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ARTICLE

Breaking through the Glass Ceiling: who really cares about sustainability indicators?

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ABSTRACT *This paper describes some of the insights gained by the authors in the development of an approach for systemic sustainability analysis to arrive at sustainability indicators (SIs) for development. The paper describes the problems of perspective and mindset which such research involves, and the necessity to rethink both the purpose and content of SIs as well as taking into account the perspective of the researcher. The result represents a new perspective on the classification of SIs that serves to highlight one of the central difficulties encountered so far with these tools, namely their limited use in management and the setting of policy. We argue that this is due in large part to the nature of the SI frameworks created to date, even if carried out in a 'participative' mode. The framework itself is representative of a mindset or paradigm of understanding which, when applied as the sole device, we find less than adequate in achieving useful SIs. SIs arising from this mindset tend to be quantitative and explicit (clearly stated and with a defined methodology), while in practice most people's and institutions' use of SIs tends to be more qualitative and implicit ('understood' to apply in vaguer terms, with no defined methodology). These two paradigms or mindsets are represented here as the* reductionist *and the* conversational*: the first is characterised by quantitative and explicit indicators (or QNE* indicators); and the second is characterised by qualitative and implicit indicators (QLI* indicators). We suggest that what is required is far more research on the evolution and use of QLI* SIs (and the mindset which is necessary to develop them), in order to best appreciate how they can be hybridised with the QNE* group. The result may be termed 'multiple perspective' SIs.*

SIMON BELL & STEPHEN MORSE, Atravezando el Techo de Vidrio: a quien le importa realmente los indicadores de sostenimiento? *Este documento describe algunas de las ideas obtenidas por los autores en el desarrollo de un acercamiento por análisis de sostenimiento sistemático para llegar a los indicadores de sostenimiento (SIs) por desarrollo. El documento describe los problemas de*

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perspectiva y patrones que dicha investigación involucra, y la necesidad de repensar tanto en el propósito como en el contenido de los SIs así como tambien toma en cuenta la perspectiva del investigador. El resultado representa una nueva perspectiva en la clasificación del los SIs la cual sirve para resaltar una de las dificultades centrales encontradas hasta ahora con estas herramientas; especificamente su limitado uso en el manejo y establecimiento de polítticas. Nosotros argumentamos que ésto se debe en gran parte a la naturaleza de las estructuras de los SIs creadas hasta la fecha, incluso si se lleva a cabo en un modo 'participativo'. La estructura por si misma es representativa de un patron o paradigma de entendimiento el cual cuando es aplicado al esquema único encontramos menos adecuado alcanzar SIs útiles. Los SIs que surgen de este patrón tienden a ser cuantitativos y explícitos (claramente señalados y con una metodología definida), mientras que en la practica el uso de los SIs por parte de la mayoria de la personas e instituciones tiende a ser mas cualitativo e implicito ('entendido' a aplicar en terminos mas vagos, con metodología mas definida). Estos dos paradigmas o patrones son representados aquí como el reduccionista y el coloquial — uno es caracterizado por indicadores cuantitativos y explícitos (o indicadores QNE), el otro por indicadores cualitativos e implícitos (QLI*) respectivamente. Nosotros sugerimos que lo que se requiere es mucha mas investigación en la evolución y uso de SIs de QLI* (y el patrón que es necesario para desarollarlo), para apreciar mejor como ellos pueden ser mezclados con el grupo de QNE*. El resultado puede ser denominado indicadores de sostenimiento de perspectiva multiple.*

An Indisputable Logic? Sustainability Indicators

Sustainable development has become something of a holy grail in modern times. Rather like the Yeti and the Loch Ness Monster, there have been many claims of sightings but verification is hard to come by. One approach to gauging progress towards sustainable development is the use of sustainability indicators (SIs), and there are many published frameworks of SIs dating back nearly two decades. Some examples and discussions can be found in Liverman *et al.* (1988), Izac & Swift (1994), Moffatt (1994), Mitchell *et al.* (1995), Gilbert (1996), Harger & Meyer (1996), Pinfield (1996), Hardi & Zdan (1997) and Rennings & Wiggering (1997). However, a complication arises in that sustainability incorporates many dimensions, including emotive and normative issues such as the 'quality of life' (Crilly *et al.*, 1999; Kline, 2000) and the 'management of expectation' (Bell & Morse, 1999). Such issues cannot easily be encapsulated in simple indicators or prioritised in any objective sense of the word (Mitchell *et al.*, 1995; Stirling, 1999). Indeed, summarising complexity into simple numbers can be dangerous, but does condense information into a form that can be accessible to the non-specialist. Nevertheless, despite the problems that are inevitable in the use of simple indicators for something so complex, the focus upon SIs appears to be irresistible. In large part this is a reflection of the huge appeal of the basic ethos of sustainable development, and its particular resonance with the collective psyche of the Western world. Given this pressure, it has to be said that SIs are perhaps the most logical way to

proceed, especially given the long and successful (in terms of their widespread use) history of indicators in environmental management, economics, poverty, social science and policy, etc.

Yet while examples of SI frameworks are legion—and expanding rapidly—there have been relatively few examples of SIs being used at a senior level to routinely influence policy or as management tools (Pinfield, 1996; Stirling, 1999; Rigby *et al*., 2000). On the surface this may be puzzling, given their apparent popularity in the literature and the fact that for the most part SIs have been established in a more 'top-down' (also referred to as 'external' or 'expert-driven') mode by natural and social scientists and planners. An 'expert-led' process of SI generation may, at least on the surface, be thought to appeal to managers and policy makers. One comment on this can be found in a recent review:

> Much of the measurement of indicators has, at the end of the day, largely resulted just in the measurement of indicators. The actual operationalisation of indicators to influence or change, for instance, policy is still in its infancy. (Rigby *et al*., 2000)

This is sobering, given that SIs have been with us for nearly two decades, and that substantial resources (time and money) have been allocated to the development of SI frameworks. What is the problem? This question has been addressed by others, including a vigorous debate within this journal, and some have suggested that in part it may be due to a historical and continuing technical emphasis on improving measurement rather than 'use' (Pinfield, 1996). In our view there have been two dominant facets of this emerging debate on 'use' that one can trace back to the early days of SIs some 20 years ago:

(1) the need for clear and simple presentation of SI frameworks;
(2) the need for participation on behalf of those who are intended to ultimately benefit from the SIs.

Presentation has tended to revolve around the use of diagrams, tables (Crilly *et al*., 1999) or even an integration of SIs into a single value for sustainability. A simplified presentation does inevitably mean a reduction in information conveyed and a precondition that the information presented will conform to the assumptions and mindset of the gatekeeper of the SIs. It could also do the opposite—providing attractive, simple and persuasive diagrams that are based on incomplete and/or inaccurate data sets.

The argument for participation is convincing (Pinfield, 1996; Brugmann, 1997a). After all, if one is to really make SIs effective then one should include the views of the stakeholders who are ultimately intended to benefit from them. As well as the moral side to this, there is the realistic view that if these groups are involved and engaged in SI conceptualisation and development then it is far more likely that they will use and appreciate the results. The desirable result may well be a two-way interaction, with both groups 'participating and learning'.

The debate over participation has been sharper in terms of how the developed world deals with the developing world through aid than within the power structures of either of these two (e.g. Hirschheim, 1989; Chambers, 1997; Connell, 1997; Craig & Porter, 1997; Jackson, 1997; Reckers, 1997). The notion

of participatory SI development quickly became established within this broad paradigm, and well established tools within participatory learning and action (PLA) have been applied in this arena (Morse *et al.*, 2000). SIs are seen here as another potential tool within often highly localised processes of empowerment and change. The improvement of dialogue with government and policy makers may not necessarily be an objective within this. In the developed world, however, participation in terms of SIs often becomes linked to discussions over political power—local and national—and improvement in SI 'use' is typically linked to greater involvement from the public in government decision making (Pinfield, 1996).

It is the topic of the 'usage' of SIs in a broad sense that forms the basis of this paper. From 1998 to 1999 the present authors worked together on a book (Bell & Morse, 1999) that discussed the current state of the use, understanding and appreciation of SIs, and the issue of participation was central to the thesis. In particular, we looked at participation within a developing country context, and made suggestions as to how SIs might be operationalised within the broad PLA and soft systems methodology (SSM: see Checkland & Scholes, 1990). The book (Bell & Morse, 1999) was reviewed in *Local Environment* (4(3), pp. 391–392) in 1999. A central conclusion in the book was that we do not need to scrap the notion of SIs, but that we do need to provide means for developing SIs which are both open and participatory. We described one approach that we called systemic sustainability analysis (SSA), which has emerged from our combined work on projects in Africa and Asia. SSA is a soft-systems approach quite distinct from the hard-systems methodologies traditionally used by others to analyse sustainability (eg. Foxon *et al.*, 1999).

In this paper we wish to share some of the insights that have arisen from our ongoing fieldwork (reported in Bell *et al.*, 2000a, b, c), which will form the basis for a new book in 2001. We want to discuss some of the issues and emergent properties that we recognise as being informative of our current experience. Of paramount concern in all of this is the issue of 'usage': who will actually 'use' the SIs, how, and what for? Our previous book did not cover 'usage' to any great extent, but concentrated instead on the need for participation in the creation of meaningful SIs. However, the question of 'use' has haunted us throughout our fieldwork and has become by far our biggest concern.

We shall begin with a brief review of the traditional perspective on the types of SI. Our aim here is to illustrate how this cataloguing has been based primarily on technical concerns rather than on 'usage'. We shall follow this with a new perspective on the types of SI—a perspective driven by 'usage'—and employ this to tease out some of the issues that we have found to be important, based on our field experience.

The Conventional Classification of SIs

Traditionally, SI frameworks have involved a cataloguing into two types:

(1) state SIs;
(2) driving force SIs.

The distinction is essentially one of 'cause and effect'. Driving force SIs describe 'causes', while state SIs essentially describe 'effects'. A third type has been used by the United Nations to gauge the policy response of governments and others (response SIs). However, all these types do have a number of features in common. To begin with, they are all quantifiable. This is seen by many as a central feature of SIs, even if at the end of the day all that is 'recorded' and presented is the direction of the indicator (increase, same, decrease). Allied to this are requirements for a defined methodology to measure the SI, and naturally the methodology needs to be replicable and 'doable' in terms of the cost and ease of data collection. The SI should also be sensitive to what it is intended to measure.

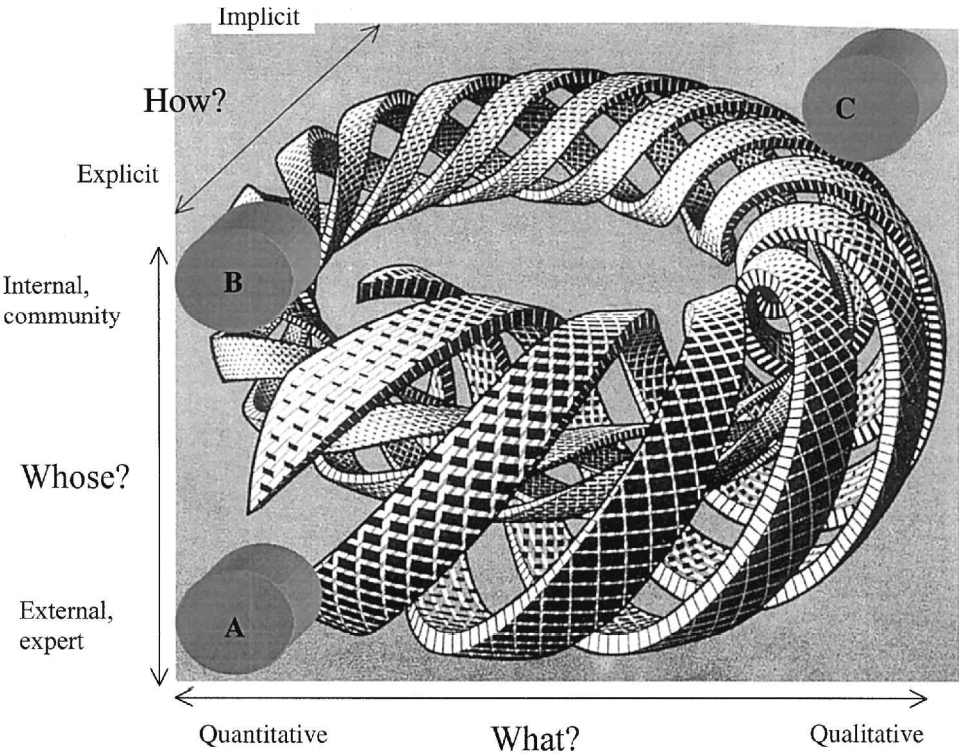
Although the 'state' and 'driving force' distinction is arguably sound in the sense that one needs to know cause as well as effect, one has to be careful with what can easily be a gross simplification. The world which we perceive and appreciate is complex, and while in some cases it may be relatively straightforward for some specialists with privileged knowledge to assign a 'cause and effect' distinction between SIs, in many others it may not. In part this may be due to multiple relationships acting at various levels in the system under consideration.

Nevertheless, the 'cause and effect' classification of SIs is well ingrained in the psyche of those that work with them. Indeed, the classification is so well established that it was an interesting experience in our fieldwork to see some people who are familiar with the textbook 'state' and 'driving force' convention spending more time trying to pin labels on SIs than exploring the rich relationships that exist between them. Attempts to highlight the relationships between SIs in an organic sense—with multiple 'causes and effects' and perspectives being something to consider and explore—became quite difficult. It is a 'tribute' to the dominance of the standard classification of SIs that mechanically 'shoe horning' them into a table with two columns became an overriding priority. In this manner it imposes a world view that in turn dominates the discourse of SIs and restricts other perspectives. At one level this may not be a bad thing: thinking through 'cause and effect' relationships can be revealing and indeed vital if one is actually going to use SIs as management and policy tools. However, the 'cause and effect' classification makes little concession to the perspective of the 'use' of the SIs, in that it is primarily based on a technical mindset rather than on the aspirations and wishes of those who may ultimately want to use them. But why have we arrived at such a mindset in the first place? Why in the field were we dealing with this classification as a start and participation as a sort of 'bolt on' extra? Would this fundamental decision not have serious implications for the 'use' of SIs?

In order to address 'usage' of SI frameworks, we wish to present a new classification that sits at a more fundamental level than the one outlined above. While the traditional classification emphasises technical driving force–state relationships, we wish to go 'back to basics' and consider at a primary level the 'usage' of SIs. 'Cause and effect' then becomes a secondary concern.

SIs: juggling two paradigms?

The new primary classification is outlined in Figure 1, and is based on who has set the indicators and how the SIs have been set, with an additional dimension related to whether the SI is quantitative (numerical) or qualitative (non-numerical).



Whose?	Who has set the indicator?	Local community or external experts?
What?	What type of indicator?	Qualitative or quantitative?
How?	How is the indicator defined?	Explicitly, with a defined methodology, or implicitly, with no definition or methodology?

FIGURE 1. Types of SI based on the 'whose?', 'what?' and 'how?' descriptors. Note that any single indicator may be located anywhere within this three-dimensional space, as the axes are continuous rather than discrete. The spheres on the left (A and B) represent the current emphasis in much of the SI literature (quantitative, explicit and either external or internal). In contrast, the sphere at the upper right (C) represents more qualitative, implicit and internally derived SIs that, we reason, are far more common in practice. *Note*: We have made use of the three-dimensional diagram ('Spirals') by M. C. Escher (© 2001 Cordon Art BV, Baarn, Holland, www.mcescher.com, all rights reserved) to provide a graphic image of the complexity which we experience as the three-dimensional space from which SIs can be drawn. "The things I want to express are so beautiful and pure" (M. C. Escher).

(1) *Whose indicator?* The first dimension by which SIs may be characterised relates to their origin. They may be derived externally to the community to which they are meant to be applied, or internally.
(2) *What indicator?* SIs can be quantitative (numerical) or more qualitative (subjective 'feel').
(3) *How is the indicator defined?* SIs may be explicit (clearly articulated with standard methodologies for assessment and presentation), or implicit (not clearly articulated but assumed to apply). An explicit SI would state the indicator clearly and provide the methodology and units that should be used to determine the value of the SI. In addition there may be a stated target for the SI, even if this is simply an expression of change.

Note that one axis relates to who has defined the indicator while the other two describe its nature in terms of the form in which the SI is articulated (quantitative or qualitative) and the methodology upon which its assessment is based (explicit or implicit). Therefore, unlike the traditional and one-dimensional classification where an SI is pigeon-holed into one category, in the proposed classification each SI sits within a three-dimensional space, depending upon who derived it and what it is. An SI can exist anywhere within this three-dimensional continuum, and different SIs gauging the same underlying parameter can sit at opposite ends of this space. To help illustrate this point, the ideas behind Figure 1 have also been illustrated in Tables 1–4. These tables set out a number of locations on the three essentially continuous axes in Figure 1, with examples that would apply in each case. The reader will note that we have employed the shorthand notation of QN for quantitative and QL for qualitative, and combinations of E and I for external/internal and explicit/implicit.

Tables 5 and 6 provides further examples of the axes and categories. Table 5 illustrates the wider thinking we should like to employ about what has tradition-

TABLE 1. Internal and external dimensions (who defines the SI, including its nature and methodology)

Type of participation	Characteristic
1 Manipulative	A pretence (no real power). For example, the presence of 'people's' representatives on a board or committee, who are, however, outnumbered by external agents.
2 Passive	People told about a decision or what has already happened, with no ability to change it.
3 Consultative	People answer questions.
4 Material incentive	People contribute resources (e.g. labour) in return for some incentive.
5 Functional	Participation seen by external agents as a means to achieve goals (e.g. reduced costs) usually after major decisions have already been made.
6 Interactive	People involved in analysis, development of action plans, etc. Participation is seen as a right and not just as a mechanical function.
7 Self-mobilisation	People mobilise themselves and initiate actions without the involvement of any external agency, although the latter can help with an enabling framework.

Source: Based on Pretty (1995).

TABLE 2. Implicit and explicit dimensions (methodology behind the SI)

Type of methodology	Example
1 Explicit SIs based on a defined and replicable methodology.	Highly defined techniques for measuring car density based on observation at key junctions or car sales per year. Allows replication of measurement so as to follow time-series measurements or for data checking.
2 SIs based on a methodology that is stated but not well defined, and therefore open to being assessed in different ways with different results.	Less well defined or published techniques (relative to 1) for measuring car density. Time-series data or validation may not be possible as methodologies could be different.
3 Implicit SIs not based on a defined and published methodology as such, but one's perception (based on experience, media coverage, pressure group statements, etc.) suggests that a particular trend is occurring.	No explicit methodology. Equates more to an impression or 'gut feeling' as to what is happening with car density.

TABLE 3. Quantitative and qualitative dimensions (nature of SI, including the form in which it is represented)

Type of SI	Example
1 Quantitative SIs based on counts, mass, lengths, volumes, densities, etc.	Density of cars recorded by counting presence on a sample stretch of road(s)/registration, etc. of vehicles over a period of time.
2 Quantitative SIs based on the scoring or ranking of essentially qualitative information.	Asking people to score their perception as to the change in car density over a 5-year period. Simple example: (1) large decrease; (2) small decrease; (3) no change; (4) small increase; (5) large increase.
3 Qualitative SIs based on colour, shape, feel, smell, taste, impression, etc.	People asked for their views, using focus group interview techniques, as to the change in the density of cars over the last 5 years.

ally been meant by an 'indicator'. *Webster's Dictionary* defines 'indicate' as 'to point out or to direct to a knowledge of', and in Table 5 simple metaphors are used to highlight how this wider vision of an indicator can be categorised with the new terminology. Indeed, we shall use this definition for the remainder of the present paper. Table 6 is another example of how the categories outlined in

TABLE 4. Combinations of SI: representation of extreme positions for each category

Category	Acronym	Table 1	Table 2	Table 3
Qualitative, implicit, internal	QLII	7	3	3
Qualitative, implicit, internal	QLEI	7	1	3
Qualitative, implicit, expert	QLIE	1	3	3
Qualitative, explicit, expert	QLEE	1	1	3
Quantitative, implicit, internal	QNII	7	3	1
Quantitative, explicit, internal	QNEI	7	1	1
Quantitative, implicit, expert	QNIE	1	3	1
Quantitative, explicit, expert	QNEE	1	1	1

Note: These categorisations are simplistic. In practice, each one of Tables 1, 2 and 3 could have many rows representing a spectrum.

Figure 1 and Tables 1–4 can be applied to another field where sustainability has been extensively researched and debated, and indeed has been very much in the news in the UK over the last few years, given bovine spongiform encephalopathy, genetically modified crops and 'foot and mouth' disease. In this case it is the sustainability of agriculture, and the role played by the quality of an important resource, the soil. 'Quality' in this context would be a composite of parameters such as organic matter content, nutrient content (primary, secondary), physical structure, water-holding capacity and cation exchange capacity, etc. From Table 6 it is clear that given the same underlying parameter—soil quality—there are many different perspectives not only on what it is but also on what to measure and how to measure it.

From Figure 1 and Tables 1–6 the reader will appreciate that with this three-dimensional vision and classification of SIs, a single underlying parameter can be judged using quite different SIs. Much depends upon who is making the judgement and how. This point is illustrated in Figure 2 (an activity sequence diagram), where a parameter often described as important to sustainable devel-

TABLE 5. An illustration of a broader vision of 'indicators' and an association with metaphors: in this example the 'indicator' is based on an individual's experience that dry and sunny days tend to result in high pollen counts that in turn lead to hay fever

Indicator type	Meteorological metaphor
QLII	Dry and sunny day
QLEI	Local weather outlook
QLIE	Informal pollen count estimation
QLEE	Computer forecast pollen count estimation
QNII	Series of dry and sunny days
QNEI	Local pollen count
QNIE	Recalled annual trends in national pollen count
QNEE	National pollen count statistics for last 10 years

TABLE 6. Examples of the different categories of SIs: all these examples are based on the assessment of soil quality (nutrient content, particle size distribution and organic matter content, etc.)

Indicator type	Who typically does the assessing	Some practical examples	Notes
Qualitative, implicit, internal community (QLII)	Farmer	Soil colour, 'feel' (texture) and perhaps others, such as taste.	'Loamy' feel and a 'darker' colour typically imply better-quality soil. Knowledge may be based on more limited experience of localised soil types and unlikely to be associated with a numerical characterisation.
Qualitative, explicit, internal community (QLEI)	Farmer	Could merge into QN** indicators if given a quantitative value, if the characteristic could be associated with a known quantitative value (e.g. a colour is known to equate to an organic matter content of $<4\%$).	As for QLII, but greater experience allows a more systematic analysis based on colour/feel', perhaps even including a wider range of factors such as taste. More likely to merge with QNII and QNEI type indicators, particularly in terms of yield potential.
Qualitative, implicit, expert (QLIE)	Agronomist or field level consultant		Similar to QLII/QLEI but based on greater experience of a much wider range of different soil types and formal scientific knowledge of these soils.
Qualitative, explicit, expert (QLEE)	Agronomist or field level consultant	Soil assessed using simple visual aids (e.g. colour charts).	The use of visual aids such as standard colour charts to make a judgement over the type of soil and hence an idea as to its 'quality'. Again, colour, etc. can be 'quantified' by association with known values for organic matter, etc.
Quantitative, implicit, internal community (QNII)	Farmer	' Quantitative' knowledge of soil generated as a result of farmer experimentation. Knowledge from	More informal 'look and see' trials on different soil types, without replication or a systematic selection of treatments.
Quantitative, explicit, internal community (QNEI)	Farmer	these would be used to 'quantify' the QLII/QLEI type of indicators, largely in terms of yield potential.	More formal experiments with a systematic approach (replication, treatment selection, etc.) linking crop yield to soil type.
Quantitative, implicit, expert (QNIE)	Soil scientist	Similar to QNEI. Also soil quality measured using more 'rough and ready' techniques (e.g. portable field testing kits).	Typically use colormetric techniques (based on colour change) for nutrient content, etc. Methods provide a rough indication of various parameters, but not as robust or as accurate as QNEE measurements.
Quantitative, explicit, expert (QNEE)	Soil scientist	Soil quality measured by a range of standard and well defined techniques.	More precise (than QNIE) laboratory techniques under controlled conditions. Formal methods set out in many publications.

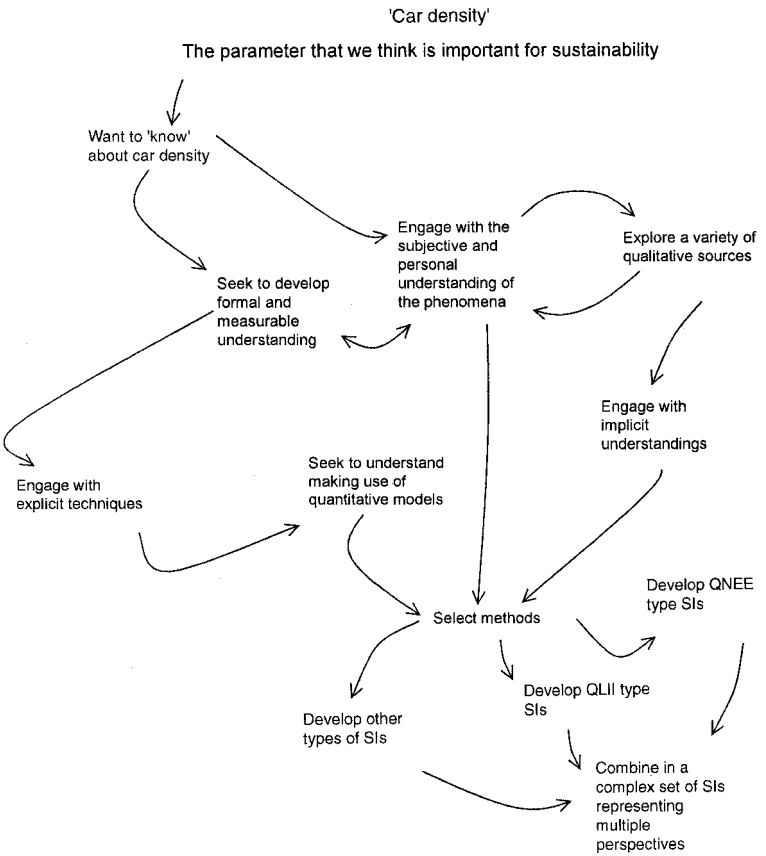


FIGURE 2. Activity sequence diagram of multiple perspectives yielding a range of SIs in practice. The diagram illustrates how the same underlying parameter, such as car density (a numerical parameter), can be visualised through a variety of lenses (including qualitative impression or 'feel') so as to result in a host of different SIs in practice. It should be noted that the resulting SIs are attempts to gauge the same parameter, but much depends upon the route between the bottom and the top of the diagram. 'Implicit' methods may be nothing more than 'walk down the street each day and observe the traffic that passes …'.

opment—the density of cars on the road—can be visualised through multiple perspectives yielding at times contradictory conclusions.

The current emphasis in much of the SI work so far has been upon quantitative, explicit and external SIs (sphere A in Figure 1) (QNEE for short). As mentioned earlier, there is a more recent emphasis upon quantitative, explicit and internal SIs derived by stakeholder participation (QNEI for short; sphere B in Figure 1). Both of these may be described generically as QNE* (QNE star, with the star being either 'E' for external or 'I' for internal) SIs, and represent the groups where 'usage' has apparently been a problem. Yet the QNE* group of SIs does have advantages. Having an explicit set of defined indicators, with a replicable means of measurement, does have the advantage of allowing

comparison across time and space. After all, one can prove almost anything by perhaps changing the methodology only subtly: unsustainable becomes sustainable! By at least stating the methodology and units, etc. this sort of manipulation becomes less likely. It is this 'replicability' that has helped make the QNE* group of SIs so attractive. Indeed, with the traditional perspective of SIs they can only be QNE*: everything else, by definition, cannot be an SI.

Beyond the QNE* set of SIs there has been little study. For example, the qualitative end of the three-dimensional space in Figure 1 has been almost completely unexplored. The same can be said of more implicit SIs. This is ironic given that it is the qualitative, implicit and internal (QLII; sphere C in Figure 1) types of information that are by far the most often used in practice. To an extent this may be due to the fact that many would not realise that these are 'indicators' in the sense of the Webster definition, and that they use them. Everyone knows of the adage 'Red sky at night—shepherd's delight'. The colour of the sky is an indicator of the weather to follow the next day—but a qualitative one with no explicit 'methodology' other than simply looking up! Similarly, we may not be in tune with QNE* SIs, but all of us know what we think is 'sustainability' when we see it!

While the QLI* group may be the most prevalent at the level of the individual, does the same apply at the level of agencies and professionals that are supposed to apply SIs? Surely such groups would be expected to be more attuned to QNE* SIs? As mentioned above, evidence to date suggests otherwise, even though much effort has been placed by highly skilled individuals into the generation of QNE* frameworks over 20 years. However, we would argue that individuals within such agencies apply qualitative and implicit indicators all the time. In that sense we partly disagree with a comment made by Brugmann (1997a), when referring to the use of SIs as elements in setting political objectives:

> In more than 20 years of grass-roots organising experience I have neither personally used nor come across a grass-roots group that has used indicators as a primary tool to encourage a party or government to change its political objectives.

Brugmann (1997a) is referring to the QNE* group, and in that sense we believe him to be right, but we would argue that the exact opposite applies if one broadens 'indicators' to include the QLI* group. While it is true that a "grass-roots group" does not typically quote QNE* SIs arising out of an explicit 'methodology', it may clearly articulate its 'gut feeling' that having more cars is bad for sustainability and its perception (right or wrong) that the density of cars on the roads is 'too high'. This is still the use of an 'indicator' (a desired trend/level for sustainability and a notion of what the trend/level currently is), even if a QNE* practitioner may not recognise it as such. Car density can, of course, be expressed in QNE* terms, and such information can help shape people's perceptions of trends. Indeed, QNE* SIs are meant in part to be used in this way: to facilitate and inform discussion and debate. A problem can arise, however, if the value of a QNE* SI does not resonate with a QLI*-based impression of exactly the same thing. QNE* SIs may say one thing (e.g. that car density is decreasing on a national basis), but if people's 'gut feeling' says

something else (e.g. their perception is that it is increasing) then they may follow the latter. This is not to say that QNE* SIs are wrong or at fault: it is just that in some circumstances people may prefer to believe QLI* information. Hence we can have multiple perspectives of the same underlying parameter, in this case car density. A QNE* perspective can say one thing yet a QLI* perspective on the same underlying parameter can be at odds with this.

An underlying complication in all of this has been the association between a parameter judged to be important to sustainability, and the form and method behind which it is to be expressed and hence understood. There is, of course, a measurable (in strict quantitative terms) entity 'out there' that one can call car density. If one had the resources it would be possible to measure the exact number of cars on the road in any place and at any moment in time. In practice we are not able to do this for every mile and minute—far from it—and we settle for simpler (and cheaper!) methods of measurement that inevitably make compromises. We may, for example, measure density at a specific place and time. Yet all of this results in multiple levels of assumption, the first, of course, being the selection of car density as an indicator of something called sustainability in the first place. Having made this judgement we then look for ways of articulating car density as an SI. What we almost always end up with is an 'indicator of an indicator' that has human value judgement bound within it. For example, who makes the decision about where and when to sample a stretch of road? How contestable is it? However, the main point we wish to make is that even if one were able to determine the true car density for every mile and minute, this same parameter would inevitably be being experienced (largely qualitatively and implicitly) in the same space/time frames by the very people who would be affected by any change. Even with this most fundamental of situations we have two entities: a 'true' car density and an 'experienced' car density. Given all of this, we would argue that multiple perspectives of the same thing are inevitable as long as people are involved, and if people are not 'inside' then does it make sense to talk of sustainability in the first place?

In contrast to many writers, we suggest that all people understand, value and care about indicators! Gold medals in the Olympics, pollen counts on the weather forecast, football results, pay rises, the feeling at the end of a good meal or a holiday. These are all indicators from the 'real world' that may affect our lives, yet people would not recognise them as such. People may 'know' that sustainability means fewer cars on the road (even if they mean other people's cars!), 'better' soil that is exposed to 'less' fertiliser and pesticide (even if they do not want to pay a premium for organic produce) and less pollution (provided it is not their job at stake). Yet words like 'better' and 'less' may not be visualised in strict QNE* terms, and could in fact be highly diffuse and nebulous, as they are based on perception. Academics may run shy of words like 'beauty', 'goodness' and 'truth' but people everywhere understand them and value them and, whether we like it or not, they lie at the heart of sustainability. We saw evidence of this time and time again in the field. When first asked for SIs the immediate response of government officials was to generate textbook QNE* SIs. When prompted via SSM for indicators that really meant something to them the initial response was to come up with a host of ideas, many of which

were not 'doable' in strict QNE* terms, but at the same time rested at the heart of what they felt was important to sustainability. It was interesting to observe how discussions of QNE* SIs amongst such officials were more mechanical and typically lacked emotion, yet the QLI* indicators became the centre-point of vigorous and highly emotive debate.

This should not be taken as a criticism of QNE* SIs. There is nothing 'wrong' with this group *per se*, and indeed they do need to be a vital element of any attempt to assess sustainability. The point being made here is that there will inevitably be multiple perspectives of the same thing, and a QNE* viewpoint is but one of these. The problem is not the inclusion of QNE* SIs but that other perspectives have been ignored and the QNE* mindset has dominated the SI discourse. Indeed, if one accepts the logic behind this classification of SIs, one can ask why this has occurred. The epistemology behind this group of SIs is scientific reductionism, a paradigm that has been very successful and is now dominant. Chambers (1997), for example, provides a commonly cited diagram in the development literature which illustrates a ranking of the 'value' of knowledge in agricultural development, with farmers typically at the bottom and laboratory-based scientists at the top (the same spectrum as in Table 6, but reversed in order). Using this as a base, one may rank the categories of SIs outlined here in a similar way, with QNEE at the top and QLII at the bottom (Table 7). The SSM described in our book recognises this 'valuation' and we have, using systems approaches and participation as the key, tried to make this given situation better by making it more systemic and transferring ownership to local people. In other words we have tried to 'make what *is* more effective or better'. Although we have attempted to make the manner and aims of the SI approach we have adopted both humanised and systemic, we have still been constrained by the overall format of the paradigm. In other words, we were still in the QNE* mindset. This is the glass ceiling we refer to in the title of the paper.

However, given the above classification and ideas is it not possible to rethink the SI approach, starting, and not ending, with 'use'? Traditionally, the starting point with SIs has been a perception of technical excellence (embodied as QNE* SIs), and the solution to engaging local interest in the QNE* SIs has been participation and marketing. The assumption has been that all one has to do is 'package' the SIs in such a way as to make them attractive to potential users. But whatever one does with 'packaging', we are still with the QNE* mindset: all we

TABLE 7. The valuation of knowledge and SIs

Actors	Status	Location	'Valued' data	SIs employed
Laboratory-based scientists	High	Laboratory	Quantitative	QNEE
On-station researchers		Field station		QNEE
Off-station researchers		Field		QN**
Extension agents/consultants		Field		QN** and QL**
Farmers	Low	Field	Qualitative	QL**

Source: Based on Chambers (1997).

are doing is trying to sell something that people may not basically want (appearing to 'make' what '*is*' 'better'). Yet people use the QLI* mindset all the time, so cannot something be done to mainstream this? This implies that the paradigm needs to be changed from "making what *'is*' better" to '*doing better things*'. This requires a complete shift in the epistemological ground of SI conception. Indeed, to break into this new model is to break the glass ceiling of our own mental prison. At present we are applying participation, marketing and systemisism to a complex process in order to attempt to hand over QNE* SIs to local people and institutions. But this is all undertaken within a paradigm that is ambiguous, at best, in relation to local values. What we feel we need to do is to engage with local people to share understandings of what is important in their lives. The shift is from the reductionist paradigm to what we call the conversational paradigm. The latter is conducted as conversation and mutual sharing of the underlying grounds of concern with respect to issues which relate to the aesthetics, honesty and utility that local stakeholders appreciate. People might not care about QNE* SIs, no matter how they are packaged and 'sold', but they do care about QLI* SIs—they use them all of the time—and if voters care then so will politicians.

The notion of reformulating the SI experience in more QLI* terms may be desirable, but how is it to be done? By their very nature these may be highly volatile and subjective. Unfortunately, there is little we can say about this, given the paucity of information that exists with regard to QLI* SIs and the conversational paradigm which they represent. Little is known about how these are created, modified and negotiated with other concerns in terms of both the individual and the institution. Even less is understood concerning the potential to combine SIs from both QLI* and QNE* paradigms. The logic behind all this is that some of the advantages of the QNE* group, particularly in terms of replicability, could be combined with more qualitative SIs.

The experience of the authors in Malta and elsewhere (see Bell, 1996; Morse *et al*., 2000), as well as the experience of others (see, for example, the literature based on the Sustainable Seattle[1] and Sustainable Southwark[2] projects), indicates that it is possible to combine both qualitative and quantitative SIs, but that this requires an exercise in engagement at both policy and local levels. For example, one could purposefully set out to accommodate multiple perspectives of the same parameter rather than insist upon only one acceptable vision. Why not include and work with the range of SIs at the bottom of Figure 2 as embodying 'valid' perspectives, even if some are not quantitative or explicit? The result could be what we would like to call 'multiple perspective' SIs (MuPSIs). What people 'feel' about something may not smack of good science to some, but does provide a finger on the pulse of the parameter as experienced in their lives. Relying on only one vision of this—the QNE* one—may be good science but perhaps may be too sharp and ignored by key groups as a result. The fundamental difficulty, as we see it, rests not with QNE* SIs as such but with the current dominant environment that surrounds the reductionist paradigm and the QNE* SIs that it has spawned to the exclusion of all else. MuPSIs would allow use to combine these different visions as a basis catalysing change, but at the same time provide an internalised reminder about the centrality of people in all of this.

A systemic format for such inclusion would be to provide a means for multiple perspectives to be accommodated in the range of indicators selected. Such a view would allow for policy to be formulated on more wide-ranging MuPSIs rather than just single perspective (usually QNEE) SIs. For example, if one took the fish stock of the North Sea as a likely area to react favourably to inclusive conversation among stakeholders, SIs from fish stock experts would form a vital part of formative material necessary for policy making. However, other SIs might include the outcomes of focus groups with fishermen and fish market specialists. These indicators (tending to the QLII) would need to be subsequently assessed in dialogue with more formal QNE* type indicators. Our argument is that such inclusion would make the process of SI collection more inclusive and the resulting conversation about fish stock quotas more representative of the views, concerns and aspirations of stakeholders. This form of inclusion, however, raises issues and problems for those wishing to integrate indicators into policy and make decisions that are bound to be of concern to some stakeholders.

Hothousing SIs

The traditional approach to developing SIs in conventional research and consultancy, favoured by the reductionist paradigm, we call 'hothousing', and there are two related issues that are of particular interest in terms of sustainability and SIs:

(1) the institutional and personal maelstrom within which sustainability and SIs have to operate;
(2) imposed limitations on resources, especially time, for generating SIs.

In both of these the complication is that the promotion of sustainability is but one concern among many that individuals have within such agencies: hence sustainability and SIs have to operate within an institutional maelstrom of limited resources and an ever-changing set of concerns and agendas. An important part of this maelstrom may comprise an emphasis on clear and concise measures of accountability and performance (Brugman, 1997a, b). At one level this favours the QNE* SIs, but perhaps only a limited matrix of them that meets these institutional concerns. The danger is that limited matrices of QNE* SIs established in such negotiations cease to become 'meaningful' measures of sustainability except when the latter is seen in a very narrow sense. How does all this mesh with a desire to engage the public—an oft-quoted reason for having SIs in the first place? QNE* SIs have a tendency once set to have little flexibility, and when applied in the diverse and changing circumstances of everyday life it is perhaps unlikely that such frameworks will achieve widespread operational usage, even if they are developed in a participative mode. In contrast, QLI* SIs may be highly malleable and open to variation between individuals as well as over time for the same individual. In our diverse and rapidly changing world it is perhaps logical and to be expected that QLI* SIs will do well in terms of everyday usage, while the more fixed QNE* SIs may lose out to other concerns.

Growing Conversation in a Hothouse

It was obvious to us that growing QLI* SIs within the sort of hothouse environment described in the previous section will require a substantial shift in the thinking of those funding SI research. Up to the present these agencies have been comfortable with the notion of QNE* SI frameworks. as they sit firmly within the dominant reductionist and mechanistic mindset. Studies that are orientated towards more qualitative SIs and processes involved in their evolution and application are far more messy, and methodologies are perceived as being more complex (rather than representing and revealing the perspective which nominates the context as complex), diffuse and 'risky' (to the funder). It is understandable that donors and others when faced with this will opt instead for the perceived 'tried and trusted' approaches of QNE* framework development, even if no one ends up using QNE* indicators or they are applied in a narrow sense within other institutional concerns. Such a position is understandable but lacking in imagination, a recognition of the level of failure of past endeavours and the capacity to envisage things being different. Herein we believe rests the central conundrum of SIs. We are trying to use SIs as a tool to gauge something that is highly subjective and ridden with human values and desires, yet we are trying to do this either by ignoring these very human aspects or by trying to reduce them to a few simple numbers.

In this paper we have presented one mechanism that may allow us to arrive at some answers. Our view is that before a single SI is created, the starting point of the whole process needs to be a series of simple questions that require deep and honest answers.

- Who wants SIs and why?
- Do those who want SIs also want participation from local people?
- If local participation is required then whose mindset counts?

All too often we tramline the answers to match the dominant paradigm rather than the reverse.

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Notes

[1] http://www.scn.org/sustainable/susthome.html
[2] http://www.southwark.gov.uk/future/index.html

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