



Why space?
Because Earth
depends on it.

Cecilia Hertz, Founder and Managing Director, Umbilical Design
Dream-on workshop, Riksteatern May 27, 2016

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Background



- Umbilical Design was founded 2001
- Focus on design and architecture for space and extreme environments.
- Ongoing cooperation with NASA and ESA.

The Name

Umbilical is a term adopted by the space industry, where an *umbilical* implies the connecting line carrying power, air, water and oxygen between a launch pad gantry and a launch vehicle, or between an astronaut and his/her spacecraft, etc.



Application Areas



Umbilical Design works in three application areas;

Space Solutions, Extreme Environments and Everyday Life



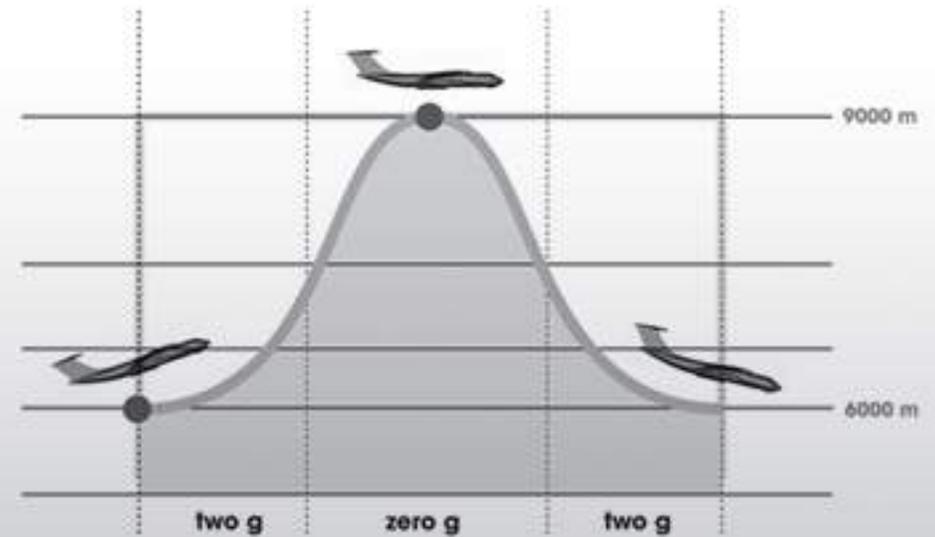
Crew Return Vehicle CRV
In cooperation with NASA and ESA

Task

”To produce and visualize solutions for an interior layout of the CRV cabin, that support and ensure a psychologically and physically safe trip from the ISS back to earth.”

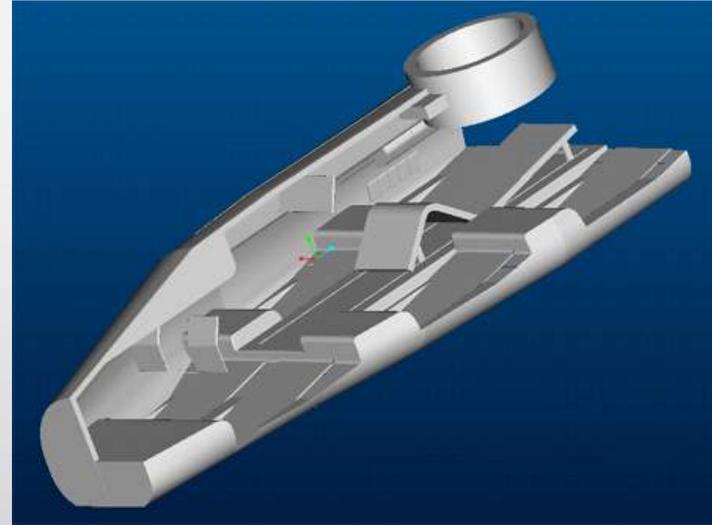


Tests in weightlessness



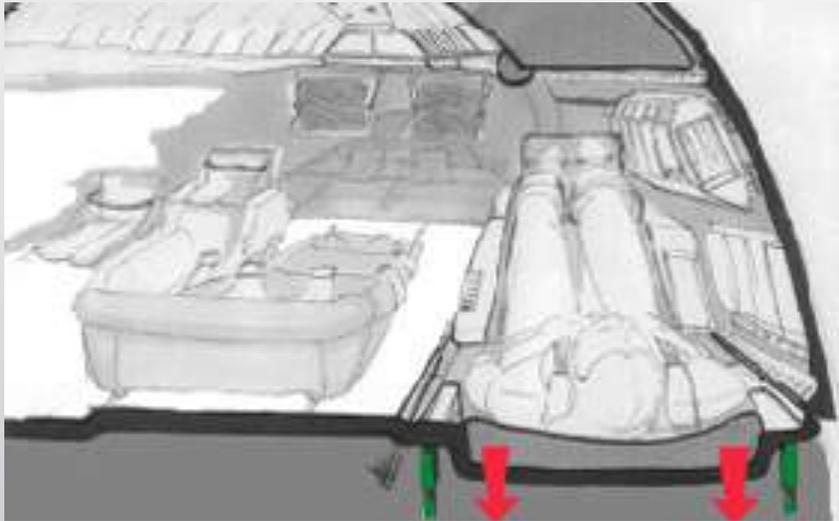
The project was selected as one of 30 to participate in ESA's Parabolic Flight Campaign in Bordeaux, France

Design Level #1



Concept and configuration of the CRV cabin

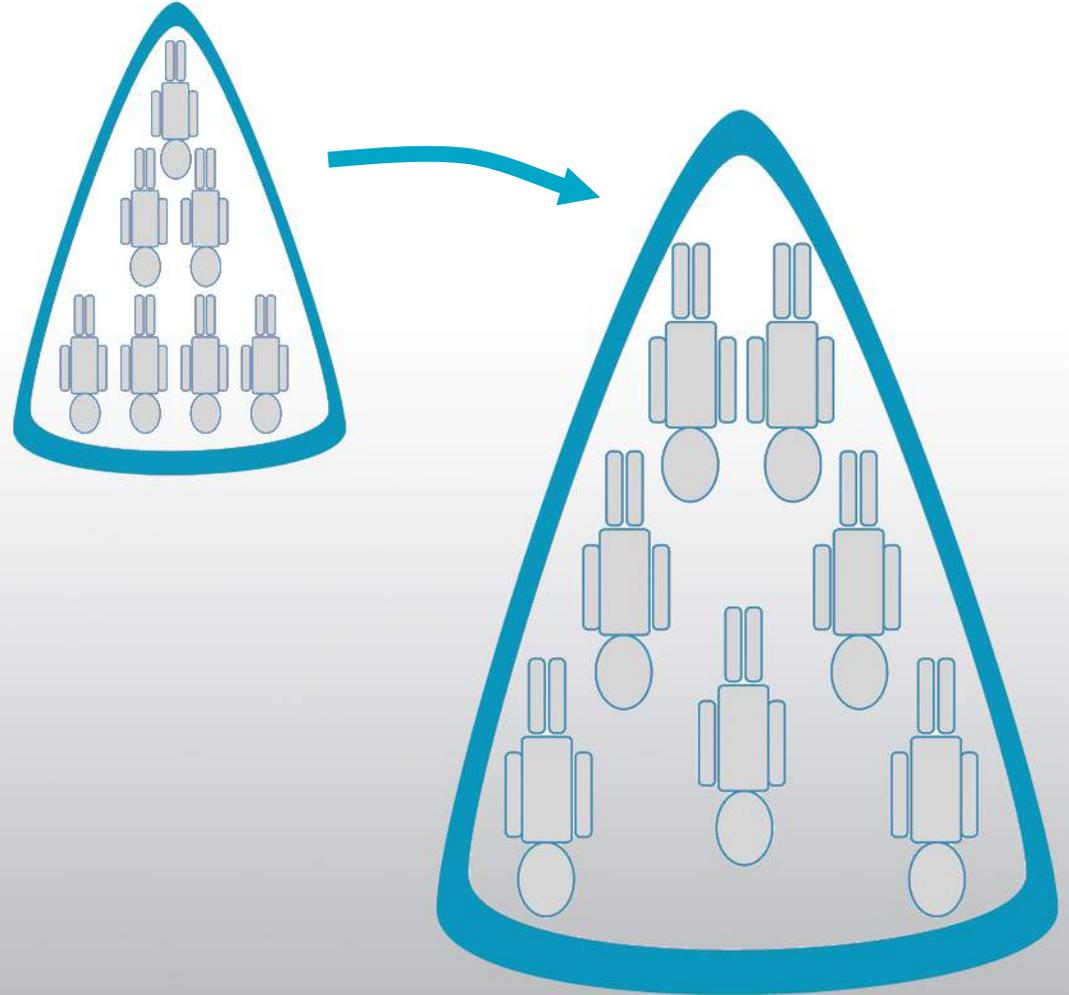
Design Level #3



Functionality design of the products inside the CRV cabin

Collaborations with astronauts





Result

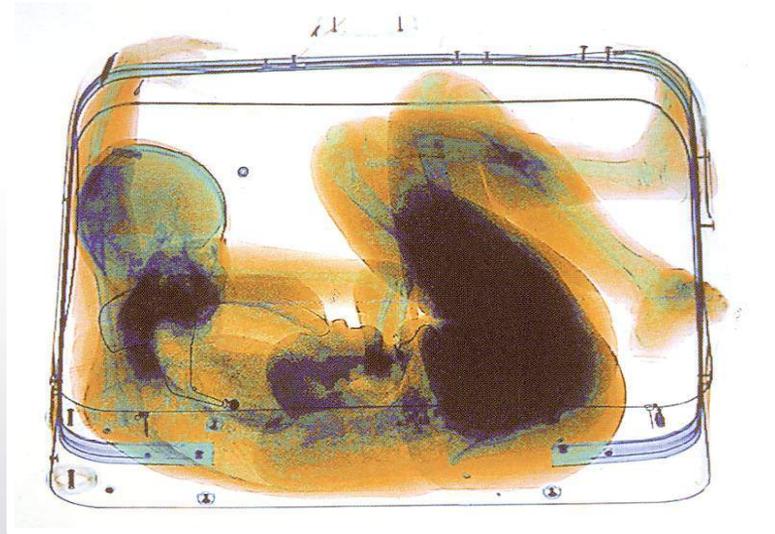
- Decreased weight
- Better volume management
- Easier to ingress & egress
- Increased comfort & safety



Goal

To put Sweden on the international space design scene

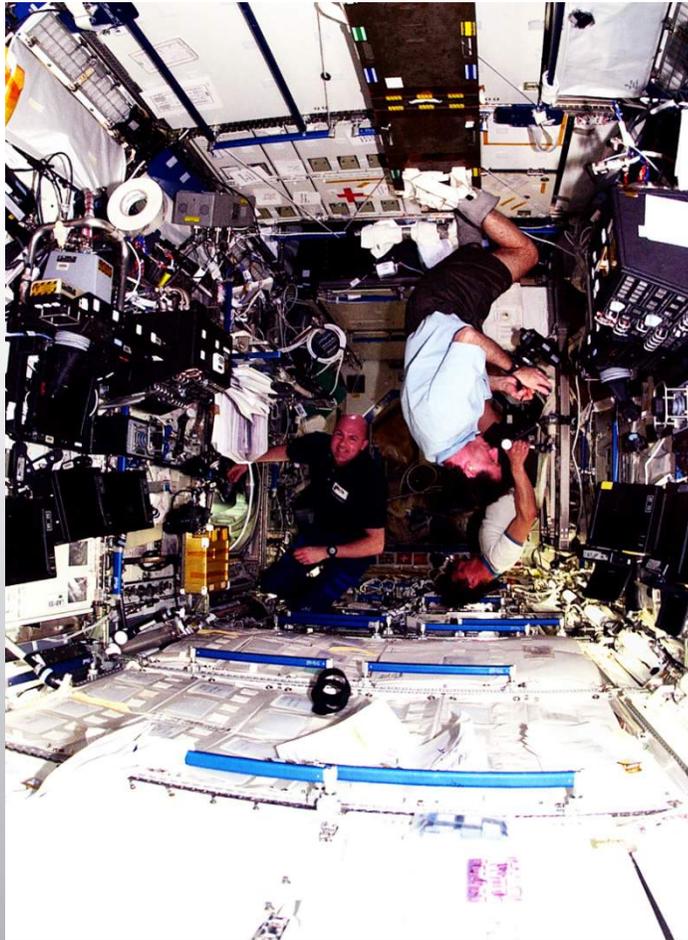


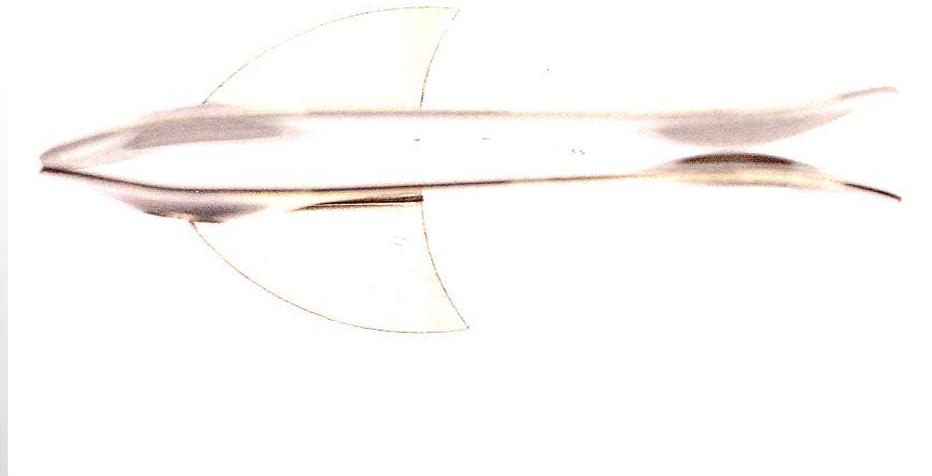


Volume Management

Space Environments – Unique Solutions

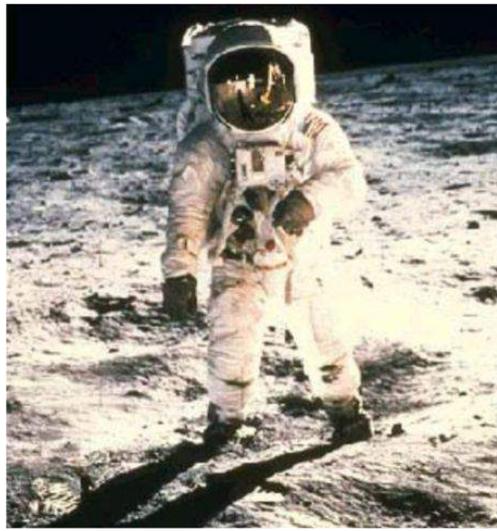
Living and working in enclosed environments





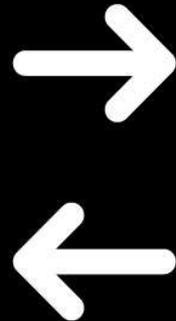
Weightless Thinking

Space Environments – Unique Solutions



Space suits

Our new homes?



Terrestrial Applications

Umbilical Design's **major business area is Space Technology Transfer**, where we've been active since 2004 and represent Sweden in ESA **Technology Transfer Network**.

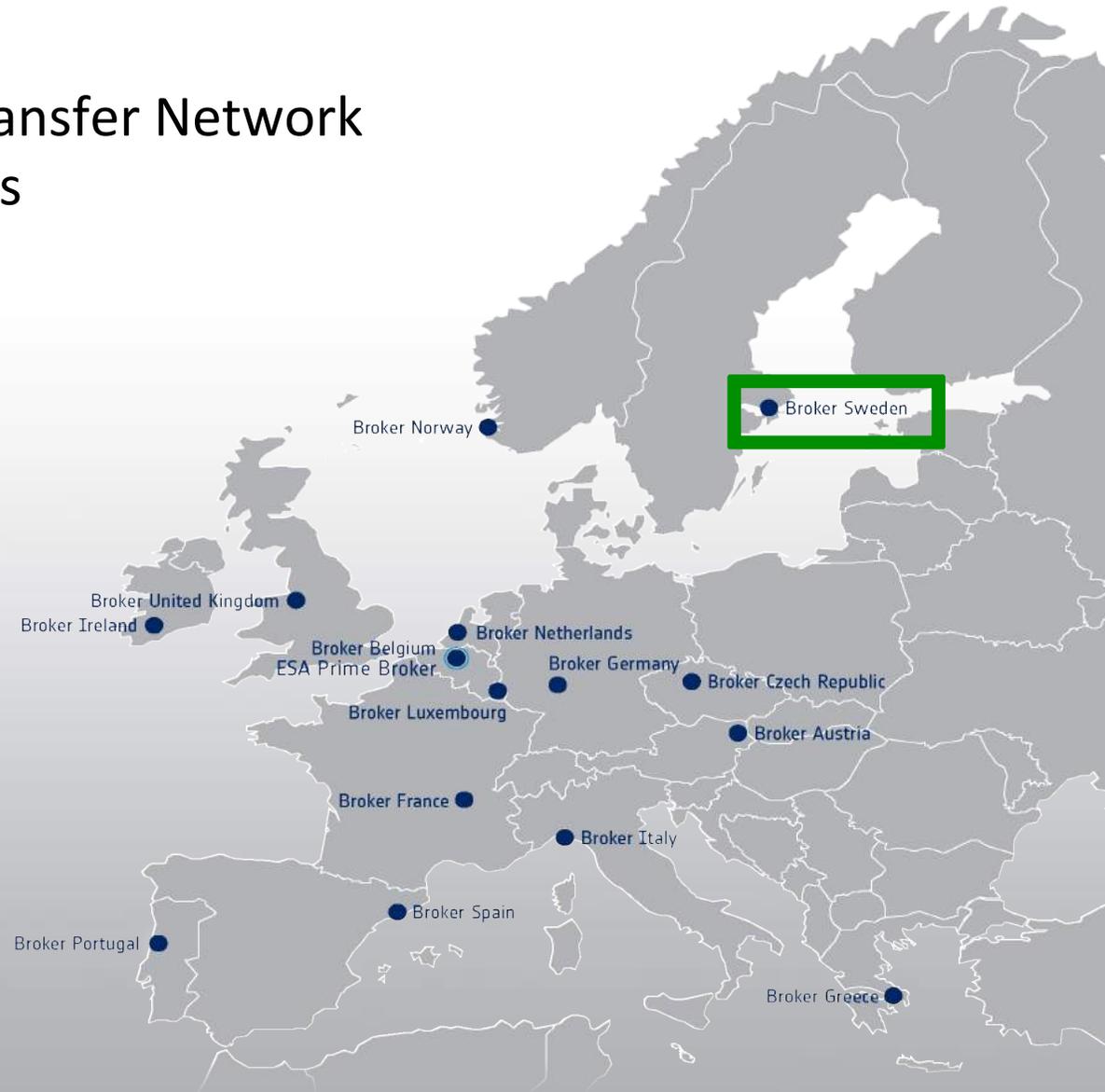
We are developing a national platform to transfer materials, technologies and concepts from the space industry to commercial and industrial applications.

In our major project – the Down to Earth project we focus on companies willing to **develop and launch sustainable products incorporating space technologies**, which can be used as competitive advantages on a global market

ESA BROKER NETWORK

ESA Technology Transfer Network
Across 15 Countries

20 Transfers
per year



UMBILICAL DESIGN

ESA Broker, Stockholm, Sweden

EXTREME SAILING SUIT

Materials from the Mars Rovers tires were transferred to a sailing suit for extreme sailing.



Couture in Orbit – From spacewalk to catwalk

A project in cooperation between ESA and the Science Museum in London





Between 2014 and 2016, five ESA astronauts from the UK, France, Italy, Denmark and Germany are visiting the International Space Station

To mark the missions, the project: "Couture in Orbit" was initiated



Material "Shape memory alloys" (SMAs)

that returns to its original shape at a pre-programmed temperature

Colours of Earth - Fashion inspired by space

The Great Salt Lake seen from the International Space Station
Artificial pools, where water is evaporated to extract minerals



Photo taken by ESA astronaut Alexander Gerst during mission 2014

CONTROL ROOM - FIELDVISIT – STEEL INDUSTRY



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ESA Broker, Stockholm, Sweden



THUNDERWEAR

SPACE TECHNOLOGY

Space fabric used in astronaut clothing, which can resist heat up to 350C.

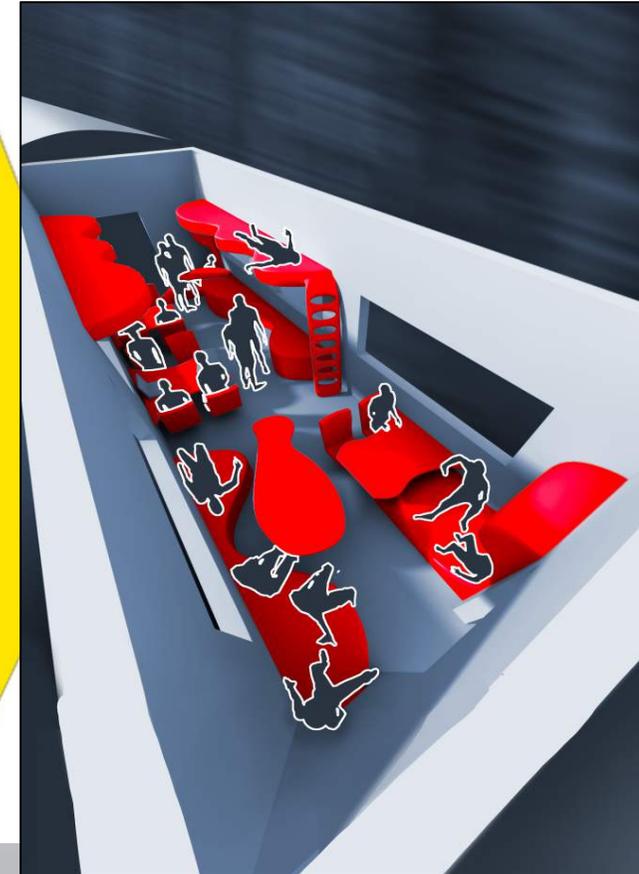
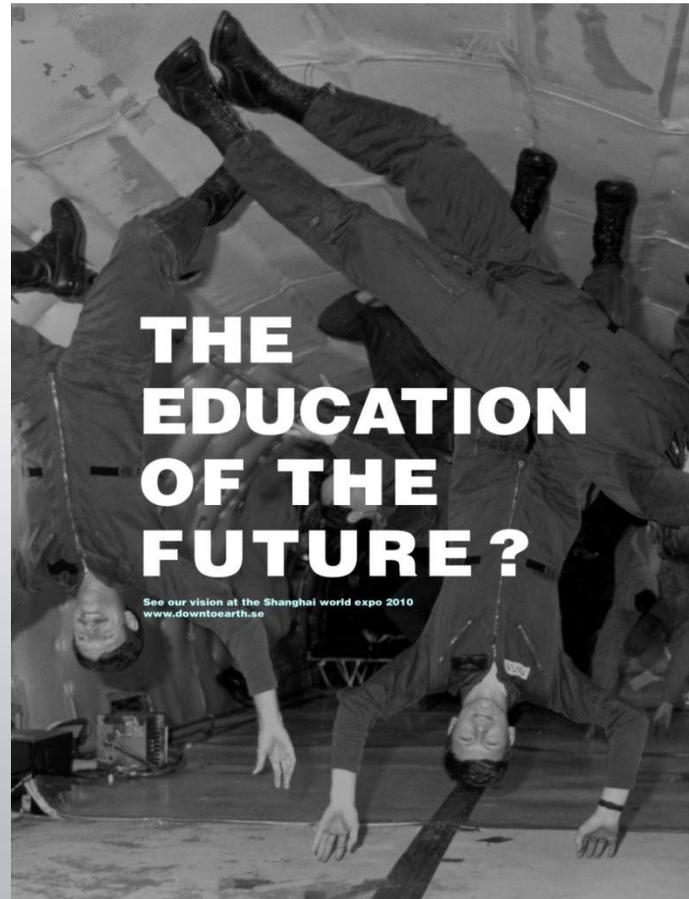
BENEFIT FOR PLANET EARTH

- Protects steel workers from burns and scars;
- No coating, the fiber of the material is resisting heat in itself;
- Biodegradable



Client case: TRAINing for Academedia

Challenge: “The education of the future”, **Concept:** TRAINing, **Client:** Academedia



“New learning environments are needed and as TRAINing uses the train, journey as a basis for learning, the concept helps us explore what a school can be in the future”

TRAINing

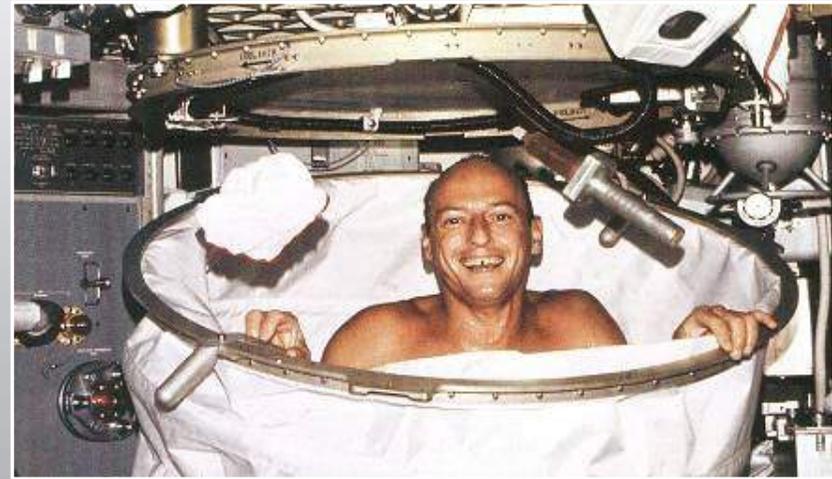
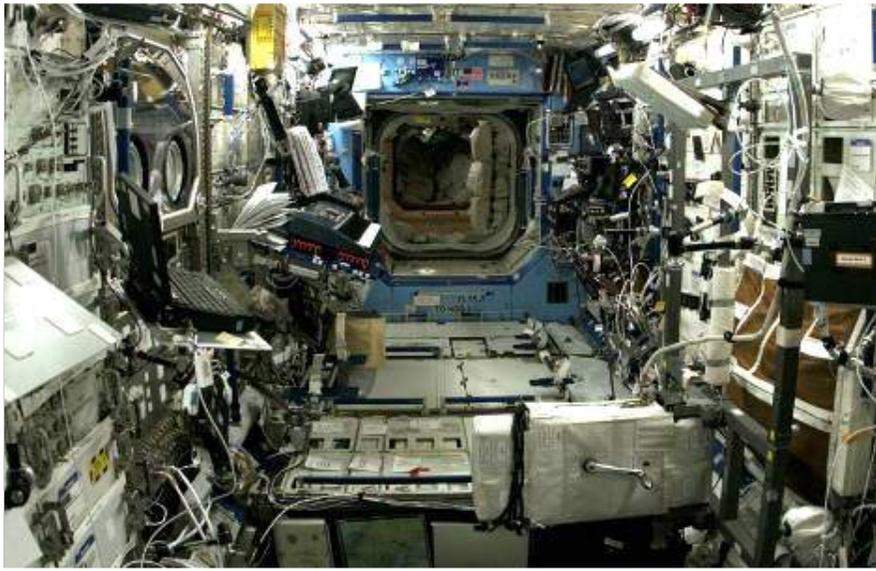
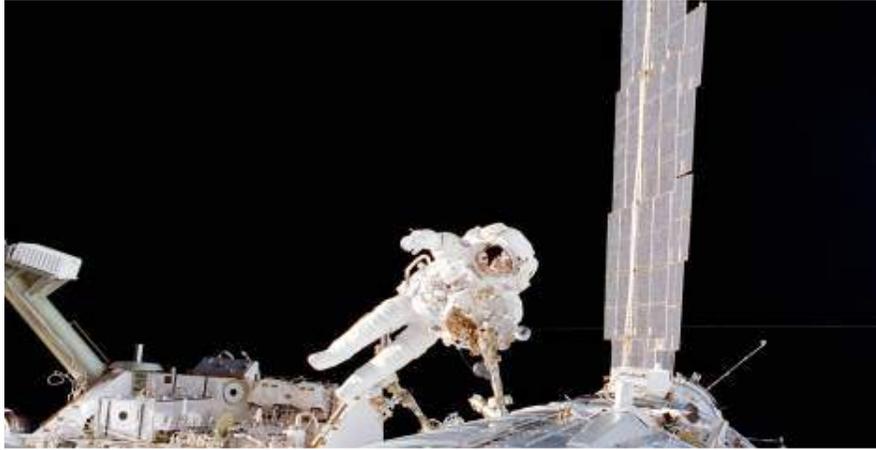
- A new learning environment using existing infrastructure

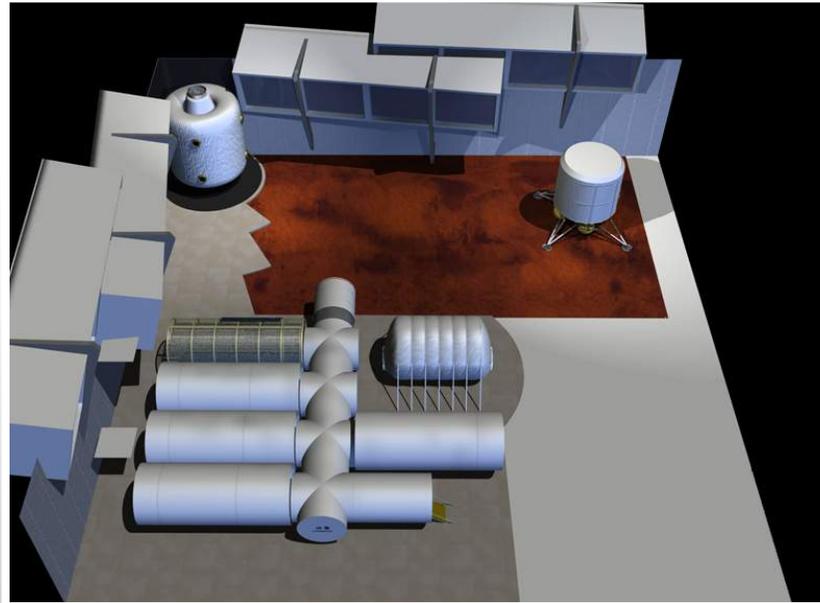
80 students travelling from Shanghai to Helsinki,
project values: exploration, knowledge, innovation





Space Realism





AIM Advanced Integration Matrix







Mega cities







Sustainability Base, NASA Ames

Space material Aerogel

Environmentally harmless and recyclable



ESA Moon Village by 2030 - an international lunar base

3D printing on the Moon

Turn lunar soil into construction blocks



© ESA/Foster and Partners

Reflections





Cross-fertilization and team work

Why not



Thank you!

Swedish astronaut **Christer Fuglesang** during EVA on STS-128

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