

eLabs - Platform for online laboratory management

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1. ABSTRACT

We observe, today, an unprecedented development of information technologies in various organizational, social and economic fields. The Web is the main driver of this evolution from a simple display system of linked pages to a powerful platform for information and communication, having the interaction, the dynamism and multimedia resources their main features.

At the organizational level, the Web has introduced several improvements, turning the business processes more effective and centered on users. The deployment of portals to support management and communication in organizations was the first step in the integration of information technologies in several fields of organizations.

One of the most relevant technologies to support business process management is workflow, representing the most significant solution for process automation and information management inside an organization. According to Hales (1997) workflow is a proactive management system that manages the workflow among the participants (users or other systems), according to predefined procedures that define the tasks.

This article discusses the development of a platform for online laboratory management based on workflow technologies, with the main goals to improve communication, cooperation and integrated management of resources, promoting greater efficiency in laboratory management.

The eLabs platform is been used in Instituto Politécnico de Bragança for laboratory management, integrating the management of internal and external services, equipment, resources and tasks. The results obtained demonstrate an improvement in the efficiency of resources management and the enhancement of quality of services realized inside the institution and to the community.

2. INTRODUCTION

Information systems had their evolution from the age of data processing to the information age, where the information and knowledge are the main drivers of evolution in our societies. At organizational level, the management systems are often associated with the workflow systems, cooperative work and groupware, because they permit to extract knowledge from various systems within an enterprise or institution. Communication and knowledge are naturally associated with the human experience and social contexts, and managing it with efficiency means that is necessary paying attention to persons, cultures, organizational structures and technologies, in terms of its sharing and use.

The main types of collaboration systems in organizations are workflow and groupware systems, having the purpose to establish a relationship between people and processes, enhancing process management and communication. The integration of these systems in an organization, have several implications in respect to the natural resistance that people presents when is necessary to change habits.

The adoption of workflow systems in higher education institutions to support management has some resistance, because the necessity change the internal procedures and the difficult to harmonize the different processes is a great challenge.

The integration of workflow systems in laboratory management is the main topic of this paper, presenting a bottom up approach that started in one laboratory and was progressively expanded to other laboratories in different areas.

3. WORKFLOW TECHNOLOGIES

Workflow systems had an important role in organizational management integrating information technologies to decision support in processes of an organization. With the implementation of these systems, the information can be used to produce organizational knowledge implementing good practices and promoting the sense of responsibility in each part of the process by all the collaborators.

Chiavenato (1995) refers that: "the process of adapting and updating technologies have profound internal modifications, in relation to material aspects such as machinery, equipment and facilities". The main purpose of collaborative systems is to allow responding to routine questions and flow the transactions across the organization.

The main characteristics of workflow systems are (Sarmiento 2002):

- Having the capacity to distribute tasks between participants;
- Have the ability to store rules (work plans, priorities, referrals, authorizations, security and the role of actors);
- Automate business processes and document management;
- Generates the flow of work between participants, documents, information and tasks;
- Coordinates information resources, users and tasks based on information.

According to the author, the success of an organization depends on the ability to communicate and cooperate in teams, emerging working groups and even in virtual organizations. It means that to perform a task or job team members don't need to be in the same geographic location or at the same time, when using appropriate tools for communication and collaboration.

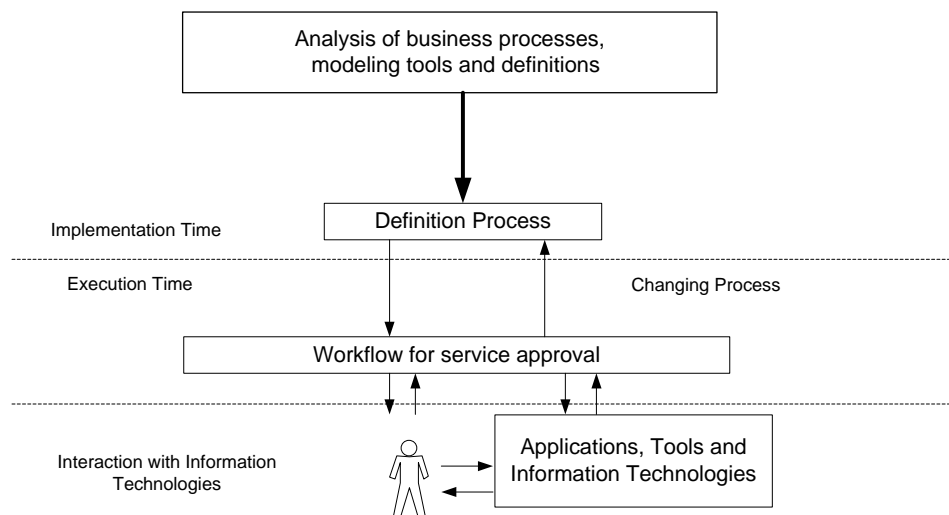


Figure 1 - workflow process implementation

The basic characteristics of a workflow system was proposed by Moro (1998), divided into three functional areas: design and implementation of processes, services and activities, control of execution time and changing process and the interaction of individuals with the information technology, tools and applications (Figure 1).

Workflow systems bring several advantages to organizations, at environmental level, with the reduction of paper, and increases the sharing of information and its access without the limitation of space and time. Moore (2002) highlights the main advantages of workflow systems:

- Reduction of production time;
- Increased productivity and reduced costs;
- Improved customer service;
- Increased ability to rapidly change business processes;
- Reduction of errors;
- Reduced time spent on administrative tasks, which frees resources for other tasks increasing productivity.

According to Jablonski (1996) workflow systems can be defined in three different areas: consulting, industrial and academic. In this paper we discuss the academic field, more specifically the laboratory management, where workflow can support processes and tasks management, facilitating the requisition of equipment, inventory management and the improvement of services.

These characteristics were explored in order to add to the eLabs platform the ability to support different tasks related to laboratory management. The development of eLabs platform was based on workflow technologies to support communication, cooperation, integrated resources management and to promote the efficiency of processes.

4. ELABS PLATFORM

The eLabs platform has an interface that integrates the management of several laboratories in different areas and associated with different departments of an institution of higher education. The general architecture of the platform eLabs has three user profiles: the supervisor, laboratory staff and end user. eLabs has two main parts: the frontoffice portal, allowing access to end users (students, faculty management services, staff or clients) and the backoffice which is available to the eLabs supervisors and laboratory staff.

The backoffice has the feature of management of equipment, including supplies and stocks, clients, users, services, tasks, requisitions and agenda. On the frontoffice clients, including external enterprises, students and lecturers, have access to online services and equipment requisition (Figure 2).

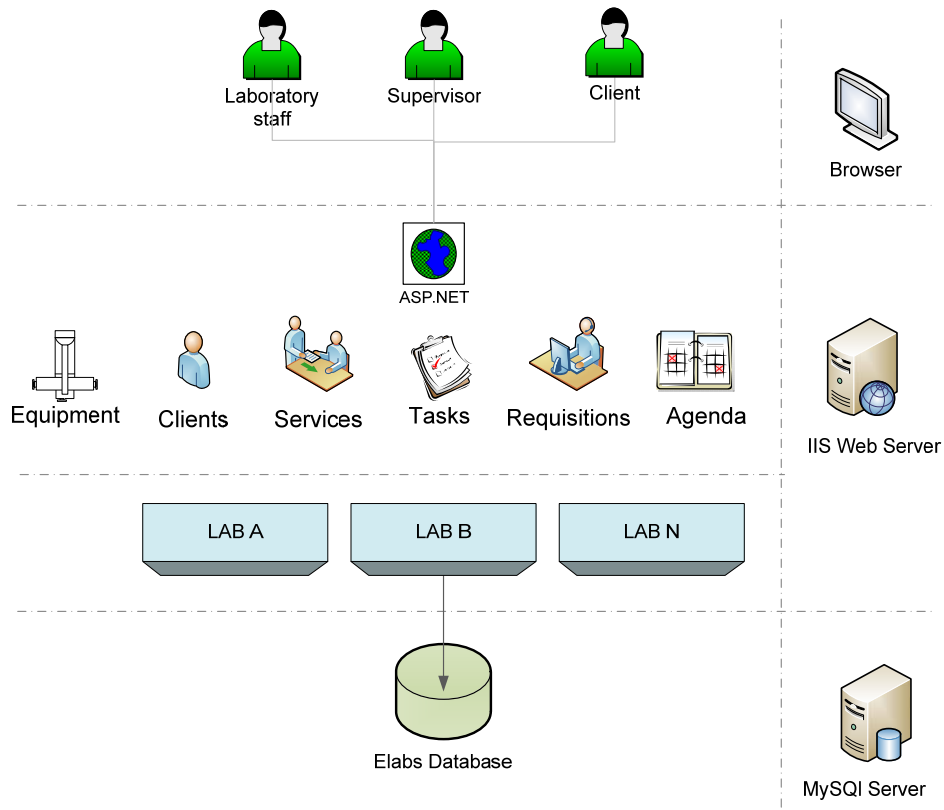


Figure 2 - eLabs architecture

Each user profile has different roles in the system. The laboratory staff is the administrator of the laboratory that is affiliate managing equipments, clients, providers, services, tasks and requisitions. The supervisor has a read only view of the information and can view all the information related to the laboratory that is affiliated. The end users have access to services and equipment requisition, and can follow all the workflow of each process that request.

ELabs presents an intuitive design based on tableless structure (Figure 3) and is compatible with most common browsers. All formatting is based on CSS and XHTML standards and the architecture is based on tree layers supported by ASP.NET and AJAX.NET(Asynchronous JavaScript and XML).

The screenshot displays the eLABs web interface. At the top, there is a header with the eLABs logo and a navigation menu with items: Home, Regulamento, Actividades, Recursos, **Serviços Online**, Serviços à Comunidade, and Contactos. Below the header is a banner image of a laboratory. On the left side, there is a vertical menu with categories: Home, Equipamento (with sub-items: Equipamento, Componente, Consumível), Entidades, Workflow, Groupware, Relatórios, and Portal. The main content area shows a calendar for January 2009, with the 26th highlighted in red. Below the calendar, it says 'Hoje: segunda-feira, 26 de Janeiro de 2009'. Underneath is a 'Tarefas' section with a table of tasks.

Nº	Título	Início	Conclusão	Progresso	Gestão
15/2008	Vistoria às salas 204/2007/2008	06-10-2008 14:00:00	30-06-2009 17:00:00	75%	
16/2008	Configuração da rede WIFI aos alunos EM,EB,EQ	06-10-2008 00:00:00	30-06-2009 00:00:00	50%	
		06-10-2008	30-07-2009		

Figure 3 - Elabs interface

The today screen shows all the tasks and services that each laboratory has in execution, informing the staff and supervisors when a task or service is delayed by email and in the eLabs platform.

The platform also contains a public area with a number of information including general information about each laboratory, services policy, resources and contacts.

5. RESULTS AND CONCLUSIONS

Workflow systems are very powerful tools for organizational management. It facilitates the sharing of information, coordination of tasks, processes flow management, services and activities.

Elabs platform is based on workflow technologies to support laboratory management, with the aim to promote a greater efficiency in resource management. The implementation of a common service management framework for all the laboratories represents an improvement in the time to respond to services requests and in its quality, because all the data is now electronic with advantages in their access and management.

The platform is been used by eight laboratories in School of technology and Management of Instituto Politécnico de Bragança, in the areas of mechanical engineering and chemistry. The average of monthly accesses is near 50, the number of tasks per month is 31 and the numbers of requested services per month are 16, which it is a good indicator because there are only six laboratory staff members.

The adoption of eLabs in the laboratories of Instituto Politécnico de Bragança represents an improvement in the efficiency of laboratory management, supporting the management of services, tasks, equipment, stocks and documents. The launch of the platform eLabs also contributes to increase the activity of technology transfer, since it allows a higher efficiency in the support of research projects and facilitating the management and the development.

6. REFERENCES

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