

# SOLIBRI

A NEMETSCHKE COMPANY

## Model Checking for Quality

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Building the Future Together

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We drive open standards. Our customers can choose the best solution for their needs.

**Innovative**

We have a history of pioneering technology. Our Group of strong, individual brands fosters innovation and entrepreneurship.

**Focused**

We are the software provider solely dedicated to the AEC market. We have a portfolio of brands that thoroughly understands the customers' needs in this industry.

**Solid**

We are built to last: Financially solid, reliable and with a long-term strategy, the Nemetschek Group and its brands are a trustworthy partner.

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**BLUEBEAM**

CREM **SOLUTIONS**

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dRofus

**FRILO**  
Software

**GRAPHISOFT**

**MAXON**

**MCS**  
SOLUTIONS

**NEVARIS**

**PRECAST** | SOFTWARE engineering

**IRISA**

**SCIA**

**SDS/2**

**SOLIBRI**

**V**

**VECTORWORKS**

# The Continuing Need For Quality.....

# Can we manage and understand complex product systems?

The Berlin Brandenburg Airport's feasibility and preplanning phase took about 15 years. Construction started in 2006, and the airport was expected to take five years to be built. The target opening date was Oct. 30, 2011. Today, over six years later, the airport has yet to open. The latest estimate of project costs is €7.9 billion, almost 50 percent above the approved budget of €5.4 billion!

Photo credit: Micagoto,

# Can we manage and understand complex product systems?

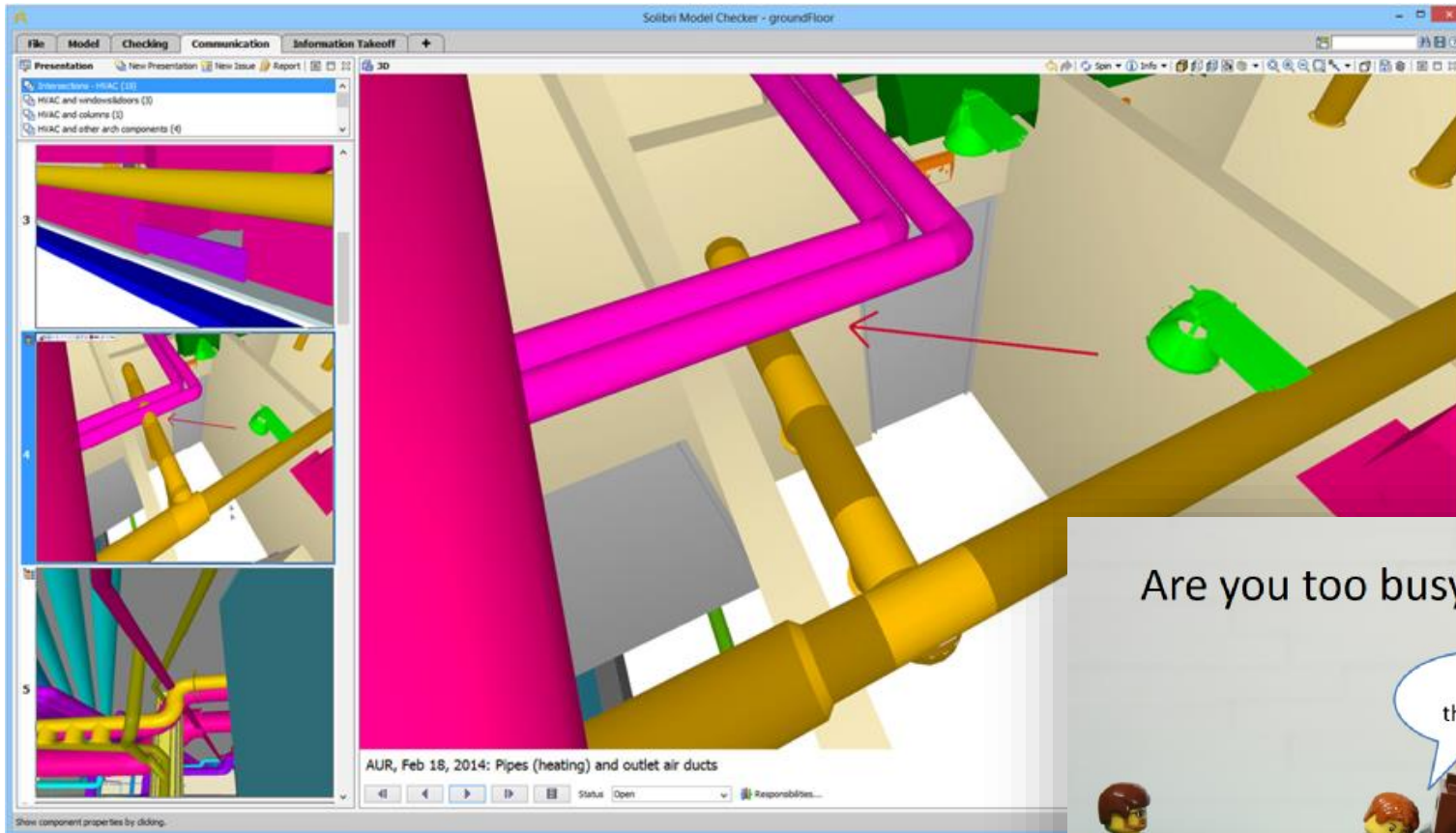
The Berlin Brandenburg Airport project encountered significant quality issues, which is surprising in a country so focused on excellence and high-quality standards. Reports indicate that **66,500 defects** were found, **34,000 are described as “significant”** and **5,845 as “critical.”** Critical defects included a non-functional fire protection, an alarm system that was not built in accordance with appropriate building codes, wrongly placed smoke extractors, conducts without isolation, and walls built to the wrong fire rating.

Photo credit: Micagoto, F

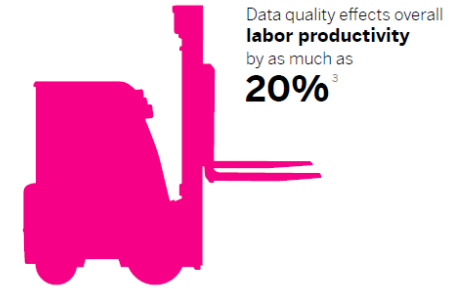
# What does Model Checking Mean?

A woman in a black dress stands in a meeting room, pointing at a large screen displaying a complex diagram. Two men are seated at a desk in the foreground, looking at the screen. The room is dimly lit, and the overall atmosphere is professional and collaborative.

# Is It Enough To Only Do Clash Detection?



But is data quality really that important?



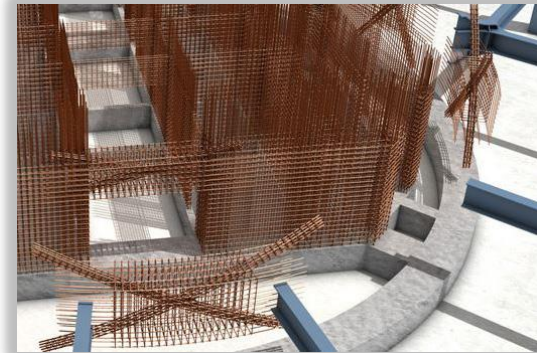
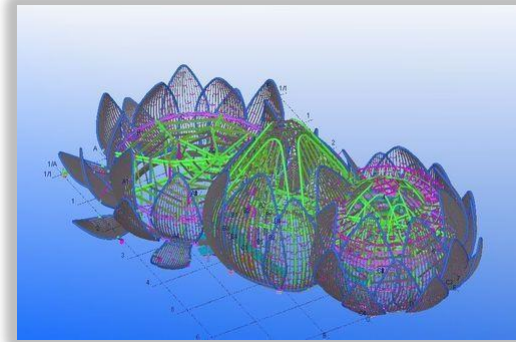
Source: Gartner, Measuring the Business Value of Data Quality Published: 10 October 2011

How do you Quality Assure your geometry or your data?

Is your model fit for purpose?

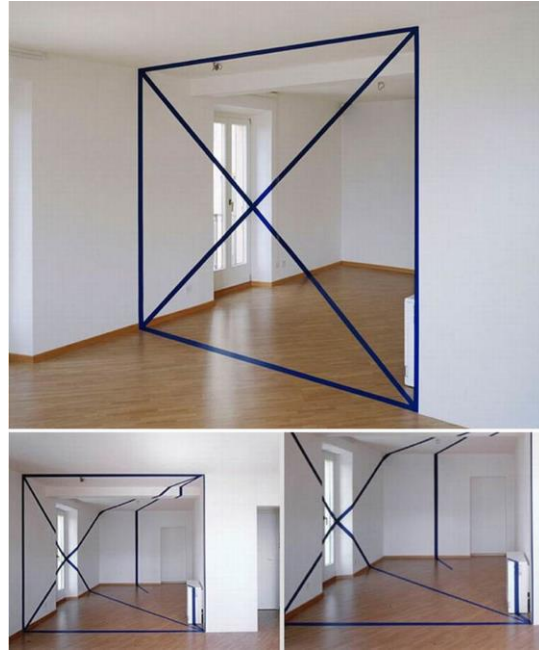
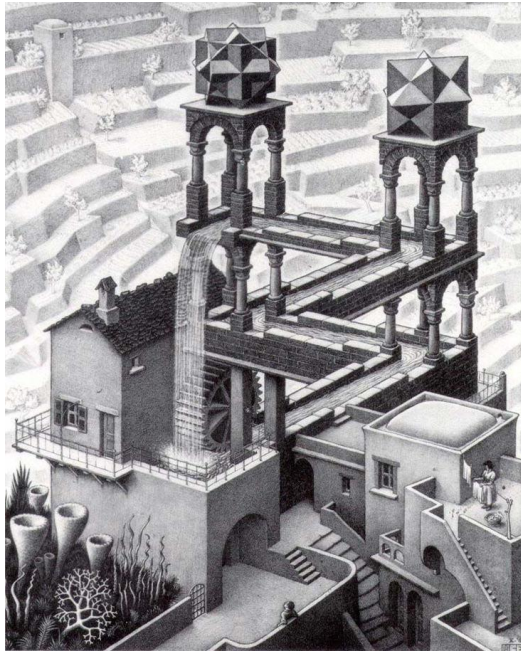


## Fantastic Model Examples Everywhere





## But Is Everything Quite What It Seems?



~~More or less~~ every model we see has errors!!

People take shortcuts

Models often used primarily for drawings. As long as the drawing looks right ...

Its not my job

# What's In A Building Information Model ?



## A Collection of Data

- Geometric shapes
- Components
- Objects/Families
- Relationships
- Attributes
- Constraints
- Classifications
- Metadata
- Other

## Which Must Conform To ...

- Standards (Industry, Company or Project)
- Protocols
- Regulations
- Best Practise



# BIM Use Cases

## Some Examples

# Accessibility

Solibri Model Checker - KP\_COMBINED\_ORIENTED\_Classified\_10\_11\_checks\_1850\_13\_03\_13

File Model Checking Communication Information Takeoff COBie Work Packages + To-Do (2/3)

**Checking**

- Ruleset
  - 407.5 Elevator Door Requirements
    - 407.3.6 Width
  - Chapter 5. General Site and Building Elements
    - 504 Stairways
      - 504.2 Treads and Risers
      - 504.3 Open Risers
      - 504.5 Nosings
  - Chapter 6. Plumbing Elements and Facilities
    - 603 Toilet and Bathing Rooms
      - 603.2.1 Turning Space
    - 604 Water Closets and Toilet Compartments
  - Chapter 8. Special Rooms, Spaces, and Elements
  - ICC - International Building Code (2009)
  - Chapter 10 - Means of Egress

**Result Summary**

	🚨	⚠️	⚠️	❌	✅
Issue Count	0	273	0	0	0
Issue Density	0	0.59	0	0	0

**Results** No Filtering Automatic

Results

- WC [0/273]
  - No Free Floor for Wheelchair Turning Space ø5' [0/273]

**Info**

No Free Floor for Wheelchair Turning Space ø5'

Description Hyperlinks

3D

LEVEL 1 GSA Design Gross Area 0.00 m2

LEVEL 4 GSA Design Gross Area 0.00 m2

LEVEL 2 GSA Design Gross Area 0.00 m2

LEVEL 3 GSA Design Gross Area 0.00 m2

LEVEL 1 GSA Design Gross Area 0.00 m2

Selected: 0

# Accessibility

**Checking**

- 407.3 Elevator Door Requirements
  - 407.3.6 Width
- Chapter 5. General Site and Building Elements
  - 504 Stairways
    - 504.2 Treads and Risers
    - 504.3 Open Risers
    - 504.5 Nosing
  - Chapter 6. Plumbing Elements and Facilities
    - 603 Toilet and Bathing Rooms
      - 603.2.1 Turning Space
        - 604 Water Closets and Toilet Compartments
    - Chapter 8. Special Rooms, Spaces, and Elements
    - ICC - International Building Code (2009)
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**Result Summary**

	🚩	⚠️	⚠️	✖️	✅
Issue Count	0	273	0	0	0
Issue Density	0	0.59	0	0	0

**Results**

- WC [0/273]
  - No Free Floor for Wheelchair Turning Space  $\phi 5'$  [0/273]
    - ACC TLT/SH [0/1]
      - (A) Space.4.352 : ACC TLT/SH[3312A]
      - ACC TLT/SHW [0/1]
      - ACC TLT/SHWR [0/1]
      - ACC TOIL/SHW [0/1]
      - ACC. TLT/SHWR [0/2]
      - FEMALE TOILET, STAFF [0/1]
      - MEN TOILET / SHOWER ROOM [0/1]
      - PATIENT TLT [0/246]
      - PATIENT TOILET [0/3]
      - STAFF MEN TOILET [0/1]
      - STAFF TOILET FEMALE [0/1]

**Info**

ACC TLT/SH

Description	Hyperlinks

Selected: 0

# Missing Components

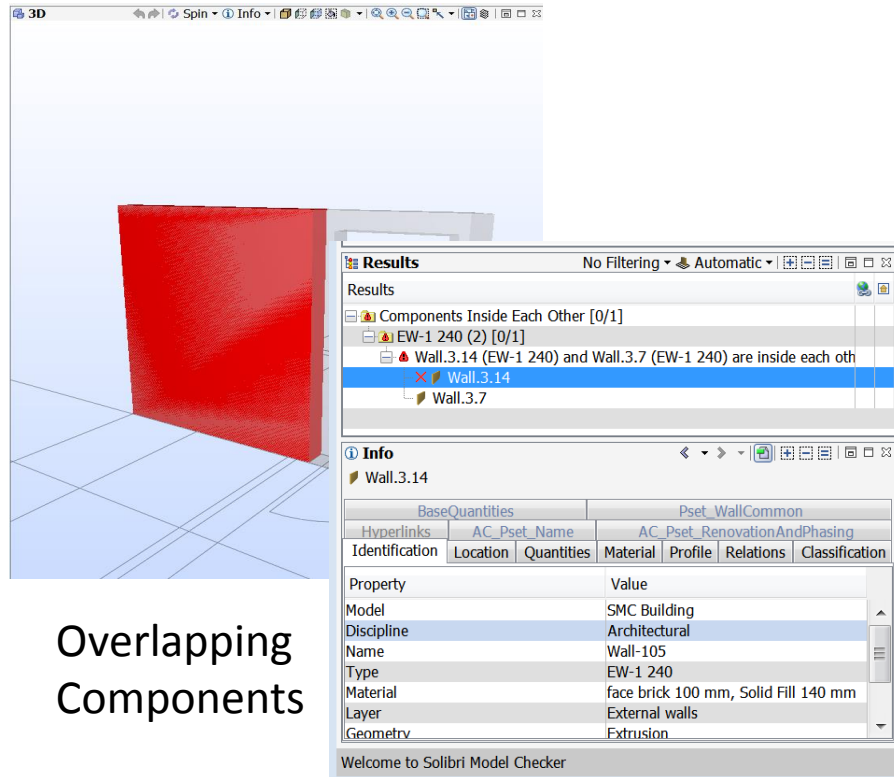
The screenshot shows the Solibri Model Checker interface. The main window displays a 3D perspective view of a consulting room with three desks and chairs. The room is labeled 'Consult Exam 1' and 'Consult Exam 3'. The left sidebar contains several panels: 'Checking' with a ruleset 'ADB Compliance', 'Result Summary' showing issue counts, 'Results' listing errors, and 'Info' for the selected component.

Issue Count	2	0	3	0	0
Issue Density	10	0	15	0	0

Property	Value
Model	(Arch) Consult Exam Room Solbri ADB Demo
Discipline	Architectural
Name	CHA318
Type	Chair 06 15
Material	Background
Layer	810P Group 3 FFE
Geometrv	Boundary Representation

Solibri is also very good at checking for things that are missing. In this example, 3 consulting rooms in a hospital should all have the same standard equipment according to the room data sheets from the NHS. Because we know the type of space we can check all specified equipment is present against an external table Solibri has checked two of the consulting rooms and found they conform to the required specification but the third room has a patient chair missing.

# Other Checks



**Results** No Filtering Automatic

Results

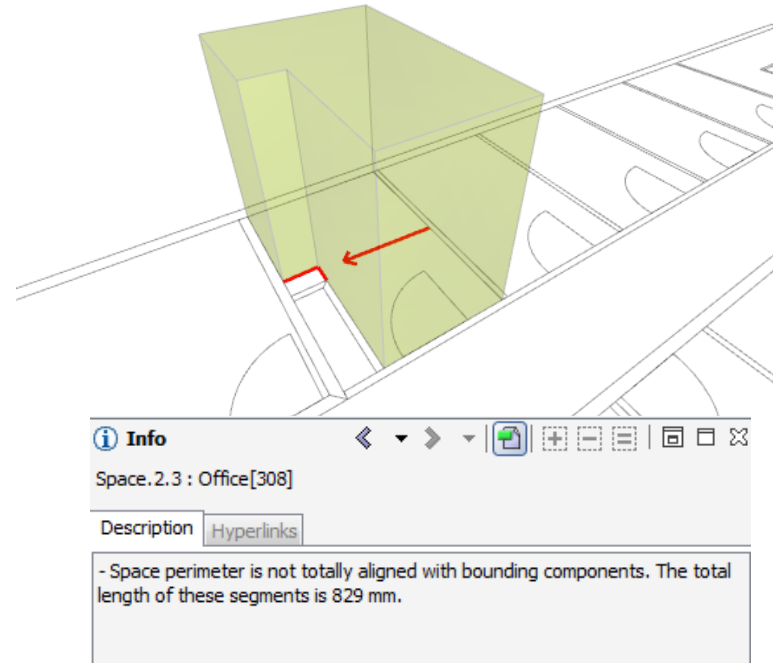
- Components Inside Each Other [0/1]
- EW-1 240 (2) [0/1]
- Wall.3.14 (EW-1 240) and Wall.3.7 (EW-1 240) are inside each other
- Wall.3.14
- Wall.3.7

**Info** Wall.3.14

BaseQuantities		Pset_WallCommon	
Hyperlinks	AC_Pset_Name	AC_Pset_Name	AC_Pset_RenovationAndPhasing
Identification	Location	Quantities	Material Profile Relations Classification
Property	Value		
Model	SMC Building		
Discipline	Architectural		
Name	Wall-105		
Type	EW-1 240		
Material	face brick 100 mm, Solid Fill 140 mm		
Layer	External walls		
Geometry	Extrusion		

Welcome to Solibri Model Checker

Overlapping Components



**Info** Space.2.3 : Office[308]

Description Hyperlinks

- Space perimeter is not totally aligned with bounding components. The total length of these segments is 829 mm.

Space Validation

# Egress and Occupancy

The screenshot displays the Solemnity US - Solibri Model Checker interface. The main window shows a 3D model of a building with blue lines indicating egress routes. The left panel, titled 'Constraint Set', lists various checks with their status. The bottom panel, titled 'Visualization', shows options for displaying components, occupancies, fire compartments, and exits, along with a floor level selection list.

Constraint Set	Status
BIM Validation Process	⚠️ ⚠️ ⚠️ ❌
Visualization	⚠️ ⚠️ ⚠️
Model Integrity	⚠️ ⚠️ ⚠️ ❌
Space Measurement	⚠️ ⚠️ ⚠️
Quantity Take-off	⚠️ ⚠️ ⚠️
Egress Analysis and Zone Management	⚠️ ⚠️ ⚠️
Escape Routes	⚠️
Fire Compartment Requirements	⚠️
Fire Wall Requirements	⚠️ ⚠️
Doors Must Be Connected to Spaces	⚠️
Minimum Door Dimensions	⚠️
Fire Compartments and Spaces	✅
Spaces Must Have an Access	✅
Building Codes	⚠️
Organization's Best Practices	⚠️ ⚠️

Visualization options:

- Show Components
- Show Occupancies
- Show Fire Compartments
- Show Exits

Floor Level Selection:

- Ground floor
- First floor
- Second floor
- Roof



# Fire Zones

**Solemnity US - Solibri Model Checker**

File Checking 3D Tools Window Help

Checking Model Tree

Constraint Set

- BIM Validation Process
  - Visualization
  - Model Integrity
  - Space Measurement
  - Quantity Take-off
  - Egress Analysis and Zone Management
    - Escape Routes
    - Fire Compartment Requirements
    - Fire Wall Requirements
    - Doors Must Be Connected to Spaces
    - Minimum Door Dimensions
    - Fire Compartments and Spaces
    - Spaces Must Have an Access
  - Building Codes
    - Component Type Code
    - Space Code
    - Drawing Layer Code
  - Organization's Best Practices

3D

Parameters Results Tools Compartmentation Info

Compartment	Storey	Area	...
Gross Areas			...
Fire Compartments			...
Fire Compartment.0.1	Ground floor	85,852.6 sq in	...
Fire Compartment.0.2	Ground floor	182,325.3 sq in	...
Fire Compartment.1.1	First floor	86,178.9 sq in	...
Fire Compartment.1.2	First floor	204,776.3 sq in	...
Fire Compartment.2.1	Second floor	86,167.3 sq in	...
Fire Compartment.2.2	Second floor	204,793.2 sq in	...
Fire Compartment.3.1	Roof	18,212.6 sq in	...
Secure Compartments			...

# Site Safety

Solibri Model Checker - Site\_Safety\_Example

File Model Checking Communication Information Takeoff COBie Work Packages +

Checking

Ruleset

- OSHA - 1926 - SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION
  - 1926 Subpart D - Occupational Health and Environmental Hygiene
    - 1926 Subpart F - Fire Protection and Prevention
    - 1926 Subpart M - Fall Protection
      - 1926.501 - Duty to have fall protection.
        - 1926.501(b)(1) - "Unprotected sides and edges" ⚠ ✖
        - 1926.501(b)(4) - "Holes." ⚠ ✖
        - 1926.502 - Fall protection systems criteria and practices ⚠ ✖
      - 1926 Subpart X - Ladders OK

Result Summary

	⚠	⚠	⚠	✖	✓
Issue Count	5	0	0	5	0
Issue Density	0.25	0	0	0.25	0

Results

No Filtering Automatic

Results

- ✖ Slabs of Type 7" max riser 11" tread Aren't Near Walls [2/2]
  - ✖ Slab.2
  - ✖ Slab.3
- ✖ Slabs of Type Generic - 12" Aren't Near Walls [2/2]
  - ✖ Slab.3.1
    - ✖ Slab.3.1
    - Related Components
      - ✖ Slab.2.1
  - ✖ Slab.2.1
- ✖ Slabs of Type Non-Monolithic Landing Aren't Near Walls [1/1]
  - ✖ Slab.1

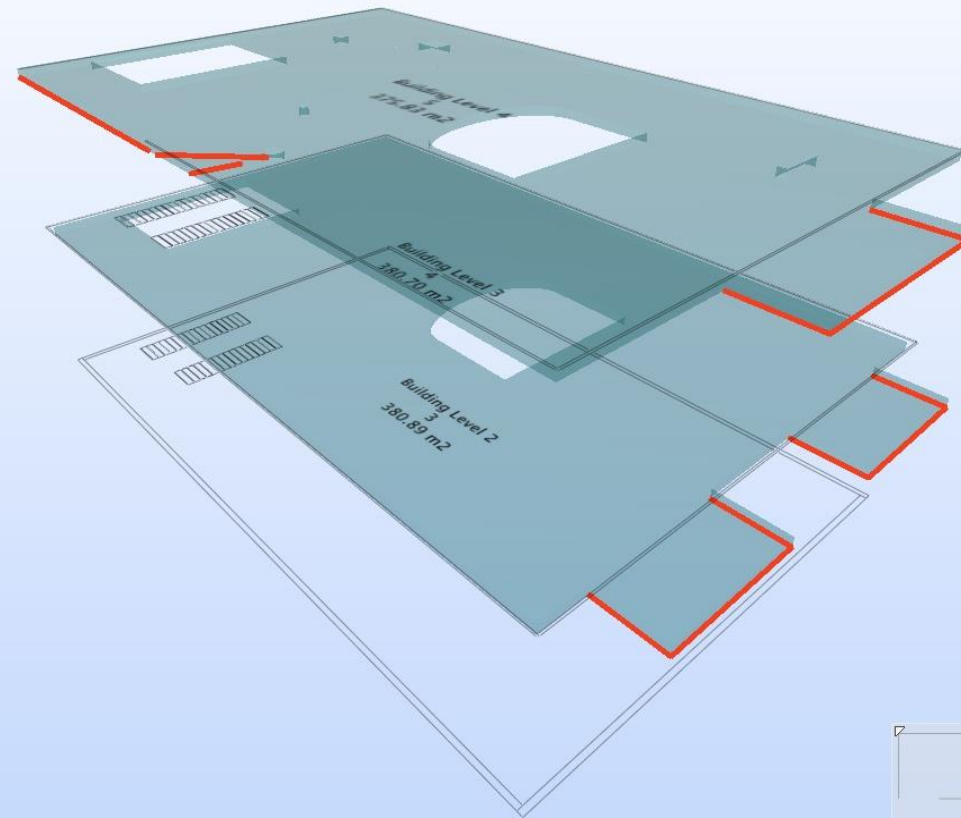
Info

Slab.3.1

Description Hyperlinks

The slab footprint contains 5 sections that don't meet walls or other slabs. The total length of these sections is 99'-8 15/16".

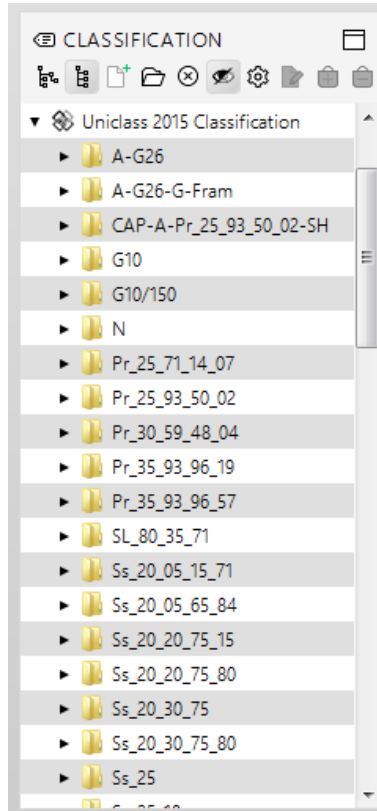
Location:  
Level 7



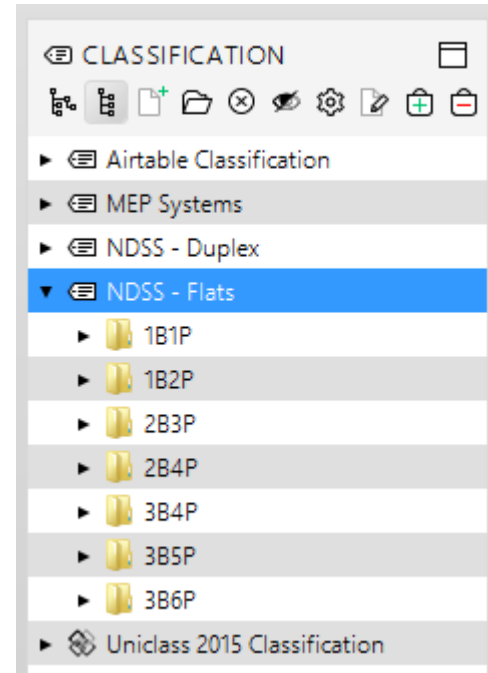
Selected: 0

## Classifications

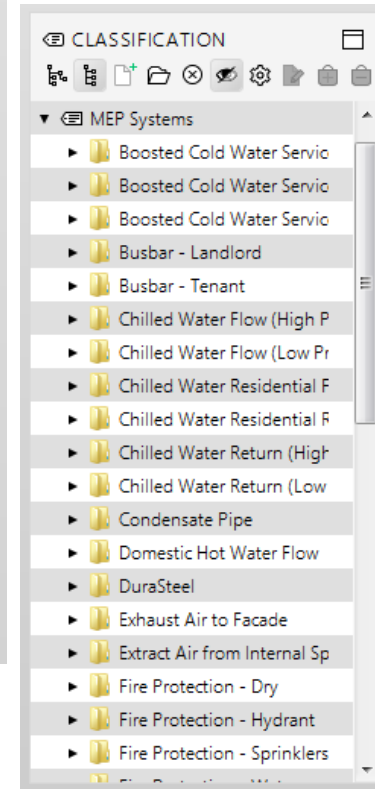
Classifications in Solibri are a way of filtering the model and visualising data and when combined with our Information Take Off functionality it provides a powerful tool



Uniclass 2015



NDSS



MEP Systems

# Information Take Off

Floor	Space Usage	Total Area	Average Area	Count	Color
(ARCH) Story-1	Bathroom	55.0 m2	4.6 m2	12	Yellow
(ARCH) Story-1	Circulation	158.8 m2	19.8 m2	8	Orange
(ARCH) Story-1	Elevator	12.5 m2	4.2 m2	3	Red
(ARCH) Story-1	Kitchen	36.0 m2	9.0 m2	4	Pink
(ARCH) Story-1	Residence	570.0 m2	28.5 m2	20	Light Blue
(ARCH) Story-1	Special	2,824.0 m2	88.3 m2	32	Light Green
(ARCH) Story-1	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-1	Technical	35.0 m2	11.7 m2	3	Light Purple
(ARCH) Story-2	Bathroom	55.0 m2	4.6 m2	12	Yellow
(ARCH) Story-2	Circulation	158.8 m2	19.8 m2	8	Orange
(ARCH) Story-2	Elevator	12.5 m2	4.2 m2	3	Red
(ARCH) Story-2	Kitchen	36.0 m2	9.0 m2	4	Pink
(ARCH) Story-2	Residence	570.0 m2	28.5 m2	20	Light Blue
(ARCH) Story-2	Special	2,824.0 m2	88.3 m2	32	Light Green
(ARCH) Story-2	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-2	Technical	35.0 m2	11.7 m2	3	Light Purple
(ARCH) Story-3	Bathroom	55.0 m2	4.6 m2	12	Yellow
(ARCH) Story-3	Circulation	158.8 m2	19.8 m2	8	Orange
(ARCH) Story-3	Elevator	12.5 m2	4.2 m2	3	Red
(ARCH) Story-3	Kitchen	36.0 m2	9.0 m2	4	Pink
(ARCH) Story-3	Residence	570.0 m2	28.5 m2	20	Light Blue
(ARCH) Story-3	Special	3,024.0 m2	8.7 m2	1	Light Yellow
(ARCH) Story-3	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-3	Technical	35.0 m2	11.7 m2	3	Light Purple
(ARCH) Story-4	Bathroom	55.0 m2	4.6 m2	12	Yellow
(ARCH) Story-4	Circulation	158.8 m2	19.8 m2	8	Orange
(ARCH) Story-4	Elevator	12.5 m2	4.2 m2	3	Red
(ARCH) Story-4	Kitchen	36.0 m2	9.0 m2	4	Pink
(ARCH) Story-4	Residence	570.0 m2	28.5 m2	20	Light Blue
(ARCH) Story-4	Special	2,824.0 m2	88.3 m2	32	Light Green
(ARCH) Story-4	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-4	Technical	35.0 m2	11.7 m2	3	Light Purple
(ARCH) Story-5	Circulation	73.8 m2	73.8 m2	1	Light Green
(ARCH) Story-5	Elevator	12.5 m2	12.5 m2	1	Light Yellow
(ARCH) Story-5	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-5	Technical	35.0 m2	35.0 m2	1	Light Purple
(ARCH) Story-6	Circulation	73.8 m2	73.8 m2	1	Light Green
(ARCH) Story-6	Elevator	12.5 m2	12.5 m2	1	Light Yellow
(ARCH) Story-6	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-6	Technical	35.0 m2	35.0 m2	1	Light Purple
(ARCH) Story-7	Bathroom	55.0 m2	55.0 m2	1	Yellow
(ARCH) Story-7	Circulation	158.8 m2	158.8 m2	1	Orange
(ARCH) Story-7	Elevator	12.5 m2	12.5 m2	1	Red
(ARCH) Story-7	Kitchen	36.0 m2	36.0 m2	1	Pink
(ARCH) Story-7	Residence	570.0 m2	570.0 m2	1	Light Blue
(ARCH) Story-7	Special	24.0 m2	24.0 m2	1	Light Green
(ARCH) Story-7	Storage	8.7 m2	8.7 m2	1	Light Yellow
(ARCH) Story-7	Technical	35.0 m2	35.0 m2	1	Light Purple

**Concrete Volumes**  
By Grade  
By Type  
Etc

Component	Type	Volume	Count	Color
Curtain Wall	Curtain Wall_PIL_CONTIGUOUS PILE-750DIA...	442.155 m3	3	Yellow
Slab	1200DIA_PILE_RBG	100.935 m3	15	Orange
Slab	1500 THK_PILECAP	33.600 m3	1	Red
Slab	900DIA_PILE_RBG	176.981 m3	47	Pink
Slab	CAP-PC-PILE CAP_resi-retal_RBG1:CAP-PC...	389.111 m3	1	Light Blue
Slab	CAP-PC-PILE CAP_resi-retal_RBG:CAP-PC1...	1,184.494 m3	3	Light Green
Slab	CAP-PC1 PILE CAP_RBG	541.795 m3	10	Light Yellow
Slab	CAP-PC10 PILE CAP_RBG	29.743 m3	1	Light Purple
Slab	CAP-PC11 PILE CAP_RBG	33.650 m3	1	Yellow
Slab	CAP-PC12 PILE CAP_RBG	27.627 m3	1	Orange
Slab	CAP-PC13 PILE CAP_RBG 2	34.077 m3	1	Red

**Space Usage**  
Room Type and Count  
Floor Area  
Volume

# Information Take Off - COBie

The screenshot displays the Solibri Model Checker interface. The top menu bar includes File, Model, Checking, Presentation, Information Takeoff, and COBie. The left sidebar shows a Model Tree with categories like Roof, Wall, Level 1, Beam, Covering, Door, Opening, Railing, Slab, Space, and Stair. The central 3D view shows a building interior with various components highlighted in different colors. The bottom panel shows the COBie data table with columns A through Q. The table contains data for various building components, including Floor Deck, Roof, Single - Flush, Single - Glass, Single - Wood, Slight, Skylight, Sofa, and Furniture. The table is color-coded by component type.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
133	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Window	1102SPT	Available	n/a	2012	n/a	Available	n/a	11.64
134	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	59.23
135	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	59.33
136	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	25.42
137	Floor Deck	n/a	n/a	Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	25.42
138	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	64.78
139	Floor Deck	n/a	n/a	Structural Floor Deck	n/a	Floor Deck	n/a	Slab	1102SPT	Available	n/a	2012	n/a	Available	n/a	64.91
140	Roof	n/a	n/a	Structural Roof Deck	R301	Roof	n/a	Roof	1102SPT	Available	n/a	n/a	n/a	Available	n/a	132.54
141	Single - Flush	n/a	n/a	Flush Wood Door	R101	Single - Flush	n/a	Door	1102SPT	Available	n/a	2012	n/a	Available	n/a	2.53
142	Single - Flush	n/a	n/a	Flush Wood Door	R101	Single - Flush	n/a	Door	1102SPT	Available	n/a	2012	n/a	Available	n/a	2.53
143	Single - Glass	n/a	n/a	Wood Door	R102	Single - Glass	n/a	Door	1102SPT	Available	n/a	2012	n/a	Available	n/a	2.41
144	Single - Glass	n/a	n/a	Wood Door	R102	Single - Glass	n/a	Door	1102SPT	Available	n/a	2012	n/a	Available	n/a	2.41
145	Single	n/a	n/a	Roof Window	R301	Single	n/a	Window	1102SPT	Available	n/a	2012	n/a	Available	n/a	0.76
146	Skylight	n/a	n/a	Roof Window	R301	Skylight	n/a	Window	1102SPT	Available	n/a	2012	n/a	Available	n/a	0.76
147	Sofa	n/a	n/a	1183mm	R102	Sofa	n/a	Furniture	1102SPT	Available	n/a	2012	n/a	Available	n/a	n/a
148	Sofa	n/a	n/a	1183mm	R102	Sofa	n/a	Furniture	1102SPT	Available	n/a	2012	n/a	Available	n/a	n/a
149	Sofa	n/a	n/a	1183mm	R102	Sofa	n/a	Furniture	1102SPT	Available	n/a	2012	n/a	Available	n/a	n/a

Is it enough to generate COBie deliverables without first of all validating the content?

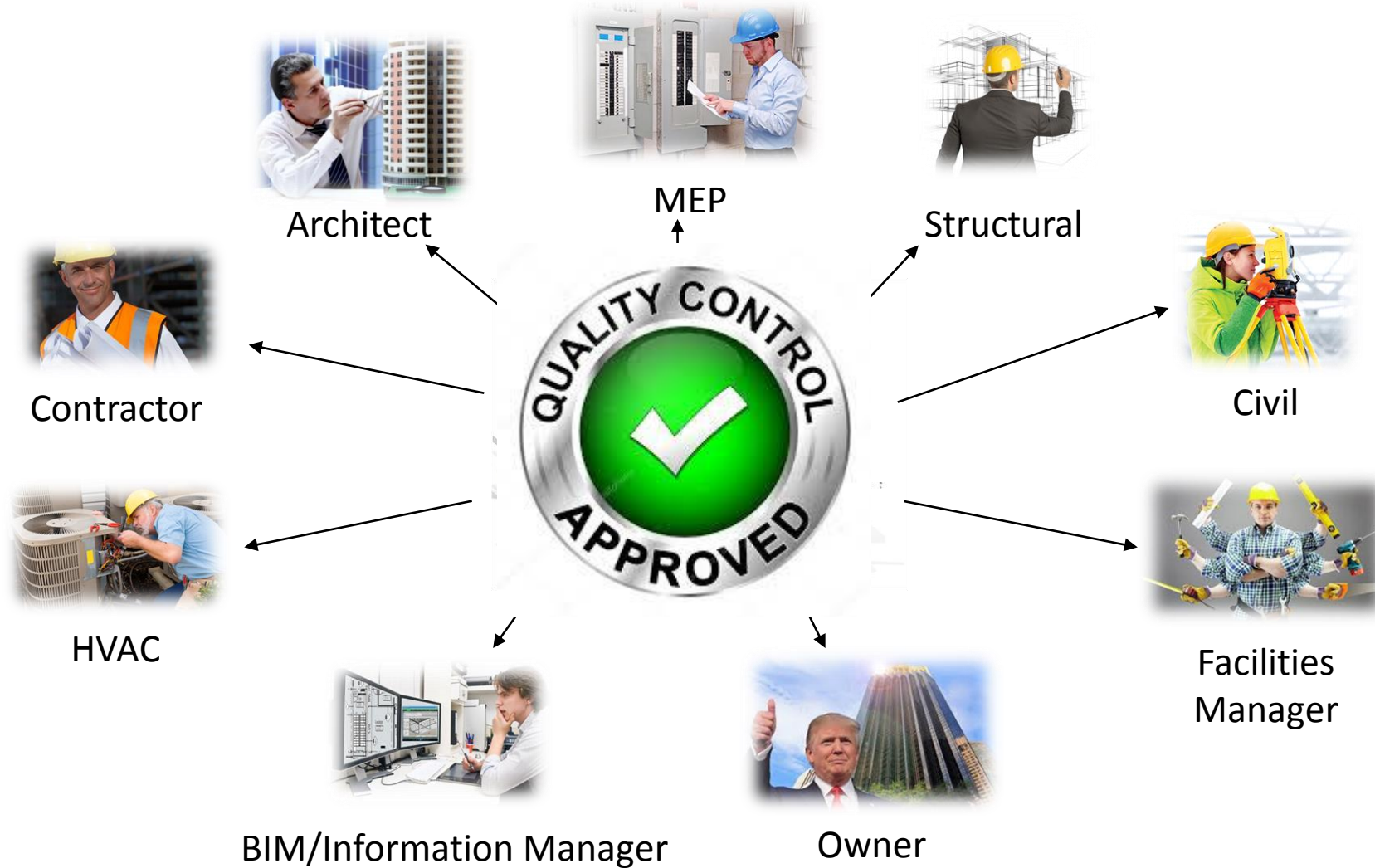
Visual COBie data allows bi-directional querying and interrogation



# Who do we help?

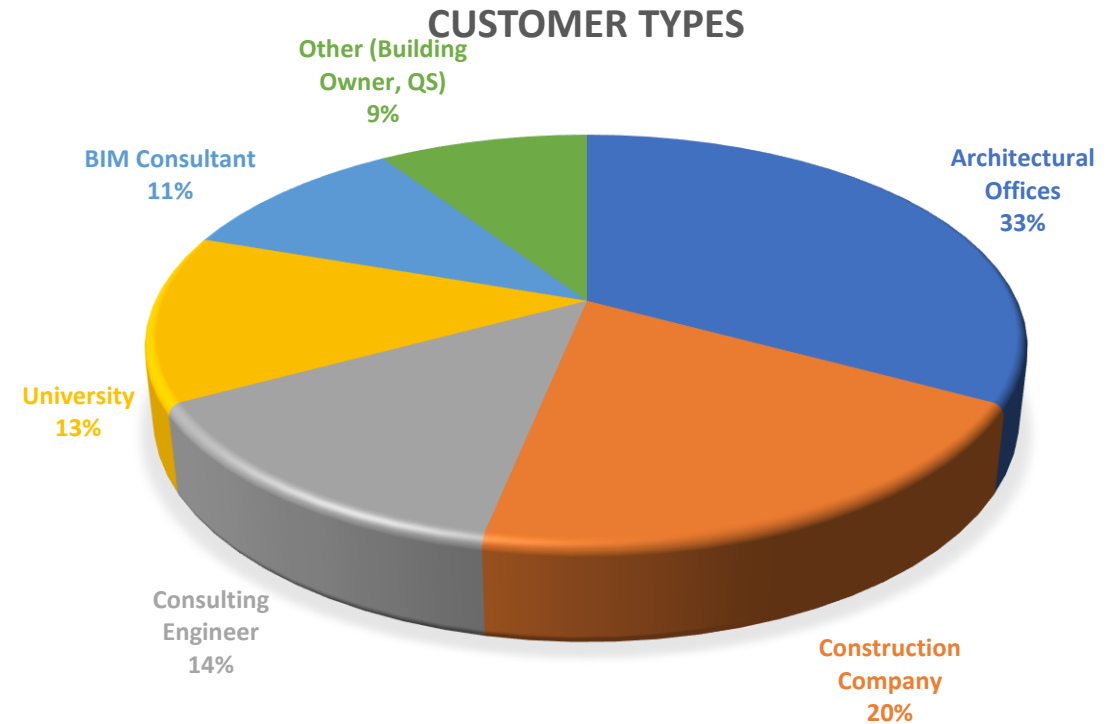
## What's in it for you?

# Who Benefits ?



# Our Customers

- Architects are our largest customer group by number of accounts
- Contractors are our largest customer group by number of licenses (excluding Academia)
- Almost all of the top 20 contractors utilise Solibri to some extent
- Largest customer in the UK is Wates who have been expanding usage rapidly over the last 18 months





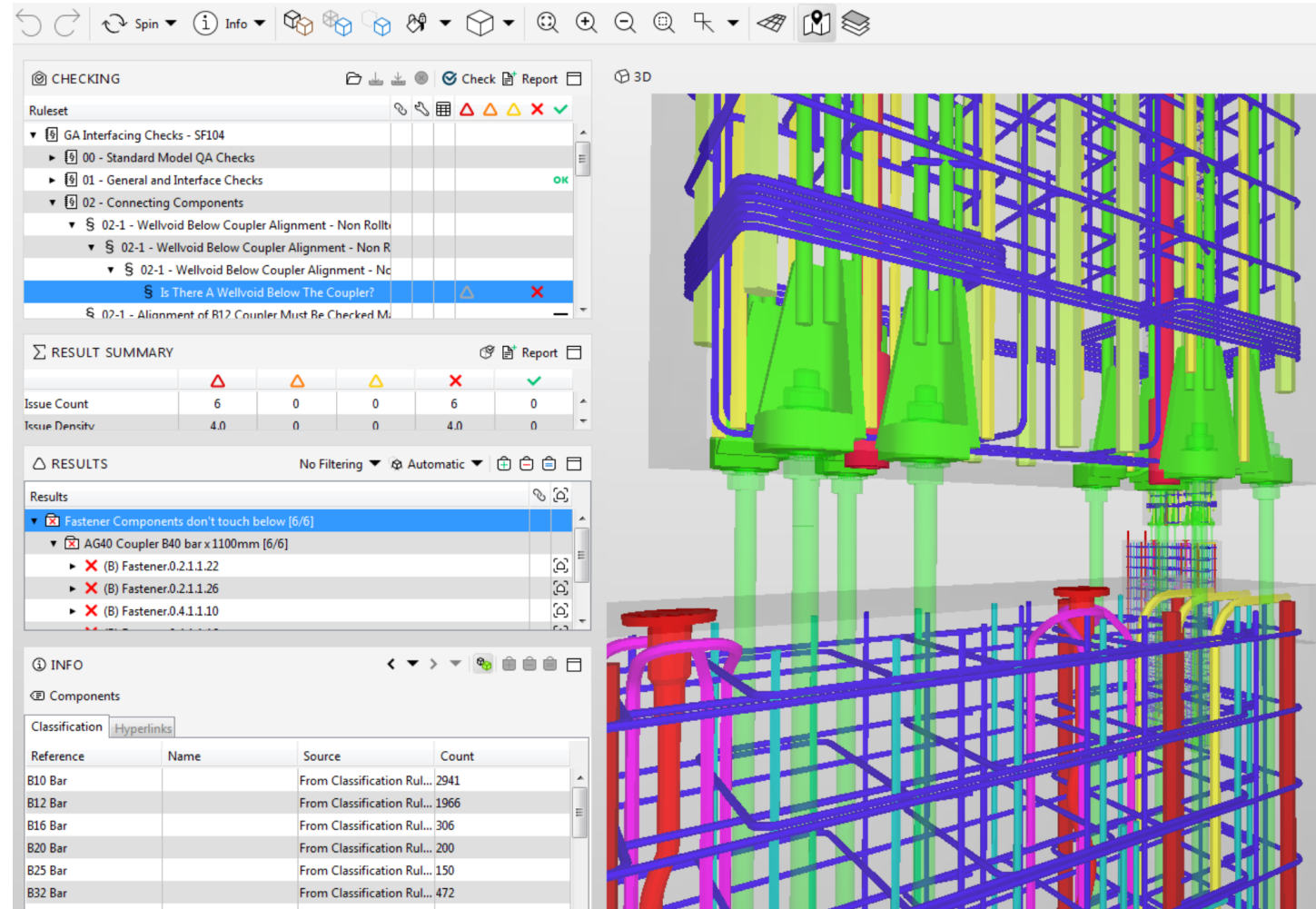
# Quality in Prefabrication



“The value that we get from Solibri is the efficiency,” adds *Robert Broad*, Senior Digital Engineer at Laing O’Rourke. “We’re using it for checks that previously would have been quite difficult and labor intensive to do manually.” With Solibri, Laing O’Rourke has been able to automate a great deal of their model checking, bringing overall time savings and quality into the checking process

“Model checking just gives us that complete reassurance that when the project is actually put together on site, everything works exactly as it should.”

*Antony Aucote*



# Buildoffsite Members & Customers

Assael



ARUP



SKANSKA



Sir Robert  
McALPINE



GERAGHTY TAYLOR



Wates



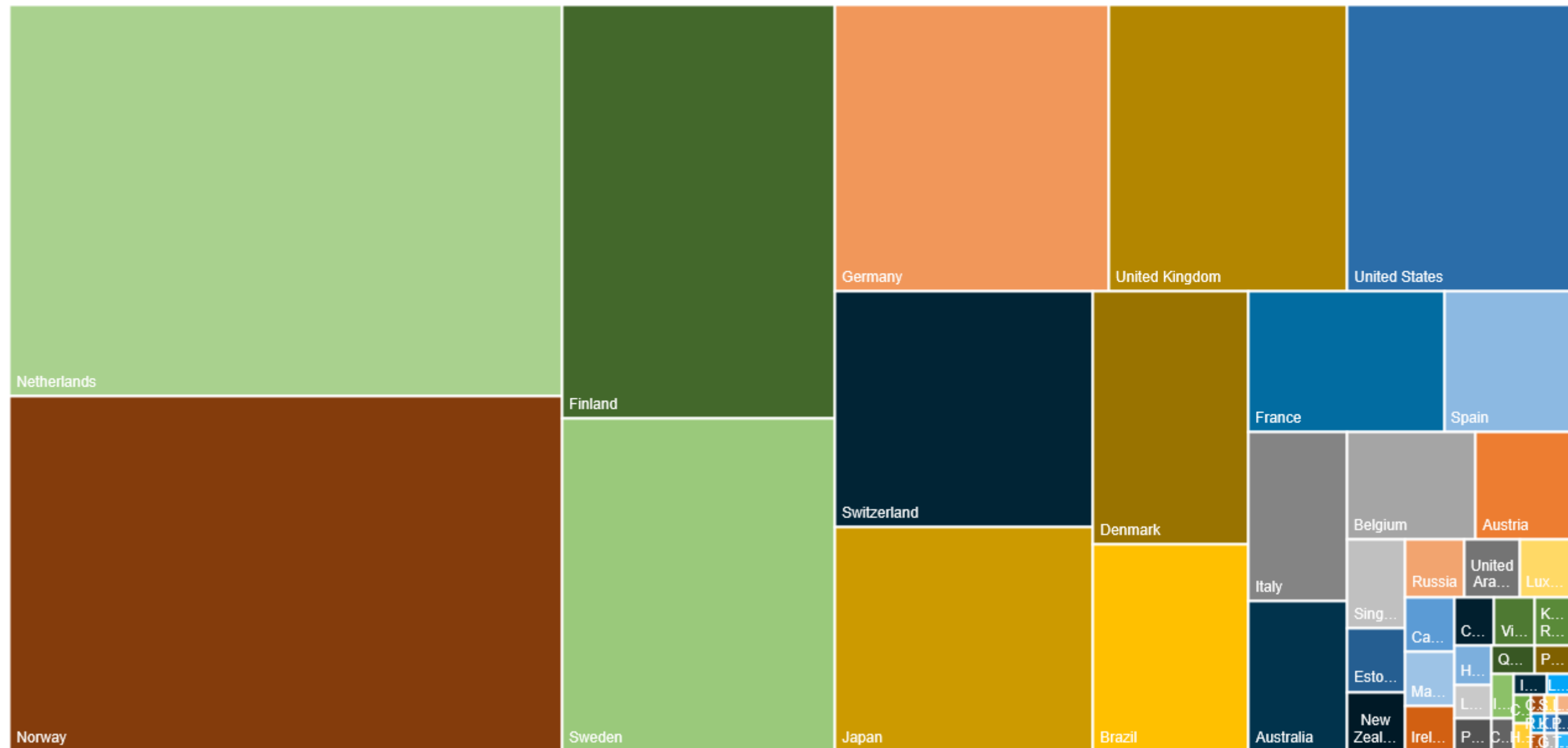
Levitt Bernstein  
People.Design

Balfour Beatty



# Solibri HeatMap

- Australia
- Austria
- Belgium
- Brazil
- Canada
- Chile
- China
- Chinese Taipei
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Guatemala
- Hong Kong
- Hungary
- Iceland
- India
- Ireland



**SOLIBRI**  
A NEMETSCHEK COMPANY

# Questions?