Application for

Larry L. Sautter Award
Best IT Practices in Business Processes and Services

A Collaboration and Technology Transfer Approach for
College-wide Web Sites Development and Maintenance
College of Humanities, Arts, and Social Sciences
University of California, Riverside

Nomination for:

College of Humanities, Arts, and Social Sciences
CHASS College Computing (C³)
Center for Visual Computing (CVC)

James Lin, Director of CHASS College Computing
james.lin@ucr.edu
(909) 787-5031
Robert Hanneman, Associated Dean
robert.hanneman@ucr.edu
(909) 787-5614
Dean’s Office
College of Humanities, Arts, and Social Sciences
University of California, Riverside

CHASS Web Development Project
University of California, Riverside
May 2, 2003
Project Teams
CHASS College Computing
Team Leader: James Lin, Director of CHASS College Computing
Team Members: Ryan Rich, Programmer Analyst
Phuong Lynda Tran, Graphic Design Intern
Stephanie Young, Communication Specialist Intern
Stephanie Wejbe, Communication Specialist Intern
Joshua Willis, Information Management Specialist Intern
Sean Cox, Information Management Specialist Intern
Ferda Mehmet, Communication Specialist Intern

Center for Visual Computing, Dept. of Computing and Communication
Team Leader: Nasser Salomon, Manager
Team Members: Eric Martin, Web Programmer
Sohail Wasif, Creative Lead
Ben Han, Production Specialist

Unix System Group, Dept. of Computing and Communication
Loren Irwin, Programmer Analyst

Abstract
As the largest college at UC Riverside, the College of Humanities, Arts, and Social Sciences (CHASS) houses twenty departments, a wide variety of academic and outreach programs, research centers, museums, and arts facilities. With the rapid evolution of Internet technology in early 2000, newly arrived Dean Patricia O’Brien had a vision making appropriate web presence an essential element of the college. She requested her Information Technology Advisor, Professor Robert Hanneman, who later was appointed as Associate Dean for Instructional Technology and Research, to layout the technology plan for CHASS. In November 2000, a “standard and best practice” for web development across the college was drafted. In early 2001, a RFP was initiated to the college units and funding was allocated. By August of 2001, a limited number of web sites had been developed meeting the “standard and best practice”. Other college units either had no web sites or had poor design without regular maintenance. In September of 2001, CHASS initiated a project campaign to make web sites across the college meet standard baseline requirements and common navigation architecture. However, there were challenges to be overcome in order to accomplishing the campaign. A collaboration and technology transfer approach was developed for managing the challenges and implementing the project. From December of 2001 to March of 2003, a total of 35 new web sites were successfully developed and 13 web sites have been enhanced. An on-going maintenance program has been implemented after the completion of each web site. The project has proven to be incredibly cost-effective and successful with high satisfaction from web site stakeholders, not only accomplishing CHASS’ vision of proper web presence, but also overcoming financial and technical constraints in development and long-term maintenance.

Project Description

Introduction
Proper web site presence across the college was determined to be the top IT priority task in early 2000. However, after 10 months, only a few web sites met the college’ s web design “standard and best practice” with acceptable content presentation. Among these, some followed the “standard and best practice” and resided on the web in the UCR campus virtual web server. However, some web sites were on different server platforms that had little or no regular maintenance. With limited financial and technical resources, the majority of the web sites were developed by casual student workers who had no professional or technical training and left the position after a short period of time. As a result, web sites stakeholders were unable to maintain their web sites in both technical issues and correctness of the contents. In order to resolve these problems, a project was initiated in September of 2001 to make web sites across the college
meet standard baseline requirements and common navigation architecture, and establish long-term maintenance schemes. This paper addresses the project objectives, challenges, strategies, development methods, organization, development procedures, resource allocations, and long-term maintenance schemes. The project results and examples are presented.

**Objective**

Develop a long-term strategy for CHASS web site development and maintenance in order to meet CHASS’ vision and keep up with the pace of World Wide Web technology development. The project did not intend to develop comprehensive web sites for the college. Rather, it hoped to establish a standard baseline for every college web site, such that on-going technology enhancement, and content maintenance can be implemented cost-effectively and efficiently.

**Challenges**

There were two major challenges:

1. To obtain the consent from all stakeholders of CHASS to participate in the project. By doing so, the team needed to address concerns, particularly for those who claimed the project might result in losing autonomous status within the system. The team needed to learn stakeholder’s desires for unique web presence, distinct features, and functions.
2. With only one newly hired IT professional in the college, there is limited funding, and on a tight schedule, it is a challenge to find proper resources to support technical programming, artistic design, content development and maintenance, and purchasing adequate hardware infrastructure and software tools.

**Strategies**

To meet the challenges, the following strategies were developed:

1. To meet the first challenge, a multi-phase development method and a project organization was established. One of the components of the project organization was the Project Advisory Committee whose members included volunteers of faculty and staff, and chaired by Associate Dean for Instructional Technology and Research. The influential committee approved the standardized baseline requirements and web page common navigation architecture, and create a good prelude for convincing the stakeholders. To facilitate the development progress, a set of web design templates would be available on-line for stakeholders to view and choose. Those templates were designed to be flexible for modification after Phase I.
2. To meet the second challenge, a very close collaboration between CHASS and UCR’s Computing & Communication (C&C) was established with commitment from top administrators of both units (Dean Patricia O’Brien and Associate Vice Chancellor Chuck Rowley). C&C contributed to the web development technical team, Center for Visual Computing (CVC), for web programming and design graphics free for CHASS. CHASS’s newly formed IT division, CHASS College Computing (C3) whose members included the director and a team of undergraduate student interns, interfaced the project to all stakeholders, coordinated the project, and prepared the web contents for CVC. CVC worked with C3 closely and transferred developed web sites to C3 as part of collaborating efforts.
3. To meet the tight schedule, web sites were developed based on their prioritized order: academic and outreach programs, followed by facilities, and lastly research related web sites.
4. A basic principle was promoted “Working Together As A Team”.

**Development Methods**

**Multi-Phase Development**

Three phases of development were designed.

1. Phase I – Development and Technology Transfer: CVC and C3 jointly developed new web sites for those units who had no or poor design web sites.
2. Phase II - Enhancement: Enhanced those web sites with new technology, common navigation architecture and contents. This phase solely carried out by C3.
3. Phase III - Maintenance: C³ developed new web sites and/or maintained all developed web sites.

**Key Features of the Approach**

**Standardized Baseline Requirements and Common Navigation Architecture**
A first step was to establish college-wide web site development standard baseline requirements and common navigation architecture to achieve the uniformity of the web technology. It sets the minimum requirements for any web site development and enhancement. The common navigation systems are in three areas: left, top, and right areas of the web page. The top navigation menu includes link to UCR home page, CHASS home page, and search engines. The left navigation menu includes About Us, Academic Programs, Courses, People, News and Events, Contact, and an optional menu item such as colloquium determined by the stakeholder. The right information panel is an optional area. Stakeholders determine their choices of information in this panel. For example, Student Resources, Join Us, Faculty Resources, Announcements, College Info, UCR info, etc. All web pages were organized in a common hierarchical structure. For example, the top-level folders shall be organized as About, Academic, People, Courses, Contact, News & Events.

**Progressive Implementation Strategy**
The first two phases of development ensured that all web sites met the standard baseline requirements and common navigation architecture. Future enhancements were based on recommendations from CHASS and or requests from stakeholders, and were implemented either across all web sites or individually depending on the nature of the enhancement. This strategy gives web site flexibility to have its own distinct presentation.

**Templates to Facilitate Stakeholders' Decision in Design**
In the majority of cases, stakeholders have difficulty in decision making in design without viewing sample or prototypes. A set of design templates are available on-line for viewing, to guide and facilitate the stakeholders’ decision making. All templates met the standard baseline requirements and common navigation architecture, but each look different and unique. It was decided early on in the process that each academic needed to have a unique and distinctive look and feel, while retaining common site architecture, navigation, and other standardized elements. The on-line templates worked effectively and all users had little difficulty choosing one when C³ presented them to stakeholders. To achieve the uniqueness of each web site, the templates allow stakeholders to choose background color, text font, and graphics.

**Assistance to Stakeholders in Preparing the Web Content**
With overloaded staff, it was extremely difficult for stakeholders to develop appropriate content effectively and on time. Therefore, a set of standard templates in Microsoft Word for developing content was designed. C³’s student intern team consisting of majors in business marketing or journalism prepared the web contents on the templates based on existing web site, brochures, and/or consulting stakeholders. The drafted content was then sent to stakeholders to review, revise, and approve. All contents and images were validated with their right of use.

**Outsourcing the Technical Portion**
Project implementation occurred within a predefined period of time. The technical portion required outsourcing so that technical staff won’t be immediately required to fulfill the needs of the project. With the collaboration and technology transfer approach, CVC specialists of programmer and graphic designers were able to fulfill project needs free of charge.

**Implementing Software Engineering Practices**
Implementing software engineering practices is the best mechanism to ensure that the project will achieve the highest quality results. The following stages were carried out during the project:

1. Requirement analysis and review: identify CHASS vision, standard baseline requirements and common navigation architecture
2. **Prototype**: develop a set of web design templates and a set of content development templates
3. **Design and Review**: program the design and navigation system of the templates, develop content, review and approve content
4. **Implementation and review**: program the site according to the content, review by both CVC and C³
5. **Test**: Web site review on-line via an Intranet environment by stakeholders.
6. **Install**: upload the web site from Intranet to its designated web server.
7. **File management**: Every web site has its own designated project folder on the file server which include sub-folders of Current Site (source codes and images), Prepared Docs (for the set of Word format templates holding the developed contents), and Support Docs (for storing all change requests). All updates were done on the Current Site folder and will be uploaded to web server after validation and approval.

**Virtual Web Server Hosted by C&C**

To eliminate the cost and maintenance of web servers, all web sites reside on the UCR main web server through virtual web server technology. Using this approach places minor limitations on site contents because of the security and other standards of the campus web server. However, the cost and reliability advantages of a single professionally managed server far outweigh any costs due to limited functionality.

**Effective Communications among Teams**

To achieve effective communication among teams, a set of electronic communication protocols using shared project folders, intranet web demos, e-mail and phone were setup for passing contents and informing development progress among teams. The set of content development templates are named as About Us.doc, Academic Programs.doc, Courses.doc, Contact.doc, People.doc, News and Events.doc. Word format content development templates have the exact page layout that was on the actual web page so that technical designers can easily implement it without consulting content developers or stakeholders. All links presented in red within a set of brackets. All images are in JPEG format with size no more than 30 KB in most cases.

**Intranet Based Development**

A restricted access web server is used for stakeholders to review the web sites before they are released to their designated web servers. The stakeholders either approved or requested modifications via e-mail after their review. This provided an easy and cost-effective method and facilitates the development pace.

**Project Organization**

Project organization was critical to success by providing an efficient and highly participatory social structure:

1. **Project Coordinator**: C³ Director is the Project Coordinator who was responsible for overall project management. The Project Coordinator coordinated the communications among stakeholders, Project Advisory Committee, Publishing Advisory Team, Technical Design Team and Content Management Team.
2. **Project Advisory Committee**: The committee was composed of faculty and staff volunteers selected in consultation with the leadership of each unit and was chaired by Associate Dean for Instructional Technology and Research reviews. The committee approved the standard baseline requirements and common navigation architecture, and project development approaches.
3. **Publishing Advisory Team**: The team, chaired by Assistant Dean, included staff who is involved with public relations. The team will reviewed the web site before release to the public and advised necessary on revisions to ensure proper contents are presented. Only errors of fact were edited by the advisory team; selections about how much information, what information, and style of presentation were left in the hands of the stakeholding units.
4. **Technical Design Team**: CVC was the primary technical design team in Phase I. C³ assumed the responsibility starting from Phase II.
5. **Content Management Team**: Members of this continuing group are authorized liaison from each stakeholder and C³ student intern team, along with the Project Coordinator. This continuing group
is responsible for developing web contents and maintaining web contents; the group also suggests possible enhancements for all managed sites (e.g. adding discussion boards).

Project Development Procedures

Phase I – Development and Technology Transfer

Phase I was the most challenging phase. Listed below are the development procedures that occurred during this phase.

1. Propose standard baseline requirements and common navigation architecture. Develop project development approaches.
2. Technical Design Team develops a set of design templates based on the standard baseline requirements and navigation system.
3. Form Project Advisory Committee and obtain committee’s approval of standard requirements and common navigation architecture (through reviewing the set of design templates), and project development approach. This is a critical step for gaining the consent from stakeholders since the committee represents the faculty. In November 2001, the committee accomplished the major milestone of concluding and approving the standard requirements and common navigation architecture, and project development approach, which paved a clear road for the project.
4. Prioritize the web sites.
5. Form Publishing Advisory Team and Content Management Team.
6. Stakeholder determines the design based on the design templates. Content Management Team begins to develop content in Microsoft Word.
7. Stakeholder review and approve the contents.
8. Technical Design Team performs programming and graphic design based on the content development templates and approved contents, and then uploads web site to Intranet web server.
9. Stakeholder reviews developed web site via Intranet, request modification or approve the design.
10. Publishing Advisory Team reviews the web site and makes recommendations for necessary changes.
11. Release the web site to its designated server. Inform Publishing Advisory Team to review.
12. CVC transfers all developed sources and images to C³ who has established its IT technical capability.

Phase II - Enhancement

For web sites developed in 2001 that met the RFP’s draft “standard and best practice”, enhancement achieves the uniformity of the web technology. With the technology transfer in Phase I, this phase also begins the customization of the web sites upon request from stakeholders to achieve distinction and uniqueness.

Phase III - Maintenance

With all web sites having reached the uniformed web technology, maintenance is much simpler. Content maintenance is performed regularly and technology is upgraded or added depending on the availability of the technology and resources. Unless the technology is so specific and has to be developed from scratch, the service is free to the stakeholders. For all tools and technology developed by C³, they will be free for stakeholders. For examples, messages board, online survey, online registration, event calendar, database, on-line audio, and image animation have been implemented on various web sites. This phase also develops new web sites as deemed necessary.

Resources Allocations and Justification

Resource allocation methods are described below:

1. CHASS’s Office of the Dean funded the project and at no cost to stakeholders. This reduced resistance from the stakeholders and improved the chances of succeeding the standardization of the web site technology across the college. The enhancement of the college’s global image, better marketing results, ability of future technology enhancement, and higher quality of web sites provide the ROI.
2. Each stakeholder invests the project by authorizing an individual to be the member of the Content Management Team, and releasing work time for this purpose, as well as (very) occasional meetings.
3. After project completion, stakeholders may be responsible for the financial needs of future technology enhancement depending the availability of the technology.

**Maintenance Schemes**

**Content Management**
1. For the stakeholders who have assigned an individual to maintain content directly, C³ configures a standard content management environment using Dreamweaver as editor.
2. Members of the Content Management Team for each web site, send updates to C³ via e-mail. C³ completes the update within two working days depending on the complexity of the update.
3. C³ assists the stakeholders in writing news and posting events regularly.

**Technical Enhancement**
1. C³ assists stakeholders to ensure the web site is keeping the pace with technology changes.
2. Tools and technology developed by C³ will be available for stakeholders at their discretion free of charge.
3. In case of specific technology enhancement requested by stakeholders, C³ develops and may charge a minimum fee depending on the complexity and availability of the technology.
4. C³ offers in-service seminars to update the availability of technology enhancement to Content Management Team twice a year.

**Project Results**

<table>
<thead>
<tr>
<th>Phase</th>
<th># Of New Developed Site(s)</th>
<th># Of Enhanced Site(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>III</td>
<td>4</td>
<td>47</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th># of Faculty</th>
<th># of Staff</th>
<th># of Graduate Student</th>
<th># of Undergrad Intern</th>
<th># of Dept. Head</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65</td>
<td>61</td>
<td>3</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

**Cost**

<table>
<thead>
<tr>
<th></th>
<th>C³</th>
<th>Stakeholders</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVC</td>
<td>Average 4 man-hour per web site</td>
<td>Minimum, only review time</td>
</tr>
<tr>
<td>Average 3 undergraduate interns, 15 hr/week per intern</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Examples**
The following are examples of these developed web sites.

- [http://www.politicalscience.ucr.edu](http://www.politicalscience.ucr.edu)
- [http://www.philosophy.ucr.edu](http://www.philosophy.ucr.edu)
- [http://www.religiousstudies.ucr.edu](http://www.religiousstudies.ucr.edu)
- [http://www.music.ucr.edu](http://www.music.ucr.edu)
- [http://www.anthropology.ucr.edu](http://www.anthropology.ucr.edu)
- [http://www.americanindians.ucr.edu](http://www.americanindians.ucr.edu)
- [http://www.sociology.ucr.edu](http://www.sociology.ucr.edu)
- [http://www.history.ucr.edu](http://www.history.ucr.edu)
- [http://www.chassstudentaffairs.ucr.edu](http://www.chassstudentaffairs.ucr.edu)
- [http://www.womensstudies.ucr.edu](http://www.womensstudies.ucr.edu)
Technology Utilization

1. Web Server: Sun Solaris Enterprise Server (provide virtual web server services), Apache freeware
2. Database: MYSQL freeware
3. Programming Languages: HTML, PHP
4. Database Management Tool: phpMyAdmin freeware
5. Graphic Design Tool: Adobe Photoshop
6. Web Editing Tool: Dreamweaver
7. Other Applications/Tools: PHP Message Board freeware

Timeframe

Phase I – Development and Technology Transfer: December 2001 to August 2002
Phase II - Enhancement: September to December 2002
Phase III - Maintenance: Starts from January 2003

Customer Satisfaction Data

Acceptance of New Site Development:

<table>
<thead>
<tr>
<th>Phase</th>
<th># of Site(s) Accepted during 1st Stakeholder Review</th>
<th># of Site(s) Accepted during 2nd Stakeholder Review</th>
<th># of Site(s) Accepted-More than Twice Reviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>22</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>III</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Conclusion

The CHASS web development project moved the college from a situation where a substantial number of the college’s (35) units had no web sites, or web sites that were outdated. There were no mechanisms for assuring that enterprise standards and best practices were being met, and maintenance was very difficult and expensive.

By the end of the project, all academic units in the college had new and distinctive web sites. Each web site met enterprise standards and best practices, and also conformed to the standards for content and navigation that were set by representatives of the units in the college. By the end of the project, web technology had been standardized – allowing for the possible future application of content management server technology.

More importantly, the project created new mechanisms of collaboration and cooperation across college units, the principle of “Working Together As A Team”, and provided a sense of stakeholder ownership in the web-presence of their unit, and the college as a whole. Mechanisms for providing continuing maintenance and review of web contents, assure that good maintenance, as well as low cost future enhancements will be possible.

The project was delivered over a little more than the period of one academic year, with extremely limited investment in new resources. Once in place, the software and peopleware approaches promise a flexible approaches to continuing enhancement of the web presence of CHASS academic units, at minimum cost, and with active collaboration between stakeholders and service providers.