VISUALIZING SUSTAINABILITY – SUSTAINING THE FUTURE A Design Manifesto MOOC Everything is Connected

- Green Chemistry
- Sascha PPT July 2017. NTU's approach for sustainability solutions
  - • Platforms for disciplines, private sectors and government to meet
  - • Topical projects, e.g. **building, transport, water, security**, etc.
  - • Early involvement of students and civil society
  - • Seed money to develop inter- and transdisciplinary projects
    - NTU Research Projects
    - NTU Industry Research
- Biomimicry
- Product
- **Resilience**
- Outreach across borders
  - No borders from space
  - No borders on nature
- Planetary Boundaries
- 180° opposites to find center
- An Operating Manual A Design Manifesto
- Everything is Connected
- Upcycle
  - Cradle to Cradle
    - What are the real costs of resources vs. recycled?
- Vastness
  - Visualize the vastness
    - Getting a grasp of the scope and size and scale of the planet
      - Physical Size
      - Distance to Moon Distance to Sun
    - Getting a sense of size of the atmosphere
    - This is all we have
      - A closed system
      - From climatologist Ken Caldeira in MIT Magazine "...the attention brought to the climate problem at the highest levels of government represents an important step toward a social tipping point—to that phase change when we decide collectively that we are not going to use the sky as a waste dump."
        - The sky as a waste dump or not
        - The ocean as a waste dump
        - Th
    - "The Power of Pictures Everybody's saying it: we need a new economic story, a narrative of our shared economic future that is fit for the twenty-first century. I agree. But let's not forget one thing: the most powerful stories throughout history have been the ones told with pictures.

      If we want to rewrite economics, we need to redraw its pictures too because we stand little chance of telling a new story if we stick to the old illustrations. And if drawing new pictures sounds frivolous to you—like mere child's play—believe me it is not. Better still, let me prove it. From prehistoric cave paintings to the map of the London Underground, images, diagrams and charts have long been at the heart of human storytelling.
      ……..
      With far fewer pen strokes, and without the weight of technical language, images have immediacy—and when text and image send conflicting messages, it is the visual message that most often wins. 27 So the old adage turns out to be true: a picture really is worth a thousand words." from "Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist" by Kate Raworth
      - Draw the future
      - Seeing the big picture and the small picture
- CREATE Mobile phone parallel workflow
- Its the Chemistry
  - hydrogen, oxygen, nitrogen
- It's the Math
  - Orders of Magitude
  - Powers of Ten
  - Thinking in Millions and Billions
    - Quadrillion BTU
  - MATHEMATICS FOR SUSTAINABILITY
- Panarchy Thinking in Multiple Scales
  - Scale of things Scale of time
  - Doing by Learning by Doing
- Singapore & NTU Buildings
  - Solar installations in Singapore
  - Energy Efficiency
    - GreenMark Certifications
  - Retrofit to higher efficiencies
  - Living in Cities
    - Green Skyscrapers
      - Ken Yeong Architect
- Drawdown
- SUSTAINISM
  - https://www.sustainism.com/ www.sustainism.com/statement.html
- See things as other things
  - MTSFATFS
    - GET THE SCALE RIGHT

- "Imagine, we are Travelers in time...one second. 1000 years. one million years.
- Key Elements of MOOC
  - Quotes from many books
    - from "Abundance: The Future Is Better Than You Think" by Peter H. Diamandis, Steven Kotler "Imagine a world of nine billion people with clean water, nutritious food, affordable housing, personalized education, top-tier medical care, and nonpolluting, ubiquitous energy. Building this better world is humanity's grandest challenge. What follows is the story of how we can rise to meet it."
  - Gathering Data
    - Dear Data Self Assement
- Dear Data Self Assement
- The Commons
- **FUTURE IS A TIME THAT WE CAN CHANGE!**
- Speaking for Earth Speaking for Us
- It's the cost of things
  - Sustainable Business Practices
- Everything is Connected at Every Level of Scale
  - Seeing the world whole
    - Since the whole earth photo
      - All has changed except our thinking
    - Why is the sky blue? Chemistry
    - Making the air visible tangible
  - Beyond Borders
  - Chemistry of all of us
  - Volume of atmosphere
  - Economics Money Flow
- We swim in a vast ocean of Air
  - Oxygen
- Biomimicry
- Volume of Stuff
- Density of People
  - How many 25 years ago/parents time ago?
  - How many now?
  - Impact in multiples
- Economics
  - http://sustainablebizconsulting.com
  - Externalities
- Doughnut Economics
- Key Elements of MOOC
- Gender equality
- Embodied Energy
  - Lifecycle Assessment. LCA
  - Certification Programs
    - Greenmark
    - LEED
    - Cradle to Cradle
  - Cradle to Cradle Upcycle
    - Case Study examples
  - http://www.realworldvisuals.com/blog/us-daily-co2
  - Stranded Assets
    - Fossil Fuels
- Renewable Energy
  - Solar
  - Hydro
  - Windpower
- **How to authenticate real information?**
  - Sagan's baloney detection kit
  - Feynman plain language
- 180° opposites to find center