DYVELOP Method Implementation for the Research Development in Small and Middle Enterprises

Jiří F. Urbánek, David Král

Abstract—Small and Middle Enterprises (SME) have a specific mission, characteristics, and behavior in global business competitive environments. They must respect policy, rules, requirements and standards in all their inherent and outer processes of supply - customer chains and networks. Paper aims and purposes are to introduce computational assistance, which enables us the using of prevailing operation system MS Office (SmartArt...) for mathematical models, using DYVELOP (Dynamic Vector Logistics of Processes) method. It is providing for SMS′s global environment the capability and profit to achieve its commitment regarding the effectiveness of the quality management system in customer requirements meeting and also the continual improvement of the organization's and SME′s processes overall performance and efficiency, as well as its societal security via continual planning improvement. DYVELOP model′s maps - the Blazons are able mathematically - graphically express the relationships among entities, actors, and processes, including the discovering and modeling of the cycling cases and their phases. The blazons need live PowerPoint presentation for better comprehension of this paper mission – added value analysis. The crisis management of SMEs is obliged to use the cycles for successful coping of crisis situations. Several times cycling of these cases is a necessary condition for the encompassment of the both the emergency event and the mitigation of organization′s damages. Uninterrupted and continuous cycling process is a good indicator and controlling actor of SME continuity and its sustainable development advanced possibilities.

Keywords—Blazons, computational assistance, DYVELOP method, small and middle enterprises

I. INTRODUCTION

THIS document introduces DYVELOP method in Czech Crisis Management [1], which uses just three operators of Boolean algebra and four types of the entities: the Environments, the Process Systems, the Cases and the Controlling actors. The Process Systems (PrS) have five "brothers": Management PrS, Transformation PrS, Logistic PrS, Event PrS and Operation PrS. The Cases have three "sisters": Process Cell Case, Use Case (similar to [2]) and Activity Case. They all need for the controlling of their functions special Ctrl actors, except ENV – it can do without Ctrl. Basic terminology of DYVELOP [3] method follows.

The entity is it what exists, or what is possible to imagine even in human mind on any scene. *Dominance* is predominant aspect on the scene. *Domains* are real time, space and environments, dominating entities independent on a controlling of human perception. Controlling (ctrl) is

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generalized capability to have control over situational policy. Controlling actor is an executor of ctrl functions. Environment (ENV) is entity′s 1st kind, having principal domain role of any scene without defined ctrl actor. Process System (PrS) is entity′s 2nd kind, having transformation role of inputting to outputting things and its external ctrl actor operates from its defined ENV. The case is entity′s 3rd kind, having the complex situational set role of process′s entities, requiring the purpose or action fruition in certain circumstances and conditions, according to its inherent ctrl actor, initiating and composting case situation.

The operation represents the process chains / nets, running in dominant real time and environments, needing a work of real process factors (agents, actors, participants…). The scenario is a formal record of the operations on scene and arena environments, having a Libretto as a one-sentence summary. The scene is the exactly specified framework of scenario entities. The arena is space specified framework of scenario entities. Scenery represents the instant perception of the scene and arena. The event is the PrS′s manifestation and realization on the operational scene, as well as situational symptom or occurrence.

Circumstance affects and guides event′s process. Map's [4] arrangement of entity′s portfolio is also surveyed. Blazon's [3] scenic meta-model, representing the entities′ roles, semantics and their relationships in pictographic maps. Interface's [5] relative domain, symbolizing, defining and demarcating typological differences among entities. Critical interface encloses antagonistic negate entities. Crisis interface encloses more than two antagonistic entities. The situation is a qualitative and quantitative manifestation of event scenery, influenced by the environments and circumstances. Crisis situation has over than two critical/ crisis interfaces, and it is succeeded to the emergency state. Crisis measure designates organizational and technical solution of a crisis situation and the elimination/ mitigation of its consequences. Extraordinary event originally initiate crisis situation.

II. DYVELOP TYPOLOGY, SYMBOLS, AND ROLES

A. Mathematical - Graphical Relations of the Entities

Mathematical - graphic relations of DYVELOP [3] entities might express *semantic relations*, using Boolean algebra operators AND, OR, NOT- Fig. 1. For *structural relations* expression are used common symbols of system flowcharts (Fig. 2) and algorithms.

B. Environments

The definition for the environment (ENV) is above. Here is

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necessary to accept that the ENV has the the mathematical role of the *principal domain* of any scene *without defined* ctrl actor [6]. The symbol for the ENV on the two-dimensional scene is blazonry expressed in Fig. 3. Here, it must be typologically demarcated double dash curve / line.
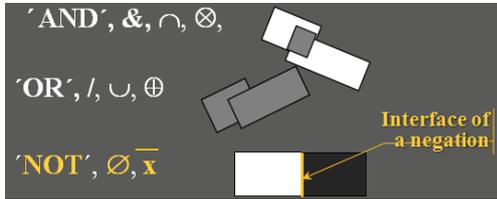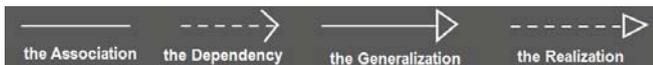

Fig. 1 Semantic relations

Fig. 2 Structural relations

Fig. 3 Symbol for the environment

C. Process Systems

The definition for the processing system (PrS) is above. Here is necessary to accept that the PrS has the mathematical role of the transformation of inputting things to outputting new-things. The both in/outputs symbols as the typical processes are displayed blazonry by five-corner arrows as logistic process systems (Fig. 4). The aim of outputting logistic PrS is a Product. PrS´s defined ENV X is parameterized by the domains ´space´ and ´real time.' Last named real time is going to the page top to the bottom on the blazon, similar as on any algorithm.
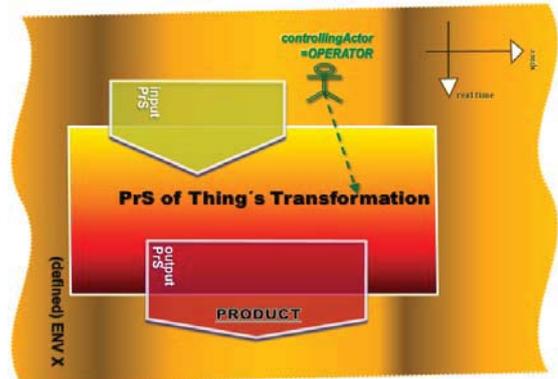

Fig. 4 Process system for things transformation and production

At Fig. 4 is the most common PrS: the ´PrS of Thing´s Transformation,' which symbol must be typologically demarcated by single lines with four sharp corners. It has its *external* ctrl actor – the OPERATOR, which operates from its defined ENV X –quod vides blazonry at Figs. 4 and 5.

On the Fig. 5 is blazonry expressed that the process systems have typologically just a five "PrS´ brothers": Management PrS, Transformation PrS, Logistic PrS, Event PrS and Operation PrS. They all are sufficient for expression and DYVELOP modeling of all possible type and characteristics of arbitrary process systems. They all need for the controlling of their functions special ctrl actors (defined on blazon), functioning *externally* from pertinent PrS´s environments. The externality is their special characteristic.
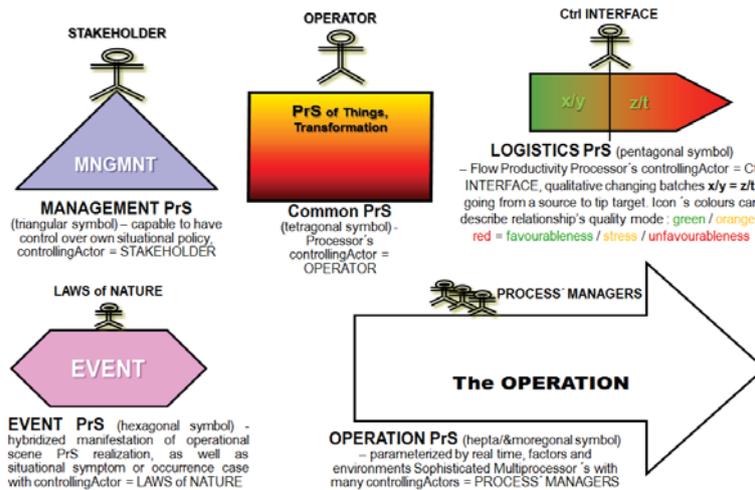

Fig. 5 The typology of "five PrS´ brothers"

D. Cases

The Case definition is above. Compare with the processing system, the Cases significant characteristic is that its controlling actor is an *inherent* entity. They have a more complex system of processes and functions. The best view of its complexity brings the smallest, but quite autonomous PrS: the ***Process Cell Case*** [5]. Its blazonry symbol has the shape of a "puzzle" in Fig. 6. Process cell has processor´s operational behavior, but its characteristics are more

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complicated complex and hybrid, making automatic functions as the smallest autonomous automate case on defined ENV XY.
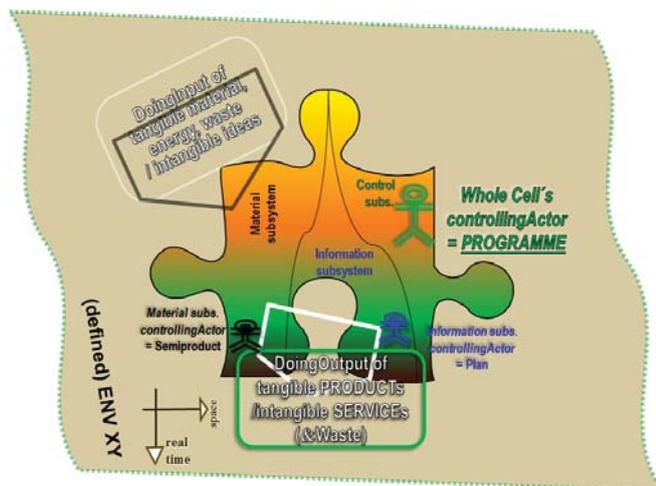

Fig. 6 The Process Cell

Whole cell´s ctrl actor is a PROGRAMME, which is an inherent part of process cell "body," functioning in cell control subsystem. The program has complex controlling, control and regulation roles also. But the cell as the automat needs two furthers subsystems: material and information. Here the role of ctrl actor takes a semi-product in the material subsystem and plan in information subsystem. On the Fig. 6 is defined tangible or intangible cell´s input. The objective and output of process cell operation are tangible products and intangible services. But here is unrequired co-product - a waste always.

On the Fig. 7 is blazonry expressed that the cases have typologically just a three "Case´s sisters": Process Cell Case, Use Case and Activity Case. First sister the Process Cell Case was introduced above, and its symbol is by simply way repeated at Fig. 7.

The second sister is the **Use Case** (corner rounded polygonal symbol). It has inscribed alphanumeric legend, which is *cursive typified gerundive form* as *verbal noun* ending in '-ing,' which has a function of a noun and at the same time shows certain verbal features [7]. It can be ´cameLetter´ completed by process specification, expressing structural things always. Case´s complex situational set create a lot of the process´ entities, process cells (organized to the ´funnels´), circumstances, conditions, various environments [6] and much of single processors (representing by puzzle symbols of the cells). Here, an output from the one entity often directly forms an input into another processing entity, requiring the purpose fruition according to its *inherent* controlling actor – the USER, from of whose perspective the Use Case is initiated and composed.

The third sister is the **Activity Case** *(globoid symbol). It has inscribed legend, which is *cursive typified process verb* mostly as an infinitive with *´to´* preposition. It can be ´camelLetter´ completed by the attribute. It represents single operational process´ function, aiming & specifying terminal or transit

change of the thing, state, structure, behavior, interaction, capability, service, relation, situation or attribute within real operation. Activity Case requires action fruition under its *inherent* controlling actor – the AGENT.
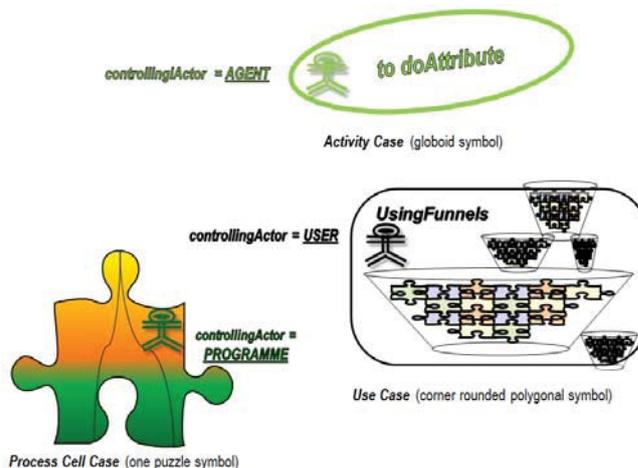

Fig. 7 The typology of "three Cases´ sisters"

III. DYVELOP FOR CRISIS MODELING IN THE SME

In this chapter of this paper, the blazons of DYVELOP [5] method will be used for the discovering and modeling of the cycling cases and their phases. Each blazon´s better comprehensions need live PowerPoint presentation for better displaying of this paper mission. The crisis management of the SMEs (Small and Middle Enterprises) is obliged to use cases cycles displayed in Fig. 8 for successful coping of crisis situations.

The cycle [8] is a native controlling actor for any course almost of all natural or healthy man-made processes. Any uninterrupted cycling of the processes is a good indicator of sustainable development [9]. General question asserts to the foreground of SME´s organization system´s vulnerability and security during not only economic but even any process of ´life cycles´: *How the resilience and resistance are of organizational ´processes life cycle´ against relevant threats, perils, and hazards?* [5]. The answer can be obtained from the analytic, planning, testing and auditing procedures, according to of international (British) BS 25999-2 [10] and global ISO family 22300 standards [11] - for a Business Continuity Management System - BCMS.

Several times cycling of these cases is a necessary condition for the encompassment of the both the emergency event and the mitigation of organization´s damages. Uninterrupted and continuous cycling process brings for crisis management great fruitfulness, and it is a good indicator and controlling actor of organizational continuity and its sustainable development advanced possibilities. The reliable research rules are derived for the safety and reliable continuity of SME Organizations in the crisis situation. It brings profit in societal security and business continuity scenarios [5]. In crisis situation of SME, not all playing entities are only in cooperative relations on real societal security scene. But always there have been numerous

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participating ´enemies,' which play apparent or hidden opponent roles with prosperous organization system. They can overgrow till in antagonistic dramatically irreconcilable relations, resulting in crisis scene or even to battle theater. But for the purpose of this paper, the main behavior of modeled entities of SME will be tended to continuity obtaining in cyclic organizational processes.

Dynamical blazon with real time, cycling clockwise on the Fig. 8, displays the SME´s crisis operation. Here, Crisis / emergency specialized operation system named ⟨⟨CrOpM

PrS⟩⟩ (triangular symbol) acts as a part of organizational ⟨⟨PrS of SME Organization⟩⟩ of SME total management system. It sets and innovates of the continuity cyclic process approach of total integrated management system activities and processes in whole organization´s life cycles. The Business Continuity Planning PrS ⟨⟨ BCP PrS⟩⟩, producing ´Manuals for BIA, Prevention, Preparedness and Readiness´, serves for organization´s business continuity management successful processes and for the system the crisis management operation
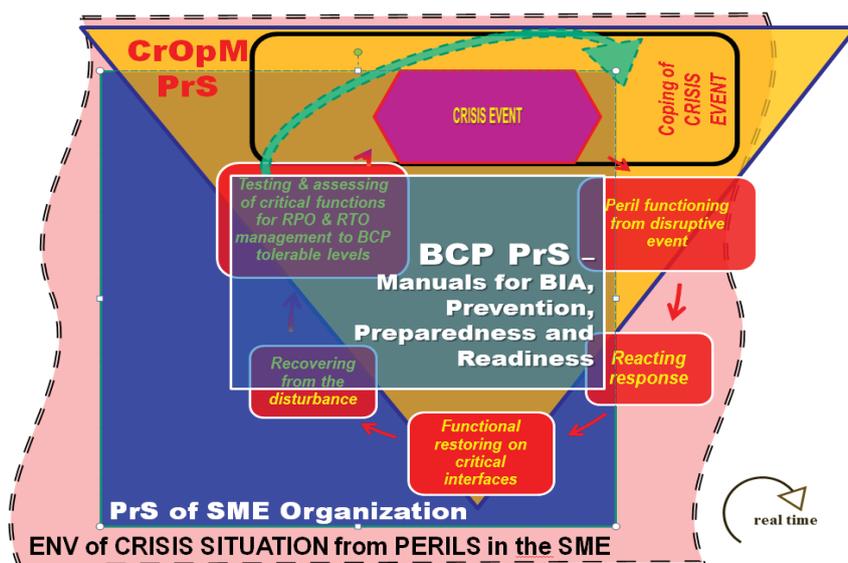

Fig. 8 The blazon of crisis situation coping

⟨⟨CrOpM PrS⟩⟩, using Business Impact Analysis (BIA) and others evaluative tools [10]. They use for the prevention, preparedness & readiness processes. In blazoning scenario at Fig. 8, all PrSs work systematically and permanent for SME organizational processes continuity and efficiency improvement, operating at organizational threat´s environment ⟨⟨ENV of CRISIS SITUATION from PERILS in the SME⟩⟩. They provide threats prediction, prevention, preparedness, and readiness, as well as the risk analysis and scenario design for continuity solution and testing of organizational acceptance and maintenance services for the ⟨⟨PrS Organization⟩⟩. These services are implemented only, if an ⟨⟨EMERGENCY EVENT⟩⟩ (hexagonal symbol) enforces an intervention. It is clear that this ⟨⟨CrOpM PrS⟩⟩ intervention and response procedure is initiating only after ad hoc ⟨⟨EMERGENCY EVENT⟩⟩ occurrence, which activates ´critical functions.' Then it immediately acts and operates off the use cases in the cycle at Fig. 8: ⟨⟨Peril, functioning from the disruptive event ⇒Reacting response ⇒Functional restoring on critical interfaces ⇒Recovering from the disturbance ⇒Testing & assessing of critical functions for RPO & RTO management to BCP tolerable levels⟩⟩. These use cases cycle is multiplied repeating for the RPO & RTO successful obtaining. It brings ⟨⟨EMERGENCY EVENT⟩⟩ elimination and consequently it is issuing to terminal asked the ⟨⟨Coping of CRISIS EVENT⟩⟩.

These mastering guarantees satisfy organization continuity, improving the processes of ⟨⟨BCP PrS⟩⟩. From the [10] an RPO (Recovery Point Objective) is used, identifying maximum tolerable functions loss for each activity, which cannot be exceeded. The RTO [11] (Recovery Time Objective) is also used, identifying the acceptable amount of time to restore the functions, till the MTPD - Maximum Tolerable Period of Disruption of the SME O organization [4].

IV. ADDED VALUE CONTROLLING MODEL

Value Added (VA) is possible to model by DYVELOP method. At Fig. 9 is blazonry operated a "meta Processor" representatives of SME model [8]. This SME model has three-dimensional (3D) ´funnel´ shape, aiming to ⟨⟨PRODUCTs⟩⟩ generation on defined ⟨⟨ENV XYZ⟩⟩ (3D parameters are real time/space/information), operating on use case scene ⟨⟨Producing Value Added⟩⟩. The VA production is here abstractly indicated by means thing´s transformation rate - τ (tau), which varies between ⟨0; π/2⟩. The τ represents transformational processes of the thing´s productivity in the funnel between activity case "to do Input Batch," having value a/b to the output activity case with value c/d, according to DIRECTOR´s controlling and management aims. This scene produces the VA, proportionally to τ size extent. If the τ ≠ 0, then this scene the batches (a/b and c/d) have a relation:

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$$a/b \neq c/d \qquad (1)$$

Case´s inherent ctrl actor is the DIRECTOR, having a key user´s role in the need to consider processes in terms of added value, obtaining results of process performance & effectiveness and obtaining continual improvement of processes quality, based on objective measurement in local or global competitiveness environment [6]. Full comprehension of, next Fig. 9 and 10 need a rolling out step by step in live power point presentation, which will be performed at Istanbul´s Conference. Here, just in a "static pictures" of the processed scene must be rolled out by the attendant verbal way for the reading of this blazon. At Fig. 10, process scene of the SMEs is enacted at use case named $\langle\langle Controlling\ Dominance\rangle\rangle$, where a $\langle\langle Things\ change\rangle\rangle$ must be performed by two next model cases: $\langle\langle TransformationCONTROLLING\rangle\rangle$ and $\langle\langle LogisticCONTROLLING\rangle\rangle$ -Fig. 10.
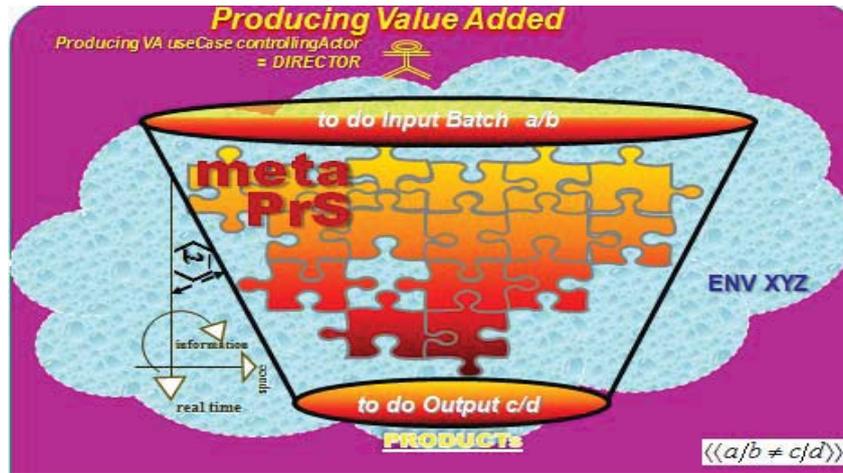
Fig. 9 SME 3D "funnel" model
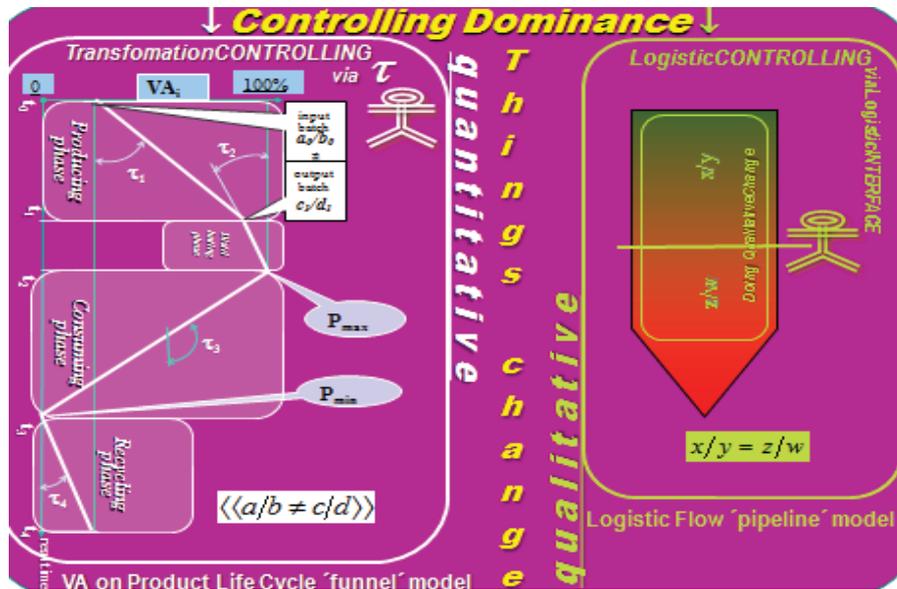
Fig. 10 SME two use cases of the CONTROLLING

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