Maximizing Knowledge to Improve Space Transportation System Development

"Experience is knowledge. Everything else is information." — A. Einstein
♦ Approach and Landing Test Vehicle (ALTV)
  • Demonstrates system performance in the approach and landing environments
  • Validates aerodynamic stability, structural integrity, and automated operations

♦ Orbital Vehicle (OV) Technologies Research and Development (R&D)
  • Thermal Protection Systems
  • Hot Structures Control Surfaces
  • Lithium-Ion Batteries
  • Aero-database Improvements

Reduces Risk Through Real-World Hardware Experience
♦ ALTV development is nearing completion, with high-altitude drop tests planned in 2005.

♦ Progress has been made in:
  • Automated Controls
  • Composite Structural Design
  • Operations Planning

♦ OV Technologies R&D is ongoing.
  • Selected to reduce technical risk for future missions

Experience Relevant to Future Space Transportation Systems
Policy

- Follows NASA Procedure and Regulation 7120.5
- Management Leads by Example
- Sharing Information Is Expected and Rewarded

Plan

- States Purpose and Expectations
- Includes Policy, Process, and Forms

Capturing Lessons to Improve Products and Processes
Process

- Capture
- Review
- Store
- Disseminate
  - Briefings
  - Staff Meetings
  - Document

Making Experience Available as Knowledge
♦ Establish a consistent methodology for defining upper- and lower-level schedules across all Project participants.

♦ Establish a single integrated Project schedule, including predecessor and successor links between activities.

♦ Establish a weekly forum for reviewing and statusing the integrated schedule to ensure communication between all Project participants.

_A Single Integrated Schedule Is Critical to Keeping all Facets of a Project Synchronized_
My Experience:
External Interface Definition

- Develop a context diagram for the entire system to ensure that all external interfaces are identified early in the Project.

- Launch Services Provider should supply a Payload Accommodations Handbook to clearly define launch vehicle capabilities, constraints, and requirements.

- Agreement with interfaces and resolution of interface issues should be resolved by Preliminary Design Review.

- Document verification responsibilities in Interface Control Documents that are agreed to and signed by both sides of the interface.

Clearly Defining External Interfaces Results in Timely Definition of Requirements and Constraints
Work risks on a weekly basis at the subsystem level.
- Increases efficiency
- Facilitates risk coordination among engineers

Software subsystem team held weekly contractor meetings and discussed risk as a regular agenda item.
- Risks were coordinated before Risk Team and Board meetings
- Facilitated process and decreased need for actions

Lead engineers in both technical and programmatic roles should include risk discussions as an integral part of weekly contractor meetings.
Visual inspection of vehicle and direct communication with engineering/manufacturing staff gives customer better understanding of problems encountered with hardware installations.

Full-time customer support is highly recommended to:

- Communicate progress
- Better understand problems
- Report any issues/concerns to management in a timely manner.

Full-time Factory Support Increases Customer Awareness of Vehicle Hardware Installation Progress
♦ Make lesson capture and dissemination a natural part of a learning culture.

♦ Provide easy-to-use tools that facilitate capture and dissemination.

♦ Lead by example.

"Experience is knowledge. Everything else is information." A. Einstein