Maximizing Success on Integrated Projects: An Owner's Guide

An Owner's Only Presentation

September 9, 2016

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CHARLES PANKOW FOUNDATION
Building Innovation through Research

DBIA Western Pacific Region Design-Build Institute of America

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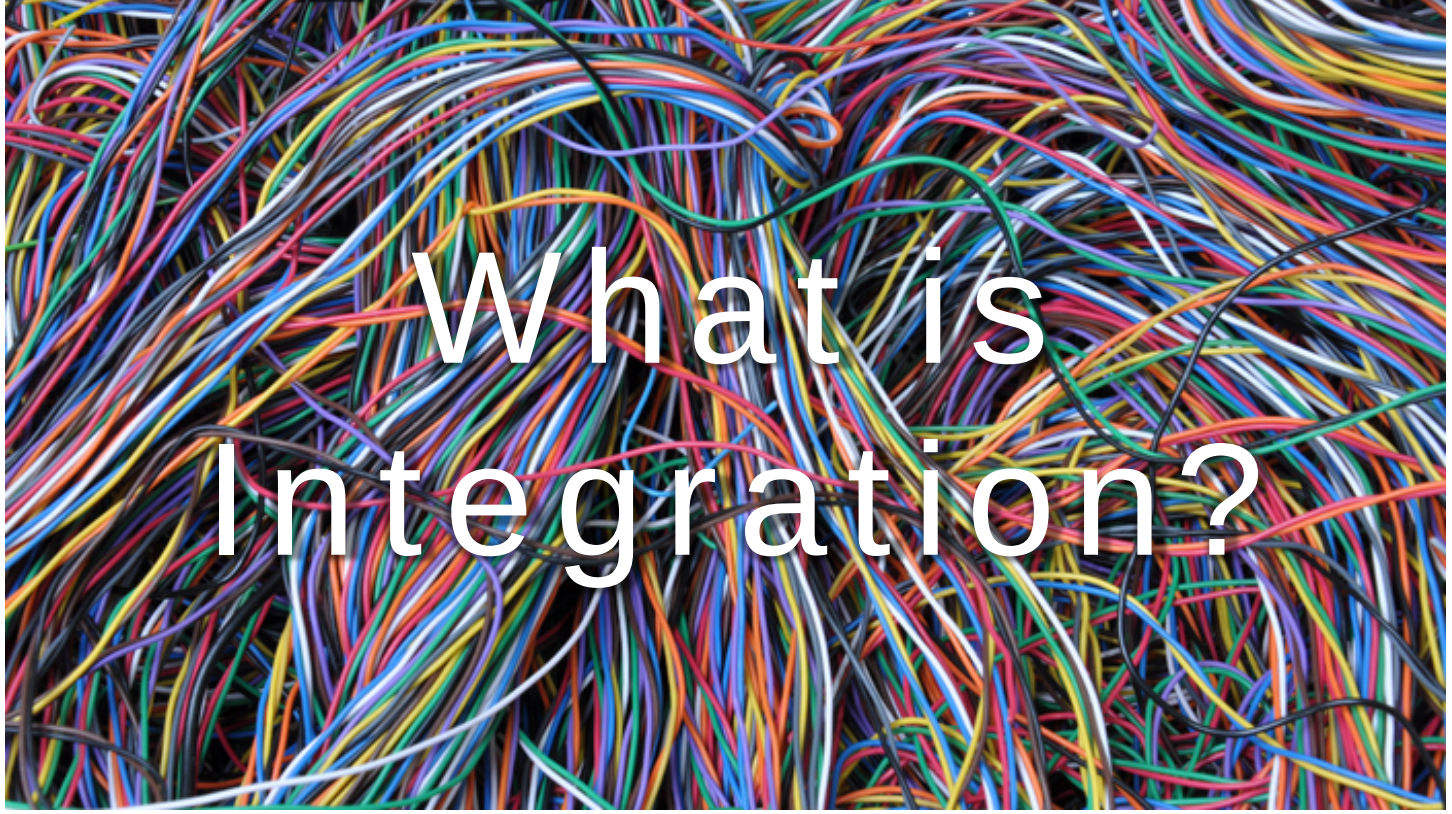
What is COLLABORATION?

col·lab·o·rate

kəˈlabəˌrāt/

verb: **collaborate**;

- work jointly on an activity, especially to produce or create something.



What is Integration?

in·te·grate

ˈin(t)əˌgrāt/

verb: **integrate**

- combine (one thing) with another so that they become a whole.
- bring (people or groups with particular characteristics or needs) into equal participation

INTEGRATION IS A TEAM SPORT

POETRY IN MOTION

co·he·sion

kōˈhēZHən/

noun: **cohesion**

1.the action or fact of forming a united whole.


What is an integrated project?


What is Project success?

For the Owner?
For the Architect?
For the Engineer?
For the Builder?
For the Trade?
For the user?

WHAT IS THE RESEARCH?

Project Delivery Research

- In 1997-1998 the Construction Industry Institute in collaboration with Penn State University published seminal research indicating Design Build out performed CM at Risk or Design Bid Build in terms of
  - Lower cost,
  - Improved schedule
  - Better quality

- ***The more integrated, the better the performance***
- ***Singular vs multiple contracts***

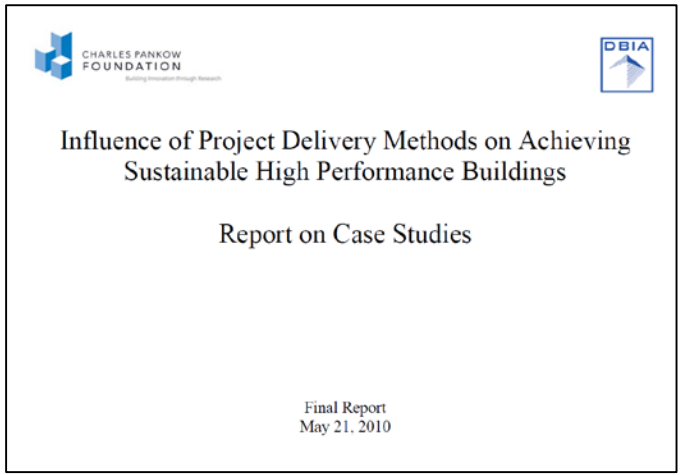
Metric	DB vs. DBB	CM@R vs. DBB	DB vs. CM@R
Unit Cost	6.1% lower	1.6% lower	4.5% lower
Construction Speed	12% faster	5.8% faster	7% faster
Delivery Speed	33.5% faster	13.3% faster	23.5% faster
Cost Growth	5.2% less	7.8% more	12.6% less
Schedule Growth	11.4% less	9.2% less	2.2% less

1998 CII RT 133 Research

Team Integration and Sustainability

When sustainability is a goal –

- The higher the level of team integration the higher the performance of the building
- The greater the Owner involvement, the better the opportunity to achieve sustainable goals



https://www.dbia.org/resource-center/Documents/CPF_ThrustII_05212010_Final.pdf

U.S. GREEN BUILDING COUNCIL LEED PLATINUM USGBC

HPB HIGH PERFORMING BUILDINGS

ENERGY STAR

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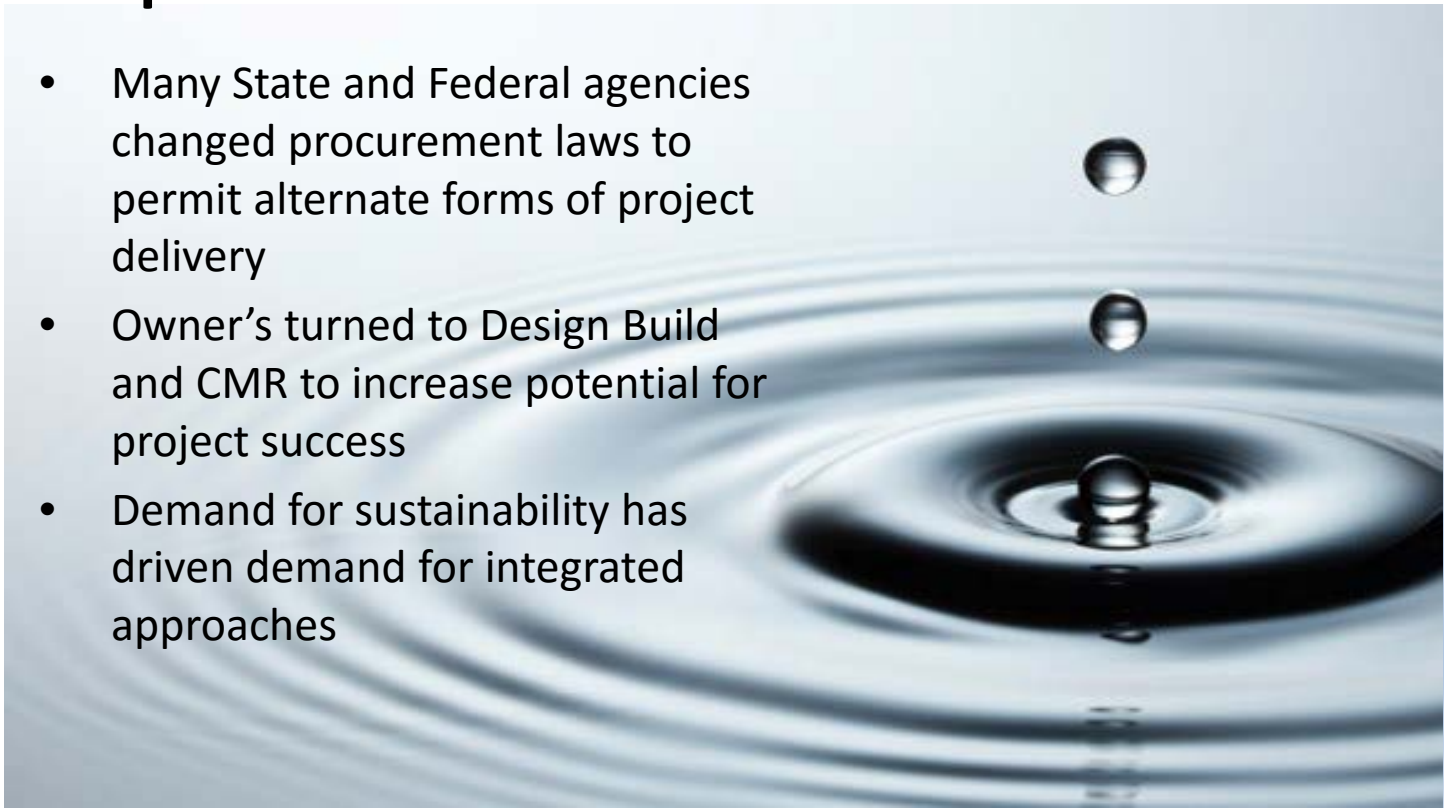
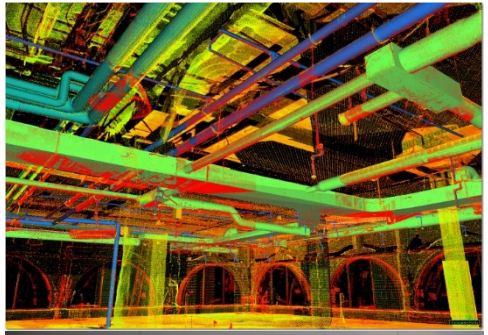
Impacts of the Previous Research



- Many State and Federal agencies changed procurement laws to permit alternate forms of project delivery
- Owner's turned to Design Build and CMR to increase potential for project success
- Demand for sustainability has driven demand for integrated approaches

What has Changed?

- Is the previous research still relevant?
- What has changed?
  - Technology
  - Building Information Modeling
  - IPD, Progressive DB, P3
  - Construction technologies
  - Economy
  - Level of sophistication
- What are the factors that improve outcomes in any project delivery strategy?



- How can an Owner best structure the project for a successful outcome?

Maximizing Success in Integrated Projects: An Owner's Guide

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- **Mark Konchar (co-chair),** *Balfour Beatty Construction*
- **Howard W. Ashcraft, Esq.,** *Hanson Bridgett LLP*
- **Spencer Brott,** *Trammell Crow Real Estate Services, Inc.*
- **Bill Dean,** *M.C. Dean, Inc.*
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- **Matthew Ellis,** *US Army Corps of Engineers*
- **Behzad Esmaeili,** *University of Nebraska-Lincoln*
- **Bryan Franz,** *University of Florida*
- **Diana Hoag,** *Xcelsi Group, LLC*
- **Mike Kenig,** *Holder Construction*
- **Robert Leicht,** *Penn State University*
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- **John Messner,** *Penn State University*
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- **Keith Molenaar,** *Univ. of Colorado*
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- **Victor Sanvido,** *Southland Industries*
- **Ronald Smith,** *Kaiser Permanente*
- **David P. Thorman,** *Former California State Architect*

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Team

- 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

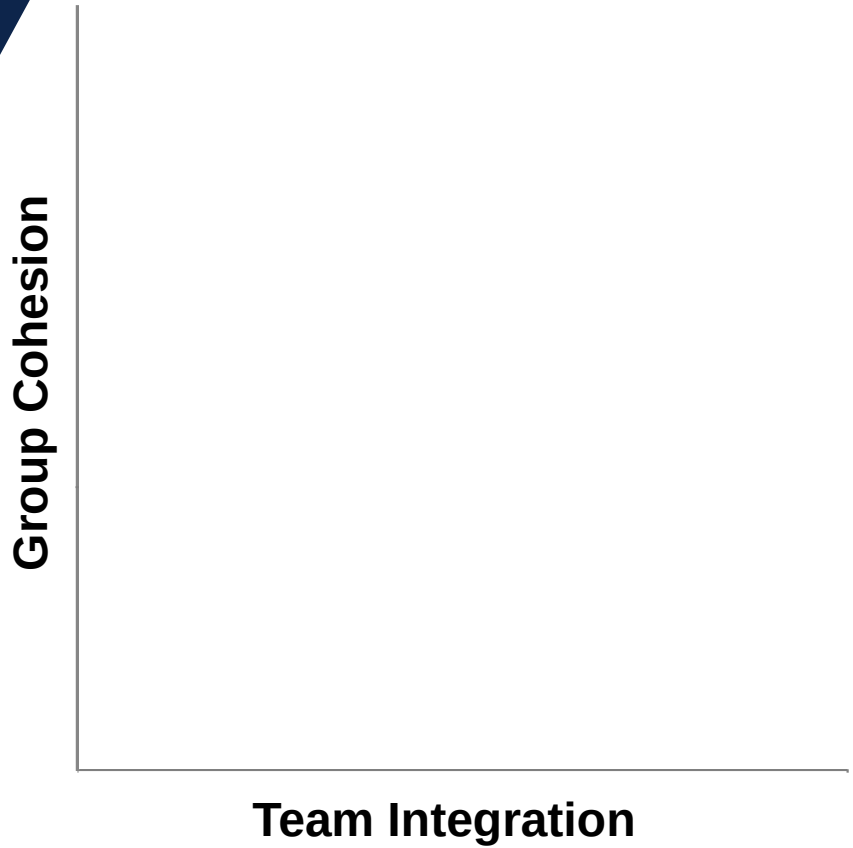
Degree to which team, as individuals, have shared, task commitment, group pride, and interpersonal alignment

- 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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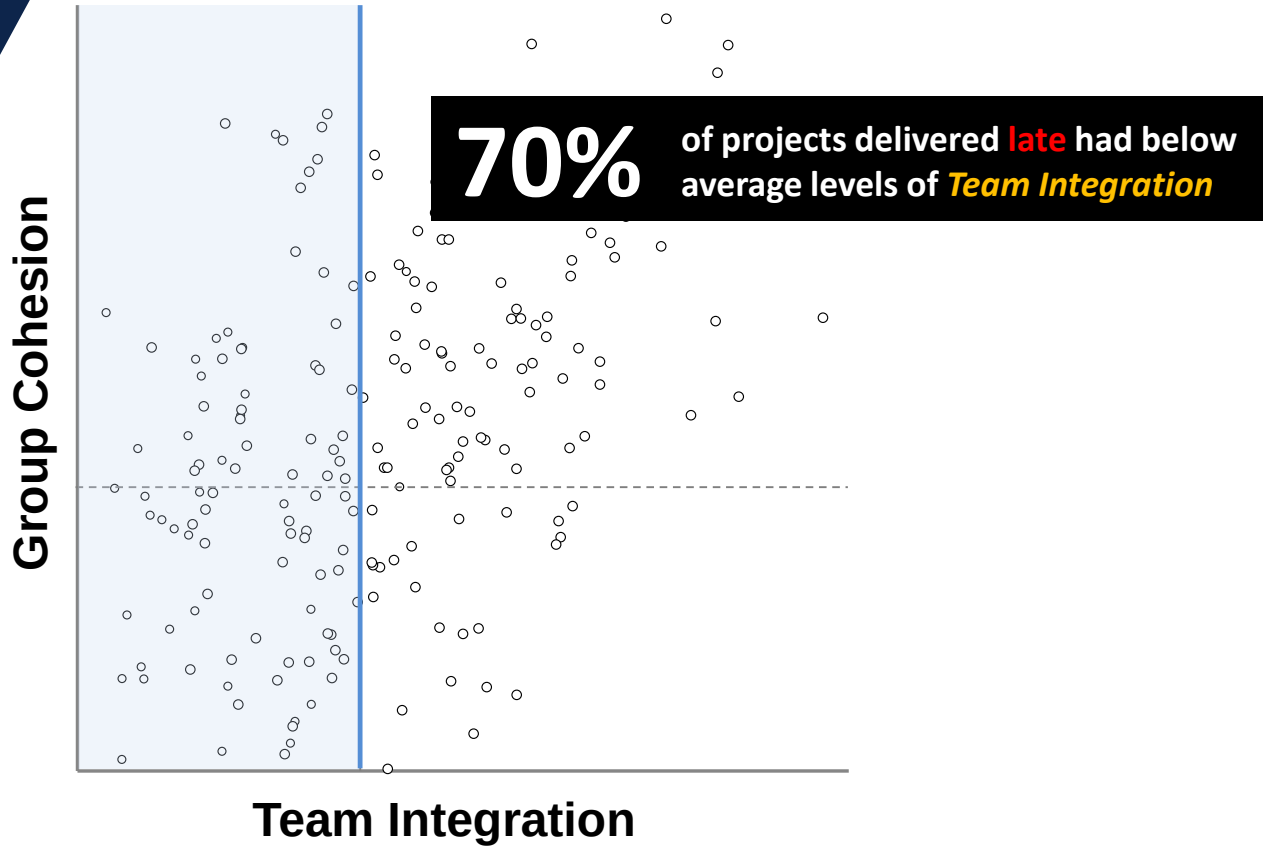

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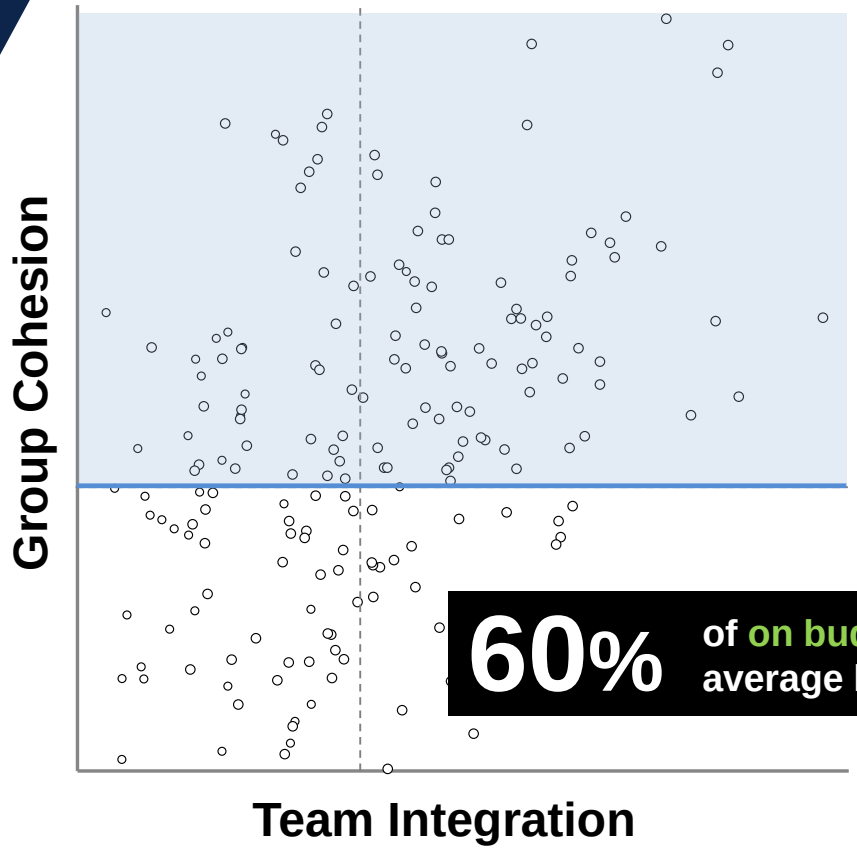
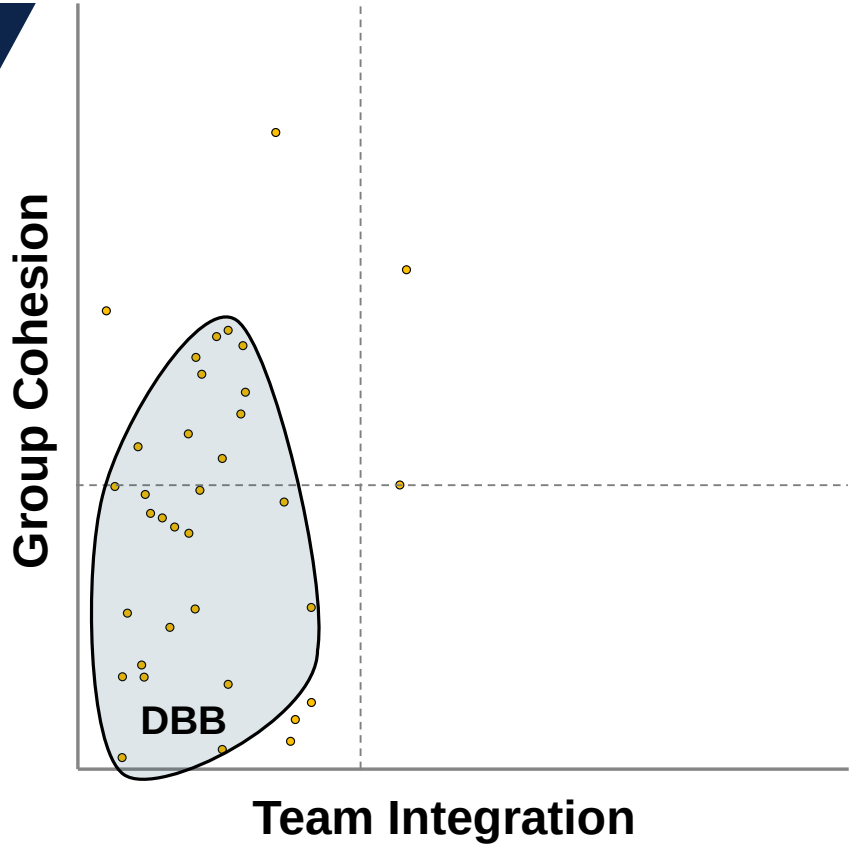


60% of **on budget** projects had above average levels of ***Group Cohesion***

Delivery Method



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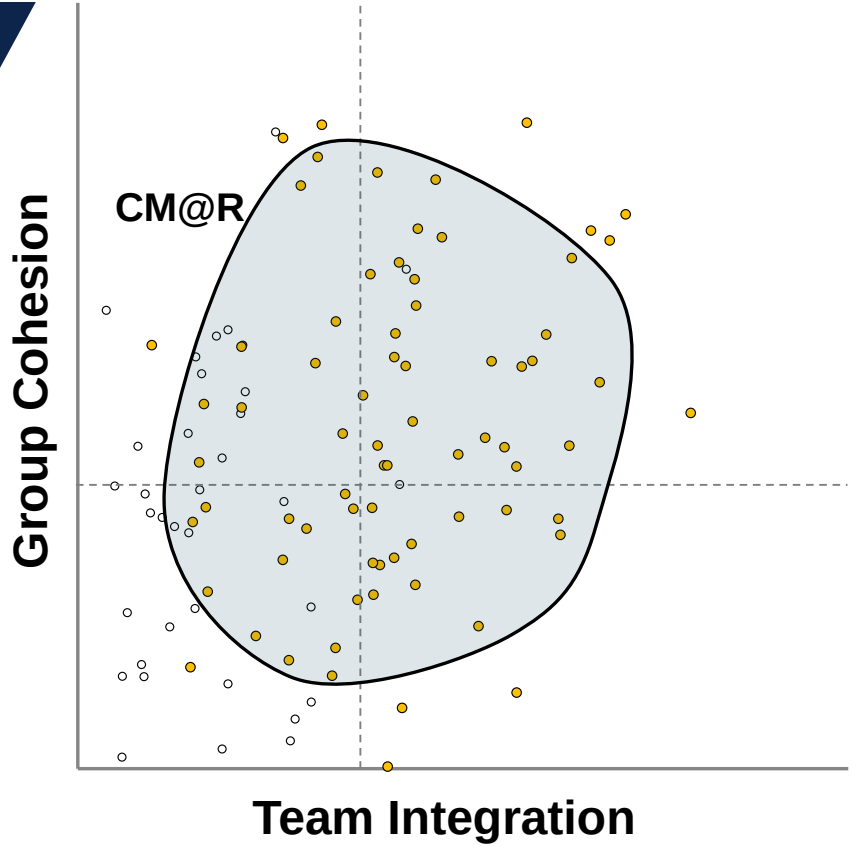

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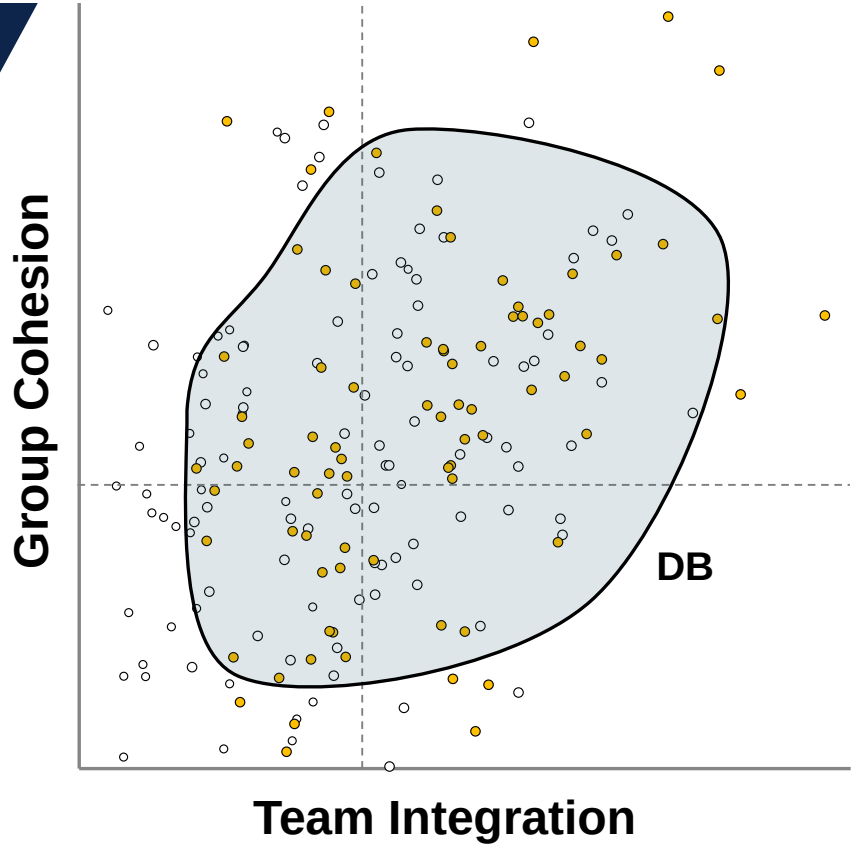

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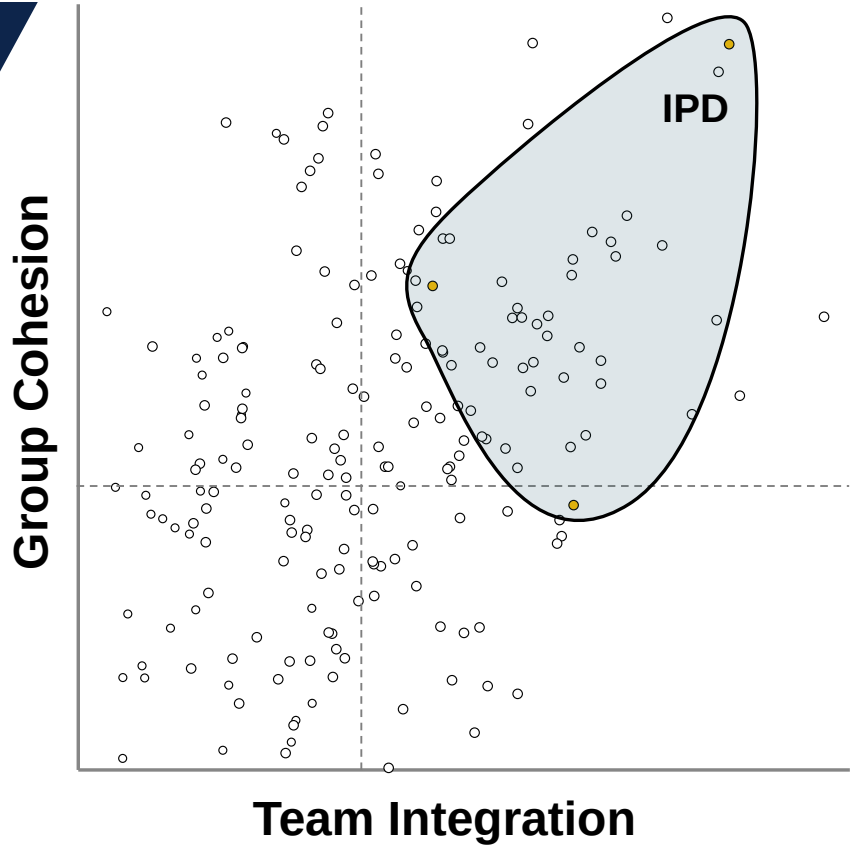

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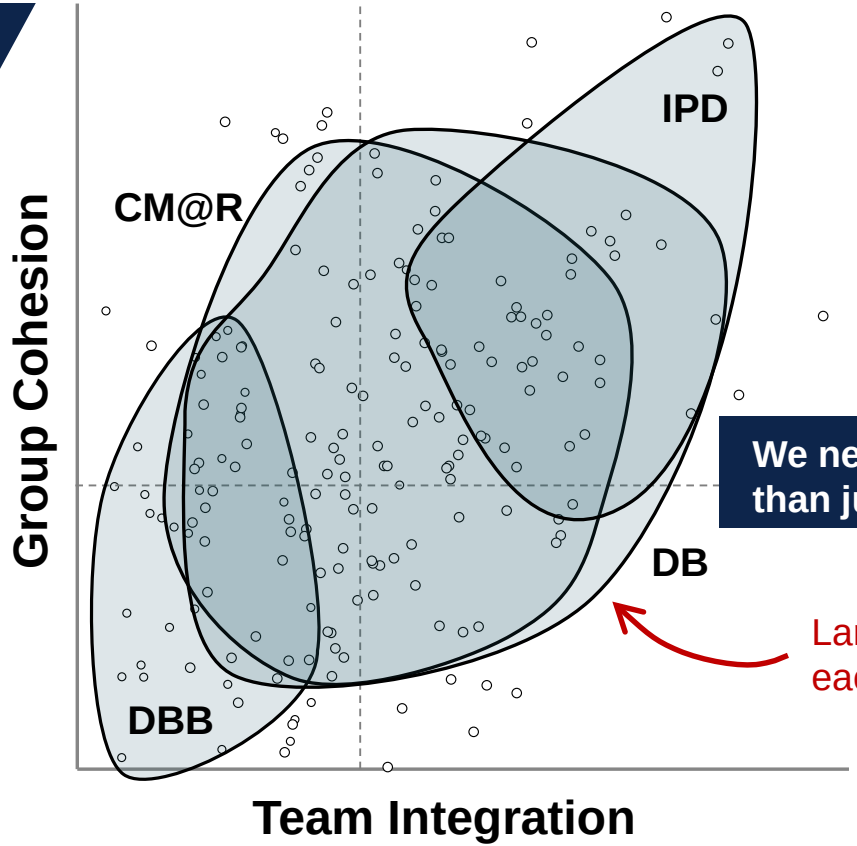
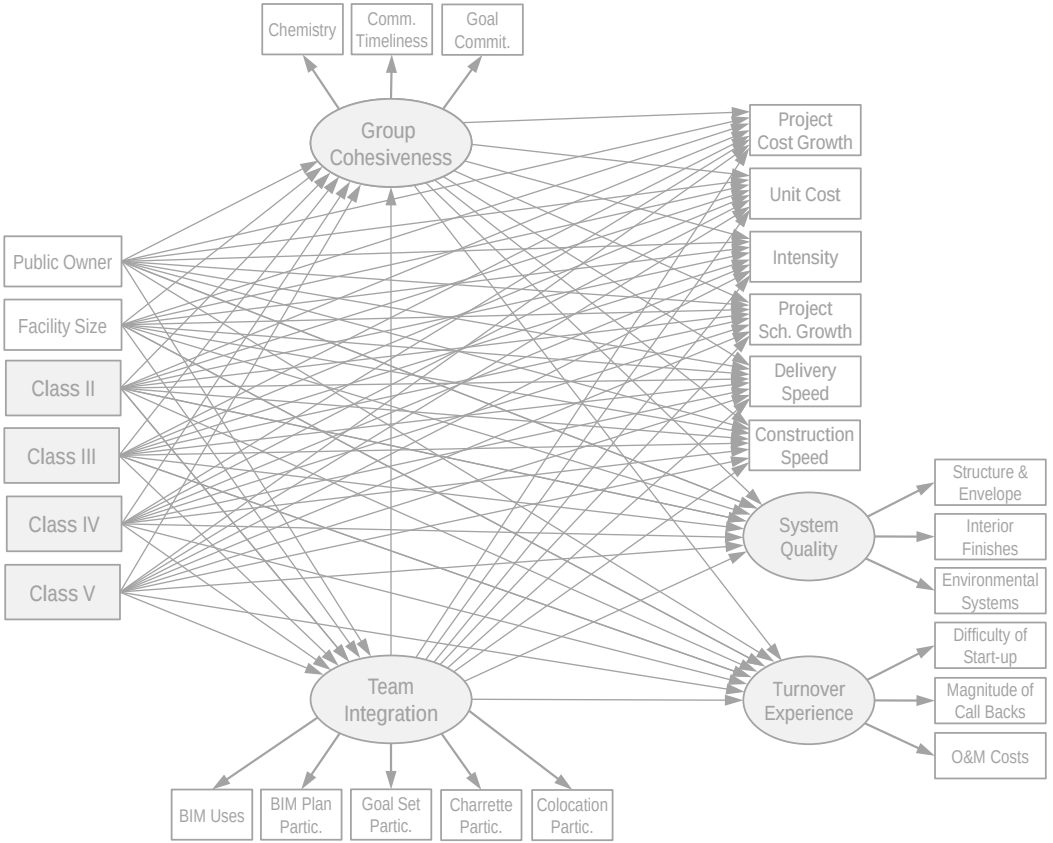


We need to consider *more* than just delivery method

Large variance within each delivery method

How did we come to these findings?



Study Background

Research Charrette

- A structured 2-day workshop that combined surveys and focus group discussion
- Attendees: CM/GCs, specialty contractors, owners, lawyers, architects

Study Background

The Role of Team Integration in Project Performance

Methodology: *Empirical Study*

- Large-sample data collection
- Latent variable analysis
- Structural modeling of relationships

Sponsors:

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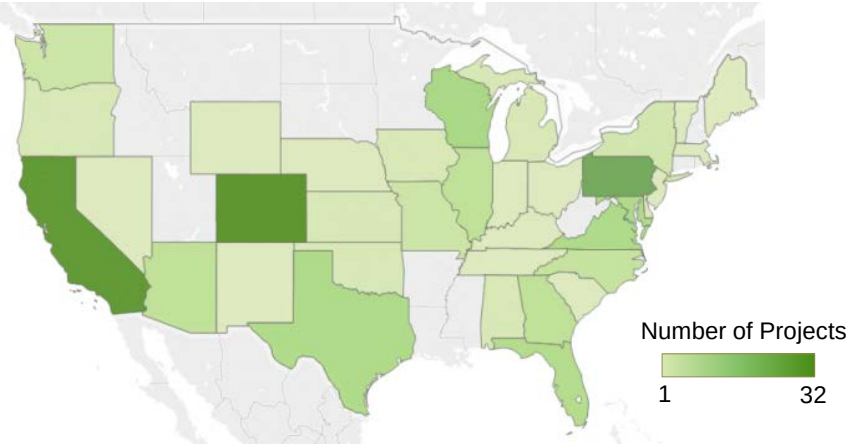
Construction Industry Institute (CII)

Data Set



204 Projects

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

Completed: 2008 - 2013

Facility Sizes

(4%)	**8**	> 700,000 ft^2
(3%)	**7**	600,000 - 699,000 ft^2
(2%)	**3**	500,000 - 599,000 ft^2
(3%)	**6**	400,000 - 499,000 ft^2
(7%)	**15**	300,000 - 399,000 ft^2
(13%)	**26**	200,000 - 299,000 ft^2
(24%)	**49**	100,000 - 199,000 ft^2
(44%)	**90**	0 - 99,000 ft^2

Facility Types

Educational	**56**	(27%)
Office	**41**	(20%)
Health Care	**32**	(16%)
Lodging	**27**	(13%)
Commercial	**20**	(10%)
Sports & Recreation	**11**	(5%)
Manufacturing	**11**	(5%)
Correctional	**4**	(2%)
Transportation	**2**	(1%)

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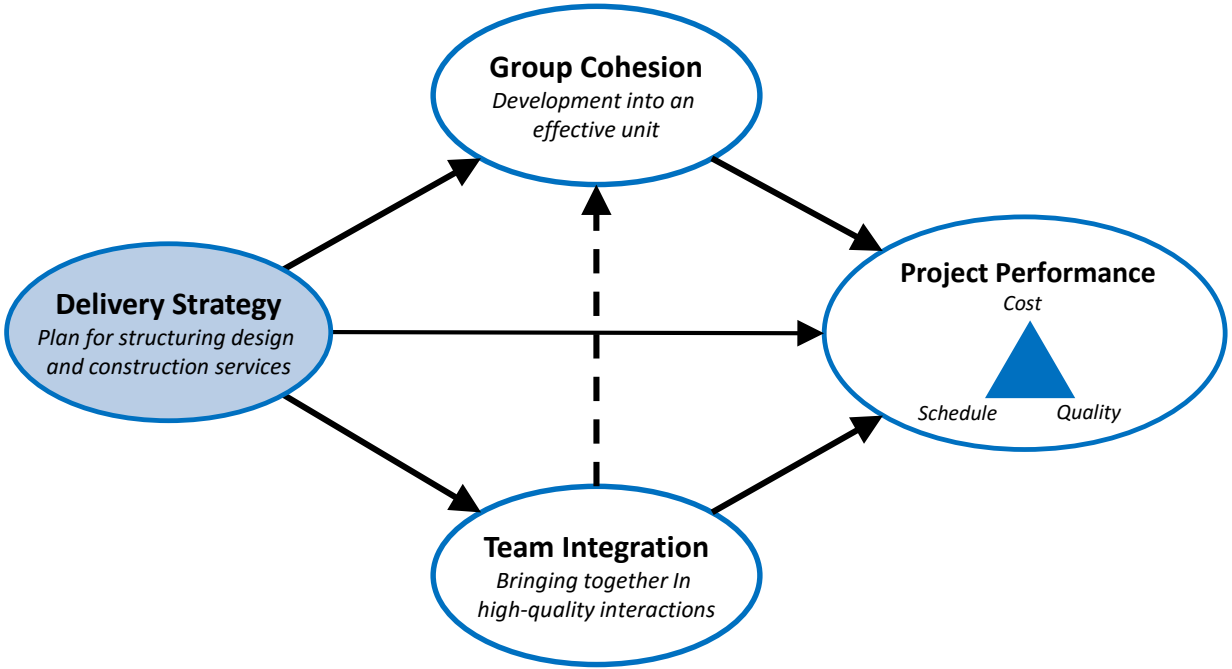
The Factors

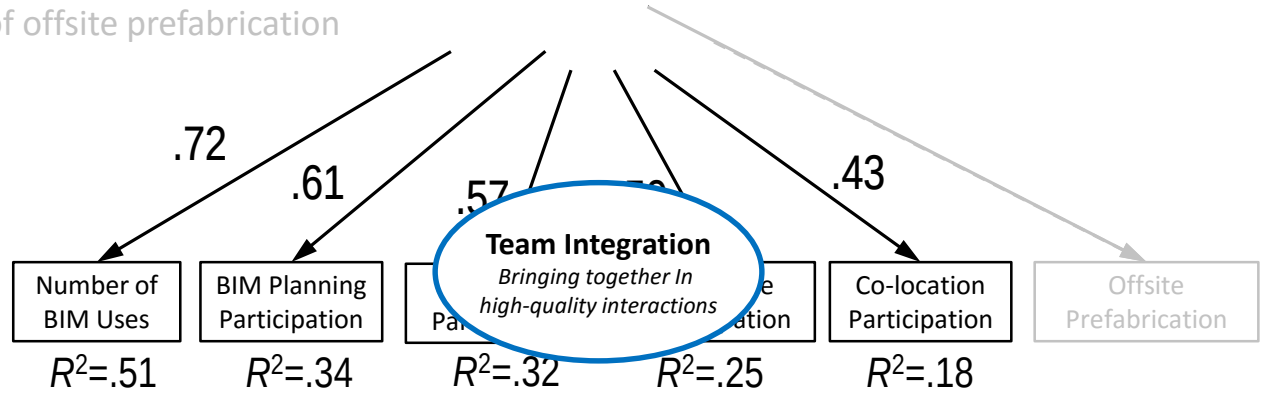

Group Cohesion
Development into an effective unit
Delivery Strategy
Plan for structuring design and construction services
Project Performance
Cost
Schedule
Quality
Team Integration
Bringing together In high-quality interactions

The Factors

Measurements of participation in **high-quality interactions**, suspected to be driven by the level of team integration:

- Number of BIM uses from a predefined list
- Proportion of **core*** project team participating in:
  - BIM planning
  - Goal setting
  - Design charrettes
  - Co-location
- Percentage of offsite prefabrication

**Includes owner, designer, primary contractor, MEP trades and structural trades*



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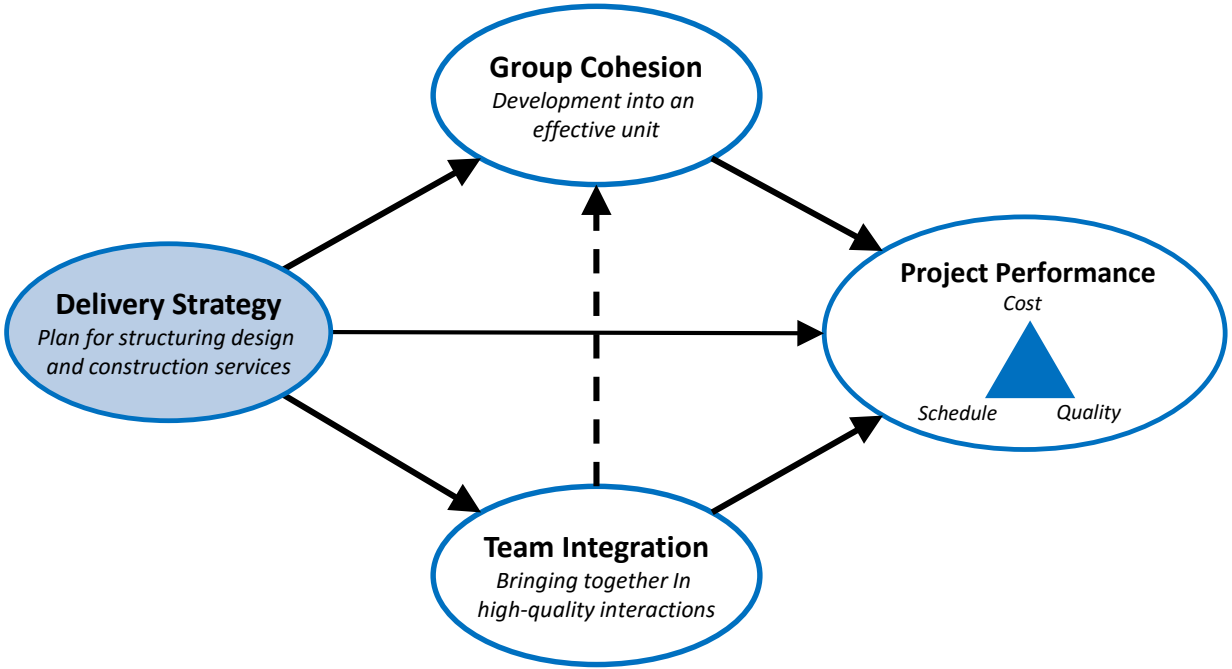
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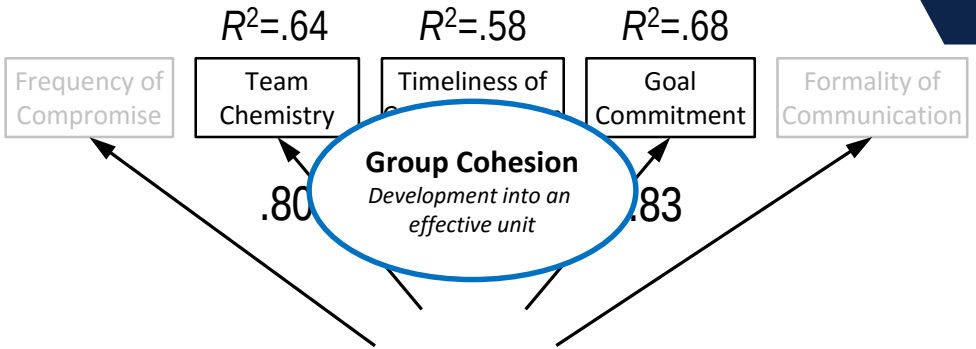

Measures of the **team environment**, thought to be reflective of the level of group cohesion:

- Frequency of compromise
- Team chemistry
- Timeliness of communication
- Commitment to project goals
- Formality of communication

Poor	○ ○ ○ ○ ○ ○	*Excellent*
Never on time	○ ○ ○ ○ ○ ○	*Always on time*
Weakly	○ ○ ○ ○ ○ ○	*Strongly*

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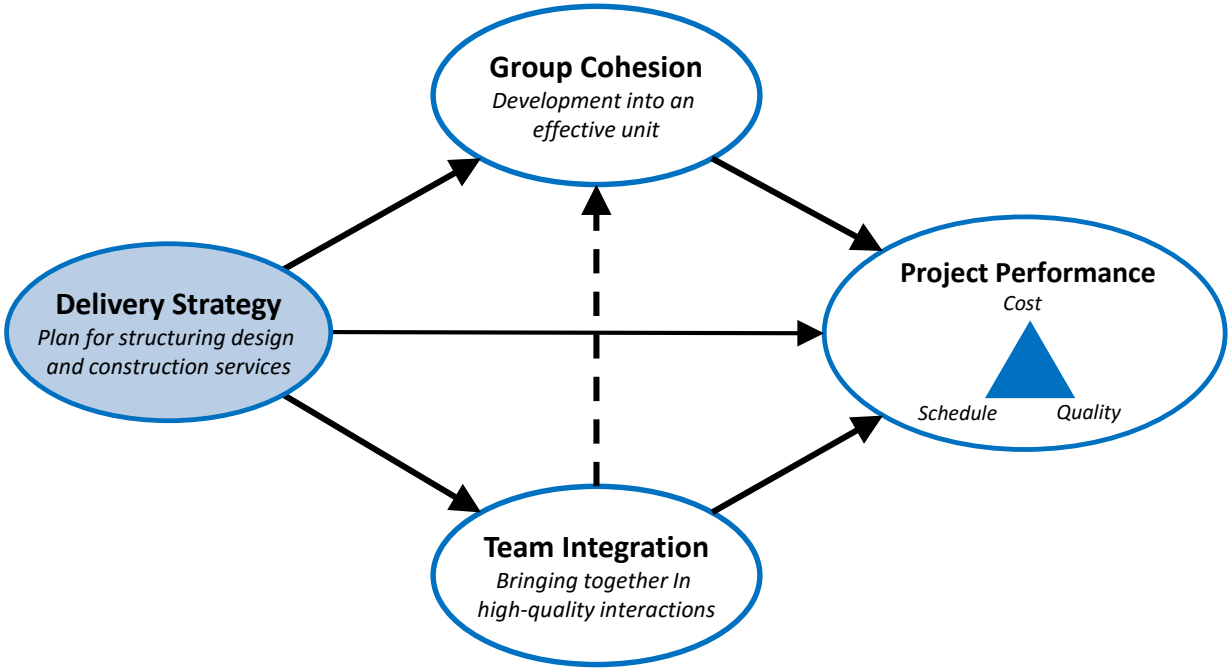
The Factors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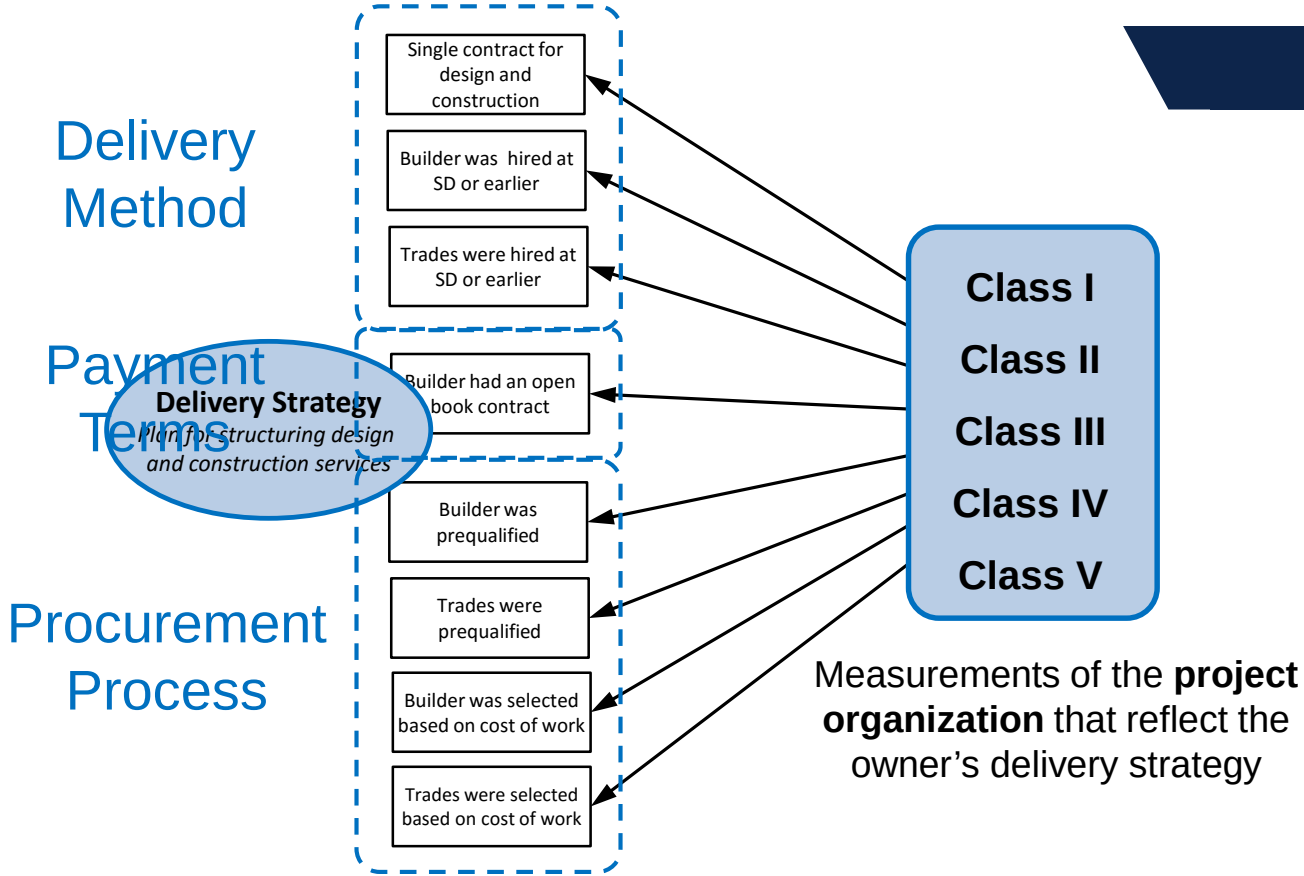


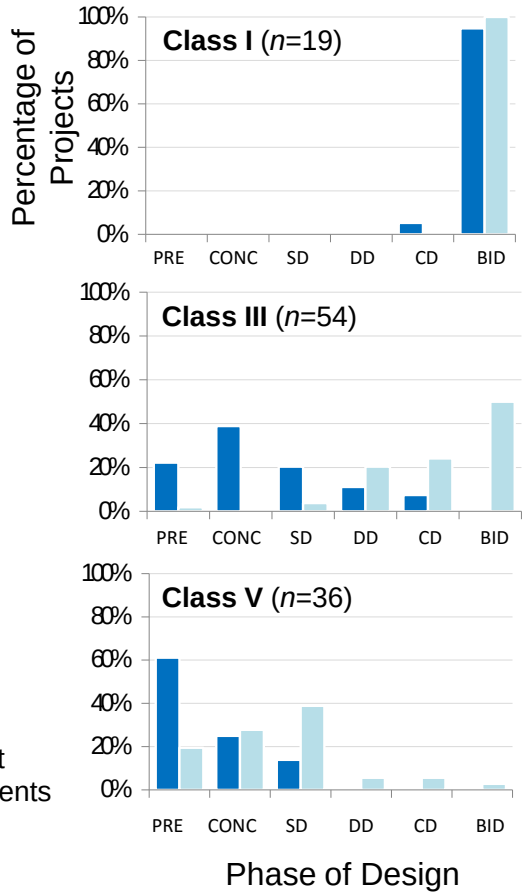
Measurements of the **project organization** that reflect the owner's delivery strategy

Timing of Involvement

Early Involvement of the Builder and/or Trades

Project Delivery Strategy

- **Class I**
- Class II
- **Class III**
- Class IV
- **Class V**

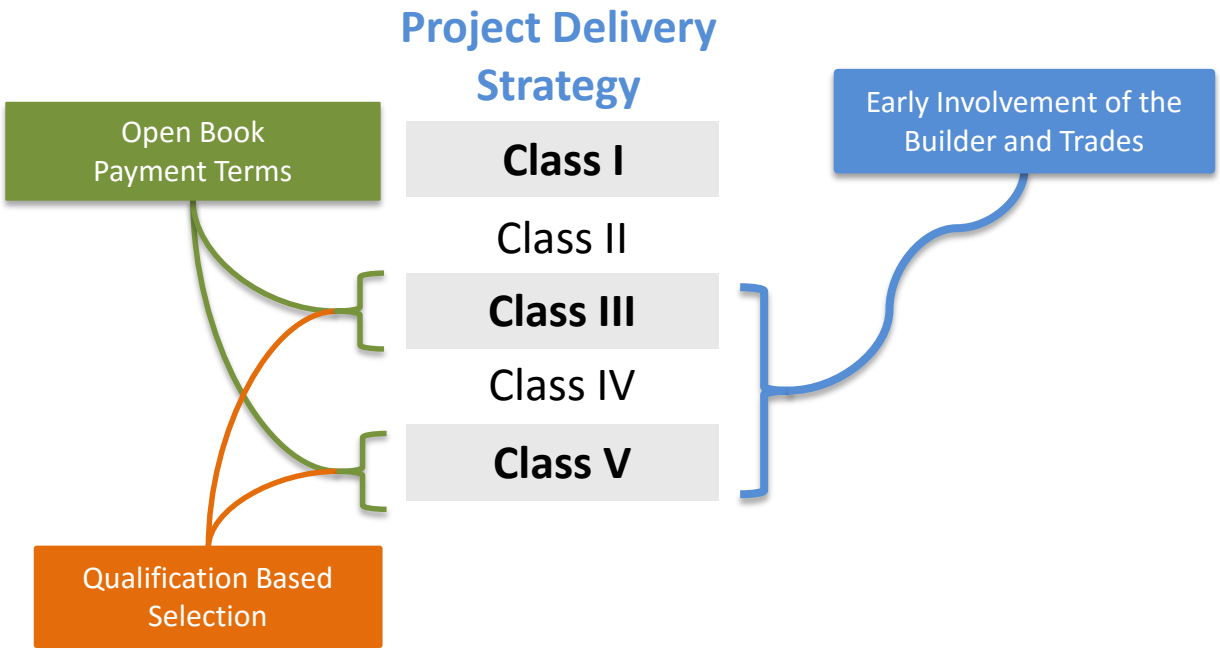


Primary Contractor / CM

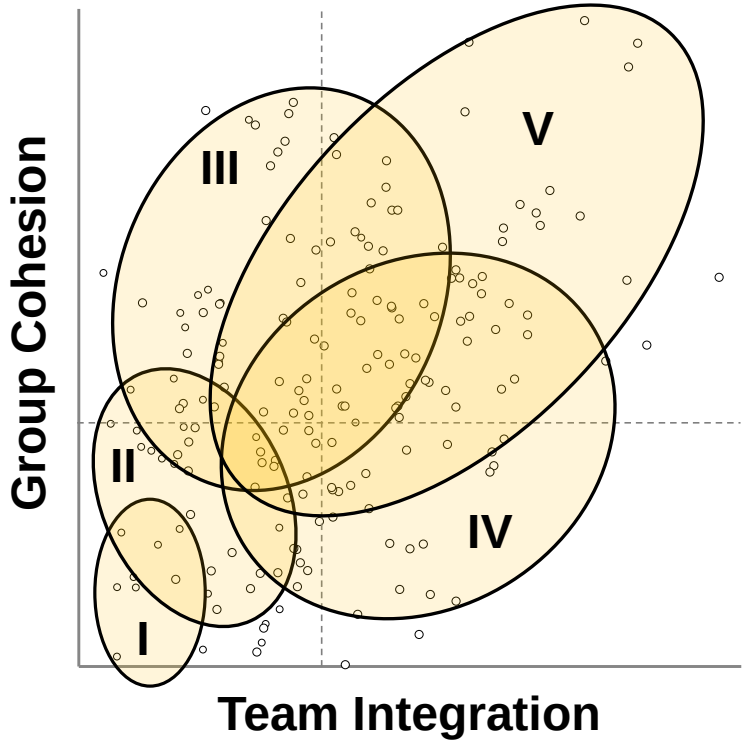
Trade Contractors

PRE = Pre-Design
CONC = Conceptual Design
SD = Schematic Design
DD = Design Development
CD = Construction Documents
BID = Bidding

Underlying Themes



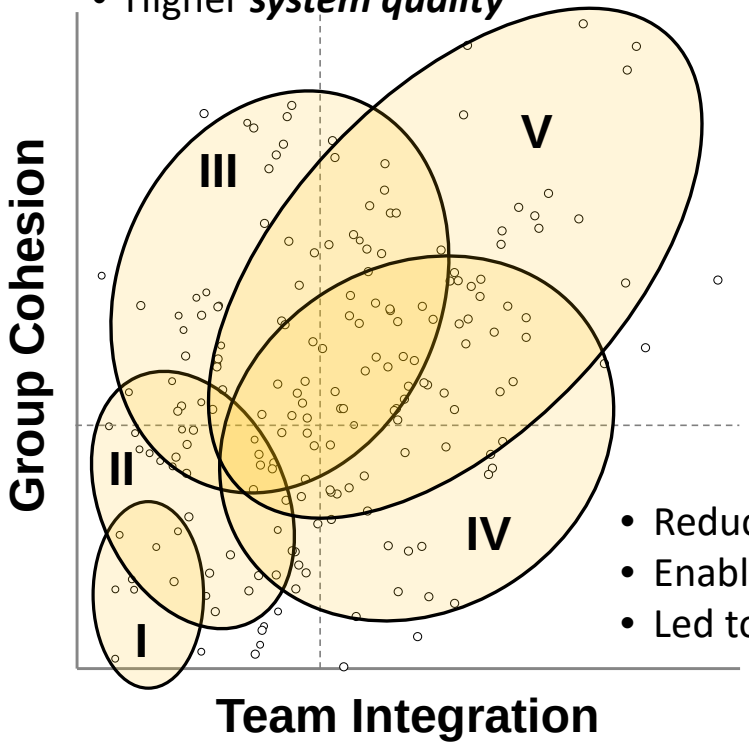
Delivery Strategy



The Owner's Guide

Pulling it all together

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



- Reduced ***schedule growth***
- Enabled more ***intense schedules***
- Led to ***more group cohesion***

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How do I use this information for my projects?

"What if we don't change at all ...
and something magical just happens?"

Maximizing Success in Integrated Projects

An Owner's Guide

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

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Workshop

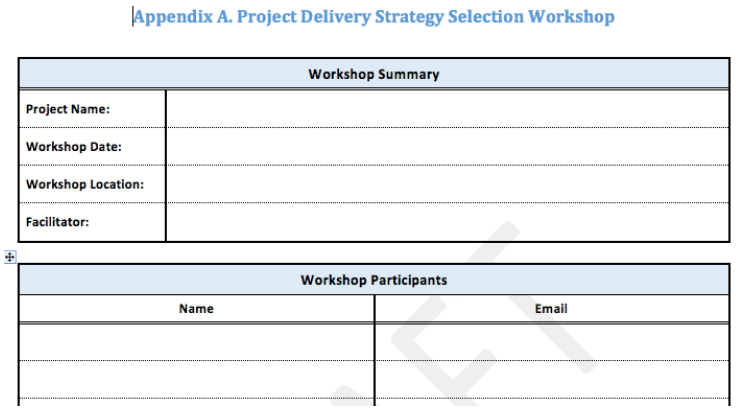
Workshop Goal

Identify the targeted delivery strategy for your project

Bring together key stakeholders ***BEFORE*** setting the strategy

Preparation:

- Outline of project scope and goals
- Define / invite key stakeholders
- Approximate timeline / budget



Appendix A. Project Delivery Strategy Selection Workshop

Workshop Summary	
Project Name:	
Workshop Date:	
Workshop Location:	
Facilitator:	

Workshop Participants	
Name	Email

The Process

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

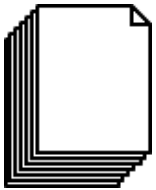
Discuss delivery decisions with attention to integrated processes and team cohesion

- 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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Step 1a

a. Document project summary information

b. Determine project goals

Define Project Needs

Formally document the project purpose and scope

Project Attributes
Project Name:
Location:
Estimated Budget (or range):
Estimated Project Delivery Period:
Estimated Size (or range, in square feet):
Required Delivery Date (if applicable):
Source(s) of Project Funding:
Function Project Scope (i.e., what will be delivered):
Major Schedule Milestones:
Major Project Stakeholders:

a. Document project summary information

b. Determine project goals

Define Project Goals

Define the specific goals for the project and functionality of the completed facility.

Project-Specific Goals
Goal #1:
Goal #2:

Schedule

- Accelerate start of project revenue

Cost

- Maximize value for project budget
- Complete the project on budget

Functional

- Minimize inconvenience to current facility users

a-b. Org. Structure

c. Payment Terms

d-g. Team Assembly Process

Explore Delivery Options

Discuss the organizational structure

Multiple Contracts: Design and construction responsibility can be split into separate contracts. Design-bid-build contract forms have a clear separation with the builder's contract beginning after design is complete. Construction manager at risk forms of contract have separable preconstruction and construction contracts for the builder.	
Opportunities	**Obstacles**

Design Responsibility
- Shared contract or split

Early Involvement
- Builder
- Specialty Trades

Timing of Involvement
- Pre-Schematic Design
- Late Design
- Post-Design

Step 3b

a. Identify Constraints

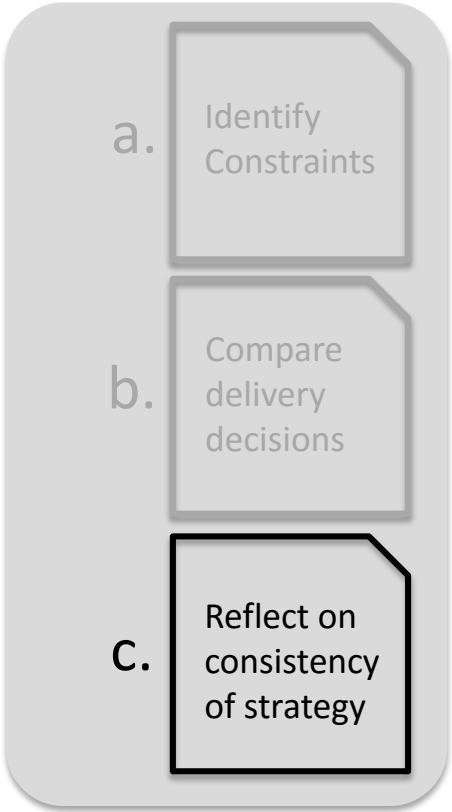
b. Compare delivery decisions

c. Reflect on consistency of strategy

Compare by Strategy

Apply underlying themes to inform strategy decisions

Selection Factors	Delivery Strategy Selection				
	I	II	III	IV	V
Box 2a. Design Responsibility	Separate	Separate	Separate	Combined	Separate; **Combined**
Box 2b. Timing of Involvement					
Primary Builder	CD or later	DD or CD; **CD or later**	Pre-SD	Pre-SD	Pre-SD
Key Specialty Trades	CD or later	DD or CD; **CD or later**	DD or CD; **CD or later**	**Pre-SD;** DD or CD	Pre-SD
Box 2c. Cost Transparency	Closed book	**Closed book;** Open book	Open book	**Closed book**	Closed book, **Open book**
Box 2d. Selection Criteria					
Primary Builder	**Price only;** Best value	Best value	Best value; **QBS**	Best value	QBS
Key Specialty Trades	Price only	Price only; **Best value**	Price only; **Best value**	Best value	QBS
Box 2e. Prequalification					
Primary Builder	Open	Shortlist	Open; **Shortlist**	Shortlist	Shortlist
Key Specialty Trades	Open	Shortlist	Shortlist	Shortlist	Open; **Shortlist**
Box 2f. Experience Working Together	First time	First time	Repeat	First time; **Repeat**	Repeat
Box 2g. Interview Process	No interview	No interview	Interview	Interview	Interview



Reflect on Consistency

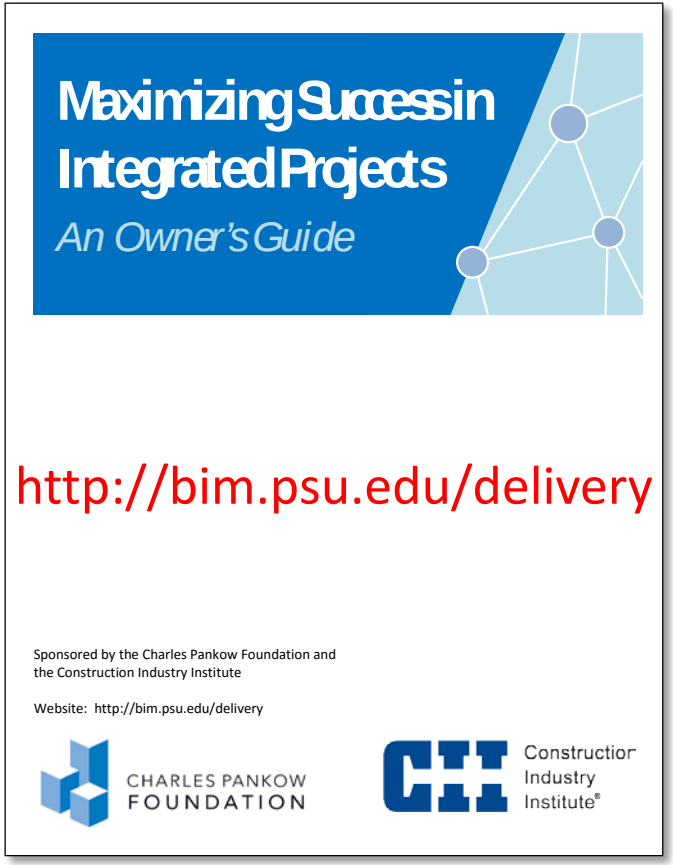
Regardless of the selected strategy, consider implementing these critical success factors:

Integrated Processes

- Number of BIM uses from a predefined list
- Proportion of **core*** project team participating:
  - BIM planning
  - Goal setting
  - Design charrettes
  - Co-location

Behaviors leading to Team Cohesion

- Team chemistry
- Timeliness of communication
- Commitment to project goals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How can you help inform the process?

GET SMART

1st THING

MAKE THE MENTAL SHIFT

RIGHT PERSON IN THE RIGHT SEAT ON THE BUS

INTEGRATION IS A TEAM SPORT

POETRY IN MOTION

to

Procurement → **Contracts** → **Execution**

educate

Impacts of this Research

- Federal Owners and State agencies are strategically determining best project delivery strategies to maximize success
- Maximizing success requires a holistic strategy, an integrated team and a motivated group of individuals

What you should remember?

- Best path to project success is through building a **TEAM** – integration / cohesion
- Teams are influenced through project delivery decisions – ***early involvement, open book, qualifications driven***
- Project Delivery needs to be developed as a **strategy** across the project

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