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Last updated: 11 August 2022

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Getting Started with openBIM

Holger de Groot
Director | Modmation Pty Ltd

Xchange 2025
Sydney | 25-26 June

Acknowledgment of Country

I would like to acknowledge the traditional owners of the different lands we work on today. I would also like to pay respect to the Elders both past and present, acknowledging them as the traditional custodians of knowledge for this land.

Your Speaker Today

2001 JANSSEN-BAU Planen & Bauen
2003 Fachhochschule Hannover University of Applied Sciences and Arts
2006 MSM Architects
2007 THE UNIVERSITY OF AUCKLAND Te Whare Wānanga o Tāmaki Makaurau NEW ZEALAND
2010 TMK HDR
2015 GRIMSHAW
2017 RICE DAUBNEY HDR
2020 MODMATION

Holger de Groot

https://www.linkedin.com/in/holger-de-groot/

Holger de Groot is the Vice Chairperson at buildingSMART Australasia and the CEO and Founding Director of Modmation. As a certified BIM Manager, he has accrued invaluable experience in (building) information management and digital project delivery in Australasia and Europe.

Sign up today for a 10% discount!

#Xchange10

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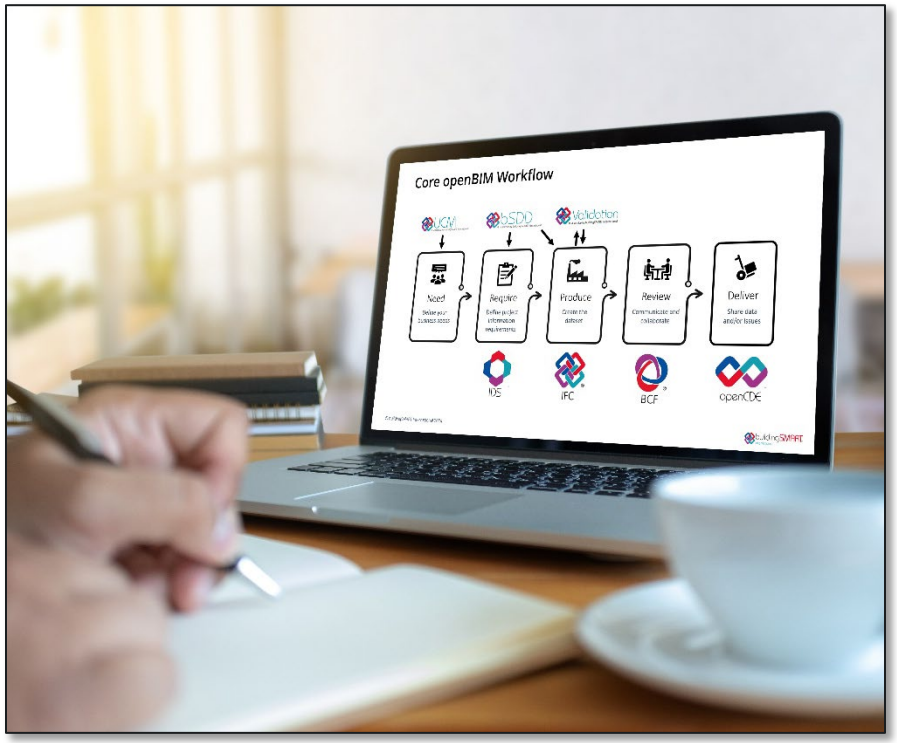
Professional Certification – Foundation

Getting Started with openBIM



By the end of this session, you will have learned:

1. What is openBIM?

2. Exchange Requirements:
   Know what UCM, IDM and MVD are and their benefits.

3. Creating and Validating Information:
   Know what IFC and BCF are and their benefits.

4. Information Requirements:
   Know what bSDD, IDS and openCDE are and their benefits.

What is openBIM?

One of the biggest challenges in the AEC industry comes from different **teams working in silos** and a **lack of technology interoperability**.

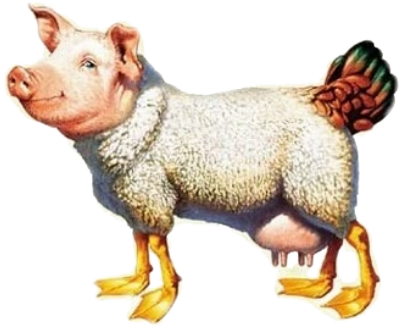
openBIM extends the benefits of BIM by **improving the accessibility, usability, management and sustainability of digital data**.

The benefits of openBIM include the **ability to use multiple software solutions** and have access to data for the whole life cycle of a built asset.

At its core, **openBIM is a collaborative process** that is vendor-neutral, also known as software-neutral, by using open standards.

openBIM®

≠



“Egg-Laying Wool-Milk-Pig”
(Eierlegende Wollmilchsau)

German mystical creature laying eggs, providing wool, giving milk and delivering ham.

Source: https://warriorsofmyth.fandom.com/

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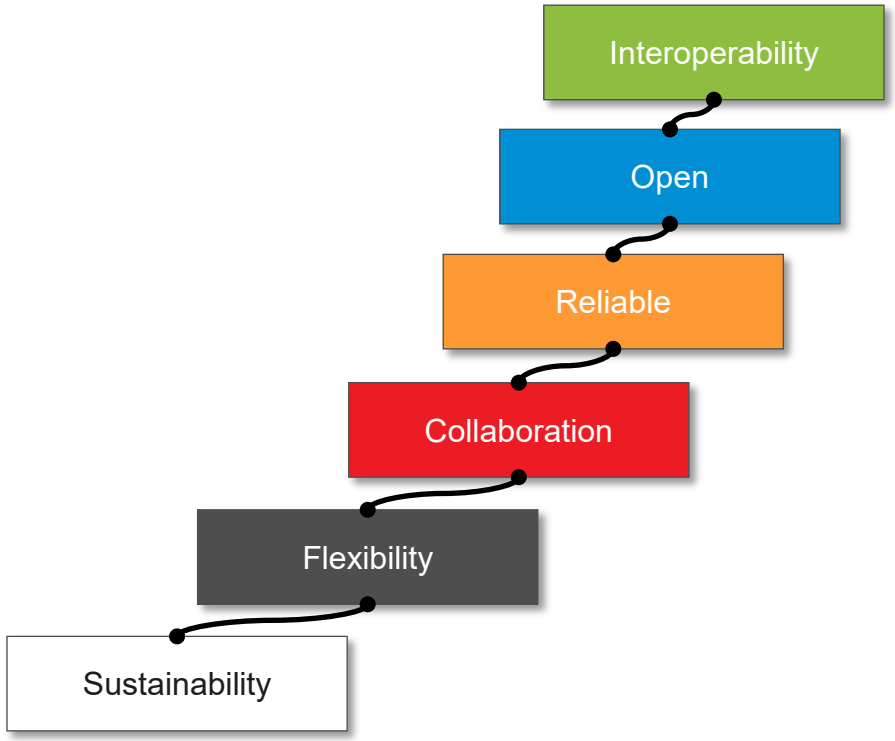
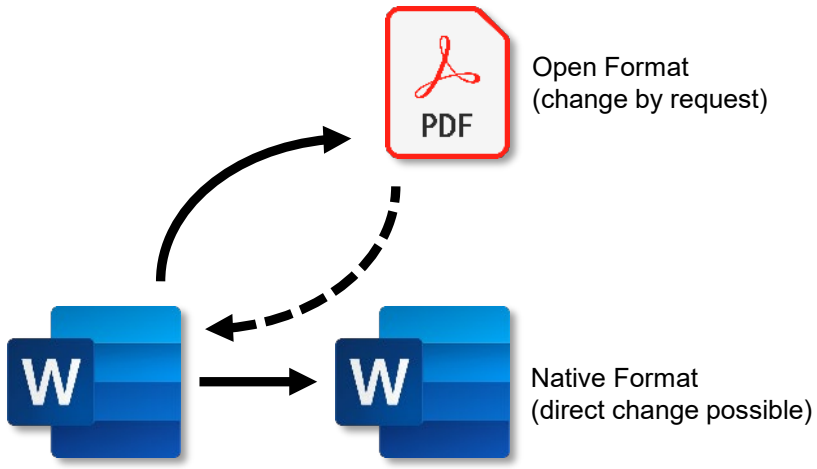
Principles of openBIM



- In the built asset industry, **interoperability** is key to digital transformation.
- Based on **open** standards and workflows to facilitate interoperability.
- Exchanges of **reliable** data depend on independent quality benchmarks.
- Open and agile data formats enhancing **collaboration** workflows.
- The **flexibility** of exchanging information from one software to another.
- Interoperable standards provide **sustainability** for long-term data strategy.

Open Format vs Native Format



Source: Based upon a chart by Thomas Liebich (AEC3 Deutschland GmbH)

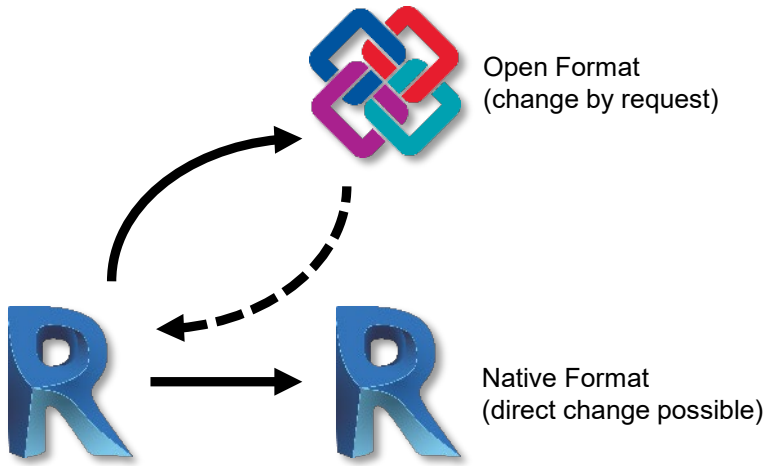
Creating and sharing information models can be compared to **writing and publishing a document**.

You may create the document in MS Word, Apple Pages or any other tool but you publish the report as a PDF, which is an **open format**.

This way **anyone can view** and print the document in the same format **without having the software it was created in**.

If changes are desired, reviewers give their feedback to you, who will then make the changes in MS Word, the **native format** and republish the PDF.

Open Exchange vs Closed Exchange



Source: The BIM Manager (2019)

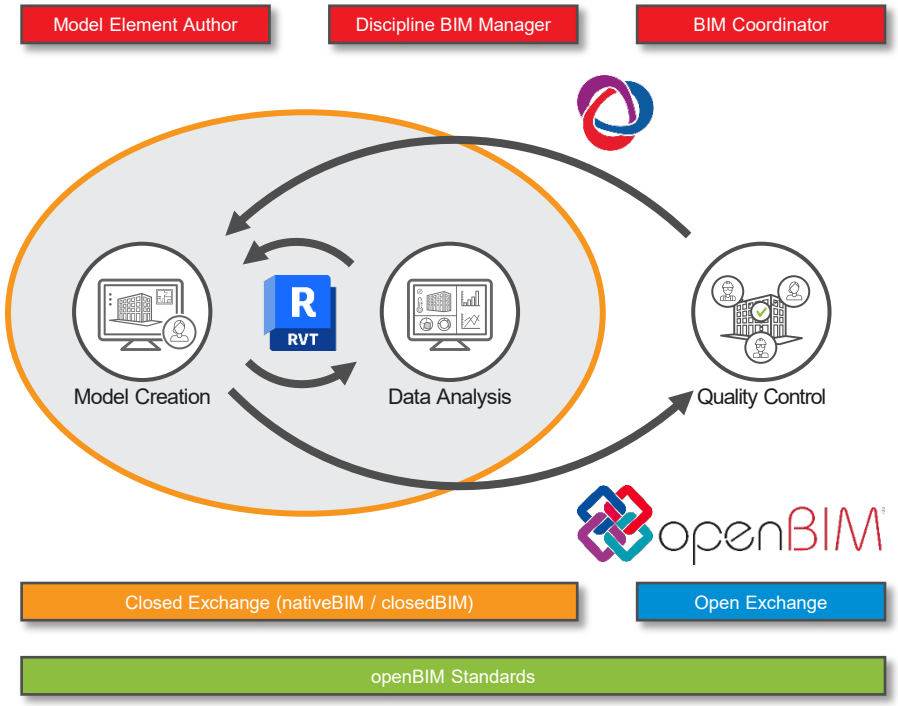
In the context of BIM, start by producing an information model e.g., in Revit and export an **Industry Foundation Classes** (IFC) file **for data exchange**.

By exporting and exchanging an **IFC file**, you deliver the information model in an **open format**, you could say this is an **open exchange**.

But if you exchange a **Revit file**, you deliver the model in a **native format** because the receiver needs Revit even just to view your file.

By exchanging the information model in a native format, you could say this is a **closed exchange** (or **native exchange**).

openBIM vs closedBIM



The term **openBIM** exists to differentiate between a non-proprietary way of working and commercial solutions which are based on native formats, known as **closedBIM** (or **nativeBIM**).

It is impossible to work in a purely openBIM environment because **data is** almost exclusively **created using native authoring software solutions**.

However, it is possible to **export and exchange IFC and BCF files** at any stage in a project and thereby, initiating an **openBIM process**.

Following ISO 19650, all parties shall **use openBIM standards** whenever possible to deliver information and **to avoid poor processes on projects**.

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openBIM Standards - Use Case Management Service

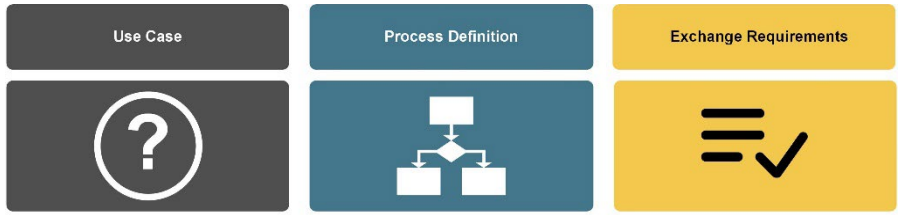
Define the Industry Needs / Domain Experts

UCM
® a service by buildingSMART International

Certify / Software Vendors

Create the Dataset

Communicate & Collaborate



Purpose: Foundation for the definition of BIM Use Cases

The Use Case Management (UCM) service creates a common language for the definition of ‘BIM Use Cases’ between the client and contractor for all phases.

By identifying ‘BIM Use Cases’ and mapping processes (using IDM), it enables the definition of information exchange requirements (using MVD and IDS).

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openBIM Standards - Use Case Management Service

Define the Industry Needs / Domain Experts

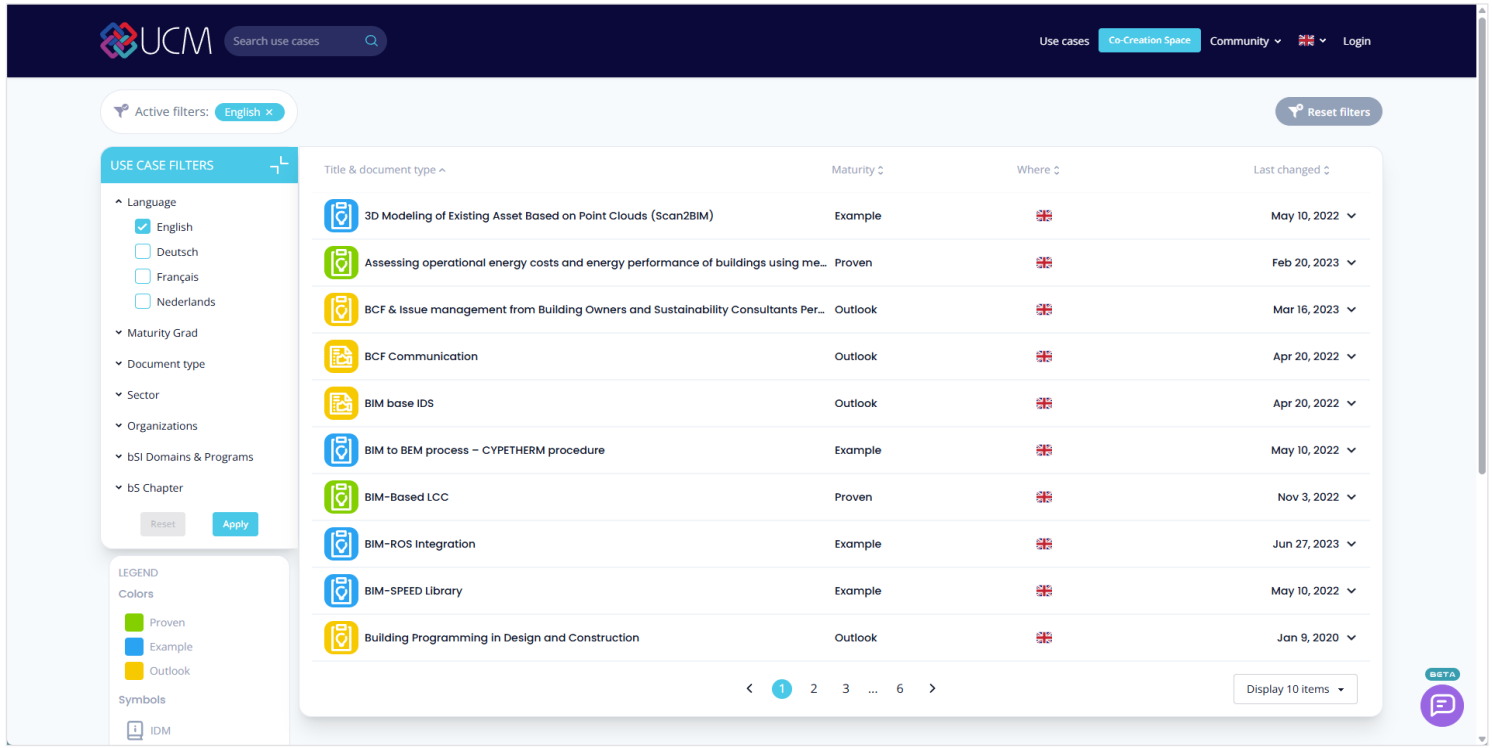
Certify / Software Vendors

Create the Dataset

Communicate & Collaborate

Available
ucm.buildingsmart.org

Powered by
buildingSMART
Switzerland



Source: https://ucm.buildingsmart.org/

openBIM Standards - Information Delivery Manual

Define the Industry Needs / Domain Experts

Exchange Requirements (ER)

Process Definition

Information Delivery Manual (IDM)

ISO 29481.1

UCM

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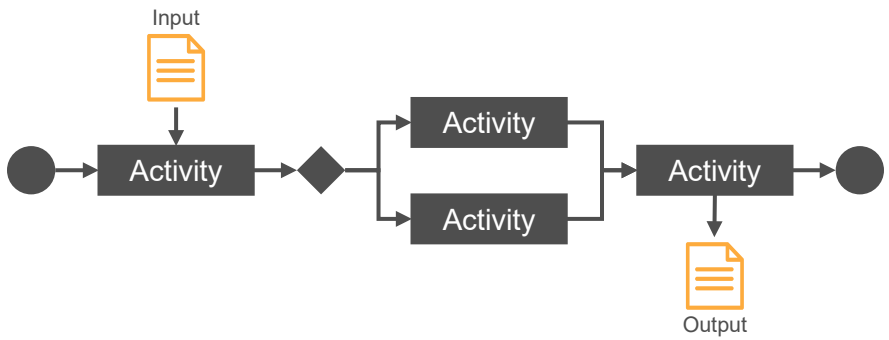
Certify / Software Vendors

Create the Dataset

Communicate & Collaborate



Purpose: Standardised Process Description

The main purpose of an IDM is to map an information process and to define the exchange requirements (ER) for information for a specific ‘BIM Use Case’.

The output can be used to make sure that relevant data is communicated in such a way that it can be used by a receiving software.

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openBIM Standards - Model View Definition

Define the Industry Needs / Domain Experts

Exchange Requirements (ER)

Process Definition
Information Delivery Manual (IDM)
ISO 29481.1

Solution Design
Model View Definition (MVD)
ISO 29481.1

UCM
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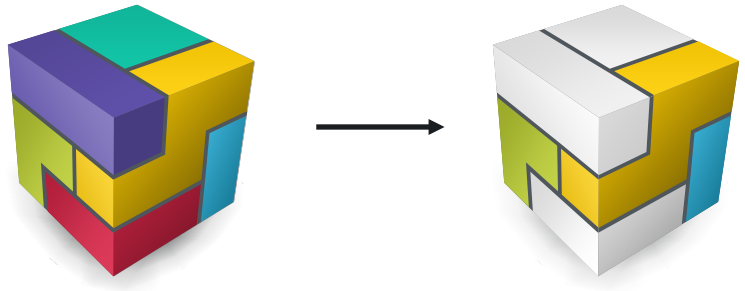
Certify / Software Vendors

Create the Dataset

Communicate & Collaborate



Purpose: IFC View Filter

The MVD is a subset of a data schema to support the exchange requirements of information for a specific ‘BIM Use Case’.

As a filtered view, the MVD allows us to export specific objects and properties from a model to meet a particular ‘BIM Use Case’ requirement.

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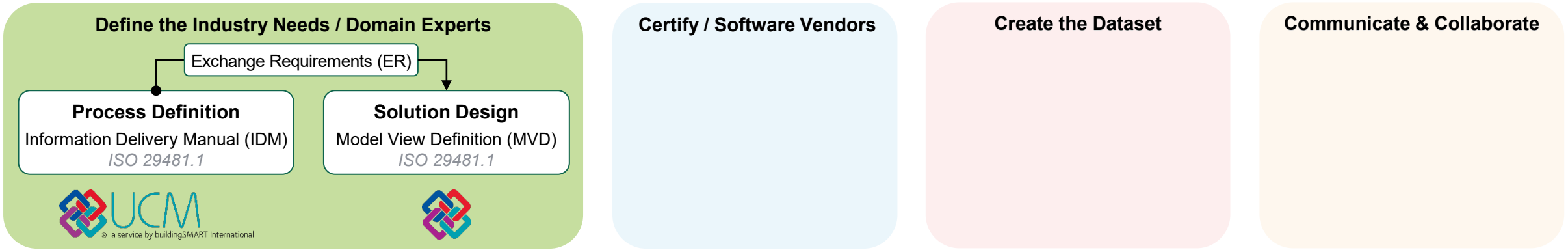
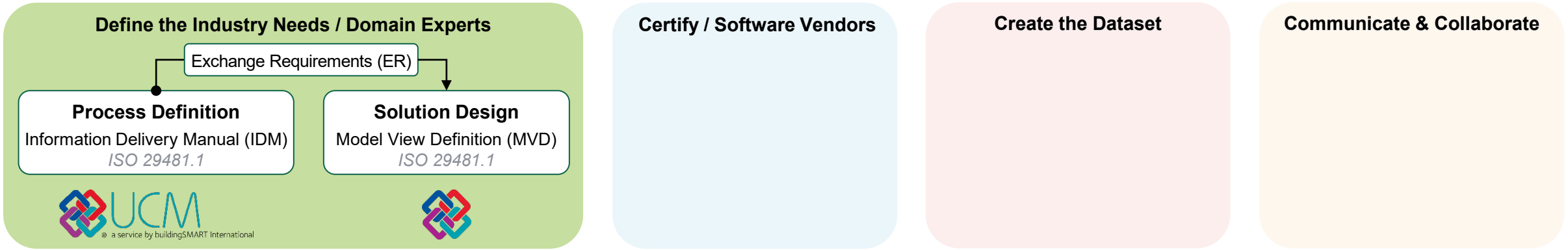
openBIM Standards - Model View Definition



IFC2x3 TC1	Coordination View 2.0	Spatial and physical components for design coordination between architectural, structural, and building services (MEP) domains.
IFC2x3 TC1	Space Boundary Addon View	Identification and export of additional Space Boundaries. Can be used for building energy analysis and quantity take-off.
IFC2x3 TC1	Basic FM Handover View	Handover of model information from planning and design applications to CAFM and CMMS applications, as well as the handover of model information from construction and commissioning software to CAFM and CMMS applications
IFC2x3 TC1	Structural Analysis View	The structural analysis model, created in a structural design application by a structural engineer to one or many structural analysis applications.

Source: https://technical.buildingsmart.org/standards/ifc/mvd/mvd-database/

openBIM Standards - Model View Definition



IFC4 TC1	Reference View	Simplified geometric and relational representation of spatial and physical components to reference model information for design coordination.
IFC4 TC1	Design Transfer View	Advanced geometric and relational representation of spatial and physical components to enable the transfer of model information from one tool to another.
IFC4 TC1	Quantity Take-off View	Estimate and track construction materials and costs.
IFC4 TC1	Energy Analysis View	Estimate and track energy usage and costs.
IFC4 TC1	Product Library View	Manufacturer product information and configurations.
IFC4 TC1	IFC4 Precast	Exchange of geometric information between CAD and MES systems.

Source: https://technical.buildingsmart.org/standards/ifc/mvd/mvd-database/

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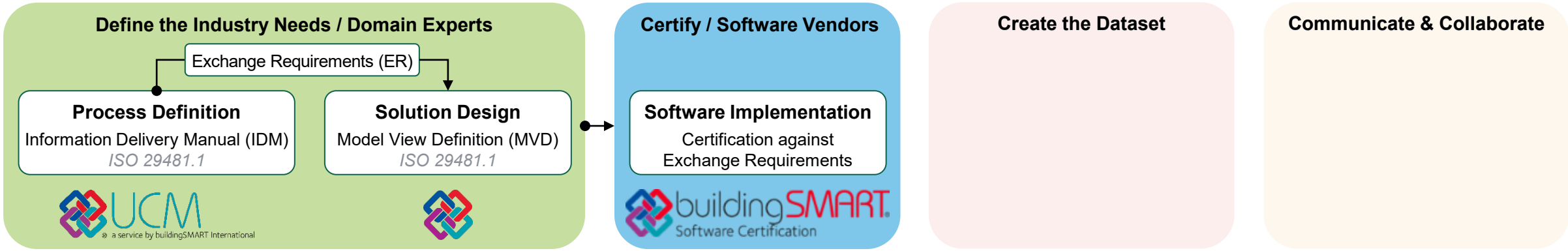
openBIM Standards - Software Certification



openBIM Standards - Software Certification

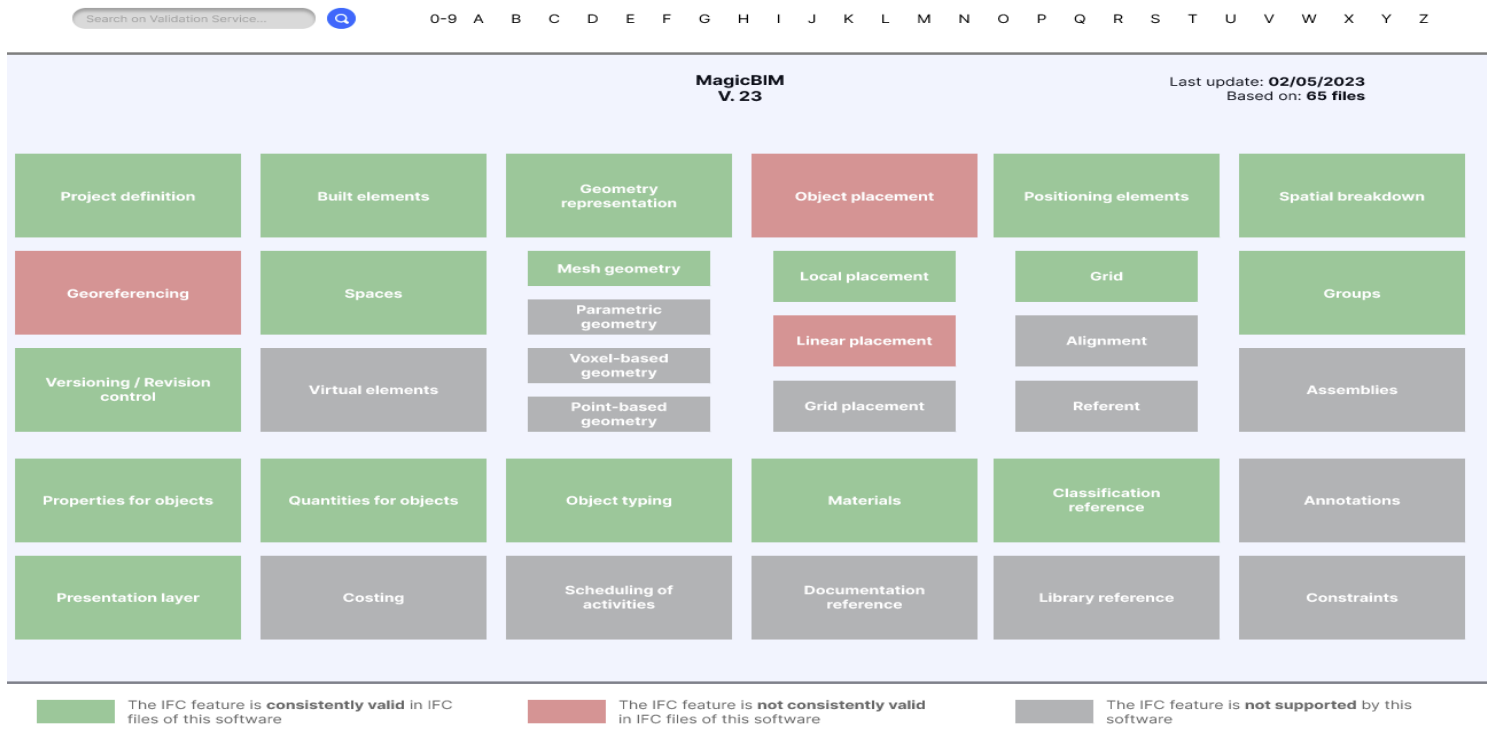
Define the Industry Needs / Domain Experts

Certify / Software Vendors

Create the Dataset

Communicate & Collaborate

New approach to Software Certification coming soon!



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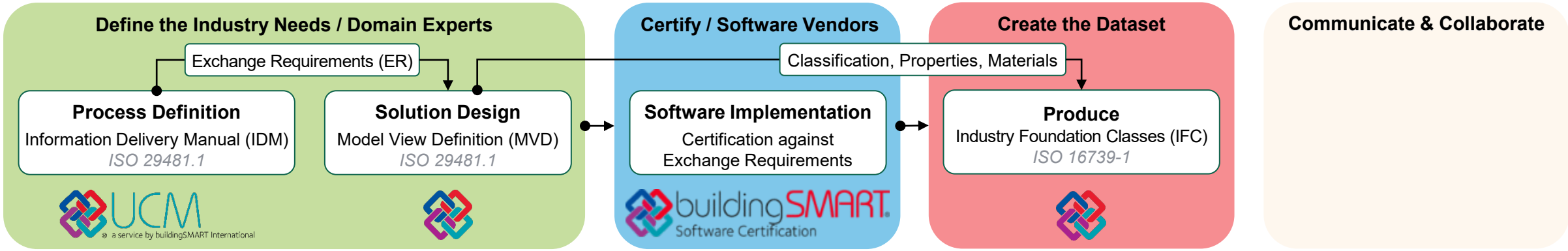
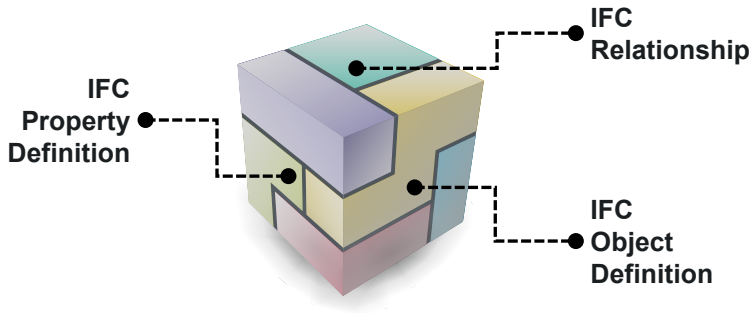
openBIM Standards - Industry Foundation Classes



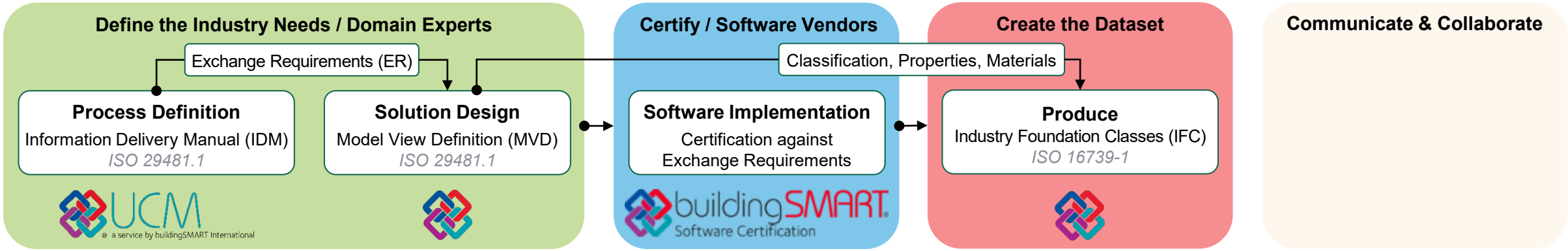


Purpose: Medium for Data Transfer

As an open standard for data exchange, the IFC schema is usable across a wide range of hardware devices, software platforms and interfaces.

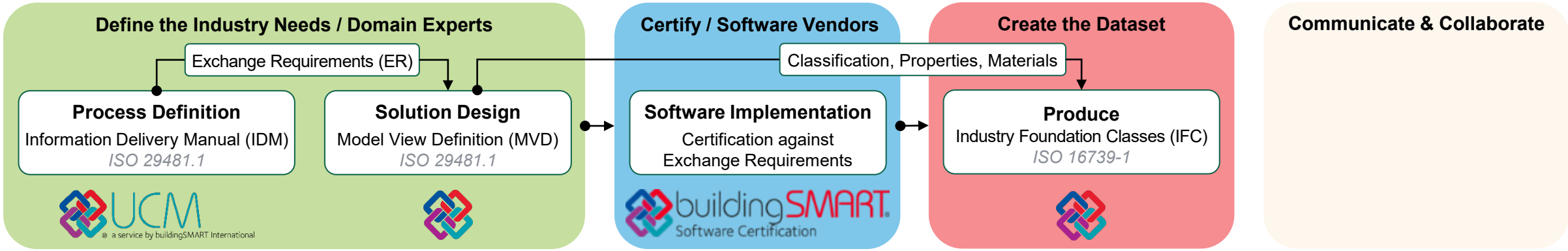
Its codification is based on object definition (real world objects), relationship (between objects) and property definition (classification, properties, materials, etc.).

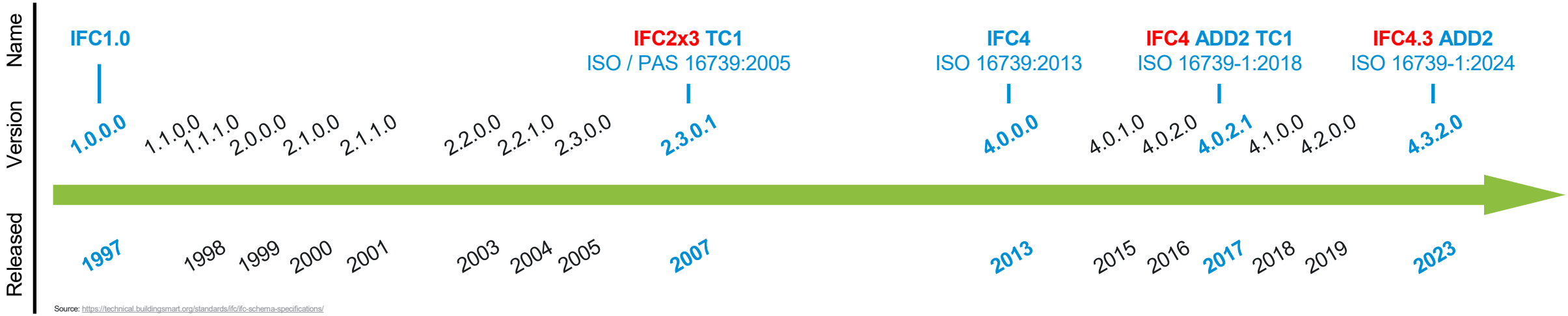
openBIM Standards - Industry Foundation Classes



STEP Physical File (SPF)	.ifc	100%	STEP Physical Format (SPF or IFC-SPF) is the most widely used format for IFC in practice, which is the most compact of the formats listed that can be read as text. IFC-SPF is based on ISO 10303-21.
Extensible Markup Language (XML)	.ifcXML	113%	Extensible Markup Language (XML) provides enhanced readability and benefits from a broad range of software tools. ifcXML is based on ISO 10303-28.
ZIP	.ifcZIP	17%	IFC data may embedded within a ZIP file. The embedded data may be encoded as either SPF or XML, where the resulting size is typically comparable.

openBIM Standards - Industry Foundation Classes





Source: https://technical.buildingsmart.org/standards/ifc/ifc-schema-specifications/

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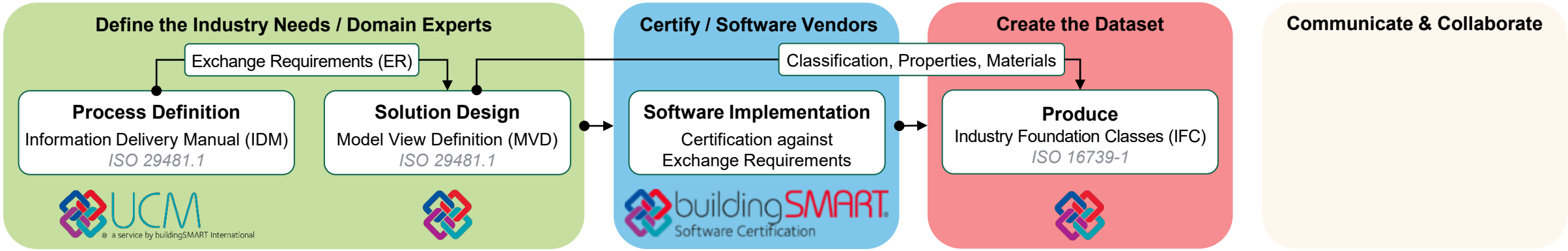
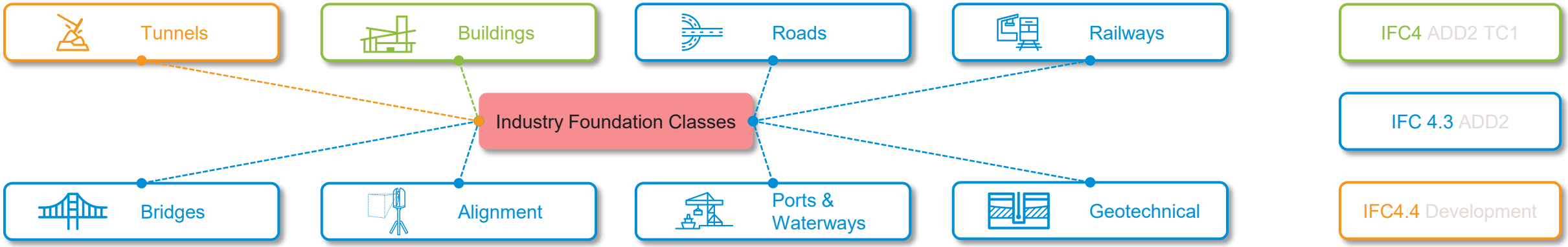
openBIM Standards - Industry Foundation Classes





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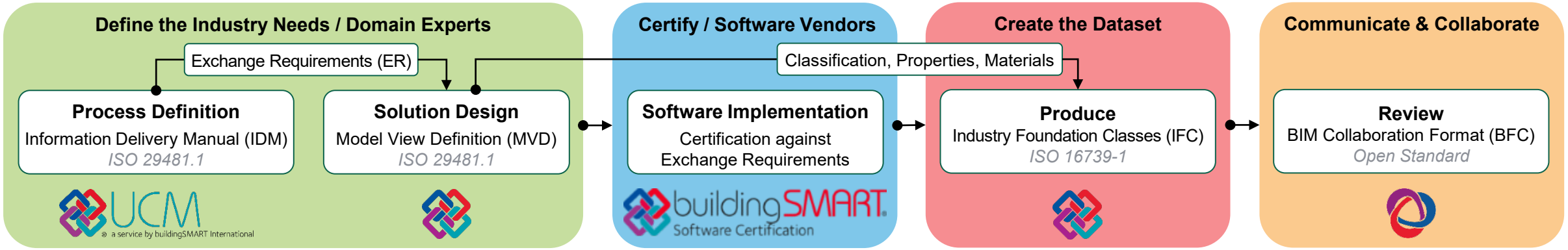
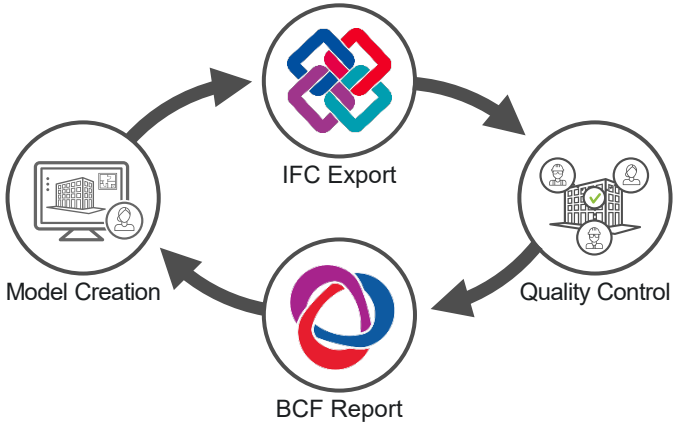
openBIM Standards - BIM Collaboration Format



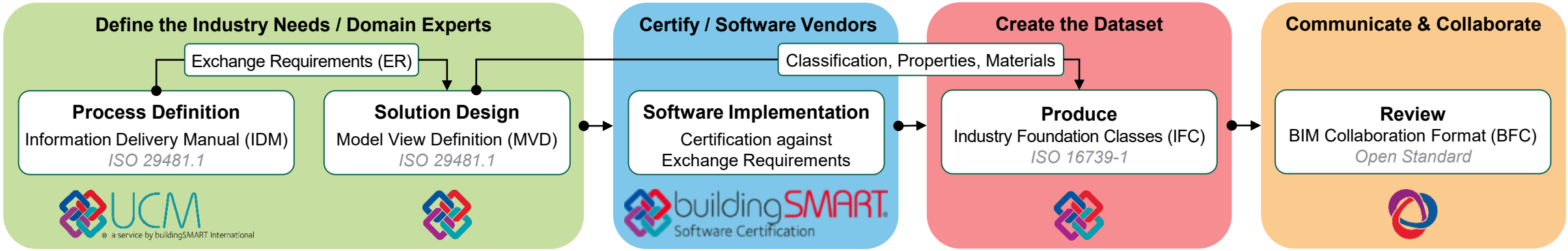


Purpose: Reporting and Tracking

The BCF is a buildingSMART openBIM standard, like the IFC schema, for exchanging model-based issues from one software to another.

There are several ‘BIM Use Cases’ that benefit from BCF workflows, where reporting, tracking and communication of issues and changes is required.

openBIM Standards - BIM Collaboration Format

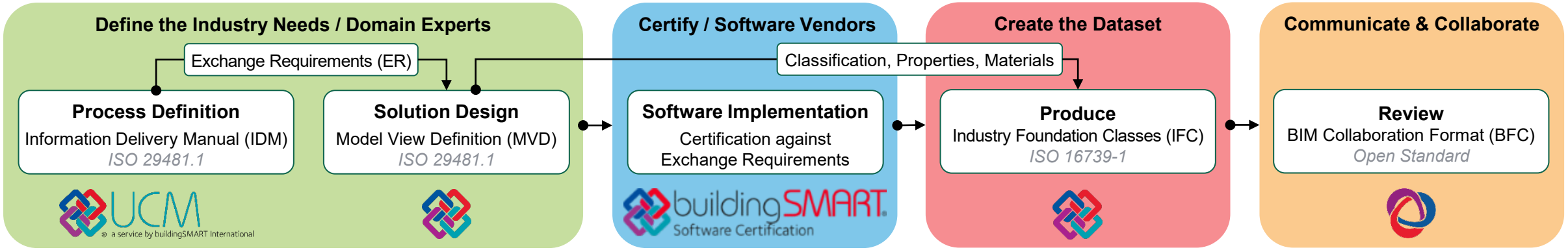


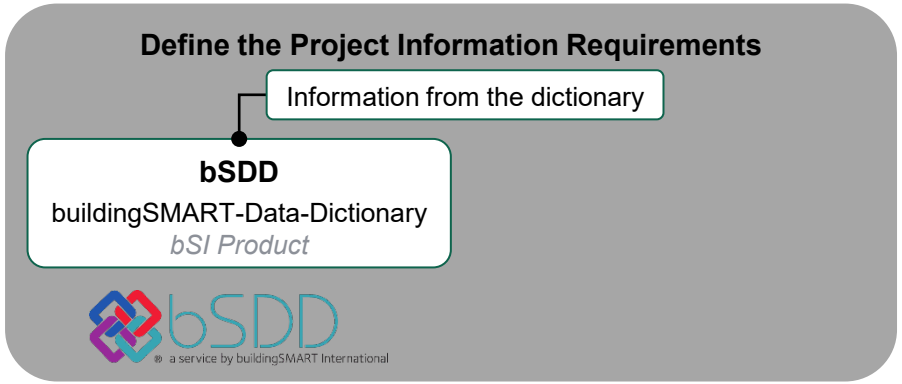
Purpose: Reporting and Tracking

A BCF file may contain comments, the issue status, a view of a model (screenshot), object GUIDs (Globally Unique Identifier), and more.

A BCF file can be viewed, edited and transferred easily between modelling and coordination tools, and be updated as issues have been resolved.

openBIM Standards - buildingSMART Data Dictionary



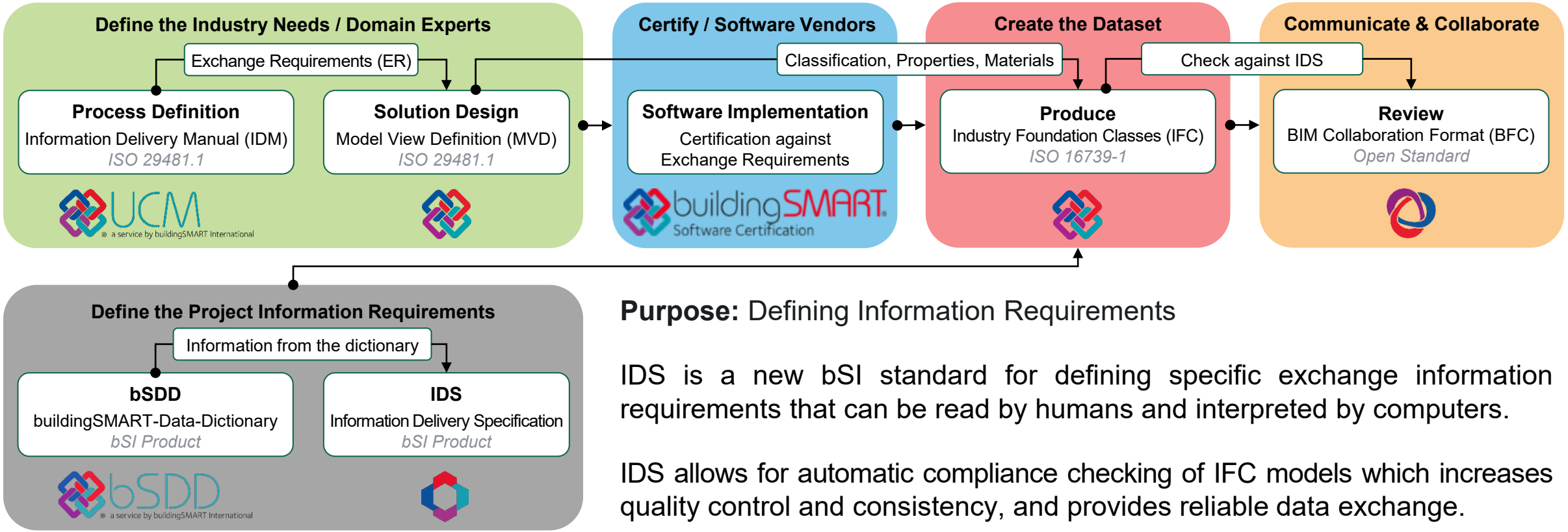


Purpose: Mapping of Terms

The bSDD translates concepts and properties of objects consistently, used to map classification systems and multi-language terminology.

The bSDD is a free online service that hosts these classifications (classes) and their properties, allowed values, units and translations.

openBIM Standards - Information Delivery Specification



Purpose: Defining Information Requirements

IDS is a new bSI standard for defining specific exchange information requirements that can be read by humans and interpreted by computers.

IDS allows for automatic compliance checking of IFC models which increases quality control and consistency, and provides reliable data exchange.

openBIM Standards - Information Delivery Specification

Define the Industry Needs / Domain Experts | Certify / Software Vendors | Create the Dataset | Communicate & Collaborate

Human-friendly 👓

All **walls** should have the property **FireRating** in the set **Pset_WallCommon** with a value being one of **REI30**, **REI60**, **REI90**.

Computer interpretable 💻

```
<ids:ids xmlns:xs="http://www.w3.org/2001/XMLSchema" xm
<ids:info>
<ids:title>Example IDS</ids:title>
<ids:version>1.0</ids:version>
<ids:author>technical@buildingsmart.org</ids:author>
<ids:date>2024-01-06</ids:date>
</ids:info>
<ids:specifications>
<ids:specification ifcVersion="IFC4X3" name="Walls need
<ids:applicability minOccurs="0" maxOccurs="unbounded">
<ids:entity>
<ids:name>
<ids:simpleValue>IFCWALL</ids:simpleValue>
</ids:name>
</ids:entity>
```

Automated validation ✅

☑ 7/10 walls passed the requirement.

☒ 2/10 walls don't have a FireRating property.

☒ 1/10 wall has a FireRating, but the value is "REI_60" which is not allowed.

Source: https://www.buildingsmart.org/standards/bsi-standards/information-delivery-specification-ids/

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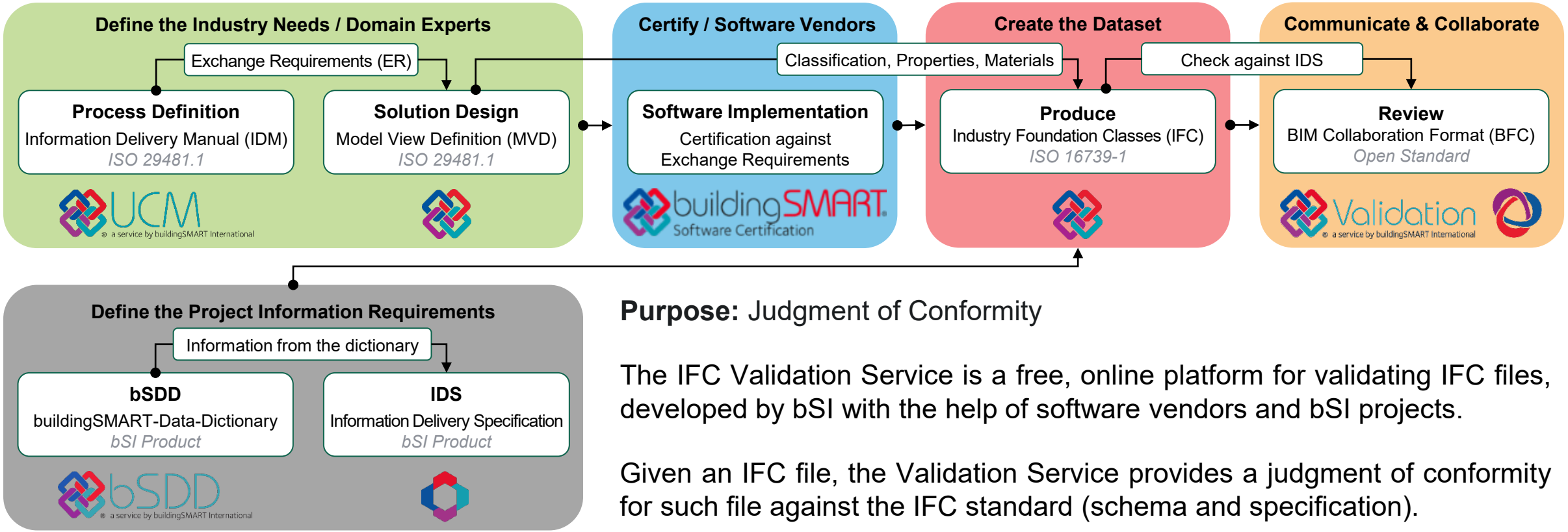
openBIM Standards - Validation Service



Purpose: Judgment of Conformity

The IFC Validation Service is a free, online platform for validating IFC files, developed by bSI with the help of software vendors and bSI projects.

Given an IFC file, the Validation Service provides a judgment of conformity for such file against the IFC standard (schema and specification).

openBIM Standards - Validation Service

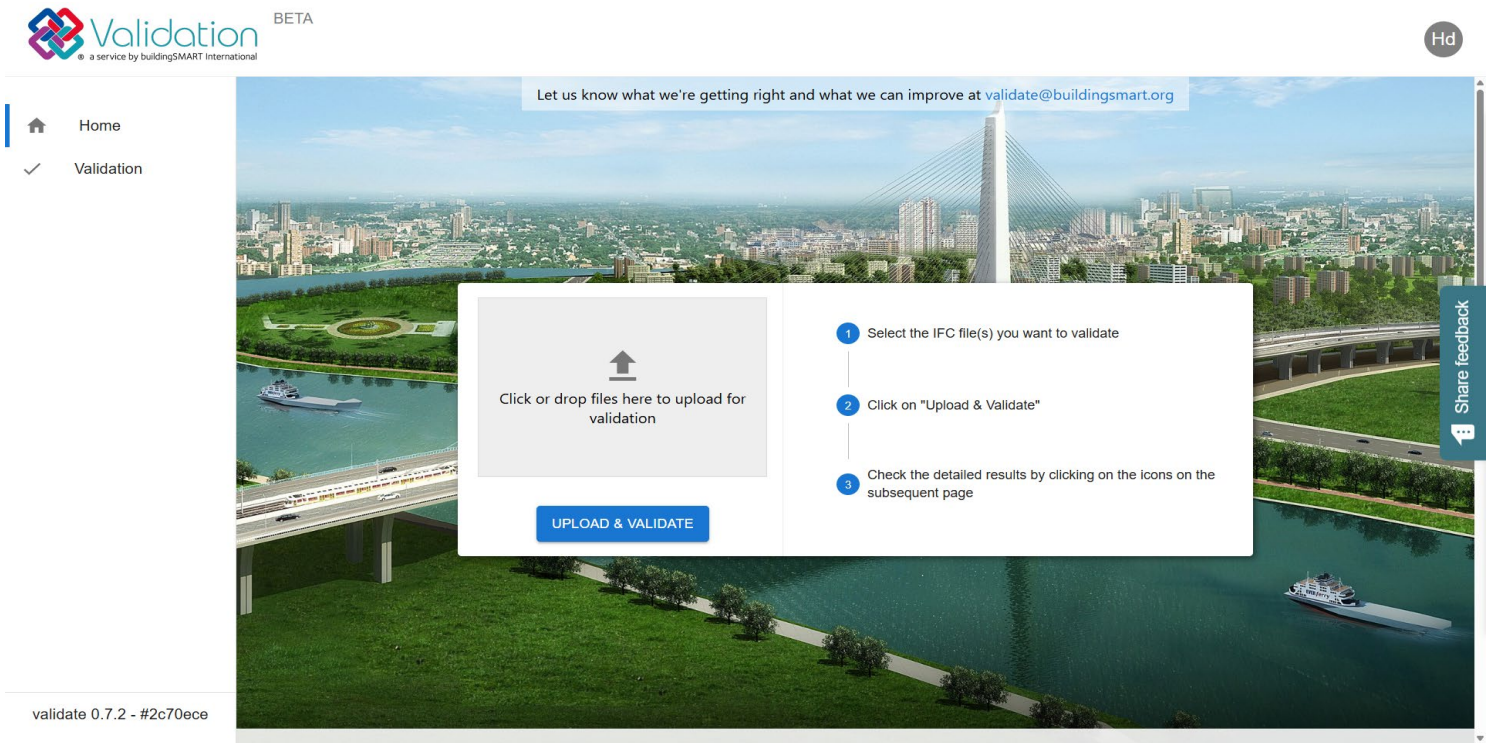
Define the Industry Needs / Domain Experts

Certify / Software Vendors

Create the Dataset

Communicate & Collaborate

Beta-version available
validate.buildingsmart.org



Source: https://validate.buildingsmart.org/dashboard

openBIM Standards - Validation Service

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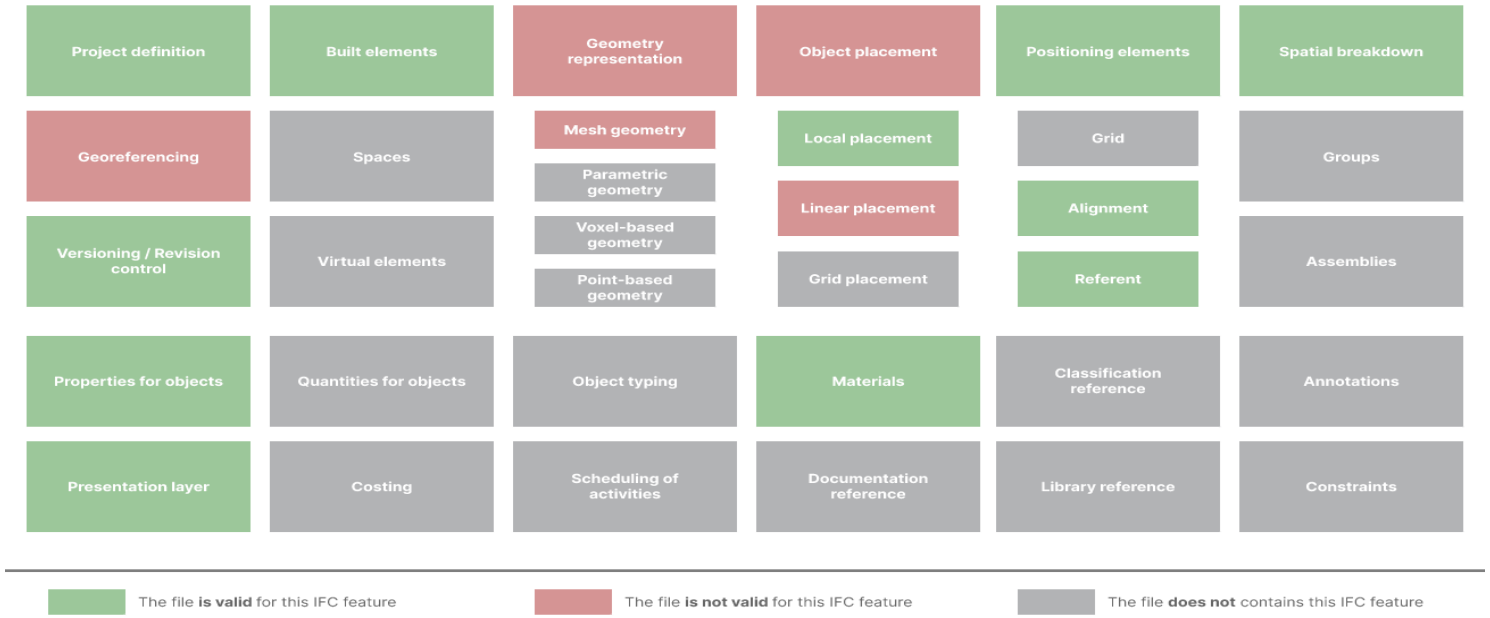
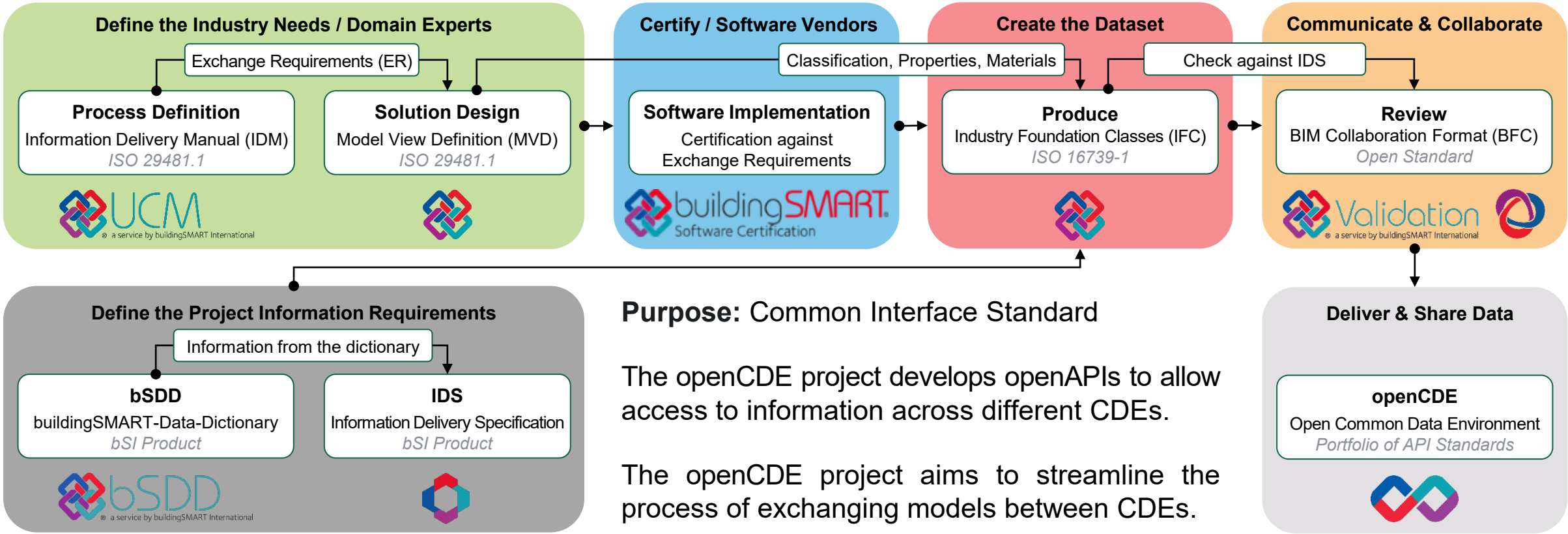
Beta-version available
validate.buildingsmart.org

File name	File size	File date	Validation date	N. of geometries	N. of properties	IFC schema	MVD	Authoring tool	Version
Pipe_4×3_RC3_20230322...	318.25 KB	2021-01-12 10:11:59	2023-04-12 09:25:39	2	214	IFC4X3	no MVD detected	Bentley iModel IFC Export	22.3



Source: https://validate.buildingsmart.org/dashboard

openBIM Standards - Open Common Data Environment



Purpose: Common Interface Standard

The openCDE project develops openAPIs to allow access to information across different CDEs.

The openCDE project aims to streamline the process of exchanging models between CDEs.

Thank You for Your Attention

Holger de Groot
Director | Modmation Pty Ltd

change 2025
Sydney | 25-26 June