

### **Public description of your project**

The University of Michigan plans to develop a process and pilot programs to distribute comprehensive, open, pre-clinical health professions curricula using materials from health professions schools at Michigan and partner institutions in Africa.

### ***Proposal Summary***

The inadequate density and distribution of health care providers is having a profoundly negative effect on health outcomes around the globe. In Africa in particular, too few physicians and supporting health care professionals are being trained to meet local needs.<sup>1</sup> A key barrier to educating more health care providers is the lack of instructors to teach both basic and clinical sciences. This is complicated by the duplication of faculty efforts at multiple sites for courses which can now be completed online. In this planning grant, we will:

1. Develop a low-cost and scalable process (dScribe) for converting existing educational materials into Open Educational Resources.
2. Convert a set of educational materials from the medical, dental, and public health schools at the University of Michigan as a proof of concept.
3. Develop a website with an integrated learning management system to facilitate delivery of educational materials based on specific diseases, educational outcomes, or entire curricular paths.
4. Establish the commitments of all University of Michigan health sciences schools to the vision of Open Educational Resources for all curricular materials.
5. Convene meetings with colleagues in South Africa and Ghana to identify how they could add their own materials to the site, adapt existing materials, or jointly generate materials with Michigan-African collaboration.
6. Track costs and resources needed for all activities in preparation for a full proposal to be submitted by November 15, 2008.

We believe this model will succeed because it responds to an imperative need, it capitalizes on our existing information technology used to train physicians and other health care providers, and builds on our existing long-term partnerships in Africa.

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<sup>1</sup> World Health Organization. Working Together for Health: The World Health Report 2006. WHO Publications: Geneva. 2006.

## **Section 2. PROPOSAL NARRATIVE**

**Name of Organization:** Regents of the University of Michigan

**Program Unit within Organization (if appropriate):** Internal Medicine–General Medicine

### **A. Background.**

The University of Michigan (U-M) has a strong tradition of leadership in health science education. The University of Michigan established the first school of scientific medicine on the western frontier in 1850, and quickly became a leading producer of both practitioners and faculty members for other medical schools such as Johns Hopkins, which opened in 1893. It was one of the first US medical schools to admit women, and has a long tradition of innovation in professional education and global collaboration. Other health sciences programs were established in the late 19<sup>th</sup> Century and early 20<sup>th</sup> Century, leading to the university's current complement of programs in Medicine, Public Health, Nursing, Dentistry, Pharmacy, Kinesiology and Social Work. Michigan is uniquely situated to create a cross-disciplinary health professions education initiative.

The university has one of the world's great research libraries, with extensive holdings in the health sciences. It has long been an innovator, with a history of leadership in the exploitation of technology to improve learning. In partnership with Google, the University Library is transforming scholarship by putting its entire holdings of more than seven million volumes on-line – the only academic library to do so. In addition to these resources, the University is home to its pioneering School of Information (SI), one of the world's leading programs of research and instruction in the emerging information professions with special expertise in the development of support for global collaboration.

Michigan is a public university founded upon the obligation of public service and a tradition of international engagement. Michigan established research and instructional programs in Asia, Africa, and Europe in the mid-19<sup>th</sup> century. This tradition is especially strong in the health sciences; for example, the School of Nursing's collaborative programs in China preceded the 1948 communist revolution, survived unabated through the Cultural Revolution, and remain vibrant today. It is no accident that President Kennedy chose the steps of the Michigan Union to announce the creation of the Peace Corps program in 1960.

The university has long had vigorous engagement in applying modern information technology to learning. In the 1960's and 1970's Michigan was unique among US universities in providing computer resources to students on a par with that offered to faculty. Michigan was a co-founder of Educomp, which became Educause – one of the largest associations furthering the application of IT to education. Michigan played a key role in the creation of the modern Internet through its leadership in the Merit Network, which built and sustained NSFNet that shifted the revolution of TCP/IP begun with the ARPANet into the commercial Internet. As the Internet became successful, Michigan helped create Internet2, the non-profit consortium of over 300 education, government, and industry members working on Internet futures. Ted Hanss, one of this proposal's co-investigators, was seconded to Internet2 as employee number one and led Internet2's application development efforts. Internet2's international efforts have contributed to the increase in network

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capacity for the research and education community world-wide, though there are still challenges in many areas, such as sub-Saharan Africa.

In the early 1990's Michigan's School of Information and Library Studies, one of the country's top library schools for more than six decades, was transformed into the School of Information. With generous support from the W.K. Kellogg Foundation, SI began a revolution in library education and research, partnering the deep traditions of libraries and archives with the innovation of computer science. Among other accomplishments, SI was essential in the creation of the Journal Storage Project, JSTOR, which has had a great effect in extending access to scholarly literature to underdeveloped countries world-wide (SI ran JSTOR until 2004). SI also was a key partner in Michigan's digital library projects that transformed the University Library into one of the world's leading institutions in retrospective conversion. It was this lead that convinced Google to start its library partnership program at Michigan. SI was also responsible for the research programs that led to the development of the "Worktools" collaboration support environment under NSF support that was subsequently converted to the "Coursetools" infrastructure, Michigan's first course management system. Coursetools became the base of C-Tools and Sakai, and Michigan leadership helped guide the Sakai Project in the development of an active international community and a robust and growing set of software. Joseph Hardin, one of this proposal's co-investigators, was the Principal Investigator for both the Hewlett Foundation and Mellon grants, the founding Chairman of the Board for the Sakai Foundation. He is one of the SI faculty who continues to provide Sakai leadership, and still directs the C-Tools and Sakai efforts at Michigan.

Sakai itself is one of the most important initiatives in the application of IT to the transformation of education and learning. Bringing open source modes of development and licensing to the application arena within education for key production infrastructure, and innovating on organizational models for inter-institutional collaboration among leading universities in the USA and now globally, the Sakai Project has helped make open source choices possible for enterprise level software in academia. Supported by both the Hewlett and Mellon Foundations, Sakai has grown to a community of practice of over 150 institutions of higher education, including a number of the leading schools in South Africa who participate as full contributors to the development and core code for the project. This base of open-source-embracing, collaborating, innovating institutions provide a foundation upon which we can build a far reaching open content effort upon.

Within the health science schools at Michigan, there are educational technology initiatives underway that will facilitate the proposed project. At the Medical School, all lectures (syllabi, slides, and streaming video) are already available through our Sakai-based course management system. Cross-course educational resources (anatomy, histology, pathology materials) are in the process of being converted to OER. The Dental School has been a leader in transforming lecture materials to podcasts, creating portable and reviewable educational opportunities. The School of Public Health (SPH) supports a web-searchable database of instructional modules in multimedia format (e.g., streaming, synchronized audio and Powerpoints, flash, podcast) that can be accessed through the University's Sakai-based course management system. The SPH database already contains over 600 hours of instructional material.

The health science schools are also deeply involved in issues of global health. The Medical School's Global REACH office has as its mission to facilitate international research, education and collaboration for the benefit faculty, students, and our global partners. The School of Public Health has a long tradition of engagement in global health. This includes a Globalization and Health Interdepartmental Concentration that

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introduces students to the issues that define global health. American students learn about global health, as well, by interacting daily with the 139 international students from 25 different countries - comprising 17% of the student body - who study for their public health degrees at U-M SPH. At least two dozen SPH faculty are actively engaged in global health research and service. Dental School leadership participated in the 2007 *DentEd World Congress* that culminated with the founding of the International Federation of Dental Educators and Associations (IFDEA). The Dental School is committed to the IFDEA's core value of bringing together a community of dental educators to improve oral health world wide by sharing knowledge. The President and Provost of the University, with the health sciences deans supporting, have committed to developing a Center for Global Health, and the search for its inaugural director is well underway.

The University of Michigan provides a unique platform from which to launch this initiative. We have one of the strongest collections of health sciences education programs, deep engagement in cutting-edge informational and educational technologies, and a vision for global service. The President, Provost, Deans of health sciences schools, and key faculty are all committed to this exciting venture.

## **B. Problem/Theory of Action.**

Global poverty and ill health create a vicious cycle that can only be broken when the healthcare needs of the poor are met. In developing nations, the current crisis in health derives not only from a lack of medications and facilities, but also from a lack of trained health care workers<sup>2,3</sup>. Sub-Saharan Africa is estimated to need an additional 1 million health workers to be able to provide even minimal standards of healthcare. A key barrier to educating more workers is the lack of instructors to teach both basic and clinical sciences. Basic science teaching faculty are part of a scarce, aging, and emigrating population. Severe shortages of teachers make the necessary scaling up of health worker training challenging. This is further complicated by the duplication of faculty efforts at multiple sites for courses which can now be completed through the use of educational technology, and the lack of materials that can be collaboratively built upon.

In this context, we propose to launch an OER, outcomes-based, health education curriculum that could be used in a variety of settings around the globe. The U-M and its health science schools are committed to converting existing health science curricula to Open Educational Resources. This process is expected to build on the experience of existing Hewlett-funded projects including Sakai, MIT-OCW, and Tufts-TUSK, with notable exceptions. For example, we expect to release the entire pre-clinical curriculum for the MD degree at Michigan – more than a series of courses, an entire curriculum consisting of learning objectives, outcomes, competencies, and assessment standards.

Prior efforts to convert courses to OER have required significant staff and faculty time, effort, and cost. Using the dScribe process outlined below, we intend to develop a lower cost, high quality set of OER materials. As slide presentations and course materials alone do not work well for conveying all the necessary information, we plan to include streaming videos or voice-over-slide presentations for all materials in our curricula. Clear links through the curricula will also be provided, giving

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<sup>2</sup> Joint Learning Initiative. Human Resources for Health: Overcoming the Crisis. Joint Learning Initiative. 2004.

<sup>3</sup> World Health Organization. Working Together for Health: The World Health Report 2006. WHO Publications: Geneva. 2006.

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users the ability to move across and between courses in a motivated fashion as they move through their learning, providing them with the step beyond open courseware – that of open curricula.

While launching our health science curricula may be of great interest in the U.S. and other developed countries, our goal is to make these materials useful in developing countries and to learn from their use and development outside the U.S. We plan to work within the context of existing long-term relationships with African universities to identify ways they could use our curricula, edit them for more appropriate use, or co-create new educational materials. We expect these steps to benefit both our partner institutions and our students here in Ann Arbor. We plan evaluation efforts that will be used to assess improvements in learning outcomes.

As part of our process for reviewing and launching course materials, we are building in well-recognized copyright models for open educational materials, based on Creative Commons licensing. However, we are aware of the key concerns around the definitions and laws of “fair use,” and recognize the potential a robust practice of “fair use” might have in the medical educational materials arena and beyond. Thus, while not a primary goal of this grant, what constitutes “fair use” has a substantial impact on the work we and others are doing in the field of OER. Because we will be struggling with this issue on a daily, practical level, we expect to develop and participate in a consensus conference on fair use, with support from other foundations.

This project advances the Open Educational Resources field in three ways. First, it is the planning stage of the first full pre-clinical health sciences curriculum, and all of our health science schools are committed to the process of OER for health curricula. Second, the material and images are necessarily of a much higher quality than many existing materials online. For example the histology slides must be viewed with at least 4 degrees of resolution comparable to real microscopy. Third, we expect that the most practical advances from this project will derive from our international collaborations. The way our partners use our materials, the ways they use our process for OER development, and the ways we identify to co-create content could markedly change the way health sciences are taught both here and in developing nations.

### C. Inputs.

**[See Section 5 Budget Description for financial deals of the inputs and University cost-sharing. See Appendix 1 for curriculum vitae of each key participant]**

We have six months of experience with the dScribe process, and have piloted one medical school sequence (Endocrinology, consisting of 23 lectures and supporting materials) for conversion into an Open Educational Resource. In doing so, we have also considered additional educational materials that cross course boundaries (e.g., anatomy, histology). This experience has exposed us to many of the process issues we expect to find during implementation, including fundamental workflows in the dScribe process, software tools to capture and support this workflow, and how to streamline the dScribe process (e.g., so as to use as little faculty time as possible). We have begun to consider issues of efficiency and scaling with increased material and effort, information technology, intellectual property, and the steps necessary to obtain faculty support and buy-in to the project. The identified costs in this budget reflect estimates based on our current work, with expectations of increased efficiency with more experience. Continued tracking of time and costs for each activity are an integral part of this grant, and an expected outcome in anticipation of a full grant proposal.

## D. Activities.

### 1. dScribe Activities

We will further develop the dScribe workflow process for assessing the quality of materials and clearing the IP in class materials that originate in the Sakai/CTools collaboration and learning environment. We will focus initially on the identification and clearing (permitting, replacement, or citation) of embedded content elements of lecture slides, and then move on to video works, including recorded lectures and video and voice-over lectures and demonstrations. This will codify an unambiguous step-by-step set of procedures for dScribes to follow as they move through the materials of a sequence or course. As dScribes move through this process, guided by the policies decided upon by the schools and the University, a record of their work will be automatically generated to serve as permanent documentation of the due diligence done by the University in determining the IP of the materials and their release status. This will be combined with identification and testing of software solutions for transformation of various materials (text, image, audio, video, screen demos, etc) to meet the standards and policies of the OER release site.

As points in the process that would benefit from the development of specific software tools are identified, as some already have been, then tools will be developed and integrated into the dScribe support system. These tools include integrated views in CTools for faculty or staff to assign dScribes to lectures, sequences and courses, and to aid the faculty in quickly choosing which of their materials they desire to have moved to the OER site. The tools also include simple methods for dScribe users to capture relevant elements, such as embedded objects of slides, images, documents, web pages, and eventually videos, so that they can be assigned a tracking number, associated with their position in the original materials (e.g., the point in the slide set for a particular lecture), tagged, commented on, and placed in a database of content objects. As we proceed, we are discovering the best combination of automated and user-generated comments and metadata that will allow rapid movement of lightly trained dScribes through the materials. We will then create views of the materials about which we need to question faculty, the specific questions (and their simplest forms) for which we need answers, and tools with which to auto-generate emails and web pages to which the faculty can asynchronously review and respond without requiring meetings. Their answers then move back into the database and the workflow, completing steps in that workflow and moving it along to completion. We will be testing and iterating this software throughout the project, discovering new routes through the processes that simplify the workflow, and new ways of optimizing the human and computer interactions that we are supporting.

As we develop the dScribe process and the supporting software, we will progressively develop methods of understanding and capitalizing on the natural incentive structures that would lead students to participate in the dScribe effort as volunteers. As this proceeds, we will be open to new teacher/learner interactions that support increased participation by students in the learning process. This is an important component of the project as we seek to bring the cost as low as possible for the generation of quality OER materials. We recognize that this will continue to be a hybrid process, with paid staff and volunteers working together. However, we are keenly interested in all models of pedagogy and content generation, such as peer production and crowd-sourcing methods that the new networked class and learning community provides.

Using these tools and methods, we will dScribe and place on the OER site a minimum of 6 UMMS courses, 2 Dentistry courses, and 2 Public Health Courses. This experience will form the foundation for the accelerated dScribe efforts we envision.

## 2. Fair Use Activities

We will work with the U-M General Counsel's Office, specialists in Fair Use law, and faculty involved in the project to determine the value of Fair Use approaches and to lay the groundwork for a set of manageable criteria for Fair Use claims for material on the Global ACCESS site. We will pilot the integration of Fair Use review and determination in the workflow of the dScribe process, so that we can see how it affects the process of health sciences OER generation from an overall cost/benefit perspective.

Mindful that Fair Use is a concern for OER development and use that goes well beyond the health sciences in the U.S. and around the world, we will organize a workshop on Fair Use, copyright licensing, and OER. Initial approaches on our part to both the Stanford Center for Internet and Society Fair Use Project and the CClearn Project have met with very positive responses. We will also pursue other sources of expertise and support for the workshop, including the National Science Foundation.

## 3. Website/LMS Activities

We will create a *U-M Health Sciences OER web site* that will provide a repository for the pilot courses developed as part of this planning grant and serve as a prototype platform for the anticipated fully interactive site used by the effort's partners. We will develop the *architecture for a federation of interactive sites* that will allow instructors and learners to work together on content development and enhancement (e.g., wikis, the Connexions system), identification and association with people of related interests (social networking), peer-based sharing of information (e.g., blogs), and access by a variety of devices across different network connections (e.g., mobile devices and locally replicated caches where wide area connectivity is constrained). The web sites will have an underlying learning management system that will include a learning object content management system, a course management system (Sakai), and the dScribe tools for reviewing and publishing educational resources. The requirements and user testing for the web sites and the overall publishing activity will come from a process that engages all partners.

We will develop an *architecture for semantic-based searching* that will be based on the needs of both content contributors and learners. Anticipated attributes include automated indexing, use of a meta-thesaurus (e.g., the National Library of Medicine's Unified Medical Language System), and the ability to search across federated repositories of educational resources. The thesaurus-based capabilities should also address differences in English (e.g., American versus British spellings and usage) and anticipated translations to local languages. We expect challenges in developing a system that will facilitate quick and accurate access to sought-for educational resources. Fortunately, we can draw on the natural language processing expertise of the U-M Medical School's Center for Computational Medicine and Biology. We will also pilot features of this architecture to validate our plans.

We will develop an architecture for publishing all educational resources not simply as distinct courses but as a *complete, fully transparent curriculum* by including identified competencies, specific outcomes, learning objectives, learning activities, standards, and the linkages among all of them. In addition to the competency, outcomes, and assessment standards, the educational materials will be linked to a set of

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approximately 120 patient complaints that will provide the clinical context for each learning experience. Through the interactive features of the web site, the U-M Medical School curriculum will be adapted, extended, and re-published as alternative paths by partners or even self learners. Michigan is a member of MedBiquitous, a standards organization for creating and publishing health education materials. We will base our approach for characterizing and publishing competencies on MedBiquitous's emerging XML standards in this area.

4. Global Collaboration Activities

While health professions students, practicing health providers, and the public in developed countries may find great interest and usefulness of the materials we present, our greatest interest remains in how these materials could be used in developing countries. The U-M has extensive relationships with universities in South Africa and Ghana, and we do not yet know how our materials may be used, how their materials could be posted alongside ours, how multi-institutional curricula could be developed, or how course materials could be co-created. To begin understanding these issues, we plan the following activities:

- Meetings with African colleagues to develop the process for adding their courses/outcomes, adapting UM materials, or developing new materials that are locally useful.
- Participation in African health workforce development conference in Kampala, Uganda, March 2008.
- Engagement of FAIMER as a possible partner in faculty development activities
- Invitation and support for Hewlett-funded OER project coordinator from India to participate in the above meetings
- Explore additional modes of information delivery including cellular wireless and short-wave radio, as well as mixed-mode strategies.

5. Administrative activities

This planning grant will be used as the basis for determining the scope of a health sciences open educational resources initiative that will be expansive in terms of content (Medicine, Dentistry, Nursing, Pharmacy, Public Health, Social Work, Kinesiology) and global partnerships. Therefore, we will carefully document all the costs for pilot activities. From that data we will build financial models that can be used to anticipate the effort level and costs for publishing educational resources.

We will develop partnerships with the Foundation for Advancement of International Medical Education and Research (FAIMER), the Institute for International Medical Education (IIME), MedBiquitous, and the Sakai Foundation. By partnering with FAIMER we hope to reach local experts who can provide localization of educational content. Through IIME processes we will validate the outcomes we're publishing as part of the curriculum as either being based on international standards or localized (e.g., to U-M, University of Ghana, etc.). MedBiquitous, mentioned above, will provide the XML standards framework for publishing competencies. With the Sakai Foundation we hope to promote the dScribe process and work flow tools, and engage the South African institutions that are using Sakai and have shown interest in OER and the dScribe process of generating localized open educational materials.

We will bring the vision in this proposal to foundations that fund OER, healthcare disparities programs, health workforce development, and health education materials. The intention is to establish a coalition effort for a sustainable model for developing and maintaining health education materials. The goal is to



have by November 2008 a fully detailed partnership model for funding and executing our vision for an encompassing health sciences OER initiative.

## E. Outcomes.

### 1. dScribe Outcomes

- a. We will work with all of the U-M health science schools to identify the materials that will comprise the Global ACCESS Curriculum Version 1.0. In parallel, we will approach the University's largest undergraduate college, Literature, Science, and the Arts (LSA), to explore bringing a pre-professional curriculum into Global ACCESS. That is, to identify the learning paths that a pre-medical or pre-dental student may take and getting the engagement of those LSA departments and faculty in this initiative.
- b. We will have a complete, detailed process for taking course materials through quality evaluation, IP clearance, and OER publication. This will be tested in the courses that we are doing for this grant, which will be prepared through the dScribe process, vetted by the review board, and published on the open project website.
- c. We will have a detailed description of dScribe software tools to capture workflow intelligence, simplify dScribe activities, automate asynchronous faculty interaction, provide a due diligence trail for legal review, and database all materials for alternative uses and distribution, including archiving. These tools will be released under open source (Apache 2.0) licenses and will be used in the project by dScribes and faculty. These tools will be developed under an architecture that allows easy integration with other VLE's such as ATutor, Moodle or commercial systems.
- d. We will have specific job descriptions for dScribe1s and dScribe2s, which detail the job tasks and opportunities for both paid staff and volunteers. These will be targeted to the specific disciplines for maximum effect and to highlight the incentives available in the different disciplines. Additionally, recruiting materials strategies, eg, targeting of pre-med students to be dScribes for pre-clinical classes, and training program and materials for dScribes, both volunteer and supported, will be developed and tested in the field.
- e. We will have at least six proof-of-concept sequences loaded to the OER site for UMMS (with commissioned content as needed) from the pre-clinical curriculum, and at least two proof-of-concept sequences loaded to the OER site for each of Dentistry and Public Health.

Measures of success will include:

- Recruitment of dScribe2 and dScribe1 supported and volunteer staff
- Publishing of recruiting and training materials for dScribe process
- Publishing of dScribe workflow process and supporting materials
- Release of dScribe software for use with Sakai/CTools
- Publishing of pre-clinical and health sciences courses on the open website

### 2. Website/Learning Management System Outcomes

Immediate outcomes are the platform for publishing the pilot health OER materials and recruiting and training dScribes and the architectures for a searchable, interactive federation of web sites that provide an outcomes framework, clinical context, and curricular path for the content. The ultimate goal is the

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realization of a very active community contributing and accessing content in support of affordably educating an expanding healthcare provider workforce.

Measures of success with the pilot courses will focus on usability:

- Ability to access a single lecture
- Ability to access a single course, including all its lectures and supplementary materials
- Ability to access a single curriculum (path) through courses
- Ability to add, adapt, and collaboratively generate content

Anticipated obstacles include the disparities in wide area network connectivity between the U.S. and Africa. We anticipate in the short term using travel to build the person-to-person collaborations necessary to launch this initiative. In the longer term, we will ally with efforts focused on expanding the Internet bandwidth available within sub-Saharan Africa. We will also look to hybrid offline models for delivery of content, such as DVD-based and local server based models (as practiced by MIT), and methods of providing cell phone-based interaction among users (as investigated at the University of Cape Town with students in the townships). We are investigating such models with both African and American partners. We expect that a combination of existing and innovative ways of delivering the content and support for educational interaction surrounding that content will help fill existing gaps in connectivity, utilize locally appropriate means of communication, and provide access to a growing portion of the population.

Another obstacle may be rationalizing the differences between the U.S. model of a four year undergraduate degree followed by a professional school degree (e.g., four years of medical or dental school). We may address this by developing, as part of this program, a pre-professional school curriculum drawn from the liberal arts college at Michigan, which contains the departments of biology, psychology, physics, chemistry.

Our first focus will be on generalizing our methods across health science schools. In parallel, we will review our efforts with other professional schools (e.g., business schools) to see if our approach would work with them as well.

### 3. Global Collaboration Outcomes

The outcomes expected for this planning grant are intermediate in nature. We plan to identify processes and pilot projects to be developed more fully in the future. Our intermediate outcomes include:

- Partnership agreements with at least two African universities (University of Capetown and University of Ghana); investigation and/or agreement with UNISA and others on relevant health sciences curricula.
- A process for adding, adapting, and/or co-creating courses with African faculty.
- Investigation of dScribe process adoption at one or more African schools.
- A description of one or more pilot demonstration projects.
- A document that outlines the scope of work necessary for African OER for Health, including discussions around pre-health professions curricula.
- Exploration of scaling and replication issues to expand to other regions (e.g., Asia, Latin America).

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Key obstacles to global collaboration include the lack of existing information technology necessary for rapid international collaboration, the lack of academic infrastructure, and the time pressure on faculty in developing countries where health needs of patients can be overwhelming and preclude participation in educational projects. There may also be educational traditions at international sites that conflict with the principles of OER; faculty and students may have counter-incentives to participation. Faculty and/or students may also not have the necessary expertise to cooperate fully in co-creation of course materials. The status, expectations for, and participation of students in the teaching and learning process may create barriers to dScribe activities. Identifying the extent of these obstacles and potential solutions is a key outcome of this planning grant.

If successful, the processes we develop for adding local content, adapting existing content, or co-creating content are expected to be generalizable at least to other developing countries with similar cultures. It is our hope that many of these principles will be operant in other parts of the world as well.

### 4. Administrative Outcomes

These outcomes include:

- A financial model for (1) scaling up Global ACCESS to include more health education content provided through more curricular paths by more participating institutions and (2) sustaining Global ACCESS into the future beyond start-up.
- Collaborative agreements with international health education groups (e.g., FAIMER, IIME) and education standards groups (e.g., MedBiquitous).
- A proposal that engages a collaboration of content contributors with a coalition of foundations providing the support for initiating the large scale effort.

## F. Evaluation.

We will evaluate our strategy and outcomes through a variety of means:

- We will compare our financial models with the experiences of established programs, including MIT OpenCourseWare. The goal of the dScribe process is to publish more content and update that content more frequently at a lower cost than previous models.
- We will publish the dScribe workflow online for public comment and review it at relevant conferences (e.g., OCW Consortium).
- We will evaluate the benefits that students and faculty identify from participating in the dScribe process, and modify the recruitment and workflow processes to maximize these benefits and student participation.
- We will investigate the impact of dScribe activities on the pedagogies and practices of the faculty involved in OER generation and review.
- We will establish an advisory committee of experts in open publishing, to ensure our publishing approaches are valid according to open licenses (i.e., Creative Commons) and related policies, and learning sciences, to validate that our learning assessment measures will accurately represent educational outcomes.
- We will involve the Department of Medical Education at Michigan, in which Dr. Stern has a joint appointment, in developing an assessment plan that with pre-deployment assessments can set a baseline for showing the effectiveness of OER in improving outcomes.

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- We will use online project planning and tracking tools, provide written monthly progress reports, and hold quarterly status meetings with the Hewlett Foundation.
- We will hold two partner planning meetings, one with a team traveling to Africa and the second with a team of medical educators from Africa visiting Michigan.

Approximately 10% of our overall budget will go to evaluation, approximately one quarter of the time being spent by Stern, Hardin, and Hanss on the initiative plus between 5 and 10% of the time of the other faculty and staff.

**G. Intellectual Property Rights.**

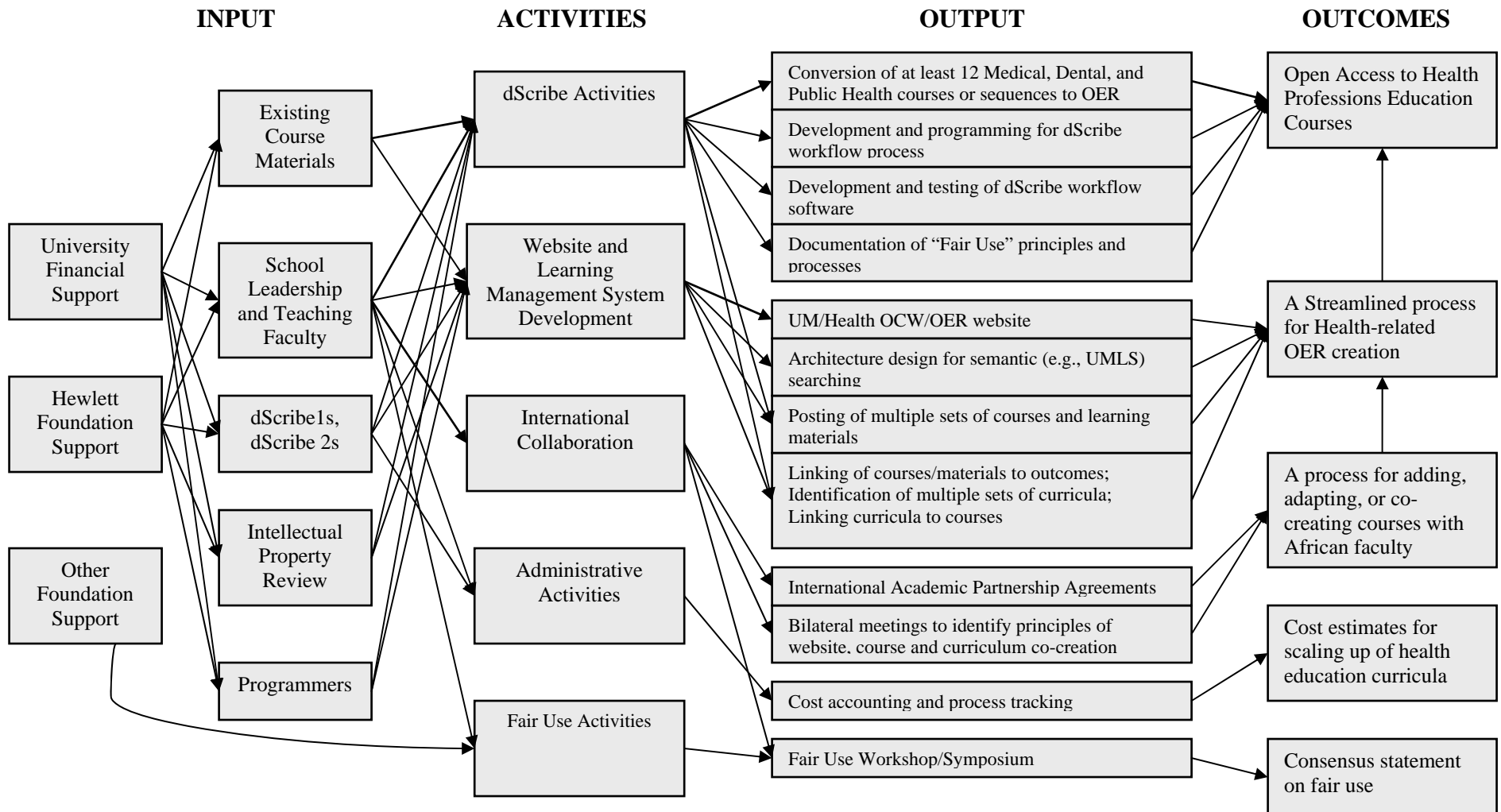
The purpose of this planning grant is to develop processes to launch Open Educational Resources for health professions. Existing courses and teaching materials from Michigan health professions schools will be converted for open use under the Creative Commons 3.0 (Attribution, Share Alike, Non-Commercial) License. Our educational resources platform will be based on Sakai, an existing open-source learning management tool (<http://sakaiproject.org>). Additional software developed as part of this grant will be licensed under the Apache, Version 2.0 license (<http://opensource.org/licenses/apache2.0.php>)

Any partner institutions collaborating with us will be required to agree to the above standards as a requirement of collaboration.

**H. Compelling Reasons for the Grant.**

1. To promote rapid scaling-up of health professions education in resource-poor settings.
2. To create low-cost solutions for producing Open Educational Resources.
3. To facilitate inter-university collaborations in health education.

**Section 3. LOGIC MODEL**



### Section 4. PROGRAM CHART

CATEGORY	INDICATORS	BASELINES	TARGETS AND TARGET DATES
<b><u>Activities/Outputs</u></b>			
◆ dScribe software development	◆ A software tool that allows faculty and dScribes to work asynchronously and with little faculty input time	◆ None	◆ Less than 2 hours of faculty effort to review, revise, and approve the OER version of a one-hour lecture by 8/1/08
◆ dScribe1 training	◆ dScribe training manual	◆ None	◆ Beta version training manual by 5/1/08, final version 8/1/08
◆ Bilateral meetings with international colleagues on Global ACCESS application in Africa	◆ Formal agreements to collaborate on course and curriculum co-development ◆ A process for adding, adapting, and co-creating educational content	◆ None	◆ Formalized process for loading courses from multiple institutions (5/1/08) ◆ Pilot project planned for content co-creation (8/1/08)
◆ Fair Use Symposium	◆	◆	◆ 1 conference and 1 consensus statement
<b><u>Intermediate Outcomes</u></b>			
◆ Global ACCESS OER Website	◆ UMLS searching architecture ◆ Linking course materials to educational outcomes ◆ Linking course materials to curricula ◆ Capacity for multiple curricula and outcomes lists	◆ None	◆ Search architecture available by 8/1/08 ◆ Architecture for linking outcomes, competencies, and patient complaints to learning experiences and materials available by 8/1/08
◆ Identification of pre-professional course content from University of Michigan and other OER sites	◆ Number of courses listed on website	◆ 0 courses	◆ All pre-professional prerequisite courses identified for future release as OER 8/1/08
<b><u>Ultimate Outcomes</u></b>			
◆ OER release of Global ACCESS Health Professional Curriculum content	◆ Number of courses and sequences listed on website	◆ 0 courses/sequences	◆ 10 Medical, 2 Dental, and 2 SPH courses by 8/1/08
◆ Financial sustainability	◆ Difference between Global ACCESS income and expenses	◆ Negative projected balance of \$350,000 in 2008	◆ Zero Yearly Net Balance 12/31/08 from additional foundation sources.

## Section 5. FINANCIAL INFORMATION

### 5.1 Detailed Budget Description

[See Appendix 2 for Financial Spreadsheet]

#### Personnel

*David T. Stern, MD, PhD* will serve as principal investigator on this proposal, and is expected to spend 25% of his total University effort on this project. However, University effort compliancy policy requires him to list his effort as a percentage of University appointment. Although the budget reflects that he will spend 32.1% of his University appointment during the year, it is actually a mathematical function still representing 25% of his total professional effort. David has a joint appointment with the U-M and VA. He is a general internist with a PhD in curriculum and teacher education. He has developed and served in an advisory role for curriculum and assessment programs locally, nationally, and internationally. He has participated in developing global essential outcomes for medical education, and led the Institute for International Medical Education's 8-school outcomes assessment program in China. He currently serves as Director of the international office of the U-M Medical School. He will provide oversight for all aspects of the project and coordinate communication between working teams, faculty, international colleagues, and the foundation. He will ensure that the project meets timelines and objectives stated in this proposal.

*Theodore Hanss, MBA* will direct the implementation efforts and will spend 25% of his effort on this project. Ted is the Director of Enabling Technologies, with responsibility for making the Medical School an innovative user of leading edge information and communication technologies. He has been with the University for over 20 years working on next generation IT infrastructures. He spent eight years on loan to Internet2 as the Director of Applications Development, where he worked with colleagues around the world to support advanced research and education collaborations. He will ensure delivery of the overall technical architecture and proof-of-concept implementations. His effort will be concurrent with his current position in the Medical School.

*Joseph Hardin* is Clinical Assistant Professor in the School of Information and will spend 25% of his effort on this project. Joseph is the Director of the Collaborative Technologies Lab at the Duderstadt Center, has been leading the University of Michigan Sakai open source software effort, and has been working with faculty, staff and students to develop both an understanding of open educational resources dynamics and practices and software to integrate open courseware generation into the practices of faculty and students using CTools at the U-M. Joseph will lead the research and development of "dScribe" workflow and software efforts for this project. His effort will be fully cost-shared as part of the commitment from the Vice Provost for Academic Information.

*Tamara Stein* is an anatomy professor, and Assistant Director of Component 1 and 2 (Years 1 and 2) of the U-M Medical School Curriculum. She has administrative authority for all courses in these pre-clinical years and is in a key leadership position to promote and assist in the conversion of existing educational materials to Open Educational Resources. Her effort on this grant is expected to be 13.3% of her total University activity which is based on a 75% appointment. She

will serve as the key liaison between dScribes and faculty in the Medical School for the conversion of four course sequences into OER.

*Emily Springfield* is an instructional designer for the U-M School of Dentistry with a focus on learning technology. She will work with the Dentistry faculty to put courses and resources online for the OER project. She will also assist in evaluation of the project. As part of this grant, Ms. Springfield will spend 40% of her time developing and adapting Dental School courses as Open Educational Resources, coordinating between dScribes and faculty in the conversion of two courses into OER.

*Rithvick Divecha* is an E-Learning specialist in the School of Public Health. He will spend 25% of his effort on this project. Vic is the Rich Media Library manager and will conduct the Public Health specific hands-on operations necessary to deploy the Public Health courses into the OER environment, including contacting and collecting material from faculty to integrating the different media elements into BlueStream, Michigan's digital access management system.

*Haurani Sypher Hunter* is an administrative assistant working in medical education, with experience in curriculum revision and information technology. She is expected to spend 53% of her University effort on this project, based on a 75% appointment. She will provide administrative support for the project including internal and external communication, production of documents and reports, and facilitating communication with the foundation.

*Vickie Earl* is a grants administrator in the division of general medicine through which this grant will flow. Her expected effort on this project is 5%. She will be responsible for maintaining financial records, providing disbursements, and generating financial reports for this project.

*dScribe 2s* are leaders of the dScribe process. These individuals have advanced degrees in information, with special training in both information technology and intellectual property management. They will train dScribe 1s, monitor and supervise their activity, develop and maintain the dScribe process, provide tracking and triage of educational objects under IP review, and provide statistical and financial data on ongoing processes. These individuals are the key operational individuals in the dScribe process. Two individuals are needed at 1.0 FTE each for this project and their salaries will be fully cost-shared as part of the commitment from the Vice Provost for Academic Information.

*Programmer (Indexing/Mapping)*: This person will research, install, and maintain a system that will allow local and federated search across open educational resources published by U-M and partners. Materials will be automatically indexed and then searched using a Unified Medical Language System (UMLS) meta-thesaurus. In addition, the individual will build a database for storing all outcomes, competencies, and patient complaints that will be both manually and automatically mapped to each resource (e.g., lecture material, learning experience, assessments) illustrating the interconnectedness of the entire curriculum. This 1.0 FTE will be fully cost-shared by the Office of Enabling Technology of the Medical School.

*Programmer (dScribe)*: This person will design, develop, test, and continuously update the software tools that instantiate the dScribe-based workflow model, including the intelligence for facilitating publication decision making on content objects embedded in curriculum materials.



Tool development includes the analysis of social practices by faculty and students in the development and use of class materials and the 'clearing' of those materials for use outside of the original classroom. A full 1.0 FTE is necessary for this activity and requested as part of this grant.

*Publications Director:* This person is responsible for the overall public face of Global ACCESS, setting the strategy and approach for communications in all media. The primary focus will be the Global ACCESS web site, setting the standards for publishing text, graphics, and video materials from U-M and partners and providing an interactive work environment for the collaborative development and publishing of open educational resources. A full 1.0 FTE is required for this activity and requested as part of this grant.

*Information Architect:* This person provides the high level technical expertise and strategic thought leadership on the standards-based design and deployment of all Global ACCESS systems (databases, content management systems, web publishing, collaboration tools, search systems, ontologies, and taxonomies), including the integration of heterogeneous systems in a services-oriented environment. This person would provide the liaison with all providers of system components (open source or proprietary, vendor-based or community-driven). This 50% FTE will be provided as cost-sharing from the Medical School Information Systems office.

*Programmer (Web 2.0):* This person will design, develop, test, and update the software tools that facilitate the dynamic (synchronous and asynchronous) collaborations of the Global ACCESS community. This includes tools for shared editing of materials (e.g., wikis), identification and association with people of related interests (social networking), peer-based sharing of information (e.g., blogs), and more across web sites, rich internet applications, and mobile devices. This 1.0 FTE will be fully cost-shared by the Office of Enabling Technology of the Medical School.

*Lynn Johnson, PhD* is professor and Director of Dental Informatics at the U-M School of Dentistry, and will serve as liaison between dental faculty within the University of Michigan and between Michigan faculty and those of our African partners. Lynn is currently the president-elect of the Educational Research Group within the International Association for Dental Research. She represented the School of Dentistry at the recent conference at which the International Federation of Dental Educators and Associations was formed at the 2007 Global Congress on Dental Education III in Dublin, Ireland. Her 5% effort to this grant will be cost-shared by the Dental School.

*David Mendez, PhD* is an Associate Professor in the School of Public Health and will spend 5% of his effort on this project. David is the faculty lead for Instructional Technology and Distance Learning at the School of Public Health and has been working with faculty and informatics staff to develop the Rich Media Modules library, a searchable database of instructional material on a variety of media formats. David will coordinate the deployment of two Public Health courses into the OCW environment and with our African partners. His effort will be cost-shared by the School of Public Health.

*Benefits* are estimated at the customary University rate of 30% to cover all health, disability, and retirement benefits for individuals.

## **Consulting**

*dScribe 1s:* These individuals are familiar with the content to be converted to OER and are expected to be employed on an hourly or course-specific basis to provide the initial support in converting existing educational materials to OER. Start-up hourly costs are included in the grant to cover 80-100 hours of dScribe support. Additional resources from each school are indicated to reflect additional funds likely to be allocated during the grant period for this support.

*Graphic Designer:* A graphic designer will be required as part of this grant to re-create materials necessary for OER. This support will be provided as cost-sharing as part of the commitment from the Vice Provost for Academic Information.

*Jack Bernard, JD* is Assistant General Counsel for the University of Michigan, and will serve as part of his existing capacity to advise and assist in intellectual property issues.

*Deborah Biggs, JD* is Director of Compliance and Regulatory Affairs for the University of Michigan Medical School, and will facilitate faculty intellectual property issues at the medical school as part of her existing capacity.

*Susan Kornfield, JD* is a nationally-recognized expert in intellectual property issues and adjunct professor at the University of Michigan Law School. She has agreed to provide advice on a *pro bono* basis for this project.

*John Leslie King, PhD*, is Vice Provost for Academic Information and Professor and former Dean in the School of Information at the University of Michigan. He is an expert in requirements analysis for complex system design, and in assessment of organizational and institutional impacts of IT application. He will assist with project development and management, as well as evaluation.

## **Infrastructure and Supplies**

*Phones:* We are asking for \$1000 to cover the cost of long-distance calls, fax usage, and postage for mailing materials from the University of Michigan.

*Printing, copying, etc:* We are asking for \$1000 to cover the cost of research supplies, including copier and printer paper, toner cartridges, disks, pens, notepads, notebooks, etc.

*Computer software and supplies (not included in above):* We are asking for \$1000 to cover CDs, and other removable storage (e.g., flash drives) for the storage and re-distribution of materials.

*Information technology support services* are available for the project through the University of Michigan. This includes server space, software installation and support, advice, and troubleshooting for IT issues.

## **Travel**

*U-M Team to Africa (4 to South Africa, Uganda, Ghana 7 days)* A critical part of this planning grant will be collaboration with our African colleagues to determine utility, adaptability, and collaboration on Open Educational Resources. We plan to send a team of 4 to Africa for meetings and conferences to achieve this goal. One conference is the meeting of the Global

Health Workforce Alliance of the WHO, which is meeting in Kampala, Uganda in March 2008. We expect to meet with some colleagues at that meeting, then travel to Capetown and Accra to better understand the local issues and opportunities for collaboration. Travel includes roundtrip airfare, hotel costs, ground transportation, and meals following University of Michigan guidelines for travel expense costs. Resources are also included to invite one additional colleague from India to coordinate with Hewlett efforts at that location.

*African Team to U-M (2 each from Capetown and Accra 4 days)* Equally important as U-M faculty going to Africa to meet and observe educational settings is the opportunity for African colleagues to come to Michigan and observe the same. This will provide them the opportunity to observe the array of educational technologies and opportunities available, and will also allow us the opportunity to hear from them about educational materials they could provide to enrich the educational experience at Michigan. Travel includes roundtrip airfare, hotel costs, ground transportation, and meals following University of Michigan guidelines for travel expense costs. Resources are also included to invite one additional colleague from India to coordinate with Hewlett efforts at that location.

### **Gap Funding**

This grant, as submitted, is for a six-month commitment. In coordination with the Hewlett Foundation, we acknowledge that the next funding date would be on or around December 1, 2008. Because of this, there will be a 4-month potential gap in funding. We have received commitments from a variety of units of the University (Vice Provost, Deans, Departments) to cover these costs from August 1 – November 30, 2008 should further funding from other foundations not be forthcoming.

### **5.2 List of current foundation funders for this project**

None

### **5.3 IRS determination letter**

See Appendix 3

## Appendix 1: Curriculum Vitae of Key Personnel

**David Stern** is an Associate Professor of Internal Medicine and Medical Education at the University of Michigan Medical School and the Ann Arbor Veterans Administration Healthcare System. Dr. Stern received his bachelor's degree in anthropology from Harvard University and his medical degree from Vanderbilt Medical School. He completed internship and residency in internal medicine at Tufts/New England Medical Center. He subsequently served as a fellow in Ambulatory Care and Research at Stanford and the Palo Alto Veterans Affairs Medical Center, and received his Ph.D. from Stanford University School of Education in curriculum and teacher education.

Dr. Stern practices general internal medicine at the Ann Arbor VA medical center, where he also teaches residents and medical students. Over the past decade he has been associate director of the Introduction to the Patient Course at the University of Michigan Medical School, and faculty director of the Standardized Patient Program. He now serves as Director of Global REACH, Michigan Medical School's international initiative "to facilitate health research, education, and collaboration among the University of Michigan Medical School faculty, students, and our global partners for the benefit of patients worldwide."

In addition to administrative responsibilities, his primary research interest is in the development and assessment of professional behavior of physicians. He is the author of over 100 abstracts and papers on the topic, and is editor of "Measuring Medical Professionalism," published by Oxford University Press in 2006. He has served as a consultant and visiting professor at medical schools nationally and internationally, conducting workshops and seminars on teaching, learning, and evaluating professionalism.

In 2001, he was invited to participate as a member of the Core Committee of the Institute for International Medical Education and their project to evaluate outcome competencies of medical schools internationally. For the IIME pilot project in China, he directed the IIME task force on assessment, organized and managed faculty workshops, and organized the test administration in 2003. Subsequent international panels for standard setting at the student and school levels have helped the IIME to achieve its goal of measuring outcome standards in medical education. He is now President of the Institute for International Medical Education, an independent non-profit institute.

**Deborah Biggs** received her juris doctorate from Thomas Cooley Law School in 1994. She received her bachelor of arts from James Madison College at Michigan State University in 1986.

Ms. Biggs joined the University of Michigan Medical School in 1994 and is currently the Director for Regulatory and Business Affairs. Ms. Biggs also serves as the Medical School Chief Compliance Officer. She has led clinical and research compliance initiatives, coordinating these issues for the Health System and the University. Recently these included reorganization of the Health System Compliance function, helping to lead the University Effort Reporting Compliance initiative, serving as the institutional lead for Clinical Research Billing issues and directing the implementation of privacy regulations.

Additionally, Ms. Biggs manages a leadership development program in partnership with the University of Michigan Business School, is administrative lead for the executive incentive compensation program and manages faculty compensation and appointment issues for the Medical School.

Previously Ms. Biggs was involved in new business development managing the creation of joint ventures and affiliations for the faculty of the Medical School.

**Ted Hanss** is Director of Enabling Technologies for the University of Michigan Medical School. Reporting to the dean, Ted directs the application of leading-edge information and communications technologies to support the school's missions, enabling new modes of curriculum delivery and enhancing research capabilities. Current focus areas include learning and research collaboratories (from browser-based collaboration tools to

uncompressed HDTV-based videoconferencing), next generation learning management systems, open educational resource initiatives, virtual worlds (e.g., the design and implementation of Wolverine Island, the University's presence in Second Life), cyberinfrastructure, optical networking, data center design, and health informatics.

Ted has a B.S. in Biology from Boston College and an MBA from the University of Michigan. Ted has been with U-M since 1985, working on each new technology wave as it was introduced to the campus. He started with the campus personal computer roll-out and then progressed to Internet technologies, client/server computing, UNIX systems support, distributed computing, campus-wide identity and authentication systems, and campus portals. He has led a computer science research center, software development teams, IT operations, user services, human resources, and training and development programs. He has directly managed budgets of several million dollars per year and staff units of over 50 people. He has been the PI on over \$6.5 million in external funding.

Ted was an early advocate of “open.” In 1994, while Director of the Center for Information Technology Integration, he created the University of Michigan Open Systems Center as an R&D and training facility for educating higher education and corporate customers in standards-based distributed computing. He also conceived, created, and taught a course in data, voice, and video networking during the 1990s in the U-M Business School where he posted all course materials for public access.

On assignment from Michigan from 1997 to 2004, Ted was employee number one of Internet2, a non-profit consortium of over 300 education, government, and industry members working on Internet futures. Ted was the Director of Applications Development and supervised applications area staff, planned and organized the applications activities, conducted technology assessment, and served as a central point of contact with Internet2 members and government and industry partners on applications issues. He conceived and implemented “Internet2 Days” as a means to raise faculty awareness, resulting in over 65 universities hosting these events. He also initiated Internet2-based arts performance events as a platform for several innovations, including the first live HDTV streams on the Internet, an Internet-based distributed recording studio, and remote master music classes.

With expertise in leading edge, Internet-based distributed computing, he has had significant involvement in national and international standards efforts and consortium activities. He is a frequent speaker on leading edge technology topics, having given scores of invited talks around the world. He has written four book chapters and several articles. He has been interviewed by CNN, National Public Radio, *The New York Times*, *Business Week*, and numerous trade publications.

**Joseph Hardin** is the Director of the Collaborative Technologies Laboratory in the Duderstadt Center, and a Clinical Assistant Professor in the School of Information, at the University of Michigan, Ann Arbor.

Joseph is also currently the Vice-Chairman of the Board for the Sakai Foundation, which provides a legal structure for the work of the Sakai Community as it constructs itself and constructs and uses the Sakai Collaboration and Learning Environment open source software - a modular collection of open source tools to support online education, research and collaboration. This effort has been joined by over 150 colleges, universities and commercial affiliates around the world. (see <http://sakaiproject.org>) Joseph was the founding Chairman of the Board of the Sakai Foundation, and the Principal Investigator on both Hewlett and Mellon Foundation grants that supported the formation and initial development of the Sakai software and community.

Joseph also has a deep interest in open content systems, material generation processes and use, giving numerous talks at OER and OCW conferences, organizing seminar series and working with projects at Michigan and other schools, including universities in China, Europe and South Africa. He has led the development of the Digital Scribe, or dScribe, efforts at the University of Michigan and within the Sakai Community which seek to combine the power of institutionally adopted VLE/CLEs such as Sakai with

distributed workflows and participatory pedagogies to generate OER materials as a low-cost derivative of ongoing educational activities, in the process transforming the educational environment of those institutions.

Joseph has worked on the development of such open and online collaboration systems for a good while, both at the University of Michigan, where he led the development of the CompreHensive collaborativE Framework (CHEF) system, a forerunner of the Sakai system, and when he was Associate Director of Software Development at the National Center for Supercomputing Applications (NCSA) at the University of Illinois-UC, from the early to the late 90's. There he led the Software Development Group (SDG) at NCSA that built a number of innovative visualization and internet tools, including the Mosaic browsers. He is also a founder of the International World Wide Web Conference Committee (see <http://www2006.org>), has taught a graduate course on the Semantic Web, and is preparing a course on Open Source Software Systems and their Communities. (see <http://www-personal.si.umich.edu/~hardin/>).

**Lynn Johnson** holds a doctorate in Instructional Design and Technology from the University of Iowa with a cognate in computer science, and over twenty years experience in developing and researching innovative educational technologies that support dental education. She currently holds the rank of professor in dentistry and is concurrently the director of the Office of Dental Informatics. She has focused her research in four areas: (1) interactive patient simulations, (2) the assessment of clinical problem-solving skills, (3) innovative use of multimedia applications for the instruction and evaluation of oral health care providers, and (4) the evaluation of the merit and worth of instructional products and methodologies. She has been the principal investigator on two grants funded by the National Institutes of Health (NIH) and an investigator on 7 grants funded by NIH or the National Science Foundation. She is the primary or secondary author on 38 peer-reviewed manuscripts and 14 peer-reviewed electronic scholarship products. She has served as a consultant to private industry including serving as the project manager for the Dental Interactive Simulation Corporation, a non-profit company developing computer-based simulations for the assessment of dental students and practitioners.

Dr. Johnson directs the dental informatics and information technology activities for the University of Michigan School of Dentistry including learning technologies, the patient management system, and the information and communications infrastructure. Her current research projects include an NIH funded grant to development Web-based simulations of dental patients with genetic conditions. Using an evidence-based approach students work collaboratively to resolve patient issues and provide oral health care. She is also currently active in two campus collaboration projects that may be of interest to this open education project—a digital asset management system (DAMS) project and podcasting. The DAMS project, known as *BlueStream* <<http://sitemaker.umich.edu/bluestream/home>> at the University of Michigan, is a campus-wide project to develop a cyberinfrastructure that will support the use of multimedia in teaching and learning. One functionality of *BlueStream* is the use of video analysis tools to search across the content of videos and other media. *BlueStream* ensures that only users with the appropriate clearances have access to the resulting media. Her work with podcasting demonstrates the power of using proven software development techniques. Podcasting at the University of Michigan was a student-initiated research project that used demonstrated that formative evaluation techniques to prove that audio is a useful tool for lecture review. The result of this research was an invitation from Apple, Inc. to be one of a handful of schools to help guide the development of *iTunes U* <[http://www.apple.com/education/profiles/michigan\\_dentistry/](http://www.apple.com/education/profiles/michigan_dentistry/)>.

Lastly, Dr. Johnson was a member of the September 2007 *DentEd World Congress* that culminated with the founding of the International Federation of Dental Educators and Associations (IFDEA). A core value for IFDEA's is to bring together a community of dental educators to improve oral health world wide by sharing knowledge.

**David Mendez** is an Associate Professor in the Department of Health Management and Policy at the University of Michigan School of Public Health. His research is in the areas of smoking control, product and service quality on demand, and policies regarding residential radon. Professor Mendez is the faculty lead for

instructional technology in the School of Public Health, and recently he has worked on developing a model for distance education for the School's Executive Master's program.

**Tamara A. Stein** is a faculty member in the Division of Anatomical Sciences, a researcher in the Department of Obstetrics and Gynecology, and the Assistant Director of the preclinical components of the University of Michigan Medical School Curriculum. She has completed undergraduate and graduate study in Human Biology and Anthropology at Stanford University and the University of Chicago. In addition, she served as a fellow at the Smithsonian National Museum of Natural History.

Tamara teaches anatomy to medical students throughout their four years of medical school, as well as to surgical residents and fellows throughout their graduate medical training. Over the past several years she has been awarded numerous teaching awards, both locally and nationally.

Administratively, Tamara is the Assistant Director of the preclinical components of the medical school curriculum, and is a member of numerous policy and curricular committees within the medical school.

In addition to her teaching and administrative activities in the medical school, Tamara has been an active researcher with the Pelvic Floor Research Group in the Department of Obstetrics and Gynecology. Her main interest is investigating the functional morphology of the pelvic floor and support system within an evolutionary context, in order to define morphologic abnormalities that result in functional problems for women.

Tamara is also active in research focused on pedagogical methodologies in medical education, with specific attention to the integration of basic and clinical sciences. For the past five years, she has served on a national advisory committee for medical education in women's health, and was instrumental in the development of outcomes in women's health education. She is currently overseeing grants, funded by the Ford Foundation, to five US medical schools to implement these outcomes into their curriculum.