Major Issue:
As of the summer of 2010, 10 years will have passed since CU-Boulder last made a significant investment in campus wide, generally available web hardware and software infrastructure. The lack of investment has resulted in a highly disperse web infrastructure environment. As of late February, 2010, the CU-Boulder IT Security Office had registered more than 500 distinct web servers spread across dozens of colleges, schools and departments. Many of these web servers were created due to the lack of progress on upgrading the generally available web solutions. Maintaining an extremely disperse web environment results in many inefficiencies. Consolidating around a collection of “common good” web services addresses these inefficiencies, leading to a web environment which is more cost effective, more durable, less complicated, more broadly available to anyone with web technology needs, and easier to support. In addition to inefficiencies, the extremely disperse web environment complicates CU-Boulder’s efforts to implement the University of Colorado System branding initiative. When the final details of the new visual identity standards become available, CU-Boulder will begin an effort to systematically align campus, college, school, and department web content with the new standards. CU-Boulder would greatly benefit from the development of additional web infrastructure services.

A. Background/Rationale

The CU-Boulder Web Environment
The CU-Boulder web environment includes two broad categories of service: 1) the primary WWW service, hosted by ITS, serving as a general purpose, “common good” but basic web site hosting environment, and 2) the highly distributed and localized campus wide web environment.

ITS has provided the “common good” www.colorado.edu web server environment since the earliest inception and identification of the world-wide-web as a core campus technology infrastructure need. No significant investment in improving the web server infrastructure available to campus as a whole has been made in nearly 10 years; the practices and technologies have not been significantly changed since the inception of web technologies in 1994. The age and stagnation of current central web technologies has, in large part, contributed to the second category of web environment, the collection of localized web solutions deployed by colleges, schools, and departments.

The current campus wide web environment at CU-Boulder is highly distributed and diverse. This highly diverse, highly distributed environment, though very flexible and suitable for meeting any number of business needs, results in a very inefficient use of university resources. The challenge of consolidating the CU-Boulder web environment will be finding the proper balance of a flexible enough environment to support many, but perhaps not all, of the technology combinations while still remaining sustainable.

Web Developer and Content Manager Support and Community
University Communications has developed resources for the large number of web developers and web content managers existing at CU-Boulder. The “Web Central” web site includes a
description of web technologies available, resources for training and certification available, a collection of help documents and guides, and lists the policies and standards governing web publishing at CU-Boulder. Though “Web Central” and the mailing list provide a useful collection of information, web developers and content managers would benefit from greater support and community development.

Brand Management
University Communications currently provides assistance to colleges, schools, and departments in developing their web visual identity on a for fee basis. CU-Boulder has developed guidelines for the web visual identity, but no mandatory standards and campus approved policies exist. The upcoming branding initiative of the Office of the President for the University of Colorado will require a change in this practice. The initiative will require the reevaluation and revision of the existing CU-Boulder “Web Identity Standards”, an increased need for mandating compliance with visual identity standards, and the systematic review and refurbishment of existing CU-Boulder web content to align with the new standards.

IT Strategic Plan 2006
The IT Strategic Plan of 2006 included a recommendation for implementing a web content management system and requested funding for the infrastructure and staffing for the service. Since funding never materialized, the effort stalled. The need still exists. Section 2.6.2 “Adopt and Deploy a Web Content Management Solution” renews the recommendation and request for funding.

Relationship to Flagship 2030
The strategic plan recommendations for Developing Web Infrastructure Services align with specific action items promoted in Flagship 2030. These include the following:

- Curriculum Enhancements
- Research Excellence
- Internationalizing the Campus
- Serving the State
- Investing in Our Staff
- Information Technology
- Developing a New Budget Model

B. Accomplishments to Date

- The www.colorado.edu service provides basic web capabilities, receives more than 1 million web page hits per day, and contains hundreds of thousands of web page content.
- More than 500 local web servers provide numerous web applications and frameworks for a variety of college, school, and department web needs.
- University Communications provides guidance and for fee assistance for colleges, schools, and departments seeking web development and content management assistance.
- ITS and University Communications collaborated on developing a functional requirement definition for a Web Content Management solution. The initiative has never been funded and, therefore, has not progressed further.
- ITS and University Communications have collaborated on identifying emergency communications needs and developing plans for enhancing web and messaging infrastructures.
The Office of the President for the University of Colorado has begun a CU-System wide branding and visual identity alignment initiative. Details and expectations will become available during the summer of 2010.

**Action Plan**

**Campus Assessment and Audit of Current Web Tools and Resources**

A. Explicit Assumptions

A detailed assessment of current web practices and technologies would greatly assist setting strategic directions for web infrastructure services.

B. Specific Recommendation

- Perform an in depth, campus wide assessment/audit of both current and desired web tools and resources.
- Maintain the gathered information through periodic review and reassessment.
- Summarize the results in a report.

Note: The general needs and current use assessment/audit should explore combining efforts with the IT Security Office.

C. Long & Short Term Objectives/Timeline

Short Term:
Perform audit/assessment

Long Term:
Provide one or more summary reports.
Continue periodic updating of the baseline audit/assessment.

D. Possible Risk:

Web infrastructure services may involve private or restricted data. The audit/assessment outcome documentation may contain information which could include sensitive detailed server, service, network, and data descriptions.

E. Resource Allocation:

The majority of the cost of this project involves personnel time for conducting the audit/assessment. Hiring an additional staff member responsible for conducting and maintaining these audits would require approximately $80,000 in ongoing funding.

**Responsible Parties:**

ITS, Campus-wide Governance Group(s), Organizational Unit web Information Technology support personnel, Organizational Unit web content developers

**Evaluation:**
• Completed audit/assessment and summary report(s).
• Impact of the audit/assessment on selecting appropriate web technology solutions for campus wide implementation.

**Adopt and Deploy a Web Content Management Solution**

A. Explicit Assumptions:

• Several funding requests for a Web Content Management solution have been issued but never granted. New, less expensive solutions may be available, but ongoing and one time funding will still need to be granted to proceed with this project.
• Developing work flow, delegating responsibilities for a Web Content Management solution, governance over standards, and policy/procedure development will require campus wide involvement.
• A Web Content Management solution would assist with the CU-System branding initiative.
• A Web Content Management solution supplements, but cannot immediately replace, the current [www.colorado.edu](http://www.colorado.edu) service.

B. Specific Recommendation:

Select and implement a Web Content Management solution available as a “common good” enterprise service available to all CU-Boulder faculty, staff, colleges, schools and departments. Provide adequate infrastructure and scalability to support sustainable growth.

The Web Content Management solution must account for CU-System and CU-Boulder policies and guidelines for Web Visual Identity standards, ensuring section 508 accessibility requirements are met for all content, and accommodating Universal Design for all content.

C. Long & Short Term Objectives/Timeline

**Short Term:**
Reevaluate and refine Web Content Management functional requirements developed by University Communications and ITS.
Investigate and select a Web Content Management solution.

**Long Term:**
Implement the solution.
Develop policy, practice, procedure, and work flow for the service.
Migrate content from the [www.colorado.edu](http://www.colorado.edu) and localized web solutions to the Web Content Management solution.

D. Possible Risk:
Some content may include sensitive information requiring greater security measures.

E. Resource Allocation:

Hardware and software infrastructure costs for a Web Content Management solution vary greatly depending upon the specific solution selected. One time infrastructure costs are expected to be within the range of $100,000 to $250,000. Ongoing funding for a five year renewal and replacement is expected to be within the range of $20,000 to $50,000.
Additional staffing for operating and maintaining the service: one ITS employee for the core infrastructure and one University Communications employee for application support are
required. The equivalent of two FTE’s for a total of $200,000 in ongoing funding would be needed.

F. Responsible Parties:
ITS, University Communications, Campus-wide Governance Group(s), Organizational Unit web Information Technology support personnel

Evaluation:

- Customer satisfaction and usability.
- Increased consistency and compliance with web branding standards and policy/regulatory compliance.
- The amount of web traffic (in hits and data transfer) served by the solution over time.

Create a Flexible, Robust, Multi-Purpose Web Hosting Environment

A. Explicit Assumptions:

- Sufficient funding commitments must be made in order for the Web Hosting Environment project to succeed.
- The Web Hosting Environment would accommodate many, but not all, of the needs leading colleges, schools, and departments to deploy localized web technology.
- The audit/assessment discussed in section 2.6.1 would provide highly valuable information for developing web hosting environment plans.
- A central "common good" Web Hosting Environment is expected to increase security by reducing complexity, reducing redundancy and the need to repeat security constraints across multiple solutions, and focus greater security expertise on developing a single robust solution.

B. Specific Recommendation:

- Implement a "common good" web hosting infrastructure capable of supporting a flexible, multi-purpose collection of web technologies including.
- Provide "common good" backend database structures.
- Design the solution for scalability and highly availability.
- Investigate the applicability of cloud computing resources to meet these needs.
- The Web Hosting Environment solution must account for applying CU-System and CU-Boulder policies and guidelines for Web Visual Identity standards, ensuring section 508 accessibility requirements are met for all content, and accommodating Universal Design for all content.

C. Long & Short Term Objectives/Timeline

Short Term:
Determine strategy for providing a web hosting environment and backend database solutions. Develop deep technical proficiencies in the small subset of web technologies that will be broadly supported for CU-Boulder. Develop shallow technical proficiency for the full collection of web technologies the web hosting environment will accommodate.
Long Term:
Implement the web hosting environment and backend database solutions.
Develop policy, practice, procedure, and work flow needs for the solution.
Migrate local college, school, and department web applications and application frameworks to the web hosting environment.

D. Possible Risk

Many localized web solutions maintain some form of sensitive data. The suitability of a shared, central web hosting environment for interacting with sensitive information will need to be carefully analyzed.

Cloud computing solutions may limit CU-Boulder's ability to directly respond to service incidents and develop service enhancements.

E. Resource Allocation:

Hardware and software infrastructure costs for a Web Hosting Environment vary greatly depending upon the specific solutions supported, and whether the service is built locally or contracted to an external cloud provider. One-time costs for developing the service are expected to be within the range of $100,000 to $200,000. Ongoing funding for renewal and replacement, or alternatively for ongoing contracts with external service providers, is expected to be within the range of $20,000 to $75,000.

Additional ITS staffing for operating and maintaining the service is required. The equivalent of one FTE for a total of $100,000 in ongoing funding would be needed.

If both the Web Content Management Solution recommendation and this Web Hosting Environment recommendation were acted upon, it is expected that some of the deployed infrastructure could serve both purposes and potentially lower the overall cost.

F. Responsible Parties:

ITS, University Communications, Campus-wide Governance Group(s), Organizational Unit web Information Technology support personnel

G. Evaluation:

- Measurable reduction in the number of distributed web servers on the CU-Boulder network.
- Customer satisfaction and adoption rates.
- The amount of web traffic (in hits and data transfer) served by the solution.

Establish Greater Campus Web Support, Training, and Community

A. Explicit Assumptions:

Sufficient funding commitments must be made to develop robust support, training, and establishment of a community for CU-Boulder web developers and content managers. These positions are critical for supporting the proposed Web Content Management and/or Web Hosting Environment. If funding is provided for the services but not the support staffing, the value of the deployed services will be reduced.
B. Specific Recommendations:

Create and hire a position in ITS Strategic Communications, Outreach, and Documentation for a Tier 2 Web Support Coordinator. The position would combine duties similar to the ITS Tier 2 Computer Support Representative Coordinator, facilitating communication and collaboration between central and college/school/department web personnel, and ITS Escalated Support, maintaining proficiency and currency with a wide variety of web technologies to provide web service support and advising assistance. The position would also develop and promote a web developers and content management community to encourage collaboration and knowledge exchange between the many web experts on campus.

Create and hire a position in ITS for Web Escalated Support to specifically support the enterprise web services: the legacy WWW service, the recommended Web Content Management solutions, and a small subset of the additional web technologies available within the web hosting environment.

Create and hire a position for a Web Business and Functional Analyst to provide in depth consulting to colleges/schools/departments on which web technologies and solutions could best meet their needs and to provide periodic information, training, and evangelism for current and emerging web technologies. The role would also need to gain and maintain awareness of CU-Boulder visual identity policies and standards, policies and federal regulations including section 508 accessibility requirements, web development best practices and standards such as W3C, and security and privacy practices in order to assist colleges/schools/departments in understanding and meeting these needs.

All three positions must maintain close coordination with both ITS and University Communications, serving as a bridge between the primarily ITS concerns of technology specifics and content creation, editing and hosting, and the primarily University Communications concerns of content composition, structure and presentation. These positions must understand and represent all of these concerns while assisting campus with their web technology needs. They must understand and provide assistance with meeting and retaining compliance with branding and visual identity guidelines.

C. Long & Short Term Objectives/Timeline

Short Term:
Create and hire an ITS Escalated Support position for Web Technologies.
Create and hire an ITS Tier 2 Web Support Coordinator.
Begin developing a CU-Boulder web developers and content managers’ community.

Long Term:
Create and hire a Web Business and Functional Analyst.
Possible Risk
None

D. Resource Allocation:

The recommended positions require hiring staff with considerable expertise:
$100,000 for the Web Support Coordinator
$100,000 for the Web Escalated Support position
$100,000 for the Web Business and Functional Analyst position.
E. Responsible Parties:

ITS and University Communications

F. Evaluation:

- Development and use of a “web developers community” for CU-Boulder.
- Increased communication and collaboration between CU-Boulder web developers and content managers.
- Customer satisfaction.

Develop CU-Boulder Web Standards and Achieve Compliance

A. Explicit Assumptions

- The CU-System is currently working on branding standards for the entire university. Once developed, all campuses will be required to align their web content with the brand.
- University Communications will be responsible for understanding the new branding requirements, assuring compliance for sites directly maintained by University Communications, and assisting other web administrators at CU-Boulder with understanding how to achieve compliance.
- CU-Boulder web identity and style standards, policies, and guidelines will need to be reviewed and updated and/or supplemented.

B. Specific Recommendations:

- Review and revise CU-Boulder Web Visual Identity standards to align with the CU-System branding initiative.
- Ensure CU-Boulder web sites achieve compliance with forthcoming CU-System web branding standards.
- Deploy a web reverse proxying and caching solution that will answer for all www.colorado.edu web requests.
- Conduct periodic audits of CU-Boulder web content to ensure ongoing compliance. Explore state and/or federal grant opportunities which may provide funding for and accessibility expert and auditor for campus.

C. Long & Short Term Objectives/Timeline

Short Term:
Review CU-System branding initiative standards once released.
Form plans for achieving compliance.
Review and update relevant policies to align with the CU-System branding initiative.

Long Term:
Select and deploy a web reverse proxying and caching solution.
Update web site layouts and content to conform to the branding initiative.
Conduct ongoing audits for compliance.

D. Possible Risk:
TBD

E. Resource Allocation:

Estimated costs for a cloud based reverse proxying and caching solution is $24,000/year. University Communications has the expertise for working towards comprehensive campus wide branding compliance, but would require backfill money to free the resources and maintain current obligations. The effort would require $200,000 in temporary money to backfill 3 positions for three consecutive years for a total of $600,000.

F. Responsible Parties

University Communications, ITS, Campus-wide Governance Group(s), Program Accessibility Committee, Disability Services, Organizational Unit web Information Technology support personnel, Organizational Unit web content developers

Evaluation:

Pre and post assessment of web site branding.

**Establish Standard eCommerce Solutions**

A. Explicit Assumptions:

Many colleges, schools, and departments have the need to accept internet payments. A few have adopted their own solutions. Standard policies, practices, and procedures for if/when/how organization units accept internet payments would decrease the risks associated with handling credit card data and increase efficiencies for accepting the payments.

B. Specific Recommendation:

- Reevaluate and revise CU-Boulder campus policies and procedures for if, when, why, and how colleges, schools, and departments conduct online eCommerce payments.
- Evaluate and adopt one or more eCommerce solutions as standards for all CU-Boulder eCommerce: a payment portal or gateway for CU-Boulder web transactions, a campus wide agreement with one or more vendors, and/or specific shopping cart solutions.

C. Long & Short Term Objectives/Timeline

**Short Term:**
Review, update, and create eCommerce policies.

**D. Long Term:**

Adopt standard solutions for CU-Boulder eCommerce. Meet and ensure PCI data security standard compliance.

E. Possible Risk:

eCommerce solutions must meet legal and security requirements for complying with PCI data security standards.
Specific needs for interoperability between the web application, eCommerce application, and the payment gateway are usually unique and complicated. Finding an eCommerce solution for campus must recognize those needs and be able to adapt and accommodate those needs.

F. Resource Allocation:

Cost of the project: TBD

G. Responsible Parties:

ITS: ITS Program Management, ITS Security Office, ITS Project Management, ITS Operations Office of University Controller, Office of the Treasurer of the University, Campus-wide Governance Group(s)

H. Evaluation:

- Adoption rate of eCommerce solution(s).
- Customer satisfaction.