From Variability to Viability

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Abstract

Socially and industrially globalized environment generates the need for flexibility of enterprises acting, cooperating and preserving their identity in various value and supply chains and socio-technical ecosystems. Achieving required flexibility, ability to cooperate, and ability to care for enterprise identity is possible via use of information systems that can provide a high level of variability of systemically organized information services. The points of variation may reside in types of information provided, in information, data, software, hardware, and network architectures, systems development methods, and in types of chosen information sources in enterprises and their environment. Vigorous models are needed to handle the variability in enterprises in general and in information systems in particular. St. Beer's Viable Systems Model known in organizational cybernetics is one of the candidates for handling and utilizing the variability to achieve enterprise viability via viable information systems.
Keywords: Variability, Enterprise, Information System, Viable Systems Model.

1. Introduction

Socially and industrially globalized environment generates the need for flexibility of enterprises acting, cooperating, and maintaining their identity in various value and supply chains and socio-technical ecosystems. Achieving required flexibility, ability to cooperate, and ability to care for enterprise identity is possible via use of information systems that can provide a high level of variability of systemically organized information services.

The need for variability of services depends on variation points that may be discovered by looking at the enterprise from different viewpoints at different levels of detail. The following issues can be considered regarding the variation points in [1], [2]:

- enterprise operational contexts or environment
- enterprise and systems development goals
- business or production processes
- information sources and information users
- data, information, software, hardware, and network architectures
- types of systems development methods

The variation points have to be carefully analyzed when changes are introduced due to external and internal factors influencing strategies, goals, and activities of enterprises. Therefore vigorous models are needed to handle the variability in enterprises in general and in information systems in particular.

2. Managing Variability

St. Beer's Viable Systems Model known in organizational cybernetics, if applied from enterprise and information systems perspectives, is one of the candidates for handling and utilizing the variability to achieve enterprise viability via viable information systems [3], [4]. This model has a potential to balance standardization and openness to changes via its fractal organization of subsystems at the level of organizational processes. Viable Systems Model combined with contemporary enterprise architecture analysis methods can be used as a

framework for continuous acquisition of information systems requirements [5] and analyzing their completeness and consistency according to the changes that can be introduced by external or internal organizational factors such as changes in regulations, changes in strategies, changes in human resource policy, changes in technologies and other issues. In Viable Systems Model the ideas for handling variability with respect to external environment are rooted in the law of requisite variety stated by W. R. Ashby [6]. The law states that the larger the variety of actions available to a control system, the larger the variety of perturbations it is able to compensate. Or in other words: the quantity of variety that the model system or controller possesses provides an upper bound for the quantity of variety that can be controlled or modeled [7]. Thus the law implies that the degree of control of a system is proportional to the amount of information available [8]. The application of the Ashby's law has become more realistic with supercomputing, high network throughput, and development of new methods of business intelligence that can monitor physical and social events and provide statistical and predictive data about expected and unexpected changes in the enterprise environment and promote use of larger scope of actions by decision makers.

The Viable Systems Model gives an opportunity to flexibly change the borders of enterprises and see them as individual entities, the members of supply and value chains as well as parts of organizational ecosystems [9]. When using powerful models of enterprises, the information systems models should be capable to represent information demands and flows at different levels of detail and for different combinations of data and information providers and consumers. Specific enterprise architecture patterns [10] can be utilized to model and analyze information flows between physical and virtual information processing nodes in the enterprise. These enterprise architecture patterns can reflect active enterprise architecture elements such as roles and actors, software systems, and hardware; as well as passive enterprise elements such as business objects, data objects, and artifacts at the technology level; as well as behavioral elements of the enterprise such as process or functions.

3. Conclusion

Using the architecture patterns, Viable Systems Model, and specific models for representation of variety it is possible to take into consideration whether the information processing is to be done manually, automatically, or semi automatically and support, configure, or orchestrate information processes and services at different levels of abstraction and detail and from different viewpoints or perspectives. Both predictive and adaptive approaches of information systems development can be utilized when handling variability via use of principles prescribed by Viable Systems Model. These principles enable the use of well known and innovative systems analysis and design methods at a higher capacity by considering different variation points relevant in enterprises and their information systems as well as by imposing needed variability in the process of information system and service development through supporting different levels of rigidity of artifacts and different frequency and length of information systems development cycles performed by internal or outsourced information systems development teams.

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