

Moving to Whole-Life Value: BIM-enabled Deconstruction Management (DRIM)

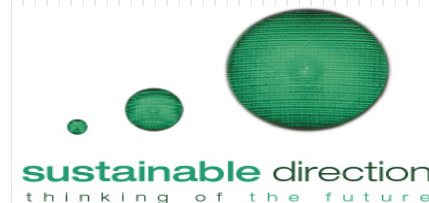
23rd February 2018

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West of England



Sustainable Direction:



Sustainability Consultancy

Environmental Engineering

Project Delivery



Our cross cutting areas



Energy



Water

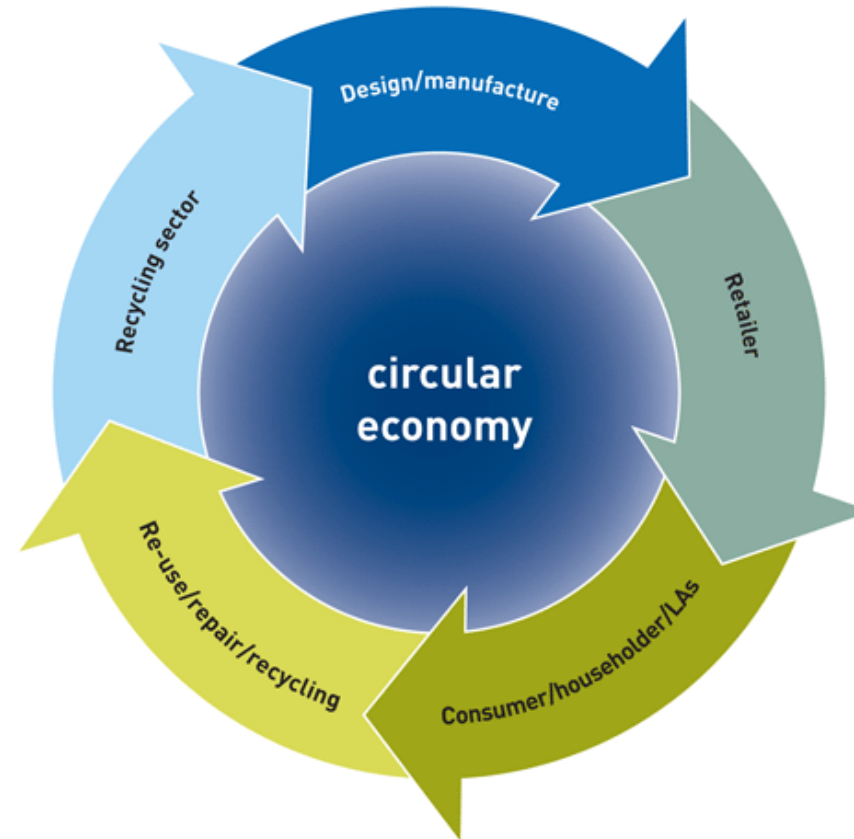
Resource Efficiency


Supply chains



Circular Thinking

- The demolition industry is a key contributor in the drive to increase the **recovery, reuse and recycling** of building materials
- The industry is on the front line of progress towards a **Circular Economy**



A man wearing a red hard hat and a dark suit with a tie is looking upwards. In the background, a building is under construction with visible scaffolding and structural elements. The image is semi-transparent, serving as a background for text.

Continual
Improvement
across the
industry:

✓ Building “deconstruction”
rather than demolition

✓ Pre-deconstruction audits

✓ Materials to be won
identified- BoQ

✓ Segregation, storage and
processing of materials
included in project program/
logistics plan

- This approach maximizes material reuse and recovery as far as possible on every project
- This helps ensure that **value is retained** and **quality assured** when the material enters the marketplace for reuse or recycling



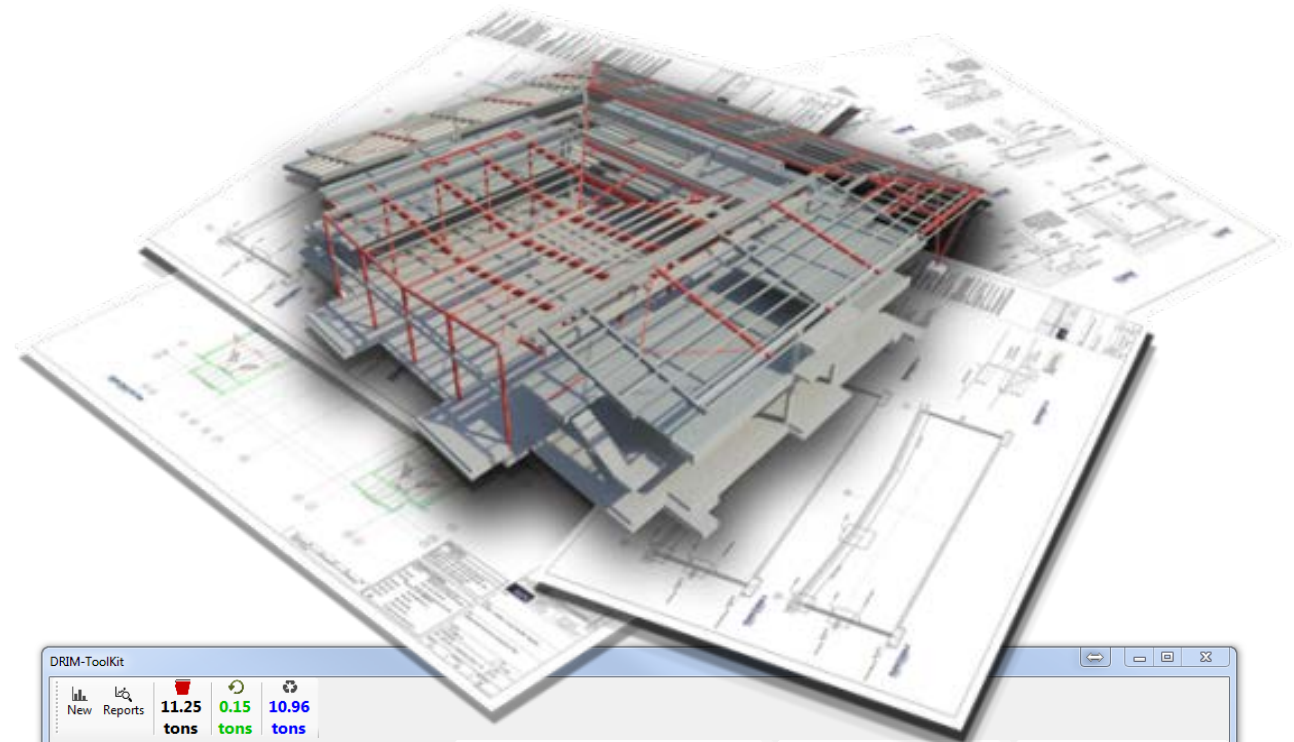


Importance of BIM

- BIM now mandated for all government contracts
- BIM adoption increased from 13% in 2010 to 54% in 2015
- Level 2 programme a significant part of recorded savings of £840M for 2015 construction spend
- Level 3 is coming

Deconstruction, Recovery Information Modelling (DRIM)

- Innovate funded project, due to conclude with commercial launch in April 2018
- A **BIM-compatible software tool**
- Provides **modelling and forecasting** capabilities to help developers, contractors, designers and asset owners to better understand the retained value of materials within a building
- The DRIM tool is targeted at both new-build and existing building refurb/ demolition projects



DRIM-ToolKit

New Reports **11.25** **0.15** **10.96**
 tons tons tons

Document preview
 3D View (3D)

Chart Save

Material type	Arising output (tons)	Overall Arising Percenta (OAP)	Arising Output Index (AOI)
Plasterb...	0.0766	0.68 %	0.0052
Wood	1.4144	12.57 %	0.0174
Concrete	9.5519	84.91 %	0.0225
Metal	0.2044	1.82 %	0.0019
Miscella...	0.0012	0.01 %	0.0001
Ceramic	0.0002	0 %	0.0011
Glass	0.0011	0.01 %	0.0001
Plastic	0	0 %	0.0026

Element class	Arising output (tonnes)	Arising Output Index (AOI)
Walls	7.3915	0.0212
Structu...	1.0511	0.0126
Structu...	0.2034	0.0221
Stairs	0.2881	0.0224
Roofs	0.595	0.0065
Generi...	0.0092	0.0017
Floors	1.68	0.0202
Curtain...	0.0011	0.0001

Material Classes - Waste Output

Navigator Table Update Select in Model Select All in Model Replace

Element Id	Element name	Category	Arising output (tonnes)
414482	M_1000	Structural Columns	0.1128
512277	600 x 600 x 900...	Structural Found...	0.003
512297	600 x 600 x 900...	Structural Found...	0.003
512319	600 x 600 x 900...	Structural Found...	0.003
512394	600 x 600 x 900...	Structural Found...	0.003
512445	600 x 600 x 900...	Structural Found...	0.003
512449	600 x 600 x 900...	Structural Found...	0.003
512469	600 x 600 x 900...	Structural Found...	0.003

Properties

CONSTRANTS
 Extrusion End -6202
 Extrusion Start 13298
 Level Offset 0
 Reference Lev Roof Line
 Related to Ma False
 Room Boundir True
 Work Plane (not associated)

CONSTRUCTION
 Fascia Depth 0
 Rafter Cut 33615

GENERAL
 Contains toxic False
 Contains toxic False
 Has own pack False
 Has own pack False
 Prefabricatec False
 Prefabricatec False
 Recyclable ite False
 Recyclable ite False
 Reusable item False
 Reusable item False

GEOMETRY
 Area 173 m²
 Slope 0.00'
 Thickness 202
 Volume 34.97 m³

Area
 Area



Autodesk Revit Plugin

Design for Deconstruction Advisor

End-of-life Performance Estimation

Material Recovery Information Tagging



Deconstruction Process Visualisation

What-if Scenerio Simulation

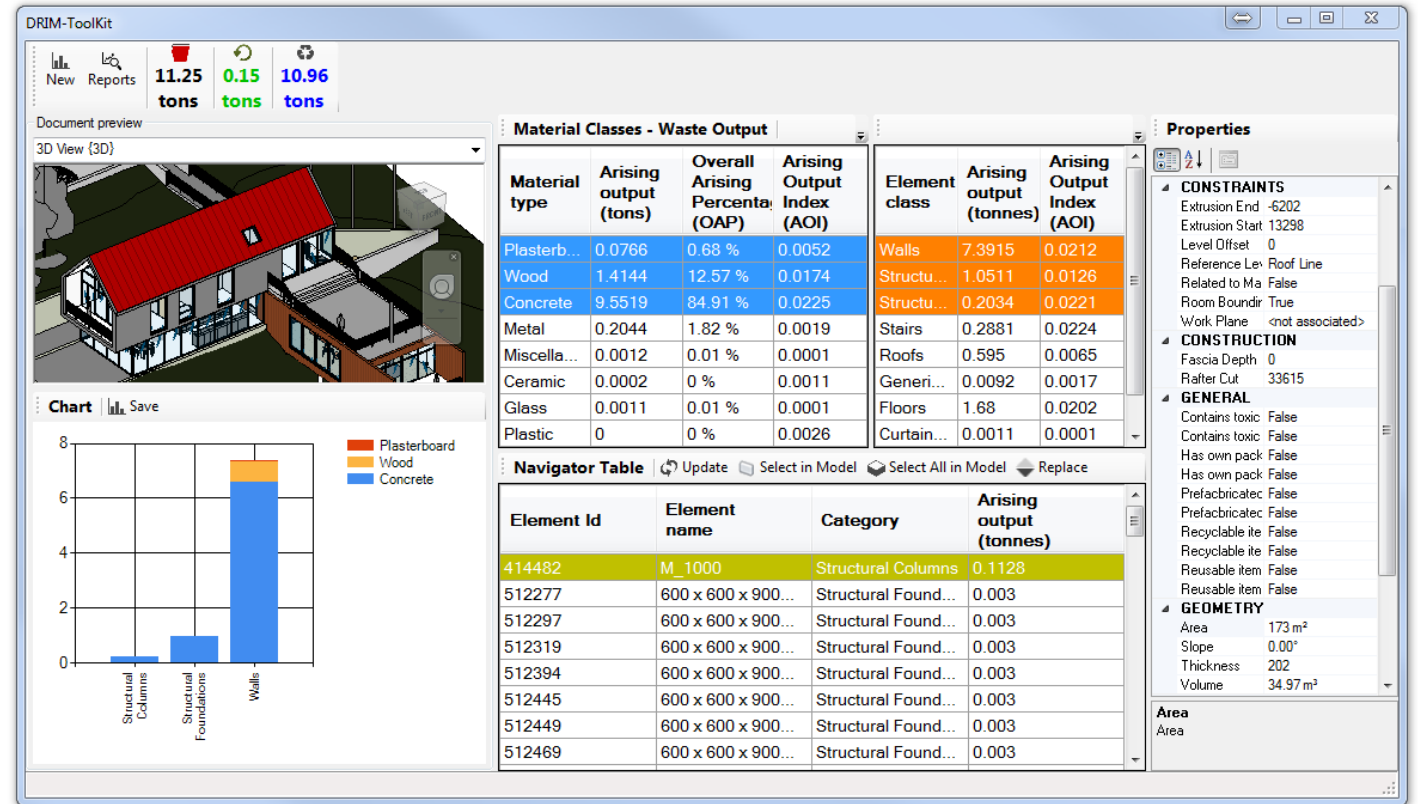
Building End-of-Life Audit



Simulation Platform

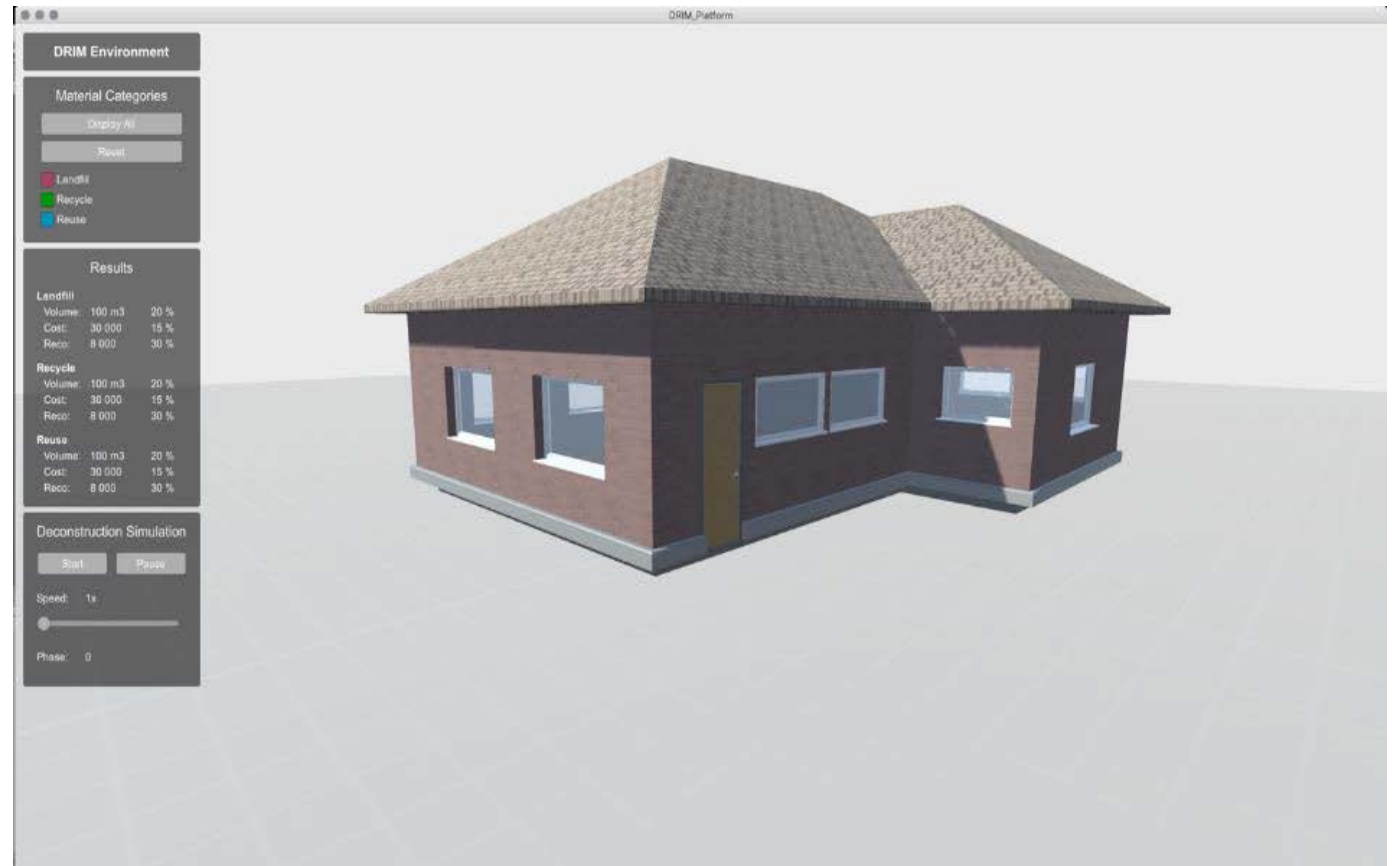
BIM Plug-in

- Integrated with the Autodesk Revit platform
- Provides support to architects and design engineers to adopt a Design for Deconstruction (DfD) approach
- Enables integration of material information and properties within a design model
- Material recoverability is ensured through design, material choice and integration decisions made at design stage



Simulation Platform

- Provides visualisation to support planning of the building deconstruction process
- E.G deconstruction methodology, scheduling and space/ logistical considerations
- Also supports whole-life performance analysis of the building to determine the best time to refurbish, rebuild or relocate a building.



At the **Deconstruction stage**
the DRIM Tool will:

- Produce a deconstruction plan
- Model and simulate the deconstruction process
- Improve deconstruction protocols and scheduling
- Improve waste collection schemes
- Generate pre-demolition/ refurb material recovery estimates
- Capture and predict the end-of-life properties and value of materials

However...

Many barriers to material recovery cannot be overcome at demolition stage!

- Materials specification- materials available are non-recyclable or contain non-recyclable components
- e.g. Steel roof panels with sprayed insulation- too complex to process for recycling or have hazardous properties
- Building design- building design features can often inhibit deconstruction
- e.g. Make deconstruction unsafe or not economically feasible

DRIM can help!

At the **Design stage**
the DRIM Tool will:

- Support architects, designers and material specifiers to design for deconstruction
- Enable design decisions and material specification to make the job of deconstruction more efficient at the end of asset life
- Allow different material choices, fixing types, building design and material integration features to be modelled, and different options to be evaluated in terms of material recoverability and value

We need you!

- We are now nearing the end of the project and are very keen to recruit volunteers to work with us and test the tool on real life projects!
- If you or your organisation can assist us with this, free of charge, please contact us



Thank You


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