



# IMPLEMENTATION OF LEAN AND AGILE METHODOLOGIES TO ENHANCE COLLABORATION DURING THE DESIGN PHASE OF BIM PROCESSES

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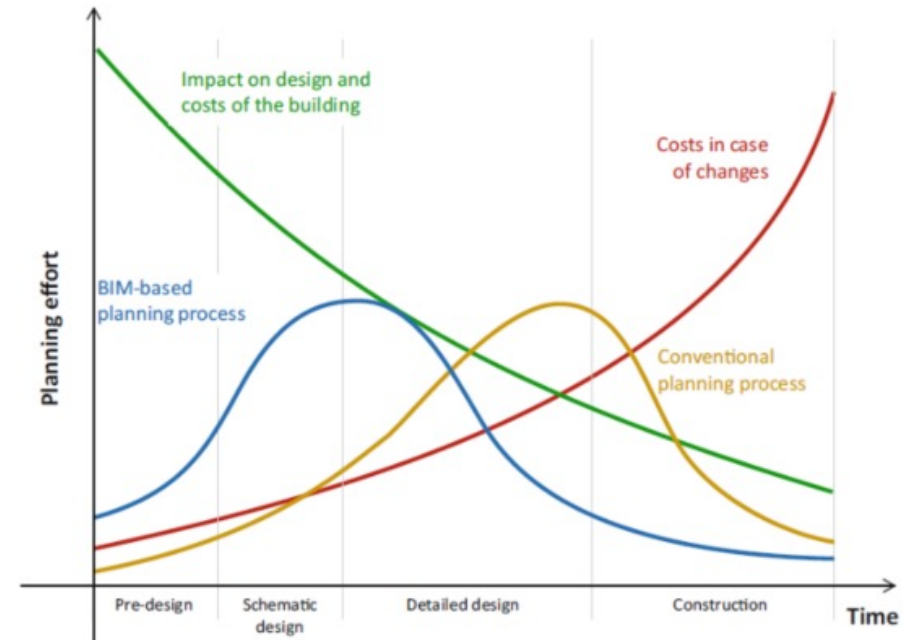
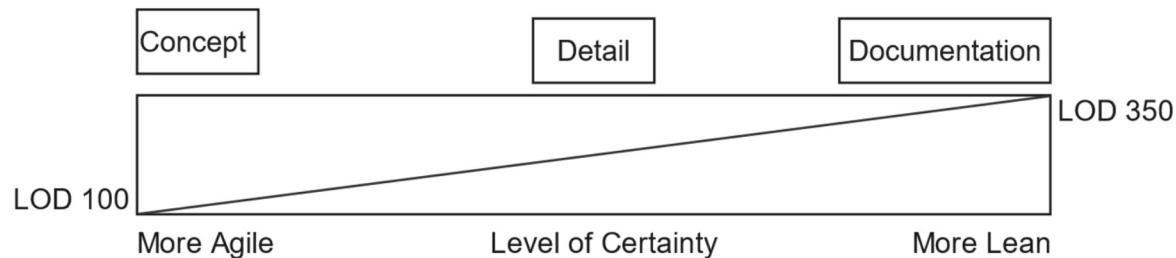
# Agenda

- 01 Introduction
- 02 Research Design
- 03 Findings and Discussion
- 04 Framework Development
- 05 Conclusion

# Introduction

## Importance of Collaboration in Design Phase of BIM Processes

- Multidisciplinary nature
- Complex, dynamic, iterative, and evolving
- Lays the foundation of the entire project lifecycle
- Determines the quality of the project
- Project team performance
- Decisions taken could generate future waste



MacLeamy Curve of Conventional and BIM-Based Planning Process  
(Borrmann et al., 2018)

# Introduction

## Process Problems and Research Question

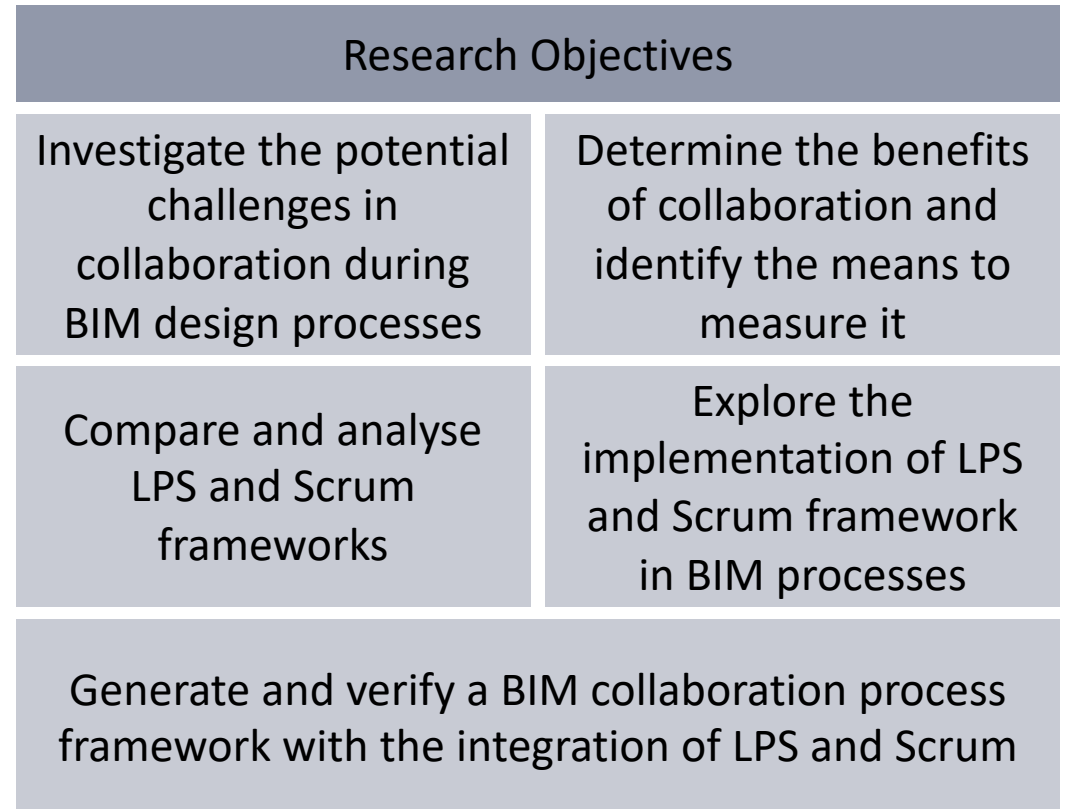
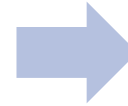
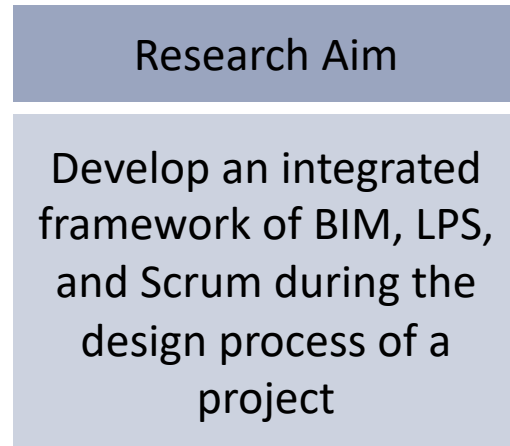
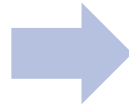
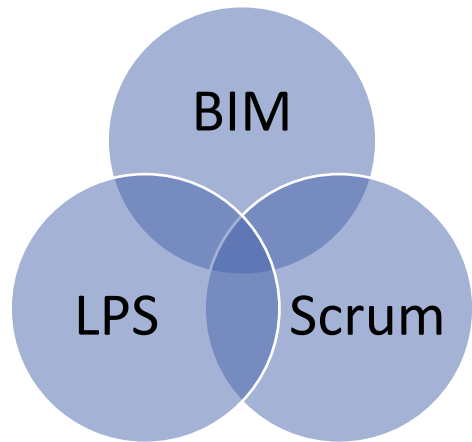


### Research Question:

*How can the implementation of Last Planner System (LPS) and Scrum increase the efficiency of collaboration during the BIM design process?*

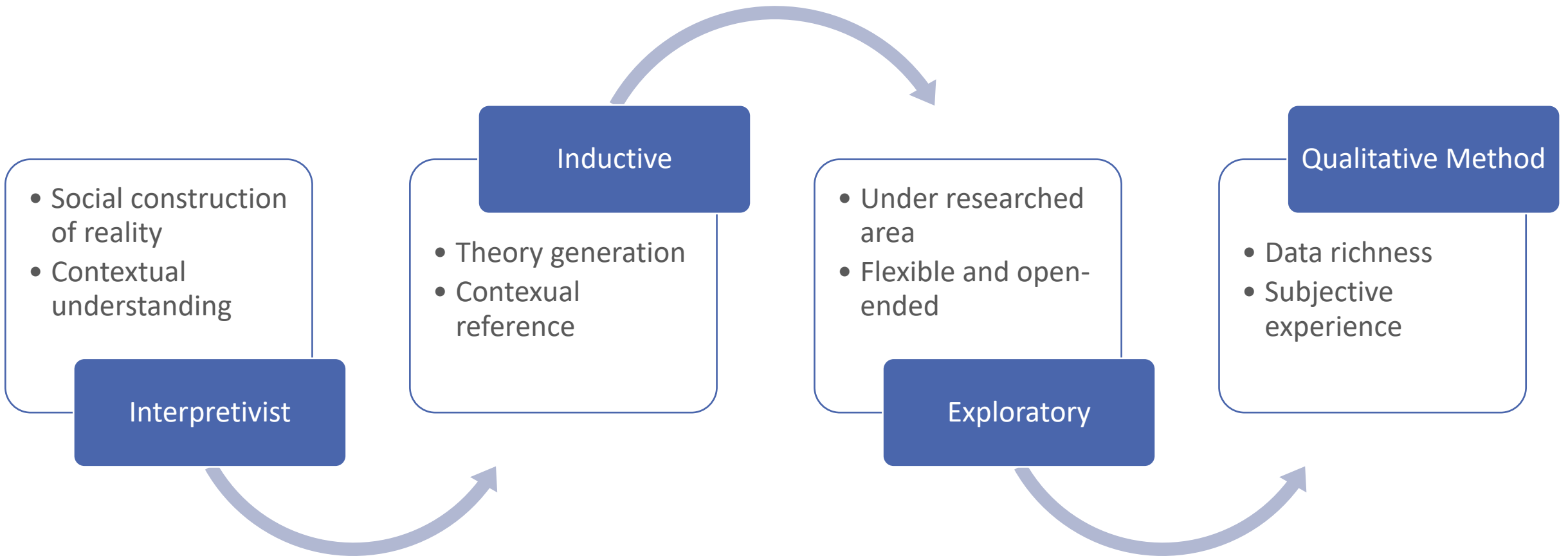
# Introduction

## Research Aim and Objectives



# Research Design

## Methodology



# Research Design

## Methods



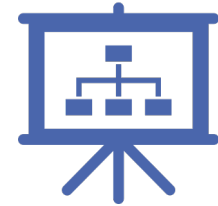
### Literature Review

Existing concepts



### 14 Semi Structured Interviews

Exploration of challenges and solutions



### Data Analysis

Coding and themes identification



### Creative Problem-Solving Workshop

Creative solutions



### Framework Development

Conceptual framework with possible solutions.

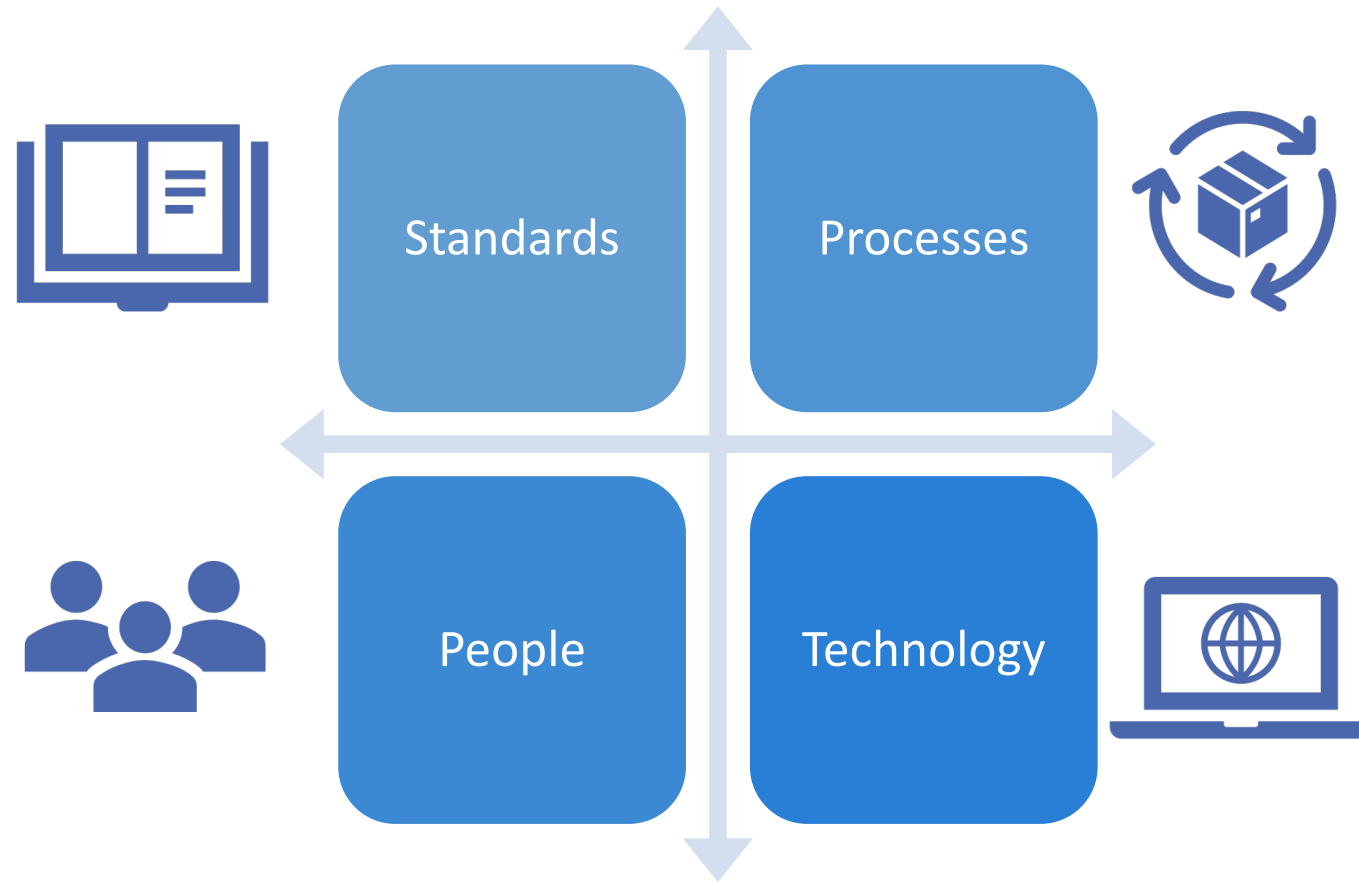


### Focus Group Interview

Validation of framework and scope for improvements

# Findings and Discussion

## Pillars of BIM





# Findings and Discussion

## Processes



### Challenges

- **Goal setting**
- Information flows
- Change management
- Requirement definition
- Process design
- Learning and optimization
- Continuous training
- Time and resource constraints



### Benefits

- Error-free design
- Reduced rework
- **Increased productivity**
- Improved predictability
- Identification of potential conflicts and clashes
- Reduced ambiguity and uncertainties



### Success Factors

- **Clear goals, objectives, and vision**
- Comprehensive process definition
- Lean and Agile methodologies

# Findings and Discussion

## People



### Challenges

- Resistance to change
- Working in silos
- Communication styles
- **Decision-making**
- Meeting structure
- Transparency
- Roles and responsibilities



### Benefits

- Trust and respect
- Knowledge sharing
- Innovation
- Accountability
- **Problem solving**



### Success Factors

- **Role definition and responsibility allocation**
- Continuous training
- Clear and effective communication
- Consensus-based decision making

# Findings and Discussion

## Standards



### Challenges

- Standardisation
- **BEP compliance**
- Basic level of LOD specifications
- Open ended contractual methods



### Benefits

- Risk identification
- Goal alignment
- **Information sharing**
- Conflict reduction
- Clarity and common understanding



### Success Factors

- **Organisational commitment**
- Continuous improvement
- New contractual models
- Higher maturity levels

# Findings and Discussion

## Technology



### Challenges

- Interoperability of tools and software
- Lost geometry and information
- **Access to Common Data Environment**



### Benefits

- Cost savings
- Information sharing
- Transparency
- Data loss reduction
- Accuracy of design
- **Single source of truth**



### Success Factors

- Collaborative platforms
- Seamless information exchange
- Standardization
- **Comprehensive BIM Execution Plan (BEP)**

# Findings and Discussion

## BIM Execution Plan (BEP) as a Moderator

### Strategy

- Project goals
- BIM objectives
- Project deliverables

### Process

- BIM uses
- Process design
- Collaboration procedures

### Information

- Information exchange
- LOD

### Infrastructure

- Technology
- Infrastructure needs

### Personnel

- Roles
- Responsibilities
- Organisation chart

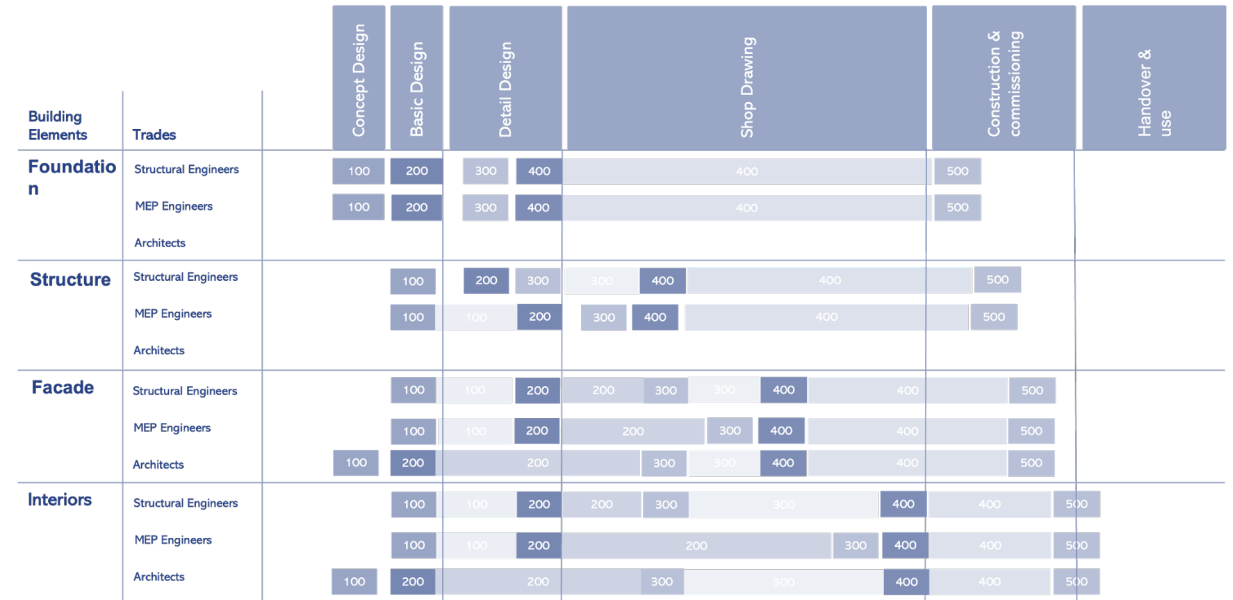
### Standard

- Model structure
- Quality control

# Findings and Discussion

## Level of Development (LOD)

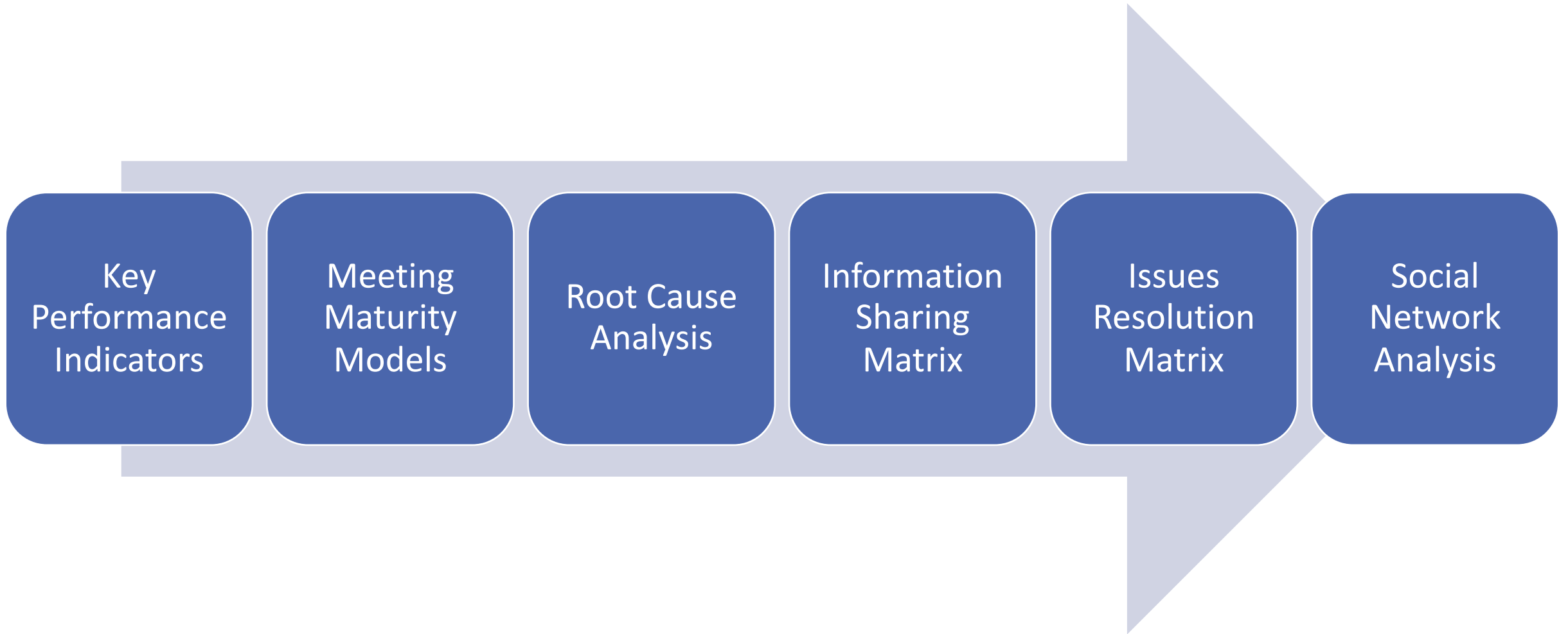
- LOD is often not well integrated into design schedules.
- Developing LOD increases Modeling time.
- High-detailed models before demand are wasteful if changes occur.



Changing levels of development (Svalestuen, et al., 2018)

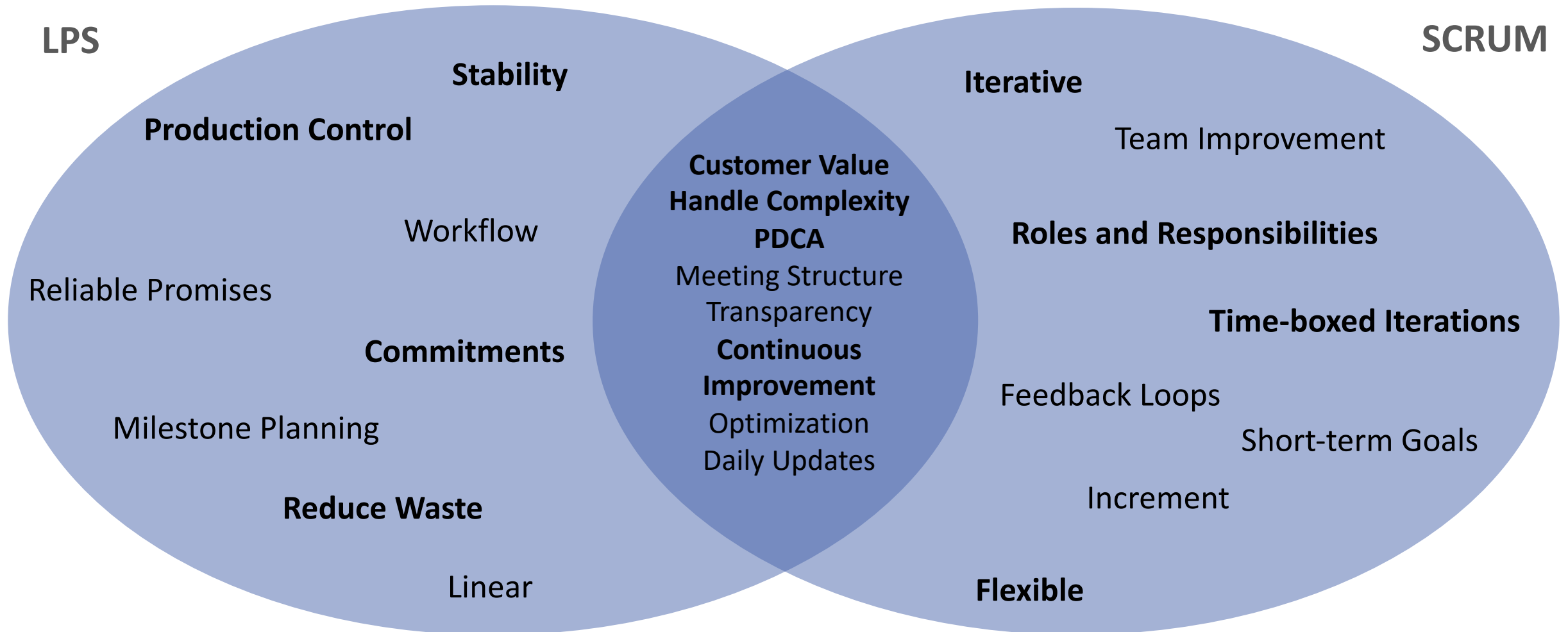
# Findings and Discussion

## Collaboration Measurement Methods



# Findings and Discussion

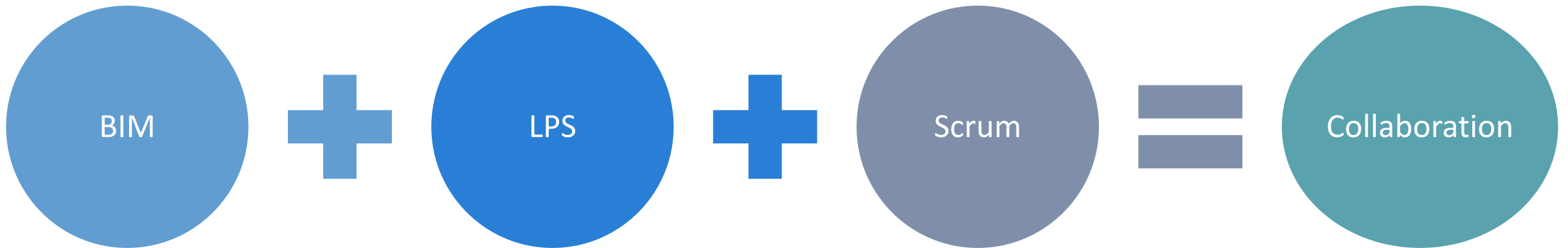
## Comparison of Last Planner System(LPS) and Scrum Frameworks





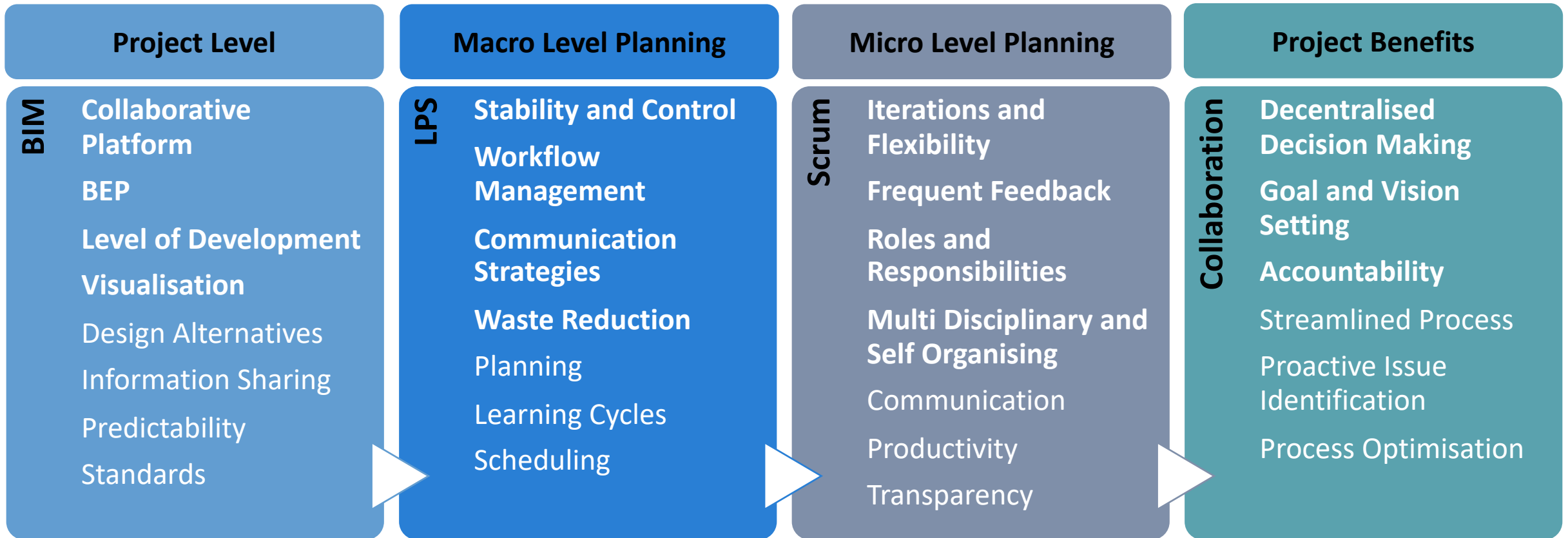
# Findings and Discussion

## Implementation of LPS and Scrum in BIM Design Processes



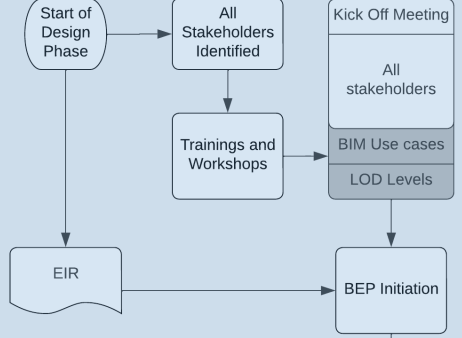
# Framework Development

## Framework – BIM LPScrum



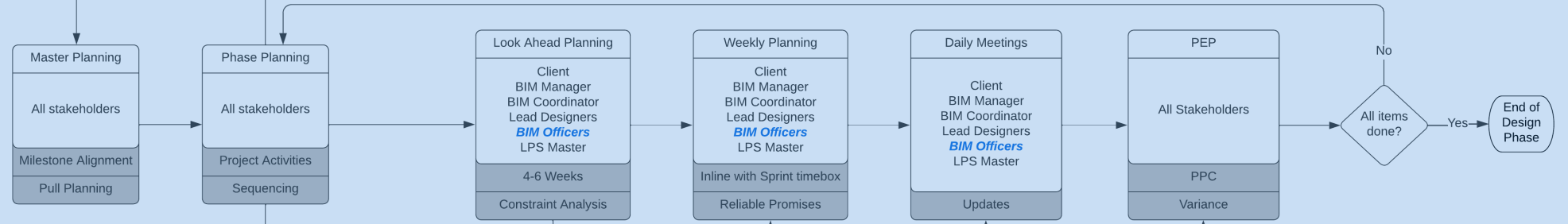
# Project Level Planning - BIM

Initial Phase



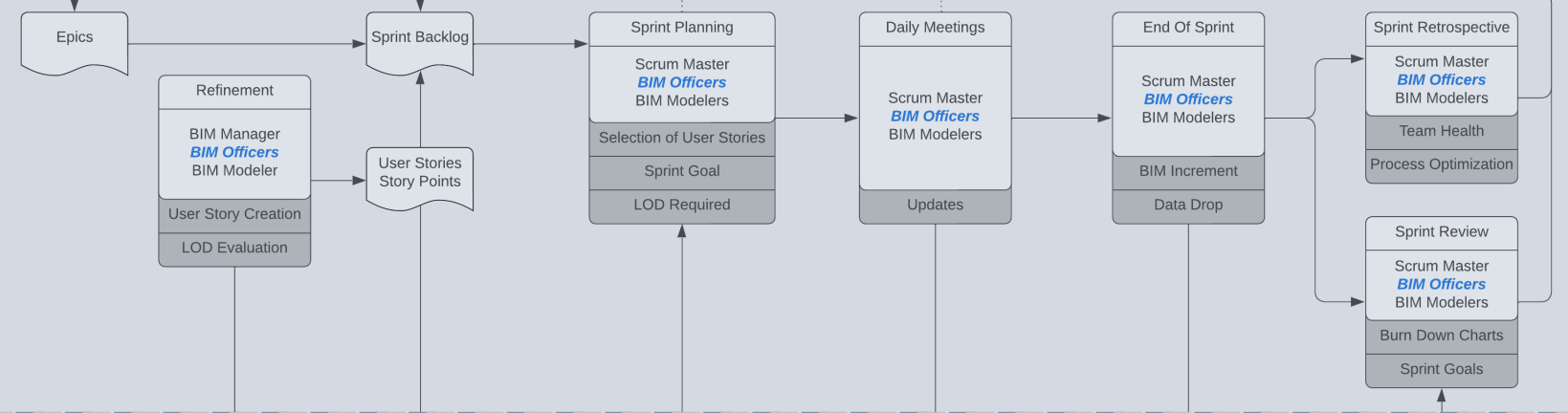
# Macro Level Planning - LPS

Macro Level Planning Last Planner System



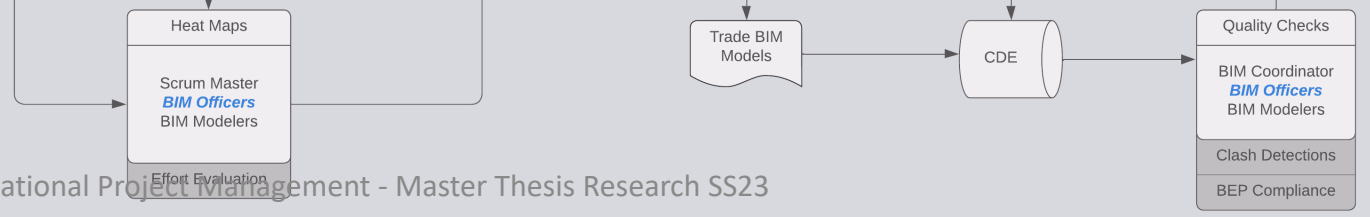
# Micro Level Planning - Scrum

Micro Level Planning Scrum



# BIM Environment

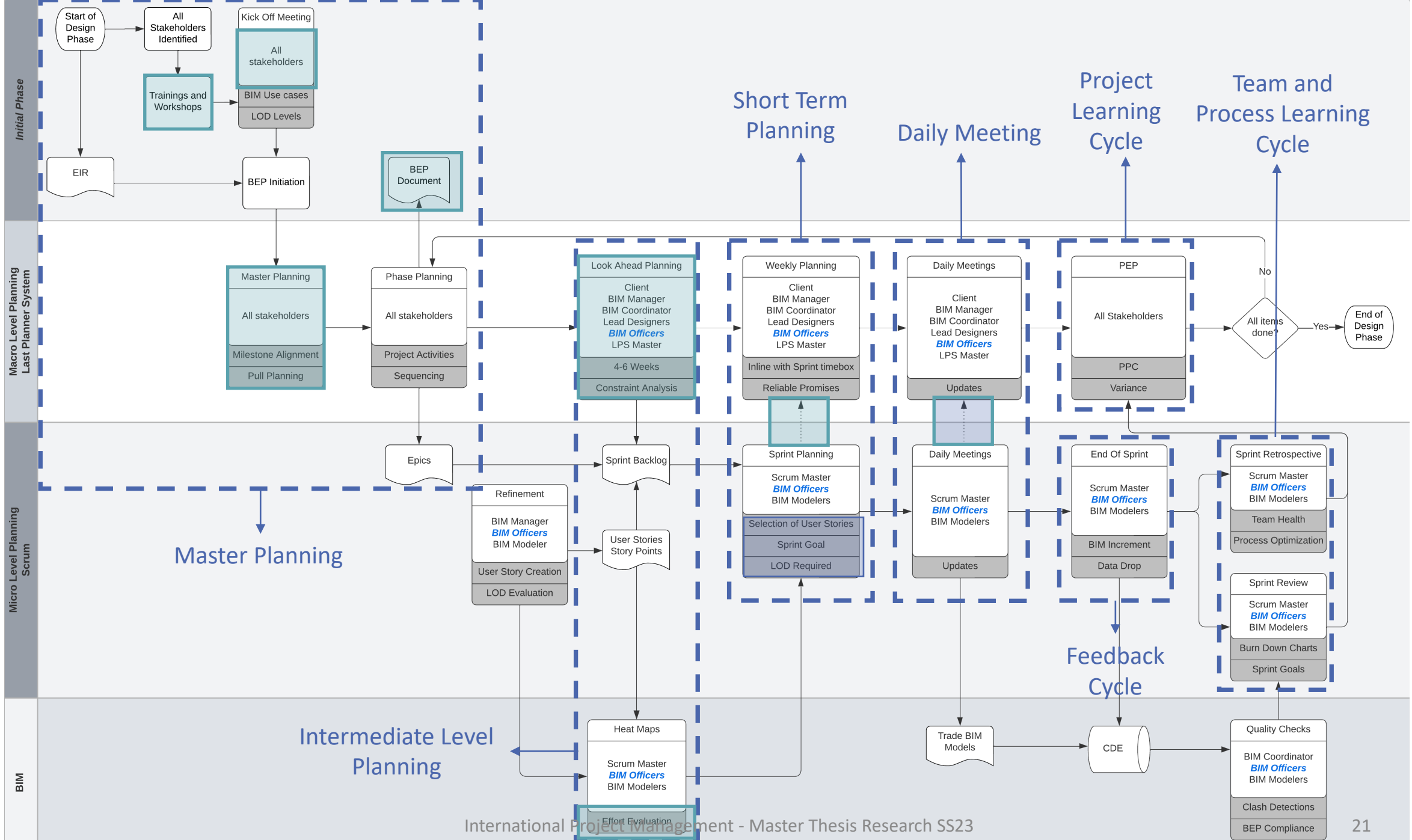
BIM



# Framework Development

## Overall Process Map





# Framework Development

## Framework Validation – Focus Group



### Prerequisites

- Organizational Acceptance and Support
- Continuous Training
- Maintaining BIM Maturity Level
- Clear Plan to Maintain Mindsets
- Open-mindedness of Stakeholders



### Challenges

- Requires Additional Customisation
- Resistance to Change



### Limitations

- More Suitable for Complex Projects
- Diverse Stakeholders
- Additional Costs

# Conclusion

## Limitations



Scope and application -  
Design phase



Sample size -  
Time constraints



Researcher's and  
interviewees'  
bias



Limited previous  
studies



Researcher's  
limited practical  
experience

# Conclusion

## Research



The study aimed to improve collaboration during the design phase of the BIM process.



Collaboration is established as crucial during the design phase because of its complex and iterative nature.



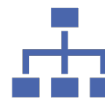
Collaboration challenges faced during the design phase of BIM processes were identified.



The design phase has yet to fully embrace new processes for improving collaboration.



The benefits of differences between LPS and Scrum are leveraged.



A framework is developed by combining BIM, LPS, and Scrum to enhance the efficiency of collaboration.



**Thank you!**