

# A Preliminary Case Study on Circular Economy in Taiwan's Construction

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# Introduction- basic information of Taiwan's construction

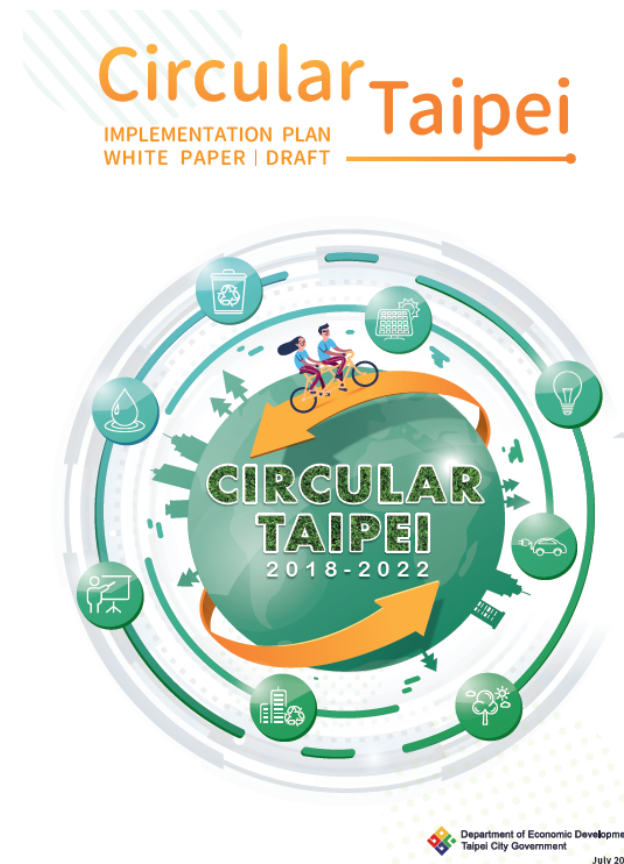
- Taiwan is an island country populated by 23 millions people with the total land area as 36 thousands km<sup>2</sup>
- Every year there is about 25 thousands buildings being built with the total floor area as 30 millions m<sup>2</sup>
- Every year there is about 2.5 thousands buildings being demolished with the total floor area as 2 millions m<sup>2</sup>
- Around 70% of floor area of new building projects are built with RC structure
- Around 20% of total construction waste is recycled



picture of capital city in Taiwan- Taipei

# Introduction- recent trends of Taiwan's construction

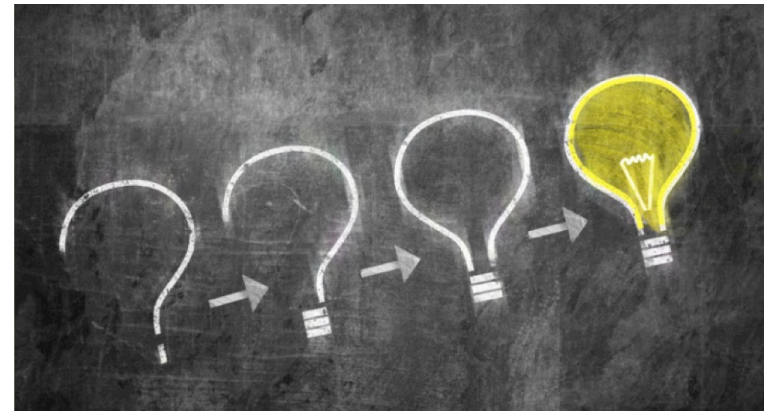
- In 2008, first BIM project has been constructed in Taiwan
- In 2013, Taipei city has established BIM system
- In 2017, Taiwan central government has set BIM Implementation Roadmap
- In 2017, Taiwan central government has included Circular Economy into new Industrial Innovation Plan
- In 2018, Taipei city has released implementation plan for Circular Taipei
- In 2018, first circular building has been constructed



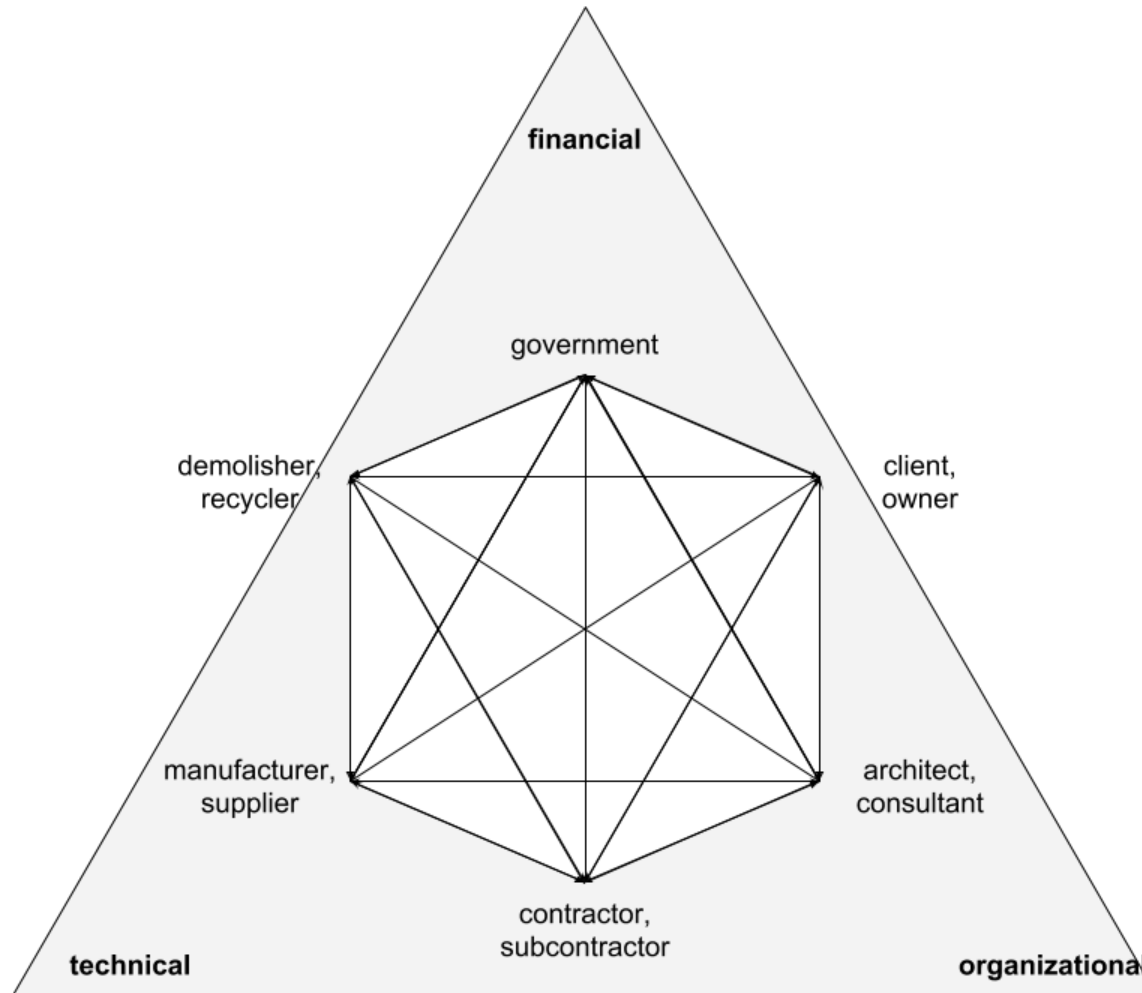
Implementation plan for circular Taipei

# Introduction- Research Questions

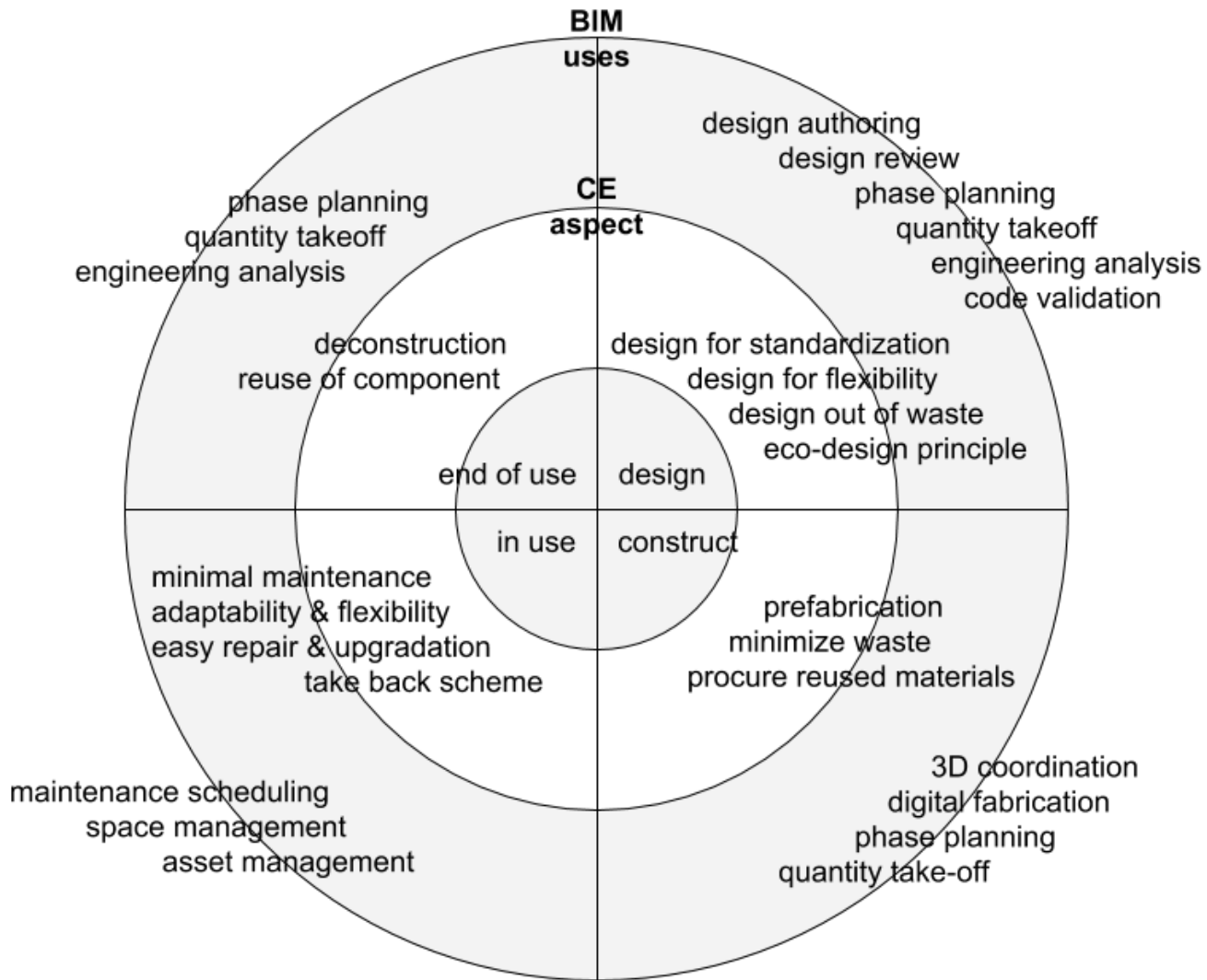
- What is the current awareness, challenges and enablers for CE in Taiwan's construction?
- What is the current adoption, limitations and potentials of BIM applications for CE in Taiwan's construction?



# Literature Review- CE in Construction



# Literature Review- BIM for Circular buildings



# Methodology- Interview & Case study

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## Part 1. Awareness, challenges, enablers of CE in Taiwan's construction

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- (1) What is your understanding of CE in construction?
  - (2) What is the current awareness of construction industry towards CE? (Please share your view towards different stakeholders, e.g. clients, designers, contractors, manufacturers, government)
  - (3) What are the current challenges and future potentials for CE in Taiwan's construction? (Please share your view towards three aspects, i.e. technical, financial, organizational)
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## Part 2. Adoption, limitations and potentials of BIM application for CE in Taiwan's construction

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- (1) Which BIM uses have been adopted in your project? (e.g. design authoring, design review, cost estimation, phase planning, performance analysis, code validation, etc.)
  - (2) What are the benefits of BIM application for circular buildings in your project?
  - (3) What are the limitations and potentials of BIM application for circular buildings in your project?
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# Result- 3 Pilot Projects

- Project A: pavilion (private)
  - Phase: constructed, to be destructed
  - Size: small (SC structure)
  - Interviewee: architect (junior)
- Project B: housing (private)
  - Phase: designed, to be constructed
  - Size: medium (SC structure)
  - Interviewee: architect (senior)
- Project C: housing (public)
  - Phase: designed, to be constructed
  - Size: large (SC structure)
  - Interviewee: architect (senior)





# Result- Project A

- CE in construction
- Understanding: BAMB (material passport & modular design), C2C, product service (lighting)
- Awareness: high for government, low for manufacturers
- Challenges: lack of incentives for manufacturers
- Enablers: green purchase of government



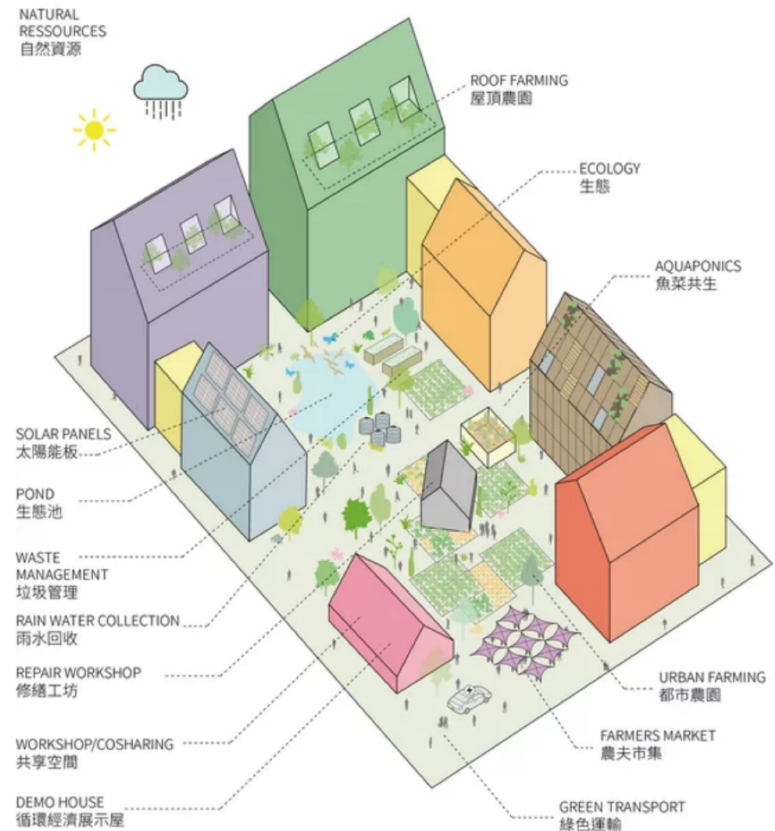
# Result- Project A

- BIM for CE in construction
- Adoption: design review, quantity take-off (material passport)
- Benefit: information management of building components
- Limitation: incomplete label information for material passport
- Potential: phase planning for demolition



# Result- Project B

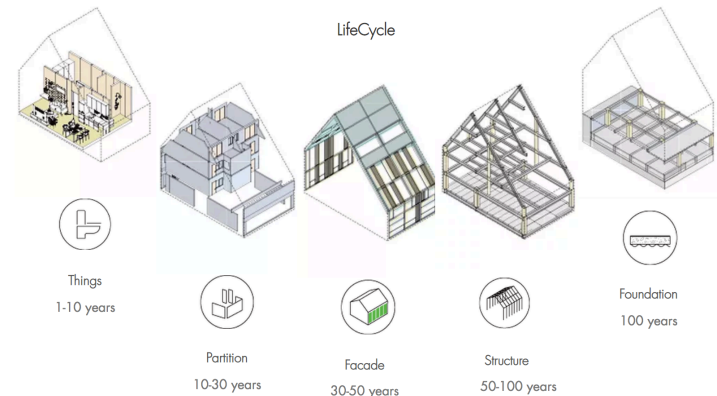
- CE in construction
  - Understanding: BAMB (material passport & modular design), resource management (urban agriculture), sharing economy (cohousing)
  - Awareness: high for government, low for manufacturers
  - Challenges: lack of incentives for manufacturers
  - Enablers: financial incentives by government, platform for material exchange



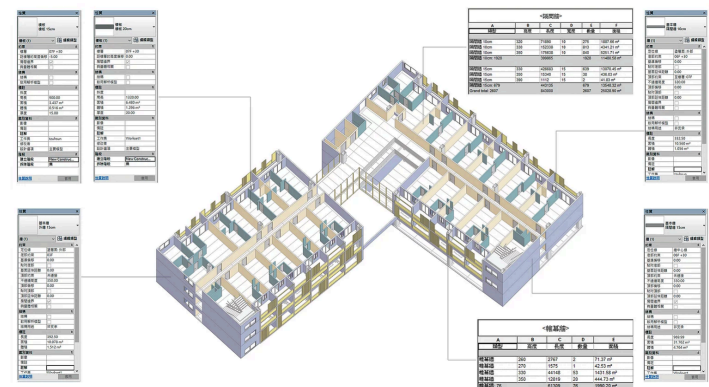
# Result- Project B

- BIM for CE in construction
- Adoption: design authoring, design review, quantity take-off (material passport), engineering analysis (energy)
- Benefit: information management of building components
- Limitation: unclear relevant information for material passport
- Potential: engineering analysis for building circularity

## B A M B Buildings As Material Banks



## Material Passport



# Result- Project C

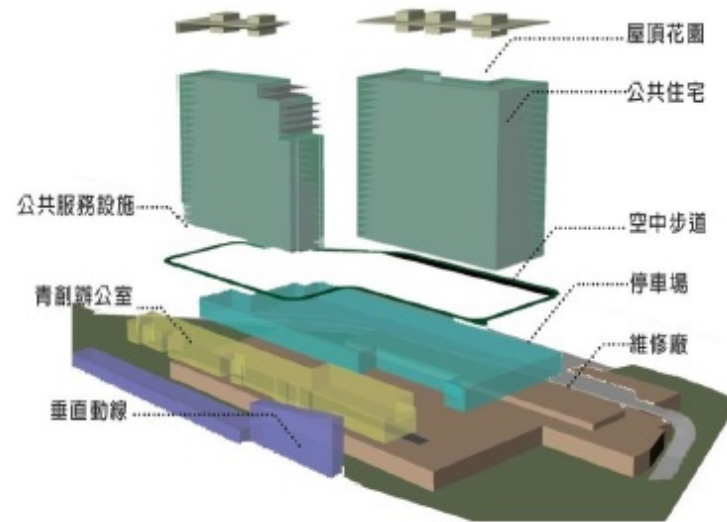
- CE in construction
- Understanding: BAMB (material passport & modular design), product service (electronics, furniture), sharing economy (coworking)
- Awareness: high for government
- Challenges: barriers by existing regulation for public building
- Enablers: new policy and regulation



# Result- Project C

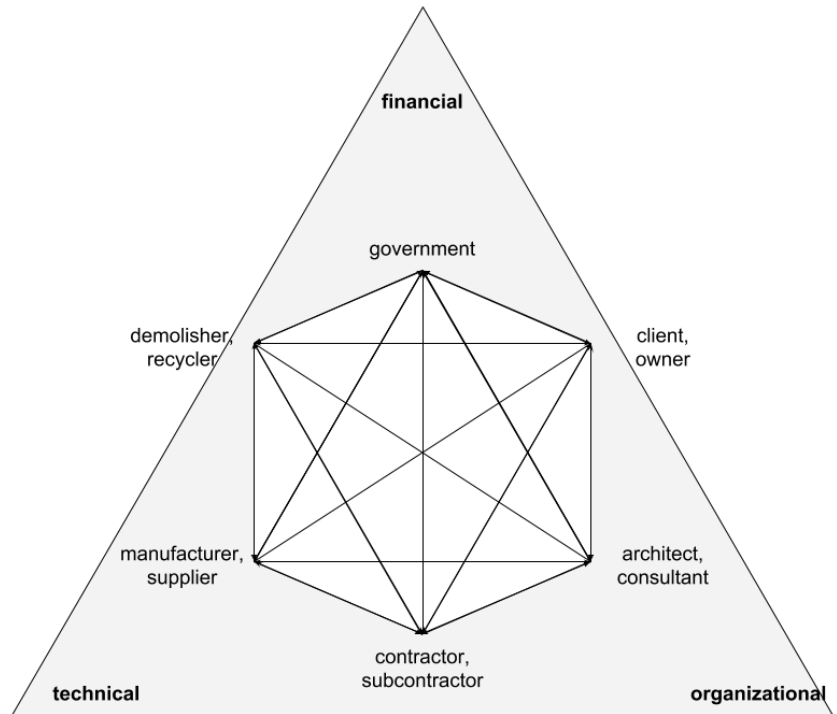
- BIM for CE in construction
  - Adoption: design authoring, design review, quantity take-off (material passport), phase planning (construction)
  - Benefit: information management of building components, construction management
  - Limitation: unclear relevant information for material passport
  - Potential: facility management

立面規劃設計



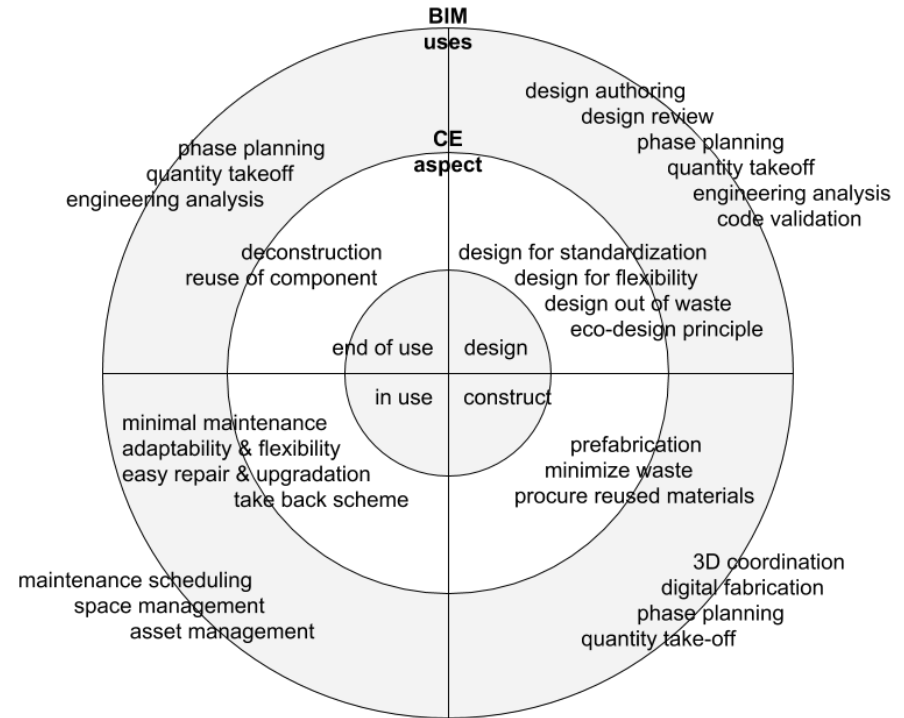
# Conclusion

- CE in construction
- Understanding: BAMB (material passport & modular design), product service, sharing economy
- Awareness: high for government, low for manufacturers
- Challenges: lack of incentives for manufacturers, barrier by existing regulation
- Enablers: financial incentives by government, new policy and regulation, platform for material exchange



# Conclusion

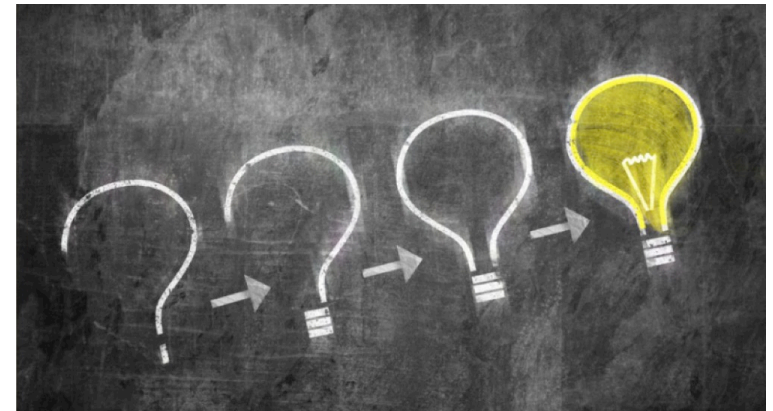
- BIM for CE in construction
  - Adoption: design authoring, design review, quantity take-off (material passport), phase planning (construction), engineering analysis (energy)
  - Benefit: information management of building components
  - Limitation: unclear relevant information for material passport
  - Potential: engineering analysis for building circularity, phasing planning for demolition





# Future Work

- More interviews to be carried out with other stakeholders (e.g. manufacturers)
- Comprehensive survey over construction industry sector
  
- BIM for material passport
- BIM for building circularity assessment
- BIM for circular building design





THANKS  
FOR YOUR  
ATTENTION  
ANY  
QUESTIONS?

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