ZONNECT PROJECT PLATFORM: AN INTEGRATED APPROACH FOR PROJECT MANAGEMENT

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Abstract

The project management is an increasingly complex task due to project size and the number of companies that take part in, because in many cases it is necessary to establish business partnerships that enable organizations to address medium and large projects. The establishment of these partnerships involves collaboration in management and project management among the involved organizations, using a single methodology and a common set of tools. To reach this consensus in the selection of the methodology and tools is necessary to overcome some barriers that exist in many of the organizations and which make they are reluctant to employ different methodologies or tools than those commonly used.

The technological solution Zonnect Project Platform presents an innovative approach that brings together a methodology for project management based on international standards and a set of software tools that allow to follow the different project management processes defined in the methodology in an integrated, simple and intuitive way. So it overcomes many obstacles existing in organizations and supports the specific characteristics of globalized structures which exist in the current projects.

Keywords: *Project Management Methodology, Project Management Tools, Project Integrated Management, Project Distributed Management, Integral Project Management.*

Resumen

La dirección y gestión de proyectos es una tarea cada vez más compleja debido al tamaño de los proyectos y al número de organizaciones que participan en los mismos. En muchos casos, es necesario establecer consorcios empresariales para ejecutar medianos y grandes proyectos. El establecimiento de estas alianzas conlleva una colaboración en la dirección y gestión del proyecto entre las diferentes organizaciones participantes en el proyecto, empleando una única metodología y un mismo conjunto de herramientas. Para llegar a este consenso en la selección de la metodología y herramientas es necesario vencer las barreras

existentes en gran parte de las organizaciones, que hacen que éstas sean reacias a emplear metodologías o herramientas diferentes de las que utilizan habitualmente.

La solución tecnológica Zonnect Project Platform presenta un enfoque innovador que aglutina bajo un mismo paraguas una metodología de gestión de proyectos basada en los principales estándares internacionales, junto con un conjunto de herramientas software que permiten seguir los diferentes procesos de gestión de proyectos que conforman la metodología de forma integrada, sencilla e intuitiva; venciendo así muchas de los obstáculos existentes en las empresas y soportando las características particulares de las estructuras globalizadas existentes en los proyectos actuales.

Palabras Clave: Metodologías de gestión de proyectos; Herramientas de gestión de proyectos; Gestión integrada de proyectos; Gestión de proyectos distribuidos; Dirección integral de proyectos

1. Introduction

Currently, the new information technologies are fully implanted in society and are essential in its future; they have become vital for today's economy. (Fundación Telefónica, 2009). The role of small and medium enterprises in current economy is crucial, since a large percentage (over 95%) of the industry and Spanish enterprises are within the SME concept (Cámara de Comercio, 2005).

On the frame of this work, the concept of SME includes, in addition of small organizations, small organizational work units, which have to face up projects identifying their needs and performing management tasks. So both concepts, SMEs and small organizational units within large companies, are what come to be called Small Settings (IPRC, 2006).

Nowadays, most of the projects are faced up through business consortiums of different size, in which each organization behaves as a Small Setting, but they all work together in an organized way with the purpose of achieving the project goals. However, not all operate using the same methodologies, tools and work processes. This makes difficult to carry out the job and decreases its effectiveness (Arora et al. 2001).

The need for process improvement is widely attested, like their benefits in businesses and organizations worldwide. Years of research and practice have shown the competitive advantages that provide effective and efficient use of defined development processes. It also increases the predictability of projects, the quality of products and services and reduces the variability in time and cost of a project (SEI, 2006). Large companies have been the main beneficiaries of the advantages that are provided by the process improvement. This is mainly due to the implementation of processes in organizations is a complex and expensive task (Pinto, 2002).

This helps to understand why, in spite of being well-known that the implementation of processes helps organizations to improve their productivity, increase product quality and reduce costs (Capel, 2004), what is a key factor to improve the company's competitiveness; there is a great difficulty to develop and implement these improvement processes (Iversen, 2006). This difficulty is not in a lack of standards or models but a lack of strategy to implement these processes successfully, due to it is not only needed to know what activities have to be implemented but how to implement them (Arent, 2000).

Considering the importance of the implementation of processes for organizations to achieve their business goals and the handicaps that Small Settings have to overcome to implement them (due to costs and required time), this work is set out with the intention of providing to small organizational units a technological platform that enables them to address successfully the continuous improvement of its processes, and therefore of their projects.

Through the use of this technological platform, the Small Settings could obtain benefits from the suitable implementation of processes which are aligned with business strategies, making them enjoy of the following advantages:

- Accessibility and socialization of organizational knowledge.Tools to provide continuous visibility to the organization on its current state and each of the projects that manages.

- Organizational process is performed so that each organization is equipped with a set of processes defined according to international standards and tools designed to support them completely, making it easier to obtain international quality seals (ISO 9000, CMMI, ISO 15504, etc.) without additional cost and effort required for documenting and deploying processes.

- The knowledge management platform provide an only portal accessible via Web, avoiding the complexity of installation, configuration and integration of the most existing solutions in market and reducing training requirements for using them properly by the employees of a software development organization.

In addition, Zonnect Project Platform implements mechanisms of knowledge management such as electronic process guides, so that organizations can have available and accessible their business assets as key elements to make their activities more flexible, improve their maturity levels and obtain feedback through their projects. This allows organizations to be positioned in a competitive place on the market.

On the other hand, organizations need to define processes to share knowledge in the way that employees may take decisions considering all required information. Therefore, these organizations must acquire knowledge about new technologies that enable collaboration, coordination and knowledge sharing through these systems, and their use should not have repercussions on time and cost for employees. Thus, the communication is related with transfer of knowledge and collaboration in this knowledge sharing. Team members should be coordinated independently of time and place, which has also been considered in the definition of Zonnect Project Platform.

Considering the capabilities for knowledge management about project management processes and elements and collaborative work supported by Zonnect project Platform, the purpose of this work is to determine how this technological platform might help to manage and control of current engineering projects, through using the several mechanisms which it has implemented.

2. Project Management wit Zonnect Project Platform

The technological solution Zonnect Project Platform presents an innovative approach that joins in the same technological framework a project management methodology and a set of supporting tools. The methodology has been developed from the main international standards (PMBoK, Métrica v3, etc.), and the tools provide advanced functionality but they are easy to use and support the defined processes in an integrated way. Moreover, this platform facilitates to project team members to work in different geographical locations, because it is marketed as Software as a Service *(SaaS).*

2.1 Main characteristics of Zonnect Project Platform

Zonnect Project Platform is a technological solution aimed at making easier and faster the process deployment in organizations which develop engineering projects, independently of their purpose. It follows a non intrusive approach because of the methodology and tools are provided as a service.

The quick process deployment is provided to organizations by means of the definition of activities and tasks to carry out in each defined process, as well as a set of integrated tools which support each defined process in a complete way. Therefore, it makes up a single architecture and a innovative solution as regards the existing ones. The main difference between Zonnect Project Platform and others solutions is that Zonnect Project Platform provides a single solution which integrates methodology and tools whereas other solutions define on the one hand the methodologies and the other try to adapt existing technical solutions to support them. This requires an extra consultancy work to adapt methodologies and tools to the particular characteristics of an organization.

In addition, in many cases, conflicts emerge because many organizations try to impose the methodology and tools which use usually. This fact causes that organizations must achieve a consensus about them and, frequently, no one is satisfied completely.

Zonnect Project Platform faces up this problem by means of a light and easy to implement methodology and a set of simple and intuitive tools which provides the necessary functionality to support the processes.

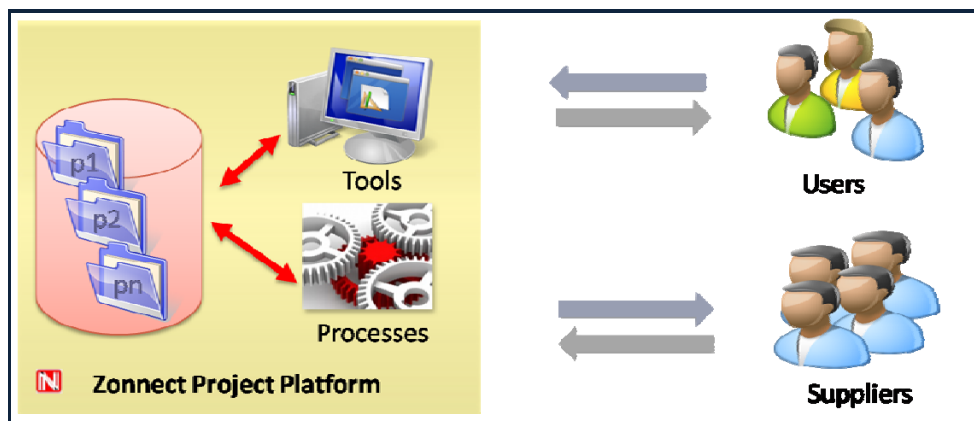**Figure 1: Organization of Zonnect Project Platform**

Figure 1 shows the philosophy of Zonnect Project Platform. It is based on facilitating the collaboration among different stakeholders of a project through a collaborative web portal where each team member can perform the tasks that he has assigned according to the role that has assigned in the project. It permits that project managers, software engineers, service providers and other stakeholders can work in a collaborative way from different places. So, it makes easier the project development and its management.

Thus, all project stakeholders share the same methodology along the project development and the different views of its state according to his role and tasks that have to carry out.

The Zonnect Project Platform architecture has been developed to solve some of the existing problems in project management. Currently, projects are faced up by business consortia where each organization contributes with its expertise in a specific area and they work together with the purpose of achieving a common goal. In this context is a fact that it is necessary to collaborate among different organizations and establish a common methodology that provide a suitable and common framework.

As we mentioned previously, Zonnect Project Platform defines two main items: The Zonnect Coach which has been implemented through an electronic process guide where are defined a set of processes and their activities and tasks; and Web Portal of Tools that constitutes a suite of integrated and accessible via web tools which support the processes.

2.2 The Zonnect Coach

Zonnect Coach is a tool which provides the necessary support to carry out the defined project management processes by means of an electronic process guide (EPG). It provides the knowledge needed to use the tools implemented in Zonnect Project Platform, in order to make an effective and efficient project management in organizations which provide with software solutions and services.
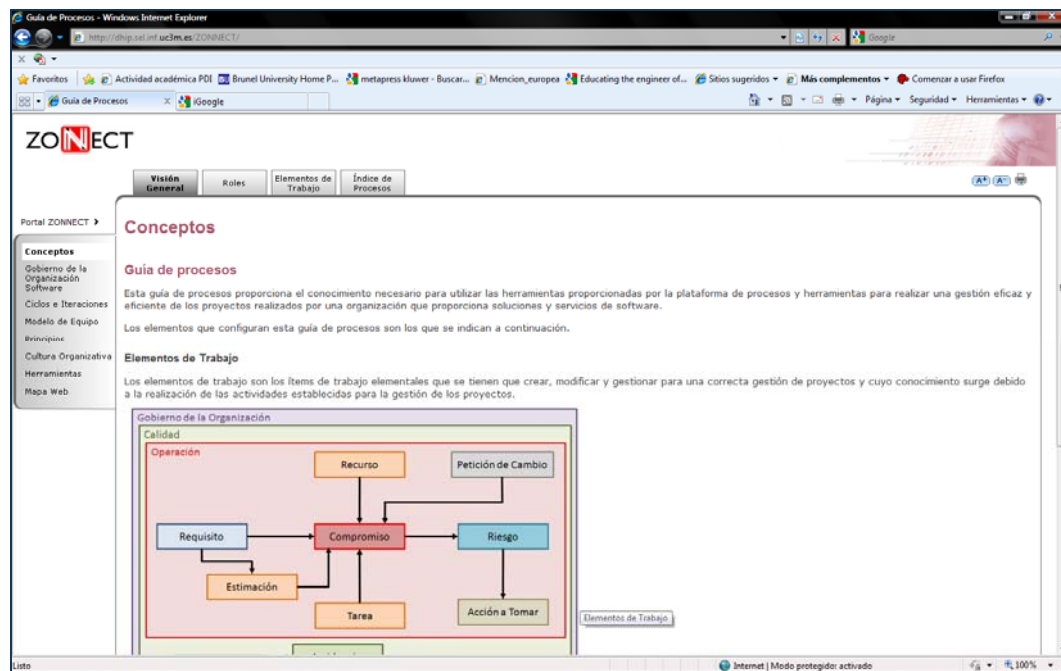
Figure 2: The Zonnect Coach

Figure 2 shows the appearance of the Zonnect Coach and the main elements which are defined in it. The project management methodology defined in this guide is based on five key elements:

- *Work Items:* They are the elemental items which have to be created, modified and managed to make an effective and efficient project management. The knowledge about them emerges due to develop the established activities in the methodology. These work items are following:

  o *Follow Up Action:* They emerge as a consequence of executing the Project Control and Track process, when state of the project variables are revised.

  o *Commitment:* Agreement established between project stakeholders to fulfil the established goals in the project.

  o *Verification Item:* Activity or criterion included in a checklist. The main goal of these checklists is to evaluate a project to assure its suitable progress.

  o *Estimation:* Valuation based on available data of the project, effort and cost that means the execution of a software development project or service.

  o *Incidence:* It emerges as consequence of two different possibilities: when an activity has not been made properly or when an activity has been developed with methods different from those defined in the processes.

- o *Indicator:* Measure which provides an estimation or evaluation of specified attributes derived from a model as regards defined information needs.

- o *Lesson Learned:* Assessment and documentation of best practices, poor practices and high risks that have happened during the project development, for every process area.

- o *Changed Request:* Identification of a proposed change to some part of the product or baseline.

- o *Resource:* Means, both human and material, necessary to carry out the project activities.

- o *Requirement:* Condition or capability needed to develop the project activities and to achieve the project goals.

- o *Risk:* Documentation of a likely event or condition which may provoke a negative result in the project future.

- o *Task:* Work breakdown element of a project according to its scope and objectives.

- *Roles:* Members of a software development team can take one or more roles. In particular there are defined four roles, as follow:

  - o *Responsible of Organizational Unit:* Responsible for providing the resources necessary to fulfil the objectives, and formally review and approve each of the processes.

  - o *Project Manager:* He performs tasks of coordination and management of human resources, makes the estimation of the required effort to carry out the project, selects the development strategy, determines the project structure, sets the schedule for setting milestones and deliverables, and plan the project.

  - o *Engineer:* He makes the project technical work.

  - o *Client:* He provides teamwork the necessities which should be satisfied by the software system or product to be developed and approves changes.

- Processes and activities: Team members play a certain role in the project, so they execute activities that are grouped into workflows. Activities may produce work products, and may also require some work before they can be executed. Currently, there are defined seven processes whose main objective is to facilitate the project management to different organizational levels.

  - o *Quality Assurance:* Its goal is to perform a tracking of quality activities which have been committed internally in the project.

  - o *Project Control and Tracking:* Its goal is to control the execution of each project and its progress according to the project plan.

  - o *Requirement Development:* Its goal is to manage requirements during the execution of the project, from they are collected to its validation with the client.

  - o *Configuration Change Management:* Its goal is to manage and control different changes that emerge about configuration elements, once the baseline has been defined.

  - o *Risk Management:* Its goal is to manage the possible risks which may appear along the project.

o *Measurement and Analysis*: Its goal is to develop and maintain an operational capability of measurement that serves to support the information needs about new processes and tools.

o *Project Planning:* Its objective is to establish project estimations, and develop the planning elements which make up the project plan. In addition, it will be needed to obtain the commitment of different stakeholders.

- *Work Products:* The work products are documents, spreadsheets, project plans, source code and other tangible outcomes that result from the implementation of activities and support team members involved in the project to carry out the tasks which have assigned.

- *Technical Instructions:* They provide the information about how to perform tasks related to the activities and processes, both at the methodological level, how to perform the activity; and technological level, how carry it out with the tools implemented in Zonnect Project Platform.

The organization of these five items in the Zonnect Coach and relations that exist among them are shown in figure 3.

Figure 3: Organization of different items of the Zonnect Coach
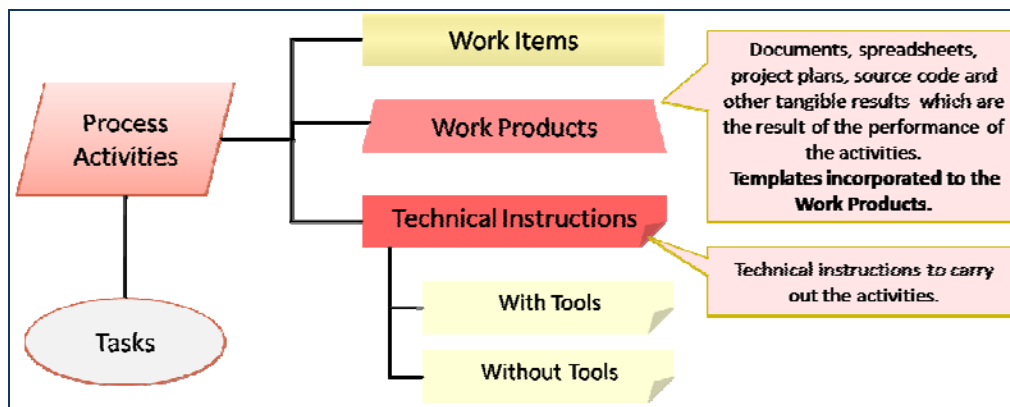
For every process defined in the Zonnect Coach and each of its activities is provided: *work items* which are managed during the execution of the activity, *work products* that can be used to make the activity or must be obtained as a consequence of its execution and the *technical instructions* which help to carry out it. These *technical instructions* provide guidance about using tools that support the execution of the activity development (with tool), or understanding the work that should be made in that activity (without tool).

Finally, each activity is broken down into several elementary steps called tasks, which show the sequence of steps needed to perform the activity.

Not only the power of the Zonnect Coach is its use as a process supporting tool in order to execute them properly, but also facilitates to each role the execution of its work considerably.

The methodology defined in the Zonnect Coach includes a value chain that consists of four phases. Pre-offering, offering, execution and maintenance; and for each defined phase and role a sorted activity list is provided according to the role responsibilities. In these lists activities are shown sorted by the phase of the value chain, independently of its process. This way of navigation among activities allows stakeholders to know what activity should be developed according to the last they have carried out, facilitating their work enormously

because, as we have seen before, each activity has a set of tasks, work items, work products and technical instructions that support them continuously.

Therefore, the Zonnect Coach is a powerful tool for managing knowledge about project management processes, which facilitates the process improvement to organizations and also allows to establish alliances for executing project among different organizations using the methodology defined. With this tool the knowledge transfer among the different roles is improved substantially for every phase of the chain value and it also assure the continuous improvement in organizations through defined processes.

3.3 The Tool Portal

The second main element of Zonnect Project Platform is the tool portal. In this portal supporting tools for the project management processes defined in the Zonnect Coach are completely available and integrated. So, they are accessible and usable for the project stakeholders. As well as the support to project management processes, and what is most important for collaborative project management, Zonnect Project Platform implements a set of technological solutions that favour information maintenance and management and communication among different team members who use the platform. Next the main features implemented by the tool portal are analyzed.

- *Zonnect Project Platform* allows to perform a continuous tracking of the work carried out by each team member. The team leader will be able to consult the degree of progress of a team member in the execution of a task according to the work reported for him. So, the team leader can also know the difference between the planned and real work. With this information he may determine people or areas in which there are problems and decide the actions that should be taken in order to correct such problems.

- Documents management with version control is an essential functionality to be available in a collaborative environment, and it is also available in Zonnect Project Platform. Moreover, this platform provides with notification mechanisms for any modification that is made in the existing documents or folders. So, team members can know instantaneously who has made a change or contribution to the information repository, as well as what he has contributed.

- The automatic sending of e-mails to remind team members next tasks that they have to carry out, as well as next or expired state reports is other of the contributions provided by Zonnect Project Platform. The goal of this functionality is to avoid that team members forget the execution of any task.

- Work items are a key element in Zonnect Project Platform and an appropriate management of them is a success factor for the project. So, work items such as requirements, risks, change requests, etc, are supported by the platform. With this management of work items the project stakeholders can know when a change has been made in a work item and the author of the change. The fact that knows this information in real time favours the information management and decrease the probability of having repeated or redundant information.

With these mechanisms, Zonnect Project Platform allows to manage easily the different versions of products created during the project, make a continuous tracking of the project personnel assessing the project progress degree and detecting possible problems, and maintain all data related to project in an efficient way. Moreover, Zonnect Project Platform allows to communicate to each stakeholder any change over any item which is found on platform.

From a technical point of view, the tools implemented in Zonnect Project Platform can be catalogued as: Multi-Project Tools or Mono-Project Tools.

Multi-Project Tools allow to make different actions about data associated to several projects according to the role which hold on each project. Figure 4 shows the appearance of these tools.

Figure 4: Multi-Project Tools
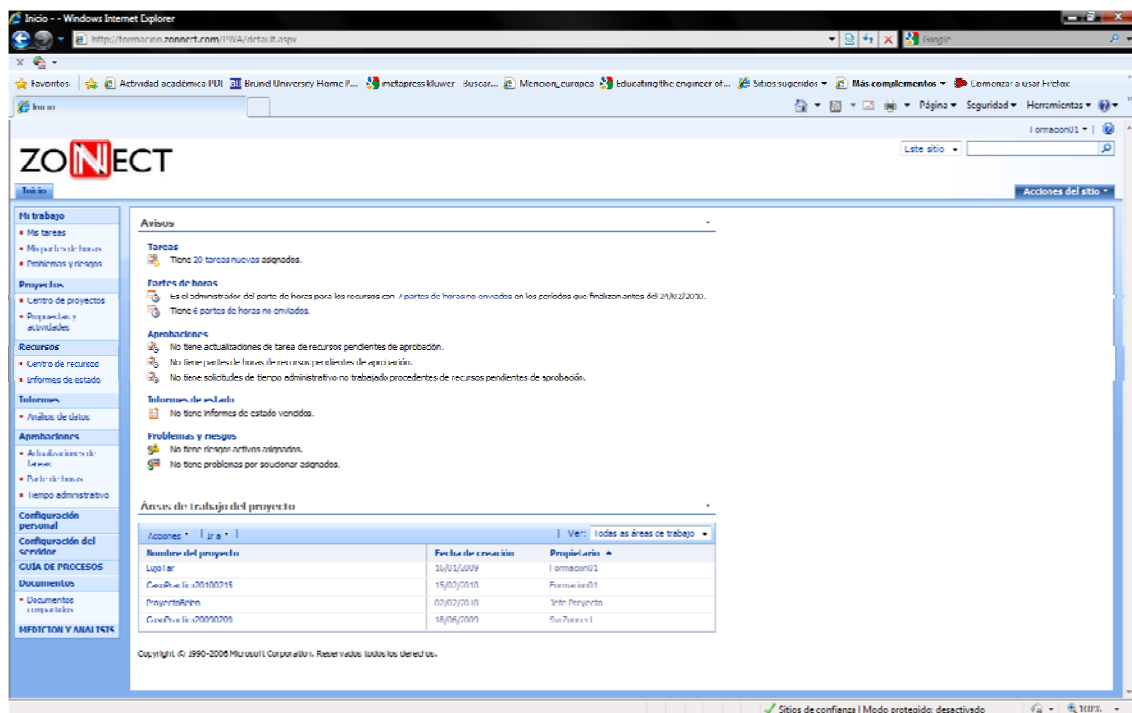
Multi-Project Tools are grouped by functionality. The groups are following:

- *My work*: It includes basic tools which allow team members to introduce the daily dedicated effort to develop each task that has assigned and update the progress task according to this effort.

- *Projects*: It allow to access to project planning tool. From here it behaves as a Mono-Project Tool.

- *Resources:* Tools to manage the resources existing in the organization (register, attribute cost-hour, etc.).

- Approvals: Tool that allows the project manager to update the overall progress of the tasks of each project of which he is responsible, once he has approved the progress introduced by members of his team. This tool allows also to check timesheets sent by team members and approve or reject them according to the project manager's view. Moreover, it permits to approve or reject administrative time requests sent by team members.

- *Personal Configuration:* Personal configuration of general tool features.

- *Server Configuration*: General tool configuration. It allows to delete projects, configure administrative time, schedules, etc.

- *Electronic Process Guide:* Link to the Zonnect Coach.

- *Documents:* Library of general documents. It is shared for all projects.

- *Measurement and analysis:* Tools that provide indicators with common information of all projects. It includes indicators such as: index of efficiency in cost and time, earned value of checklists, acceptation level of requirements, temporal evolution of requirements in each state, acceptance rate of change requests, implementation rate of change requests, temporal evolution of change requests by state and evolution of checklists by state. These indicators are calculated based on existing data from all projects of the organization at a specified date range.

Mono-Project Tools allow to different actions about data associated to only one project, managing their work elements. Figure 5 shows the appearance of these tools.

Figure 5: Mono-Project Tools
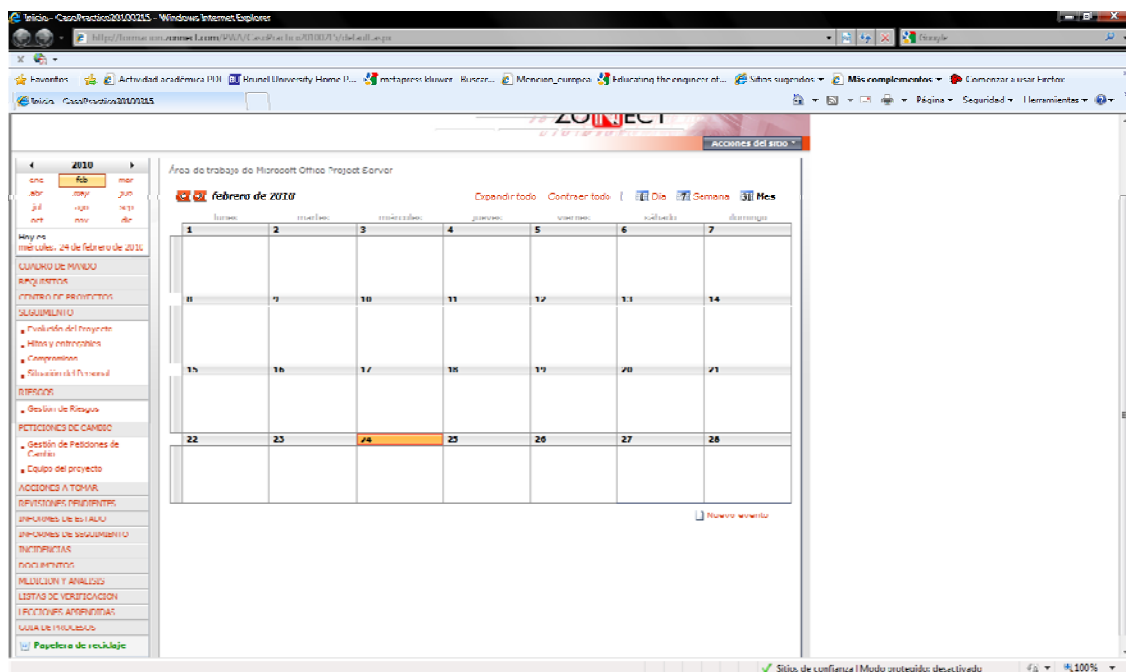
First, we can see a schedule where appear the events which will take place the current month. On the left, it shows the access to the different tools. Next, we describe briefly the characteristics of these tools.

- *Scorecard*: Tool that provides several indicators with information about our project, such as the efficiency index in cost or time, level of risk, status of change requests and evolution of commitments and billing milestones.

- *Requirements*: It allows to manage and develop requirements.

- *Project Centre*: It provides the access to project planning tool that allow us to define project plan, assign resources, establish costs, etc.

- *Tracking:* It allow us to know current state of the project according to the earned value as well as make tracking about milestones, deliverables, commitments and project personnel.

- Risks: It allows to manage project risks by means of introducing their mitigation and contingency actions and data associated with their probability of occurrence and their impact on the project.

- *Change Requests*: It allows to manage configuration changes by means of a formal and well-know process by each stakeholder.

- *Follow Up Actions*: It allows to manage actions defined to solve problems or unexpected events which arise during the project. Usually these problems and events have been detected during tracking activities.

- *Pending Reviews*: It indicates if there is an element without checking among those defined in the tool, such as commitments or risks, and they will have to be revised to be able to create both status and monitoring reports.

- *Status Reports*: It allows to generate status reports in an automatic way. For this, the tool uses data that are stored in Zonnect Project Platform. The default option is generate automatically reports every two weeks.

- *Monitoring Reports*: It allows to generate monitoring reports in an automatic way. For this, the tool uses all data about tracking project.

- *Incidences:* It allows the management of incidences that has emerged during the project.

- *Documents:* Library of documents related to the current project. It is possible to organize the in directories or folders.

- *Measurement and analysis:* Tools that provide indicators with information about current project. It includes indicators such as: acceptation level of requirements, temporal evolution of the requirements in each state, acceptance rate of change requests, implementation rate of change requests and temporal evolution of change requests by state and evolution of checklists by state.

- *Checklists:* It allows to manage verification items and carry out quality assurance activities.

- *Lessons Learned*: It allows to define and manage lessons learned which have been identified along the project.

- *Electronic Process Guide:* Link to Zonnect Coach.

The entire set of tools, both Mono-Project and Multi-Project, are fully integrated. In addition, they are easy to use and accessible, which reduces significantly the resistance to change that may occur in many organizations when they want to evolve towards most powerful technological solutions that facilitate the work but whose learning curve is severe.

Zonnect Project Platform is provided as a service so it enables the collaborative work among different participants of the project regardless of where they and the organization to which they work are located. It is only necessary to assign a profile based on the work that they will develop in the project. Other solutions which are installed in the client organization require a large consulting work to their adaptation and integration of particular characteristics of each organization, increasing their cost substantially.

4 Conclusions

This work has presented a new methodology based on the main project management standards and methodologies used in engineering projects and that has been implemented in an Electronic Process Guide and supported by a set of integrated tools.

This methodology has also the contribution of several experts with wide experience in project management who have contributed to the definition of light and easy to follow and apply processes, so that they can be introduced in organizations quickly. With the goal of not only

processes are defined but also they are useful, a set of tools have been developed to support the process execution in a quicker and complete way, at the same time s set of technical instructions have been developed to support both process and tool usage.

Thus, a new methodology that facilitates engineering project management has been defined, with an innovative approach centred in the integrated project management. Moreover it favours the collaboration among different stakeholders because both tools and methodology definition are accessible web. So, everyone can carry out his job independently of his geographical location. In the current situation, where project personnel travel frequently and participate in several project at the same time between different organizations, to have available in any moment methodology and tools is an important contribution to facilitate project management.

With the final goal of supporting the project development among several organizations which cooperate as Small Settings, this new solution has been designed considering knowledge management features and collaborative work under a same architecture, trying to get the following achievements:

- Make available to users the best project management practices into a platform which is easy to deployment and use, and at low cost.

- Make available to organizations an effective solution that allows them to save on projects costs, reduce failures and increase the quality of results.

- Be a supporting element for the homogenization and collaboration of technology transfer activities between organizations. Constituting a knowledge base and discipline that give competitive advantage to their users.

Both methodology (The Zonnect Coach) and supporting technologies are provided as a service to organizations, so they can contract them for a period of time, as the duration of a particular project , without having to pay the high costs of licenses and consultancy to adapt tools and personnel training.

Moreover, the methodology defined in Zonnect Project Platform expects to change the concept of training, making it is more self-taught using the information and help provided by the Zonnect Coach. This new teaching model tries to reduce both costs and time associated to teaching, facilitating continuous guide to each role involved in the projects along its lifecycle.

5 Future lines

Zonnect Project Platform will be improved in future versions incorporating new functionalities which enhance and complement the existing ones. Considering the distributed characteristics of current engineering projects due to externalization of tasks and globalization, some features to facilitate the collaborative and integrated project management are to be added to facilitate communication and coordination among team members.

New mechanisms to support communication and coordination among team members will be incorporated as well as others to improve the current information management. Some improvements will be considered in next versions are explained below.

- Implementation of mechanisms for generating ideas collaboratively among project team members what facilitates distributed brainstorming sessions.

- Supporting to project virtual meetings incorporating video and audio conference tools, chat and shared blackboard in an integrated way into the platform. This makes a big effort to improve synchronous communication among project team members.

- Assets control and management based on Web 2.0 technologies. Shared collaborative workspaces and document repositories will be developed based on Wikis and Blogs. This will allow a more lively management of assets, facilitating the contributions of projects team members.

- Implementation of more exhaustive mechanisms for controlling and monitoring project personnel at an organizational level.

- Zonnect Project Platform will also allow stakeholders to publish videos which can be visualized and discussed for other project team members. Videos can show projects advances, lessons learned, best practices, etc.

With the implementation of the previously mentioned improvements, Zonnect Project Platform will become a leader tool not only to support project processes, but also to support the management of virtual teamwork. It therefore will provide a set of integrated applications under a single web portal, capable of supporting the management of a collaborative engineering project in a distributed environment in an integrated way.

6 References

Arent, J., & N"rbjerg, J. (2000). Software Process Improvement as Organizational Knowledge Creation: A Multiple Case Analysis. In Proceedings of the *33rd Hawaii International Conference on System Sciences*, Volume 4. IEEE Computer Society.

Arora, A., Arunachalam, V.S., Asundi, J., & Fernandes, R. (2001). The Indian Software Services Industry. *Research Policy*, *30(8)*, 1267-1287.

Cámara de Comercio. (2005, February 22) Las tecnologías de la información y las comunicaciones en las PYMES. Retrieved February 28, 2010, from: http://www.camaramadrid.es/asp/pub/docs/proyecto_mutic_las_tic_en_las_pymes.pdf

Capell P. (2004). *Benefits of Improvement Efforts.* Special Report CMU/SEI-2004-SR-010. September.

IPRC: The International Process Research Consortium. (2006). *A Process Research Framework*. Carnegie Mellon University, EEUU.

Fundación Telefónica. (2009, December 21). *La sociedad de la información en España.* Retrieved March 1, from: http://e-libros.fundacion.telefonica.com/sie09/aplicacion_sie/ParteA/datos.html

Iversen Jakob, Ngwenyama Ojelanki. (2006). Problems in measuring effectiveness in software process improvement: A longitudinal study of organizational change at Danske Data. *International Journal of Information Management, 26*, 30-43.

Pinto R. and Shoemaker D. (2002). "The Cost of CMM in a Conventional IT Organization: A Field Study".

Software Engineering Institute (SEI). (2006). *CMMI Performance Results.* Available at http://www.sei.cmu.edu/seir.

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