

Product Life Cycle Support (PLCS)

The Information Backbone for the Logistics Enterprise

PLCS Status update

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OASIS  **PLCS**

Support
Engineering

Resource
Management

Configuration
Management

Maintenance
& Feedback



The PLCS Initiative



- ***Overview of PLCS***
 - ❖ *Vision*
 - ❖ *Scope*
 - ❖ *Capabilities*
- ***Status and current plans***
 - ❖ *ISO*
 - ❖ *OASIS*
- ***Implementations***
- ***Conclusions***



Setting the Business Context

Business Drivers



- ***Reduced Cost of Ownership***
 - ❖ *Users of products are seeking improved availability, reliability, maintainability and lower cost of ownership*
- ***Sustainable Business Growth***
 - ❖ *Companies are seeking to make money through the life cycle support of their products to improve profits, improve quality and be more competitive*
- ***Protect investment in product data***
 - ❖ *Users of information systems want to ensure long term usability for product information as IT and processes change*

Setting the Business Context

Digital Product Data has become a valuable business asset



- ***New Business Opportunities***

- ❖ *Leading manufacturers are 'going downstream' to generate additional revenue from supply of lifecycle support services*
- ❖ *Major users are seeking to outsource their support and information services*

- ***Product Lifecycle Management***

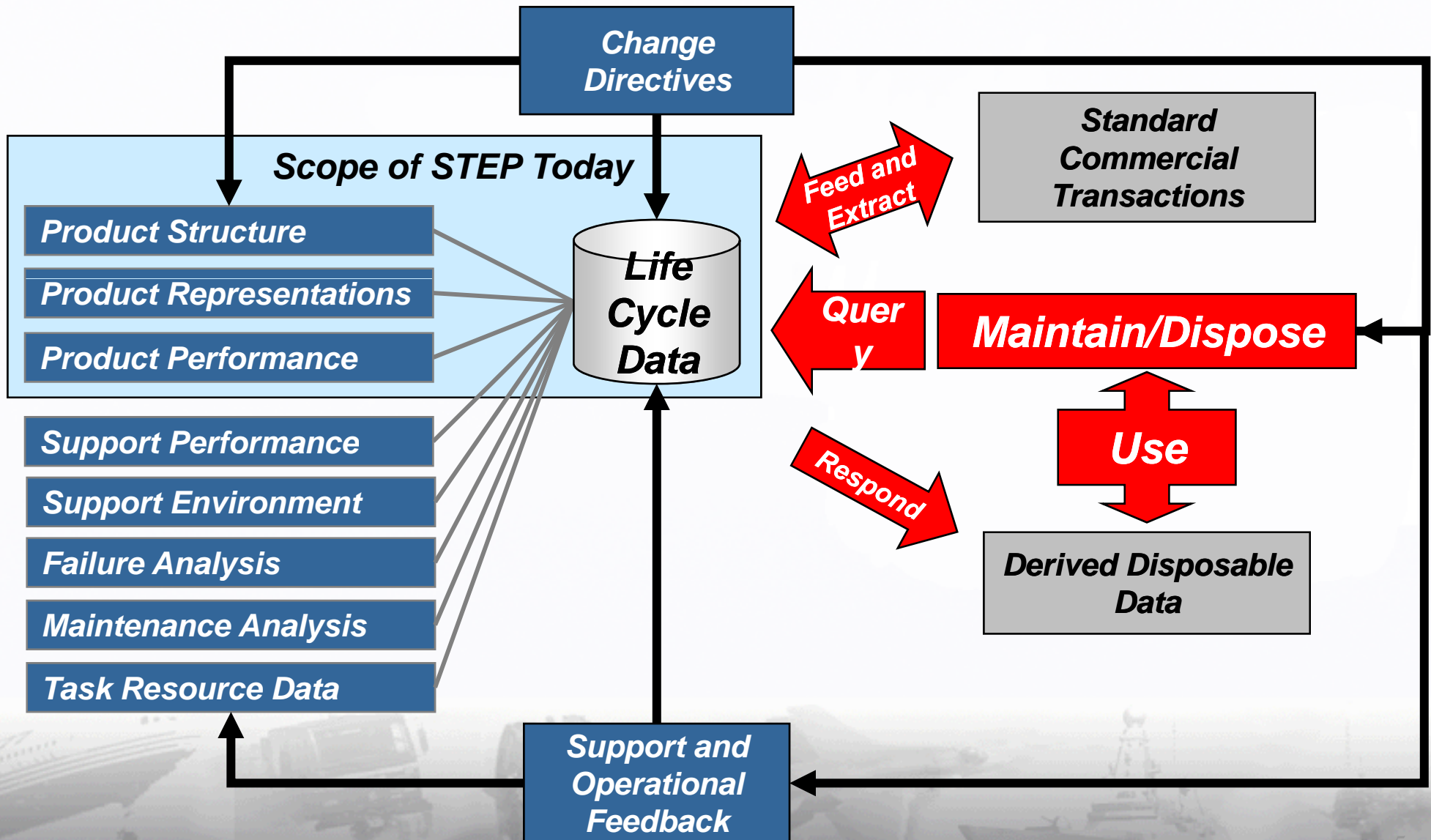
- ❖ *Businesses are focusing on total cost of ownership, as product life cycles increase and products become more expensive to maintain*
- ❖ *Increased focus on managing information throughout the product lifecycle – Concept to Disposal*

- ***Extended Enterprise***

- ❖ *Increasingly complex business networks*
- ❖ *Not practical to adopt common system mandate*
- ❖ *Knowledge workers need to share information in real time*

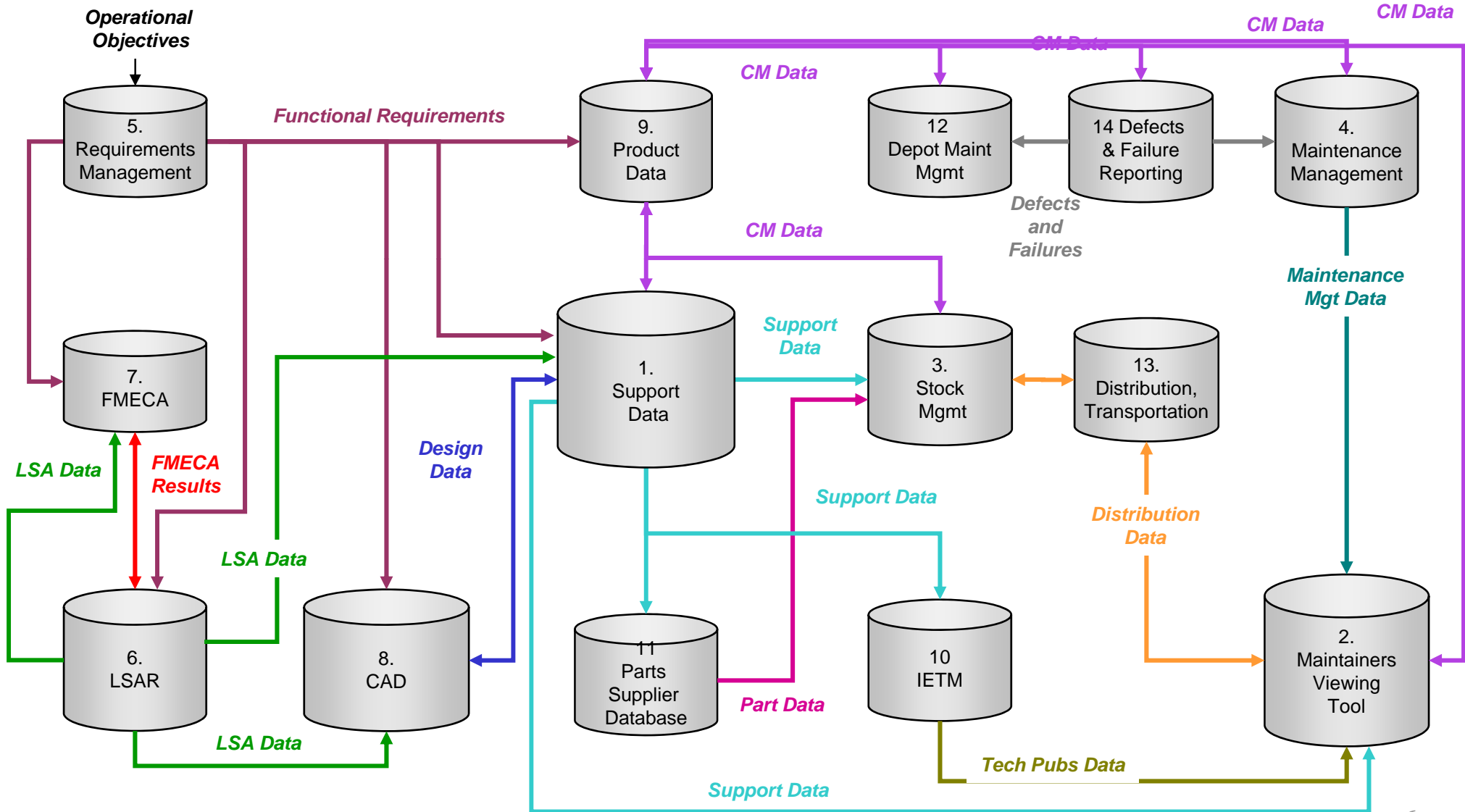
Product Life Cycle Support (PLCS)

The Vision



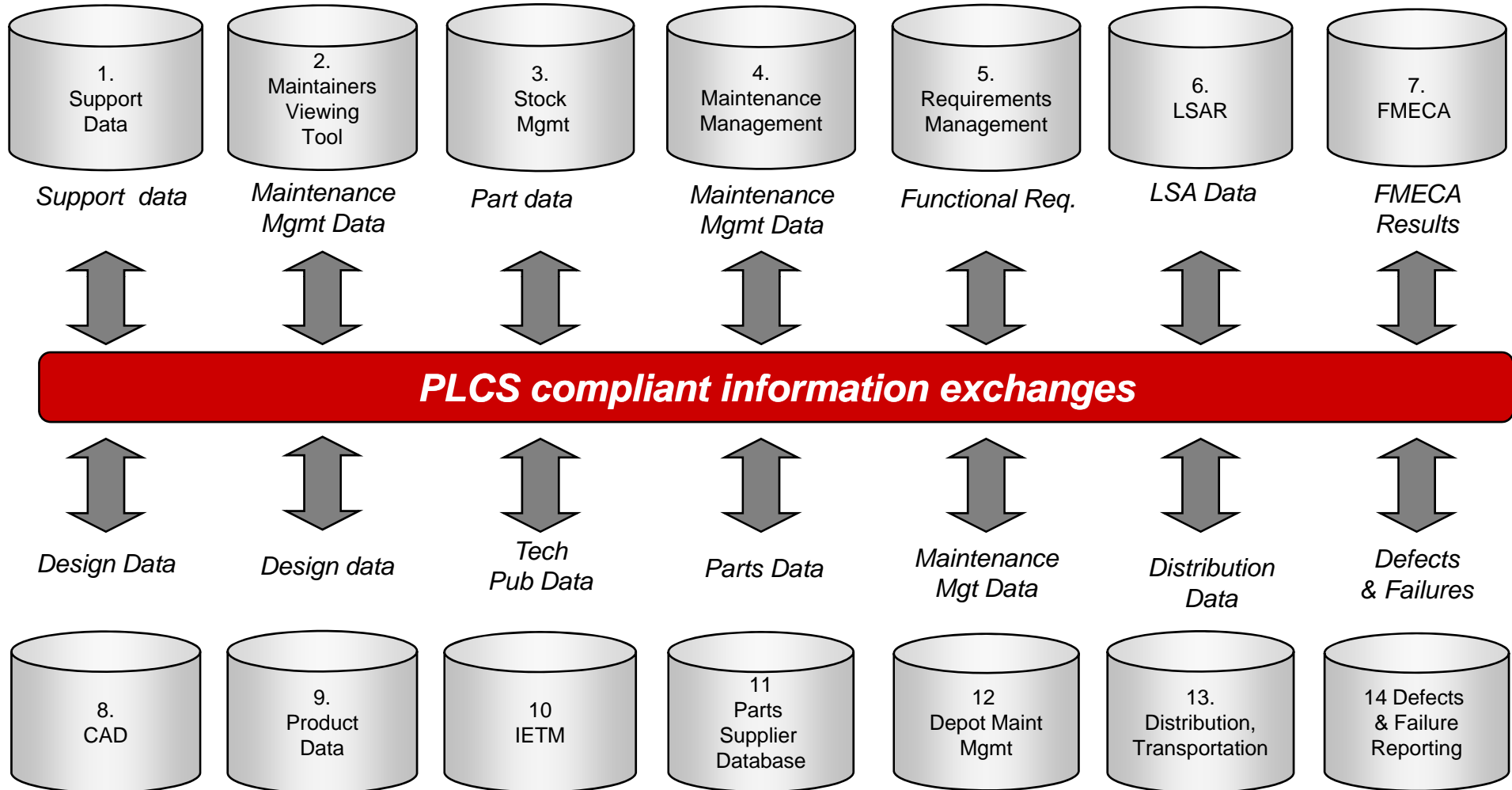
Product Life Cycle Support (PLCS)

Typically complex systems environment – point to point integration



Product Life Cycle Support (PLCS)

PLCS will enable cost effective information exchanges



In future, support system integration will be easier to implement

Product Life Cycle Support (PLCS)

Capabilities enabled by PLCS



Product Description

Capability to define product requirements and configuration, including relationships between parts and assemblies in multiple product structures (as-designed, as-built, as-maintained)

Work Management

Capability to request, define, justify, approve, schedule and capture feedback on work (activities) and related resources.

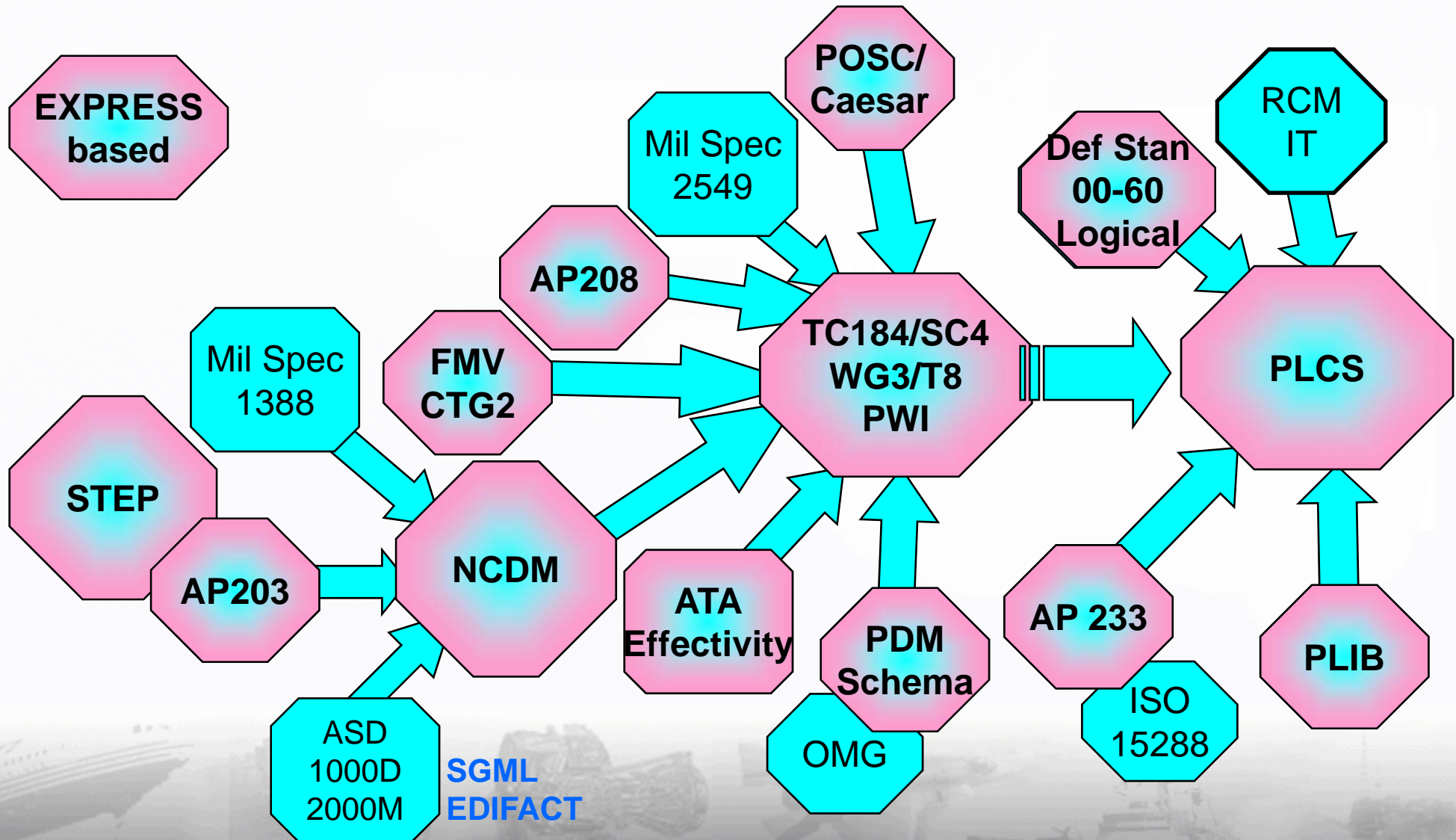
Property, State and Behaviour

Capability that describes and captures feedback on product properties, operating states, behaviour and usage

Support Solution and Environment

Capability to define the necessary support for a given set of products in a specified environment and to define support opportunity, facilities, personnel and organizations

PLCS - Relationship to other standards



- *A new vision for life cycle support*
- *A terminology dictionary*
- *An illustrative process model to provide data context*
- *A comprehensive data model, standardised through ISO 10303-239 (STEP AP239)*
- *Capability to define data exchange sets (constrained subsets of AP239)*
- *Improved capability to tailor or extend the data model or exchange sets using external reference data (e.g. existing standards)*
- *A standardised interface to transaction standards/systems (ebXML, Exostar, Covisint, S2000M) – not achieved*

PLCS – Key features



- ***The PIF – Product in focus: “what products do you want me to support?”***
- ***A PIF will be supported by one or more support solution definitions: how to support these products***
- ***Each support solution definition is based on***
 - ❖ ***Deployment environment, with a matching***
 - ❖ ***Support solution requirement***
- ***The deployment environment defines:***
 - ❖ ***A product group – a subset of the PIF needing tailored support***
 - ❖ ***A usage pattern***
 - ❖ ***A definition of the expected support organizations, locations, facilities and resources***
- ***A support requirement is a structured requirement statement including performance metrics and targets for support performance***
- ***Support metrics are required to enable:***
 - ❖ ***Continuous optimization of support solution definition through life, based on feedback from use***
 - ❖ ***Specification of an assessment strategy (what data to collect and how)***
- ***A PIF scope may include many deployment environments and hence many support solution definitions***
- ***These will be derived from a common set of task and resource descriptions***

PLCS – Key features



- ***(Each) Support solution definition includes:***
 - ❖ *Task specifications and task logic (e.g. diagnostic procedures)*
 - ❖ *Relationship of tasks to the product configuration (including “effectivity” /“applicability” to all product versions)*
 - ❖ *Specification of task trigger conditions based on:*
 - *State of individual product (as identified by UID)*
 - *Usage of individual product*
 - *Prior task or other events*
 - ❖ *Identification and quantification of resources needed for each task, including a resource consumption model*
- ***Task specifications may:***
 - ❖ *point to an existing document*
 - ❖ *point to an SGML document (e.g. collection of ASD S1000D modules)*
 - ❖ *be fully “machine readable”*
- ***Task specifications may be linked to resources***
 - ❖ *Required resources*
 - ❖ *Resource items (products, people, facilities etc)*

PLCS - Assured Information



- ***Assured Product and Support Information comprises***
 - ❖ *PIF scope*
 - ❖ *Description of relevant deployment environments*
 - ❖ *Support Solution requirements*
 - ❖ *Product Definition Information (at least that needed for support)*
 - ❖ *Support Solution Definitions*
- ***This full data set is subject to configuration change management***
- ***Related Information may comprise***
 - ❖ *Test results*
 - ❖ *Manufacturing records*
 - ❖ *History of collected feedback on:*
 - *Individual product configuration over time*
 - *Product state and properties over time*
 - *Activities, including:*
 - ◆ *Product use*
 - ◆ *Work done*
 - ◆ *Resource use*

PLCS – Keeping your history



- ***In the PLCS models it is assumed that any value supplied***
 - ❖ *E.g. a property such as mean time to perform a task****may have multiple values over time***
where each value could have been:
 - ❖ *supplied at different times*
 - ❖ *by different people*
 - ❖ *subject to approval*
 - ❖ *subject to security classification*
 - ❖ *Have an associated justification/probability/risk*
- ***Improve CM of support information by use of “single source” Assured Product and Support Information***

- ***PDM Schema already supports automated exchange of***
 - ❖ *Part id and properties*
 - ❖ *Associated documents and files (incl. CAx)*
 - ❖ *Product structure*
 - ❖ *Product (and document) approval status*
 - ***This is already in production use by***
 - ❖ *US Aerospace and Defence prime contractors (via AP203)*
 - ❖ *German/Swedish/French Automotive sector (via AP214 cc6)*
 - ❖ *Eurofighter Typhoon PDM partners*
 - ❖ *And many others*
- .. A powerful and proven capability for Configuration Management of a complex product design***

PLCS – Through the Life Cycle



- ***AP239 uses common STEP information modules***
 - ***AP239 has added:***
 - ❖ *Classification, supported by reference data libraries*
 - ❖ *Product_as_individual (planned and realized) - UID*
 - ❖ *Product breakdowns (system, physical, functional, zonal and hybrid)*
 - ❖ *Text based requirements (from AP233)*
 - ❖ *Extended property capability*
 - ❖ *Interfaces*
 - ❖ *Attachment_slot*
 - ❖ *Message, Envelope (similar to ENGDAT)*
 - ❖ *Information Rights*
- ... A powerful capability for Life Cycle Configuration Management of Assured Product and Support Information***

- ***What is it?***

- ❖ *Values for attributes that are agreed and defined in advance of use*
- ❖ *E.g types of task, grades of people, types of products, types of document*
- ❖ *E.g. Nato Stock Number – classifications*

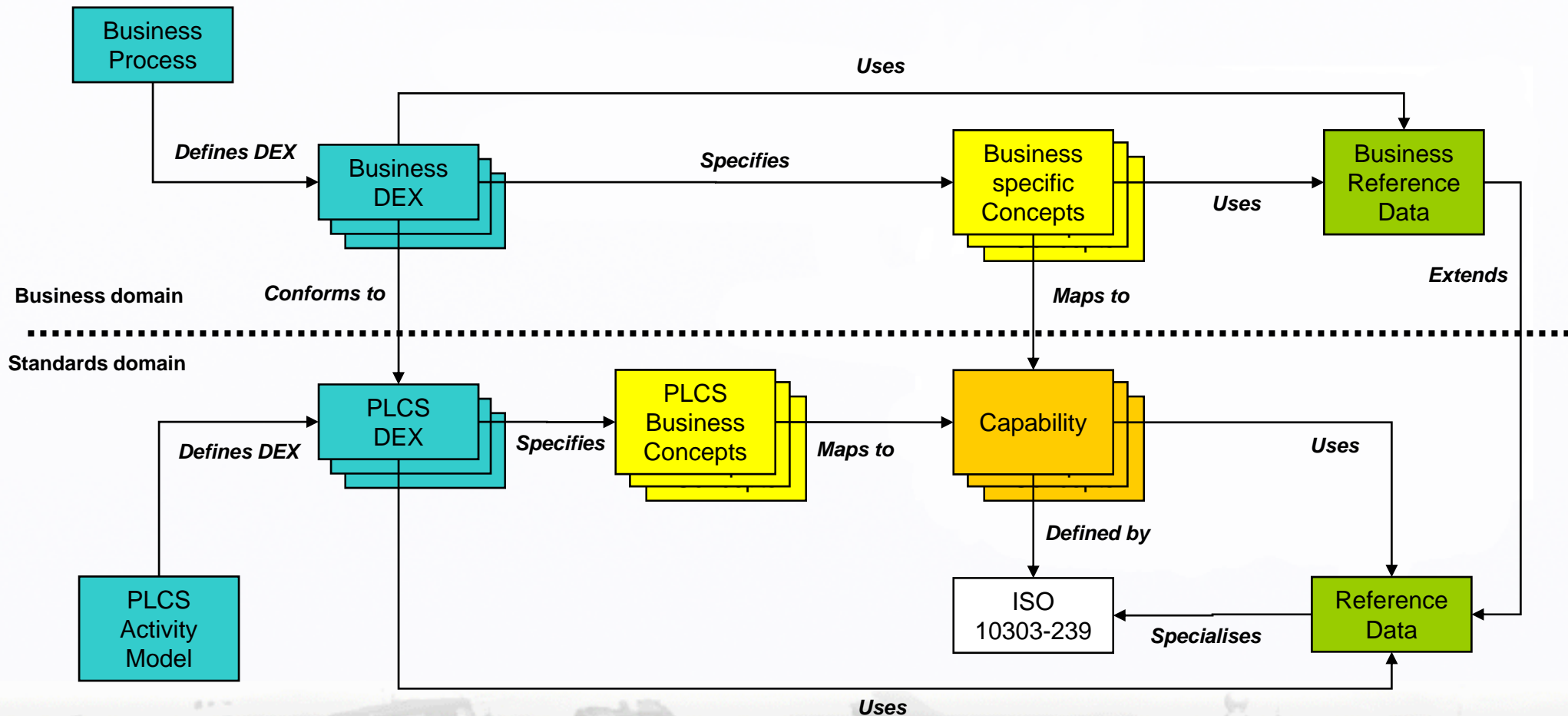
- ***Why use it?***

- ❖ *Because it improves reliability and effectiveness of exchange*
- ❖ *Because it can be extended:*
 - *To add to the scope of the standard*
 - *To provide project specific functions*
- ❖ *Because it supports re-use of values from existing standards*

- ***Idea proven in Oil and Gas industry***

- ***DEXs are:***
 - ❖ *Subsets of the AP239 Information model*
 - ❖ *Selected to meet a specific data exchange need*
 - ❖ *Built from relevant modules*
 - ❖ *Supported by Usage Guidance, population rules and Reference data*
 - ❖ *Can be refined from other DEXs*
- ***DEXs may be standardized at any level (work group, company, project, organization, national, international)***
- ***DEXs enable***
 - ❖ *Consistent implementation of AP239*
 - ❖ *Data consolidation through time*

DEX Architecture



Status and plans



- *Activity Model published as part of standard*
- *1750 requirements allocated to 153 modules*
- *Modules published by ISO as Technical Specifications:*
 - ❖ *PDM modules*
 - ❖ *PLCS modules*
 - ❖ *AP239 information model*
- *PLCS standard unanimously approved through ISO and published September 2005, available as hyperlinked CD-ROM product*

- ***ISO TC184/SC4 is responsible for “Industrial data”***
 - ❖ *Chaired by Howard Mason on behalf of US until 2009*
- ***Working Group 3 is responsible for “Product modelling”***
- ***Team 8 is responsible for “Product life cycle”***
 - ❖ *Also provides active liaison to Systems Engineering development*

- ***Team 8 will retain responsibility for AP239***
- ***Resources committed through national standards bodies***
- ***Initial “Systematic Review” will take place in late 2008***
 - ❖ *Opportunity for bug fixes from OASIS*
 - ❖ *Integration with final version of Systems Engineering*

The
2007
Lawrence D. Eicher Leadership Award

for excellence in creative and innovative
ISO TC/SC services and initiatives

is presented to

ISO/TC 184/SC 4

Industrial automation
systems and integration –
Industrial data

Håkan Murby
President of ISO



Alan Bryden
Secretary-General of ISO

September 2007

PLCS - DEX Development and publication



- ***Open participation in DEX development***
 - ❖ ***lower cost entry***
- ***Need enhanced links with other information standards development***
- ***Selected OASIS consortium as parent***
- ***Formed OASIS Technical Committee for “Product Life Cycle Support”***
- ***Open to all OASIS members***
- ***Operating under OASIS rules***
- ***Depends on resources contributed by participants***
- ***Coordinates across different DEX developments***

The OASIS Technical Committee



- ***The purpose of the OASIS Product Life Cycle Support TC is to:***
 - ❖ *establish structured data exchange and sharing capabilities for use by industry to support complex engineered assets throughout their total life cycle*
 - ❖ *define, develop, test and publish OASIS Product Life Cycle Support DEX's based upon ISO 10303 (STEP) Application Protocol 239 (Product Life Cycle Support).*
 - ❖ *liaise with ISO TC 184/SC4*
 - ❖ *coordinate with relevant OASIS Technical Committees*
 - ❖ *promote the use of OASIS Product Life Cycle Support DEX's across industries and governments world-wide*

DEX Development and publication



- ***Open-source infrastructure developed***
www.plcs-resources.org
- ***DEX Publication Project established to***
 - ❖ ***Finalise guidance and other supporting material***
 - ❖ ***Develop first examples of DEX***
 - *Task Definition (Generic and business)*
 - *Aviation Maintenance*
- ***First drafts reviewed Monday 1 October***
- ***OASIS approval process scheduled to start in November***
- ***OASIS will deliver a set of :***
 - ❖ ***DEX***
 - ❖ ***Capabilities and templates***
 - ❖ ***Reference data***
- ***Updated as new DEXes are made available***

- ***PLCS designed from the start to work with S1000D***
 - ❖ *Task documentation*
 - ❖ *Tracking actuals against processes defined in S1000D modules*
- ***Several demonstrators developed***
- ***Also being looked at in the US***
 - ❖ *ASD/AIA/ATA MoU on S1000D*
 - ❖ *AIA Electronic Enterprise Integration Committee recommending PLCS and tracking S1000D as industry standards*

Implementations



- ***The standardized PLCS information model can be implemented in 3 ways:***
 - ❖ ***As an **integration architecture** for product life cycle support management systems and information***
 - ❖ ***As a **mapping** between systems (APIs)***
 - ❖ ***As a standardized **data exchange** capability (plus compliant software)***
- ***STEP technology supports all three and is language independent (Cobol, Java, C++, XML)***
- ***STEP is in production use, with proven benefits, for CAD, CAM and PDM systems***
- ***PLCS can also be used to promote further standardization via Reference Data (e.g. fault codes, skill grades)***

Current implementations



- ***Norwegian frigate***
 - ❖ *Extending to other NDLO programmes*
- ***Being promoted actively for JSF***
- ***Visby Corvette***
- ***Gripen pilot project***
- ***Eurostep Share-A-Space***
- ***BAE Systems Land Systems Hagglands***
- ***US DoD ELITE project for UH-60 helicopter***
 - ❖ *Extending to other services as Aviation Maintenance DEX*
 - ❖ *Linked to UID*
- ***US Army deployment on HMMWV***
 - ❖ *Plans for Bradley*

Current implementations



- ***UK MOD pilots for RAF LITS and Navy UMMS***
 - ❖ *LITS mapping for eg Tornado ATTAC*
- ***UK MOD Logistics Coherence Information Architecture***
 - ❖ *Jointly developed between industry and MOD*
 - ❖ *PLCS as base standard with OAGIS for transactions*
 - ❖ *Mandated in Support Solutions Envelope*
 - ❖ *Support to IPTs through central Engagement Team*

Conclusions



- ***PLCS is accepted as an International Standard***
- ***PLCS has been shown to work as designed***
 - ❖ ***Integration architecture***
 - ❖ ***System mapping***
 - ❖ ***Standardised Interface***
- ***DEX development environment available***
 - ❖ ***Documentation***
 - ❖ ***Guidance***
- ***Ready for use!***
- ***Ready to link to other standards***