

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Advanced Systems, Technologies, and Innovations for Human Spaceflight (7)

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DESIGN & BREADBOARDING RESULTS OF THE FIRST EUROPEAN EXPLORATION UNIT

Abstract

Humankind is entering a new space Era, where space exploration will become a higher priority again, since the Apollo missions. It is now time for Europe, with the European Space Agency (ESA) and its commercial partners, to join NASA, ROSCOSMOS, and CNSA, as a market leader in this endeavour. The European eXploration Unit (EXU), designed in collaboration with the ESA BIC start-up ICEE.Space, focuses on representing Europe in this new Era. The colours chosen are white, to reduce the heat absorbed coming from the sun, along with blue, and gold features. These colours, representing the European Union (EU) and the EU flag, provide a clear visibility from afar of Europe its presence in space. By using a New Space approach with standard off the shelf components, the costs will be reduced tremendously. Using technologies such as 3D printing components allows for quick repairs or custom modifications according to the users' needs. In addition, these components can be printed using the "Made In Space" 3D printer, which is currently present on-board the International Space Station (ISS). As the EU represents the unity and diversity of different cultures, the suit will focus on gender inclusivity and different anthropometrics, using the NASA 3000 standard by reducing identified health risks, such as joint pain and mobility restrictions for smaller sized astronauts or those with a disability. The systems integrated in the EXU will contain an implementation of the latest spin-in smart technologies, beyond the current standard space suit requirements such as: airtight, radiation shielding, pressurised, backpack with life support system. These will include among others: A custom Augmented Reality (AR) Heads-In Display (HID), suit exoskeleton, haptic feedback gloves, biometric undergarment readout, increased power efficiency, Knee lights to support operations, long-distance range communication systems, and Machine Learning / Artificial Intelligence support. Furthermore, an additional gold coating used for glasses will be added to reduce the common known problem of fogging and water build-up inside the helmet. The suit designed and developed by ICEE.Space, with support of ESA BIC CZ will be build within the next 2 years and field tested (up to TRL 6), during the ICEE.Space owned analogue astronaut mission CHILL-ICE III in the lava tubes of Iceland.