ERP inside Large Organizations

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Many large companies in Romania are still functioning without an ERP system. Instead they are using traditional application systems built around the strong boundaries of specific functions: finance, selling, HR, production. An ERP will offer lots of advantages among which the integration of functionalities and support for top management decisions. Although the total cost of ownership is not small and there are some risks when implementing an ERP inside large and very large organizations, having such a system is mandatory. Choosing the right product and vendor and using a correct risk management strategy, will ensure a successful implementation.

Keywords: *Enterprise Functions, ERP Functionalities, Process Lines and Solutions, Cost Implementation, Total Cost of Ownership, Risk Management, Active Global Support, ERP Advantages, Success Factors, Return of Investment*

1 Enterprise Management Systems

In order to manage business well, entrepreneurs must control the following **enterprise functions**: purchasing, production, marketing, finance, administration, Human resources, public relations and general management. Purchasing ensures the availability of goods and raw material, when needed, at the best price. Production represents the most efficient combination of the four factors (natural resources - land, capital, labor and entrepreneurship) to produce the goods. Using market research, advertising and sales, the company is able to produce and offer what customers actually are looking for. Finance keeps records of financial activities and raises the necessary capital. General management must manage, plan, direct and control all the activities in order to ensure a successful business. Public relations are necessary for keeping a close connection with the business environment and to promote the business of the company. The recruitment, training, evaluation of employees are functions of the human resources enterprise component. Human resource function has significant importance because proper management of people means efficient work which means efficient business. Administrations assist in running the business and handling information.

According to the University of Kent [15] a more sensitive manner to describe the functions in a company is to classify them in internal and external functions and in core business and support function. "Internal functions are those which are part of the company. External functions are those which are supplied by an outside provider (outsourcing)." [15]. In Figure 1 we can find a simplification of the business functions. "Not all companies can be easily categorized, and some will have specialist functions which are not included here. Some companies will not have all the functions listed, for example service and finance companies will not normally have research and production departments. Some functions such as Market Research and PR may be internal, external or both. A small company will probably hire an external agency when it needs these functions. A large company may well have in-house market research and corporate PR staff, but will still outsource much of the work that is of a specialist nature." [15]

Production is a general function but in particular it deals with research and development, production and quality, distribution/logistics. Research and developments is important for developing products and keeping the business up to date with new developments. Production and

quality manages the entire production process. It is responsible with planning the production, it ensures the efficient usage of resources. Inside a company, production is connected to marketing, research and finance. Distribution/logistics manages the supply chain processes. It coordinates the supply, the distribution and the storage of goods, transport and distribution of products.

Selling has two aspects: sales and marketing. Sales is the function responsible with products presentation, budget management, learning about new products, ensuring that the products meet the customer requirements. Marketing supports the promoting and selling of the products.

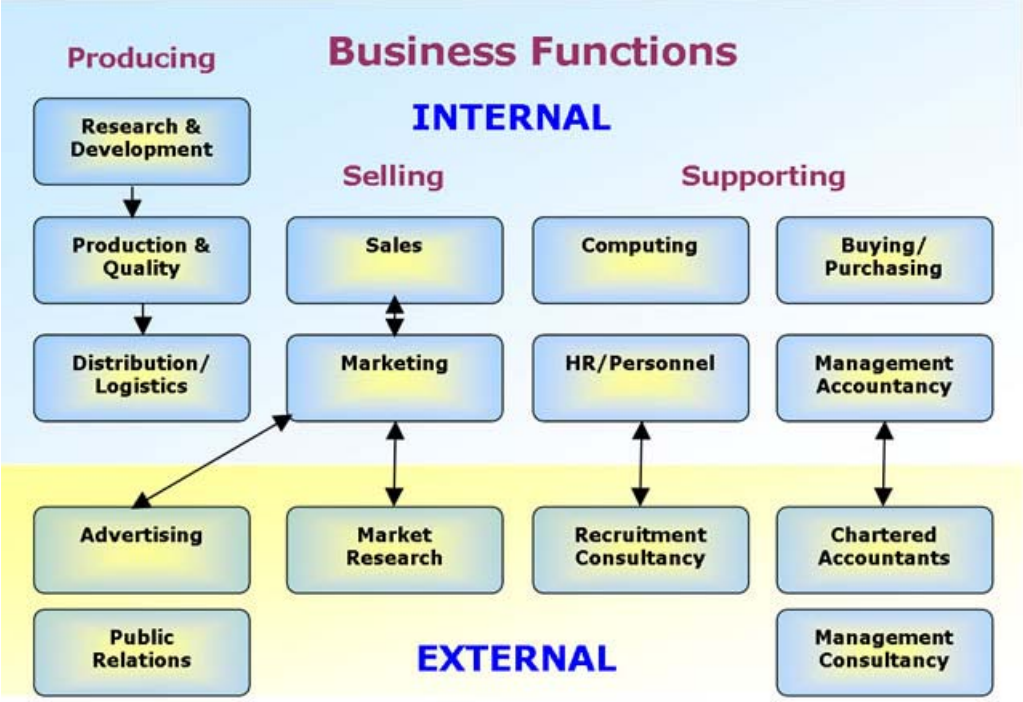

Fig. 1. Business Functions (source: University of Kent [15])

Production and selling are core business functions in a company. They cannot exist without support functions such as finance, computing, HR, purchasing.

Finance or management accountant offers financial protection and planning inside the company.

Computing is the function responsible with the implementation and maintenance of ICT systems, data bases, network, intranet and portals.

Purchasing not only provides the goods and raw materials at the best price but also maintains the relationships with suppliers. It is connected with the management function in order to anticipate future demands.

The functions mentioned above are considered internal functions. They coexist with the external functions: chartered accountants, management consultants, recruitment agencies, advertising, market research, public relations.

The charter accountants represent the financial audit agencies. They check and verify the validity of company's accounts, they offer support on tax liability.

Management consultants help with the internal organization and procedures.

Advertising offers information about the competitors and offers improvements to the marketing function concerning the communication.

Market research is not always an external function. It can be done internally but these days companies usually request marketing and communication support from external specialized agencies. A specialized market research agency can do market research and

analyses on behalf of the company. It can also do draft proposals.
Public relation deals with media, press and public in general. It is an important function especially at a corporate level.
Informatics systems are vital nowadays for all organizations and for their continuous survival and improvement. It is quite impossible for companies working in the utility area (gas, oil, water, electricity) or in the telecommunication area, to manually calculate millions of customer bills every month. The effort involved without the support of IT systems would make profit become an impossible objective. It's the same with all the other industry fields, banks, public institutions, manufacturing companies, retailers. Nowadays a large company could last only a few days without IT support.
It is a common knowledge that the secret of a successful business is the information. However, obtaining the specific information for a certain business means that elementary data need to be saved continuously and analyzed. Storing this amount of data it's impossible without databases and data warehouses. Saving the information is not enough. The information must be retrieved easily and analyzed in order to support the business. For instance, the selling function inside a company must have access to the price catalog of the company, to the discounts, to the history of the clients. The finance function inside an organization needs to work with the financial data, the millions customer bills mentioned before. This is way over the working power of human being. Not only data needs to be saved in databases but it also need to be extracted and analyzed in real time. This requires the presence of informatics systems inside an organization.
Each function inside an organization can be supported by one or more informatics systems. Even a small company will be using a financial software application for invoicing, for obtaining the balance sheet, for analyzing costs and profitability. There are lots of financial applications from which a company can choose. In order to train and evaluate the employees, a company could use an e-learning platform. The sales structure inside an organization could use an informatics system providing information about the customers and about their debts. If, for instance, one client is a bad payer, with the support of an informatics system the sales responsible can easily decide not to sell to that client. Managing the employees' rights can be done with a HR software application. The production process can be managed using a MRP system (material requirements planning) which can support in the production planning and inventory control. All the information concerning existing and potential clients can be managed by a CRM system (client relationship management).

2 ERP Modules and Functionalities

We indentified in the first chapter of this article several organization functions and related software applications described as traditional application systems built around the strong boundaries of specific functions: finance, selling, HR, production. An ERP (Enterprise Resource Planning) has a different approach in supporting the business. It is integrated. All the small software application dealing with different functionalities are working and communicating together as a single platform, exchanging information and depending one on another. An ERP treats the functions inside an organization as interconnected processes. We explained in the first chapter that the main functions inside a company are linked together. For instance purchasing is connected to the management function in order to anticipate future demand. Selling is strictly connected to finance. Inside an organization an informatics system is not isolated. An ERP has several modules supporting different functions but they are integrated for the fast and accurate results required by multiple users for multiple purposes.
An ERP must be flexible, modular, comprehensive, beyond the company and belongs to the best business practices. Beyond the company it means that an ERP should not be confined to the organizational

boundaries. Instead it should support connectivity between all entities inside and outside an organization.

When analyzing **ERP functionalities** we should focus more on **process lines** instead of **modules**. This way the interconnectivity between functions inside an ERP can be described better. The main line process inside an ERP is:

- OTC (Order to Cash) meaning the entire process form selling to invoicing, registering the customers' invoices and receiving payments also (accounts receivable);
- PTP (Purchase to Pay) meaning purchasing, receiving the vendors' invoices and paying them (accounts payable);
- RTR (Record to Report) meaning finance - general ledger;
- COGS (Cost of Goods Sold) meaning producing, selling, invoicing and analyzing costs and profitability (COPA).

Inside the process lines we can find the **ERP solutions**. These are related to the organization functions described in the first chapter: financials, human resources, customer relationship management, supplier relationship management, product lifecycle management, supply chain management, business intelligence.

A more detailed overview of an ERP function, without considering the integration between them, can be obtained describing the **modules of an ERP**. In [11] and [9] we find out that an ERP contains the following modules:

- FI (Financial Accounting) providing general ledger, book close, tax, accounts receivable, accounts payable, asset management, consolidation, special ledger;
- CO (Controlling) manages the internal costs, cost elements, cost centers, profit centers, internal orders, activity based costing, product costing;
- PS (Project System) supporting the projects including make to order, plant shut downs, third party billing;
- HR (Human Resources) including employment history, payroll, training, career management, succession planning;
- PM (Plant Maintenance) supports the equipment maintenance, labor, material, down time and outages;
- MM (Material Management) including requisitions, purchase orders, goods receipts, accounts payable, inventory management, BOM's (Bill of Material), master raw materials, finished goods etc;
- QM (Quality Management) supports the improvement of goods quality, including planning, executions, inspections, certificates;
- PP (Production Planning) is managing the production processes: capacity planning, master production scheduling, material requirements planning, shop floor;
- SD (Sales and Distribution) is the module that support the activities from order to delivery including: RFQ (request for quotation), sales orders, pricing, picking, packing, shipping.

Not all the ERP functionalities are needed in an organization because companies are different entities working in various industry fields. A retail organization doesn't need an ERP banking solutions because it doesn't exercise this function. According to the "*Analysis of the Romanian Offer of ERP Solutions"* article, [6], in Romania in 2006, 42.9% of the companies over one million dollar worth, had an ERP solution implemented. From these 64,8% were in production area, 57.6% in distribution area and 53.3% in retail. A very interesting aspect is that only 20% of the implementations cover all the functionalities mentioned in this chapter. The most common functionalities implemented were the financial and accounting found in more than 80% of the cases.

According to the most recent analysis done by Pierre Audoin Consultants "ERP Romania 2010" [3], the ERP local market has decreased for the second consecutive year. In 2009 the ERP market in Romania was 17%

smaller than in 2008. A growth on the ERP market in Romania is anticipated for 2011 but it will be a moderate growth because of the economical problems in the past years and because of the instability inside the economical and political environments. The entire IT and ERP market growth in Romania is estimated at 14% in the period 2010-2014. The first two ERP brands implemented in Romania remain SAP and Oracle with 9,5% and 7,1%. The third and the fourth places are taken by Charisma and Siveco, both having under 5% of the local ERP market.

3 ERP Life Cycle Implementation

Implementing an ERP is a very important decision inside an organization. The implementation is not an easy task. It can be expensive and it can fail if it's not treated with the appropriate attention. Some implementation can also be very long; sometimes they can last for years. Installing an ERP is a top management decision and it must be implemented top - down. The entire organization must understand from the beginning the importance of the ERP and must cooperate entirely during the implementation. This kind of cooperation must be requested from the top of the organization to the bottom of it.

Choosing the ERP is the first step of any implementation. Choosing the right product is related to the dimension of the company, to the budget, to the particularities of the business. An organization should analyze the current business, the internal processes, the critical point inside the company and also the strengths. This kind of analysis is important in choosing the right ERP. A business analysis must be completed by a technical analysis because the new software must align as much as possible with the current infrastructure. Specialists are sometimes saying that when installing a big ERP, the infrastructure must align with the ERP not the other way around.

A very detailed cost calculation must be done. The company must understand from the beginning the total cost of implementation. This includes buying the product, implementing the product, maintaining it. It includes hidden costs associated, hardware costs etc. In this phase, before even buying the product, the company will calculate the implementation period because this is related to the total cost. Most of the time, the vendor estimation is optimistic.

When buying an ERP, the company must calculate the benefits of the new system. An ERP is meant to reduce costs and increase revenue in time. The company must estimate these benefits and compare them to the implementation costs.

In *"Criteria for selection of ERP software"* article [7] we can identify e series of factors that need to be considered when choosing an ERP:

- functionality - covering the business functionalities;
- technical architecture - technical requirements and constraints including integration with existing applications;
- cost - treated as TCO (total cost of ownership);
- service and support level provided by the vendor;
- ability to execute;
- vision.

Once the most proper ERP for the organization was chosen, the actually implementation will begin.

In [11] and [8] we can identify the most important implementation phases of a complex ERP.

During **project preparation phase** the following components are discussed and documented:

- initial project planning represents a macro plan of the implementation;
- project procedures consists in the methodologies that will be used during the implementation, naming conventions, project hierarchy;
- project team members and their training;
- project kickoff lasts a few days usually or a few weeks if the implementation is large and complex; during kick off meetings the initial project planning and

the project procedures are presented to the project team members;
- technical requirements are discussed in order to identify any constraint that might influence the project implementation;
- quality check tools and methodologies are chosen to ensure the project quality.

During **business blueprint phase** a detailed study of business processes and business requirements are undertaken by the project team members. This is the phase where project team members interact with respective core team members or process owners. The entire requirements gathered during this phase are documented as Business Blueprint (BBP). During this phase, following components are discussed and documented: project management, organizational change management, training, develop system environment, organizational structure definition, business process analysis, business process definition, quality check.

During **realization phase** all the business and process requirements are implemented as documented in business blueprint. The ERP is configured step by step in two work packages, baseline and final configuration: baseline configuration and confirmation, system management, final configuration and confirmation, development of external programs and interfaces, unit testing and documentation, final integration test, business scenarios and process documentation, end user training and documentation, quality check.

During **final preparation phase** following activities are discussed, completed and documented, successful completion of these activities leads to transition of all configurations settings to live the ERP system: system management, stress and volume tests, cutover strategies and plans, end user training, quality check.

During **go live and support phase** all configurations/customizations are transported to live production operation and business starts all its activities in the new ERP. During this phase, all the problems/issues related to hardware, network, operating system, database, training, and application system are addressed by the project team members and they help the end users in achieving their day to day task/assignments.

Continuous improvement phase is a never ending phase meaning post go-live support and system's performance improvements.

A two years long ERP implementation could be planned as shown in Figure 2.

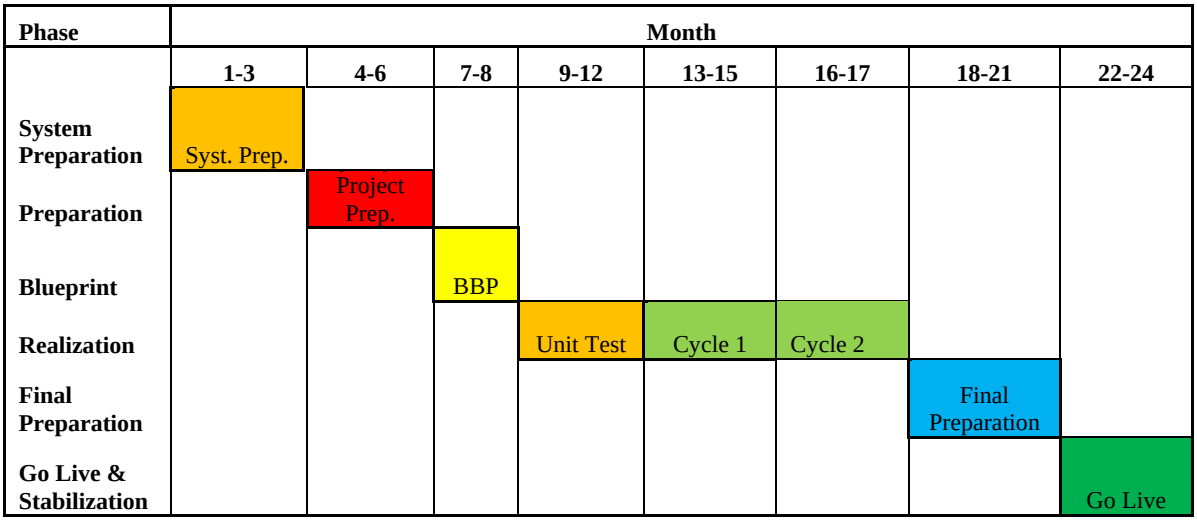

Fig. 2. Two years ERP implementation life cycle

4 ERP Implementation in Large Organizations

When choosing an ERP, a large organization is considered an organization with many users that will actually logon to the system

and use it every day. An organization with more than 1.000 users working with transactional data all day long is already considered large.

Very often, large organizations are also complex organizations meaning that most of the functions described in chapter one exist inside the company, from purchasing raw materials and goods to producing, ensuring the quality management, monitoring the costs, selling, advertising, invoicing, analyzing costs and profitability.

A telecommunication company with millions of users is a large company, looking from the ERP perspective. A retailer is also a large company considering the number of transactions the company deals with every day.

Cost implementation inside large organizations must be treated as TCO (total cost of ownership) including buying the product, install it and configure it, training the end users, integrating other existing applications etc. In Romania an ERP implementation can start from 50.000 Euro. In a large or very large organization, the TCO can easily be over 1 million Euros. In large organizations the TCO is very high because first of all the cost of the product itself is high. Usually an ERP is sold in no. of licenses, one for each user. If the company is large and has more than 1.000 users this means more than 1.000 licenses. If the business of the company is complex it means that the ERP must be installed with all the components/modules. Even if an ERP is usually very modular and can be bought in modules, for a large and complex organization this is not the case. The entire ERP with all its components must be implemented.

The article [6] shows that the most frequently implemented modules in Romanian companies are:

- Accounting module: 77,2%;
- Payroll module: 60,4%;
- Reporting and Analysis module: 57,8%;
- Manufacturing module: 49,1%;
- Marketing and Sales 48,9%;
- Fixed Assets module: 42,6%;
- Budget and Project Management module: 34.4%;
- Manufacturing Processes Launch and Control module: 32.8%;
- All modules, fully integrated solution: 19,9%;
- Supply module: 15.2%.

A detailed description of the TCO can be found in *"Criteria for selection of ERP software"* article [7]. The following cost components are mentioned:

- cost of software - purchasing the licenses;
- cost of hardware - purchasing the necessary hardware that can support the new product;
- potential future cost - installing a new release of the product, post go-live support;
- implementation cost - installing, customizing and personalizing the ERP product for a perfect match with the company business;
- training cost.

Upgrade costs and the maintenance costs are not small. All large ERP products need upgrades and an upgrade project, even if it doesn't have the size of the implementation project, still follows the same rules: purchasing the new product version, migration to the new version which involves new hardware and new implementation costs. In my experience of six years ERP implementations, a release upgrade project has the same daily cost as the initial implementation. The big difference is that this is a much shorter implementation.

Maintenance never ends especially when dealing with large organizations. From my experience the daily costs with maintenance are smaller than the implementation costs but maintenance can last forever. Most of the time an ERP implementation has a delimitation in the Business Blue Print (BBP) concerning the priorities of the functionalities: *must be* and *nice to have*. Very often lots of *nice to have* functionalities are not implemented during the implementation period for different reasons. This means that during the maintenance

period we won't find only support and bug fixing but also some change requests that must be treated with the attention pay to the initial implementation.

Working on large ERP projects I have learned that is very safe to consider from the beginning the support and maintenance cost. For instance, when implementing a functionality one will always estimate the design, build, test phases (DBT) meaning analysis, development, unit test and integration test, documentation and acceptance support. Starting from this estimation one should always add 10% to the cost in order to cover a support and maintenance period of at least six months.

Cost implementation is connected to the **implementation period**. Previously we established that the product itself has a high cost when dealing with large companies. The TCO contains the cost of implementation, training, maintenance, changes inside the organization etc. In a small company, an ERP can be implemented in less than six months. In large and very large organizations the implementation can last more than two years. I participated in large ERP implementations that lasted more than three years and registered a cost around 30 million Euro. The longer the implementation, the higher the TCO is. This is because the implementing team is usually a team of specialists with high daily rates. For an implementation of more than two years, the costs with the specialists are much higher than the cost of the product itself (the licenses).

Especially in large ERP implementation there are some **risks** and some chances of failure. These risks must be identified, managed and eliminated as much as possible considering the costs of the company we discussed earlier. When investing more than 1 million euro, the project must not fail.

Edward Yourdon in [2] indicated some factors that can contribute to an implementation failure:

- the initial phases, choosing the product, system preparation and project preparation were not done properly;
- the users and all the employees were not prepared well for the acceptance of new informatics system; as mentioned previously, implementing an ERP is a top-down decision;
- the business strategy does not support the implementation and the processes description;
- the implementation lasted more than planned;
- the cost of the implementation was higher than the initial budget.

Edward Yourdon sustains that large ERP implementations can sometimes become "death marches". The salvation will come from the **risk management** process that in some organizations adjoins with **quality management**. This kind of managements identifies the risk paths and eliminates these paths from the implementation route. This process demands accepting some level of risk and it leads to a risk oriented culture which has nothing to do with the implementation team. It is more about political decisions inside the organization. However, implementation risks are not always project related. Some risks arise from outside the project, even from outside the company. They can be related to the business environment. Figure 3 shows the risk areas that can affect the project implementation. These areas are not always related to the project itself.

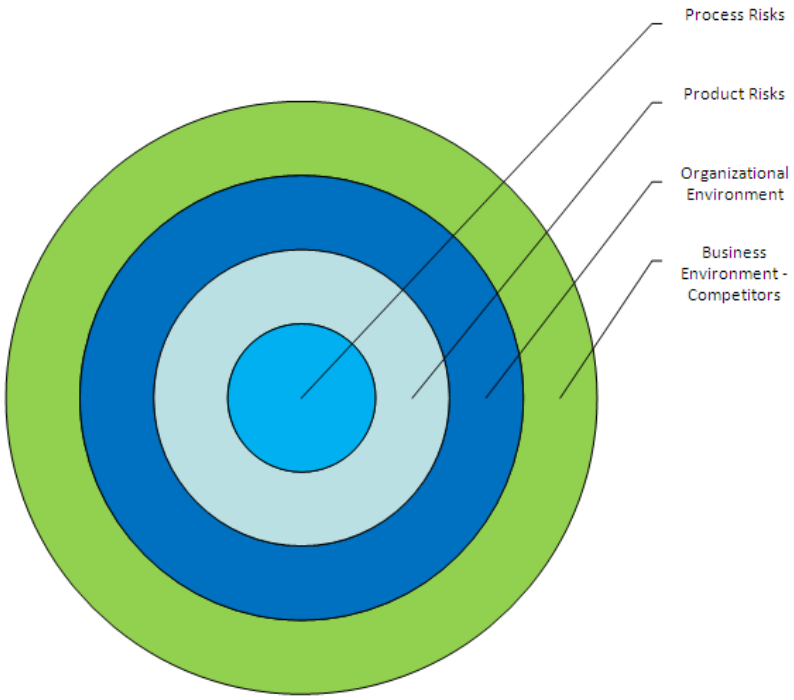

Fig. 3. Risk context

Rich organizations willing to implement very complex ERP products will seriously consider the implementation risks. I was involved in the ERP implementation in the Benetton Group. The implementation lasted more than three years and cost more than 30 million euro. Every year more than 100 external specialists were working every day to finish the implementation. The risks were huge considering the dimension of the project and in order to keep them under control Benetton Group and the ERP vendor signed an **active global support agreement**. The vendor offered support not only for the product, which is a common practice, but for the implementation itself - for the solution. We can find the level of support in Figure 4.

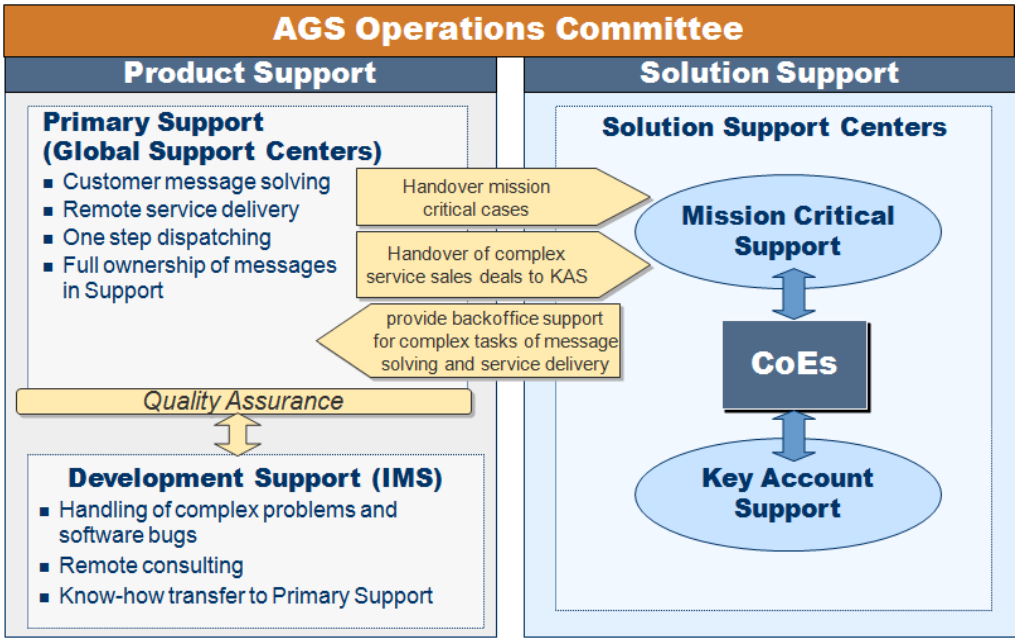

Fig. 4. Active Global Support (source: SAP AG)

Risk management was a very important aspect in Benetton Group implementation. The implementation was considered a critical mission for a series of reasons: business depends to a very high degree on affected business processes, high availability required, very high volume processes, very time-dependent business. In combination with the complexity of the solution (global operations, heterogeneous solutions, complex business processes, new technologies) the implementation became even more critical and effective risk management was required. The risk management proposed by the vendor had the objective of indentifying potential risk of failure and reduces the total cost of ownership by reducing the duration of the implementation, providing technical guidelines to help minimize unnecessary work and avoid complications, preparing the ERP solutions to run with optimum performance, availability, and maintainability, identifying areas that could benefit from optimization. The vendor was committed in the risk management process because its expertise which involved usage of specialized tools and methodologies for risk management. The ERP implemented in Benetton Group was SAP and the risk management model was called Safeguarding. We can see in Figure 5 and Figure 6 the Safeguarding Guiding Principle.

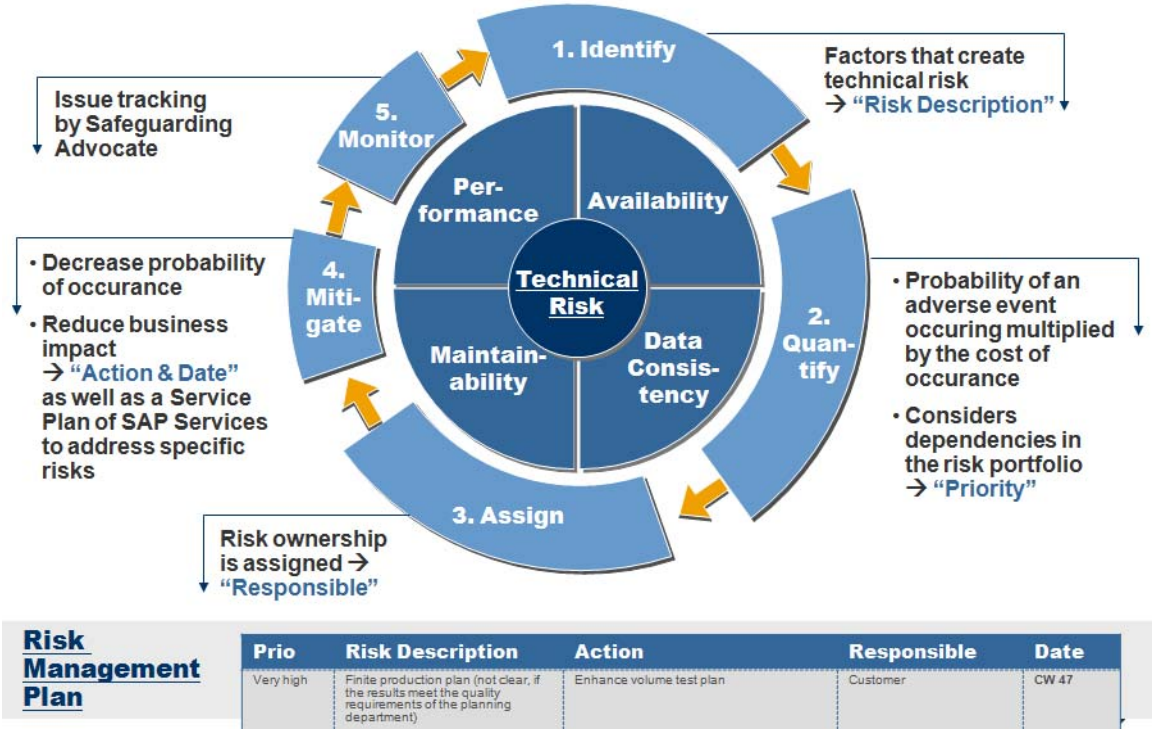

Fig. 5. Safeguarding Guiding Principle (1/2) (source: SAP AG)

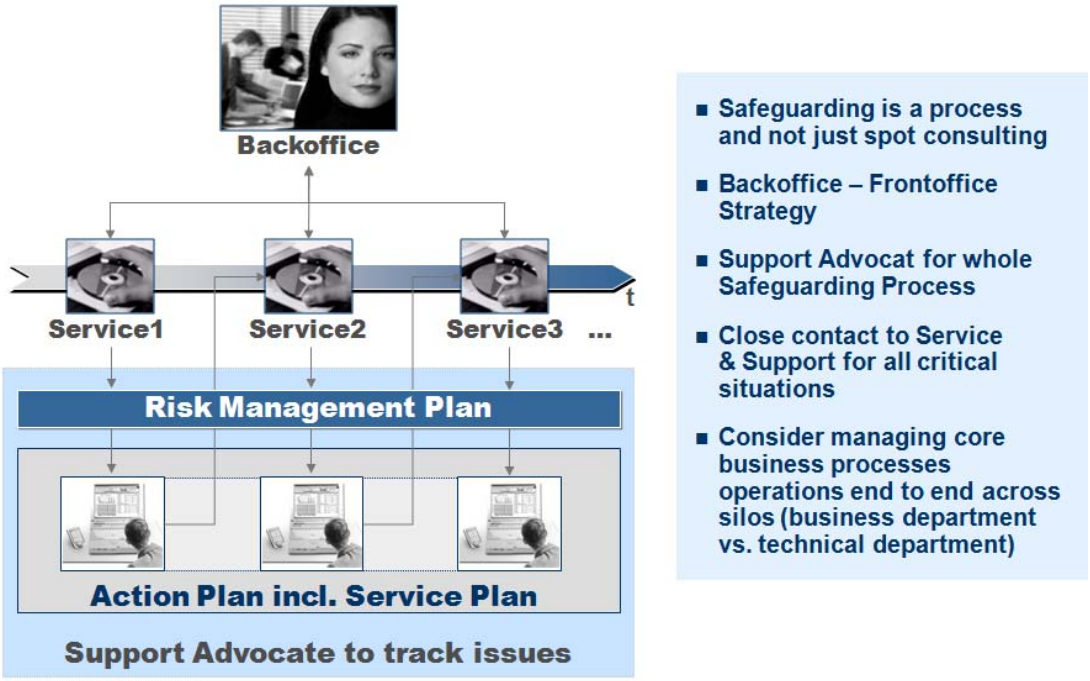

Fig. 6. Safeguarding Guiding Principle (2/2) (source: SAP AG)

According to this guideline there are five steps in managing **technical risk**:

1. identify the factors that create technical risks;
2. quantify - calculate the probability of adverse event occurring multiplied by the cost of occurrence;
3. assign - risk ownership is assigned;
4. mitigate - decrease probability of occurrence, reduce business impact;
5. monitor - issue tracking.

Obviously an ERP system is not a simple software that will fix all the company problems without any intervention. We saw that risk management is important in large implementations but in order to make the implementation easier, the first phases are critical. Choosing the product is very important because every company should choose a flexible product, able to adapt very fast according to business requirements. The implementation team must include an inside coordinator, preferable somebody with authority.

In the article *Personalized Training in Romanian SME's ERP Implementation Project,* [1], 22 critical factors for a successful ERP implementation are mentioned. The most important success factors are: top management support, clear goals and objectives, communication, efficient project management, business process reengineering, data accuracy and integrity, suitability of software and hardware, vendor support, education, training and user involvement. In the Benetton implementation the vendor support was crucial and complete in my opinion. Not only the vendor was giving product support but also solution support plus risk management strategies.

After long and stressful implementation periods, the companies using an ERP system will now exploit the many **advantages**: improved efficiency, integration, support for better decision, real time responses to customers requests etc. These can be considered direct advantages. There are also indirect advantages such as customer satisfaction. The advantages that can be easily measured in monetary terms are: improving the productivity of process and personnel, lowering the cost of products and services purchased, inventory reduction, lead time reduction, reduced stock obsolescence, automated ordering and payment, lowering payment processing and paper costs. Other advantages that cannot be measured

immediately consists in: increases organizational transparency and responsibility, accurate and faster access to data for decisions, more vendors, producing more competitive bids, improved customer response, saves enormous time and effort in data entry, more control, facilitates strategic planning, uniform reporting according to global standards.

5 Conclusions

An organization doesn't consist in separate, isolated departments, each with a specific function. Instead it works as a single entity with process lines across several departments, all liked together. An ERP is an informatics system able to reproduce this exact behavior of an organization - functions interconnectivity.

Implementing an ERP in large companies can be a very difficult mission. The total cost of ownership is high, the period implementation is long and changes must be done inside the organization. Most of the time is the organization that must change in order to embrace the ERP system, not the other way around. However, having an ERP shows many advantages. An ERP system is different from other software applications because of the concepts it is built on. An ERP integrates, in a single unified model, the data manipulation, it integrates all the functionalities inside a single platform and it ensures connectivity between them, it allows extensions of new functionalities, it can adapt to every single economical process, it allows process modification based on legal changes and requirements, it offers multi-dimensional financial analysis (project based, activity based, company level), it supports budget, planning and management decisions, it provides reports for any kind of activity in different languages and layouts, it provides financial consolidated reports using several systems, it can manage a department, a company or a even a group of companies and it can consolidate more companies into one single group. An ERP systems improves the collaboration with clients and vendors, therefore it improves the business. Inside an ERP data redundancy is insignificant therefore data integrity is higher because data must be saved only once. An ERP allows everybody to use a single integrated system regardless the department or the location. Communication inside the company is better and more secure. An ERP system helps formalizing the activities inside an organization.

Given these advantages, the total cost of ownership is small considering the return on investment (ROI). If we consider the Benetton implementation that cost 30 million euro, I believe this amount is at least a deposit inside the company because the company values more now having an ERP than before. I can assure you that by the end of the implementation the group valued at least 30 million euro more. I said the cost is at least a deposit because it is actually a successful investment. The quality of Benetton products remained the same after the ERP implementation but the production cost got smaller and the producing capacity got higher. Smaller cost and more sales orders mean more profit. The cost of implementation was recovered in only a few years.

Implementing a different product instead of an ERP, inside a large or a very large organization is out of the question. It has to be an ERP because of the integration advantages first of all. It has to be a mature and verified ERP because developing one from scratch for a company that big it's almost impossible. It would cost a lot more, it would last forever and there will be no guarantees either.

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