Evaluation Approaches: Two Examples

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Multi-Scale Evaluation in STEM Education
Pre-conference Tutorial

Goal is to use two examples to illustrate different evaluation approaches by considering program and project contexts.

Example 1: Math Achievement Common Core (MACC)

- State-level Math and Science Partnership

- Three year funding cycle

- All MSP projects are required to have the same goals that were outlined by the funding agency
  - Increase teacher content knowledge
  - Improve classroom instruction
  - Improve student achievement
  - Build a sustainable partnership

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Project Context

- Professional development for middle and high school math teachers
  - Summer content courses led by UNCW faculty
  - Lesson study during school year
  - Classroom coaching support
- # teachers
  - 24, 25, 46

Evaluation Approach

- Outcomes-based
  - Links project activities to anticipated outcomes
  - Keeps project team focused
  - Identifies how the project makes a difference in the participant's lives
  - Improves program services
  - Provides feedback loop

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Evaluation Matrix

Goal 1: Increase teacher content knowledge

Objective	Indicators	Data Source	Data Collection
that increases participants' content knowledge.	PD meets needs of teachers. Teacher scores on content exams improve after PD. Teachers self-report increase in content knowledge	Coach, Teachers, University Faculty, Project Management Team	Interviews, Pre/Post Content Measures, Observations
Develop a professional learning experiences based on CCSS.	PD aligns with CCSS. Teachers report increase in understanding of CCSS	Coach, Teachers, Project Management Team, University Faculty	Document Review, Post PD Survey, Annual Participant Survey Interviews?

Goal 2: Increase student achievement

Objective	Indicators	Data Source	Data Collection
Complete Lesson Study cycles during school year with coaching support.	Teachers deliver improved standards-based lessons. Increased student achievement on formalized exams is seen. Teacher's classroom instruction improves. Teacher's self-efficacy towards math improves.	Coach, Teachers, Project Management Team	Document Review, Interviews, Annual Participant Survey, EOC or equivalent Student Measure, RTOP Observations, MTEBI Survey

Objective	Indicators	Data Source	Data Collection
teachers totaling 5 days in 3 years.	leadership training meets needs of teachers. Lead teachers report g... leadership abilities. Lead teachers build relationships with particip... teachers.		w, Post Leadership s, Observation
Complete Lesson Study cycles during school year with coaching support.	Individual teacher teams will develop 1-2 model lesson studies each year. Teachers plan and deliver improved standards-based lessons using multiple representations, strategies, and appropriate technologies. Teachers demonstrate greater familiarity with standards. Teachers report better understanding of how to incorporate standards. Number of coaching	Teachers, Coach, Project Management Team	Document Review, Annual Participant Survey, Interviews, RTOP Observations, MTEBI

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Example 2: CyVerse (iPlant)

- NSF funded cyberinfrastructure project

- 5 year initial funding with 5 year extension

- Expectation: Create cyberinfrastructure for plant science

  - Foster computational thinking in Biology

  - Be by, for, and of the community

  - Be interdisciplinary

  - Reinvent itself and its capabilities

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Project Context

- Awarded to University of Arizona in 2008

- Renewed in 2013

- Rebranded in 2016

- "Dynamic virtual organization" that provides:
  - Computational infrastructure to handle large datasets and complex analyses
  - Data storage, bioinformatics tools, image analyses, cloud services, APIs, etc.

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Example 2: CyVerse (iPlant)
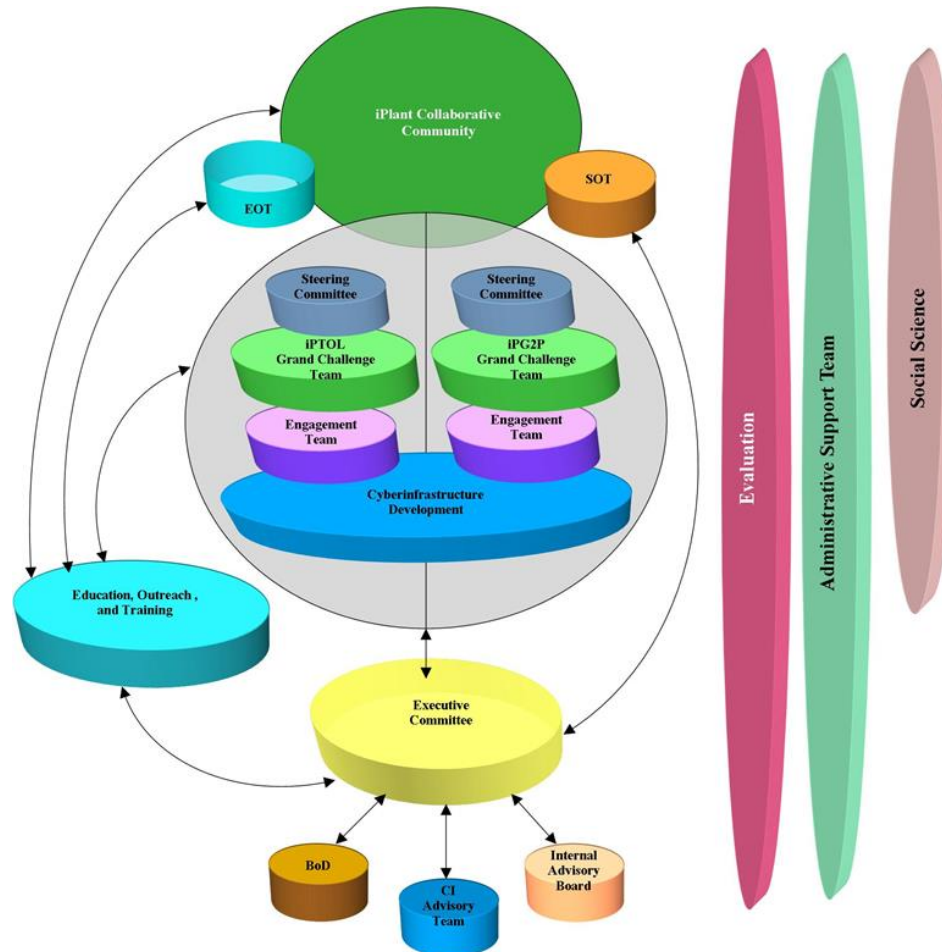
- Multi-site (current sites):
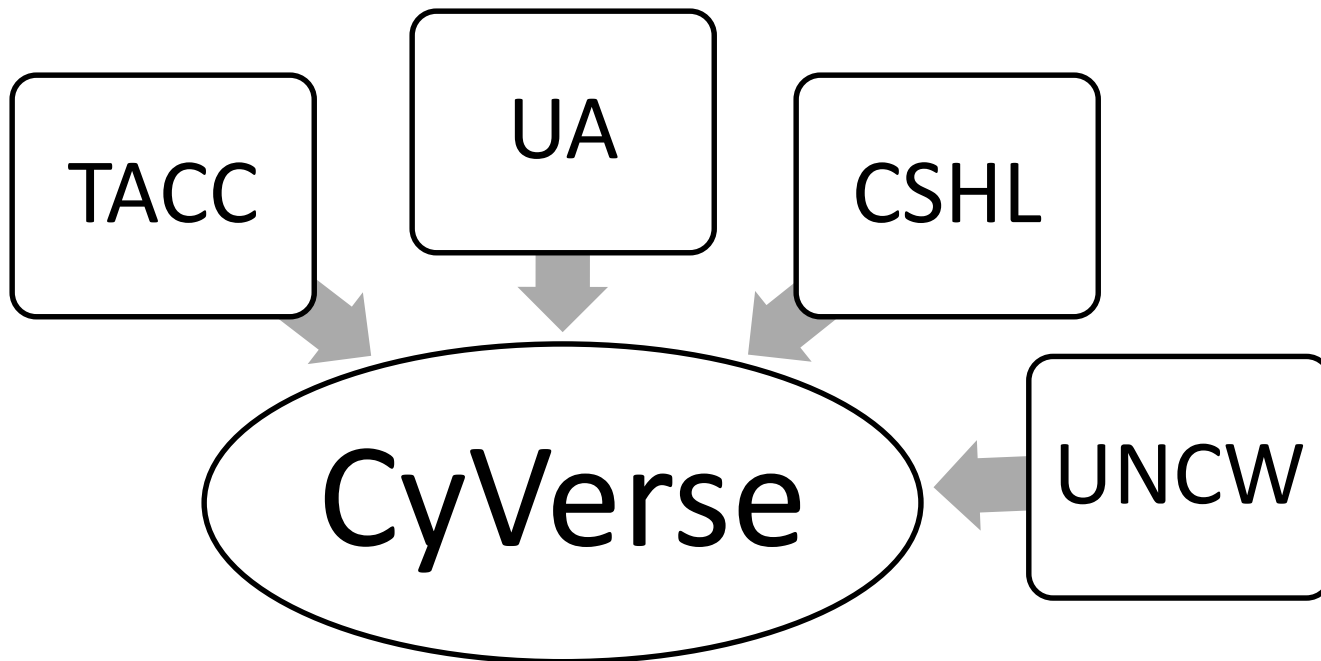
Evaluation Approach

- ## Human System Dynamics (HSD)

  - Participants possess a moderate degree of freedom of action

  - Systems are defined by function over structure

  - Change over time is dynamical

  - Outcomes are emergent

  - System boundaries are open

 - Change occurs in different units simultaneously

Eoyang, G.H. (2007). Human Systems Dynamics: Complexity-Based Approach to a Complex Evaluation. In Systems Concepts in Evaluation: An Expert Anthology. Bob Williams and Iraj Imam (Eds.). AEA, Point Reyes.

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CDE Model

Evaluation Question	Data
What results when analyzing iPlant as a complex human system?	• Synthesis of all data collected
What is the management structure and how does it facilitate communication, decision-making, and progress?	• Document review (wiki, email, reports) • Staff interview series • Meeting attendance • PI phone calls
What are the project strategies and how do they bring about change?	• Document review (wiki, email, reports) • Meeting attendance • Targeted user interviews • PI phone calls
What evidence exists that indicates iPlant is fulfilling its mission and vision?	• Data gleaned from metrics tables
What are the benefits to the community of users?	• Targeted user interviews • Post WS surveys • General user satisfaction surveys • Document review (forums, wiki, email, presentations, publications)

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Within context of INCLUDES
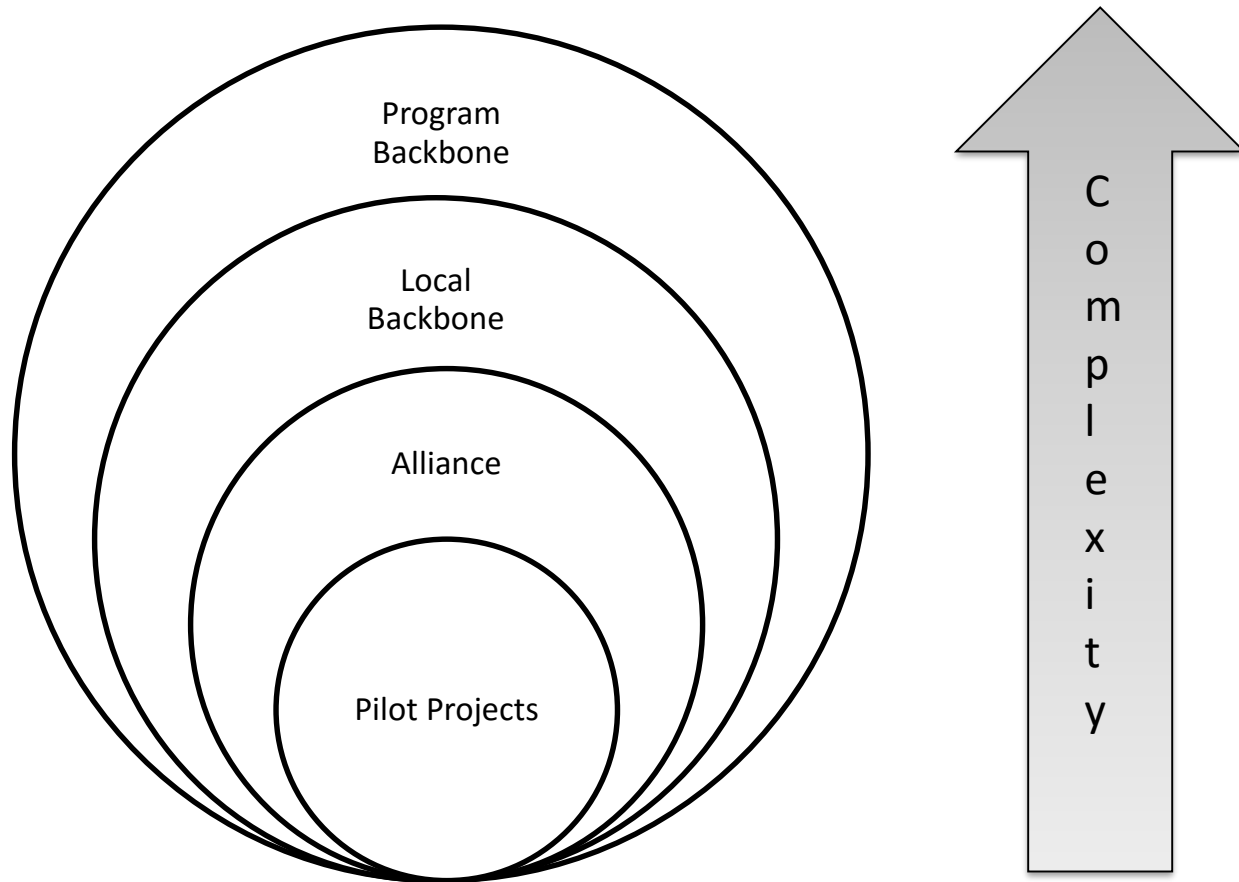
Breakout Session Information

Case Study #	Room	Facilitator
1	109	Pam Bishop
2	103	Barbara Heath
3	105	Sondra LoRe
4	123	Frances Lawrenz