Sustainability & the Occupant Experience: Value Effects of Wellness-based Design

Presenters
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AGENDA

What is wellness-based design?
Re-defining performance
Connecting health to building design
Rating systems

Appraisal Impacts
Case Studies – Virtual tours
Value impacts – direct & indirect
Section One

RE-DEFINING PERFORMANCE
Re-defining Performance 1.0

• Sustainability in the built environment
• Beyond economic performance
• aka 3 P’s
Results so far...

- Focus on energy efficiency
  - Been There – Done That – Bought the T-Shirt
- Green building – incorporated into building codes, planning/land use regulations
- Magnitude of value effect?
- So what’s next?
Re-defining Performance 2.0

• So far, focus has been on performance of the *building*
• Now, focus is on performance/experience of the *occupants*
Consider...

We spend 90% of our time indoors

How does the built environment affect our health, well-being and productivity?
Leading causes of death (U.S.)

Central Park (1858)

Tenement House Act (1901)

NYC subway system (1904)

Board of Water Supply (1905)
Section Two

CONNECTING HEALTH TO OUR BUILT ENVIRONMENT
Connecting health to building design

Rise in chronic airway disease

– 1970: 10th leading cause of death
– 2015: 3rd leading cause of death
– asthma most common childhood chronic disease affecting 9.1% of US children (Krieger, 2010)
– numerous studies link air quality to incidence of asthma
Connecting health to building design

RESULTS
- 44% increase in symptom-free days
- 66% decrease in urgent clinical visits
- Overall results equal to or better than in-home asthma education alone

COST
- + $6000-$7000 in building costs per unit, or approx 5% of construction costs

Image of Breathe Easy Home from “Home Is Where the Triggers Are: Increasing Asthma Control by Improving the Home Environment”; Dr. James Krieger, 2010
Connecting health & productivity to building design

- Improved cognitive function assoc with higher ACHs  (Allen 2016)
  - 61% higher – low VOCs
  - 101% higher – low VOCs + low CO2
- Cost low relative to increase in productivity  (MacNaughton 2015)
  - $40/yr cost vs. $6000/yr productivity gain

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Connecting health to building design

Rise in physical inactivity
- Comparable to smoking as health risk factor (Lancet 2012)
- Obesity linked to “chair-enticing environment” vs. genetic changes in humans (Levine, 2006)

- “We are sitting ourselves to death.”
  Dr. James Levine, Mayo Clinic
Connecting health to building design

• High Point: Walking increased 66% - from 65 to 108 minutes/day (Buckner-Brown 2014)
• NEAT – Non-Exercise Activity Thermogenesis (Levine 2006)
• “Irresistible stairwells”
  – 1.4x as likely to meet activity guidelines (Dodson 2008)
  - Elevator-centric: <10% use stairs
  - Stair-centric: >70% use stairs (Bassett 2013)
But there’s a catch...

Building performance goals can be at odds with optimizing human health

- Sick Building Syndrome
- \( \uparrow \text{ACH} \Rightarrow \downarrow \text{Energy Efficiency} \Rightarrow \uparrow \text{OpEx} \)
But there’s a catch...

Building Management Systems lacks real-time monitoring of indoor air quality metrics

Split incentive: property owner pays for building improvements/energy use; tenant reaps benefits
What’s driving demand?

- Employers want to attract top talent
  - 78% of millennials rank workplace quality as “important” when choosing employer
  - 69% would trade other benefits for better workplaces (CBRE 2016)
  - “Healthy is more than just ‘not sick’” (Goldman Sachs study 2016)

- Cost of employees vs cost of real estate
"90/10" or "90/9/1" rule

Annual Costs - Average U.S. Office

- Salary + Benefits: $4,260
- Rent: $256
- Energy: $56,285

<table>
<thead>
<tr>
<th>Company</th>
<th>Revenue Gain from 1.0% Productivity Increase/SF</th>
<th>Annual Rent/SF</th>
<th>% of Annual Rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBRE</td>
<td>$10</td>
<td>$20</td>
<td>52%</td>
</tr>
<tr>
<td>Chevron</td>
<td>$148</td>
<td>$66</td>
<td>225%</td>
</tr>
<tr>
<td>Gilead</td>
<td>$81</td>
<td>$48</td>
<td>169%</td>
</tr>
<tr>
<td>Netflix</td>
<td>$124</td>
<td>$75</td>
<td>165%</td>
</tr>
<tr>
<td>Prologis</td>
<td>$94</td>
<td>$50</td>
<td>187%</td>
</tr>
</tbody>
</table>
Value premise

• Commercial sector
  – Cost of RE compared to cost of employees
    • wages + benefits
    • “presenteeism”
  – Improved health and well-being of occupants =>
    reduction of employee costs + increased productivity

• Residential sector
  – “mindful mansions” and walkability in demand –
    Wall Street Journal
  – effect on home prices
  – health of self & family members
Section Three

RATING HEALTHY BUILDINGS
WELL & Fitwel

• New rating systems focused on enhancing health & well-being of occupants

• Uses evidence-based medical research
  • ex: Fitwel reviewed 3,000 scientific studies
WELL Building Standard

- Launched 2014; just released v2
- Developed by Delos; administered by IWBI (International WELL Building Institute)
- Third-party certified by GBCI
- Variety of building types such as commercial office, multi-family residential, retail, institutional; v2 meant to expand eligible projects
- 948 projects certified or registered; 178 million SF; 35 countries
WELL Building Standard

• Requires on-site performance testing

• Stipulates pre-conditions (i.e. prerequisites)

• Silver, Gold, Platinum

• Must re-certify every 3 yrs
WELL Building Standard

• 7 “Concepts” (v1) – expanded to 10 in v2

Air
Nourishment
Movement
Sound
Mind

Water
Light
Thermal Comfort
Materials
Community

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Fitwel

• Launched 2016-2017
• Developed by CDC & GSA; administered and third-party certified by Center for Active Design (CfAD)
• Variety of building types: separate reference guides for “Workplaces” and “Multi-family Residential”
• approx 700 projects certified or in pipeline; 20 countries
Fitwel

- No on-site performance testing
- No pre-conditions
- Fitwel Score and Star Rating system:
  ★ ★★★★★
  - Score can be used for benchmarking
  - Must re-certify every 3 yrs
Fitwel – 12 Categories

Location
Outdoor Spaces
Stairwells
Workspaces (Dwellings)
Water Supply
Vending Machines & Snack Bars (Vending Machines, Micro Markets & Corner Stores)

Building Access (Access)
Entrances & Ground Floors
Indoor Environments (Indoor Spaces)
Shared Spaces
Food Services (Grocery Stores & Food Retail)
Emergency Procedures
Comparison

• Cost
• Prerequisites
• Verification
• Differences in strategies and categories
Section Three

CASE STUDY #1: WELL CERTIFIED OFFICE
Human Centric Lighting Cycle

- Degrees Kelvin (K)
- SUNRISE
- NOON
- SUNSET

Time of Day
- 6:00a
- 8:00a
- 10:00a
- 12:00p
- 6:00p
- 8:30p

380 Pastoria Lighting
Natural Daylighting
<table>
<thead>
<tr>
<th>Property</th>
<th>Year Built</th>
<th>WELL</th>
<th>Cost Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>400 S. Hope Street</td>
<td>1983/2010</td>
<td>Certified</td>
<td>$3.60/SF 1.73%</td>
</tr>
<tr>
<td>Los Angeles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNP Tower</td>
<td>New</td>
<td>Gold</td>
<td>5.0%</td>
</tr>
<tr>
<td>Vancouver, BC</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Biophilic design

“Taking characteristics of the places we go to relax and restore and bringing them into our built environment” (Bill Browning)

- 1984 Ulrich study: initiated evidence-based design
- SMUD study: 6-12% increase in productivity
CASE STUDY #2: FITWEL CERTIFIED OFFICE
CASE STUDY #3: WELL CERTIFIED MULTI-FAMILY
What’s Walk Score?

- www.walkscore.com
- uses a proprietary algorithm to measure “walkability” on a scale of 1-100
- relative proximity to daily needs and pedestrian friendliness
- higher score = greater ability to walk vs drive for daily errands
- also Transit Score and Bike Score

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## Walk Score Details

The Walk Score for 201 8th Avenue South is based on the following categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dining &amp; Drinking</td>
<td>100%</td>
</tr>
<tr>
<td>Groceries</td>
<td>50%</td>
</tr>
<tr>
<td>Shopping</td>
<td>100%</td>
</tr>
<tr>
<td>Errands</td>
<td>100%</td>
</tr>
<tr>
<td>Parks</td>
<td>100%</td>
</tr>
<tr>
<td>Schools</td>
<td>50%</td>
</tr>
<tr>
<td>Culture &amp; Entertainment</td>
<td>100%</td>
</tr>
</tbody>
</table>
Section Four

APPRAISAL IMPLICATIONS
Possible Value Implications

- Cost of improvements
- Rent
- Financing, eg: Fannie Mae Healthy Housing Rewards program
- Marketability => absorption, turnover, vacancy
- Liability
<table>
<thead>
<tr>
<th>Study/Authors</th>
<th>Metric</th>
<th>Analysis</th>
<th>Result</th>
</tr>
</thead>
</table>
### Value Impact of One Walk Score Point

<table>
<thead>
<tr>
<th>Metro</th>
<th>Median Price</th>
<th>Walk Score</th>
<th>$ per WS Point</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 14 Metros</td>
<td>$360,000</td>
<td>64.7</td>
<td>$3,250</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

Compiled from Redfin 2016 study
<table>
<thead>
<tr>
<th>Description</th>
<th>Change Range</th>
<th>$/WS Pt.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car Dependent</td>
<td>19 to 20</td>
<td>$181</td>
<td>0.05%</td>
</tr>
<tr>
<td>Car Dependent</td>
<td>39 to 40</td>
<td>$1,704</td>
<td>0.47%</td>
</tr>
<tr>
<td>Somewhat Walkable</td>
<td>59 to 60</td>
<td>$3,744</td>
<td>1.04%</td>
</tr>
<tr>
<td>Very Walkable</td>
<td>79 to 80</td>
<td>$7,031</td>
<td>1.95%</td>
</tr>
</tbody>
</table>

Compiled from Redfin 2016 study
## Value Impact of Raising Walk Score from 60 to 80 (Somewhat Walkable to Very Walkable)

<table>
<thead>
<tr>
<th>Metro</th>
<th>Median Price</th>
<th>Walk Score</th>
<th>Median Price Increase 60 - 80</th>
<th>per WS Point</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phoenix</td>
<td>$204,900</td>
<td>40.3</td>
<td>$15,700</td>
<td>$785</td>
<td>7.7%</td>
</tr>
<tr>
<td>Orange County</td>
<td>$580,000</td>
<td>43.5</td>
<td>$41,000</td>
<td>$2,050</td>
<td>7.1%</td>
</tr>
<tr>
<td>Atlanta</td>
<td>$168,000</td>
<td>48.4</td>
<td>$84,000</td>
<td>$4,200</td>
<td>50.0%</td>
</tr>
<tr>
<td>Denver</td>
<td>$285,000</td>
<td>59.9</td>
<td>$84,000</td>
<td>$4,200</td>
<td>29.5%</td>
</tr>
<tr>
<td>Portland</td>
<td>$275,000</td>
<td>63.9</td>
<td>$53,000</td>
<td>$2,650</td>
<td>19.3%</td>
</tr>
<tr>
<td>Chicago</td>
<td>$220,000</td>
<td>77.5</td>
<td>$33,000</td>
<td>$1,650</td>
<td>15.0%</td>
</tr>
<tr>
<td>Boston</td>
<td>$325,000</td>
<td>80.7</td>
<td>$129,000</td>
<td>$6,450</td>
<td>39.7%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>$950,000</td>
<td>85.7</td>
<td>$187,630</td>
<td>$9,382</td>
<td>19.8%</td>
</tr>
</tbody>
</table>

Compiled from Redfin 2016 study
## Value Impact on Luxury Homes (Top 5%)

<table>
<thead>
<tr>
<th>Metro</th>
<th>Walk Score</th>
<th>Median Price (Top 5%)</th>
<th>per WS Point</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All 14 Metros</td>
<td>64.7</td>
<td>$1,236,000</td>
<td>$6,800</td>
<td>0.55%</td>
</tr>
<tr>
<td>Phoenix</td>
<td>40.3</td>
<td>$585,000</td>
<td>$277</td>
<td>0.05%</td>
</tr>
<tr>
<td>Orange County</td>
<td>43.5</td>
<td>$1,728,000</td>
<td>($451)</td>
<td>-0.03%</td>
</tr>
<tr>
<td>Atlanta</td>
<td>48.4</td>
<td>$580,000</td>
<td>$5,424</td>
<td>0.94%</td>
</tr>
<tr>
<td>Denver</td>
<td>59.9</td>
<td>$685,000</td>
<td>$5,230</td>
<td>0.76%</td>
</tr>
<tr>
<td>Portland</td>
<td>63.9</td>
<td>$630,000</td>
<td>$1,944</td>
<td>0.31%</td>
</tr>
<tr>
<td>Chicago</td>
<td>68.7</td>
<td>$680,000</td>
<td>$5,581</td>
<td>0.82%</td>
</tr>
<tr>
<td>Boston</td>
<td>80.7</td>
<td>$985,000</td>
<td>$7,385</td>
<td>0.75%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>85.7</td>
<td>$3,000,000</td>
<td>$8,077</td>
<td>0.27%</td>
</tr>
</tbody>
</table>

Compiled from Redfin 2016 study
Wrap Up

• Building design and construction continues to evolve
• Demand for “healthy” buildings is growing in commercial and residential sectors
• Recognition of new building design and features requires expanding knowledge base
• Analysis of local market reaction key
Resources

• WELL & Fitwel
  – www.wellcertified.com
  – www.fitwel.org

• “9 Foundations for a Healthy Building”
  – Harvard T.H. Chan School of Public Health, 2017
Resources

AI’s Green Courses

– Practical Applications in Appraising Green Commercial Properties –
  Oct 11-12, 2018 Concord, NH
– Intro to Green Buildings
– Residential & Commercial Valuation of Solar
– Case Studies in Appraising Residential Green Buildings

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Resources

Appraisal Institute Textbooks

– *The Valuation of Green Commercial Real Estate* (Runde & Thoyre, 2017)


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Thank You!

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