Practice-Based Research: Operationalizing Landscape Performance

March 20, 2014

Allyson Mendenhall, Director of Legacy Design

Riverfront Park—Denver, CO
### Environment

**SUSTAINABLE PLANNING**
- Site Selection
- Ecosystem Protection
- Brownfields
- Regional Water-Management Systems
- Development Density
- Open Space and Conservation Lands
- Habitat Protection
- Other

**SITE DESIGN**
- Program Placement
- Planting and Soil Design
- Heat Island Effect
- Noise Pollution Reduction
- Light Pollution Reduction
- Other

**TRANSPORTATION**
- Framework and Infrastructure
- Motorized Alternatives
- Non-Motorized Alternatives
- Incentives and Programs
- Other

**WATER MANAGEMENT**
- Stormwater Management Technologies – Quality
- Stormwater Management Technologies – Quantity
- Erosion and Sedimentation Control
- Water Use Reduction
- Innovative Wastewater Technologies
- Other

**ENERGY AND ATMOSPHERE**
- Energy Budget
- Renewable Energy
- Air Quality
- Carbon Footprint
- Other

**MATERIAL RESOURCES**
- Green Building
- Resource Preservation and Reuse
- Landscape Materials
- Waste Management
- Construction Practices
- Other

**OPERATIONS**
- User Education
- Site Maintenance
- Recycling
- Other

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### Economics

**MARKET POTENTIAL**
- Supply and Demand – Development for Sale to end users
- Supply and Demand – Residential Rental Properties
- Absorption
- Capture Rate
- Other

**FINANCIAL FEASIBILITY**
- Public Financing
- Private Equity/Venture Capital
- Return on Investment
- Debt
- Private Sector Grants / Philanthropy
- Opportunity Costs
- Other

**COMMUNITY IMPACT**
- Employment (see Community sheet also)
- Fiscal Impact (Governmental)
- Local Businesses / Existing Businesses
- Affordability
- Public and Community Infrastructure
- Community Assets
- Economic Value of Art
- Other

**ENVIRONMENTAL IMPACT**
- Energy Budget, Carbon Budget and Recycling are located on the Environmental Conservation
- Other

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### Community

**SOCIAL CONDITIONS**
- Social Justice/Equity
- General Demographic Characteristics
- Human Capital
- Other

**CIVIC LIFE**
- Emotional Content
- Traditions
- Tax Structure
- Regionalism
- Community Leaders
- Social Contributions and Connections
- Community Interaction
- Arts, Culture and Entertainment
- Communication / Media
- Other

**CULTURAL LANDSCAPE**
- Historic Designed Landscapes / Architecture
- Historic Vernacular Landscapes
- Landmarks / Places of Significance
- Other

**SERVICES / INFRASTRUCTURE**
- Emergency Services (Police, Ambulance, Fire Protection)
- Public Health
- Sanitation (Wastewater, Solid Waste, Recycling)
- Child Care / Senior Services
- Education
- Community / Continuing Education, Youth Clubs
- Social Services
- Basic Needs (Food, Water, Energy, Technology)
- Other

**WORK FORCE SYSTEM**
- Housing
- Mobility (Pedestrian, Vehicle, Bike, Home, Transit)
- Employment (see Economics sheet also)
- Other

**LAND USE SYSTEM**
- Residential, Retail, Industrial, Public
- Recreation and Open Space
- Compact, Complete and Connected Neighborhoods
- Other

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### Art

**INTELLECTUAL / EMOTIONAL CONTENT**
- Emotional and/or Spiritual Wellness
- Meaning
- Narrative
- Other

**PLACE-MAKING EXCELLENCE**
- Site Specificity
- Identity / Character
- Arts and Cultural Districts
- Other

**TEMPORAL QUALITIES**
- Permanence / Ephemeral
- Seasonality
- Succession
- Timeliness
- Other

**INVENTIVENESS / ORIGINALITY**
- Innovation / Originality
- Transcendence
- Collaboration with Artists
- Public Art
- Other

**CULTURAL / POLITICAL CONSIDERATIONS**
- Authenticity
- Aesthetics
- Polemics
- Other

**COMPOSITION**
- Compositional Perception and Elements
- Dilemma / Thesis Resolution
- Functional Aesthetics
- Other

**TECHNICAL EXCELLENCE**
- Materials
- Details / Craftsmanship
- Other

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In October 2010, the U.S. Department of Housing and Urban Development announced the winners of $200 million in Sustainable Communities grants. These grants went to 41 areas of the country to create what HUD is calling Regional Plans for Sustainable Development. The grants are a huge step forward, part of the Obama administration’s Partnership for Sustainable Communities, which unites HUD, the Department of Transportation, and the Environmental Protection Agency to coordinate public investments in infrastructure, facilities, and services across various federal agencies. The hope is that this kind of coordination will amplify the economic, community, and environmental benefits of the projects on target with $50 million. By considering housing, transportation, and environmental protections in a full, synthetic way, the move marks a potential turning point in land-use planning and design in this country. For landscape architects who are adept at bringing together diverse, complex sets of knowledge in projects, this program presents a huge opportunity.

The Sustainable Communities grants are remarkable because they bring together these three federal departments that profoundly shape our natural and built environment—agencies not known in the past for their collaboration—but also because they look for measurable successes and heavily emphasize computer modeling and metrics to track the progress of proposed interventions. They help to formalize a new emphasis on measurement in planning and design issues.

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These days, landscape architects are obsessed with green certification and rating systems and are busy searching for “points” to achieve the desired rating for their projects. Measurement has taken on a life of its own, especially since the founding of the U.S. Green Building Council nearly 20 years ago, which brought on huge growth in the development and application of rating and certification systems for green building—the council’s Leadership in Energy and Environmental Design, or LEED, program now covers approximately 5,000 currently certified buildings. The number of ENERGY STAR-rated buildings is over 11,000. These are just a few of many such systems built around the notion that “what gets measured gets done.” A National Association of Homebuilders/ McGraw-Hill construction survey shows that more than half of the NAHB’s members, who build more than 50 percent of the houses in the United States, will incorporate green practices into their development in the next two years. Metric-based systems, which reward projects for their prowess ability to reduce waste or energy use or provide measurable performance in a number of areas, have moved the environmental design discourse from fantasy to positive action. In that regard, they are to be applauded.

But making a limited number of environmental measures synonymous with sustainable design is short-sighted. A project can save water or cut energy use, yet contribute little to the success of a community culturally or economically. The benefits of sustainable development and, by extension, sustainable design...
Research Agenda for the Landscape Architecture Profession

RESEARCH PRIORITIES

BY KURT D. CULBERTSON, FAASLA

As a practitioner, I am often approached by graduate students in search of thesis topics that will be of value to landscape architecture practice. I have found that, more often than not, their desire is to produce research that will have utility and value to the profession rather than simply meeting degree requirements. But the role of research in landscape architecture has always been weak relative to that of other professions such as medicine or engineering. Though practitioners investigate and gather information in their project work, most of them are not trained researchers. Education in research methods is seldom incorporated into undergraduate curricula. Many firm principals recognize the growing importance of research, especially given the move toward evidence-based design. Evidence-based design, now common in fields such as healthcare, is a design approach that emphasizes the importance of using credible data to influence the design process. But practitioners may balk at the idea of adding work in the midst of their constant need to get projects out on time and on budget. Even so, a well-grounded foundation of research is needed to ensure that evidence-based design does not fall into the realm of pseudoscience.

Evidence-based design offers a great opportunity for the profession—the chance to build a dynamic relationship between academia and practice by establishing a research agenda for landscape architecture at a national level. A national research agenda would not restrict or bias the research efforts of the academy. Rather, it would aggregate and give structure to the many issues of research important to the profession and identify a context for investigation. Although there is clearly a place for research within professional practice, it is the academy that must provide leadership. Some landscape architecture degree programs are emphasizing evidence-based design, and others have active research programs. But the profession needs a way to raise the visibility of these research efforts. Ideally, an organization such as the Council of Educators in Landscape Architecture (CELA), perhaps in conjunction with the Landscape Architecture Foundation Performance Series, could conduct a periodic survey of the profession to identify topics of research interest and schools where they are a focus.

CELA has historically played an important role in fostering a research community, and ASLA’s Professional Practice Networks have circulated and promoted research that is closely linked with practice. The new National Academy of Environmental Design, a consortium of national design organizations including ASLA, will further advance research within the design professions.

A national research agenda could suggest areas ripe for theses and dissertations to help stimulate graduate-level research. It might propose projects of immediate relevance, but it should also include inquiries into topics that may apply more speculatively to the profession—the kind of exploration critical to bringing new ideas to the surface. Potential solutions identified by the academy can be tested by practice. In turn, new areas of interest to the academy will emerge from practice as well.

Providing a framework for the collaboration of academia and practice offers the potential for generating funding sources for academic research. Sophisticated clients are willing to pay for research that will help solve the challenges they face if they have confidence in the research and can see a reasonable return on their investment from the results. Some enlightened practitioners, who face common challenges across multiple projects, may also contribute to research that advances their practice areas.

There are two areas of concern, however. The first is that some academicians are suspicious of privately funded research and its whiff of potential bias. Rather than turn away private funding, we need clear standards to ensure objectivity. The second concern is that some academic programs are eliminating the requirement of a thesis for the graduate degree, substituting instead a final project that, in many cases, is not a framework for rigorous research. Graduate students are often poorly prepared to conduct thesis research because of a lack of training at the undergraduate level.

Design approaches without evidence are based on theory alone. Our obligation to maintain the health, safety, and well-being of society demands more. Evidence-based design suggests a need for research in multiple areas, such as sociology, community planning, and economics, as well as traditional design issues. Our efforts must be built upon the collaborative efforts of private practice and the academy guided by a national research agenda that gives focus to our work.

KURT D. CULBERTSON, FAASLA, IS THE CHAIRMAN OF THE BOARD OF DESIGN WORKSHOP
33% of local stormwater captured by rain gardens before it drains into the bayou.
88% of sidewalks will be shaded when trees reach maturity.
3X increase of pedestrian space within the right of way
Bagby Street Signage | If Streets could Speak

- **Average 13°C Cooler**: temperatures due to increased shade and specific material selection.
- **Bicycles Welcome on Bagby**: 33% of local stormwater captured by rain gardens before it drains into the bayou.
- **See Bagby Street in a Whole New Light**: just look at all those new lights making it a safer street.
- **45% reduction of street crossing distance**.
- **300 TONS OF CARBON**: saved from being emitted into the atmosphere (that's equivalent to you not driving a car for the next 133 years).
- **88% of sidewalks will be shaded when trees reach maturity**.
- **More than 3X the tree canopy overhead**.
- **Dogs Welcome!**: (because Bagby Street is for everyone).
- **3X increase of pedestrian space within the right of way**.
- **42% increase in existing tree growth area and organic soils**.
- **38% more seating and gathering places on the street**.
Measurement Tools Backpack
Site Analysis

Baseline Conditions =
As is conditions
Measurement Tools

- Temperature
- Noise
- Light
- Speed
- Weather
- Tree Caliper
- Digital Counter
- Digital Counter
- Manual Counter
Human Comfort
South Grand Great Streets Initiative—St. Louis, MO
Temperature

Infrared Digital Thermometer

Hand-held laser gun measures the surface temperatures of a variety of materials.

Can be used to compare the relative impact of various materials on the heat island effect and human comfort.
Temperature
**Evidence:** On-site measurements demonstrated that by reducing the amount of asphalt and increasing planted areas and pervious pavement, reduced the heat index by 14.4%.
Noise

Digital Sound Level Meter

Hand-held device measures and records sound levels for sounds ranging from 40 to 130 decibels.

Sound level data can be analyzed to identify where sound levels exist that are inappropriate for human comfort and where design intervention is needed.
Noise
Noise

**Strategy**: to create a case for a “road diet” by demonstrating to the public the reduction in noise levels due to reduced speeds.

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**Chart**: Does the current noise level on South Grand negatively impact your shopping and dining experience? (select one)

- Yes: 50% (212 responses)
- No: 43%
- I do not have an opinion: 6%
Noise

**Evidence**: By implementing a pilot test of the proposed lane reduction and bulb-outs, the average peak noise levels fell by 17db, meeting the target noise level of 60db. The street is about one-third as loud as it was previously, therefore providing a more comfortable shopping and dining experience.
Capitol Valley Ranch—Pitkin County, CO
Capitol Valley Ranch

Utah State University:
Assistant Professor Bo Yang
Pamela Blackmore
Chris Binder

LAF Case Study Brief:
Creates outdoor spaces during the summer with 77% in the human comfort zone in the morning, 42% in the afternoon, and 48% in the evening by modifying the effects of wind and using passive solar techniques such as building orientation, thermal massing, and tree placement.
Late morning sunlight allowed in to warm-up space

Evening shade to cool the space
Victor Olgyay’s “Human Comfort Zone”
Sampling Locations

Behavior Mapping

Legend
- Design Intent
- Time of Day Used:
  - After Dark
  - Early Morning and Afternoon
  - Evening
  - Mid Morning and Noon
Capitol Valley Ranch

On-Site Data Collection

GIS Interpolation

ArcGIS
ArcMap™ 10

Analysis in Excel
Collecting Bioclimatic Data

Temperature
Relative Humidity
Wind Speed
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<th>Time</th>
<th>RC</th>
<th>Temp</th>
<th>comfort</th>
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<td>23.0</td>
<td>79.2</td>
<td>comfort</td>
<td>13:07</td>
<td>17.8</td>
<td>78.1</td>
<td>dry</td>
<td>10:01</td>
<td>33.3</td>
<td>78.5</td>
<td>comfort</td>
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<tr>
<td>Swimming Lap Pool 29</td>
<td>5:40</td>
<td>23.0</td>
<td>79.1</td>
<td>comfort</td>
<td>13:08</td>
<td>23.0</td>
<td>79.2</td>
<td>comfort</td>
<td>10:02</td>
<td>35.2</td>
<td>74.9</td>
<td>comfort</td>
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<tr>
<td>Swimming Lap Pool 30</td>
<td>5:41</td>
<td>21.7</td>
<td>76.7</td>
<td>comfort</td>
<td>13:10</td>
<td>18.6</td>
<td>83.9</td>
<td>hot &amp; dry</td>
<td>10:03</td>
<td>41.3</td>
<td>69.1</td>
<td>comfort</td>
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<tr>
<td>Sun Terrace 31</td>
<td>5:42</td>
<td>23.3</td>
<td>75.8</td>
<td>comfort</td>
<td>13:11</td>
<td>21.1</td>
<td>78.9</td>
<td>comfort</td>
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<td>34.6</td>
<td>77.9</td>
<td>comfort</td>
</tr>
<tr>
<td>Sun Terrace 32</td>
<td>5:43</td>
<td>21.4</td>
<td>77.8</td>
<td>comfort</td>
<td>13:14</td>
<td>20.2</td>
<td>76.6</td>
<td>comfort</td>
<td>10:08</td>
<td>31.3</td>
<td>76.5</td>
<td>comfort</td>
</tr>
</tbody>
</table>
Capitol Valley Ranch

Morning  Afternoon  Evening

Percent of outdoor spaces that fall into human comfort zone:

Morning: \[ \frac{24}{31} = 77\% \]

Afternoon: \[ \frac{13}{31} = 42\% \]

Evening: \[ \frac{15}{31} = 48\% \]
iPhone Apps

- Travel Altimeter Light
- Anti-Mosquito Repellent
- Decibel Gauge
- GPS Locator
- Level
- Leaf Identification
- Light Meter
- Pedometer
- Night Sky
Resources

Amazon
http://www.amazon.com/

Forestry Suppliers, Inc.
http://www.forestry-suppliers.com/

Extech
http://www.extech.com/instruments/