IMPROVMENT OF ECONOMICS BY IMPLEMENTING PROCESS-BASED INFORMATION SUPPORT

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Economic development of a company can be achieved by embarking upon continuous process improvement, by eliminating process variations, and hidden costs. Once improved, processes should be information supported. The quality perspective in the supply chain in the economy becomes every day increasingly important. This perspective is briefly reviewed in this paper. Moreover, this paper elaborates on the concepts of process mapping, improvement, information support, and tools and methods for the quality analysis in the services and industry. Process mapping to be presented is based on the SIPOC model using Visual Processes .Net process modeling tool. Applying quality tools and methods allows organizations to profit from the "low fruit" and improve processes without significant financial investments.

1. INTRODUCTION

Services and productions has processes that add core value – core processes –alongside with support processes. Organizations' business success depends on the process quality level, and especially on quality level of core processes. In an average organization, processes are at the 3σ quality level and they make 67.000 defects per million opportunities for a defect. The cost of such a quality level is 25-40% of organization's gross income. By improving processes, organizations can arrive at the 6σ quality level which causes only 3.4 defects per million opportunities and cost less than 1% of gross income.

Economic development of a company can be achieved by embarking upon continuous process improvement, by eliminating process variations, and hidden costs. Once improved, processes should be information supported. Information support of "ill" processes leads only to a bigger trouble. Such an approach is widely accepted worldwide and Jack Welch was one of the prominent people who proclaimed that processes have to be improved first and automated only afterwards.

The quality perspective in the supply chain in the economy becomes every day increasingly important. This perspective is briefly reviewed in this paper. Moreover, this paper elaborates on the concepts of process mapping, improvement, information support, and tools and methods for the quality analysis in the services and industry. Process mapping to be presented is based on the SIPOC model using Visual Processes .Net process modeling tool. Applying quality tools and methods allows organizations to profit from the "low fruit" and improve processes without significant financial investments. CIM College d.o.o. automates improved processes on the process oriented OPISys™ .Net platform. OPISys™ .Net allows process monitoring at any location, data acquisition and analysis using quality tools and methods. OPISys™ .Net enables organizations to arrive at 6σ quality level.

2. PROCESSES AND PERSPECTIVES IN THE SUPPLY CHAIN AND THE SYSTEM LIFECYCLE IN THE ECONOMY

The suppliers and customers are linked in an extended chain working together to deliver services or products to the market that the customer is willing to pay for. This multi-company group which functions as an extended company should make its optimum by using shareable resources (people, processes, technologies and performances) for the sake of improving business performances. The efficiency of the whole supply chain is equal to the efficiency of the weakest process in this very chain. If the economy is to be improved, then the process to be improved first is the one with the poorest performance – the bottleneck.

When it comes to economy in services or production industry three perspectives should be taken into consideration: one refers to the process capability, the second refers to the security in all the processes in the supply chain and the third refers to the finances. The security perspective can reduce the financial one due to increased costs in the domain of prevention and risk reduction. Yet, if the security perspective is not taken into consideration, this may lead to incidents which, in its turn, may considerably weaken the financial side of the whole process. In both the mentioned cases, the process capability perspective can contribute to the further improvement of the financial and security ones.

Since the financial perspective is a direct outcome of the two perspectives, namely the process capability and the process security, it is not especially dealt with in this paper. It is assumed that if the former two perspectives are under control, the company will realize a positive financial performance, that is, the services or production industry will have positive business results.

1. ECONOMY AND THE PROCESS CAPABILITY IN THE SUPPLY CHAIN IN THE ECONOMY

The process effectiveness and efficiency directly influence the business economy of the companies in the services or production industry. If the company has process capability, for instance, at the Six Sigma quality level, then its losses are less than 1% of the gross income. If the processes are at the 3σ level then the company's losses are between 25 and 40% of the gross income, George (2). It can be seen that business economy is directly proportional to the process capability. A higher process capability, a better business economy, and *vice versa.*

The process capability in the supply chain is determined on the basis of the quality characteristics in particular process. In order to define the capability it is first necessary to draw a process flowchart (macro-process flowchart or micro-process flowcharts). It is on this flowchart that the experts familiar with the process should determine the critical to quality characteristics as well as aspects affecting the living environment and the hazards that may be risky for occupational health (Sto, 2003). In addition, experts may determine and define the losses that come up in particular activities or between them, that is, they may also define a value flowchart in the process.

For designing and mapping the process the software developed for this particular purpose is used. One of such software tools is the Semantic Visual Process .Net developed by the CIM College d.o.o. (CIM Integrated Systems Ltd.) (CIM, 2007). Semantic Visual Processes .Net is a software tool designed to enable advanced business process modeling. It allows the user to simply and effectively design/redesign process flowcharts using standard elements (activities, resources, documents, connections, signals, databases...) as well as using a set of parameters that characterize these elements (critical to quality characteristics, aspects provoking environmental

impacts, health and safety hazards, etc.). Semantic Visual Processes .Net includes **three working modalities**: 1. Visual Processes .Net for Management Systems; 2. Visual Processes .Net as an Integrated Quality Tool; 3. OPISys™ integrated Semantic Visual Processes .Net for process-based information system modeling

The first, basic working modality allows the user to design the process flowchart according to her/his specific needs, including: quality management perspective, occupational health and safety perspective, and environmental management perspective). The process flowchart creates a comprehensive view of business processes of an organization, or, in other words, establishes a "big picture" of the system. Semantic Visual Processes .Net enables simple design of complex process maps in a user-friendly environment. Process maps can be exported to a number of formats which speeds up the process of creating management system compliant documentation.

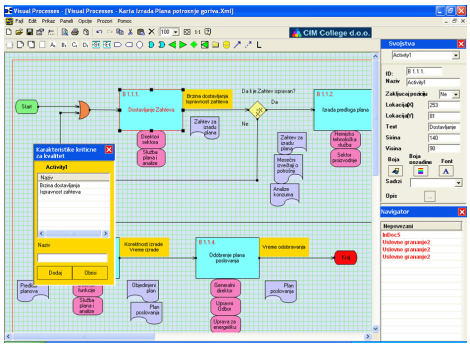

Figure 1 Process flowchart designed in Semantic Visual Processes .Net

1.1. Process Mapping

The first step in determining process effectiveness and efficiency is the mapping of the as-is state of the processes. On the basis of the obtained results it is possible to get information about the formation of added values through the process or to perceive the losses created in the process. This ultimately leads to data about the performances of individual processes as well as to the performance of the whole supply chain.

For example from the gas supply chain, for the purpose of this paper, only one aspect of the distribution macro-process and of the gas sale to the customers is singled out. The flowchart of the distribution macro-process and gas sale is shown in Fig. 3.

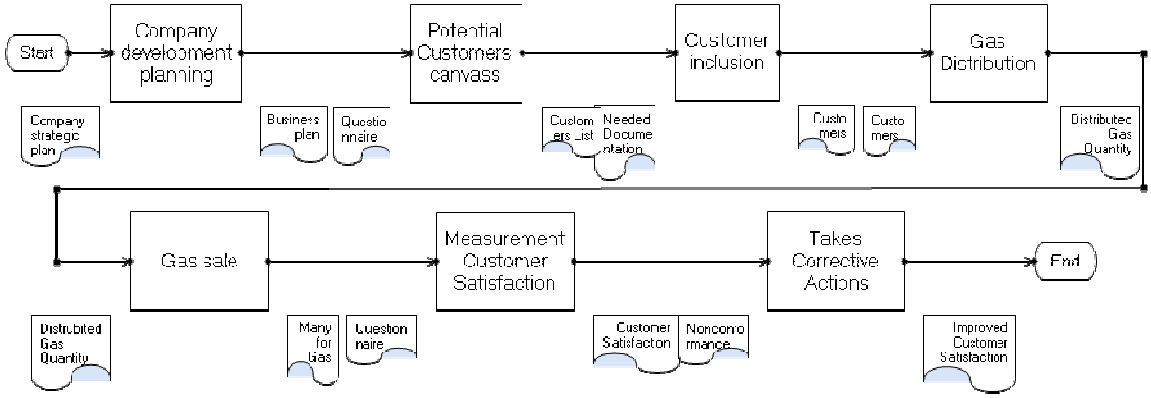

Figure 3 – Macro-process map of Gas distribution and sale process

The processes presented on the macro-process flowchart can also be presented through micro-process charts. It is also possible to proceed further with the process decomposition to the lower level through the micro-process charts. The paper scope does not allow us to show these process flowcharts at present.

4. Integration of Quality Tools and Methods on the OPISys™ .Net Platform

To analyze the process capability, which indirectly means to analyze business economy in the services or production industry, it is necessary to use respective methods and quality tools. Fig. below shows the concept developed by the CIM College d.o.o. (CIM Integrated Systems Ltd.) which enables the experts to improve their processes to reach excellence (CIM, 2007).

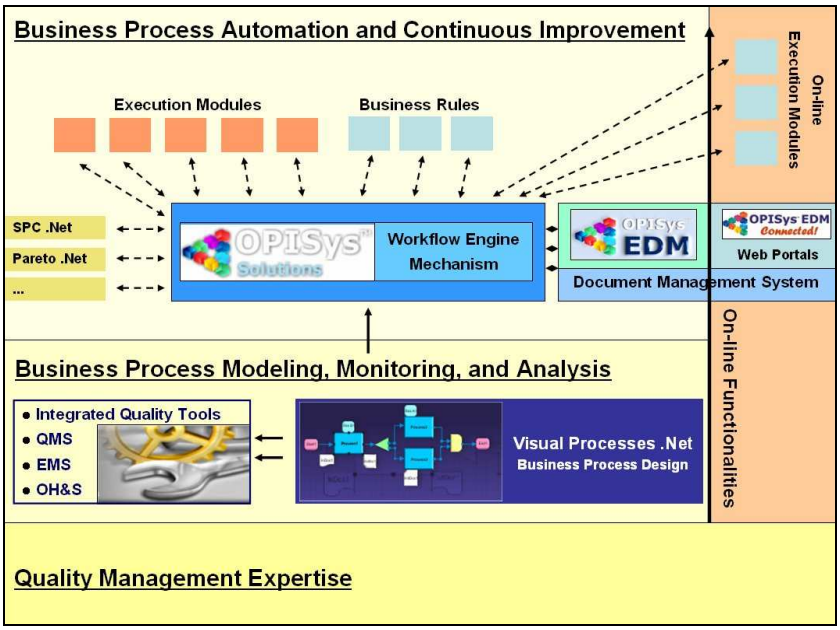

Figure 4 Quality management journey towards excellence

Integrated Visual Processes .Net enables comprehensive communication between the business process design environment and basic & advanced tools for quality monitoring and analysis. Process flowcharts designed in Visual Processes .Net can serve as a major metadata input for quantitative and qualitative business process analysis using quality tools and methods. For example, critical to quality characteristics defined in on the process flowchart can be accessed using SPC .Net which is capable of conducting statistical analyses and developing appropriate control charts. Similarly, other tools, such as Pareto Analysis .Net, Ishikawa Diagram .Net, Corrective Actions .Net, QFD .Net, etc. access metadata they need and realize integrated quality analyses according to their technical preferences.

The third, semantically enriched, work modality allows realizing advanced extensions of a standard flowchart which enables process execution using OPISys™ Kernel – BR enabled Workflow Engine. Such an innovative business process information system design environment allows easy system expansions and adaptations. Semantic Visual Processes .Net uses State Machine workflow, whereas definition of Workflow Runtime Engine is being accomplished using XOML fail that is generated in the very same design modality. For one or more activities, it is possible to define any number of states. Circulation through workflow states is events driven.

In the third business process design phase, system architects/end-user administrators connect independent software components (Windows applications/components, web portal pages, isolated business rules, and more) to the system backbone. OPISys™ integrated Semantic Visual Processes flowchart is a backbone of an information system.

OPISys™ .Net Kernel – BR Enabled Workflow Engine is object oriented integrated platform for information systems development, based on processes with component modules. OPISys™ operates in Intranet/Internet environment and provides crucial support for effective and efficient business performance. OPISys™ relies on Workflow Engine based on MS Workflow Foundations and is capable of isolating business rules from the software code. OPISys™ .Net Kernel – BR Enabled Workflow Engine enables effective and efficient execution of component developed software, where components are platform independent.

The process which is defined to the minutest detail by Semantic Visual Processes and which is workflow execution enabled on OPISys™ .Net Kernel may be monitored via the defined characteristics just as it is possible to activate the data from the process and perform analyses of the data by using the quality methods and tools. Quality Tools and Method provide a dynamic view on all the organization's processes, by measuring and analyzing characteristics critical to quality. They help experts define critical to quality characteristics, methods of their acquisition and analysis, as well as their modifications based on performed analyses. Quality tools and methods provide its users with a possibility of measuring process performances according to the widely accepted quality management standards.

OPISys™ .Net is a platform designed for process improvement and management, supporting: ISO 9001:2000, ISO 14001:2004, OHSAS 18001:1999, ISO 22000:2005 standards, as well as innovative concepts: Total Quality Leadership, Six Sigma, Lean. It further allows monitoring of organizational performances from four perspectives, as suggested by the Balanced Scorecard. All in all, OPISys™ .Net allows establishment of a “bird’s eye” perspective on the system, processes within the system, and resources used within processes. By utilizing Quality Tools and Methods integrated in the OPISys™ .Net platform it is possible to monitor all critical to quality characteristics, environmental safety aspects, occupational health and safety hazards, and process performances.

Every process has inputs. The outputs are the results of the process. The outputs are products/services – tangible or intangible. The process itself is (or should be) a transformation that adds value. Every process involves people and/or other resources in some way. An output may be, for example, an invoice, computing software, liquid fuel, a clinical device, a banking service or a final or intermediate product of any generic category. There are opportunities to make measurements on the inputs, at various places in the process, as well as on the outputs. These measurement points are called control points. OPISys™ .Net allows organizations to define, monitor, and conduct analyses at the critical points in effective and efficient manner.

The concept of integration of quality tools and methods on the OPISys™ .Net platform is presented in the figure below.

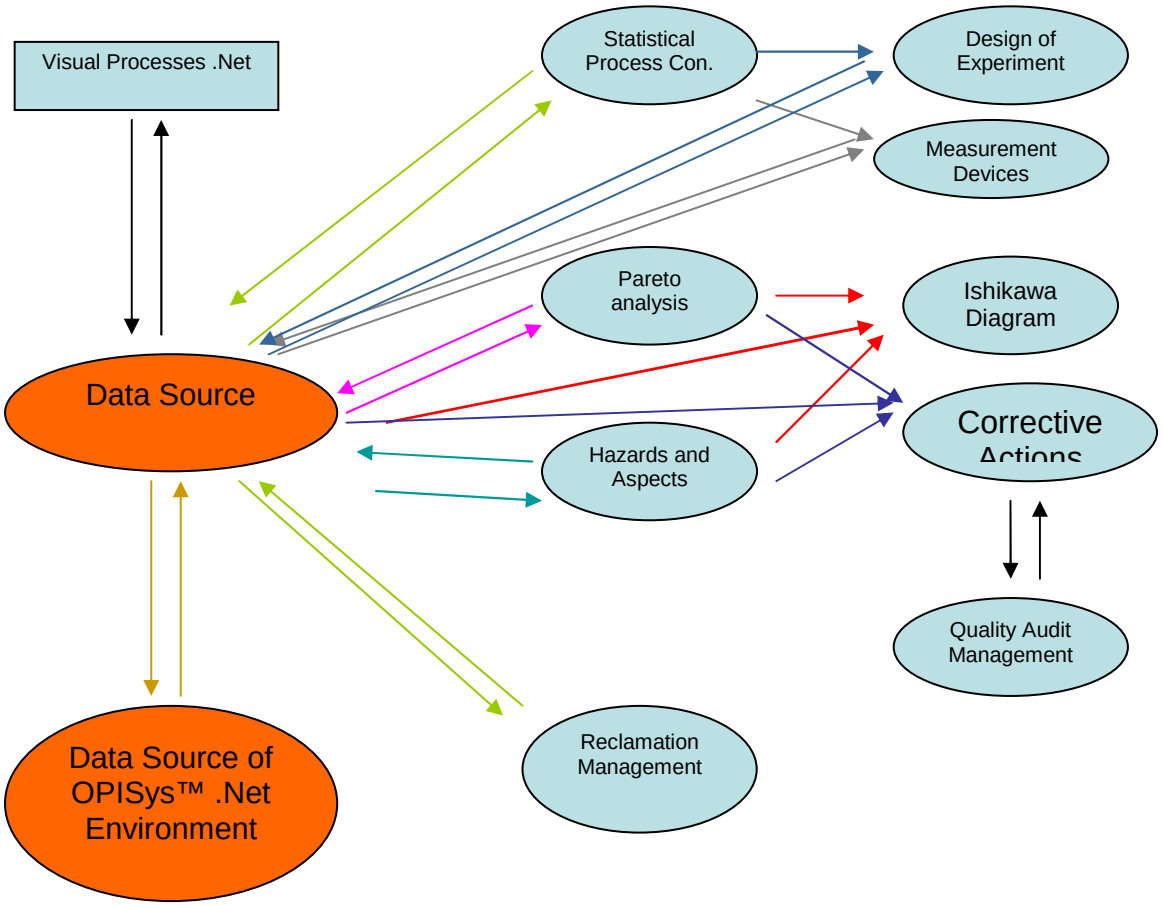

Figure 3 Integration of Quality Tools and Methods on the OPISys™ .Net Platform

The figure above shows that the Process improvement team uses Visual Processes .Net for process mapping (establishment of process flowcharts) as well as for the identification of critical to quality characteristics. Depending on how the characteristic is defined (as a nonconformance, variable of attributive statistical parameter, environmental aspect, occupational health and safety hazard, a consequence of a customer complaint, nonconformance identified in an audit, etc.) metadata about it is stored in the appropriate database.

The integrated wizard mechanism allows the end-user to select the appropriate quality tool or method (if not yet familiar with them) for the processing of the given characteristic. This means that depending on the metadata allocated to the characteristic, the user selects the most suitable quality tool: SPC .Net, Pareto Analysis .Net, Hazards and Aspects .Net, QFD .Net, Ishikawa Diagram .Net, Corrective Actions .Net, etc.

By utilizing the selected quality tool, data is collected in the OPISys™ .Net integrated databases. Data is simultaneously being linked with the critical to quality characteristic, activity which it belongs to, process where the characteristic is monitored, departments and the other attributes used for further narrowing down the analysis, etc. See figure below.

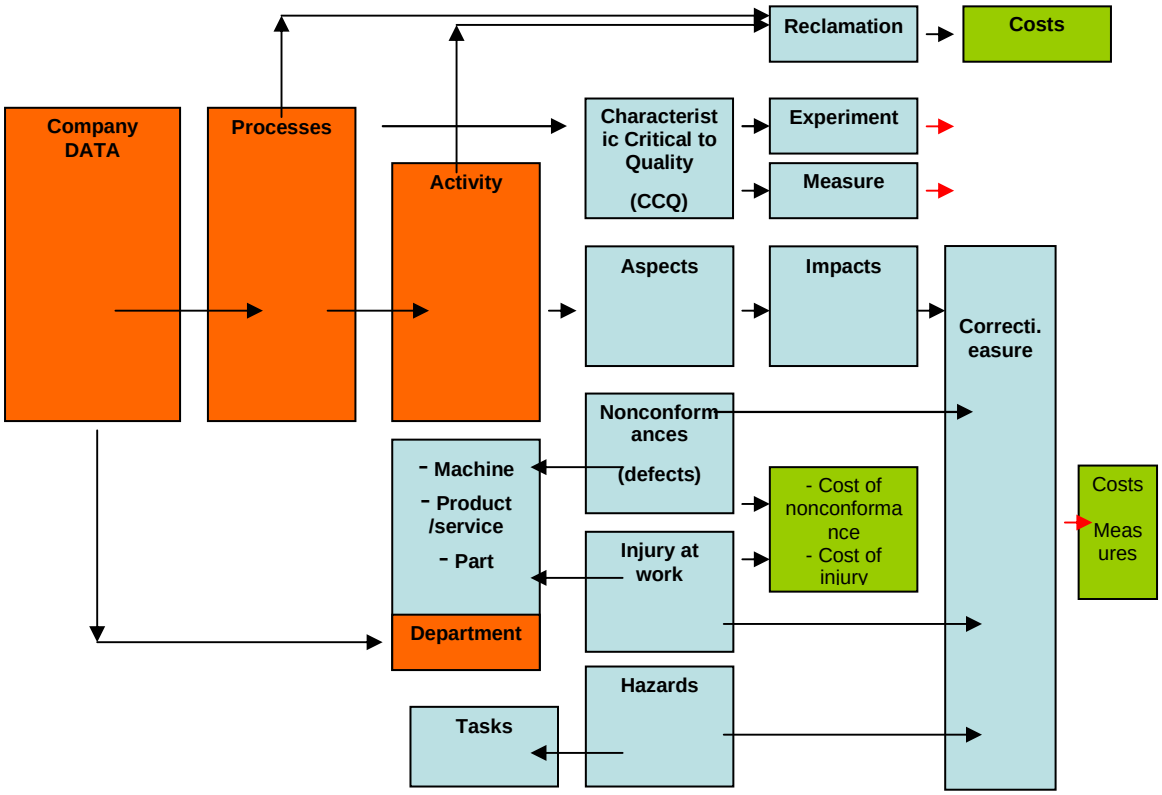

Figure 4 Integration of critical to quality characteristic analysis on the level of the organization, process, department, machine, human resource, etc.

Some of the tools and methods are: Statistical Process Control (SPC) .Net, Ishikawa Diagram .Net, Quality Function Deployment (QFD) .Net, Pareto Analysis .Net, Failure Mode Effects Analysis (FMEA), ISO 14001 & OHSAS 18001…

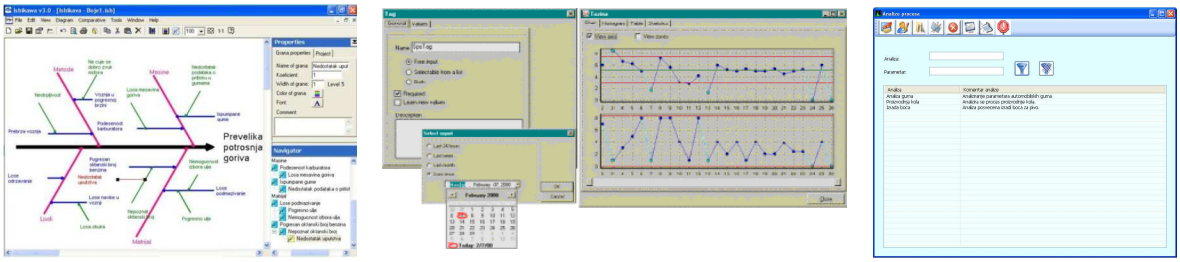

Figure 5 Quality Tools in OPISys™ .Net

Statistical Process Control (SPC), for example, is a collection of methods and management concepts and practices that can be used throughout the organization. SPC .Net involves the use of statistical signals to identify sources of variation, improve performances and maintain control of production/service delivery at a higher quality level. It can be applied to any area where the work is done. The statistical concepts that are applied in SPC .Net are highly complex, but on the user side they are made simple and can be learned by everyone in the organization. SPC .Net is enabled to process and analyze data that is manually entered in the system, but also data kept in the information system databases of different kinds.

By analyzing the processes which are in the gas supply chain their capabilities are defined. The process capabilities, thus defined, provide for further determination of the economy of the entire gas supply chain since there is a correlation between the process capability and the economy.

5. CONCLUSION

The General Electric is a global company which became the Six Sigma Company in the late 2000. It means it makes 3.4 defects per million opportunities. When the GE set out on its journey to excellence they faced 35,000 defects per million opportunities in their processes. This cost the company more than 10% of its gross income. Once it reached the Six Sigma level the GE losses became less than 1% for the defects popping up in the process.

What GE has reached is not unattainable. The paper shows how this goal may be reached even for a shorter period of time than that needed by the GE. It needs commitment on the part of the management in the gas industry as well as the knowledge of how to make a change that would bring about enormous savings. With the quality tool support it is firstly necessary to simplify the processes and to reduce the variations of the critical to quality characteristics. The thus improved processes should be supported by the most recent information systems which enable the process monitoring, measurements in the process, analysis of the data from the process and continuous improvement. One of the solutions for this is OPISys™ .Net.

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