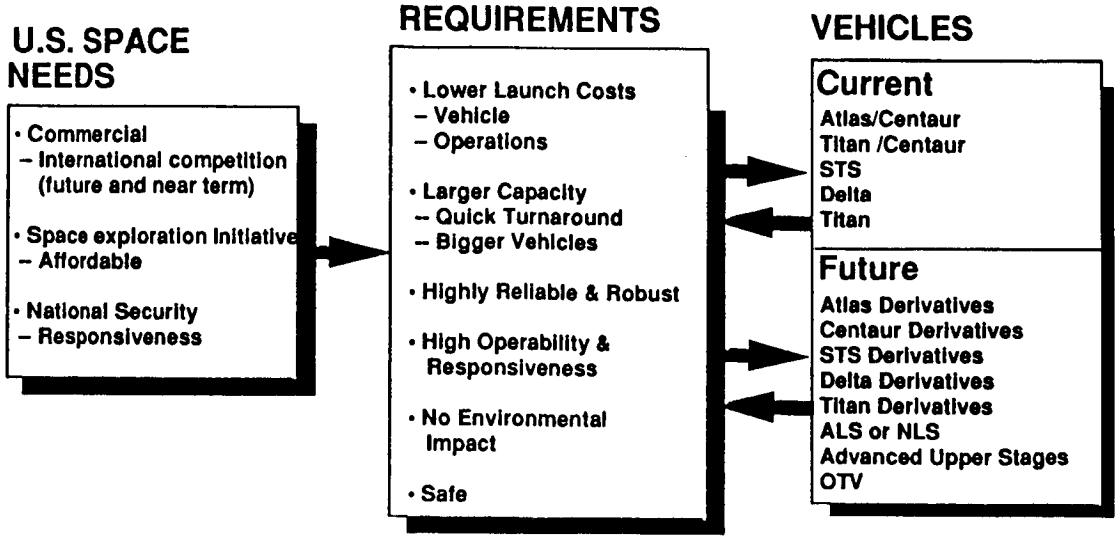
PRESENTATION 4.3.11

GENERAL DYNAMICS
Space Systems Division

PROPULSION TECHNOLOGIES FOR NEAR TERM

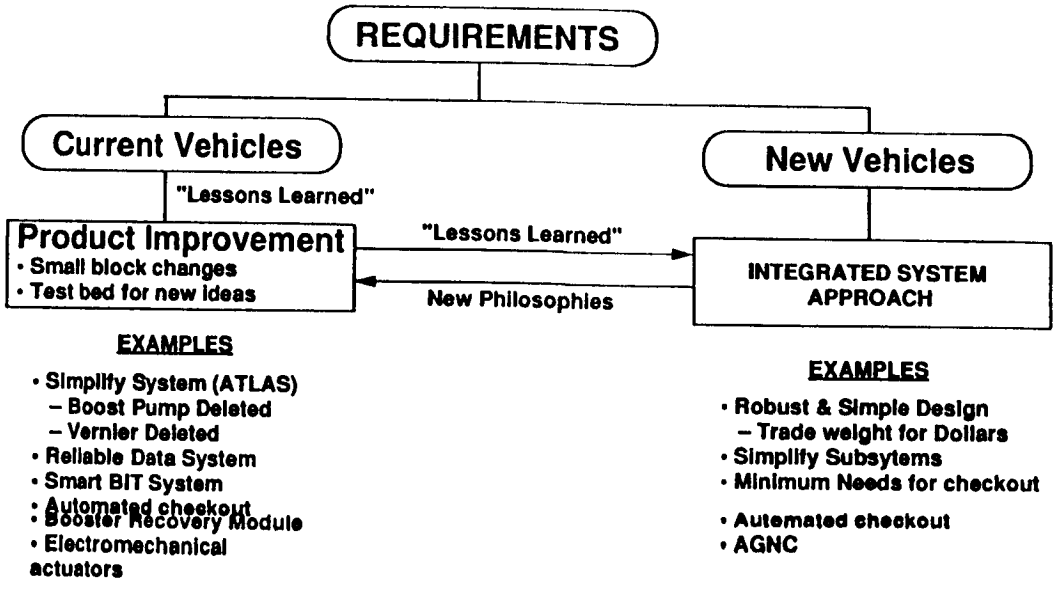
GOPAL MEHTA

PROPULSION SYSTEM REQUIREMENTS AND CONSIDERATIONS



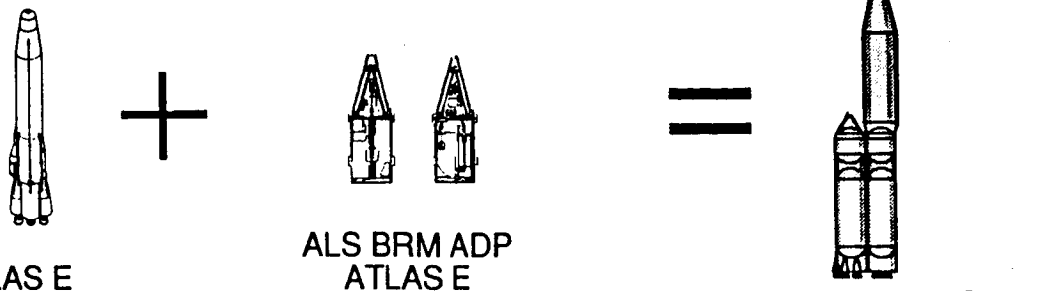
There Are Similar Requirements For Short Term And Long Term, Commercial And National Needs

COST EFFECTIVE APPROACH



Current Vehicles Are Prime Candidates For Development Of New Technologies Which Benefit Near TermCommercial As Well As Far Term National Needs

EXAMPLE: BOOSTER RECOVERY MODULE
Simple Recovery/Partial and Limited Reuse



ATLAS E STAGE & HALF VEHICLE

ALS BRM ADP ATLAS E THRUST SECTION RECOVERY SYSTEM PODS

ALS BRM CONCEPT

- Atlas E Vehicle/Flight Demonstration
  - Vehicle Design Similar to ALS BRM
  - Near Identical Environments
  - Similar Type Recovery System
  - Similar Corrosion Prevention Operations
- ALS BRM ADP Objectives
  - Assess BRM Cost Feasibility
  - Define Engine Reuse Requirements
  - Define Engine Test Conditions
  - Evaluate Refurbishment Goals
  - Identify Reuse Operations/Facilities

The Atlas E flight experiment provides a technically sound, cost effective approach to simulate real-life conditions and provides a sanity check for the ALS BRM concept.

COMMERCIAL VEHICLES -- NEAR TERM NEEDS-- EVOLUTIONARY APPROACH

- **Use Current Vehicles To Demonstrate New Technologies & Upgrade To Make Them Competitive**

  EXAMPLES

  - **Electromechanical Actuation**
  - **Integrated Health Monitoring**
  - **Booster Recovery System**
  - **AGNC**
  - **Expert System**
  - **Smart BIT**
  - **Electromechanical Pressure Control**
  - **Critical Failure Detection**

- **Provide New Facilities To Test Uprated Systems**
- **Higher Thrust H2/O2 Engines For Boosters And Upper Stages**
- **Clean Burning Solid Motors**

Evolution of Current Vehicles Lowers Risk Of Flight Failures For New System

CONCLUSIONS

- Similar Basic And Applied Technology Needs Exist For Current And Future Vehicles

- More Emphasis Needed On Evolution Through Demonstration Of New Technologies On Existing Vehicles
  - Improves U.S. ELV Competitiveness
  - Provides Flight Experience And Reduces Risk Of Flight Failures For Future Vehicles