

THE NECESSITY OF IMPLEMENTING A COMPUTERIZED SYSTEM OF INTEGRATED ADMINISTRATION IN AN INSTITUTION

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Abstract

The system proposed in this paper provides integrated management information gathering tools and provision tools for information requested by the user, using communication technologies, in order, to help consolidate decisions in a particular area of the institution.

In the analysis of management systems, we will seek to identify ways of data processing through the use of rare matrices.

In general, a matrix (n,n) - dimensional is rare if it contains a small number of non-zero elements, τ , namely $\tau \ll n^2$. Quantitatively, rare matrices are characterized by the ratio of non-zero elements and the null ones, $d = \tau / (n^2 - \tau)$, which is called a density matrix. Current applications can be found in the matrix densities between 0.15% and 3%.

The need to achieve and implement an integrated system results from the need to manage all categories of data and information contained in the applicant institution, to meet the requirements defined by any of the departments and ensure the correct, complete and timely decision making process.

The result of implementing an integrated IT management system should lead to an improved control and organization in an institution.

Keywords: rare matrix, integrated information system, implementation, data, administration.

JEL Classification: F60, F61, F62, F63.

1. Introduction

The need to achieve and implement an integrated system results from the need to manage all categories of data and information contained in the applicant institution, to meet the requirements defined by any of the departments and ensure the correct, complete and timely decision making process.

The large volume of data and information contained in a given institution's departments makes the management of data and information a core function of the institution. Coordination and information management is a strategic issue of major importance.

An integrated information system will have to ensure the creation and sharing of collections of information of general interest, namely: catalogs, private data banks and public data banks, unique coding and identification information, fast information access and fast transfer of information between users, ensuring data security and access to information on the levels of competence, determination of responsibility for the provision, management and quality assurance and integrity of these collections of information, provision of information to support decision-making and public administration reform.

Regarding management information systems, specialist literature mentions two approaches, namely:

- a) based on the information and its support;
- b) starting with the function which needs to be achieved by the management information system.

In the first case, management information systems refers to all the information used within the company, the means and procedures for identification, collection, storage and processing of information.

In the second approach management information systems are defined starting from their purpose, namely providing information requested by the user in the desired form and at the right time to make decisions.

Management information systems (SIG) involves the following four components: the areas of management, data models, rules management.

Management areas correspond to each of the activities carried out within the firm, research and development, commercial, production, personnel, financial accounting - taking into account the interactions between them. Moreover, addressing these areas is done in a hierarchical vision leading to the identification of the following levels, transactionally – at elementary levels, and operationally – at current operation level; decisions at this level are current, routine checks and they tactically correspond to the short term decisions, while strategically they are characteristic long term decisions that globally involve the company.

The data represents the "raw material" of any management system. All data are considered, irrespective of their nature, their formal or informal status or supports on which they are located.

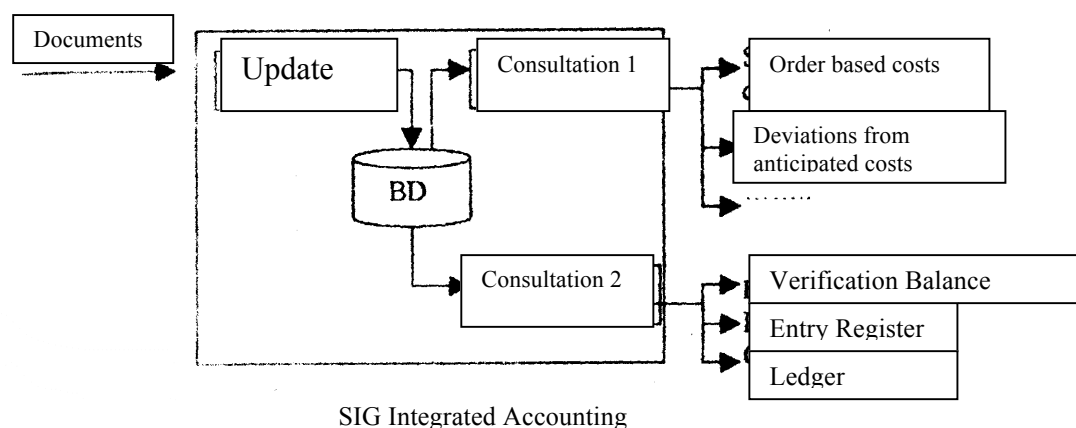
Management models regroup the procedures specific to a domain, i.e. the accounting model is specific to financial accounting, manufacturing technology domain is specific to production, sales is specific to the commercial activity.

The rules of management that enable data processing and use information in accordance with the objectives of the scheme refer to the supply, showing when the stock actually falls below the normal stock, to the evaluation of materials, such as FIFO, to the storage of raw material by storing them in a single management unit, to the price reduction on second quality products with 15%, while the sales value of over 50 million is granted a discount of 1%.

The notion of domain leads to the concept of management information subsystems, which determine functional criteria, related to two other concepts: the management model and the rules of management.

We conclude that the system proposed in this paper provides integrated management information gathering tools and provision tools for information requested by the user, using communication technologies, in order, to help consolidate decisions in a particular area of the institution.

If an integrated approach to an accounting system is considered, the following schematic diagram is helpful :



Currently all current management systems are integrated embedded systems, characterized by the principle of introducing multiple unique data and processing them according to the needs of specific customer information.

As suggested by Figure SIG integrated accounting is characterized by placing unique data taken from primary documents that maintains a unique database of accounting (in the previous case

of systems unintegrated each exploiting its own database) which will subsequently be exploited in ensuring the specific work of those specific financial accounting and management accounting.

The system of the company meets management subsystems in specialized fields between which specific interactions manifest. Each sub-groups defines homogenous information processes specific to a certain area of interest in the system. The following are defined as information subsystems within each operation: research and development, production, financial accounting, commercial and personal.

Because functions are defined in each specific activities (eg the financial accounting function is conducted in: financial accounting, management accounting, financial control) at subsystem level, the management information system will define distinct applications corresponding to these activities. In turn applications consist of procedures and each procedure is decomposed into modules representing the code sequences making it independent from the procedure. For example, a procedure to update feature of the database will decompose in the following modules: Module coordinator of the upgrade procedure, module to perform the function of adding recordings, module erase function, records module for editing records from the database.

In the accounting management information subsystem two applications are defined: one covering the financial accounting and the second performing management accounting.

The procedures defined in the financial accounting application cover the following functions: updating the database of accounting, bookkeeping chronological systematic accounting, operations and works accounting month end. in systematic accounting procedure ensuring generation module defines the following works: ledger, trial balance analytical, synthetic trial balance.

For pursuing rigorous and efficient design and implementation of management information systems need to be considered and observed the following principles:

1. Global Approach to problem solve. Being the realization of an information system of the company is necessary to first define a general architecture of the system, which will result in a solution embedded computing, establishing a flexible structure of the system, specifying priorities in achieving component system, the necessary resources develop the system;

2. Using a standard methodology in the design and implementation of information system;

3. The application of modern design techniques and solutions and making IT system;

4. Structuring IT system relatively independent of the organizational structure of the company. This will ensure on the one hand a well functioning system even after conducting any major organizational changes within the company and on the other hand the possibility of generalization and system implementation in other companies with the same profile. But if there are special features concerning the organization of work and this is passed on information flow and processing of data information system will have to respond to these features;

5. The direct participation of beneficiary future activities of analysis, design and implementation of information system. Such participation ensures the clear design and specifications necessary to validate the solutions proposed by designer staggered However ensuring the final product which fully correspond to user requirements;

6. Compliance with the legislative framework. Being systems achieve records management becomes mandatory within the company, calculating indicators and drawing works of synthesis in accordance with regulations in force;

7. Complete information systems in line with the resources available to the user;

8. Since by nature software is subject to change, this change must be anticipated and controlled;

9. Compromises inherent in software development and they should be explained and documented. Studies have tried to highlight success factors in the development of software projects. Standish report, for example, places that get success factors, end-user involvement, executive management support, clarity requirements planning.

To define the general structure of a computer system should start from its ability to process data available to obtain the information necessary to make decisions in the management, major components forming the computer system being input, processing and output.

All data **entries** are uploaded, managed and processed within the system to obtain information and are classified in two groups:

1. Foreign transactions that give operations and dynamic business processes and financial within the company. Coming from the outside of the system. Foreign transactions are: data on supplies of raw materials, data reflecting the operations of receipts and payments etc. External transactions are:

- Data recorded in documents, on-site operations it highlights in the company (eg a ticket consumer an invoice to a customer etc.);
- Data from the rural economic-banking, documented or included in the regulations and / or legal provisions (invoices received from suppliers, payment order honored customer, legal VAT rate, tax rates on profits etc) ;
- Data from other operating systems within the same company;
- Data from other systems (outside the company).

Documented data will be entered into the computer system in the following ways:

- Enforcement procedures specialized computer system allowing the operator typed data loading models based on collecting data generated on the computer monitor and validate data;
- Scan documents, allowing modern technology on optical principles retrieve a large volume of data in a short time.

Entries are made directly, often using modern means of TI:

- Data transfer via local network within the company, eg a Novell network or intranet so resulting in the outputs of a computer subsystem of the company to become inputs for another subsystem;
- Remote Data Transfer;
- Via the Internet, including the use of technology-EDI Electronic Data Interchange;
- The private networks etc.

2. Domestic transactions are the result of automatic processing carried out under the computerized system leading to structural changes in the Database. Examples: the total value of the products delivered, the total receipts etc.

Processing, the second element of the system, represents a coherent set of automatic processing realizing:

- Establish initial and updating the database;
- Operation of the database;
- Reorganizing the database;
- Save / restore database.

Computer system **outputs** are the results of processing carried out.

These outputs, depending on the nature of the processing that generated them, are of two categories:

- Outputs obtained as a result of data transfer operations, which have not changed the value to entry into the system. For example, an invoice number and date, name of a product, the amount invoiced etc.;
- Outputs obtained as a result of arithmetic operations based on preset algorithms (invoiced value of the product, the total invoice value of sales per month ... etc). Computer system outputs can be sorted by content and form of their presentation:

1. **Aggregate indicators** found in dashboards provide managers that can be consulted online;

2. **Reports (statements)** that bring together various analytical indices or table form. Example: payroll, the stocks of finished products at ..., Balance Synthetic etc. The degree of aggregation of data reports cover: Reports containing synthetic indicators for synthesizing high-activity analysis and substantiation decisions. Examples: Situation evolution of sales by product and quarters, synthetic balance, balance sheet etc. Analytical reports containing detailed information on an activity on a particular time segment (example: Situation consumption of materials per month ... The situation material inputs on management etc). They are designed for use within functional departments.

The criterion nature of the information presented reports can be divided into:

- Reports containing state data reflecting the heritage value at a time, the volume of activity on a given date. The best example is the balance sheet that reflects a "snapshot" the economic situation at the end of the reporting period;
- Statistical reports containing information required for reporting statistical character having hierarchical (ministries, banks etc), National Statistical Commission or substantiation of decisions regarding future periods of time;
- Reports that enable forecasting based on information relating to periods prior management to anticipate the evolution of economic processes and phenomena. These reports feel needed both in decision making tactical and strategic needs.

By destination, content and how to structure reports can be classified as:

- Reports of internal use with content determined by their own information and control requirements;
- Reports of general purpose content which is predetermined (ie balance sheet, trial balance etc.) many of which are designed and external environment of the company (the banks for loans, tax authorities, etc.).

Reporting interval is daily, monthly, quarterly and annual basis.

In these reports the degree of aggregation / consolidation of the information contained is all the greater as the time covered is wider.

Reports can be generated to the printer, PC monitor, magnetically to be sent off-line client or sent away (as files) via networks.

Output for other file systems represented transmitted online and offline to further processing in other computer subsystems.

Design and implementation strategies of management information systems are based on the approach and achievement system, while cristalizându the three strategies namely, strategy downward, upward and mixed.

2. Data analysis

In the analysis of management will seek to identify ways of data processing technique relative to management matrices rare.

In general, a matrix (n, n) - dimensional is rare if it contains a small number of non-zero elements, τ , namely $\tau \ll n^2$. Quantitative matrices to be characterized by the ratio of the number of elements of the non-zero and zero, $d = \tau / (n^2 - \tau)$ called density matrix. Current applications can be found in the matrix densities between 0.15% and 3%.

A square matrix (n, n) - dimensional is rare if not increase with the increase of the number of nonzero elements τ is smaller than one square, ie $\tau < n^{1+k}$, $0 \leq k < 1$.

Null elements of rare matrices are ranked in numerical zeros and zeros. All zeros are topological and numerical zeros. Some numerical zeros are treated as non-zero elements, which are considered topological null.

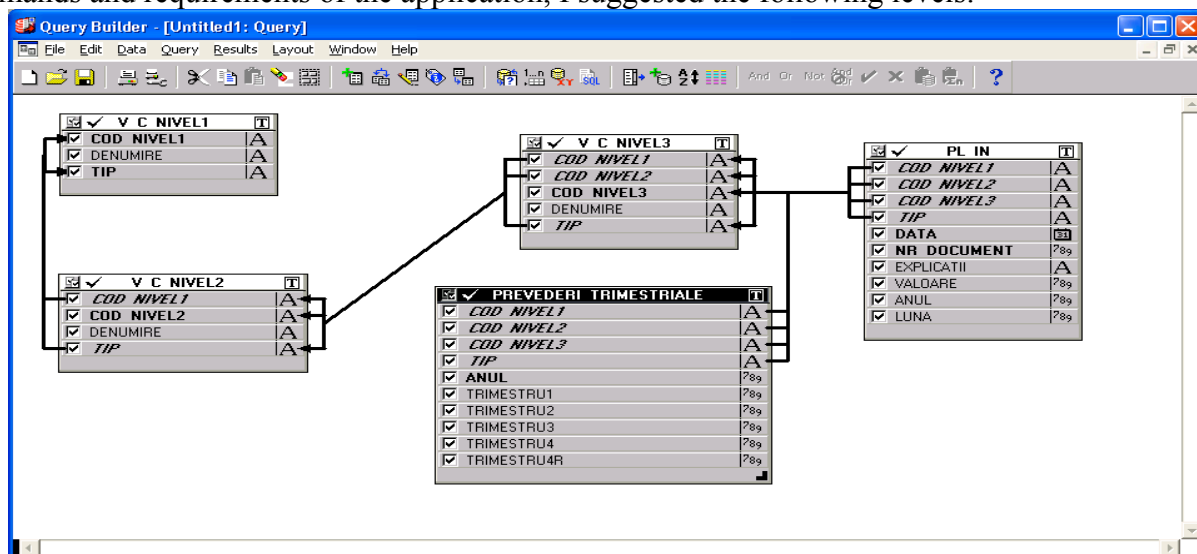
A non-singular matrix A can be expressed as the product of two factors matrices L and U , where L is lower triangular and upper triangular U , with main diagonal elements equal to unity.

A non-singular matrix is a matrix where all elements perfect elimination of the corresponding null the null elements in the factors L and U. All rare matrices non-singular, the matrix can be transformed into the perfect removal by reason of certain topological numerical zeros as nezerouri. These elements provide full rare matrices in a process of elimination. By reordering the rows and columns of a matrix filling rare may be reduced, while maintaining as much as possible rare matrix structure in the process of elimination. So an effective rare matrix calculation necessarily involves consideration of special methods of storage and ordering.

Traditional methods of calculation matrix, commonly used in practice as LU factorization, reverse, solving linear systems are reviewed and revised by optical matrices rare to adapt them to solve large-scale problems. Rare matrices behavior that differs radically from that of dense matrices. Factorization requires only a sparse matrices n^{1+2k} operations and reversing only n^{2+k} . Because $k < 1$ for rare matrices, both factorization and inversion advertises less than n^3 operations, the same calculations necessary for dense matrix. Whereas $n^{1+2k} < n^{2+k} < n^3$, factorization implies that fewer operations than reversing what makes solving linear systems to be used factorization. Dense matrices can be factored or reversed by the method of Strassen requiring $n^{2,81}$ operations. However rare class of matrices $k < 0,904$ techniques for calculating matrix factorization rare offer a superior method. Similarly, techniques for calculating rare matrix reversal provides a better way matrices whenever $k < 0,807$.

It started to study the structure of revenues and expenditures of the State Budget Law which is organized by parts, sections, chapters, titles, articles and aligned.

To have a systematization of data into tables that can be queried and to respond to the demands and requirements of the application, I suggested the following levels:



- Chapter - we accordingly table V_C_Level1.
Significance fields:
 1. Code_Level 1 – 30 characters
 2. Name – 250 characters
 3. Type – 1 character (V – income, C – costs)
 Unique key¹: (Code_Level1, Type)
- Article – we accordingly table V_C_Level2.
Significance fields:
 1. Code_Level1 – 30 characters
 2. Code_Level2 – 30 characters
 3. Name – 250 characters

¹ Key combination is unique - there can not be two records with the same key.

4. Type – 1 character (V – income, C – costs)

Unique key: (Code_Level1, Code_Level2, Type)

Foreign key²: (Code_Level1, Type) the table V_C_Level1

- Article – we accordingly table V_C_Level3.

Significance fields:

1. Code_Level1 – 30 characters

2. Code_Level2 – 30 characters

3. Code_Level3 – 30 characters

4. Name – 250 characters

5. Type – 1 character (V – income, C – costs)

Unique key: (Code_Level1, Code_Level2, Code_Level3, Type)

Foreign key: (Code_Level1, Code_Level2, Tip) the table V_C_Level2

- Quarterly provisions – we accordingly table Quarterly_Provisions.

Significance fields:

1. Code_Level1 – 30 characters

2. Code_Level2 – 30 characters

3. Code_Level3 – 30 characters

4. Type – 1 character (V – income, C – costs)

5. Year – Numerical

6. Quarter1 – Numerical

7. Quarter 2 – Numerical

8. Quarter 3 – Numerical

9. Quarter 4 – Numerical

10. Quarter 4r – Numerical

Unique key: (Code_Level1, Code_Level2, Code_Level3, Type, Year)

Foreign key:(Code_Level1,Code_Level2, Code_Level3, Type) the table V_C_Level3

- Payments and Receipts – we accordingly table Pl_In.

Significance fields:

1. Code_Level1 – 30 characters

2. Code_Level2 – 30 characters

3. Code_Level3 – 30 characters

4. Type – 1 character (V – income, C – costs)

5. Date – Date

6. No_Document – Numerical

7. Explanation – 250 characters

8. Value – Numerical

9. Year – Numerical

10. Month – Numerical

Unique key: (Code_Level1, Code_Level2, Code_Level3, Type, Date, No_Document)

Foreign key: (Code_Level1, Code_Level2, Code_Level3, Type) the table V_C_Level3

PL_IN the ORACLE table is an object that has a "method", a "trigger" that a program module acting when we introduce a new registration or modify a record (DATA field).

² Foreign key reference to another table where there should be a record that has that unique key reference.

```
CREATE OR REPLACE TRIGGER CARINA.T_PL_IN  
BEFORE INSERT OR UPDATE OF DATA  
ON PL_IN  
FOR EACH ROW
```

```
Declare
```

```
Begin
```

```
:New.Year:=To_Number(To_Char(:New.Data,'YYYY'));
```

```
:New.Month:=To_Number(To_Char(:New.Data,'MM'));
```

```
End;
```

This data structure allows data entry at the lowest level (level "aligned") provisions that quarterly or monthly payments and receipts; and, on the other hand, we compare the provisions of quarterly and quarterly achievements in three areas:

- At paragraph
- At article
- In the chapter

by adding specific.

We have therefore:

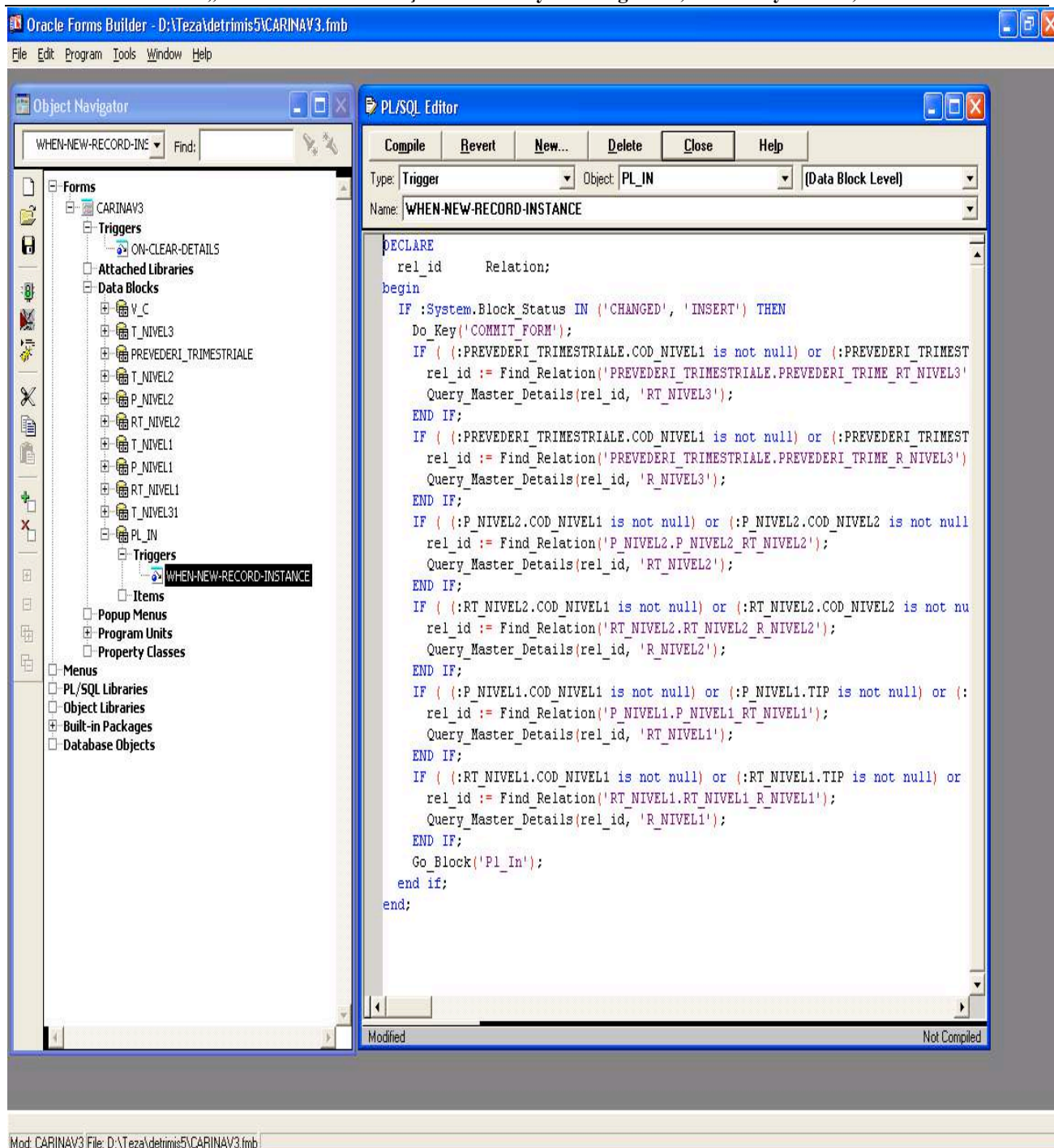
- At paragraph:
 - o a quarterly provisions – the table Quarterly_Provisions
 - o Achievements quarterly query that has the following structure:

```
„SELECT a.Code_Level1,  
        a.Code_Level2,  
        a.Code_Level3,  
        a.Type,  
        a.Year,  
        Sum(NVL(a.Value,0)) as Achievement,  
        Trunc((a.Month-1)/3)+1 as Quarter  
FROM Carina.Pl_In a  
group by a.Code_Level1,  
        a.Code_Level2,  
        a.Code_Level3,  
        a.Type,  
        a.Year,  
        Trunc((a.Month-1)/3)+1”
```

- At article:
 - o Quarterly provisions - the query has the following structure:

```
„SELECT a.Code_Level1,  
        a.Code_Level2,  
        a.Year,  
        a.Type,  
        Sum(a. Quarter1) AS Quarter1,  
        Sum(a. Quarter2) AS Quarter2,  
        Sum(a. Quarter3) AS Quarter3,  
        Sum(a. Quarter4) AS Quarter4,  
        Sum(a. Quarter4r) AS Quarter4r  
FROM Quarterly Provisions a  
GROUP BY a.Code_Level1,  
        a.Code_Level2,
```

- a.Year,
 - a.Type”
 - Achievements quarterly query that has the following structure:
„SELECT a.Code_Level1,
a.Code_Level2,
a.Type,
a.Year,
Sum(NVL(a.Value,0)) as Achievement,
Trunc((a.Month-1)/3)+1 as Quarter
FROM Carina.Pl_In a
group by a.Code_Level1,
a.Code_Level2,
a.Type,
a.Year,
Trunc((a.Month-1)/3)+1”
- In the chapter:
 - Quarterly provisions - the query has the following structure:
„SELECT a.Code_Level1,
a.Year,
a.Type,
Sum(a. Quarter1) AS Quarter,
Sum(a. Quarter2) AS Quarter2,
Sum(a. Quarter3) AS Quarter3,
Sum(a. Quarter4) AS Quarter4,
Sum(a. Quarter4r) AS Quarter4r
FROM Quarterly_Provisions a
GROUP BY a.Code_Level1,
a.Year,
a.Type”
 - Achievements quarterly query that has the following structure:
„SELECT a.Code_Level1,
a.Type,
a.Year,
Sum(NVL(a.Value,0)) as Achievement,
Trunc((a.Month-1)/3)+1 as Quarter
FROM Carina.Pl_In a
group by a.Code_Level1,
a.Type,
a.Year,
Trunc((a.Month-1)/3)+1”



3. Conclusions

Using rare matrices I edited the expense section of the "tracking sheet of loans approved ; payments and actual expenditure" respecting fully the form approved by the Ministry of Finance.

On the other hand we have developed based on the same rare matrices the algorithm based on which the amounts of cash disbursements and actual expenditure are recorded.

To complicate the possible tampering of records of the Chapters and Articles of sums already registered, we agreed to have sums at the level of paragraphs as editable only.

This way if they operated such expenditures in the Article "current repair" in the first two quarters, and their sum exceeds the provisions approved in the budget, changing records to agree

with the amounts approved would require a huge amount of work in order to change every paragraph.

The application allows both highlighting the obtained budgetary expenditures on chapters, articles, paragraphs, and their volume compared to the original provisions approved by competent bodies.

This application can be used by any public institution using public funds (budget appropriations), and the regulatory bodies that hold this app and connect it to track use of budget appropriations through some form of network determined by the interested parties.

We conclude that the management information system ensures the delivery of the information requested by the user, using communication technology, to support decisions about a particular area of the institution.

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