THE ROLE OF PROJECT MANAGERS TO AVOID PROJECT FAILURE

PROJECT MANAGEMENT INSTITUTE GERMANY CHAPTER

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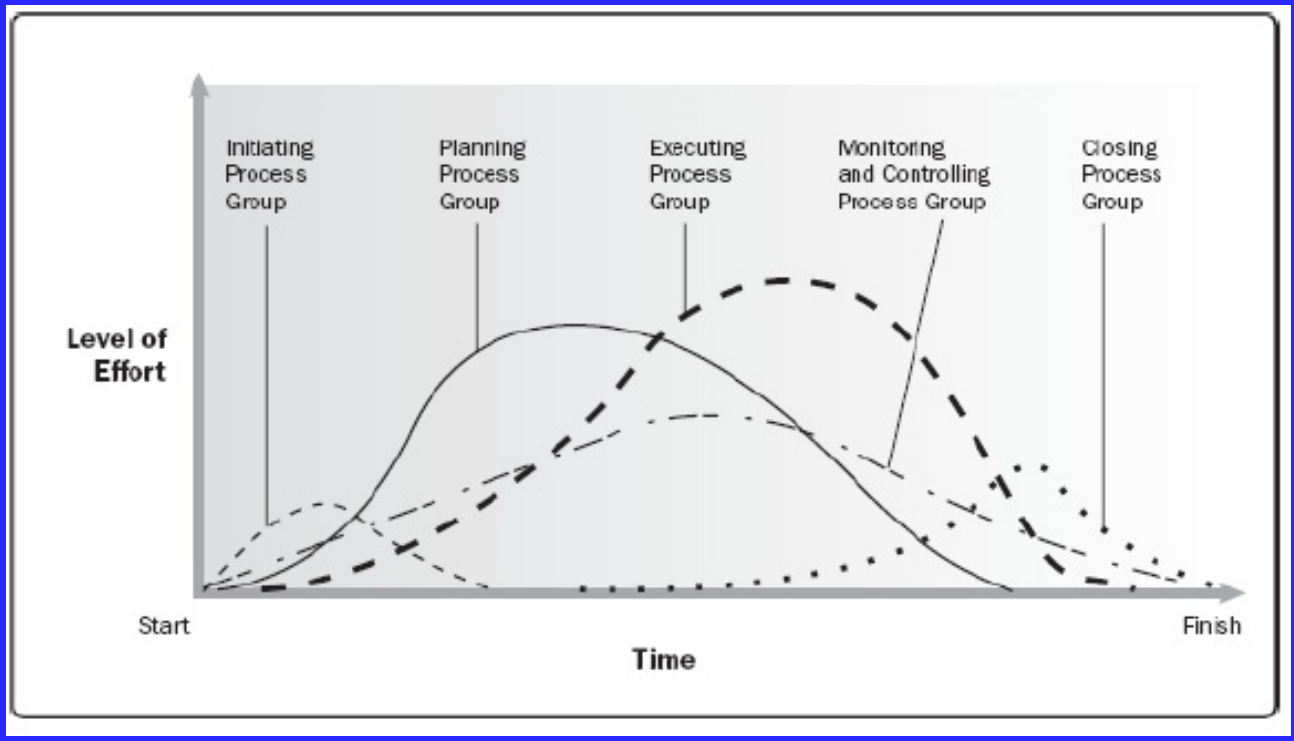
March 29, 2023

Project Management Processes

PMBOK 6th Edition



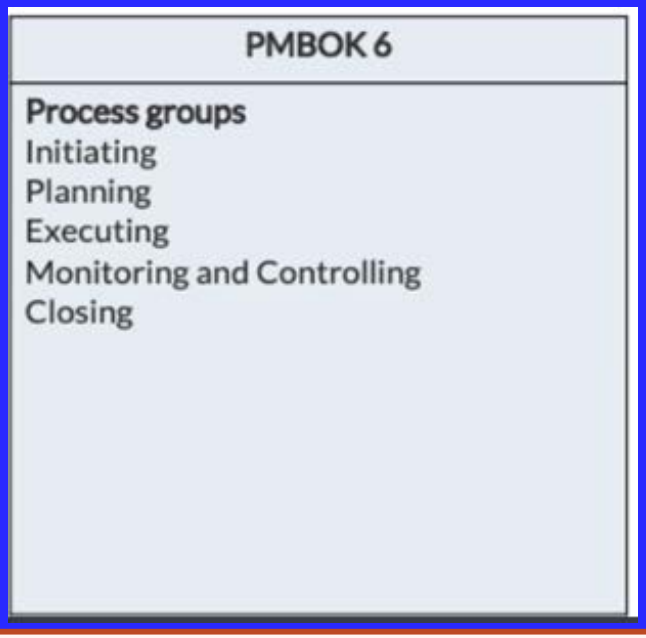
Project life cycle vs. Project management process?

Project Life Cycle vs. Project Management Processes

Construction Project Lifecycle:

- Pre-Design
- Design
- Procurement
- Construction
- Post-Construction

VS.



For the projects being successful we need more than management processes
We need project life cycle management

Project Life Cycle vs. Project Management Processes

How could we manage project life cycle appropriately?

Project delivery systems!

Project Delivery Systems in Construction Projects

Many approaches exist, but we may be able to reduce them up to the followings:

- Traditional approach
- Multi-Prime
- Construction Management
- Design-Build
- EPC
- EPCM
- IPD
- JOC

One of the systems that could cause projects to be successful is CM Delivery System

What is that?

The Construction Management Project Delivery System

is a process by which a potential project owner engages an “agent” referred to as CM, to coordinate and communicate the entire project process, including project feasibility, design planning, letting, construction, and project implementation, with the objective of minimizing the project time and cost, and maintaining the project quality.

What is the reason for that?

Reasons for the Emergence of the CM Project Delivery System

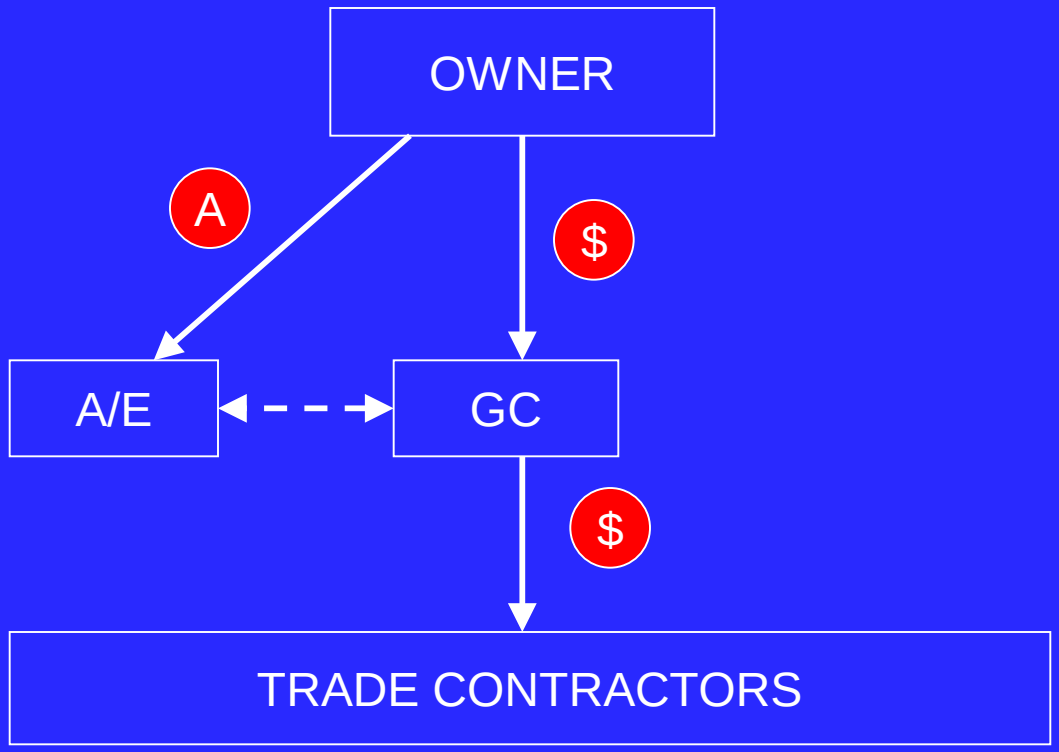
- Failure of traditional methods to attain owners' time, cost, and quality objectives
  - Inability of A/E to give reliable budget estimate
  - Absence of construction expertise during design
  - Absence of good management by contractor
  - Linear nature of feasibility-design-letting-construction
- Increased project complexity and size

What variations exist for the CM?

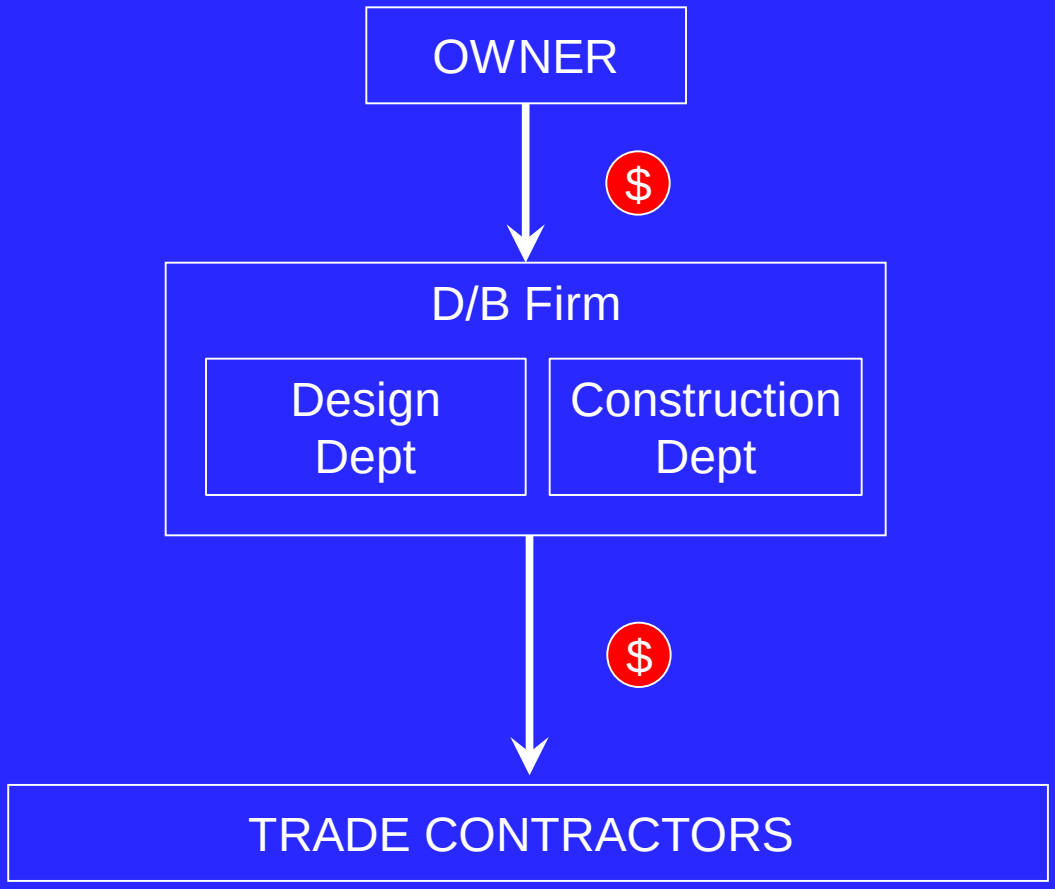
Variations of the CM Project Delivery System

- Agency CM (ACM)
- Extended Services CM (XCM)
- Guaranteed Maximum Price CM (GMPCM)
- Owner CM (OCM)

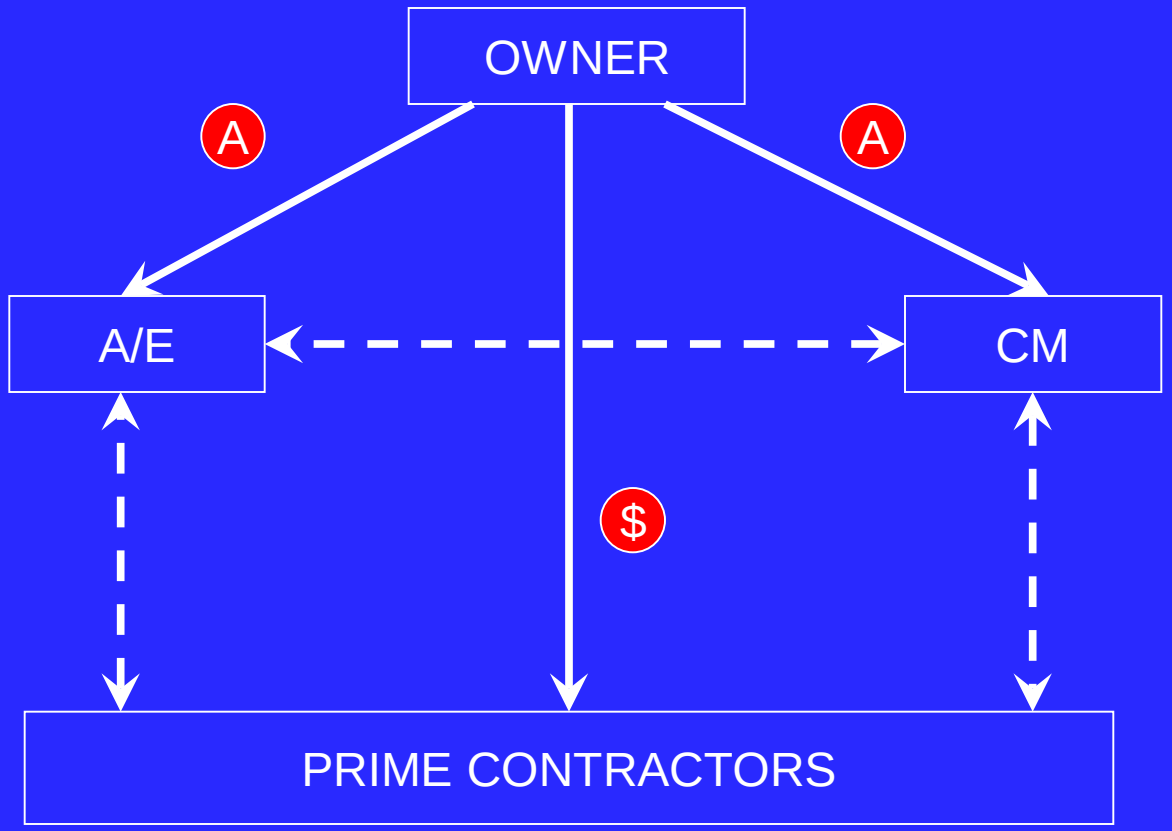
The Traditional Project Delivery System



The Design/Build System



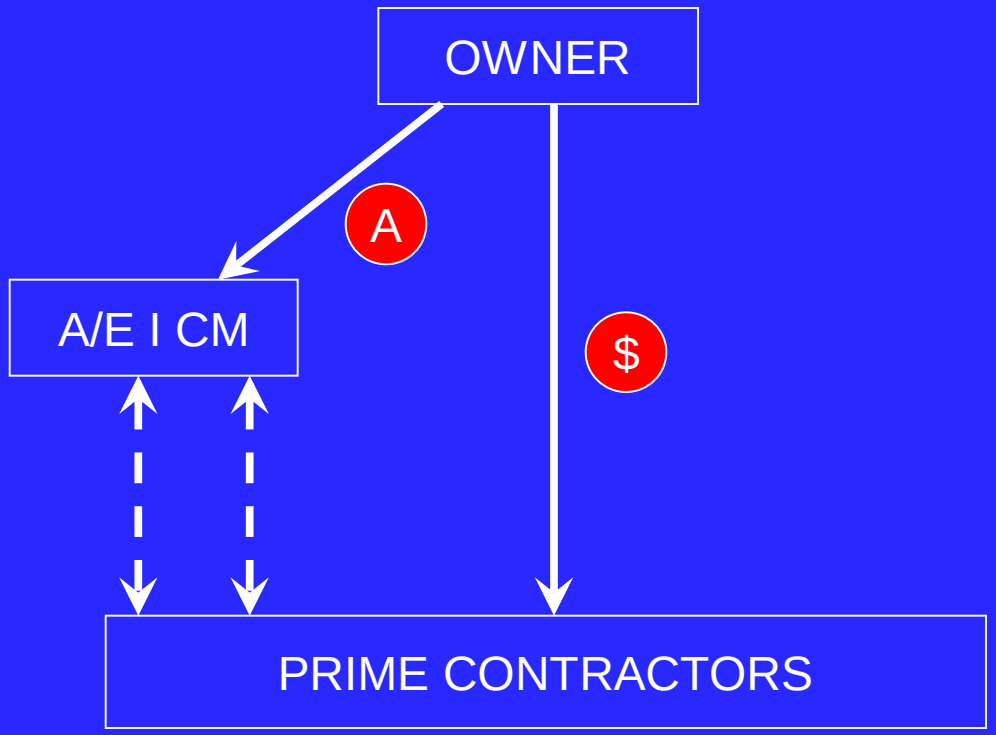
Agency CM (ACM) (CM-for-fee)



CM Project Del System

- ACM
- XCM
- GMPCM
- OCM

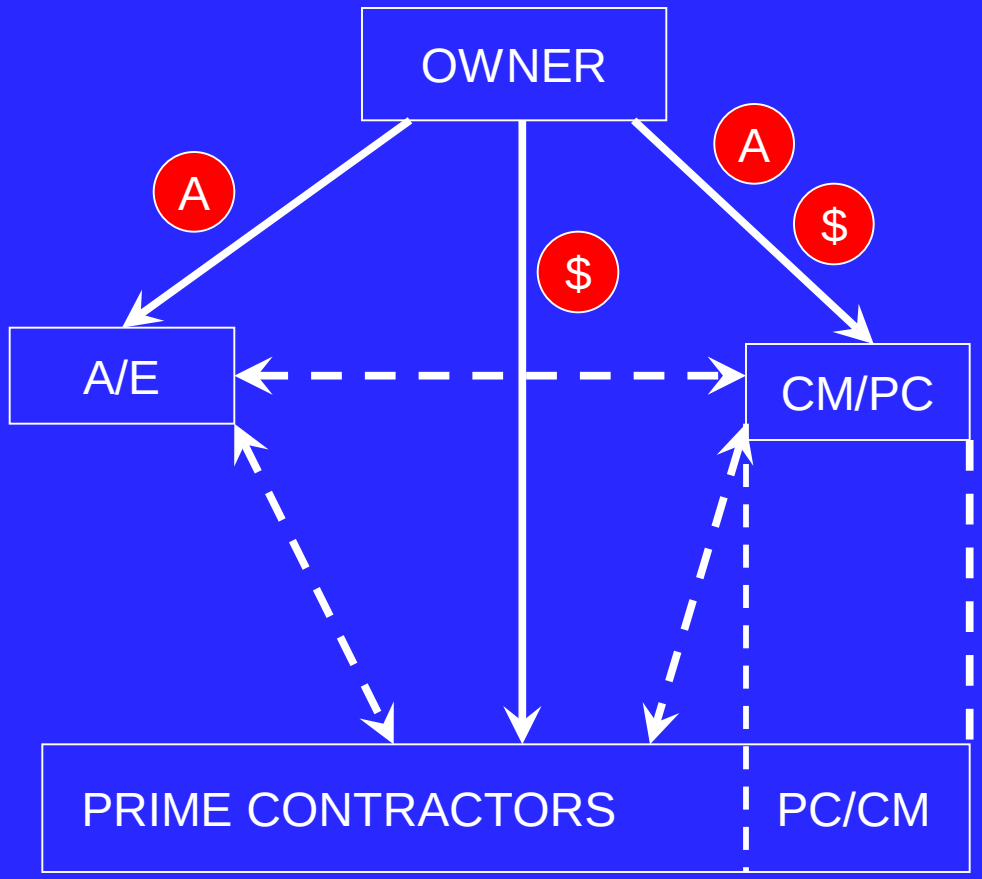
Design XCM



CM Project Del System

- o ACM
- o XCM
- o GMPCM
- o OCM[12]

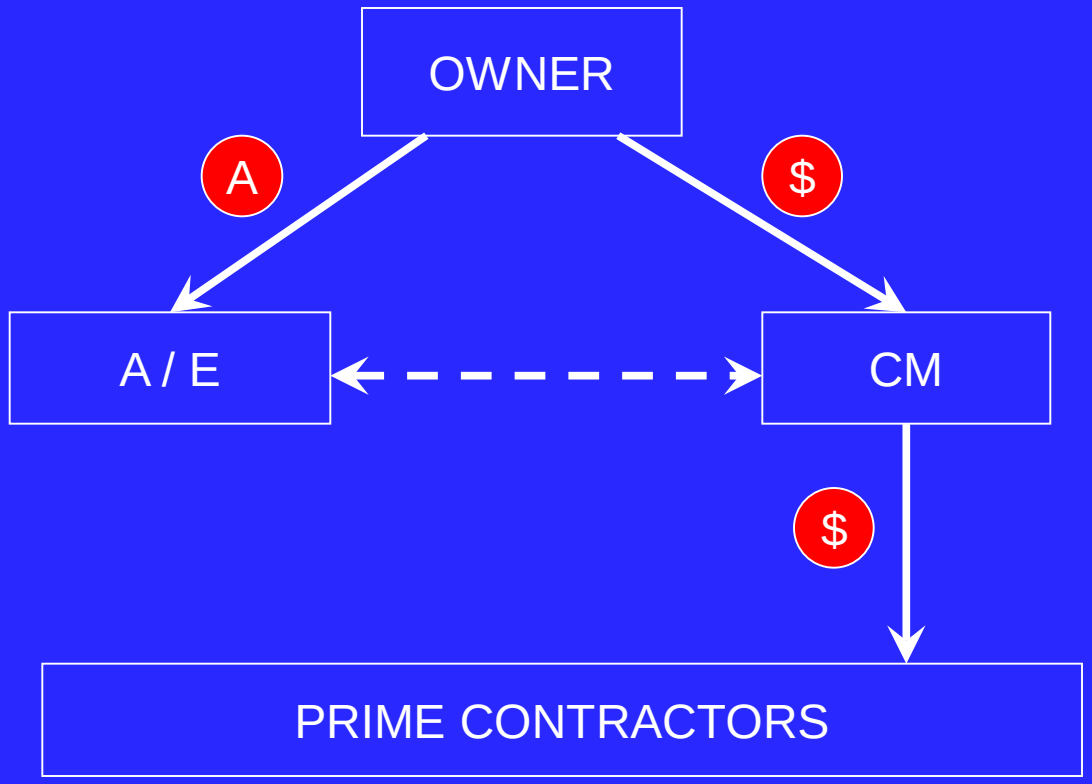
Constructor XCM



CM Project Del System

- o ACM
- o XCM
- o GMPCM
- o OCM

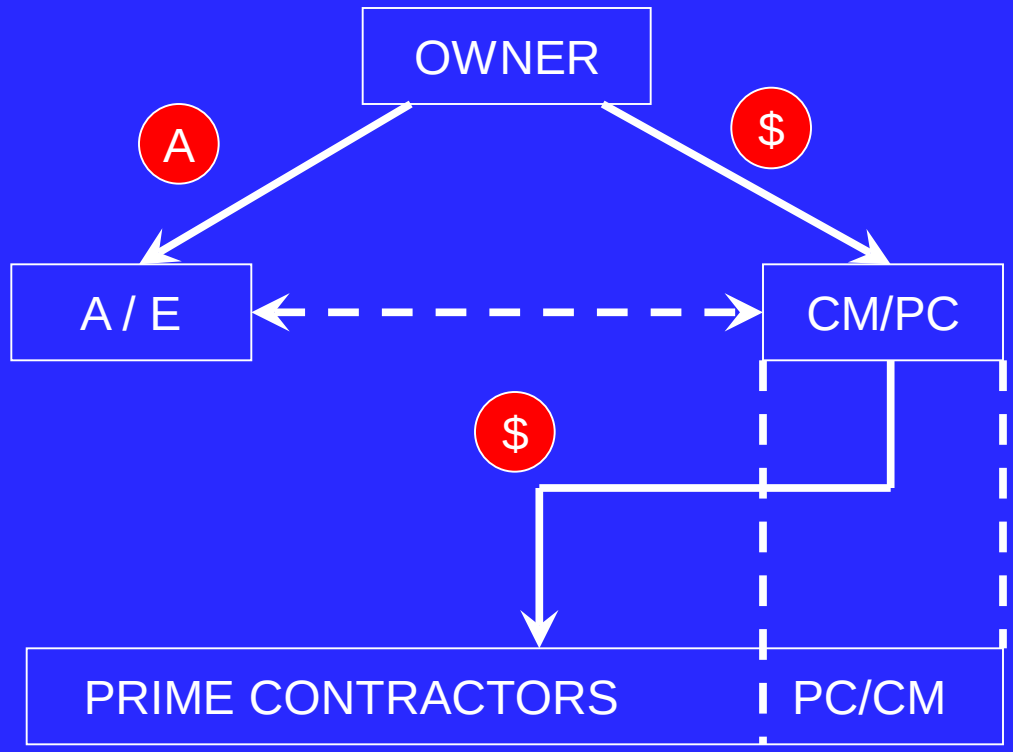
Contractor XCM (CM-at-risk)



CM Project Del System

- ACM
- XCM
- GMPCM
- OCM[14]

Contractor/Constructor XCM (CM-at-risk)



CM Project Del System

- ACM
- XCM
- GMPCM
- OCM[15]

Extended Services CM (XCM)

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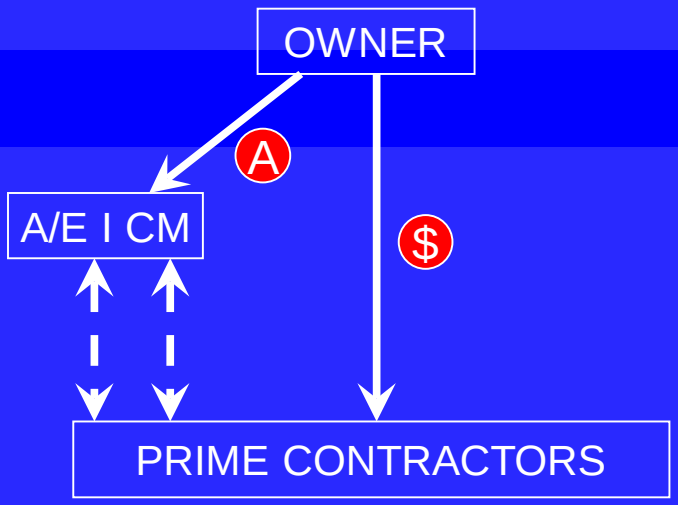
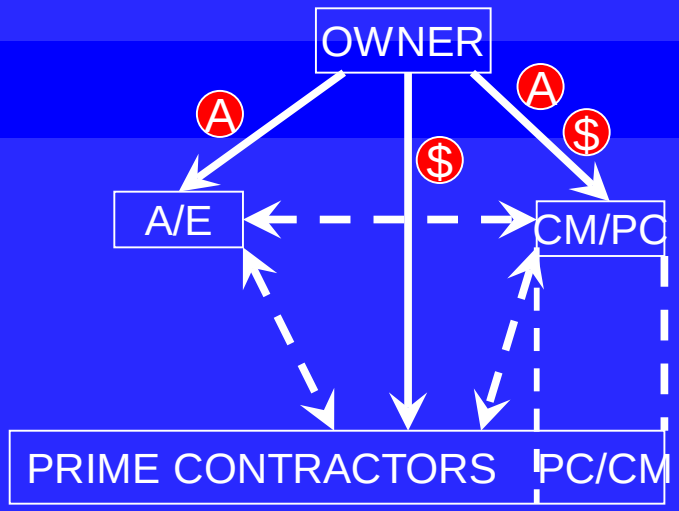
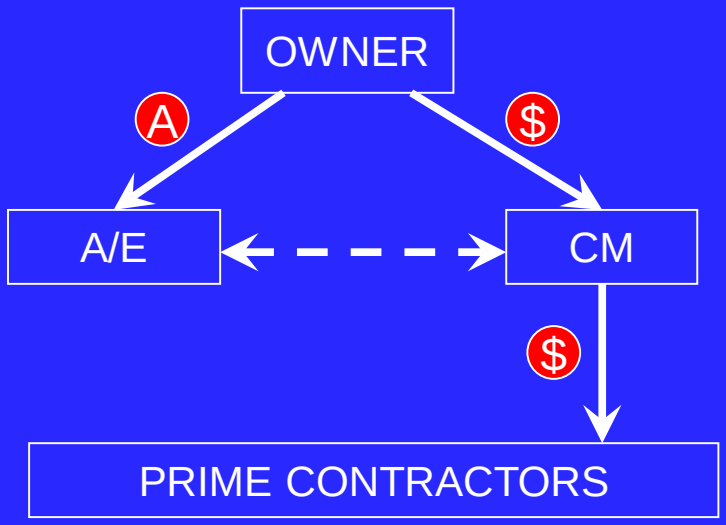
Design XCM



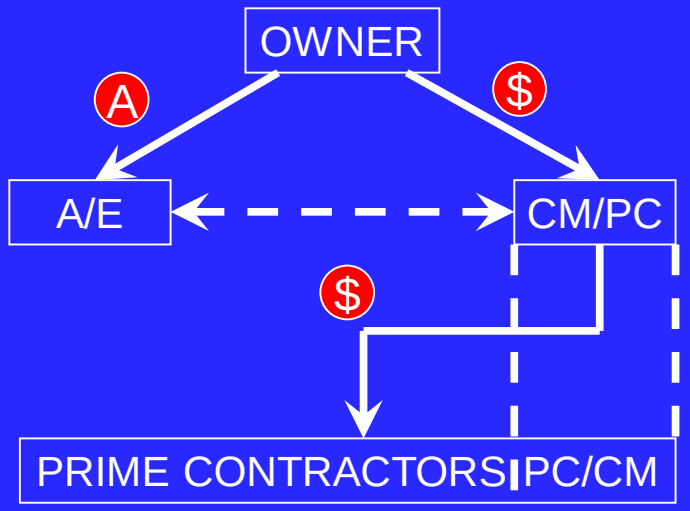
Constructor XCM



Contractor XCM (CM-at-risk)



Contractor/Constructor XCM (CM-at-risk)



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So, is there any history for that?

Historical Background of the CM Delivery System

1972 AGC Guidelines
1973 AIA Form of Agreement
1974 AGC Form of Agreement
1975 ASCE Committee on CM
- 1976 Definition of Process
- 1979 Definition of Tasks
- 1979 Specs for CM Services
- 1979 Contractors' Views
- 1989 A/E's Views

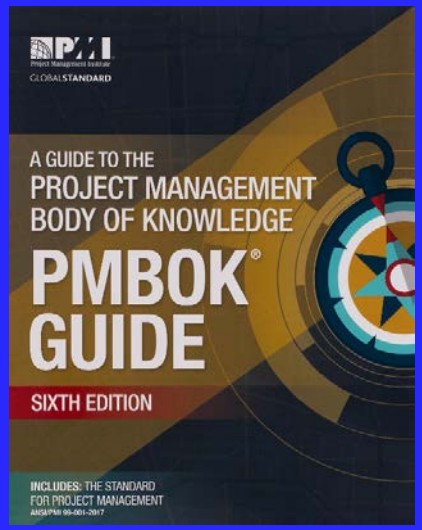
1982 CMAA
- 1986 Manual of Practice

1983 CII
1989 ENR Top 100 CM Firms

So, is there any difference between CM and PM body of knowledge?

General PM Body of Knowledge

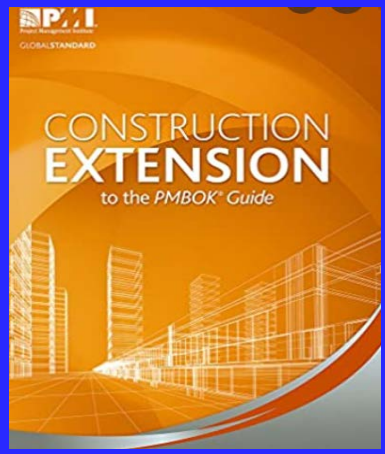
- Project integration management
- Project scope management
- Project schedule management
- Project cost management
- Project quality management
- Project resource management
- Project communication management
- Project risk management
- Project procurement management
- Project stakeholder management



Construction PM Body of Knowledge

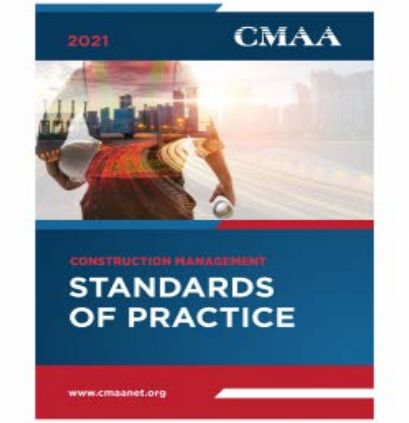
- Project integration management
- Project scope management
- Project schedule management
- Project cost management
- Project quality management
- Project resource management
- Project communications management
- Project risk management
- Project procurement management
- Project stakeholder management
- Project health, safety, security, and environment (HSSE) management
- Project financial management

❖ ANNEX A1 (Managing claims in construction)



CM Body of Knowledge

- Code of professional conduct
- Professional construction management
- Project management
- Cost management
- Time management
- Quality management
- Contract administration
- Safety management
- Sustainability
- Technology management
- Risk management
- Program management
  - Stakeholder, PGMO, MIS, Scope, Procurement



Contract Management

Involvement of the CM in the operational and administrative provisions of the contract.

- Understanding types of contracts
- Understanding of contract language
- Familiarity with standard contracts
- Knowledge of contract law
- Recommending a contracting structure to the owner
- Knowledge of traditional contracting procedures

Project Management

Making the project delivery system work from the beginning of design to the end of the warranty period.

- Providing leadership and expertise in carrying out responsibilities
- Effectively organizing design, contracting and construction
- Effectively organizing the activities of the team members

What are the services provided by the CM?

Key Services Offered by a CM at Preconstruction Stage

- Owner needs identification
- Project feasibility study
- Tax analysis
- Market research
- Assistance in financing
- Obtaining permits
- Budgeting
- Value engineering
- Parameter estimating
- Scheduling of design
- Identification of long lead items
- Bid packaging
- Awarding contracts
- Setting out operating procedures
- Processing paperwork

Key Services Offered by a CM at Construction Stage

- Detailed scheduling
- Phase estimating
- Setting out operating procedures
- Supervision of time and cost
- Inspection of quality
- Testing materials
- Organizing site safety
- Regulating labor relations
- Handling change orders
- Controlling time and cost
- Processing contractors' payments
- Testing completed project
- Marketing completed project
- Handling paperwork
- Property management

What are the advantages of having the CM?

Advantages of the CM Delivery System

- Minimizing schedule problems (77%)
  - Mitigation of delay
  - Phasing of design, bid/award, construction
- Minimizing budget problems (77%)
  - Reduction of contractor overhead
  - Reduction of A/E fees
  - Cost estimating input into design
- Leadership for the whole project team (76%)
  - Systems approach to problems
  - Single source of management
  - Reduction in owner's involvement
  - Elimination of adverse relationships
  - Construction input into design
  - Possibility of owner-purchased materials

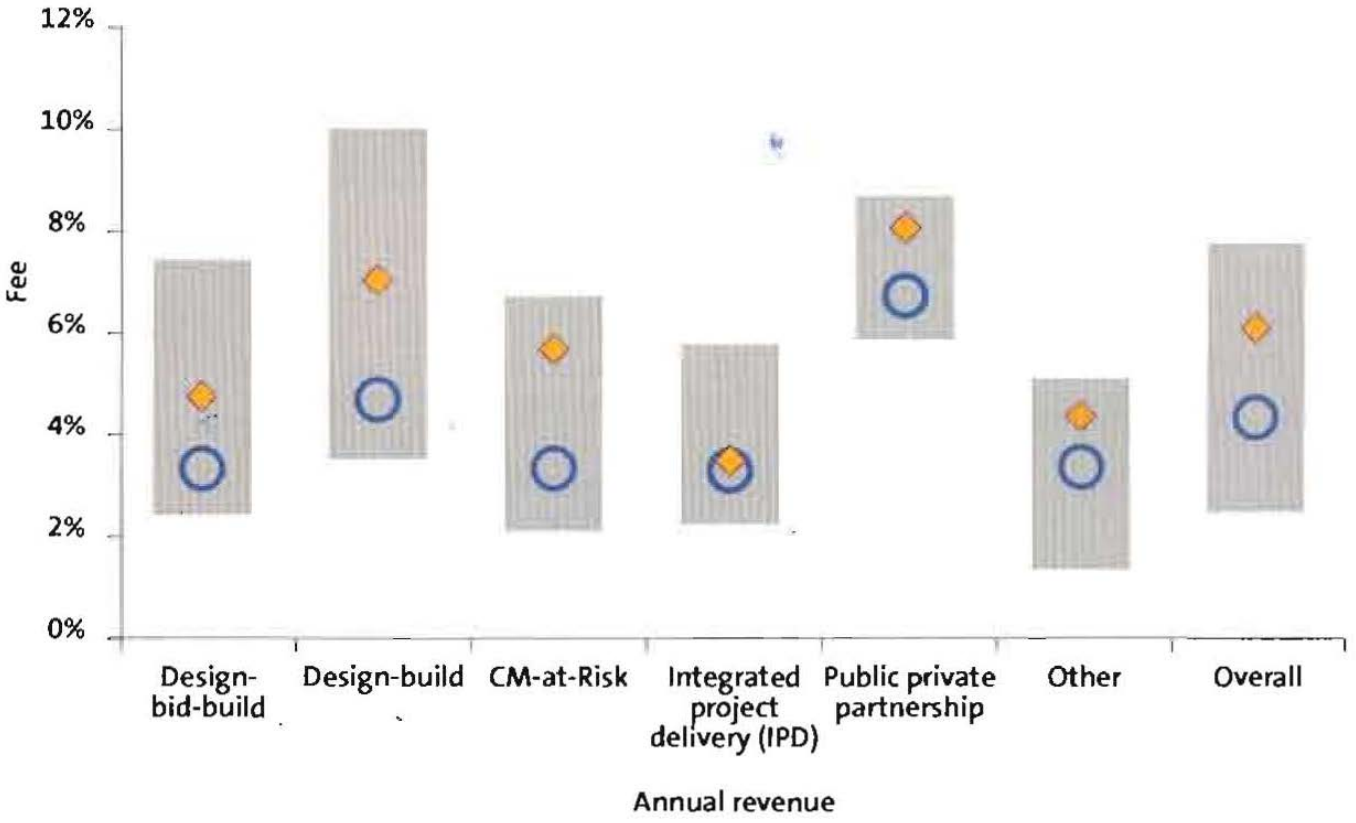
How about disadvantages?

Disadvantages of the CM Delivery System

- Fees to be paid to the CM (average 5.6% in 2014, ranging between 0.6% to 18%)
  - Fixed fee
  - Fixed fee + reimbursable items
  - Percent of project cost
- Unknown total cost at start
- Responsibility without authority
- No cost guarantee given by CM
- Bonding of individual contractors
- Problems with phased construction

Typical CM fees

Typical CM/PM fees by project delivery method



The grey-shaded bars represent the span from the 25th percentile to the 75th. The blue circles represent the median values and the orange diamonds represent the averages.

Disadvantages of the CM Delivery System

- Fees to be paid to the CM (average 5.6% in 2014, ranging between 0.6% to 18%)
  - Fixed fee
  - Fixed fee + reimbursable items
  - Percent of project cost
- Unknown total cost at start
- Responsibility without authority
- No cost guarantee given by CM
- Bonding of individual contractors
- Problems with phased construction

How to select a CM?

Selection of a Construction Manager

- Defining scope of project and services
- Advertising and solicitation
- Compiling short list (prequalification)
- Request for proposals
- Fee negotiation

Criteria for Short-listing

- Overall/specialized experience
  - Scheduling
  - Cost estimating
  - Inspection
  - Value engineering
  - Design
  - Construction
  - Etc.
- Depth of organization
  - Present workload
  - Available personnel
  - Key personnel
  - Recruiting requirements
- References/reputation
  - Current clients
  - Past clients
- Services offered
- Financial stability
  - Overall financial strength
  - Financial adequacy for the project

Selection of a Construction Manager

- Defining scope of project and services
- Advertising and solicitation
- Compiling short list (prequalification)
- Request for proposals
- Fee negotiation

Information to be made available before seeking "Proposed Work Plan"

- Feasibility studies
- Preliminary drawings
- Preliminary design criteria
- Preliminary specifications
- Owner's operating requirements
- Owner's contracting requirements
- Design schedules
- Completion requirements
- Location of jobsite
- Appropriation estimate
- Any other owner requirement

Selection of a CM

- Defining scope
- Advertising
- Compiling short list
- Request for proposals
- Fee negotiation

Contents of “Proposed Work Plan”

- Description of overall approach
- Services in field office
- Services in head office
- Proposed contract package
- Preliminary construction schedule
- Preliminary procurement schedule
- Proposed value engineering program
- Cost and progress control system
- Proposed project organization
- Resumés of key personnel

Selection of a CM

- Defining scope
- Advertising
- Compiling short list
- Request for proposals
- Fee negotiation

Criteria for Final Selection

- Understanding of owner's goals
  - Understanding of project requirements
  - Understanding of site conditions
  - Understanding of special features
  - Anticipation of potential problems
- Staff
  - Names and backgrounds of key personnel
  - Prior experience of key personnel
- Familiarity with locality
  - Local regulations
  - Availability of local materials, labor, equipment

Selection of a CM

- Defining scope
- Advertising
- Compiling short list
- Request for proposals
- Fee negotiation

Criteria for Final Selection

- Specific management approach
  - Overall approach
  - Preliminary schedules
  - Proposed organization
  - Specific services provided
  - Specific services not provided
- Fees and compensation
  - Fee
  - Reimbursable costs
  - Non-reimbursable costs
  - Other arrangements

Selection of a CM

- Defining scope
- Advertising
- Compiling short list
- Request for proposals
- Fee negotiation

What other parties think about the CM?

Perceptions of parties involved in construction about the duties and responsibilities of CMs

ASCE CI MPIC's Observation:

Consensus appears to be lacking about what constitutes "construction management" primarily because of the fragmented nature of the modern construction industry where many different parties with different objectives, interests and cultures are involved in the construction process.

What are the expectations of different parties involved in the construction project?

- MPIC commissioned survey 2006
- MPIC commissioned survey 2016

Funded jointly by ASCE and CMAA.

Duties and responsibilities of CMs

- 150 CM duties identified
  - CMAA *Standard Form of Agreement between Owner and CM*
  - AIA *Standard Form of Agreement between Owner and CM*
  - AGC *Standard Form of Agreement between Owner and CM*
  - General CM literature
- CM duties categorized by project phase
  - Pre-design (24 duties)
  - Design (39 duties)
  - Bidding (25 duties)
  - Construction (43 duties)
  - Post-construction (19 duties)
- CM duties circulated to MPIC members and revised based on input received

Questionnaire for Pre-design Phase

ILLINOIS INSTITUTE OF TECHNOLOGY — CI Construction Institute — CMAA Construction Management Association of America

IIT Construction Engineering and Management Program – Chicago, Illinois

Please indicate below the construction management services expected *in the Pre-Design Phase* of the typical construction projects undertaken by your company.

Pre-Design Phase	Always Expected	Often Expected	Sometimes Expected	Seldom Expected	Never Expected
1. Develop scope of project and areas of use					
2. Conduct market research					
3. Collect typical operating costs, tax information, etc.					
4. Establish models for optimizing return on investment					
5. Develop broad outline schedule					
6. Develop conceptual budget					
7. Evaluate financing sources and alternatives					
8. Develop target design fees					
9. Develop feasibility study report					
10. Establish cash flow projections					
11. Determine organization and staffing to administer project					
12. Outline responsibilities of the project team					
13. Establish basic communication procedures					
14. Prepare contractual agreements					
15. Prepare the procedures for claim avoidance					
16. Prepare BIM execution plan					
17. Establish reporting and accounting procedures					
18. Interview and select architects, engineers, estimators, land surveyor, and other consultants					
19. Conduct site evaluation					
20. Plan for logistics including temporary construction requirements					
21. Overview of LEED green building strategies and set the LEED goals					
22. Select project delivery system (traditional, D/B, multiple primes, etc.)					
23. Explore partnering possibilities between parties					
24. Plan for risk management steps with regard to such duties					

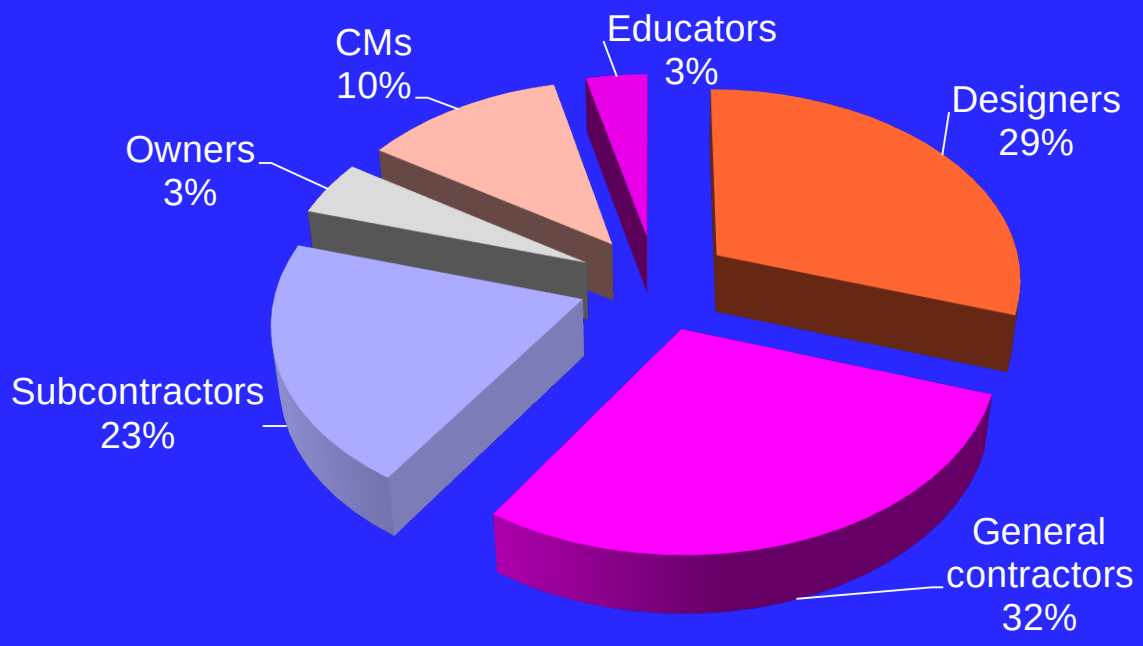
Survey of the Parties Involved in the Construction Project

- Parties surveyed
  - Owners
  - General contractors
  - Subcontractors
  - Construction managers
  - Designers
  - Educators
- Potential respondents identified
  - American Society of Civil Engineers (ASCE)
  - American Subcontractors Association (ASA)
  - American Institute of Architects (AIA)
  - Construction Owners Association (COAA)
  - Construction Management Association of America (CMAA)
  - Engineering News-Record (ENR)

Rates of Response

Parties	Number of firms that received questionnaires	Number of responses	Rate of response
Designers (D)	463	65	14%
General contractors (GC)	375	63	17%
Subcontractors (SC)	580	44	8%
Owners (O)	412	10	2%
CMs (CM)	178	26	15%
Educators (E)	50	8	16%
Total	2,058	216	10%

Distribution of Respondents



Statistical Analysis of the Data Collected

$$\text{Average Score} = \frac{(5\times A)+(4\times B)+(3\times C)+(2\times D)+(1\times E)}{A+B+C+D+E}$$

where:

A = Number of respondents who answered “always expected”

B = Number of respondents who answered “often expected”

C = Number of respondents who answered “sometimes expected”

D = Number of respondents who answered “seldom expected”

E = Number of respondents who answered “never expected”

Statistical Analysis of the Data Collected

- Prism (www.graphpad.com)
- Kruskall-Wallis Test
  Compares three or more unpaired groups
- Dunn's Post-Hoc Test
  Compares the rankings of two groups
- Significance level $\alpha = 0.05$

Average Scores in Pre-Design Phase

Statement #	Duties of Construction Manager in Pre-Design Phase	Average Scores							P value	Kruskal -Wallis statistic	Statistically Different Opinions by Dunn's test
		Designer (D)	General Contractor (C)	Sub Contractor (SC)	Owner (O)	CM (CM)	Educator (E)	Overall			
1	Develop scope of project and areas of use	3.20	3.49	3.30	4.50	3.81	3.88	3.46	0.1021	9.181	None
2	Conduct market research	2.03	2.16	1.93	2.30	2.04	2.38	2.07	0.5534	3.973	None
3	Collect typical operating costs, tax information, etc.	2.46	2.38	2.39	3.70	2.46	3.13	2.50	0.0761	9.97	None
4	Establish models for optimizing return on investment	2.08	2.10	2.20	3.70	2.08	2.50	2.20	0.0191*	13.5	D/O, GC/O, SC/O, O/CM
5	Develop broad outline schedule	4.00	4.41	3.59	4.90	4.42	4.38	4.14	0.0008*	21.01	GC/SC, SC/O
6	Develop conceptual budget	4.14	4.46	3.80	4.60	4.31	4.38	4.21	0.1027	9.163	None
7	Evaluate financing sources and alternatives	2.34	2.19	1.91	3.20	2.12	2.75	2.24	0.0306*	12.33	None
8	Develop target design fees	3.12	2.83	2.84	3.50	2.65	3.50	2.95	0.4157	5.001	None
9	Develop feasibility study report	2.89	2.38	2.39	3.50	2.23	3.75	2.62	0.001*	20.59	None
10	Establish cash flow projections	2.71	3.46	2.57	3.70	3.54	3.38	3.07	0.0008*	20.96	D/GC, GC/SC
11	Determine organization and staffing to administer project	3.52	3.94	3.41	4.10	4.12	4.13	3.74	0.0587	10.65	None
12	Outline responsibilities of the project team	3.51	4.02	3.43	4.40	4.19	4.38	3.80	0.0283*	12.52	None
13	Establish basic communication procedures	3.63	3.87	3.16	4.10	4.15	4.13	3.71	0.0416*	11.54	None
14	Prepare contractual agreements	3.42	3.76	3.00	3.90	3.92	4.25	3.55	0.0305*	12.33	None
15	Prepare the procedures for claim avoidance	2.85	2.68	2.32	3.30	3.15	2.75	2.75	0.0364*	11.88	None
16	Prepare BIM execution plan	2.66	2.90	2.66	3.20	3.23	3.13	2.84	0.1262	8.599	None
17	Establish reporting and accounting procedures	3.00	3.22	2.55	3.90	3.58	4.13	3.13	0.0033*	17.71	None
18	Interview and select architects, engineers, estimators, land surveyor, and other consultants	2.86	2.87	2.64	3.30	2.92	3.88	2.88	0.1414	8.282	None
19	Conduct site evaluation	3.45	3.63	3.34	4.20	3.50	4.25	3.55	0.2293	6.885	None
20	Plan for logistics including temporary construction requirements	3.69	4.10	3.34	4.30	4.04	4.25	3.83	0.0237*	12.97	None
21	Overview of LEED green building strategies and set the LEED goals	2.68	3.00	2.64	2.90	3.00	3.50	2.84	0.1763	7.654	None
22	Select project delivery system (traditional, D/B, multiple primes, etc.)	3.11	3.16	2.84	3.90	3.23	4.38	3.17	0.0257*	12.76	SC/E
23	Explore partnering possibilities between parties	2.80	3.00	2.80	3.20	3.08	3.75	2.94	0.2761	6.322	None
24	Plan for risk management steps with regard to such duties	2.95	3.24	2.75	3.40	3.38	4.38	3.12	0.0077*	15.72	D/E, SC/E

Main Findings:

- Consensus on 35% of CM duties.
- Disagreement on 65% of CM duties.

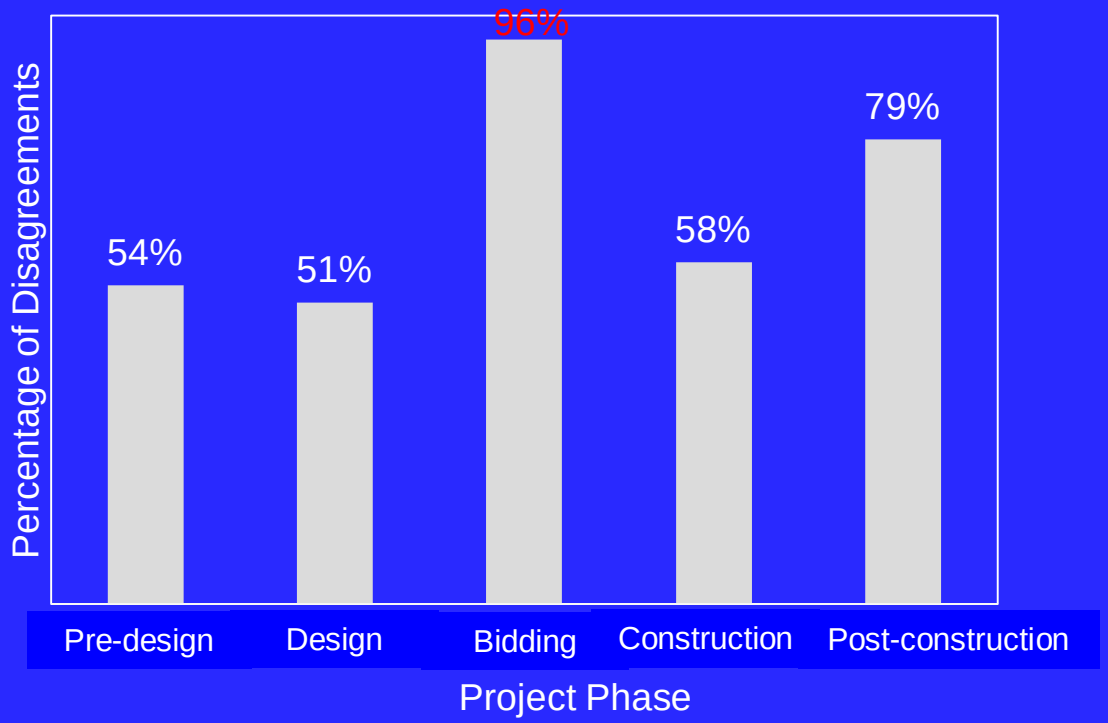
Mean Scores of Surveyed Parties by Project Phase

Parties	Pre-design	Design	Bidding	Construction	Post-construction	Overall
Designers (D)	3.05	3.20	3.98	4.01	3.96	3.64
General contractors (GC)	3.22	3.44	4.30	4.33	4.27	3.91
Subcontractors (SC)	2.82	2.99	3.26	3.89	3.49	3.29
Owners (O)	3.74	3.57	3.87	4.33	4.28	3.96
CMs (CM)	3.30	3.36	4.23	4.23	4.32	3.89
Educators (E)	3.72	3.51	4.15	4.19	3.96	3.91
Overall	3.31	3.35	3.97	4.16	4.05	3.77

Main findings:

- The CM duties that are considered by the average respondent to be of priority are those that CMs perform in the construction phase.
- The CM duties are considered to be of lowest priority by the average subcontractor compared to other parties.

Percentage of Disagreements on CM Duties in Each Project Phase



Main finding:

- A very large number of disagreements between parties occur in the bidding phase

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Disagreements between Parties

Parties after Dunn's test	Number of disagreements between two parties	Distribution of disagreements between two parties (%)
Designer vs. General contractor	24	15.8
Designer vs. Subcontractor	12	7.9
Designer vs. Owner	1	0.7
Designer vs. CM	2	1.3
Designer vs. Educator	1	0.7
General contractor vs. Subcontractor	61	40.1
General contractor vs. Owner	1	0.7
General contractor vs. CM	1	0.7
General contractor vs. Educator	4	2.6
Subcontractor vs. Owner	12	7.9
Subcontractor vs. CM	26	17.1
Subcontractor vs. Educator	5	3.3
Owner vs. CM	1	0.7
Owner vs. Educator	0	0.0
CM vs. Educator	1	0.7
Total	152	100%

Main finding:

- Most disagreements involved subcontractors.

Findings of 2016 Survey

- There is consensus among the parties on 35% of CM duties and there is disagreement on 65%.
- The CM duties that are considered by the average respondent to be of priority are those that CMs perform in the construction phase, while those that are of least relevance are those that CMs perform in the pre-design and design phases.
- Most of the disagreements occurred between subcontractors and general contractors (40%), with disagreements between subcontractors and CMs (17%) being a distant second.
- Most of the disagreements are related to CM duties performed in the bidding (96%) phase of a project, whereas fewer disagreements are observed in the pre-design (54%), design (51%), and construction (58%) phases.

COMPARISON OF FINDINGS
2006 vs. 2016 SURVEYS

Comparison of Response Rates (2006 vs. 2016)

Parties	Number of firms that received questionnaires		Number of responses		Rate of response	
	2006	2016	2006	2016	2006	2016
Designers (D)	488	463	46	65	9%	14%
General contractors (GC)	393	375	35	63	9%	17%
Subcontractors (SC)	596	580	13	44	2%	8%
Owners (O)	405	412	28	10	7%	2%
CMs (CM)	179	178	25	26	14%	15%
Educators (E)	48	50	10	8	21%	16%
Total	2.109	2,058	157	216	7%	10%

Observations:

- Comparable populations
- Comparable rates of response

Comparison of Survey Findings (2006 vs. 2016)

Definition	2006	2016
Number of questions	124	150
Disagreements	58 (47%)	97 (65%)
Agreements	66 (53%)	53 (35%)
Decline in average scores	91 (73%)	

Main findings:

- Marked increase in disagreements between parties in the period 2006-2016.
- Less is expected from CMs in 2016.

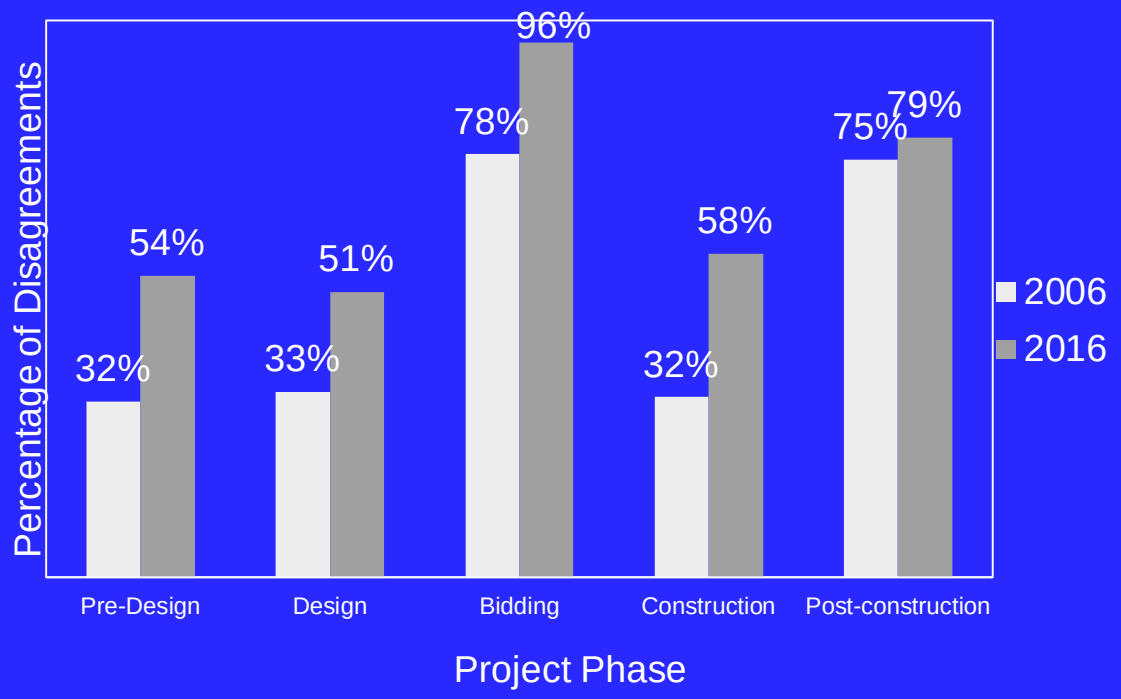
Mean Scores of Surveyed Parties by Project Phase (2006 vs. 2016)

Parties	Pre-design		Design		Bidding		Construction		Post-construction		Overall	
	2006	2016	2006	2016	2006	2016	2006	2016	2006	2016	2006	2016
Designers (D)	3.04	3.05	3.10	3.20	3.59	3.98	4.10	4.01	3.84	3.96	3.53	3.64
General contractors (GC)	3.33	3.22	3.59	3.44	4.46	4.30	4.51	4.33	4.41	4.27	4.06	3.91
Subcontractors (SC)	3.61	2.82	3.62	2.99	3.99	3.26	4.06	3.89	3.78	3.49	3.81	3.29
Owners (O)	3.43	3.74	3.47	3.57	4.08	3.87	4.26	4.33	4.01	4.28	3.85	3.96
CMs (CM)	3.45	3.30	3.51	3.36	4.17	4.23	4.38	4.23	4.18	4.32	3.94	3.89
Educators (E)	3.92	3.72	3.69	3.51	4.44	4.15	4.43	4.19	4.31	3.96	4.16	3.91
Overall	3.46	3.31	3.50	3.35	4.12	3.97	4.29	4.16	4.09	4.05	3.89	3.77

Finding:

- Decline in average expectations from CMs in every phase of the project.

Percentage of Disagreements on CM Duties in Each Project Phase (2006 vs. 2016)



Finding:

- Increase in disagreements in all phases of the project.

Conclusion

- The number of CM duties on which there is disagreement between parties went up significantly (from 47% to 65%) between 2006 and 2016.
- The parties that mostly disagree with each other have changed between 2006 and 2016 (from designers disagreeing with general contractors and educators in 2006 to subcontractors disagreeing with general contractors and construction managers in 2016).
- The percentage of disagreements between parties increased in all phases in 2016.

Final Remarks

It is disappointing that a larger number of disagreements exist in 2016 than in 2006.

The parties involved in construction projects should reconcile their differences and have a common understanding of CM duties over all phases of the construction project.

A uniform understanding of CM duties across the industry would be beneficial for all parties concerned.

THE QUESTION IS:

“WHAT CAN BE DONE TO ACHIEVE A STATE OF REASONABLE AGREEMENT BETWEEN PARTICIPANTS IN CONSTRUCTION PROJECTS RELATIVE TO CM DUTIES?”

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THE ROLE OF PROJECT MANAGERS TO AVOID PROJECT FAILURE

THANK YOU FOR YOUR ATTENTION

If you have any questions?

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