

BANFF NEW MEDIA INSTITUTE

Group Work Summaries:
Carbon versus Silicon: Thinking Small/Thinking Fast
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Amorphism and Visualization: Group One

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Question: How can we organize for fruitful interaction and collaboration across/between disciplines?

- Any group of collaborators needs enough diversity and difference, plus enough commonality. Proportion of diversity to commonality will vary
- While the group may be supported by a gift economy it also needs some cash. Again proportions may vary.
- Chemistry between collaborators is essential, as perceived common goals are not enough.
- Power structures (and being aware of them is important: we are all 'other' in some environment, but there is a (situated) hierarchy of 'otherness' that can be a block.
- Spontaneity is important.
- The collaborative group needs mechanisms for interaction and for feedback, between group members that make up a group that has a critical mass.

Two Sets of Two Laws:

- White's Law: Too much similarity, trust and niceness, and not enough gaps and frisson will thwart collaboration.
- Ryan's Law: from the material sciences, annealing removes defects and gaps which weakens the structure.
- Theise's Law: the less you have in common the smaller the group needs to be/can be in order to get results.
- Resch's Law: If you want an incremental result you need a large and homogenous group.

"Visualization" --> "Display": Group Two

Russell Taylor, Anthony Harckham, Tania Fraga and others

- What is the palette of things that you can use to display? Visual, haptic, auditory are dominant.
- What is the palette of things we want to show? Mechanical properties, electrical properties, chemical properties, behavior, process.
- It turns out that visualization are single-purpose, rather than multi-purpose: the best one to use depends on the question being asked. Also, the human perception system characteristics must be known so as to produce a faithful representation.
- Current visualizations are limited to the "photorealistic" model will break down at some scale, but the display doesn't change at this scale; this will produce an incorrect display. Is visual the best source of information at that level? Is it more problematic than some other form of representation?
- Current measurements average over space and time, as opposed to bubble chambers where you get single events. This brings up two issues: merging the two kinds of measurements, and displaying the measurements in a way that faithfully displays the ambiguity.
- Purposes of visualization matters: (1) To aid our understanding. For this, you want to make sure the mapping doesn't mislead. (2) Communicating results to others. For this, you need to produce something with veracity and give proper understanding. You do want to portray a simplification in this case, and be sure that you tell what simplification you are using. People who work in visual communication will be able to select a technique that is closest to what you want to transmit. Marketing: you need to make it clear to people why this will improve your life to help encourage funding. Picking techniques that are like what people have seen already will help them make connections: weathermaps of nanoscale behavior.
- None of this is fundamentally different for nanoscale phenomena than at other scales.
- Stop this group unless it turns into artists and vis folks talking about novel unexplored representations.
- At the nanoscale, there are some sort of surprising effects that occur. Tactile interaction could be interesting because you can feel the differences when you try and manipulate things. In terms of geometry, you can get down to the atomic level and still have a reasonable representation of the world with geometry; it could have the same role at this scale.
- If you look at a thing like a carbon nanotube, which seems to have three dimensions, it turns out to behave as a 1D object for electrical transport.

- Note that any display is an interpretation, and you need to pick a display that makes a truthful representation for the purpose of your inquiry.
- Note that astronomers have similar problems: bringing multiple wavelength display into human perception.
- Transparency modulation may be closer to representing a continuum model than the opaque-surface representation. Maybe you could encode multiple transparent surfaces this way. [Editors note: simple transparency fails.] Example of visualizing shock and sound waves to show refraction of what is behind (the Matrix) to view a 3D wave. Metaballs may be used to show layers.
- For looking at quantum effects, these objects need to be viewed as waves, rather than just as particles. For electrical interactions, you need to understand band-gap configuration across an entity. Also, probability distributions.
- Electric field gradients would be present: how would you represent these as force fields?
- Adding simulations into the visualization toolkits as a method of comparing the theory with what you're measuring can be a helpful tool. Adding models to the mix makes the display more challenging.

Nano Dream Home (aka. Nanorganic Home, NanoHome, nanoDream Home): Group Three

Joanna Berzowska, Sara Diamond, Diana Domingues, Brian Fisher, Mary Flanagan, Deepak Srivastava, Ruth West, David Wishart, Tania Fraga

1. We need to write a Banff Letter of Nano Architecture Design (manifesto)

2. Proposal Ideas

- proposal built on/in nano level (either prototype size or process of designing the physical structure, such as “printing” at atomic level)
- international team
- online creation space + website
- awareness of existing nano Presence (integrate existing products that currently use some form of nanotechnology as well as “futuristic” vision)
- education + outreach
- ethical questions of protein-based nanoubiquity (Europe)
- dream, therapy research (NIH)
- eco-sustainable architecture (UNESCO)

3. What will this responsive space do?

One way of looking at it is that our environment is already “responsive”. Nano-technologies can be examined on 3 axes:

- **alter** existing responsiveness of environment
- **augment** existing responsiveness of environment

- **insert** poetics into environment (express/communicate/art)

Some ideas:

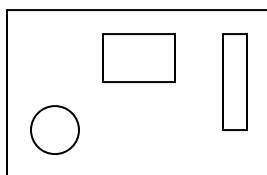
- scaleable environment
- ubiquitous/obvious vs. interventional
- recognition: home aware of occupants or surroundings
- facilitate or enable continuous sleep deprivation lifestyle
- augment + replenish health, health monitoring, medication compliance etc...
- personalized interaction (like many visions in existing “smart” homes)
- entertainment centre, adaptive, relaxing, funny space
- complex narrative systems embedded in architecture
- nano-organic
- affective architecture
- **invisible** (parallels process of experience?) – ie. your “skin” (think wearable home???)
- record and playback **memories** (quantify properties such as smoke, smell, temperature to reconstruct memories, sensations)
- chemical sensors to create recordable conditions
- cognitive science

IMPLEMENTATION NOTES

One method of looking at design process:

BEHAVIORS	
interaction	materials/surfaces
	lightweight materials
	air

Another:



AXES:

- colors
- light
- motion
- sound...

nanosensors

“invisible skin”?

input data into database

communication database

processing point

remember: complex interaction of memory/recall

FUNCTIONALITY

- material responds to (through nanosensors):
 - pressure
 - humidity/moisture
 - sound temperature
 - light
 - charge
- lightweight
- soft
- flexible
- response of materials:
 - nano-muscles/fibers
 - memory metal (**Nitinol**)
 - piezo-electric materials (actuators)
- volumetrically
 - walls
 - use nano-scale wire with sensors
 - airborne (what about BREATHING)
 - protein-based sensors

Group 4