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BIM Automation for Quantity Takeoff and Data Validation

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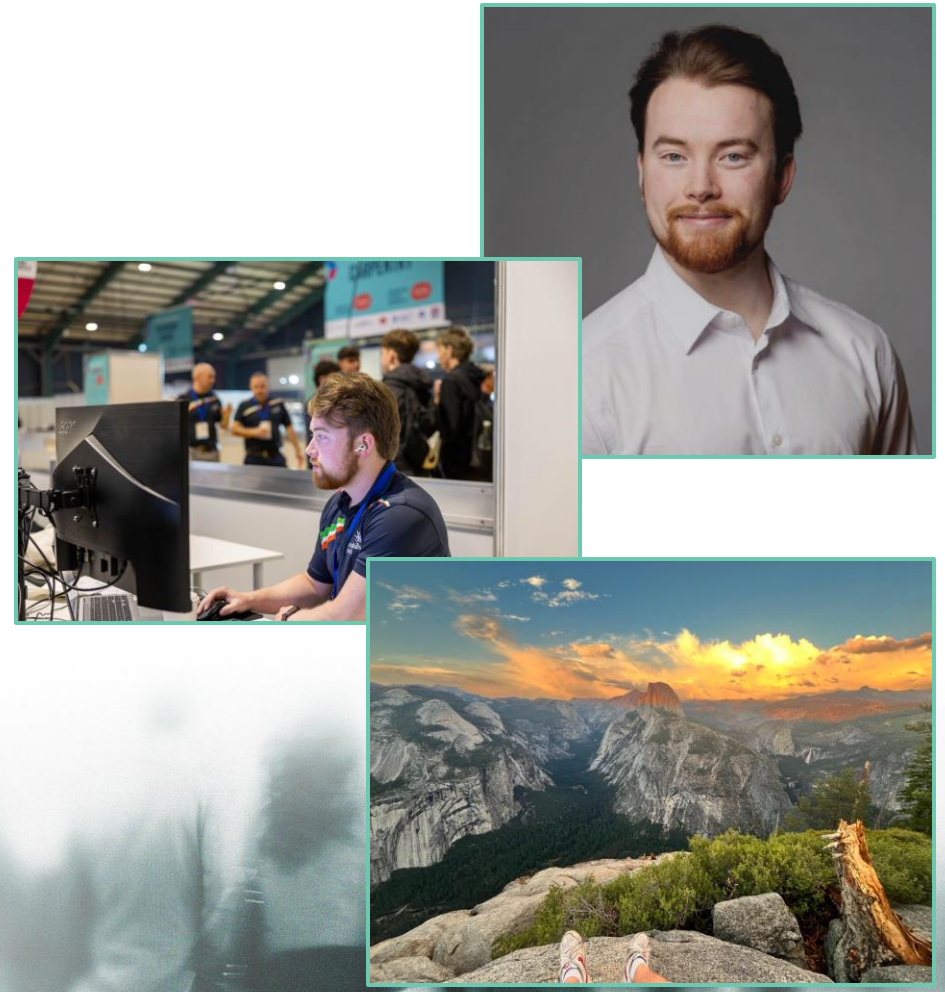
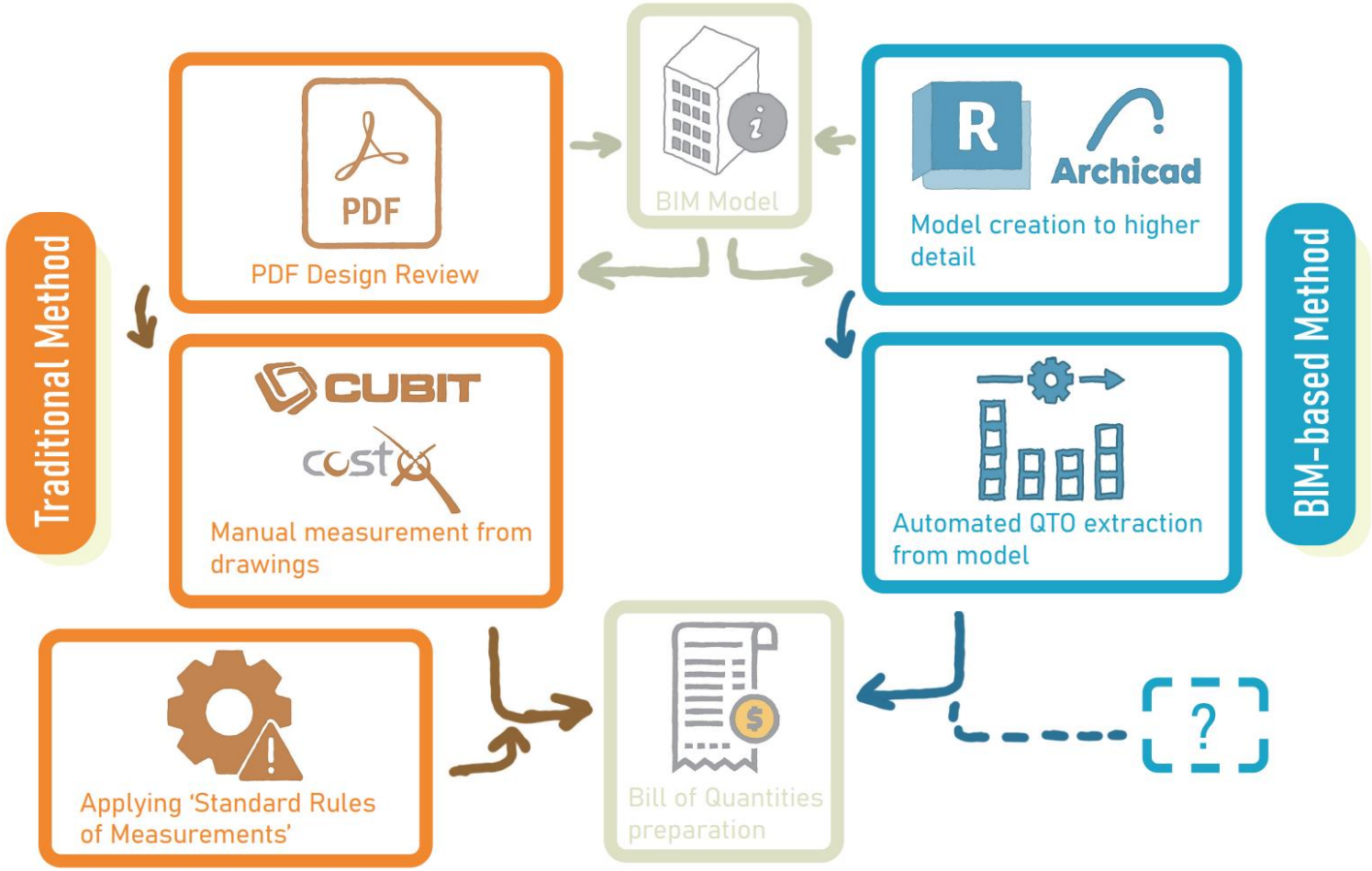
About Me

- Graduate from TU Dublin (Bolton St, Linenhall) with a BSc (Hons) in Architectural Technology
- Project Specialist, Architectural Technology at Corgan in Dublin
- Interested in BIM Automation, Programming, and Artificial Intelligence
- Outside of construction, I enjoy travelling, weightlifting, and finding time to switch off with film or music

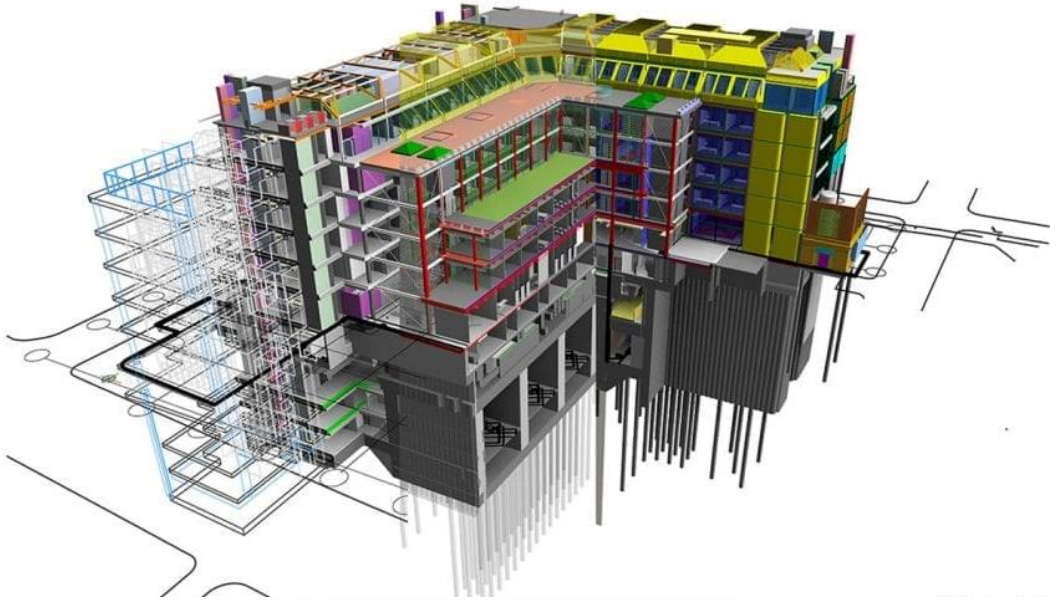


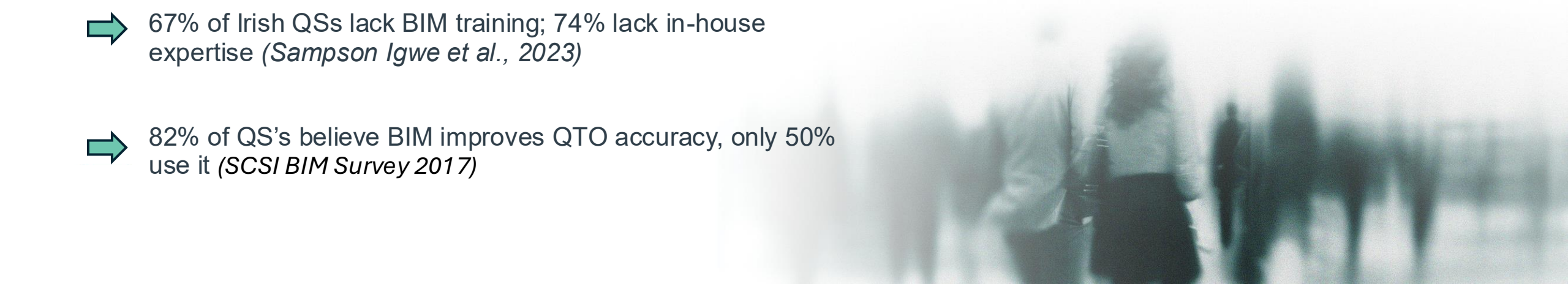
What are the methods for carrying out a Quantity Takeoff?



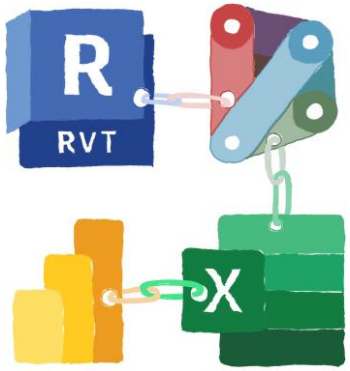
What was my motivation?

- Previously worked as a Project Manager with an in-house QS team – I gained practical insights into the **issues of BIM-based QTO**
- Ireland's housing affordability crisis – **demand for efficiency** (*Demographia Housing Affordability Survey 2023) (Mahon 2025)*
- Traditional Quantity Takeoff – **slow, manual, error-prone** *(Sepasgozar et al., 2022)*
- 67% of Irish QSs lack BIM training; 74% lack in-house expertise *(Sampson Igwe et al., 2023)*
- 82% of QS's believe BIM improves QTO accuracy, only 50% use it *(SCSI BIM Survey 2017)*

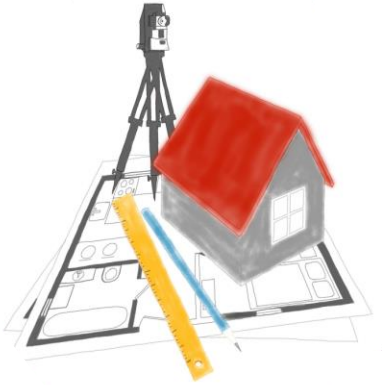




What objectives did I aim to achieve in this research?



1. Identify Inefficiencies in Traditional & BIM-based QTO
2. Investigate Residential Case Study
3. Develop BIM Workflow incorporating Standardisation
4. Validate through Professional Interviews



What issue did I come across?

The information in a typical BIM model **lacks the Standardisation** that is required for QS's to determine how an element is measured

Currently, in Ireland the **Agreed Rules of Measurement Version 5 (ARM5)** is the Rules of Measurement used

The thought-process was if there was a way to:

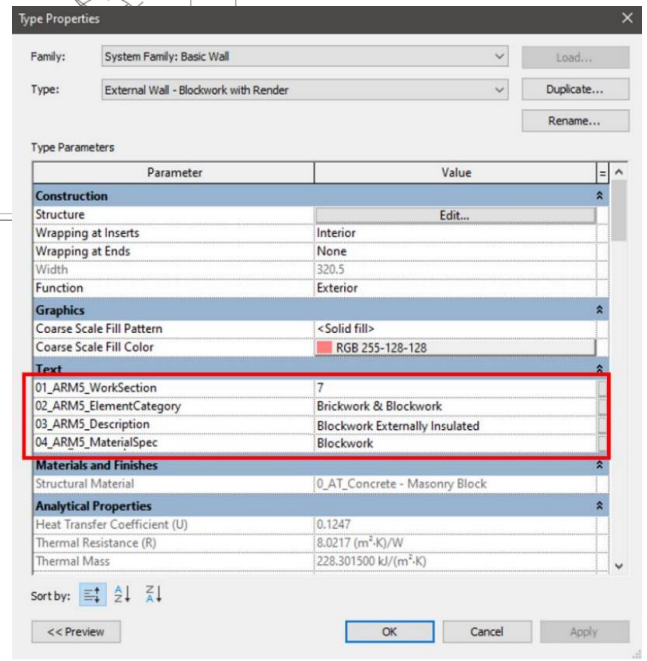
- Have a mapping file that can assist with assigning classifications to elements
- Have the quantities be pulled from the model into a schedule based on ARM5
- Have an ability to QA this data in a format accessible to all users

Then the **gap between the QS and Designers could be bridged**

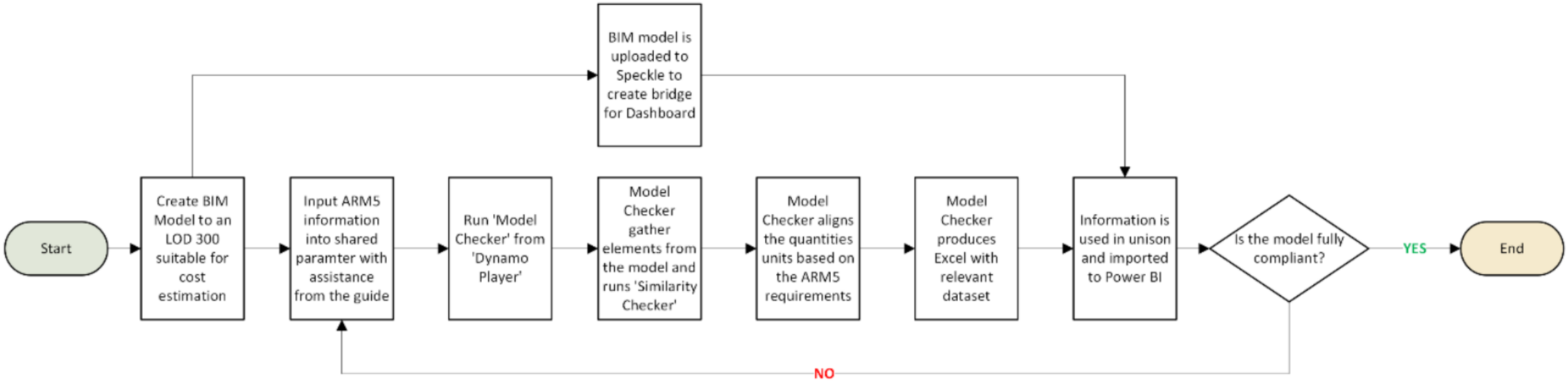
Work Section	Element Category	Description	Material Specification	Unit of Measurement
4	Excavation & Earthwork	Excavation		m^3
5	Piling	Driven Piles	Concrete / Steel	m
5	Piling	Bored Piles	Concrete	m
6	Concrete Work	In-Situ Concrete Slab	Concrete (C20/C25)	m^3

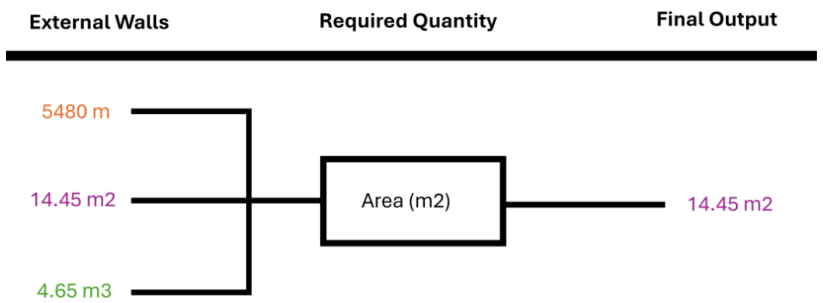
Case Study

- Small dwelling based in Foxrock, Co. Dublin
- Scope of BIM model set to an LOD300 to reflect the detail a model would be for costing
- ARM5 parameters embedded as Shared Parameters
- Intentional anomalies added to test detection



Workflow Overview





Model Checker Demonstration

Professional Feedback

Participant	Role	Years of Experience	Qualification
QS1	Senior QS	27 Years	Level 8
QS2	Senior QS	7 Years	Level 8
QS3	Senior QS	9 Years	Level 8
QS4	Director	25 Years	MBA
AT1	AT	11 Years	Level 8
AT2	Senior AT	10 Years	Level 8
AT3	BIM Manager	11 Years	Level 9

Professional Feedback

1 Model Accuracy and Coordination

All the participants expressed the importance of model accuracy and multi-disciplinary coordination on projects.

Participant QS1 *"Drawings from different consultants rarely align perfectly. You have to fill in the gaps yourself."*

Participant AT1 *"Model accuracy is always in flux—it's never finished, especially early in the process*

Professional Feedback

2 Dashboard and Workflow Usability

The dashboard was praised for clarity, but concerns about accessibility and ease of use were noted.

Participant AT2 *"It's visual, interactive, and you can locate issues easily. That's a massive step up from combing through PDFs"*

Participant AT3 *"Only a few in the office would know how to run these [Dynamo] scripts"*

Professional Feedback

3 ARM5 Standardisation and Structuring

Incorporating standard rules of measurements such as ARM5 used for this workflow into BIM elements was seen as a major strength.

Participant QS2 *"You save time because the structure's already there - you're not trying to build it from scratch"*

Professional Feedback

4 Time-Saving Potential and Trust in Automation

Participants saw automation as a way to reduce workload, but emphasised that trust in the outputs would need to build over time.

Participant QS3 *"People need to trust the outputs-and that takes time and experience."*

Participant AT2 *"It helps us validate the model before passing it on"*

Professional Feedback

5 Barriers to Adoption

Barriers to adoption included training gaps, cultural resistance, software skills, and unclear professional boundaries between designers and quantity surveyors.

Participant QS4 *"The system works, but the industry isn't quite ready. The people, training, and attitudes have to catch up"*

What are the implications of the research?

- ✓ Standardised Outputs
- ✓ Visual Dashboard
- ✓ Automation
- ✓ Ease of use

What are the barriers of implementing this research?

- ✗ Digital Skills Gap
- ✗ Early Buy-In needed
- ✗ Cultural Resistance

What future research should be done to improve on this work?

REAL-WORLD ACCURACY

Applying the workflow to a live, real-world residential project to test the potential accuracy and time savings

REFINING CLASSIFICATIONS

Further refine the tool to 'drill down' and sub-categories and their specific requirements

AI-DRIVEN SOLUTIONS

Integrating an AI-solution into the workflow to further automate the process and reduce user input

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Thank you for listening!