Motivation

• Simulation use is widespread and increasing

• Strategic importance for Canada

• Carleton leadership in simulation education and research
“Pilots at airlines receive almost no hands-on training in how to recover from aerodynamic stalls and other extreme scenarios, according to the National Transportation Safety Board (NTSB). The reason for the glaring shortfall is that current flight simulators, the backbone of airline training programs, cannot accurately reproduce such calamities.

... Even advocates of the improved simulators say they are not foolproof. For instance, the machines can't reproduce violent motions that a real plane encounters when it goes out of control.”
Objective

- To develop a unique, state-of-the-art, complete, and flexible simulation facility at Carleton
  - Novel motion platform (large range of motion, easily controllable, efficient, compact, quiet, electrically actuated, affordable)
  - Reconfigurable
  - Full sensory cueing
  - HLA compliant (IEEE 1516)
Carleton University Simulator Project - CUSP

Software
- In-house developed distributed computing environment (CUSP Simple Infrastructure - CSI)
- Interface to X-plane flight simulation software

Angular Actuation
- 3 powered 8 inch mecanum wheels provide unbounded rotation
- 24 passive mecanum wheels support the capsule in all directions

Sphere
- 9.5 foot composite spherical capsule is integral to the actuation system
- Self-contained computing and pilot interface components
- Pilot experiences immersive flight simulation

Atlas Simulator Facility

Translational Actuation
- 3 orthogonal translations provided by commercial MOOG Stewart-Gough platform
- Capable of developing high acceleration using 6 prismatic actuators and 3 passive pneumatic struts
2016 / 2017 Overview

• Finish Commissioning Atlas
  – Complete calibration
  – Benchmark testing, MOOG, and motors
  – Design refinement (where required)

• Integrate developed technology
  – Vehicle modelling
  – Washout control
  – Orientation sensing, VOS, and IOS

• Applications
  – Road vehicle model
  – Rigid inflatable boat
  – Extra 300 aircraft
• For additional information
  – Web: http://cusp.mae.carleton.ca
  – Project manager: John.Hayes@carleton.ca; tel. 5661
  – Contact current CUSP students or lead engineers
  – Winter design review: April 7, 09:00-18:00, University Centre