



"OKI provides us with valuable tools for technology research and integration. For example, in a current project we are researching the impact of different learning designs by using a very granular breakdown and tracking of learning content objects. We are potentially able to use the existing OKI APIs to control user access permissions for each learning object. We are also working with OKI on evaluating how the SCORM object player we have developed can be integrated into learning management systems to provide the rich tracking data needed to support educational research."

**Jem Rashbass, Director
CARET, University of
Cambridge**

Innovating with OKI

Pushing the Limits of Learning Technology at the University of Cambridge and Tufts University

The University of Cambridge and Tufts University are working at the leading edge of learning technology innovation, and they don't want anything to slow them down. That's where OKI comes in. It allows researchers to quickly and easily integrate their innovative tools and content into the existing technology infrastructure.

At the **University of Cambridge** the focus is on "learning objects." Cambridge is part of a global community trying to understand how granular content can be assembled, reused, and tracked within a learning environment. The systems managing this content need to authenticate users and control access to each learning object. The existing OKI APIs are tailor-made for that purpose. They enable the use of authentication and authorization services provided by *any* system supporting the OKI APIs, regardless of whether those services are provided by an LDAP server, an NT domain server, or Kerberos.

The Centre for Applied Research in Educational Technologies [CARET] at the **University of Cambridge** provides the university with research on the development and evaluation of pedagogically sound innovative resources for online learning. (<http://www.caret.cam.ac.uk>)

At **Tufts University** researchers are creating visual representations of relationships among information objects. They are linking this work to existing access control services, and plan for future integration with learning and library services. The OKI architecture provides a way to access these services through a controlled API. This allows researchers to develop technology and run experiments without facing the unpleasant choice of either simulating an entire learning and library environment themselves or running the risk of destabilizing a real environment being used by thousands of students.

The Academic Technology department at **Tufts University** supports research in new and emerging technologies and makes them available for experimentation and creative development. (<http://www.tufts.edu/tccs/at/>)

"At Tufts we are working on a tool called the Visual Understanding Environment that allows instructors to visually define a network of relationships between information objects. Eventually we plan to merge this tool with our course management and digital library environments. OKI APIs are used to link to access and authentication services, and we are helping OKI to define the Content Management / Digital Repository APIs." **David Kahle, Director of Academic Technology, Tufts University**

OKI provides exciting projects like these with a general framework that allows technology innovation to safely be incorporated into live learning environments. Innovators' work can also be easily shared with users and developers at other institutions that support the OKI architecture. OKI enables research and development efforts to concentrate on core functionality, rather than spending time and money building simulated environments or managing complex system integrations.

About the Open Knowledge Initiative

Innovation. Integration. Cooperation.

The Open Knowledge Initiative (OKI) defines an architecture that precisely specifies how the components of a learning technology environment communicate with each other and with other campus systems. By clearly defining points of interoperability, the architecture allows the components of a complex learning environment to be developed and updated independently of each other. This leads to a number of important benefits:

- Learning technologies appropriate for a *range of teaching and learning requirements* can be integrated together into a common environment. For example, the needs of the Math department are not those of the English department, and tools that work well for new users may not be adequate for seasoned users.
- Learning technology and content can be more *easily shared among schools and departments*. This provides a catalyst for cooperative and commercial development.
- There is a *lower long term cost of software ownership* because single components can be replaced or upgraded without requiring all other components to be modified.
- Modularity makes learning technology *more stable, more reliable, and able to grow with increased usage*, and allows components to be updated without destabilizing other parts of the environment. OKI is based on technologies that have proven to be scalable and dependable in large scale enterprise computing environments
- The architecture offers a *standardized basis for learning technology software development*. This reduces development effort and encourages the development of specialized components that integrate into larger systems.

At the core of OKI is a set of application programming interfaces (APIs) that realize the OKI architecture. OKI is providing Java versions of these APIs. These Java APIs are provided for use in Java-based systems and also as models for other object-oriented and service-based implementations. OKI's partners and developer community are providing open source examples and reference implementations of learning technologies that make use of the APIs.

Higher education leaders recognize that learning environments are a core component of their information technology infrastructure. These environments must successfully support faculty and students, and they must be flexible enough to adapt to a range of instructional requirements and styles. The technologies must be robust and must scale up to support an ever-increasing demand.

OKI is being developed by and for higher education. OKI was started with Mellon Foundation funding and has grown as partners have received additional funding for specific OKI-related projects and activities. Institutions of higher education can take concrete steps to move OKI forward. These include making OKI part of procurement and product definition cycles and participating in the OKI development community. This will help direct the efforts of the vendor community and will help campuses move more quickly to a stable and scalable learning technology infrastructure that effectively supports their educational processes.

The OKI Partners

The Massachusetts Institute of Technology leads the project in close collaboration with a growing community of partners, including Stanford University, the University of Michigan, the University of Cambridge, Dartmouth College, North Carolina State University, the University of Pennsylvania, the University of Wisconsin-Madison, and the University of Washington.

To find out more about OKI, visit our web site at <http://web.mit.edu/oki>, or email oki-info@mit.edu.