



sLOVEnia as a PECS country

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“Traveling into outer space should no longer be viewed as something impossible for humans but presents a problem that really can be solved by technical work. The overwhelming greatness of the goal should make all the roadblocks still standing in its way appear insignificant”

Herman Noordung Potočnik, 1928

History

- HERMANN NOORDUNG POTOČNIK (1892-1929)

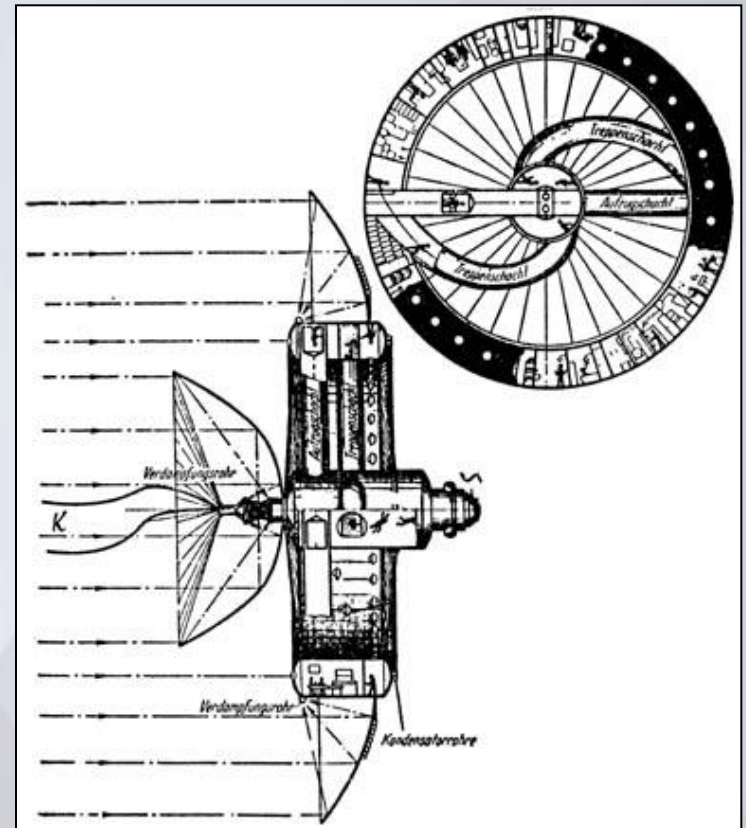


Origins: HERMANN NOORDUNG POTOČNIK (1892-1929)

Hermann Noordung Potocnik Slovenian rocket engineer published *Problem der Befahrung des Weltraums - der Raketen-motor* in 1928.

The book has 188 pages and 100 illustrations.

- He was the first man to put forward a serious space station design.
- His three-part station included two solar power collectors, a free-floating machine module, and a habitat ring. Set in geosynchronous orbit, Noordung's station was to be used for chemical and physical experiments, astronomical observations, mapping the Earth, and monitoring shipping.



Origins: HERMANN NOORDUNG POTOČNIK (1892-1929)

- HERMANN NOORDUNG POTOČNIK (1892-1929)
- A Space Odyssey is a 1968 science fiction film directed by Stanley Kubrick and Arthur C. Clarke. He used the Hermann Noordung Potočnik design of Space station for the film.
- The film deals with thematic elements of human evolution, technology, artificial intelligence, and extraterrestrial life, and is notable for its scientific realism, pioneering special effects, ambiguous and often surreal imagery, sound in place of traditional narrative techniques, and minimal use of dialogue.



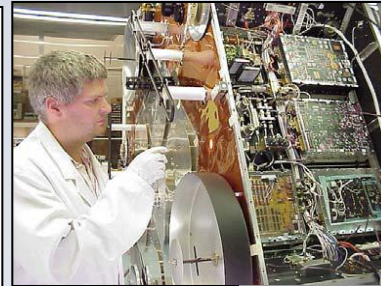
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- The habitat ring is particularly interesting, because it is the first example of what would become a common sight in space station proposals: the rotating ring, which would provide artificial gravity by centrifugal force.
- With his many ideas Potočnik became one of the founders of the astronautics. His ideas were first taken seriously only by Hermann Oberth and his co-workers, and later by Wernher von Braun and Arthur C. Clarke.



Domestic and expatriate experiences

- **Prof. Dr. Vidmar** was a team member by satellite AMSAT P3D
- **Dr. Marcos Bavdaž**, ESA – ESTEC, Head of ESA's Advanced Technologies Section
- **Dr. Mavretič** is professor and research associate at the Boston University. He worked for the MIT Center for Space Research under contract for project Voyager 1 in Voyager 2



Domestic and expatriate experiences

Prof. Dr. Dušan Petrač an internationally recognised scientist, has been involved in practical research work for the Jet Propulsion Laboratory - NASA, over several decades.

Specialties:

- Infrared Astronomical Satellite (IRAS) , zero gravity at low temperatures, the sub-orbital rockets and space-taxi missions.

Astronomers and Astrophysics:

- Dr. Zwitter, dr. Gomboc, Dr. Prša



Astronauts - Slovenian origin (NASA)

- Dr. Jerry M. Linenger



- Dr. Ronald M. Sega



- Captian, MSc. Sunita Williams



Chronology- first formal steps

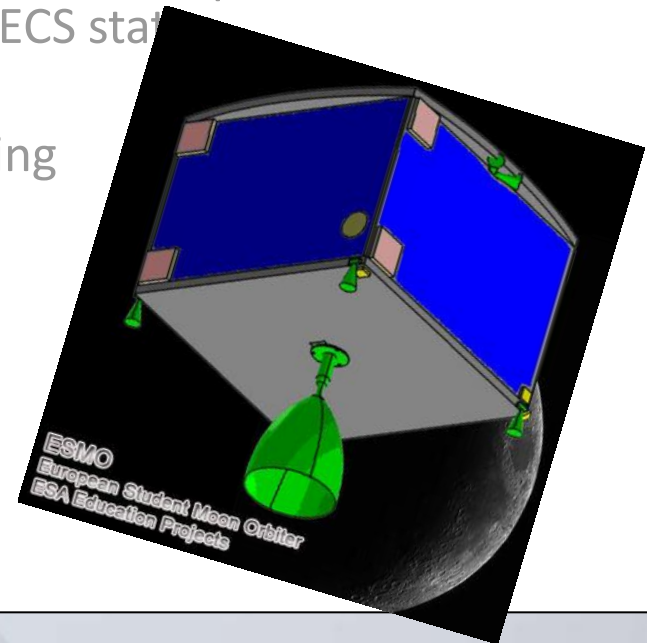
- **ESA Framework agreement** between ESA and the Republic of Slovenia
 - signed on 28.5.2008 at Snežnik castle
- ESA Framework agreement was **ratified** by the Slovenian government and published in Official gazette on 06.02.2009.
- MHEST on 31.3.2009 organized a presentation of EU project STAVE (Space Transportation Assets Valorization in Europe) for reliable and cheap EU access to space

Chronology- next steps

- On more than **15 national events** in 2009, where future actions and activities of MHEST and Government were promoted SPACE was always mentioned as one of the future industry programs.
- Target audience:
 - Research centres, university, public research institutes, industry, technology centres, scientists, artists, ...

Chronology- next steps

- At the beginning of May 2009 **ESA Technical visited** Slovenia to assess the readiness of Slovenian industry and academia. Results were very promising.
- On that occasion ESA delegation also met Minister Golobič and ESA expressed satisfaction with the presented Slovenian capabilities. Minister expressed his wish of Slovenia to proceed to ECS stage.
- At the End of May 2009 first activities regarding The European Student Moon Orbiter (ESMO)
 - On board computer
 - Flight simulator
 - Radar



Chronology- recent developments

- On its session on **23.7.2009** Slovenian government took all decisions necessary for the **European Cooperative State (ECS)** status
- Conference Slovenia and space: yesterday, today and tomorrow held in Ljubljana, 20-21/10/2009
 - Confident, ambitious, pragmatic

Cooperation with ESA



Slovenia becomes sixth ESA
European Cooperating State

22 January.

Slovenia becomes sixth ESA European Cooperating State

25 January 2010

Slovenia becomes the sixth
European country to sign the
European Cooperating State
Agreement with ESA.

ESA's Director of Legal Affairs
and External Relations, Peter
Hulsroj, and Slovenian Minister of
Higher Education, Science and
Technology, Gregor Golobic,
signed the agreement at ESTEC,
Noordwijk, The Netherlands, on

Participation in ESA Project and Programmes

- Besides Earth Observations, Telecommunication and Navigation, Life and Physical Sciences, Ground Segments and Utilisation, its major participation will be Robotic Exploration Programme.

Plan for European Cooperating State (PECS) Charter

- European Cooperating State Agreement strengthens Slovenia's relations with ESA and defines the legal basis for developing a Plan for European Cooperating State (PECS) Charter (5 years) describing activities, projects and budget for Slovenia's cooperation with ESA.
- Slovenia selects the projects from the approved PECS and contributes 1 M€ (e.c. 2010) per year through the PECS Charter which may thereafter be updated after a year or two.
- In the end of May 2010 first Slovenia's PECS call was closed with 58 of PECS proposals.
- Evaluation of ESA- 10 projects

PECS Projects

On-Board Data Handling for ESMO mission OBDH

Ka/Q-band Propagation Measurements and Modelling for the Design of Prediction and Impairment Mitigation Techniques (SatProSi) SATPROSI

Spectroscopic techniques for Gaia SPECTRO@GAIA

Relativistic global navigation system RELATIVISTIČNI GNSS

Planetary (LUNAR&MARS) habitat simulations: Influence of nutritional and exercise countermeasures on muscle atrophy and loss of bone mass PLANICA

Mesoscale wind profiles and data assimilation for numerical weather prediction MESOSCALE WIND PROFILES

Study of effects of ionospheric plasma-density irregularities on satellite navigation and telecommunications services under adverse space weather conditions SLOIONO

Integration and control of liquid fuel processor based on ceramic micro-systems CERACON

CAVITATION IN THERMOSENSIBLE FLUIDS CATHEF

Development, prototyping and manufacture of special metal components for space applications with advanced laser technology lens LENS FOR SPACE

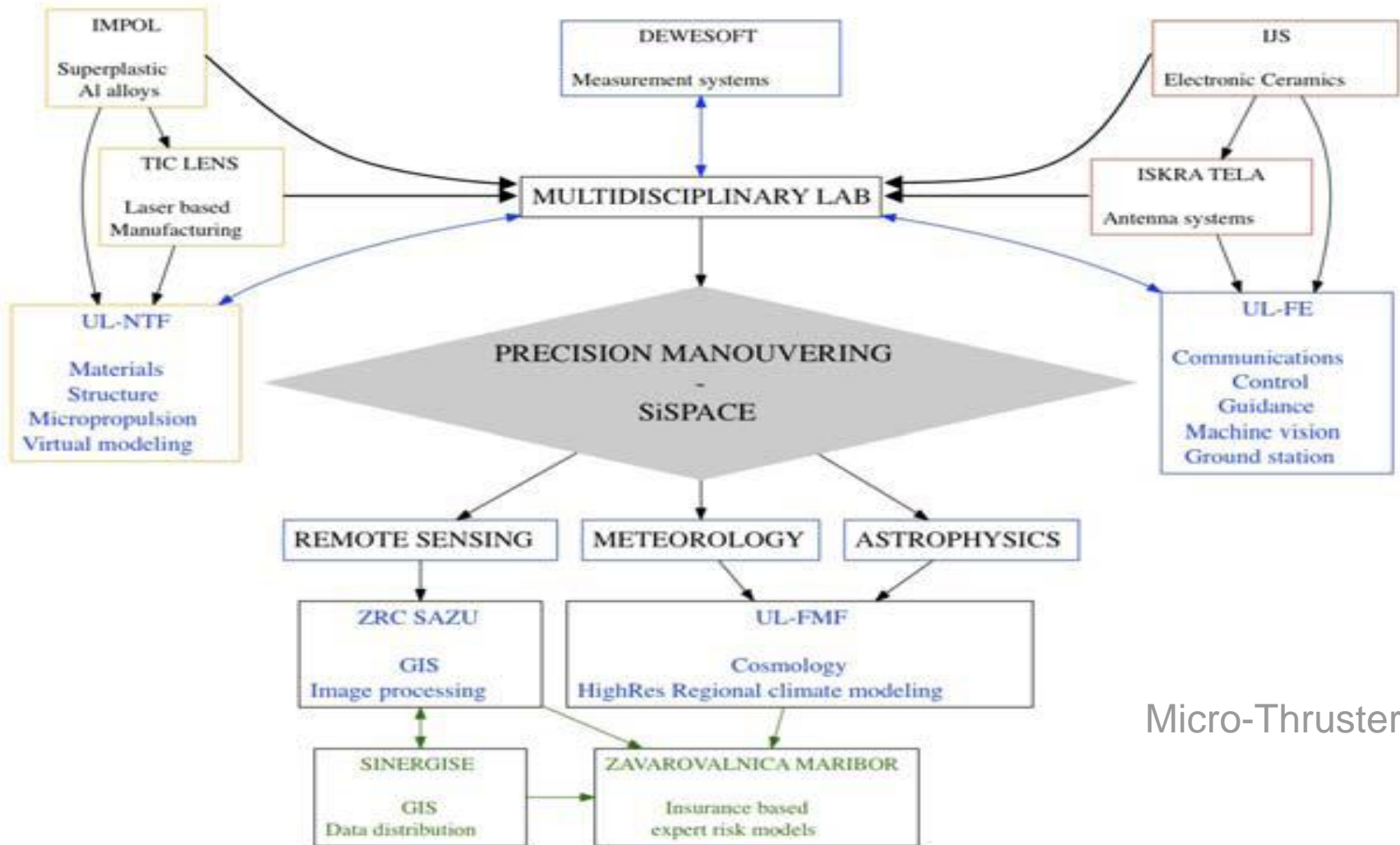
Space.si

Slovenian Centre of Excellence

- SPACE.Si in Oct.2009
 - The SPACE.Si Centre of excellence was selected by IEP as 1 out of 8 on public tender with 68 applications.
 - SPACE.Si – 11 partners (3 UNI-Lj, 2 Public research institutes and 2 large companies and 4 SMEs)
 - 10,0 MEUR of public money for the period 2009-13

Due to their excellent S&T potential for the development of MEMS micro propulsion systems, satellite control, communications, data and image processing as well as virtual and experimental investigations of micro and nano satellite systems, the proposed Centre of Excellence (CE) will enable Slovenia to efficiently join international state-of-the-art in space RTD.

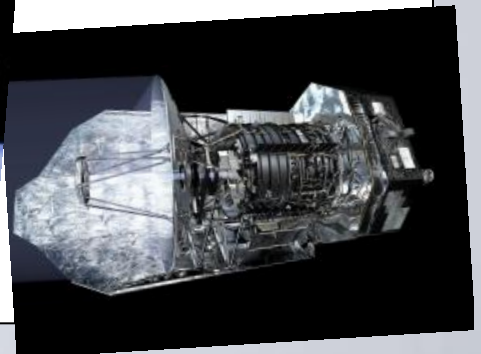
Example of Approach



Micro-Thruster

Plans and ambitions

- Become ESA full member in 2-3 years
- Develop good relations with large Space industry – as subcontractors
- Find and exploit niches in areas where we have enough S&T potential
- Be strong on application side
- GMES
- Astronomy



Application: Dewesoft – PCM telemetry

- The **Kennedy Space Center** in Florida is the busiest launch site in the world. NASA placed two large contracts to deliver 25 Dewetron measurement instruments and a development contract for digital telemetry interfaces. **Dewesoft a Slovenian** company is providing a **PCM telemetry** solution for a complex devices with several thousand measurement channels.



Application: Planica center – Valdoltra hospital

- Space medicine and simulation
- Very good results with long duration bedrest experiments (NASA and ESA) projects
- Lunar habitats, Mars exploration
- Physiological effects of long-term exposure to reduced oxygen and low gravity
- Possible ground-based simulation of a Lunar habitat





Thank you for your attention.

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