



## Chapter

### Measuring with Meaning: Grounding Data in Place, Perspective, and Practice

As anyone who has ever marked a growing child's height on a doorjamb well knows, taking measurements to chart one's progress is time-honored tradition. Measuring the 'performance' of *cities*, however, is a more recent phenomenon. Yet this relatively new practice is becoming an increasingly common tool for managing urban areas. Many current approaches or so-called 'best practices' entail expansive attempts to characterize places with numeric values and quantifiable descriptions.

The past five years have also seen a proliferation of indicator projects that quantitatively describe, often displaying data in maps, different conditions *within* a given city or region. Similarly, a cottage industry has emerged to rank cities based on "sustainability" (see [www.sustainlane.com](http://www.sustainlane.com); [www.greenbiz.com](http://www.greenbiz.com); [www.popularscience.com](http://www.popularscience.com)); most employ some combination of economic, environmental, and societal indicators.

However, measurement systems are powerful, and can have far-reaching impacts on communities far beyond the initial effort to quantify conditions in the place. As discussed below, the findings of performance audits can have a profound impact on local and regional policy, as well as the everyday lives of people. Yet little has been written about how measurement systems interact with the pressing concerns of local communities.

This chapter offers an integrated approach for developing measurement systems that are grounded in the places people inhabit, people's perspectives on these places, and scientific understandings about relationships between collective behaviors and ecology. Specifically, we offer guidelines for building long-term measurements of urban places that draw on three inter-related dimensions:

1. form - physical space including infrastructure, land use, and other structural attributes;
2. function - intended uses of place and flows of resources in and out of them; and
3. meaning -the social construction of place, including historical and contemporary conditions.

We apply this framework to a case study: the EcoDistricts Initiative of Portland (OR). By examining empirical data about places, perspectives, and practices, in an EcoDistrict, we highlight the challenges of measuring place by comparing quantifiable measurements and qualitative descriptions of a place. The conceptual framework and its application to the case study are the basis for a set of guidelines for the development of new measurement systems for urban areas.

These guidelines emphasize longer-term, integrated, and locally relevant measures that capture the ‘lived experience’ of places as key components of measuring urban sustainability. The guidelines will improve the processes and products of measurement systems by grounding measurements in the experiences of people who inhabit a place, and fostering opportunities to engage those most affected by sustainable planning and development efforts. While an existing literature addresses the purposes of developing measurement systems (Innes and Booher, 2000; Semken and Freeman, 2009), this chapter focuses on the need to align the development of indicators with the needs, perspectives, and experiences of those living in areas that are potentially affected by actions taken as a result of these indicators.

### *Existing Measurement Systems*

Our call to incorporate local perspectives is offered in the context of a boom of urban measurement projects. Notable initiatives have been undertaken in various U.S. cities and regions: the Boston Indicators Project ([www.bostonindicators.org](http://www.bostonindicators.org)), Minnesota Compass ([www.mncompass.org/](http://www.mncompass.org/)), the Joint Venture Silicon Valley Index ([www.jointventure.org/index.php](http://www.jointventure.org/index.php)), and the Sightline Institute’s Cascadia Scorecard for the Pacific Northwest ([scorecard.sightline.org/summary.html](http://scorecard.sightline.org/summary.html)). While projects vary in focus, all these assessment efforts share the aim of providing numeric descriptions for the conditions in a place.

There are four major purposes for developing quantitative descriptions of urban places. First, with the increased demand for evidence-based practices in governance, many urban measurement projects are seen as tools for *decision-making and management*. Research on the relationship between science and policy suggests a need to more tightly integrate both the process and outcomes of scientific investigations with policy decisions about conservation, development, and other programmatic or policy matters (Cash and Clark, 2002; Francis et al., 2003; Shandas et al., 2008). For example, recent efforts to reduce greenhouse gas emissions in order to address climate change include attempts to build quantifiable measures for assisting in decision-making (Bassett and Shandas, in press).

Second is *advocacy*. Organizations that aim to influence public policy and resource allocation decisions are using quantifiable measures to make the case for the importance of their cause. A case in point is the *Regional Equity Atlas* (<http://www.equityatlas.org>), produced by the Portland Oregon non-profit organization Coalition for a Livable Future



How do we  
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(CLF). The Coalition tells compelling stories about gentrification and access to services and opportunities by cross-referencing measures of poverty, race, and other social characteristics with the spatial distribution of amenities throughout the metropolitan area. The findings of this measurement project have been used to advocate for actions like increasing transportation access to underserved populations and expanding urban green spaces. While the *Equity Atlas*' findings mirror stories echoed time and again in qualitative vignettes (e.g. public hearing testimony, newspaper articles, local arts venues, etc.), the quantitative and cartographic depictions have arguably had a greater impact on public policy discussions about social justice challenges in the region.

A third reason for quantifying and measuring the condition of urban places is for expanding and/or deepening *participation and consensus building activity*. Involving citizens in public decision making continues to be a daunting and increasingly challenging charge for public officials, who are required by local, state and Federal laws to ensure opportunities exist for citizens to comment on proposed plans, policies or programs. At the same time, the growing diversity of interests (Day, 1997; Irvin and Stansbury, 2004) threatens to paralyze public decision-making by making consensus difficult, if not impossible. Although this purpose of measurement systems is not as institutionalized as the previous two, the field of Public Participation Geographic Information Systems (PPGIS) is forging new ground in the creation of measurement systems by and for citizen engagement (Talen, 2000; Palmer et al. 2007). PPGIS holds special promise if locally relevant measurements ("bottom-up") can be combined with institutional data ("top-down") to create a comprehensive picture of the conditions in a region, city, or neighborhood.

Finally, quantitative measurement systems also offer opportunities for comparative *research and analysis* of urban areas. For example, concerns about low-density, auto-dependent urban development ("urban sprawl") emerged most recently in the 1970s, yet there were few measurements of how these development patterns affected social, economic, and environmental conditions. Then, starting in the late 1990s and continuing to the present, scholars have developed sprawl indices that compare urban regions across the United States (see for example, Cruthers and Ulfarrson, 2004; Ewing, 2004; Pendall, 2004), and evaluated their association with on-the-ground conditions and policy responses.

Other analytical approaches focus on the environmental impact of urban development. Examples include the Ecological Footprint (Wackernagel and Rees, 1996), Natural Step, Environmental Sustainability Index, and the Environmental Performance Index. An outstanding question, however, is whether, when and how, these comparative analyses can actually inform policies or programs to address local, regional, or global social and environmental challenges.

Despite this abundance of measurement systems and purposes, major aspects of urban sustainability—and indeed urban life—are not included in these indicator systems. While laudable, and akin to other quantitative characterizations of outer space, molecular space, or digital space, efforts to measure the sustainability of urban places are hobbled by four distinct challenges.

First, since current ranking systems use different measures for what constitutes “sustainable,” they might value some metrics while dismissing others and incorporate different understandings of the relationship between sustainable practices and meaningful outcomes. Indeed, scholars have pointed out that conceptualizations of sustainability are often vague and contain limited specificity about what is to be measured, by whom, and to what end (Kates and Parris, 2003; Leiserowitz et al, 2006).

As a result, proponents of sustainable development differ in their emphases on what is to be sustained, what is to be developed, how to link environment and development, and for how long a time. If we follow Seltzer’s conceptualization of sustainability (see introduction) as both a process and a condition in which the people involved ultimately determine whether the characteristics of choice and access are changing, then establishing uniform measurement systems for all urban places might be a poor goal. Instead, fostering diverse perspectives and providing opportunities for ongoing assessment of the sustainability agenda might be a better marker of a sustainable urban place.

A second and related challenge is the huge number of potential indicators. As with other planning processes, measurement initiatives can suffer from downplaying definitional differences in favor of reaching a common set of indicators, resulting in a broad “laundry list” of options for quantification. In terms of urban sustainability, the Bruntland Report’s commonly accepted definition calls for an approach to urban development that meets the needs of the current generation without compromising the ability of future generations to meet their own needs.

Use of this definition in measurement projects, however, creates confusion by attempting to align intergenerational needs without articulating the complexities of resource use across spatial and temporal scales or the feedbacks between environmental conditions and human behavior. As a result, the indicators can reflect the interests of the groups involved in their development, rather than opportunities for charting progress toward a common goal, much less sustainability.

In addition, these extensive lists of indicators can almost always create a lack of clarity about:

- prioritization of the indicators (*which ones are important and to whom?*),
- level of disaggregation (*how many metrics is sufficient to gauge performance?*), and
- connection between a measured place and the “lived experience” (*how do the measures capture the day-to-day life of inhabitants and what matters to them?*).

While drawing on existing and general definitions of sustainability offers advantages, developing meaningful measurement systems of urban places may require tailored definitions of sustainability that reflect the values and lived experiences of each given place being measured.

A third challenge is the temporal frame of indicators. Despite the Bruntland Report's emphasis on intergenerational equity, many measurement projects focus on a short time frame (1-3 years) or completely lack an explicit identification of when the desired outcomes are expected - with the exception of a few sustainable development indicator initiatives (e.g. U.N. Commission on Sustainable Development; Global Scenario Group; Ecological Footprint). In fact, several commonly cited guidelines for indicator development (e.g. Innes and Booher, 2000) have no criterion for including time as a component of the indicator—yet timing is far from trivial. In addition to impending crises such as massive climate disruptions, biodiversity loss, and epidemics, a temporal dimension underlies the foundation of sustainability: without explicit definitions of “endpoints” and targets, charting progress (often the self-identified aim of indicator development) is untenable.

Finally, while they are not unique to urban sustainability projects, the challenges associated with the practice and quality of measurement itself—selecting who is involved, scaling the metrics, determining the accuracy and precision of outcome measures, and addressing the limitations of measurement instruments and the availability of data, among others—are central to the development of urban measurement systems. Although numerous efforts have addressed criteria and methodology for constructing indicators and measurement systems (such as work by the Scientific Committee on Problems of the Environment (Moldan et al., 1997), the Balaton Group (Meadows, 1998; Bossel H. 1999), and others: Farrell and Hart, 1998; Bell and Morse, 1999) empirical evidence about the relationship between the quality of measurement systems and their role in advancing sustainability remains limited.

As a result, we have a limited understanding about the role that data can play in connecting goals, definitions, values, and sustainability development practices. Currently, most projects adopt one of two approaches to developing their measurement systems: (1) focusing exclusively on the creation of data, while compromising outcomes (e.g. normative effects, desired outcomes); or (2) creating sustainability goals and frameworks without attention to empirical measurement systems.

We enumerate these challenges not to suggest that robust measurement is a lost cause, but rather to show that careful attention to the objectives and plausible outcomes of measurement is necessary to make measurement useful and ethical. There is clearly great interest in applying these metrics: the Compendium of Sustainable Development Indicator Initiatives, for example, lists over 500 sustainability indicator efforts, varying in their scale, process, and geographic scale (IISD, 2000). Of these, 67 are global in scope, 103 national in scope, 72 are state or provincial in scope, and 289 are local or metropolitan in scope. The proliferation of indicators and measurement systems could suggest one of two things: the maturation and general acceptance of sustainable development concepts, or a general confusion about the goals, definitions, practices, and outcomes of sustainable development.

### *Grounding Measurement in Place*

The concepts of “sense of place” and “place attachment” help describe the complex connections people have with the environments they encounter (Cantrill 1998; Williams and Stewart 1998). While these relationships are timeless and enduring, only recently have local, state, and national organizations turned their attention to place as an organizing and integrating principle for research and education with direct relevance to pressing global problems. For example, the National Science Foundation’s Advisory Committee for Environmental Research and Education claims that “place-based science” is at the heart of understanding “complex environmental systems, particularly in the 21<sup>st</sup> century” (Pfirman, 2003, p.63).

The inherent aims of place-based research and education is to address locally-based environmental challenges by framing them in the context of globally relevant questions such as:

- How are long-term trends in environment and development reshaping nature-society interactions in ways relevant to sustainability?
- What determines the vulnerability or resilience of nature-society systems in particular kinds of places and for particular types of ecosystems and human livelihoods?
- How can today’s relatively independent activities of research planning, observation, assessment, and decision support be better integrated into systems for adaptive management and societal learning?

Implied in these phrases and questions are the rich and often powerfully emotional sentiments that influence how people perceive, experience, and value their environments –both their immediate surroundings and faraway landscapes. As such, people-place connections are difficult to uniformly define and measure since they vary across places and over time.

Place attachment further illustrates that places are not merely the physical backdrops for human action: places, along with social interactions, help people find order and meaning in the world. Incorporating this people-place connection into conceptualizing and measuring sustainability, however, is virtually unheard of. But making the connection is critical given both the emotional power of place and the new focus on place-based approaches to natural resource issues by academics, policymakers, and citizens.

Despite the emergence of place as an integrative concept for research and education and the concentration of human activities in urban environments, expertise on the topic has primarily developed in rural or wildland settings, generally in the context of recreation research (Mitchell et al. 1993; Schroeder 1996; Williams et al. 1992). Additionally, the literatures on place and those on indicator systems are currently disparate, with little overlap in their language, objectives, or participants.

Consequently, building urban indicator systems that are grounded in place and the meanings derived from these places is a largely unexplored area of research, theory, and practice. Characterization of people-place interactions in *urban* areas is unique because unlike cultivated or forested landscapes, urban places are highly diverse combinations of built, natural, economic, and cultural characteristics. As a result, urban places face conditions of social and ecological change that will be at once uneven, continuous, and unprecedented.

Further, management and decision making efforts affecting local ecology and quality of life for urban residents are deeply political and influenced by the activities of numerous groups and individuals with different priorities and varying levels of input into the planning process (Swyngedouw, 2004). Though engaging the public in stewarding urban natural resources through innovative institutional designs and the creation of “civic infrastructure” may improve planning of new and existing urban developments (Shandas & Messer, 2008), knowledge about the coupling of social and biophysical systems, particularly in urban places, is just emerging (Alberti, 2008; Grimm et al., 2008). We are only beginning to understand, for example, how differences in local and state levels of governance and policy affect people’s capacity to respond to changes in their environment, let alone how to measure changes that result from feedback between the constituent parts of complex urban systems.

### *Place-Based Measurement Systems - Conceptual Framework*

To integrate these place meanings into our understanding and measurement of urban processes, we propose a conceptual model that expresses the relationship between form, function, and meaning as concentric circles (Figure 1). These three elements are essential to describing a place and, consequently, developing quantitative and qualitative measures of its operation. At the center of the figure is the *form* of place, the tangible physical structures that constitute and are contained within a place. For the purposes of this paper we focus on those elements that are above ground (not geologic), built, and can generally be described using land cover characterizations.

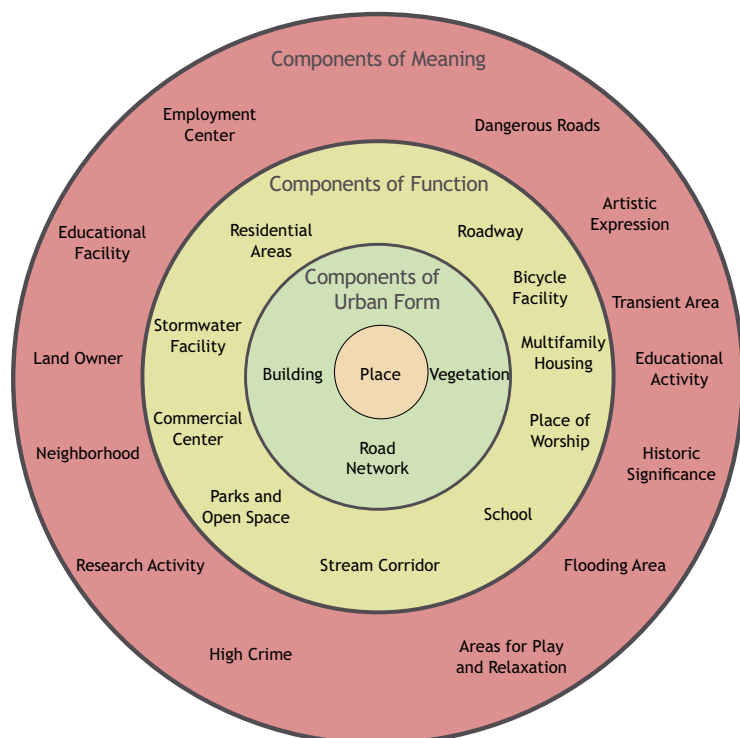


Figure 1: Conceptual model containing examples of components in each of the three dimensions

The second dimension of the diagram describes the *functions* of a place. We define function as the intended use, in either legal or administrative terms. The functions of urban places are often highly regulated, most commonly by the zoning or other land use ordinances. Due to the complex interaction between transportation, housing, employment, and other uses, most (if not all) urban areas will contain an administratively or legally prescribed function. Urban form is also governed by a variety of formal and informal *proscriptions* - that is, prohibitions or exclusions.

Finally, both form and function are encapsulated by the *meaning* attributed to each place. We offer this third dimension of place as a mechanism for incorporating the emotional sentiments that influence how people perceive, experience, and value the local environment as the broader context for their actions as well as the technical and bureaucratic descriptions of urban form and function. The meaning attributable to each place emerges from a set of stories, understandings, and belief structures that individuals, groups, and society confer. Characterizing the meaning(s) of a place, as we will describe later, is an essential component that can help to link data to context-specific actions. In the conceptual diagram, the meaning circle encompasses the function and form circles, suggesting that these dimensions are to be viewed as components of the meaning we ascribe to them instead of being viewed in isolation.

### *Measuring EcoDistricts: The Case of Downtown Portland's University District*

If form, function, and meaning can be used to provide a people-centered description of places, then how do we begin to develop measurements for the meaning of places? Regardless of the forms and functions visible in a place, we propose that every place will have multiple meanings, some consistent across generations. Our case study provides an example of a place that has a diverse forms, functions, and meanings: downtown Portland. As the site of a new pilot EcoDistrict, Downtown

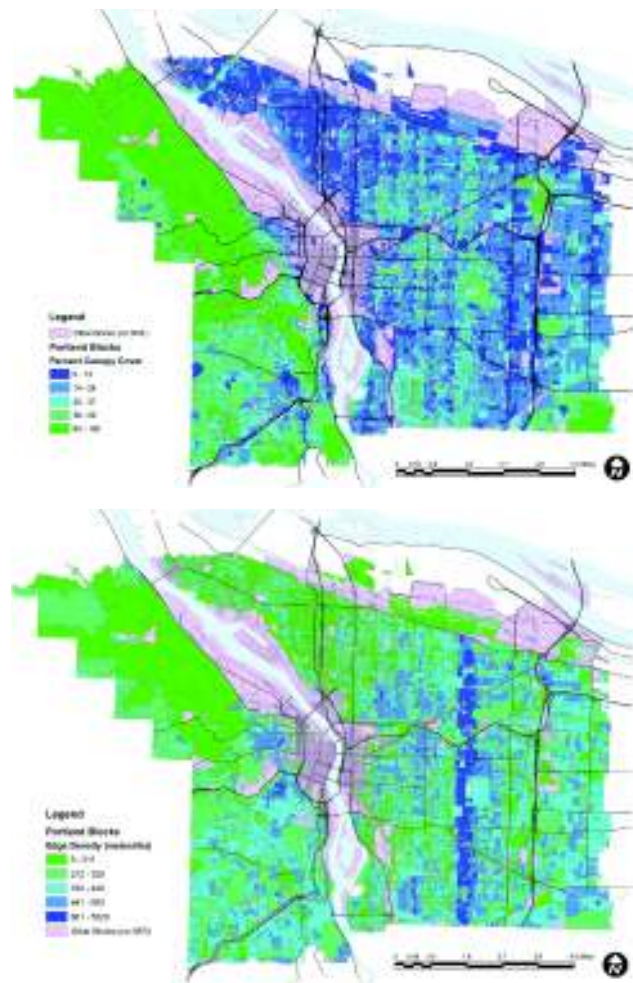


Figure 2: Maps describing the canopy conditions within U.S. Census blocks in Portland, OR. Map on top illustrates total amount of canopy, and the map below illustrates the Edge Density (one measure of canopy fragmentation)

Portland's University District provides a timely and fruitful opportunity to apply the conceptual model and explore how measurement and meaning can coalesce. We begin by describing the EcoDistrict's form and function, and then follow with an extended exploration of meaning and how it integrates with the two prior domains.

### *Form and Function*

While the form of urban places can be described from a variety of perspectives (see for example, Clifton et al, 2007), for illustrative purposes, we focus here on available measurements of land cover and land use within the Portland region. Thanks to spatial analysis technologies like remote sensing and geographic information systems (GIS), we can now describe in extraordinary detail the amount of vegetation, rooftop, roads, and other physical attributes within a place. As an example measuring vegetation cover in a place can tell us about the total amount (Figure 2, top) or the distribution of vegetation (Figure 2, below) within a place. Given the importance of vegetation to human health (Jackson, 2003), economic (Donovan and Butry, 2010; Netusil, et al., 2010), environmental (Nowak et al., 2006; Shandas and Alberti, 2007), and social (Kuo and Sullivan, 2001) conditions, this one dimension of form offers several clues about the conditions in a place.

Although citywide vegetation patterns may not be easily discernible by an individual or groups, examining neighborhood-level vegetation data can begin to show how the form and function differs within one place and from place to place (Figure 3). Spatially explicit descriptions of neighborhoods such as Downtown Portland, for example, allow us to measure the amount and distribution of vegetation within a relatively small geographic area. Functional elements are also quantifiable, through the analysis of land use designations. The key point here is that data on physical form and function are relative easy to obtain and characterize, provided sufficient

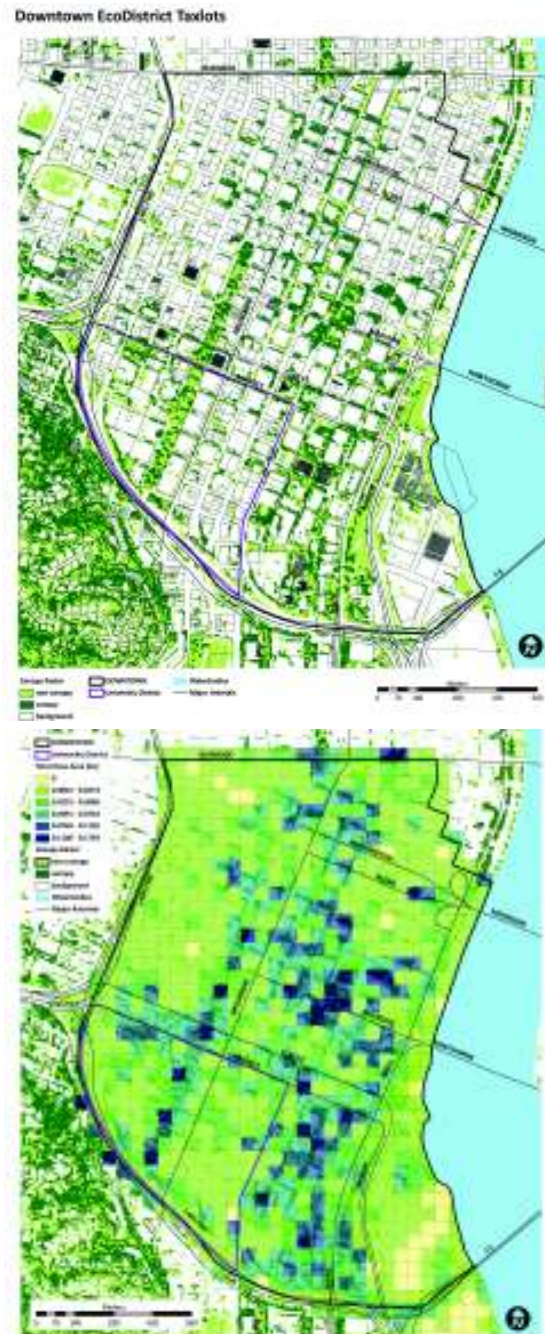


Figure 3: Maps describing canopy conditions within downtown Portland, OR. Map on top illustrates different land cover conditions, and the map below illustrates the Edge Density (one measure of canopy fragmentation) within 50M grid cells

technical expertise. In fact, though datasets to describe the form may vary from region to region, most urban governments are developing increasingly robust data resources for describing urban form and function.

### *Meaning*

The diverse meanings of place discussed above constitute the central challenge of measuring place meaning. We prefer to consider this, however, a key opportunity for measurement, evaluation, and engagement. For example, the case of Downtown Portland provides a clear example of how one place with discernible forms and functions can contain multiple meanings. While some may use the downtown area as a place for employment, others may see it as a high crime area, an entertainment district, and/or a residence. The description that follows builds on the case of Downtown Portland by drawing on empirical data from surveys, focus groups, and interviews conducted with Downtown residents and faculty and students of Portland State University, which is located in Downtown Portland.

The University District is home to Portland State University (PSU) and is characterized by mixed-use zoning that puts residential and commercial land uses in most buildings. As part of an effort to establish a baseline understanding of perspectives of the University District and Downtown Portland more generally, we conducted a survey, which was administered online and through intercepts with Downtown pedestrians. We aimed to identify and survey the three groups of people we consider Downtown users: residents, PSU-affiliated non-residents, and non-resident/non-PSU affiliated users. By surveying these three groups we were able to quantify and evaluate the perspectives of Downtown by different ‘user-groups,’ while exploring the meaning that these groups ascribe to the area.

Specifically, participants were asked to select Likert scale responses to several statements about safety, automobile traffic, public transit, diversity and other social, environmental, and economic conditions of the area (Table 1).

| Perspective         | Downtown Resident | PSU-Affiliated | Non-Resident, Non-PSU Affiliated |
|---------------------|-------------------|----------------|----------------------------------|
| Safety              | 4.3**             | 3.4**          | 5.4**                            |
| Auto Traffic        | 3.2**             | 4.1**          | 4.3*                             |
| Public Transit      | 3.1**             | 5.0**          | 4.7**                            |
| Diversity of People | 4.7*              | 4.2*           | 3.7*                             |

**\*\*P,0.001; \*,0.01 (n=983)**

Table 1: Statistical (t-test) Analysis of Likert Scale Responses of Perceptions of Downtown Portland (numbers represent means for each category)

The results suggest that different groups indeed have different perspectives about conditions Downtown. Of the four topics presented in Table 1, all contain statistically significant differences between how the three groups evaluated the neighborhood, although some of the other themes (e.g. bicycling safety, waste management, access to drinking water) did not have statistically significant differences. The results also suggest that Downtown

residents ranked public transit lower than PSU-affiliated respondents or visitors, and that safety and automobile traffic were perceived as least problematic by those who neither live Downtown nor are affiliated with PSU. Consequently, different groups have different experiences of Downtown, and each of these groups may and probably do confer different meanings on the area.

To explore further some of these differences, we conducted three focus groups examining the relationship between place and perspective. The focus group participants provided a rich description of their lived experience of Downtown, beginning with their perspective of the University. Both residents and PSU-affiliated focus group members described limited interaction between the University and other aspects of Downtown. For example, PSU was noted as one of the most important resources to the Portland community in general, but residents found it difficult to understand how to take advantage of this resource. Explained one resident:

*There's no way that us out here can work with you in there unless there's a bridge...where's the bridge? (Downtown resident)*

The residents wanted the “bridge” to be a two-way flow of knowledge and resources between the neighborhood and the University. Residents who have been active in the local community group expressed limited opportunities for interaction with the university:

*What I'm saying is, don't come out and just do a survey, start digging deeper. What gets me is that groups will come out and [hold a focus group] and then you don't go any further; research and retreat, research and retreat. Knock it off! (Downtown resident)*

University faculty members echoed these sentiments when they emphasized that “engagement” described a level of connection to the community, in the words of one faculty member, “where both parties are willing to be changed.” Faculty also expressed a disconnect between the university and the community priorities for the space they share:

*What does the community want to know? What do the people that live around us want to know? We tend to think we know what it is they should care about and we are not really asking too many questions. (PSU faculty member)*

Faculty members discussed several ways in which they would like to be more connected to the community. One discussed the senior citizens who audit her classes, and how she would like to reach further into the community to connect with other elderly residents:

*I have been intrigued (with) the idea of connecting with some of the new and large residences, the big condo spots and having colloquia there about the kinds of research going on, on campus, just sort of life-long learning stuff...there's a strong connection with elders in this place and I [think]*

*that there should be more connection between them and students. (PSU faculty member)*

Other faculty members recognized that community members were an essential resource for the University Studies general education curriculum:

*...really the community is our classroom, but I'm not sure they know that. (PSU faculty member)*

The PSU case is particularly illuminating in terms of our conceptual model because these stories contain shared meanings of the value of a research university alongside challenges to realizing the potential of this resource. Our survey and focus group results offer a richer description of meanings associated with Downtown than the form and function analysis alone could offer. If we focused only on the form and function of the area, we could (erroneously) assume that the experience of being Downtown simply reflects the EcoDistrict's physical structures and their expected functions. Yet because those affiliated with PSU have different perspectives of the area than those non-affiliated, both perspectives and understandings vary based on their respective experiences.

The results of this survey corroborate other surveys conducted in different parts of the city (Shandas et al., 2010), and suggest that without meaningful engagement of multiple user groups, opportunities for improving urban places could fall flat. These results also pose a question that quantitative measurement systems often try to avoid: how do we move from multiple experiences, perspectives, and meanings to actions that can help to build better urban places?

### ***Better Measures: Incorporating Place, Perspective, and Practice***

The case study above, of form, function, and meaning, illustrate the complexities inherent in measuring the characteristics of places. While the range of descriptions associated with the physical form and function of a place may be limited, meanings attributed to a place such as Downtown Portland are many - the diverse sentiments expressed by faculty, students, and residents show just a few of the many different stories one place can have.

Better understanding place attachment can bring meaning into a measurement system and enable local communities to guide the changes occurring in and to that place. **Place attachment**, in this view, refers to an affective bond formed through direct experience in, or vicarious engagement with, a place. Such bonds vary in intensity and duration.

Numerous researchers have developed measures of attachment of place, many of which have been repeatedly validated over the past two decades. Shamai (1991) proposed a 7-point ordinal scale of place attachment extending from obliviousness (no sense of place), through knowledge of being in a place, belonging to a place, attachment to a place, identifying with goals of the place, involvement in a place, to willingness to make sacrifices for a place. This and other studies (Brown, 1987; Kaltborn, 1998; Williams, et al., 1992; Williams & Vaske, 2003) demonstrate that place attachment can be quantitatively measured and compared among different groups of people.

Yet, to capture the wide variety of ways that individuals and groups can be attached to place, the characterization has to be generalizable across diverse places and populations. Here we offer a set of guidelines that draws on our existing understanding of place attachment and focuses on the pragmatic demands of integrating meaning into the characterization of places. We describe six principles grounded in the perspectives and practices of the communities that inhabit a place.

In providing these principles, we make several assumptions about the intention for and expectations of a measurement exercise:

- First, the aim of these efforts is to reveal opportunities for understanding a place, not to define it in specific terms. As such, the process of measurement is a means for creating dialogs and expanding understanding of what matters to a community.
- Second, size matters. These guidelines are not designed for application across large populations; rather, our intention is to focus on intermediate-scales of time and space. Considering that these guidelines are aimed at neighborhood scale (EcoDistrict) approaches, the focus is not on entire city populations, nor city scales, nor measurement over the course of decades.
- Third, several other principles of measurement systems are described elsewhere (Innes and Booher, 2000; Phillips and Berman, 2003) and our aim here is not to replace earlier descriptions, but to complement them by developing the concept of *meaning* in the context of measurement systems.
- Finally, the impact of measurements cannot be overlooked and we approach these guidelines recognizing that true impacts of actions can often take a long time to occur and even longer to conclusively measure.

As a result, these guidelines are intentionally aimed at refining the specific system of measurements as information becomes available throughout the duration of sustainability projects:

### **1. Discern the Meaning of Place**

Measuring the meanings that individuals and groups attribute to place is not an easy process, although value systems have been developed and successfully applied. Place attachment theories are subdivided into two dimensions: *place dependence* and *place identity* (Brown, 1987; Williams and Stewart, 1998). Place dependence is a functional attachment associated with the capacity or potential of a place to support the needs, goals, or intended activities of a person or group (Stokols & Shumaker, 1981; Williams & Vaske, 2003).

Place identity is an emotional attachment to place (Williams & Vaske, 2003), comprising the “memories, ideas, feelings, attitudes, values, preferences, meanings, and conceptions” (Proshansky et al., 1983, p. 59) of and toward places that are part of a person’s or group’s

self-identity. These concepts are essential because they help to reveal the value systems underlying the creation of measures.

Measuring these concepts of place attachment lets us begin to discern the meaning of place associated to different groups, and track how changes in a place affect notions of dependence and identity. Both these dimensions can help to articulate mechanisms for developing measurement systems that describe a place over time. For example, statements made by several faculty members and students refer to Downtown Portland as a place where they receive education, or will meet their goals of building a career, with few statements associated to emotional attachments to Downtown.

However, sentiments expressed by residents of Downtown suggest feelings, attitudes, and values that describe the identity of an individual or group. The description of Downtown by faculty members and students as a functional attachment suggests strong elements of place dependence, while those of residents suggest place identity. With sustained study we can begin to evaluate the extent to which dependence and identity changes over time. While not mutually exclusive, these sentiments are indications of the meaning attributed to Downtown, which also suggest that measurements systems need to be sensitive to the fact that different groups value places differently.

## **2. Establish Baseline Measurement**

If we recognize that each community contains specific strengths and that these strengths are a function of the community of people involved, then charting progress requires a measurement of baseline conditions. By baseline conditions, we mean a description of the current form, function, and meaning attributable to a place. Ongoing or continuous monitoring is not an approach commonly used in planning of neighborhoods, and one result is the limited availability of long-term datasets in planning systems.

We know through the U.S. Census and other surveys the extent of population change in neighborhoods, but we have less systematic understanding about how lived experience changes over time. A baseline assessment of the lived experience offers a first step to creating a long-term approach to evaluating the perceptions and practices of a place, and how physical changes to a place can manifest in meaningful descriptions of a place.

The establishment of baseline measurements creates within the indicator system a requirement to continue monitoring over time. As a result, baseline indicators illustrate trends in conditions, but they are not meant to provide direction for action. Trends over time describe a starting point for discussion and exploration of *potential actions*. Development of the baseline measurements, accordingly, can help to create longer-term systems of feedback, evaluation, and assessment.

### ***3. Distinguish Between the Measurement of Systems, Policy Outcomes, and Feedbacks***

When considering measurement systems for urban places, many reports warn about conflating different types of approaches. Three main approaches are system measurements, policy measurements, and feedback measurements. System measurements describe multiple characteristics of a specific system—an ecosystem, for example, or a social system—and communicate the most relevant information to decision makers (Hardi et al., 1997). Policy outcome measurements are similar to system indicators in that both are descriptive. However, these measurements are also prescriptive because they include a reference value or policy target that allows comparisons with local, national, or international goals, targets, and objectives. Thus performance measurements are particularly useful in the policy evaluation phase of the decision making process (Hardi et al., 1997).

Finally, the area of feedback measurements is an emerging area of research and practice that responds to the need to make decisions with ‘real-time information’ in hand. Only a few examples of feedback measurements exist, with some of the best being in the field of traffic engineering. For example, the monitoring systems placed across major thoroughfares in metropolitan areas allow users to make route-choice decisions based on ‘real-time’ detailed information about the location and severity of accidents.

As described above, measurement systems can address several purposes, including decision-making and management, advocacy, participation and consensus building, and research and analysis. Analysts must select a measurement system that corresponds with their purpose. If, for example, our aim is to evaluate the effectiveness of an EcoDistrict program and its impacts on a particular place, this requires a measurement system where a preliminary or baseline condition is tracked over time.

Our conceptual framework of form, function, and meaning can both inform decision-making and increase participation of residents by having them describe the lived experience of place. As a result, our measurement approach may focus on policy performance, but our outcomes can help to achieve multiple purposes. Such approaches to measuring places are becoming increasingly recognized, particularly measurement systems where ‘local’ and ‘expert’ knowledge are integrated for understanding how changes in neighborhood conditions affect the wellbeing of individuals and communities (see for example, Corburn, 2009).

### ***4. Balance Goal-Oriented and Process-Oriented***

The consistent focus on targets seems to be an overriding reality of measurement projects. While laudable, the single focus on goals to reduce crime, congestion, or poverty rates, or to increase sustainability, can detract from opportunities to engage whole communities in participatory processes. The reported aim of many of the current indicator projects is to inform public decision-making and improve the conditions of residents; however, the current approaches often focus largely on specific statistics related to physical systems without regard to indicators that describe processes.

A focus on the process makes necessary the consideration of the people who are involved in the development of neighborhood measurement systems. The process of designing a measurement system can be invaluable to a community. By participating in the development of a project, residents can envision their community's future, establish specific goals, and select measurement systems for gauging progress, all of which can foster residents' sense of belonging to their community and encourage both the selection of more meaningful outcomes and stronger interest in the results of the measurement initiative.

A consistent challenge of this process orientation is an expectation that community members will participate and that their involvement will provide reliable and accurate measurements of urban places. While reports on the reliability and validity of resident monitoring of urban places are limited, studies evaluating volunteer involvement in collecting environmental data suggest reliability and accuracy equivalent to that achieved by professionals (Fore et al., 2001).

The critical distinction, however, is that the quality of data will depend largely on the process of involving the participants—that is, the quality of the process will determine the quality of the product. If residents are able to identify and design measurement systems for their neighborhoods, they will be more invested in the reliability and accuracy of the data collected. Moreover, consensus-based measurement systems can also serve to diffuse conflicts within a community: If citizens can agree on which dimensions that are important to measure, then a basis of mutual understanding can be established, utilized, and sustained.

### ***5. Emphasize Resident-Held Spatial Dimensions of Place***

The effects of space, place and locality are important in determining who is interested in a decision problem and why. Geographic measurements of place can play a unique role in eliciting input about the types of measurements that are meaningful to a community. People local to a particular problem or issue will, by the very virtue of their geographical position, be (in the main) interested enough to get involved or at least express a considered point of view.

When spatial analyses have been used to analyze varying conditions within cities, they have tended to be presented as color-coded maps. These assign a color range to a map so that each geographical area, such as a suburb or postal code, is shaded a particular color based on the number of responses or quality of responses found within its bounds. These sorts of maps are useful for displaying broad trends across a city or region but, if they are based on simple counts or other such official sources, they are bound to miss a significant proportion of the meaning attributable to specific places. These mapping practices notoriously omit informal sector activities, disagreement, and experiences of undocumented individuals or groups.

Participatory GIS (PGIS) can help to minimize conflict and arrive at decisions that are acceptable to the majority of stakeholders through consensus building approaches based on awareness of the spatial implications of a decision problem. The recent blossoming of interest in public use of GIS in recent year comes about from a merging of the re-evaluation

of the social implications of spatial analysis GIS, and existing lines of research into public participation and decision-making, principally from the planning field. The recent Varenius initiative on “Empowerment, Marginalization and Public Participation GIS” clearly focuses the issues discussed here and identifies a broad range of issues of relevance to community representations and PGIS, and if these challenges are properly addressed. As a result, PGIS is well placed as a technology to explore neighborhood-scale challenges and offer opportunities for consensus building.

#### ***6. Allow the Data to Inform Perspectives***

As described earlier, the varied perceptions of a neighborhood often reflect different lived experiences. A fundamental question that follows from this is whether to accept all meanings as is, or to develop approaches that build shared meanings based in alternative viewpoints? The challenges of varied meaning can cloud discussions about planning and policy decisions in neighborhoods. Here we suggest joint fact-finding as a system for creating meaningful and consistent descriptions of place.

In joint-fact finding (Ozawa, 1991; Karl et al, 2007) a team works together to agree on relevant facts, which are generally scientific, technical or historical claims associated with a place. While joint fact-finding is not always a viable or appropriate option, a strong case can be made for it being the preferred method for developing shared meanings associated with a place. The goal here is not to disregard the varied meanings that an individual or group may present, but rather to consider the prospects for simply understanding the conditions resulting in multiple notions of sense of place.

In the case of measuring neighborhood conditions, joint-fact finding can be a tool for linking meanings to facts. For example, students in the EcoDistrict focus groups expressed concerns about crime, stating that Downtown Portland was more dangerous than most other parts of the city. Others, such as the resident group, described the area as being safe. Perspectives on the issue of crime are divergent and might, from the student perspective, limit their willingness to engage the downtown community. Joint fact-finding would address the divergence in the facts associated with these perceptions. The group, through joint fact-finding, could gather and examine data associated with a shared goal (e.g. safety), in the process becoming more familiar with each other and building trust through a fact-finding exercise.

#### ***Conclusion: The Potential For and Necessity of Measuring Place Meaning***

Measurement, then, can both enable and constrain a community’s ability to control the direction of change. Measurement systems are constructed to tell stories, but the purposes, use, and control of those stories can have profound effects on local communities and their prospects. In this chapter, we suggest that failure to understand the meaning associated with the process of measurement can lead to significant errors in the planning of cities. Even worse, misguided measurement may alienate the very communities intended to engage in neighborhood initiatives.

The six guidelines offer a starting point for creating a long-term integrated urban measurement process that aims to create a people-focused strategy for sustainability. A primary difference in this approach, as opposed to the many that currently exist, is an emphasis on the meanings attributed to a place. Understanding meaning, alongside form and function, is a critical step towards ensuring that measurement stays focused on what matters and in the hands of those most directly affected.

This is particularly relevant to the EcoDistricts Initiative because the current construction of meaning is based on a specific purpose, which is concisely described in the existing framework document:

*The EcoDistricts Initiative is a comprehensive strategy to accelerate sustainable neighborhood development by integrating building and infrastructure projects with community and individual action“(p. 7).*

Quite apart from resident perceptions of their place, and their needs and challenges, the central purpose here is to accelerate the advancement of neighborhood-scale sustainability. Making neighborhoods better places from the perspective of residents and accelerating sustainability from the perspective of PoSI and its EcoDistricts Initiative, do not need and are not intended to be mutually exclusive.

However, several questions remain: What is the “neighborhood?” How will neighborhood and EcoDistricts Initiative aims be reconciled into a consistent and mutually supportive story? Who participates in creating the measurement system and its purposes? How will the measurement be conducted and used?

A sole focus on accelerating development— sustainable or otherwise—creates a dangerous focus on a single story. The danger of a single story that focuses on rates is that it is incomplete. For example, a highly cited story about the city of Portland is one that focuses on sustainability and “greenness,” often present in the popular and peer-reviewed literature about the City; however, if social equity is part of sustainability, then Portland contains numerous challenges to live up to its reputation (Shandas et al., under review). The single story sets up a vision of a city that does not honor or address other aspects of the city, or EcoDistricts, that do not ‘fit’. This ‘incompleteness’ can result in decisions about how to guide measurement, and growth of the region at odds with broader and necessary goals.

What is needed now for the current EcoDistricts Initiative is recognition that neighborhoods, like cities, are complex systems. Inherent in a characterization of neighborhoods as complex systems is a need to move away from a focus solely on form and function and to one that incorporates an understanding of them as human constructs laced with meaning. The Latin term “quantify” is “*quantus*” which translates to “how much” or “how great.” When we quantify places we often reduce their complexity to a single number, which describes how much of something is occurring. By bringing in meaning associated with place, we enrich the stories, thereby making possibilities emerge and opportunities unfold.

To the extent that the EcoDistricts Initiative aims to build better urban places, then the challenge will be to develop measurement systems that maintain the richness of stories associated with places, and ensuring that processes and perspectives provide for long-term engagement. We offer this perspective as a means for grounding urban measurement systems in place, perspective, and practice.

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