A Comparison Study:

Design-Build

Design-Bid-Build

Construction Management at Risk

Charter

Compare the cost, schedule,
and quality of the design-build
delivery system versus
design-bid-build and CM at risk.

CII Research Team

- Industry Members — Norm Strong, Marshall
  - 4 Owners
  - 6 Contractors
- Academic — Dr. Vic Sanvido, Penn State
                    Mark Konchar, Penn State

Data Collected

- Cost
- Schedule
- Quality
- Team characteristics
- Building systems
- Lessons learned

Data Sources

- Mail-In Response Rate
  - >7,000 mailed
  - Rate = 5.1%
- Owner Type
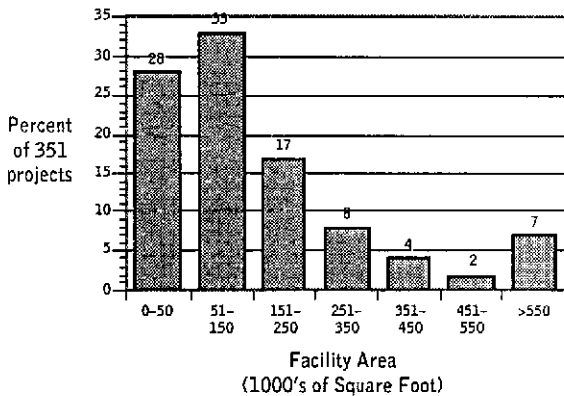 - Public = 43%
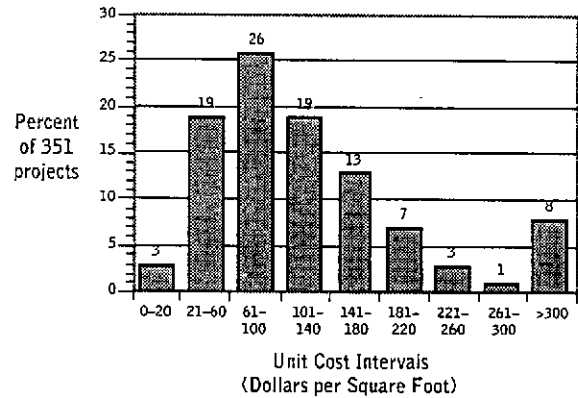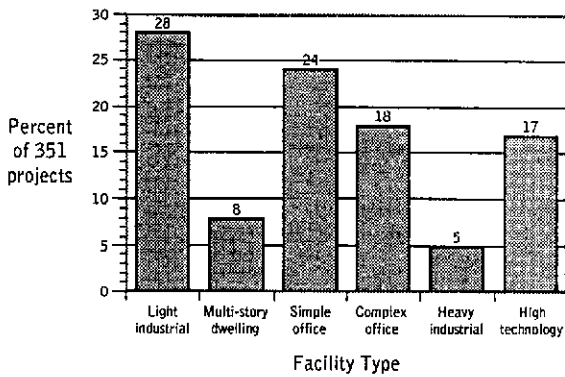 - Private = 57%

Data Sources

- 37 States
- Size (Sq. Ft.)
  - 5,000 – 2,500,000
- Unit Cost ($ / Sq. Ft.)
  - 30 – 2000
- Full range of market sectors

Delivery System Distribution

|	PSU/CII	
	No.	%
CM@R	80	23
DB	155	44
DBB	116	33
Total	351	100

The Six Families

- Light industrial facilities
- Multi-story dwellings
- Simple general buildings
- Complex general buildings
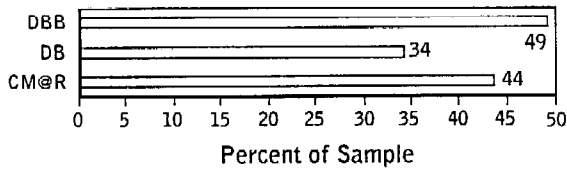- Heavy manufacturing facilities
- Technology projects

Percent of 351 projects vs. Facility Type

Light industrial 28, Multi-story dwelling 8, Simple office 24, Complex office 18, Heavy industrial 5, High technology 17

Percent of 351 projects vs. Unit Cost Intervals (Dollars per Square Foot)

0–20: 3, 21–60: 19, 61–100: 26, 101–140: 19, 141–180: 13, 181–220: 7, 221–260: 3, 261–300: 1, >300: 8

Percent of 351 projects vs. Facility Area (1000's of Square Foot)

0–50: 28, 51–150: 33, 151–250: 17, 251–350: 8, 351–450: 4, 451–550: 2, >550: 7

Design & Construction Cost Growth

Cost Growth = [(Final Project Cost − Contract Award Cost) / Contract Award Cost] x 100

DBB: 4.83
DB: 2.17
CM@R: 3.37
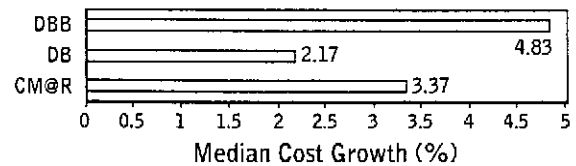
Median Cost Growth (%)

Design & Construction Cost Growth

Greater than 5% Growth

	Percent of Sample
DBB	49
DB	34
CM@R	44

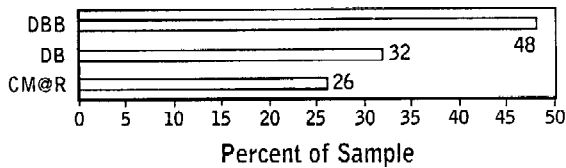Percent of Sample (0–50)

Design & Construction Schedule Growth

Design & Construction Schedule Growth =
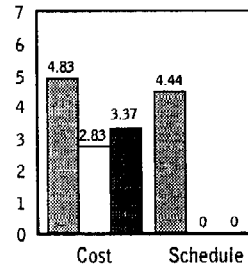[(Total As-Built Time − Total As-Planned Time) /
Total As-Planned Time] x 100

	Median Design & Construction Schedule Growth (%)
DBB	4.44
DB	0
CM@R	0

Median Design & Construction Schedule Growth (%) (0–4.5)
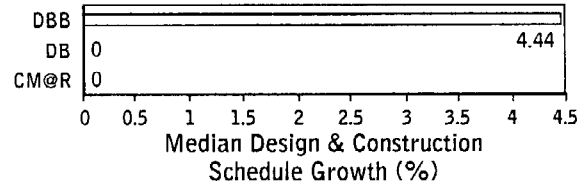
Design & Construction Schedule Growth

Greater than 5% Growth

	Percent of Sample
DBB	48
DB	32
CM@R	26

Percent of Sample (0–50)

Summary of Principal Metrics

Growth (%)

	Cost	Schedule
DBB	4.83	4.44
DB	2.83	0
CM@R	3.37	0

Aggregate Score

	Quality
DBB	39.3
DB	46.0
CM@R	43.1
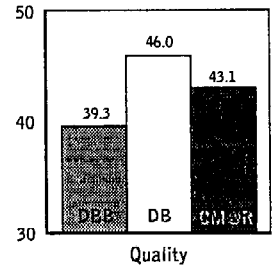
By Owner
(Univariate)

	Public Owner	Private Owner
Unit Cost	—	DB
Cost Growth	—	DB
Scheduled Growth	DB/CM	DB/CM
Construction Speed	DB	DB
Delivery Speed	DB	DB
Intensity	—	—
Takeover Quality	DB/CM	DB
System Quality	CM	DB
Equipment Quality	—	—

By Type Facility
(Univariate)

	Lt. Mfg.	Multi-Dwell	Simple Ofc.	Complex Ofc.	Heavy Mfg.	Tech
Unit Cost	DB/CM	—	—	—	—	—
Cost Growth	—	—	—	—	—	DB
Scheduled Growth	CM	—	CM	DB	—	—
Construction Speed	DB/CM	—	—	—	—	—
Delivery Speed	DB	—	CM	—	—	—
Intensity	—	DB	DB	DB	—	DB
Takeover Quality	—	—	CM	DB	—	DB/CM
System Quality	DB	—	—	—	—	DB
Equipment Quality	—	—	—	BD	—	—

By Type Facility

(Multivariate)

	Lt. Mfg.	Multi-Dwell	Simple Ofc.	Complex Ofc.	Heavy Mfg.	Tech
* Unit Cost	—	—	—	—	—	—
* Construction Speed	DB/CM	—	—	DB	—	DB
* Delivery Speed	DB/CM	—	DB	DB	—	DB
Cost Growth	—	—	—	—	—	—
Scheduled Growth	—	—	CM	DB/CM	—	—

* Most Reliable (>85% variance explained)

Results

- Cost Growth: DB best

- Schedule Growth: DB and CM@R best

- Quality: <15% variation