

Sustainable Direction Ltd

***Long term whole life cycle perspectives –
Cradle to Cradle and BIM to DRIM***

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Deconstruction Recovered Information Modelling



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Innovate UK



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Sustainable Development Goals



Where do buildings come in? Goals 8, 9 and 11?

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Is this a sustainable building?



Does it achieve:

- Form **and** function
- Iconic **and** practical
- Desire **and** reality
- Human **and** divine / eternal

What about these?



Does it achieve:

- Form **and** function
- Iconic **and** practical
- Desire **and** reality
- Human **and** divine / eternal

Nothing new under the sun...

- Roman structures and walls and Medieval City Walls were used as “quarries” to build new structures in later years.
- We asset strip features from Georgian, Regency and Victorian dwellings as they are valuable.
- We are really good at recycling tarmac now on road resurfacing, and other materials but not yet at reuse.
- What potential is there to really join up the dots and help create a circular economy and a cradle to cradle mentality for reuse and value?
- We think there is a real opportunity



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But what is it worth?

- There are challenges and they are real:
- *e.g.* What are the values of the materials in a building as a resource for reuse, not just recycle, against the cost of delay in completion of the new building and creation of an income stream (or is that even the right way of looking at it)?
- So, what are the actual whole life values of the in-situ materials?
- Can and how do we realise them?
- How does this optimally link to BIM and BMS and BAMB and COBie

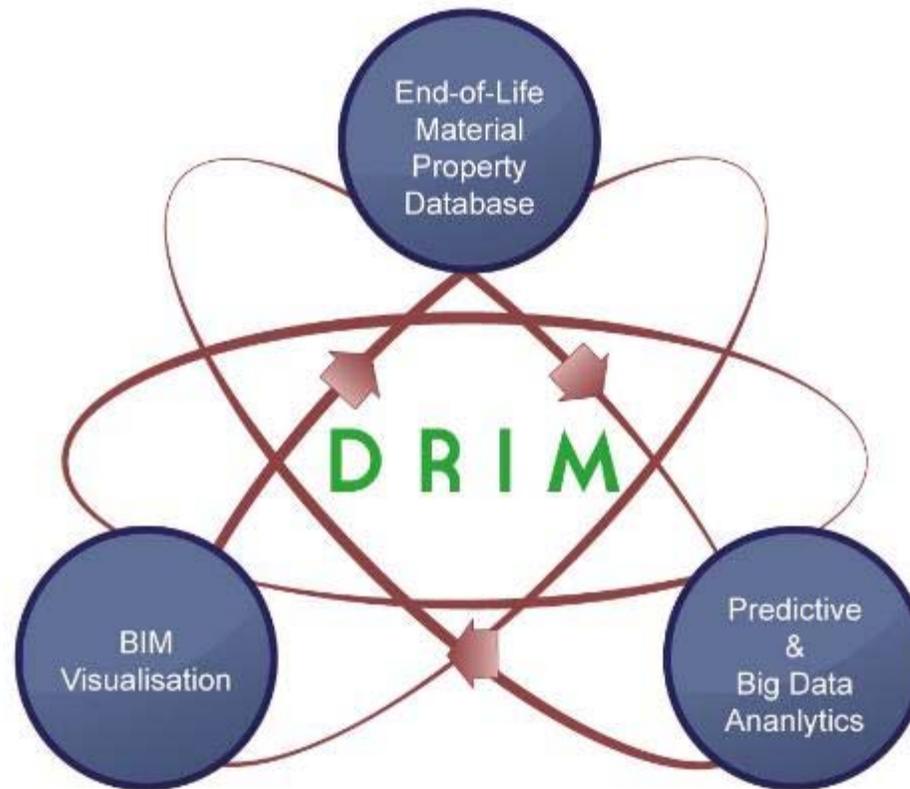
DRIM



- **DRIM (Deconstruction: Recovered Information Modelling)** is a software tool being developed by a consortium of Waste Plan Solutions Ltd (project lead), Sustainable Direction Ltd, UWE (academic lead) and Coventry University, which will maximise the enabling of re-use and recycling of demolition materials at building end of life. Innovate UK is backing this project as they think it is a winner.
- Planned to be available 2018/19, DRIM will interface with BIM software and be of benefit to both the new build and existing build sectors.



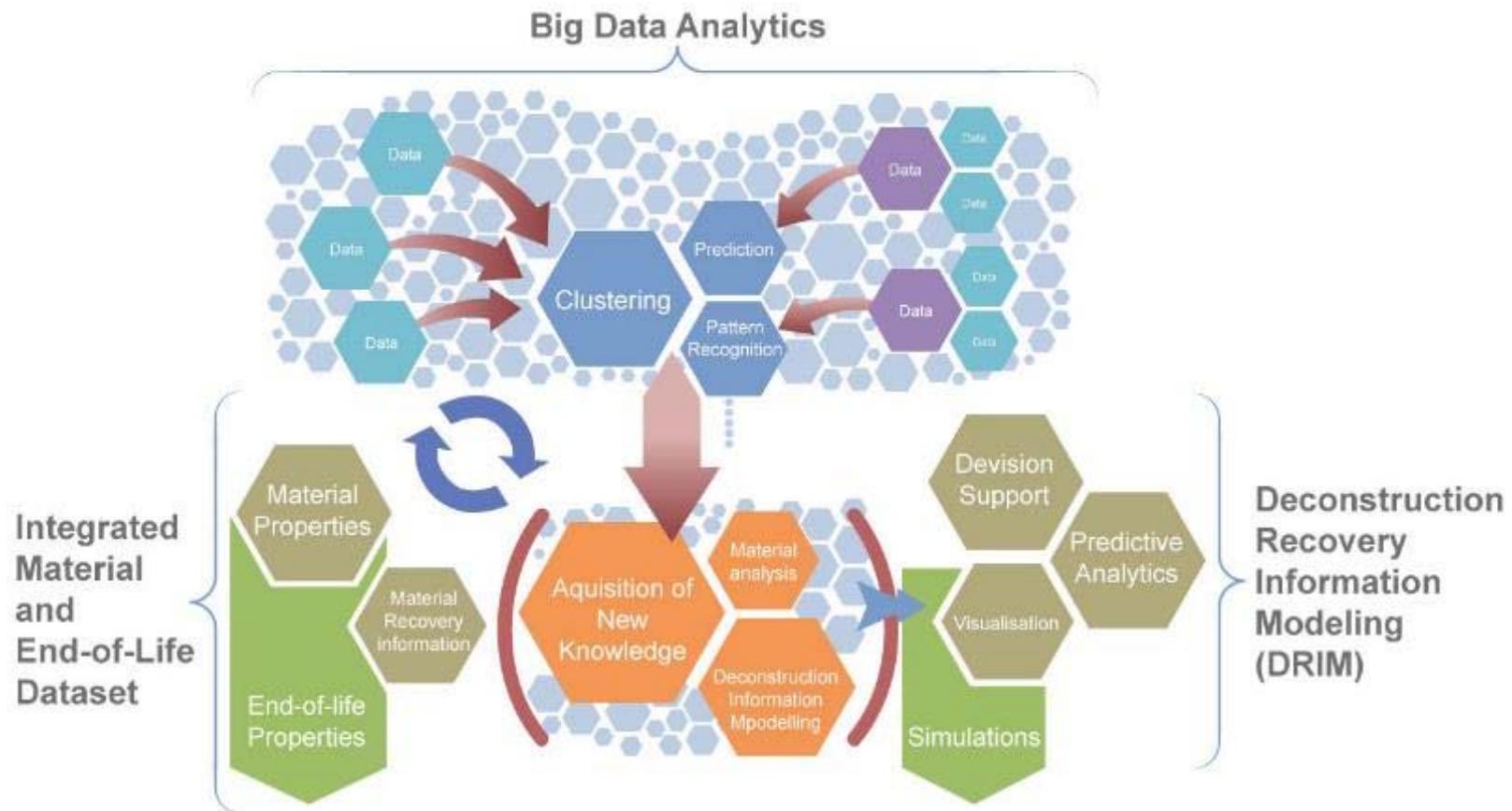
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We have a Love-Hate Relationship with ~~Waste~~ Materials...

- Construction and demolition accounts for 25–30 % of all waste generated in the EU
- UK generated 100 million tonnes of Construction Waste in 2012.
- The recovery rate from non-hazardous construction and demolition waste reported in the UK in 2012 was **86.5** per cent.
- There is an EU target for the UK to recover at least **70** per cent of this type of waste by 2020.
- But are we recovering the value? (and is this level of recovery real)

The opportunity

- More than 50,000 buildings are demolished yearly in the UK leading to a huge quantity of demolition waste much of which still ends in landfill (Power, 2014).
- Demolition waste could comprise a significant proportion of valuable building materials that could be re-used for new construction or refurbishment if recovered properly.



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- Most materials are unsuitable for reuse as they contain toxic elements due to the nature of demolition (not deconstruction).
 - Recovery of demolition waste is unattractive because the waste is often contaminated with “paints, fasteners, adhesives, wall-covering materials, insulation, and dirt.”
 - Current demolition waste comes from old buildings torn down yesterday and today, but buildings erected now may well cause the same issues in 30 years.

- 400 million tonnes of raw materials get delivered to site each year
 - (60 million tonnes of which are described as still thrown away straight away – but that’s another story)
- How much could be avoided if we used the “resource bank”...
- Has been tried before, with some success, the CRRCCs...
(Construction Resource Recovery Consolidation Centres)



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Creating the future now

- We are in a world where roads, bridges, public spaces, sports facilities, office buildings and private homes represent the biggest (and least costly) valuable materials deposits for the built environment.
- We are moving to the reality where these assets are connected to a digital library, revealing up-to-date condition of the assets' components to not only enable predictive maintenance and performance models, but also to be a platform for a secondary materials market.
- DRIM provides the connectivity of these assets to pave the way for closing the material loops for one of the largest sources of waste in modern society... by recognising value.

CONNECTIVITY FOR BUILDINGS

THE BENEFITS OF AN INTELLIGENT AND CIRCULAR ECONOMY



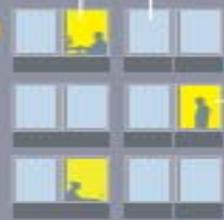
PERFORMANCE MODELS :

PREDICTIVE MAINTENANCE

BETTER END-OF-USE LOOPING OF ASSETS

CAN BE APPLIED TO KEY FUNCTIONS (ELEVATORS, POWER ETC).

ENERGY EFFICIENCY



ASSET SHARING:
DIGITAL MARKET FOR SHARED OFFICE SPACE

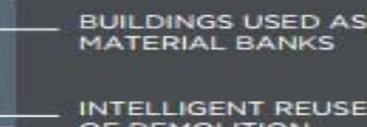
OPTIMAL USE OF SPACE ASSETS. INCREASING WORK PRODUCTIVITY

EFFICIENT USE OF RESOURCES:
DIGITAL EMBEDDED MATERIAL & PRODUCT INVENTORIES

BUILDINGS USED AS MATERIAL BANKS

INTELLIGENT REUSE OF DEMOLITION WASTE

FLEXIBILITY:
INDIVIDUAL INVENTORIES FOR INTERIORS - CHANGING BETWEEN HOME AND OFFICE USE



DIGITAL LIBRARY
COMMUNICATING REAL-TIME HEALTH OF BUILDINGS, INFRASTRUCTURE ENERGY AND OTHER ASSETS. THIS WILL INFORM PREDICTIVE MAINTENANCE, PERFORMANCE MANAGEMENT AND OVERALL 'USE CYCLE'.



DIGITAL LIBRARY

PREDICTIVE INFRASTRUCTURE MAINTENANCE:

BRIDGES
ROADS



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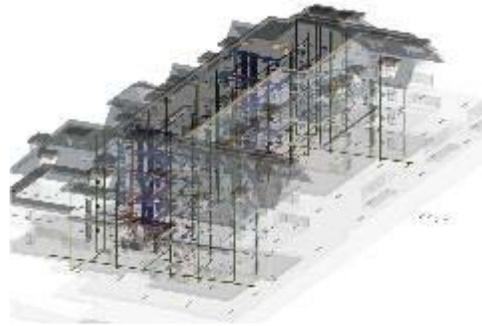


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Case Study

- The automatic embedded product inventories generated by Dutch company BAM's building information management software allows multiple stakeholders to treat the constructions as a 'resource bank', enabling the assets to be returned when a building is decommissioned.
- IBM and Delta Development are collaborating on incorporating connected sensors into the new Schiphol Trade Park, which will provide an extremely rich flow of data that can be used to optimise resource use, predictive maintenance, reuse and functional design.

A word on BIM



A tool for
sustainable design,
construction and
operation

Benefits of BIM:

- ✓ Pooling knowledge means design is value engineered and optimised for every stage
- ✓ Design changes made while project is still flexible, and when one party make a change all other disciplines are aware. Automatic clash detections eliminate the need for ad-hoc solutions
- ✓ Accurate ordering of materials and equipment
- ✓ Better communication
- ✓ Streamlined delivery
- ✓ 'As-built' info for management of building

A word on BIM - COBie



- Construction Operations Building Information Exchange
- Non-proprietary **data format** for publishing **BIM information**
- Delivers **asset data**, rather than geometric information
- Helps capture and record important project data:
 - Point of origin
 - Equipment lists
 - Product data sheets
 - Warranties
 - Spare parts lists
 - Preventive maintenance schedules
- **Information essential to support operations, maintenance and asset management** once building is in service



DRIM



- Will enable identification of reusable and recoverable building materials at end-of-life of a building.
- DRIM Tool will enable:
 - production of deconstruction plan;
 - simulation of deconstruction process;
 - production of deconstruction protocols during demolition of the building to enable efficient recovery;
 - improved demolition waste collection schemes. The tool is aimed at both new and existing buildings sector.



But we need your help and data Input!...



- Tell us what would you like this to do for you?
- Do you have data / examples we could use to develop and test this?
- Would you like to be a development partner?

- Thank you

Where to find us:



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- Thank you

Dr John Henry Looney