

**Antonino Di Raimo**

*[Architect PhD,  
Dean of Architecture at  
POLIS University]*

Architect with a Doctoral Degree in Architecture Design by University of Rome, La Sapienza. His main area of research focuses on the relations between human body and architecture space, according to an information paradigm infused by embodied cognitive science framework. In 2012 he received the TRIMO International Research Award for his PhD research. In 2014 he published the book 'Francois Roche Heretical Machinism and Living Architecture of New Territories.com' in THE IT Revolution book series. Since 2012 he's Dean of the Faculty of Architecture and Design (FAD) at Polis University, where he also teaches architecture design.

# ALLOWING THE UNKNOWABLE:

*The experience of Biosphere2*

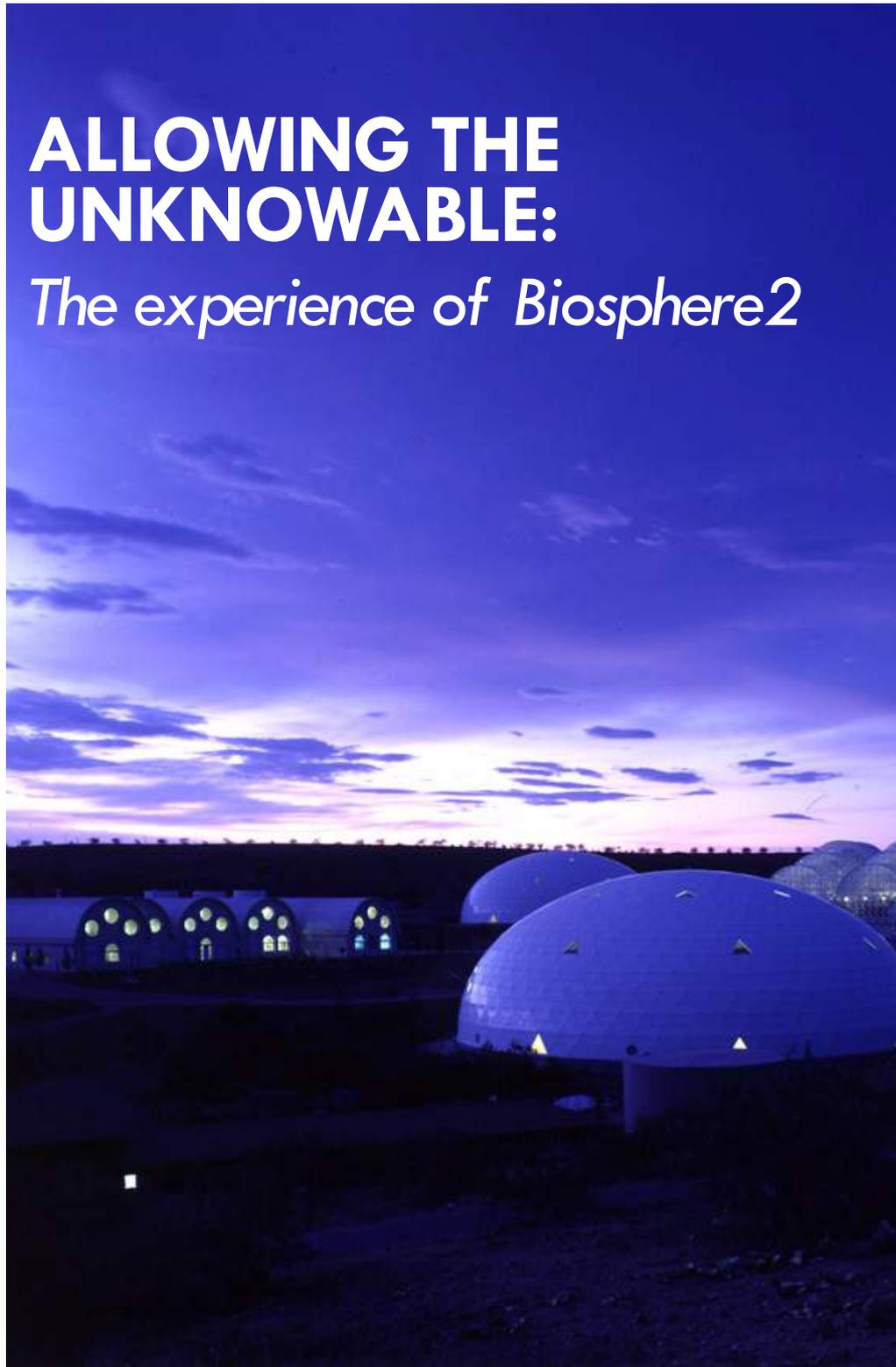




Fig. 1

## FIGURES OF OUR TIMES

A voice belonging to the recent history of human thought talks almost silently though solemnly about an experiment unknown to most. A vaguely sardonic vein that more than belonging to the scientist who professes, belongs to one who knows, occasionally emerges through the speech. John Allen, the inventor of Biosphere 2 and chair of the Global Institute of Ecotechnics, gives a talk to the audience of Tirana Architecture Week (2nd edition), focused on the *Envisioning Future of Cities*. One of the most significant and original achievements of the twentieth century - Biosphere 2 - an experience that only recently has been revisited by architecture circles (Saggio, 2010, 362-365), is told by its creator. Regarding future cities, Biosphere 2 (Fig. 1) comes from the past and it does not just represents the first attempt to build an architectural space through which to implement and study the web of life and the systemic phenomena that this implies, but it also

resulted in being the first attempt aimed at creating an entire living system. But Allen (Fig.2) is actually a man from the past, a past related to the last century and too often easily confused with the ideologies of change dominated by the post-Hiroshima environmentalism (Kim et Carver 2009). Yet, biosphere is not about the crisis, nor ideology; it is mainly about a scientific paradigm shifting from Reductionism to Comprehensivism. Indeed, Biosphere is mainly dealing with epistemology and the way we know.

The Biosphere 2 experiment was rooted within a paradigm that is older than the crisis in environmentalism due to its origins in the research carried out by Vladimir Vernadsky (1863-1945) a Russian scientist, mineralogist and geochemist (Fig. 3). The word *biosphere* has been used by Vernadsky in order to explicitly refer to the Planet Earth by considering it as a whole system. In doing that, Vernadsky anticipated a



Fig. 2 Photos courtesy of Gill Kenny



Fig. 3

vision which would have become part of the collective imagination because of the planet's images within space disseminated by NASA since 1968. Within the whole – Vernadsky claimed - the presence of living systems is crucial, because it would address a delicate balance depending on a continuous interaction between the living and the inert elements. Therefore referring to the Planet Earth as a sphere of life, something we should think as alive, is actually also a derivation of a broader school of thinking, not fully studied in the West yet, which is known as *Cosmism*. This philosophical movement was developed in Russia by Nikolai Fyodorovich Fyodorov (1829 - 1903) who can be considered the founder, with Konstantin Tsiolkovsky (1857 to 1935), and finally by Vernadsky. Thought extremely complex, sometimes visionary, and interwoven for better or worse with the advent of Bolshevism, the *Cosmism* however was characterized by a significant faith in mankind's colonization of space and consequently by a number of pioneering investigations equally carrying out technical and philosophical beliefs. Tsiolkovsky especially, is known for his research concerning space ships projects, space-stations and even the development of the concept of *closed ecological systems*. The latter are means capable of operating in an extraterrestrial environment because of their proper ability to replicate terrestrial conditions. According to Vernadsky, the biosphere concept

indicates the geological crust in which life manifests itself, it being inextricably linked with geology; yet, life constitutes the real driving force although laughable in comparison with inert matter. Furthermore, Vernadsky who considers scientific activity of a crucial importance in the biosphere's evolution, also announces the fundamental transition from the biosphere to the *noosphere*. The latter term indicates the realm of the human mind and its fundamental importance in awareness through scientific knowledge and consequently in the ability of biosphere to transform itself. However, the term biosphere is actually taken up by Vernadsky after meeting the geologist E. Suess, although it will be Vernadsky through his studies who will succeed ingraining general acceptance of it by the scientific community.

A way of thinking, then, which prepares the ecology and particularly that vision related to the planet as an enormous interacting system, in which the *biotic* directs the *abiotic* in the pursuit of developmental stages through stationary periods of fitness. This is *de facto* also the scientific proposal offered by the scientist J. Lovelock at the end of the Seventies: the entire planet, a homeostatic self-regulating system, as the *Gaia Hypothesis* claims (Capra 1997). Thus, the basic idea of the biosphere consists of considering the planet a single interacting system and, therefore, attempting a description of it in these terms rather than in terms of individual and divided phenomena.

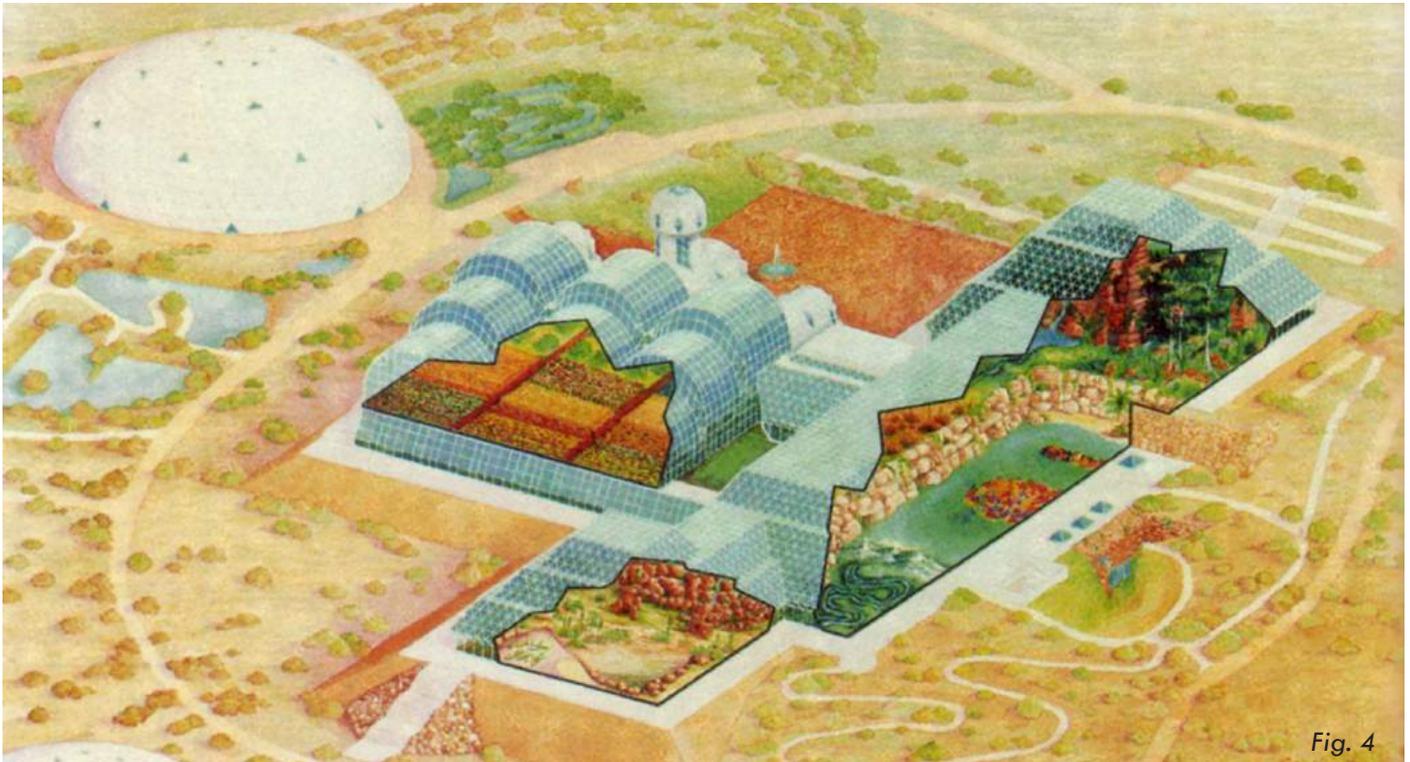


Fig. 4

## BIOSPHERE

The importance of this approach which goes beyond the crisis and the so-called ecological ideologies is also the way in which scientific thinking moves from a reductionist approach to a systematic paradigm, the former being unable to grasp the relationships between the billions of interacting variables. As a matter of fact, it is important to critically highlight the central concept developed by Vernadsky and taken up several times in the twentieth century, particularly by Allen. This concept considers Earth a relatively closed system, specifically a shell characterized by life as emerging phenomenon. A system, therefore of an enormous complexity, order, and characterized by its self-containment. The envelope as the creators of Biosphere 2 write and as

Allen reiterates in his lecture is first and foremost something that allows life; any system, then, designed for a similar purpose must be based on the same idea. Actually, the envelope is a mean of containment aimed to support a delicate and impressive interaction among billions of components, whereas the relations have an impact on each other and results in *self-regulation* and *self-sufficiency*. The abovementioned facts are the reasons of a formidable *Galilean experiment* never realized up to that point.

J. Allen, a charismatic leader, is also head of the Institute of Ecotechnics, a group founded in 1973 on the basis of a research effort aimed at combining technique with ecology. Ecotechnics are still active in various locations around the world, along with

various research projects. On these bases and on the ideas of Vernadsky, Allen arrived at the fundamental step of Biosphere2, an experiment as ambitious as necessary: if you want to understand the Earth, you should attempt to replicate its conditions. Earth (called for this reason Biosphere 1), could be modeled through a system which first integrates the parts that are considered fundamental: the 7 biomes (Fig 4). They are constitutive of the system along with the fundamental human presence (Allen 1991). The system then must be closed to the passage of matter while it may be open to the passage of energy (solar energy) and information (that related to communication between Biosphere 1 and Biosphere 2). You could think of a kind of bubble that can trigger, at a



Fig. 5\_Photos courtesy of Peter Menzell

small scale and at a very low degree of complexity, the same conditions that support life on Earth through a heterogeneous interaction between the biome components and humans. In this way an implicit correspondence between the terrestrial sphere and the architecture, is established, as the both of them are based on the thought of containment.

However, Allen and his group's work also owes a part of its success to similar positions expressed by other researchers closer to architecture; such is the case for example of synergy, a terms proposed by Richard Buckminster Fuller who defines this approach in his book *Synergetics: Explorations in the Geometry of Thinking* in 1975. Others, like Herman Haken, devotes a lifetime to the development of this new science, which is nothing else other

than the attempt to understand reality in more systemic terms rather than reductionist. In his texts, Allen directly references the research carried out by Lewis Mumford, while stressing that the synergistic or what he calls the science of the biosphere, or other denominations, are all synonyms. The important thing, he emphasizes, is that all of these definitions highlight the *exceptionality of the Earth phenomenon as a whole and uniquesystem* (Allen 1991). The need of studying the complex reactions by not isolating the components along with the need of understanding the emergent behaviors, consequences and unpredictable and unobservable events (not possible according to a classical approach), are certainly part of a scientific milieu which seems ripe to approach the observation of isolated phenomena

together with those which are linked and inextricable. Allen, in other words indicates not only a paradigm shift within the scientific tradition, but one acting in the role of the scientific observer. Observing the planet as a whole, looking at it from a distance, although it results from a cultural climate created by the first space missions and the dream of a future colonization, has a meaning indicating the need for a deep epistemological change: *a thinking able to give an account of both the individual and the whole* (Morin 1994).

In 1984, Allen says, while simultaneously projecting some images that literally emerge from the repressed, the adventure of Biosphere 2 began, radicalizing a large number of premises through an experiment that resulted in the building of a complex architecture never before created on this planet: an architecture which would replicate the planet to the extent that it is able to contain and maintain life.

At the beginning it was decided to proceed with the construction of a test-module which would summarize the salient facts of the project. The site was chosen to be in Oracle, Tucson, Arizona. I would like to mention the name of this project's architect: a woman, Margaret Augustine, (Fig 5) who designed the first test module and then the same Biosphere 2 (Fig 6). Allen points out that only thanks to the observations expressed by architect Augustine they were able to *design this little micro-world in relation to the critical dimension of each main element of the program* (Allen 1991). This suggestion solved a fundamental dilemma about



Fig. 6  
 Photos courtesy of  
 Roger Ressmeyer

the dimensions to be selected for the biomes belonging to Biosphere 2 . The experiments conducted in the module gave very encouraging results, with Allen remaining in the closed module for 3 days, A. Alling for 5 days, and L. Leigh even for 21 days. These were meaningful results for the birth of a science aimed to study closed systems coupled with the human body and open to the passage of energy and information.

Then they proceeded in parallel with the design and construction of Biosphere 2 which in 1991 was ready for the most ambitious experiment: namely the accommodation of a crew of 8 members for two years.

Several specialists worked under the coordination of Margaret Augustine in the creation of about 13000 square meters, biomes sealed together through a transparent casing in order to ensure minimal losses of air. The complex involved a rain forest, an ocean, a marsh, a savanna, and a desert, complemented by appropriate transitional zones and a specific selection of species (in the number of 3000) resulting in different miniature sets of ecosystems, from the mangrove to the reef. The species were selected through the contribution of several experts. The system then was completed by an area dedicated to agriculture and livestock from which crew members will obtain the food resources. Additionally, a residential area and a control center were designed for the crew.

The architectural form of the complex took the shape of a big T, with the short side hosting the most anthropic part. It is interesting noting

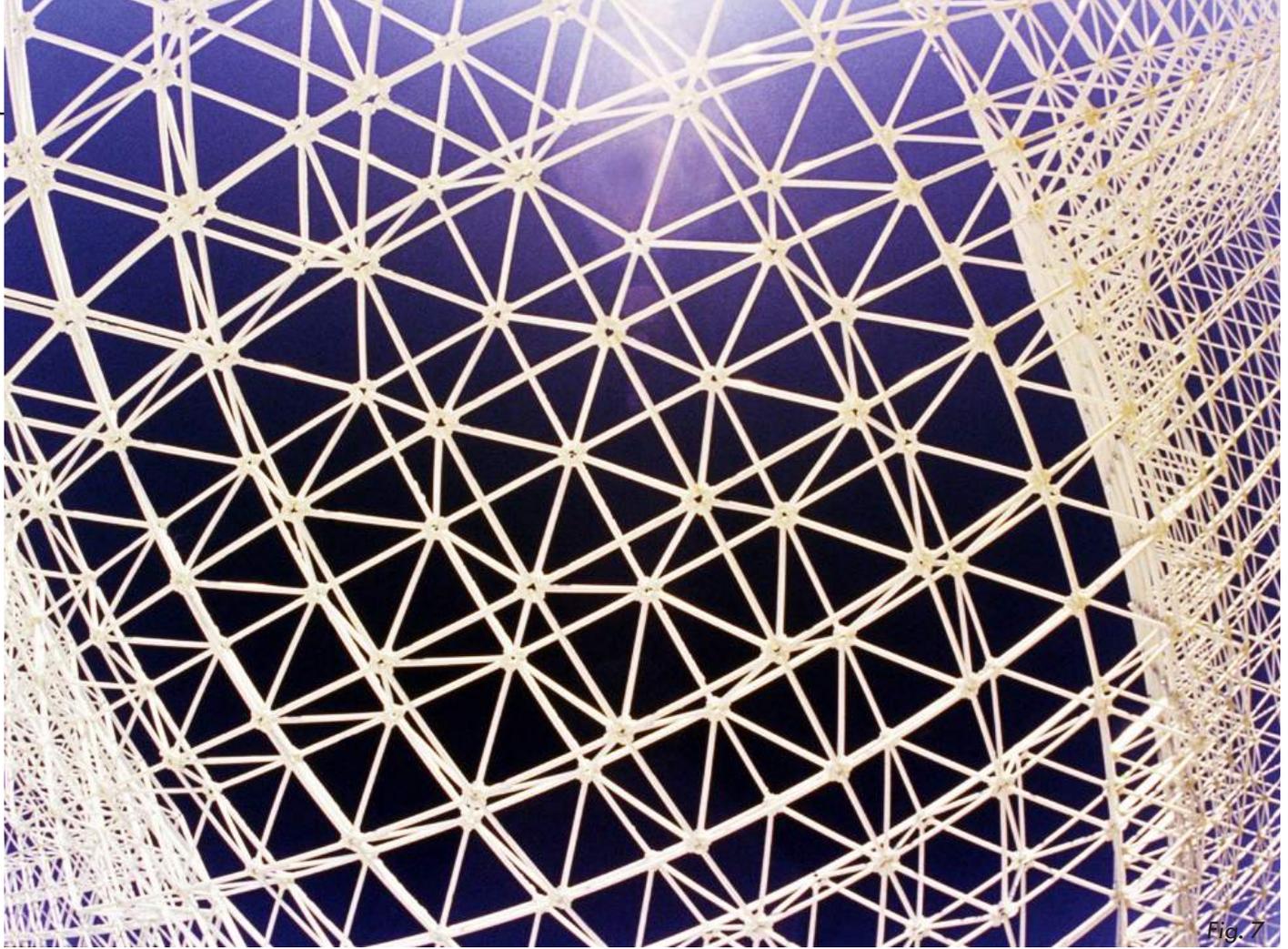


Fig. 7

that the overall volume, far from being *superficial postmodern* (Kim et Carver 2009), finds instead its profound reasons within the Ecotechnic's vision of architecture; Augustine, the first architect in history designing this type of system, summarizes the idea of Biosphere 2 as inspired by several masterpieces left as a heritage to all humanity. In this sense, Augustine assembles two large pyramids at the ends of the complex, articulating them according to a volumetric progression inspired by minarets. The agricultural area is instead characterized by three architecture bodies gradually sloping, each of one featuring a circular vault. Attached to them stands the residential and the administration area with a tower from which it is possible to enjoy a view of the overall system. By using the archetypal forms, Augustine is able to articulate and to merge the biomes. The architectural theme, in fact, is developed from the requirement of the system sealing rather than from

a language issue or a concern with quoting historical forms. The sealing is materially resolved through a technology that owns a lot to Fuller and his assistant Peter Pearce who ultimately designed the structure. In this case, an apparent linguistic problem turns into an opportunity to experiment with a new technique. It is therefore a composition that has nothing superficial and above all does not yearn to *create multicultural variations, capable of wrapping a universal nature*, as the hasty and poor conclusion by Kim and Carver implies (Kim et Carver 2009). Rather, this should be intended as syncretic research still deriving from the *cosmistic* cultural background, perhaps difficult to grasp, for that architects who are unable to associate the pyramid to nothing other than the festive Las Vegas. Peter Pearce known for his studies on structures inspired by nature, through the update of techniques learnt from Fuller, proposes a space frame (Fig.7) able

to work not only for domes but also for the simultaneously articulation of different shapes. In this regard, it is worth to noting that paradoxically, similar architecture complexes built afterward such as the Eden Project designed by N. Grimshaw in Cornwall in the United Kingdom in 2000 or even the Bubble by Renzo Piano in Genoa in 2000, despite their reference to the Biosphere concept, do not have the same vision of complexity and radical experimentation that animated Biosphere 2.

They are not experiments but places which couple the encapsulation of nature with entertainment's program required by the contemporary city.

The first experiment was carried out through a mission that lasted two years from 1991 to 1993. This mission provided the first results: it is possible to study complex systems and understand the relationships which govern the whole set. Several results even confirmed the initial

assumptions. As in all experiments, this one also aimed to foresee and witness the emergence of problems and unforeseen events. The unexpected fluctuations related to the presence of oxygen or the uncontrolled growth of a species were some examples. As such, the experiment couldn't also result in unexpected problems? Are not the apparent failures, the unexpected surprises in the observation, the fundamental and turning points of knowledge?

A second mission began in March of 1994 and prematurely ended the same year as a result of a number of factors. The negative publicity that these events caused (the Biosphere 2 was always under the observation of the media, which in principle praised the project and subsequently demolished it), including some attempts to discredit the project, caused the dismissal of the first team. The main financier E.P. Low, then, passed the entire project to Columbia University (1995 - 2003) and later to Arizona University which has administered Biosphere 2 since then.

Since then, despite the availability of academic facilities, able to ensure the scientific value of the experiment, it has never recovered: the scientific research on biosphere that Allen and the Institute directed by him continued to develop was probably too dangerous for the powers that be. Still.

## **LEGACY FROM THE EXPERIMENT**

Concerning the huge amount of elements put into place by the Biosphere 2 experiment, I would like to firstly highlight how relevant they are to the contemporary architecture discourse.

I believe that among the different experiences that should be studied there is one which can be considered of huge importance as it directly influences two fundamental dimensions of contemporary architecture. I refer to Information Technology and therefore to the Cybernetics of Biosphere 2 and its proper ability to work in tandem with living systems contained within the Biosphere 2 architecture. The way in which these different systems were able to enter into conversation one with the other, also with Biosphere 1 (the Earth), is one of the most interesting technical and conceptual levels of Biosphere 2. In some of his texts Allen alludes to several themes belonging to the cybernetic science: as a matter of the fact Earth and Biosphere 2 as two systems where complex metabolic reactions occurred *within, resulting in chemical and physical changes of energy, and with simultaneous exchange of information* (Allen 1990). As embodied human agents, according to Allen, we can refer to these exchanges according to very simple levels. This means we can be mere observers who interact through the identification of patterns referring to behaviors, images or sounds, or according to a more complex level, we can refer to the use of scientific models of description and analysis. Allen was certainly aware of many of the issues carried out within the science of complexity. The information related to these two complex systems (the Biosphere 2 or the Earth and humans) is exchanged according to a velocity which is imperceptible by a human agent. Along with the human, the Biosphere 2 experiment, and in general the systemic and non-reductionist attitude, also trigger a continuous emergence of a

kind of a new knowledge, almost a new intelligence, what Allen called *noosphere* by explicitly referring to Vernadsky's work.

From the point of view of the technosphere and also of architecture what has been said, implied not only the need for monitoring the system and related subsystems within the Biosphere 2 project but also the idea that the system, in turn, had to be able to dialogue as much with the external world as with 'its inner world', the latter consisting of the subsystems living in it (the human crew, flora and fauna) and the artificials. In this sense perhaps, Biosphere 2 is also the greatest cybernetic experiment ever made. Its ability to be inclusive of the various components and to articulate them should still be rediscovered and re-discussed.

Consequently, another point of great interest which pertains more to the topic of interaction and then again to architecture, is the one related to the role of *computer science* in those aspects focused on Artificial Intelligence. This constituted a formidable bench test and a possible model regarding the question of control between different cognitive systems that are defined within an architectural space. It seems therefore very important to summarize the components of the whole system again, considering them as part of the architecture:

- Within the first experiment, 8 crew members who needed to be continuously controlled regarding their vital signs. A sudden overload of CO<sub>2</sub> would cause alterations of these signs. Thousands of plants and animal species to converse with, bearing in mind that each group included variations on the other;

### HUMAN AGENTS

The human agent in Biosphere 2 is the fundamental factor of the whole system and in this regard Allen's words are emblematic. Indeed, he refers to this fundamental presence as *the agent within a more general condition of dynamic equilibrium* (Allen 1991). The embodied human agent thus plays a role of 'controller of the control systems' working otherwise in conditions of equality with it. This embodied condition in Biosphere 2 is indeed called by Allen when he also refers to the flexibility of the crew and its ability to play several roles simultaneously: as well as to specific occupational skills, was required to these people the ability to promote themselves as observers systemic. The ability to look not so much at the single species but rather at the emergent behavior of entire patterns of biomes is a

prerogative of an embodied agent. The observer/ controller living in Biosphere 2, therefore, also constituted one of the most reliable performers. The system based on an elaboration of the computational information, i.e. through the artificial sensors, worked in order to monitor that information not directly perceptible by the human agent. It is no coincidence that the analogy chosen to describe this monitoring system (Fig 8) matches the most original ideas of cybernetics as it refers to a *nervous system* which consisted of a network of 2,000 sensors and various actuators that permeated the whole architecture of the Biosphere. This system called Biosphere 2 Nerve System, resulted from a collaboration between ecologists and engineers and was finally defined according to a basic law which required the system itself to preserve *the health of the entire*

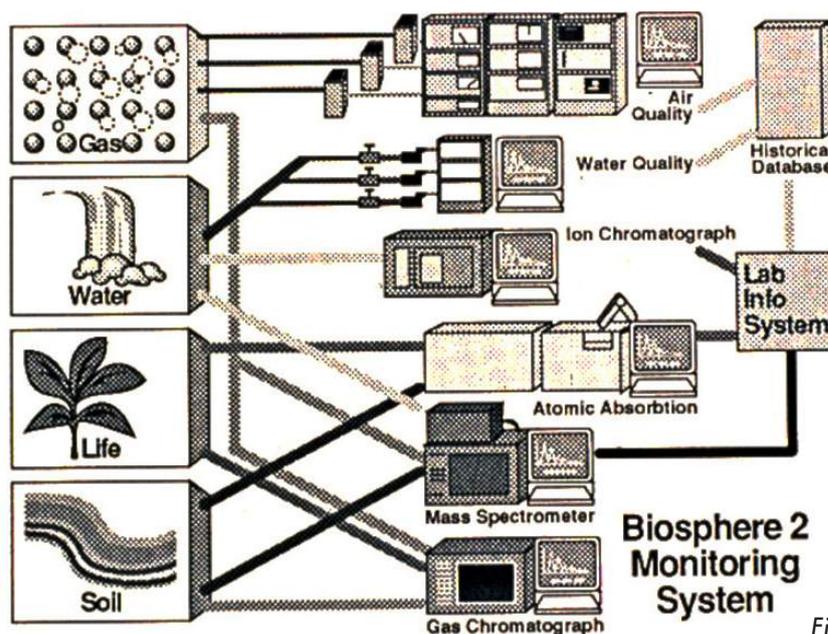


Fig. 8

ecosystem. Certainly, putting into play several sensors aimed at forming a large laboratory in order to solve gradually emerging and basically unforeseen problems, for which, furthermore, there was no literature to refer to has been another great achievement of the Biosphere 2 experiment. How can one create a device capable of detecting the information coming from the temperature measurement below the surface of a leaf? In this case, the gas concentration, behaved as a suitable sniffer, capable of monitoring the Biosphere's key points.

The control system also included an analysis laboratory. Thus, on another disciplinary level, the Biosphere 2 was also capable of self-analysis resulting in the presentation of its internal states. The purpose of the Nerve System then, was to collect this huge wealth of data in order to process them as information to be sent to Mission Control and to the same biospherians (Fig.9). They had access to this information through the monitors. It is worth noting that from a general point of view, the choice was to avoid a hierarchical centralized system of monitoring but rather follow the analogy of the neural network. The entire structure was made of a distributed network, capable of avoiding blocks of the entire system if any component had crashed. The network would trigger alarms if certain values had reached danger levels and, in these cases, would have triggered the actuators and called the the crew to attention.

I think it's important to reiterate that the wealth of sensors in Biosphere 2 was a dialogue system working between analog and digital conventions



Fig. 9



Fig. 10

and therefore able to work on issues related to mechanics, landscape, the health of the environment, and so on. In this text, I would also like to indicate a further level of Biosphere 2 which I wish will be thoroughly studied as it is one for which the entire system could be seen as a robotic mind devoted to the maintenance of the complexity and richness of life (Fig.10, fig. 11). I do not hesitate to use the term robot, as in view of the fascinating *robotics laws* expressed by Isaac Asimov (Asimov 1940), the Biosphere 2 was governed by a cornerstone rule that can be summarized in the following statement: *no operation of the nervous system of Biosphere 2 can damage life* (Allen 1990). On the second rung of the Biosphere's hierarchical behavior it was the second rule which required that all of the equipment should operate according to the criteria based on the highest efficiency as long as they were not opposing the first law. Compliance with these laws took place thanks to a special approach which provided a dual use of both human

and artificial intelligence acting on different layers of the whole cognitive system. Rather simplistically, the idea was based on the consideration that computer and human agents constitute two types of hardware that work at different speeds and with different types of software, through interaction events rather than intense what and at different scales. If the development of computer-type management system for the ecological maintenance (never realized until then) entailed the adoption and use of expert systems, however, it had to integrate the knowledge only provided by natural embodied agents. Among these agents, there were primarily those human and then all the sets of the so-called ecological indicator species, such as complex cognitive systems that would provide measurements different from those provided by electronic sensors. The integration, therefore, involved the following data collection and processing of information:

The natural sensors plus electronic sensors in a permanent consultation of

great complexity aimed to provide the information that the individual would never be able to produce and using an approach deeply systemic and hybrid in terms of analogical and digital information. Rather than pursuing ideological construction and the development of a completely artificial system capable of acting as a *deus ex machina*, the team of scientists created a realistic *dual-brained system* (Allen, 1990), providing that on each layer, humans would have been able to intervene, not leaving and not being able to leave the entire control to the exclusivity of the artificial system.

Considering much of the research under way, it is useful to examine the layers of this model as they constitute the meta-structure of the whole architectural design and the description of the different modes of interaction between human agents and artificial ones:

1\_The level of the touch, or the physical contact with the world. The entire Biosphere 2 system elaborated information through a direct contact



Fig. 11

between bodies, occurring through the living systems and the sensors. Allen describes this layer as that related to the naturalist's trance or the cognitive level where, through the contact, the agents can reach a continuous flow of information due to a greater level of complexity and richness. This level, however, works through classic computational rules structured into tree and conditional statements. For this reason, it is supplemented by the human presence. Given the simplicity of the rules, the system was able to correct itself.

2\_The level of the filter information which constituted a degree of information processing more sophisticated data than the previous one. This aimed to eliminate the noise which could affect data collected by sensors and by human observations. Data in this level were also modeled in patterns of information and analyzed according to several temporal scans (daily, monthly, and seasonal). This is a level in which parts of the system were able to model themselves.

3\_At the third level, the information processing was treated in an even more systemic and dynamic manner, with a meaningful increase in complexity when compared to the previous layer. On this layer, information about an entire biome was processed. It also provided a mathematical function of supervision invoking the scrutiny of a human specialist if necessary. Another interesting element of the third level is that it enabled human agents to rewrite the rules of data processing on the basis of previous experience. So, it also had an evolutionary nature.

4\_Continuing forward, the fourth level can be defined as the narrative level. The information here was modeled in order to trace a history of Biosphere 2, according to a global perspective. Significantly, while in the previous level only the observation of individual biomes was possible, here the relationships triggered among the biomes with respect to each other could be observed.

5\_At the fifth level, we find the transmission of the experience coming

from the whole cognitive system. The team referred to this level as the *Inter-biospheric layer*, or the layer focused on understanding. Of course, it was a clear statement about the communication of the Biosphere 2 experience to the Earth (B1) or even to other biospheres. The idea was that this was just the level of the emerging noosphere that Allen and his team called explicitly.

But the existence of these layers should not obscure the enormous amount of functions and variables that were found at the base of the living system. By just trying to articulate the functions of the water system, for instance, we would get the following:

- water as the need of rain for each biome, with variations in the level according to the individual ecosystems present in the biome and its seasonal variations;
- water for the streams, such as for the connecting elements belonging to the hydrographic system of Biosphere 2;
- water for the requirements

of the intensive agriculture system according to its seasonal variations;

- recovered water by condensation carried out by artificial systems;
- recovered water by natural condensation;
- humidity levels as a whole;

and we could still go forward, keeping in mind that the management of these aspects needed to be carried out according to different temporal variables reaching values that ultimately were required by a sort of balance. The calculation was made on the basis of the same flexibility criteria simulating the state of the natural systems: for example, if the budget highlighted did not include enough water for the needs of the rainforest on a given day, but at the same time the system believed the demand available in the next two days, it simply proceeded to delay the release of water to the date on which it was fully available. It was a cybernetic system able to reason and proceed according to a debts and compensation criteria. Finally, it was similar to a budget sheet. But, in addition to the amount of water to be distributed on time taking into account every need, the system was also able to constantly monitor its quality according to the respective uses.

As for the living systems of a certain complexity it would be the unpredictability of the events that constituted the real challenge of an experiment that should have lasted 100 years in order to fully test the

capacity of the system, produce food, oxygen, energy, in other words ordered and structured information: it would take at least 100 years, from its start and during these years we could collect information, observe the phenomena by choosing quantitative variables, and make assumptions that may lead to the theories which will turn to be refuted or confirmed (Allen 1991).

Just twenty years later, in our Envisioning the Future Cities Conference, the experience of Biosphere 2, resonates as even more valuable, perhaps because of its premature end. During his lecture, Allen very clearly shows a number of principles which now appear to the architects' community as still unaccepted but progressively necessary. Thus, Allen, based on his experience and on the history of one of the most important researches of the last century, sets out the principles of Biosfera2 as design principles. Indeed, it is clear that a discipline like architecture, in turning the real, will increasingly look at it as a living complexity and not as an aggregate of inert materials. The project, then must firstly be *Sustainable and Co-evolutionary* as it should, while at the same time, feed aesthetic concepts such as those of Beauty, Sublimity and Picturesque, according to a more integrated conception of different human attitudes rather than their division. The criteria of *Micro-incisive action* along with the *Macro-comprehensive understanding*, would complete this set from the observer's

conceptual point of view. Furthermore, Allen, by foreseeing the importance of computational processes, discusses *Algorithm for Creativity and Critique along with Transparency and Accountability*. Their guidelines insist on the necessity of a Conceptual Scheme, which is a *Complex Adaptive System* (not a rigid plan) also as a prerequisite for the understanding of what he calls *The Law of Unintended Consequences*. Architects who are focusing on the ecology should seriously consider these points beyond a shadow of a doubt. But, from a conceptual point of view and perhaps a more precise representative of the exceptional experience of the cognitive dimensions, Allen points out the Fundamental Design Elements as result of spending a lifetime on understanding the biosphere and the possibility of replicating it. It is about the conceptual spheres or, if you like, the dimensions related to human cognition and perception: *the Biosphere, the Ethnosphere, the Technosphere, the Geosphere, the Cosmosphere, the Cybersphere, the Noosphere and MicroCosmosphere*. Finally, an articulation of reality which seems to reaffirm the coexistence between dimensions which are very close, self-contained as distant, almost outside of the human cognitive domain. I think it is remarkable that at the end of his lecture, within a comprehensive effort, from which the current fragmentation of the architecture could only benefit, Allen added two more dimensions, namely the one of the *Unknown* and of the *Unknowable*.

A commitment, therefore, against any orthodox views in the sciences and any control expressed by the power, in order to continue the investigation of the *unknowable* through his teaching in the discipline of maintaining the opening of human curiosity, and especially our ability at allowing the Unknown to manifest.

---

Article Reviewed by Prof. Dr. Besnik Aliaj

*A special thanks for the images to John Allen.*

*The statement 'allowing the unknowable' used in the title come from the lecture held at TAW 2014 by John Allen. We would like to thank Prof. A. Saggio for creating the link between John Allen and Tirana Architecture Week.*

## REFERENCE:

- Allen, J. (2014). *Comprehensive, Sustainable and Co-evolutionary Design Design Paradigm for the 21st Century*. Lecture held at Polis University, TAW Tirana Architecture Week, Albania
- Allen, J., Alling, A., Dempster, W., Nelson, M., Silverstone, S. and Van Thillo, M. (2005). *Lessons Learned from Biosphere 2 and Laboratory Biosphere Closed Systems. Experiments for the Mars On Earth® Project*. In *Biological Sciences in Space*, Vol. 19, No. 4, pp. 250 – 260.
- Allen, J.P., Nelson, M., and Alling, A. (2003). *The Legacy of Biosphere 2 for the Study of Biospherics and closed ecological Systems*. In *A & Space Res.*, Vol. 31, No.7, pp. 1629 – 1639. Great Britain: Elsevier Science
- Allen, J. (1991). *Biosphere 2: The Human Experiment*. Viking: Penguin
- Blomfield, H. (2003). *Human Ecological Dysfunction and the Value of Closed Biosphere Research*. In *Journal of Futures Studies*, Vol. 8, No. 2, pp. 31 – 38. Canada: University of British Columbia
- Capra, F. (2005). *La rete della vita*. Milano: BUR, Biblioteca Universale Rizzoli
- Gandolfi, A. (2008). *Formicai, Imperi, Cervelli. Introduzione alla scienza della complessità*. Torino: Bollati Boringhieri
- Garcia Marques, F. and Pearce P. (1991). *Biosphere 2*. In *Arca*, numero 53, 1991, p. 30
- Gleik, J. (2002). *Caos. La nascita di una nuova scienza*. Milano: BUR
- Kim, J. and E. Carver (2009). *Crisis in Crisis: Biosphere 2's Contested Ecologies*. In *Volume: 20 Storytelling*. Columbia University Laboratory for Architectural Broadcasting (C-Lab)
- Morin, E. (1994). *Il Paradigma Perduto. Che cos'è la natura umana?*. Milano: Feltrinelli
- Rossetti, M. (2011). *Progetti non convenzionali*. In *Costruire*, n. 333
- Saggio, A. (2010). *Architettura e modernità. Dal Bauhaus alla rivoluzione informatica*. Roma: Carocci
- Saggio, A. (2010). *Tra gli anni Settanta e Novanta. La sperimentazione sistemica di John Allen*. In *Per un'architettura come ecologia umana, studiosi a confronto. Scritti in onore di Paolo Soleri*, a cura di Lima, A. I., pp. 58 – 79. Milano: Jaca Book
- Vernadskij, V.I. (1999). *La biosfera e la noosfera*. Palermo: Sellerio Editore

