- …
- Milano - Headquarter CAP
- Milano "Magnifica Fabbrica"
- Palermo - Centro Direzionale Regione siciliana
- Parco di Bagnoli
- OrbiTecture
- …


Milano - Headquarter CAP

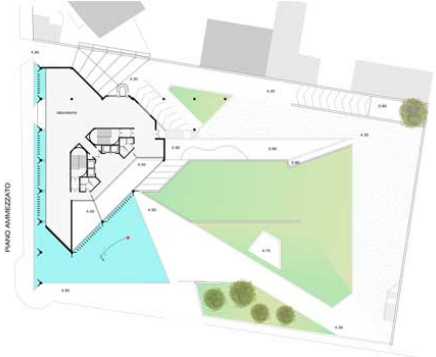
L’ACQUA

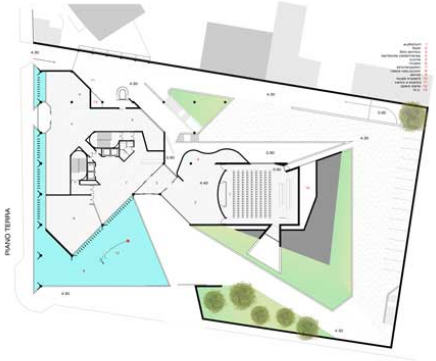
nebulizzata scorre in canali verticali lungo i pilastri,
quindi nella vasca lineare alla base della facciata,
collegata a una vasca più ampia
che accoglie una scultura

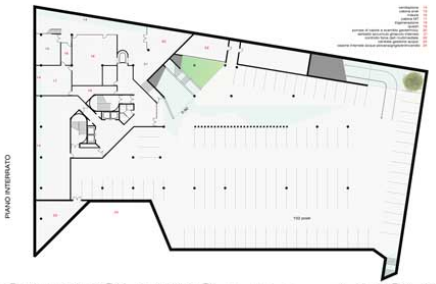
è raccordo con il contesto
memoria del suo ruolo storico nella città

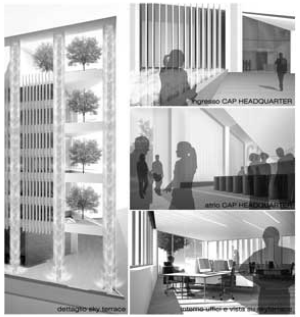
Milano - Headquarter CAP

Milano - Headquarter CAP



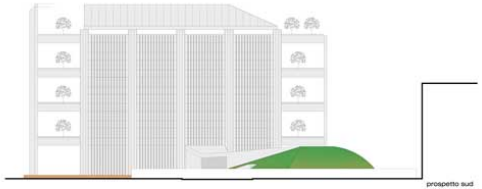


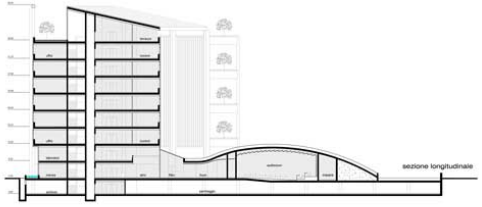


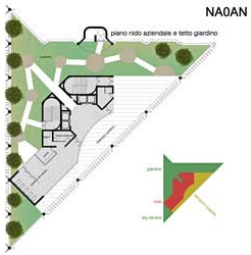


CAP HOLDING s.p.a. NUOVO HEADQUARTER 3

LIVELLI INFERIORI / IL FRONTE D'ACQUA

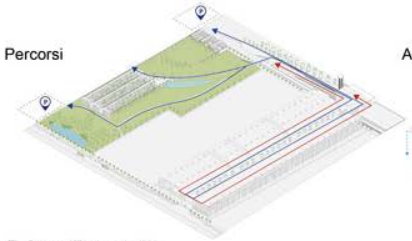


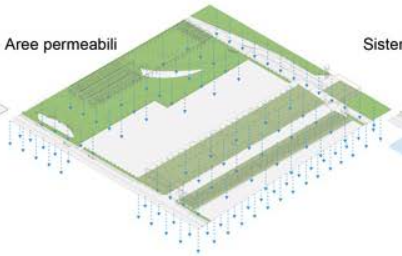


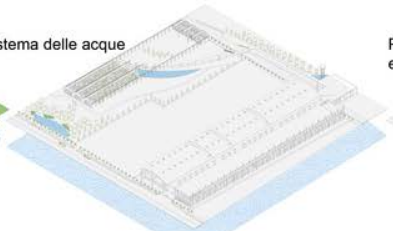


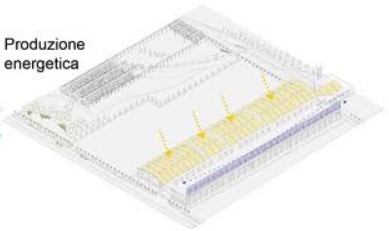
CAP HOLDING s.p.a. NUOVO HEADQUARTER 4

LIVELLI SUPERIORI / PROSPETTI / SEZIONI

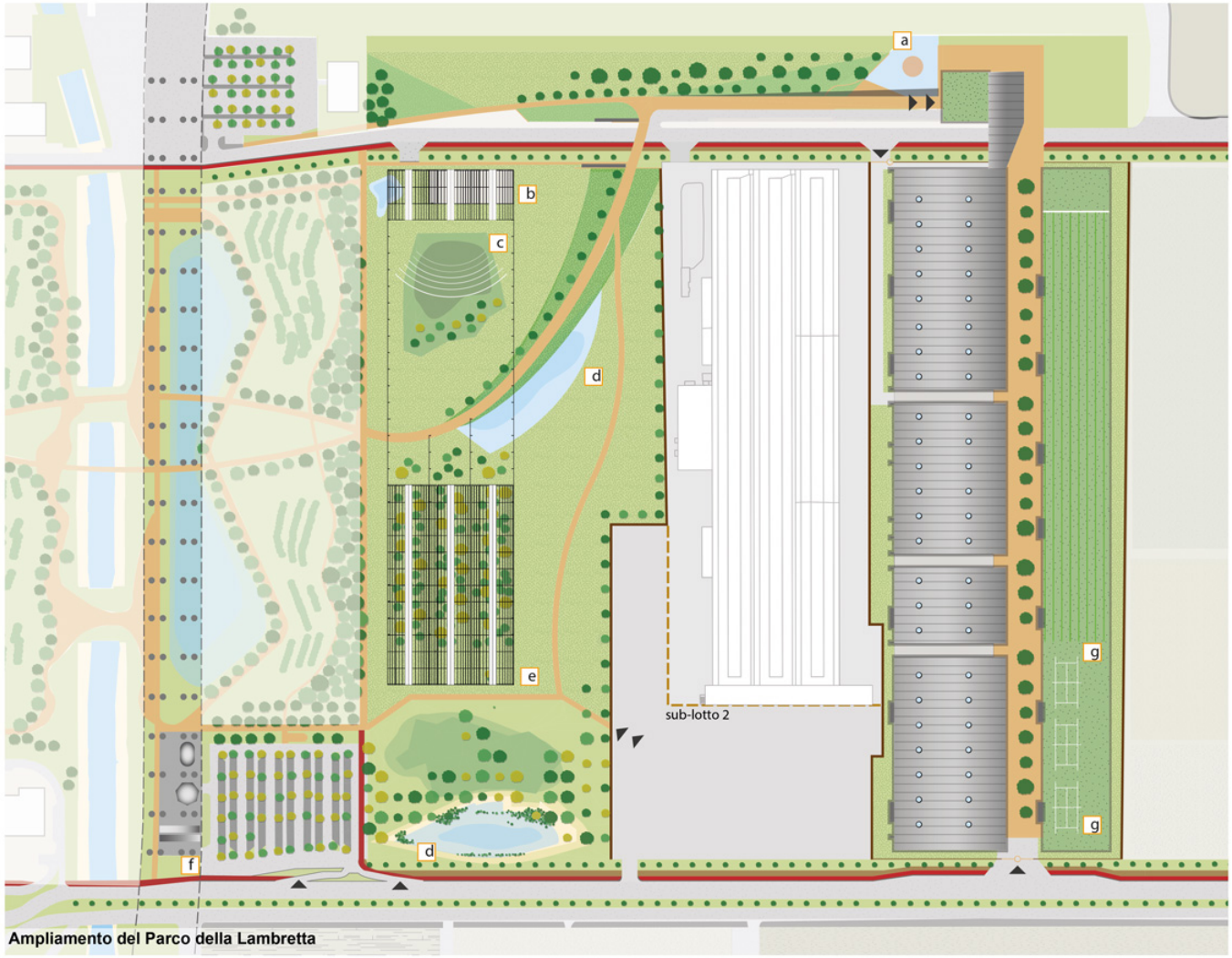






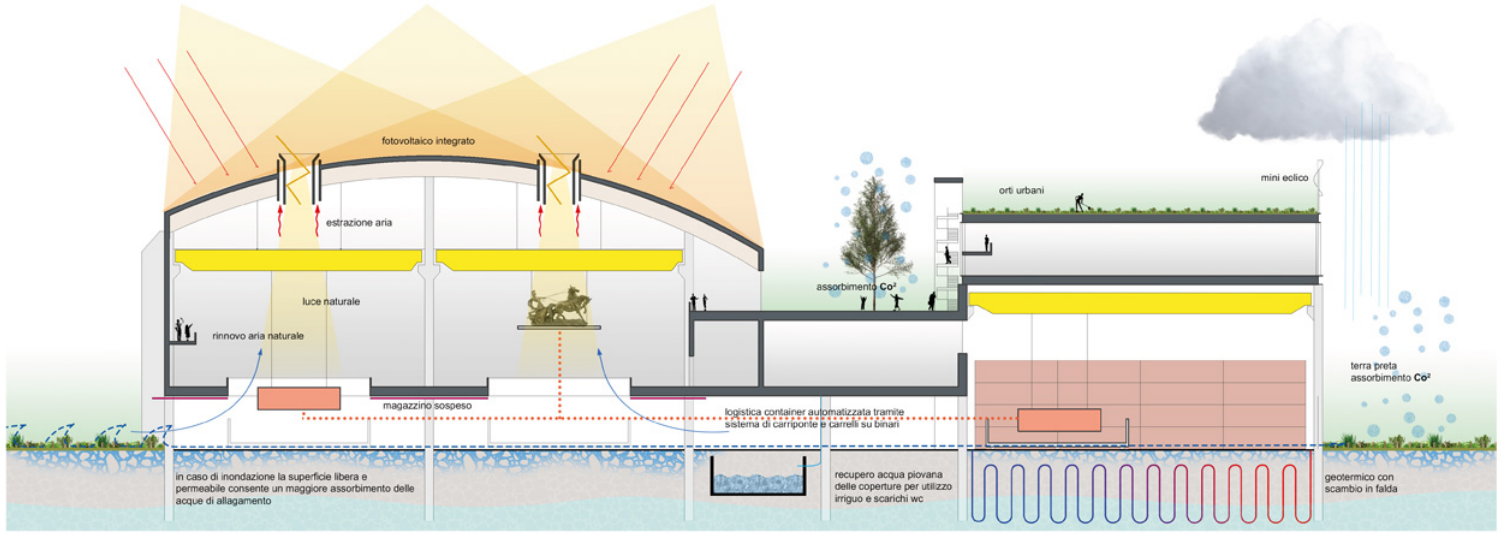


Driver di progetto

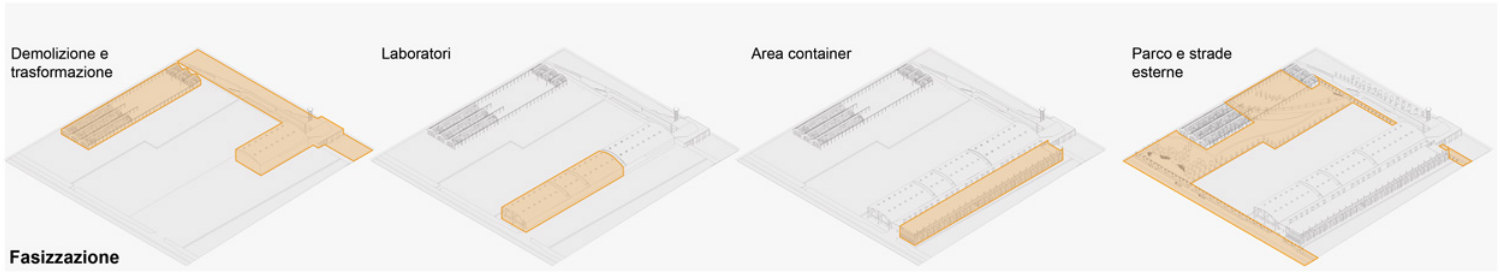


Ampliamento del Parco della Lambretta

Sezione longitudinale



Sezione trasversale



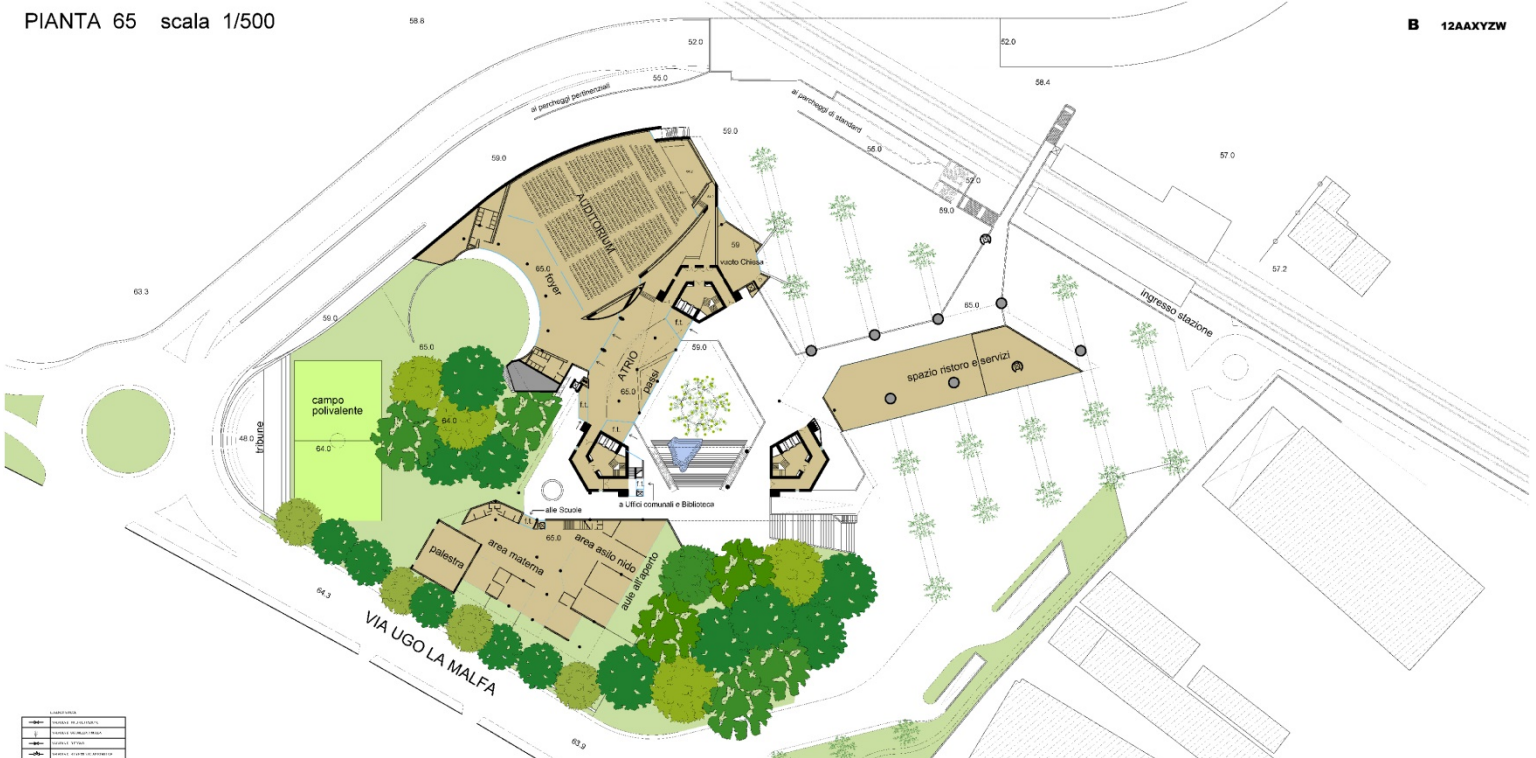
Fasizzazione

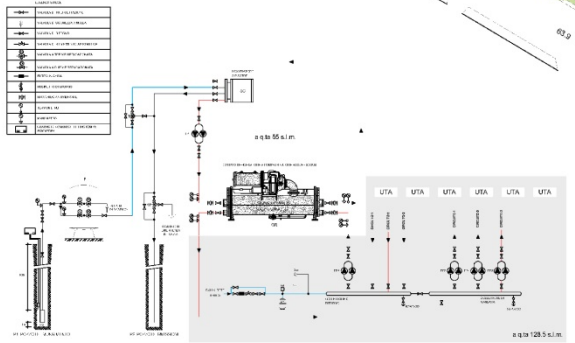
Palermo - Centro Direzionale Regione siciliana


SIVIBUS
IVECO

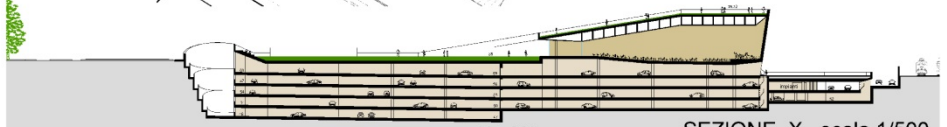
PIANTA 65 scala 1/500

B 12AAXYZW





SCHEMA CENTRALE TERMOFRIGORIFERA

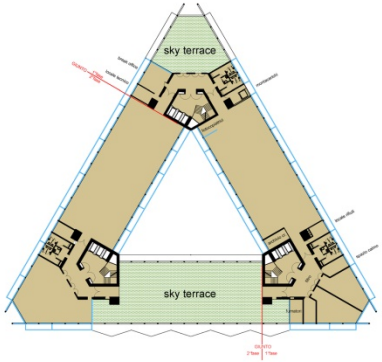


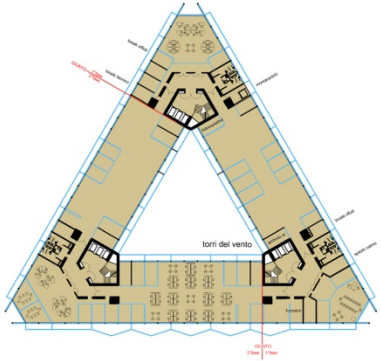
I1 * M1

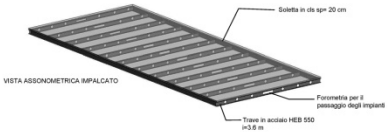
SEZIONE X scala 1/500

B 12AAXYZW

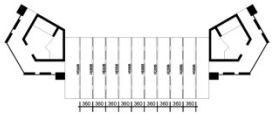
POSSIBILITA ALTERNATIVE DI DISTRIBUZIONE scala 1/500



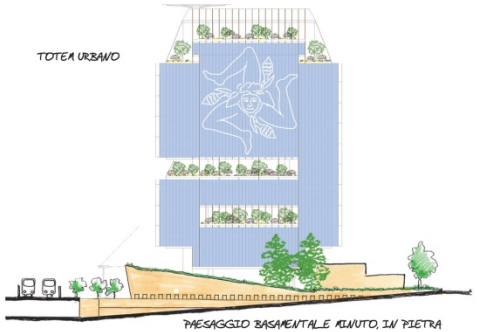


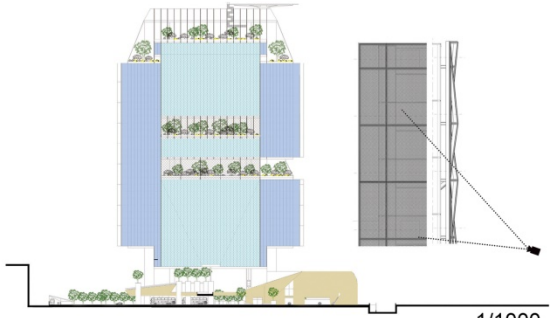


VISTA ASSONOMETRICA IMPALCATO


IMPALCATO TIPO

SEZIONE Z scala 1/500




1/1000

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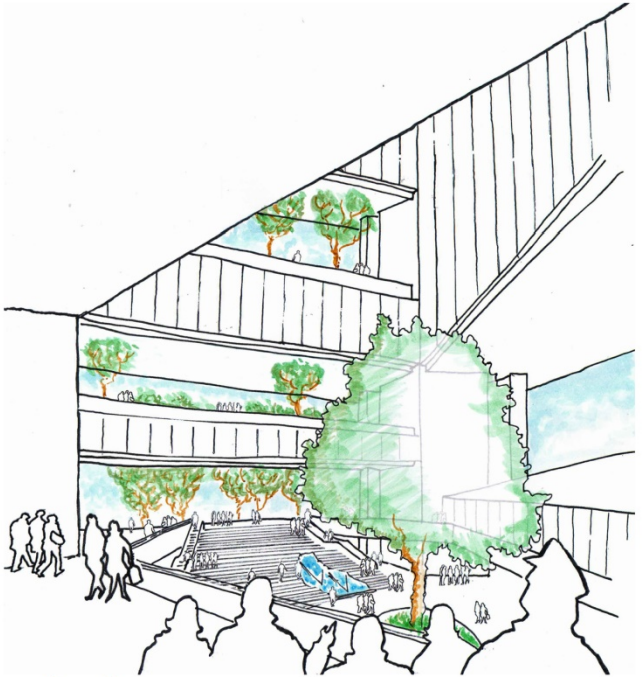


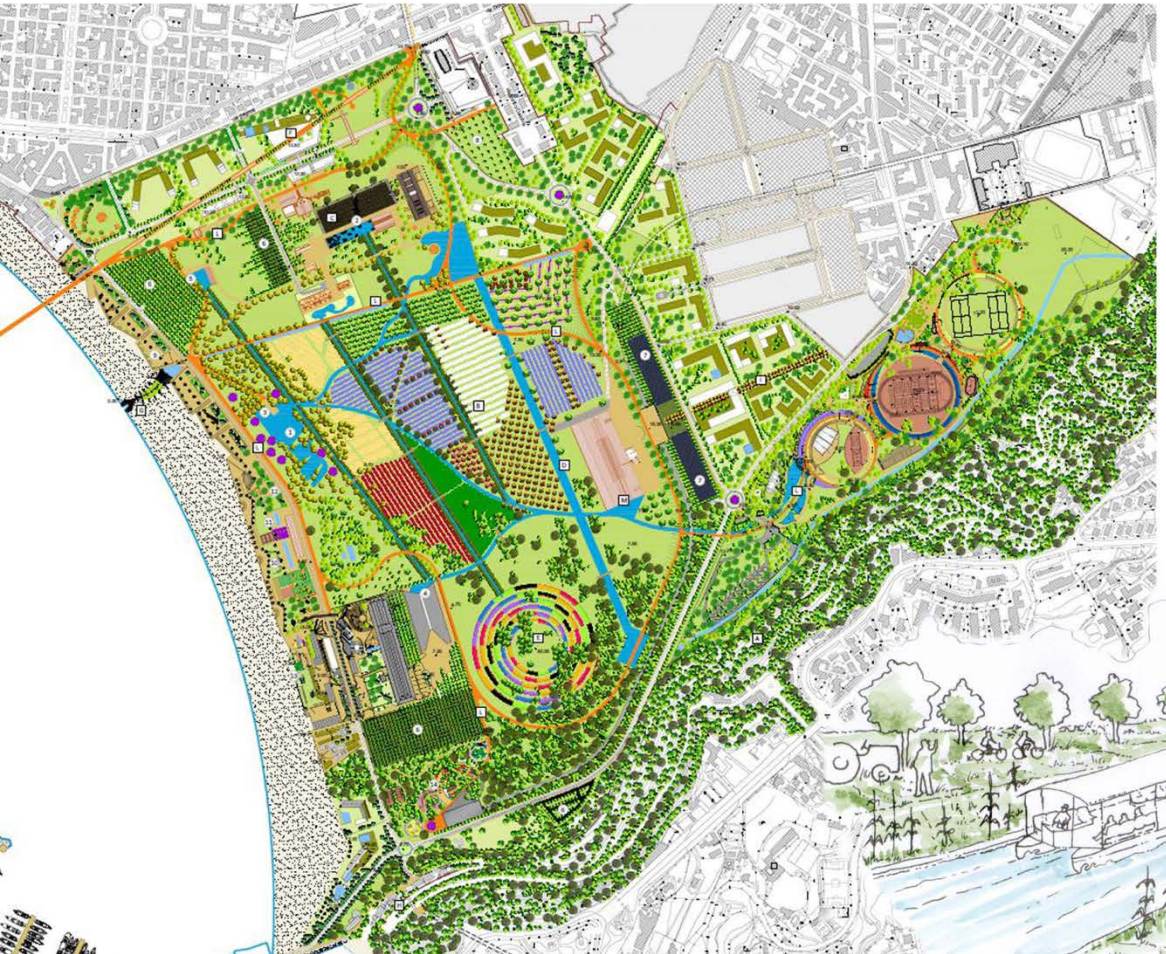
la corte interna

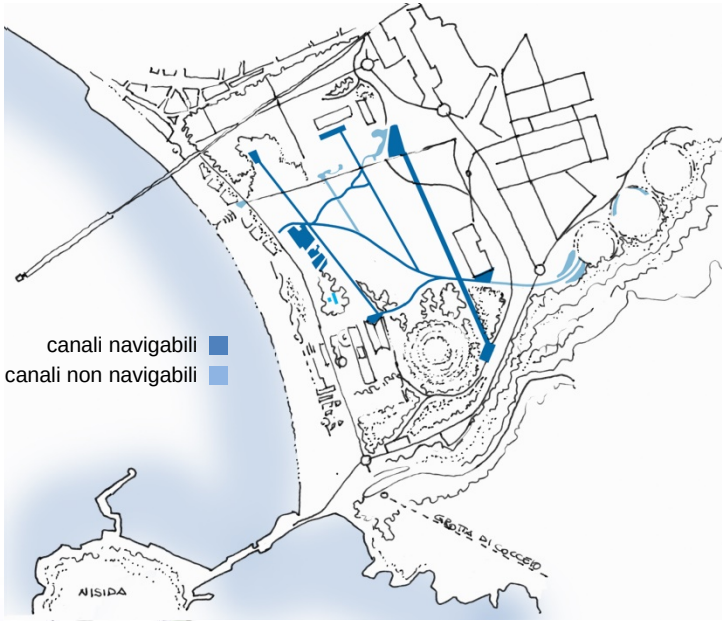
SEZIONE Y 1/500

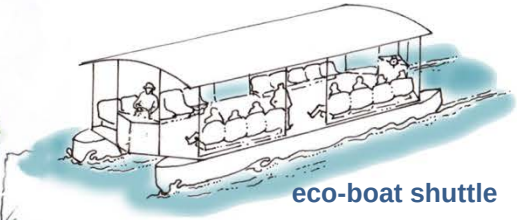

Parco di Bagnoli

NAVETTE ECOLOGICHE

ecoboat







eco-boat shuttle

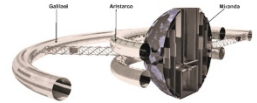
Parco di Bagnoli

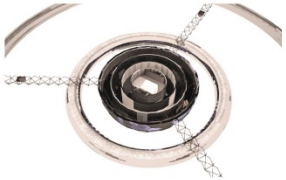
Parco di Bagnoli

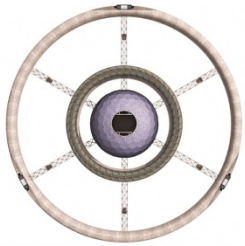
... "it is not a question of scaling up from the current 6 guests to the 100 expected guests, nor to respond to new and different performance needs, but to evolve from the concept of the current ISS, juxtaposition of autonomous synthesisless elements, to a whole capable of unitary expression: overcome current concepts that, like the very first cars, look "Paleolithic" ...

Center for Near Space
in posterum astra

Section of Miranda evidencing the Hangar and the Microgravity Laboratory



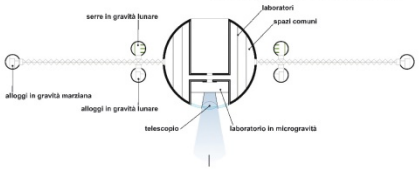


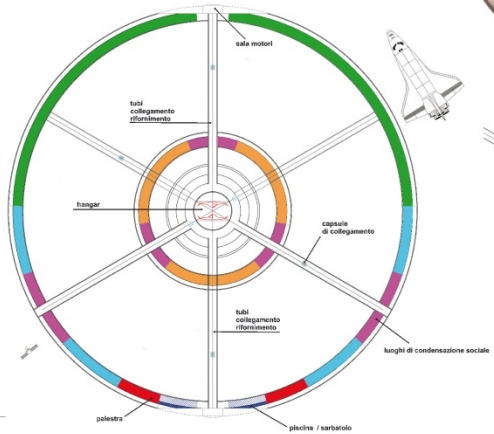


LODGING
AGRICULTURE
SPORT AREAS
PLACES OF SOCIAL CONDENSATION

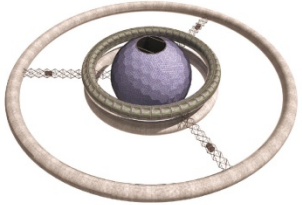
r = 100 mt

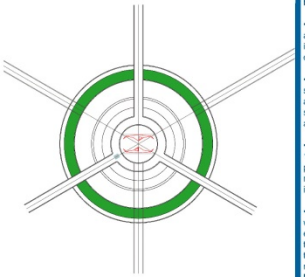
MIRANDA spherical central element, total surface 3767 m2

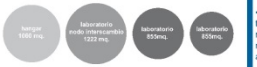


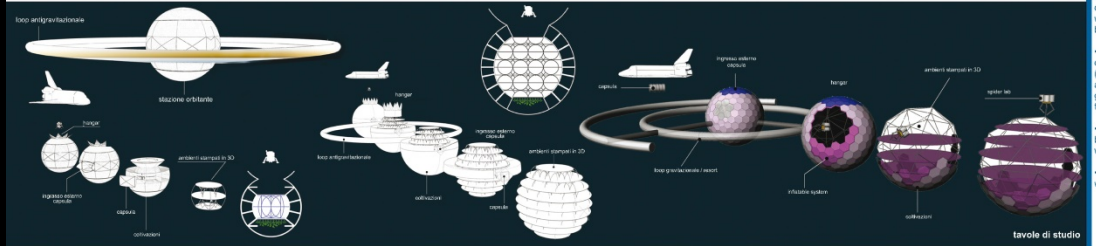


ARISTARCHUS toroid dedicated to crops and connecting elevators









tavole di studio

OrbiTecture

Requirements and multidisciplinary for the SpaceHub

Design criteria for the expansion of humanity in space:

- within 50 years a cis-lunar city is anticipated with 1000 individuals located in different areas (neighborhoods) in orbit and on the Moon.
- the development of space tourism - space democratization - will allow abandonment of logics of inhabitants selection, as done so far with astronauts.
- for an orbital interchange node with 100 people, spaces will be designed to perform specific functions and to minimize internal conflicts among the inhabitants.
- explore the Fourth Environment - weightlessness - means leaving the environment atavically known to humanity: the gravity. This however does not mean to deny gravity, so that physical training remains necessary in view of trips to the Moon and Mars.
- long-term permanence will require to guarantee a daily cycle in the residential areas of the station. Light management - artificial or solar - will be another fundamental paradigm.
- the current space configurations - really being "Paleolithic" - will be overtaken by other solutions consistent with the context: spheres, rings, rotating bodies, orbits, etc.
- although a cislunar city traffic of the order of 100,000 trips/year is anticipated (about 10 arrivals/day on the SpaceHub), an almost full autonomy must be guaranteed in terms of energy, air, water, food.
- protection from cosmic radiation will be ensured by shields of water enriched with cyanobacteria.
- only the multidisciplinary approach will ensure efficiency and effectiveness.

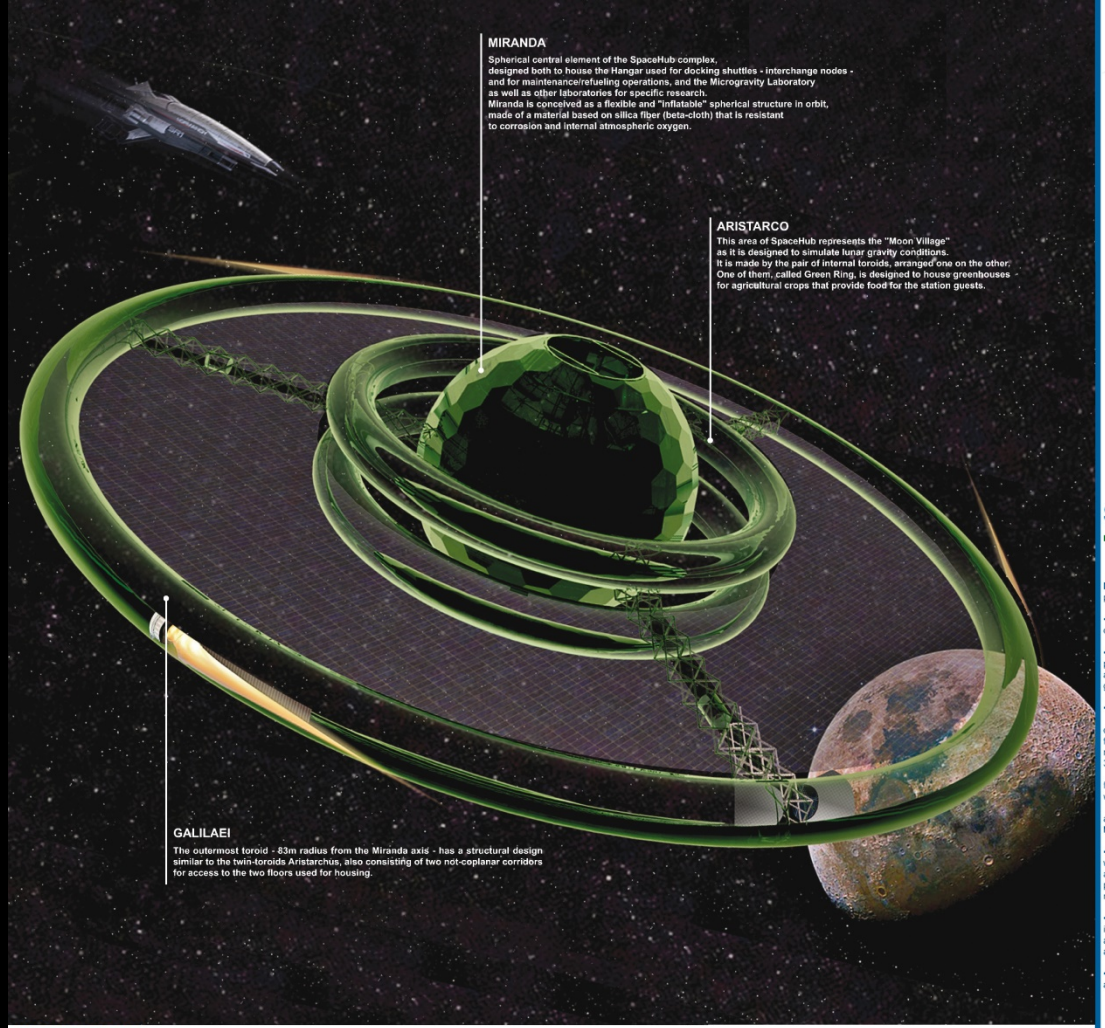
1

CENTER FOR NEAR SPACE / Italian institute for the future

OrbiTecture

Requirements e multidisciplinary for the SpaceHub

coordination: Massimo Pica Ciamarra, Gennaro Russo, Vincenzo Torre, with the contribution of Roberto Paura
historical evolution and futuristic visions: Vincenzo Torre **architecture:** Guido De Martino, Massimo Pica Ciamarra **space systems and technologies :** Matia Barbarossa, Alessandro Concas, Aliaa Nemolato, Dario Pisanti, Gennaro Russo, Valentino Scalera **Materials, structures, manufacturing processes :** Gennaro Russo, Vincenzo Torre **botany and space crops:** Stefania De Pascale
psychology and human sciences : Caterina Arcidiacono, Aurora Martina Russo **virtualization and animation :** Roberto Chiaiese, Luca Mastroianni **light and lighting :** Filippo Cannata



CENTER FOR NEAR SPACE

SpaceHub

a planetomorphic concept

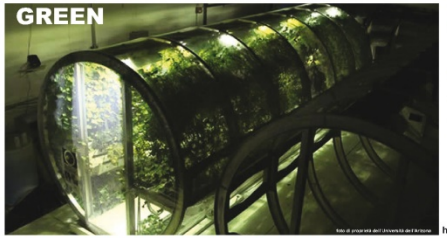
Center for Near Space

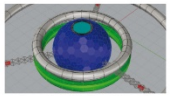
SpaceHub

main features

Design criteria for continuous presence in space :

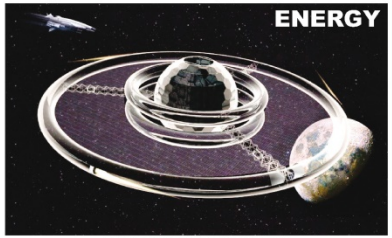
- hosts 100 people, including operators, researchers and tourists.
- rotates around its axis at 2 rpm to produce different values of centrifugal acceleration simulating different gravitational conditions.
- has a planetomorphic concept :
  - **Miranda**, the central sphere of 44m in diameter, houses the hangar for spaceships docking and the microgravity laboratory. Connected by 3 "capsules/elevators."
  - **Aristarco**, at 38m of distance from the axis, two overlapping toroids with moon Gravity.
  - **Galilaei**, at 83m from the axis, toroidal element with gravity Martian.
- manufactured and assembled in situ, with inflatable structures technologies and additive manufacturing (3D printing) processes with metallic and non-metallic materials.
- for the livelihood of the inhabitants, includes 6.000 m2 of edible crops in addition to green areas for a comfortable and a better life habitat on board.
- in order to support missions to Mars and Moon, has training rooms.





configuration of the two Aristarchus toroids with the highlighted Green Ring

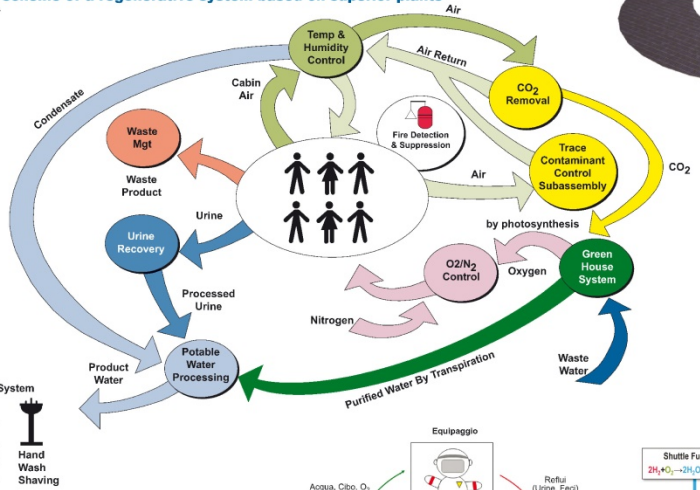
hydroponic cultivation / prototype of a space greenhouse



photovoltaic system for energy production

Crops will be indispensable in the "cislunare city"

Simplified scheme of a regenerative system based on superior plants

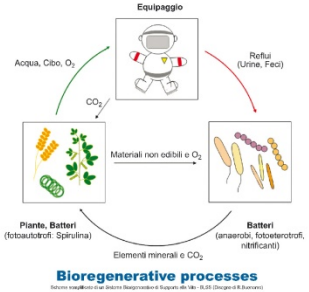


The surface of GaAs-4J solar cells produces 3875 kW, against the estimated need of 2650 kW.

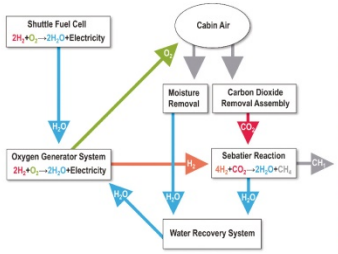
Life Requirements on Earth and Space

Item	On Earth		In Space	
	kg per person per day	gallons per person per day	kg per person per day	gallons per person per day
Oxygen	0.84		0.84	
Drinking Water	10	2.64	1.62	0.43
Dried Food	1.77		1.77	
Water for Food	4	1.06	0.80	0.21

One-person need of water



Bioregenerative processes



Regenerative processes

CENTER FOR NEAR SPACE

SpaceHub

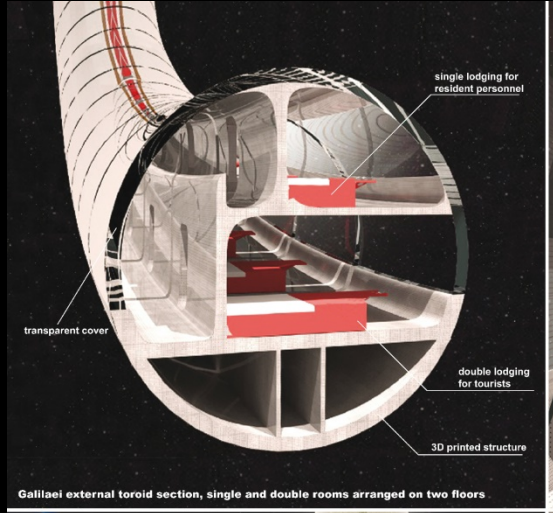
water: primary element of life support

SpaceHub

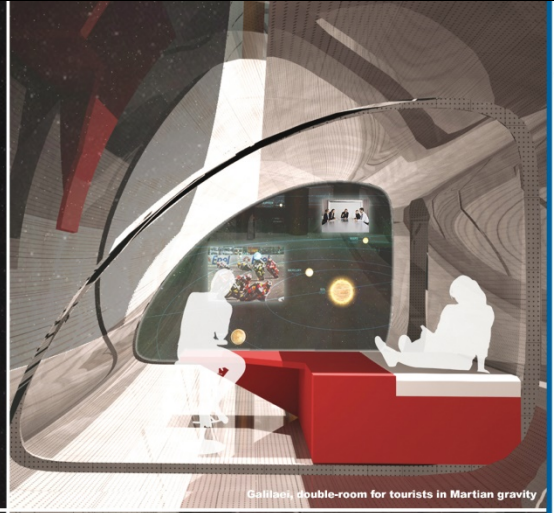
water: essential element for the life

Needs and recycling :

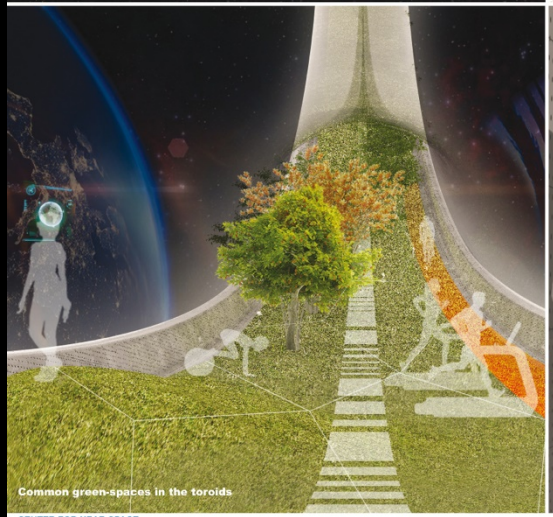
- Permanence in space requires the development of a system capable of sustaining life of the inhabitants through a continuous regeneration of primary resources.
- it is therefore necessary to implement a closed system from the point of view of matter (but open from that of energy) that reproduces at a reduced scale the cycles on Earth. The bioregenerative systems based on superior plants will contribute to solve these problems.
- Plants must be represented by efficient agricultural crops able to provide the crew with a proper diet (in quantity and quality) during long periods.
- Such a closed-loop bioregenerative system must contribute to the production of fresh food, oxygen generation and removal of carbon dioxide from indoor air (due to human breathing) through photosynthesis, to water purification through the transpiration process, to reuse of biomass residues, organic waste from processes and physiological wastewater, after adequate treatments, and to the psychological well-being of the crew.
- on the International Space Station (ISS) recycling systems produce 25-30 l/day of water.
- on SpaceHub an average water consumption of 50-60 l/day is estimated, 5 l/day of which for drinking and cooking.
- maximum possible recycling to minimize the need for supplies from other parts of the cislunar city or in orbit production (e.g. NASA plans to obtain 1 liter of water from 5 kg of rock from asteroids).
- the water cycle will be completely closed and all the water on board (humidity in the cabin atmosphere, water used for personal cleaning, urine) will be recovered and purified.
- the adoption of a water system with cyanobacteria for protection against cosmic radiation involves the availability of large quantities of water to be recycled with continuity and an environment that can be well integrated with aforementioned other systems.



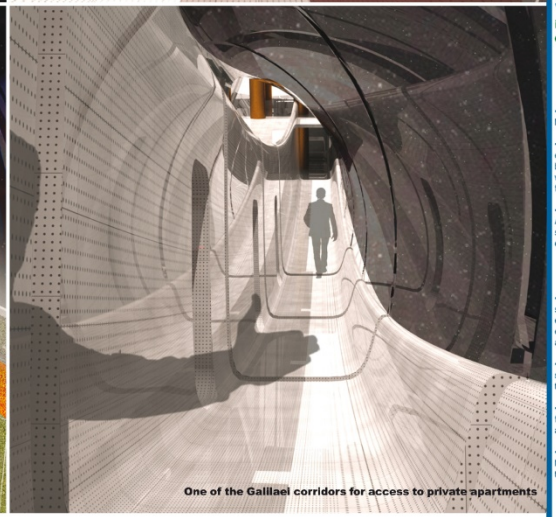
Galilaei external toroid section, single and double rooms arranged on two floors



Galilaei, double-room for tourists in Martian gravity



Common green-spaces in the toroids



One of the Galilaei corridors for access to private apartments

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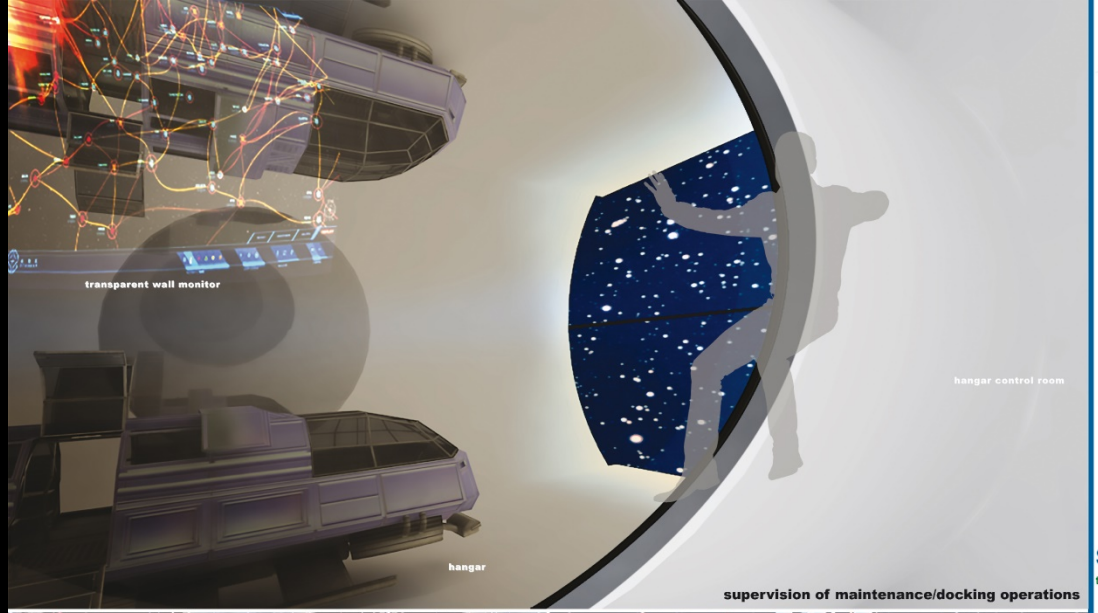
internal livability environments

Spaces for research :

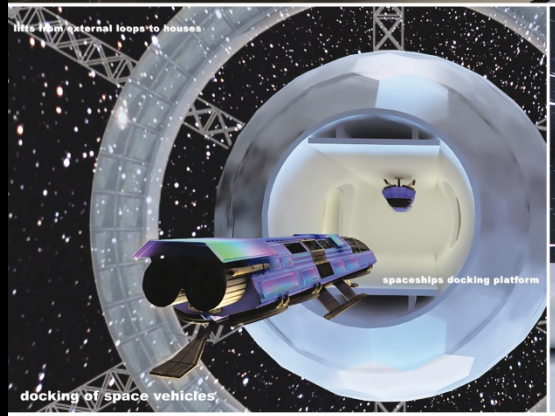
- 70% of the laboratories are within Miranda, in reduced gravity.
- the "microgravity laboratory", connected to the structure with bearings, remains inertially steady without being affected by the centrifugal force produced by rotation.
- several laboratories are located in Aristarchus and Galilaei to study situations related to lunar and Martian environments.

Spaces for tourism and relax :

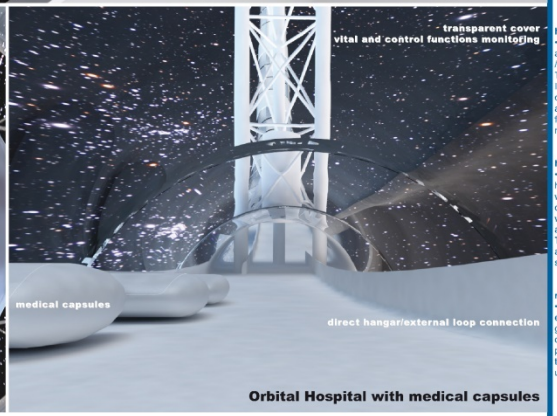
- Aristarchus and Galilaei contain spaces of stay and socialization equipped with pieces of artwork: local of refreshment, religious spaces, green areas and areas for sports.
- single rooms for the crew and long-stay operating staff; double rooms for tourists.
- 30-40 resident tourists are expected for limited periods - hosted in mini-apartments of approximately 25 m2.
- an environment is provided in Miranda for holographic cinema and theater.



supervision of maintenance/docking operations



docking of space vehicles



Orbital Hospital with medical capsules

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technical and support spaces: interchange node, security and control

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technical and support spaces

hangar

• shuttles arrival/departure function and traffic management, maintenance /refueling and access to the structure. True heart of the Spacehub.
Interior characterized by two platforms of opposing moorings that allow approach and subsequent anchoring of spaceships for boarding operations, refueling and maintenance

hangar control room

• control room located outside of the hangar (inside Miranda): the monitor window allows the supervision of the operations of docking and maintenance with the aid of AI (artificial intelligence) and AR (augmented reality).
The space is such that it can accommodate at the same time 4 specialists in microgravity condition

medical room

• equipped with 5 beds and an emergency room, located on Aristarchus; guarantees the health control of the occupants and constant monitoring of patients in different conditions from the terrestrial environment, in addition to the usual intervention practices