Notes from meetup: data-driven design 2.0 (Data-driven architecture), 2015-08-24

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Basics:

- AIANY chapter (http://main.aiany.org/)
- #datadrivendesign
- http://www.meetup.com/Transforming-Architectural-Practice-Meetup/events/224093716/
- First panel was http://main.aiany.org/eOCULUS/newsletter/data-in-the-built-environment-new-sources-new-strategies/

Melissa Marsh on intros and bios…

- "Transforming architectural practice series" = thinking differently about the process of arch: tools, practice, how they run their business (leads to thinking differently about product).
- Panelists showing how taken on data-led practice changes how arch does their work… incorporating different methodologies, s/m/l/xl data.
- Today = moving from data sources and collection to examples within projects, how to set up projects and client relationships differently. Came out of feedback from June event. Continuing looking at future of design relationships.
- Panelists:
    - Jeff Ferzoco (linepointpath),
    - Zak Kostura (ARUP, hiph performance structures - currently form found roof system for MX city)… thinking about project setup and info sharing and how it's changing client relationships.
    - Darrick Borowski - on tools and techniques… data-driven design = ask better questions at the beginning… back and forth with Q&A.
    - Shawn Rickenbacker - intersection of data and design; urban, architectural, interior design: opportunity to link the scales of design and learn from the scales how to apply design. "love of systems, problem-solving skills".
    - (Panelists all teach class: uni?)
- Later:
    - Oct 12th: coworking and the future of architecture.
    - tues pm: measuring architecture (shift from geometric to other measures, including financial and social)… exhibit and event.
- Program: 10-min presentations from each panelist, then Q&A on each topic.

Jeff Ferzoco (@zingbot):

- Practice: info design, mapping and experience design. Tonight: examples of what he does with data. Practice is almost all mapping at this point. Looking at 3 problems and how he solved them.
- “hardest part about data is understanding what to do with it when you get it”
- Old job: 8 years at regional scale, 31 NY counties, NYC not as a city, but as counties and larger areas. e.g. America2050 project, on high-speed rail in US… maps, event, work with stakeholders on what HS rail would look like (america2050.org, linepointpath.com). Train, traffic, cultural data, produced massive-scale maps.
- Since then, looking only at neighbourhood and city scale issues.
    - NYC released open data. Started working with Geonyc, Betanyc on this… data for NYC policy…
    - 2013, citibike called clients… opening data, called Sarah Kaufman NYU… wanted to see what people were doing. Dataset was 4Gb for the year, 1 row per ride (1.5M rides; pickup place, droopy place, times, casual/member, gender, zipcode of member… more data got released later). Put into OpenRefine, looked at favourite stops…
        - http://linepointpath.com/111242/2771111/work/citi-bike-visualization
        - Looked at gender divide - men midtown, women brooklyn “because it’s safer”.
        - Found hookups - people riding from bars to same stops together. Found tourists out late. Tourists in from NJ, around park at lunchtime etc.
    - Next was DOB site… has 4’ profile of all jobs done. (http://www.nyc.gov/html/dob/html/bis/bis.shtml?). Jean wanted to know about renovations in the city. Had database from 2004, lots of human errors. Pulled into map, can see where all residential renovations have been. Very messy data. See sweeten.com http://linepointpath.com/111242/4498744/work/sweeten-renovation-map
    - Current project: finding where all gay nightlife spots have ever been in NYC. Went through old guidebooks(60s, 70s) about gay life, scraped them… about 7 sources, 2 archives (gay and lesbian centre) - about 1000 gap spots since 1859.
- Citibike - automatically generated data; DOB = human-generated; gay = historic data.
- Need to understand the tools.
    - Tools better over last 3 years
    - Favorite tool is CartoDb for mapping.
    - Take data and put through other tools, like google refine (“sophisticated pivot tables, non-destructive”), google drive. Tools for big datasets listed on last slide of his presentation.
    - Jeff posting presentation on the meetup.

Zak Kostura (ARUP)

- ARUP people - lots of then, different fascinations including data.

- Excited can get a lot of data, not know why looking at it, but by exploring it, find opportunities wouldn't otherwise have known.
- Arup were doing taxi commission data on rides: 10-15 years of data collected by the commission. Arup were handed a hard drive of data… taxi commission went to them with the data.
- Zak = structural engineer. "never accept data unless I know what I need it for". Tonight, talking about 2 projects as examples of this.
- Need all structural systems to be sized for any event.
- First project was Fulton Centre - the net on the inside, alongside Jamie Carter on the engineering of it.
    - Soft structure, takes the form that it wants to take, like a hammock. When forces on the net change (e.g. wind), the shape changes too… in design, needed to understand all the changes possible… e.g. smoke exhausts create wind forces, building moves, heat rises and changes it. About 1000 panels. Was 2007… needed algorithms could interrogate on the fly.
    - Can stop the process of having to idealise.. can look at exact systems, not estimates, can aggregate info and not be afraid of it.
- Mexico City airport. Largest roof in the world… giant X… road around it is 2.9 miles. Only 21 touchdown points, big space-frame system.
    - Principles simple: forces on it, how much force it takes an element to yield, how much force before it buckles… do this calc for each of 1m+ elements, or approximate it (but approx = inefficiency).
    - Started data-driven… from a database. Used to use Excel, but not think about using a database… excel not designed for e.g. fast v-lookups.
    - Could only design because knew exactly what the forces would be on each panel.
    - Processing comes down to a pipe, calculated 3/4m times. To do this in the timeframe, everyone on the team has to be confident interacting with the data, e.g. using the right SQL commands to do this. Currently working with fire teams, architect etc on a database. Hoping to get to a point where can hand the database over to contractors.

Darrick Borowski (design director, ARExA)

- Follow-up to a talk at the AIA. This time, talking about the tools used to do projects.
- "The generative nature of information, or the dirty things people do with data"
- Tools: grasshoppers, cellular mod, dijkstras, A* etc.
- Last time were talking about material experiments, human behavior as a source of data, extracting learnings from natural systems as a data source, and cultural systems as a source of data (and particularly cities), all in Grasshopper.
- Grasshopper is a graphical system editor. Can model behavior in this. Looking for the learnings that are available in our world (human, natural, cultural

systems). https://en.wikipedia.org/wiki/Grasshopper_3D

- System: data in, computational model, data out. Use simulation in all 3 aspects of that.
    - Data in = pounding pavements, streetcorner counters, material experiments, simulation.
    - Model: create algorithm to process data and map onto problem trying to solve. Sometimes data is in the natural system that are extrapolating data from. Key this is that mapping from what you're trying to accomplish to the model you're using.
    - Data out. Can do many things with this. Data in itself, e.g. 3d model. Data for decision making, e.g. hand back to designer. Data fed back into another algorithm, adding complexity to that solution.
- Project: workspace layout based on connectivity that different layouts enabled.
    - Tied into: more frequent conversations people have, the more innovation comes out; the closer you are to other people, the more likely you are tho communicate. (Allen Curve).
    - Put in different design layouts, measured distance between, looked for layout with best average distance.
    - Desks are agents; agents are sent to every other person in the room, by navigating around obstacles in the room… draw a vector and test options for routes…
    - Different desk layouts, paths travelled… fed into excel, averaged, extracted average distance travelled.
    - Inefficiencies in building that behavior from scratch: phase 2 = pre-developed algorithms using efficiencies they couldn't see in phase 1. Eg. use A* etc for routes (like Google Maps does), and looking at how slime mould aggregates (slime mould aggegates). http://christinehastie.com/2015/01/collaboration-can-learn-slime-mould/
- Project: greenhouse.
    - Problem distributing structural nodes across a dome. Looked at phyllotaxis (e.g. how sunflowers distribute seed heads - how to pack things into a space)… extrapolated principles of algorithm, added into Grasshopper (who scales out, repeats) - produced a structural network with equally-sized members over a surface.
    - Examples of data in a natural system serving as a computational model
- Example: based on caloric intake of average american, land needed to create that, designed city tissues - areas of land to feed people; reaction to fuel crisis, global warming etc.
    - Showed power of building things up in layers. Complicated algorithm: tempting to pack everything into one Grasshopper algorithm… robotics etc will build one small piece, e.g. walk, and build on that and build on that again to create the systems.

Shawn Rickenbacker, Urban Data + Design.

- Use Rhino and Grasshopper quite a bit for complex geometries.
- Example: designing a wavy, moving wall.

- “Somehow ended up as data analysts, working with china partnership in downtown manhattan on how tourism were shaping their environment”.
    - One characteristic: knock-off goods; this black market enormously important part of downtown economy.
    - Video of group of swallows… look choreographed: interested in why they do this: barometric pressure, predators etc? This is the problem of data: understanding why.
    - Big data is about... tracking individuals… Borrowed S/M/L/XL from Kolleeny
    - R visualisation… R as a useful tool.
    - Tourism used counters (interns) on streets. Generated heat maps from the dataset (easy to get from R; had timestamps). R still needs human input to recognize the patterns.
- User groups: did some work with Sony.
    - Client understands the user… each one of the data points is a different individual. CAn’t understand the flock because you don’t understand the individual. Buildings are reacting to the environment, e.g. wind blows - spatial element.
- Chinatown again:
    - Distributed QR codes across Chinatown. Borrowed idea from stores showing pictures with QR codes to purchase things instantly on the street.
    - Client asked “what happens at night?”. Started projecting QR codes on walls at night… Chinatown has different night and day populations.
    - Marc Andresson: “software is eating the world”… shakes at the core of arch, which is about physicality. SW was designed as a tool to solve physical problems.
    - Got into distributed networks… Xbee+ Arduino to create a wireless mesh network, can add sensors and cameras to these.
        - Software eating the world: working less with physical architecture, more with non-discrete architecture (e.g. no physical component, like wireless networks).
        - E.g. QR code as a pass to get into a Nike event. this is convergence between the digital and physical. “felt lame using QR codes back in 2012”. Nike was pop-up event, large size… had huge LED basketball court projected inside… access only gained by using QR codes set up around the event.
- How to deal with software eating the world spatially, architecturally.
    - Video is best way to track the flock of birds. Programming xbox connect, then manipulating real-time data from it. Used processing, arduino, R, gestures as data compiled by the camera then processed through p/a/r; creates action = movement of swallows.
- Kimono Labs are good place for data
    - https://www.kimonolabs.com/
    - Can go to any website, scrape data and produce an API from it.

    - e.g. taking data from video - bus going by, using data for next time bus goes by… creating interactive.
- M: “If software is eating the world, architects are making that world more nutritious”? "N… maybe get a lot skinnier”.

Q&A session with panelists:

- Q: If dealing with large amounts of data, how do you share raw data and communicate results with other team members (consultants etc)?
    - A: Zac: newforma, file transfer protocols; lawyers need legal protocol for sending data, e.g. timestamped, who sent, who received: this is barrier for collaborating over data. e.g. airport model can’t be done in live collaborative fashion because strips have to be packaged and sent. Tech: set up database server and use that, but lose ability to see who did what and why? This hampers ability to share effectively.
    - M: need a next version that takes on responsibility and ownership of data by parties, e.g. all becoming stakeholders collaboratively: share blame, but can do great design.
    - Derek: problem with Grasshopper, are the only people int he team interested in behavior; everyone else wants geometry; tend to bake data into 3d model for rest of team to work with; sometimes geometry, sometimes excel spreadsheet, sometimes evaluation of spreadsheet. All about shared language.
    - Jeff: use SQL to access mass amounts of taxi data; communicating, usually a layer on top, e.g. google chat. BigQuery for large storage; if smaller, then Dropbox (or Box).
    - Shawn: AutoDesk pilot project called Dreamcapture (=AutoCad Artificial Intelligence). Future of large data affecting design isn’t as large as commerce data. Dreamcatcher premise is collaborative environment, where can see effect of team member changes. Security: if you have a secure cloud with limited access, get round problem of waiting for save, send, send back etc.
    - M: data volumes; if look at buildings as they’re lived an occupied, will get to consumer-driven sized volumes of data. Important that archs have a thoughtfulness about that data. NB Autodesk is a sponsor of the global self quant annual meeting.