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Title: Charting pathways for sustainability transformations with scenario simulation

Description: Contemporary human societies have agreed to an ambitious package of reforms aimed at making their development sustainable. The 2030 Agenda for Sustainable Development calls for radical change in all sectors of society. To-date, progress has been faltering. The concept of “pathways” has emerged in recent years as a potential solution to the current impasse. Pathways are envisioned as planned processes of change, co-created by affected stakeholders and embracing the complexity of and uncertainty about present and future human societies and their social and ecological contexts. Attempts to shape the future of human societies are confronted by challenges related to subjectivity, normativity, and uncertainty. In this talk, I will demonstrate a model-based approach for coping with these challenges and thinking rigorously about how we might steer the evolution of our societies towards sustainability. Central to this approach is the method of Cross-Impact Balances (CIB). The CIB method was designed for systematically generating scenarios and assessing their internal consistency. It uses categorical variables to represent system components and numerical impact scores, called cross-impacts, to represent interactions among those components. Categorical variables can take on any type of data, whether nominal, ordinal, interval, or ratio, making it easy to integrate various types of information, including evidence, assumptions, and ideas. But the CIB method was not designed for simulation and experimentation. In my work, I have extended the CIB method and developed a new software package, Prophecy, for simulation and experimentation using the the CIB method. I will illustrate the approach and software with a theoretical model based on the IPAT equation, where environmental impacts are held to be a function of population, affluence, and technological efficiency. The IPAT model has been criticized for its simplicity, and so the model that I present, IPAT+, consists of several additional variables and a system of equations interrelating ecological, economic, political, and cultural variables. A working paper describing the methodological advancements, software, and IPAT+ model will be available on a pre-print server (e.g., arXiv) soon.

Suggested readings:

[Cross-impact balances: A system-theoretical approach to cross-impact analysis](#)

[Guided Cultural Evolution and Sustainable Development: Proof of Concept and Exploratory Results](#)