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ACCEPTED MANUSCRIPT

Wickedness and the anatomy of complexity

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Highlights

1. We break down the catchall term "complexity" to a map of ontological categories.
2. Wickedness, complexity and complicatedness in “Spectrum of Overwhelming Systems" (SOS).
3. SOS is useful for aligning ideas and actions across fields and backgrounds
4. Innovation is suggested to be the causal basis of wickedness.

Abstract

Traditional scientific policy approaches and tools are increasingly seen as inadequate, or even counter-productive, for many purposes. In response to these shortcomings, a new wave of approaches has emerged based on the idea that societal systems are irreducibly complex. The new categories that are thereby introduced – like “complex” or “wicked” – suffer, however, by a lack of shared understanding. We here aim to reduce this confusion by developing a meta-ontological map of types of systems that have the potential to “overwhelm us”: characteristic types of problems, attributions of function, manners of design and governance, and generating and maintaining processes and phenomena. This permits us, in a new way, to outline an inner anatomy of the motley collection of system types that we tend to call “complex”. Wicked problems here emerge as the product of an ontologically distinct and describable type of system that blends dynamical and organizational complexity. The framework is intended to provide systematic meta-theoretical support for approaching complexity and wickedness in policy and design. We also points to a potential causal connection between innovation and wickedness as a basis for further theoretical improvement.

Keywords

Wicked problems; Future; Sustainability; Sociotechnical systems; Complexity; Innovation

1. Introduction

Out of discontent with the performance and adequacy of traditional approaches, which may be described as embodying a top-down rather than a bottom-up approach to understanding and acting, and that are largely based on prediction, planning and control (e.g. Leach *et al.* 2010; Loorbach 2010; Hasnoot *et al.* 2013; Castree *et al.* 2014), an alternative view of socio-eco-technological systems is taking shape. This view emphasizes qualities related to ideas about complexity, such as multidimensionality, path-dependency and unpredictability (e.g. Rip and Kemp 1998; Gunderson and Holling 2002; Berkhout 2002; Beddoe *et al.* 2009; Folke *et al. 2010;* Byrne and Callaghan 2013; Bai *et al.* 2015). These qualities are seen as irreducible root causes of problems – not least ones related to sustainability – *and* of our persistent

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