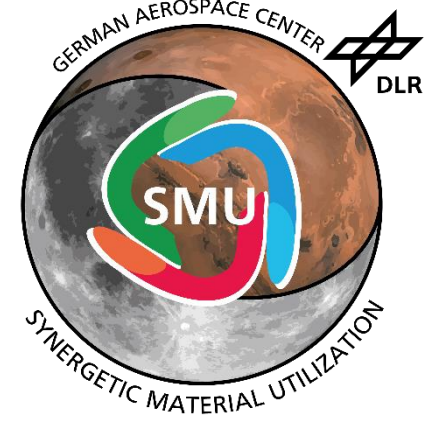


Synergetic Material Utilization

ISRU developments at the DLR Institute of Space Systems

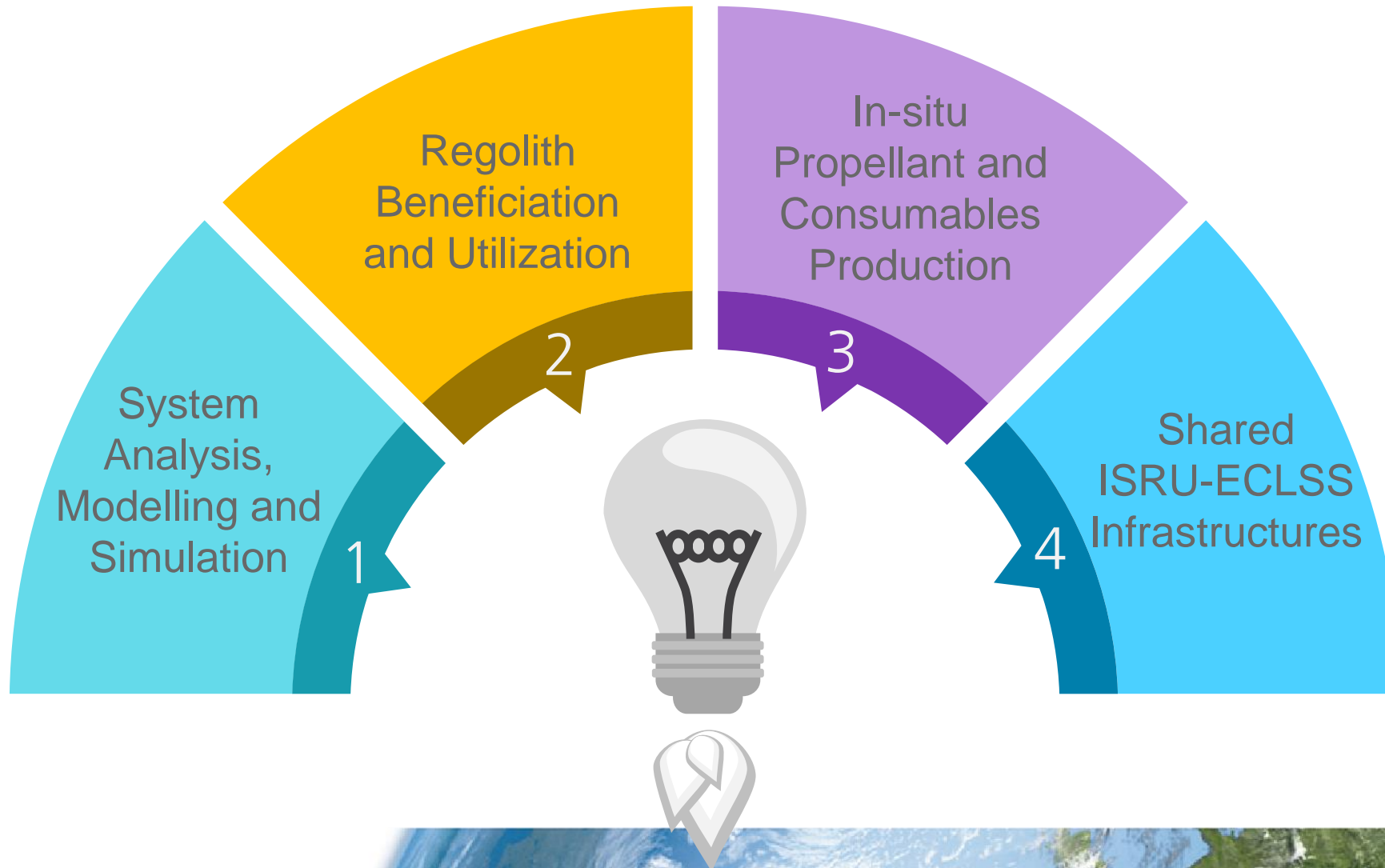
Dr. Paul Zabel
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Thursday, 05.05.2022



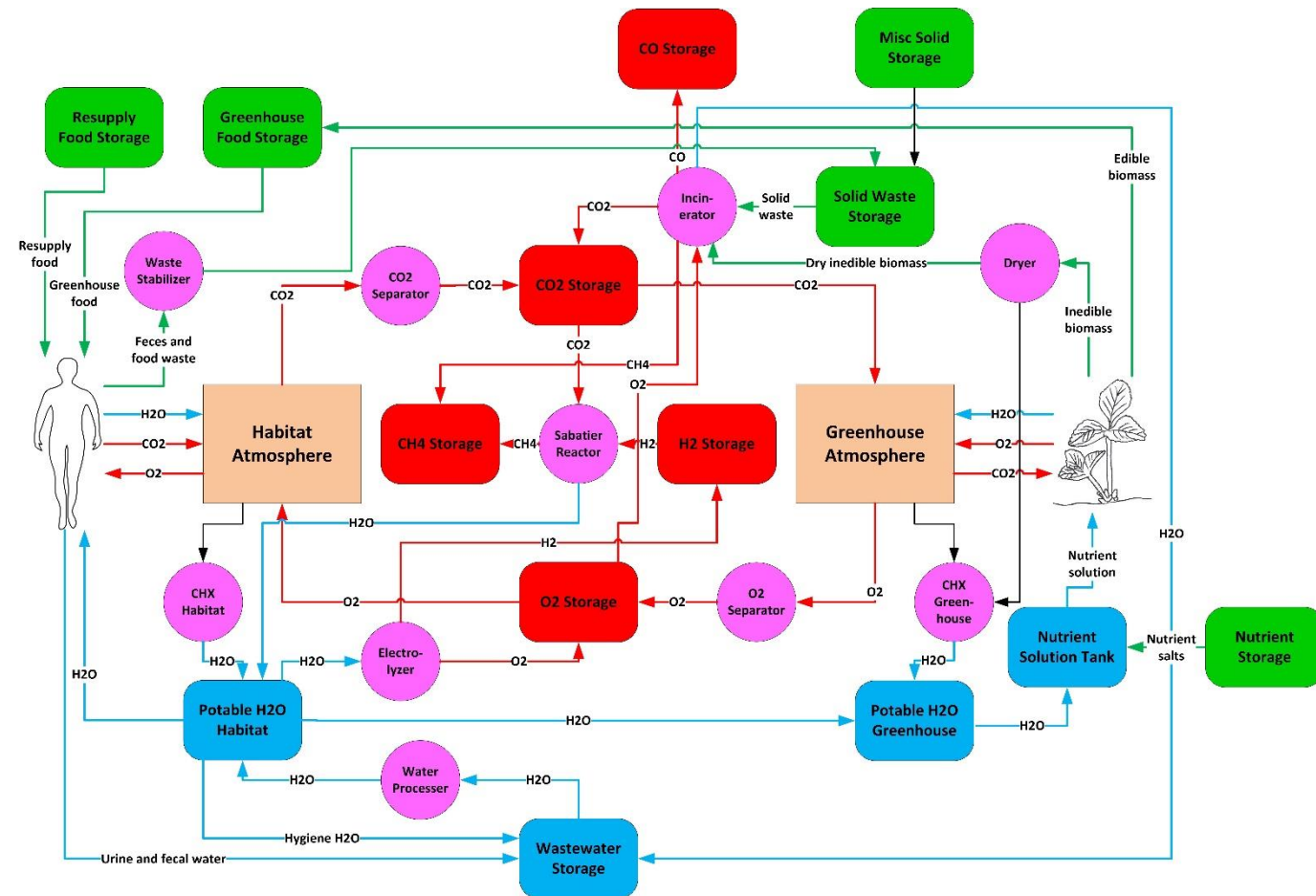
Knowledge for Tomorrow

Synergetic Material Utilization Research Topics



Topic 1: System Analysis, Modelling and Simulation

- System analysis of ISRU and ECLSS technologies, systems and architectures
- Modelling and Simulation of ISRU and ECLSS architectures with respect to mass flows and mass balances
- Concept studies by students:
 - Potential of extracting nutrients from the Martian surface for algae and plant cultivation
 - In-situ material production for potential thermal applications in a Lunar mission



Overview of a simulation model of a life support system architecture (DLR)

Topic 2: Regolith Beneficiation and Utilization

Goal: Designing a multi-stage regolith separation test stand to produce feedstocks:

- to improve oxygen extraction,
 - to improve metal extraction,
 - to assist construction and manufacturing.
-
- Assembly started in January 2022
 - Initial experiments planned for end of June 2022

One Application:
MEFAM – The Metals
Factory on the Moon
(See talk of Achim
Seidel)



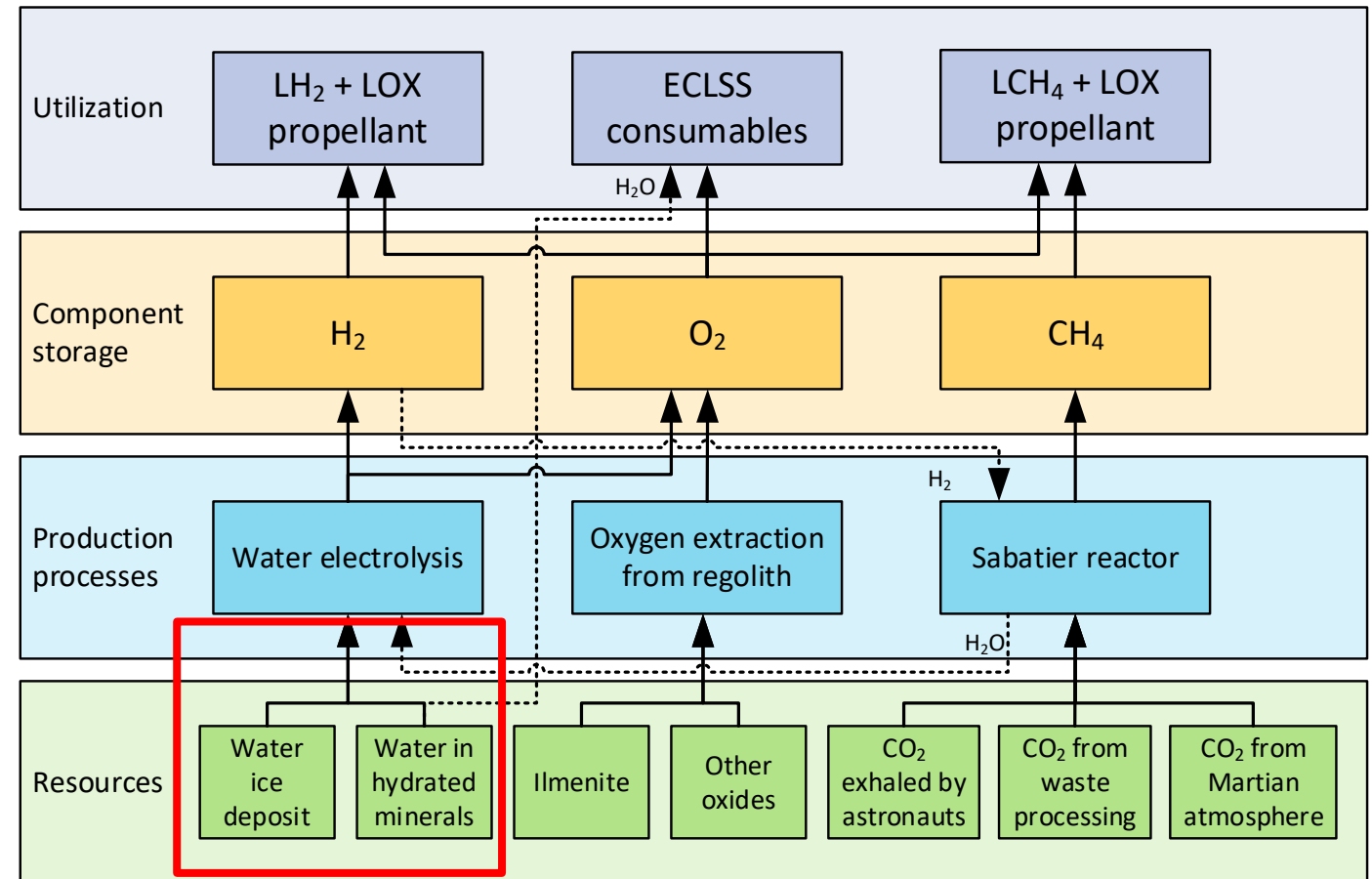
Concept of a Regolith beneficiation laboratory experiment.

Topic 3: In-situ Propellant and Consumables Production

Goal: Technologies for water extraction from ice deposits and hydrated minerals

- Building a laboratory-scale prototype
- Process simulation
- Currently in conceptualization stage

For detailed information take a look at the poster by **Luca Kiewiet!**



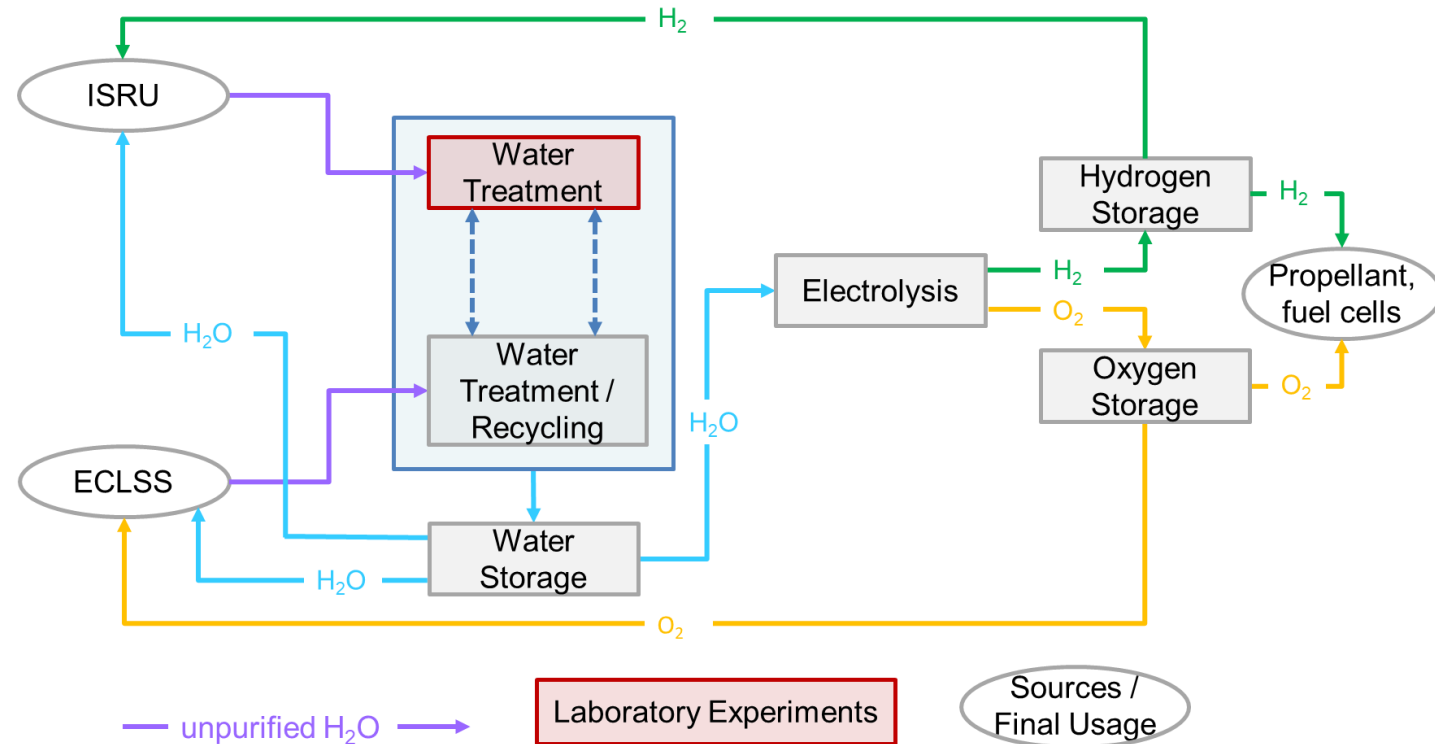
Pathways for in-situ propellant and consumables production from resource to utilization.

Topic 4: Shared ISRU-ECLSS Infrastructures

Goal: Conceptualize and simulate a shared H_2O - H_2 - O_2 infrastructure

- Experiments on regolith dissolution in water
- Experiments on purifying raw water extracted on the Moon using ECLSS technologies
- Modelling and simulating the mass flows between the different elements of the infrastructure

For detailed information take a look at the poster by **Rieke Freer!**

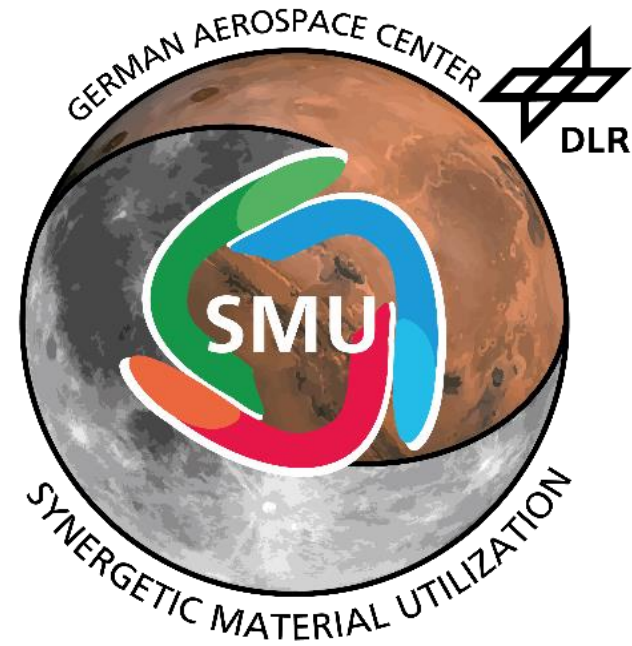


Interfaces between different components of the shared H_2O - H_2 - O_2 infrastructure.

Summary

For detailed information take a look at our posters and meet us!

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Enjoy the Space Resources Week 2022!