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The complex challenge of sustainability

Achieving sustainability requires understanding the complex interactions between a vast number of systems including climate, economics, technological progress, geology, ecology, space science, population control, security, global politics, and mass psychology. Sustainability forces us to think clearly about our vision of the future, putting philosophy into direct contact with science. As scientists our job is to try to understand causes and effects, both by making predictions and by quantifying the vast uncertainties in these predictions as best we can. I will explore several topics relating to my own work on sustainability, including the subtleties involved in properly discounting the value of the future relative to the present, the flaws in economic models of climate mitigation (and thus the huge uncertainties in their predictions), and my current efforts to predict technological progress (which is perhaps not quite as unpredictable as one might imagine). The talk will include a few mathematical illustrations embedded in the complex challenge that we all face.