

One University of Illinois Graduate's Experience

Presented by: John Bignell

Friday 2/25/2011

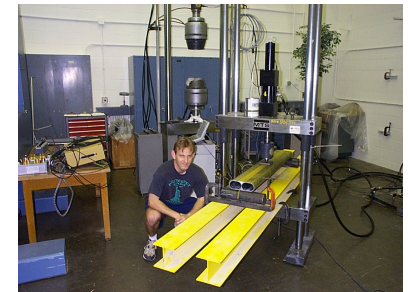
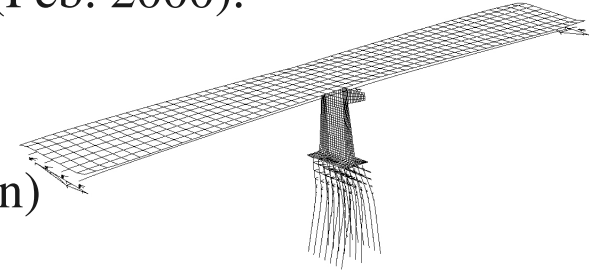
A Little Bit About Me

- Born and Raised in New Mexico
 - ▶ Socorro – 7000 people
- Interest in Engineering
 - ▶ Balsa Wood Bridge Competition (5th - 8th Grades).
- Attended the University of Utah
 - ▶ BS in Civil and Environmental Engineering (2000)
 - ▶ Geotechnical and Structural Engineering
 - ▶ Undergraduate Research
 - Seismic strengthening of an existing interstate highway bridge bent using FRP composites.
 - Shear strengthening of concrete T-joints using FRP composites
 - Investigation of the performance of a Geopier foundation system.
 - ▶ Activities: AISC Steel Bridge Competition, ASCE



My Time at the University of Illinois

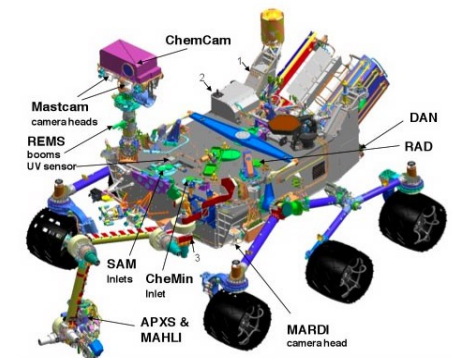
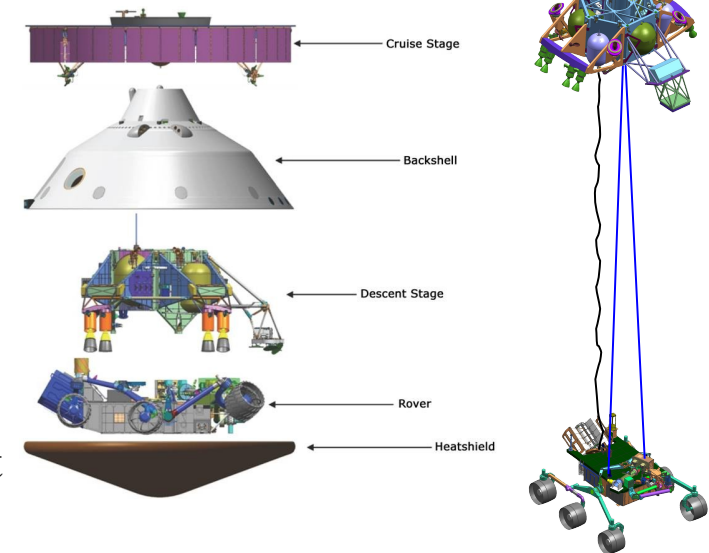
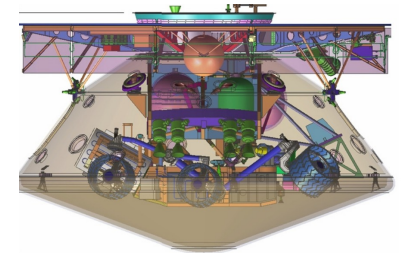
- Attendee of the 1st University of Illinois Recruitment Weekend (Feb. 2000).
 - ▶ Uncertain about whether I should come to Illinois.
 - ▶ Uncertain about whether to Pursue a PhD after attaining a MS.
- Decided Upon Illinois (over Berkeley, Stanford, and Washington)
- Worked as a Graduate Research Assistant.
 - ▶ MS Work (1.5 Years or 3 Semesters)
 - _ Analysis and Test of Filament Wound Scale Glass and Carbon Fiber Reinforced Polymer Bridges.
 - _ Development of a Glass Fiber Reinforced Polymer T-Joint Using Injection Molding.
 - ▶ PhD (4.5 Years)
 - _ Fragility Analysis of Wall Pier Supported Highway Bridges on Southern Illinois Priority Emergency Routes.
- Professional Benefits of Attending the University of Illinois
 - ▶ Large University that is Strong in all Areas of Engineering.
 - _ Special Programs: Computation Science and Engineering Certificate Program.
 - _ Civil and Environmental Engineering Alumni Teaching Fellowship.
 - ▶ World Renowned Reputation in Engineering.
 - _ Graduates have an excellent reputation throughout academia and industry.
 - _ Graduates are strongly recruited at industry leading engineering firms, national laboratories, and major institutions.
 - ▶ Excellent Resources (Library, Test Facilities, Computational - NCSA)



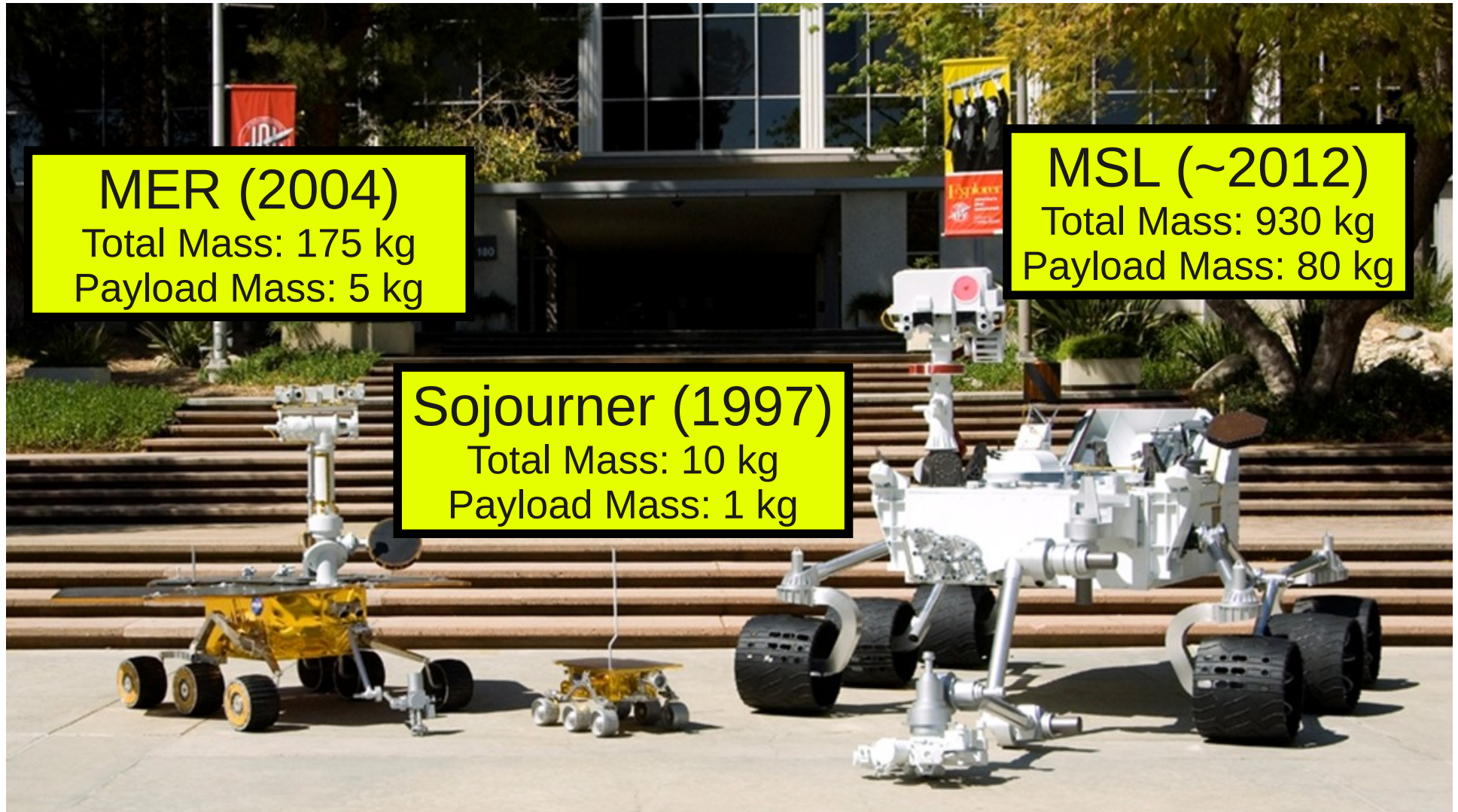
After Illinois

- Jet Propulsion Laboratory (JPL)
 - ▶ One of 11 NASA Centers
 - ▶ Located in Pasadena (Southern California)
 - ▶ Managed by the California Institute of Technology (Caltech)
 - ▶ Specializes in Robotic Exploration of the Solar System
 - _ Viking Landers (Mars 1976)
 - _ Voyagers (Outer Solar System 1977)
 - _ Galileo (Jupiter 1989) and Cassini (Saturn 1997)
 - _ Mars Pathfinder (97) and Mars Exploration Rovers (2003)
 - _ Mars Science Laboratory (2011)
- Spacecraft Structures and Dynamics Department.
 - ▶ First Assignment was on the Mars Science Laboratory Project
 - _ Landed/Rover Mission to Mars
 - _ Scheduled Launch: Fall 2011 (with Arrival at Mars Mid 2012)
 - _ Objective: Qualitatively assess a local region of Mars for its current and past habitability.
 - ▶ Primary Responsibilities on MSL
 - _ Design, Analysis, and Test of the Rover Chassis and Suspension Components.

Reference: <http://marsprogram.jpl.nasa.gov/msl/>



MSL vs. MER and Sojourner



Reference: <http://marsprogram.jpl.nasa.gov/msl/>

MSL Videos

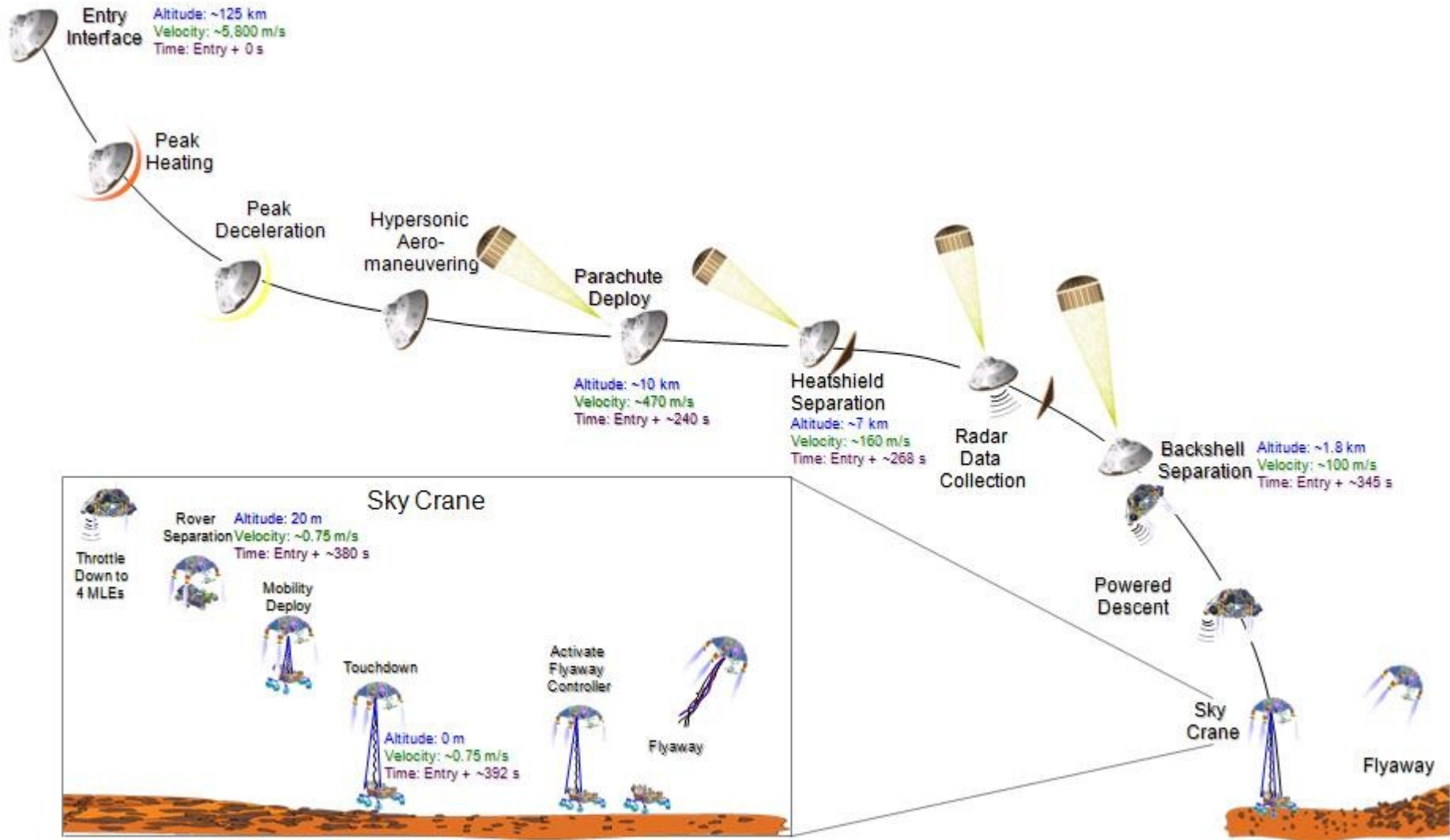
- MSL EDL Sequence

- ▶ http://marsprogram.jpl.nasa.gov/msl/multimedia/videos/movies/MSLAnim_480_Cap.mov

- Sky Crane FMDT Test

- ▶ <http://marsprogram.jpl.nasa.gov/msl/multimedia/videos/movies/msl20110119/msl20110119-640.mov>

EDL Sequence



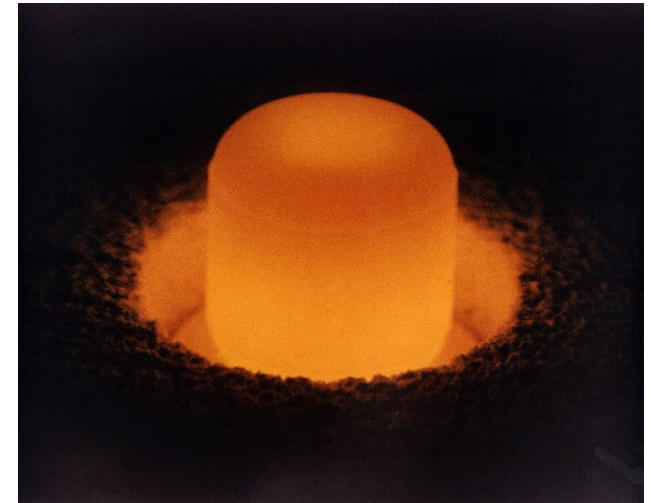
Reference: <http://marsprogram.jpl.nasa.gov/msl/>

After JPL

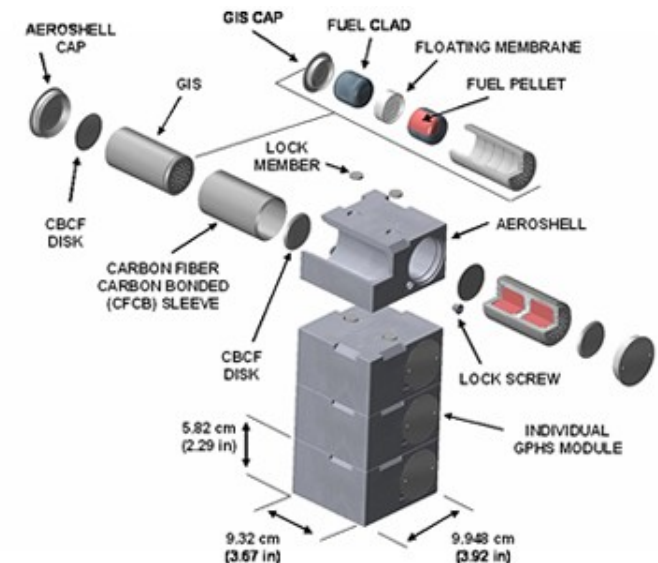
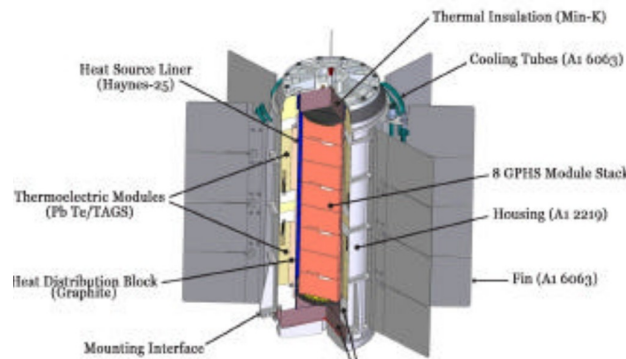
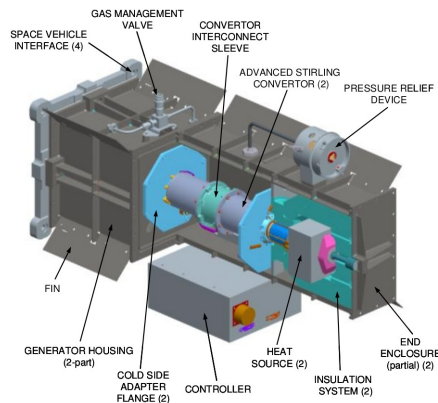
- Sandia National Laboratory
 - ▶ One of 19 DOE Laboratories
 - ▶ Located in Albuquerque (New Mexico)
 - ▶ Managed by the Sandia Corporation
 - ▶ Grew out of the Manhattan Project following the development of the first atomic bomb.
 - ▶ National Security Laboratory with Several Mission Areas
 - Nuclear Weapons Stewardship
 - Energy and Infrastructure Assurance
 - Nonproliferation
 - Defense Systems and Assessments
 - Homeland Security and Defense
- Thermal and Structural Analysis Department
 - ▶ Currently Work on the Radioisotope Power System Launch Safety Team
 - ▶ Primary Responsibilities: Blast and Impact Analysis.

Radioisotope Power System

- RPS convert the heat generated by the decay of Pu-238 oxide into usable energy.
- RPS enable exploration of the outer planets where solar energy power systems are impractical.
 - ▶ Major NASA missions utilizing RPS systems since then include.
 - _ Apollo 12 through 17 – Seismic Experiments
 - _ Pioneer, Viking, Voyager, Galileo, Ulysses, Cassini, and MSL
- Safety Issues
 - ▶ Pu-238 is an Alpha Emitter (Only Light Shielding Required).
 - ▶ Respiration/Ingestion of Particles (Resulting From a Launch Accident) Poses Some Safety Concerns.
 - ▶ U.S. law requires that the risk posed to the public by the launch of any spacecraft with radioactive materials on board be quantified.



Reference: <http://nuclear.gov/space/neSpace2a.html>



Launch Accident

- Launch Accidents Do Happen (Delta II Rocket Launch Accident)
 - ▶ <http://video.google.com/videoplay?docid=5606033304791886669#>



- Impact Analysis (Example)

Reference: <http://www.sandia.gov/ASC/library/index.html>

