

Re-thinking Sustainability Indicators: local perspectives of urban sustainability

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Abstract

The measurement of sustainability is not only a contentious issue, but one which has captured the attention of both academics and politicians since the late 1980s. A plethora of methods and approaches have been developed over the last decades or so, from rapid measurements as inputs to specific projects, to longer-term processes of research, monitoring and wider learning. But perhaps, the most influential ones have been *indicators*. The tensions between expert-led and citizen-led models of indicator development have fuelled much debate in the literature, in relation to their reliability or effectiveness. Among the solutions suggested, integrating the two approaches has been seen as salient to tapping into various levels of ‘knowledge’ of sustainability and thus, a better way of assessing sustainability. However, little is known of whether these ‘integrated’ sets of sustainability indicators work in practice or, indeed, reflect local perspectives, values and understandings of sustainability which they aim to represent. This paper aims to fill this gap. We first design such an ‘integrative’ set of indicators which we then discuss with over 60 ‘sustainability experts’ and 130 residents living in three urban areas in the UK. We find that our set of indicators is generally a good reflection of urban sustainability in these areas, however, individual indicators held different degrees of ‘importance’ in people’s day-to-day lives, something which is little accounted for when measuring urban sustainability. We also find that sustainability indicators are not isolated pieces of information, but manifestations of local underlying processes and interconnections that can be mapped and which have the potential to shed more light on our understanding of local sustainability.

Key words: indicators, sustainability, measurement, urban sustainability, sustainable communities

Introduction

Sustainability has become one of the most contested terms in modern times. But, like all such terms, sustainability has a history. It did not always have such significant connotations. The term was first coined in an environmental context in 1712 by Hans Carl von Carlowitz, a German forester, in his book *Sylvicultura Oeconomica* which prescribed how forests can be managed on a long-term basis. It was, however, not until the 1980s that 'sustainability' came into much wider currency. With the birth of contemporary environmental movement in the late 1960s and 1970s, and debates about the 'limits to growth' (Meadows et al., 1972) and 'greening the economy' (Dasgupta, 1993, Dresner, 2002, Pearce, 1989)¹, environmentalists were keen to show how environmental issues could be linked to mainstream economic development. This culminated with the Brundtland Report in 1987 which offered the now still used classic definition of sustainable development.

development that meets the needs of the present without compromising the ability of future generations to meet their own needs (UN, 1987).

Since the 1980s we have seen an explosion of academic work and debate, including different models of sustainability - strong versus weak, broad versus narrow – and building up to the UN Summit in Rio (1992) which marked the beginning of the relationship between the sustainability and policy arenas. Even more work has emerged since then. The 1990s saw the establishment of sustainability commissions and national bodies across the world, and a whole plethora of economic valuation, indicator measurement and assessment techniques were elaborated to aid policy processes. A more local-level community-led process was conceived in parallel – Local Agenda 21 – which saw sustainability built from the local level through initiatives by local governments, community groups and citizens (Lafferty and Eckerberg, 1998, Selman, 1998). The

result was an exponential growth in planning frameworks, evaluation procedures, sustainability indicators and monitoring protocols.

At the same time, hundreds of 'sustainable urban projects' have been initiated across the world. Collectively termed as the 'sustainable urban movement', these efforts have inspired a range of initiatives in the UK including 'healthy cities', 'urban villages', 'millennium communities', 'mixed communities', 'growth areas' and 'housing market renewal' projects. A range of approaches have been pursued to measure their success including the *ecological footprint* and *cost-benefit analysis* (CBA) methods, but perhaps, the most influential ones have been those dedicated to developing sets of sustainability indicators (see for example (Mega and Pedersen, 1998, Spiekermann and Wegener, 2003, Ravetz, 2000, Maclaren, 1996)).

Sustainability indicators have prompted much debate about the way they were developed: from the 'top' (expert-led), initiated primarily by governments and based on expert input, or from the 'bottom' (citizen-led) drawing on local expertise and networks, and involving the public. These tensions between expert-led and citizen-led models of indicator development are well documented in the literature and, it has been suggested that integrating the two approaches would reconcile tensions (Reed et al., 2006). However, little is known about how such an integration works in practice and whether it reflects local values and understandings of sustainability.

Following this introduction, the remaining of the paper continues by problematizing sustainability measurement in general and sustainability indicators in particular. This is followed by methodological considerations and the development of a set of urban sustainability indicators, which integrates expert and citizen knowledge of local sustainability. The set is then discussed within its target context in order to understand whether it is a true reflection of this context and examine how the tensions between top and local players of urban sustainability are shaped. We

conclude the paper by reflecting on the implications of our findings for the development of future sets of sustainability indicators.

1. Can we actually measure sustainability?

‘Sustainability’ and ‘sustainable development’ have generally been defined as an aggregate of characteristics including economic security and growth, environmental quality and integrity, social cohesion and quality of life, empowerment and governance. The complex interdependencies between economic, social and environmental phenomena, and the need to *balance* or *harmonize* these over time, have been the focus of particular attention in defining sustainability (AtKisson, 1999, Lafferty, 2001)). This definition is, however, imprecise: it is holistic and attractive, but too elastic. Moreover, no single way of telling the extent to which sustainability had been achieved in any sector has been agreed so far.

Despite this caveat, ideas and thinking about sustainable development have permeated over the last two decades into most disciplines and sectors. Swimming with the tide, the area of urban studies has generated an impressive body of literature, which aims to marry ‘sustainability’ and ‘urban development’ by grounding the many interpretations of sustainability in an urban setting. On the one hand, we have seen ‘eco-centric’ interpretations of sustainable urban development which shows the city as a ‘living organism’ and focuses on its ability to self-regenerate, self-sustain and adapt (Rees, 1992, Rees and Wackernagel, 1996, WWF, 2010). On the other hand, other studies have focused on ‘anthropo-centric’ views of urban sustainability including:

- city’s capacity to ‘endure’ by undertaking activities which produce lasting benefits or deal with long term urban problems (Thake, 1995, Aldbourne Associates, 1999);
- city’s ‘demand-based’ approach to undertake activities that respond to people’s needs and encourage them to live in communities, equating ‘sustainability’ with ‘popularity’ and ‘quality of life’ (Evans, 2000, Smith et al., 1998); and

- city's drive to optimize both environmental and human resources, with an emphasis on democratic and participative outcomes (DETR, 1999, Hall and Pfeiffer, 2000).

'Urban sustainability' has attracted, however, much criticism. It has been argued that cities rely on too many resources crossing their boundaries to be sustainable and only by, for example, 'rehabilitating' natural capital stocks, such as local fisheries, forests and agricultural land, cities can become more self-reliant (Rees, 1997, Rees and Wackernagel, 1996, Renn et al., 1998). In addition, Owens (1992) argues that the notion of urban sustainability is a contradiction. Urban areas will always be net consumers of resources, drawing them from the world around them. They are also likely to be major degraders of the environment, simply because of the relative intensity of economic and social activity taking place in such places (Owens, 1992).

Scholars have also argued that no-one knows exactly what 'sustainable human settlements' look like and that there are few places or whole communities that have incorporated sustainability across their entire social, economic process and physical fabric (Beyond Green, 2004, Barton and Kleiner, 2000). For example, Church and Young (2001) note that the 'sustainability' is increasingly employed by initiatives ranging from 'eco-villages in rural Wales to those based around tower blocks in depressed urban areas' (Church and Young, 2001) p.123. They also point to the difficulty of evaluating what is and what is not a sustainable: some tangible components of sustainability are easy to measure such as 'people completing training schemes', while others, such as 'local cohesion', are much harder to assess (Church and Young, 2001).

There is, however, a more positive view of sustainable cities and despite the fact that urban sustainability is so contested, the term is a useful label for those who seek to move towards more stable and balanced areas. Cities can become 'sustainability heroes' and offer a better quality of life by being well-governed, using resources efficiently and lowering their waste and greenhouse gas emissions (Satterthwaite, 2002).

Wider social scientific framing

These debates resonate deliberations within the wider context of modern social sciences where traditional positivist perspectives of the world, coined by Comte in the 19th century, have been challenged by modern thinking. Positivism dominated the philosophy of science during the 20th century and relied on applying scientific rigor to the study of society. However, it has come under severe criticism over the last four decades – Anthony Giddens (1997) argues that ‘positivism’ has become a ‘term of abuse’ and was not considered a ‘fashionable association’ for contemporary philosophers (Giddens, 1977). This criticism has been bundled up under ‘post-positivism’, which does not represent one school of thoughtⁱⁱ but includes philosophers and social scientists that have been strongly critical of Comte by opposing the ‘established order’.

Post-positivists argue that the present orthodoxy of social sciences is obsolete and new visions based on human conjectures for generating social knowledge are required. They also argue that all social ‘measurement’ is fallible and emphasize the importance of multiple measures and observations, each of which may possess different types of errors, but nevertheless invaluable in order to get a better understanding on what is happening in reality. For them, all observations are theory-laden and researchers and scientists are inherently biased by their cultural experiences and world views – thus, they renounce unity and promote ‘methodological pluralism’ (Lapid, 1989). Moreover, one of the post-positivist schools of thought, ‘social constructivism’, in stark contrast to positivism, understands any reality as ‘socially constructed’. It encourages rich and multi-faceted research and focuses on exploring how social constructions happen by ‘disclosing’ of how social phenomena are socially constructed.

Following from this, it is not surprising that the study of any aspects in society, including their methodologies and ‘measurements’ are issues of much debate. And the study of sustainability is no exception to this. There is no generally accepted definition or measurement of ‘sustainability’ (Hardi et al, 1997, quoted in (Bell and Morse, 2003)). Measuring sustainability is not only an

objective issue but, unavoidably, a political and social one which points to the difficulty of comprehending the 'social construction' of sustainability - this is unlikely to be 'objective', likely to serve a certain scope (such as the assessment of policy process and impact in our case) and are conflictual and manipulated (by the various expert and citizen groups involved). Sustainability 'is not a single, well-defined concept; rather, various positions and perspectives exist – whichever view is propagated, it entails a normative choice' (Zeijl-Rozema and Martens, 2010) p. 8.

As such, there is no agreed way of defining the extent to which sustainability is being attained in any sector. On the one hand, it has been argued that the issue of sustainability is a 'moving target' and that developing measures at any one point in time is not worth the effort (Hempel, 1999). Existing methods are seldom influential in the sense that influential players such as policy makers and politicians take little note of subsequent results and findings (Innes and Booher, 2000). On the other hand, as many scholars have advocated before us, we think that it is important to monitor progress, as people need a reality check to ensure that things are moving in the desired direction (Innes and Booher, 2000; Hemphill et al., 2002; Brandon and Lombardi, 2005).

Many authors employ rather 'ad-hoc' check-lists of sustainability without a clear methodological framework (see for example (Brownhill, 2002, Barton, 2000, Barton et al., 2003, Bell and Morse, 2003). However, indicators have been, perhaps, the most popular approach to measuring urban sustainability – a small field of debate, but nevertheless important, within the wider field of post-positivist debate and framing. They have never failed to capture the imagination of both scholars and politicians, in an attempt to encapsulate the real meaning of urban sustainability.

Sustainability indicators

There are many sets of sustainability indicators (SIs) but none has emerged so far as having universal appeal (Mitchell, 1996). Some indicators are especially made for a certain city, community or organization (AtKisson, 1999, Roberts, 2000, McAlpine and Birnie, 2005, Tasser et al., 2008) while others are universally applied across a number of areas, projects or organizations

in a comparative exercise (European Communities, 2001, Expert Group on the Urban Environment, 2000, Schlossberg and Zimmerman, 2003, Pulselli, 2008, Tiezzi and Bastianoni, 2008). Moreover, urban SIs have been widely employed especially at European level in an attempt to help policy-makers ensure the continued success of their cities (Mega and Pedersen, 2005, UN, 2004, Maclaren, 2007, Ravetz, 2000).

Views on how to choose indicators or develop sets of SIs are also split, as there is a on-going tension between subjective and objective in their development and use (Rydin et al., 2003b, Astleithner and Hamedinger, 2003). On the one hand, SIs should be largely objective, 'measurable', easy to understand, 'eye-catching' and reflect local circumstances (Cartwright, 2000). On the other hand, they do not need to be purely objective, as in fact, few of them are. They are the result of a highly subjective selection process which is rooted in the fact that most of us already have indicators in the back of our minds, 'beloved indicators' that reflect issues of great concern for us and measure what is measurable, rather than what is important (Meadows, 1998, Cartwright, 2000, Gahin et al., 2003, Hemphill et al., 2004).

The development of any set of SIs rests on a challenging choice between two 'methodological paradigms' (Reed et al., 2006) or approaches. First, *expert-led* approaches, also called 'top-down' or government models are based on traditional and formal hierarchies and have epistemological roots in scientific positivism. These approaches tend to include 'scientific' or quantitative indicators (such as 'economic activity', 'average annual domestic consumption of electricity' or 'election turnout') as a way of defining complex and dynamic systems. Yet, indicators that are top-down developed could easily miss what is important for local communities and thus, have been critiqued for ignoring local issues (Morse and Fraser, 2005). For example, Zeijl-Rozema and Martens (2010) shows how EU indicators failed to reflect regional perspectives of sustainability (Zeijl-Rozema and Martens, 2010). Hence, there is wide agreement that local communities need to participate in all stages of indicator development and implementation (Corbière-Nicollier et al.,

2003) as indicators evolve over time as communities become engaged and their circumstances change (Carruthers and Tinning, 2003).

Second, *citizen-led* approaches, also known as community-led, governance or 'bottom-up' models draw on 'participatory philosophy', popular amongst post-positivist scholars. They explore networks and the blurred relationship between private and public and tend to measure soft indicators or issues that are linked to individual behavior such as the 'level of community activity', 'satisfaction with local area' or 'perceptions of community spirit' (Eckerberg and Mineur, 2003). Research in this tradition emphasizes the importance of understanding the local context in defining and prioritizing indicators and on-going learning (Freebairn and King, 2003). Yet, this approach has its limitations too: 'community control' is not helpful if it does not foster change towards a more sustainable behavior and 'community representatives' or 'intermediaries' could become as dominant centre stage as government institutionsⁱⁱⁱ.

The tensions between *expert-* and *citizen-led* models of indicator development are well documented in the literature. They can inhibit the effective use of any type of indicators (see the Pinfield-Brugmann debate (Brugmann, 1997a, Brugmann, 1997b, Pinfield, 1997)) and can make difficult to bridge the gap between policy makers and end-users (Eckerberg and Mineur, 2003). Moreover, these tensions could lead to 'breeding complacency about conditions, mindlessly recording anything and everything as "baseline data" and provoking unnecessary actions or implementing measures that ultimately turn out to be ineffective' (McCool and Stankey, 2004)p.297. In other words, a set of indicators which is not 'embedded in' and 'reflective of' its target context will prove difficult to implement and yield effective results. It is far more likely that if the target audience is allowed to participate in the conceptualization and development of these indicators they will also use and appreciate the results (Rydin et al., 2003a, Pinfield, 1997, Bell and Morse, 2001).

In order to lessen these tensions, scholars have argued for integration between expert- and citizen-led approaches (Reed, 2005, Reed et al., 2006, Fraser et al., 2006, Batterbury and Forsyth, 1997, Nygren, 1999, Thomas and Twyman, 2004). For example, Reed and colleagues (2006), suggesting a possible solution to integration, advances the importance of involving citizens early in setting the context for SIs at local scales, but stresses the role of expert-led methods in indicator evaluation and dissemination, employed later in the process (Reed et al., 2006). However, three broad directions can be distinguished in the literature to understanding the integration between expert- and citizen-led models of indicator development. These involve a focus on: methodology, crossing points between the two models and scale of integration.

First, a number of authors have focused on how integration can be best achieved by looking at the range of methods employed. Reed and colleagues (2006) undertake a useful overview of how integration of methods can be best achieved at local scales, and develop a step-by-step and 'adaptive' set of SIs which could be applied to 'a range of local situations' (Reed et al., 2006). Yet Kelly and Moles (2002) argue that although extensive literature exists on integration of methods in indicator development, only few studies have asserted how integration works in practice, while Maclaren (1996) in his review of urban sustainability projects found that no particular methodology dominated indicator development, but rather a variety of mostly ad-hoc approaches (Kelly and Moles, 2002, Maclaren, 1996).

Studies in the second category look at the interface between 'experts' (scientists or technocrats) and 'policy makers' (government officials and the public) which is neither well defined nor particularly understood (Jasanoff, 1990). Their line of reasoning is that SIs are designed to help make and implement policy in environments that are foreign to the controlled world of scientific experimentation and therefore they 'must be as firmly grounded in an informal, deliberative and defensible social context as it is in credible, rigorous scientific principles' (Mccool and Stankey, 2004) p. 294. This has an effect on their relevance as well as on the capabilities of local actors to

use, update and further develop the indicators (Mickwitz and Melanen, 2009). Yet these studies have focused on relatively formal players, with little attention paid to how the public interact with these players.

Finally, some studies discuss how integration has been applied at different geographic scales including countries, regions and cities. Many authors have focused on understanding how indicators are cascaded down from national to regional level, with, however, few aiming to discuss the 'local scale', mainly due to data limitations and 'top-down' definitions of sustainability. For example, Zeijl-Rozema and Martens (2010, 2011) develop an 'adaptive indicator framework' for integrated monitoring of sustainability at in a Dutch region, while Kelly and Moles (2002) investigates the role of public participation in developing a range of regional sustainability indicators (Zeijl-Rozema and Martens, 2010, Zeijl-Rozema and Martens, 2011, Kelly and Moles, 2002).

Despite useful insights, these research strands have their limitations and deserve to be developed further. The focus on methodology does not offer any guarantee that by choosing the 'right' methods, the end-product (the set of SIs) will reflect 'community concerns and hopes for the future' (Kelly and Moles, 2002) p. 889. This can readily become tick-box exercises rather than actually achieving integration between expert- and citizen-led interpretation of sustainability. A focus on the interface between science and policy goes some way farther by focusing on key players' contributions to indicator development. However, it offers a too narrow window into how the public selects and understands SIs by mainly focusing on a one-way process from 'science heavy' (technocrats, scietifists) to 'science light' (policy and decision makers) tiers of integration, with the public blended into the 'policy/ decision makers mix'. Finally, most 'scale' studies focused on the regional rather than local 'sensitivity' of indicator development.

This paper aims to extend these research directions by uncovering how integration works in practice, and to what extent SIs development is a representation of local knowledge of urban sustainability. It proposes a transparent methodology for developing an integrated set of urban SIs, unpacks further the interface between 'science' and the public in SIs development and looks at whether 'local sensitivity' is indeed a main characteristic for a set of urban SIs designed with such sensitivity in mind.

2. Some methodological considerations

The inability of existing methodologies to guide SIs development is recognized by several authors including Bossel (1999), Gallopin (1997) McCool and Stankey (2001) and McLaren (1996), while Reed and colleagues (2006) offer a good overview of how best to integrate current quantitative and qualitative methods when developing an integrated set of SIs (Reed et al., 2006, McLaren, 1996, Mccool and Stankey, 2004, Bossel, 1999, Gallopin, 1997). Yet the majority of these examples are either tailored to sustainability more generally rather than urban sustainability or lack in methodological transparency. Moreover, it is not clear to what extent expert- and citizen-led models are intertwined: many sets do not rest on citizens' values and understanding of sustainability, but rather on expert views on what these values might be.

Perhaps the closest approach to an 'integrated' model is the Sustainable Seattle model which developed 40 indicators of urban sustainability (from an initial shortlist of 100) based on local values and goals, through a skilful process of negotiation between expert- and citizen-led inputs (AtKisson, 1999). However despite being almost unanimously acknowledged as 'good practice', there is little evidence about how actually the model had been 'embedded' and how well had worked in practice (Holden, 2006). Another good example is the Bellagio Principle model (Hardi and Zdan, 1997) that advocates SIs development based on the principle of openness. The principle requires that the process, assumptions and frameworks used to develop indicators need to be

explicit and revealed to those affected. Thus, development is open to multiple interests and concerns. However, is this sufficient? And how is this applied across varying spatial scales and social groups?

Failing to uncover a convincing model in the literature we decided to design one. Thus, we were faced next with the challenge of 'breaking up' the multidimensional concept of urban sustainability, into constituent parts (or indicators). It was then when we came across the methodological literature developed around Amartya Sen's capabilities approach, which has increasingly become an alternative 'point of departure' for the operationalization of multidimensional concepts and echoes some of the post-positivist thinking through its sustain critique of utilitarianism, originated in the 'first positivism' of Comte . This literature parts from the assumption that in 'operationalizing' ambiguous or multidimensional concepts, the real problem is twofold. First, the target audience or end-users are not enough involved and consulted throughout. Second, and recalling the Bellagio Principle, researchers fail to make explicit the way certain indicators have been chosen so that an 'outsider' cannot probe, trust and question their choice (Alkire, 2008, Robeyns, 2005b, Alkire et al., 2008).

Thus, the process of making operational any multidimensional concept should engage fully and from the beginning its end-users or target group, and be highly transparent in its development. It goes further and suggests that a systematic 'participatory consultation' strategy should be planned throughout and the process should be accompanied by an 'explicit documentation of selection procedures' as an invitation to dialogue and scrutiny. Needless to say here that some caution should be taken as one could go down the route of describing everything and learning little. Thus, five complementary methods^{iv} are suggested when selecting indicators, in combinations of at least two methods and making use of:

- **Existing data**, whereby indicators are selected (mainly by experts) because of data convenience or availability;
- **Normative assumptions**, where indicators are based on (expert's) explicit or implicit assumptions about what people should (or do) value;
- **Public consensus**, through which indicators draw on 'existing lists' that are the reflection of legitimate citizen consensus.
- **Participatory processes**, where indicators are selected on the basis of ongoing purposive (expert and citizen) participatory exercises; and
- **Empirical evidence**, whereby indicators draw on empirical accounts of people's values and experiences.

Following from this, three of the above methods are employed by us to develop a new set of urban SIs. First, we draw on five existing and well established lists of SIs, which have achieved some level of **public consensus** during their development. Second, we developed a list of urban SIs by employing **normative reasoning** and using a three-step selection process to identify indicators. Third, we integrate various levels of 'expertise' and involvement, by taking the list through a process of **participatory consultation** with 25 sustainability 'experts' and 38 community representatives and stakeholders in three urban locations.

Empirical testing

By empirically testing SIs, 'it is possible to retain community ownership of indicators, whilst improving accuracy, reliability and sensitivity' (Reed et al., 2006) p.414. For example, Reed and Doughill (2002) empirically tested SIs that have been initially developed by a community of farmers in Africa. They found that some indicators were not supported by empirical evidence due to methodological flaws in indicator development and specific (or hidden) local conditions (Reed

and Dougill, 2002). Our aim is to pursue this line of inquiry. By listening to community or citizen's reactions to an 'integrated' set of SIs, we can learn more about the indicators we test and uncover those that *should be measured* (a normative issue) rather than those that *can be measured* (a technical issue). This could help us to further unpack some of the underlying causes of local (un)sustainability.

The base for our empirical testing was three urban areas located in the North of the UK. These areas underwent extensive urban intervention over a twenty year period in order to tackle significant urban deprivation and inner-city decline; at the time of fieldwork, all three areas were part of the 5% most deprived wards nationally (CLG, 2007). 'Urban intervention' not only sought to address physical decay but also a weak economic base, high unemployment and rocketing levels of crime. The three areas were predominantly residential and seen as 'improving' and becoming 'more sustainable' following public urban intervention. They were selected from a representative pool of 140 such areas and were similar in a number of ways. They all contained between 400 and 700 two-up-two-down Victorian terraces and were inhabited by long-term populations, with many local residents 'living through' the transformation process and experiencing the area both at its lowest and following urban intervention. They all underwent large scale urban retrofitting, were located within easy access to city centres and took an active part in their growing regional city centres.

The empirical testing of our SIs involved discussions with a sample of 134 residents living in these three areas. All data was collected between the summers of 2007 and 2008. The sample was purposively weighted to reflect areas' socio-economic profiles according to six characteristics: housing tenure, economic activity, ethnic affiliation, household composition, gender and age. One potential drawback of this approach is that the sample was self-selecting and only respondents taking an active part in their areas and communities were included while 'difficult to reach' respondents were excluded. In practice, we found that a notable proportion of the interviewed

respondents in the three areas (45%, 61% and 75% respectively) were not involved at all in their localities. Another drawback of this method is that, this is a non-probability technique. This does not mean that the resulting findings are non-representative of the population. However, they should be interpreted with caution, given the potential for bias.

Each of the 134 respondents was 'talked' through a survey questionnaire. The questionnaire consisted of closed questions and had two parts. The first part explained in plain English each SI and the way SIs were developed (i.e. involving both 'experts' as well as inputs from their communities), while in the second part respondents were asked to rate the importance (to them) of each SIs on a Likert scale of 1-3 – with 1 being *very important*, 2 being *important* and 3 being *not important*. A major limitation of this approach is associated with force-choice response format which can create false opinions by giving an insufficient range of alternatives and by not taking account of respondents' reasoning. However, to overcome this problem, respondents were given the option to make comments or explain the reasons for their options. They were also encouraged to suggest new indicators and comment on the existing ones.

We analyzed the results by using a 'grading of importance' scale and discussed which indicators seemed to be 'prioritized' (i.e. received most 'very important' ratings) by respondents in each area as well as across the three areas. We then reflected on how 'local priorities' were married to current policy initiatives targeting the sustainability of urban areas and communities. We have considered initially whether to analyze these results by assigning each indicator a weight in relation to its local 'importance' within the overall set of SIs. For example, van Zeijl and Martens (2010), conditioned by a policy requirement, puts forward a weighting system (a 'dashboard' or 'rosette' of sustainability) which evaluates SIs in relation to each others, in terms of their relative 'influence' within a region. Not being conditioned by such requirement, we found it problematic from a theoretical perspective to carry out such exercise – assessing and changing weights can significantly alter overall scores and focus (policy) attention on the few 'weighty' rather than the

overall urban sustainability. Moreover, we did not aim to rank indicators or shortlist a limited number of them, but to unpack the complexity of local sustainability by observing the range of options and priorities that local people may consider within the clearly defined context of our three urban areas.

Departing from these theoretical and methodological foundations, which have also set the paper within a wider context, the following two sections proceed now to develop first an 'integrated' set of SIs, and second, test this in its originating context.

3. An 'integrated' set of urban SIs

We considered initially whether to develop a set of SIs by primarily drawing on consultation with sustainability 'experts'. Prompted by findings in the literature (highlighting the diversity of understanding, or lack thereof) we piloted a 'what is a sustainable urban area' discussion with two 'experts': one government official and one built environment professional. Despite a semi-structured interview, we found it difficult to develop a focused discussion or look at a range of aspects, as each person had an individual understanding of urban sustainability, mainly drawing on their professional experience: for example, the government official tended to focus on governance issues and delivery mechanisms such as partnerships, while the built environment professional talked mostly about urban form, buildings and design. Seeing how difficult we found it to have an effective discussion about urban sustainability with sustainability 'experts', we decided to develop first a set of SIs drawing on existing lists of SIs and normative reasoning, and then discuss the list with sustainability 'experts', local stakeholders and residents.

Consequently, five lists of SIs were 'derived from, embedded in, and engaged with the existing literature in the field' (Roybens, 2003, p.38), reflecting both the academic and policy areas of SIs.

They were:

- *Securing the Future's* list of 39 indicators of sustainable communities (HM Government, 2005);
- *Egan's* list of 46 indicators of sustainable communities (ODPM, 2004);
- *Housing Corporation's Toolkit* of 49 indicators of sustainable communities (Long and Hutchins, 2003);
- *Four Capitals'* list of 18 neighbourhood sustainability indicators (Green et al., 2005); and
- *Sustainable Seattle's* list of 40 urban sustainability indicators (AtKisson, 1999).

The amalgamation of these five lists brought together over 30 themes and 170 indicators. Many themes were similar and could be roughly grouped under the four 'pillars' in the 'prism of sustainability', embodying our preferred model of sustainability^v (Spangenberg, 2003, 2004). The core themes were:

- economic sustainability;
- social sustainability including a strand on education and health;
- environmental sustainability including both natural- and built-environment sustainability;
and
- institutional (governance) sustainability.

At this point in the selection process, however, we decided to exclude the 'education and health' strand for two reasons. First, changes in health and education outcomes are likely to occur over relatively long periods of time and so, local communities may find it difficult to perceive them. Also, ascribing causation is problematic. Second, both education and health policy take a strategic view by looking at larger geographical areas than the local scale of our target residential areas.

Our attention turned next to the over 170 indicators originating from the five lists and grouped under the four core themes. A three-filter process of selection was applied to reduce their number and identify those indicators which suited our purpose. First, the indicators had to be 'visible', perceptible and relevant at local level (and to local people). Thus, indicators such as 'household formation', 'economic output' or 'air pollution levels' were excluded as we considered them too broad to be perceived by local residents. Second, the indicators had to be a reflection of their specific urban settings – that is to say, to depict conditions which were traceable to our three urban areas. We therefore included indicators defining area deprivation and weak housing and economic markets such as 'housing price', 'jobs availability' and 'provision of training', or 'unpopular' housing areas such as 'levels of crime', 'moving in and out of an area', 'community mix' and 'area conditions'. Third, the indicators had to reflect change triggered by urban policy and investment in order to make it possible to hint at possible impacts and causal relations. For example, we found difficult to include levels of 'noise pollution' or 'groundwater' when these were unlikely to be affected by the policy of urban retrofitting that our three areas had undergone.

The result of this three-step normative process of selection was a list of urban SIs made of four core sustainability themes under which a number of indicators were grouped. This list was then presented at two academic conferences, and discussed in detail with 63 sustainability 'experts', community representatives and stakeholders from our three urban areas^{vi}.

Almost all of the interviewees questioned the absence of a 'school indicator' on our list.

...the performance of local schools is important so they should be on the list, they anchor people in one place and make them more sociable ... do you know what I mean, some people get to know other people only at the local school and supermarket, they start to have a

social network and so everybody in the community is happier... (Head of Policy and Strategy, Area 3)

...the schools were much better a few years ago...we cannot keep the community together if schools are not performing well...people with children will just leave from these areas to areas with better schools...only the elderly and unemployed will stay behind...(Community Representative, Area 2)

Durable and efficient local 'partnerships' between different local agencies and institutions, and 'housing affordability' were also mentioned as important by many.

...partnerships are important ...they pool together resources and knowledge in the area ... and also working together makes things easier and you get more things through and get the assurance that things keep running and do not stop once regeneration ends... (Local Head Teacher, Area3)

...I think that affordability is an issue and should be looked at somehow ... people talk about raising house prices ... I would be less keen to lean on house prices ... we've had a major house price increase and it may appear quite obvious that the area is not low demand anymore and therefore sustainable ... it is not really the case...people who want to live here cannot afford to do so and those who can afford don't want to live here...(Head of Research, Area1)

Moreover, the feedback from the academic conferences suggested that a list of urban SIs should include 'some kind' of health and education indicators. Though there was sympathy and understanding towards the initial reasons for their exclusion, suggestions were made to include them at least in form of 'access to' and 'performance of' local school and health services. The result of this consultation process was four new indicators on our initial list: 'school', 'GPs/health

services', 'housing affordability' and 'local partnerships'. The new list is diagrammatically illustrated in the figure below and is made of six domains of 'themed' indicators which are organized under the four pillars in the prism model of sustainability.

[INSERT Figure 1]

This is by no means an 'absolute' or 'final' set of urban SIs, but a set which aims to marry to its best 'expert' and 'citizen' knowledge of local urban sustainability in a specific urban setting, the result of normative judgement and 'end-user' consultation. Thus, these SIs, designed to measure the (un)sustainability of our selected three urban areas, may not necessarily be appropriate for measuring sustainability in another urban setting. At the same time, some indicators could be well placed under a different domain of sustainability, depending on the view one takes. For example, 'community activity' can be placed both under 'institutional sustainability' and 'social sustainability'. However, besides these detail specific interpretations, the merit of this set of SIs is that it aims to be transparent in its development and seeks to neatly fit the context it has been designed for. The next task was to find out whether this set of SIs was indeed a representation of people's values and understanding of urban sustainability.

4. Local perspectives of urban sustainability

Our set of urban SIs was then discussed with a weighted sample of 134 local residents in three urban areas. Based on a face-to-face questionnaire, the respondents were asked to rate each sustainability domain and indicator. The three possible answers were *very important*, *important* and *not important* (to them).

[INSERT Figure2]

Figure 2 shows that all six sustainability domains were rated as *very important* by a majority (over 50%) of all residents and that an overwhelming majority (over 90%) rated them as either *very*

important or *important*. Both the 'housing and built environment' and 'services and facilities' domains did not receive any *not important* ratings, and the highest percentage of *not important* ratings was a mere 8%, received for the 'resources' domain.

[INSERT Figure3]

Figure 3, in turn, confirms that our set urban SIs is a good reflection of what residents value and understand as being important for the sustainability of their local communities and urban areas. Indicators that received a higher number of *very important* ratings are located at the top of the chart, while those receiving a smaller number at its bottom. The diagram shows that a majority of residents (>50%) rated as *very important* all indicators but four: 'school', 'community activity', 'moving in and out of an area' and 'local partnerships'. All indicators were rated as either *very important* or *important* by over 60% of the total resident sample. In addition, over 50% of residents rated 22 of the 26 indicators as *very important* and over 60% rated 15 of 26. Between 80-90% of residents rated all indicators but two as either *very important* or *important* and the one 'wild card' was the 'school' indicator which received almost 40% *not important* ratings. When counting both the *very important* and *important* ratings across the three areas the results of the diagram can be summarized as follows:

- A vast majority of indicators (19 out of 26) received virtually total support, whereby more than 90% of residents rated them as *very important* and *important*;
- Four indicators received some *not important* ratings (between 15% and 20%). These were: 'income mix' (15%), 'water use' (15%), 'community activity' (18%) and 'moving in and out of an area' (21%);
- Two indicators, 'ethnic mix' and 'school' received a notable number of *not important* ratings, 28% and 37% respectively.

However, when examining how domains and indicators were rated in each area separately, a number of similarities but also notable differences emerge in relation to the analysis above. First, both the 'housing and built environment' and 'services and facilities' domains were rated by *all* residents (in all three areas combined and separately) as either *very important* or *important* for the sustainability of their communities and areas; and the 'resources' domain received the highest number of *not important* ratings (maximum 20%) when compared to the other domains. At the same time, all our domains with the exception of 'economic sustainability', depicted a similar pattern in the way residents rated their indicators both across the three areas, as well as within each area: indicators within a 'domain' followed always in the same pattern, that is to say we always found the same indicators at the top and bottom of the gradient, no matter which area we looked at.

More generally, this could mean that local people are more likely to consider 'important' for the sustainability of their communities and areas aspects that are related to the 'housing and built environment' and 'services and facilities' conditions in an area, while aspects related to the use of 'resources' in that area are seen as less salient. At the same time, the way in which residents rate indicators under each domain is relatively predictable, with the exception of 'economic sustainability'. That is to say that it seems very likely that people will always feel, for example, that 'crime and safety' is more 'important' to them than 'income mix', but it is more difficult to 'guess' whether people in one area will see 'local jobs' as more 'important' than say 'local training and skills'.

Second, the 'economic sustainability' domain presented a more heterogeneous picture. We found a lot of variation between how indicators were rated in all three areas combined and separately, as well as when comparing areas between them. For example, across the three areas 'local jobs' seemed to be the most valued indicator of 'economic sustainability'. However, only in Area1 this

was true, while in Area2 and Area3 'business activity' and 'house prices' were considered the most important indicators for area's 'economic sustainability'.

These were all reflections of local circumstances – both 'local jobs' in Area1 and 'business activity' in Area2 were 'doing well', and were specifically targeted and encouraged by local urban investment; thus, residents might have ascribed them to area's improvement and so, unanimously rated them as important. However, the 'house prices' indicator in Area3 tells us a different story – the local housing market was artificially inflated by buy-to-let activity which was fuelled in turn by large-scale demolition in adjacent areas. In consequence, most residents told us about their desire to 'cash-in' on their properties and move out of the area – a potentially strong enough motivation to make them rate 'house prices' as the most important indicator of economic sustainability? The lesson learnt here is that indicators can be a reflection of specific, and perhaps apparently insignificant, local circumstances and have different meanings and values for different communities.

From the stories above we learnt that indicators are not only measures of conditions of (un)sustainability, favored in a top-down interpretation of sustainability, but also an expression of underlying local states and processes, which only become 'visible' from a grassroots perspective. This has important policy implications: indicators are not only useful for measuring progress, but also for identifying problems, setting sustainability goals and suitable management solutions at local level. In other words, a community goal may not always be to reach a defined (policy) target/indicator but to respond to local condition(s) which impact or influence that certain target/indicator. Thus, indicators have a twofold purpose: first, they tell us where we are down the line; and second, they show us how (local) conditions operate and suggest the nature and intensity of interconnections among these conditions.

Third and perhaps the most striking finding was that the 'school' indicator received so many *not important* ratings both in the three areas combined and separately. We did not expect this, bearing in mind the notable body of literature on the importance of (good) schools in urban areas: they are important for families with children, have the potential to attract middle-class families (Gibbons and Machin, 2003) and could add up to 34% to property values (Cheshire and Sheppard, 2004). A possible explanation is that our three areas by being urban benefited from a number of nearby schools; in addition, they experienced in the past a significant loss of population, which meant that local schools were unlikely to be oversubscribed. As a result, residents had a good choice of schools and so, were more likely to think that they were not so important for the sustainability of their community.

Finally, the residents from the three areas also suggested five new indicators. These were:

- An indicator to reflect the 'variety of local jobs', in addition to the 'jobs availability' indicator. Residents commented that only low-skilled jobs were usually available in their areas which had a negative impact on people's aspirations and career development.
- An indicator to monitor not only 'levels of community activity' but also its 'quality'. Residents commented that many community initiatives and groups were created and supported through urban programmes but only few had a noticeable involvement in the local life.
- An indicator to indicate 'levels of traffic pollution'. In one urban area, residents felt, that the levels of traffic have increased significantly due to new homes being built in an adjacent area. They also complained about heavy traffic being diverted through their neighborhood as a result of wider regeneration plans and construction works in the borough.

- An indicator to show the way local urban agendas are integrated with city and regional agendas. Residents pointed out inconsistencies between local, city and wider sustainability goals including waste recycling practice and targets for new development.
- An indicator to reflect the 'provision of services and facilities for children and the elderly'. Many residents commented that despite new and upgraded facilities and services being more recently provided in their areas, little actually targeted children and the older generations.

These were nevertheless important and interesting indicators for our three urban areas and prove that our 'integrated' set of urban SIs has failed to a certain extent to capture 'what urban sustainability really meant' for the given urban setting, despite our deliberate attempts to integrate both expert and citizen knowledge of urban sustainability in this setting. But perhaps more importantly it is worth to note here that SIs are not isolated pieces of information but expressions of underlying processes, interesting per-se to study and understand. SIs do more than describing current conditions or trends. They create understanding of how a 'reality' operates, hint to the nature and intensity of links with other indicators as well as the overall sustainability system. Ultimately, they provide policy players with insights into (un)sustainable conditions or effects and opportunities to think at larger scales and could offer insights into how people's daily routines and circumstances may affect different aspects of sustainability.

5. What next for indicators?

SIs with a strong local affiliation are useful policy tools and can provide a relatively truthful image of local (un)sustainability. Moreover, understanding local underlying causes and processes that shape SIs is worth investigating – this extends our understanding of a system state's response to an intervention and promotes an ability to assess causal relations by offering insights into 'rates of change', but also improving or threatening local conditions. As Chiras and Corson (1997) argues,

this 'permits us to modify policies to address specific issues and, if necessary, enact new ones to fashion a more desirable future' (Chiras and Corson, 1997) p.66. Thus, in concluding this paper we discuss two important lessons for the future development of SIs: one regards the challenge of choosing the 'right' indicators that can act as both policy signals, but also valuable local 'barometers', while the other draws upon their ability to reflect relations among themselves and between themselves and the wider system of local urban sustainability.

First, we found surprisingly difficult to identify an 'integrated' set of SIs in a literature otherwise besieged with lists of indicators – this is not because there is no reliable sets of SIs out there, but because there is so many of them! Thus, we embarked to design such a set by drawing both on 'expert' and 'citizen' knowledge of urban sustainability. Such model was expected to facilitate dialogue and lessen tensions at various levels by employing an understandable departure point as a base for equal and democratic participation of those involved. Indeed, we found that our set of urban SIs was generally well 'supported' by residents in three urban areas. This was reassuring.

However, we also found that, despite agreement that our set of indicators generally 'fitted' well its context, new area-specific indicators were suggested when it was empirically tested at local level. For example, for one area the amount of traffic/car pollution generated by nearby private developments was considered as having an important negative impact on its community, while another area found the range as well as the quality of local jobs equally important. This means that despite its planned integration, our set of urban SIs failed, to a certain extent, to measure what it *should be measured* and capture *what urban sustainability really meant* at ground level. As Reed and Doughill (2002) finds, our initial set of 'integrated' SIs did not pick upon area specific and 'hidden' local conditions which shaped local urban sustainability – these only became visible when 'double-checked' through the lens of local communities.

The lesson we learn here is that no matter how carefully designed and 'integrated' a set of SIs is, it cannot be comprehensive at all levels: 'it only can be taken literally as it only provides an indication of conditions and problems' (Maclaren, 2007) and could fail to capture critical issues for local people. SIs development all too often is characterized by unclear methodologies and represents what experts feel could be '(un)sustainable' issues rather than citizens' portraying and understanding of the system to be sustained. As such, the search for SIs continues to be framed primarily as a technical and scientific problem rather than a political and social challenge that includes ethical and moral dimensions. Moreover, until 'agreement' (of both top and local players) on what it is that should be sustain is reached, it is impossible to identify or interpret any indicators – and this is much challenged by the social construction of sustainability which can be framed differently and can be manipulated and produced with different purposes in mind. Thus SIs are as much political and value-based as they are scientific; they are more iterative than linear, less private than public.

This leads to important social and policy implications and makes us to reflect back on our indicator selection process – what seemed obvious and important to experts at the 'top' of indicator development, seemed to be less so to citizens at its 'bottom' – as Bourdieu put it in his social positioning theory, we have an intrinsic tendency to impose researcher 'middle-class' values as mainstream. By including local values and priorities to indicator development, the focus of such indicators could shift from 'input' and 'process' to 'outcome' oriented understanding of local sustainability (McCool and Stankey, 2004) which will ultimately provide policy-makers relevant information to assess progress toward sustainability.

The lack of 'local accuracy' can conflict with the wider goals of policy and decision-making which tend to 'compartmentalize' conditions and problems and see indicators as a 'safe' and effective way to capture, monitor and deal with them. There is no blueprint but multiple pathways to urban sustainability, as areas and communities have different circumstances and priorities, and so,

devising a highly contextualized but nevertheless 'fix' set of SIs may not be the way to go. One solution here could be context specific set of SIs which is flexible enough to allow for 'sub-context'/area indicators to be included.

Second, we found that some indicators were 'valued' or 'counted' more than others in their context, which seems to be little accounted for in indicator development and sustainability evaluation. This failing results in a distorted image of urban sustainability and more importantly, could trigger the wrong policy choice. The mismatch between what indicators residents view as important for the sustainability of their communities and what indicators urban policy chooses to target can lead to further tensions between top down and local models of urban sustainability. For example policy could target indicators that are of less concern to specific local communities and neglect those of greater concern - needless to say that 'indicator prioritization' should only be seen within the whole system of local sustainability, bearing in mind the local interconnectedness and underlying processes at work that this paper discusses. 'It is only by relating a particular indicator to other measures and evaluating its importance within the system that we can make a meaningful sustainability assessment' (Zeijl-Rozema and Martens, 2010) p.15.

For example, on the one hand, we found that indicators related to physical and safety aspects of the built environment such as *housing and area conditions*, *housing state of repair* and *crime and safety* received resident's virtually total 'seal of approval', whereby more than 90% of residents rated them as *very important* for the sustainability of their communities. This goes hand in hand with past years urban policies under the 'British urban renaissance agenda' which have focused on 'image construction' (Lawless, 2006, Rhodes et al., 2005) and crime (SEU, 2001, Page, 2005) as a prerequisite for achieving sustainable intervention in deprived urban areas.

On the other hand, indicators such as *community activity* and *local partnerships* were viewed by residents as less salient in the sustainability of their areas and communities. This contrasts to

policy attempts which strongly promote public involvement (Hay, 2008, Ray et al., 2008, Maguire and Truscott, 2006, Skidmore et al., 2006) and 'joined-up' action (Cullingworth and Nadin, 2002{Cole, 2008 #553, Shelter, 2009}) as a way to catalyze urban communities. It also helps to explain why some of the more recent policy initiatives seem to swim against the tide and put in a new light the Coalition's agendas of 'Localism' and 'Big Society' which rely heavily on such community involvement and local partnering.

Finally, the local perspective of urban sustainability seems to be more complex and less 'predictable' or tangible than from its top end view. Urban areas and communities are dynamic entities and their characteristics change according to local circumstances and priorities. In other words, while still inside the prism of sustainability (Figure 1), an urban area and community can be skewed in any direction in order to respond to local priorities and needs and so, become sustainable. The recipe (urban sustainability) is the same but the ingredients (indicators) have different weights or are slightly different. This means that SIs should not be seen as 'definite' measures of local sustainability but as flexible ones, accounting for local priorities and needs.

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Endnotes

ⁱ Scholars in the late eighties and early nineties approached 'sustainable development' from an economics background (for instance, Dasgupta, 1993; Pearce, 1989) attempting to price the environment through a framework of fiscal controls and incentives (see Dresner, 2002 for a comprehensive discussion of this).

ⁱⁱ Post-positivist approaches include: critical theory, postmodernism, constructivism and normative theory.

ⁱⁱⁱ For a detailed discussion of the limitations of public participation in sustainability indicator development and application see KELLY, R. & MOLES, R. 2010. The Development of Local Agenda 21 in the Mid-west Region of Ireland: A Case Study in Interactive Research and Indicator Development. *Journal of Environmental Planning and Management*, 45, 889-912.

^{iv} For a fuller discussion of the five methods, including their limitations and strengths as well as area of use see ALKIRE, S. 2008. Choosing dimensions: The capability Approach and Multidimensional Poverty. In: KAKWANI, N. & SILBER, J. (eds.) *The Many Dimensions of Poverty* London: Palgrave Macmillan. and ROBEYNS, I. 2005b. Selecting Capabilities for Quality of Life Measurement. *Social Indicators Research*, 74, 191-215, ROBEYNS, I. 2005a. The capability approach: a theoretical survey. *Journal of Human Development*, 6, 93-114.

^v A number of theoretical models of sustainability have been pursued from the late 1980s, which culminated with the Trefoil diagram of social, environmental and economic integration, also called the 'people, planet, and prosperity' or 'triple bottom line' model (POPE, J., ANNANDALE, D. & MORRISON-SAUNDERS, A. 2004. Conceptualising sustainability assessment. *Environmental Impact Assessment Review*, 24, 595-616, PARKIN, S. 2000. Sustainable development: the concept and the practical challenge. Proceedings of the Institution of Civil Engineers. *Civil Engineering*, 138, 3-8.) More sophisticated models have emerged recently, including the 'embedded' or 'Russian Doll' model, which overlaps instead of intersecting the three dimensions (O'RIORDAN, T., CAMERON, J. & JORDAN, A. 2001. *Reinterpreting the Precautionary Principle*, London, Cameron May.), and 'the prism' model that adds governance as the fourth dimension of sustainability (SPANGENBERG, J. H. Year. New challenges need new answers. In: EPA Ireland 10th Anniversary Conference: Pathways to a Sustainable Future, , 2003 Dublin, SPANGENBERG, J. H. 2004. Reconciling Sustainability and Growth: Criteria, Indicators, Policies. *Sustainable Development*, 12.).

^{vi} 'Sustainability experts' included heads of policy, research and strategy at local and regional level, urban regeneration and neighbourhood managers, planners and designers; while 'community representative and stakeholders' included local head teachers, businesses, police, health services, housing associations and NGOs.