



# Industrialization of Construction – a Lean Modular Approach

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and

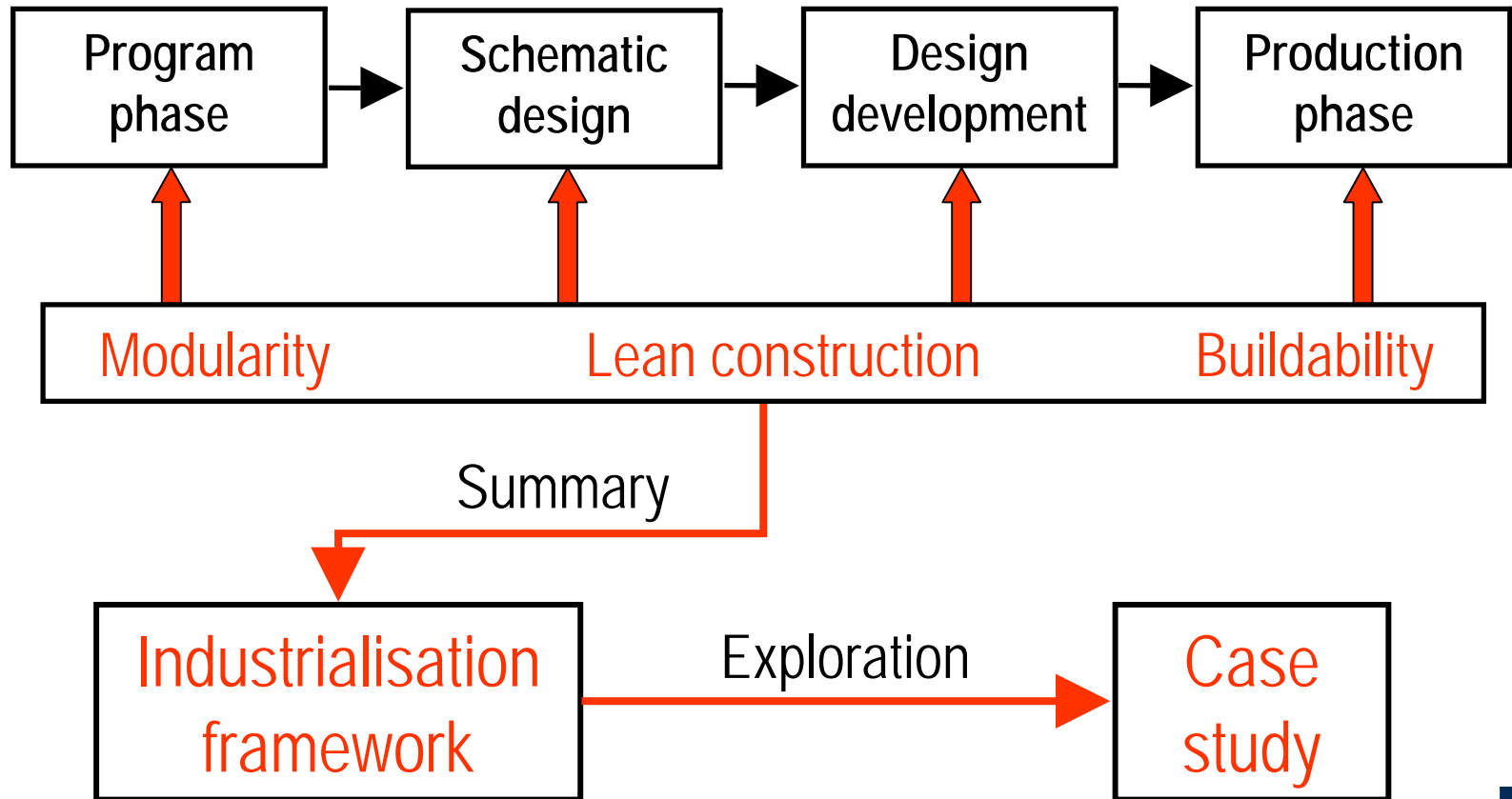
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# Research method

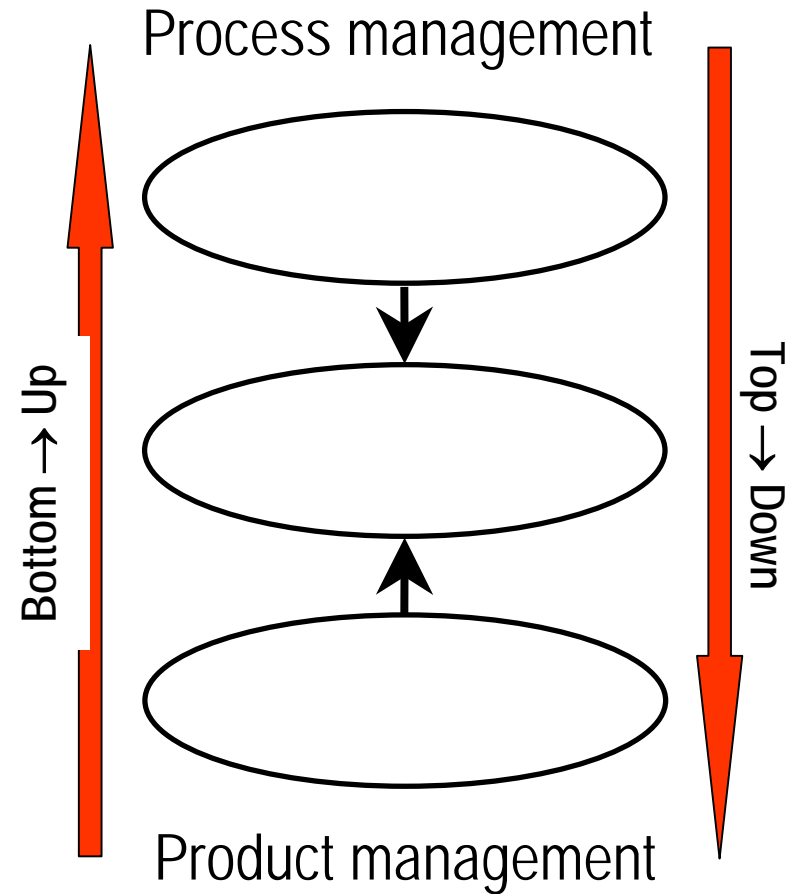
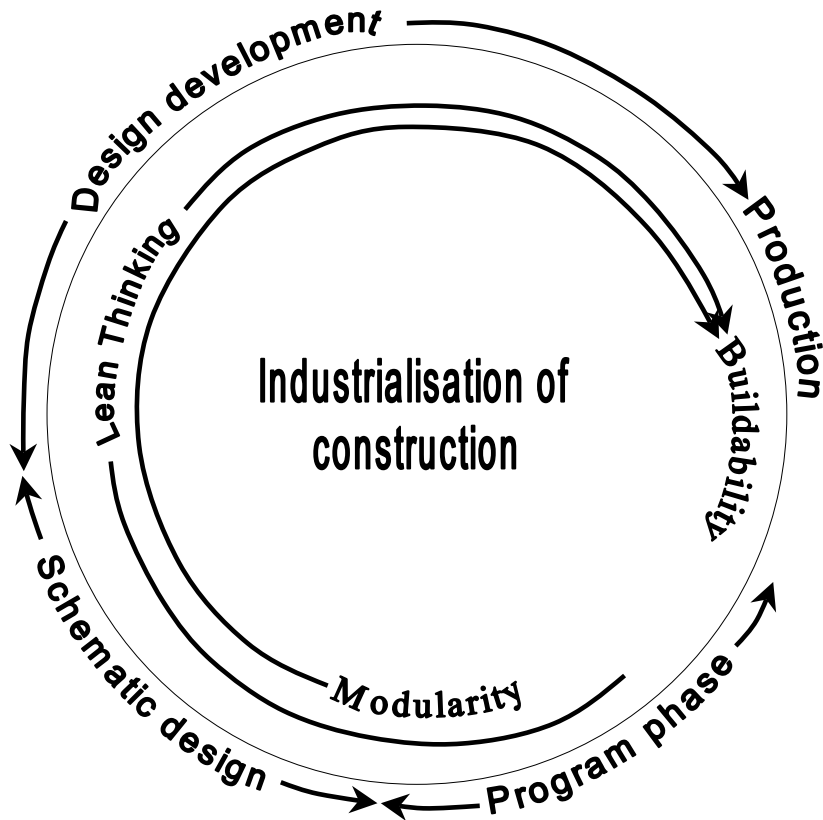
The conventional D&B construction process is used as base of discussions



# Industrialisation principles

- **Modularity** is both a process and product discipline offering a wide variety of advantages in the whole construction process. Modularity is applied at the product level and realised in design development and production.
- **Lean construction** is a process management discipline offering management in the whole construction process, aimed at streamlined production.
- **Buildability** is a process and product based discipline. In contrary to modularity; buildability is more of a goal than a means for product and process efficiency.

# Summary - Industrialisation framework



Framework → Application?

# Case study – assembly process

Sequential assembly process



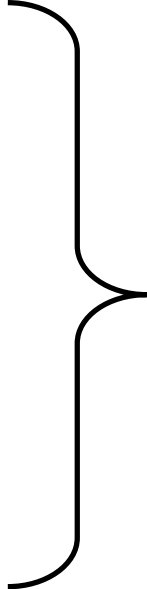
- 4 weeks until finished structural assembly
- General assembly activities; sub-assembly, placement, and final assembly
- Resources used; up to a 3 men workforce, 2 tower-cranes, and 2 sky-lifts

# Modularity simulations

What is the usefulness of thinking in modularity during assembly?

“Thinking” modularity offers;

- Increased self-control
- Improved quality
- Opportunity for out-sourcing
- Guidance for pre-assembly
- Guidance for prefabrication
- Reallocation of resources



Product buildability  
Process buildability  
Lean thinking

# Discussion and conclusions

- **Modularity** has been one of the driving forces in the evolution of the manufacturing industry
- In construction, the product is usually not unique, the **setting** is!
- Modularity confers both product and process **buildability**
- Modularity aids in the implementation of **lean thinking** in construction
- The Swedish construction industry is **not mature enough** to handle the direct implementation of lean practices as is...
- ...the construction industry should initially focus on product modularity
  - a “**bottom-up**” **product focused** view...