at Glassell School of Art of the Museum of Fine Arts, Houston
Room 201, at the intersection of Montrose Blvd. and Bissonnet
organized by the AIAA DETC Aerospace Architecture Subcommittee
space architecture workshop, Saturday 12 October 2002, 9:00 - 16:00 admission free

---

THE MILLENNIUM CHARTER

Fundamental Principles of Space Architecture
October 12, 2002 Houston, Texas, USA

SPACE ARCHITECTURE MISSION STATEMENT

> ***Space Architecture is the theory and practice of designing and building inhabited environments in outer space.***

Motivation
We are responding to the deep human drive to explore and inhabit new places.

Contributions of Architecture
Architecture organizes and interprets the creation and enrichment of built environments.

Knowledge
Designing for space requires specialized knowledge of orbital mechanics, propulsion, weightlessness, hard vacuum, psychology of the hermetic environments, and other topics.

Other Fields
Space Architecture has complimentary relationships with diverse fields such as aerospace engineering, terrestrial architecture, transportation design, medicine, Human Factors, space science, law and art.

TYPOLOGY

- Architecture is defined by "firmness, commodity and delight" (Vitruvius).
- Architecture is conceived within an ambient environment that has multiple variable and pre-existent states.
    - The multiple variables occur on spectra or ranges (such as temperature, chemistry, atmospheric pressure, humidity, gravity, light, colour, sound, air movement, etc), combinations of which define the current state of the ambient environment.
- Architecture subsystems are designed to compensate for conditions in the ambient environment that would otherwise compromise the "firmness, commodity or delight".
    - "Firmness, commodity or delight" may be conditional upon survival ranges (minimum and maximum values within which the conditions of "firmness, commodity or delight" remain valid) within the environmental spectra.
    - Optimal operational ranges or "comfort zones" may be a subset of the survival range.
- Human-occupied structures are a subset of architecture.
- Typology of architecture is multi-dimensional and is not hierarchical. Each type within its space is defined by the range of environmental conditions it intended to address. Terrestrial architecture is a small sub-array defined by the ambient environmental conditions on Earth.
- Extreme environments also fall within the multi-dimensional array, and include environments that require extraordinary artificial compensation to maintain "firmness, commodity or delight". These include desert, polar, underwater, subterranean, high altitude, earth orbital, Moon, Mars, interplanetary transit, etc.
- Design for extreme environments also includes support facilities for vehicles that will transit into extreme environments, such as spaceports or airports.

CATEGORIES for Action: Team 11 Principles

1. Sustainability
As in earth architecture sustainability is multidimensional and encompasses the following areas:

- Ecology
- Technology
- Economics
- Social

But in the context of space architecture it requires greater flexibility to adjust to unknown situations.

2. Human Interaction
Space Architecture is influenced by the interaction between

- Human - Human
- Human - Machine (product)
- Human - Universe

3. The User
Because user needs and well being are critical components of mission and vehicle design, user contributions are indispensable in the practice of space architecture.

4. Human Factors
Human requirements for inhabited space systems are fundamentally similar to our requirements for daily life on earth.

5. Human Condition
Space architecture is concerned with the continuum and the future of the human condition.

6. Social Aspects
Community life, communication and interaction among space voyagers are important considerations for space architecture.

7. Environmental Conditions
Space architecture must respond to a wide range of different environmental boundary conditions (orbital, interplanetary, surface).

8. Education
Space Architecture uses a multi-disciplinary approach to manage the complex nature of space projects. From the start of each project, success is derived from collaboration.

9. Life Cycle
The Life Cycle of architectural elements is an essential aspect of mission planning and design.

10. Humility
Architecture involves forging harmony around the human system, balancing culture, biology, planetary knowledge and technology in counterpoint to the unknowable.

11. Benefits
The involvement of space architecture from project onset provides great benefit to space development and exploration: measurable savings in cost, time, maintenance and extended usability.

Knowledge and Technics derived from the practice of space architecture can improve the sustained quality of life on our human mothership, the Earth.

PHILOSOPHICAL GUIDELINES

- We seek to improve the human life experience by providing environments conducive to intellectual, spiritual and social enhancement.
- Our work is to be accomplished in an environment of cooperation... in which no single idea or concept is considered greater than the whole, and the focus is always on the needs and desires of the user.
- We seek to understand the implications of our presence in a space and what kind of footprint we want to leave.

List of attendees / signatories:

Constance Adams, USA
Oscar Arenales, Colombia
Marc Cohen, USA
Sam Coniglio, USA
John Cook, USA
Annalisa Dominoni, Italia
Mireille Downard, Australia
Donna Duerk, USA
Maria Joao Durao, Portugal
Alice Eichold, USA
Sue Fairburn, Canada
Paola Favata, Italia
Theodore Hall, USA / HK
Sandra Hauplik, Austria
Cecilia Hertz, Sweden
A. Scott Howe, USA / HK
Barbara Imhof, Austria
Yuki Komure, Japan
Aleksandra Konopek, Germany
Michael Kriegh, USA
Pat Manley, USA
Kurt Micheels, USA
Susmita Mohanty, India
Juan Morales, USA
Yusuke Murakami, Japan
Robin Nilsson, Sweden (abstaining)
David Nixon, UK / Rep. of Ireland
Kenji Nozaki, Japan
Jun Okushi, Japan
Rachelle Ornan, USA
Jan Osburg, Germany
Martina Pinni, Italia
Mark Reiff, USA
Lars Reutersward, Sweden (abstaining)
Brent Sherwood, USA
Thomas Sturm, Austria
Ross-Alan Tisdale, USA
Erieta Tsantoula, Greece
Paul Van Susante, Netherlands
Arturo Vittori, Italia (abstaining)
Andreas Vogler, Switzerland
Adam Wapniak, USA
Ardis Wenda, USA
David Wong, China / Hong Kong
Val Woods, USA
Andrea Zigon, Italia

Other (nonattending) participants in pre-Workshop deliberations:

Buzz Aldrin, USA
Serkan Anilir, Turkey
Marilyn Dudley-Rowley, USA
W. Rod Jones, NASA, USA
Kriss Kennedy, NASA, USA
Dr. Joseph Kerwin, USA
Ernesto Maldonado, AIA, USA