The Center for Secure and Resilient Maritime Commerce (CSR)

Decision Making and Collaboration

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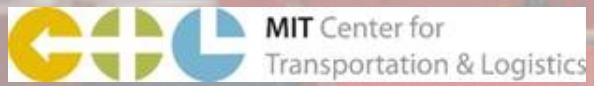
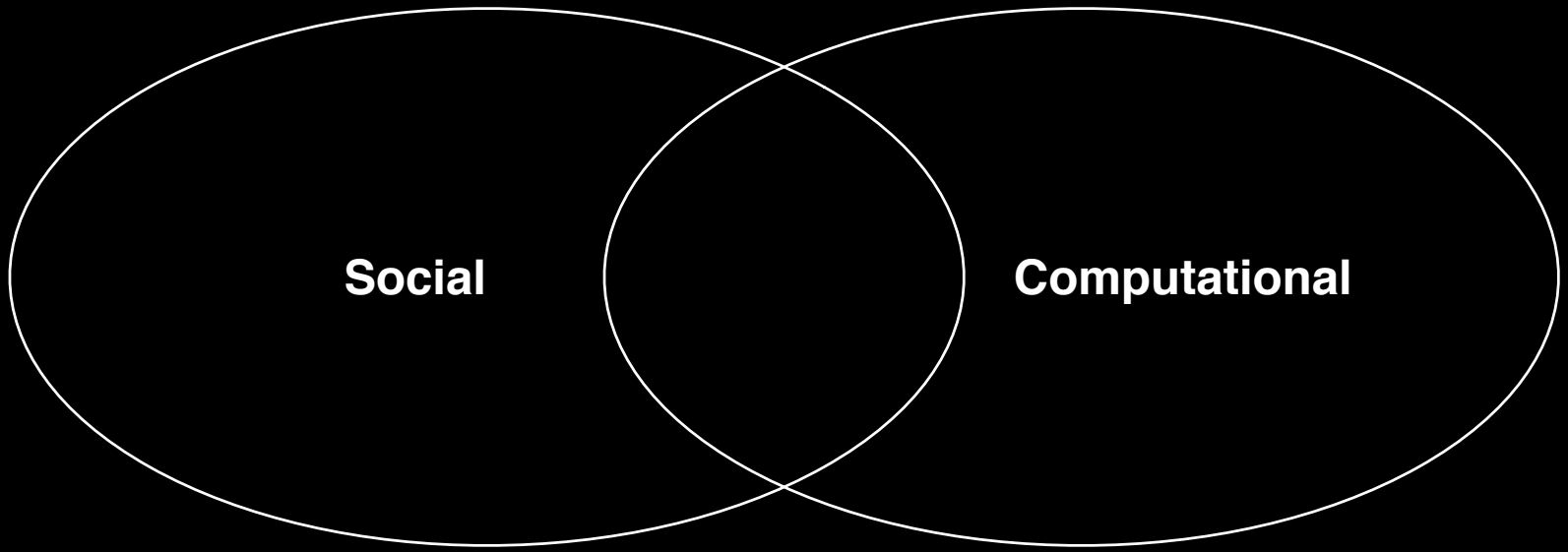



Social
Computational

Topics

- Review
  - Decision priming
  - Social media and Tsunamis
- Collaboration
  - Citizen science, crowds, and collective intelligence

Life in an Organization

- Many crises simultaneously
- Many sources of information and noise
- Information is hard to interpret
- Integration is difficult
- Resources are scarce, dispersed, and protected
- Information itself is protected
- Citizens want to help, but get in the way
- Specialized skills are required
- Common ground is hard to achieve quickly

Human factors issues

- How does an individual make sense of new information?
- How does a group make sense of information?
- How can we expand the concept of a group?
- How can we change the structures of groups?

Crowds

- Crowds are assembled to solve a particular problem
- Really good at certain tasks. For example:
  - Labeling images for content
  - Categorizing galaxies from photographs
  - Exploring a search space
- Can be thought of at different levels: the general public, or a set of government employees

What we know

- Collaboration
  - Face-to-face
  - Mediated Synchronous
  - Asynchronous
- Expertise
  - Automaticity
  - Reflective practice
- Decision making
  - Biases
  - Priming
- Collective intelligence
  - Peer production
  - Citizen science

Open research questions

- How fast can we train expertise?
- Can we use the crowd to correct those who are learning?
- What tasks do the crowd enjoy doing? Do well?
- Can we train the crowd:
  - To understand radar images?
  - To find things in satellite images?
- What if the crowd consists of staff?

Citizen Science and Crowd Collaboration

California

To play, click anywhere on the panel on the right to choose a spot to drill for oil. When you are ready, click 'Submit' to confirm your choice.

On the next round and every round after, you will see where you and the other players drilled and how much oil you each got for drilling at that spot.

Hover over the locations or the bars to see the exact amount earned; blacker bars mean more oil.

You always get the same amount of oil per round at any location, no matter how many other people are drilling there.

There will be 15 rounds, and you will be paid based on how much total oil you get across the 15 rounds.

X: Y:

Submit

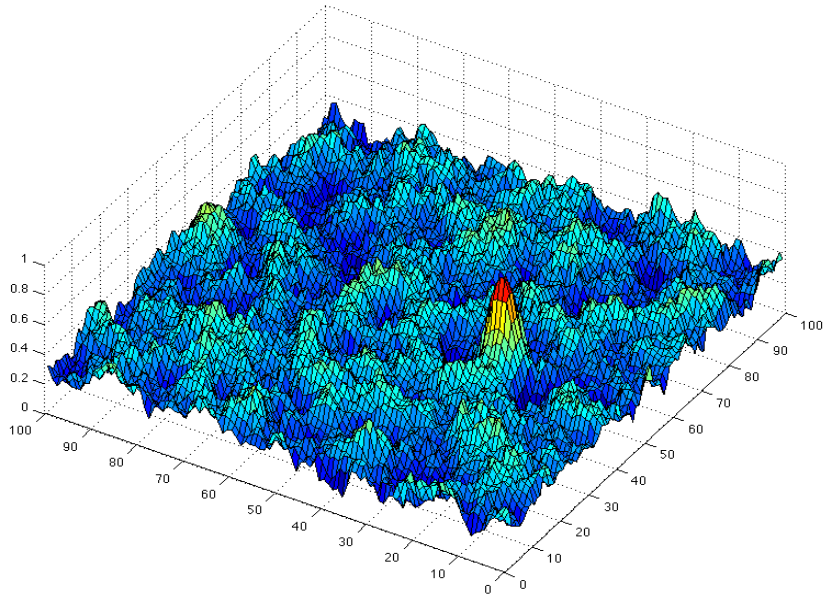
Time left:
0:45
Current Round: 1

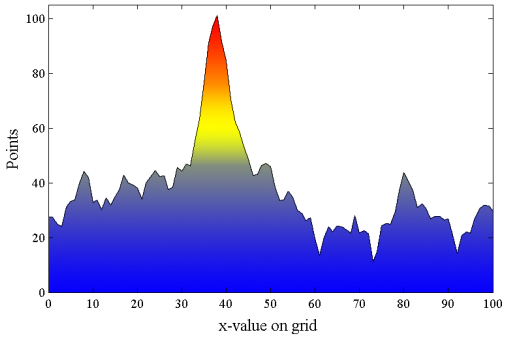
TOTAL: 0

Mason and Watts 2012, *PNAS*

Payoff functions

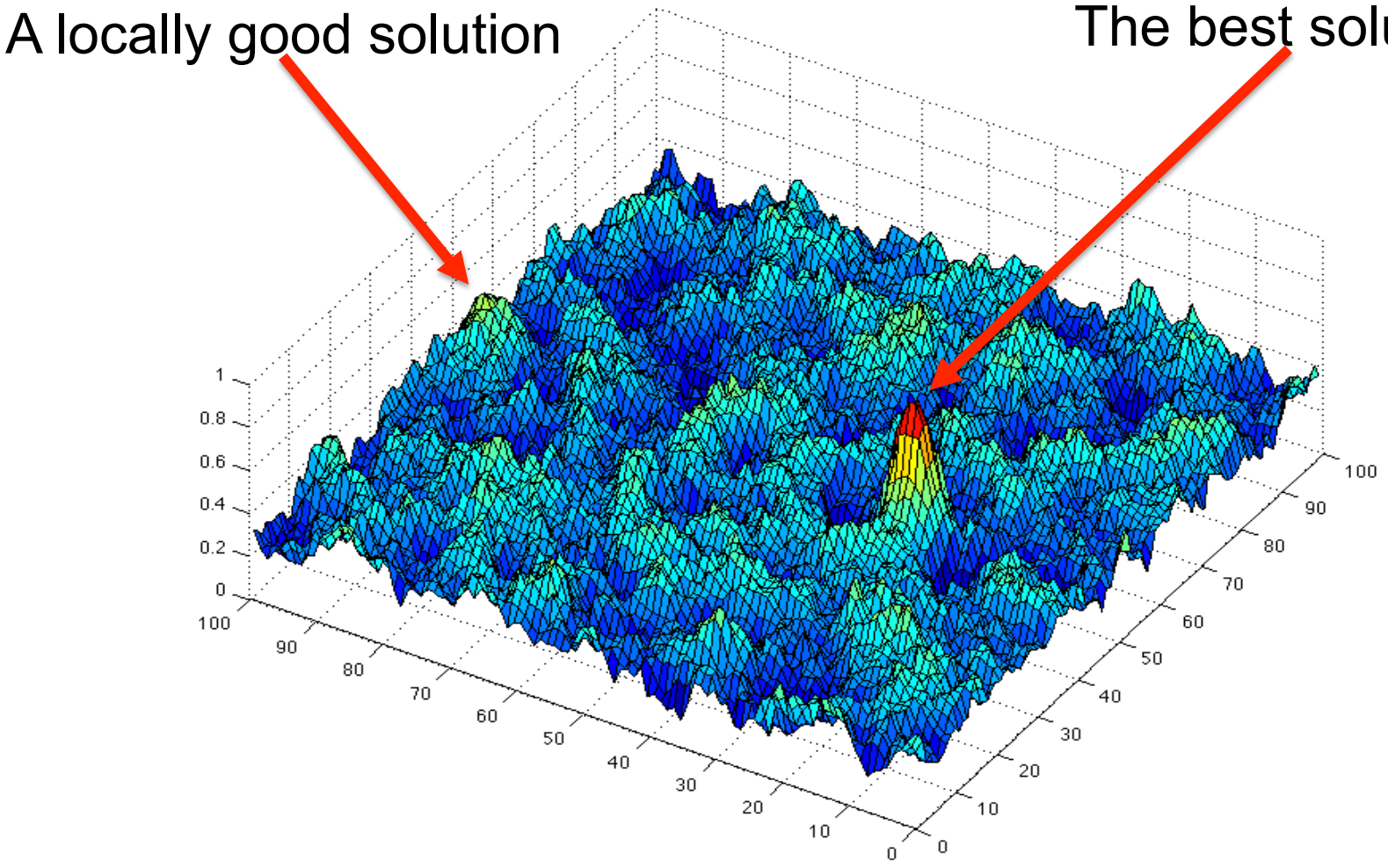
- Background generated with 4-octave Perlin noise
- Added to a unimodal Gaussian function with mean chosen uniformly at random and SD = 3
- Normalized so maximum points = 100





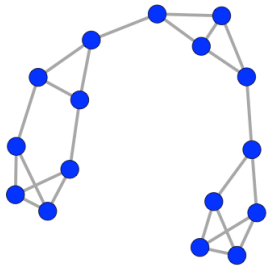
Mason and Watts 2012, *PNAS*

Payoff functions

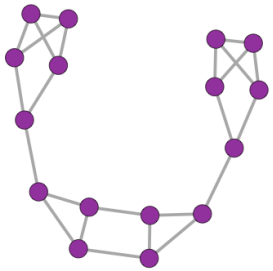


Mason and Watts 2012, *PNAS*

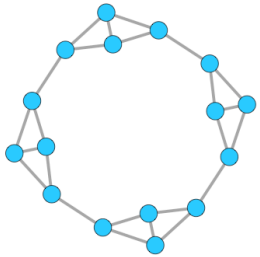
Communication networks



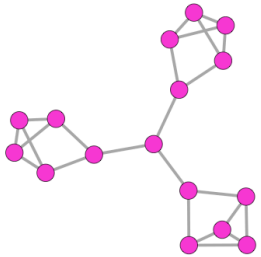
Greatest Average Betweenness



Smallest Maximum Closeness



Greatest Average Clustering



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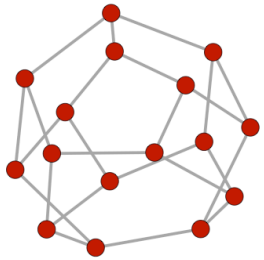

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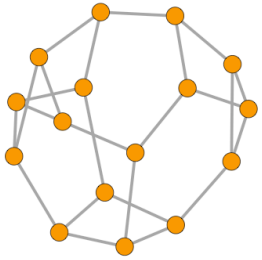

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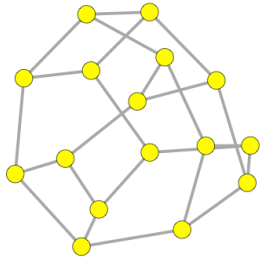

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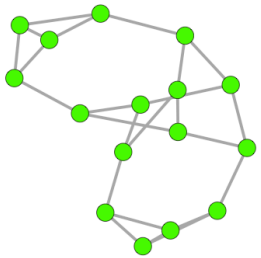
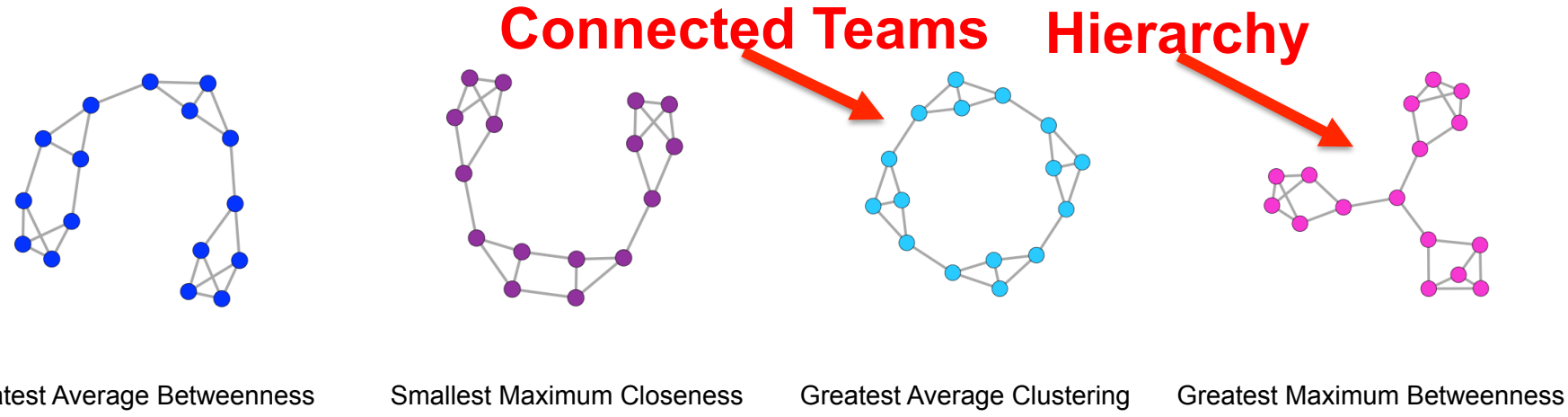


Greatest Variance in Constraint

Mason and Watts 2012, *PNAS*

Communication networks

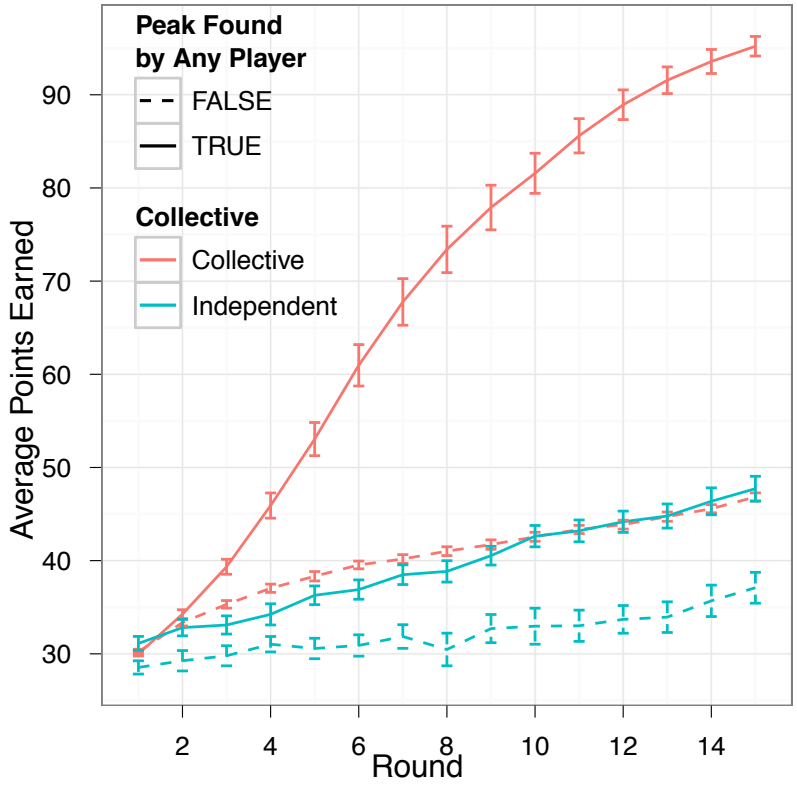


Mason and Watts 2012, *PNAS*

It's a good idea to share ideas

- Collectives do much better when best solution is found

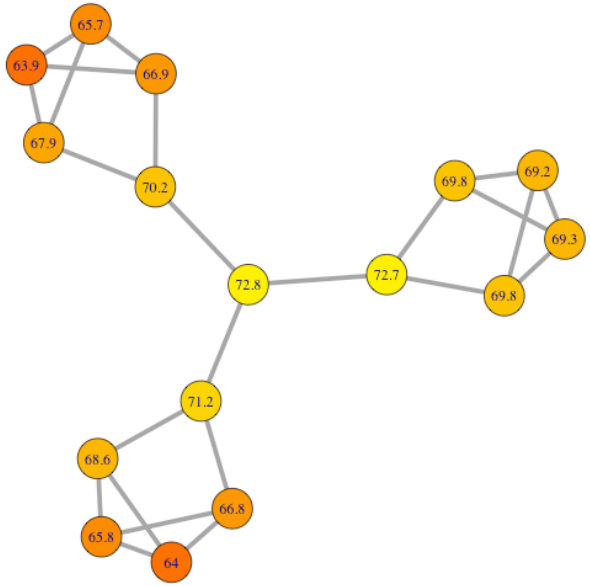
- Even when best solution is not found, collectives more effectively exploit local optima



Mason and Watts 2012, *PNAS*

Individual performance is combination of individual position and collective performance

Greatest Maximum Betweenness



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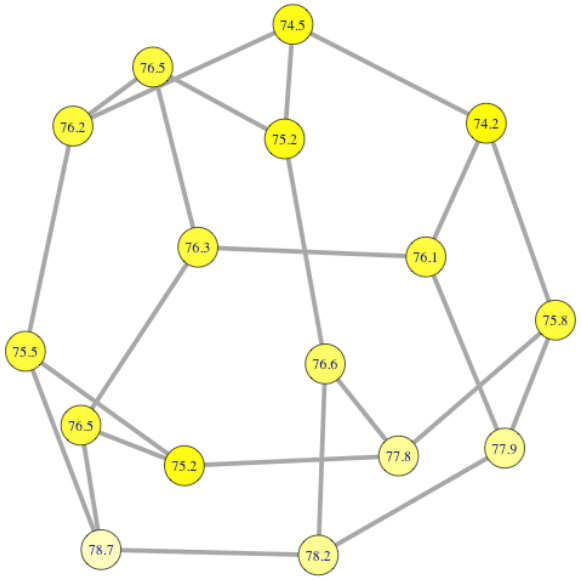

Mason and Watts 2012, *PNAS*

Key takeaways

1. Sharing innovations improves collective success
2. Efficient networks better for collective: less imitation & faster dissemination
3. Performance gap greater in inefficient networks
4. Individuals face a social dilemma: risky exploration vs. free-riding
5. Even though invisible, network structure affects strategy of exploration vs. exploitation

Mason and Watts 2012, *PNAS*

Future steps for CSR research

- How well can the information coming from new technologies be interpreted in the field?
- Can we utilize new social science research on collective intelligence to assist with:
  - The interpretation of new information formats
  - Training
  - Emergency response more generally