



Seminar 12: Critical Systems Thinking

- Critical Systems Heuristics
- Boundary Critique
- Frameworks for applying Systems Thinking
 - Total Systems Intervention
- If time:
 - ↳ The Global Problematique
 - ↳ How projections of future climate change work, and what they mean

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A “Wicked” Problem...

- Has no definitive formulation
- Has no stopping rule
 - ↳ each solution leads to new insights
- Solutions are not right or wrong
- No objective test of how good a solution is
 - ↳ subjective judgment needed
- Is unique
 - ↳ no other problem is exactly like it
- Can be treated as a symptom of another problem
- Has strong political, ethical or professional dimensions

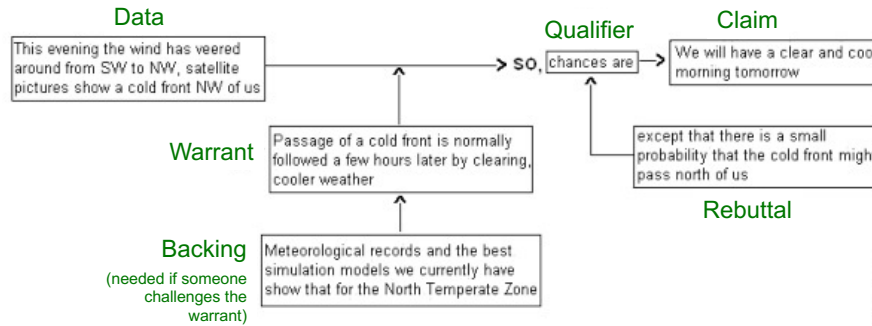
See: Rittel & Webber (1973) Dilemmas in a General Theory of Planning. *Policy Sciences*, 4, 155–169.

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Preamble: How do we establish validity?

→ Structure of Arguments (Toulmin)



(C) 2009 W. Ulrich

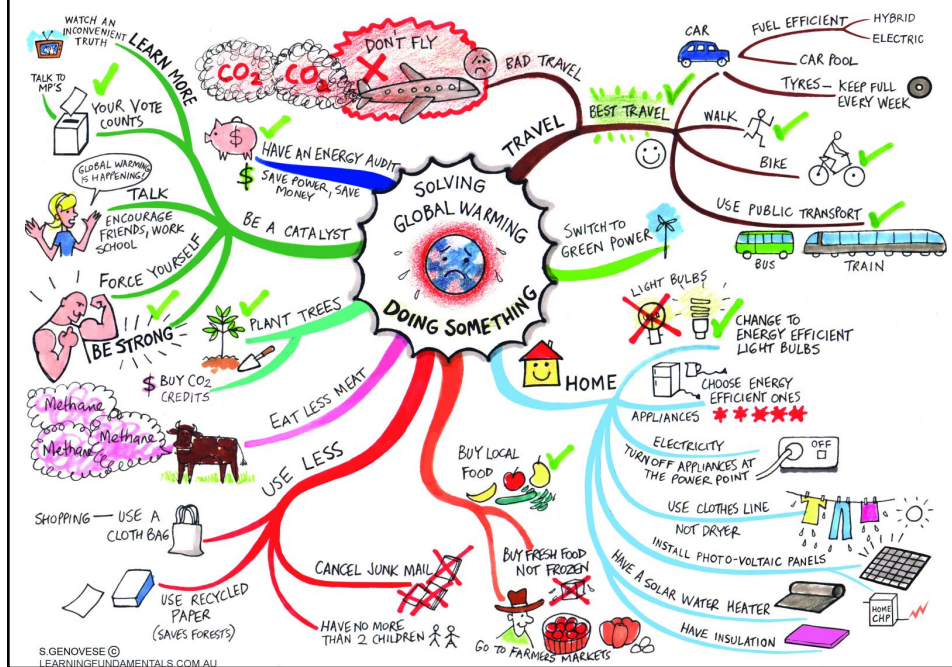
→ key insight:

- Scientific theories (claims) aren't true or false...
...they each have a scope of applicability

http://wulrich.com/bimonthly_november2009.html

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Boundary Critique Exercise: What has been left out, and why?





Ulrich's Critical Systems Heuristics

→ **Claims**: assertions/suggestions we consider to be meaningful (relevant) and justifiable (valid)

- ↳ Eg problem definitions (descriptions of a problem situation)
- ↳ Eg solution proposals
- ↳ Eg suggested measures of success / notions of what counts as improvement
- ↳ Eg assertion of moral rightness
- ↳ Eg claims to knowledge or rationality

All claims are partial

Partial as in "incomplete"

Partial as in "favouring a particular viewpoint"

Partiality arises because of (implicit or explicit) boundary judgments

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Critiquing the Partiality

Perspective	Empirical selectivity ('Is' mode)	Normative selectivity ('Ought' mode)
'Facts'	<p>Actual mapping:</p> <p>What 'facts' are considered relevant and which ones are left out?</p>	<p>Ideal mapping:</p> <p>What 'facts' ought to be considered relevant and which ones should be left out?</p>
'Values'	<p>Actual mapping:</p> <p>What 'values' are considered relevant and which ones are left out?</p>	<p>Ideal mapping:</p> <p>What 'values' ought to be considered relevant and which ones should be left out?</p>

http://projects.kmi.open.ac.uk/ecosensus/publications/ulrich_csh_intro.pdf

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Boundary Critique

→ Systematic boundary critique seeks to:

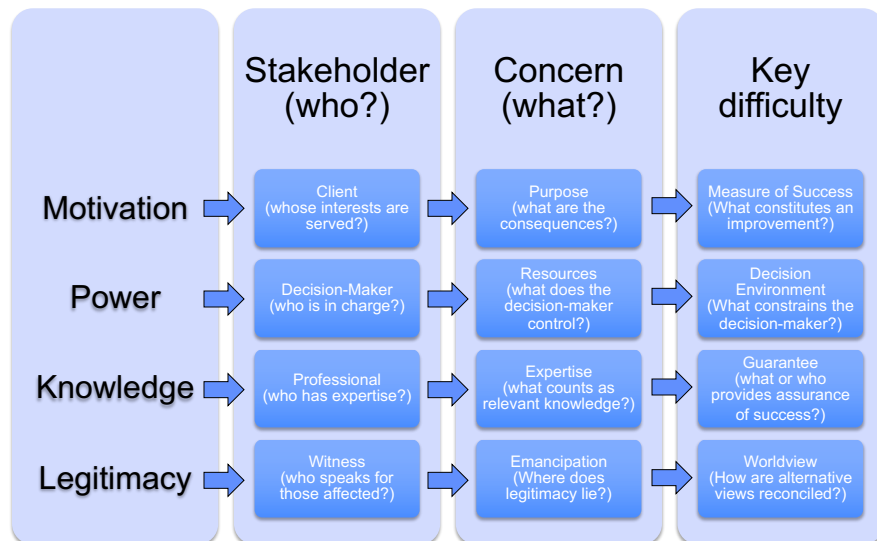
- ↳ Identify the source of selectivity by surfacing boundary judgments
- ↳ Examine practical and ethical implications of the boundary judgments
- ↳ Find alternative reference systems (to show why the current one is selective)
- ↳ Seek mutual understanding with stakeholders about their reference systems
- ↳ Challenge claims (in cases where stakeholders try to apply their boundary judgments uncritically)

→ Implications:

- ↳ All “problem situations” are with respect to a particular reference system
- ↳ All claims must be judged by how well we make their conditioned nature clear
- ↳ Everyone can question boundary judgments
 - so expert and layperson meet as equals
- ↳ Emancipation possible without specialist knowledge



Boundary Categories

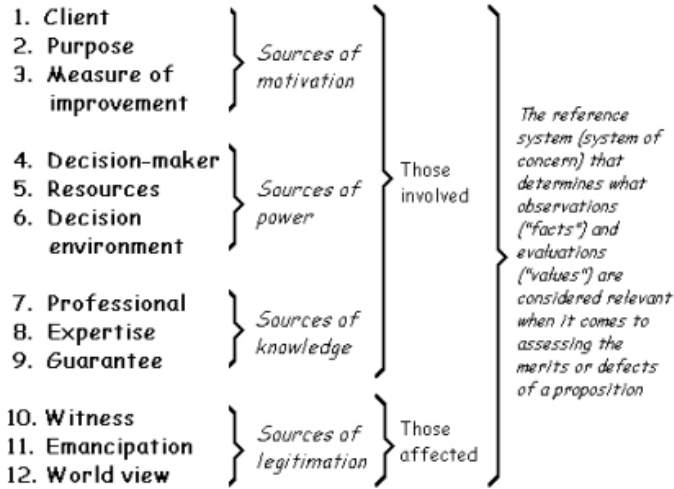




Ulrich's Rationally Justified Action

Boundary categories

Boundary issues



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Ask both "is" and "ought" questions...

- sources of motivation
 - ↪ Client: whose interests are served?
 - ↪ Purpose: what are the consequences?
 - ↪ Measure of improvement: how will we assess success?
- sources of power
 - ↪ Decision-makers: Who determines whether an improvement has been made?
 - ↪ Resources: what do the decision-makers control?
 - ↪ Context: What constrains the decision-makers?
- sources of knowledge
 - ↪ Professions: Who is involved as a competent provider of knowledge/experience?
 - ↪ Expertise: What counts as relevant knowledge?
 - ↪ Guarantee: What basis do these experts use to assure success?
- sources of legitimation
 - ↪ Witness: who represents the interests of non-participants?
 - ↪ Emancipation: how will their rights and freedoms be protected?
 - ↪ Worldviews: how are different values/perspectives treated?

http://projects.kmi.open.ac.uk/ecosensus/publications/ulrich_csh_intro.pdf

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Ask both “is” and “ought” questions...

→ sources of motivation

- ↳ Client: whose interests **ought to be** served?
- ↳ Purpose: what **ought** the consequences be?
- ↳ Measure of improvement: how **ought** we assess success?

→ sources of power

- ↳ Decision-makers: Who **ought to** determine whether an improvement has been made?
- ↳ Resources: what **ought** the decision-makers control?
- ↳ Context: What **ought to** constrain the decision-makers?

→ sources of knowledge

- ↳ Professions: Who **ought to be** involved as competent provider of knowledge/experience?
- ↳ Expertise: What **ought to** count as relevant knowledge?
- ↳ Guarantee: What basis **ought** these experts use to assure success?

→ sources of legitimation

- ↳ Witness: who **ought to** represent interests of non-participants?
- ↳ Emancipation: how **ought** their rights and freedoms be protected?
- ↳ Worldviews: how **ought** diff. values/perspectives be treated?

http://projects.kmi.open.ac.uk/ecosensus/publications/ulrich_csh_intro.pdf



Example: GMOs

→ Examine claims about whether a field trial for a new GM strain of wheat should go ahead

→ Boundary judgments:

- ↳ Scientists doing scientific research: Science must proceed unimpeded
- ↳ Research ethics and risk management: Beneficence argument must be transparent
- ↳ Ecosystems and contaminants that weaken them: Allowing organisms to escape into the wild cannot be undone
- ↳ Economic system in which investment in R&D boosts jobs and growth: You can't stand in the way of progress!
- ↳ Intellectual property and privatization of public goods: Who does GM research benefit anyway?
- ↳ Global food supply and demand: We need to overcome the food crisis!
- ↳ Potential threats to human health and well-being: Our highly industrialized food production system is making us sick – don't make it worse!
- ↳ Sustainable agriculture with long term time horizons: Technical fixes like GMOs are short term solutions, what we really need is permaculture

See: <http://www.easterbrook.ca/steve/2012/05/systems-thinking-and-genetically-modified-food/>



Example: COVID-19

→ Commons (market failure):

- ↳ Strong rules and quotas needed to ensure resources (TP, masks, healthcare) available to everyone who needs them
"quotas to limit hoarding"; "no shaming"; "move ventilators to regions that most need them"

→ Optimization:

- ↳ Use cost-benefit analysis to measure whether solutions enhance (economic) welfare for society overall
"is the solution worse than the problem?"; "re-open the economy"

→ Compromise:

- ↳ Use multi-goal trade-off analysis to find compromises that help all stakeholders
"list of essential businesses"; "how many people can congregate?"

→ Prioritization:

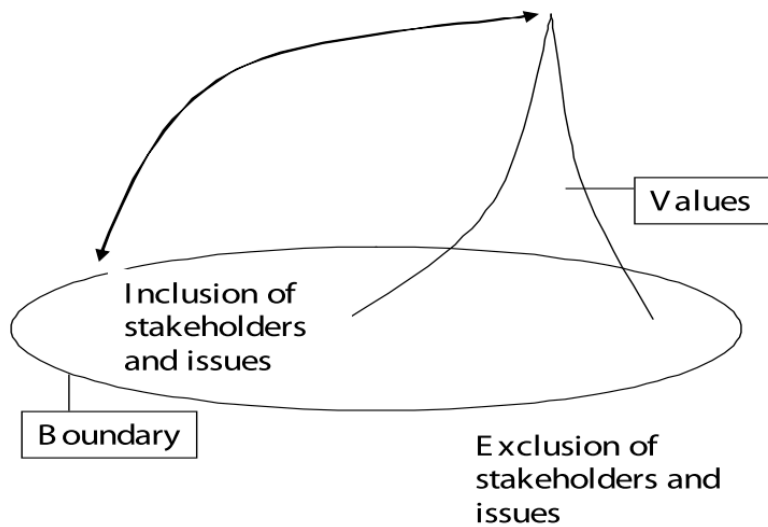
- ↳ On moral grounds: it is imperative to do everything we can to avoid people dying
"nothing is worth more than a human life"; "humans are not expendable"
- ↳ On scientific grounds: if the scientific evidence is clear, then we must act on it or acknowledge it cannot be solved
"flatten the curve"; "test and trace"

<https://www.globalpolicyjournal.com/blog/07/04/2020/why-experts-disagree-how-manage-covid-19-four-problem-conceptions-not-one>

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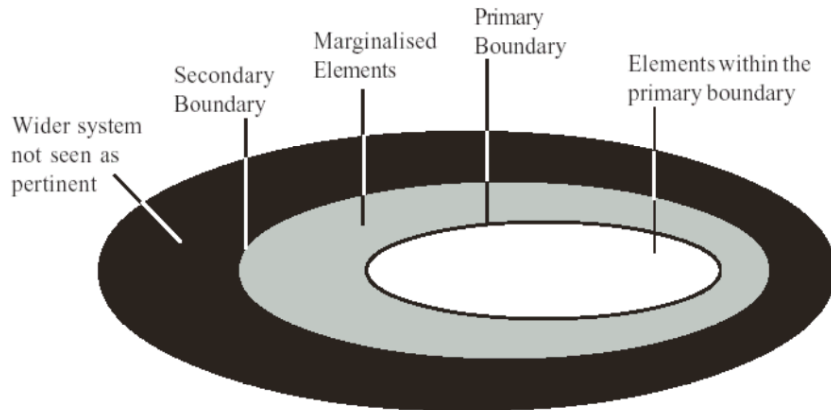
Midgley's Values and Boundaries



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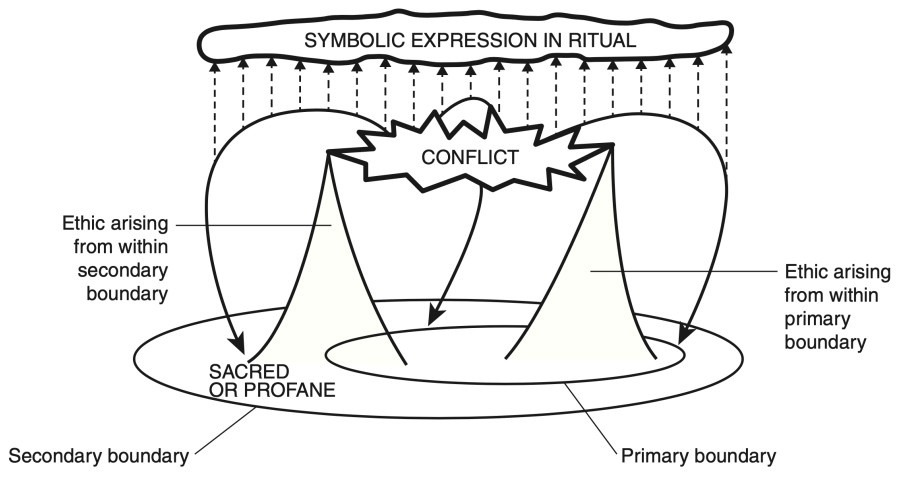
Midgley: Marginalization



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Midgley's Boundary Critique



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Boundary Crossing

“It is a good exercise for researchers to transgress a boundary at least once a week”.
- Ulrich

What kinds of boundaries should we cross?

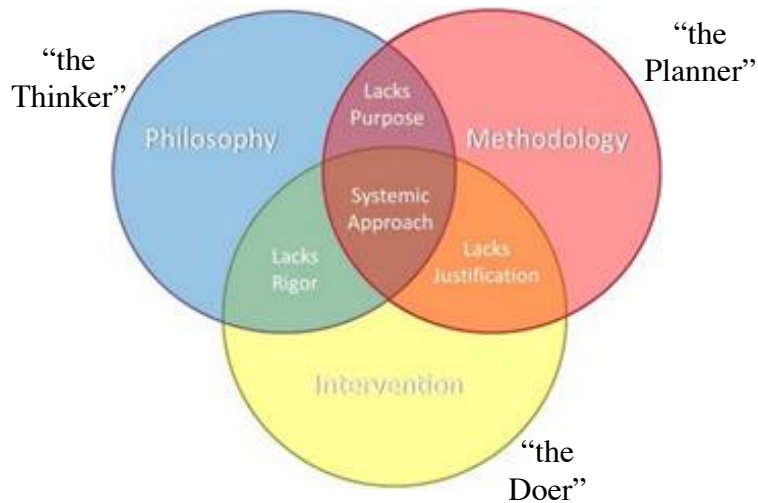
- ↪ Our preconceived notions of research
(what kinds of research ought we do?)
- ↪ Our analytical categories
(what do we study? How do we study it?)
- ↪ Our institutionalized cultures and conventions of research
(what is meaningful to me?)
- ↪ Our tendency to technological determinism
(what technologies do we want, and how can we re-shape them?)
- ↪ Our national identities
(what is the broader historical context?)
- ↪ Our familiar dichotomies
(quantitative/qualitative; thinking/doing; etc)



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Systemic Intervention



Source: <http://www.sweetnessphd.com/bookshelf-systemic-intervention/>



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Paradigms for Research

→ Functionalist/Positivist

- ↪ Knowledge is objective
- ↪ “Causes determine effects/ outcomes”
- ↪ Reductionist: study complex things by breaking down to simpler ones
- ↪ Prefer quantitative approaches
- ↪ Verifying (or Falsifying) theories

→ Interpretivist/Constructivist

- ↪ Knowledge is socially constructed
- ↪ Truth is relative to context
- ↪ Theoretical terms are open to interpretation
- ↪ Prefer qualitative approaches
- ↪ Generating “local” theories

→ Emancipatory/Critical

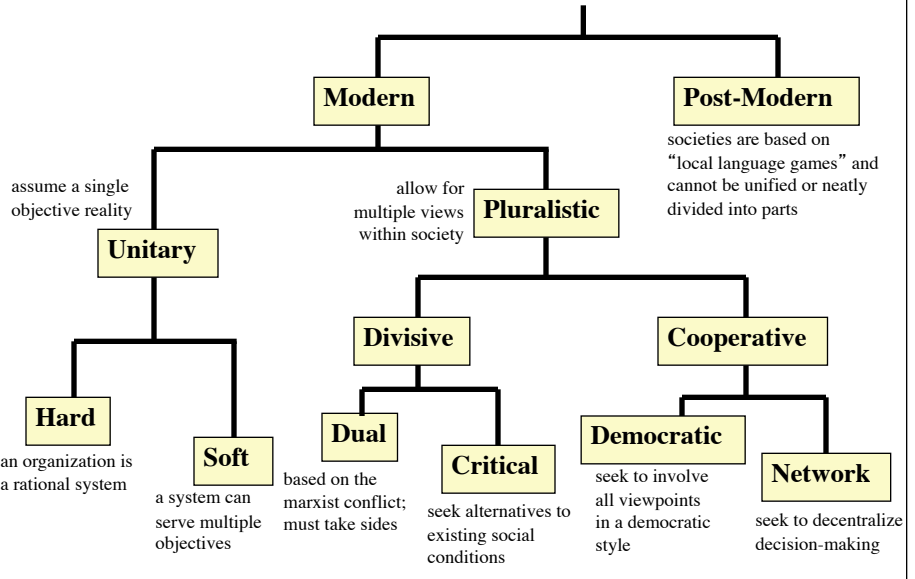
- ↪ Knowledge is power
- ↪ All research is political: protecting the status quo or empowering people
- ↪ Choose what to research based on who it will help
- ↪ Prefer participatory approaches
- ↪ Seeking change in society

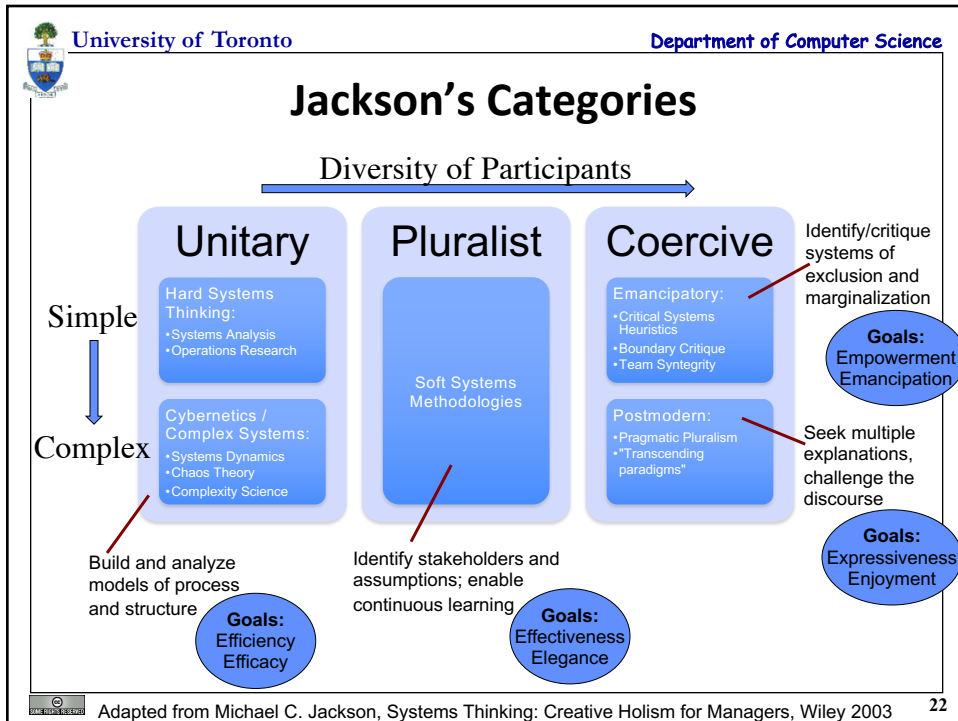
→ Pragmatist/Postmodern

- ↪ Knowledge can't be separated from its narrative/performative context
- ↪ All forms of inquiry are biased
- ↪ Prefer multiple methods / multiple perspectives
- ↪ Exploring multiple meanings, promoting diversity



Types of Systems Thinking (after Lyotard)





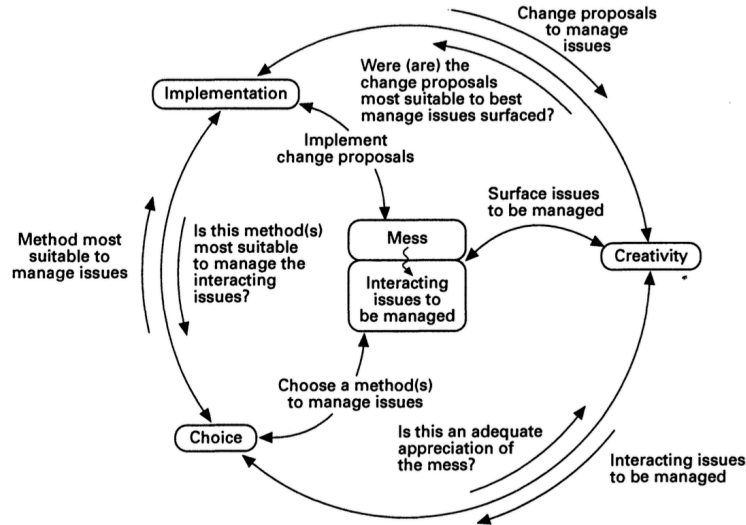
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Total Systems Intervention

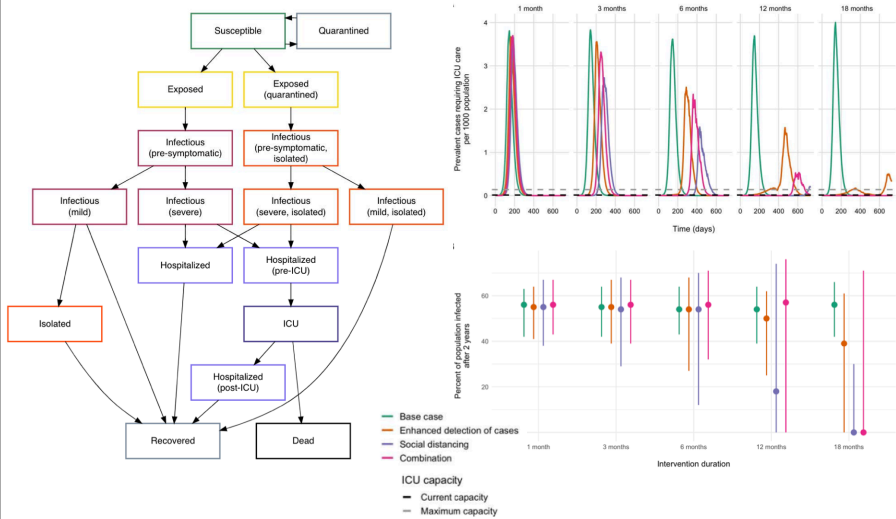


Flood, R. L. (1995). Total Systems Intervention (TSI): a Reconstitution. *The Journal of the Operational Research Society*, 46(2), 174–191.

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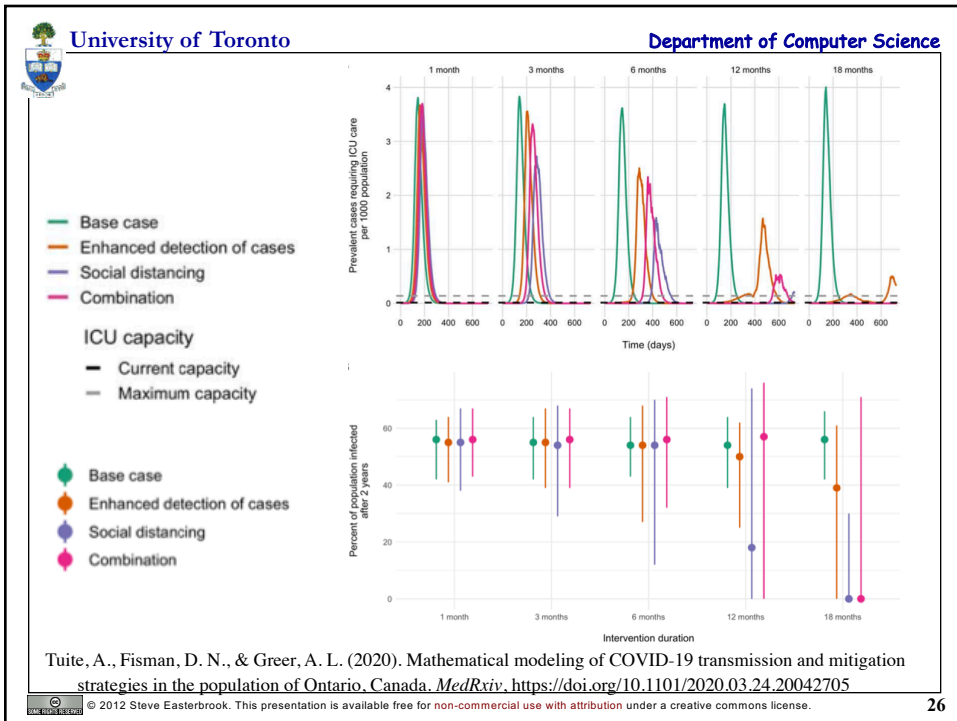


Emerging from Pandemic Lockdown

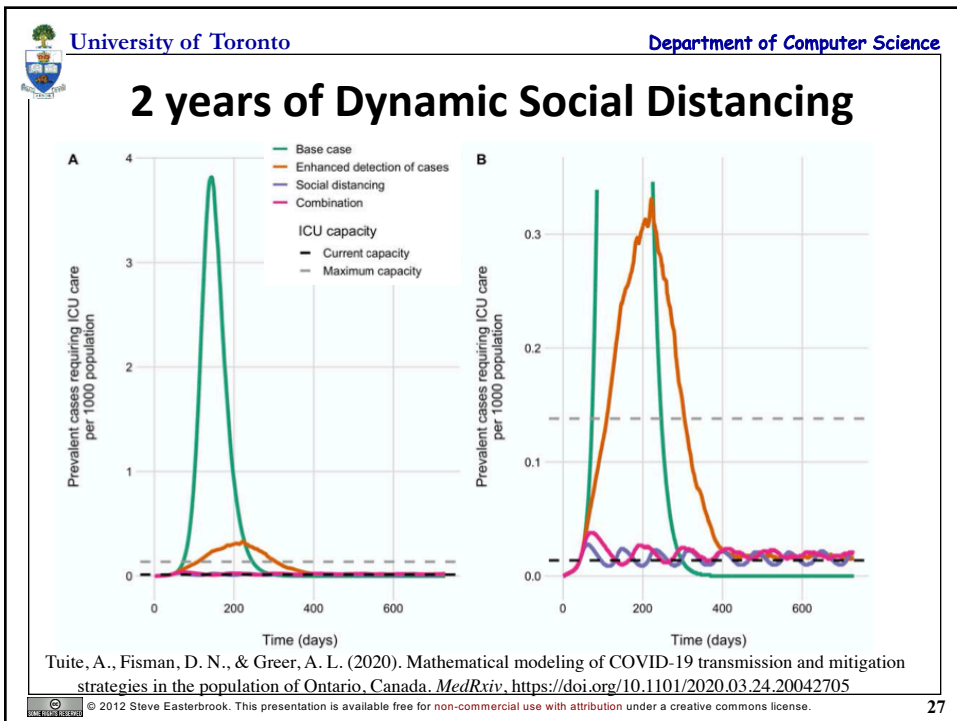


Tuite, A., Fisman, D. N., & Greer, A. L. (2020). Mathematical modeling of COVID-19 transmission and mitigation strategies in the population of Ontario, Canada. *MedRxiv*. <https://doi.org/10.1101/2020.03.24.20042705>

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Strategies?

→ Total suppression

↳ Lockdown until there is a vaccine

→ Let it smoulder

↳ Relax and re-apply lockdown dynamically

→ Let go by region


↳ Strict measures on all but one region; devote healthcare resources there

→ Individual measure

→ Herd Immunity

↳ Expose >60% of the population (not considered viable)

<https://www.nrc.nl/nieuws/2020/04/05/ik-zag-de-eerste-resultaten-en-ik-dacht-holy-fuck-die-tijdlijn-a3995973>

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