

The Measure of Intelligence is the Ability to Change

Anu Sabherwal, Blake Jackson, Gail Borthwick & Rod Schebesch

October 16th, 2017



Adapting design to improve the human experience









URBAN BOOM

T



DENSE URBAN CENTRES



CONNECTED CITIES

• Energy • Buildings • Infrastructure



Education

Adaptation

• Public spaces

- Renewables
- Energy efficiency
- Smart metering
- Reduced emissions

- Autonomous • Smart shopping vehicles
 - Accessibility

Just-in-time

- Trip reliability
- Public transit
- Walkability
- Bikeability

- Planning

Technology

Security

- Green space
- Natural disasters
- Police and fire

- Disaster response and recovery
- Risk Mitigation and Resilience Planning
- Infrastructure

WEST FIVE



大阪

Smart, sustainable and socially responsible solutions for buildings













PITTSBURGH 2030 DISTRICT: DOWNTOWN







Enhanced Reliability (in-site and islanding)



Rerewable Generation









Healthy buildings are an extension of our own physical health



HEALTHY BUILDINGS = HEALTHY LIVING

Health - (WHO)

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"

Swasthya - (Ayurveda)

"Equilibrium of the elements" / "Dhatu Samya"

Balanced Qi (Traditional Chinese medicine) "Equilibrium of vital energy"



UN PREDICTS BY 2030, 60% OF THE WORLD'S POPULATION WILL LIVE IN URBAN ENVIRONMENTS.

2030 Energy Strategy



- a 40% cut in greenhouse gas emissions compared to 1990 levels
- at least a 27% share of renewable energy consumption
- at least 27% energy savings compared with the business-as-usual scenario.

Source: EU Energy

https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings

"Emissions from non-residential buildings have shown little or no change in recent years and increased in 2015."

Planned policies to 2020 are **insufficient** to meet required contributions for future carbon budgets."

Source: Committee on Climate Change, Progress Report 2016

DIGITALISATION, NEW TECHNOLOGIES · Competitive solar and wind · New digitally enabled solutions

CLIMATE CHANGE AND RESOURCE EFFICIENCY

- Decarbonisation
- · Renewables
- Circular economy

Storage

URBANISATION

- · Growth of cities especially in Asia
- · Need for sustainable utility services
 - Electrification

ACTIVE CUSTOMERS

- Customers make conscious choices
 - Decentralised production
 - · Demand response

HOW MUCH TIME DO WE SPEND INDOORS? 87%

The environmental quality of these spaces influences our physiology and wellness.



HOW DO WE IMPROVE HEALTH AND WELLBEING IN THE BUILT ENVIRONMENT?

"DO LESS HARM"



"HOLISTIC HEALTH"





"NURTURING BY NATURE"



14 PATTERNS OF BIOPHILIC DESIGN IMPROVING HEALTH AND WELL-BEING IN THE BUILT ENVIRONMENT

HUMAN HEALTH AND BUILDING HEALTH





Cardiovascular Digestive Immune Integumentary Muscular Nervous Reproductive Respiratory









Cundalls Corporate Offices, London - the first project in Europe worldwide to be Well Certified Gold.



TOWARDS A **HEALTH** FOCUS...

"What if every time I started to invent something I asked 'How would nature solve this?"

Source: Janine Benyus, Biomimicry Institute

Sustainability

Green Technology Physical comfort Active & Passive Design Energy & Waste reduction On site regeneration Ecological enhancement

Wellness

Healthy Living Happiness & productivity Physiological comfort Benefits of Nature



Natural Balance

Self regulation Natural Rhythms Adaptations to Stimuli Homeostasis / Equilibrium Self Sustainable – Net 0/+ Energy & Waste Circular ecosystem

OPTIMISE BUILDING PERFORMANCE TO **HEALTH & HAPPINESS**



Briefing Paper

Assessing Health and Wellbeing in Buildings Alignment between BREEAM and the WELL Building Standard[™]

Chris Ward & Alan Yates - BRE Jaclyn Whitaker, Shalini Ramesh & Nathan Stodola - IWB

Green Star & WELL Building Standard[™]

Approaches to buildings or fitouts seeking a dual rating





Health and happiness Equity and local economy Culture and community Land use and wildlife Sustainable water Local and sustainable food Sustainable materials Sustainable transport Zero waste Zero carbon





REGION CITY/TOWN DISTRICT SITE BUILDING

NET POSITIVE HEALTHY BUILDING







Varennes Library, Montreal, Canada

Stantec. LEED Gold

1st Institutional Net Zero Building in Canada

INTEGRATED APPROACH IN ACTION



Google Offices Renovation, Chicago

LEED Gold +WELL+LBC certification – on target





Forest City



Green Envelope Retrofit



Urban Green Roofs

BIOMIMETIC DESIGN

The "Living Building Skin"









Protect against elements

Feedback Change to stimuli to bring back equilibrium

Homeostasis /equilibrium





DESIGNING A "WELL" CITY FOR A HEALTHY COMMUNITY



What do SAVs mean for urban centers and their inhabitants?





6

11% with a senger's overall travel distance with pooling

Source: D. J. Fagnant, K. M. Kockelman (2014). The havet and environmental implications of shared autonomous vehicles, using agent-based model scenarios. Transportation Research Part C; Emerging Technologies, 40, March 2014.



Sturce: LD. Burn, W.C. Johdon, B.A. Scarborough (2013), "Stansforming personal mobility", Earth Island Institute, Columbia University, 2013.

CAVS SAFELY COMINGLE WITH BIKES, PEDS

- Soften divisions between modes.
- Route SAVs where cars aren't traditionally welcome.
- Policies like a 'Zombie Tax' should be considered early.



HEALTH AND SAFETY

SAVS PROMOTE HEALTHIER LIFESTYLES, PLACES

- Plan SAV networks to reinforce walkability and biking.
- Track air quality trends with shift to EV.
- Add trees and greenspace as road regulations ease.



HEALTH AND SAFETY

SAVS AMPLIFY ACCESSIBILITY TO TRANSIT

- Integrate SAV into comprehensive mobility network
- Utilize SAV for first/last-mile connections
- Automate low-volume routes to improve viability



TRANSIT

EVERY DEVELOPMENT IS A TOD

As SAVs extend transit's reach beyond walkable radius, expand what you consider TOD.



LAND USE

PARKING DEMAND WILL EVENTUALLY VANISH

- Encourage garages designed for future retrofit.
- Reimagine today's surface parking as tomorrow's development sites, green space.



LAND USE

SAVS EXTEND ACCESS

- Mobilize historically underserved populations
- Help reduce amount of subsidy needed for paratransit operation
- Improve accessibility to goods and services



TRANSIT

TRANSLATING IMPACTS INTO BENEFITS





EMERGING TECHNOLOGIES IMPACT HOW CITIES WILL:

- Operate Accommodate Growth Manage Congestion Improve the Economy
 - Increase Safety
 Save Time
 Improve
 Quality of Life



Profound Impact to our Cities

Soonest impact: SAVs in dense urban centers (1-5 years)



CONCLUSION

- 1. Innovative infrastructure is important to the future in order for cities to remain successful.
- 2. Smart grid solutions not only reduce energy use, but reduces CO2 emissions and pollutants - while encouraging greater density, growth, and activity and increasing community resilience.
- 3. Smart buildings encourage socially responsible habits.
- 4. The design of smart cities requires the integration of holistic and sustainable design solutions as a foundation.
- 5. Smart cities reduce environmental impact and have a significant impact on our health and quality of life.
- 6. We need to go beyond our current approach in sustainability to achieve 2030 goals, to focus on the integrated health of people, buildings and facilities.



