

# Well-being and the built environment

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# CBE research team and 47 industry partners



Ed Arens



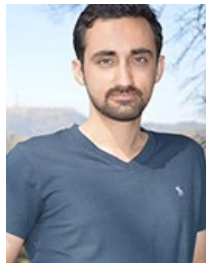
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David Lehrer



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Paul Raftery



Thomas Parkinson



Jessica Uhl



Hui Zhang

Partners are a diverse set of industry and government organizations





# Primary research areas

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## 1. Indoor environmental quality

Occupant surveys, thermal comfort, personal comfort systems, IoT of buildings

## 2. Energy efficient HVAC systems

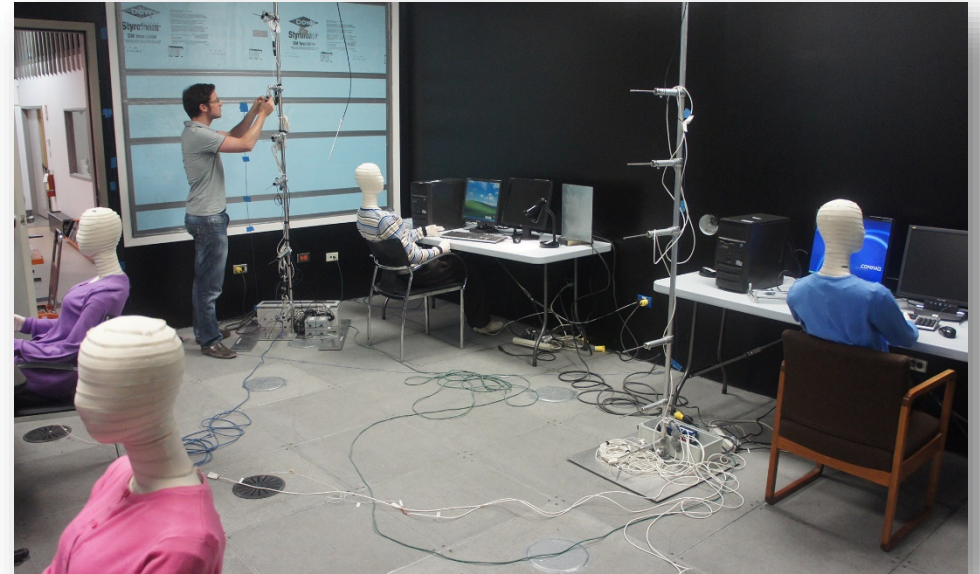
Underfloor, radiant and advanced integrated systems, monitoring tools, controls

## 3. Low-energy envelope systems

Mixed-mode buildings, natural ventilation, advanced facade studies, circadian health

## 4. Controls and human interactions

Building control innovations, wireless lighting prototype, energy visualization, occupant feedback, plug loads



# Rich, variable, multi-sensory environments

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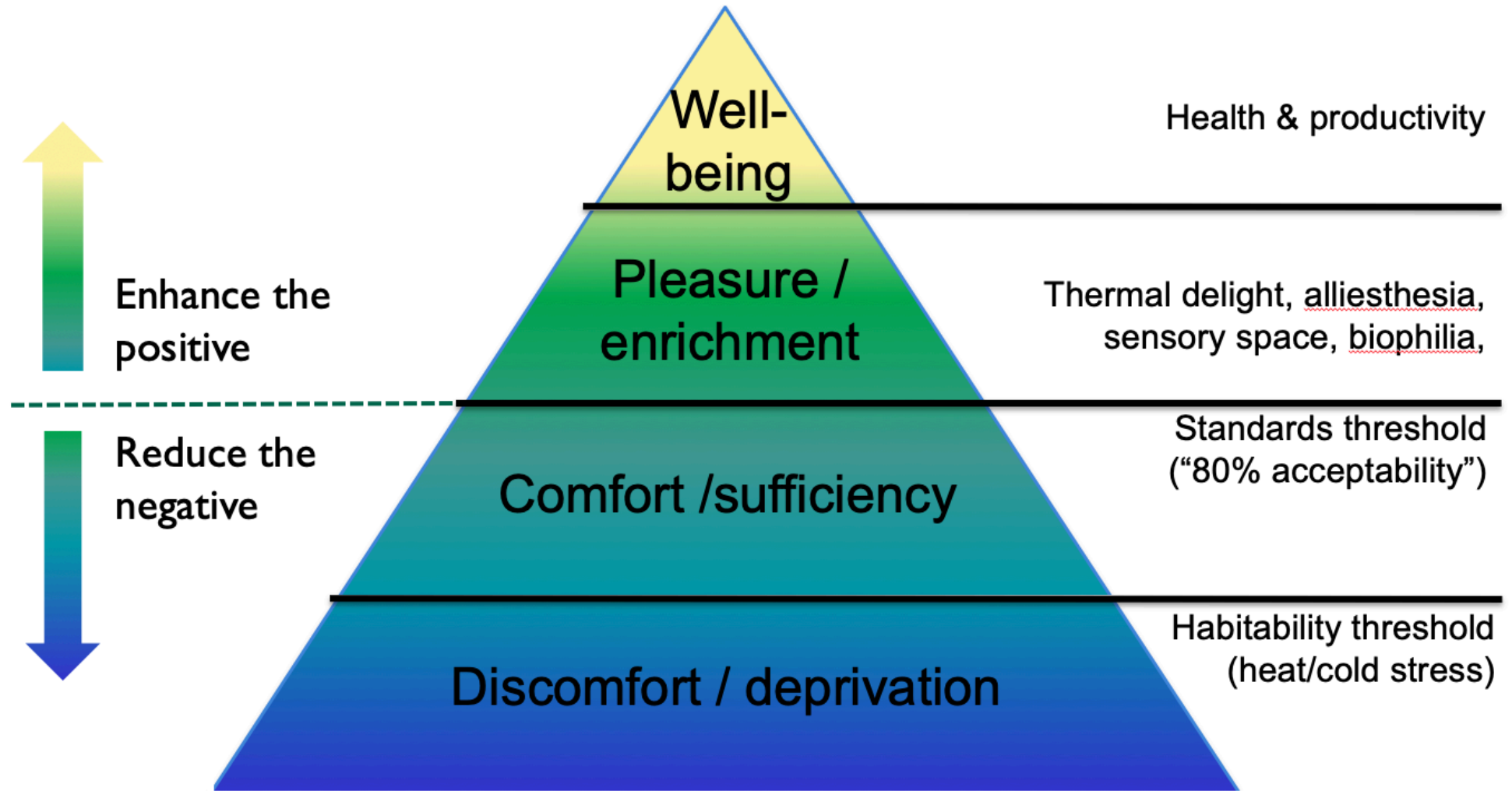
# Experiential Monotony



A 3D architectural structure composed of blue and white rectangular blocks, creating a complex, multi-level environment. Several business professionals are positioned within the structure: a man in a suit holding a lifebuoy, a woman with a laptop, a man with arms crossed, a man with a briefcase, a woman with papers, and a man with a briefcase. The scene is lit with soft, even light, emphasizing the geometric forms and the professional attire of the individuals.

We spend **90%** of our time indoors.

# Spectrum of occupant experience



# What is well-being?

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# One space does NOT fit all, personalization matters

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How can we promote personalization in  
the built environment?

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the built environment?

*Increase personal control*



# Space variation for person-place fit



Herman Miller: Living Office

<https://www.hermanmiller.com/solutions/living-office/>



Philips, source: <http://officesnapshots.com/>



Boch & Fernsh,  
source: <http://officesnapshots.com/>

# Personal comfort systems

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Heated/cooled chair prototype



Desktop fan prototype



Foot warmer prototype



# Encourage personal artifacts

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Wells, Thelen, & Ruark (2007); Gosling, Ko, Mannarelli, & Martin (2002); Wells & Thelen (2002); Wells (2000); McElroy, Morrow, & Ackerman (1983)



How can we tell if our  
space is functioning  
the way it should?

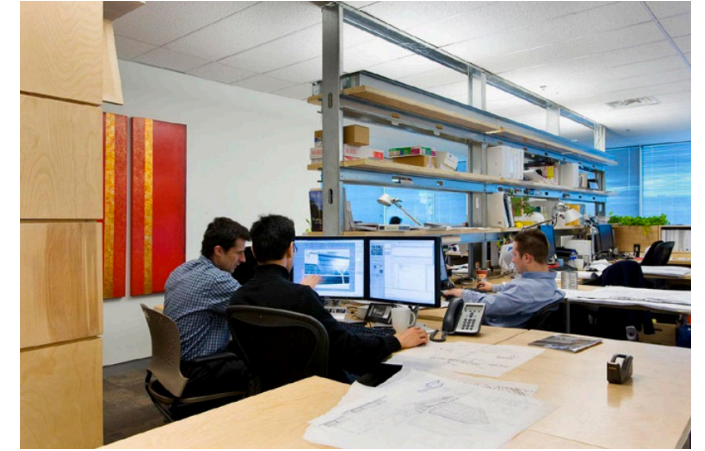
How can we tell if our  
space is functioning  
the way it should?

*.....Ask our occupants*

# CBE's Indoor Environmental Quality Survey

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- Powerful occupant survey analytics platform
- Developed based on industry need
- Used in over 1,000 buildings with over 100,000 occupants
  - Offices
  - Higher-education workspaces and classrooms
  - Residence halls
  - Laboratories
  - K-12 educational spaces



DIALOG Toronto, Livable Buildings Award Finalist, 2009; Architecture: DIALOG



Ohio State Wexner Medical Center Expansion  
Arch: HOK



# What does this tool do?

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## **Get Feedback**

Learn what's working from the occupants' perspective



## **Benchmarking**

Compare your buildings against an extensive database of other buildings



## **Diagnostics**

Branching questions help diagnose the reasons behind dissatisfaction



## **Evaluate**

Evaluate energy solutions, design approaches, technologies



## **Inform**

Make improvements in operations and the design of future buildings



## **Get Credits**

Adopted by LEED, ASHRAE, and WELL

# Thank you-- let's connect!

- Center for the Built Environment: [www.cbe.berkeley.edu](http://www.cbe.berkeley.edu)
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