S1000D User Forum - Amsterdam

How Product Lifecycle Management (PLM) Architectures and S1000D Support Technical Training Content

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Why Am I Here?

- *I am here to discuss:*
- Facts about U.S. Navy training/learning content
- Ongoing problems with U.S. Navy training/learning processes
- How/where technical training fits into product lifecycle management (PLM)
- How data standards support training in PLM
- Proposed R&D efforts to solve training/learning issues
- Why this information is important to (Advanced) Distributed Learning

Facts About Navy Training/Learning Content

Facts:

What the Naval Education Training Command (NETC) knows about curriculum:

"Of the 408 projects … ***two-thirds*** reported the primary reason for the [training product] maintenance request was due to ***equipment or publication changes***. ***Better integration*** *of technical information with training would* ***alleviate*** *some of this* ***rework***."*

* ***Computer-Based Training & Personal Computer-Simulation Prioritization and Cost Estimation Assessment for Naval Education Training Command COO Supporting FY10/11 Spend Plan and POM12 Submittal (NETC 2009)***

Problems with Technical Training Development and Management

However, even though the majority of Navy training is designed for technical systems, *we still have these problems…..*

1. ***Technical data & human performance*** requirements are ***not consistently factored together for*** product acquisition or product life cycle support.

2. Learning content development tools ***are not integrated into*** life-cycle-managed technical manual environments.

3. Technical learning content is ***18-24 months behind*** because (*in part*) it is ***not configured to systems and tech manuals.***

4. Technical training managers ***cannot efficiently identify what product support content may be impacted*** by an engineering change proposal.

2009 Navy Inspector General Report on the State of CBT

The *Navy Inspector General* has researched and documented the issues…

A 2009 Navy Inspector General (IG) Report on the state of computer-based training (CBT) found *(Link to report):*

- "***Minimal governance or standardization*** for the acquisition, design and development, or life cycle management of CBT curricula."

  (Callahan, et al., 2009)
- "Lack of ***robust life cycle management practice*** for CBT curricula."

  (Callahan, et al., 2009)
- "The necessary centralized governance and standardized management for courseware development, lifecycle management and content development ***have lagged behind the expansion of CBT***."

  (Callahan, et al., 2009)

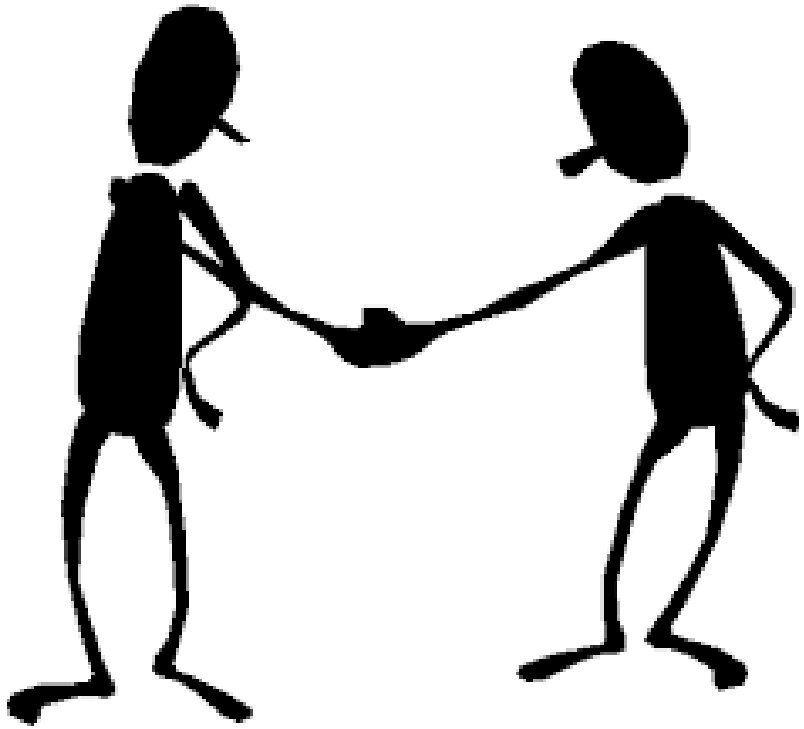
Asking Questions in Search of Solutions

1. What is the ***natural birthplace of training considerations*** while ***designing and developing DoD systems***?

2. What are the ***connections between*** a ***maintenance task analysis and a human competency model***?

3. What can ***commercial data standards do to establish*** a ***lifecycle link between task analyses and related technical curriculum***?

Let's Start With a Premise



Maintenance Task Analysis *Meet* **Human Competency Model**

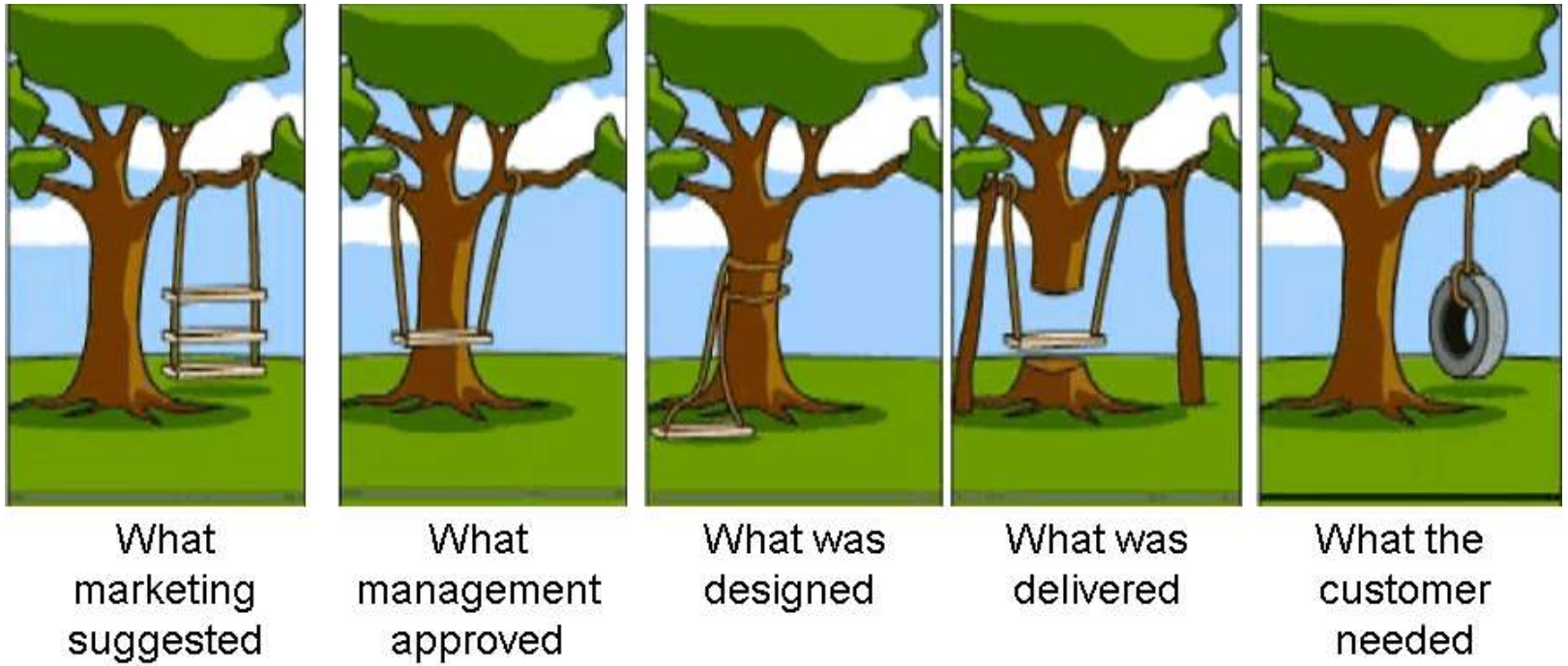
Technical manual content ***is rooted in maintenance task analyses.*** Maintenance task analyses supports system performance requirements.

Therefore…

Technical curriculum ***also*** has its roots ***in maintenance task analyses to support human performance requirements.*** Human performance requirements will support the optimal performance of a system…

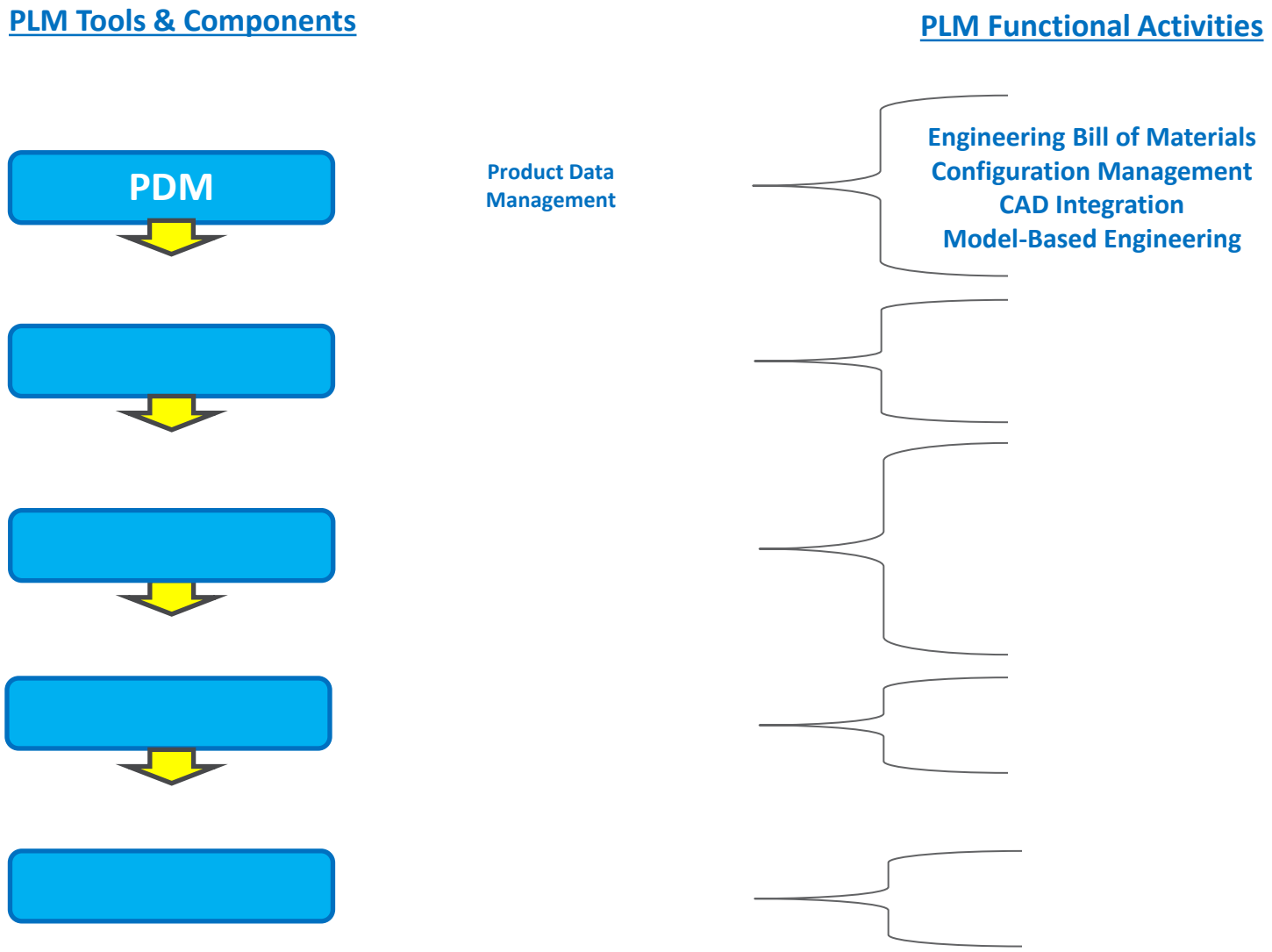
Can we agree?

Linking Training to System Maintenance Requirements



Let's look at technical training development (*intended for distributed learning*)
in the context of Product Lifecycle Management.

PLM Conceptual Architecture: Where Does Training Fit?



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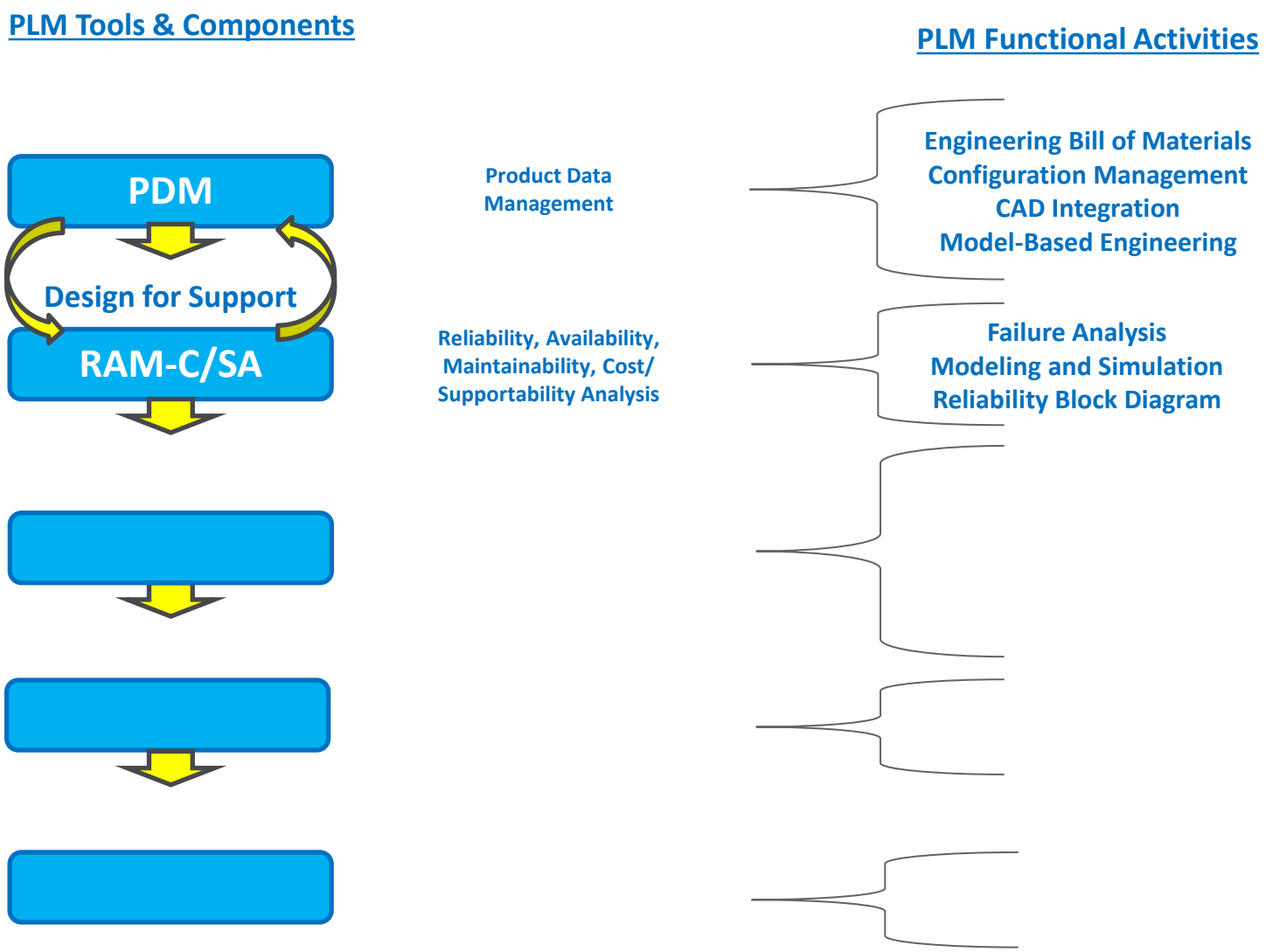

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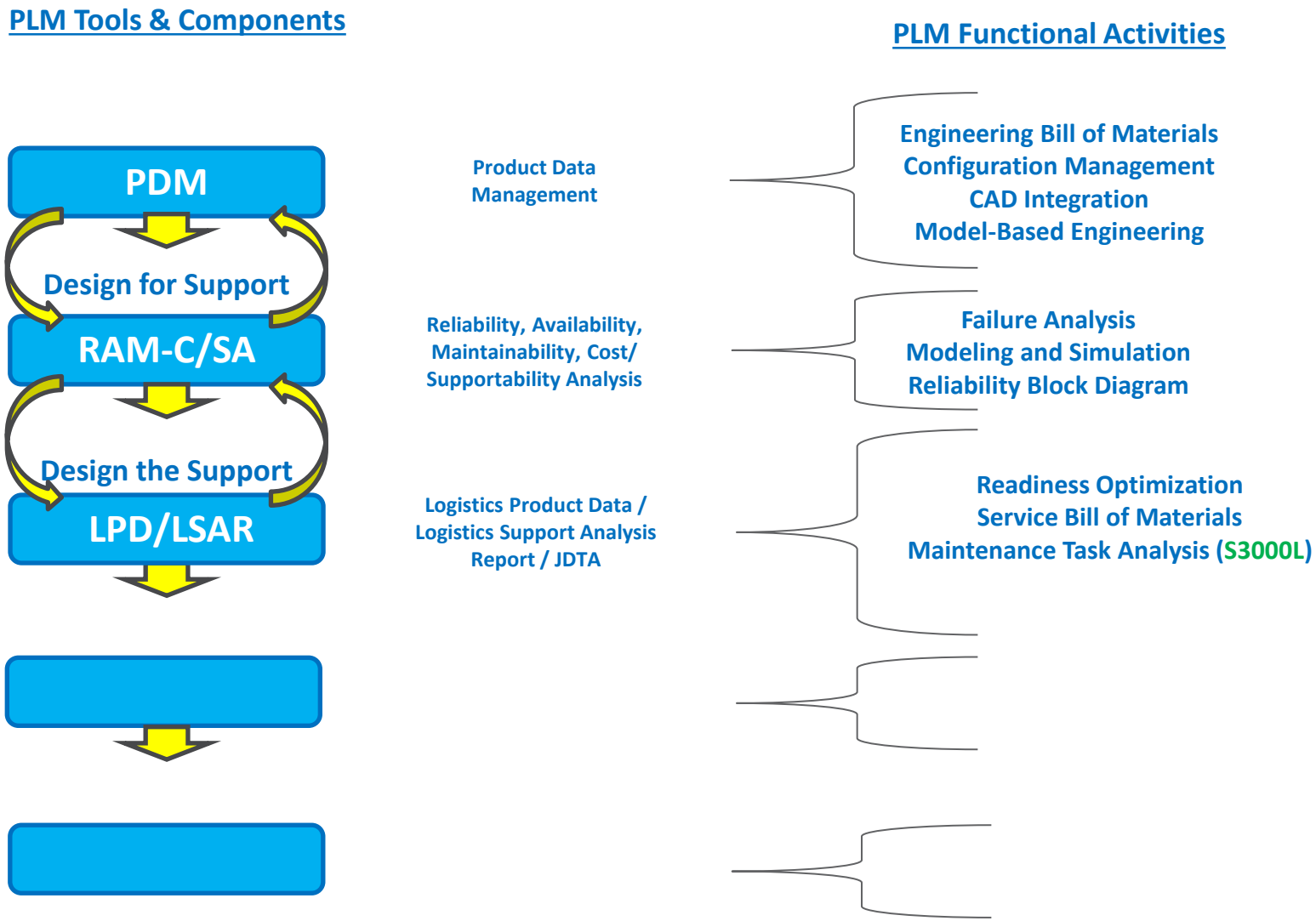

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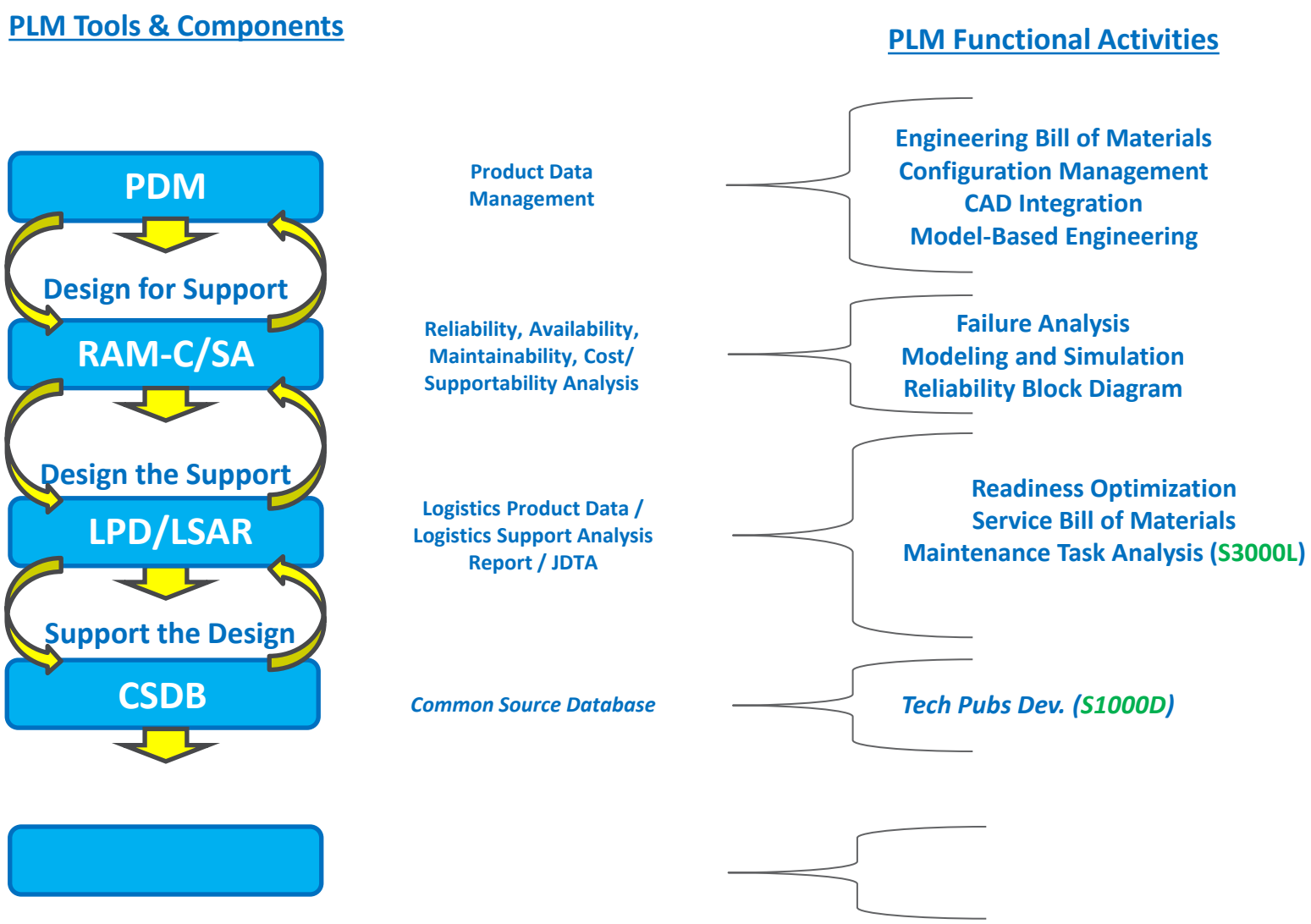

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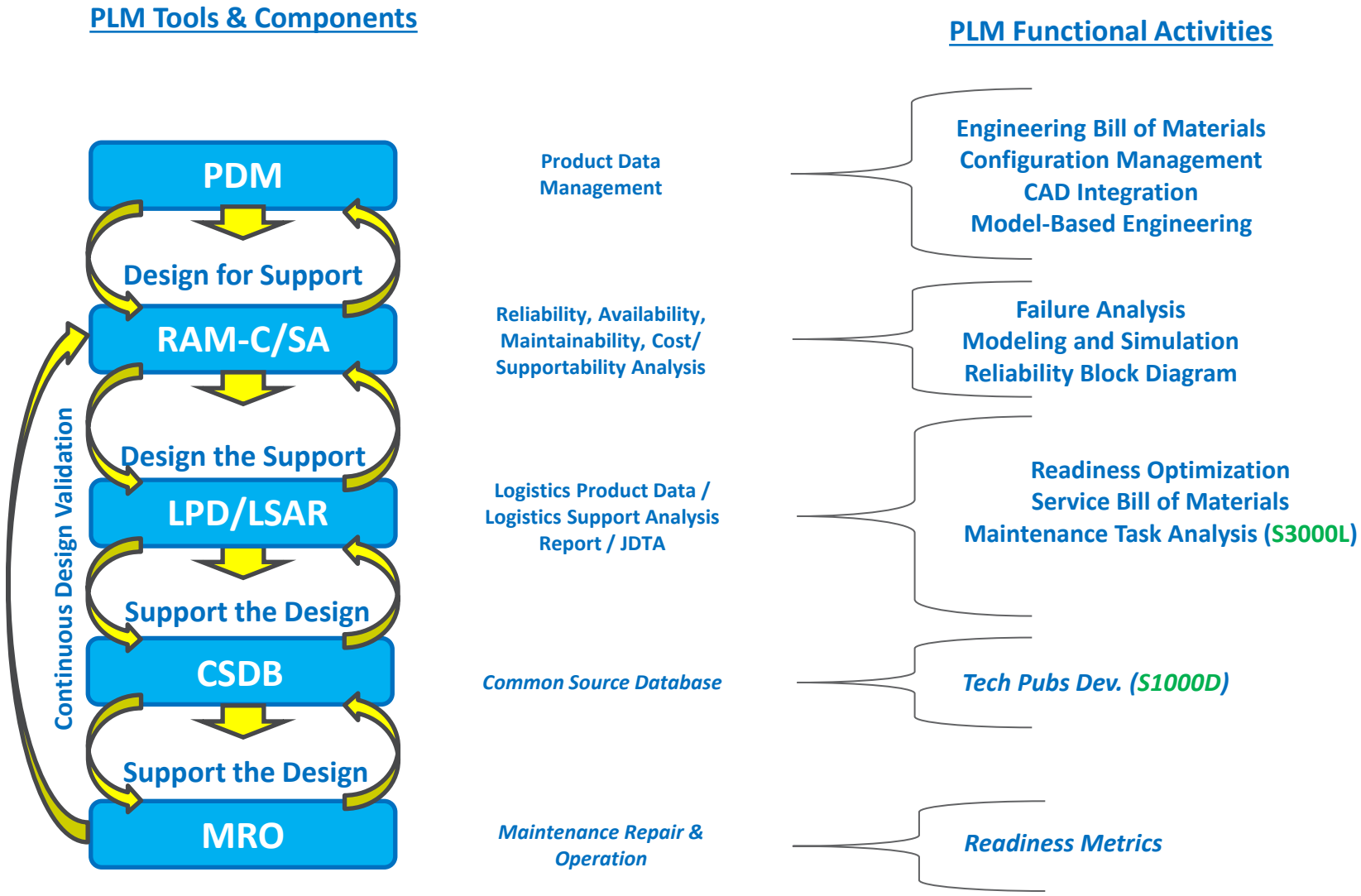


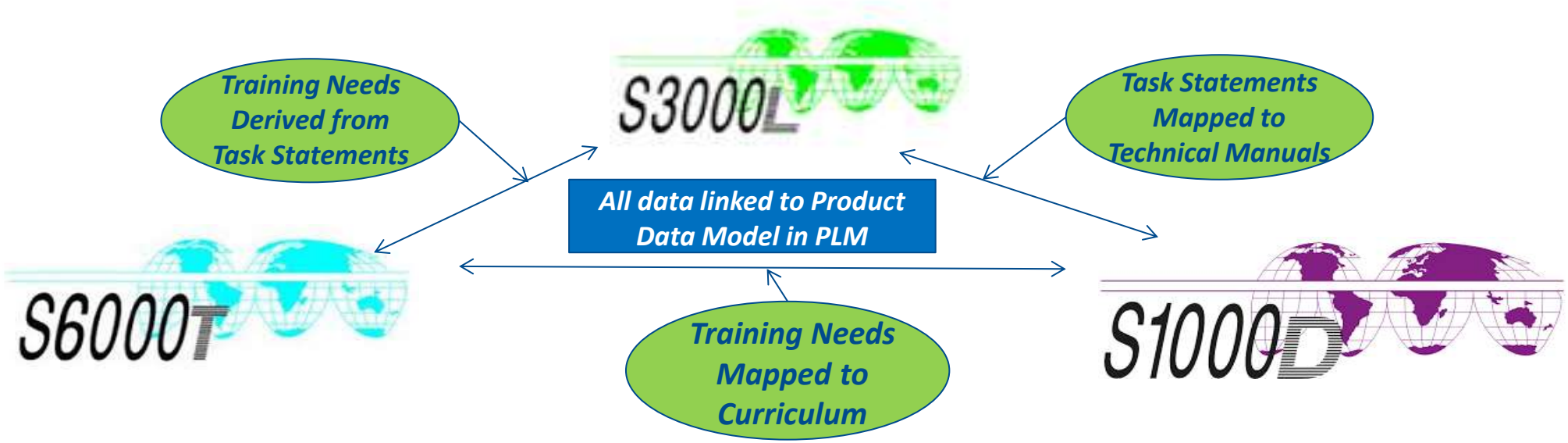
But First, PLM Needs Standards to Link Training Requirements and Content to Systems

How does PLM overcome our problem statements and improve configuration?

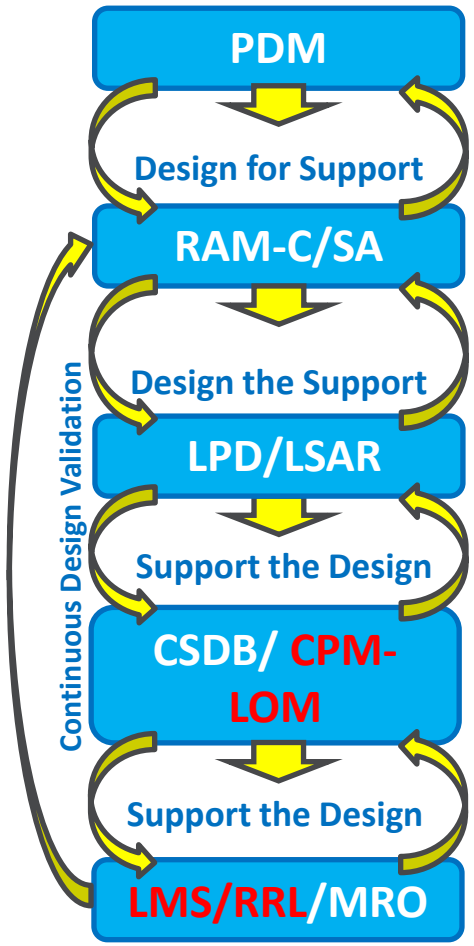
It starts with The S-Series Standards Data Models…

*The **S-Series of Integrated Logistics Support specifications** is a **common denominator** for supporting different **capabilities** of integrated logistics support critical to technical training.*

- **S3000L** – International Procedure Specification for ***Logistics Support Analysis*** (Detailed Definition of Tasks and Subtasks)
- **S1000D** – International Specification for ***Technical Publications Using a Common Source Database***.
- **S6000T** – International Specification for ***Training Needs Analysis and Design*** (***in development - looking for WG members.***)



Where Training Fits into the PLM Architecture Supported by the Three Specifications



PLM Tools & Components	PLM Functional Activities	Analytics Proposal Part
Product Data Management	Engineering Bill of Materials Configuration Management CAD Integration Model-Based Engineering	
Reliability, Availability, Maintainability, Cost/ Supportability Analysis	Failure Analysis Modeling and Simulation Reliability Block Diagram	
Logistics Product Data / Logistics Support Analysis Report / JDTA/ *Content Planning Module/*	Readiness Optimization Service Bill of Materials Maintenance Task Analysis (S3000L, NLP) Human Competency Modeling (S6000T)	Part 1
Common Source Database/ Learning Object Module	*Tech Pubs Dev. (S1000D)* *Training Content Dev (S1000D)*	Part 2
Learning Management System/ Ready Relevant Learning /Maintenance Repair & Overhaul	*Learning Analytics (xAPI)* *Readiness Metrics (xAPI)*	Part 3

Three-Part Proposal to OPNAV, Naval Postgraduate School and SEA05H: Part One: *Develop Algorithm to Create Competency Model*

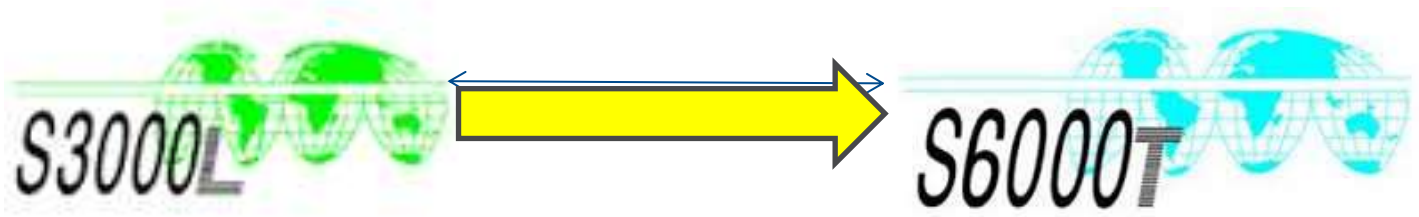
PLM Layer >

LPD/LSAR

Logistics Product Data / Logistics Support Analysis Report / JDTA

- Readiness Optimization
- Service Bill of Materials
- Maintenance Task Analysis (S3000L, NLP)
- RRL Human Competency Modeling (S6000T)

Spec Involved >



Proposal Activity > Develop & Natural Language Processing (NLP) algorithm to:

- Read a task statement in S3000L
- Output a competency model in S6000T
- Link the models in PLM

Integrating Training into PLM Using S-Series Spec: Part Two: *Support S1000D in AIM-CPM/LOM, Integrate AIM into PLM*

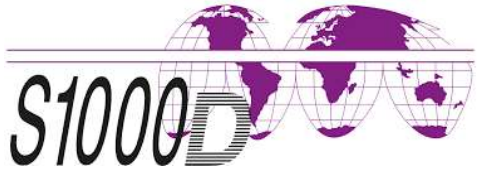
PLM Layer >

CSDB/ CPM-LOM/RRL

Common Source Database/ Content Planning Module/ Learning Object Module

Tech Pubs Dev. (S1000D)
Training Content Dev (S1000D)

Spec Involved >



AIM-CPM /LOM (or other learning content) DEV Tool

PLM CSDB

Proposal Activity >

This is a software plumbing project that:

- **Builds S1000D Support in Navy's AIM-CPM/LOM**
- **Integrates AIM-CPM/LOM into Navy PLM**

All work studied in the S1000D THE BRIDGE PROJECT SCORM

Integrating Training into PLM Using S-Series Spec:
Part Three: *Use xAPI to Capture Learning Analytics, Compare to Baselines*

PLM Layer >

LMS/RRL/MRO

Learning Management System (?)/
Ready Relevant Learning /Maintenance
Repair & Operation

Learning Analytics (xAPI)
Readiness Metrics (xAPI)

Spec Involved >

Simulation → **xAPI** →

PLM

S3000L

S6000T

Proposal Activity >

Use xAPI to capture:

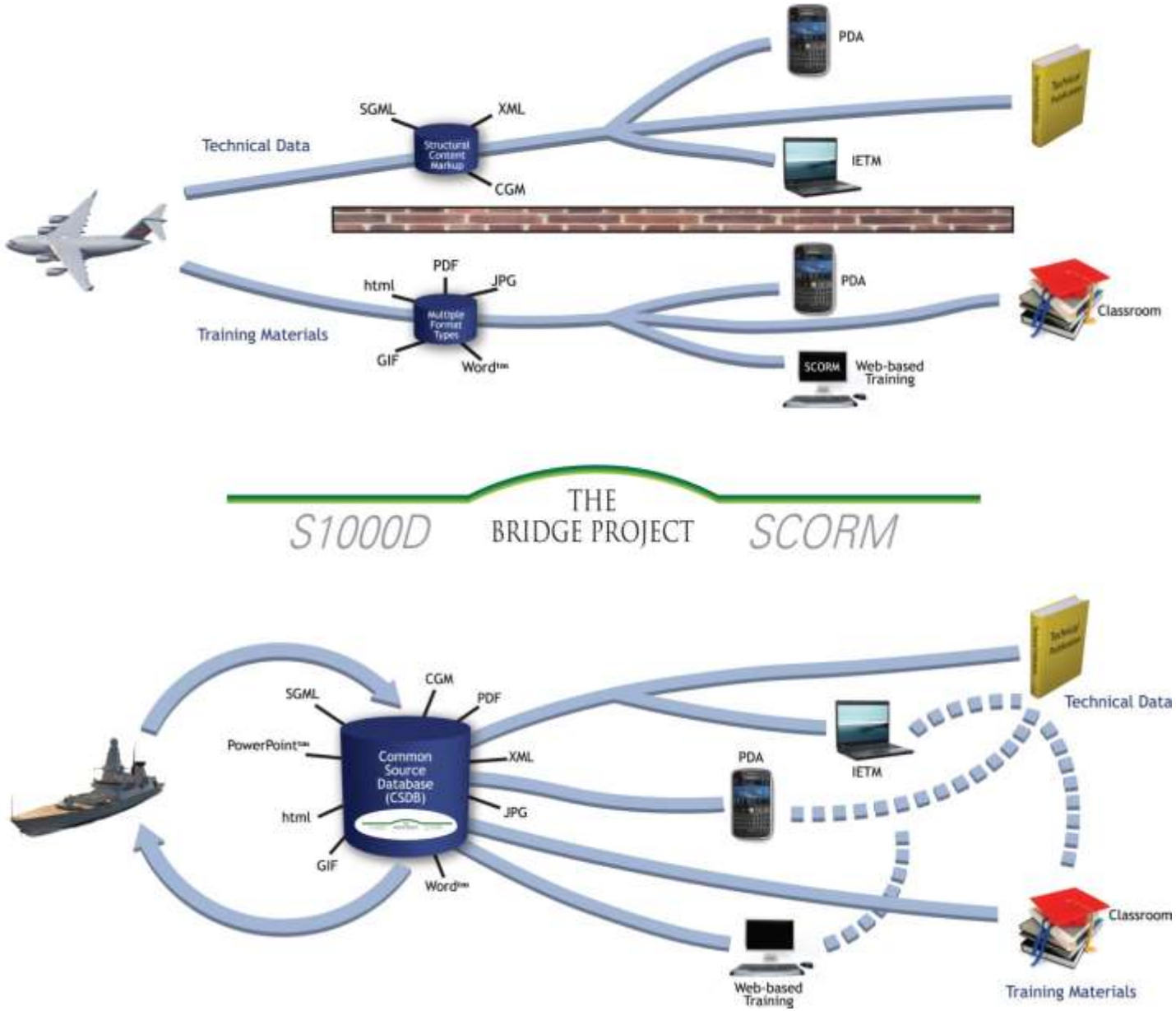
- **Real-Time learning analytics**
- **Compare, capture analytics to baseline expectations in PLM**
- **Provide performance data**

S1000D Harmonizes Technical Data and Training Content in a PLM Common Source Database: *Significant for Distributed Learning*

Without PLM and Specs: *No harmonization of technical and training data.*

PLM and Specs harmonize maintenance and training data.

With PLM and Specs: *Tech data and training are part of a digital thread.*



Summary

1. Majority of Navy training based on engineered systems.

2. Training out of date and not configured to systems.

3. Training based on system supportability analysis.

4. PLM Architecture and S1000D can support training.

5. 3-Part Innovation proposal to support competencies, curriculum development, and learning analytics in PLM submitted to OPNAV N1, Naval Postgraduate School, and the Office of Naval Research.

Questions? …Thank you!

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