Web Applications Classification: A State Government Case

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Abstract

This paper reports the classification of web applications from an evolution perspective in a state government. This paper reports on an empirical investigation of a state technology authority (STA) to the actual experiences of the web application maintenance practice in the States. The STA classifies Web applications into Static, Web-enabled form, Custom Web, and Enterprise Application Integration (EAI) categories. The resources required for those types of Web application maintenance are also identified.

1. Introduction

Many companies use the Web to communicate with the external world as well as within their organizations, and to carry out their business processes more effectively. A survey on web application development shows that 84% of the systems don't meet business need, 56% don't have the required functionality, 79% are behind schedule and 63% are over budget [1]. Garc´ıa-Cabrera, Rodr´ıguez-F´ortiz and Parets-Llorca [2] report that the development of a web application is never finishes and the nature of web applications is evolutionary. The architecture of web applications three layers: conceptual, presentation and navigation and two perspectives: designer and viewer. Software evolution is "the dynamic behavior of programming systems as they are maintained and enhanced over their life times" [3]. Web application maintenance and evolution is of increasing importance as more web systems in production.

Taylor, McWilliam, Sheehan, and Mulhaney [4] indicate issues of web application maintenance activities. Those issues are the impact of dynamic web application, web system structure, coding for specific web browsers, documentation and development standards. They classify web application into two categories: static and dynamic in terms of data. Dynamic web systems require more maintenance considerations than static.

Web technologies have been adopted by organizations in public sector. Many state agencies have provided their services via the Web. This study will investigate the management of e-government applications at a state technology agency (STA) of the United States.

2. The STA Vision and Background

The mission of the STA is to deliver secure, reliable

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technology services and solutions, and provide guidance and oversight that lead to sound decisions for the state government.

STA has developed seven strategies for achieving its mission:

- 1. Use IT to facilitate agency collaboration.
- 2. Protect the state's infrastructure.

3. Improve access to government information and services while ensuring privacy.

4. Improve IT decision-making, investments and implementation.

5. Increase agencies' productivity by delivering reliable technology services.

6. Support a resourceful and productive workforce.

7. Improve internal processes.

STA works with government to develop strategic plans and facilitate sharing technology and information. Major activities include:

- operating the state's new enterprise portal which offers quick and easy access to government information and services, including online business registration;
- overseeing information system projects costing more than \$1 million to prevent waste and delay;
- upgrading and modernizing the state's telecommunications infrastructure; modernizing the state's computing environment;
- strengthening the security of the state's computer and information network; and

• reviewing and analyzing IT budgets and strategic plans.

STA was established in July 2001 by integrating IT positions from different agencies into a centralized technology agency to deliver secure and reliable technology services and solutions for the state government. The STA is bringing state agencies together to achieve the vision of a digital government. The digital government starts with a commitment to making state government more efficient, effective, and responsive through the use of information technology. The online experience is transforming the way customers interact with businesses, and as the general public becomes more comfortable with computers and Internet usage becomes more widespread, the demand for online access to government services is growing. Driver's license renewals, Internet voting, incorporating a business, participating in the bidding process for a government contract, paying taxes, paying a

parking ticket, and ordering birth, death, and marriage certificates are perspective, it no longer sees itself as operating in isolation from other agencies. It sees itself as one part of a larger entity with many of the same goals and objectives, and it looks for ways to share resources to achieve greater efficiency and cost savings.

3. Web Application Classification

STA classifies web application systems within the state web portal into four categories: static, web enabled form, custom and EAI. Units involved in the web application maintenance are Traffic which records user requests and monitors request, Creative Services which delivers graphical design work to accommodate the look and feel of web applications, and e-Development which is responsible for the state web portal maintenance. STA uses "Full Time Equivalent" (FTE) to determine the number of full time positions to maintain the state web portal.

4. Author Information

The name of author(s), affiliation(s), and e-mail address(es) should be set centered. Author names are to be centered beneath the paper title and in Times 12-point non-boldface. Affiliations should be Times 10-point non-boldface. Include e-mail addresses if possible. Multiple authors may be shown in a two- or three-column format, with their affiliations below their respective names.

4.1 Static Web Applications

Static web sites, sometimes called "brochureware" sites, provide a snapshot of information about an organization or activity. Such sites consist primarily of content files that require no runtime compilation, interpretation, or execution. Content in these sites is generally limited to html, image, pdf, and office (such as word processing documents, spreadsheets, presentations) files. This content is statically presented to users when requested and changes only when files are manually replaced or updated. Dynamic content and interactive forms on static web sites are limited to common, across-the-board simplistic functionality (e.g. an on-line e-mail form).

Maintenance Requirements: (estimated average maintenance request, See Table 1)

Traffic unit provides initial triage to static web site change requests. Technical designers do the majority of maintenance performed on static web sites. Graphic artists may be required to update images. A negligible percent of the time developers may be required to provide minor updates to the limited number of interactive forms.

 Table 1: Static Web Application Maintenance

 Requirement

		neganomene	
Functional		Resource Cluster	# FTEs
Requirement			
Traffic	=>	Project Manager I (PM I)	0.25
Graphic Artist	=>	Creative Services (CRE)	0.25
Technical	=>	Prog/Coding/Dev I (PCD	1.00
Designer		I)	
Baseline			1.50

4.2 Web-Enabled Form Application

Web-enabled forms provide limited interactivity by automating *simple* paper-based business processes. An example of a web-enabled form could be a web-based survey that generates either e-mail or a flat-file extract to the business owner. Common modules provide limited dynamic web content by reusing (copy & paste reuse) existing software modules. An example of a common module is the press release application. Both static content and a modest amount of interactive/dynamic content that requires runtime compilation, interpretation, or execution typically comprise development at this level. Dynamic content or interactive forms at this level usually contain minor customizations.

Maintenance Requirements: (estimated average maintenance request, See Table 2)

Traffic provides initial triage for maintenance requests of web-enabled forms & common modules. Technical designers may be able to resolve minor modifications. Graphic artists may be required to update images. A large percent of the time developers will need to make the requested modifications.

Table 2	2:	Web-	Enabled	F	orm	Ap	plicati	ion	Main	tenance

Kequirement				
Functional		Resource Cluster	# FTEs	
Requirement				
Traffic	=>	Project Manager I (PM I)	0.25	
Graphic Artist	=>	Creative Services (CRE)	0.25	
Technical Designer	=>	Prog/Coding/Dev I (PCD I)	0.50	
Developer	=>	Prog/Coding/Dev I (PCD I)	1.25	
Baseline			2.25	

4.3 Custom Web Applications

Custom web applications generally provide both static and dynamic/interactive content. Such applications may augment a static website or may constitute a website on its own. Custom web applications may include simple web-enabled forms or common software modules, but provide additional business level processing. Examples of such additional business level processing could include automated workflows such as scheduling and calendaring, custom search applications, or on-line reporting. Dynamic content and interactive forms at this level usually contain significant customizations.

Maintenance Requirements: (estim ated average

maintenance request, See Table 3)

Traffic provides initial triage and requirements discovery for maintenance requests on custom web applications. Changes in the underlying business process may require formal project management by a project manager or team supervisor as well as detailed requirements gathering by a requirements engineer, developer, or team supervisor. Graphic artists may be required to update images. Technical designers may resolve user interface (UI) design issues. Developers must make program changes to accommodate new business requirements. A test engineer may be required for user acceptance testing.

Table 3: Custom	Web Application	Maintenance
	Requirement	

Functional		Resource Cluster	# FTEs
Requirement			
Traffic	=>	Project Manager I	0.50
		(PM I)	
Project Manager (or	=>	Project Manager II	0.75
Supervision/Mgt)		(PM II)	
Requirements	=>	Requirement &	0.75
Engineer (or Senior		Testing Engineer	
Developer or		(RTE)	
Supervision/Mgt)			
Graphic Artist	=>	Creative Services	0.25
		(CRE)	
Technical Designer	=>	Prog/Coding/Dev I	0.75
		(PCD I)	
Developer		Prog/Coding/Dev I	1.25
		(PCD I)	
Test Engineer (or	=>	Req. & Testing	0.50
Senior Developer		Engineer (RTE)	
or Project Manager			
or			
Supervision/Mgt)			
Baseline			4.75

4.4 EAI Applications

EAI stands for enterprise application integration. EAI web applications exhibit the same characteristics as custom web applications but add an additional level of complexity because they communicate either synchronously or asynchronously with various enterprise application environments that are autonomous of STA's web application environment. Examples of existing enterprise application environments include mainframe-based systems (such as GRATIS and CJIS), COTS (such as LicenseEase and Systems Automation), or agency data stores (such as SoS SQLServer and OSR SQLServer). Dynamic content and interactive forms at this level usually contain significant customizations.

Maintenance Requirements: (estimated average maintenance request, See Table 4)

Traffic provides initial triage and requirements discovery for maintenance requests on EAI web

applications. Changes in the underlying business process may require formal project management by a project manager or team supervisor as well as detailed requirements gathering by a requirements engineer, developer, or team supervisor. Graphic artists may be required to update images. Technical designers may resolve user interface (UI) design issues. Developers must make program changes to accommodate new business requirements. A test engineer may be required for user acceptance testing.

Functional		Resource Cluster	# FTEs
Requirement			
Traffic	=>	Project Manager I (PM I)	0.50
Project Manager (or Supervision/Mgt)	=>	Project Manager II (PM II)	0.75
Requirements Engineer (or Senior Developer or	=>	Req. & Testing Engineer (RTE)	0.75
Graphic Artist	=>	Creative Services (CRE)	0.25
Technical Designer	=>	Prog/Coding/Dev I (PCD I)	0.75
Developer		Prog/Coding/Dev I (PCD I)	1.25
EAI Developer	=>	Prog/Coding/Dev I (PCD I)	1.25
Test Engineer (or Senior Developer or Project Manager or Supervision/Mgt)	=>	Req. & Testing Engineer (RTE)	0.50
			6.00

Table 4: EAI Application Maintenance Requirement

5. Conclusion

Much of the existing literature in web applications attempts to describe and understand the web application development process. Web application maintenance gets its attention when more web applications are in production. By investigating the STA web application maintenance practice, we expect to find lessons learned from the case that can be used to other organizations

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