

SAP from design and implementation to a university course. A case study.

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Abstract: This paper refers to how to adapt an integrated ERP - SAP system, from installation, configuration and commissioning, to teaching as a teaching material, after an adapted curriculum for the university environment. The growing pressure from the job market is showing more and more that universities and higher education institutions will have to adapt to the demands of companies that work and offer jobs to current students and future practitioners. Within this paper, we want to highlight, the possibility for students to learn an SAP course using universities curricula (we describe this content of), part of economic faculty or technical one, part of SAP University Alliances program. This paper wants to cover some aspects regarding connection between job market, society and universities/schools in order to show how teaching principles are integrated with an Enterprise Resource Planning (ERP) systems, furthermore, how we can have utilized the contextual interface, regarding teaching, between SAP, SAP University Alliances and Universities. Our scope for this paper was to describe, discuss and show the teaching plan of development regarding ERP / SAP software application included in University curricula via SAP University Alliances.

Keywords: SAP UA, ERP, ERP II, ERP III, Enterprise Systems, SAP, SAP Fiori interface, SOA, SaaS, Enabled Learning Organizations, Curriculum, Business Process, SAP University Alliances

1. INTRODUCTION

SAP is the most important ERP from all over the world and this integrated system, are installed in majority of the companies. The SAP Company (SAP means Systemanalyse und Programmentwicklung ("System Analysis and Program Development")) was founded in 1972, by five former IBM employees. First release of SAP system was in 1972, with the name: SAP R/1 Financial. The vision of the company was to build a system for processing data in real time (Peter and Poll (2009)).

SAP is now a complete integrated system which has modules for covering entire functional areas of financial services (banking and insurance industries), automotive, building materials, chemicals, communications, consumer packaged goods, logistics, electronics and high tech, energy, oil and gas, discrete industries, service industries, public industries (defense and security, future cities, healthcare, higher education and research, public sector, public security).

Large companies have installed SAP ERP software. More than 80% of the world's international transactions traded an SAP system. Most companies use SAP R / 3 systems (3 layers: database, application, and SAP GUI). SAP can integrate with other SAP systems or with non-SAP systems using different types of links or by helping other systems (we mention here WebMethods). In large

companies, the SAP integrated system is used in various forms depending on the specifics of the activities carried out in respect of the divisions: a system for marketing - petroleum products, an exploration and production system, a marketing system - non-oil products, a system that strengthens financial activities, a system for human resources (Banta and all (2012)), (Banta (2017)).

The reasons why an architecture of SAP systems is needed in a company that has different business areas are several, mentioning here: different business model, the specificity of the processes that take place in that area / department / division, the way of interfacing with other systems specific to those areas of interest, etc. In Figure 1 we present an SAP system architecture as it is implemented in an oil and gas company. The company's specificity is complex one, ranging from oil production to refining, from power generation using wind farms to selling this electricity, from selling petroleum products (gas oil, gasoline, etc.) to selling non-petroleum products, (Orosz (2011))

Each SAP system used to serve a business environment so that the existence of an SAP farm is welcome. In the case study presented in this paper, the existence of several systems is seen in Figure 1, so if the environment the business has common activities it can be chosen that within the same SAP system different company codes are created, if not, choose the way to different systems.

application, to install SAP, monitoring data, applications, solving errors, debugging, to create connections between systems (RFC, etc), (Goebels and all (2016)).

3. SAP COURSE IMPLEMENTATION CONCEPT

What knowledge must students have to enroll in the SAP course?

Why can they understand the students from the computer master?

Is there a difference between a course taught to economics students and a course taught to students at computers?

If anyone would ask what knowledge students have to enroll in an SAP course, the answer is simple: they need to know how to work with the computer, know what a database is, how an application works on a computer. He/She have to knows what it is that user, a role well defined in a context, to knows how to make a project, its stages, to knows a series of knowledge about an operating system, (Bönnen and all (2016)), (Adams (2016)).

The SAP system is a system that has two well-defined directions: a functional part and a technical part. Economics students study the functional part of the system (how to customize the system in order to define the functioning of a business). Students from technical faculties are studying the technical side of the system, from configuring servers, installing the operating system, installing databases to installing and maintaining the system, (Prewett and Pytel (2016)), (Gahm and all (2016)).

We could say that for students from technical faculties it is a plus that they can learn economic notions. From defining a company code, what is an account plan, how to add economic data to the system, what is an accounting note, to see how a check balance looks. Working with the company that has SAP installed, they will face errors that they need to be able to solve (incorrectly entered data, reports that do not work correctly, etc.), (Szirtes and Rivlin (2015)).

Courses are not somewhat different, it will begin with some understanding of the functioning of the system, part of understanding of its use, and it will be a part of user administration and roles. After that, it will go to defining the business to be implemented in SAP. We will discuss general notions about how this business will be implemented, from the company's definition, the subject matter of the activity, to the definition of the account plan, the usage parameters, (Bönnen and all (2016)).

Once the business has been deployed in SAP, it will simulate the input of multiple inputs to see that everything works. Students from the master computers will then go to learning the programming language (ABAP) that underlies the existence of the SAP integrated system(Antolovic (2014)). Here they will begin to study a series of purely technical notions (about SAP GUI, login,

SAP Access Menu, system functions, help, development prerequisites, development tools in SAP, usage of the Object Navigator, concepts and tools, data types and data declaration, important instructions, local modularization, background processing, etc.).

What abilities we will get students after doing the course?

After the students graduate from the SAP UA course, they will be able to:

- general knowledge and skills in the use of information and communication technology
- work with an integrated ERP system
- model and implement an economic process
- customize an economic process
- have an overview of a business
- install an SAP information system
- to parameterize such an ERP system
- develop reports using ABAP code
- develop new Z applications
- work with multiple databases, depending on what you choose (each company can choose which database it wants - Oracle, DB2, etc.), etc.
- combining and applying the knowledge, concepts and techniques needed to manage financial, performance, risk, IT processes, projects, teams and business analysis
- business analysis and assessment, forecasting, business threats and business opportunities, business communication, in the context of internationalization and globalization of business

As objectives of this course, we have the following:

- to familiarize students with the necessary knowledge on the use of the SAP system, its configuration in order to define the business structure needed to inform a company, regardless of its specificity;
- using the specific tools needed to manage business processes within an ERP system;
- develop an implementation plan so as to model the SAP system that is appropriate to business requirements / specifics for an enterprise;
- develop the skills needed to integrate other existing SAP modules within the integrated ERP system offered to the business environment.

1.1 SAP Course overview - structure

The complete package offered within the SAP UA program contains a series of courses that can be divided among several faculties so we have the following solutions offered by SAP UA:

- Digital Marketing
- ERP Configuration using GBI 3.1
- Introduction to Analytics using Global Bike
- Introduction to BW (Business Warehouse) using Global Bike
- Introduction to ERP using Global Bike

- Introduction to S/4HANA using Global Bike
- Introduction to SAP HANA
- Introduction to SCM (Supply Chain Management) using Global Bike
- SAP ABAP
- SAP Application Development
- SAP Business ByDesign
- SAP Leonardo Internet of Things with Industrie 4.0
- The Digital Transformation of Global Bike

Global Bike its model company used by SAP UA for this program, but each student can configure own business. This model comes with SAP, the client, provided by SAP UA, and can be then, modeled as desired, creating its own entries in the system configuration tables.

The structure of the ERP Configuration using GB1 3.2, is focused on the three main semesters of the six main modules, which are presented below:

- Phase I - Financial Accounting
- Phase II - Procurement
- Phase III - Fulfillment
- Phase IV - Production
- Phase V - Material Planning
- Phase VI - Warehouse Management

Each of the above modules has laboratory work exemplifying systematically, how to configure SAP to model business processes.

According with SAP UA curricula, each module is divided into the following:

- General Notes and Cautions

- Part I.1 – Enterprise Structure
- Part I.2 – Rules and Parameters
- Part I.3 – Master Data
- Part I.4 – Process Execution

General Notes and Cautions: in this introductory part we must mention the rules that apply to each student in terms of working with the SAP system, the symbols used, each student will have, example for Craiova, CR ## for the company code, where ## is a unique number given to each student. All objects, which will be created in SAP, will have this unique symbol. Also here are rules such as using the SPRO transaction, the fact that certain tables cannot be used at the same time, how can be used the F1 key, how to use the search appliance, what is the SAP Menu Bar, and how to use "SAP Customizing Implementation Guide".

The part I.1 – Enterprise structure will have the following points, which will be treated by the students on the lab:

- I.1.1: Define Company Code
- I.1.2: Define Business Area
- I.1.3: Define Empty Chart of Accounts
- I.1.4: Maintain Controlling Area
- I.1.5: Define Credit Control Area
- I.1.6: Define Variants for Open Posting Period
- I.1.7: Define Field Status Variants
- I.1.8: Enter Global Parameters
- I.1.9: Assign Company Code to Controlling Area
- I.1.10: Assign Controlling Area to Op. Concern
- I.1.11: Define Standard Hierarchy

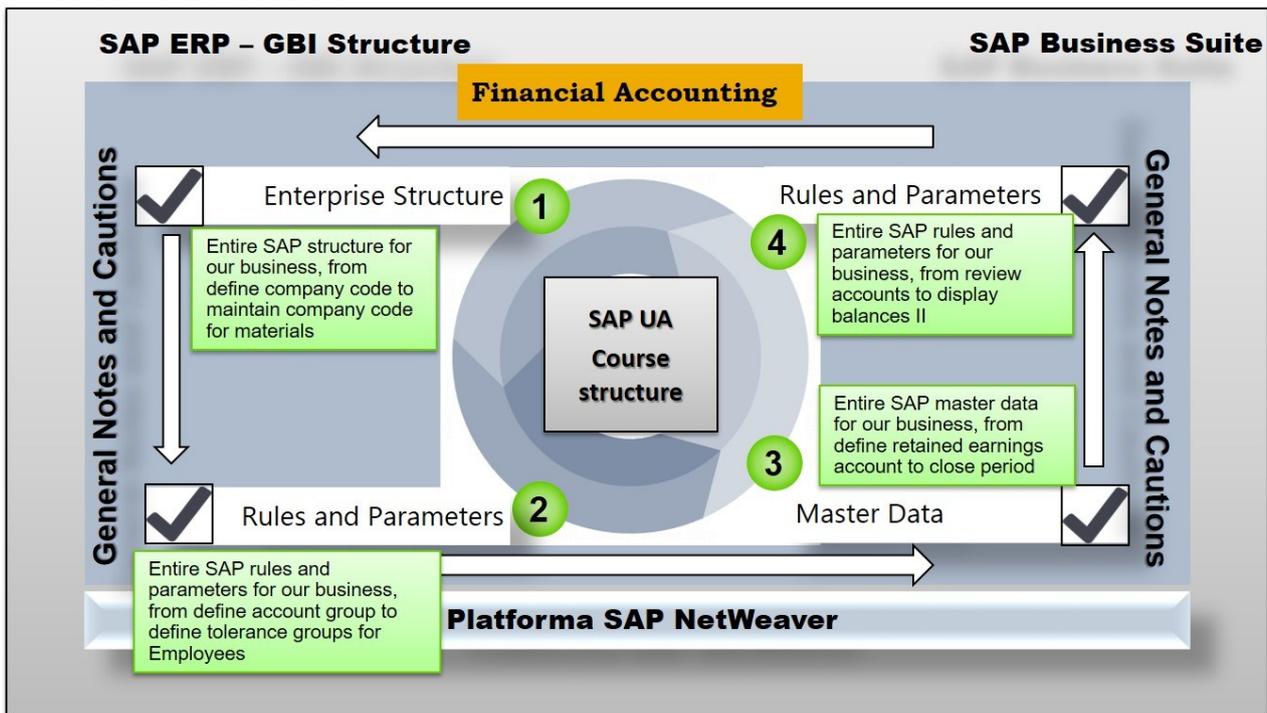


Fig. 4 SAP FI Course structure

The part I.2 – Rules and Parameters will have the following points, which will be treated with a laboratory work by the students on the lab:

- I.2.1: Define Account Group
- I.2.2: Copy Document Number Ranges
- I.2.3: Set Up Company for Payment Transactions
- I.2.4: Maintain Number Ranges for Controlling
- I.2.5: Define Tolerance Groups for Employees

The part I.3 – Master Data will have the following points, which will be treated with a laboratory work by the students on the lab

- I.3.1: Define Retained Earnings Account
- I.3.2: Copy General Ledger Accounts
- I.3.3: Create Standard Hierarchy
- I.3.4: Create Primary Cost Elements
- I.3.5: Create Secondary Cost Elements
- I.3.6: Create Cost Element Groups
- I.3.7: Open Periods for Variant
- I.3.8: Close Period

The part I.4 – Process Execution will have the following points, which will be treated with a laboratory work by the students on the lab

- I.4.1: Review Accounts
- I.4.2: Display Balances I
- I.4.3: Enter General Ledger Account Postings
- I.4.4: Display Balances II

The course offered by SAP UA is tailored to students who want to learn SAP and who want to engage in a large company, at the same time it opens their minds in shaping and adapting a functional business process with the help of an ERP system.

1.2 SAP ABAP Course

This course from SAP UA is adapted and designed especially for faculties with technical specifics, the structure of which is very oriented towards the practical part, but the theoretical part has its place.

This structured course is in this way:

- Lecture 1: Navigation Course (the students will learn how to navigate in SAP and how to use the system)
 - User guidance
 - User specific settings
 - Navigation in SAP Easy Access Menu
 - Help
- Lecture 2: ABAP Course – introduction a first program (with this lecture the students will learn how to setup the system for developing software)
 - Introduction to ABAP
 - The use of ABAP in SAP systems
 - Development prerequisites
 - First program 'Hello World!' + Exercise
 - Online help for ABAP

- Lecture 3: ABAP Course Development Environment (this lecture will help the students how to use ABAP tools)
 - Development tools in SAP
 - Usage of the Object Navigator
 - Concepts and tools
- Lecture 4: Basic Concepts (in order to build z programs, this lecture will help the students to see how to use declarations, instructions and modularization)
 - Data types and data declaration
 - Important instructions
 - Local modularization
 - Background processing
- Lecture 5: Database access (in this lecture the students will learn the components of database, operations, changes)
 - Data dictionary
 - SAP flight example
 - Database operations in SAP
 - SAP OpenSQL
 - Types of database changes
 - Types of entry help
- Lecture 6: ABAP Course Dynpros (with this lecture, the students will learn how to use the Dynpro technologies)
 - Dynpro attributes
 - Dynpro runtime
 - Creation of Dynpros
 - Title and status bar
 - Entry help in Dynpros
- Lecture 7: ABAP Course Specialties of ERP Software (this lecture will add, for students, new concepts, in terms of ABAP for ERP system)
 - Authorizations
 - Lock objects
 - Logical units of work
 - Updater
- Lecture 8: ABAP Course ABAP Objects (here the students will learn how to create an ABAP object)
 - Introduction
 - Principles of object orientation
 - Definition of classes
 - Implementation of classes
- Lecture 9: ABAP Course BSPs (with this lecture the students will learn how to use BSPs - Business server pages - an extension of SAP R/3, meaning that the SAP application will be displayed on web browser)
 - Maintenance and execution of BSPs
 - Usage of BAPIs in BSPs
 - HTMLB
 - Model View Controller

- Lecture 10: ABAP Course Exception Handling (with this course the students will learn how to create and except classes in ABAP, how to use exceptions, declarations, texts)
 - Motivation
 - Principles of exception handling
 - Raising exceptions
 - Catching exceptions
 - Exception classes
 - Exception subclasses
 - Declaration of exceptions
 - Categories of exceptions, Exception texts
 - Example
- Lecture 11: ABAP Course Further Topics (this lecture will bring to the students how to create subscreens, HTML viewer control)
 - Subscreens
 - TabStrips
 - HTML viewer control
- Lecture 12: ABAP Course Web Dynpros (this lecture will be the most advanced course because the students will learn about Web Dynpro technologies and how to use views, components)
 - Objectives of Web Dynpro
 - Future proof UI declaration
 - Central implementation of UI standards
 - Support of major platforms (ABAP as of NW 7, JAVA as of NW 2004)
 - Web Dynpro and MVC
 - Web Dynpro Component
 - Views
 - Controllers
 - Window
 - Exercise: Create a flight data application

As shown above, we expanded course 12 to highlight the objectives and chapters that will be achieved at each course / laboratory. Each course also has a practical part, so students will finalize their theoretical notions by applying them to the SAP system. Another aspect that we want to mention in this article is the fact that SAP UA offers the possibility to work either from the faculty's laboratory or at a distance from home.

4. CONCLUSION

This article addresses those who want to see how an SAP course is structured either for an economics faculty or for a technical faculty. By reading this article, you can see that teaching an IT course (in our case: SAP course) within each faculty area that chooses to have such a course in the curriculum must be related to their applicability.

The applicability of the SAP course has a very large share, and the advantage that it can work in the system wherever the internet is, is again a great advantage.

Students can communicate with each other, having the same work platform.

Students who study SAP at the faculty of economics can work with students from the faculty of automation, computers and electronics. How? Simple! Joint projects will be created in which the economists will ask the automated ones to create reports, applications dedicated to either the economic environment or the industrial environment.

The platform provided by SAP UA has the advantage of being connected to nearly 3,200 universities around the world, so that student communities can be created from universities. In this way, the applicability of SAP solutions, with the specificity of the countries where these students learn, contributes to having a more complex vision on the possibilities of implementing of an ERP solution.

Another benefit of learning SAP and belonging to a university that is a member of SAP UA is that each student has the opportunity to have a certification, which in other conditions costs a lot; in these conditions, the price is modest.

By learning the TERP10 (SAP ERP Integration of Business Processes) course, students will go through all the functional modules so that passing the exam is not a problem. With this certification, insertion into the labor market will be very easy, companies with a recruitment policy considering this paper. With the introduction of the programs offered by SAP in the curriculum of universities, a link between business and the university environment is created; students will learn how to use software that is used by the world's largest companies.

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