



# Technology Strategy Report

Request for Public Comment

October 24, 2005

SUNY Learning Environments

SUNY Plaza

Albany, NY 12246

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# Introduction

## What's this all about?

In Spring 2005, SUNY Learning Environments (LE) convened a Task Force to envision a future in which all of SUNY could be supported by a common online environment for teaching, learning, and research. This future solution would support system-wide collaboration while continuing to address the respective needs of individual campuses.

On June 1<sup>st</sup>, the Task Force issued its report, which was the first step in a requirements-gathering process by LE in order to best identify a technology strategy that will offer long-term sustainability to the 100,000 enrollments, 3,000+ faculty, and 40 campuses participating in SUNY Learning Network (SLN) as well as students, faculty, and campuses that SLN may serve in the future.

Now, SUNY LE has identified a uniquely powerful and flexible LMS solution, and this Technology Strategy report details how they reached their conclusions. The following Executive Summary provides an introduction to the solution and highlights the evaluation process. The remainder of the report discusses the evaluation and solution in detail.

## Why a new technology?

For the past 10 years, the Lotus Notes/Domino platform has served the SLN community well. However, the time has come to identify a platform that will serve the community even more effectively for the *next* 10 years. Making the right choice is no easy task.

Finding the appropriate solution involves carefully evaluating the changing needs of the campuses, rapid pace of change in technology trends, and evolving best practices in online teaching and learning --without losing sight of the fundamental values around teaching and learning that the SLN community holds dear.

## What happens next?

LE's goal is to make this technology transition a positive experience for our member campuses. We expect this process to take several years. During that time, LE will work with each campus to develop transition plans that suit their needs and their timeframes. The current platform will continue to be supported until all member campuses have made the transition to the new platform.

To ensure a smooth transition, both the solution candidate and the implementation and migration plans (detailed in this report) are designed to be substantially customized to meet the needs of our community. On an ongoing basis, these plans will be adjusted in response to feedback from our constituents.

Toward that end, we are releasing this report to inform and solicit feedback from the SLN community. It is critical for LE to confirm that our planning to-date is consistent with the evolving needs of the community, and to receive any course-correction necessary to keep our planning closely aligned with the community's needs.

LE will be gathering feedback from all SUNY campuses as well as from trusted advisors and recognized experts in the global distance education community. All feedback will be incorporated into LE's planning and implementation documents, which will be released on a quarterly basis to keep the community apprised of our progress.

## How you can help

Once you have reviewed this report, please provide any feedback to LE you feel is relevant. In particular, we would greatly appreciate any further information regarding the following matters:

- **Educational Appropriateness:** To what degree does our proposed solution candidate align with your campus' particular educational objectives, administrative needs and the desires of your faculty, staff, students, and other relevant stakeholders?
- **Technological Feasibility:** To what degree does this technology solution align with your campus' Information Technology guidelines, practices, mission and vision?
- **Risks and Opportunities:** What risks or opportunities do you see in the proposed implementation and support measures, and how can LE and/or SLN mitigate or capitalize on those respectively?
- **What is missing:** What information is missing from the analysis, selection criteria, candidate solution, or implementation and support plans?

SUNY LE thanks you in advance for your attention to this report and welcomes your participation as we build significant advancements into the teaching and learning environment supporting SUNY's future.

## Executive Summary

This summary provides an introduction to the technology solution proposed by SUNY Learning Network (SLN) and highlights the evaluation process performed by the Learning Environments (LE) Technology Team.

Both the proposed solution and the evaluation process are discussed in detail later in this document.

### The Technology Solution Candidate

The LE Technology Team and LE Task Force performed extensive evaluations to find the most powerful and flexible learning environment technology solution for all of SUNY, one that effectively matches our increasingly complex requirements, now and into the future.

After considerable research, SLN has identified the best solution to be a **component strategy**, as no single-platform LMS solution exists today to meet our needs. This powerful component strategy would integrate several carefully chosen Open Source projects, each with strong technical compatibility, resulting in a whole far greater than the sum of its parts.

Collectively, the component technologies provide the requisite compatibility through standards compliance, complementary function, and strong alignment between their supporting communities. The result is a system that provides important wins for SUNY, including:

- Optimized integration with various campus IT systems;
- Leveraging of leading-edge design of teaching and learning environments;
- Feature sets far richer than any currently available single-platform LMS.

### Technology Components of the Proposed Solution

- **uPortal – Extended functionality and unified user experience**  
uPortal is a free, sharable portal under development by institutions of higher education. It allows flexible integration with SIS and other campus information technology systems for a consistent user experience, and uPortal enables SLN to implement a broad range of tools from a variety of sources.
- **LAMS - Best-in-class teaching and learning experience**  
The Learning Activity Management System (LAMS) is an Open Source project that is globally recognized to be the most advanced and easy-to-use implementation of IMS Learning Design to-date. With LAMS, faculty will be able to use an intuitive, drag-and-drop authoring environment to create online course experiences more compelling than anything allowable in most LMSs today. LAMS is built using technologies compatible with uPortal, which allows SLN to easily integrate the two components to create a seamless user experience.
- **Sakai and other sources - Best-in-class tools**  
SLN will be able to choose the best individual tools from a variety of sources, both Open Source and proprietary. For example, SLN could choose to use Sakai's excellent Samigo test engine while using other best-in-class tools from different sources. This integration flexibility provides a significant advantage over current single-platform LMS's, which currently provide tools that only partially address our complex needs.

## The Evaluation Process

Performed by: **LE Technology Team**

The evaluation process included extensive reviews and analyses, which are highlighted in this summary and detailed later in this document. The evaluation process included:

1. **Assessments and Assumptions**

The LE Technology Team reviewed specific foundational data that would be required of any LMS technology candidates. These reviews included technical and IT environment assessments, assumptions on SUNY requirements, and assertions for long-term trends in LMS development.

2. **Analysis of Task Force Recommendations**

An LE Task Force, comprised of representatives from across the SUNY system, was formed to envision a future in which all of SUNY could be supported by a common online environment for teaching, learning, and research. The recommendations of that task force were then analyzed by the LE Technology Team in order to form the necessary criteria for evaluating candidates for a new LMS solution.

3. **Evaluation of Potential Solutions**

Drawing on both the assessment studies and the analysis of the Task Force recommendations, the LE team then proceeded to evaluate potential solutions, including consideration for resources and support availability. Once a strong solution had been identified, the team prepared an overview as well as a snapshot of a functional specification for production of that solution.

4. **Implementation Strategy**

As a final step in the process, the LE Technology Team formulated an implementation strategy for the proposed LMS solution, one that effectively addresses the anticipated challenges of development, rollout, and migration of a new learning environment solution for SUNY.

# Assessments

## Overview

To begin the evaluation, the LE Technology Team reviewed specific foundational data that would be required of any LMS technology candidates, including:

- **Technology Assessment**  
Along with IBM consultants, the LE team assessed the viability of both Lotus Notes/Domino and its successor technology, Workplace/WebSphere, for serving the short- and long-term needs of the SLN community. Conclusion: Both teams determined that neither of these technology platforms is a viable option for SUNY.
- **Assumptions**  
Teams re-affirmed SLN's historic mission and added requirements for closer integration with complex campus IT environments.
- **Assertions for Long-term trends for LMS**  
It was critical to incorporate assertions on long-term trends in Learning Management System (LMS) development. Conclusion: The teams determined that a portal is the best technology foundation for a modern LMS.
- **IT Environment Assessment**  
The team reviewed availability and requirements of support centers such as ITEC and SICAS, initiatives such as the portal evaluation and university-wide LDAP, and growing trends such as cross-campus enrollment.
- **Task Force Recommendations**  
An LE Task Force, comprised of representatives from across the SUNY system, was formed to envision a future in which all of SUNY could be supported by a common online environment for teaching, learning, and research. The recommendations of that task force were then analyzed by the LE Technology Team in order to form the necessary criteria for evaluating candidates for a new LMS solution.

## Technology Assessment

Both the LE Technology Team and consultants from IBM (the manufacturer of Lotus Notes/Domino, our current LMS platform) independently assessed Lotus Notes/Domino's ability to meet both current and long-term functional needs of the SLN community as well as the stability of the underlying technology itself. The result was that both teams recommended *against* continued use of a Lotus Notes/Domino environment as SLN's technology base for reasons detailed below.

LE is confident that the technology team can maintain quality support for current users on Lotus Notes/Domino for the next several years. However, we must anticipate and plan for a technology platform that is aligned more effectively with the projected functionality, performance and scalability needs of the SUNY community for years to come.

The primary drivers for migrating away from Lotus Notes/Domino are as follows:

1. **SLN's implementation of a Lotus Notes/Domino-based LMS has reached the limits of its scalability and performance.**
  - Loss of performance... SLN's architecture is based on Lotus Notes' document-driven data storage, which limits performance due to reliance on look-up views (flat or table data model) rather than relational databases. This inefficient process creates a significant performance lag. For example, many SLN features require data based on a personal profile rather than a document profile. This is fundamentally impossible in a document-driven database like Notes considering the number of users. SLN would require 110,000 user-profile documents to run against hundreds of millions of documents.
  - Inefficient security implementation... In SLN's deployment of Lotus Notes, security is an attribute of a document, not a user. This requires all documents to be read in order to determine each user's access privileges. As SLN requires 7 terabytes of data for document storage, this approach is not as efficient as other methods available. Optimizing SLN's security implementation would require significant rewriting of SLN code.
  - Increased storage costs... Domino utilizes data replication to maintain data continuity between servers, and each server requires a dedicated data repository. This restriction means significantly higher storage costs compared with other platforms where servers can share data repositories. While this configuration provides redundancy, beneficial for recovery and back-up, continued storage demands and their accompanying costs will soon outpace the benefits of six repositories.
  - No performance data... IBM only offers performance benchmarks and evaluation based on Notes mail use: NotesBench. There are no benchmarks or established performance evaluation criteria for SLN.
2. **Lotus Notes limits SLN functionality desired by users.**

The LE Technology Team submitted to IBM a report on the most urgently requested features and functionality, and IBM responded that they were unable to identify solutions to meet our needs.<sup>1</sup>
3. **SLN has no active community outside of SUNY developing tools specifically for SLN's LMS.**

SLN was created by SUNY as a custom-developed service, and there are no other organizations running SLN. Out of the 80+ Learning Management Systems reviewed by Edutools, only one --TeleTop developed at The University of Twente in the Netherlands-- is based on Lotus Notes/Domino.<sup>2</sup> As a result, *all LMS functionality that can be useful to SUNY must be custom-developed by or for SUNY.* There is no reason to believe that migration to any direct successor technology of Notes/Domino would change this situation.
4. **IBM's transition from Lotus Notes/Domino to IBM Workplace/WebSphere represents a substantial migration challenge for Notes/Domino customers.**

According to the Gartner Group, "IBM's positioning of Workplace against Microsoft represents a tacit admission of the shortcomings of its well-established Notes/Domino product. Within IBM, many viewed the technologies underneath Notes and Domino as limiting the potential to enter new markets and for technological evolution. The

<sup>1</sup> For the full text of IBM's response, see Appendix A of this report.

<sup>2</sup> See

<http://www.edutools.info/course/compare/compare.jsp?product=215,153,164,216,232,252,220,230,239,256,259,79,152,3,144,236,251,165,128,130,169,69,183,118,70,193,173,148,237,261,52,73,217,115,114,132,116,113,129,74,203,112,78,151,146,41,180,156,168,227,233,255,219,140,218,182,234,260,262,157,21,231,155,15,4,142,160,176,141,145,175,235,162&feature=63>. NOTE: While UMUC's WebTycho runs on Domino servers and supports a comparable user base, Lotus Notes is not used by UMUC faculty and staff for course development and administration.

Notes/Domino infrastructures were too monolithic and proprietary for the rest of IBM to embrace, and not ready for the emerging world of service-oriented architectures and open systems. In addition, Notes and Domino were alien to the other technology initiatives inside IBM software, such as DB2 and WebSphere. The problem for IBM is that Workplace is not ready yet for Notes/Domino customers to switch to.”<sup>3</sup>

5. **For LMS platforms, IBM recommends technologies other than Workplace.**<sup>4</sup>  
IBM has partnered with Sakai Community for providing an LMS solution to their higher education customers and explicitly recommends to LE that SLN2.0 **not** be based on Workplace technology.

## Assumptions

The following assumptions were made for selecting a new technology platform and LMS:<sup>5</sup>

- SLN2.0 should satisfy the needs of current SLN campuses.
- Student access to courses (education) should be increased.
- SLN should integrate with system-wide and campus enterprise applications.
- SLN, by acting as a centralized service provider, should provide efficiencies to the campuses.
- Campuses desire a centralized service to provide and promote best practices and communities for online teaching and learning.
- SLN's current users deserve a smooth migration to a stable platform.
- The LE Task Force's recommendations should be considered and implemented in the design and distribution of future SLN technologies and services.
- A proof-of-concept should be available for review by the campuses in Fall 2006 with a production-quality implementation available on or about Fall 2007.

## Assertions

The following assertions represent noteworthy trends in SUNY, online education, and higher education in general, which are likely to have significant impact on the future of Learning Management Systems.<sup>6</sup>

Like the environmental assumptions, the following assertions were used for establishing the criteria of the new technology platform and LMS:

- The standard set of tools and functionality available in LMSs is finite.
- LMS development should be focused on the development of tools and functionality for narrower teaching niches.
- Interoperability provides richer usability than integration.
- The portal is the best platform for delivering an LMS.

There is reason to believe that commercial vendors in higher education have economic motivation to *reduce* interoperability rather than increase it. For a detailed argument along these lines, see Derek Morrison's paper, "E-Learning Flexible Frameworks and Tools: Is it too late? – the Director's Cut."<sup>7</sup>

<sup>3</sup> Is IBM's Lotus Notes/Domino a Safe Investment Platform? Gartner, 1 March 2005.

<sup>4</sup> See <http://www-03.ibm.com/industries/education/doc/content/news/pressrelease/1306320110.html> and [http://www.sakaiproject.org/index.php?option=com\\_content&task=view&id=234&Itemid=222](http://www.sakaiproject.org/index.php?option=com_content&task=view&id=234&Itemid=222)

<sup>5</sup> Note: The following assumptions were eliminated during the evaluation and analysis process: 1. SLN should be a compelling choice for all SUNY campuses and 2. SLN2.0 should be available for Fall 2006 courses.

<sup>6</sup> See Appendix B for the rationale behind these assertions.

<sup>7</sup> See <http://www.bath.ac.uk/e-learning/Download/DM20040909.pdf>

## IT Environment Assessment

In addition to the assumptions, assertions and Task Force recommendations, the SLN evaluation process included an assessment of existing dependencies, policies, practices, and initiatives across the SUNY landscape at the SUNY-wide, campus, and SLN program levels.

The most significant environmental elements identified are as follows:

### SUNY Learning Network

- Over 100,000 enrollments, 4000 courses and 1000 faculty supported by SLN annually.
- 40 campuses, of which:
  - 38 deliver asynchronous courses via SLN;
  - 13 deliver blended/hybrid courses via SLN;
  - 12 use SLN exclusively for all of their online teaching.
- 104 of the 141 online degrees and certificates offered throughout SUNY are delivered via SLN.

### Campuses

- Campuses are steadily adding applications to their ERP such as: e-mail, calendars, directories, search engines, announcements, portals, workflow, student management systems, content repositories, e-portfolios, etc.
- Nearly all SUNY campuses currently offer online access to educational content.

### SUNY System-wide

- **Cross-Campus Enrollment:**

*Current Enrollments:* SLN can potentially provide any SUNY student with access to courses across SUNY, regardless of campus, discipline or degree program.

*Institute for European Union Studies at SUNY Program (IEUSS):* This program brings together political/social science faculty and courses from SUNY Fredonia, SUNY Cortland, Jamestown Community College and Manchester Metropolitan University, England with students from across SUNY and the world. The IEUSS is an example that illustrates how faculty with specific expertise, yet limited campus support, can collaborate and pool resources to offer unique curricula.

*Bachelors of Electrical Engineering:* All courses, materials, tests, labs, discussions, advising and contact with faculty will occur completely online. It is the result of a unique collaboration among three prominent universities of the State University of New York - Binghamton, Buffalo and Stony Brook funded by the Alfred P. Sloan Foundation. It will be the first online degree in the scientific or technical disciplines of this stature coming from campuses in the Research I Carnegie classification.

- **Portal Initiative:**

SUNY began a University wide portal evaluation in November 2004. Chaired by Karen Klose, Associate Vice President, Information Technology Services, SUNY College at Fredonia, the committee was created to evaluate different portals and present findings focusing on shared u-wide standards and community. Participants include a number of campuses, SLN, SICAS, ITEC, System Administration and individual faculty and staff.

- **SUNYConnect:**  
A joint initiative of the SUNY Provost's Office of Library & Information Services and the libraries of the 64 SUNY campuses to share collections and services across the State University of New York. SUNYConnect provides a collection of full-text, full-image and multimedia digital publications and services available to all SUNY students, faculty and staff anytime and from anywhere. Additionally, they provide applications to provide more powerful searching and integration of Web-based electronic resources.
- **SCT Banner Initiative:**  
Currently, SUNY offers system-wide access to SCT Banner for student, financial aid, finance, HR, and advancement. Currently thirty-seven SUNY campuses have partners with SCT and SICAS, SUNY's internal Banner support center.
- **SICAS Center:**  
The Student Information and Campus Administrative Systems supports administrative computing needs for SUNY campuses that operate SCT BANNER through administration, maintenance, enhancements and documentation.
- **University-wide LDAP:**  
A typical LDAP server is a simple network-accessible database where an organization stores information about its authorized users and the privileges of each user. Thus, rather than creating a new account on 50 different computers, the new faculty, staff or student is entered into LDAP and granted rights to those 50 systems. SUNY has been exploring the development of a system-wide implementation since 2003.
- **ITEC Support:**  
ITEC is one of several special purpose organizations within the SUNY system established by participating institutions to support multi-campus, computer-related, group activities targeted at improving the quality, quantity and cost- effectiveness of campus-based and University-wide computer services. These services include:
 

*Hosting:* ITEC provides Hosting Service to University-wide programs and campuses. The Hosting Service provides centralized support for University-wide programs and campuses share common computing and networking needs.

*Hardware and Software Contracts:* ITEC has been designated the single support organization for University-wide software contracts. Software licenses, support, upgrades, etc. are provided, including operating systems and layered products, Oracle software, Lotus Notes, etc. ITEC also provides support in hardware acquisitions.

## Summary of the Task Force Recommendations<sup>8</sup>

SUNY Learning Environments (LE) convened a Task Force of representatives from across the SUNY system to envision a future in which all of SUNY could be supported by a common online environment for teaching, learning, and research. This future system would incorporate all the benefits of system-wide collaboration without compromising the respective needs and missions of the constituent campuses.

The Task Force recommendations for SLN2.0 were as follows:

- Prioritize and emphasize teaching and learning.
- Harness the strength and diversity of the SUNY federation.
- Maintain excellence in service.
- Plan for tomorrow's campuses.
- Support a smooth transition.

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<sup>8</sup> See Appendix C

- Develop open and transparent governance.

In addition, LE affirmed the following:

- Support the grass roots.
- Establish a baseline of competitiveness.
- Respond to the guidance of the task force.
- Provide ongoing calibration of future development.

# Analysis of Task Force Recommendations

## Overview

After the data was gathered from the assessment phase, the next step for the LE evaluation team was to analyze the Task Force's recommendations to translate these high-level directives into LMS evaluation criteria. The following evaluation criteria were deduced:

- Strong support for integration of new teaching and learning tools via open standards.
- Student-centric rather than course-centric application design.
- Support for the IMS Learning Design Specification.
- Native interoperability with SUNY's portal environment.
- Strong integration capabilities with campus IT systems.

## Analysis of Task Force Recommendations

### Recommendation 1: Prioritize and emphasize teaching and learning

*One of SLN's key competitive differentiators has been and should continue to be its focus on delivering tools, training, and research that promote the best possible learning experience for SUNY's students. SLN should maintain this emphasis on teaching and learning excellence and should expand it by supporting multiple pedagogical approaches and supporting tools, especially in the area of discipline-specific teaching innovations. SLN should also continue to support and promote its research into online teaching and learning, which has shaped the design of its learning environment to-date and should continue to drive future development.*

This recommendation strikes closely to the core values of SLN; the LE evaluation team therefore spent significant time considering its implications when devising the following LMS selection criteria:

- **Strong support of discipline-specific and other niche tools:**  
As learning environments grow richer, the number of specialty/niche teaching applications will dwarf the number of general-use tools typically found in today's LMSs. As a result, the number of specialty tools available for a particular platform today is less important than a strong adherence to open technology standards that will facilitate the rapid integration of new tools as they are developed. Best-in-breed support for open integration standards is therefore a critical evaluation criterion for SLN2.0.
- **Student-centric design:**  
Traditionally, LMSs tend to be course-centric rather than student-centric. For instance, personal content that should be aggregated, such as assignment due dates, campus club meetings, and other calendar events are segregated in their own silos rather than being available to students in a unified view. Likewise, student-created content, such as assignments, is submitted to course silos and is only re-exported to student-controlled portfolios as an afterthought—often with some difficulty. Therefore, SLN2.0 must provide an architecture that supports personalized views of all content from the ground up.

- **Support for the IMS Learning Design (LD) specification:**

LD is an open standard that is designed to express sequences of learning activities. The LD is specifically designed to express learning sequences from multiple pedagogical approaches and draws on current international research to this end. This development is very much in keeping with SLN's historic mission of collecting and exchanging best practices for online teaching via both formal research and free interchange among SLN community members. LE therefore deems support for LD as an important goal for SLN2.0.

## **Recommendation 2: Harness the strength and diversity of the SUNY federation**

*An optimal learning environment for all of SUNY must be flexible enough to accommodate the distinctive missions of each of the sixty-four campuses. Furthermore, the structure of the environment should enable the campuses to benefit from the federated structure of the SUNY system which, by design, empowers each campus to make resource investment decisions that best serve the needs of its students and faculty. LE's technology strategy should therefore support campuses' freedom to align their resource investments with their individual needs, while simultaneously working to lower the barrier to resource pooling among the campuses whenever there is mutual benefit to be gained.*

LE has interpreted this recommendation to suggest the following evaluation criteria:

- **Native interoperability with SUNY's developing portal environment:**

The SUNY-wide initiative to standardize on a set of portal technologies makes clear the growing institution-wide consensus that the portal is going to be one of the major points of system integration. However, none of the existing LMS offerings provides strong native integration with the portal technologies currently under consideration by the portal task force. Ensuring easy portal integration appeared key to any solution for SLN2.0.

- **Strong integration with their other campus IT systems:**

Typically, LMSs require specialized conduits and integration efforts for each type of IT system with which they may need to integrate, for instance, Student Information Systems (SIS's), library systems, etc. This restriction poses considerable risk and cost: as campus IT systems continue to become more complex and interdependent, institutions might be forced to invest an increasingly large percentage of their resources into a never-ending series of integration projects –or– accept that their LMS will slowly become an island unto itself. As such, the LE team deemed that ease of integration through strong standards support is also a critical evaluation criterion.

## **Recommendation 3: Plan for tomorrow's campuses**

*While much of this report is necessarily concerned with the relatively immediate needs of the constituent campuses, SUNY will be served best by keeping the future in mind. LE's technology strategy should place emphasis on providing a system that will enable SUNY to respond quickly and efficiently to future needs and innovations. This includes giving strong consideration to ease of integration, since online learning environments will inevitably become more deeply enmeshed with a range of information systems across campuses.*

This Task Force imperative combines the requirements of the two above, as LE interprets “planning for tomorrow's campuses” to mean planning for ease of new tool integration within the learning environment and ease of new system integration between the learning environment and new campus technology systems. We believe the key to satisfying this recommendation is for SLN to provide a modern, modular architecture with ease of integration and interoperability placed at the center of the design.

# EVALUATION

## Overview

Drawing on both the assessment of various environmental and technical conditions as well as analysis of the Task Force recommendations, LE proceeded to evaluate potential solutions.

This section elaborates on the process and findings, including:

- **Candidate evaluation process**  
Reviews for candidate fit with strategic evaluation criteria identified earlier, functional gap analysis, resource analysis, and support availability analysis.
- **List of solution candidates**  
Candidates considered by the LE team, including proprietary systems, Open Source projects, and combinations of various technologies.
- **Overview of the solution candidate selected**  
Based upon uPortal as the primary framework, with additional functional components from several other sources.
- **Snapshot of the functional specification**  
Intentions for the first production release, based upon existing functionality in the proposed components.

## The Evaluation Process

When analyzing the various solution candidates for our next-generation LMS platform, LE implemented the following process:

1. **Fit with strategic imperatives**  
The team looked at how well potential candidates would fulfill the broader SUNY imperatives (defined earlier in this report), and then derived a list of six candidate solutions.
2. **Functional gap analysis**  
Each candidate solution was analyzed based on the functional requirements derived from the Task Force Report (see Appendix C for full details) as well as a few extra requirements gathered from internal LE team members.
3. **Resource analysis**  
Once each gap analysis was completed, the LE team evaluated the requirements for filling those gaps. (Note that the same gap may have different resource requirements on different technology platforms.)
4. **Support availability analysis**  
Finally, the LE team looked at support services available for each technology or group of technologies from vendors and Open Source communities. This review included evaluating both the size/health of these communities and their alignment with SUNY's needs. Based on both the resource analysis and the community support that exists to help meet resource requirements, a final solution candidate was selected.

## Potential Solutions Evaluated

LE examined a wide array of currently available LMS platforms, including:

- Blackboard 6
- WebCT Vista 4.0
- ANGEL 6.2
- Academus 1.5
- Moodle 1.5
- Sakai 2.0
- dotLRN 2.1

Additionally, the team evaluated the following combinations of technologies:

- **Sakai + Moodle + uPortal**  
Moodle's strengths in online pedagogy would compliment Sakai's enterprise infrastructure. (This is a combination that has been lightly explored by the respective Open Source communities.) uPortal would act as part of the solution to provide interoperability.
- **Sakai + Academus + uPortal**  
Academus would fill some of the functional holes that are present in Sakai, which is still relatively immature. uPortal, upon which Academus is built, would provide interoperability.
- **Academus + LAMS + uPortal**  
LAMS would provide the pedagogical affordances, while Academus would provide a rich set of functionality. Both would be presented in uPortal as the integration framework.

For a detailed analysis of these solution options, see **Appendix D**.

## Overview of Proposed Candidate Solution

The Task Force recommendations and other identified strategic considerations are consistent with the current technology trends and standards for learning environments. However, none of those recommendations match technologies currently available today (in terms of strengths), whether Open Source or proprietary.

As such, the LE Technology Team, on behalf of the SUNY Learning Network (SLN), has identified a **component strategy** that we believe will bring unprecedented power and flexibility in a learning environment for all of SUNY—well beyond anything available in a single-platform today.

By integrating several carefully chosen Open Source projects, each with strong technical compatibility, SLN believes that the resulting whole will be greater than the sum of its parts. Collectively, the component solutions provide the requisite compatibility through standards compliance, complementary function, and strong alignment between their supporting communities. The result is a system that provides important wins for SUNY, including:

- Optimizes integration with various campus IT systems;
- Leverages leading-edge design of teaching and learning environments;
- Provides a much richer feature set than any currently available single-platform LMS.

## Technology Components of the Proposed Solution

- **uPortal for strong integration and unified user experience**  
 uPortal is a free, sharable portal under development by institutions of higher education.<sup>9</sup> It is also one of the main portal options under consideration by the SUNY Portal Evaluation Committee and Workgroup. uPortal can provide the ability to integrate SLN with SIS and other campus information technology systems, as well as providing a unified user experience. Further, as uPortal is compatible with the JSR-168 and WSRP standards, it enables SLN to potentially draw on a far broader range of tools —both Open Source and proprietary— than are available for integration with any LMS on the market today.
- **LAMS for best-in-class teaching and learning experience**  
 One of the most important innovations in online teaching and learning today is the IMS Learning Design specification. The Learning Activity Management System (LAMS) is an Open Source project that is globally recognized to be the most advanced and easy-to-use implementation of Learning Design to-date.<sup>10</sup> With LAMS, faculty will be able to use an intuitive, drag-and-drop authoring environment to create an online course experience that is more powerful and flexible than anything available in most LMS's today. Furthermore, as LAMS is built using technologies that are compatible with uPortal, SLN will be able to easily integrate the two components to create a seamless user experience.
- **Diverse sources for best-in-class tools**  
 As the uPortal and LAMS communities will be working together with SUNY to enhance their already strong integration capabilities, SLN will be able to choose the best individual tools from a variety of sources. For example, SLN could choose to use Sakai's excellent Samigo test engine while using other best-in-class tools from different sources. This integration flexibility provides a significant advantage over current single-platform LMSs, which currently provide tools that only partially address our complex needs.

## Snapshot of the Functional Specification

The following is a list of proposed features for the first production release of SLN2.0. This list is based primarily on the existing functionality of the technology components for the proposed system.<sup>11</sup> LE anticipates release of SLN2.0 to be Fall 2007 at the earliest, although we plan to have several working prototypes available for interested stakeholders beginning in Fall 2006.

The vast majority of development required for the first production release is focused on integration rather than new feature development; substantial new functionality development beyond what is in the existing components will be reserved for subsequent releases. Also, the requirements here should be considered a *snapshot*, subject to change based on feedback from the community and the availability of new or upgraded components.

<sup>9</sup> For more information about uPortal, see <http://www.uportal.org/>. For a list of some of the applications available for incorporation into the uPortal framework, see <https://jasigch.princeton.edu/render.userLayoutRootNode.uP>. For more information about JA-SIG, the Open Source community that supports uPortal, see <http://www.ja-sig.org/>.

<sup>10</sup> For more information about LAMS, see <http://lamsfoundation.org/>. For information about what individual educators and educational institutions are doing with LAMS, see <http://www.lamscommunity.org/>.

<sup>11</sup> For reference purposes, LE used the functionality available in Unicon's *Academus* product to construct this snapshot. *Academus* may or may not be included in the production system, depending on the outcome of the forthcoming Request for Proposals. However, the product's functionality provides a useful baseline to assess the functionality available in portal-native products more generally. Also included in this snapshot are the Sakai grade book and test engine. More information about these applications is available at <https://www.indiana.edu/~sakaikb/display.cgi?docid=agfv.html> and <http://bugs.sakaiproject.org/confluence/display/ENC/Sakai+Assesment+Manager?showAttachments=true#attachments>, respectively.

NOTE: This functional spec has been written in the same format as Edutools.info and attempts to use similar language. We chose this format so that stakeholders can make apples-to-apples functionality comparisons with existing commercial and Open Source systems.

Interested stakeholders may choose to compare this list with the detailed LE Task Force Report; see **Appendix C**.

<b>FUNCTIONAL SPECIFICATION: Features Targeted for SLN2.0</b>	
<b>Discussion Board</b>	<ul style="list-style-type: none"> <li>▪ Discussions can be viewed by date, thread, number of posts, and author.</li> <li>▪ Posts can include attachments and URLs.</li> <li>▪ Instructors can determine the level of involvement (read, write, or post anonymously) for students.</li> <li>▪ Discussion forum includes a rich text editor that includes the ability to add graphics, embed flash files, and use an equation editor.</li> <li>▪ Instructors can create discussion areas for small groups, both on an individual activity level and at a course-wide level.</li> <li>▪ Discussions are expandable and collapsible to view the entire conversation on one screen.</li> <li>▪ Individual discussion threads can be expanded and collapsed.</li> </ul>
<b>File Management</b>	<ul style="list-style-type: none"> <li>▪ Students can upload files to a shared group folder.</li> <li>▪ Students can submit assignments using a drop box.</li> <li>▪ Students and instructors can make notes about a module or a course that can be either private or shared with the instructor.</li> <li>▪ Notes have rich text editor and equation editor.</li> <li>▪ Students can submit assignments to a partner or group of students.</li> <li>▪ Students can create shared references for a class, organized by date, title, or media.</li> <li>▪ Instructors can comment on files and return them to the student.</li> <li>▪ Students and instructors can upload documents to a private file storage area.</li> </ul>
<b>Internal Email</b>	<ul style="list-style-type: none"> <li>▪ Faculty have internal email accounts with both webmail and full client access.</li> <li>▪ Students have webmail access to their external email accounts.</li> </ul>
<b>Online Journal/Notes</b>	<ul style="list-style-type: none"> <li>▪ Students and instructors can make private notes about a module.</li> <li>▪ Notes can include rich text and equations</li> <li>▪ Students can share those notes with the instructor.</li> <li>▪ Students and instructors can upload documents (including assignment drafts) to a private file storage area.</li> </ul>
<b>Real-time Chat</b>	<ul style="list-style-type: none"> <li>▪ Online chat is provided.</li> <li>▪ The system creates archive logs for all chat rooms.</li> <li>▪ Chat supports private messaging.</li> </ul>
<b>Video Services</b>	<ul style="list-style-type: none"> <li>▪ Instructors can embed video (and other media) files into their courses.</li> <li>▪ A video server supports high-quality streaming video.</li> <li>▪ Faculty can embed Flash files within the rich text editor and the system will automatically generate the player.</li> </ul>
<b>Whiteboard</b>	<ul style="list-style-type: none"> <li>▪ An instructor-controlled whiteboard is available.</li> </ul>
<b>Bookmarks</b>	<ul style="list-style-type: none"> <li>▪ Bookmarks can be shared via "shared references" tool.</li> </ul>

<b>Calendar/Progress Review</b>	<ul style="list-style-type: none"> <li>▪ Instructors can post course-related events and announcements in the course calendar.</li> <li>▪ Students can view their grades.</li> <li>▪ Students can track assignment deadlines and due dates in the course calendar.</li> <li>▪ Students can view their evaluations of completed assignments, instructor feedback, and points or percentages.</li> <li>▪ Instructors and students have a personal home page that lists all the courses in which the student is enrolled and all the system-wide events and tasks.</li> <li>▪ Instructors and students can set To-Do items.</li> <li>▪ Instructors and students can import and export between their calendars and handheld Palm OS devices.</li> </ul>
<b>Orientation/Help</b>	<ul style="list-style-type: none"> <li>▪ Students and faculty have access to a product knowledge base.</li> <li>▪ Some contextual help is available.</li> </ul>
<b>Searching Within a Course</b>	
<b>Working Offline/Synchronize</b>	
<b>Groupwork</b>	<ul style="list-style-type: none"> <li>▪ Instructors can assign students to groups.</li> <li>▪ Groups can be randomly generated.</li> <li>▪ Groups can be created at both an activity level and a course-wide level.</li> <li>▪ Activity-level groups can have any resources that an instructor can assign to a module, including shared resources, discussion groups, chat, chat &amp; scribe, chat &amp; scribe + journal, question &amp; answer, question &amp; answer + journal, voting, voting + journal.</li> <li>▪ Course-level groups can have their own shared presentation folders, discussion forums, calendars, chat rooms, and white boards.</li> </ul>
<b>Self-Assessment</b>	<ul style="list-style-type: none"> <li>▪ Instructors can create multiple-choice tests.</li> <li>▪ Test questions can display rich text and scientific notation.</li> <li>▪ Student answers may include rich text and scientific notations.</li> <li>▪ The system automatically scores multiple-choice, true/false, matching, and fill-in-the-blank questions and can display instructor-created feedback, explanations and links to relevant course material.</li> <li>▪ The system can display instructor-created feedback.</li> <li>▪ Instructors can create timed or un-timed self-assessments that allow multiple submissions.</li> </ul>
<b>Student Community Building</b>	<ul style="list-style-type: none"> <li>▪ Administrators can create online clubs, interest, study groups, and other communities.</li> <li>▪ Community sites can include discussion boards, calendars, file sharing areas, surveys, polls, classified ads, and chat.</li> <li>▪ Students from different courses can interact in system-wide chat rooms or discussion forums.</li> </ul>
<b>Student Portfolios</b>	<ul style="list-style-type: none"> <li>▪ Students can create a personal home page.</li> <li>▪ Home pages can include photos and personal information.</li> <li>▪ Each class or non-class group can have a members list with links to the personal home pages.</li> </ul>
<b>Authentication</b>	<ul style="list-style-type: none"> <li>▪ Administrators can protect access to individual courses with a user name and password.</li> <li>▪ The system can also authenticate against an external LDAP server or using the Kerberos protocol.</li> </ul>
<b>Course Authorization</b>	<ul style="list-style-type: none"> <li>▪ Instructors can assign different levels of access to their course based on the following pre-defined roles: instructors, students, designers, tutors, and guests.</li> <li>▪ Instructors or students may be assigned different roles in different courses.</li> </ul>

<b>Registration Integration</b>	<ul style="list-style-type: none"> <li>▪ Banner and Datatel campuses will have courses automatically created and populated with students and professors.</li> <li>▪ Other campuses can have an administrator upload a flat file via a web interface to create courses and populate them with students and professors.</li> <li>▪ Campus administrators may manually create non-course groups and populate them with participants.</li> </ul>
<b>Automated Testing/Scoring</b>	<ul style="list-style-type: none"> <li>▪ Instructors can create automatically scored true/false, multiple-choice, multiple-answer, matching, fill-in-the-blank, and short answer/essay questions.</li> <li>▪ Questions can contain images and audio files.</li> <li>▪ Instructors can create personal test banks.</li> <li>▪ Questions can be created from test banks in the system or can be imported from external test banks that support QTI.</li> <li>▪ The system can randomize test questions and the alternatives for multiple choice questions.</li> <li>▪ Instructors can set times for when students can access tests.</li> <li>▪ Instructors can set a time limit on a test.</li> <li>▪ Instructors can permit multiple attempts and specify whether correct results are shown.</li> <li>▪ Instructors can override the automated scoring.</li> <li>▪ Instructors can also create survey questions.</li> <li>▪ Instructors can differentially weight test questions.</li> </ul>
<b>Course Management</b>	<ul style="list-style-type: none"> <li>▪ Instructors can selectively release both modules and individual module map activities and content items based on specific start and end dates.</li> <li>▪ Instructors can release activities based on previous course activities as well as on start and end dates.</li> <li>▪ Instructors can personalize access to specific course materials and assessments, based on access rights, group membership, previous course activity, or student performance and/or specific start and end dates or other criteria.</li> </ul>
<b>Online Grading Tools</b>	<ul style="list-style-type: none"> <li>▪ Instructors can assign grades and comments to all types of activities and assignments (including discussion posts).</li> <li>▪ When an instructor adds a gradable assignment to the module map, the software automatically adds it to the online grade book.</li> <li>▪ Instructors can add the grades for off-line assignments to the online grade book.</li> <li>▪ Instructors can export a comma-delimited version of the grade book to an external spreadsheet program.</li> <li>▪ Instructors can manually edit all grades.</li> <li>▪ Instructors can selectively release assignment grades and comments to the students.</li> <li>▪ Both instructors and students have a unified view of assignment grades and comments.</li> <li>▪ Instructors can view grades in the gradebook by assessment, by student, and for all students on all assessments.</li> <li>▪ Instructors can create a course grading scale that can employ either percentages, letter grades or pass/fail metrics.</li> <li>▪ Instructors can create assignments that weigh various amounts of points, and the software automatically calculates the overall grade for a student.</li> </ul>

<b>Student Tracking</b>	<ul style="list-style-type: none"> <li>▪ Instructors can monitor where students are in particular modules.</li> <li>▪ Instructors can view lists of student contributions for each module.</li> <li>▪ Instructors can track student posts by assignment and discussion.</li> <li>▪ Instructors can track student clicks by assignment and discussion.</li> <li>▪ Instructors can view all student activities for a given date range.</li> <li>▪ Instructors can view the date of last activity by student.</li> <li>▪ Instructors can view total clicks and posts by day.</li> </ul>
<b>Accessibility Compliance</b>	<ul style="list-style-type: none"> <li>▪ Full 508 compliance of all system components.</li> </ul>
<b>Content Sharing/Reuse</b>	<ul style="list-style-type: none"> <li>▪ Course modules can be copied, shared, or re-used.</li> <li>▪ Content can be shared at the module or activity level within the module map.</li> <li>▪ Content at the course map level can be re-used, and the URLs will not change from semester to semester.</li> </ul>
<b>Course Templates</b>	<ul style="list-style-type: none"> <li>▪ Instructors can use templates to create course content.</li> <li>▪ The templates include a rich text content editor with an equation editor.</li> <li>▪ Instructor can categorize content as announcements, calendar entries, course units, discussion forums, handouts, lecture notes, links, syllabus and course descriptions, tips, FAQs, chat &amp; scribe, chat &amp; scribe + journal, question &amp; answer, question &amp; answer + journal, voting, voting + journal, and resources.</li> <li>▪ Templates support organizing content and functionality both by sequences of learning activities (within the module map) and by system functionality (through portlets)</li> <li>▪ Instructors can use a wizard to walk them through the template population process.</li> </ul>
<b>Curriculum Management</b>	
<b>Customized Look and Feel</b>	<ul style="list-style-type: none"> <li>▪ Institutions can apply their own institutional images, headers and footers across all courses.</li> <li>▪ Instructors can alter the appearance of their course.</li> <li>▪ Students may choose from multiple "skins", including a low-bandwidth skin.</li> </ul>
<b>Instructional Design Tools</b>	<ul style="list-style-type: none"> <li>▪ Instructors can create both linear and non-linear sequences organized in an arbitrarily deep hierarchy using a content library.</li> <li>▪ Instructors can organize learning objects into learning sequences that are reusable.</li> <li>▪ Instructors can draw from a library of activity sequence templates, and these templates can be knitted together in a course creation wizard.</li> </ul>
<b>Instructional Standards Compliance</b>	<ul style="list-style-type: none"> <li>▪ Test engine supports import/export of QTI.</li> <li>▪ Course mapping tool supports import/export of IMS LD Level A.</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>▪ Students and faculty will have an address book that allows them to create and manage lists of contacts and groups.</li> <li>▪ Instructors and students have personal address books that integrate with webmail and can import from and export to Microsoft Outlook.</li> <li>▪ Students and faculty can store private bookmarks in their "MySLN" tab.</li> <li>▪ Campus administrators can post campus-wide announcements.</li> <li>▪ Campuses may post announcements that will go to students' unified announcements window in their "MySLN" tab.</li> </ul>

# Implementation

## Overview

As a final step in the process, the LE Technology Team has developed an implementation strategy for the proposed LMS solution, one that effectively addresses the anticipated challenges of development, rollout, and migration of a new learning environment solution for SUNY. This strategy includes the following elements:

- **Agile development strategy**  
The LE development team will follow “agile” development methodologies (also known as Iterative and Incremental Development or IID), including three-month iterations of the project for stakeholder review.
- **Risk mitigation plan**  
The team will maintain and publish a risk mitigation plan that will be updated regularly based on stakeholder review.
- **Outsourced development**  
The substantial majority of initial development will be conducted by one or more external vendors, following a Request for Proposals (RFP) and competitive bid.
- **Recruitment of development partners**  
In parallel to LE’s development, an Open Source project is being cultivated to recruit development partners at institutions around the globe.
- **Quarterly schedule reports**  
In keeping with the stated development philosophy, a three-month schedule is included along with more approximate milestones identified through the Fall of 2006.

## Implementation Philosophy

LE’s paramount concern throughout the implementation process is to ensure the transition to the new system is as smooth as possible for faculty, students, and administrators while continuing to support the current environment and those who rely on it. We recognize that each campus has its own distinctive requirements, which will determine when the new system is robust enough to meet their production needs.

Furthermore, the decision regarding *how* as well as *when* faculty and students should migrate to the new system will be driven by individual campus needs. As with the development of the system itself, plans for support and migration—including content migration and faculty training and support—will be iterative and developed in collaboration with campuses and the broader SLN community.

The development processes outlined in the next pages also apply to the processes that support the current system as well as migration from it. In keeping with the development philosophy of planning in three-month cycles, this document does *not* outline the migration plans for SLN campuses. As the project matures and individual campuses decide they are ready to migrate to the new platform, the SLN development, instructional design, and HelpDesk teams will work cooperatively with campus stakeholders to develop appropriate migration plans, including content migration, faculty and support staff training, and any other areas of concern.

## Iterative and Incremental Development (IID)

Our chosen Iterative and Incremental Development (IID), or “agile” development, is considered the best-fit methodology for large projects such as SLN2.0, which require intensive stakeholder input, extensive integration and evolving requirements.

The adoption of agile methods is increasingly widespread in both the private and government sectors. According to author and software development expert Craig Larman, “The [United States Department of Defense] –perhaps the largest and most experienced procurement agency of software— started with the assumption that a waterfall model and upfront specifications was best, and then based on high rates of project failures, adopted iterative and evolutionary methods, demoting the waterfall.”<sup>12</sup>

As SLN2.0 will require design and development, not simply deployment, an initial phase of uncertainty and shifting requirements should be expected. We acknowledge the possibility that many of our initially identified requirements will not make it into the next release (or possibly even into the final release) and many other requirements will only come to light once design and development begins. As such, we have employed “timeboxing” and “adaptive planning” methods to produce our working schedule.

## Timeboxing

This method minimizes risk by developing software in short timeboxes, called iterations, which typically last one to four weeks. Each iteration is like a miniature project of its own, and involves all the tasks necessary to release the mini-increment of new functionality, including planning, requirements analysis, design, coding, testing, and documentation. At the end of each iteration project, priorities are reevaluated.

## Adaptive Planning

As a development technique, adaptive planning emphasizes the short term, around three months, so that the level of detail within the schedule and the commitment to it, is commensurate with the quality of information available. Therefore, you will notice the schedule contains significantly more detail within the next three-month timeframe than the remainder. This three-month forecast will continue throughout the project lifecycle. This should not be interpreted as an assumption on our part that the level of activity or required tasks would diminish as the project progresses, but rather an acknowledgement of the complexity of the project and our limitations to foresee future needs.

## Risk Mitigation

As with any significant technology undertaking, risk management will be paramount to the success of the project. A specific risk management plan is currently in development and will be available after it has been further calibrated to take into account the priorities and concerns expressed by SLN stakeholders after reading this report. The risk management assessment process will be ongoing, with public documentation updated on a regular basis.

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<sup>12</sup> Craig Larman, *Agile and Iterative Development, A Manager's Guide*, (Boston & New York: Addison-Wesley).

## Parallel Development Tracks

The majority of development for the first production release of SLN2.0 will be performed by one or more external vendors following an RFP bidding process. While a long-term goal of the project is to have all core components of SLN2.0 be Open Source, LE may choose to reduce the development risk and shorten the development timeline for first release by including some proprietary components that may be swapped out later on an application-by-application basis, in keeping with the needs of and input from SLN stakeholders.

In parallel, LE will support the development of an Open Source project, bringing together institutions that may have similar needs to SUNY's as well as constituent Open Source projects that can contribute system components. The growth of an Open Source ecosystem may increase resources available for initial development, and may also ensure the sustainability of LE's development efforts, even beyond the support available from the existing communities currently supporting the solution components LE has identified.

Private inquiries to potential stakeholders has yielded significant initial interest from a number of institutions —both inside SUNY and beyond— as well as projects across the globe, and a home for the Open Source project has been established recently on Eduforge.<sup>13</sup>

## Project Scheduling

The following section outlines the project milestones for SLN2.0 that LE anticipates between now and Fall 2006. In keeping with the philosophy outlined above, dates are only provided for milestones that fall within the current timebox.

The following deliverables from the first three-month timebox will collectively constitute all the necessary data for an RFP to potential vendors.

### Scheduled Events

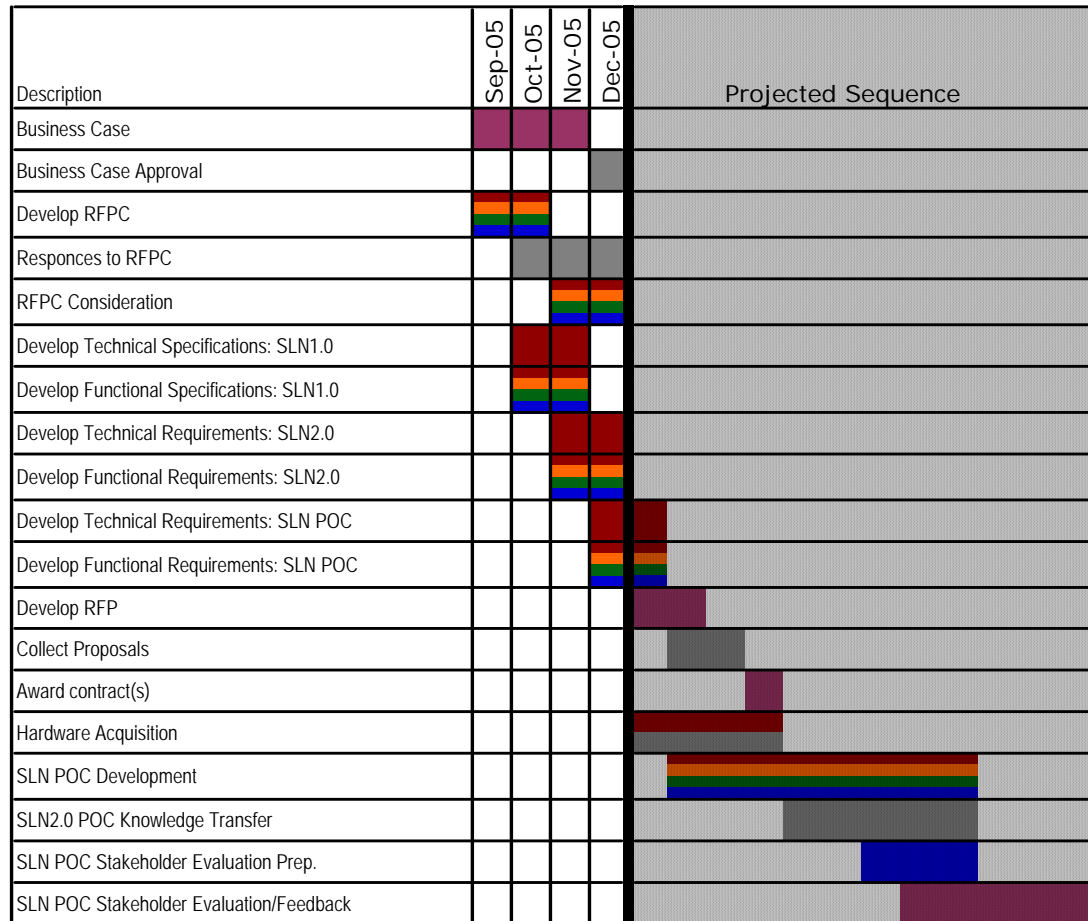
- **Development of a Business Case for the Design, Development and Deployment of SLN2.0**  
Create and present to the Chancellor of the State University of New York the compelling opportunities for the continued development of SLN technology.
- **Release SLN2.0 Request for Public Comment (RPC)**  
This report has been released to SLN stakeholders and the broader academic and technology communities to provide both a progress report detailing our interpretation of SUNY and SLN's desires for SLN2.0, the LE Task Force recommendations, and other decision criteria for the LMS candidate solution.
- **Collect responses to RPC**  
Collect and assess the feedback generated by RPC responders. These responses will help to redefine the scope of SLN2.0 and its proposed functionality.
- **Responses to RPC**  
Provide responses to those individuals and organizations that have submitted comments or questions. This will help to foster ongoing dialogue with our stakeholders that will be necessary to properly support our agile and interactive development model.

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<sup>13</sup> See <http://eduforge.org/projects/lmos/>.

- **Re-factor SLN2.0 candidate solution based on RPC findings**  
Incorporate feedback from stakeholders and industry experts, address issues, answer questions and apply findings to the candidate solution for SLN2.0. This process will enable us to ensure that our candidate solution benefits from the expertise and best thinking of all our relevant communities.
- **Develop Functional Specifications for SLN1.0**  
Identify and document SLN1.0's current features and functionality. This process will provide a relevant description of existing functionality and a unified direction and scope from a user's perspective for SLN's educational and development partners.
- **Develop Technical Specifications for SLN1.0**  
Identify and define the current technology that supports SLN1.0's features and their functionality. This process will provide a relevant description of existing supporting technologies and a unified direction and scope from a developer's perspective for SLN's development partners.
- **Develop Functional Requirements for SLN2.0**  
Based on the re-factored candidate solution and SLN1.0's functional and technical specifications, we will generate a functional blueprint for SLN2.0's first production release.
- **Develop Technical Requirements for SLN2.0**  
Based on the re-factored candidate solution and SLN1.0's functional and technical specifications, we will generate the system architecture for SLN2.0's first production release.
- **Develop Functional Requirements for SLN2.0 Proof of Concept Prototype**  
Considering the overall functional objectives and requirements for SLN2.0, time constraints, stakeholder feedback and available resources, we will outline key features, requested functionality, usability, etc. for a proof-of-concept prototype of the candidate solution. This proof of concept should provide a limited, yet stable, prototype that measures functional continuity with end-user expectations to-date and the final SLN2.0 implementation.
- **Develop Technical Requirements for SLN2.0 Proof of Concept Prototype**  
Identify key technologies and resources needed to develop the SLN proof of concept prototype.

### Three-month Development Timeline and Projected Schedule



POC= Proof of Concept

While we have included high-level events beyond our three-month horizon (in gray) that we feel belong on the roadmap to SLN2.0, specific details regarding engagement would be based heavily upon speculation and assumptions.



Technology Strategy Report  
**APPENDICES**

## Appendix A

# Issue Resolution Re: IBM Proposal to Provide IBM On-Demand Workplace e-Learning Solution

Prepared For SUNY Learning Network, July 22, 2004  
IBM Global Services

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### SLN

**Issue:**

Unreliability of Read and Unread marks in Notes and from the web (web version of read and unread marks)

**Description:**

This is a well known and documented bug within a Notes/Domino environment.

Instructors manage the course through the Notes client. In order to see the most recent postings submitted by students, in context, the Read/Unread indicator is used. Since many postings (from students) take place in a threaded discussion area, the flat/categorized 'By Date' view doesn't meet the needs.

From the web, there is no feature to indicate whether or not a document is new, other than using the web browser's History setting. This functionality does appear within WorkPlace and we would like to see it added to Lotus/Domino as well. If not, we would like to hear your alternative means of achieving this on the web.

### IBM

**Response:**

The matter of read/unread marks has indeed been the topic of many a support issue as well as the target topic for many technical articles and IBM/Lotus "white papers". The behavior of the read/unread marks is for the most part programmatic and yields to a simple serial workflow model. Read/Unread marks are maintained in a form of table that is stored initially within the structure of the Notes/Domino server copy of the database. Opening or selecting a server based Notes database causes the Notes client to receive a copy of this read/unread table and as long as the user remains connected to the database the table is maintained by the local Notes client. Closing the database properly or exiting Notes causes the read/unread marks table to be written back to the server. Failure to properly close the database or forcing an exit to the Notes client will cause the read/unread marks table to be out of synch with the users actual movement through documents in the database. The loss of 'synch' in this case is caused by the table never being written back to the server. This condition causes documents that have indeed been read by the user, to later appear as unread. Since connectivity to any server can never be 100% guaranteed the noted behavior has no known absolute solution. Here are some suggested actions that will improve the reliability of the read/unread marks:

- Communicate to Notes client users that in order for the marks to be properly maintained, always attempt to close the database or exit the Notes client properly so that the table may be properly written to the server copy of the database
- Work on local replica copies of databases if possible and replicate with the server at the end of the work session. Users should make note that after replication, the read/unread marks count may be expected to change if new documents were added to the server copy of the database after the initial replication but before the final replication.

- Avoid using task manager to terminate the Notes client, this causes the changes to the read/unread marks table to be lost.
- Do not allow the use of shared Notes ID files. Read/unread marks can not be maintained properly for two users utilizing the same ID. This is not the same as a single user that has more than one work station with the same ID. Also be mindful that a single workstation, with a single ID...but with multiple 'authorized' users will also cause the table to appear out of date or incorrect.

## SLN

### Issue:

Better rich text editing from the web (like iNotes) for both faculty and students

### Description:

Currently, we are using the "Best Fit for OS" rich text field to have the DHTML/Active X rich text editor appear on the web. We are looking for a full-featured editor, similar to the one that is in the iNotes software.

Another helpful feature would be for us to be able to get a handle on the underlying API for the editor we are currently using. This would allow us to customize the current editor without having to re-create the API or build another one using JSP.

Lastly, are there any plans to make this editor, or any editor, work cross-browser and cross-platform?

## IBM

### Response:

The current version of the native rich text field design component will not provide the level of functionality that is desired. There are at least two immediately available options in this regard:

- If the iNotes rich text component provides a level of functionality that is equal to or similar to the desired level of functionality then additional effort can be made to 'extract' that component from the standard and open mail template (.ntf) design and integrate it's functionality into the existing application.
- Evaluate other non-Notes/Domino rich text editing tools built specifically for Web based applications. There are a number of HTML rich text editors available that may serve the application functional requirements more fully however, the list of 'nice to have' makes the selection of a single editor that meets all requirements currently not possible. Of the number of software offering we were able to identify for the workshop, the following non-IBM product offering offers a rich enough feature set that further research and testing is of merit:

#### **TCP/IQ / HTML Rich Text Area v1.3**

<http://www.tcpiq.com/tcpiq/HTMLRichTextArea/Default.asp>

## SLN

### Issue:

Support for displaying math symbols/scientific notation easily in threaded discussions, assignments and other documents

### Description:

Since SLN is a course delivery system that is used for courses falling under all disciplines, we need a means of allowing both students and faculty to add this type of font/notation within postings.

This relates to the “better rich text editing from the web” area above as we would like to see this in a full-featured editor.

## IBM

### Response:

No immediate response is available at this time. A decision on this point may be influenced by the selection and integration of an appropriate HTML rich text editor.

## SLN

### Issue:

Web-based spell checker

### Description:

This is currently in the iNotes rich text editor. It would be beneficial to have this available in the other editors as well. As mentioned above, if we are able to get a handle on the underlying API for the other editors, we would be able to add a third party spell checker. This relates to the “better rich text editing from the web” area above as we would like to see this in a full-featured editor.

## IBM

### Response:

There are two possible approaches to resolution of this issue:

- The current iNotes implementation of spell checker can also be ‘extracted’ from the Notes email template at the same time the iNotes rich text editor component is extracted. The design of the template is not locked and that feature can be incorporated into other non-mail applications as needed.
- Many of the 3<sup>rd</sup> party HTML rich text editors offer spell-check functionality, the accuracy, number of words known, speed of the spell checker and ease of integrate vary dramatically among vendors. The 3<sup>rd</sup> party “HTML Rich Text Area v1.3” product offering from TCP/IQ in addition to supporting image libraries also provides for a nicely integrated spell checker function.

## SLN

### Issue:

Inaccurate Replication settings dates that get inserted into databases

### Description:

Instructors re-use documents that have been created at an earlier date. Since documents can have a creation date as back as far as 1997, this setting causes for documents to not appear within a new/local replica of a database.

We are aware of why this date is added, but need a solution to avoid it from being added. If this is not possible, what suggestions can you offer to ease the troubles that the end user experiences?

## IBM

### Response:

No immediate response is available at this time beyond the possibility of working directly with the IBM/Lotus Software Development Team(s) to provide additional functionality in this regard; perhaps fixing the replication to some early date such that the system always examines all documents during a replication event. Care and caution is advised here in that a poorly conceived change to these features can possibly create an undesirable

network traffic issue due to excessive network traffic caused by the exchange of document information between server and client.

## SLN

### Issue:

Gradebook

### Description:

This is a two phase project.

- (1) Gradebook that is stand alone within the course database (LMS).
- (2) Gradebook that ties in with both the LMS and the campus student information system.

### Issue:

Overall integration with campus systems (Banner, DataTel, etc)

### Description:

The SLN system currently has individual campuses offering hundreds of courses, with thousands of students. There is a need to have the SLN system speak with the campus systems. Examples of this integration would be for: student records, course information/descriptions, etc. We are currently in the process of piloting this sort of communication via SFTP and flat-files.

## IBM

### Response:

Integration and exchange of data with other database systems is one of Notes/Domino strong points of functionality. There are a number of native features of the Domino Designer client (LSX, DECS, etc.) that allow you to access external data as well as a large selection of other IBM (Domino MQ Series, a variety of data pumps) and non-IBM 3<sup>rd</sup> party products such as NOTRIX, or Granite Software's 'ZMerge'. Further definition of the requirements for these features will make it possible to select the best tool for data exchange between the Domino application and other campus systems.

## SLN

### Issue:

ADA compliance issues

### Description:

The Domino/WorkPlace HTML that is generated by the server needs to meet ADA compliance standards. For example, when you embed an object in a Lotus/Domino database, it is published out as an image. There is no way to add Alternative Text to this image. This renders a page non-ADA compliant for TIMEFRAME 1.

**IBM****Response:**

The ability to be completely compliant with these organizations is often made more difficult when Web pages are generated dynamically as with Domino and many other similar systems. The primary reason is that the developer does not have complete and absolute control over the HTML that will be included on every page. In this case, compliance can only be a best case scenario. The best approach here would be to identify the exact areas that the existing site pages are out of compliance and examine those items individually to determine if there is a reasonable and appropriate fix, configuration change, or work around. If that effort identifies any non-compliance issues that can not be easily accomplished or economically justified, then a more compliant approach must be taken in the architecture of the existing application (less dynamic, more static HTML) or a more suitable and more compliant Web server must be identified and implemented, the later requiring a partial but substantial of many of the applications features and administration tools.

**SLN****Issue:**

Course import utilities for/from other LMSs (BlackBoard, WebCT, Angel)

**Description:**

This would be a tool that would allow for courses to be transferred to/from any LMS.

**IBM****Response:**

If the ability to import courses from other systems is desired, these features can be added utilizing any number of import/export tools already available from IBM/Lotus and other 3<sup>rd</sup> parties. Only the format of the course data from the source system need be known to create the custom code and resulting application for this feature.

**SLN****Issue:**

Better design for asynchronous discussion threads

**Description:**

Courses use threaded discussions for a large portion of their learning activities. We are looking for a different organizational method to display threaded discussions, other than the typical response document hierarchy in a view and thread map in each form.

Using web design tools, such as DHTML, work but cause others problems with the server setting limiting lines per view. SLN currently displays 1500 lines per view set on all servers, but this gets exceeded in some courses. Once this is exceeded, a DHTML view does not allow one to get to the next set of documents.

What suggestions can you offer to organize these large scale discussions?

**IBM****Response:**

If your team feels confident that it has exhausted all the favorable options in regards to the manner in which a Domino server streams documents for threaded discussions, it is possible that the current platform simply will not offer the desired functionality. Discussion boards are a very popular area of program development and Web based discussion type applications are available in a number of configurations and languages. It would further be suggested that a focus group be assembled to review the current and some alternative

discussion applications and determine the must have features. From this list of required features, a candidate application/solution could then be identified and implemented.

## SLN

### Issue:

Catalog size limitation issue

### Description:

There is a limit on the memory pool that is available when the Cataloger server task runs. This limit is 1MB. If you exceed this memory pool limit, the Notes Catalog (catalog.nsf) is not updated with new databases that are added to this system, or when a database is archived.

What solutions can you offer for this issue?

## IBM

### Response:

As discussed in the workshop, the root cause is a lack of regulation or file grooming process of the archive service that is currently being provided. The native 'Catalog' Domino task was not designed to be an archive server cataloging and management tool, but a catalog tool for a more manageable number of applications. To use the existing 'catalog' task, the number of databases will have to be reduced on the server or the archive will need to be spread over a number of servers.

We also acknowledge that an interim solution has already been identified, developed, implemented, tested and is currently in production.

## SLN

### Issue:

Would like offline editing via Browser (as in Notes) that works reliably (similar to DOLS)

### Description:

A majority of the SLN instructors use the offline component of the Notes client. We are looking to retain the offline component of our LMS, but have it work with a browser and not a client. DOLS required a large client install, along with a large support base.

It has been publicly stated that the second release of the WorkPlace client will allow for offline editing. Will this be through a web browser? If so, will there be plug-ins added to the browser or will a full offline client be necessary (i.e.-DOLS)? Also, will the offline component of WorkPlace work on a Mac and browsers other than Internet Explorer?

## IBM

### Response:

As of the writing of this document, no announcements have been made indicating that the off-line editing capabilities such as those announced to be available in the Eclipse based version 2.0 of the Lotus Workplace client experience. A non-disclosure with the IBM/Lotus software development team is suggested to possibly unveil any possible future design and feature enhancement plans. It might be important to consider that the off-line capabilities in both cases here REQUIRE a rich client of some sort. In the case of Notes, the add-in DOLS task is required, and in the case of the Workplace v2.0 the workplace client is required for off-line editing. Large scale implementation of DOLS may not be the best route to take from a management and support point of view, however the automated distribution of the Workplace client technology would be appropriate and offers the economies afforded by the automated distribution.

## SLN

**Issue:**

Tests and Self-Test – enhancements

**Description:**

We are looking for an integrated tool that would allow for test banks to be used within the LMS, and have question banks based on various criteria. The criteria would be things like: By Instructor, By Campus, By Discipline, etc.

Once the test banks are developed, we would need testing features/tools such as random test questions and unlimited numbers of questions per test.

## IBM

**Response:**

IBM already has at least one education/school system client that has developed a system that seems to match the criteria as described above. The system allows 'teachers' to enter questions that match lesson plan criteria. Questions are aligned with very specific course completion and lesson content criteria and then evaluated further before they become part of the 'question bank'. Teachers/instructors, then use the Notes application to assemble tests that adhere to the content requirements for the course. The system supports randomization of questions (so pupils in the same class can get different version of the same test) and also prints answer keys for instructors and instructor assistants/aides.

It is possible this Notes/Domino application can be made available. Contact your IBM representative for further information on this item as needed.

## SLN

**Issue:**

Better support for multimedia (scalable support)

**Description:**

As instructors and courses get more advanced with the technology, they are looking to add multimedia to courses. There is no easy way to integrate multimedia files directly into a Notes document.

What suggestions/tools can you offer to make this process easier for the end-users? What will be the impact to the level of support necessary if these suggestions/tools are used?

## IBM

**Response:**

No immediate response. A non-disclosure with the IBM/Lotus software development team is suggested to possibly unveil any possible future design and feature enhancement plans.

## SLN

**Issue:**

End-user customization of web-based LMS

**Description:**

The user interface of the current LMS is dictated by SLN. We would like to be able to have users apply skins, of sorts. Also, we would like to have users be able to change font sizes/colors, along with page background colors. This would allow for the ultimate flexibility with regards to users with disabilities.

Resource: <http://devedge.netscape.com/>

We have started to accomplish this through CSS, JavaScript and Cookies. Are there other alternatives approaches that you would recommend?

## IBM

### Response:

In the current user environment, the issue of 'personalization' has become a very favorable feature to implement. Personalization in a 'connectionless' environment can be somewhat problematic however there are a variety of approaches and acceptable work arounds to personalization in a Domino or other Web server environment. Lotus Domino supports a feature that is not widely publicized (or understood) called user profiling. Based on the standard notes 'Profile' document type, it is very easy to implement applications that are secure (require a login) and then can lookup the users preferences. This feature is well implemented in the Lotus Notes email template application.

## SLN

### Issue:

File attachment import feature

### Description:

The third party software called Double-Sixes allows for file attachments to automatically be imported into a rich text field upon submission of a document. Due to the lack of stability of this software, it cannot be used on a mass scale. We are looking for a routine that will automatically enter the contents of a file attachment into a rich text field.

## IBM

### Response:

No immediate response. A non-disclosure with the IBM/Lotus software development team is suggested to possibly unveil any possible future design and feature enhancement plans. Identification of a more robust 3<sup>rd</sup> party solution may also be possible.

**[END OF APPENDIX A]**

## Appendix B: Assertions

The following assertions represent noteworthy trends in SUNY, online education, and higher education in general, which are likely to have significant impact on the future of Learning Management Systems. Like the environmental assessments and assumptions, these assertions were used for establishing the criteria of the new technology platform and LMS for SUNY.

- **The standard set of tools and functionality available in Learning Management Systems is finite.**

Online education began with a few user/developers who had the skills and resources to create online supplements to their courses, and then was “commercialized” and bundled as out-of-the-box solutions. A common practice for assessing these solutions is to review the functionality, i.e., what features are available in a product and how they compare to other products.

However, this assessment has become of decreasing value as systems have matured and converged through continuing industry consolidation. Edutools evaluated three applications, and across 40+ feature categories listed, only six were not available in all three applications (these include features not considered “mission critical” such as UNIX-compatibility, Open Source, etc.). Therefore, making comparative evaluations is not so much about features but the fine granularity of functionality. For example, as all LMSs have discussion forums, evaluation might focus on functions within that feature such as sort criteria, searching capabilities, archiving, and so on.

- **SLN2.0 will accommodate broader ranges of teaching styles and goals and therefore will need to provide tools for specialized pedagogical practices.**

As the core functionality of LMSs has stabilized and is continuously maturing, attention in LMS development will increasingly turn toward specialized teaching and learning applications. This new generation of tools will address specialized disciplinary needs (e.g., audio discussion boards for foreign language teaching) as well as specialized pedagogical approaches (e.g., wikis to support social constructivist teaching methods).

As a result, the next generation of LMS design will require a focus on ease of development and integration of specialized tools. This trend will go hand-in-hand with exemplary support of a range of open standards for integration, data exchange, and interoperability.

- **Interoperability provides richer usability than integration.**

Many applications, particularly Learning Management Systems, tout their integration abilities with a variety of campus ERP applications from Student Management Systems and Libraries to personal e-mail and calendars. However, we might gain greater usability benefits through interoperability than integration. What’s the difference? In this case, *integration* means one object from a single source could be accessed from multiple locations; *interoperability* means multiple objects from different sources could be accessed all from a single location.

Consider an integrated calendar vs. a calendar that provides interoperability. *Integration* would allow a calendar native to one application to appear in another. For example, your Outlook calendar could reside in both in its native Outlook email application as well as within a campus portal. The flexibility to work with one’s calendar in either location is convenient and time-saving.

Now imagine the same scenario, but in addition to having your personal calendar both in Outlook and the campus portal, you want to access your course calendar maintained by an LMS, and a Campus Events calendar managed by your school through WebEvent. *Interoperability* could allow access to all three calendars through a single log-in process and even aggregate the data for all calendars into a unified calendar view in the campus portal. Any additions, deletions or modifications made in one application should publish out to a single calendar.

- **The portal is the best platform for delivering an LMS.**

If the previous assertions hold, then a modern, standards-compliant portal provides an exemplary framework for constructing a next-generation Learning Management System. Standards-compliant versions of all LMS core components exist, and in many cases there are multiple options—both Open Source and proprietary—from which to choose. One core strength of a modern portal is that it provides both integration and interoperability based on open standards, and thus affords a fertile and highly accessible platform for developers who wish to create specialized teaching and learning applications.

Furthermore, a portal is specifically optimized for aggregating features—i.e., combining tools from various providers into a unified interface—while serving as a conduit for tool interoperability by providing a framework for a single application to be available in multiple contexts—for example, the unified calendar with personal, class, and campus views.

In addition to these general benefits, a portal environment is particularly well suited to SUNY's technology landscape and its attendant challenges. A portal will enable SLN to achieve simultaneous integration with multiple instances of the various Student Information Systems (SIS) on SLN campuses. Likewise, as SUNY schools increasingly adopt portals for their more general campus computing needs, a portal-centric LMS will fit in well with their infrastructure plans.

**[END OF APPENDIX B]**

# Appendix C: Task Force Report

## Introduction

The State University of New York is committed to its mission of providing the broadest possible access to high-quality education for a wide diversity of students and impact on society through teaching, research, and public service opportunities. As the SUNY community looks to its future, it is imperative that we consider the profound impact that technological change will have on the ways in which the constituent campuses can continue to fulfill their respective missions. It is equally imperative that we face these changes together, as a community, so that we may fulfill our collective obligations to provide both quality services to our students, faculty, and staff and outstanding value to the taxpayers of New York.

SUNY Learning Environments (LE) has a unique opportunity to engage the SUNY community in a discussion about goals and priorities for the SUNY Learning Network's (SLN's) next-generation technology strategy. Accordingly, LE has convened a Task Force of representatives from across the SUNY system to envision a future in which all of SUNY could be supported by a common online environment for teaching, learning, and research, with all the benefits of system-wide collaboration yet without compromise to the respective needs and missions of the constituent campuses.

Meeting the challenge presented to the Task Force, LE, and the SUNY community entails both an act of faith and an act of will. The act of faith lies in choosing to believe that all SUNY campuses, whether large or small, upstate or downstate, community colleges or research centers, can identify common elements for an online environment able to effectively serve the current and future needs of SUNY's 415,000 students and 30,000 faculty members. The act of will lies in keeping our attention resolutely focused on our common goals, maintaining a SUNY-wide view of the greater good while also faithfully representing the distinctive needs of its constituent campuses.

This appendix presents the findings of the Task Force.

## Strategic Recommendations

The guiding vision stated in the beginning of the Task Force's charter reads as follows:

*[To] create, deploy, and support a collaborative online teaching, learning, and research<sup>14</sup> environment for **all** of SUNY.*

We interpret this vision statement to mean that Learning Environments (LE) seeks to transform the SUNY Learning Network (SLN) into the optimal learning environment for all SUNY campuses while setting a national standard for collaborative and cost-effective implementation. Accordingly, we have identified a number of overarching principles that we believe are necessary to achieving that vision.

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<sup>14</sup> *With regard to research, the charter notes only that it should be "explored further, within the context of SLN." The task force has accordingly focused its main effort on defining the goals for teaching and learning. See Appendix I for the full text of the charter.*

First, we affirm the four promises made to this body by LE:

1. **Support the grass roots**  
All substantial affordances<sup>15</sup> in SLN's current platform will be carried forward to the next generation.
2. **Establish a baseline of competitiveness**  
SLN's next-generation platform will contain all substantial affordances currently available in the base configurations of the major learning management systems (LMS's). This standard of competitiveness is considered to be a starting baseline and minimum requirement.
3. **Respond to the guidance of the Task Force**  
LE will issue a report in response to the Task Force's report which outlines SLN's technology strategy and explains how it aligns with the recommendations contained in this report.
4. **Provide ongoing calibration of future development**  
A standing committee of SLN community members will be convened to help ensure that future development plans will continue to reflect the priorities set by the Task Force.

In addition, the Task Force recommends that the following principles guide LE's strategic planning:

- **Prioritize and emphasize teaching and learning**  
One of SLN's key competitive differentiators has been and should continue to be its focus on delivering tools, training, and research that promote the best possible learning experience for SUNY's students. SLN should maintain this emphasis on teaching and learning excellence and should expand it by supporting multiple pedagogical approaches and supporting tools, especially in the area of discipline-specific teaching innovations. SLN should also continue to support and promote its research into online teaching and learning, which has shaped the design of its learning environment to-date and should continue to drive future development.
- **Harness the strength and diversity of the SUNY federation**  
An optimal learning environment for all of SUNY must be flexible enough to accommodate the distinctive missions of each of the sixty-four campuses. Furthermore, the structure of the environment should enable the campuses to benefit from the federated structure of the SUNY system which, by design, empowers each campus to make resource investment decisions that best serve the needs of its students and faculty. LE's technology strategy should therefore support campuses' freedom to align their resource investments with their individual needs, while simultaneously working to lower the barrier to resource pooling among the campuses whenever there is mutual benefit to be gained.
- **Maintain excellence in service**  
LE's current challenge of defining and implementing a next-generation platform should always be considered within the context of SLN's larger mission of providing services to the campuses through a *combination* of technology, services, and expertise. Like the emphasis on teaching and learning, high-quality services have been and should continue to be a key competitive differentiator for the program. At the request of LE's Executive Director, we have included an appendix to this document outlining some of the support and service affordances that the Task Force deems essential to SLN's mission. LE should also charter a successor body to this Task Force empowered with the specific charge of setting priorities for further development of SLN services.
- **Plan for tomorrow's campuses**  
While much of this report is necessarily concerned with the relatively immediate needs of

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<sup>15</sup> *The term affordance is drawn from the literature of both industrial design and cognitive psychology. It refers to the "action possibilities" latent within an object or interface, i.e., the capability that it grants to the user. An affordance is distinct from a feature, which is a specific (and often technology-specific) implementation of an affordance.*

the constituent campuses, SUNY will be served best by keeping the future in mind. LE's technology strategy should place emphasis on providing a system that will enable SUNY to respond quickly and efficiently to future needs and innovations. This includes giving strong consideration to ease of integration, since online learning environments will inevitably become more deeply enmeshed with a range of information systems across campuses.

- **Support a smooth transition**

The faculty and staff of each campus have invested substantial time and effort in creating course content, learning technology interfaces, and tuning their support processes to fit best with their current technology platform, whether that platform happens to be SLN or one of the commercial or Open Source alternatives. The challenges of migrating to a new platform will be unavoidable. LE should therefore include as part of its strategy an array of technologies and services designed to ease the challenges of transition as much as possible.

- **Develop open and transparent governance**

The recommendations listed above can all be best achieved in close communication and cooperation with the campuses, in the same spirit in which this Task Force was chartered. LE should develop governance and communication structures for SLN that maximize both the effective input from the campuses and the transparency of major decision-making processes. As with services, LE should charter a committee to recommend improvements in governance.

## Summary of Critical Functional Requirements

The Task Force has identified a number of high-level functional requirements for the next-generation platform. These requirements map to affordances which, in turn, map to features.<sup>16</sup>

The functional requirements we have identified are as follows:

- **Interface**

The user interface should be quick and responsive, easy for faculty and students to learn and use, present navigation in an intuitive and visually compelling way, and support appropriate accessibility standards.

- **Tools**

The system should facilitate best online teaching practices through the structure of its provided tools and interfaces. Further, it should support collaboration beyond courses, including student support as well as research and collaboration among stakeholders. It should support a range of teaching and learning modalities, such as the presentation of visual materials and synchronous communication. It should enable students and their teachers to keep track of their progress. It should also support collaboration and re-use, enabling faculty to move content in and out of the system, share and re-use content, and maintain long-term archives of course content easily. Finally, it should provide a student-centric approach, allowing students to collect vital information they need to track across all their courses.

- **Integration**

The system should integrate and interoperate with a wide range of campus systems, including Student Information Systems (SIS), library resources, campus portals, and support systems such as advisement and billing systems. It should also provide best-in-class support for quickly integrating new tools and innovations.

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<sup>16</sup> The Task Force has provided a representative (i.e., non-exhaustive) mapping of important affordances to features. See Appendix II for details.

- **Enterprise and System Administration**

The platform should provide students and faculty with appropriate protection of their privacy through robust security, effective authentication, and appropriate roles and permissions. It should support state requirements for monitoring attendance, and allow campus administrators to obtain the kind of usage statistics that will enable them to monitor their campus' return on their investment. It should enable workflows for content creation, editing, and publishing. Finally, it should offer flexibility to accommodate intra- and intercampus differences in administrative structures by allowing customized roles and privileges for various administrative duties as well as a range of configuration options to support the sharing of content and resources across multiple sections of a class.

## Appendix C-I: Learning Environments Task Force Charter

### SLN Vision

Create, deploy and support a collaborative online teaching, learning, and research<sup>17</sup> environment for **all** of SUNY.

### What the vision means

*Imagine* if SUNY did all of its online learning, research and collaboration on a common platform...

- Imagine cross-campus degrees & new programs
- Imagine lifelong SUNY learners from high school through seniority online
- Imagine bringing a more diverse student population, nationally & internationally to SUNY
- Imagine unleashing academic activities beyond what is achieved in traditional modalities<sup>18</sup>
- SLN supports the entire spectrum of e-learning
- SLN's goal is to serve all SUNY campuses on an interoperable<sup>19</sup> platform and support programs, including enterprise systems
- SLN integrates communities, services and technologies for online learning by identifying, developing and promoting best practices

SLN collaborates with SUNY campuses and U-wide programs to achieve academic excellence and economies

### SUNY LE Task Force: Charge

To make recommendations for the requirements for a Learning Management System that can serve all SUNY and its online learning needs...

- User requirements
- Migration strategy
- Continuous improvement process and governance

### Task Force Goals

- What are the requirements of an LMS that enables the best learning and teaching online? What functions and activities do we want in the virtual classroom?
- What will ease, enable and empower the experience of students, faculty, advisors and technical support who use SLN?
- What qualities of an LMS make it the compelling choice<sup>20</sup> for all campuses, including business and technical requirements?

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<sup>17</sup> Explore the dimensions of research further, within the context of SLN.

<sup>18</sup> Discuss non-traditional modalities more. An example of non-traditional modalities might include course lengths that vary from the traditional periods.

<sup>19</sup> Interoperability might include a common platform and/or centralized repositories.

<sup>20</sup> Factors that would make SLN a 'compelling choice' might include: ease of learning, flexibility to integrate tools, total cost of ownership/economic feasibility within SUNY, 'faster, cheaper, better', adaptability to future needs, etc.)

### **Task Force Opportunities**

- **Think U-wide thoughts** (Avoid campus, technical, and disciplinary parochialisms)
- **Assume the vision** (Don't debate its merits or feasibility)
- **Dream it up!** (Avoid shopping for or comparing specific LMSs)

**[END OF APPENDIX C-I]**

## Appendix C-II: Affordances, Success Indicators, and Representative Features

The following table charts the **LMS interface requirements** as identified by the LE Task Force:

Interface • SLN must offer the following:			
Affordances	Success Indicators	Base Configurations of LMS <sup>21</sup>	Core Features
a) User experience that is quick, available, and responsive within the constraints of the desktop and network platforms that faculty and students use	<ul style="list-style-type: none"> <li>✓ Increased faculty and student participation</li> <li>✓ Reduced number of complaints regarding technical issues, frustrations</li> </ul>		<ul style="list-style-type: none"> <li>✓ Students and instructors can search all course content, discussion postings and email messages within a course</li> </ul>
b) System that is easy for faculty, staff, and students to learn, manage, and navigate as effortlessly as possible	<ul style="list-style-type: none"> <li>✓ Increased faculty and student participation</li> <li>✓ Adaptation to the new interface with minimal time demands</li> <li>✓ Feedback from faculty, staff, and students on ease of use</li> </ul>		<ul style="list-style-type: none"> <li>✓ Online editor that allows for creation of basic web page layouts and integration of other web media: for both instructors and students, as specified at the campus level</li> </ul>
c) Interface that can communicate both content and functionality in a visually compelling way	<ul style="list-style-type: none"> <li>✓ Use of multiple modalities</li> <li>✓ Assessment and analysis of interface design by campus faculty in appropriate fields (e.g., graphic &amp; web design faculty and students)</li> </ul>		<ul style="list-style-type: none"> <li>✓ Course interface maps the learning experience rather than the software's functionality</li> <li>✓ Course map creates a primary interface for students that reflects the instructor's organization of the material – often, though not always, walking the students through the learning experience temporally, much like a syllabus</li> <li>✓ Ability to customize the course map, based on campus standards</li> </ul>
d) Interface that provides content that is in compliance with ADA guidelines or that can be provided by alternative accessible means.	<ul style="list-style-type: none"> <li>✓ Content that is accessible to all</li> <li>✓ Approval by ADA assessment service(s)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Instructors can add alt tags to uploaded images</li> <li>✓ All system images contain alt tags</li> <li>✓ All framesets are appropriately titled with descriptions of the functionality of the frames layout</li> <li>✓ System allows invisible navigation links to be used by screen readers</li> </ul>	<ul style="list-style-type: none"> <li>✓ Design for accessibility to meet State and Federal guidelines</li> </ul>

<sup>21</sup> *Base Configurations of LMS: These are the features entailed by the first two promises made by LE to the Task Force. (See the "Strategic Recommendations" section for details.) For the purposes of compiling this table, features were identified using the Edutools web site and internal marketing documents created by SLN. Blue are features contained in ANGEL 6.2, Blackboard 6, and WebCT 4.1 Campus edition; Red are features now available in the SLN templates that are not included in all three of the base configurations of the major commercial products.*

The following table charts the LMS **tools requirements** as identified by the LE Task Force:

Tools • SLN must assure the ability to:			
Affordances	Success Indicators	Base Configurations of LMS	Core Features
a) Flexibly integrate components	<ul style="list-style-type: none"> <li>✓ Implementation of tools that support technical and pedagogical advances</li> <li>✓ Feedback from faculty, staff, and students on range and type of tools needed to complete necessary teaching and learning tasks</li> </ul>		
b) Easily and efficiently handle the appropriate import, archive and export of materials, including pre-packaged course materials	<ul style="list-style-type: none"> <li>✓ Development of materials and coursework in a variety of applications</li> <li>✓ Campuses and faculty repurposing course content</li> </ul>	<ul style="list-style-type: none"> <li>✓ <b>Instructors can batch download current copies of all course materials to their local hard drive</b></li> <li>✓ <b>Students and instructors can attach files in multiple formats</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability to publish course content to CD for specific audiences (e.g. EArmyU)</li> <li>✓ Tool to locate and report bad links, both internal and external</li> <li>✓ Portability of course content, including support for SCORM import and export</li> </ul>
c) Enable faculty to work offline (with the exception of synchronous communications)	<ul style="list-style-type: none"> <li>✓ Fulfill the need for faculty to work without a persistent network connection</li> </ul>	<ul style="list-style-type: none"> <li>✓ <b>Instructors can prepare all course materials offline and synchronize them with the server</b></li> <li>✓ <b>Instructors can download all discussions and student assignments, respond to them offline, and then synchronize their responses with the server</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ Faculty can replicate a local copy of their course, make changes, and review student contributions without having internet connectivity</li> <li>✓ Provide faculty with robust backup capabilities</li> <li>✓ Provide a “staging area” that is invisible to students for faculty use in making changes before uploading them to the student space</li> </ul>
d) Integrated guidance and support for instructional design	<ul style="list-style-type: none"> <li>✓ Structured course development by faculty with varying levels of design experience</li> </ul>	<ul style="list-style-type: none"> <li>✓ <b>Instructors can use templates to create course content</b></li> <li>✓ <b>Instructors can use a wizard to walk them through the template population process</b></li> </ul>	<ul style="list-style-type: none"> <li>✓ Course creation process that walks faculty through the pedagogical thought process: course wizard prompts faculty to think about kinds of experiences they want students to have and configures course environment based on faculty input on those pedagogical issues</li> </ul>
e) Support the best-in-class synchronous capabilities for class meetings and group work	<ul style="list-style-type: none"> <li>✓ Feedback from faculty, staff, and students on effectiveness and immediacy of synchronous collaboration</li> </ul>	<ul style="list-style-type: none"> <li>✓ <b>Chat tool supports private messages</b></li> <li>✓ <b>System creates archive logs for all chat rooms</b></li> <li>✓ <b>Software supports an instructor-controlled whiteboard</b></li> <li>✓ <b>Whiteboard supports image uploading and annotation</b></li> <li>✓ <b>Software archives snapshot of whiteboard sessions for future use</b></li> </ul>	

<p>f) Automatically and completely convert all existing SLN LotusNotes-based materials</p>	<ul style="list-style-type: none"> <li>✓ “Frictionless” movement of materials from a proprietary format</li> </ul>		
<p>g) Allow students to track assignments across courses</p>	<ul style="list-style-type: none"> <li>✓ Student enrollments in more than one online course in a term</li> </ul>	<ul style="list-style-type: none"> <li>✓ Students have a personal home page that lists all courses in which they’re enrolled and all system-wide events and tasks</li> </ul>	
<p>h) Incorporate a comprehensive range of assessment and related communication capabilities to faculty</p>	<ul style="list-style-type: none"> <li>✓ Effective feedback to students</li> <li>✓ Efficient access to assessment statistics and communication features</li> </ul>	<ul style="list-style-type: none"> <li>✓ Instructors can create true/false, multiple choice, matching, and short answer questions</li> <li>✓ System automatically scores the above</li> <li>✓ Instructors can import questions from existing test banks</li> <li>✓ Instructors can create self-assessments</li> <li>✓ System can display instructor-created feedback</li> <li>✓ Instructors can mark assignments and short answer tests online</li> <li>✓ Instructors can assign grades to discussion posts</li> </ul>	<ul style="list-style-type: none"> <li>✓ Full featured testing system that provides instructors with a variety of online, automatically-scored assessments, surveys and tests.</li> <li>✓ Ability to create multiple choice, true-false, exact match, short essay, drag and drop tests in any combination of question type with test bank support</li> <li>✓ Ability to randomize, present time release, and time tests</li> <li>✓ Ability to consolidate individual and group participant response in a single document with summary displays for evaluations and discussions</li> </ul>
<p>i) Provide students with a personal tracking system within each course as well as faculty access to that tracking information</p>	<ul style="list-style-type: none"> <li>✓ Provide students with a personal tracking system within each course as well as faculty access to that tracking information</li> </ul>	<ul style="list-style-type: none"> <li>✓ Students can make private notes about their course</li> <li>✓ Students can search all course content and discussion postings within the course</li> <li>✓ Students can access a product knowledge base</li> <li>✓ Students can view their grades</li> <li>✓ Students can track their assignment deadlines and due dates in the course calendar</li> <li>✓ Student can view their evaluations of completed assignments, instructor feedback, and points or percentages</li> <li>✓ Students can create shared references for a class, organized by date, title, or media</li> <li>✓ Students can save private drafts of assignments</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability for students to create and manage their own discussion and project groups, both synchronous and asynchronous</li> <li>✓ Ability for students to take and save notes directly on course pages (students can then print or download their notes into a study guide)</li> <li>✓ Tools to allow students to post instant feedback on content; optional anonymous mode</li> </ul>

The following table charts the LMS **integration requirements** as identified by the LE Task Force:

<b>Integration • SLN must assure the ability to:</b>			
<b>Affordances</b>	<b>Success Indicators</b>	<b>Base Configurations of LMS</b>	<b>Core Features</b>
a) Automatically create class instances and enroll students directly from the campus SIS system	✓ Streamlining of the registration process		
b) Construct live links or “conduits” between SIS and the CMS, which should be constructed to allow live polling and posting of data within the framework of the CMS	✓ Single login for posting of material or locating information such as grades		✓ Automated enrollment and reconciliation process
c) Learning environment that integrates with related support functions such as advisement, registration, billing, etc.	<ul style="list-style-type: none"> <li>✓ Facilitation of learning experience broader than just the classroom</li> <li>✓ Feedback from faculty, staff, and students on effective integration of these functions</li> </ul>		
d) Integrate appropriate supplemental electronic resources, including major proprietary resources	✓ Effective and efficient integration with library databases and content into courses		✓ Ability for instructors to easily upload content provided by textbook publishers and other third-party vendors
e) Integrate with portals of the individual campuses	✓ Easy access to the system by stakeholders		
f) Environment that supports the integration of discipline specific tools	✓ Adoption by faculty in disciplines and programs with image-heavy or other appropriate curricular requirements	✓ <a href="#">Instructors can use a mathematical equation editor to enable students to enter and edit mathematical notations</a>	✓ Support the display of annotation of images as well as related collaborative learning activities

The following table charts the LMS **administration requirements** as identified by the LE Task Force:

<b>Enterprise and System Administration • SLN must assure the ability to:</b>			
<b>Affordances</b>	<b>Success Indicators</b>	<b>Base Configurations of LMS</b>	<b>Core Features</b>
a) Provide stakeholders with robust security	✓ Security breaches are relatively few/minor when compared to similar enterprise systems		
b) Include effective tracking capabilities	✓ Ability to easily monitor student attendance and track student activity	<ul style="list-style-type: none"> <li>✓ Reports showing number of times and date that each student accessed course materials</li> <li>✓ Ability to set a flag for individual course components to track the frequency with students access those components</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability to track participation, student review of content and overall usage statistics</li> </ul>
c) Assure the identities and appropriate access levels for users (i.e. Authentication and authorization)	✓ Provide access to a wide variety of specific services and information, as appropriate to each user's defined role in university system	<ul style="list-style-type: none"> <li>✓ Administrators can protect access to individual courses with a user name and password</li> <li>✓ System can authenticate against an external LDAP server or using the KERBEROS protocol</li> </ul>	<ul style="list-style-type: none"> <li>✓ Site access and authentication set at the campus level</li> <li>✓ Faculty, students and guests have a single login for both campus and SLE activities</li> <li>✓ Permission systems set by and controlled at the campus level</li> <li>✓ Ability to control whether or not faculty can add guests, based on campus guidelines</li> </ul>
d) Provide system with common authentication schemes and allow scripting of custom interfaces	✓ Use of different authentication schemes		

e) Allow for scalability and replication within programs and in the development of new programs	✓ Allow campuses to grow their online programs economically		<ul style="list-style-type: none"> <li>✓ Ability to customize design elements, based on criteria set at the campus level</li> <li>✓ Support branding by college or program at all levels of the course</li> <li>✓ Ability to create and manage courses manually and via batch processing</li> <li>✓ Ability to create a master copy of a course that can be used for pouring multiple sections</li> <li>✓ Provide development and staging area for new courses -- independent of specific terms-- (supports creating courses as far in advance as possible)</li> <li>✓ Ability to create courses not tied to a term or semester</li> <li>✓ Access to a course, closing a course, archiving and similar events should be based on start and end dates or through campus controlled tools</li> </ul>
f) Allow faculty to share resources	✓ Ease of access and use resulting in increased faculty collaboration		
g) Flexibly share resources and enrollments across sections while also providing distinct information required by the SIS	<ul style="list-style-type: none"> <li>✓ Increased faculty collaboration between and among sections, departments, campuses</li> <li>✓ Correct, trouble-free coordination between SIS systems regarding each course</li> </ul>		
h) Obtain up-to-date reports on course usage, system usage, and other related information	✓ Implementation of an accurate, easily accessible, available reporting system		<ul style="list-style-type: none"> <li>✓ Program level assessment tools: support for program assessment, curriculum planning, benchmark testing, student outcome tracking and instructional research – all aggregated data</li> <li>✓ Generate faculty-focused statistics (e.g. Identifying instructor presence/activity, unevaluated assignments, discussion statistics, time since update of newflash, etc.) – to be used in accordance with campus and contractual policies</li> </ul>
i) Set release preferences for all course content	✓ Flexible design environment		
j) Maintain a long-term archive of courses and other student work with appropriate security and privacy safeguards	✓ Accurate, readily accessed historical records of courses and student work		

k) Ability for campuses to selectively delegate appropriate administrative tasks	✓ Individual programs efficiently implement necessary administrative tasks		
l) Ability for individual campuses to tailor the platform autonomously if so desired	✓ Campuses support and customize platform as desired		
m) <i>Provide a development and staging area for new courses that is available independent of specific terms</i>	✓ <i>Campuses are able to develop numerous courses and programs simultaneously (in support of "large scale" programs)</i>		
n) Provide online collaboration environments	✓ Effective and efficient support of non-course collaboration for a variety of faculty, staff, and student groups (committees, organizations)	✓ Administrators can create online clubs, interest or study groups, and other communities	✓ Availability of nonacademic, non-billable courses (as with MeetingSpace) to be used for student orientations, advising, training and administration, and student communities

The following table charts the LMS **additional feature requirements** as identified by the LE Task Force:

Additional Features and Core Functionality		
Tool Type	Base Configurations of LMS	Core Features
Instructor tools	<ul style="list-style-type: none"> <li>✓ Instructor can make private notes about the course</li> <li>✓ Instructors can save private drafts of evaluations</li> </ul>	
Discussion forums	<ul style="list-style-type: none"> <li>✓ Discussion viewed by date and thread</li> <li>✓ Posts can include attachments and URLs</li> <li>✓ Posts can be either plain text, formatted text, or HTML</li> <li>✓ Instructors can determine the level of involvement (read, write, or post anonymously) for students</li> <li>✓ Instructors can create discussion environments for small groups</li> <li>✓ Discussion threads are expandable and collapsible to view an entire conversation on one screen</li> <li>✓ Instructors can comment privately to individual students on each discussion post</li> </ul>	
Groupwork	<ul style="list-style-type: none"> <li>✓ Instructors can assign students to groups</li> <li>✓ Each group can have its own shared group presentation folder and discussion folder</li> </ul>	
Authorization	<ul style="list-style-type: none"> <li>✓ Instructors can assign different levels of access to their course based on the following pre-defined roles: student, designer, tutor, and guest</li> <li>✓ Instructors or students may be assigned different roles in different courses</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability to control whether or not faculty can add guests, based on campus guidelines</li> </ul>
Gradebook	<ul style="list-style-type: none"> <li>✓ Instructors can add the grades for offline assignments to the online gradebook</li> <li>✓ Instructors can export a comma-delimited version of the gradebook to an external spreadsheet program</li> <li>✓ Instructors can manually edit all grades</li> <li>✓ Instructors can delegate the responsibility for grading assignments.</li> <li>✓ When an instructor adds an assignment to the course, the software automatically adds it to the online gradebook</li> <li>✓ Instructors are provided with a “permanent pen” feature which allows for easy font and color-specific in-text annotation</li> <li>✓ Instructors can provide extended narrative comments as well as letter grades</li> <li>✓ Instructors can store completed evaluation privately, and release them at a later time</li> <li>✓ Students and instructors can view the grades and narrative evaluations for all assignments in a separate evaluation section of the course site</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability to track student performance directly into the gradebook</li> <li>✓ Assessment of student activity documents synched with the gradebook</li> <li>✓ Ability to report based on a number of variables, both in tabular and graphic form</li> <li>✓ No character limits on evaluation comments</li> <li>✓ Ability to auto import pre-posted comments into the evaluation form</li> </ul>

Course calendar	<ul style="list-style-type: none"> <li>✓ Instructors can post course-related events and announcements in the course calendar</li> </ul>	
Content sharing and reuse	<ul style="list-style-type: none"> <li>✓ Populated course templates (with instructor-generated content) can be cloned</li> </ul>	
Course organization	<ul style="list-style-type: none"> <li>✓ Instructors can create both linear and non-linear sequences using a content library</li> <li>✓ Templates support organizing content and functionality by sequences of learning activities rather than system functionality (e.g., discussion board, file storage, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>✓ Tools for data sorting to enable instructors to sort and display the course data and materials in a variety of ways</li> </ul>
Rich text editor	<ul style="list-style-type: none"> <li>✓ Templates include a rich text content editor</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability to edit all course text, using robust editing tools</li> </ul>
Instructional standards compliance	<ul style="list-style-type: none"> <li>✓ System supports IMS Content Packaging 1.1.2.</li> <li>✓ The product provider will work with the institution to migrate existing courses into the system</li> </ul>	
Internal email	<ul style="list-style-type: none"> <li>✓ Students have email aliases that forward to external email accounts</li> <li>✓ Faculty have internal email accounts with both webmail and thick client access</li> </ul>	<ul style="list-style-type: none"> <li>✓ Ability for students and instructors to send private messages to each other within the course, without the need for an external email account</li> </ul>
File Exchange	<ul style="list-style-type: none"> <li>✓ Students can upload files to a shared group folder</li> <li>✓ Students can submit assignments using drop boxes</li> <li>✓ Students can submit assignments to a partner or a group of students</li> <li>✓ Instructors can comment on files and return them to the student</li> </ul>	
Collaboration		<ul style="list-style-type: none"> <li>✓ Enhance engagement, learning and community through group interaction</li> <li>✓ Ability to support a variety of approaches to teaching and learning, including learner center approaches</li> </ul>
Faculty tools		<ul style="list-style-type: none"> <li>✓ Ability to automatically release learning content and activities based on preset criteria, such as date/time, student, etc.</li> </ul>
Administrative tools		<ul style="list-style-type: none"> <li>✓ Ability to extract numeric or letter grades and text comments in a batch process that creates a flat file for downloading and processing by the campus</li> <li>✓ Ability to archive courses on a course-by-course basis, as established by the campus</li> <li>✓ Ability to grant and revoke access to a course both manually and via automatic batch process</li> </ul>

**[END OF APPENDIX C-II]**

## Appendix C-III: Service and Support Recommendations

### Introduction

The SUNY Learning Network provides services and support in addition to a learning management system. Although it is outside the charter of our current Task Force to address these services in detail, we believe strongly that they are critical competitive differentiators of the total SLN system. It is within this context that we offer the recommendations below.

### General Program Considerations

- Campus budgets vary from year to year; therefore, SLN total cost of ownership must be competitive, effective, and predictable.
- SUNY is a large and diverse group with a variety of needs; consequently the evolution and growth of SLN's services and support must be based on community input and needs.

### SLN Professional Development Program

- Professional development programs ideally should be designed to meet the needs of participants for a variety of learning modalities and scheduling opportunities. SLN should provide campuses with continuum of professional development opportunities from which to choose – at a variety of times throughout the year – encompassing both online and on-site methods.
- Professional development is facilitated with effective, immediate communication. Furthermore, information, advice, and support are often best conveyed by skilled individuals on individual campuses. Individual SLN campuses should have the option of identifying existing faculty or staff members to become on-site trainers in order to more efficiently create and disseminate knowledge within the SLN community. This will also further promote self-reliance among faculty on individual SLN campuses in terms of benefiting from more immediate, as-needed training opportunities and from having more opportunities to share and grow a collective knowledge base. SLN should provide train-the-trainer options for these campuses.

### Knowledge base

- The size and diversity within the SUNY system provides a unique opportunity to grow a pool of knowledge about web-based teaching and learning. Furthermore, faculty and students benefit from sharing content and effective practices. SLN should therefore continue to support and enhance its ability to systematically confirm and formalize resources and knowledge through a program of research and dissemination.

### Technology Development and Support

- Products and processes related to educational technology are constantly changing and improving. SLN should therefore plan regular and focused improvements to its technology platform and services with the goal of maintaining status as a compelling choice for the campuses.
- When it comes to professional development, faculty respond best to knowledgeable, credible colleagues. Faculty also want and need just-in-time support as well as training.

SLN should encourage the appointment of individuals with established teaching experience, as well as expertise in instructional design and online pedagogies, to serve in the role of the Multimedia Instructional Designer (MID).

- The management of campus SLN activities is time consuming and unpredictable; SLN should therefore advocate for the role of Academic Coordinators on member campuses.
- Online faculty and students should be focused on teaching and learning rather than technology. Furthermore, it is neither cost effective nor likely that individual campuses can support their own individual Help Desks. Consequently, SLN should continue to provide and grow Help Desk services for all campuses.
- It is neither cost effective nor likely that individual campuses can support course archiving and back-up functions. SLN should continue to maintain a thorough and reliable archiving and back-up operation.

### **Communications**

- Customer service is a critical feature of the total SLN package. LE should focus on timely responses and clear communication with all stakeholders. This includes collecting input as well as prioritizing and implementing enhancements to all SLN services and support in a timely manner.
- An organization's Internet presence is highly influential in shaping individual's predisposition towards and expectations of that organization. In particular, a higher-education DE network such as SLN should present a state-of-the-art, best-in-class website. SLN should therefore extensively revise its current website in terms of content (currency, accuracy, functioning links), appearance, and organization/usability.
- The ability to observe a course has the potential for significant impact on prospective students, prospective faculty, and others. SLN should offer a range of "example courses" on its site from a variety disciplines and exhibiting a range of approaches.

*[END OF APPENDIX C-III]*

## ***Appendix C-IV: Task Force Members***

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**[END OF APPENDIX C-IV]**

# Appendix D: LMS Evaluation

## Step One: Evaluation Against Task Force Criteria

Red = Does not meet requirements    Amber = Partially meets requirements    Green = Meets requirements

1. Task Force Recommendation: Prioritize and emphasize teaching and learning <sup>22</sup>		
Does the LMS support presentation of content and activities around class workflow rather than software functionality?		
Blackboard 6	Red	
WebCT Vista 4.0	Red	
ANGEL 6.2	Green	
Academos 1.5	Red	
Moodle 1.5	Green	
Sakai 2.0	Red	
dotLRN 2.1	Red	
Sakai 2.0 + Moodle 1.5 + uPortal 2.5	Green	
Sakai 2.0 + Academos 1.5 + uPortal 2.5	Red	
Academos 1.5 + LAMS 1.1 + uPortal 2.5	Green	LAMS would provide this functionality.
Are a large number of add-on teaching tools available that can support teaching and learning in different disciplines or using different pedagogical approaches?		
Blackboard 6	Green	Blackboard's "Building Blocks" program lists over 60 add-ons. Generally, vendors who develop add-on tools for LMS's develop for Blackboard first.
WebCT Vista 4.0	Green	WebCT's "PowerLinks" program is roughly equivalent to Blackboard's "Building Blocks", albeit somewhat less robust. (They list about 30 partners for learning applications.) However, WebCT is also actively supporting integration with Open Source tools.
ANGEL 6.2	Red	Although ANGEL comes with a rich set of tools in the system itself, there is no formal network for add-on tools, either vendor-supplied or Open Source.
Academos 1.5	Amber	Because of its uPortal heritage, Academos can be integrated with JSR-168-compliant portlets. However, most of the existing portlets are not teaching- and learning-specific.
Moodle 1.5	Green	A rich range of community-provided Open Source tools is one of Moodle's strong suits.
Sakai 2.0	Red	
dotLRN 2.1	Red	

<sup>22</sup> Full text of the recommendation: **Prioritize and emphasize teaching and learning:** One of SLN's key competitive differentiators has been and should continue to be its focus on delivering tools, training, and research that promote the best possible learning experience for SUNY's students. SLN should maintain this emphasis on teaching and learning excellence and should expand it by supporting multiple pedagogical approaches and supporting tools, especially in the area of discipline-specific teaching innovations. SLN should also continue to support and promote its research into online teaching and learning, which has shaped the design of its learning environment to-date and should continue to drive future development.

Sakai 2.0 + Moodle 1.5 + uPortal 2.5		
Sakai 2.0 + Academus 1.5 + uPortal 2.5		
Academus 1.5 + LAMS 1.1 + uPortal 2.5		
<b>What is the level of usability of the product, as evaluated by internal experts?</b>		
Blackboard 6		The organization of both the student presentation and the faculty controls are counterintuitive and inflexible.
WebCT Vista 4.0		While somewhat better than Blackboard, WebCT suffers from unnecessary complexity and from rough edges on important applications. Particular areas of weakness are the grade book, the test engine, and the homework drop box.
ANGEL 6.2		
Academus 1.5		
Moodle 1.5		
Sakai 2.0		Sakai's general usability design is sound but unfinished, with some controls (most notably around permissions) labeled in cryptic language that would only make sense to the programmers.
dotLRN 2.1		
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		The strength of the usability would depend on the integration work yet to be done.
Sakai 2.0 + Academus 1.5 + uPortal 2.5		Sakai's weaknesses in usability would prevent this combination from achieving strong usability, even were the integration to be done well.
Academus 1.5 + LAMS 1.1 + uPortal 2.5		The strength of the usability would depend on the integration work yet to be done.

2. Task Force Recommendation: Harness the strength and diversity of the SUNY federation <sup>23</sup>		
Does the LMS enable campuses to integrate the online learning experience with their total online presence through their campus portal?		
Blackboard 6		Although Blackboard provides some portlets that enable students to see their course lists within the campus portal, students and faculty must still leave the campus portal to enter the LMS.
WebCT Vista 4.0		Although WebCT provides some portlets that enable students to see their course lists within the campus portal, students and faculty must still leave the campus portal to enter the LMS.
ANGEL 6.2		
Academos 1.5		
Moodle 1.5		
Sakai 2.0		Sakai does provide uPortal integration; however, at present time, it does so at the cost of some usability.
dotLRN 2.1		
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		
Sakai 2.0 + Academos 1.5 + uPortal 2.5		
Academos 1.5 + LAMS 1.1 + uPortal 2.5		
Does the LMS support simultaneous integration with the various SIS platforms currently hosted by campuses?		
Blackboard 6		Blackboard provides integration with all the major SIS vendors; however, their technical infrastructure does not lend itself to <i>simultaneous</i> integration with multiple platforms.
WebCT Vista 4.0		WebCT advertises simultaneous integration with multiple platforms. It is unclear, however whether this integration is compatible with pushing registration from one SIS to another for purposes of cross-registration.
ANGEL 6.2		Angel provides integration with the major SIS vendors; however, their technical infrastructure does not lend itself to <i>simultaneous</i> integration with multiple platforms.
Academos 1.5		One of the strengths of the uPortal-based options is the relative ease of integration with SIS (and other campus IT systems); no programming would be required to simultaneously support multiple systems.
Moodle 1.5		Moodle currently provides integration with some of the SIS systems available, but not all. It also does not currently support <i>simultaneous</i> integration with multiple platforms.

<sup>23</sup> Full text of the recommendation: **“Harness the strength and diversity of the SUNY federation:** An optimal learning environment for all of SUNY must be flexible enough to accommodate the distinctive missions of each of the sixty-four campuses. Furthermore, the structure of the environment should enable the campuses to benefit from the federated structure of the SUNY system which, by design, empowers each campus to make resource investment decisions that best serve the needs of its students and faculty. LE’s technology strategy should therefore support campuses’ freedom to align their resource investments with their individual needs, while simultaneously working to lower the barrier to resource pooling among the campuses whenever there is mutual benefit to be gained.”

Sakai 2.0		Like the uPortal-based solutions, Sakai has the capability to provide simultaneous integration with multiple SIS platforms.
dotLRN 2.1		
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		One of the strengths of the uPortal-based options is the relative ease of integration with SIS (and other campus IT systems); no programming would be required to simultaneously support multiple systems.
Sakai 2.0 + Academus 1.5 + uPortal 2.5		One of the strengths of the uPortal-based options is the relative ease of integration with SIS (and other campus IT systems); no programming would be required to simultaneously support multiple systems.
Academus 1.5 + LAMS 1.1 + uPortal 2.5		One of the strengths of the uPortal-based options is the relative ease of integration with SIS (and other campus IT systems); no programming would be required to simultaneously support multiple systems.
<b>Does the LMS support per-campus customization of the learning environment within a single hosted instance?</b>		
Blackboard 6		Blackboard does not appear to support multi-campus configurations within one instance.
WebCT Vista 4.0		WebCT does appear to support multiple campus configurations within a single instance.
ANGEL 6.2		ANGEL does not appear to support multi-campus configurations within one instance.
Academus 1.5		The uPortal-based systems could support multiple campus configurations; however, some alterations to uPortal would be required.
Moodle 1.5		Moodle is not designed to support multiple configurations from a single instance.
Sakai 2.0		
dotLRN 2.1		dotLRN could support multiple campus configurations; however, some alterations to uPortal would be required.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		In the particular configuration envisioned, Moodle would be the limiting factor, requiring multiple instances to enable campus customization.
Sakai 2.0 + Academus 1.5 + uPortal 2.5		The uPortal-based systems could support multiple campus configurations; however, some alterations to uPortal would be required.
Academus 1.5 + LAMS 1.1 + uPortal 2.5		The uPortal-based systems could support multiple campus configurations; however, some alterations to uPortal would be required.

3. Task Force Recommendation: Plan for tomorrow's campuses <sup>24</sup>		
Is the LMS technology consistent with the ITEC-supported technology stack and potential SUNY-wide standards?		
Blackboard 6		Written in Java Supports Oracle Integrates with Banner Limited integration with uPortal
WebCT Vista 4.0		Written in Java Supports Oracle Integrates with Banner Limited integration with uPortal
ANGEL 6.2		Is <b>not</b> written in Java Does <b>not</b> support Oracle Can integrate with Banner Does <b>not</b> integrate with uPortal
Academos 1.5		Written in Java Supports Oracle Integrates with Banner Integrates with uPortal
Moodle 1.5		Is <b>not</b> written in Java Does <b>not</b> support Oracle Integrates with Banner Does <b>not</b> integrate with uPortal
Sakai 2.0		Written in Java Supports Oracle Integrates with Banner Limited integration with uPortal
dotLRN 2.1		Is <b>not</b> written in Java Supports Oracle Limited integration with Banner via IMS Enterprise Does <b>not</b> integrate with uPortal
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Partially written in Java Does <b>not</b> support Oracle Integrates with Banner Does <b>not</b> integrate with uPortal
Sakai 2.0 + Academos 1.5 + uPortal 2.5		Written in Java Supports Oracle Integrates with Banner Integrates with uPortal
Academos 1.5 + LAMS 1.1 + uPortal 2.5		Written in Java Supports Oracle Integrates with Banner Integrates with uPortal

<sup>24</sup> Full text of the recommendation: **“Plan for tomorrow’s campuses:** While much of this report is necessarily concerned with the relatively immediate needs of the constituent campuses, SUNY will be served best by keeping the future in mind. LE’s technology strategy should place emphasis on providing a system that will enable SUNY to respond quickly and efficiently to future needs and innovations. This includes giving strong consideration to ease of integration, since online learning environments will inevitably become more deeply enmeshed with a range of information systems across campuses.”

<b>Does the LMS support integration with other campus systems (e.g., Ex Libris)?</b>		
Blackboard 6		Blackboard provides integration APIs. Any integration required that are not supported by the APIs would need to be negotiated with the vendor. The scope and quality of the APIs are subject to further qualification through a future RFI.
WebCT Vista 4.0		Blackboard provides integration APIs. Any integration required that are not supported by the APIs would need to be negotiated with the vendor. The scope and quality of the APIs are subject to further qualification through a future RFI.
ANGEL 6.2		ANGEL provides both integration APIs and the full source code of their applications to their customers. The scope and quality of the APIs are subject to further qualification through a future RFI.
Academos 1.5		uPortal is, first and foremost, an integration framework. In addition, it is Open Source.
Moodle 1.5		Moodle provides both integration APIs and the full source code to the application. However, Moodle's architecture is not optimized for a high degree of integration with other applications. In addition, the fact that it is not Java-native limits its integration capacities within the SUNY environment. The limitations of Moodle's integration capabilities are subject to further qualification through a future RFI.
Sakai 2.0		Sakai provides both integration APIs and the full source code. Its architecture is optimized for integration. The strengths and limitations of Sakai's integration capabilities are subject to further qualification through a future RFI.
dotLRN 2.1		Sakai provides both integration APIs and the full source code. Its architecture is optimized for integration. However, the fact that it is not Java-native limits its integration capacities within the SUNY environment. The strengths and limitations of Sakai's integration capabilities are subject to further qualification through a future RFI.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		uPortal is, first and foremost, an integration framework. In addition, it is Open Source.
Sakai 2.0 + Academos 1.5 + uPortal 2.5		uPortal is, first and foremost, an integration framework. In addition, it is Open Source.
Academos 1.5 + LAMS 1.1 + uPortal 2.5		uPortal is, first and foremost, an integration framework. In addition, it is Open Source.

4. Task Force Recommendation: Support a smooth transition <sup>25</sup>		
Does the LMS support easy transition of course content from SLN 1.0?		
Blackboard 6		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. Blackboard does not.
WebCT Vista 4.0		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. WebCT does not.
ANGEL 6.2		Because ANGEL organizes content and functionality similarly to SLN 1.0, content transition should be somewhat easier than on systems that provide functionality-based presentation.
Academos 1.5		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. Academos does not.
Moodle 1.5		Because Moodle organizes content and functionality similarly to SLN 1.0, content transition should be somewhat easier than on systems that provide functionality-based presentation.
Sakai 2.0		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. Sakai does not.
dotLRN 2.1		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. dotLRN does not.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Because Moodle organizes content and functionality similarly to SLN 1.0, content transition should be somewhat easier than on systems that provide functionality-based presentation.
Sakai 2.0 + Academos + uPortal 2.5		Because SLN 1.0 is not standards-compliant, no system will support easy import. However, content will require less rewriting when ported to systems that, like SLN 1.0, support workflow-based presentation rather than functionality-based presentation. Academos and Sakai do not.
Academos + LAMS 1.1 + uPortal 2.5		Because LAMS organizes content and functionality similarly to SLN 1.0, content transition should be somewhat easier than on systems that provide functionality-based presentation.

<sup>25</sup> Full text of the recommendation: **“Support a smooth transition:** The faculty and staff of each campus have invested substantial time and effort in creating course content, learning technology interfaces, and tuning their support processes to fit best with their current technology platform, whether that platform happens to be SLN or one of the commercial or Open Source alternatives. The challenges of migrating to a new platform will be unavoidable. LE should therefore include as part of its strategy an array of technologies and services designed to ease the challenges of transition as much as possible.”

<b>Does the LMS support easy transition of course content from other LMS's present at SUNY via IMS standards compliance?</b>		
Blackboard 6		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. Blackboard supports appropriate IMS data transfer standards.
WebCT Vista 4.0		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. WebCT supports appropriate IMS data transfer standards.
ANGEL 6.2		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. ANGEL supports appropriate IMS data transfer standards.
Academos 1.5		Academos is not currently IMS-compliant.
Moodle 1.5		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. Moodle supports appropriate IMS data transfer standards. In addition, Moodle provides a Blackboard-specific migration tool.
Sakai 2.0		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. Sakai supports appropriate IMS data transfer standards.
dotLRN 2.1		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. dotLRN supports appropriate IMS data transfer standards.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. Moodle supports appropriate IMS data transfer standards. In addition, Moodle provides a Blackboard-specific migration tool.
Sakai 2.0 + Academos + uPortal 2.5		Migration of content from one system to another almost always requires some redesign because of both different presentation formats and different capabilities between platforms. Sakai supports appropriate IMS data transfer standards.
Academos + LAMS 1.1 + uPortal 2.5		Neither LAMS nor Academos currently IMS-compliant.

5. Task Force Recommendation: Ease of customization		
<b>Would SLN staff have access to the application source code?</b>		
Blackboard 6	Red	
WebCT Vista 4.0	Red	
ANGEL 6.2	Green	
Academos	Green	
Moodle 1.5	Green	
Sakai 2.0	Green	
dotLRN 2.1	Green	
Sakai 2.0 + Moodle 1.5 + uPortal 2.5	Green	
Sakai 2.0 + Academos 1.5 + uPortal 2.5	Green	
Academos 1.5 + LAMS 1.1 + uPortal 2.5	Green	
<b>Would SLN participating campuses have access to the application source code?</b>		
Blackboard 6	Red	
WebCT Vista 4.0	Red	
ANGEL 6.2	Yellow	To be negotiated with the vendor.
Academos	Yellow	To be negotiated with the vendor.
Moodle 1.5	Green	
Sakai 2.0	Green	
dotLRN 2.1	Green	
Sakai 2.0 + Moodle 1.5 + uPortal 2.5	Green	
Sakai 2.0 + Academos 1.5 + uPortal 2.5	Yellow	Partial; to be negotiated with Unicon.
Academos + LAMS 1.1 + uPortal 2.5	Yellow	Partial; to be negotiated with Unicon.
<b>To what degree is the source code modular?</b>		
Blackboard 6	Red	Source code is not available.
WebCT Vista 4.0	Red	Source code is not available.
ANGEL 6.2	Yellow	Although ANGEL is written in separate modules, the ASP language in which it is written is procedural and therefore does not support modularity as cleanly and granularly as object-oriented languages.
Academos 1.5	Green	
Moodle 1.5	Yellow	Although Moodle is written in separate modules, the PHP language in which it is written is procedural and therefore does not support modularity as cleanly and granularly as object-oriented languages.
Sakai 2.0	Green	
dotLRN 2.1	Yellow	Although dotLRN is written in separate modules, the TCL language in which it is written is procedural and therefore does not support modularity as cleanly and granularly as object-oriented languages.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5	Yellow	
Sakai 2.0 + Academos 1.5 + uPortal 2.5	Green	
Academos 1.5 + LAMS 1.1 + uPortal 2.5	Green	

<b>6. Task Force Recommendation: Support and community</b>		
<b>Does the LMS vendor/community provide a range of choices in terms of application customization and support?</b>		
Blackboard 6		Support/customization is only available through the vendor.
WebCT Vista 4.0		Support/customization is only available through the vendor.
ANGEL 6.2		Support/customization is only available through the vendor.
Academos		Support/customization is only available through the vendor.
Moodle 1.5		There is a wide range of companies providing support and customization.
Sakai 2.0		There is a small but growing list of companies providing support and customization, including large vendors such as IBM and Sun.
dotLRN 2.1		There is a somewhat limited range of companies that provide dotLRN support.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Support exists for each of the components.
Sakai 2.0 + Academos + uPortal 2.5		Only Unicon could support Academos; the other pieces can be supported by a range of companies.
Academos + LAMS 1.1 + uPortal 2.5		Only Unicon could support Academos; the other pieces can be supported by a range of companies.
<b>To what degree does the user community align with SUNY?</b>		
Blackboard 6		Many large installations, including multi-campus installations.
WebCT Vista 4.0		Many large installations, including multi-campus installations.
ANGEL 6.2		A handful of installations nation-wide, Penn State being the largest.
Academos		
Moodle 1.5		
Sakai 2.0		
dotLRN 2.1		
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		
Sakai 2.0 + Academos + uPortal 2.5		
Academos + LAMS 1.1 + uPortal 2.5		
<b>To what degree do the current SLN and ITEC staffing and support structure align with the ongoing technical and system administration requirements for supporting the platform?</b>		
Blackboard 6		
WebCT Vista 4.0		
ANGEL 6.2		
Academos 1.5		
Moodle 1.5		ITEC does not support PHP, MySQL, or PostgreSQL.
Sakai 2.0		Sakai is a relatively immature application and would require more testing and administrative support than the more mature candidates.
dotLRN 2.1		ITEC does not support AOLServer or TCL.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		ITEC does not support PHP, MySQL, or PostgreSQL. In addition, this untested combination of components would require more testing and administrative support than any of the more traditional LMS candidates.
Sakai 2.0 + Academos 1.5 + uPortal 2.5		This untested combination of components would require more testing and administrative support than any of the more traditional LMS candidates.
Academos 1.5 + LAMS 1.1 + uPortal 2.5		This untested combination of components would require more testing and administrative support than any of the more traditional LMS candidates.

<b>7. Task Force Recommendation: Other considerations</b>		
<b>Does the LMS vendor/community support long-term cost stability and economy of scale?</b>		
Blackboard 6		Vendor offers a closed source license and has a history of raising prices after initial contract has achieved lock-in. Licensing costs in most contractual arrangements tend to scale with number of students.
WebCT Vista 4.0		Vendor offers a closed source license and has a history of raising prices after initial contract has achieved lock-in. Licensing costs in most contractual arrangements tend to scale with number of students.
ANGEL 6.2		Vendor offers a closed source license. Licensing costs in most contractual arrangements tend to scale with number of students.
Academos		Vendor has offered a cost-free license of source code. Perpetual license remains to be negotiated.
Moodle 1.5		Open Source; no license costs regardless of number of students.
Sakai 2.0		Open Source; no license costs regardless of number of students.
dotLRN 2.1		Open Source; no license costs regardless of number of students.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Open Source; no license costs regardless of number of students.
Sakai 2.0 + Academos + uPortal 2.5		Initially no cost. Long-term viability depends on ability to negotiate a perpetual cost-free license with Unicon and/or ability to replace Academos components with Open Source components over time.
Academos + LAMS 1.1 + uPortal 2.5		Initially no cost. Long-term viability depends on ability to negotiate a perpetual cost-free license with Unicon and/or ability to replace Academos components with Open Source components over time.
<b>How quickly could the system be implemented by LE?</b>		
Blackboard 6		Speed of implementation would be somewhat slowed by the requirement for multiple SIS integration.
WebCT Vista 4.0		
ANGEL 6.2		Speed of implementation would be somewhat slowed by the requirement for multiple SIS integration.
Academos 1.5		
Moodle 1.5		Speed of implementation would be somewhat slowed by the requirement for multiple SIS integration.
Sakai 2.0		
dotLRN 2.1		Speed of implementation would be somewhat slowed by the requirement for multiple SIS integration.
Sakai 2.0 + Moodle 1.5 + uPortal 2.5		Significant programming required.
Sakai 2.0 + Academos 1.5 + uPortal 2.5		Significant programming required.
Academos 1.5 + LAMS 1.1 + uPortal 2.5		Significant programming required.

### Summary of Candidate Evaluations on Strategic Criteria

Solution	Score <sup>26</sup>	Prioritize Teaching and Learning			Harness the Strength and Diversity of SUNY			Plan for Tomorrow's Campuses		Support a Smooth Transition		Ease of Customization			Support and Community			Other	
		1a	1b	1c	2a	2b	2c	3a	3b	4a	4b	5a	5b	5c	6a	6b	6c	7a	7b
Blackboard 6	10	Red	Green	Red	Red	Red	Red	Yellow	Yellow	Red	Yellow	Red	Red	Red	Red	Green	Green	Red	Yellow
WebCT Vista 4.0	16	Red	Green	Yellow	Red	Green	Green	Yellow	Yellow	Red	Yellow	Red	Red	Red	Red	Green	Green	Red	Green
ANGEL 6.2	19	Green	Red	Green	Red	Red	Red	Red	Green	Yellow	Yellow	Green	Yellow	Yellow	Red	Green	Green	Green	Yellow
Academos 1.5	24	Red	Yellow	Green	Green	Green	Yellow	Green	Green	Red	Red	Green	Yellow	Green	Red	Green	Green	Yellow	Green
Moodle 1.5	21	Green	Green	Green	Red	Red	Red	Red	Yellow	Yellow	Yellow	Green	Green	Yellow	Green	Yellow	Yellow	Green	Yellow
Sakai 2.0	24	Red	Red	Yellow	Yellow	Green	Green	Yellow	Green	Red	Yellow	Green	Green	Green	Green	Yellow	Yellow	Green	Green
dotLRN 2.1	16	Red	Red	Green	Red	Red	Yellow	Red	Yellow	Red	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Yellow
Sakai 2.0 + Moodle 1.5 + uPortal 2.5	24	Green	Green	Yellow	Green	Green	Red	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Green	Yellow	Red	Green	Red
Sakai 2.0 + Academos 1.5 + uPortal 2.5	20	Red	Red	Yellow	Green	Green	Yellow	Green	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Red	Yellow	Yellow	Red
Academos 1.5 + LAMS 1.1 + uPortal 2.5	24	Green	Yellow	Yellow	Green	Green	Yellow	Green	Green	Yellow	Red	Green	Yellow	Green	Yellow	Yellow	Green	Yellow	Red

<sup>26</sup> Scores are derived by adding up the unweighted point values of each criterion – two points for green, one point for amber, and no points for red.

## Step Two: Final Decision Criteria

Based on their scores on the strategic criteria, the candidate field was reduced to the following six contenders:

- Academus 1.5
- Sakai 2.0
- Sakai 2.0 + Moodle 1.5 + uPortal 2.5
- Academus 1.5 + LAMS 1.1 + uPortal 2.5
- Moodle 1.5
- Sakai 2.0 + Academus 1.5 + uPortal 2.5

The remaining candidates were then evaluated against three filters:

- Fine-grained functional requirements
- Workflow-focused interface
- Technical feasibility and resource analysis

### Fine-grained Functional Requirements

The Task Force and LE cooperatively set two criteria for minimum functional adequacy:

1. Any substantial affordance that is present in *all* of the *base configurations* of the top three commercial LMS's at SUNY should also be present in SLN2.0.<sup>27</sup>
2. Any substantial affordance that is present in SLN 1.0 should be present in SLN2.0.

LE gathered a list of features for ANGEL 6.2, Blackboard 6, and WebCT Campus Edition 4.1 from the Edutools website and created a list of the intersection of those feature lists. The team then added any features present in SLN 1.0 that were not already on the list, as well as a few high-priority items that had either been strongly requested by the current SLN community or were requirements for the BE3 program. Any candidate that did not provide at least 85% of the features on the resulting list (without further enhancement) was eliminated from contention.

The following candidates did not meet this criterion:

- Academus 1.5
- Sakai 2.0

### Workflow-focused Interface

The LE team then decided to privilege the interface (strategic criterion 1a). In addition to having an impact on usability (criterion 1c) and ease of migration for SLN 1.0 users (criterion 4a), the staff felt strongly that an interface organized around learning workflow rather than software functionality tends to support superior learning outcomes. Any system that does not support this type of interface was eliminated from contention.

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<sup>27</sup> The goal of this requirement is to capture the features that have commoditized enough to become part of the definition of a Learning Management System (LMS). If a feature is present in all of the top three entry-level commercial products, then it is considered to be a baseline requirement for an LMS.

The following component-solution candidate did not meet this criterion:

- Sakai 2.0 + Academus 1.5 + uPortal 2.5

### **Technical Feasibility and Resource Analysis**

At this stage, the list was narrowed to three candidates:

- Moodle 1.5
- Sakai 2.0 + Moodle 1.5 + uPortal 2.5
- Academus 1.5 + LAMS 1.1 + uPortal 2.5

The above candidates were then evaluated in more detail by the LE team. Their examination weighed both the general feasibility for meeting goals regarding integration with other campus systems and, in cases where the candidate involved integrating multiple components, the feasibility and resource requirements of achieving that integration.

Based on this feasibility analysis, both options involving Moodle were eliminated. Moodle's use of the PHP language and the platform architecture were sub-optimal from the perspective of meeting integration goals.

In contrast, the component solution incorporating Academus + LAMS + uPortal appeared highly compatible with the campus systems integration goals and well suited in terms of the solution-internal challenges.

As such, subject to further validation, LE has chosen this powerful component solution as the best fit to meet the goals and assumptions stated earlier in this report.

## Appendix E: SLN'S INSTITUTIONAL CONTEXT

### The State University of New York (SUNY)

The State University of New York's 64 geographically dispersed campuses bring educational opportunity within commuting distance of virtually all New Yorkers and comprise the nation's largest comprehensive system of public higher education.

- SUNY's 64 campuses represent a total enrollment of more than 413,000 students.
- SUNY offers students a wide diversity of educational options: short-term vocational/technical courses, certificate programs, associate degree programs, baccalaureate degree programs, graduate degrees and post-doctoral studies. The University offers access to almost every field of academic or professional study somewhere within the system---some 6,688 degree and certificate programs overall.
- SUNY's students are predominantly New York State residents, representing every one of the state's 62 counties. SUNY students also come from every other state in the United States, from four U.S. territories or possessions, and 171 foreign countries.
- As of Fall 2003, the University numbers more than 2.2 million graduates on its rolls.

SUNY is committed to bringing its students the best and brightest scholars, scientists, artists and professionals. SUNY campuses boast nationally and internationally recognized figures in all major disciplines, with their efforts often recognized by prestigious awards and honors.

### Learning Environments and SUNY Learning Network

Under the Office of the Provost, Learning Environments is the organization that administers the SUNY Learning Network (SLN), the State University of New York's award-winning online education program. SLN is one of the world's leading providers of online learning with more than 100,000 enrollments annually.

SLN is the convergence of pedagogy, technology, and support services. Through SLN, SUNY faculty members have been empowered to offer thousands of online courses in scores of degree programs to tens of thousands of students.

SLN-powered courses redefine online learning. They integrate today's students into learning environments that provide intensive interaction, individual attention, high standards, and enhanced learning outcomes.

SLN was established to increase access to SUNY's academic programs and maintain consistently high-quality online pedagogy. SLN supports the full range of online learning, from courses that use the Web to enhance in-class teaching, through courses and full degree programs available completely online.

The SUNY Learning Network is:

- Robust course management system software, developed by SUNY for SUNY to support the full range of online education;
- Professional development for all participating faculty;
- Community of users committed to accessing high-quality, enhanced learning outcomes;
- Technology hosting, management, development, and maintenance on SUNY-wide servers.