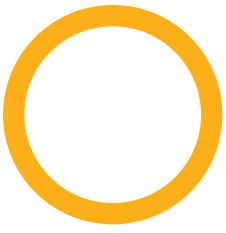




IMAGINE.
RELIABLE INFORMATION
ON DEMAND

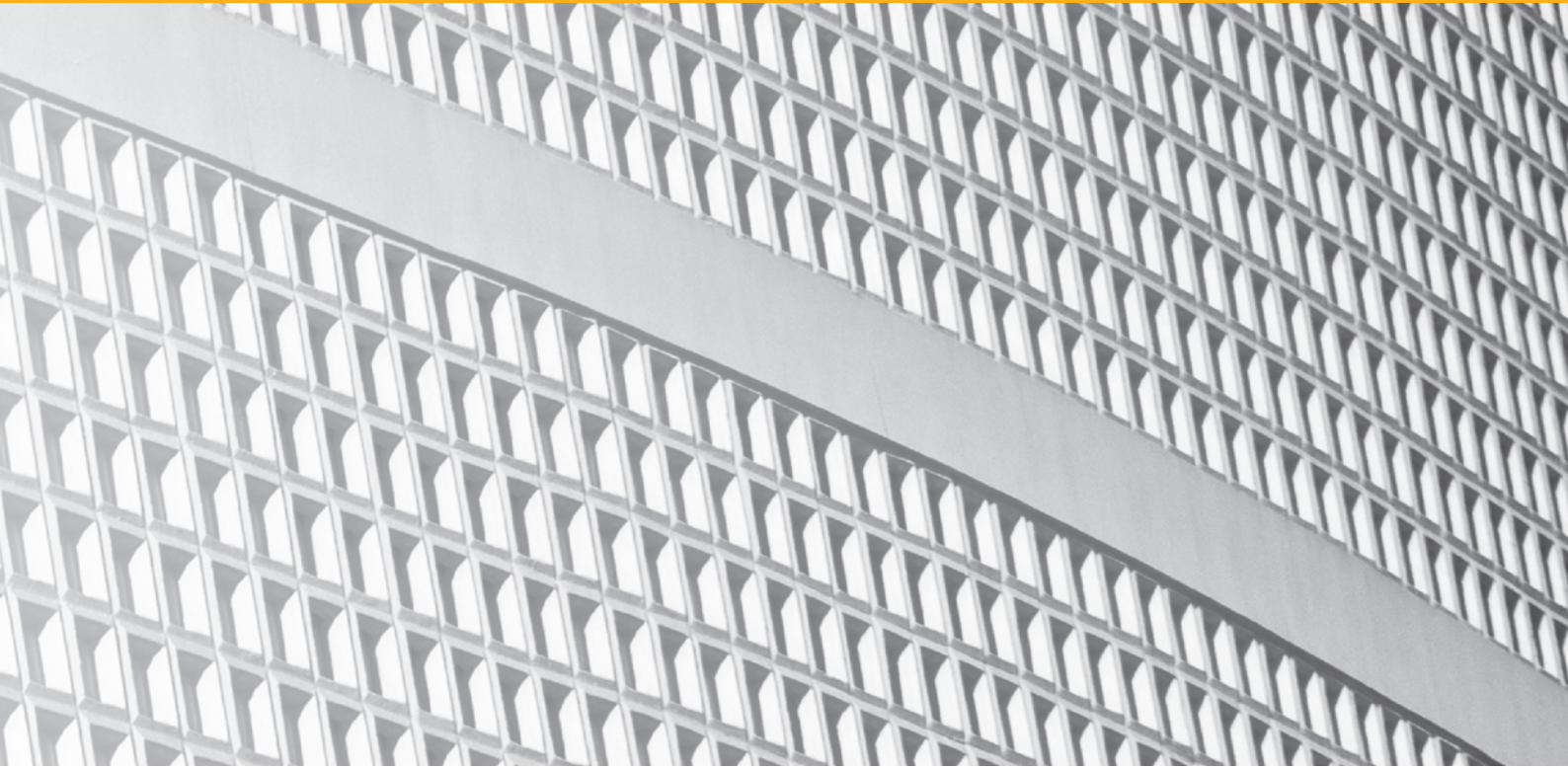


ABOUT SOLIBRI

Solibri was founded by a group of individuals who noticed the world was changing. In 1999, software modelling was improving and common standards were being formed. These standards allowed quality checking in different industries. The founders had experience from the worlds of construction, chemical and aerospace. As designers could now create with digital tools, it made sense to offer supporting software to check the validity and quality of these designs.

Construction was the natural industry to focus upon. The fundamental challenges of money and material waste could be solved with Solibri's new ideas. From this thinking came out of the box software to check and analyze construction designs. Solibri Model Checker (SMC) X-rays Building Information Models – offering 3D visualization and walk in functionality to reveal potential clashes, flaws and weaknesses. You can also share that information within the construction team using SMC. The same software allows you to quantify the amounts of building materials needed and provides easier maintenance information once the building is ready.

Solibri now sells software in over 70 countries. It is privately owned and based in Helsinki, with offices in the US and UK. Solibri continues to work with architects and construction companies to save time, money and the environment.



Solibri Model Checker

Solibri Model Checker is the Quality Assurance solution for BIM validation, compliance control, design review, analysis and code checking.



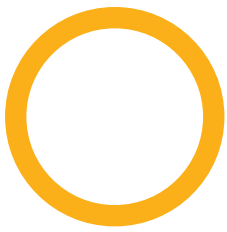
Solibri Model Viewer

Solibri Model Viewer is the free software for viewing Solibri Model Checker files and open standard IFC files.



Solibri IFC Optimizer

Solibri IFC Optimizer the free software for optimizing open standard IFC files on your computer.

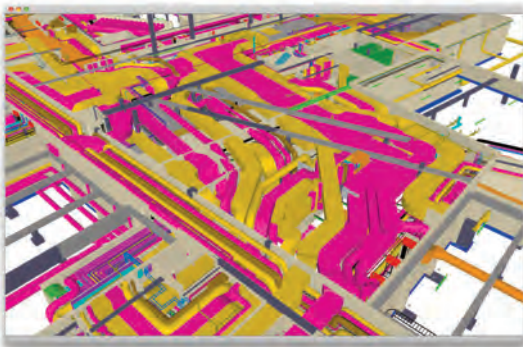


SOLIBRI MODEL CHECKER

Solibri Model Checker (SMC) helps you find and visualize issues and problems before and during construction. It will also provide a wealth of information that can be taken off throughout the building's life-cycle and utilized for needs that include area calculation, accessibility and building code compliance. Find out more below on the functionality.

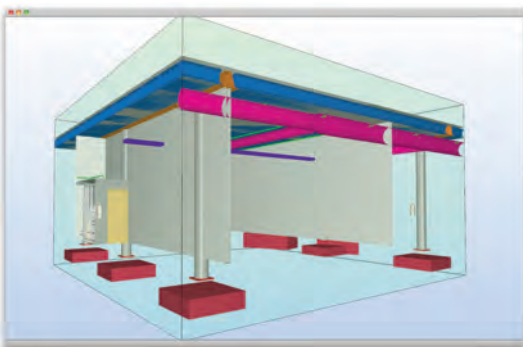
Features

Solibri Model Checker is our flagship product. Here are few reasons that make it unique to the market.



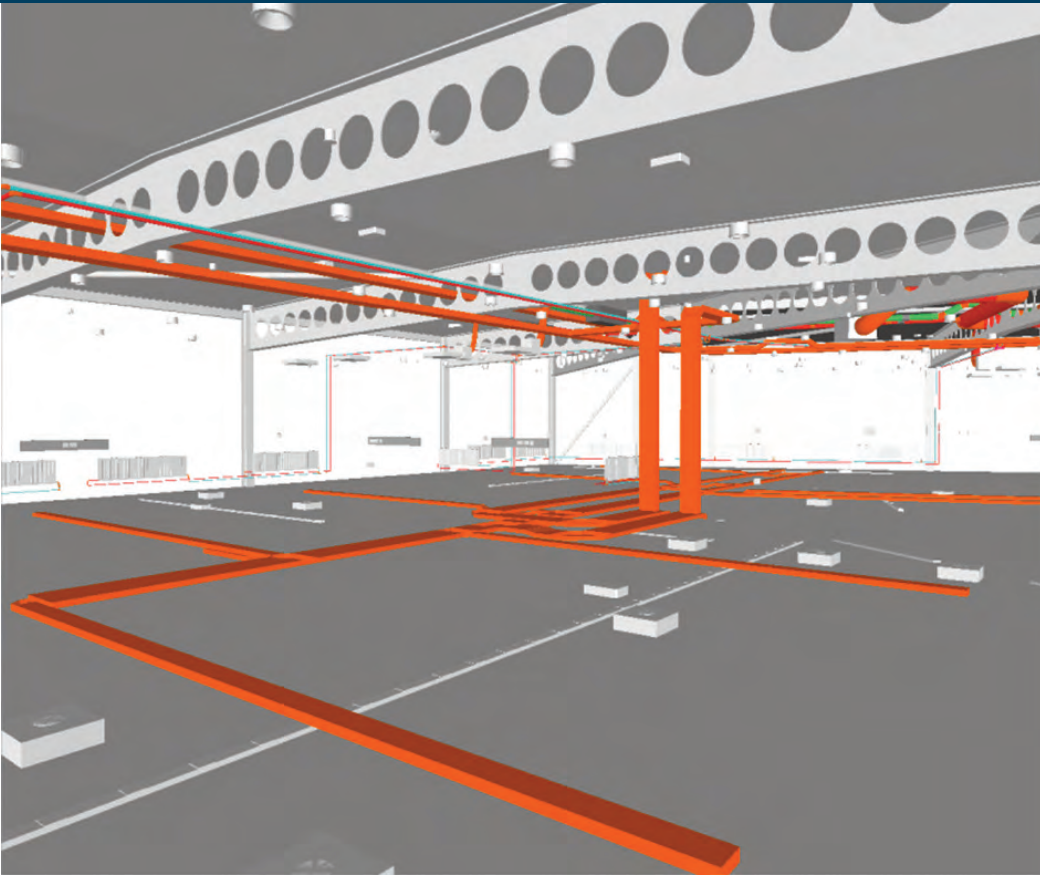
> ADVANCED CLASH DETECTION & MANAGEMENT

Automatically analyze and group clashes according to severity. Find relevant problems quickly and easily. Investigate the quality of your BIM files.



> DEFICIENCY DETECTION

Prevent issues in advance. Use SMC and its logical reasoning rules to search for components and materials missing from the model.



BIM MODEL VALIDATION

BOND BRYAN ARCHITECTS

Early steps towards validation

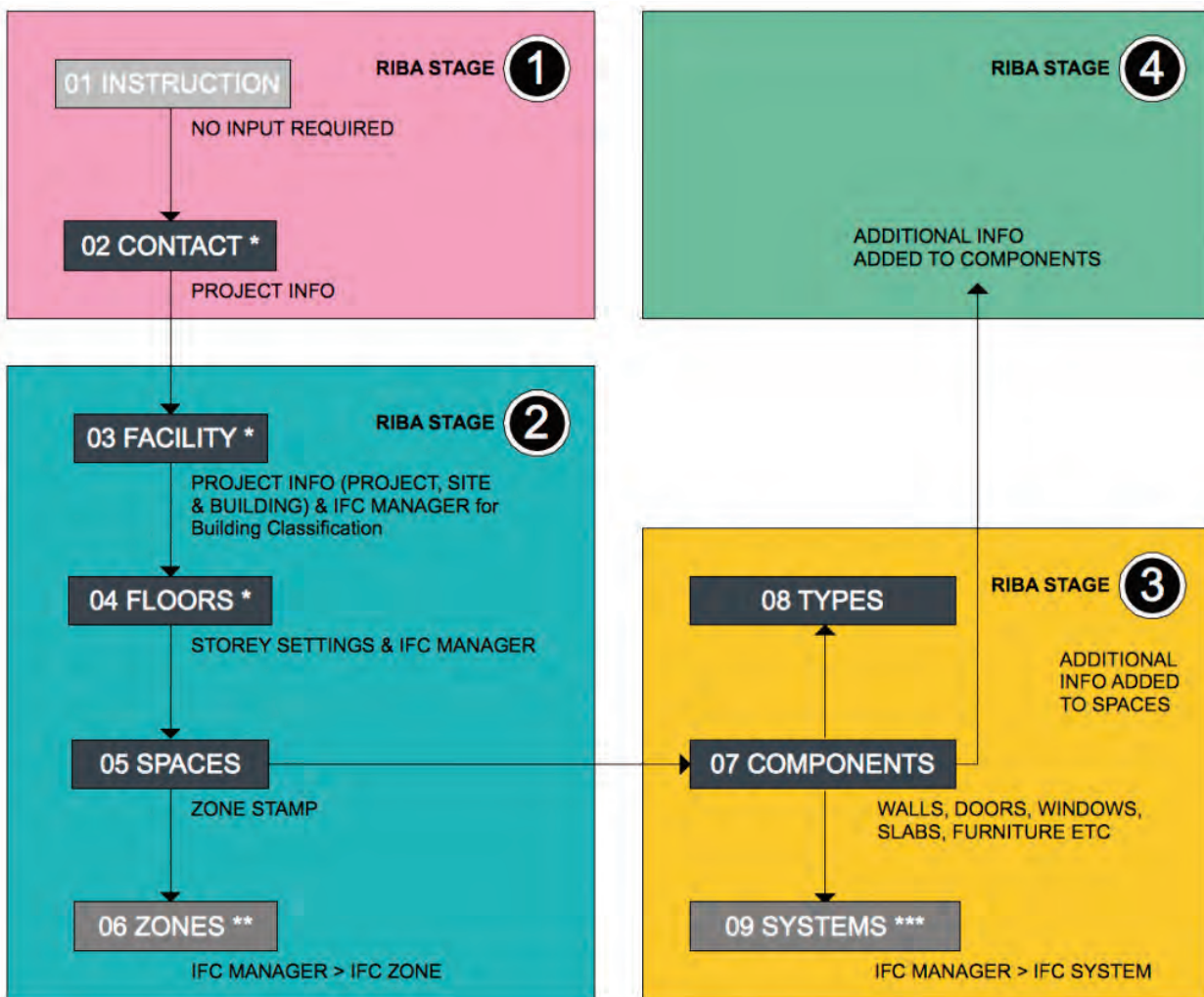
In early 2013 Bond Bryan Architects invested in a single network license of Solibri Model Checker. We had recognised that validation of information was going to be critical to the future of Building Information Modelling (BIM) in both our own business and the industry.

We began by testing a few of our models and quickly realised that we needed to do more work implementing standards within our models before we could develop a viable model checking approach.

So during the summer of 2013 we spent a lot of time focussed on the integration of emerging industry standards in our authoring tool. At the

same time the BIM overlay to the RIBA Plan of Work became available (which was subsequently published as the RIBA Plan of Work 2013).

So in September 2013 we introduced new authoring tool templates to our staff for use on live projects. These templates focussed on greater data integration and moved away from creating and exporting native data fields to using Industry Foundation Classes (IFC) data, which is covered by ISO 16739:2013. Moving to IFC also allowed us to align our data deliverables with COBie-UK-2012. COBie is a subset of IFC and is the non-graphical data deliverable for all UK Government projects from April 6th 2016 and is at the core of Solibri Model Checker (and its free accompanying viewer). So we knew that aligning with open



Workflow at Bond Bryan Architects

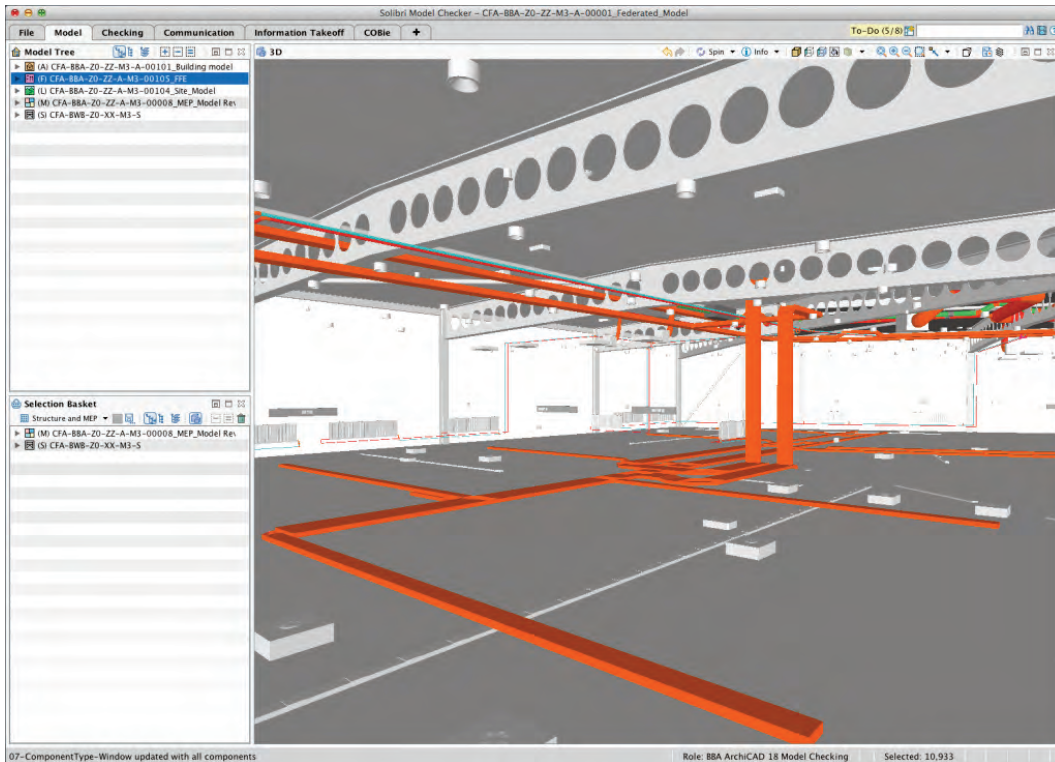
international standards would provide us with the best methodology for validating our data and subsequently using it for other workflows.

Building validation workflows

So six months after introducing our new workflows we were starting to get better models. With this improvement in our authored models, it allowed us to return to Solibri and work on developing a matching set of rules to the authored model standards. Having spent a long time understanding the data we were creating building a set of rules was more straightforward. Our whole approach has been built around the RIBA Plan of Work 2013, BS1192:2007 (and subsequently PAS1192-2:2013) and COBie-UK-2012. As a practice we are keen to integrate as

much of COBie as possible, irrespective of whether we are asked for it. We have always believed that standard BIM deliverables should become the 'new norm' over time rather than something that is additional to our services.

Whilst we were building our model validation rules for Solibri, a new version of our authoring tool, Graphisoft ArchiCAD was released. This version allowed us to automate much of our data creation through mapping. Changes were also made to make the workflows simpler for staff. This immediately offered the opportunity to integrate more information as standard. This meant that the validation process could be more specific and therefore more robust. So in September 2014 we finally rolled out our company rulesets for Solibri



Validating building services

Model Checker to be used in anger on our new live projects.

The rulesets

Built to align with industry standards but coupled with a clear understanding of what data we should produce at each stage, the rulesets are split for each RIBA workstage. This means the user can focus solely on the set of rules they are required to pass at each stage. As much is automated, many of these rules will be passed with very little effort. We actually split out a lot of the out-of-the-box rules to create a longer list. This meant that users would see that they had passed an awful lot and not be daunted by the fact that a rule had failed because one aspect had failed within a single rule. Splitting the rules also allowed us to make the descriptions simpler and clearer and add information about where to fix the rules if they do fail. The advantage of this approach also means that a clear report can be provided to others about what has and hasn't passed.

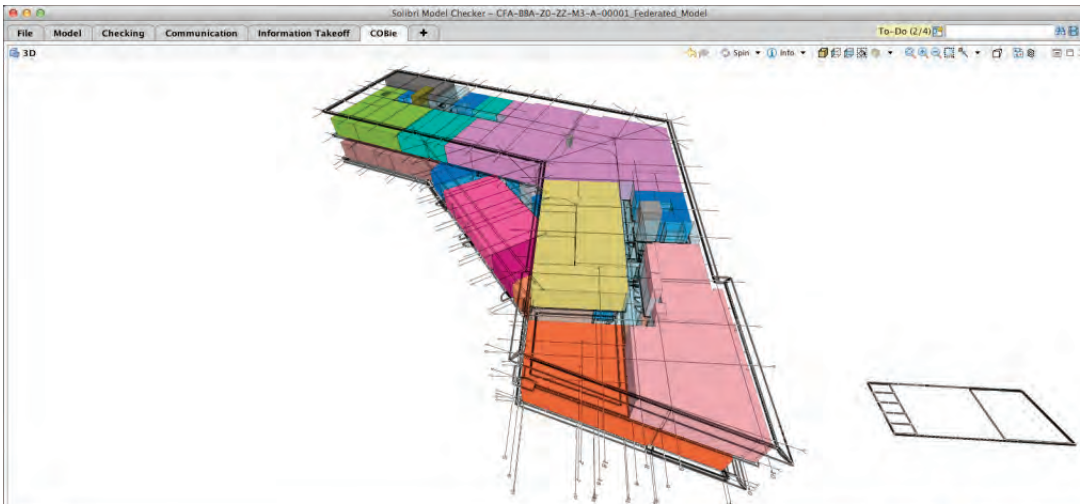
We now have a number of projects that have implemented our rules. Instantly users are

surprised at the power of the issues Solibri picks up. Things they thought were thoroughly checked manually throw up issues. It becomes a positive challenge to resolve these issues rather than a chore. As we have used the rules more we have realised that further rules need to be added or existing ones tweaked.

The benefits

Clearly model checking has obvious benefits to the quality of traditional outputs. Ensuring that spaces don't have duplicate numbers means there is no chance of duplicated Room Data Sheets and it's a similar story for duplicated window and door numbers. The benefit of this becomes more pronounced on bigger or more complex projects. So our outputs are more reliable compared to manual processes.

We are also using Solibri to check our 3-dimensional models against others models such as Structure and Building Services. These models are being used in coordination meetings to discuss the resolution of issues. This is allowing issues to be resolved faster and removing the



Solibri Model Checker - CFA-BBA-20-22-M3-A-00001_Federated_Model

File Model Checking Communication Information Takeoff COBie

To-Do (2/4)

3D

Calculate

A	B	C	D	E	F	G	H	I	J	K	L	M	
1	Name	CreatedBy	CreatedOn	Category	FloorName	Description	ExtSystem	ExtObject	ExtIdentifier	RoomTag	UsableHgt	LossArea	NetArea
2	RDS 00-01	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_10	00 Ground Floor	Circulation	ArchCAD-64	RCSpace	3yGwFXr64m1MKT3DNR6	n/a	3.000	3.000	3.000
3	RDS 00-01a	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_10	00 Ground Floor	Lift	ArchCAD-64	RCSpace	1o8NFKA6lRNM2J3wWFCY	n/a	3.100	3.098	3.098
4	RDS 00-02	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_10	00 Ground Floor	Entrance Area - Circulation	ArchCAD-64	RCSpace	15QKZFC6Xvcc6700K6W	n/a	3.221	4.396	4.396
5	RDS 00-03	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Dis. WC	ArchCAD-64	RCSpace	3_148V1ndw5e4eOKm7S	n/a	2.700	4.26	4.26
6	RDS 00-04	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Public WC	ArchCAD-64	RCSpace	3VzZ597Epbp4CqRAMM	n/a	2.700	3.714	3.714
7	RDS 00-05	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Public WC	ArchCAD-64	RCSpace	2v7Hf6Q3D8M7S8M	n/a	2.700	3.740	3.740
8	RDS 00-06	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_30_10	00 Ground Floor	Circulation	ArchCAD-64	RCSpace	2VMX8n7C0_3hYdQuVt058	n/a	2.700	14.719	14.719
9	RDS 00-07	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_30_10_36	00 Ground Floor	Store	ArchCAD-64	RCSpace	18t4tUxM0N_CyWd_275	n/a	2.700	8.610	8.610
10	RDS 00-08	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_30_10_36	00 Ground Floor	Store	ArchCAD-64	RCSpace	15Z7z4Z6g8Zm0D34	n/a	2.700	10.000	10.000
11	RDS 00-09	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_20_45	00 Ground Floor	Kitchen	ArchCAD-64	RCSpace	1267D580K_6t8AS5nb0	n/a	2.700	49.950	49.950
12	RDS 00-10	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_20_35_73	00 Ground Floor	Reception	ArchCAD-64	RCSpace	253R8N8L8q7cYk2yH7	n/a	2.700	13.430	13.430
13	RDS 00-11	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_20_11	00 Ground Floor	Carpet	ArchCAD-64	RCSpace	16p3200P6u8n48n6	n/a	2.700	106.333	106.333
14	RDS 00-12	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Changing Shower	ArchCAD-64	RCSpace	1d1g7y4dpb8U8Kq4V3	n/a	2.700	4.431	4.431
15	RDS 00-13	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_30_10	00 Ground Floor	Changing Lobby	ArchCAD-64	RCSpace	1Ww3z0nFP3RR125_P9W7C6	n/a	2.700	6.050	6.050
16	RDS 00-14	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Shower	ArchCAD-64	RCSpace	1pY4V8F8E146N8M785	n/a	2.700	2.213	2.213
17	RDS 00-15	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Shower	ArchCAD-64	RCSpace	15v0W8B1G6u8K52g8	n/a	2.700	2.201	2.201
18	RDS 00-16	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_30_28	00 Ground Floor	Gymnasium	ArchCAD-64	RCSpace	16vYF3V91eH2zJ2V31	n/a	2.900	50.550	50.550
19	RDS 00-17	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_25_10_01	00 Ground Floor	Industrial / Commercial Classroom	ArchCAD-64	RCSpace	1V137R4R6D0311009VH	n/a	2.700	4.639	4.639
20	RDS 00-18	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_25_10_01	00 Ground Floor	RTE Classroom	ArchCAD-64	RCSpace	15Y85A8y2856LW0Y75	n/a	2.700	39.826	39.826
21	RDS 00-19	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_25_10_01	00 Ground Floor	BA Classroom	ArchCAD-64	RCSpace	2_0uF8R3D9z2BFRz2p10H	n/a	2.700	68.663	68.663
22	RDS 00-20	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_40_10	00 Ground Floor	Circulation	ArchCAD-64	RCSpace	1D1Z4L8W8N315310D	n/a	2.700	58.819	58.819
23	RDS 00-21	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Male ToB Lobby	ArchCAD-64	RCSpace	11154eX8Z7FH85v828	n/a	2.700	3.374	3.374
24	RDS 00-22	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_35_80	00 Ground Floor	Male Changing	ArchCAD-64	RCSpace	15V203234_10Q4L84Y_02	n/a	2.700	65.254	65.254
25	RDS 00-23	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_15	00 Ground Floor	Gold Command	ArchCAD-64	RCSpace	16R8M8H06050E450VY	n/a	2.700	61.400	61.400
26	RDS 00-24	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_15	00 Ground Floor	Assessors	ArchCAD-64	RCSpace	153u8j23087N168H8C	n/a	2.700	23.128	23.128
27	RDS 00-25	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_15	00 Ground Floor	Fireground Briefing	ArchCAD-64	RCSpace	158P_0P3178443Y9X955	n/a	2.700	32.360	32.360
28	RDS 00-26A	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_15	00 Ground Floor	Command Vehicle	ArchCAD-64	RCSpace	16Q605pY1K898R0W03Q	n/a	2.700	15.317	15.317
29	RDS 00-26B	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_17	00 Ground Floor	LV Store Server	ArchCAD-64	RCSpace	1AM7V10255_088K1Tg	n/a	2.700	2.876	2.876
30	RDS 00-27	CFABondBryan.co.uk	02-03-2015T10:45:25	sp_65_30_15	00 Ground Floor	Sector 1	ArchCAD-64	RCSpace	2_c08A8u8Cm9uH1049v0w	n/a	2.700	16.010	16.010

Producing COBie output showing data and visualisation

need to resolve these issues on site. This reduction in risk has an obvious cost benefit to contractors and ultimately to clients.

However the benefits of integrating data and being able to validate it is that our information is more reliable for others to use. It can be used for COBie but it can also be used to produce Information Take-off. Our project models have become business development tools in their own right to some sceptical contractors. Many are amazed about the quality of the information we are now starting to output and they are realising what our approach can bring to make their lives easier.

Next steps

So now in 2015 we have 3 licenses (with more planned) and are now only a year away from 'BIM Level 2' becoming required on all publicly procured projects. As a practice we are already seeing projects requiring COBie and we started

our first projects, which formally required COBie in January 2015. Our model rulesets and Solibri's COBie functionality are making this process relatively straightforward. Live projects are providing more valuable learning experiences and our processes will continue to evolve.

2015 will also see the publication of the Digital Plan of Work and updated Uniclass classification system. Both these will need us to develop our approach further and we also plan to introduce more checking for the extended requirements of BS1192-4:2014, NRM1 and the NBS BIM Object Standard. So over the summer we plan to further develop both our authoring approach and our matching validation process. September 2015 will be another step forward and the opportunity to further improve our offering.

by Rob Jackson of Bond Bryan Architects

COBIE – UK CASE STUDY

STRIDE TREGLOWN

In 2012, architects Stride Treglown were appointed to deliver a UK Government early adopter BIM project. As 'pathfinders' working with newly defined processes and delivering COBie outputs, Stride Treglown faced a number of challenges. To find out how Stride Treglown successfully implemented the project, Solibri UK Managing Director David Jellings, chatted with Anthony Walsh, Senior Associate and Sector Lead for Public & Community Projects and Dean Hunt, BIM Co-ordinator for Stride Treglown.

How did you first become aware of the Government BIM and COBie requirements?

'We had been working in a BIM environment for a number of years and as one of our key client groups is government, in particular justice and defence, we were aware of the new COBie requirement as a government directive from the outset. To help improve our knowledge, we've attended numerous conferences and seminars and disseminated the information internally to raise our overall company awareness. We knew this was going to be important and that it would involve developing new working practices, so we wanted to be properly informed.'

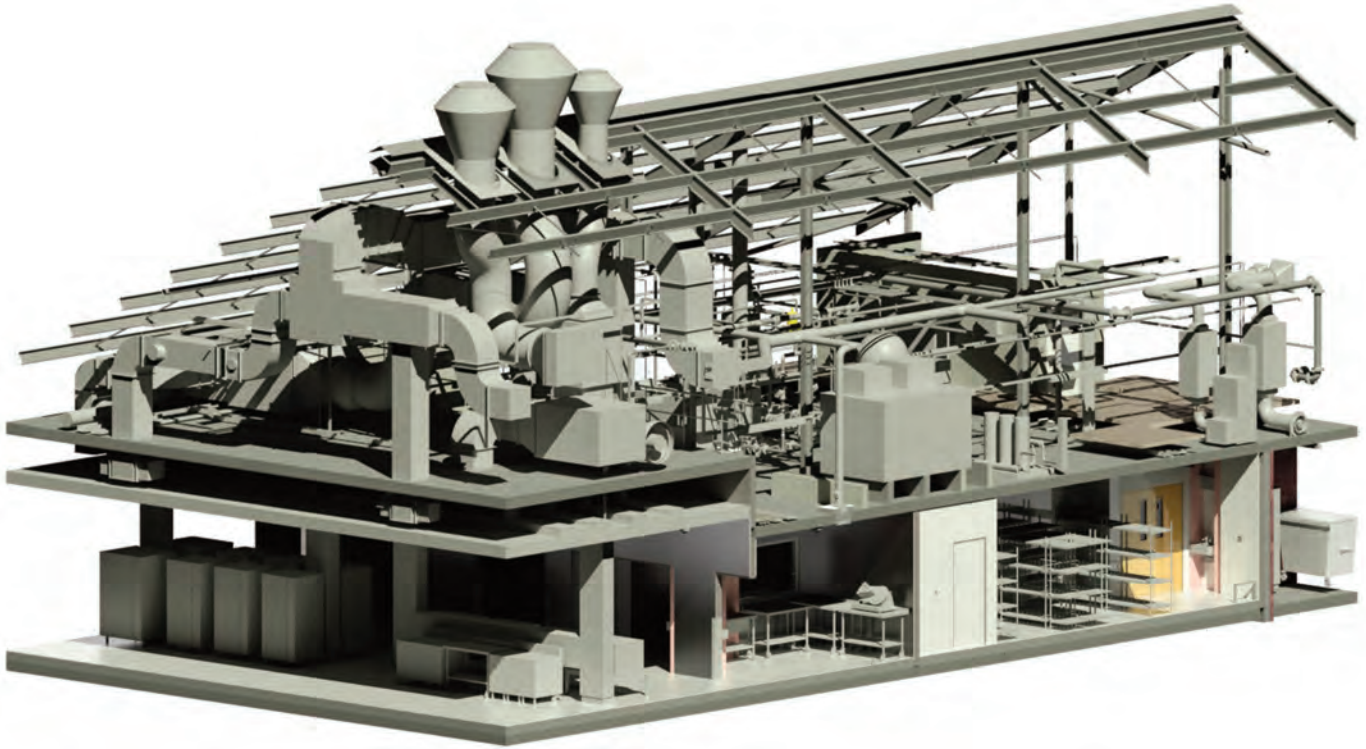
Stride Treglown is an international architectural practice with overseas offices in Dubai and Abu Dhabi and eight offices in the UK including London, Cardiff and Bristol, making them the 10th largest architectural practice in the UK.

Sustainability influences the way Stride Treglown runs its practice and since 2009 they have reduced their carbon footprint by 40%. Their expertise covers most sectors and they apply commercial awareness to balance the sometimes conflicting aspects of time, cost and quality to achieve the best outcome for our clients.

Stride Treglown have always invested in technology and are at the forefront of BIM implementation.

When/how were you first involved in a COBie project?

'In 2012 we were appointed to deliver one of HM Government's Early Adopter projects. Our appointment was as the technical delivery architect, initially to deliver the scheme to COBie data exchange stage 3 (representing the technical design solution). This changed however and we were eventually became tasked with fully coordinating



the BIM process and COBie data requirement (with the lead contractor, other consultants and the supply chain) to stage 6 – i.e. practical completion.’

What were your individual roles in the project?

Anthony Walsh: ‘I am a Senior Associate and Stride Treglown’s Sector Lead for Public & Community, which incorporates this particular work stream.’

Dean Hunt: ‘I am Stride Treglown’s BIM Co-ordinator responsible for directing the project team in a collaborative BIM environment to ensure that the geometric coordination and data requirements were achieved and fully coordinated. I needed to develop new workflows and strategies to achieve the COBie data requirements for the project.’

“Early engagement of the whole project team is essential to ensure productive output. The management and collaborative culture of the team is just as important as the technical manipulation of the data.”

Anthony Walsh, Senior Associate, Stride Treglown

How did this project change the way you worked?

‘We were already familiar with current BIM processes, such as coordinating geometry and clash detection. However, the new process required us to output intelligent data in a format that could be easily accessible to all. This necessitated implementing new working practices and protocols to ensure that these outputs could be

incorporated into the COBie schema. Technically, we had to invest in additional add-ins for authoring tools to enable a more efficient workflow. We also had to invest time working with other project partners to help them deliver the data requirements.'

What was the main initial challenge?

'This was a new way of working, not just for us, but everyone from the client down. The biggest challenge at the start of the process was the initial lack of understanding by the project team. The information requirements and formats were at first ambiguous, but after research into the requirements of COBie, the required levels of data became clearer and more understandable to us all.'

And the wider challenges?

'The whole team were fully committed to delivering the project, but not having previously worked with COBie, it was a steep learning curve for everyone involved, including the mechanical & electrical engineers, civil & structural engineers, catering suppliers and key supply chain partners. All were very enthusiastic about working in a collaborative environment. We believe our lead role was instrumental in ensuring that all parties were fully integrated into the process.'

How did Solibri become involved?

'We were aware of the options available to output COBie data, including directly from the authoring software itself. Initially this seemed like the obvious and easiest option but unfortunately it did not satisfy the requirements. It was important to us that we found a way of automating what was essentially a very manual process, in order to

develop a repeatable workflow for our future COBie requirements. We originally became aware of Solibri Model Checker from our attendance at the ICE BIM Conference in 2012 and it seemed to provide the solution to many of our problems.'

How was Solibri Model Checker (SMC) applied in the project?

'One of the main problems we faced was how to ensure that the model contained the complete and correct COBie data. It is very inefficient to spend time validating, and checking COBie outputs only to have to correct them further down the line. Using SMC rule sets, we were able to validate the completeness of the COBie output before exporting to the data sheets. Using the classification tables to coordinate all consultant models is a particularly powerful feature of SMC, furthermore, SMCs infinitely configurable user interface makes coordinating data straight forward and particularly excels when using IFC models prepared by varying authoring software. Within SMC we were able to federate all discipline models using IFC, which is the industry standard exchange format and also a requirement of the COBie deliverable. At every stage, the Solibri UK team worked with us closely to optimise these solutions.'

How successful was the application of SMC?

'We believe we successfully implemented the workflow that we initially set out to achieve. We strongly believe that COBie should be an output provided by data in the authoring software which is then federated, coordinated, validated, and checked by SMC, which then automates the export to the completed COBie sheets. By

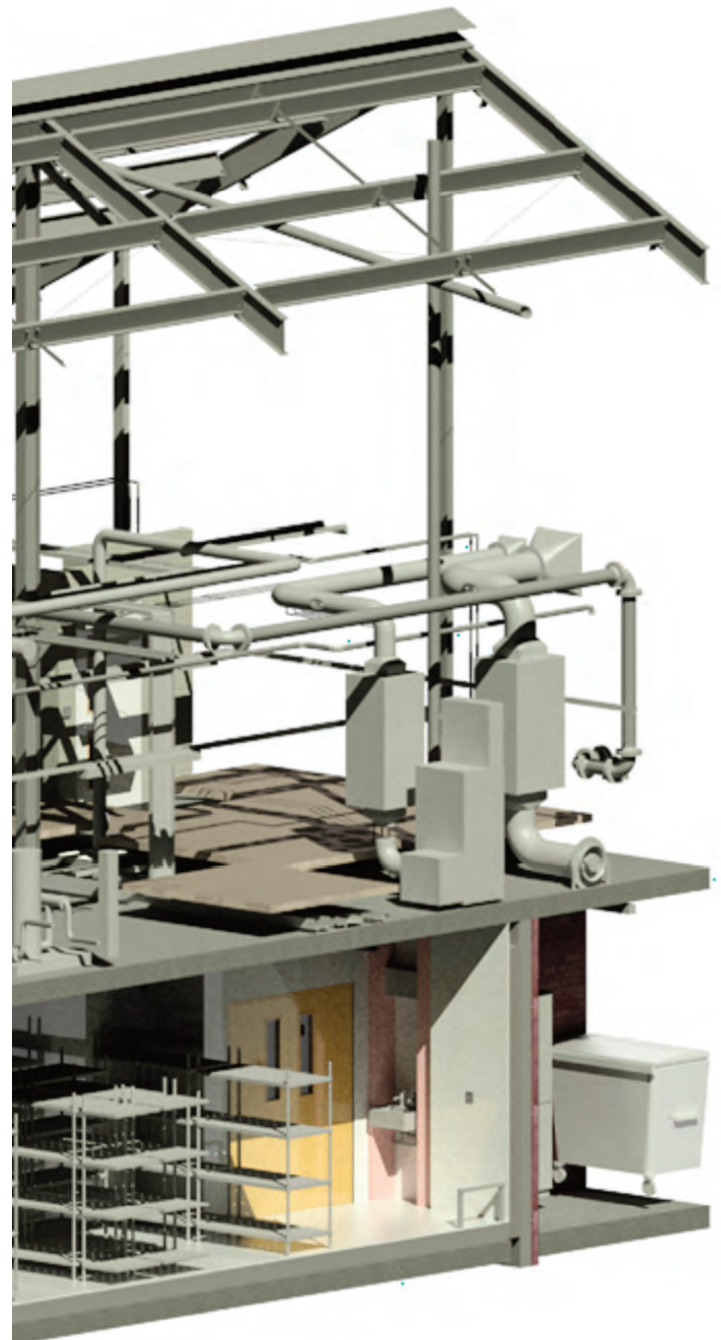
“It was important to us that we found a way of automating the process, creating a workflow that was repeatable. It was imperative to generate the data requirement via industry standard IFC format as COBie data is a subset of IFC. We strongly believe COBie data should reside in the authoring software which can then be federated, coordinated, validated, and checked by Solibri Model Checker”.

Dean Hunt, BIM Co-ordinator, Stride Treglown

eliminating any manual data entry in the final COBie sheets we not only save a huge amount of time, but more importantly eliminate user error from the process. Large projects that require data output from many maintainable assets becomes almost impossible to achieve without using automation software such as SMC.’

How do you see the future for COBie and Solibri’s role in its implementation?

‘Being championed by government, COBie will be business as usual from 2016 and we are already seeing elements of COBie being requested by some private clients. We feel ultimately that Excel as the output will gradually disappear; however, COBie data will remain and become the universal delivery method across all projects. Stride Treglown has now adopted SMC software to undertake internal coordination so that as a practice we can deliver fully co-ordinated buildings. We feel confident that SMCs communication method is far superior to its competitors and will be an essential component of future project deliveries.’



The mark of Quality Assurance

SOLIBRI

Client, Contractor, Designer, Engineer...?

Everyone deserves and needs accurate information from BIM Models
Quality assure ALL data in BIM Models with Solibri Model Checker™
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Describe it – Check it – Assure it



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MODEL CHECKING FOR QUALITY