

## Theme A – Friday AM

### Regeneration at the Building Scale

Notes taken by Geza Gergo

#### **Fionn Stevenson, University of Sheffield**

- Zero carbon housing, smart housing
- ....BUT no people in pictures, unwanted heat gains, poor cross-ventilation, malfunctioning, unintegrated new technology, dumb housing, unusable products and buildings=unhappy occupants
- Sustainable Building Performance and Design, Designs on the Planet: publications
- Durable design increases usability, avoid perfection... cherishabe, meaning through memory, embody habit, design for discovery
- Luk Kreze's recycled port cabins
- Why do we need building performance evaluations?
- Why feedback? Resilience through responsiveness - Sandy Haliday and Howard Lidell
- Key problem areas for a "building doctor": tender documentation, roles and responsibilities, commissioning procedures, handover procedures and guidance, especially in new "low carbon" housing
- Visualizing feedback for buildings (infrared, thermal imaging camera) showing heat leaks
- The Sigma Housing
- User behavior in buildings...a story: normative behavior, nudging, action gap theory, competition
- Haslow's hierarchy, physiological needs, safety...spiritual
- Affordance-design interfaces, key control touch points in the home: heating, ventilation, lighting
- Conceptual model of how things work
- Norman's theory '86
- Usability in design-the Cinderella factor, ergonomics and psychology not emphasized
- Things that go wrong with usability: too many features, disconnected with human

- Emerging properties: maximum usability when clear how to use the product
- Avoid "rear view mirror" effect in evident-based design

### **Sandy Mendler, Mithun**

- Global Energy Use, CO2 imbalance, Urbanized Areas (1000 people per square mile=2 people per acre), poor definition!
- Land Use Graphs US
- SC Project Baltimore, MD (State Center): Office Ghetto, feeling of being unsafe
- GOALS: walkable streets, cultural centers, programming, active public space
- 1st step: urban form (lighting, air) massing study, narrow footplates, 45'x75'
- 2nd step: Deep Green Design Option, Building G&I Savings of \$1M savings annual electric costs
- 3rd step: Street Design, green, permeable, limited access
- 4th step: Energy Systems (typical 40%efficiency\*line transmission losses) vs. CCHP Plant, BAU baseline vs. CHP energy district Challenges: anxiety to do something not the usual, legal
- Balance heating loads; housing needing heat, office spaces need to lose heat
- Can Urban Agriculture produce eco food? 10 calories of petroleum based energy are to create each calorie of food energy, agriculture in a low income housing project= green infrastructure
- Chatham University-Eden Hall Campus-houses food studies program "graduate Rachel Carson": sense of wonder, best of both worlds, the new farm generates more energy than it uses, is a water resource, produces food, recycles nutrients, uses waste as resource, builds eco-literacy, shadyside-eden hall (30min north), BNIM and Andropogon master planning (MITHUN), ecocenter, classroom buildings, ecovillage (off the grid), LEED platinum, passive house, living building, sustainable sites, AASHE stars, biophilia:natural connection with landscape, mosaic field, constructed wetlands, PV canopy: OLD FARM transformed to NEW FARM, seep walls concept axon, bio wastewater treatment, aquaculture+aquonias as a year round complement to in the ground, energy analysis update reduction 43%, residence lodging, passive house criteria, simple building design, energy systems map, connecting the maps, water+nutrient cycles, water reuse (tricky to get approvals), health and happiness map: zip line, tree house, fire pit; sticky issues for regenerative design: on v. off grid

## **Martin Nielsen, MAIBC, P.Eng, Principal, Perkins+Will: Regenerative Buildings**

- Climate Change/Climate Crisis: Industrial Design, Architecture, Transportation Infrastructure, Urban Planning
- Foster and Partners model pyramid: Active, Passive, Building Shape Orientations, Building Operation and Occupant Behavior
- LEED: transformation practice, savvy developers brand LEED, risks "green washing"
- Living Building: problems dense urban location difficult
- Biomass Plant, Ci-3, Ci-1, wastewater treatment plant: GE-Z-MOD, Dockside: Storm water, Wastewater/Ecology: problem with chlorinated: Nexterra
- Dockside Green Development Victoria, BC worked with ecologist, politics of pumping waste water
- Vandusen Botanical Garden \$15million budget (\$22 heard at the opening ceremony): was once a golf course, older crowd, needed to draw a new generation, rebranding, Orchid petal (cornelia) concept, Natural Ecosystem, potential aspirations, strategies identified: storm water runoff, working landscape, how do you use diagrams on such a complex problem?, "worries" a lot about things, breaking the barriers between humans and nature encourages: stewardship, education, adaptation, growth, biodiversity, constantly adapting solutions, comfort with uncertainty, Robert Smithson spiral jetty...disappeared for a while, a sculpture that depends on snow pack, regenerative design: aims to give back more than it takes, must reach well beyond the footprint of the site, acts as catalyst for continuous improvement, growth and refinement, based on strategies not buildings, too complex to diagram or checklist...the concept that human intervention can actually have a positive and restorative impact is both optimistic and audacious, but we have no choice but to believe that it is possible.

Notes taken by David Hau

### **Ray Cole**

- CIRS
  - the design process itself that is transformational (it has been 10 years in the making)
  - now that it is built, it is hoped that the building will be transformational
- the distinction between building and community scale of regeneration is being blurred such that it essentially seamless

### **Fionn Stevenson**

- Feedback to feed forward in Regenerative Design
- background - taught and practiced all over the UK
- her idea of sustainability - environment is everything - economics and culture is within and they interact with each other
- approach to design is systems based
  - cause, effect, feedback
  - cause and effect don't make sense unless you consider place
- has taken part in studies of sustainability on campuses
- most of work is involved with housing because housing contributes largely to the carbon emissions
- 0 carbon housing before 2019 - government policy
  - Backfired slightly - what exactly is 0 carbons?
  - the decided to look only at heating, lighting
- UK is committing to smart housing, passivHaus, and integrated design
- reality in UK
  - overheating in homes, unwanted heat gains
  - poor cross-ventilation due to use of mechanical ventilation
  - malfunctioning, unintegrated new technology
  - unintelligible design
  - unusable products and buildings
- key challenges
  - situating carbon debate within ecosystems
  - maintaining place-based approach
  - globalisation of resource use
  - architectural education
  - including the user
- Building in time
  - thinking about buildings through time
  - reuse vs. recycling
  - design for deconstruction
  - design for adaptation and flexibility
  - design for uncertainty
  - robustness in detailing
- Durable design increases usability
  - avoid perfection - make design scratchable
    - aim for robustness, resilience
  - make design cherishable
  - increase the meaning through memory
  - avoid waste, embody habit over time
  - design for discovery, not 'covering up'
- Why do we need building performance evaluation?
  - "buildings use four times as much energy as it is intended to use" Leeman
- Why feedback?

- improving design through evaluation
- feeding forward to improve briefing
- improving predictive modelling
- resilience through responsiveness
- Feedback informs a lot of different areas
- Key problem areas
  - tends to push people upstream
  - tender documentation
  - installation
  - handover procedures
  - roles and responsibilities must be more defined because if people don't know what they're doing, things go wrong
- Visualising feedback for buildings
- The Sigma Home
  - prototype 0 carbon home in UK
  - human behaviour accounts for 300% energy use
- Normative behaviour - I'll do it if they do it
- Action Gap theory - I don't want to
- Competition
- How do humans work?
  - we are hunters and gatherers still
  - we are programmed to respond to cues and variances
- Conceptual models of how things work often aren't accurate on how users use things
- Conceptual Congruency in Design
  - Danny Norman
- Usability in design
  - not tested for usability
  - education does not teach usability
- Building Performance Evaluation
  - danger of blaming user
  - we need to go back to analyzing usability
- Usable design
  - boring designs
  - too many features
  - over automation
  - forgetting the person
- Evaluate usability
- move on from affordance to learning
- coevolutionary buildings
- interactive systems
- despite need to look back, we still need to look forward

## Sandy Mendler

- Regenerative Design at the Building Scale
- We are increasing outputs
- need to look at land use
- Project 1
  - Baltimore
  - State Center
  - no one wants to go there, feels unsafe
  - objective - to reintroduce neighbourhood
  - resources, mobility, partnerships, economics, sense of place - keys to success
  - a number of arts buildings are nearby - looking to connect to them
  - goal - to bring opportunities together
  - looked at massing...decided to pull it apart for greening, light, and air
  - mixed use - housing, hospitals, commercial, office space
  - Deep Green option saved \$1 million per year in energy costs vs. LEED standards
  - the street design is the place that is more interesting
  - district system for electricity
    - transformation efficiency of 90% vs. tradition method which is 30-35%
- Can Urban Food Revolutionize Design?
  - 80% of water is used for food production
  - 10 calories of petro used for each calorie of food
  - Agriculture in buildings? a bit expensive
  - Agriculture belts in cities?
  - The new farm
    - generates more energy than it uses
    - is a water resource
    - produces food
    - recycles nutrients
    - uses waste as a resource
    - builds eco-literacy
- Project 2
  - Chatham University Eden Hall Campus
  - building ratings - LEED Platinum, Passive house, living building
  - engaging the site
  - urban food module
    - aquaculture and aquaponics
  - capturing food for composting, recycling nutrients
  - capturing heat from waste and composting
  - How do you nurture the spirit?
- Sticky issues
  - On or off the grid?
    - on so that you can give energy to grid
- Incrementally vs. big green move?

- big green move gives huge savings

## **Martin Nielsen**

- Regenerative Design - Beyond the Building
- worried about cutting edge systems and how they are transferred to mainstream
- if it doesn't hit the mainstream, it won't go anywhere
- if we are going to be sustainable, we can't do it one building at a time, we have to jump scale
- active strategies are most high cost
- LEED is meant to transform mainstream
- How can Living Building address dense urban development?
- goal setting
- regenerative - smart + green + human, with feedback
- dockside green development, Victoria
  - need at least 1 million sq. ft. to do district planning
  - wastewater treatment becomes amenity
  - can't get past requirement of water chlorination
  - sewer sludge from water treatment used for energy production
  - interplay and overlap between different systems is quite complex
  - developer was able to use the buzz around the green project to reconcile the cost of greening the building
  - treated wastewater from community and sold the water to surrounding industries
- Vandusen Botanical Garden
  - \$15 million
  - was a golf course
  - needed rebranding to entice a new generation
  - looked to orchid petal for inspiration of organic form
  - expand scope of building to include the program of the landscape
  - design of building reached into broader context
  - how to make the landscape into a WORKING landscape
  - requires a diverse team
- How do you disseminate green theory into practice?
- Spiral Jetty
  - the leading edge is to make the leading edge consumable
  - disturb the shit - inspiration
- regeneration must give back more than it takes
- be a catalyst for improvement
- must reach beyond site footprint
- too complex to diagram into checklist
- we need human intervention to save our asses

We need to get beyond the club and out to the masses