Distributing quantitative faculty expertise to classrooms that need it

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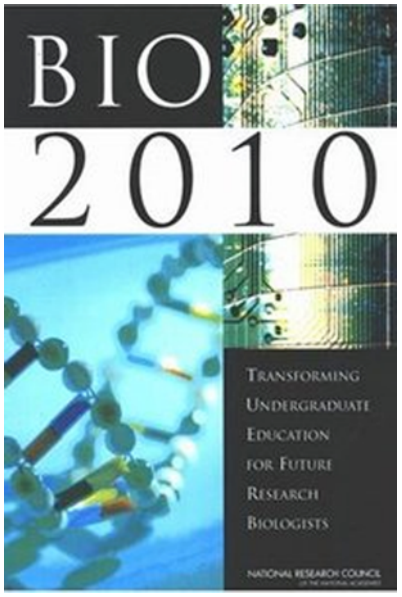


Why haven't we fixed this already?

Defining the challenge…

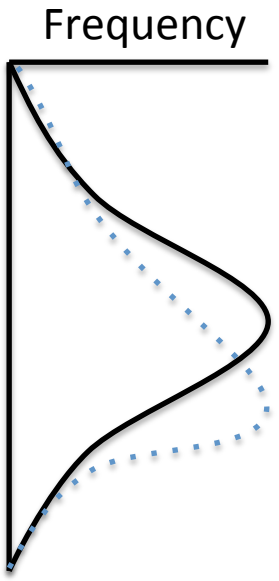
Ideas Lab

Why haven't more faculty made the change to increase quantitative rigor in their courses?

Faculty development

- **Faculty perspectives**

Faculty perspectives:
I can't add (math), I have to teach _____ !
I know it's important, but I'm not a modeler…
Everyone must do math!



Solution should focus on…

- … lowering the activation energy for faculty that already want to change.

- **Difficulty implementing existing classroom resources**
  - **Awareness** ← **Traditional "faculty development workshops"**
  - **Adapting**
  - **Assessing** ← **The hard part…**

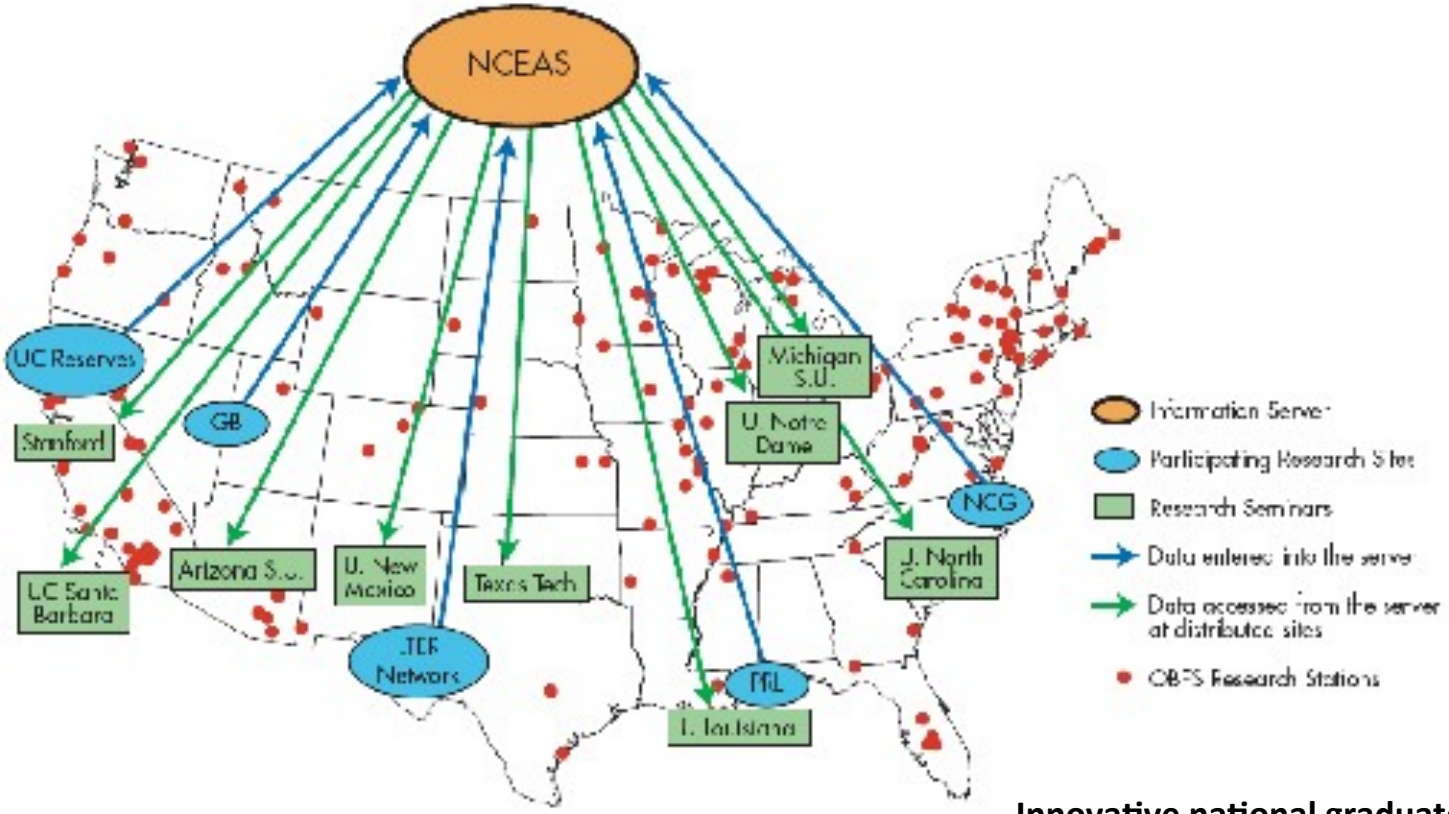
Solution should focus on…

- … lowering the activation energy for faculty that already want to change.
- … providing help **AS** faculty are teaching.

Inspiration

NCEAS Distributed graduate seminars

National Center for Ecological Analysis and Synthesis



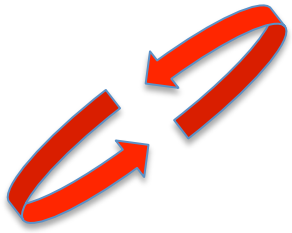
Developing an Interdisciplinary, Distributed Graduate Course for Twenty-First Century Scientists
Wagner et al. *BioScience* 2012

Innovative national graduate student seminar analyzes habitat conservation plans. LT Savage, *Integrative Biology: Issues, News and Reviews* 1998.

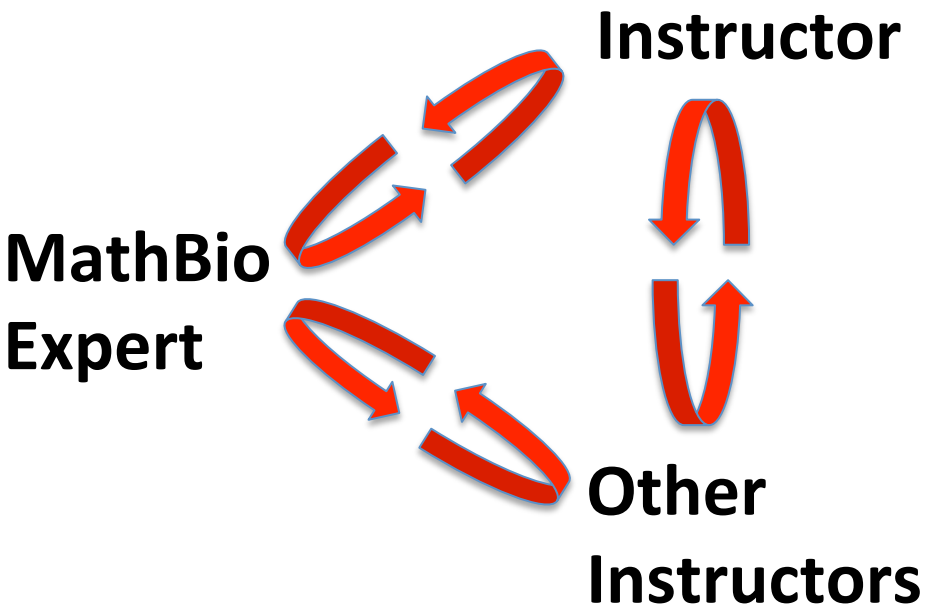
”… teaching does not provide for a shared culture based on the movement from knowledge to experience in the company of one’s peers…Once graduated from a preparation programme, teachers find themselves alone in the classroom without a peer or supervisor (support structure) in sight.”
Lieberman and Miller

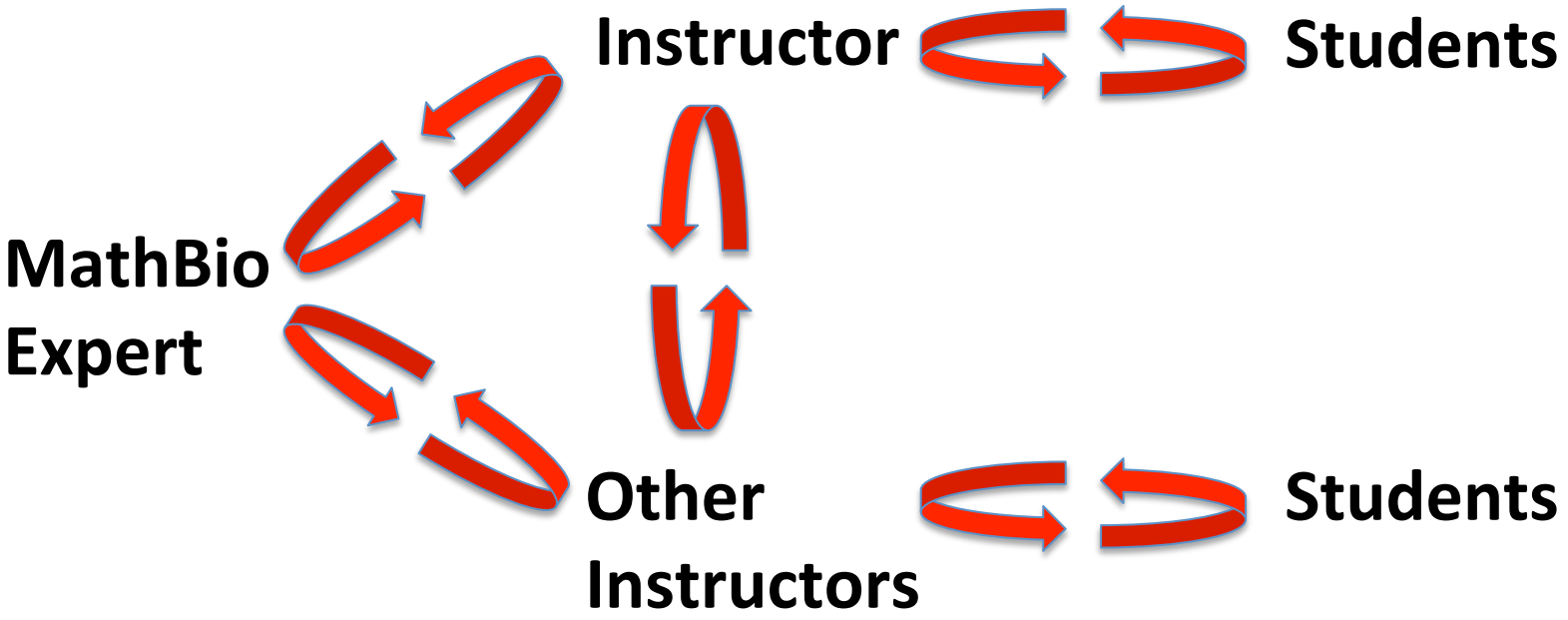
Instructor

Instructor



MathBio Expert


Instructor
MathBio
Expert
Other
Instructors


Instructor
Students
MathBio
Expert
Other
Instructors
Students

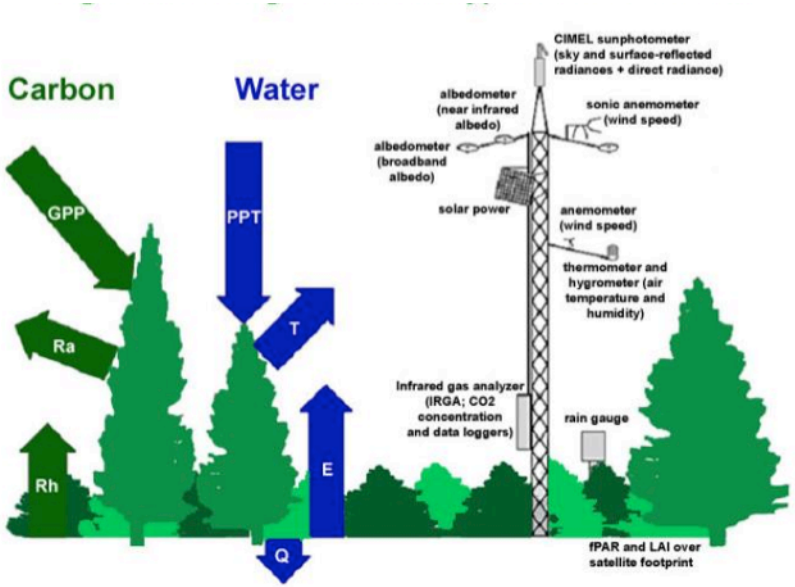
“How do I make math interesting and relevant?”

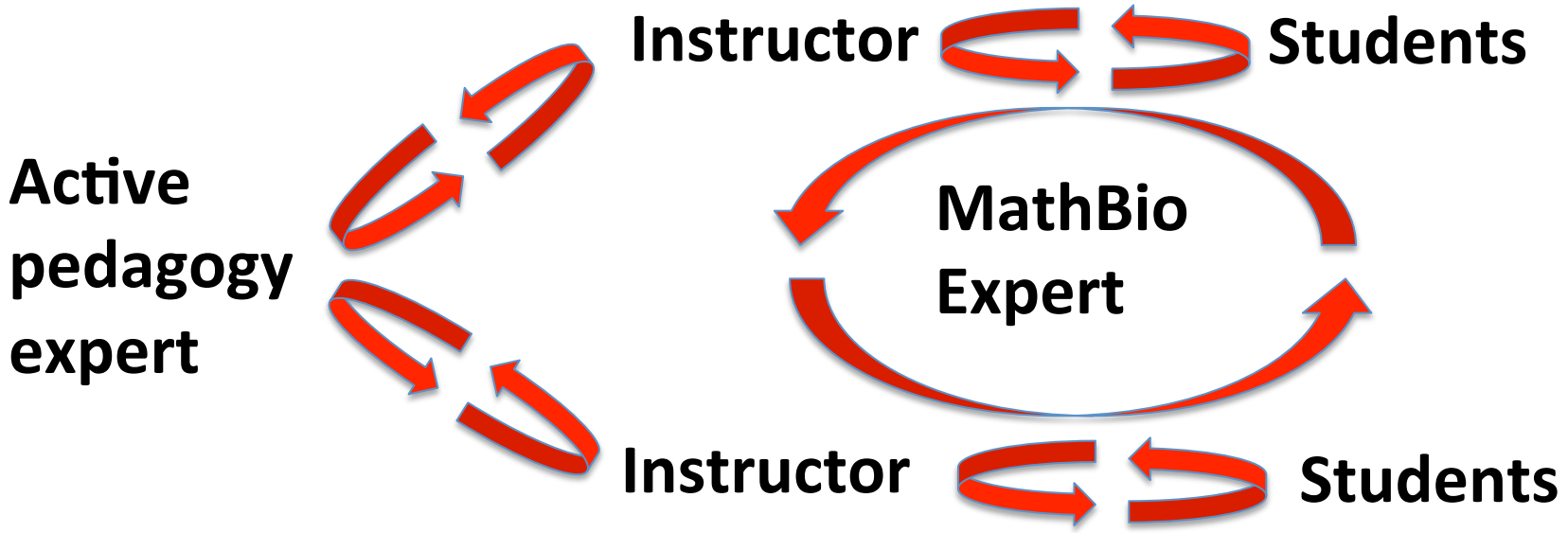
New faculty ⇄ **Students**

Ecosystem ecologist

Community college faculty ⇄ **Students**

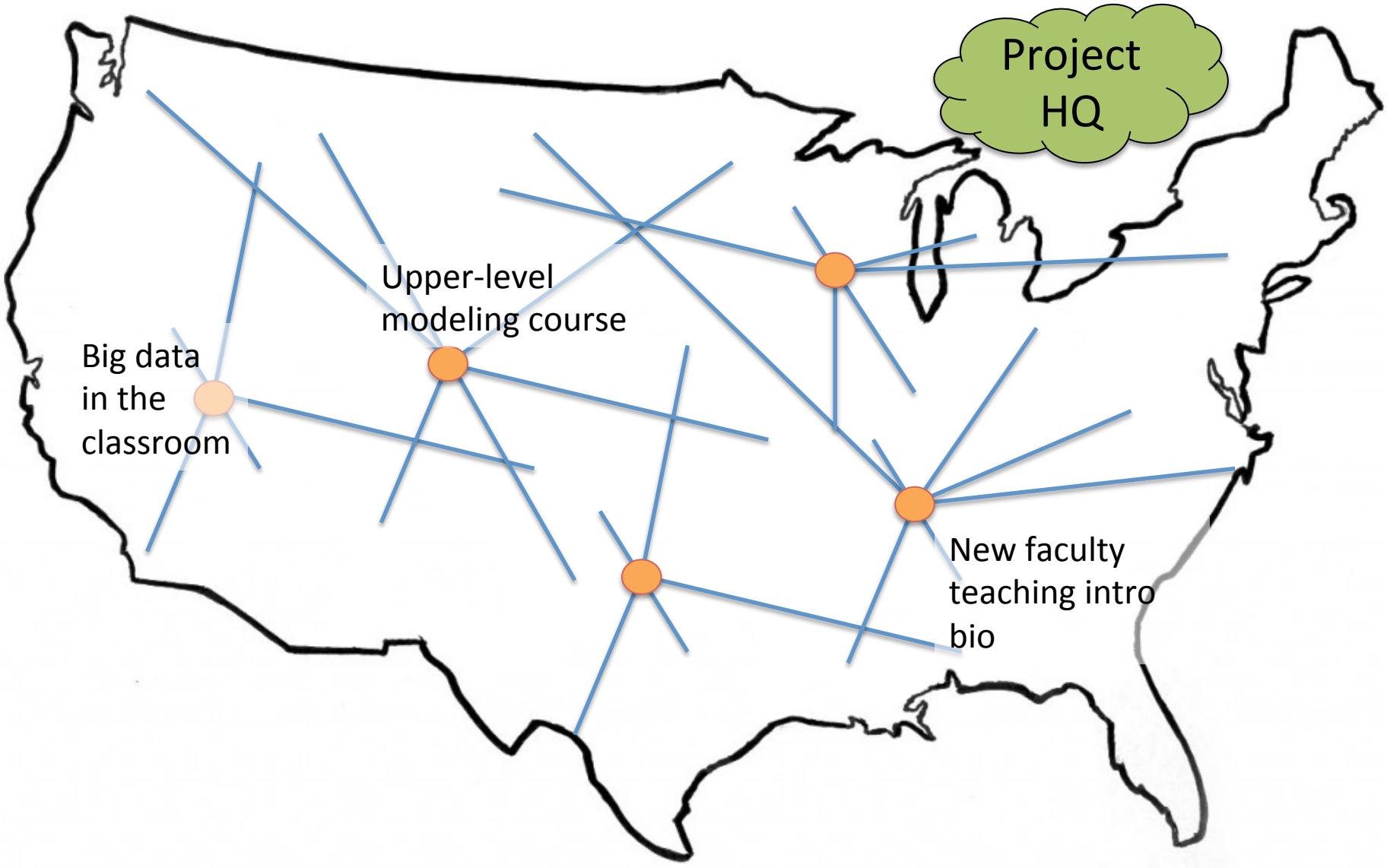
“I took math 25 years ago…”



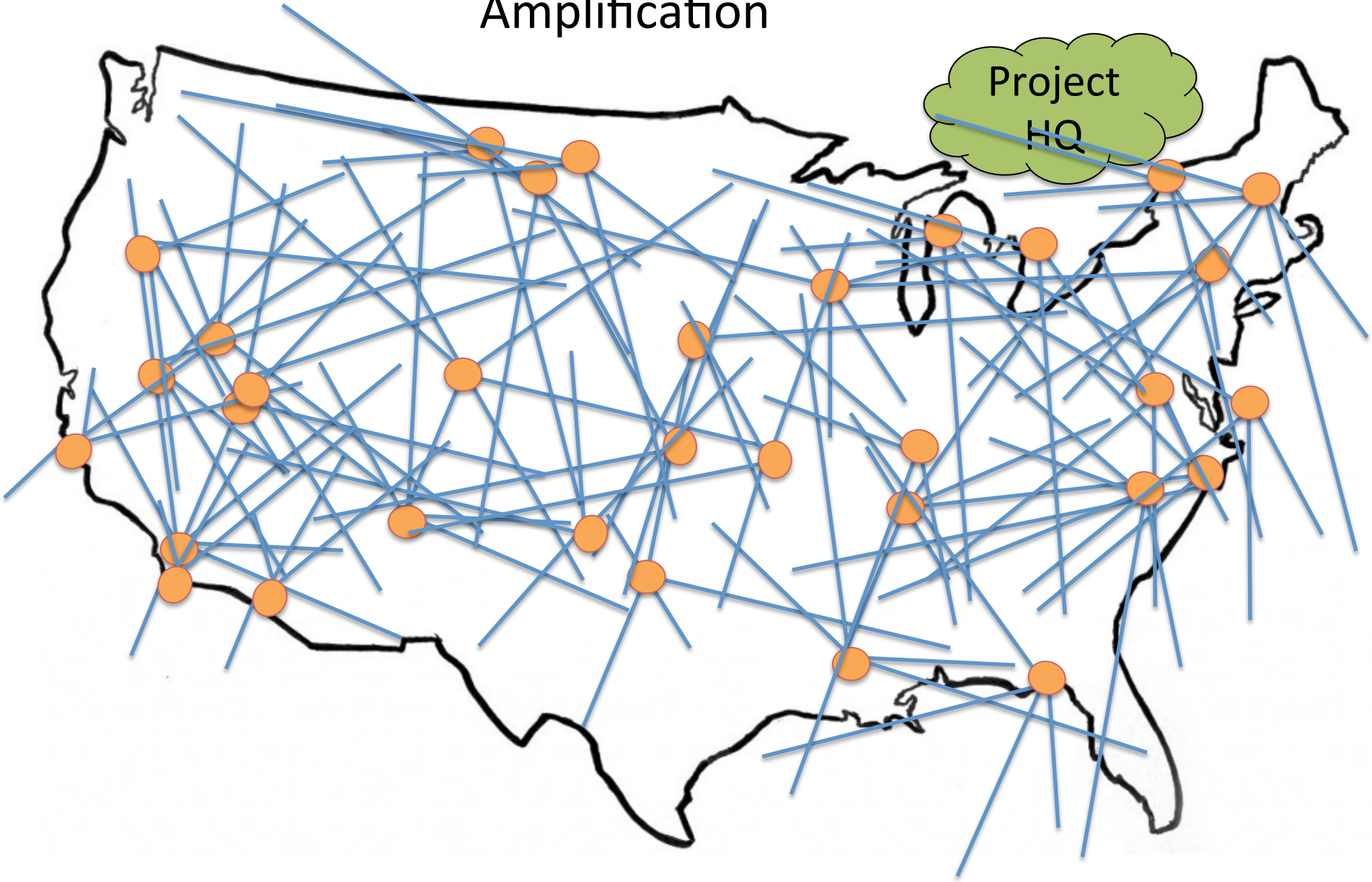

Instructor
Students
Active pedagogy expert
MathBio Expert
Instructor
Students

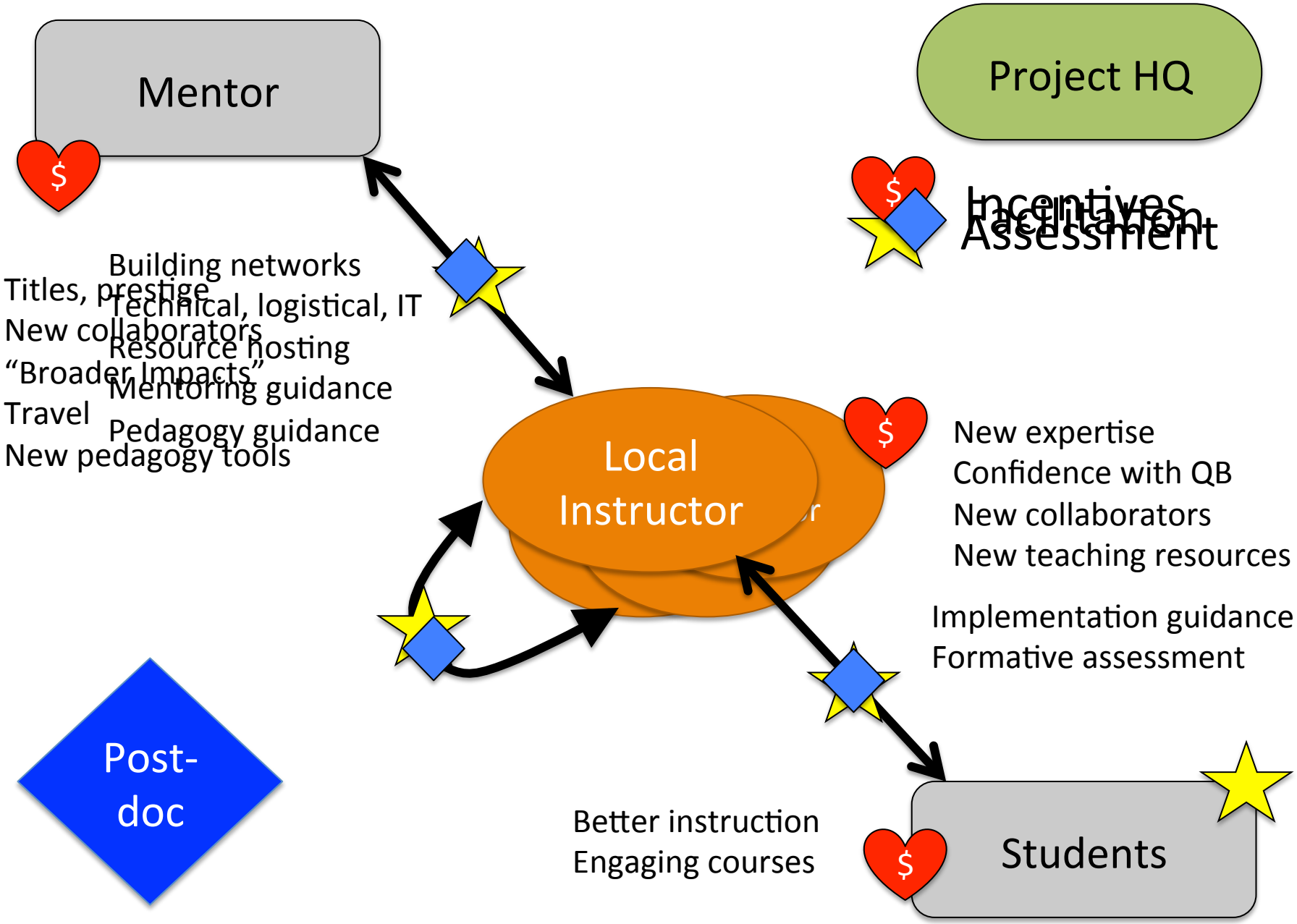
Core Mission

- To **create and assess a family of faculty mentoring models that distribute and amplify existing quantitative science expertise**, through collaborative development and implementation of instruction.


Project HQ
Upper-level modeling course
Big data in the classroom
New faculty teaching intro bio

Amplification

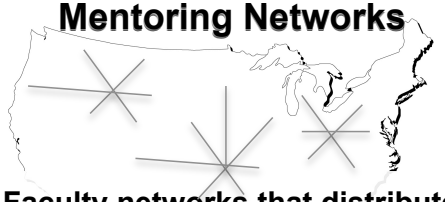



Mentor
Project HQ
$
$
Incentives
Facilitation
Assessment
Building networks
Technical, logistical, IT
Resource hosting
Mentoring guidance
Pedagogy guidance
Titles, prestige
New collaborators
“Broader Impacts”
Travel
New pedagogy tools
Local Instructor
$
New expertise
Confidence with QB
New collaborators
New teaching resources
Implementation guidance
Formative assessment
Post-doc
Better instruction
Engaging courses
$
Students

QUBES Consortium

Alliance of societies, institutions, programs with a common goal

QUBES Mentoring Networks



Faculty networks that distribute and amplify quantbio expertise to impact students now

QUBES Hub

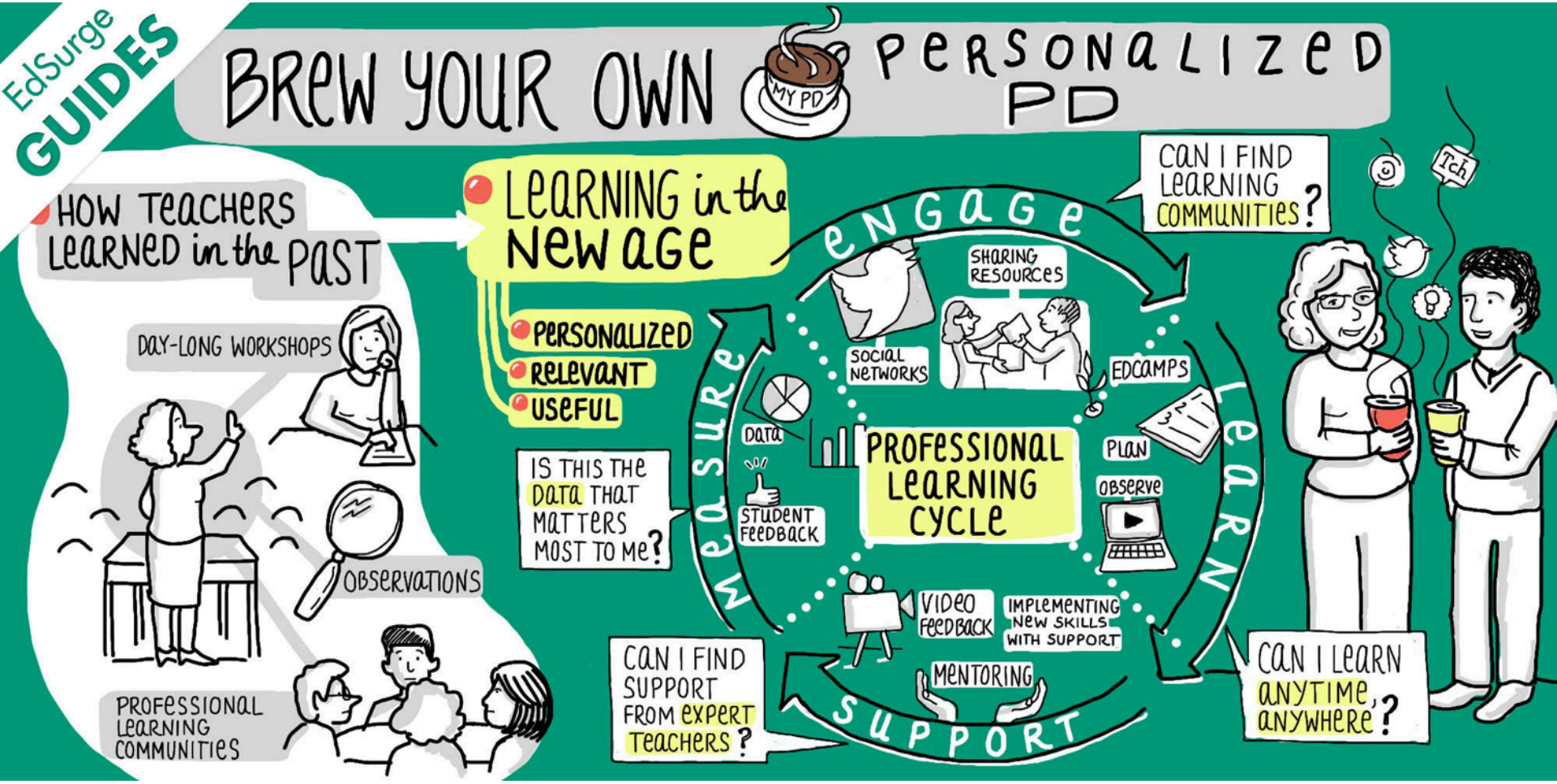
Collaborative teaching and learning platform leveraging existing resources

QUBES Metrics

Systems for defining and tracking teaching scholarship

Implementation Research

Pursuing a systems level understanding of how teaching practices change


EdSurge GUIDES
BREW YOUR OWN PERSONALIZED PD
MY PD
HOW TEACHERS LEARNED in the PAST
DAY-LONG WORKSHOPS
OBSERVATIONS
PROFESSIONAL LEARNING COMMUNITIES
LEARNING in the NEW AGE
PERSONALIZED
RELEVANT
USEFUL
IS THIS THE DATA THAT MATTERS MOST TO ME?
CAN I FIND SUPPORT FROM EXPERT TEACHERS?
CAN I FIND LEARNING COMMUNITIES?
CAN I LEARN ANYTIME, ANYWHERE?
ENGAGE
LEARN
SUPPORT
MEASURE
SHARING RESOURCES
SOCIAL NETWORKS
EDCAMPS
PLAN
OBSERVE
VIDEO FEEDBACK
IMPLEMENTING NEW SKILLS WITH SUPPORT
MENTORING
STUDENT FEEDBACK
DATA
PROFESSIONAL LEARNING CYCLE

Why science teachers should not be given playground duty.

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Measuring professional contributions to undergraduate education

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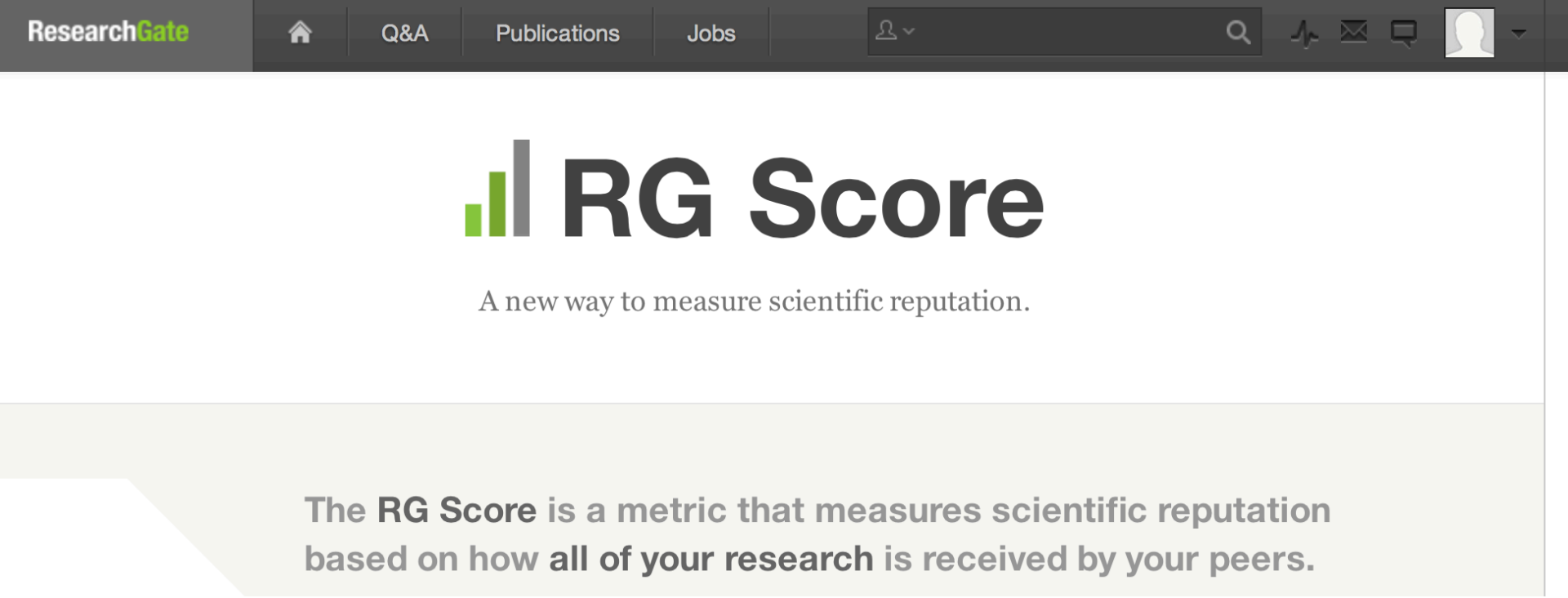
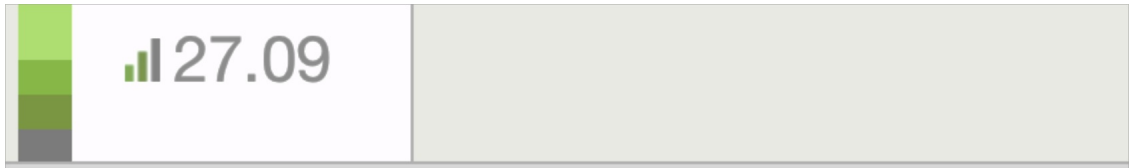


A contribution is anything you share on ResearchGate….your questions and answers, a published paper you add to your profile, or the negative results and raw data you upload…

Our algorithm looks at how your peers receive and evaluate your contributions, and who these peers are. This means that the higher the scores of those who interact with your research, the more your own score will increase..



SUMMARY

PUBLICATIONS · 96 **100%** of RG SCORE

- Articles · 93
- Books · 1
- Datasets · 1
- Theses · 1
- Full-texts · 25

QUESTIONS

ANSWERS

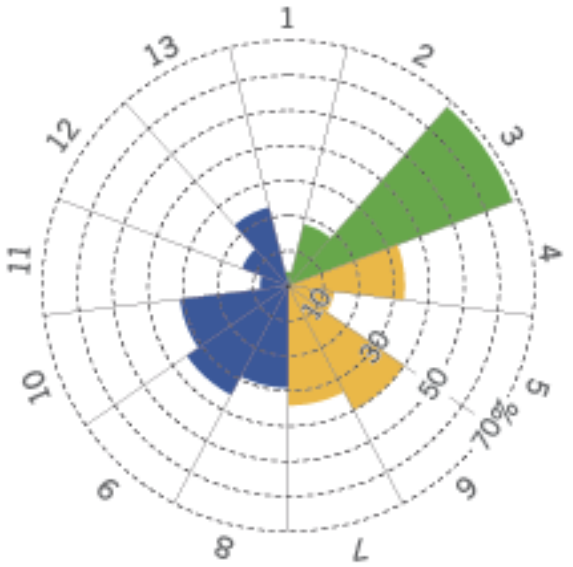
FOLLOWERS · 46

CITATIONS · 366

OPEN REVIEWS

RESEARCHGATE

1,589 regular visitors

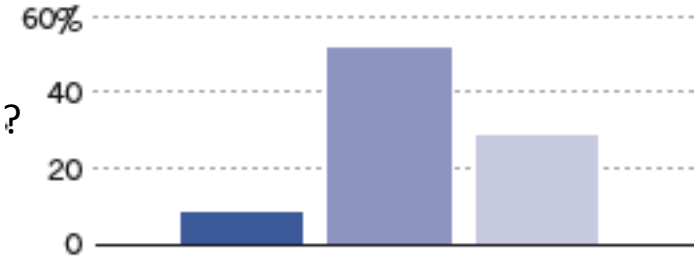


1. Do not use professionally
2. Curiosity only; not maintaining profile
3. In case contacted

4. Track metrics
5. Discover jobs
6. Discover peers
7. Discover recommended papers

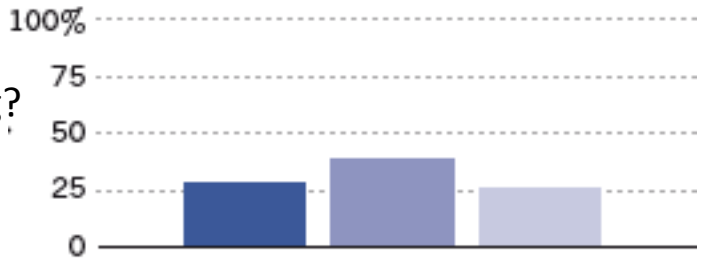
13. Follow discussions
12. Comment on research
11. Actively discuss research
10. Share links to authored content
9. Post (work) content
8. Contact peers

Use often?



- Once a day
- Once a week
- Once a month

Had long?



- Less than 1 year
- Between 1 and 2 years
- Longer than 2 years

Challenges

- What counts as teaching scholarship?
- How are disparate activities weighted?
- How do we use these metrics?
- How do we avoid pitfalls?