



UNIVERSITY OF ILLINOIS  
AT URBANA-CHAMPAIGN

# Enhancing Team Science Through Mobilizing the Diversity-Creativity Tension

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# The Challenge

- NSF Germination Program

*How can effective learning frameworks, platforms and/or nurturing experiential environments be designed in which early- and mid-career faculty, as well as graduate students and post-doctoral fellows can be stimulated to germinate **transformative research ideas and questions to open large opportunities that address important societal needs?***

- Typical: Announced in October, 2015 and proposals due mid-January, 2016



# Diverse Teams in Science: A Dilemma

- The very features that allow them to **innovate** also come with elevated **challenges** that hinder their success (Milliken et al., 2003)

## Challenges:

- Increased conflict
- Coordination costs
- Value, motivation, language differences

## Benefits:

- Wider array of knowledge
- Novel recombination of ideas
- Predictor of novelty, creativity, and impact



# Agenda

- **Our Approach: Temporal Alternation**
- **The Structured Process of Oscillation**
- **Seeding Diversity**
- **A Macro-level Look: Addressing Climate Resilience**
- **A Micro-level Look: Stepladder**
- **Implications**
- **Future Work**

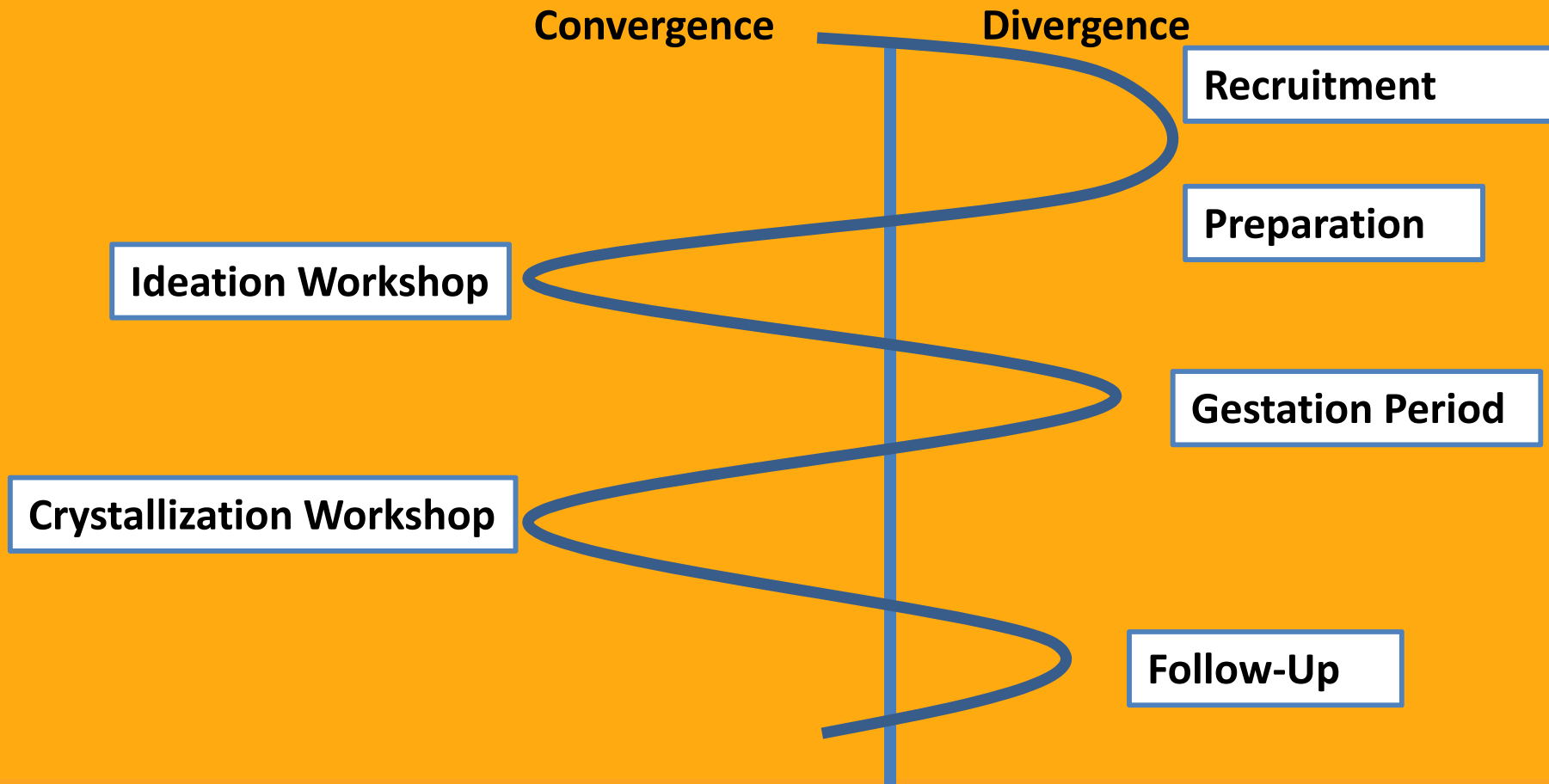


# Our Approach: Temporal Alternation

- **Oscillates** between **divergence** and **convergence** to generate transformative ideas in team science research projects
- **Longitudinal design:** this stuff doesn't happen all at once
- RQ: Does oscillation work to manage the challenges of diversity while maximizing its benefits?



# The Structured Process of Oscillation



Temporal Alternations (Carlson, Poole, Lambert, & Lammers, 2017)



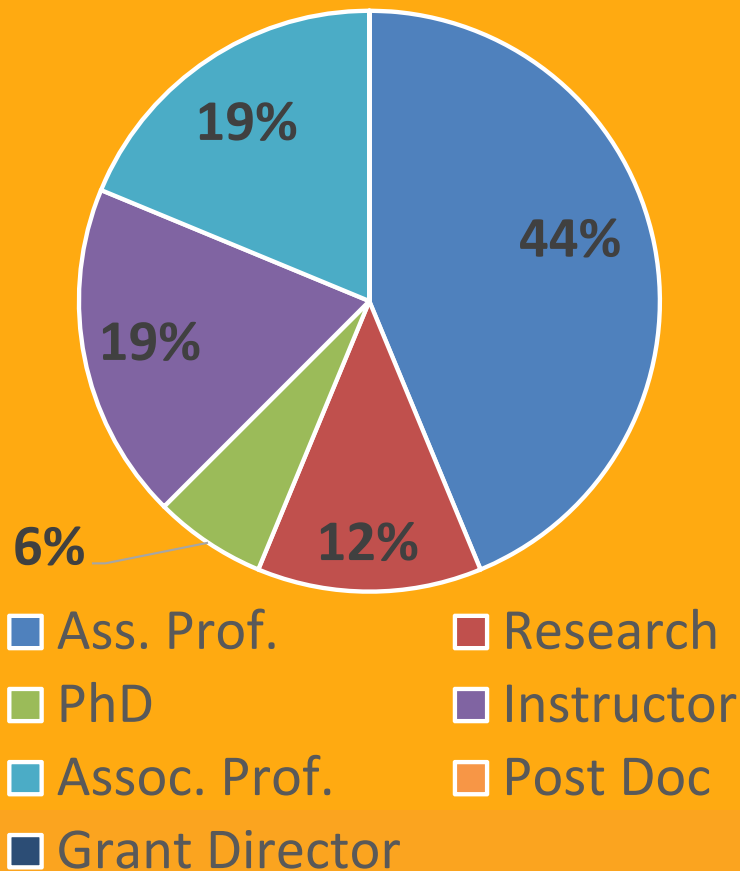
# Cohort 1: Climate Resilience

- 1st application of this process focused on the wicked problem of **climate resilience**
- 16 participants selected from application pool
- Fall 2016 – Spring 2017

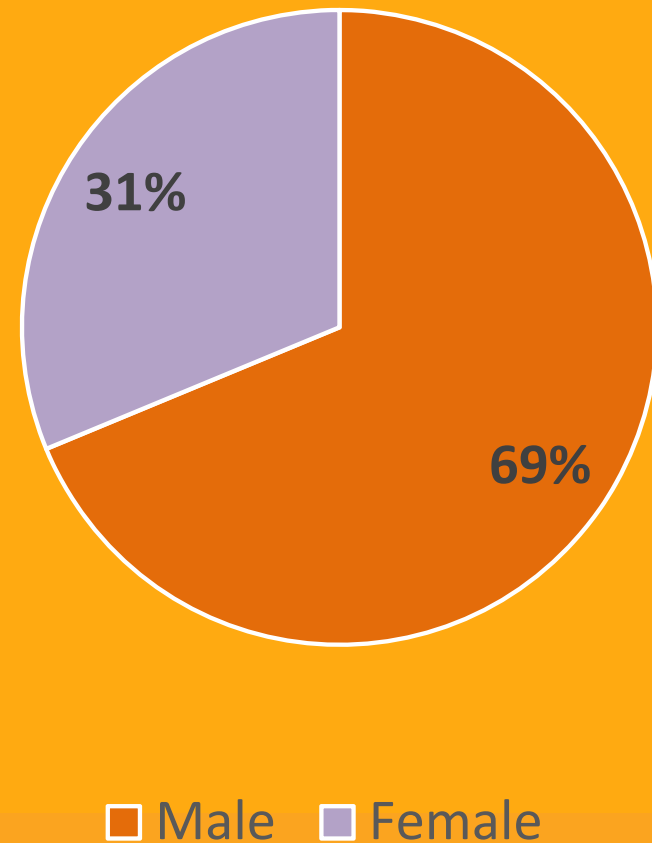


# Seeding Diversity: Participants

Career



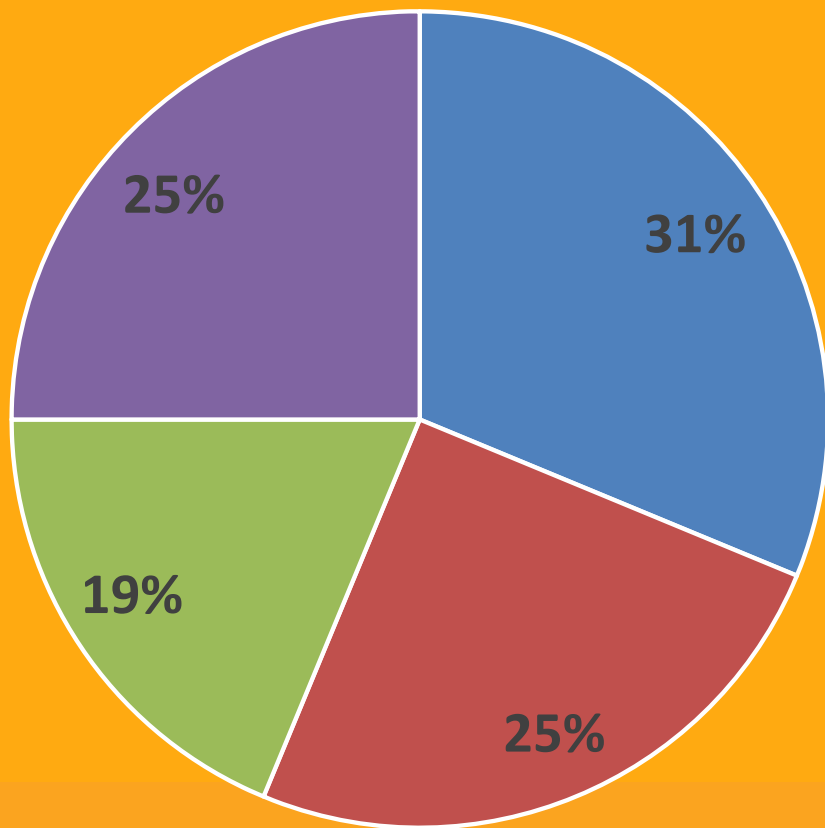
Gender





# Seeding Diversity: Participants

## Institution Type

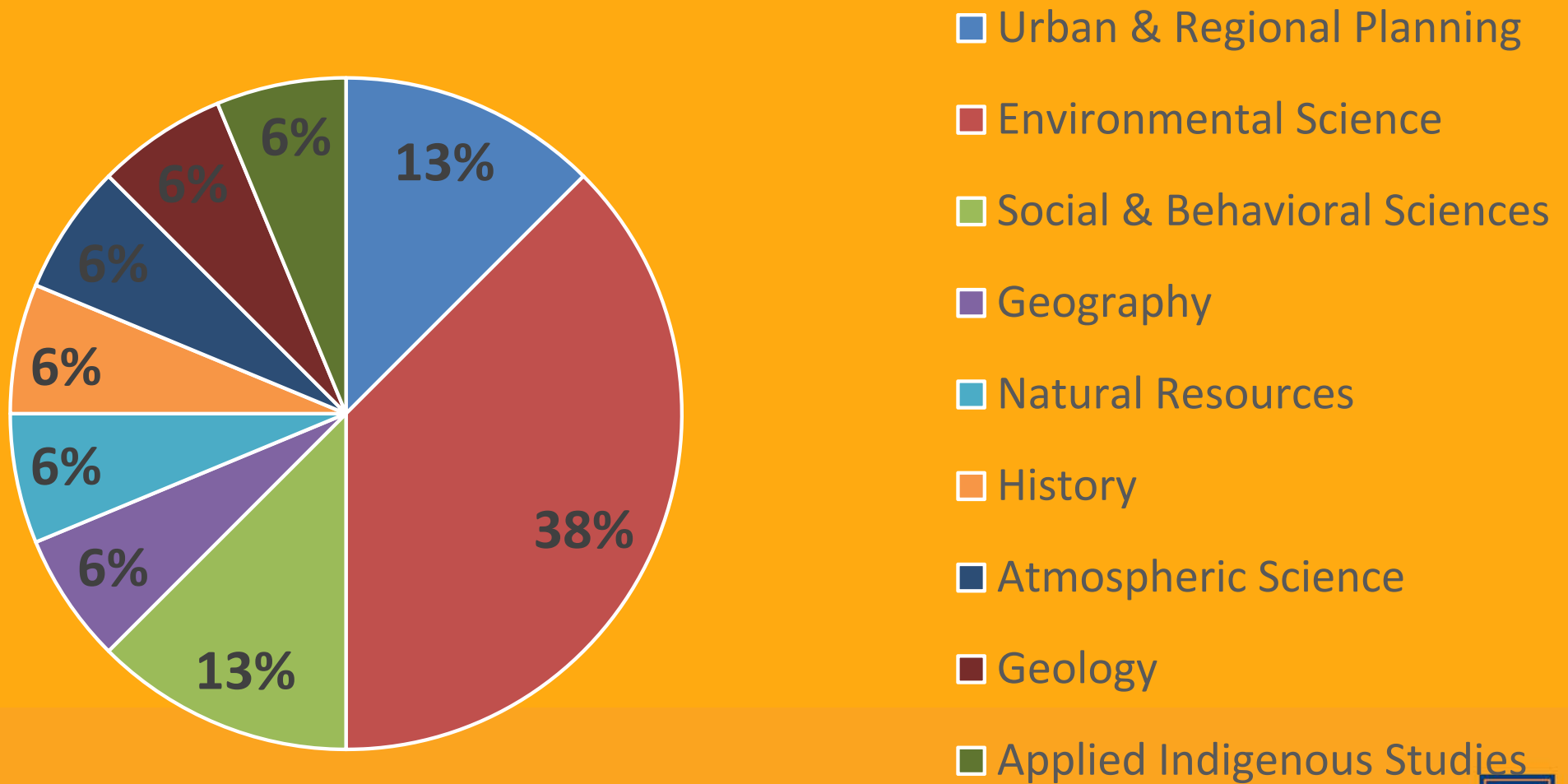


- Historically Black Colleges and Universities
- Hispanic Serving Institution
- Tribal Colleges and Universities
- Land Grant



# Seeding Diversity: Participants

## Disciplinary Backgrounds



# Cohort 1: Outcomes

125

Research ideas generated related to climate resilience

7

Newly developed research projects

5

Self-selected research teams

1

Project approved for funding by the EPA

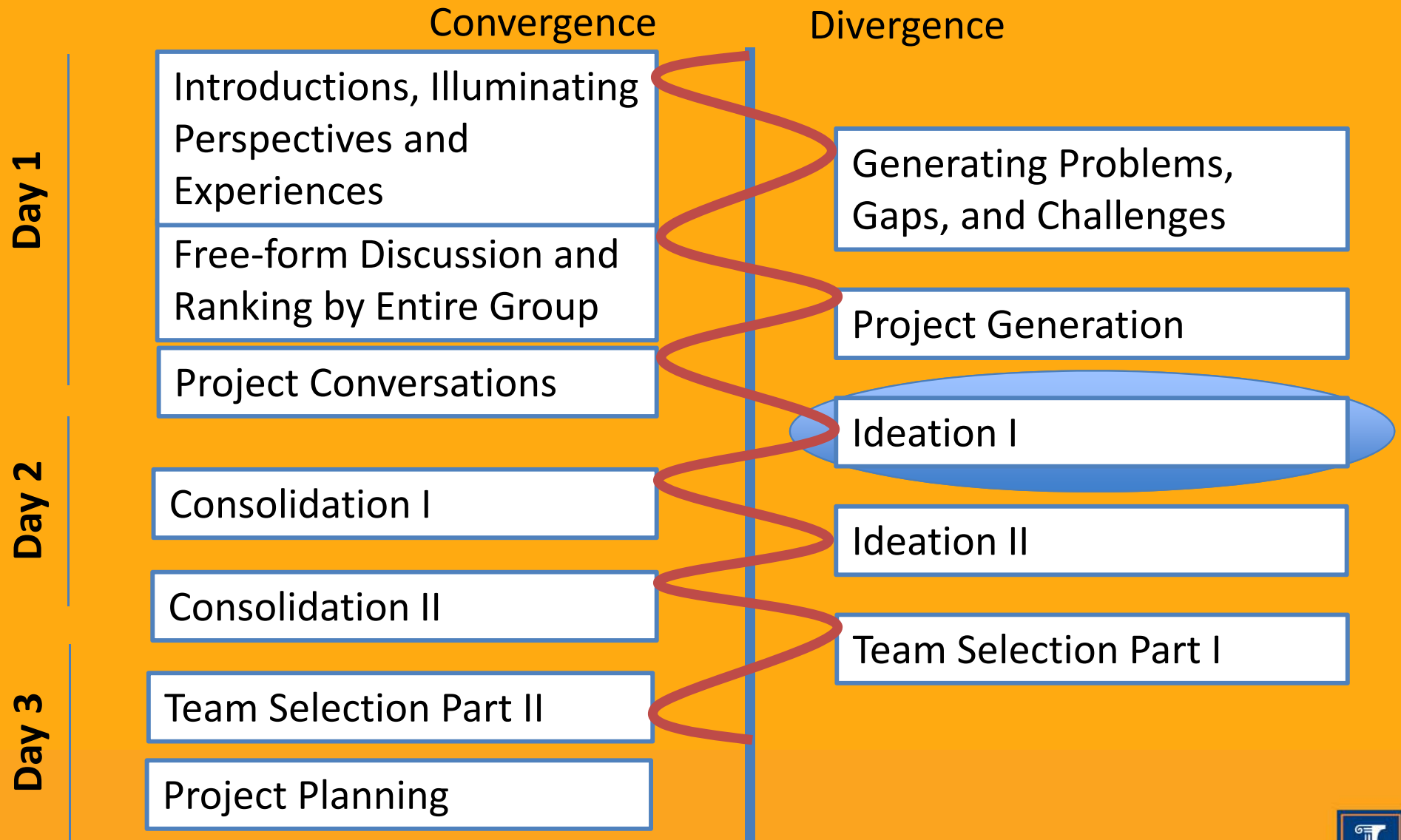


# How Did Participants Perceive This Process?

- “[Being] in the same room, the same group of people, hashing out ideas, deliberating on ideas... [Then we] reconvene and come back, give critique and comments. **All leading up to something concrete.** We all understood we could walk away with an understood distribution of labor and target. **It was nice to see how well arranged this workshop was.**”
- *Participants signaled that the alternation process was important to their team development and productivity*



# Workshop 1 Oscillation



# Ideation I

- Day 1 ended with **convergence**.
  - “How do problems connect?”
  - “As a group, what do we find important?”
  - This resulted in key problems/challenges. These are put on easels around the room.
- During the Stepladder activity (Day 2), **divergence** was emphasized.
  - Individuals create project components centered on a particular key problem



# Stepladder Process

- **Part 1:** Individuals brainstorm 1-2 ideas for project addressing a challenge (diverge)
- **Part 2:** Pair and describe project ideas (converge). Swap paper and elaborate or make new project component (diverge); pairs debrief
- **Part 3:** Come together into groups of 4-5. Describe each project component and team elaborates on ideas; new project components are put on a new sheet (converge)
- **Part 4:** Project components are posted on key challenges easels (diverge)



# Outcomes

- Key challenges -> project ideas

“The activity to create the core idea was inspiring and very effective, as it provided the context to reflect upon the contributions each of us were bringing to the table. **The fact that two colleagues were not initially in the brainstorming phase brought a more in-depth richness to the exercise.**”



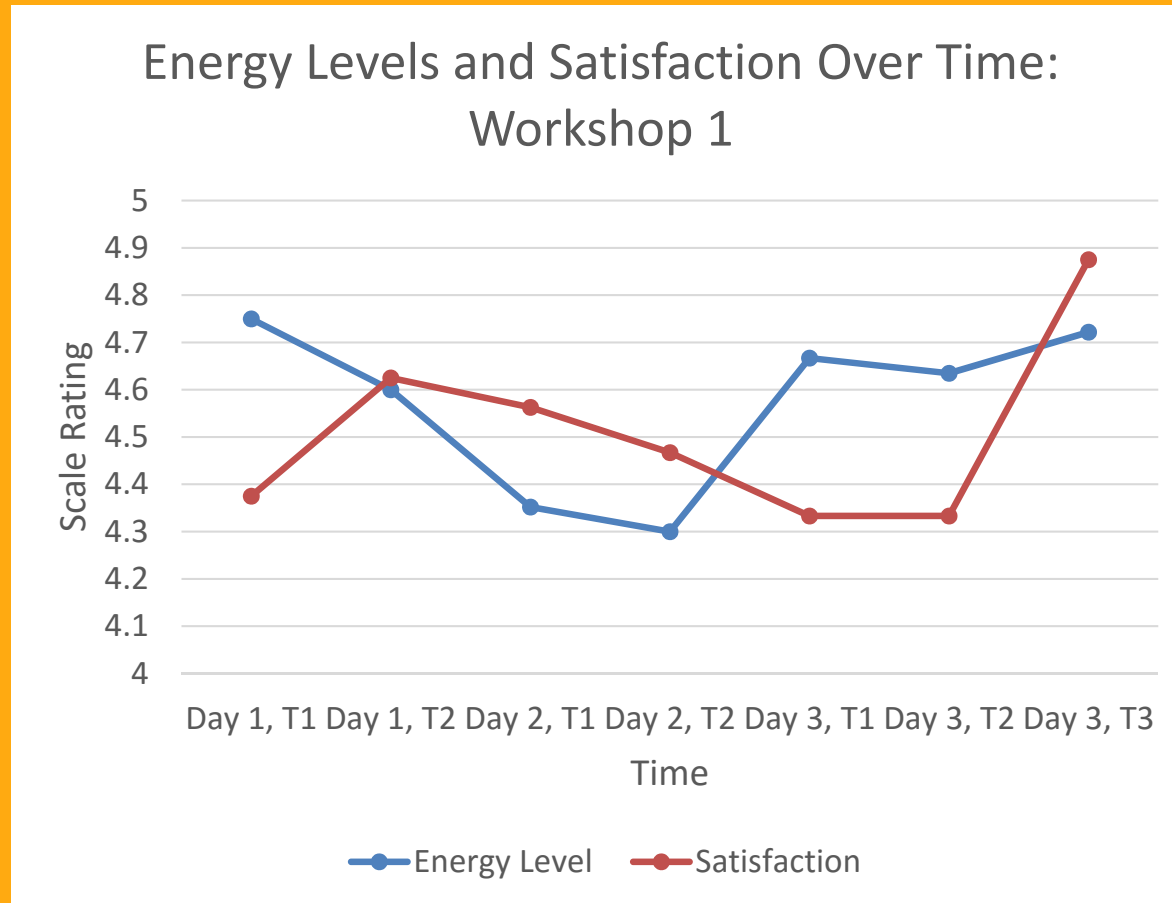


# Implications for Team Science

- Longitudinal, not single intervention
- Tentative evidence of oscillation as a way to manage inherent difficulties/benefits of diverse teams in creativity
- Alternative mode for team formation
  - Originating project not at idea level, but team level



# Cohort 1: Workshop 1



# Future Work

- Case comparisons
  - Food & Water Security (2018; ongoing)
  - Energy Sustainability (2019)
- Empirical measures of creative ideas (comparisons of project ideas to already funded NSF projects)
- Empirical measures of overall structure and process (survey analysis, interview analysis)
- Analysis of audio and video data of workshops and off-site meetings



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# Questions?

