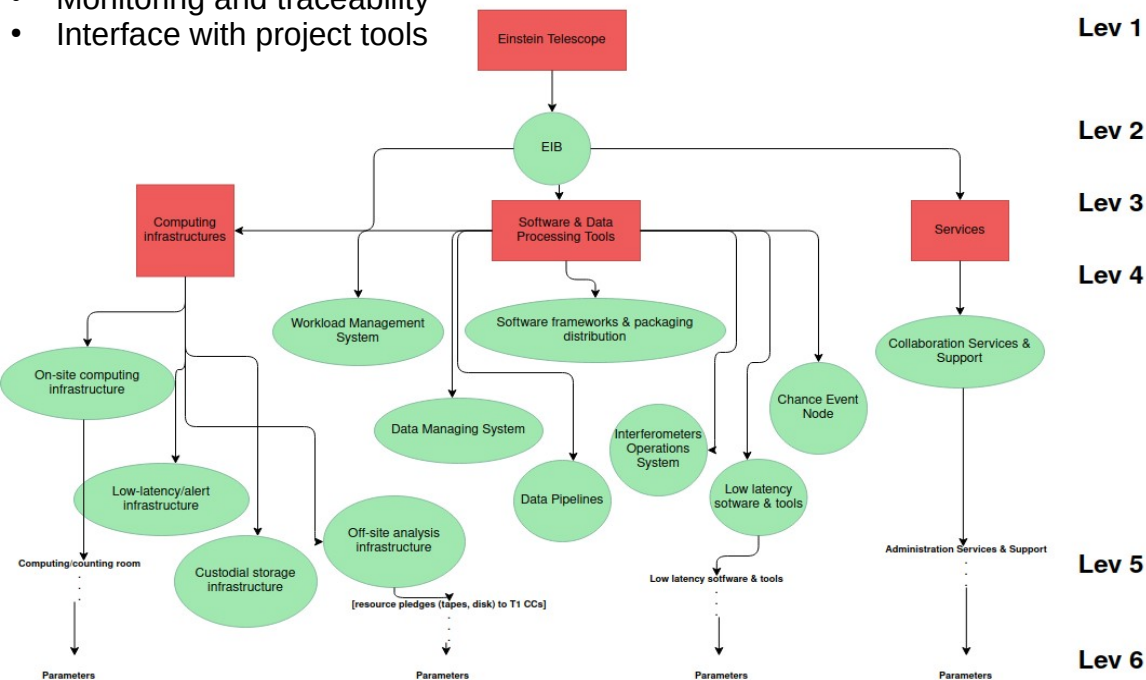


Document ID	TBA
Document type	Slides
Document Status	
Author	O. El Mecherfi
Verified by	
Approved by	

# PBS database and PO software development

- The PBS database (DB) is a critical part for managing and visualizing PBS elements and their associated parameters. The initial population of the database was carried out using Excel files provided by system coordinators for each ET system.
- Data management and structuring
- Monitoring and traceability
- Interface with project tools



## Title & Context

Requirements

Elements Change requests

Elements Risks

## Reminder: What is the PBS DB?

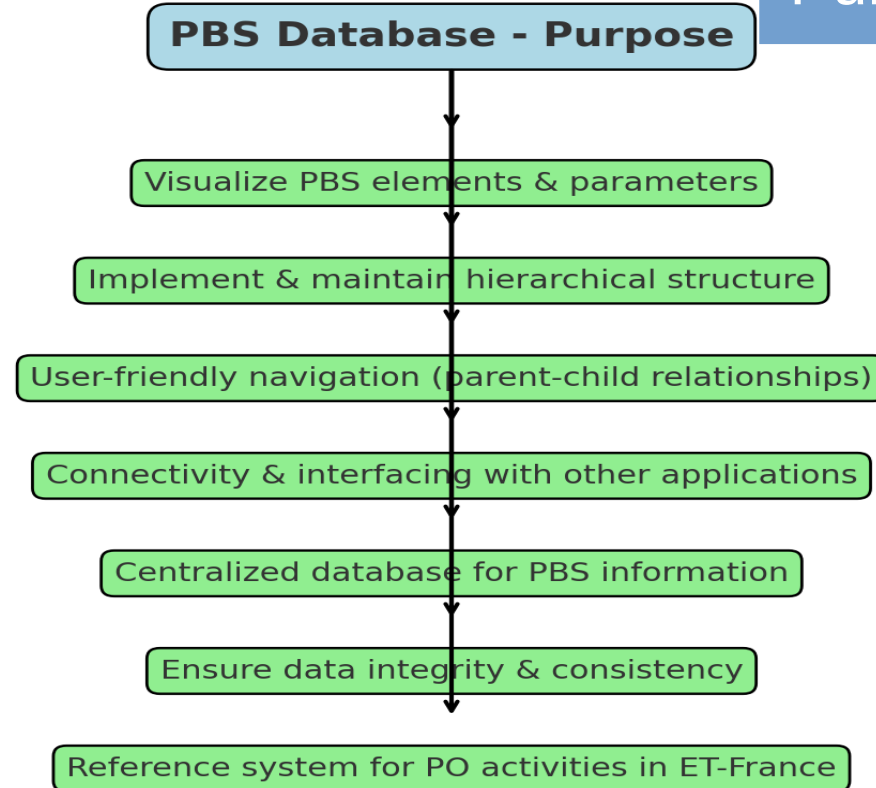


**Initial Data Input** : Successfully imported from Excel files.



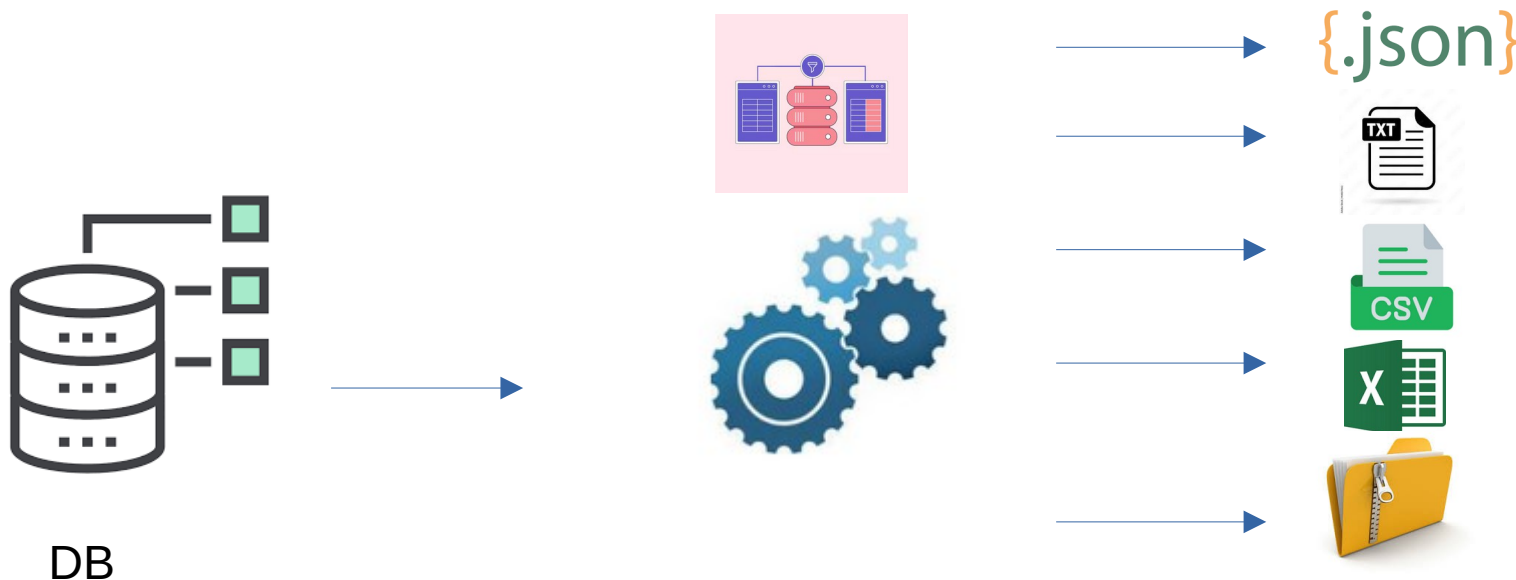
- **Reminder :**
- We implemented a process to convert the PBS element tree into the database.
- Any change in element parent/child is tracked, preserving history and consistency.
- Admins can upload large batches (~400 Excel files) at runtime with optimized streaming.
- Feedback log reports any file not inserted into the DB (with error reasons).
- **What is it :**
- Converts a tree of elements into a structured database
- Tracks history when elements are updated (new parents/children) without breaking dependencies
- Supports bulk uploads (~400 Excel files) at runtime with fast streaming
- Provides feedback logs for rejected files (rule violations)

# Purpose and Objectives

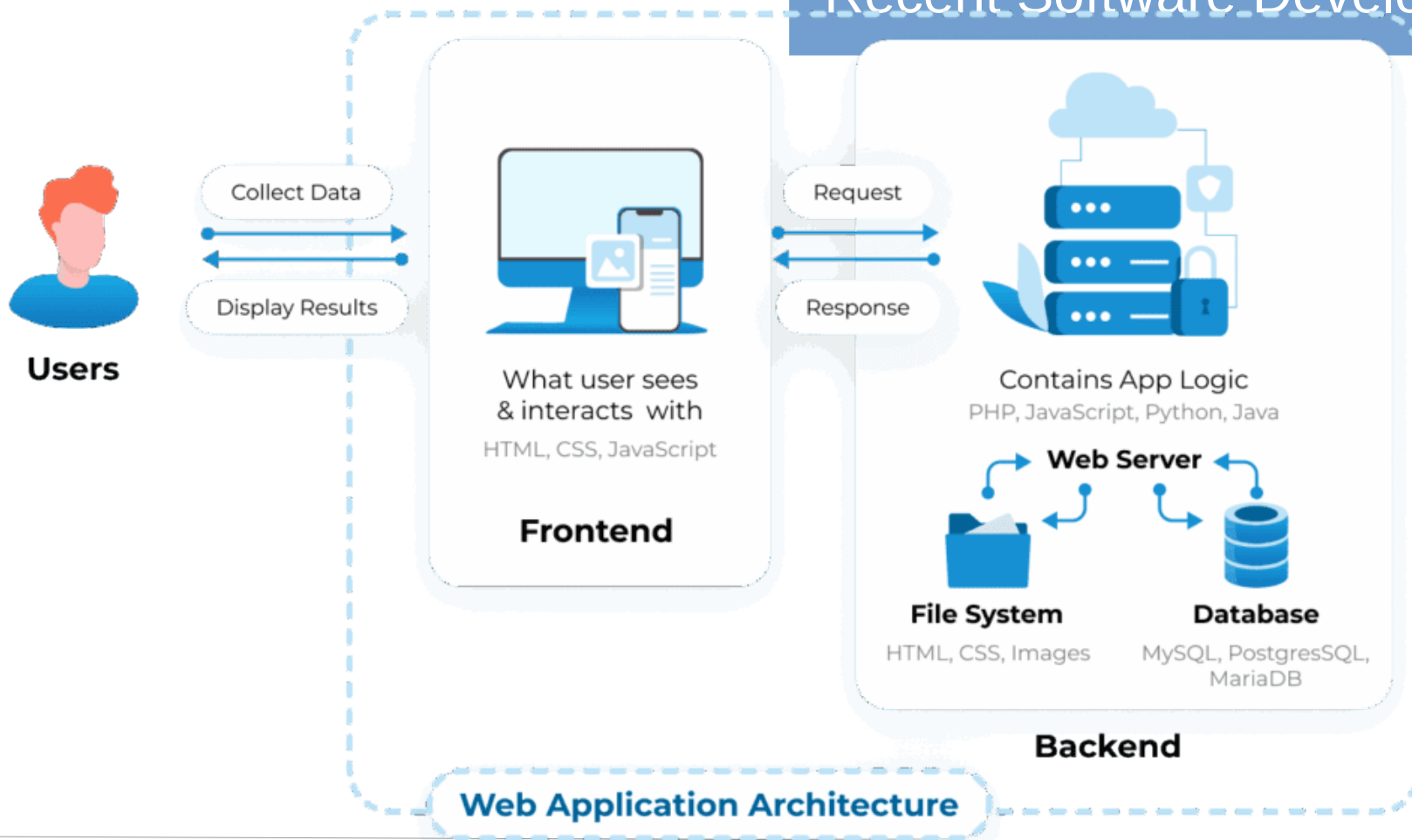


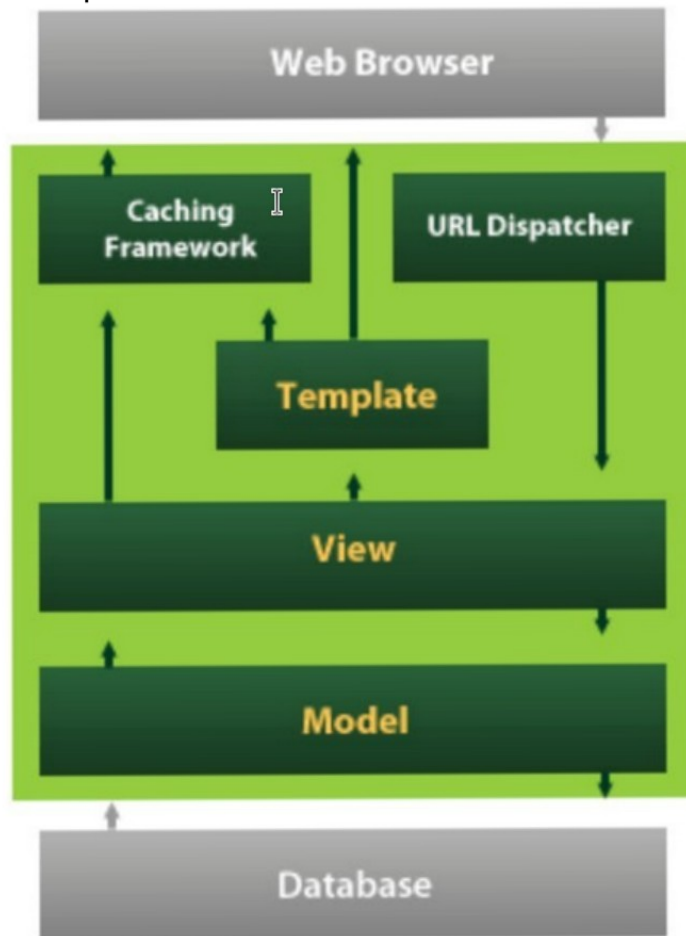
Show and Export the database with filtered  
Queries Included

## Allowing Exports and Filters



# Recent Software Developments



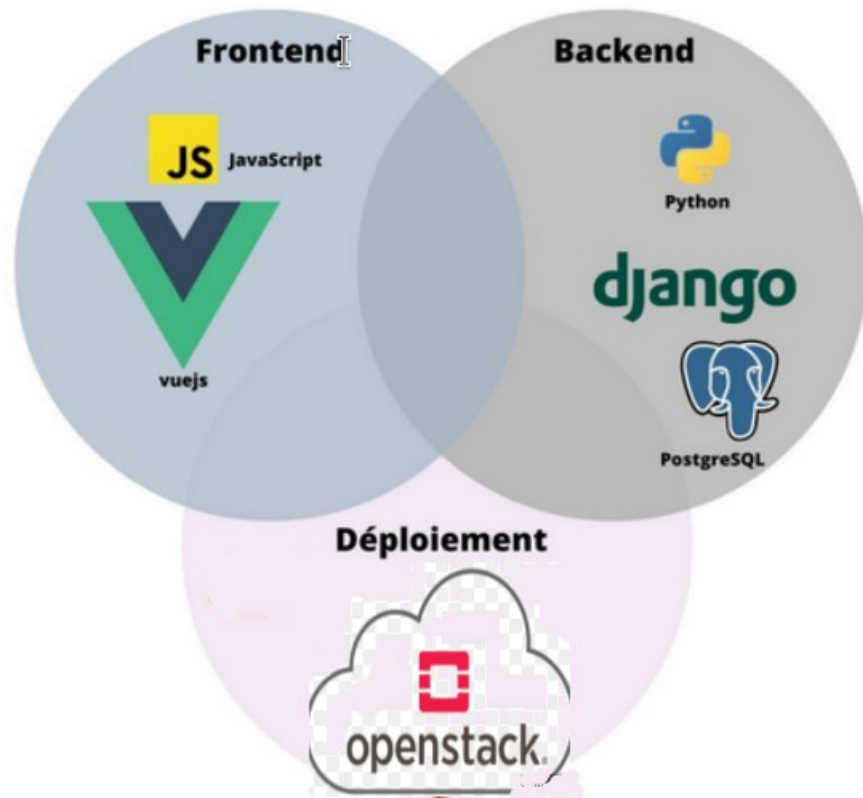


## Recent Software Developments

Views are executed when the user makes an HTTP request from frontend to backend. This is mainly a GET request (to access a resource) and POST request (create resource).

All requests are indicated in the Dispatcher URL: A table associating URL addresses with views.

## Recent Software Developments



For the development of the frontend, we opted for the VueJS Framework being Open source.

The frontend is made up of components called “vue”. Each view describes a part of the application or a feature.

Splitting the code into multiple views .vue is very important to improve readability and understanding of the code.



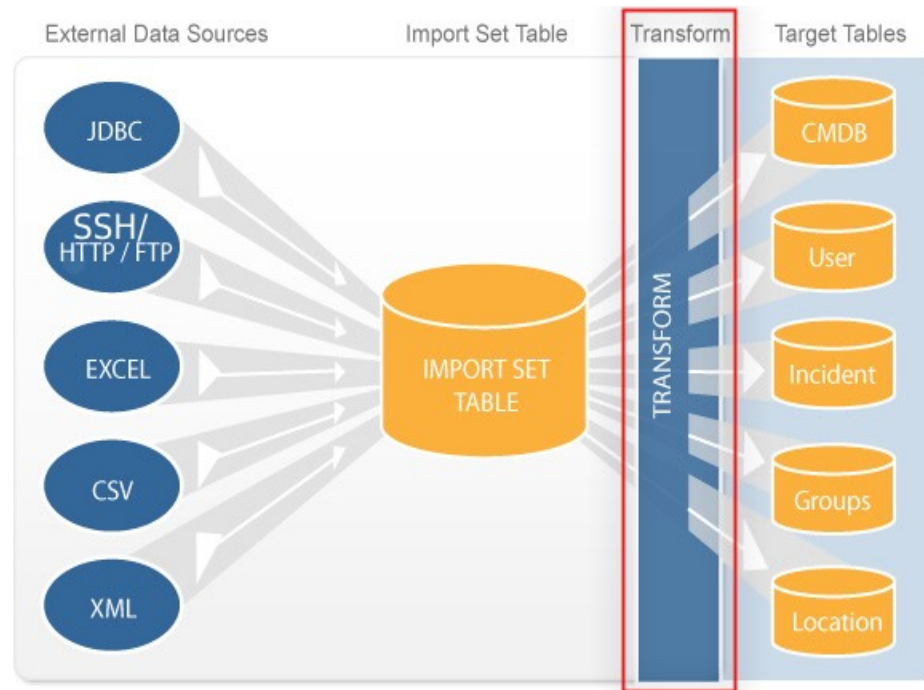
## Current Status of the Database

**Initial Data Input** : Successfully imported from Excel files.

**Structural Integrity** : The PBS hierarchy is well-defined and fully operational.

**User Roles** :

- **All ET collaborators** : Read-only access.
- **System managers** : Delete/Write access to manage their sections.
- **Admins** : Management rights for administrative tasks.



## Users Roles

- The PBS management processes are described not only by their functional flowcharts, but also from the roles and responsibilities description with respect to the full PBS lifecycle. These are summarized in Table.
- PBS roles description. Rights may be of the type R= read, W=write, P=Propose (the modification). RACI acronyms are the classic Responsible, Accountable, Consulted, Informed
- a user must have role authority to make change requests to associated elements and their parameters, change requests can only be accessed by the correct change request manager group based on a **WBS name** added as an attribute to entity elements.

Role	PBS rights	RACI	Description
Technical coordinator	RWP	R	Responsible for the PBS editing and modification. Responsible for all process validation
Unit manager (level n)	RP	A	Responsible for the unit breakdown and for change request proposal
Unit manager (level n+1)	RP	A	Responsible for the unit breakdown and for change request proposal verification
System manager	RP	A	Responsible for the unit breakdown and for change request proposal validation
e-Infrastructure manager	RW	C	Responsible for the PBS e-Infrastructure management tool
Quality manager	RP	A	Responsible for the PBS quality process
Configuration manager	RP	A	Responsible for the PBS integration as configuration item (CI). Responsible for the change process definition
Review manager	R	I	Responsible for the PBS verification and validation reviews.
Safety manager	R	I	Responsible for PBS safety integration
Resources manager	R	I	Responsible for the PBS associated resources and budget

## Current Status of the Database

**User Interface** : Functional and user-friendly, supporting efficient data navigation.

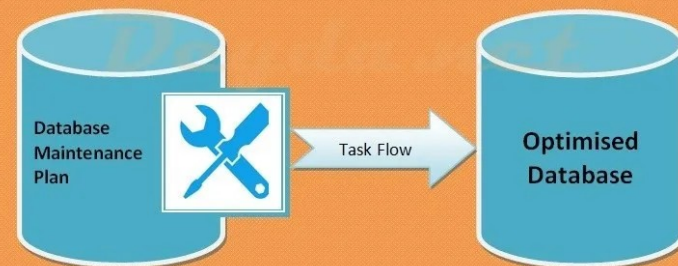
**Allowing Exports and filters** : Full export in different format, and filtered requests supported.

**Maintenance and Updates** : Regular updates required to align with evolving project needs.

### Change Management Process



### Database Maintenance Plan



www.SQLServerLog.com

## What was done ?!

- Provide first definition of parameters (functional + interface)) for all PBS items
- Connect PBS items (1.5k+) to respective parameters (10+)
- Track 10k+ quantities ==> change management process
- (Version Control system that tracks changes of the Backend / FrontEnd and DB)
- Allow evolution of PBS and parameters
- Propagate information( crucial in ensuring that modifications to attributes are properly documented, reviewed, and propagated to maintain the integrity of the PBS.)
- Risks Management Plan, still in development mode

Some Snapshots

Elements==>Underground Seismic Monitoring

/ 1827 | EINSTEIN TELESCOPE | 1 / 1828 | HF INSTRUMENT | 1.1 / 2511 | ACTIVE NOISE MITIGATION | 1.1.5 / 2512 | ENVIRONMENTAL SENSORS | 1.1.5.1 / 2513 | UNDERGROUND SEISMIC MONITORING | 1.1.5.1.1

parent\_id == 2513

id	element_name	wbs_name	element_type	parent_id	level	description	PBSCODE	pbs_element_manager	Manager_s_email	Review	Actions
✓ 2514	Broadband triaxial seismomet...			2513	6	Seismic monitoring in caverns...	1.1.5.1.1.1	Fausto Acernese	fausto.acernese@na.infn.it		<div><div></div><div></div><div></div><div>CHILDREN</div><div>PARAMET...</div></div>
✓ 2515	Conditioning electronics for br...			2513	6	Driving for seismic probes incl...	1.1.5.1.1.2	Rosario De Rosa	rosario.derosa@na.infn.it		<div><div></div><div></div><div></div><div>CHILDREN</div><div>PARAMET...</div></div>
✓ 2516	Broadband triaxial accelerome...			2513	6	Vibration monitoring of critical...	1.1.5.1.1.3	Fausto Acernese	fausto.acernese@na.infn.it		<div><div></div><div></div><div></div><div>CHILDREN</div><div>PARAMET...</div></div>
✓ 2517	Conditioning electronics for tri...			2513	6	Driving for triaxial acceleromet...	1.1.5.1.1.4	Rosario De Rosa	rosario.derosa@na.infn.it		<div><div></div><div></div><div></div><div>CHILDREN</div><div>PARAMET...</div></div>

PARAMETERS

REQUIREMENTS

CHANGE REQUESTS

PEEK RISKS

PARAMETERS

REQUIREMENTS

CHANGE REQUESTS

PEEK RISKS

PARAMETERS

REQUIREMENTS

CHANGE REQUESTS

PEEK RISKS

PARAMETERS

REQUIREMENTS































CHANGE REQUESTS

PEEK RISKS

## Broadband triaxial seismometers / Parameters

## Some Snapshots

pbs\_element\_id == 2514

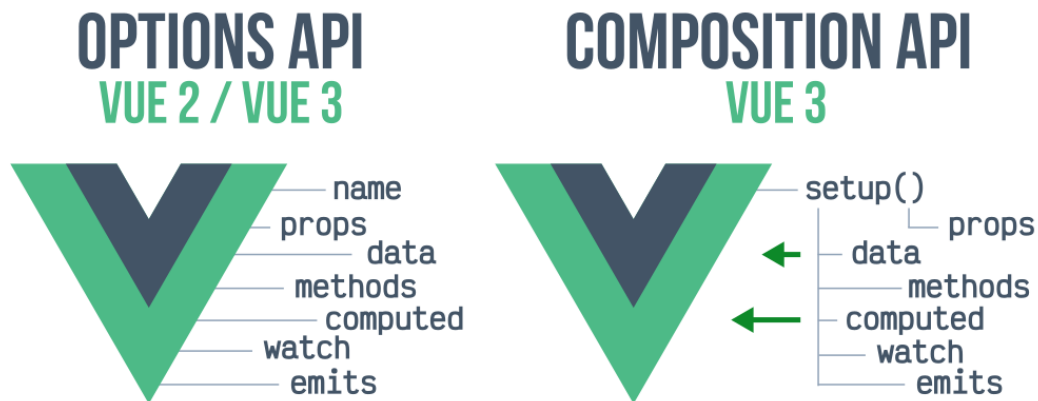
id	in_file_id	element_id	pbs_element_id_PBSCODE	Name	Value	Unit	Margin	Type	description	ref	flag	identity	impact_or_axis	author	verified_by	Actions
✓ 17667	1	2514	1.1.5.1.1.1	Material ?	Fused Silica			Specification				FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17668	2	2514	1.1.5.1.1.1	Thickness				Constrain more than	Thickness of the blank before polishing			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17669	3	2514	1.1.5.1.1.1	Diameter		cm		Constrain more than	Diameter of the blank before polishing			FUNCTIONAL	1.1.1;	Fausto Acernese	Roario De Rosa	  
✓ 17670	4	2514	1.1.5.1.1.1	Weigth		kg		Constrain more than				FUNCTIONAL	1.1.1;	Fausto Acernese	Roario De Rosa	  
✓ 17671	5	2514	1.1.5.1.1.1	Index of refraction		-			Index of refraction @ 1064nm			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17672	6	2514	1.1.5.1.1.1	Homogeneity		-		Constrain less than	Index homogeneity @ 1064nm in the bulk (2 dimensions.			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17673	7	2514	1.1.5.1.1.1	Surface 1 HR - RoC		m		Specification	Radius of curvature of the HR surface			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17674	8	2514	1.1.5.1.1.1	Surface 1 HR - WFE (w/o curvature)					WFE of the HR surface with curvature filtering			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17675	9	2514	1.1.5.1.1.1	Surface 1 HR - Roughness		nm rms		Constrain less than	Roughness of the HR surface			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  
✓ 17676	10	2514	1.1.5.1.1.1	Surface 1 HR - Scatch and Dig					Surface quality of the HR surface			FUNCTIONAL		Fausto Acernese	Roario De Rosa	  





# Perspectives & Upcoming Developments (2026)

- Currently we are using vue 2.6.11 and thinking moving to 3.x. Performance gains (faster rendering, smaller bundle size).
- (2.x **Options API**) while 3.x has **Composition API** for better code organization and reusability.  
(composing logic inside a single `setup()` function.)



# Perspectives & Upcoming Developments (2026)



## CPU

**Architecture:** x86\_64 (64-bit)

**Model:** Intel Xeon Processor (Icelake)

**Sockets:** 8 (physical CPU)

**Cores** per socket: 1

**Threads** per core: 1

**Total CPUs (logical):** 8 (8 sockets × 1 core per socket × 1 thread per core = 8 vCPUs)

**L1 Cache:** 256 KiB (data) + 256 KiB (instruction)

**L2 Cache:** 32 MiB

**L3 Cache:** 128 MiB

**Virtualization:** VT-x, running under KVM (hypervisor)

**Instruction sets:** SSE (Streaming SIMD Extensions)

128-bit SIMD (Single Instruction, Multiple Data), SSE2, **AVX**(256-bit SIMD (Advanced Vector Extensions), AVX2, AVX-512, **AES**(hardware acceleration for AES encryption/decryption.), FMA, BMI1/2, etc.

**$(2 \times 8) + 1 = 17$  workers**

That's the theoretical max for pure CPU-bound workloads.  
(More workers help handle concurrent requests)

**2-4/ 4-8 : per CPU - I/O-bound** (web APIs, Django, DB queries)

**Total RAM:** 7.8 GiB

**Used:** ~661 MiB

**Free:** ~1.8 GiB

**Cache/Buffers:** ~5.3 GiB

**Available:** ~6.8 GiB

**Swap:** 0B (not configured)



**Main Disk:** vda → 40 GB (Virtio virtual disk)

**Partition 1:** vda1 → ~39.9 GB → Mounted as root (/) → our main OS + data

**Partition 14:** vda14 → 4 MB → Likely a BIOS/bootloader placeholder

**Partition 15:** vda15 → 106 MB → Mounted at /boot/efi (EFI System Partition)





# Perspectives & Upcoming Developments (2026)

- With the **New Parameter File Generator**, we can generate an excel file from this form, of course, a **keygen** is generated to make sure each user does not edit the file by hand, **avoiding conflicts** with our **DB**, the user can reedit the file anytime by re-uploading !
- while **8 default parameters** have been added to the dynamic form by default.
- **Dimensions (with free space for description), Weight, Peq. Power, Req. Water, Peq. Cryo, Req. Gas**

"Warning ! Make sure you generated the file from this source to ensure the key is valid. Enjoy!"

make file (.xlsx) General informations

pbs\_element\_id\*

pbs\_element\_id\*

Element Description

HFI or LFI\*

author\*

verified\_by\*

+ ADD PARAMETER

Parameter #2 | Dimensions L (z axis)  
**Integration**

Parameter #3 | Dimensions H (y axis)  
**Integration**

Parameter #4 | Dimensions W (x axis)  
**Integration**

Parameter #5 | Weight  
**Integration**

Parameter #6 | Required Power  
**Integration**

Parameter #7 | Required Water  
**Integration**

Parameter #8 | Required Cryo  
**Integration**

Parameter #9 | Required Gas  
**Integration**

DOWNLOAD ALL PARAMETERS

import .xlsx (redit)



## Perspectives & Upcoming Developments (2026), Evolution in Configuration Context

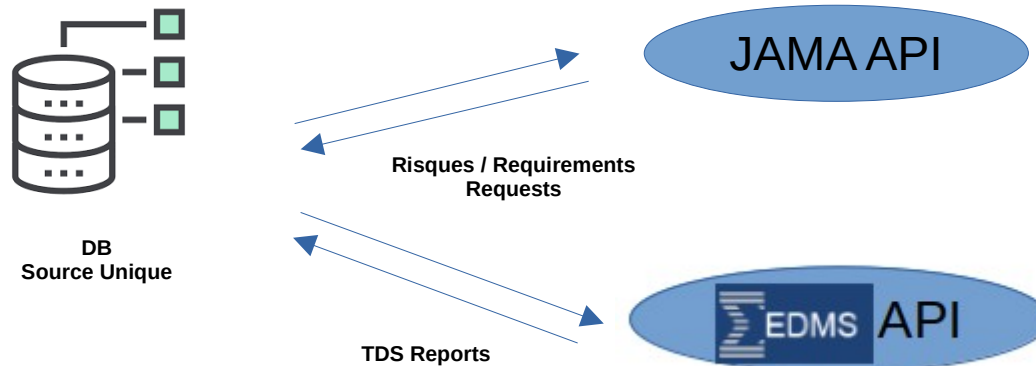
### A Bridge Between EDMS, JAMA, and PBS Elements :

Our backend (**middleware**) will serve as the integration layer between:

**EDMS API** (Electronic Document Management System) – Storing and retrieving **technical documents (TDS, reports, etc.)**

**JAMA API** (Requirements & Test Management System) – Managing requirements, specifications, and test cases.

**PBS Database** – Storing **elements, parameters, and hierarchical relationships**.



# Perspectives & Upcoming Developments (2026), Evolution in Configuration Context

## Middleware Role & Architecture

Our **middleware** will:

**Fetch Documents from EDMS** : Query **EDMS API** to get URLs of **TDS/reports** related to PBS elements.

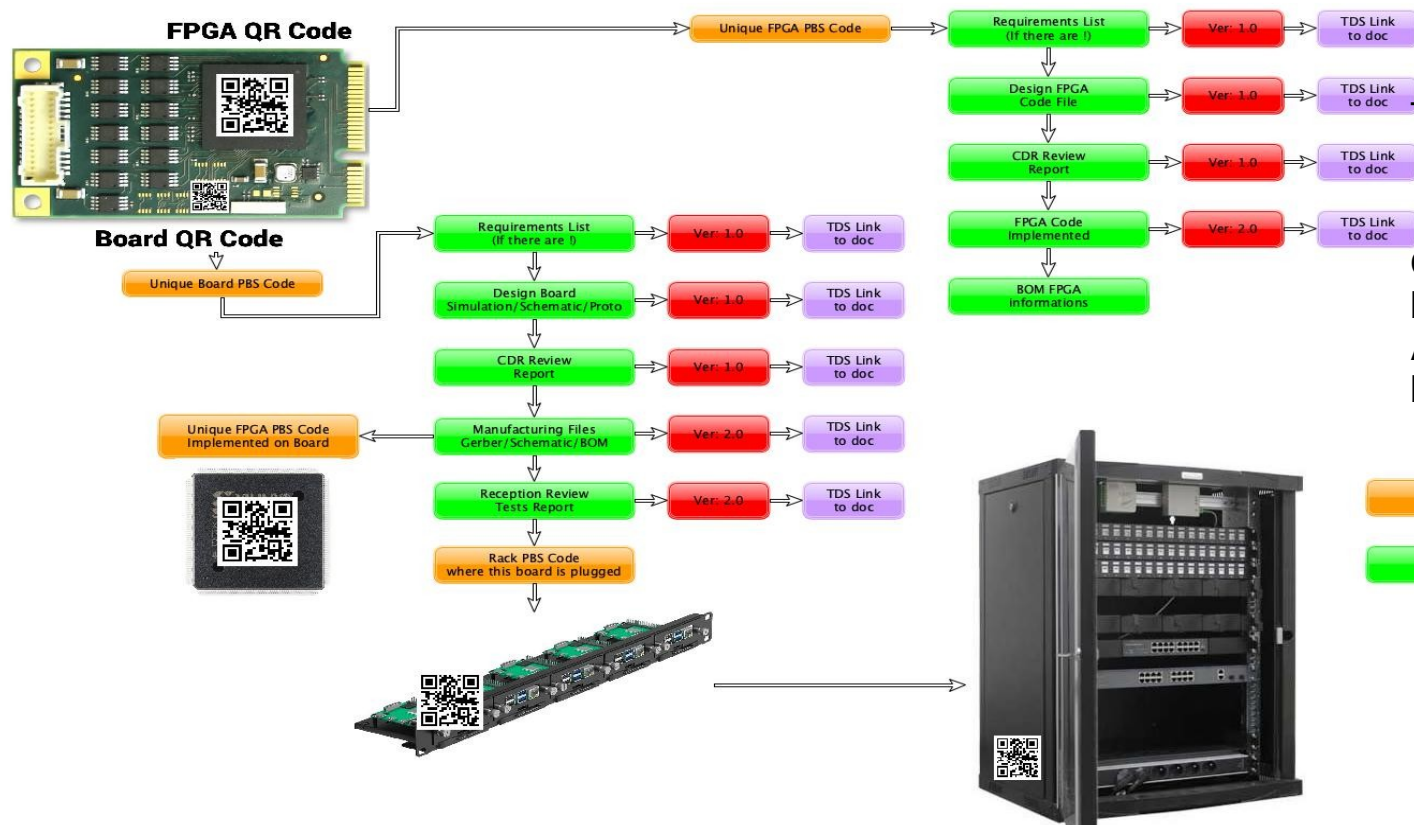
**Retrieve Requirements from JAMA** : Pull relevant specifications and link them to **PBS elements**.

**Map Data to PBS Elements** : Ensure each **PBS element** has its associated documents & metadata.

**Provide Secure Access** : Only authorized users can access specific reports or documents.

**Serve Data via API** : Our **Frontend** will request documents from Django, which fetches and delivers the appropriate links or content.

## Product Configuration Traceability Process



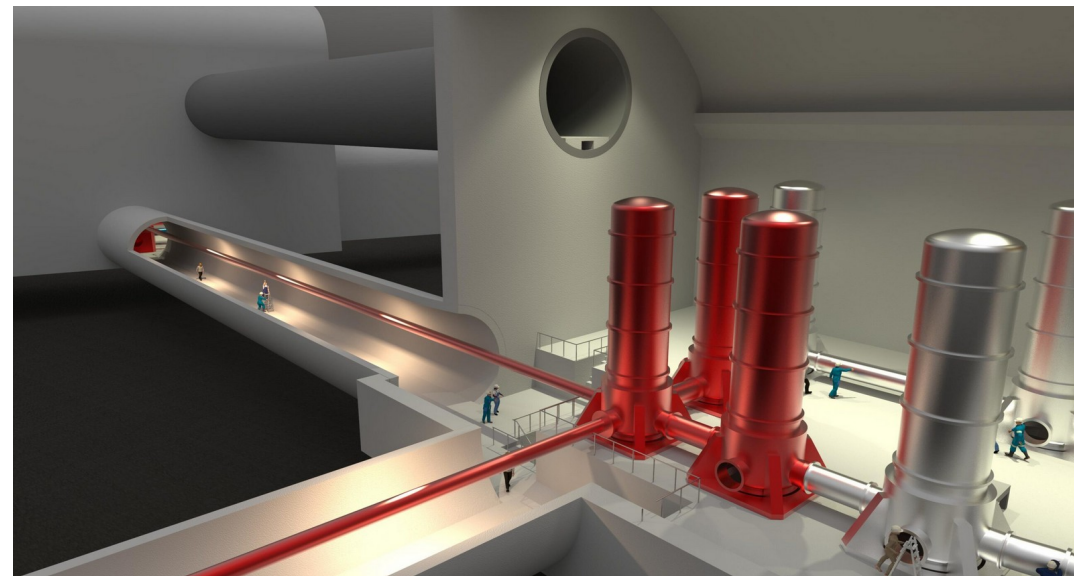
TDS associated with Link

Our middleWare will act as a bridge to **EDMS** and **JAMA API** to get documents to view back to the user

# Perspectives & Upcoming Developments (2026), Evolution in Configuration Context

## 2D and 3D Visualization of Elements:

- **2D and 3D Visualization of Elements** : Enabling interactive 2D and 3D representations of PBS elements to improve understanding and navigation.
- Supporting **3D model file formats** integration and real-time rendering of elements. Interactive 2D and 3D Views: Helps users explore PBS elements visually rather than just through text or tables.
- **Enhanced Understanding** : A graphical representation improves clarity, especially for complex hierarchical structures.
- **Navigation Aid** : Users can zoom, rotate, and inspect elements, improving user experience. **Real-Time Rendering**: Supports integration of 3D model formats like **FBX, GLTF, and CAD files** for dynamic visualization.

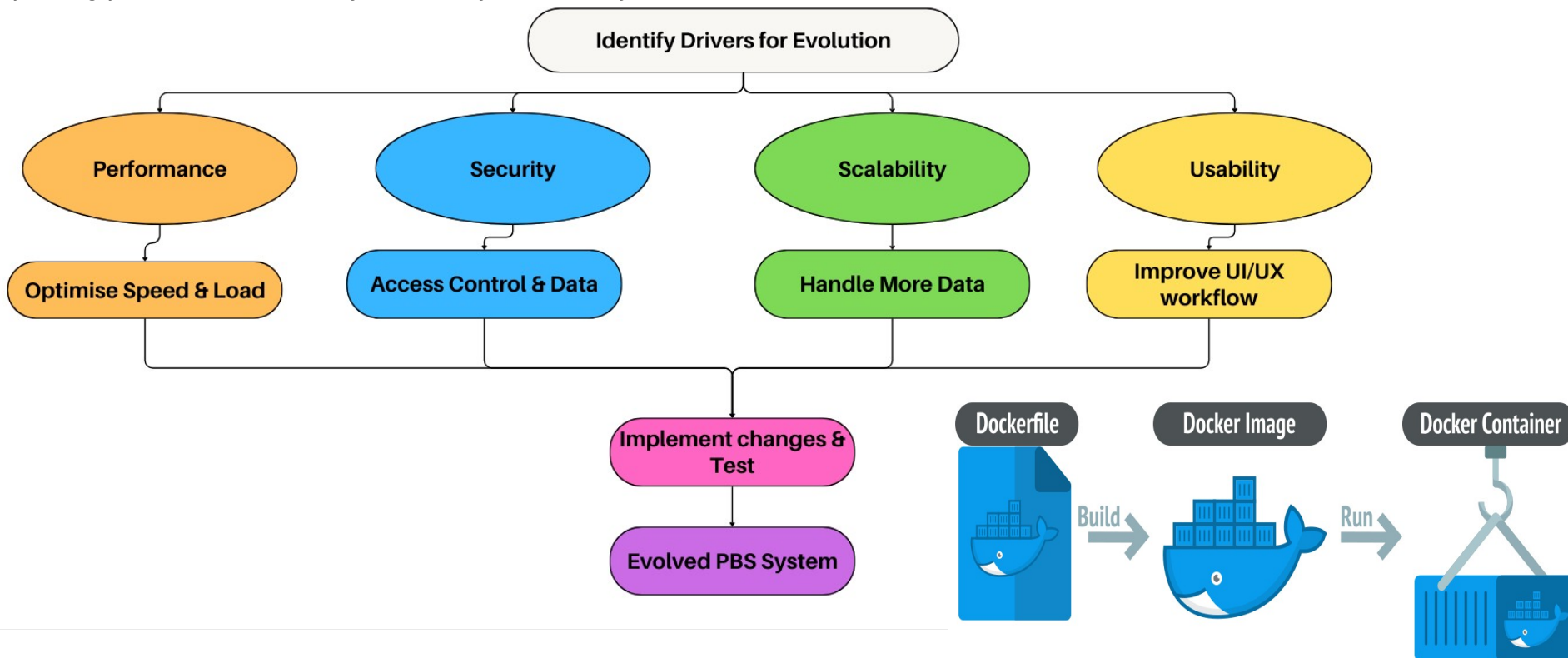


# Perspectives & Upcoming Developments (2026), Evolution in Configuration Context

## Define the Evolution Context

Identify the **drivers for evolution**:

Are we improving performance, security, scalability, or usability?





# Perspectives & Upcoming Developments (2026), Evolution in Configuration Context

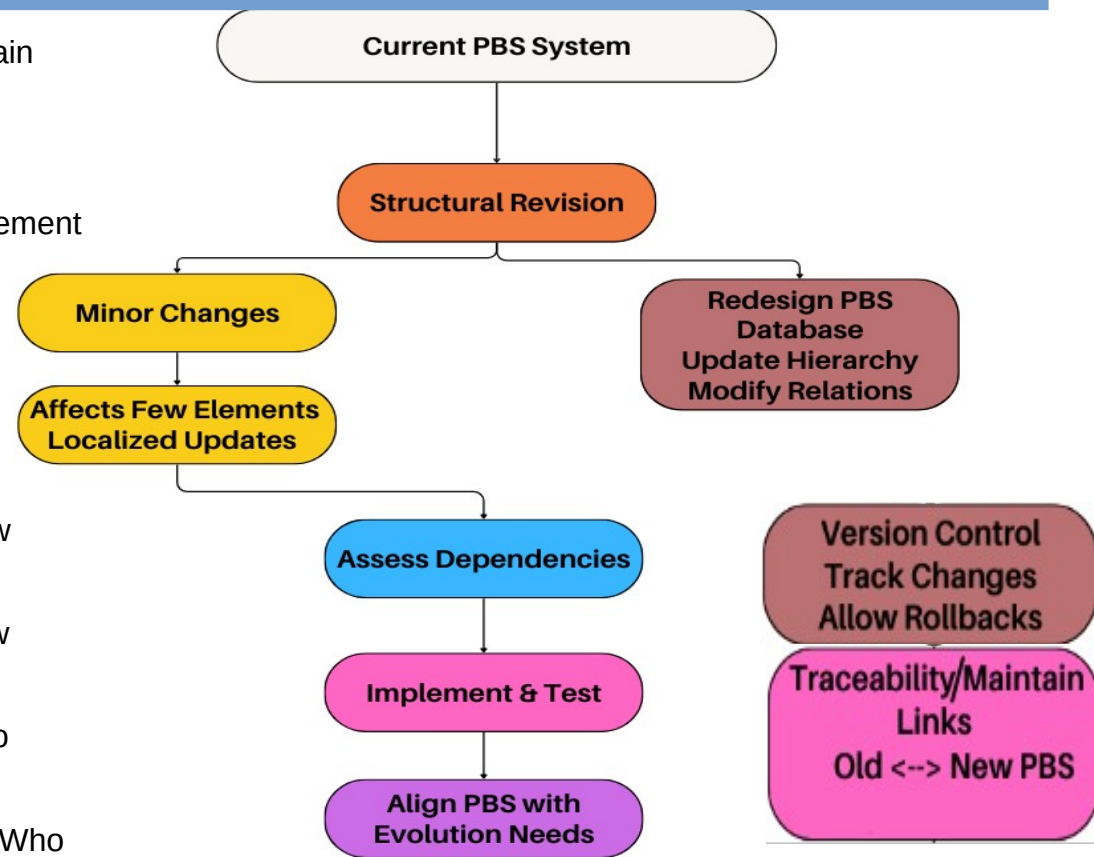
Assess the **impact on the current PBS**: Will changes affect only certain elements, or is a structural revision needed?

What about **NOMENCLATURE ! ?**

Ensure compliance with **existing processes**, such as change management and approval workflows.

## Align PBS with Evolution Needs

- **Refine the Hierarchical Structure** : If the evolution introduces new components, update the PBS accordingly.
- **Version Control** : Implement versioning to track changes and allow rollbacks when needed.
- **Traceability** : Maintain links between old and new PBS elements to understand dependencies.
- **Define roles and responsibilities**: Who validates **PBS** changes? Who implements them?



MERCI

DB