Sustainable Development Indicators
PROPOSALS FOR A WAY FORWARD

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Indicators of Sustainable Development: Proposals for a Way Forward

**Discussion Paper Prepared under a Consulting Agreement on behalf of
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Acknowledgments

List of Acronyms

DSR	driving force-state-response
EEA	European Environment Agency
EEB	European Environmental Bureau
EPI	Environmental Performance Index
ESI	Environmental Sustainability Index
EU	European Union
GIS	geographic information systems
HDI	Human Development Index
ICT	information and communication technology
IISD	International Institute for Sustainable Development
JPOI	Johannesburg Plan of Implementation
MDG	Millennium Development Goals
MEA	multilateral environmental agreements
NSDS	national sustainable development strategy
SD	sustainable development
SDI	sustainable development indicator
SEEA	System of Integrated Environmental and Economic Accounts
UNCSD	United Nations Commission for Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNECE	United Nations Economic Commission for Europe
UN-DPCSD	United Nations Division for Policy Coordination and Sustainable Development
UNDSD	United Nations Division for Sustainable Development
UNSD	United Nations Statistics Division

Executive Summary

This paper was prepared for the United Nations Division for Sustainable Development (UNDSD) expert meeting (New York, 13-15 December 2005) on sustainable development indicators (SDIs). The paper provides a review of key achievements and emerging trends in the field of SDIs, reflects on the role of the indicator system developed by the United Nations Commission for Sustainable Development (UNCSD) and offers a set of options and suggestions for the way forward.

As strategic policy tools, SDIs have the potential to turn the general concept of sustainability into action. Today, however, we are far from achieving this potential.

Among *emerging trends,* the paper highlights:

- Continuing interest in the development of aggregate indices;
- Interest in core sets of 'headline indicators';
- Emergence of goal-oriented indicators;
- Measurement of sustainability by capital ('green') accounting systems; and
- Emphasis on making better use of indicators in performance measurement.

Given the need for global level cooperative action on many sustainable development (SD) issues, agreement on a framework, goals and indicators would be helpful. We acknowledge the important role of the CSD in drawing attention to the need for SDIs at the national level, particularly, but not exclusively, in those countries participating in pilot testing. However, offering a menu of indicators alone did not lead to a common framework and a common set of influential SDIs. While common frameworks still do not automatically lead to common measures and common measures may not lead to coordinated action, they are important components of an enabling environment and governance mechanism that can result in effective action for sustainability.

When considering strategic options for the future, the paper suggests building closer synergy between the UNCSD SDI initiative, the Millennium Development Goal Indicators (MDGIs) and the System of Integrated Environmental and Economic Accounts (SEEA). Alternative pathways are formulated around four *scenarios* of strategic action on SDIs: Indicator Zoo, Global Cooperation, Global Integration and Synergy World.

Indicator Zoo essentially assumes continuing the same approach to coordination, and a growing diversity of SDI frameworks and indicator sets. *Global Cooperation* assumes stronger coordination mechanisms without a major overhaul of the existing approaches. *Global Integration* envisions new and significantly strengthened institutional arrangements between key actors involved in SDIs. And in *Synergy World* we assume that key actors of SD are willing to compromise, and there is political appetite for connecting SDIs with other policy mechanisms, particularly the SEEA and MDGIs.

A pragmatic way forward might include the following:

- adopt a framework based on various *categories* of capital and capital maintenance, with the understanding that the scope and definition of the concept may need further extension to cover human, ecological and social assets beyond those covered in the SEEA;
- strengthen the synergy between SDIs and underlying statistical data collection and accounting, building particularly on the widely accepted national accounts and their satellite, the SEEA;
- adopt an evolutionary approach—instead of or besides offering a long menu of indicators—focusing on annual or, if real progress requires multi-year work programs, on a small set of maximum three to five indicators, related to high-priority policy issues;
- align indicators with the MDGIs, selecting globally relevant indicators, adopting core measures that would complement the MDGIs, particularly in the environmental domain, and linking SDIs where possible to policy goals and targets;
- revitalize a capacity building program focused on priority indicators through the usual channels of technical support;
- continue to explore options for the integration of SDIs and national sustainable development strategies (NSDSs), recognizing that SDIs and NSDSs are mutually supportive; and
- promote the periodic evaluation of SDIs for dealing with emerging priorities and ideas, and for building credibility, e.g., through audits or peer reviews, following the approach adopted for NSDSs.

"We need many indicators because we have many different purposes—but there may be over-arching purposes that transcend nations and cultures, and therefore there may be overarching indicators."

(Donella H. Meadows, 1998)

1.   Background and context

This background paper has been written as a contribution to the review of the work of the United Nations Division for Sustainable Development (UNDSD) on sustainable development indicators (SDIs). In order to put things in the proper context, we provide a brief review of progress on SDIs over the last decade on the national and international level, with particular attention to the contribution of the UNDSD. The main purpose of the paper, however, is to offer thoughts that we hope will help chart out a work program for the UNDSD on SDIs for the future.

The mandate for the DSD's work on indicators was provided through Chapter 40 of Agenda 21, and further confirmed by subsequent resolutions of the Commission. In its very first session, the CSD called for the Secretary-General of the UN to formulate proposals regarding the elaboration of indicators that would allow the Commission and countries to assess the progress made towards sustainable development (SD) (UN 1993). In response to this call, in its third session the Commission approved a program of work on SDIs (UN 1995).

The mandate was further confirmed by the Johannesburg Plan of Implementation (JPOI). Specifically, the JPOI called for:

> *"...further work on indicators of sustainable development by countries at the national level, including integration of gender aspects, on a voluntary basis, in line with national conditions and priorities"(UN 2002).*

Most recently, the report of the 13th session of the CSD on 11-12 April 2005 also pointed to the need for continuing work on SDIs on the national level. The report called on:

> *"Member States to continue to work on the development and application of indicators for sustainable development at the national level, including integration of gender aspects, on a voluntary basis, in line with their national conditions and priorities, and in this regard invites the international community to support the efforts of developing countries"(UN 2005a).*

In the view of the authors, other international legal mechanisms, such as the Aarhus Convention may play a catalytic role, because of their influence on the enabling conditions required for the development and effective use of indicators (UNECE 1998). The Aarhus Convention itself is open to accession by countries outside of the Economic

Commission for Europe (ECE), subject to approval of the Meeting of the Parties, so its applicability goes beyond ECE members and the regional level. Its combined emphasis on strengthening access to information and facilitating public participation is directly applicable to the systematic development and use of SDIs as key information tools. Parallel to, though not necessarily derived from international commitments, there are other examples of national and sub-national legislation requiring the establishment and reporting of SDIs.

The SDI agenda was accompanied and directly or indirectly influenced by several other global trends that we have seen unfold in the last decade. Among these trends, the following were particularly relevant—for different reasons—for SDIs:

- undisputable evidence of the growing cost, but also some benefits of globalization on environmental and social conditions, at national and international levels;
- improved understanding of the interactions between ecosystems and human well-being, particularly poverty;
- increasing number of state of the environment (SOE) and integrated assessments, reports, multilateral environmental agreements (MEAs) and use of economic and other instruments for environmental policy, all of which require a quantitative evidence base;
- rapid development of information and communication technologies (ICTs), including the Internet and geographic information systems (GIS), with many countries still left, though, on the wrong side of the digital divide; and
- increasing emphasis on strategic initiatives, including national strategies for sustainable development (NSDS) and the Millennium Development Goals (MDGs) that involve time-bound targets and require systematic monitoring of progress.

Although the Brundtland definition of SD gained widespread acceptance and its ambiguity proved useful in building broad coalitions of stakeholders, it provided little detail on what to sustain, to what extent and on what time scale (Bartelmus 2003, p. 61; Parris and Kates 2005). SD could be interpreted to mean the maintenance of aggregate stocks, inventories or qualities of economic, social, ecological or institutional assets over time. However, operationally, this works only if we have information on these stocks, inventories and qualities, their substitutability and safe limits to their depletion. Indicators can provide this information, and thus they were often used to collectively define key aspects of sustainability in specific contexts (Pintér 1998; Parris and Kates 2005).

During the last 10 years we have seen a remarkable expansion of interest in SDI systems, both in industrialized and, albeit to a lesser extent, in developing countries. SDIs are seen as useful in a wide range of settings, by a wide range of actors: international and intergovernmental bodies; national governments and government departments; economic sectors; administrators of geographic or ecological regions; communities; non-governmental organizations; and the private sector. SDI processes are underpinned and driven by the increasing need for improved quality and regularly produced information with better spatial and temporal resolution. Accompanying this need is the requirement,

brought in part by the information revolution, to better differentiate between information that matters in any given policy context versus information that is of secondary importance or irrelevant.

As the development of SDIs typically takes place without a rigorous review of national statistical data collection systems, they inevitably lead to a discovery of major data gaps and data quality issues. Addressing these data gaps and data quality issues requires a systematic and long-term approach that is yet to get underway. As an early indication of progress, integrated environmental and economic accounts, such as those proposed by the System of Integrated Economic and Environmental Accounts (SEEA), illustrate efforts to combine economic and environmental data in a consistent fashion. Although the SEEA has been developed separately from SDIs, it could—in a robust, transparent format and expanded scope that also covers currently missing human well-being measures—serve as a starting point for assessing the data needs for sustainability measures. As proposed later in this paper, there is strong rationale for better connecting SDIs with underlying common statistical information systems and platforms.

The emphasis on the Millennium Development Goals (MDGs) has brought attention to the need for indicators that monitor progress towards the goals individually and collectively. A large and still growing number of attempts to create aggregate measures of various aspects of sustainability created a stable of indices that provide a more nuanced perspective on development than economic aggregates such as GDP. Some of the most prominent of these include the Human Development Index (HDI) of the United Nations Development Programme (UNDP); the Environmental Sustainability Index (ESI) and the pilot Environmental Performance Index (EPI) reported under the World Economic Forum (WEF); or the Genuine Progress Index (GPI) calculated at the national or sub-national level. Parallel to these initiatives, political interest in producing a 'green' GDP that would take at least the cost of pollution and natural capital depletion into account has grown, even if implementation is held back by the reluctance of policy-makers and statistical services arising mostly from a concern about conceptual and technical challenges.

While sustainability indicators, indices and reporting systems gained growing popularity in both the public and private sectors, their effectiveness in influencing actual policy and practices often remained limited. The gap between the large *potential* but smaller *actual* influence of SDIs on more mainstream adoption of sustainable policies and practices suggests there is a latent potential for indicators to play a stronger role in articulating and tracking progress towards sustainability visions in a wide range of settings.

Realizing this potential would require tackling a number of challenges that we identify as institutional, methodological and technical.

From the *institutional* perspective, the key challenge is to ensure SDIs are integrated into mainstream policy mechanisms, instead of being an environmental "add-on" to already existing and used statistical, measurement and reporting systems. SDIs are still often assigned to environmental agencies without the sufficient mandate, capacity and

influence to ensure indicators are brought to bear on key policy decisions, such as the development of government budgets, sectoral policy frameworks, or long-term plans and sustainable development strategies. This political weakness of SD indicators mirrors the relatively low weight of SD in mainstream politics, with a lot of lip service for SD but often insignificant real consequences.

From the *methodological* point of view, there are continuing uncertainties and debates about what and how to measure and how to link specific indicators to time-bound targets and thresholds. Comparability of indicator systems continues to be limited by the use of different indicator frameworks that often adhere minimally to standards of how the same variables should be measured. Aggregated indices are attractive for communication with citizens but require high quality data for consistent, comparable and complete indicator sets, plus a political consensus on indicator weights that is difficult to achieve on either an international or even national or sub-national scale.

SDIs also continue to be affected by serious *technical* challenges, particularly related to problems with data. The challenges include data availability and quality, but they also go deeper into problems with common definitions and the lack of long-term, consistent monitoring mechanisms that would supply data with adequate temporal and spatial resolution. The issue, however, is not simply the lack or inadequacy of the right kind and quality of data, but also that in some cases the data that *are* collected at considerable cost have little apparent use in decision-making.

Making significant progress on any of these issues requires a more serious investment of time and effort, and coordinated action of many agencies from the global to the national and often sub-national level. The challenge for an organization such as the CSD is to understand the niche they can most usefully fill, given mandate and capacity constraints. Charting a course for the future should consider the experience with the CSD's earlier SDI effort that focused on providing a long global list of indicators that was used as a menu for compiling country-specific sets during pilot testing.

Key objectives of our paper thus include the following:

- review key achievements and SDI trends—not trends SDIs show, but trends in how SDIs are approached in theory and practice;
- reflect on the role of the CSD and its SDI program, including its intended and actual relationship with national and other key international programs (like SEEA and environmental reporting by UNEP) and institutional mechanisms (like NSDS); and
- offer a set of options for re-directing and advancing the CSD's work on indicators over the next decade and assess the potential for a common global framework to emerge.

2.   Recent trends in the development and implementation of SDIs

Indicators have always been an integral part of governance. However, the sustainable development indicator "movement" did not take hold until the early 1990s when SD started to become an integral consideration in policy-making. Since those early years, SD indicator initiatives continue to flourish. A December 2005 review of the Compendium of Sustainable Development Indicator Initiatives—possibly the most ambitious database to date to keep track of SD indicator efforts—showed 669 entries (IISD 2005).

SDIs are developed at the nexus of public policy and science often resulting from dynamic iterative processes and dialogue among non-expert citizen participants, government bureaucrats and technical experts. The process allows participants to define locally-relevant aspects of sustainability from their unique perspectives, anchored by their own values.

The diversity of core values, theories on SD and the proliferation of SDI processes typically result in the development and application of many different conceptual frameworks. Conceptual frameworks for SDIs help focus and clarify what to measure, what to expect from measurement and what kind of indicators to use. A framework serves as a high-level, direct reference to the basic concepts of SD. Underlying an SDI framework is usually a conceptual model that helps identify and organize the issues that will define what should be measured. The main differences among frameworks are the way in which they conceptualize the main dimensions of SD, the inter-linkages between these dimensions, the way they group the issues to be measured, and the concepts by which they justify the selection and aggregation of indicators.

Some of the more commonly used frameworks are:

- pressure-state-response (PSR) and its variations, limited mostly to the environmental pillar;
- human well-being/ecosystem well-being;
- issue- or theme-based frameworks; and
- capital-accounting based frameworks, centred on the economic and environmental pillar of SD).

While these and many other frameworks were developed in the 1990s, only a few of them gained international acceptance. Others remained in an experimental stage or have never become practically relevant. Two of the above mentioned frameworks—the PSR and capital accounting-based frameworks—were developed prior to the concept of SD, although subsequently attempts were made to adapt them to be used in assessing sustainability. The PSR framework, in particular was developed for environmental statistics in Canada, then further developed and adopted internationally for use in methodological handbooks and country studies (Friend and Rapport 1979; UN 1984, 1988, 1991; UN 1991). The framework was later adopted by OECD for use in environmental indicator reports, starting in 1991 (OECD 1991). The UNCSD called the modified framework driving force-state-response (DSR) and used it in the categorization

of its first set of 134 SDIs (UN 1996). UNEP also adopted a version of the framework as driving force-pressure-state-impact-response (DPSIR) for use in the Global Environment Outlook (GEO 1997, 1999 and 2002).

Any variation of the PSR framework can be tied to SD only with certain assumptions. A limitation of the PSR model is that it does not work if evidence for causal linkages is missing, and it oversimplifies inter-linkages among issues. Often, it is ambiguous as to whether the issue measured by an indicator represents a driving force or a state. Also, there are multiple pressures for most states, and multiple states arising from most pressures, creating difficulties in identifying indicators. This is the main reason why the DPSIRF was abandoned in the UN (2001) indicator report.

Decision-makers demand indicators for SD that can be integrated into the relevant level of policy-making (regional, national, sub-national, local). In cases where serious attempts to systematically implement SD are made, this brings up the challenge that indicators, including social and environmental indicators, usually without a known and accepted monetary value, are brought to bear on *economic* policy-making. These demands lead to the following preferences:

- a small set of indicators;
- indicators that are linked to policy targets; and
- environmental and social indicators that are compatible with macro-economic indicators and the budgeting process.

These preferences help explain why decision-makers tend to select indicators that are linked to the policy process; or why they derive indicators from policy targets.

While many indicator sets are in use, and many frameworks are applied by different actors, developments in the past half decade appear to follow the trends below:

2.1 Continuing interest in the development of aggregate indices;
2.2 Interest in core sets of 'headline indicators';
2.3 Emergence of goal-oriented indicators;
2.4 Making better use of indicators in performance measurement.

2.1   Continuing interest in the development of aggregate indices

There appears to be a continuing need for aggregate indices that characterize progress towards SD or at least some of the dimensions of SD. This explains the popularity of the ecological footprint (WWF 2005; EEA 2005b; Global Footprint Network 2005); the Human Development Index – HDI (UNDP 2004); and the recent interest in the Environmental Sustainability Index – ESI (WEF 2005), or its offshoot, the Environmental Performance Index (EPI). Other more prominent indices and underlying frameworks that had been developed and applied on various scales include the Barometer of Sustainability (IUCN-IDRC 1997); the Genuine Progress Indicator – GPI (Redefining

Progress 2004); the Genuine Savings Indicator (Hamilton et al. 1997; Pearce 2000); the Total Material Requirement (EEA 2001); the Compass of Sustainability (AtKisson 2005); and eco-efficiency indices (WBCSD 2003). Most of these indices have not generally been accepted for actual decision-making because of measurement, weighting and indicator selection problems (Bartelmus 2001).

2.2 *Interest in core sets of 'headline indicators'*

Headline indicators (HI) is a term adopted by some countries and organizations to describe an SDI approach where short core sets of indicators closely linked to policy priorities are compiled. While not a framework *per se*, this approach reflects pragmatism in terms of the number of SDIs and the need to link the SDIs to issues high on policy-makers' and the public's agenda.

Core indicators provide signals to high-level policy-makers and to the general public. Their combined use helps raise the profile of priority policy issues and in particular provide early warning about imminent trends. Such indicators have been recently published, among others, by the Government of the United Kingdom, the European Environment Agency (EEA) and the Australian Bureau of Statistics (UK 2005; EEA 2005; AusStats 2005), among others. Some international agencies, even those which have developed other sets of SDIs, like the World Bank and OECD, have published headline indicators in different sectoral and SD reports. The interest in HIs is rooted in the perception that robust core sets of measures are easier to understand, and they help track progress (or lack of it) towards selected policy goals. It also reflects an understanding that working with a long list of indicators can be counterproductive, as in all-inclusive indicator sets real priorities tend to be lost.

However, whether HIs represent sustainable development priorities or not depends on their relationship with any declared sustainability objectives and a more rigorous underlying conceptual framework. HIs may simply be constructed around political priorities, whether they reflect sustainability considerations or not. This can be quite misleading, focusing on current issues dominating political discourse and obscuring significant issues influencing future sustainability.

Developing HIs based on longer SD indicator sets and thoroughly considered sustainability objectives is feasible and could be an effective approach to informing and influencing policy development. Beyond official organizations, several expert groups such as the Balaton Group (Meadows 1998) and the Consultative Group on Sustainable Development Indicators (IISD 2000) have experimented with core sets of indicators based on a holistic approach, even without calling them HIs. In 2003 a coalition of experts (RSPB-Oxfam-New Economics Foundation, see RSPB 2003) called explicitly for a set of 10 global HIs, most of them in the environmental pillar of SD. The composition of such a set, even if it is the result of a consensus-based process, will always reflect the preferences and biases of those involved in making the selection. This may be less of an issue in local SDI initiatives, but at the global level there are many powerful institutional

actors with special policy priorities and apparently little incentive and political will to even launch a process that would result in a global set of HIs. Even the highest profile global HI initiative, the Millennium Development Goal Indicators (MDGIs) are not universally applicable and accepted, as they reflect mostly the priorities of the least developed countries, and have a distinct weakness in the environmental domain.

2.3   Emergence of goal-oriented indicators

Interest in linking indicators to goals and targets enables their use in tracking performance and helps link them to policy priorities. The Millennium Development Goal Indicators (UNSD 2005; and WB 2004) are the most influential recent SD indicators with a link to specific targets at the global level. MDGIs are derived from a set of development goals that address the most pressing issues of developing countries. MDGs do not follow the three- or four-pillar SD framework, but rather the eight-pillar MDG model of development that was agreed on at the UN Millennium Summit. They quantify a set of development policy objectives that may be considered preconditions for long-term SD. MDGIs are relevant because of the immediate linkage to policy targets—one could say they were actually *derived* from these targets—and the link between these targets and subsequent development assistance and other policy measures.

Beyond the MDGIs, in the past five years there has been a shift in favour of connecting SDIs with associated goals and targets among some major international and national organizations involved in official development assistance, and among decision-makers in developing countries and countries in transition. Even for agencies that have developed SDIs along different models, such as the WB, UNDP, FAO, WHO, UNSD or UNESCAP, the MDGIs have become the standard reference set, applied in their sectoral, global, regional and country reports. The MDGIs demonstrate that a policy-relevant indicator set can be successfully applied globally, even if the application is restricted to developing countries and countries in transition (UNDP 2005, with the exception of Goal 8). The concept of the linkage to targets, however, makes a variation of the MDG indicators applicable for all countries if the targets are derived from national SD strategies.

In addition to the direct application of the MDGIs, there are some other interesting uses of the set. One of these is the application of MDGIs in the business world. A notable example is the Global Reporting Initiative (GRI)—known for its efforts to standardize corporate SD reporting through its otherwise eclectic set of indicators—to help corporations assess and report on the contribution of their activities to the achievement of the MDGs (GRI 2003; GRI 2004). Another relevant example is the impact of the MDGs on improving monitoring, data collection and reporting related to the measurement of performance and the redefined tasks and methodological improvements of statistical offices (IDA 2005; UNSD 2005b).

Other efforts also link development policies to different policy goals, particularly by developed country agencies responsible for Official Development Assistance policies (CIDA 2004; SIDA 2004).

2.4   Making better use of indicators in performance measurement

Parallel to linking indicators to goals and targets, there is growing interest in using SDIs in measuring the performance of organizations within and outside of government. This development, though inspired independently from SD indicators, has an impact on indicator design and use. As the essence of performance measurement is comparison between actual and expected results (either targets, baselines or "best in class" performance, i.e., ranking), several different performance measurement methods have been developed and applied independently or in combination with other indicator frameworks. Some of the more prominent examples include Logical Framework Analysis (SIDA 2004); Results-Based Management (CIDA 1999); and a balanced scorecard approach (GAO 2003). Software applications such as the Dashboard of Sustainability are based on and support performance measurement and can be applied to any indicator framework and SDI set (IISD 2005).

Performance measurement in the 1970s and 1980s tended to be management-driven, spurred by professional associations and by research in, and demonstrations of, measurement methodologies. Although performance measurement remained largely management-driven, more elected officials took note of the practice in the 1990s. Most of the approaches use both quantitative and qualitative performance measures to assess progress in achieving strategic goals and objectives. Collectively, these measures help demonstrate the degree to which the particular agency provides timely, quality service to their governments so that they can respond to current and emerging challenges by changing the way they operate.

Beyond narrower sector-specific initiatives, performance measurement and SDIs have an integral role in NSDS. Based on the view of NSDSs as cross-sectoral cyclical processes (rather than documents) SDIs have a role in several phases, from the identification of strategic priorities, through the planning and implementation of specific policy interventions, monitoring progress and learning from successes and failures. Given this direct role of SDIs, indicator development and strategy development are sometimes coupled, though this connection is certainly one that should be strengthened.

Countries that are seriously interested in a strategic approach to SD often follow a different approach of course, including for example coupling the strategy to national planning processes, developing separate overarching strategies or having the strategies developed by line ministries sector by sector. Regardless of the approach taken, however, SDIs are essential for designing strategies and specific interventions that address real priorities, that take interactions between sustainability issues into account, and that help identify weaknesses. Although politically often a challenge, SDIs help improve

accountability both in terms of specific sustainability initiatives and the success of an entire NSDS.

SDIs and NSDSs both represent policy innovation and face challenges of influencing mainstream decision-making. However, when developed and deployed together, they can play a mutually supportive and strengthening role by SDIs increasing the rigour and credibility of NSDSs and NSDSs providing an institutional framework within which the potential of SDIs can be more fully realized.

3.   Experience with the UNCSD's role in SDIs

3.1   General mandate and role

Agenda 21, the action program adopted by the 1992 Rio Summit, calls in Chapter 40 for countries, international organizations and non-governmental organizations to develop and use SDIs, as part of an integrated approach to accounting. The UNDSD's work program on indicators was adopted in 1995 in response to this call with the following elements:

(a) enhanced information exchange among all interested actors;
(b) development of methodology sheets, to be made available to governments;
(c) training and capacity-building at regional and national levels;
(d) testing of the menu of indicators and monitoring of experiences in three to four countries; and
(e) evaluation of the menu and adjustment, as necessary (UNDSD 1995).

The CSD was of course not alone with a mandate to work on sustainability indicators in the intergovernmental system. However, its approach was broader in terms of the range of indicators covered than that of most other specialized agencies and programs such as FAO or UNDP that focused on issues related to their more narrowly defined spheres of interest.

The program, coordinated by the UN Department for Policy Coordination and Sustainable Development (UN-DPCSD) that was recently renamed Department for Economic and Social Affairs, involved a participatory, iterative exercise to develop a SDI set. The SDIs were intended to help measure progress on the wide range of sustainability concerns of UN member states, and the aim was to have an agreed set of SDIs that all countries could accept by 2001.

3.2   Overview of the CSD's indicator process

The CSD's indicator work developed in four phases, as schematically shown in Figure 1. Besides the CSD and interested governments, participants in the process included a wide range of specialized agencies and non-governmental organizations. The development of the SDI set also involved national testing, supported by a capacity building effort, and a review

of 'lessons learned' in expert workshops. The CSD's work on NSDSs started later, building on the mandate provided by the 19th special session of the UN General Assembly in 1997, and it provided an opportunity to emphasize the use of indicators in national policy planning and reporting.
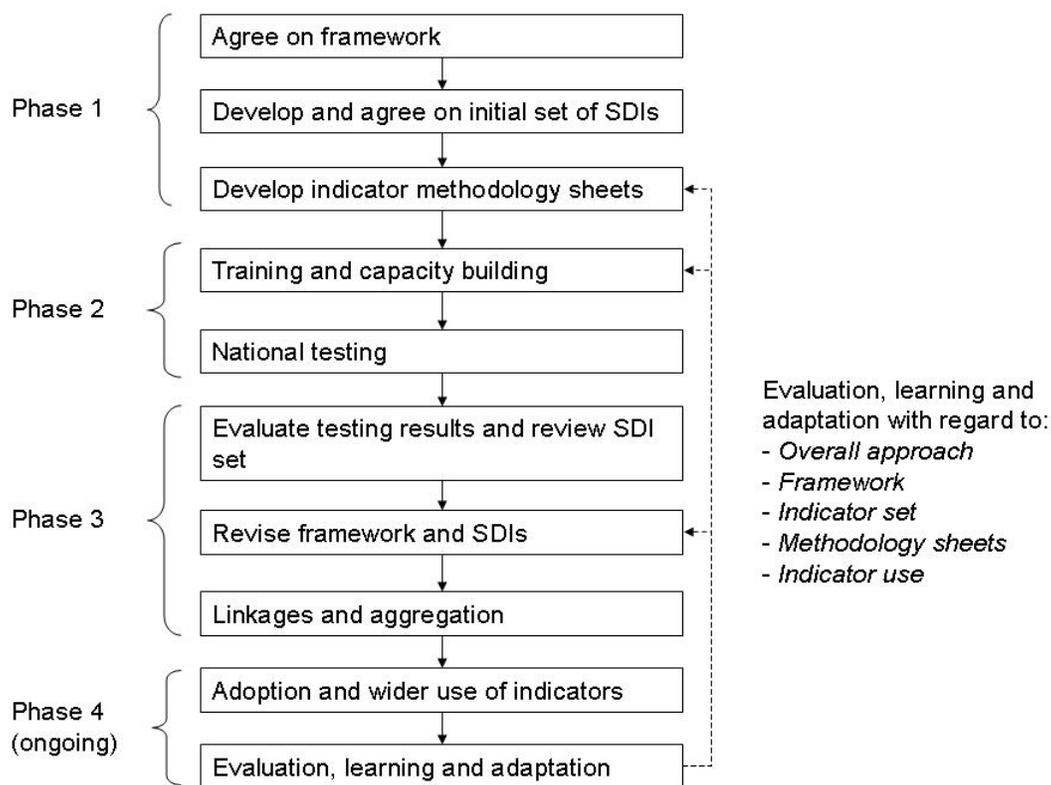
Figure 1: Schematic view of the CSD's SDI process.

Starting with **Phase 1**, the development of the initial set of SDIs resulted in 134 indicators, grouped according to the dimensions of SD in four major categories: social, economic, environmental and institutional indicators (UN 1996). The link to specific Agenda 21 chapters was also identified. The four categories create the horizontal structure of a matrix in which the vertical structure is organized according to driving force, state and response (DSR), following the logic of the pressure-state-response framework earlier developed at Statistics Canada (Rapport and Friend 1979) and further developed by the Statistical Office of the United Nations and endorsed by the Statistical Commission of the United Nations (UN 1984). Every indicator in the set was defined and described in detail on 'methodology sheets,' using a common template by experts from relevant agencies and published in what has become commonly known as the CSD's 'blue book' on SDI (UN 1996).

The uniform methodology sheets proved useful and provide a description of the following for each indicator:

- indicator definition (name, brief definition, unit of measurement);

- place in the framework (relevant chapter of Agenda 21, type of indicator);
- significance and policy relevance (purpose, relevance to sustainable/unsustainable development, linkages to other indicators, targets, relevant international conventions and agreements);
- methodological description and underlying definitions;
- assessment of the availability of data from international and national sources;
- agencies involved in the development of the indicator; and
- further information, including bibliography of sources.

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Following the completion of the initial SDI set, the indicators were pilot tested in **Phase 2** by 22 countries from major regions of the world on a voluntary basis. The UN-DPCSD developed guidelines for the implementation of the indicator set, and among the testing countries 12 also volunteered to test the indicators in their national reporting to the UNCSD. Several countries and regions published test results, including the European Union (Eurostat 1997); Finland (Rosenström and Muurman 1997); the Philippines (Mendoza and Magpantay 1997); and Asia and the Pacific (Economic and Social Commission for Asia and the Pacific 1997).

In order to aid the testing process, the CSD initiated capacity building activities targeting developing countries. Besides providing methodology sheets on indicators and the testing process, capacity building involved training workshops and twinning arrangements between countries. Testing was completed in 1999 and interim results were both compiled in a database and published in a report (UN 1999).

In addition to testing the indicator set and within that, individual indicators, another goal was to explore aggregation methods and the use of SDIs in the analysis of inter-linkages relevant for sustainability. However, the review of testing experience found that few, if any countries made attempts to include these in their efforts.

During 1999 in **Phase 3** the UNDSD performed an independent assessment of the experiences of the CSD indicators testing and held an expert group meeting in Barbados to provide an opportunity for countries and experts to share lessons learnt from the testing process. Based on the findings of the expert group meeting and the independent review, recommendations were made to focus efforts on creating a shorter list of core indicators, promoting aggregation, and following a thematic organization of the indicators along the four basic themes of economic, social, environmental and institutional categories instead of grouping them according to the DSR framework and the chapters of Agenda 21 (UN 1999).

As a result of pilot testing and considering the findings of the independent review, the DSR and Agenda 21 chapter based framework was adjusted and the indicator set was revised with the following results:

- The conceptual framework was simplified and resulted in a theme-based approach with four main themes (social, environmental, economic and institutional) and subsequent sub-themes. The DPSIR categorization was abandoned, with the

observation that the analysis of sustainability issues based on the DSR *logic* is still useful.
- The indicator set was reduced to 58, eliminating indicators based on the results of the testing and meeting specific criteria.
- Strict reference to Agenda 21 chapters was removed in favour of linking indicators to high priority policy issues, while the conceptual relationship to Agenda 21 chapters has still been preserved (UN 2001).

Phase 4 on the process diagram refers to the actual or potential use of the SDIs in national reporting. This phase of the process has been ongoing since the completion of the core set of measures in 2001, although countries were assumed to take leadership in starting national initiatives rather than the CSD playing an active leadership role.

The diagram also indicates a currently hypothetical learning loop that may result in a further review and adjustment of various elements of the CSD's work program based on new experience and information.

3.3   National level uptake and experience

Recognizing that approaching the development of SD indicators in an un-coordinated way risked rather different and incomparable indicator sets, one of the goals of the CSD was to help achieve consistency in what is being measured and reported and to move in the direction of better synchronize national reporting. While experience with the first set of 134 SDIs was evaluated and discussed in an expert meeting, this review is just taking place for the shorter set of 58 measures at the December 2005 meeting that this paper is prepared for. As systematically assessing the degree to which the DSD succeeded in influencing the SDI agenda is through these indicators is starting at the December 2005 meeting and requires an effort that is beyond the scope of our paper, our analysis is based on available reports and expert judgment.

One of the goals for the CSD was to help build consistency in national reporting of SDIs. Whether this was achieved is one of the measures of the effort's success. Apart from SDIs themselves, another measure of success should be related to the influence of the CSD's effort on the degree of interest and effort countries put into developing and operationalizing their indicator systems. Ultimately and most importantly, this has to include the actual use of SDIs in decision-making.

The CSD's focus on SDIs in the mid-1990s provided a useful forum for the discussion of national-level indicators with the involvement of governments, international organizations and others at a time when thinking on the whole area on SDIs was immature and evolving. While none of the testing countries were able to report all 134 indicators in the first set, they ended up using the CSD set as a *menu* out of which they selected indicators that reflected their priority concerns.

While this approach provided indicators that were more relevant at the national level, it did not lead to a truly common and comparable set of measures across the board, given the difference between what SD issues and indicators various countries would consider applicable and important. *Partial* comparability of SDIs was achieved related to issues and indicators that matter everywhere or among peer groups of countries with similar concerns and conditions.

Although the first set of SDIs did not lead to a common set of indicators, testing helped identify some that were selected everywhere. This information, along with the consideration of other criteria helped whittle down the SDI set from 134 to 58. Even this shorter list contains some obvious irrelevancies for some countries—for example, none of the indicators related to coastal and marine issues are directly relevant for landlocked countries —while it may miss critical issues that are not universally important, but critical for some. For instance, while infection by AIDS didn't make the list and it may not seriously affect some countries, for others, like many countries in Sub-Saharan Africa, it is now an essential measure of both social and economic sustainability. Given national differences, some lack of relevance is probably unavoidable even at this level of 58 measures.

Recognizing the need for flexibility, the CSD took a pragmatic approach and in the guidelines for developing a national program of SDIs it calls for the use of even the shorter list as a menu, even though it refers to the indicators as a 'core set' (UN 2001). This approach is more realistic than the expectation that countries would buy into a comprehensive, global set of measures that may or may not reflect their concerns, without a link to a strong policy agenda and in the absence of incentives, such as participation in well-funded capacity building or tying the indicators to economic assistance. Such a link was strongly resisted, and it is unlikely that through this mechanism alone a further reduced core set would simply 'emerge.'

Assessing the impact of the CSD's indicator effort would thus need to look beyond the emergence of a common set of measures. A first order impact would involve countries, possibly those participating in the pilot testing, which built indicator sets directly on the basis of either the long or short CSD 'menu.' There is also a second order impact, probably more difficult to quantify, where countries outside of the testing process developed indicator systems taking the CSD's effort *to some degree* into account.

Beyond specific indicators, the CSD's approach brought political attention to indicators, which probably mattered particularly in developing countries, and provided some other tools such as methodology sheets that could increase the rigour and credibility of national processes. This was possibly the case in some national efforts, but also in regionally coordinated work on SDI, such as the Latin American and Caribbean Initiative for Sustainable Development. The latter appears now to set the pace for national level indicator development in Latin America and the Caribbean. One of the possible conclusions from this experience is that while making available indicator sets and methodologies can be of some direct or indirect use, it is not sufficient. This is the case in particular where developing and regularly reporting of indicators requires significant

investment and capacity, as well as changing accepted routines of performance measurement.

3.4   Areas of SD inadequately covered in the current SDI core set

Considering that even the current list of 58 SDIs is probably too long for a core set, offering advice on filling gaps would make sense only if it also involves removing indicators to keep the total number constant. Going back to a longer 'shopping list' that was already abandoned would likely be a mistake, even if it is understood that the set is used as a menu. It might be feasible and desirable, however, to link the core set to the underlying statistics and indicator programs such as those of the UNSD.

Keeping in mind these constraints and the possible need to link the SDIs to major policy agendas, particularly the MDGs, the following is a list of issues that are high on the international policy agenda, but appear un- or under-represented on the indicator list:

- Institutional
    o Conflict and refugees
    o Governance
- Social
    o Gender equity, including maternal health
    o HIV/AIDS
    o Malaria
- Economic
    o Tariffs
- Environmental
    o Risk of soil degradation
    o Vulnerability to climate change
    o Biodiversity weighted land use change.

Given the nature of the CSD's list as a *menu*, any exercise trying to produce a more 'complete' list should recognize that creating the perfect list is neither possible nor even desirable. Depending on the spatial, ecosystem or socio-economic context it would almost always be possible to identify indicators that could be added.

Section 5 of this paper provides further details and options for a more broadly framed approach for the future. While that approach could certainly utilize elements of the existing SDI set, it would be more strategically focused, with more attention to policy priorities. Developing the approach, which would identify and fill critical information gaps but would also establish higher-level sustainability priorities, would require a carefully designed and managed technical/political exercise. The result could be more elaborated and better indicators, with increased influence in policy-making.

4. Potential, advantages and limitations of a common global SDI framework

4.1 A global framework for SDIs: need and purpose

Monitoring and reporting on the trends and interactions associated with SD, while appearing technical in nature, represents major conceptual challenges. These challenges go to the heart of understanding the concept of sustainable development and how its components are related and interpreted in decision-making.

Defining SD in general, and SDI in particular, continues to be challenging at least for the following reasons:

- absence of general scientific consensus on many of its specific components and the required quantities and qualities of these components;
- dependence on often context-specific conditions; and
- dependence on what is being valued, and to what extent, by human society today and human societies in the future.

As the review of SDI trends at the national and other levels illustrates, there is a continuing proliferation of not only indicator sets but also conceptual frameworks and methodologies. Similar to indicator sets, though on a higher level, conceptual frameworks help anchor indicator systems in theory (notably to operational concepts of sustainability); provide an organizing structure; help identify useful indicators and data gaps; ensure indicator comparability; and help communicate with the public and decision-makers. The variety of frameworks, however, appears to signal that there is conceptual uncertainty or at least ambiguity with regard to the specific elements of sustainability, the inter-linkages among these elements, and their connections with indicators and indices. It also signals that different frameworks appear to resonate with different regions, organizations, cultures and political purposes. Even when a common conceptual framework is used, as it was attempted in the country pilots based on the CSD's indicator menu, countries might choose to develop customized indicator sets that suit their needs and conditions in order to maximize policy relevance.

The fact that the details, in our case *measurable* details, of sustainability are subject to a degree of interpretation represents a challenge, because at many levels, certainly at the global level, action on SD requires cooperative action. Cooperative action is hard to achieve, though, unless there is political will and agreement on key common goals and measurement of progress towards those goals. Ultimately, this is perhaps the key rationale for a shared framework and indicators, at least related to those issues that demand joint action at the international level. While common frameworks still do not automatically lead to common measures and certainly not to coordinated action, they are important components of an enabling environment and governance mechanism, in which cooperative action can emerge.

Besides this higher-level rationale, there may be other reasons that support the need for common frameworks such as:

- developing shared terminology;
- easier comparability of SDIs, targets and thus performance; and
- more opportunities for institutional cooperation.

The potential advantages of a common framework are in contrast to practical experience over the last decade. While many organizations and experts have developed 'universally' applicable frameworks, the many new entrants into the field of SDIs still found it usually necessary to define their own, rather than simply adopt someone else's 'as is.' This brings up the question not only whether a common framework is necessary, but whether it is politically *feasible* to attain. The fact is that, to date, a common framework has not emerged through this *bottom-up* process.

Some organizations such as the CSD and others, have tried a *top-down* approach followed by a consultative process, common frameworks and indicator sets that they expected countries to adopt. It has become clear, however, that this combined approach did not lead to a common framework either. Of course, it is possible that the societal learning curve on SDIs is much longer than the time we had since Agenda 21 or the Earth Summit when SDIs got on the mainstream policy agenda. Even under optimal conditions a common framework would take decades to evolve. A case in point is the national income accounts that took decades to evolve and be accepted. However, it is hard to see how the current pattern of coordination by the CSD alone would, even over time, lead to the emergence of measurement and SDI systems with an acceptable level of consistency, relevance and credibility across different scales.

In considering the potential role of the CSD in working towards better harmonized SDIs, it is useful to contrast its approach with other leading indicator initiatives. Whatever approach to frameworks the CSD decides to take, it needs to consider the niche, experience and relationship with other leading SDI efforts.

4.2 *Potential for building synergy: The Millennium Development Goal Indicators and the Systems of Integrated Environmental and Economic Accounting*

As noted earlier, there is by now a large and growing stable of SDI systems and initiatives around the world, on various scales. In order to maximize its impacts and to advance the cause of SDIs globally, whatever work program the CSD will choose will need to carefully position it with regard to other major efforts. We propose that, for different reasons, considering the relationship with at least two other initiatives, the MDGI and the SEEA should be considered in the CSD program.

Potential synergies with the MDGIs would make sense because currently and in the foreseeable future, this indicator system is the one that receives perhaps the highest level of political attention in the international arena. However, the MDGIs are very limited in

that they cover only issues of concern to a set of developing countries, but not the entire global community. In addition, they are particularly weak in the environmental domain and say nothing about the sustainability of global ecological support systems.

The relevance of the SEEA is related to the need to strategically strengthen the relationship between mainstream statistical data collection systems and data platforms and SDIs. SDIs suffer from having weak underlying organizational frameworks and a weak connection to statistical systems. Over time and through systematic and meticulous effort link-up with 'official' statistics could start plugging at least the most critical holes that make many SDIs weak in the absence of data useful only in theory.

Millennium Development Goal Indicators (MDGIs): The mandate for the CSD's indicator system was provided by Agenda 21; the basis for the MDGs and, through them, the MDGIs is the UN's Millennium Declaration (UN 2005). While far-sighted and brilliant in its scope and balance, the action agendas that emerged around Agenda 21 were much less concrete than the policy programs and resources allocated to achieving the MDGs. This does not mean that the vision underlying Agenda 21 was incorrect or irrelevant for the future—to the contrary. But it does illustrate that more focused policy vehicles are needed to translate the grand vision into political will and action. All MDG indicators serve a very clear policy purpose: to measure progress towards agreed upon and widely publicized time-bound targets (UNSD 2005b). In contrast, the CSD indicators were developed without reference to concrete policy agendas, even if there are, in many cases, policy agendas in the background, and they are certainly developed without explicit reference to targets.

Identifying targets is undoubtedly a complex and risky exercise as targets immediately raise policy relevance. However, they do help evaluate performance, and make indicators more useful in the context of NSDSs as planning and monitoring instruments. In many cases targets related to SDIs would need to be different country by country, but could help catalyze action agendas and could be promoted as an additional tool related to the use of SDIs. There is, however, a risk because target setting is a difficult political process of consensus building, which might lead to the erosion of the whole indicator program.

System of Integrated Environmental and Economic Accounting (SEEA): Contrary to nearly all indicator frameworks, which were developed mostly by the user community, the SEEA is the result of collaboration of the statistical services of international organizations and selected countries, endorsed by the Statistical Commission of the United Nations. The challenge is now to familiarize policy-makers with the capacity of these accounts to capture the environmental sustainability of economic activity.[2] Table 1 is a 'hybrid'—physical and monetary—accounting framework, which can be considered the centrepiece of the revised SEEA. The table shows the main physical indicators in italics. All other indicators are monetary. Environmental and environmentally adjusted indicators are shown in the green areas. Land uses and material

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[2] For instance, an international programme of the China Council for International Cooperation on Environment and Development (CCICED) is currently following up on a request by the Chinese leadership to provide a 'green GDP.'

flows are also presented in the green area as they represent pressures on environmental carrying capacities.

The hybrid accounting framework can make indicator selection more informed, compatible and transparent. In fact, most of the physical and monetary indicators of natural resource stocks and use, and of pollution and its cost, are accounted for in the SEEA. Indicators and indices outside the accounting framework are less comparable and may lack the strict quality control of 'official' accounting systems. Linking accounting and indicator frameworks can improve the comparability and quality of indicators.

Monetary indicators such as environmentally-adjusted net domestic product (EDP, or alternatively: green GDP), capital formation (ECF) or value added (EVA) measure sustainable economic activity and growth—overall and by economic sectors. Deducting the cost of produced and natural capital consumption from conventional economic indicators is the result of capital maintenance accounting, sometimes sweepingly called the 'capital approach' to indicator development. Such accounting is a prerequisite for wealth (and changes in wealth) accounting, even if ad hoc estimates of wealth indicators claim to modify stock and flows of produced, natural and human capital outside the accounting system.[3]

The *physical part* of the accounting framework presents material flows and stocks, notably natural resource inputs (DMI, TMR) and 'outputs' of pollutants and wastes (TDO, DO). Contrary to the monetary green accounting indicators, material flows cannot be interpreted as indicators of both environmental and economic performance. They measure environmental pressure and refer, therefore, to environmental performance only. They can be linked, however, to economic performance indicators, notably GDP, as ratios of material intensity or resource productivity. Time series of these ratios indicate the linkage or delinkage ('decoupling') of environmental impact from economic growth.

The material flow accounts do not capture other elements of environmental sustainability of a more qualitative nature. These are changes in environmental quality of ecosystems, loss of biodiversity and other impairments of ecological services. Additional indicators would have to be compiled for assessing these ecological concerns. Also, social indicators are *a priori* not included in an environmental-economic accounting framework. There are however efforts to expand the green accounting systems by incorporating human capital. Furthermore, there is the possibility of linking up with social accounting matrices (SAM) which have been developed in consistency with the national accounts. The further expansion of the SEEA to incorporate all these efforts is a matter of further research.

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[3] Arbitrary deviations from the established accounting conventions for wealth, cost, income and output would severely hamper the comparability with conventional economic indicators and the sustainability analysis of economic performance and growth.

Table 1: Accounting framework for economic and environmental indicators

	DOMESTIC PRODUCTION (industries)	FINAL CONSUMPTION (households, government)	CAPITAL FORMATION	CAPITAL ACCUMULATION	REST OF THE WORLD
OPENING STOCKS			Economic assets (CAP_f)	Environmtl. assets (CAP_n)	
SUPPLY OF PRODUCTS	Output (**O**)				Imports (**M**)
	thereof: environmental protection (**EP**)				thereof: **EP**
USE OF PRODUCTS	Intermediate consumption (**IC**)	Final consumption (**C**)	Gross capital formation (**GCF**)		Exports (**X**)
					thereof: **EP**
USE OF FIXED CAPITAL	Capital consumption (**CC**)		Capital consumption (**CC**)		
VALUE ADDED, NDP	Value added (**VA**), **NDP**				
USE OF NATURAL ASSETS	Environmental cost (**EC**) *Material inputs (MI)* *Land use (L), emissions (E)*	Environmental cost (**EC**) *Material inputs (MI)* *Land use (L), emissions (E)*	Natural capital consumption (**EC**) *Depletion of natural resources (ΔMI), net additions to stocks (NAS)* *Change in environmental quality (ΔEQ)*		*Export/import of materials, and wastes and residuals ($X_{MI,E}$)*
GREEN INDICATORS	**EVA** = VA – EC: **EDP** = ∑EVA **TMR, DMI, TDO, DO**	*Output of residuals by households (DO, TDO)*	**ECF** = CF – CC – EC *Net additions to stocks (NAS)*		

+

Other asset changes (**OVC**)	Other asset changes (**OVC**)

=

Economic assets (**CAP_f**)	Environmental. assets (**CAP_n**)

CLOSING STOCKS

Source: based on Bartelmus (2001, Fig. 3, p. 1728).

5.   Options for a global work program on SDIs

From the review of national SDI initiatives and the consideration of potential synergies it is clear that although there are common elements in almost all indicator systems, to date no universally accepted conceptual framework for the compilation and presentation of indicators has emerged.

The relevant questions are whether a common conceptual framework is needed, whether such a framework is feasible to define, and whether the CSD is suitably positioned to advance this agenda. If it appears that working towards a commonly accepted conceptual framework is at this stage not desirable, there is also a question about what alternative strategy could most usefully facilitate progress in the area of SDIs.

In examining available options, the authors found it useful to sketch out four medium-term (about 10-year) scenarios for the evolution of SDIs in the future. The central theme that runs through the first three scenarios is the coherence and degree of coordination among the SDI initiatives taking place on different scales. The fourth scenario explores the potential for building more synergy between SDIs, MDGIs and SEEA. Note that the scenarios are not 'pure' in the sense that some of them have shared features, and of course many other scenarios with combinations of the ones sketched out here could be drafted.

- **Indicator Zoo** – assumes the continuation of currently dominant SDI practices into the future:
    o weak global coordination;
    o diverse set of institutional arrangements;
    o diverse, even if sometimes comparable frameworks;
    o diverse, but contextually appropriate indicator sets
    o SDIs and underlying statistical and information systems develop on parallel tracks, with incidental cross-referencing and limited coordination;
    o distributed and weakly coordinated data collection system; and
    o no systematic linkage to global or national scale country-specific policy targets.

- **Global Coordination** – assumes stronger coordination mechanisms without a major overhaul of the existing approaches:
    o stronger role for global organizations in promoting the harmonization of common frameworks, methods and ultimately indicators;
    o promoting the integration of national SDI frameworks with underlying statistical and information systems;
    o direct coordination with some global reporting systems, like EPI, MDG indicators, GEO, etc.;
    o distributed, but coordinated data collection and reporting;
    o no common data platform; and
    o linkage to some existing global and national targets.

- **Global Integration** – assumes new and significantly strengthened institutional arrangements between key actors involved in SDIs:
  - strong global coordination and capacity building;
  - strong national champions and commitment, including resources;
  - distributed, but well-coordinated statistical data collection systems,
  - common global data sharing platform; and
  - effort to identify and link SDIs to targets wherever possible throughout the entire spectrum of SDIs.

- **Synergy World** – assuming that key actors of SD are willing to compromise, and there is political appetite for connecting SDIs with other policy mechanisms:
  - accept globally relevant components of the MDGIs, but complement them with SDIs from the existing CSD set or new indicators that capture dimensions where the MDGIs are weakest, particularly in the area of Earth support system and ecosystem services;
  - better quantification of poverty-environment links;
  - add a long-term sustainability perspective to existing non-environmental MDG indicators;
  - develop a direct interface with statistical monitoring and data sharing platforms; and
  - embrace an evolutionary learning approach and promote integration with NSDS.

Using the four scenarios, we can envision different roles for the CSD's indicator effort.

Indicator Zoo is an attempt to represent the projection of the current situation into the future. Under this scenario we assume weak political will to invest time and resources in developing new approaches and institutional arrangements, which would likely mean a continuing trend of relatively independent and uncoordinated development of SDIs at various levels and a continuing growth in the diversity of SDI frameworks and indicator systems. As discussed in Section 4 of this paper, this would likely mean continuing and perhaps growing inefficiencies in terms of our ability to develop and monitor progress towards goals and objectives where cooperative action is required.

While *Global Integration* in principle could address the inefficiencies inherent in *Indicator Zoo*, there may be neither the political will nor the technical knowledge to move comprehensively in this direction. One of the reasons for the limited traction of earlier SDI coordination attempts may have actually been the strategy that involved, at least initially, command-and-control style attempts to have large sets of SDIs accepted without sufficient consideration of the institutional dimension, underlying statistical infrastructures and the actual use of the resulting information in policy-making. There is an emerging understanding and appreciation of the institutional dimension connected to SDIs that reflects, among others, their key role in NSDS.

There is also an opportunity to better connect SDIs to environmentally modified

accounting frameworks that are based on the world-wide adopted system of national accounts (SNA) and aim at integration by summation and deduction (of cost) of indicators; such accounting is to ensure consistency in the underlying data and derived indicators, at least as far as the immediate environmental-economic interface is concerned. An important limitation of the SEEA is in its current form is that is does not cover social and institutional issues, and the use of a stock-and-flow approach is problematic with regard to ecological and social issues that could be measured only in physical units, but do not have a market price. However, this is not a reason to discount the accounting approach, because it provides a systematic platform, and with some targeted research some of its key problems may be resolved.

While moving in the direction of *some* elements described under *Global Integration* may be desirable, choosing the right strategy is crucial and elements of these may fall more under *Global Coordination*. We propose a more ambitious, yet pragmatic approach that on a selective basis builds on and strengthens existing mechanisms and frameworks that already have some acceptance. At the same time we would like to open doors to a gradual expansion of the SDI agenda to other areas that are logically related to it, but have so far been weakly connected and explored.

One of the key qualities of the proposed approach is that it should be *gradual*. This reflects the need to advance the SDI agenda to the next level where, instead of just being labels, indicators are real in terms of being more firmly anchored in mainstream statistical data collection systems and having a clearer place in policy planning and strategy processes. Advancing to this level from just having indicator sets takes time, can be costly, and requires careful consideration of a range of technical and institutional factors. Neither the CSD nor any other single organization would have the capacity to move comprehensively on a full spectrum of measures. But when moving in a gradual way establishing strategic patterns of collaboration and achieving real progress should be possible.

The fourth scenario, *Synergy World* tries to bring together some of these elements with an additional explicit link not only to the SEEA but also to the MDGs, without a 'merger' with them. By sketching out this fourth scenario we tried to present a more concrete alternative that may build on the comparative strengths of the various systems, while keeping to the proposed pragmatic approach.

Key elements of this pragmatic approach could be summarized as follows.

- Adopt a framework based on *capital categories* and related sustainability concepts, particularly capital maintenance. These categories could include economic and environmental, and possibly human, social, cultural and institutional capital, but should *not* be seen as an attempt to measure all sustainability issues in financial terms. In fact, many issues that matter for sustainability and that can and should be measured do not and will not lend themselves to be expressed through prices and should be measured in physical units. Nevertheless, categories associated with this approach and the underlying systematic approach to stocks and flows are in sync

with SD, and they are generally reflected in most generally accepted SDI categories.

- Through explicitly accepting a capital-based approach (even if the terminology needs to be adjusted to accommodate sustainability issues that do not easily lend themselves to the term 'capital'), we would also accept and could advocate the underlying stock and flow accounting system. This system is the basis of the SEEA that would help emphasize and strengthen the connection between SDIs and official statistical data systems. We believe this is a connection that must be strengthened if, over time, we want to systematically address key data gaps that continue to constrain most SDI exercises. Currently the SEEA does not extend to social issues and indicators, which is an area where further work would be needed.

- We propose an evolutionary or gradual approach, with emphasis on an indicator-by-indicator learning process, rather than (or besides) advocating a long menu of indicators. This approach has been usefully adopted by some governments on the national or sectoral level (e.g., OECD, Agriculture and Agri-Food Canada) and can over time lead to a significantly strengthened set of core measures. It is a more realistic approach in the sense that it recognizes that building up real capacity in SDIs and building up support of key constituents takes serious effort and requires investment of time and resources.

- The evolutionary approach would involve developing and adopting a year-by-year work program focused on priority-SDIs of high policy relevance. This program could focus annually or bi-annually on a very small set, maybe just 4-5, of leading indicators, directly connected to SD issues at the top of the policy agenda e.g., at the CSD. The work program could involve a thorough analysis of the indicator(s) in question, with attention to analytic soundness as well as integration into, or at least linkage to, the SEEA at various levels, adequacy of the existing monitoring and data collection systems, capacity issues, and potential uses in policy analysis.

- Close coordination and possibly alignment with other indicator systems, particularly the MDGIs. This may involve not only alignment of specific indicators, but also establishing a pattern for linking indicators to targets, recognizing that this is not always possible at the global level. But even if not possible globally, target setting at the national scale usually helps increase the SDIs' policy relevance.

- Revitalize a capacity building program focused at priority indicators through the usual channels of technical support. Build on earlier applied mechanisms where countries volunteered to work in pairs and explore the possibility of expanding the peer review mechanisms used for NSDSs to indicators.

- Continue to push for the integration of SDIs into NSDSs and their use in national and sub-national/sectoral reporting. SDIs are essential for the long-term success of NSDSs and, at the same time, NSDSs can provide the broader institutional context within which SDIs have a clear function. In cases where no NSDS or equivalent mechanisms are available explore the possibility of coupling of SDIs with explicit

sectoral policy programs and priorities.

- Wherever possible, build into SDI processes a role for periodic reviews. Reviews not only facilitate learning and integration of new priorities and ideas, but they also build credibility for the indicator system. Reviews can take different forms and involve a range of institutions, including fully independent evaluations, internal reviews or external audits. They can also be coupled with the review mechanism of national SD strategies. If targets have been selected, the review of SDIs could also involve the review of targets.

In order to implement the proposed approach, a work program of no less than five years could be developed in consultation with member states and relevant international organizations. In preparation for the development of the program the CSD might consider commissioning a more systematic independent review of the experience with its current list of SDIs, and use the results of this evaluation in developing the program.

If the evolutionary approach is adopted, as outlined in this paper, its initial thematic priorities should be identified in consultation with countries, the upcoming work program of the CSD, and other emerging policy priorities at the international scene.

Finally, the program should have built-in provisions for an evaluation mechanism at least at the end of a five year cycle that would provide an opportunity for learning and adjustment for the future.

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Annexes

Annex I: SEEA: Accounting for Sustainability

Capital maintenance, extended to include, besides produced capital, non-produced natural assets, as well as human and social capital, is a widely accepted notion of sustainability of economic development. World Bank estimates of national 'genuine' wealth have become quite popular as the information base of 'portfolio' development analysis (WB 1997, 2005). Ad hoc estimates using 'placeholder' values and controversial assumptions about long-term returns of labour and social capital make these estimates a matter of research rather than regular accounting.

The United Nations System of Integrated Environmental and Economic Accounts (SEEA) (UN 1993, 2000; United Nations et al. 2003) focuses therefore on the immediate interface between environment and economy. Conceptual and measurement problems of human and social capital, including changes in capital value, are left to future research. Of course, for theoretical and organizational purposes of indicator development, fully extended accounting categories could be used as a framework for sustainability assessment.

Actual compilation of extended accounting indicators, on the other hand, are at least for the time being limited to the impacts of economic activities on the sink and source functions of the natural environment. Qualitative concerns of environmental quality and quality changes (damages) and their effects on health and well-being need thus to be assessed by supplementary ecological and social indicators. The drawback of these indicators is their limited comparability and difficulties of aggregation, resorting to controversial weighting (as in the above-described indices).

Notions of sustained economic growth and development along with corresponding indicators and indices have proliferated. Expanded national accounting systems can help to quantify the elusive notion of sustainability in a more transparent and systematic manner. To this end, natural science offers basic principles for the nature-economy interface, and economics provides the accounting tool for this interface. Thermodynamic laws of matter and energy conservation and dissipation govern the use of natural resources. Formal double-entry accounting can then be applied to assess: (1) the use (input) of raw materials, space and energy; and (2) the dispersion (output) of these resources as waste and residuals from/to the natural environment (Uno and Bartelmus 1998; Bartelmus 2003).

The application of accounting tools requires aggregation of physical environmental data by means of a common measuring rod. Physical measures, such as the weight of emissions and materials, and prices and costs of environmental impacts reflect the ecological view of de-linking economic activities from their environmental impacts on

environmental quality, and the economic view of environmental cost internalization and full-cost pricing, respectively.

Two operational sustainability concepts can thus be distinguished according to the economic and ecological outlook. They represent two sides of the sustainability coin—the physical and the monetary one (Bartelmus 2004):

- Economic sustainability refers to the established requisite for economic growth, capital maintenance, and extends the (produced) capital concept to include non-produced natural capital.
- Ecological sustainability considers material flows from the environment, through the economy and back to the environment (as waste) as pressures on the carrying capacities of natural systems, and aims to reduce this pressure to tolerable levels by de-materializing the economy.

Accounting for natural capital consumption and maintenance (through re-investing the allowance made for capital consumption) extends the sustainability notion, as already built into the conventional net indicators of value added and capital formation, into the field of environmental services for the economy. Analogous to the ultimate destruction of capital goods in the production process, natural capital loss is defined as the permanent loss of natural resource stocks and capacities of waste absorption and other ecological services.

Among a variety of different accounting approaches, two accounting systems appear to be most successful in capturing ecological and economic (environmental) sustainability. Material Flow Accounts (MFA) and related physical input-output tables measure material flows in physical units (weight). SEEA embraces both physical and monetary accounts, seeking compatibility with the worldwide-adopted SNA (UN et al. 1993).[4] An international group of experts and accountants has now revised the SEEA. The United Nations and other international organizations issued the revised SEEA as "Integrated Environmental and Economic Accounting 2003" (UNSD 2003).

The SEEA tackles the overall goal of assessing the sustainability of economic performance and growth through different 'categories' or modules of accounts. They include:

- the physical and hybrid accounts, which aim to assess ecological sustainability in terms of material inputs and emissions; they also provide links to the monetary accounts;
- environmental transaction accounts, which elaborate defensive expenditures; they include environmental protection services and transactions related to economic instruments of environmental cost internalization;

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[4] Environmental accounting is also pursued at the corporate level in both physical (EMAS, ISO 14000) and monetary (full-cost accounting) terms; such accounting could and should be linked to the quite similar concepts and methods of national environmental accounting.

- physical and monetary asset accounts, which seek to assess the maintenance of natural capital, i.e., environmental sustainability of economic performance
- environmental adjustment accounts, which generate modified economic aggregates such as a green GDP.

Table 2 shows how environmental services can be integrated in the national accounts by:

- incorporating 'environmental assets' as natural capital—in addition to produced (fixed) 'economic assets'—into the asset accounts of the SNA
- costing natural capital consumption, in addition to, and in consistency with, fixed capital consumption in both the asset and flow (supply and use) accounts
- maintaining the accounting identities for the definition and calculation of the key economic and environmentally adjusted indicators of value added, net domestic product and capital formation.

Table 2 also presents environmental protection expenditures as 'of which' items of the supply and use of products.

The SEEA has been tested and established, at least partially, in both developing and industrialized countries. The power of these accounts is their immediate and organic link with the worldwide adopted System of National Accounts (SNA) and its basic statistical data services. They complement the income and product accounts (including GDP calculation) and have an immediate appeal to and influence on decision-makers and the budgeting process. They may also function as a specific information system for sustainable development (SD) assessments. Agenda 21 (paragraphs 40.6, 9) recognizes this function, requesting the UNSD to pursue the development of indicators as part of its work on green accounting. However, as pointed out above, their close link to economic activity makes them inadequate for many, more qualitative aspects of SD that are difficult to quantify in economic terms, such as ecological services or gender equality or damages resulting from emissions of pollutants.

The greened national accounts of the SEEA are based on the worldwide-adopted SNA. This ensures not only consistency in the concepts, definitions and classifications of its indicators, but facilitates international comparability and reporting in a globalizing world. Moreover, the national accounts and their sectoral breakdown provide the database for most applied models, such as computable general equilibrium models and input-output analyses. Such modelling takes the sustainability of economic performance out of past accounting and assessments and applies it to the future as potential sustainable growth in the short, medium or long term.

Table 2. SEEA: flow and stock accounts with environmental assets

				Assets	
	OPENING STOCKS	Economic assets	Environmental assets		
	Industries	*Households/ Government*		+	*Rest of the World*
SUPPLY OF PRODUCTS	Domestic Production				Imports of products
	of which: for environmental protection				of which: for environmental protection
USE OF PRODUCTS	Economic cost (intermediate consumption, consumption of fixed capital)	Final consumption	Gross capital formation, consumption of fixed capital		Exports of products
	of which: for environmental protection				of which: for environmental protection
USE OF NATURAL ASSETS	Environmental cost of industries	Environmental cost of households	Natural capital consumption		
			+		
	OTHER CHANGES OF ASSETS	Other changes of economic assets	Other changes of environmental assets		
			=		
	CLOSING STOCKS	Economic assets	Environmental assets		

Source: Bartelmus (2001), p. 1728.