Structuring The Space Exploration’s Supportability and Logistics & Maintenance Functions

Includes ISS Supportability Lessons Learned

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Logistics and Maintenance in Exploration

- The ISS Program studied in depth the question of how to structure the Logistics & Maintenance management function, and where to locate it organizationally.
  - Operations Phase Assessment Team (1991)
  - OPAT II (1992)
  - Utilization, Operations and Training Assessment Team (UOTAT) (1994)
- The common conclusion from each study was that the L&M management function must be closely tied to System Engineering especially during early development.
  - OPAT II and UOTAT performed extensive trade studies to assess the proper organizational location for L&M.
  - Separating L&M from System Engineering organizationally and geographically was found to detract significantly from the integration of L&M with design, development, manufacturing, engineering oversight, and on-orbit operations.
Logistics and Maintenance during DDT&E

- **Program Management Level**
  - Co-locate L&M with System Engineering and Engineering management.
    - Greatly improves system engineering practices by integrating the logistics support development with the design development – logistics support is not a separate stand alone activity.
    - Greatly enhances concurrent engineering – logistics support is developed with design, not following design.
    - L&M requirements are better integrated into the Program by being co-mingled with Engineering, rather than be seen as coming from the “outside”.
  - Operational and launch site support requirement inputs feed naturally into a Program’s L&M Management.

- **Technical Level**
  - Logistics analysts work concurrently with design engineers, reliability engineers, test engineers, etc. Greatly improves the design, manufacturing, test and initial start up of system hardware.
  - Logistics engineers work directly with design engineers to improve design to reduce support costs – eliminates the “over the fence” processes that occur when the two organizations are separate.
  - Logistics engineers get direct feedback from engineering on quality of logistics products—maintenance source data, sparing plans, repair concepts, transportation plans, storage plans, etc.
  - Operational and launch site considerations feed naturally into logistics engineers to enhance design.
Logistics and Maintenance during Operations

- The System Engineering and Logistics & Maintenance management functions should be co-located in the Program Office.
  - Support of Exploration, like ISS, will primarily be on the “in space” and “surface destination” hardware, especially on long duration missions.
  - Evolution of the systems maintenance concept and troubleshooting of in transit and surface destination problems is a shared task between System Engineers, Logistics & Maintenance and MOD.
  - Trades to determine the most effective and economical repair agents (original manufacturer versus government depot) is a shared task between System Engineers and Logistics & Maintenance.
  - Depot certification is a shared task between System Engineers and Logistics & Maintenance.
  - Contractor base for operations will be largely the same as was during design and manufacturing – keeping L&M with Engineering assists in a smooth transition.
Launch Site Logistics Roles & MOD

- Some Logistics & Maintenance roles can and should be allocated to the Launch Site and MOD.
  - Launch Site:
    » Developing design requirements to reduce launch and return costs.
    » Warehousing of spares for launch.
    » Inventory management of launch site spares.
    » Maintenance of Launch Site facilities and support equipment.
    » Developing and managing in-line processing of hardware for launch and return.
  - MOD
    » Performance and planning of real time maintenance operations.
    » Pre and post on-orbit maintenance operations.
Notional Organization Structure

ILS – Integrated Logistics Support