Integrated Logistics Product Support for the 21st Century Program 11/28/11

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ESC

Logistics Engineering and Analysis Capabilities

- Team QinetiQ (Engineering Support Contract)
  - Logistics Engineering and Analysis
    - Over 144 years of combined experience via backgrounds in:
      - Commercial/industry logistics
      - Kennedy Space Center specific logistics (LSA, ILSP)
      - Army, Navy, and Air Force logistics
      - DOD logistics

Purpose

- To outline the relationships between logistics requirement documents for the 21st Century Program
- To show the relationships between the logistics tasks and the design process

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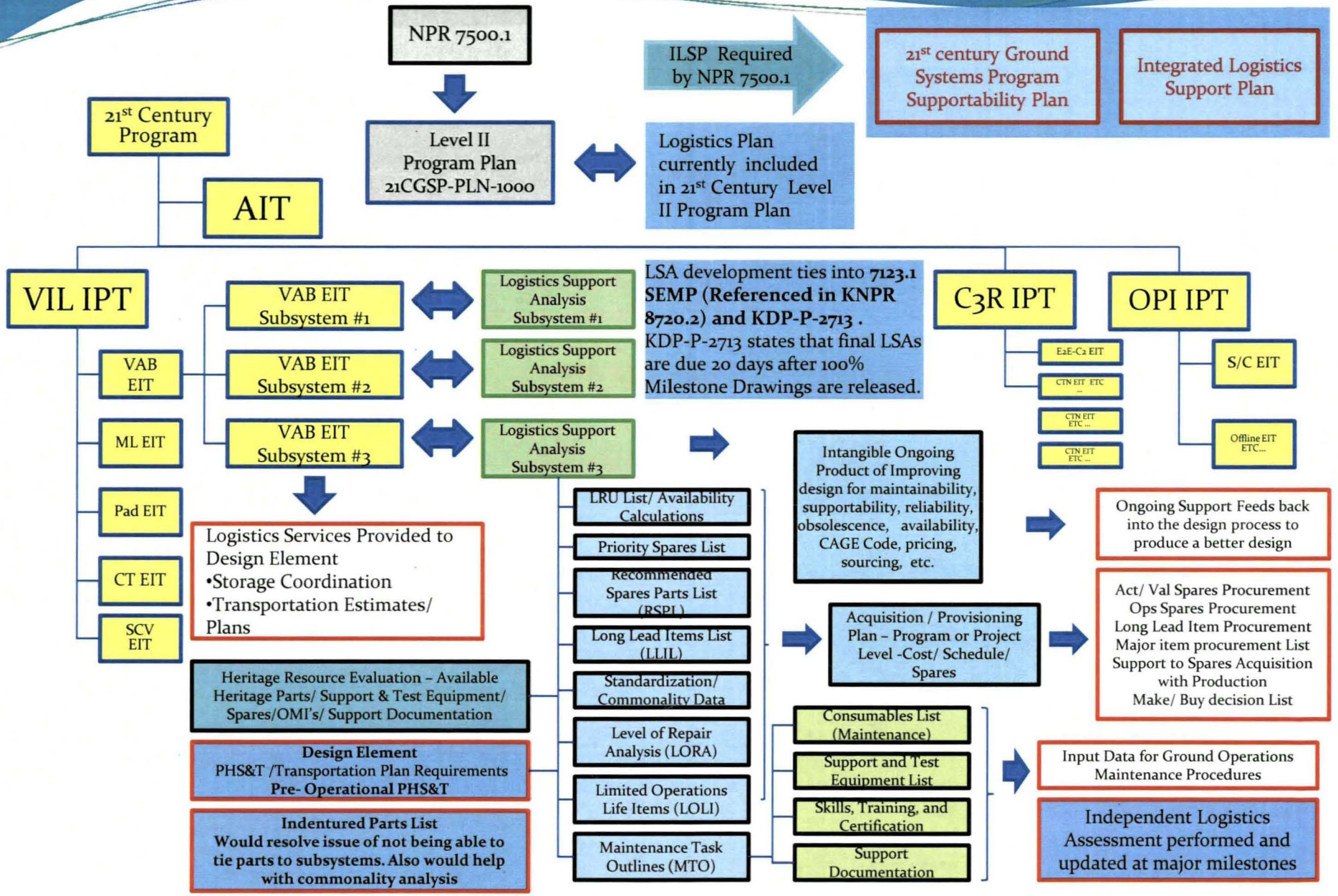
Relationship Between 21CGSP Documents and GPD Organization

- 21 Century Ground Services Program
  - Currently supports SLS/ MPCV
  - Program Plan mandates compliance with NPD 7500.1
    - NPD 7500.1 only specifies minimum requirements for an integrated logistics regimen, gives 50000 foot guidance on topical content
  - Program Plan contains reference to performing a supportability analysis
    - ESC currently on contract to perform Logistics Supportability Analysis for subsystems

Relationship Between NASA Program Management and Logistics Governing Documents

- NPR 7120.5 - Project Management Plan Drives Development Process
  - Requires Program/ Projects to Comply with NPD 7500.1- Program and Project Logistics Policy
  - Program Plan requires a Logistics Plan on **HOW** NPD 7500.1 requirements will be met in Program/ Project
  - Requires Programs/ Projects to comply with NPR 7123.1 – Systems Engineering Processes and Requirements
- NPR 7123.1 - Systems Engineering and Processes Requirements drive System Engineering Process
  - SEMP requires logistics documentation to be updated at major milestones
    - Does not specify what logistics documentation
    - Does not describe how logistics interfaces with engineering during the design process
- NPD 7500.1 - Program and Project Logistics Policy drives logistics requirements
  - Requires an ILS approach for all phases of a program/ project
  - Contains minimum support requirements for developing an ILS regimen for a Program or Project
  - Mandates that LSA will be performed concurrently with the system engineering process
  - Future Revisions of NPD 7500.1 will reference a handbook containing guidance on how to develop an ILSP and the expected content
    - If this handbook were available today it would provide guidance to a contractor for developing an ILSP.

Logistics Products and Where they Interface with the Design Organization

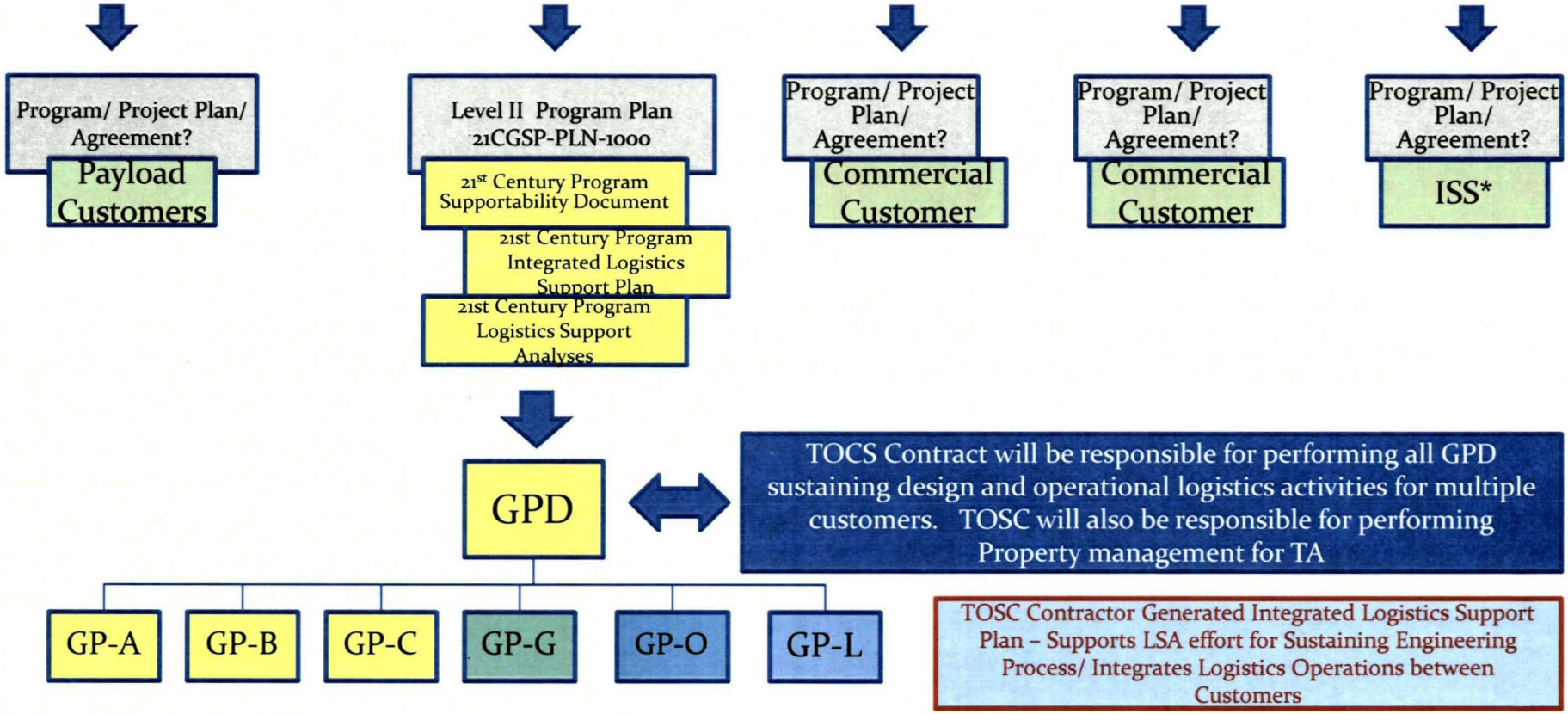


Logistics Products

- Design - by being involved in the SEMP Process
  - Infusing Supportability Considerations into the design effort though the SEMP Process
  - LSA
  - Maintenance Plan Data
  - Provisioning Conference
  - Independent Logistics Assessment
- Operational Services – by supporting Customers
  - Packaging, Handling, Shipping &Transportation
  - Supply Support
  - Spares Re-procurement
  - Support and Test Equipment
  - Technical Training
  - Logistics Information Systems
  - Facilities
  - Technical Data and Documentation
  - ETC...

Logistics Products and Where they Interface with the Operational Organization

NPR 7120.5/ NPR 7500.1 Applies to Programs and Projects – Proposed NPR 7500.1 Handbook provides guidance on ILSP development



*Note: ISS already has an extensive ILSP

Each Customer will need to define what logistics capability they would like to fund from the core logistics capability illustrated on the next page.

Logistics Products and Where they Interface with the Operational Organization

GPD

TOSC Contract mandates that the contractor provide an ILSP covering their operational logistics areas of responsibility DRD 7.1-1

- GP-A
  - Vendor/ Depot Repair Coordination
  - Stock Level Management
  - Obsolescence/ Supply Chain Management
  - Inventory Record Management
  - IDMRD – Operating life Management
  - IDMM - Shelf Life Management
  - Asset Tracking – On Site and Off-Site
- GP-B
  - Ground Systems O&M Procurement/Supply Support
  - Vehicle Processing Ops Procurement/ Supply Support
  - Ground Systems Logistics Engineering Support/Analysis
  - Flight/ Payload Bench Stock Material Support
  - Inventory Management/ Tracking Flight and Ground
  - Technical Training
  - Not Security/ Access training- ISC does this
  - Not Firing Room Training – GO does this
- GP-C
  - Supply Support/ Provisioning – Spares, Material, Consumables*
  - Logistics Facilities
  - Environmental /Disposal Plan**
  - Training
  - Logistics Technical Data
  - Vendor Data/ Maintenance Manuals/ Warrantees
  - Procurement Data Material Pedigree
- GP-G
- GP-O
- GP-L
  - PHS&T
    - Storage/ Warehousing
      - Vehicle/ payload processing material/ equipment
      - Ground system material/equipment
      - Flight element/ Payload material and equipment
      - Identified Flight Material
    - Packaging/ Handling- shipping only, GO does operational Handling for Large Elements
    - On- Site Transportation
    - Shipping/ Off-Site Transportation
      - Flight Element/ Payload Shipping - only
      - GPD Ground Systems/ Processing Shipping/ Receiving
      - Large Element Transportation GO Responsibility
      - Payload Transportation -UB Responsibility
  - Test and Support Equipment*
  - Logistics Managed Tools/ Support and Test Equipment
  - Logistics Managed Tools and Test Equipment Computer Resources Plan
  - GO Managed Tools/ Support and Test Equipment
  - Off-Line Maintenance Management
  - LES/NSLD
  - Shops and Labs
  - Customer/ Vendor Support
  - Post Production Support Plan
    - Obsolescence Identification
    - Supply Chain Risk Mitigation

*Supply Support/ Property Management influenced by HQ Supply Support, Equipment management, and KNPR 4000.1 (TA procedure)

**Interfaces with Environmental Plan and TA procedure KDP-KSC-P-3716 – NASA-KSC Personnel Property Transfer/ Excess Process

Current SPOC DRD 1.4e

09/29/11

Logistics In the Project Design Process

Pre-Project/ Concept Studies	Phase A Concept and Technical Development	Phase B (II) Prelim. Design & Technology Completion	Phase C (III) Final Design and Fabrication	Phase D (IV) System Assembly, Int. and Test, Launch & Checkout	Phase E Operations & Sustainment
	KDP A (I)	KDP B	KDP C (II)	KDP D (III)	KDP E(IV)
Mission Concept Review	System Requirements Review	System/ Mission Definition Review	Preliminary Design Review	Critical Design Review/PRR	System Acceptance Review

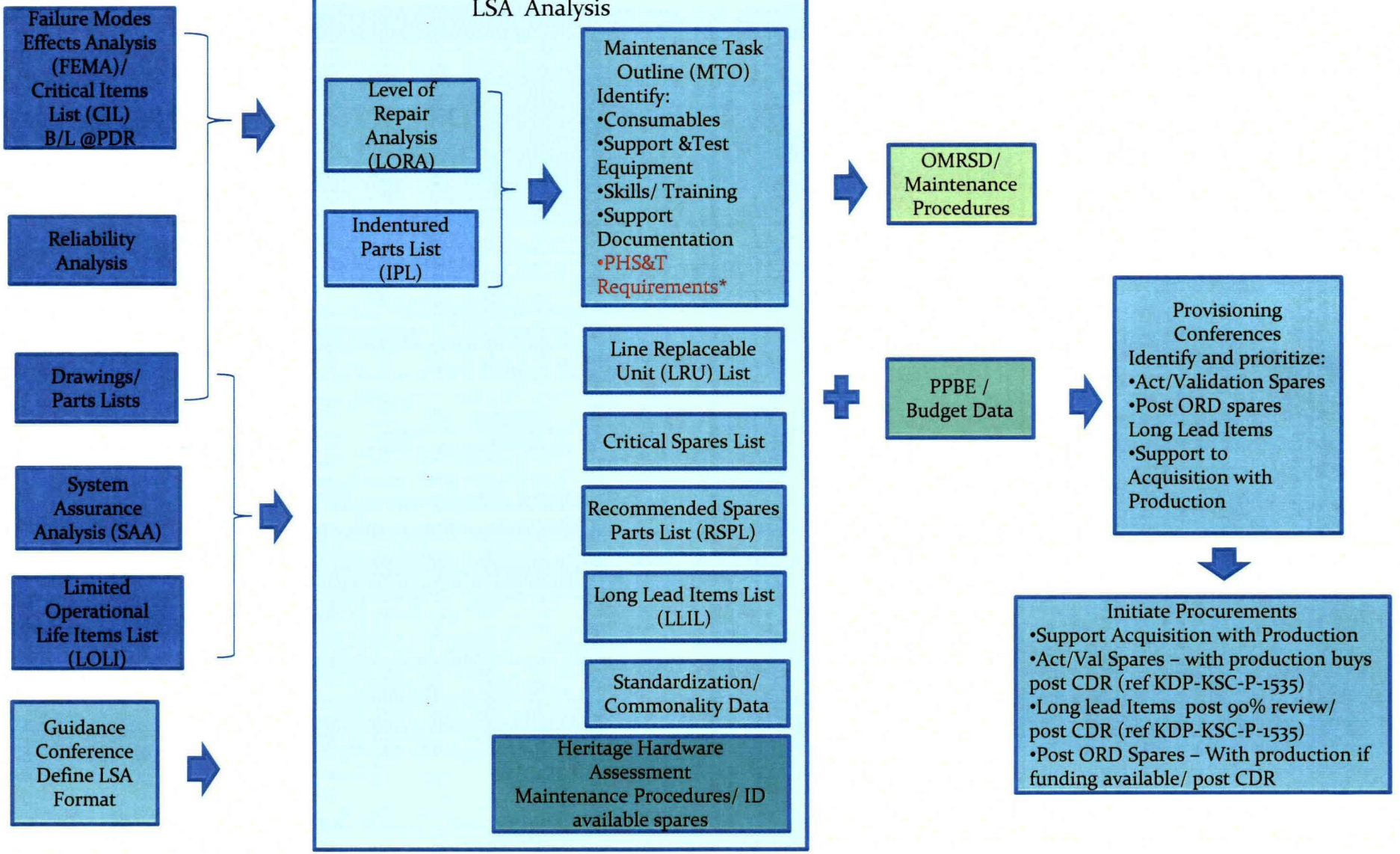
Phase 1

Need	Requirements Analysis	Functional Analysis	System Optimization / Alternative Evaluation	Preliminary Design	Detailed Design	Production	Vehicle Integration	Mission Ops
•Preliminary ILSP @ MCR limited to approach for managing logistics documentation of considerations that may affect cost & schedule Ref. 21st Century MCR Plan/ Draft 7120.5E •Conceptual life cycle support strategies - NPR 7123.1	•Preliminary ILSP @SRR, ref 21st CGSP MCR Plan/Draft 7120.5E Prelim. Maintenance Plan - NPR 7123.1 •Define logistics supportability requirements (Availability, Commonality, Transportability, Accessibility, Life Cycle Cost etc.) •Define Reliability & Maintainability Requirements (MTTR, MTBF, Reliability, etc.) •Define Maintenance Concept (repairable/ non-repairable, etc)	Allocate reliability and maintainability requirements Allocate supportability factors	•Prelim. ILSP @SDR (ref. Draft 7120.5E, 21st CGSP MCR Plan) •Update logistics documentation Preliminary Maint. Plan (LSA MTOs) - NPR 7123.1 @S/MDR •Logistics Ops con - @SDR ref 7123.1 Design and supportability requirements balanced at this step (ref MIL-HDBK-502) •List of Long Lead Procurements for Program Manager approval Ref 7120.5D 4.4.2.C.11	•Baseline ILSP @PDR (ref Draft 7120.5E, 21st CGSP MCR Plan) •Update log. documentation @PDR A/R, ID Life Limited items – NPR 7123.1 Preliminary Training Plan / Transportation Plan @PDR (ref KDP-P-2713) • Prelim. LSAs @PDR (KDP-P-2713) •Review designs : standardization, commonality, reliability, etc.	Update ILSP @ CDR (ref. Draft 7120.5E, 21st CGSP MCR Plan) •Update log. doc, update Life limited items list @CDR-NPR7123.1 •Baseline LSAs @CDR (KDP-P-2713) •Long Lead item procurement list @CDR (ref KDP-KSC-P-1535) •ID Pre-ORD Spares @CDR (ref KDP-KSC-P-1535) •Baseline Training Plan/ Transportation Plan @CDR (KDP-P-2713)	Provisioning Conference Update ILSP/LSA Initial Provisioning of Long Lead LSA Items/ Spares Verify and validate supportability requirements	•Update ILSP/LSA •MIL-HDBK-502 Plans Established for monitoring obsolescence/ vendor support •Establish and maintain an ILS capability, including spares, ground support equipment, and system maintenance and operating procedures, in accordance with the project's ILSP •Final Training Plan / Final Transportation Plan/ Final LSAs (ref KDP-P-2713)	Phase F Closeout Disposal

KDP F

Stakeholders Expectations | Technical Requirements Review | Logical Decomposition Process | Design Solution Process | Product Realization Process | Product Implementation Process | Product Transition Process

Logistics Design Product Dependencies- LSA Development / Maintenance Procedure / Provisioning Conference Support



Logistics Operations Product Dependencies- ILSP Development

Pre-Phase A (0) Concept Studies	Phase A Concept and Technical Development	Phase 1	Phase B (II) Prelim. Design & Technology Completion	Phase C(III) Final Design and Fabrication	Phase D (IV) System Assembly Int. and Test, Launch & Checkout	
	KDP A (I)		KDP B	KDP C (II)	KDP D (III)	KDP E (IV)
	Mission Concept Review	System Requirements Review	System/ Mission Definition Review	Preliminary Design Review	Critical Design Review/PRR	System Acceptance Review
	Guidance Conference (3)				Provisioning Conference	
	Supportability Plan (2)			Baseline Supportability Plan**		
Prelim. ILSP (1)		Preliminary ILSP	Preliminary ILSP	Baseline ILSP	Update ILSP	
				Preliminary Training Plan	Baseline Training Plan	Final Training Plan
				Preliminary Transportation Plan	Baseline Transportation Plan	Final Transportation Plan
				Preliminary LSAs	Baseline LSAs	Final LSAs
				Independent Logistics Assessment (4)	Independent Logistics Assessment	

ILSP Includes Plans for how the following will be accomplished :
- Maintenance
- Design Interface
- Logistics management Information
- Supply Support – Includes Distribution and Post Production Support
- Facilities
- Technical Data
- Personnel and Training
- Test and Support Equipment
- Packaging, Handling, Storage &Transportation
- System Retirement Plan

(1) Preliminary ILSP : Approach for developing an ILSP , ID Supportability Risks to Cost and Schedule
(2) Supportability Plan : Outlines what is required in an ILSP
(3) Guidance Conference defines product content and formats
(4) Independent Logistics Assessment –multi-disciplined assessment of maturity of products required to build logistics infrastructure

Logistics Support Documentation

- Current Logistics Paragraph in 21CGSP Program Plan
- Current Logistics Paragraph in SEMP

Current Logistics Paragraph in 21CGSP Program Plan

3.13 Logistics Plan

The Program will implement the requirements in NPD 7500.1, *Program and Project Logistics Policy, to define and plan life cycle logistics support required to develop ground systems for emerging flight programs, launch site infrastructure modernization projects, and other potential government and commercial customers. Via the KSC GPD Logistics Division, it will identify requirements, planning, and implementation for: acquisition logistics; supply support; maintenance; training; maintenance documentation/procedures; Packaging, Handling, Storage and Transportation (PHS&T); and logistics information systems. The capabilities listed above will be tailored to meet specific customer requirements through developing formal and informal planning products and analyses as necessary to support the Program at KSC. The required products will be a joint responsibility of the Program Integration Division organization, Operations and Integration organization, and KSC GPD Logistics organization. KSC GPD Logistics will coordinate all logistics support needed in support of customer and stakeholder organizations.*

Supportability analysis will be accomplished through the application of the following Integrated Logistics Support (ILS) functions, tailored as appropriate: Design Interface (to infuse supportability considerations into the system design/development processes); Maintenance Planning (performing maintenance analyses and planning the approach to performing maintenance for the Program); maintenance and logistics workforce (labor and skill set) planning; Supply Support (identify, plan, provision, acquire, receive, store, transfer, and issue parts and items necessary to support a system and its support items [such as test equipment, shop aids, trainers, and simulators]); Support and Test Equipment; Training and Training Support; PHS&T; Logistics information systems; Facilities analysis; and Technical Data and Documentation necessary to operate, test, repair, and maintain the Program assets.

Current Logistics Paragraph in SEMP

Logistics Support Analyses identify and address life cycle cost drivers and define system support needs and resources throughout the system life cycle. LSA helps to ensure that supportability requirements are considered in the design process by addressing the following objectives:

- •Aids in the establishment of supportability requirements to assist in the development of a cost-effective solution for system support. Outputs include the system maintenance concept and supportability-related design criteria.
- •Identifies specific logistics support resource requirements:
- •Type and quantity of support and test equipment
- •Spare and repair part requirements (for maintenance)
- •Personnel skills (maintenance)
- •Training requirements (maintenance)
- •Operations & Maintenance technical data requirements
- •Provisioning Data (spares, vendor/distributor information, etc.)
- •Test and retest requirements
- •Inventory data
- •Packaging, Handling, Storage, and Transportation (PHS&T) requirements
- •Maintenance Task Outlines, maintenance task intervals, and times.

The LSA and requirements allocation activities are interdependent and the most accurate data needs to be coordinated in order to optimize the launch availability, maintainability, and supportability of the systems. The Mean Time To Failure (MTTF), Mean Time Between Failures (MTBF), and Mean Time To Repair (MTTR) used to determine the quantitative availability of the ground system subsystems will be included when available in the LSA in order to affect sparing and sparing analysis.

Current Logistics Paragraph in SEMP Continued

Activities and Products

The Logistics Support Process product is shown in Table TBD.

TABLE TBD: GO LOGISTICS SUPPORT PROCESS PRODUCT

Doc Num	Title	Owner	Plan
TBD	Integrated Logistics Support Plan	GP-L	Updated as program matures or prior to certain program reviews
Assigned to each Subsystem	LSAs for each design package (housed with design packages in DDMS)	GP-L	Updated as subsystems matures

Status

The ILSP will be updated as the program matures and transitions from planning into development and then into operations. As the ILSP is matured the focus will increasingly be the identification of logistics support resources to support operations.