THE DEVELOPMENT AND INTEGRATION OF A PROJECT MANAGEMENT BUSINESS PROCESS INTO A WEB/DATABASE SYSTEM

by
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This project developed a web database system for requesting projects within the Project Management Office (PMO) of a major company within the RTP area.

The main objectives of the project were to develop a formal business process for requesting a project within the PMO, to decide upon a methodology for collecting and documenting request information and incorporating it into the business process, and to develop a web site that would describe and advertise the PMO as well as automate the business process as much as possible through the use of a web database system.

Once developed and implemented, the system will be used as the primary vehicle to request and document projects within the PMO.

Headings:

Database – Management – Systems

Information – System – Design

TABLE OF CONTENTS

INTRODUCTION

This thesis project was developed in the Spring of 1999 during an internship at a large company located in RTP. The assignment of this internship was with the newly developed Project Management Office (PMO) located within the Infrastructure and Information Management Division of the company.

The objectives of this thesis project were threefold:

1) To develop a formal business process for requesting a project (request) within the PMO.
2) To decide upon a methodology for collecting and documenting request information and incorporating it into the business process.
3) To develop a website that would describe and advertise the PMO as well as automate the business process as much as possible through the use of a web database system.

The methodology that was decided upon for the business process is actually used as a template for the first section of this paper, "Description of Project". It demonstrates the type of information that is collected for each request. An outline and a description of each key component used in this methodology can be found in Appendix A.

This thesis project revolves primarily around project management. Therefore, brief definitions of a project, of project management and an explanation of the importance of supporting project management within a company are in order. The

following definition is taken from the "Project Management Memory Jogger Pocket Guide[1]", an excellent handbook for the project manager:

> " a project is any temporary, organized effort that creates a unique product, service, process, or plan. It can be as simple as the plan for an offsite retreat or as complex as the construction of a medical center, with a team size ranging from a few people to hundreds or even thousands who are working in one location or across continents. Project management supplies project teams with the process that helps them coordinate their efforts so they may create the right product (or service, process or plan), at the right time, for the right customer, within the resource limits established by the organization." (pg. 1)

As far as importance to the company --"these advantages may be better illustrated by listing the pitfalls of NOT USING project management

- Excessive work load for some individuals
- Cost overruns
- Team members lack the right skills or expertise for the project
- Staffing conflicts with other projects or assignments
- Scope of the project keeps changing
- Work is redone or duplicated
- Resources are insufficient
- Deadlines are missed [1]" (pg. 4)

Each of these "pitfalls" is addressed in the business process and the corresponding forms that were developed, as will become evident through the course of this project description.

Description of Project

Background

Currently, the division does not have a central office that handles project management. Project management is handled individually by each of the departments and usually by the department's own project managers. For example, the finance

[1] Project Management Memory Jogger, Martin, Paula and Tate, Karen; 1997 GOAL/QPC

department would use its project managers to handle projects for the finance department while engineering has its own project managers to handle projects within its department. This has caused some difficulties, including the lack of a single standard methodology, the lack of consolidation of project information to be used in reporting and tracking, prioritization problems, and resource allocation problems.

Currently there is no one methodology being used. Instead, projects are managed in an ad-hoc fashion. While many large projects have been completed with success, this has, nonetheless, led to inconsistencies in project documentation. One project manager may spend time collecting and documenting a project request, while another may spend resources on actually working on the project request at hand and not completing all of the documentation.

Terminology is inconsistent within the division and across all company Information Service (IS) groups as well. A process, a service, or an item may be called different things by different departments or even by different project managers within a department. Several current business drivers such as the need to share information globally, the growing use of global applications, and the need to handle information electronically, have underscored the impact of this problem.

Because project request data is collected in an ad-hoc fashion and because of the lack of a central location for this data, consistent reporting and tracking of projects and project requests have been very difficult to maintain. This has caused problems with prioritization and resource allocation. It is very difficult to prioritize new project requests or to change the priority of existing projects without readily available project reports and project status.

Resource allocation can also be improved with project documentation and reports as well. If a project request called for skills that a particular project manager or staff member possessed, then that project manager or staff person could be assigned to the project. Also, experiences learned from one project or by a project manager could be transferred on to other projects and project managers, thus project management would become a way of collecting and transferring corporate knowledge.

In conjunction with the need to develop a standard business process and methodology, another area of need is the development of a website. This website will achieve three goals: 1) describe and advertise the PMO, 2) incorporate a web-based database system for the request process, and 3) incorporate the business process within the web system enforcing that the required documentation is obtained and stored. The system will also ensure the necessary approvals are obtained.

With this information, the following formal statement of need was established.

Problem Statement/Need

The project need is threefold:

1) To develop a formal business process for requesting a project (request) within the PMO.
2) To decide upon a methodology for collecting and documenting request information and incorporating it into the business process.
3) To develop a web site that will describe and advertise the PMO as well as automate the business process as much a possible through the use of a web database system.

First, there is a need to develop a business process to obtain project requests from employees. Second, it should define a standard methodology which every request will follow, including the information that will be obtained, the approval process that will be followed, and any business rules that need to be defined. This business process would define a formal beginning to the request process as well as the stages of approval. Third, a web-based database system should be built to incorporate and automate as much of the process as possible. The system should enforce all of the methodological components established above. It should include:

- an entry point to disseminate general information about the PMO.
- a link to the online request form
- a link to the paper based project request form
- instructions on the use of the PMO request process
- means to track the progress of the project request, and
- means to view the overall information of a project request and who the project managers and sponsors are.

It is mandatory that the site be as intuitive and as easy to use as possible.

Assumptions

It is assumed that the software to produce a web-based system will be made available or purchased for use. This includes Microsoft Access for the development of the database and Microsoft Visual Interdev for the development of the web pages. Access and space to the corporate Intranet web server must be made available once the system has been developed and tested. Development and testing will take place on a local

computer. Access to PMO staff, IS senior management and potential users of the system are also necessary for interviews and data collection.

Scope

The scope of this project will include developing a business process for requesting projects within the PMO. This project will then focus on incorporating this business process into a web-based database system. This project will also develop a general informational web site that will include the web-based database system as well as general information about the PMO.

Resources

This project will take approximately 200 staff hours. This time will be spent in developing the business process and writing the scripts for the web pages which automate this process. Staff used for this project will be one part time intern. Other resources include access to or the purchase of Microsoft Access, Microsoft Visual Interdev, space on the corporate Intranet web server, and a desktop computer to do system development and testing. Cost for this project is limited to the wages of the intern and the purchase of Visual Interdev. Approximately 20 hours of staff time from the project managers should be calculated for interviews and process reviews. Staff resources for continued maintenance will need to be calculated unless this is delegated to the Web Design Center after the system is installed.

Critical Success Factors

This project needs upper management support. Upper management should require that this method be used with all project management requests and should encourage the use of the process through their active participation as well.

The project managers and sponsors of the projects must take ownership of the business process. One of the goals of this project is to provide a consistent methodology in project request data collection. This can only occur if the project managers and sponsors use this system exclusively as their method of collecting request information. By doing so, all request information is collected in a standard way, stored in a common location, and can be reported on consistently.

The web-based system must be easy to use and as automated as possible. The general audience will not use it if it is considered to be more difficult than the paper-based process currently in place.

The final critical factor is that of training. General education on the services offered by the PMO and training on the use of the new request system must be made available to the employees of the company.

Constraints

Several constraints must be considered in the development, testing and implementation of this project.

Concerning the website: The company web administrators only allow static web pages on both the main development web server and the main corporate web server. Therefore, the dynamic pages will have to be developed and tested on a local machine.

Once development is complete, the pages will have to be housed on a different server, possibly an application server, to comply with the company's current policy.

The web server used by the company is Microsoft IIS. Since the Web Design Center only supports Microsoft web development products, the web site will be developed using MS FrontPage/Visual Interdev and the scripting will be written in Visual Basic using Active Server Pages.

Concerning the database: A future plan is to move data for all approved projects to the IS activities and resources management database. This Oracle database tracks all activities and resource utilization within most of IS within the United States. Moving the data collected in the request process will save data entry duplication efforts. To assure that porting of the data between the Access database and the Oracle database is as easy a process as possible, the data fields and table structure in the Access database should match those of the Oracle database where applicable. This includes assuring the table names, field names and data types are the same between the two databases.

Decision- Makers/Stakeholders

The primary decision-maker for this project is the senior manager for the PMO. She has decision-making power for all areas of the project including design, development and the budget.

There are several stakeholders involved with this project. Since these stakeholders will play a part in the development or maintenance of the project, it is important to get their buy-in and support early in the process.

One stakeholder is the Web Development Center. It has guidelines that must be followed when publishing pages on the corporate Intranet. The staff there will also

provide web server space and can provide technical assistance with web design. They may also take on website maintenance once the installation is complete.

Other stakeholders include the PMO staff. They will be the people who work with the process on a daily basis. Their input should be taken into account and be weighed heavily in the design process. The project sponsors and IS Infrastructure vice presidents will also use the system. Their input on the approval process in particular should be seriously considered.

The educational unit staff of the corporation should be involved as well, as they will provide the main training on the process and provide general education about the PMO to the company.

The final stakeholders are the employees of the company. They will be the users of the web request form. Design elements should be tested with users to obtain input for ease of use and the completeness and helpfulness of the instructions.

Deliverables

This project will produce two deliverables: the business process for requesting and approving project requests and a website.

A detailed document describing the business process for requesting and approving a project through the PMO will be completed. The document will contain a flowchart describing the process as well as a written description of the process.

In addition, a website containing general information about the PMO will be completed. This web site will include web-based forms for project requests and well as the back end database for storing this information. The website will contain the functionality to access information about projects in the database, update information via

the web, and conduct the approval process via the web. Project managers will also have the ability to see a list of all project requests and their status via the web.

Timeline

Microsoft Project 98 software was used to produce a project timeline and describe the interdependencies of the tasks. A copy of the Gantt chart produced can be found in Appendix B.

Analysis

Process Description

Several steps were taken in completing this process. They can be divided into three main areas: data collection, project definition, and system design. While it was easy to divide these steps up for the purposes of this paper, in practice, the lines between these categories were not so cut and dried. Many times activities in each category occurred simultaneously or information obtained in one area caused additional work to be done in another. But overall, they did follow this general order.

Data Collection

The first step was to conduct an interview with the PMO senior manager to get an overall view of what was needed, what available documents should be reviewed, who the key players were, and who should be interviewed. This provided the necessary information to get an understanding of the current system in place and to better understand the current needs of the PMO.

After this interview, all available documentation on the PMO and all available information on the current process were obtained. This documentation included a Business Plan, a Mission Statement, and this year's goals and objectives. It also included the current paper-based form used for project requests and a flowchart of the current approval process.

Because development of a methodology was part of this project's scope, several manuals were obtained and reviewed. These included materials from project management workshops and manuals from other department project management offices outside of IS such as engineering.

All of the information was read and a general understanding of the current process as well as the desired process was established. Another meeting was conducted with the senior manager and one of the project managers. The purpose of this meeting was to review what I had read and to describe, in my own words, my understanding of the current and desired process. After the requirements were thoroughly discussed and understood, a flowchart of the process was developed.

Project Definition

Once this preliminary flowchart was developed, interviews with each of the project managers were scheduled. In the interviews, a series of questions were asked about the flowchart, as well as questions about the managers' personal style of project management. The flowchart was reviewed and modified. For example, it was decided that the term "approval" should be changed to "endorsement" in some situations to prevent the appearance that excessive approvals were needed. Questions that had not been previously considered were brought up and addressed in this process. One

particular question answered was “Would the approval process be the same for all projects, large or small?” The issue here was whether it would (or should) take two weeks to approve a half-day project. While there was no simple solution, it was decided that in order to foster consistency, all projects would go through the same process. An attempt by the PMO would be made to address small projects as quickly as possible. Another design issue that was incorporated was a step that allowed the PMO to request additional information at the PMO approval stage of the process. This can be seen in step 5 of Figure 1. This prevented having to kill a project request because of missing or inaccurate information.

Other points of concern obtained from the interviews with the project managers included assuring that the customer (requester) entered information accurately the first time. The inclusion of good instructions and client-side validation would help address this concern. This would prevent having to ask for additional information once a request was submitted, thus speeding up the approval process.

It was also suggested that, in all cases, the requester and the requester’s manager be notified any time a project request was denied, and informed of the reasons for the denial.

Over about a two-week period of time, a finalized flowchart of a process was established. The flowchart was reviewed in a general staff meeting. It contained the combination of all of the input from the project managers. Minor changes were made and an approval of the process was obtained. Once approval of the business process was obtained the logical model of the web-database was developed. This included a storyboard of the website, an Entity-Relationship (ER) diagram of the database and a

high level description of the scripting needed for the various web pages. Each of these will be described in detail in the logical model section below.

Logical Model

The following is a description of the Project Request Process that was approved by the senior manager of the PMO. It describes in detail the flowchart in Figure 1. The different steps of the process represented in the flowchart are numbered for ease of discussion.

The first stage of the process begins when the requester completes the web-based request form. This form is accessed through the PMO website. Any employee within the company may request a project.

On completing this form, it is sent to the manager for his/her endorsement. If the manager endorses the project request it is logged into the database and sent to the Project Management Office (PMO) for review.

If the manager denies the project request, the requester is notified by the manager and is given the reasons why the request was denied. At this point the project request dies.

Once the request has been completed and endorsed by the manager, it is reviewed by the PMO. The PMO evaluates the request in terms of its feasibility from a technology and resource perspective. Three decisions can be reached at this point:

1. The project is feasible and the PMO approves that the request continues through the process.
2. Additional information is needed to make the approval decision. This can include the need for a more detailed description of the project, more

justification as to why the project is needed, examples of why current technology or current processes are not meeting the need. If the PMO sees errors or miscalculations in the budget or timeframe, then he/she may ask the requester to update this information. In either case, the form is sent back to the requester for the needed information. The manager is also notified of this. Once the form is updated, it is sent to the manager for his/her endorsement. The manager may again endorse or deny the modified project request. If it is denied, the manager notifies the requester. If he/she approves it, it is forwarded on to the PMO for re-evaluation. Again, the PMO can approve the request, deny it, or request additional information. There is no defined limit on the number of times this cycle may occur, although those most familiar with the process anticipate that the cycle would occur only once. The chances of it occurring more than twice would be extremely small.

3. The third possibility is that the PMO determines that the project request is not feasible and the project request is denied. If this is the case, the PMO notifies the requester and the manager as to the reasons why the request was denied.

If the project request is approved by the PMO, it moves to the next step (4a) of the process, to obtain a sponsor and a PMO representative. The sponsor is a director who will take ownership of the project.

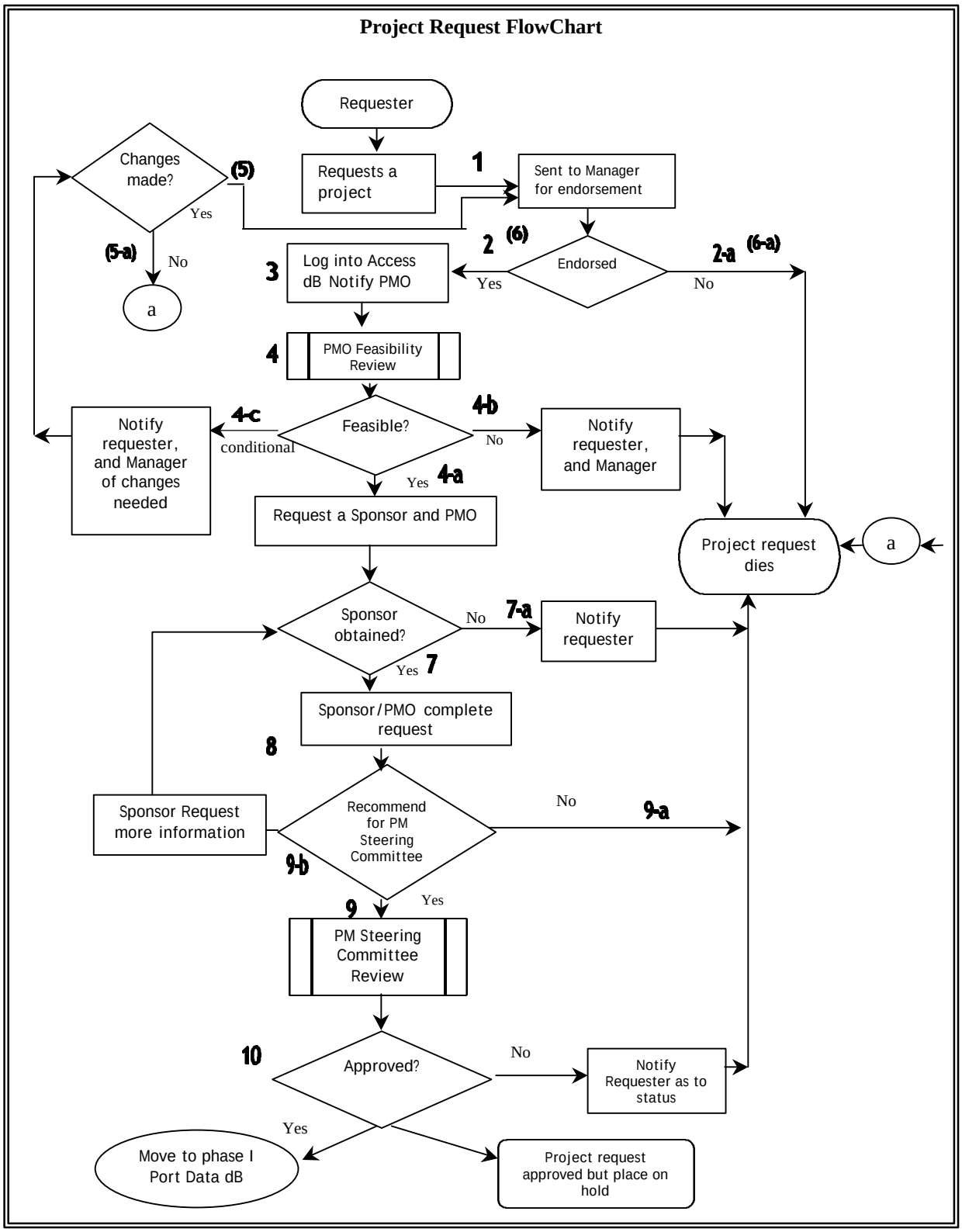
Project Request FlowChart
Requester
Requests a project
1
Sent to Manager for endorsement
Changes made?
(5)
Yes
(5-a)
No
a
2
(6)
Endorsed
Yes
No
2-a
(6-a)
3
Log into Access dB Notify PMO
4
PMO Feasibility Review
Feasible?
4-b
No
Notify requester, and Manager
4-c
conditional
Notify requester, and Manager of changes needed
Yes
4-a
Request a Sponsor and PMO
Project request dies
a
Sponsor obtained?
No
7-a
Notify requester
Yes
7
Sponsor/PMO complete request
8
Sponsor Request more information
Recommend for PM Steering Committee
No
9-a
9-b
Yes
9
PM Steering Committee Review
10
Approved?
No
Notify Requester as to status
Yes
Move to phase I Port Data dB
Project request approved but place on hold

Figure 1

The PMO representative will be the PMO staff person who is responsible for ensuring that the remainder of the information for the project request is collected and entered into the system for the final approval process. If no sponsor is obtained, the project request dies. The requester and the manager will be notified that no sponsor could be obtained and that the project died.

Once a sponsor and PMO representative are obtained, the PMO and the sponsor work to complete the remainder of the request form (step 7). This includes developing a more detailed analysis of the resources needed to complete the request, the anticipated cost, and a timeline for completion.

They would also investigate any alternative methods for satisfying the need of request. Once all the information is collected, the PMO representative and sponsor decide whether to 1) seek approval from the PM Steering Committee, 2) get more information, or 3) kill the request. If more information is required, the PMO representative assists the sponsor in obtaining the needed information. If the project dies, the requester and manager are notified as to the reasons why the project request died. If the project request is completed and approved for the PM Steering Committee, the complete form, with all relevant information is sent to the PM Steering Committee for final approval.

The PM Steering Committee review is the final step in the project request process. The PM Steering Committee is made up of the division vice president and his/her representatives. They can approve the project request, at which point it becomes a "project" and development and implementation can begin. They can deny the request, at

which point the requester and manager are notified of the decision; or they can approve the project but place its implementation on hold.

Once the project has final approval from the PM Steering Committee, the data from the Microsoft Access database is ported into the company project management database.

The next logical model design element, shown in Table 1, is the high level scripting model of what will be needed to provide the automated functionality of the business process within the web database system. It also cross-references the flowchart (by process element number).

	Task	Script	DB	Status of Request	Comments
1	The form is filled out by the requester.	On submit – A new web page is compiled with the information from the requester's form plus fields for the manager's endorsement or denial. This page is stored and the URL to the page is sent via email to manager.	None	n/a	**Care should be taken to assure the manager's email is entered correctly on the requester's form as this will stop the request process.
2	Manager endorses by checking "endorsement button"	On submit, the form is sent to PMO database with all of the requester's information and the manager's endorsement.	None	n/a	Because it is the manager who sends it on to PMO, is this sufficient for approval.
2-a	Manager does not endorse request by checking "denied" button.	On submit an email is sent to requester of the denial.	None	n/a	PMO only begins tracking request after manager approves.
3	Data is stored in database	Store data in Access DB. A unique ID is assigned to the record. Email with a URL and the name and id of the project request is sent to the PMO notifying them of the need to review a new request. Status of request is set to "Project Requested" and date of this status is inserted.	insert	Project requested	A unique id is applied to the record. A web page with a list of projects that need to be reviewed will be created. This is the URL that gets sent to the PMO.
4	PMO reviews form by choosing project name and action from the list/action web page sent to them via email	A web page is created with the information previously completed by requester and manager. PMO reviewed, denied, additional information requested status buttons and a recommendation of needed information text box are added to the original form.			A Web page with a list of projects and a list of actions will be created. This page is named the List/Action page. The URL for this page is what will be sent to the PMO. By choosing a project and an action, a web page with the appropriate information will be generated.

	Task	Script	DB	Status of Request	Comments
4-a	PMO approves by checking the approval button	On submit, status is set to "PMO reviewed" in the database along with the date of the status change. A Project Manager (PM) is assigned to the project. An email is sent to this PM with the project name and URL to the list/action web page.	Update to status	PMO reviewed	
4-b	PMO does not approve project	On submit the status in DB is changed to "PMO denied" along with the date of the status change. An email as to the reason of the denial of the request is sent to the manager and the requester.	Update to status	PMO denied	
4-c	PMO makes a request for additional information to the requester.	On submit, the recommendation/comments are stored in the DB— A URL to a web page that has the original form data is sent via email to the employee and manager with a description of what is needed. Status is set to "update requested" in database along with the date of the status change.		update requested	May need to do something with the data in the database while waiting for the updated info?
5	Requester Updates Form	A form is created with the original information in the form fields with the comments of needed changes After making necessary changes, on submit, a new web page with the requested changes is compiled, plus fields for the manager's endorsement or denial. This page is stored and the URL to the page is sent via email to manager.	None	Changes requested	The following steps are identical to step 2, 2-a and 2-b with the exception of the status field. A web page needs to be created that will pull the original data from the DB and insert these values into the original form so that they may be edited.
5-a	Requester does not update form		None	Changes requested	Periodically the DB will need to be checked for those requests whose status remains as "update requested"
6(2)	Manager endorses by checking approval button	On submit, the form is sent to PMO database with all requester's information and the manager's endorsement. An email is sent to PMO stating that changes have been made and review is needed. Status of request is changed to "Changes Received" along with the date of the status change.	Update to all fields	Changes received	From here, the process is the same as step 4. The PMO can approve, deny or request more changes.
6-a (2-a)	Manager does not endorse by checking "denied" button.	On submit an email is sent to requester of the denial. Denial is sent to DB and the status is set to "Manager Denied" Along with the date of the status change. Project dies.	Update to status	Manager denied	
6-b	Manager does not respond to the second request for approval		None	Changes requested	Periodically the DB will need to be checked for those requests whose status remains as "Changes Requested"

	Task	Script	DB	Status of Request	Comments
7	Sponsor is obtained	The PMO review form (from step 4) is obtained, the sponsor info is added. On submit the data is added to the DB. An email is sent to the sponsor with a URL to the list/action web page to obtain request form data.	Insert to sponsor field	PMO Reviewed	This step can occur in conjunction with step 4.
7-a	No sponsor is obtained	The PMO review form (from step 4) is obtained. The status is changed to "PMO Denied" along with the date of the status change. On submit, an email is sent to requester and manager with a reason as to why project request was terminated	Update to status	PMO Denied	The reason given would be "No sponsor was obtained"
8	PMO and sponsor review and complete remaining request information	A web page is created with the original data plus the remainder of the form info to be completed. On submit, the remainder of the data is stored in the DB	Insert into new data fields on form	Sponsor Review	The PMO will have received an email with the URL of the web page that will create the form for this process.
9	PMO/Sponsor recommends project for Steering Committee review	The form created in step 8 is obtained, the "Recommended to Steering Committee" button is checked. Status is updated to "referred to steering Committee	Update to status	Refereed to Steering Committee	This can happen in conjunction with step 8
9-a	PMO/Sponsor terminates project	The form created in step 8 is obtained; the "terminated" button is checked. A comment box as to why the project was terminated is added and on submit this is stored in the DB. Status is set to "request terminated" along with the date of this status change. Email is sent to requester and manager.		Sponsor terminate	
9-b	Sponsor Requests Additional information	The form from step 8 is obtained, additional information is provided	Update to DB	Sponsor Review	
10	Steering Committee reviews project request	Project request form data is obtained from URL mailed to Steering Committee. Additional buttons of approved, not approved, on hold are added to web page document. On submit status is set to one of the above and stored in the DB. Email is sent to requestor, manager, sponsor and PM as to status	Update to status	Approved Denied On-hold	

Table 1

The description of the logical model was designed in layers, each layer being more detailed than the previous. This allows the reader to "drill down" to the level of specificity that he/she chooses. A more detailed description of the scripting along with sample web pages can be found in Appendix C.

Design Development

After completing the logical model of the system, the development phase began. This included building the Access database and developing the website.

Website Design

The first step of the Web design phase was to set up a consultation meeting with the company Web Design Department to obtain information on Web publishing requirements and standards within the company. The following tools and design specifications were obtained from this meeting:

- the website was developed using Microsoft FrontPage/Interdev
- the primary browser coded to was Microsoft Internet Explorer 4.0
- the screen resolution used for development was 800 x 600 pixels

Originally, the site was done using frames, but on the advice of the Web Design Center this was changed to use FrontPage's includes pages. This gives the page the same appearance of frames, but doesn't create the bookmarking and navigational problems that framed pages seem to cause.

Because all of the information and descriptions of the new PMO have not been worked out, shell pages were created that will eventually hold the content of each area. A site map with brief descriptions of each of the pages and links can be found in Appendix D. The numerous question marks or ambiguous descriptions are the result of the undefined areas of the PMO. As the PMO becomes more defined and its purpose is more defined, these web pages will be more defined. It was requested that the structure or "shell" be created first, even if the content was not there.

Database design

The database was developed using Microsoft Access 97. Its purpose is to provide the holding area for the data collected through the web-based system. Its structure is quite simple. A detailed ER diagram and data dictionary can be seen in Appendix E.

One of the most important aspect of the database design was to ensure that the table structure, field names and data types matched that of the IS activity and resource management database. This will make the porting of data easier, since the data for approved projects will eventually be moved to this database.

The "request" table contains the elements of the request form, both from the requester and from the project manager and sponsor. This also contains the status field of the request. Many actions such as who to send email to and what Active Server Pages (ASP) to call depend on the status of the request.

One particular function that was not automated into the ASP and must be run on occasion is a query to remove records from the database when additional information is requested by the PMO, but the requester does not provide it. This essentially results in a dead record in the database with a status of "additional information requested". Assuming all records over 90 days with the status of "additional information requested" were to be deleted, the query would look like:

```
DELETE request.*, request.status, request.sdate
FROM request
WHERE (((request.status)="additional information requested") AND
((request.sdate)>Date()-90));
```

The approval table contains the records of all of the approvals at different levels of a project. It has a one-to-many relationship with the request table. It was established because the PMO wants to have a history of the approval process for each project.

The resource table contains records of resources allocated to a project. It has a one-to-many relationship with the request table. In addition to tracking resources allocated to one project, it will also be used to report resource allocation within the division as a whole.

The last table of the database is the stakeholders table, again having a one-to-many relationship with the request table. Part of the methodology is to make sure the project manager gets input from all of the stakeholders of a project. This table will hold that data.

Testing

All testing for the system was done on a local machine using Microsoft Personal Web Service, Internet Explorer and an Access database.

Testing was done to assure that 1) data was inserted appropriately into the database, 2) the correct email was sent, and 3) the status of a project was appropriately updated. The testing was done with a test set of information for 5 projects. All data had been defined and documented outside of the system to assure integrity. With each of the projects, the request form was used to input the data. Then several cases were used to test the pages at each level. For example, project 2 was not approved by the manager. Project 3 had additional information requested by the PMO. All possible conditions of a project were tested in this manner. The test scenarios can be seen in the System Test

Document in Appendix F. Other areas tested were the display of information within the browser and testing security measures to ensure that only appropriate persons could assess the web pages.

Additional testing will be conducted once the system is installed on the company Intranet. This has been scheduled to occur at the beginning of June. Additionally, user testing will be conducted to obtain any user suggestions for system improvement and also to insure the forms are easy to use.

Implementation

At the writing of this paper, the system had not been installed. Implementation will involve transferring the web pages to the company web server and scheduling training sessions through the educational division. Because of company policies, the web site will not live on the traditional company web server due to the interactive nature of the site. Websites on the Intranet web server must be static pages, therefore, this site will live on an application server within the IS division.

At this time implementation is scheduled for June 1999.

Maintenance

Maintenance of the site should be low after the initial contents of the shell pages are complete. Other than minor changes to content and fixing any broken links, the primary maintenance issues deal with the database. Delete queries to remove requests that were never completed by the requester or approved by the manager should be performed at least twice per year. Also, a procedure for moving data from approved

project requests into the IS activity and resource management database needs to be established. That procedure falls outside of the scope of this project.

Evaluation

Evaluation for success of this project will occur in 3 stages. The first evaluation will occur to determine the success of the development of the business process. This will occur in mid-April. A business process flowchart and detailed description document will be submitted to the senior manager and the PMO Steering Committee for review and approval.

The next stage of evaluation should occur in May. This will evaluate the successful development and implementation of the Web database system. It includes the completion of all web pages, the database, and the integration and automation of the business process into the system. The system will be installed on the company Intranet and system tests by the program managers and sponsors will be conducted. The evaluation will focus on functionality and fault tolerance of the system.

The final evaluation period will occur in July. This evaluation period will evaluate the usability and effectiveness of the system. The following questions will be answered during this period:

- Are the employees using the system to make requests?
- Are the sponsors and the program managers using the system?
- Are approvals being made via the system?
- And most importantly, does the system provide an easier method for requesting, approving, and reporting project requests?

Overall success of this project will yield positive responses to the questions above.

Problems/Solutions/Comments

From the start of this project, I decided to try and follow the methodology that would be adopted by the business process we developed. It became very evident to me why a standard methodology was needed. It is very easy to get lost in all of the tasks involved in completing a project, especially when you are the sole person responsible for their completion.

The biggest problem I ran into in the course of this project was not following the timeline. Looking back, I can see that if I had followed the timeline and concentrated on each task at hand instead of trying to go back and forth between tasks, my effort, or at least my anxiety level, would have been better. For instance, when working through the logical model of the business process, I continually tried to turn it into the development stage. This was a mistake. At this level of the process, the focus should be on design, not on how to implement the design.

Another problem was with scripting the pages. I had originally decided to write the web page scripts using PERL. After meeting with the Web Development Team about three weeks into the process, I discovered that they did not support PERL and that I should use ASP instead. So, much of the process of figuring out how to script in PERL during the logical model task was unnecessary.

Both of these problems underscored the importance of using the tools and methodology of project management. The methodology we adopted would have specified the constraints of the project long before scripting began, therefore preventing

the wasted effort with PERL. I learned that it really helps to spend this extra effort at the start in developing a timeline rather than working through the project haphazardly.

What became evident to me as I worked through this process was how many of the skills I learned through the courses at SILS were used throughout this project. These included skills obtained in system analysis and design, all of the database courses, communication, my networking courses, as well as the team approach model that was often used by the professors when projects were assigned. As a personal note, it was encouraging to put to use, in a practical business application, so many of the skills and so much of the information that I learned through SILS.

Afterword

At the completion of this paper another step in the business process was identified and determined to be critical in the overall process. While this step is still being defined, a brief description and explanation of its necessity is given below.

The current process tracks project requests within the IS division. The step that is missing is one that checks whether a similar project to the one being requested has already been approved and is in progress within the company. Having this step will reduce duplicative efforts within the organization. This new step would be a decision point in step 4 as shown in Figure 2.

Several additional items must be defined including the crucial definition of what constitutes “similar”. How will this process check projects across the entire company, since this system only tracks projects within the IS division? And finally, what will be

the process steps if a similar project is discovered. All of these issues are currently being investigated.

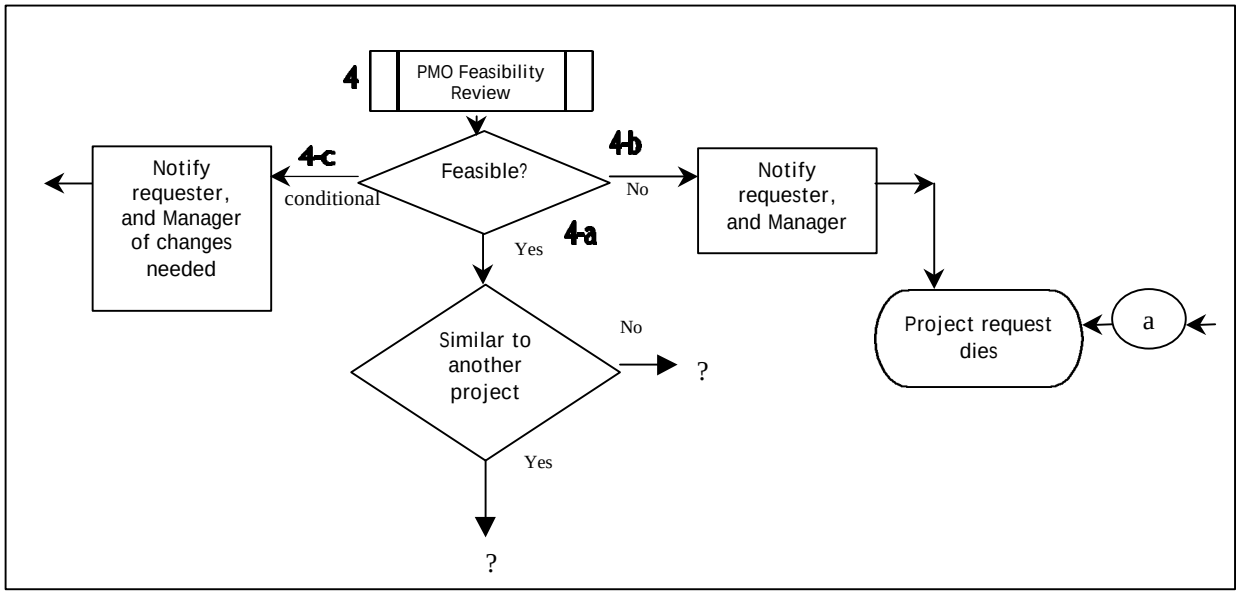

Figure 2.

Once this process step is fully evaluated and defined, it will be added to the business process.

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Appendix A Methodological Terms and Definitions

The following is a list of key components of the project request process. Each of these components is necessary to accurately plan for and complete a project. Data for these components are incorporated into the forms of the web-based system.

Background – a relevant historical statement introducing the need for this work

Problem Statement/Need— a statement of the business problem including a clear definition of what success looks like and how this project will solve it

Assumptions—any/all assumptions which may influence the outcome

Scope— the agreed boundaries for the overall work

Resources— the resources that will be needed to complete the project and the costs associated with these resources (to the best of your knowledge)

Critical Success factors— concise statements about what must occur or be provided to ensure success of the project

Constraints— concise statement about boundary conditions

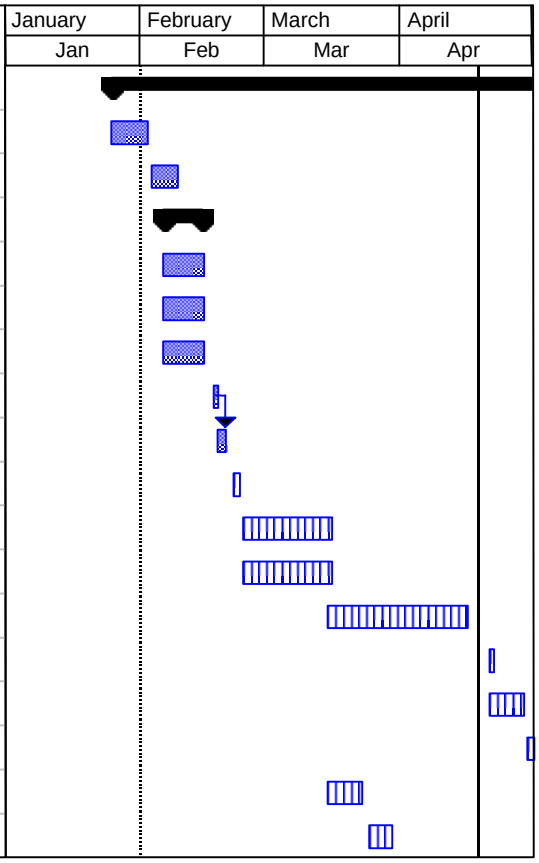
Decision Makers/Stakeholders—the business decision makers, the person(s) who make the decisions/ and all of the persons who are involved or will be affected by the project

Deliverables— the tangible output materials and their intended use

Timeline— the anticipated timeline and milestones for completing this project

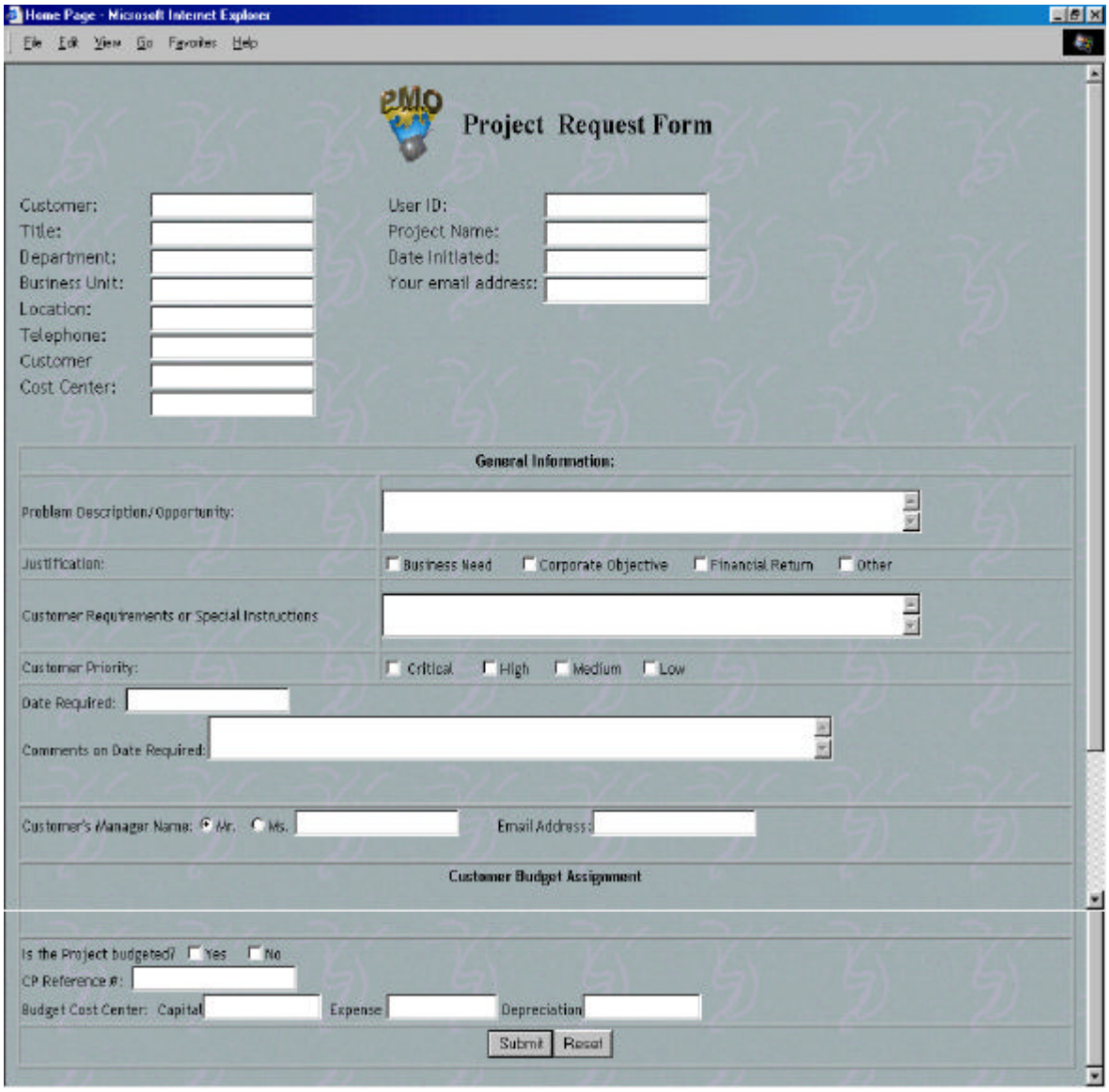
Appendix B Timeline

Task Name	Start	Finish
PMO	**Mon 01/25/99**	**Fri 04/30/99**
Read Available data on PMO	Mon 01/25/99	Mon 02/01/99
Interview Key Staff of PMO	Wed 02/03/99	Mon 02/08/99
Develop Logical Model	**Sat 02/06/99**	**Sun 02/14/99**
develop data flow diagram	Sat 02/06/99	Sun 02/14/99
develop ER diagram	Sat 02/06/99	Sun 02/14/99
Appendix B	Sat 02/06/99	Sun 02/14/99
Review Model with PMO Staff	Wed 02/17/99	Wed 02/17/99
Modify model with changes	Thu 02/18/99	Sun 02/21/99
Get approval on Model	Mon 02/22/99	Mon 02/22/99
Develop Web Site	Wed 02/24/99	Mon 03/15/99
Develop Database	Wed 02/24/99	Mon 03/15/99
Develop ASP pages	Mon 03/15/99	Thu 04/15/99
demo System to PMO	Wed 04/21/99	Wed 04/21/99
Modify system from demo	Wed 04/21/99	Wed 04/28/99
Get final approval on Project	Fri 04/30/99	Fri 04/30/99
write Thesis Document (1st Draft)	Mon 03/15/99	Mon 03/22/99
Revise Paper	Thu 03/25/99	Mon 03/29/99



Appendix C Scripting Model

1	The form is filled out by the requester.	On submit – A new web page is compiled with the information from the requester's form plus fields for the manager's endorsement or denial. This page is stored and the URL to the page is sent via email to manager.	None	n/a	**Care should be taken to assure the manager's email is entered correctly on the requester's form as this will stop the request process.



<hidden unique id (id)> will be added to the form for tacking purposes

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Script:

Take this data, reformat it into another web page with all of the above data plus fields for the manager's endorsement, denial, text box, and date. Name this new web page <proj_name, id> and store it in the request folder on the server.
Mail the URL to the <manag_email> requesting the manager to open the form and endorse or deny it.
**Develop a thank you form to be sent to the requester on submit.

**Provide lots of error checking and popup instruction/example boxes on this page.

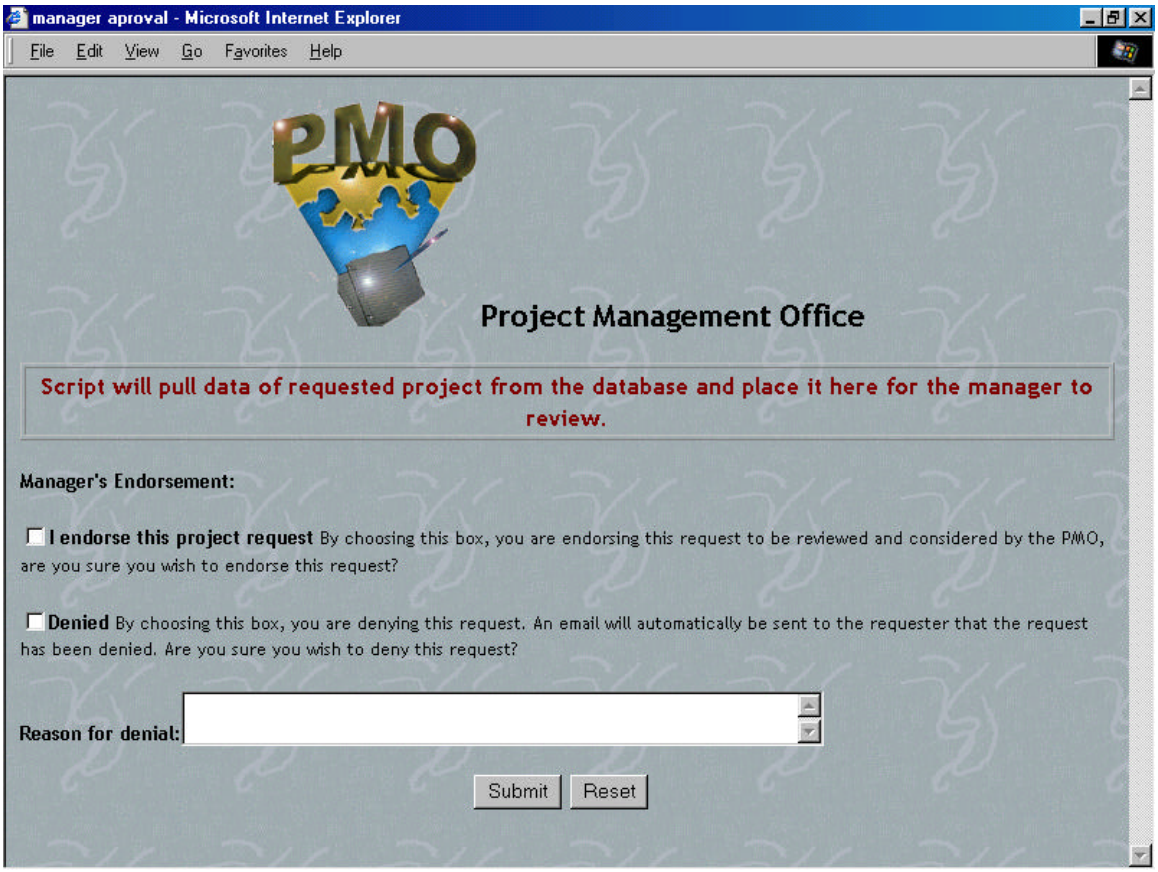
Note: Having the wrong manager email will cause the process to break.

Email:
To: <manag_email>
From <requester_email>
Subject: <Proj_name> ": Project Request Endorsement Needed"
<manag_name>,
<requester_name> has requested the following project to be reviewed by the PMO: <project title> . Before we proceed we need your endorsement of this project request. Please open the following form by clicking on this URL <URL>.

After you have reviewed the form, please click "I endorse this request" or "Request Denied" and hit the submit button. If you have endorsed the project, the information, along with your endorsement, will be sent to the PMO request database and the request will be processed by the PMO. You will be kept up to date via email of any changes. Notification will use this name <proj_name, id> to refer to this project.
If you do not endorse the project request, please hit the deny button on the form. This will send an email to the requester of your decision to deny the project request.

Thank you
PMO

2		Manager endorses by checking "endorsement button"	On submit, form is sent to PMO database with all of the requester's information and the manager's endorsement.	None	n/a	Because it is the manager who sends it on to PMO, is this sufficient for approval. Need to determine a way to validate it is the manager accessing the page
	2-a	Manager does not endorse request by checking "denied" button.	On submit an email is sent to requester of the denial.	None	n/a	PMO only begins tracking request after manager approves.



Script

Approval-
Data is sent to PMO access DB for storage. Script is written to delete the web page that was stored in the project request folder.

Denial --- email is sent to requester informing them of the denial. Script is written to delete the web page that was stored in the project request folder.

Email-
To: <requester_email>
From: <manag_email>
Subject: <proj_name> "denial"
<requester_name>,
I have denied your request for the following reasons <textbox>.

3	Data is stored in database	Store data in Access DB. A unique ID is assigned to the record. Email with a URL and the name and id of the project request is sent to the PMO notifying them of the need to review a new request. Status of request is set to "Project Requested" and date of this status is inserted.	Insert	Project requested	A unique id is applied to the record. A web page with a list of projects that need to be reviewed will be created. This is the URL that gets sent to the PMO.

From previous step (2) on manager's approval data is sent to PMO database and stored.

Script

Take data from manager form and insert into each of the corresponding fields in the DB

Email to PMO gets sent once data is stored.

Email

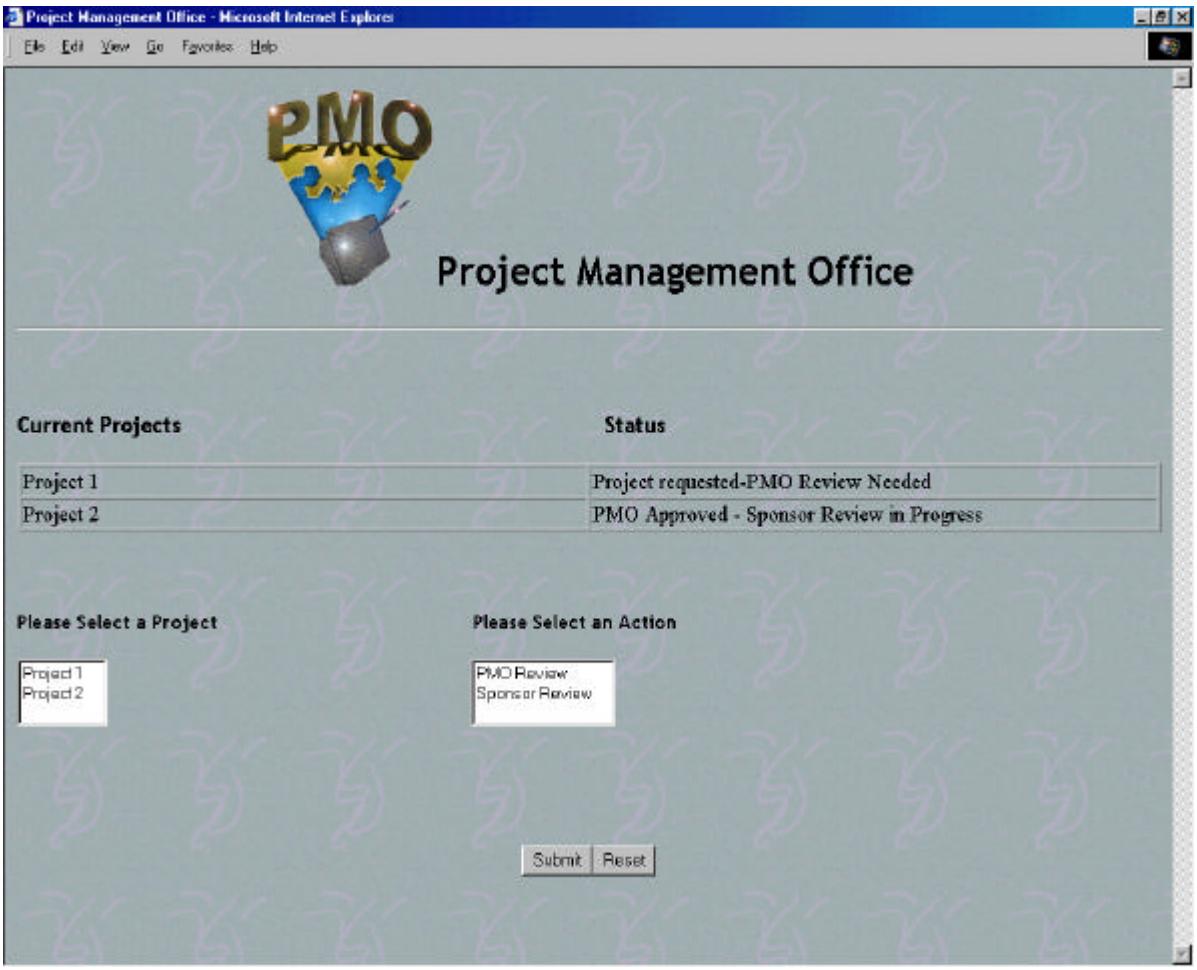
To: PMO
From: <manag_email>
Subject <proj_name> "review requested"

<manag_name> has endorsed the <proj_name> request and has submitted it to the PMO for review. Please click here <URL> to review the request.

4	PMO reviews form by choosing project name and action from the list/action web page sent to them via email	A web page is created with the information previously completed by requester and manager. PMO reviewed, denied, additional information requested status buttons and a recommendation of needed information text box are added to the original form.			A Web page with a list of projects and a list of actions will be created. This page is named the List/Action page. The URL for this page is what will be sent to the PMO. By choosing a project and an action, a web page with the appropriate information will be generated. Need to assure that only the PMO staff and appropriate sponsor has access to this page.

From email sent in step 3—

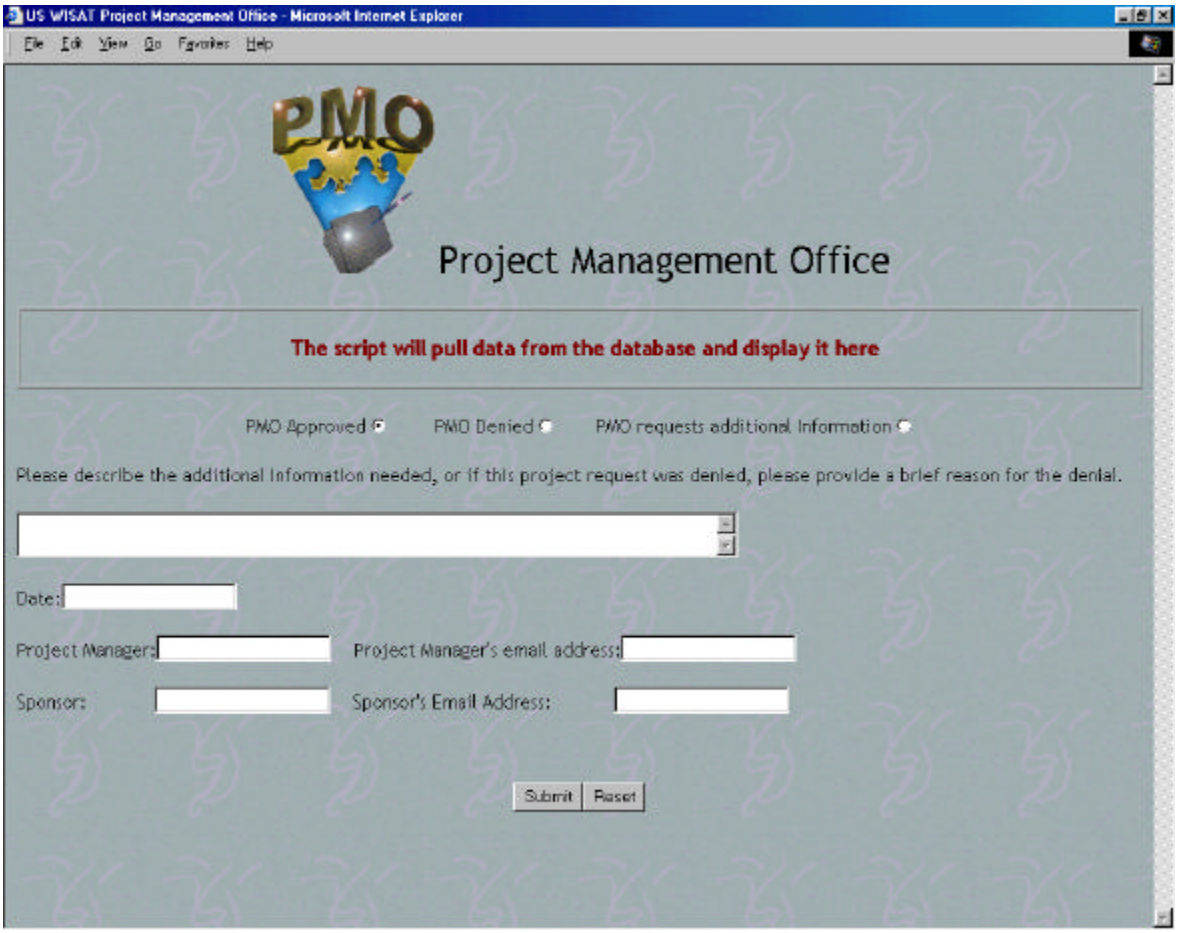
By clicking on the URL in email the staff is brought to the "list/action" web page which lists the current project requests and their status. Also included on this page is two form items:



A drop-down box for selecting the desired project and a drop-down box for selecting the desired action. By selecting these two items and pressing submit, a query is run that pulls the necessary web page (depending on the action selected).

4-a	PMO approves by checking the approval button	On submit, status is set to "PMO reviewed" in the database along with the date of the status change. A Project Manager (PM) is assigned to the project. An email is sent to this PM with the project name and URL to the list/action web page.	Update to status	PMO reviewed	

After choosing a project and the PMO review action the PMO, the following review form is pulled up.



On submit the Status field in the DB is updated to "PMO Reviewed" and the date of the status change is updated.

The name of the Sponsor is input as well as the name and email of the Project Manager and inserted into the database. Email is sent to the Sponsor and Project Manager notifying them of a new project request and the action required.

Email

To: <PM>, <Sponsor>
From: <PMO>
Subject: <proj_name> "PMO reviewed"
The following project request has been reviewed by the PMO and was assigned to you for completion. Please go to<url> and complete the required information.

4-b	PMO does not approve project	On submit the status in DB is changed to "PMO denied" along with the date of the status change. An email as to the reason of the denial of the request is sent to the manager and the requester.	Update to status	PMO denied	

Process is the same as for 4-b with the following exceptions. Status is updated in DB to PMO "Not Approved" and the date of the status change is updated. An email of the denial, with an explanation as to why, is sent to the requester and the manager.

Email

To: <requester_email>, Manag_email>
From PMO
Subject <proj_name>

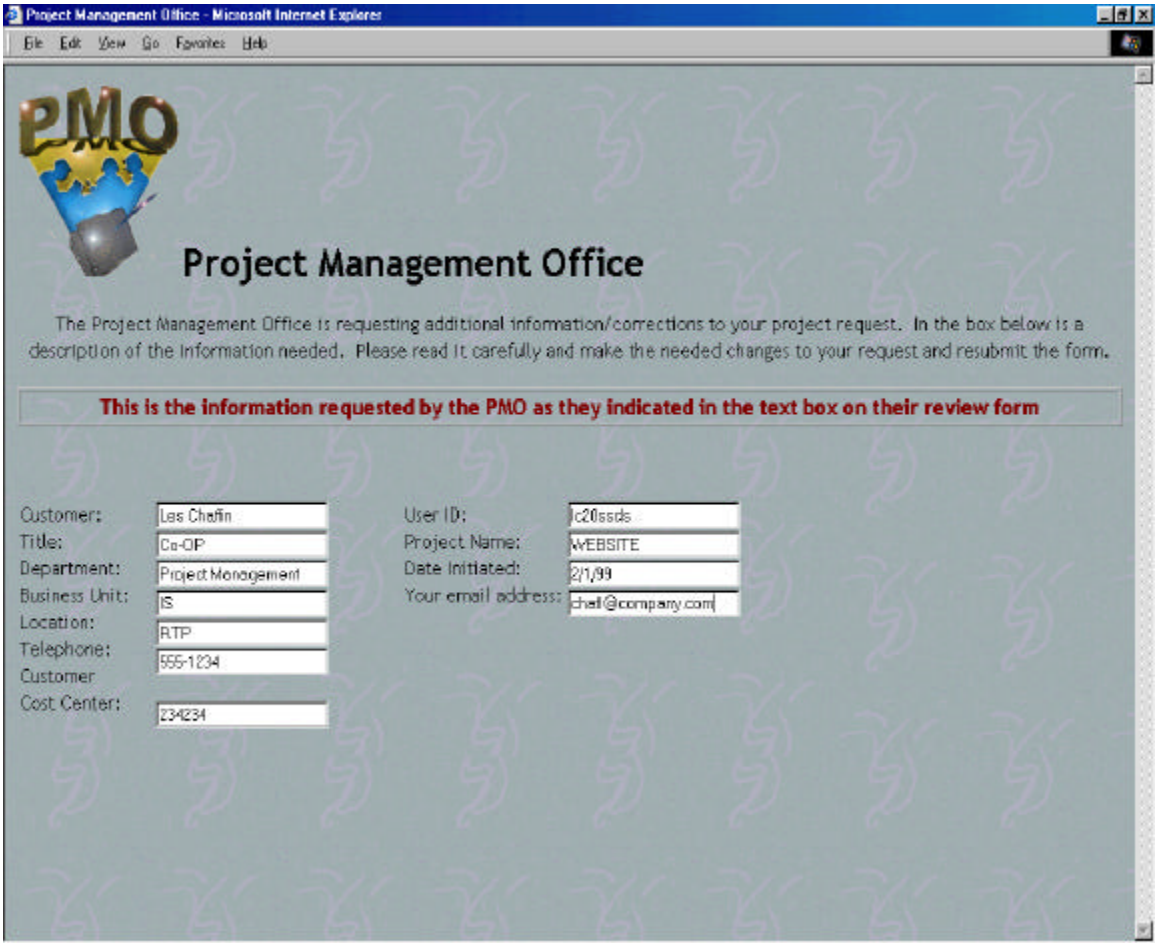
The PMO has reviewed this request and has denied it because of the following reason <textbox>.

4-c	PMO makes a request for additional information to the requester.	On submit, the recommendation/comments are stored in the DB— A URL to a web page that has the original form data is sent via email to the employee and manager with a description of what is needed. Status is set to "update requested" in database along with the date of the status change.		update requested	May need to do something with the data in the database while waiting for the updated info?

Same form as step 4 comes up, on submit the same action takes place with the following exception. On submit an email is sent to the requester stating that changes have been requested by the PMO. The email will include a URL which will pull the original form completed by the requester with the original values. This URL is to a password protected web page that will request the user id, proj_name.

5		Requester Updates Form	A form is created with the original information in the form fields with the comments of needed changes After making necessary changes, on submit a new web page with the requested changes is compiled, plus fields for the manager's endorsement or denial. This page is stored and the URL to the page is sent via email to manager.	None	Changes requested	The following steps are identical to step 2, 2-a and 2-b with the exception of the status field. A web page needs to be created that will pull the original data from the DB and insert these values into the original form so that they may be edited.
	5-a	Requester does not update form		None	Changes requested	Periodically the DB will need to be checked for those requests whose status remains as "update requested"

By inputting their user ID and Project name in form from step 4-c, the original project request form is pulled back from the database with the original values. At the top of the form is the request for additional information.



6(2)	Manager endorses by checking approval button	On submit, the form is sent to PMO database with all requester's information and the manager's endorsement. An email is sent to PMO stating that changes have been made and review is needed. Status of request is changed to "Changes Received" along with the date of the status change.	Update to all fields	Changes received	From here, the process is the same as step 4. The PMO can approve, deny or request more changes.
6-a (2-a)	Manager does not endorse by checking "denied" button.	On submit an email is sent to requester of the denial. Denial is sent to DB and the status is set to "Manager Denied" Along with the date of the status change. Project dies.	Update to status	Manager denied	
6-b	Manager does not respond to the second request for approval		None	Changes requested	Periodically the DB will need to be checked for those requests whose status remains as "Changes Requested"

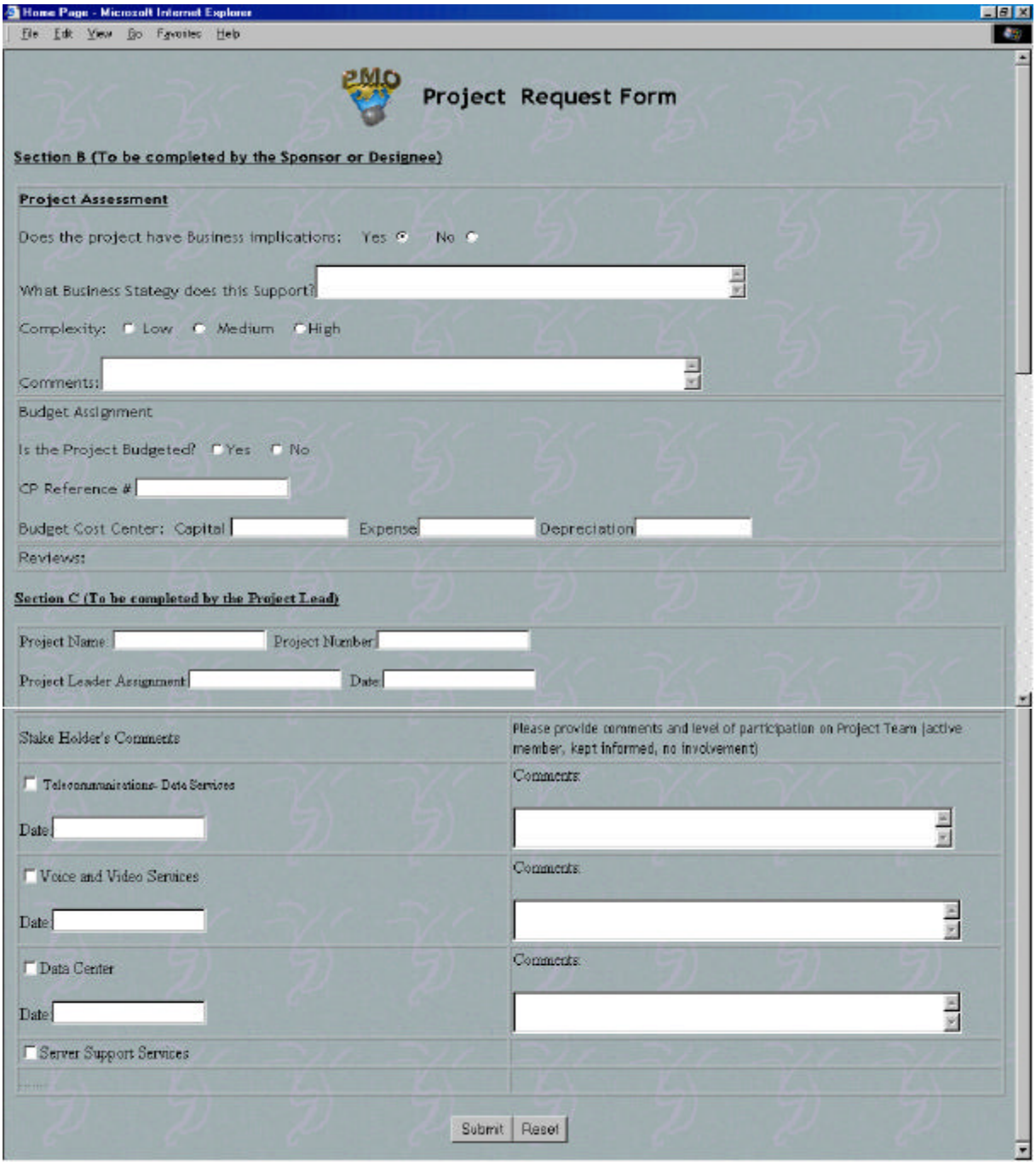
The process involved in step 6 is identical to steps 2 and 3 with the exception that the input into the DB is an Update query not an Insert query and the status is changed to "changes received".

7	Sponsor is obtained	The PMO review form (from step 4) is obtained, the sponsor info is added. On submit the data is added to the DB. An email is sent to the sponsor with a URL to the list/action web page to obtain request form data.	Insert to sponsor field	PMO Reviewed	This step can occur in conjunction with step 4.
7-a	No sponsor is obtained	The PMO review form (from step 4) is obtained. The status is changed to "PMO Denied" along with the date of the status change. On submit, an email is sent to requester and manager with a reason as to why project request was terminated	Update to status	PMO Denied	The reason given would be "No sponsor was obtained"

This is a continuation of Step 4

8	PMO and sponsor review and complete remaining request information	A web page is created with the original data plus the remainder of the form info to be completed. On submit, the remainder of the data is stored in the DB	Insert into new data fields on form	Sponsor Review	The PMO will have received an email with the URL of the web page that will create the form for this process.

From the "list/action" web page in step 4 and choosing sponsor/PM action, the following web page will be created. The PM will enter the required data, on submit this new data is entered into the database. The status is changed to Sponsor Review.



9	PMO/Sponsor recommends project for Steering Committee review	The form created in step 8 is obtained, the "Recommended to Steering Committee" button is checked. Status is updated to "referred to steering Committee	Update to status	Refereed to Steering Committee	This can happen in conjunction with step 8

This step is done in conjunction with step 8. Once all the information from step 8 is complete and is submitted, the PM and Sponsor can recommend the project request to the Steering Committee for review. To do this the form is pulled from the database via step 4. The "Recommend to Steering Committee " option is selected.

On this action, an email with the URL (action page) along with the project name is sent to the Steering Committee notifying them of the need for a project review.

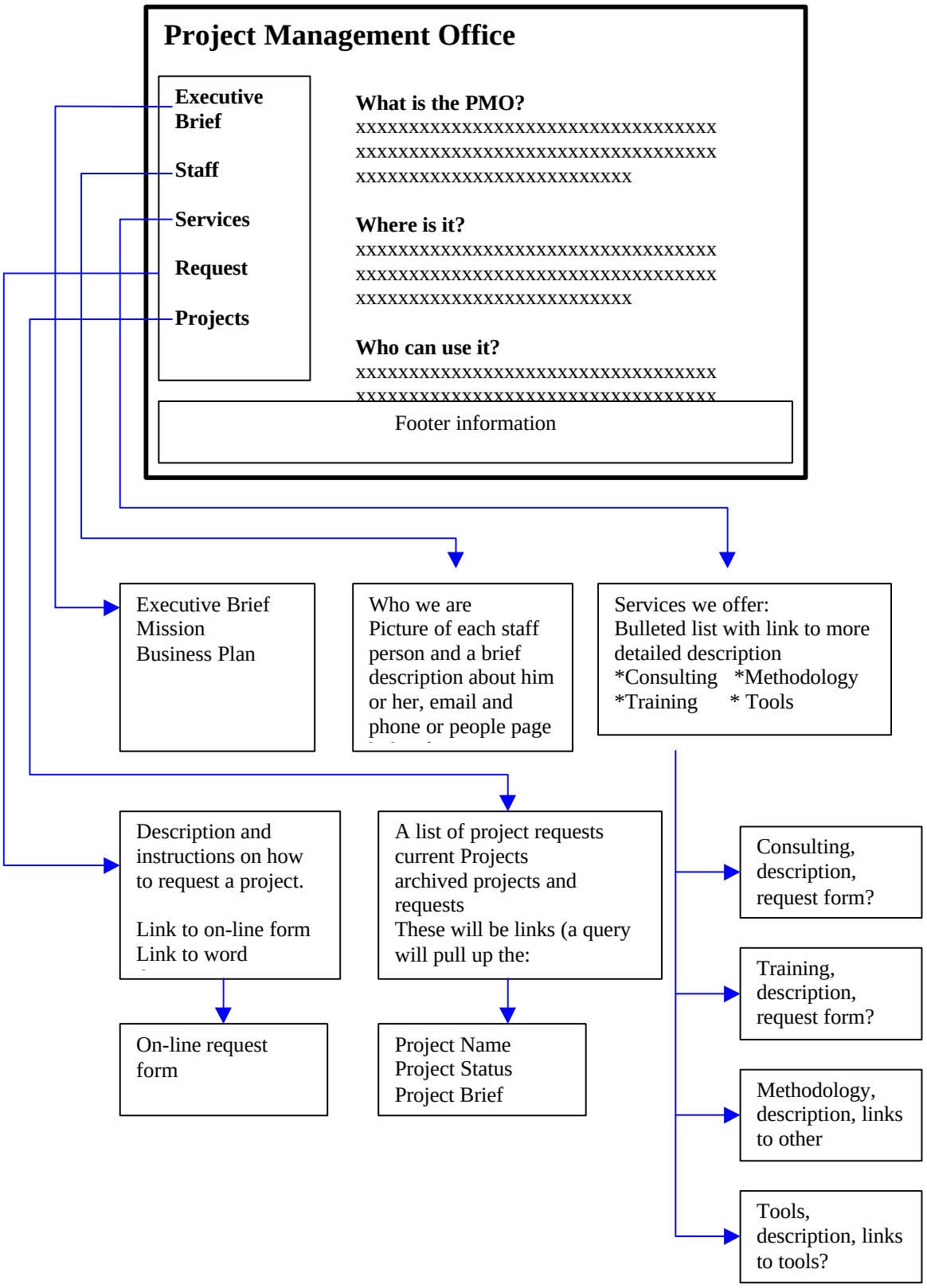
9-a	PMO/Sponsor terminates project	The form obtained in step 8 is obtained; the "terminated" button is checked. A comment box as to why the project was terminated is added and on submit this is stored in the DB. Status is set to "request terminated" along with the date of this status change. Email is sent to requester and manager.		Sponsor terminated	

The PM and Sponsor can decide to terminate the project. If this is the case, the terminated button is pressed. On this action email is sent to the requester and the manager notifying them of the status of the project and the reason as to why the project request was terminated.

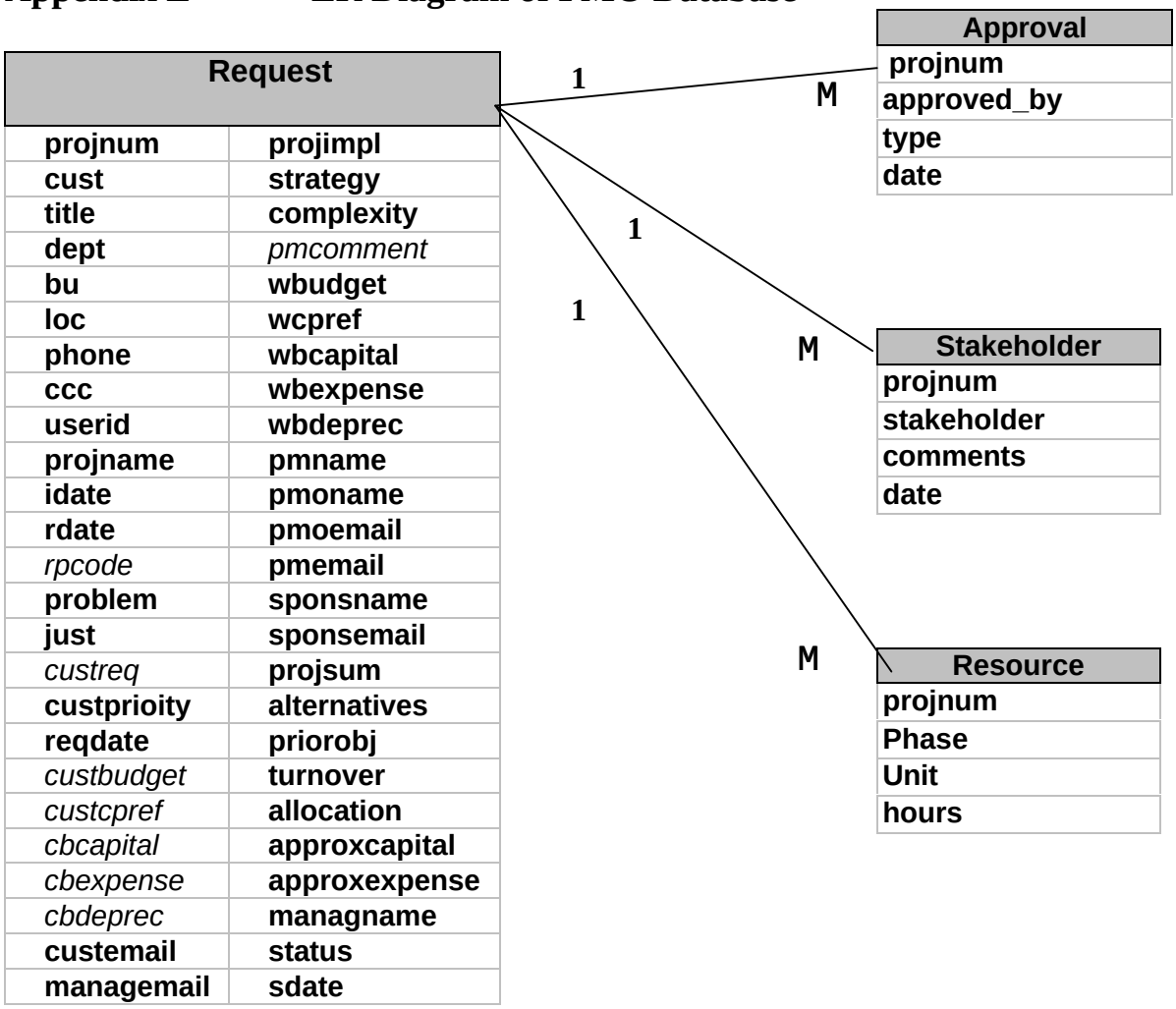
10	Steering Committee reviews project request	Project request form data is obtained from URL mailed to Steering Committee. Additional buttons of approved, not approved, on hold are added to web page document. On submit status is set to one of the above and stored in the DB. Email is sent to requester, manager, sponsor and PM as to status	Update to status	Approved Denied On-hold	

From the email obtained from step 9, the Steering Committee goes to the URL, selects the project and the "Steering Committee Review" action options and a web page with all of the request information is displayed. Also included are a Steering Committee approval button, denial button, place on hold button, and a comment box.

Appendix D Preliminary Site Map for PMO Website



Appendix E ER Diagram of PMO Database



Legend

Required

Optional

——————— Required

..... Optional

Data Dictionary

Table: approval

Column Name	Type	Description	Size
projnum	**Number (Long)**	**Primary Key, Foreign key to request table**	**4**
approved_by	**Text**	**Primary Key, Person who approved request**	**50**
type	Text	Type of approval, e.g. manager, PMO sponsor	50
date	Date/Time	Date of the approval	8

Table: request

Column Name	Type	Description	Size
projnum	**Autonumber**	**Primary Key**	**4**
cust	Text	Name of the employee making the request	50
title	Text	Title of the person making the request	50
dept	Text	Department that the requester works for	50
bu	Text	Business unit that the requester works for	50
loc	Text	Location of the requester	50
phone	Text	Phone number of the requester	50
ccc	Text	Cost center of the requester	50
userid	Text	MUD ID of the requester	50
projname	Text	Name of the project	50
idate	Date/Time	Date the request was initiated	8
rdate	Date/Time	Date the request was submitted	8
rpcode	Text	this code is provided by finance department (line item reference number)	50
problem	Memo	a detailed description of what the project will do	-
just	Text	justification for the project	50
custreq	Memo	any special requirements from the requester	-
custprioity	Text	priority of project from requester's perspective	50
reqdate	Date/Time	date the project is required from the requester's perspective	8
custbudget	Yes/No	is the project budgeted by the requester department	1
custcpref	Text	cpreference number from the requester-- this code is provided by finance department (line item reference number)	50
cbcapital	Text	requester budget cost center #-capital	50
cbexpense	Text	requester budget cost center #- expense	50
cbdeprec	Text	requester budget cost center # - depreciation	50
custemail	Text	email address of the requester	50
managemail	Text	email address of the requester's manager	50
managname	Text	name of the requester's manager	50
status	Text	status of the request	50
sdate	Date/Time	date of this status	8
projimpl	Text	Does the project have Business implications	50
strategy	Text	What company strategy does this project support	50
complexity	Text	what is the complexity of the project	50
pmcomment	Memo	comments about the project from the project manager	-
wbudget	Yes/No	Is the project budgeted by PMO	1
wcpref	Text	cpreference number from the PMO-- this code is provided by finance department (line item reference number)	50
wbcapital	Text	PMO budget cost center #- capital	50
wbexpense	Text	PMO budget cost center #- expense	50
wbdeprec	Text	PMO budget cost center #- depreciation	50
pmname	Text	name of the project manager	50
pmoname	Text	name of the pmo representative	50
pmoemail	Text	email address of the PMO representative	50
pmemail	Text	email address of the project manager	50
sponsname	Text	name of the sponsor	50
sponsemail	Text	email address of the PMO sponsor	50
projsum	Memo	summary of the project	-
alternatives	Memo	what are the alternatives that could be used in place of project (if any)	-

priorobj	Text	What is the priority of this project	50
turnover	Text	What is the expected time it will take to complete the project and turn it over to the requester?	50
allocation	Text	what is the initial $ figure to complete the project	50
approxcapital	Text	what is the initial $ in capital to complete the project	50
approxexpense	Text	what is the initial $ in expense to complete the project	50

Table: resources

Column Name	Type	Description	Size
projnum	**Number (Long)**	**Primary Key, Foreign key to request table**	**4**
Phase	**Text**	**Primary Key, the phase the project is in (e.g. Focusing, Planning, implementation**	**50**
Unit	Text	the business units from which the resource is coming (e.g. Server support, Requester service, Network ops)	50
hours	Text	the number of hours expected	50

Table: stakeholder

Column Name	Type	Description	Size
projnum	**Number (Long)**	**Primary Key, Foreign key to request table**	**4**
Stakeholder	**Text**	**Primary Key, name of the stake holder**	**50**
Comments	Memo	comments	-
Date	Date/Time	date	8

Appendix F System Test Document

				Yes	No	Comments
1	Requester	1	Was the data input into the database appropriately and correctly?			
		2	Was email sent to the right person?			
2	Manager	1	Is this person the only one who can access page?			
	Approved	1	Was status of project updated in the database?			
		2	Was email sent to the PMO notifying them of a new request?			
	Denied	1	Was the record in the database deleted?			
		2	Was email sent to the requester notifying him of the denial?			
4	PMO Review	1	Are the PMO staff the only ones who can access this page?			
	Approved	1	Was status of the project updated in database?			
		2	Was email sent to the sponsor?			
		3	Was email sent to the PM ?			
	Denied	1	Was status of project updated in the database?			
		2	Was email sent to requester notifying them of denial?			
		3	Was email sent to the manager notifying him of the denial?			
4-c	Changes requested	1	Was email sent to requester notifying them of the need for changes?			
		2	Was email sent to the manager notifying him of changes?			
		3	Is the requester the only person who can access the page?			
5	Changes made	1	Were changes updated in database?			
		2	Was email sent to the manager?			
6	Manager	1	Is manager only one who can access the page?			

	approves	2	Was status of the project updated in database?			
		3	Was email sent to PMO notifying them of the changes			
	denies	1	Was status of the project updated in the database?			
		2	Was email sent to requester notifying him of denial?			
8	Sponsor completes request	1	Is the sponsor the only person who can access page?			
		2	Were changes updated in database?			
9	Recommend for Steering Committee	1	Was the status of project updated in the database?			
10	Steering Committee approves	1	Was status of the project updated in database?			
	Denies	1	Was status of the project updated in database?			

The numbers on the far-left column of the table cross-reference the numbers in the flowchart (Figure 1.)