

Presentation Disclaimer

Last updated: 11 August 2022

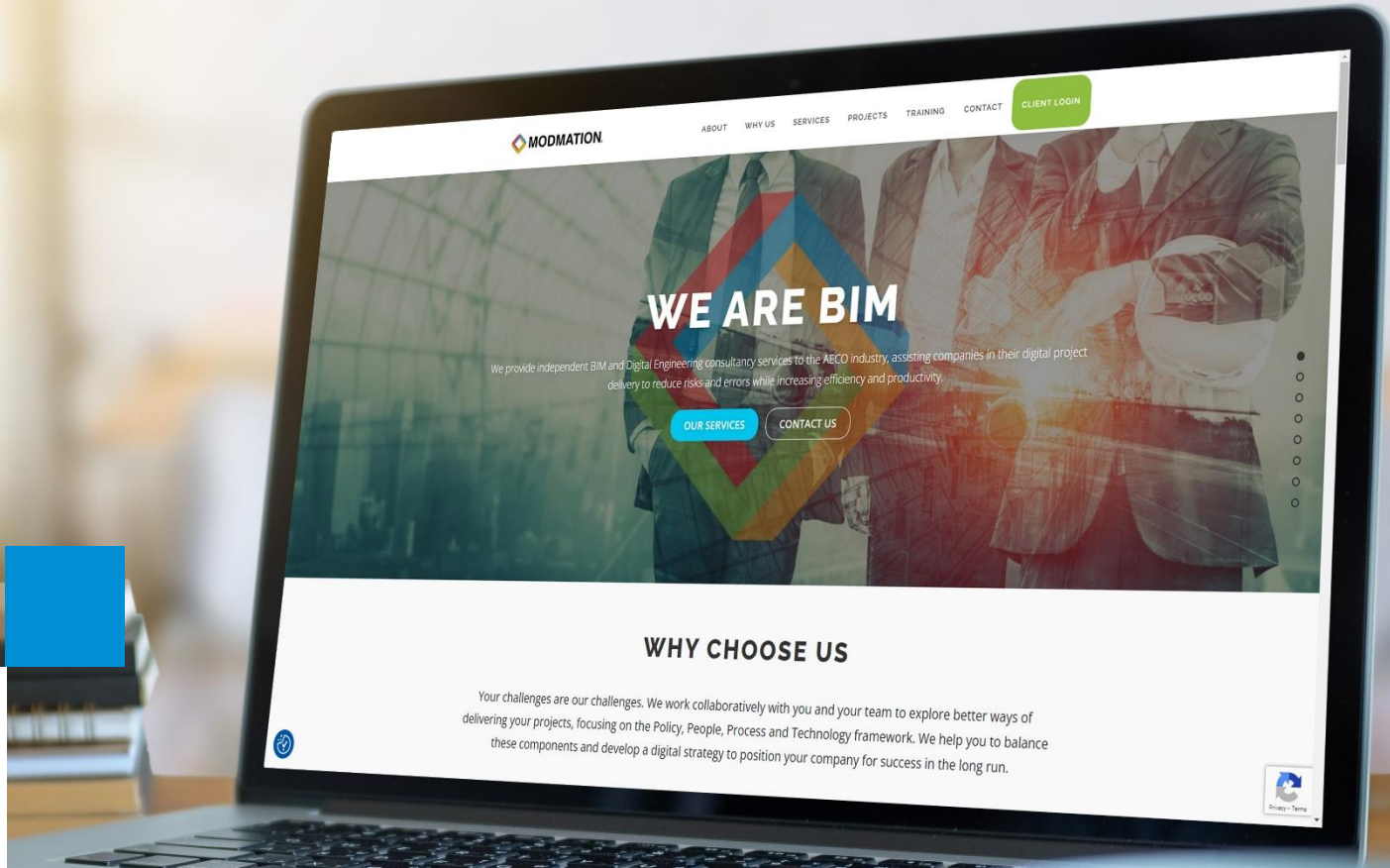
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Getting Started with openBIM

Holger de Groot
Director | Modmation Pty Ltd



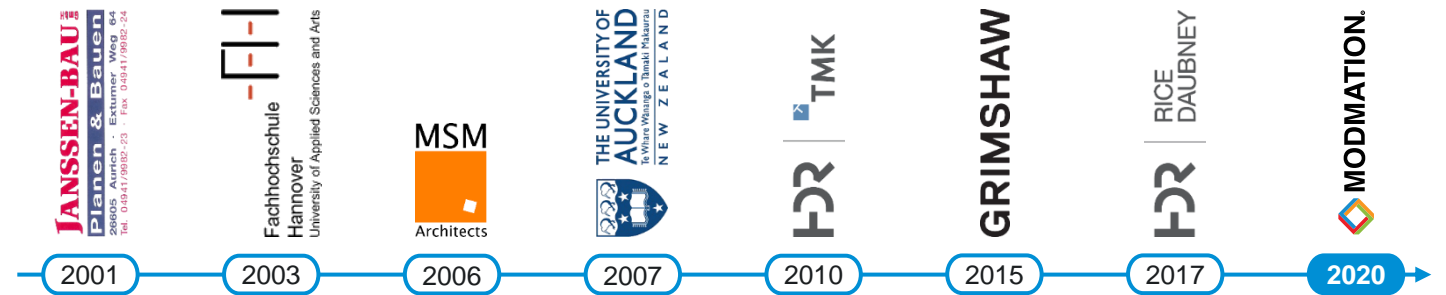


Acknowledgment of Country

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



Holger de Groot

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



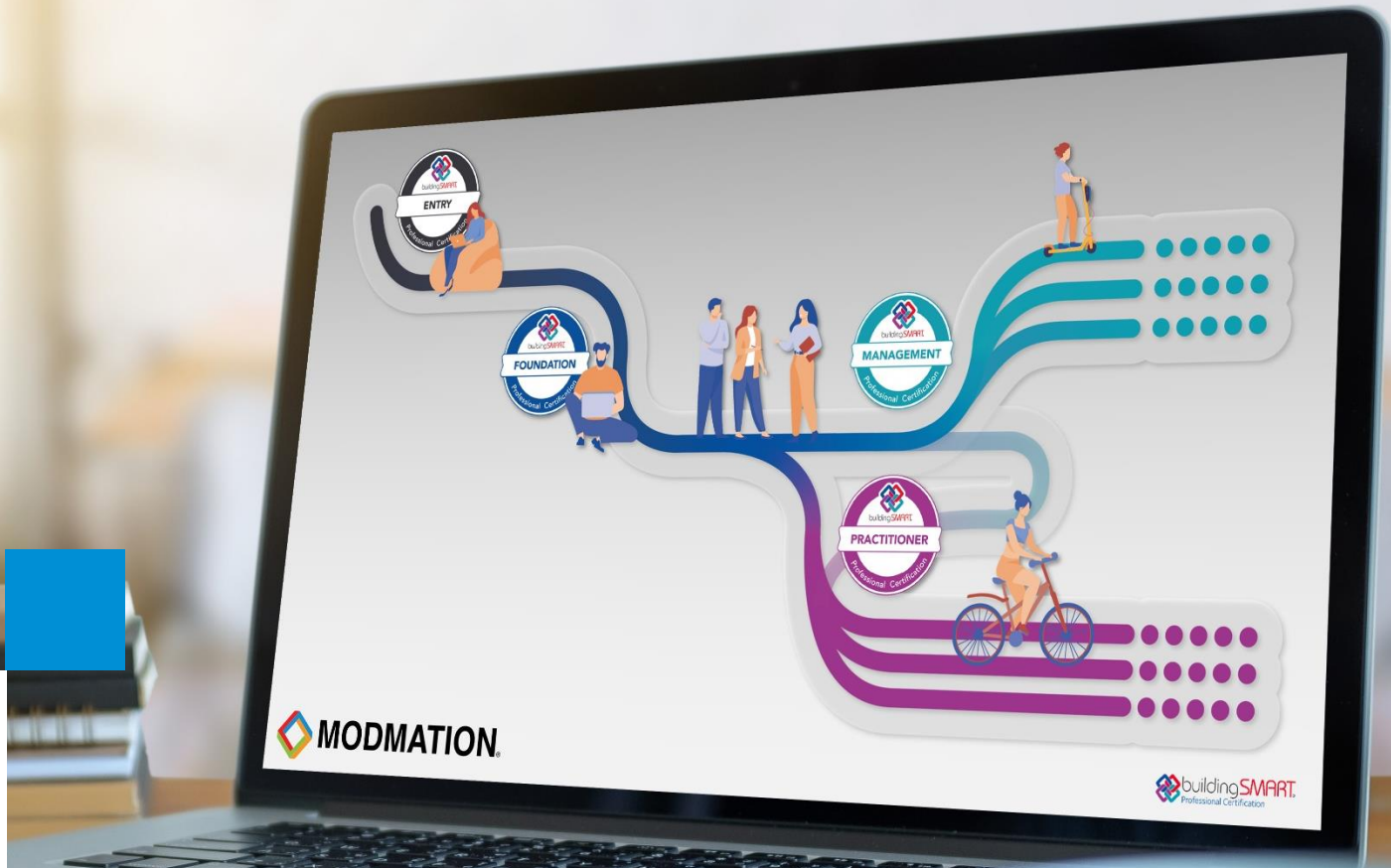
Holger de Groot is the Vice Chairperson at buildingSMART Australasia and the CEO and Founding Director of Modmation. As a certified BIM Manager, he has accrued invaluable experience in (building) information management and digital project delivery in Australasia and Europe.





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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.



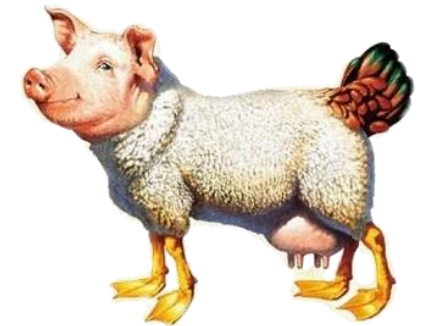
What is openBIM?

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 BIM 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.



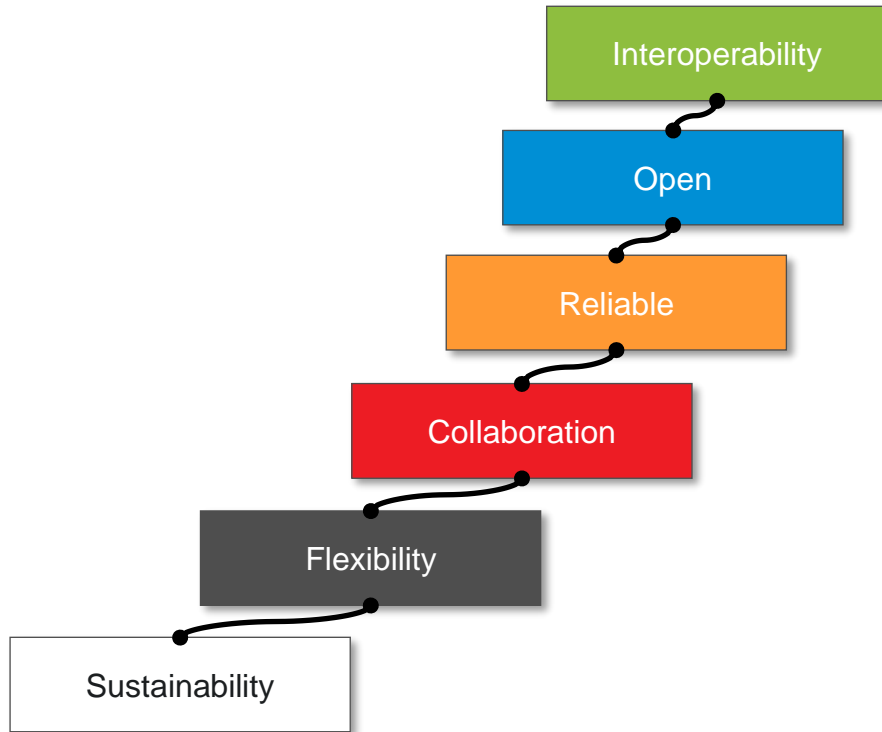
“Egg-Laying Wool-Milk-Pig”
(Eierlegende Wollmilchsau)

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

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



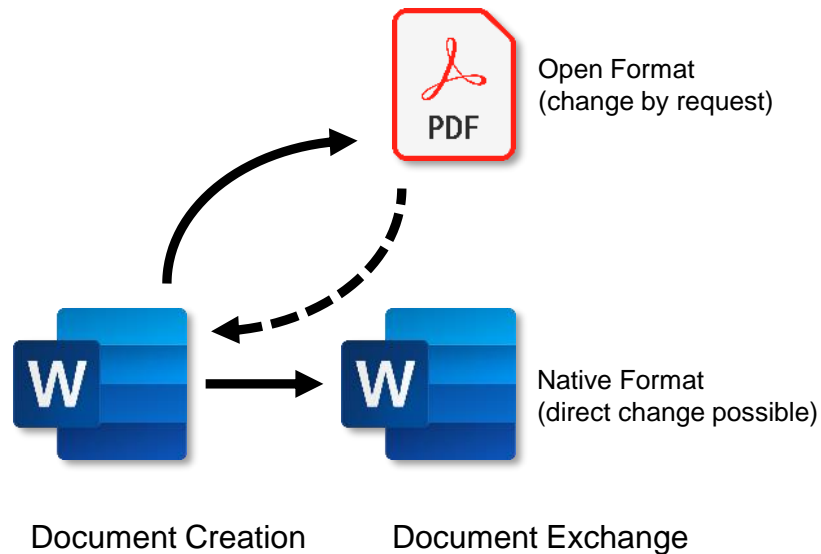
Principles of openBIM



- Interoperability is key to the digital transformation in the built asset industry.
- Open and neutral standards should be developed to facilitate interoperability.
- Reliable data exchanges depend on independent quality benchmarks.
- Collaboration workflows are enhanced by open and agile data formats.
- Flexibility of choice of technology creates more value to all stakeholders.
- Sustainability is safeguarded by long-term interoperable data standards.



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.

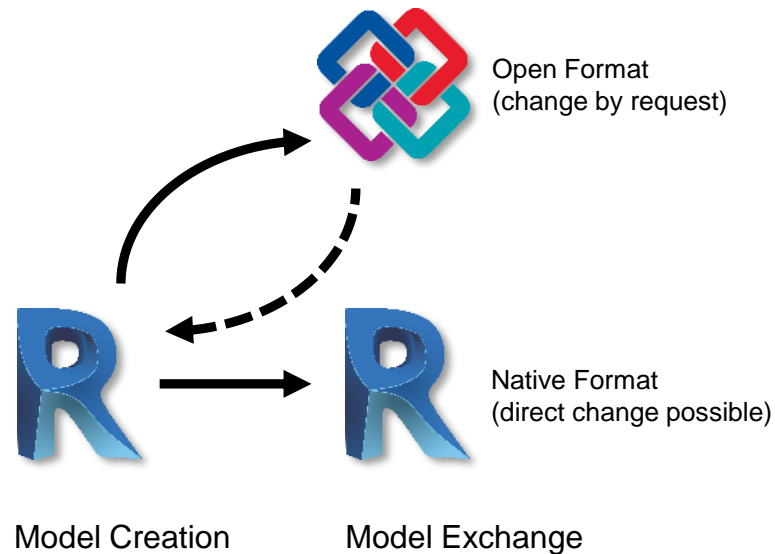
You may create the document in MS Word, Apple Pages or any other tool but you publish the report as a PDF, which is an “open format”.

This way anyone can view the document without having the software it was created in and it secures the content because it cannot be edited.

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, you start by producing an information model e.g., in Revit and you export an Industry Foundation Classes (IFC) file for exchange.

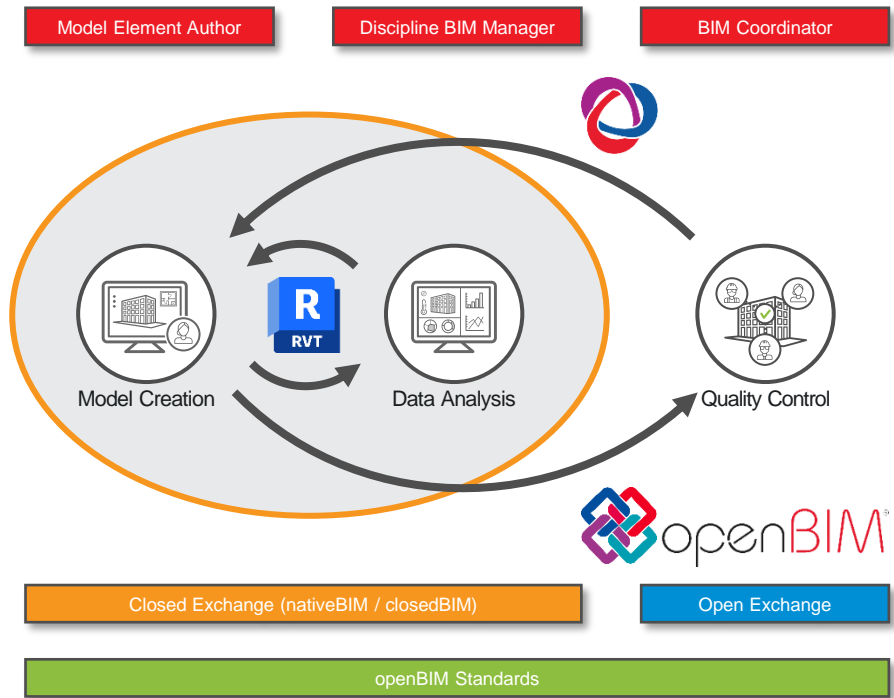
By exporting and exchanging an IFC file, you deliver the information model in an open format, you could say this is an “open exchange”.

But if you exchange a Revit file, you deliver the information 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”).

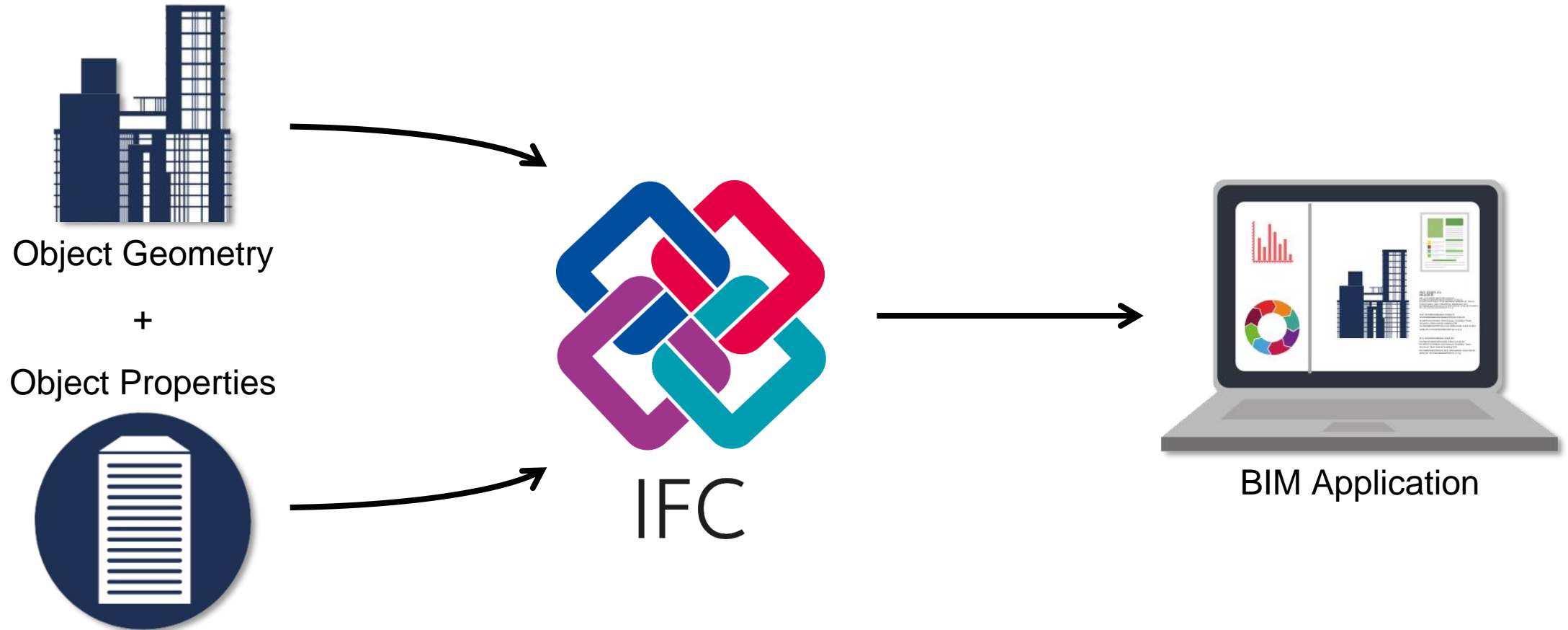
It is impossible to work in a purely openBIM environment because data is almost exclusively created using native authoring software solutions.

However, it is possible to export and exchange an IFC and BCF file 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.



openBIM Standards



openBIM Standards - Use Case Management Service

Define the Industry Needs / Domain Experts



Certify / Software Experts

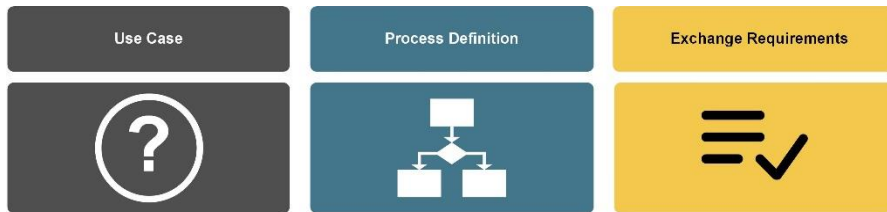
Create the Dataset

Communicate & Collaborate

Purpose: Foundation for the definition of BIM Use Cases

The Use Case Management (UCM) service establishes a common language for the definition of BIM Use Cases between the client and contractor.

It enables the capture, specification and exchange of best practices and provides a basis for a Model View Definition (MVD).



openBIM Standards - Information Delivery Manual

Define the Industry Needs / Domain Experts



Certify / Software Experts

Create the Dataset

Communicate & Collaborate



Purpose: Standardised Process Description

bSI developed a methodology known as the Information Delivery Manual (IDM), now standardised and managed by ISO through the ISO 29481 series.



openBIM Standards - Information Delivery Manual

Define the Industry Needs / Domain Experts

Requirements Definition

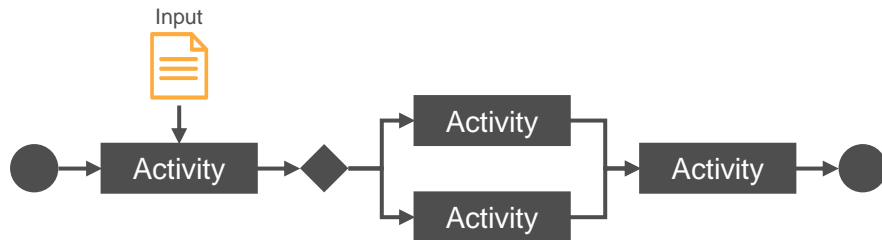
Information Delivery Manual (IDM)
ISO 29481.1



Certify / Software Experts

Create the Dataset

Communicate & Collaborate



Purpose: Standardised Process Description

bSI developed a methodology known as the Information Delivery Manual (IDM), now standardised and managed by ISO through the ISO 29481 series.

The main purpose of an IDM is to map an information process and to define the exchange requirements for information between parties.



openBIM Standards - Information Delivery Manual

Define the Industry Needs / Domain Experts

Requirements Definition

Information Delivery Manual (IDM)

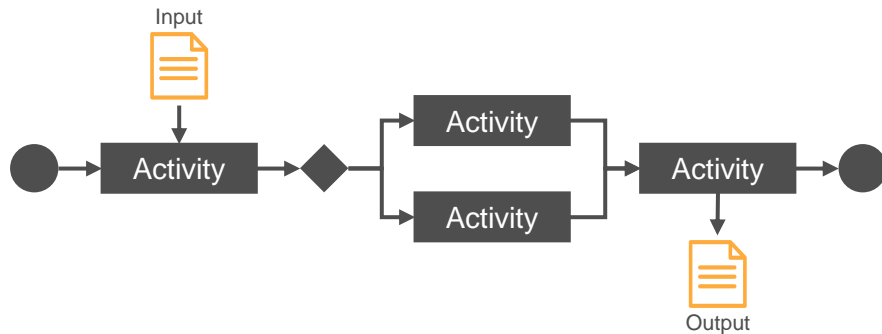
ISO 29481.1



Certify / Software Experts

Create the Dataset

Communicate & Collaborate



Purpose: Standardised Process Description

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.

Once a relevant 'BIM Use Case' specific workflow and its information exchange requirements have been defined, an MVD can be developed.



openBIM Standards - Model View Definition

Define the Industry Needs / Domain Experts

Exchange Requirements

Requirements Definition

Information Delivery Manual (IDM)
ISO 29481.1



Certify / Software Experts

Create the Dataset

Communicate & Collaborate



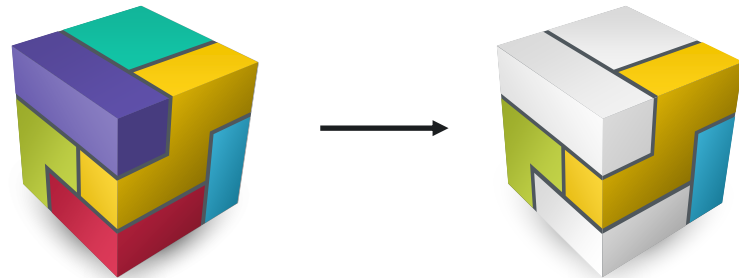
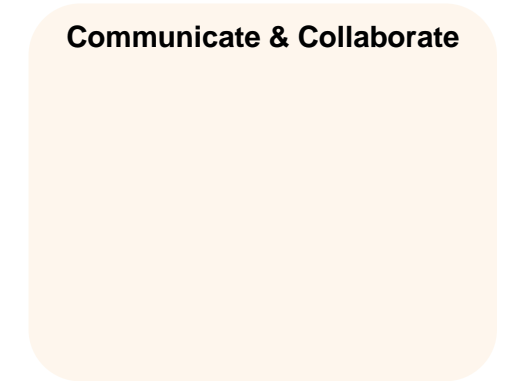
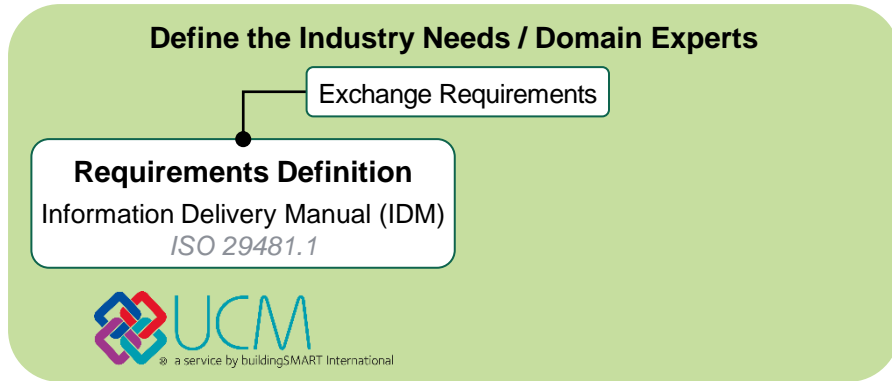
Purpose: IFC View Filter

Standardised in ISO 29481-1, 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 to export specific objects and properties from a model to meet a particular 'BIM Use Case' requirement.



openBIM Standards - Model View Definition



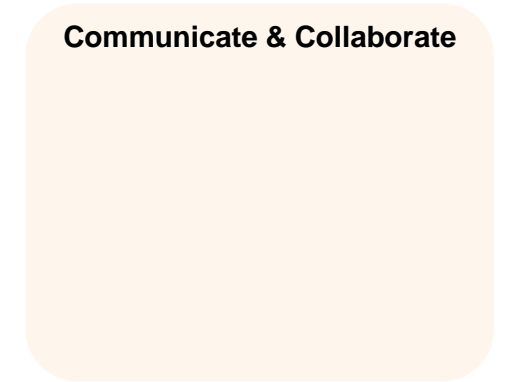
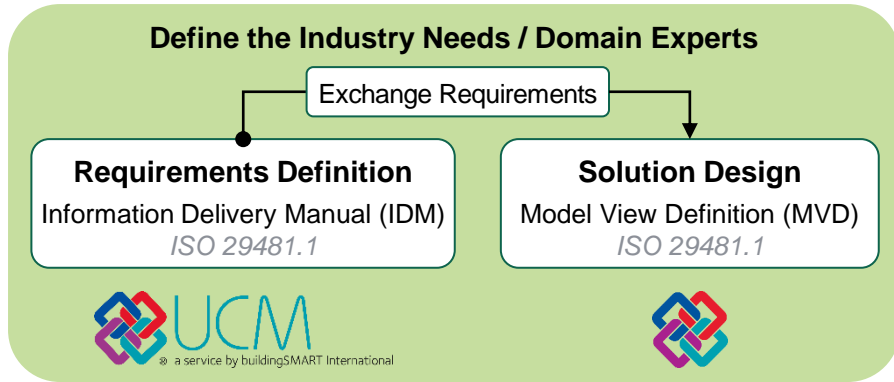
Purpose: IFC View Filter

Basically, we can say that the entire IFC schema (cube on the left) is never being used for the export of information.

Instead, we generate a specific view of a model (partial cube on the right) to support 'BIM Use Case' specific information exchanges.



openBIM Standards - Model View Definition

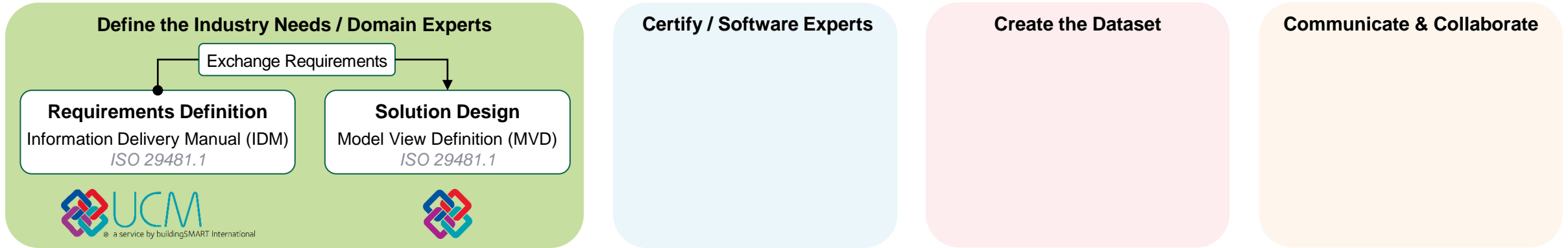


IFC2x3 TC1	Coordination View 2.0	Spatial and physical components for design coordination between architectural, structural, and building services (MEP) domains.
IFC2x3 TC1	Space Boundary Addon View	Identification and export of additional Space Boundaries. Can be used for building energy analysis and 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

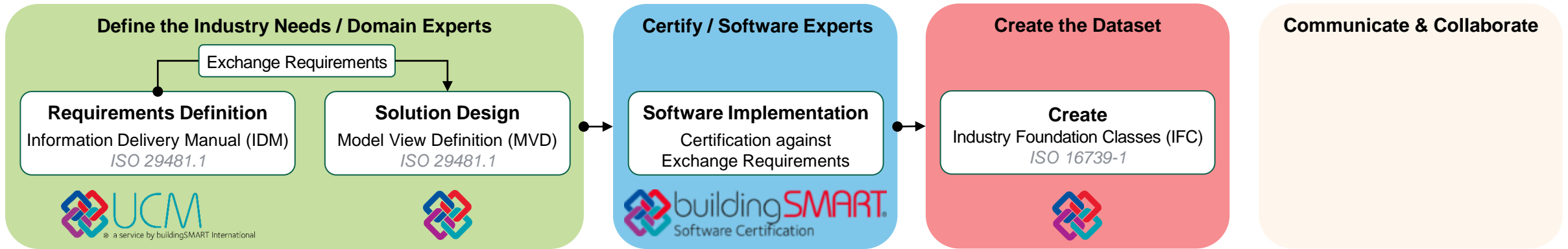


IFC4 TC1	Reference View	Simplified geometric and relational representation of spatial and physical components to reference model information for design coordination.
IFC4 TC1	Design Transfer View	Advanced geometric and relational representation of spatial and physical components to enable the transfer 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/>



openBIM Standards - Industry Foundation Classes



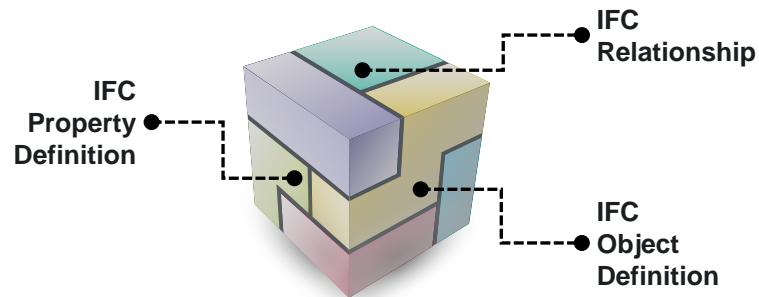
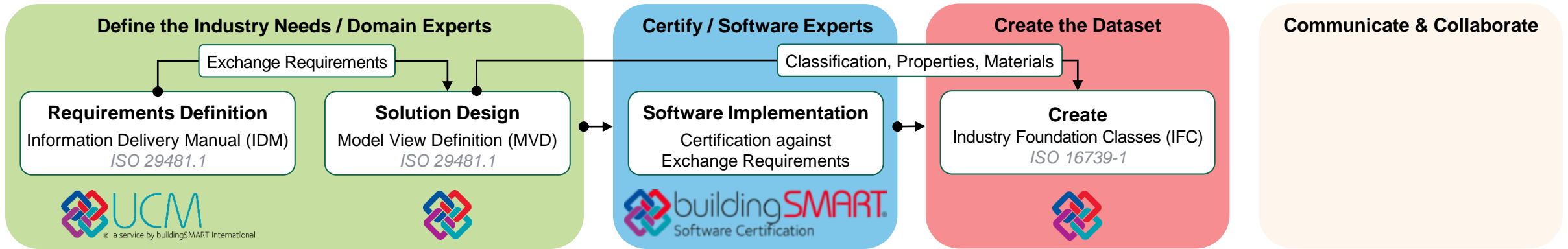
Purpose: Medium for Data Transfer

The Industry Foundation Classes (IFC) is a data schema that has been standardised in ISO 16739-1 since the release of IFC4 in 2013.

Being vendor-neutral, the IFC schema specification is also the primary technical deliverable of buildingSMART to promote openBIM.



openBIM Standards - Industry Foundation Classes



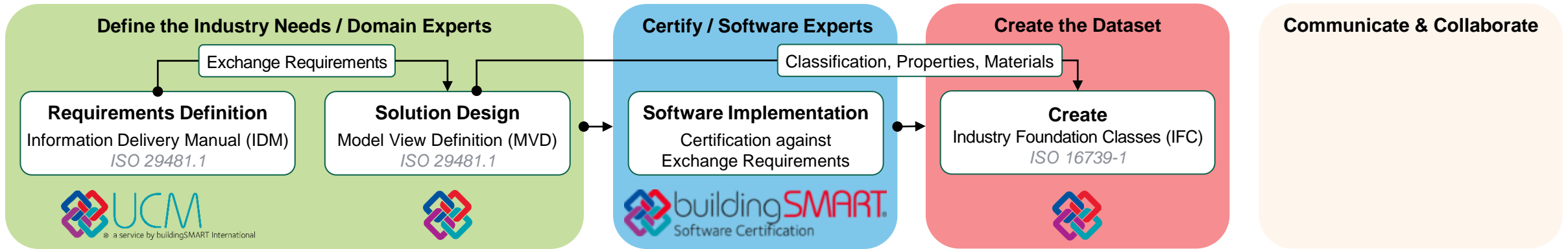
Purpose: Medium for Data Transfer

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

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



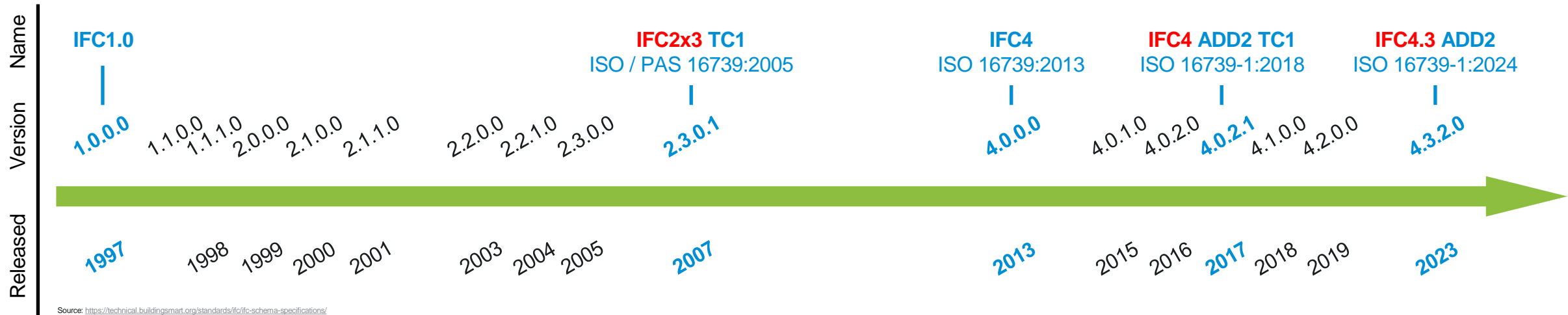
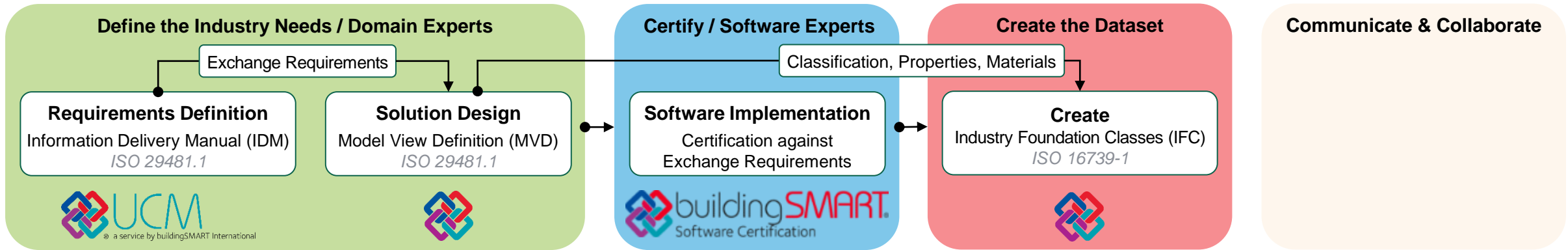
openBIM Standards - Industry Foundation Classes



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 be embedded within a ZIP file. The embedded data may be encoded as either SPF or XML, where the resulting size is typically comparable.



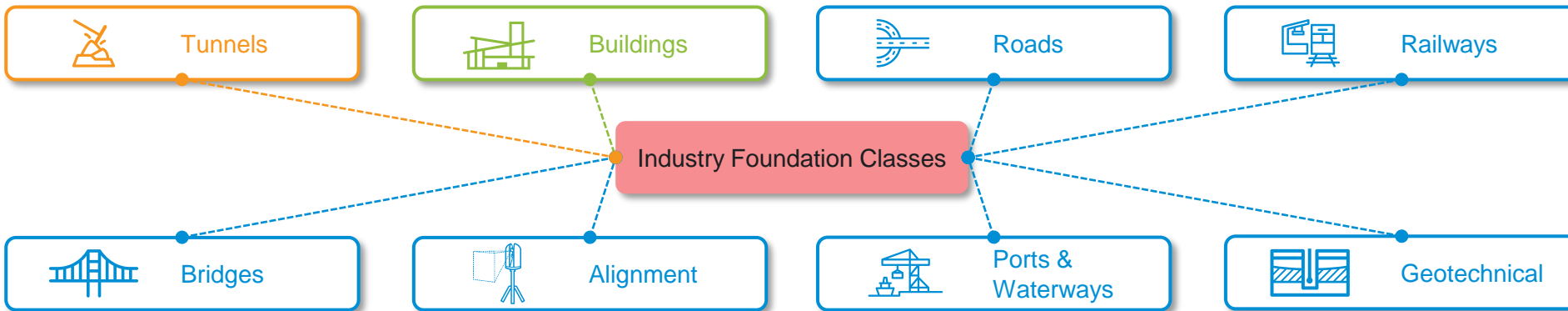
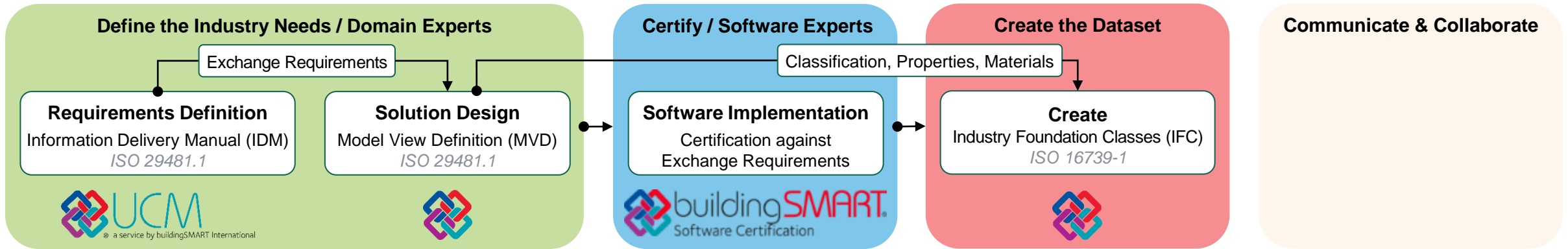
openBIM Standards - Industry Foundation Classes



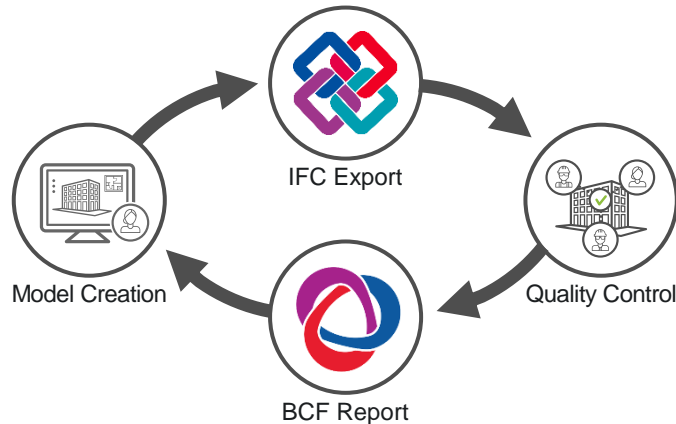
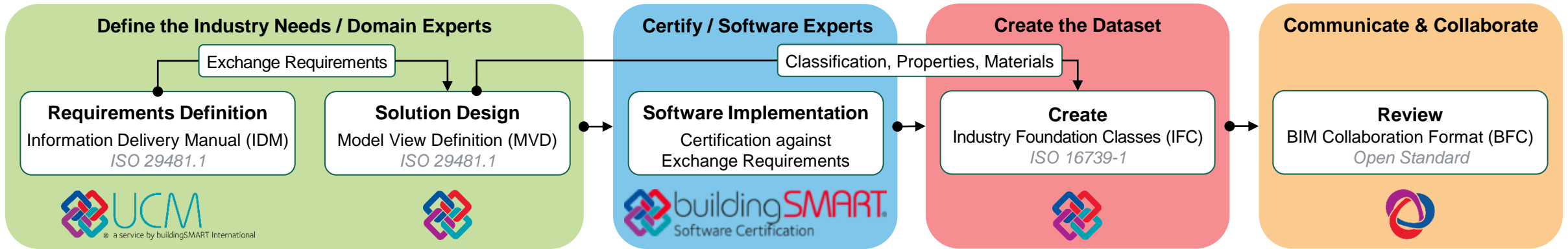
Source: <https://technical.buildingsmart.org/standards/ifc/ifc-schema-specifications/>



openBIM Standards - Industry Foundation Classes



openBIM Standards - BIM Collaboration Format



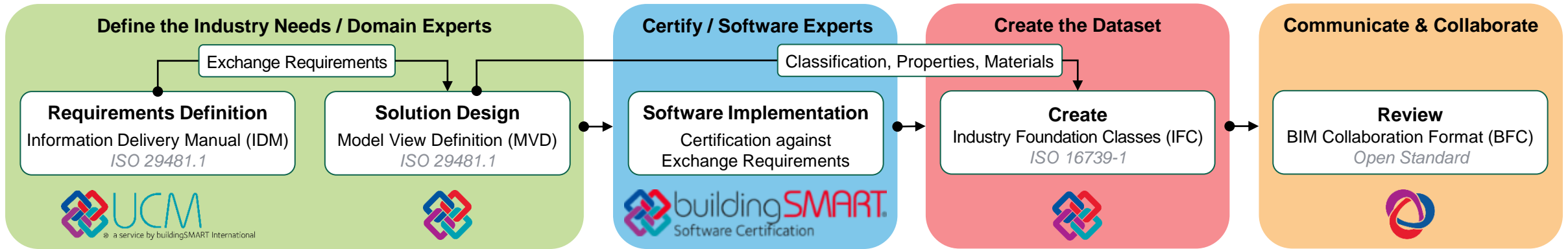
Purpose: Reporting and Tracking

The BCF is a buildingSMART openBIM standard, like the IFC schema, for managing and communicating model-based issues.

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



openBIM Standards - BIM Collaboration Format



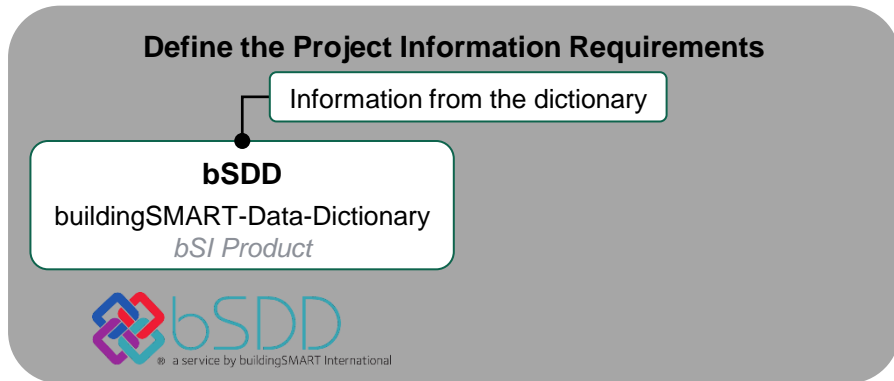
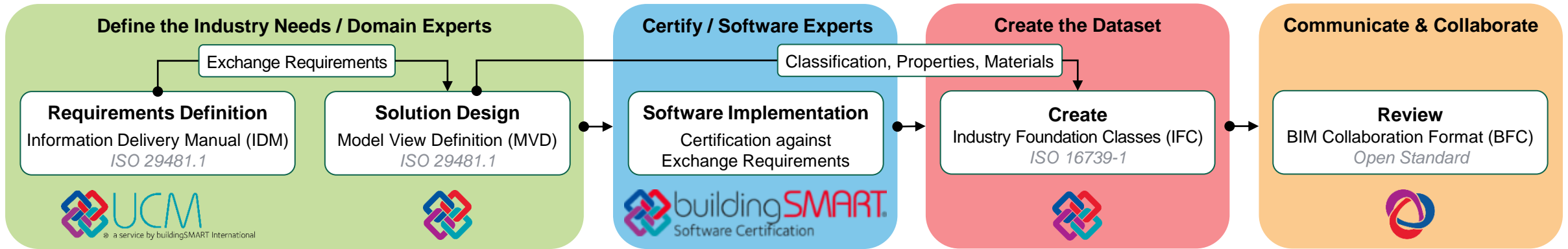
Purpose: Reporting and Tracking

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



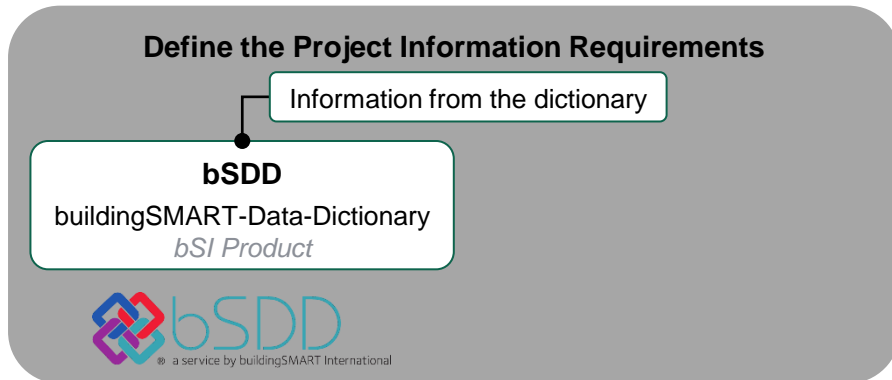
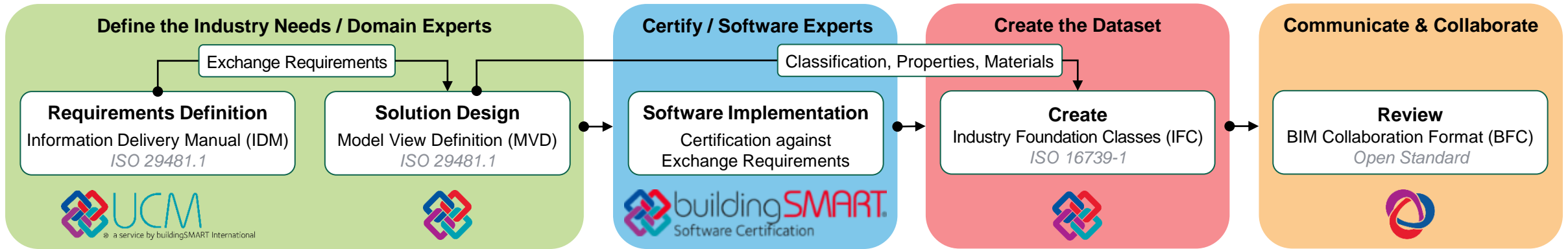
Purpose: Mapping of Terms (previously IFD)

The bSDD is not a standard but an application based on the International Framework for Dictionaries (ISO 12006-3).

Translates concepts and properties of objects, used for mapping classification systems and multi-language terminology.



openBIM Standards - buildingSMART Data Dictionary



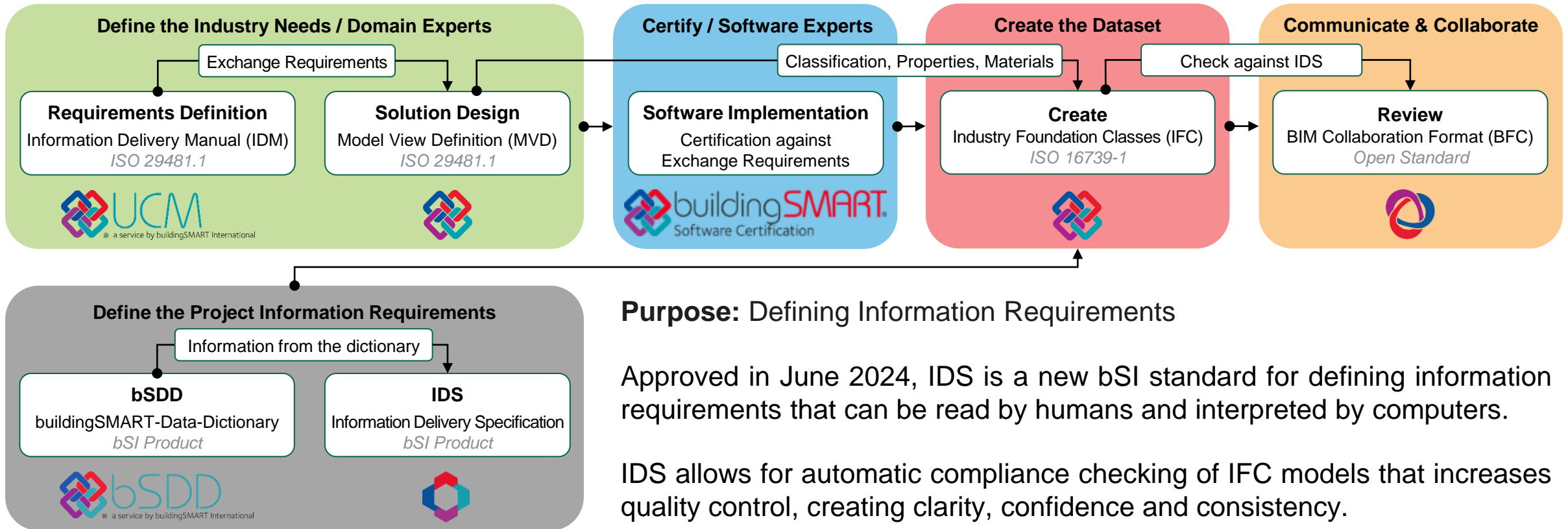
Purpose: Mapping of Terms (previously IFD)

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

As a bSI product, bSDD makes these objects and property definitions available, involving 100+ organisations, 80+ dictionaries, 10+ software solutions.



openBIM Standards - Information Delivery Specification



openBIM Standards - Information Delivery Specification

Define the Industry Needs / Domain Experts

Certify / Software Experts

Create the Dataset

Communicate & Collaborate

Require
Information

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" xmlns:ids="http://www.buildingsmart.org/standards/bsi-standards/information-delivery-specification-ids" >  
<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 FireRating" >  
<ids:applicability minOccurs="0" maxOccurs="unbounded">  
<ids:entity>  
<ids:name>  
<ids:simpleValue>IFCWALL</ids:simpleValue>  
</ids:name>  
</ids:entity>  
</ids:specification>  
</ids:specifications>  
</ids:ids>
```

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

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.

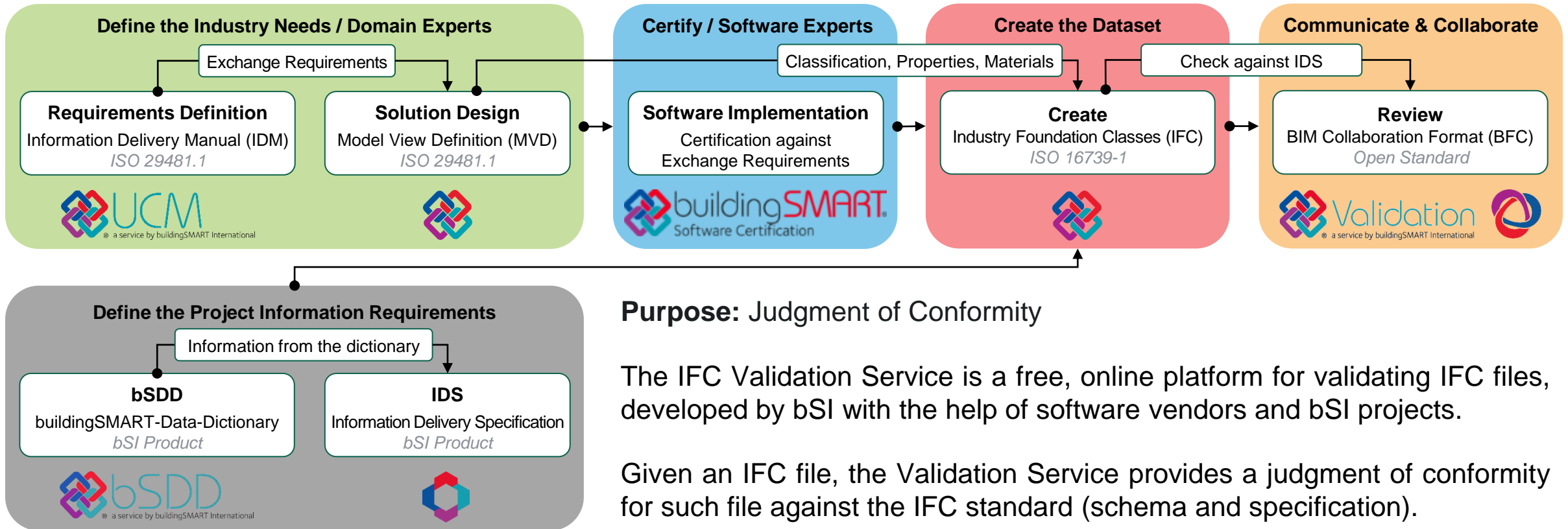
(BFC)

building

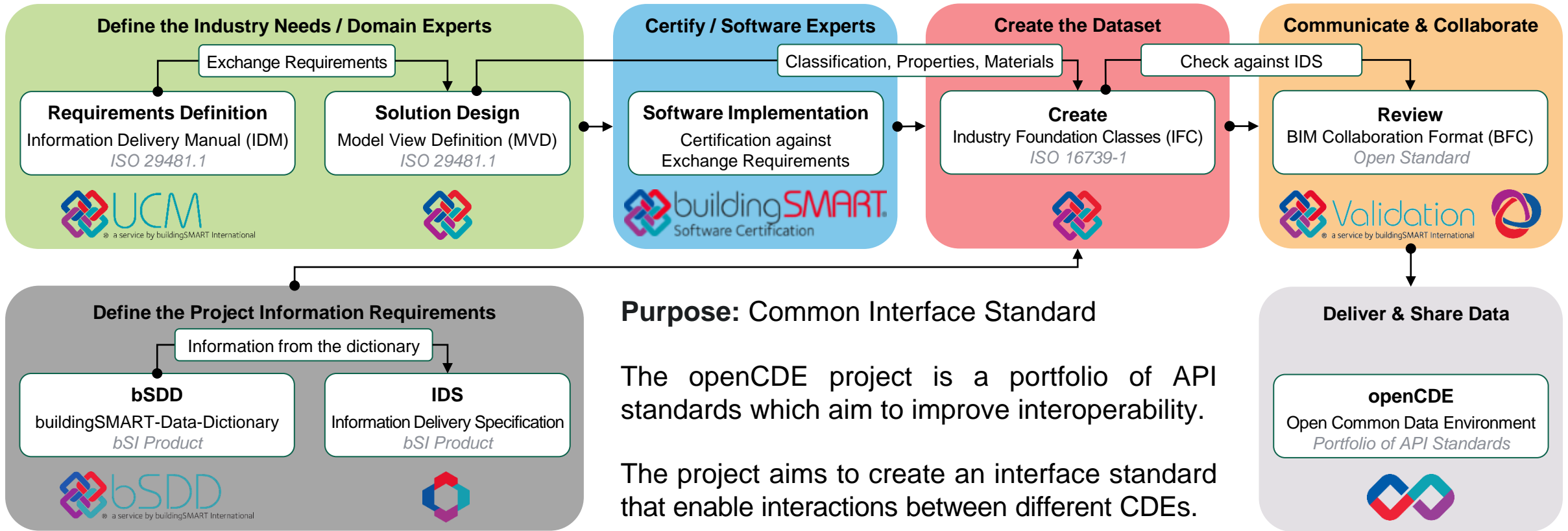
ation
rs.
eases



openBIM Standards - Validation Service



openBIM Standards - Open Common Data Environment





Thank You for Your Attention

Holger de Groot
Director | Modmation Pty Ltd

