

SPACE TRANSPORTATION
PROPULSION SYSTEMS
SYMPOSIUM

E.G. Woods
NASA/SSC

June 25-29, 1990

NASA
Stennis Space Center

Space Transportation Propulsion Systems
SYMPOSIUM

Development, Manufacturing & Certification
PANEL

Flight Certification
TOPIC

Infusion of Instrumentation Technology (Engine Plume Diagnostics)
Into Operational Test Programs

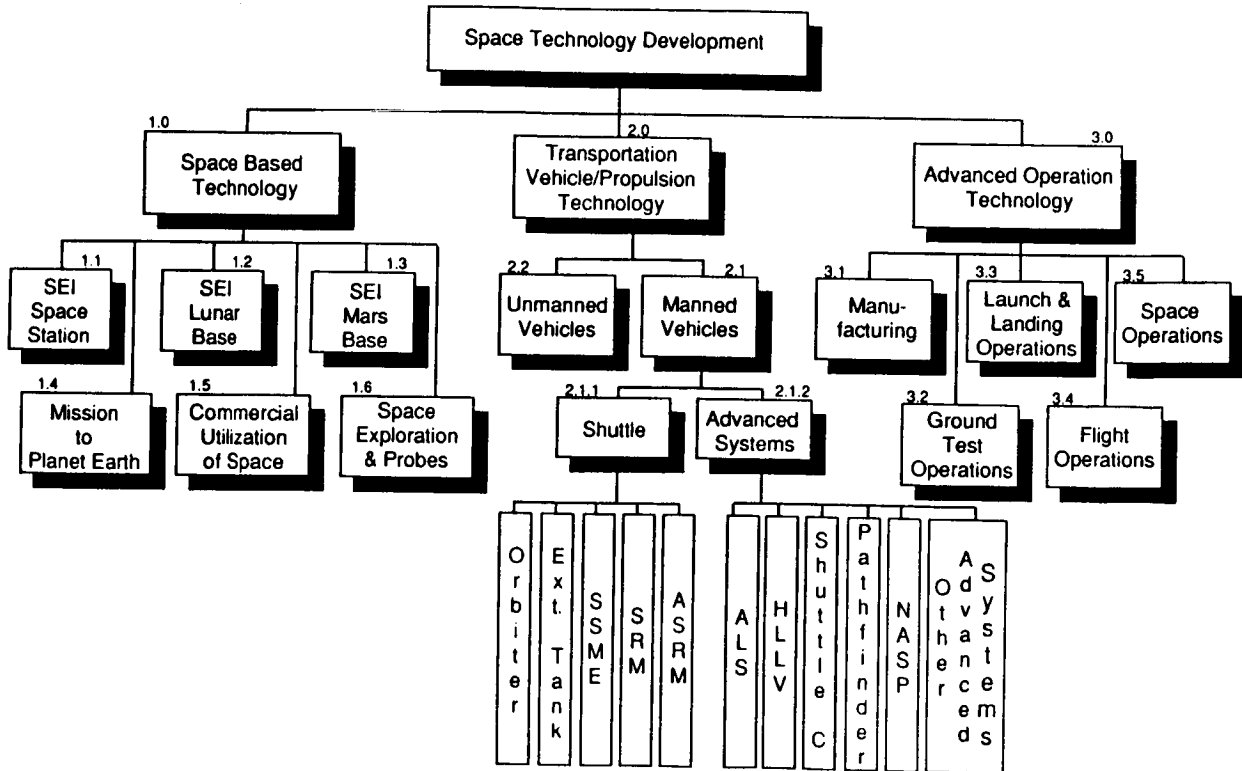
SUBJECT

E.G. Woods
Topic Coordinator
NASA/SSC

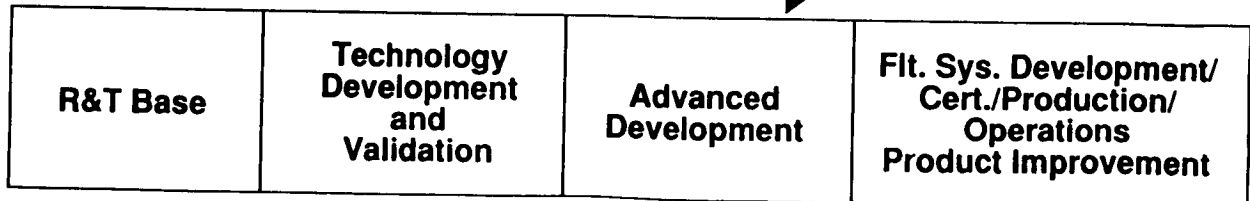
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HIERARCHY OF CIVIL SPACE TECHNOLOGY PROGRAM



EVOLUTION OF TECHNOLOGY DEVELOPMENT



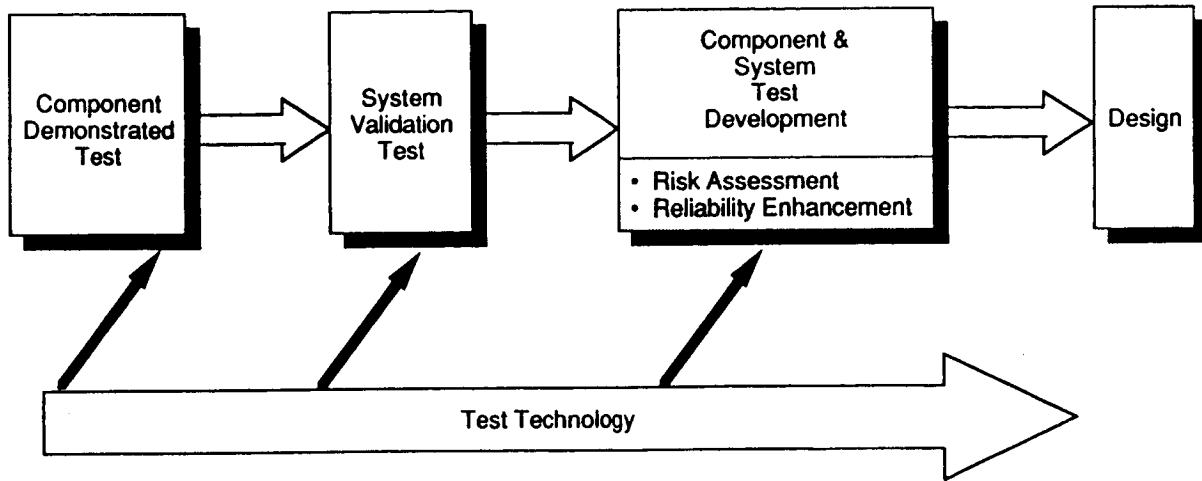
Basic Fundamentals
Far Term, High Risk,
Unfocused

Generic Subcomponent
Subscale Test Rigs
Component, System
Test Beds,
Focused

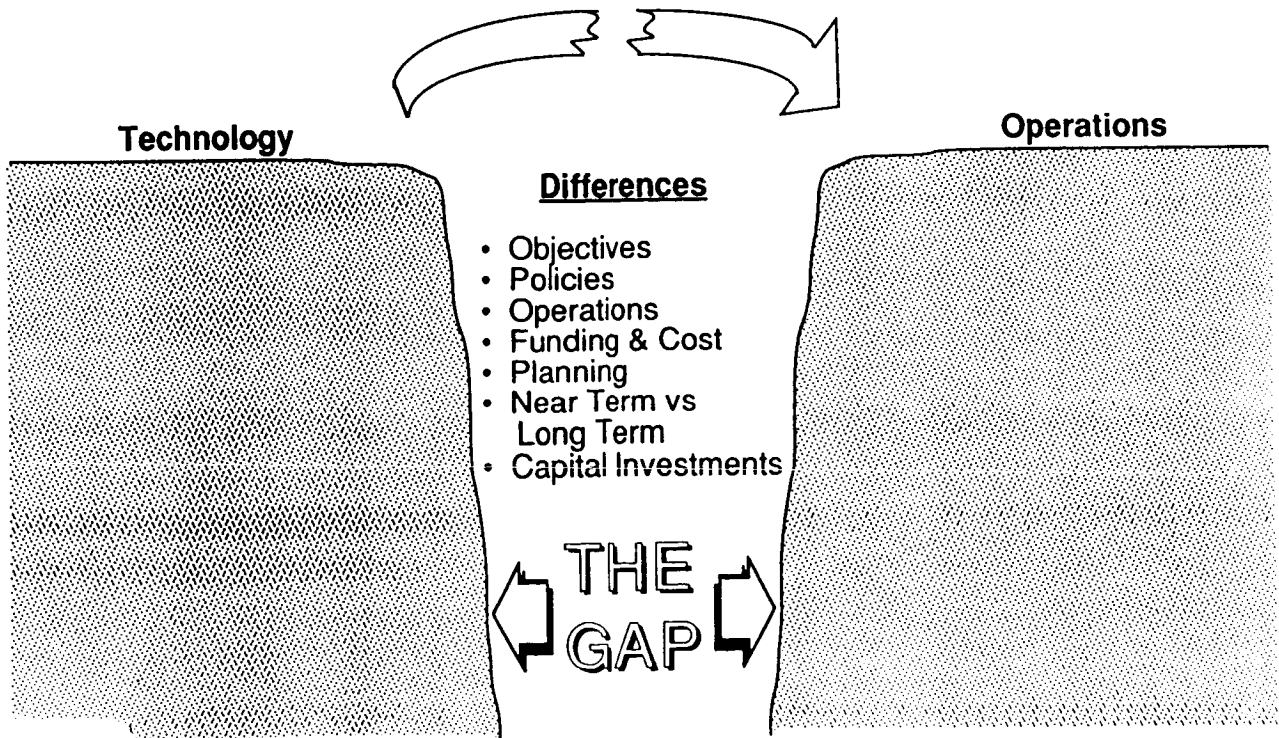
Prototype System
Demonstrations,
Point Designs

Products

TECHNOLOGY VALIDATION PROCESS



POTENTIAL IMPACTS



IMPACTS OF TECHNOLOGY INFUSION INTO FLIGHT CERTIFICATIONS

Capability	vs	Obsolescence
Automated	vs	Labor intensive
Timely	vs	Delays
Effective	vs	Inefficiency
Synthesis	vs	Repeated duplication of efforts
Quality	vs	Poor simulation
Knowledge and confidence	vs	Loss of expertise

POTENTIAL SOLUTIONS

- Proceed programs with technology development and continue technology options up to critical design review
- Early and continued communications between technology and operational elements
- Adequate, stable funding of technology problems
- Schedule and plan technology demonstration "windows" into program operations
- Cross-train personnel in technology and operational policies and procedures
- Pre-planned product improvements at three year cycles
- Plan for technology improvements for Test-Launch-Landing, and Ground Support systems, as well as, vehicle transportation systems
- Identify blind spots in operations
- Establish "ownership" of technology enhancements by operations personnel

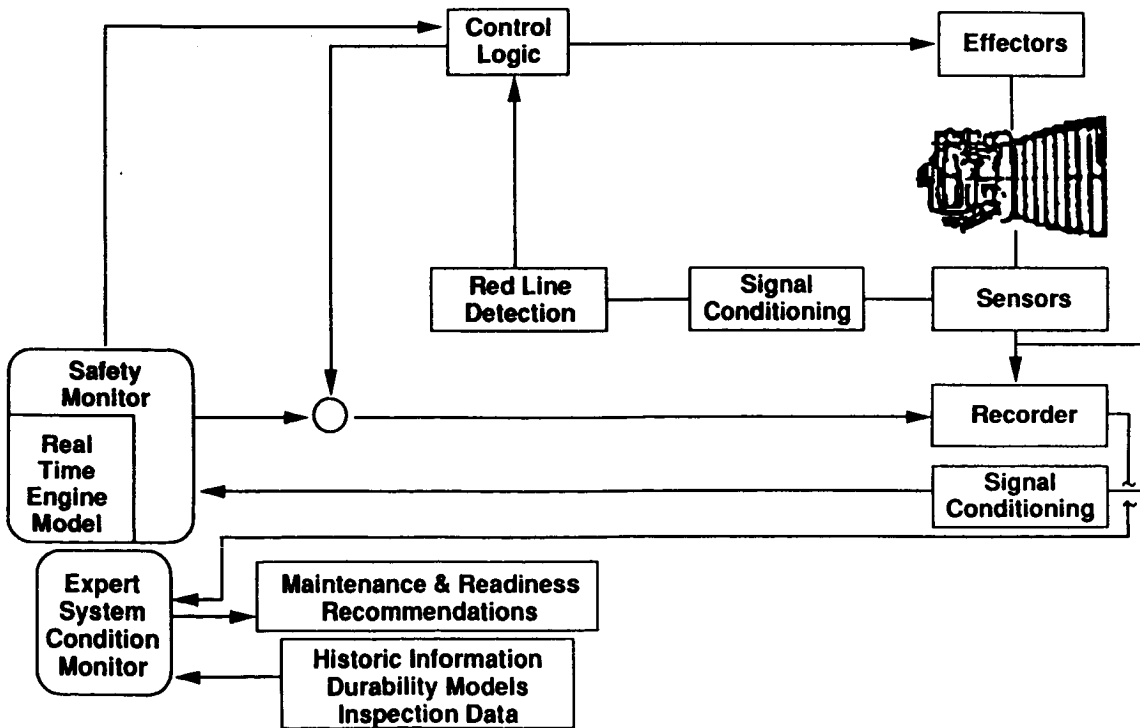
EXAMPLES OF CURRENT TECHNOLOGY INFUSION INTO FLIGHT CERTIFICATION

SHUTTLE THERMAL IMAGER & ICE DETECTION SYSTEM → SPACE SHUTTLE

ENGINE PLUME DIAGNOSTICS → SPACE SHUTTLE MAIN ENGINE TEST PROGRAM

SMART HYDROGEN SENSOR & FUGITIVE GAS DETECTION SYSTEM → SPACE SHUTTLE MAIN ENGINE TEST PROGRAM




OAET - CSTI HEALTH MONITORING & CONTROLS





Stennis Space Center

CHALLENGES FOR FUTURE SPACE VEHICLE PROPULSION SYSTEM PROGRAMS

- Reduce Cost 
- Improve Reliability 
- Improve Safety 
- Improve Performance 