I. BRIEF DESCRIPTION OF THE BIG IDEA

INTRODUCTION

We live in an era of ubiquitous and pervasive access to computing power, connectivity, and information. From President Obama’s wildly successful Internet+mobile campaign strategy, to the typical UO student pulling out her phone to text a friend the minute class is over, it’s clear that connectivity has become essential to our lives. To connect, we must have a robust network that can handle ever-increasing loads, and demands we can’t foresee. Without this network, we literally can’t talk to each other.

But a strong and well-planned network is only one part of the infrastructure we need to stay connected. In the context of our largely residential AAU research university, we must always consider the physical campus as an indispensable partner to our digital network. These two seemingly separate environments depend upon each other, and they have a great deal in common. Both the physical campus and the digital network are interactive environments for user experience and community-building. Both serve as platforms for delivery of and access to services, products, and information. Both must support current needs without losing adaptive capacity for the future. Both require thoughtful design, development, and a commitment to ongoing maintenance.

This Big Idea proposes a deliberate and inclusive design process that fosters integration of the physical campus and networked environments. Taken together, these two environments form our “ubiquitous learning environment”--the infrastructure that allows teaching and learning, research, and our other work to take place at any time, in practically any location. The concept warrants consideration as a Big Idea because the issues it raises are complex, the stakeholders are many, and the implications are significant for every aspect of the university’s mission.

In more concrete terms, and at the level of individual instructors and students, what is at stake in this Big Idea?

Case Study #1
Professor Michal Young (Computer & Information Science) describes our evolving physical and digital campus environment as follows:

"The conventional classroom experience was designed for a time in which classrooms were the only chance for students and teachers to converse. With only
limited chance for group interaction, it was necessarily an asymmetric interaction, mostly passive on the part of the students.

In contrast to this framework of limited interaction a few hours each week, students today carry on extended conversations with a network of friends physically present and absent, over a variety of media and in person, almost continuously. For students, the conventional classroom experience is an odd sort of punctuation to an otherwise continuous discussion. Distance education programs, ironically, use modern technology in ways that replicate the worst features of the conventional classroom.

In a residential, comprehensive and research-oriented university like Oregon, we can turn this model on its head. Face-to-face interaction in the classroom is the foundation of a larger conversation that continues outside the classroom. When the extended conversation is continuous and rich, the last thing we should do with precious face-to-face time is waste it on one-way transmission. It should be a time of active engagement in which students learn as much from each other as from the instructor.

The technology to support such extended conversations will continue to evolve rapidly. We should not expect to make one large investment in technology and then be done with it. We should rather plan for multiple waves of innovation, experimentation, and a mix of failures and success. Our students will not begrudge us experimentation. They are already experimenting; we should join them.

The key idea ... is how ubiquitous learning environments fit with the strength of a residential, comprehensive liberal arts university. We think too often of communication and computation as threats, making it possible for a University of Phoenix or recorded lectures from MIT to replace what we do. It's just the opposite -- ubiquitous communication and computation allow us to really do what we do, because the virtual conversation is a continuation of the face-to-face conversation. That requires transformation of the in-class as well as the out-of-class environment (and technology for both), and it challenges us to rethink the way we approach education, but it's an opportunity to provide a much richer educational experience (and, not incidentally, to reduce the gap between classroom education and research).}

Case Study #2
Professor Greg Bothun (Physics) describes his experience teaching students in a wireless laptop classroom environment:

Since fall 2001, the UO has had at least one wireless laptop classroom in which the laptops are provided to the students. The typical class size for this environment is 40-60 students and many different kinds of courses (ASTR, ENVS, GEOG, HIST, HUM, MUS) have been taught in this environment. A key component of this environment is the development and implementation of the Laptop Classroom reporting system. With this software, text based, spreadsheet based, or image based
applications are pushed out to teach student laptop and students work together in
groups to manipulate the application and report their results back, in real time, to the
instructor. This creates a brand new dynamic in the classroom and it strongly
supports peer learning and it definitely moves the class away from being lecture
based to a much more participatory learning model that is highly interactive in
nature. By any pedagogical measure this approach has been successful but more
importantly, the engagement of the students is very high because they know, if they
come to class, they will be expected to “publish” their laptop work to the rest of the
class. This has also had a strong influence on student behavior in the positive sense
of becoming more serious and committed to the course material. In a very real sense,
these wireless laptop facilities and the associated courses taught in them represent an
excellent combination of learning that occurs in physical space and network space.

These case studies reveal the potential impact of technology on fundamental dynamics of
teaching and learning. The learning that occurs in physical space (i.e., the formal classroom)
and the learning that occurs in network space are both valid, but the differences must be
recognized and accommodated by design. Learning in network space involves collaboration,
communication, and simulation — attributes that can be leveraged to produce the student
engagement that is central to successful learning.

The UO’s long-established participatory process for capital projects can serve as an excellent
starting point for the design process that we propose. As a planning framework, the
ubiquitous learning environment is revenue-neutral, but it should inform the infrastructure
components of other Big Ideas and priorities of the Academic Plan. The costs of building a
sound ubiquitous learning environment into each campus proposal will vary widely. In
some cases the cost will be minimal — for example, providing flexible furniture rather than
tab-arm chairs in a classroom remodel. In other cases the resource requirements will be
more significant. Although much of our technology is already ubiquitous, the UO will need
to make greater investments in physical learning spaces and in flexible access to networks,
discovery systems and information content. Currently, much of our connectivity is mostly
text based but in the very near future it will be high resolution image based, with flexible
Organic Light Emitting Diode (OLED) displays as well as virtual, project keyboards.
Improved network bandwidth and throughput will be necessary to accomplish video
broadcast to any location. Curricular re-design and retooling of research workflows to
exploit the potential of new tools and modes of communication and access could require
significant investments in course buyouts for faculty, instructional design, information
resources, and media development. But the advantage of the inclusive and collaborative
planning process we propose is that it will allow all costs to be identified in the early stages
of a project, and incorporated into budget proposals and revenue models.

RELATIONSHIP TO ACADEMIC PLAN

The concept of a ubiquitous learning environment relates directly to several major
components of the Academic Plan.
Values and Mission: Academics on a Human Scale, Cooperative Leadership and Community Engagement, Resourceful Creativity

Liberal Education for the Twenty-first Century: The Rapidly Evolving World of Work; Globalization, Technology (see comments from Dale Smith, Science Council, Deb Carver, et al.).

A Comprehensive Research University: Infrastructure

Goals:

AAU Excellence on a Human Scale: Access, Capacity

Cultivation of Intellectual Communities and Virtues: Visibility of Scholarship, Connected Research, Internationalization

A Diverse Community: Undergraduate Retention, High-Achieving Students, Analyzing Student Experiences, Student Involvement, Residential University, Statewide Initiatives

RELATIONSHIP TO OTHER BIG IDEAS

The ubiquitous learning environment provides enriching elements and in some cases, enabling conditions for other Phase 2 Big Idea initiatives, including but not limited to Creative Inquiry: UO Arts and Design, Making Connections in a Web 2.0 World, Teaching the Scholarly Method, and Center for Information Science & Technology Research and Education (forthcoming). The concept also relates to many ideas and comments from Phase 1, including Scientific Frontiers and The Engaged Academy. Note especially Allen Malony’s proposal, Transforming the Academy for a Information-Rich, Knowledge-Oriented, and Technology-Aware Society, Michal Young’s comment on the Engaged Academy, and Mrs. Baker’s comment about distance education.

SAMPLE FRAMING QUESTIONS FOR CAMPUS DISCUSSION

- How do we educate UO students to be thoughtful citizens of an always-connected world?
- How do we support faculty/instructors/GTFs in design of instruction that uses technology to produce richer, more collaborative learning experiences that both mirror and enrich students’ lives?
- How do we support students who expect all campus services to be integrated and fully usable via a wide range of devices (laptop, desktop, mobile), on-campus or off-campus?

...in the past decade, 3 billion mobile devices have been added to the telecom environment. This is having a major impact on the internet. In the developing world, many people will have their first interaction with the internet via mobile, and not through a laptop.
• How do we support faculty whose research requires access to campus communication systems, file servers, and library resources when in the field, anywhere in the world?
• What university activities are best co-located in physical space, and what activities are enriched by mobility and flexibility?
• What university activities are best conducted in synchronous mode, and what activities are enriched or enabled by asynchronous participation?
• What are the technological and legal barriers to providing services in more flexible environments?
• Do we lead, follow, or get out of the way?

II. ADHERENCE TO BIG IDEA EVALUATION CRITERIA

1. Aligns with UO’s mission and goals as embodied in the academic plan and
2. Addresses the core missions of teaching and learning, research and engagement
   See "Relationship to Academic Plan" and "Relationship to Other Big Ideas," above.

3. Builds on existing UO academic strengths, including disciplinary or interdisciplinary programs and
4. Demonstrates a “critical mass” of faculty interest and participation
   See 5, "Fosters new cross-institutional collaboration and partnerships" and 6."Strengthens some existing disciplines," below.

5. Fosters new cross-institutional collaboration and partnerships
   The ubiquitous learning environment encompasses physical and network infrastructure, user experiences, and content -- work that is inherently cross-disciplinary and collaborative throughout its life cycle. Adopting this framework will necessitate ongoing and effective partnerships across schools, colleges, academic support units, and administration. New structures could emerge to facilitate these efforts. ix

6. Strengthens some existing disciplines
   The design, development, and observation of this environment will provide direct research and service opportunities for faculty and students in many key UO academic and professional disciplines. These include but are not limited to: Computer and Information Science, Architecture, Art, Psychology, Education, and Music.

7. Links to fundamental societal opportunities, challenges or needs
   Experience in a thoughtfully designed and managed campus learning environment will prepare UO students to be effective citizens of an always-connected world. The convergence of networked communication and media distribution systems that this environment requires
and implies will also provide tremendous opportunity to extend campus outreach and service to the state, the nation, and the world.

8. Proposes a viable funding model from a combination of revenues such as private fundraising, General Fund dollars, and/or competitively awarded grants or contracts. As a planning framework, the ubiquitous learning environment is revenue-neutral. The model can be used to inform and shape ongoing General Fund and state-supported activities such as deferred maintenance and system replacements. For example, routine classroom remodel projects would become opportunities to support active learning methods such as those described by Michal Young in I., above. Specific initiatives for infrastructure, faculty development, and curriculum development support should be attractive to private donors, federal, state, foundation, &/or industry partners as standalone projects or components of other Big Ideas and priorities of the Academic Plan.

9. Considers investments in infrastructure needed to pursue the big idea. The ubiquitous learning environment is a comprehensive framework for academic infrastructure. Because of the profound influence of a ubiquitous environment on every aspect of campus life, it warrants consideration as a Big Idea in its own right. It can also serve as a guiding document for specific infrastructure investments required by other Big Ideas and priorities of the Academic Plan.

10. Incorporates assessment and communication strategies to articulate benefits and impact. Feedback about the overall teaching and learning environment (physical and virtual) can be gathered through a combination of general surveys with qualitative follow-up. Specific projects and services will require targeted assessment.

11. Is sustainable beyond the three-to-five year “focus phase.” Sustainability and scalability must be mandatory requirements of any project undertaken beneath the umbrella of this Big Idea.

III. INITIAL LIST OF SUPPORTING TEAM AND POINT OF CONTACT

The initial team for policy development and proposal intake is the Committee on Academic Infrastructure (CAI), chaired by Ken Doxsee, Associate Vice Provost for Academic Affairs. CAI members include teaching faculty, along with representatives of the UO Capital Construction Office, Information Services, University Libraries, and University Planning. Additional stakeholders include Teaching Effectiveness Program, Undergraduate Studies, Student Life, University Housing, and many more. Research partnerships could begin with faculty and students from Computer and Information Sciences and Architecture, with expansion to other disciplines and interdisciplinary teams as appropriate. The UO Libraries, Information Services, other academic support units, University Planning, and/or the UO Capital Construction Office will provide management, execution, and ongoing support of approved projects and services.
IV. INDICATION OF STARTUP RESOURCES POTENTIALLY AVAILABLE

As a Big Idea, the ubiquitous learning environment serves as a conceptual framework for planning. As stated above, this function is revenue neutral. The resources required for specific projects will vary widely. One great benefit of adopting this Big Idea is that it will permit all costs to be identified in the early stages of a project, and incorporated into budget proposals and revenue models.

Thank you for the opportunity to share this proposal with the UO community. We look forward to further discussion.

Contributors and Co-Signers:

- Zack Barnett, Web Communications
- Doug Blandy, Architecture and Allied Arts
- Andrew Bonamici, UO Libraries
- Greg Bothun, Physics
- Ron Bramhall, Lundquist College of Business
- Sara Brownmiller, UO Libraries
- Amy Cacan, UO Capital Construction Office
- Deb Carver, UO Libraries
- Suzanne Clark, English
- Ken Doxsee, Academic Affairs
- Lori Hager, Arts and Administration
- Kirstin Hierholzer, UO Libraries
- JQ Johnson, UO Libraries
- Karen Munro, UO Libraries
- Andrzej Proskurowski, Computer and Information Science
- Dale Smith, Information Services
- Ed Teague, UO Libraries
- Mark Watson, UO Libraries
- Brian Westra, UO Libraries
- Stephanie Wood, Wired Humanities Project
- Michal Young, Computer and Information Science

Contact:

Committee on Academic Infrastructure, c/o Ken Doxsee, Associate Vice Provost for Academic Affairs, [doxsee@uoregon.edu](mailto:doxsee@uoregon.edu) (541) 346-2846
REFERENCES


iii. ...Ubiquitous computing... is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities. As opposed to the desktop paradigm, in which a single user consciously engages a single device for a specialized purpose, someone “using” ubiquitous computing engages many computational devices and systems simultaneously, in the course of ordinary activities, and may not necessarily even be aware that they are doing so. This paradigm is also described as pervasive computing, ambient intelligence, or more recently, everyware. [http://en.wikipedia.org/wiki/Ubiquitous_computing](http://en.wikipedia.org/wiki/Ubiquitous_computing)

iv. Michal Young to Andrew Bonamici, March 3, 2008

v. Greg Bothun to Andrew Bonamici, March 10, 2008

vi. University of Oregon Campus Plan (2005). [http://uplan.uoregon.edu/plandoc/CampusPlan/CampusPlan2005Aug01/CampusPlan8.1.05.pdf](http://uplan.uoregon.edu/plandoc/CampusPlan/CampusPlan2005Aug01/CampusPlan8.1.05.pdf)

vii. Vinton G. Cerf, Vice President and Chief Internet Evangelist Google Inc. Presentation at the University of Oregon, October 17, 2008. [http://media.uoregon.edu/channel/?p=178](http://media.uoregon.edu/channel/?p=178)


ix. Colorado State University’s ISTeC (Information Science & Technology Center) is a potential model for campus-wide participation and engagement in issues related to the ubiquitous learning environment. ISTeC is "... a university-wide organization for promoting, facilitating, and enhancing CSU’s research, education, and outreach activities pertaining to the design and innovative application of computer, communication, and information systems.” For more details, see [http://istec.colostate.edu](http://istec.colostate.edu)
FURTHER READING


3. EDUCAUSE Connect: Mobile Learning: [http://connect.educause.edu/term_view/Mobile+Learning](http://connect.educause.edu/term_view/Mobile+Learning)


5. Handheld Devices for Ubiquitous Learning project at Harvard University [http://gseacademic.harvard.edu/~hdul/](http://gseacademic.harvard.edu/~hdul/)

6. Brown, Malcolm. "Learning Spaces." Chap. 12, in *Educating the Net Generation*, edited by Diana G. Oblinger, 12.1-12.22. Washington, DC: EDUCAUSE, 2005. [http://www.educause.edu/LearningSpaces/6072](http://www.educause.edu/LearningSpaces/6072) (accessed November 5, 2008) “…As institutions create an anywhere, anytime IT infrastructure, opportunities arise to tear down silos and replace them with a more ubiquitous learning environment. Using laptops and other networked devices, students and faculty are increasingly able to carry their entire working environment with them. It is important to recognize that adoption of ubiquitous learning environments is not a replacement of traditional modes of instruction. Rather, they open up a new range of modalities that can address the diversity of learning abilities and preferences. They can also reinforce each other, such as the follow-up video clip sent to students’ phones, demonstrating a particular scientific principle covered in class. To capitalize on this, campus organizations must work collaboratively to create a more integrated work environment for the students and faculty, one that better serves the mobile Net Gen students as well as a faculty faced with the initial influx of these students into their ranks. This will involve not only libraries and IT organizations but also facilities planning and buildings and grounds departments....”

7. The 2008 International Ubiquitous Learning Conference (November 17 – 18, 2008 at the University of Illinois Illini Center in Chicago) identified four major themes plus seven areas of Concern ("moves"). For a detailed explanation of these Themes and Concerns, see [http://q08.cg-conference.com/](http://q08.cg-conference.com/). The conference’s journal is *Ubiquitous Learning*. [http://ijq.cgpublisher.com/](http://ijq.cgpublisher.com/)
8.  Computers and Writing 2009: Ubiquitous and Sustainable Computing @ School @ Work @ Play. [http://writingprogram.ucdavis.edu/cw2009/]

...Ubiquitous computing has produced a series of challenges for educational institutions. Sustainable computing means finding ways to meet current technological needs without sacrificing future innovation. As teachers and scholars of writing, how do we avoid the curse of technological obsolescence, even as computing rapidly evolves and expands into new corners of lived experience? How do our uses of technology move beyond short-term interventions, and contribute to sustained and sustainable learning across the life-span of our students? Finally, how do we employ these technologies ethically, given their potential impact on a local and global scale? Ultimately at stake is not just the sustainability of computing, but also how computing can help us lead more sustainable lives.

Not only has computing become ubiquitous, human interactions with technology have expanded from the keyboards, mice, and screens of desktop computers to cell phones, microphones for speech to text input, PDAs that recognize handwriting, digital cameras, digital audio recorders, GPS navigators, and other ever-emerging information and communication technologies (ICTs). Today’s computing is not quite the utopia imagined by Howard Rheingold or Mark Weiser, nor is it the dystopia predicted by Clifford Stoll or Philip K. Dick; it is a rather more interesting, nuanced, and complex world than we’d imagined. ..... 