



Collaborative Technologies for Medical Education

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The Problem: Educating Medical Professionals When, Where, and How They Need It

The state-of-the-art for professional medicine is changing at an extraordinary pace. To stay current, medical professionals must continuously update their skills and knowledge. This proves a nearly impossible task for the majority of medical professionals who already feel overloaded by the pressures of increased clinical workloads and decreased reimbursement.

The established methods of continuing education for the health professions have been largely ineffective in helping medical professionals maintain their clinical knowledge and competence. In its recent report “Health Professions Education: A Bridge to Quality,” the Institute of Medicine calls for a “major overhaul” of health professions education, one which focuses on a set of core competencies and allows clinicians to employ the expanding evidence base into their practice. In parallel, the Council of Medical Specialty Societies and many others are urging educators to redefine the current systems of Continuing Medical Education (CME) in ways that support the physician as a self-directed, lifelong learner.

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Traditionally, clinicians turn to their professional medical societies for a variety of educational resources that help them maintain their knowledge and skills. The Internet offers an increasingly popular and important medium for education because it removes both geographic and temporal barriers to learning, allowing clinicians to access educational resources from their office or home. Unfortunately, the web sites produced by professional societies often fail to give clinicians ready access to the education and information they need. Scattered across a variety of locations and formats, society web resources are often silos of information lacking integration with key partners including other professional societies, certifying boards, government agencies, scientific publishers, and pharmaceutical and device companies. In addition, the web resources are rarely made available in ways that can be integrated into a clinical care process. Instead of getting relevant, targeted information when they need it, clinicians must go from web site to web site searching for the information they need.

The Solution: Collaboration and Standards

Addressing the current problems in medical education will require collaboration on a common solution that connects educators and supports clinician learning in new ways. To achieve these goals requires a broadly implemented technology solution that is embraced by numerous educators, certifiers, and other key stakeholders. For example, the current maintenance of certification initiatives, which seek to ensure physician competence, require physicians to complete self-assessments and other performance improvement activities. Technology provides the only scalable means to administer and track these new activities for the large number of physicians seeking recertification in one or more specialty. The distributed nature of medical

education and the number of physicians with cross-specialty certification require that a solution work across multiple organizations.

Technology standards are the key to fostering this type of collaboration and making education more accessible and effective. Just as with telephones and fax machines, standards are essential for enabling communication among multiple entities.

Standards provide a common language and cost-effective means for exchanging relevant information and resources.

With a common language around medical education, the best educational resources can be reused in a variety of environments, reaching beyond the boundaries of the organization that created them. MedBiquitous plays the critical role of developing technology standards that support collaboration and support the efforts of those organizations seeking to innovate medical education and physician competency initiatives.

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The MedBiquitous Consortium

Founded in May 2001, MedBiquitous Consortium is a non-profit organization created by Johns Hopkins University School of Medicine in partnership with several leading professional medical societies. The Consortium's mission is to advance medical education through technology standards that promote professional competence, collaboration, and better patient care. To accomplish this mission, MedBiquitous has convened many of the leading professional medical societies and interested government, industry, and university colleagues devoted to developing a technology blueprint for medical education. In bringing these different sectors together, MedBiquitous serves as neutral ground for open discussion of common problems.

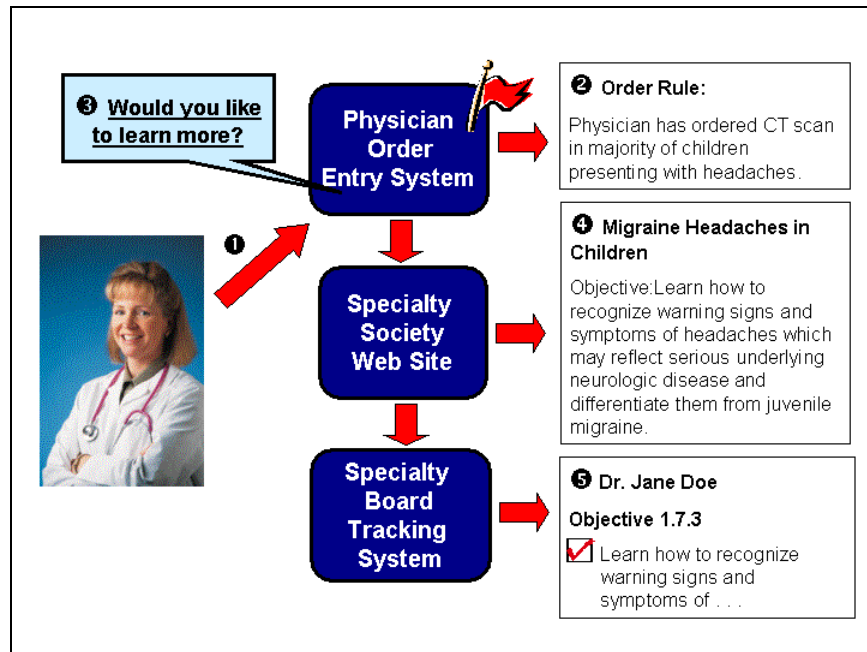
The MedBiquitous technology standards will allow members to work together and exchange information in a reliable, secure, and automated fashion. Representatives from IBM, Sun Microsystems, and Rational Software serve as visiting architects and provide strategic technical direction to the Consortium. Enabling standards are created through Consortium working groups, member-staffed groups that donate their ideas and expertise to create shared resources that benefit all of the members.

Our Vision

To be most effective, medical education should be a seamless part of the clinician's work environment. Instead of requiring a clinician to leave a clinical encounter to seek learning, learning opportunities will be embedded within clinical systems, delivering the right information and education at the time of need. For clinicians seeking more comprehensive information after a clinical encounter, medical education must be ubiquitous, available at any time from any Internet-connected device to which they have access. Clinicians will receive continuing education credit for both types of activities without having the administrative burden of printing

a certificate and submitting it to the appropriate certifying body. With the ability to track educational activity, educators will be able to conduct outcomes studies to determine the effectiveness of medical education and its impact on clinician behavior and patient care. In addition, clinical systems will present patient educational resources to physicians when appropriate.

The following figure illustrates an example of this vision for medical education.



A Pediatrician Receiving Education through a Clinical System

In this example, 1) the pediatrician orders a CT scan for a patient through a physician order entry system. 2) The system detects that she has ordered a CT scan in a majority of patients presenting with headaches. 3) This in turn triggers a clinical rule within the system that provides the physician with the opportunity to learn more about diagnosing children presenting with headaches. The physician is highly motivated to learn more so that she can best serve her patient, so she clicks the link to educational resources. 4) The order entry system then retrieves an educational module from the physician's specialty society that addresses the physician's learning need. After five minutes, she has completed the educational module. 5) The specialty society awards her CME credit for completing the module and sends an electronic transcript of this activity to her specialty board, which tracks her educational progress against a curriculum of learning objectives. The physician is able to educate herself quickly and efficiently and receive credit for her efforts. More importantly, she improves the quality of care her patients receive.

Technology Blueprint

To make this vision of medical education a reality will require the support of collaborative technology systems that bridge the gaps between learners, educators, and certifiers. Such a complex endeavor requires a plan. The construction workers, electricians, plumbers, and other contractors involved in building a new building work from a common blueprint to coordinate their efforts. Professional medicine also needs a common blueprint to coordinate the efforts of those building collaborative systems for medical education. To achieve this goal, MedBiquitous is working with its members to develop a technology blueprint for medical education. This blueprint will weave together the many activities, organizations, and resources that support the ongoing education and performance of clinicians, creating more integrated access to educational resources, scientific journals, pharmaceutical and device product information, and clinical trials and registries.



MedBiquitous builds on the work of consortia and standards groups in other industries to create this blueprint.

Advanced Distributed Learning

The development of a technology blueprint for medical education has been greatly accelerated by incorporating the work of the Advanced Distributed Learning Initiative (ADL). ADL is a collaborative effort among government, industry, and academia to create technology standards to establish a new distributed learning environment that permits the interoperability of learning tools and course content on a global scale. The ADL's suite of standards for education is called SCORM (Shareable Content Object Reference Model). MedBiquitous is working with ADL to customize SCORM standards to make them useful for medicine. MedBiquitous customizations

would allow educators to indicate a module's subject using a medical terminology, tie modules to objectives or competencies within a medical curricula, disclose financial relationships of module authors up front, and indicate the number of CME credits awarded per module. Using MedBiquitous guidelines and customizations, medical educators can implement the SCORM standard consistently and make relevant educational materials more accessible to clinicians and potentially to clinical systems at the point of care. MedBiquitous further supports the education of medical professionals by providing additional technology standards for communicating educational accomplishments and representing medical curricula.

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XML

The MedBiquitous technology blueprint is based on Extensible Markup Language (XML). XML is an open industry standard developed by the World Wide Web Consortium to facilitate the exchange of structured data over the Internet. In other words, it helps computer systems "talk" to one another. XML is widely backed by all major technology companies, including Microsoft, IBM, and Sun Microsystems; in fact, many of their products, including Microsoft Office, already implement XML. But XML becomes more powerful when there is agreement within an industry on a common syntax. Professional medicine needs an organization like MedBiquitous to provide the vehicle for a consensus-building process of defining an XML vocabulary specific to medicine.

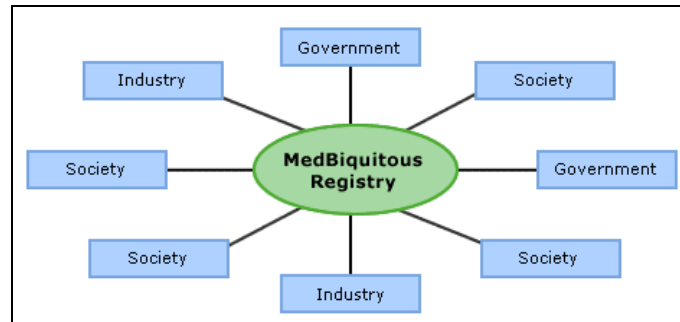
XML can be of enormous benefit to clinicians and their organizations. For example, the Content Management Working Group is developing a metadata standard that allows organizations to describe a piece of web content, such as a news article or policy statement. A common metadata standard would allow clinicians to search for and find highly relevant resources across a variety of high quality sources, including multiple society, industry, and government web sites. When combined with other XML standards, metadata allows societies to syndicate their web content, creating a revenue opportunity through delivering targeted information to clinicians trying to stay current.

Web Services

Web services bring together the online offerings of multiple entities, allowing societies to tunnel information and software services from key business partners through the societies' community portals. Disparate server software systems to work together as if they were parts of a single application. Through a directory of these Web services called a registry, systems can find and implement services that provide specific functionality or information.

Once MedBiquitous members have agreed upon an XML vocabulary, Web services will offer a way to integrate resources and services from a variety of other provider partners, including other online communities, journal publishers, government agencies, and pharmaceutical and device companies. Since Web services can be tunneled through existing community portals according to agreed upon MedBiquitous standards, societies could accomplish this integration cost effectively while maintaining the brand of their own web site. Pharmaceutical and device

companies could provide the latest product information to each society dynamically. And Web Services could allow a professional medical society to verify a physician's certification with the appropriate specialty board quickly and easily. MedBiquitous creates software tools called MedBiquitous Community Code that help organizations implement the MedBiquitous XML and Web services in working applications.



The MedBiquitous Registry – A Directory of Web Services

For more information on MedBiquitous technologies, see The MedBiquitous Software Architecture Document at http://www.medbiq.org/technology/tech_architecture/softwarearchitecture.pdf.

Membership

MedBiquitous has been designed to foster widespread collaboration and innovation across medicine. We welcome applicants who share our commitment to empowering medical educators and creating collaborative technologies that promote the competence of medical professionals.

The MedBiquitous Consortium offers members access to Internet technologies that can save them money and increase the reach and effectiveness of medical education. Members receive open source access to MedBiquitous Community Code (with certain licensing restrictions detailed in the Member Agreement) and full access to MedBiquitous XML.

In addition, members have the chance to:

- Collaborate with peers to advance medical education and solve common technology problems.
- Engage in a cooperative dialogue with society, government, and industry representatives in an open, neutral environment.
- Participate in working groups that determine how societies interact with each other and with their industry and government partners via the Web.
- Shape the Consortium's direction by initiating new working groups and being actively involved in the governance structure.
- Vote on the technical standards and policies that will shape the future of professional medicine.
- Reduce the costs and improve the quality of online educational resources for medicine

The following table outlines the annual fees for a three-year period for each membership category.

Membership Category	Consortium Fee
Individual Non-Profit Societies, Universities, and Government Entities	\$5,000 per year for 3 years
Groups of Non-Profit Societies Corporation, based on annual revenue:	\$15,000 per year for 3 years
Less than US \$15 million	\$7,500 per year for 3 years
US \$15 to 50 million	\$15,000 per year for 3 years
Over US \$50 million	\$50,000 per year for 3 years

The Board of Directors has representation from all categories with majority representation from society members.

If you are interested in joining the MedBiquitous Consortium, or you would like more information, please visit our website at <http://www.medbiq.org/>, or contact us using one of the following addresses or phone numbers.

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