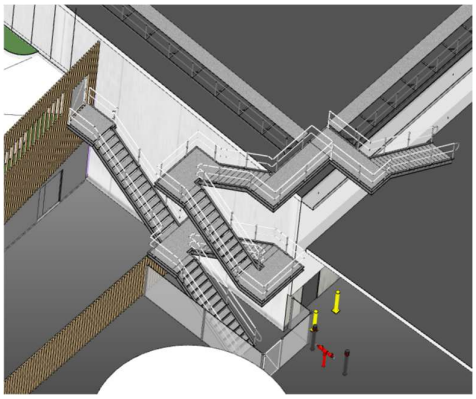
I have recently completed the measurement of a builder's bill (not SMM) for a project where we were issued with both PDF drawings and an IFC model. We utilise the model to assist us in BQ production but rely on the formal drawn information. I have explored how we can use BIM for BQ/Estimate production on the link below, some features I have considered include:

- The 'automated' take off, how real is this?
- Model Mapping
- Non-modelled items
- BIM for QA
- BIM for Schedules.

Please feel free to follow the link below for more information.

How we use BIM for BOQ Measurement.



My team has recently completed the measurement of a BOQ for a scheme in Australia. In measuring this we were issued with the PDF tender issue drawings as well as civil, structural, and architectural models. I thought that it was interesting to share how we use BIM and design models to assist us in the preparation of Estimates and BOQ production.

The RICS says that "Building Information Modelling (BIM) can help quantity surveyors to speed up the estimating process by supporting the use of the New Rules of Measurement"[1]. Utilising BIM allows a surveyor to extract quantities from the model and in a sense 'automate' the take-off process. The advantage of utilising BIM for measurement is that the model can become a data hub for building information. The measurements that are traditionally 'taken-off' drawings are already captured within eh Building Information model. Below is an example of the Model Schedule which you can see includes measurements for building elements.

[1] Rushton Trevor, BIM is key to future of QS professions says RICS, https://watts.co.uk/bim-is-key-to-future-of-qs-profession-says-rics, Accessed September 2022

Schedule:

Absorptanc	Area	Assembly Code	Comments	Description
	0 m²			
	10 m²			
0.1	0 m²			CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	310 m²			CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	20 m²			CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	270 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	90 m²			CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	60 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	300 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	670 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	740 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING
0.1	210 m²		MAIN SLAB	CONCRETE FLOOR SLAB TO ENGINEER'S DRAWING

[2]

Automatic Measurement

Much is made of BIM's ability to seemingly 'automate' measurement and hence speed up the traditional take off process. However how do we take the above information which lacks specification information, is not sorted for trade for procurement and produce a tool that is useful for tendering and managing a construction project. We do this via a process called 'model mapping'.

Creating a model map is relatively straight forward for a qualified and experienced quantity surveyor. It is a process similar in application to a traditional take-off. The QS looks at the information that has been prepared, the BIM objects in the model, identifies elements that they intend to measure, int the above example this concrete, and maps this achieve an output that is in a format that can be used for tendering. This format might be aligned with the NRM1/ACMM Vol 1 if cost planning or NRM2/A&NZSMM1 if measurement is undertaken for a BOQ. A widely used tool, Costx allows the Surveyor to create 'Dimension Group' for measurement from 2D drawings. The model mapping process allows the Surveyor to create these dimension groups by extracting quantities from objects within the model and mapping them to output dimension groups that are created to align with the required method of measurement. I have included some screen shots of the model mapping process below.

This process is not new and has been considered by industry for a long time. Mitchel Brandtman put out a video of this process on YouTube back in 2012. This is a good example of how utilising a model map and rate library can improve take off processes and worth watching if you are interested. They state it is the "wisdom"[3] behind the model that is important. This is right the model needs to be able to extract the required information whether this be coded into the model or mapped by the surveyor. A link to Mitchel Brandtman's video is here:

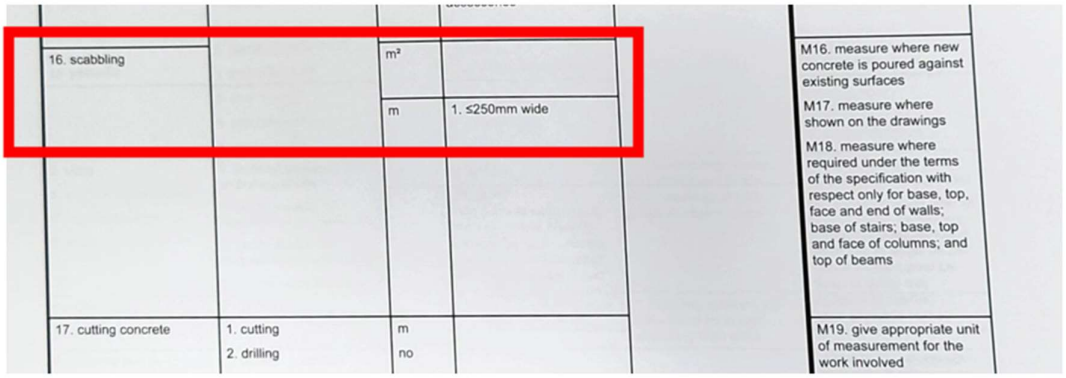
How MB use CostX for 5D BIM (Building Information Modeling) - Mitchell Brandtman - YouTube

This process can allow the Surveyor to utilise the information contained within the model, but it will not allow for items that are not created as objects within the model. For example, taking our

[2] Example Project (Confidential), August 2022, Australia

[3] How MB use CostX for 5D BIM (Building Information Modelling), https://www.youtube.com/watch?v=FHeKpo-YbuQ, Feb 2012, Accessed September 2022.

example of concrete, the A&NZSMM1 requires that a surveyor measure items that are not objects within the model. These items might include items that are workman ship related such as 'scabbling'. The A&NZSMM1 requires that scabbling be measured in area and in length where less than or equal to 250mm wide.



16. scabbling		m^2		M16. measure where new concrete is poured against existing surfaces M17. measure where shown on the drawings M18. measure where required under the terms of the specification with respect only for base, top, face and end of walls; base of stairs; base, top and face of columns; and top of beams
		m	1. ≤250mm wide	
17. cutting concrete	1. cutting 2. drilling	m no		M19. give appropriate unit of measurement for the work involved

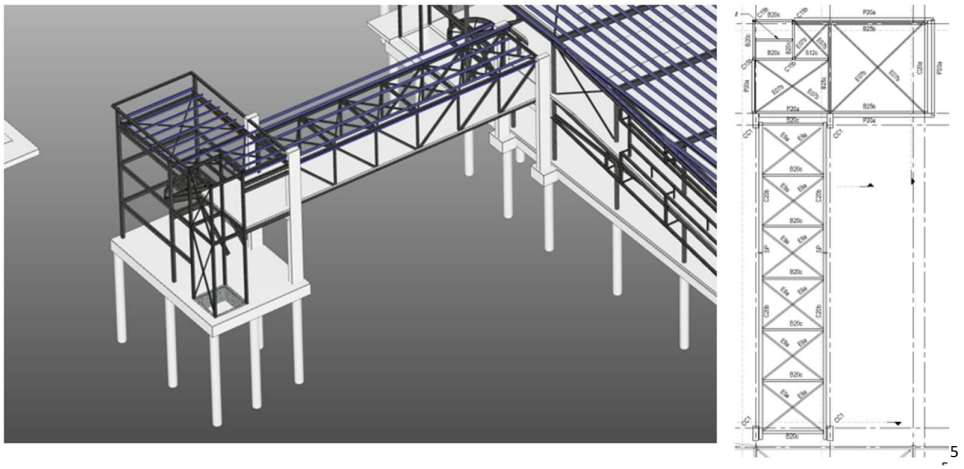
[4]

The model in our example does not model these elements and therefore if required the surveyor would need to review the information and measure this out traditionally. Relying therefore on the model to 'automate' the measurement process is to rely solely on a model designer's skill to prepare a capture that captures all required works. This is highly unlikely, and whilst the model mapping process is useful and can speed up the measurement process in our example this will only provide areas of concrete slab. This element of 'take-off' is relatively quick even if undertaken traditionally off A1 drawings. The Surveyor will still need to interrogate the information to ensure that the correct items are captured to suit the level of detail required by the chose SMM for their BoQ.

Using BIM Models to 'Supplement' Measurement

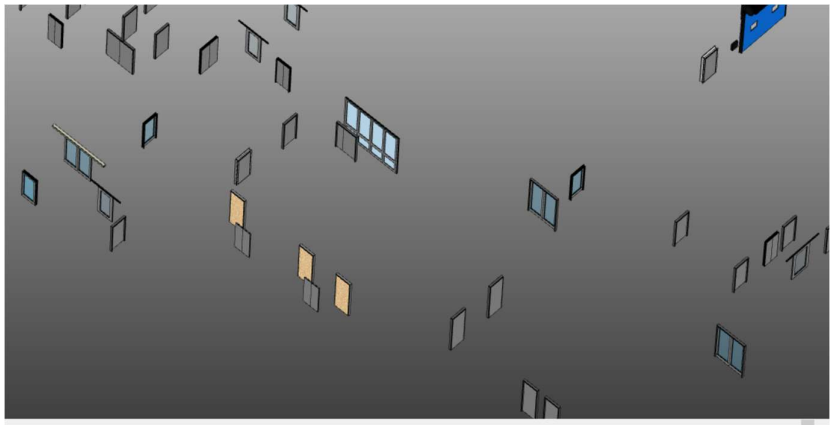
An alternative approach is to utilised BIM models to supplement the traditional measurement and take off process. This can be where a traditional set of PDF drawings is issued for BOQ production. The team utilises this set for the BoQ measurement, but reference to the BIM Model is used to help the team understand how the building is to be constructed. Form and function can quickly be seen in 3d. Elements such as a steel frame can be more readily understood. Below are some 'snips' taken from our example project which show how much more readily these types of elements can be understood by a surveyor when viewing in 3D as opposed to a 2D plan.

[4] AIQS, Australian and New Zealand Standard Method of Measurement of Building Works (A&NZSMM1), 2018 Edition,



[5]

A further example of use of the BIM model to supplement the traditional measurement process in in QA and bulk checking. The model includes large broad quantities, and these can be cross checked against the detailed measurement undertaken in the BoQ. A very useful cross check. I find this especially useful when consider items such as Furniture and fittings. These 'layers' of 'object' can be isolated int eh mode and scheduled produced from the model. There are some clear speed advantages here when measuring such items. Below is an extract of doors from the model and as you can see the Model Schedule has already itemised these and the Surveyor's process need now be one of extract, cross check and measure items not models, such as frames (if required) hardware and so on.



	Existing	Fabric Header Shroud	Family Name	Fire Rating	Frame Reveal Height	Frame Section Type	Fram
458c-bff5-3ee17008a8eb	No		AP ACCESS PANEL - SINGLE DOOR		1763	Door Jamb - Steel Frame - Single Swing - Insulated Door	0
458c-bff5-3ee17008a295	No		AP ACCESS PANEL - SINGLE DOOR		1763	Door Jamb - Steel Frame - Single Swing - Insulated Door	0
458c-bff5-3ee17008a428	No		AP ACCESS PANEL - SINGLE DOOR		1763	Door Jamb - Steel Frame - Single Swing - Insulated Door	0
458c-bff5-3ee17008a451	No		AP ACCESS PANEL - SINGLE DOOR		1763	Door Jamb - Steel Frame - Single Swing - Insulated Door	0
45dd-97b1-33a9e2b304c0	No		AP ACCESS PANEL - SINGLE DOOR		1763	Door Jamb - Steel Frame - Single Swing - Insulated Door	0
4d16-927b-437f01826eec	No		Double Door_Joinery Door		2062	MM12-092/4040	10
4686-a29e-1a3707037fae	No		Double Door_Joinery Door		2062	MM12-092/4040	10
487f-8ec6-0bcf7db9d566	No		Double Door_Joinery Door		2062	MM12-092/4040	10
4dbe-80ab-82f3d8d1bf79	No		Double Door_Joinery Door		2062	MM12-092/4040	10
4dbe-80ab-82f3d8d04881	No		Double Door_Joinery Door		2062	MM12-092/4040	10
4ef6-8de0-69b250841 1f4	No		Double Door_Joinery Door		2062	MM12-092/4040	10
470d-948c-cf1864032fac			Fence_Chainlink Gate-Single				
4505-9f88-f2331995b81e			Fence_Chainlink Gate-Single				
4505-9f88-f2331995803f			Fence_Chainlink Gate-Single				
4505-9f88-f2319958de6			Fence_Chainlink Gate-Single				
4505-9f88-f2319958de5			Fence_Chainlink Gate-Single				
4668-a834-85cfb7f6e31b			Fence_Chainlink Gate-Single				
42e1-9409-485a248d7b2d			Fence_Chainlink Gate-Single				
46b6-a709-37e8c1e2d952			Fence_Chainlink Gate-Single				
4290-8f25-0cc06a2e99fa			Fence_Chainlink Gate-Single				

[6]

[5] Example Project (Confidential), August 2022, Australia

[6] Example Project (Confidential), August 2022, Australia