

# Maximizing Success on Integrated Projects: An Owner's Guide

## An Overview of the Research and Owner's Guide



# Maximizing Success on Integrated Projects: An Owner's Guide

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# Research Motivation

To improve owner delivery decisions by providing practical guidance based upon empirical evidence

## 1998 CII/Penn State Study of 351 projects

| Metric             | D-B vs. D-B-B | D-B vs. CM@R |
|--------------------|---------------|--------------|
| Unit Cost          | 6.1% lower    | 4.5% lower   |
| Construction Speed | 12.0% faster  | 7.0% faster  |
| Delivery Speed     | 33.5% faster  | 23.5% faster |
| Cost Growth        | 5.2% less     | 12.6% less   |
| Schedule Growth    | 11.4% less    | 2.2% less    |

# Research Motivation

To improve owner delivery decisions by providing practical guidance based upon empirical evidence

|                 | 1998 CII RT 133  | 2015 CPF-CII  |
|-----------------|--|---|
| <i>Question</i> | How do project delivery methods impact performance?  | How does the level of integration impact project delivery success?  |
| <i>Scope</i>    | Delivery – DBB, CMR and DB   | Delivery, procurement, contracting, behaviors and environment   |
| <i>Findings</i> | <ul style="list-style-type: none"><li>✓ DB was faster than DBB and CMR</li><li>✓ Cost and schedule growth were highest for DBB</li></ul> | <ul style="list-style-type: none"><li>✓ Combined contracts were faster than split contracts</li><li>✓ Cost and quality were driven by procurement and contracting</li></ul> |

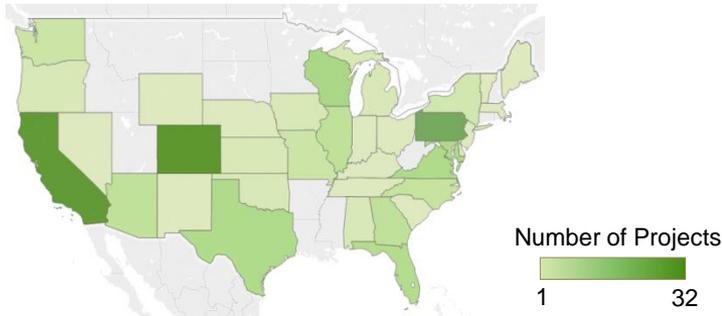
# Summary of Findings

Best performing delivery strategies maximize

1. Early involvement of the core team
2. Qualification-based team selection
3. Transparency in cost accounting

# Project Data Characteristics

## Facility Sizes



## 204 Projects

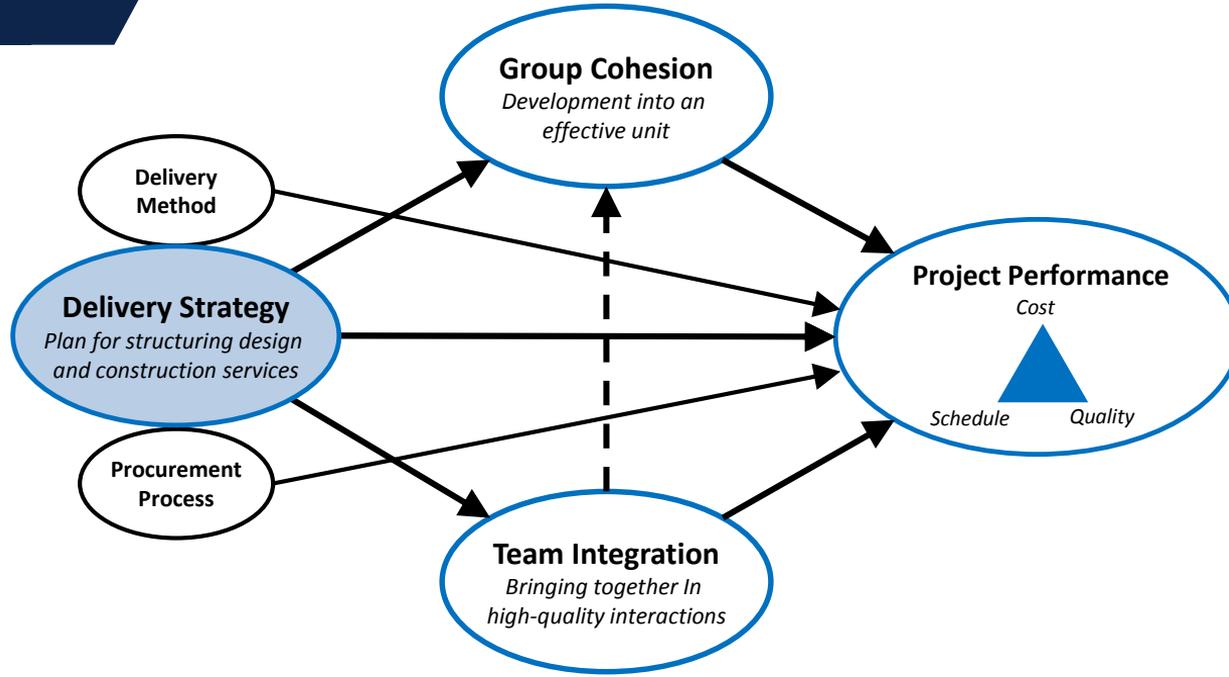
**Public:** 127 (62%)  
**Private:** 77 (38%)

**Completed: 2008 - 2013**

## Facility Types



# Framework



**Goal:** Determine if team processes and behaviors have an impact on project performance

## Team

Integration

Group Cohesion

## Integration

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Integration

Group Cohesion



## Integration

*Degree to which team members from separate organizations and disciplines are engaged in collaborative activities*

- Participation in
  - Joint Goal Setting
  - Cross Disciplinary design charrettes
  - BIM Execution Planning
- Increased sharing of information and analysis through BIM
- Increased team interaction through colocation

Higher levels of integration led to:

- Reduced ***schedule growth***
- Enabled ***more intense schedules***
- Led to ***more cohesive teams***

## Team

Integration

Group Cohesion



## Group Cohesion

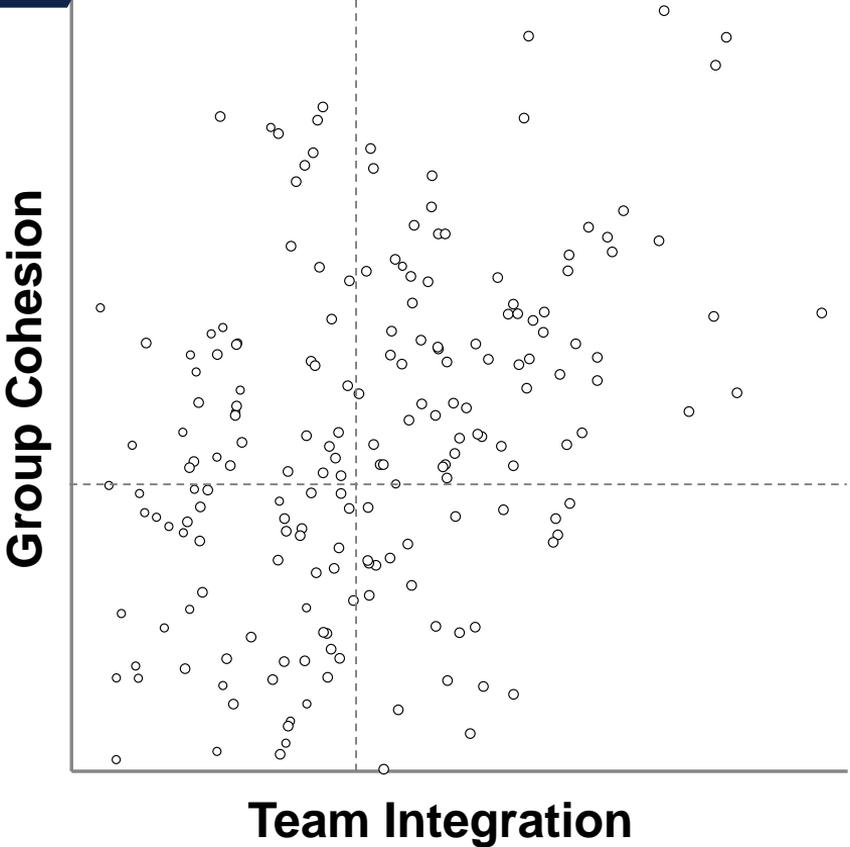
*Degree to which team, as individuals, have shared, task commitment, group pride, and interpersonal alignment*

- Commitment to shared goals
- High levels of team chemistry
- Communication is timely and effective

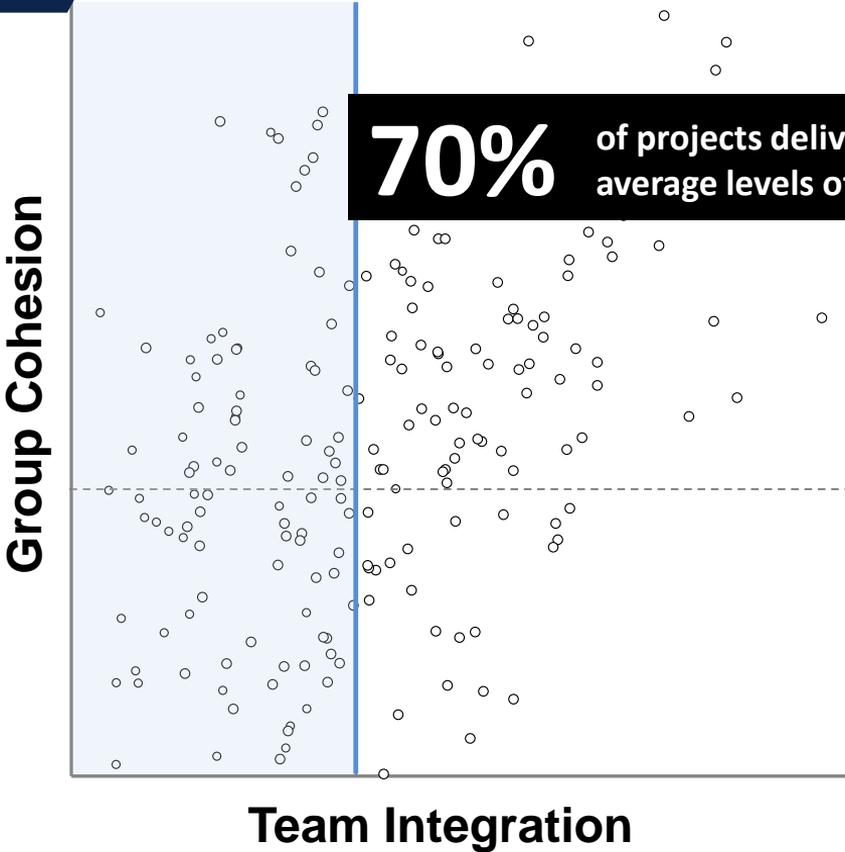
Higher group cohesiveness led to:

- Reduced **cost growth**
- Higher **system quality**
- Improved **turnover experience**

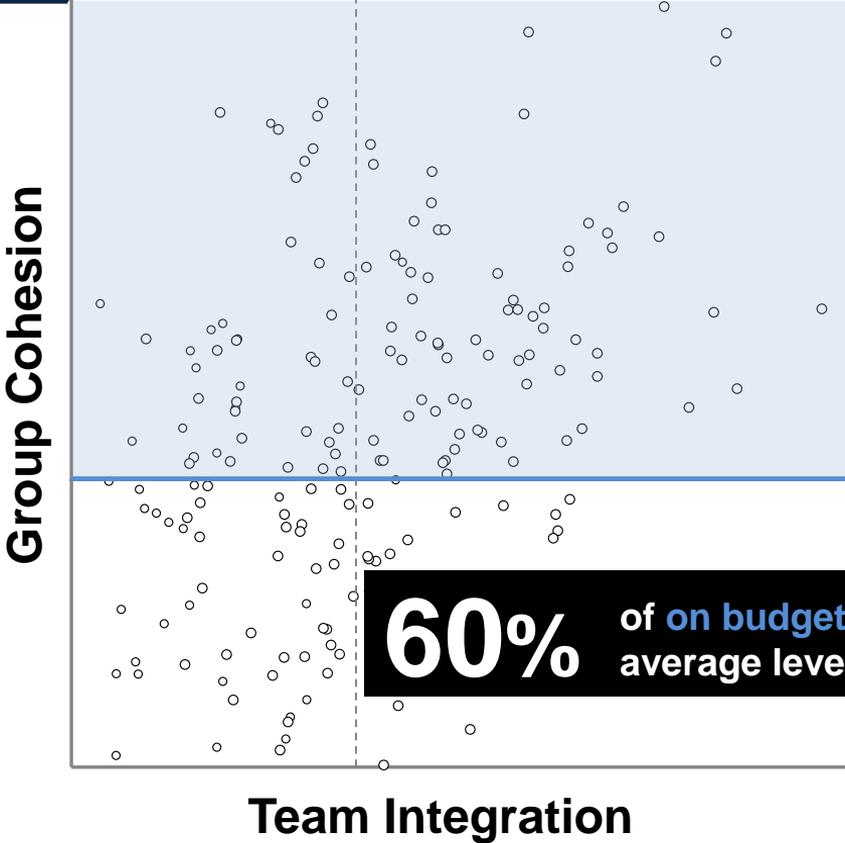
# Factor Value



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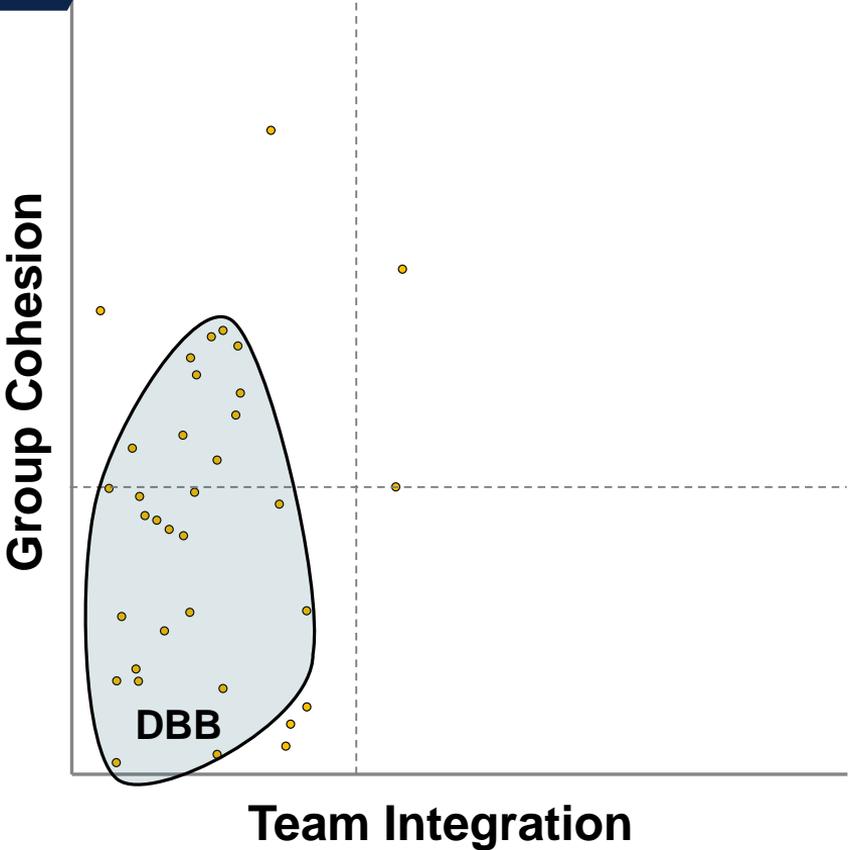


# Factor Value

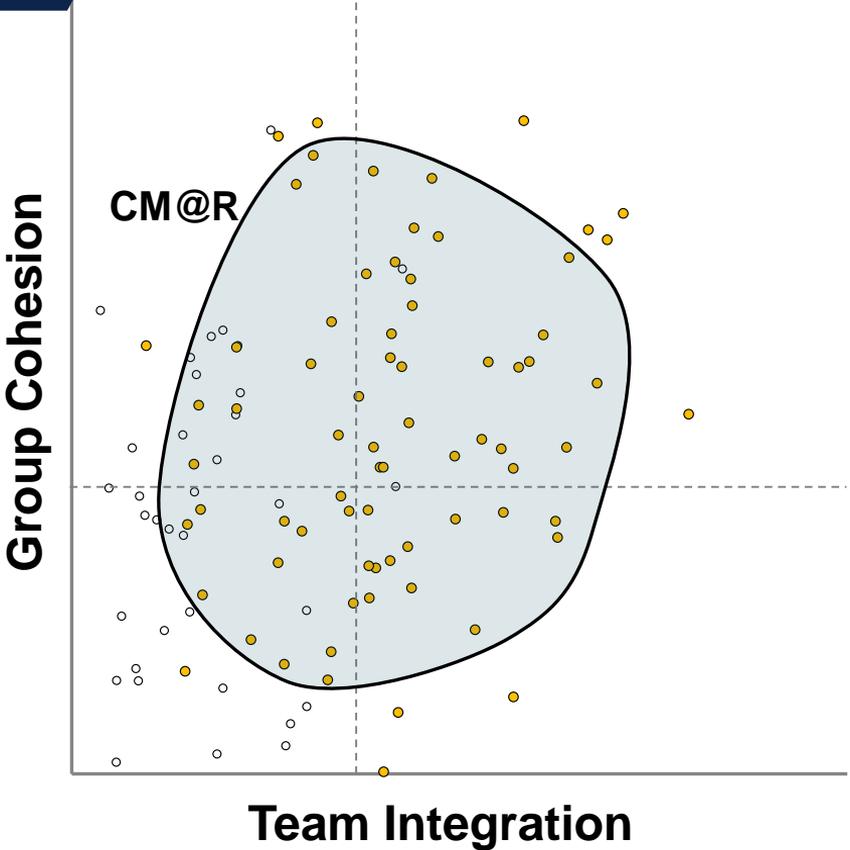
**Group Cohesion**

**Team Integration**

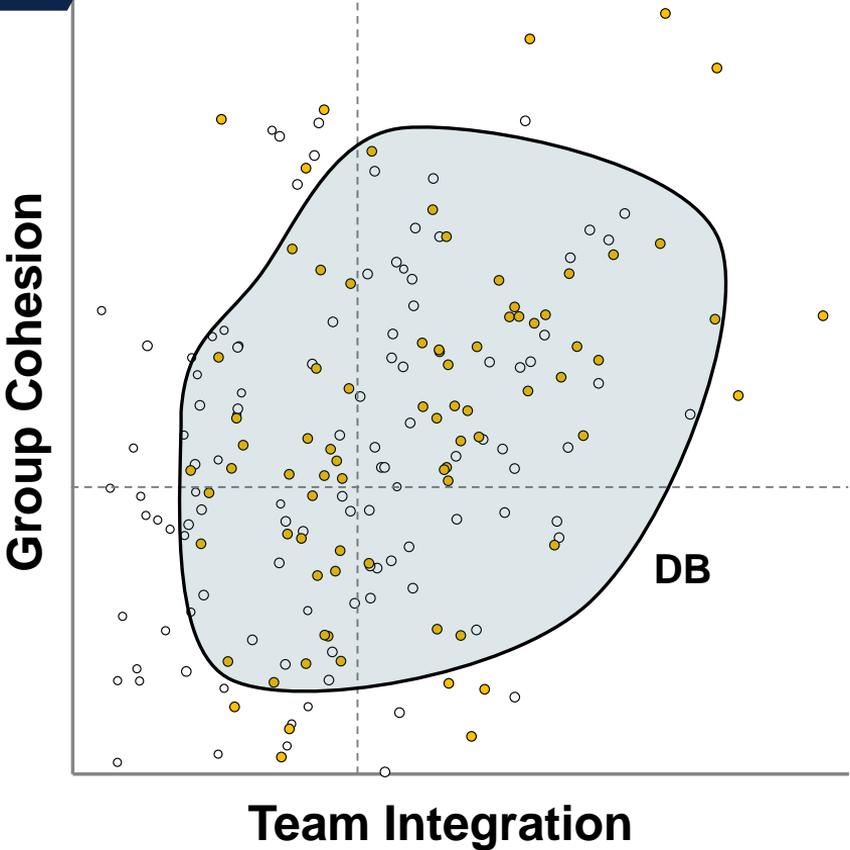
# Delivery Method



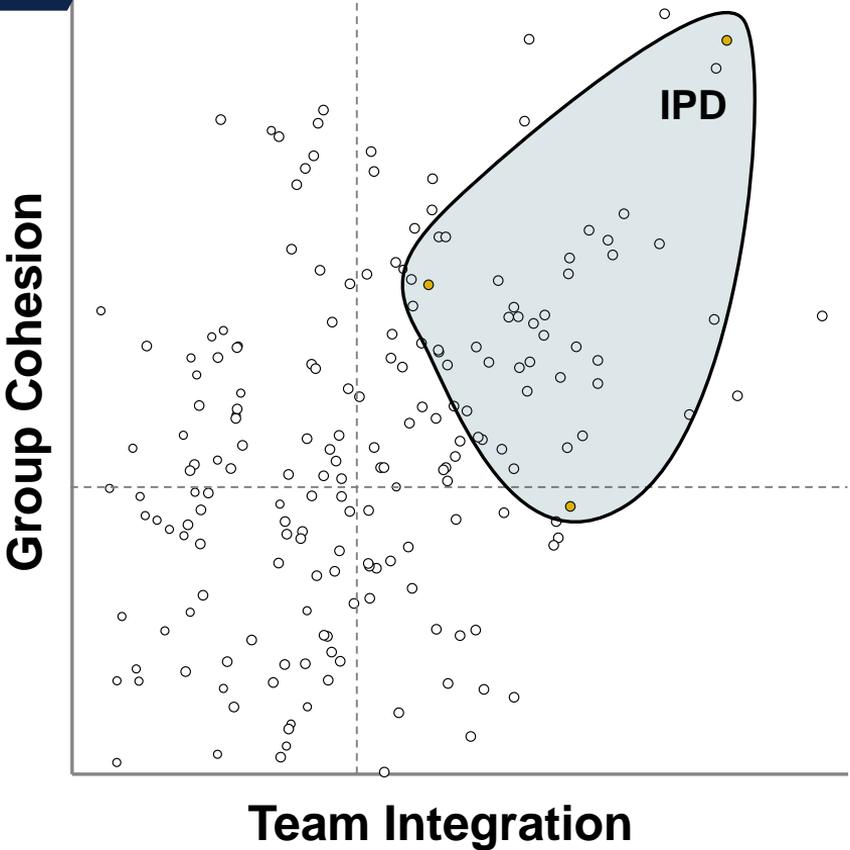
# Delivery Method



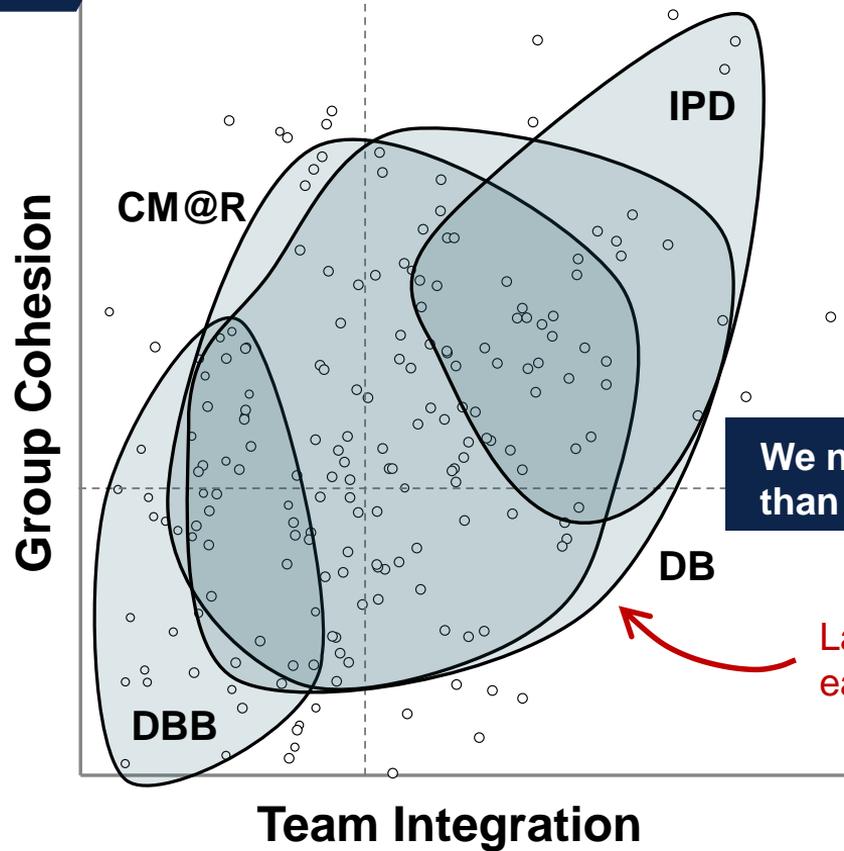
# Delivery Method



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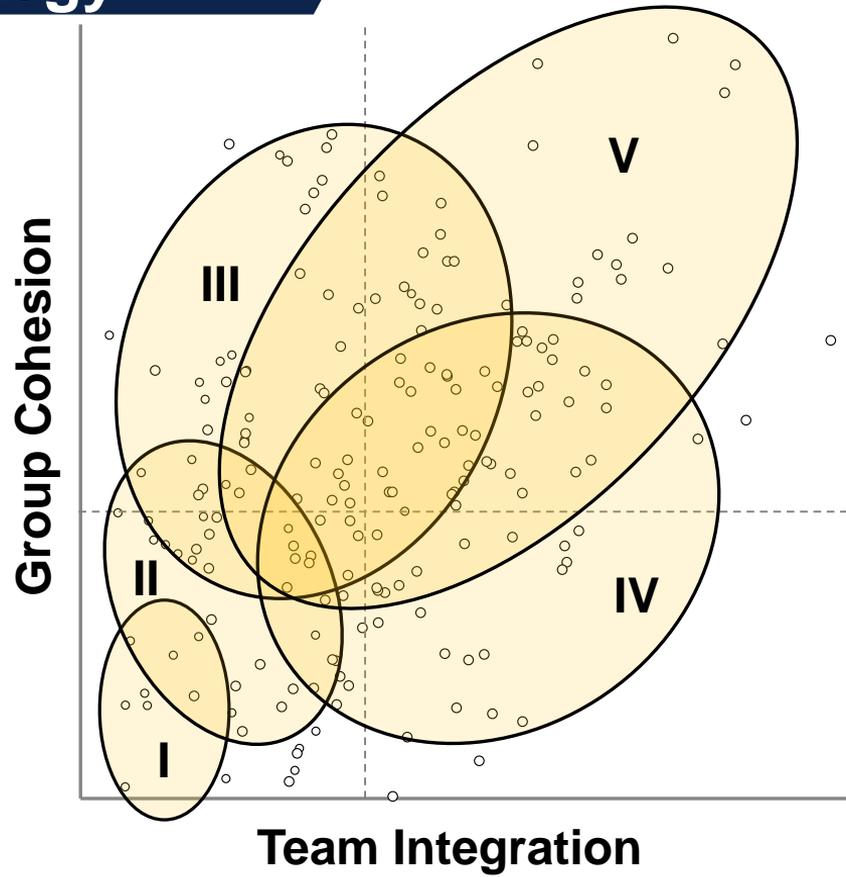
# Delivery Method



We need to consider *more* than just delivery method

Large variance within each delivery method

# Delivery Strategy



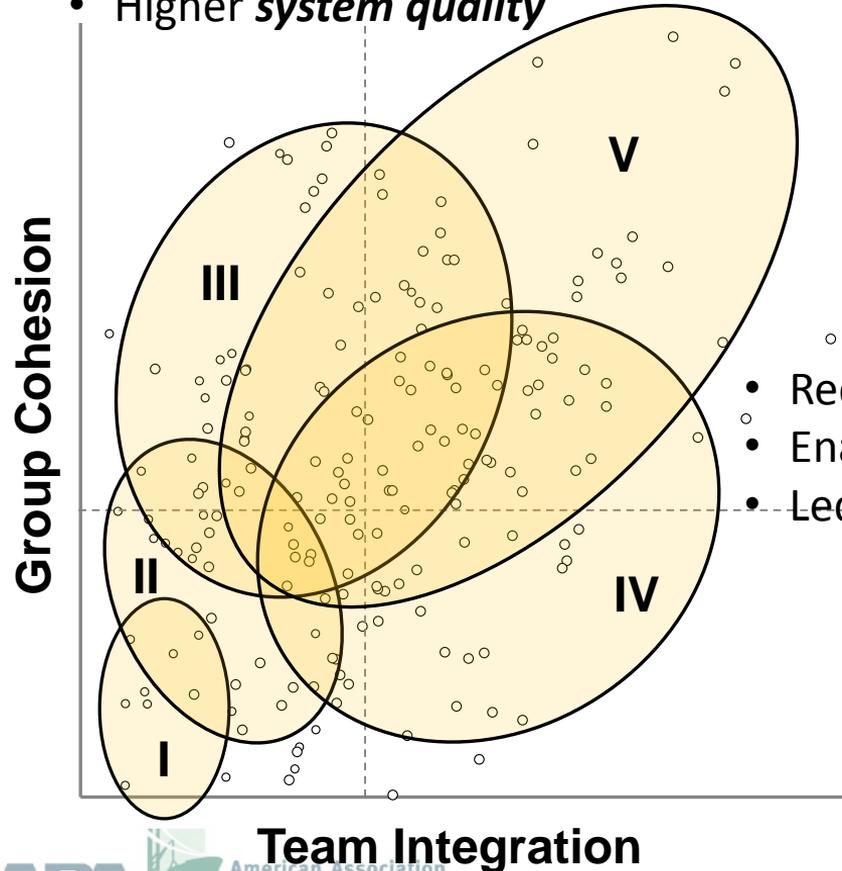
# The Owner's Guide

*Pulling it all together*

- Reduced **cost growth**
- Improved **turnover experience**
- Higher **system quality**

Best performing delivery strategies maximize

1. Early involvement of the core team
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- Reduced **schedule growth**
- Enabled more **intense schedules**
- Led to **more group cohesion**

# Maximizing Success in Integrated Projects

*An Owner's Guide*



<http://bim.psu.edu/delivery>

Sponsored by the Charles Pankow Foundation and  
the Construction Industry Institute

Website: <http://bim.psu.edu/delivery>



## 1. Define Project Needs

Assess goals for management and performance

- 1a. Document project summary information (e.g. size, type, etc.)
- 1b. Determine project goals (e.g. time, cost, quality, etc.)

## 2. Explore Delivery Options

Discuss delivery decisions with attention to integrated processes and team cohesion

- 2a-b. Discuss organizational structure (single vs. split D&C contracts, timing of core team involvement)
- 2c. Discuss contract payment terms for builder and key trades (open vs. closed book)
- 2d-g. Discuss team assembly (e.g. selection process and criteria, prior experience, etc.)

## 3. Select Delivery Strategy

Identify an optimal delivery strategy consistent with owner constraints

- 3a. Identify owner's legal and policy constraints (e.g. procurement law, staff experience, etc.)
- 3b. Determine strategy by comparing to research results (e.g. Classes I-V)
- 3c. Select and Implement Project Delivery Strategy



## Owner's Project Delivery Strategy

- Project summary
- Project goals
- Etc.

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