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SPACE EDUCATION AND OUTREACH SYMPOSIUM (E1)
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Author: Dr. Sarah Jane Pell
ESA Topical Team Arts & Science, Australia, research@sarahjanepell.com

Mr. Paolo Nespoli
European Space Agency (ESA), Germany, paolo.nespoli@esa.int
Mr. Mark MacKay
KiwiSpace Foundation, New Zealand, mark.mackay@kiwispace.org.nz

EVA SIMULATION TRAINING UNDERWATER WITH A REMOTE MISSION 'CONTROL'.

Abstract

We live in an increasingly stimulation-rich environment comprising of actual and virtual networked systems and complex human-computing and environment interactions. Much of our education, training and adaptation for activities in extreme environments from the sea to space makes use of real-time network design - coupled with direct physical, real-world experience. Virtual Motion Simulators and networked analogue research station activities are a great example. The budgets and unique locations of sophisticated facilities such as this, limit the opportunities for broad education and outreach opportunities for a wide field of young professionals. We ask, what can be achieved with a stone-soup build combining expert human resources with limited time and budgets, with commonly-available technical resources, good will, good attitudes and reasonable proximity to a wireless network and local pool? This paper outlines the challenges and discoveries arising from an ambitious workshop designed to introduce participants of the International Space University Southern Hemisphere Summer Space Program to the rigors of EVA (Extra Vehicular Activity or spacewalk) and the complexities of working in neutral buoyancy facilities (WET) and interdisciplinary networked environments (DRY). Conducted with two teams of 20 people, over two days, and across two-locations, the EVA simulation training exercise aimed at challenging and connecting the activities of participants in the water with those of a remote mission control. The mission objective was to perform a simulated EVA to complete the installation of the 'D'Under Arm (an Australian response to the Canadian Arm). Under the supervision and remote control of a mission control center, the spacewalkers, wearing regular SCUBA gear in a 3-meter deep pool, were to egress through an airlock (simulated by hula hoops); transport hardware and tools to the work-site using specific tethering protocols; complete the hardware installation with semi-real time rudimentary instructions from mission control; attach a calibration tool to the end of the installation; maneuver the 'D'Under Arm to perform an inspection, and translate back to the airlock with their tools. We highlight the activities to report on the lessons-learned and the recommendations for future low-cost educational EVA Simulations, covering aspects including operational design considerations for the systems installation, the configuration and operation of crew aids, tools, communications and operational protocols.