

Terms of Reference for the Phase of Flight and Accident/Incident Working Group (PFAIWG)

Background

Standard data is the cornerstone of the information infrastructure that supports the systems and overall mission of the Federal Aviation Administration (FAA). Information sharing is critical to accomplishing the missions, functions, and business processes for the FAA. The FAA's information domains have been broken down into three segments covering National Airspace System (NAS) Operations, Mission Support, and Administrative. Mission support includes aviation safety related functions that are dependent on quality reference data in order to do aviation safety analysis and reporting.

Two key classes of aviation safety reference data are phase of flight and accident/incident types. By knowing the phase of flight of accidents and incidents for a period of time, an aviation safety analyst can determine whether there are trends or patterns involving one or more phases of flight. For instance, certain kinds of incidents may be repeating within certain phases of flight for certain kinds of aircraft. However, aviation data systems must use standardized data on phases of flight in order to facilitate aggregation of data by phase of flight.

Similarly, using a standard list of the types of accidents and incidents will enable an aviation safety analyst to aggregate data by accident or incident type in order to look for trends, patterns or causal factors.

The Commercial Aviation Safety Team/International Civil Aviation Organization Common Taxonomy Team (CICTT) was jointly chartered by the International Civil Aviation Organization (ICAO) and the United States Commercial Aviation Safety Team (CAST) in 1999¹. The team has created taxonomies for phase of flight and occurrences (accidents and incidents) after reviewing lists of valid values from the FAA, NTSB, Canada, private sector organizations, and European civil aviation authorities. This proposed FAA data standardization working group will focus on applying these taxonomies in proposed data element standards for the FAA.

Each data standard covered is a description of a data element or other administered item shared among FAA information systems and is portrayed through a common set of metadata (data *about* data). The metadata set should comply with the governance of the Data Management policy for data standardization, which is based upon the International Organization for Standardization /International Electrotechnical Commission (ISO/IEC)

¹ The CAST/ICAO Common Taxonomy team has international participation including aviation staff from ICAO, CAST, national civil aviation authorities (including the U.K., U.S. and Canada), accident investigation organizations (U.S. NTSB, French BEA, Canadian TSB), and commercial enterprise. The CAST/ICAO Common Taxonomy Team (CICTT) is co-chaired by a representative from ICAO and the U.S. National Aeronautics and Space Administration (NASA), which represents CAST. The team's charter is to provide common taxonomies and definitions for safety related information to enable world-wide focus on accident prevention issues. By providing common terms, aviation organizations, both the breadth and depth of safety analysis will be enhanced.

11179 Standard and follows best practices for managing shareable data.² The individual data standards are maintained in the FAA Data Registry (FDR) tool. Individual data standards must be well constructed, uniformly specified, widely coordinated and accepted by the user community in order to be effective.

Scope

This effort is considered part of the NAS data standardization process (rather than non-NAS). These Terms of Reference describe the PFAIWG role in defining data standards on phase of flight and accidents/incidents for information systems that will be approved and controlled by the NAS Configuration Control Board (CCB)

The following list of data entities provide the framework for identifying and developing candidate data elements that will be further developed by the PFAIWG:³

- Event Taxonomy including Accident Type, Incident Type and Other Event Type (see the Safety subject area of the FAA Data Architecture)
- Phase of Flight (see Flight and Launch subject area of the FAA Data Architecture)

The attached **appendix** contains further information on the likely direction of this working group.

Working Group Action Plan

- Determine if additional organizations and personnel should be contacted as a source of information; determine the FAA offices that will develop and/or maintain the PFAI data.
- Conform to the Data Standardization Procedures adopted for this domain
- Identify phase of flight and accident/incident type Data Standards and develop Data Standards Proposal Packages for approval by the appropriate boards; Develop additional items necessary for presenting such proposals
- Determine if any modifications are necessary to the products developed for other standardization efforts.
- Keep this Terms of Reference current and submit changes for approval to the DSAB.

² “For systems to be truly open, data must be portable and shareable within and among these various application environments, which span localized and distributed networks. For data to be shareable, both the users and owners of data must have a common understanding of its meaning, representation, and identification. To understand the meaning of any data, the descriptions of the data must be available to the users from, for example, a Data Element Registry. Data must be adequately described and users must have a convenient way to obtain these descriptions. Data Element Registries provide a way to organize the content and representation of data elements so that data descriptions are consistently specified and can be easily located by data designers and users. Uniform specification of data facilitates data retrieval, data exchange, and consistent use of data throughout the Software Development Life Cycle. The units of information with normalized meanings and formats are known as ‘standardized data elements.’” -- *ISO/IEC STANDARD 11179-1, Specification and Standardization of Data Elements.*

³ Entities described in the Entity Definition Table are those described in the FAA Data Architecture, Version 1.1, November 15, 2001.

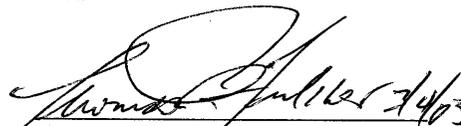
Product Schedule

- Register proposed data elements and specific valid values in the FAA Data Registry (FDR)
- Develop any other material required for the data standards approval process
- Register initial data elements in the FDR by April 15, 2003.
- Submit one or more sets of data standards for approval by April 31, 2002
- Approval by NIAC co-chairs and then the NAS CCB

Working Group Membership

NAME	ORGANIZATION
Joe Mooney	AVR/AAI
Rick Jordan	AIO-300
James Daum	ASD-110
Planned AFS representative	
Inviting an AVN representative	
Diana Young (FDR Administrator & Registrar)	AIO-300
Burt Parker (consultant)	AIO-300/Paladin

Approvals





Tom Fulcher, AIO-300 (Date) 3/4/03 Dick Powell, ATA-100 (Date) 3/4/03 Bennie Sanford, AUA-6 (Date) 3/11/03
 NIAC Co-Chair NIAC Co-Chair NIAC Co-Chair

Appendix

Figure 1 presents the usage of the **Phase of Flight** and **Aviation Occurrence Type** code set reference data in a sample aviation safety context (this is intended for the FDR data standardization Terms of Reference document).

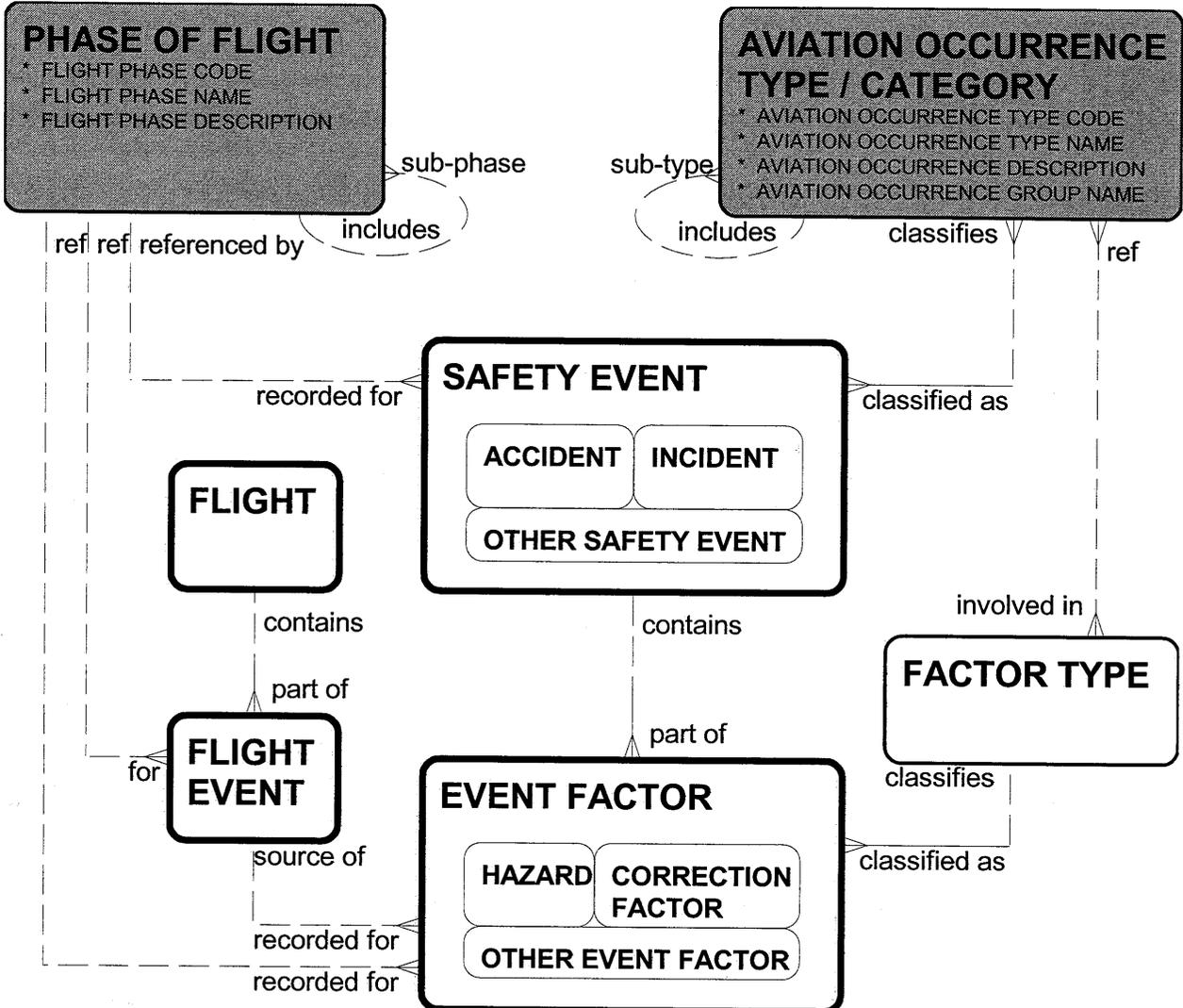


Figure 1: Data model of Phase of Flight and Aviation Occurrence Type in the context of other aviation data

Figure 1 high-level data model shows the **Phase of Flight** and **Aviation Occurrence Type** as data entities related to other aviation safety data entities. The relationship lines show that **Phase of Flight** and **Aviation Occurrence Type** are code sets (database lookup tables) that will migrate as reference data elements (i.e. relational foreign keys) to other aviation data entities such as Flight Event, Safety Event, Event Factor, and Factor Type. The same standard code sets may also be used in other than aviation safety domains.

The CAST/ICAO CICTT documents define the **Phase of Flight** and **Aviation Occurrence Type** standards with data attributes such as name, code and description. Figure 1 represents these entity attributes in user perspective.

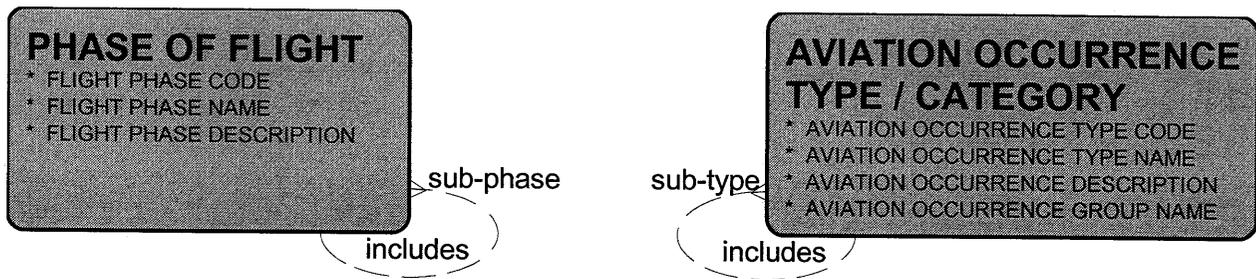


Figure 2: Code Set Reference Data Entities

Looking from the user perspective of data to be accessible from database lookup tables the above standards provide the following data attributes:

Phase of Flight

- Flight Phase Code
- Flight Phase Name
- Flight Phase Description

Aviation Occurrence Type

- Aviation Occurrence Type Code
- Aviation Occurrence Type Name
- Aviation Occurrence Type Description
- Aviation Occurrence Group Name

Additionally, both the **Phase of Flight** and **Aviation Occurrence Type** data standard entities may have a hierarchical structure with multiple sub-phases and sub-types accordingly that are represented in the data model by the recursive relationships:

- **Phase of Flight** “includes” zero-to-many **Phase of Flight** sub-phase records
- **Aviation Occurrence Type** “includes” zero-to-many **Aviation Occurrence Type** sub-type records

A user should be able look up and enter a phase or sub-phase of the **Phase of Flight** standard reference data and a type or sub-type of the **Aviation Occurrence Type** standard.

4. FAA Data Registry Constructs to Populate

In accordance to the approach defined in the ISO 11179 standard for the Data Element Metadata Repository, the FAA Data Registry needs to be populated with additional records for the following primary registry constructs:

- Data Element Concept
- Data Element
- Conceptual Domain
- Value Domain
- Permissible Value
- Value Meaning

The simplified structure of the registry constructs to be populated is shown in the Figure 3.

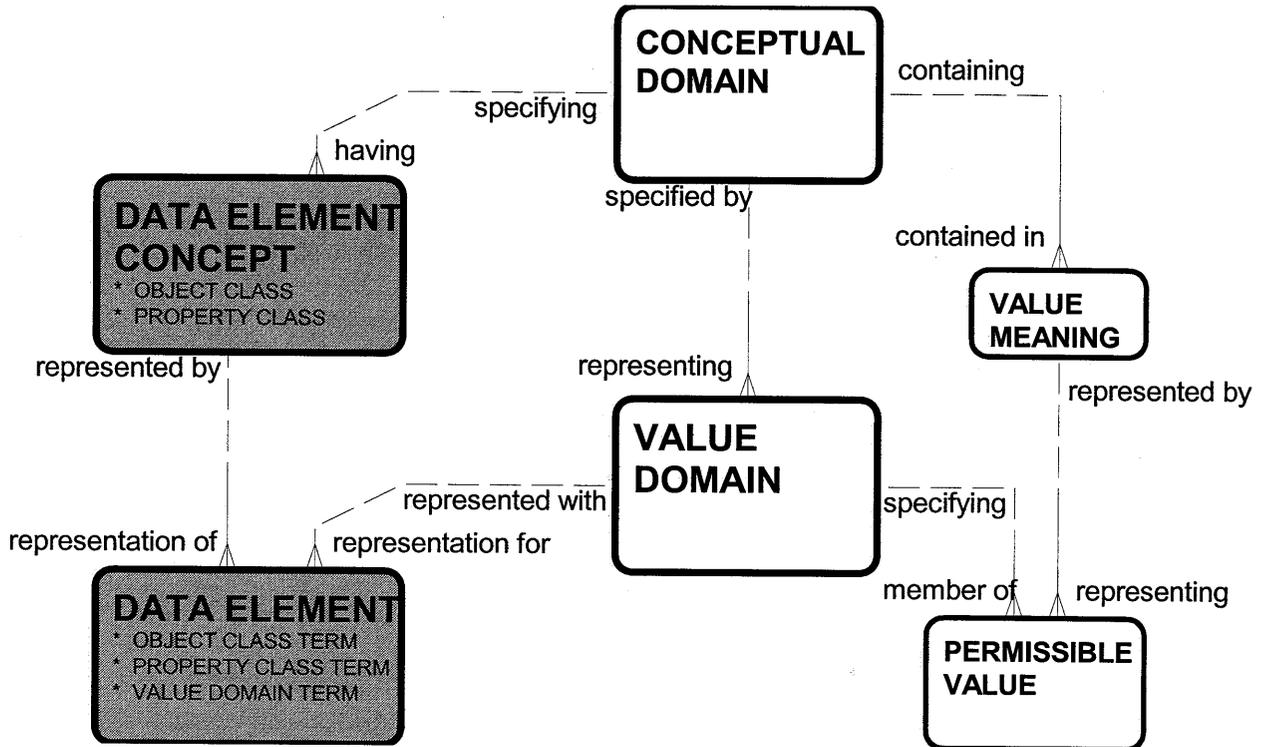


Figure 3: Simplified data structure of the FAA Data Registry constructs

The first main outcome of the submitted standard need to be populated FDR constructs of Data Element Concept and Data Element with the following metadata attributes:

- Object Class Term
- Property Class Term
- Value Domain Term

The second main outcome needs to be populated FDR constructs of Value Domains with Permissible Values consistent with the constructs of Conceptual Domain and Value Meaning.

Also other FDR records and fields not shown in the above figure need to be populated such as the following code value and support/administrative registry constructs:

- Administered Component
- Classification Scheme
- Data Element Relationship (and other relationship constructs)

The primary records to be populated in the above structure are specified in the rest of this document.

Data Element Concepts

	<u>Object Class</u>	<u>Property Class</u>
• Flight Phase	FLIGHT	PHASE
• Aviation Occurrence Type	AVIATION OCCURRENCE	TYPE
• Aviation Occurrence Group	AVIATION OCCURRENCE	GROUP

Data Elements

	<u>Full Data Element Name in FDR</u>
• Flight Phase Code	FLIGHT_PHASE_CODE
• Flight Phase Name	FLIGHT_PHASE_NAME

- Aviation Occurrence Type Code AVIATIONOCCURRENCE_TYPE_CODE
- Aviation Occurrence Type Name AVIATIONOCCURRENCE_TYPE_NAME
- Aviation Occurrence Group Name AVIATIONOCCURRENCE_GROUP_NAME

Conceptual Domains

- Flight Phases
- Aviation Occurrence Types
- Aviation Occurrence Groups

Value Domains

- Flight Phase Codes
- Flight Phase Names
- Aviation Occurrence Type Codes
- Aviation Occurrence Type Names
- Aviation Occurrence Group Names

Value Meanings

Populated value meanings as specified in the CAST/ICAO specification, such as for example:

<u>Conceptual Domain</u>	<u>Value Meaning</u>
Flight Phases	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phases	Aircraft is moving in the gate, ramp, or parking area, assisted by a tow vehicle [tug].
Aviation Occurrence Types	Any landing or takeoff involving abnormal runway or landing surface contact.
Aviation Occurrence Types	The intentional abrupt maneuvering of the aircraft by the flight crew.

Permissible Values

Populated permissible values as specified in the CAST/ICAO specification, such as for example:

<u>Value Domain</u>	<u>Permissible Value</u>	<u>Value Meaning</u>
Flight Phase Code	STD	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phase Name	Standing	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phase Name	Engine(s) Not Operating	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phase Name	Engine(s) Operating	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phase Name	Engine(s) Start-up	Prior to pushback or taxi, or after arrival, at the gate, ramp,

		or parking area, while aircraft is stationary.
Flight Phase Name	Engine(s) Shutdown	Prior to pushback or taxi, or after arrival, at the gate, ramp, or parking area, while aircraft is stationary.
Flight Phase Code	PBT	Aircraft is moving in the gate, ramp, or parking area, assisted by a tow vehicle [tug].
Flight Phase Name	Pushback/Towing	Aircraft is moving in the gate, ramp, or parking area, assisted by a tow vehicle [tug].

<u>Value Domain</u>	<u>Permissible Value</u>	<u>Value Meaning</u>
Aviation Occurrence Type Name	Abnormal Runway Contact	Any landing or takeoff involving abnormal runway or landing surface contact.
Aviation Occurrence Type Code	ARC	Any landing or takeoff involving abnormal runway or landing surface contact.
Aviation Occurrence Type Name	Abrupt Manoeuvre	The intentional abrupt maneuvering of the aircraft by the flight crew.
Aviation Occurrence Type Code	AMAN	The intentional abrupt maneuvering of the aircraft by the flight crew.