Common Instrument Interface (CII) Workshop 1

CII for Earth Science Instruments

Randy Regan
CII Team

21 April 2011
CII Workshop Agenda

- Welcome
- CII Purpose and Goal
- Approach
- Workshop Purpose and Goal
- Outcomes
- CII Working Group/Team
- Level 1 CII Guidelines
- CII Interfaces
- Summary
CII Purpose and Goals

- Common Instrument Interface (CII)
- What is it? What is its purpose?
- Problem statement:
  - NASA’s Earth Science Division (ESD) will be developing secondary payload Earth Science instruments that will need to be matched up with Missions of Opportunity (MoO).
  - How can we improve this matching?
- Proposed solution:
  - If these Earth Science instruments had some common instrument to S/C interfaces then there would be a better possibility of this matching to occur.
Goal:

- To develop a set of Common Instrument Interface (CII) guidelines for Earth Science instruments that will improve the match up with Missions of Opportunity and reduce instrument to spacecraft interface complexity
Approach:

- Form a CII Working Group to work with industry, academia, and other government agencies to see how instrument interface guidelines could be developed to understand the key drivers that help or hinder the matching of these secondary payloads.

- CII Working Group will hold CII Workshops several times a year and also participate in Rideshare conferences.
Workshop Purpose:

- Give an overview of CII
- Discuss some MoOs
- Cover similar CII lessons learned
- Hold sessions on each of the instrument interfaces to engage S/C and instrument developers in the development of these CII guidelines.
Outcomes:

- CII Guideline documents will be briefed to the ESD on a regular basis to provide feedback on the Earth Science instrument to MoO accommodations.
CII Team (cont.)

CII Organization

HQ Flight - Dr. Steve Volz

ESSP Program Office
Program Director/Dep. Program Director – Frank Peri/Greg Stover
Mission Manager EV-I - Diane Hope

Special Projects – CII
PO Lead/Chief Engineer - Randy Regan
Business Manager - Cathy Murray-Wooddell
Consultant - John Rogers
Workshop Support - Craig Hutchinson

Project Manager
Dr. Satya Kotaru (LaRC)

Working Group

- International Contacts
  Dr. Satya Kotaru

- JPL Lead
  Dr. Benny Toomarian

- GSFC Lead
  John Carey

- ARC Lead
  Deborah Westley

- MSFC Lead
  Roy Young

HQ
Program Scientist EV-I – Dr. Ken Jucks
Program Executive EV-I – Dr. Mitra Dutta

Management Group
<table>
<thead>
<tr>
<th><strong>ESSP PO &amp; LaRC</strong></th>
<th><strong>JPL: (WG &amp; Testbeds/Simulators)</strong></th>
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<tbody>
<tr>
<td>PO Lead/Chief Engineer - Randy Regan</td>
<td>Management POC - Dr. Steve Bard</td>
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<tr>
<td>Business Manager - Cathy Murray-Wooddell</td>
<td>Lead - Dr. Benny Toomarian</td>
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<tr>
<td>Consultant - John Rogers</td>
<td>Instrument Electronics - Larry Hovland</td>
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<tr>
<td>Project Manager/International POC - Dr. Satya Kotaru (LaRC)</td>
<td>Instrument System Engineering - Michael Brenner</td>
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<td>Workshop Support - Craig Hutchinson</td>
<td>Instrument Data and FSW Management - Ben Bornstein</td>
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<td><strong>ARC: Systems Engineering - Deborah Westley</strong></td>
<td>Instrument Mechanical Engineering - Randy Hein</td>
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<td><strong>MSFC: Systems Engineering - Roy Young</strong></td>
<td>Instrument Thermal Engineering - Eric Sunada, Gaj Birur</td>
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<td>Engineering - Raul Romero</td>
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<td><strong>GSFC:</strong></td>
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<td>Management POC - Barbara Pfarr</td>
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<td>Lead - John Carey</td>
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<td></td>
<td>Instrument Interfaces - Jeff Hein</td>
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<td>Systems Engineering - TBD</td>
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<td>Instrument System Engineering - Evan Goldstein</td>
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<td>Testbeds/Simulators - TBD</td>
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CII Interfaces

- Interfaces
  - Data
  - Power
  - Instrument modes
  - Power distribution
  - Mechanical / Structural
  - Mass / volume constraint
  - Moment / CG constraint
  - Contamination
  - Pointing: Degrees of movement, launch lock
  - Alignment, optical bench
  - Thermal Interface
  - Field of View
  - Environments
<table>
<thead>
<tr>
<th>Requirement ID</th>
<th>Function</th>
<th>Guideline</th>
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<tr>
<td>LEVEL 1-1</td>
<td>Priority</td>
<td>The instrument should be classified as a secondary payload</td>
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<td>LEVEL 1-2</td>
<td>Operational Lifetime</td>
<td>The instrument design operational lifetime should be $\leq 2$ years (based upon a mission risk classification of Class C or D and NPR 8705.4)</td>
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<td>LEVEL 1-3</td>
<td>Power</td>
<td>The orbital average power required by the instrument should be $\leq 200$ Watts</td>
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<td>LEVEL 1-4</td>
<td>Mass</td>
<td>The mass of the instrument should be $\leq 200$ Kg</td>
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<td>LEVEL 1-5</td>
<td>Data Rate</td>
<td>The instrument data rate should be $\leq 1.5$ Mbps</td>
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<td>LEVEL 1-6</td>
<td>Electrical Ground</td>
<td>The instrument should electrically ground to a single point on the spacecraft</td>
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<td>LEVEL 1-7</td>
<td>Software Classification</td>
<td>The instrument software should be Class C</td>
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<tr>
<td>LEVEL 1-8</td>
<td>Thermal</td>
<td>The instrument should be thermally isolated from the spacecraft</td>
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The CII guidelines are provided to increase instrument compatibility with spacecraft so that the maximum number of Missions of Opportunity (MoO) can be realized.

The CII guidelines are designed to allow both the instrument and the spacecraft providers to work independently through the early phases of the applicable design processes.

Final implementation details will still require some resolution between the instrument and the spacecraft once paired in an MoO via the Spacecraft to Instrument ICDs.

CII Workshops provide a method to engage S/C and instrument developers in the development of these CII guidelines.