

COURSESMART SOLUTIONS

DIGITAL COURSE MATERIALS SYSTEMS INTEGRATION

White Paper 2.0

Introduction

CourseSmart Solutions is a technology initiative that gives educational institutions an easy way to incorporate access to the CourseSmart® catalog, the world's largest collection of eTextbooks and other digital resources, into your existing campus web site or learning management system.

Thousands of students and faculty already visit the CourseSmart web site each day to search for, obtain, read, and work with our digital materials. We offer over 20,000 titles from leading publishers such as Pearson, Cengage Learning, McGraw-Hill Education, John Wiley & Sons, Macmillan Higher Education—overall, more than 90% of the core titles used in North American higher education.

Now this popular resource can be part of your own institution's web presence, so that students and faculty can find and use the materials they need without leaving the campus's on-line ecosystem.

A CourseSmart Solutions integration can help you:

- Make your campus technology platform more comprehensive and useful.
- Provide your students with exactly the course materials they need, instantly.
- Keep your faculty up to date and empower them to make timely adoption decisions.
- Encourage cost-savings all around.
- Find new revenue opportunities for your campus bookstore.
- Give users with disabilities access to the largest possible selection of accessible digital course materials.
- Stay ahead of the curve on incorporating mobile devices and social networking models into your learning environment.
- Promote the tangible environmental and ergonomic benefits of going digital.

Dozens of institutional partners are realizing these benefits as CourseSmart Solutions partners. And integrating with CourseSmart has recently become extremely fast and easy, thanks to a growing set of connectivity options, a "Service Hub" of easily-accessed functionality, and a consulting organization that can offer technical assistance and help you build any custom components that you need.

Course Materials Go Digital

Digital learning materials are a higher-education success story of the decade. The number of students and instructors taking advantage of on-line or downloadable eTextbooks and related resources has grown exponentially every year.

CourseSmart has been a pioneer in working with publishers on producing and distributing eTextbooks. We are now the world's largest provider of digital course materials. Most publishers put most or all of their newly published materials into the CourseSmart catalog, often before these materials are available in print.

There are many reasons for CourseSmart's popularity on campus:

- **Ease of access and use**—CourseSmart materials are available at any time at any location with an Internet connection. A student or instructor can find them, obtain them, and start reading in a matter of minutes. And of course digital materials are much easier to carry around than heavy textbooks.
- **Ability to work smarter**—digital resources can be searched, highlighted, and annotated. Students can copy and paste important information into their own summaries, and can print what they need when they need it.
- **Relevance and currency**—CourseSmart provides the exact edition the instructor recommends, in the same page format as the printed material. Custom editions can be created, giving students precisely the content that the instructor plans to assign.
- **Cost savings**—students and institutions save an average of 50% compared to the cost of purchasing new print textbooks.
- **Ecology**—with an eTextbook there is no paper, no ink, no shipping, no driving to the bookstore. Academia, especially, appreciates how “green” digital content can be.

Making the benefits of digital course materials more widely available is the goal of CourseSmart Solutions.

Incorporating Digital Materials

Educational institutions use web technology to great advantage. The vast majority rely on Learning Management Systems (LMS), Student Information Systems (SIS) or campus portals to facilitate a wide range of administrative and pedagogical tasks. Incorporating digital course materials into these online environments is an obvious next step.

Already, many instructors use the CourseSmart web site to locate, try out, and recommend digital materials, and refer their students to www.CourseSmart.com to obtain course materials in digital form. Hundreds of thousands of students now pull up their assignments on their laptops, iPads, iPhones, or other mobile devices.

The convenience and cost-savings increase dramatically with an explicit institution-to CourseSmart integration. Benefits might include:

- Licensing widely-used eTextbooks in bulk and making it easy to distribute them to students at enrollment time.
- Providing students with immediate access to electronic course materials as soon as they register for the class, no separate payment involved.
- Avoiding the cumbersome process of accepting, crediting, and shipping returns of physical media when students drop courses.
- Making it more efficient for faculty to find and review materials, communicate their recommendations to students, and begin teaching immediately, without ordering and shipping delays.
- Leveraging existing knowledge about student course-loads and instructor interests to embed personalized links to assignments and supplemental materials (for students), and newly-available titles (for instructors).
- Facilitating the incorporation of eTextbook citations or page references into social networking or on-line chat systems.

The Integration Challenge

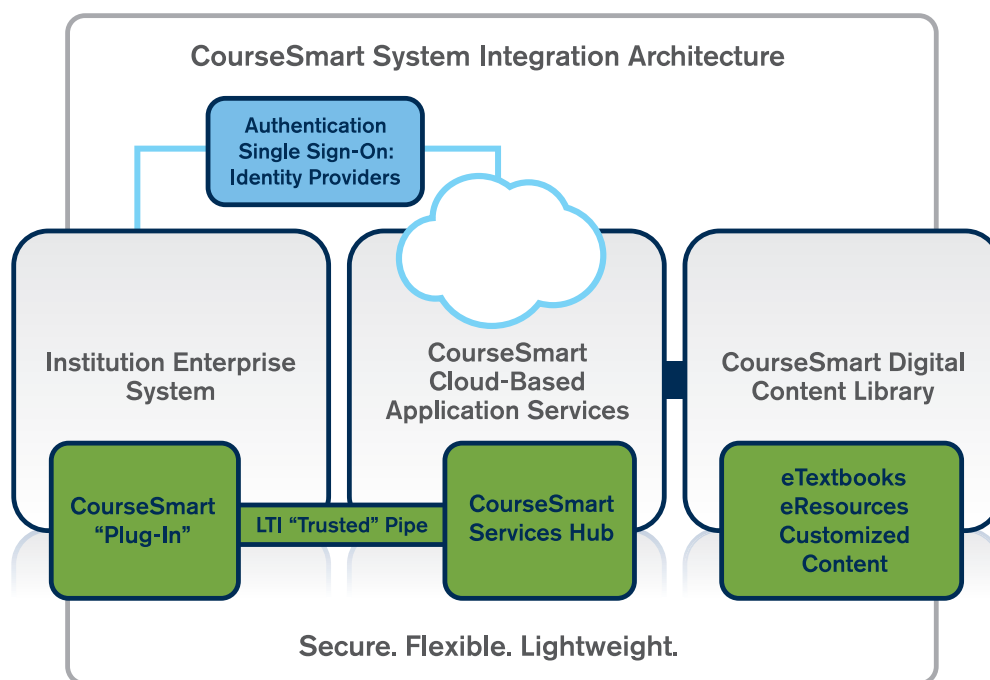
Like all large-scale integrations between organizations, CourseSmart Solutions has to take on a number of tasks. The job is to integrate CourseSmart's processes for cataloging, selling, and displaying material with the systems that a school has in place. This means finding ways to exchange data, maintain security, identify users, conduct financial transactions, and present a consistent look and feel so that users don't feel disoriented as they move around.

While every organization is different, and consequently every implementation will be unique, the basic tasks are largely the same. There is no point in doing the same job from scratch over and over. So CourseSmart Solutions provides a set of pre-built, reusable components that handle the fundamental (and most difficult) pieces of an integration project. These components are maintained by CourseSmart and stored on cloud-based servers in what we call the CourseSmart Services Hub. They are available to any partner implementation that connects into the hub.

The CourseSmart Services Hub

The CourseSmart Services Hub serves as an easily-accessible front end to CourseSmart's powerful but highly specialized digital asset server. The Hub greatly simplifies the tasks involved in connecting your site with our large catalog of titles, our search capabilities, our on-line and downloadable readers, and the technology that enables text searches, highlighting, annotations, copying and pasting, emailable citations, etc.

With its hookups via a variety of connectors and its array of pre-built services, the Hub provides a quick path to achieving cross-system user management, security, and information exchange.



CourseSmart's system integration architecture. This diagram shows an LTI connector as an example; there are several others.

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Multi-tenant Architecture

The CourseSmart Services Hub uses a multi-tenant architecture. The Hub is something like an apartment building, where each tenant has a private apartment that holds his personal assets while sharing common infrastructure with others. In the Hub, each CourseSmart Solutions partner connects into a partitioned-off, access-controlled space of its own. Here CourseSmart Solutions maintains, on that partner's behalf, the collection of services that partner has chosen to use—standard and custom-built—along with, potentially, a personalized catalog of titles, custom editions of digital materials, institution-specific user information, etc.

Service-orientation

The Services Hub is organized as a collection of high-level web services.

Service-orientation reflects a consensus on the best way to exchange information and deliver functionality over the Internet. A web service is an operation that one system performs at the request of another system and then delivers the results over the web. Examples of Services in the CourseSmart Services Hub are: AddStudentUser, AddFacultyUser, LookUpTextbookByISBN, ProcessRedemptionCode, PutBookOnBookshelf, ListTitlesOnBookshelf, OpenToPageNumber.

As these examples show, web services model real-world business events. This is one of the great advantages of services—they are easy to understand and talk about because they use the vocabulary of the business world rather than the programming world.

For example, a Hub service such as PutBookOnBookshelf packages up a sequence of highly-technical API calls to the CourseSmart back end. A CourseSmart partner system can invoke this service and avoid much time-consuming and error-prone programming.

Variety of Connectors

A partner can connect to the CourseSmart Services Hub through the adapter of its choice. Some adapters require no programming at all—infrastructure to connect with the leading LMSs, for example, is already in place. In other cases, a straightforward scripting or programming effort is required. Architecture on the Hub side keeps all adapters lightweight and achieved within a matter of minutes or, at most, a few hours.

Information about the most widely-used connectivity options follows.

LTI (Learning Tools Interoperability) Adapter

LTI, Learning Tool Interoperability, is an exploitation of the OAuth security infrastructure that is specialized for educational institutions. OAuth was developed by engineers from Google, Twitter, and Flickr to provide a lightweight but reliable set of security standards; LTI adds in education-specific vocabulary.

Any institutional system that supports an LTI-compliant adapter can connect to the CourseSmart Services Hub with a few simple configuration steps. LTI is currently implemented primarily by LMS systems; those that are not already LTI compliant are moving in that direction. CourseSmart has been certified a LTI 1.0 Tool Provider by the IMS Global Learning Consortium.

LTI standards handle all of the major connector 'responsibilities,' so once the LTI adapter is in place you will have:

- Secure, "trusted" communication (via OAuth) between your institution and CourseSmart.
- Capabilities for managing the user interface of the CourseSmart viewer so that it matches the look and feel of your own LMS.
- Ability to pass "context" that has been specialized for education, such as student, course, and institution information.

OAuth Connector

When an LTI adapter is not available, a native OAuth connector is a fine option. Both use the same “trusted pipe” approach. While native OAuth takes more setup, once the connector is in place, CourseSmart sees the two data sources as indistinguishable.

To facilitate this approach, CourseSmart provides an “OAuthLite” kit that enables an institution to connect to CourseSmart with a few hours of light scripting, primarily to provide the education-related context that enables CourseSmart to provision and identify the user. The procedure is well-documented, and CourseSmart can walk you through it.

Industry-standard Web Service Connector

LTI and OAuth provides connectivity short-cuts, but in fact the CourseSmart Services Hub can support other types of web service your organization may use. Most widely used is the so-called REST web service; a SOAPbased web service is also available. Since most of these web service interfaces are “unprotected” and do not support the same high level of trust as the OAuth and LTI connectors, we recommend supplementing them with an architected security interface (usually a single sign-on environment) as described below.

Security Concerns

Connections set up using OAuth, either via LTI or hand-scripted, contain all of the security safeguards that are needed. OAuth builds in facilities for verifying a user’s identity so that CourseSmart Solutions knows what resources the user is entitled to and what functionality the user can invoke (if the user is a faculty member, for example), and lets CourseSmart present that user’s personalized Bookshelf and the user’s own marked-up copies of digital resources.

Architected Security Interface

Beyond, or in place of, this built-in security, the CourseSmart Service Hub can optionally integrate with an architected security framework—often referred to as a single sign-on environment or a Federated Identity Management System. This infrastructure allows the Hub to collaborate with your institution’s Identity Management system. The Service Hub has its own security server, based on the universally-accepted SAML security protocols. Consequently, the Hub can collaborate with rich federated systems such as Shibboleth or OpenSSO, or with lighter-weight authentication-only systems such as CAS or OpenId.

There are several reasons an institution might want to use this architected security interface:

- 1.** If the institution is not using one of the trusted pipe approaches (LTI or OAuth), the Hub will need this interface to establish the identity of the user.
- 2.** The institution may want a “universal” authentication approach that will support interoperability among its own diverse applications and with partners besides CourseSmart. Where LTI/OAuth ensures trust only between the campus learning system and the CourseSmart Service Hub, Federated Identity Management can be used for multi-way inter-system connections.
- 3.** In order to avoid overload, institutions with a high volume of users may want its students and faculty to access the CourseSmart hub directly, without going through the Learning System. FIM makes it possible, for example, to email to thousands of users links that take them directly into a CourseSmart digital asset.

Security Evolution

An institution may wish to start with a simple LTI/OAuth connector approach to get up and running rapidly. The security interface can be added later as the system scales up or becomes more complex.

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Standards-compliance

The CourseSmart Services Hub is a good network citizen. We honor industry standards at multiple levels, including:

- IT standards for service delivery (W3C/SOA), database interoperability, and system interconnection
- Security standards that enable authentication, single sign-on, and federated identity. There are many competing standards, as described above, and CourseSmart can help you navigate these alternatives and decide on a best fit.
- Education standards. CourseSmart has been an active participant in the IMS Global Learning Consortium. IMS promotes a number of technology-related standards for educational innovation. In particular, CourseSmart has been an early adopter of the Learning Tool Interoperability initiative (LTI), and made it a core feature of connection with the CourseSmart hub.

Migration Opportunity

Digital standards for interoperability are relatively new to the education field. Many educational institutions run proprietary applications that were built to address specific needs in the most expeditious way. But the future clearly lies in alliances, partnerships, consortia, and inter-campus and inter-institution connections.

Such connectivity requires standards, and the path from a one-of-a-kind proprietary system to a standardsconformant one can be disruptive.

Integrating with CourseSmart through CourseSmart Solutions can be an important step in this direction. CourseSmart Solutions is prepared to start where you are today, making the custom connections you require for the short-term while designing a solution that moves toward standards in manageable steps. The legacy-to-standards recipes developed by CourseSmart Solutions may prove useful in other integration projects you are contemplating, and help you get into position for richer interconnectivity overall.

Getting Started

CourseSmart Solutions would like an opportunity to introduce ourselves more fully and work with you on integrating CourseSmart materials into your campus systems.

We invite you to contact us at solutions@coursesmart.com to request more information or to schedule a consultation. CourseSmart Solutions consultants can discuss your integration objectives, evaluate your existing configuration, and recommend an approach that will suit the needs of your students and faculty.

You can also learn more about this new initiative at CourseSmart Solutions website at www.coursesmart.com/go/solutions. And of course the CourseSmart home page at www.coursesmart.com provides extensive information about digital learning materials and lets you explore our catalog.

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