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Facultad de Arquitectura, Universidad de San Carlos
GUATEMALA, September 2012
David Grierson “How do we begin again?”
Architecture & Ecology
New Masters Course (2013/14)
Partnership between the University of Strathclyde Glasgow & the Cosanti Foundation, Arizona, USA
\[ P = 7,000,000,000 + (2012) \]

\[ P = 9,000,000,000 + (2030) \]
Numbers

• 40 billion metric tonnes of CO2 (actual 36 in 2012)
• Estimated 27 billion tons (2030)
• USA t 5 billion (2012)/per capita 19.78
• Guatemala t 11 million (2012)/per capita 0.9 (increase of 78% since 1996)
• Kenya t 11 million (2012)/per capita 0.3
• Target per capita by 2030 0.33
• My own is more than 8 metric tonnes per year
Why is this important?
Water Polo in Calcutta, 2007
Drought in India: a well in Gujarat, 2003
Child Poverty in Kenya, China and Scotland
Riots against Austerity Measures in Athens
In some parts of the world buildings account for 50% of all CO2 emissions
Buildings are half of the problem. What is the other half?
Crisis of the Spirit
Life Changing

• The problem is of hypocrisy
• I could design zero carbon buildings but my lifestyle is not ´sustainable´ so I´m only responding to half the problem
• Not a call for abundance but for austerity (not more...but less)
• Not a confrontation with others but with myself
• To meet target I need to reduce my own emissions dramatically
• I need to change
• But how?
Beginnings
In search of an alternative
Elizabeth Mock “The Architecture of Bridges”, 1948
Paolo Soleri, born 1919
Ceramica Artistica Solimene, Vietra sul Mare, 1958

Dr. David Grierson, University of Strathclyde, Glasgow
Free forming soft cities.

VISIONARY CITIES: THE ARCOLOGY OF PAOLO SOLERI

Exhibition, Corcoran Gallery, 1970
Babel II B

Population: 520,000
Density: 662/hectare; 236/acre
Height: 1,360 meters
Diameter of structure: 3,160 meters
Surface covered: 778 hectares; 1,920 acres

Scale: 1:10,000
Hexahedron

Hexahedron

(Any topography)

Population 170,000
Density 2,264 hectares; 1,000/acre
Height 1,100 meters
Side 1 kilometer
Surface covered 57 hectares; 140 acres
1,000

Comparative Archeology

Basis 10
Population 340,000
Elevation: scale 1.5,000

The danger of the pseudo-organic is that man can only metaphysically be defined as one of the many cells combining in the spatial body because man is not morphologically, essentially, functionally like a biological cell. The micro-environment that allows the cell to act is a reflection on and a determinant of the cell's own structural and functional characteristics. Exclusive of these characteristics are sight, hearing, smelling, feeling, unpredictability, and so on. It is not that a cell has none of these characteristics but that those that it has are only approximately comparable to the corresponding ones in a complex organism. Then, for instance, to bore up an artery and pretend to run people in it as if they were blood cells is not very logical. It is to take form at face value and miss the substance of the problem and its predicaments.

The organic has defined itself in the long interim between the mineral and the mental, and the beauty of its power is somehow contained there. The organization of the living to construct a container to the condition of man is thus turned upon a specific and not organic structurally, a postorganic structure and indeed a pseudostructure compared with the miraculous order of the mineral and of the living. This is why such pseudostructures, purely functional and always on the threshold of obsolescence, must find redemption in form, the aesthetic side of comparative man. Morphologically and structurally, Hexahedron is like Aristotle, a pseudocrystal. Its validity would be in the high human and emotional standard featuring it.
“The natural landscape is not the apt frame for the complex life of society. Man must make the metropolitan landscape in his own image...The only realistic dimension toward a physically free community of man is toward the construction of truly three-dimensional cities.”

Soleri 1969

arcology model

• An arcology (architecture + ecology) takes the place of the natural landscape by constituting a new kind of topography (a “neonature”) that:
  • is a complex, miniaturized, multi-level configuration
  • recognises the need for the radical re-organisation of urban sprawl into dense, integrated, compact three-dimensional urban structures
  • contains all the elements that make the physical life of the city possible
  
  • pre-figures the possibility of the energy city by promoting material recycling, waste reduction and the use of renewable energy sources as viable components in a coherent sustainable strategy aimed at reducing the environmental impact of the entire urban system

Dr. David Grierson, University of Strathclyde, Glasgow
“The most common mistake about my work is the assumption that years of introspection have produced a take it or leave it package…rather I am proposing a methodology and at the same time trying to illustrate it.”

Soleri 1981

The development of the arcology concept

• **Mesa City Project** (1958 - 67) - theoretical regional plan for two million people on a 55,000 acre isolated, pre-flattened desert plateau
• **First generation arcologies** (1969) - published in *City in the Image of Man*. Thirty structures designed for different environmental contexts (oceans, deserts, mountains and canyons) and varying in size, shape and form
• **Second generation** (1975) - The *Two Suns* (or “energy city”) concept. Structures split in half exposing the core to the sun
• **Third generation** (1980) - Habitats for shifting populations
• **Fourth generation** (1984) - *Space for Peace*
Thirty arcologies were designed from 1963 - 69.
Consisted of 2 groups - ‘free-form’ Dionysian & the simple geometry of Apollonian

Hexahedron plan

- Population: 170,000
- Density: 2,964/hectare
- Height: 1,100 metres
- Side: 1 kilometre

Comparative densities (1969)
- Mexico City: 22/hectare
- Paris: 264/hectare

Hexahedron model

Dr. David Grierson, University of Strathclyde, Glasgow
Climate Zone, Air Dam, India Village, Maryland and Regina form of the urban structure including south-facing greenhouses - designed to maximise use of solar energy & reduce dependence on external energy sources.

Energy city

Two Suns (in response to the growing energy crisis of the mid-70s) described related architectural effects which collectively (within the “urban effect”) offer a response to many of today’s environmental problems:-

• THE GREENHOUSE EFFECT
• THE HORTICULTURAL EFFECT
• THE APSE EFFECT
• THE CHIMNEY EFFECT
• THE HEAT SINK EFFECT
third generation

Valetta Spring Complex

*Apse form* became the generating structure as a passive solar device. It has inherent strength, envelopes space and becomes the anchoring element for shading/sheltering membranes attached via a tensile mechanism. By adapting the space and function of the prototype the structure could be adapted to serve human population shifts of various kinds including:-

• MIGRATION - OLD TO NEW SETTLEMENTS
• MIGRATION CAUSED BY CLIMATIC CHANGES
• POLITICAL REFUGEES
• THE COLONISATION OF SPACE
Space for Peace proposed a series of space cities or colonies (with names like Euclidean, Urbis et Orbis, Ovum II and In Orbit) as testing grounds for the eventual “urbanisation of space”.

- Theoretical attempt to examine the rules of complexity and miniaturization and predict what some of the characteristics of space habitats might be
- Addressed notions of confinement, introspection, loneliness, defining a balanced ecology, and self-reliance within a hostile environment
- Show how asteroids of different sizes and types, once “captured” could be processed into small, simple, habitats functioning as centres of:
  - MINING, PROCESSING AND SHIPPING
  - URBAN (environmental & social) EXPERIMENTS
  - LEISURE FOR SPACE TRAVELLERS

Dr. David Grierson, University of Strathclyde, Glasgow
A place to think, to build, to ask why?
1) Green
2) Mobility & Integration
3) Social Integration
4) The Presence of Technology

Edward Paes, Mayor Rio de Janeiro
“How do we begin again?”