A Corporate Application to the Process of Environmental Management

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Abstract: This paper's purpose is to present a functional description of a groupware-type application that controls the environmental management process [Michelis] [Dix 1996]. The application, named SIGMA, was developed for PETROBRAS and has three main objectives: to provide the users information on the process of environmental licensing; to help users conduct this work and allow a better interaction between them and the community concerned with a given environment – either PETROBRAS workers or not –, and to disseminate information in a differentiated way according each user's profile.

1. Introduction

The Brazilian legislation regarding the environment determines that any project that might have a high-degree impact on the environment must be submitted to a specific process of environmental licensing.

PETROBRAS (Brazil's petroleum company), through COEMA (Environmental Engineering Coordination), an agency belonging to SEGEN (Engineering Services), had the need to implement an information system that allows the management of the licensing processes of the corporation' enterprises that have an environmental impact.

The SIGMA system provides communication resources that allow, in an easy way, information sharing, negotiations in cases in which divergences may appear, and experience exchange among members of the community involved in environmental licensing processes.

On the other hand, the corporation wished the enterprise to start in the shortest possible date, hence the need to accelerate as much as possible the conduct of the process. Thus, an important requirement is to establish automatic controls aiming to avoid unjustified delays, taking into account that fast information broadcast means expense economy to the corporation.

Despite the system's wide covering, it devotes maximum attention to information security, regarding both access to it and its integrity. For this, different kinds of users and different kinds of access to the information were defined, making the system available in a differentiated way according to the user.

2. Monitoring Mechanisms

The environmental licensing process consists in obtaining licenses with the competent agencies. This requires the development of several activities: (a) Preliminary Analysis Study; (b) Definition of the Reference Term, in which the scope of the environmental studies to be made is presented; (c) Environmental Study Elaboration; (d) Revision of the studies by the competent agencies, dissemination of information and public hearing when required; (e) Issue of the Previous License; (f) Issue of the Installation License, which allows the corporation to begin the construction stage; (g) Construction Stage; (h) Environmental Hearing; (i) Elaboration of Emergency Action and Risk Analysis Plans; and (j) Issue of the Operation License.

For this monitoring, the application was divided to two parts. The first one is identified by the inclusion, for each project, of cadastral data, of the dates corresponding to the activities, of the people responsible for them and of the restrictions involved. PETROBRAS has created three kinds of projects: ducts, industrial units, and production units. The projects concerning the ducts refer to the implantation or enlarging of ducts for the

transportation of products such as gas, petroleum, oils, etc. The projects concerning the industrial units consist in the construction or enlarging of refineries, while the ones concerning the production units correspond to the construction or enlarging of platforms or terminals.

In this stage, the phases with their respective activities are selected. Each project has a set of particular phases/activities that might be different from another project's or not. This selection is made by means of the fulfillment of the dates related to the activities, estimated and/or accomplished. It is also here that the information on the evolution of the management process are updated.

The set of phases available in the inclusion part follows a standard. The system doesn't allow the inclusion of new phases yet, but phases that will not be used in a given project could be excluded. There is also a default set of activities for each phase. In this case, the system allows the exclusion and/or creation of new activities in each phase. The exclusion of phases and/or activities and the creation of new activities are only valid for the specific project. Each project has its own set of information, all of which are stored in a data base and are recovered in real time when the user navigates through the application's pages of a given project.

The second part of the application refers to monitoring the environmental management process. There, the pages of the project, of the monitoring of phases/activities, and of the schedule are presented.

Schedule Charts

The schedule can be analyzed according to two concepts: the bar chart and the block chart, developed by TeCGraf (the Catholic University of Rio de Janeiro's computer graphics development team). The bar chart, presented in Figure 1, refers to the GASBOL project, which is the duct responsible for transporting natural gas from Bolivia to the South and Southeast regions of Brazil. It lists all the project's phases, being also available to each phase. The access to the bar charts is also made through the links existing in the block chart in the page of products being licensed or in the product's page.

In the project's abbreviation there is a link to the project's page. There are also links in the name of each phase, leading to each one's bar chart.
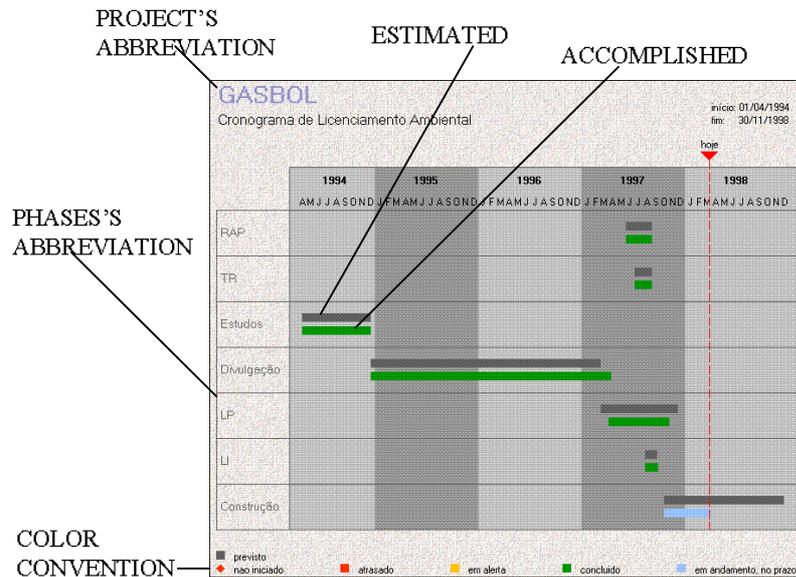

Figure 1: Bar Chart

The block chart presented in Figure 2 has two purposes: to present the project's situation, and to present the situation of the phases that constitute the project. Both cases inform the user about the situation of the project or phase by means of a graphic feature, detailed in Table 1, which allows a quick identification of the situation of the project or phase.
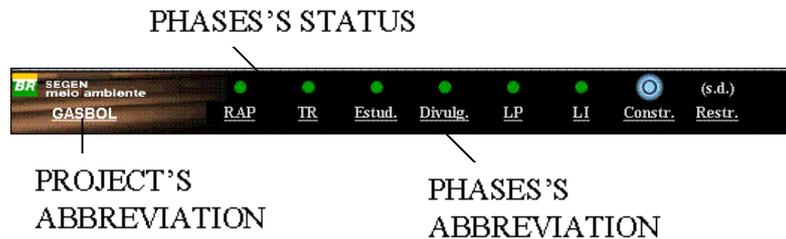
Figure 2: Block Chart

Below is the description of each symbol and its meaning. A particularly important one is the alert state, represented by the yellow ball in Table 1, which aims to inform the person responsible for the environmental management process that the final date of the activity is approaching.

	Symbol	Description
	Green ball	The Phase/Activity is concluded
	Red ball	There is a delayed phase/activity
	Red lozenge	There is a non-started phase/activity whose schedule has expired
	Blue ball	There is a phase/activity in progress, in time
	Yellow ball	There is a phase/activity in progress, in time, whose end date is approaching; alert state
	Gray ball	There are project/phases/activities yet to be initiated

Table 1: Symbols from the block chart

The monitoring of each activity is made through the project's page, shown on Figure 3 for the GASBOL project. This page presents information on the projects according to their kind. They include the entities involved with the people responsible for them. For each entity, there may or may not be a list of the ones responsible for the project.

The top of the page presents the project's block chart, in which the links to the bar chart and to the details of the phase selected are available.

The vertical frame to the left is called general index. It presents the links to recurrent themes when navigating through the application, such as sending an e-mail to the webmasters or consulting the system's user guides.

The second vertical frame (beside the general index), in Figure 3, is called contextual index. It shows the list of activities belonging to the selected phase.

The central frame is called main frame. It presents information to be consulted or for the forms to be filled by the user.

The system works with text files, such as environmental reports, study letters forwarded to Environmental Agencies, etc. In this case, the system makes available pre-defined files which serve as a base for

the creation of new text files. The access to these documents is made by means of links that activate text editor MS Word, the one used by PETROBRAS.
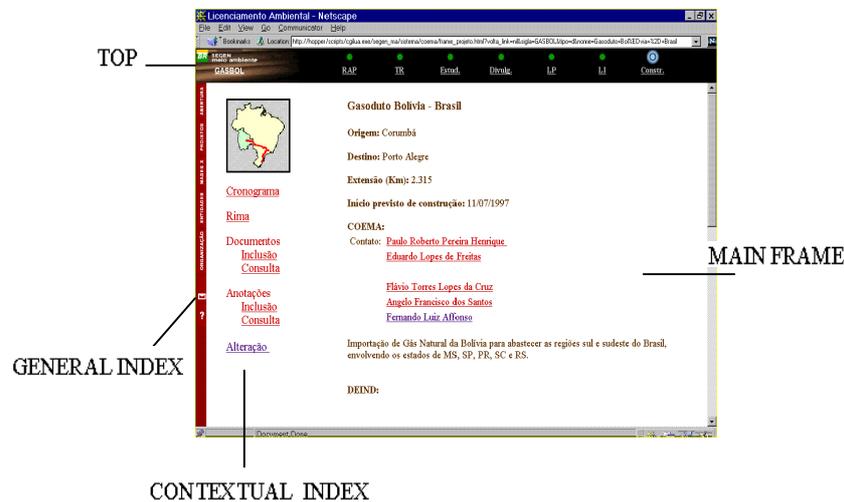

Figure 3: Project's Page

The documents received, including the licenses (Previous, Installation, Operation), will be associated to their corresponding projects. They will be scanned, treated, and stored digitally, becoming available in the system to be accessed by those interested and authorized. The documents will be scanned for any area, and, by means of upload, will be included into a specific area of documents for each project. In this case, the system automatically defines each document's name.

3. Communication Mechanisms

Communication mechanisms are the features through which the users can make notes concerning the project. In the note pages the users register comments during the execution of the projects under their responsibility, which become available in the system to be accessed by the people involved in the environmental management process, according to their profile. These notes are classified as individual, public, pertaining to a sector, pertaining to a project's community, and pertaining to the managers.

Access permission to the notes available in the projects is defined by the kind of note together with the kind of user that is trying to access. Based on this combination, the users might have access to the notes or not, both for reading them and for creating them.

The individual notes may be created by any PETROBRAS employee involved in the project, and may only be accessed by the person who created them. This kind of note aims to allow the users to write reminders or to make observations for themselves.

The notes pertaining to a sector may be created and accessed by the users belonging to the same entity of the person who made the note. Their purpose is to disseminate information on the project, so that those working in the sector involved in the project may be kept informed on what is going on.

The notes pertaining to a project's community may be created and accessed only by the users related to the project. It is one of the mechanisms that aim to maintain an interaction between the people responsible for the environmental licensing process and those relat to it.

The notes pertaining to the managers may be created by the users who are responsible for the project. These information is only accessible to those working in the high administration (superintendence and board of directors).

Public notes may be created by people from entities like COEMA, Enterprises, Coordination of Works, and Division of Projects related to the project. They may be accessed by any person belonging to the environmental community, either a PETROBRAS employee or not.

SIGMA also has links to consult other organizations, making available access to information from environmental agencies.

Beside the above mentioned communication mechanisms, electronic mail is also available to provide direct communication among the people involved in the process.

4. Access Mechanisms

Due to the security needs demanded by the users regarding access to the system's information, differentiated visions were defined according to the their profile. The users are divided into: COEMA, Enterprises/Coordination of Works/Divisions, Operational Agencies (the clients), Superintendents/Directors, PETROBRAS' intern public, and PETROBRAS' extern public. For each of these users there are different levels of access.

The access level informs how users have access to the information specifically available for him. Level A allows the user to include and update the information concerning the projects under his responsibility, and to create any kind of note. Level B allows the user to consult the information regarding the projects under his responsibility, and to create and access specific notes according to the entity that he belongs to. Level C allows the user to consult cadastral information about all projects and specific notes according to the entity that he belongs to.

5. Conclusion

Groupware is a technology that allows corporate work between two geographically distant groups, propitiating a better and wider interaction among themselves [Khoshafian 1995] [Ostwald].

SIGMA is a groupware application. It enhances the interaction among those belonging to the environmental community, allowing them to exchange ideas, to share information, and to actually control the environmental licensing process of PETROBRAS' enterprises by means of three mechanisms: monitoring mechanisms, communication mechanisms, and access mechanisms.

6. References

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