# Transforming (Inter)Institutional STEM Infrastructures: Lessons from the SEISMIC Project on Designing for Equity and Inclusion at Scale

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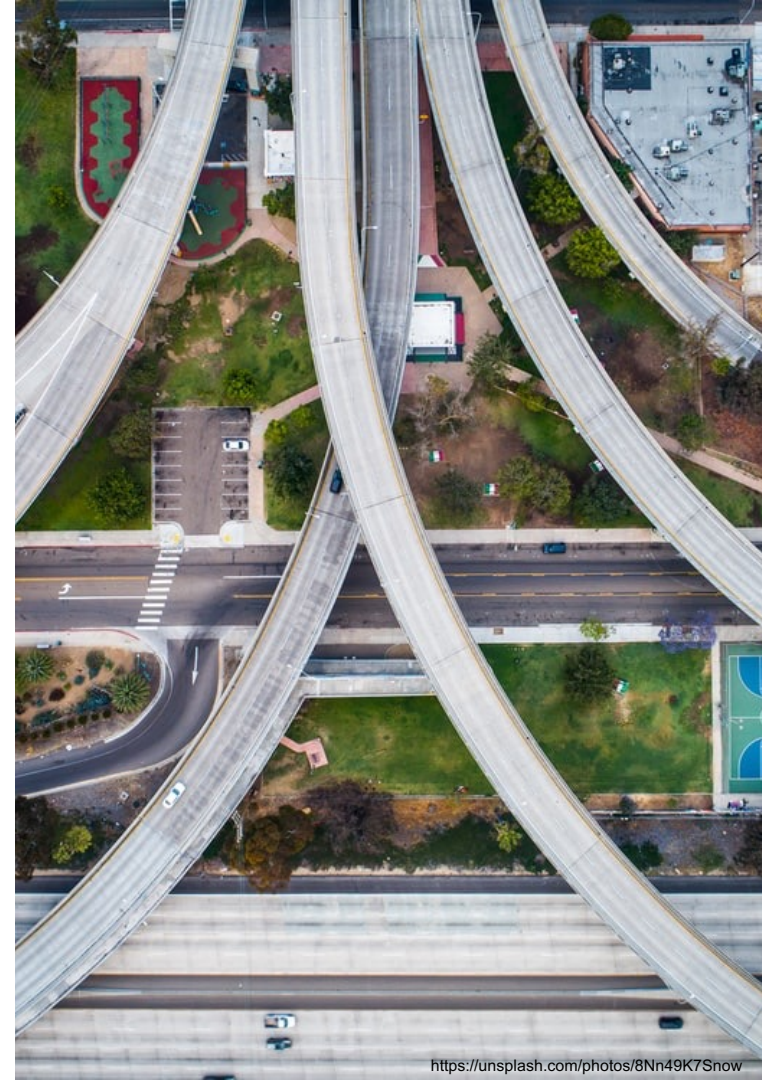
Presentation Roadmap

1. Challenges to increasing equity and inclusion in STEM education

2. What is infrastructure studies?

3. Case study: Applying infrastructure studies to (re)designing the Sloan Equity and Inclusion in STEM Introductory Courses (SEISMIC) project

4. Takeaways and guiding questions

Breaking down **systemic barriers** to equity and inclusion in STEM requires **systemic solutions** that can be scaled.
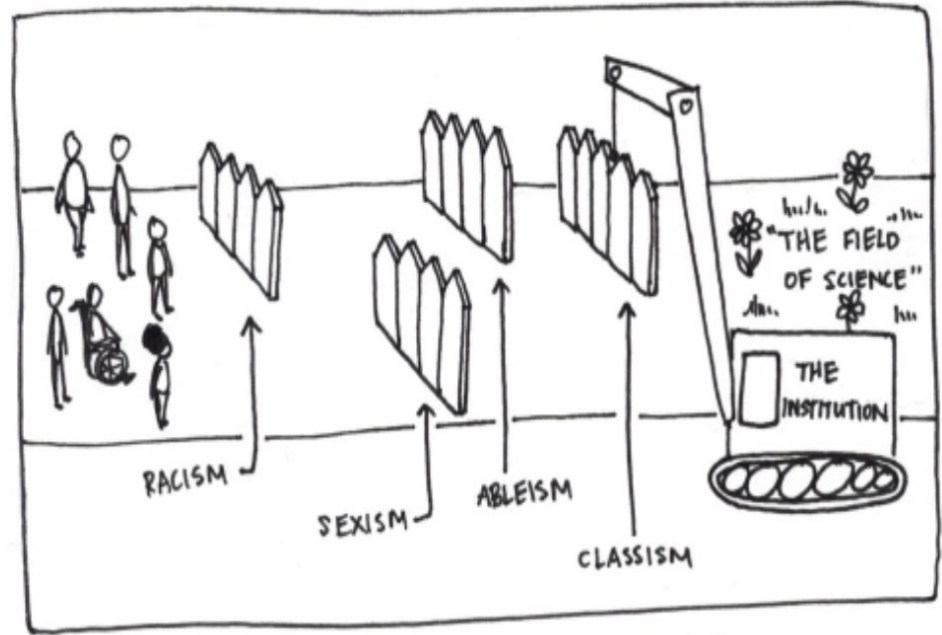
Sophie Wang, Science Under the Scope

(Inter)institutional collaborations are one possible way to enact the structural solutions needed for STEM education.

But they also come with complex challenges.

What is **infrastructure**?

In science, technology, and society studies (STS), *infrastructure* refers to:

- "prior work (be it building, organization, agreement on standards, and so forth) that supports and enables the activity we are really engaged in doing" (Slota & Bowker, 2016, p. 529).

Infrastructural components can include:

- procedures and policies, structures, systems and processes

Slota, S. C., & Bowker, G. C. (2016). How infrastructures matter. In U. Felt, et al. (Eds.), The handbook of science and technology studies (4th ed., pp. 529–554). MIT.

What is **infrastructure**?

Infrastructure is both a **noun** and a **verb**.

- **As a verb**: "The going, active, and collective process of forming, reforming, and maintaining infrastructure" (Karasti et al., 2010).

Infrastructures need to be continually maintained or remade.

- Interinstitutional collaborations may benefit from shifting their focus from infrastructure-as-*noun* (static thing) to infrastructure-as-*verb* (ongoing process).

Karasti, H., Baker, K. S., & Millerand, F. (2010). Infrastructure time: Long-term matters in collaborative development. Computer Supported Cooperative Work, 19, 377-415.

SEISMIC

"a new standard for STEM reform projects: a class cannot be successful unless it is equitable and inclusive."

SEISMIC. (n.d.-a). About. Retrieved from https://www.seismicproject.org/about/.

10 universities contributing to 4 working groups to build equity and inclusion in STEM introductory courses.

Member Universities

Working Groups

UNIVERSITY OF MICHIGAN

INDIANA UNIVERSITY

MICHIGAN STATE UNIVERSITY

UC SANTA BARBARA

University of Pittsburgh

UC IRVINE

ASU Arizona State University

PURDUE UNIVERSITY
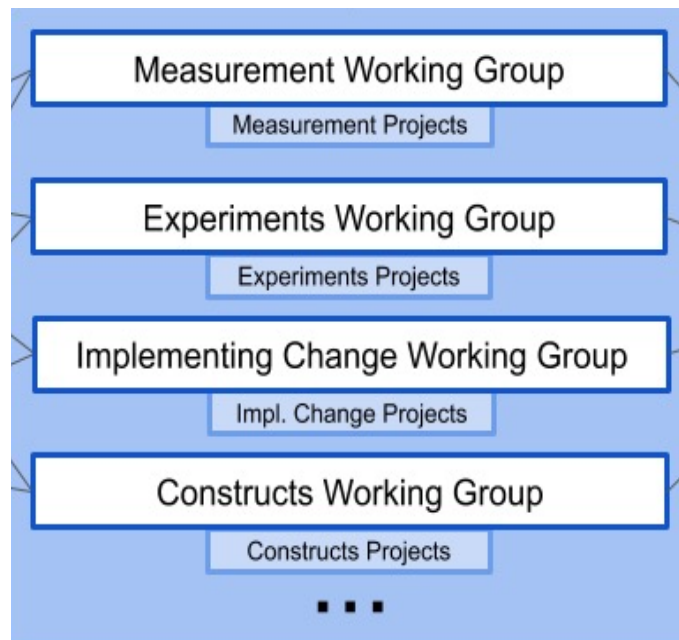
UNIVERSITY OF MINNESOTA
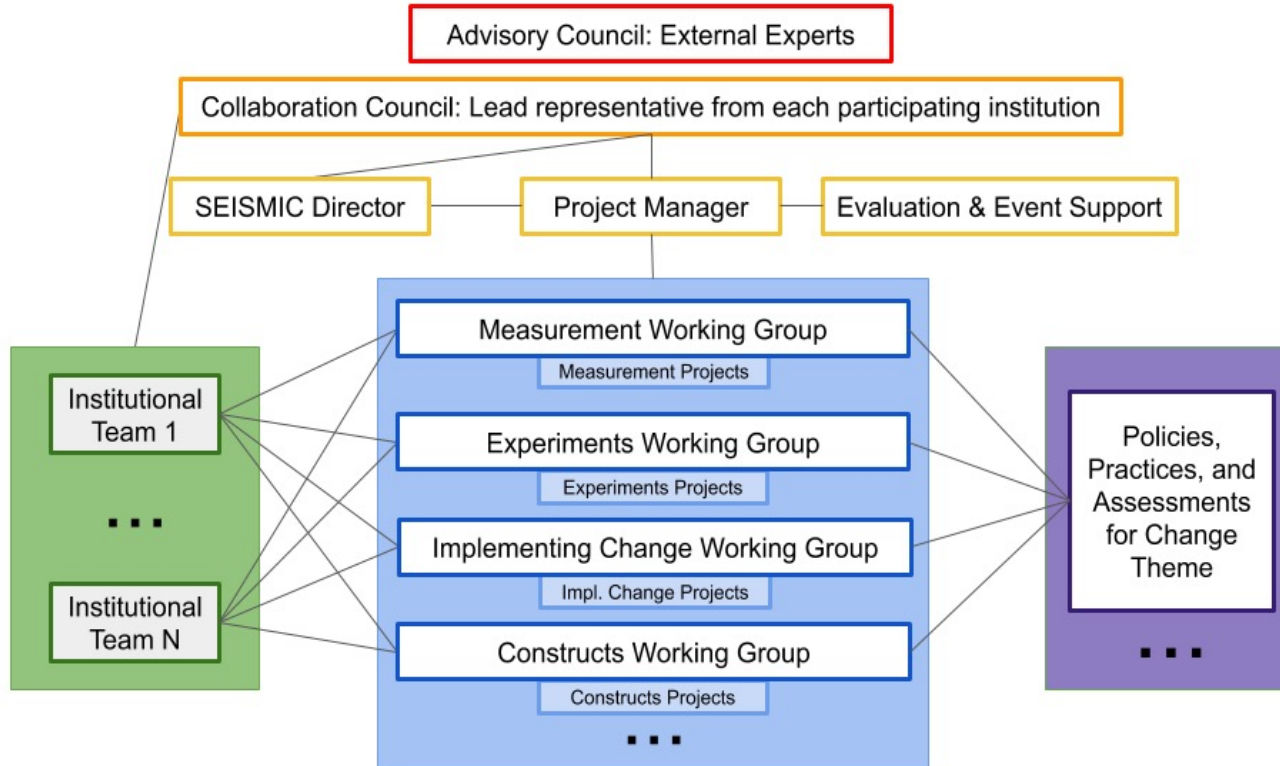
UC DAVIS UNIVERSITY OF CALIFORNIA

SEISMIC Institutions: Arizona State University, Indiana University, Michigan State University, Purdue University, University of California Davis, University of California Irvine, University of California Santa Barbara, University of Michigan, University of Minnesota, University of Pittsburgh

https://www.seismicproject.org/

Measurement Working Group

Measurement Projects

Experiments Working Group

Experiments Projects

Implementing Change Working Group

Impl. Change Projects

Constructs Working Group

Constructs Projects

■ ■ ■

SEISMIC's larger organizational structure

Infrastructural lessons from Year 1 of SEISMIC: Designing interinstitutional collaborations for equity and inclusion

Infrastructural lessons from Year 1 of SEISMIC: Designing interinstitutional collaborations for equity and inclusion

People: Designing for Membership & Representation

Voice: Designing for Participation & Power

Data: Designing for Evidence & Meaning

Tradeoffs

People: Membership & Representation

Interinstitutional collaborations…

- Connect people together from across **disciplines** and **institutions**.

- Don't necessarily lead to an increase in diversity in **expertise** or **identity**.

Infrastructuring SEISMIC: **People**

Current infrastructure bridges disciplinary, departmental, and institutional silos through:

- Summer Meeting

- Speaker Exchange Program

- Website

- Newsletter

Future infrastructuring needed to:

- Ensure equity in participation and leadership of scholars from marginalized communities

Tradeoffs

Voice: Participation & Power

Interinstitutional collaborations…

- Provide new **platforms** for people who might not typically be heard in their local context.

- Don't necessarily enable **equitable participation** from all members, particularly given who has held the "sonic space" of STEM.

- Need to consider questions about **power**, **participatory culture**, and **potential** to reinforce or disrupt existing hierarchies.

Infrastructuring SEISMIC: **Voice**

Responses include:

- "SEISMIC Voices" column
- Guidance for authorship
- External evaluation

Continued infrastructuring needed to:

- Disrupt power hierarchies
- Create opportunities for new projects and more communication across projects
- Increase equity in decision-making within project teams, working groups, and the collaboration

Tradeoffs

Data: Evidence & Meaning

Interinstitutional collaborations…

- Allow for new **methods** of data collection, pooling, and analysis.

- Can intensify risks for overlooking **differences** between student identities and local contexts.

Infrastructuring SEISMIC: **Data**

Infrastructuring **needed** to:

- Continue clarifying assumptions brought to data collection, use, and interpretation

Infrastructuring **response**:

- Working group to examine assumptions about data and identity constructs

Design considerations

People

- Which groups, stakeholders, and institutions has the collaboration been designed to bring to the table?

- How might future design intentionally promote greater diversity and representation?

Voice

- Whose voices are carried and amplified within the collaboration?

- What structural changes are needed to honor and amplify voices that might otherwise be marginalized?

Data

- How are demographic data being aggregated or disaggregated within and across institutions? What patterns are rendered visible or invisible based on those practices?

- How can your collaboration be explicit, transparent, and engage in critical reflection about its data practices?

Questions?