

**THE MARS LAB: A MISSION TO ENGAGE STUDENTS WITH SCIENCE AND ENGINEERING.** C. A. Oliver<sup>1</sup>, J. A. Fergusson<sup>2</sup>, J. Oliver<sup>3</sup>, I. Kingsley<sup>4</sup> and C. Browne<sup>5</sup>. <sup>1</sup>Australian Centre for Astrobiology, University of New South Wales, Sydney, carol.oliver@unsw.edu.au

**Introduction:** The *Mars Lab* is a science and engineering-based immersive and spatial experience delivered in person and via the Internet. The project was created in partnership between three organisations: the Australian Centre for Astrobiology at the University of New South Wales (lead), the Australian Centre for Field Robotics at the University of Sydney and the Museum of Applied Arts and Sciences, Sydney.

The *Mars Lab* is aimed at addressing a number of issues. Difficulty in engaging school students with science is a problem reported internationally, including in Australia. A number of reasons are thought to be in play including students not being able to identify with science [1]. It is also generally agreed that traditional school science stands in stark contrast to how science is actually undertaken [2]. There is a wealth of literature that demonstrates the classroom portrayal of science and the transmissive (teacher lectures, students take notes) approach to teaching science is at odds with science practice [3] [4], making it difficult for students to understand how science is undertaken. There is evidence that students hold some misconceptions about the processes of science [5] [6] and that their attitudes to science become less positive as they move from primary (elementary) school through secondary (high) school years [7] [8]. Attitudes to science affect science learning and are closely linked to science learning outcomes [9].

The *Mars Lab* project utilizes a purpose-built 140 square meter scientifically correct Mars Yard located in the familiar but informal learning environment of a museum. There are three research grade experimental rovers, which both researchers and school students use. Mars research is used as the inspirational context for three science curriculum-linked education programs that are aimed at increasing student engagement with science. The project is delivered directly to classrooms across Australia and internationally as well as being available to schools for in-person experiences.

Student pre and post attitudes to science surveys helped to modify the project as development progressed over 15 months in 2013 and 2014. The most significant results came from student and teacher post experience interviews and teacher post surveys, which showed the project had produced unexpectedly high engagement in the employability skills of communication, team-building, creative thinking and problem solving as well as an understanding of science research as a concept that is different from school science.

We will present the project visually, including describing several innovative tools that address the challenges of technology in schools, the building of a virtual spectrometer that uses real data from the Mars Rover Curiosity to facilitate student research, and the presenting of a number of video-conferences bringing NASA scientists and engineers and

other experts together with hundreds of students spread across Australia. Results to date will also be presented.



NASA Administrator Charles Bolden (far right) with US Ambassador to Australia John Berry (far left) both on one of two visits to the Mars Yard in Sydney

**References:** [1] Lyons T. and Quinn F. (2010) *Understanding declining science participation in Australia (University of New England report)* [2] Wong S. and Hodson D. (2009) *Science Education* 93 (1) 109-130, [3] Kind P. and Kind V. (2007) *Studies in Science Education* 43 (1) 1-37 [4] McWilliam E. et al. (2008) *Journal of Science Education and Technology* 17 (3) 226-235 [5] Lederman N.G. (2007) *Handbook of research on science education* 831-879 [6] Deng F. et al. (2011) *Science Education* 95 (6) 961-999 [7] Thomson S. et al. (2008) *TIMSS Australia Monograph No.11, ACER, Melbourne* [8] Thomson S. et al. (2012) *TIMSS and PIRLS 2011, ACER, Melbourne* [9] Alsop S. and Watts M. (2003) *International Journal of Science Education* 25(9) 1043-1047.