

Application Of Olap System In Information Sub-System Of Qms Inconsistency Analysis

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Abstract: Records of inconsistencies arise as a result of incompliance of certain requirements during the execution of the process for the quality management system (QMS) functioning. In this study, the established connection between QMS and projected information sub-system for inconsistencies management is presented. The information model of inconsistencies management provides a possibility to analyse inconsistencies from the aspect of interactive analytical data processing (OLAP systems) on the basis of multi-dimensional tables (OLAP cubes) created in MS SQL Server-Analysis Services programme.

Key words: inconsistency, QMS, OLAP systems

1. INTRODUCTION

The inconsistency analysis is only one type of data analysis within the quality management system (QMS). In this study, the established connection between QMS and projected information sub-system for inconsistencies management is presented. The

information model of inconsistencies management provides a possibility to analyse inconsistencies from the aspect of a number of dimensions. The analysis is founded on interactive analytical data processing (OLAP systems) on the basis of multi-dimensional tables (OLAP cubes) created in MS SQL Server-Analysis Services programme.

2. INCONSISTENCIES MANAGEMENT

An inconsistent product shall be a product not in line with certain requirements for such product, when is subject to planned or unplanned verification.

A control shall discover inconsistency,

inconsistency management shall identify, select and improve the inconsistency, whereas a corrective measure is used for preventing the inconsistency reoccurring. A corrective measure shall be a measure for eliminating causes of detected inconsistency or other unwanted situation. On the other hand, a correction shall be a measure taken only to eliminate the detected inconsistency ([1], page 280.)

3. OLAP SYSTEMS

Interactive analytical processing (On line Analytical Processing – OLAP) is intended for on line analyses and reporting, while production systems are intended for updating database and transaction processing (On Line Transaction Processing – OLTP). ([2], page 154.)

The analytical data processing should provide the following to the end user:

- to be able to raise any business question,
- to use any data from the organization for the analysis,
- opportunity for unlimited reporting.

They are used for intuitive, fast and flexible manipulation of the transaction data.

They support complex analyses carried out by analysts and provide data analysis from various views (business dimensions).

OLAP servers use multidimensional structures for data keeping and connections among them. Multidimensional structures may be visualized as cubes of data. Each side of the cube is called a dimension (the data category).

4. WORK METHOD FOR THE REALIZATION OF THE INFORMATION SUB-SYSTEM INCONSISTENCY MANAGEMENT

The following work methodology has been used for the realization of the information sub-

4.1. INFORMATION MODEL OF INCONSISTENCY MANAGEMENT

The analysis of quality management documents on inconsistency management shall

Interface of OLAP systems should provide to the user comfortable work, independent performance of analytical operations and obtaining overview and business graphics, without any skills in program designing and data base structures.

system inconsistency management and their analysis:

- design and information data mode in Erwin program,
- design of data base and application model in MC Access program,
- design of analytical database (OLAP systems) applying the MS SQL Server -Analysis Services program.

address the information modelling, i.e. defining the data model by using CASE tool Erwin. Figure 1 presents all required entities or the holders of information relating to the inconsistency management.

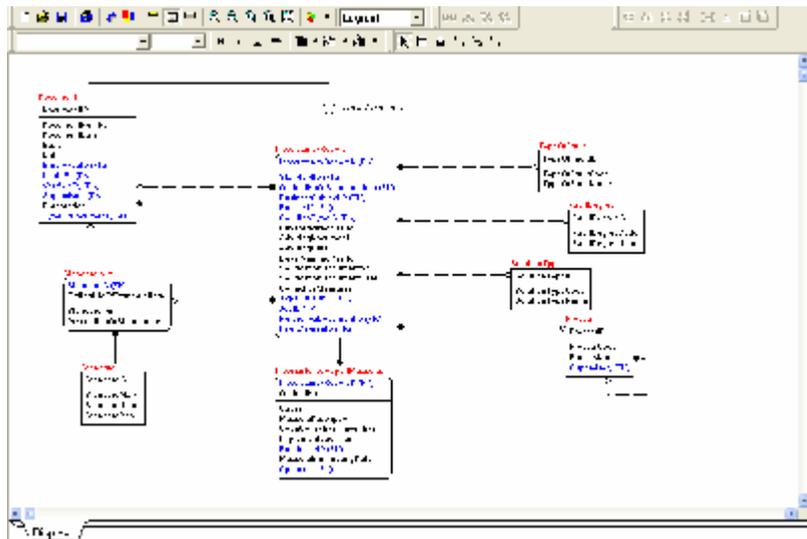


Figure 1. Logical model for inconsistency management

The initial entity is a document realized as a category defining a hierarchy relation between a superior generic entity containing the mutual features of the entities of subordinate categories (Inconsistency Report).

Entity Inconsistency Report as an

association entity shall make a relation with the following entities defining the future code bases:

- Process – processes in the enterprise connected to a standard item (Entity Item Standard)

- Fault Type – a machine, measuring equipment, a man, etc.
- Fault Degree – critical inconsistency, higher inconsistency, lower inconsistency
- Decision Type - sorting, finishing, reject, to be approved, decreased value, accepted.

Entity Inconsistency Report Measures is connected to the Entity Inconsistency Report because each corrective measure is a consequence of some inconsistency influencing its reoccurring.

Pursuant to the previously created logical

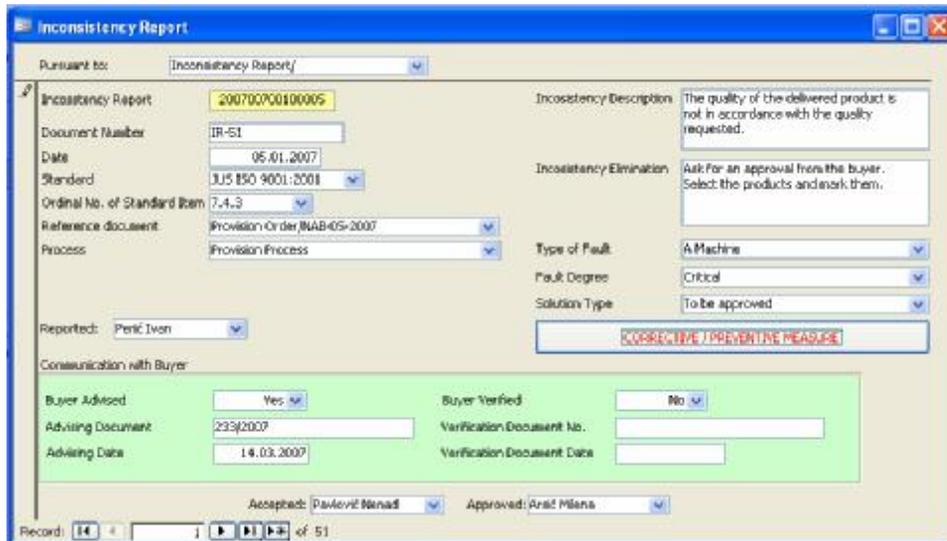
4.2. APPLICATION MODEL OF INCONSISTENCY MANAGEMENT

Generating physical database scheme was executed by translating a data model from Erwin into MS Access. On the basis of the generated database scheme, the client application will be generated into Microsoft

model it is necessary to further define a physical data model.

The database scheme shall comprise of physical tables, columns and relations that are automatically generated from the logical model in CASE tool. The database scheme shall be defined for a selected target platform, defining physical tables, columns and relations. SQL Server 2000 has been selected in this paper, supporting certain data types and syntax for defining model structures (syntax for relation, the description of relations, columns and domains at the physical level).

Access 2000. A list of tables used for database in the MS Access program is identical to the list of entities in the part defining a logical data model. Forms provide the users to present data from the base and enter them into the base. Figure 2 presents the forms of client applications of the QMS inconsistency management.



The screenshot shows a software form titled "Inconsistency Report". It is divided into several sections:

- Pursuant to:** A dropdown menu with "Inconsistency Report/" selected.
- Inconsistency Report:** A list of reports with "200700700100005" selected. Below this are fields for Document Number (IR-51), Date (05.01.2007), Standard (JUS ISO 9001:2008), Ordinal No. of Standard Item (7.4.3), Reference document (Provision Order/BA05-2007), and Process (Provision Process).
- Inconsistency Description:** A text area containing "The quality of the delivered product is not in accordance with the quality requested."
- Inconsistency Elimination:** A text area containing "Ask for an approval from the buyer. Select the products and mark them."
- Type of Fault:** A dropdown menu with "A Machine" selected.
- Fault Degree:** A dropdown menu with "Critical" selected.
- Solution Type:** A dropdown menu with "To be approved" selected.
- Reported:** A dropdown menu with "Peric Ivan" selected.
- Communication with Buyer:** A green-shaded section with fields for Buyer Advised (Yes), Buyer Verified (No), Advising Document (233/2007), Advising Date (14.03.2007), Verification Document No., and Verification Document Date.
- Acceptance:** Fields for "Accepted: Pavlovic Mirsad" and "Approved: Anst Milana".
- Buttons:** A prominent red button labeled "CORRECTIVE / PREVENTIVE MEASURE".
- Footer:** "Record: 14 of 51" with navigation icons.

Figure 2. Form of inconsistency reporting

Form of Inconsistency Reporting shall identify when the inconsistency is detected, the process, reference documents, inconsistency description, type and degree of inconsistency as well as the solution type. If a buyer's/user's

consent is required, an authorized person shall make the decision by entering relevant information about the communication with the buyer. The inconsistency report may be based on the QMS internal reviews, the QMS external reviews as well as process-born inconsistencies.

The following tables were required for the realization of the Form of Inconsistency Reporting: Document, Inconsistency Report, Process, Standard Item, Failure Type, Failure Degree, Solution Type.

A corrective measure shall be a measure taken to eliminate causes of detected inconsistency or other unwanted situation, which is presented in the form in Figure 3.

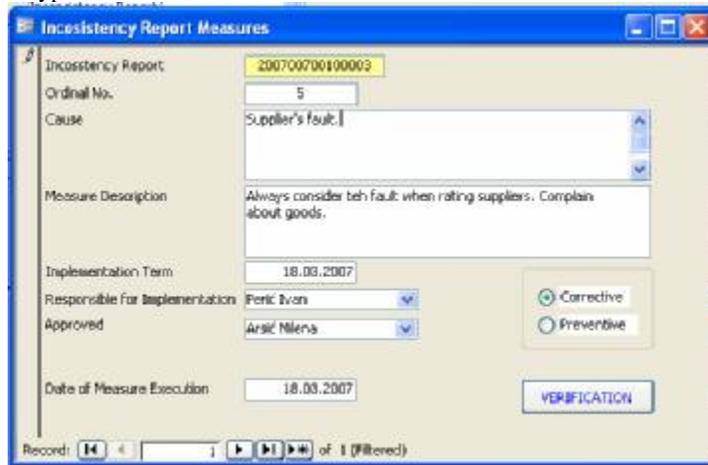


Figure 3. Form of corrective measures

4.3 CREATION OF ANALYTICAL DATABASE

When creating an analytical database, the first step is to identify dimensions and attributes. The identification of dimensions and attributes reminds of classic designing using ER model and is called dimensional modelling.

Dimensional modelling is a technique of the logical design, aiming at the presentation of data in a form that provides high system performance in order to conduct data analysis.

In dimensional modelling, the data structures are organized in such a way to describe measures and dimensions. *Measures*

are numerical data housed in the central, so called fact table. *Dimensions* are standard business parameters defining each transaction. Dimensions are housed in the tables directly, or through other dimension table, connected with the fact table ([2], page 98.).

All inconsistencies occurred either by external review, internal review or those identifies during the work process shall contain the same activities. Therefore, the inconsistencies analysis may be viewed from various dimensions such as: standard item, failure type (Figure 4), failure degree (Figure 5), the process in which they occurred, job, frequency etc.

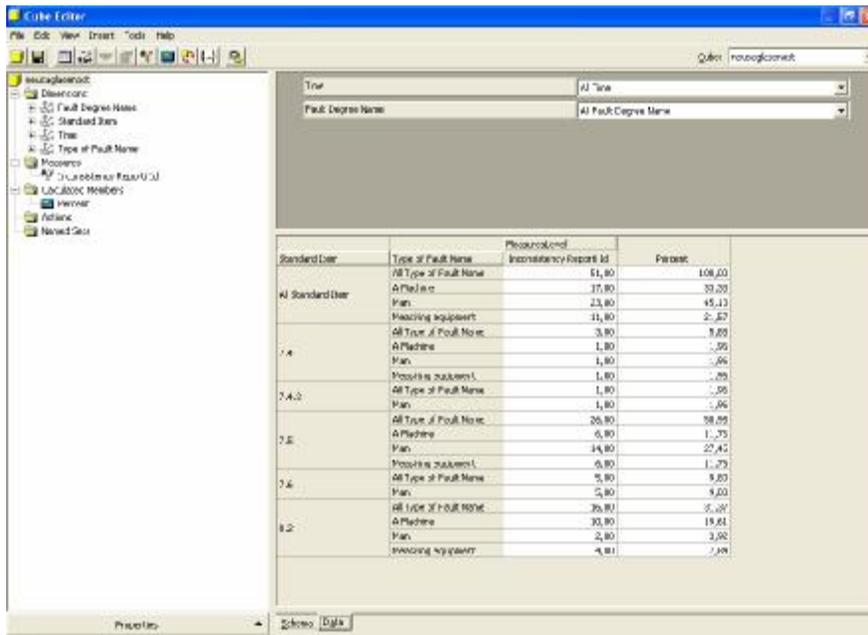


Figure 4. Analysis of inconsistencies from the aspect of standard item and failure type

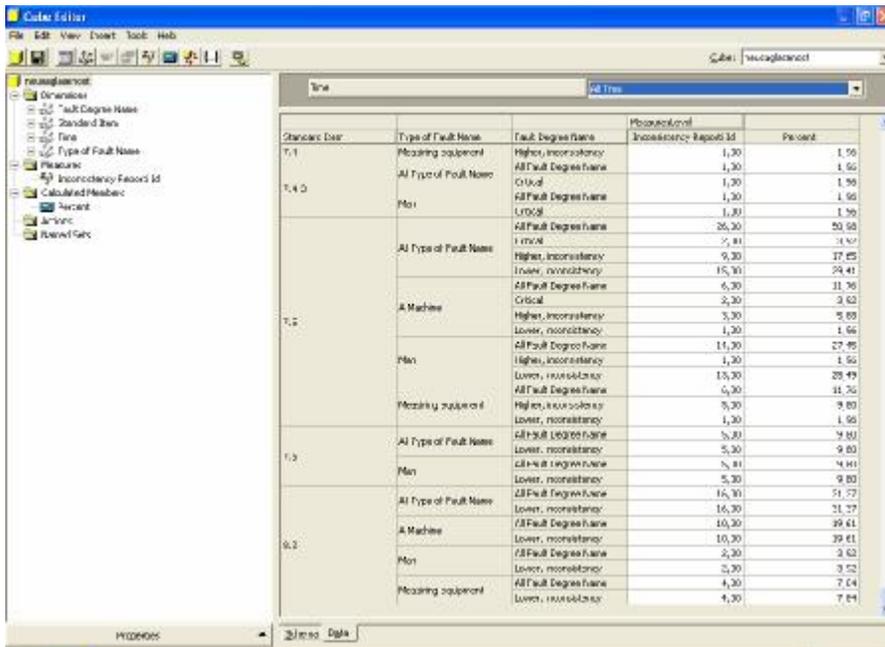


Figure 5. Analysis of inconsistencies from the aspect of standard item, failure type and failure degree

5. CONCLUSION

By integrating the information system and the QMS within the inconsistencies management process an automatic information subsystem is established which provides the possibility to create the overview of the irregularities analysis from the aspect of a number of dimensions. The example presented in the paper is generating reports for the analysis of irregularities under the system of

interactive analytical data processing (OLAP systems) on the basis of multidimensional tables (OLAP cubes) created in the MS SQL Server -Analysis Services programme. OLAP systems provide in easy and fast manner the view of data on inconsistencies from various dimensions, which is the base for the quality data analysis from the aspect of improving the effectiveness of the quality management system.

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