# Assessing Requirements and Academic Impacts of BIM Multi-disciplinary Collaborative Working in Higher Education Sector

**Prepared by**
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## Background to the research

**Aim of the project**
To integrate BIM (Building Information Modelling) multi-disciplinary collaborative working into the Higher Education curriculum within the architecture, engineering and construction disciplines

**Why are we doing it?**
- Changing the behaviour of silo working mentality in the UK construction industry
- The UK Government start putting mandate that all public funded project will need to meet BIM Level 2
- Equipping the current students and future graduates with the right employability skills by getting them to work in a BIM Multi-disciplinary environment
- To get them to understand roles and responsibilities of various people in the design team and throughout the life cycle of a building projects.

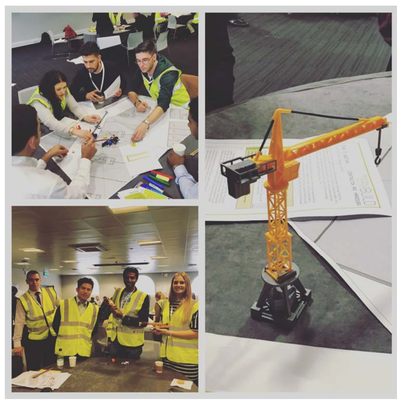
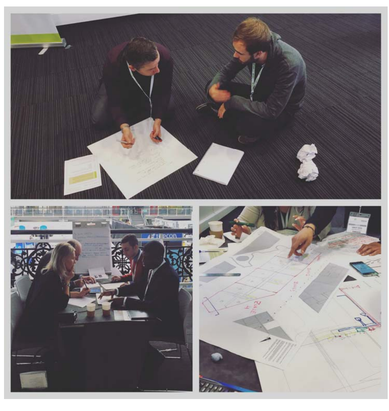
**Objectives of this research:**
- Exposing students to multi-disciplinary collaborative working within the formal curriculum and also extracurricular activities
- Getting staff to work together collaboratively
- Identify ways in implementing BIM into the formal curriculum

**Type of interventions being carried out:**
- Set up 1: A semester long (5 months) design project extracurricular activity
- Set up 2: One day physical design competition extracurricular activity
- Set up 3: Integration of BIM into curriculum with team-working and peer assessment

**Intervention 1: A semester long BIM design project extracurricular activity**
- Students from different courses grouped into multi-disciplinary team and asked to complete tasks monthly for a given design project
- Professional guest lectures were invited weekly to give talk relating to BIM within the construction industry to give students exposure of the practical aspect
- Multi-disciplinary mentor were appointed to assist students from different disciplines in completing their task as a group
- Students were encouraged to communicate regularly and meet up fortnightly through physical or virtual meeting
- Online collaborative site were set up using LSBU's virtual learning environment




**Intervention 2: Teambuild One (two) Day(s) Design Competition**
- Students from different courses were grouped and asked to assess virtual information available regarding Passmore Building, a real building case study owned by LSBU (this includes site survey, walkthrough videos, etc captured during the feasibility survey of the building).
- Students were then given a chance to visit the site in person and upload further pictures to shared folder for other group members to review if they cannot attend physically.
- Groups were given tasks to complete based on life cycle of a project on the day and each group will nominate someone within their team to present the proposal to judges on each different cycle of the project.
- Best performing group was identified based on judges and peer review scores.

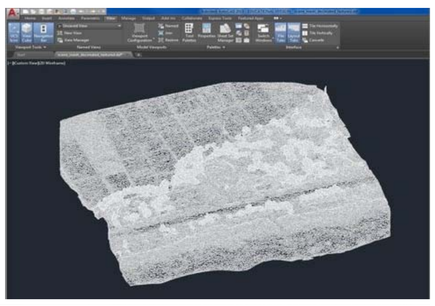







**Intervention 3: Integrating BIM as part of the curriculum**
- Students work in groups on Design Project module
- Peer assessment: at the end of the semester, students from level 6 review works of students from level 5. Each student were also asked to review their group members and fellow classmates
- Multi-disciplinary assessment: at the end of the semester, students and colleagues from other disciplines and courses were invited to review students' final presentation and their BIM models.
- The use of VR/AR and tablet equipment as part of the peer assessment





**Challenges:**
- Resource intensive
- Not all staff aware of what BIM is about and hence does not push themselves or their students to collaborate
- Silo working mentality
- Students lacking in basic group-working skills
- Competition among students and colleagues

**Benefits and impacts:**
- Students' communication and leadership skills improved
- Understanding of roles and expertise of other disciplines improved
- Students and staff awareness of BIM increased
- Positive collaborative working environment enhanced for both staff and students

**Lesson learned:**
- Staff awareness and clear understanding of BIM is crucial
- Increase interest from staff to collaborate together and support their students on multi-disciplinary collaborative working activity
- Lower students drop out rate as students became more aware of the benefit of it for their future career development
- Students would like multi-disciplinary collaborative working to be incorporated into the formal curriculum
- Set up ground rules on communication and expectation on collaborative working

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# Industry Academic Partnership Program – IAPP Indonesia

# Developing Indonesian Coastal Areas as Sustainable Tourism Destinations – A replicable Integrated Engineering Model for Exemplary Waste Management

**Prepared by**
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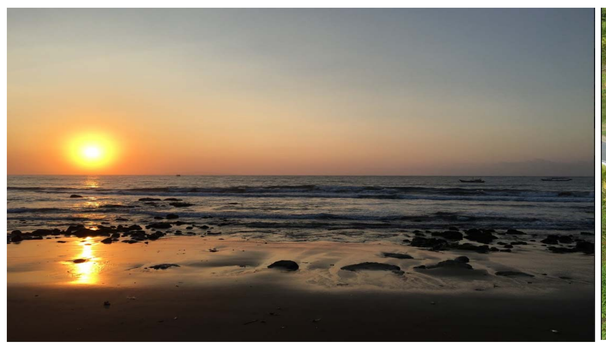
## Introduction

Under the remit as a delivery partner of the Newton Fund, the Royal Academy of Engineering has partnered with the Ministry of Research, Technology and Higher Education of the Republic of Indonesia (RISTEKDIKTI) to enhance engineering teaching, research and innovation outcomes in Indonesian universities by building bilateral industry-academia links. We have partnered with the Institut Teknologi Bandung (ITB) in Indonesia with industry partners Lembaga Penerapan Teknologi Tepat (LPTT), MANTRA, CLEAR Community and Atelier 10. Together, we have worked on two projects that address the impact of coastal pollution on tourism in Indonesia. In the context of an urgent need in Indonesia to address waste management infrastructure provision in coastal areas, LSBU and ITB are collaborating with the industry partners to deliver a world-standard integrated waste-management engineering model as an exemplar solution for Indonesia. In this IAPP programme, our team combines a wide-ranging Industry and Academic expertise to develop and enhance engineering methodology and technology. It brings innovative approach in addressing Indonesia's waste management challenges. This project is a catalyst for further industry engagement, and a knowledge-based and skills transfer in Engineering research and education. Batu Karas in Pangandaran, West Java has been selected as a UN Sustainable Tourism Observatory and study area for engineering research into waste management, both programmes run by ITB.



### First Project: Developing Indonesian Coastal Areas as Sustainable Tourism Destinations – a Replicable Integrated Engineering Model for Exemplary Waste Management

**Collaborators:**

- Jennifer Hardi and Prof Andy Ford from London South Bank University
- Dr Budi Faisal, Ari Perdana and Benno Rahardjan from Institut Teknologi Bandung (ITB)
- Rohadji Trie from Lembaga Pengembangan Teknologi

**Project duration: 18 months**

**Objectives:**

1. Bring together experts from UK and Indonesia to deliver a world-standard integrated waste management engineering model that can act as exemplar for other areas and local communities across Indonesia.
2. Provide practical, simple and deliverable waste management solutions to equip Tourism Destinations in Indonesia to develop with greater sustainability.
3. Increase understanding amongst academia, industry and the wider public regarding the latest technological solutions for affordable community-scale waste and recycling treatment in Indonesia and identify the potential actions required to further improve apply those technologies.

This project exchange has enabled all the above objectives to be successfully met.

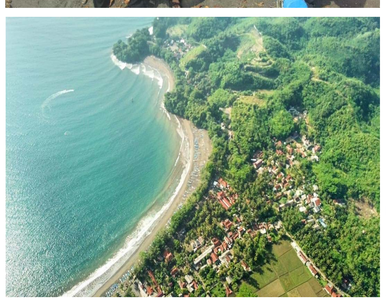
The success of the first project continues on with the **Second Project: Integrated waste management facilities for coastal Indonesia at 3 scales: Village, District and Region**

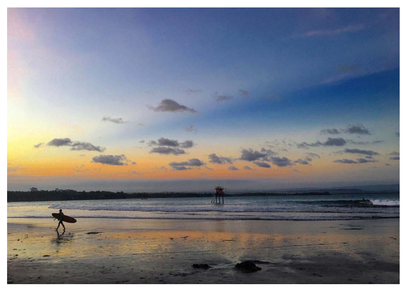
- Jennifer Hardi and Dr Issa Chaer from London South Bank University
- Dr Budi Faisal, Ari Perdana, Benno Rahardyan and Andry Widjowijatnoko from Institut Teknologi Bandung (ITB)
- Chani Leahong from CLEAR Community
- Ajay Shah and Tilly Ford from Atelier 10
- Nino Sean from Mantra

**Project duration: 18 months**

**Objectives:**

1. Bring together experts from UK and Indonesia to deliver a world-standard integrated waste management engineering model that can act as exemplar for other areas and local communities across Indonesia.
2. Derive a range of innovative sustainable engineering design and technology to serve three levels of area in Indonesia from village, district to regional scale.
3. Enable academia, researchers and students in both Indonesia and UK to be trained in and practice in implementing the most up-to-date engineering design techniques and softwares, including Building Information Modelling (BIM), in the applied context of solving real world need for waste management infrastructure in Indonesia coastal and rural area.






**Impacts and Outcomes:**

1. On community level: the workshop and mentoring activities helped raise awareness of waste minimisation, separation and recycling which in turn result in waste reduction to landfill and the ocean.
2. For SMEs: further potential to turn the recycled and reusable materials into sustainable products that they can sell to improve the economy of the area further
3. The industry and academia partnership allow for cross fertilisation of ideas where the industry partners able to bring experience and practical application to the team and to get access to cutting edge research
4. It also enables NGOs to upscale their charitable work
5. It allows LPTT to develop a prototype of a small-scale pyrolysis machine
6. It allows project collaborators and students from ITB and LSBU to address sustainability concerns using multi-disciplinary Building Information Modelling approaches that integrate design, construction and operation. This has been very useful for negotiating different social and economic context.

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