# Bridging the Gap of Education and the Requirements of the Business Environment

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*Abstract:* - Best practices in Business Information Systems recognize the importance of ERPs in supporting business processes in organizations, SAP solutions being a key player in enterprise applications for large companies. Impediments in managing SAP projects in multinational companies or autochthon companies in Romania have been identified, e.g. Lack of skills/training/education; Inadequate support from executives; Data is not integrated; Poor data quality; Inadequate support from business organizations; Inadequate access to data; Inadequate support from IT. Nowadays, beyond the SAP Basis modules, the enterprise applications are enriched with Business Intelligence solutions capable for advanced analysis and reporting. Therefore, the demand of specialists is highly required, companies beginning to act as promoters of a business oriented education. The demarche is developed based on a successful university-business collaboration materialized in the Master program in Business Information Systems organized by the West University of Timisoara, Romania. The rise of a global knowledge economy has intensified the need for strategic partnerships that go beyond the traditional cooperation between university and companies. Lessons learned from this successful project can contribute to the development of further similar projects in the area of business engagement with universities over skills and training.

*Key-Words:* - university-business collaboration, curriculum development and delivery, SAP modules

## 1 Introduction

The rapid development of IT, the increasing complexity of business information systems enriched with new functionalities in order to support business processes in organizations, advanced analysis and reporting put forward new requirements to graduated students. Universities have to face the rapidly changing of this field of knowledge, the variety of qualification requirements for professionals, the need of high financial costs in order to provide adequate material base of training, the complexity of establishing a quality of professional practice for students. Companies also have to retrain their employees, a lot of financial, human and time resources being spent in "Training & Development at the workplace" programs. [1]. It is possible to solve the problem by mutual cooperation between universities and the business environment, to achieve a reasonable balance between theoretical knowledge and applied technologies and information systems.

Consistent with its strategy to increase the quality of education in Romania and facilitating labour market insertion of future graduates, West University of Timisoara, the Faculty of Economics and Business Administration, with the Dräxlmaier support, outlined a Master program in Business Information Systems [4].

## 2 University-Business Collaboration

A distinguish paragraph of the European Commission Agenda is dedicated to "Supporting education in Europe and beyond" [8]. University Business Cooperation (UBC) initiatives are encouraged and supported. There are many examples of successful UBC projects materialized in one of the following dimensions or implying a mix of collaboration directions [9]: 1 - Collaboration in research and development ( R&D); 2 - Mobility of academics; 3 - Mobility of students; 4 - Commercialization of R&D results; 5 - Curriculum development and delivery; 6 - Lifelong learning; 7 - Entrepreneurship and Governance. In all cases, a mutually beneficial relationship was identified. In addition to the European funding

framework, both universities and organizations are interested in UBC projects, being aware of the importance of such an openness.

## 2.1 Curriculum development and delivery

Through the HRD strategic project "Development of an operational system of qualifications in higher education in Romania" (DOCIS), there were conducted several activities, including the implementation of the National Higher Education Qualifications Framework (NQF) through the specific scale description of qualifications and operationalization of the National Register of Qualifications in Higher Education (RNCIS). A major project result/output consisted in Grid 1, a major instrument for the unitary description of all higher education domains/programs through professional and transversal competences (Table 1) and Grid 2 for representing the curriculum to support the learning outcomes and correlation with the European Credit Transfer and Accumulation System (ECTS) credits. The Qualifications Framework for Higher Education is a mechanism that creates opportunities for: training based on learning outcomes: knowledge, skills and competences; student-centered learning; mobility and employability for students and graduates; transparency and trust. For the Bachelor programs in Romania, Grid 1 (Table 1) is at national level unitary defined; that means e.g. all programs in Business Informatics have the same Grid 1, but Grid 2 is particularized for each program according to the curriculum.

Table 1. RNCIS Grid 1

| Name of qualification:<br>Qualification level : LICENCE | Possible occupations:<br>Proposals: | | | | | |
|---|---|---|---|---|---|---|
| Professional competencies<br>Level descriptors of the structural elements of the professional competencies | C1 | C2 | C3 | C4 | C5 | C6 |
| KNOWLEDGE/LEARNING | | | | | | |
| 1. Knowing, understanding of concepts, theories, and essential methods of the domain and of the specialization area; appropriate use of professional communication | C1.1 | C2.1 | C3.1 | C3.1 | C4.1 | C6.1 |
| 2. The use of basic knowledge for explanation and interpretation of various types of concepts, situations, processes, projects, etc. related to the domain | C1.2 | C2.2 | C3.2 | C3.2 | C4.2 | C6.2 |
| SKILLS | | | | | | |
| 3. The application of the basic principles and methods for problem/well-defined situations solving, typical for the domain in terms of qualified assistance | C1.3 | C2.3 | C3.3 | C3.3 | C4.3 | C6.3 |
| 4. Appropriate use of the criteria and standard evaluation methods, in order to appreciate the quality, the merits and limitations of processes, programs, projects, concepts, methods and theories | C1.4 | C2.4 | C3.4 | C3.4 | C4.4 | C6.4 |
| 5. Development of professional projects with the use of principles and methods used in this domain | C1.5 | C2.5 | C3.5 | C3.5 | C4.5 | C6.5 |

Minimum performance standards for the evaluation of competencies:

| Level descriptors of the transversal competencies | Transversal competencies | Minimal performance standards for competence evaluation |
|---|---|---|
| 6. | TC1 | |
| 7. | TC2 | |
| 8. | TC3 | |

For the Master programs, universities internally define the content of Grid 1. Starting with the establishing of competencies, the curriculum of the program will be designed. This implies the introduction of disciplines/subjects in a logical sequence, in accordance with the competencies targeted by the Master program and correlated with ECTS credits (defining Grid 2). **Competences are associated with the educational goals, designed in accordance with the employer's expectations from a future graduate**. Best practices in competence-based education recommend [5]: clearly defining of the competencies; providing an explicit link between the skills measured by the assessments and those competencies; demonstrating that students behaviors or thought process during testing reflect the competencies; relating performance on competency assessments with other measures of the same competencies; document the empirical relationship between assessment scores and future outcomes (such as success in the workplace).

Last, but not least, for optimizing the program delivery, it is recommended to involve the teachers into a training program.

## 2.2 Master program in Business Information Systems (BIS)

The following six professional competences have been drafted for our master program: **C1** - BIS fundamentals. Applying theoretical approaches in

practice; **C2** - Information systems' development. Methodologies, techniques and tools; **C3** - Web and Mobile Technologies in BIS; **C4** - Programming methods and techniques used in BIS; **C5** - BIS management and auditing. Methodologies, techniques and tools; **C6 - Information systems in organizations. EAI, ERP and Business Intelligence**. The specific learning outcomes for these competences describe what graduates should be able to do [3]. All competencies were been covered by disciplines/subjects, but unfortunately no SAP related topics were introduced in the syllabus, also a great demand of SAP practitioners had been identified.

According to [4], companies have increasing educational requirements and expectations. As mentioned in the above referred article, "multinational companies often follow a best cost approach in their global plant site strategy; cities like Timisoara, located in the western part of Romania, can hardly compete in the field of labor costs which can be found cheaper in other areas of Eastern Europe". But, "due to the **availability of the universities in Timisoara**, multinational companies could substitute low skilled workplaces more and more with educated workplaces in the areas of engineering, production or high qualified administrative services in an increasing number of Shared Service Centers". Further studies identified the major impediments in adopting SAP projects or Business Intelligence projects by the autochthon companies in Romania, e.g. lack of skills/training/education; inadequate support from executives; data is not integrated; poor data quality; inadequate support from business organizations; inadequate access to data; inadequate support from IT [7].

The actual curriculum of the Master program in Business Information Systems (Table 2), organized by the West University of Timisoara, was developed two years ago and is currently delivered with the support of practitioners. Based on the university-business collaboration memorandum, the following **strategy for curriculum development and delivery** has been adopted [4]:

- introducing SAP related topics in the curriculum in order to consolidate the learning outcomes for the professional competencies (Table 2);
- providing a train the trainer program for the professors to support their future teaching;
- providing financial aid to the university to purchase the necessary IT infrastructure;
- providing internships positions for the students enrolled in the Master program in BIS;
- selecting further employees according to the company's needs.

Table 2. Grid 2 for the Master program in BIS

| Professional competencies | Level descriptor of the structural elements of the professional competencies | Disciplines | Number of ECTS credits / Discipline | Number of ECTS credits / Professional competency |
|---|---|---|---|---|
| **C1** - …. | … | … | …. | 21 |
| **C2** -Information systems' development. Methodologies, techniques and tools | | D1. Advanced Business Information Systems Development | 8/8 | 11 |
| | | D2. Internship | 3/20 | |
| **C3** - …. | …. | … | … | 18 |
| **C4** - Programming methods and techniques used in BIS | C4.1….<br>C4.2…..<br>C4.3….<br>C4.4….<br>C4.5….. | D1…… | 7/7 | 20 |
| | | D2. ABAP programming | 7/7 | |
| | | D3 Internship. | 6/20 | |
| **C5** - … | … | ….. | … | 12 |
| **C6** - Information systems in organizations. EAI, ERP and Business Intelligence | C6.1….<br>C6.2…..<br>C6.3….<br>C6.4….<br>C6.5….. | D1. Enterprise information systems | 7/7 | 28 |
| | | D2. Business Intelligence | 7/7 | |
| | | D3. Advanced Business Reporting | 7/7 | |
| | | D4. Internship | 7/20 | |
| Transversal competencies | | Disciplines | | |
| CT1 ….. | | | | 3 |
| CT2….. | | Internship | 4/20 | 4 |
| CT3…… | | | | 3 |

According to the Eduniversal Best Master Ranking 2015-2016, 100 masters have been classified in the ranking for best masters in E-Business. The Master program in BIS managed to be included in this ranking (www.best-masters.com/ranking-master-e-business.html).

## 3 Teaching/learning methods

Additionally to the traditional teaching/learning methods, like T1 Exposition, T2 Demonstration; T3 Textbook documentation and T4 Drills, modern methods are recommended to achieve the desired learning outputs. According to [6], **modern teaching approaches** are based on : M1 Systematic and independent observation, M2 Experiment, M3 Debating, M4 Modeling, M4 Inquiry, M5 Internship, M6 Project, M7 Case study, M8 Simulation, M9 Programmed learning, M10 Brainstorming, M11 Class discussion and M12 Jigsaw. Debate, Project and Case study have been identified as the most often used methods in supporting teaching.

**Advanced business reporting** is one of the new disciplines introduced in our Master program. According to the syllabus description, the laboratory exercises are focused on designing all kinds of

InfoProviders; case studies are used to familiarize the students with the methodological approaches in: 1 - defining InfoObjects (characteristics and key figures); 2 - defining DataStoreObjects (DSOs) and InfoCubes based on the introduced InfoObjects and some native SAP InfoObjects; 3 - Creating MultiProviders/- Creating InfoSets; 4 - Designing reports based on different InfoProviders (BEx Query Designer); 5 - Analyzing data with BEx Analyzer.

A final, globalizing **case study** will consolidate the **From - InfoObject - To - Reporting** chain. Students are encouraged to proceed similar and try to create their own InfoProviders.

The primary data is stored in an Excel file, into two sheets (Figure 1). Before starting with steps 1-5, a preliminary operation should be performed - creating the DataSources, one for the DSO and one for the InfoCube (Figure 2).

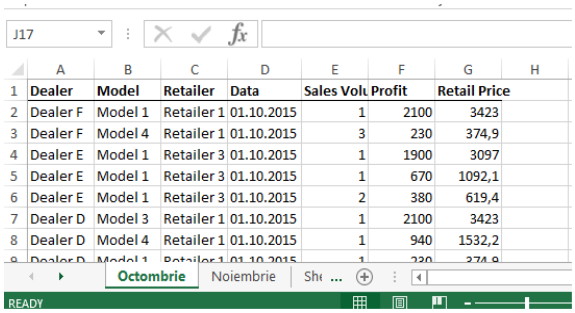


Fig. 1. External primary data

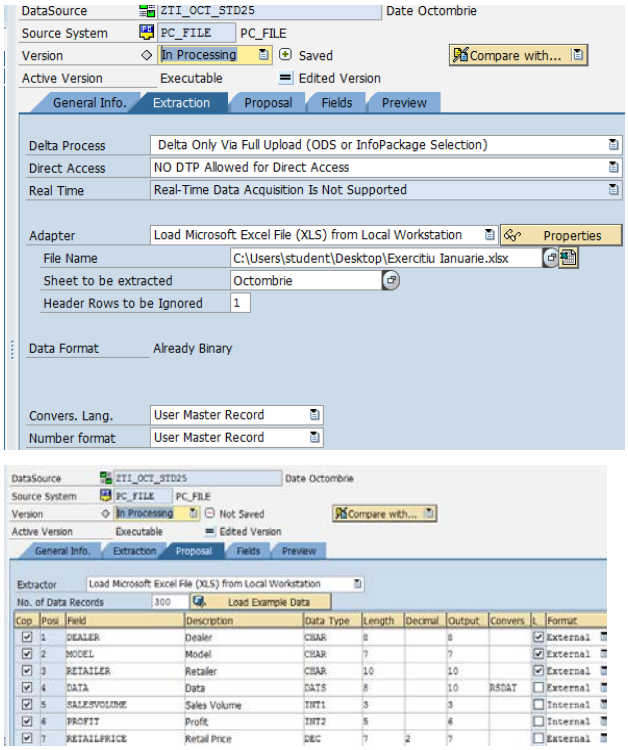




Fig. 2. DataSource for the InfoCube

**Step 1** - For the proposed case study, we have identified four characteristics (*dealer*, *model*, *retailer* and *data*) and six key figures (*sales volume*, *profit* and *retail price* distinguish for each month - Figure 3).

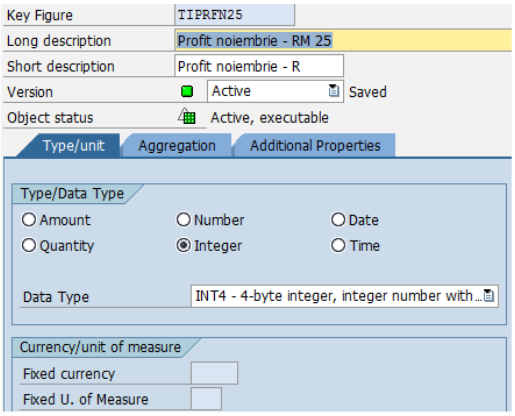


Fig. 3. Key figure example

**Step 2** - Both DSO object and InfoCube have been designed (Figure 4, Figure 5) according to the methodological procedures.

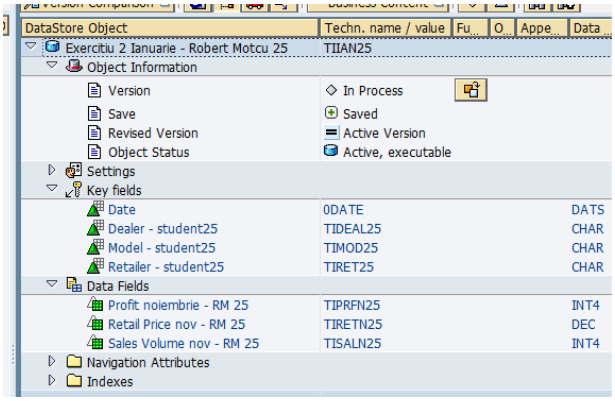


Fig. 4. DSO

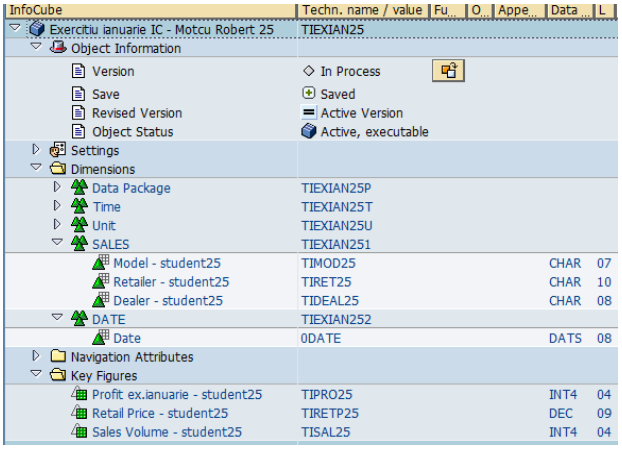


Fig. 5. InfoCube

The components of the DSO object (key fields, data fields), as well as the components of the InfoCube (dimensions, key figures) must be associated with the fields of the corresponding Datasource in order to load the data into the DSO, respectively into the InfoCube (Figure 6, 7). We deal, in fact, with an Extract-Transform-Load (ETL) process, that will be defined by creating a Transformation.

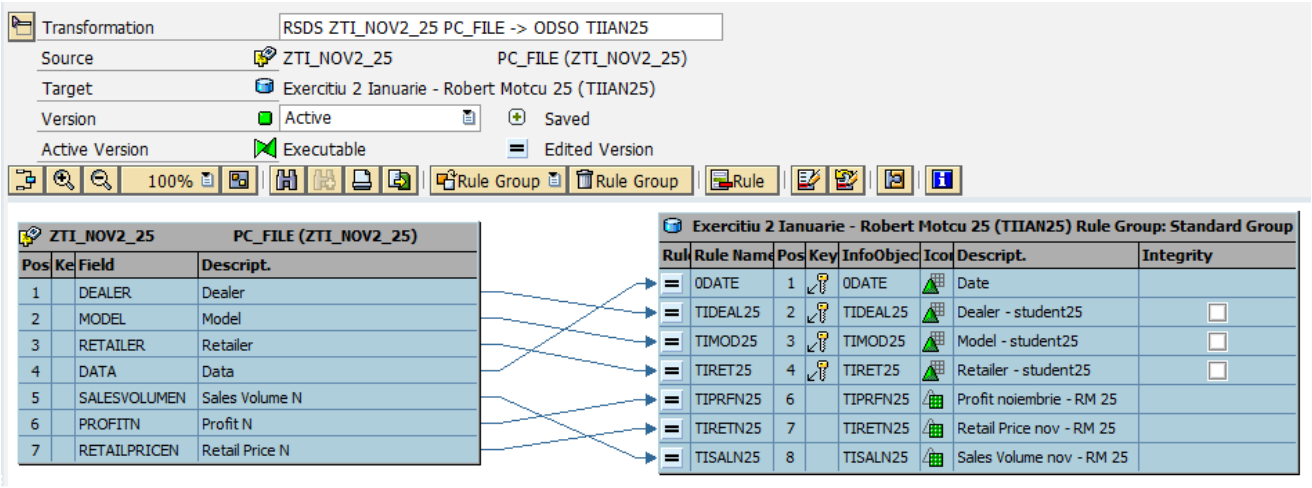


Fig. 6. Transformation for the DSO

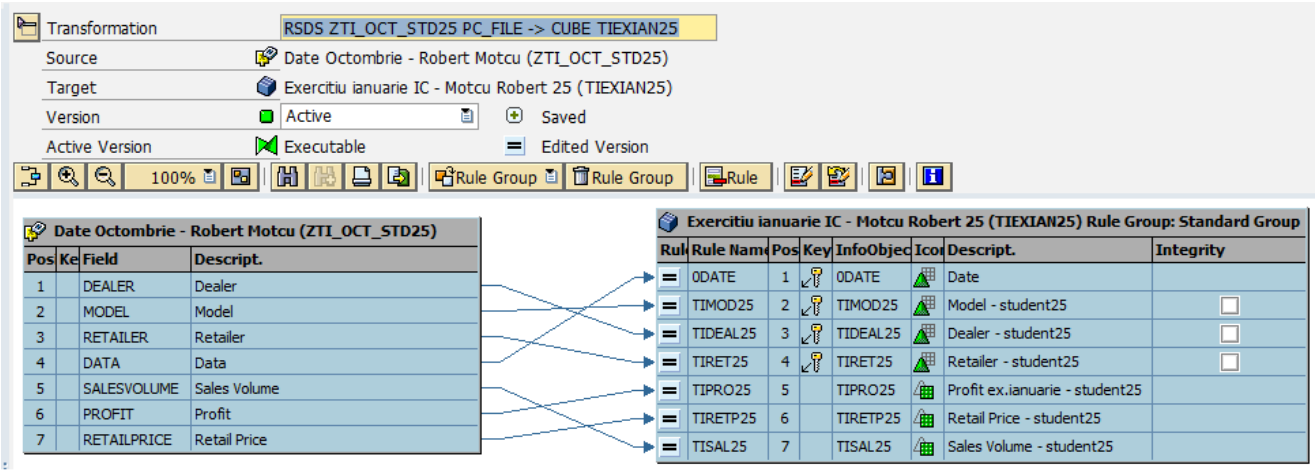


Fig. 7. Transformation for the InfoCube

For executing a transformation, a Data Transfer Process (DTP) must be initiated (Figure 8, 9). After loading the data into the target DSO and InfoCube, the two InfoProviders can be used for reporting.

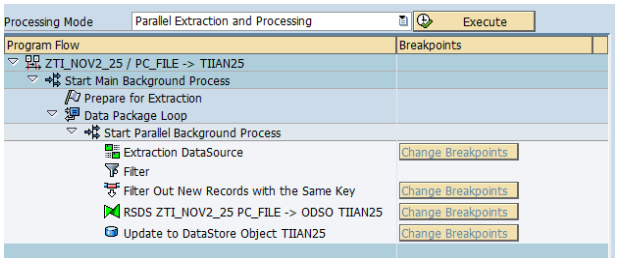


Fig. 8. DTP process for the DSO

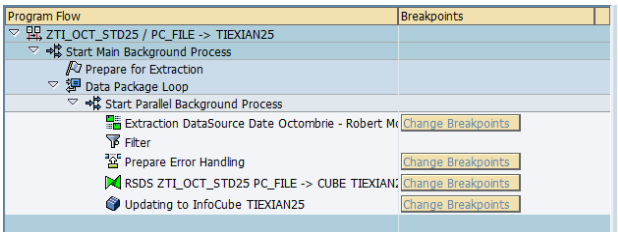


Fig. 9. DTP process for the InfoCube

**Step 3** - MultiProviders combine data of several InfoProviders and provide a single view of the data [10]. That means that a union operation takes place at the database level, combining all values for the InfoProviders. MultiProviders do not store data: a query

collects data directly from the InfoProviders. A Multiprovider based on the DSO and InfoCube will be created.

**Step 4** - Reports are created with the BEx Query Designer (Figure 10). Reporting in the SAP BW environment implies the access to and the process of multiple data sources in a single report [10].

Reports are query-based objects, designed to deliver relevant information to the end-users and enable business analysis. Working with queries in the SAP BW environment is limited by the fact that a query can only be based on a single InfoProvider.

Therefore, the non-persistent InfoProviders (MultiProvider, InfoSet and VirtualProvider) are used to combine data from various persistent InfoProviders (DSO, InfoCube and even InfoObjects) and present the result as if they were one source.

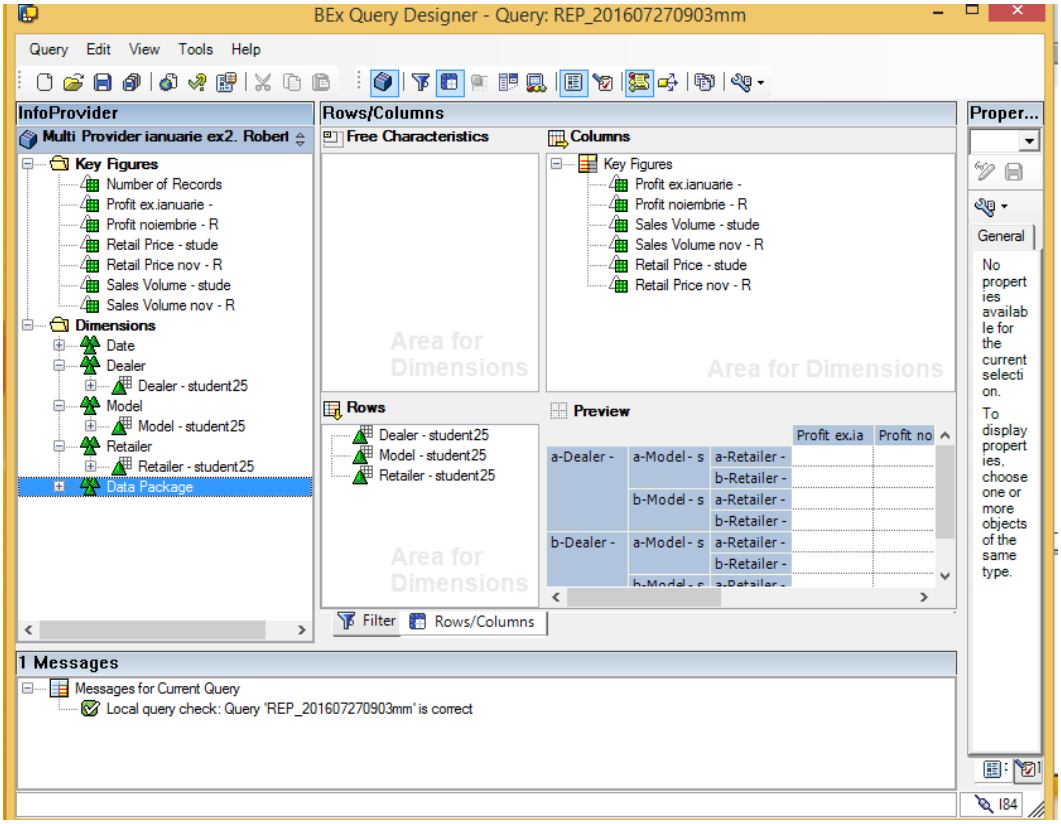


Fig. 10. BEx Query Designer

**Step 5** - Analyzing the data

BEx Analyzer is an analytical, reporting and design tool embedded in Microsoft Excel. In BEx Analyzer, you can analyze and plan with selected InfoProvider data using the context menu or drag and drop to navigate in queries created in BEx Query Designer (Figure 11, 12) [10].

Table

| Retailer - student25 | Profit noiembrie | Sales Volume nov | Retail Price nov |
|---|---|---|---|
| Retailer 1 | 7.793 | 13 | 12.702,590 |
| Retailer 2 | 8.560 | 12 | 13.952,800 |
| Retailer 3 | 8.210 | 7 | 13.382,300 |
| Retailer 4 | 7.809 | 11 | 12.728,670 |
| Overall Result | 32.372 | 43 | 52.766,360 |

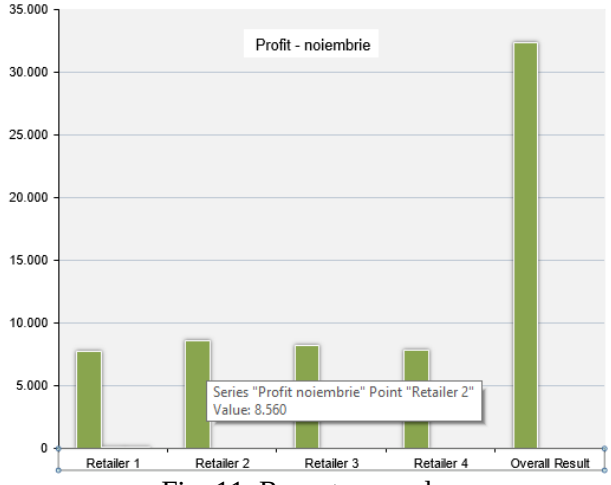


Fig. 11. Report example

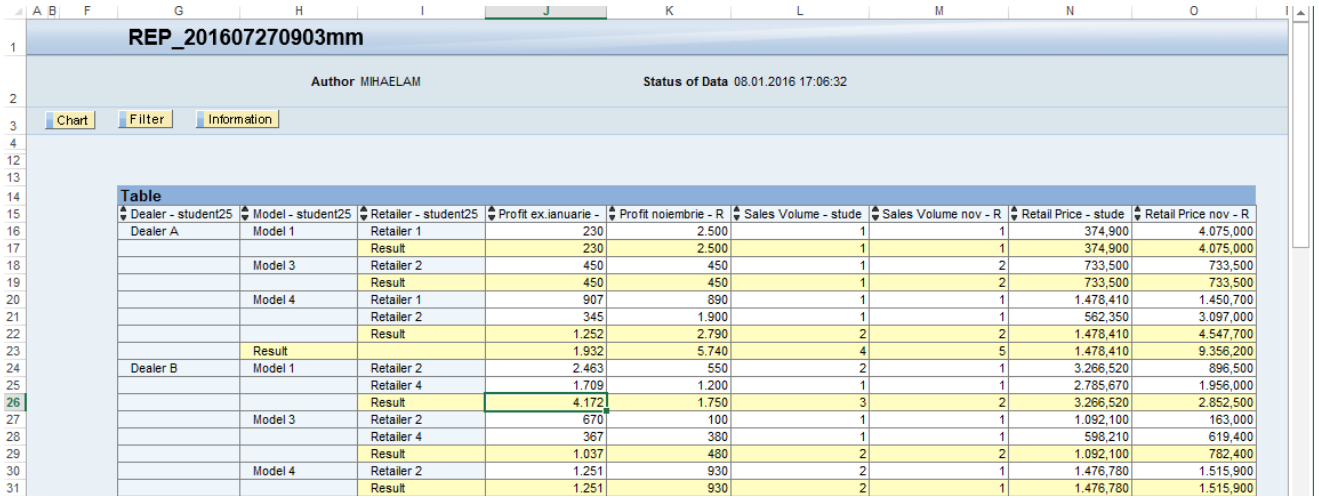

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Chart Filter Information

Table

| Dealer - student25 | Model - student25 | Retailer - student25 | Profit ex.ianuarie - | Profit noiembrie - R | Sales Volume - stude | Sales Volume nov - R | Retail Price - stude | Retail Price nov - R |
|---|---|---|---|---|---|---|---|---|
| Dealer A | Model 1 | Retailer 1 | 230 | 2.500 | 1 | 1 | 374,900 | 4.075,000 |
| | | Result | 230 | 2.500 | 1 | 1 | 374,900 | 4.075,000 |
| | Model 3 | Retailer 2 | 450 | 450 | 1 | 2 | 733,500 | 733,500 |
| | | Result | 450 | 450 | 1 | 2 | 733,500 | 733,500 |
| | Model 4 | Retailer 1 | 907 | 890 | 1 | 1 | 1.478,410 | 1.450,700 |
| | | Retailer 2 | 345 | 1.900 | 1 | 1 | 562,350 | 3.097,000 |
| | | Result | 1.252 | 2.790 | 2 | 2 | 1.478,410 | 4.547,700 |
| | Result | | 1.932 | 5.740 | 4 | 5 | 1.478,410 | 9.356,200 |
| Dealer B | Model 1 | Retailer 2 | 2.463 | 550 | 2 | 1 | 3.266,520 | 896,500 |
| | | Retailer 4 | 1.709 | 1.200 | 1 | 1 | 2.785,670 | 1.956,000 |
| | | Result | 4.172 | 1.750 | 3 | 2 | 3.266,520 | 2.852,500 |
| | Model 3 | Retailer 2 | 670 | 100 | 1 | 1 | 1.092,100 | 163,000 |
| | | Retailer 4 | 367 | 380 | 1 | 1 | 598,210 | 619,400 |
| | | Result | 1.037 | 480 | 2 | 2 | 1.092,100 | 782,400 |
| | Model 4 | Retailer 2 | 1.251 | 930 | 2 | 1 | 1.476,780 | 1.515,900 |
| | | Result | 1.251 | 930 | 2 | 1 | 1.476,780 | 1.515,900 |

Fig. 12. BEx Anayzer. Displaying data

Although, the debate was focused on the case study, lectures and laboratories are supported by a mix of modern teaching/learning techniques and methods.

## 4 Conclusion

The Master program project is an example of successful correlation between the society/business needs and educational needs. As key players in their environment, universities have multiple mechanisms of regional, national or international involvement. To remain a source of highly qualified labor force, universities should encourage different collaborations with other universities, companies, institutions. On the other hand, companies become more and more interested in being involved in UBC projects, e.g. the implication in curriculum development and delivery. This kind of projects are sustaining the dissemination of knowledge between firms and higher education institutions, having a benefic impact on all implied partners.

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