Modelling and measuring sustainable wellbeing in connection with the UN Sustainable Development Goals

Robert Costanza [a,*], Lew Daly [b], Lorenzo Fioramonti [c], Enrico Giovannini [d], Ida Kubiszewski [a], Lars Fogh Mortensen [e], Kate E. Pickett [f], Kristin Vala Ragnarsdottir [g], Roberto De Vogli [h], Richard Wilkinson [i]

[a] Crawford School of Public Policy, Australian National University, Australia
[b] Demos, New York, NY, USA
[c] Centre for the Study of Governance Innovation, University of Pretoria, South Africa
[d] Department of Economics and Finance, University of Rome Tor Vergata, Italy
[e] European Environmental Agency, Copenhagen, DK, Denmark
[f] Department of Health Sciences, University of York, UK
[g] Faculty of Earth Sciences, University of Iceland, Reykjavik, Iceland
[h] Department of Public Health Sciences, University of California, Davis, USA
[i] Division of Epidemiology and Public Health, University of Nottingham, UK

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ABSTRACT

The UN Sustainable Development Goals (SDGs) offer a detailed dashboard of goals, targets and indicators. In this paper we investigate alternative methods to relate the SDGs to overall measures of sustainable wellbeing that can motivate and guide the process of global societal change. We describe what a Sustainable Wellbeing Index (SWI) that connects with and complements the SDG dashboard might look like. We first investigate several options for how to construct such an index and then discuss what is needed to build consensus around it. Finally, we propose linking the SDGs and our SWI with a comprehensive systems dynamics model that can track stocks and flows and make projections into the future under different policy scenarios.

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1. Introduction

The Sustainable Development Goals (SDGs) agreed in the UN 2030 Agenda for Sustainable Development (UN, 2015) are a major step forward and an improvement on the Millennium Development Goals (MDGs). They address some of the systemic barriers to sustainable development and contain better coverage of, and balance between, the three dimensions of sustainable development – social, economic, and environmental – and their institutional/governance aspects. In addition, the SDGs apply to all countries, not just developing nations, as the MDGs did. The SDG process provides an opportunity to trigger systemic change to build a sustainable future in an increasingly interconnected world, However, with 17 goals, 169 targets, and over 300 indicators proposed, the SDGs provide diluted guidance at best. This is to be expected, given the complex political process that led to the SDGs.

The SDG process so far has merely opened the door. There is still much additional work needed to elaborate (1) the complex interconnections

between the goals; (2) the means-ends continuum toward an overarching goal; and (3) a 'narrative of change' to describe the societal shifts and policy reforms necessary to achieve the SDGs and how this could actually happen within existing socioeconomic and geopolitical circumstances (Costanza, 2014; Ostrom, 2014).

The SDGs need an overarching goal with clear metrics of progress toward that goal that are geared to integrate the sub-goals (Costanza et al., 2014a). Fig. 1 shows the relationship between the "ultimate end" of sustainable, equitable and prosperous wellbeing and the intermediate means of the economy and society, and the ultimate means of the environment. Table 1 shows the 17 proposed SDGs clustered according to the three sub-goals of ecological economics originally proposed by Daly (1992) of sustainable scale, fair distribution, and efficient allocation. These are embedded in the "means-ends" spectrum shown in Fig. 1.

One important point of clarification is that sustainability is impossible to measure directly. It can only be assessed after the fact, so any measure of "sustainability" is in reality a prediction of which characteristics of the system might ultimately be sustainable (Costanza and Patten, 1995; Garnåsjordet et al., 2012). The requirement for "sustainable

* Corresponding author.
E-mail address: rcostanz@gmail.com (R. Costanza).

Fig. 1. The "means – ends" spectrum showing the three elements of sustainable wellbeing used to cluster the SDGs in Table 1 (Costanza et al., 2014a).

scale" is based on the idea that a sustainable system cannot deplete natural capital or damage ecosystem services beyond a certain "safe operating space" (Rockström et al., 2009). What we are after is a system that is both sustainable and desirable in all senses, including the contributions of natural, social, human, and built capital assets (Costanza et al., 2013). Ultimately, to properly assess sustainability and desirability will require an integrated dynamic systems modelling approach, as we discuss further on. The SDGs represent an important step in building global consensus on what kind of world is desirable, and sustainability in the sense of longevity is certainly one of the characteristics of a desirable world, but it can only be predicted, not measured directly.

In this paper, we investigate alternative methods to relate the SDGs to overall measures of sustainable wellbeing that can motivate and guide the process of global societal change. The SDGs, along with their targets and indicators provide a detailed dashboard for the transition to sustainable development. Some would argue that a dashboard approach is sufficient and the only feasible option. We disagree and contend that dashboards and aggregate indicators are *not* mutually exclusive — in fact they are both essential. For example, having a well-instrumented dashboard in your car is essential, but so is knowing

Table 1

the 17 SDGs (UN, 2015) clustered under the three elements of sustainable wellbeing shown in Fig. 1.

Efficient allocation: building a living economy

Goal 7.	Ensure access to affordable, reliable, sustainable, and modern energy for all
Goal 8.	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9.	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 11.	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12.	Ensure sustainable consumption and production patterns

Fair distribution: protecting capabilities for flourishing

Goal 1.	End poverty in all its forms everywhere
Goal 2.	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
Goal 3.	Ensure healthy lives and promote well-being for all at all ages
Goal 4.	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all
Goal 5.	Achieve gender equality and empower all women and girls
Goal 10.	Reduce inequality within and among countries
Goal 16.	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17.	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Sustainable scale: staying within planetary boundaries

Goal 6.	Ensure availability and sustainable management of water and sanitation for all
Goal 13.	Take urgent action to combat climate change and its impacts [*]
Goal 14.	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15.	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

where you are going and whether you are making progress toward your destination. As baseball star Yogi Berra once quipped: "if you don't know where you're going, you end up somewhere else." We must first decide where we are going - our overarching goal - in order to measure progress toward it. The 17 proposed SDGs are best seen as sub-goals or means to this larger end (Table 1). We are certainly not recommending throwing out the dashboard, but merely recognizing that the dashboard and an aggregated indicator of overall progress toward our shared goal are *both* necessary if we hope to achieve our goal.

The SDGs in fact acknowledge this need in Target 17.19, which states: "By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries."

In this paper we investigate what an aggregate Sustainable Wellbeing Index (SWI) that connects with the SDG dashboard might look like. We first analyse several options for how to construct such an index and then propose a way forward that builds a hybrid approach. Finally, we propose linking the SDGs and our SWI to a comprehensive, non-linear, systems dynamics model that can track both flows and stocks of built, human, social, and natural capital and make projections into the future under different policy scenarios. This is an essential and often overlooked step in the process. GDP has been so widely accepted partly because of its links to the System of National Accounts (SNA) and the underlying static, linear input-output model of the economy. We need a new, integrated, dynamic systems model to underlie and integrate the SDG goals and aggregate wellbeing indicators.

2. Existing General Approaches

There have been a large number of alternative approaches to aggregate indicators of societal wellbeing and progress developed over the years. Costanza et al., 2014b includes a table listing some of the major ones. Three basic approaches have been used in developing these indicators. We first discuss these basic approaches and then discuss how these approaches might be applied to the SDGs.

1. Consumption, Production, and Wealth Based Indicators
   Conventional measures of national progress, like the gross domestic product (GDP), are based on production and consumption of goods and services exchanged in markets (with the odd imputed value). GDP was never designed as a measure of societal wellbeing, but a popular assumption, derived from utilitarian philosophy, is that, all else being equal, more consumption leads to higher wellbeing and that therefore GDP/capita can be used as a proxy for national wellbeing (Costanza et al., 2014d). This assumption has been challenged for decades and the problems with using GDP as an indicator of national wellbeing are well known (Stiglitz et al., 2009; Fioramonti, 2013; Fleurbaey and Blanchet, 2013; Costanza et al., 2014b). For example, UNDP (1996) identified five types of negative GDP growth: (1) *jobless growth* (the economy gets bigger with more buying and selling of goods and services, but without creating more jobs); (2) *voiceless growth* (an apparently successful economy rides on the back of the suppression of civil rights, union membership and democracy); (3) *ruthless growth* (accompanying high or rising inequality); (4) *rootless growth* (culturally destructive effects of economic globalisation); and (5) *futureless growth* (that steals our collective future by depending on the unsustainable consumption of finite natural resources). Several alternatives have been devised that attempt to correct some of the problems with GDP. These include Green GDP (Boyd, 2007; Li and Lang, 2010), Genuine Savings (Hamilton and Clemens, 1999; Pillarisetti, 2005), the Inclusive Wealth Index (UNU-IHDP and UNEP, 2014), the "degrowth accounts" proposed by O'Neill (2015), and the Index of Sustainable Economic Welfare (ISEW – Daly and Cobb, 1989), also known as the Genuine Progress Indicator (GPI – Talberth et al., 2007). For example, the GPI is calculated by starting