May 2014

Project Title: Investigate Content Management Systems + Social Media Analytics systems

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Report Dates

- Project Scope – March 7, 2014
- Draft Report – April 4, 2014
- Final Report – May 16, 2014

Problem Statement

Although Cascade is the university supported Content Management System (CMS), and is utilized by many academic/non-academic organizations and units, there currently is no campus-wide utilized platform for content management, this with various groups utilizing varying platform solutions. For example, ECN uses Zope, the College of Agriculture uses SharePoint, and College of Technology uses Drupal. There is much good information produced and published on campus, but not having a single CMS prevents the information from being easily shared. Multiple conflicting systems are more expensive to support and learn than one campus-wide system. Additionally, much of the content being shared now includes images and video, and not all systems handle this type of content well. In practice, most corporations now carefully track the performance of content on the web and through social media. This provides important analytical data about what content is being well-received by the intended audiences. A "cradle to grave" system that would track a piece of content from initiation through its life stages on the Internet would be ideal.

The content management and social media analytics systems subcommittee of the Operational Oversight Committee, under Gerry McCartney, V.P. Information Technology, has been formed to better understand and frame the factors of efficiency and cost savings attendant to decentralized solutions for content management and human resource support across the campus of Purdue University, West Lafayette. The committee will seek insight into:
Efficiencies and effectiveness of centralized versus decentralized organizational design models and web platform software solutions
Defining the stated and derived requirements for content management systems across the many current academic and non-academic units
Identifying current content management systems in use and/or being considered for use and their capabilities

The final report will document the findings of this committee with recommendations for further study.

Executive Summary
Purdue University has the opportunity under the leadership of President Daniels to continue to be and enhance our reputation as good stewards of state appropriations and student tuition. In response to declining state revenues and student tuition freezes, Purdue is poised to lead the nation in becoming a model for efficiency and improved effectiveness.

On January 18, 2013, President Daniels’s Open Letter to the People of Purdue, makes explicit reference to higher education as we know it being poised for big change. He highlights treatises on challenges faced by higher education today:

- College costs too much
- Administrative costs have run up the cost to students without enhancing the value of education
- Rigor has weakened
- The system lacks accountability

President Daniels goes on to say “..the operating model employed by Purdue and most American universities is antiquated and soon to be displaced…” In response to these many concerns and criticisms, President Daniels offers suggestions for collective thought and action, to name a few:

- Excellence – “Purdue is not its buildings, or even its wonderful past or traditions ...this would be a great university if it met in a tent.” Purdue is its faculty and students and what happens when brought together effectively.
- Affordability – “...every university community should embrace the shared responsibility to reexamine current practices and expenditures with a determination to keep its tuition and fees within the reach of every qualified student”
- Shared governance – “..shared governance implies shared accountability. It is neither equitable nor workable to demand shared governing power but declare that cost control and substandard performance in any part of Purdue is someone else’s
problem. We cannot improve low on-time completion rates and maximize student success if no one is willing to modify his schedule, workload, or method of teaching”

- Common purpose – “...the widespread duplication of identical functions can work against the common goal we must have of affordability and liberating resources for new investments in faculty and facilities... many choices will necessitate a communitarian outlook that consciously places the interests of the overall university first”

President Daniels’s Open Letter to the People of Purdue makes reference to being good stewards, creating efficiencies, becoming more effective, reexamining current practices and expenditures, and addressing the duplication of support function services. These and many other references to our multiple email systems or web development tools are indicative of areas for improvement and alignment to our current mission.

The purpose of this report is to open dialog on one aspect underlying these many references, namely, the duplication of resources and increased costs attendant to the multitude of decentralized current content management systems.

**Recommendations and Action Items**

Recommendations for further action are duplicated below and are as well depicted later in the “Future Actions” section of this report.

- Categorize and prioritize the identified requirements
- Analyze the functional capabilities of the utilized and potential systems
- Analyze the implications of transforming the many currently used content management systems into the fewer recommended content management systems as discussed in this report.
- Assess the process and implications of realigning personnel into a matrix form of organizational design model with IT as the administrative functional organization and the academic and non-academic units as the targeted matrixed units.
- Create a time-phased set of activities with attendant outcomes to ensure a steady progression of effort, and, assign a single point of contact with responsibility and accountability for effort outcomes.

**Methodology**

At present there is no single, coherent and consistent manner to manage web content across the Purdue University campus of West Lafayette, Indiana. Content management web application systems are identified, purchased and utilized by each independent unit, academic or otherwise, in a decentralized manner. Any facsimile to consistency in tool usage, is generally coincidently.
To better understand the scope and implications of this decentralized approach, a methodical process was employed; identifying activities and attendant outcomes. A summary of the three primary activities of this study as well as a time-phased master schedule is depicted below.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
<th>Week 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Definition</td>
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<tr>
<td>Requirements Identification</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current and/or Considered Systems</td>
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Definition of the problem was examined through the lens of efficiency and cost savings as manifested through centralized versus decentralized organizational models and software platforms. A complete understanding and assessment of efficiencies and costs can only be realized when discussing both human and software implications. To this end, with an eye to centralized versus decentralized organizational models as applicable to human resource alignment and common software platforms is required. Appendix A more thoroughly discusses the advantages of centralized versus decentralized models of organization.

Requirements, both stated and derived, were identified through a university cross-unit represented requirements gathering information session. The group represented academic and non-academic units as nominated through their respective Information Technology (IT) point of contact (PoC) or an OOC Team #6 team member.

Identifying currently used and/or currently being evaluated content management systems and attendant application software was accomplished through the cross-unit representation and literature review comparing and contrasting commercially available applications.

Once the requirements were defined and alternative potential solutions were compared and contrasted, this report culminates with a recommendation for further study to overlay the subset of potential application solutions onto the identified and defined requirements.

**Problem Definition**

While it is widely accepted the centralization of resources, and, use of common hardware and software platforms, creates efficiency and subsequently lowers overall costs, the premise of this report is solidly grounded in organizational design theory and practice.

To fully appreciate the financial implications of common software and hardware platforms, one must be versed in the differences between cost savings and cost avoidance. Appendix A discusses these subtleties.
Requirements Identification
To better understand the stated and derived requirements of the academic and non-academic units relative to their use of content management systems, the Operational Oversight Committee convened a meeting of cross-university subject matter experts and end users. The collective efforts of this representative cohort resulted in the below high-level strategic stated and/or derived requirements.

<table>
<thead>
<tr>
<th>Detailed Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized support (e.g., ITaP or other group) for maintenance, training, technical issues, etc.</td>
</tr>
<tr>
<td>Allow non-Purdue collaborators to have authorized access</td>
</tr>
<tr>
<td>ADA compliance (including checking and providing feedback)</td>
</tr>
<tr>
<td>Should have strong mainstream, long-term (possibly open source) support; including ease of migration, upward and backward compatibility, etc.</td>
</tr>
<tr>
<td>Responsive support to ensure pages display well all devices</td>
</tr>
<tr>
<td>Ensure content is archived and versioned, and can be &quot;pull-back&quot; to previous state</td>
</tr>
<tr>
<td>Accommodate large sites (multi-gigabyte to terabyte)</td>
</tr>
<tr>
<td>Ease of content creation (e.g., by non-technical writers); including creation of blog-style content</td>
</tr>
<tr>
<td>Content tracking to alert contributors about old content and ask if it needs to be removed or updated</td>
</tr>
<tr>
<td>Efficient handling and sizing of images (e.g., resizing appropriately for clarity and to avoid slow page loads)</td>
</tr>
<tr>
<td>Ease of use for front-end developers (e.g., page layout, site design, navigation, menus)</td>
</tr>
<tr>
<td>Allow (but not require) workflows that require moderating content before publishing</td>
</tr>
<tr>
<td>Ease of use for back-end developers (e.g., scripting language, database support)</td>
</tr>
<tr>
<td>Allow cross-site sharing of content (e.g., to copy content from one site to another)</td>
</tr>
<tr>
<td>Social media integration into content creation (e.g., provide simultaneous Twitter and Facebook postings)</td>
</tr>
<tr>
<td>Integration with campus emergency notification system (web sites and computers pop up notifications)</td>
</tr>
<tr>
<td>Digital asset management, including making assets available to other campus sites in real time</td>
</tr>
<tr>
<td>Content syndication: Content is entered in one place, but can be distributed to multiple sites and pages</td>
</tr>
<tr>
<td>Ability to provide (at least some) remote support with a mobile device</td>
</tr>
<tr>
<td>Allow content publishing by start and end dates (and other criteria)</td>
</tr>
<tr>
<td>Support for e-commerce</td>
</tr>
<tr>
<td>Support standard access protocols, including SFTP and WebDAV</td>
</tr>
</tbody>
</table>
Support JavaScript library management, including jQuery plug-ins and Bootstrap
Integrate with campus and other calendering systems (e.g., Google calendar)
Provide quick and simple form building tools (e.g., MachForms)
Track data that is published across campus and to social media sites
Allow granular access controls for modifying content, including group and user management, and user content edit logs
Good and easy to enable analytics (e.g., equivalent to or better than Google); ability to aggregate analytics data among sites; dashboard view

Currently Used and/or Being Considered for Use CMS Solutions
The below, from the collective input of the cross-university cohort, represents those CMS and attendant software systems currently in use by one or more academic and/or non-academic units.

<table>
<thead>
<tr>
<th>System</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WordPress</td>
<td>Blogging and beyond (now with MultiSite)</td>
</tr>
<tr>
<td>OpenText</td>
<td>Enterprise Content Management (ECM)</td>
</tr>
<tr>
<td>MediaBeacon</td>
<td>Digital Asset Management</td>
</tr>
<tr>
<td>Plone</td>
<td>CMS built on Zope</td>
</tr>
<tr>
<td>Drupal</td>
<td>CMS</td>
</tr>
<tr>
<td>SharePoint</td>
<td>Collaboration system</td>
</tr>
<tr>
<td>Cascade</td>
<td>CMS</td>
</tr>
<tr>
<td>WordPress VIP</td>
<td>Hosted CMS</td>
</tr>
<tr>
<td>HootSuite</td>
<td>Social media management</td>
</tr>
<tr>
<td>SproutSocial</td>
<td>Social media management</td>
</tr>
<tr>
<td>SumAll</td>
<td>Analytics for marketers</td>
</tr>
<tr>
<td>iModules</td>
<td>Encompass online audience engagement</td>
</tr>
<tr>
<td>Web2Py</td>
<td>Web-database framework</td>
</tr>
<tr>
<td>Ruby on Rails</td>
<td>Web-database framework</td>
</tr>
<tr>
<td>Code Igniter</td>
<td>Web-database framework</td>
</tr>
<tr>
<td>Zope</td>
<td>Web-database framework</td>
</tr>
<tr>
<td>OpenID</td>
<td>Access control</td>
</tr>
<tr>
<td>Django</td>
<td>CMS and web-database framework</td>
</tr>
<tr>
<td>Chorus</td>
<td>CMS and web-database framework</td>
</tr>
<tr>
<td>RedPoint</td>
<td>CMS</td>
</tr>
<tr>
<td>Global</td>
<td>CMS</td>
</tr>
</tbody>
</table>
**Findings**

It is a recommendation of this report that the many current content management systems be centralized into some number of fewer currently available commercially viable solutions and that the personnel responsible for the design, development, integration, test and maintenance be centralized under the administrative umbrella of Information Technology, and, matrixed back to the academic and non-academic units as required for content management system activities.

The findings from this report are depicted below.

- There are approximately 23 content management systems and attendant support software employed across the West Lafayette campus of Purdue University.
- There are roughly 30 total unique operational requirements of the academic and non-academic units currently using a content management system.
- There exist commercially viable software applications which would satisfy the predominance of the stated and derived academic and non-academic unit total requirements.
- Centralization of these many current cross-campus utilized content management systems into one or more would result in a reduction in cost and an increase in efficiency.
- Common computing hardware and software is not simply a practice used in business and industry, but one which will provide significant efficiency and effectiveness as well as cost savings to Purdue University and its academic units.

**Future Actions**

Below depicts proposed future actions for consideration.

- Categorize and prioritize the identified requirements.
- Analyze the functional capabilities of the utilized and potential systems.
- Analyze the implications of transforming the many currently used content management systems into the fewer recommended content management systems as discussed in this report.
- Assess the process and implications of realigning personnel into a matrix form of organizational design model with IT as the administrative functional organization and the academic and non-academic units as the targeted matrixed units.
- Create a time-phased set of activities with attendant outcomes to ensure a steady progression of effort, and, assign a single point of contact with responsibility and accountability for effort outcomes.
Appendix A

Cost Avoidance versus Cost Savings

Cost avoidance is not the same as cost savings. Cost avoidance that does not directly lead to a cost savings may in fact actually lead to a cost increase.

An example best illustrates this difference. If a process is made more efficient, such that it used to take three people two hours each, or six person hours in total, and now takes one person one hour, that is a cost avoidance, through a process improvement, of five person hours. So, it may be stated that the organization, through process improvement, has saved five person hours. If those saved five person hours are simply reapplied to other areas of work, then there are no real savings, simply a cost avoidance through the improvement of one process.

Real savings, in contrast, are savings that have a direct reduction to the bottom line performance of the organization or unit. To be short, if the five person hours saved in our above example resulted in not paying someone for the five person hours, then that saved cost is realized in the bottom line of the financial statement. In other words, an organization or unit could give back to the oversight entity the equivalent of five person hours worth of funding.

Cost savings, then, are real and have a direct impact on the bottom line of the financial statement. Whereas, cost avoidance may result in an improvement contributing to increased efficiency or effectiveness, but does not necessarily result in real cost savings; i.e., a realized reduction in expenses against an activity base, which may be returned to a parent organizational entity.

Cost savings may be realized through one, another or combination of activities. Namely:

- A unified approach to common hardware and software platforms.
- Reduction in required new hires – this is a reduction through attrition and consolidation of lower-skilled positions into fewer, more highly-skilled positions.
- Recognition and personnel actions relative to a skills mix issue – a model frequently used in business and industry and premised on Jack Welch’s General Electric model put forth in his 2000 report to shareholders, which advocates the churning of the bottom 10% of personnel on an annual basis.

Converting from one organizational design model (decentralized) to another (centralized), may, and should, result in increased efficiencies and cost savings. This is the premise of the remainder of this report.
Centralization versus Decentralization - The Matrix Organization Design Model

Centralization of resources, which includes the utilization of common hardware and software platforms, brings consistency and coherency to policies, procedures, methodologies and practices, as well as consistency in human resource knowledge. This latter point of consistency in the knowledge, skills and abilities of comparably trained individuals creates a parallel discussion on centralizing versus decentralizing human resources; hence the direct applicability of discussing organizational design models. While centralization of resources increases efficiencies and reduces overall costs, decentralization increases resources and inherently increases costs due to replication of the many resources and variability in platform application software implementations.

The manner in which an organization groups work, and people, is referred to as an organization’s structural design, or its organizational design model. From a theoretical and experiential perspective, as an organization evolves from a small entrepreneurial entity to a mature and evolving on-going concern, so too does its organizational design model evolve.

Premised on the conclusions and recommendations of this report, the matrix organizational design model is discussed at this time for reference purposes.

The matrix structure is a hybrid organization that attempts to balance the use of human resources as people are shifted from one project to another. It can be viewed as a project organization superimposed over a functional organization. The figure below is an example of a typical matrix organizational structure.
Taking the above and converting it to terminology specific to higher education and Purdue University specifically reflects the model below.

The matrix structure is more complex than either the traditional or product-oriented structures. To this end, it requires basic ground rules to be successful:
Participants must spend committed time in an academic unit; this ensures a degree of loyalty.
Horizontal as well as vertical channels must exist for making decisions.
There must be quick and effective methods for conflict resolutions.
There must be good communication channels between leaders.
All leaders must have input into the planning processes.
Both horizontal (ITaP) and vertical (academic unit) leaders must be willing to negotiate for resources.
There should, ideally, be no disruption due to dual accountability.

Matrix Model Advantages
Advantages of the matrix organizational structure are predominantly focused on efficiency and cost savings, this through a focus on the knowledge, skills and abilities of people and the efficient allocation of those people across academic units:

- Promotes career continuity and professional growth, as each information technology individual has a home discipline outside of the academic unit; meaning, the individual can be retrained and redeployed in other Information Technology (IT) required capacities.
- Perpetuates consistent and coherent technology. By this, functional IT resources gain the benefit of a functional strength of knowledge and skills, which can be transferred to the academic or non-academic unit.
- Resources may be retrained and redeployed without an academic unit having to take personnel actions. The IT function, as the home department of all IT personnel, assumes any and all personnel actions.
- Resources may be used in multiple shared capacities. This supports the level and full loading of each individual, versus partial loading expanded to fill a full-time load requirement.

Matrix Model Disadvantages
Disadvantages of the matrix organizational structure include:

- Dual accountability of personnel. This is perhaps the biggest threat to this type of structure. Personnel will generally favor whoever it is that completes their performance review and subsequently has control over their income adjustments. Confusion here can derail a collaborative effort.
- There are continuously changing priorities, especially on the part of the academic units who control the resources.
- Employees may feel confused about loyalty.
Current Decentralized Academic Computing Purdue IT Model Advantages

- Strong control by a single academic unit
- Rapid reaction time. The academic unit has all of the resources required to be successful, and can command these resources in any way required to satisfy their changing needs
- Encourages performance, schedule, and cost tradeoffs within the academic unit
- Personnel are loyal to a single academic unit
- The academic unit interfaces well with outside units. In this model, a single academic unit is given primary responsibility for interfacing with other units, both externally and internally.
- Good interface with customer – a single academic unit (e.g., Science) interfaces well with students, alumni, donors and research entities
- Strong communication channels. It helps in this type of structure that all employees have a common goal: to produce a single product or brand of product. This builds a unified allegiance to a single cause.

Current Decentralized Academic Computing Purdue IT Model Disadvantages

- Inefficient use of resources; decentralization creates a duplication of effort. This may be the single greatest argument against this type of organizational structure. The fact that, in the above example, IT personnel are duplicated for every academic unit implies full-time employees are being used where part-time employees may only be required.
- Does not develop strong functional technology. Single individuals performing a single function within an academic unit do not have the time or the breadth of exposure to see what the latest and best methodologies, techniques, and practices may be; as can be learned from other academic units or from a centralized discipline.
- No direct connection with centrally-supported enterprise applications. This is problematic in three ways:
  - there may be an already-implemented or planned enterprise application that can for the most part meet the academic unit’s needs,
  - if one academic unit has a specific need for new functionality, chances are others do as well and the need should be explored centrally, and
  - if a unit-specific application requires a connection to enterprise data, that work effort is not centrally prioritized.
- Does not prepare for future business. Without functional oversight, the entire academic unit is focused on design, development, and delivery of a single product or service. If greater vision does exist, it typically is limited to similar, or like, services. In academic unit terms, academic units are limited in their services received with little opportunity for cross-fertilization of IT services available
- Less opportunity for technical interchange of IT personnel among centralized or other academic units
Minimal career opportunity and continuity for academic unit IT personnel. In other words, there exists limited career growth potential within the singularly focused academic unit.

Difficulty in balancing workloads as projects phase in and out. Individuals may not have work in a particular time frame, but must be kept busy doing something until that specific type of function is again in demand; this, assuming IT subject matter expertise is a focal point.

**Cohort Considerations for Use**

There exist two bifurcated primary cohorts when considering the university-wide organizational model for distribution of IT human resources and utilization of common software and hardware platforms; the central university IT organization and the academic units (academic and non-academic).

**University Centralized IT considerations for use**

It is the interest of the centralized IT organizational model to achieve the following:

- Create a common set of policies, procedures, guidelines and practices
- Create a consistent and coherent knowledge and skill base for each system (content management system, operating system, database management system...) and applications tool
- Promote career continuity and professional growth within the IT discipline
- Provide continued employment through the reassignment of human resources – this is accomplished through schedule level-loading across academic units
- Reduce university costs through more efficient utilization of IT human resources

**Academic Unit Considerations for use**

It is the position of the academic units to achieve the following:

- Academic-unit specific knowledge
- Control of required IT resources
- Adequate response time from IT personnel

Relative to academic unit specific knowledge, the question arises what knowledge is central to the information technology department; i.e., is it academic unit specific knowledge (math, history, science…) or information technology specific knowledge (operating systems, database management systems, applications…)? It would appear on the surface the knowledge most applicable to information technology personnel is information technology specific knowledge. IT personnel need to understand how an academic unit intends to use the information technology, but does not need to have the breadth or depth of academic unit discipline specific knowledge. To this end, the matrix model seems most appropriate with information technology
and all resources aligned to an information technology discipline and subsequently assigned as required to support an academic unit.

Control of IT resources is a double-edged sword. Control of personnel, while a typical management response for accomplishing tasks within cost and schedule, fails when work is no longer necessary or changed and a skills mix materializes. For example, should an academic unit desire to move to another web development platform, current IT personnel might prove most unskilled. In this instance, it would be more appropriate to allow the existing IT personnel to return to their IT functional stovepipe and be offered yet other IT personnel with the appropriate skills to move the academic unit in the new direction they have selected. This ability to move personnel to and from a functional stovepipe lends itself to a matrix organizational design model.

Response time of an IT function and its assigned personnel to the needs of an academic unit is of major concern to the academic unit when something needs to meet schedule criteria. This topic forms the underlying premise in some instances for academic units seeking control of their own IT resources. This topic is more appropriately an issue for resolution between the IT functional stovepipe and the lead of the academic unit; and, should not be a criterion for changing an organization’s design model.