

# THESIS TOPIC: INTEGRATIVE DESIGN AND BIM

## THESIS TITLE: BENEFITS OF INTEGRATIVE BUILDING DESIGN FOR THEIR SUSTAINABLE CONSTRUCTION AND OPERATION USING THE BIM METHOD

### INTEGRATIVE DESIGN

#### WHAT IS IT?

It is an interdisciplinary, collaborative, and iterative process".

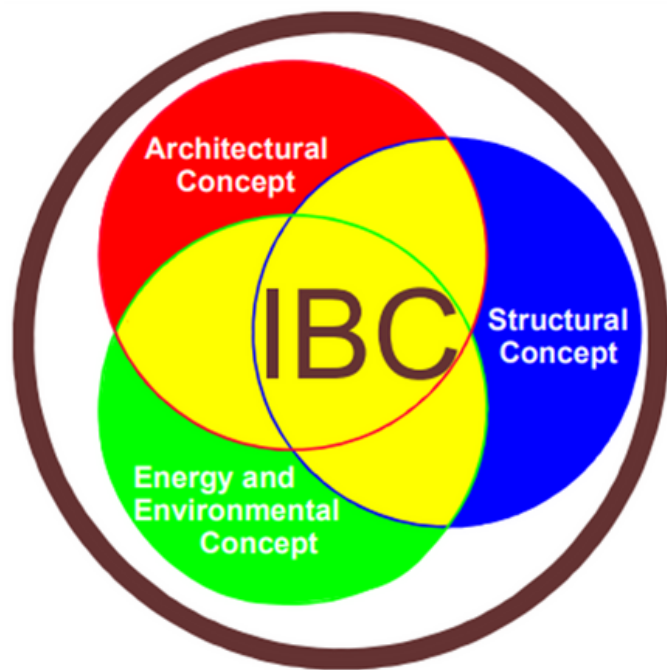


Figure 1: Illustration of the Integrated Building Concept. (Heiselberg 2007)

#### WHY?



Figure 2: Difference between traditional and Integrated Design Process (Palma 2022)

#### HOW?

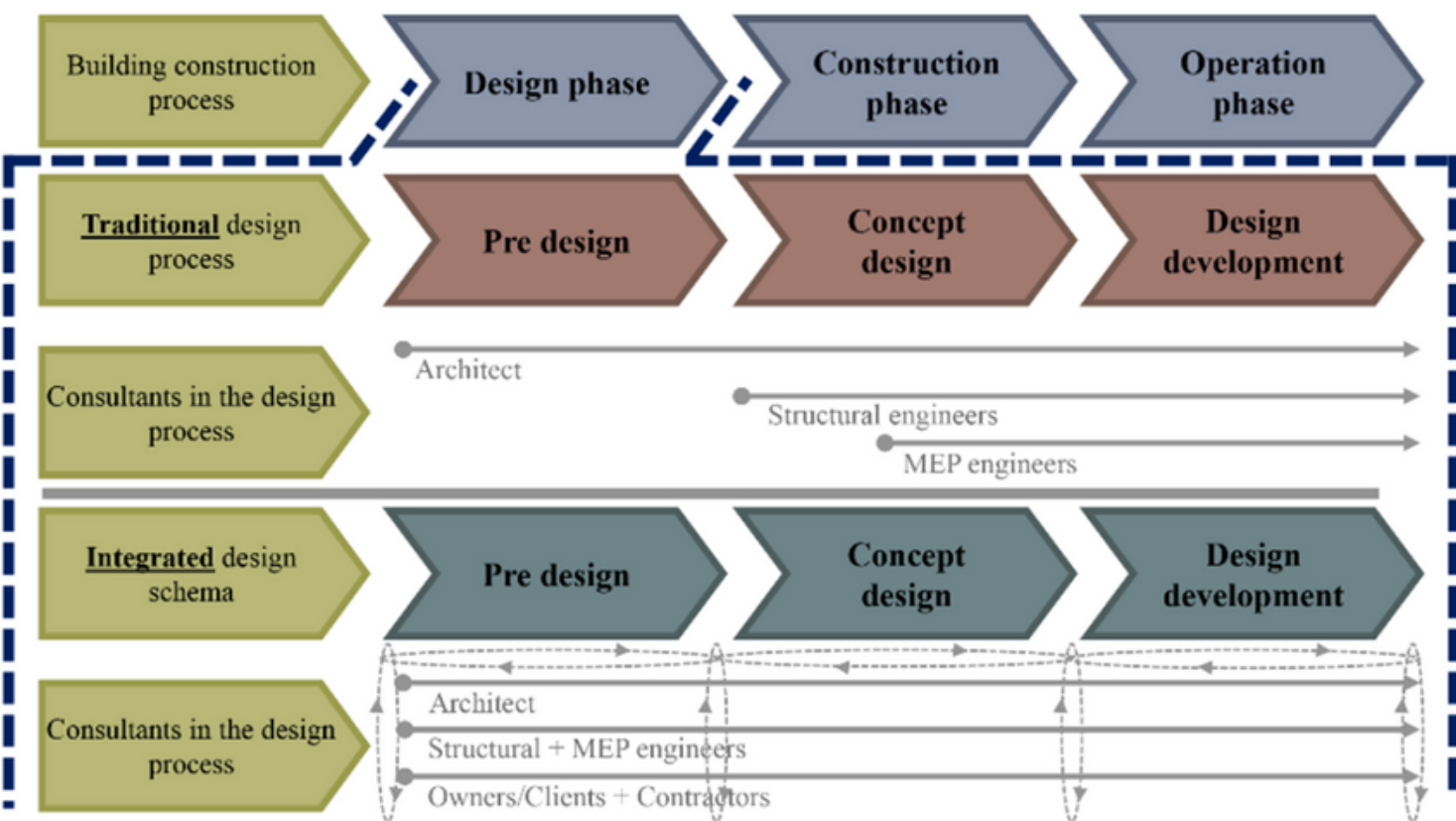
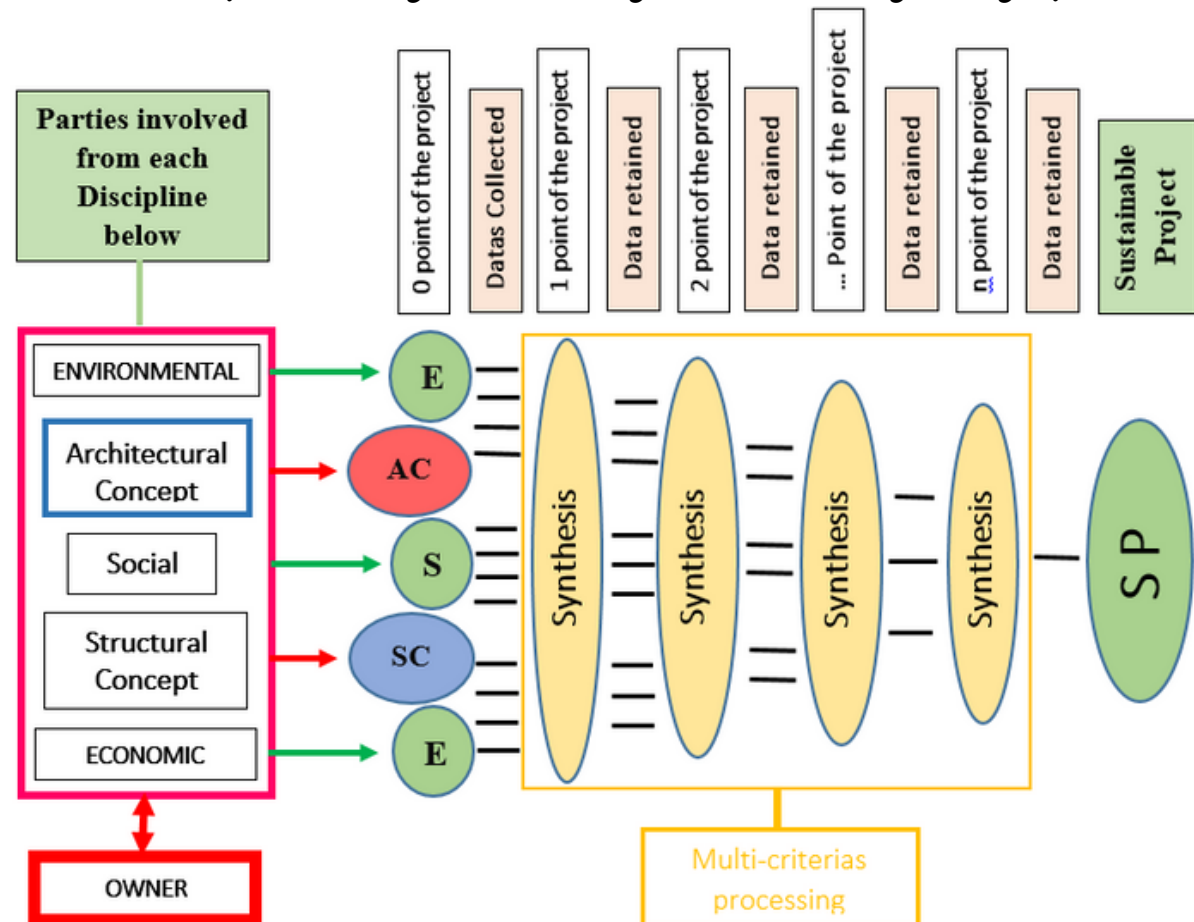


Figure 3: Traditional design process versus integrated design (ID) schema in the AECO industry (Kamari and Kirkegaard 2019).

The principle of Integrated Design is based on the total involvement of all the parties involved in the construction from the initial design stage. Unlike the traditional design process, where the parties involved work separately in the initial design phase and begin to collaborate in the construction phase, this leads to loss of information, repetitive errors that are not taken into account upstream and increases the cost of construction.

### Information processing in the integrated building design process



The information relating to each building trade is collected at the start of the project, then processed and synthesised at each stage of development until a sustainable project is achieved.

### BIM (Building Information Modelling)

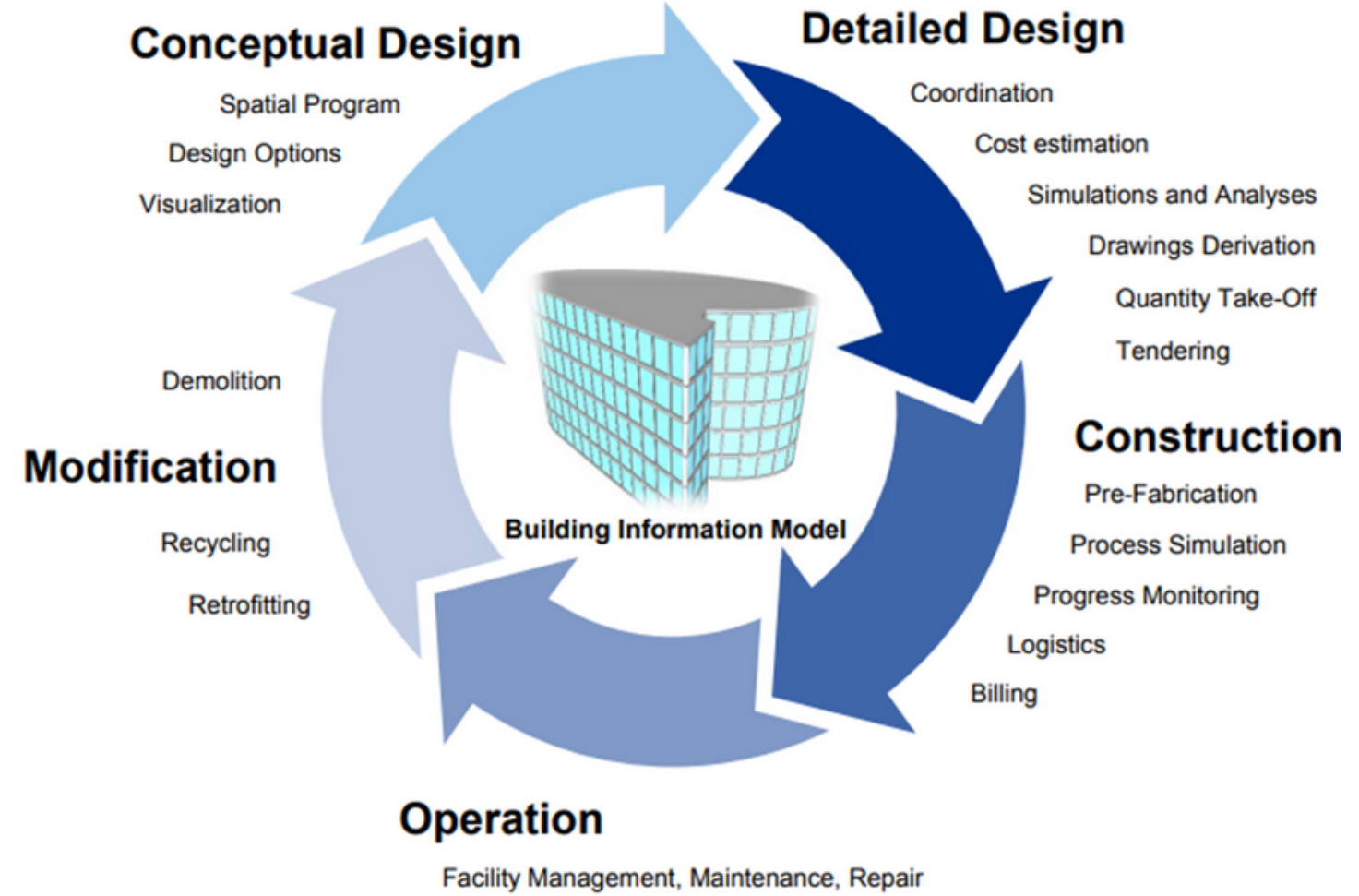


Figure 4: The concept of Building Information Modelling. (Borrmann et al. 2018)

### Research problem

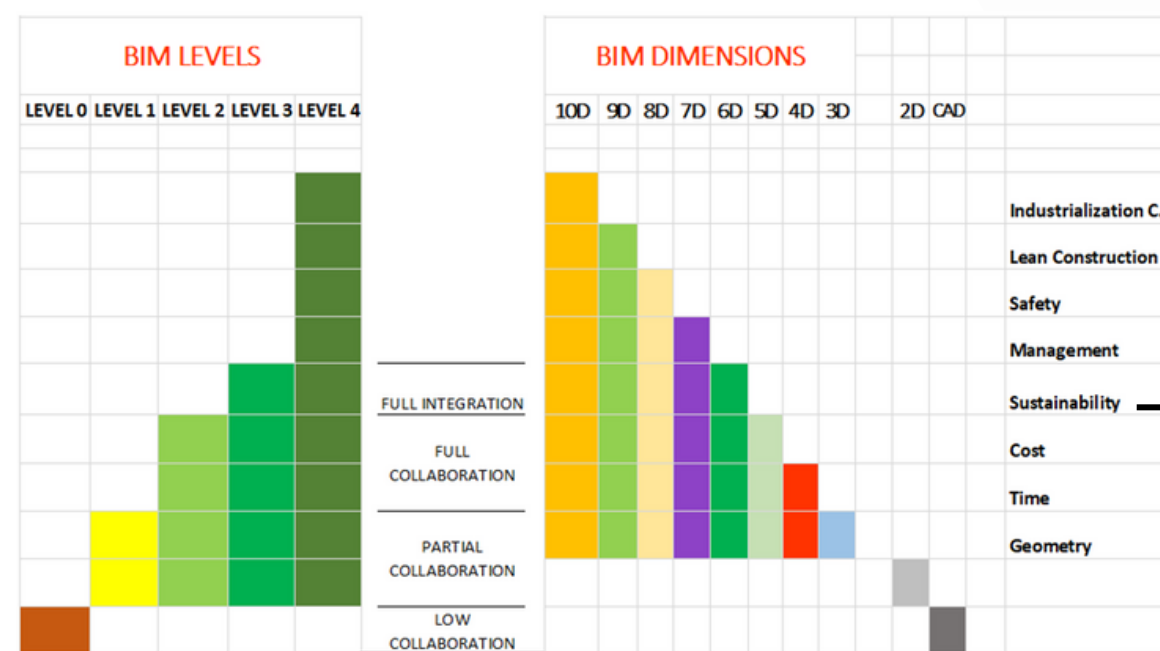
Since BIM is a 3D model-based process that provides all information of the project from the conceptual design stage through construction and operation.

**how to use the BIM method to achieve sustainable projects?**

### Research objectives

establish a clear process for applying the BIM method in the design process for sustainable buildings

### Research questions



**What is the real benefit of the integrated building design using BIM technics on the cost and the sustainability of built assets?**

### Research Methodology

- Literature review and data collection
- Case study: Modelling a project using the BIM process and carrying out the possible simulations to achieve a sustainable project. (Quantitative)
- Investigation of expert users of the BIM method and comparative study between two projects, one of which is designed within the scope of the integrated design process and the second only based on conventional technics (separated design). (Qualitative)
- Analysis of results
- Proposals

### Basic time line of Integrative Design and BIM

- Integrated Building Concept. (Heiselberg 2007)
- Heritage building information modelling (Y. Arayici, J. Counsell, L. Mahdjoubi, G. A. Nagy, S. Hawas, and K. Dweidar, : Taylor & Francis, 2017)
- Building information modeling. Why? what? how? (Springer.Borrmann, André; König, Markus; Koch, Christian; Beetz, Jakob (2018))
- Traditional design process versus integrated design (Kamari and Kirkegaard 2019).
- low energy buildings(2020)
- The conceptualization of integrated building design (B. Perkins(2007); A. Sánchez, C. Gonzalez-Gaya, P. Zulueta, and Z. Sampaio (2019); L. Aye, B. McNiven, and D. Holzer(2022).
- Creating Sustainable Buildings (A. Nenadović and J. Milošević 2022)