Sustainability Leadership
Class 2:
Part 1: Wicked problems, participatory modeling, and conceptual models.
Part 2: Initiating the research
“Some problems are so complex that you have to be highly intelligent and well informed just to be undecided about them.”

--Laurence J. Peter
A wicked problem is one for which each attempt to create a solution changes the understanding of the problem. Wicked problems cannot be solved in a traditional linear fashion, because the problem definition evolves as new possible solutions are considered and/or implemented.

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Wicked Problems

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Fragmentation suggests a condition in which the people involved see themselves as more separate than united, and in which information and knowledge are chaotic and scattered.
Rittel and Webber (1973): Ten characteristics for wicked problems in social policy planning:

1. There is no definitive formulation of a wicked problem.
2. Wicked problems have no stopping rule.
3. Solutions to wicked problems are not true-or-false, but better or worse.
4. There is no immediate and no ultimate test of a solution to a wicked problem.
5. Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
6. Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
7. Every wicked problem is essentially unique.
8. Every wicked problem can be considered to be a symptom of another problem.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
10. The social planner has no right to be wrong (i.e., planners are liable for the consequences of the actions they generate).

Wicked problems are crossly similar but discretely different.
Wicked Problems

Conklin (2006) generalized wicked problems with six defining characteristics:

- **You don't understand the problem until you have developed a solution.** Indeed, there is no definitive statement of "The Problem." The problem is ill-structured, an evolving set of interlocking issues and constraints.

- **Wicked problems have no stopping rule.** Since there is no definitive "The Problem", there is also no definitive "The Solution." The problem solving process ends when the solution is acceptable or when you run out of resources.

- **Solutions to wicked problems are not right or wrong,** simply "better," "worse," "good enough," or "not good enough."

- **Every wicked problem is essentially unique and novel.** There are so many factors and conditions, all embedded in a dynamic social context, that no two wicked problems are alike, and the solutions to them will always be custom designed and fitted.

- **Every solution to a wicked problem is a "one-shot operation," every attempt has consequences.** As Rittel says, "One cannot build a freeway to see how it works." This is the "Catch 22" about wicked problems: you can't learn about the problem without trying solutions, but every solution you try is expensive and has lasting unintended consequences which are likely to spawn new wicked problems.

- **Wicked problems have no given alternative solutions.** There may be no solutions, or there may be a host of potential solutions that are devised, and another host that are never even thought of.
Super-Wicked Problems

Levin et al. (2012) distinguish between “wicked problems” and “super-wicked problems.” Super-wicked problems have the following additional characteristics:

1. Time is running out.
2. No central authority.
3. Those seeking to solve the problem are also causing it.

- The characteristics that define a wicked problem relate to the problem itself.
- The characteristics that define a super-wicked problem relate to the agent trying to solve it.

Wicked Problems

Wicked problems demand tools and methods which create shared understanding and shared commitment.
Wicked Problems

Wicked problems demand tools and methods which create **shared understanding** and **shared commitment**.

**Shared understanding** is not the same as consensus. It does not mean everybody agrees with each other. Shared understanding among stakeholders in a project means that the stakeholders know about each others' concerns and goals.

Addressing Wicked Problems

Roberts (200): Three strategies:

**Authoritative**: Vesting the responsibility for solving the problems in the hands of a few people.
- Reduction in the number of stakeholders reduces problem complexity.
- Authorities and experts may not have all the perspectives needed to tackle the problem.

**Competitive**: Pitting opposing points of view against each other.
- Different solutions can be weighed up against each other and the best one chosen.
- Creates a confrontational environment in which knowledge sharing is discouraged.
- Parties involved may not have an incentive to come up with their best possible solution.

**Collaborative**: Engaging all stakeholders in order to find the best possible solution for all stakeholders.
- Involves meetings in which issues and ideas are discussed and shared understanding is developed.
- A common, agreed approach is formulated.
- Chosen solution has a good chance of being supported by most stakeholders.
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Power Contested?

- Yes: Competitive
- No: Collaborative Strategies

Power Dispersed?

- Yes
- No: Authoritative Strategies

Conflict Over Problem and Solutions (Type III Wicked Problems)

Conflict Over Solutions (Type II Complex Problems)

Low Level of Conflict (Type I Simple Problems)
Addressing Wicked Problems
Addressing Wicked Problems

Traditional approach
Addressing Wicked Problems

Traditional Science

Threats → System (Ecosystem/Species) → Possible Futures

Stakeholders/Decision makers → Interventions → System (Ecosystem/Species)
Addressing Wicked Problems

Figure: The process of conducting the collective social learning spiral.
Brown, 2008
New approach:

- System knowledge
- Participatory modeling
- Goal Knowledge
- Transformation knowledge (simulations)
- Decision making/Interventions

Threats to habitat
Threats to procreation
Threats to population

System (Ecosystem/Species)
Adaptation
Adaptation
Possible Futures

Stakeholders (gov. & NGO)
Desired Future
Conceptual model
Options, Policies Actions

Addressing Wicked Problems
Wicked Problems

Multiple actors,
Differing perspectives
Conflicting interests
Important intangibles
Inescapable uncertainties.

Solutions are not right or wrong but more or less acceptable
There is no stopping rule.
The answer is a process

Each solution is
• unique
• costly
• ...and has consequences

Taming Wicked Problems

• Authoritative
• Competitive
• Collaborative
Participatory Modeling

Patricipatory modelling

On participation

Arnstein (1969) Ladder of citizen participation

- Citizen control
- Delegated power
- Partnership
- Placation
- Consultation
- Informing
- Therapy
- Manipulation

Degrees of citizen power

Degrees of tokenism

No power

http://www.georgejulian.co.uk/2013/01/22/social-media-and-citizen-engagement/
Participatory Modeling

On participation

A Ladder of Citizen Participation - Sherry R Arnstein

French student poster. In English, "I participate, you participate, he participates, we participate, you participate... they profit."

Participatory Modeling

Maintain a diversity of points of views

World Cafe Delphi Focus Group

Policy Experiments

Scenario Analysis Surveys Deliberative Polling

React to a new scenario

Converge towards a shared representation

Participatory Planning

Participatory Assessment, Monitoring & Evaluation

Share existing knowledge

Participatory Learning & Action

Citizen Jury

Expert Panel

Companion Modelling

Charrette

Adapted from Van Asselt (2001)
Assumptions and Principles

1) Involve all stakeholders, collaboration
2) New ways of working together
3) Management = process
4) Managers = designers and facilitators
5) Solutions: institution-building, rule-making, planning
6) Scale: local social-ecological sustainability, global regimes
Participatory Approaches

- Search for unity of agency ("we")
- Coordination of stakeholders and collaborative procedures

Search for processes that will transform divided societies into unified managers of ecosystems

Mermet 2011
Participatory Modeling

**Commod**

- **Group Model Building**
  - Causal loop diagram
  - Learning history

- **Mediated Modelling**
  - Stock and flow diagram

- **Shared Vision Planning**
  - Common language

- **Participatory simulation**
  - Agent-based model
  - Role-playing game

- **Agent-based model**
  - ARDI diagrams

- **Companion Modelling**
  - Common language

Authors and References:
- Andersen & Richardson, 1997
- Van den Belt, 2004
- Voinov & Bousquet (2010)
- Etienne, 2010
- Meadows, 1986
- US army, 2005
- Etienne, 2010

**ARDI diagrams**

**Mediated Modelling**
Roles

- **Leader**
  A participant who takes on leadership connects people, supports convergence and induces engagement.
  
  Arbitration and integration of divergent understandings is also part of leadership.
  
  Facilitation and leadership may be held by the same person.

- **Convener**
  The formal lead in the process.
  
  He decides on the nature of participation and prepares the agenda.
  
  He has legitimacy and capacity to gather together parties concerned.

- **Facilitator**
  The facilitator role is normally explicitly assigned to one external person
  
  A facilitator helps the group to work collaboratively
  
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- **Technical Expert**
  The technical expert brings technical expertise on a topic to the process, and adds a particular perspective.

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  All stakeholders taking part in the process are participants.
  
  He is active if he engages in the collaborative process influencing the outcome.
  
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- **Sector-based actor**
  Those who create environmental problems and may resolve them by changing

- **Strategic environmental actor**
  The burden falls on specific stakeholders

Who is we?

Importance of the actor supporting the environmental change

Collaborative approach: stakeholders act jointly

Who takes initiative? If environmental concern are not shared?

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Role of experts and facilitators have to be strictly separated.
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Important Conclusion:
Having Experts as conveners and leaders is in conflict with the Participatory Modeling Approach

Facilitation and leadership may be held by the same person...
...connects people, supports convergence and induces engagement.
**Participatory Modeling**

### B0: General Introduction

#### System dynamics
- Stock and flow models, feedback loops

![Diagram of System Dynamics](image)

#### Bayesian belief networks
- Conditional probabilities between variables

![Diagram of Bayesian Belief Networks](image)

#### Fuzzy cognitive mapping
- Weighted connections between nodes

![Diagram of Fuzzy Cognitive Mapping](image)

#### Agent-based models
- Decision rules based on states of the environment and the communication modalities

![Diagram of Agent-based Models](image)
Step 1: Goal statement

Step 2: Conceptual model

Step 3: Table top game

Step 4: Agent-based models