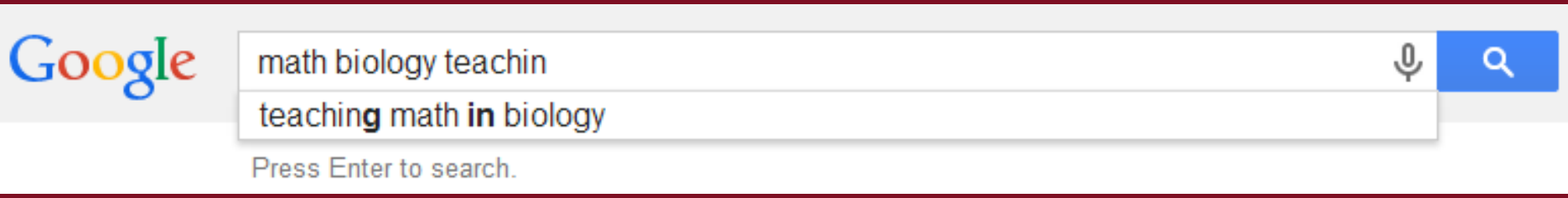
QUBES: A vision of community collaboration in teaching and learning in quantitative biology

BEER QUBES 2014

M. Drew LaMar, The College of William and Mary
Carrie Diaz Eaton, Unity College

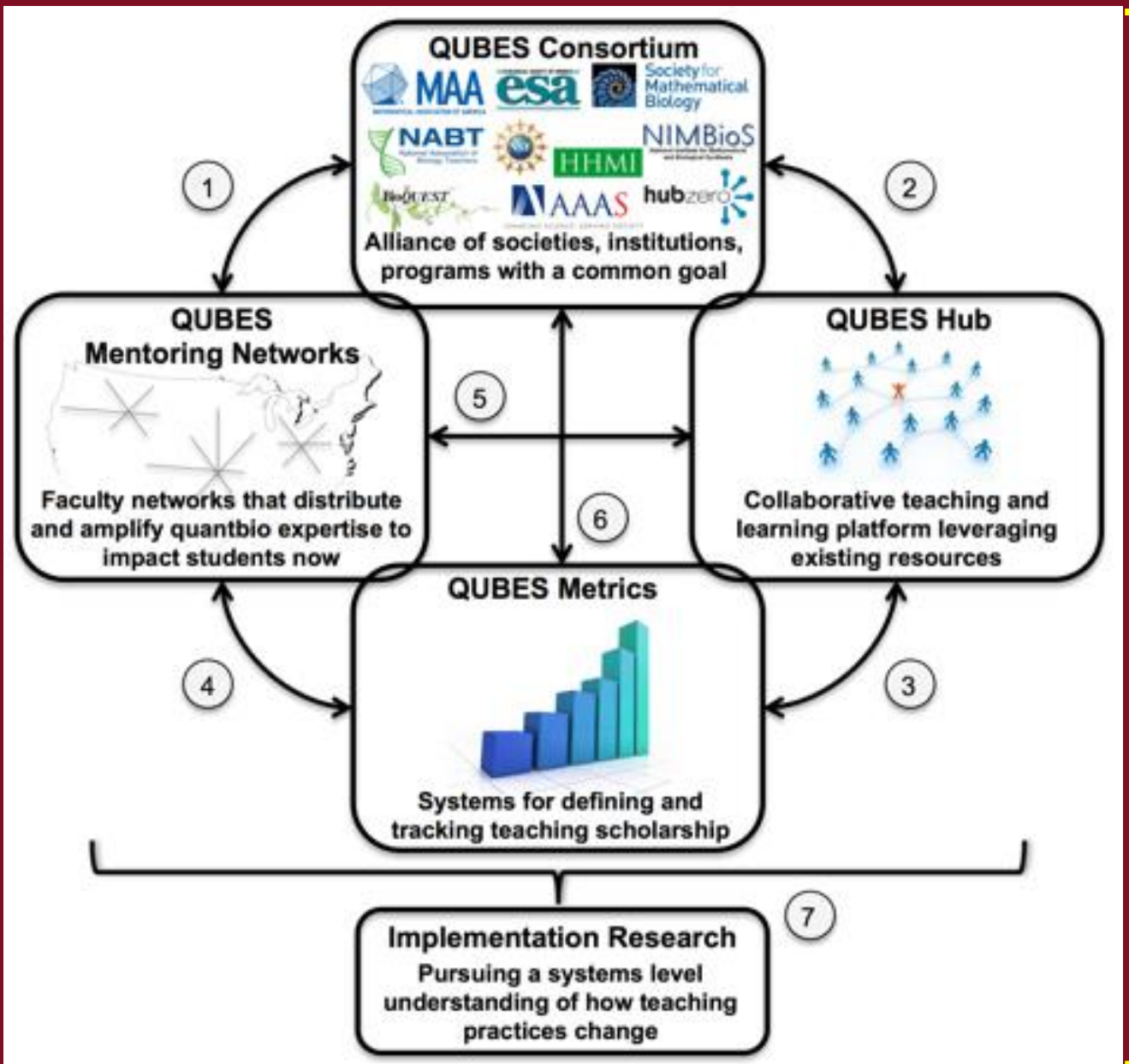
NSF grants DBI-1346584 and DUE-1446258

QUBES: Quantitative Undergraduate Biology Education and Synthesis



The synthesis problem: Entities from mathematics and biology are working independently to create curriculum content at the interface of these two fields, with the intended audience both mathematics and biology students.

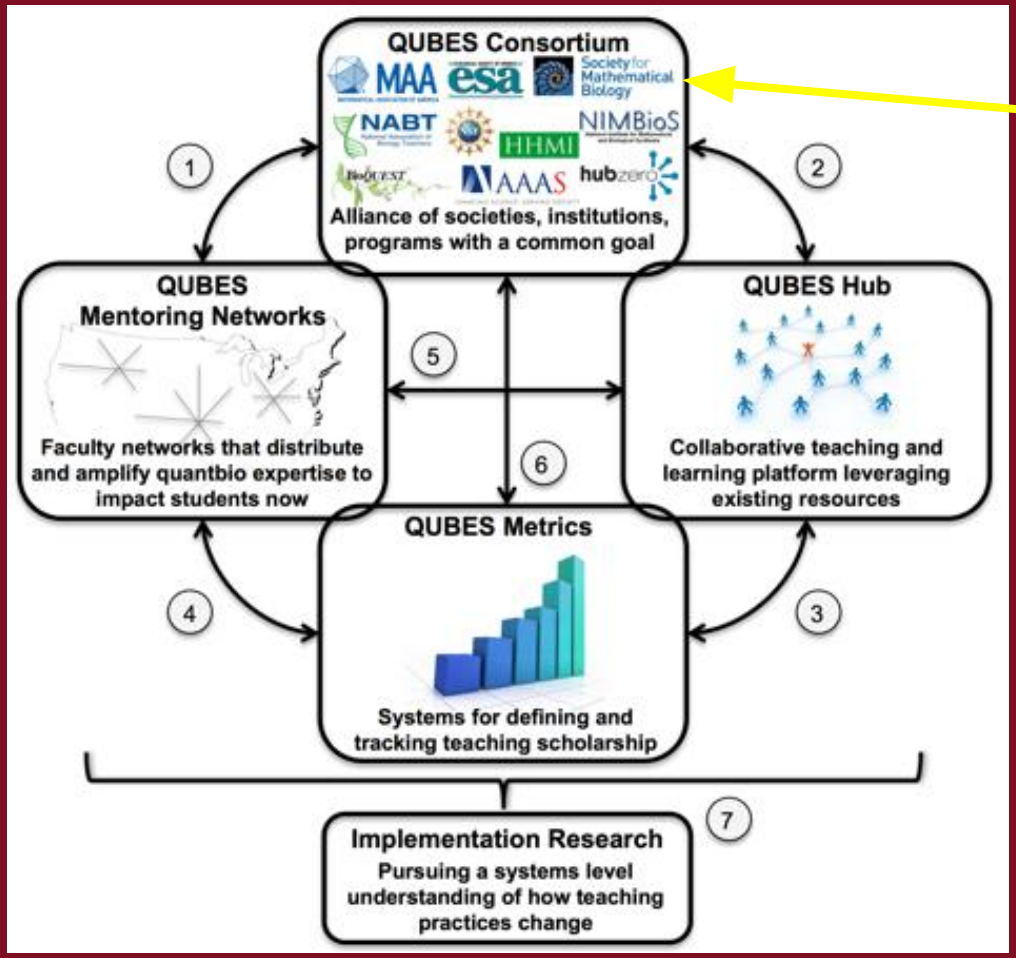
How do we bring it all together??



Scope of work under the $2.9 million NSF IUSE Ideas Lab grant.

- W&M,
- Unity College,
- Roanoke College,
- Radford,
- UPitt,
- UW, and
- BioQUEST

QUBES Consortium



- Communications with community, Consortium liaisons, and advisory board.
- Develop partnerships,
- Leverage resources,
- Education and Outreach plans

Talk to:
Carrie Diaz Eaton

QUBES Consortium members

QUBES Consortium:

- NSF
- NIMBioS
- BioSIGMAA
- SMB
- MBI
- AAAS
- HHMI
- BioQUEST
- 10 other institutions and organizations

QUBES Activities

to connect the community

BIO-SIGMAA and NSF RCN Incubator Grant start

Development team meeting at RC

Summit at NIMBioS at UT Knoxville

Submitted NSF IUSE Ideas Lab Proposal

$2.9 million, 5-year NSF IUSE award

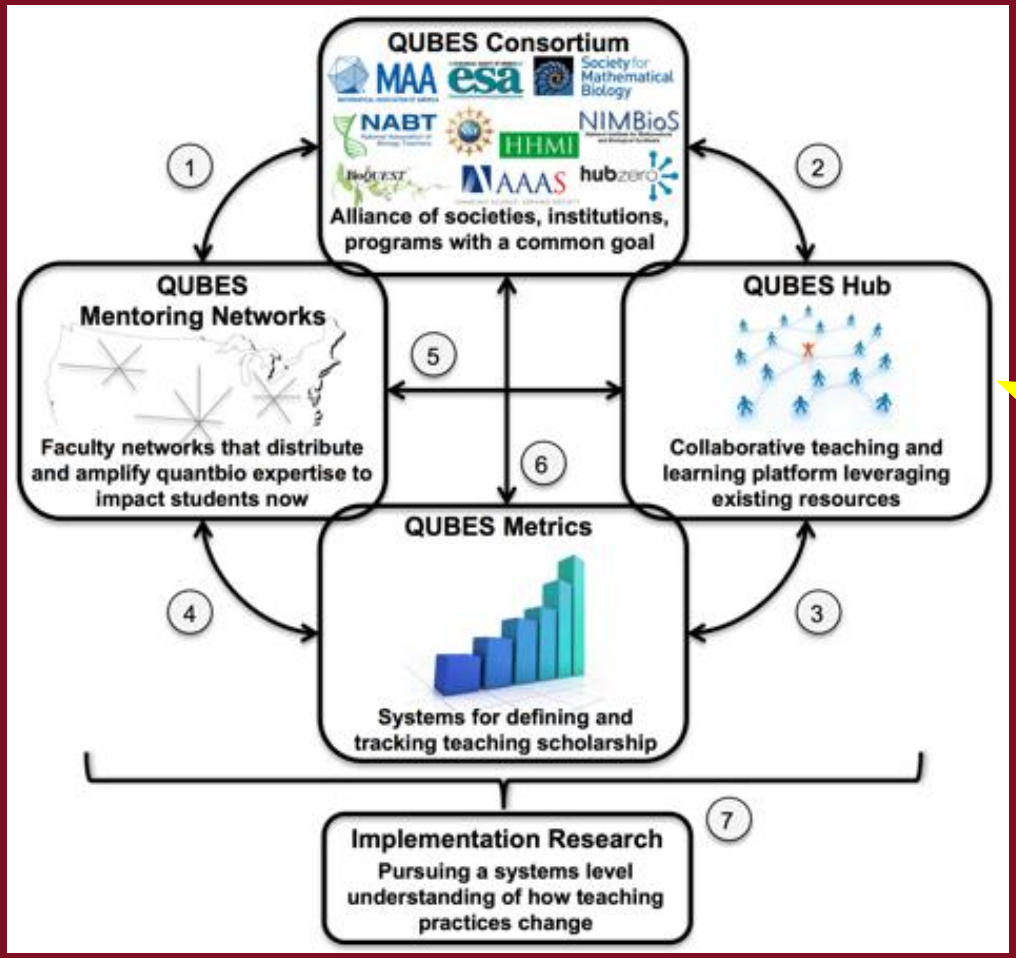
QUBESHub, HubZero site online

Jan 2014 | Mar | May | June | Sept | January 2015

Consortium vision for QUBES

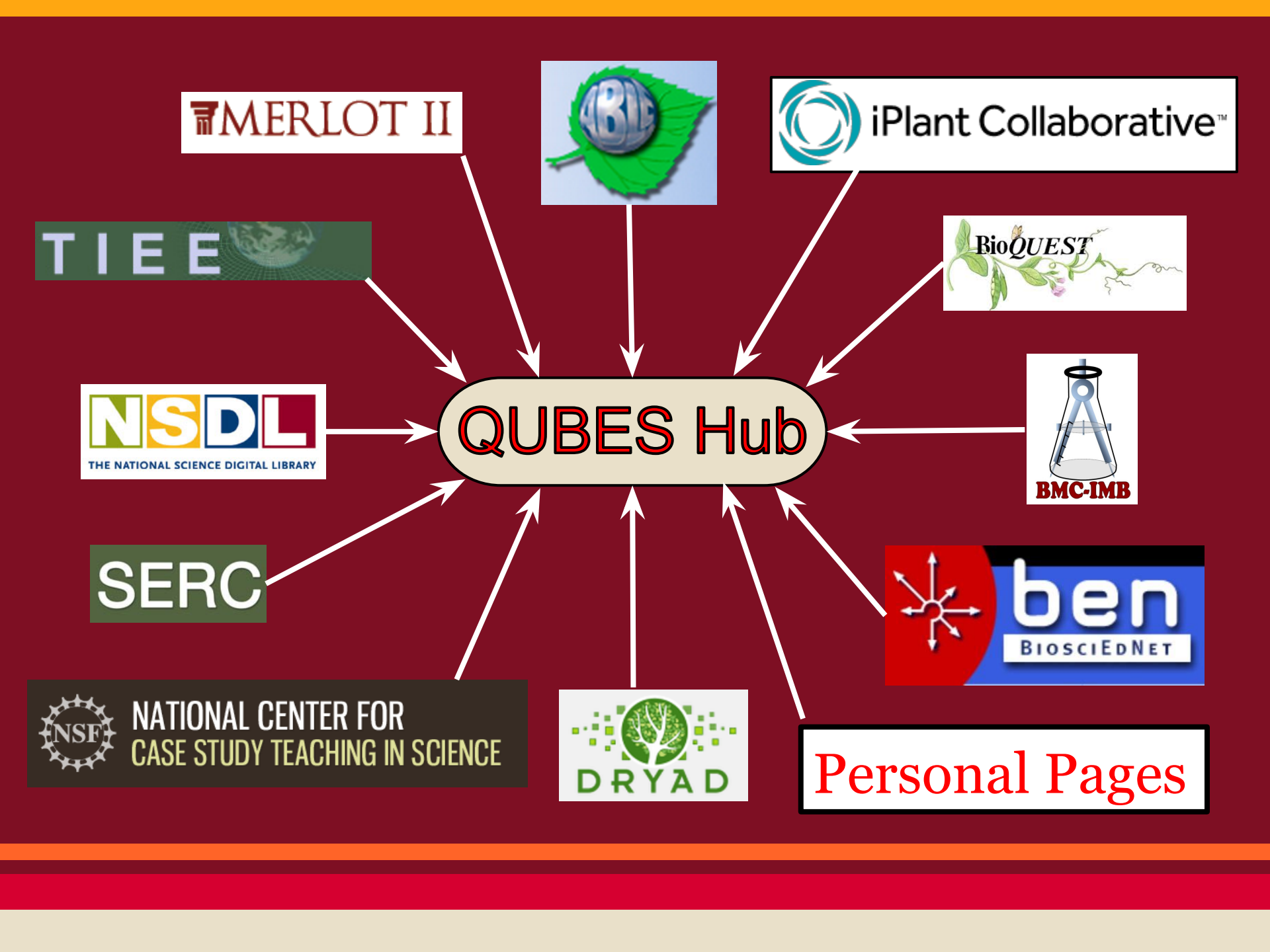
- To **build community** around quantitative biology;
- To use the **synergy of multiple organizations** to reach goals;
- To **facilitate collaboration** and communication at the interface of mathematics and biology (broadly defined) for education and research;
- To **promote** the use of mathematics in understanding biology;
- To use the questions of **biology to motivate** new mathematics;
- To **share information** about uses of quantitative biology to the public, including literacy skills and career options (Vision and Change and Rising above the gathering storm);
- To develop, share, adopt, and implement **effective pedagogical methods** and curriculum in quantitative biology;
- To **build faculty confidence** with training, mentoring, and support (faculty professional development, letters of support for new faculty, in particular in underserved populations).

QUBES Hub



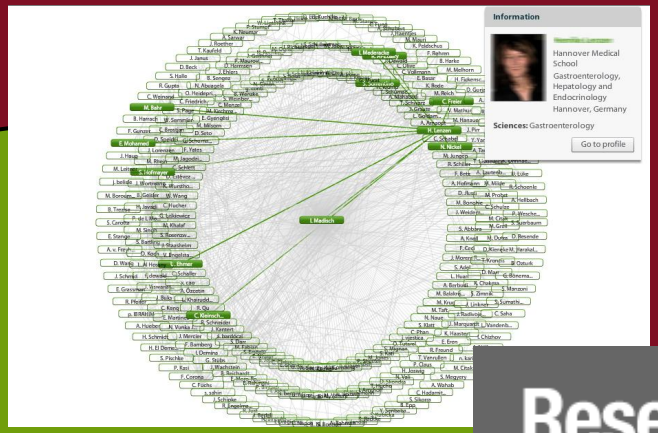
Virtual space to bring the math-biology education community together.

Hub Team w/HubZero:
M. Drew LaMar
Bob Sheehy
DB Poli
Jennifer Cartier
Anil Shende
Michael McLennan
J. Patrick Mulligan


MERLOT II
iPlant Collaborative
TIEE
BioQUEST
NSDL
THE NATIONAL SCIENCE DIGITAL LIBRARY
QUBES Hub
BMC-IMB
SERC
ben
BIOSCIEDNET
NATIONAL CENTER FOR
CASE STUDY TEACHING IN SCIENCE
DRYAD
Personal Pages

WIKIPEDIA
The Free Encyclopedia

Multimedia-rich content pages



bioRxiv beta

Development Sandbox

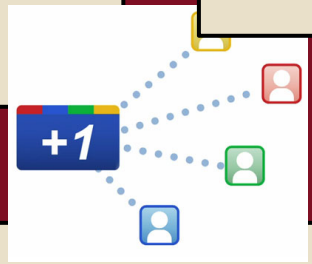
arXiv.org

ResearchGate
SCIENTIFIC NETWORK

All in an *integrated*, user-friendly way

Profile ability

Rate shared material



Share material hosted anywhere

Easy to search

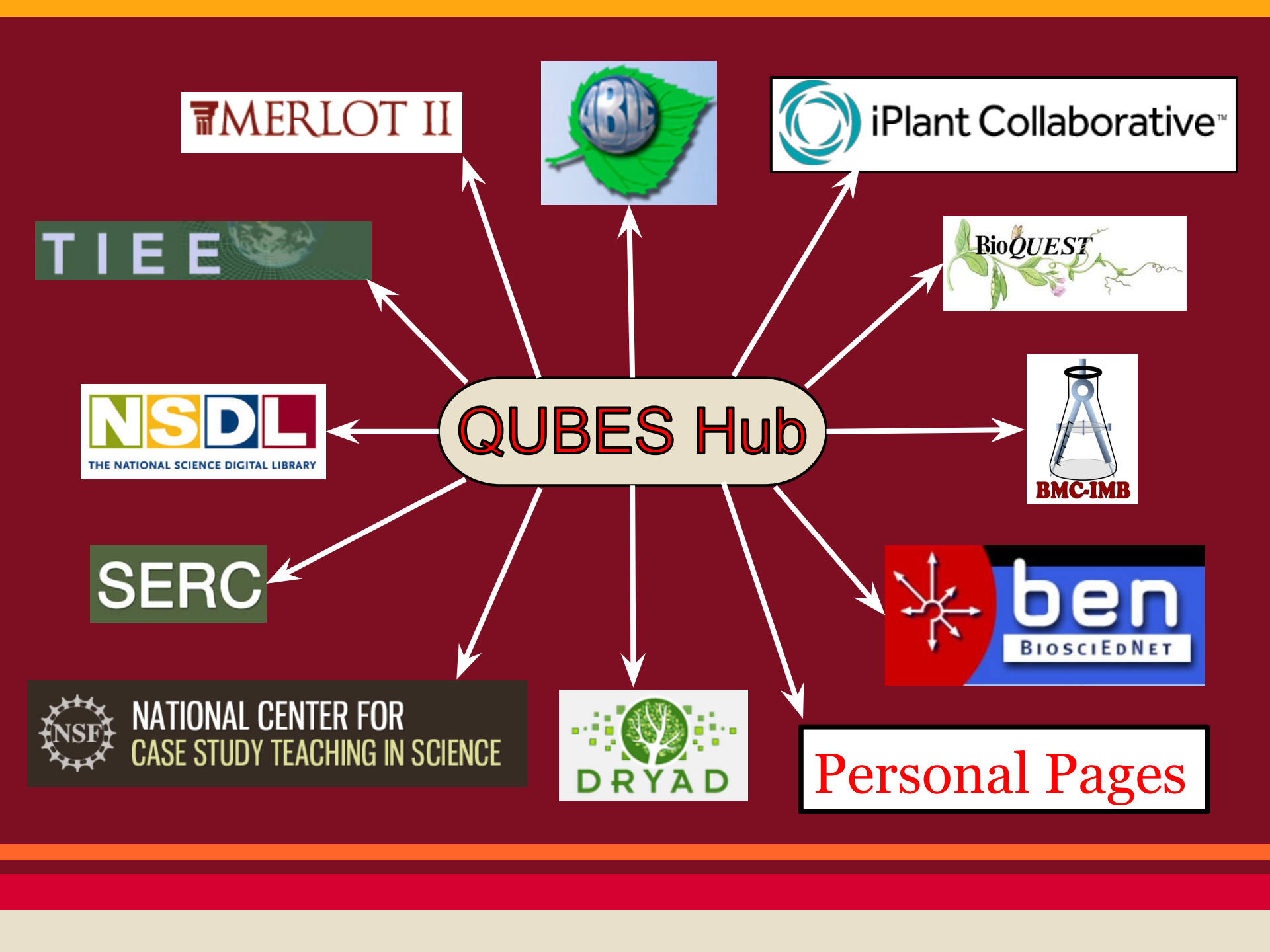
allrecipes.com

Provide feedback to authors

IBM WATSON

From Idea to Product

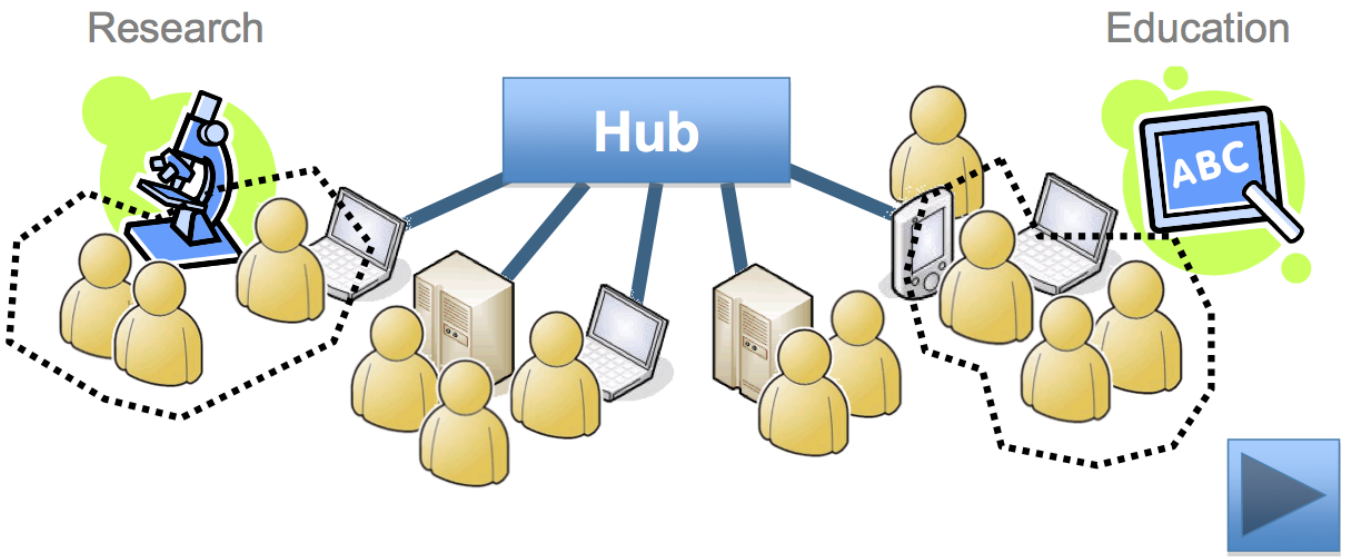
http://www.webmd.com/parenting/d2n-stopping-germs-12/slideshow-kids-germs-handwashing
http://sf.funcheap.com/event-series/carve-san-francisco-sandcastle-building-contest/


MERLOT II
iPlant Collaborative
TIEE
BioQUEST
NSDL
THE NATIONAL SCIENCE DIGITAL LIBRARY
QUBES Hub
BMC-IMB
SERC
ben
BIOSCIEDNET
NATIONAL CENTER FOR
CASE STUDY TEACHING IN SCIENCE
DRYAD
Personal Pages

Vision for QUBES Hub

1. Foster collaboration beyond silos (language!)

HUBzero: Group/Project Collaboration

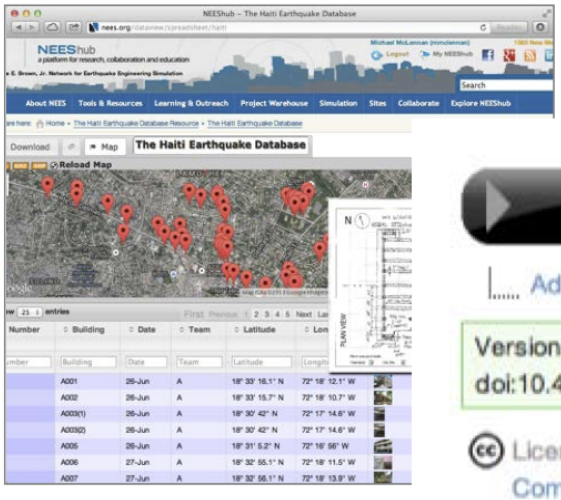


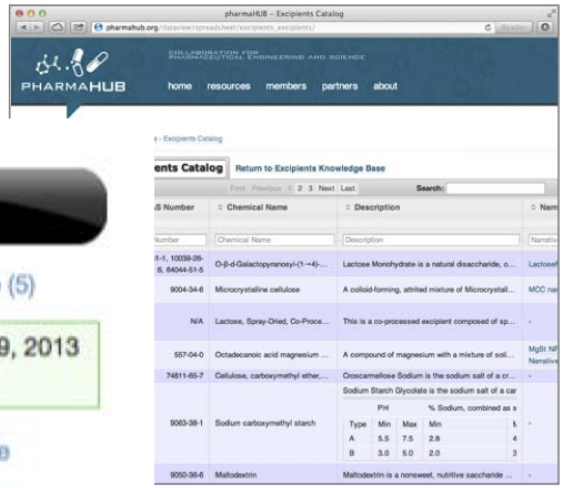
- ✓ Private groups/projects for collaboration
- ✓ Messages, wikis, blogs, calendars
- ✓ Data repository with versioning

Vision for QUBES Hub

1. Foster collaboration beyond silos (language!)
2. A hub/repository for multiple types of curriculum/research objects, such as:
    a. labs, data, modules, assessments (*version control, customizable*)
    b. web-based simulators/data analyzers
    c. implementation guides

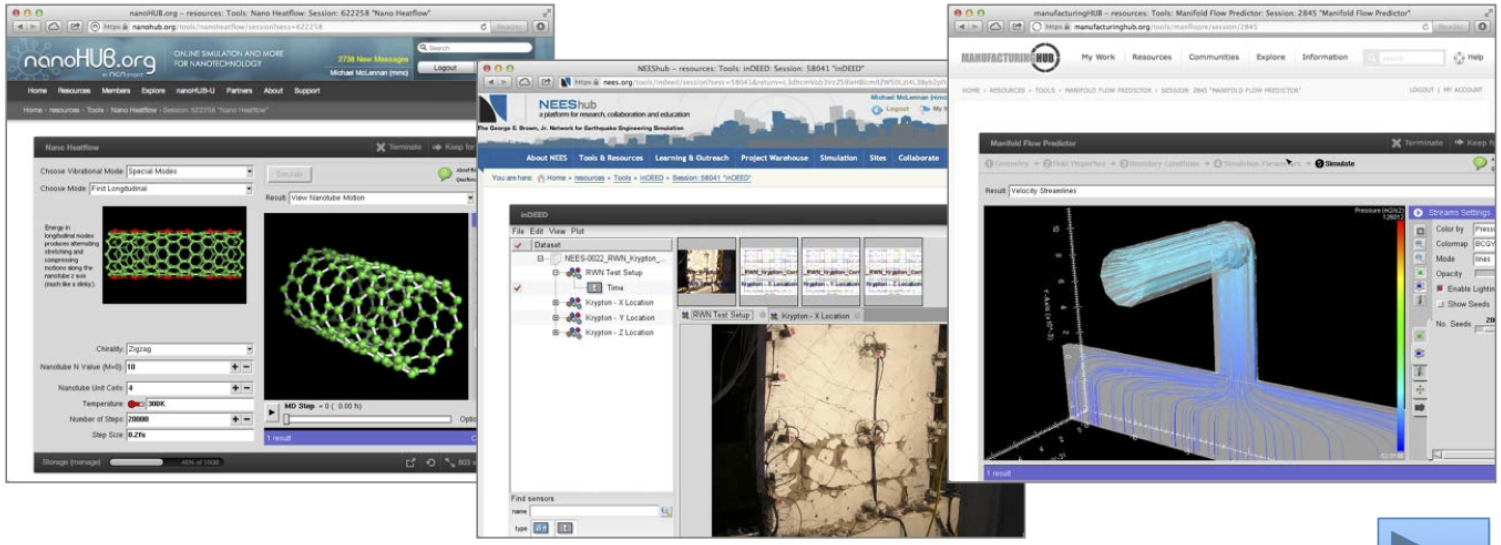
HUBzero: Databases and Digital Assets





- ✓ Databases and digital publications
- ✓ Uploaded by researchers in the community
- ✓ Digital Object Identifiers and license options
- ✓ Data ↔ tools for analysis

HUBzero: Simulation/Modeling Tools



- ✓ Powerful research codes
- ✓ Uploaded by researchers in the community
- ✓ Run on cloud/grid/cluster resources
- ✓ Integrated visualization

Vision for QUBES Hub

1. Foster collaboration beyond silos (language!)
2. A hub/repository for multiple types of curriculum/research objects, such as:
   a. labs, data, modules, assessments (*version control, customizable*)
   b. web-based simulators/data analyzers
   c. implementation guides
3. Nested tagging system, a powerful search engine, and fluid content navigation tools

Vision for QUBES Hub

1. Foster collaboration beyond silos (language!)
2. A hub/repository for multiple types of curriculum/research objects, such as:
   a. labs, data, modules, assessments (*version control, customizable*)
   b. web-based simulators/data analyzers
   c. implementation guides
3. Nested tagging system, a powerful search engine, and fluid content navigation tools
4. Ability for informal and formal peer review

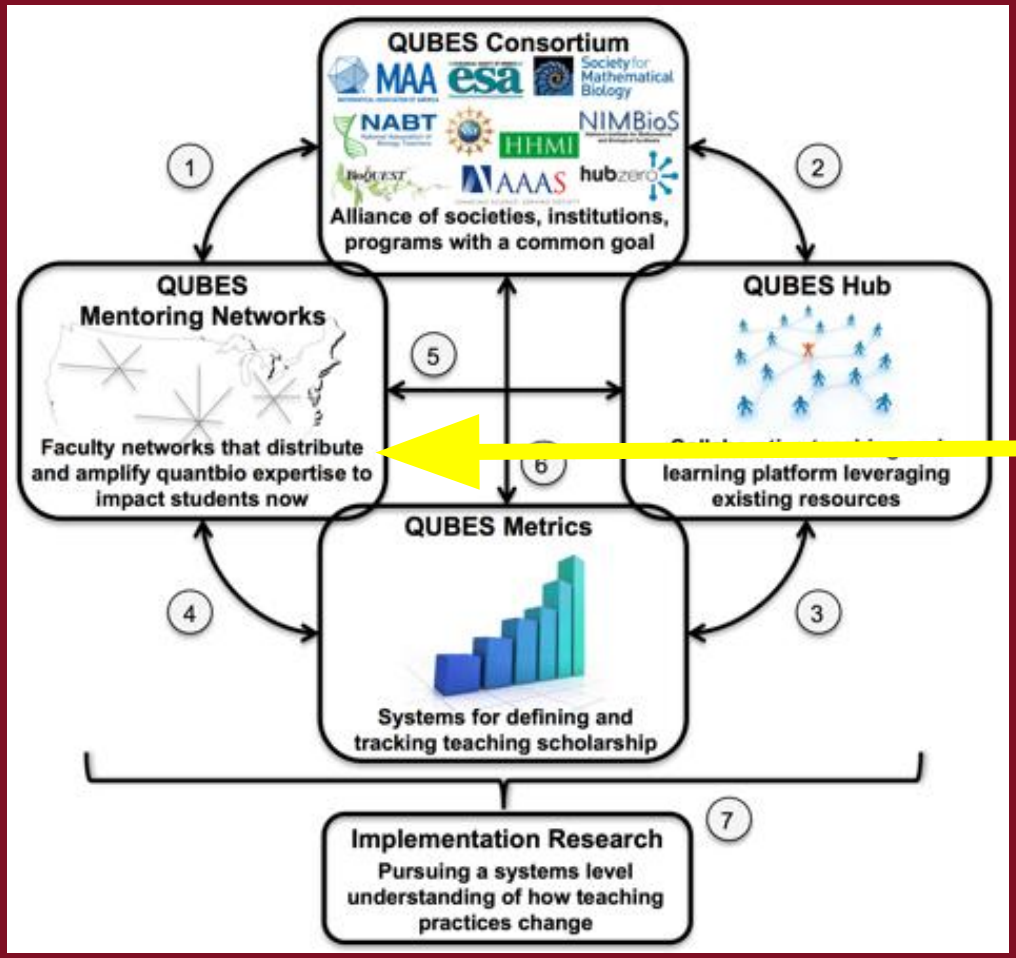
More than just a repository

With the ability to like, rate, dynamically add and link content.

A HUB where curriculum content can be *created*, **shared**, **modified**, **stored**, and **organized**, all in a heavily **social**, **adaptive** and **collaborative** context.

QUBES Hub

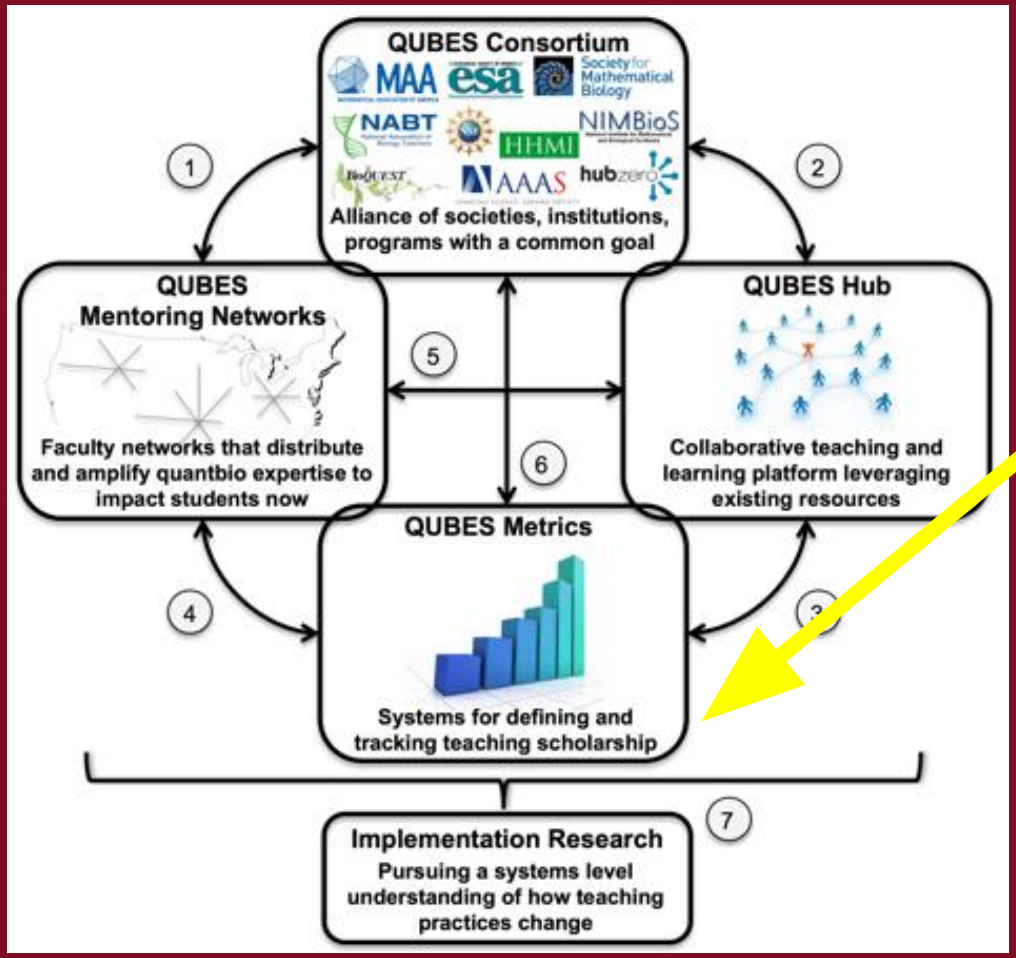
QUBES Mentoring Networks



- Distributing Faculty Expertise
- Mentoring programs
  - F2F and virtual
- Community curriculum development and assessment

Talk to:
Sam Donovan
Jeremy Wodjak
Kristin Jenkins

QUBES Metrics

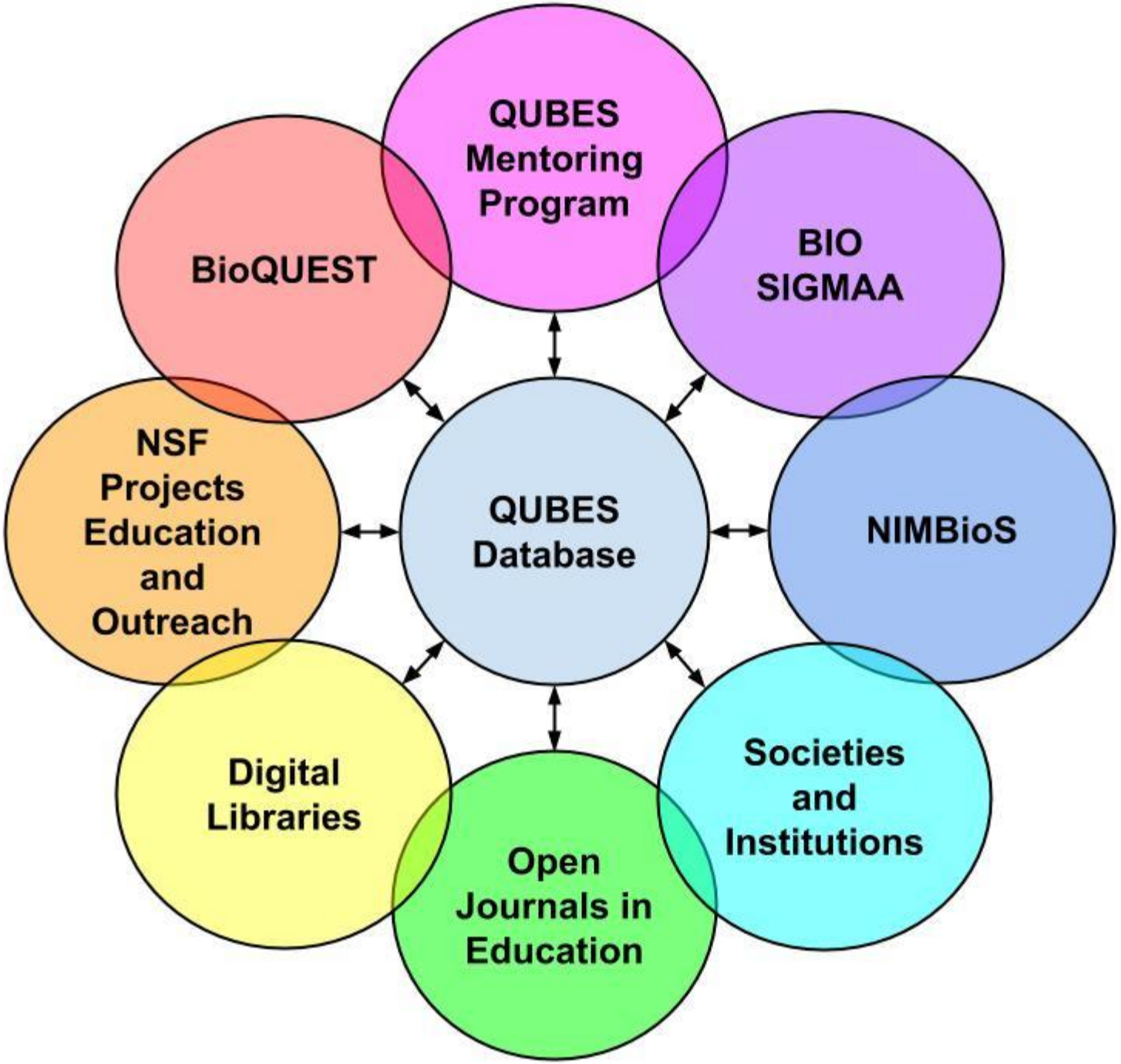


- Defining teaching scholarship
- Tracking teaching scholarship

Talk to:
S. (Tom) Gower

- Systems level understanding of how teaching practices change

Talk to:
Sam Donovan


QUBES Mentoring Program
BioQUEST
BIO SIGMAA
NSF Projects Education and Outreach
QUBES Database
NIMBioS
Digital Libraries
Open Journals in Education
Societies and Institutions

Consortium Vision for QUBES

- To build community build around quantitative biology;
- To use the synergy of multiple organizations to reach goals;
- To facilitate collaboration and communication at the interface of mathematics and biology (broadly defined) for education and research;
- To promote the use of mathematics in understanding biology;
- To use the questions of biology to motivate new mathematics;
- To share effective practices for teaching quantitative biology to the public; including literacy skills and career options (Vision and Change and Rising above the gathering storm);
- To develop, share, adopt, adopt, implement effective pedagogical methods and curriculum in quantitative biology;
- To build faculty confidence with training, mentoring, and support (faculty professional development, letters of support for new faculty, in particular underserved populations).

Math + biology education working together on curriculum, professional development, and outreach

Thank you for your attention

- Stay for more awesome details on other portions of the project.
- Thank you to our QUBES Consortium partners.
- Thank you to those that believed in us.

NSF grants DBI-1346584 and DUE-1446258

QUBES

Ideas for future work together

- Allowing partners to leverage each other's expertise
- Ongoing funding proposals out to scale up the level of the QUBES Hub
- Adding partnerships with K-12 and ongoing NSF UBE projects

From “Poop” to Product

http://www.webmd.com/parenting/d2n-stopping-germs-12/slideshow-kids-germs-handwashing
http://sf.funcheap.com/event-series/carve-san-francisco-sandcastle-building-contest/