Electronic Parts Applications Reporting and Tracking System (EPARTS)

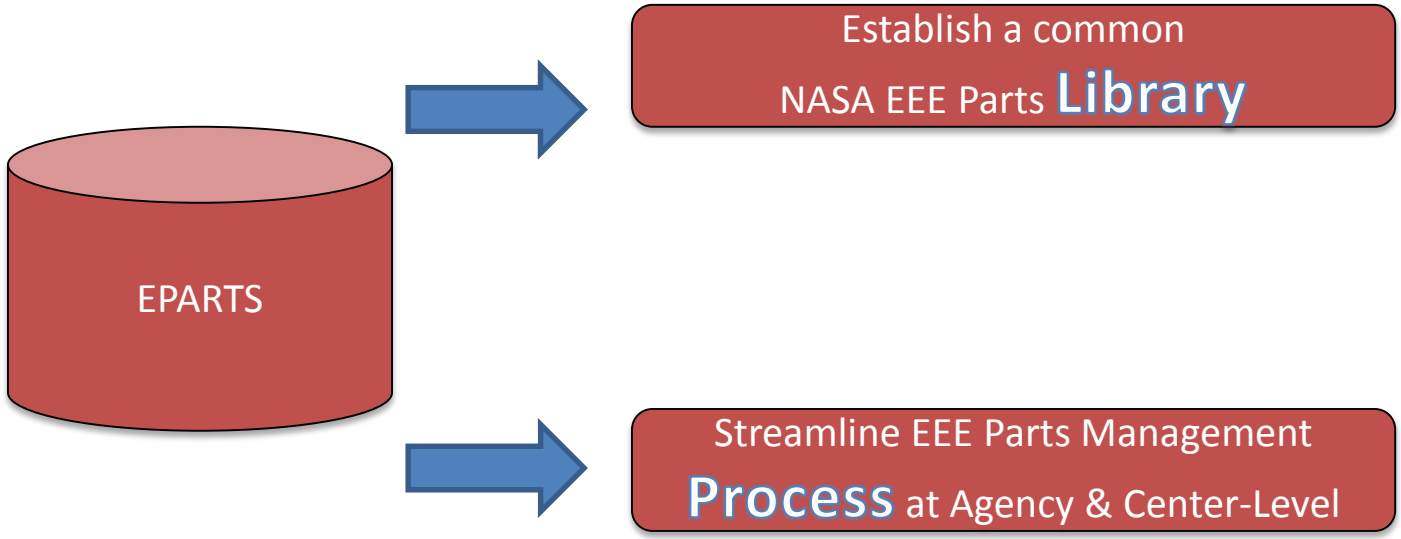
http://www.eparts.nasa.gov

Yuan Chen, John Pandolf, Pete Majewicz, LaRC
Pat McManus, Angela Thoren, David Beeson, MSFC
Erik Denson, KSC
Kuok Ling, ARC
Edward Zampino, Jeff Riddlebaugh, Kristen Boomer, GRC
Lori Risse, JPL

Outline

- What is EPARTS
- Overview
- Current Status
- Modules
- EPARTS Implementations
  - MSFC
  - KSC
  - ARC
  - GRC
  - JPL
  - LaRC
- Conclusion

What is EPARTS



EPARTS Overview

- Established in response to a request from the Office of the Chief Engineer at NASA Headquarters to establish a consolidated EEE parts management system.
  - Sponsored by NASA HQ/OCE APAD for development.
  - Based on JPL PARS database and developed by JPL.
  - Coordinated by EEE Parts Community of Practice (CoP).
  - Supported by center leadership
  - Implemented by center EEE parts offices
  - Participation during development
    - LaRC, MSFC, KSC, ARC, GRC, JPL
  - EPARTS
    - Housed on GOV cloud behind NASA firewall.
    - Accessed via Launchpad username and password.

EPARTS Status

FY 2011	FY 2012	FY 2013	FY 2014	2015 (and beyond)	
Inception	Design	Development	Development/ Test	Implementation	Maintenance
Decide to build EPARTS based on JPL PARS	Pilot at LaRC LaRC Mission Assurance Address center needs	MSFC obsolescence KSC GSE Address center needs	ARC Legacy GRC Legacy Center test database functionality	Center POC Module LaunchPad	Operational

- EPARTS
  - Houses 32 project parts lists used across NASA
  - Consists of 11,614 parts identified on both active and historical missions.
- Status
  - Currently operational.
  - Transitioned implementation and maintenance
- **EEE Parts CoP encourage engineering participation across NASA.**

EPARTS Modules

- Database structure consists of 4 main modules:
  - ① Parts Management
  - ② Obsolescence
  - ③ Part Search
  - ④ Mission Assurance Module
- Target user group includes (but not limited to):
  - Design Engineering
  - EEE Parts Engineering

MSFC

USING EPARTS AS PARTS DATABASE AND PROVIDING PARTS OBSOLESCENCE TO THE AGENCY

How Does MSFC Use EPARTS?

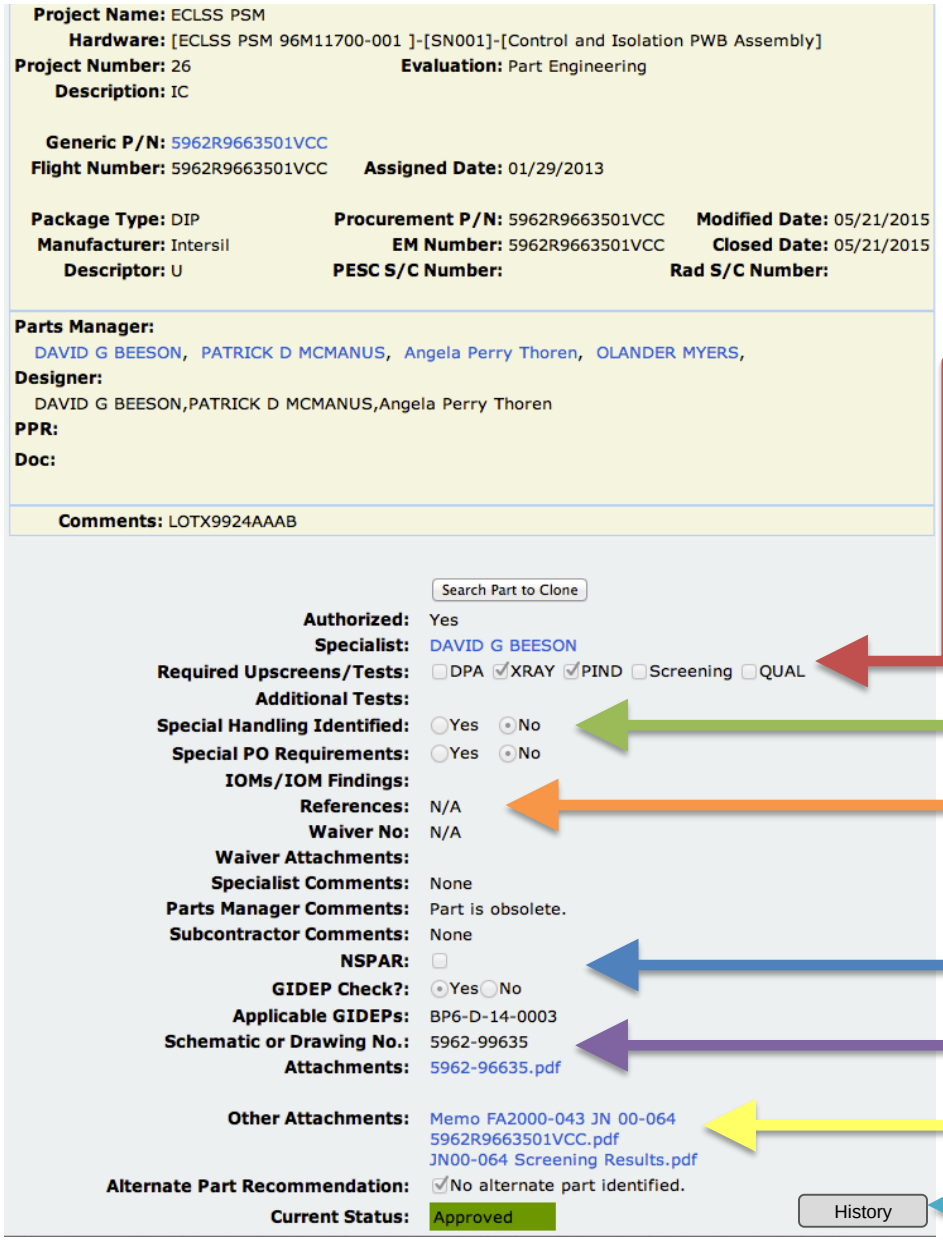
- MSFC has 5 projects loaded into EPARTS:
  - International Space Station Environmental Research and Visualization System (ISERV)
  - Lightning Imaging Sensor (LIS)
  - Environmental Control Life Support System (ECLSS)
  - ARES
  - Space Launch System
- Utilize EPARTS for project parts list management.
  - Part Selection
  - Part Approval
  - Part Search
- Utilize the EPARTS Obsolescence Module to perform obsolescence management activities for NASA.

1. Parts Management Module (I)

- Create hardware tier structure for project assemblies.
- Upload parts lists and attach to project assemblies.
- Manage viewer access to all project assemblies.
- View parts approval status and obsolescence risk on project-specific dashboard.
- Export options in report format to capture project hardware tiers, EEE part data, and obsolescence information.

Hardware Tier Structure

1. Parts Management Module (II)



Displays part review and approval data.

- EEE Part Test Type
- Procurement Information
- Waiver Information
- GIDEP Impacts
- Source Control Drawing
- EEE Part Testing Data
- Part Review History

2. Obsolescence Module

- MSFC provides EEE parts obsolescence management service to NASA.
  - Identified the need to incorporate obsolescence data into EPARTS.
  - Coordinated with JPL to build Obsolescence Module.
    - Streamlines obsolescence analysis process.
    - Ensures obsolescence data is accessible across NASA.
    - Encourages other Centers to upload parts lists.
    - Enables bulk export of parts library for obsolescence analysis.
      - Eliminates duplication of effort by performing bulk analysis versus project-specific analysis.

Obsolescence Risk Dashboard

Parts Manager View

Project	Part List Name	#Obsolescence Risk
MyPage		
MSL	AIS CCB PL10256825 Rev M (**PL10256825**) (Review) (PL Maintenance)	**0**
MSL	AIS CPB PL10256821 Rev K (**PL10256821**) (Review) (PL Maintenance)	**1**
MSL	BCB PL10256551 Rev H (**PL10256551**) (Review) (PL Maintenance)	**4**
MSL	CEB PL10256322 Rev B (**PL10256322**) (Review) (PL Maintenance)	**0**
MSL	CEPCU1 PL10256363 Rev H (**PL10256363**) (Review) (PL Maintenance)	**2**
MSL	CEPCU2 PL10256353 Rev G (**PL10256353**) (Review) (PL Maintenance)	**1**
MSL	CRCC PL10256313 Rev D (**PL10256313**) (Review) (PL Maintenance)	**1**
MSL	DPFA PL10256770 Rev T (**PL10256770**) (Review) (PL Maintenance)	**2**

2. Obsolescence Module

- Each part loaded into EPARTS is assigned an obsolescence status.
- Fields are added to each EEE part to denote part availability:
  - Total manufacturing sources
  - Available manufacturers
  - Projected obsolescence date
  - Actual obsolescence date
  - Obsolete part replacement options
- Obsolescence risk color code is assigned to each part and appears on the project-specific dashboard.
- All parts monitored on a continuous basis for end-of-life notification.

Total Parts Analyzed for Obsolescence Impact

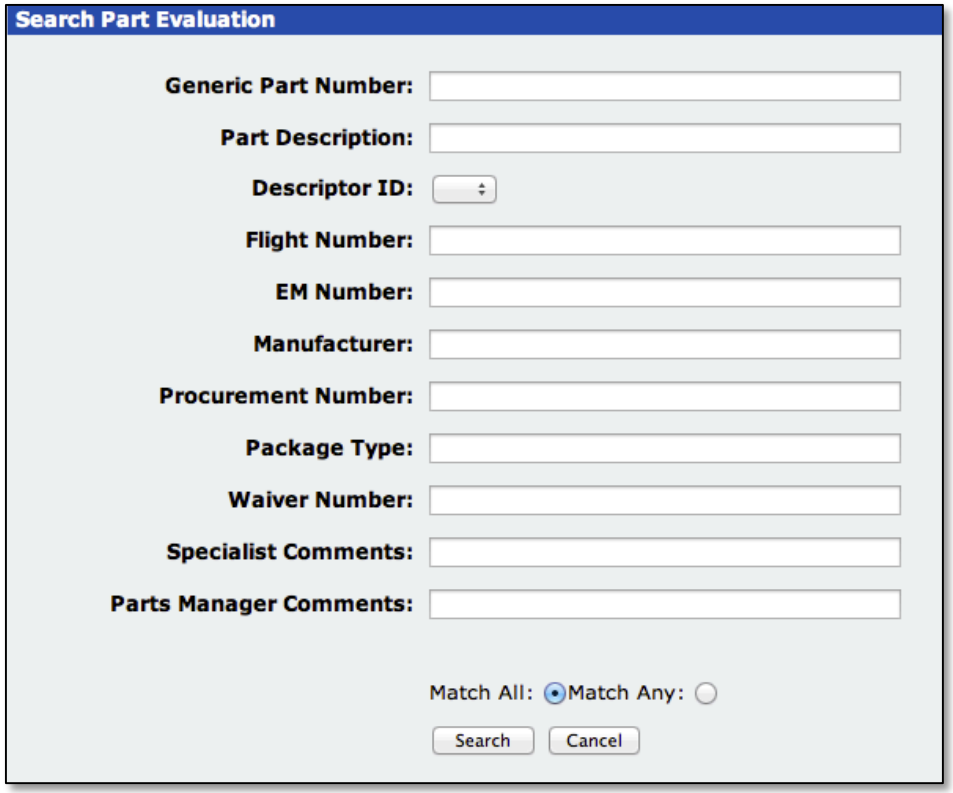
Part Availability Status	Number of Parts
Obsolete	160
End-of-Life (EOL)	5
Single Manufacturing Source	887
2 or More Manufacturing Sources	513
Total Parts Analyzed (to date)	**1,565**

Obsolescence Risk Legend	
Y	Obsolete, End-of-Life Date issued, Sole Source Manufactured with less than <4 years availability
N	Part availability >4 years, 2 or more manufacturing sources
N/A	Obsolescence risk not assigned due to part type (passive devices)
U	Obsolescence risk unknown

3. Parts Search Module

- Allows users to search for EEE parts via multiple criteria:
  - Part number
  - Description
  - Manufacturer
  - Package Type
- Assists in the part selection process.
- Streamlines the obsolescence alert process at the Agency level.
- Identifies part commonality across NASA.

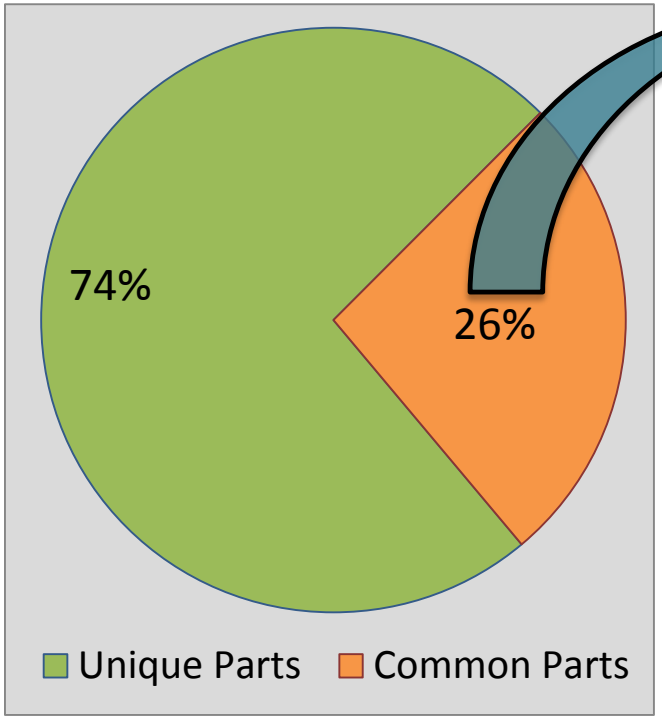
Part Search Function



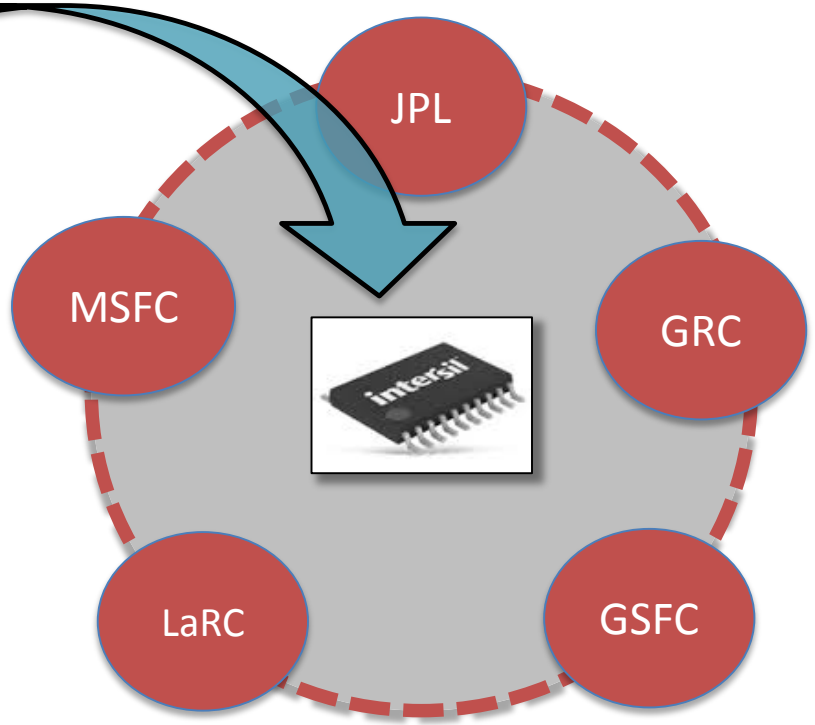
Identification of Common Parts

- Part Search Module identifies common parts used across NASA.
  - Leverage data across projects & Centers.
  - Resolve EEE parts risks from a NASA standpoint, versus center-specific, to eliminate duplication of effort and unnecessary engineering cost.

Part Commonality



Part Commonality Example



KSC
USE EPARTS AS DATABASE

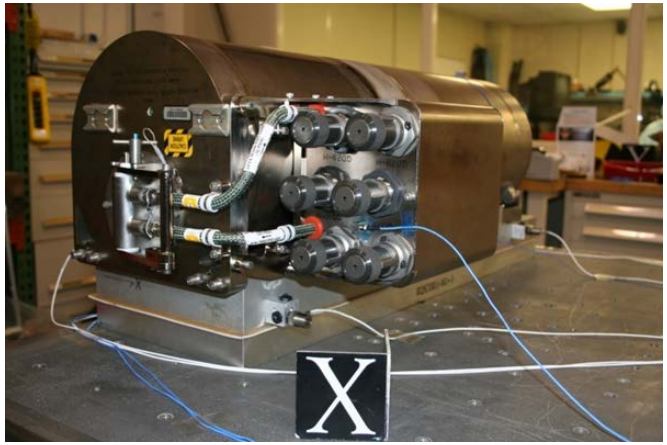
How Does KSC Use EPARTS

- Utilization of EPARTS is specified in KSC's EEE Parts Plan (KSC-PLN-5406).
- KSC created the Kennedy Ground Control System (KGCS) project in EPARTS to test the new Ground Support Equipment (GSE) module of EPARTS. Typically, EEE parts databases concentrated on flight components. The addition of the GSE module allows centers to share qualification data on hardware used in critical GSE.
- KSC is in the process of designing and qualifying EEE Parts including custom assemblies and COTS equipment for Electrical GSE for the Space Launch System (SLS) Program.
- KSC will use EPARTS mainly as a parts database. KSC has a qualification team responsible for the qualification of GSE components and assemblies. Currently this data is stored in a local database. This data will be uploaded to EPARTS, visible to all centers. Now that EPARTS has gone operational, KSC will actively start uploading parts as they become qualified.
- KSC also has small flight projects such as RESOLVE and Advance Plant Habitat that will leverage on the database to select parts. Any qualification performed by these projects will be uploaded to EPARTS.
- KSC will also use the EPARTS obsolescence module to assist in the selection of EEE Parts and monitor part obsolescence.
- The biggest benefits of EPARTS are the sharing of part qualification data from projects from all over NASA and having a central repository for this data. Qualification at all levels can be expensive. Using EPARTS to search and find qualified parts can save projects and programs a significant portion of their budget and time in their schedules.

Parts Management Module - GSE Feature

Electromagnetic Compatibility

- KSC GSE undergoes extensive qualification for the launch environment (EMI, vibration, acoustic, thermal, etc…)
- EPARTS developed a GSE Module to capture qualified GSE components and sub-assemblies including sensors, transducers, meters, custom subassemblies, connectors and cable subassemblies, and COTS equipment such as Programmable Logic Controllers (PLC) and power supplies.
- The EPARTS GSE Module was based on KSC needs, but will benefit the agency and those requiring qualified GSE.



Vibration & Acoustic Testing

ARC
USE EPARTS AS DATABASE

How does ARC use EPARTS

- How we use EPARTS
  - EPARTS is not currently used for ARC parts review process but it can be once it's more mature and people here learn how to use it
  - The most highly used EPARTS function is part search, especially for flight legacy and alerts; inventory data would be most useful if available
  - I am the only user currently, but I will train others at ARC to use it when EPARTS is working fully
- Projects or parts uploaded into EPARTS – LADEE (only 62 parts from one avionics box) & UV LED (132 parts); uploaded by Angie Thoren
- Trying to upload more nano-sat project part lists; but having trouble getting EPARTS to cooperate

EPARTS Benefits

- EPARTS benefit from center's perspective:
  - Search for part flight legacy data during design phase
  - Search for part ordering info during procurement
  - Search for NASA or GIDEP part alerts/advisories
  - Share flight legacy data for all the COTS parts that have been flown successful by ARC's projects
  - Cost reduction by sharing minimum-buy parts with other NASA Centers through EPARTS collaboration
  - Part inventory search for long lead-time parts to help meet schedule; assuming other Centers have the parts & willing to share
  - Find and inquire about user experiences/expertise on parts that other Centers' have used on their flight projects

GRC
USE EPARTS AS DATABASE

How will GRC use EPARTS?

- How we will use EPARTS
  - EPARTS is not currently used at GRC; no space flight projects have reached the parts selection stage since EPARTS became fully operational.
  - We plan to use the parts search module as aid in selection, review and approval of project parts lists, and to identify part commonality.
  - Only the three S&MA EEE Parts Engineers currently have access to EPARTS, but others can be trained.
- Project parts lists uploaded into EPARTS : CoNNeCT /SCAN Test Bed (partial list) was sent to Angie Thoren but is not in public view.
- We Plan to use EPARTS for Solar Electric Propulsion Project parts selection and review.

How does GRC perceive the Benefits of EPARTS?

- Three SMA engineers share available time between R&M Engineering, EEE Parts, and provide some support to System Safety.
  - EPARTS will eventually provide some relief in the area of resources.
  - The EPARTS will reduce the amount of time to perform part searches and parts selection.
  - The database and its features should reduce human error
  - Will provide more time to carefully evaluate parts and this will ultimately lead to improved selections of EEE Parts for designs.
  - Higher quality EEE Parts for the applications intended means increased reliability and lower frequency of system level failures.
  - Increased efficiency will also contribute to meeting schedules, leading to more available time to make corrections when mistakes are detected. => Leads to cost reduction.
- EPARTS can be a tool that is transferred to the electronics design teams.
- We have written EPARTS into the EEE Parts Control Plan for the Solar Electric Propulsion Project parts selection and review.

JPL
USE EPARTS AS DATABASE

How JPL Uses EPARTS

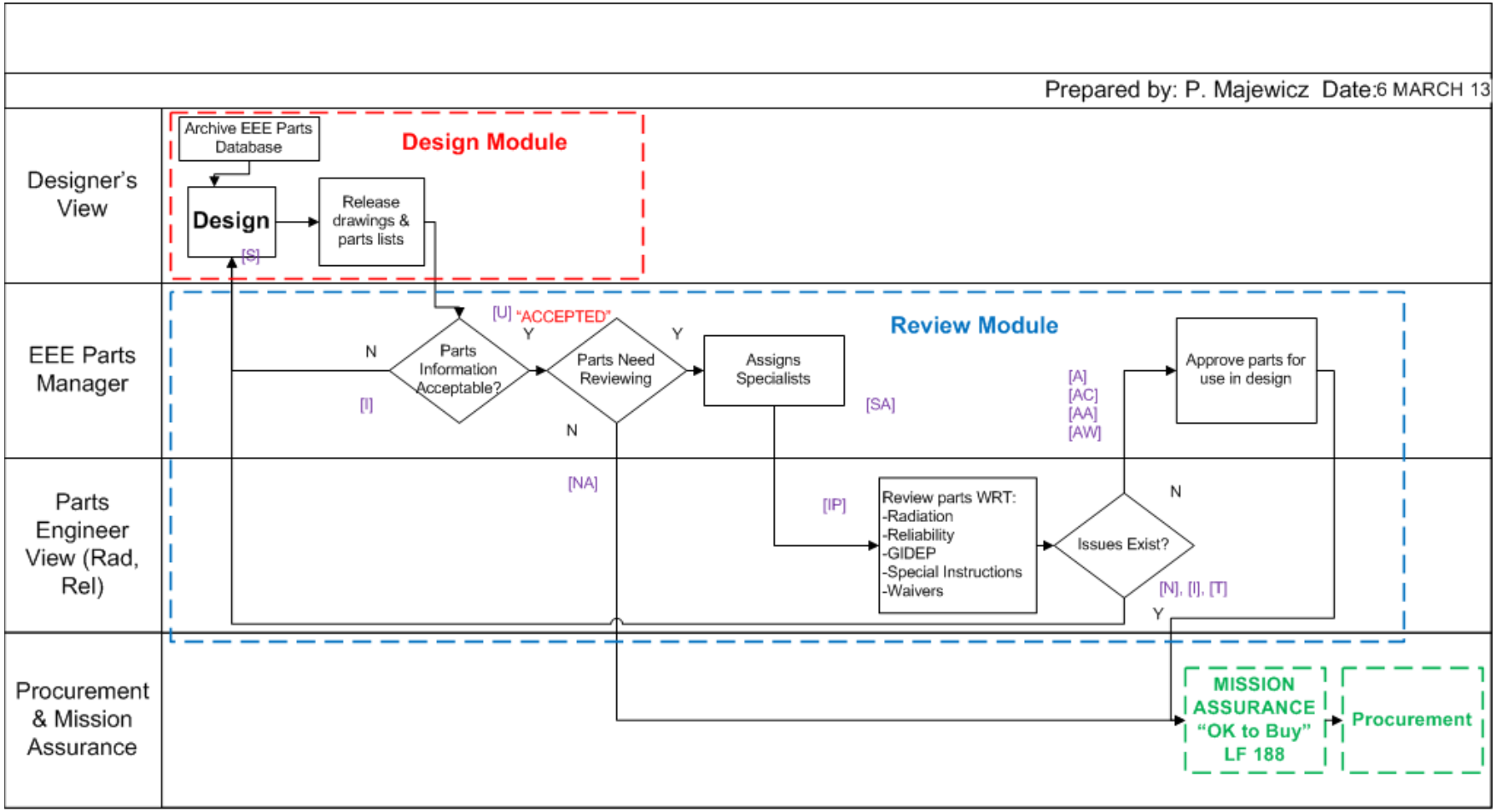
- JPL uses PARS extensively (the database that EPARTS is modeled after).
  - For part reviews and approvals
  - For tracking part procurements
  - For tracking screening/testing of parts
  - For reporting

- JPL parts lists in EPARTS are monitored for obsolescence.
  - We are notified of obsolescence issue for parts on heritage designs, such as MSL, uploaded to EPARTS.

LARC

USING EPARTS AS PARTS REVIEW AND APPROVAL PROCESS TOOL AND PARTS DATABASE

EPARTS Flow @ LaRC



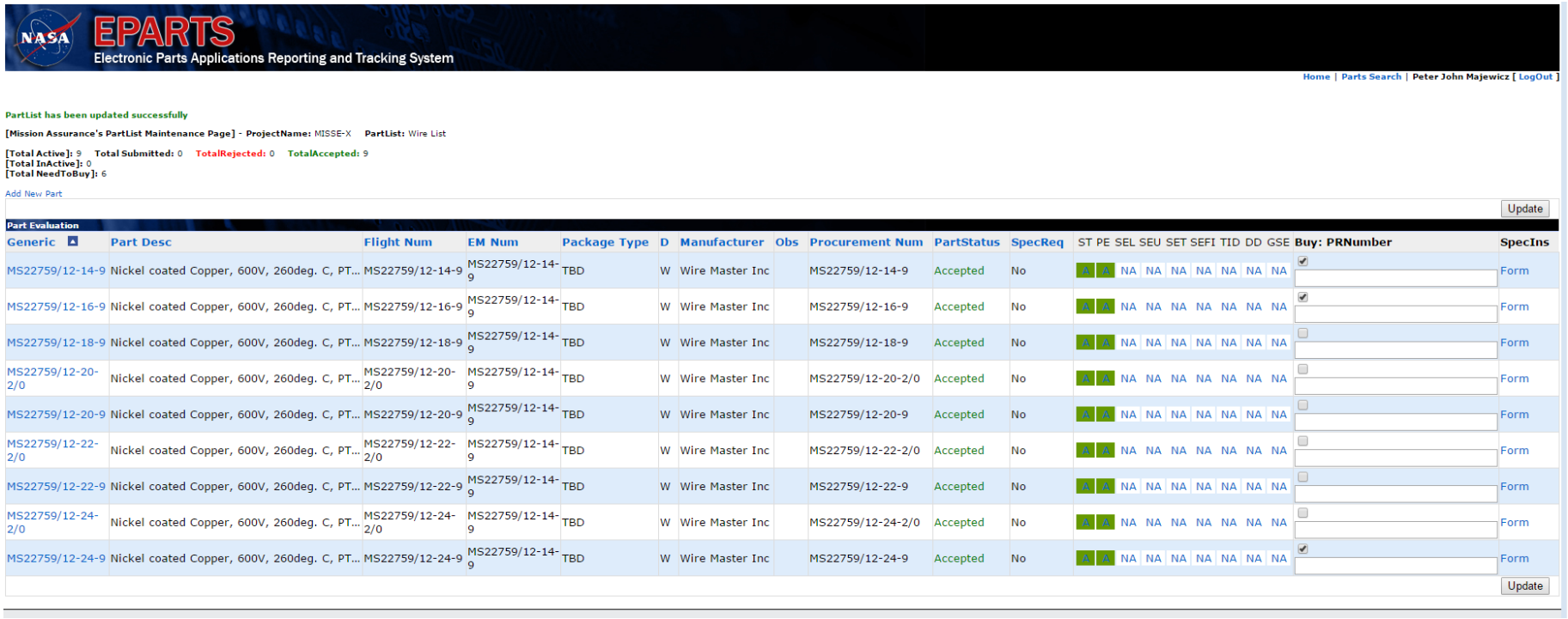
Review Codes:

[NA] = No Review Required
[U] = Unassigned
[SA] = Assigned to reviewer/results pending
[IP] = In Progress
[I] = Info needed
[T] = Test/test data needed
[S] = System Analysis

[A] = Approved
[AC] = Approved conditionally
[AA] = Approved by Analysis
[AW] = Approved via Waiver
[N] = Not Approved

4. Mission Assurance Module

- Records S&MA input for Critical & Complex purchases
- Records “OK to Buy” Decision



EPARTS
Electronic Parts Applications Reporting and Tracking System

Home | Parts Search | Peter John Majewicz [LogOut]

PartList has been updated successfully

[Mission Assurance's PartList Maintenance Page] - ProjectName: MISSE-X PartList: Wire List

[Total Active]: 9 Total Submitted: 0 TotalRejected: 0 TotalAccepted: 9
[Total InActive]: 0
[Total NeedToBuy]: 6

Add New Part

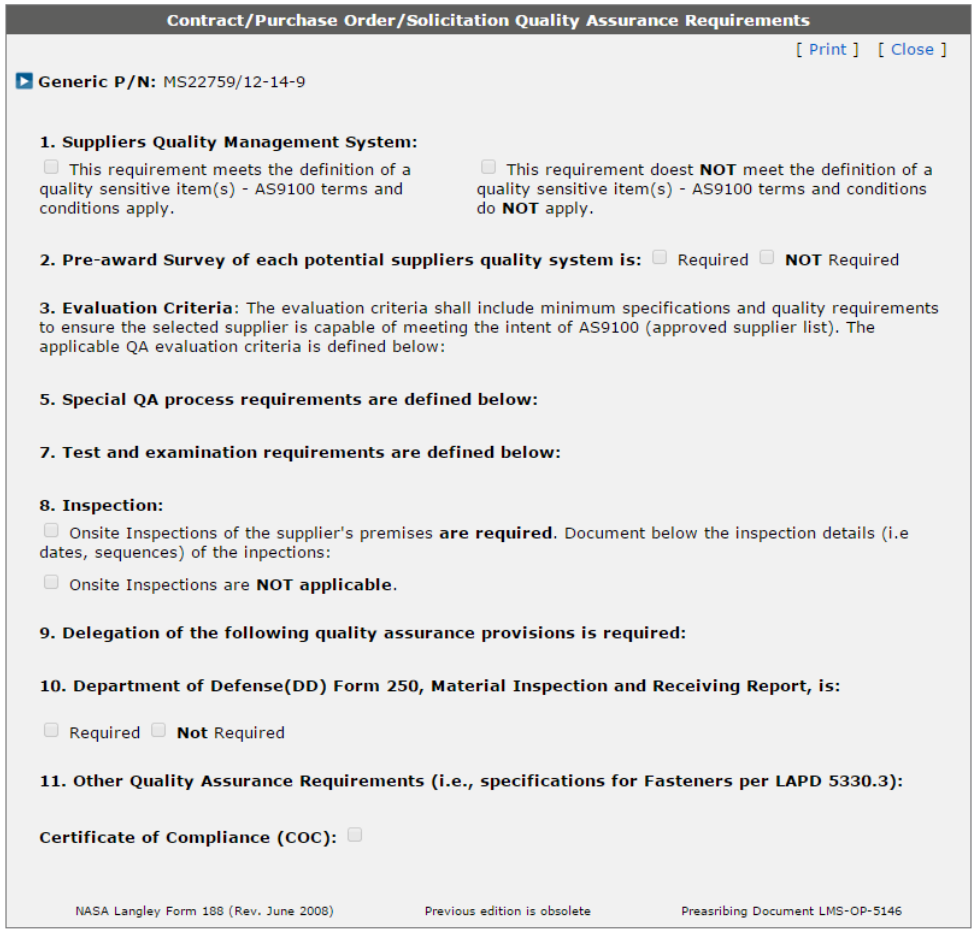
Update

Part Evaluation

Generic	Part Desc	Flight Num	EM Num	Package Type	D	Manufacturer	Obs	Procurement Num	PartStatus	SpecReq	ST PE SEL SEU SET SEFI TID DD GSE	Buy: PRNumber	SpecIns
MS22759/12-14-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-14-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-14-9	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-16-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-16-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-16-9	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-18-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-18-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-18-9	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-20-2/0	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-20-2/0	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-20-2/0	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-20-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-20-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-20-9	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-22-2/0	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-22-2/0	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-22-2/0	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-22-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-22-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-22-9	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-24-2/0	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-24-2/0	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-24-2/0	Accepted	No	A A NA NA NA NA NA NA NA		Form
MS22759/12-24-9	Nickel coated Copper, 600V, 260deg. C, PT...	MS22759/12-24-9	MS22759/12-14-9	TBD	W	Wire Master Inc		MS22759/12-24-9	Accepted	No	A A NA NA NA NA NA NA NA		Form

Update

Based on Langley Form 188



Contract/Purchase Order/Solicitation Quality Assurance Requirements

[Print] [Close]

Generic P/N: MS22759/12-14-9

1. Suppliers Quality Management System:

☐ This requirement meets the definition of a quality sensitive item(s) - AS9100 terms and conditions apply.

☐ This requirement doest **NOT** meet the definition of a quality sensitive item(s) - AS9100 terms and conditions do **NOT** apply.

2. Pre-award Survey of each potential suppliers quality system is: ☐ Required ☐ **NOT** Required

3. Evaluation Criteria: The evaluation criteria shall include minimum specifications and quality requirements to ensure the selected supplier is capable of meeting the intent of AS9100 (approved supplier list). The applicable QA evaluation criteria is defined below:

5. Special QA process requirements are defined below:

7. Test and examination requirements are defined below:

8. Inspection:

☐ Onsite Inspections of the supplier's premises **are required**. Document below the inspection details (i.e dates, sequences) of the inpections:

☐ Onsite Inspections are **NOT applicable**.

9. Delegation of the following quality assurance provisions is required:

10. Department of Defense(DD) Form 250, Material Inspection and Receiving Report, is:

☐ Required ☐ **Not** Required

11. Other Quality Assurance Requirements (i.e., specifications for Fasteners per LAPD 5330.3):

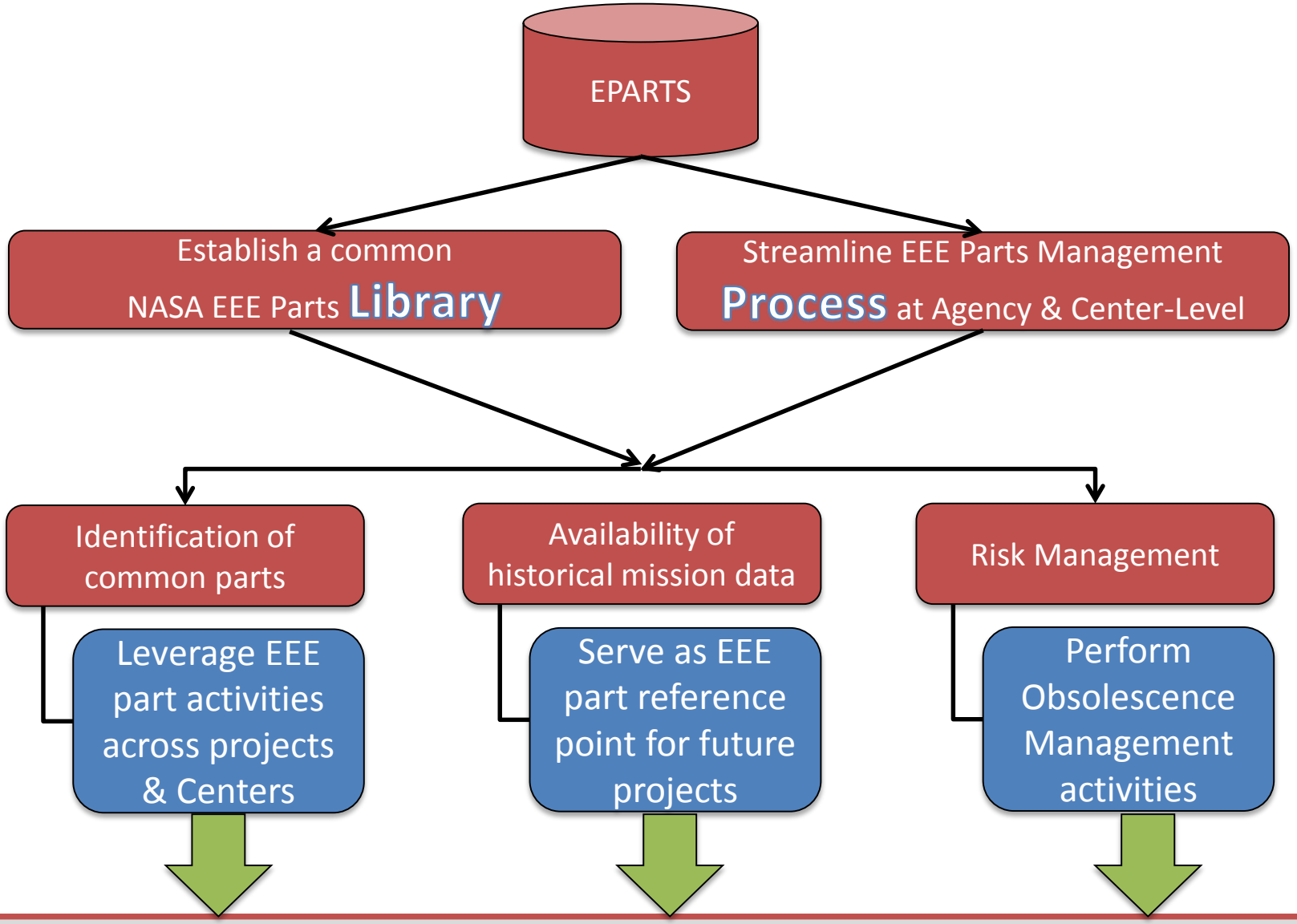
Certificate of Compliance (COC): ☐

NASA Langley Form 188 (Rev. June 2008) Previous edition is obsolete Preasribing Document LMS-OP-5146

Additional Comments

- Capability to do part searches across Centers
  - Immediate information on who is using a specific part
    - NASA alerts
    - GIDEPS
    - News from Manufacturer or DLA
  - Information on what companies NASA is buying from
    - Justification for audits
    - Review of purchase data at audits

Conclusions - EPARTS



Question?