SEEING CHANGE THROUGH THE LENS OF SUSTAINABILITY

Background Paper for the Workshop
*"**Beyond Delusion**: Science and Policy Dialogue*
on Designing Effective Indicators of Sustainable Development"
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1. Introduction

The Costa Rica Science-Policy Dialogue is being convened to review how change in today's world can be more effectively recognized and fed back into policy development and decision-making processes. Understanding and measuring change is key and will be at the centre of deliberations.

While the quest is not new, the urgency to improve capacity to measure change is rapidly mounting. The rate and extent of change now facing society are unprecedented. Human population continues to expand, the gap between rich and poor is growing, and ecosystem degradation continues. To date, society has not been able to anticipate and head off these trends. The dangers – economic, environmental, social, cultural, and technological – that our uncertain future may bring are becoming increasingly apparent. More effective systems of measuring and assessing progress toward sustainability will help enable decision-makers respond more pro-actively. The following goals all apply (modified from NRTEE 1993, 12):

- to contribute to improved decision-making and reduced risk by providing early warning signals for required policy and behavioural changes;
- to ensure accountability;
- to encourage initiative by recognizing success when it is achieved;
- to facilitate continuous learning and adjustment on the part of all stakeholders; and
- to identify knowledge gaps and suggest priorities for filling these gaps.

In simplest terms, an individual's or society's capacity to improve their situation and contribute to the wellbeing of the enveloping ecosystem, depends on taking action that leads to some positive outcome. The nature of the outcome must be recognized and assessed against desired ends for learning to occur. If there is no such feedback, any improvement is by chance if it occurs at all. Often, the same mistakes get repeated

until some form of feedback[1] and sense of direction is finally recognized and the cycle is broken. At the organizational level, in both civil and military applications, this insight underlies all successful management systems.

Through the past several decades, there has been growing recognition that the feedback capacity in decision-making processes is inadequate, in particular because of a singular emphasis on economic concerns. This point was emphasized in the report of the World Commission on Environment and Development (WCED, 1987) and re-emphasized at the UN Conference on Environment and Development held in Rio de Janeiro, Brazil in 1992. Responses around the world from local to national have echoed this theme.

As a result, increasing effort has been put to designing and testing ways of tracking change that capture not only trends within the economy but also a broader sense of the ecological and human condition. This effort has been motivated by a growing desire to decrease vulnerability and increase confidence by using a wider, longer, more anticipatory perspective.

Relevant activities are taking place across a great scale. At the global level the United Nations Commission on Sustainable Development has been working with dozens of countries in tracking a list of 134 indicators. At the other end of the scale, communities and businesses across the world are also implementing systems of performance measurement. For each of the following perspectives or scales of application, there is a distinct literature:

- program, project, facility (with its traditional approach to performance measurement that differentiates measures of input, output, and outcome or results);
- company (small, medium, large), industry, sector of the economy
- community
- province, state or nation;
- ecosystem-bounded unit (could be a landscape unit, a river basin, an island etc.); and
- globe.

The above listing is by no means the only way of categorizing or grouping relevant activities. However, there is ongoing work occurring within each node and much

[1] Closely associated with the notion of feedback is the the term "cybernetics" which traces its origin to the Greek work ""kybernes." The same Greek word is also at root of our word government, through the Latin "gubernare." Kybernes means helmsman. Government is the act of steering the ship, using feedback to adjust course toward the desired destination.

insight to be drawn to inform the deliberations of the Workshop. Some of these insights are captured in the four Case Studies.

This shift in perspective amounts to expanding the boundaries of contemporary decision-making. The result is a new lens for seeing the world and for tracking change. It is the lens of sustainability.

The greatest power of this lens lies in its bridging capability – its ability to facilitate integration, synthesis, and collaborative approaches to problem solving. Such bridging is not possible using single discipline tunnel vision.

The concept of sustainability also sets a time horizon that extends into the lives of future generations, a perspective that has rarely, if ever been at the centre of human decision-making, particularly that of "western" developed countries. In addition, it demands open, inclusive, and consensus-seeking processes of decision-making and subsequent implementation of policy and programs.

Developing an approach that applies this lens in a practical and broadly accepted way of measuring and understanding change and communicating the result to decision-makers remains elusive. This task can be seen to have three related dimensions: scientific; technical or measurement; and political/business related decision-making. The specific purpose of the workshop is to draw from the many contributing disciplines, collaborate on building a conceptual and practical foundation for assessing progress toward sustainability, and identify priorities for subsequent action. In turn, the role of this paper is to initiate discussion, catalyze debate, and engage participants.

2. Retrospective

It is 50 years since Systems of National Accounts (SNA) were established in countries around the world and calculation of GDP/GNP became common practice. At the time, the aftermath of World War II brought a population explosion, burgeoning technical capacity, and drive for material growth without precedent in human history. From today's vantage point, it is perhaps not surprising that the theoretical construct that emerged at the time in the form of the SNA and the linked emphasis on GDP/GNP (and other economic signals) reflects the material growth-dominated perspective of the day.

Between then and now, a number of attempts have been made to displace this uni-dimensional perspective (summarized from Hodge, 1995). Within the economics profession itself, there has always been some who have offered an alternative viewpoint. Much of this thinking coalesced in the field of ecological economics in the

late 1980s. However, much earlier in the 1960s, the social indicators movement emerged along with a strong focus on quality-of-life studies. The late 1960s and 1970s saw the environmental movement come into its own as Ministries of Environment were established around the world (starting with Japan in 1969) and environmental non-government organizations gained prominence. In the 1970s and 1980s, new ideas about the determinants of human health began emerging and under the auspices of the World Health Organization, the idea of "healthy communities" gained prominence as a delivery mechanism for attaining their goal of "health for all" by the year 2000 (a goal that is far from being reached).

In the mid and late 1980s, the work of the World Commission on Environment and Development (Brundtland Commission) captured a growing sense that a new perception of development was needed, one that included consideration of many "externalities" that had been excluded in the immediate post World War II era. It also included a renewed emphasis on thinking about the distribution of costs and benefits between developing and developed nations and between this generation and those yet to arrive.

Thus the idea of sustainable development, development which "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, 8) emerged and quickly gathered momentum[2]. Implementation requires a much more holistic perspective than has been typical of decision-making in the past, a perspective that is provided by systems ideas.

3. Systems Ideas

During this same half-century period, systems ideas also gained prominence and no doubt influenced the train of events described above. While the roots of these ideas lie in antiquity, biologist Ludwig von Bertalanffy (1901 – 1972) is credited with first establishing systems thinking as a significant conceptual approach.

Important principles of systems thinking include:

1. systems do not necessarily behave simply as the sum of their individual parts and the behaviour of the parts does not necessarily allow the behaviour of the whole to be predicted;
2. the complex whole may have "emergent" properties that are essential for understanding and describing the whole but may have little or no meaning in terms of individual constituent parts;

[2] More than 300 definitions or interpretations of sustainable development are now in use.

3. the concept of emergent properties implies a view of reality as existing in the layers of a hierarchy;
4. feedback mechanisms exist within the hierarchically organized whole that allow adjustment and adaptation in the face of stress

(summarized from Goldberg 1989, Atkinson and Checkland 1988, and Checkland and Scholes 1990).

An intriguing development in the last decade or so has been the shift in systems thinking from a focus on optimizing systems with crisply defined objectives (the hard systems of the engineering world) to a focus on articulating and enacting a systemic process of learning related to an issue that has ill-defined or rapidly shifting objectives, as well as a variety of options for achieving those objectives (these are the soft systems of every day life). In other words, "systemicity is shifted from the world to the process of enquiry into the world." Systems amenable to "hard" analysis are seen to be a sub-set of soft systems and resolution of problems more of a continuous journey than a project with a set end point (Checkland and Scholes 1990, 17 – 18, 277).

Based on several decades of working with and developing systems ideas, Holling has offered a series of observations on the issues that society is currently facing: (modified from Holling 1995, 33-34):

1. Problems are often systems problems where aspects of behaviour are complex and unpredictable and causes are always multiple. Interdisciplinary and integrated modes of inquiry are needed for understanding; understanding in turn is needed to inform the policy process today, not complete explanation that might be available after years of laborious research;
2. Problems typically have non-linear causes; they demonstrate multistable states and discontinuous behaviour in both time and space. Thus, solutions must build from application of nonlinear dynamics and theories of complex systems. Policies that rely on social or economic adaptation to smoothly changing and reversible conditions may be misleading;
3. Major problems are increasingly found to be linked to slow change, reflecting decadal accumulations of human influence on air, water, land, and biota. These slow changes cause sudden changes in fast environmental variables that directly affect the wellbeing of people and ecosystems. Therefore analysis should focus on the interactions between slow phenomena and fast ones, and monitoring should focus on long term, slow change in structural variables. The political window that drives quick fixes for quick solutions simply leads to more unforgiving conditions for decisions, more fragile natural systems, and more dependent and distrustful citizens.
4. The reach of human activities is expanding and so too the space and time scale of problems. Impacts range up to global in scope. Thus the "globalization" phenomenon is not only economic as is often discussed in the media, but is equally environmental, social, and political. In addition, system recovery following perturbation is progressively longer term. The science needed in

solution building must span these same scales in space and time as well as the many disciplines that can contribute insight.

The multi-disciplinary, holistic perspective of systems ideas is central to the concept of sustainability. This perspective insists on placing economics as a subsystem of the human subsystem which in turn is nested within and a part of the enveloping ecosystem. The single-focus prominence accorded to economic growth during the post World War II era can be seen to be not only incomplete but even dangerous in terms of system survival.

However, while systems ideas demand a holistic perspective, a practical response to the question of how to identify, track, and assess changes to the whole system as well as the parts remains unanswered. In practice, this question is a central challenge.

4. Science and Policy: While Perhaps Having Different Needs, Perspectives, and Discourses, They Have a Common Requirement for Empirical Evidence of System Performance

The discussion below is offered to spark discussion. The idea expressed appear to provide black and white comparisons when in the real world are found many shades of colour.

Science, in its quest for discovery of cause-effect relationships, depends on observation and the resulting empirical evidence as the foundation for learning. Decision-makers too have a need for empirical evidence of performance -- but for reasons of accountability. While scientists seek explanation (where ever that voyage might take them), decision-makers are focussed on knowing whether or not tasks have been carried out and intended results achieved. These two perspectives reflect vastly different cultures. How scientists analyze, understand, and experience the world is not the same as do policy- and decision-makers. The scientist's need to control the experiment and replicate results is far from the motivation of policy and decision-makers. However there is a powerful linking foundation: a common need for observation and empirical evidence of system performance.

In illustration, through the past several decades, there has been continuing interest in developing a small group of key indicators or indices that provide a mechanism for monitoring and communicating progress, most recently using the lens of sustainability. This interest is subject to a long-standing debate between policy makers on the one hand and scientists/engineers on the other.

The former, faced with the responsibility to account for government activity or business performance, argue that simple indicators, few in number, are required to

monitor and communicate progress on public policy and business issues. The latter, understanding the complexity of the systems being monitored are resistant to building simple indicators using assumed causal relationships that are weak at best. Furthermore, the process of peer review which is engrained in every scientist, demands a transparency in data measurement and interpretation that is often side-stepped by "nutshell" information sought by policy makers.
The issue is complicated by the dynamic nature of our society and world: what is considered a critical concern today in terms of sustainability will inevitably be overtaken by other concerns tomorrow. Further, the comfort zone of the policy maker often excludes the detail of "numbers" while that of the crisp world of scientist and engineer excludes the "mixed drama, tragedy, and farce, of the social process." (Checkland and Scholes 1990, 31). However the tension that can emerge between scientists and policy makers is no different than the tension that exists between theoretical designers (the scientist) and practical users (the policy maker) in almost any application.

Lastly, the communities of policy makers, scientists, and measurement experts often have distinctive language or discourses. In part, this characteristic simply reflects the unique vocabulary or jargon that inevitably grows up around a profession or discipline. But the concept of discourse is broader and deeper – it reflects the way that language connects with a particular way of conceptualizing the world and acting on it. Bringing these communities together will require the capacity to translate between their respective discourses. To do so is important: each of these communities provides different input to the decision-making process and each brings a particular set of skills and insight to the issue of understanding and communicating change.

This workshop has been crafted to draw from these differences and build on the strengths of each community.

5. Boundary Conditions

Defining the boundary conditions is an essential early step in solving any problem, including that of resolving how to measure and assess whole-system change in the context being discussed here. The concept of sustainability brings a new, expanded set of boundary conditions. In 1996, an international consensus defining the boundary conditions linked to the concept of sustainability began to emerge. This consensus is captured in The Bellagio Principles for Assessing Progress Toward Sustainability (Appendix 1).

In summary, the Bellagio Principles address: (1) as a starting point, establishing a vision and goals that reflect sustainability in practical terms; (2) the substance or

"what" of sustainability; (3) the process or "how" of sustainability; and (4) institutional capacity for entrenching a capacity for continuous learning (Hardi and Zdan, 1997) . Together, the "what" and "how" of sustainability define the boundaries for the system of performance measurement that is guided by the vision and in the ideal, provided with a long-term institutional home to ensure continuity.

In substantive terms, a whole system perspective is called for that spans people and the enveloping ecosystem, not only on the short term but also using a time horizon that captures ecosystem time scales. In process terms, open, inclusive and consensus-seeking characteristics are demanded. From both of these perspectives, performance measures are required to assess success.

Despite the growing consensus reflected in the Bellagio Principles, their application in practical terms is cause of debate – they do not provide (by design) advice on exactly what should be measured or how in any given case. While such principles can appropriately by *adopted* to local conditions when there is consistency with local values, their application must be *adapted* in any practical application to serve local needs.

6. The Performance Measurement and Progress Assessment Triangle

In addition to those who participated in articulating the Bellagio Principles, many groups and individuals have grappled with expressing the elements of what should be included in assessing progress toward sustainability. Figure 1 below is a synthesis of many of these efforts.

Drawing from Herman Daly's ideas (1980, p. 8-9) as well as concepts of results-based management, it differentiates means from ends and clearly identifies desired outcomes (human and ecosystem well-being). Human activity (the means that society has to generate well-being and the target of management and decision-making) is recognized as including aspects that lie within the formal economy as well as many important other aspects. These activities generate unintended stress on people and ecosystems as well as the good that motivates them in the first place. Lastly, both process and substantive dimensions are recognized as important as well as long and short term time horizons.

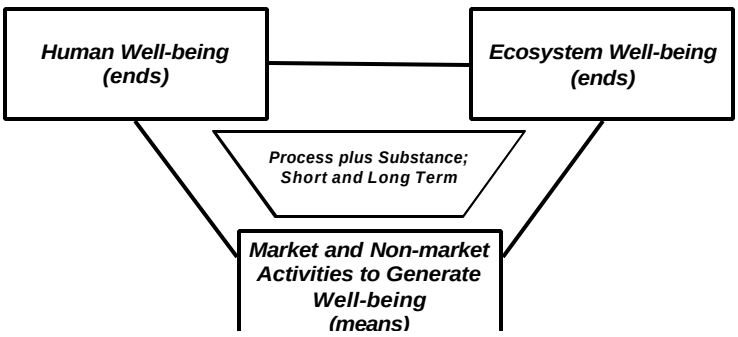

Figure 1. The performance measurement and progress assessment triangle

7. The Performance Measurement and Progress Assessment Cycle

Any process of measuring and assessing progress toward sustainability will, in practice, use the cycle reflected in Figure 2 below. While the focus of the workshop will be on measures and measurement the context of this complete cycle will be maintained.

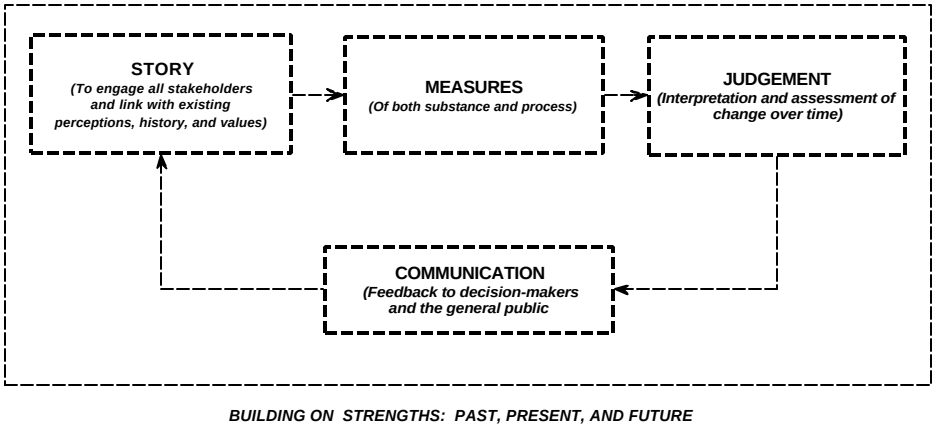

Figure 2. The Performance Measurement and Progress Assessment (PMPA) Cycle.

The above cycle can be thought of as an overlay on the sequence of steps that comprise a common approach to strategic planning and decision-making. One common form of these steps is listed below – there are many others. (Listing these steps does not imply that they are universally applicable in all cultures and all situations.)

Step 1: Establishing a Vision

Step 2: Defining Goals

Step 3: Defining Objectives
- ◊ Benchmarks
- ◊ Targets
- ◊ Standards
- ◊ Criteria

Step 4: Defining and choosing Actions

Step 5: Grouping Actions in a Strategy

Step 6: Implementing

Step 7: Evaluation and Reporting

Definitions of the terms used in the above list are found in Appendix 2. Performance measurement and progress assessment is typically limited to the seventh and final step. Often it receives only a low level of resources. In many instances, it is not addressed in any effective way at all.

In practice, if the question of how to measure performance and assess progress is posed throughout the planning – decision-making process, the way that vision, goals, objectives, actions, and strategies are defined and implemented changes in a way that reflects a stronger and more practical results orientation. In short, the PMPA perspective can be used to sharpen the entire planning – decision-making process.

If this is so, why is there such a dearth of political willingness to support and draw from systems of performance measurement and progress assessment? This question is central to workshop deliberations.

Story

More and more recognition is being given to story and narrative in the policy process (for example see Fisher and Forester 1993). In any process of performance measurement and progress assessment toward sustainability, an understanding of the human and ecological story is the starting point. The process of compiling that story provides insight into prevailing values while building a foundation for engagement with the relevant community of interest – in this matter, they are the experts for it is their story.

There is a skill in "story" that is as profound as "measurement." Cultures that are oral-based in their transmission of knowledge and wisdom have much to teach those that have lost this capacity. There is a strong link here to current efforts aimed at integrating traditional and local knowledge into decision-making. At the same time, there is much to learn about how to best draw from story that can not be verified in the sense that is used by "scientific" approaches.

Of course, indicators too tell a story. And in the ideal, story and indicators combine, feeding each other to create the most rigorous possible sense of conditions.

Measurement

The power of measurement is great but so too are the limitations. This contrast is illustrated in the following quotes:

We are what we measure, it's time to measure what we want to be.

- Maureen Hart (personal communication)

What gets measured gets managed.

- anonymous

Not everything that can be counted counts, and not everything that counts can be counted.

- sign hanging in Einstein's Princeton University office

The lesson from these quotes is that systems of performance measurement and progress assessment are important to effective management of human activity but just because good measures of a given issue are not available, it does not necessarily follow that the issue should be ignored.

A misconception is that measurement applies only to quantitative forms of analysis. Palys (1997) makes a strong case for bringing quantitative and qualitative approaches together for achieving the most effective research and analysis. Measurement has an important role to play in both.

A critical sub-issue of the measurement topic is perhaps best termed "legitimacy." Legitimacy relates to ensuring that those to whom measures will be applied will validate and accept the relevance of the resulting measures. This concern lies at the heart of "participatory action research" (see for example Cunningham 1993 and Kemmis and McTaggart 1988 amongst many references) and more recent work on "appreciative inquiry" (for example see Annis Hammond and Royal, 1998). By offering full participation, legitimacy is earned.

Common challenges that face all those concerned with measurement of progress toward sustainability include:

- **Building an effective system model to serve as an organizing framework.** Any model is a representation of what can be a very complex system by a simpler system that is a construction based on assumptions, theories, and preconceptions. Learning about how we interact with the world is possible when the perceived external world is set against the systemic model. However the model will never fully capture the full external world: its complexities are well beyond our understanding. In the end, the only complete model of a cat is a cat.

  The importance of the organizing framework design extends well beyond a straight forward interest in portraying how humans interact with the world: it has a significant influence on how measurement is actually undertaken in practice.

- **Mapping the assessment hierarchy.** An important step is to map the assessment elements. The result is a hierarchy of data and information elements which are very general at the top (for example, ecosystem well-being) and progressively more detailed below, eventually to reach specific measures (for example, global temperature over time). The importance of this step lies as much in identifying what is NOT being included in the assessment process as much as what is being included. Note that such assessment hierarchies are not system models and within them, traditional top-down power relationships do not necessarily hold. In cases such as this, Gunderson et al. (1995) suggest the use of the word "panarchy" rather than hierarchy.

  One issue that has yet to be successfully addressed is that of capturing the nature of the complete web. This point brings us back to the fundamental questions of system sustainability: how best to capture a sense of the whole system and track the emergent properties that systems ideas predict. Perhaps such whole system characteristics can be measured or it may be that it is only through interpretation and judgement that this step can be taken.

- **Aggregation, Weighting, Units and Scaling.** These four technical issues are faced by many measurement approaches. As the assessment moves from the detailed data points at the bottom up through progressively greater degrees of aggregation, there is an increasing possibility of loosing information. Overcoming this information loss is a major measurement challenge (although new computer techniques are promising). Inevitably, problems of weighting, scaling and use of appropriate units are all implicated here.

  Weighting, whether it be equal (1 to 1 ratio) or on the basis of some complex distribution of weights depends on some value judgment. If components of different units are involved in the aggregation process, scaling can be used in which components are assigned a dimensionless value on a scale of say 1 to 100 or 1 to 10. Scaling is a complex topic on its own. The scale itself can be simple and linear (between the end points) or follow some complex distribution. Choosing this distribution, setting scale end points, and for locating the component on the scale are value dependent processes that can be difficult. Aggregation can hide all of the above issues leading to loss of confidence in the end result.

- **Achieving transparency while maintaining effective capacity to communicate.** Measurement by its very nature is complex. Rigorous exposition of all the calculation details will make impossible effective communication. On the other hand, there are ongoing demands for

transparency in how calculations are made. The resulting tension is inevitable.

Judgement

Even with measurement effectively in hand drawing on the best quantitative and qualitative data and information, and nested in a sense of the human and ecological story, the task of judging the significance of the resulting insight remains formidable. Who is best to judge, the policy maker or the scientist? What world view and critieria should be applied, that of the scientist or that of the policy maker? How can time be found to allow the kind of reflection that is often needed for making fair judgment? How can knowledge be supplemented with wisdom in the judgement process? These are questions for which there is no single or straight forward answer.

Usually there is a high degree of uncertainty either as a result of little understanding of cause – effect relationships or when the data/information base is weak. It is under these conditions in which the significance of change must be judged and recommendation from "science" transmitted to "policy" for input to decisions that must be made today, not 20 years from now when perhaps understanding might be enhanced. It is here where the commitment to continuous learning is seen to be an imperative.

Communication

There are rapidly shifting opportunities with the advent of computer technology. A major challenge arises because the same package is not heard or seen in the same way by everyone. Effective communication to decision-makers including the general public, of complex data and information as well as the assessment of its significance is a special skill.

8. Measurement Approaches: Old and New

Motivated by the need for a broader perspective and longer view, many workers have offered approaches to measuring and assessing change and progress. Included in the list are the following; the grouping is one of many that is possible. This list is presented to demonstrate to policy and scientist alike, the nature and breadth of current activity.

Economics and Ecological Economics:

- Green Accounting, National Wealth, Index of Sustainable Economic Welfare, Genuine Progress Index

Human Development:

- Human Development Index (UNDP)

From an Environmental Perspective:

- Stress-Response Environmental Statistical System (Rapport and Friend 1979) and the more recent Pressure-State-Response evolution of these ideas.
- Eco-efficiency (Schmidheiny 1992).
- Physical Accounting: Total Material Throughput (World Resources Institute)
- Material Intensity Per Service Units (MIPS) (REFERENCE TO ADD)
- Factor Four: quadrupling resource productivity – halving resource consumption while doubling well-being (Wuppertal Institute for Climate, Environment and Energy)
- Ecological Footprint (Wackernagel and Rees, 1996)

Organizational Performance Measurement:

- Triple Bottom Line Accounting (social, economic, environmental) (Elkington 1998)
- Eco-compass (health and environmental potential risk; resource conservation; energy intensity; materials intensity; revalorization (remanufacturing, reuse, recycling), service extension) (Fussler 1996).
- Performance Planning and Reporting(Reach: who? where? Results: what wanted? why? Resources: how? Telling the Performance Story) (Steve Montague, personal communication)
- Balanced Scorecard (financial, customer satisfaction, employee learning, innovation) (Kaplan and Norton 1996).
- Accountability Scorecard (clientele, employees, suppliers, society, stewards) (Nickols, F, personal communication.)

More Recent Sustainability Approaches

- System Assessment Method/Barometer of Sustainability (Human wellbeing plus ecosystem wellbeing) (IUCN, 1997; Prescott-Allen, 1997)
- Multiple Capital Approach (natural capital, produced assets, human resources – individual attainment plus social capital) (World Bank)
- Compass of Sustainability (N=nature; S=society; East=economy; West=wellbeing of people) (AtKisson, Alan. The Consultative Group on Indicators of Sustainable Development)
- The Endowments Approach of the US Interagency Working Group on Sustainable Development Indicators (IWGSDI 1998, 9-15).

9. Toward a New Synthesis: Questions for the Science-Policy Dialogue

The Costa-Rica science-policy dialogue has been initiated to bring together a spectrum of perspectives as a step in generating a new synthesis based on the insights reflected in the discussion above. The following questions have been developed through interviews with dialogue participants and with other experts. They will serve as an initial guide to discussion.

1. **Current Effort.** What is the extent of effort currently underway in communities, corporations, and governments aimed at designing and implementing approaches to assessing progress toward sustainability? What successes/failures can be described?
2. **Strengths.** What strengths are reflected in the current state of knowledge; how can we build on these strengths?
3. **Barriers.** What are the barriers to: (a) more effectively incorporating monitoring and the results of monitoring into decision-making processes; and (b) developing and implementing more effective systems of feedback in the first place?
4. **Lessons from Existing Methodologies.** What insights emerge from analysis of existing methodologies related to:
    a. effectively addressing both the "what" and the "how" of sustainability?
    b. identifying high priority knowledge gaps?
    c. identifying emerging conceptual issues?
    d. identifying common characteristics?
    e. addressing the four common technical issues that are common to almost all measurement methodologies: aggregation, weighting, units, and scaling?

f. the idea of focussing on identification of unsustainable trends rather than on sustainable trends?

5. **Transparency and Complexity.** Is there any methodology that is effective in achieving transparency while effectively communicating the complexity involved in assessing system conditions?
6. **Engagement.** What different steps can be taken to engage with different decision-makers:
   a. the public at large in their own lives?
   b. communities?
   c. leaders of corporations and the many other organizations of civil society?
   d. those in senior government?

   Are there issues of capacity and resources related to these different decision-making groups that need to be addressed by this workshop?
7. **Priorities.** What are the priorities for action?

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Appendix 1. Useful Definitions

Goal: a broad statement of condition which is aspired to in the long term; a general statement that sets the desired direction of progress. Goals are a reflection of the operating values and are usually abstract and not directly measurable. However, in assessing progress, they provide the starting point from which all else follows. Goals become operational with development of specific *objectives* progress towards which can be measured by *indicators*.

Objective: a desired, specific, achievable condition that will contribute towards a goal. Objectives are measurable or potentially measurable and provide an explicit link between goal and system components. Objectives are achieved with specific *actions* that are grouped within a *strategy*.

Indicator: a signal, typically measurable, that could reflect a quantitative or qualitative characteristic, and that is important for making judgments about system conditions -- now, in the past, or projected in the future. Judgments are facilitated by making a comparison between existing conditions and an explicit standard, target, benchmark, or some other form of reference. The result is a measure of system performance.

Indicator of sustainability: an indicator (as above) that applies this generic set of ideas to the particular system, value set, and goals evoked by the concept of sustainability. Thus, indicators of sustainability provide signals that facilitate assessment of progress toward specific objectives that are contributing to achieving the goal of achieving human and ecosystem wellbeing together.

Criterion: a comparative mechanism that facilitates assessing any given indicator by providing a set of reference conditions. This generic sense applies whether it be to :

(1) indicator selection criteria used to test the appropriateness of selecting a given indicator as opposed

to another;

(2) indicator evaluation criteria in the sense used by the auditing profession to test the adequacy of a given indicator (or overall conclusion arrived at with the use of indicators) against generally accepted principles; or

(3) criteria used to assess the significance of the state or trend signaled by the value of the indicator.

In contrast to standards which usually have an elevated legal status, criteria are not entrenched in law but can carry considerable weight.

Standard: a comparative mechanism that facilitates assessing any given indicator by providing a set of reference conditions. A standard usually enjoys some elevated status: if it is incorporated within a formal regulation, it can have the weight of law. Such standards are usually expressed as minimum or maximum values that must be achieved.

Target: a desirable result aimed at; a statement (usually quantitative but can be qualitative) reflecting the amount of change of an indicator expected or hoped for and often the time period within which that change is to be achieved.

Benchmark: a point of reference, a starting point of scale. Might be the best level of performance on an indicator that can be hoped for or that has been achieved in a reasonably comparable situation elsewhere. Benchmarks are sometimes adopted as targets as in the case of the Oregon Benchmarks where they are described as signs of wellbeing or indicators used to assess progress required to achieve a strategic vision.

Strategy: i. a coherent set of approaches and interventions proposed or chosen to accomplish an objective or group of objectives. While objectives state what we want to accomplish, strategies indicate how to proceed. ii. a comprehensive, highly organized approach on how to work smarter rather than harder by doing the right things at the right times for the right reasons.