

SPACE ARCHITECTURE SYMPOSIUM - BREMEN: 29th Sep 2018

SUMMARISED NOTES

Where are we by Region

Russia

- Academia, Not Really Industry, International Competitions, most work outside of Russia
- RosCosmos Visualizations outsource
- No known employed space architects

America

- Last generation - NASA
- This generation employed as space architects - Habitability Design Center Johnson Space Center, Bigelow, Nanorax, Blue Origin, etc - people who work 100%
- What do they Do: Overall Vehicle Interiors and Concept of Operations/Systems Integration
- Project: Deep Space Gateway
- Universities: UoH only masters, Pratt, RISD, Industrial Design
- Private Industry is more accessible space - price of space is slowly dropping (SpaceX BFR etc)
- Its a good time to be in the space industry, right on the cusp of becoming a day to day thing

Europe

- There are space architects who work in the field, maybe not 100% but half
- Some work at ESA (3 architects @ Advanced Concepts team) - very interdisciplinary team
- Young generation who now studied and a starting to get into that field
- A couple of academic institutions - studios, or collaborating with ESA: TU Vienna, Univ of Stuttgart (with astronaut center), TU Delft
- Developments: Very political (Germany, Italy, France - largest contributors)
 - France new Network: Este Arches
 - Network - Europe is diverse in level of interest in space
 - Netherlands - no demand for space architect? When the netherlands has so much! (Space Architecture at TU Delft - no demand for this)

Japan

- Cultural Utilization at JAXA (must come from university - not open, so its difficult to find a platform)
- More interest from the young generation
- Architects must design for small spaces

China

- There is no space architect in China, people who are designing are part of the National Chinese Space Administration (whoever is working on human factors is part of the government)
- Manned mission for China : Multi module space station, similar to the MIR station in scale - to last 10 years, a stepping stone
- Recently 1 manned mission every 2½ years, in the next to build this station up to 5 in a year (a lot more manned missions in the next decade)
- By the end of 2020s Chinese might have the only manned space station
- Mainly from the engineering side
- A lot of analogue missions (Bioregenerative life support system - a cross between a MELISSA and HERA)
- No particular space architecture startups but there is opportunity from Chinese government to push for space startups (SpaceX China)

India

- Earth to Orbit - facilitating orbits
- Residential Astronaut Training Facility?
- Universities Engineering mostly - some exciting inspiration projects from Universities
- India is slowly developing its own space program, and as they become more mature they will be more interested in architects and industrial designers
- India has many planetary missions, we are on the trajectory for manned exploration

MORNING SESSION - WHERE WE ARE

TOPIC 1: PROJECTS

- Orion Project
- Phillippe Stark Axiom (making use of the name)
- SHEE (Liquifer) - European Framework Program, a bottom up approach, produce a statement of work, background doesn't matter, composition of the team is important
- RAMA Rover - an ESA project, a top down approach, architects not as well perceived
- Horizon 2020 calls, European Grants, very competitive, a lot of bureaucracy (need an external agency just to put together the grant)
- Private Sponsored Projects?
 - Different Business Models: SpaceX v Blue Origin
 - SpaceX - a little bit of his own and government contracted
 - Blue Origin - directly privately funded
 - Bigelow - more private funded
- NeXT Step: NASA Funding 6 Companies for a Cis Lunar
 - 4 Astronauts for a month out of the year (in between is autonomous)
 - Domestic Hab (US Hab - a Bigelow/Boeing infaltable) + European Hab
 - ESA contracting Europe now? (Opportunities come and go)
 - ESA is now putting out calls (lead by AirBus and Thales Alenia)
 - Architects
 - Size is given and the configuration - find ways of minimizing the system, color, light, more efficient spaces
 - NASA JSC testing ground tested habs
- Space Simulators
 - ESTEE
 - Life Support Systems - full bioregenerative life support system, private venture, spinoff of Melissa (a big scale)
 - Habitat Construction Systems
 - Mars Science City
 - Labs, Museums
 - A Hub for people to come produce spinoffs
 - 3 domes (BIG for the name brand, now contracting out)
 - Lunarix
 - Human Interaction Testing
 - Private Investments - missions for companies, mission for kids, team workshops
- ESA Advanced Concepts
 - Materials and construction testing, less human factors
 - Lunar construction
- Moon Village

- Many analogues
- Construction, 3D printing
- Distinguishing between technology projects and initiatives, theory, and projects

TOPIC 2: COMPANIES

- Definition of space architecture work: Theory and practice
- In Europe, funding comes from tax-payers money
- Private foundations interested in supporting
- SOM
- ITAR/EAR regulations existent in US to participate
- Other areas for space architects
 - Hollywood participation helps to motivate the general public, who would provide the financial support through their taxes to support space mission programs
 - Movie: passengers
 - Developing games
 - Virtual reality (also used for ground tests in NextStep)
 - Transportation (trains, air, etc.)
- Ground architecture: Space Port
 - There are 11 spaceports in the US
- Umbilical Design - Cecilia
- Architecture Envision: extreme environments (train design award)
- UAE has companies and private ventures hiring space architects (need to research more)
- Cities created in extreme environments (will be discussed in a later discussion)

TOPIC 3: COMPETITION

- Visionary versus Technically Realistic?
- NASA 3D Printed
 - The premiere project where architects are in the media
- Design Competitions (Eleven, MarsCity)
 - Heritage and Portfolio Building
 - Mars City Design
 - Bridge Science and Artists
 - Vision - to create access in space for more people, opening up to the rest of the world, an incubator, a gateway
 - Critics and Admirers
 - Taking it to the next level, the company is growing, build prototypes, real projects behind the competition

- All about timing, doesn't have to be built today, participate in creating the path
- University Competitions
 - A way to get architects in the door,
 - How to a seat at the table
 - Competitions are a place for people to start
- Interdisciplinary Teams - but the architect is the baker of the cake, the binder (systems engineering is a similar thing)
- Keeps us in the conversation, puts us in front of the architecture community

TOPIC 4: EDUCATION

What is the vocabulary of a space architect? What is the current trade of the architect?

- Extreme Habitats and Extreme Conditions

Technical and solid project in education, we should make sure that existent competitions have the competency that architecture projects need

What you think is missing in your education?

- Need for architects to reach out other disciplines like engineering to have a better product
- Challenge convince traditional engineers about the importance of space architecture
- Middle school involvement so that generation can build the space architecture field
- Struggle to find advisors for graduate students looking to work on space architecture advanced degrees, also funding related
 - Need to be pioneers, and sometimes even educate institutions of the opportunities that space architecture brings it
- Offer to give a lecture on architecture (habitability, human factors) in undergrad engineering schools
- SATC could put together a module (AIAA)
- What about places where fields cannot be reached to: there are online courses they can get to take classes on it
- When do I call myself a space architect?
 - There is no specifics at the moment
 - It's not only educational level
 - Participate in space architecture activities
- What benefits can you get if you are an architect first and then an engineer?
 - It's not about switching fields, it's adding to your field

AFTERNOON SESSION - WHERE WE ARE GOING

TOPIC 1: WORK FOR NEW SPACE

- Personal Outreach - “Related Field” - be a pioneer
- Profession Outreach - for “Space Architects”
- Profession Outreach or for “Architecture”

- Work In-House
 - must be Master of Science in many cases
 - personal connections
- Get hired as an architecture firm
- Get hired by an architecture firm as a space consultant

- Most companies don’t believe they need architects in house

- New Space gives us an opening into who the users are
 - Consumer is the person going to live in it - no longer an astronaut
 - In a world where we have tourists or paying passengers, they have different expectations

- Reach these companies through other companies who work them (Industrial Designers)
 - Industrial Design experience rather than product
- We can differentiate competitors - SpaceX v Blue Origin
- Personal Connections

Action Items

- Build your personal network
- Introduce it in front of your work at conference

TOPIC 2: BRANDING THE PROFESSION

- SpaceX goes to Hollywood
- Industrial Design - are these space architects?
- Engineers use different words - “architect” and “design” mean different things
- Getting in front of the media - spoken about by someone outside the community

TOPIC 3: Working on Earth

- Session - Connecting earth and space practices, creating jobs, finding jobs
- Christina has to make the link between Earth and space to be able to work.
- Water Studio, working on floating cities with EU.

- Floating, Flying, and Space - connected through movement of system
 - How can a city reorganize itself with changing needs
 - Flying city relates to Venus habitat projects.
 - Floating city relates to Titan submarine missions.
 - Use of any nomadic analogue for space design
- Climate refugees as space analogues
- Extreme environments as space analogues
 - Flooded, cramped, cold, isolated, desert
 - Necessitates self sufficiency
- Urban designer from PR at city design working with trash for new building material.
- 3d printed moon solutions for rebuilding after volcano
- Looking at entire lifecycle of habitat, whether on earth or space
 - Architects can also bring expertise in lifecycle
 - Even not yet there on Earth, but an area of need in both.
- Maintainability and repair for space and earth.
- Analogue habitats for space
 - Why are architects involved in building these, but not spacecraft as much
 - Not agency driven, so easier to have architects involved.
 - MDRS, Canadian MDRS
- Should SA reach out to companies about using their products in space (e.g. solar panels)
- What is scope of space architecture?
 - Perfumes of earth scents?
 - Fashion
 - Health care spinoffs
 - Furniture
 - Utensils
 - Sleeping bags
- What is value proposition of SA?
 - Could they be principles to live/work by?
 - How to think like space architect when working on Earth
 - Could we brand SA that way?
 - Start with universities, students,
- In 200 years, no distinction between space and earth architecture.
- Architecture is more generalized than design, it is a way of thinking.
 - Organize, develop, brainstorm, not connected to specific product
 - Classically for humans, but differentiated by location only.
 - Must it be for humans only?
- Space architecture principles
 - Scarce resources
 - City as a spaceship
- Promoting notion of Plan B is “insane”
 - Earth is only habitable planet we know

- Mars is barely less inhabitable than moon
- Do we want SA to be associated with that?
- Planetary defense as area for SA?
 - Prevention and recovery
- How similar are working in earth and space, really?
 - Does space have more stringent requirements?
 - E.g. sustainability, zero energy
- Has been common for people look for things that are similar on earth in order to find work
- Reality is that people who have brand name become space architects, not the trained people.
- Branding
 - Do you go in front of aerospace companies as 'architect' 'space architect' or neither?
 - It's more about the expertise that you can bring
- ISU
 - 7 alumni of ISU
 - Mantra of ISU - strategy is to gradually take over the world by graduating people through ISU
 - What are skills that architects have the engineers don't
 - Synthetic thinking - design directed
 - Find a role and build from within
- What makes a space architect?
 - No set of values or skills required yet
 - Would it be possible to have a set of knowledge that they have?
- Can architecture reduce cost of systems in space?
- Discussion of values of SA from SAS in Vienna
 - Its about a way of thinking
 - Key skills - able to communicate vision, apply day to day problems on earth,
- SA Standards through AIAA SATC or ISO
 - Habitability standard
 - Will go behind standard 3000, 3001

Topic 4: Outlets for Space Architecture Ideas

- Start talking to other outside of SA, inviting them to SAS and other events.
- How do we publish SA work?
 - Sandra and Olga have published books successfully.
 - Exhibition about the moon in Denmark at Louisiana (Katerina, May to January)
- 50th anniversary of moon landing.
 - Museums want to focus on the moon - will be opportunities for that.
 - Could contact them about architecture on the moon.
- Exhibition, SAS, and panel discussions in Valencia
- Science museums could also be possibilities

- Takeaways from today
 - Online PhD course for Space Architects should be created.
 - ND university has space exploration online degree, could be similar to that.
 - Affirmation of what SAs do. Need to go talk with people about what SAs do.
 - Had problems explaining to university, but problem is more general.
 - Changes from 2004 - things are not that bad :)
 - SA offerings as many universities
 - Many SAs working as SAs
 - Many habitable flight systems in development today
 - Many dimensions of space habitation
 - Many challenges and competitions
 - Professional org
 - Participation in major conferences
 - Lots of einterest by young people
 - Global nextwork
 - Two mailing lists (SpaceArchitect.org, AIAA SATC)
 - SATC applications due in november
 - Leaving with no fear about state of Space Architecture.
 - Possibility for SA sponsored phd fellowship to work with company
 - Get students involved in curriculum based projects
 - We Are Pioneers
 - Interest in standards.
 - SAS is motivating event, seeing each other in person, not surrounded by engineers.
 - Offering CAD skills and other tools are important. Will do software teaching.
 - Wish everyone a successful future.
 - Publicize the field of space architecture by branding yourself
 - Continue PhD work about moon and mars habitat design and human predictive project.
 - Communicate SA to engineers - making things more usable, more human centric. Communicate with architects that are not space architects to draw more connections.
 - There is interest and new blood in field "we want new blood, especially young blood"
 - Disseminate SICSA graduates into industry
 - Make SA more technically solid
 - Show world we can produce good work
 - 7 people interested in space architecture phd
 - Build up the SA brand
 - Personally will continue SA work, generally will speak about SA back at home to publicize brand.
 - New member, found through SpaceX, will continue SA work back home

- Inspired to continue to work on diploma on getting energy from ice and snow waste. Wants to make research center on ship or volcano.
- How to create more opportunities to share ideas
 - More symposiums and SATC events
 - Share with others to inspire others
- Need to educate people about what SA is. Take that to your jobs, schools, etc.
 - Can be active in local chapter of AIAA.
 - Human Systems Integration - related field that people should look at.
 - Find a small part of the system to work on, not just the whole habitat.
- Once people realize need for SA, then more opportunities will come about.
- At the start of career, SAS is great introduction to field.
- SpaceArchitect.org should be updated with new projects
- Start Instagram feed to complement Facebook
- Update Wikipedia page
- Collaborate openly on new projects together, can help entire community.
- Reach out to local media, home country and home town, to popularize SA and SAS.
- Show colleagues at ISU about what SA is. Teams are excited to have architects on team.
- Nice to see there are more space architects, and we are not alone.
- Middle East becoming interested in space just now.
- Help future students find opportunities e.g. ISU
- Mars City Design has shown there is a lot of interest. Can connect with Olga to offer education side for publication side (e.g. ISU or SICSA).
 - For example, think about how to redesign lighting on earth and mars
 - Have access to exhibit some projects (October, design museum in London), can accept content.
 - Pavilion at Bienal of Vennizzia? VERY expensive
 - Sponsorship from Earth sector companies?
 - Monthly interview with Vera to talk about Space Achitecture.
- Dad suggesting Space Architecture as future of space - two years later here she is!
 - Will finish internship and thesis at university.
 - May suggest space architecture related projects.
- Will connect SA with ongoing commercial projects
- Thanks to everyone for help organize and participate
- Panel tomorrow - at IAC CCB Franzius 18:00
 - Building Beyond
- Now dinner - at HAUS AM WALDE at 19:30
- MORE SYMPOSIUMS PLEASE :)