

Bridging the Gap of Education and the Requirements of the Business

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31 July 2016

Online at https://mpra.ub.uni-muenchen.de/72952/ MPRA Paper No. 72952, posted 11 Aug 2016 10:23 UTC

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 reporting forward and put 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 theoretical between 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

distinguish paragraph of the European А Commission Agenda is dedicated to "Supporting education in Europe and beyond" [8]. University Cooperation (UBC) initiatives Business are encouraged and supported. There are many examples of successful UBC projects materialized in one of the following dimensions or implying a collaboration directions mix of [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 **Oualifications** Framework for Higher Education is a mechanism that creates opportunities for: training based on outcomes: knowledge, learning 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.

Name of qualification: Qualification level : LICENCE		Possible occupations: Proposals:						
Profession Level descriptors of the structural elements of the professional competencie	aal competencies s	C1	C2	C3	C4	C5	C6	
KNOWLEDGE/LEARNING								
 Knowing, understanding of concepts, theories, specialization area; appropriate use of professional 	and essential methods of the domain and of the communication	C1.1	C2.1	C3.1	C3.1	C4.1	C6.1	
2. The use of basic knowledge for explanation a situations, processes, projects, etc. related to the dor	nd interpretation of various types of concepts, nain	C1.2	C2.2	C3.2	C3.2	C4.2	C6.2	
SKILLS								
 The application of the basic principles and meth typical for the domain in terms of qualified assistant 	ods for problem/well-defined situations solving, ce	C1.3	C2.3	C3.3	C3.3	C4.3	C6.3	
 Appropriate use of the criteria and standard evalu the merits and limitations of processes, programs, pr 	ation methods, in order to appreciate the quality, ojects, concepts, methods and theories	C1.4	C2.4	C3.4	C3.4	C4.4	C6.4	
5. Development of professional projects with the us	e 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 performa	ance st	andards	for cor	npeteno	e evalu	ation	
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 high qualified engineering, production or 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 Romania. companies in 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.

Professional Level descript		Disciplines	Number of ECTS credits /					
competencies	of the structural		Discipline	Professional				
	elements of the			competency				
	competencies							
C1				21				
C2 -Information		D1. Advanced						
systems'		Business						
Methodologies		Systems	8/8	11				
techniques and		Development						
tools		D2 Internation	2/20					
C3-		D2. internship	3/20	18				
C1 D '				10				
C4 - Programming methods and	C4.1	D1	7/7					
techniques used in	C4.3	D2. ABAP						
BIS	C4.4	programming	7/7	20				
	C4.5	D3 Internship.	6/20					
C5				12				
C6 - Information	C6.1	D1. Enterprise	7/7					
systems in	C6.2	information systems						
ERP and Business	C6.4	D2. Business	7/7					
Intelligence	0.5	Intelligence		28				
		D3. Advanced	7/7					
		Business Reporting						
		D4. Internship	7/20					
Transversal compete	ncies	Disciplines						
CT1				3				
CT2		Internship	4/20	4				
CT3				3				
			l					

Table 2. Grid 2 for the Master program in BIS

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 (<u>www.best-masters.com/</u> <u>ranking-master-e-business.html</u>).

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).

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4	А	В	С	D	E	F	G	н
1	Dealer	Model	Retailer	Data	Sales Volu	Profit	Retail Pric	e
2	Dealer F	Model 1	Retailer 1	01.10.2015	1	2100	3423	
3	Dealer F	Model 4	Retailer 1	01.10.2015	3	230	374,9	
4	Dealer E	Model 1	Retailer 3	01.10.2015	1	1900	3097	
5	Dealer E	Model 1	Retailer 3	01.10.2015	1	670	1092,1	
5	Dealer E	Model 1	Retailer 3	01.10.2015	2	380	619,4	
7	Dealer D	Model 3	Retailer 1	01.10.2015	1	2100	3423	
3	Dealer D	Model 4	Retailer 1	01.10.2015	1	940	1532,2	
•	Doalor D	Model 1	Potsilor 1	01 10 2015	1	220	27/ 0	
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Fig. 1. External primary data

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	DataSource	ZTI_OCT_	STD25		ate Octomb	rie		
	Source System	PC_FILE	PC_FILE					
	Version	♦ In Processi	ng 🔳 🕀 Sa	ved	R	Compare w	/ith 🔳	
ļ	Active Version	Executable	= Ed	ited Version				
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	✓ 3 RETAILER	Retailer	CF	HAR 10	10		External	
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	6 PROFIT	Profit	11 II	VT2 5	6		Internal	
	✓ 7 RETAILPRICE	Retail Pri	ce Da	5C 7	2 7		External	

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).

Key Figure	TIPRFN25
Long description	Profit noiembrie - RM 25
Short description	Profit noiembrie - R
Version	Active Saved
Object status	Active, executable
Type/unit Aggr	egation Additional Properties
Type/Data Type	
OAmount	O Number O Date
O Quantity	Integer O Time
Data Type	INT4 - 4-byte integer, integer number with🗈
Currency/unit of measu	re
Fixed currency	
Fixed U. of Measure	

Fig. 3. Key figure example

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

			-
)	DataStore Object	Techn. name / value Fu O Appe	Data
	Exercitiu 2 Ianuarie - Robert Motcu 25	TIIAN25	
	Object Information		
	Version	♦ In Process	
	Save	 Saved 	
	Revised Version	 Active Version 	
	Object Status	Active, executable	
	🖻 🐻 Settings		
	∽ 🖉 Key fields		
	Date Date	ODATE	DATS
	Dealer - student25	TIDEAL25	CHAR
	Model - student25	TIMOD25	CHAR
	Retailer - student25	TIRET25	CHAR
	🗢 🖬 Data Fields		
	🕮 Profit noiembrie - RM 25	TIPRFN25	INT4
	🚈 Retail Price nov - RM 25	TIRETN25	DEC
	All Sales Volume nov - RM 25	TISALN25	INT4
-	Navigation Attributes		
	Indexes		

Fig. 4. DSO

InfoCube	Techn. name / value Fu O Appe Data L
Exercitiu ianuarie IC - Motcu Robert 25	TIEXIAN25
🗢 🕒 Object Information	
Version	♦ In Process
Save	Saved
Revised Version	 Active Version
Object Status	Active, executable
Settings	
Dimensions	
🖻 🌺 Data Package	TIEXIAN25P
🖻 🌺 Time	TIEXIAN25T
🖻 😤 Unit	TIEXIAN25U
SALES	TIEXIAN251
Model - student25	TIMOD25 CHAR 0
Retailer - student25	TIRET25 CHAR 1
Dealer - student25	TIDEAL25 CHAR 0
	TIEXIAN252
Date 🖉	ODATE DATS 0
Navigation Attributes	
Key Figures	
🕮 Profit ex.ianuarie - student25	TIPRO25 INT4 04
4 Retail Price - student25	TIRETP25 DEC 0
4 Sales Volume - student25	TISAL25 INT4 04

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.

	Tran	sformation		RSDS ZTI_NOV2_25 PC_F	FILE ->	ODSO TIIAN25								
	Sour	се	1 Sector 1 S	ZTI_NOV2_25	PC_F	ILE (ZTI_NOV2	_25)							
	Targ	et	6	Exercitiu 2 Ianuarie - Robe	ert Mot	cu 25 (TIIAN25)								
	Vers	ion		Active 🗈	•	Saved								
	Activ	ve Version		Executable	=	Edited Version								
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ß	, SLI	_NOV2_25	PC_F	ILE (ZTI_NOV2_25)			0	Exercitiu 2	Ian	uari	e - Robert	Mot	cu 25 (TIIAN25) Rule Gro	oup: Standard Group
Po	s Ke	Field	Descript.				Rul	Rule Name	Pos	Key	InfoObjec	Ico	Descript.	Integrity
1		DEALER	Dealer		 	_ ^		ODATE	1	۷Ï	ODATE	Æ	Date	
2	2	MODEL	Model		L		=	TIDEAL25	2	∠Î	TIDEAL25		Dealer - student25	
3	;	RETAILER	Retailer		L	$\searrow \longrightarrow$		TIMOD25	3	2Î	TIMOD25	<u>A</u>	Model - student25	
4	+	DATA	Data		\vdash			TIRET25	4	2	TIRET25		Retailer - student25	
5	;	SALESVOLUMEN	Sales Volun	ne N	\vdash		-	TIPRFN25	6		TIPRFN25	2	Profit noiembrie - RM 25	
6		PROFITN	Profit N		\vdash	\checkmark	=	TIRETN25	7		TIRETN25	4	Retail Price nov - RM 25	
7	,	RETAILPRICEN	Retail Price	N	—			TTEALNOE	•		TISALN25	/am	Salas Veluma pour DM 25	

Fig. 6. Transformation for the DSO

⊫	Tran	nsformation		RSDS ZTI_OCT_STD25 PC	_FILE ·	-> CUBE TIEXIAN	125							
	Sou	rce	P	Date Octombrie - Robert I	Motcu (ZTI_OCT_STD2	5)							
	Targ	jet	(Exercitiu ianuarie IC - Moto	cu Robe	ert 25 (TIEXIAN2	5)							
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4	1	DATA	Data		\vdash		=	TIRET25	4	۷Ľ	TIRET25		Retailer - student25	
5	5	SALESVOLUME	Sales Volume		\vdash		=	TIPRO25	5		TIPRO25	4	Profit ex.ianuarie - student25	
6	5	PROFIT	Profit		\vdash	\checkmark	=	TIRETP25	6		TIRETP25	4	Retail Price - student25	
7	7	RETAILPRICE	Retail Price		<u> </u>		=	TISAL25	7		TISAL25	4	Sales Volume - student25	

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.

Processing Mode	Parallel Extraction and Processing	10	>	Execute	
Program Flow		Break	point	S	
▽ �� ZTI_NOV2_25 /	PC_FILE -> TIIAN25				
🗢 🗢 🛱 Start Main B	ackground Process				
🖓 Prepare	for Extraction				
🗢 🖅 Data Pac	kage Loop				
🗢 📲 Start	Parallel Background Process				
- E	xtraction DataSource	Chan	ige Br	eakpoints	
76 F	iter				
🐺 F	iter Out New Records with the Same Key	Chan	ige Br	eakpoints	
💌 R	SDS ZTI_NOV2_25 PC_FILE -> ODSO TIIAN25	Chan	ige Br	eakpoints	
🞯 ປ	pdate to DataStore Object TIIAN25	Chan	ige Br	eakpoints	

Fig. 8. DTP process for the DSO

Program Flow	Breakpoints
マ 聞 ZTI_OCT_STD25 / PC_FILE -> TIEXIAN25	
Als Start Main Background Process	
Prepare for Extraction	
🗢 🖅 Data Package Loop	
▽ ♣\$ Start Parallel Background Process	
Extraction DataSource Date Octombrie - Robert M	Change Breakpoints
Filter	
홈플 Prepare Error Handling	Change Breakpoints
RSDS ZTI_OCT_STD25 PC_FILE -> CUBE TIEXIAN	Change Breakpoints
Updating to InfoCube TIEXIAN25	Change Breakpoints

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									



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			Author	MIHAELAM		Status of Data	08.01.2016 17:06:32			
C	hart	Filter	nation							
5										
		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	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
6			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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