Ground System Architectures Workshop
"Innovation on the Ground"
Manhattan Beach Marriott, Manhattan Beach, Calif.
March 1–4, 2010

AEROSPACE
Assuring Space Mission Success

**Session 12A
5:30 pm Wednesday
Compatible Satellite C2**

NASA's Participation in Joint SatOPS Compatibility Efforts 2009-2010

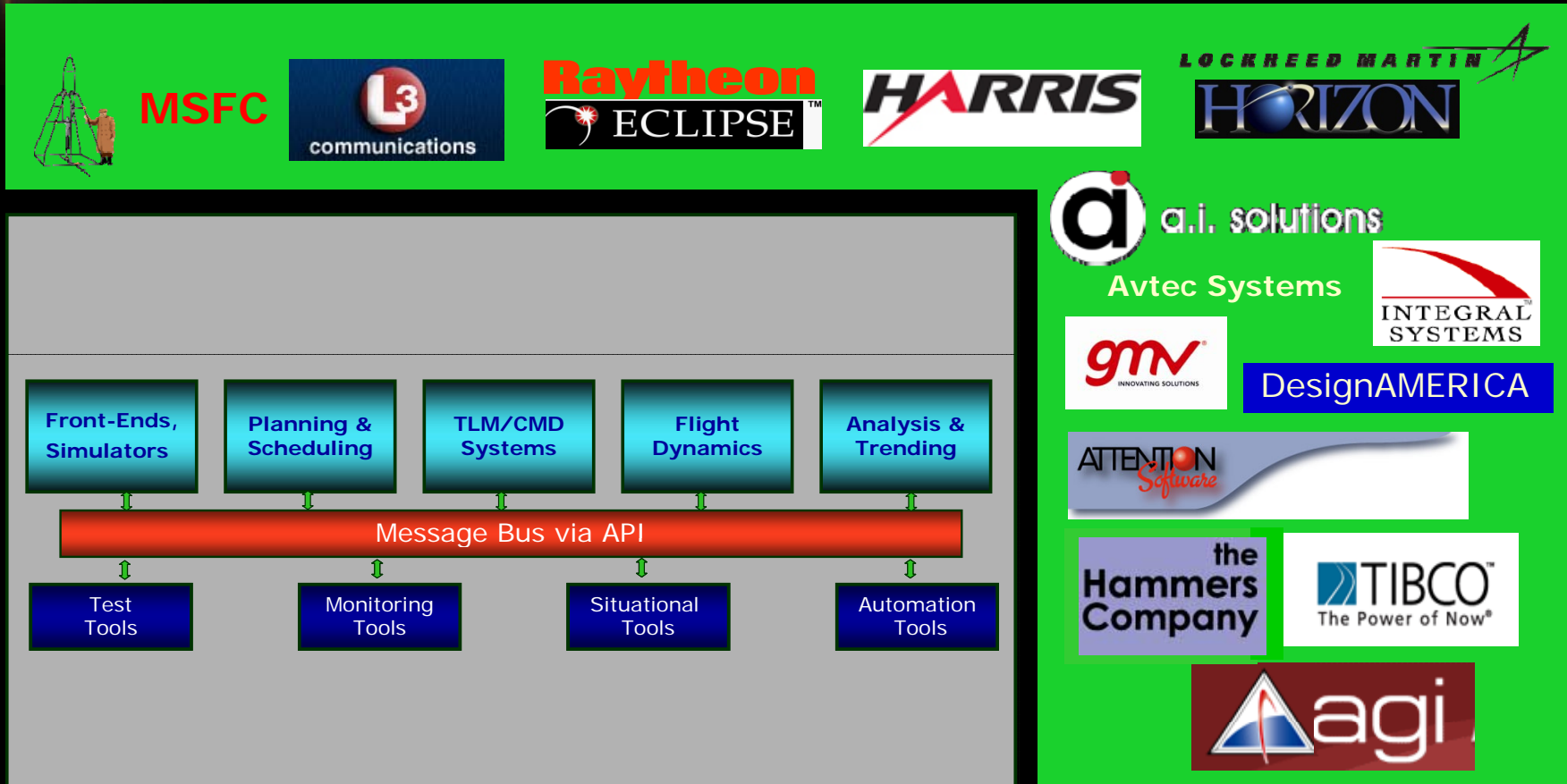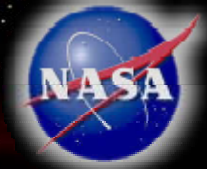## Dan Smith

NASA Goddard Space Flight Center

3 March 2010

Introduction

- Many U.S. government organizations build or fly space systems:
  - NASA, NOAA, Navy, Air Force, NRO, ORS. Others?
  - Through the Joint SatOps Compatibility Committee (JSCC) we have increased the grass-roots interaction between many of these organizations
  - We all deal with many of the same challenges
    - More rapid deployments, lower budgets
    - Advancing technologies – frameworks, clouds, virtualization
    - Evolving concepts – automation, situational awareness, enterprise mngt.
    - Standardization – formal or by common use

- "There is an inherently governmental role in creating the business case for contractors and commercial product vendors to move in directions beneficial to multiple government space organizations."

NASA/GSFC's "GMSEC" Architecture

MSFC

L3 communications

Raytheon ECLIPSE™

HARRIS

LOCKHEED MARTIN HORIZON

a.i. solutions

Avtec Systems

INTEGRAL SYSTEMS

gmv INNOVATING SOLUTIONS

DesignAMERICA

ATTENTION Software

Front-Ends, Simulators	Planning & Scheduling	TLM/CMD Systems	Flight Dynamics	Analysis & Trending

Message Bus via API

Test Tools		Monitoring Tools		Situational Tools		Automation Tools

the Hammers Company

TIBCO The Power of Now®

agi

The Goddard Mission Systems Evolution Center (GMSEC) provides a publish/subscribe framework to enable rapid integration of commercially available satellite control products.

NASA/GSFC's Efforts Since GSAW 2009 (1 of 2)

◆ Supported establishment of Joint SatOPS Compatibility Committee following GSAW 2009
   ❖ Primary NASA participation from NASA Headquarters and NASA GSFC
   ❖ GSFC GMSEC Team and Standards Group participation

◆ Continued development of the GMSEC system
   ❖ Proof of concept labs running at other JSCC locations
   ❖ NASA continues to fund basic system development and maintenance
      ✦ Introduced IBM's Websphere as a pub/sub communications bus
      ✦ Adding local environmental monitoring (temp/humidity, etc.)
   ❖ Collaborations started for GMSEC core enhancements
      ✦ Enterprise communications
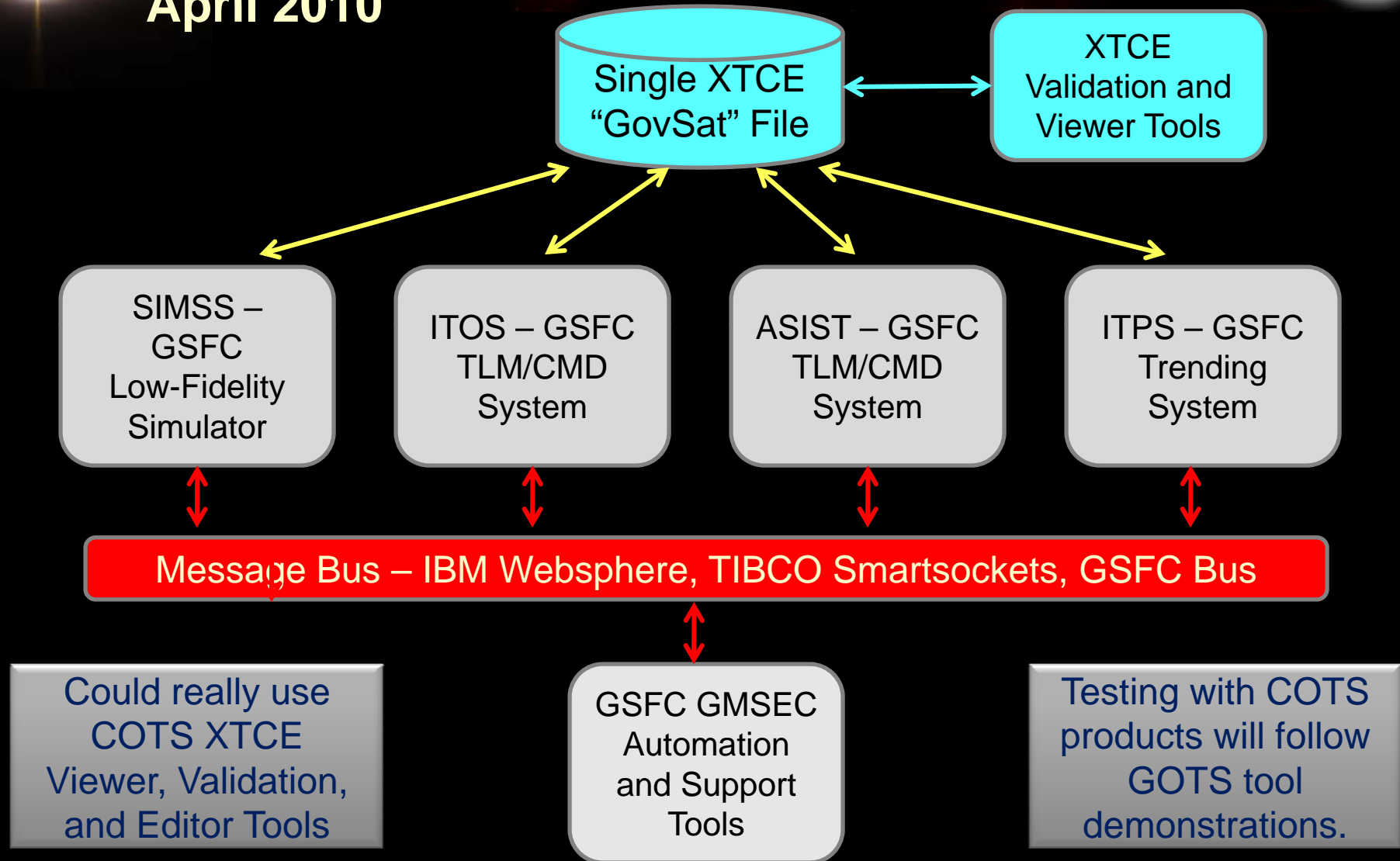   ✦ Security
      ✦ NDDS as a pub/sub communications bus

NASA/GSFC's Efforts Since GSAW 2009 (2 of 2)

◆ Pushed for the adoption of XTCE for TLM/CMD list definitions
  ❖ Proceeded with plan presented at GSAW 2009
  ❖ Developed "GovSat" – a tailored XTCE subset for CCSDS missions
    ✦ Documented limited set of XTCE-compliant capabilities and approaches
    ✦ Added field constraints
    ✦ Created populated database for consistent testing
    ✦ Preparing for general industry release of GovSat materials
  ❖ Modified GSFC-internal products to utilize XTCE definitions
    ✦ Full test planned for April 2010
  ❖ Encouraged use of XTCE for upcoming missions
    ✦ Missions at several NASA Centers now considering XTCE
    ✦ ORS and Naval Research Labs will soon be testing with XTCE
  ❖ Will encourage industry participation in 2010
    ✦ Adapters need to COTS tools can accept XTCE files
    ✦ New XTCE support tools suites needed

NASA/GSFC XTCE "GovSat" Validation Test April 2010

Single XTCE "GovSat" File

XTCE Validation and Viewer Tools

SIMSS – GSFC Low-Fidelity Simulator

ITOS – GSFC TLM/CMD System

ASIST – GSFC TLM/CMD System

ITPS – GSFC Trending System

Message Bus – IBM Websphere, TIBCO Smartsockets, GSFC Bus

Could really use COTS XTCE Viewer, Validation, and Editor Tools

GSFC GMSEC Automation and Support Tools

Testing with COTS products will follow GOTS tool demonstrations.

Now What?   NASA Priorities

◆ NASA believes in the value of the JSCC

  ❖ Let's keep it going as a broad forum

◆ Time for increased industry participation

  ❖ JSCC can consider position papers for future direction

◆ Work on common challenges

  ❖ Enterprise level situational awareness

  ❖ Security

  ❖ Increased use of inter-agency sharing and COTS

◆ Broad acceptance of standards

  ❖ CCSDS packetized data

  ❖ XTCE

  ❖ Delay/Disruption Tolerant Networking (DTN)