

From Limits to the Sustainable Development Goals: integrated modeling in the era of the SDGs

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Extended Abstract

The Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda, recognized by 193 signatory countries, are today's global roadmap to sustainable development. The SDGs, adopted in 2015, are the culmination of some 50 years of debate and consensus-building on the nature and imperatives of sustainable development. A common thread through this process has been the increasing awareness, on the part of the United Nations, other international institutions and governments around the world, of the complex and integrated nature of human-built and natural systems and – if we are to attain sustainable development – of the need for policies that recognize and leverage this integration.

This awareness has been fostered by the discipline of System Dynamics; beginning with the *World* models and *Limits to Growth* studies that provided scientifically based proclamations on what would later become known as sustainable development. System Dynamics research has in turn addressed many aspects of the sustainability imperative, and has responded to calls from the United Nations and other world bodies for integrated tools to support sustainable development policy.

The 2030 Agenda has explicitly called for integrated methods to guide SDG policy. Two multi-sector modeling frameworks have been developed with the necessary degree of integration to be useful for SDG policy analysis. These are the System Dynamics-based Integrated Sustainable Development Goal (iSDG) model developed by the Millennium Institute, and the multi-method International Futures (IFs) model developed by the Pardee Center for International Futures. There are important differences between iSDG and IFs; however, both are feedback-rich and thoroughly integrated, and we introduce the term *Integrated Systems Models* (ISMs) to distinguish them from Integrated Assessment Models (IAMs), which are generally much less integrated in structure.

The deeply integrated nature of ISMs enables quantification of policy impacts across SDG sectors, allowing planners to identify policies that favorably impact numerous SDGs, and also to be aware of potentially adverse tradeoffs. This makes it possible for planners to design synergistic policy mixes in which policies mutually support one another, resulting in greater and more cost-effective attainment of SDGs. These benefits have been witnessed in countries and regions where these ISMs have been put to task on SDG policy. As the sustainable development paradigm being put forward by the United Nations and world

community becomes increasingly integrated, a central role is being created for the further development and deployment of ISMs.