipline of Enterprise Engineering.

vSa is a methodology based on the governance of firms as viable systems, and is characterized by the key role of decision makers who lead the system toward a viable evolution within its context of reference. The viable system in its behavioral qualification is characterized by the identification of two distinct logical areas: that of decision making and operations. vSa redefines the initial distinction between decision and action (Fig.7), specifying that in organizations it is always possible to identify two decisional areas: the governing body, deputed to the strategic decisions (decision making) and the operational structure, deputed not only to executive operations, but also to operational decision making related to problem-solving. However, while problem solving refers to routine problems that characterize the management purpose, decision making characterizes the purpose of the government and is essential for the viable development of the system, especially when operating in complex conditions. (Barile & Nauta, 2011); (Golinelli,, 2010) therefore, the structure-system paradigm has been introduced as a framework for governance and management of corporate communication decisions in two levels, strategic decision and tactical and operational decision. (Siano et al., 2011).

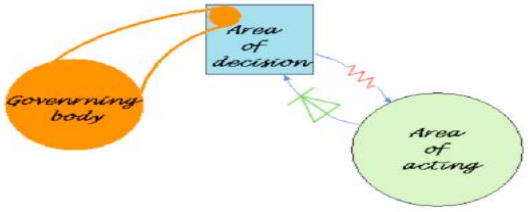

Fig.7. The (vSa) distinction between operation and decision making

5 Proposed approach: to specialize GSDP to SSDP

Regarding the two mentioned solutions, our approach is to specialize GSDP (as EE framework) to a Service System Development Process (SSDP) as a framework for Service Oriented Enterprise Engineering (SOEE). Based on the proposed discipline (SOEE) and framework (SSDP), our research contributions are: (Fig.8)

1) Viewing **enterprises as viable systems** aiming at surviving in their context, both internally and externally balanced. A viable system can dynamically adjust its structure and behavior to achieve consonance with its context, and thus preserve its stability. (Barile & Polese, 2011)
2) Applying **the structure-system paradigm** to study the dynamic nature of enterprises. Referring to this paradigm, every organization can be characterized by a structure constituted by a set of individual elements with assigned roles, activities, and tasks that are performed in compliance with rules and constraints.

From any such structure, a system can emerge by the activation of relationships into dynamic interactions with external supra-systems and internal subsystems. (Golinelli et al., 2001; 2002) This paradigm is useful to study the dynamic nature of enterprises related to key enablers, componentization and service orientation, in order to support sourcing models of enterprises (shared services model, outsourced model, centralized model, etc).

3) Introducing **emerging phenomena of componentization and service orientation as complex phenomena** like dynamic configuration of resources, dynamic capabilities, internal and external interaction between components, service exchange and value creation in order to increase the viability (survivability, well-being) of the enterprise (system). Such complex phenomena are understood depending on the interpretative capacity of the observer (decision maker) of enterprise (system) not on the characteristics of the phenomenon.
4) Using **vSa to interpret the complex emerging phenomena** of componentization and service orientation. We apply vSa as an interpretative approach to qualify the concept of complex emerging phenomena, highlighting its dynamic nature.
5) Using **vSa as a governance approach** for investigating the implications of the complex emerging phenomena of componentization and service orientation for sourcing decision making.
6) Applying **service system abstraction** to understand the building blocks of a componentized-service oriented enterprise as business components. Our reasoning is as follows: First, the construct of service system has been defined as a dynamic configuration of resources (people, technologies, organizations and shared information) that is able to create and deliver value to other interested entities, through service (Spohrer, et al., 2008) and also as the whole, composed of entities that interact in service exchanges to co-create value. (Poels, et al., 2013) Second, a business component is a key concept of componentization and service orientation. It has also been defined as a part of an enterprise that has the potential to operate independently - even as a separate company, or as a part of another company. Furthermore, each business component contains purpose, activities, resources and also business services, which form the interfaces to other business components. (IBM, 2003; 2005) Consequently this proves the similarity between the concept service system and a business component as a key element of a componentized/service oriented enterprise. Therefore, *the service system abstraction introduces a meaningful way to understanding key new sourcing model enablers like componentization (dynamic configuration of resources and internal or external interaction between components), service orientation (service exchange and value creation)*.

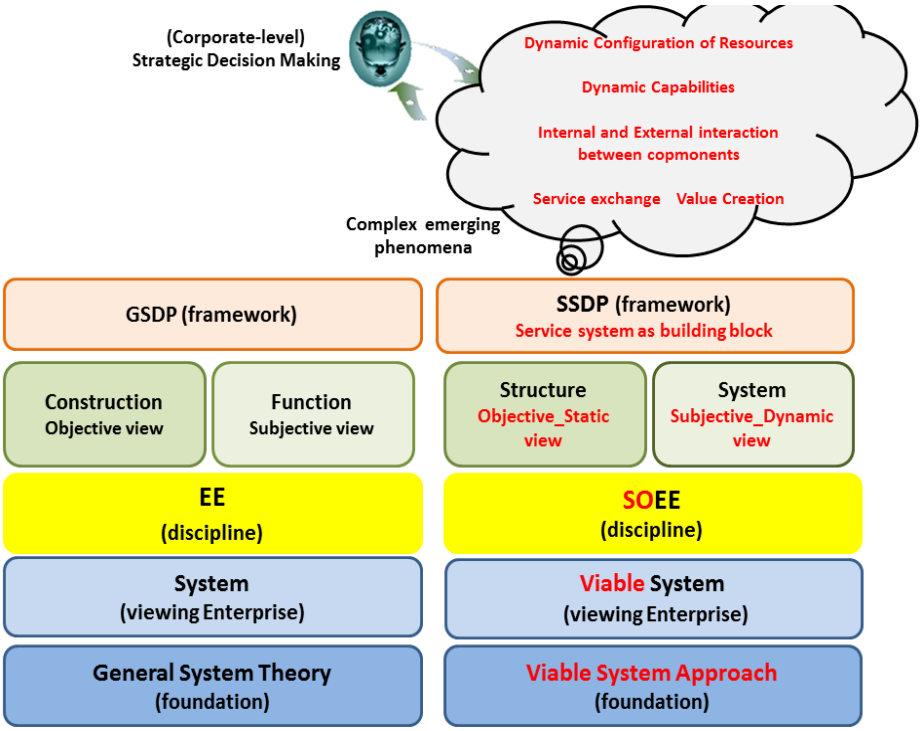

Fig. 8. GSDP framework vs. SSDP framework

6 Methodology and Plan

Our methodology is Design Science Research Methodology (DSRM) of Peffers (Peffers et al 2007). Figure below shows the process model of DSRM. The DSRM is based on seven papers about design science research including the paper describing the most widely accepted framework for design science research proposed by Hevner (Hevner et al. 2004). The process model shows the steps involved in design science research including identify problem and motivate, define objectives of a solution, design and development, demonstration, evaluation, and communication. Also, the figure shows that we have four possible entry points: problem-centered initiation, objective-centered solution, design and development centered initiation, and client/context initiated. In our research, we take a problem centered initiation as our research entry point and we follow the nominal sequence.

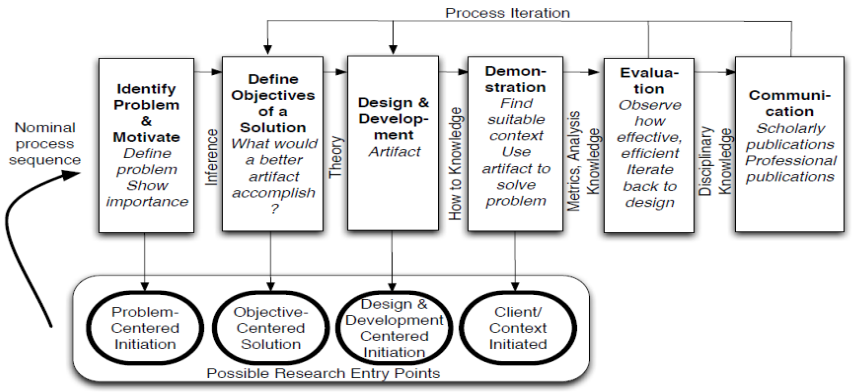

Fig. 9. Design Science Research Methodology

Also we applied the guidelines of Hevner (Hevner et al. 2004) in table below:

Table 1. Applying the guidelines of Hevner et al. (2004)

Guideline 1: Design as an Artifact	Our artifact is a framework for Engineering Engineering to support corporate level strategic decision making.
Guideline 2: Problem Relevance	In our research there are two main questions: 1) How complex issues of componentization and service orientation like resource integration, interactions between components, service exchange and value creation can be modeled in the discipline of Enterprise Engineering? 2) How corporate level strategy decisions can be managed and governed based on the complex emerging phenomena of componentization and service orientation in the discipline of Enterprise Engineering.
Guideline 3: Design Evaluation	We use an observational design evaluation method for evaluating the service oriented enterprise engineering framework, i.e. case studies.
Guideline 3: Research Contributions	The contribution of this research is new knowledge on organizational science and enterprise engineering to support corporate level strategy decisions making through introducing a sourcing conceptualization.
Guideline 5: Research Rigor	Our research is based on three fundamental theories 1) (open) system theory and viable system approach (vSa) as fundamental theories in system engineering 2) fundamental theories and definitions in service science and engineering. 3) fundamental theories and definitions in organization science and enterprise engineering. All three theories are

	published in multiple academic papers.
Guideline 6: Design as a Search Process	We want perform case studies in which we aim at acquiring new insights.
Guideline7: Communication of Research	Our research will be presented effectively by publishing scientific and professional articles.

For doing this research, our plan is as below:

1- Formulating problem and defining solution (the first year): we define the specific research problem and justify the value of a solution. Also we define the objectives for a solution in this step.
2- Design and development artifact/framework (the second year): in this step, we determine the artifact/framework's desired functionality and then create it.
3- Evaluation (the third year): we demonstrate the use of the artifact/framework to solve one or more instances of the problem by case studies and then we compare the objectives of the solution to actual observed results.

References

1. Arnold B.R.T., Op 't Land M. and Dietz J.L.G: Effects of An Architectural Approach to the Implementation of Shared Service Centers. Conference paper for the Second International Workshop on Enterprise, Applications and Services in the Finance Industry, Germany, 2005.
2. Baldwin. R.: Globalization: The Great Unbundling(s), Prime Minister's Office, Economic Council of Finland , September 2006.
3. Barile S., Di Nauta P.: A Viable Systems Approach to territory development. In: AA.VV.,Contributions to theoretical and practical advances in management. A Viable Systems Approach (VSA), 2011.
4. Barile S., Saviano M.: "A New Perspective of Systems Complexity in Service Science", in coll. with BARILE S., in Impresa, Ambiente, Management, vol.3, n.3. 2010a.
5. Barile S., Saviano M.: «Foundations of systems thinking: the structure systems paradigm», in Aa.Vv., Contributions to theoretical and practical advances in management. A Viable Systems Approach (VSA), International Printing, 2011a.
6. Barile S., Saviano M.: «Qualifying the concept of systems complexity», in Aa.Vv., Contributions to theoretical and practical advances in management. A Viable Systems Approach (VSA), International Printing Avellino, 2011b.
7. Barile S., Saviano M.: «S-DL, VSA and SS – Highlighting Convergences », International Cooper Link Workshop The emerging Perspective of Service Science for Management and Marketing Studies, Naples, June 9, 2010b.
8. Barile, S., Pels, J., Polese, F., & Saviano, M.: An Introduction on the Viable Systems Approach and its contribution to Marketing. Journal of Business Market Management, 2, 54–78, 2012.
9. Barile, S., Polese, F.: «Linking the viable system and many-to-many network approaches to service-dominant logic and service science», in International Journal of Quality and Service Science, Vol. 2 No. 1, 2010a.

10. Barile, S., Polese, F.: «Smart service systems and viable service systems», in Service Science, Vol. 2 No. 1/2, 2010b.
11. Barile S., Polese F.: A viable system can dynamically adjust its structure and behavior to achieve consonance with its context, and thus preserve its stability, 2011.
12. Beer, S.: Brain of the Firm, The Penguin Press, London. 1972.
13. Beer, S.: The Viable System Model: Its Provenance, Development, Methodology and Pathology. The Journal of the Operational Research Society. 35(1), 7-25. 1984.
14. Cherbakov L., Galambos G., Harishankar R., Kalyana S., and Rackham G.: Impact of Service Orientation at the Business Level, IBM Systems Journal 44, No. 4, 653–668 , 2005.
15. Davenport T.: The Coming Commoditization of Processes, Harvard Business Review 83, No. 6, 2005.
16. Dietz J. L. G.: Architecture - Building strategy in design. Academic Service, Amersfoort, The Netherlands, 2008.
17. Dietz J.L.G.: Enterprise Ontology – Theory and Methodology, Springer Verlag, 2006.
18. Dietz, J.L.G., Hoogervorst, J.A.P.: Enterprise Ontology and Enterprise Architecture – how to let them evolve into effective complementary notions. GEAO Journal of Enterprise Architecture 1 ,2007.
19. Dietz, J.L.G., Hoogervorst, J.A.P.: Enterprise Ontology in Enterprise Engineering, in: Proceedings of ACM-SAC'08, Fortaleza, Ceará, Brazil, 2008.
20. Dietz, J.L.G.: Enterprise Engineering Manifesto (2011), http://www.ciaonetwork.org/publications/EEManifesto.pdf (last visited January 24, 2012).
21. Golinelli, G., Pastore, A., Gatti, M., Massaroni, E., Vagnani, G.: The firm as a viable system: managing interorganisational relationships. Sinergie. (58), 65-98. 2002.
22. Golinelli, G.M., Gatti, M., Vagnani, G., Gatti, C.: Managing The Firm as a Viable System. Euram (European Academy of Management) Proceedings: European Management Research: Trends and Challenges, IESE, Barcellona, April 20-21. 2001.
23. Golinelli G., Pastore A., Gatti M., Massaroni E., Vagnani G.: The firm as a viable system: managing interorganisational relationships. Sinergie. (58), 65-98. 2002.
24. Golinelli, G.M., Spohrer, J., Barile, S., Bassano, C.: The evolving dynamics of service co-creation in a viable systems perspective, in The 13th Toulon-Verona Conference proceedings of the International Conference in Coimbra, Portugal, 2-4 September, 2010.
25. Golinelli, G.M.: Viable Systems Approach (VSA). Governing Business Dynamic, Cedam, Kluwer, 2010.
26. Grant, R. M.: Contemporary strategy Analysis (4th ed.). Oxford: Blackwell Publishers Inc, 2002.
27. Grant, R. M.: The resource-based theory of competitive advantage: implications for strategy formulation. California Management Review, 33(3), 114–135, 1991.
28. Grossman G.M., Rossi-Hansberg E.: The Rise of Offshoring: It's Not Wine for Cloth Anymore, Proceedings of the Symposium on New Economic Geography: Effects and Policy Implications, Jackson Hole, Wyoming, August 24–26, 2006.
29. Hagel J., Singer M.: Unbundling the Corporation, Harvard Business Review 77, No. 2, 133–141, March– April,1999.
30. Heck E., Vervest P.: Smart Business Networks: How the Network Wins, Communications of the ACM 50, No. 6, 28–37, 2007.
31. Hevner, A., R., March, S., T., Park, J., and Ram, S.: "Design science in information systems research". MISQ, 28, , 75—106, 2004.
32. IBM Institute for Business Value: The Specialized Enterprise--A Fundamental Redesign of Firms and Industries, Publication G510-4014-02, IBM Corporation 2005.
33. IBM Institute of Business Value: Component Business Model, 2003b.
34. IBM Institute of Business Value: On demand business: The new agenda for value creation, 2003a.

35. Mallach EG.: Understanding decision support systems and expert systems. Irwin, Burr Ridge, Illinois, 1994.
36. Maier M.W., Rechtin E.: The Art of Systems Architecting, 2002.
37. Op 't Land, M. and Pombinho J.: Strengthening the Foundations Underlying the Enterprise Engineering Manifesto. in 2nd Enterprise Engineering Working Conference. Delft, The Netherlands: Springer, 2012.
38. Palmisano S. J. (CEO of IBM): The Globally Integrated Enterprise, Foreign Affairs, 2006.
39. Peffers K., Tuunanen T., Rothenberger M., and Chatterjee S.: A design science research methodology for information systems research. Journal of Management Information Systems, 24(3):45–77, 2007.
40. Peppard J., Rylander A.: From Value Chain to Value Network: Insights for Mobile Operators, European Management Journal 24, No. 2, 128–141, 2006.
41. Pombinho J., Aveiro D., Tribolet J.: Towards Objective Business Modeling in Enterprise Engineering – Defining Function, Value and Purpose, 2012.
42. Poels G., Van Der Vurst G., Lemey E.: Towards an Ontology and Modeling Approach for Service Science, Lecture Notes in Business Information Processing Volume 143, 2013, pp 285-291.
43. Rajput Sh., Singh Sh., Singh P.: Business Strategy, Change Management and Organizational Development, VSRD International Journal of Business & Management Research Vol. 2 (2), 2012
44. Reveliotis S.: Corporate Strategy and its Connection to Supply Chain Management, 2004.
45. Saviano M., Berardi M.: Decision making under complexity. The case of SME, in Vrontis, V., Weber, Y., Kaufmann, R. and Tarba, S. (Eds), Managerial and Entrepreneurial Developments in the Mediterranean Area, 2nd EuroMed Conference Proceedings, EuroMed Press, Cipro, 2009.
46. Siano A., Confetto M.G., Vollero A., Siglioccolo M.: A framework based on the structure-system paradigm for governance and management of corporate communication, Contributions to theoretical and practical advances in management. A Viable Systems Approach (vSa), International Printing, Avellino, 2011.
47. Spohrer J., Vargo S.L., Caswell N., Maglio P.P.: The service system is the basic abstraction of service science. Proceedings of the 41st Hawaiian International Conference on System Sciences (HICSS), Waikoloa, Hawaii, 2008.
48. Von Bertalanffy L.: General System Theory, 1969.