Towards a method to design web sites for public administrations

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Abstract :
There is presently no well-established design method for Internet sites. Current approaches mainly rely on tools to assemble pages. The on-going project GAEL[1] aims to design a method and tool to support the development of web sites for public administrations. In our approach, a web site is an *integrated* set of *customized* services. These services are rather specific to the Administration although a few are usable by other organizations. Our method has two main steps: the first step is to make the right choices and to avoid some Internet project pitfalls by check-listing items. It includes the selection of services. The second step consists of service parameterization. This paper outlines the method and presents a pilot project, which involves an extranet of administrative services, made up of thirty sites.
Keywords: design method, workflow in the public administration, Internet sites, e-government

1. Introduction

The design of Internet sites is usually based on the concept of HTML pages, which are assembled by links. The relations between pages map more or less to a global and conceptual view of information and services. This conceptual view is only in the designers' minds, since site design tools only include links between pages without any representation of the nature of information and of services. Such tools offer a low level of abstraction.

Moreover, they do not enforce a customer-oriented structure. For instance, many administrative web sites are centered on the administration's organizational chart. In such sites, for example, a citizen has to know or find that the deliverance of passport depends on a particular office which is more or less hidden in the organization. There are also too few sites that are centered around the citizen needs, for instance, http://www.help.gv.at/. This site's menu is centered on people life events, for instance, birth, moving, retirement, etc. These two kinds of sites have a consistent design but their principles differ a lot. Administrative web sites should be centered on the services offered irrespective of the administrative office that offers them. And there are many services, like obtaining a building permit, that depend of several offices. Although the service-centered approach can be applied to business sites, the set of services we selected is specific to the administrative web sites.

Whatever the consistency level of a site, its lifecycle inside the organization (administration or enterprise without distinction) is usually not well defined according to a methodology: everything often relies on the webmaster who has to update the site and to maintain a service level (in terms of net connections, and so on).

For administrative web sites, the two main issues are:
- at the methodological level: to enforce a consistent design centered around services relevant to the citizens and to define the web site management,
- at the tool level: to design a web site around the parameterization and integration of services.

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Although these two issues may cover any web site (with customers instead of citizens), the services to the citizens are rather specific to the government area. Among the possible services to the citizens, companies can use some of them, see section 3.

To address the two issues, we have first, defined a checklist of design issues for web sites and second, enforced the web site design around the notion of service. These two aspects constitute the core of the method, which we are still currently improving. This checklist has been experimented and tuned in public administrations. Applying the check-list elicits the services that should be offered on the web site being designed. The method steps are depicted on figure 1. The services should then be parameterized to fit the services as they are really performed. They are then integrated in a whole structure, which constitutes the web site itself.

The check-list is presented in the next section. Section 3 reviews these services. Most of them are offered in web sites of Swiss administrations. Then, we describe how these services can be integrated into a web site. Section 4 describes a pilot project in a Swiss administration. Section 5 discusses related work. The last section reviews the project status and presents the on-going issues and perspectives.

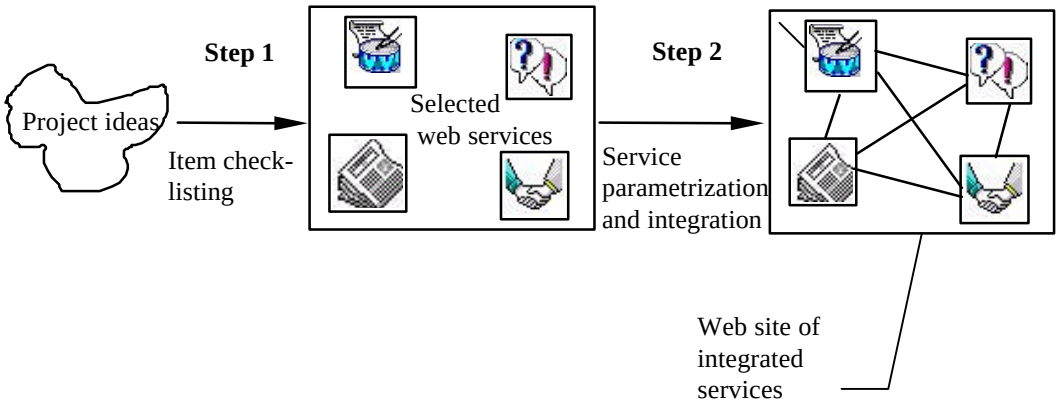

Figure 1: method overview

2 An Internet project checklist

From 1975, the Swiss Federal Administration has used the Hermes project management methodology [OFI95]. In 1986, major updates have been performed and Hermes became mandatory for information technology projects within the federal administration. Although Hermes has been a success factor in many projects, using it requires quite a heavy workload, which is not well suited to Internet site projects. Even if some Hermes phases can be “forgotten”, the management cost of applying Hermes is still high for Internet site projects. The check-list, which is described below, is more adapted to such projects. It has been designed, and experimented in the Federal Department of Economy. Numerous problems that have been encountered during experimentation have been integrated in the check-list because a questionnaire revealed that these problems are common in other public administrations [Reich99]. By using the check-list, costly project management is avoided. The aim of the check-list is not to replace Hermes but to bring attention to some new issues raised by Internet projects. The whole checklist covers the pre-project, project management and operational phases; it consists of one hundred items.

2.1. The pre-project check-list

The pre-project phase contains fifty-three items which are grouped by sections (see table 1). These items facilitate the opportunity analysis and help specify the project requirements.

Sections	Topics
management and the Internet project	mandate written by top management
site objectives	their definition and their acceptance, cost reduction, easier access to the users,…
communication strategy	target clearly identified
corporate identity	global marketing concept
information and services	information and service availability, translation into the several official languages,…
architecture and presentation of services	browsing, menus, links, images, …
other administrative standards and guidelines for Internet projects	whether they exit or not, should the central organization define them?
technology choices	people awareness
site maintenance	definition of maintenance process
project human resources	their availability, roles and people agreement

Table 1: checklist of topics for the pre-project phase

The services and information which should be offered are identified during this phase. The second part of the check-list will focus on how to manage the project, according to the design choices that have already been made.

2.2 Project management checklist

The next thirty-six items cover project management (see table 2):

Sections	Topics
technical aspects	databases, web servers, installation
schedule of conditions	deliverables
external suppliers	knowledge about the suppliers. Are they numerous enough? qualitative and quantitative criteria for selection
contract with suppliers	guaranties delays, supplier subcontractors
project tracking	information availability in digital format, tests
top management involvement	how the central organization supports the project?
deliverable testing	Internet and intranet tests
documentation	content checking and availability
job-changing	traceability
budget	planning versus fiscal periods

Table 2: checklist of topics for the project management phase

2.3 Operational check-list

The last eleven items cover the implementation and maintenance of the web site. They concern the updates, connection statistics, responsibilities, activities and process…

The pre-project checklist has provided the intended services of the future web site. These services are chosen from a library, which is presented below.

The first step of our method consists of applying the check-list. The second step starts by the parameterization of the selected services, and then their integration into the whole site structure.

3. A library of Internet services for public administrations

Our institute manages a directory of all Swiss administrative web sites[2] at the national, cantonal and municipal levels. A review all these sites highlights the current practice of information and services offered to the Swiss population. Drawing on this review them, we have designed a set

[2] http://www.gov.ch

of thirteen services which should be customized and integrated into a whole in order to implement a successful administrative web site. These services, some of which are specific to public administrations, are listed in table 3.

We are currently implementing these services as database templates in the Lotus Domino® environment. Domino is the well-known web-enabled groupware system, which provides a suitable definition of access rights to data. Database systems also provide such features, but their specification is rather static and thereby does not fit the needs of administrative workflows for which the user's access rights to information evolve all along the workflow, according to his or her roles.

Services	Function or content
 General presentation	Pages to present the site structure and the services.
 Forms[3]	Downloadable forms or forms to be filled on line and printed
 Press information, news topics	Classified by topic (e.g. press release) or by date
 Mail and email directory	Sorted list of addresses belonging to the administrative service
 Publications	A sorted list of official publications which are downloadable and possibly require electronic payment
 Acronyms (glossary)	The glossary of all the acronyms used by the administration
 Official Information	Laws, projects, elections, ...
 Links	Connection to other related sites
 FAQ	Frequently Ask Questions
 Job offers	Job offers in the administration
 Forum	Questions & answers
 Workflows	Interactive procedures based upon Workey®[4] which is a method and tool to design web based workflow applications for public administrations.
 Resource reservation	A standard workflow procedure built with Workey.

Table 3: list of administrative web services.

3.1. Service parameterization

Each service is accessible through its interface. The service interface defines a set of entry points to access the service. For instance, the interface of the job offer service contains the entry points, which are listed below:

- Job posting,
- Job removing,
- Job offer list sorted by :
  - Date of posting,
  - Topic,
  - Level,
  - Classification, and so on.

Moreover, for each service entry point, an access right should be defined (no access, reader, author, editor). For instance, the access right to job posting is reader for the citizens

[3] The forms service is typically relevant to public administration, although some enterprises may use them.

[4] Workey is a registered trademark of C-Log S.A., which was also the industrial partner in an other project, on workflow, which ends last year [Chap97,98,99].

and author for the administration employees who have the responsibility to post job offers. The service does not enable to apply on-line for a job since many paper documents are still required to do it.

3.2. The service integration

The service integration consists of defining a graph whose nodes contain one or several entry points to parameterized services. This graph is the web site structure. A node of this graph is the set of tuples *(service, entry point, access right, responsibility)* and/or a service itself. The node service entry points are filtered according to the responsibilities of the user who reads / writes the node. The users' roles thus determine what access to information they have and when. Current HTML practice consists of using HTML frames to share a common navigation structure between all the pages of a site. A page's content is then split into a navigation menu and the information or service. We follow this practice for the user interface to the designed web site.

The next section describes a running pilot project, which illustrates our approach.

4. A pilot project

Our aim in this pilot project is to improve and validate our service-oriented administrative web site design method. The project involves the Employment Agency (EA) of the Canton of Vaud in Switzerland. Among its activities, the EA supports the unemployment of people with social difficulties. Our check-list helped to focus on a small area of services for which a web site can be built in the context of a pilot project. Among the reintegration measures, unemployed people may follow some courses and get a temporary job, which is subsidized by the Swiss Confederation, known as TSJ. These jobs are not ordinary ones; their main aim is to put back people in saddle. Only organizations recognized by EA may propose such jobs. Up to now, about fifteen such organizations have been agreed. Moreover, each temporary subsidized job (TSJ) offer should also be agreed by the EA.

With the help of our check-list, two generic procedures of the workflow service, namely the *document submission* and *request for proposal*, have been selected from the library of services. These two generic services must then be parameterized and integrated into a web site.

The parameterization of services is twofold. A service is a set of generic functions and a set of ways to access or apply these functions. These entry points are also generic, they can be enabled /disabled according to the web site design. Sections 4.1 and 4.2 describe two generic workflow services and the way they are instantiated. Section 4.3 presents these generic accesses to the functions of the workflow service, namely its generic entry points. The integration of the services consists of assembling the selected parameterized entry points into frames which are similar to the HTML frames. Section 4.4 describes this integration for our application.

4.1 The parameterization of the document submission service

The workflow diagram (see fig. 2) displays the flow of agreement of a TSJ by the EA[5]. A TSJ offer may be refused or sent back to the supplier in order to be corrected. If accepted, the offer

[5] The diagrams and screen copies have been extracted from the pilot project documents and web site. Our approach based upon generic services enables an easy translation of all documents and of the prototype itself. People uses the French version of the prototype, since the Canton of Vaud belongs to the French-speaking area of Switzerland

is then registered into a national database (PLASTA) in order to be subsidized. This workflow diagram is derived from a generic workflow, which is known as *document submission*[6]. Its parameterization requires to:

- instantiate a generic document by TSJ[7],
- define the number of revision cycles which are allowed for a TSJ,
- define under which conditions the TSJ can be left apart for a lapse.

Once registered, the TSJ is available to all the thirteen placement agencies of the Canton of Vaud. These agencies are administrative offices, known as "Offices Régionaux de Placement" (ORP). An ORP makes a reservation for a TSJ for unemployed people of its geographical area (see fig. 3). Then the next responsibility is to select, among the existing reservations, those people who best match the selection criteria. These criteria, which are defined by the SDE, aim to select the unemployed people, who will gain more experience and will learn a lot from the TSJ. A TSJ has usually several positions, and the organization which is responsible of it, may allow a maximum number of reservations for these positions.

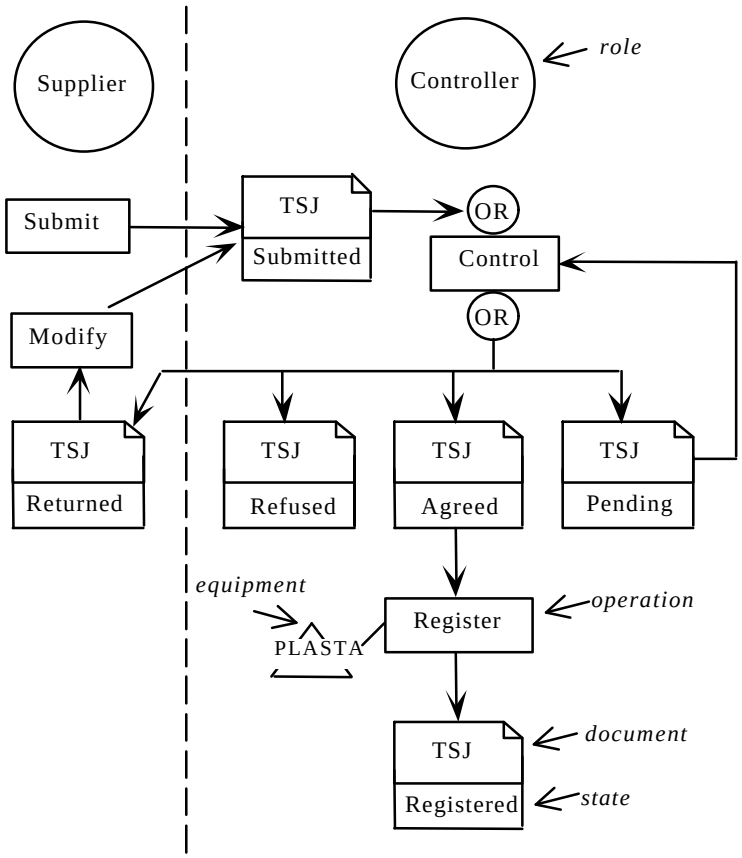

Fig. 2: The TSJ submission workflow

This pilot project is an extranet which offers online services which were not available beforehand. Only a closed set of official and agreed organizations can access this extranet, which is therefore not open to the Swiss population. Before this project, work relied on a twice yearly updated directory which contained all the registered TSJ. This directory was sent to all the ORP. Final reservations relied on phone calls. It was difficult to know if a TSJ was still available because nobody is interested, or because the person who benefits from the TSJ left

[6] The generic workflows and their parameterization are designed with Workey [Chap97,98,99].

[7] The generic workflow contain the word *document* instead of TSJ, some states have also been renamed to better fit our case. All these operations belong to the transformation of a generic service to a dedicated one.

because he or she found a job in the free market. Thus, the pilot web site offers a true service to the unemployed citizens with a better quality of service and a significant reduction of cost.

4.2. The parameterization of request for proposal service

The request for proposal service (RFP) is a generic workflow whose parameterization requires to:

- instantiate request for proposal and proposal (the two generic documents of this workflow). They are instantiated respectively in our case, by TSJ and Reservation.
- define the number of reservations which can be made from a TSJ.
- define under which conditions the reservations of a TSJ can be suspended for a lapse.

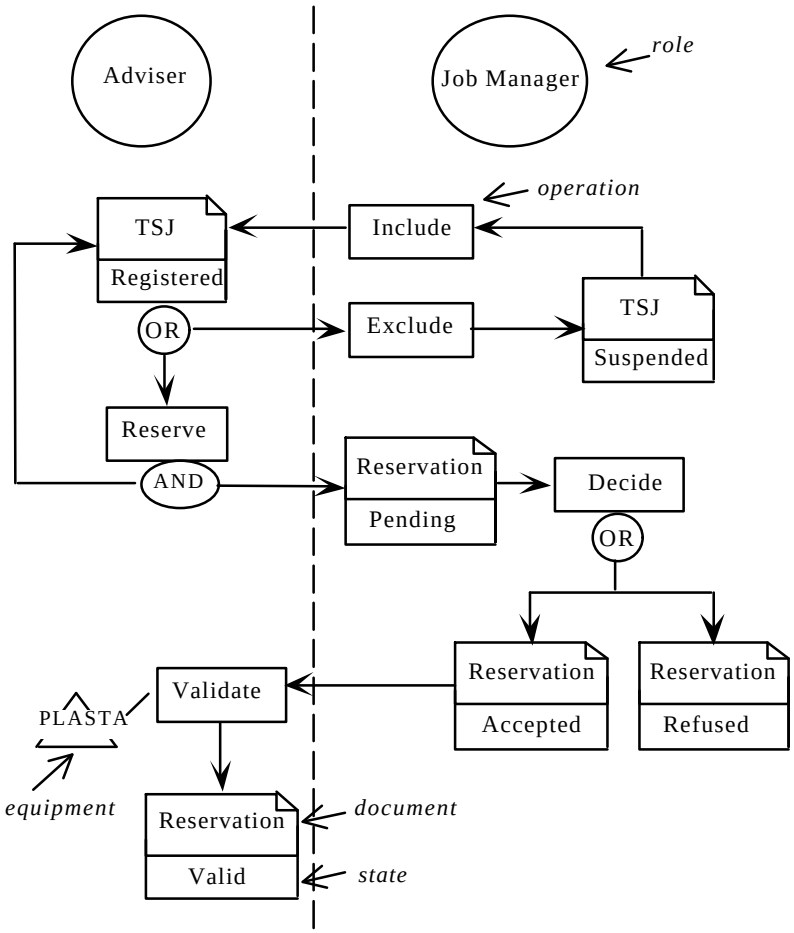

Fig. 3: The TSJ reservation workflow

4.3 The entry points of the two generic workflows

All the workflow services contain the following generic entry points:

- *new workflow document (request in the request for proposal service)*: its aim is to initiate a workflow by enabling the first operation of the flow for people who carry out the ad-hoc role.
- *to-do lists*: sorted by current state, or by pending operation, these lists present to roles the documents for which they have an operation to perform.
- *draft list*: it contains workflow documents which are not yet inserted in the flow.

These entry points are necessarily used in the customization of a service. Moreover using some of them may be allowed for a restricted class of responsibilities. For instance, the

"new workflow document" entry point is available for the *Supplier* role only. The other entry points display documents lists. The documents that a list displays depends of the roles carried out by the user who reads the list. For instance, to-do lists for *Advisers* contain all the documents which are in the *Registered* state. All the documents are not displayed in the to-do lists of *Jobs Managers* which only contain all the TSJ documents which are in *Registered* and *Suspended* states and all the *Reservation* documents which are in *Pending* state.
How the documents will be displayed in the list (columns, their content and their appearance) can also be parameterized.

4.4 The parameterization of entry points to customized services

The responsibilities or roles are dispatched as follows (see fig. 4):

- recognized organizations carry out the role of *Supplier* and of *Job Manager*. They propose TSJs and select the best reservations according to the EA criteria.
- the EA controls the TSJ proposals and register them into the PLASTA database, if agreed. This responsibility is performed by the *Controller* role on figure 1.
- the placement agencies (ORPs) carry out the role of *Adviser* on figure 2.

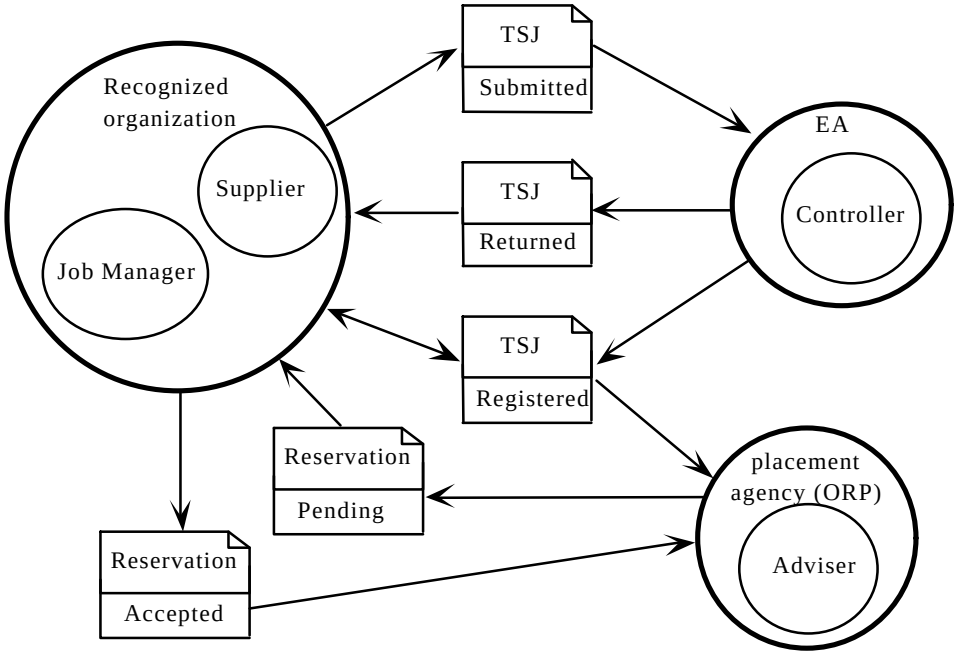

Fig. 4: documents exchanged between roles

There are thus three ways to access the web site according to the role partition. Each way defines an interface dedicated to a user type. Each interface maps a navigation bar. The navigation bar is thus different for each type of users. A type of users is defined by the set of roles he or she has to carry out.

The navigation bar for the recognized organizations is described below (see also fig. 5). Each item is described as a tuple expression as explained in section 3.2.

- *TSJ/New*: (TSJ submission, new workflow document, author, *Supplier*)
- *TSJ/Drafts*:(TSJ submission, draft list, reader, *Supplier*)
- *TSJ/Returned*: (TSJ submission, to-do list filtered to only display TSJs in *Returned* state, reader, *Supplier*).
- *TSJ/Pending* (TSJ submission, to-do list filtered to only display TSJs in *Submitted* and *Pending* states, reader, *Supplier*). This entry point displays the TSJ list for which the EA has not yet taken a decision.

- *TSJ/Agreed* (TSJ submission, to-do list filtered to only display TSJs in *Agreed* or *Registered* state, reader, *Supplier*). The purpose of this list is to display to an organization, its agreed TSJs.
- *Reservations/Pending* (TSJ reservation, to-do list filtered to only display TSJs which at least one *Pending Reservation*, author, *Job Manager*).
- *Reservations/All* (TSJ reservation, to-do list filtered to only display all the *Reservations*, author, *Job Manager*).
- *Full TSJ*: (TSJ reservation, to-do list filtered to only display TSJs which are filled and the relevant *Accepted Reservations*, author, *Job Manager*).

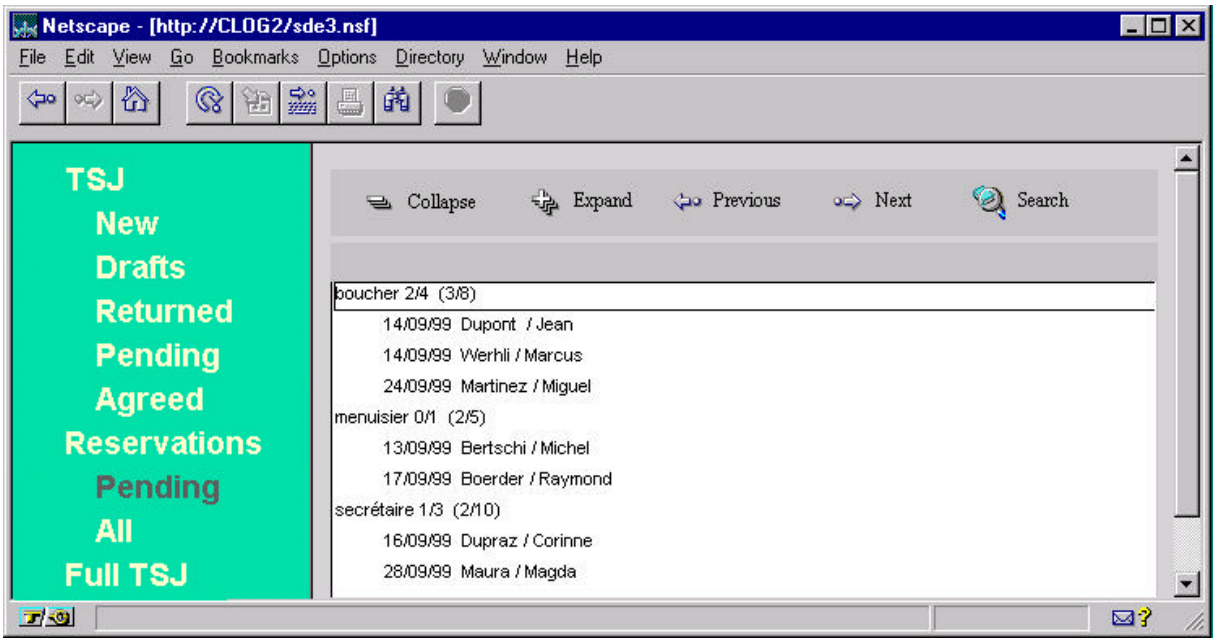

Figure 5: Screen copy of organization's navigation bar and "Pending Reservations" service accessed

From an engineering point of view, the navigation bar will be implemented as an outline in Domino Notes 5. An action is associated to each outline entry. This action is the implementation of the parameterized entry point. The outlines will be built from a specification written in the case-tool. The specification language is not yet completely formalized. One aim of this pilot project is to circumscribe all the requirements of service tuning.

Up to now, we have presented a subpart of the whole site. The whole site structure is a graph whose nodes contain the entry points to other selected services. This structure defines the conceptual view of the web site. The graph nodes represent the pages of the web site.

For this pilot project, each node, which is related to the parameterized request for proposal, has two components. These components are implemented as a frameset in HTML. One component contains the navigation bars which are included in the left frame. Only one navigation bar is displayed in this left frame (the responsibilities of the authenticated user determine which one is displayed). The other component (included in the right frame) contains a service entry point which has been selected from the left frame. Figure 4 displays a screen copy of the web site as an agreed organization can see it. The left frame contains the navigation bar which is common to all organizations. The right frame displays the pending reservations of the organizations TSJs. All the nodes of the web site share this common structure.

4.5 Project status

The prototype is fully implemented. For this paper, the parameterization and integration of generic services have been translated into English whereas the prototype which is used is in French. The prototype translation was performed without too much extra work since our approach is based upon the notion of generic services. The Employment Agency has validated the prototype and uses it to require the further development for online services.

5. Related work

Check-lists to help design of web sites usually focus on the usability of the site, for instance http://webreview.com/pub/1999/10/15/usability/index.html. Our check-list is more centered on project management. Moreover, its underlying principles (around the notion of services) force the designers to focus on the users needs. Other design methodologies are briefly discussed below.

The Araneus web design methodology is conceived to organize and maintain large amounts of data in a web hypertext [Atze98]. This methodology uses a database conceptual schema as the basis for the hypertext design. The hypertext design adds, among other concepts, navigation links which extend the semantics links from the database schema. The aim of this work is to provide web accesses to data-intensive applications, whereas ours is to design a site as a set of services.

The Strudel system supports declarative specification of a web site's content and structure and automatically generates a browsable site from the specification [Fern98]. The visual representation of the site's page is separated from the web data and structure, as in Lotus Domino Release 5. Moreover this approach focuses on managing semi-structured data because web sites are graphs with irregular structure and non–traditional schema.

Our approach is different from both the conceptual and implementation points of view. Our approach is service-centered: we design a web site for a public administration by selecting, customizing and integrating services which are relevant to the administration. The originality of our work relies on this service-centered approach. A related approach is GovWorks.com [Gov99a]. This company plans to offer transactional services to local governments. Among the 11 services they will supply, GovPay and GovPages are in beta-test in several US cities [Gov99b]. GovPay facilitates payments between citizens and business governments. GovPages is an informational application which provides contact information for governments agencies. The service set of GovWorks.com is different from ours. Ours came from a study of all Swiss administrative web sites. It seems that some services are common to several countries, whereas other are more local and depend of local practices.

6. Conclusion and perspectives

Our prototype is fully implemented. Lessons learned include a better understanding of the parameterization requirements of online administrative services. Moreover, the service-centered approach is strengthened by its closeness to the users' daily work. The specification of parameters is more centered on the specific work procedures than other approaches discussed in section 5. Our prototype will help to define the next generation of a national system to manage the TSJs for the twenty-six Swiss Cantons.

Our current work is to define the specification language to parameter the services and to implement a CASE-tool supporting our approach. Such a case tool will be based upon linked nodes whose content is services entry points.

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