Development of Hybrid Product Breakdown Structure for NASA Ground Systems

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INTRODUCTION

- The Product Breakdown Structure is traditionally a method of identification of the products of a project in a tree structure.
- It is a tool used to assess, plan, document, and display the equipment requirements for a project.
- It is part of a product based planning technique, and attempts to break down all components of a project in as much detail as possible, so that nothing is overlooked.
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PRODUCT BREAKDOWN STRUCTURE (PBS)

- The PBS for ground systems at the Kennedy Space Center is being developed to encompass the traditional requirements including the alignment of facility, systems, and components to the organizational hierarchy.
- This paper will document, demonstrate, and identify key aspects of the life cycle of a Hybrid Product Breakdown Structure (PBS) developed for KSC Ground Operations.
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- The PBS is defined differently depending on the application or the organization developing the PBS.

![Diagram of Developmental Decomposition]

Figure 1. Developmental Decomposition

- The PBS becomes the single source for identification of hardware, software and the information products. As a result, it is a top-down high-level matrix of the products and organizations necessary to baseline the project.
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HOW PBS RELATES TO PROJECT MANAGEMENT

• The PBS is used to identify the project deliverables at a summary level. It provides the hardware, software, and information listing for the completion of the project.

Figure 1: PBS as developed by Project Management
The PBS relationship to system engineering can be identified to three basic functional goals:

- Translate top level requirements to functions
- Identify functional interfaces into ConOps
- Allocate functions into the PBS
THE MERGER BETWEEN PE AND SE USE OF THE PBS

- The merger of the two views of a PBS can be made to determine in a complex system first by identification of various groups to provide deliverables, and second, to identify how operations relate to the individual systems. The intersection of PBS_PM and PBS_SE becomes the engineering group responsible.

![Figure 4. Intersection of PBS_PM and PBS_SE](image)
GSDO APPROACH TO PBS

- GSDO as a system engineering centered project has requirements to follow based on the customer (ESD). GSDO then establishes ConOps for the operation of the program based on the requirements.

![Diagram showing NASA Human Exploration Organization](image)

- The individual subsystems utilized in the development of the GSDO PBS are identified in the Master Subsystem List (MSL).
GSDO PBS Structure

- The IPT represents the level 2 part of the program with the EIT responsible physical locations or facilities.
- The systems/subsystems contained within the respective location or facility is managed by the program through the EIT.
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- SRR: the PBS hierarchical structure is defined
- PDR: the System & Equipment identified at Location
- CDR: Baseline the Architecture
- ORR: Adjust to As-Built Configuration/Support
GSDO PBS SUMMARY AND CONCLUSION

- Communicates what is needed to build the Architecture
- Linkage between Program, Design, & Logistics
- Identifies Capability & Support requirements
- Provides a single source to locate subsystem documentation for a specific Architecture
- Provides a means for Operations to identify Architecture needs when multiple missions are competing for the same support.