



Post ISS

Study Idea:

- Carry out research based on two questions:
 - What concepts do exist, i.e. what are current and future (10-30 years) plans?
 - Aside from space station operation, what could be done in 10 to 30 years?

Results:

- All evaluated projects highly linked to development and strong use of robotics
- Moon or asteroids are most promising targets for future, leaving LEO and exploring deep space
- Three scenarios ranked best:
 - Moon prepared ATV (resupply/base)
 - Obtain resources on Moon for inflatable moonbase
 - Search for traces of life on an asteroid



Ideas	Trade-off	Ranking										Weight	Score	Weighted Sum
		1	2	3	4	5	6	7	8	9	10			
Commercialize spaceflight	10	5	10	10	10	10	10	10	10	10	10	5	16	17
(Modular) heavy lift launcher	10	5	5	5	5	5	5	5	5	5	5	5	7	8
Earth protection from asteroids	0	5	5	5	5	5	5	5	5	5	5	5	8	8
Partnership with other nations	5	10	10	10	10	10	10	10	10	10	10	10	12	13
Alternative of ISS	5	5	5	5	5	5	5	5	5	5	5	5	8	8.5
Europe's next astronaut	0	10	10	10	10	10	10	10	10	10	10	10	14	14.5
Power system	5	5	5	5	5	5	5	5	5	5	5	5	8	8.5
Get energy from space debris	0	0	5	5	5	5	5	5	5	5	5	5	6	6.5
Shuttle lifecycle in space	0	10	10	10	10	10	10	10	10	10	10	10	12	13
Go to another orbit	0	5	5	5	5	5	5	5	5	5	5	5	4	4.5
Weight	1	0.5	1.5	0.5	1	1.5	1	1.5	1	1.5	0.5			

HELIOS

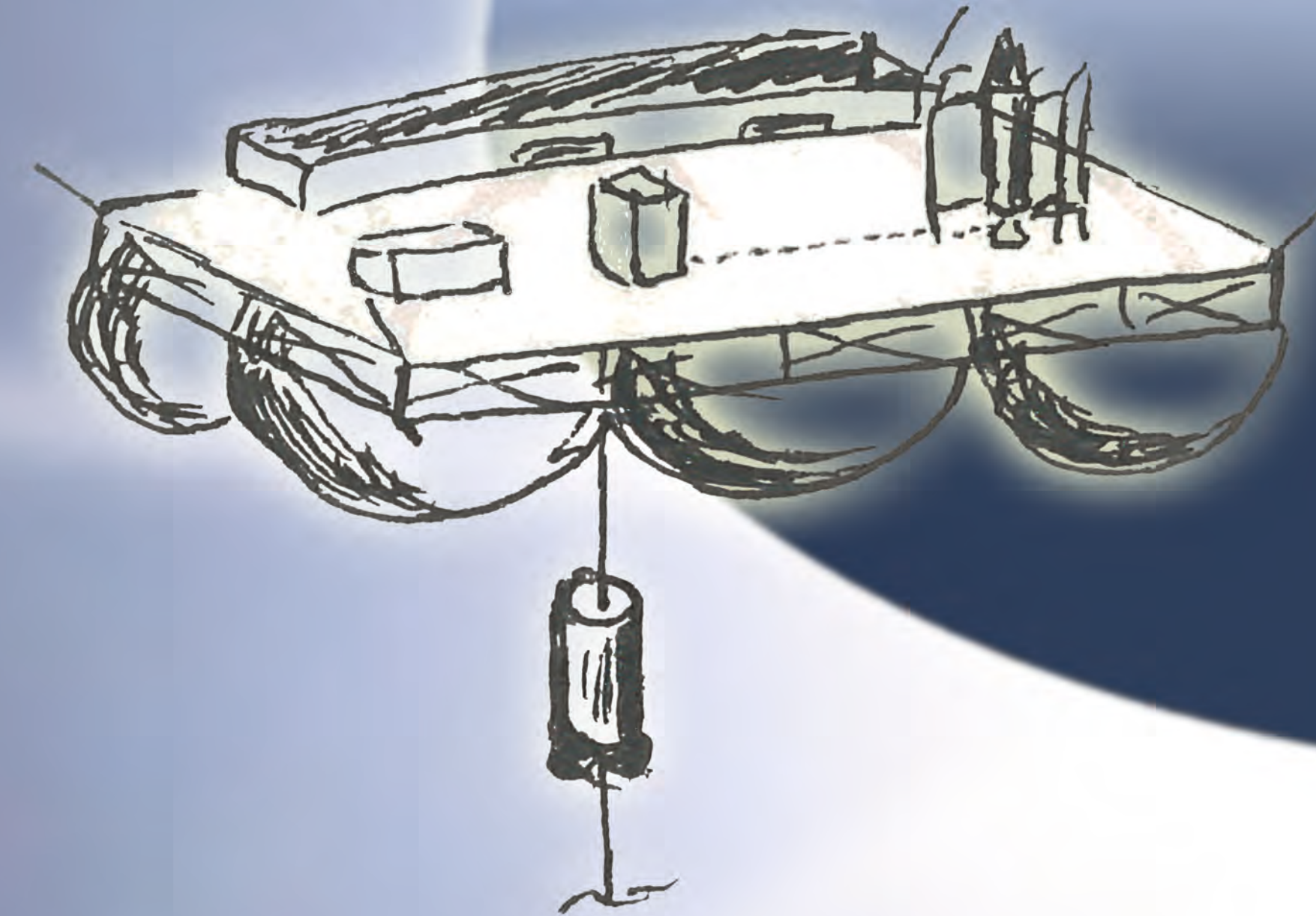
Study Idea:

- Lift generation by "balloons"
- High altitudes with thinner atmosphere => less drag
- Launch platform for effort savings

Results:

- Mass savings for sample rocket: 30% (target orbit of 350 km altitude)
- Platform altitude: 30 km
- Position: Equator region, above ocean
- Automated for small payloads (1000 kg in orbit)

Hydrostatically Elevated Launch Insertion Station



DLR Advanced Study Group

- Year One -

ESA-ACT 10th Anniversary Event, Noordwijk, July 2012

D. Quantius, W. Bauer, A. Braukhane, V. Maiwald, O. Romberg, D. Schubert, E. van der Veen, C. Zeidler, S. David, D. Djordjeovski, P. Plötner, C. Zamora, T. Ballatre, M. Bande Firvida, A. Falconi, M. Zglinski
 German Aerospace Center (DLR), Institute of Space Systems, Bremen, Germany
 Department of System Analysis Space Segment

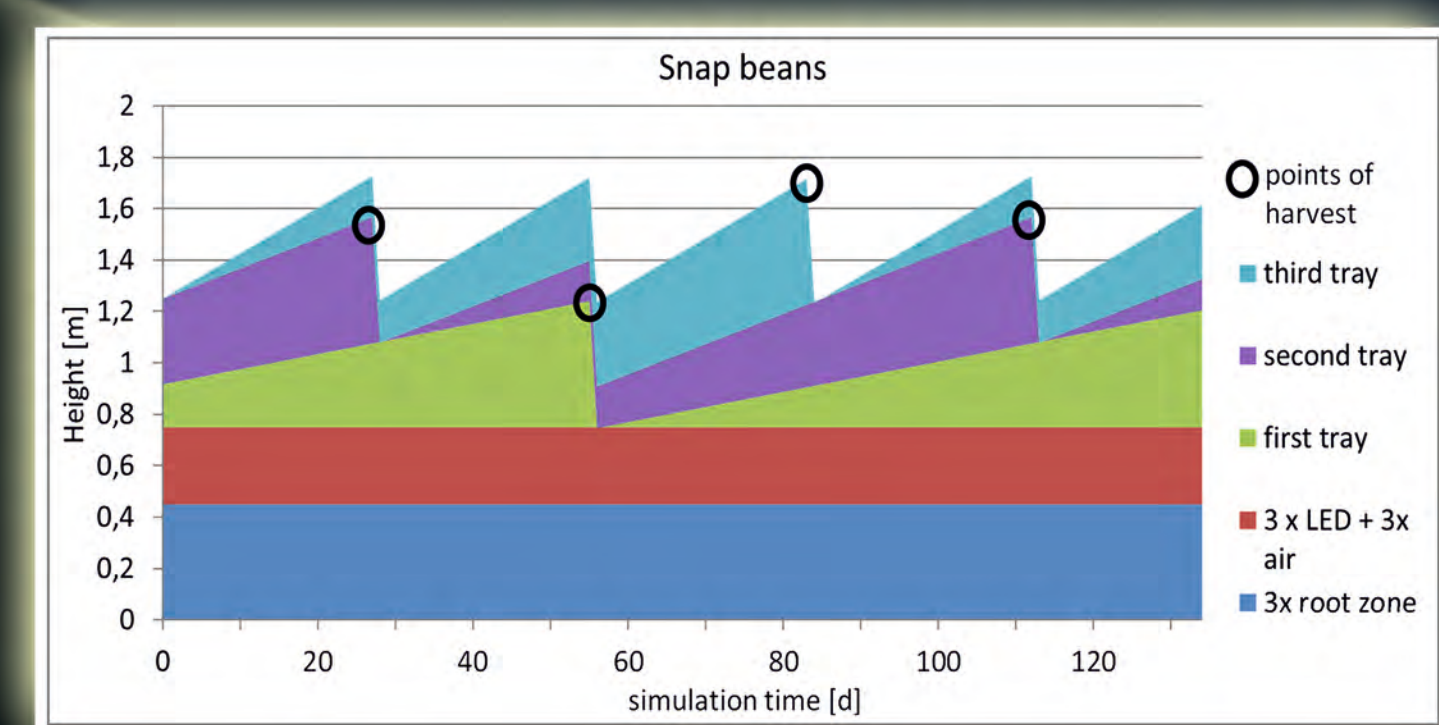
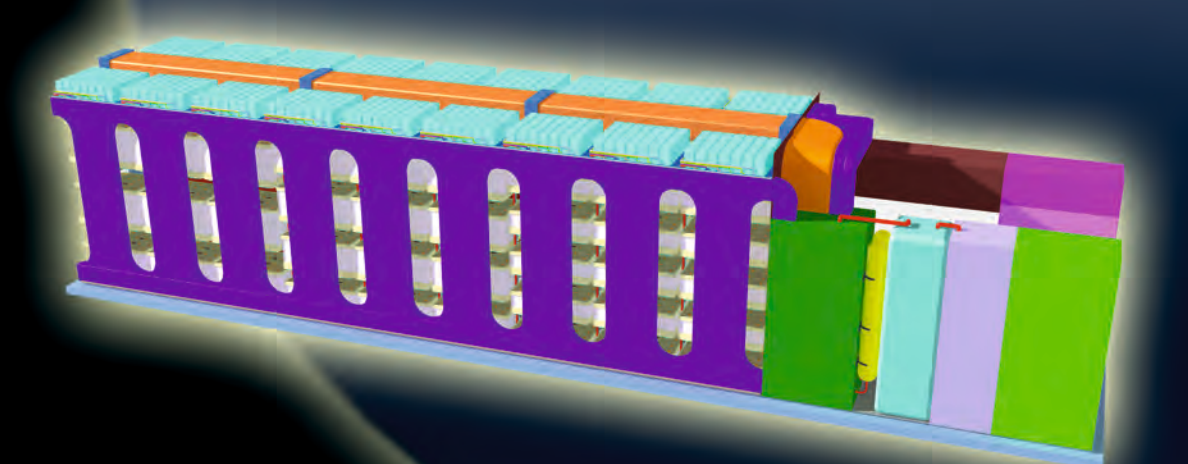
Greenhouse Module

Study Idea:

- Evaluation of Controlled Environment Agriculture-Technologies within several terrestrial markets
- Analysis of different markets (e.g. Vertical Farming, Home Farming) => workshop style
- Design focus on a Greenhouse Module for remote research stations (e.g. Antarctica)

Results:

- Market segmentation and analysis of five terrestrial markets
- System analysis and subsystem accommodation of Antarctic Greenhouse Module (GHM) => 40 foot container size
- Detailed grow accommodation and crop yield calculation (ca. 2.5 t/a of edible biomass, depending on crop mixture)
- Dynamic tray movement for yield maximization



Antipodal Satellite Acceleration

Study Idea:

- Place two satellites in exactly antipodal orbits
- Electromagnetic impulse exchange by flying through each other

Results:

- Coaxial accelerator (coilgun) preferred to railgun
- Sufficient accuracy for many "fly-through" points not feasible => initial idea reduced to a single Linear Inductance Launcher in LEO
- Electromagnetic technologies not mature, acceleration system in orbit complex, heavy and high impacts on payload => acceleration of payloads by electromagnetic fields not promising for next decades

