A Decade of Lunar Night Survival Strategies and Technologies Developed at Canadensys Aerospace. J. Newman[1] and C. D. Author[2], [1]Canadensys Aerospace Corporation (Bolton, Ontario, Canada), [2]Affiliation for second author (full mailing address and e-mail address, if desired).

Introduction: Global interest in space exploration, especially returning to the Moon and venturing on to explore Mars, is at a level not seen since the Apollo era. At Canadensys Aerospace, however, this interest never waned. While global lunar mission developments slowed in 2012 as the US pursued its Flexible Path and the Asteroid Redirect Mission, Canada steadily continued its lunar mission development; in particular at Canadensys, where a strategic decision was taken to focus on micro- & nano-class missions and the enabling technologies required for them to survive and operate for meaningful mission durations in cislunar & deep space, as these would tend to scale favourably to larger systems. By the time international attention had shifted back to the Moon in 2017, Canadensys was already deep into development of a range of small-mission technologies and strategies for lunar exploration, from avionics & thermal control, mechanical systems, vision & sensors, to hibernation & wakeup controllers, and strategic rover path planning, all targeting flight-readiness for the emerging wave of new, more commercially-coupled space exploration missions, including survive-the-night capabilities.

Today, Canadensys has leveraged its efforts to manifest lunar night-qualified avionics and cameras on several upcoming launches, and is developing rover systems and standalone science instruments ranging from less than 0.1 to greater than 1000 kg capable of surviving lunar night using a variety of passive and active approaches. In particular, Canadensys has submitted a proposal to lead the Canadian Space Agency's Lunar Rover Mission (LRM) flight program, which aims to land a 30 kg rover in the lunar south polar region in 2026 and operate for 5 months, performing geology and volatile science as well as key technology demonstrations in the areas of mobility, communications, navigation, thermal control, and others. This paper will discuss the path taken by Canadensys in achieving these developments, and project forward to future capabilities.