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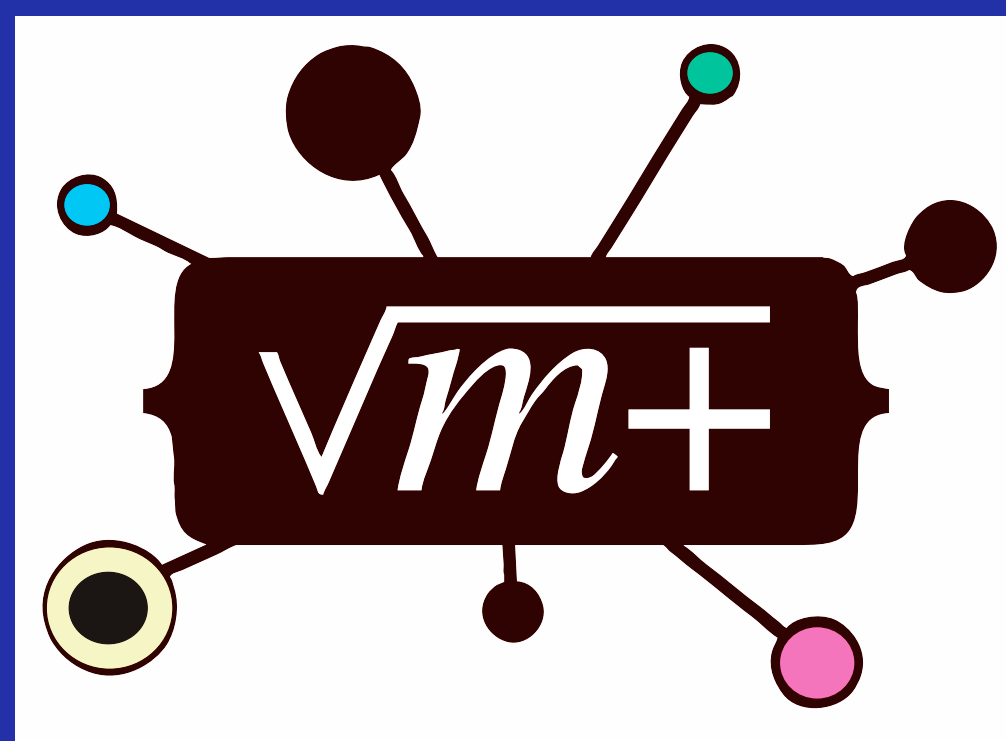
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# Virtual Math Teams (VMT): Continuity and Sustainability of Collaborative Knowledge Building

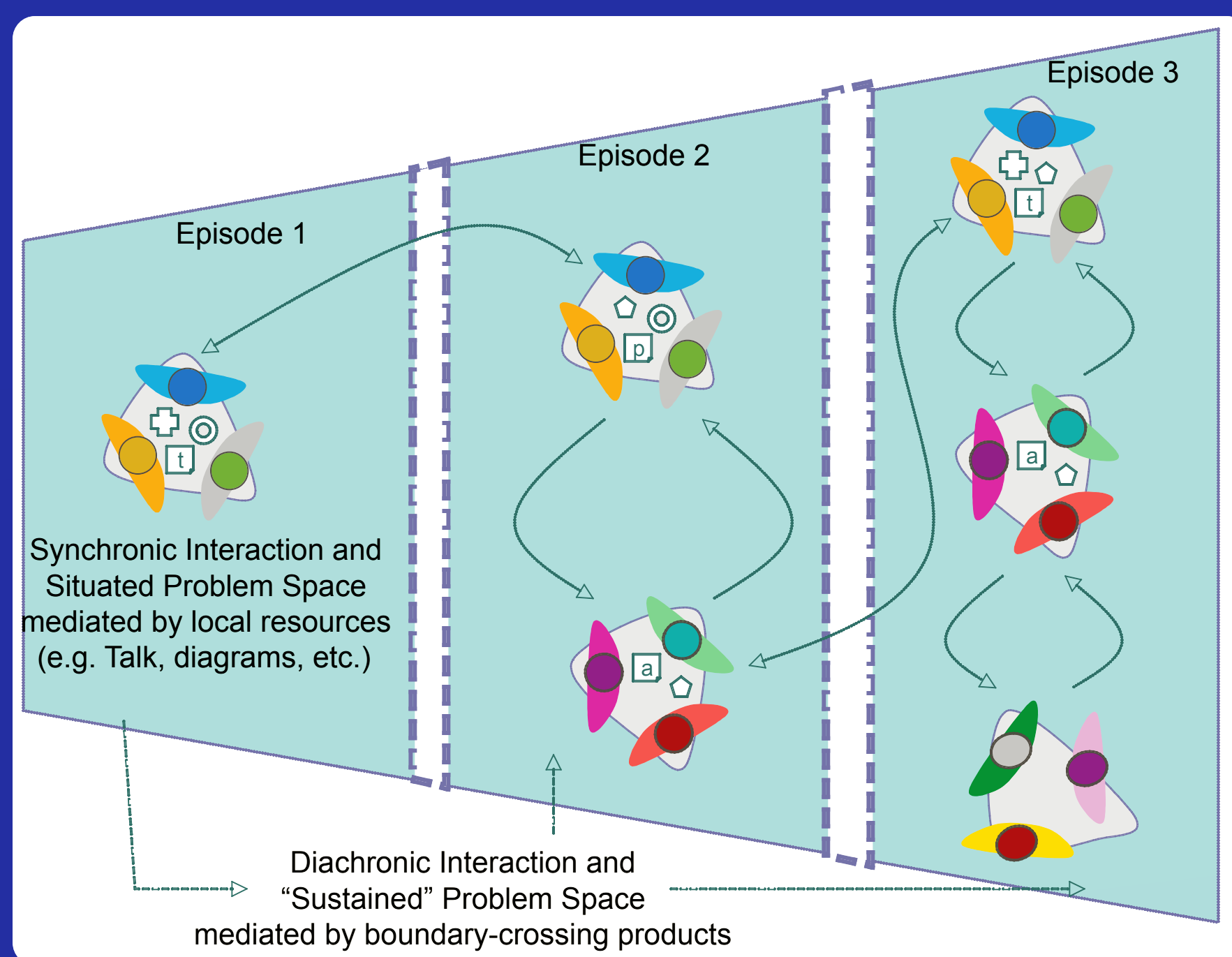
JOHANN W. SARMIENTO

## Virtual Math Teams (VMT):

The VMT project is an NSF-funded research program that investigates the dynamics of group cognition and the innovative use of online collaborative environments to support effective K-12 mathematics learning.

### Challenges for Group Cognition:

- ★ Knowledge building is distributed across the members of a group and the resources they create and use through their interaction
- ★ Knowledge building is distributed across multiple groups
- ★ Knowledge building is distributed across time and across multiple episodes of joint activity

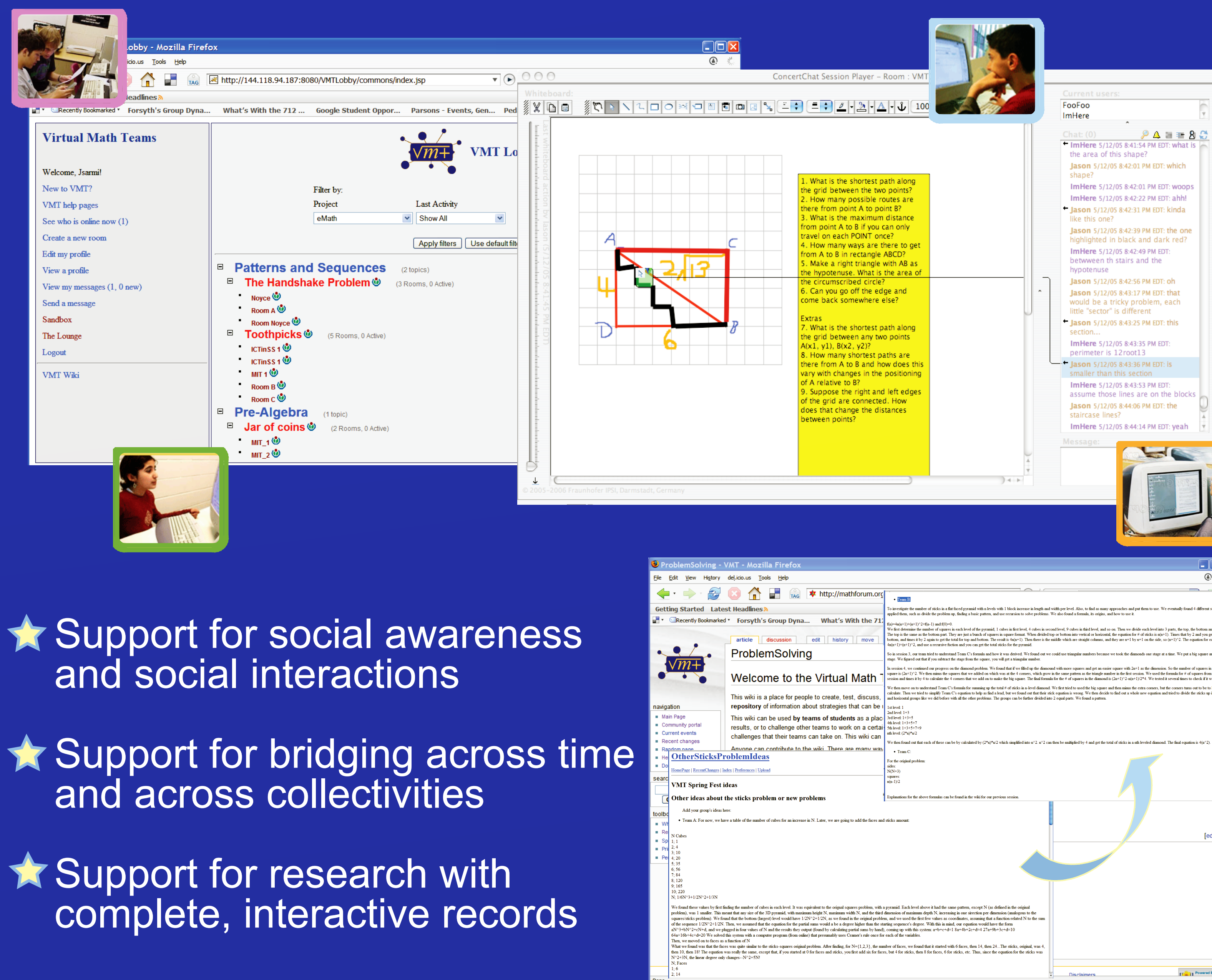


How do online groups overcome these gaps?

How do they bridge "synchronic" aspects of their collaborative knowledge building (i.e. single episode interactions) and its "diachronic" evolution across time?

## The VMT Online Environment:

- ★ Support for rich synchronous interaction
- ★ Support for persistent local representations of knowledge



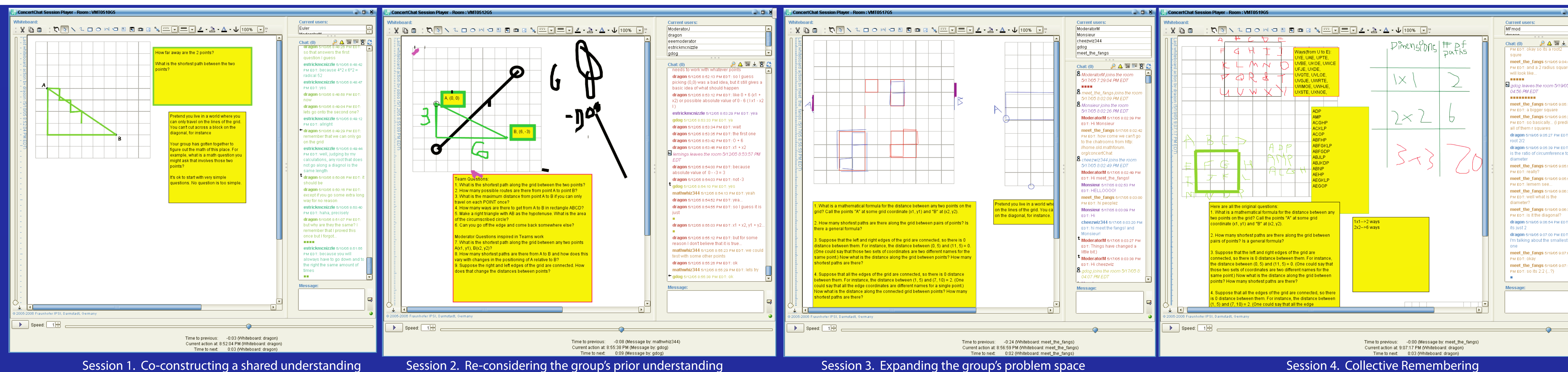
- ★ Support for social awareness and social interactions
- ★ Support for bridging across time and across collectivities
- ★ Support for research with complete, interactive records

## Preliminary Findings:

- ★ Groups overcome the challenges for their distributed cognition using:
  - (1) a wide range of socially-shared "methods" for interacting.
  - (2) Groups deploy these methods with various degrees of success.
  - (3) This has noticeable effects on the reach of their knowledge building activity.
- ★ The synergy between "synchronic" knowledge building (single episode interactions) and its "diachronic" evolution (across time and across collectivities) relies on:
  - (1) Construction of a group problem space, in which resources can be actively referenced.
  - (2) Collective remembering: the ability of a group to base current activity on prior joint action.
  - (3) Bridging across the work of multiple groups to reconsider, extend, and project other's work and to create boundary-crossing artifacts.
- ★ Three aspects of the socio-technical system can support the interplay between diachronic and synchronic interactions, leading to successful knowledge building:
  - (1) the affordances of the online environment,
  - (2) the sequences of activities offered for participation, and
  - (3) the interactional engagement of the participants.

## Case Study: Trajectories of Knowledge Building

Five teams of 3-5 participants  
 Upper middle school & high school students  
 Invited teachers selected participating students  
 Groups mixed across schools in 5 different states  
 Team configuration varied across sessions  
 Four one-hour online sessions in 2 weeks  
 Light facilitation and feedback between sessions  
 Anonymous participation  
 Open-ended, creative task, partially self-regulated  
 Data: Re-play of Chat and Whiteboard actions  
 Method: Qualitative Interaction/Chat Analysis.

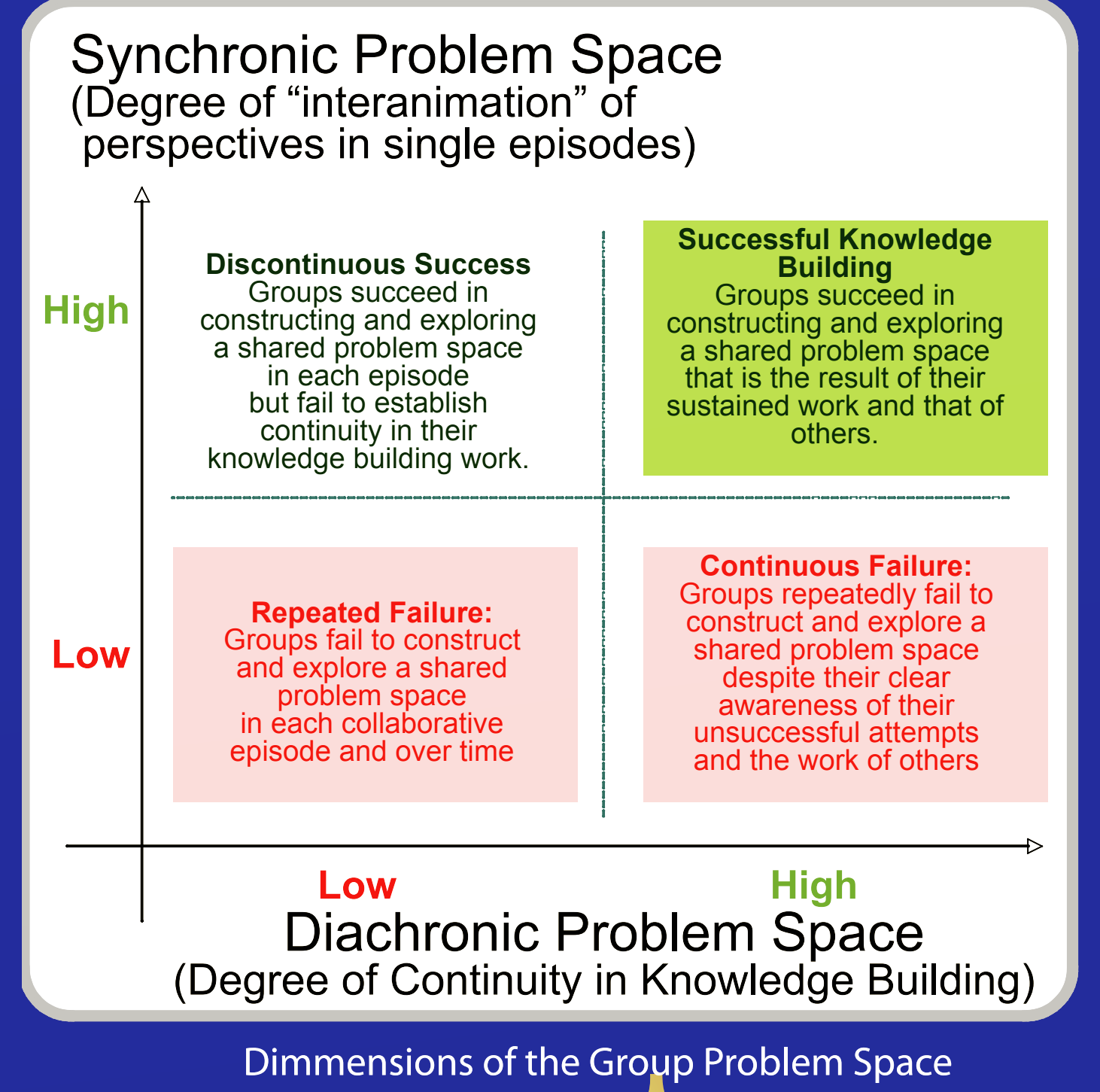


Session 1. Co-constructing a shared understanding

Session 2. Re-considering the group's prior understanding

Session 3. Expanding the group's problem space

Session 4. Collective Remembering



**Principal Investigators:** Gerry Stahl, Stephen Weimar, Wesley Shumar  
**Guest Researchers:** Elizabeth Charles, Jan-Willem Strijbos, Stefan Trausan-Matu, Fatos Xhafa, Martin Wessner, Alan Zemel  
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