Retrofitting Health and Wellbeing

Henry Woon, Director
A legacy of positive change

We are an international team of environmental design consultants, building services engineers and lighting designers focused on delivering sustainability to the planned and built environment.
Practice Principles

- Buildings and landscapes do more, systems do less
- Design from first principles
- Integrated design process and solutions
- Pragmatic strategies
- Establish sustainability goals early
- Set performance targets
- Develop and test design strategies
Why Health and Wellbeing in Buildings
For people……

- Because, it’s for people – and people only
- We spend 90% of our time in buildings
- It covers every aspect of human wellbeing
- Very relevant to Malaysia and SE Asia Context
- Positive impact on the people in your building
The future of well-being is now!

“The trends all point in a single direction – more and more consumer spending on health and wellness... WELLNESS IS THE NEXT TRILLION DOLLAR INDUSTRY as employers invest in healthy living programs and as customers take more responsibility for optimizing their own health.”

- Mckinsey and Company
Create places for people to enjoy

- There is already a rapid lifestyle shift towards green and healthy lifestyle
- In terms of food, leisure activities, sports
- There is a demand for the built environment industry to adopt
Change in the industry is already happening…

• Buildings are by far the World Largest Asset Class
• Innovation Vs revolution
• You can see various Mega development projects integrating live, work, play and learn elements but there is a need of focus objective of delivering health and wellbeing for the occupants/visitors of these buildings

Gardens by the Bay
Jewel Changi
US Direct Rental Rates & Sale Price
LEED and non-LEED rated buildings

Difference = $171 per sq./ft.
Incentives

Unhealthy workplaces cost organizations approximately $1,200/person/year.

Investments in healthy environments have a 2 year payback.

Recruitment and retention of employees is greater for organizations that invest in indoor environmental quality. Turnover cost of a professional is 1 year’s pay + benefits.
Adding Value

83% feel more productive
100% said that clients are interested in their new way of working
92% said the new space has created a positive effect on their health and well-being
94% said that the new space has a positive impact on their business performance
93% said that they are able to more easily collaborate with others

Source: CBRE Global Corporate Headquarters Los Angeles, California, Workplace 360 Study. 2014.
WELL Building

- Established in 2008 by a group of Doctors, scientist, architects and Engineer
- Performance based, not prescriptive
- Collaboration with GBCI for certification and administer – LEED
- Design + Operations + Engagement

Benefits:
- Consistency – smooth implementation
- Improve performance
- Staff retention and improved outcomes
- Enhance ongoing health and wellness
- Next generation of high performance building marketing and branding
Body Systems Applied to WELL Features

A simple way to express the built environment’s complex impact on the human body
Seven Concepts

- air
- water
- nourishment
- light
- fitness
- comfort
- mind
air

Create optimal indoor air quality to support the health and well-being of building occupants.

material selection · ventilation · filtration · moisture control · maintenance & operations · source of concern protection · construction processes
water
Promote safe and clean water through proper filtration and other methods, and require the appropriate quality of water for various uses.

performance testing | treatment | maintenance & operations | hydration promotion
nourishment

Require the availability of fresh wholesome foods, limit unhealthy ingredients and encourage better eating habits and food culture.

healthy portions | mindful eating | food production | access to healthy foods | food preparation allergies & alternatives | transparency environmental cues & influencers
light
Provide illumination guidelines to minimize disruption to the body’s circadian system, enhance productivity and provide visual acuity.

circadian design | daylighting | glare control | color quality | activity-based lighting levels | visual acuity
fitness

Allow for the seamless integration of exercise and fitness into everyday life by providing the physical features and components to support an active and healthy lifestyle.

exterior active design | interior active design | activity-based working | physical activity spaces | awareness and habits | physical activity programs
comfort

Establish requirements to create a distraction-free, productive and comfortable indoor environment.

ergonomic | acoustids | thermal | olfactory | accessibility
mind
Require design, technology and treatment strategies to provide a physical environment that optimizes cognitive and emotional health.

stakeholder engagement | transparency | wellness | awareness & protocols | connection to nature | adaptable spaces | altruism
Retrofitting Health and Wellbeing – Mind Map

- Recognise change is required
- Occupant Satisfaction Survey
- Conduct Building Operation Survey

Team Workshop and Charrettes
Building Tour
Matrix and categories of key focus
Establish importance and priority
Develop Implementation plan
Assign Responsibilities
Operation and Maintenance Plan
S.R. Crown Hall Renovation
Illinois Institute of Technology Chicago, IL
Krueck + Sexton Architects and McClur
S.R. Crown Hall Renovation
Krueck + Sexton Architects and McClirer

Atelier Ten and Transsolar developed an environmental renovation strategy that not only reduces the building's energy consumption by 50% while greatly improving occupant comfort, but also restores many of Mies original design concepts.

LOCATION: ILLINOIS INSTITUTE OF TECHNOLOGY, CHICAGO, IL
AREA: 50,000 SQ FT
COST: $4 M (FAÇADE RENOVATION ONLY)
DATE: 2005
Ludwig Mies Van Der Rohe - 1956
Existing Conditions

- Thermal Issues
- Ventilation Issues
- Daylight Issues
- Internal Load Issues
Existing Conditions
Original Landscape Design
Glazing & Envelope Operation

Glazing
• Clear plate glass
• Polished sandblasted glass
• Replacement in the 1970's

Operation
• High-level blinds
• Ventilation flaps
• Insulation
Ventilation

Original Design
• Mechanical ventilation system at ceiling level
• Cooling added in the 1970’s
Heating

- Radiant floors
- Originally 10 zones
- Renovation consolidated to 1 zone.
Lighting

• Manual drafting requires uniform light level of 500-750 lux without shadow.
Proposed Summer Operation

1. Restored Landscape
2. Renovated Perimeter ventilation flaps
3. Lower glazing replaced
4. New Venetian blinds
5. New Mechanical ventilation diffusers
6. Lighting dimmed or switched off by automatic daylight sensors
7. High efficiency light fitting
8. Modified mechanical ventilation
9. Additional roof insulation
10. Additional glare reducing screens
11. Hazardous fumes exhaust
12. Cooling system for lower level
13. Floor heating pipes used for heating and circulate chilled water for cooling
14. Increased controls
Daylight
Lighting
Natural Light Improvement
Project Scope > Building Renovation Enhancement

Venetian Blinds – Daylight Penetration

Proposed Semi-specular to reduce solar gain

Proposed Semi-specular concave up slats
Landscaping

Current Conditions, looking SE

Original Conditions, looking SE

Current Conditions

Original Conditions
Interior Restoration
Project Scope > Multi-phase Restoration

Architectural Components - Blinds

Exterior View - Full Size Mock-up

Interior View - Full Size Mock-up
Daylight Simulation
Lighting Zone Diagram

LIGHTING ZONE DIAGRAM
- Perimeter Control Zone
- Intermediate Control Zone
- Core Control Zone
Performance

Energy Saving Strategies - Combined Effects

- Heating kWh
- Electricity kWh
- Cooling kWh

Current Status:

- Heating kWh: 600,000
- Electricity kWh: 500,000
- Cooling kWh: 300,000

Total: 1,400,000 kWh/a

Improve airtightness + shading, add roof insulation, trees, high performance single glazing, T5 lighting and controls, heat recovery + floor cooling

Total: 1,600,000 kWh/a
“The renovation of Crown Hall is truly worth celebrating, not only because it looks so good but also because it tells us so much about Mies that we didn’t know before”

Blair Kamin, Chicago Tribune
National Theatre, London
The National Theatre
NT Future - £80 million refurbishment with Haworth Tompkins Architects
HVAC Upgrades

- Displacement Ventilation where applicable
6. Human Centric Lighting
Humans exhibit daily changes in physiology

Sleep/wake

Body Temperature

Mathematical Ability
Irregular light patterns affect mood and cognition

Irregular Light Patterns
- Depression
- Lack of Energy
- Difficulty Concentrating

Circadian & Sleep Problems
- Mood & Learning Difficulties

Seasonal Affective Disorder
Sustainable and Healthy Lighting

- Make the most of natural light …
- Make the most of reflected light …
- Don't be afraid of the dark …
- Use light when and where you need it …
- Use good quality light sources…
- Lighting for health not just visual…
Don’t be afraid of the dark

Original Lasdun lighting

1990’s refurbishment
Don’t be afraid of the dark
Reflected light

Cloakroom
Use light where required

1990’s bookshop –
gimbal fittings visible in concrete diagrid
Use light where required

New bookshop
Use light where required

New Entrance
Use light where required

New long bar
Control

Scenic Paint Studio
Layers of light

House Restaurant

Kitchen Cafe
Visual variety

Dorfman Foyer
Thank you!

Atelier Ten (Asia)
14A Sago Street, Singapore 059015
T: +65 6910 0600