Introduction to Projects
Complex Systems Summer School 2019

Project Overview

Major focus of your experience here
- Group work

Unique opportunity
- Collaborate
- Be really creative
- Explore

Very different from an academic/professional project context
- "Fail"

What to Know Today

Think about the *process* you want to be involved in

- Is there a field you want to learn more about (even just as a hobby/personal interest?)
- Is there a technique or method you want to learn about?

Don't worry too much about *product* yet (but do start thinking about your expectations)
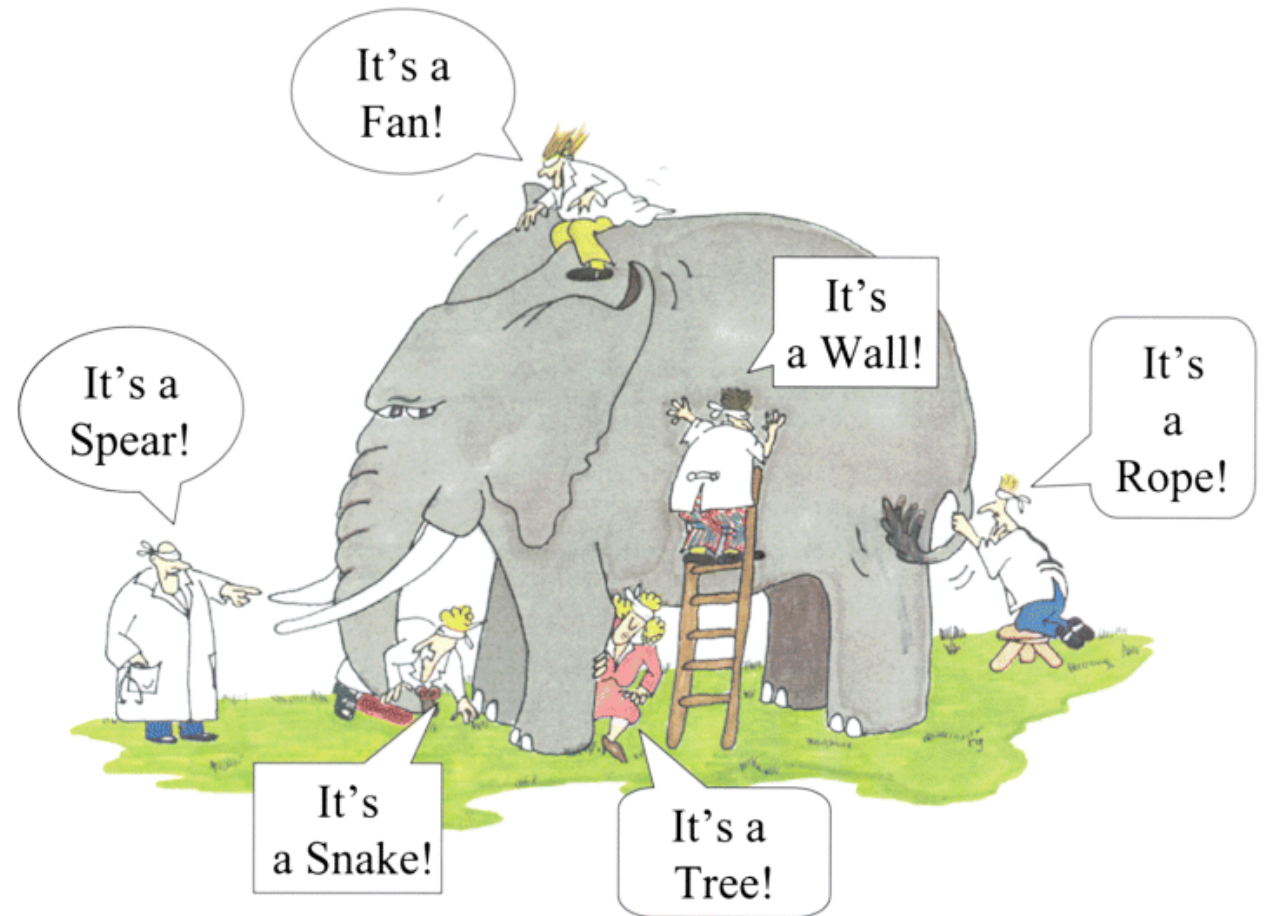
Different Perspectives are GOOD

They are also really HARD

Diversity of perspective is critical to creativity and learning
- Discipline
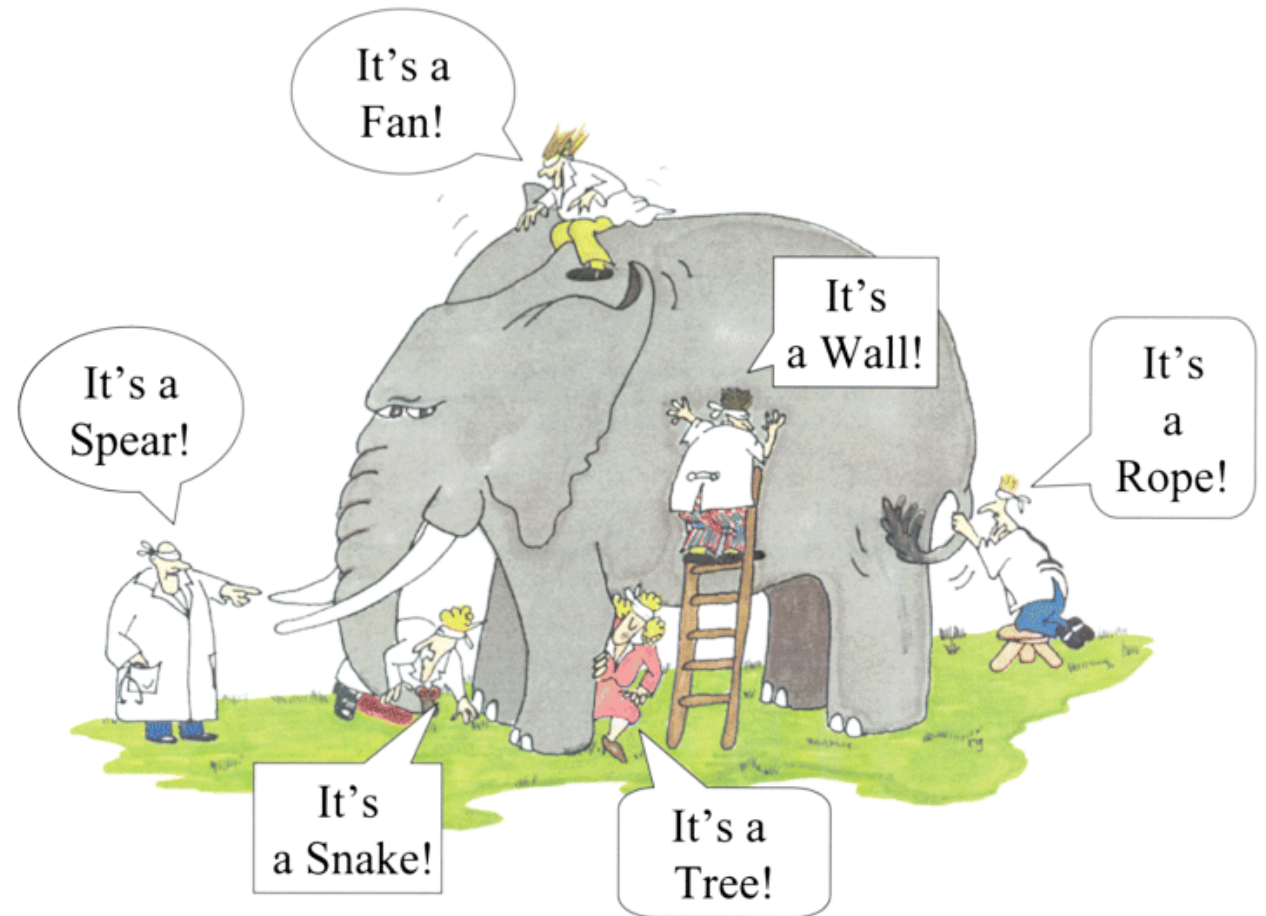- Methods
- Personality
- Culture

This can be really uncomfortable

("un-academic")

Different Perspectives are GOOD

Complexity is all about viewing the same issue from different angles

There is a difference between scientific disagreement and interpersonal conflict – if you are unsure how to solve either of these come speak to us!

Group guidelines

We will spend more time this week to help you form groups and find people to collaborate with

Until then, think about what you want within your group(s):

- What role you want to take
- How much time you can commit post-summer school
- What you don't want to do

There is no right or wrong, just be clear and respectful with your colleagues
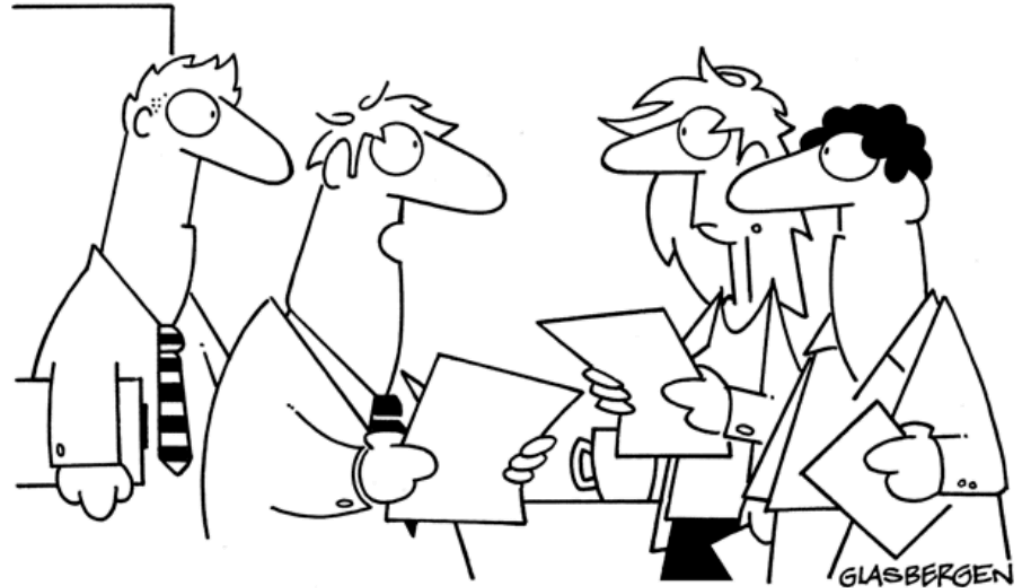
Things to Consider

People have different:

- Communication styles
- Leadership styles
- Personalities
- Cultural backgrounds

Commitment:

- No more than 2 project per person, discuss what you want out of the project (drinking group vs. paper submission vs. both)
- You can be in more groups to start with and drop out - just be honest and clear

"If we want to succeed as a team, we need to put aside our own selfish, individual interests and start doing things my way."

We are here and we want to help – sometimes outside voices can help bring perspective

What Do You Need To Do Now?

Some things to do/think about this week:

- What kind of topic/field/methodology you'd like to explore

- Talk to other people about their ideas

- Think about what role you feel comfortable taking, how much time you want to commit, etc.

- We will have a session on Wednesday to help you find people with similar thoughts/interests and form initial groups

- Don't stress!

Presentation Days and Logistics

There will be short meetings with Lou, Amy, Dave (there will be sign up sheets on the wiki)

Presentation days:

- Short, 10 minute project presentations **on July 3**
- We don't really care if you have results or not – use your time together wisely

Other deadlines:

- By the end of the summer school, a report with your meeting notes (useful for you to have)
- By end of October, an abstract and short paper (required for certificate of attendance)

Project Examples

The Role Of Feedback in Multi-Scale Systems

During the summer school: Mostly reading and discussing literature. Four people, of which one was the main leader.

After summer school: One person dropped out. We skype on average every 2 weeks (once a week before a deadline)

Outcomes:
- I got to spend time reading about ant colonies, the visual cortex and animal societies
- A short 10 page paper was accepted for SASO 2019
- We are building an online project page with all our examples, and writing a longer paper to submit to a journal

↑ Information abstraction (upward causation)
↓ Feedback (downward causation)
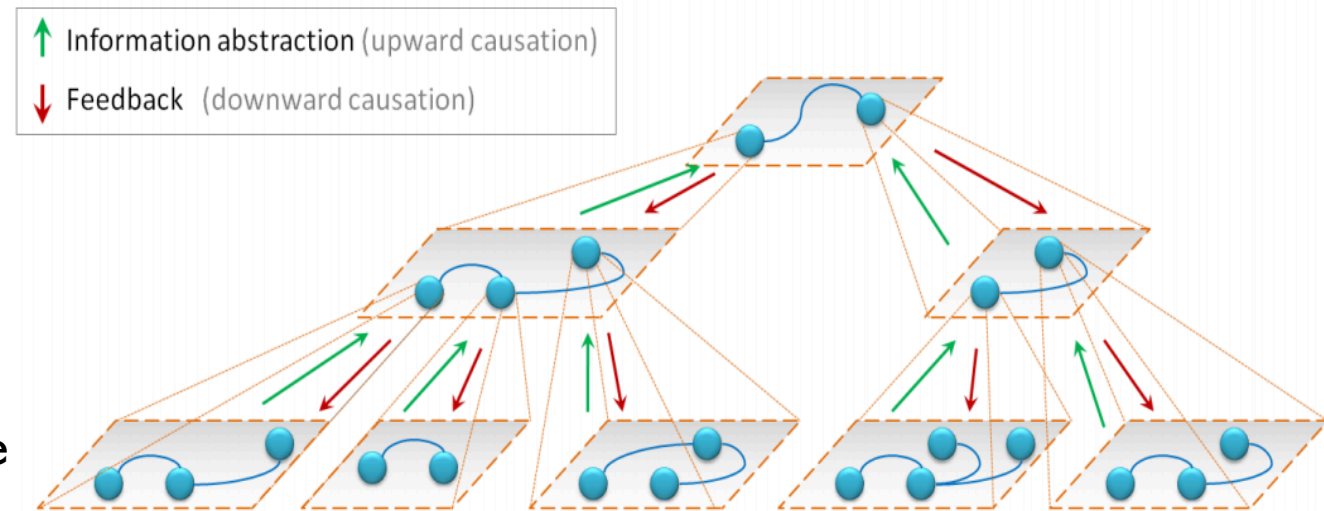
Structural overview of a multi-scale adaptive system (or hierarchy)

The Impact of Technology Intervention on the Sustainable Development Goals (SDGs)
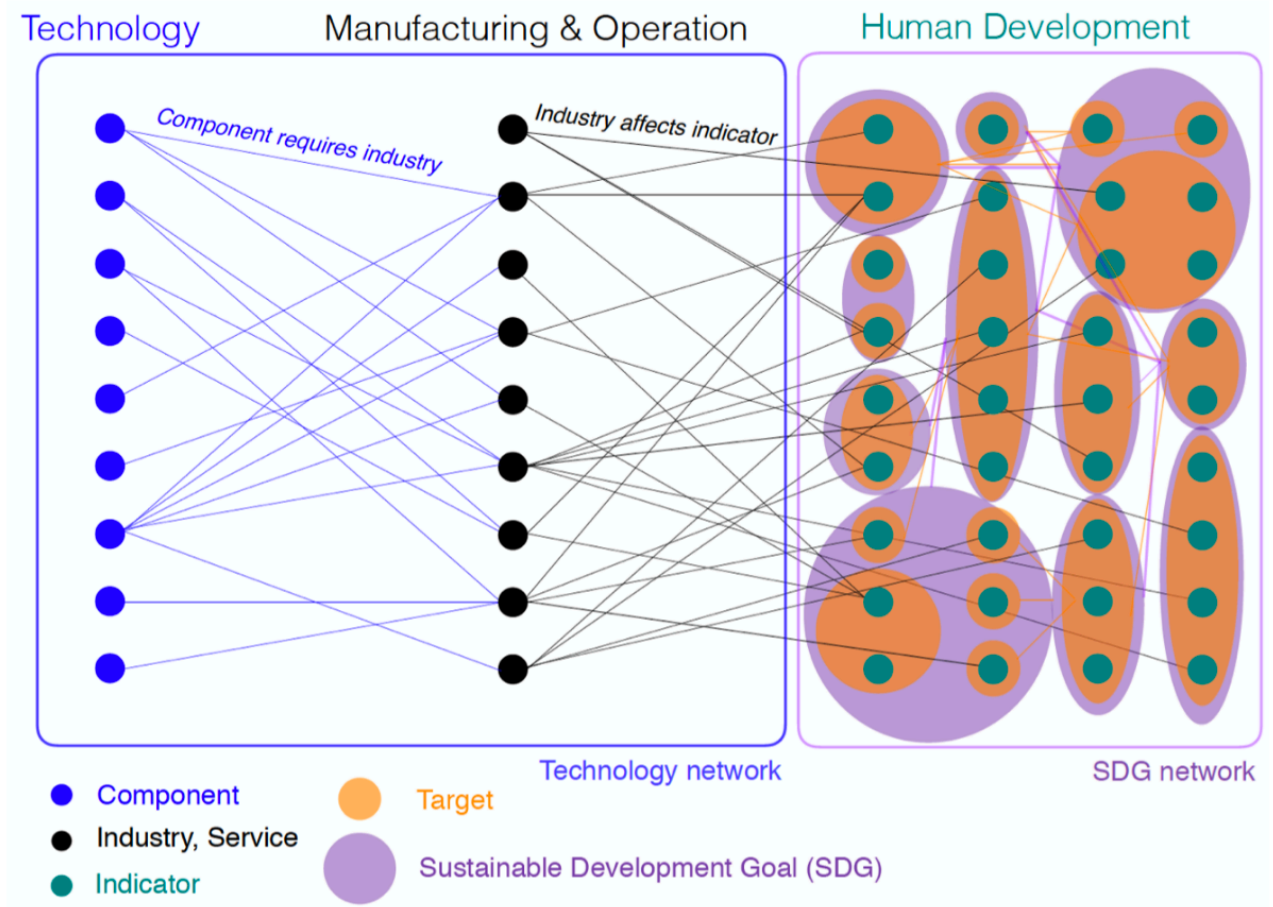
During the summer school:

- Strong leader, but idea evolved through data-driven conversations and model development

- Started with 4 people, ended with 3

- Good example of needing to identify expectations (roles, input, output) throughout the process

After summer school: Emails, several spin-offs of the work, but paper is in progress

Outcomes:

- Two really good professional friendships!
- Spin-offs of work in other contexts

A Quantitative Approach to Contact Improvisation Dance

A group of six people exploring how prediction, adaptation and emergent outcomes characterize partner improvisation

During the summer school, videos of improvisation pairs of different levels of experience were coded to detect the points of contact and their frequency, and the role of mutual information/adaptation was discussed.

After the summer school, the mutual information was measured and it was found that it is higher for partners with higher levels of experience

Scalability and Structure in Human Interactions

During the summer school:

- 3 main people, 2 others involved. Didn't start as a formal project

- Really diverse group – no one expertise
- Explored Santa Fe's breweries throughout most of the conceptual conversations

- Developed an ABM module for Python (MESA-ABM)

After summer school: Open-sourced the Python module, working on full paper
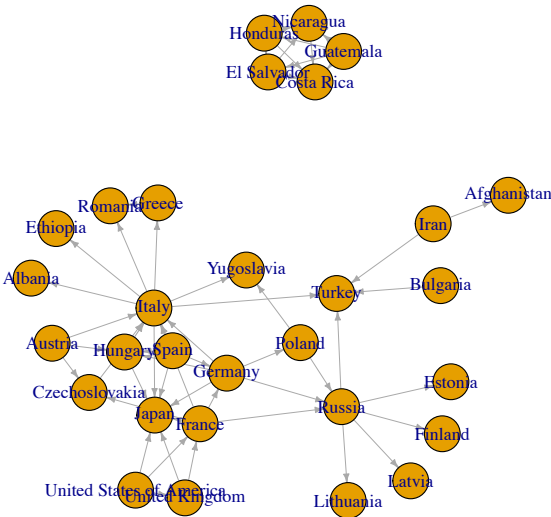
	Cooperate	**Conflict**
Cooperate	x, x	0, x+ε
Conflict	x+ε, 0	0, 0
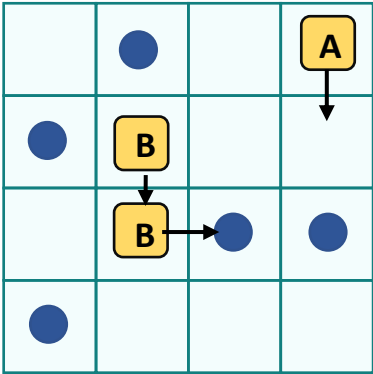
Other interesting examples

- Automated opinion detection analysis of online conversations

- Translating from nature to technology: framework to compare innovation pathways in biomimicry

- Understanding music with higher order networks

- Talking loud or talking often: how the interplay between network structure and agent influence affects the time to reach consensus in collective decision-making

- Modelling the dynamics of wealth inequality

Our contact information

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You can find us also on slack, whatsapp, skype, etc. (but also we're around so just talk to us whenever)