Hype Cycle for Higher Education, 2007


The priority for most higher education institutions in 2007 is to ensure that IT investments follow institutional strategic and tactical needs and plans. New investments must be made to ensure institutional competitiveness and provide services and support for changing student and staff needs.
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ANALYSIS

What You Need to Know

Higher education technology leaders must follow consumer technology-buying trends and the "hot items" that higher education consumers will likely bring to campus in the next 10 years. Higher education institutions must begin to assess their cultural environment for openness of language differences and plan for clear communications with the increasing numbers of digital natives entering their organizations. At the same time, higher education CIOs must become (or must identify) the digital "interpreter" to continually review language and decisions with regard to the nature of the differences in user expectations and needs of both digital natives and digital immigrants.

The Hype Cycle

This is the fourth Hype Cycle for Higher Education. New and emerging technologies for consideration must be viewed from a consumer perspective as students bring their own technologies to campus and expect IT leaders on campus to allow them to seamlessly connect these devices to the campus network while providing quality service and support. Tied to this demand is a need for CIOs to plan for and manage changing expectations while facing the aging of the IT workforce and bringing digital natives into the workforce. This will result in a cultural tension that will rage on at most institutions for at least the next 10 years.

While technologies on the Hype Cycle offer the promise of long-term efficiencies, the cost to bring these technologies to the campus falls on IT budgets, which continue to grow more slowly than demand. This disconnect between increased demand and the need for increased IT expenditures requires higher education IT leaders to market the value and savings to executive leaders and work within a governance model that can appropriately assess and assign priorities. New technologies must continue to be sold and viewed as campus strategies, rather than as IT strategies. Not every institution will or should buy into new technologies at the Technology Trigger point, but should carefully decide when to invest based on the greatest value to the institution and the expected time to maturity. Long-term investments still must be viewed in light of strategic value and competitive advantages.

Since the 2006 Hype Cycle, several key technologies have made progress, some have disappeared as their relevance has diminished, and some new entries are already commanding the attention of higher education IT leaders. New to the Hype Cycle for 2007 are virtual environments/virtual worlds, quantum computing, open-source higher-education financials, open-source student systems, grid computing, wikis, tablet PCs, open-source higher education portals, business intelligence platforms and digital rights management.
Figure 1. Hype Cycle for Higher Education, 2007

Source: Gartner (July 2007)
The Priority Matrix

Technologies that have the ability to transform higher education include global library digitalization projects, personally owned devices with campus network access, Internet2/next-generation Internet, e-learning repositories, quantum computing and virtual environments/virtual worlds. Most of these transforming technologies focus on the teaching and learning environment, where we expect the transforming power of IT to have the greatest impact.

**Figure 2. Priority Matrix for Higher Education, 2007**

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Years to Mainstream Adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>less than 2 years</td>
</tr>
<tr>
<td>Transformational</td>
<td>Internet2/Next-Generation Internet</td>
</tr>
<tr>
<td>High</td>
<td>802.11x on Campus Business Intelligence Platforms</td>
</tr>
<tr>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

*As of July 2007*

Source: Gartner (July 2007)

**On the Rise**

**Quantum Computing**

*Analysis By:* Jim Tully
Definition: Quantum computing is based on the principles of quantum theory. Data is represented as linked qubits (quantum bits), which have the ability to represent all possible states simultaneously. This gives quantum computers the ability to operate exponentially faster than conventional computers as the word length is increased. A quantum computer filters the states to find the correct answer. Qubits must be held and linked in a closed quantum environment and must not be allowed to interact with the outside world because they are very susceptible to the effects of noise. Some classes of problems would be executed extremely fast with quantum computers, but the technology is unsuited to general office tasks, such as word processing.

Position and Adoption Speed Justification: Quantum computing is in the relatively early research stage, but a number of significant advancements have been made during the past several years. IBM demonstrated five qubit computation in 2000, based around five fluorine atoms. In February 2007, D-Wave Systems demonstrated a purported 16 qubit quantum computer, based on a supercooled chip arranged as 4x4 elements. The results of the latter demonstration were inconclusive, but the technology continues to attract significant funding. Considerable problems exist in increasing the number of linked qubits available for computation because of noise. The slightest amount of interference while computation is occurring will cause the system to drop out of the quantum state and generate random results. It is therefore necessary to enclose the system within an intense magnetic field (or a comparable shielding scheme) for isolation reasons. In practical quantum computers, total isolation would not be feasible, so error-correction schemes are being developed to compensate for small amounts of interference. Much of the current research on quantum computing is focused on these error-correction schemes. Averaging out errors through parallel computations is the most promising approach because it is not clear that fundamental quantum noise can be reduced.

User Advice: No concrete actions are needed at this time. Monitor developments.

Business Impact: Quantum computing can potentially have a huge effect, especially in areas such as optimization, code breaking, DNA and other forms of molecular modeling, large-database access, stress analysis for mechanical systems, pattern matching and, possibly, weather forecasting.

Benefit Rating: Transformational

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Open-Source Higher-Education SIS

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: Open-source higher-education student information systems (SISs) are developed via open-source or community source models.

Position and Adoption Speed Justification: Open-source SISs have the potential to be part of a nonproprietary and highly customizable higher-education administrative application suite, or as a best-of-breed solution. However, features, functionality, process, integration and support issues are still undefined.

User Advice: Open-source solutions for SIS are in early stages and should be monitored for future development.

Business Impact: Student administration and, possibly, integration with e-learning platforms are areas that will be affected.
Benefit Rating: Low

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Sample Vendors: Kuali

Open-Source Higher-Education Financials

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: Open-source higher-education financial applications are developed via open-source or community-source models.

Position and Adoption Speed Justification: Open-source solution financial projects have the potential to be a part of a nonproprietary and highly customizable higher-education administrative application suite, or as a best-of-breed financial solution. Process, integration and support issues are still undefined.

User Advice: Open-source solutions for financials are in an early stage and should be monitored as a possible fit only for institutions capable of supporting in-house application development and with no pressing need for changing their solution. When this is the case and the institutions have homegrown systems, they might consider joining the open-source community to see if they can contribute and prolong the life of their current system.

Business Impact: The area of financial administration and the areas of financial integration with other administrative applications will be affected.

Benefit Rating: Low

Market Penetration: Less than 1% of target audience

Maturity: Embryonic

Sample Vendors: Kuali

CobiT — Higher Education

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: Control Objectives for Information and Related Technology (CobiT) is an IT governance framework that helps organizations understand primary control objectives. CobiT comprises four high-level domains, such as planning and organization, and 34 subdomains, such as HR management. CobiT is not a complete set of IT processes, but rather a set of 318 control points, such as procurement control, designed to provide reasonable assurance that certain objectives will be achieved. For example, the CobiT framework identifies a software release policy as a control point, but it does not define the process and procedures associated with software release. Tools consist largely of spreadsheets and they hook into workflow-based tools.

Position and Adoption Speed Justification: Despite an emerging interest in CobiT, few institutions have gone beyond initial discussions toward building an implementation plan.

User Advice: Institutions that are unfamiliar with CobiT should begin by examining the framework and the standard process framework used by CobiT. Before the institution selects any set of process improvement frameworks and models, it must assess: 1) what the organizational scope of the improvement initiative is; and 2) whether the ultimate goal is operational process
improvement or business transformation. If the goal is business transformation, then a more strategic approach to change will be required.

**Business Impact:** Large and/or complex institutions will likely find greater financial and performance benefits.

**Benefit Rating:** Moderate

**Market Penetration:** Less than 1% of target audience

**Maturity:** Adolescent

### Technology-Enabled Classrooms

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Rather than viewing the physical classroom, the technology and the pedagogy separately, a technology-enabled classroom must integrate all three. For example, pedagogy emphasizes the importance of personal, interpersonal and group interaction with multiple resources and stimuli to enhance the teaching and learning process. Therefore, it is helpful to have technology-enabled Wi-Fi access for individual devices with single and multiple visual displays that are augmented by search, applications and presentation media.

**Position and Adoption Speed Justification:** Some institutions are interested in creating the ultimate technology-enabled classroom.

**User Advice:** The optimum setting might be a physical classroom providing individual and team work areas with direct line of sight between the student and the instructor, as well as flexible seating, lighting and power sources.

**Business Impact:** Affected areas include research institutions and instructional technology R&D.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

### Virtual Environments/Virtual Worlds

**Analysis By:** Marti Harris; Waldir Arevolo; Jan-Martin Lowendahl

**Definition:** Virtual environments are online platforms in which participants are immersed in a three-dimensional representation of a virtual space.

**Position and Adoption Speed Justification:** The current limitations of virtual environments, such as network and grid scalability, English-only language for the end-user interface, and relatively high-cost hardware components such as processors, graphical boards and network access bandwidth to meet good performance, restrict the adoption to a niche audience. However, as the price of entry for those pre-requirements decreases, the technology matures, and global-class consumers and enterprises access and realize the value of using them, the pace of adoption will accelerate and the number of initiatives on those virtual environments will rapidly increase. Inhibitors to adoption specific for institutions are related to lack of collaboration tools, 3-D modeling tools and integration with real-world educational applications.

**User Advice:** Evaluate the alignment between virtual environments, consumerization of IT and your institution’s research, teaching and learning goals. Identify the early adopters and easily attainable objectives, such as increasing faculty/student communication, collaboration and
learning activities, because they've been the focus of short-term benefits for a long time. Use the "try before buying" strategy, experimenting with proven virtual environment platforms such as Entropia Universe, Second Life and There.com. Watch for emerging integration developments between e-learning platforms and virtual world environments, such as Second Life with Moodle and Angel Learning.

**Business Impact:** There will be effects on analysis, student performance, productivity and agility for knowledge-transfer processes, teaching/learning and research support, decision support, training, R&D, intellectual capital management, and innovation.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

**Sample Vendors:** Croquet Consortium; Forterra Systems; Linden Labs; There.com; Virtual Heroes

**Recommended Reading:** "What Virtual Worlds Have to Do With Your Business Life"

"Top Four Business Areas to Pilot Virtual Environments"

"Toolkit Presentation: What Counts for and Against the Corporate Adoption of NVEs"

**At the Peak**

**Global Library Digitalization Projects**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Global library digitalization projects are massive organizational initiatives that make research library collections globally accessible.

**Position and Adoption Speed Justification:** The massive size of such a project means that implementation could take a decade, and publishers are concerned that copyright interpretation of "fair use" could delay the progress.

**User Advice:** These projects will deliver great academic value, but the projects are so large that technological changes must be expected during the length of project life cycles. Commitments to specific technologies could prove shortsighted.

**Business Impact:** Affected areas include instruction, research, library collection development and e-learning.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

**Sample Vendors:** Google; Yahoo

**ITIL — Higher Education**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl
**Definition:** The Information Technology Infrastructure Library (ITIL) is a standard process framework for integrated IT service support and delivery processes used to manage an IT operations environment.

**Position and Adoption Speed Justification:** Despite emerging interest in ITIL, few institutions have gone beyond initial discussions toward building an implementation plan. There are some regional differences in interest, based on geopolitical pressures. For example, interest seems to be higher in Australia and the Nordic region.

**User Advice:** Institutions that are unfamiliar with ITIL should begin by examining the standard process framework used by ITIL. Before the institution selects process improvement frameworks and models, it must assess: 1) what the organizational scope of the improvement initiative is; and 2) whether the ultimate goal is operational process improvement or business transformation. If the goal is business transformation, then a more strategic approach to change will be required.

**Business Impact:** Large and/or complex institutions will likely find greater return on investment.

**Benefit Rating:** Moderate

**Market Penetration:** Less than 1% of target audience

**Maturity:** Adolescent

**ID and Access Management — Higher Education**

**Definition:** ID and access management (IAM) technologies enable institutions to manage and control user accounts and privileges.

**Position and Adoption Speed Justification:** IAM has the potential to secure access to network systems and data, which has become a top priority in higher education.

**User Advice:** IAM should be considered part of the institutional security strategy and included in the security plan. It is imperative that institutions obtain an IAM solution as quickly as possible. Due to the nature of the global academic community, sharing resources within that community will be easier for institutions using a federated approach. For institutions that have significant student/faculty mobility, a federated approach can provide a collaborative advantage. User-centric IAM is emerging as a future option and as an identity layer off the Internet with potentially high effect. It should be closely watched.

**Business Impact:** Affected areas include network management, e-learning, research, administration and databases.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Cisco Systems; e-Security; IBM; Microsoft; netForensics; NetIQ; Network Intelligence; Novell; OpenID; Oracle; Sun; SXIP Identity

**Personally Owned Devices With Campus Network Access**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl
**Definition:** Personally owned mobile devices with campus network access are capable of voice and data calls. They can run data applications without a network connection, including digital audio/video download.

**Position and Adoption Speed Justification:** Students are the main drivers to access networks with small, personal digital mobile devices.

**User Advice:** The institution must consider community management to include managing beyond the institution and the institutionally owned devices and applications. The important role of community management includes anticipating the future of the community and the technological changes to support future developments.

**Business Impact:** Areas of impact include network management, e-learning, student administration and messaging.

**Benefit Rating:** Transformational

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Apple; Creative Technology; Fujitsu; iRiver; Motorola; NEC; Nokia; Panasonic; Research In Motion; Rio; Samsung

**Podcasting Learning Content**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Podcasting learning content involves the prerecorded, radiolike format delivery of content via Really Simple Syndication across a varied set of content themes.

**Position and Adoption Speed Justification:** Podcasts will become increasingly important as students’ requests for course content continue to fragment.

**User Advice:** Podcasting should be considered a relatively easy way to deliver lectures for distance learning, as well as for follow-up study access.

**Business Impact:** Podcasting is an extremely efficient method for delivering audio and spoken-word content to students, and it can be an important institutional communications tool.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Emerging

**Sample Vendors:** Apple Computer; NotePage; Softease

**Sliding Into the Trough**

**E-Learning Repositories**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** E-learning repositories are global digital repositories for extra-institutional sharing of e-learning content.

**Position and Adoption Speed Justification:** Progress on standards will cause the pace of adoption to pick up, but faculty culture is still not attuned to reusable, object-level content.
**User Advice:** Consideration of how the e-portfolio will be used for verification of student assessment is still a major concern. Product selection must be made with an awareness of credentialing limitations.

**Business Impact:** Affected areas include instruction, learning space and library management.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Emerging

**Sample Vendors:** Blackboard; DSpace; MERLOT; Nuventive

**Peer-to-Peer Entertainment for Students**

*Analysis By:* Marti Harris; Jan-Martin Lowendahl

*Definition:* Students are using peer-to-peer technologies for entertainment.

*Position and Adoption Speed Justification:* Institutions are at risk when copyrighted materials are illegally shared. Many institutions are rethinking the proposition that they should provide institutional access to entertainment resources.

*User Advice:* Institutions should carefully consider if there is academic value or a purpose for opening up campus licenses to share music, video and other digital entertainment resources.

*Business Impact:* Affected areas include student services.

*Benefit Rating:* Low

*Market Penetration:* 5% to 20% of target audience

*Maturity:* Emerging

*Sample Vendors:* Apple; LionShare; Napster; RealNetworks

**Learning Content Management**

*Analysis By:* Marti Harris; Jan-Martin Lowendahl

*Definition:* Learning content management involves the storage of institutional e-learning content so that it can be indexed, searched, managed and shared.

*Position and Adoption Speed Justification:* High content-creation costs need to be brought under control. Metadata tagging and standards adoption are key barriers.

*User Advice:* Consider learning content management to increase performance of other course management system applications. Look for providers with a track record of higher-education integration with course management systems.

*Business Impact:* Affected areas include instruction, content management and library management.

*Benefit Rating:* High

*Market Penetration:* 5% to 20% of target audience

*Maturity:* Emerging
**Sample Vendors:** Blackboard; HarvestRoad

**Grid Computing**

**Analysis By:** Carl Claunch; George Weiss; Paul McGuckin

**Definition:** Using computers owned by more than one organization to collectively accomplish large tasks, such as derivative risk analysis, candidate drug screening or complex simulations.

**Position and Adoption Speed Justification:** Grid computing is an extension of cluster computing, and its use is well under way in financial services and pharmaceutical firms that have made substantial progress in applications, algorithms and new research processes. Electronics, mechanical engineering and insurance companies are among those that are increasingly using grid computing, but they still lag behind the initial adopters. University and national laboratory use of grid computing is more common than in the private sector.

**User Advice:** Potentially, grid computing could be used in two ways: It can help lower costs or increase the efficiency of a fixed amount of work. More importantly, however, it can offer business advantage by accomplishing what was infeasible when using more-traditional approaches. Often, this means increasing the accuracy of a model, producing results in a short time, looking for earlier interactions, reducing the time it takes to search libraries of compounds that are drug candidates or sometimes enabling a new business model.

When business advantage can be gained from scaling up processing, add grid computing to the list of potential implementation approaches. When the objectives are mainly to reduce costs or improve efficiency, then consider other more-mature alternatives with fewer issues to overcome.

**Business Impact:** Investment analysis, drug discovery, design simulation and verification, actuarial modeling, subsystem clash detection and extreme business intelligence tasks are areas where grid computing may enable business advantage.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Appistry; DataSynapse; Digipede; HP; IBM; Platform Computing; Sun; United Devices; Univa

**Open-Source Higher Education Portals**

**Analysis By:** David Gootzit; Marti Harris

**Definition:** Open-source horizontal portal frameworks have experienced the greatest adoption among higher education organizations.

**Position and Adoption Speed Justification:** More than 250 higher-education enterprises have adopted Java Architectures Special Interest Group uPortal or a solution based on uPortal. Gartner has seen increasing interest in commercial horizontal portal options from higher education organizations in the past 12 months.

**User Advice:** Higher education enterprises implementing a portal should closely consider uPortal, but carefully evaluate their long-term requirements against what is available from this open-source portal framework or one of the solutions built on top of it.
**Business Impact:** Relying on an open-source horizontal portal framework reduces the initial acquisition costs traditionally associated with a portal product, but the trade-off may be less-than-leading-edge functionality in some areas and increased reliance on internal staff and peer organizations for technical support.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** uPortal

**E-Portfolios**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** E-portfolios are Web-accessible repositories for student work, both graded and ungraded, which may be shared with authorized parties.

**Position and Adoption Speed Justification:** E-portfolios are a popular idea with students and faculty, but standards and security issues need to be resolved.

**User Advice:** E-portfolios have caught on, but many institutions are testing the concept with limited-access projects. As the software and the functional needs are refined and become more mature, institutions should look closer at e-portfolio software as an enterprise application. Security and reliability, as well as the validity of student-entered data, are still concerns.

**Business Impact:** Affected areas include instruction, collaboration and student services.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** e-Portaro; McGraw-Hill; Nuventive; Open Source Portfolio Initiative (OSPI)

**Wikis**

**Analysis By:** Nikos Drakos; Whit Andrews

**Definition:** A wiki is a simple collaborative system for creating and maintaining hyperlinked collections of Web pages. A wiki usually enables users to add or change pages "in context" without having to worry about where and how the content is physically stored. Wikis also offer built-in search, visual comparisons between versions and full audit trails.

**Position and Adoption Speed Justification:** Wikis are now available from commercial vendors, in addition to many open-source products, and are becoming available from established enterprise vendors. Wikipedia is the best-known publicly available wiki, and it has raised awareness to the point where users often demand wiki-style collaboration support from their IT departments.

**User Advice:** Understand that there are advantages to using a wiki over a conventional repository-style collaboration system, and be receptive to users who will argue that a wiki will improve team collaboration. Now is the time to move from pilots to more systematic deployments as appropriate and to evaluate the suitability of wikis in different collaboration scenarios if not done already.
**Business Impact:** Wiki-style information creation and sharing has significant advantages over traditional collaboration environments in terms of improved transparency, usability and information reuse. Like the public Web, it encourages the creation of a "web of interrelated information," where it is just as easy to create internal cross-references as it is to reference external resources.

Within businesses, wikis are used for maintaining technical documentation, client communication, issue tracking, e-learning and training, general information sharing and knowledge management. They are also used to support communities of practice or communities of interest, product development and idea exploration.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Atlassian Software Systems; CustomerVision; GroveSite; IBM; MediaWiki; Microsoft; Mindtouch; Socialtext; Twiki

**Recommended Reading:** "Wikis Can Improve Collaborative Work and Knowledge Sharing"
"What We Learned From the Wikipedia Experience"
"Networked Collective Intelligence Represents a New Paradigm of Work"
"Apply the Knowledge Gained From Building a "Wiki"

**CRM for Enrollment Management**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** CRM for enrollment management involves systems that are verticalized for higher-education student and prospect recruiting, as well as for enrollment management functionality.

**Position and Adoption Speed Justification:** A key obstacle is showing the value of overcoming politically inspired constituent data stovepiping.

**User Advice:** CRM for enrollment management should be considered as a business-unit strategy and as part of an institutional CRM strategy.

**Business Impact:** Affected areas include recruiting and enrollment community relations.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Intelliworks; Jenzabar; Oracle; RightNow Technologies; Talisma

**Digital Rights Management**

**Analysis By:** Lou Latham

**Definition:** The term "digital rights management" (DRM) covers a variety of ways of preventing unauthorized use of electronic objects. DRM can restrict the viewing, copying, editing, altering, printing and e-mailing of business documents, messages and other intellectual property, in order to protect privacy, confidentiality and financial value.
Position and Adoption Speed Justification: Since mid-2003, large software vendors such as Adobe and Microsoft have entered the DRM arena. Microsoft's Rights Management Services technology appeared in Windows Server 2003 and Windows XP Professional, and now plays a larger role in Windows Vista, providing hardware and lower-level operating system support for DRM. In addition, financial services providers, pharmaceutical firms and healthcare suppliers — "early adopters" sensitive to the risk of privacy infringement and loss of intellectual property — have initiated pilots and deployments of DRM technology.

Nonetheless, DRM remains immature, with little functional standardization and low levels of adoption by most enterprises. As a result, we now expect it to take more than five years to reach maturity.

User Advice: Consider DRM primarily as a general-purpose protection mechanism to control access, printing and e-mailing of content within your enterprise. External distribution of information requiring protection demands the strongest forms of embedded protection technology, particularly if the content is of high value.

Business Impact: DRM offers businesses a degree of protection against loss of intellectual property and against inappropriate or unintended disclosure of proprietary or confidential information.

Benefit Rating: Moderate

Market Penetration: Less than 1% of target audience

Maturity: Emerging

Sample Vendors: Adobe; EMC; Liquid Machines; Microsoft; Oracle

Open-Source E-Learning Applications

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: Open-source e-learning applications are higher-education e-learning systems developed via open-source or community source models.

Position and Adoption Speed Justification: Open-source solution projects have the potential to introduce nonproprietary e-learning architectures, but they need to address the integration and support issues.

User Advice: Open-source solutions for e-learning should continue to be monitored as a possible fit for institutions capable of supporting in-house application development.

Business Impact: Areas of impact include instruction and student administration.

Benefit Rating: High

Market Penetration: 1% to 5% of target audience

Maturity: Emerging

Sample Vendors: Claroline; ILIAS; Moodle; Sakai

Climbing the Slope

RFID Library Materials Management

Analysis By: Marti Harris; Jan-Martin Lowendahl
**Definition:** Radio frequency identification (RFID) library materials management is the use of RFID tags on individual library books, media and objects for library management and self-service check-out/check-in.

**Position and Adoption Speed Justification:** This application has become a credible and established technology for library management. Libraries and library associations are developing best-practice RFID guidelines for the protection of library users' privacy. However, privacy advocates continue leading efforts to thwart further adoption by libraries.

**User Advice:** A library's decision to implement RFID tags for an entire library collection should be based on reasons in addition to the security tagging benefits.

**Business Impact:** RFID library materials management applications improve patron satisfaction and availability of materials.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** 3M; Checkpoint Systems; Integrated Technology Group Apex RFID; Tech Logic; Texas Instruments

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**Tablet PC**

**Analysis By:** Leslie Fiering

**Definition:** Tablet PCs meet all the criteria for a notebook PC and are equipped with a pen and an on-screen digitizer. These systems may have removable keyboards or rotating screens that can be positioned on the outside when lid is closed. Tablet PCs run Windows XP Pro Tablet Edition and Windows Vista. There are two form factors: slates, which don't have a keyboard, and convertibles, which have attached keyboards and swivel screens that lie flat on the keyboard when in the tablet mode.

**Position and Adoption Speed Justification:** Tablet PCs have overcome all the barriers to adoption, except for the $250 price premium that results from the single-supplier monopoly on screen digitizers. We anticipate that continued unit shipment growth and alternative pen input technologies will attract new suppliers and reduce the price premium during the next two years. As more PC OEMs enter the market, the hardware has shown slow and steady improvement.

**User Advice:** The tablet PC is solid and mature for vertical applications where it solves a specific problem. Sales — which we consider a "semi vertical" — is starting to show a strong return on investment with tablet PCs, because it's possible to collect customer information while maintaining eye contact and customer intimacy. The ability to do nontext entries (such as diagrams and formulae) is making tablet PCs attractive for higher-education students; however, we still don't recommend tablet PCs for broad mainstream deployment.

**Business Impact:** Tablet PCs are useful in vertical applications for clipboard replacement. There is growing payback for note taking in social settings or where nontext entry is required. Use of the pen will eventually become natural and become simply an additional input mode for horizontal use.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience
**Maturity:** Adolescent

**Sample Vendors:** Acer; Fujitsu; Gateway; HP; Lenovo; Toshiba

**Recommended Reading:** "Dataquest Insight: Tablet PCs Are Slowly Gaining Momentum"

**Web Services for Administrative Applications**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Web services for administrative applications facilitate the internal integration and extra-institutional collaborative commerce needed to carry out higher-education-specific administrative functions.

**Position and Adoption Speed Justification:** Web services have become deeply embedded in mainstream administrative application suites.

**User Advice:** Although higher-education administration application providers have embedded Web services in their latest releases, institutions must upgrade them to provide Web services to clients.

**Business Impact:** Affected areas include student administration and procurement.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Campus Management; Datatel; Jenzabar; Oracle; SAP; SunGard SCT

**IP Video for E-Learning**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** IP video for e-learning involves H.323 and similar technologies that enable point-to-point video for online academic instruction.

**Position and Adoption Speed Justification:** Despite extensive experimentation, complexity and latency issues have kept video over IP from mainstream e-learning.

**User Advice:** Institutions must look at quality-of-service issues, as well as bandwidth.

**Business Impact:** Affected areas include instruction, collaboration and research.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Avaya; Centra; Horizon; Macromedia; Microsoft; Polycom; Sony; Tandberg

**Recommended Reading:** "Desktop Videoconferencing: Vendors and Products"

**Next-Generation Library Management Systems**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl
**Definition:** Next-generation library management systems feature advanced Internet capabilities, including link servers, federated search portals and e-learning content management.

**Position and Adoption Speed Justification:** Link servers and federated portals are starting to be used successfully, but e-learning content management is still at an early stage of development.

**User Advice:** Plans to replace academic library systems must include a consideration of the replacement product's integration capabilities with mission-critical applications, including the student system, campus portal, financial applications and course management systems.

**Business Impact:** Affected areas include library management, instruction, research and collaboration.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Ex Libris Group; Innovative Interfaces; SirsiDynix; VTLS

**Internet2/Next-Generation Internet**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Internet2 (I2) or next-generation Internet refers to consortium and government efforts to define a next-generation high-speed Internet with strong educational tools.

**Position and Adoption Speed Justification:** I2 continues to be used by larger institutions; however, access through regional networks has opened up I2 access to some smaller institutions.

**User Advice:** Institutions have many initiatives to follow, including the Internet2 Middleware Initiative; the End-to-End Performance Initiative; the K-20 Initiative; the Internet2 Commons; the Internet2 Arts & Humanities; Digital Video Interface; National Research and Education Fiber Company (FiberCo); Health Sciences; and the Hybrid Optical and Packet Infrastructure. Institutions should follow these initiatives and the work done by the I2 middleware and security activities.

**Business Impact:** Affected areas include network management, e-learning, research and administration.

**Benefit Rating:** Transformational

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Internet2; Next Generation Internet

**Business Intelligence Platforms**

**Analysis By:** Kurt Schlegel

**Definition:** Business intelligence (BI) platforms enable enterprises to build BI applications by providing capabilities in three categories: analysis, such as online analytical processing (OLAP); information delivery, such as reports and dashboards; and integration, such as BI metadata.
**Position and Adoption Speed Justification:** BI platforms are widely used by most large enterprises to build numerous analytical applications and service most information delivery requests. The BI platform market is well-defined with many established vendors. Most BI platform capabilities such as reports, ad hoc queries, and OLAP are quite mature, without much differentiation across the different vendors’ offerings. However, the market is still dynamic because many emerging technologies, such as in-memory analytics, interactive visualization, service-oriented architecture (SOA), software as a service (SaaS) and search, are and will have an effect on how this technology is delivered and which vendors will dominate the market.

**User Advice:** Enterprises should standardize their BI platform capabilities as much as possible and look to balance BI platform capabilities to deliver analysis, integration and information delivery. To date, most BI platform deployments focus primarily on the information delivery capabilities. Analysis and integration capabilities need to be bolstered.

**Business Impact:** BI platforms enable users, such as managers and analysts, to learn about and understand their business. Increasingly, BI platforms will be used by a wider audience inside and outside the enterprise. In addition, BI platforms will have a dramatic effect on the business by changing the focus from primarily reporting to include process optimization and strategic alignment.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Actuate; Business Objects; Cognos; Hyperion; Information Builders; Microsoft; MicroStrategy; Oracle; SAP; SAS

**Recommended Reading:** "Magic Quadrant for Business Intelligence Platforms, 1Q07"

**Higher Education Enterprise Portals**

**Analysis By:** Marti Harris; Jan-Martin Lowendahl

**Definition:** Higher education enterprise portals are integrated with administrative, academic and other applications of interest to students, faculty and staff.

**Position and Adoption Speed Justification:** Although tight budgets have slowed adoption, the portal is emerging as the key institutional interface for online resources.

**User Advice:** Portals are becoming a key offering of higher education administration systems providers. Institutions should consider how important the provider’s portal is to their overall product integration.

**Business Impact:** Areas of impact include student/faculty/staff services, community interaction and instruction.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Campus Management; Jenzabar; Oracle; SunGard SCT; Timecruiser Computing
Entering the Plateau

802.11x on Campus

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: 802.11x refers to campus wireless LANs enabled by the 802.11 family of standards.

Position and Adoption Speed Justification: The technology is maturing quickly, and classroom use has moved forward. Although laptop prices are an issue for some students, owning a laptop is now the norm.

User Advice: The hype is on. The vendors, stretched by the thin margins of 802.11a/g technologies, are looking to push the next technology milestone, 802.11n. Many mixed messages will ensue between approval and shipment. We suggest waiting until maturity in 2007 for higher-education institutions to begin investing in 802.11n.

Business Impact: Affected areas include instruction, collaboration, student services and administrative services.

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Adolescent

Sample Vendors: Bluesocket; Cisco Systems; Nortel

Recommended Reading: "802.11n: An Update on Next-Generation Wi-Fi"
"Claims for 802.11n Compliance in Wi-Fi Products Are Premature"

Course Management Systems

Analysis By: Marti Harris; Jan-Martin Lowendahl

Definition: Course management systems are e-learning systems that enable institutions to put course material online, facilitate learner interaction and provide faculty with course administration tools.

Position and Adoption Speed Justification: Monolithic course management systems, now the e-learning workhorses, will increasingly give way to unbundled platforms and tools.

User Advice: Although course management systems have become mission-critical, they are still maturing as a market. Careful annual review of the market products, as well as their match with institutional strategies, is recommended.

Business Impact: Affected areas include instruction and student administration.

Benefit Rating: High

Market Penetration: More than 50% of target audience

Maturity: Early mainstream

Sample Vendors: Angel Learning; Blackboard; Desire2Learn; eCollege
## Appendices

### Hype Cycle Phases, Benefit Ratings and Maturity Levels

#### Table 1. Hype Cycle Phases

<table>
<thead>
<tr>
<th>Phase</th>
<th>Definition</th>
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<tbody>
<tr>
<td><strong>Technology Trigger</strong></td>
<td>A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.</td>
</tr>
<tr>
<td><strong>Peak of Inflated Expectations</strong></td>
<td>During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.</td>
</tr>
<tr>
<td><strong>Trough of Disillusionment</strong></td>
<td>Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.</td>
</tr>
<tr>
<td><strong>Slope of Enlightenment</strong></td>
<td>Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial, off-the-shelf methodologies and tools ease the development process.</td>
</tr>
<tr>
<td><strong>Plateau of Productivity</strong></td>
<td>The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters the Plateau.</td>
</tr>
<tr>
<td><strong>Years to Mainstream Adoption</strong></td>
<td>The time required for the technology to reach the Plateau of Productivity.</td>
</tr>
</tbody>
</table>

Source: Gartner (June 2007)

#### Table 2. Benefit Ratings

<table>
<thead>
<tr>
<th>Benefit Rating</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational</td>
<td>Enables new ways of doing business across industries that will result in major shifts in industry dynamics</td>
</tr>
<tr>
<td>High</td>
<td>Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise</td>
</tr>
<tr>
<td>Moderate</td>
<td>Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise</td>
</tr>
<tr>
<td>Benefit Rating</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td>Low</td>
<td>Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings</td>
</tr>
</tbody>
</table>

Source: Gartner (June 2007)

Table 3. Maturity Levels

<table>
<thead>
<tr>
<th>Maturity Level</th>
<th>Status</th>
<th>Products/Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embryonic</strong></td>
<td>In labs</td>
<td>None</td>
</tr>
<tr>
<td><strong>Emerging</strong></td>
<td>Commercialization by vendors Pilots and deployments by industry leaders</td>
<td>First generation High price Much customization</td>
</tr>
<tr>
<td><strong>Adolescent</strong></td>
<td>Maturing technology capabilities and process understanding Uptake beyond early adopters</td>
<td>Second generation Less customization</td>
</tr>
<tr>
<td><strong>Early mainstream</strong></td>
<td>Proven technology Vendors, technology and adoption rapidly evolving</td>
<td>Third generation More out of box Methodologies</td>
</tr>
<tr>
<td><strong>Mature mainstream</strong></td>
<td>Robust technology Not much evolution in vendors or technology</td>
<td>Several dominant vendors</td>
</tr>
<tr>
<td><strong>Legacy</strong></td>
<td>Not appropriate for new developments Cost of migration constrains replacement</td>
<td>Maintenance revenue focus</td>
</tr>
<tr>
<td><strong>Obsolete</strong></td>
<td>Rarely used</td>
<td>Used/resale market only</td>
</tr>
</tbody>
</table>

Source: Gartner (June 2007)

RECOMMENDED READING

"Understanding Gartner's Hype Cycles, 2007"

This research is part of a set of related research pieces. See "Gartner's Hype Cycle Special Report for 2007" for an overview.