



D3.3 – Extension of Standard Data Format Covering All Assessment Levels

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Abstract

D3.3 shows the extensions of the standardized data exchange model CPACS for the Impact Monitor project. These extensions were developed based on the requirements from use cases 1, 2, and 3 (i.e., for all assessment cases), coordinated with the tool owners, and implemented in XML Schema Definition (XSD). This document highlights the changes to the schema. For details, the XSD and the documentation derived from it in .chm format are attached to this deliverable. The .chm documentation is a compressed collection of html documents about the respective CPACS elements and their data types, which has also been made available to the project team via GitLab.

Keywords

CPACS, XSD, Documentation

Information Table

Contract Number	101097011
Project Title	Impact Monitor
Topic	HORIZON-CL5-2022-D5-01-14
Type of Action	Horizon Research and Innovation Actions
Project Start Date	1 February 2023
Duration	24 Months
Project Coordinator	Deutsches Zentrum für Luft- und Raumfahrt e. V. (DLR)
Deliverable Number	D3.3
Deliverable Title	Extension of Standard Data Format Covering All Assessment Levels
Version	1.0
Status	Final
Responsible Partner	DLR
Deliverable Type	Other
Contractual Date of Delivery	31/01/2024
Actual Date of Delivery	30/04/2024
Dissemination Level	PU

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Document History

Version	Date	Status	Author	Description
0.1	23.04.2024	Draft	Marko Alder	First version
1.0	24.04.2024	Final	Marko Alder	Final version



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Table of Acronyms

Acronym	Meaning
ATS	Air Transport System
BADA	Base of Aircraft Data
CPACS	Common Parametric Aircraft Configuration Schema
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
XSD	XML Schema Definition



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Table of Contents

1. Introduction.....	8
2. Changes to the CPACS Data Model	10
2.1 Changes at ATS and Airport level	10
2.2 Changes at aircraft level	11



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List of Figures

Figure 1: Explanation of XSD diagram symbols – occurrence	8
Figure 2: Explanation of XSD diagram symbols - sequence indicators.....	9
Figure 3: CPACS Schema modifications at ATS and Airport level	10
Figure 4: Enhancements to the CPACS Schema at aircraft level.....	11



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1. INTRODUCTION

Schema diagrams are used below to provide a clear overview of the CPACS extensions. These represent the hierarchical data model in the form of a tree. The information is taken from the XML Schema Definition (XSD), which is itself an XML file that represents the elements, their element types, and restrictions on the data structure (e.g., frequency of occurrence of elements).

The following is an explanation of the illustrations. The root node is always <cpacs> (see Figure 1). Its child elements are displayed in a top-down view. Elements with a solid border occur at least once, but not more than once (i.e., [min..max] = [1..1], i.e. they are mandatory elements. Dashed elements do not need to be specified (e.g., [0..1]). Elements in stacked form indicate that they can be listed more than once (e.g., [1..inf]).

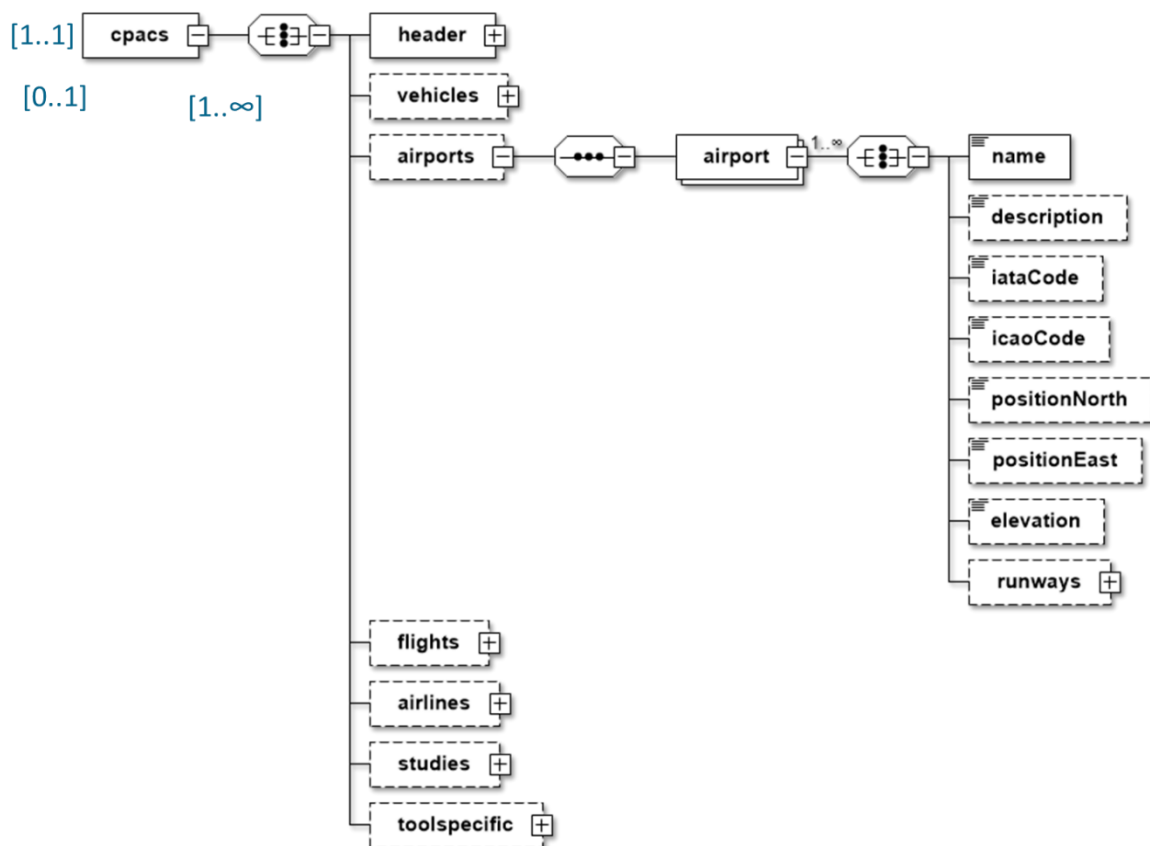


Figure 1: Explanation of XSD diagram symbols – occurrence

In addition, elements on the same hierarchy level are preceded by a symbol that indicates the order of the elements (see Figure 2). For example, three contiguous dots represent the so-called xsd:all statement, in which the order of the subsequent elements is arbitrary. On the other hand, three dots next to each other indicate that the order of the elements is mandatory. A switch-like symbol indicates that a selection of subsequent elements must be made, i.e. several elements may not be listed at the same time.

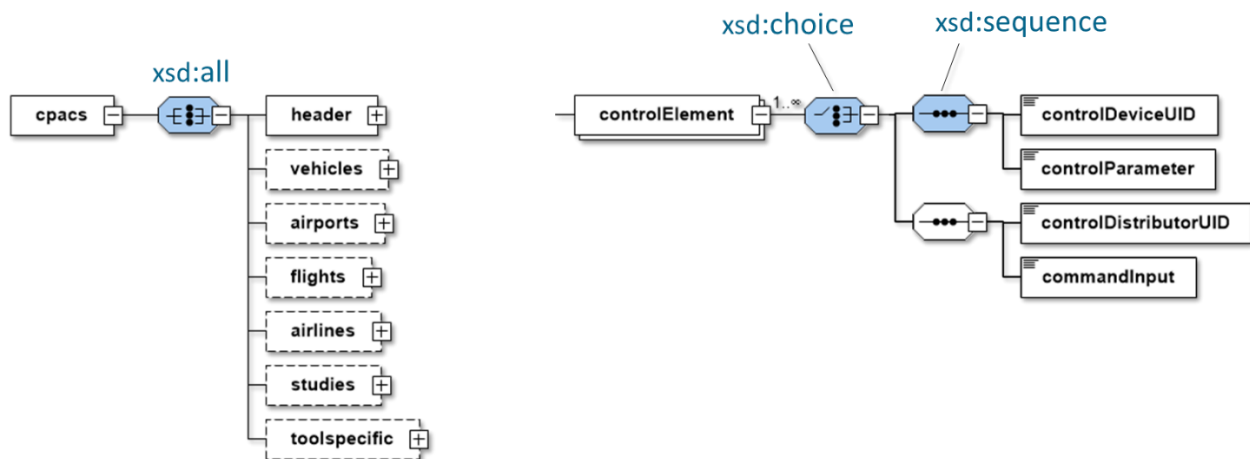


Figure 2: Explanation of XSD diagram symbols - sequence indicators

2. CHANGES TO THE CPACS DATA MODEL

The Impact Monitor schema is based on the official CPACS v3.4 release. The changes are summarized below. For detailed information on the newly added or modified elements, please refer to the attached XSD file or the .chm documentation derived from it.

2.1 Changes at ATS and Airport level

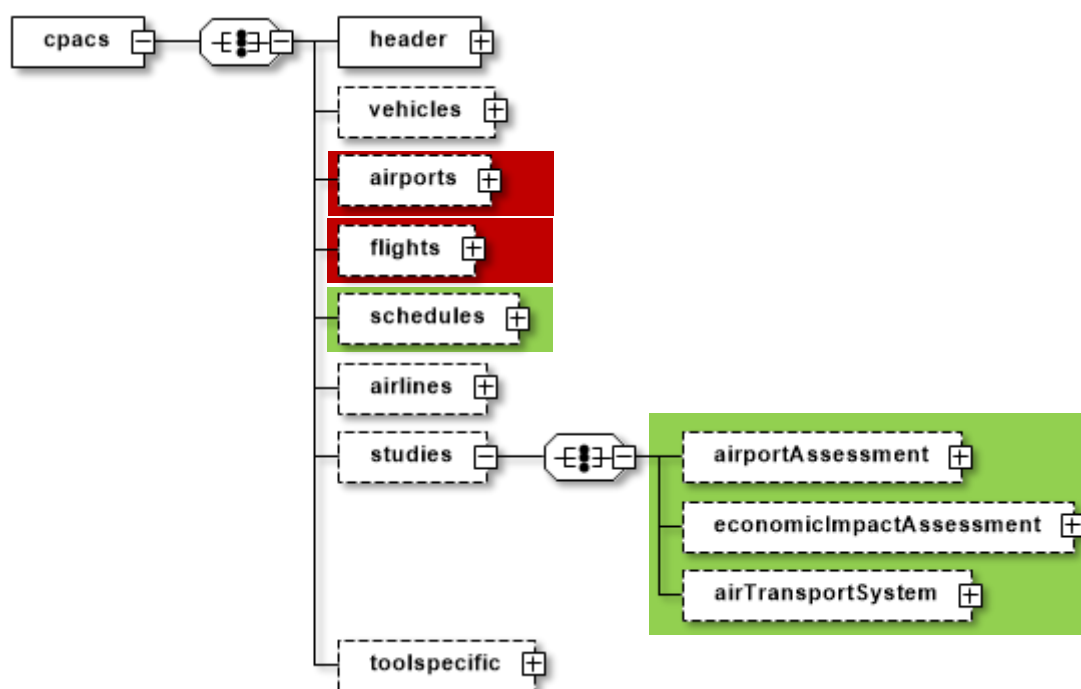


Figure 3: CPACS Schema modifications at ATS and Airport level (green = added elements; red = modified elements)

Figure 3 shows the changes to the data schema at the Air Transport System (ATS) and airport levels. Elements shown in green were developed in the Impact Monitor project and added to the data schema. On the one hand, these are higher-level <studies> nodes. These include airport assessment analyses, some noise and emissions data. The <economicImpactAssessment> node essentially represents time-dependent gross value added or employment changes. Finally, <aviationFuelPolicies> are represented in the <airTransportSystem>. The <schedule> node is one of the largest extensions to the CPACS data model. It contains arrival and departure locations and times, references to associated flight plans, references to associated flights, and information about formation flights.

Red items represent changes to the CPACS data schema. This concerns the <airports> node, to which, for example, detailed approach routes have been added. The <flights> node has been adapted to display detailed information on flights, including economic aspects, trajectories and emissions.

2.2 Changes at aircraft level

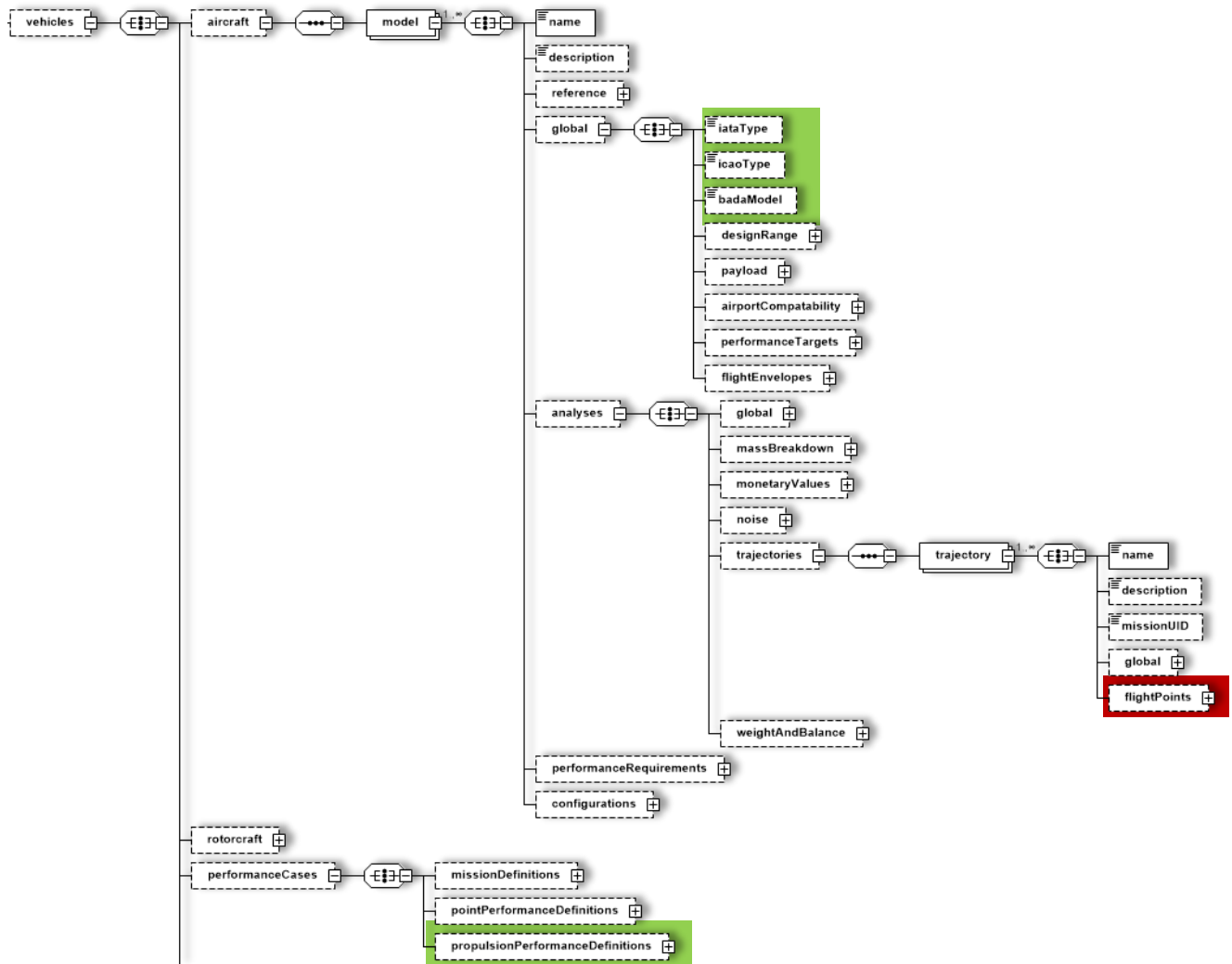


Figure 4: Enhancements to the CPACS Schema at aircraft level

Figure 4 shows the adjustments to the CPACS data model at aircraft level. First, propulsion performance definitions were added to the vehicle-independent performance cases. These define propulsion requirements. Furthermore, the <global> node of an <aircraft> model is supplemented by the associated IATA, ICAO or badaModel designators. The <flightPoints> are modified to simplify the definition of trajectories by clustering the elements in such a way that the order can be specified as desired, the camelStyle syntax has been corrected, and missing elements, e.g. for contrail formation, have been added.