Development Vision

To contribute to the federated development of a global, interactive, digital learning space and community of learners in Science, Mathematics, Engineering and Technology Education (SMETE).
• Identifying Best Practices
  – Existing SMETE Digital Libraries
  – Lessons Learned From Existing Digital Libraries
  – Metadata
  – Publications Related to SMETE Digital Libraries
  – Services and Tools for Digital Libraries
  – Strategic Visions for the SMETE Digital Library
  – User Studies and Requirements Analysis for Digital Libraries
SMETE Digital Library Test-Bed Status Report

• SMETE Digital Library Test-bed Developed based on NEEDS Infrastructure
  – Improved interface
  – User Comments (user-based reviews)
  – User Registration
  – Improved Cataloging System

• Expanded Collections
  – Expanding into Chemistry, Physics, and Mathematics
  – Cataloged over 643 new learning objects since 9/98

<table>
<thead>
<tr>
<th>Total Collection</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>58%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>21%</td>
</tr>
<tr>
<td>Physics</td>
<td>14%</td>
</tr>
<tr>
<td>Math</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>2%</td>
</tr>
</tbody>
</table>
Example Record: www.smete.org
SMETE Digital Library Needs Assessment

Purpose:
To understand the math and science communities of educators and examine their needs in order to design services and structures to support users from multiple communities.

Research Questions:
• What services, features and programs are integral to success?
• What do users expect with regards to quality of the holdings?
• Who makes up the SMETE digital library community?
Needs Assessment Design

Method: 10 focus groups
(AAAS, AAPT, AMS, MC², & Learning on the Internet)

Participants:

<table>
<thead>
<tr>
<th>Type of Institution</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>70% 4-year universities</td>
<td>50% &gt; 10,000 students</td>
</tr>
<tr>
<td>20% Community Colleges</td>
<td>25% &lt; 2,000 students</td>
</tr>
<tr>
<td>10% K–12 Teachers/Prof. Orgs</td>
<td></td>
</tr>
</tbody>
</table>

Experience with Technology
- 97% use Instructional Technology
- 77% developed own Instructional Technology
- 69% use Instructional Technology developed by others
Findings, Trends, & Design Implications

Quality

• Library as a marketplace/shopping mall of ideas and products
• Contents range from “works in progress” to highly rated products
• “Peer review” includes cognitive science, pedagogy, curriculum and user reviews
Findings, Trends, & Design Implications

Community

• Communication potential is most highly valued
• A place for networking, learning from peers and communication — not just a repository
• Users look to their peers first to learn about teaching — strong discipline identify

Contents

• Library holdings should be diverse:
  problem sets to entire courses, books to data sets, visualizations and simulations, instructors’ guides and assessment tools
Translating Findings into Services & Features

Quality

- System to rapidly identify the quality of holding
- Place to comment about a learning object or regarding something of interest to the community
- Reviewers should include experts in pedagogy and content
Translating Findings into Services & Features

Community

• Embedded structures for developing and maintaining communication links
• Developing community should be on par with building content
• Build on discipline based communities to establish connection to a broader community

Content

• Useful content and community interaction will ensure user participation as authors, reviewers, adapters/adopters, and consumers
Implications for Building the SMETE Digital Library

The wide range of users...

<table>
<thead>
<tr>
<th>Those we understand</th>
<th>Those we need to understand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experts</td>
<td>Novices</td>
</tr>
<tr>
<td>Innovators</td>
<td>Adopters/adapters</td>
</tr>
<tr>
<td>Baby boomers</td>
<td>Gen-X</td>
</tr>
<tr>
<td>Technological “have’s”</td>
<td>Technological “have-not’s”</td>
</tr>
<tr>
<td>Instructors</td>
<td>Learners</td>
</tr>
</tbody>
</table>

...requires a flexible design, and an adaptable organizational structure.
SMETE Digital Library Prototype Project Goals

• **Expand partnerships**
  – Math Forum at Swarthmore College
  – University of California Nexus K–12 project

• **Collaborate with partners to develop the SMETE Digital Library Prototype**
  – test interoperability of federated searches and shared services with partners
  – expand requirements analysis to include K–12
  – develop criteria and standards to assess the impact of learning objects across disciplines
  – implement community feedback systems and evaluate services
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Copies of this presentation will be available at:
http://www.smete.org/smete/info/presentations/
Research in Community Development

“Creating a Digital Learning Spaces for Science, Mathematics, Engineering and Technology Education”

– Develop a controlled vocabulary and semantic structures for SMET education

– Apply to organizing, indexing and retrieving educational materials stored in NEEDS (as a test-bed SMET Digital Library) and in federated searchers

– Use to structure discussion among our community of learners
- National digital library developed within the Engineering Coalitions program (1990-1999)
- Established Quality Review Programs
- Expanding to include Science, Mathematics, Engineering and Technology Education (SMETE)
- Developing digital learning spaces for SMETE teaching & learning communities
The Premier Award for Excellence in Engineering Education Courseware

• A national competition to identify and reward the authors of high-quality, non-commercial courseware designed to enhance engineering education
  – The *Premier Award* is about the entire experience of using the courseware by learners, not just the courseware itself

• A dissemination system to distribute the Premier Courseware (via CD’s, ASEE Prism ads, presentations at FIE and ASEE)