



**a comprehensive study of using SAP in university environment**

# Participants

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## **SAP applications**

Carl Andersson  
Helena Andersson  
Johan Borgert  
Theresa Carlstedt-Duke  
Amin Gholiha  
Tony Gunnarsson  
Robert Höglund  
Isabel Jensen  
Monika Johansson  
Patrick Mansén  
David Nilsson-Jatko  
Martin Peterzon  
Anders Svedberg  
Yuheng Zhao

## **Business game**

Daniel Andersson  
Lisa Granholm  
Nicklas Jansson  
Roland Lundblad  
Anders Taflin  
Lisa Wallman

## **The current educational use of SAP R/3**

Maria Fälth  
Lars Hägglund  
Maria Johannisson  
Gunilla Svanfeldt

## **Helpdesk**

Johan Backström  
Christoffer Eriksson  
Adam Hedman  
Patrik Lakhsasi  
Matts Mattson-Djos  
Gunnar Robertsson

## **Technology**

Emily Andersson  
Mikael Carlsson  
Daniel Guldbrandsen  
Emma Löfgren  
Lars Melander  
Christian Melki

## **Economics**

Magnus Andersson  
Jonas Eklund  
Johan Haldin  
Eleonora Juhasz  
Karin Markstad  
Lars Pettersson  
Magnus Öström

## Abstract

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This report is the result of a project aiming to evaluate the possibilities of a University Competence Centre for education in enterprise systems, SAP R/3 in particular. Several aspects have to be considered before implementing such a centre, for example the information network, economics and technology. Concrete suggestions on these matters are presented in the text. A thorough investigation of the current situation at different universities has also been accomplished. Furthermore, the idea of a business game as a way of understanding SAP R/3 has been developed. In the beginning of the report an overview of SAP applications is given.

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# Introduction

This report is the result of a project that is part of the course "IT in the Society", where the participants are 4<sup>th</sup> grade students from the program of Information Technology Engineering. The purpose of the course was to evaluate the interaction between technology, users and designers.

The assignment was to look at the use of the enterprise system SAP R/3 in a university environment. One of the goals of the project was to produce a requirements definition on how a centralized R/3-installation for Swedish universities could be implemented. The intention was also to present a more cost efficient use and to encourage a better exchange of competence and experiences between different universities through a Universe Competence Centre (UCC). This would facilitate the integration of SAP R/3 in higher education. Due to the complexity of SAP R/3 and the teachers' lack of knowledge of this system, the available resources are not fully used today.

## **40 students divided into six groups have evaluated the following**

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SAP applications	Overview of SAP R/3 and mySAP
Business game	An easier and funnier way to learn SAP
The current educational use of SAP R/3	National and international contacts
Helpdesk	Means of information exchange
Technology	Hardware and software requirements
Economics	Economical aspects

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During this project we have received information from many different contacts and we would like to make a reservation against any incorrect analyses of the conversations.





# SAP applications

Our task in the project was to give an overview of the internal part of the mySAP system. We were also given the task to be of help to the other groups concerning issues about the internal aspects of mySAP.

Our goal is to come up with a document that describes how mySAP is designed and an overview description of each part.

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## Methods

By identifying several parts of mySAP that could be studied by themselves we decided to divide our group into several subgroups. Each subgroup is then assigned one or two parts and responsible to come up with an overview description of that/those parts.

We wanted a uniform look to the overviews so we decided that each overview should have a short introduction that describes the functions and benefits of that specific part. Since each part is divided into several sub parts the next step is to give a short overview of the sub parts.

The information needed by each subgroup can be obtained from the assigned contact person at SAP, via [www.sap.com](http://www.sap.com) and [help.sap.com](http://help.sap.com), and other material when needed.

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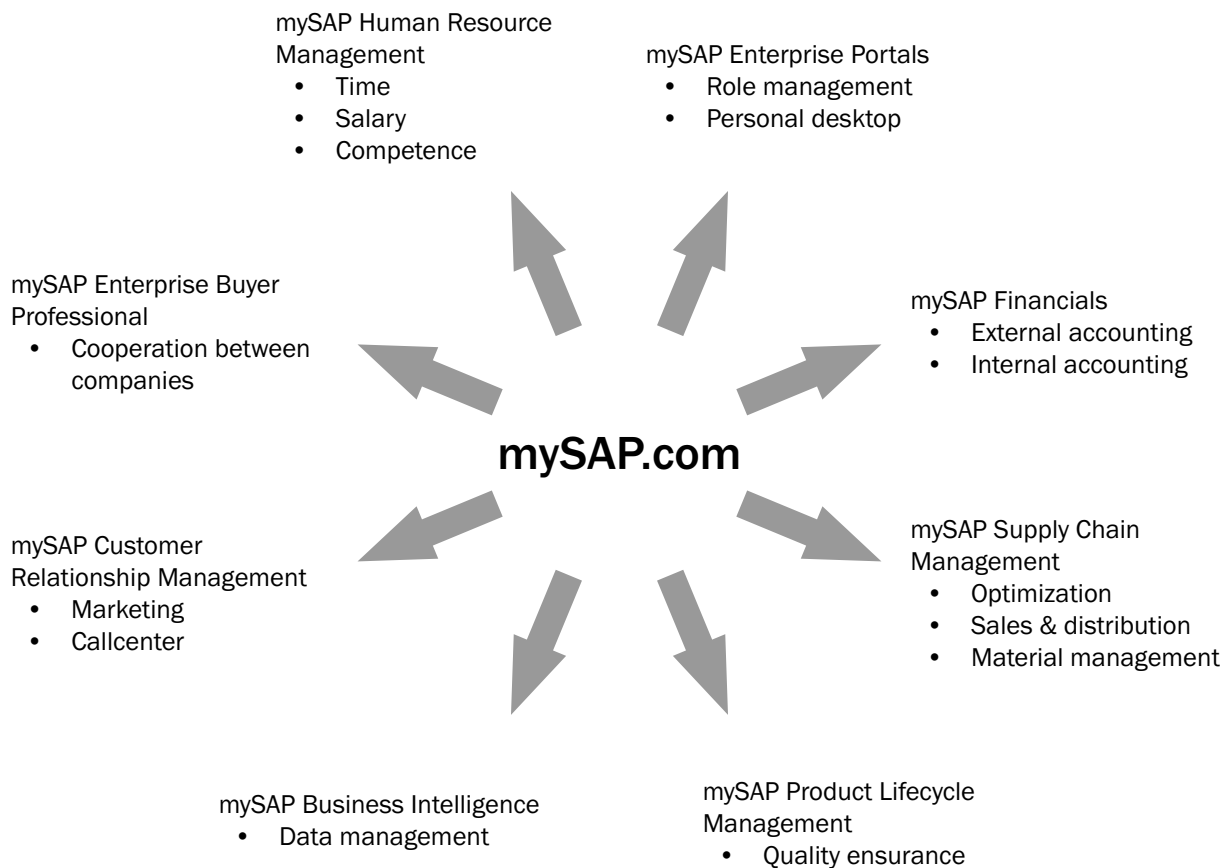
## Overview of the system and its components

SAP R/3 is a market leading business system. It consists of different modules that each may be used separately, and together these cover practically everything that might be needed in a company. SAP R/3 is a component in mySAP.com

but can also be used separately. There exist a number of different branch specific dispositions that simplify the implementation of R/3. Built into the system there are a number of predefined roles that simplify the adjustment towards specific users within a company.

mySAP.com is a web based service with a user interface towards SAP R/3. In mySAP.com users can save their personalised configurations. The user can decide what favourite links to be shown during work and what operations that should be available for fast access. By this, the user does not need to switch between different programs to find the information that is needed. Using favourite operations or transactions in the navigation window the user can optimise and simplify the work. mySAP.com is also a role-based system, which means that every user has one or several roles that give access to different parts in R/3. mySAP.com works as a portal that filters different information and services from SAP R/3 as transactions and operations.

The IDES system is an R/3 installation which contains a number of sample companies with transactions in the system. It contains application data for various business scenarios that can be run in the SAP system. The business processes in the IDES system are designed to reflect real-life business requirements, and have access to many realistic characteristics. The business scenarios used in IDES are easy to follow to show the comprehensive functions



of the R/3 system. This makes the system useful for demos and education without having to extensively configure R/3 from nothing. IDES comes with all R/3 installations and can therefore be used by all R/3 users for practice. On the SAP web page there exists a version of IDES that only consists of some parts of the components and this version is smaller than the original version.

Here follows a brief overview of the different components in mySAP.com. A more extensive description of the following parts can be found in *Appendix A* of this report.

## Human Resources

mySAP HR gives support to all aspects in personnel management. The Human Resources part can also be fully integrated with the way the company runs the rest of their business, including accounting, project planning, sales and distributions, project management and logistics. By connecting mySAP HR in this way it is possible to save and have access to all the company's data in a joint system, which gives the information that is needed to carry out necessary HR functions.

### Key Parts of mySAP Human Resources

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Organizational Management	Planning the human resources of the company.
Personnel Requirement Planning	for determining future staffing by doing analysis and compare it with current statistics.
Personnel Cost Planning	A tool where you can compare planned and actual cost analysis and for keeping the staff.
Personnel Administration	A part that supports all administration tasks, like hiring, reassignment or leaving. It also keeps all HR data central and accessible.
Personnel Development	A tool to ensure that employees keep up with the company's development and goals, by for example having training solutions and reaction to organizational changing, hiring and vacancies.
Recruitment	Provides tools for all from advertising a vacant spot to filling it.
Time Management	A tool that is used for all time management in a company; planning employee shifts, recording time data and evaluating the time data for bonus and overtime wages are just a few examples.
Employee Self Service	A tool where the employees themselves check their status in the system.

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## Financials

External and internal accounting is tightly nested together to make the financial system. The internal accounting in SAP is found in the component "Controlling" while the external accounting is found in the "Financial" component. A couple of other components (e.g. the Project system) that are part of the Financials are described in *Appendix A*.

**External accounting (module FI in R/3)** With the legal demands that external interested parties as banks, owners, authorities etc. have for a company or an organization you could register all business events as verifications in the ledger between some of the accounts in the chart of accounts and later on fulfil these demands.

This is the main issue for the SAP FI, to in some way store all transactions occurred. The registration of all business events as verifications is mostly done automatically from sub-components of FI (such as FI-Accounts Payable, FI-Accounts Receivable etc).

**Internal accounting (module CO in R/3)** Revenue and costs that occur in the different SAP R/3 applications, like in the Financials (FI), Human Resources (HR), Material Management (MM) and Sales/Distribution (SD), gets passed on to the controlling applications.

The components that belong to Controlling (CO) are Overhead Cost Controlling (CO-OM), Product Cost Controlling (CO-PC) and Profitability Analysis (CO-PA). These three components aggregate together and create a component called Profit center analysis.

All the Controlling components each give a different view of the cost accounting.

### **Customer relationship management (CRM)**

The idea with the CRM part of mySAP is to help a company in the contact with its customers. This can be all from support to callcenter personnel to supporting a seller in his contact with a customer. CRM also includes a part for analysis to make it possible to draw strategic information from customer data. With CRM a company also gets a better overview of its customer data.

#### **Key parts of mySAP CRM**

Marketing	A tool in CRM to create marketing campaigns like personalized letters.
Sales Support	A tool to help the seller to organize facts about customers and also helps out in a sellers contact with a customer.
Customer Interaction Center	Helps personnel in a callcenter to give the best support possible to calling customers. Important and relevant information about the customer will be shown on screen at all times.
Analytical CRM	A tool to analyse the gathered data about the customers. Can answer questions like of what gender and age the typical customer is.

### **Supply Chain Management**

Supply Chain Management is the logistics part of SAP. The system can be used to control the entire supply chain from the suppliers to the finished product and its deliverance. It can overview goods in storage's around the suppliers, factory processes, order status, keep track of vehicles and much more. It can also be used for companies offering services such as software developments.

### Key parts of mySAP SCM

Planning	The ability to anticipate future developments and respond to changing situations quickly and easily.
Optimization	The ability to plan or carry out supply chain activities with optimum efficiency.
Execution	The ability to automate the supply chain and execute optimized plans within predefined constraints.
Performance Measurement	The ability to define key performance indicators and benchmark against them.
Integration and Openness	The ability to guarantee the free flow of data through your system for better productivity.
Better Business Insight	The ability to better understand overall business issues, complexities and interactions, to make better decisions.

### Enterprise Buyer Professional (EBP)

First and foremost EBP is a solution for getting more effective purchase/procurement of non-production material (e.g. office material) within a big organisation.

An EBP-process begins with the creation of a shopping cart and ends with the entry of the invoice. All participants in the process first log on to the Enterprise Buyer system. After users log on, the initial Enterprise Buyer screen appears as well as a navigation window. Using this window, users can access all functions relevant to them.

### Product Lifecycle Management

Product Lifecycle Management is used for controlling the product development in a company. It centralizes the information and makes it accessible for the people developing and managing the product. During the whole lifecycle of the product, this module will be able to assist in this work.

#### Key parts of mySAP Product Lifecycle Management

Product and process structures	Collect and spread information about products and processes
Program management	Optimise cost of product development and project planning
Change and configuration management	Update product development cycle in changing market conditions
Engineering collaboration	Information exchange between external and internal partners

### Business Intelligence

Business Intelligence is a solution to help companies collect their data, ennoble data into information, transform information into knowledge and use that knowledge to help make better business decisions.

The central part of mySAP Business Intelligence is the Business Information Warehouse. Data is imported and transformed into the data warehouse. In the warehouse the data becomes information by giving the data a description or metadata. On top of the data warehouse is a layer with infocubes that provides a more specialized view of the information. The information is used by analytical applications to get business knowledge.

#### Key parts of mySAP Business Intelligence

Business Information Warehouse	Combines SAP data sources as well as other external data sources into a common view.
Reporting and OLAP Analysis	Tools for creating reports and studying company data with OLAP navigation.
Strategic Enterprise Management	Used for planning and simulation of company strategies.
Knowledge Management	Handles unstructured information and is used for collecting and classifying that information

#### Enterprise Portals

The portal component is the mySAP.com interface towards the user. The portal gathers the different interaction interfaces for the different components, and presents these in a simple, collected and standardized manner.

The portal has also capacity to gather data from non-SAP data sources, as the "ordinary" web or other business systems, and present these and let the user interact with these in such a way that they can't tell any difference from SAP's original components.

The portal is being viewed as a web page, whereby it can be accessed from almost any computer anywhere in the world.

The portal supplies different user types with the kind of information and privileges needed for each users job tasks by so-called roles. Besides this, any user can freely customize the way the data supplied to him/her is being presented.

Since all different components interaction points are gathered to a single place, this makes simplification in the daily work possible. One example of this is "single login" which means that when the users once logged into the system, the portal transparently keeps track of passwords and stuff, so the user him/herself never has to login to each single used module.



# The business game

This idea of a Business game originates from a project that a group at Uppsala University performed fall 2000, see reference list for details. The basic idea behind the Business Game is to teach the SAP R/3 environment and system in an enjoyable and funny way at Universities. This goal will be achieved by letting groups of six students manage a virtual company in R/3 over a specific time period. These six student players have different tasks and roles in the company. Every company looks the same, and exists in separate "worlds". The players together with the teacher will decide about the duration of the game.

Our suggestion is that the game should be based on IDES. This is the abbreviation of "International Demonstration and Education System", which is a model company that has been set up in an R/3 system. This model company contains almost all of the functionality in the R/3 system. The hardest point is to decide what to use in IDES, because the environment is very rich and complex.

## **Limitations of IDES**

One way to limit IDES is to reduce the amount of steps (screens or windows) in a transaction. The idea is to take away the parts that are not relevant for the player. This will result in a better overview and understanding of the system. It will also give the constructor of the game a possibility to control the degree of difficulty in the game. The constructor should be able to raise the amount of steps to increase the difficulty level of the game. The problem is to decide on the parts that are not relevant for the student and should be excluded.

## **The Game Idea**

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### **Game preparations**

Before the game begins, certain information should be given. The players must know about the company's business idea and important processes within the company as well as the market trends. They should also get information about their specific roles, so that they know what to do when the game begins.

### **During the game**

During the game, the group will get external information via news. The news will contain info about events that could affect the company. News could be info about co-operators, info about other rivals or info about the market. The group will also get info via internal channels, like order requests, market analyses or transactions inside the company. A transaction made by a member in the group will not only affect the surrounding but also the other members in the group. This forces the members to work close and learn about each other.

To control and manage input data to the game a step method is suggested. With a step method we mean that the group receives data in fixed time periods. This will make it easier to design the game and also to decide on how to allocate points to final score. How these points will be given is important to decide before the start of the game.

To make the game alive and interesting, we suggest increasing the difficulty level for each step. This could be solved by adding extra unnecessary data that the players have to filter away to find the important information.

## **The IDES model Company**

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The International Demonstration and Education System is an R/3 system set up with data and procedures describing a complete international corporation. The IDES group includes a number of companies that have separate business tasks. These companies can be used individually, or in interaction with each other. The intent of IDES is to show the vast functionality that is available in the R/3 system.

Most companies that orders R/3 get an IDES system to use for training and educational purposes. The system environment contains real-life master and transaction data to make it as easy as possible to use for self-learning and to prepare end users for using the R/3 system in practice. The business processes have been set up as self-learning units, and the system provides extensive data and process descriptions. The intent is to make it possible for users without detailed R/3 knowledge to familiarize themselves quickly with the system. All the R/3 training courses offered by SAP are based on IDES data.

Together with a detailed online documentation, all the above are strong arguments for basing the Business Game on this already existing complex model company.

A brief overview over IDES is given in *Appendix B*.

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## The Players

In the IDES Business Game, we have chosen to divide the modules in IDES into different player roles. By doing this we hope that every role will have its own acting character. In IDES, there are thirteen different modules of which we have created six player. When we studied the thirteen modules, we found that three of them did not suit our game or was not interesting enough to work with. The idea is that the group of six players should work as an independent group, and make their decisions independent from the other groups.

The data that is supplied to each of the players comes from the same database and therefore will one player's decision affect the others, as it would in a real company. Which modules that are contained in each role and how it works, you can read here below where all the player roles are presented.

### **Player One – Controlling and Enterprise Controlling**

In the Business Game, one of the players should control the modules Controlling (CO) and Enterprise Controlling (EC). Both these IDES modules strongly involve economics, therefore it would be a benefit for the player if he knows the basics in this area, also some knowledge in marketing and sales would be good. In the game the player will use the controlling module for planning, managing and monitoring overhead costs. Since overhead costs cannot be assigned directly to cost objects, they are assigned to the cost centers on which they were incurred, or to the jobs that gave rise to them. Having these data, which is in the cost center, the player can, with the provided tools that are in IDES, make sure that the data are allocated to the correct source. The player can for example at the end of a posting period, which also will be a posting period in the game, see if the planned costs (adjusted to the operating rate) are right compared with the actual costs. Would this not be the case, the player will have to change the data for the next coming posting period. The idea with this is that the player will have to analyze any discrepancies between planned and actual costs that exceed a predefined threshold.

The player will also work with cost controlling, and solve questions like: Did the company calculate the right price for a product that is manufactured, or a service that is provided. If the company didn't, what price should be the right in the future? To get this "right" price the player has been provided with important information for pricing and pricing policies, controlling the cost of goods manufactured, stock valuation, and profitability analysis.

Another major part in the Controllers role is to work with Profitability Analysis, which is as the name suggest, analyze the company's future profit, what it depends on and what parameters that are the main reason behind the profit numbers. To be able to do this the player will have help of a range of online, multidimensional reporting tools that gives him key figures and numbers.

**Succeeding** With this data and with these queries the player that handles the Controlling role hopefully will have an encouraging and learning assignment. How the player succeeds and on which basis this should be measured is not totally easy, but it will be calculated out on the parameters that the player will change during the game session. Hopefully the player will get the right data from his companions which will make his job a lot easier.

### **Player Two – Financial accounting**

This role is focused at the usage of the modules Financial Accounting and Investments Management. The system of Financial Accounting allows you to collect all the data in your company relevant to accounting, providing complete documentation and comprehensive information. This is a big assignment to handle and, as mentioned before, it requires perhaps more experience than other roles in the game. The module Investment management offers integrated management and processing of investment measures and projects from planning to settlement.

The student or employee that has been assigned to this role needs to have a pretty good experience in the accounting area, since this part is the most crucial in this player role. He or she will have an enormous amount of data and statistics available and need to be able to point out the most important issues and areas. Since the role also deals with investment management the player should have some experience in analyzing investments and markets, in order to be effective in the game.

This role is also crucial for the evaluation of the game, since the evaluation is based on the closure over a given playing time. It is the responsibility of this player to generate a period closure and obtaining the relevant information for doing so.

### **Player Three – Human Resources**

This player "works" at the personnel department and handles for example the recruitment, personnel development, documents and information about personnel, company benefits and vacations. The role is primarily made for the students studying Personnel Administration and is based on the Human Resource module.

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**Example of things that the player needs to know before the game is started**


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- How many employees?
  - How does the hierarchical structure in the company look like?
  - Which departments do they have?
  - How much does each department cost?
  - Which company policies for example we want our personnel to be well educated.
  - How does the benefit and salary agreement look like? What do they base the wages on?
- 

Many events in the game are related to the human resource department. Examples of actions that the player can do without any external messages are: planning the summer vacation, personnel dialogue and competence development. Other events such as: an employee asks for leave of absence, planning shift work if needed and interviewing, selecting and hiring a new employee (for example an incoming order of 300 elevators which requires the player to employ 10-20 people) are made by the game constructors or by the other players (external messages).

**Succeeding** It is really hard to decide which player that has won in this kind of role. One way to look at it is that the game constructor has made an ideal employee and gives the student a good grade if she hires the right one. Another way is to let the student change the salary according to what the union and the company has agreed on. Unsatisfied employees might leave the company if the student forgets to adjust the salary. The consequence of many employees leaving the company will be bad performance of the company. Some of the events that the player handles will be detected in a financial way. For example if the costs for new recruitment are low, the player has succeeded well to educate the already existing employees in the company.

#### **Player Four – Sales and Distribution Manager**

This role will be of great importance in the Business Game. The student acting will supply the other colleagues with market analyses, keep an eye on competitors and make sure that the company will live up to its promises by ensuring timely deliveries and good customer service.

**Educational profile** This role fits a student with marketing and customer service as his or her main interest. A typical employee in a real company would be a senior marketing manager, but could also be a business developer or a customer service manager. Depending on the implementation of the game, this role could also suite a student interested in sales management; a typical real-world employee could be a key account manager.

**Game activities and decisions** The activities concern the main four P:s in marketing – product, price, promotion and place (distribution).

Market analyses will have to be performed to gain knowledge of what type of **products** the customers demand. Important factors to take into account will be product configuration, style and support packages. Extra game features could include pre-sales consulting and services development. The Sales Information System will be used extensively to perform these analyses.

**Pricing** will be an important issue in the game. The student playing this role has to respond quickly to changes in the price expectations of the customer, and continuously perform competitor analyses to make sure that the prices of the products that the company offers remain competitive.

Direct mailing campaigns will have to be performed to **promote** the product. These could be advertising campaigns as well as invitations to information seminars. Inclusion of appropriate enclosures such as brochures, documentation, and product samples are important. Sales prospects will have to be found using the tools in Sales support. Extra game features could be other types of sales activities such as phone calls and preparing for trade fairs.

Availability checks and delivery scheduling will have to be carried out to ensure quality of **distribution**. All distribution channels will have to be supplied appropriately; sometimes there will even be order-driven production requests to be discussed with the production manager.

**Succeeding** To "win" in this role, the student has to understand what type of product the market demands, and make appropriate changes to the existing products. Cooperation with the student managing development projects will be important. A "perfect" product will be defined in the rules of the game as the objective of these activities. If this perfect product is produced, the maximum amount of units will be ordered by the customers. Any differences from this perfect product will result in a loss of demand.

Price will affect customer demand as a function containing competitor prices and their product similarities as variables. Too high prices will result in a loss of demand; too low prices will of course affect profitability, but will also have a certain negative effect on demand.

Promotion will affect the rate of incoming new customers as well as the demand from existing customers. It should be fairly easy to achieve the maximum result in these activities. Grading will be done more on a passed/fail basis, due to it being fairly hard to depict rules in the games for this part.

**Distribution** will be of great importance to retaining customers, and increasing their demand. It should also have a certain effect on gaining new customers. Pricing will have to be correlated to the ability of delivering in a timely and fast manner. To succeed in these activities, extensive cooperation with the production manager will be required.

**Player Five – Project planning and Service management**

This player is responsible for the planning of the projects and the service management. He or she must have experience in project development and be able to break down a large project into smaller entities. The co-operation with the customer is important to be able to make a correct specification of the project. The service management is included to show that a project is not over only because the product is finished.

This role is intended for computer science students.

**Engineering project** The player should define a sales order according to the customer requirements. The sales order must be well defined; otherwise the customer will not be satisfied. When the sales order is saved, a work breakdown structure (WBS) and network is automatically generated. A graphical display shows the project structure generated by the system. Now the design is drawn up and the player presents it for the customer. If the customer is not satisfied, design changes must be made. The customer confirms the design/activities and that releases subsequent activities for processing. The confirmations are sent to the HR organization unit.

The resources are planned automatically when the sales order is entered. It provides data on the activities, materials, capacities and production resources for the elevator variants. With the resource plan, the player should plan the capacity requirements, that is which persons and /or machines that are required for this project. The player should also determine the components and raw materials that have to be reserved or ordered by assigning materials. If the player orders wrong it would lead to insufficient components and the project could be late. This is linked to the MRP and Purchasing.

**Software project** The player should use structural planning to create and edit projects. The project is automatically divided into smaller entities, work break down structures, the player uses relationships to decide in which order they should be carried out. The player should also plan the duration of the entities and the individual activities. It is important that the estimated time is right; otherwise the customer will get the software later than promised and the development costs increases. The order, in which the entities are carried out, is also very important. The player must consider the dependability's between the entities and if there are any critical entities to start with.

The player should also decide if there is enough knowledge among the employees to make the project successful. Otherwise taking courses or hire consults must be considered.

The player must estimate the project costs. It is based on the estimated project duration. To plan deadlines the project planning board is used.

**Service management** The player should sign a service contract with the customer. Here they agree upon which services which should be provided. It could be telephone support, consulting hours, a certain amount of repairs or other guarantees. This is followed up by the call management.

### **Player Six – Production Planning and Materials Management**

- This player is responsible for production planning and material management.
- Get input from sales and distribution and create the requested product.
- The player must setup product cycle with material to finished product.

**Product Planning** To make the requested product, the player has to configure the product, that is, the product must be specified in detail in the sales order, details such as color, special models or specific accessories. To produce the product you need decide amount of material, you also have to order missing parts and request required material.

**Material Management** In the decision of materials you must control warehouse and suppliers, to decide if enough material is available. Otherwise you need to purchase more. To check warehouse you need to run the inventory tools.

You must keep control of warehouse, order so material is there when needed but at the same time keep down the warehouse size. Problems at warehouse could also be at purchasing, do want the cheap material with fast and reliable delivery or the material that is a bit more expensive with excellence quality but not 100 % reliable delivery in time?

**To increase difficulty in game** A way to increase the difficulty level during the game is to increase input. You must get a faster overview and maybe compromise to hold the company running. Problems that could occur are deliveries that fail to come or a supplier is out of products. Suppliers are our out of products/material, you need to purchase new in a hurry.

New problems occur, Do you want the material with less good quality but with fast deliver or can you afford waiting for a new deliver? Another problem is to keep the warehouse down, but still keep materials for production.

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## **Evaluation/Judgment criterias**

Considering the complexity of the IDES system, it is very difficult, nearly impossible to base the evaluation of the game on a transaction and decision level. It would take a lot of time and effort just deciding what decision is the right one in a specific situation, if it's even possible to so, considering the complexity of the IDES system. Then, if one has decided to do so, the game module would be very complex. It would have to concentrate on keeping

track of single transactions, and all their consequences, in order to make a fair judgment. This would also affect the time, effort, and overall costs for developing the game in a negative way.

Therefore we decided to use some of the IDES systems functionality that already exists, in the FA module, for the evaluation part of the game. Since all the groups in the business game will play during given time, decided before the game starts, it's natural to look at the closure over that time when determining a winner. Especially, since the IDES system has built in functionality for getting these numbers and statistics.

If one always prioritizes the result over the period, the players might sell out the entire company in order to make a good profit over a short period. This is not the ideal scenario in order to learn running a company. Therefore different aspects of the closure should be considered in making the evaluation. It is up to the groups to decide what areas of the closure they should prioritize in deciding a winner. This is preferably decided before the game starts, so that the groups can make transactions and decisions in order to achieve the decided goals. These goals could be market shares, result, different key numbers, liquidity, or increased turnover just mentioning a few.

### **Economical aspects**

As we have seen such a game as this would not be made over a night. The IDES-database is very big and contains a lot of information. Programming a game-engine, implementation of it and testing the game would probably take some time. What the costs would be is at this stage impossible to say, it all depends on how big the game should be, but a rough figure would be 100,000, a figure that comes from a game producing company.

### **Troubleshooting**

The implementation of a game like the one you just have read about is a big and complex process.

Many of the people that we have been spoken to during the course have told us that IDES is too big and contains too much data to produce a working game within reasonable time and money frame, others have told us that IDES would be great to start with because it contains all the data that is needed.

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## **Game User Interface**

For a beginner not acquainted to R/3, the user interface can be rather overwhelming with all of its fields to make input in, and non-intuitive buttons in strange places. We would like the players of the game to be able to learn R/3 while playing. Previous R/3 knowledge should not be required. One way of achieving these goals is to change the user interface by using the client

side scripting framework GuiXT from Synactive. By associating a script to a transaction screen, we can do things as removing unnecessary fields, fill in others for the users, create drop-down menus instead of having text input fields and much more. In this way, we can direct the user to the inputs and choices that are important for the game, and shield him or her from getting flooded by all other unnecessary information that is present in the IDES system. This will make it much easier for the player to understand what is important for the game, and create a convenient environment for learning R/3.

### **The GuiXT framework**

The GuiXT framework scripting engine is shipped together with newer full blown SAPGui clients; all you have to do to make it work is to set it as active in one of the menus of SAPGui. The scripts can be stored either locally on the computer executing the client, or on a file server on a network.

The GuiXT framework is divided into three different products; GuiXT, InputAssistant and GuiXT Viewer. There is also a WYSIWYG editor called GuiXT designer. Currently, only the first of these products – GuiXT – comes for free together with the SAPGui client (release 4 and above).

**GuiXT** GuiXT can be used to customize the layout of R/3 screens, you can move or delete fields, table columns and pushbuttons, modify headings and pushbutton labels, display images and more. You can also affect the navigation of the screen; add own pushbutton functions, set default values, offer radio buttons instead of coded input and more. There are also other miscellaneous functions are such as data dependent images, for example for product images, and the ability to start PC applications by clicking an image.

**InputAssistant** The InputAssistant can be used to accelerate data input speed by providing local value help, input history and input combinations for individual business processes. It can also be used to reduce multiple screen transactions into single ones, and combine multiple navigation steps. Another help for the user could be to provide data integrity checks on input.

**Viewer** With the viewer, radical changes can be done to the user interface. Html and rtf files can be integrated into R/3 screens, creating a web- or Word-like environment. Complete data entry applications can be written by using html and JavaScript.

### **Conclusion**

The GuiXT framework can be leveraged upon to create a great user experience in the game. There are a range of options and solutions available, and every business process will probably require its own solution. As there must be one script written for every transaction screen, the amount of screens used in the game will have to be held on a minimum level; otherwise the development costs for the user interface part will definitely soar.



# The current educational use of SAP R/3

We were assigned to investigate the current situation concerning the use of SAP R/3 at national as well as international universities. This required contacting involved teachers at different universities. Most of them answered a questionnaire but we also performed interviews with some of the representatives in Sweden.

The international part of the assignment involved many interesting contacts. We have been studying their use of R/3 in the education and also looked at the parts that can be applicable at universities in Sweden. At the national level we have been in contact with universities currently using R/3 in their education as well as universities that have not yet introduced any enterprise system. The main subjects discussed concerned the existing problems of the use of R/3 and the future aspects involving developing an UCC that would enhance the cross-university collaboration.

From the received answers we concluded that the universities in Sweden using R/3 are not satisfied with the situation today, mainly because technical problems with the installations and lack of education and support from SAP.

We also discovered that the international universities are using SAP R/3 more frequently than we do in Sweden. The teachers seem to have more education in the system, they also have good contact with SAP.

## **The use of SAP R/3 in the education at Swedish universities**

### **Survey**

There are today three Swedish universities that have SAP installations: Lund, Stockholm and Uppsala. For the moment, only the one in Stockholm is running, so The School of Economics and Management in Lund is using the installation in Stockholm (which has almost completely been spared from technical problems).

In the following section we will examine this a little bit closer, concerning how R/3 is used, the teachers' situation and their opinion about a competence centre. We have obtained this information by interviews, surveys and through a conference arranged by us, where representatives of the Department of Information Systems in Uppsala, SLU and BTH participated.

### **Lund**

Our contact person at The School of Economics and Management in Lund has answered a questionnaire. To our questions about education and skills concerning SAP R/3, he tells us that he has got adequate education in R/3 and considers his skills intermediate. He has been using R/3 as an education tool for over three years in economics and computer systems courses. The modules concerned are Financials and Customer Relationship Management.

He hopes that a competence centre would provide him with the knowledge that he does not have, and that the cost for running the installation will lower with a central and shared installation. Since a central installation might make the maintenance of the system easier, he expects the system to become more available.

For the moment, he already co-operates with other universities, both in Sweden and abroad. He also co-operates with companies related to R/3, such as Hewlett-Packard, Ericsson Business Consultants and EponaData.

### **Stockholm**

At Stockholm university, SAP products are used by the Department of Computer and System science, which is a co-operation between Stockholm University and the Royal Institute of Technology. MAS/IBM has sponsored the hardware, the database, implementation and consulting. They have also helped the teachers with the planning and teaching of the courses.

Our contact person at the Department of Computer and System science has been using SAP R/3 in education for two years and considers his skills novice to intermediate. He has an adequate education on the system with an introduction course, workplace and self-studies. The courses he teaches are related to computer systems and the R/3 modules used are Financials and Supply Chain Management, where the system is used to illustrate the

functionality of an enterprise system. The system is used in single courses, but they are intervened in the way that the students can use knowledge gained in one course in later ones.

To our question about what a competence centre should provide he answers access to SAP products, course material, continuous education, seminars and discussion groups. He thinks that prepared course material and a well functioning installation are crucial to get more universities to integrate SAP R/3 in their education.

## **Uppsala**

In Uppsala, R/3 is used as an education tool at two departments: The Department of Information Systems and the Department of Education.

**Computer Systems** At the Department of Information Systems, R/3 is used in a course called Knowledge and Management. The course includes expert and knowledge systems, and enterprise systems like SAP R/3, among others. The R/3 modules used in course are Logistics and Financials. The reason for choosing an installation of R/3, was that SAP were the only enterprise system company to offer an installation.

The teacher of this course first got an introduction course for 2-3 days and then a continuation course for 3 days. But since the courses were not aimed for teachers, but rather people who would be using R3 at work, she did not find the courses that profitable.

She states that there is a co-operation between the universities in Sweden and also in the rest of the world, in the way that the responsible for the systems at the universities meet and exchange knowledge and experiences, the so-called SAPPHIRE.

According to the teacher of this course, the students are not especially interested in R/3, since it is difficult to experiment with the system. "You can only use it, not change and develop it". She therefore thinks that R/3 is better suited for courses like economics, where it is possible to use the tool for simulations of different flows and processes. But on the other hand, she also claims that it is very useful for the students to learn how to "get on" with existing systems, in most courses you only learn how to "start from scratch". Besides, it is also quite common that R/3 is used in parallel with another enterprise system, so it is important to get a picture of how to put them together.

For this department, a competence centre, with the possibility to exchange for example laboratory lessons and other course material would be really useful, but as the situation is right now, they do not have the means to pay for services at a central installation.

**Human Resources** At the Department of Education, R/3 is integrated in the course "Pedagogy with concentration on staff development", using the Human Resources Management module. R/3 is used in the course to illustrate a general discussion about staff training, concerning needs, purposes and instances for education. Other enterprise systems are being mentioned in the course, but R/3 is the only one there is access to. The teacher himself has no formal education on R/3, and describes his skills in R/3 as novice, but he is very interested in getting more education.

He has had some co-operation with other universities abroad, in USA and Germany, concerning laboratory lesson material and exchanges of experiences. However, he can no longer use that material after an upgrade of R/3, which he was not informed about although he was to use R/3 in the course right afterwards. Of course, it was not possible to go through with the session. Shortly after that, the system broke down and has not been in use since. If they cannot get the system running within short, he is going to have to remove this part of the course.

He wants a competence centre to provide a forum for exchange of experiences, support and also technical reliability. He does not think that he will use the system more himself in that case, but perhaps that the other institutions that are involved in the "Personnel-program" could integrate R/3 in their courses too. But for that to happen, another attitude from SAP is needed.

**Conclusions** Generally we found that the most important issues are the technical problems that have occurred and also the relatively low competence level among the teachers concerning SAP R/3. The shortage of material and support is also striking. There is a general wish for more co-operations between the teachers who uses R/3 in their courses, so a competence centre could probably be a solution to that.

It seems like the common reason for using an R/3 and not any other enterprise system in the education is that SAP is the only one to have offered an installation.

R/3 is only used in single courses at these universities, there is not any more coherent use of R/3 through a whole education program.

## Universities not using SAP R/3 in their education

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Besides contacting universities that are current users of SAP R/3 we have also been in touch with universities in Sweden that are not using R/3 in their education. This subject was divided into two parts: the universities that according to SAP are aiming to introduce SAP R/3 in their curriculum and other universities that might be interested of using R/3.

### **Universities aiming to introduce R/3**

There are universities in Sweden today that have an interest in using an enterprise system like SAP R/3 in their education but for different reasons, mainly due to the lack of resources, they have not succeeded to introduce one. To find out more about their situation and their future plans we choose to interview representatives of universities that according to our contact person at SAP were aiming to introduce SAP R/3 in the education.

Topics that we wanted to investigate further concerned the current situation at the universities, i.e. what is being used at the moment, as well as the interest of a central installation and a competence centre. They were also asked to mention the type of courses where they consider R/3 profitable to use. The following text is based on the interviews made with Sven Carlsson and Mats Apelkrans at Jönköping international business school and Gunnar Ågren at Blekinge institute of technology.

### **Jönköping international business school (IHH)**

**The situation today** In the courses offered at IHH there is no practical use of enterprise systems involved. The students get a quick overview of the possibilities of enterprise systems as the institute invites guest lecturers to their courses but there are no laboratories or practical work. Since an enterprise system is a very useful tool and also a common part of today's work environment at many companies, the institute is aware of the disadvantage of not being able to offer the students more insight into such a system.

Among the courses at IHH today it would be of interest to keep laboratories in enterprise systems mainly in economics but also in parts of the computing education. The main difficulty for a relatively small university as IHH is the cost of introducing a complex system like SAP R/3 into their education. Since the number of courses where an enterprise system would be applicable is quite low, the university chooses to place their resources somewhere else.

**Future plans** One of the major aspects of the future plans at IHH is the development of a programme in enterprise system configuration, which is an occupationally oriented education. The students attending this programme will be offered several hours of computer-laboratories where the use of enterprise systems will be studied more deeply. Hopefully the students will get to use different kinds of systems but this is depending on the companies interest to co-operate with the university. A complex system like SAP is of great interest for the programme since there is a lot of possibilities of how to use the system. In order to get to know how other universities uses SAP R/3 in their education some of the SAP arranged workshops have been attended by staff from IHH.

There is not yet a financial solution to the resources needed for introducing enterprise systems at IHH and this is still one of the major problems. There are different solutions of how to keep an installation of a system but the alternative

of a university competence centre situated in Stockholm is probably one of the better. The primary reason for this is focused on the possibilities for the universities to communicate and exchange experiences with each other.

### **Blekinge institute of technology (BTH)**

**The situation today** The education at Blekinge institute of technology is focused on trying to integrate academic and commercial life in order to prepare the students for future work at national and international companies. At the moment there are unfortunately no courses where the practical use of enterprise systems is being offered, although it would be suitable for an university like BTH.

At BTH it would be convenient to use an enterprise system in the business administration education but also in courses as computing and human work sciences. In courses like accounting the students get to use Excel which is nothing like the complex enterprise systems that are used at the companies today. Therefore it would be beneficial to introduce real enterprise systems into the courses. Occasionally there are guest lecturers invited to keep lectures in enterprise systems but there is no laboratory work.

**Future plans** The use of enterprise systems in the education is a way of integrating academic and commercial life and therefore it is certainly something for a university like Blekinge to aim for. One of the future plans at BTH is to develop a course in enterprise systems.

Since SAP R/3 is a very complex system a local installation of it would require resources that are not available at BTH. Instead, a central installation with a competence centre would be preferable. The advantage of a competence centre is mainly due to the increasing possibilities to exchange knowledge about the system with other universities. How to finance a central installation is still an unsolved problem and something that has to be further investigated.

Some preparations for a future use of SAP in the education have been done by attending SAP workshops and also by reading material from other countries where SAP R/3 is used at the universities.

**Conclusions** When handling the material that covers the interested universities there were some interesting and common aspects that came up.

Firstly, the most difficult problem that the universities wanting to introduce SAP R/3 have to deal with is the financial part. A local installation is in many cases excluded since it is too demanding of resources. A development of a central installation is more interesting but there will still be costs to cover. These costs can not be financed by foundations since many are unwilling to sponsor education that is tied to a particular company.

Secondly, the work with introducing an enterprise system at an university is very time consuming. It takes many research hours to become acquainted with the system and to investigate how it can be used in an optimal way. Hopefully the development of a university competence centre can make the progress of introducing a business system at the university smoother.

### **Other universities**

To get information to use as a base for this part of the report we e-mailed a survey to about 15 different universities, see *Appendix C*. This turned out to be a not very efficient way to get information, as the response frequency was not very high. Totally we only got five surveys back. This means that the result in this part of the report is not statistically safe.

The survey we sent out was very generally aimed, we wanted primarily to find out if there are any universities that use some sort of enterprise system in their education.

**Results and conclusions** Most of the universities that replied indicated that they do not use any enterprise systems. The reasons for this is not only because there is a shortage of funding but also, as one person wrote, that focusing on a single system might mean that they loose some of the width in their education.

A central installation might lower the costs and therefore universities like those mentioned above would be able to use SAP R/3 in their education. Furthermore, if the universities got more support from SAP they might be more interested in using SAP R/3 in their education.

## **How is R/3 used in the world?**

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We have sent a questionnaire – see *Appendix D* – to about 25 different universities that are using SAP R/3 in their education. We only got a handful of them back, but we got lots of information from those who answered. All of them who answered were positive to our work and were willing to answer more questions. They were all interested in more co-operations between universities in Europe. (Our questionnaire was mostly sent to universities in Europe.)

The answers that we got show that:

- almost every university has some kind of co-operation either with another university or with a company using SAP.
- most of the teachers were well educated in R/3.
- they were using R/3 in many different courses and there were co-operations between the different courses.

### **A summary of how different universities (and highschools) are using SAP R/3**

**Australia** At Queensland University of Technology they have done a lot of research on how to use enterprise systems in education. Two of these reports are summarised in *Appendix E*.

They are using SAP R/3 in a very advanced way, they configurate the system in one course.

**Belgium** At Phlimburg highschool they are using a businessgame called PHLOGISTICS. It is a virtual company where the students execute different tasks of the logistic chain (ordering, procurement, delivery, ... ).

At the **Université de Liège** they are using SAP R/3 in courses for economic students and engineers students. They have been using R/3 as an education tool for four years.

**Czech republic** Prague Economics University is using R/3 in their Computer Science courses. They have also just started to use R/3 as an education tool. They have co-operation both between their own courses and with other Universities by exchanging lab-materials.

**Denmark** We do not know so much about how they are using R/3 in Denmark. The only thing we know is that they have a competence centre in Denmark.

**Netherlands** Is also developing an UCC. They have more experience of using R/3 than we have. The **Amsterdam School of Business** has been using SAP's enterprise system as an education tool since 1992. And they are responsible for the share SAP installation.

They have now an introduction course in SAP R/3 in that course the students get a 20 hours introduction to the system. They are using IDES in that course and they let the students execute themselves in a complete process from creating master data to delivering of the product.

Their main course is a business simulation using a separate R/3 installation without IDES and the course is described in Enterprise system as a business simulation.

**Poland** They started the installation of R/3 this autumn (2001) at the **Akademia Podlaska**. They are going to use R/3 in courses about Management Systems. They want to use R/3 through the entire education.

### **Which modules are used in different courses?**

R/3 is developed to be able to apply to almost any kind of business, therefore R/3 is divided into eight modules. To get some kind of information about how different universities are working with R/3 we asked the universities which modules they were using in different kind of courses. Here is the result.

**Economics (Used by 3 universities)**

- 
- Financials (Economics) – 2
  - Supply Chain Management (Logistics) – 3
  - Customer Relationship Management (Customer care) – 1
  - Human Resource Management – 1
- 

**Computer Science (Given by 3 universities)**

- 
- Enterprise Portals (Portal) – 1
  - Financials (Economics) – 2
  - Supply Chain Management (Logistics) – 2
  - Product Lifecycle Management (Productions) – 1
  - Business Intelligence (Information) – 1
  - Customer Relationship Management (Customer care) – 2
  - Enterprise Buyer Professional (Co-operation between companies) – 1
  - Human Resource Management – 2
- 

**Logistics (Only given by one university)**

- 
- Financials (Economics)
  - Business Intelligence (Information)
  - Customer Relationship Management (Customer care)
  - Enterprise Buyer Professional (Co-operation between companies)
  - Human Resource Management
- 

**Human Resource (Only given by university)**

- 
- Financials (Economics)
  - Human Resource Management
- 

**Information System (Only given by one university)**

- 
- Financials (Economics)
  - Supply Chain Management (Logistics)
  - Business Intelligence (Information)
  - Customer Relationship Management (Customer care)
- 

**Engineering (Only given by one university)**

- 
- Supply Chain Management (Logistics)
  - Product Lifecycle Management (Productions)
- 

We also got some examples of how different universities are using Enterprise systems in different education programs:

**Enterprise Systems as a storage of information** Most of the enterprise systems have some kind of example companies used for education of the system. In R/3 it is possible to use IDES. One way to use the enterprise system in an education program is to let the students study one of the example companies and that way learn about the structure and functionality of the system. They will also be able to study process flows, data and information flows, models of business scenarios and organisational structures.

It is also possible to use the enterprise system as a simulation tool. Students can simulate transactions to start with. This can be done together with lectures about businessprocess analysis, database integrity or even client-server architecture. Or else it is possible to simulate an entire business process like "Prodcement-2-Pay" or "Planning-2-Produce". There are many processes like these in an enterprise system. Depending on what subject the students are taking they will learn different things.

To extend this it is possible to let the students modify these pre-defined processes. This is for example done at a course at Queensland University of Technology. In this course the students are asked to add for example employees in SAP R/3, after that they discuss the integration in an enterprise system. But this kind of courses demands good system knowledge of the teachers.

**Enterprise Systems as an Implementation Tool** To use an enterprise system as an implementation tool demands a lot of knowledge from the teachers. But it is not impossible to configure SAP R/3. There are a few universities around the world that have courses that include configuration of R/3. To start with there exists courses where the students are allowed to investigate how the system is configured without being able to change the configuration. In these courses the students get some insight in how different processes are configured. This gives the students knowledge about the structure and design of the system. If these exercises are combined with lectures about implementation methodologies and tools the students will learn more about project management and system design.

To take these courses even higher some universities give their students a company and then they have to configure an enterprise system for that company. This is a big challenge for the students, but it is not impossible to succeed.

**Enterprise Systems as a Development Environment** One way to use the enterprise system is to let the students learn the programming language, this way they solve simple configuration tasks without being aware of the system functionality. Another way to use the system in a course about developing is to let the students use developing tools and make new applications to the system or change existing applications. This way the students learn how to work with an integrated system.

**Enterprise Systems as an Administrator Environment** It is also important that students learn how to be the administrator of an enterprise system. There are lots of things to think about when administrating a big integrated system. It is possible to split the administrating task into

- User administration
- Transport administration
- Database administration

All these tasks are combined with security and communication aspects. It is important to be aware of the legal aspects that are involved in an enterprise system, it has to be assure that only the right people can reach their information.

**Enterprise Systems as a business simulation** Another way to use an enterprise system is to let students from different departments run a company together. On Amsterdam School of Business they have a course like this. The course is a co-operation between students from different specialisations, like economics, informatics, logistics and bank and insurance. They are about 75 students working on the same company and there are four different companies in the same course. The students take part of the daily running of a department of the company. They are working with their company for a semester and then a new group of students continue working with the company. The four companies they are using in Holland are connected to each other so there is some sort of co-operation between them.

### **Conclusion**

There is lot of information about using SAP R/3 in education purpose around the world and everybody wants to share his or her experience, so do not be afraid to ask for help. It seems like all the universities would like to have more co-operation between different universities to be able to exchange information and give common courses.

One of the biggest problems with teaching courses in enterprise systems is that the teacher needs to have a good education in how the system works. Many teachers do not have the time or the opportunity to get that knowledge. One way to solve this problem is to have distance courses using enterprise systems. If we are going to have a central installation of SAP R/3 in Sweden, perhaps it would be possible to have distance courses. There is more information about distance courses using enterprise system in *Appendix E*.

### **Discussion**

We know that R/3 is a complex system but perhaps it is not as complex as we thought? During this project we have seen that it is possible to use it in education programs, although it requires well-educated teachers.

In order to develop a UCC we need well educated (in R/3) persons to run it. Otherwise it will be useless since there has to be some administration behind. From what we have experienced in our research there are two major things to consider. Firstly, to start a UCC there has to be some persons that are willing to spend a lot of time in the beginning administrating the UCC and help the users. Secondly, SAP has to give a helping hand, and unfortunately they are not very willing to do so in Sweden. We also got two tips from the Netherlands who also are working on a UCC; they told us not to try to make the UCC to big to start with and also to let the developing process take its time.

Another question is: do we need a UCC? Perhaps it is enough with a central installation? A central installation would make it possible for smaller universities to introduce SAP R/3 in their education. Although it might become too expensive for other universities that already have a working local installation.

Is it possible to create a competence centre without forcing everyone to use the central installation? What happens with the support of the local installations in that case?

What can be done to make more universities use R/3 in their education? The more universities/teachers that use SAP R/3 in their courses, the more competence, experience and ideas will be accessible via the UCC. Perhaps more support from SAP?

From what we heard the teachers in Sweden would appreciate more support from SAP. But the latter admit a more restricted approach towards the universities than is usually the case in other countries. That is partly the reason for this step towards a competence centre, i.e. to create a separate institution to ensure the maintenance of a competence network. But to create a UCC there has to be more support from SAP.

Another suggestion is a co-operation with universities in other countries. This might be profitable for Swedish universities. The international universities seem to have more experience, more ideas and more material. Distance education might also be of interest for smaller universities since the initial cost of educating the teachers is quite high.



# Helpdesk

Our task in the project was to look at channels to support users of the SAP business system, and how a competence centre could be used to let users learn from each other and take advantage of each other's experience of SAP business system. In the project, our group was assigned the task of specifying a helpdesk for users within the University Competence Centre (UCC).

SAP has developed a wide and thorough customer support system with a helpdesk that users may access in a number of ways. However, this only includes SAP and R/3 specific problems and is therefore not adequate as the only source of support in our case. The goal with a UCC Helpdesk is to provide a system that handles relevant information, which will aid teachers and students in their work. This could include general course information, lab resources, documents, files, and solutions to given problems etc...

The UCC is a distributed system and users within it may work in different places at different hours of the day. Therefore, people should be able to communicate and help each other no matter when and where they work. Given this, we have studied information channels that might serve in the helpdesk and discussed how these could be used. We have had contact with a number of persons at the Swedish universities involved in the UCC as well as foreign universities where competence centers already exist. Furthermore, feedback from surveys given to users with different level of expertise has further guided us in the specification of an extensive yet quick and easy helpdesk.

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## Methods

The first step in our work was to set up some methods for how we should work and what should be done. First of all, we must identify the different kind of users of the University Competence Centre. Who will use the system and for what purpose? What kind of information will circulate in the system? Is it

primarily SAP-related, or could the system be able to expand to contain other users and information? How are different users going to interact with each other? Do we need to separate classes of users? Hopefully we will find some answers to these questions and finally be able to come up with a suggestion for the helpdesk of University Competence Centre.

We concentrated on the fact that the system, at least in the beginning, would be used for SAP-related courses at different Swedish universities. The user group will contain both teachers and students. Students should be able to exchange information with each other. The areas aimed for teachers must be protected from student access so that teachers can exchange information in a secure manner. It is important that we base the helpdesk on a communication system that can provide those mechanisms.

What kind of communication channels should we use for our purposes? Are the preferred communication channels dependent of the age of the user? What kind of skills do the users believe that they have, compared to their actual skills?

We didn't want to speculate entirely on our own about what communication channels the involved people are using to get guidelines and help. Neither had we wanted to speculate on how they are using them. Therefore, we must get answers from people who are using the SAP/R3 system in the education today as well as those who will use the system in the future. One good way to collect this kind of information is through a survey with relevant questions. The next thing to look into was the kind of relevant questions we should ask.

We had to get an apprehension of the age and gender of the users to see if some behavioral patterns were age related. We also had to get an apprehension of how the users feel about their own skills related to the education they have on the SAP/R3 system. These kinds of questions are subjective and can't be measured, but it will bring some light over how intuitive the SAP/R3 system is.

How often the user uses the SAP/R3 system is an objective question, but can it be measured? Another question we had to ask is which communication channel the users prefer to use if they need help. Which communication channels have the users heard about and used? Which of these do they use more frequently and also - most importantly - why or rather why not. Is it because the channel is insufficient for their needs or is it because they have never tried to use it due to the behavioral issues? Maybe it is because of the usability or learning thresholds, that the users don't use some of the channels.

To ease up our work a little and to be able to get measurable answers, we had to provide all users with predefined answer alternatives. We had to come up with examples of different communication channels, divide users in to properly selected age groups and provide them with non-measurable questions where

they could freely come up with own ideas and suggestions. All users had to feel that their answers were equally important and independent of age, gender or skills. A bad example of questioning would be something like this:

*How old are you?*    20–25,  25–30,  30–35,  35 and older.

If the user is older than 35 he/she might probably throw the questionnaire away without answering any of the questions.

Another issue is: Which gender should come first?

*Are you*    Man,  Woman or *Are you*    Woman,  Man.

After several discussions internally in the project group we decided to send out the questions summarized in *Appendix D*. We did not expect a very high answering frequency but we hoped that the material would give us some guidelines to propose a useable solution. If we were lucky we might be able to get some new ideas from it.

Users are often busy and do not wish or have time to answer several questionnaires sent by different project groups or too many questions in the questionnaires. Therefore we must concentrate the questions to the important issues and try to coordinate questions from other project groups to one questionnaire. The rest of the issues could be discussed internally in the team or externally at the presentations or meetings. Examples of those issues could be availability of the helpdesk system and how it should be organized. Is it a matter of cost how dynamically, interactive and reliable help the system can provide? How big is the user group and how should the costs be balanced against the usability, availability and reliability of the helpdesk system.

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## Channels of Communication

A UCC Helpdesk should meet a number of requirements in terms of when, where and how users want to get help. The possibility to communicate, share documentation and files as well as getting help on the right topics means that helpdesk should provide a number of functions. Based on this we have studied possible channels of communication and reviewed how well these comply.

### **(Bulletin Board System) BBS**

A Bulletin Board System (BBS) is an electronic meeting and announcement system where users can communicate and share information without having to be online at the same time. Its original intent was to allow users to discuss topics by writing and reading messages off the board system. Modern BBSs also let users share files, similarly to FTPs, but through a more convenient and easy-to-use interface.

**First Class** First Class is a widely used communication platform that goes beyond the functionality of traditional BBSs. It is meant to be a complete conferencing system suitable for any type of organization or business. It can either be downloaded as a small client or be run off the web and is supported by Windows, Macintosh, Unix as well as handheld computers. Naturally a server, in our case the base for the help desk, is needed where all information is stored. The task of administrating this First Class server would fall on the administrator for the help desk.

Users can take part of discussions or conferences (cluster of discussions) by posting messages directly, or via email, share files and chat with other online users. By creating user groups, different users can access information relevant only to them. The message history holds important information for the specific message, including who has read it. The calendar makes it easy for everyone to see when things happen and depending on how the system is administered; users may add their own activities to it.

**Our Context** First Class could be very useful in the context of the UCC. Despite its complexity and size it is quite easy to get started, and the system is fairly intuitive. Since it offers an easy web interface besides the downloadable client, users may use at any time if they have a network connection and a web browser. Because of the way First Class allows information and users to be grouped, different problems can easily be identified and dealt with. Moreover, since all users may take part of the discussions, solutions to given problems could be given by anyone that has an answer. This of course requires that users actively use the system. The file function is welcome as it allows for teachers and students to transfer important documents. Furthermore, the calendar makes it easy for everyone to check for important events.

The number of tools and functionality provided makes First Class a good candidate for a UCC. Drawbacks include the need for an administrator and the fact that many people are new to the system. The latter is not a big problem though as First Class is easy to use and there is good support for beginners.

#### Advantages

---

- Available almost anywhere and anytime
  - Provides broad and deep information on given topics (provided people use it)
  - Good support for beginners
  - Ability to see who has read messages
  - Supports a wide range of functions and services
- 

#### Disadvantages

---

- Requires an administrator
  - People must learn the system
- 

**Conclusions from survey about BBS** BBS is according to the survey something the users have relatively small experience of about 5 % have experience from BBS. Many users have answered in the survey that they have not heard of BBS and that they have no experience of BBS.

When we discussed this among the members in the project group we came to the conclusion that BBS is really an old concept. This might be one explanation why the users in elderly users groups might have more experience from BBS and the younger users chose other channels for communication. We can therefore say that the traditional Bulletin Board System is quite unknown to most users today and it is probably not too useful in the UCC.

First-Class is a system that in some ways remind of BBS but it has a lot more features such as sending messages and files and so on. We believe that the First Class system is a model that can be very useful in combination with online help and FAQ.

### **Paper Manuals**

Paper manuals are one way to give users information on how to use a system. The biggest advantage is that most people are familiar with using manuals. The disadvantage with them is that they often are considered boring and they can be too extensive. Paper manuals should be limited to the most essential information just to give new beginners the needed information to get started. When this is done, further help should be reachable from within the system.

**Our Context** To support the UCC, paper manuals might have very limited use because the questions that users have vary a lot over time. To cover all these questions the manuals grow to be very large. As mentioned earlier, extensive paper manuals are very boring and people avoid them as long as possible. A faster and easier way to receive help is to prefer and this is, as we believe, the main goal of the competence centre.

#### **Advantages**

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- Familiar and easy-to-use medium
  - Can be used without access to a computer.
- 

#### **Disadvantages**

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- Boring
  - Irrelevant and/or limited information
  - Time and space consuming
- 

**Conclusions from survey about Paper Manuals** The survey shows that about 11 % of the users think that paper manuals is the best way of reaching help and that this is the channel they have the most experience in. It also shows that in 25 % of the cases, they turn to paper manuals when they need help. However, the survey shows that paper manuals are considered to give the least accurate help for the user. This doesn't mean that the users don't get any help from paper manuals but it implies that users get more accurate help from other help systems, such as online and built-in help, phone support and e-mail.

This should be one of the main reasons why a competence centre is needed to provide the user with better help than the paper manuals provide and the possibility to find the accurate help at minimum effort.

**Built-in help**

Most systems have some sort of built in user help. This help is designed to give the user information on how to use the system in an effective manner.

The user help usually consists of some graphical interface where the user can search through indexed files for the topic that covers the subject of the query. This is fairly effective and if the user has some earlier experience from using this kind of help system it is easy to get started with.

There also exists more interactive help systems, which give the user hints about how to solve tasks more efficient, and this help is presented with pop-up messages or sometimes in the form of an assistant.

A combination of both these variants might be optimal as built-in help in complex systems.

**Our Context** A built-in help system does not involve that users interact with each other but with the system. Because of this fact, we believe that there are other channels to use that are more suited if users are to learn from each other.

One possibility is that the competence centre might contribute with knowledge about what the most frequent problems are for users, and maybe this will point out how to evolve the built-in help system to be more suited for their task.

**Advantages**

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- It is always available
  - Quick to search within
- 

**Disadvantages**

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- Limited amount of information
  - Sometimes hard to understand
  - Deals with standardized static problems
- 

**Conclusions from survey about Built-in help** The survey shows that Built-in help is the help that users have most experience of using, about 15 %. It is also very frequently used and about 23 % said it to be the most frequently used help and only paper manuals are used more frequently according to the survey. However, the survey indicates that few users believe it to give the most accurate help, about 10 %, and this could be compared to online help for which 67 % of the users said to give the most accurate help. These numbers have high uncertainty due to the fact that the survey relies on very few answers.

Our conclusions are that there might be a lot of work to be done on the built-in help system in SAP/R3 to give more accurate help for the user. This result should be of high interest for people who work on developing SAP/R3 built-in help. On the other hand the conclusion is that it has less relevance to the

competence centre, but it is noted. Built-in help is a very important part of the user help, maybe the most important, and it is very desirable that users can learn from each other through the competence centre on how to use this help.

### Online help

This means take help from web pages that contain help information, which is accessible through the Internet. The only thing needed to make use of this kind of help, is an Internet connection and a web browser. The help site often contains a portal, which shows the different help sections available. The page can contain almost any kind of help such as: FAQ (Frequently Asked Questions), contact information (E-mail addresses, phone numbers), free search for help documents, forums and more.

**Our context** To be able to reach help through the Internet can be very useful in a competence centre. The site can provide almost any kind of help that we are interested in, as mentioned above. Online help will work as a base for the other help methods available.

#### Advantages

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- Easy to make updates
  - Easy to access
  - Always available (Office work time)
- 

#### Disadvantages

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- Limited amount of help
  - Requires of an administrator
- 

**Conclusions from survey about Online Help** Online help seems to be the best way to get help according to the survey. As much as 67 percent of the persons asked think that this is the best help channel. It is also one of the most common ways to access help according to the survey. When looking at experience from different communication channels, online help comes in the third place among the channels. About 13 percent have answered that online help is the kind of help that they have the most experience in. Only email and built in help are the channels that users seem to have more experience in. The explanation to this is that email and built-in help has been common and widely used for a long time. Hence people are more familiar with these services. Online help is appreciated by the users and can be a good help source. But online help is a very general term and can include many sub channels. To gain maximum effect from online help it is very important that it is structured in a natural way so the users can navigate and find what they are looking for. There is also a need for maintenance and updating and that means a lot of administration work.

Finally we think that online help is a good base for a competence centre and should be increased with other services.

## Telephone Support

The telephone is something everyone has access to and phoning someone is more personal than writing a letter. It is also very convenient when you don't know exactly what you want help with and need some guidance. You can also easily be redirected to another person that knows more about the problem. You hopefully get your answers very fast, and can discuss the problem. Misunderstandings can easily be corrected.

Phone support is restricted to some hours a day and those can be very short. You can be put on hold or be placed in a phone switch. The support can only talk to a limited number of persons at a time and all others have to wait, often resulting in long phone queue. The phone calls don't come when you want them to, rather when you don't want them to. To have somebody to answer the phones costs a lot of money and time. To phone somebody can take a lot of time and costs money as well. The amount of information you can "transfer" is very restricted and it can be very hard to visualize pictures and large scenarios.

**Our context** The telephone is a good complement to other ways of exchanging information. It is a good way of giving support to users. It often requires that the person receiving the questions have a lot of knowledge about the subject, when trying to understand the problem without any pictures or text.

The user gets the help fast, if the person is available. It's impossible to have somebody always available. Therefore if it is to be used in the UCC it will probably be open for a restricted time some days.

### Advantages

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- Personal
  - When you don't know exactly what the problem is
  - Fast response
- 

### Disadvantages

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- Costs money and time
  - Hard to exchange large amount of information
  - Phone queues
  - Difficult to visualize pictures
  - Restricted time
- 

**Conclusions from survey about Telephone Support** When it comes to telephone support, the survey shows that it is one of the channels that users have most experience from. But we have noticed that telephone support seems to be the alternative that the users take as the last alternative when they need help. The reason why it is used in last hand may be bad experiences from earlier attempts or the user can feel pressure for explaining his problem in a correct way. The answers also show that the help users get from telephone support is not as accurate as they would like. We consider that telephone support is a

good complement as help channel. This is so because of the ability to prevent misunderstandings and the possibility to easily explain the problem and get quick help. To make this work efficient there is a demand of competent staff.

## E-mail

Email does not require somebody to be available at a specific moment. You can answer or write the mail when you have time. Everybody knows what email is and almost everybody has an email address. It is easy to use and easy to learn. It requires no extra program and doesn't require many changes in the computer. Some can be 'accessed directly from the web. Mailing lists can be used to send out mails to a lot of people at the same time. The amount of information you can send is large in plain text. But large files and pictures cannot be sent.

It can be hard to retrieve email-addresses and it takes time to write emails, depending on the person of course. You don't know when the person is going to read your mail or answer it. If a misunderstanding occurs, it might take many extra mails to clear it up, and a lot of time too. If you want to use mailing lists you need to assign someone to update those. It can be difficult to find the important information if you get too much. This can happen when you have large mailing lists. You often get a lot of junk mail.

**Our Context** Mail is used a lot and it does not require too much extra work to get a couple of extra mails a day. Mailing lists can get the information out to a lot of people easily. Hopefully someone wants to take the time to answer the mails.

### Advantages

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- Easy to use and learn
  - Many persons use it
  - Mailing lists
- 

### Disadvantages

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- Don't get answers directly
  - Update mailing-lists
  - Lots of junk
- 

**Conclusions from survey about E-mail** Most of the users have experience from using mail according to the survey. It shows that mail is the second alternative that users have most experience from. Mail is a popular way to get help because one can easy send a mail when a problem occurs. Most people have access to a mail account and this technology has been present for many years so most people are familiar with the concept of mail. There are no personal contact included which can make people nervous and thus appreciated by some users. One important aspect is that there are most often no guarantees to get an answer within a certain time. We have no actual numbers indicating how well mail works as a help channel for the users so we will try to give our view of this channel.

**Chat & IRC (Internet Relay Chat)**

For people with some knowledge of computers and the use of Internet, chat is well known as an interactive channel for communication. It is possible for a user to find an interest group and chat in real time discussions with the members in that interest group. There are a very large number of sites that have links to some sort of chat forum so users have a lot to choose from.

Chatting is easy to get started with and the user can choose to enter different rooms to meet with a special group of people or just one or a few other users. The user himself can create these rooms. It is also possible to send private messages, ignore a certain user or to seek for another user. Some chat sites also support sending pictures and audio messages.

Chat is closely related to IRC, which is shorthand for Internet Relay Chat. The difference is that it is possible to enter a chat from an ordinary homepage and you don't need any additional software. With IRC you will need special software and there are several different to choose from depending on what platform to use and what the user like. To mention some of the software we have PIRCH for Win 95 & NT, mIRC for Win 3.x & 95/98. We also have AmIRC for Amiga and sirc for Unix.

**Our Context** One advantage with chat is that the users from the universities would have access to real time communication through this forum. This provides possibility for SAP users to get help from each other and to learn from others. Teachers could get hints from colleagues and exchange experiences on how to structure assignments or elaborations on different subjects.

The chat could be used to send out a question from one user about some matter and then hopefully some answer will be sent back from other user after some time. The important thing for this to work is that the users participate in an active manner. Otherwise there is a great chance that a question from one user would stay unanswered too long with the result that users would loose interest in the chat.

Another way to use the chat is as a complement to some other channel such as mail and phone. We could have a situation where two or more users decide to use the chat at a certain time instead of phone, which is more expensive, or because mail is slow when you are having a discussion. This is probably the most realistic use of the chat when we are considering the UCC.

**Advantages**

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- Communicate in real time
- 

**Disadvantages**

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- Unknown to some people with less computer experience
  - Requires active participants to work well
-

**Conclusions from survey about Chat & IRC** The survey shows that the users questioned have very little experience of chat and IRC. This might be because of the fact that Chat and IRC are quite new features in communication and mostly younger people use it. There are certainly many users of higher age that in fact use Chat and IRC but probably even more among the younger generations. Chat might need a few more years before it becomes fully appreciated when used to perform such tasks as giving users a communication channel for support and help.

We would like to point out that Chat and IRC can be a very good complement if users who usually communicate using E-mail want to do so in real-time. This might be because they want to solve some urgent issue more efficiently. It is important when using IRC and Chat that participants are active and agree on some kind of order for the meeting to achieve good results.

### **FTP (File Transfer Protocol)**

FTP is a protocol used for transferring files between computers across networks. There are many Internet sites that have established publicly accessible repositories of material that can be obtained using FTP, by logging in using the account name anonymous, thus these sites are called anonymous ftp servers.

Common FTP-applications are WS-FTP (PC) and Fetch (Macintosh). Most of the web browsers can also handle FTP for file transfers but is not that reliable as the FTP-applications.

**Our context** For the competence centre FTP could preferably be used to provide a file archive. This file archive can for example contain educational labs, documents etc. The users would have to learn how to handle and make use of FTP-applications before they can use this kind of help.

#### **Advantages**

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- Very commonly used
  - Fast transfer
  - No limitations of file size
- 

#### **Disadvantages**

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- Must have a file server
  - Works only for files
  - Must download before viewing documents (Can seem to be complicated for new users)
  - User must learn how to use it
- 

**Conclusions from survey about FTP** The survey shows that people do not have very much experience from using FTP. That mustn't be seen as an obstacle for using FTP for file distribution. Because it is quite easy to learn how to use FTP it can become a very powerful tool in exchange of elaboration and documents.

Our conclusion about FTP is that it can preferably be used to provide file archives. There will be need to have detailed instructions how to get/install/use an FTP application.

### **Newsgroups**

Usenet is a worldwide-distributed discussion system. It consists of a set of newsgroups with names that are classified hierarchically by subject. People using computers with the appropriate software post articles or messages to these newsgroups. These articles are then broadcast to other interconnected computer systems via a wide variety of networks. This will not guarantee any fairness or correctness. Anyone can give his own opinion, at anytime, not necessarily always fair or correct.

Some newsgroups can be moderated. In these newsgroups the articles are first sent to a moderator for approval before appearing in the newsgroup. This will cost a lot of resources, but ensure more correctness to the discussions. It is preferable if the moderator is closely involved in many different applications of the system. Another aspect of moderated newsgroups is that it will take time for moderator to go through all material and that will introduce slowness.

Advantages of newsgroups are that it is easy to find the right forum for certain questions or observations. Other user thoughts and theories can make life easier for a user even before the problems occur.

There are also possibilities for private discussions with other members. In those forums the user can discuss very specific problems without adding unnecessary information redundancy to the channel and this is the main advantage.

**Our Context** Newsgroups can be a very good complement to BBS.

#### **Advantages**

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- Categorized topics that match users interests are easy to find
  - Possible to join public and private discussions
  - Depth of discussions can go far if many users have a common interest
- 

#### **Disadvantages**

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- No guarantee that contents in articles is correct.
  - Moderator might be needed to control contents
- 

**Conclusion from survey about Newsgroups** Half of the people in our survey have tried newsgroups at least once, and of those that have not, there is an even distribution between those who have and those who has never heard of it. This is not a barrier as newsgroups are very easy to find and use and potential users do not need more than a brief introduction to get started.

However, newsgroups do not introduce any extra functionality beyond what is offered in First Class. Basically, First Class allows ongoing discussions and messages to be posted under categorized topics. Hence the redundancy for newsgroups as a channel of communication in the UCC helpdesk will be higher than with First Class.

### **ICQ (I Seek You)**

ICQ is an Internet tool that informs you who's online at any given time and enables you to contact them at will. With ICQ, you can chat and send messages, files and URLs. Your messages travel across the net in real time.

The program runs in the background, taking up minimal memory and net resources. While you work with other applications, ICQ alerts you when friends and associates log in. You see all who is online and can choose who to ask your question.

You can also ask questions even if the user is not online. The user gets questions automatically when he gets online. If it is an urgent problem, you can use the SMS function or IP-telephony.

The main disadvantages are that ICQ demand software installation and "know how". You must have a personal ICQ-ID and the address book is stored locally. That will restrict flexibility to one stationary computer (or a few). The contact list can be very messy if many users are involved. It is often very irritating when you are in a hurry and someone takes your attention and time to make you solve his or her problem, which you are not at all interested in.

**Our Context** A short ICQ-list with some key persons who can form some kind of support group and get paid for their time could be a good complement to the main information channel. This kind of service is useful when problems occur at inconvenient times of day. One candidate for the list could be the moderator for the newsgroup or administrator of the help system.

#### **Advantages**

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- Real-time communication
  - Many features
  - Lot of user info e.g. Personal info, on-line info
- 

#### **Disadvantages**

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- Requires Software
  - Unique ID-number
  - Local address book
  - Users must learn how to use it
- 

**Conclusions from survey about ICQ** ICQ is a relatively new innovation and thus the survey shows quite low knowledge about ICQ. The users' experience of ICQ is about the same as BBS, FTP, chat and news groups which all are quite new tools. In the survey some users have answered that they have not tried ICQ and some users that it is very easy to use but not very useful. We think that

ICQ provide many good channels such as private chat, offline messages, SMS and file transfer. One problem is that it can be irritating in case of message overload.

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## Results

The result from our work on the issue of how to configure a useful helpdesk in the UCC can be summarized as follows.

- The survey has shown that users are most positive to receive help in the form of online help or built-in help and if this is combined with a FAQ (Frequently Asked Questions) which could be reached from a web page, this is probably the best solution.
- The survey also showed clearly that users prefer to have help reachable from their workstation and this is probably so because the user doesn't have to leave the session and go look for help. It could also be noted that it's probably more cost effective if the help is reachable from the computer in built-in help or online because of this fact.
- We have also noted that few users have telephone as best alternative to reach help and they chose this as last way out when they seek help. This implies that a help desk should not be centered on telephone support. However this could be a good complement to online help when it's very important to avoid misunderstandings.
- When the basic help desk is launched it would be desirable to add more features that would allow users to exchange experiences from using SAP/R3 for educational purpose. We can think of these features as sub channels for communication. These sub channels would provide ability to share course material and ideas on how to conduct education on large business systems such as SAP/R3.

Many of the tasks that the UCC help desk would be able to solve can be solved by using ordinary email system or maybe by telephone if we assume that the user already know who to turn to. But we feel that a more structured help for the user is desirable and necessary and since there are very useful tools with many features to support well structured help we hope that such tools will be used when the help desk is launched. This would provide the user with an interface to an organized and more structured help desk.

## Discussion

When we put together the questionnaire, we were aware that the answering frequency could be quite low which actually was the case. The answers can only be used as guidelines for the conclusions we made and not as guaranteed statistic material.

According to the interviews, there is a desire to have some kind of centralized UCC. Because of SAP/R3 being a very complex system it demands lots of resources such as competent personnel. Small universities usually don't have those resources so a UCC would be a suitable solution. Often there are only a few courses where such business systems as SAP/R3 are used and thus the cost for keeping competent personal might be too high.

One way to ease up the implementation of UCC is to let SAP be part of the development. Their interest to participate in the development seems to be quite low. The University representative for SAP Sweden says that a helpdesk is indeed important in a development of a UCC, but SAP has no resources to participate in such a project. Her idea is to use one of their partners, which will add a new economical aspect.

The conclusion is therefore that we should not base the UCC only on services for SAP/R3.

One university had tried to finance their focus on business systems via the KK-foundation but were rejected because they were too focused on one commercial company (SAP in this case). Several universities were aware of these risks and didn't want to get stuck in one big commercial system such as SAP/R3. The universities have the ambition to focus on several kinds of commercial business system in the education. Therefore it is important for the UCC to be as general as possible and not bound to one business system.

To sum up the results and discussions from the survey and the work done in this project group and to give some suggestion on how to configure the user help we give the following advice:

### **Suggestions**

- An administrator is needed to make sure that a main web page is working and is updated with new links and contact persons.
- Use a FAQ to handle the most common problems that users have. This FAQ should be reached from the main web page.
- Since we have found that the First Class system is very useful and contains many of the channels that we have discussed in this report, we believe that if an interface is implemented from the web page towards First Class this would be the best solution.

**A short suggestion based on our conclusions** The heart of the helpdesk should be a First Class server. That is where the main part of the information will be accessible. Here you can find help about First Class, UCC etc.. The help will be adapted to fit the proposed system and possible users. The information accessible for students and teachers will be separated.

Students:

- Course info, labs and help adapted for students
- Discussion forums, under each course and for larger subjects.

Teachers:

- Course design, exchange of experience in different subjects and specialized help for the administrators.
- Discussion forums, one for all and different for system administrators, course teachers etc.

What to put on the server is up to the system administrators and teachers. This can easily be changed to fit the demands. This is just a suggestion to make people see the possibilities of a future helpdesk:



To supplement the First class server, a home page can be added. This could contain short info about the UCC helpdesk, a FAQ and downloads of the FC client. Additionally, there can also be contact info and a link to the web based First Class server.



# Technology

Our assignment was to look at the technology, i.e. the hardware and the software, needed to administrate the central SAP installation. This involved contacting manufacturers, investigating different solutions, and comparing prices.

To get us started, Cathrine Caldefors at SAP provided us with contact information to their partners. We contacted them, and found that some of them seemed more interested than others. Some contacts resulted in interesting visits, others just in email correspondence and phone calls. Furthermore, we discovered that it might be possible to use existing hardware for the UCC, which is why we investigated that alternative as well.

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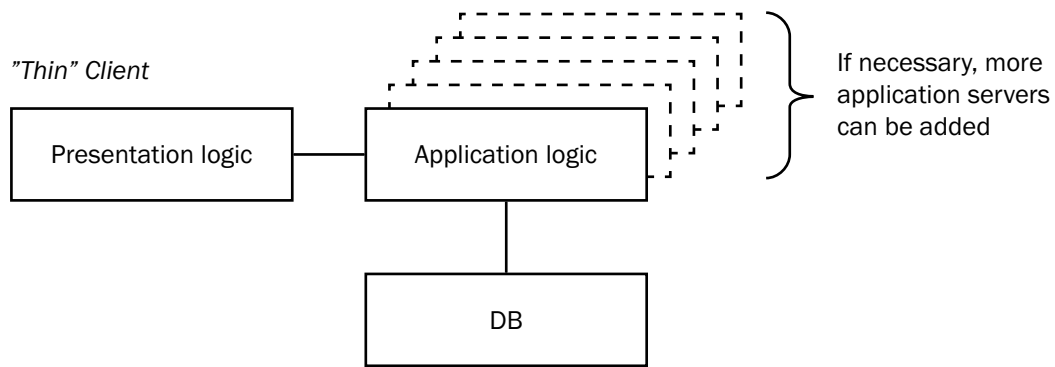
## Methods

### Visits

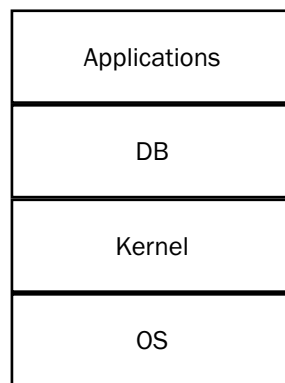
All of our visits have been more like discussions than interviews. We usually had only a few generic questions prepared; more detailed questions were brought up during the visits. These meetings have provided us with a deeper understanding of our needs.

**SAP** To get an overview of the technology behind SAP we visited Jan Lindgren, responsible for technical consulting at Swedish SAP. We got a lot of interesting information. Here follows a summary of the aspects important for our part of the project.

**Architecture** The different architectures are all based on the client/server model. The most common architecture for SAP systems is to use thin clients for presentation, which are only responsible for displaying on the screen. The clients communicate with an application server that performs the work and gets data from a detached database. The advantage of this architecture is the scalability, allowing additional application servers to be attached if necessary.



**Platform independent applications** The applications, which are written in SAP's own programming language ABAP, are platform independent. This is achieved with a kernel, written by SAP in C/C++.



**Relational databases** Relational databases are only used for the purpose of storing data. The different databases supported by SAP are:

SAPDB	Is only sold together with SAP's system and is free, except for a maintenance fee. This database is currently not used by any of SAP's customers in Sweden.
ORACLE	Has a lot of users, but is rather expensive.
DB2	Might be cheap when used for educational purposes.
MS SQL	Should be available for a reasonable price.
Informix	Bought by IBM, is to be integrated in DB2.

**Operating systems** SAP and their partners provide equivalent support regardless of the platform chosen for running SAP. Supported operating systems are:

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MS (increasing)	2000, XP and NT4 (though NT4 is being phased out)
IBM	OS/400 (expensive, less support, few Swedish customers) OS/390 (for large computers)
Unix (dominating)	AIX, HP-UX, Tru64, Reliant, and operating systems from Sun and Siemens
Linux (is not used by any of SAP's customers in Sweden, yet)	

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The most important advice we got from Jan was to choose platform, database etc. according to the knowledge, wishes and experiences of the users/administrators of the system. This is possible since SAP supports any solution.

**IBM** The main reason for our visit to IBM was the interest showed from their part. We were also interested in what solutions they could offer, as well as hearing some more about the company.

Participants from IBM: Eric Saxin, Aarni Nyqvist, and Klas Grönqvist.

We got informed about the new machines using 64 bits of address length. This is interesting since, next year, there will be SAP applications on the market, able to take advantage of this feature. This will probably lead to a new way of constructing the systems; only one machine will be necessary.

We also got some information about IBM's own database, DB2. One of the advantages is the possibility to manage DB2 in a SAP environment. This is not possible with any other database; all the others have to be managed through a command interface. DB2 is also available for more platforms than any other database.

## Main issues

### Scalability steps

- 
1. Application server and database on the same machine.
  2. Application server and database on separate machines.
  3. Adding more application servers
- 

Initially, probably only one machine will be needed, or possibly two. As the system grows, it can be scaled according to the above.

### High availability

- 
1. Using a backup database that is idle, in case of a failure in the primary database.
  2. Using one of the application servers in a cluster with the database. This server can if necessary serve as a temporary database until the primary database is up.
- 

The cost of system downtime has to be weighed against the cost of a high availability solution. This mainly concerns companies, and is not a big issue for this project.

We also learned that more CPUs not necessarily imply higher performance. In many cases a solution with few CPUs has shown higher performance than one with more CPUs.

**Administrator in Stockholm** We followed Jan Lindgren's advice and talked to some of the administrators. Our motive was to find out their competences and preferences regarding systems.

We visited Michael Persson, who administers the SAP installation at Stockholm University in Kista. It turned out that Michael had not heard about the planned UCC, but he still had some useful information concerning what to think about, and shared his personal experiences of their existing system.

The most important issue brought up was that when building a UCC, from a technical point of view, a functioning cooperation between the university, SAP and the hard/software supplier is vital. This so that the university's technical administrators can easily get external help in case of an error they cannot solve on their own. An open system that allows a person outside to remotely enter the system if problems arise, could also be a good idea. For this purpose there is an opportunity to, for an annual charge, have a connection directly to Waldorf. However, this might not be necessary in this case.

### Other contacts

We have also been in touch with some of SAP's other hardware partners to see what they have to offer. These contacts have been through email and phone calls.

**Compaq** First contact was established via email and we were then directed to their website. After a phone call to the SAP contact person Michael Bågstam we received the number to Erik Hjalmarsson. Then, after a few calls to him discussing our needs, a sizing suggestion was sent to us via email. He then referred to Bågstam for pricing information who, after a few reminders, passed this on to Masoud Khoshnam, in charge of university accounts. After contacting him we finally were directed to Patrik Johansson, sales person, who had another opinion on what the solution should look like. This proposal was received too late in the project for being considered as a possible solution. Although it has not been considered as such, it is still enclosed in *Appendix F* for information.

**HP** Our contact at HP, Mikkel Brandtvig, did not answer any mails at first. Then we bumped into him when visiting SAP. After that everything went smoother. We got their sizing suggestion and price. Later we called Mikkel and asked him if HP had hosting possibilities, which they had, but for much larger companies though.

**Microsoft** Microsoft was to be contacted for prices on their SQL database and an operating system for the server(s). Initially Kristina Askstedt was contacted. She forwarded the request to Charlotte Johansson, who is Microsoft's contact for universities. The request was then forwarded to another associate, Anna

Ekbjörn. Then nothing happened for a while, but after a reminder was sent, they got in touch with us again and Bruno Larsson provided us with information about their products and approximate prices.

**EMC** We excluded EMC after finding out that they dealt more with large computers. EMC's product range covers high-end storage solutions for really big systems.

**Administrator in Uppsala** To further research current installations, we contacted Pierre Hjälms who is the administrator of the local system in Uppsala. We learned that the installation was not operational due to a software failure in the Oracle database. Pierre had already used all the annual free support that came with the Oracle license. An online knowledge database at Oracle could not help him either. Although he is satisfied with the current system, hardware wise, he needs more support to be able to maintain the system in a good working condition.

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## Results

### Existing Systems

Today, there exist several hardware installations in university environments throughout Sweden. They all run SAP software and they do so with different hardware. The only installation that is operational and used in the curriculum today is the one in Stockholm. All the other local installations are experiencing downtime mostly due to software failures.

#### Uppsala

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SUN Enterprise 450

- 4 CPUs, Ultrasparc II at approximately 400 MHz each.
- 4 G of RAM. (4 G Max).
- Approximately 100 G storage (20 internal 3,5", above 800 G of storage).
- 10 PCI expansion slots.
- Retail Cost, approximately 500,000 SEK.

Software

- OS - SunOS 2.6.
  - DB - Oracle DB.
- 

This machine is located at Ekonomikum, Uppsala University. It is not used today because of a database failure, which the administrator, Pierre Hjälms, has not been able to solve.

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**Stockholm**

---

IBM RS / 6000 Model F50

- 4 CPUs, Power-PC 604e's at 333 MHz each.
- 2 G of RAM (16 G Max).
- Approximately 100 G storage (5 internal 3,5", above 250 G storage).
- 5 PCI expansion slots.
- Retail Cost, approximately 450,000 SEK.

Software

- OS - AIX 4.3.3.0
  - DB - IBM DB2 6.1.0.21.
- 

This machine is located at Computer and System Sciences, Stockholm University, Kista. It is being used today for SAP courses held by the university. The administrator, Michael Persson, has experienced some problems though. Mainly while setting up the system for which all the consulting days were spent. Also, a system upgrade tends to cause some trouble.

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**Lund**

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HP Netserver 4000.

- 1 CPU.
- 1 G of RAM (2 G Max).
- Approximately 36 G storage (5 internal 3,5", above 100 G storage).
- 4 PCI expansion slots.
- Retail Cost, approximately 70,000 SEK.

Software

- OS - Microsoft Windows NT4
  - DB - Oracle
- 

According to our contact in Lund, Jonas Hedman, their present HP based system has been working satisfactory until the recent disc crash after which the system has been down due to lack of time for repairation. Earlier they tried a Sun system but had massive problems setting up the system which made them change to HP. They have been using Windows NT and strongly recommend a future UCC to use it as well since it is much easier to administrate than a UNIX based system.

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**UCC in Denmark**

## Database Server / Application Server

## Compaq ProLiant ML570

- 4 CPUs, Intel Xeon III at approximately 700 MHz (Max 4 CPUs).
- 3 G of RAM (16G Max).
- Approximately 330 G of storage (12 internal 3.5", above 500 G storage).
- 6 PCI expansion slots.
- Retail Cost, approximately 340,000 SEK

## Software

- OS – Microsoft Windows 2000
- DB – Oracle DB

## Application Server

## Compaq ProLiant ML579

- 2 CPUs Intel Xeon III at approximately 700 MHz (Max 4 CPUs).
- 2 G of RAM (16 G Max).
- Approximately 9 G of storage (12 internal 3.5", above 500 G storage).
- 6 PCI expansion slots.
- Retail Cost, approximately 170,000 SEK

## Software

- OS – Microsoft Windows 2000 Server
- 

**Possible Systems**

Our company contacts were all given the same information about the software that was supposed to run on the hardware. That is, 600 users with 100 of them working simultaneously, assuming the system would run a SAP IDES-like environment. Below are the solutions that the different vendors have suggested.

**IBM**

## IBM p-series 640 Model B80

- 4 CPUs, Power3-II at approximately 375-450 MHz.
- 4 G of RAM (16 G Max).
- Approximately 150 G of storage (5 internal 3.5", above 200 G storage).
- 5 PCI expansion slots.
- Retail Cost, approximately 600,000 SEK.

## Software

- OS – AIX 4.3.
  - IBM DB2.
- 

This machine is very similar to the IBM RS6000 F50. The main difference is actually that the p640 is rack mounted and the RS6000 is a tower chassis. It seems like a very balanced machine for this task.

**HP**

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**HP LC2000**

- 2 CPUs, Intel P3 at approximately 933 MHz.
- 2 G of RAM (4 G Max).
- Approximately 100 G of storage (10 internal 3.5", above 400 G storage).
- 6 PCI expansion slots.
- Backup DAT 24 G.
- Retail Cost, approximately 112,000 SEK.

## Software

- OS – Microsoft Windows 2000 Server
  - DB – Microsoft SQL
- 

This is an x86-based machine with two CPUs running Microsoft software. According to HP's sizing this should fit our needs. However, it seems a bit weak in the sense that it should be able to do both DB and application serving for 100 heavy users, as was specified that the machines should be able to handle. It is quite cheap and the configuration could be more useful if it was duplicated, one machine for application serving and one for the database.

**Compaq Alternative 1**

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**Database Server****ProLiant DL580**

- 2 CPUs, Intel Xeon III at approximately 700 MHz (Max 4 CPUs).
- 1 G of RAM (16 G Max).
- Approximately 320 G of storage (4 internal 3.5", above 300 G storage).
- 6 PCI expansion slots.
- Retail Cost, approximately 240,000 SEK

## Software

- OS – Microsoft Windows 2000 Server
- DB – Oracle DB

**Application Server****2 x ProLiant DL580**

- 4 CPUs Intel Xeon III at approximately 700 MHz (Max 4 CPUs).
- 1280 M of RAM (16 G Max).
- Approximately 140 G of storage (4 internal 3.5", above 300 G storage).
- 6 PCI expansion slots.
- Retail Cost, approximately 270,000 SEK

## Software

- OS – Microsoft Windows 2000 Server
- 

This configuration would definitely do the job and more than that. This would be the example of using too many resources to do the task at hand. According to Compaq's sizing tool, this would demand a third of the machines' resources. Since this is not a solution aimed for the industry, it is not necessary to have this kind of headroom in the solution. Removing one of the application servers would still leave plenty of power to grow with.

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## Alternative 2

### Database Server

#### AlphaServer DS 20E

- 2 CPUs, Alpha 21264 at approximately 666 MHz (Max 2 CPUs).
- 1 G of RAM (4 G Max)
- Approximately 320 G of storage (6 internal 3.5", above 400 G storage).
- 5 PCI expansion slots.
- Unfortunately, Compaq did not include a system price tag and could not complete a cost calculation in time.

#### Software

- OS – Compaq Tru64
- DB – Oracle DB

### Application Server

#### 4 x AlphaServer DS 20E

- 2 CPUs, Alpha 21264 at approximately 666 MHz (Max 2 CPUs).
- 1 G of RAM (4 G Max).
- Approximately 140 G of storage (6 internal 3.5", above 400 G storage).
- 5 PCI expansion slots.
- Unfortunately, Compaq did not include a system price tag and could not complete a cost calculation in time.

#### Software

- OS – Compaq Tru64
- 

This is Compaq's Unix solution of the same size as the x86 one. It does also suffer from the same problems as the previous example, a waste of resources to do the task at hand. Reducing this solution to a quarter of the application server would still do the job. It would be sufficient with one machine for the database and one for application serving.

## Microsoft Database

- Microsoft SQL Standard Edition
  - Retail Cost approximately 45,000 SEK/CPU
  - Microsoft SQL Enterprise Edition
  - Retail Cost approximately 140,000 SEK/CPU
- 

**Oracle Database** Oracle uses a Universal Power Unit (UPU) unit to calculate the cost for the individual versions of the database. CPU frequencies in MHz, are added together. This sum is multiplied by 1.0 if it is a CISC machine and by 1.5 if it is a RISC machine. Oracle deducts 30 % of the price for administrative databases and 75 % for educational databases in university environments.

## Sun E450, 2400 UPU (400×4×1.5) example

- Oracle Standard Edition
  - Retail Cost approximately 307,200 SEK, (75 % off, 76,800 SEK)
  - Oracle Enterprise Edition
  - Retail Cost approximately 2,040,000 SEK (75 % off, 510,000 SEK)
-

## Possible Solutions

After considering the offers from the different vendors, we have come up with a number of solutions, from a technical point of view. We have taken the following factors into consideration; local competence, scalability, initial start-up cost, and hardware/software support.

**Installation at Stockholm University, Kista, with IBM** The current IBM machine in Kista, the RS/6000 would not be able to handle the load of 100 simultaneous users as specified. In this case we need to upgrade the current solution with another machine from IBM, for example the p-series 640. This new machine would add to the cost, but it is inevitable that another machine becomes operational together with the RS/6000. The RS/6000 could then be expanded with additional disc space for acting in the role of a DB-machine to the p-series 640 which will do the application serving instead.

The existing solution has proven to be a viable one with the local competence. If the current hardware is expanded as mentioned, with extended support from both SAP and IBM to give the administrator the fallback necessary, we feel confident that this would be a reasonable solution.

**Installation at Uppsala University, Ekonomikum, with SUN** The current Sun E450 machine will suffice initially except that it should be expanded with additional disc space to accommodate for the extended needs. It might be necessary to add another E450 later. This would be the most economical solution, at least to start with. However, this alternative will demand much more support for the administrator than the existing support agreement allows for.

**Installation at Uppsala University, ITS, with IBM** This alternative involves moving the IBM machine from Stockholm to Uppsala and buying a new p-series 640, or just letting a new p-series 640 handle the load temporarily. ITS has great knowledge in administering systems and they will perform OS and DB upgrades as well as seeing to the machine's physical health. This scenario would, like the first solution, require an acquisition of a new IBM machine.

**Installation at Uppsala University, ITS, with SUN** An option similar to the one just stated would be to move the SUN machine from Ekonomikum to ITS. The SUN machine should be able to handle the initial load, but it will perhaps need an upgrade in the near future. With this proposal, no hardware has to be acquired at first.

**Installation at a SAP Hosting Partner** This was suggested by SAP, but has nothing directly to do with hardware, since the configuration and installation would be handed to the hosting partner. Yet, we investigated the possibility some further by contacting HP, but they only seemed to deal with large hostings like Tetrapak. Compaq were also contacted, but they did not seem to offer this service.

**Other possible solutions** To investigate other possibilities we contacted people at the UCC in Denmark. They should be able to provide us with a link to let Swedish universities be able to connect to the Danish UCC in an initial stage. As an initial stage, this could provide a reliable system for the Swedish universities to use before the planned UCC is operational.





# Economics

The main topic for this subject is the economical aspect of using SAP/R3 in education on university level.

Plans for a centralised competence centre, UCC have been made. These plans were not yet known to the questioned universities, why discussing future costs, budget of the universities and modes of use was relevant.

Investigations have resulted in a specification of the universities' wishes and economical possibilities and also a suggestion for onward development of the UCC.

## **Current situation at Uppsala University**

The current agreement between Uppsala University and SAP states how the university is allowed to use the software, how much they pay for it, and both parties' responsibilities against one another. All Swedish universities that currently use SAP systems for educational purposes have such existing agreements.

For a cost of 20,000 SEK per year, Uppsala University receives necessary software and documentation to keep a SAP R/3 system running. In the agreement, four free installation days and 75 free training days are included. On top of this Uppsala University is granted one free support day, and one free remote telephone support day per year. On their part, Uppsala University agrees to:

- Keep the system in good working order
- Only use R/3 products for educational purposes
- Ensure that Uppsala University will acquire and maintain a comprehensive and fundamental knowledge of the R/3 products they use.
- Send a minimum of one technical person to SAP courses.

There also exists a University Alliance Agreement. An excerpt from this agreement, regarding SAP software to be used in a future UCC, states the following:

”The University may only use the software for the purpose of teaching students, for internal training of lecturers, for research purposes, and for the preparation of diploma, doctoral or postdoctoral theses.

The University may only use the programs in the installations located at SAP Competence Center appointed by SAP (with a maximum of 150 named users at any one time).

Use for any other purpose, whatever it may be, shall require a separate agreement.

Additional ABAP/4 Development Workbench users can be obtained free of charge within the framework of this Agreement, if the University can prove that they are needed for a project and SAP has given its prior consent. In all other respects, the acquisition of components and/or additional documentation shall take place in accordance with SAP’s List of Prices and Conditions for R/3 valid at the time in question.

Other services (for example, software changes, installation, testing, consulting and training) are not governed by this Agreement and must be agreed separately on the basis of the prices and conditions valid at the time in question.

No license fee shall be charged, provided that the University meets the following requirements:

The University shall actively use the SAP software in lectures and shall officially include such lectures in its syllabus. The University shall undertake to use only the latest version of SAP software delivered by SAP.

The University shall appoint a qualified contact person with the required specialist and technical knowledge to ensure that the conditions necessary for effective implementation of the SAP software are in place at the University (for example, technical consulting and user support, receipt and processing of error messages, implementation of update levels, execution of required correction measures).”

This agreement is crafted by SAP Finland and is presumed to be in use, in its current or revised form, for the future UCC.

The current costs of Uppsala University are greater than 20,000 SEK a year because of the employment that Uppsala University agrees to keep for maintenance of hardware and administration of software. The actual annual cost is approximately 260,000 SEK<sup>1</sup>, not including other expenses such as location of the hardware. Uppsala University has had no expenditure for hardware or software in the initial state of setting up the R/3 system. The University received a donation for the hardware and the software for the

database server was provided by Oracle. The cost is not an issue for the University if the system would work and be in use for education. Unfortunately the system has not been functioning since January 2001.

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1) Estimated system maintenance roughly corresponds to a half-time employment and the employee has a salary 25,000 SEK per month.

$$\frac{\text{Salary}}{2} \times \text{employment tax} + \text{license fee. } \frac{25,000}{2} \times 1.6 + 20,000$$

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### **Total cost of investments for the UCC**

The initial costs of the UCC depend on the chosen hardware, its location and maintenance and possible software license fees. Several possible solutions are found in the Technology part above.

### **Requirements and expectations from universities**

**Sharing of information** One of the most important things for a system to be successful and of real use for the universities is the sharing of information. This stretches over several levels, from SAP to the universities, between universities, and within universities. It is not enough that a group of people at the universities know how to use (parts of) the system. The use of the system must be supported at all levels of the university hierarchy. One suggestion for increase of competence sharing is through some kind of encouragement that works on spreading information. Another suggestion is on-line material for education for students and teachers. The universities must be responsible to arrange for education within their organization and the overall competence must be increased. One way to increase the knowledge can be through graduate students that do research part time and work part time. To conclude, the focus on sharing of information should be just as important as setting up a system.

**Workshops** One way to share information has been through SAP-organized workshops. These have been greatly appreciated by the universities. Workshops serve several purposes. Besides the spreading of information, people exchange experiences and build up a communication network. This aims towards learning of how to use and teach SAP products in courses at the universities. From the interviews performed with the universities concerned, it should be noted that everyone was for a continuation of workshops and emphasized the value of the outcome of them.

**Courses for teachers** The possibility for teachers to attend (a limited number of) courses at SAP has been very welcome at the universities. Unfortunately, these courses have not focused on how to teach SAP R/3 back at the universities. It has been suggested that the courses must be reorganized for this purpose. The courses at SAP should be in two steps: first, the teachers must learn how to use the system and how it works, and second, the teachers must learn how to teach the system to students and to be able to pass on information achieved, back to the universities.

**Contact between universities and SAP** Another point that has been stated is the somewhat poor contact between SAP and the universities. Although most of the universities find that SAP has been a good partner, they feel that the contact between SAP and the universities has not resulted in the support, information and encouragement as expected. This consideration should be taken seriously by SAP for a success with projects involving universities.

**Providing of the service** When talking to the universities concerning how services of the system should be provided to the universities, three alternatives were suggested.

- Hosting at one of the universities that already have the system.
- Hosting by one of SAP's hosting partners.
- Hosting by a third party.

The opinions in this matter differ between the universities, according to interviews made in this project. One university states that that the location of the server has no importance as long as the system is running. Several others consider that if a third party would be hosting the system, the interest from the third party's side would be mostly economical, and this would affect the universities and the service provided, in a negative manner. Yet another says that the location of the server is unimportant, but that a local administrator at each university would guarantee that the interest of each university would be satisfied.

After these interviews were done, another approach appeared. Possibilities to connect to an existing centralized system have been investigated. The corresponding UCC in Denmark, UNI-C, has offered to provide this service to Swedish universities. One advantage with this approach is that setup time could be shorter than setting up the system from scratch, provided that the adjustments to Swedish circumstances goes relatively easy. For closer description on the Danish SAP-C system, see *Appendix G*.

**Requirements on UCC** One question asked to the universities was the expected content of the UCC. In this question, the opinions also differ. Among the expectations, a working system with possibilities to configure the system for a specific user and to be able to work with prototypes and development can be mentioned. For full-length interviews (in Swedish), see *Appendix H*.

### **Maintenance and system provisioning**

When it comes to providing and maintaining the system there are several possible solutions. One solution is a part-time employee, employed by UCC. Another possible solution is outsourcing the responsibility of system maintenance. The costs for this will be as above 240,000 SEK for a part-time employee and around 150,000 SEK annually for the outsourcing solution<sup>2</sup>. There would also be a person needed who takes care of the administrative part of the system. The needed time for this is hard to say. In Denmark there are

three half-time employed who take care of both system maintenance and the administrative part. In the Netherlands there is a half-time employed who takes care of the administrative part.

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2) ITS charges 10 - 15,000 SEK per month for maintenance of system and software, according to offer submitted

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The possible maintenance solutions are stated in Technology part.

**UCC subscription cost** Apart from these more concrete economical aspects mentioned above, other factors that determine how much it is actually worth to pay for UCC are:

- How reliable the system is.
- How efficient it is to distribute experience and information among the connected parties.
- How help and support towards the users is given.

The annual investment and maintenance costs will set a lowest limit. Other aspects add the actual value of the services that the UCC provides for. Interviews indicate that some universities have the opinion that money is not an obstacle if the system is reliable and the information and experience sharing works well.

### **Financing the system**

There will be initial costs, mainly for hardware and the database license. This leads to the question of financing. The best alternative is of course a donation and a free database license, as it is today. However, if this will not be manageable it is suggested that one or two of the universities currently interested, would cover these expenses. All subscribing universities pay connection fees, including the university/universities initially founding costs of the UCC. The money to repay the financing university/universities would be an income from UCC. This would make the connection cost equal to all universities, while the coverage of the initial costs would be taken care of. If the UCC would make some profit, it could be used to cover future costs. Examples of such costs are new licenses, new hardware for up-scaling the system. The profit could also be used for arranging workshops and seminars for the participating universities.

### **Conclusion**

The main problems for the universities currently using SAP software in their education, mostly regard the system availability. Regarding the problem, the UCC should be reassuring system availability and ease of use. Among

other factors affecting the availability of the different systems used today, the maintenance employees' dedication and the will to use the system in education can be mentioned. This builds for a downward spiral:

The system works, but not without problems. Because of the problems, less and less courses are taught using the system, and since only few are using the system, why fix it?

Our suggestion to solve these problems is that the hardware and database of the UCC should be maintained by a third party. This solution is also cheaper than the cost of maintenance employees at the universities. ITS at Uppsala University charges 10,000 - 15,000 SEK a month to keep the hardware and database running but they do not take any responsibility for SAP software. Outsourcing of the maintenance also put the universities in another position when it comes to demands regarding system up time.

To provide the assurance of the system's reliability, SAP should provide the necessary support of it. The cost of educating the personal in need of it should also fall within the frames of responsibility for SAP. A suggestion is to create a platform in UCC, where teachers can set up own courses for their individual education. The basic education regarding the university teachers must be aimed towards academic needs instead of the usual business approach. Thus, to meet the responsibility, SAP also has to reassure that the money spent for UCC is worth it. SAP has stated that they will not keep any fulltime employee for university contact. This is a strange statement from SAP, since the universities explicitly asked for increased contact. How this problem will be solved is still an open question.

Concerning the hardware issue, are the universities going to use the hardware available or purchase new to set up UCC? Among the different scenarios stated as described in the Technology part, the best solution is to purchase both the hardware and database from IBM. The advantage of that solution is that it simplifies the support. IBM has also indicated a possibility to let the universities use the DB2 database without charge. However, if the universities would have to pay for the database this whole solution could be too expensive. In that case, a better solution would be to use the already existing SUN server and Oracle database currently used by Uppsala University.

Another solution would be for Swedish universities to subscribe to the Danish SAP-C. As mentioned above this might initial be a good solution because of the short setup time. Nevertheless, in the long-term up-scaling problems may arise as more Swedish universities connect. Also, the suggested improvement including workshops and seminars may not interest SAP Sweden when connecting to SAP-C in Denmark.



## Summary

We have not completely accomplished our goal of producing a requirements definition for a University Competence Centre. However, we hope our project has contributed to establish an interest and create connections among involved parties. Furthermore we believe this report will constitute a foundation for future work.

We would also like to thank all people concerned.





# Appendix A

## Business Intelligence

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Business Intelligence is a three step process to transform raw data into real knowledge. First you have to collect your data from various sources. To use that data it will have to be transformed into information. That is done in the second step when the data is put in a data warehouse and labelled as information. The third step is to transform the information into knowledge that can be used for making business decisions. This is done by various analysis programs.

The SAP definition of Business Intelligence is:

”Business Intelligence is a solution to collect data, ennoble data into information, transform information into knowledge and use the knowledge for the right actions.”

### Background

There are two major components in a Business Intelligence system: a data warehouse and one or more analysis programs. The data warehouse serves as a foundation for the analysis software. The idea is to give raw data a label so it can be used as information and the transform the information into real knowledge.

**Data warehouse** Data warehouse is an integrated decision support database whose content is derived from the various operational databases. (McFadden et. al 1999, p. 19)

Most organizations today have mountains of data but can't extract the information they need to make critical business decisions. There is a big information gap between the actual data stored in databases and the information needed by i.e. managers.

Bridging that information gap are data warehouses which consolidate and integrate information from many different sources and arrange it in a meaningful format for making accurate business decisions.

When setting up a data warehouse all data is first transformed and integrated before loaded into the warehouse itself. The transformation provides metadata which describes properties and characteristics about the data.

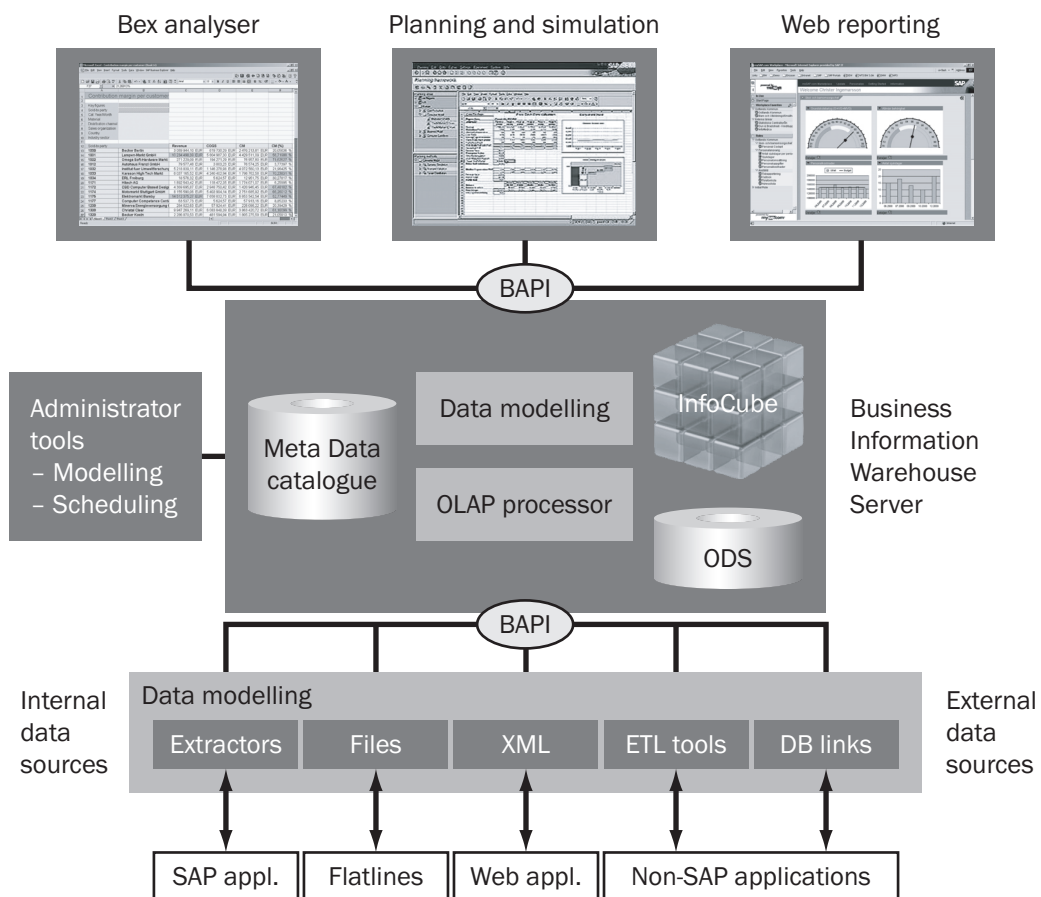
**Metadata** Describes properties and characteristics of other data. By providing metadata the data becomes information which can be used more effectively.

**Data mart** A data mart is a specialized view of a data warehouse.

**SAP Data Warehouse**

The Business Information Warehouse makes it possible to analyse data from the operative R/3 applications as well as from any other business application and external data source such as databases, online services and the Internet.

For facilitation of import and export of data, an open standard is used.

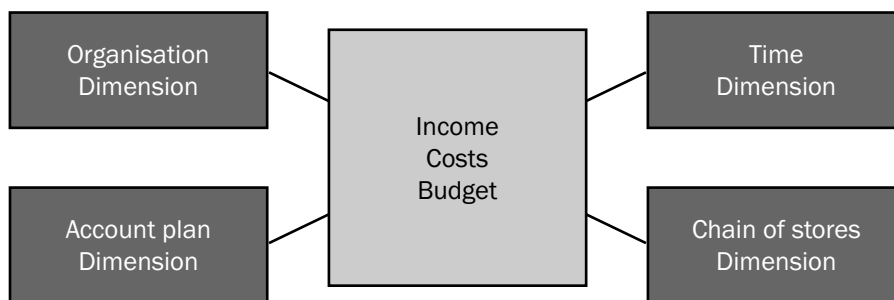


Architecture of the Data Warehouse, © SAP Svenska AB, used with permission of Christer Ingemarsson/SAP

**Extraction of data** The Data Warehouse handles extraction of data from the different data sources of SAP as well as from other non-SAP data sources. Prepared couplings exist for extraction of data from the SAP economy system to the data warehouse, both in terms of programs for extraction as well as data models. For external data sources flat file interface or database links are used to convert the data into a common data model; an operation referred to as data laundry.

**Multidimensional data modelling** The data warehouse is object-oriented with unique information objects in the form of dimensions (for example organisation or time) and key numbers (such as income or sold amount) that freely can be used when modelling the data. The data is modelled in multidimensional data models in the form of star-schemes to enable fast and flexible analyses.

The data model is built to reflect the different users' analysis and information need instead of the structure of the transaction systems. The entire concern uses a common data model and this model is changeable over time. This form of modelling makes it possible to turn and change the key numbers according to different dimensions like employees, business and time.



*Example of star-scheme, © SAP Svenska AB, used with permission of Christer Ingemarsson/SAP*

Data is stored at different levels of detail, in denormalized data models called Operational Data Store (ODS) objects, or normalized models called InfoCubes to make it possible to analyse data on different detail levels.

**Metadata catalogue** With the help of a metadata catalogue a description of the connection and origin of the data warehouse content is achieved. To ensure the quality of a data warehouse it is important that all concepts and terms are common and consistent, and that all concepts and definitions are well documented. The metadata catalogue shows how the different key numbers and criteria are related to each other. This makes it possible to track the origin of a specific key number and see what laundry process information has passed through. If the content of the data warehouse is changed the metadata is automatically updated.

**Administration** Consistence and data quality are ensured by the use of a central administration part where all modelling, data storage and schedule planning are surveyed. The administration tool takes care of extraction of data from SAP applications and non-SAP applications as well as of maintenance of data model and content. It also handles scheduling and survey of data loadings and maintenance of metadata. There is also a translation function to support several different languages, a function for administration of authority, and one for definition of roles.

**Business Content** The data warehouse has a preconfigured content, referred to as Business Content, when delivered. This content can be used for extraction and loading of data, information objects, data and analysis models (information cubes), reports as well as roles. By this solution, the implementation time is considerably reduced.

### **Reporting and OLAP Analysis**

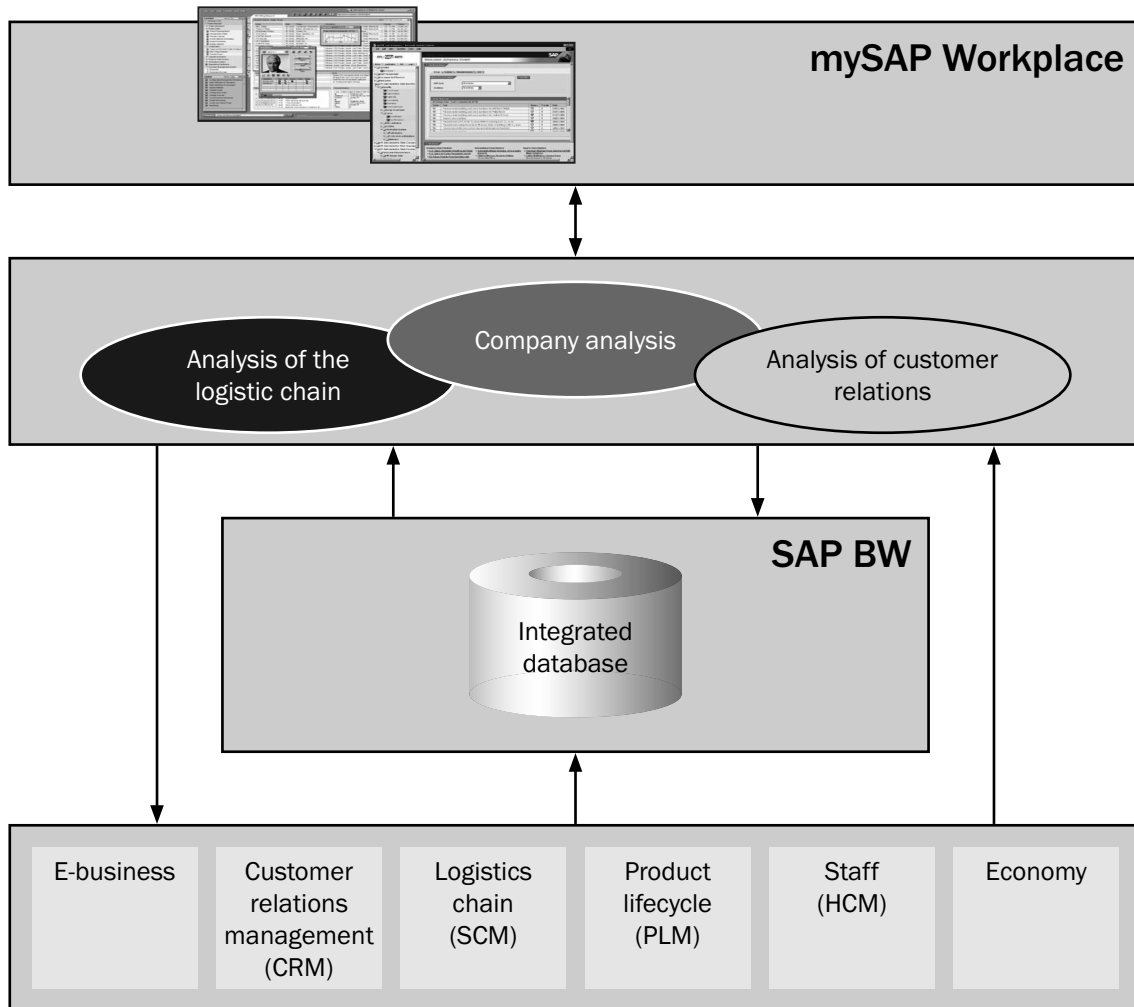
The presentation tools allow for both static and dynamic reports, and also provide an easy opportunity to create "Ad hoc" reports. Data can be analysed by using the BEX, Business Explorer, analyser that can be used with a Microsoft Excel interface or a web interface. The authorized employees can access historical as well as current data in any context and to any level of detail by using the Business Explorer.

The OLAP (Online Analytical Processing) navigation makes it possible to freely turn the key numbers according to the different dimensions to enable multidimensional analyses according to various business perspectives. The tools provide interactive graphics with a "drill-down" functionality that gives a possibility to work down into more detail, and a "drill-thru" functionality to reach original documents or transactions in underlying SAP systems.

### **Analytical Applications**

The different analytical applications that exist has all got predefined "closed-loop" scenarios that measures business processes and gives the users the opportunity to directly take the right action. This closed loop provides a fast and flexible reaction to changes in the market. Every analytical application needs to have an integrated database for all systems and applications that spans over all points of contact (for example to customer, supplier or company). They are also in the need of an interface towards operational systems to directly implement analytical results.

Some of the analytical applications that exist are: Analysis of customer relations (CRM), Analysis of the supply chain (SCM), Marketplace analysis and Company analysis. The analysis of customer relations (CRM) contains market analysis, campaign optimisation and e-trade analysis. Analysis of the supply chain (SCM) provides optimisation of expenses and purchase optimisation of direct materials. Marketplace analysis has tools for traffic analysis and



*Architecture of analytical applications, © SAP Svenska AB, used with permission of Christer Ingemarsson/SAP*

aggregation of demand, which makes it possible to open up the most profitable markets. Company analysis contains credit management, company investments, optimisation of the recruiting process and decreased turnover of staff.

### **Strategic Enterprise Management (SEM)**

Strategic Enterprise Management can be divided into several different parts, each with a different functionality. The part Business Information Collection handles usage of unstructured business information from the internet by making it possible to search, edit and link to internal information. Other parts handle business consolidation, stakeholder relationship management, or performance management and strategy monitoring.

The SEM part Business Planning and Simulation handles strategic planning and simulation, cross-functional enterprise management and area-related detailed planning. The strategic planning and simulation is an integrated planning model from strategy level to resource allocation. It contains predefined

models for dynamic simulation where different scenarios can be tested and verified. The planning models can be visualised and linked to key numbers for follow up and matching with the strategic goals.

### **Knowledge Management and Web Content Management**

Knowledge Management handles unstructured information and is used for collecting and classifying documents, presentations, help files, course material, sound and video. By this, knowledge can be created and shared throughout the organisation and beyond. It provides a search engine, handles different languages and contains a possibility to subscribe so that users automatically receive content.

Web Content Management is used to distribute content to stakeholders both inside and outside the enterprise. It contains functionality to create and edit web content, with a "Check-in, Check-out" principle so that only one person can make changes to a document at a time. It also handles collecting and classification of documents, news, stock markets, and weather. Search functions, a possibility to subscribe, handling of authority and a discussion forum are also provided.

### **Role Based**

To make the software easier to use SAP have developed that concepts of roles. A role maps to a business function and that role gets the information it needs. This lets the user get personalised and relevant information at the same time as irrelevant information is not displayed. The roles also control which applications and reports the user has access to.

### **Mobile Solutions**

It is possible to get information from the Business Intelligence solution to a portable device such as a mobile phone or a PDA.

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## **Customer relationship management**

Customer relationship management (CRM) is used to help a company to take better care of its customers.

The goals with CRM are:

- Customer information should be presented correctly at all service places. Role based access control makes sure that the right person receives the right information.

- Operational CRM will handle and synchronize customer interactions in marketing, sales and services. Analytical CRM will optimize information sources for better understanding of customers. Collaborative CRM helps supplier, partners and customers for more effective process.
- The solution handles the whole "marketing à sales à customer services à analysis" cycle.

CRM consists of many parts. The ones we find most important are:

- Customer Interaction Center
- Sales Support
- Analytical CRM
- Marketing
- Internet-Customer Self Service
- Solution Database

These different parts will be explained further in this paper.

### **Implementation of CRM**

CRM solution can be implemented in different ways:

- Integrated with "Supply Chain Management", " Business Intelligence" and other CRM products.
- With ERP - Run a centralized mySAP CRM which links to SAP and non-SAP ERP systems.
- Without ERP - as a separate solution for all customer-related operations.

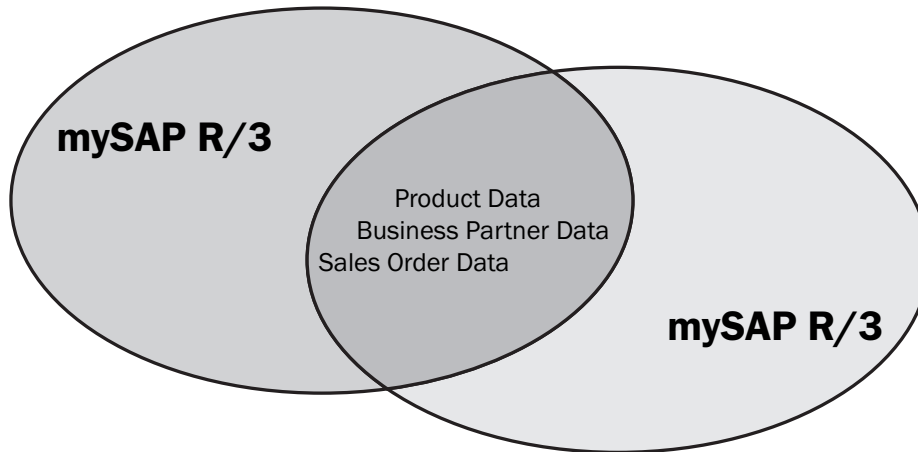
To integrate CRM with mySAP R/3 and to allow subsequent data transfer between the two systems, data has to be mapped between the two components. In doing this, you define how the data from each source field in R/3 is to be mapped in the source field in CRM.

A detailed analysis is made of the following objects (common relationship data):

- Product Data
- Business Partner Data
- Sales Order Data

### **Customer Interaction Center**

The Customer Interaction Center is used in the contacts with customers, for example when a customer calls to the company and is mainly used to support call center personnel.



If a customer has entered data about himself on the phone the person receiving the call gets all relevant data on the screen before him. Information that the customer tells can be entered in the system and if it is necessary for the customer to talk to another person he won't have to tell the same thing again, since the data is already in the system.

The Customer Interaction Center has support for any business transactions via phone, e-mail, chat or paging.

### **Sales Support**

The sales support in CRM helps the sellers in the company. It has support for various sales activity types. The sales activity type controls what data the seller should remember to enter or ask for from a customer and what data that should be included in a particular report. The system helps the seller in his interaction with the customer depending on the situation. Examples of sales activities can be "sales call", "telephone call" and "letter sales activity".

The system helps the seller to organize information about the different customers. Important data such as address, telephone, position and areas of responsibility are entered in the contact person master record.

Existing customer and contact person data can be used to make targeted marketing campaigns. Direct mailing campaigns are available in the standard system and these can be used to organize the sending of product information or promotional gifts.

### **Analytical CRM**

Analytical Customer Relationship Management (Analytical CRM) is the tool used for analysis of the CRM. It is an integrated suite of analytical applications. This makes it possible to draw strategic information from customer data and thereby measure and optimize customer relationships. Examples of questions that can be answered are:

- Which product is the best selling?
- What are the characteristics of the typical customer?

These analytical applications do not only analyze the past. It is also possible to predict what is likely to happen in the future. This can be useful information to make correct decisions and strategies.

The analyzed data can be viewed in different ways depending on the role in the company.

Analytical CRM can combine data from different sources, such as:

- Internal systems such as CRM
- External sources (such as market data or enterprise data on competitors)

By combining data it is possible to notice important information that would otherwise be missed.

The basis of the integration is formed by the customer knowledge base in SAP BW. It can be used to combine relevant customer data extracted from the different sources. The data can be analyzed in one of the many way offered in SAP BW but it is also possible to use third-party products for data mining.

Analytical CRM is mainly implemented in the SAP Business Information Warehouse (SAP BW).

### **Marketing**

This component contains several marketing related tools, which can be used at all levels of marketing processes, from marketing campaign, creation of specified target groups and personalized product recommendations.

The system helps to plan, structure and budget the marketing and it can be structured in different ways, e.g. chronological, product-oriented, or customer-oriented planning structures. The system can also be integrated with Microsoft Excel and Project for the budget planning and times schedules.

The marketing campaign tool in CRM helps to create personalized marketing campaigns cross different customer interaction channels. It can e.g. be personalized letters, emails, fax, SMS or telephone campaigns. The whole process can be controlled centralized to keep the budget.

**Solution Database**

Solution Database is a part of Enterprise Intelligence. It is basically a knowledge base with problem descriptions and solutions. The information should be indexed in a way so that you easily can find the solution for a certain problem. The information should also be structured so that relationships can be created between different problems and solutions and in that way make it easier to navigate.

Solution technicians can enter the system and maintain the information. They can also create different user interfaces for support technicians and other users who only can search in the database. The system can be implemented so that even customers may access part of the information in the database.

**Internet Customer Self Service**

This application makes it possible for customers and intern users to solve their product related problems using a web based user interface. The application can e.g.:

- Register an account and log in to the system
- Maintain their personal data
- Search in the solution database for solving problems
- View frequently asked questions
- Ask for help.

**What is useful in the game and for Uppsala University?**

Customer Interaction Centers are very important in a real company. We think however that it can be hard to implement in a game since they mainly are used when interacting with real people.

Sales Support enables office sales staff and field staff to collect and make use of invaluable information regarding customers, interested parties, contacts, competitors, and competitors' products. Sale Support is a part of IDES.

Analytical CRM could be useful in the game since it makes it easier to overview the data.

Marketing part may be interesting in the business game for interested students.

The solution database and self service are more interested for a real company instead.

None of these has a clear place in any course in Uppsala University. Possibly principles in datamining could be taught using the possibilities for datamining in the SAP Business Information Warehouse.

## Financials

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### Summary of Financials

First we shortly describe the components of Financials and after that we look more deeply into the two most important parts, the FI & CO-modules (for external & internal accounting).

**Accounting – General (AC)** Consists of a number of interfaces for data transfer to the FI/CO Interface.

**Financial Accounting (FI)** FI-GL, FI-LC, FI-AP, FI-AR, FI-BL, FI-AA, FI-FM, FI-TV according to existing part of document (SAP FI).

### Treasury (TR)

TR-CM Cash Management is used to monitor payment flows and safeguard liquidity, so that you can meet your payment commitments.

TR-Cash Budget Management

The main task of Cash Budget Management is to identify control payment flows in light of liquidity considerations. This means, for example, identifying impending illiquidity or possible budget overshoots promptly.

**Controlling (CO)** According to existing part of document (SAP CO).

**Investment Management (IM)** The Investment Management (IM) component provides functions to support the planning, investment, and financing processes for:

- Capital investments, such as the acquisition of fixed assets as the result of-house production or purchase
- Investments in research and development
- Projects that fall primarily under overhead, such as continuing education of employees or establishing new markets
- Maintenance programs

**Project System (PS)** Both large scale projects, such as building a factory, and small-scale projects, such as organizing a trade fair, require precise planning of the many detailed activities involved. The project manager has the job of ensuring that the project is executed efficiently, on time, and within budget - which he or she achieves by ensuring that the required resources and funds are available as and when needed.

**Enterprise Controlling (EC) – Profit Center Accounting (EC-PCA)** Profit Center Accounting (EC-PCA) lets you determine profits and losses by profit center using either period accounting or the cost-of-sales approach. It also lets you analyze fixed capital and so-called "statistical key figures" (number

of employees, square meters, and so on) by profit center. Consequently, you can calculate all the key figures commonly used in cost accounting (return on investment, cash flow, sales per employee, and so on).

– **Consolidation (EC-CS)** This application component features consolidation functions you can use for external (statutory) rendering of accounts as well as internal (management) reporting.

To do this, this component offers different consolidation types that are based on user-definable organizational units. Specifically, you can perform consolidation for companies, divisions, business areas or profit centers.

**Real Estate Management** This component maps the requirements of Real Estate Management in a general overview of the relevant business transactions.

## SAP FI

The standard solution from a general point of view in SAP is that all business events which occurs in an organization only should be registered once. Of course this presupposes that the organization utilizes an overall solution from SAP, which means that in principle there is a defined process in the system for all business events and decisions in the organization. If we merely look at SAP Financials we see that it is a question about budgeting, registration of business events (verifications) with follow-up, and different sorts of account and to different internal as well as external parties.

**General Ledger (FI-GL)** The main part among the functionalities that SAP Financials offers is, as in all business systems, the general ledger with the chart of accounts. Before we proceed we'll take a step back to establish: With the legal demands that external interested parties as banks, owners, authorities etc. have for a company or an organization you could register all business events manually as verifications in the general ledger between some of the accounts in the chart of accounts and later on fulfil these demands. A chart of accounts is further reminding a set of the supplies, debts, receipts and costs that a company or a legal unit can have. The general ledger later on describes the specific company's position on the different accounts through which the different verifications are registered between the accounts.

All bookkeeping amounts to that all business events should be registered in the general ledger according to the old Italian double entry bookkeeping model. SAP uses the same model. The input of business events usually is done in other SAP modules and is automatically placed into the general ledger. That is also the way the system works between the included parts in the administrative routines as accounts payable ledger, accounts receivable ledger and construction account.

**Legal Consolidation (FI-LC)** Consolidation is the process of combining the individual financial statement data of relevant companies in order to prepare consolidated financial statements for a corporate group. For example, in order to consolidate correctly, all data accounting for trade and investment relationships between affiliates in a corporate group must be eliminated.

**Accounts payable ledger (FI-AP)** All incoming invoices are registered in the accounts payable ledger either manually, when they arrive to the company, or through checking with other SAP modules, for example order and storage. We'll keep to the manual case for a natural delimitation of the administrative routines from the other SAP modules. Every incoming supplier invoice is registered in the accounts payable ledger to later on be authorized, paid and then be transferred to the general ledger. SAP supports different procedures by the different steps and it is up to every company to define, for example, how and which people who are to perform the different elements. You can always define and change the degree of automatization.

**Accounts receivable ledger (FI-AR)** Analogous to accounts payable ledger but here it is the company that has demands on their customers.

Registering manually or transference from, for example, a sale module. The same freedom of choice according to the automatization level.

**Bank Accounting (FI-BL)** This component is used to handle accounting transactions that are processed with the bank. It is as simple as that.

**Asset Accounting (FI-AA)** Constructions, machines and other fixed assets are registered and plans of depreciation are connected to every object to be automatically and manually transferred to the bookkeeping. Even other attributes can be connected to the objects to be able to read, for example, information about insurance, useful life and where it is placed.

**Funds Management (FI-FM)** The functions in this component support the creating of budgets. The tasks of Funds Management are to budget all revenues and expenditures, monitor future funds movements in light of the budget available, and prevent budget overruns.

**Travel Management (FI-TV)** The goal of this process is the complete, integrated management of all processes involved in a business trip and the travel expenses incurred. The process includes the entire procedure of requesting and planning a trip, accounting the travel expenses and the correct taxation in Payroll Accounting (HR), correct posting of the travel expenses in Financial Accounting (FI), and clearing in Controlling (CO) or Funds Management (FI-FM) according to the allocation-by-cause principle.

**Reporting and follow up** The SAP FI have a large set of standard reports which can be supplied from the system. Furthermore they can be complemented with reports created on your own with help from the report generator in SAP (the Profit Center Accounting (EC-PCA), a part of the Enterprise Controlling (EC) module).

**SAP CO** External and internal accounting is tightly nested together to make the financial system. The internal accounting in SAP is found in the component "Controlling" while the external accounting is found in the "Financial" component.

Revenue and costs that occur in the different SAP R/3 applications, like in the Financials (FI), Human Resources (HR), Material Management (MM) and Sales/Distribution (SD), gets passed on to the controlling applications.

The components that belong to Controlling (CO) are Overhead Cost Controlling (CO-OM), Product Cost Controlling (CO-PC) and Profitability Analysis (CO-PA). These three components aggregate together and create a component called Profit center analysis.

All the Controlling components each give a different view of the cost accounting.

**Overhead Cost Controlling (CO-OM)** In the CO-OM the direct costs gets analyzed. Examples of master data in the CO-OM are the cost areas (departments) and the activity types (e.g. machine hours, work hours.)

**Activity-Based Costing (CO-OM-ABC)** This component helps to distribute the indirect costs onto the different products. In the traditional distribution, key figures are often used to distribute the indirect costs. With the help of this component the indirect costs are distributed to where they belong.

**Product Cost Controlling (CO-PC)** CO-PC gives the answer to what the real cost will be in the end, for the manufacturing of a product or the performance of a service.

This component is closely connected to the Logistic components.

A product that is manufactured after a customer order, in the CO-PC, will be charged with the costs that the product itself rose. Among these costs are the material costs, productivity costs and the indirect costs.

**Profitability Analysis (CO-PA)** This component receives data from both the Product Cost Controlling and the Overhead Cost Controlling. This is the last step in the cost oriented period accounting.

In this analysis the parts of the company, which are profitable, are made visible. This component therefore makes it possible to do different calculations on the profitability. This can be done from the different aspects and by using all possible master data and by looking at the different organization units.

These calculations can in the end be used as basic data for decision-making in the specific areas like pricing, client analysis and the choice of the distribution channels.

**Profit center analysis** The Profit center is an organization unit, which is for the internal control.

The division of the company into profit centers makes the ground for controlling of the internal responsibility over an area. The company is divided into profit centers with the help of result relevant master data (e.g. material, order, project).

The Profit center analysis supports the calculations of an internal result for the profit center according to the bookkeeping or after the revenue based accounting. The fixed assets in a company can also be shown divided among the profit units. The static key figure (e.g. revenue / employee) can also be shown per profit unit. With the help of profit center analysis many different key figures can be calculated for controlling as for example cash flow, profitability, and turnover per employee.

**IDES** In the IDES system all three of the CO components presented above are present. These three components are CO-OM, CO-PC and CO-PA. The IDES system is a R/3 installation where there are some sample companies with some transactions in the system. This makes the system useful for demos and education without having to configure R/3 from scratch (which is a big and hideous job). IDES comes with all R/3 installation and can therefore be used by all R/3 users for practice and so on. The IDES version on the SAP web page is a smaller version than the original version. The one on the homepage only has some parts of the components and totally lacks other components.

**Controlling in education** The IDES system can become very useful for testing theoretical aspects for economical students, which are studying internal accounting.

**Business game** The CO component is one of the most important components when building a business game. Without this component there wouldn't be a business as same as there wouldn't be a working business if some other vital component would be removed. This of course depends on the complexity of the game. The higher the complexity of the game, the more need there will be of the CO component. In simple business games there may not be the need of the CO component, since the FI component probably will be enough. A possibility is that the leader of the game distributes some of the information from CO, for the own and the competitors companies, to the players with some periodicity. This is more or less the case for some of the existing business games today.

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## Product Lifecycle Management

Companies need to centralise product information and its lifecycle. When this is archived, the company can be flexible and optimise daily business in all life cycle phases of products.

Product Lifecycle Management (PLM) is a collection of different modules that create product information, centralise it and manage life cycles of products, it aims to make it accessible from World Wide Web thro portals who also creates an communication chain with external business partners.

Improvement of coordination and cooperation during the production is also an important feature of PLM. This is obtained by linking product and process data with following applications:

- Product and Process Structures
- Program Management
- Change and Configuration Management
- Engineering Collaboration

### **Product and Process Structures**

The purpose of this application collection is mainly to increase and spread knowledge about products and processes and carry out/in changes to the developers and customers to increase productivity.

The set of "Product and Process Structures" applications makes it possible to create, manage and transfer information that describes products, information about task lists and production order, production quantities, times, schedules and resources or capacities.

It also provides a standard, universal data model for all product and process data. Product information from all life cycle phases, from product development, through production right up to service, is available centrally to management, to the users involved and to partners.

### **Program Management**

The aim with this is to reduce the costs for the development of new products and optimising the business processes from project planning through to carrying out the project and enables a project progress analysis.

### **Change and Configuration Management**

This collections give beside a high level view of product and process development, in aim to optimise the quality of the product and the cost. There is a close connection between logistic processes and Change and Configuration Management who makes it possible to transfer design changes into the operative areas of the logistics chain.

### **Engineering Collaboration**

Makes it possible to have a close information exchange between external and internal partners into a development process. Information such as determination of product requirements, selection of suitable development

technologies or the coordination of development activities based on the division of labor. This optimises the flow of relevant information between employees or external partners.

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## Supply Chain Management

Supply Chain Management, SCM, is the logistics part of SAP. The system can be used to control the entire supply chain from the suppliers to the finished product and its deliverance. It can overview goods in storage's around the suppliers, factory processes, order status, keep track of vehicles and much more. It can also be used for companies offering services such as software developments.

The main purposes are:

**Planning** The ability to anticipate future developments and respond to changing situations quickly and easily.

**Optimization** The ability to plan or carry out supply chain activities with optimum efficiency.

**Execution** The ability to automate the supply chain and execute optimized plans within predefined constraints.

**Performance Measurement** The ability to define key performance indicators and benchmark against them.

**Integration and Openness** The ability to guarantee the free flow of data through your system for better productivity.

**Better Business Insight** The ability to better understand overall business issues, complexities and interactions, to make better decisions.

### Key Capabilities

MySAP Supply Chain Management is divided into a number of key capabilities.

#### Networking

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- Private Exchange
  - Supply Chain Portal
  - Mobile Business
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#### Planning

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- Collaborative Demand & Supply Planning
  - Supply Chain Design
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**Coordination**

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- Supply Chain Performance Management
  - Collaborative Procurement
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**Execution**

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- Collaborative Manufacturing
  - Collaborative Fulfilment
- 

**Networking**

**Private Exchange** The private exchange is a system for sharing information among suppliers, partners and customers. In the system the participants themselves manage the structure in the communication environment. They can collaborate, share information, plan and coordinate which can increase speed and responsiveness across the supply chain.

Orders can be tracked along the supply chain. You can also check inventory levels, control shipping status and make forecasts based on order history. Unlike the supply chain portal, the private exchange is owned and managed by its users. Here the data is secured and will only be accessible to the involved partners.

**Supply Chain Portal** In the supply chain portal, the information is presented based on your role in the company. You only get the information you need and are allowed to access. This information can be obtained both from within your company and from the outside. It is also possible to access information from other enterprise systems than SAP. The portal can be run from a regular web browser and is also designed for mobile computing.

**Mobile Business** This technology is used to connect mobile computers such as Palm™ to the mySAP platform via wireless technology. It supports a graphical interface to handle the information exchange.

**Planning**

**Collaborative Demand & Supply Planning** Demand planning includes tools that allows manufacturers to develop an overall supply plan. That takes into account all procurement, production and transport requirements from all the participants in the supply chain. This way, you can handle complex forecasting problems by taking into account forecast from other in the supply chain.

**Supply Chain Design** The supply chain in a company may vary over time and it is expensive to make these changes. A method to decrease these costs is to be able to predict market changes, new product releases, raw material distributions and much more. This module can simulate these changes in the supply chain, and the company will be able to allocate their resources in a better way.

## Coordination

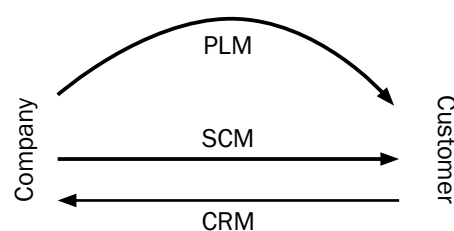
**Supply Chain Performance Management** It is useful if you can handle unexpected events in the supply chain flow. This affect the regular plan designed by the supply chain design and other modules. Supply chain gives an overview of every event in the chain. For example, Tracking events include location messages, exception messages, equipment status, packing, loading, load transfer, and more. With this you can monitor advanced modelling of business rules that automates response when actual activity deviates from plans and schedules.

**Collaborative Procurement** In the collaborative procurement the purchasing staff can administrate their work. With the system they can compare different supplier and set up bid invitations that let different suppliers to compete with the price. This way you can identify the products and services that meet your criteria at the lowest price. Some of these stages can be automated.

## Execution

**Collaborative Manufacturing** When the entire supply chain is defined and is up running, a new, cheaper product becomes available. To reduce cost, this new product can be used instead of another, but also we have to adjust the supply chain to the new product. Things like lot sizes and new orders have to be handled. Collaborative manufacturing includes features with algorithms that can reduce order cycles and costs, optimise production schedules and takes into account material and capacity constrains. In real-time, it can adapt changes and customer requirements and supports a complete manufacturing environment from planning to execution of a product.

**Collaborative Fulfilment** When a product is finished and placed in the company storage, it is supposed to be shipped away to the customers. Collaborate fulfilment deals with the administration to associate the customers to the products. To make sure a product is delivered on time, a company can share inventory levels and production schedules with its suppliers and partners. It also takes into account the transportation logistics. It can for example handle multiple transportation modes, multiple carriers and tariffs, and alternative routes to consolidate orders. This means that you can optimise the transport routes to deliver the products in the fastest and most efficient way.



### **Integration with other modules**

Supply Chain Management is closely integrated with Customer Relationship Management (CRM) and Product Lifecycle Management (PLM). You could say that SCM is the interaction from company to customer while CRM is the interaction from customer to company. CRM and SCM are closely dependent of each other, and in the future, these two modules will probably become one. PLM, the development of the product is a parallel process and is also dependent of a functional supply chain.

### **Advanced planner and optimizer in SCM**

The SAP Advanced Planner and Optimizer (SAP APO), consist of a number of integrated modules to monitor and manage the supply chain. It also includes support for planning, identify and analyse patterns in demand and production. Neither we nor our SAP SCM contact person, Anders Segerfeldt, consider this relevant in an education context. Therefor we exclude this part from the report.

### **SCM in the business game**

Most of the common parts of mySAP SCM are included in R/3 and in the IDES system. The parts of SCM that could be useful in a game are the basic logistics functions. Depending on how complex the game will be, you might implement different parts of SCM. For a relatively easy installation, the basic parts like storage management, inventory levels, control shipping status and forecasts based on order history - in modules like Private Exchange and Supply Chain Portal - can be used. For a more complex game, the other parts with functionality such as complex forecasting model, market simulations and coordination can be chosen.

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## **SAP Human Resources**

SAP HR gives support to all aspects in personnel management. It can also be fully integrated with the way the company runs the rest of their business, including accounting, project planning, sales and distribution, project management and logistics. By connecting SAP HR in this way it is possible to save and have access to all the company's data in a joint system, which gives the information that is needed to carry out necessary HR functions.

The different parts of SAP HR handle the all-premiere areas in HR: Organizational Management, Personnel Administration and Development, Recruitment, Pay Roll and Compensation Management and Rapport and Analysis. Here we explain some of those and also Employee Self Service.

## **Organizational Management**

In Organizational Management you can plan one of your company's most important source, its human resources. It enables you to map the company's organizational structure and give the facts back. This also allows for simulations and experiments on the future organizational changes in any number of plan scenarios, until the results reflect the company's cost, profit and quality strategies. This is helpful for the company, so it can keep pace with the growing trend in business to decentralize some tasks to line managers. You can use it as an analysis and reporting tool for making personal decisions in areas such as personnel development or budgeting.

Organizational Management is the basis for other Personnel Planning Components: Personnel Requirements Planning, Personnel Cost Planning and Compensation Management.

**Personnel Requirements Planning** An integral task of personnel planning is determining future staffing requirements. To obtain a sound basis upon which to make decisions regarding the number of personnel or the skills and the qualifications required, you can request reports on staff assignment, the job index, or job descriptions. You can then compare the reports results with the current staffing statistics.

**Personnel Cost Planning** With this tool you can make comparisons and planned vs. actual cost analyses. It helps you forecast labor costs, compare target and actual personnel costs, forecast wages, salaries, and other cost elements based on simulated, planned or actual payroll figures and you can also compare personnel cost against industry standards and complete planned vs. actual analysis.

**Compensation Management** An important factor in attracting and keeping employees is to have the right compensation for them. R/3 Compensation Management allows for control of your company's remuneration and those of your competitors. This by budgeting, using the organizational structure, to associate groups of employees to share their part of the budget. This planning and administration, with compensation policies and job pricing, can also be made by comparing with external job evaluating systems.

## **Personnel Administration**

This part is completely integrated into the Human Resource Management chain and supports all HR administration tasks. It is for managing the HR data centrally and to keep it accessible in both decentralization and globalization. It provides predefined, system-controlled process flows, which means the personnel actions.

Also it allows for automatic monitoring of dates for all HR processes that require follow-up. Access to both current and old data is possible at all time, to for example compare with the previous salary. Here you can do basic personnel actions like hiring, reassignments or leaving.

**Personnel Development**

The employees need to keep up with the company's dynamic development and R/3 Personnel Development is a tool made to ensure that. It shows what potential all employees' possess, so specific skills can be promoted. It is possible to be provided with dynamic training solutions, it reacts on changes in the company, such as Organizational changes, vacancies and new hiring, and it is possible to build up strategic company goals. This part is supposed to be integrated with other components of HR to be effective. You can view existing and missing qualifications and make Career planning, by looking at employees' planning criteria, such as qualifications, preferences, potentials, dislikes, etc.

**Recruitment**

With this you can automate the routine tasks that come with recruitment planning and delegating them into the system. The system can recruit new staff dynamically, because all current and future vacancies are available in it. The system takes care of filling up vacant spots and sends info to the person responsible. It is possible to monitor every step of each applicant administration task. R/3 Recruitment handles the most from confirming an application to actually offering a contract of employment and there can be done a profile match of jobs and applicants. The process of finding staff with R/3 Recruitment is by first advertising in some media that a position is vacant (from Organizational Management). Then there is a screening of applications, when entering basic data (to Personnel Administration), only those who fulfill the minimum requirements (enter and receive from Personnel Development) pass to the Personnel officer. Those who are screened out always receive a rejection letter automatically. Then there is a selection of those who may come on an interview and so on until the most suitable person is hired and then the person's data and hire date is sent on to the R/3 Personnel Administration (and vacancy filled to Organizational Management). Now only the missing data is needed, like payroll etc.

**Benefits**

In today's competitive employment market, the best companies must give the best benefits to attract and retain the best employees. SAP Benefits is the tool for managing this. With Benefits you are able to give different benefits to every employee, depending on what that employee deserves, according to your plan. It is also possible to let the employees decide about their own benefits, depending on age, salary and length of service as an example.

## Time Management

**The time managers of a company use SAP Time Management.** There are a few examples of usage:

- 
- Determining requirements and planning employee shifts
  - Recording time data
  - Processing data from time recording systems or self-service applications
  - Checking working time assignments against internal company policies, collective agreements and other legal regulations that apply to employee working time
  - Evaluating the time data used for bonus and overtime wage types for R/3 Payroll Accounting
  - Maintaining time Accounts, such as those for flextime, leave entitlements and other yearly accumulations
  - Generating time tickets automatically based on Plant Data Collection (PDC) postings
- 

## Employee Self-Service

The SAP Employee Self-Service (SAP ESS) is actually a portal to your company Intranet. With the ESS every employee can configure the look of the Intranet to suit that person. All the Human Resource information about that person can always be seen, and changed if allowed. The information will be presented in a straightforward way, and what you don't want or need you take away from the screen easy.

**Integration with R/3** An Internet Transaction Server (ITS), which runs in front of the R/3 system, connects the R/3 application server with one or more web servers, bringing R/3 content to the Intra-/Internet. Bringing the users into ESS is easy, a new ESS is created for each employee.

### Function List

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Office	Office: Employees can display their SAP office inbox; with emails and work items. Who's Who: Check on other employees to see what on or when they are working.
Time Management	Time sheet (CATS): Employees can register the hours worked by themselves. Leave Information: Employees can display an overview of the current status on their leave entitlements. Leave Request: Check available leave, and request leave. Cancel a leave request. Time Statement: Display and print out time balances. See hours worked in previously payroll. Work Schedule
Travel	Expense Reports: Enter the expenses for a business trip. List trips and the costs.

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**Function List (cont'd)**


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Benefits	Benefits Inquiry: Check which benefits they are currently enrolled in. Open Enrollment/Mid-year Adjustment: Employees can plan their enrollment choices, select plans, choose options, coverages, contribution amount, dependents and beneficiaries.
Purchase	Purchase Requisition: This links to SAP's Enterprise Buyer Professional (ß har bytt namn!) component, where employees can order equipment and supplies.
Jobs	Job opportunities: Apply for new jobs in the company Application status
Payment	Employment and Salary Verification: Employees can request a report verifying their employment and salary details Paycheck Inquiry
Personal Information	Address Bank information Emergency Address Emergency Contact Family member/dependants New Hire Data Tax Inquiry Personal Data Tax Withholding
Training and Event Management	Book Attendance Calendar of Events Cancel Attendance List of booked Events
Skills	Skills Database
My ESS	My preferences My photo

---

**The Time Sheet**

With the time sheet all the recording of hours worked is done. The Time Sheet can be used together with the R/3 components Attendance and absences in Time Management Internal activity allocation in Controlling (CO) Confirmations in Plant Maintenance (PM), Project System (PS), and Service Management (SM).

**Incentive Wages**

The R/3 Incentive Wages component facilitates the recording, processing and valuating of accounting data that is relevant for employees who earn piecework or premium wages. Both forms of compensation are dependent on how employees perform to determine compensation. The actual performance is compared to the target performance. The employees always earn a base salary with premium wages compensation. Overtime is added in form of a premium.

### Training and Event Management

The Training and Event Management component are used for manage training and events effectively. This component can be fully integrated with other HR components; Recruitment, Personnel Development, Organizational Management and Time Management. It has also an interface to Cost Accounting in Controlling (CO), Sales and Distribution (SD) and Materials Management (MM). Training and Event Management component can also be used as a standalone system.

### SAP HR in the education

All of the Human Resource module in R/3 exist in IDES, so everything that would be useful to have in either the business game or in a Human Resource course is possible by using IDES. You can either by making adjusted rolls, for different types of employee in the HR department of a "company", try different kind of tasks or do analysis of simulated data that is put into the system or manipulated with in lab sessions.

### Enterprise Buyer Professional (EBP)

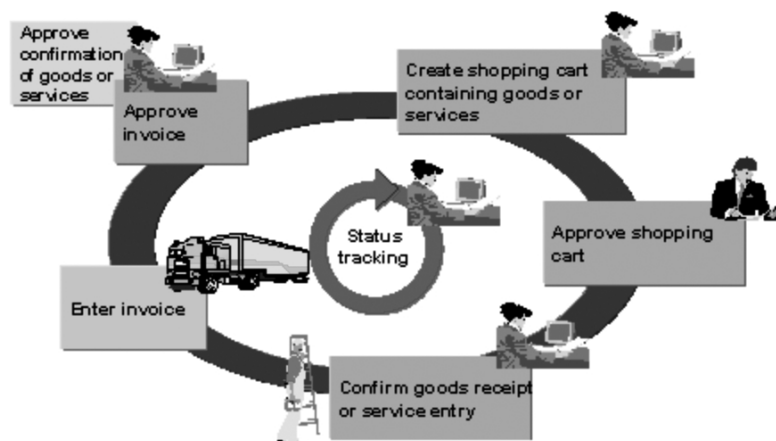
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First and foremost EBP is a solution for getting more effective purchase/ procurement of non-production material (e.g. office material) within a big organisation.

#### EBP process

This process describes the procurement of products using EBP. The process begins with the creation of a shopping cart and ends with the entry of the invoice. All participants in the process first log on to the Enterprise Buyer system. After users log on, the initial Enterprise Buyer screen appears as well as a navigation window. Using this window, users can access all functions relevant to them.

The following graphic shows an example process flow:



1. Create shopping cart  
Employees either search in a catalogue for a suitable material, or enter the requirement directly on the entry screen and transfer this to the shopping cart. Employees can hold the requirements or order them.
2. Approve or reject shopping cart  
If one or more superiors need to approve the shopping cart, for example, because it exceeds a certain value, the system automatically submits it to the inbox of those responsible via the Web-compatible workflow. They then decide whether to approve or reject the document. If the shopping cart is approved, the system creates the follow-on documents (for example, a purchase order).
3. Process shopping cart and check status  
Employees can check the status of shopping carts and, for example, see whether the cart has already been approved
4. Transmit purchase order  
If the purchase order is created in the backend system, then it will be sent to vendors in the usual manner (such as via EDI, by fax, by post). Vendors have to create the order in their company's system. If the purchase order is created locally in the Enterprise Buyer system, it can then be sent to the vendor as a printout or by e-mail, fax, or XML.
5. Confirm goods receipt or performance of service  
After the goods are delivered or the service is performed, employees can confirm this. You can have an internal dispatch department or business partner enter the confirmation. If business partners enter the confirmation, the system starts a workflow and places the confirmation in the employees' inbox for their approval.
6. Enter invoice  
Vendors enter the invoice in the Enterprise Buyer system. The system starts a workflow and places the invoice in the employees' inbox for their approval.
7. Approve invoice or service entry sheet  
Employees check the documents that the business partner created (invoice or confirmation) and release the document. If the document contains errors, employees can also reject it. The system then notifies the vendor or service provider via e-mail.

**EBP in education**

Not really useful in education because it's a specialised module.

**EBP in a business game**

Not really useful in a business game because it's a specialised module. There will probably be no purchase of "non-production material" in a business game.

## Enterprise Portals

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### Introduction

The mySAP.com enterprise portal is the interface towards the user, which enables the user to collect the interfaces for each mySAP.com component in one single place and interact with them in an easier, uniform manner. The portal is presented as a web page, and can thereby be viewed and utilized from almost any computer anywhere in the world.

### Access management

Each user has a record that provides the basis for authentication to the enterprise portal and for single sign-on. The user only needs to logon to mySAP.com once, and every password and login is handled automatically in a transparent way. When a user accesses a content-providing component, he/she is automatically authenticated and does not need to provide further logon information.

Once a user has been authorized to access a component, additional component-specific authorization becomes the responsibility of each component. For example, if an external data source is accessed, it is up to the component to handle login and access to it, and not the user or the enterprise portal.

The mySAP.com users are divided into roles, which regulates which information, functions and privileges each user can utilize. Roles represent the offering of the company to the users, and users can personalize what to do with that offering. The mySAP.com workplace is fully personalizable. Each user can have his/her own settings for navigation, representation, as well as visualized content.

### Building portal content

In the mySAP.com workspace, SAP has introduced flow logic, an XML-based descriptive language and execution environment, as the portal building engine for populating the workspace. Client-based JavaScript allows developers to build customized features and implement individualized interactions.

The main concepts of the user-component interaction are pushing and pulling. By pushing data, information is put (or altered) into some data source from the user. To pull data is – of course – to retrieve data from a data source. For those operations, the enterprise portal has provided a set of tools.

The LaunchPad, a kind of menu, organizes the pull portion of the enterprise portal. The tool is represented by a set of hierarchically organized links, which can be visualized in a variety of ways. The pulled data is presented by the WorkSpace component, and provides a space in the web browser for the accessed component to present its data in.

The screenshot displays the mySAP.com Workplace interface. On the left is a navigation menu with categories like 'Sales Representative', 'Inquiries & Analysis', and 'Master Data'. The main workspace is divided into several sections:

- Welcome Chris Anderson**: A personalized greeting at the top.
- News**: A section titled 'Business from Reuters' containing a list of news items:
  - [ATT Eyes Bell Atlantic Long Distance Halt](#)
  - [Birmingham Steel Says Funds Running Out this Quarter](#)
  - [Snyder Hires Adviser to Explore Possible Sale](#)
  - [Industry Trends favor new form of E-Business](#)
  - [Stocks climb on new sector news from the government](#)
  - [Yoder talks about trade show trends for the 3 Quarter](#)
- Sales Figures**: A section titled 'Competitor Sales' containing a table:
 

Market Competitor	May 2000 Sales	April 2000 Sales
Home Care, Inc.	\$ 499,200,000	\$ 416,000,000
Linwood, Ltd	\$ 632,700,000	\$ 666,000,000
Others	\$ 330,000,000	\$ 333,000,000
United Home	\$ 913,000,000	\$ 830,000,000
<b>Overall Result</b>	<b>\$2,374,900,000</b>	<b>\$2,245,000,000</b>
- Company News**: A section titled 'SAP has strong hold in China' with a quote from Klaus Zimmer, Managing Director of SAP China, and a photo of him. The quote states: "Most of the ERP business in China is concerned with business-to-business and mainly manufacturing," says Zimmer. "We are regarded as the champions in manufacturing which is the lion share of the e-business market here." Below the quote, it mentions Haler, one of SAP China's largest home-appliances clients, and their SAP Business-to-Business Procurement implementation.
- Workflow Inbox**: A section with tabs for 'Inbox', 'Outbox', 'Resubmission', and 'Info'. It includes a 'Show my work items' section with filters for 'With task' (set to 'All entries') and 'In status' (set to 'All entries'). There is an 'Update!' button and a 'Work Item List' section below.

Image: A screenshot of a typical portal layout. The pull portion, which is represented as the menu on the left, presents the desired (pulled) data along with any eventual MiniApps in the workspace on the right.

For pushing operations, small components called MiniApps are utilized as the interface towards the user. The MiniApps are small nuggets of information that populates the workspace(s), for the user to interact with.

### Beneath the shell

In order to provide a secure sign-on that suits most systems, mySAP.com supports digital signatures, cookies and operating system services to fit various login demands for various data sources. To secure the content that is exchanged, strong encryption with the help of public key infrastructures is used. In the case of http services, https is used. For other methods, encryption facilities, either on the application/network level, is to ensure a private communication channel. All mySAP.com components support https via the graphical component SAP GUI for HTML and strong encryption with help of 3<sup>rd</sup> party tools.

The SAP GUI is fully integrated into the mySAP.com workplace, and is the component that provides a standardized way of presenting data that may originally come in a variety of formats from a variety of sources. The SAP GUI is available for HTML or for Java as a browser plugin. The conversion of data into one single standardized format is accomplished with the support of Citrix Terminal Server and plugins, by which most non-SAP components and Microsoft Windows applications can be seamlessly integrated into the mySAP.com workplace.

### **Included features**

The mySAP.com workplace utilizes the unique Drag&Relate feature, which enables the user to freely associate any type of data with any type of service. For example, the user can grab a customer id field and drag it to a shipment component to make the component perform some action given the customer id. The key feature of Drag&Relate is seamless navigation, as a user can drag an object from any kind of component and relate it to functions provided by any other component. Even though this feature can be described as a common drag&drop action but more flexible, SAP has somehow managed to patent it.

The enterprise portal also includes features for many-to-many communication, which allows users to be share and automatically get information from desired areas delivered. Also included in the enterprise portal is WebFlow, an open engine that can integrate all kinds of components, even those that cross company borders. The portal also provides services for role-based reporting and individual reporting.

A collection of features which enables users to take advantage of web services are fully integrated into the mySAP.com workplace. External web community services such as news, end-to-end services and collaborative services can easily be integrated into the workplace. By default, the enterprise portal also provides a standardized access to a number of search engines and common applications.

### **Conclusion**

The enterprise portal is the mySAP.com component that coordinates the other components, and provides the user with a simple interface to all mySAP.com functions. It is very much alike other portals, and can probably be very handy in large business systems that features many employees with many different access rights (roles), and many components that needs to be integrated in a slim way. A very good thing about the portal is that it can compile data from components that aren't produced by SAP. It does provides some nice ways of building and accessing contents in a uniform manner, but very much, like the Drag&Relate property, seems more like unnecessary hypes. The main question is which demands the customer – Uppsala University – has on its business system; if it will have lots of users and complex components and thereby demand a standardized access in form of this particular portal/interface, or can do as well with some alternate solution.





# Appendix B

## Controlling, CO

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The controlling module in the IDES system involves almost everything that the module in the R/3 system does. In IDES controlling module you can find scenarios ranging from simplest cost accounting to a fully controlling module which has overhead cost, product cost and profitability analysis.

The module is divided in three general segments, Overhead Cost Controlling (CO-OM), Product Cost Controlling (CO-PC) and Profitability Analysis (CO-PA) which together ensures that all controlling processes can be coordinated, monitored and optimized.

**Overhead Cost Controlling (CO-OM)** is used for planning, managing and monitoring overhead costs. This part makes it very easy to see how the previous period turned out. Did the planned costs (adjusted to the operating rate) compare with the actual costs turned out as planned or not?

**Product Cost Controlling (CO-PC)** is used for calculating the costs that are incurred when a product is manufactured, or a service provided. The product costing is an instrument that helps you to see manufacturing costs, costs of goods sold per manufacturing unit etc. Depending on which IDES Company that are running you can also run schedule headers, sales orders, service orders, projects, networks, and other objects that are used as cost objects.

**Profitability Analysis (CO-PA)** is as the name suggests used to analyze profits. In the system you can see which market segments in the company that are the most profitable. The information that is gained can then be used for pricing, selecting customers, offering special conditions, and regulating quantity flows. In the R/3 system there are two forms of profitability analysis available: cost based profitability analysis, and account-based profitability analysis. The CO-PA system can be used to demonstrate cost-based profitability analysis.

Together, these three systems make the IDES Controlling module very useful and a strong instrument when you should learn how the CO module in R/3 works.

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## **Enterprise Controlling, EC**

Like the controlling module the enterprise controlling module is divided into different areas, Executive Information System (EIS) and Profit Center Accounting (PCA).

**The Executive Information System** provides information on all of the factors that influence an organization's business activities, to do this EIS gathers relevant data from internal and external sources. In IDES the EIS includes three different analysis tools which help the user to create reports with data from other information systems like Financial Information System, Human Resource Information and Logistics Information System.

**The Profit Center Accounting** helps the user to see how the transactions affect sales and costs, or stock changes regarding products and assets created in-house, and work in process. With this information the user can easily see and calculate the company's value flow and see how different transactions alternatives affect the company. All this data is stored in what is called a profit center area.

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## **Financial Accounting**

The Financial Accounting module collects all the data in the company relevant to accounting, providing complete documentation and comprehensive information, and is at the same time an up-to-the-minute basis for enterprise-wide control and planning. The module is divided into six different areas:

### **G/L Accounting**

Goods and logistics accounting, which includes all the transactions involved in acquiring, selling and transporting goods. It gives possibility to monitor and regulate the transactions made in this area using accounts. These accounts can be implemented for a specific company or for entire corporate group.

### **Accounts Receivable Accounting (ARA)**

This part is used to efficiently regulate and monitor business transactions with customers. In the IDES system there are about 70 customers defined with the company code 1000 (Germany). Each customer belongs to a sales organization within the company. Most of the German customers belong to sales organization 1000 (Frankfurt) or 1020 (Berlin).

### **Accounts Payable Accounting (APA)**

Here the account-based data for all the vendors are managed. This data is transferred to APA by means of the integrated business process for invoice verification. Most of the vendors in company code 1000 (Germany) are maintained centrally and belong to IDES sales organization 1 (Europe) or 1000 (Germany).

### **Asset Accounting (AA)**

This area is restricted by national regulations on asset evaluation. Acquisitions, retirements, transfer postings, depreciations and write-ups are some of the things that can be regulated and monitored here. Besides the asset evaluation described by law, one can also define your own valuation and depreciation methods.

### **Special ledger**

This function allows you to work with customer-specific ledgers. These ledgers contain factors from additional account assignments, and are then used for company-specific reporting. Validation and derivation functions are available for all customer-specific ledgers.

### **Consolidation**

The core task of Consolidation is to gather data from the individual elements of a business enterprise. The goal is to display only the external business relationships, and to eliminate the internal relationships and processes.

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## **Investment management**

Offers integrated management and processing of investment measures and projects from planning to settlement, including pre-investment analysis and depreciation simulation. In most companies today, there are extensive, company-wide planning and budgeting procedures that are carried out before major investments are made. These investigations can be, and are in IDES, divided into three main issues that have to be considered. These are pre-investment analysis, cost planning and budgeting.

In IDES the whole investment process is covered, from the planning phase, all the way to settlement. This is done in a capital investment program; which can be used to manage a budget with a large number of individual measures, such as orders or projects. There is an important difference between orders and project when it comes to investment policies. An order is a one time happening, whereas a project is an ongoing thing that needs to be supervised and managed during its evolution. Only projects are integrated with networks

and logistics functions, therefore single orders can not be simulated through capacity and resource planning scenarios. However, that can easily be done with projects.

There are several projects and orders in the IDES database in order for the user to learn how to manage and supervise this kind of information and transactions. This information is also closely related to other parts of the IDES system, such as plant maintenance, material management, in order to get the data, and information needed for the investment analysis.

There are also two forms of settlement possible in the IDES system. These two are line item settlement (individual) and summary settlement (collective). They differ in the way of how much system resources they use up. The line item settlement allows much more details in proof of origin, since it is handled individually, then the summary settlement.

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## Human Resources

The Human Resources component is completely integrated in the IDES system. The IDES system has been set up so that personnel administration, time management and payroll accounting can be demonstrated.

In the IDES system, personnel organization and planning concentrates principally on organizational management, human resource information system, personnel cost planning, recruitment, career and succession planning as well as shift planning. Various incentive wages (wages that is based on what you have achieved) scenarios have also been set up in the IDES system. These scenarios demonstrate individual incentive wages, group incentive wages and how incentive wages are integrated with logistics.

In the HR Organizational Model of the IDES corporation, the human resources part is broken down into three different groups which is:

- Administration
- HR Development
- Social & Legal

IDES contains a range of evaluation for reporting on organization structures, headcount and training courses on offer. The standard system contains a range of data that you can change to meet your own individual information needs.

## Sales and Distribution Processing

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### Functional areas

The functions in the SD part of IDES are subdivided into the areas of:

**Sales support** tools for both office and field staff. Concerns management of information about customers, competitors and their products, and other contacts.

**Sales** activities concerning pricing, product availability and distribution scheduling.

**Shipping** distribution and delivery management.

**Billing** invoices and credit management

As the most interesting parts of SD for a student playing the Sales and Distribution Manager in the Business Game are located in Sales support and Sales, the short overview will describe these areas.

**Sales organizations** IDES currently contains eight sales organizations, i.e. sales units in the legal sense of term. Four of them have data and settings that are restricted to a specific business task and the other four are complete organizations. The complete ones are located in Frankfurt, Berlin, Philadelphia and Denver. Thus, only American and German sales business processes are fully depicted.

**Distribution channels, product divisions and sales areas** There are a range of distribution channels and product divisions in IDES. A sales area is a specific combination of sales organization, distribution channel and division. In IDES, products from different divisions can be entered into a single sales document by using a generic division. The product divisions play a definitive role in determining the business area in the sales document as well as in the Sales Information System, and in Profitability analysis.

**Sales offices and sales groups** A sales office is a sales outlet or company that can work for one or many sales areas. Sales groups are used to show how these offices are staffed, with a certain number of sales employees in each group. Each employee is assigned a certain number of customers.

## Sales Processing

The sales-based business transactions can be described by means of sales documents:

### Typical Business Transactions

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- Inquires and customer quotations
  - Orders (standard, rush, cash sales)
  - Outline agreements (scheduling, service, quantity contracts)
  - Customer problems and complaints (free deliveries, returns, credit and debit memo requests)
- 

### Specific business transactions (selected)

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- Make-to-order production
  - Configuration of standard products
  - Consignment stock processing
- 

## Sales support

Sales support is an important tool for people working with sales and marketing, especially for business developers and customer services managers. A range of master data records constituting a realistic environment are in place in the IDES system. This means that competitor and market analyses can be performed on a quantitative as well as qualitative basis.

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## Project System

The project system module contains project-specific methods which are required in order to monitor and regulate all the tasks that are involved in realizing a project. It is based on two aspects:

**Work breakdown structure** The project is divided into individual work break down structures (WBS) elements, which are arranged hierarchically. This is used in software projects.

**Structuring using a network** The WBS elements are arranged into a chronological sequence, often used in engineering projects.

Engineering projects concerns different processes, such as sales and distribution, assembly processing, engineering/design, milestones and procurement;

**Sales and distribution** The sales orders are configured to meet the customer's specification. The activities are confirmed and sent to the engineering team (HR organization unit). A purchase requisition is also created.

**Assembly processing**

All functions connected with sales orders and networks can be used. The system automatically creates a network with procurement elements. Scheduling and material availability checks are made are used to determine correct delivery dates. Changes are passed back to the sales-order.

**Engineering/design**

A standard network plans the resources automatically when the sales order is entered. You define the performance of machines and persons required for the production and you determine the components and raw materials that have to be reserved or ordered for the operation in question. Services are used to perform unplanned and planned activities.

**Milestones** Can be used to release subsequent project steps automatically when the activities have been confirmed.

**Procurement phase** Material components are produced and delivered to the construction site.

**Software Projects** Software projects concerns different project phases, such as structuring, project planning, release, execution and completion.

**Structuring** Structural planning is used. Activities and WBS elements are created together to maintain the data required. Relationships are used to define in which sequence the activities should be carried out.

**Project planning** The work that has to be done is planned and also the duration of the work. A Planning board is usually used to calculate deadlines. During the execution phase, the actual costs are set for the WBS elements.

**Release** The current values from Controlling are transferred for budget allocation.

**Execution** Actual values for the project is entered and the project is evaluated using the information system.

**Completion** The costs for the WBS elements are set and are internally allocated to the commissioning centre.

**Service Management**

The Service Management application is a solution that enables various customer services. Service contracts are followed and the call management handles the planning and the billing.

**Service contract** The service contracts describe which services that should be done for which objects and under which conditions. A charge is made for the services defined in the contract.

**Call management** Involves activities performed as part of call logging, planning, editing services and necessary resources. The service order is used to plan the repair required and to determine the planned costs for the reparation.

## **Production planning and Materials Management**

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This area in IDES is a collection of examples from R/3. It has several sub-companies where each company describes a process of R/3. I will describe some of the companies that describes the big areas I IDES.

### **Production planning**

This is a kit of tools for planning and controlling production. One part is to set up the product, make map over all part included in the product, and demand material for each part from MM. There are also tools for repetitive manufacturing, set up for the same products for certain period of time. Another area covered is how to package to products.

### **Materials Management**

This part helps you with all the functions you need for getting material. There is for example MRP, inventory management, material valuation and invoice verification.

Areas included in MM:

**MRP** IDES contains demonstrations how to set up data for forecasting.

**Purchasing** Shows how to transform purchase requests to purchase orders. There are also tools for long-term supply relations, and other tools needed for quick and easy purchasing.

**Goods movements** Tools for keeping control over goods movement, or example cross-code transactions.

**Invoice verification** The procedure Evaluated receipt settlement can be used to demonstrate an automated process in invoice verification.

**Inventory management and material valuation** Help for discrete or continuous inventory. Lowest price principle is an example of material valuation.

**LIS (Logistics Information System)** A kit of tools for collecting, summarizing and evaluating data from logistics applications.

**Quality Management (QM)**

Quality management is a module to manage quality-related problems. You can easily set and view incoming inspections.

You can use a control key to activate tools that will affect purchasing, procurement and invoice verification.





# Appendix C

## Questions sent to Universities in Sweden that are not using R/3

For a translation of these questions please contact the course responsible teacher.

Vi är en grupp elever från Civilingenjörsprogrammet i Informationsteknologi Uppsala Universitet 4:e året som i kursen "IT i samhället" utreder och ställer upp en kravspecifikation för centralisering av en affärssysteminstallation och kompetenscenter för användar- och utbildningshjälp. I det arbetet har den arbetsgrupp vi representerar i uppgift att ta reda på hur och i vilken omfattning olika affärssystem används inom högskolor och universitet i Sverige och vad de används till och i vilka kurser. Främst då när det gäller Ekonomi, Systemvetenskap och Human-Resource management. Vi skulle därför vara väldigt glada om ni kunde ta er tid att svara på några frågor vi har i det ämnet.

Om ni inte kan svara på våra frågor så skulle vi bli glada om ni skickade oss en adress till den som kan.

Används något slag av affärssystem i undervisningen?

Om inte:

- Vad upplever du som huvudanledningen till det?
- Finns det planer på att införskaffa något system i undervisningssyfte ?
- Om man vill ha undervisning i affärssystem, vilka kurser skulle man helst vilja ha det i?
- Har man någon övrig undervisning med datorstöd i ekonomi- systemvetar- eller psykologi- sammanhang.

Om något affärssystem används:

- Vilket/vilka system?
- I vilka kurser används det?
- Hur upplever lärare och elever att det fungerar?
- Vill man utöka med ett annat system också?
- Hur fungerar finansieringen/licensavtalen?

Om man genom ett visst system kan få mer samarbete mellan universitet och kurser, skulle det finnas mer intresse av ett sådant system?

### **Some of the answers**

This is some of the answers we got, for a translation please contact the course responsible teacher. We have omitted those answers that only say "we don't use it".

#### **From mälardalens högskola**

Jag har inte så många svar på dina frågor, men kan kanske leda dig vidare till de som vet mera.

För det första, vi har använt ett affärssystem inom en C-kurs i informatik. Den kursen är för närvarande lagd på is på grund av för litet intresse från studenterna. Den som vet mera både om den kursen och om licensavtal är Joa Silver, som är studierektor inom informatik. Han är för närvarande på tjänsteresa i USA, men återkommer ca 27/11.

I höstas startade vi ett nytt program, IT-ekonom, som skall vara en kombination av informatik och företagsekonomi. Inom det programmet kommer vi att på vissa kurser använda oss av affärssystem. De som vet mera om detta är Jonas Truedsson (informatik) och Per Janze (företagsekonomi/ekonomistyrning). E-postadresser, se ovan!

#### **From högskolan i Trollhättan/Uddevalla**

Hej

Vi är en grupp elever från Civilingenjörsprogrammet i Informationsteknologi Uppsala Universitet 4:e året som i kursen "IT i samhället" utreder och ställer upp en kravspecifikation för centralisering av en affärssysteminstallation och kompetenscenter för användar- och utbildningshjälp. I det arbetet har den arbetsgrupp vi representerar i uppgift att ta reda på hur och i vilken omfattning olika affärssystem används inom högskolor och universitet i Sverige och vad de används till och i vilka kurser. Främst då när det gäller Ekonomi, Systemvetenskap och Human-Resource management. Vi skulle därför vara väldigt glada om ni kunde ta er tid att svara på några frågor vi har i det ämnet. Om ni inte kan svara på våra frågor så skulle vi bli glada om ni skickade oss en adress till den som kan.

Används något slag av affärssystem i undervisningen?

Svar: Ja

Om inte:

- Vad upplever du som huvudanledningen till det?
- Finns det planer på att införskaffa något system i undervisningssyfte?
- Om man vill ha undervisning i affärssystem, vilka kurser skulle man helst vilja ha det i?
- Har man någon övrig undervisning med datorstöd i ekonomi-, systemvetar-, eller psykologisammanhang.

Om något affärssystem används:

Vilket/vilka system?

Svar: SPCS 2000 administration.

I vilka kurser används det?

Svar: Redovisning 5p

Hur upplever lärare och elever att det fungerar?

Svar: Enligt utvärderingar relativt bra

Vill man utöka med ett annat system också?

Hur fungerar finansieringen/licensavtalen?

Svar: Årliga abonnemang

Om man genom ett visst system kan få mer samarbete mellan universitet och kurser, skulle det finnas mer intresse av ett sådant system?

Svar: Naturligtvis

### **From Linköpings universitet, Dept of Behavioral Sciences**

Hej. Här kommer några svar på era frågor

Används något slag av affärssystem i undervisningen?

Nej vi använder inga system generellt i undervisning. Genom seminarieverksamhet inbjuder vi dock it företag att presentera vad som finns och hur utvecklinegn ser ut.

Om inte:

Vad upplever du som huvudanledningen till det?

Vi har marginellt med instrument/verktyg i undervisningen. Vi anser att det smalnar av och att utvecklingen sker så snabbt att vi knappast hinner med. Därför gör vi som svaret ovan.

Finns det planer på att införskaffa något system i undervisningssyfte?

Svar Nej

Om man vill ha undervisning i affärssystem, vilka kurser skulle man helst vilja ha det i?

Svar: Vet ej

Har man någon övrig undervisning med datorstöd i ekonomi- systemvetar- eller psykologi- sammanhang.

Oklar fråga, men vi använder det i forskningsmetodiska kurser.

**From Linköpings universitet, systemvetenskapliga programmet**

Vi använder inte några affärssystem i undervisningen.

Huvudanledning: Andra kurser är intressantare.

Planer att införskaffa: Nej, inte för närvarande.

Kurs i affärssystem: har ej utrymme för en sådan kurs.

Övrig undervisning med datorstöd: Ja, flera.

**From Södertörns högskola**

Tyvärr kan jag ej svara på era frågor. Utbildningen i systemvetenskap här på Södertörnshögskola köps in från Data och systemvetenskapliga institutionen på Stockholmsuniversitet och de lärare som undervisar på kursen kommer från SU.



# Appendix D

## Questionnaire about SAP/R3 – Sent to Universities around the world

- I am a  Man  
 Woman
- Age  -25  
 25 - 35  
 36 - 45  
 46 - 55  
 55+
- I consider myself  Novice  
 Intermediate  
 Skilled  
 Expert
- I have used SAP/R3  Less than six months  
 Six months to two years  
 More than two years
- I use SAP/R3  Daily  
 Once a week  
 More seldom
- I consider the education I have on SAP/R3  
 Adequate  
 Not adequate  
 I have no formal education on SAP/R3
- I have the following education on SAP/R3

-----  
-----

When I need help, I do the following (mark with an X for first, second and third alt.)

- | 1                        | 2                        | 3                        |                              |
|--------------------------|--------------------------|--------------------------|------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Read the manual              |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Ask the nearest person       |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Use the built-in help        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Surf the web for online help |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Call SAP support             |

Where do you think that you get the best and most accurate help

- The manual
- The nearest person
- The built-in help
- Online help on the web
- SAP support

I have the following experience of the below mentioned:

- | Heard of                 | Tried                    | Using daily              |                               |
|--------------------------|--------------------------|--------------------------|-------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Manual in paper form          |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | The built-in help function    |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Online help on the web        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Phone support                 |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | E-mail                        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | FAQ                           |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | BBS (for example First Class) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Chat (for example IRC)        |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ICQ                           |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | News groups                   |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | FTP                           |

Please give a short comment on what you think about each of the following (and why):

Manual in paper form \_\_\_\_\_  
\_\_\_\_\_

The built-in help functions \_\_\_\_\_  
\_\_\_\_\_

Online help on the web \_\_\_\_\_  
\_\_\_\_\_

Phone support \_\_\_\_\_  
\_\_\_\_\_

E-mail \_\_\_\_\_  
\_\_\_\_\_

FAQ \_\_\_\_\_  
\_\_\_\_\_

BBS (for example First Class) \_\_\_\_\_  
\_\_\_\_\_

Chat (for example IRC) \_\_\_\_\_  
\_\_\_\_\_

ICQ \_\_\_\_\_  
\_\_\_\_\_

News groups \_\_\_\_\_  
\_\_\_\_\_

FTP \_\_\_\_\_  
\_\_\_\_\_

If you had access to a "competence center", what kind of services do you think it should provide?

\_\_\_\_\_  
\_\_\_\_\_

Other comments and suggestions:

-----  
-----

For how long have you used R/3 as an education tool?

\_\_\_\_\_ years

In what courses do you use R/3? And Which modules do you use in that course?

Economics

Which modules do you use? (mySAP)

- Enterprise Portals (Portal)
- Financials (Economics)
- Supply Chain Management (Logistics)
- Product Lifecycle Management (Productions)
- Business Intelligence (Information)
- Customer Relationship Management (Customer care)
- Enterprise Buyer Professional (Cooperation between companies)
- Human Resource Management

Human Resource

Which modules do you use? (mySAP)

- Enterprise Portals (Portal)
- Financials (Economics)
- Supply Chain Management (Logistics)
- Product Lifecycle Management (Productions)
- Business Intelligence (Information)
- Customer Relationship Management (Customer care)
- Enterprise Buyer Professional (Cooperation between companies)
- Human Resource Management

- Computer Science
  - Which modules do you use? (mySAP)
  - Enterprise Portals (Portal)
  - Financials (Economics)
  - Supply Chain Management (Logistics)
  - Product Lifecycle Management (Productions)
  - Business Intelligence (Information)
  - Customer Relationship Management (Customer care)
  - Enterprise Buyer Professional (Cooperation between companies)
  - Human Resource Management

- Other. Which?
  - Which modules do you use? (mySAP)
  - Enterprise Portals (Portal)
  - Financials (Economics)
  - Supply Chain Management (Logistics)
  - Product Lifecycle Management (Productions)
  - Business Intelligence (Information)
  - Customer Relationship Management (Customer care)
  - Enterprise Buyer Professional (Cooperation between companies)
  - Human Resource Management

How often do you use R/3 in the education?

- Through the whole education
- Single courses

Is there any cooperation between different courses using R/3?

- Yes
- No

If yes, how?

-----  
-----

Do you use any other business systems in your education?

- Yes
- No

What kind of installation do you use?

- Local installation
- Central installation
- Share it with a few other universities
- Other type:

-----  
-----

If you share the installation, how do you pay for it?

- Pay for every user
- Pay for using time
- Share all costs
- Other:

-----  
-----

Do you have any cooperation with other universities?

- Yes
- No

If no, are you interested in starting a cooperation?

- Yes
- No, why?

-----  
-----

If yes, how do you cooperate?

- Exchange of lab materials
- Common courses
- Exchange of experiences etc.
- Other way:

-----  
-----

If yes, is it a cooperation between

- Universities in the same country
- Universities in the other countries
- Companies that are using R/3



# Appendix E

## A Summary of Michael Rosemanns report

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### Teaching enterprise systems in a distance education mode

Many IT graduates will in the future work at companies using some sort of enterprise system, but the limited resources at most universities makes it difficult to have an installation of their own. However, an Application Hosting Center can solve this problem. The next problem is to have teachers that are well educated in this area. These two obstacles make it meaningful to talk about "Teaching enterprise systems in a distance education mode".

A collaborative model for the enterprise systems education has been found the most appropriate. The following recommendations can be made to universities with interest in distance education in enterprise systems:

- Use a University Application Hosting Center, since it facilitates concentration on the content delivery rather than the complex system administration.
- Accept the necessity of a collaborative model as the system complexity does not allow the classical objective model.
- Use the same assignments for on-campus and off-campus students, to reduce the efforts for the development of assignments and to allow a continuous comparison of the students' performance and the quality of content delivery.
- Explore the quality and acceptance of videotaping on-campus lectures for distance education students.
- Try to build up a good collaboration with the Enterprise Systems vendor and its implementation partners in order to have access to current knowledge.
- Focus on the educational principles of distance education rather than the technologies.
- Try to collaborate with other universities in order to learn from their experiences.

**ERP in University Teaching & Research: An International Survey**

In 1999 an Australian survey concerning the use of enterprise systems like SAP R/3 in the university education took place. The participating universities represented many different nationalities and they all had introduced, or were aiming to introduce, SAP R/3 in their curriculum. The main issue that was investigated concerned the reasons for using enterprise systems in teaching according to the students, teachers and industry. Furthermore the survey also included aspects as cross-university collaboration and the importance of different training opportunities in R/3 for teachers. The following text will discuss some of the main results of the survey however since the survey covered a very large topic there are unfortunately many areas left out.

In the survey the respondents were requested to list the main reasons for using SAP R/3 in teaching. The result of this question was clearly spread out although there were two main issues that were frequently mentioned. The undoubtedly most popular reason was the rich teaching environment that R/3 offers. The second most popular was the great demand from students and industry to use R/3, in fact these demands were cited equally. Some other reasons mentioned were good support from SAP, close to practice and that it should be used since it is a forthcoming standard in industry. The importance of the international perspective was also cited.

Since the rich teaching environment turned out to be a very important issue the respondents were further asked to give their main teaching reasons, i.e. the education areas where R/3 is mostly used. Here the value of R/3 in teaching about business processes as well as enterprise software were the most frequently cited reasons. An other interesting teaching reason that was mentioned is the value of employing a single software environment across a range of subjects. The different modules that R/3 supplies can be used in many areas and thereby involve students with varying background.

In the section where the respondents were requested to list the importance of different methods for teachers to learn R/3 the most highly quoted alternative was hand-on experience. According to the survey this was not surprising since the breadth and depth of enterprise systems is difficult to comprehend and also to demonstrate without hands-on access. SAP training courses and R/3 documentation were also mentioned as important training opportunities. The score on the alternative of SAP training courses depended on what country the respondent represented. The courses were most popular in America which is also where the training courses have been most available for the universities. However the high score on the training courses is somewhat surprising since these are designed for professional users. The interest in the online-documentation may indicate either high quality or simply strong dependence on this source since this is the easiest to reach.

The participants were also asked whether they were collaborating with other universities in their use of R/3. It turned out that collaboration between universities is quite a common matter. Fifty percent told that they were

currently collaborating in various ways and 35 % of these collaborations were on an international basis. Most of the respondents also indicated that they were interested in cross-university collaboration and that it is a good way of exchanging experiences. The most common areas of interest were sharing of teaching material like lecture notes and the general exchange of knowledge and experiences. Furthermore universities that have just commenced their R/3 initiative were interested in input from experienced universities.

Finally, according to the survey the students and teachers using SAP R/3 in education are generally very satisfied with the system. Although there were some drawbacks mentioned including problems with the IDES processes or with the online help, the overall system complexity and the high workload. The positive reactions from employers and industry further enhance the students awareness of the importance of enterprise systems in the education and thereby results in students demanding the universities to introduce such systems.





# Appendix F

Uppsala Universitet

Kista den 13 december 2001

Offertnr: PJ112128

Box 887

Hej,

Efter Er förfrågan översänder vi härmed Prisuppgift avseende SAP-lösning för Uppsala Universitet. Vi hoppas att ni ska finna vårt erbjudande intressant.

Priserna är enligt UDC avtal.

MED VÄNLIG HÄLSNING

VIRTUS INFRAKONSULT AB

PATRIK JOHANSSON

E-MAIL: PATRIK.JOHANSSON@VIRTUS.SE

Tel: 08-444 12 44

Mob: 073-660 38 14

**Prisuppgift**

Virtus Infrakonsult AB erbjuder Uppsala Universitet att köpa utrustning enligt följande:

Alpha server (här är den totala lösningen uppdelad i 3 st lösningar, den totala summan krävs)

Antal	Artikelnr	Beskrivning	Pris/st	Pris
		DS20E Tru64 Unix		
1	DA-56PAA-FA	Alpha Server DS20E 6/667MHz 8MB/1GB minne	146 804	146 804
1	3X-BA56R-RE	Rackmount bezel kit for Compaq Series 9000 Cabinets	2 362	2 362
1	3X-BA611-4D	DS20E 4-SLOT DRIVE CAGE	4 843	4 843
1	3X-KZPCA-AA	1 CH WIDE ULTRA-2(LVD) ADAPT	2 756	2 756
1	KN311-CB	6/667-MHz CPU with 8-MB T64	50 085	50 085
2	3R-A0584-AA	9GB 10K rpm Ultra2 Universal	2 990	5 980
1	SN-PBXGK-BB	ELSA GLORIA Synergy 8MB graph	1 766	1 766
1	3X-DE600-AA	PCI to 10/100 Ethr NIC 8255x	755	755
1	BN35S-4E	Nätkabel	88	88
1	QA-MT4AA-H8	Tru64 UNIX media and online documentation on CD-ROM	3 320	3 320
1	QL-2GVAE-AA	DEC LSM U/A TRAD LICDEC LMS U/A Tr	18 433	18 433
1	KZPAC-CA	PCI 3-port UltraSCSI RAID controller with 4-MB	20 132	20 132
1	FR-H7910-AA	DS20E redundant power supply	4 041	4 041
		Summa		261 364

Antal	Artikelnr	Beskrivning	Pris/st	Pris
		DS20E Tru64 Unix		
4	DA-56PAA-FA	Alpha Server DS20E 6/667MHz 8MB/1GB minne	146 804	587 216
4	3X-BA56R-RE	Rackmount bezel kit for Compaq Series 9000 Cabinets	2 362	9 447
4	3X-BA611-4D	DS20E 4-SLOT DRIVE CAGE	2 756	11 023
4	3X-KZPCA-AA	1 CH WIDE ULTRA-2(LVD) ADAPT	2 756	11 023
4	KN311-CB	6/667-MHz CPU with 8-MB T64	50 085	200 339
8	3R-A0584-AA	9 GB 10K rpm Ultra2 Universal	2 990	23 920
4	SN-PBXGK-BB	ELSA GLORIA Synergy 8MB graph	1 766	7 064
4	3X-DE600-AA	PCI to 10/100 Ethr NIC 8255x	755	3 018
4	BN35S-4E	Nätkabel	88	353
4	QL-2GVAE-AA	DEC LSM U/A TRAD LICDEC LMS U/A Tr	18 433	73 731
4	FR-H7910-AA	DS20E redundant power supply	4 041	16 162
		Summa		943 297

Antal	Artikelnr	Beskrivning	Pris/st	Pris
		Storage		
2	190209-B31	StorageWorks Model 4314R Ultra3 SCSI (LVD)	22 838	45 676
4	3R-A0584-AA	9.1-GB Ultra3 SCSI 10,000 rpm 1.0 <sup>2</sup> Universal disk drive	2 990	11 960
9	3R-A0919-AA	36.4-GB Ultra3 SCSI 10,000 rpm 1.0 <sup>2</sup> Universal disk drive	6 953	62 578
1	BN37X-01	Ultra SCSI Kabel 1 m, 68VHD168256-B21Ultra 68VHD 1	1 229	1 229
1	BN37X-02	Ultra SCSI Kabel 2 m, 68VHD168256-B21Ultra 68VHD 1	1 229	1 229
2	BN35S-4E	Nätkabel	88	176
		Summa		122 848

Intel (här är den totala lösningen sammanfattad)

Antal	Artikelnr	Beskrivning	Pris/st	Pris
1	155617-421	ProLiant DL580R01 X700-1MB M1 512MB	63 361	63 361
1	189080-B21	512MB PC100 ECC SDRAM (4x128MB)	4 690	4 690
1	174448-B21	700MHz 1MB Pentium III Xeon Processor ProLiant	16 550	16 550
1	124992-B21	Smart Array 5302/64MB RAID Kontroller Ultra3, 2kanaler	13 108	13 108
2	155617-421	ProLiant DL580R01 X700-1MB M1 512MB	63 361	126 722
2	189081-B21	1GB PC100 ECC SDRAM (4x256MB)	11 370	22 740
6	174448-B21	700MHz 1MB Pentium III Xeon Processor	16 550	99 301
1	190211-B31	Diskkabinett 4354 Rack 3U -14 x 1" hot-plug platser	27 229	27 229
2	164604-B21	24ft SCSI kabel VHDCI-VHDCI	753	1 505
2	142673-B22	18,2GB Ultra3 Hot-Plug 10K 1" Universal	3 758	7 517
2	142673-B22	18,2GB Ultra3 Hot-Plug 10K 1" Universal	3 758	7 517
9	176496-B22	36,4GB Ultra3 Hot-Plug 10K 1" Universal	5 851	52 655
2	142673-B22	18,2GB Ultra3 Hot-Plug 10K 1" Universal	3 758	7 517
		Summa		450 412

### Allmänna Villkor

Virtus leveransvillkor är enligt SITO:s Avtal 90 Allmänna bestämmelser och SITO:s Allmänna leveransvillkor 91. För tjänster gäller SITO:s allmänna bestämmelser - Tjänster 92. Övriga Statskontorsvillkor tillämpas i nedan nämnda avtal. Informationen i offerten är att betrakta som konfidentiell, och för ej delges tredje part.

### Pris

Priserna är efter gällande avtal för Compaq mot Statskontoret Nr: 6440/99.

Priserna är angivna i svenska kronor, SEK, exklusive moms och är giltiga i 15 dagar från ovan datum.

Leveransen är fraktfri.-

### Leveranstid

Ca 1-2 veckor.

### **Garantier och servicenivå**

Alla produkter levereras med respektive leverantörs gällande garantier.

### **Äganderättsförbehåll vid kontantköp**

Äganderätten till varan övergår till köparen först vid det tillfälle köparen korrekt erlagt full avtalad betalning härför. Vid utebliven betalning har Virtus rätt att omedelbart häva avtalet och återhämta varan. Köparen skall aktivt medverka till att varan i sådant fall återlämnas till Virtus. Sker hävning av avtalet, har Virtus rätt till skadestånd för den skada Virtus lider till följd härav. Köparen är medveten om att det är straffbart att vidareöverlåta vara som är behäftad med äganderättsförbehåll.



# Appendix G

## Information on SAP-C/UNI-C in Denmark

When Ms. Maibritt Heide started the work of creating an educational competence center for SAP, three Danish Universities administrated their own SAP IDES systems, but only one of them where able to keep the system up and running. The idea of a centrally maintained system was formed.

The competence center, SAP-C ([www.sap-c.dk](http://www.sap-c.dk)), was created to solve the maintenance problems evident in the individual systems maintained by the Universities. SAP-C has been in use since spring 2001 and currently six academic institutions subscribe to the service. The initial system was set up with a SAP license and hardware from SUN. The hardware is recently replaced by two systems sponsored by Compaq.

Access to the SAP-C competence center is offered through collaboration with UNIC, an organization under the Danish Ministry of Education. At UNIC Mr. Rasmus Brogger administrates the technical issues and Mr. Martin Hovbakke Sørensen runs the project. Together with they provide support to the subscribing members and maintain the system.

SAP-C offers access to an enterprise resource planning system that has been set up to suite the needs of educational institutions. A subscription gives access to an instance of IDES, an educational database with several case models of companies. For each subscription, the data can be rearranged without interfering with other subscribers IDES databases.

The cost is 15.000 DKK for the first year and then an annual payment of 7.500 DKK. The price is targeted towards Danish universities and colleges. Other universities should invite tenders.





# Appendix H

## **Intervju med Torbjörn Elowson, SLU 011205**

Fråga: Vilka tjänster tycker ni att det centraliserade systemet, UCC ska erbjuda? Vad skall ingå?

Svar: Support och utbildning av lärare (både webbaserat och i kursform). Gärna möjlighet att branschanpassa systemet så att eleverna kan lära sig hur SAP/R3 används i industrin.

Fråga: Utifrån föregående fråga, vad får detta kosta för ert universitet?

Svar: Vi ser helst att kostnaden baseras på antal studenter som använder systemet, på varje högskola/universitet. För närvarande har vi ca 12 studenter som kan vara intresserade av en kurs där SAP undervisning ingår. Räknar med ungefär samma antal till den planerade SAP-baserade kursen, Styrning och styrsystem, som ska ges from. 2002.

Fråga: Hur skulle driften av systemet se ut enligt er? Kan ansvaret för systemet ligga hos ett av de universitet som idag har ett SAP/R3-system, eller skulle det hellre ligga hos en av SAP:s hosting-partners alternativt ett oberoende företag?

Svar: *Ansvaret bör ligga hos SAP eller någon universitet eftersom de har intresse i att allt fungerar. En tredje part kanske inte är lika insatt i systemet.*

## **Intervju med Anders Hederstierna, BTH 011205**

Fråga: Vilka tjänster tycker ni att det centraliserade systemet, UCC ska erbjuda? Vad skall ingå?

Svar: Vi vill använda systemet för att våra studenter ska förstå och kunna påverka ett företags styrning. Som vi har förstått så har SAP/R3 systemet varit för stort och komplicerat att användas i undervisning. Därför vill vi gärna ha lärarhandledning i UCC och någon sorts introduktionsutbildning (både webbaserat och i kursform). handledningen kan liknas vid befintliga undervisningsböckers webbsidor. där bl.a. läarmaterial kan hittas. Även ett slags övningssystem efterfrågas, där man kan göra ändringar.

Fråga: Utifrån föregående fråga, vad får detta kosta för ert universitet?

Svar: Vi har inte diskuterat denna fråga ingående. Kostnaden bör vara baserad på antalet studenter som läser kursen och använder systemet. På det sättet får även de mindre universiteten möjlighet att använda SAP i undervisningen.

Fråga: Hur skulle driften av systemet se ut enligt er? Kan ansvaret för systemet ligga hos ett av de universitet som idag har ett SAP/R3-system, eller skulle det hellre ligga hos en av SAP:s hosting-partners alternativt ett oberoende företag?

Svar: Spelar ingen roll.

### **Telefonmöte 2001-12-03 kl 15**

Närvarande: Maibritt Heide, Lars Pettersson, Christian Melki, Anders Taflin, Mikael Carlsson

Först gör Maibritt Heide en sammanfattande beskrivning av SAP-C, det danska SAP kompetenscentret. Den beskrivningen följer efter intervjufrågorna.

Fråga: Vad skulle kostnaden vara om ett svenskt universitet ansluter sig?

Svar: Se kompletterande frågor

Fråga: Hur mycket använder de abonnerande institutionerna sig av systemet?

Svar: Systemet har bara varit igång 6-8 månader. Hon har inte gjort en undersökning ännu. De som abonnerar på systemet kommer att besökas i februari för intervjuer.

Fråga: Vad kostar det idag att driva SAP-C. Hur många anställda arbetar med systemet. Är det på heltid?

Svar: Två-tre stycken arbetar idag halvtid med systemet. Arbetsbelastningen är ganska ojämn. Driften av systemet kräver ca 4 timmar om dagen för en tekniker.

Fråga: Vilka supporttjänster erbjuder ni?

Svar: 3 dagars introduktionskurs för två lärare. Hjälpdokumentation för att komma igång. Hjälp med att installera SAP klienter för upp uppkoppling mot central server. Kartläggning av problemlösningar på olika universitet

Vad finns för samarbete mellan institutionerna som abonnerar på SAP-C

De har tillgång till SAP-C Forum, en webbplats med diskussionsforum.

Fråga: Ni har 3 dagars utbildning för de som beställer systemet. Vad tar den utbildningen upp?

Svar: Man får en kombinerad kurs i SAP 20 och SAP Overview. Kursen är anpassad för lärare och har mer teoretiskt innehåll än ordinarie kurser.

Fråga: Vilka möjligheter finns det att anpassa IDES på SAP-C efter egna önskemål.

Svar: Se kompletterande frågor

Kompletterande frågor till Maibritt Heide:

- Vilka möjligheter finns det att anpassa IDES på SAP-C efter egna önskemål?
- Vad skulle kostnaden vara om ett svenskt universitet ansluter sig?
- Vad är det för processor, MB ram och MB disk i Compaq serverarna? Vilken databas använder ni?

Hej Lars,

Jeg vil i denne mail forsøge at svare på jeres spørgsmål, jeg vedlægger samtidig en produktbeskrivelse på SAP-C det er denne beskrivelse i fremsender til alle uddannelsesinstitutioner i Danmark.

- A. Ja, det er muligt at tilpasse IDES, men det kræver konsulent bistand som koster en del penge, der ligger allerede en del virksomheder med data i systemet som kan bruges i undervisningen. I Danmark er vi ved at lægge sidste hånd på en Case som er skrevet af en lærer og sat op i systemet af SAP Danmark, denne case vil når den er færdig blive tilgængelig i SAP-C Forum, og er sat op på en sådan måde at der kan bygges videre, altså i forskellig retninger (produktion, økonomi m.m.).
- B. Jeg kan ikke bekræfte en pris for et svensk universitet, dette skal undersøges og aftales nærmere, men bag på vedlagte beskrivelse kan du se priserne for Danmark, jeg forventer at ved et evt. samarbejde mellem Sverige og Danmark at pris niveauet vil ligge i nærheden af det danske.
- C. Det er svært at vurdere arbejdstimer, det kræver altid ekstra i opstarts fasen, derefter vil antallet af timer afhænge af kvalitets- og service niveau, UNIC drifter systemet og er uddannelses institutionernes første kontakt, bag ved står SAP med støtte til drift, service support og andet. Det kræver en del at opbygge de rette kompetence til at drive systemet, og det tager som bekendt tid at få den fornødne erfaring.
- D. Den tekniske opsætning af systemet består af følgende:

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1 Databaseserver/Applikationsserver og 1 ren applikationsserver.

Dataserver/Applikationsserver

Compaq ML 570

4 x 700 mhz Xeon cpu

3 GB RAM

Alle logfiler og operativsystem er lagt på spejlede 9,1 GB diske

Databasen ligger på en ca. 330 GB spejlet partition.

Applikationsserveren er en Compaq ML579

2 x 700 mhz Xeon cpu

2 GB RAM

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Systemet ligger på hardware spejlede 9,1 GB diske.

Begge servere køre load balance, så brugere vil blive henvist til den server med bedste svar-tider. Jeg håber at dette kan hjælpe jer, og jeg venter spændt på at se resultaterne fra jeres analyser.

Med venlig hilsen  
Maibritt Heide  
HLI Manager  
SAP Danmark A/S

### **Intervju med Anneli Edman, 011011**

Gunilla, Maria J, Maria F, Lars H, Anneli Edman (AE)

Fråga: Licens?

Svar: Det finns ingen skriven licens! Det finns en överenskommelse som utarbetades av en grupp intresserade från universitet, vilken man borde kunna få tillgång till. Med i denna grupp satt Mats Daniels! Han borde kunna hjälpa till med detta. Även Werner Schneider kan ev. hjälpa till.

Fråga: Investeringskostnad?

Svar: Programinstallationen kostade universitetet inget. Vad hårdvaran kostade vet inte AE. Databasen som krävs för att systemet ska löpa är en Oracle databas, vilken sponsrades av Oracle. DeLoyt(?) & Company sponsrade med kurser som hölls på universitet för anställda. Tove Saeland (som hade Catrines tjänst då universitetet införde systemet) på SAP ordnade med spons.

Fråga: Driftskostnad?

Svar: I överenskommelsen ovan (och vilket SAP kräver av alla universitet som använder SAP:s affärssystem) krävs att man har en deltidstjänst där personen ska fungera för att systemet ska fungera. Denna person är Pierre Hjälms. Deltidstjänsten är ett krav inte bara för att systemet skall fungera, utan finns även i det syfte att om universitetet krävs lägga tid och pengar på detta, faller inte systemet i glömska och ligger på hög som så många andra program som universitetet har licensierat. För att systemen skulle fungera fanns tidigare tät kontinuerlig kontakt med SAP genom Tove Saeland. När hon slutade på tjänsten har backupen/kontakten med SAP blivit mycket sämre. Nu fungerar inte R/3 på Uppsala Universitet, (man befarar att felet ligger i databasen) upplever man att SAP inte visat tillräckligt intresse för att få det att fungera igen. Från Uppsala universitet finns inte pengar för att sätta igång felsökning på egen hand.

Fråga: Budget?

Svar: AE frågar sig om det finns någon. I så fall ligger den på universitetsnivå. Hon tipsar att vi ska prata med Pierre Hjälms.

### **Mailfrågor till Mats Apelkrantz**

Fråga: Vilka tjänster tycker ni att det centraliserade systemet, UCC, ska erbjuda?  
Vad ska ingå?

Svar:

- Stöd för undervisning i olika kurser framförallt inom föret.ekonomi
- Möjlighet att studera SAPs affärsprocesser
- Möjlighet att konfigurera systemet, utefter en användares affärsprocesser.
- Möjlighet att arbeta med prototyper och utveckling

Fråga: Utifrån föregående fråga, vad får detta kosta för ert universitet

Svar: Vi arbetar med att sätta upp ett Affärssystemlabb, där ett antal leverantörer förväntas var intresserade att få deltaga. Jag kan vända på frågan: Hur mycket är SAP berett att betala för att få visa upp sig i detta labb?

Fråga: Hur skulle driftandet av systemet helst se ut enligt er? Kan ansvaret för systemet ligga hos ett av de universitet som idag har ett SAP/R3-system, eller skulle det hellre ligga hos en av SAP:s hosting-partners alternativt ett oberoende företag?

Svar: En svår fråga som måste utredas utefter vilka förutsättningar som bjuds.

### **Möte med Pierre Hjälms**

Fråga: Vilka kostnader har SAP medfört?

Svar:

- Inga kostnader för installation av hård och mjukvara.
- Servern man använder kostade 460.000 kr och den har man fått genom en donation, databasen är sponsrad av Oracle.
- Lön för halvtidstjänst (pierre var tveksam om det verkligen var någon kostnad, det var han som skulle ha den tjänsten men han var osäker på hur tjänsten såg ut i dagsläget).
- 20.000 kr per år för R/3 systemet enligt avtal med SAP.

Fråga: Hur ser din halvtidstjänst ut?

Svar: I början närvarande han vid installationen av systemet vilket tog ett par dagar. Därefter lite underhåll av systemet och att lägga upp nya användare i systemet.

Fråga: Hur tycker du att det fungerar som det är nu?

Svar: Servern har inte fungerat sedan nyår och det har inte kunnat åtgärdas. Innan servern slutade fungera tyckte pierre att det i stort sett fungerade bra.

Fråga: Hur tror du att det kommer att fungera med ett UCC?

Svar:

- Fördelen är att det blir mer kostnadseffektivt och det blir lättare att få hjälp med problem (t.ex. UU server).
- Han tror att lärarna inte kommer känna att de har rätt stöd. De upplever det som jobbigt att behöva ta kontakt med en person som finns någon annanstans.

Fråga: Hur skulle du vilja att ett UCC ska fungera?

Svar: Om det finns en lokal administratör vid varje universitet så borde det kunna fungera som det gör idag. Näten är så pass snabba att det inte skulle märkas någon skillnad.

**Workshops** Pierre var inte informerad om att det inte skulle bli några fler workshops.

Han tyckte att de var en bra företeelse, man fick träffa andra som använde systemet och kunde utbyta erfarenheter.

**Utbildning** UU hade i år utnyttjat ca 15 av sina 75 utbildningsdagar från SAP.

Pierre ansåg att lärarna som använde SAP i undervisningen inte var tillräckligt kunniga i systemet men det var svårt att få rätt kunskaper för SAPs kurser är ej anpassade för lärare.

**Övrigt** Pierre tyckte att samarbetet med SAP fungerade bäst i början och att det sedan har avtagit efter hand. UU har fri användning av SAPs online support.



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## Business game

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Caldefors, Catherine	SAP <i>catherine.caldefors@sap.com</i>
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## The current educational use of SAP R/3

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Apelkrans, Mats	Jönköping International Business School <i>mats.apelkrans@ihh.hj.se</i>
Bay Maud	Université de Liège <i>maud.bay@ulg.ac.be</i>
Caldefors, Catherine	SAP <i>catherine.caldefors@sap.com</i>
Carlsson, Sven	Jönköping International Business School <i>sven.carlsson@ics.lu.se</i>
Edman, Annelie	Uppsala University <i>anneli.edman@dis.uu.se</i>

Fonteyn, Toni	Provinciale Hogeschool Hasselt, <i>toni.fonteyn@ping.be</i>
Hedman, Jonas	The School of Economics and Management in Lund <i>jonas.hedman@ics.lu.se</i>
Johannesson, Paul	Stockholm University <i>paulj@dsv.su.se</i>
Jönsson, Barbro	Mid Sweden University
Olsson, Anette	Södertörn University <i>anette.olsson@sh.se</i>
Peterson, Gunnar	The University of Trollhättan/Uddevalla, <i>gunnar.peterson@htu.se</i>
Pettersson, Ulla	Mälardalen University <i>ulla.pettersson@mdh.se</i>
Popkowicz, Bronislaw	Prof - Podlaska Academy <i>b.popkowicz@valmont.com.pl</i>
Pour, Jan	Doc, Prague Economics University <i>Pour@vse.cz</i>
Rosemann, Michael	Dr, Queensland University of Technology <i>m.rosemann@qut.edu.au</i>
Schenk, Dirk-Jan	Amsterdam School of Business <i>DJ.Schenk@hesasd.nl</i>
Svedin, Per-Olof	Linköping University <i>PerSv@IBV.liu.se</i>
Wikander, Lennart	Uppsala University <i>lennart.wikander@ped.uu.se</i>
Ågren, Gunnar	Blekinge Institute of Technology <i>gunnar.agren@bth.se</i>

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## Helpdesk

Caldefors, Catherine	SAP <i>catherine.caldefors@sap.com</i>
Schenk, Dirk-Jan	Amsterdam School of Business <i>DJ.Schenk@hesasd.nl</i>

**Technology**

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Arvidson, Sven	ITS, Uppsala <i>Sven.Arvidson@its.uu.se</i>
Askstedt, Kristina	Microsoft AB/Enterprise and Partner Group <i>kristinask@microsoft.com</i>
Brandtvig, Mikkel	HP, Stockholm <i>mikkel_brantvig@hp.com</i>
Bågstam, Michael	SAP's contact on Compaq, Stockholm <i>michael.bagstam@compaq.se</i>
Caldefors, Catherine	SAP <i>catherine.caldefors@sap.com</i>
Ekbjörn, Anna	Microsoft <i>annaekb@microsoft.com</i>
Grönqvist, Klas	IBM, Stockholm <i>Klas.Gronqvist@se.ibm.com</i>
Hjalmarsson, Erik	Presales Manager/Systems Engineer, Compaq <i>erik.hjalmarsson@compaq.com</i>
Hjälms, Pierre	Uppsala University Administrator <i>Pierre.Hjalm@dis.uu.se</i>
Johansson, Charlotte	Sales Manager Microsoft Education, Microsoft
Johansson, Patrik	Vendor, Virtus data, Kista <i>patrik.johansson@virtus.se</i>
Khoshnam, Masoud	Compaq <i>masoud.khosnam@compaq.se</i>
Knutar, Niklas	Oracle Sales Representative, Oracle, Stockholm <i>niklas.knutar@oracle.com</i>
Larsson, Bruno	Microsoft
Lindgren, Jan	SAP
Nyqvist, Aarni	IBM, Stockholm <i>Aarni@se.ibm.com</i>
Persson, Michael	Stockholm University Administrator <i>mpe@mail.dsv.su.se</i>
Saxin, Eric	Sales Manager, IBM, Stockholm <i>eric.saxin@se.ibm.com</i>
Tellberg, Björn	IBM, Stockholm <i>bjorn.tellberg@se.ibm.com</i>

## Economics

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Apelkrans, Mats	Jönköping International Business School <i>mats.apelkrans@ihh.hj.se</i>
Caldefors, Catherine	SAP <i>catherine.caldefors@sap.com</i>
Edman, Anneli	Uppsala University <i>anneli.edman@uu.se</i>
Elowson, Torbjörn	SLU <i>torbjorn.elowson@slu.se</i>
Heide, Maibritt	HLI Manager, SAP Danmark A/S
Hederstierna, Anders	Blekinge Institute of Technology <i>anders.hederstierna@bth.se</i>
Hedman, Jonas	Lund University <i>jonas.hedman@ics.lu.se</i>
Hjälml, Pierre	Uppsala University Administrator <i>Pierre.Hjalm@dis.uu.se</i>
Johannesson, Paul	University of Stockholm <i>pajo@dsv.su.se</i>

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