



Finns lösningarna till ett hållbart samhälle i rymden?

Umbilical Design - ESA Technology Transfer Broker Sweden
Cecilia Hertz, Founder and Managing Director Umbilical Design

REG LAB, Västerås, 27 mars 2019

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



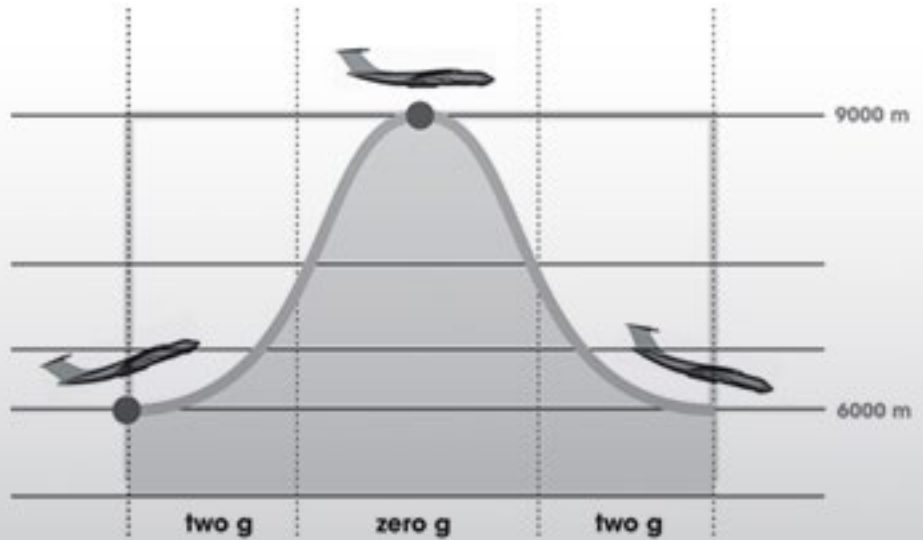
Crew Return Vehicle CRV
In cooperation with NASA and ESA

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."

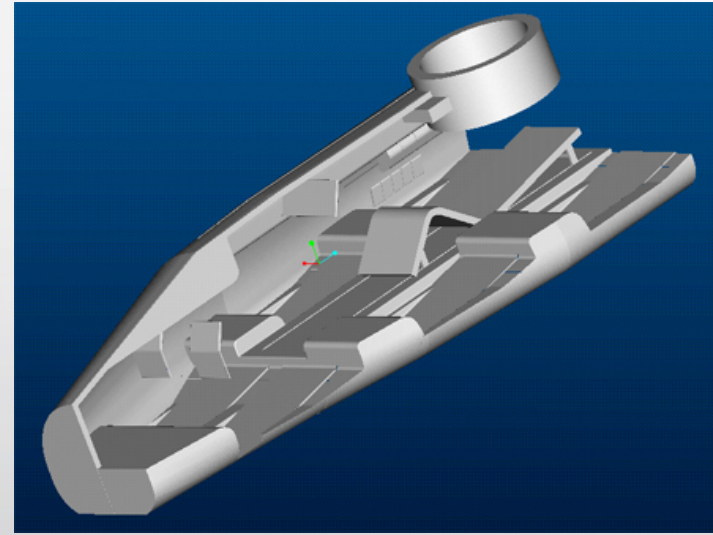


Tests in weightlessness



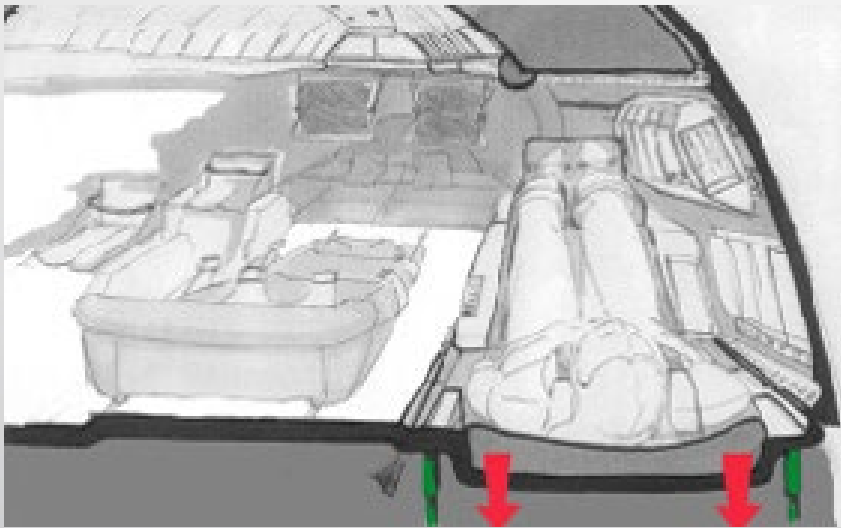
The project was selected as one of 30 to participate in ESA's Parabolic Flight Campaign in Bordeaux, France

Design Level #1



Concept and configuration of the CRV cabin

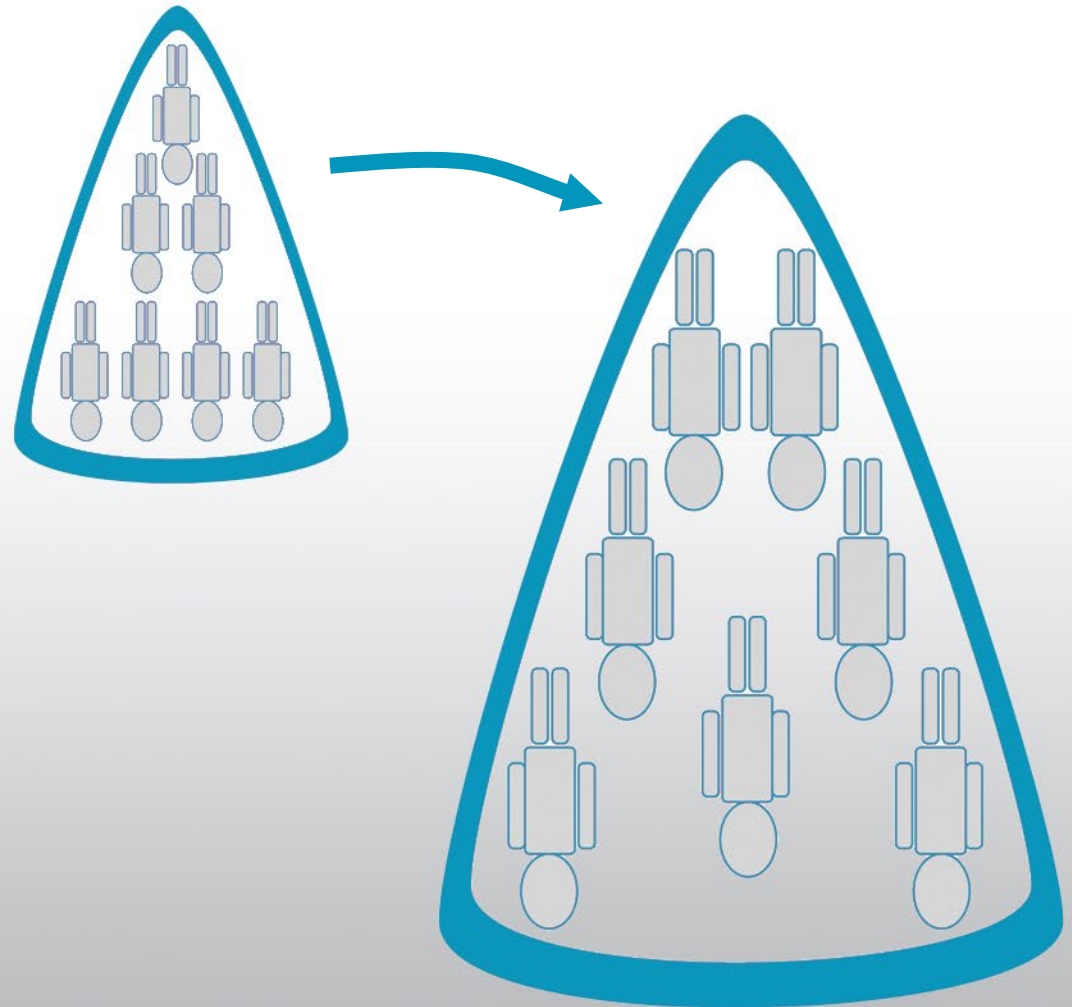
Design Level #3



Functionality design of the products inside the CRV cabin

Collaborations with astronauts





Result

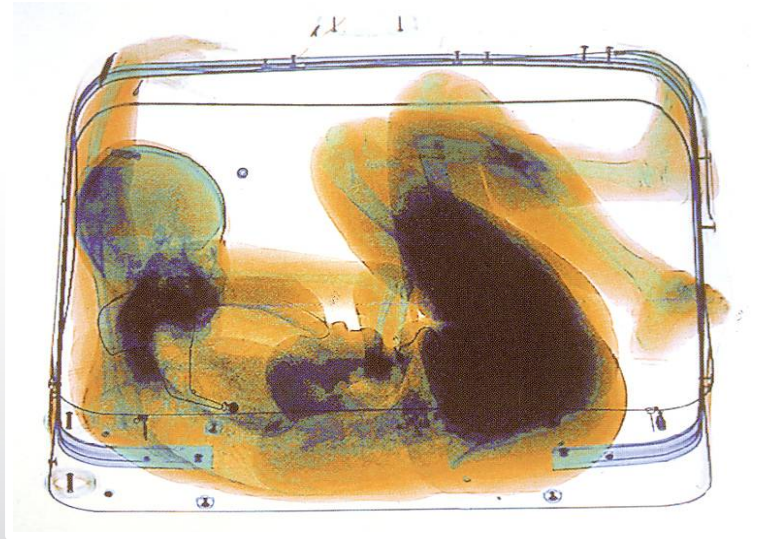
- Decreased weight
- Better volume management
- Easier to ingress & egress
- Increased comfort & safety



Goal

To put Sweden on the international space design scene

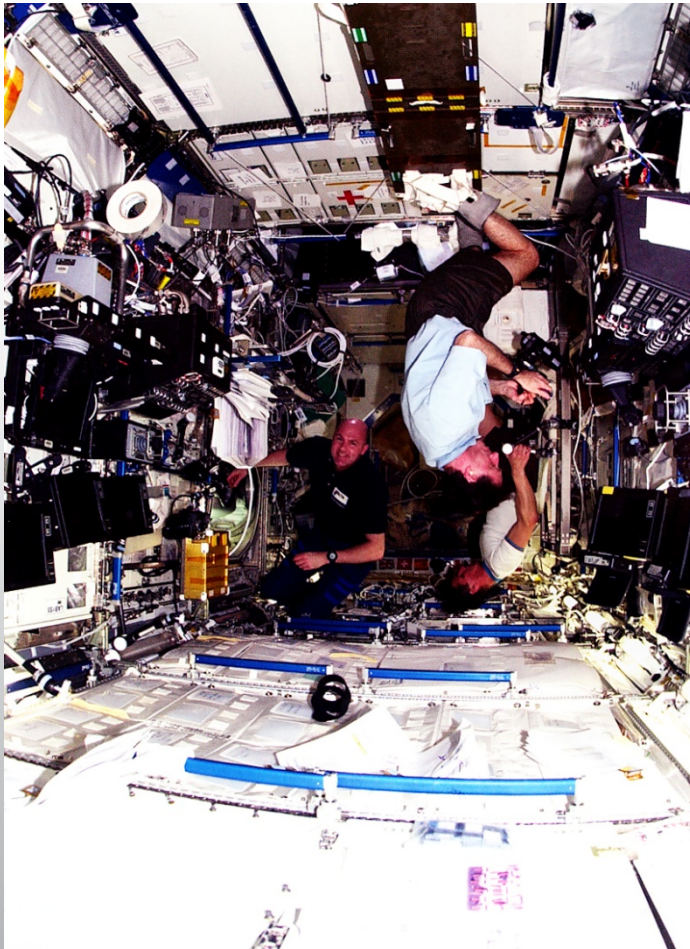


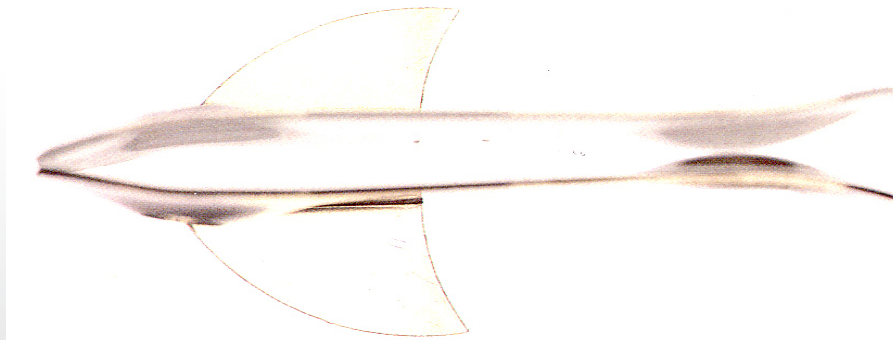


Volume Management

Space Environments – Unique Solutions

Living and working in enclosed environments





Weightless Thinking

Space Environments – Unique Solutions



Space suits

Our new homes?



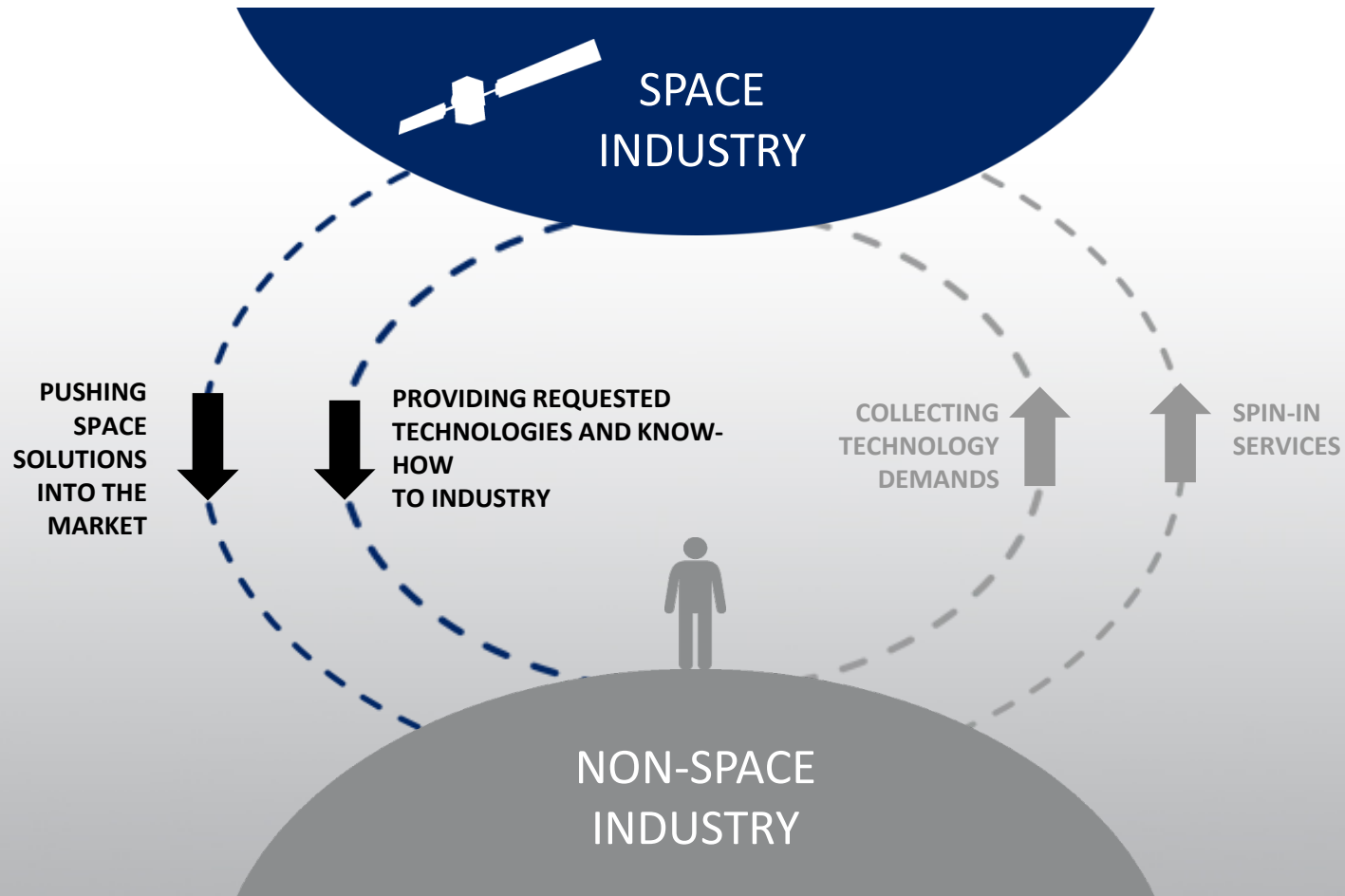
Terrestrial Applications

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.

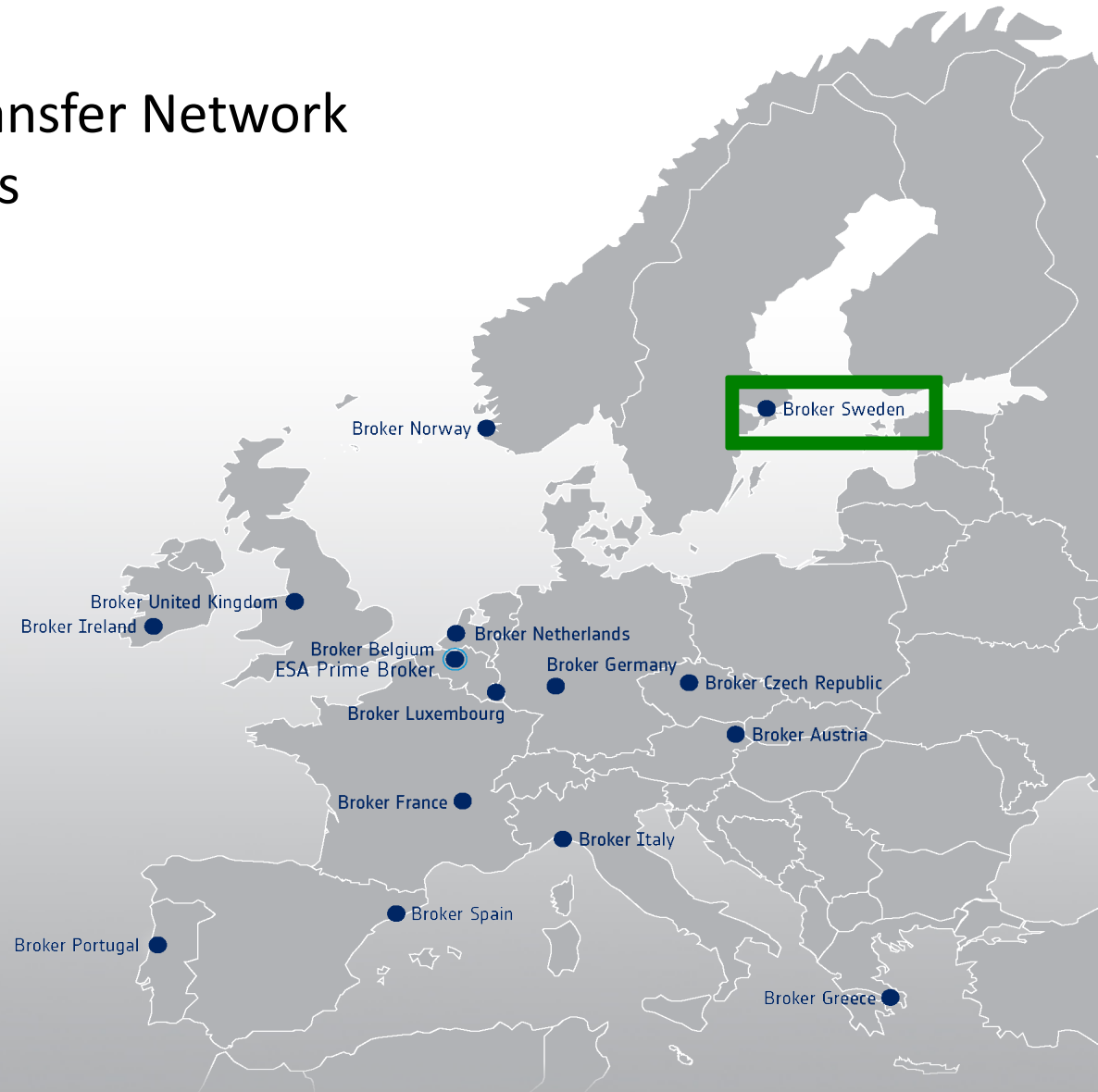
In our major project – the Down to Earth project we focus on companies willing to **develop and launch sustainable products incorporating space technologies**, which can be used as competitive advantages on a global market

TECHNOLOGY TRANSFER



ESA BROKER NETWORK

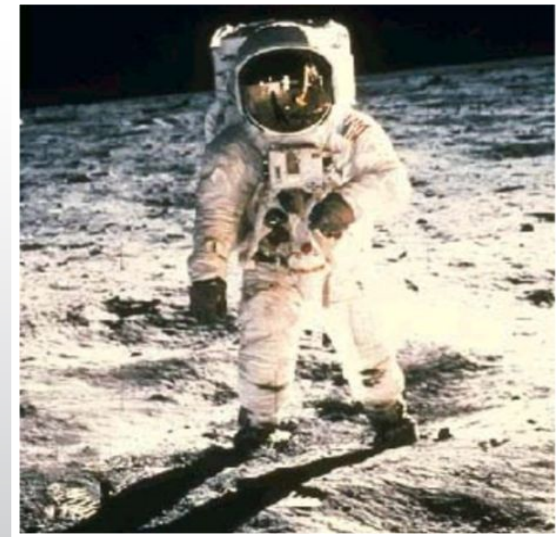
ESA Technology Transfer Network Across 16 Countries



What's so special with aerospace materials and technologies?

Climate in space sets high demands on materials and technical solutions;

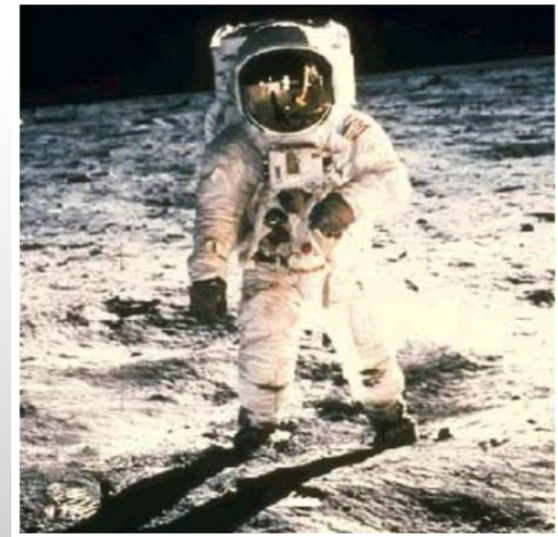
- Extreme changes in temperature
- Blending sunlight
- Low gravity
- Strong winds
- Radiation
- Heavy vibrations during launch
- Micro meteorites



The materials and technologies
have qualities like ..

- Low weight
- Strength
- Durability
- Reliability
- Low sensitivity to changes in temperature
- Low sensitivity to radiation
- Low sensitivity to corrosion

.. which can be used as competitive
advantages in commercial products!



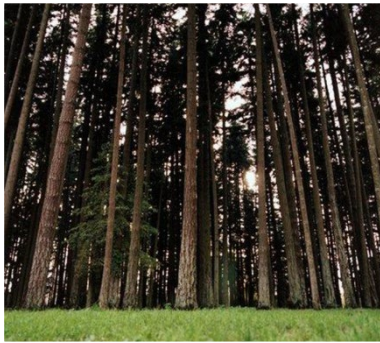
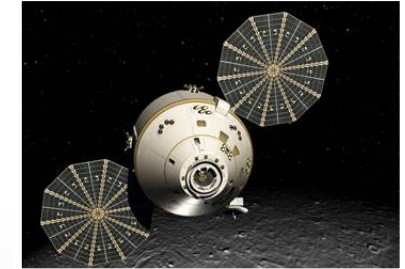
... as well as the human factor





Non-space sector

Space materials, technologies and concepts transferred



Revitalizing the forest industry with space technology



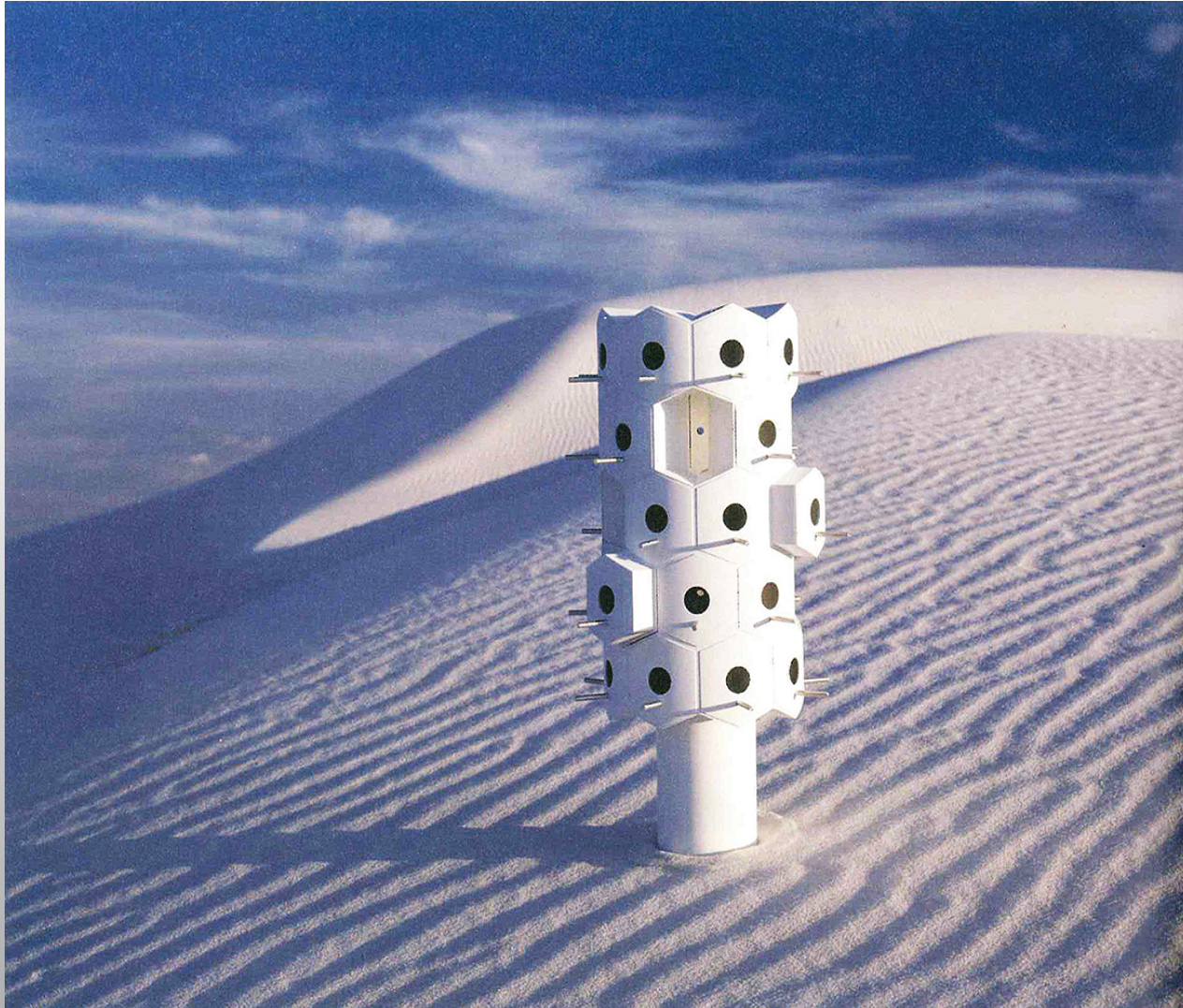
Fabrics from the space and aero industry were transferred to industrial protective clothing



Technologies for insulation and life support systems were transferred to future house concepts

BIRDHOUSE PROJECT Japan

SEASCRAPER - FUTURE LIVING CONCEPT



Space vs. Karolinska University Hospital



CONTROL ROOM - FIELDVISIT – STEEL INDUSTRY



UMBILICAL DESIGN

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

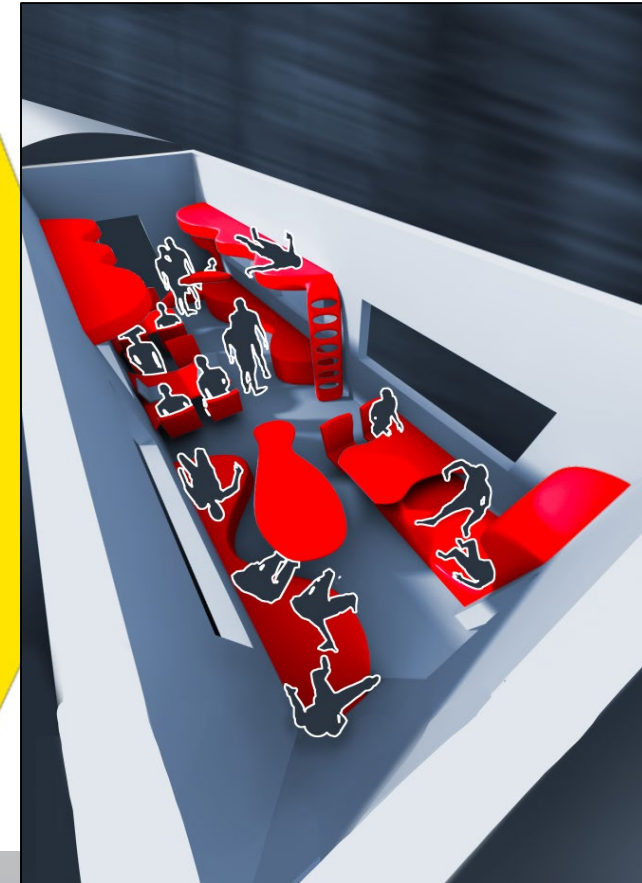
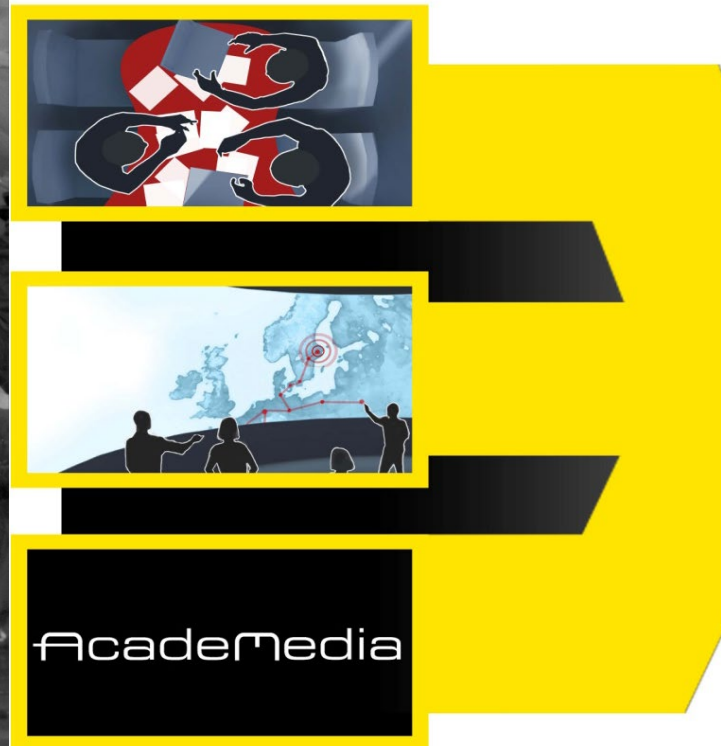


BRANDING WITH BRANSON



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”

Space Innovation Module, Shanghai World Expo 2010



Module characteristics

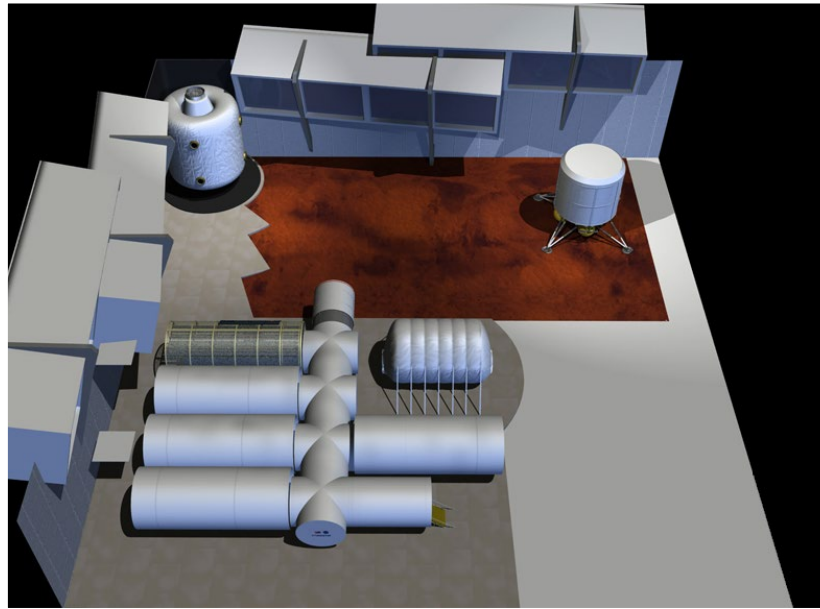
- 2.7 m high, 1 m diameter (1:4 of a space station living cell)
- Contains process description and physical visualizations of the process
- Computer screens on sides shows films with visualized concepts from innovation processes

TRAINing

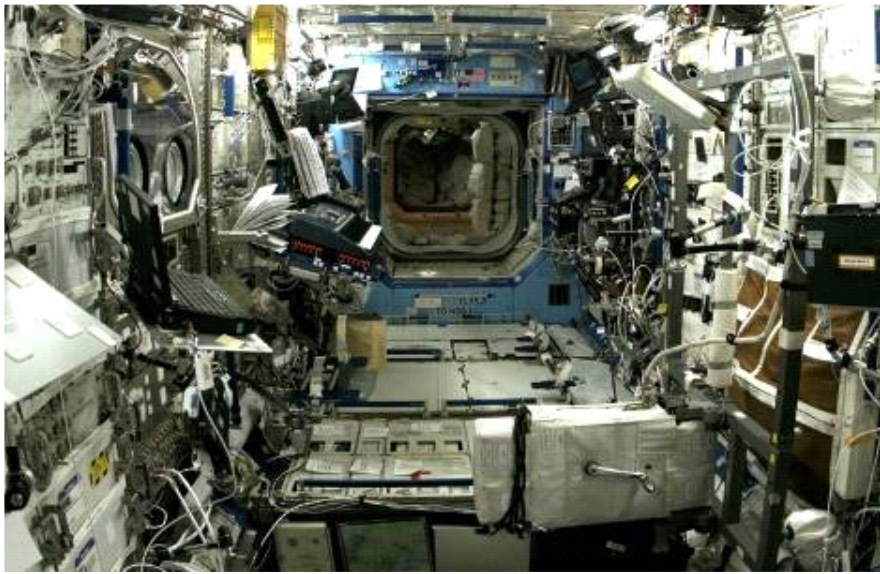
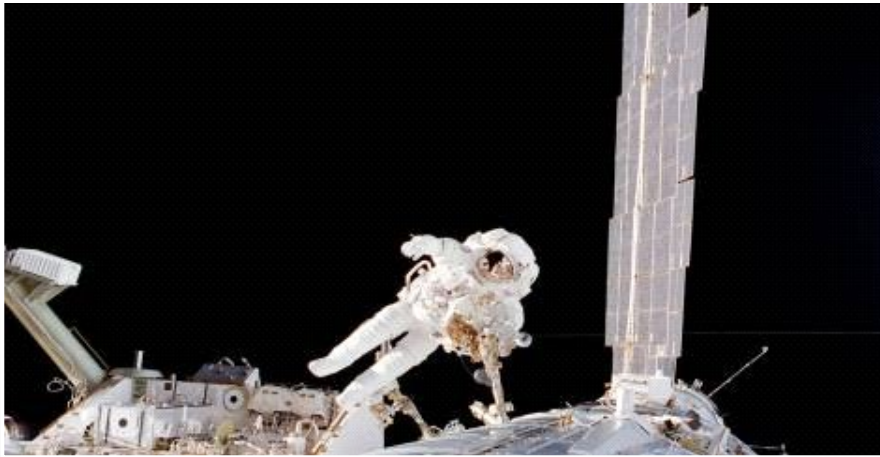
- A new learning environment using existing infrastructure

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





AIM Advanced Integration Matrix







URBANISATION

2/3 of our planet's population will live in cities by 2050



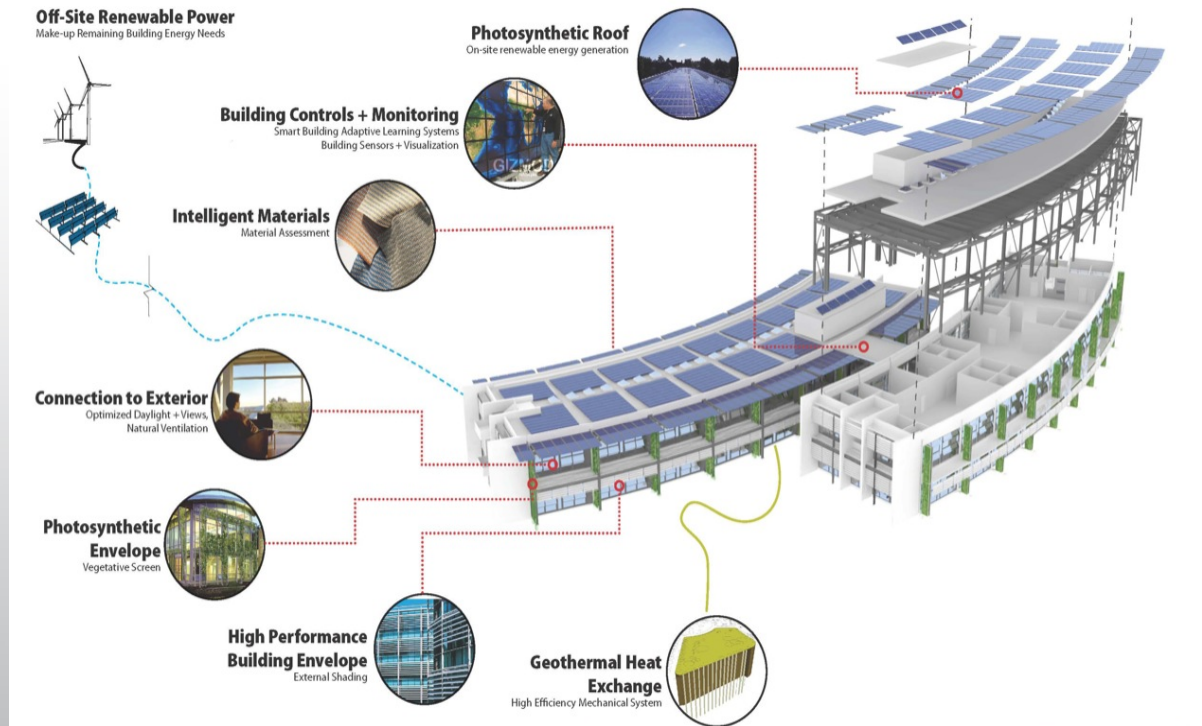
ESA ROUNDTABLE SWEDEN

ESA Roundtable, co-organised by ESA and Umbilical Design. Participants from 6 countries in the space and non-space sector sharing insights on Sustainable Development.





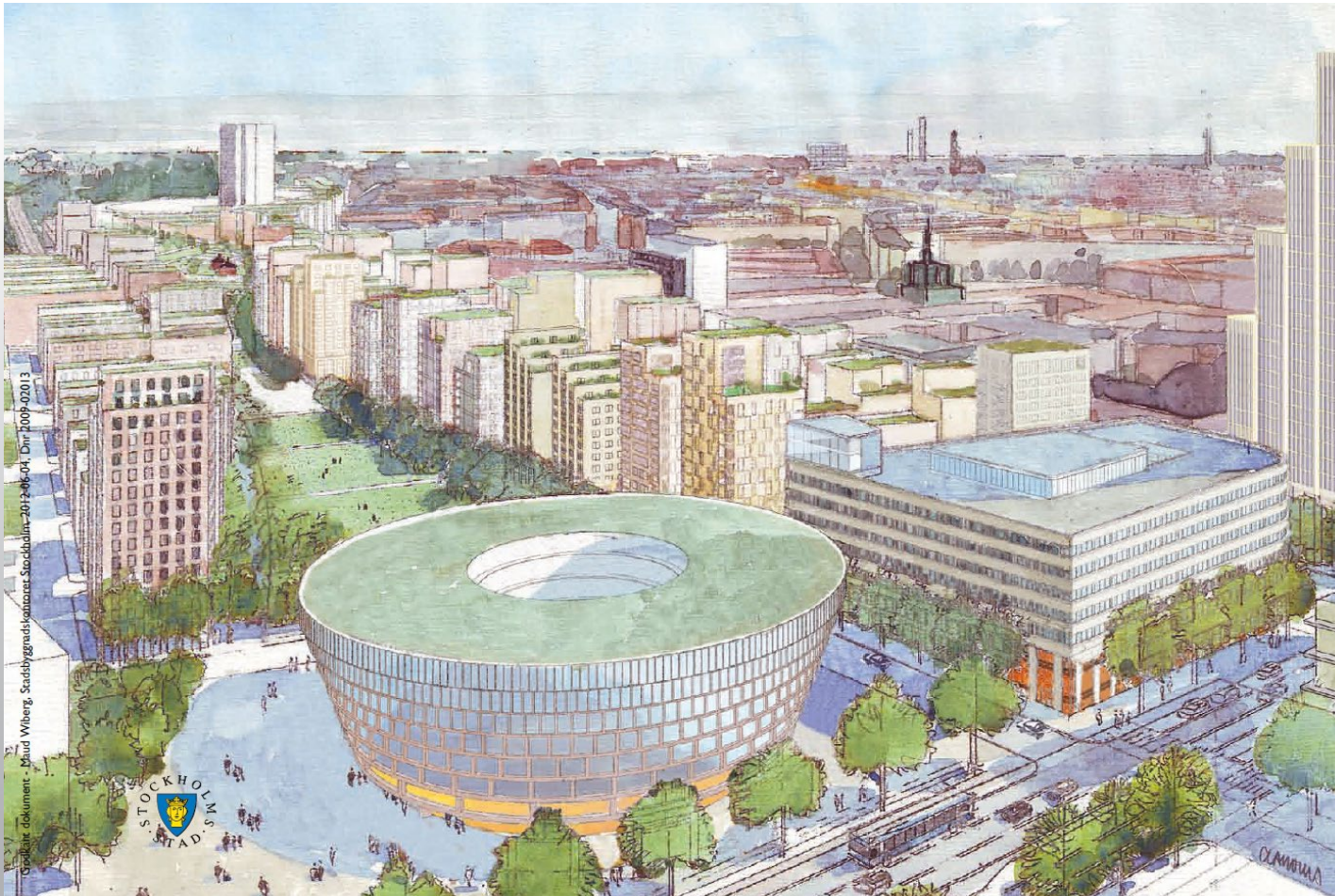
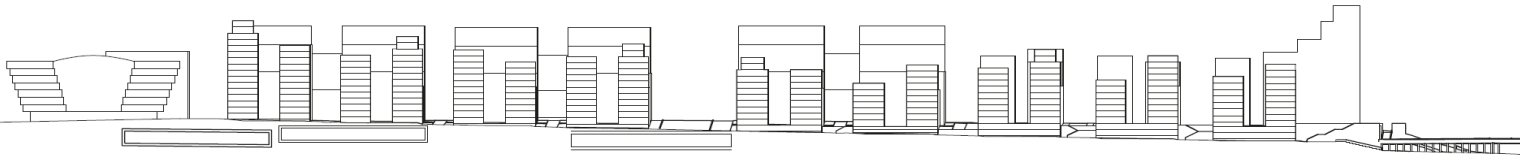
NASA AMES SUSTAINABILITY BASE





Sustainability Base, NASA Ames

CHRISTER FUGLESANG SPACE CENTER



ASTROCITY

– a project we initiated with Swedish space companies and the property company Humlegården to explore how we can integrate space technologies in their existing buildings and in the planned CFSC building.

Partly funded by Environmental Protection Agency

APR Technology

Ochno

Svenska Aerogel

Sally-R

Orbital Systems

Space material Aerogel

Environmentally harmless and recyclable



Space Impact workshop

- Lund, March 20-22 2017
- Part of biannual ESA meeting where all ESA BIC (Business Incubation centres) and ESA Technology Transfer Brokers from 16 countries meet to network and exchange knowledge.
- 100 people working together - 10 Companies, like Eon and Skanska contributed with challenges on the theme, the Sustainable City





ESA Moon Village by 2030 - an international lunar base

3D printing on the Moon

Turn lunar soil into construction blocks



© ESA/Foster and Partners

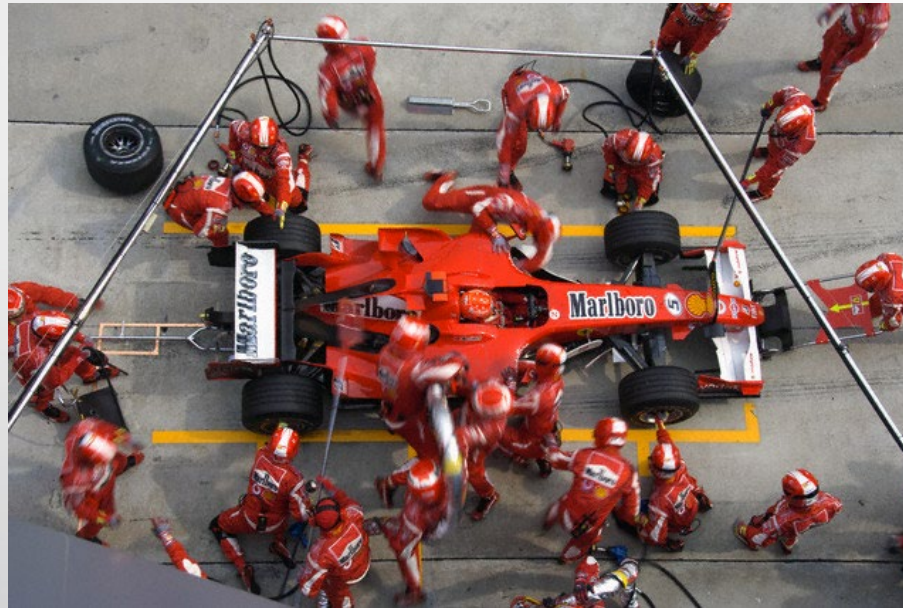
Reflections











Cross-fertilization and team work

***“Design is color, form, function, ergonomics, interaction [..]
But it’s also to refrain”***

Jan Ahlin

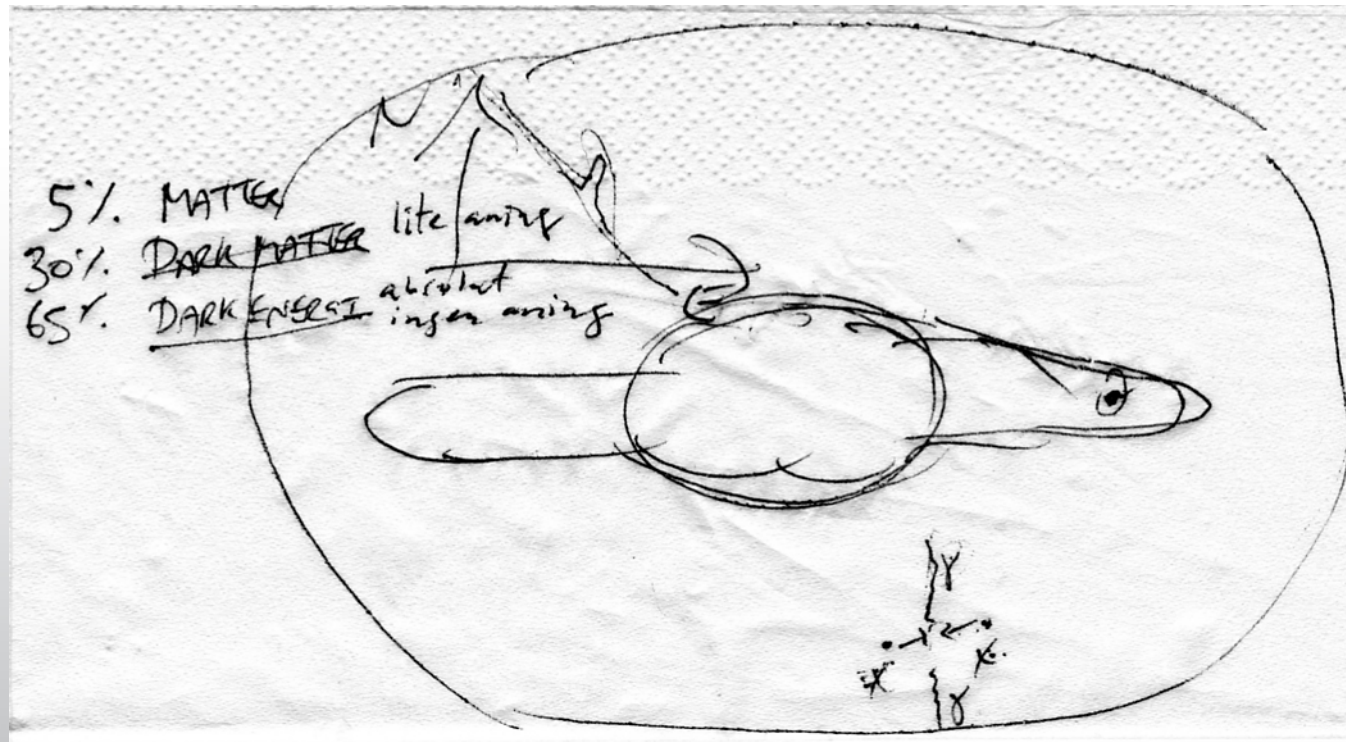
Former professor at Lund Institute of Technology, Sweden



Challenge your clients



It takes courage



Why not



Thank you!

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