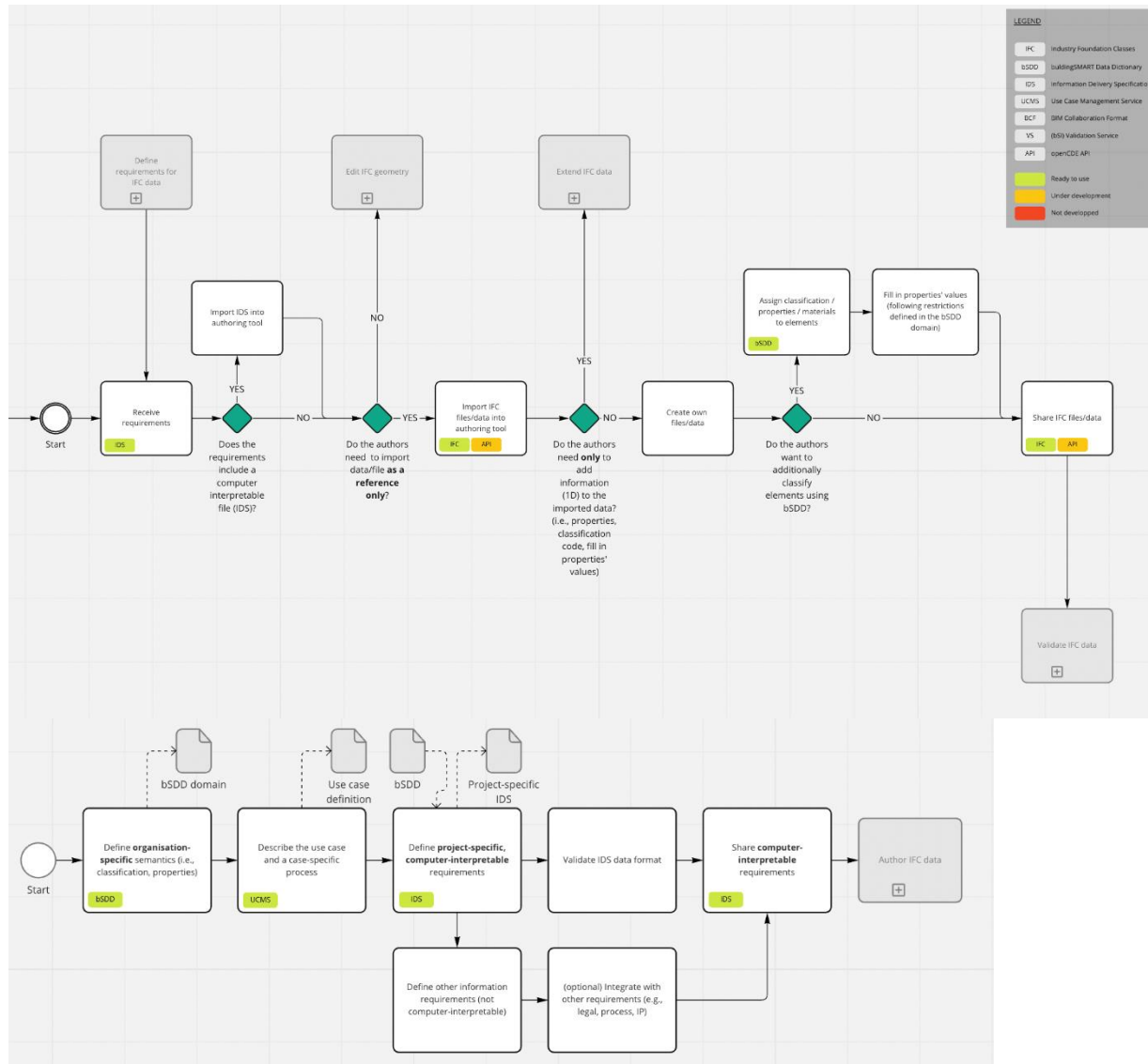


Adding value with openBIM Workflows



Which bSI solution can I use for my task?

Full workflow diagrams:

Solutions functionalities

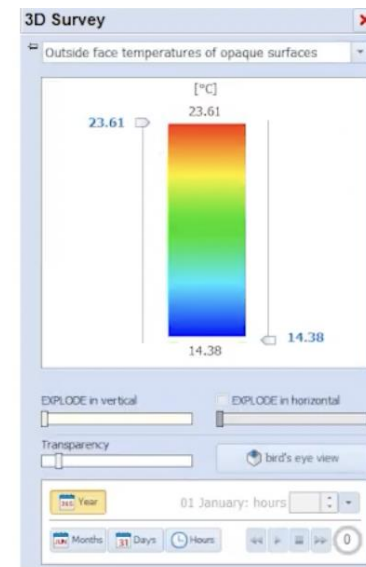
	UCM	bSDD	IDS	VS	IFC / openCDE API	BCF	Other tools
Define requirements for IFC data	<div>Describe the use case and a case-specific process</div> <div>UCM</div>	<div>Define organisation-specific semantics (i.e., classification, properties)</div> <div>bSDD</div> <div>Define project-specific, computer-interpretable requirements</div> <div>bSDD</div>	<div>Define project-specific, computer-interpretable requirements</div> <div>IDS</div> <div>Share computer-interpretable requirements</div> <div>IDS</div>				<div>(optional) Integrate with other requirements (e.g., legal, process, IP)</div> <div>Define other information requirements (not computer-interpretable)</div> <div>Validate IDS data format</div>
Author IFC data		<div>Assign classification / properties / materials to elements</div> <div>bSDD</div>	<div>Receive requirements</div> <div>IDS</div>	<div>Check bSDD classification compliance</div> <div>bSDD</div>	<div>Import IFC files/data into authoring tool</div> <div>IFC API</div>		<div>Fill in properties' values (following restrictions defined in the bSDD domain)</div>
Extend IFC data					<div>Share IFC files/data</div> <div>IFC API</div>		<div>Create own IFC files/data</div> <div>Import IDS into authoring tool</div>
Validate IFC data				<div>Validate IFC data against syntax and schema compliance</div> <div>VS</div> <div>(optional) Check bSDD classification compliance</div> <div>VS</div>	<div>Receive IFC data (from the author)</div> <div>IFC API</div>	<div>Log errors found in IFC data</div> <div>BCF</div> <div>Share errors found in IFC data (to the author)</div> <div>BCF</div>	<div>Validate IFC data against IDS requirements</div> <div>Validate IFC data against other requirements</div>



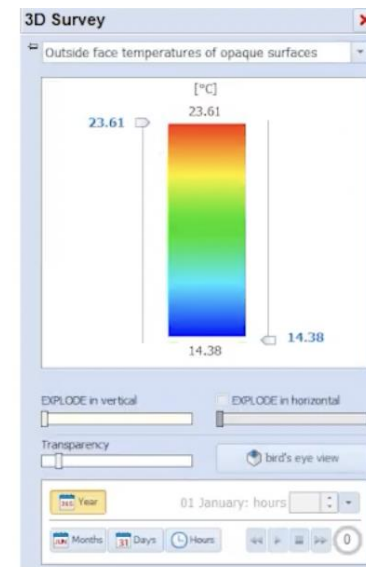
Example: Energy analysis

Example: Energy analysis

Simulation tool



What do we need?

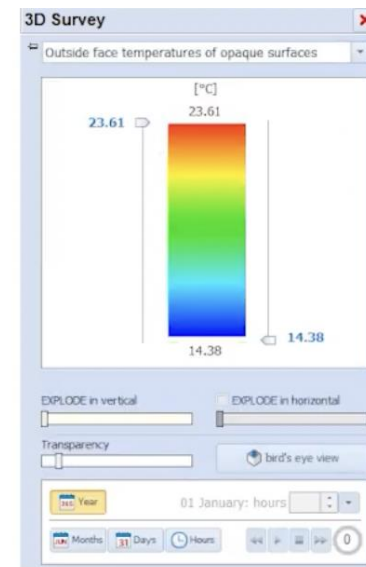


What do we need?

Walls

Windows

Rooms



What do we need?

Walls

Material

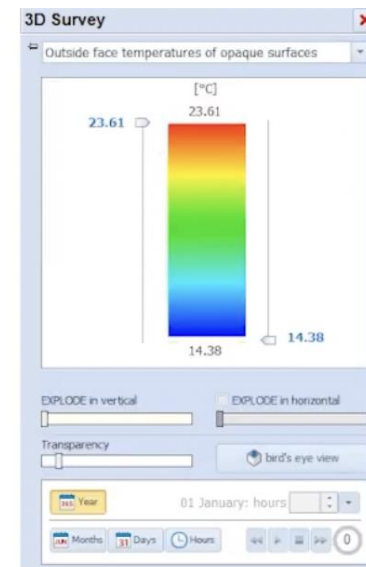
Windows

u Value

Rooms

Number of people

Type of room



What do we need?

Walls

Material

Windows

u Value

Rooms

Number of people

Type of room

Room id:

Type of room:

Window in room - id:

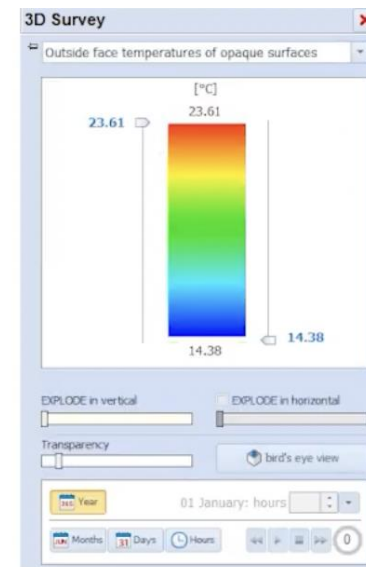
Window u value:

Wall around room - id:

Material of wall:

Complete the form to enable button.

Submit



What do we need?

Walls

Material

Windows

u Value

Rooms

Number of people

Type of room

Room id:

Type of room:

Window in room - id:

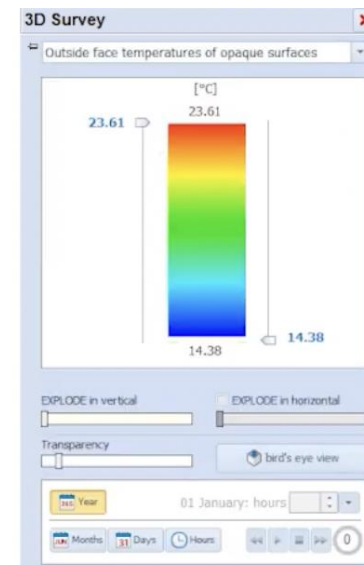
Window u value:

Wall around room - id:

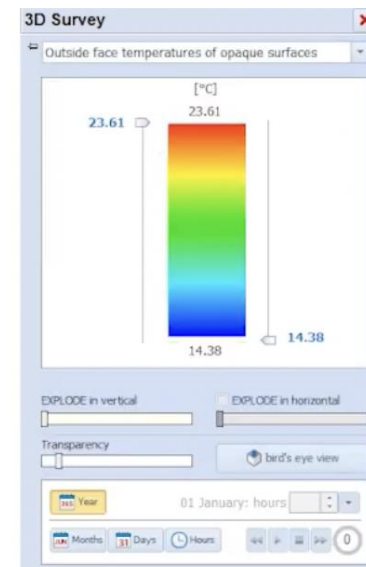
Material of wall:

Complete the form to enable button.

Submit



Type of room



What do we need?

Walls

Material

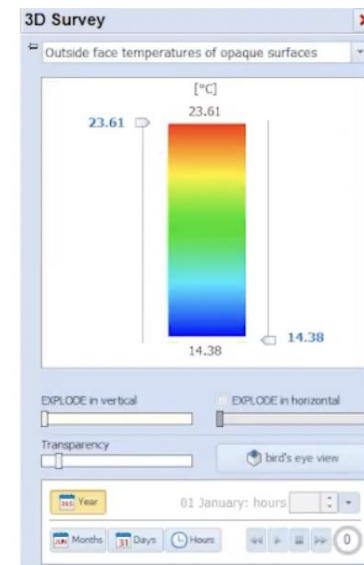
Windows

u Value

Rooms

Number of people

Type of room



What do we need?

Walls

Material

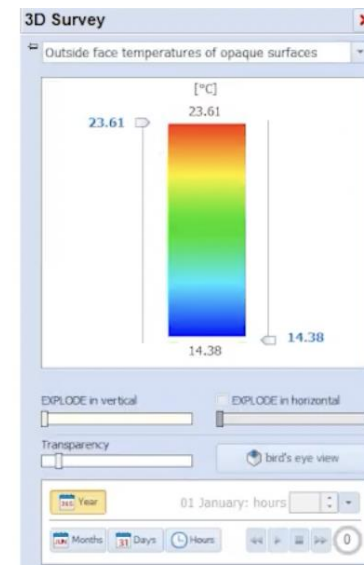
Windows

u Value

Rooms

Number of people

Type of room



What needs to be in here?



What do we need?

Walls

Material

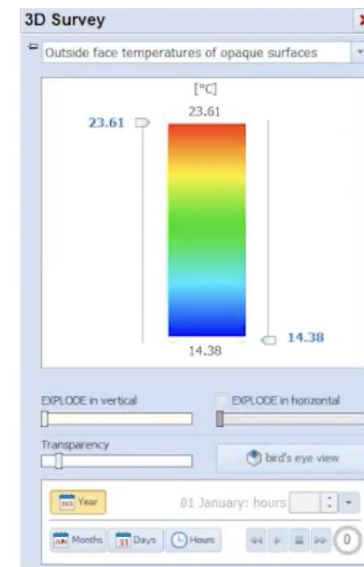
Windows

u Value

Rooms

Number of people

Type of room



What needs to be in here?

Walls

Material

Windows

u Value

Rooms

Number of people

Type of room



What do we need?

Walls

Material

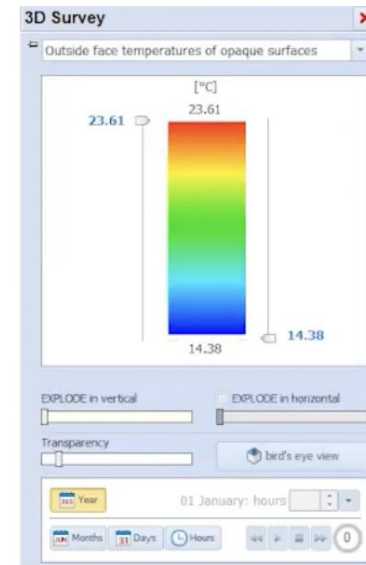
Windows

u Value

Rooms

Number of people

Type of room



How to put that in?



What do we need?

Walls

Material

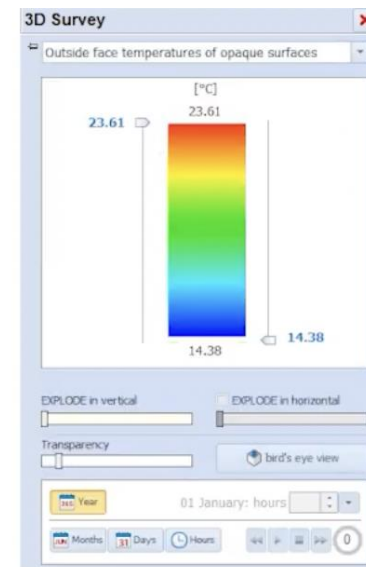
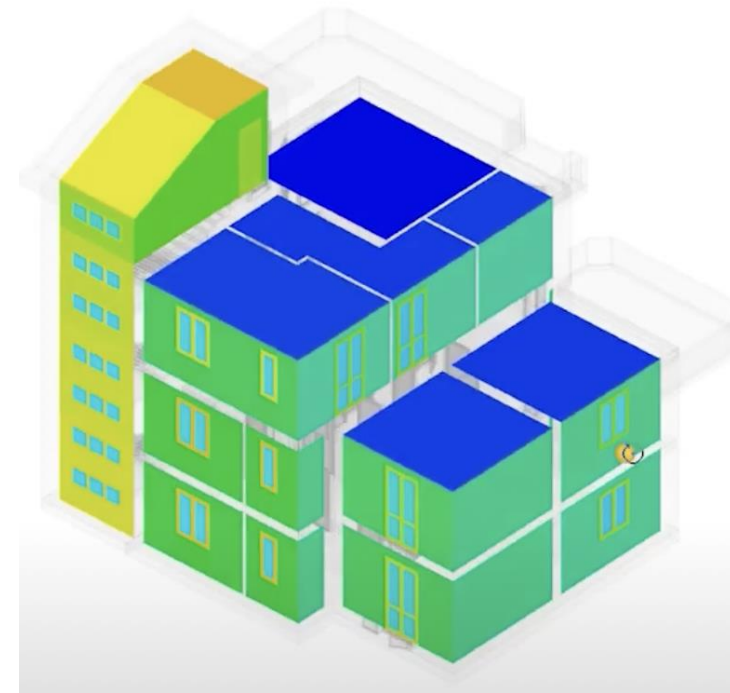
Windows

u Value

Rooms

Number of people

Type of room



How to put that in?
Form again?



What do we need?

Walls

Material

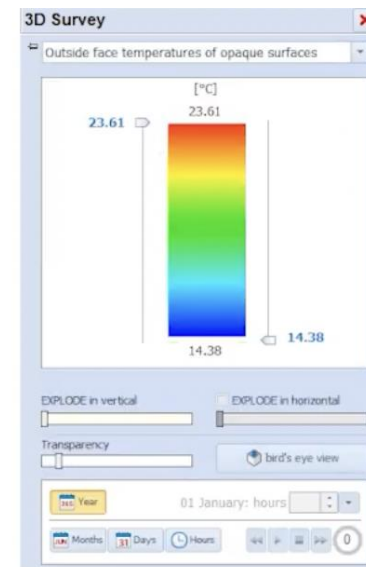
Windows

u Value

Rooms

Number of people

Type of room



What do we need?

IfcWall

IfcMaterial → choose from list

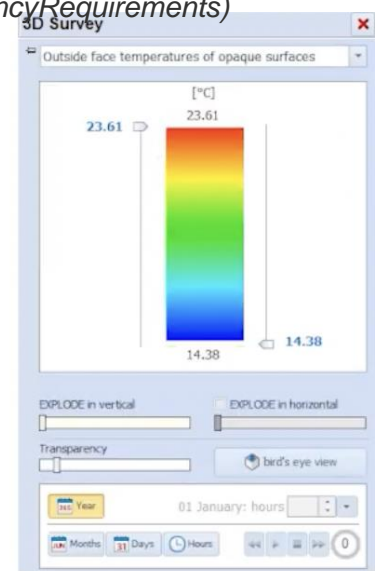
IfcWindow

ThermalTransmittanceSummer (*Pset_Pset_DoorWindowGlazi*)

IfcSpace

OccupancyNumber (*Pset_SpaceOccupancyRequirements*)

Uniclass



IFC

Uniclass

(National) material list

Extend with your own properties (when needed)



What do we need?

IfcWall

IfcMaterial → choose from list

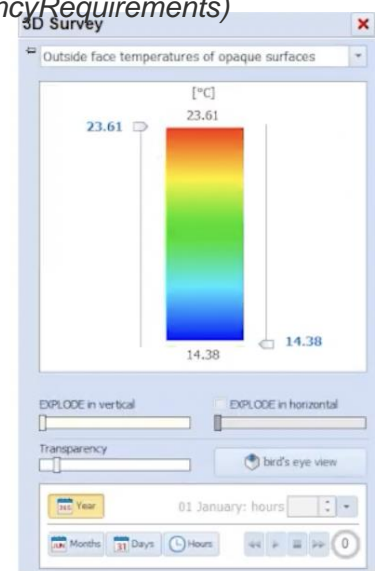
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazi

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



What do we need?

IfcWall

IfcMaterial → choose from list

IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



What do we need?

IfcWall

IfcMaterial → choose from list

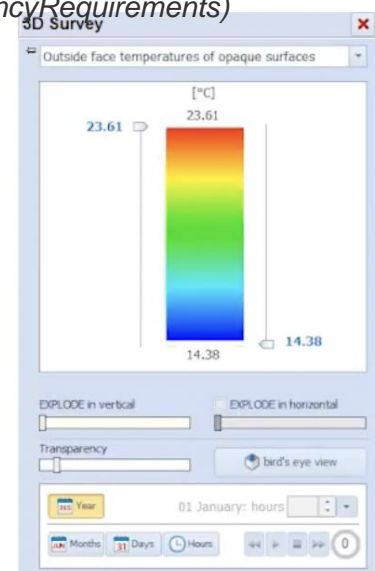
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



What do we need?

IfcWall

IfcMaterial → choose from list

IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



AUTOMATED

What do we need?

IfcWall

IfcMaterial → choose from list

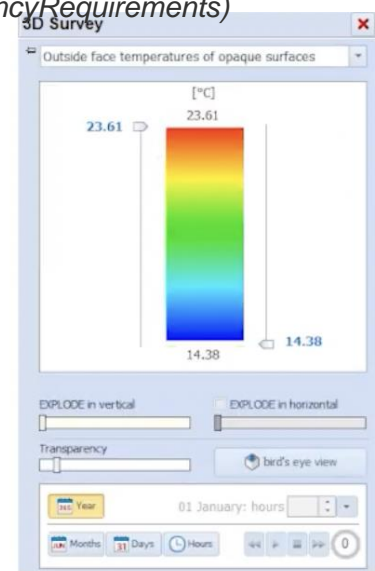
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



What do we need?

IfcWall

IfcMaterial → choose from list

IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



AUTOMATED



What do we need?

IfcWall

IfcMaterial → choose from list

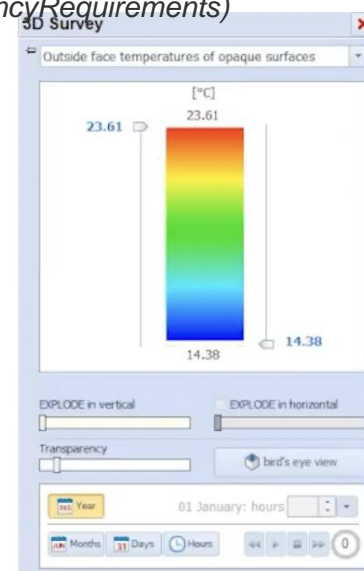
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazingType)

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



What if we use agreements?

IFC

Uniclass

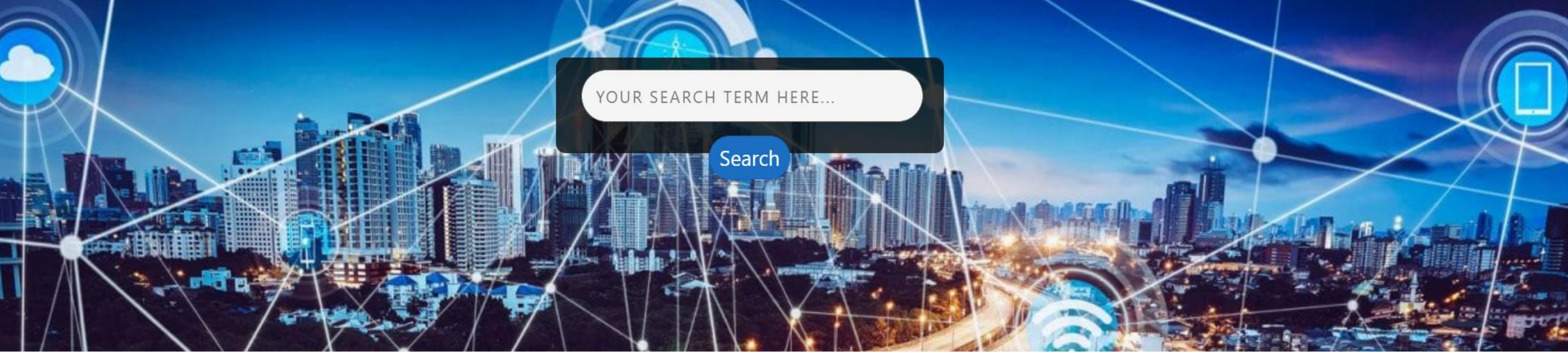
(National) material list

Many many more...

What if we **publish** the agreements?

IFC
Uniclass
(National) material list
ETIM
CCI
NL-Sfb
CoClass
Many many more...





search.bSDD.buildingSMART.org

All


Classifications

Properties


Domains

- ☐ IFC 4.3
- ☐ CCI Construction 1.0
- ☐ ETIM 8.0
- ☐ NL-SfB 2005 2.2
- ☐ Uniclass 2015 1
- ☐ UniversalTypes 1.0


Classification IFC > ... > IfcBuiltElement

IfcStair  A stair is a vertical passageway allowing occupants to walk step from one floor level to another floor level at a different elevat...


Classification IFC > ... > IfcStair

IfcStair.CURVED_RUN_STAIR  A stair extending from one level to another without turns or winders. The stair is consisting of one curved flight.


Classification IFC > ... > IfcStair

IfcStair.DOUBLE_RETURN_STAIR  A stair having one straight flight to a wide quarterspace landing, and two side flights from that landing into opposite directions...


Classification IFC > ... > IfcStair

IfcStair.HALF_TURN_STAIR  A stair making a 180 turn, consisting of two straight flights connected X 0D by a halfspace landing. The orientation of the turn i...


Classification IFC > ... > IfcStair

IfcStair.HALF_WINDING_STAIR  A stair consisting of one flight with one half winder, which makes a 180 turn. The orientation of the turn is determined by the wa...


Classification IFC > ... > IfcStair

IfcStair.LADDER  a piece of equipment consisting of a series of bars or steps between two upright elements used for climbing up or down something


Classification IFC > ... > IfcStair

IfcStair.QUARTER_TURN_STAIR  A stair making a 90 turn, consisting of two straight flights connected by a quarterspace landing. The direction of the turn is det...

Classification IFC > ... > IfcStair

IfcStair.QUARTER_WINDING_STAIR  A stair consisting of one flight with a quarter winder, which is making a 90 turn. The direction of the turn is determined by the ...

Classification IFC > ... > IfcStair

IfcStair.SPIRAL_STAIR  A stair constructed with winders around a circular newel often without landings. Depending on outer boundary it can be either a ci...

Classification IFC > ... > IfcStair

IfcStair.STRAIGHT_RUN_STAIR  A stair extending from one level to another without turns or winders. The stair consists of one straight flight.

Classification IFC > ... > IfcStair

IfcStair.THREE_QUARTER_TURN_STAIR 

All

Classifications

Properties

Domains

- ☐ IFC 4.3
- ☐ CCI Construction 1.0
- ☒ ETIM 8.0
- ☐ NL-SfB 2005 2.2
- ☐ Uniclass 2015 1
- ☐ UniversalTypes 1.0

Classification ETIM > ... > Stairs and railings

Accessories/spare parts for stairs and railings 


Classification ETIM > ... > Accommodation/storage space

Industrial stairway 

Classification ETIM > ... > Power tools

Stair cleaning device (electric) 

Classification ETIM > ... > Stairs and railings

Stair nosing 

Classification ETIM > ... > Stairs and railings

Stair rod 

Classification ETIM > ... > Power tools

Stair stringer milling machine (electric) 

Classification ETIM > ... > Devices for distribution board-/surface mounting

Staircase lighting timer 

Classification ETIM > ... >

Stairs and railings 

Property ETIM

Ramp and stair function

Property ETIM

Stair light and forewarn








Property ETIM

All

Classifications

Properties

Domains

☐ IFC 4.3☒ CCI Construction 1.0☐ ETIM 8.0☐ NL-SfB 2005 2.2☐ Uniclass 2015 1☐ UniversalTypes 1.0Classification [CCI Construction](#) > ... > [Level connecting component](#)**Flight of stairs**  level connecting object in the form of sequential stepsClassification [CCI Construction](#) > ... > [Positioning object](#)**Stair stringer**  positioning object for treadClassification [CCI Construction](#) > ... > [Access building](#)**Staircase tower**  access building designed to create non-automated vertical access between two or more storeysClassification [CCI Construction](#) > ... > [Assembly system](#)**Stairway construction**  assembly system establishing a step-wise link between two or more levelsClassification [CCI Construction](#) > ... > [Circulation space](#)**Stairwell**  circulation space vertically and non-automated between two or more storeys or levelsClassification [CCI Construction](#) > ... > [Ground surface construction system](#)**Terrain stairway/Terrain ramp construction**  ground surface construction system which connects spaces at different levelsClassification [CCI Construction](#) > ... > [Level connecting component](#)**Landing**  level connecting object in the form of a horizontal plane connected to a flight of stairs

 [Classification](#)

 [Landing](#)

ENGLISH

Namespace URI	http://identifier.buildingsmart.org/uri/molio/cciconstruction-1.0/class/L-XSA
Domain	CCI Construction
Domain version	1.0
Domain license	MIT license
Domain state	Released
More info	https://anvisninger.molio.dk/Gratis-vaerktojer/CCI_Klassifikation
Domain quality assurance procedure	Private
Owner	Molio
Parent classification	Level connecting component
Related IFC entity	IfcSlab
Description	level connecting object in the form of a horizontal plane connected to a flight of stairs

Properties

ConstructionMethod	The type of construction action to the building, the project deals with, e.g. new construction, renovation, refurbishment, etc.
------------------------------------	---

Property



ConstructionMethod

ENGLISH



Namespace URI	http://identifier.buildingsmart.org/uri/buildingsmart/ifc-4.3/prop/ConstructionMethod
Domain	IFC
Domain version	4.3
Domain license	Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International
Owner	buildingSMART Change request
Description	The type of construction action to the building, the project deals with, e.g. new construction, renovation, refurbishment, etc.
DataType	string

Classifications

Abutment	structural supporting object in a plane or curved surface form withstanding compression forces and bending moment
Balcony	assembly system that creates an adjoining outer user space built into wall system or roof system
Bay window	assembly system that creates an extended inner user space built into wall system
Beam	structural supporting object in a straight linear form withstanding bending moments
Cable tray	carrying object between discrete positions
Ceiling structure	structural system terminating a space upwards
Column	structural supporting object in a curved or straight linear form transferring compressing forces to other structural objects
Cooker hood	enclosing object for spot ventilation
Cubicle	enclosing object for devices
Dormer	assembly system that creates an extended inner user space built into roof system
Drive belt	mechanical energy guiding object by a belt
Fixed light fibre socket	light connecting object for pluggable connections
Flight of stairs	level connecting object in the form of sequential steps
Floor structure	structural system terminating a space downwards
Foundation construction	assembly system forming separation towards underground
Foundation structure	structural system connecting a construction entity with the underground
Gutter	open enclosure guiding object for liquid in open conduit
High voltage socket	high voltage connecting object for pluggable connections
High voltage terminal	high voltage connecting object for a single connection

All

Classifications

Properties

Domains

- ☐ IFC 4.3
- ☐ CCI Construction 1.0
- ☐ ETIM 8.0
- ☒ NL-SfB 2005 2.2
- ☐ Uniclass 2015 1
- ☐ UniversalTypes 1.0

Classification NL-SfB 2005 > ... > (75.1) vaste onderhoudsvoorzieningen; standaard

(75.13) vaste onderhoudsvoorzieningen; standaard, gevelonderhoudsvoorzieningen 

Classification NL-SfB 2005 > ... > (75.1) vaste onderhoudsvoorzieningen; standaard

(75.12) vaste onderhoudsvoorzieningen; standaard, interieur onderhoudsvoorzieningen 


Classification NL-SfB 2005 > ... > (75.1) vaste onderhoudsvoorzieningen; standaard

(75.11) vaste onderhoudsvoorzieningen; standaard, gebouwonderhoudsvoorzieningen 


Classification NL-SfB 2005 > ... > (24.3) trappen en hellingen; ladders en klimijzers

(24.32) trappen en hellingen; ladders en klimijzers, klimijzers 

Classification NL-SfB 2005 > ... > (24.3) trappen en hellingen; ladders en klimijzers

(24.31) trappen en hellingen; ladders en klimijzers, ladders 

Classification NL-SfB 2005 > ... > (75.2) vaste onderhoudsvoorzieningen; bijzonder

(75.23) vaste onderhoudsvoorzieningen; bijzonder, gemechaniseerde gevelonderhoudsvoorzieningen 

Classification NL-SfB 2005 > ... > (75.2) vaste onderhoudsvoorzieningen; bijzonder

(75.22) vaste onderhoudsvoorzieningen; bijzonder, interieuronderhoudsvoorzieningen 

Classification NL-SfB 2005 > ... > (75.2) vaste onderhoudsvoorzieningen; bijzonder

(75.21) vaste onderhoudsvoorzieningen; bijzonder, gebouwonderhoudsvoorzieningen 

Classification NL-SfB 2005 > ... > (24.1) trappen en hellingen; trappen

(24.13) trappen en hellingen; trappen, spiltrappen 

Classification NL-SfB 2005 > ... > (24.1) trappen en hellingen; trappen

(24.11) trappen en hellingen; trappen, rechte steektrappen 

Classification NL-SfB 2005 > ... > (24.1) trappen en hellingen; trappen

So far:

- Industry Foundation Classes (IFC)
 - Global agreement on objects, properties, geometry, etc.
 - Global *foundation* agreements

So far:

- Industry Foundation Classes (IFC)
 - Global agreement on objects, properties, geometry, etc.
 - Global *foundation* agreements
- Other standards
 - They exist!
 - Niche industries, country specific, simulation specific, etc.

So far:

- Industry Foundation Classes (IFC)
 - Global agreement on objects, properties, geometry, etc.
 - Global *foundation* agreements
- Other standards
 - They exist!
 - Niche industries, country specific, simulation specific, etc.
- bSDD
 - Publishing standards
 - Including Product Data Templates, Materials, etc.
 - Allows other standards to extend IFC

Back to our use-case



This is what simulation needs:

IfcWall

IfcMaterial → choose from list

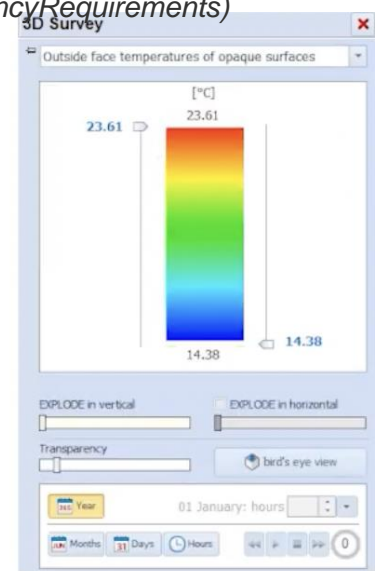
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazi

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



How do I know what you need?



This is what simulation needs:

IfcWall

IfcMaterial → choose from list

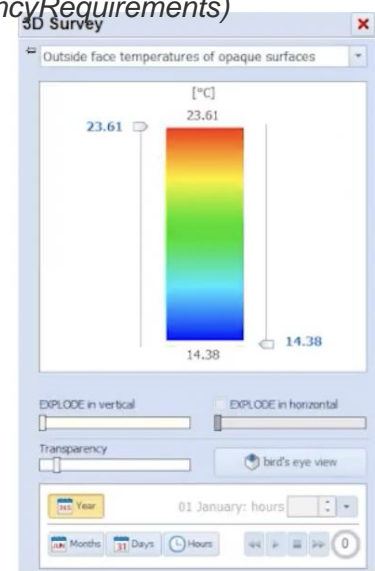
IfcWindow

ThermalTransmittanceSummer (Pset_Pset_DoorWindowGlazi

IfcSpace

OccupancyNumber (Pset_SpaceOccupancyRequirements)

Uniclass



Define what you need:

Define what you need:

- Excel!

Define what you need:

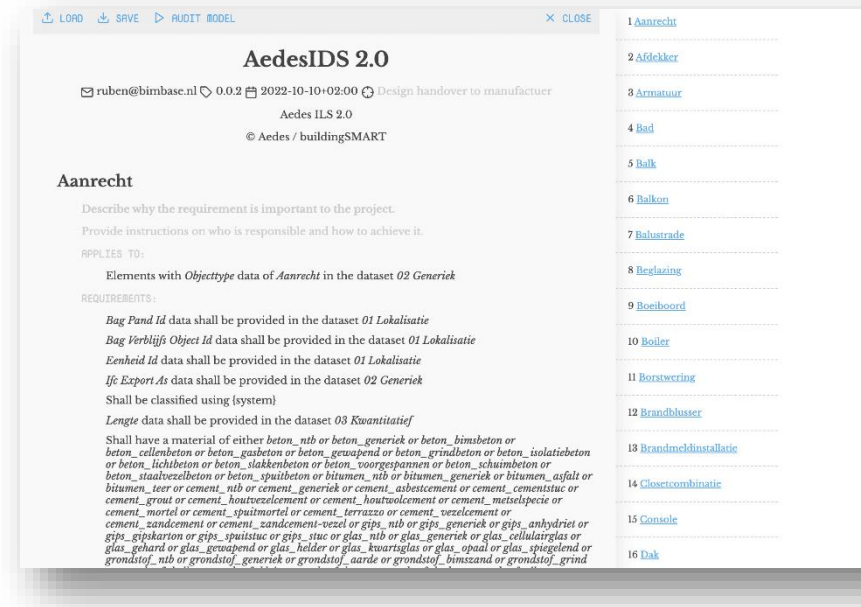
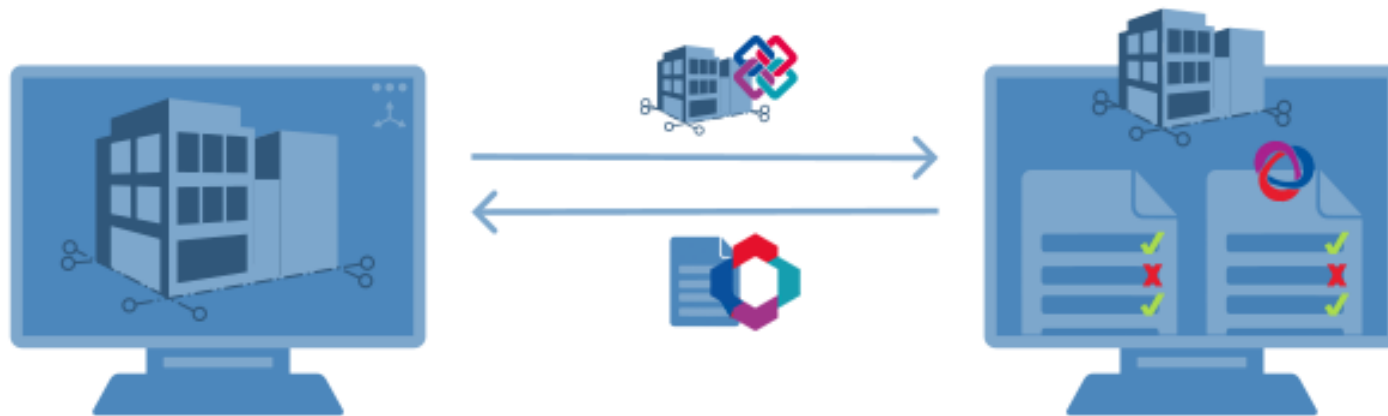
- Excel!
- Information Delivery Specification (IDS)
- Product Data Templates (PDT)
- Information Delivery Manual (IDM & idmXML)
- Exchanges (mvdXML)
- Level of Information Need (LOIN)
- So many more...

Define what you need:

buildingsmart.org/information-requirements/



Information Delivery Specification (IDS)



So far:

- Industry Foundation Classes (IFC)
 - Global (*foundation*) agreement on objects, properties, geometry, etc.
- Other standards
 - Niche industries, country specific, simulation specific, etc.
- bSDD
 - Publishing standards
- Information Delivery Specification (IDS)
 - Define what you need for your situation / use-case / tool / project / whatever

Is there more?

- Way too much....

Is there more?

- Way too much.... But my time is up...

Bonus round

- Want to check if your IFC file is valid?
- Want to check if your data is consistent against bSDD data?
- Want to get 'sanity' check on your data?

- BETA Test

validate.buildingSMART.org

Bonus rounds

- What if something is wrong?
- What if you want to discuss an object?
- What if you want someone else to contribute to something?
- BIM Collaboration Format (BCF)
 - Agreements on how to do messaging about BIM objects

Bonus rounds in reserve time

- Want to know what other did?
 - Want to get a 'best practice' to use?
 - Want to share your best practice with others?
 - Want to see what buildingSMART Rooms produced?
-
- Use-case Management Service
ucm.buildingSMART.org

Bonus rounds in reserve time

- Want to know even more?

Bonus rounds in reserve time

- Want to know even more?

Become a member of buildingSMART Turkiye!



Teşekkürler!

Leon.vanBerlo@buildingSMART.org