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Project:

DISC IMF Datasheet Project

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1 ABBREVIATIONS

Term	Explanation
CDD	Common Data Dictionary
DISC	Digitalization Industrialization Standardization Collaboration
DEXPI	Data Exchange in the Process Industry
ENUM	Enumeration
IEC	International Electrotechnical Commission
IMF	Information Management Framework
PCA	POSC Caesar Association
RDL	Reference Data Library
SFP	Snøhvit Future Project
SME	Subject Matter Expert
UoM	Unit of Measure
PFD	Process Flow Diagram
UFD	Utility Flow Diagram

2 REFERENCES

ID	Reference
[1]	Erlend Fjøsna, Torleif Saltvedt, Arild Waaler, Magnus Knædal, Vetle Koppergård, Lillian Hella, Martin Georg Skjæveland, Rustam Mehmandarov, Mihaly Fekete, Baifan Zhou. **The Information Modelling Framework Manual. Revision 2.1.1**
[2]	Cameron, D. B., Otten, W., Temmen, H., Tolksdorf, G.. **DEXPI Process Modelling of Process Systems and their Documentation. Version 1.**
[3]	DEXPI e.V.. **DEXPI P&ID Specification Version 1.4**
[4]	Alexander Kuznetsov, **DISC IMF The build and documentation of the Oracle database v1.1**

3 INTRODUCTION

DISC—a collaboration between Equinor, Aibel, Aker BP ASA, Aker Solutions and PCA (Posc Caesar Association) to foster a common digital language for Contractors and Operators.

Within the context of DISC and Equinor's SPINE project Draga is tasked with delivering IMF Type definitions to PCA and a documented process for this work. The initial IMF Types to be delivered are based on the datasheet requirements of the Snøhvit Future Project (SFP) and represent the building blocks of the digital datasheet requirements for handover. The scope of the project was then extended to cover additional datasheets based on the needs of the Ygdrasil project.

Making the datasheets digital will enable new ways of working and simplify workflows and data handover. It will also pave the way for new ways to display the data, quality assure the data, and report.

The datasheets can be regarded as "containers" of data which are filled as "snapshots" of the sender's data and can represents information from different aspects of the engineering element(s). The project resolves to capture, categorize and uniquely identify the data points within these "containers" using the IMF structures and definitions and standard reference library identifiers.

4 DOCUMENT SUMMARY

The objective of this project is to utilize the scoped datasheets as a foundation for defining basic IMF Types. When modeled together, these IMF Types represent the complete information requirements of the datasheets in a standardized digital format. Each defined IMF Type, along with valid RDL references for its attributes, is provided to and made available through PCA.

According to the Information Modeling Framework (IMF) Manual v2.1, an IMF Type serves as a library resource and starting point for creating Facility Asset Information Model objects. Types are defined within the scope of an IMF Aspect, representing distinct perspectives of a data artifact. When combined across various aspects and linked to their respective RDL references, IMF Types offer a comprehensive digital representation of the Facility Asset, enabling a new, standardized approach to transferring information about an industrial plant or its components.

The IMF Manual v2.1 further specifies that IMF Types can be constructed using elements such as blocks, related terminals, and connectors within a single aspect.

This document outlines the workflow and decision-making process employed by Draga to define these basic IMF Types. It describes how datasheets are systematically deconstructed into IMF Aspect blocks, terminals, and connectors. Additionally, the document addresses the challenges encountered during the conversion of datasheets to the IMF model and details the strategies Draga has implemented to resolve or manage these issues.

All work has been completed using standards and reference libraries relative to their content as of January 2024, except where specifically requested by the project.

For a summary of the key challenges and recommendations, refer to Appendix C: Project Findings / Recommendations

5 ENGINEERING DATASHEETS

The following table lists the JIP33 and NORSOK datasheets within the scope of this project.

Discipline	Equipment type	IOGP JIP33 datasheet	NORSOK datasheet
Instrument / Process	PRESSURE / DIFF. PRESSURE INSTRUMENT ELECTRIC	S-718	P01 / PR5
Instrument / Process	BLOCK/ACTURATOR (ON-OFF) VALVE (pneumatic, hydraulic, electrical)	S-707	V01 / PR1
Instrument / Process	TEMPERATURE INSTRUMENT ELECTRIC (Temperature instrument incl. thermowell and clamp-on)	S-718	T01/T02 / PR5
Instrument / Process	CONTROL/CHOKE VALVE	S-729	V02 / PR2
Instrument / Process	SAFETY / RELIEF VALVE (Pressure and Safety valve & Rupture disc)	S-730	V03/V05 / PR3/PR7
Instrument / Process	SOLENOID / PNEUMATIC / HYDRAULIC PILOT VALVE		V04 / NA
Instrument / Process	LEVEL INSTRUMENT ULTRASONIC / MICROWAVE	S-718	L02 / PR6
Instrument / Process	THERMOWELL	S-718	T01 / PR4
Mechanical / Process	Centrifugal pump	S-615	RDS-001
Electrical	Emergency generator		EDS-002
Instrument / Process	Ultrasonic flow meter	S-718	F02 / PR4
Instrument / Process	VARIABLE AREA FLOW METER	S-718	F04 / PR4
Instrument / Process	MASS FLOW METER	S-718	F05 / PR4
Instrument / Process	ORIFICE PLATES AND FLANGES	S-718	F07 / PR4
Instrument / Process	LEVEL GLASS/GAUGE	S-718	L05 / PR6
Electrical	LV Motor	S-703 / S-704	EDS-004
Instrument / Process	VENTURI FLOW ELEMENT	S-718	F08 / PR4
Instrument / Process	RUPTURE / BURSTING DISC	S-718	V05 / PR3
Instrument / Process	LEVEL INSTRUMENT MAGNETIC	S-718	L01 / PR6
Instrument / Process	LEVEL INSTRUMENT DISPLACER / FLOAT	S-718	L03 / PR6
Electrical	Power transformer	S-720	EDS-007
Mechanical / Process	Heat Exchanger	n/a	RDS-019
Instrument / Process	MAGNETIC FLOW METER	S-718	F03 / PR4
Instrument / Process	LEVEL INSTRUMENT NUCLEONIC	S-718	L07 / PR6
Instrument / Process	FIRE AND GAS DETECTOR	S-718	S01 / NA
Instrument / Process	LEVEL INSTRUMENT CAPACITIVE / CONDUCTIVE	S-718	L04 / PR6
Instrument / Process	PRESSURE / DIFF. PRESSURE INDICATOR	S-718	P02 / PR5
Instrument / Process	LEVEL SWITCH VIBRATING FORK	S-718	L06 / PR6
Instrument / Process	TEMPERATURE INDICATOR	S-718	T03 / PR5
~~Instrument / Process~~	~~MISCELLANEOUS INSTRUMENTS~~		~~X01 / NA~~

Instrument / Process	TURBINE AND POSITIVE DISPLACEMENT FLOW METER	S-718	F01 / PR4
Instrument / Process	AVERAGING PITOT TUBE	S-718	F06 / PR4
Instrument / Process	VORTEX FLOWMETER	S-718	F09 / PR4

Table 1: Datasheets in scope

Note: NORSOK datasheet X01 – MISCELLANEOUS INSTRUMENTS is no longer part of the scope. This datasheet does not refer to a specific type.

6 IMF Assignment Project Fundamentals

The following sections outline fundamental decisions made within the project during the early stages of the assignment work. These decisions helped provide structure to the work in progress, closed perceived gaps, and aligned IMF with existing standards such as the DEXPI Process.

6.1. IMF Aspects

The IMF Manual Version 2.1 defines four aspect definitions Function, Product, Installed and Location with the following definitions (Ref [1]):

- The *Function Aspect* (yellow) is to specify the intended activity, e.g., the information about activity, performance, and function about a pump.
- The *Product Aspect* (cyan) is to specify the intended solution of a set of physical artefacts to perform the activity, e.g., the information about the physical artefacts of the pump.
- The *Location Aspect* (magenta) is to specify the geometrical and positional information of the intended solution, e.g., the size and shape of the specified pump.
- The *Installed Aspect* (dark blue) is to describe information about the actual solution, e.g., the serial number, run hours, and status of an actual pump installed in a plant.

During the initial stages of the DISC IMF Datasheet project, it was identified that the predefined aspects did not allow for the separate capture of both the plant design value and the vendor's response to the requirement. This limitation meant that any digital representation or tool configuration of these attributes resulted in the vendor's response overwriting the original plant design value.
To address this challenge, a new aspect called **"Plant"** was introduced, with the following definitions to differentiate between the "Plant" and "Product" aspects:

- **Plant Aspect (green)**: Represents the intended plant design to support the desired activity. This includes information about the design of physical artifacts based on project-specific requirements and practices.
- **Product Aspect (cyan)**: Represents the intended solution for a set of physical artifacts to perform the activity and fulfil the plant design. This is the vendor-provided information about the physical artifacts, such as a pump.

The purpose of the new **Plant Aspect** is to ensure there is a clear placeholder for both the plant design value and the vendor's response. This approach captures, at any given time, both the as-designed requirements and the product's suitability to meet those requirements. It is envisioned that typical management of change functionality will be used to document changes and decisions, ensuring traceability and accuracy in capturing updates during the project design phase and as-building.

6.2. Use of Standard Classification Schemas and IMF Elements

From the initial work on the DISC IMF Datasheet project, Draga determined that IMF elements should be identified using a classification hierarchy system. This approach provided structure to the project, particularly in defining and understanding the scope of the IMF blocks.

While the IMF Manual Version 2.1 mentions support for classification schemas for IMF Types and provides some examples of classification type definitions, it does not include comprehensive guidance on classification hierarchies. Therefore, it was decided to adopt existing, recognized standards from the process industry, as well as from electrical, electronic, and information technologies where possible. Specifically, DEXPI (Process and Plant) and IEC were chosen as references, as both offer well-defined classification hierarchies that can generally serve as a foundation for block type definitions within the project.

As a rule, we use the DEXPI and IEC classification types as follows:

6.2.1. Aspect Blocks

- Function aspect blocks naming and general definition shall be selected from the list of Process Steps within the DEXPI Process Specification [2]
- Plant/Product/Installed aspect blocks naming and general definition shall be selected from:
    - IEC CDD for Instrumentation, Electric, Electronic & ElectricalMechanical Components (incl. control valve)
    - DEXPI standard conceptual model for taxonomy for Piping (inline elements ex. actuated/control valve) & Equipment (incl. motor) (Ref: [3])

** Block elements without direct alignment with IEC CDD or DEXPI taxonomy are grouped more generally based on the datasheet types.

No standardized classification system has been applied to the Location aspect as the project is not aware of any standards that can be used to provide type naming and definitions.

- The following Location aspect block definitions have been used to allow for collection of attributes:
    - Process Area: attributes defining the project area/location codes.
    - Safety-Related Area: logical area defining specific safety requirements relevant for a specified physical space.
    - Environment Condition Area: logical area defining environment condition requirements relevant for a specified physical space.

Refer to section Appendix A: Project Classification Definitions for the full list currently in use.

6.2.2. Aspect Connectors

The IMF Manual v2.1 does not provide comprehensive guidance on when or how connectors should be used. As a response to this, the project introduced a single Function Aspect connector, **“MaterialPort(Stream)_Connector,”** as a trial approach to align with the DEXPI Process Specification [2] for process connection types, in this case the DEXPI Process Flow Class ‘Stream’.

No IMF connectors were identified within the Plant, Product, or Installed aspects. However, it may be beneficial to use these IMF Types as containers for attributes directly related to the media, energy, or information being conveyed between elements. For further details, refer to **Error! Reference source not found.**.

6.2.3. Aspect Terminals

- Function aspect terminal naming and general definition shall be selected from the DEXPI Process Specification [2]Port types: Material Port, Information Port and Energy Port (Electrical Energy Port, Thermal Energy Port and Mechanical Energy Port)
- Plant/Product/Installed aspect terminals:

  Initially the terminals for the Plant/Product/Installed aspects where given a definition based on the functional terminals i.e. Information Port -> Information Transfer (Plant/Product aspect) / Information Connection (Installed Aspect). We then saw the need to use IMF Terminals in Plant/Product/Installed as a way of capturing the physical interface between elements and the flow of media/energy/information between them. This was particularly relevant when referring to cabled connections, given that they can be used to transfer energy and information. Consequently, we adopted the use of following terminal element definitions:

  - CableConnection
    - Includes electrical energy and information transfer connection interfaces.

      Please refer to: C.6 IMF Terminal Element for additional findings related to CableConnection terminal type.
  - MediaFlowConnection
    - Includes media flow transfer and connection interfaces for processing medium (direct or indirect) as well as auxiliary process mediums such as hydraulic fluid, cooling medium and instrument air.
  - MechanicalEnergyConnection
    - Includes mechanical energy transfer and connection interfaces.

6.2.4. IMF Attributes

The IMF Attributes created by this project are based on the ‘normalization’ of the attribute datasheet references (Ref: 7.1.8) and have no references towards a classification hierarchy. Rather attribute names were generally based on converting the labels shown on the datasheet uppercase and words were delimited with underscore allowing us to more easily sort and search. Names were then changed to aid in readability and/or provide a better connection to the underlying RDL reference names.

We have worked to ensure that all attributes have been given a relevant RDL reference whereby the reference together with context of the block or terminal (and terminal direction) that refer to it provides enough information on what information is required.

The aim was to use a single CFIHOS, PCA, and IEC CDD reference (in that order), along with any qualifiers as much as possible, and then resort to providing our own reference codes and descriptions where this was not possible.

E.g. Temperature Transmitter Housing Dimension

Normalized to 'HEIGHT', 'LENGTH', 'WIDTH' attributes

a) Associated with block 'Instrument Housing' (RDL: **http://staging3.data.posccaesar.org/rdl/RDS431099)**
b) Abstracted Semantic IDs are then:
   i. HEIGHT (RDL: 0112/2///61987#ABA574#007)
   ii. LENGTH (RDL: 0112/2///61987#ABA640#007)
   iii. WIDTH (RDL: 0112/2///61987#ABA573#007)
c) 'Instrument Housing' is then defined with a PartOf relationship to the 'Temperature Transmitter'

1: Example of normalization breakdown

With the over 6000 datasheet attribute references we were not always able to create IMF Attributes using the approach above. As a result, we made several decisions, documented below, that allowed us to manage these 'special' attributes.

Our work identified the following attribute 'types':

6.2.4.1 Case Types

These are attributes where the value to be entered depends on an engineering design scenario, such as process case or electrical load profile. For such attributes, it is necessary to identify the design parameter(s) used to determine the final value. For these attributes we have included a special attribute **CASE_DESCRIPTION**. This attribute captures the design scenario that shall be applied to the dependent attributes.

Examples of these attributes can be found within the Function aspect IMF Connector element, **MaterialPort(Stream)_Connector**, such as Temperature and Pressure. The IMF deliverable for this element includes the attribute **CASE_DESCRIPTION**, which aims to demonstrate that certain attributes within the element are linked to the named process case.

The concept of 'Case' can also be applied to the Plant block element **Rotational AC Motor**, where several attributes depend on the percentage of rated voltage or the percentage of load applied.

These are attributes where the value to be entered is dependent on the engineering design scenario such as with process cases and electrical load profiles. With such attributes we need a way of identifying the design parameter(s) used to provide the final value. It is suggested to use a new IMF element 'the design case/profile' that can be related to those attributes to provide the design basis for which they are relevant.

Examples of these are found within the Function aspect IMF Connector element MaterialPort(Stream)_Connector e.g. Temperature & Pressure

The IMF deliverable for this element includes the attribute 'CASE_DESCRIPTION' in an effort to demonstrate that some of the attributes within the element are linked to the named process case.

The concept of 'Case' could also be applied to the Plant block element 'Rotational AC Motor' where there are a number of attributes that are dependent on the % rated voltage or % load applied.

6.2.4.2 *UoM 'Independent' Reusable Attributes*

Within the Instrumentation discipline we found a number of attributes that addressed the same type of required value but would have a different UoM type depending on the type of instrument e.g. calibration range maximum is a common attribute that is found on many of the instrument datasheets and has a different UoM dependant on the type of instrument.

For these cases we chose not to create unique attributes for each UoM type as this could result in tens of different attributes. Rather we chose to create a separate attribute that could be 'linked' and used together with the base attribute to provide the UoM type requirement information.

Example: CALIBRATION_RANGE_MAXIMUM & CALIBRATION_RANGE_MINIMUM have a related UoM type attribute CALIBRATION_RANGE_UOM.

6.2.4.3 *Parent / Child RDL References*

There were many attributes where no single RDL reference could be found to describe the attribute, but where a combination of two RDL references used together could provide the correct definition.

In this case rather than creating a new Draga reference code and description we used the concept of a Parent and Child reference. From our work we can see that many of the Parent references can be discarded by instead creating a new IMF block to represent the parent and then assigning the attribute to the newly created block. This break-down to sub-blocks was not completed in the project as it would have resulted in many small IMF blocks with only 1-2 attributes.

Examples of Combined RDL Definitions

Centrifugal Pump: WEAR_RINGS_MATERIAL

Parent PCA RDL: WEAR RING —PCA RDL2

Child PCA RDL: MATERIAL OF CONSTRUCTION —PCA RDL2

Induction Motor: HEATING_TIME_CONSTANT

Parent PCA RDL: HEATING —PCA RDL2

Child PCA RDL: TIME CONSTANT —PCA RDL2

6.2.4.4 *Required / Count Type Attributes*

Many attributes from the datasheets were placeholders to identify the need for other items and the count of those items. This is an understandable part of a document centric process for gathering requirements for an engineering project However, with the use of modelling of the IMF types these attributes would not be required as it would be evident through the modelled relationships.

We were regardless required to manage these attributes and have used the Parent/Child reference functionality to identify these using the child reference REQUIREMENT or COUNT.

Examples:

AC Generator: VIBRATION_DETECTORS_COUNT

Parent PCA RDL: VIBRATION DETECTOR —PCA RDL2

Child PCD RDL: COUNT —PCA RDL2

AC Generator: VIBRATION_DETECTOR_REQUIRED

Parent PCA RDL: VIBRATION DETECTOR —PCA RDL2

Child PCD RDL: REQUIREMENT —PCA RDL2

6.2.4.5 Enumeration Type Attributes

Many attributes identified on the datasheets, particularly the JIP33 datasheets are specified along with a list of valid options. We found during our work that in many cases the list of options varied across the different datasheets for the same base attribute, or that there was overlap of list option across attributes. This was particularly prevalent with the location/environment type attributes.

Rather than try to identify and create IMF attributes for each combination of list options we worked to identify the 'meaning' of the attribute, what requirement it was addressing. We then found a RDL reference(s) that matched most closely the list of options. It would then be an expectation that as additional options were required that they could then be added to the referenced list.

In some cases it may also be necessary to introduce a related attribute that would indicate the standard being used to provide the option list as in the case of Hazardous classification systems.

6.2.4.6 Functional Class Attribute

Where we have broken down an engineering element into smaller reusable blocks, we found that it was necessary to introduce a special attribute 'FUNCTIONAL_CLASS' which would be used during modelling to provide additional information on the type or specific element function the block has been instantiated for.

Example:

In the case of the Dry Type Power Transformer we have collected the attributes regarding transformer windings into the Block 'Transformer Winding'. When we look at Transformers they must have at least 2 windings, a primary winding and a secondary winding. The FUNCTIONAL_CLASS attribute assigned to the Transformer Winding block would be used to identify whether the instantiated block was either Primary or Secondary.

6.2.5. Inheritance

The initial project concept involved leveraging classification hierarchies from established standards to enable attribute inheritance from generic types to more specialized types. For example, generic pump attributes would be assigned to the "Pump" type, which would then be inherited by the more specialized "Centrifugal Pump" type through a subtype relationship.

However, due to a lack of clear guidance on type classifications and the constraints of project timelines, this approach was not pursued further.

7 Digitalization Process

7.1. High-Level Workflow

The high-level workflow depicts the general process for the IMF digitalization of datasheets used within the DISC IMF Datasheet project. The focus of the process was on identifying the aspect blocks that described the activity to be fulfilled and the plant design and product element(s) that would fulfill the activity. This allowed the SMEs to focus on ensuring that both the normalization and identification of attributes, using reference data libraries, were contextualized within the definition of these pre-identified blocks. The pre-identification of blocks prior to normalization and the provision of RDL references was key to ensuring focus on the engineering objects being defined within the scope of the datasheet(s).

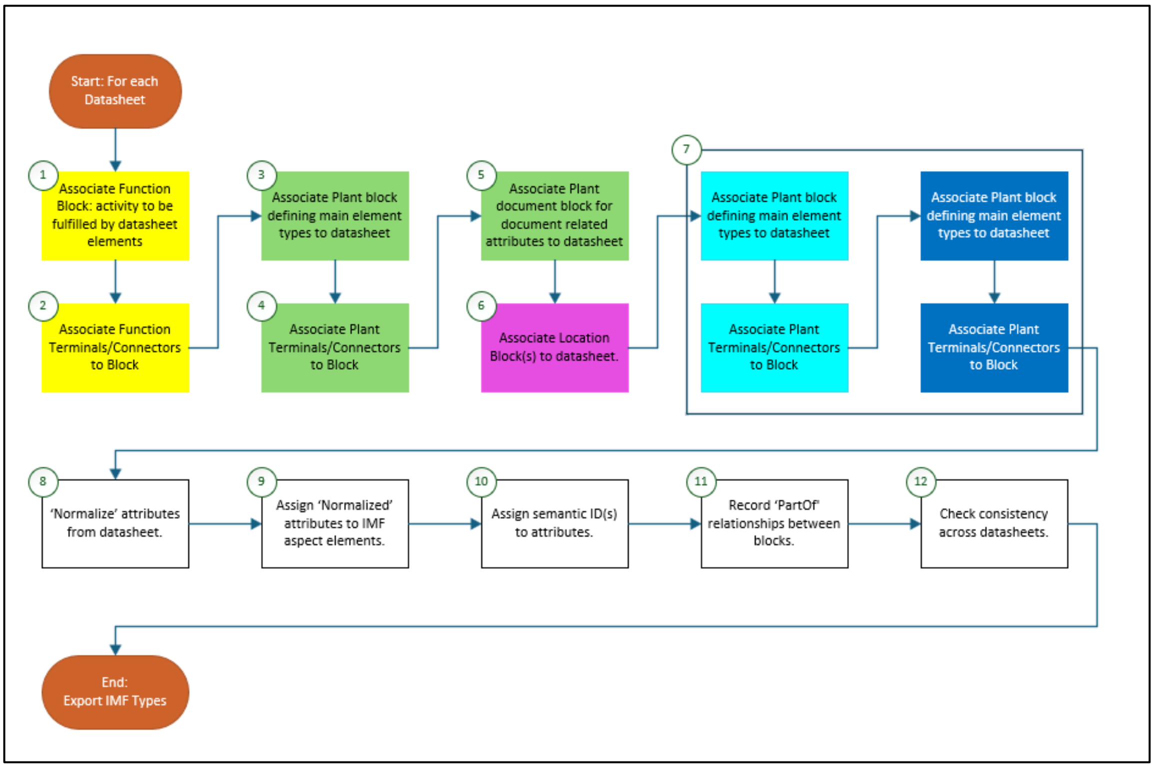


Figure 2: High level DISC IMF Datasheet project workflow.

The following sections describe the numbered steps in more detail.

Note: In the sections below, the term *Normalized attribute* refers to an attribute record in the database that had its own unique semantic ID(s). Each of these *Normalized attributes* had a consistent meaning across the blocks, terminals, or connectors to which it was assigned, within the context of the associated IMF element.

7.1.1. Step1

Referring to the DEXPI Process Specification [2], the Process Step that described the activity to be fulfilled by the datasheet was identified. The corresponding block with the same name was then located in the list of available blocks within the internal tool (Ref: Draga IMF Element Manager.) and associated with the datasheet. If the name did not exist in the list, it was added by the tool administrator. The administrator was also responsible for assigning an RDL reference to the block.

7.1.2. STEP2

Referring to the DEXPI Process Specification [2], the interface reference points (in/out)—whether material, energy, or information—that could be assigned to the activity being described and were supported or required by the datasheet element(s) were identified. The name of the DEXPI Process port type reference was then found within the list of terminal names for the functional aspect. The terminal was linked to the block from Step1 as the input and/or output of the block as required.

In this step, not only were the interface points (Terminals) defined, but also the IMF element that captured information about the 'state' of the exchange between blocks (Connectors). Again, referring to the DEXPI Process Specification [2], the Process Connector (which this project correlated with the concept of an IMF Connector) that best defined the exchange type out of the IMF Terminal was identified. The name of the Process Connector was located in the list of available IMF Connector types and associated with the appropriate terminal.

7.1.3. STEP3

The main engineering element(s) in the datasheet were identified. These were elements that are typically tagged or were main sub-components referenced in separate categories within the datasheet.

Cable, Pipe, or Auxiliary Line blocks were included where there was a need to capture specific details regarding the connected conduit.

It is important to note that, within this step, consideration was given to:

- Ensuring IMF block assignment consistency with previously completed datasheets
- Ensuring IMF block assignment consistency with all variants of the engineering element(s) defined in the database

Focus on consistency was particularly important when working with the instrumentation datasheets. The following table uses images from Krohne.com website to demonstrate some of the challenges with variants of just one type of flowmeter.

<table>
<tr><td colspan="3">Blocks used to describe an ultrasonic flow meter were defined to ensure that they could be modelled together to support:
• in-line and clamp-on types
• external and internal sensing elements (transducers)
  o sensing elements (transducers) with and without their own housing
  o sensing elements (transducers) with and without individual signal connections.</td></tr>
<tr><td>
Ultrasonic flowmeter (clamp-on)</td><td></td><td></td></tr>
</table>

	Ultrasonic flowmeter (external transducer housing)	Ultrasonic flowmeter (internal transducers)

3: Example showing Ultrasonic Flowmeter variants and some considerations taken when creating the blocks/terminals.

7.1.4. STEP4

The physical connection points for each of the blocks defined in Step3 were identified from the list of terminals provided by the project. The assigned terminals needed to support all variations of the engineering element (Refer to the example above).

The DISC IMF Project extended the use of Plant/Product/Installed terminals to include attributes related to the physical connection objects — e.g. flange/nozzle/cable gland. Using this approach we believe will allow for digital validation of interface requirements, such as matching flange facing type, material type, and cable gland connection type.

It was important to note that the terminals assigned to blocks in this step might or might not be relevant for all variants of the engineering element type.

7.1.5. STEP5

The Plant aspect 'Document' block was related to the datasheet to capture document-related attributes when required.

7.1.6. STEP6

The Location block elements relevant to the datasheet (Ref: Aspect Blocks) were identified and associated with the datasheet.

7.1.7. STEP7

Using the same names as defined in Step3, Product/Installed blocks were associated with the datasheet. Similarly, using the same names as defined in 3: Example showing Ultrasonic Flowmeter variants and some considerations taken when creating the blocks/terminals.

Step4, terminals were associated with the relevant Product and Installed blocks that were previously linked to the datasheet.

7.1.8. STEP8

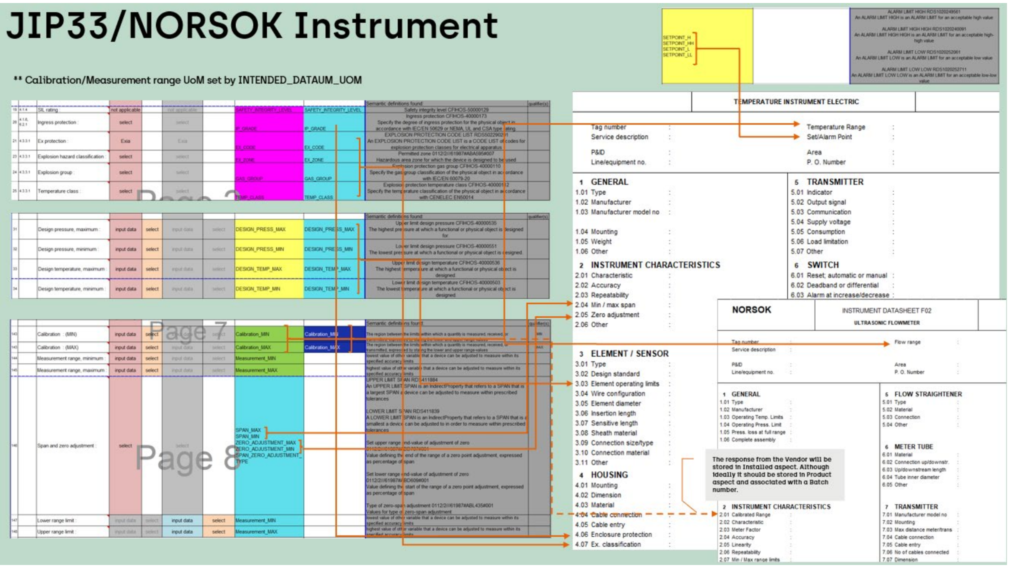
The attribute 'Normalization' step could be initiated before Step1 and was an iterative process.

During this step, the SME completed the following tasks:

1. Identified any datasheet attribute labels that referred to more than one value. These attribute label references were split into attribute rows in the database, where each row referred to a unique attribute value and was given a unique internal attribute reference.

2. Identified attribute references where the underlying meaning or information capture was the same across the IMF elements with which it would be associated. These attribute references were linked to the same internal normalized attribute record.

Additional supporting attributes were also added during this step as required (Ref: IMF Attributes).



4: Example of normalization across JIP33 and NORSOK datasheets demonstrating 'normalization' across datasheets.

7.1.9. STEP9

The Normalized attribute was associated with the IMF element using the following logic.

Note: an attribute could be assigned to elements within more than one aspect:

<u>Function Aspect:</u>

i. If the information is captured during process design typically as part of the PFD/UFD or is a plant level standard, then:

   a. If the attribute described the state of the flow transfer between functional blocks, it was associated with the Functional aspect connector linked to the datasheet, e.g., data originating from steady-state process simulation or heat and material balance.

   b. If the attribute defined a calculated value from one or more attributes associated with the connector element, typically values calculated or derived using rules from process cases, the attribute was assigned to the function aspect block associated with the datasheet.

<u>Plant Aspect:</u>

ii. If the attribute is captured during the plant design phase or subsequent communication with the vendor to update the plant design phase, then:

   a. If the attribute defined information required or provided by a connecting block, it was associated with the plant terminal for the relevant interface type.

   b. If the attribute defined information specific to the block type, it was associated with the plant block.

Additionally, any document attributes were assigned to the Plant aspect 'Document' block.

<u>Product Aspect:</u>

iii. If the information is given a response from the vendor, then:

   a. If the attribute defined information required or provided by a connecting block, it was associated with the product terminal for the relevant interface type.
   b. If the attribute defined information specific to the block type, it was associated with the product block.

Installed Aspect:

iv. If the information is defined (or set) during installation:
   a. If the attribute defined information specified at installation for the physical connection between connecting installed blocks, it was associated with the installed terminal for the relevant interface type.
   b. If the attribute defined information specific to the installed instance of the physical element, it was assigned to the installed block.

Location Aspect:

v. If the information is a requirement of the location (planned or actual) of the element:
   a. If the attribute related to safety requirements, it was associated with the Safety Relevant area location block.
   b. If the attribute related to environmental condition requirements, it was associated with the Environment Condition area location block.
   c. If the attribute did not relate to either safety or environmental condition requirements, it was associated with a Process area.

7.1.10. STEP10

All Normalized attributes were assigned a semantic ID from either CFIHOS, PCA, or IEC CDD (in that order).

The logic described below aimed to reduce the overall number of semantic ID references by using contextualizing block and/or parent semantic ID references. This approach reflects the methodology taken in IEC CDD.

The assignment of Semantic ID followed the logic:

1. If the normalized attribute meaning had a direct match with an existing RDL reference, the ID was assigned to the attribute.
2. If the normalized attribute meaning could be reconstructed from an existing RDL reference combined with the context provided by the IMF element it was assigned to, the ID was assigned to the attribute.
3. If the normalized attribute meaning could be reconstructed from an existing RDL reference combined with a ‘parent’ RDL reference and the context provided by the IMF element, both the ID and the ‘Parent’ ID were assigned to the attribute.

All reference matching was completed with the understanding that the meaning of the reference could be ‘extended’ by also assigning one or more of the IMF defined quantity datum types.

For attributes where no reference ID was found, an internal Draga ID was assigned. A list of Draga references is provided: Appendix B: Draga Semantic References.

7.1.11. Step11

PartOf relationships were created between blocks as required following the IMF Definition:

[part of] is a [hierarchical relation] and an [intra-aspect relation] that relates an [Element] E1 and an [Element] E2 to specify that E1 is part of E2, or equivalently that E2 has E1 as a part. [part of] is used to specify a breakdown hierarchy of [Element]s.

Example: A Dry Type Power Transformer has a **partOf** relationship with the Transformer Winding, as the winding is an internal part of the transformer.

7.1.12. Step12

Each Normalized attribute was checked before setting the export status. The checks included:

- Verifying the semantic ID against the IMF elements to which the attribute was assigned and ensuring the description provided by the RDL was relevant to each IMF element.
- Ensuring, where possible, that attributes defining requirements were met with a corresponding attribute giving a response from the vendor.
- Checking for relevant UoM (Unit of Measurement) between the datasheet attribute reference and the RDL reference.
- Reviewing enumeration list options between the datasheet attribute reference and the RDL reference.
- Collaborating with other discipline SMEs to ensure alignment.

7.2. Internal Tools

Draga developed several internal tools to aid in the development of IMF Types. Below is a description of the functionality provided by these tools.

7.2.1. Draga Reference Data Service

The ‘Reference Data Service’ tool was key to the task of finding and assigning Semantic IDs to the normalized attributes. This tool imported the January 2024 references from IEC CDD, PCA environments, CFIHOS, and selected 15926 lists into an internal database. The user interface allowed users to search using a fuzzy matching technique within the library lists to find a valid reference ID.

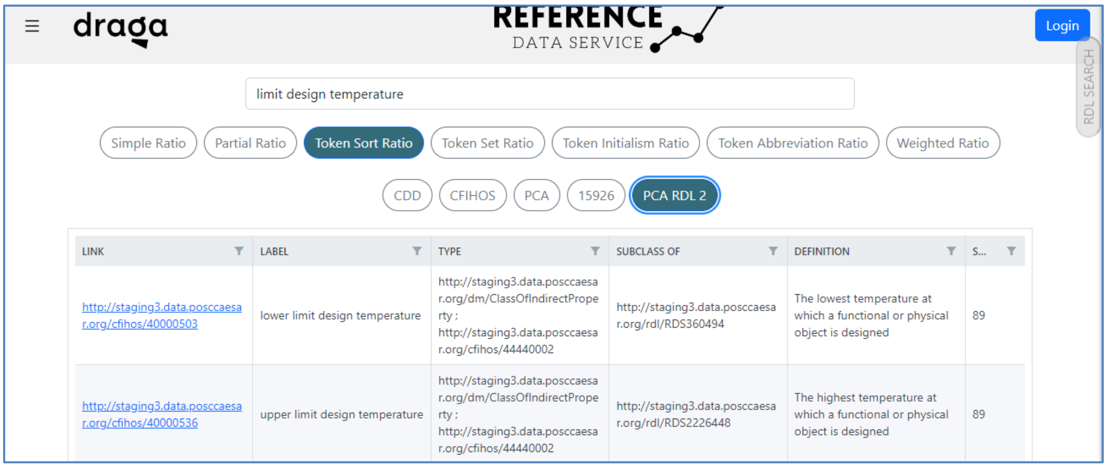


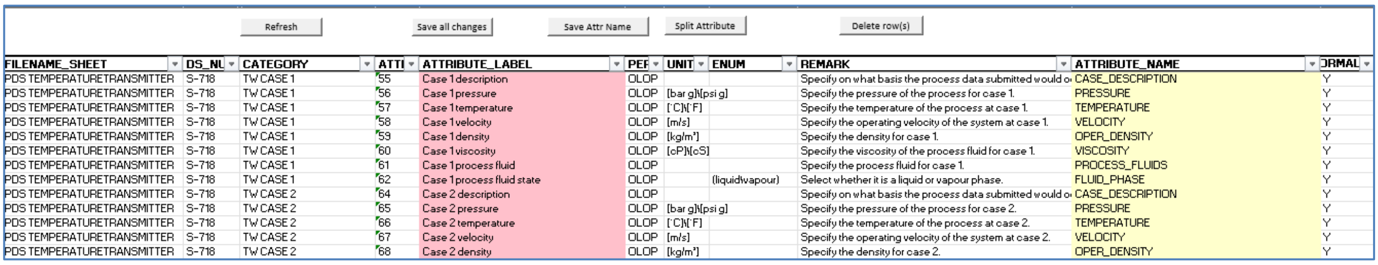
Figure 5: Fuzzy matching interface

7.2.2. Draga Macro Scraping

Draga developed several Excel macro-based scraping utilities to help extract information from the project-specified datasheets into the project database. These utilities captured details such as the sheet, heading, attribute number, label, etc., into the database, saving time and reducing quality issues related to manual reentry of attribute label details.

7.2.3. Draga IMF Normalizer

The IMF Normalizer, based on an Oracle database with an Excel front-end, provided a list of the datasheet attributes captured using the Draga Macro Scraping tool. The tool provided search functionality and allowed users to search and modify the list records and split records where the datasheet reference referred to more than one value. This tool was used to 'Normalize' the attributes across different datasheets and within a single datasheet



Refresh   Save all changes   Save Attr Name   Split Attribute   Delete row(s)

FILENAME_SHEET	DS_NU	CATEGORY	ATTI	ATTRIBUTE_LABEL	PEF	UNIT	ENUM	REMARK	ATTRIBUTE_NAME	ORMAL
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	55	Case 1 description	OLOP			Specify on what basis the process data submitted would o	CASE_DESCRIPTION	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	56	Case 1 pressure	OLOP	[bar g]\[psi g]		Specify the pressure of the process for case 1.	PRESSURE	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	57	Case 1 temperature	OLOP	[°C]\[°F]		Specify the temperature of the process at case 1.	TEMPERATURE	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	58	Case 1 velocity	OLOP	[m/s]		Specify the operating velocity of the system at case 1.	VELOCITY	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	59	Case 1 density	OLOP	[kg/m^3]		Specify the density for case 1.	OPER_DENSITY	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	60	Case 1 viscosity	OLOP	[cP]\[cS]		Specify the viscosity of the process fluid for case 1.	VISCOSITY	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	61	Case 1 process fluid	OLOP			Specify the process fluid for case 1.	PROCESS_FLUIDS	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 1	62	Case 1 process fluid state	OLOP		(liquid\vapour)	Select whether it is a liquid or vapour phase.	FLUID_PHASE	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 2	64	Case 2 description	OLOP			Specify on what basis the process data submitted would o	CASE_DESCRIPTION	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 2	65	Case 2 pressure	OLOP	[bar g]\[psi g]		Specify the pressure of the process for case 2.	PRESSURE	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 2	66	Case 2 temperature	OLOP	[°C]\[°F]		Specify the temperature of the process at case 2.	TEMPERATURE	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 2	67	Case 2 velocity	OLOP	[m/s]		Specify the operating velocity of the system at case 2.	VELOCITY	Y
PDS TEMPERATURETRANSMITTER	S-718	TW CASE 2	68	Case 2 density	OLOP	[kg/m^3]		Specify the density for case 2.	OPER_DENSITY	Y

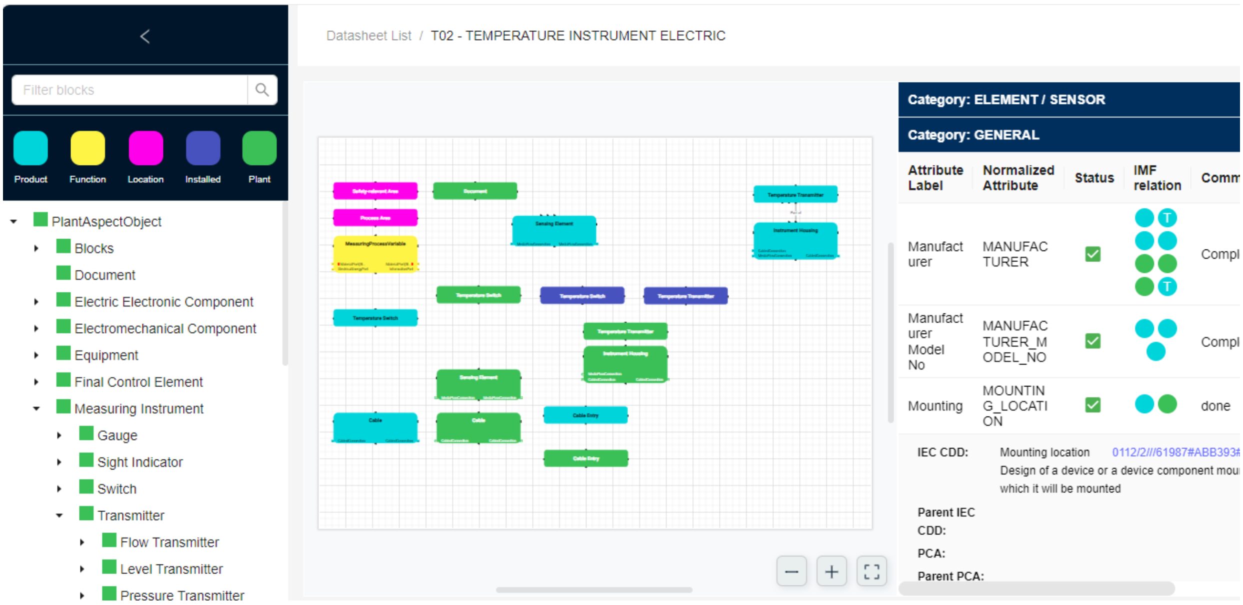
6: Interface of the Draga IMF Normalizer tool.

The database build document is provided Ref: [4]

7.2.4. Draga IMF Element Manager.

The IMF Element Management tool was developed to provide a user friend method for managing the complex nature of identifying IMF blocks and terminal/connectors to support the datasheet definitions and to allocate attributes to these IMF elements. Providing functionality to:

- Link the relevant IMF Blocks elements to a datasheet so that the user could only assign normalized attributes from the datasheet to those blocks and related terminals. Additionally, any pre-assigned block attributes were automatically made available within the attribute list.
- Assign RDL references to the Normalized attributes
- Assign qualifier references to the Normalized attributes
- Make simple 'test' models to help visualize possible connections between elements.



7: Screenshot of the Draga IMF Element Manager.

The database build document is provided Ref: [4]

Appendix A: Project Classification Definitions

The following class definitions for the IMF Blocks are used in the project. These classes are based on the IEC CDD, DEXPI Process and DEXPI definitions. RDL references for the final leaf class element type are provided where an appropriate match was found.

Aspect	Classification Hierarchy Path
Location	Environment Condition Area
Location	Process Area
Location	Safety-relevant Area
Function	Connector|MaterialPort(Stream)_Connector
Function	InstrumentationObject|InstrumentationActivity|MeasuringProcessVariable
Function	ProcessObject|ProcessStep|ExchangingThermalEnergy
Function	ProcessObject|ProcessStep|GeneratingFlow|Pumping
Function	ProcessObject|ProcessStep|SteeringFlow
Function	ProcessObject|ProcessStep|SupplyingElectricalEnergy
Function	ProcessObject|ProcessStep|SupplyingMechanicalEnergy
Plant/Product/Installed	Blocks|Cabinet
Plant/Product/Installed	Blocks|Cable Entry
Plant/Product/Installed	Blocks|Instrument Related|Control Panel
Plant/Product/Installed	Blocks|Instrument Related|Diaphragm Seal
Plant/Product/Installed	Blocks|Instrument Related|Displacer/Float
Plant/Product/Installed	Blocks|Instrument Related|Flow Straightener
Plant/Product/Installed	Blocks|Instrument Related|Instrument Housing
Plant/Product/Installed	Blocks|Instrument Related|Manifold
Plant/Product/Installed	Blocks|Instrument Related|Nuclear Source
Plant/Product/Installed	Blocks|Instrument Related|Transducer
Plant/Product/Installed	Blocks|Main Equipment Related|Cooling Fan
Plant/Product/Installed	Blocks|Main Equipment Related|Heat Exchanger Related|Heat Exchanger Front-end Head
Plant/Product/Installed	Blocks|Main Equipment Related|Heat Exchanger Related|Heat Exchanger Rear-end Head
Plant/Product/Installed	Blocks|Main Equipment Related|Heat Exchanger Related|Heat Exchanger Shell
Plant/Product/Installed	Blocks|Main Equipment Related|Heat Exchanger Related|Heat Exchanger Tubes
Plant/Product/Installed	Blocks|Main Equipment Related|Heat Exchanger Related|Shell Expansion Joint
Plant/Product/Installed	Blocks|Main Equipment Related|Pump Related|Impeller
Plant/Product/Installed	Blocks|Main Equipment Related|Pump Related|Line Shaft
Plant/Product/Installed	Blocks|Main Equipment Related|Pump Related|Pump Casing
Plant/Product/Installed	Blocks|Main Equipment Related|Pump Related|Pump Seal
Plant/Product/Installed	Blocks|Main Equipment Related|Shaft
Plant/Product/Installed	Blocks|Main Equipment Related|Transformer Related|Cable Box
Plant/Product/Installed	Blocks|Main Equipment Related|Transformer Related|Termination Point
Plant/Product/Installed	Blocks|Main Equipment Related|Transformer Related|Transformer Winding
Plant/Product/Installed	Blocks|Valve/Actuator Related|Accumulator
Plant/Product/Installed	Blocks|Valve/Actuator Related|Air Receiver
Plant/Product/Installed	Blocks|Valve/Actuator Related|Valve Body
Plant/Product/Installed	Document
Plant/Product/Installed	Electric Electronic Component|Automatic Voltage Regulator
Plant/Product/Installed	Electric Electronic Component|Conductor|Insulated Conductor|Cable
Plant/Product/Installed	Electric Electronic Component|Exciter
Plant/Product/Installed	Electric Electronic Component|Neutral Earthing Resistor
Plant/Product/Installed	Electric Electronic Component|Power Transformer|Dry Type Power Transformer
Plant/Product/Installed	Electric Electronic Component|Power Transformer|Liquid Immersed Power Transformer
Plant/Product/Installed	Electric Electronic Component|Reactor
Plant/Product/Installed	Electric Electronic Component|Tap Changer (Incl. OLTC)
Plant/Product/Installed	Electric Electronic Component|Variable Speed Drive Converter
Plant/Product/Installed	Electromechanical Component|Generator|AC Generator
Plant/Product/Installed	Electromechanical Component|Motor|Rotational Motor|Rotational AC Motor
Plant/Product/Installed	Electromechanical Component|Terminal Box
Plant/Product/Installed	Equipment|Heat Exchanger|Air Cooled Heat Exchanger

Plant/Product/Installed	Equipment|Heat Exchanger|Tubular Heat Exchanger
Plant/Product/Installed	Equipment|Heater (Incl. Space Heater, Anti-Condensation Heater)
Plant/Product/Installed	Equipment|Pump|Centrifugal Pump
Plant/Product/Installed	Equipment|Pump|Pump Driver
Plant/Product/Installed	Equipment|Turbine
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Actuator|Electrical Actuator
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Actuator|Hydraulic/Pneumatic Actuator
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Automated On/Off Valve
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Control Valve
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Flow Modification Accessory|Restriction Orifice
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Filter/Filter Regulator
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Hydraulic/Pneumatic Pilot Valve
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Limit Switch
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Position Transmitter
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Positioner
Plant/Product/Installed	Final Control Element|Control Valve Or Automated On/Off Valve|Valve Actuator Accessory|Solenoid Valve
Plant/Product/Installed	Measuring Instrument Component|Fitting|Thermowell
Plant/Product/Installed	Measuring Instrument Component|Sensing Element
Plant/Product/Installed	Measuring Instrument|Gauge|Level Gauge
Plant/Product/Installed	Measuring Instrument|Gauge|Pressure Gauge|Differential Pressure Gauge
Plant/Product/Installed	Measuring Instrument|Gauge|Pressure Gauge|Gauge Pressure Gauge
Plant/Product/Installed	Measuring Instrument|Gauge|Temperature Gauge
Plant/Product/Installed	Measuring Instrument|Sight Indicator|Level Sight Indicator
Plant/Product/Installed	Measuring Instrument|Switch|Flow Switch|Variable Area Flow Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Displacer Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Electrical-based Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Float Level Switch|Magnetic Float Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Nuclear Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Vibrating Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Level Switch|Wave Level Switch
Plant/Product/Installed	Measuring Instrument|Switch|Pressure Switch|Differential Pressure Switch
Plant/Product/Installed	Measuring Instrument|Switch|Pressure Switch|Gauge Pressure Switch
Plant/Product/Installed	Measuring Instrument|Switch|Temperature Switch
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Averaging Pitot Tube Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Electromagnetic Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Mass Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Pressure-type Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Turbine and Positive Displacement Flowmeter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Ultrasonic Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Flow Transmitter|Vortex Flow Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Displacer Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Electrical-based Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Float Level Transmitter|Magnet Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Hydrostatic pressure Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Nuclear Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Level Transmitter|Wave Level Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Pressure Transmitter|Differential Pressure Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Pressure Transmitter|Gauge_Absolute Pressure Transmitter
Plant/Product/Installed	Measuring Instrument|Transmitter|Temperature Transmitter
Plant/Product/Installed	PipingNetworkSystem|PipingNetworkSegment|Supplementary Line
Plant/Product/Installed	PipingNetworkSystem|PipingNetworkSegment|Pipe
Plant/Product/Installed	PipingNetworkSystem|PipingNetworkSegment|PipingComponent|Inline Primary Element
Plant/Product/Installed	PipingNetworkSystem|PipingNetworkSegment|PipingComponent|SafetyValveOrFitting
Plant/Product/Installed	Process Analyser|Fire And Gas Detection Assembly
Plant/Product/Installed	Process Analyser|Fire And Gas Detector|Flame Detector Component
Plant/Product/Installed	Process Analyser|Fire And Gas Detector|Gas Detector Component
Plant/Product/Installed	Process Analyser|Fire And Gas Detector|Heat Detector Component
Plant/Product/Installed	Process Analyser|Fire And Gas Detector|Smoke Detector Component

APPENDIX B: DRAGA SEMANTIC REFERENCES

The attached file contains a list of Draga references used in the project.

DragaReferences.csv

Appendix C: Project Findings / Recommendations

C.1 Plant Aspect

Recommend introducing Plant aspect into the IMF Manual specifically to accommodate attributes that will be provided during plant design and will also serve as a response from the vendor.

A concrete example is Suction Pressure Maximum (normalized to OPER_PRESS_MAX). This attribute will be provided during process design as part of the Functional requirements, it can then be adjusted during Plant design to account for placement of the pump (elevation). The vendor will then respond with this value as part of the manufacturer data of the pump.

C.2 Location Aspect

Recommend a discussion on use of the Location aspect. Within the project Location is mainly used to provide containers for attributes linked to logical locations with basic grouping towards environment and safety. Ideally the Location (or similar) should be used to provide validate rules for the specific placement of elements.

C.3 Design Case/Scenario

Referring to IMF Attributes: Case Types it is recommended that IMF provide an element capable of grouping or linking to a group of attributes that provide responses to as an example, an engineering steady-state process simulation, heat and material balance calculations or electrical load scenario.

C.4 UoM Reference

Recommend a discussion on how/if to manage generic attributes where the UoM type will change depending on the engineering element type. Ref: Referring to IMF Attributes: UoM 'Independent' Reusable Attributes.

C.5 IMF Connector Element

Recommend IMF to provide an improved definition of IMF Connector element.

PCA must also be updated to provide support for this IMF element type.

C.6 IMF Terminal Element

Recommend IMF to provide an improved definition of IMF Connector element within the IMF aspects.

Recommend a discussion on how to manage physical interface attributes which will need to be aligned between connecting blocks e.g. flange facing type, cable gland connection ends, shaft rotation. This project has assigned these types to the **Terminal**, however, the current definition does not seem to support this.

Suggested discussion points:

- Management of Nozzles/Flanges
- Possible use of **partOf** reference for **CableConnection** by introducing **InformationFlowConnection** and **ElectricalEnergyFlowConnection** as child types.
- How to identify when a **partOf** (child block terminal shall be used or 'collected up' to the complex type)

- Suggest that when associating a terminal to a block to create an IMF Type that no direction should be assigned as this may not be known before the type has been instantiated.
- Modelling with Terminals and how to identify/manage terminals that shall be used / unused within an IMF Complex type.

C.7 IMF Type Hierarchy

Recommend a discussion to decide on a clearly defined classification system for the creation of block, terminal and connector types to ensure common understanding of the identity of the IMF element.

- Can be extended to provide inheritance of attributes

C.8 IMF Complex Type Creation

The DISC IMF Project scope provided a list of IMF Elements with basic connectivity between elements.

Draga recommends a continuation of the work with IMF to identify and create IMF Complex Types for reuse in IMF modelling.

C.9 IMF Quantifiers

Recommend discussing extending the grouping, types and values available within the IMF datum quantifiers.

Example: upper/lower, internal/external

C.10 Enumerators

Recommend to create a project to work with enumeration value list standardization and mapping.
Recommend extending IMF to enable enumeration lists to be associated with attributes and perhaps also link these list to project requirements to enable filtered list values. A major challenge in the project was management of Environmental codes that provide details on physical environment of the placement of the engineering element e.g. outside/inside, shaded, dust, offshore, under roof, coastal etc..

C.11 Document and Project Specific Attributes

Recommend a discussion to decide how/if to manage document and project specific attributes that play no role in requirement specification.

C.12 External Reference Libraries

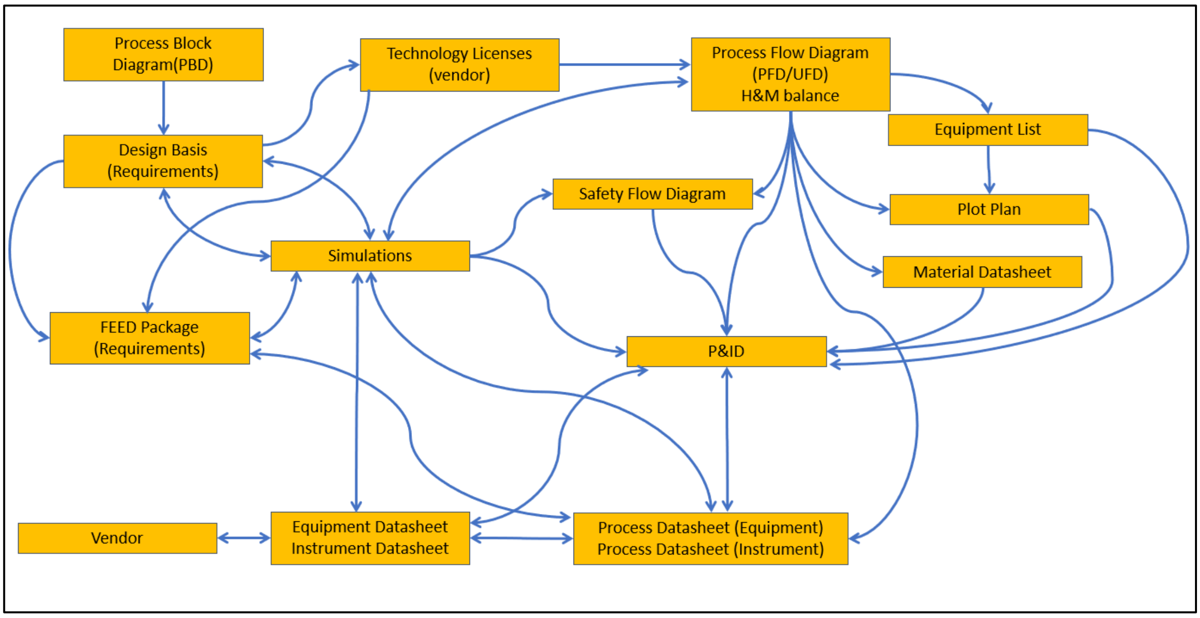
Recommend a discussion linked to overcoming challenges with external reference libraries used for referencing:

- Inconsistent methods for classifying attributes.
- Alignment of RDL references
- Management of RDL reference updates where no notification is given from the external reference group.

C.13 Specifications / Simulation/ Calculation References

Recommend a discussion on how to incorporate the various specifications, design basis, simulations etc that will be used to provide project process and safety requirements.

- Safety Integrity Level (SIL)
- Piping Class Sheets
- Valve Datasheets
- Design Basis
- Simulations
- Ex coding



8: Example showing the complex nature of building project requirements, indicating possibilities for digital validation improvements.

C.14 Notes, Remarks, Other & Characteristics

Recommend a discussion on how to manage/capture information/requirements that are added into Notes, Remarks .. fields.

C.15 Attribute Parent/Child RDL Reference Support

Recommend a discussion on possibility of adding a ‘context/grouping’ predicate possibility when defining IMF Attributes. Ref: Parent / Child RDL References

C.16 Standardized Naming of IMF Attributes

Recommend a discussion on standardized method for naming IMF attributes which will supports end user sorting and filtering requirements.

C.17 Relationship Types

Recommend a discussion to determine need for other IMF relationship types and how these can be used to support digital validation of data.

‘Cable entries’ provide an simple example of this challenge of relating one or many cables (identified by terminals) to a single cable entry point (hole within the housing / body of an object to allow the cables to access connection points within the engineering element.

Another main challenge is the management of linking requirements and response across aspects.

C.18 PCA IMF Element ‘Clean-Up’

Recommend ‘clean-up’ of delivered elements based on results of IMF discussions. This may involve creation of new elements, change of terminal/attribute association and semantic reference.

C.19 Additional Datasheet Conversion

The DISC IMF Project scope provided a list of many datasheets as the basis for new IMF Types. The majority of these datasheet were related to instrumentation process measurement and control.

Draga recommends continuing the work with IMF conversion to include additional datasheets:

JIP33/ NORSOK	Datasheet	Equipment Type	Draga Comment
JIP33 NORSOK	S-710D RDS-021	Air-cooled Heat Exchanger	Provides attributes relating the functional requirements for function of Exchanging Thermal Energy which supports the ‘Shell and Tube Heat Exchanger’ datasheet work.
NORSOK	S-xxx	Safety items: Safety Station/Cabinet, Liferaft, Safety Fire Valves	Enable project to check and automatically validate safety requirements.
NORSOK	EDS-013	Electric Process Heater	Referenced by elements in the current datasheet scope
NORSOK	RDS-002	Rotary Pump	This is a good test case to use with inheritance within a classification structure together with the already completed RDS-001.
NORSOK	RDS-005	Centrifugal Compressor	Expect that this is used in the project.
NORSOK	RDS-017	Pressure Vessel	A good candidate to use along with DEXPI based digitalization.
NORSOK	RDS-018	Shell and Tube Heat Exchanger (Standard Type)	RDS-019 Shell and Tube Heat Exchanger has been converted to IMF elements, however, RDS-018 is the datasheet that is normally used in projects.

NORSOK	RDS-027	Filter	Referenced by elements in the current datasheet scope
NORSOK	EDS-001	Uninterruptible Power System	Expect that this is used in the project.
NORSOK	EDS-011	Reactor	Referenced by elements in the current datasheet scope
NORSOK	EDS-003	High Voltage Switchboard	Expect that this is used in the project.