

# Giving Shape and Structure to the Mess of Sustainability Accounting

Dick Osborn

Centre for the Public Awareness of Science, The Australian National University, AUS

Pidd (1996) defines an unstructured situation where disagreement exists as to what needs to be done and why as a mess, and where it is impossible therefore to say how it should be done. Finding shape and structure are the means towards resolving a mess. This work-in-progress establishes sustainability accounting as a mess. New ideas transmitted from a mess are likely to inhibit behavioural change. The Innovation Adoption Curve is used to test this proposition. Adoption rates of ISO 14001 and the Global Reporting Initiative Guidelines cannot reach the critical mass interval on the Adoption Curve within any reasonable planning horizon. Adoption rates for an accounting tool for communities of place, such as Local Agenda 21, are significantly higher. Three hierarchical models are then aligned to offer a structure for going beyond the messy consequences from past initiatives in sustainability accounting. Daly's capitals hierarchy is aligned with an Australian hierarchy of communities-of-place, and with the UN's hierarchical classifications of human, natural, and built capital stocks.

## 1. Introduction

This work-in-progress argues for simplifying the communication and organisational learning tasks of managing for sustainability transition. It advocates decision-makers monitor progress within their community-of-place by assessing change in its capital stocks, doing so across multiple levels with existing metrics and institutional arrangements. Argument is presented in the following three sections.

Section 2 uses a definition from management science to establish the collective efforts in sustainability accounting over past decades as a mess. Widespread behavioural change towards sustainability seems unlikely when messages promoting its accounting practices are transmitted from a mess. Section 3 supports this view by providing examples of progress along the shape of the Adoption Curve for popular innovations in sustainability accounting. Resolving the mess and its consequences is essential, since managing for sustainability transition depends on engaging most, if not all, decision-makers (eg Carver 2001; Walker *et al* 2002; Backstrand 2003; Siebenhuner 2004). Section 4 identifies integrated assessment of change in a place's capital stocks as an effective means to engage many decision-makers, and to transmit information across the multiple levels of sustainability governance. A framework for structuring the process and content of an integrated assessment on community capital are presented.

## 2. Establishing sustainability accounting as a mess

A mess is an unstructured situation where disagreements exist on what needs to be done and why, and therefore where it is impossible to say how it should be done (Pidd 1996). Giving shape and structure precedes resolving a messy situation (Richey 2002; Mackenzie *et al* 2006). Two entry points seem useful for the mess considered here: finding a definition of accounting to accommodate the interests of accountants and non-accountants, and establishing when the communication of new ideas on sustainability accounting began. Two channels are used to connect transmitter and receiver in establishing a mutual understanding on the worth of new ideas: interpersonal channels and mass media channels (Rogers 1995: 17-18). Considering when sustainability accounting began must rely on evidence from transmitters using one-to-many channels.

Peskin (1998) defines accounting as providing decision-makers at household, business, and government levels with a structured body of information, where movements in a system's inputs and outputs during an accounting period are described relative to its state of balance. Peskin applies this definition to financial accounting, and to accounting for environmental sustainability.

The US National Erosion Reconnaissance Survey of 1934 meets Peskin's accounting definition as a structured body of information describing the extent and nature of imbalances in a land use system (Natural Resources Conservation Service 2001). Its pioneering methods were repeated in Australia a decade later (Rural Reconstruction Commission 1944), and have been adopted and adapted since by many agencies. A research literature on social and environmental accounting practice in the corporate sector began in the early 1970s (Mathews 1997). In 1973, the US Water Resources Council (WRC) mandated selected federal agencies apply common principles and accounting standards when evaluating and reporting proposals for water and land-related project. The US WRC regulations require the construction of four accounts: national economic development, environmental quality, regional economic development, and social well-being (Water Science and Technology Board 2004). Some member countries in the OECD (including Australia) compiled and published State-of-Environment-Reports in the 1970s (OECD 1979).

The evidence shows mass media channels were being used between 40-70 years ago to communicate innovations in sustainability accounting to practitioners at multiple scales of decision-making. Even so, significant disagreements as to the why and what of sustainability accounting practice remain. Examples include:

- *It [the sustainability debate] is prone to inclusive political correctness and the accounting profession should not attempt to respond to all the different agendas and expectations* (Institute of Chartered Accountants in England and Wales 2002) v. *There are no other binding commitments remotely achievable at the World Summit on Sustainable Development that could be more valuable than a commitment to creating the means to authoritatively assess progress to sustainable development* (Hales and Prescott-Allen 2002).
- *At the heart of accounting is the measurement of financial transactions which are transfers of legal property rights made under contractual relationships. Non-financial transactions are specifically excluded due to conservatism and material-*

*ity principles* (Wikipedia 2006) v. *The task of the accounting profession in relation to intangible assets and knowledge-based enterprise is less about counting than it is about giving an account – telling the story of both tangible and intangible assets in meaningful ways, for both managers and markets* (Lambe 2002).

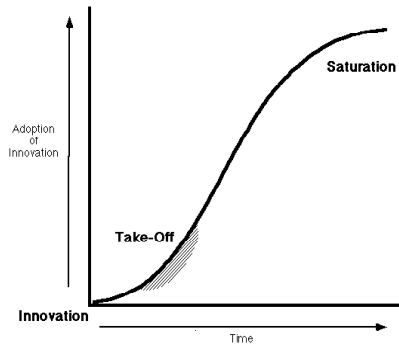
- *Correct accounting is good economics and good economics accounts correctly.... Green accounting does not provide a method for accounting for sustainability and cannot be massaged, manipulated or extended to do so* (Cairns 2006) v. *Sustainability accounting desegregates the internal accounts to show costs and benefits relating to economic, social, and environmental performance. It also extends the accounting boundary to consider the monetary value of external impacts* (Forum for the Future 2003).
- *Developing and using information on environmental performance and conditions is critical to any environmental management framework and must be incorporated at all levels of decision-making. There is a need to develop, agree upon, and apply common metrics for measuring and reporting environmental performance of products, households, services, firms, facilities and the economy* (President's Council for Sustainable Development 1999). v. *675 tools applicable to the assessment of sustainability in urban development were identified, with 165 of these undergoing evaluations against a set of criteria identified as important for the integrated assessment of urban sustainability. Additionally, stakeholders, including urban decision-makers and tool developers were canvassed on the strengths and weaknesses of current assessment tools and future user requirements. The results of this work confirmed that there is no tool currently capable of simultaneously covering all assessment criteria* (Walton et al 2005).

### **3. Using the Innovation Adoption Curve to illustrate the mess's consequences.**

**T**he communication research field of innovation diffusion began in 1903 (Rogers 1995: 39-40). It now contributes, for example, to evidence-based policy and practice (Nutley et al 2002); and to policy design for dealing with complex adaptive systems (Rogers et al 2005). Progress in adopting accounting innovations can be estimated by combining a generic Innovation Adoption Curve with secondary data on the number of adopters, and on the number of decision-making units at saturation point (Osborn et al 2002).

#### **3.1 The generic Innovation Adoption Curve**

The cumulative rate at which decision-makers adopt innovations within a given social system generally follows an S-curve over time (Rogers 1995:11). The take-off interval on the generic curve (Figure 1) is predicted to occur when some 10-20% of all decision-makers within the social system under consideration have adopted the innovation. Original work on the strength of weak ties by Granovetter (1973) provides the basis for this prediction, and for much of present understanding on how social networks operate. For example, Granovetter's work has popular acceptance through Gladwell's (2000) description of epidemic diffusion thresholds.



**Figure 1** *The innovation adoption curve (adapted from Rogers, 1995)*

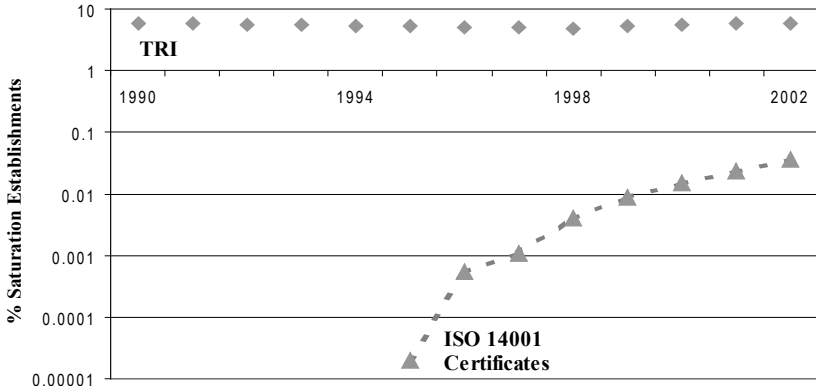
### 3.2 Mandatory versus voluntary adoption in the US

The generic Innovation Adoption Curve of Figure 1 illustrates the cumulative rate of adoption over time where the decision made to adopt or reject an innovation is voluntary. Adoption can also occur through an authority-innovation decision (Rogers 1995: 28-30). Political judgements determine the extent and nature of adopter engagement within a social system as part of an authority innovation decision.

Differences between mandatory and voluntary innovation adoption provide one illustration of consequences from the mess of sustainability accounting. Figure 2 shows adoption by US establishments of two sustainability accounting practices. Trends in adoption rates are expressed relative to the known number of establishments at the saturation point of the Innovation Curve.

Some differences between the two practices are as follows:

1. The Toxic Release Inventory (TRI) Program began in 1987 as a response to the Bhopal disaster (US EPA 2006). Establishments operating above specified thresholds within the manufacturing, oil refinery, and public utilities industries are required to disclose their location coordinates, plus provide data on their release of specified toxic chemicals and other wastes. Establishment numbers within targeted industries declined slightly from 410, 000 to 400,000 during 1990-2002 (OECD 2006). Of these, close to 6% qualified each year in that interval as TRI Reporters (US EPA 2006).
2. Certification of performance under ISO's Standard 14001: Environmental Management Systems. In 1996, the International Standards Organization (ISO) released a standard set of procedures for any organization in any industry to follow in forming, implementing, evaluating, and communicating its environmental management system (EMS). OECD data indicates the size of the US social system meeting the 'any organization, any industry' eligibility criteria went from some 6.1M private establishments in 1995 to 7.1M in 2002. ISO 14001 procedures follow the Plan-Do-Check-Act steps in the management cycle of continuous improvement (ISO 2006). Should an organization decide to communicate its performance to external stakeholders, it seeks a certificate on its EMS from an accredited auditor. Global surveys on the number of ISO 14001 Certificates issued are conducted annually.



**Figure 2** Mandatory v. voluntary adoption of sustainability accounting in the US (sources: ISO 2000, ISO 2004, OECD 2006, US EPA 2006)

Results illustrated in Figure 2 reflect growth in ISO 14001 certifications went from 0.00003% to 0.01015% of saturation between 1995 and 2002.

### 3.3 Comparing ISO 14001 Certifications among some OECD members

The current inventory of the ISO contains nearly 15,000 standards, with its Standard 9000: Total Quality Management and Standard 14001: Environmental Management Systems being by far the most popular (ISO 2004). Figure 2 data sources are used again to provide another example of a sustainability accounting tool's progression along the Innovation Adoption Curve. Good sustainability policy built on an understanding of the Curve will use the instruments available to get adopters within a targeted social system to the critical mass interval or tipping point within the shortest possible time, and with the least economic and political costs. Table 1 is built on a no-policy change scenario. It assumes average annual growth in ISO 14001 adopter numbers during 1998-2002 will continue into the future. The assumption is then used to estimate the time required to reach an ISO 14001 tipping point within each of the twenty-four countries in the OECD sample. Estimates shown in Table 1 for reaching critical mass range between 480 to 5,500 years from present.

### 3.4 Comparing adoption in Australasia between community-of-practice and community-of-place

As with the US TRI Program and Bhopal, the Global Reporting Initiative (GRI) originated as a response to an environmental disaster: in this case the Exxon Valdez oil spill of 1989 (Consumer Protection Working Group 2002). The GRI is identified as the best seed on which to grow a uniform global framework for reporting any organization's performance in relation to sustainability (eg Ranganathan 1999; UN Division for Sustainable Development 2002). Adoption and adaptation of GRI is driven by seeking consensus among stakeholders, and involves organizations located in sixty countries (GRI 2006). The GRI is probably the most well known among many hundreds of sustainability accounting tools, where significant efforts are made to create a community-of-practice.

Global Region	Countries in sample (n)	Establishments in Critical Mass Target (n)	Years to Critical Mass
Asia	2	471, 000	5, 500
Oceania	2	363, 000	3, 400
Americas	2	1, 200, 000	1, 800
Europe	18	2, 500, 000	480

**Table 1** Years to critical mass for ISO 14001 adoption - estimates for 24 OECD countries (sources: ISO 2000, ISO 2004, OECD 2006)

	GRI	LA21
Organizations at Saturation Level	2.4M	920
Organizations @ Critical Mass (15% Saturation)	360, 000	138
Adopters as % Saturation in 'most recent' year (1)	0.0028%	23%
Adopters as % Saturation in ('most recent' - 5)	0.0010%	5%
Years from 'most recent' to Critical Mass	43, 000	-2
(1) 'most recent' for GRI = 2006; for LA21 = 2001		

**Table 2** Progress in GRI and LA21 adoption - Oceania circa 1996-2006

Local Agenda 21 Planning (LA21), is probably the most well known among many hundreds of sustainability accounting tools, where significant efforts are made to sustain a community-of-place. Its origins can be traced back to preparing for the 1992 Earth Summit, since Section 28.28 of Agenda 21 requires local authorities *undertake a consultative process with their populations and achieve a consensus on a 'local Agenda 21' for the community* (UN Division for Sustainable Development 1993). LA21 therefore shares with GRI the process of consensus seeking among stakeholders. LA 21 differs from GRI by using accounting to assess environmental, economic, and social conditions within a community-of-place built from many organizations, rather than one. LA21 thereafter uses performance indicators for tracking progress towards needs in sustainability conditions for a community-of-place..

Supplemented with data on adopter numbers and on the number of local authorities, OECD statistics on private establishments across all industry sectors again provides a platform for comparing the adoption of two sustainability accounting tools. Table 2 shows results from this comparison. Adoption of GRI and LA21 increased some three or four fold over the five years of most recent data available. Differences between the two practices on time remaining before reaching critical mass on their respective Innovation Adoption Curves remain substantial. If growth in LA21 adoption rates between 1996-2001 continued, then around 2004 all local authorities in Australia and New Zealand could be engaged in this form of sustainability accounting. In Oceania, reaching critical mass with GRI does not seem possible within any reasonable planning horizon, should growth achieved under its arrangements and institutional settings of 2002-2006 continue.

Differences between GRI and LA21 with respect to interpersonal communication channels could be one reason for differences in their progress along the In-

novation Adoption Curve. Rogers (1995: 82) discusses the significant differences between interpersonal and mass-media channels, with many small-scale empirical studies showing the former to be more effective in achieving a positive adoption decision. Community Innovation Surveys conducted in Europe, however, provide the most robust evidence. For example, a significant majority (>70%) of some 201,000 enterprises adopting innovations during 1998-2001 did so through interpersonal communication channels within their own industry and market (Eurostat 2004). A minority (<10%) identified governments, universities and research institutions as important sources of information in innovation adoption. The ratio between non-adopter and adopter organizations also provides some understanding of the interpersonal communication task facing promoters of sustainability accounting. In Oceania, for GRI this ratio is around 36,000:1, compared with a ratio of 4:1 for LA21.

### 3.5 Summarising results

Some 40-70 years of using mass-media channels have failed to resolve disagreements between scientists and practitioners as to the why and what of sustainability accounting practice. The resulting mess transmits conflicting information, increasing the uncertainty that always accompanies the decision to adopt or reject an innovation (Rogers 1995: 6). Section 3 reflects this uncertainty by combining a generic Innovation Adoption Curve with secondary data on relatively well-known examples of sustainability accounting practices. LA21 in Oceania is the only case among examples considered where the critical mass benchmark is achieved. The activity thresholds of the US TRI Program limit disclosure requirements to one third of the critical mass benchmark within the social system it targets. The large social systems they target means voluntary adoption of ISO 14001 and GRI is unlikely to reach critical mass within any reasonable planning horizon. Results support Peshkin's (1998) assertion that communication failure contributes to poor adoption of accounting for sustainability.

## 4. Resolving the mess's consequences

Giving shape and structure are necessary steps in dealing with a mess. Peshkin's 1998 definition sees any form of accounting as a structured body of information describing change in a system's inputs and outputs relative to its state of balance. Anielski's definition of sustainability accounting specifies the state of balance sought: *In the Genuine Wealth model, sustainability is being achieved when the overall integrity of the five core capital assets of a community or organization (human, social, natural, built and financial capital) are non-declining in their overall physical and qualitative 'condition'. In this model, the conditions of the capital stocks and flows can be reported both in physical/qualitative terms (composite indices) and monetary (full cost) accounting terms* (Anielski 2005).

Concepts and case studies on a capitals approach for tracking progress toward sustainable development are common at many levels of decision-making. Examples for businesses include Dyllick and Hockerts (2002), Sigma Project (2003); for local communities include Kretzmann and McKnight (2005); Roseland (2005); for engaging community stakeholders in qualitative assessments include



Grosskurth and Rotmans (2005), Osborn and Macfarlane (2006); and for national governments include UN Statistics Division (2005), World Bank (2006). Anielski's Genuine Wealth model provides therefore an overarching framework for accommodating many initiatives. What could a structured body of information look like when combining the Genuine Wealth model with multiple levels of sustainability governance? Accepting the evidence on adoption rates presented elsewhere pushes policy design toward promoting existing ideas and common practices.

Hierarchical structures are used frequently as mental models in learning for sustainability transition (Meadows 1998). Figure 3 aligns three existing hierarchies to create a structured body of information consistent with Anielski's Genuine Wealth model, and to realise the opportunities it provides for convergence between many initiatives. The hierarchy of capital stocks, where nature provides the means for achieving human well-being was proposed by Daly in 1973 (Meadows 1998:41), and accepted by many as a guiding principle for structuring sustainability information. Each country has its own statistical geography where communities-of-place exist at different levels, and with their own sizes in terms of decision-making units. An Australian example is provided. The classification systems established as standards and guidelines by the UN's Statistical Commission provide hierarchical structures for codifying natural, built and human capital stocks with consistent, credible and comparable metrics. Data collection and dissemination will vary over time and space, but regularly engage many decision-makers through census and sample collections.

The shape of the Innovation Adoption Curve, and the body of information possible from aligning three hierarchical structures, provide insights into the why, what, and how of sustainability accounting.

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**Richard (Dick) Osborn's** research addresses the communication challenges of sustainability science. It is a place-based, integrative, and civic science able to engage stakeholders from multiple decision-making scales in designing local futures. His work builds on some four decades as an information broker. He began as an agricultural extension officer, providing a communication channel between cattle husbandry researchers and producers. Then as broker between scientists from many disciplines and research institutions, and with local stakeholders, working on integrated natural resource management. That work extended over time from the Darling Downs, through the Upper Darling Basin, to the Murray-Darling Basin. As Senior Policy Analyst within the Australian Local Government Association, he then worked in all areas of public policy, at national scale, and with actors in each of the three government spheres in Australia's federal system. His responsibilities in the early 1990s led to concentrating on sustainability issues. They included contributions to drafting and implementing Australia's National Strategy for Ecologically Sustainable Development, its Inter-Government Agreement on the Environment, and, at global scale, on the role of local authorities in Agenda 21. He has been work-

ing on accounting design to sustain communities since the mid-1990s. Much of this work is within Australia. It also includes networking internationally, particularly by invitation in an Expert Working Group on Environmental Management Accounting established by the UN's Division for Sustainable Development.