MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Peer Comparison

- of -

Course/Learning Management Systems, Course Materials Life Cycle, and Related Costs

Final Report

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WCET's EduTools
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Table of Contents

individual class offerings. Four years later, the fall 2005 semester saw a 414% increase in faculty participation as 1,819 faculty members used the system. The number of students accessing Blac

envisioned more centralization. Also mentioned by a few institutions were increased "community involvement" in effective C/LMS use and worries about adequate staffing to support a transition to Sakai.

MIT Peer Comparison on Course /Learning Management Systems, Course Materials Life Cycle, and Related Costs

Final Report

Project Goal

The Massachusetts Institute of Technology (MIT) periodically surveys peer institutions to benchmark the array of options used for centrally-supporting Course/Learning Management System (C/LMS) products. A similar peer comparison was last conducted in the 1999-2000 academic year and, given the dynamic nature of C/LMS products, an updated benchmarking study was undertaken. This study is part of a continuous assessment of the changing C/LMS landscape.

MIT's C/LMS solutions are solid for the near future, but some uncertainty might arise in coming years. Stellar, an MIT-developed product, serves most of the institution's needs. This fall, Stellar will take advantage of Sakai, which is a national community[2] source C/LMS product. Sakai has now transitioned from a funded project to a subscription-based community. Meanwhile, in the commercial C/LMS market space, Blackboard (the system implemented in the most institutions) has just acquired WebCT, its closest competitor. The uncertainty of the C/LMS landscape, the number of faculty and students affected by changes in a C/LMS solution, and the magnitude of the budget supporting these systems has led MIT to continue to monitor its future options.

WCET (www.wcet.info) is a membership-based non-profit organization that advances the effective use of technology in higher education. One of WCET's activities, EduTools (www.edutools.info), conducts independent reviews of C/LMS products and consults on C/LMS selection processes. MIT contracted with WCET's EduTools to survey selected peer institutions regarding their use and support of C/LMS products and the Course Materials Life Cycle used by each institution. The data gathered in this survey is intended to benchmark these services at peer institutions and to collect information that will inform future decision-making. This report is a compilation of the survey results. It also includes comments from EduTools staff on trends, interesting insights or activities from a single institution, and implications for MIT to consider.

[2] According to the Sakai Project (www.sakaiproject.org): "The Sakai Project follows what is called the community source model, which is an extension to the already successful, economically feasible, open source movement forged by projects such as Apache, Linux, and Mozilla. Based on the goal of addressing the common and unique needs of multiple institutions, community source relies more on defined roles, responsibilities, and funded commitments by community members, than some open source development models."

Methodology

MIT project liaisons (Amitava Mitra, Phil Long, and Jeff Merriman) provided both written and verbal background information on the history, culture, and context of C/LMS implementations. They also provided detailed guidance on some sections of the final report.

The survey (Appendix A) was constructed by EduTools staff (Russell Poulin of WCET, Bruce Landon of EduTools and Douglas College, and Tom Henderson of Central Washington University) in close consultation with the MIT liaisons. Weekly phone calls were held to provide project updates and to obtain further clarifications, as needed. The survey covered the following main topics of interest:

Course/Learning Management Solutions. Identified such items as: what C/LMS solution(s) are being used, what statistics exist on C/LMS usage, and how are departments using alternative solutions to replace all (or part) of their C/LMS solutions.

Course Materials Life Cycle. Identified the institutionally-supported path for electronic learning materials from appearance online to archiving.

Related Costs. Collect cost data on C/LMS selection, support, licensing, maintenance, integration with other systems, and improvements. Collect costs data on the maintenance and support of the Course Materials Life Cycle.

MIT selected ten peer institutions to be surveyed:

Carnegie Mellon University	Stanford University
Columbia University	University of California, Berkeley
Harvard (College of Arts and Sciences)	University of Chicago
Middlebury College	University of Texas at Austin
Princeton University	Yale University

They also selected four groups of MIT faculty and administrative personnel to be surveyed:

MIT Operations – Those responsible for operating Stellar, DSpace, and the Library as well as those providing support.

MIT Sloan School of Management – Those who operate, support, and use SloanSpace

MIT Stellar Faculty Advisory Group – Faculty who serve on committees advising on Stellar functionality.

MIT Strategic – Individuals involved in strategic planning for IT, Library, and academic technology support.

A complete list of the individuals surveyed from the peer institutions and those who comprised the MIT groups can be found in Appendix B.

Definitions of Terms for the Purposes of this Survey

To assure that there was a common unde

one, but only an average of 69% make "significant use" of a C/LMS. Given that institutions did not have concrete numbers on "significant use," this clearly was a rough estimate that was not easily calculated by all respondents. At MIT,

3. *For the 2004-2005 academic year, how many courses use each C/LMS system listed in the previous question? For the 2004-2005 academic year, what is your estimate of the number of students using each system?*

BlackBoard usage ranges from all of the courses at and Carnegie Mellon University, to all students using it (but not necessarily all courses using it) at the University of Chicago, to most of the courses at University of Texas at Austin, to a tiny fraction of the courses at Stanford and Yale. The situation with the open source and locally developed C/LMS's is more diverse and changing rapidly with very high growth rates in usage. The emerging pattern is for an institution to have a clearly dominant C/LMS with rapid grow in utilization of the C/LMS along with some continuing, but not growing, niche C/LMS's. At MIT, there were 765 courses in Stellar and 120 courses in Sloan Space during 2004-05 making up roughly 50% of the courses.

In terms of number of courses, file space used in courses, and the number of students using a C/LMS in courses, all institutions experienced growth in C/LMS usage and some institutions realized tremendous increases in usage. The University of Texas at Austin exemplifies this pattern. For the fall 2001 semester, 354 faculty members and 20,204 students used Blackboard in 656 individual class offerings. Four years later, the Fall 2005 semester saw a 414% increase in faculty participation as 1,819 faculty members used the system. The number of students accessing Blackboard increased 136% to 47,615 and the number of individual course offerings increased 522% to 4,078. Similarly at MIT, the usage of Stellar, (their locally-developed C/LMS) grew from 151 courses during fall 2002 to 511 courses during spring 2006, an increase of 238%.

4. *Of the courses making "significant use" (see definition) of a C/LMS, how many courses were…*
    a. *Newly developed in the 2004/2005 academic year: _____*
    b. *Underwent major revisions (i.e., updated more than half of content, adapted to a new textbook, newly incorporated epacks, changed C/LMS or other supporting software) in the 2004/2005 academic year: _____*

Assessing "significant use" was problematic for most institutions in part because course content (and content revisions) is under the control of the faculty and statistics are not gathered by the C/LMS administrators. Some institutions make course rollover inside the C/LMS very convenient, while other institutions strategically encourage course revisions. One explanation of the pattern was that faculty initially use the C/LMS primarily for course management functions in the first couple of years and (after becoming more familiar with the system) they begin to make "significant use" of the C/LMS for content delivery and class interaction. At MIT, there were 539 new courses and 442 courses that underwent major revisions in the 2004/2005 academic year.

5. *In your C/LMS, how are you currently handling "non-text" media (video streaming, audio streaming, podcasts, simulations, virtual laboratories,*

Table 2. Estimated C/LMS and Related Personnel Spending by Institution for FY 2004-05

Survey Question		MIT	California Berkeley	Carnegie Mellon	University of Chicago	Columbia	Harvard Arts & Sciences	Middlebury	Princeton	Stanford (1)	U of Texas Austin	Yale
--- C/LMS Systems Used ---												
1.	Number of Students	10,206	32,331	8,800	13,000	24,000	9,600	2,300	6,500	14,000	50,400	11,390
2.	Primary C/LMS	Stellar	B-space	BlackBoard	BlackBoard	Prometheus	Instructor's					

Table 3. Estimated C/LMS Costs per Student by Major Activity as well as One-time and Related Expenses

Survey Question	MIT	California Berkeley	Carnegie Mellon	University of Chicago	Columbia	Harvard Arts & Sciences	Middlebury	Princeton	Stanford (1)	U of Texas Austin	Yale
C/LMS Operating Costs (2)	$547,550	$1,330,000	$485,000	$500,000	$1,220,000 (3)	No data	$135,000 (4)	$987,500	$1,086,000	No data	$275,000
Estimated C/LMS Operating Costs per Student	$54 (5)	$41 (5)	$55 (5)	$38	$51	No data	$59	$152	$78 (5)	No data	$24 (5)
Total One-Time Costs for C/LMS	FY 2005 = $23,000	FY '06 = $230,000	$ Included in #6 in Table 2	$134,000 (more in 2006)	$150,000 in 2001, $200,000 expected in 2006	No data	1/2 FTE Assume $50,000	$400,000 to $500,000 (used $450k)	About $1,000,000 during 2004/2005 - will spend $1.05million next year	Significant	

images, and a way to embed research library support and library expertise into the C/LMS. The OCW related features were: the ability to track information at the object-level (including copyright status), workflow ability to enable publishing at the end of the course (similar to the present Microsoft Content Management software supporting publishing), and the ability to enable a range of support levels (from self-serve to in-depth help) for faculty wanting assistance in preparing their courses for publication.

Faculty and TAs were generally more interested in seeing enhancements to file storage, the homework tool, and bulk mail features. Students were thought to be primarily interested in improving the ways in which the system organizes information. Students reportedly (there were no students interviewed in the survey) would like future features that would provide an efficient user interface integrating their calendars, registration information, C/LMS-based courses, and RSS feeds. Students reportedly would also like to enhance the bulk mail functionality and make additional improvements to the calendar so that it is more widely used by faculty and TAs. Staff envisioned a more sophisticated survey tool that could handle conditional questions and can have multiple sections (similar to the functionalities needed in a course evaluation tool).

The categorized list of all features using the edutools.info feature schema that are expected to be added by other institutions follows (the MIT categorized features are in the implications section):

Communication Tools
- Discussion Forum
  - discussion board
- Discussion Management
  - Tool for creating voice-based discussions or transactions.
- File Exchange
  - improved file management
- Online Journal/Notes
  - student-centric environment, e.g., del-icio-us or tag based environment for on-line note taking
  - editing with a thin WYSIWYG client
  - Annotation tool for text and images
- Whiteboard
  - specific pedagogic support (like voice support for language learning, virtual instrumentation)
  - embedding media (video, audio - not necessarily podcasting)
  - real time multimedia capture of the classroom presentation screen for podcasts and screencasts
  - Sophisticated support for non-text media, e.g., podcasting

Productivity Tools
- Searching Within Course
  - multimedia indexing and searching, e.g., of lecture videos

- Student Involvement Tools
  - Groupwork
    - Wiki kind of functionality
  - Community Networking
    - Sophisticated collaboration and communication with Wiki-like features and email
    - SAKAI as collaborative work tool
    - Collaboration tools (discussion, chat, mail list management)
    - Collaborative environment with access to academic materials and ability to talk about them
    - advanced collaborative tool
    - extended research collaboration
  - Student Portfolios
    - ePorfolios and ePortfolio with OSPI
- Administration Tools
  - Course Authorization
    - administrative tasks like student enrollment in course sections
    - clearer system for archiving snapshots of courses
    - administrative tools to see "how the tools are being used"
  - Registration Integration
    - to be able to see all courses
    - integration with central mainframe (SIS, Registrar, etc.)
- Course Delivery Tools
  - Test Types
    - student-based course evaluations
    - course evaluation feature
    - Assessment and assessment tools
    - locally developed language placement exams administered via assessment tools
  - Course Management
    - photo roster function
    - updates to students for new information
    - version control to "rollback content"
    - modules to let students take the roles of teachers
    - seminar enrollment
  - Online Gradebook
    - gradebook management, submissions, enhancements, and more grading functions
    - gradebook for "in-term" grade monitoring
  - Content Sharing/Reuse
    - integration with video and audio services
    - making an institutional repository out of individual repositories
    - repurpose in multiple places
    - seamless interaction with the Library
    - enable publishing outside of a course
    - repository-based system for learning objects

seamless interaction with repositories, libraries, and
museum databases
portfolio-based content management
Almagest for handling digital image presentations
personalized, reusable, re-purposeable content with publishing

already using learning repositories (Fedora and Plone) as the preferred methodology for resource rights management and permanent referential links to external resource materials (that may be relocated, but the link stays constant).

At MIT, there is no Learning Object Repository in use, but there are some digital materials for courses that get reused. Examples of this include eReserves in the Library and materials from courses previously taught using Stellar. There are also files on CD's of the OCW course materials that are provided to faculty. For courses that were taught using Athena Lockers (the C/LMS that preceded Stellar) there are private course materials dating as far back as 1994.

For the Sloan School, OCW is the only form of repository used. The OCW publishing schedule is deliberately about a semester behind the current semester, so that published classes on OCW are "snapshots" in time. Starting next year DSpace will become a more visible repository option with metatagged materials from several hundred courses.

13. Are you currently using any Enterprise Content Management tools (such as, Vignette or Documentum) that enable people to collaboratively create, manage, deliver, and archive course content? Do you plan to use such a system in the next 3 to 5 years?

Enterprise Content Management tools are beginning to be used (Hannon Hill Cascade Server, Roxen, Stellent, and homegrown HyperContent), but the use is outside of the C/LMS context. Yale.8(n)1.4(TD-0.0011sesc7Tc0.0017aTD-0.000.0005 T-5.4ts1(te

b. for institutional ownership?

There were two approaches to the ownership of electronic course materials:
they were owned by the faculty who created them.
they were owned by the institution and those rights were almost always waived to faculty and student authors.
All institutions had intellectual property rights policies in place. At Yale and Berkeley, the University is the first owner. For Carnegie Mellon, Princeton, and University of Texas at Austin the instructor is the first owner. The rest of the institutions were either less definitive on this question or were presently in the process of reviewing the IP policies and did not want to forecast the outcomes of that process.

At MIT, the policy is that faculty and students own what they create. The exceptions to this may be a prior arrangement or if MIT makes a substantial contribution to content production, as in the case of producing videos. The institution owns images that are created as part of the OCW course publication process. When copies are needed, they are requested from the copy services, which manages the copyright clearance processing. Some faculty use only their own materials for their courses. OCW obtains permissions for all materials that do not belong to the faculty.

15. What policies and procedures has your institution adopted regarding acquiring and assuring proper copyright clearance for electronic course materials…

a. for course materials used for instruction?
b. for course materials that are published or archived after the course is completed?

The general trend was that there was an office or a service in the Library that was empowered to handle copyright clearance and that course materials were considered in the same way as other published materials. The response from Princeton captured the situation well: "This is a monolithic question with no monolithic answer." At MIT, faculty are responsible for any electronic documents that they post, but assistance on copyright clearance is only a phone call away. Because of the public distribution of OCW courses, only they seemed to be publishing course materials that involved additional copyright clearance processes.

16. What policies and procedures has your institution adopted regarding open access

Center budget and unmeasurable costs for faculty, administrative staff, and TA's.

The next questions relate to archiving course content and materials for future use and/or conversion into next generation C/LMS systems.

21. Approximately what percentage of your faculty during the 2004/2005 academic year have contributed to or downloaded content from learning repositories like MERLOT or the MIT Open Course Ware?

a. contributed to: _____

b. downloaded from: _____

The trend was for very low estimates in the 1-5% range for both contributing to and downloading from repositories. The MERLOT repository was essentially invisible and no institution reported any known use of it. Since the faculty are very independent, even if they were to use a repository, they would not go through a central gateway to do so. Therefore, the real extent of repository use is unknown. OCW was more visible, but the faculty usage is still unknown and estimated to be very low. These results are consistent with the slow growth of using learning repositories except in instances where they have strong organizational support within the institution. This type of repository and institutional support is more common with high volume "core courses".

At MIT, OCW has contributions from 73% of the faculty which is growing at 3-4% per year. There is no information about repository downloads by faculty.

22. What technologies/software do you use for long-term archival of course materials?

Section III – Strategic Focus for the Future

26. What issues will be the key drivers in your decision-making process regarding your institution's course materials life cycle in the next three to five years?

The idea of a course materials life cycle, while common at MIT, was unfamiliar at many of the institutions. Consequently, the issues that were expected to be key drivers in the institution's course materials life cycle were many and varied. The issues mentioned included faculty demand, copyright, cost (with the caveat that the cost of deciding what to save may exceed the cost of saving everything), integration with a content management system, scalable repositories, learning objects, use by distance education programs, and level of interest in ePortfolios. The vision of electronic materials is deepening into electronic curriculum at University of Chicago and the idea of publishing course materials is beginning to spread due to the effect of OCW. The complete list of key course materials life-cycle decision drivers are alphabetically listed below:

archiving
Change is happening rapidly
content management repository developments
copyright
Cost
discouraging fragile development (materials that cannot be preserved because of dependencies).
Distance Education online programs
ePortfolios
Faculty demand
Faculty turnover
getting a good set of faculty requirements and student requirements
increasing integration with the content management system
institutional bias for open access
institutional repository
intellectual property
interest in moving on to deal with electronic curriculum and implications of eReserves
learning objects
legislative pressures to teach more students (with no more physical campus space)
local efforts to opening up courses
MIT OCW, which seems to be having an impact.
open course content (OCW)is a demonstration that seems to be working and this empowers
open source content systems usage
Reality is that the cost of sorting what to save is higher than saving everything
Results of researching DSpace to support archiving and supporting research
role of the university press
scalable repositories accessible by one standard, e.g. OKI OSID.
selection of an archival system

At MIT, the key drivers are: understanding the value of OCW for faculty and students, easing the pathway to get course materials into OCW, driving the cost down, and increasing flexibility, functionality, and reusability of course materials. Another viewpoint was that the future course materials drivers will

As was noted by one respondent, after years of C/LMS usage, "we" still do not know much about what is really going on nor the pedagogical consequences. There is a hint of consequences from the experience related by Lois Brooks of Stanford that with their CourseWork (Sakai) C/LMS, the students using the

are implementing Sakai so that it emulates the C/LMS that is being replaced. MIT has a similar end goal in that they want to minimize the "disruption" to faculty, but they are following a somewhat different path. They are releasing Stellar2 for this fall and will use Sakai components within that implementation. A categorized listing of features using the edutools.info feature schema expected in the future (as identified by survey respondents) follows and is both similar and different from the aggregated list identified by the peer institutions and detailed in question 9 above:

Communication Tools
- File Exchange
  - enhancements to file storage
- Internal Email

- paper survey scanning system)
- Course Management
  - keeping track of who is in the class (pictures)
  - integration between Stellar and OCW
- Instructor Helpdesk
  - ability to treat faculty differentially to enable a range from self-serve style for some faculty to enabling more extensive support to TA's and faculty who want more support in preparing their course for publication
- Online Gradebook
  - gradebook feature and linking into the gradebook
- Content Sharing/Reuse
  - Library and Stellar interfaces to be more seamless and efficient
  - better interface to licensed content with rights control
  - ability to track information at the object level including copyright status
  - workflow ability to enable publishing at the end of the course
- Course Templates
  - embedding research library support and library expertise into the C/LMS
- Instructional Design Tools
  - interactive activities
  - simulation
  - visualization
  - analysis tools in the course that would enable numerical analysis of library databases like census databases

Hardware Software

- Browser
  - broad support on a range of devices including iPods and cell phones.

If priority were placed on implementing sophisticated assessment tools (such as a survey tool that could also be used for student evaluations), then there would be the means to get appropriate feedback as the "enhancements" are made to the C/LMS system. MIT could then measure improvements in usability and efficiency to guide the process.

Key Factor: Smoothly integrate the C/LMS with other campus IT systems. While the integration of the C/LMS with other legacy core services (such as course registration and library services) has proved challenging, the institutions were unanimous in saying that they are integrating more services with the C/LMS. The challenges are both organizational and technical. Many of the systems were locally developed many years ago and (while they do the job) the technology on which they were based has now been superseded by newer technologies. This often makes interfacing with legacy systems difficult and only a stop-gap solution. The vision from OKI (the Open Knowledge Initiative)

defines the open architectural specifications for educational software that targets the interoperability requirements of MIT in terms of API's. Progress on this elegant solution to the integration issues is proceeding, but the integration task at MIT, as with other institutions, is a large one spanning several years.

Key Factor: Address the usability implications of systems integration. With the rapid increase in the usage of the C/LMS the issues related to the user experience become critically important. The students and faculty are more often on the "late adoption" end of the scale and they increasingly want one-stop shopping. Therefore, as the C/LMS integrates with other IT systems, the end result must be smooth technical integration, but also a smooth integration from a usability point-of-view. MIT's has been a user-centric approach that has emphasized front-end usability, and this approach needs to continue as back-end issues are resolved. This assumes even more importance since more than half of the faculty and students at MIT are now spending some of their time interacting with the C/LMS, and that number is growing. Some strategies to address the usability/integration issue include:

Portal Based Integration (Yale approach) – use the portal as a user interface that integrates the C/LMS and other institutional IT systems.

Binary Integration (Stellar approach) – use a deeply integrated architecture on the backend that supports the development of integrated front-end services and extensions with powerful tools. These processes take place in the context of semester timetables, where many processes begin when the semester begins, end when the semester ends, and few processes span more than one semester.

Service Integration Approach---Predefined and pluggable integration

extension and the GreaseMonkey extension. With a "Browser as Agent" system, it would be possible to programmatically deal with legacy interfaces from the Library, the Registrar, and OCW rendering the "results" into a single

the experience of other institutions, portal development will probably not be a high priority for MIT's solutions to IT integration problems.

Not a Key Factor: Money. The findings from the costing questions in the survey were both disappointing and revealing. The responses were disappointing in that some of the institutions chose not to respond and, when the institution did respond, much of the requested costing data was not available. The tendency for several of the institutions to not have critical cost data was revealing. The costs of the C/LMS did not appear to be a main decision-driver compared to other issues or institutional personnel would have had a better grasp on the cost implications.

In the process of completing this project and reflecting on the complexities of C/LMS systems and course materials life cycles some more developed ideas emerged about the costs of ownership. The following framework for the Cost of Ownership of C/LMS offers a comprehensive way to conceptualize the money issue at MIT.

Table 4. Reconceptualized Comprehensive MIT Schema for Cost Elements

1. ACQUISITION
    - Strategy, ideation, feasibility plan
    - Software acquisition (License)
    - Vendor Relationship

2. DEVELOPMENT, DEPLOYMENT & OPERATION
    - Implementation
    - Customization
    - Programming
    - Usability
    - Accessibility
    - Integration of best of breed
    - Integration with MIT infrastructure
        - SIS
        - Registrar's system
        - Data Warehouse
        - Libraries --- eReserves
        - Repositories, e.g., image repositories (Stellar image tool)
        - Card Office --- student photographs
        - Streaming media servers --- Video indexing in Stellar
    - Updates and upgrades
    - Development
    - Project Management
    - System Architecture
    - Programming
    - User Interface Design

Usability / Accessibility
Quality Assurance
Technical Documentation
Development Tools (e.g., IDE tools like Eclipse)
Integrated Tools (e.g., JIVE)
Application Support
Software maintenance (Fees)
Database administration (Oracle license, DBA)
Hosting (Hardware, Backup, Systems

academia at MIT. Accommodating this communication role may require extending the Stellar platform to facilitate collaboration beyond the temporal confines of the semester timetable.

Other Considerations: Access student materials beyond graduation. One of the benefits of light-weight open source C/LMS solutions (such as Moodle) is that the students can take the system with them when they leave the university. One possible benefit is enabling an easier transition from student to teacher or from student to productive worker. There have been some initial explorations of using the open source C/LMS as a student portfolio in teacher education programs that seem promising (University of Kentucky). While C/LMS systems like Sakai and BlackBoard are not portable, the Browser Agent approach might be a sweet-spot middle ground between "all my files from university are on my hard drive" and "what I can find in OCW" approach.

There has been some recent progress in the area of intelligent tutors that suggests substantial gains are possible (15% - 25% performance increase in school district algebra test performance) when learning is assisted by an

Key Factor: MIT is a clear leader in implementing the Course Materials Life Cycle concept. The birth-to-death materials life cycle is foreign to the culture of most peer institutions. The institutions surveyed were still mostly steeped in the non-electronic course materials culture. The course materials are left to the faculty and only rarely are courses archived for use or reference beyond the terms offered. The declining cost of online storage has made it quite feasible to keep all course material continually available. Course materials never have to be discarded and the cost of deciding what to discard is more than the cost of continuing to keep everything available on disk. This dynamic may change with the increasing use of rich media like video and audio files, but the "comfort" of knowing that nothing is lost may eventually outweigh the minimal marginal costs of additional storage. The recent development of technology for searching audio or video files for specific words and phrases will be further incentive to store materials for later review and retrieval. In follow-up discussions about this survey process, Fred Beshears, Senior Strategist for Information Technology Services at the University of

Course Materials Life Cycles summary. Since the concept is not present or is very narrowly implemented at other institutions, there are little in the way of serious implications for MIT from the survey results. The most interesting conversations were with MIT personnel who revealed some upcoming enhancements including: the enterprise content management system for the MIT website (new to most of the interviewees), the OCW processing of materials, the need to explore alternatives to the Microsoft Content Management System being used currently by OCW, and a new search mechanism to find words used in audio and video resources. These additions will continue to keep MIT ahead of the surveyed peers. To share its advances and to avoid being the sole institution-wide player in open content, partnering

that use it just for administrative purposes only (maintaining course registration lists, posting a syllabus, posting grades). Courses that "significantly" use a C/LMS may be offered via the WWW, face-to-face, or with other technologies. We understand that you will probably need to estimate this number.

Course and Class: Course is a particular set of information or skills that is being taught with defined objectives and outcomes. For example, "History 131 - American History to the Civil War" is a course. Classes are considered to be individual instances or offerings of a course.

Project Web Site

In support of the MIT C/LMS survey, a project site (http://mit.edutools.info) will allow you to review and comment on the interview findings. When completed, the site will enable side by side comparisons of survey interview question information for each of the participating institutions. In some cases respondents will likely replace initial rough estimates with more grounded estimates on some questions as data becomes available. In other cases respondents may wish to correct interviewer misinterpretations of their situation. The site is intended to improve data collection and provide an easy way for institutions to compare their situation with that of other institutions. A password to the web site will be provided during the interview.

10. Many universities are now faced with developing an optimal long range deployment of C/LMS systems that minimizes costs and risks. Do you think that your institution's mixture of commercial, open-source, and in-house C/LMS systems will change in next 3 to 5 years? What role does open source play in C/LMS planning in the next 3 to 5 years?

Section II - Course Materials Life Cycle (see definition)

The next few questions relate to the designing, developing, and supporting courses during the 2004/2005 academic year that significantly use C/LMS systems.

11. Given that there is no monolithic course materials life cycle we are interested in the typical course materials life cycles at your institution.

12. If you are using a learning repository system how would you classify it - as part of your C/LMS, as a library system, or an archival system like Harvest Road, DSpace, or Fedora? How much would you estimate that it is used?

13. Are you currently using any Enterprise Content Management tools (such as, Vignette or Documentum) that enable people to collaboratively create, manage, deliver, and archive course content? Do you plan to use such a system in the next 3 to 5 years?

14. What policies and procedures has your institution adopted regarding *intellectual property rights* for electronic course materials…for faculty ownership?
    a. for student ownership?
    b. for institutional ownership?

15. What policies and procedures has your institution adopted regarding *acquiring and assuring proper copyright clearance* for electronic course materials…
    a. for course materials used for instruction?
    b. for course materials that are published or archived after the course is completed?

16. What policies and procedures has your institution adopted regarding *open access* to electronic course materials?
    a. for course materials used for instruction?
    b. for course materials that are published or archived after the course is completed?

Section III – Strategic Focus for the Future

24. What issues will be the key drivers in your decision-making process regarding your institution's *use of and selection of C/LMS systems* in the next 3 to 5 years?

25. How do you envision the institution's organizational structure for supporting

Appendix B

MIT Project Liaisons & Survey Respondents

MIT Project Liaisons

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Appendix C

University of California, Berkeley	Undergraduates: 22,880 and Graduates: 9,451, but no data available for number of students enrolled in courses that made "significant use" of a C/LMS.
University of Chicago	

	for about 12k students. WebCT is more of a niche C/LMS with only 20 courses for about 240 students from the Medical School. BlackBoard has about 50 courses and about 50 students plus a number of community users involved with the School of Education. CCNET is in another niche and is used for about 100 engineering courses by about 400 students (there are more engineering courses using CourseWork than using CCNET).
University of California, Berkeley	Fall 2004 + Spring 2005 courses: WebCT Courses: 59 BlackBoard Courses: 784 CourseWeb Courses: 3,091* * For Courseweb, sites are automatically generated for each course. 3,091 of these sites were edited (e.g., a syllabus was added). No data area available for number of students. WebCT is used for a small number of very high enrollment courses.
University of Chicago	BlackBoard is used for 1600 courses with 13K students in 2004/2005. This Grows annually, current numbers indicate approximately 1900 courses/academic year.
University of Texas at Austin	BlackBoard is the primary C/LMS with 4,078 course offerings serving 47k students. Speedway and First Class serve less than 5K students.
Yale University	"Classes" system is used for about 800 courses with about 5K students. The Med School BlackBoard system is used for 100 courses with about 1100 students. The Law BlackBoard system is used for 50 course with 670 students. The Management WebCT system is use for 50 courses with about 450 students. "Classes 2" (Sakai) is used for 100 courses with 500 students in the pilot phase (with planned replacement of "Classes" in fall 2007).
4. Of the courses making "significant use" (see definition) of a C/LMS, how many courses were… a. Newly developed in the 2004/2005 academic year: _____ b. Underwent major revisions (i.e., updated more than half of content, adapted to a new textbook, newly incorporated epacks, changed C/LMS or other supporting software) in the 2004/2005 academic year: _____	
MIT Strategic	
MIT Stellar Faculty	
MIT Operations	There were 539 unique (new) courses in 2004/2005, but this estimate is subject to over counting since the identifie.02 90 ofor the course may have changed though it is really the same course. The upper bound is 442 courses for the number of courses (over 60%) that underwent major revisions in 2004/2005.
MIT Sloan School of Management	Information about newly developed courses is unavailable. For continuing courses only about 5% copy over the old course to the new term, while the other 95% create a new course for the new term.
Carnegie Mellon University	There were about 120 newly developed courses added, but there is no way to know how many underwent major revisions revised.
Columbia University	There were about 800 newly developed courses and while there was much

Princeton University	Princeton "pre-builds" course sites in their C/LMS with a course description, course map, etc. Every new course at Princeton automatically has a Blackboard site created for it. The interviewees were not certain how many new courses were developed or heavily modified that made a significant use during the 2004/2005 academic year.
Stanford University	There is no data available on new courses making significant use or the

	content creation.
MIT Stellar Faculty	Some faculty do not use non-text media in their Stellar courses.
MIT Operations	MIT has an infrastructure for streaming video (Real, DV, and MPEG2) from links in a course. There also are plans for piloting the Stellar image tool with federated search of image repositories such as the Slide Library in the Fall term of 2006. There are plans for more podcasting and better integration linking out to the Library licensed multimedia including audio.
MIT Sloan School of Management	The C/LMS does not handle non-text media. The future options include: converge with Stellar, and user drives, Library for video streaming, DSpace hosting.
Carnegie Mellon University	There are only a few courses with embedded multimedia in the C/LMS. Most all courses use links out to multimedia resources.
Columbia University	Non-text media is not run inside the C/LMS. It is a strategic decision by Columbia University not to create content repositories of any kind inside the C/LMS. This is true of all content whether it is multimedia or not. The Library has taken the lead in organizing and handling multimedia content for courses. An example of this is Art History, which makes extensive use of multimedia. That course is part of Columbia University's core curriculum and the Library is charged with housing content for those core curriculum courses. Columbia University anticipates that the use of multimedia-based content will grow rapidly. At present, it is unclear which application (language arts, graduate schools, medical school with interviews of patients, etc.) will be the driving force in this growth. There will be presentation problems as a result of the size of files. The University has many .PDF files in course reserves, but these are no longer popular. Space for multimedia files could be a growing issue, but storage is also getting cheaper. Policies on storage may be needed in the future. There is currently no upper limit on storage, but one may be needed.
Harvard (College of Arts and Sciences)	The Faculty of Arts and Science is currently handling non-text media with: (a) a HELIX streaming media server for Real Media (b) Anystream Agility media archiving and repurposing - 60 faculty put lecture videos on line per term serving about 5,000 students. About 125 courses per term use streaming audio and video but not for entire lectures (c) Flash objects with PERL and JAVA CGI, (d) transitioning to Course iSites which has a tool for podcasts. FAS is currently investigating options and alternatives but will likely go into the fall using AnyStream. In 3 to 5 years Harvard will standardize on Anystream, decentralized to departments.
Middlebury College	One possible standard Middlebury may adopt for federated searching across repositories is the Open Knowledge Initiative (OKI) repository open service interface definition (OSID)
Princeton University	Princeton is looking at the Blackboard content system for general use, not specifically for use with digitized films. We currently use a RealMedia server to handle digitized film. They make an effort to automatically put links into Blackboard whenever they digitize any material (text, images, film, music), regardless of where the digitized material itself is hosted (Almagest, RealMedia, etc.) Princeton has no major changes now planned for the future.

	CourseWork that links into iTunes (the C/LMS operates as a gateway similar to the way journal databases are handled). Also there is URL access to an image archive. The URL linking is made more powerful by using persistent URLs (reference URLs) that can accommodate relocating resources.
University of California, Berkeley	Currently very brief video clips can be uploaded into the CMS as an ordinary file. In Fall 2005 we launched bSpace, the Berkeley implementation of Sakai. Berkeley has an extensive Webcast/Podcast program which is publicly available. We plan to add functionality to bSpace which will enable professors to stream from within bSpace. We are also developing video interaction tools. We are actively developing Course Gallery into a comprehensive image management tool that will be part of the bSpace toolset.
University of Chicago	The present basic approach is to post media in the BlackBoard course system and the BlackBoard Content System (for the Library for eReserves and by some Departments) or as links to a QuickTime streaming server that has no rights management. Faculty want to share and version media

Sciences)	
Middlebury College	(a) Yes, a summary cost analysis was conducted. (b) From the cost study in (a) total costs to maintain and develop Segue were estimated at about $75,000 a year (see #6 above). (c) Segue's significant usage is pretty constant at about 25% of all courses.
Princeton University	No on cost studies- the last they reviewed the license they talked about costs; what it would cost and why. But they haven't done comparison or "what-if" studies. They have done studies in the past on usage. The latest version of Blackboard collects much longitudinal data. They have also conducted focus group studies with faculty on features they like, don't like, etc.
Stanford University	There have not really been any cost analyses done.
University of California, Berkeley	There was a cost analysis 3 or 4 years ago but it is not publicly available.
University of Chicago	There are no cost analyses done or available. In the early years of the installation an informal costing was done which found that the cost was very small per course and since that time costing has just not been an issue.
University of Texas at Austin	No central cost analyses have been done.
Yale University	No cost analysis has been done, so none are available. The expenditure approach flows with the cultural premium for independence where there are different organizational budget lines and then independent choices are made to allocate those funds.
9. Are there any particular features or capabilities that you expect to add to your C/LMS systems within the next 3 to 5 years? What features or capabilities would your students like to see added?	
MIT Strategic	In the future the features will likely exhibit a high degree of integration and broad support on a range of devices including iPods and cell phones. A key future will be integrated calendaring that brings together email, RSS subscriptions, blogs and the C/LMS. Also there is likely a gradebook feature coming and better integration (like one-stop-shopping) for submitting grades with the Registrar along with simulation, visualization, collaboration capabilities, and a student evaluation tool for TA's and Faculty. The more pervasive change in the future will be a shifting of focus toward the student taking a lot of courses and using a calendar like feature to help them manage their schedules and assignment due dates. Students would like the Library and Stellar interfaces to be more seamless and efficient. Future OCW courses will have interactive activities and more video, plus the ability within OCW to interact with communities.
MIT Stellar Faculty	The future features included: better integration between Stellar and OCW, better way of keeping track of who is in the class (pictures) and linking into the gradebook, a hook into the calendar system, and support for student course evaluations (to replace the present paper survey scanning system which is use to evaluate 600-700 courses).
MIT Operations	Beyond ePortfolios, there were a number of candidates for future C/LMS features related to OCW and the Library. The OCW related features were: the ability to track information at the object level including copyright status, workflow ability to enable publishing at the end of the course

	course for publication. The library related future features included providing a better interface to licensed content with rights control, analysis tools in the course that would enable numerical analysis of library databases like census databases, facilitating the handling and annotating digital images, and a way to embed research library support and library expertise into the C/LMS. Students reportedly would like future features that would help them in the context of the just-in-time environment of MIT with an efficient user interface that integrates their calendar with registration, their courses in the CMS, and RSS feeds.
MIT Sloan School of Management	Faculty and TAs are generally more interested in seeing enhancements to file storage, the homework tool and bulk mail. Students are primarily interested in improving the ways in which the system organizes information, so we have made improvements to calendar and are developing a search tool. Students would also like to enhance the bulk mail functionality (by adding an HTML tool bar) and make additional improvements to calendar so that it is more widely used by faculty and TAs and by integrating it with bulk mail, so that it is easier for students to find class information. Staff would like a more sophisticated survey tool that can handle conditional questions and can have multiple sections.
Carnegie Mellon University	While there are no new features envisioned what is envisions are improvements in existing features that make them easier to use more quickly and more powerfully.
Columbia University	The following features are on the list to be added to the C/LMS: improved file management, collaboration tools (discussion, chat, mail list management), embedding media (video, audio - not necessarily podcasting), integration with repositories, content creation tools (blog, wiki, freeform), editing with a thin WYSIWYG client. For students (and faculty) the additions desired are enhancements that make the C/LMS easier to use, seamless with the Library and seamless the other repositories.
Harvard (College of Arts and Sciences)	Harvard is adding many features with its new "Course iSites C/LMS" and has more features planned for the long-term. (a) Integrated, transparent, convergence of the C/LMS with larger, Academic environment (b) Personalized, reusable, re-purposeable content with publishing content research portals (c) Content sharing of learning objects - a repository-based system for content (d) More sophisticated support for non-text media, e.g., podcasting (e) More sophisticate collaboration and communication with Wiki-like features and email (f) Annotation tool for text and images (g) Library and museum databases (h) caplet-based course wizards template (i) gradebook management and submissions (j) student-based course evaluations (k) "student-centric" environment, e.g., del-icio-us or tag based environment for on-line note taking (l) portfolio-based content management

STUDENTS
(a) Multimedia indexing and searching, e.g., of lecture videos

	improvements in the discussion board tool which they already liked.
University of Chicago	The growth of usage has been promoted by word of mouth and comparable to the seamless email system. The collaboration features are beginning to be used outside of courses by IT and some departments and future will have more usage by campus communities. The future features are envisioned as a dashboard to control access to tools in parallel (BlackBoard plus uPortal like). The other feature direction is policy driven to become mobile device aware and embrace mobile platforms (laptops, PDA's BlackBerry's) and especially cell phones with features such as RSS. Other future feature directions are to enable publishing outside of a

	commercial system.
Carnegie Mellon University	While this is difficult to forecast there are no changes anticipated. They are financially supporting open source (Sakai) and might adopt it if the feature set improved on the basic course management functions.
Columbia University	The future mix may stay the same but now they have just begun looking at it form the long term perspective. In that context there may be a possible parallel C/LMS to Prometheus in the mix.
Harvard (College of Arts and Sciences)	(a) Harvard Arts & Science's (HAS) mission in the next 3 to 5 years is to

MIT Strategic MIT Stellar Faculty	Though not a LOR the fact and previous course materials are still

	there are plans to offer such a system. There is presently a system for video content delivery (Microsoft limited CMS) via AKAMAI cashing servers around the world that provides speedy open access for OCW. Also there are plans to harvest images from a variety of repositories and sources into the C/LMS for delivery.
MIT Stellar Faculty	
MIT Operations	While there is no enterprise content management system, OCW is using Microsoft Content Management System version 2002 as the software based workflow where course are processed and turned into published OCW courses. The issue is being investigated and there are open source alternatives mentioned such as Alfresco. In the future, the system will include an easy way (button) to produce an archive of a C/LMS course in DSpace.
MIT Sloan School of Management	There is no content system and it is not likely on the 3 - 5 year horizon
Carnegie Mellon University	Carnegie Mellon University just started using Hannon Hill Cascade Server enterprise content management system and there are no plans to it for academic work, only administrative work which includes content management of the main pages on the Carnegie Mellon University web site.
Columbia University	The HyperContent homegrown enterprise content management system is being used. It is outside of the C/LMS is positioned to be the gateway to the future repository.
Harvard (College of Arts and Sciences)	Enterprise Content Management tools are being designed into Course iSites.
Middlebury College	No - all in C/LMS. Down the line Middlebury may add Fedora into Segue but they don't see the systems as separate.
Princeton University	The system Princeton is using for the Princeton home page (and related web pages making up the main Princeton web site) is Roxen. We have licensed the Blackboard content system, which Blackboard OEMed from Xythos (we do not have a separate Xythos implementation).
Stanford University	There is no enterprise content system.
University of California, Berkeley	There is no current content management system but there has been some experimentation going on.
University of Chicago	There is no Enterprise Content Management System as it is considered too expensive.
University of Texas at Austin	They have been using the Stellent content management system for the university's public websites for two years, but the use of this system with course materials is unknown.
Yale University	No enterprise content management tools are being used and none are planned.
14. What policies and procedures has your institution adopted regarding intellectual property rights for electronic course materials…for faculty ownership? a. for student ownership? b. for institutional ownership?	
MIT Strategic	There was a process 2 years ago at MIT that resulted in a shared commitment to not locking down individual course material except when it is used for a textbook. The vision was to facilitate collaborative teaching at MIT. The ownership of student thesis intellectual property depends on the source of funding where MIT has the right to use student projects and external funders may have specific grant requirements. At this time DSpace does not host student work, but OCW publishes some student work with appropriate Creative Commons permission. In some situations graphics are redone for OCW and then MIT owns them. In

	general there are rules about work-for-hire, when significant resource assets are provided by MIT, etc. that are covered by institutional policies. Course faculty determine if the materials are to be open to the world, just MIT, or just the course.
MIT Stellar Faculty	The basic part was that faculty own what they create. When copies are needed they are requested from the copy services which take care of the copyright clearance processing. Some faculty only use their own materials for their courses.
MIT Operations	OCW obtains permissions for all materials that do not belong to the faculty. The basic policy is that faculty and students own there work unless there is some prior arrangement or the institution makes a substantial contribution as is sometimes the case with producing videos. The institution also owns images that are created as part of the OCW course publication process.
MIT Sloan School of Management	The policy is to follow MIT policies.
Carnegie Mellon University	Under the University policy faculty own their course materials and students own their work. 18 refBT10.02 0 0 10biaSloan School of Universityl of cosh.00IP[ll)6.8.9(3-2.5(licy(. Wh6(w Tmse vt ds)3.e7123.6(e012diTc.9(3-mCW o)3(ourdnot)gu

	Press.
MIT Stellar Faculty	Assistance on copyright clearance is only a phone call away for faculty who are responsible for the electronic documents that they post. OCW also helps in getting material cleared before publication.
MIT Operations	OCW will only reuse content with permission and the Library eReserves can only be used for fair use content. Faculty set the use rights in their courses.
MIT Sloan School of Management	Intellectual Property questions and concerns are referred to the Library and handled by the Library.
Carnegie Mellon University	There is University policy to adhere to the law with respect to copyright.
Columbia University	Published IP policies are well developed and disseminated to guide faculty and students.
Harvard (College of Arts and Sciences)	See the response to #14.
Middlebury College	The library ensures that all e-reserve material has copyright-clearance for the time period this material is available for distribution. As well, the library provides guidance to faculty regarding copyright and fair use and faculty have complete control over access to course material they publish in the C/LMS.
Princeton University	The library does copyright clearance on all e-reserve material. They are not licensed after the course is completed. Typically material is available during the semester. Some material is explicitly license and some is fair use. There are many special cases and exceptions. This is a monolithic question with no monolithic answer.
Stanford University	The Library does the copyright clearance processing.
University of California, Berkeley	In the C/LMS the faculty is required to indicate the copyright status of materials so that fair use can be managed. Recently a new position was created for a digital assets coordinator who will be responsible for cleaning the video and audio for public access and fair use access. The library handles the situation for materials in print.
University of Chicago	Copyright clearance process is under discussion.
University of Texas at Austin	The Library handles the eReserves and issues of fair use. There is no organized OCW like program, but some faculty publish course materials on departmental websites or other public sites.
Yale University	There are general policies and procedures for guidance as well as published rules of thumb and tutorial. Also specific questions can be brought to the institutional general legal counsel for advice. There has been no recent updating of historic policies.
16. What policies and procedures has your institution adopted regarding open access to electronic course materials? a. for course materials used for instruction? b. for course materials that are published or archived after the course is completed?	
MIT Strategic	MIT promotes open access most visibly with OCW.
MIT Stellar Faculty	Open access to

	students and allowed guests only. OCW is used for providing open access to the world after class materials have undergone their publishing process.
Carnegie Mellon University	Courses may be open access at the discretion of the faculty if all material is appropriately cleared for open dissemination.
Columbia University	Published IP policies are well developed and disseminated to guide faculty and students in fair use situations.
Harvard (College of Arts and Sciences)	See the response to #14.
Middlebury College	A new Segue site is public by default. Instructor can limit access or customize access by module. Middlebury has an electronic reserve system that conducts copyright clearance.
Princeton University	Originally when course websites were pre-built all information was open to the world. Now course websites at Princeton have a few modules open to the world and others that only students can see. The "private" modules are where faculty are asked to make copyrighted material accessible. Faculty is also told to abide by fair use policies.
Stanford University	The policy is essentially for no open access beyond the course syllabus.
University of California, Berkeley	The video access has a long history of open access and the process is evolving with the times.
University of Chicago	Access is restricted to members of the course unless specifically changed

	year.
Princeton University	Approximately three to five people support Blackboard. A total cost of about $500,000.
Stanford University	This is a large cost but is essentially impossible to determine.
University of California, Berkeley	The costing information is not readily available because some of the C/LMS code development is directed precisely at faculty concerns and the assistance provided by TA's, departmental assistants, etc. is very unevenly distributed and it is impossible to separate out just the support costs. The other complicating issue is that these are the early days of faculty support for a new C/LMS system.
University of Chicago	The cost of for supporting faculty in course development is estimated at $200k from the support department cost as the only proxy for the costing.
University of Texas at Austin	The supports costs are very distributed and mostly opaque, but the in total it would be a large cost number.
Yale University	No real answer on total costs. Certainly TA's, RA's, and administrative assistance have helped with course materials; but there is no breaking out of these course development costs across the institution.
18. In considering the personnel and activities for faculty development in creating and delivering courses (including workshops, tutorials, peer mentoring, self-guided materials, etc.), what is your estimate of the total cost of supplying this support in the 2004/2005 academic year?	

Yale University	While there are no workshops or tutorials for faculty development there are opportunities made available at the request of faculty. There is annually about $200k worth of small group work, peer monitoring, and self-study guides utilized in faculty development in creating and delivering courses.
19. In considering the personnel and activities for adapting course materials for students with disabilities (including website design, captioning, adaptive technologies, etc.), what is your estimate of the total cost of supplying this support in the 2004/2005 academic year?	
MIT Strategic	
MIT Stellar Faculty	
MIT Operations	About $800 was spent by the ATIC Lab from some part of the Disabled Services budget. Materials are supposed to be ADA compliant before being used in Stellar.
MIT Sloan School of Management	No cost because no disabled students at all.
Carnegie Mellon University	The cost of adapting materials is distributed and is about $100k - $150k per year.
Columbia University	The cost of adapting materials for students with disabilities is small - approximately 0.5 FTE.
Harvard (College of Arts and Sciences)	Roughly $5,000 to $10,000.
Middlebury College	There is an office dedicated to ADA issues with one staff person who works with C/LMS, F2F, and other. A rough estimate would be $10,000 a year.
Princeton University	This is done on a case-by-case basis. There is very little demand, theoretically Blackboard is ADA compliant.
Stanford University	The cost of adapting materials is 2 FTE.
University of California, Berkeley	ETS receives some limited funding for captioning services for webcast and non-webcast courses. Currently this is about $10,000 per year. The Disabled Students Program provides adaptive technologies.
University of Chicago	Adapting materials is done on a case by case basis with no "visible" costing.
University of Texas at Austin	
Yale University	Less than $10k is use for adapting materials for students with disabilities per year.
20. What were your estimated 2004/2005 costs (both licensing and support staff salaries and benefits) of third party course materials, e.g., copyright clearance, e-packs, article databases, simulations, etc. Please include all sources, e.g., IT, libraries, departments, etc.	
MIT Strategic	
MIT Stellar Faculty	
MIT Operations	The cost is under the name network resources and is $2,138k (plus the staff costs of about 10 FTE in the Acquisitions License Service area of the Library) and there is some additional cost for copyright materials that would be associated with the Copy Center budget.
MIT Sloan School of Management	There would be some immeasurable costs for faculty, administrative staff and TA's.
Carnegie Mellon University	The materials costs would be over $1 million.
Columbia University	The cost of electronic materials acquisitions by the Library are about $5 million per year with about $50 of that for electronic reserves which support 250k accesses per year.
Harvard (College	Purely instruction - $5,000 to $10,000. Supported by the Faculty Support

of Arts and

	year.
Stanford University	Only the marginal cost of a terabyte of storage.
University of California, Berkeley	Beyond the cost of spinning disks the costs are under $100.
University of Chicago	The cost is difficult to separate out but presently there is 1/3 terabyte of course materials available on spinning disks.
University of Texas at Austin	Zero archiving cost presently except that courses are not deleted so there is marginal storage cost.
Yale University	Essentially the cost is the disk cost and the course materials part of that cost is inseparable in the present situation. What is clear however, is that disk usage is growing at 30% per year as faculty such as those in history of art have begun to use storage intensive applications like PowerPoint with high resolution images.

SECTION 3 – STRATEGIC FOCUS FOR THE FUTURE	
24. What issues will be the key drivers in your decision-making process regarding your institution's use of and selection of C/LMS systems in the next 3 to 5 years?	
MIT Strategic	In the future the C/LMS needs to become more of a service or services to faculty than thought of as an online toolbox. The key drivers for change include: what features and tools are available, the ease with which new tools can be incorporated in the platform (architectural openness), leveraging the enterprise systems, efficiency as a transactional platform, ease of adoption by faculty (popularity with faculty), transition cost (costs vs. benefits for faculty and students), and overall cost sustainability. The Total Cost of Ownership will be hopefully mitigated by open standards that change the cost slope to be downward. Another driver is the hope to integrate with open publishing from teaching to sharing. Ideally these processes would happen in parallel so that at the end of the course it is published.
MIT Stellar Faculty	The C/LMS issue drivers are: open software (Sakai), the ability to achieve a common standard -- single CMS with broad adoption, cost, maintainability, and desirability of the right features for addressing the demands faculty and students. Other issues that will help drive the decision is the need to replace old homegrown systems with new systems that will integrate easily with the other systems on campus. Politics will not matter much.
MIT Operations	The C/LMS drivers are: costs (leveraging investments), faculty acceptance/adoption, the hope for a happily integrated family of technologies, the hope that the OCW process will be sustainable and that a "true life cycle management system" will emerge.
MIT Sloan School of Management	There are many decision drivers including: the ability to support platform with existing staff of 2.25 persons plus outsourcing of 20 hours per month (manual effort as Sloan Space is not integrated with enterprise services), Stellar progress in enterprise integration, Sakai (Stellar 2), cost, "making everybody happy", and the ability to add new features. Also another driver will be the "security" of the C/LMS.
Carnegie Mellon University	The C/LMS decision drivers are: improved features for managing a course (quicker, more powerful, less clunky), and effective collaboration support.
Columbia University	The C/LMS decision drivers are: cost of ownership, support, and upgradeability.

Harvard (College of Arts and Sciences)	Yes to all drivers mentioned by the interviewer. The interviewees specifically mentioned: (a) Costs, (b) Organization efficiency, (c) Collaboration across organization units, (d) Efficiencies in developing more thorough faculty support, (e) Optimization of teaching and learning, (f) Student expectations and what drives the student experience.
Middlebury College	Primary considerations to-date and in the future are: > overall usefulness, > usability, > simplicity (especially in features), e.g., fewer but smarter, > generalizeable features, > systems inter-operability (OKI OSID), > federated searching across various repositories. Middlebury doesn't expect everything to be centralized. Middlebury has a preference for open-source for more control.

	organizational structure that supports C/LMS simplicity for the student and cost effectiveness for the institution may well turn out to be more "centralized" than the present three systems (Stellar, OCW, and SloanSpace) but not necessarily as centralized as institutional payroll organizational structure.
MIT Stellar Faculty	The supporting organization will become a bit more centralized around a common platform (central organization and central support) with big departments still having a person work with the central organization. The present organizational support systems are not well integrated and unable to provide answers to simple questions such as "who is teaching what?" in a timely manner. The Stellar C/LMS may be the best candidate for locating current data related to teaching such as course faculty, TA's, students, dates, etc.
MIT Operations	As the systems come to work more closely together the organizations will collaborate and work together more. There will be more centralization for cost control and around a strategic vision of the C/LMS.
MIT Sloan School of Management	In the future it is likely that the C/LMS will be moving out of Sloan School and that the assistance to faculty will move closer to faculty with more involvement in assisting faculty one on one.
Carnegie Mellon University	The previous model had both faculty and technical support in a single organization. We have now moved technical support into the central computing organization, which is distinct from the organization that

	few tweaks.
University of California, Berkeley	It is expected that there will be no change in the support structure in the next 3 to 5 years.
University of Chicago	This will shift even more activities inside the Library since location of the START group inside of the Library has proven fruitful. Thus far the notion of Citrix using VMware virtual machines for storing and replicating course software tools including databases has added value to archiving along with issues about licensing old software versions.
University of Texas at Austin	If there is movement toward open access and the creation of more content (as seems likely with the class presentation capture plans) then things will have to change and there will have to be a organizational support structure built to support course materials life cycle activities.
Yale University	The situation is too vague at this juncture. It will depend on the mix of repository versus Library versus portable local options.
28. Have we omitted any questions that pertain to your C/LMS or Course Materials Life Cycle usage, costs, or future plans? We're especially interested in items that give us better context on the current implementation, near-term decisions, or long-term visions regarding your C/LMS or Course Materials Life Cycle.	
MIT Strategic	
MIT Stellar Faculty	The long term vision is that the C/LMS will be helping faculty to become better teachers. Presently most classes are lecture style with "chalk talk" and then students are sent home with problem sets to do. Maybe the C/LMS can be retooled to enable more teaching methods involving active learning in the classroom and maybe problem sets can become interactive problem sets or small virtual experiments (like iLab) integrated into the C/LMS. Maybe the C/LMS could support course evaluation surveys at early in the course allowing faculty to make midcourse corrections based on student survey data.
MIT Operations	The composition of project management teams for the C/LMS was a missing aspect of this survey and that organizational aspect seems important. Some additional interesting questions were posed (but not answered): Who are the decision makers on these issues? Is there any central group that maintains a financial perspective?
MIT Sloan School of Management	Nothing extra, but an explanation about how Sloan Space came to be and its historic relationship with .LRN and open ACS.
Carnegie Mellon University	The question that was not raised directly was whether the C/LMS was centralized or not. If there were a powerful identity "service" coordinating the Registrar permissions and a repository capable of multiple data views would there be much left for the course management system to do?
Columbia University	
Harvard (College of Arts and Sciences)	
Middlebury College	Prefers the term "curricular technology." Middlebury is researching what is happening outside of academia. Instead of a C/LMS they would rather have a content management system modeled on trends outside of academia. When students graduate they will have some understanding how to work with these emerging technologies. Questions on how your institution looks at emerging trends and implements into their system
Princeton University	
Stanford University	One of the rapidly growing concerns is security, both in terms of legal requirements to protect privacy and the exponentially growing cost (about half of the network cost). The security situation becomes much more complex when collaboration involves multiple institutions and

Appendix D
WCET EduTools Project Personnel

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Bruce Landon is a member of the faculty of Douglas College in British Columbia and a senior advisor with WCET. He earned his doctorate in experimental social psychology from Rutgers University and began teaching at Douglas College in 1976. He teaches courses in introductory psychology, social psychology, research methods in psychology, data analysis in psychology, and cognitive psychology. Landon developed the landonline website in 1997 for the Centre for Curriculum, Technology and Transfer to assist in the province-wide selection of a common course management system. In 2002, through an arrangement with WCET, the web traffic was redirected to the www.edutools.info site

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Tom Henderson has over fifteen years of experience in private industry as a CPA, a financial manager/acquisitions analyst for a Fortune 500 company, and as a consultant. He has over six years of experience in higher education assessment. His education includes a B.S. in Accounting from the University of Idaho, 1975, an MBA in Finance from the University of Washington, 1981, and a Ph.D. from the Individual Interdisciplinary Degree Program at Washington State University in 1999. His first experience applying Activity-based Costing to higher education was with the Flashlight 2002, throurrr-19lyTD0.08.9781-0.0016 T4e.5464 0(re.4(Testing)-nd)-5.8.5464 -4.3(n1 1 t)-6.4(WCE)a -1.1