The new *SpaceLand Center* in Mauritius : benefits for African and Asian Countries

Incubating the Future, in Microgravity

Carlo VIBERTI

U.N.-U.A.E. High Level Forum, Dubai 6 Nov 2017

Kids, elderly, people with disabilities:

anyone can be *actively* engaged in educational & techno-scientific innovation in *microgravity*

SPACELAND

Record-breaking crew-members **selected among the general public, trained and brought to fly by SpaceLand team led by former ESA-zero-gravity test engineer and Space Station MIR European Technology Experiments Coordinator Doct. Carlo Viberti for *biomedicine, technology and/or bioengineering* experiments commissioned by Nobel-Prize-winner led groups, taking off from the *NASA Space Shuttle L.F.***
(Kennedy Space Center, Cape Canaveral, Florida)

World's youngest kid as research test subject in zero-gravity: 11 yrs old

11-year-old Kim Marco Viberti flew in 2008 as test subject for neurobiological sampling experiments related to studies on neuropathologies such as the Alzheimer's syndrom, commissioned to SpaceLand by the European Brain Research Institute led by dr. Rita **Levi Montalcini (Nobel Prize winner),** Italian State Health Institute (ISS), Italian State Research Center (CNR) and University of Milan (I); results reported in scientific paper issued for the European Low Gravity Research Association's Congress in Bonn (D).

*Left : free-flying break between sampling, right: interview by **Italian State TV "TG1"** prime news report*

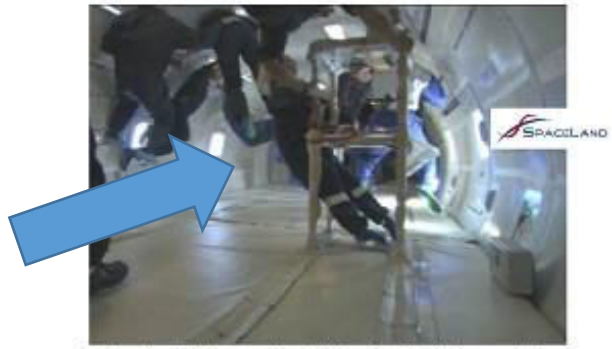
World's oldest man in zero-gravity: 93 yrs old

93 year old man, flying as test subject for bioengineering experiments commissioned by the **Don Gnocchi Science Foundation's Bioengineering Center** of Milan (image from **CNN TV news report**)

*Images show footages from **CNN TV reports***

World's 1st disabled for technology tests in zero-g

100% disabled woman as test operator for hand-free ICT control systems commissioned by **AIDA Modena ("Informatic tools for disabled and elderly")**



Footage showing Elmo operating at the SpaceLand technology payload rack, broadcasted by the Italian State TV "RAI2" and Mediaset TG 4 news reports

SpaceLand / Carlo Viberti have been awarded, inter alia, the following prizes:
. European "EOS" Award for Innovation Policy, by the European Commission
. Prize "*Torre di Castruccio*" - Gold Medal by the President of the Republic of Italy
. Prize "*Etica ed Impresa*" by Italy's Federmanagement and AssoQuadri associations
. Italian Aeronautics and Astronautics Association Award
. Finalist rank for Italy's ConfCommercio "*Innovation Prize*"

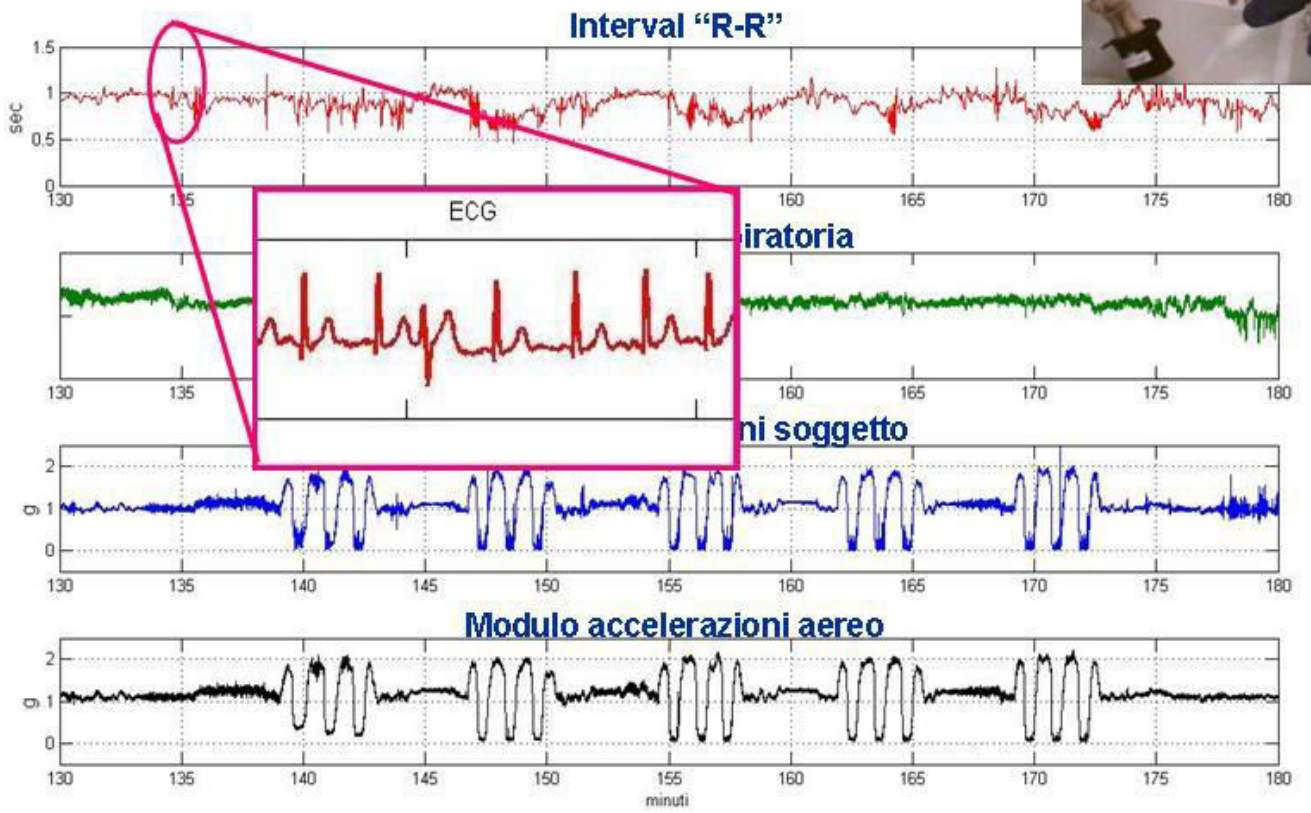
First non-US citizen taking off from NASA Space Shuttle L.F.

SpaceLand Flight Mission Commander **Eng. Doct. Carlo Viberti** is the **1st non-U.S. citizen** authorized to take off for microgravity research flights from the NASA Kennedy Space Cente
He has been formally proposed by the *Head of the Italian Space Agency* to fly as **1st Astronaut-Engineer** on the ***first sub-orbital research flight campaigns.***
The program has been presented with guest lectures in Oxford at the 1st UK Space Agency's workshop on microgravity and the 1st Space Commerce Summit in 2013 in London with NASA

Left: footage from RAI and Swiss State TV ; right: Viberti with Space Shuttle pilot Rick Searfoss,

SpaceLand

SpaceLand's micro-g ECG on 93-yr-old subject



93-year-old test subject ECG during SpaceLand research flight April28, 2007 in Mars-G,Moon-G, 0-g
jointly with Polo Tecnologico Fondaz. Don Gnocchi Milano Italy

Bio-garment zero-G qualified by SpaceLand

and utilized since 2015 by the astronauts on the International Space Station

NGF, BDNF AND CORTISOL LEVELS DURING PARABOLIC FLIGHT

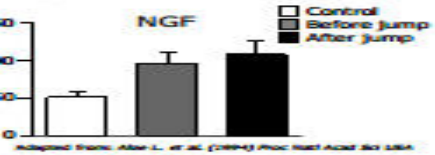
Santucci[a]; N. Francia[a]; C. Viberti[b]; L. Aloe[c]; E. Alleva[a]

ence, Department of Cell Biology and Neuroscience, Istituto Superiore di Sanità, Rome, Italy; [b]SpaceLand
[c]Institute of Neurobiology and Molecular Medicine, CNR, European Brain Research Institute (EBRI), Rome,

-studied polypeptide growth factor
intenance of specific peripheral and
In the central nervous system NGF
neurons (mainly cholinergic and
rate in disorders, such as Alzheimer's
ely more frequent due to the longer
lore recently, NGF target cells have
ne, and endocrine systems, and an
hat NGF, in addition to its role as a
rough multiple paths to ultimately
behavioural coping.

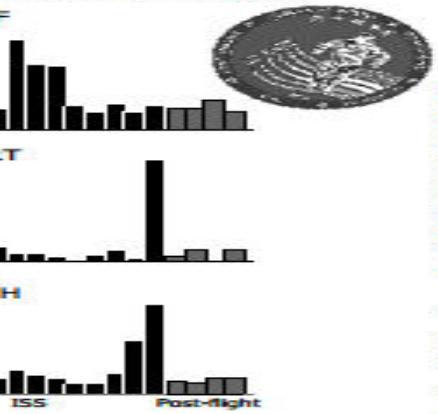
mouse model of social stress to
ase both in plasma and in the
aggressive interactions and more
F levels both in plasma and in some
, hippocampus and hypothalamus, of
rgravity (2g).

E BLOOD OF PARACHUTISTS
BEFORE AND AFTER JUMPING



stress related to a space mission
els of NGF preceding the hormonal

RT AND ACTH MEASURED
THE ENEIDE MISSION

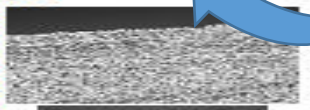


d others neurochemical parameters,
ses to stress, saliva samples were
abolic flight with Lunar-, Mars-, and

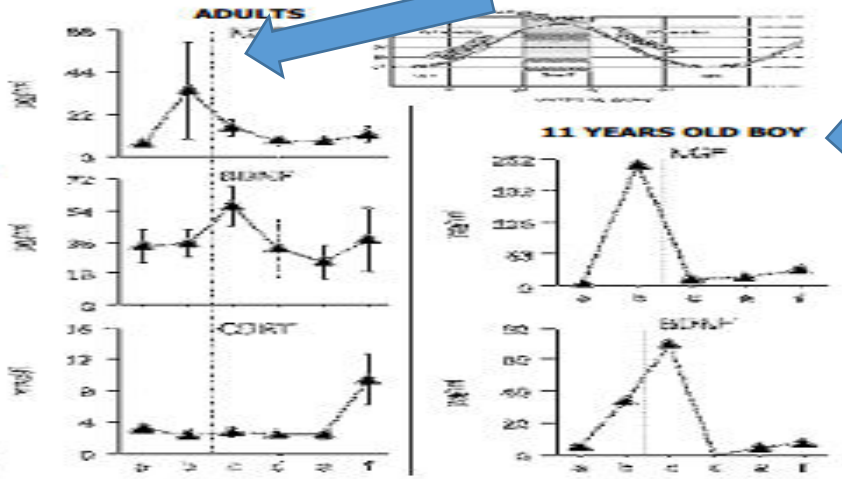
EXPERIMENTAL PROCEDURE

Saliva samples were self-collected by the experimental subjects (nine adults and a 11 years old boy) using Salivette kits (Sarstedt, Aktiengesellschaft & Co., D-51588 Nümbrecht, Germany) before, during and after the parabolic flight. Saliva was collected by chewing on a cotton rolls for 2-3 min and returned to transport vial. Samples were stored frozen at -70°C until assay.

Saliva was assayed for nerve growth factor (NGF), brain derived neurotrophic factor (BDNF) and cortisol (CORT) levels.



SALIVARY LEVELS OF NGF, BDNF AND CORT MEASURED DURING THE PARABOLIC FLIGHT



CONCLUSION

In agreement with previous studies on parachutists and on astronaut experiencing stress related to skydiving and space mission, experimental subjects showed an increase in salivary levels of NGF and BDNF only during specific phases of the flight. Moreover, individual as well as age-related differences have been observed. These data confirm the role of NGF and BDNF in the adaptative response to "extreme situations" involving psychological stress.

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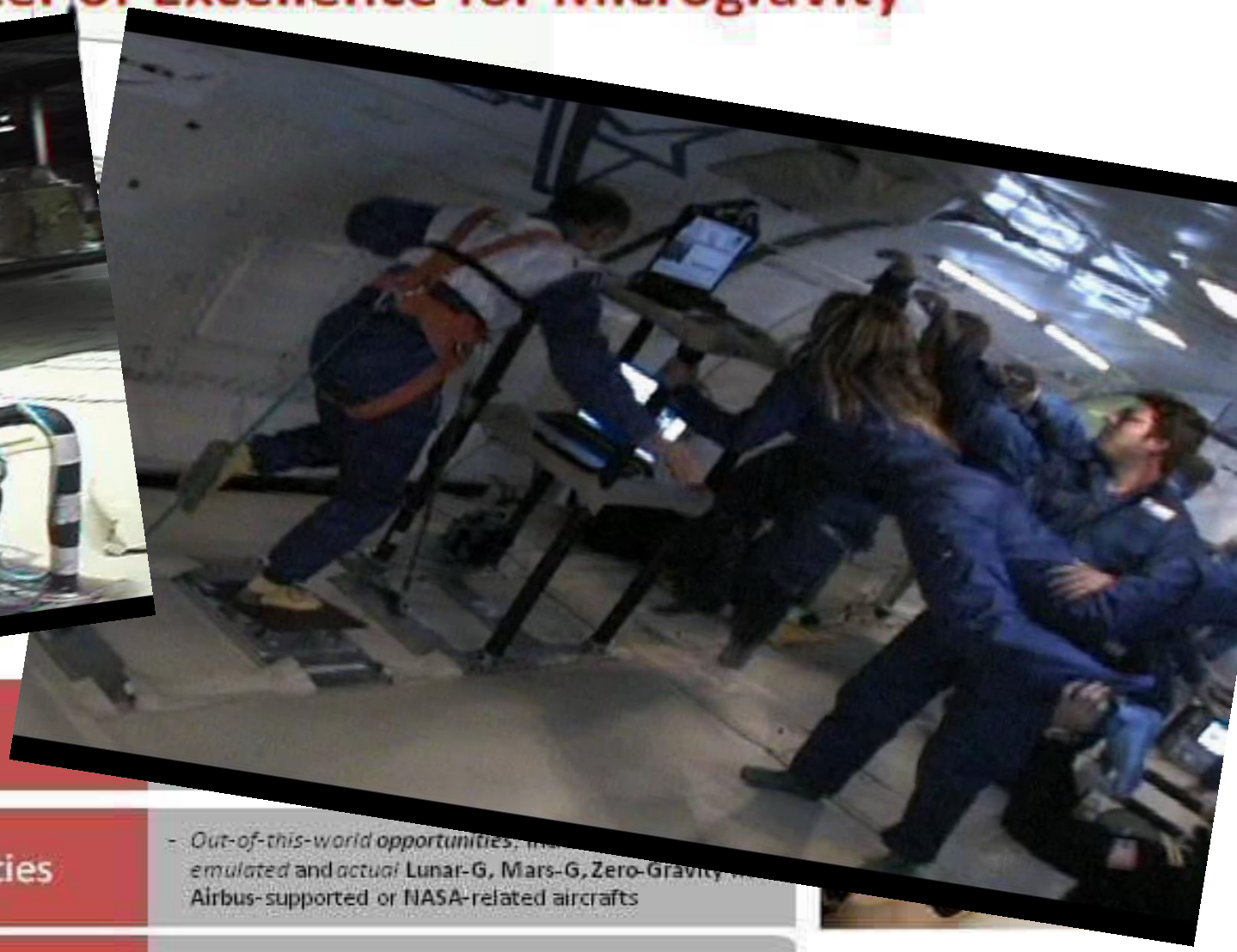
Francia N, Simeoni M, Perrucci S, Santucci D, Aloe L, Alleva E. Repeated acute exposures to hypergravity during early development subtly affect CD-1 mouse neurobehavioural profile. Brain Res Bull. 2006; 69(5):566-72.

SPACELAND

An unprecedented Center of Excellence for Microgravity



Weightless Laboratories

Public-access Space Facilities

- *Out-of-this-world opportunities*, in... *emulated* and *actual* Lunar-G, Mars-G, Zero-Gravity... Airbus-supported or NASA-related aircrafts

Intelligent Hospitality & Tourism

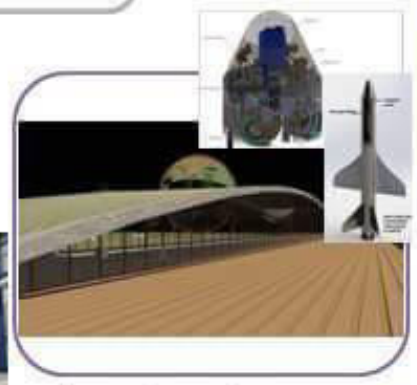
- *Astronaut Training Experiences*, also *underwater* and in *drop towers*, for *edutainment to families, tourists* and for international *Corporate Incentives and Events* (MICE)

Implementing the first Center of Excellence for Microgravity

Deal 1 implementation
inside the chosen land

System requirements analysis
and architectural concepts

Preliminary design of 22 facilities
(completed, 0.75 M EUR invested)

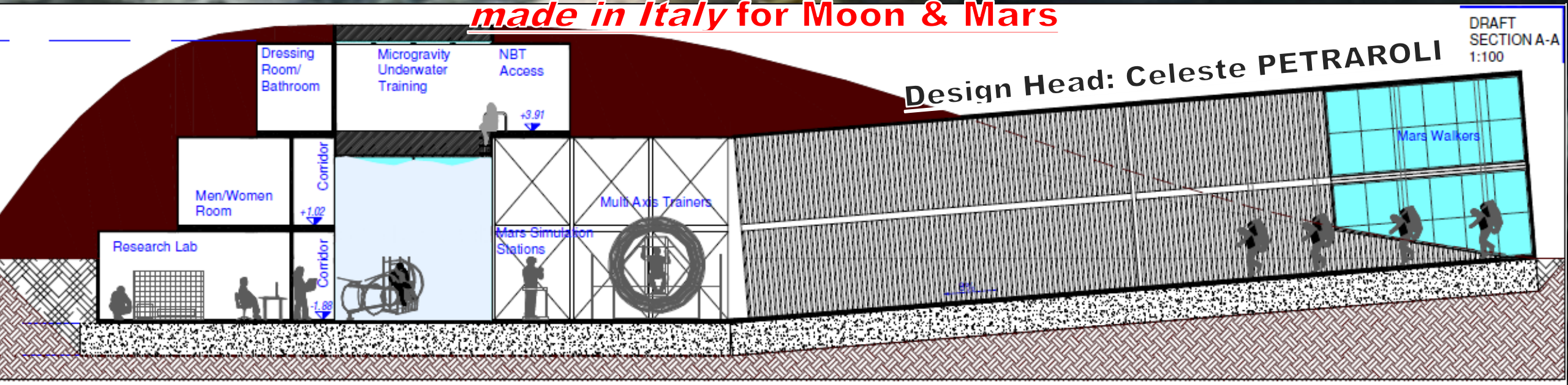


Adaptation Study to Mon Tresor
and detailed design
(within the next year)

Construction and start of
operations (within the next 2 years)

**Business plan sized for 165,000 visitors/year,
facilities dimensioned for up to 400,000/year**

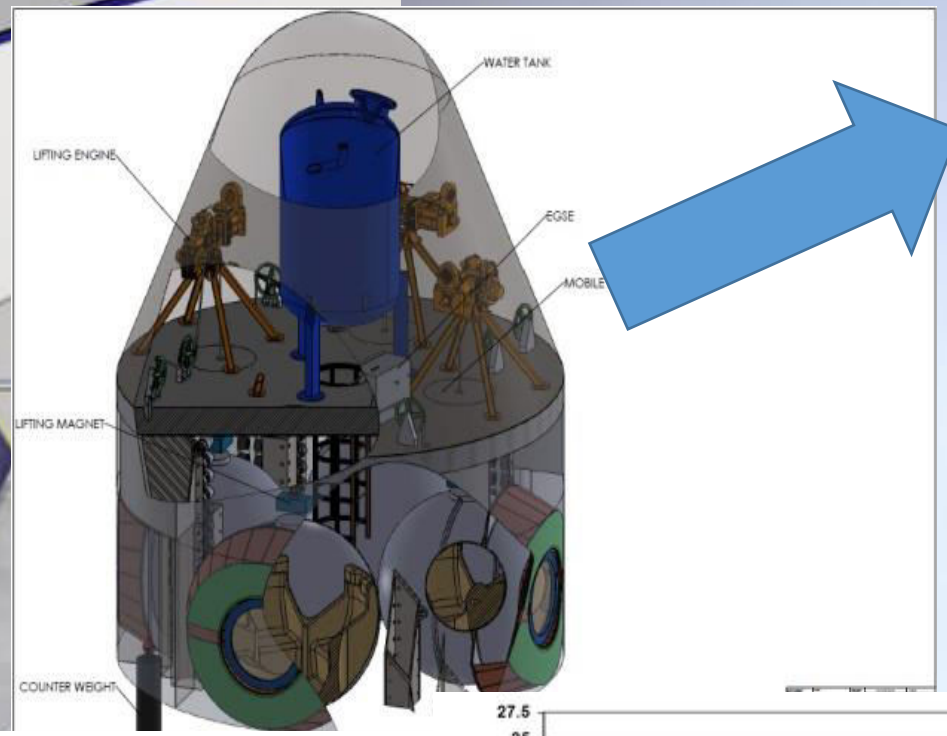
Renewable energies, recycled materials, «near 0» consumption design, *made in Italy* for Moon & Mars

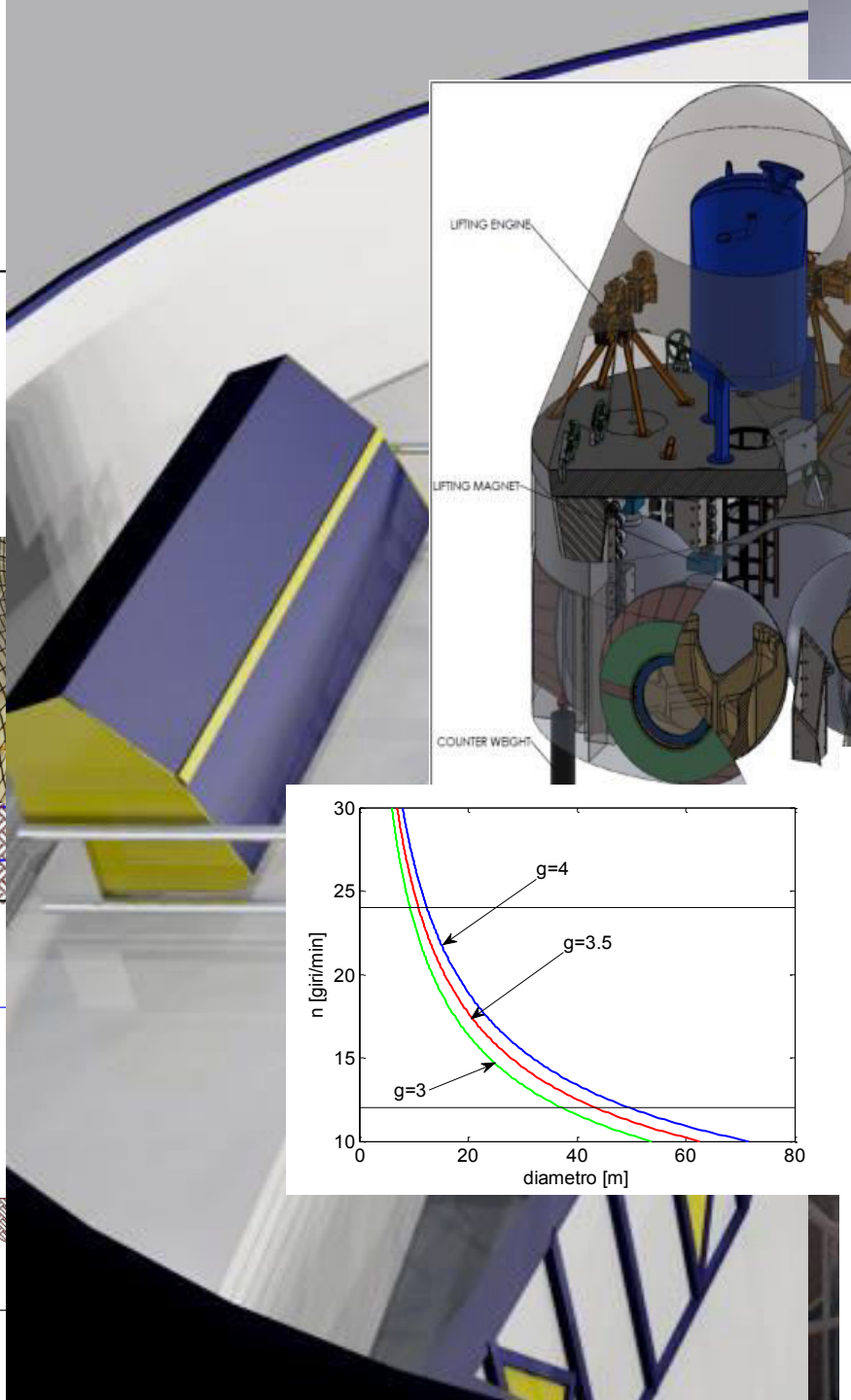


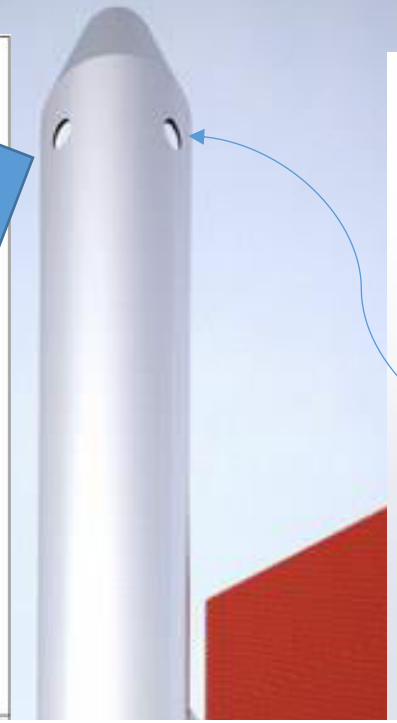
Research, Education & Training open to *anybody*

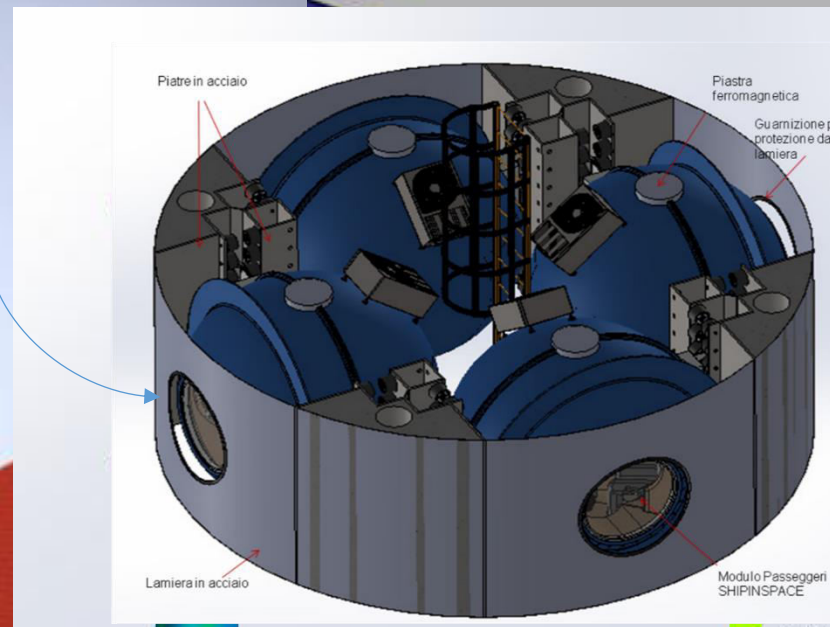
Democratizing the access to *innovation* in *microgravity*:

addressing *planetary exploration* and *Moon-G / Mars-G* educational technological, biomed and scientific R&D programs, creating jobs, spin-off's and fall-back apps to everyday's life, including *edutainment* and *space tourism facilities.*

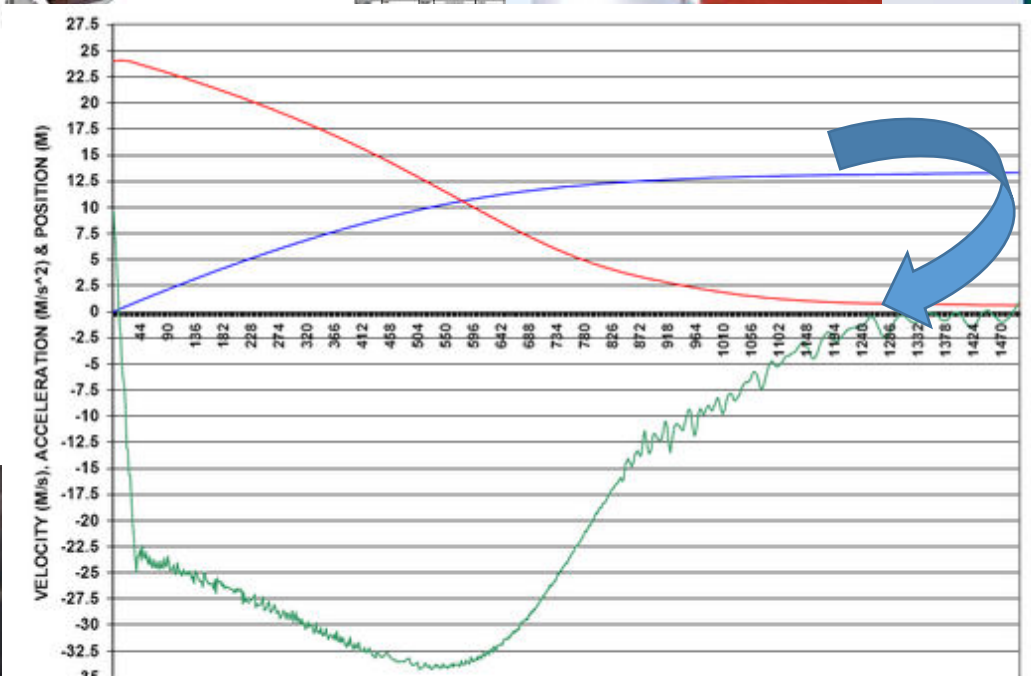

WATER TANK
LIFTING ENGINE
EGSE
MOBILE
LIFTING MAGNET
COUNTER WEIGHT

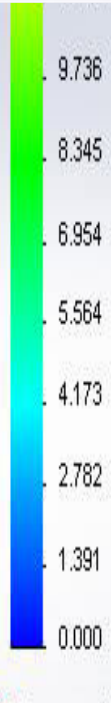





Piatre in acciaio
Piastra ferromagnetica
Lamiera in acciaio
Modulo Passeggeri SHIPINSPACE

g=4
g=3.5
g=3
n [giri/min]
diametro [m]


VELOCITY (M/s), ACCELERATION (M/s^2) & POSITION (M)
Vehicle Position (M)
Vehicle Entry Velocity (M/s)
Acceleration Profile (M/s^2)

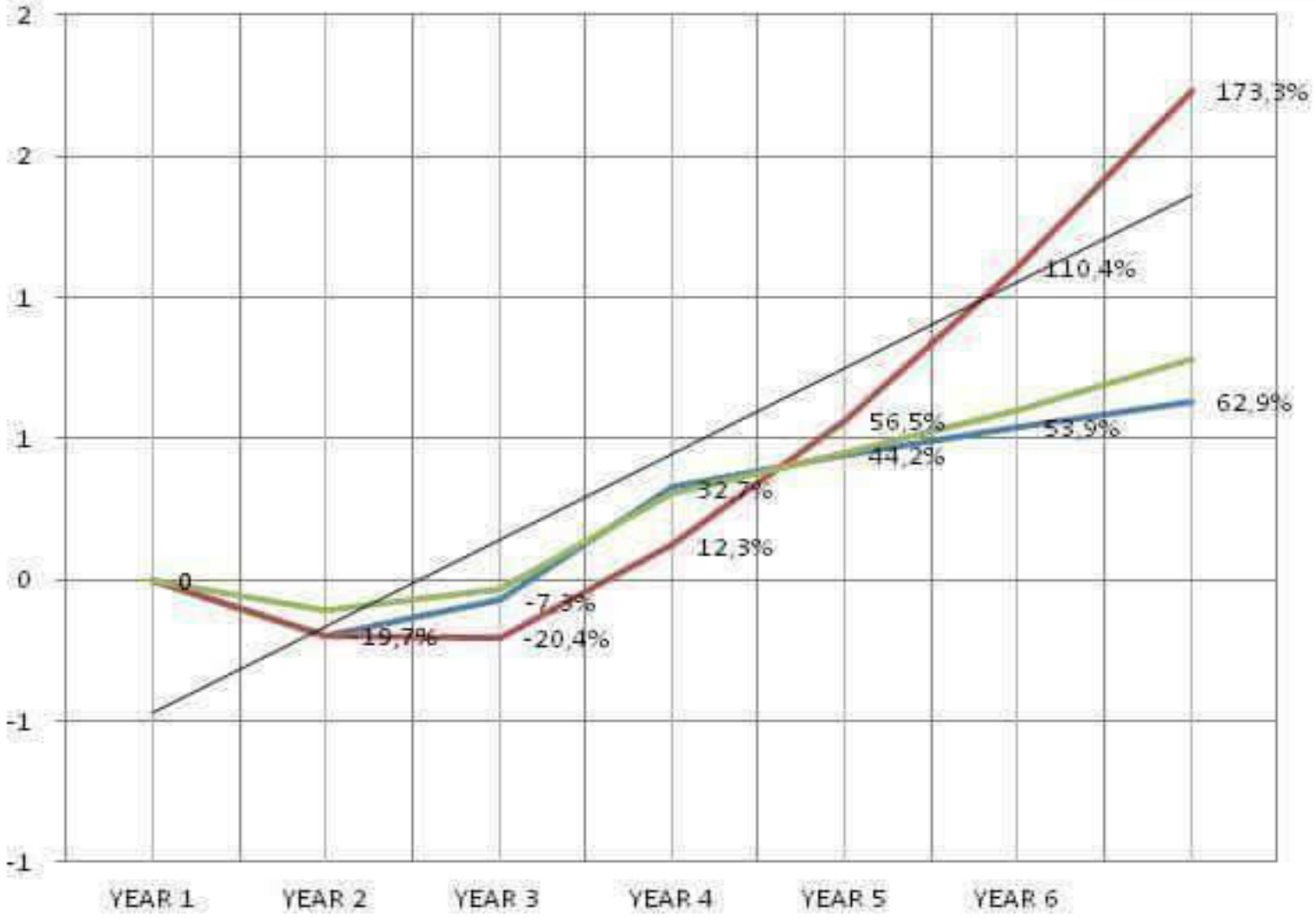

9.736
8.345
6.954
5.564
4.173
2.782
1.391
0.000

SPACELAND

6-year ROE

Every $ invested in *space centers*
brings up to 7 $ into local economy

besides.....



....SpaceLand is **NOT** a *standard* space center,
hardly accessible by the people,

rather, it is an

international Hub for Microgravity R&D

generating a new «Space Economy»

and preparing any African and Asian

for a new future, leading to the Moon and Mars...