University of Dundee

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Al Waer, Husam; Bickerton, Ruth; Kirk, David

EXAMINING THE COMPONENTS REQUIRED FOR ASSESSING THE SUSTAINABILITY OF COMMUNITIES IN THE UK

Husam AlWaer
Ruth Bickerton
David Kirk

This paper considers how to approach the design and development of sustainable communities as an integrated process of assessment and planning in the United Kingdom. First, we review the characteristics of communities and the market, social, regulatory, and political forces that change them. Then, we outline the strategic management and operational processes through which stakeholder actions can be directed using a combination of corporate governance and professional teamwork. We set out a sustainability assessment framework to support the provision of feedforward and feedback intelligence to planning and development processes. We then conclude by discussing the challenge of enhancing the skills of design and development professionals, drawing on the results of a survey concerning the perspectives of development professionals in the UK.

INTRODUCTION

Over 6,000 local authorities across the globe have committed to planning processes to make their communities more sustainable (Connelly, *et al.*, 2012:144). Governments have incorporated sustainable development (SD) principles into their community vision statements and decision-making processes (Connelly, *et al.*, 2012). However, the progress achieved with regard to the implementation of SD and the translation of high-level goals and objectives into tangible projects and action strategies can only be described as very hesitant.

The challenge with regard to achieving sustainability rests in identifying where to focus and where to start. Our interest in this paper is in achieving sustainable communities. Adopting an integrated "whole-system" approach, this paper aims to clarify the process management issues of planning and assessment in the design and development of sustainable communities. The principles of the sustainable community provide the starting point, setting out a vision for the scope of outcomes that define that ideal. We begin by reviewing the modes of influence of the governance systems that provide boundaries and pathways for community living. We then use a typology of community-planning scenarios to highlight the differences among the scenarios' dominant interests and methods of decision making. Next, we review the qualities required in a whole-system sustainability assessment framework and conclude with an assessment of the feasibility of teamwork among professionals with different specialties. This diversity is examined using a survey of UK professionals with community-planning experience, who identified the different ways they interpret the main aspects of sustainability.

THE MULTIDIMENSIONAL NATURE OF SUSTAINABLE COMMUNITIES

Principles of Sustainable Communities

A community is considered "sustainable" when it is characterized by "the ability of the urban area and its region to continue to function at levels of quality of life desired by the community without restricting the options available to the present and future generations and causing adverse impacts inside and outside the urban boundary" (Brebbia, *et al.*, 2000, in Wallbaum, *et al.*, 2011:21). Wallbaum pointed out that this definition places the inhabitants' quality of life at center stage. Instead of focusing on the preservation of the ecological or social fabric, a sustainable community exists when community-based stakeholders' lifestyles and patterns of production and consumption do not deplete nonrenewable resources; individuals and families can live independent, fulfilling, and healthy lives; enterprise can flourish; and the cycle of renewal of the natural environment is ongoing. As such, sustainability requires the presence of interconnected and desirable social, economic, and environmental qualities that apply to the past, present, and future functioning of the community. As Roberts (2009:128) succinctly expressed,

> *Sustainable conditions require a balancing and integrating of the environmental, social and economic components of the community (the balanced development principle); satisfying the requirements of the present generation and of future generations (the futurity principle); and respecting the needs and desires of other communities locally, regionally, nationally and internationally (the equity principle).*

Communities function in open economies and increasingly depend on global communications and material resources that are externally sourced. Communities are comprised of networks and clusters of individuals whose interactions (1) are guided by the norms of social institutions and (2) build mutually supportive networks of people. While networks may not be spatially limited, clusters are defined as interactions between actors that are played out within a place or territory. These places are locations where daily face-to-face interactions occur and where the physical form and content of the local environment have been shaped over time to facilitate such interactions in

productive and meaningful activities. The spatial level may vary, but a place is considered to be hosting a community when it acquires a collective significance that residents and others acknowledge and are willing to maintain and, on occasion, enhance.

As a visionary statement bringing together the strands and time frames of sustainability, *The Egan Review* (ODPM, 2004:7) clarified the social, economic, and environmental dimensions critical to establishing a balanced community:

> *Sustainable communities meet the diverse needs of existing and future residents, their children and other users, contribute to a high quality of life and provide opportunity and choice. They achieve this in ways that make effective use of natural resources, enhance the environment, promote social cohesion and inclusion and strengthen economic prosperity.*

This statement applies two types of vision: the ability to see things clearly in the present and the ability to envision a better future. These visions are acquired through the practices of me-search, re-search, and we-search. *Me-search* entails listening to one's intuitions, preconceptions, and biases. *Re-search* investigates the past, best practices elsewhere, and current conditions. *We-search* involves listening to others and carefully observing places to build relationships, identify assets, and consider how best to leverage them (Ellin, 2012:280). Combining the three practices enables us to "co-create" a vision of what could be, while inspiring others to implement this visionary potential through collectively sharing the possibilities (*ibid.*).

The UK government (DEFRA, 2005:184-186) identified eight characteristics of a sustainable community based on the framework outlined in *The Egan Review*:

(1) "Active, inclusive and safe — fair, tolerant and cohesive with a strong local culture and other shared community activities …

(2) Well run — with effective and inclusive participation, representation and leadership …

(3) Environmentally sensitive — providing places for people to live that are considerate of the environment …

(4) Well designed and built — featuring a quality built and natural environment …

(5) Well connected — with good transport services and communication linking people to jobs, schools, health and other services …

(6) Thriving — with a flourishing and diverse local economy …

(7) Well served — with public, private, community and voluntary services that are appropriate to people's needs and accessible to all [and]

(8) Fair for everyone — including those in other communities, now and in the future."

Systems of Governance

Sustainable communities have been defined as the spatial manifestation of SD principles: "They are places where people want to live, work, prosper and enjoy a good quality of life, now and in the future" (Roberts, 2009:128). The systems affecting communities must function effectively in concert to serve these visionary principles if the principles are to be achieved.

Market systems of price-based exchange account for much of the economic interaction within and beyond communities. Markets function best when norms of cooperation and acceptance are already operating. Essential to the well-being and spirit of any community is the presence of strong norms of voluntary adherence that bind members of the community in social relationships, local networks of association, and patterns of neighborly and civic behaviors. However, the key driver promoting the development of sustainable communities is a concern about the failure of the market to deliver equal and balanced development and, of increasing significance, to ensure environmental security. Communities are also shaped by the force of statutory regulation. The practices of market exchange are moderated more or less effectively by regulatory controls that are meant to mitigate the impacts of negative externalities arising from producer and consumer behaviors. Such bureaucratic regulation is managed within formal institutional systems prescribing procedures and

obligations for stakeholder compliance. Statutory controls steer the development and management of space, defining land uses, road and building standards, and measures for the protection of the natural environment. These regulatory processes are greatly influenced by the normative practice models of several development-focused and environmental professions, including planners, engineers, surveyors, architects, and specialists in the diverse aspects of environmental protection. While the complexity of the "warp and weft" of market and social interaction evolves, the technical imperative of these professional groups is to make rational interventions that address current, specific needs. Such interventions are sanctioned by politicians who, in the representative system of central and local government, are accountable to their electorates. However, the representative model operates around cycles of annual grant receipts, varying local taxes and spending budgets, and regular and frequent rounds of elections, which all favor short-term, pragmatic action over longer-run planning.

A sustainable community requires a continuous renewal of education, healthcare, security, and other public services to support the social and economic vitality of its members. Fostering such communities has become associated with the processes related to developing the physical environment of local settlements, an approach described as "sustainable place making," or the facilitating process of stakeholder engagement, design, and development by which these outcomes might be achieved (ODPM, 2005).

Planners and architects, as a consequence of the importance their professions place on societal improvement, design creativity, and the coordination of development delivery, have been predisposed to engage in place making, often assuming the managerial role of a facilitator. Inspired by the vision of sustainability, they often adopt the managerial model of project management in their place-making endeavors. In its narrow, client-serving form, this model involves managing the integration of the technical competencies of planning the use of space, designing for accessibility, designing built forms and urbanscapes, and managing construction. The more inclusive perspective of place making expands the managerial challenge, requiring the adaptation of an appropriate structure of governance. Jessop (1997, in Miller and Lessard, 2000:135) defined this as "the complex process of steering multiple firms, agencies, and organizations that are both operationally autonomous and structurally coupled in projects through various forms of reciprocal interdependencies." In this process, the public authority works with developers and community stakeholders to resolve private and corporate interests and secure community benefits. As Miller and Floricel (2000:71) pointed out, today's "governance arrangements combine private sponsorship with institutional frameworks that take social consent [and] public-private partnerships into consideration."

A project to create a sustainable community must harness at least three sources of coherence: it must (1) build on established institutional structures at town-hall and local-community levels that ensure regulation and legitimacy, (2) use the design and evaluation know-how of professional specialists, and (3) rely heavily on managerial competencies because "shaping projects requires a competent leader with a team of partners and complementary co-specialised firms" (Miller and Olleros, 2000:110).

At the heart of the project-management model is the drive to coordinate. The model depends on a facilitator's capacity to envision, educate, persuade, and negotiate to secure coordinated action that is aligned with serving the visionary intent. The effort of structuring coalitions is required in three dimensions: (1) in the corporate dimension, it harnesses decision makers who are able to commit resources and provide institutional commitment; (2) in the professional dimension, it fosters teamwork across professional disciplines; and (3) in the community dimension, it is used to communicate with and gain acceptance from those affected by change.

To perform effectively, a facilitator needs to understand the nature of the interplay of market and social institutions within a community and their impacts on community, place, and environment. A facilitator must also be able to apply regulations mediated through the interpretations of different

types of specialist professionals and bureaucrats. Moreover, a facilitator is often the conduit for corporate financial and asset investment in the place-making process. This may be negotiated from public sources and/or private developers backed by commercial lending. The economic feasibility of development has to be recognized at an early stage by such facilitators, lest unrealistic expectations arise.

Experienced professionals recognize that the complexity of market, social, regulatory, technical, political, and investment influences is beyond the capacity of a single individual to adequately comprehend. Teamwork is required. The team must share an understanding of the processes involved in integrating thinking and a readiness to coordinate decisions required to promote a sustainable balance. Because it is the asset-owners, residents, and users of the place who will be impacted by changes resulting from development, the team must seek to align the interests and values of such stakeholders by promoting proactive processes of stakeholder and community engagement. The central interest of this paper is how such coordination and movement toward the goal of sustainability is guided and its achievement monitored.

Types of Community-Development Scenarios

UK policy has adopted the general applicability of the Egan framework to all types of community development: urban and rural, new and old, large and small. Roberts (2009:130) usefully distinguished between three types of community-development scenarios: new places, regenerating places, and evolving places.

New places
In the first scenario, new places in the UK are increasingly sponsored by a private consortium of the landowner and the developer. The local planning authority serves as a statutorily empowered steward of the larger public interest in relation to such ventures. In this context, place creation is design-led. Most often, the form and content of new places are comprehensively defined by a design and development team of built-environment professionals engaged by the private-venture sponsors. However, because of the scale of the sites and the costs involved in the development of new places, such projects must be associated with an SD market, and for this, the views of a market surveyor and the developers/investors are essential. Long-run sustainability must be enabled through the returns generated by short-run commercial marketability.

Regenerating places
In the second scenario, active intervention is aimed at the regeneration of a community or place that has suffered environmental, social, or market failure. In the UK, the project sponsors are usually public bodies, often the local authority acting in alliance with a public regeneration agency, thus aligning regulatory powers with public investment. Development action is targeted at remedying the shortcomings of the place and focusing on nonphysical actions, such as health, skilling measures, and education measures. These are intended to improve the life chances of the affected community. In this context, the change strategy is often more comprehensively elaborated. Early action to ameliorate stresses is paralleled by developments with longer time frames. In addition, attention is paid to improving market conditions with some hope of encouraging sustainable market activities.

Evolving places
With regard to the third scenario, the majority of places in the UK are not the subject of significant or exceptional intervention. Rather, they are modified through a gradual process of evolution. The profile, behaviors, and aspirations of the evolving community reflect demographic, market, and lifestyle changes. In the UK, a statutory local development plan adopted by the local planning authority sets out land-use policy and an action program to steer development over the short-to-medium terms. Development activity is incremental and responsive to the aspirations of individual property holders or, on occasion, smaller site developers. In this context, design professionals

TABLE 1. Views of the interested parties in the sustainable-community process (after CABE and DETR [2001:20]).

Parties	Primary motivations and views	Concerns for better community
Those who affect the project (Influencers)		
Landowners	Maximize returns	To the extent that profits are not diminished and other holdings are protected
Developers	Buildable, marketable, profitable, quickly delivered, and conforms to requirements	If a better designed community adds to either marketability or profitability
Investors (long-term)	Good liquidity, easy/cost effective to maintain, profitable over the long term	Successful completion of project on time and within budget
Design consultants	Meets design brief, satisfies client, individually designed, innovative	Depends on training but too often concerned with building design at the expense of urban design
Planning authorities	Protects local amenities, meets planning policies and standards, respects broad public interest, low environmental impact	Highly concerned but frequently unable to articulate requirements or concerned to the extent that wider economic and social goals are not compromised
Those who are affected by the project (Claimants)		
Local communities	Reflects local preferences, cultural and perceptual aspects of development, protects property values	Highly concerned but would often prefer no development at all
Occupiers and users	Value for money, flexible, secure, functional, usable, portrays correct image, healthy condition	To the extent that better urban design creates a more efficient work environment and is affordable

provide clients with required inputs related to specific property developments. Nonetheless, if one wants to avoid mediocrity in terms of sustainable outcomes at the place level, incremental development is better guided within a local development management framework of spatial policy shaped by adherence to sustainability principles. Successful evolution depends on establishing clear and relevant policy and effective public communications, including early and responsive engagement by the local planning authority officers charged with engaging constructively with affected neighborhood communities, development applicants, and their professional agents.

Progressing SD at the community level in the face of the conflicting demands of short-term political favor, economic development, social progress, and environmental sustainability is clearly a complex challenge (Curwell, *et al.*, 2005:36; D'Acci and Lombardi, 2010:20; Deakin, 2009a:98; Deakin and Allwinkle, 2007:77). The approaches to securing sustainable communities through place making differ for each type of development scenario, taking into account the various drivers and paces of change. Regardless, the principles of sustainability must inform the choice and mix of policy and action.

Stakeholders Involved in Creating a Sustainable Community

A stakeholder is an actor that can affect or is affected by the achievement of the organization's objectives (Freeman, 1984). Kaler (2002) distinguished between two categories of stakeholders: "claimants," those whose interests are affected by the project, and "influencers," those who affect the project. Claimants include a range of social actors with different material assets, life chances, lifestyles, and expectations. Influencers include a mix of developers, investors, design and development professionals, regulatory managers, and political actors. All stakeholders have their own take on the sustainability narrative and its implications, as suggested in Table 1. Influencers enjoy direct engagement in community-planning projects, while claimants (local communities, users of buildings and places) usually have indirect contact with project decisions and influences (Bell and Morse, 2007:100).

Often, stakeholder involvement in the planning and design of places is perceived as the origin of conflict, rather than a valuable contribution to solutions, and is undertaken without the adequate involvement of all relevant stakeholders. The interests of the young and old in particular are frequently neglected. The generic strategies for dealing with stakeholders are classified by most researchers using terms such as "monitor," "inform," "satisfy," and "cooperate," the latter only recommended if the power and level of interest of stakeholders is high (Freeman, 1984; Wallbaum, *et al.*, 2011). Consequently, Boyko, *et al.* (2005:119) observed, discussion of sustainability issues is often muted in favor of short-term gain, and decision makers are only weakly accountable for their choices.

An emphasis on technical expertise provided by professionals has been dominant to the full or partial exclusion of wider generic competencies (Roberts, 2009:138). Unsurprisingly, professional actors are not universally aware of the range of evaluation tools available for measuring sustainable-community outcomes (Deakin and Allwinkle, 2008:184). This can reflect a professional bias that exerting control over a small number of impacts that development may have on the use of resources and energy is adequate for delivering SD (Cooper and Symes, 2009:289). At the same time, it also reflects the absence of detailed and integrated investigations of SD effects beyond considerations of simple economic and environmental protection criteria. Frequently, the emphasis has been placed on applying specific or specialist (subject-specific) skills to development, often to the full or partial exclusion of wider generic (interpersonal and cognitive) competencies (Roberts, 2009:138). However, the sustainable-communities approach emphasizes widening the skills and knowledge required to assess and thus create and maintain quality places. These generic skills and capabilities are at the heart of the sustainable-communities skills and knowledge agenda, and they are required by all professional and others actors in the UK.

AN INTEGRATED ASSESSMENT PROCESS

A Process of Strategic Choice

Using the vision of a sustainable community as a guide for development activity, as we have outlined, requires establishing relevant policies, integrating planning and design activities, and thereafter, coordinating development action and enforcement. However, there are significant barriers to putting synoptic planning into practice. Key among these are the divergent interests and behaviors of the assorted range of influencers and claimants; the pragmatic short-term responsiveness of markets and political decision makers faced with presented problems; and the narrowness of institutionalized regulatory functions and the associated technical knowledge, outlooks, and skills of specialist professionals. The response is more often disjointed action. Pragmatic decision making tackles single issues without taking full account of the wider sustainability of the action. This has adverse long-run consequences, as Levine, *et al.* (2006:81) pointed out: the local solution to one part of the problem often causes unintended negative consequences somewhere else, and each step becomes more difficult in such a way that a point of diminishing returns is reached.

A whole-system approach recognizes that the interconnectedness of the entirety is activated by complex interrelationships and the conscious interests behind decisions. Instead of separate functions and control people, the approach works toward integration, inclusion, and dynamism. By bringing together functions that the 20th-century city separated (living, working, circulating, creating, and recreating) (Ellin, 2012), adopting a whole-system approach serving the principles of the sustainable community requires reconciling different interests, views, and practices. In this perspective, the process of strategic choice (Jessop and Hickling, 2005) requires progressing agreements through phases of engagement and shaping, designing, comparing, deciding, and developing issues.

To influence the reality of decision making in a pluralist environment, the whole-system approach has to gain a sufficiently powerful degree of broad acceptance. Statutory policy, local interpreta-

tion, and professional outlooks and practices have to be interwoven to arrive at multidimensional strategies and plans that can promote sustainability. Such plans have to be informed by developers and community members and in turn made acceptable to those interests. The necessary assimilation depends on forming binding relationships through engaging the mix of stakeholders in framing issues and generating options and involves negotiating and making trade-offs. Such a process of reflexive governance must be used when goals are contested and different understandings of problems are debated, noting that such reflexivity involves "a capacity to engage with the ways in which framings of what constitutes 'the system' are themselves plural, contingent and conditioned by divergent social values, economic interests and institutional commitments" (Leach, *et al.*, 2007:29).

This means of "front-end" shaping (Miller and Olleros, 2000:98) requires a process of purposeful coalition building. The vision must be harnessed into coalitions that draw on the power and knowledge of stakeholders. Planning agreements often formalize process commitments between public bodies and developers. However, their value depends greatly on the clarity and transparency with which a facilitator manages and directs the processes of stakeholder engagement. This process of strategic venturing in turn prepares the way for the deployment of project management. The latter mobilizes the professional teamwork approach, undertaking front-end problem solving, designing options, and coordinating implementation.

A useful tool in this latter process is the development of a process-management map to illuminate who should be involved, in what capacity they should be involved, and what they need to consider in order to make more informed decisions (Cooper, *et al.*, 2009:6). Process-management maps allow the goal of serving the principles of sustainability to be pursued on a coordinated basis and the building blocks of understanding and agreement to be progressively realized. Such maps help decision shapers and ultimately decision makers to make systematic progress — a superior approach to tackling the interdependent issues of sustainability through a series of ad hoc studies, as has often been done (Brandon and Lombardi, 2005:75).

An Integrated Assessment Framework

A reflexive process of planning and development directed toward the vision of promoting a sustainable community requires that targets are clear, progress is monitored, and performance is made transparent. The process of ongoing feedforward and feedback[1] of such intelligence promotes adaptive planning that recognizes complexity and relies on experimentation, learning, and capability building. Accordingly, sustainable communities need to be developed within an inclusive assessment framework. The assessment framework, adapted from Pearce (2000) and Pearce and Barbier (2000), needs to be informed by measurements and assessments that embody the following:
- the need for indicator sets that align development with a comprehensive setting of SD principles, goals, and standards;
- the importance of broadening the scope of how development is measured. The accounted costs and benefits need to include financial and nonfinancial dimensions and have both qualitative and more readily measurable quantitative impacts; and
- the importance of extending assessment time horizons (including future generations among stakeholders), recognizing the long-term consequences of actions, and anticipating long-run pathways for managing the critical path to the desired future.

Figure 1 sets out the elements of a sustainable-community assessment process framework. The figure illustrates a general process of strategic choice (adapting the model of Curwell, *et al.* [2005: 34]), covering the phases of issue shaping, setting goals and objectives, generating and comparing project options, selecting preferred solutions, implementing and subsequently monitoring those solutions, and evaluating performance. It identifies the mix of actors and the dimensions and time scales related to sustainable-community development. Different sets of actors may be engaged at different stages of the process. Contractors, for example, may not enter the process until the
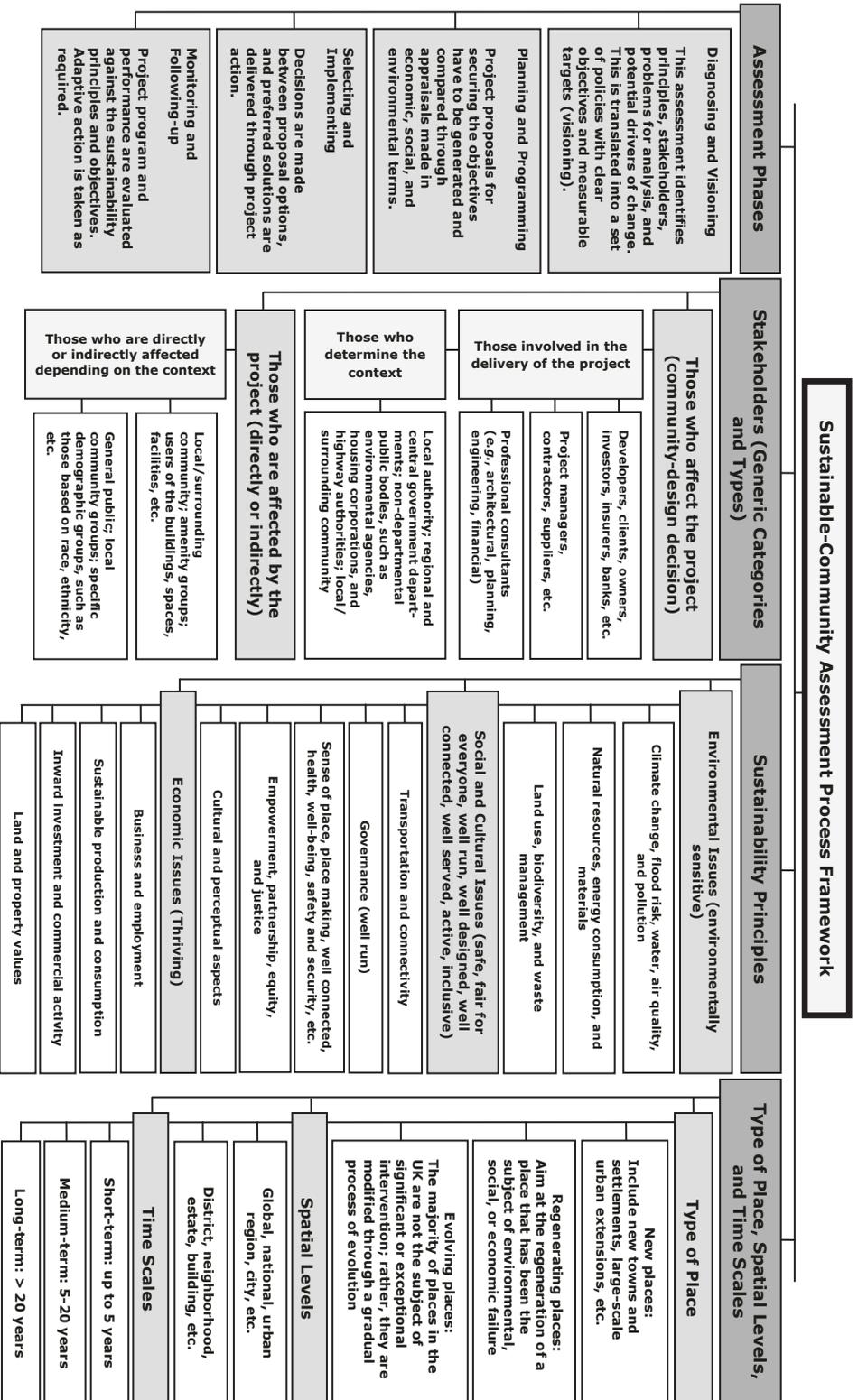
Sustainable-Community Assessment Process Framework

Assessment Phases

- **Diagnosing and Visioning** — This assessment identifies principles, stakeholders, problems for analysis, and potential drivers of change. This is translated into a set of policies with clear objectives and measurable targets (visioning).
- **Planning and Programming** — Project proposals for securing the objectives have to be generated and compared through appraisals made in economic, social, and environmental terms.
- **Selecting and Implementing** — Decisions are made between proposal options, and preferred solutions are delivered through project action.
- **Monitoring and Following-up** — Project program and performance are evaluated against the sustainability principles and objectives. Adaptive action is taken as required.

Stakeholders (Generic Categories and Types)

- **Those who affect the project (community-design decision)**
  - Those involved in the delivery of the project
    - Developers, clients, owners, investors, insurers, banks, etc.
    - Project managers, contractors, suppliers, etc.
    - Professional consultants (e.g., architectural, planning, engineering, financial)
  - Those who determine the context
    - Local authority; regional and central government departments; non-departmental public bodies, such as environmental agencies, housing corporations, and highway authorities; local/surrounding community
- **Those who are affected by the project (directly or indirectly)**
  - Those who are directly or indirectly affected depending on the context
    - Local/surrounding community; amenity groups; users of the buildings, spaces, facilities, etc.
    - General public, local community groups; specific demographic groups, such as those based on race, ethnicity, etc.

Sustainability Principles

- **Environmental Issues (environmentally sensitive)**
  - Climate change, flood risk, water, air quality, and pollution
  - Natural resources, energy consumption, and materials
  - Land use, biodiversity, and waste management
- **Social and Cultural Issues (safe, fair for everyone, well run, well designed, well connected, well served, active, inclusive)**
  - Sense of place, place making, well connected, health, well-being, safety and security, etc.
  - Governance (well run)
  - Transportation and connectivity
  - Empowerment, partnership, equity, and justice
  - Cultural and perceptual aspects
- **Economic Issues (Thriving)**
  - Business and employment
  - Sustainable production and consumption
  - Inward investment and commercial activity
  - Land and property values

Type of Place, Spatial Levels, and Time Scales

- **Type of Place**
  - New places: Include new towns and settlements, large-scale urban extensions, etc.
  - Regenerating places: Aim at the regeneration of a place that has been the subject of environmental, social, or economic failure
  - Evolving places: The majority of places in the UK are not the subject of significant or exceptional intervention; rather, they are modified through a gradual process of evolution
- **Spatial Levels**
  - Global, national, urban region, city, etc.
  - District, neighborhood, estate, building, etc.
- **Time Scales**
  - Short-term: up to 5 years
  - Medium-term: 5–20 years
  - Long-term: > 20 years

FIGURE 1. Sustainable-community assessment process framework (after Curwell, *et al.* [2005:34]).

"implementation" phase. Although conceived as a linear sequence, all of the phases of the strategic-choice process are ongoing in that they should be regularly revisited over time. Feedforward and feedback from such evaluations should be used to inform adaptations of the process in any and all phases.

Figure 2 summarizes the content of activities undertaken within each of the phases of visioning, planning, implementing, and monitoring. The framework can be used at different levels of detail, thus providing a vehicle that all decision makers can engage in but contribute to at different levels of complexity. The value of such a framework is to improve clarity, as it identifies the flow and linkage of elements in the overall assessment and development process. It provides "the ability to synthesize separate findings into a coherent whole[, which] seems far more critical than the ability to generate information from different perspectives. … Once we understand something, we no longer see it as chaotic or complex" (Gharajedaghi, 2011:89).

The indicators required to inform the strategic-choice process, which are drawn from the Egan framework, are illustrated in the overall framework. However, the role indicators play in each phase of the decision-making process differs in line with the focus of the decision making at that phase. Clarifying the use of indicators in the assessment process becomes critically important. Thus, we turn our focus to this topic in the next section.

MEASURING SUSTAINABILITY

Approaches to Measuring Sustainability

Sustainability assessment is a process by which the implications of an initiative on sustainability are evaluated (Pope, *et al.*, 2004). Although the measurement of sustainability can embrace the complexity of a full ecosystem, the assessment of sustainability is usually more focused. Saunders (2008:44) discussed the "growing appetite" for tools to measure the environmental impact of our activities and suggested this is a positive development to bring transparency to human activities. Moreover, rigor is required. Atkinson, *et al.* (2009:1) suggested, "If we are to solve the problems of sustainability, we need 'numbers — not adjectives' and must base what we do on 'evidence not public relations.' " Increasingly, assessment is perceived as a necessity, albeit a difficult one, for understanding the social, economic, and environmental requirements and consequences associated with the way we plan, design, and develop communities. However, the scope of sustainability assessment is not yet settled, with recent studies showing wide variety in its interpretations (*e.g.*, Walton, *et al.*, 2005).

The task is made difficult because there are two classes of environmental-assessment methods: those providing environmental valuations and those assessing the sustainability of development. The latter may be measured using conformance- or performance-based evaluations (Alexander, 2006). Performance yardsticks allow for comparisons of the environmental impact of different developments and highlight where design improvements may be required.

Environmental valuations are most useful in the diagnosing and visioning phase. Ex ante assessments provide an index of the multifactor conditions of the project (Deakin, *et al.*, 2007:440). Such a diagnosis informs the stakeholders' discussions of the matters of concern. It may also be useful to support these exchanges with a study of the causes of the problematic conditions and an understanding of the consequences of not responding. Environmental evaluation should be the start of a monitoring process involving ongoing and ex post facto dimensions.

Conformance- or performance-based assessment tools can be used to consider aspects of the built environment. They are particularly focused on the "micro" scale of buildings, but sustainable
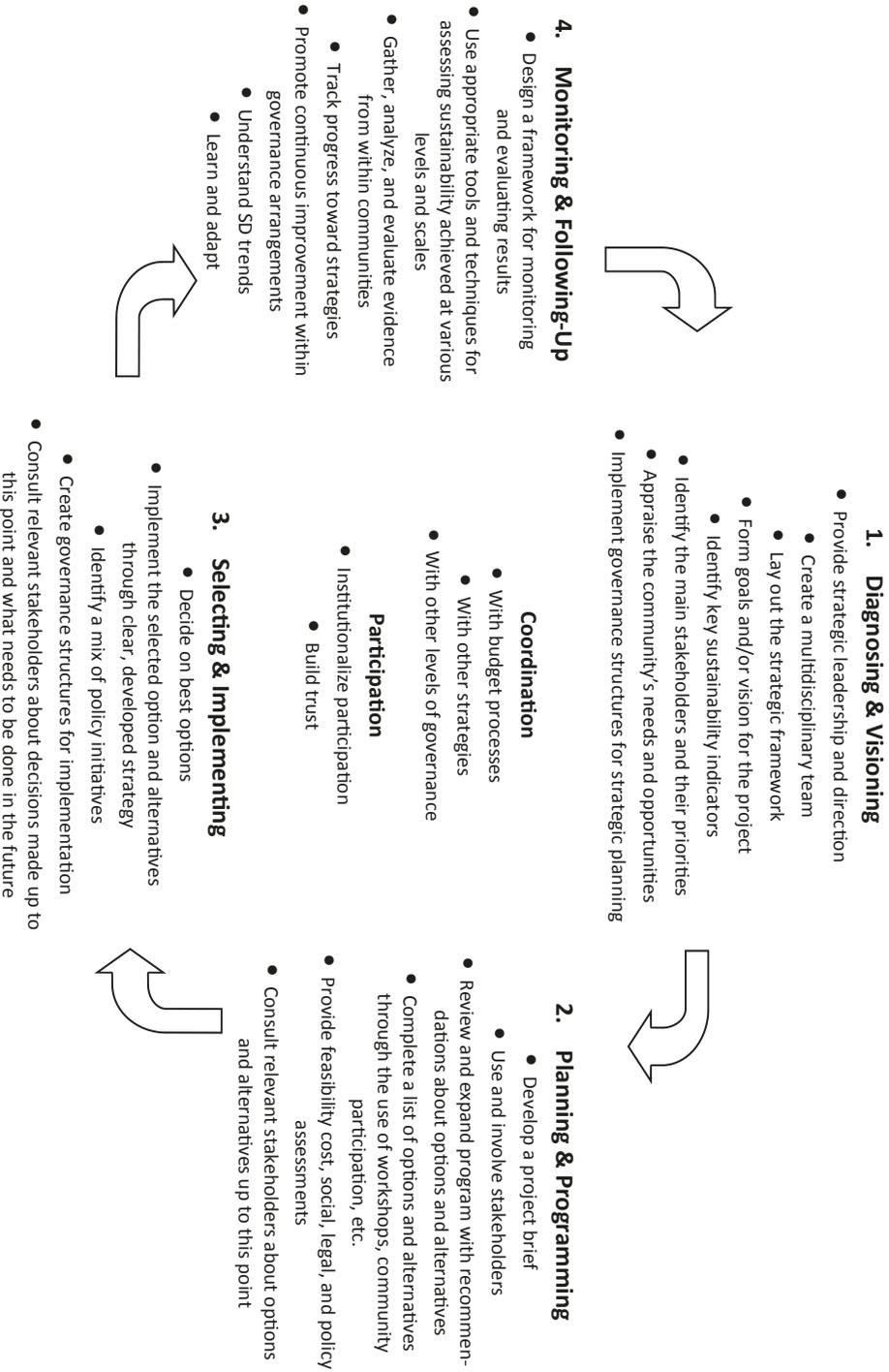
1. Diagnosing & Visioning

- Provide strategic leadership and direction
  - Create a multidisciplinary team
  - Lay out the strategic framework
- Form goals and/or vision for the project
  - Identify key sustainability indicators
- Identify the main stakeholders and their priorities
- Appraise the community's needs and opportunities
- Implement governance structures for strategic planning

2. Planning & Programming

- Develop a project brief
  - Use and involve stakeholders
- Review and expand program with recommen- dations about options and alternatives
- Complete a list of options and alternatives through the use of workshops, community participation, etc.
- Provide feasibility cost, social, legal, and policy assessments
- Consult relevant stakeholders about options and alternatives up to this point

3. Selecting & Implementing

- Decide on best options
- Implement the selected option and alternatives through clear, developed strategy
  - Identify a mix of policy initiatives
- Create governance structures for implementation
- Consult relevant stakeholders about decisions made up to this point and what needs to be done in the future

Coordination

- With budget processes
- With other strategies
- With other levels of governance

Participation

- Institutionalize participation
- Build trust

4. Monitoring & Following-Up

- Design a framework for monitoring and evaluating results
- Use appropriate tools and techniques for assessing sustainability achieved at various levels and scales
- Gather, analyze, and evaluate evidence from within communities
- Track progress toward strategies
- Promote continuous improvement within governance arrangements
  - Understand SD trends
  - Learn and adapt

FIGURE 2. Process map showing the content of activities undertaken with each phase of the sustainable-community assessment process framework (after Boyko, *et al.* [2005:121]; Deakin and Allwinkle [2008:184]; Swanson, *et al.* [2004:7]; and Volkery, *et al.* [2006:2050]).

communities have to be evaluated at a higher scale. Performance-based assessment has to take stock of the specific environment of neighborhoods, businesses, educational facilities, etc. that constitutes the place called a community. The infrastructure and environment of the place have to be considered. These assessments are concerned with the location of the settlement and its design in terms of built form and layout. The value of assessing sustainability at the community level is that it allows you to evaluate settlement patterns in terms of the qualities needed to safeguard communities against changes that are seen to threaten them, such as loss of identity arising from the coalescence of settlements and break up of communities (Deakin, *et al.*, 2007:441).

Sustainability Indicators

The purpose of sustainability assessment is to provide decision makers with an evaluation of the impacts on nature of global to local changes of society systems from short- and long-term perspectives. These evaluations then assist decision makers in determining which actions should or should not be taken in an attempt to make a community or society sustainable (Kaatz, *et al.*, 2004).

Measuring sustainability can be approached in two stages: first, the progress made in selected individual fields is measured by way of sustainability indicators. Second, the overall progress made toward SD is assessed by a combination of the individual fields with regard to their interaction (Warhurst, 2002). Using sustainability indicators helps decision makers be more informed about the impact of future developments based on an understanding of past experiences. Additionally, the use of indicators can improve decision makers' knowledge, practice, and achievement of sustainability by providing a basis for analysis, mediation, or decision making (Balsas, 2004).

However, indicators are developed through processes that are often ad hoc and lack a structured framework or consensus on what urban sustainability is (Alberti, 1996; Bossel, 1998; Deakin, 2009b; Deakin, *et al.*, 2002; Lombardi and Cooper, 2009; Mitchell, 1997). Generally, indicators are used to evaluate the performances of projects, communities, companies, buildings, sectors, and countries as they relate to one of the three dimensions of sustainability: environmental, economic, and social (Xing, *et al.*, 2009). The challenge in measuring the sustainability of communities is to establish a single framework of indicators that harnesses all three dimensions. It is the ease with which an indicator communicates to its target audience that largely determines its use. However, because SD is a multi-stakeholder process, the chosen indicators must communicate to a variety of different actors and disciplines (D'Acci and Lombardi, 2010:21).

One challenging aspect of indicators is finding the most relevant comparables. Whatever sustainability parameter is to be examined, it is easiest to understand the indicator as a basis of comparison over time and against benchmark standards of minimum acceptability and high performance. Such benchmarks help inform the importance given to the parameter in the planning and design process. The main challenge is how to reconcile the centralized approaches needed to produce standard comparable indicators and the decentralized nature of most decision making affecting sustainability (Lombardi and Cooper, 2009; Lombardi, *et al.*, 2010).

Although empirically based knowledge must validate the relevance of chosen indicators, the interests and needs of the particular groups involved in the selection of indicators must be recognized (AlWaer and Clements-Croome, 2010:800; AlWaer and Kirk, 2012; AlWaer, *et al.*, 2008a, 2008b). Stakeholder engagement processes can be seen as an opportunity for the actors to share each other's values, where "trust and knowledge are generated and circulated, to provide a foundation of social and intellectual capital upon which collaboration can build" (Healey, 1997:247). Thus, the sustainability assessment framework needs to be customized to the needs and capabilities of the spectrum of actors involved in accordance with the phases and specific steps of the planning and development cycle.

Time scales

Time scale is a source of uncertainty in assessing SD. Different indicators may optimally be measured in different time frames. The use of "snapshots" allows the sustainability level of any project to be assessed at a particular time. Some indicators, such as valuable information about trends in climate change and patterns of energy and water consumption, are ideally viewed over long time frames. For instance, energy consumption in buildings is best looked at in scales of five to 10 years, while land degradation requires scales of 20-100 years. Harrington (1992) proposed that some elements are ideally looked at over even longer time frames. "When using long-term measuring series, the observer gets clear indications about development trends" (Dalman, 2002). These different time frames could certainly be a challenge to the achievement of sustainability, unless one considers historical trends as a limit for this dimension. Thus, as a rough expedient, when assessing the sustainability of communities, three time scales, which represent the normal scales used in economic and strategic planning, are often adopted: short term (up to five years), medium term (five to 20 years), and long term (more than 20 years) (Curwell, *et al.*, 2005).

A key challenge for sustainable communities and their indicators is to reflect time lags, the trade-offs between the short term and long term, and the distinction between "weak" and "strong" sustainability (D'Acci and Lombardi, 2010:21). For example, the three pillars of SD are characterized by different time scales. Environmental systems evolve gradually and have longer time lags between cause and effect than economic systems. The methods used by the disciplines that study the different pillars also exhibit a parallel mismatch in time scales. This makes it difficult to present sustainability to decision makers, who tend to act on experience rather than insight and therefore take action only when a problem is observable, not when a problem is predicted, especially if the prediction is uncertain (*ibid.*).

Spatial levels

The measurement of environmental effects and socioeconomic implications can be felt from the local level to the global level (Curwell, *et al.*, 2005:35). There are cultural and social variations between local and regional levels, and measuring sustainability may vary from one region to another (for instance, between northern Europe and the Mediterranean), even when the same criteria are applied. A flexible assessment approach is therefore required to allow users to consider spatial boundaries while retaining an understanding of what is being changed and why (Todd and Geissler, 1999).

Decisions about where to define the community-system boundaries play a major role in determining spatial scale. Assessment methods have only recently been designed to handle community-specific issues (Birtles, 1997; Cole, 1997; Todd and Geissler, 1999:249).

It is important to note that assessment tools have been developed with a particular country in mind. They are not all universally applicable, as some countries will find some categories to be more important than others. For example, after comparing three building rating methods — the Building Research Establishment Environmental Assessment Method (BREEAM), Green Star, and Leadership in Energy and Environmental Design (LEED) — Saunders (2008:41) concluded, "It is reasonable to assume … that none of the schemes travel well if used in countries other than those which the system was initially designed to work in. It therefore suggests that, where used outside the native country, any of the systems should be tailored to take account of the local context."

STAKEHOLDER PERCEPTIONS

The foregoing considerations affect the measurement of sustainability and question the extent to which a teamwork approach can be applied in community contexts to pursue the formation of a strategy, plan, and programs for implementing development change. Central to the notion that

coordination based on corporate project management can be viable is the idea that comprehensive measurement and transparency of results are powerful influences that provide for reflexive learning and adaptive planning.

Teamwork depends on harmonizing the diversity of perceptions held by design and development professionals. The range of that diversity presents a significant challenge to promoting a whole-system approach. We consulted a sample of stakeholders to establish how perceptions influence professionals' thinking about the sustainability of a community.

Survey Method

The survey used for this research sought to (1) identify which indicators professionals consider to be important when evaluating a new development scheme and (2) establish how their professional perceptions influence their thinking about community planning and design.

The initial step was to select an indicator set that accounted for the planning and design of a sustainable community in relation to the local environment, culture, economy, and business goals (AlWaer and Clements-Croome, 2010:800). We assembled an appropriate list of core-category indicators after reviewing the literature. Each core category combined various aspects of a given phenomenon into a common unit of measurement (D'Acci and Lombardi, 2010:22). The core categories had to be compact, covering all relevant aspects of the phenomenon (Bossel, 1999:7). We matched the main principles of the Egan framework with the selected categories in accordance with the requirements of a sustainable community. The core categories' coverage was consistent with the UK government's definition of sustainable communities (DEFRA, 2005:184-186) (see Table 2).

We used the following core categories in the questionnaire: climate change; resources; ecology; transport; community; sense of place; empowerment, partnership, and equity; business and employment; and sustainable production and consumption. Lower-priority aspects can be taken into account in a later phase of the planning process without compromising the level of sustainability achieved by the project as a whole (Wallbaum, *et al.*, 2011:23). We limited the selected categories to those with standardized measurements that could be compared to targets, thresholds, or other standards. Accordingly, we chose the selected core categories by adopting existing SD indicators from the most frequently used sustainability assessment method in the UK, BREEAM Communities (BREEAM, 2009). We then supplemented those with additional categories adapted from sustainability indicators used in tools developed by other countries, such as the LEED for Neighborhood Development program in the U.S. (U.S. Green Building Council, 2007, 2009). We also added additional indicators related to equity, empowerment, and sustainable production, based on the list of categories in the Inspire East Excellence Framework (which itself builds on the aforementioned Egan framework but adds the "equity" category) (Inspire East, n.d.).

We then selected subcategories for each category using categories from BREEAM Communities, Inspire East, and elements of the Urban Design Compendium (Llewelyn Davies Yeang, 2000). One of the questions on the survey was whether stakeholders felt the list of core categories and subcategories was comprehensive.

The second step was to conduct a survey inviting professionals from several disciplines (planners, architects, economists, and engineers) who were working in the UK to participate. They were invited to give their views on the appropriateness of the core categories (composite indicators) and the relative importance of the subcategories. These individuals were viewed as "influencers," stakeholders defined as skilled individuals with extensive training and some specialist knowledge, whose opinions would provide an accurate reflection of the selection attributes and their relative importance (Waterman and Bourke, 2004). The focus of the survey was on identifying which categories these professionals considered to be important when evaluating a new scheme. We

TABLE 2. Match of questionnaire criteria to the UK government's definition of sustainable communities.

Core categories	Subcategories	Characteristics of sustainable communities							
		Active, inclusive, and safe	Well run	Environmentally sensitive	Well designed and built	Well connected	Thriving	Well served	Fair for everyone
Climate change	Flood risk			X					
	Energy and water efficiency			X					
	Renewable energy schemes			X					
Resources	Land use and remediation			X					
	Site selection			X					
	Material selection			X	X				
	Waste management			X	X				
	Energy and water use during construction			X	X				
	Modern methods of construction			X	X				
Ecology	Maintaining/enhancing habitat species			X					
	Green corridors			X					
	Ground pollution			X					
	Planting and landscaping schemes			X					
Transport	Walkable neighborhoods	X				X			
	Cycle networks	X				X			
	Provision of public transport	X				X			
	Clear public-transport routes	X				X			
Community	Community engagement and resilience		X				X		X
	Sustainable lifestyles		X				X		
	Community-facilities management		X				X	X	
	Accessibility to community and social facilities	X	X						
	Mixed-use/pepper-potting of employment and jobs	X				X	X	X	
	Affordable housing	X							X
Sense of place	Defensible space				X				
	Legibility				X	X	X		
	Active frontages				X		X		
	Accessible play and green space	X		X	X				
	Secured by design	X			X				
	Density			X	X				
	Designed for all social groups	X						X	X
Empowerment, partnership, and equity	Enable cooperative social networks	X	X	X					X
	Empower people and foster participation	X			X				X
	Future proofing and freedom	X							X
Business and employment	Inward investment						X		
	Local employment						X		
	Variety of employment space options						X		
	Retail						X		
Sustainable production and consumption	Sustainable food				X			X	
	Sustainable resource development and utilization				X			X	
	Protection of terrestrial resources				X			X	

presented 46 professional stakeholders from both industry and academic institutions with the proposed core categories and subcategories using an online survey. The response rate was 72% (n = 33). The split of stakeholders who responded by expertise is shown in Table 3.

TABLE 3. Stakeholders who responded to the questionnaire.

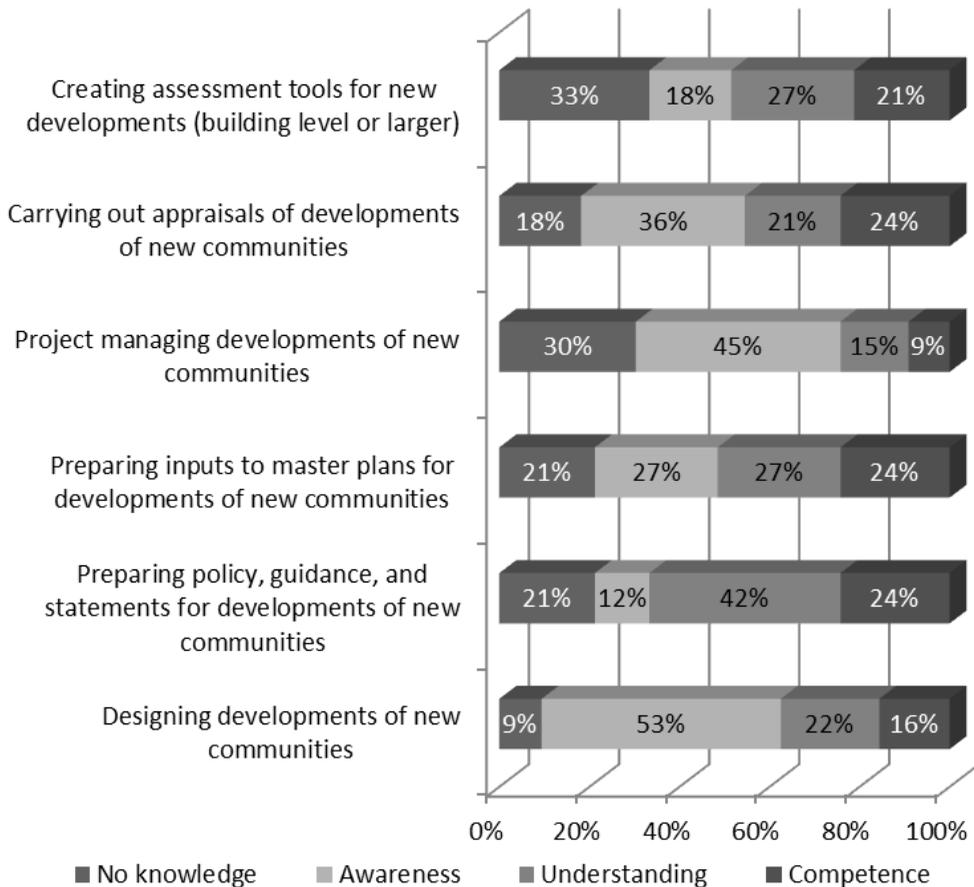| Expertise	No. of stakeholders	% of total
Planners	19	58%
Economists	7	21%
Architects	5	15%
Engineers	2	6%
Total	33	100%

FIGURE 3. Self-reported competencies of stakeholders.[2]

Figure 3 shows how stakeholders rated themselves in terms of professional competencies. Stakeholders generally felt they had at least some awareness in most of the capacities, although 33% of them stated they had no knowledge about how to create assessment tools for new developments, and 30% had no knowledge about using project management to develop new communities. This shows the difficulty in identifying suitable respondents for such a questionnaire. However, 24% of stakeholders felt they were "competent" in carrying out appraisals of developments of new communities; preparing inputs to master plans for developments of new communities; and preparing policy, guidance, and statements for developments of new communities.

We asked stakeholders whether their response was specific to a particular region of the UK because assessments of new developments can vary in different parts of the UK. For example, it may be easier in some regions to carry out development on previously developed land (*e.g.*, the
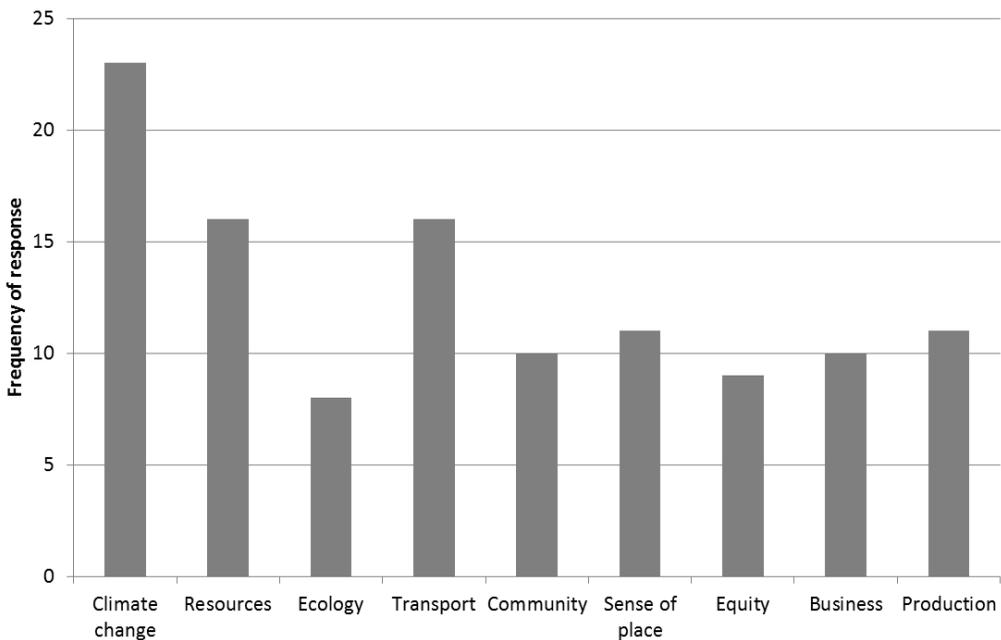
FIGURE 4. Importance placed on core categories by stakeholders.

northwest section of England has around 11,000 ha of unused, previously developed land compared to around 4,000 ha in London [Department for Communities and Local Government, 2008:11]). This is reflected in the BREEAM Communities scoring system, which assigns each English region its own weighted category based on regional policy priorities. Only one stakeholder suggested their response was specific to a region.

The "Toolkit for Sustainable Rural Communities" highlights rural areas as requiring their own specific assessment categories (Roger Tym and Partners and Rural Innovation, 2008:8). Thus, the survey also included a question asking whether stakeholders felt this was an important aspect to consider in developing an assessment tool and what issues in particular might be pertinent to rural areas. Sixty-four percent of stakeholders felt that specific issues should be dealt with in more detail for rural areas. They highlighted the following issues as important: transport, access to local services, broadband linkages, community facilities, affordable housing, design, conservation of existing settlement patterns, ecological issues, landscape protection, access to local employment, and ability to provide food locally.

The purpose of the questionnaire survey was to identify stakeholders' perceptions regarding which issues have the most significant impact on the development of sustainable communities. Questionnaire participants were asked to indicate the relative importance of each of the listed core-category issues on a scale of one to five (1 = not important at all, 2 = of some importance, 3 = important, 4 = very important, and 5 = extremely important). Respondents were asked to weigh the subcategories in each core category according to their view of the subcategory's importance. The weights of the subcategories in each of the eight core categories added up to 10.

Survey Findings

Figure 4 shows the importance stakeholders placed on the core categories. Generally, stakeholders perceived climate change as the most important, followed by transport and then resources. They perceived ecology as the least important.
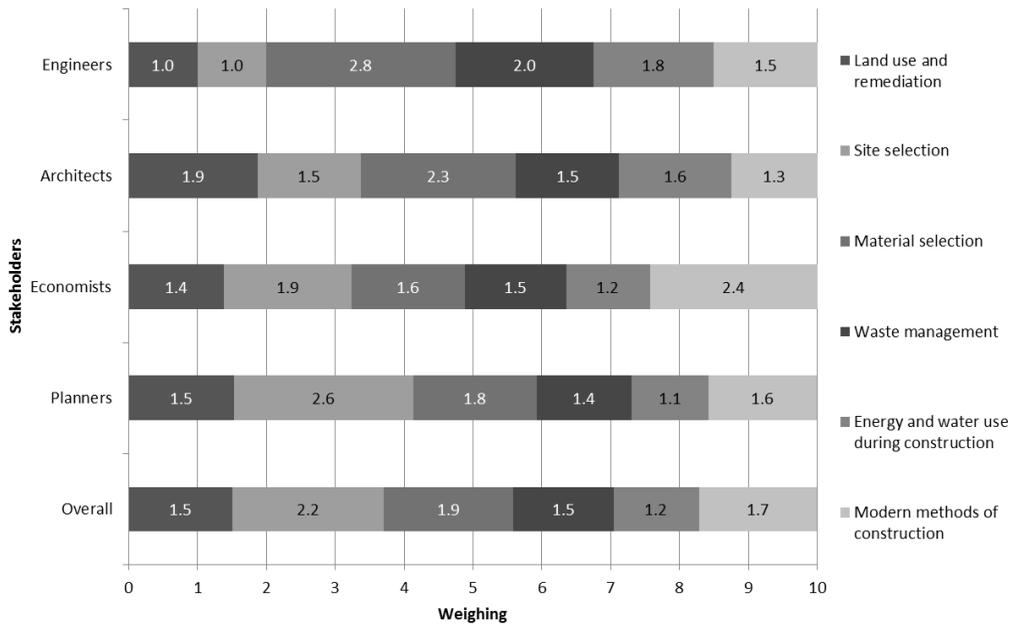
FIGURE 5. Relative weighing by stakeholders of subcategories in the "resources" core category.[3]

The overall results show various stakeholders attached different levels of importance to the core categories and subcategories. For example, Figure 5 illustrates the importance stakeholders placed on the subcategories in the "resources" core category. As the figure shows, engineers weighed material selection much more heavily than did the other stakeholder groups, while planners weighed site selection more heavily. This reflects the relative interests of these professions. Engineers have a greater interest in what is used to build a site and the life cycle of the materials selected, whereas planners are more involved with site selection with regard to compatibility with the neighboring environment and land-use requirements. Figure 6 illustrates the importance stakeholders placed on the subcategories in the "sense of place" core category. As shown in the figure, architects weighed "active frontages" more heavily than the overall group, while engineers weighed "secured by design" more heavily and emphasized "density" less.

The survey findings illustrate how professional stakeholders hold somewhat different perceptions of how to create a sustainable community. The findings are consistent with those reported by the Commission for Architecture and the Built Environment and the Department of the Environment, Transport and the Regions (CABE and DETR, 2001:19) that perceptions "vary between stakeholders and will depend on the audience perceiving them rather than on the exact nature of the development." An architect may have a very different perception of what makes a good urban environment compared to an engineer or an estate manager charged with its upkeep, while a developer may perceive the added value in a development very differently than a local resident (*ibid.*).

DISCUSSION

The central interest of this paper is how the process of planning and development is informed, coordinated, and directed toward attaining the vision of a sustainable community. The visionary nature of sustainability and its multidimensional qualities provided our starting point. A review of the literature confirmed that corporate engagement with developers, politicians, and communities is required to build strategic coalitions based on interest and intent. We concluded that the com-
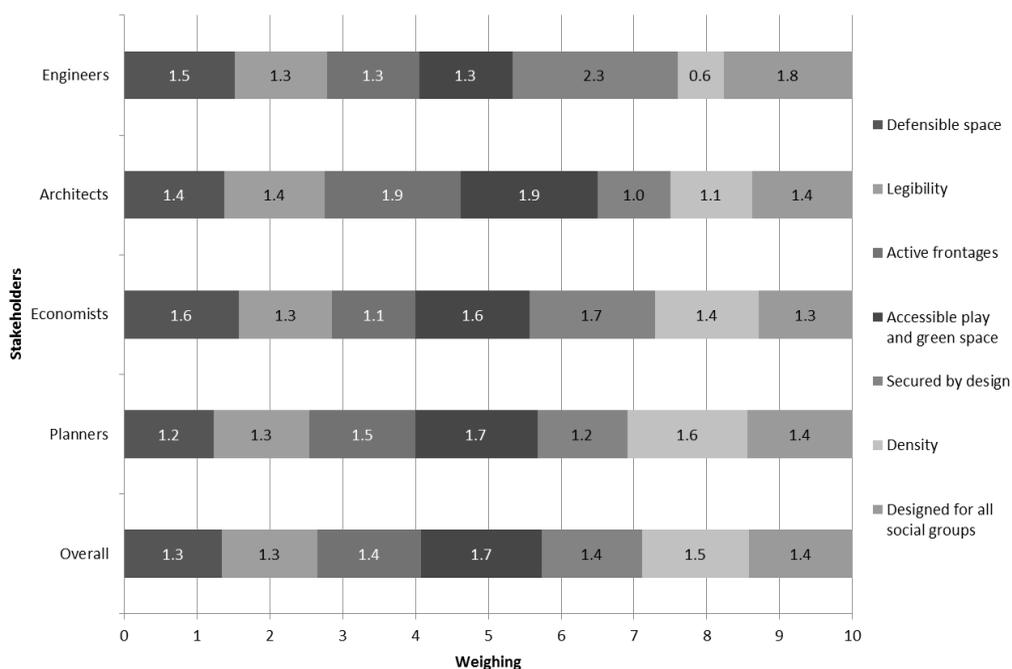
FIGURE 6. Relative weighing by stakeholders of subcategories in the "sense of place" core category.[3]

plexity of the sustainability challenge requires strong governance; a venture sponsor who can build effective public/private partnerships; and an effective teamwork approach in place to harness a mix of professionals, with leadership provided through a coordinating facilitator. We further considered the function of sustainability assessment in the process of strategic choice to provide feedforward and feedback, enabling planning to adapt in light of learning from engagement and experimentation. This assessment should be used to design ways to bring together the many activities performed by various stakeholders in new and self-sustaining relationships. In short, we concluded that a system of corporate project management governance is required to drive and coordinate the deliberate pursuit of sustainability.

Aristotle called this "second-road thinking" based on the insight that complex problem solving requires admitting voices of difference (Newman and Jennings, 2008:157). Innovative solutions to the "wicked" problems related to developing sustainable communities frequently require engaging with different perspectives but ultimately adopting a collective way of thinking (*ibid.*). As Xing, *et al.* (2009:216) pointed out, "Stakeholder engagement is an important element for improving confidence in a sustainability assessment. Further, it is often argued that sustainability issues can most adequately be addressed through the development of more transparent, integrated and dialogic approaches to modelling."

That developing sustainable communities must be a collective process is underlined by the need for integrated assessment. This requires an "interdisciplinary process of combining, interpreting and communicating knowledge from diverse scientific disciplines in such a way that insights are made available to decision makers" (Rotmans, 1998:155). And as Kaatz, *et al.* (2005) argued, collective decision shaping is required because stakeholder participation brings legitimacy and transparency when compromises are needed. In this line, Weaver and Rotmans (2006:12) suggested that sustainability assessment should be understood as a "cyclical, participatory process of scoping" through which a "shared interpretation of sustainability … is developed." Moreover, designing with a narrow set of stakeholders results in a skewed account of the importance of topics. The

stakeholder survey discussed above clearly shows the differences in priorities when different types of development professionals are involved in identifying the most important aspects of defining a sustainable community. Mathur, *et al.* (2008:607) suggested that assessments would be improved by "continuous dialogue where stakeholders have the opportunity (and are encouraged) to reflect on and reconsider their views in the light of … other stakeholders."

Society seeks to create more sustainable communities, yet the assessment of sustainability at the community level is difficult (Deakin, 2009b:235). A reflexive system of corporate governance that commits powerful stakeholders to direct and oversee the adaptive project management process through which a multi-professional team coordinates the planning and implementation of action is critical to the strategic planning process. The measurement of sustainability and transparency evident in the communication of results is vital to ensuring that the process remains flexible, accountable, and effective throughout the development period.

The assessment of community-development sustainability should not be a separate technical process. Instead, it should be closely integrated with inclusive governance structures and decision-making processes (Deakin, 2009b:241; Mathur, *et al.*, 2008:606). The sustainability assessment framework developed in this paper clarifies the relationship between the planning process and its governance, informed by assessment intelligence. The value of the framework is to provide sign-posting to help progress decision making. However, the discussion of sustainability measurement highlighted the problems related to choosing a type of assessment tool, identifying issues regarding local specificity, and recognizing the time scales of change. Professional judgments wrestle with such matters and the variability among stakeholder perceptions, themselves formed from differing biographies of experience and professional education. These discussions highlight the importance of perceptions in interpreting priorities when planning at the community level.

The reality, as evidenced by the survey findings, is that different stakeholders will hold and act on different perceptions. This has to be taken into account in any multidisciplinary evaluation process. Delivering sustainable-community planning will require that professionals cross boundaries, including the interface of private and public exchange. These crossings will be needed to ensure the effective integration of both explicit/professional and tacit/lay forms of knowledge into more deliberative forms of practice (Cooper, 2009:118).

The survey findings illustrated an adherence to the "subject specific." There is a need for the core occupations to redress this and expand their knowledge and skills toward the social and cognitive competencies that require sharing experience and insights.

This paper affirms the process of developing a shared framework for planning and assessing sustainable communities. Evaluation is an essential element of a responsive planning process and has to be structured and articulated within the process from the beginning. A key conclusion of this research is the importance of the process of sustainability assessment as a learning tool within a teamwork culture that is receptive to a plurality of views. Provision for communication and engagement to achieve collectively supported decision making at every stage in the planning process must be hard-wired into the governance system of assessment for the development of sustainable communities.

NOTES

1. Feedback refers to learning from the outcomes of action. Thus, feedback controls are used to recognize the actual impacts and consequences of planned interventions. Alternatively, feedforward intelligence directs the selection of interventions intended to bring about desired change in the future. Feedforward intelligence is concerned with anticipating future changes in the external environment and using acquired understanding to envision how positive change to the emerging future can be secured using selective interventions. Indicators are

used to frame the gathering and interpretation of both feedback and feedforward intelligence. The complexity of environmental factors of place, time, and stakeholder mix inevitably require the adoption of "core" indicators that are appropriate for the individual environment and development nexus. The selection of such indicators is a key determining activity in the overall planning process.

2. The percentages in the figure may not add up to 100 due to rounding.

3. The percentages in the figure may not add up to 100 due to rounding. In addition, the "overall" numbers given in the figure represent the mean score of all 33 survey respondents, regardless of their expertise.

REFERENCES

Alberti M (1996) Measuring urban sustainability. *Environmental Impact Assessment Review* 16(4-6): 381-424.

Alexander E (2006) Dilemmas in evaluating planning, or back to basics: What is planning for? *Planning Theory and Practice* 10(2):233-244.

AlWaer H, Clements-Croome DJ (2010) Key performance indicators (KPIs) and priority setting in using the multi-attribute approach for assessing sustainable intelligent buildings. *Building and Environment* 45(4):799-807.

AlWaer H, Kirk RD (2012) Building sustainability assessment methods: Engineering sustainability. *Proceedings of the Institution of Civil Engineers* 165(4):241-253.

AlWaer H, Sibley M, Lewis J (2008a) Different stakeholder perceptions of sustainability assessment. *Architectural Science Review* 51(1):47-58.

AlWaer H, Sibley M, Lewis J (2008b) Factors and priorities for assessing sustainability of regional shopping centres in the UK. *Architectural Science Review* 51(4):391-402.

Atkinson C, Yates A, Wyatt M (2009) *Sustainability in the built environment: An introduction to its definition and measurement*. London: BRE Press.

Balsas CJL (2004) Measuring the liveability of an urban centre: An exploratory study of key performance indicators. *Planning Practice and Research* 19(1):101-110.

Bell S, Morse S (2007) Story telling in sustainable development projects. *Sustainable Development* 15(2):97-110.

Birtles AB (1997) Environmental impact evaluation of buildings and cities for sustainability. In PS Brandon, PL Lombardi, and V Bentivegna (Eds.), *Evaluation of the built environment for sustainability*. London: E&FN Spon, pp. 211-223.

Bossel H (1998) *Earth at a crossroads*. Cambridge, UK: Cambridge University Press.

Bossel H (1999) *Indicators for sustainable development: Theory, method, applications*. Winnipeg, Canada: International Institute for Sustainable Development.

Boyko CT, Cooper R, Davey C (2005) Sustainability and the urban design process. *Proceedings of the Institute of Civil Engineers: Engineering Sustainability* 158(3):119-125.

Brandon P, Lombardi P (2005) *Evaluation of sustainable development in the built environment*. Oxford, UK: Blackwell.

BREEAM (2009) BREEAM communities: SD5065B technical guidance manual. http://iristor.vub .ac.be/patio/arch/pub/fdescamp/bruface/sustainability/BREEAM_Communities _Technical_Guidance_Manual.pdf. Site accessed 17 June 2013.

CABE, DETR (2001) *The value of urban design*. London: Thomas Telford Publishing.

Cole RJ (1997) Prioritizing environmental criteria in building design and assessment. In PS Brandon, PL Lombardi, and V Bentivegna (Eds.), *Evaluation of the built environment for sustainability*. London: E&FN Spon, pp. 183-199.

Connelly S, Roseland M, Markey S (2012) Building community capacity for strategic sustainability. In H Tigran (Ed.), *Sustainable urbanism and beyond*. New York: Rizzoli International Publications, Inc., pp. 144-147.

Cooper I (2009) Sustainable urban development and the professions in the UK: Moving from a "zero sum game" towards more deliberative practice? In I Cooper and M Symes (Eds.), *Sustainable urban development, Vol. 4: Changing professional practice*. Abingdon, UK: Routledge, pp. 99-126.

Cooper I, Symes M (2009) *Sustainable urban development, Vol. 4: Changing professional practice*. Abingdon, UK: Routledge.

Cooper R, Evans G, Boyko C (2009) *Designing sustainable cities*. Oxford, UK: Wiley-Blackwell.

Curwell S, Deakin M, Lombardi P (2005) The BEQUEST framework: A vision and methodology. In S Curwell, M Deakin, and M Symes (Eds.), *Sustainable urban development, Vol. 1: The framework and protocols for environmental assessment*. London: Routledge, pp. 19-42.

D'Acci L, Lombardi P (2010) MuSiC — a new multi-scalar index for evaluating sustainability in cities. In S Lehmann, H AlWaer, and J Al-Qawasmi (Eds.), *The Second International Conference on Sustainable Architecture and Urban Development, Vol. 3*. Amman, Jordan: The Centre for the Study of Architecture in the Arab Region Publications, pp. 19-34.

Dalman E (2002) Key factors and indicators — how do we use them? Proceedings of the Sustainable Building (SB) 2002 Conference. http://www.sbis.info/database/dbsearch/details/docsdetails.jsp?index=0. Site accessed 6 August 2013.

Deakin M (2009a) A community-based approach to sustainable urban regeneration. *Journal of Urban Technology* 16(1):91-112.

Deakin M (2009b) The search for sustainable communities: Ecological integrity, equity and the question of participation. In R Vreeker, M Deakin, and S Curwell (Eds.), *Sustainable urban development, Vol. 3: The toolkit for assessment*. London: Routledge, pp. 233-247.

Deakin M, Allwinkle S (2007) Urban regeneration and sustainable communities: The role of networks, innovation, and creativity in building successful partnerships. *Journal of Urban Technology* 14(1):77-91.

Deakin M, Allwinkle S (2008) A community-based approach to sustainable urban regeneration: The LUDA project. *International Journal of Inter-disciplinary Social Sciences* 3(5):181-191.

Deakin M, Curwell S, Lombardi P (2002) Sustainable urban development: The framework and directory of assessment methods. *Journal of Environmental Assessment, Management and Policy* 4(2):171-197.

Deakin M, Mitchell G, Nijkamp P, Vreeker R (Eds.) (2007) *Sustainable urban development, Vol. 2: The environmental assessment methods*. London: Routledge.

Department for Communities and Local Government (2008) Previously-developed land that may be available for development: England 2007. Results from the National Land Use Database of Previously-Developed Land. http://webarchive.nationalarchives.gov.uk/20 120919132719/http://www.communities.gov.uk/documents/corporate/pdf/9459 14.pdf. Site accessed 18 June 2013.

Department for Environment, Food and Rural Affairs (DEFRA) (2005) Securing the future: Delivering UK sustainable development strategy. http://archive.defra.gov.uk/sustainable/ government/publications/uk-strategy/documents/SecFut_complete.pdf. Site accessed 18 June 2013.

Ellin N (2012) Restorative urbanism: From sustainability to prosperity. In H Tigran (Ed.), *Sustainable urbanism and beyond*. New York: Rizzoli International Publications, Inc., pp. 276-281.

Freeman RE (1984) *Strategic management: A stakeholder approach*. Boston: Pitman.

Gharajedaghi J (2011) *Systems thinking: Managing chaos and complexity: A platform for designing business architecture*, 3rd edition. London: Elsevier.

Harrington LW (1992) Measuring sustainability: Issues and alternatives. *Journal for Farming Systems Research-Extension* 3(1):1-20.

Healey P (1997) *Collaborative planning: Shaping places in fragmented societies*. Basingstoke, UK: Macmillan.

Inspire East (n.d.) Inspire East — excellence framework. http://www.constructingexcellence.org.uk/ regions/eastengland/best/ExcellenceFramework.pdf. Site accessed 1 November 2013.

Jessop J (1997) The governance of complexity and the complexity of governance: Preliminary remarks on some problems and limits of economic guidance. In A Amin and J Hauser (Eds.), *Beyond market and hierarchy*. Cheltenham, UK: Edward Elgar, pp. 95-128.

Jessop J, Hickling A (2005) *Planning under pressure: The strategic choice approach*, 3rd edition. Oxford, UK: Elsevier, Butterworth, Heinemann.

Kaatz E, Bowen P, Hill R (2004) Development of benchmarks and weighting systems for building environmental assessment methods: Opportunities for a participatory approach. *Engineering, Design and Technology* 2(2):125-143.

Kaatz E, Root DS, Bowen PA, Hill RC (2005) Broadening project participation through a modified building sustainability assessment. *Building Research & Information* 33(5):441-454.

Kaler J (2002) Morality and strategy in stakeholder identification. *Journal of Business Ethics* 39(1-2): 91-99.

Leach M, Bloom G, Ely A, Nightingale P, Scoones I, Shah E, Smith A (2007) *Understanding governance: Pathways to sustainability* (STEPS working paper no. 2). Brighton, UK: STEPS Centre.

Levine RS, Hughes MT, Mather CR, Yanarella EJ, Radmard T (2006) The sustainable city in theory and practice. In D Shehayeb, H Turgut Yildiz, and P Kellett (Eds.), *The appropriate home: Can we design "appropriate" residential environments? Proceedings of the first HBNRC & IAPS-CSBE network joint symposium*. Cairo: Housing and Building National Research Centre, Ministry of Housing, Utilities and Urban Development, Egypt, pp. 81-90.

Llewelyn Davies Yeang (2000) *Urban design compendium*. London: English Partnerships.

Lombardi P, Cooper I (2009) The challenge of the eAgora metrics: The social construction of meaningful measurements. *International Journal of Sustainable Development* 12(2):210-222.

Lombardi P, Huovila P, Sunikka-Blank M (2010) The potential of e-participation in sustainable development evaluation: Evidence from case studies. In CG Reddick (Ed.), *Citizens and e-government: Evaluating policy and management*. Hershey, PA: IGI Global, pp. 1-16.

Mathur VN, Price ADF, Austin SA (2008) Conceptualizing stakeholder engagement in the context of sustainability and its assessment. *Construction Management and Economics* 26(6):601-609.

Miller R, Floricel S (2000) Transformations in arrangements for shaping and delivering engineering projects. In R Miller and DR Lessard (Eds.), *The strategic management of large engineering projects: Shaping institutions, risks, and governance*. Cambridge: The MIT Press, pp. 51-74.

Miller R, Lessard DR (Eds.) (2000) *The strategic management of large engineering projects: Shaping institutions, risks and governance*. Cambridge: The MIT Press.

Miller R, Olleros X (2000) Project shaping as a competitive advantage. In R Miller and DR Lessard (Eds.), *The strategic management of large engineering projects: Shaping institutions, risks, and governance*. Cambridge: The MIT Press, pp. 93-112.

Mitchell G (1997) Problems and fundamentals of sustainable development indicators. *Sustainable Development* 4(1):1-11.

Newman P, Jennings I (2008) *Cities as sustainable ecosystems: Principles and practices*. Washington, DC: Island Press.

Office of the Deputy Prime Minister (ODPM) (2004) *The Egan review: Skills for sustainable communities*. London: ODPM.

Office of the Deputy Prime Minister (ODPM) (2005) *Sustainable communities: People, places and prosperity*. London: ODPM.

Pearce D (2000) *Economics and environment: Essays on ecological economics and sustainable development*. Cheltenham, UK: Edward Elgar Publications.

Pearce D, Barbier EB (2000) *Blueprint for a sustainable economy*, 6th edition. London: Earthscan Publications.

Pope J, Annandale D, Morrison-Saunders A (2004) Conceptualising sustainability assessment. *Environmental Impact Assessment Review* 24(6):595-616.

Roberts P (2009) Sustainable communities, policy, practice and professional development: A model for Europe. In I Cooper and M Symes (Eds.), *Sustainable urban development, Vol. 4: Changing professional practice*. Abingdon, UK: Routledge, pp. 127-144.

Roger Tym and Partners, Rural Innovation (2008) Devon Local Strategic Partnership: A toolkit for sustainable rural communities. http://www.rsnonline.org.uk/images/files/toolkit-dec 08.pdf. Site accessed 18 June 2013.

Rotmans J (1998) Methods for integrated assessment: The challenges and opportunities ahead. *Environmental Modelling and Assessment* 3(3):155-179.

Saunders T (2008) A discussion document comparing international environmental assessment methods for buildings. http://www.dgbc.nl/images/uploads/rapport_vergelijking .pdf. Site accessed 18 June 2013.

Swanson D, Pintér L, Bregha F, Volkery A, Jacob K (2004) *National strategies for sustainable development: Challenges, approaches and innovations in strategic and co-ordinated action*. Winnipeg, Canada: International Institute for Sustainable Development and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH.

Todd JA, Geissler S (1999) Regional and cultural issues in environmental performance assessment for buildings. *Building Research & Information* 27(4/5):247-256.

U.S. Green Building Council (2007) Pilot version: LEED for neighborhood development rating system. http://www.usgbc.org/Docs/Archive/General/Docs2845.pdf. Site accessed 18 June 2013.

U.S. Green Building Council (2009) LEED for neighborhood development. http://www.usgbc.org/ DisplayPage.aspx?CMSPageID=148. Site accessed 18 June 2013.

Volkery A, Swanson D, Jacob K, Bregha F, Pintér L (2006) Coordination, challenges, and innovations in 19 national sustainable development strategies. *World Development* 34(12): 2047-2063.

Wallbaum H, Krank S, Teloh R (2011) Prioritizing sustainability criteria in urban planning processes: Methodology application. *Journal of Urban Planning and Development* 137(1):20-28.

Walton JS, El-Haram M, Castillo NH, Horner RMW, Price ADF, Hardcastle C (2005) Integrated assessment of urban sustainability. *Proceedings of the Institute of Civil Engineers: Engineering Sustainability* 158(2):57-65.

Warhurst A (2002) Sustainability indicators and sustainability performance management (Mining, Minerals and Sustainable Development project working paper no. 43). http://pubs .iied.org/pdfs/G01026.pdf. Site accessed 18 June 2013.

Waterman A, Bourke K (2004) *Whole life value: Sustainable design in the built environment* (IP 10/04). Watford, UK: IHS BRE Press.

Weaver PM, Rotmans J (2006) Integrated sustainability assessment: What? Why? How? (MAT-ISSE working paper no. 1). http://www.matisse-project.net/projectcomm/uploads/ tx_article/Working_Paper_1_03.pdf. Site accessed 18 June 2013.

Xing Y, Horner RMW, El-Haram MA, Bebbington J (2009) A framework model for assessing sustainability impacts of urban development. *Accounting Forum* 33(3):209-224.

Additional information may be obtained by writing directly to Dr. AlWaer at The University of Dundee, School of the Environment, Architecture and Planning, Matthew Building, 13 Perth Road, Dundee DD1 4HT, UK; email: h.alwaer@dundee.ac.uk.

AUTOBIOGRAPHICAL SKETCHES

Dr. Husam AlWaer is a lecturer on sustainable urban development in the School of the Environment (architecture and planning) at the University of Dundee, UK. He is a leading academic in sustainability and assessment methodologies and a widely respected researcher, contributing to emerging theory, practice, and technical developments. He has made innovative contributions to the discipline in terms of new conceptual frameworks linking sustainability assessment to urban design, smart cities, and master planning; innovative modeling applications including approaches based on sustainability indicators; and new assessment protocols for urban regeneration and master planning that have been widely adopted across the UK, Europe, and the Middle East. A conscious move toward integrated systems-based approaches is reflected in his research projects examining stakeholder engagement (consensus-based processes versus processes based on conflict and compromise), adaptability and context (handling region-specific issues and priorities), and comprehensiveness (promoting the use of the whole-system approach to create better places and environmental resilience).

Ruth Bickerton is a part-time lecturer at the University of Dundee, focusing on spatial analysis. She has an MSc in Spatial Planning with Sustainable Urban Design (University of Dundee), an MSc in Economics (University College London), and a BA (Hons.) in Philosophy, Politics, and Economics (Balliol College, University of Oxford). The extended research project for her Master's in Spatial Planning investigated sustainability assessment methods (including an extensive research survey), with a particular focus on an assessment of An Camus Mor, a new sustainable community proposed by the Scottish Sustainable Communities Initiative. Ms. Bickerton also formed part of the consultancy team for the charrette carried out in Callander, Scotland, focusing particularly on land-ownership issues and forward planning. She has been involved in work to develop new communities and workplaces in numerous locations, including most recently Sunderland, Falkirk-Grangemouth, and Moray, UK.

David Kirk recently retired from his post as Head of Town and Regional Planning at the University of Dundee and now engages with the university in an honorary research capacity. In 2012, he served as the curriculum-development adviser to the University of Zambia in the design of an MSc program in spatial planning. He continues to collaborate with academic researchers in the study of master-planning processes and performance appraisal. Mr. Kirk's career focused on policy and program work in local government and development agencies. He was a chartered member of the Royal Town Planning Institute (now a retired full member) and has a record of research-project commissions. Prior to his role in Town and Regional Planning, David taught strategic, organizational, and project management at the MSc level at the Universities of Abertay and Dundee. He holds an MA (Hons.) in Sociology from the University of Aberdeen, an MPhil in Town and Regional Planning from the University of Glasgow, and a postgraduate diploma in Management from the Dundee Institute of Technology.