

# Community Source Software in Higher Education

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**This case study shows how the University of Delaware adopted Sakai, a community source system for higher education. It discusses the major challenges of community source adoption and presents the key success factors for overcoming them.**

In his *New York Times* bestseller *Free*, Chris Anderson states that in the digital age of the 21st century, “Once something becomes software, it inevitably becomes free.”<sup>1</sup> Free and open source software (FOSS) has indeed dramatically changed the software industry and significantly impacted the behavior of different stakeholders in the software ecosystem.<sup>2</sup> According to Gartner Research, more than 90 percent of enterprises will use open source in direct or embedded forms by 2012.<sup>3</sup> IT professionals, especially CIOs, should thus be considering FOSS when making strategic decisions about their IT infrastructure.<sup>4,5</sup>

We can divide open source software roughly into two categories: community and commercial.<sup>2</sup> Community open source software, such as the Apache Web server and Eclipse, is developed by a broad community of volunteers. The community determines which contributions to accept into the source code base and decides the software’s future direction. Commercial open source

software, such as the MySQL database or Alfresco CMS, is owned and developed by a for-profit entity. The company manages the source code base and decides what to implement. Both types of open source software have been widely adopted and deployed.

Here, we focus on a special type of community open source software—in particular, software that’s created by—and for—educators. Examples include the Sakai learning and collaboration system ([www.sakaiproject.org](http://www.sakaiproject.org)) and the Kuali administrative system ([www.kuali.org](http://www.kuali.org)). We refer to it as *community source* throughout, because a distinguishing feature is that “many of the investments of developers’ time, design, and project governance come from institutional contributions by colleges, universities, and some commercial firms rather than from individuals.”<sup>6</sup> Community source systems have gained popularity in recent years, and many higher-education institutions are adopting them (or plan to) in place of

proprietary or commercial systems.<sup>7</sup> Given this trend, IT professionals can benefit from learning more about community source.

Our case study of the multiyear Sakai adoption project at the University of Delaware identifies the key success factors for adopting community source versus commercial products.

### The Sakai Collaboration and Learning Environment

In 2004, members of four universities (Indiana University, Massachusetts Institute of Technology, Stanford University, and the University of Michigan) met to discuss the future of their learning management systems (LMSs). All four had home-grown systems that answered their current needs but were unsustainable in the long run.

Many higher-education institutions are adopting community source systems in place of proprietary or commercial systems.

To address the sustainability issue, the original idea was to pool all of the different home-grown systems together and create a core common code base that would serve the needs of the original participants and others who would like to deploy it on their own campus, under an educational community license. The four universities contributed about 27 full-time equivalents or US\$4.4 million to the project and then received a \$2.4 million grant from the Mellon Foundation.<sup>8</sup> This original grant triggered the creation of the Sakai Foundation, a nonprofit umbrella organization devoted to the promotion and development of the new LMS—Sakai.

The Sakai Foundation gathers needs from the Sakai user community and acts as the point of contact for institutions interested in deploying Sakai software. It has a board of directors comprising 10 participants, elected by member institutions. Institutions can become members of the Sakai Foundation by participating in the Sakai Partners Program—a paid membership costing \$10,000 per year.

Sakai partner institutions provide the majority of the intellectual, human, and financial capital to support both the foundation and community.

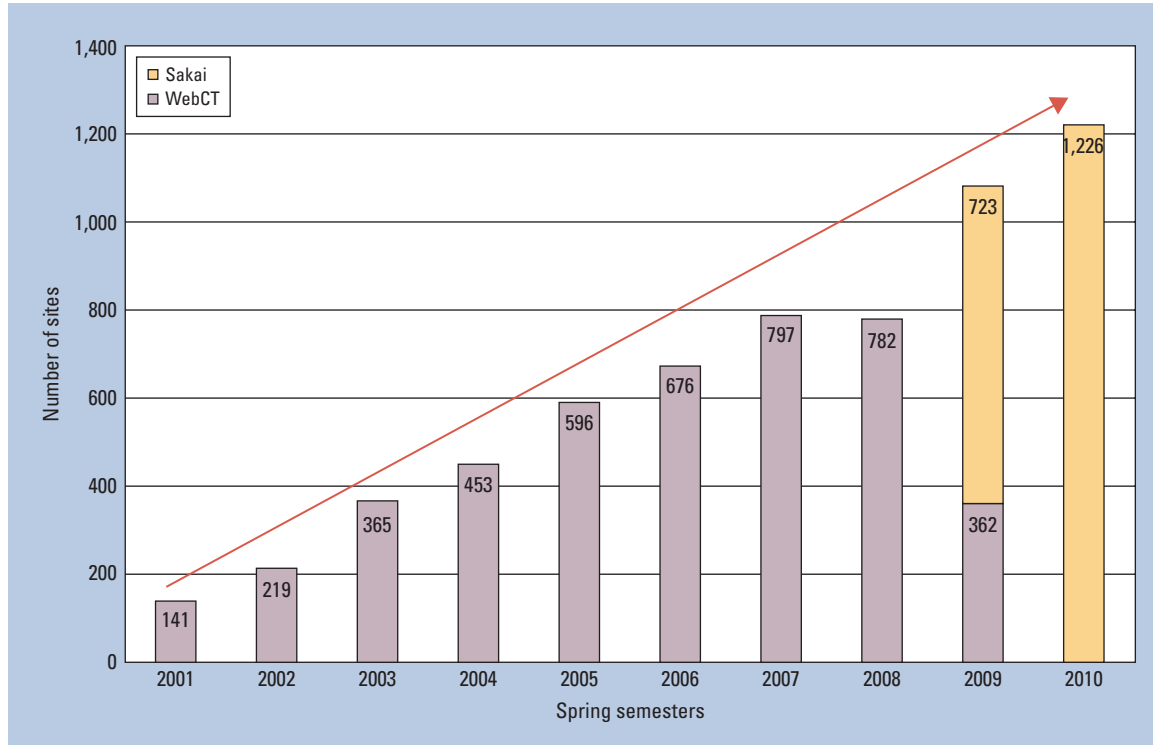
They also participate in foundation governance, help determine priorities for the community, and work cooperatively as part of Sakai's software production process. There are currently 66 academic Sakai partners, located throughout the world, who provide a solid institutional base for the Sakai community.

Sakai has a dynamic, active, and multifaceted community, which consists of many semivoluntary participants with different backgrounds involved in the software's design, development, implementation, support, and use. These pockets of interest are mostly divided through the different mailing lists, which are the main discussion channels of the Sakai community. There are four main mailing lists: announcements, building Sakai, deploying Sakai, and using Sakai. There are also more narrowly focused lists, such as teaching and learning, portfolios, user experience, and K-12. Issue tracking is centrally managed through a trouble ticketing system (JIRA), and a wiki system (Confluence) documents community activities.

The Sakai community also hosts an annual conference that attracts about 500 participants from all over the world. This important conference involves working sessions that provide guidelines for year-long development.

The current Sakai code base is tool centric, meaning that tools are independent from one another and can evolve on their own. Most tools are managed by one or two lead institutions that concentrate their efforts on solving issues for their tools. The product counsel, formed by an elite group of star contributors, decides on the readiness of different tools to be included in upcoming Sakai releases. The Sakai community tries to have one main upgrade per year.

The Sakai educational community license lets any company or organization offer the Sakai Collaboration and Learning Environment (CLE) as a part of their for-profit service offering. The Sakai Foundation encourages the growth of this ecosystem through its commercial affiliate program's voluntary annual subscription model (US\$2,000 per \$1,000,000 in company revenues) that provides funding for Foundation activities and visibility to those business partners. Using this program helps schools transition from proprietary software to open source by offering consulting, training, customization, implementation, or even completely hosted



**Figure 1.** The number of learning management system (LMS) course sites for spring semesters at the University of Delaware (UD). In 2007, UD began a two-year migration from its current LMS, WebCT, to the Sakai system.

solutions. This program currently has 13 members, including IBM, Oracle, SunGuard, rSmart, and Unicon.

### Adopting Sakai at the University of Delaware

In 2000, the University of Delaware (UD) deployed WebCT, a commercial LMS, with only 40 course sites. The number of courses on WebCT then steadily increased over the years (see Figure 1). In 2006, when Blackboard acquired WebCT, UD faced a major WebCT upgrade. It was time for a new service agreement, so UD decided to search for a new LMS.

Over the next two years, UD evaluated and tested different LMSs while running WebCT without major upgrades. During this informal evaluation process, UD had a pilot evaluation of the Open Source Portfolio (now part of the Sakai project). In addition, the UD CIO was part of the original Sakai board, so UD had more experience with Sakai than with other LMSs (such as Moodle and ATutor). In March 2008, UD announced that Sakai would be its next centrally supported LMS, and a two-year migration plan for WebCT users began, where they opted-in to Sakai to support their courses.

In Spring 2010, all of UD's LMS-based course sites were hosted on Sakai (see Figure 1).

Surveys were conducted to evaluate the Sakai system. Preliminary results from 49 faculty and 390 students indicate Sakai's success:

- 85.7 percent of faculty reported that Sakai improves communication with students,
- 81.5 percent of students say that Sakai saves them time, and
- 75.6 percent of students report learning more using Sakai.

UD's successful adoption of Sakai leads to many interesting questions. What were the key drivers for UD to adopt an open source system over a commercial product? What were the key success factors, challenges, and issues during the adoption and migration processes? To answer these questions, we conducted a case study.

### Our Case Study

Case study research has been widely applied to build theoretical constructs that are empirically testable from case-based evidence.<sup>9</sup> The data we used comes from both semistructured

interviews of UD Sakai project members and archival data.

We developed a preliminary semistructured interview questionnaire based on various project documents and our knowledge of both commercial and open source LMSs. The questionnaire helped us capture qualitative data that better explained why the university chose to implement community source software—and Sakai in particular—over other possible solutions.

**There's a common misunderstanding about the meaning of "free" in the term "free and open source."**

We interviewed five people:

- the UD CIO, who offered an historical view of UD's involvement with commercial and open source software and provided a glimpse of the future direction of open source at UD;
- the Sakai project sponsor/champion (the viceprovost for academic affairs and international programs), who oversaw the goals and expectations for the Sakai implementation, coordinated with different stakeholders on campus, and was responsible for the purchase of Sakai services;
- the project manager, responsible for implementing Sakai and acting as a liaison between outside vendors (commercial affiliate partners) and peer institutional Sakai adopters;
- the Sakai technical manager, who led the core Sakai team of developers, the system administrator, and the technical and support staff, and who was responsible for Sakai's day-to-day operations after implementation; and
- the user experience lead, responsible for Sakai's overall look and feel, documentation, and user training.

We chose this group because these individuals offered a good overall view of the entire project and provided technical, administrative, and user insights. Each individual was an integral part of the Sakai project.

The archival data we analyzed included

- the Sakai project implementation overview;
- a presentation to UD department chairs;

- key emails from members of the Sakai team;
- timelines and milestones of the Sakai implementation process;
- a tool comparison matrix between WebCT and Sakai;
- a Sakai consulting company's report, which included a SWOT (strengths, weaknesses, opportunities, and threats) analysis for UD Sakai adoption, resource recommendations, an environmental analysis and recommendations, a faculty migration strategy, and a Sakai customizations and cost analysis;
- a project manager review report; and
- a migration plan and progress report.

Codifying the data was rigorous and included techniques similar to open and axial coding<sup>10</sup> and completion coding.<sup>11</sup> Reviewing the data helped us determine the relevant categories, properties, and property dimensions (open coding). This codification technique led to axial coding where the open coding output was refined, systematically developed, and linked.<sup>10</sup> This led to plausible theoretical propositions that resulted from completion coding,<sup>11</sup> a form of hypothetico-deductive logic<sup>9</sup> where we recursively perused and synthesized the data to ensure that there weren't any contradictions between the propositions and the data.

## Research Findings

We generalized our observations into the following list of key success factors, which are our propositions regarding what's required for community source adoption.

### Understand the Costs

When people talk about adopting FOSS over commercial products, they often think that FOSS can greatly lower costs because it's free. There's a common misunderstanding about the meaning of "free" in the term "free and open source."<sup>12</sup> "Free" here doesn't mean there's no cost; rather, it's a matter of user freedom to run, change, and redistribute the software with or without charge.

Although all interviewees acknowledged that cost was an issue when considering open source systems versus commercial products, it wasn't a key factor. The cost saved by not paying commercial product licenses by adopting FOSS is likely spent on the salaries and benefits of people who

maintain and support FOSS. As one interviewee noted, “You don’t actually save money by going to open source, because basically whatever you don’t spend on licensing, you are going to spend internally on people.”

### Exploit the Flexibility

Commercial LMS companies often offer a packaged solution, which includes an annual license fee to run the proprietary software and a service plan to ensure continuity of support. This legal contract between the institution and vendor is often seen as a safe and viable solution for decision makers, but it also means they’re locked into a proprietary platform.

This vendor lockdown issue became a problem for UD when Blackboard acquired WebCT in 2006 and subsequently announced that in October 2009, it would stop supporting WebCT 4.1 (UD’s current version). As one interviewee explained, “When Blackboard took over, they were planning on dropping support for older versions [so] if something happened, we would have been stuck.” UD had to perform a costly system upgrade or run a proprietary system without support.

Vendor lockdown also leads to service lockdown, because the vendor is the only service provider, regardless of the service quality, once the contract is signed. As the UD Sakai project manager said, “One of the biggest issues we were seeing was vendor lockdown. It is really a problem when you don’t have access to any source code and all you can do is install it locally like a black box. And when you have an issue, you have to rely on the services provided by the vendor.” By decoupling the software from the service, community source gives institutions the flexibility to choose vendors who live and die by the quality of their service.

In addition to paid support service, a large and active community like the Sakai community can often provide prompt and high-quality support, according to UD Sakai team members’ experience. Community source also provides the flexibility to adapt to changes. Because the source code is available, institutions can customize community systems to satisfy their unique teaching and learning needs, something that’s difficult—if not impossible—with commercial systems.

### Build on the “Community” Component

Community Service Quality (CSQ) has been presented as a key component in the success of open source software.<sup>13</sup> CSQ entails the service level that members receive from the community in areas such as community knowledge, dependability, promptness of communications, and willingness to help. Additionally, for members of the Sakai Foundation, it’s critical that members of the community be from the same industry.

The fears of not having a vendor turned out not to be a big deal because of the great community.

An interviewee stated, “The community was very important [because] big institutions like Michigan, Indiana, Stanford, and UC Berkeley were already running it at full production and had been doing it for a while.” Another person also stated that “the idea of the community source is really good because you have a user base of many institutions who are going through the same thing you are, and someone is bound to have the same issue come up.” The strong community support can be contributed to the financial support that many members receive from their institutions. As the project manager stated, “The fears of not having a vendor turned out not to be a big deal because of the great community.”

### Engage Different Stakeholders

Different stakeholders usually have different concerns about adopting FOSS, such as quality, functionality, and support. Similar to any other software adoption, an important issue to consider is the approach taken to instantiate the product. Change must be closely managed. Among various other components, such as training and migration, an important part of change management is getting your stakeholders on board.

The vice-provost—the project sponsor and champion—stated, “IT recognized they needed to work with the provost office because at the end of the day, the people that were going to be engaged in this process were going to be faculty.” He went on to say that “one of the things

I believed in was this had to have ample community participation; this is something you can't do on your own."

In 2007, in partnership with the provost's office, UD created an LMS committee to evaluate Sakai as a potential replacement for WebCT. UD selected faculty members and staff from across the university to represent their constituents. Additionally, IT worked in conjunction with a Sakai commercial affiliate to define the needs of the institution in a two-day retreat, which was pivotal in getting buy-in from all units in IT and other stakeholders on campus. It gave UD the chance to understand the amplitude of the project and show how everyone had to contribute to guarantee success.

**The community source approach is an increasingly viable alternative to the commercial vendor services model.**

The LMS committee met four times that year so that the IT staff could give updates on deployment progress and so the faculty could share success stories and frustrations with the Sakai pilot environment. The stakeholder engagement and clear processes were instrumental to UD's successful adoption of Sakai, as summarized by the vice-provost: "One of the reasons I think it worked so well was we engaged a lot of people in the process and we made sure we presented to all the units across campus in order to make sure people felt they had input and they would be listened to."

### **Create a Commercial Affiliate Program**

All interviewees said that the commercial affiliate partners are critical for the Sakai community and Sakai adoption. The Sakai commercial affiliate program has attracted many well-known companies such as IBM, Oracle, SunGuard, rSmart, and Unicon, demonstrating Sakai's value and providing confidence to potential adopters.

Those commercial affiliate partners are also actively contributing to the community, as one interviewee noted: "The nice thing about these affiliates is that they don't just take the Sakai

code and make it their own and hide everything, but they contribute a lot to the community." According to the project manager, a key success factor is leveraging Sakai commercial affiliate partners to jump start the adoption process and help fill the knowledge gap during implementation.

### **Consider In-House IT Skills and Infrastructure**

Sakai is a large community source enterprise system, which requires higher-level IT skills and a more complex IT infrastructure than smaller open source systems, such as the blogging platform Wordpress. According to the UD CIO, one reason UD adopted Sakai was because it's written in Java, and UD has many IT staff with Java programming knowledge. UD is a large university, so it has enough IT resources to run and support Sakai by itself.

For small institutions without sufficient internal IT expertise and infrastructure, running and supporting Sakai could be an overwhelming task and could lead to high overhead. Several interviewees noted this. One said, "If you were a small college of 2,000 students, you may decide to out-source [if you don't want] to deal with adding one more staff member and [would] rather pay for a license." Another noted, "If UD were smaller, we may have decided to go with a hosted service." A hosted system with support services provided by FOSS commercial affiliates might be a better choice for small institutions who want to adopt enterprise community source systems.

### **Coexist with Commercial Software Vendors**

All interviewees raised Blackboard's acquisition of WebCT as a major concern. Many also mentioned the lawsuit Blackboard filed in 2006 against their competitor, Desire2Learn, for infringing on their education patents.

Because of this lawsuit, the Software Freedom Law Center filed a request in 2007 on behalf of several open source LMS organizations, including Sakai, Moodle, and ATutor, to the US Patent and Trademark Office to reexamine Blackboard's e-learning patents. Blackboard subsequently announced that it wouldn't assert its patents against the development, use, or distribution of open source software or home-grown systems as long

as such systems weren't bundled with proprietary software ([www.blackboard.com/Company/Patents/Patent-Pledge.aspx](http://www.blackboard.com/Company/Patents/Patent-Pledge.aspx)).

When more high-quality enterprise systems are offered as FOSS, commercial software vendors are forced to change their attitude and strategy about their FOSS counterparts. They can adapt their business models to healthily compete with FOSS and can succeed by cooperating and contributing to FOSS communities.<sup>1,14</sup>

As with any IT decision, there are many trade-offs and considerations to take into account before migrating to community source software and systems. However, we believe that overall, the community source approach is an increasingly viable alternative to the commercial vendor services model. We hope that the key factors we listed for successful migration will provide valuable insights to IT professionals who are interested or involved in adopting community source software and systems. We plan to further validate our findings by interviewing more people from the Sakai team, studying other community source adoption cases, and incorporating more open source adoption theories and models, such as the Open Source Readiness Model.<sup>15</sup> ■

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