



## FUTURE REPAIR AND MAINTENANCE FOR AEROSPACE INDUSTRY

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### **Deliverable 8.3: GRAPHICAL AND UML REPRESENTATION OF THE KNOWLEDGE AND PARTS MATERIAL DATABASE**

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July 2014

Work Package 8

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7th Framework Programme

for Research and Technological Development

COOPERATION

AAT2013.4-4.: Maintenance, repair and disposal



Distribution level	Confidential			
Due date	31/07/2014			
Sent to coordinator	29/07/2014			
No. of document	D8.3			
Name	Graphical and UML representation of the knowledge and parts material database			
Type	<i>Report</i>			
Status & Version	<i>Final Version: 2.0</i>			
No. of pages	45			
Work package	8			
Responsible	OGA			
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Keywords	<i>Part library – Knowledge DataBase</i>			
Short description				
History	Version	Date	Author	Comment
	V 1.9	28/07/2014	OGA	Version after QA
	V 2.0	29/07/2014	OGA	Final Delivery Version

***The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n°605779.***

## Executive summary

**TITLE:** REPAIR Part Library and Knowledge Data Base

**Description:** Definition of the RepAIR Data Base (Part Library and Knowledge)

### Introduction

The definition of the RepAIR (Part Library and Knowledge) Data Base contributes to the overall concept for the RepAIR IT management platform. The data base should serve as a basis for actual MRO processes (cp. WP3), but also research and preparative processes like certification (cp. WP6 and WP7). This document aims to form a continuous line with D8.1 (system architecture) and D8.2 (specification of the central IT node) adding specific information about how it will manage the parts information and how the knowledge concept inside this project must be understood.

First, it is important to define the two complementary parts of the concept:

- The **Part Library** is a relational data base structure that allows storing information related with spare parts. This information will be tidy in several data base tables:
  - General spare part information
  - Certification spare part information
  - Manufacturing spare part information
  - Legal spare part information
  - Engineering spare part information
- Regarding the **Knowledge Data Base**, 'knowledge' has been defined as **WHAT** must be done in each process step (operations) and **HOW** it must be carried out in the processes. At technical level, the knowledge data base will be a documental repository to store all kinds of technical documentation.

This document provides the IT description for the part library development and the knowledge data base as a documental repository which interact with the process workflow.

### Part Library Data Base (PLDB)

The PLDB is formed with different kinds of information about a spare part. All of this information is based on the work done in WP7:

- Technical information
- Manufacturing process
- Assessment
- Legal aspects
- Quality registers

For the PLDB an initial structure was designed which – after a more detailed analysis – has been improved obtaining a hierarchy structure (PLDB - design 2, see figure).

While the types of information to be stored were kept, the following conclusions have been obtained:

- The first one could seem complex and not easy to be understood and the future maintenance could be more difficult.
- The second design will be more easier and logic for maintenance, being possible to introduce new tables of a less complex way.

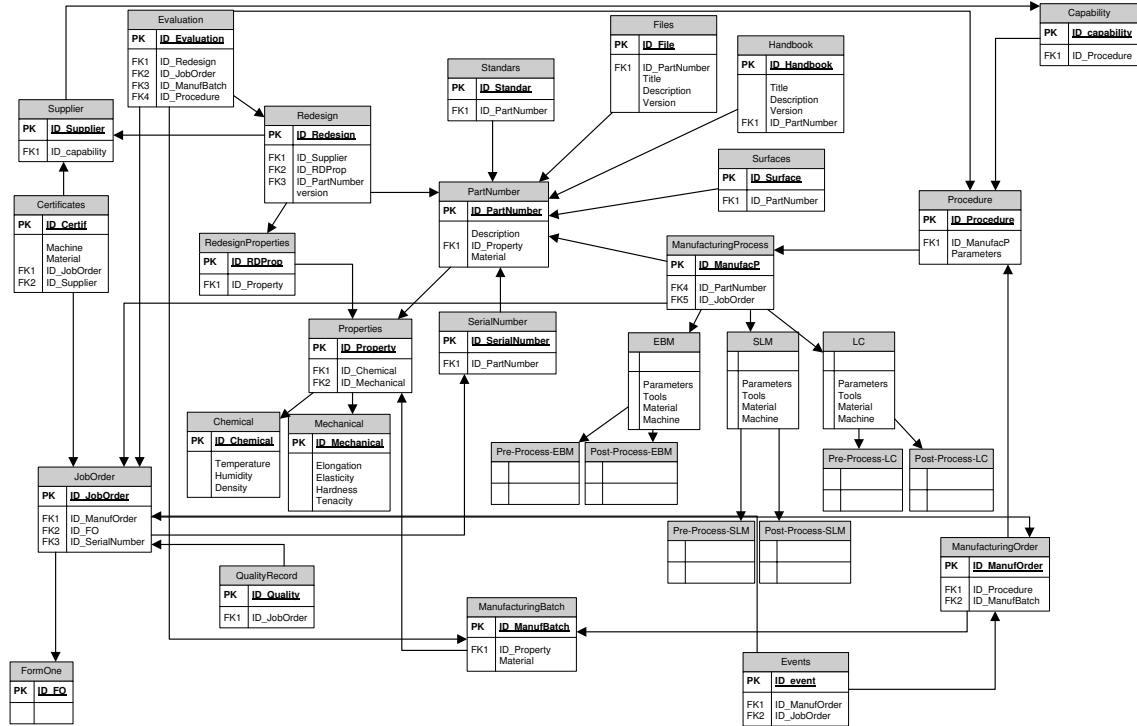


Figure 1: PLDB - design2

Based on this complete PLDB design, the deliverable highlights extracts of this model describing each kind of information by means of the interdependent entities (e.g., information related to the manufacturing process as presented in the following figure):

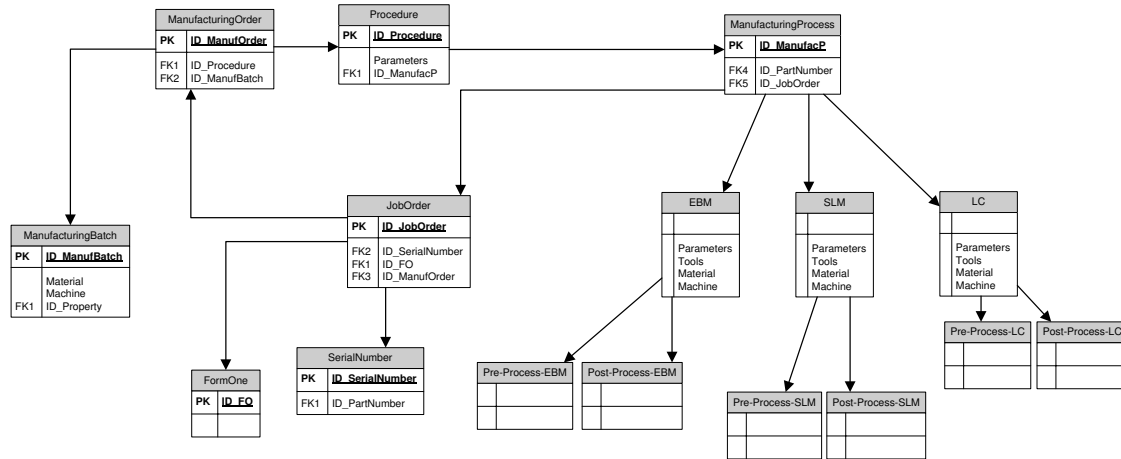


Figure 2: Manufacturing process - PLDB design2

## Knowledge Data Base (KDB)

Knowledge is a familiarity, awareness or understanding of someone or something, such as facts, information, descriptions, or skills, which is acquired through experience or education by perceiving, discovering, or learning. Knowledge can refer to a theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic.

For the RepAIR project and specifically WP8, knowledge is defined as organized information that will allow the partners to achieve their goals, improve the experience. It will be a formal description of the task that each partner should do and how they would do it. The concept idea appears in the next picture:

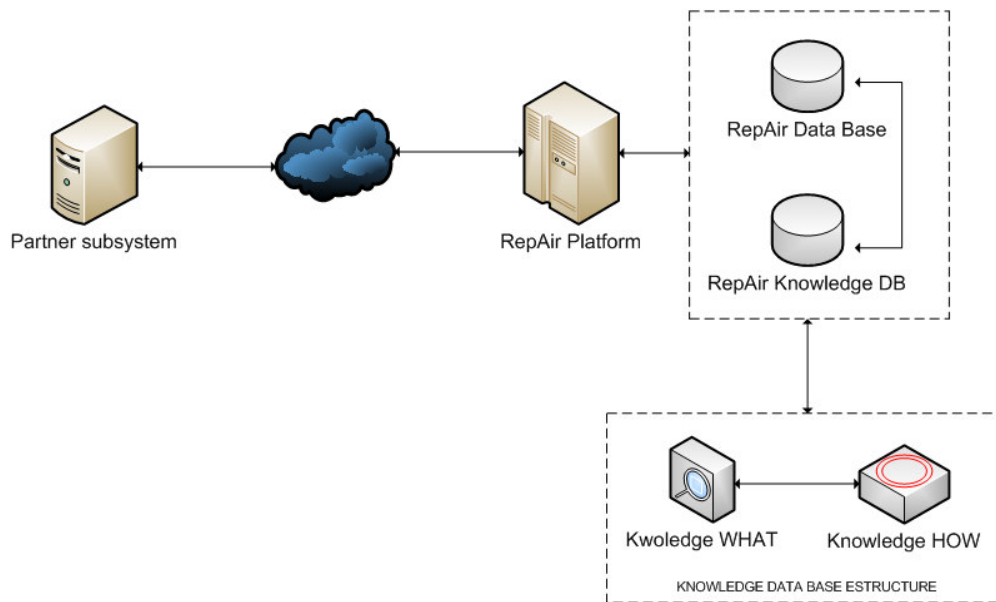


Figure 3: Knowledge Data Base concept idea and relationship with the RepAIR IT management platform including subsystems provided by partners

Two kinds of documents should exist in the KDB for each maintenance operation:

- WHAT: a document (collection) providing detailed information about what the worker should do in this maintenance operation
- HOW: a document (collection) providing detailed information about how the worker must execute this maintenance operation

All of this information will be stored in a repository (also called contents library or digital objects) located on a physical system where digital source collections are stored in an organized way with a descriptive system by means of metadata allowing to give support to activities of knowledge management. These repositories or digital libraries are usually accompanied by services for searching and using the information (text, image, audio, etc.). Another characteristic is that the digital repositories are supported in the internet to simplify access and diffusion of their contents about parts to users.

There is a great diversity of repositories of digital objects. However, all of them have in common the following layers of activity that define them:

- Content: set of services that facilitate the incorporation and publication of documents in the repository, as well as its exchange and access on the part of others.
- File: set of utilities dedicated to the preservation and permanency in the time of the documents, related to the contents layer.
- Service: it offers services with added value to the final user, like the register process, the certification of the contents quality and the notification or the information of its availability.

A study has been conducted regarding free software for repositories. Nevertheless the actual selection for functional use is difficult to realize. The following list includes the most advanced repositories with its advantages and disadvantages:

- DSpace is the most appropriate solution when it needs to dispose a repository to give support to different document types, and to attend to different user communities thanks to its versatility.
- Eprints would be the correct application when it needs to implement a preprints collection and digital magazines.
- Fedora is a technically advanced platform, but its implementation requires a notable investment in programming, hence it is rather a toolkit than a complete solution.

With criteria and comparisons it is considered that the most appropriate repository software for RepAIR purposes is provided by DSpace.