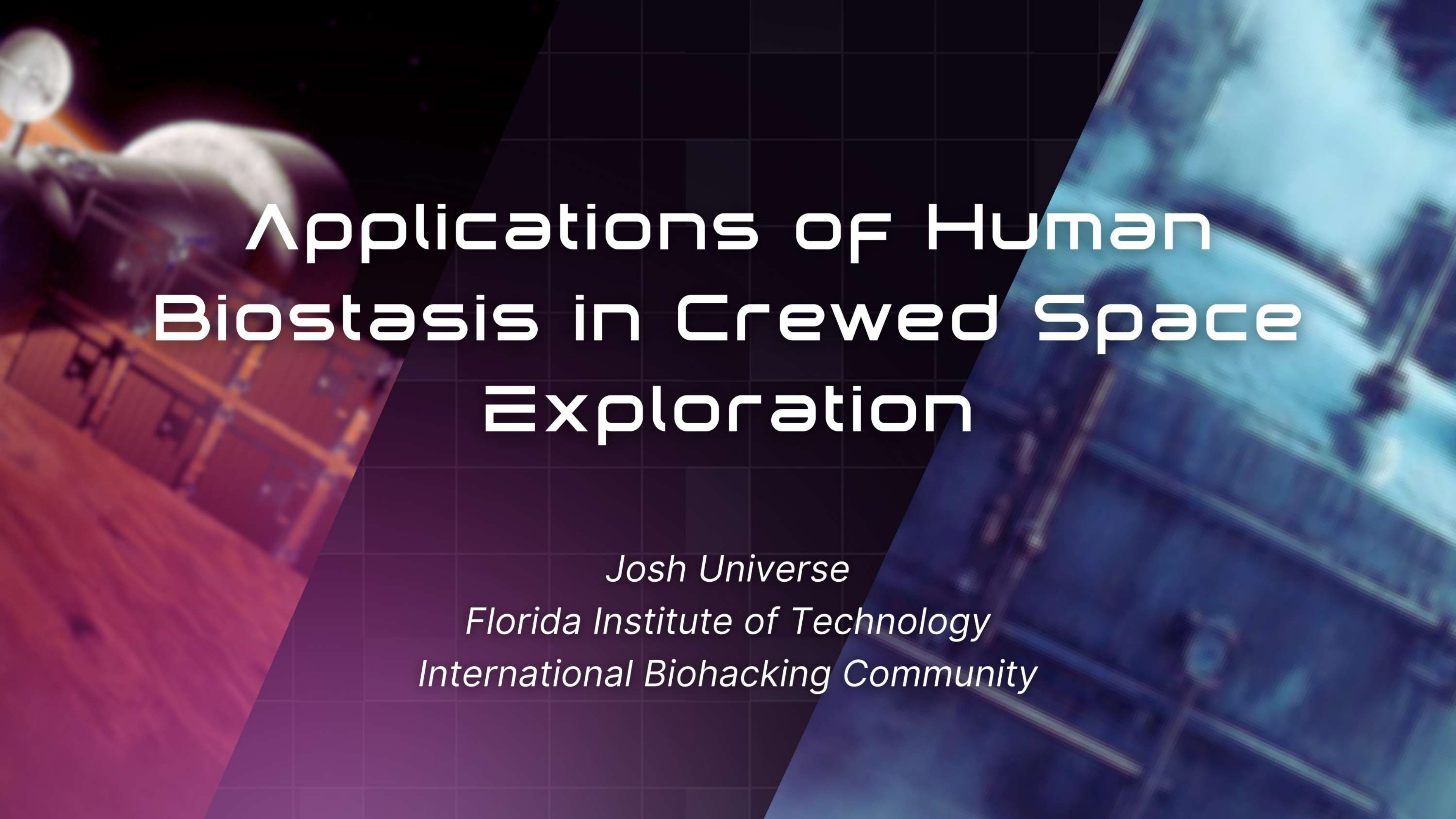




Applications of Human Biostasis in Crewed Space Exploration

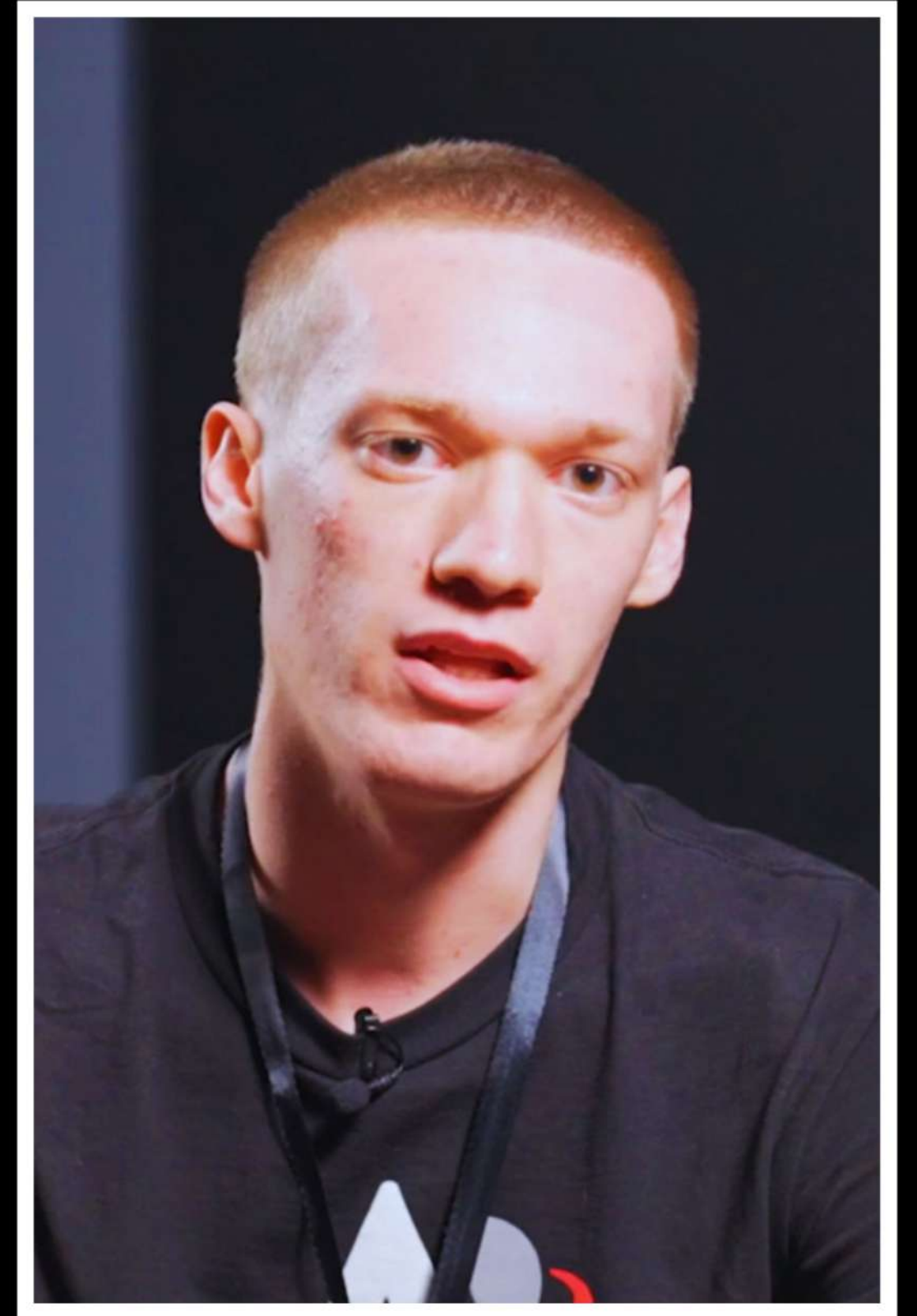
*Josh Universe
Florida Institute of Technology
International Biohacking Community*

Did You Know?

The distance to the closest habitable exoplanet is 4.24 light-years away. That would take 6,300 years to reach with current technology.

About Me!

- Current student: Florida Institute of Technology
 - Astronomy & Astrophysics
 - Commercial Enterprise in Space
- Live now: Melbourne, Florida
- Occupation:
 - Founder, International Biohacking Community & Transhumanist Council
 - Content manager, Viva City
 - Science Communicator, Scientist-Astronaut Candidate



Presentation Overview

- History of Cryonics
- History of Space Exploration
- Why Cryonics in Space?
- Applications of Cryonics in Space
- Q&A & Contact Information

History of Cryonics

History of Cryonics

- 1940s: Jean Rostand's cryobiology work laid groundwork for cryonics.
- 1962–1964: Robert Ettinger publishes "The Prospect of Immortality," proposing human cryopreservation.
- 1967: Dr. James Bedford becomes first cryopreserved human, stored in liquid nitrogen.



Robert Ettinger

Ettinger, R. C. W. (1964). The Prospect of Immortality. Doubleday. / Wowk, B. (2007). Thermodynamic aspects of vitrification. Cryobiology, 55(1), 1-9.

History of Cryonics

- 1972–1976: Alcor and Cryonics Institute founded in the U.S.
- 2005: Adoption of vitrification to avoid ice damage in preservation in human applications.
- 2005: KrioRus founded in Russia, expanding cryonics internationally.



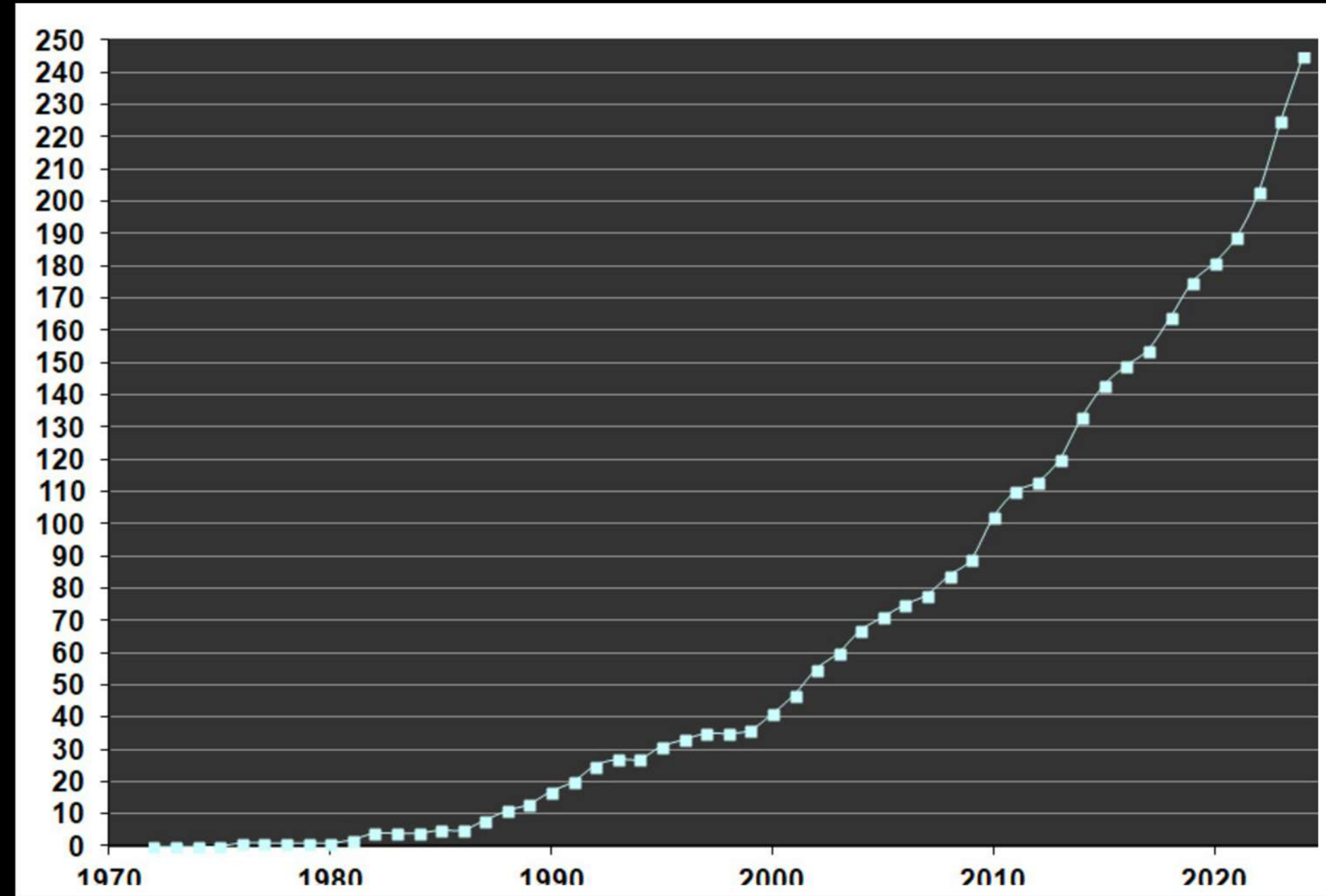
Patient Care Bay at Alcor (Alcor)

Alcor Life Extension Foundation. (n.d.). History of Alcor. | Fahy, G. M. (2010). Cryopreservation of organs by vitrification.

Cryobiology, 60(3S), S30–S37.

History of Cryonics

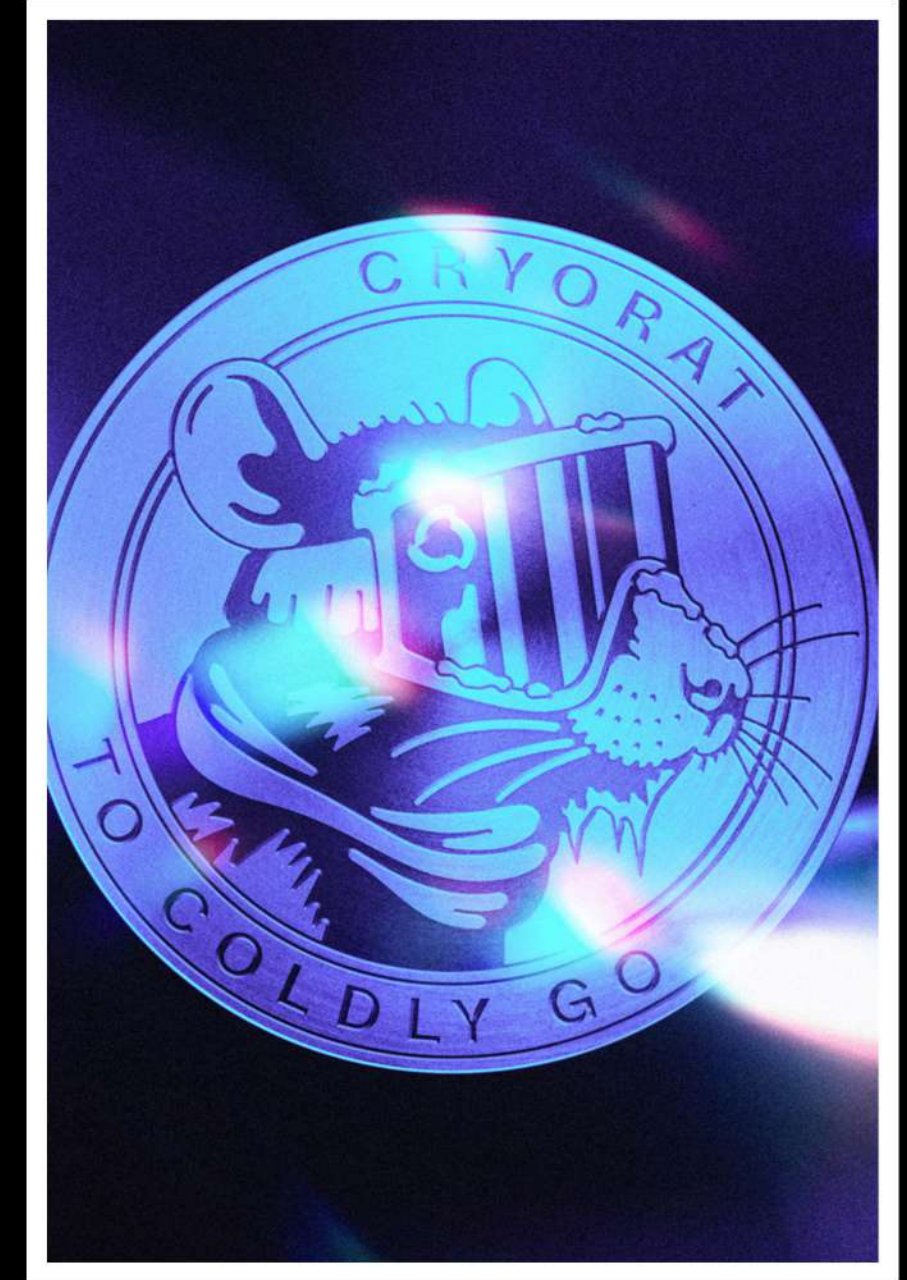
- ~559+ humans cryopreserved globally; skepticism remains in general culture.
(2025)
- Organizations like Alcor and CI use modern vitrification and stabilization protocols.
- Nectome startup explores brain preservation for future mind uploading.



Graph showing Alcor patient(cryopreserved person) growth. (Alcor)

History of Cryonics

- Alcor is doing in-house research with their RAPID program.
- CryoDAO launched the CRYORAT research project, high sub-zero preservation & revival of a small mammel, funded through the \$CRYORAT token.



\$CRYORAT Token Render (CryoDAO)

History of Space Exploration

History of Space Exploration

- 1957: USSR launches Sputnik 1, beginning the Space Age.
- 1961: Yuri Gagarin becomes first human in space in the Vostok 1 mission, from the Soviet Union.
- 1969: Apollo 11, from the United States, lands the first humans on the Moon.



Yuri Gagarin (mil.ru)

History of Space Exploration

- 1971: USSR launches Salyut 1, first space station.
- 1986: Mir becomes first modular space station.
- 1998–2000: ISS construction begins; permanent habitation starts.

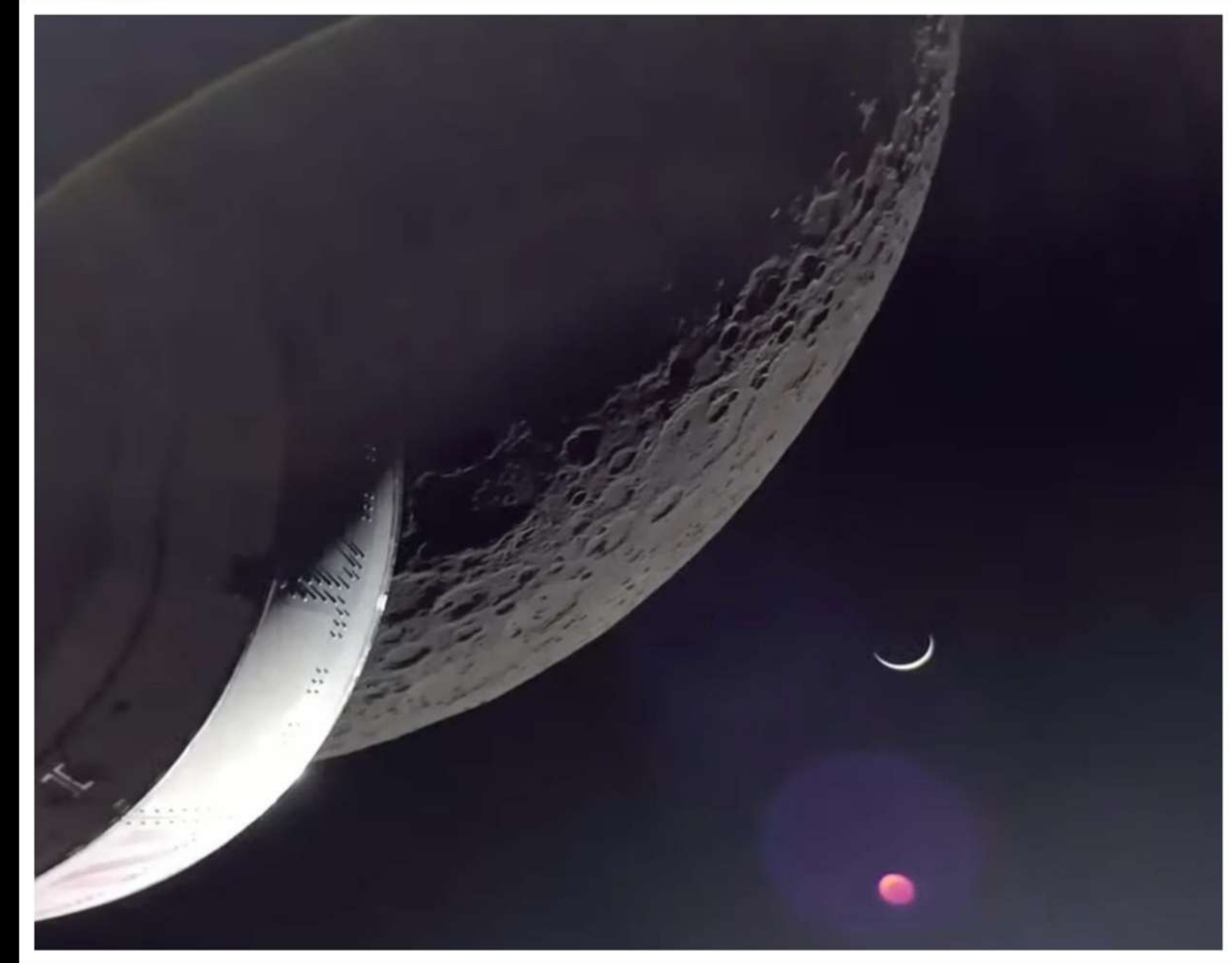


ISS (NASA)

Did you know? NASA plans to de-orbit the International Space Station around 2030 in the *International Space Station Transition Plan*.

History of Space Exploration

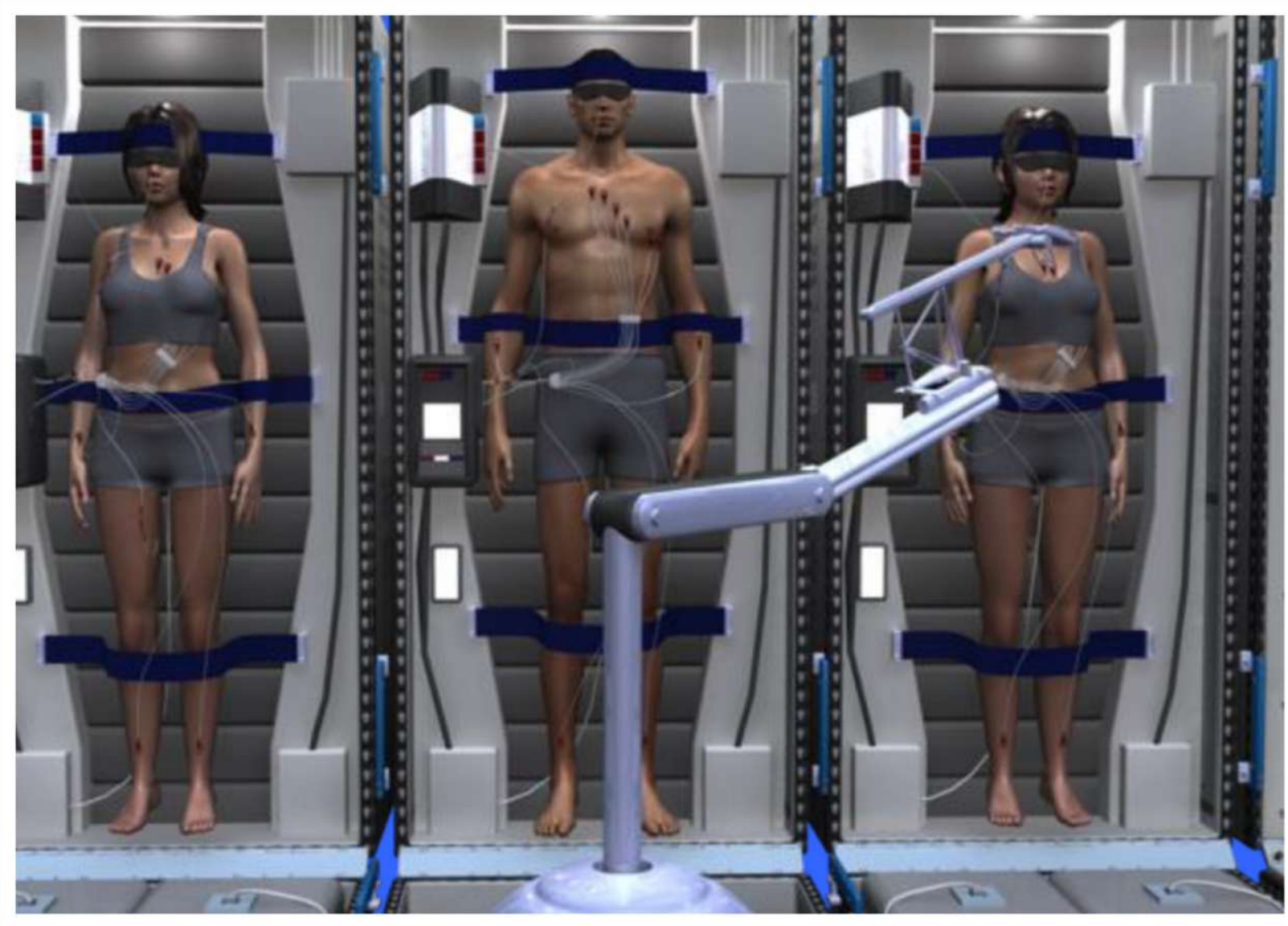
- 1981–2011: NASA's Space Shuttle enables reusable human spaceflight.
- 2011: Curiosity rover lands on Mars, marking continued robotic exploration on Mars.
- 2020s: Artemis(second Moon program), Commercial Crew & Supply Transport through SpaceX



Capture of the far side of the Moon, and the Earth, from the NASA Orion capsule. (NASA)

Why Cryonics in
Space?

Why Cryonics in Space?

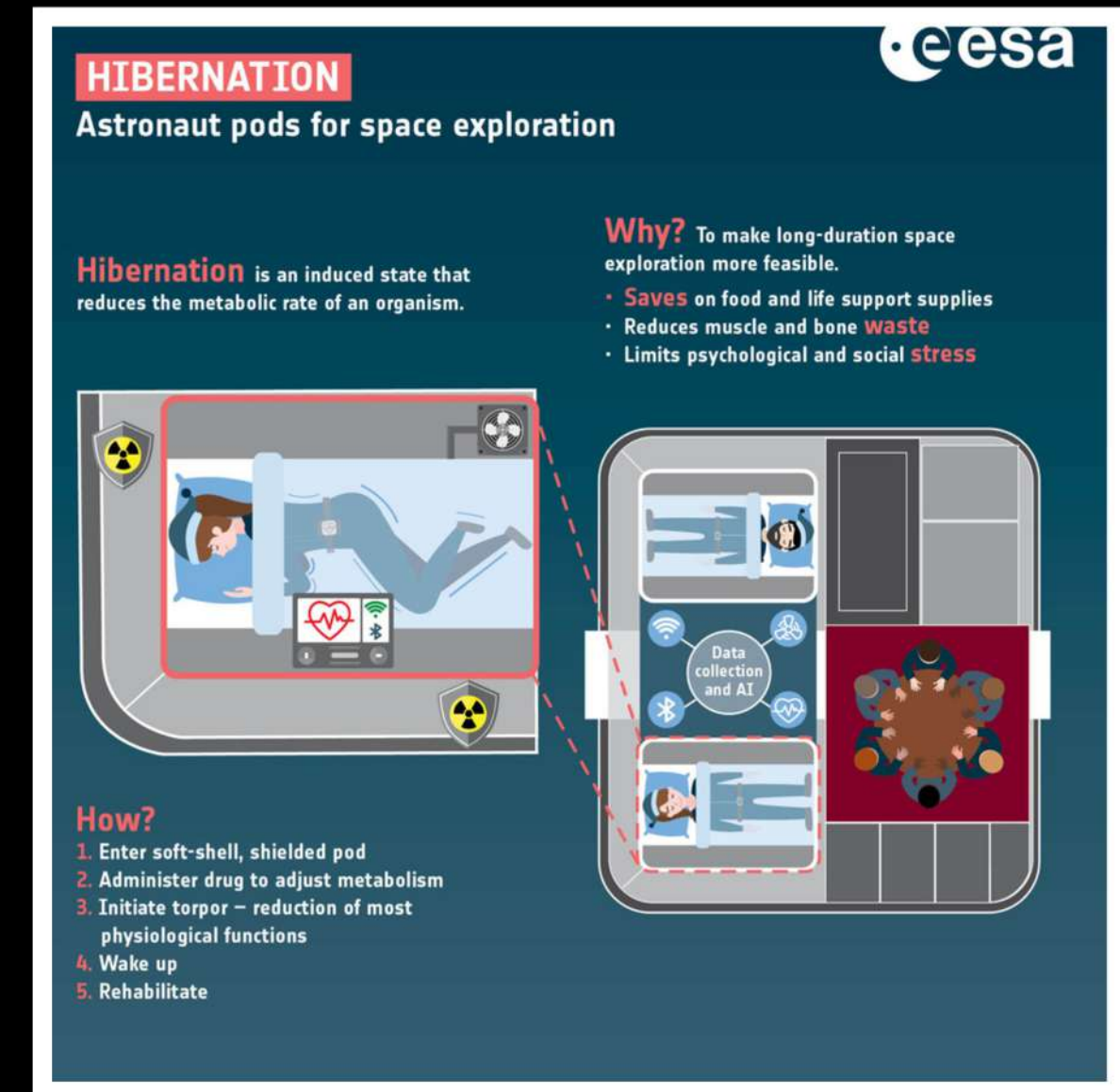


Rendering of the SPACEWORKS proposed torpor transfer system. (SPACEWORKS)

- Cryonics reduces metabolic needs, significantly reducing consumable(food, water, etc) requirements.
- Smaller crew habitats and life support systems become feasible.
- Can reduce spacecraft mass by 25–40%, reducing fuel requirements, which reduces cost.

Why Cryonics in Space?

- Reduces isolation, boredom, and conflict during long missions.
- May protect against radiation and aging via metabolic suppression(ex: reducing production of reactive oxygen species)
- Hibernating animals retain muscle/bone better than non-metabolic restrained humans.

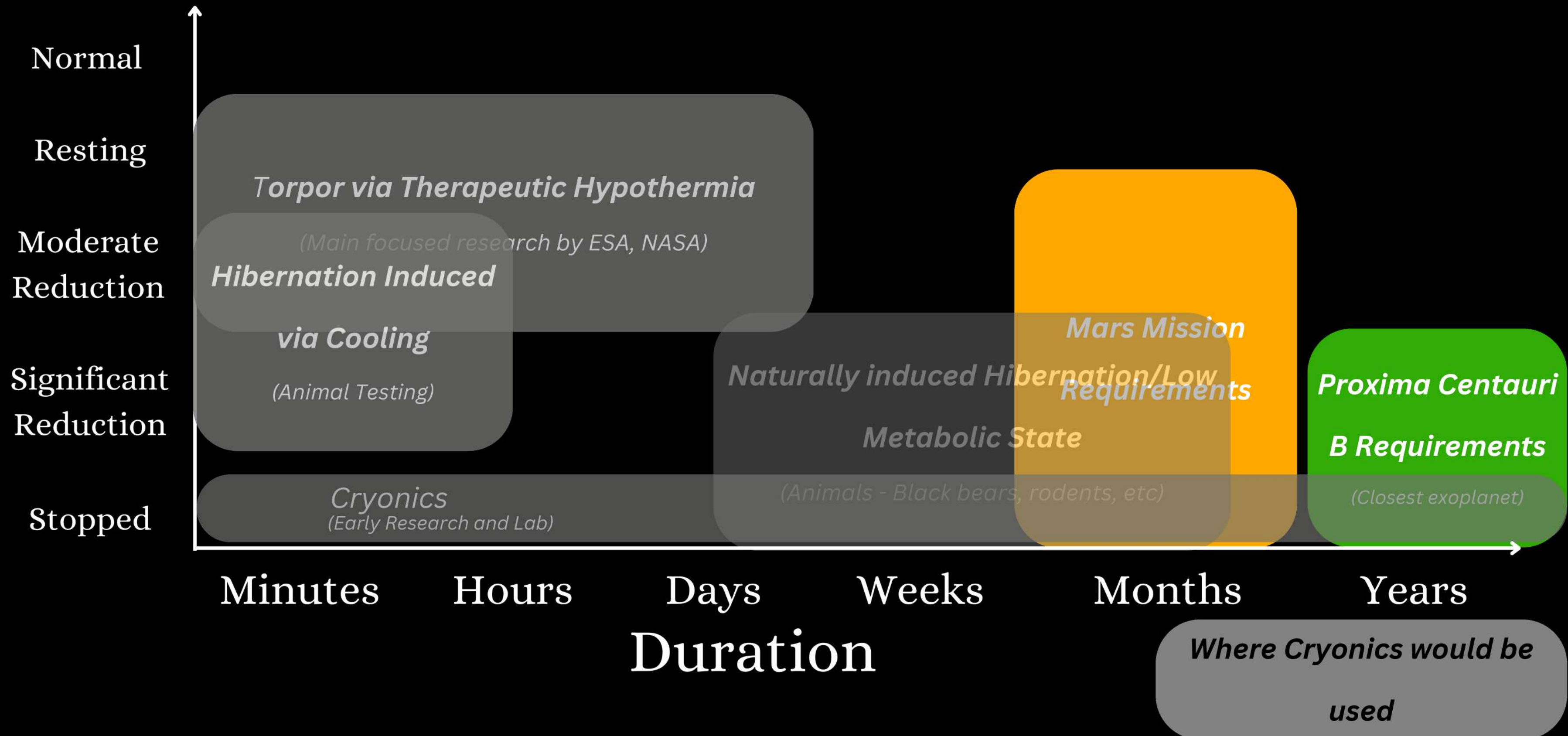


Hibernation benefits graphic. (ESA)

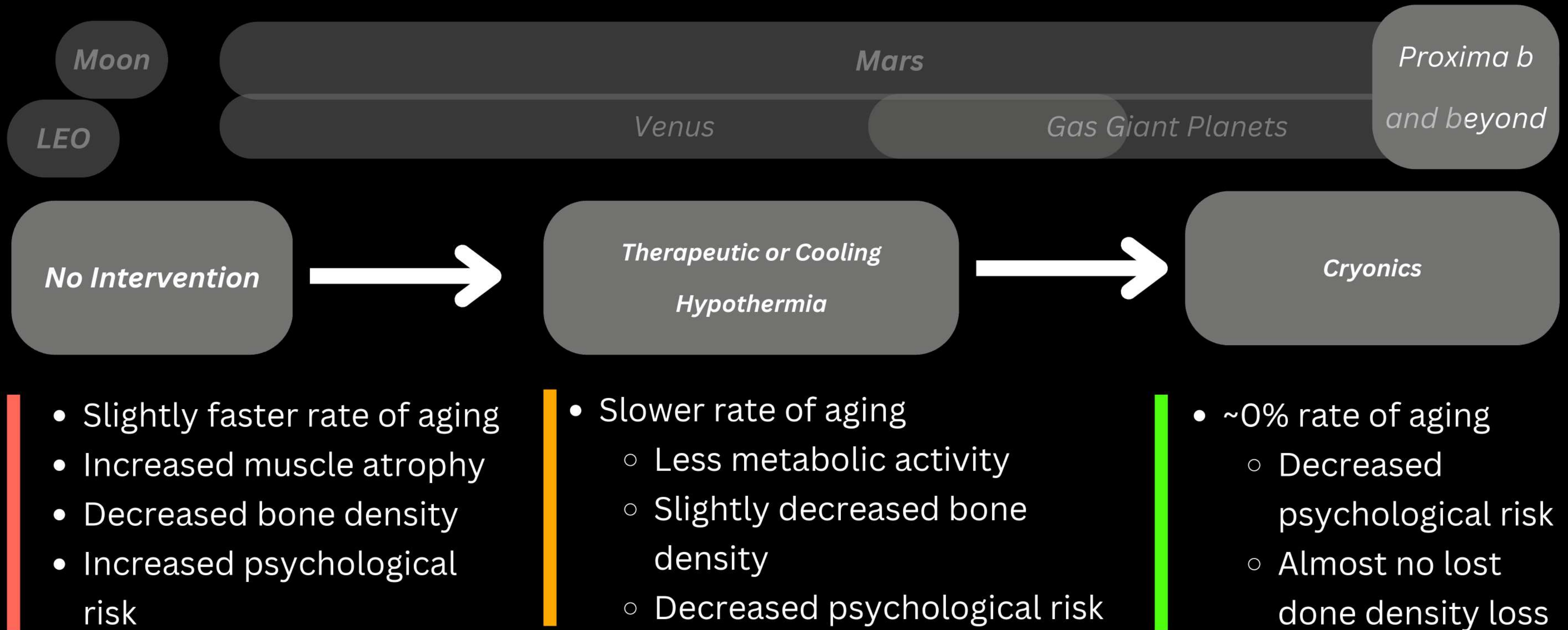
Applications

Applications - Requirements Chart

Metabolic Activity



Applications - Mission Suitability



Applications - Variables with Systems Dev.

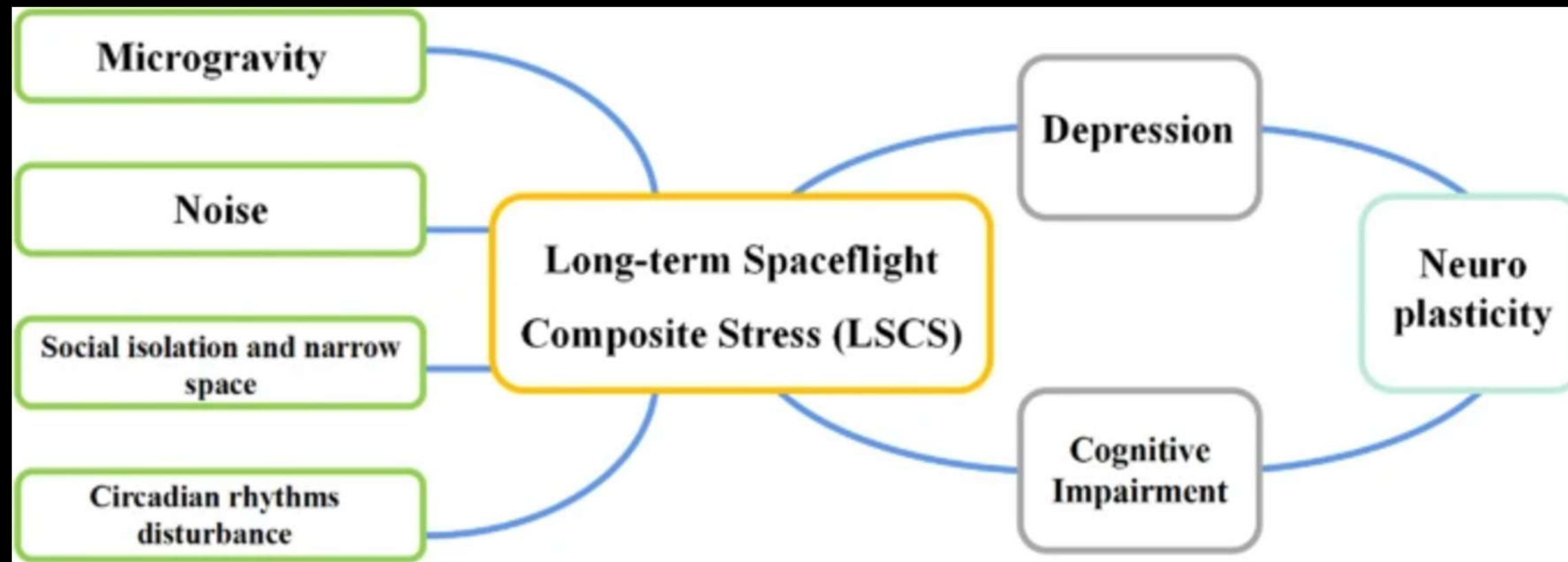
These variables become more important with longer-duration missions, such as those beyond Mars.

- Current **lifespan capabilities**(w/o metabolic intervention)
 - Longer lifespans allow for crew rotation schedules for longer-duration missions.
- Current **healthspan capabilities**
 - Astronauts are expected to maintain high mental alertness and strong physical health.
 - More metabolic activity can lead to increased muscle atrophy and other physiological decline.
 - Increased risk of delayed-degenerative diseases with increasing biological age.

Applications - Variables with Systems Dev.

- **Psychological limitations**

- We have not sent a human beyond the Moon, meaning there is limited data on the psychological effects of long-duration space travel beyond LEO.
 - Key effects include circadian rhythm disturbance, depression, and isolation.

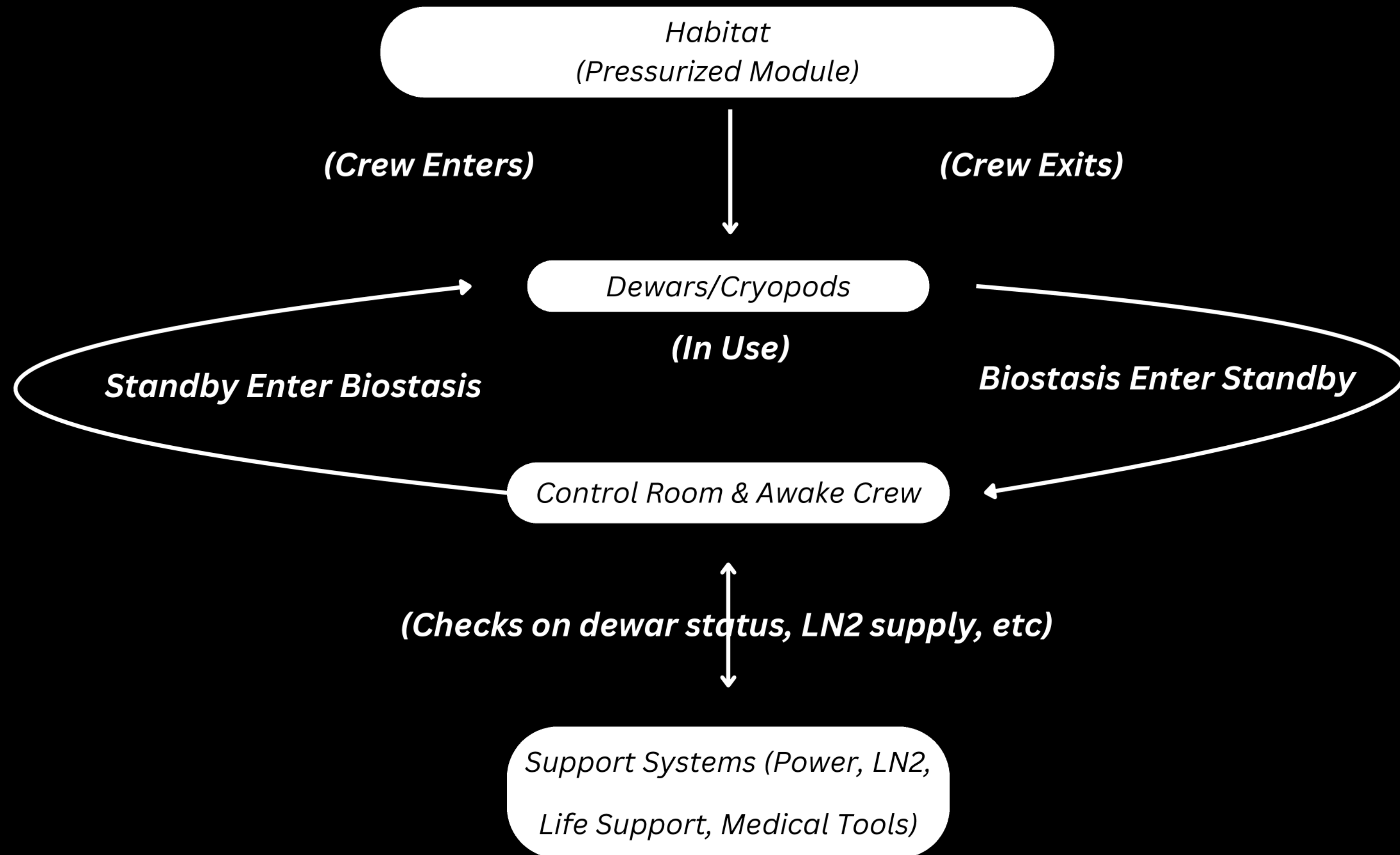


LSCS Chart (Nature)

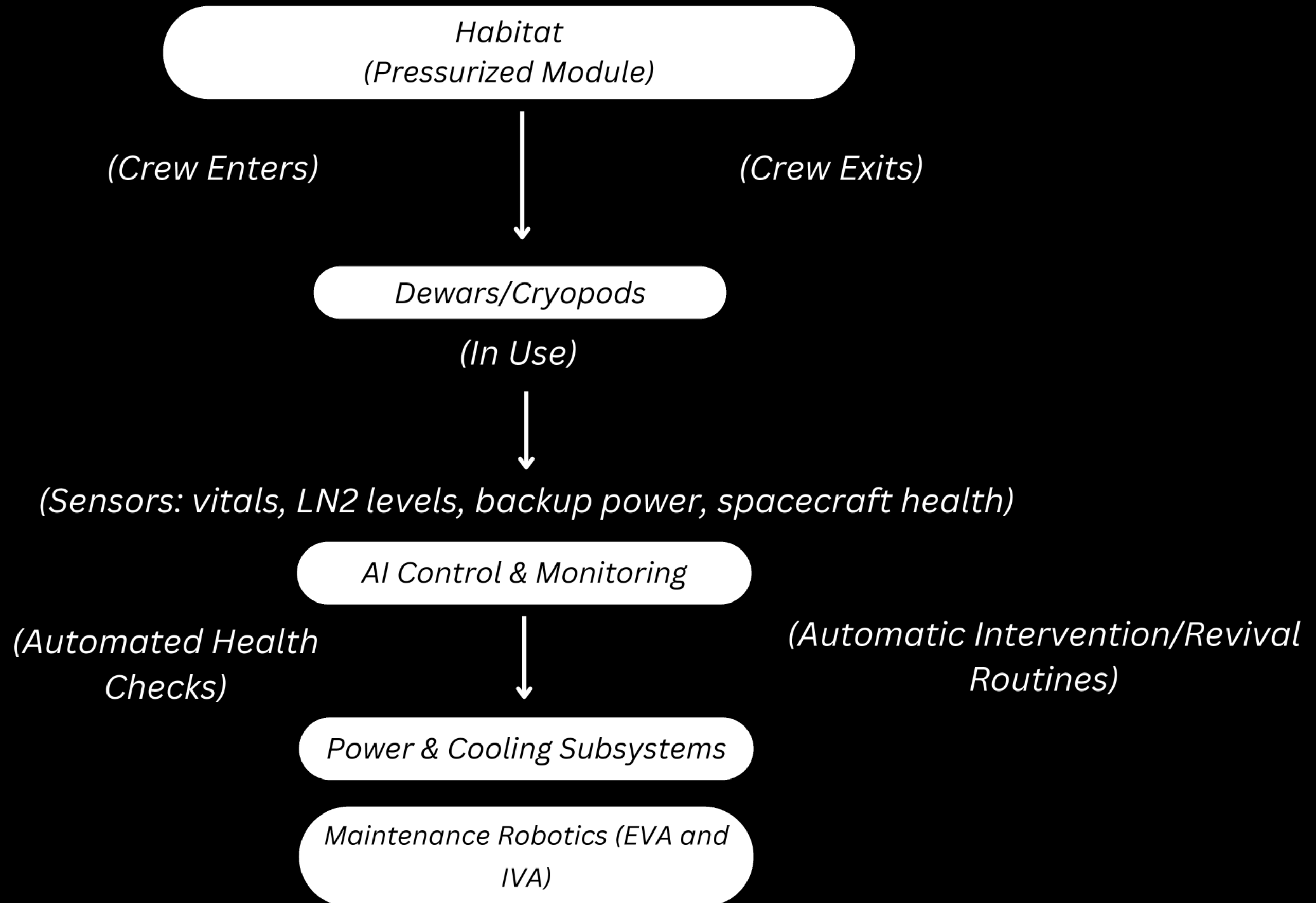
Applications - Variables with Systems Dev.

- **Maturity in respective biostasis technology.**
 - Currently, there are no **total** NASA TRL(Technology Readiness Level) 5 or higher applications of any biostasis technology for human space travel.
 - Torpor is undergoing current research in small-scale experiments(NASA's Space-health in Humans - STASH) through the NIAC (NASA Innovative Advanced Concepts Program) and ESA research papers.
 - Cryonics TRL is split into the two following readiness levels
 - Preservation - **TRL 6** (System/subsystem model or prototype demonstration in relevant environment (**ground** or space))
 - Revival - **TRL 3** (Analytical and experimental critical function and/or characteristic POC.) - embryos, rabbit kidneys, etc

Applications - Basic System



Applications - Automated System



Presentation Feedback



SCAN ME

Questions

**Linkedin:
Josh Universe**



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**Contact or
Inquiries**



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