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PLANNING FOR SHUTTLE EMPLOYMENT

IN SUPPORT OF

NATIONAL SECURITY MISSIONS

(AN ANNOTATED BRIEFING)

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This briefing highlights key planning assumptions and policy guidance as it has evolved for employment of the Space Transportation System (Space Shuttle) in support of national security missions.

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THE ISSUE

"REVIEW NATIONAL SPACE POLICY ON SEPARATE ORGANIZATIONAL CONTROL OF THE SHUTTLE TO DETERMINE WHETHER POTENTIAL COST SAVINGS ARE POSSIBLE."

PD/NSC-42

U N C L A S S I F I E D

PD/NSC-42 directed a "review of national policy on separate organizational control to determine whether potential cost savings are possible."

PD/NSC-42 noted that "separate Defense and NASA Shuttle support facilities are being prepared to respond to different requirements for orbits, security, and operations."

OMB was directed to "undertake a budget cross-cut -- taking into account all critical factors -- on Shuttle operational management responsibility with NASA, Defense, and the DCI and to make recommendations on this issue during the FY 1980 budget review. Based on this cross-cut, the Policy Review Committee (SPACE) will review these recommendations in terms of impact on policy."

As background and to provide perspective for participation in this study, this briefing reviews major activities associated with DOD's (and NRP's) participation in the Shuttle, relates them to applicable policy extant at the time, and traces how NRP operational concepts for STS employment and control flowed from these.

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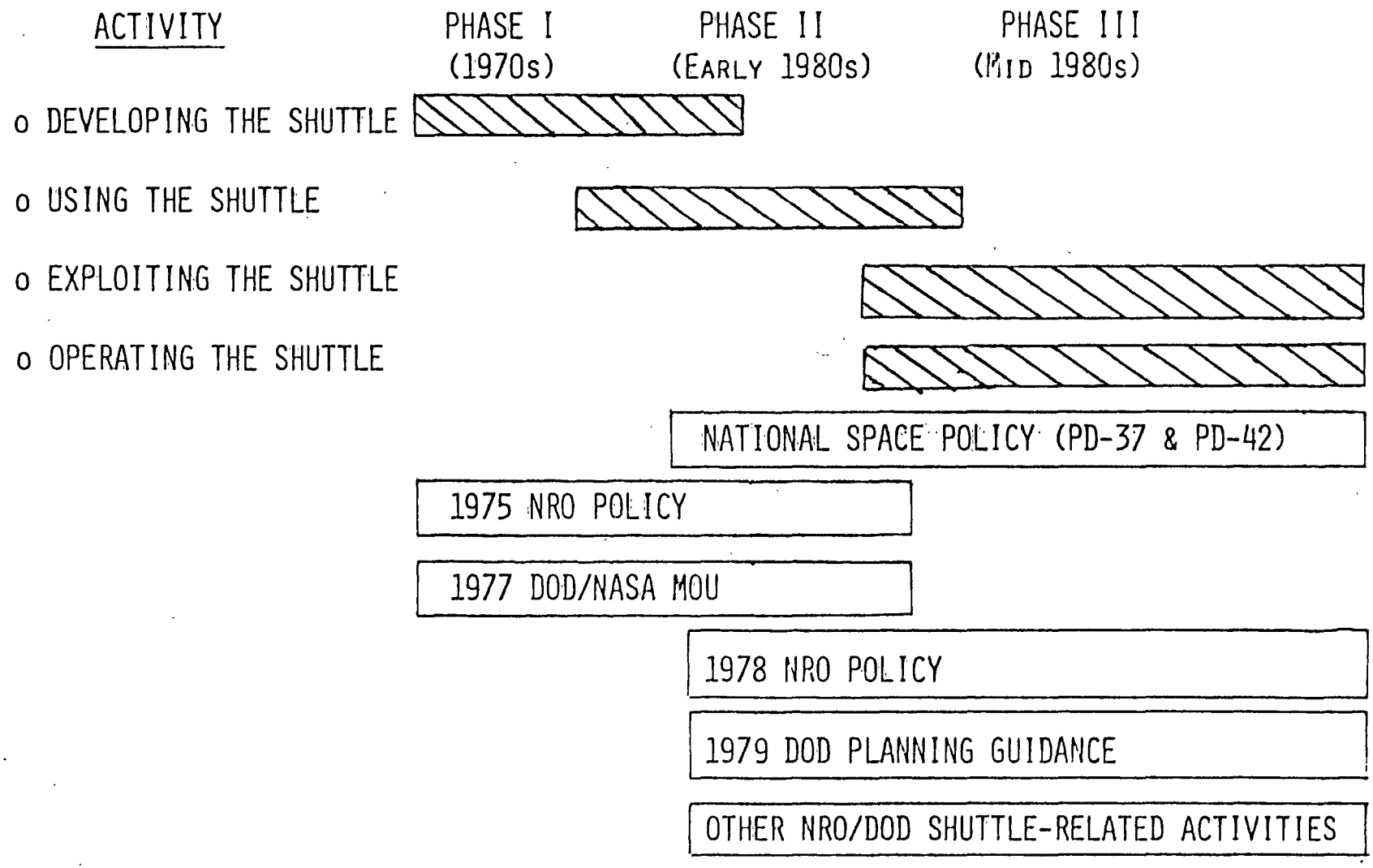
OVERVIEW OF TRENDS IN SHUTTLE EMPLOYMENT



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OVERVIEW OF TRENDS IN SHUTTLE EMPLOYMENT

This chart depicts three time frames corresponding to three phases of Shuttle operations. In the 1970s, the principal concerns have been engineering development of the space shuttle as a recoverable booster, design and development of new support facilities as at KSC and VAFB, adaption and modification of others and the development of procedures for cargo integration, mission planning, flight readiness and flight operations support. NASA as the developer of the STS has had the lead role for development and operational control of the STS for all users.

As a primary user of the STS, DOD specified technical capabilities needed to meet its mission responsibilities and was assigned principal responsibility for design and construction of shuttle facilities at VAFB. The 1977 DOD/NASA MOU reflected these roles and division of responsibilities.

In Phase II, DOD begins using the shuttle and gaining experience. Early operations were envisioned to be straight-forward payload delivery missions. As experience accumulated, more innovative uses of the shuttle would evolve.

In May 78 significant national space policy guidance was promulgated in PD/NSC-37. Salient points related to the shuttle are covered in the next chart. Also within the past year, NRO planning for use and exploiting the shuttle has matured. Encouraged by NRO thinking and requirements, DOD planning guidance in 1979 urges moving ahead with sensible ways to exploit the shuttle. We cover recent DOD guidance later.

Phase III here depicts the time frame wherein the DNRO and DOD will begin, modestly at first, to exploit the shuttle and increasingly take on more responsibility for shuttle flight operations control from NASA.

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NATIONAL SPACE POLICY FOR SHUTTLE EMPLOYMENT

- MILITARY AND INTELLIGENCE PROGRAMS MAY USE THE SHUTTLE ORBITERS AS DEDICATED MISSION VEHICLES

- UNITED STATES WILL PROVIDE LAUNCH PRIORITY TO MILITARY AND INTELLIGENCE PROGRAMS

- UNITED STATES WILL PROVIDE THE NECESSARY SECURITY TO MILITARY AND INTELLIGENCE PROGRAMS WHILE RECOGNIZING ESSENTIALLY OPEN CHARACTER OF THE CIVIL SPACE PROGRAM

- MISSION CONTROL IS THE RESPONSIBILITY OF THE MISSION AGENCY

- SURVIVABILITY OF SPACE SYSTEMS WILL BE PURSUED COMMENSURATE WITH THE PLANNED NEED IN CRISIS AND WAR. FOR CRITICAL MISSIONS, A DISTRIBUTED SYSTEM ARCHITECTURE SHALL BE CONSIDERED FOR REDUCING SINGLE, CRITICAL NODES

PD/NSC-37

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NATIONAL SPACE POLICY FOR SHUTTLE EMPLOYMENT

This chart presents key extracts from PD/NSC-37 pertaining to use of the shuttle by military and intelligence programs. Quoting from PD/NSC-37:

> "The United States will develop, manage, and operate the Shuttle-based Space Transportation System through NASA in cooperation with the DOD to service all authorized space users--domestic and foreign, commercial and governmental--and will provide launch priority and necessary security to military and intelligence missions while recognizing the essentially open character of the civil space program. Mission control is the responsibility of the mission agency. Military and intelligence programs may use the Shuttle Orbiters as dedicated mission vehicles."

PD-37 also directs that "survivability of space systems including all system elements, will be pursued commensurate with the planned need in crisis and war" ..."Identified deficiencies will be eliminated and agressive, long-term programs will be applied to provide more assured survivability through evolutionary changes to space systems. For critical missions, a distributed system architecture shall be considered for reducing single, critical nodes..."

Further PD-37 directs that security for the military space programs shall commensurate with missions performed.

These points speak directly to a major role for DOD and the NRO in shuttle employment, a role which includes management, operational control and the provisioning of an appropriately secure and survivable environment for these operations.

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DOD SHUTTLE PLANNING GUIDANCE*

- CONTINUE TO EXPLOIT NEW CONCEPTS TO USE THE SHUTTLE TO ACHIEVE MORE FLEXIBLE, EFFECTIVE SPACE OPERATIONS
- PROVIDE BASIS FOR DECISION LEADING TO A DEDICATED DOD SHUTTLE CONTROL FACILITY IN 1981 POM
- EXPLORE ARRANGEMENTS FOR TRAINING MILITARY PERSONNEL FOR EARLY DOD SHUTTLE FLIGHTS
  - ASTRONAUTS AND PAYLOAD SPECIALISTS
- AS FAR AS PRACTICAL, ESTABLISH A SINGLE AIR FORCE EFFORT TO SUPPORT DOD MILITARY AND INTELLIGENCE SHUTTLE EXPERIMENT NEEDS
- EXAMINE SHUTTLE SURVIVABILITY AND RECOMMEND PRACTICAL, AFFORDABLE STEPS TO MAKE SHUTTLE LESS VULNERABLE
- ASSURE THAT DOD NEEDS ARE FULLY CONSIDERED IN SHUTTLE DEVELOPMENTAL IMPROVEMENTS

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*SECDEF TO SECAF MEMORANDUM; SUBJ: SPACE OPERATIONS FOR MILITARY PURPOSES, DTD 12 MAY 1979

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DOD Shuttle Planning Guidance

Presented here are points made by Secretary of Defense Brown in a 12 May 1979 memorandum for the Secretary of the Air Force. In requesting the Air Force to do the things on this chart and in particular to "continue to exploit new concepts to achieve more flexible, effective space operations," it is clear that Dr. Brown views the shuttle as more than a mere booster. He notes the "Shuttle sortie mode experience should be a key element in fully defining man's military role in space" and that the shuttle can be "a manned laboratory in space for experiments and subsystems development..."

In another key point, Secretary Brown asks the Air Force to "insure that your 1981 POM provides the basis for necessary decisions leading to the creation of a dedicated centralized DOD shuttle mission command and control and payload operations specialist training facility." He further urges the Air Force to "fully define the extent to which payload specialists will participate in early operational spacecraft deployment and experimental sortie shuttle flights."

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NRO
SHUTTLE TRANSITION POLICY

POLICY IN 1975

- o INTERFACES BETWEEN SHUTTLE AND NRO PAYLOAD TO BE KEPT AS SIMPLE AS POSSIBLE
- o USE THE SHUTTLE ONLY AS A BOOSTER
- o RETAIN EXPENDABLE LAUNCH VEHICLE CAPABILITY UNTIL SHUTTLE DEMONSTRATES RELIABILITY AND WEIGHT CARRYING ABILITY

POLICY IN 1978

- o FULLY EXPLOIT THE UNIQUE CAPABILITIES OF THE SHUTTLE TO ENHANCE NRO MISSIONS
- o EXPENDABLE LAUNCH VEHICLE STRATEGY KEYED TO SHUTTLE PERFORMANCE MILESTONES
- o TRANSITION ALL SPACECRAFT TO SHUTTLE AS SOON AS PRUDENT RISK JUDGEMENTS AND COST FACTORS PERMIT

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NRO SHUTTLE TRANSITION POLICY

This chart contrasts significant facets of NRP policy of the 1975 period and earlier with today's policy.

In 1975, planners believed it possible and relatively simple to separate booster operations from payload operations. The booster would be controlled by NASA from JSC. The payloads would be checked out and initially operated from the DOD Payload Operations Control Center (POCC) located at the Satellite Test Center (STC I) in Sunnyvale, CA. before handover to any other ground station for control by a using agency. The early NRO policy was concerned with problems of transition such as satellite system redesign for the shuttle environment and maintaining an expendable launch vehicle capability until shuttle capabilities were demonstrated. In some cases, satellites had to be designed for both shuttle and expendable booster launch. The shuttle was essentially and primarily a booster albeit a manned one.

The current policy envisions full exploitation of shuttle capabilities and is moving to capitalize on man-in-space to enhance NRP missions. In addition to essential transition planning, the NRO has moved ahead on several fronts which demonstrate commitment to exploiting opportunities presented through the shuttle. Some steps taken in the past year are covered on the next chart.

SHUTTLE PLANNING ACTIVITIES
(STEPS TAKEN IN PAST YEAR)

- NEW NRO SYSTEMS ARE BEING DESIGNED WHICH REFLECT A COMMITTMENT TOWARD THE GOAL OF FULL SHUTTLE EXPLOITATION

- A PAYLOAD SPECIALIST PROGRAM HAS BEEN APPROVED AND IS NOW BEING IMPLEMENTED

- A DRAFT REVISED DOD/NASA MEMORANDUM ON SHUTTLE OPERATIONS IS NEARING COMPLETION

- A DRAFT EXECUTIVE ORDER HAS BEEN PREPARED OUTLINING DOD RESPONSIBILITIES FOR EXERCISING CONTROL OVER SHUTTLE OPERATIONS INVOLVING NRO/DOD MISSIONS

- AIR FORCE IS EXAMINING ALTERNATIVE ORGANIZATIONAL STRUCTURES FOR SPACE OPERATIONS IN THE SHUTTLE ERA

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Chart Three partially depicts the implications of the planning and policy guidance of 1975 and today. The previous assumptions led to a payload delivery oriented employment concept supported by an interim DOD capability at JSC. Under the "Controlled Mode," equipment would be allocated, color changed and electrically separated to permit support of DOD operations at the collateral DOD SECRET level.

The current planning and policy guidance assumptions take a longer view and as noted above, reflect a commitment to exploit the shuttle. Employment concepts envision integrated payload and orbiter operations. A workload analysis of NRP programs, described next, reflects shuttle capabilities and increasingly moves toward exploitation as NRP shuttle-optimized programs mature and shuttle operational experience is gained. As described later, NRP programs require compartmented security for some aspects of flight planning, flight readiness, and flight operations support. The SOPC architecture and facilities to meet these requirements are undefined at this writing, but analyses are underway.

In the past year, however, the NRO has moved ahead in several key areas reflecting a long term commitment to exploiting the shuttle and the presence of man in space. These steps include new system concepts or shuttle-optimized systems incorporating retrieval, repair and service; approval of a payload specialist program for which candidate manned spaceflight engineers are now being selected; participation in drafting a new DOD/NASA memorandum of understanding on STS operations giving more autonomy to DOD; and full involvement in a draft executive order which outlines DOD responsibility for exercising control over shuttle operations involving NRO and DOD missions.

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KEY PARAMETERS IN THE PLANNING AND POLICY GUIDANCE FOR SHUTTLE EMPLOYMENT

- EMPLOYMENT CONCEPTS
  - PAYLOAD DELIVERY
  - FULL EXPLOITATION
- FACTORS INFLUENCING REQUIREMENTS
  - CONTROL CONCEPTS FOR OPERATIONS
  - WORKLOAD
  - SECURITY
  - SURVIVABILITY

U N C L A S S I F I E D

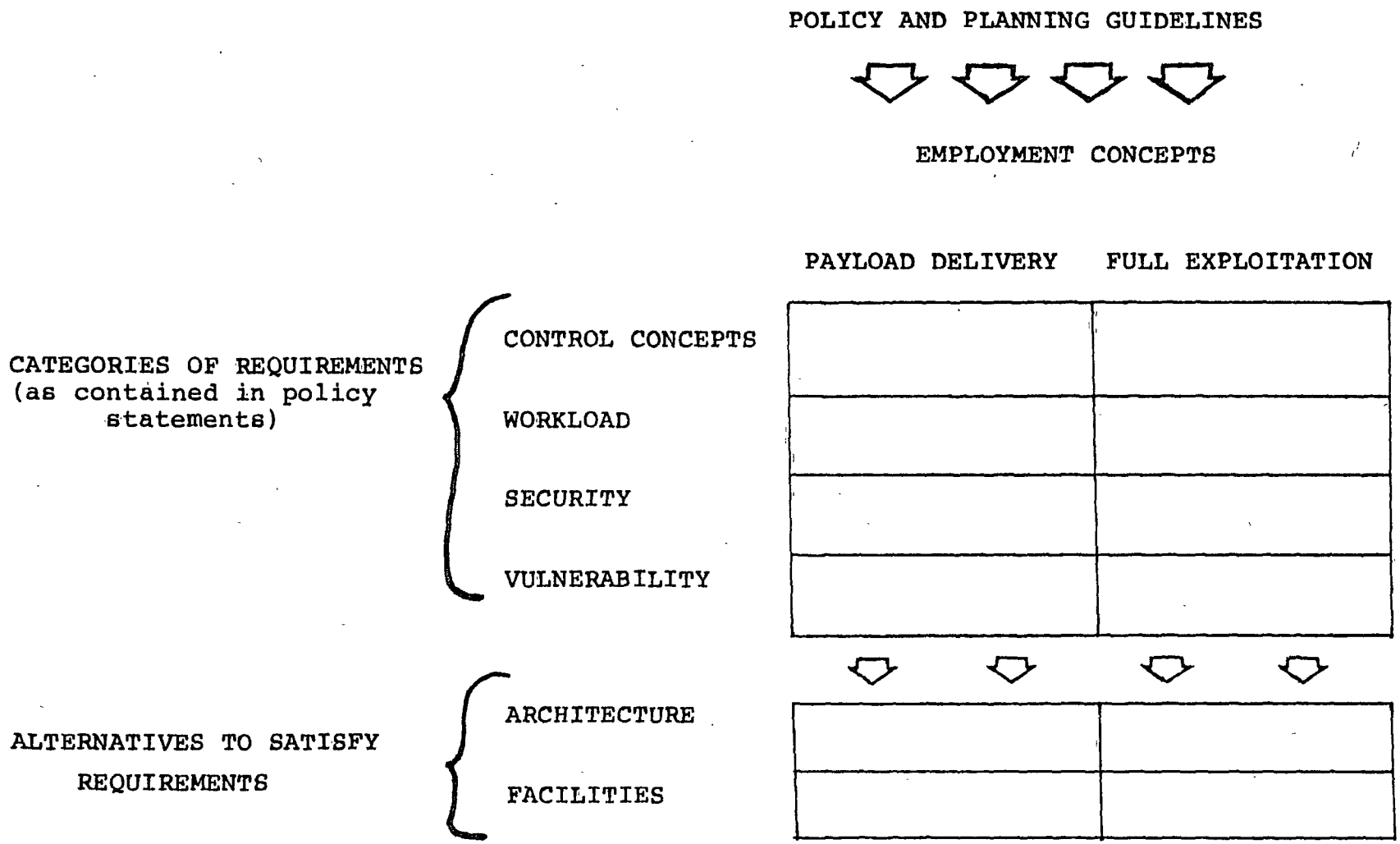
KEY PARAMETERS IN THE PLANNING & POLICY GUIDANCE FOR SHUTTLE EMPLOYMENT

To briefly summarize to this point, early STS employment concepts were payload delivery oriented while current employment concepts push toward full exploitation.

We have touched on four of the principal factors influencing requirements. Both PD/NSC-37 and PD/NSC-42 speak to survivability of the shuttle and its support systems. Survivability aspects are being explicity addressed in the study of shuttle control requirements asked for in PD/NSC-42.

We discuss next how these four requirements when applied to the two STS employment concepts lead to alternative architectures (and in turn facilities) to meet shuttle control needs. The next chart depicts this graphically and the following chart fills in the details.

THE PROCESS OF ESTABLISHING REQUIREMENTS FOR A SHUTTLE OPERATIONS CENTER



IMPLICATIONS OF PLANNING AND POLICY GUIDANCE ON A SHUTTLE OPERATIONS CENTER

PREVIOUS ASSUMPTIONS

- O SMALL WORKLOAD UNTIL 1985
- O NO SIGNIFICANT DOD SHUTTLE EXPERTISE
- O SATELLITE DESIGN PHILOSOPHY OF ELV ERA
- O USE SHUTTLE ONLY AS BOOSTER
- O PROTECT DUAL LAUNCH CAPABILITY
- O KEEP INTERFACES SIMPLE

CURRENT ASSUMPTIONS

- O GROWTH IN WORKLOAD IN 1985
- O STEPS TO ENHANCE DOD SHUTTLE PROFICIENCY
- O NEW SATELLITE DESIGN PHILOSOPHY (LOWER COST, DEVELOPMENT TIME)
- O FULLY EXPLOIT SHUTTLE FOR ADDED FLEXIBILITY AND EFFICIENCY
- O KEY RELIANCE OF SHUTTLE TO MILESTONES
- O INTERFACES NEED NOT INHIBIT EXPLOITATION

EMPLOYMENT CONCEPTS

	PAYLOAD DELIVERY	FULL EXPLOITATION
CONTROL CONCEPTS	PAYLOAD AND ORBITER OPERATIONS DECOUPLED	PAYLOAD AND ORBITER OPERATIONS INTEGRATED
WORKLOAD	DOD MISSION MODEL (REV 7)	O DOD MISSION MODEL (REV 8) O CONTINGENCY & EXPLOITATION MISSIONS O CRISIS O REPAIR, SERVICING, RETRIEVAL O SORTIE O CONSTRUCTION
SECURITY	SECRET	COMPARTMENTED
ARCHITECTURE	CONTROLLED MODE	?
FACILITIES	JSC	?

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IMPLICATIONS OF PLANNING AND POLICY GUIDANCE ON A SHUTTLE OPERATIONS CENTER

This chart depicts the architectural and facility implications of the planning and policy guidance of 1975 and today. The earlier assumptions led to a payload delivery oriented employment concept supported by an interim DOD capability at JSC. At that time, the STS workload encompassed in Revision 7 and earlier revisions was all payload delivery. Under the "Controlled Mode," equipment would be allocated, color changed and electrically separated to permit support of DOD operations at the collateral DOD SECRET level.

The current planning and policy guidance assumptions take a longer view and as noted above, reflect a commitment to exploit the shuttle. Employment concepts envision integrated payload and orbiter operations. The NRP workload analysis prepared for the PD/NSC-42 Study reflects early shuttle capabilities and depicts an increasing trend towards STS exploitation as NRP shuttle-optimized programs mature and shuttle operational experience is gained. NRP programs require compartmented security for some aspects of flight planning, flight readiness, and flight operations support. The SOPC architecture and facilities to meet these requirements are undefined at this writing, but analyses are underway in response to PD/NSC-42.

But because of significantly more stringent security requirements to protect sensitive sources and methods and an expanded workload which exploits the shuttle for national intelligence operations, the management control required by the DOD and NRO over shuttle operations is stronger and more direct. The Controlled Mode at JSC is essentially incompatible with a full exploitation of the STS by DOD and the NRO.

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SHUTTLE PLANNING ACTIVITIES
(STEPS WHICH NEED TO BE TAKEN)

- ESTABLISH A FRAMEWORK FOR SHUTTLE MISSION CONTROL IN CONSONANCE WITH A FULL EXPLOITATION GOAL (E.G., CONTROL CONCEPT, WORKLOAD AND SECURITY REQUIREMENTS)

- ENSURE THAT THE REVISED DOD/NASA MOU IS CONSISTENT WITH NRO/DOD NEEDS FOR SHUTTLE OPERATION, CONTROL AND EXPLOITATION

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SHUTTLE PLANNING ACTIVITIES
(Steps Which Need to be Taken)

While momentum is underway toward a larger role for DOD in shuttle planning and control, at least two top-level actions require attention in the near term.

The first action is underway now spurred on by a study of national policy related to organizational control of the shuttle as directed by PD/NSC-42. The NRO is participating in that study. A document setting forth NRP management control requirements, workload projections and security needs for the STS is being prepared. The workload projections include sortie missions, retrievals, repair and service activities, on-orbit construction and a menu of R&D activities -- all typical of exploiting the shuttle -- in addition to scheduled payload delivery missions. Requirements in support of national contingency operations and unscheduled events in space recognize advantages in flexibility and mission response which the shuttle may bring. Security requirements for an appropriately secure environment for NRO shuttle operations will be stated.

As negotiations proceed with NASA on a revised DOD/NASA MOU on STS operations, DOD, NRO and Air Force management attention will be needed to assure the MOU accommodates these NRO and DOD needs for shuttle operations, control, and exploitation.

SUMMARY

- THIS YEAR THE PARAMETERS THAT GO INTO THE OVERALL FORMULA FOR ESTABLISHING A FRAMEWORK FOR MISSION CONTROL ARE DIFFERENT
  - NEW POLICY AND PLANNING GUIDANCE
  - NRO/DOD THINKING ON SHUTTLE EMPLOYMENT HAS MATURED
  - GUIDANCE VECTORED TOWARD GOAL OF FULL EXPLOITATION AND ATTENDANT NEEDS
- LAST YEAR THE PARAMETERS IN THE FORMULA WERE DRIVEN BY THE TRANSITION PROBLEM AND EARLY USE OF THE SHUTTLE ONLY AS A BOOSTER
- THE REQUIREMENTS DOCUMENT WILL REFLECT BOTH SITUATIONS BY ESTABLISHING THE BOUNDS, NATURE AND IMPLICATIONS OF THESE REQUIREMENTS AS ONE MOVES FROM PAYLOAD DELIVERY TO A FULL EXPLOITATION POSTURE

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SUMMARY

This briefing has highlighted national, DOD and NRO policy related to shuttle employment and operational control. Significant changes have occurred particularly in the past year, changes which reflect a maturing of DOD and NRO thinking about the shuttle, its capabilities (current, future), the promises and prospects of man in space on a routine bases, and new defense/intelligence needs.

Last year when the "Controlled Mode" study was made under the auspices of the Aeronautics and Astronautics Coordinating Board, its ingredients were policy and employment concepts, workload and security coming from a payload delivery -- "the shuttle is a truck" -- orientation, and it took only a relatively short view of DOD/NRO requirements; an independent DOD/NRO capability was in the minds of many but it seemed to be a year or more out of the planning horizon for many decision makers.

This year, a longer view is being taken, a view which recognizes the goal of fully exploiting the shuttle to meet NRO and DOD needs. The architecture, facilities and management arrangements to satisfy NRO management control, workload and security vectored toward exploiting the shuttle will undoubtedly differ from the "Controlled Mode." This structure will emerge in the coming months as definitional work proceeds.