Overview on System Integration Projects Management: Risk Mitigation, Lesson Learned, Pitfall Avoidance and KPI Evaluation

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Abstract: - This paper discusses about methodologies for governing and managing projects of system integration, providing a new way of considering such projects' lifecycle avoiding common pitfalls. In this work Authors provide an overview of common issues in complex IT projects, focusing in particular on criticalities derived from such projects and proposing simple solutions on the basis of experiences and studies led on big System Integration projects involving international companies.

Key-Words: - ERP Enterprise Resource Management, ECC (ERP Central Component), SOA (Service Oriented Architecture) Modelling, customer behaviour, forecasting revenues, Key Performance Indexes

1. INTRODUCTION

This dissertation focuses on the correct project management of System Integration Projects. As probably most of the readers know, the term "System Integration" refers commonly to those projects devoted to replace a Company information system, partially or totally, with an ERP (Enterprise Resource Planning) System.

The Authors have developed a wide experience since the '90's in System Integration projects, with a special focus in Retail Systems, but not only, having been involved also in projects about system integration in fashion, public administration, manufacturing and so on.

By managing various projects as consultants both by the side of the "system integrator" and both by the side of the Customer, they explored the different realities and experienced the most common problems to deal with, when facing such a complex project.

The aim of this paper is to provide an exhaustive – as far as possible - description, of the complete management of a System Integration Project: through the lessons learned and experience made, this dissertation would like to be a guidance for risk mitigation and pitfall avoidance in this kind of projects, providing if possible also a sort of cockpit of key performance indexes and tools to evaluate the work in progress and retarget efforts to reach goals with efficacy and effectiveness.

As first thing, it is important to remember that an ERP System is devoted to integrate all aspects of business and its cycles, including planning, purchasing, manufacturing, sales, logistics, finance & controlling, invoicing, marketing, quality assurance etc., so it is supposed to improve Company performances on many point of views (data availability and reporting, process automation and integration, major fluidity and slimness of process flows etc). But exactly for this reason, the lack of correct target definitions is the worst enemy of the correct implementation of such projects.

Many Companies decide to face ERP System Integration to improve their efficiency and effectiveness, or for other reasons, such as:

- To manage at the same time more Companies, more languages, more currencies, many users, many divisions, plants, and warehouses
- Cover all information technology needs of the whole enterprise
- Have hardly standardized solutions
- Operate on an integrated, non-ambiguous database
- Be able to manage high-level problems and questions, such as happens in international Companies

But in many cases, Enterprises realize at a certain time of the project implementation, that the goal they fixed, and the direction where they are going, are not coincident: in the Authors experience, most of those situations could be avoided with a clear and correct definition of the targets in the preliminary phase, and by a Business Process Re-engineering made before the beginning of system implementation.

First of all, it is to be considered that those solutions were not meant to create easy-to-use applications, but to cover the whole wide functional extension of problems in an enterprise structure, even if this could mean also some possible increase of weight in the front-ends or peripheral systems.

This shall be added to the fact that system integration projects can last years, with heavy efforts made by the Company in terms of time and money, but proportionally to the degree of custom development requested to the system to adapt itself to Company's flow: this is not a good thing to do, because the best would be to rationalize processes and change them in order to meet ERP original design (usually responding to standards, laws and ergonomic rules). But sometimes it is impossible to do such rationalization because people do not want to abandon their usual way to work, and see the introduction of ERP as a menace or a problem, seeing in it all kinds of defects and gaps, though if they do not really exist. But due to the fact that ERP allows Enterprise Management to maintain continuously in control all the Company process flows, a key factor to avoid resistance created by such inconveniences must be correctly managed by a strong commitment from top management, that is the first base principle to be settled as a pillar, to ensure a correct foundation of System Integration Projects.

In the following of this dissertation, various themes will be explored, starting from basis of System Integration Projects organization, golden rules for management, correct organization of resources, methodologies, lessons learned, common problems to be avoided, tools and keys to evaluate periodically project performance and work in progress.

2. PECULIARITIES OF SYSTEM INTEGRATION PROJECTS

With the acronym ERP, in the mid-90s, the same concept began to be assigned to all the management software responding to a wide range of specific requirements, including:

- Being able to handle both: most companies, multiple languages, multiple currencies, multiple users, more divisions, more factories, more stores, etc..
- cover the broadest range of enterprise computing needs
- offer highly standardized solutions
- operate on a database of fully integrated and unambiguous information
- be able to handle high-level issues, such as happen in multinational companies

The ERP does not identify a software for small and medium enterprises, but was designed and developed for large companies or companies with particularly complex situations, especially for those present in many nations.

This element characterizes the applications: they were not designed to favor the ease of use of the programs, but to cover the vastest functional extension on all business issues, though this would involve some complication in the "suburbs".

The availability of standardized data allowed the central management to control the entire Company's performance, to have unified budget, managing the production of the various establishments, the flow of goods etc. and this privilege was far more important than the distribution of basic software, but not integrated.

As stated above it is clear that a true ERP involves a fairly long time to be installed and implemented into the company. Usually this time

was estimated at two or three years, but sometimes even more.

The ERP arise in large development companies, such as Germany's SAP, or JD Edwards, Baan, etc..

In fact, programs of a complex nature and more or less satisfying the above requirements for companies, were already operative for many years without suffering for not having a mark that set them apart from all other software. It was their complexity and functional coverage that already distinguished them.

The acronym ERP soon came to be regarded as a matter of great merit for application software and in little time, all the solutions developed by different software companies took this sort of abbreviation of "origin".

It was soon a real "fashion": the company business leaders could read about the ERP on various magazines, and not to be outdone the competition, decided to equipped with them.

In some cases it has even come to baptize as ERP also simple programs that merely manage a small accounting for small businesses.

The definition of ERP is still arbitrary, it is not enshrined in any international institution super-partes.

Misunderstandings about the term ERP, coupled with many other negative aspects of IT development, have helped to discredit or at least distrust both the vendor (the company that developed solutions) both system integrators (those that are focused on the adaptation and installation of programs).

World watched a proliferation of ERP that were not at all ERP solutions, or too heavy offerings to companies too small to be able to withstand the start-up costs and the impact on staff not well prepared to operate in an environment that is by the fact very complex.

Several factors of interest also put into the background the importance of active participation of final users together with their business managers in all stages of development of the computerization project.

Another point which caused discontent in many companies was the contrast between the size of the investment (up to several million Euro) and the return of investment.

This element has always been neglected in computing. For professionals, the mere proposal of an innovative software with broad functionality should have been guaranteed more than enough to convince any company management to take the step.

The huge expenditure in terms of licenses that of man-days for development of customizations, training personnel and testing programs, have prompted many companies to determine return on investment and not to know in any way how to justify spending in terms of performance, while defects and shortcomings of the solutions adopted were evident.

The end result is that for some years the companies themselves, due also to the crisis of early 2000s and to the troubled passage to euro, showed an absolute distrust of any renewal or additional investment in IT.

However, after a renovation and a much more professional concern from vendors and system integrators, ERP restarted to spread among companies, and despite of the new crisis of 2008-2009, there are anyway new projects currently in ERP implementation (i.e. area Fashion), installation of new modules, replacement of ERP with those of a competing brand, and so-called changes of release (from an old to a more recent version). And thus the importance of knowing how to solve and avoid previous pitfalls.

3. ERP / ECC Benefits

An ERP system is dedicated to the programming of production planning and materials management within the working cycle of a business, then lets you manage and monitor the company: in the presence of an order request, for example, the sales manager can check in real time whether a given product is in stock (and where is located) and confirm the actual availability of goods, with an estimated time of delivery. If the order is confirmed, this can be automatically forwarded to the logistics for the goods issue, avoiding loss of time and, above all intermediate steps of maps, data entry and transfer unnecessary.

At the same time, the order is filed with the preparation of accounting documents (invoice, picking list, etc.), while the economic data are included in the budget and become part of the system for management control and analysis, Financial and taxation. The same order, in the absence of a sufficient stock availability may lead to

a production order that determines a series of orders of material and human resources. All this is managed in an integrated way: the information flows within the same system, speaking the same language, without duplication, recycle or translations.

Summarizing, an ERP simplifies and manages the strategic operations of the company, such as inventory management, interaction with suppliers, product planning, purchasing, customer service and tracing of orders. Supported by a software application based on multiple modules, linking fragmented operations and share data through an integrated set of application modules.

With the increasing popularity of ERP and reduced costs for ICT (information and communication technologies), have developed applications that help business managers to implement this methodology in business activities such as inventory control, tracking orders; services for customers, finance and human resources.

The first versions of ERPs were connecting directly the areas of management in accounting with the area of logistics (warehouse and supply), it then started to implement internal relations with the areas of sales and distribution, internal production, maintenance facilities, project management etc..

Great importance inside ERPs is related to Material Requirements Planning. Material Requirements Planning (MRP) on its development MRP II (integrated in the ERP system) allows to program the logic of automatic orders to suppliers really sophisticated enough to take into account the delivery time and considering putting into production the product, this methodology allows to optimize the rotation of materials in warehouses and the minimization of inventory, which impact on accounting and taxation.

Nowadays, modern ERP systems cover all areas that can be automated and / or monitored within an enterprise, allowing users to operate on a uniform and integrated framework, regardless of the application.

Since the early 2000s, the major ERP vendors, they begin to create vertical market sectors for different companies, begin to rise as the endorsements for the "job" of the different solutions:

• For the automotive sector: Microsoft Dynamics Microsoft, SAP Automotive SAP

• For Retailers: Generix Collaborative Enterprise Generix Group, Aldata Gold, SAP Retail, SAP.

• For the logistics sector: Infolog Generix Solutions Group

• There are also vertical specific Service Companies and Public Administration

4. ERP, ECC, ENTERPRISE PORTALS & SOA

The spread of a homogeneous and shared culture within companies is a prerequisite for the development of initiatives and projects to create, over time, value for different stakeholders. To achieve this goal is necessary to generate and share in companies first and then outside, information and better knowledge about the processes and activities that impact on individual business areas.

In terms of technological and applications infrastructure, an enabler for achieving the objective can be represented by an Intranet / Extranet applications to which users log on, depending on their profile, to search for information and to obtain a range of value services added: Enterprise Portal (EP).

Within Enterprise Portal is included an advanced information system to business in order to give added value with the following characteristics:

• Information (editorial / document management / motor)

• Staff (collaboration / workflow)

• Bridge between companies and Internet

• Bridge with and between the Company Information Systems

• Evolution of the concepts of site and intranet

• Simplify IT complexity

• User Desktop

• Single Sign On

For this reason the traditional ERP ECC, together with the instruments of BW, is integrated in this frame work.

The advantages of this approach deal with:

• Information Overload: The creation of a single point of access and centralization of research helps

to reduce the problems that arise from overload information;

• Discontinuity: The continuous organizational changes create discontinuities in the flow of information. EP may be the desktop for "Knowledge Workers", eliminating the discontinuity;

• structuring of information: The EP remedies the amount of unstructured information, which exceeds by far now, that structure.

Taking into account the different business objectives and the effort required for getting it implemented, it's possible to select among four broad types of Enterprise Portal:

1) Enterprise Hub: Aiming to create a single point of access to the Intranet. Objective: access to data and information.

2) Content Portal: finalized the integration of content-based routing and differentiated profile of users. Objective: access and sharing of information

3) Service Portal: Aiming to create a single point of access to transactional services but also of DW and BI. Objective: access and sharing of information and services

4) Integrator Portal: aiming for full integration with production systems, planning, order management and forwarding, etc.. Objective: Integration of heterogeneous application environments and technology, collaboration between different business areas.

Let's see what is instead the concept of SOA:

An SOA is designed for connection to request computational resources (principally applications and data) to produce a given result for users, which may be end users or other services. The OASIS (Organization for the development of standards on information structured) defines SOA as follows:

SOA is a Paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains. It provides a uniform means to offer, discover, interact with and use capabilities to produce desired effects consistent with measurable preconditions and expectations.

Although there are many definitions of SOA, only the OASIS has produced a formal definition of the technology that is profoundly applicable to the corporate domain.

The concept of SOA (WebServices and not only) comes from the reconsideration of corporate structures as organizations rhizomatic that are rooted in the biological culture. The evolution of communication infrastructures, which are now pervasive, allows thinking about the interconnection between economic actors, such as companies, such as a dynamic process, not fixed once and for all.

Although many definitions of SOA are limited to technology or only to Web services, this aspect is predominant technology providers. In 2003 they were talking about Web services, and in 2006 about the process engine.

Firms in a global market increasingly feel the need to open up their applications and this implies the need to have something more than a simple front-end spot on the nucleus of the central system: we must build a strong integration of all applications and data, regardless of their geographical or logical belonging.

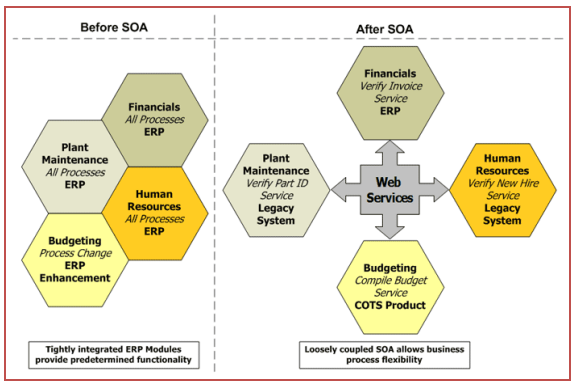

Fig. 1 – Architecture before and after SOA

Nowadays if a company wants to be part of the global market, will integrate with the outside world by including the ERP (which takes on the new name of ECC: ERP Central Component) in a service-oriented architecture (SOA), thus enabling applications to integrate with partners, suppliers and customers. The biggest software vendors are engaged in rebuilding the infrastructure underlying their applications to be able to offer integrated ERP SOA:

IBM→WebSphere,

Microsoft→Project Green,

Oracle→Project Fusion,

SAP→SAP NetWeaver

Epicor→iScala

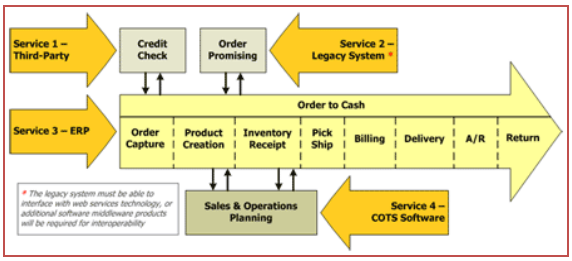

Fig. 2 – Processes in SOA

Within an SOA, so you can modify, in a relatively simple way, the interaction between departments, or the combination in which services are used in the process, as it is easier to add new services and change processes to meet specific business needs: the business process is no longer bound by a specific platform or application but can be considered as a component of a larger process, and then reused or modified.

The service-oriented architecture is well suited for companies that have a reasonable complexity of processes and applications, since it facilitates the interaction between different industrial realities, permitting, meanwhile, to the business activities to develop efficient processes, both internally and externally and increase flexibility and adaptability.

Although many companies offer products that can form the basis of an SOA should be noticed that SOA is not a product.

A common place is that service-oriented architecture is not tied to a specific technology. Who says that can be created using a wide range of technologies, including REST, RPC, DCOM, CORBA, MOM, DDS has not clarified the true value and the intrinsic meaning of SOA: no such technology is indeed capable of implementing entities, describe themselves, as can be done using web services through WSDL service definition language. Indeed test applications that run time understand the semantics of a service and invoke it without "knowing" nothing about the service itself "a priori" does not exist for any of the technologies mentioned.

The key lies in the absence of SOA business logic on the client which is totally agnostic to the platform of implementation, about the protocols, the binding, the type of data, policies with which the service will produce the information requested Service Level Agreement (SLA). All for the benefit of the independence of services that can be called upon to perform their duties in a standard manner, without any knowledge for the service of the calling application, and without that the application has knowledge, of the service that actually performs the operation.

SOA can support integration and consolidation activities within complex enterprise systems, but does not specify or provide the methodology or framework for documenting capabilities and potential of services.

The validity of service-oriented architecture (SOA) is a consequence of the elements and standards upon which it relies. In particular the following aspects should be considered:

Open standards to operate in multi-platform environments is necessary or at least advisable, to use only open standards such as XML, WSDL, and WSS (Web Services Security).

Modularity: you find the right balance between services provided by each component, creating a balanced mix of small reusable services for common functions and services the largest for specific processes.

Service Contracts: WSDL (Web Services Description Language) is the standard specification for building contracts for Web Services, a contract will result in defined services more flexible.

ESB (Enterprise Service Bus): The backbone of publishing services and enabling applications to access it. It also includes features such as adapters to legacy systems, ability to orchestration of services, authorization and authentication security side, data transformation, support for business rules and the ability to monitor service-level agreements.

5. THE STARTING POINT: SOFTWARE SELECTION

The first thing that a Company should do for approaching correctly a System Integration Project is to manage a correct Software Selection. In many cases, this preliminary phase is neglected, because Enterprise Management could be already confident in the solution to be adopted. In some cases this is due because the choice is “forced” by external elements (i.e. acquisition of the company by a wider group of enterprises that already uses a specific ERP, requests by very important customers in order to better integrate the supply chain, reasons of competition on the market, constraints from the stakeholders etc.), in some other cases instead it’s

the management itself that is feeling enthusiastic on a particular solution: because it's trendy, because it has been very well presented on fairs, conferences, specific magazines, web etc.

But this is not the correct approach. In order to be sure that the System Integration Project will be based on solid pillars, it is necessary to perform correctly the Software Selection and identify the ERP that mostly satisfies company's needs.

A correct software selection process is composed by four subsequent phases:

- **Requirements Definition** where the company shall state its goals and targets in order to choose the most suitable system for its needs
- **Conceptual Design** in which the company decides at a macro-level what could be the final, steady situation that is to be reached
- **Vendor Evaluation** in which the enterprise chooses its System Integration Partners and suppliers (i.e. vendor of software licences and hardware but also vendor of services, such as consulting etc., often referred to as "System Integrator")
- **Implementation** that is the core of the process and will be detailed and analysed in the following sections.

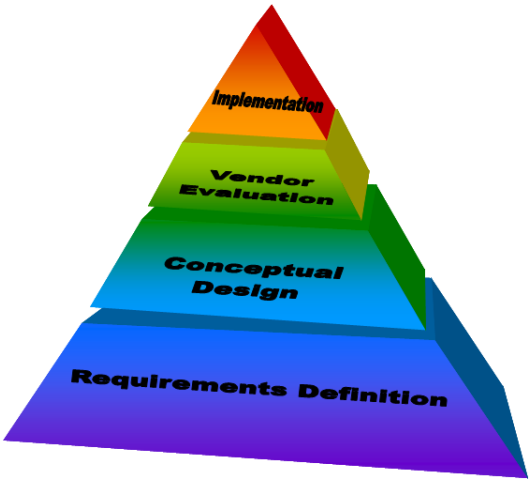

Fig.3 – the four phases of software selection

Also during Software Selection the company could request the aid of consultants having experience in business process re-engineering (BPR) and, it would be better, having also experience in many of the possible software solutions that could be exploited. The consultants chosen in this phase could even be different from the vendors selected for the implementation: it depends on the results of the analysis performed and on the availability of resources and services provided: if a consulting company specialized in BPR is not specialized also in ERP integration projects, or has no resources available on that area, obviously it will be necessary to chose another "System Integrator".

In many cases customers do ask to big consulting companies to perform software selection, in order to find a partner able to know all the possible solutions, address enterprise towards its best, and support them also during implementation. But it is quite common to find also freelance consultants or small groups of very skilled people that support side by side the customer as *super partes* experts, or to certify and verify studies made by consulting companies. And this could be done also in implementation phase.

The possibility of having a continuity on Consultants following the company from Software Selection to whole implementation, is normally considered positive, so that in project literature, there is another way to consider the phases of Software Selection, more integrated and cycling than the one we considered above.

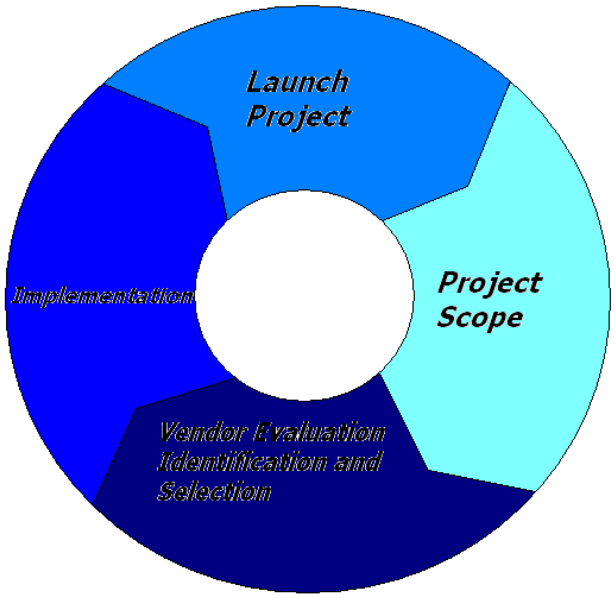

Fig.4 – a Cycling representation of Software Selection

In this case, the process of Software Selection is somehow seen as a continuous process of retuning solutions. This idea shall not create fears in what could be the result of the project itself: it is not meant that companies will have to start from the beginning of the project cyclically, but just to make a fine tuning of consolidated results in order to achieve the best as they can, including reconsidering the vendor and partner selection if they do not match anymore new requirements.

Let's keep in mind that the needs of a company introducing a new ERP are very hard to be defined completely and in a very detailed way before beginning of system implementation: the enterprise is a dynamic reality, with people, targets and constraints that change continuously. And such projects last very long time, so it is likely that needs and targets will change themselves before the complete realization of the integration. A periodical review, such as consolidated project management techniques suggest, it is to be considered necessary and fundamental. So that the Authors suggest a representation of the cycle starting from Software selection and arriving to post go-live as a spiral, with stage gates represented by periodical reviews.

6. THE SYSTEM INTEGRATION PROJECT LIFECYCLE

In Project Management literature exist many representation of the project lifecycle, mostly depending on the kind of project that is to be considered: plant projects have a representation different from pharmaceutical projects and from software projects. So, it is not surprising that also system integration projects have a representation of their own lifecycle and phases.

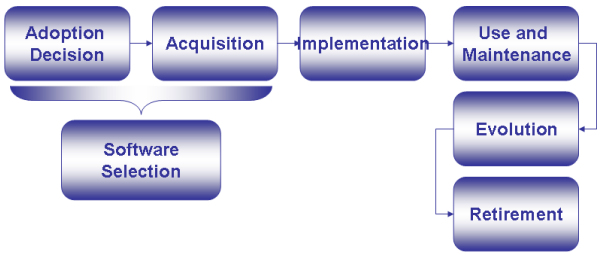

Fig.5 – classical representation of System Integration projects

This is a valid representation, in which the Vendor Selection is not explicit, but able to link together both preliminary phases (i.e. software selection) both core processes.

As it was mentioned before, anyway, the Authors have experienced the need of a more cyclic and iterative process, able to evaluate at checkpoints the consolidated work, and consequently to retune the future steps to reach the goal, a sort of revised concept of concurrent engineering applied to system integration projects.

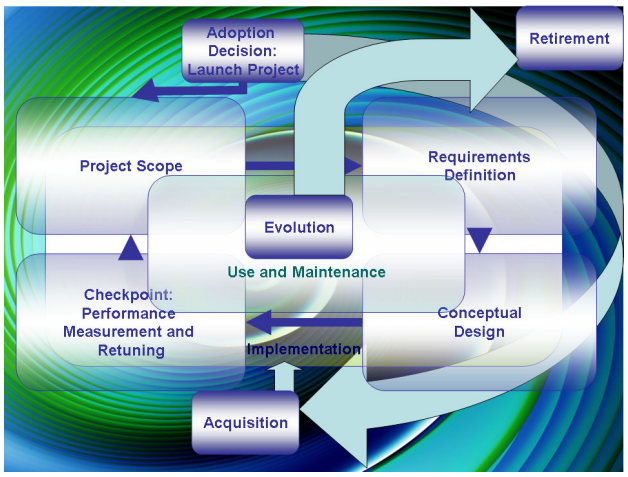

Fig. 6 - Cyclic representation of system integration projects

The basic idea of this complex representation is indeed simple: fundamental requirements and macro conceptual design must be stated in the initial phases, but just because it is the beginning, all the targets and needs can be just at macro level. Going through the implementation, it is possible to define best and in a more detailed design all the requirements. Meanwhile the company and its processes can change, external factors could outcome, so it is necessary to revise periodically detailed sub-targets, in order to get correctly and efficiently to final goal.

In the following the Authors will go deeply in the core phases of the projects, analysing the structures, terms commonly used, human resources and their roles, and methods to define project design and performance.

7. IMPLEMENTATION OF THE SYSTEM

System implementation is the core of the project. With this term it is not just meant the development

in terms of coding or customizing: it is a general word to define, in ERP, a whole process following the software selection.

The Authors have experienced mostly SAP© projects since the middle of the '90's, so the guideline of this process will be obviously the ASAP (Accelerated SAP©) model.

The roadmap to be followed will thus be composed by the following steps, or phases:

- Project Preparation
- Business Blueprint
- Realization
- Final Preparation
- Go Live and Support

Project Preparation is the initial phase, in which the task is to perform planning and preparation for development. It is indeed a very critical phase, because it is needed to define clearly objectives of the project and plan with care and accuracy how to achieve them. This phase includes a series of deliverables that are here described:

a. confirmation of high-level scope: identification of the modules to be implemented such as Financial, Controlling, Materials Management, Sales and Distribution…

b. agreement on technology plan: the key Stakeholders, including mostly IT, must subscribe commitment to a concrete plan of technology issues (i.e. what release/version to use, provide sufficient resources in terms of licences and hardware, etc.)

c. project milestone dates: the dates in which it is meant to receive a particular deliverable of the project, such as blueprints, testing etc.

d. definition of the methodology: in this issue is included a project organizational structure with resources assigned clearly to each position.

These deliverables shall be combined in a *project charter* that will become a reference during the whole project as it is the document containing *overriding principles and guidelines for the project.*

A clear definition of these points above, ensures efficiency and effectiveness to the project, being the foundation of all the implementations that will outcome.

Business Blueprint is to be considered the foundation of the project: it is needed to provide clear conceptual design for all the following stages. It is the result of meetings and workshops with all key stakeholders of the project, as the product of a collaborative process in which all possible valid business requirements (commonly referred to as "as-is") have to be collected, and the solution to deliver all these requirements (usually called "to-be") have to be confirmed. These are the elements to be incorporated in a whole document that is named, as mentioned, *business blueprint.*

Usually the production of a business blueprint is not so easy, but is indeed very important because guarantees the acceptance from the stakeholders of the basic pillars on which the project will be built. It is interesting to notice how many stakeholders could have not so deep knowledge of the specific ERP to be implemented, or maybe limited technology/information system experience. So it is difficult to make a "translation" of high conceptual design in practical implementation strategies, but this is the key factor for the success.

Some advantages produced by a correct business blueprint implementation are the following:

- allow non-technical users and business partners to better understand the solution
- translate the highly conceptual design in a functional prototype giving to stakeholders a view of AS-IS and TO-BE
- help the implementation team to configure quickly the system using all input coming from stakeholders
- avoid situations in which business partners state that the delivered solution differs significantly from the conceptual design
- At the stage of business blueprint, some other tasks can be carried out for the correct progress of the project, for instance:
- as-is and to-be design to capture valid and current business requirements and process definition of the expected results
- define all basic report requirements with characteristics and key figures involved
- evaluate all functionality not normally delivered by standard ERP, requiring custom development (list of enhancements)
- building a prototype system to show to all key users the functionality of the solution that is to be signed

- define all interfaces with legacy/other systems both in transition phases both in the steady state
- set up a register of issues and risks that can overcome during project lifecycle in order to prevent or minimize
- define data migration from systems that have to be dismissed
- state a plan of the resources to be involved for training and "change management"
- installation of the development system

Realization is the busiest phase of the project, regarding the building of the solution agreed in the business blueprint. In this phase are included the configuration activities (i.e. customizing) and the enhancements development (i.e. coding) from writing functional and technical specification, to the testing phases.

Realization is usually the longest phase of the project, and includes a long list of deliverables:

- technical building of the system (configuration, definition of reports, building of enhancements and interfaces)
- implementation of process re-engineering (organizational change management) and definition of internal communication strategy
- development of all testing phases: test scripts, performance of unit testing, integration testing
- development and delivery of documentation and user training material
- definition and configuration of users roles and profiles for accessing the system
- details on data migration: field mapping, cleansing necessities etc.
- building the cutover plan, in order to control all activities during the go-live

Final Preparation (or Cut Over) should concentrate mostly on the completion of training of end-users and administrator, and on the data loading. This phase is often called "cut over" because the old system is being dismissed by transferring existing data, and existing operations, functions, users, are moved on the new ERP in a synchronized way.

The final preparation deliverables are:

- closing all open points and issues such as reports development, training etc.
- completion of training activities
- migration of all static master data
- communication to all stakeholders of the go-live and post go-live plans and terms
- development of a scenario for disaster recovery
- final sign-off for the decision: go or no-go

Go-Live and Support is the phase in which all users will begin to operate in the new ERP, so it will be necessary a very high level of support activities in the initial period: it is usual to receive a very high number of calls for support in this phase, due not only to possible residual gaps in the implementation, but also to the scarce experience of the users. The support calls usually will drop down after the initial phase, and will reach a steady state due to system improvement (application maintenance) by one side, and to user accustoming by the other.

In many cases the System Integrator, and in particular the consultants involved in implementation, are asked to perform the 1st phase of support, but with a plan of knowledge transfer to an internal helpdesk composed by company employees, for costs containment. It is a rare (but in some cases feasible) choice, to continue in outsourcing this service after the initial period, but the reasons for "make or buy" in this case are:

- possibility to have or not internal resources skilled on support activities
- in case that resources are not available, costs of new employees versus cost of outsourcing service
- hours in which the personnel is available vs. hours in which customers need support
- Service Level of all compared solutions

After an analysis of costs and benefits, a company can evaluate how to structure its helpdesk. In any case, it could be useful to use a system for registration and management of incidents, that is required also for needs of international certifications in Information and Communication Security (i.e. ISO 27001), based on opening, assigning, solving and closing tickets with a complete log of all information provided. This could help to better manage incoming problems and to avoid persisting issues.

8. ORGANIZATION OF A SYSTEM INTEGRATION PROJECT

Usually a system integration project needs a huge effort in terms of human resources, and this is indeed one of the most critical factors for the success of the project itself. Cases in which to define clearly project organization matrix and roles is a neglected operation, reveal themselves as potentially high-risk of failure projects.

The project matrix is usually dual face: by one side there are customer resources, by the others the system integrator ones. Above all of them there is a project sponsor committee composed by customer stakeholders obviously, but also by reference resources from the system integrator side: partners or account managers or program managers that can guarantee balancing of objectiveness in decisions.

Below it is reported a possible organization structure: it can be a guideline to implement project's own, but it is not fixed in terms of roles, shall be adapted case by case to the reality to deal with.

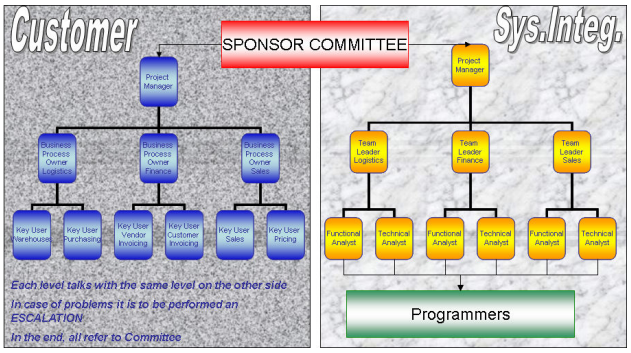

Fig. 7 – project organization matrix

Project Manager: Both by side of the customer, both by the side of the system integrator, a Project Manager must be provided. The project manager has the role of guiding the project team, by organizational points of view. He is responsible of activities being performed, and so should be able to manage conflicts, to delegate activities and responsibilities, and to define clearly tasks, programming communications and meetings when needed.

Taking reference from Project Management international Certification requirements, it is possible to summarize the activities of a project manager, in a system integration project, as follows:

- Project Integration Management: combine and integrate all aspects involved in the project
- Project Scope Management: identify targets and needs correctly
- Project Time Management: ensure respect of plans and deadlines
- Project Cost Management: define and respect budgeted costs
- Project Quality Management: ensure quality level in project realization
- Human Resource Management: guarantee a correct management of all the resources involved
- Project Communication Management: establish a strategy in communication and perform it correctly
- Project Risk Management: manage and contain risks
- Project Procurement Management: evaluate and manage vendors/services

Team Leaders are experts of processes in a specific areas, that shall coordinate more specialist resources focusing on particular aspects or task: they take care to prepare specific planning and blueprints for their own areas, focusing on open issues for which they have to obtain specific answers from customers. They often are senior consultants that may or not have specific experience in the ERP being implemented, but can handle processes without forgetting important aspects, and organize practically tasks and activities. Their homolog in the Customer's organization is the **business process owner**, or **business analyst**.

Technical and Functional Analysts are consultants that have in charge specific tasks of implementation, based on their skills. The more the project is complex in certain areas, the more a high number of consultants will be needed. It could be that some areas such as logistics have a large number of consultants specialized in parts of the process, and that some areas such as finance have just a single person performing all roles, but it depends on the specific structure of the enterprise and its processes, obviously.

Analysts have in charge customizing, specification preparation, alpha tests in order to

guarantee that user's needs are correctly translated and implemented. In some cases the distinction between technical and functional is not so defined: functional analysts should translate user's needs in technical requirements, and technical analysts should scout the system to find the fields, the technical solutions, flow charts, structure of coding in case of enhancement. Often, nowadays, the functional analyst or the programmers themselves perform the technical analysis, depending on project structure.

Key users are persons designed by the company to deal with consultants. They have in charge to explain correctly a specific process in which they are experts, in order to implement it correctly and efficiently in the ERP. They also have in charge the definition of significant test cases to be performed on the system, helped as a guideline by the consultants. The more they are not skilled in information systems, the more will be difficult to reach a stable specification. But it is indeed necessary, and so the consultant shall be able to make the correct questions and to obtain the correct answers. In case there is a complication in this process, at this level or another, both sides perform a process of *escalation.*

The escalation process is performed each time there is a *claim*, so when it's impossible to obtain correct answers for open points, or to obtain approval for specifications, or whether there is a change request respect to the statement agreed. It can be performed by both sides, and each level involves its peers. The more the problem is difficult to be solved, the more the escalation climbs up. Let's talk for instance about a case in which an interface for a legacy system is required. The specification is agreed and the development starts. In the beta test phase the key user discovers that the interface does not produce the expected result. The programmer/analyst claims that it is a case not mapped in the test plan, the key user claims that there is a gap in the development. If they cannot solve the problem at their level, they go to their superiors: probably the team leader states the need of a "change request" to be acknowledged by the customer, probably the business process owner will answer that the interface should work and be arranged without any extra paid change request. In this case is the project documentation that will decide the situation, but if it's not sufficiently clear what the interface was expected to do and in which cases, another climbing will be done, and the two project managers will need to solve the problem. If it's impossible, the decision will be submitted to Committee, that will take a decision even in terms of budgeting activities.

9. CONCLUSIONS and DEVELOPMENT

System Integration Projects are full of complexity degrees, and so full of risks. In their long experience the Authors have understood most common pitfalls and tried to identify possible solutions, identifying a new way to represent project lifecycle, and, as it will be possible to see in other publications of the same Authors, some new key performance indexes. For some specific cases they built also small and flexible simulators for choosing best forecast algorithms in sales. This paper is just an overview on all aspects that must be considered in order to improve management in System Integration Projects, and will be the starting point for a wider publication on this subject.

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