Heliple-2 PLM Federation

A Call for Action & Contributions

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PLM Road Map™ & PDT Europe 2023
The Digital Thread in a Heterogeneous, Extended Enterprise Reality
A call for PLM Professionals to share their knowledge & experience
November 15 & 16

Heliple-2

- Heliple-2 - Heterogeneous Linked Product Lifecycle Environment – Iteration 2
  - Vinnova funded project for exploring Federated PLM

The problem – an illustration

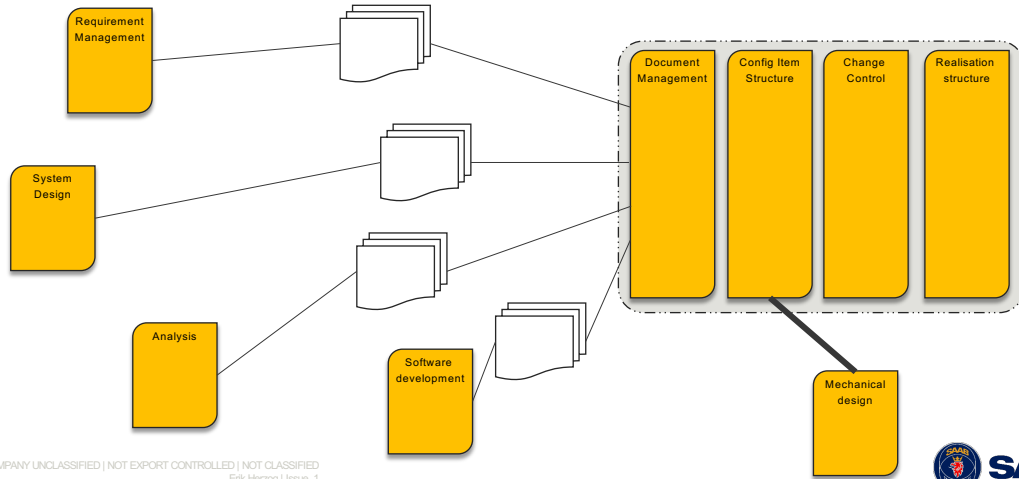Requirement Management

System Design

Analysis

Software development

Document Management

Config Item Structure

Change Control

Realisation structure

Mechanical design

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The desired solution

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2

Modularity

- Optimise support for each **engineering discipline**
  - **Maximise automation**, as provided by the supplier
  - Minimise application family **switching**
- Bring together **management and engineers** in a single environment
  - E.g., Change management and Status reporting
- **Redundant** capabilities accepted
- Ability to **upgrade or replace** environments without upsetting the complete PLM landscape
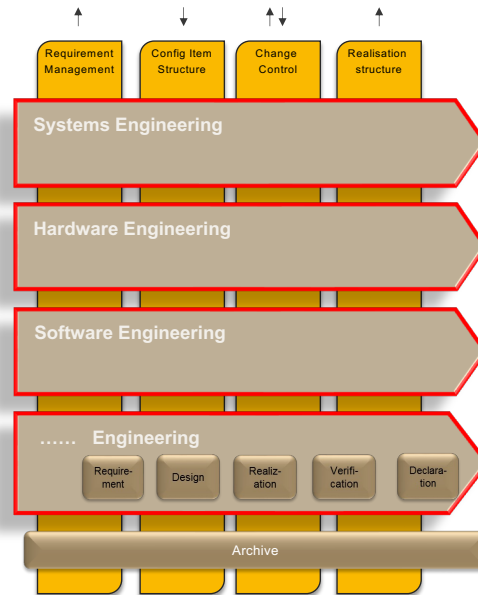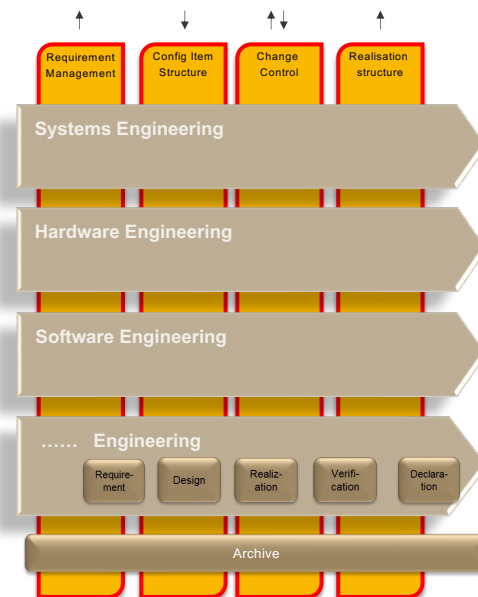
Traceability

- Need capability to ensure **traceability** and **integrity** of product data
- Traceability dimensions between engineering discipline environments
  - **Requirements**
  - **Configuration item structure**
  - **Change management**
  - **Realization**
- Configuration Management capability required for Requirements Traceability, Configuration item structure and Realization structure
  - **Versions and baseline** capabilities
- The **OSLC standard** offers the desired capabilities
  - Exploit for **low** cost and **high quality** integrations

  https://www.researchgate.net/publication/361418413_Genesis_-an_Architectural_Pattern_for_Federated_PLM

Federated PLM – prerequisites

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Evaluation criteria

Federated PLM – feasibility dimensions

- Technical feasibility
    - Does OSLC offer industrial strength solutions for integrating stand-alone PLM systems?
- Development efficiency
    - Does a federated PLM environment offer improved productivity potential in the short and long term compared to a monolithic, single supplier solution?
- Operational feasibility
    - Can a federated PLM environment be maintained over time?
- Realisation effectivity
    - Can OSLC interfaces be implemented and maintained at a reasonable cost?

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2022 Results presented

- **Federated PLM – feasibility dimensions**
- Technical feasibility
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Demonstrating federated PLM

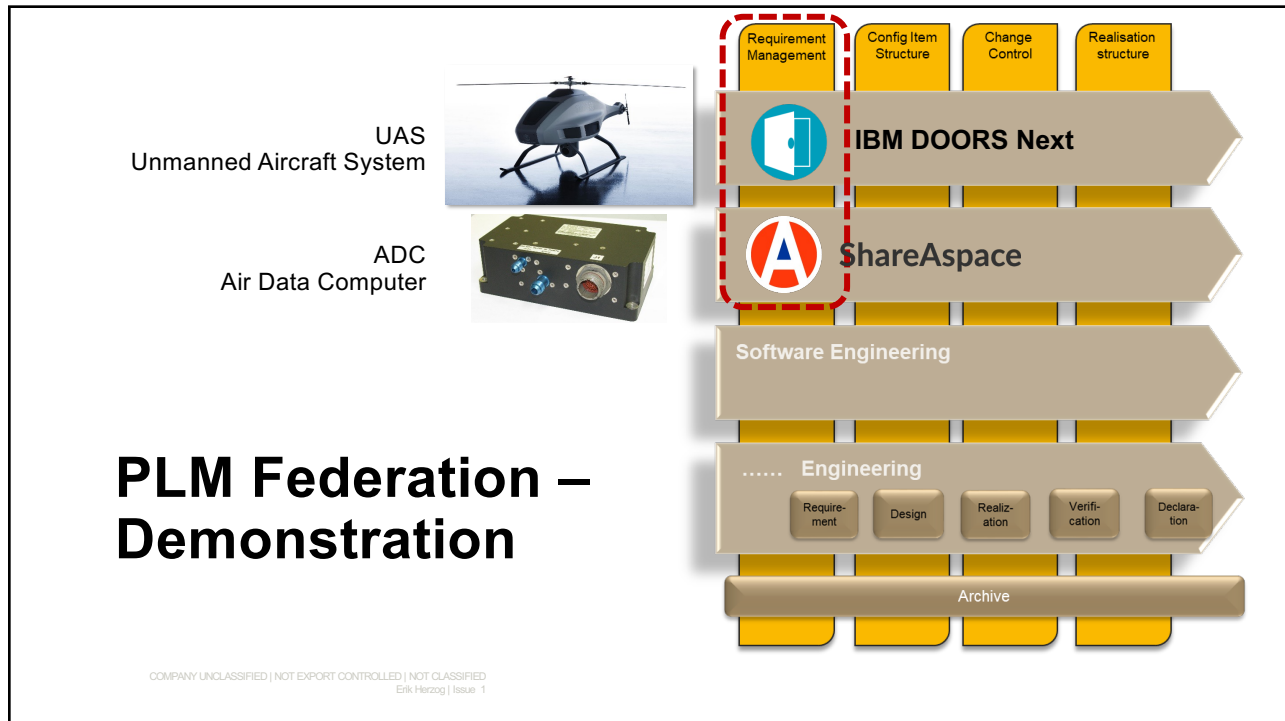Experiments by the Heliple-2 project

The tools selection presented in the example represents the experiments performed in the Heliple-2 project. It does not represent a Saab selected setup

UAS
Unmanned Aircraft System

ADC
Air Data Computer

PLM Federation – Demonstration

Requirement Management | Config Item Structure | Change Control | Realisation structure

IBM DOORS Next

ShareAspace

Software Engineering

...... Engineering

Require-ment | Design | Realiz-ation | Verifi-cation | Declara-tion

Archive

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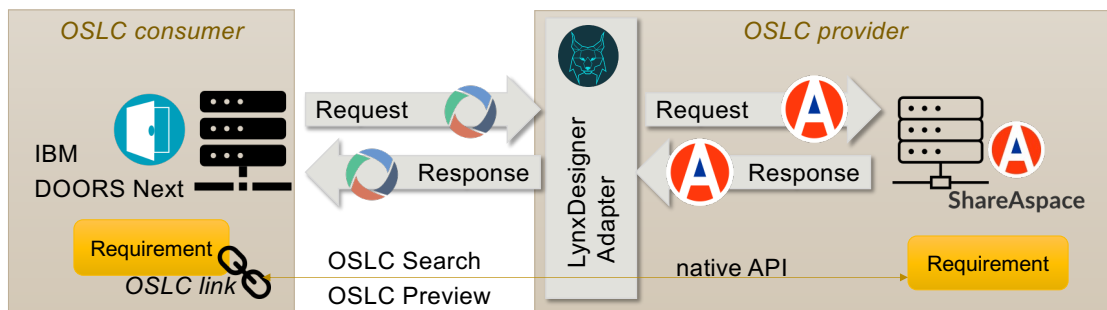Erik Herzog | Issue 1

Traceability Use Case

Use Case: Create link from DOORS NG Requirement to ShareAspace Requirement

Technology: OSLC mechanisms allow a user to search, select and link

Solution: An adapter (LynxDesigner) to convert OSLC calls to native API

OSLC consumer

IBM DOORS Next

Requirement

OSLC link

Request

Response

OSLC Search
OSLC Preview

LynxDesigner Adapter

OSLC provider

Request

Response

ShareAspace

native API

Requirement

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Developing an OSLC Adapter

LynxDesigner Adapter

VINNOVA Advanced and innovative digitalisation

eurostep IBM KTH LYNXWORK SAAB VOLVO

Representing configurations

STEP and OSLC

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Configuration Management
OSLC approach

Stream ⟶
- **Mutable** – for ongoing work
- Linking to latest artifacts
  - **implicit** - versions hidden
- **Merge** changes from other streams or baselines

Baseline ⬭
- A **frozen** record of a stream at a point in time
- Linking to artifacts at the time of freeze
- **Branch** into new streams

A stream (baseline) can be a contribution to other streams (baselines)

OSLC Approach
v1.0 v1.1 v1.2 v1.3
v2.0 v2.1
v1.0 v1.1

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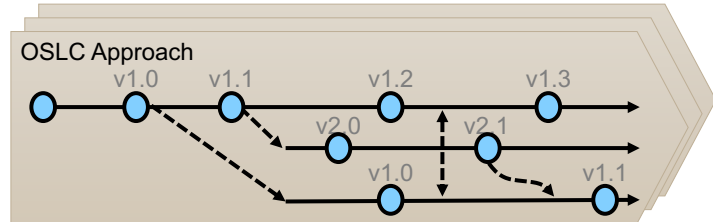
Configuration Management
STEP approach

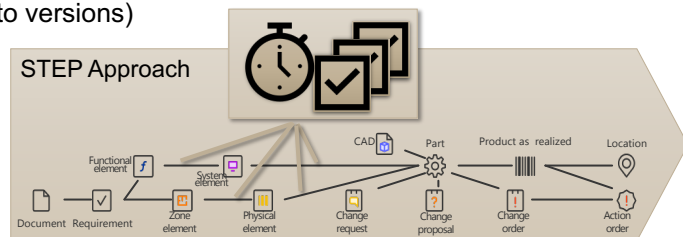Links can be **implicit** ("latest") **or explicit** (to versions)

Date effectivity 🕑
- Every **link**: start date, and optional end

Object effectivity (applicability) ☑
- Every **artifact and link** can have effectivity in relation to other artifacts, with conditions (no effectivity = always applicable)
- These can also have date effectivity

Now, or at any time in past, can **filter** to get the structured artifacts.


STEP Approach

Functional element System element CAD Part Product as realized Location
Document Requirement Zone element Physical element Change request Change proposal Change order Action order

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Configuration Management
OSLC to STEP mapping

OSLC	Equivalent in STEP
Stream	A set of object-effectivity, (with conditions if any). Time = now Filter to get structure
Baseline	A set of object effectivity, (with any conditions) Time = freeze time of baseline Filter to get structure

OSLC Approach

STEP Approach
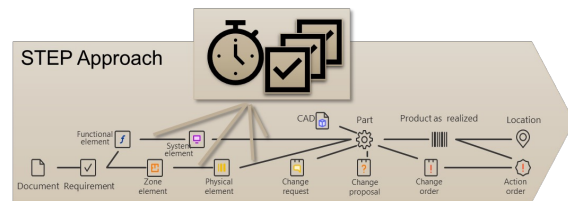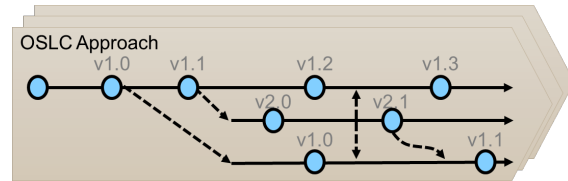
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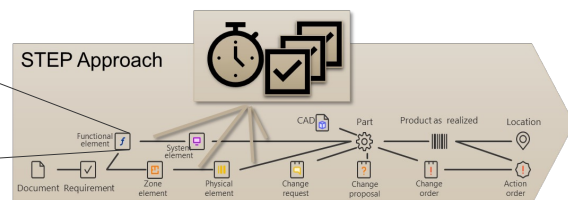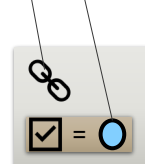Configuration Management
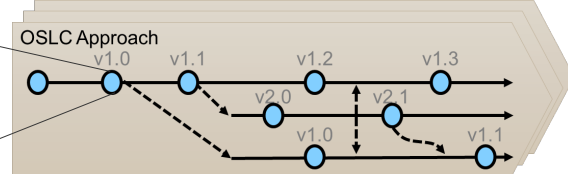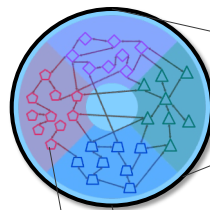STEP to OSLC mapping

OSLC resource URI
+
OSLC Configuration

=

STEP PLM resource
with object effectivity

Response:
- Configuration = baseline → fixed version
- Configuration = stream → latest version

OSLC Approach

STEP Approach

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9

Heliple-2: 2023 Contributions

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Federated PLM – enabled by OSLC

From technical demonstration to commercial acceptance

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A call for action

- Heliple-2 results clearly show that OSLC has the capabilities to enable federated PLM
    - Implementation barriers are manageable
- Enabling standard technology, such as OSLC – necessary but not sufficient condition for standards based federated PLM
- Need to clearly show the demand from end-users
- Create OSLC end-user community to
    - Increase awareness among end-users and suppliers
    - Share end-user success stories and identified needs
    - Identify need for further standardisation, within OSLC and elsewhere
    - Continuation projects to Heliple-2 is being planned
        - Open to international partners
- Sign up with Erik Herzog (erik.herzog@saabgroup.com) for contributing to federated PLM

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