

SMETE: Technology Provider for Exploratorium Online

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CONNECTING
Science
Mathematics
Engineering
Technology
Education



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Key Topics



- **SMETE and Exploratorium Online**
- **Background on SMETE**
 - NEEDS: Precursor to SMETE
 - Development of SMETE (and NSDL)
- **SMETE Technologies**
- **Demo**

SMETE Team @ Berkeley



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- **Alice Agogino**, Principal Investigator
 - **Brandon Muramatsu**, Project Director
 - **Jialong Wu**, Doctoral Candidate
 - **Eric Fixler**, Senior Software Architect
 - **Andi Niess**, Web Designer
 - **Shuang Song**, Doctoral Candidate
 - **Jonathan Hey**, Grad Student

Partnership



- **Builds on long-standing relationships**
- **Exploratorium Online's Strengths**
 - Informal education
 - Repository of resources
- **Chance to deploy technologies to other collections**

SMETE' s Strengths



- **Developed educational digital libraries for over 12 years**
- **Consulted with NSF on development of NSDL program**
- **Developed Open Federation of Partner Collections, Services and Organizations**
- **Participated in development of IEEE Learning Object Metadata**
 - IMS Metadata, IEEE XML-binding
- **Technologies**
 - Search, Federated Search
 - Recommender Systems, Metathesaurus
 - Middleware
- **Link research to production systems**

SMETE' s Activities for Exploratorium Online



- **Consulting**
 - Metadata
 - NSDL history and organization
- **Technology Provider**
 - Search for Exploratorium Online
 - Enable metadata harvesting of Exploratorium Online metadata by NSDL

- **Developing Educational Digital Libraries since early 1990's**
 - Synthesis Engineering Education Coalition
 - Educational reform in Engineering
 - NEEDS: National Engineering Education Delivery System
 - Develop, Deliver and Share Engineering Courseware
 - Repository of Synthesis Courseware and Search Technologies
 - Expansion of NEEDS leads to development of SMETE

How did we get from NEEDS to SMETE?

- **National Science Foundation and National Research Council examine a digital library for undergraduate science education from 1996-1998**
 - New funding under Special Emphasis in DLI2 and now NSDL programs
- **NEEDS already beginning to expand into physical sciences and mathematics in cataloging**
- **NEEDS as a technology-base through which we can extend to other disciplines**

The SMETE Open Federation



- **To build a successful National STEM Education Digital Library envisioned by NSDL Program...**
 - SMETE focuses on science, mathematics, engineering and technology at all levels
 - And more important, it focuses on education
- **...we needed to develop a collaborative team...**
 - To overcome the challenges and build upon work already underway
 - To cover target audiences and disciplines
 - To share in the development efforts

- **The SMETE Open Federation, individually and collectively, is committed to providing services...**
 - to support teaching and learning
 - across disciplines in science, mathematics, engineering and technology
 - providing access to high-quality resources
 - in support of education reform and cross-disciplinary learning
 - from K-12 to higher education to professional development

SMETE Open Federation

Collaborating Organizations and Projects/Collections

Access Excellence
(www.accessexcellence.org)

American Association for the
Advancement of Science
(www.aaas.org)

American Association of
Physics Teachers
(www.aapt.org)

Association of Women in
Science (www.awis.org)

BioQUEST Curriculum
Consortium
(www.bioquest.org)

Biosci Ed Net
(www.benproject.org)

Coalition for Networked
Information (www.cni.org)

CITIDEL (www.citidel.org)

ComPADRE/Physical
Sciences Resource Center
(www.compadre.org/
psrc.aapt.org)

Computer Science Teaching
Center (www.cstc.org)

Digital Chemistry
(
[ist-socrates.berkeley.edu/
~kubinec](http://ist-socrates.berkeley.edu/~kubinec))

Digital Library for Earth
Systems Education
(www.dlese.org)

Education.au Limited
(www.educationau.edu.au)

Education Development
Center (www.edc.org)

Eisenhower National
Clearinghouse (www.enc.org)

Exploratorium
(www.exploratorium.edu)

Gender and Science Digital
Library (www.gsdl.org)

iLumina
(www.ilumina-project.org)

Instructional Architect
(ia.usu.edu)

Interactive University
(iu.berkeley.edu)

Internet Scout Project
(scout.cs.wisc.edu)

Learning Matrix
(thelearningmatrix.enc.org)

Learning*Online* Network with
CAPA (www.lon-capa.org)

Mathematics Association of
America (www.maa.org)

MathDL (www.mathdl.org)

Math Forum
(www.mathforum.org)

MERIT Network
(www.merit.edu)

MERLOT
(www.merlot.org)

Michigan Teacher Network
(mtn.merit.edu)

National Center for
Supercomputer
Applications
(www.ncsa.org)

NEEDS—A Digital Library
for Engineering Education
(www.needs.org)

Project Kaleidoscope
(www.pkal.org)

SRI International, Center
for Innovative Learning
Technologies
(www.cilt.org)

University of California
Teaching and Learning
with Technology Center
(www.uctltc.org)

University of Maryland,
Baltimore County
(www.umbc.edu)

Utah State University
(www.usu.edu)

“Working” Description of “Educational” Digital Libraries



...or...how they go beyond traditional brick and mortar library or “research” digital libraries...

- **Either a repository or index to teaching and learning resources**
- **Directly supports teaching and learning activities of students**
 - Undergraduate and K-12
- **Provides support for adapting or adopting resources developed by others (through comments of use, lesson plans, etc.)**
- **Uses technology to support collaboration, personalization, recommendation of resources**
- **Supports communities of users**

And in SMETE’ s case...

- **Covers a wide range of science, mathematics and engineering subject areas, encouraging connections between disciplines**

- **Union Catalog and Federated Search**
 - OAI-PMH
 - Data provider (limited to *NEEDS Premier Award*)
 - Harvest other collections (DLESE)
 - Specialized Harvesting (Michigan Teacher Network and LON-CAPA)
 - Federated Search (MERLOT)
 - SOAP and WSDL
- **Multiple recommender systems**
- **Metathesaurus**
- **User Comments (Amazon.com)**
- **Cataloging systems**
- **“Peer Review”**
 - *NEEDS Premier Award*

SMETE and NEEDS: Today



- **Primary Audience:**
 - Engineering educators
- **Secondary Audience(s)**
 - Science, mathematics and technology educators
 - Undergraduate students
 - K-12 teachers and students
- **Systems:**
 - Commercial application & database servers
 - Production-quality systems
- **Metadata and Cataloging:**
 - IEEE Learning Object Metadata (1484.12.1-2003)
 - Exportable to Dublin Core
- **Contents:**
 - Almost entirely references to external websites/resources
 - Some historical “archives” (Synthesis)



- **SMETE is the technology platform**
 - Proof of concept and testing of new services
- **NEEDS is the collection of engineering related educational resources**
- **Multiple approaches to providing access to collections**
 - Federated Search (SOAP and WSDL) and Harvesting (OAI-PMH)
- **Multiple approaches to determining “Quality” that are more community based**

SMETE and NEEDS: Today (cont.)



- **Not Really an Archive**
 - Hold some materials
 - Could use Internet Archive techniques
 - Life-span and usefulness of educational resources tends to be limited
- **Metadata and services focus on more than bibliographic description**
 - “Context” of use
 - Recommending “Similar” resources



- **Transitions**
 - There will be a lot of change, evolving standards and specifications
- **Collaboration necessary**
 - One group can't do it all
 - Recognize strengths and history of partners
- **Build upon strengths of partners**
 - While SMETE.ORG can be a portal, it doesn't try to be the be all, end all

Contact Info



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