



Construction Management as a Building Block toward a Comprehensive Project Delivery Toolbox

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ConsMa 2018, International CM Day Celebrations

Outline and References

Topics

- The status of project delivery in the US
- Major models for delivering projects and trend of adoption
- Construction Management at Risk as a necessary building block
- Reflections

References

- Migliaccio, G. C. and Holm, L.A. (2018). ***Introduction to Construction Project Engineering***, Routledge, forthcoming, Chapter 4.
- Minchin, E., Migliaccio, G.C., Ptschelinzew, L., Gatti, U., Atkins, K., Warne, T., Hostetler, G., and Asiamah, S. (2014). ***Design Management Guide for Design-Build and Construction Manager/General Contractor Projects***, NCHRP Report 787. Washington, DC: TRB.

Project Delivery



- Built environment projects
 - ▣ Similar lifecycle
 - ▣ Same types of participants
- Phases may overlap and participants may interact differently depending on the owner's approach to deliver a project.
- Main features of project delivery
 - ▣ Project delivery method (PDM)
 - ▣ Procurement (e.g., Low Bid, Best Value, etc.)
 - ▣ Contracting (e.g. Lump sum, Cost plus w/wo GMP, etc.)

Delivery vs. Procurement vs. Contracting

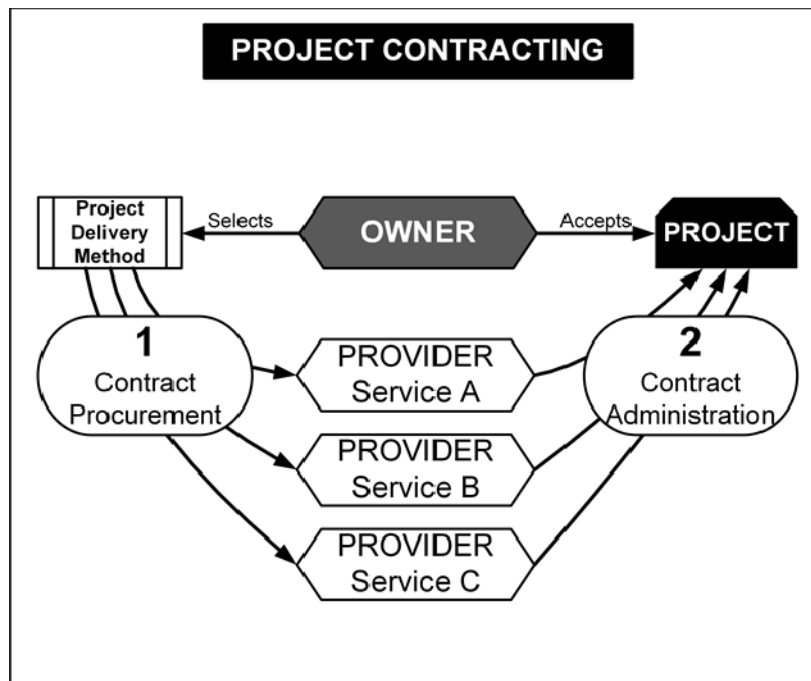
- The project delivery method selected by a project owner identifies the overall framework for delivering its project
- Procurement and contracting are two additional and necessary aspects of project delivery that would affect the project execution.
 - Procurement is the act of purchasing external services and materials necessary to deliver a project.
 - Note: Anytime a project participant needs materials or services, he or she will initiate procurement to select another project participant who will provide them.
 - Contracting is the process of establishing a contractual relationship for services and materials through the development of a written agreement expressing the expectations, responsibilities, and protections of each party.
 - Note: Contracting for construction services is substantially different from contracting for design services.

The Status of Project Delivery in the US

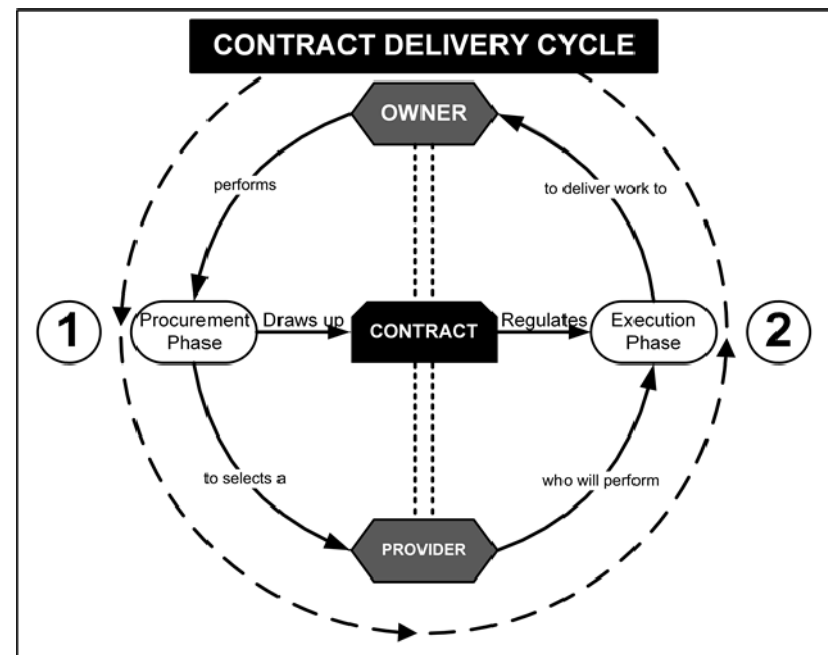
- Approaches used for delivering capital projects have significantly proliferated worldwide
- Both private organizations and public agencies have added to their project delivery toolbox several project delivery methods, such as
 - ▣ Construction Management at Risk,
 - ▣ Design-Build, and
 - ▣ Integrated Project Delivery.
- Market share of each method widely varies across industry sectors
- No single method can allow sophisticated owners to optimally achieve their project objectives
- A comprehensive project delivery toolbox is usually necessary to match a project's objectives and constraints to the right delivery method

Project Contracting

Project Level



Contract Level



Owner's Approaches to Project Delivery

□ **Option No.1: Self perform / Force Account**

- ▣ Direct performance of construction work using labor, equipment, materials, and supplies furnished by owner and used under its direct control
- ▣ Direct hire of craft workers
- ▣ Used usually only for work in military operations or emergency/maintenance operations

□ **Option No.2: Contracting**

- ▣ Hire other entities (aka designers and/or contractors)
- ▣ Follow a specific project delivery method
- ▣ Most common approach for construction projects

Note: Prime contractors and subcontractors may also have these options as long as they are allowed by the project owner.

What is a project delivery method?

- **“...a project delivery method [...] defines the relationships, roles, and responsibilities of project team members and the sequence of activities required to complete a project”** (Gibson & Walewski 2001; pp.1)
- Simply stated, a project delivery method (PDM) is the approach for managing the delivery of a project.
- It is an owner's responsibility to select a PDM as well as procurement and contracting approach

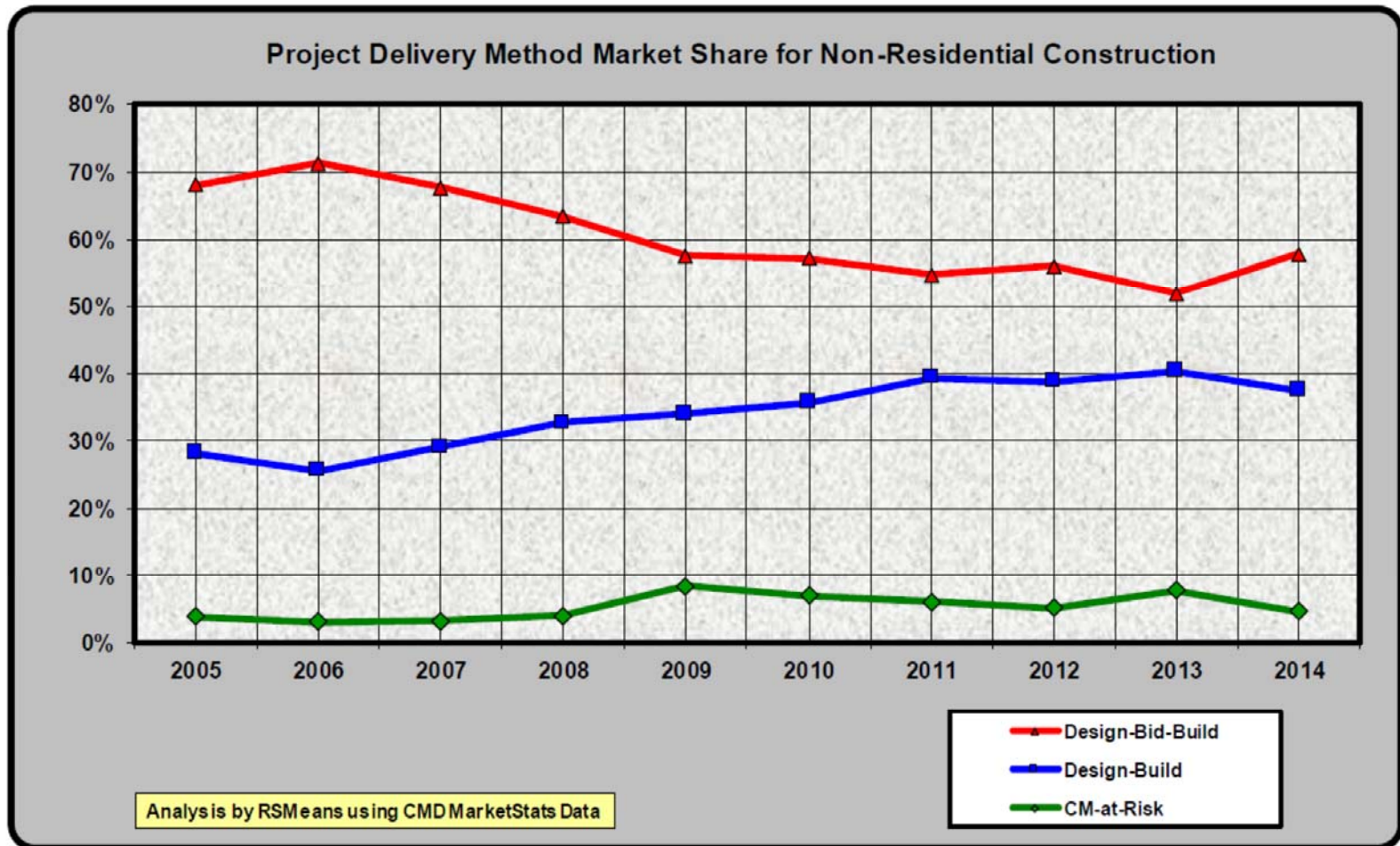
Project Delivery Methods - Market Share



- It depends from the industry sector
 - ▣ Building vs. transportation
 - ▣ Industrial vs. utilities
 - ▣ Public vs. Private

- Building sector
 - ▣ Design-Bid-Build (DBB)
 - ▣ Design-Build (DB)
 - ▣ Construction Manager at Risk (CMR)

Project Delivery Method - Market Share



RSMeans 2015

PDM Classification



- **Separated Contracting of Design and Construction Services**

- Design-bid-build (DBB)
- Construction Management at Risk (CMR)

- **Combined Contracting of Design and Construction Services**

- Design-build (DB)
- Integrated Project Delivery (IPD)

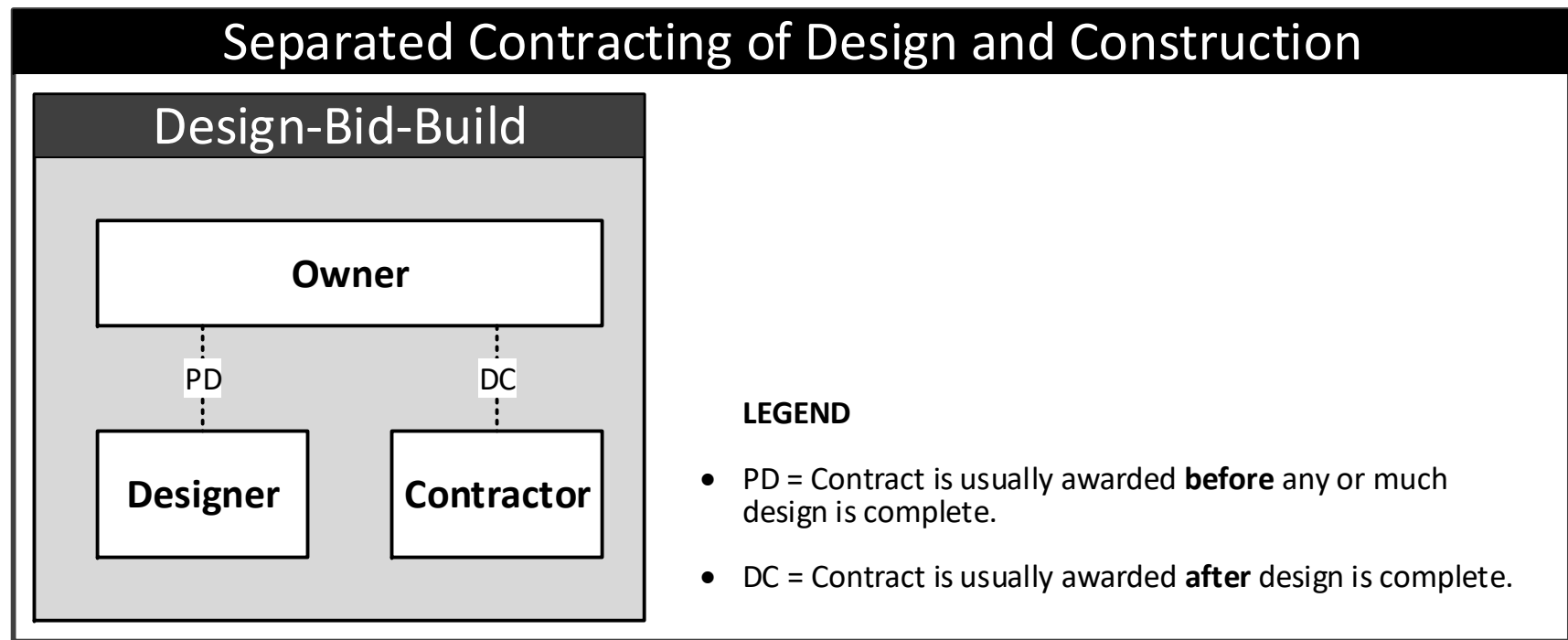
- **Beyond Design and Construction**

- Design-build-maintain
- Design-build-operate-transfer
- Design-build-finance-operate

What about Agency CM (ACM)?

- **An Agency CM is a consultant acting as an agent for the Owner (also known as external Owner Representative)**
 - Does not execute construction
 - May help owner select PDM
 - Delegation of authority from the owner highly impacts how the ACM performs its duties; Owner can delegate binding authority for decision making to the ACM, or not.
 - This question must be clearly defined up front
- Don't confuse with CMR project delivery method
 - **ACM is not a Project Delivery Method**
 - Various PDM can be used when an ACM is present
 - DBB, DB, CMR, etc.

Design-Bid-Build



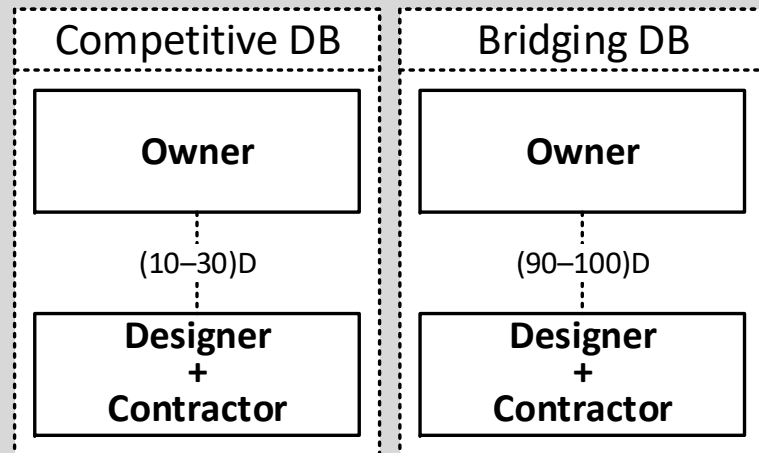
Design-bid-build (DBB)

- Design and construction services are delivered to the project separately and sequentially:
 - the owner designs the project with in-house staff or enters in an early contract with a design firm that will produce a design package to be used as the basis for pricing construction services
 - construction contractors are asked to review and price the project based on the design.
 - Note: In the public sector, this review and pricing phase is called the bid phase as laws for public work projects often require construction contracts to be awarded to the lowest bidder.
- Design and construction contracts are usually timed in a sequential fashion
 - the construction company that will build the project is usually brought on board once most of the design decisions have been made.
- Also known as “***the traditional method***”

Design-Build

Combined Contracting of Design and Construction

Design-Build Initial Variations



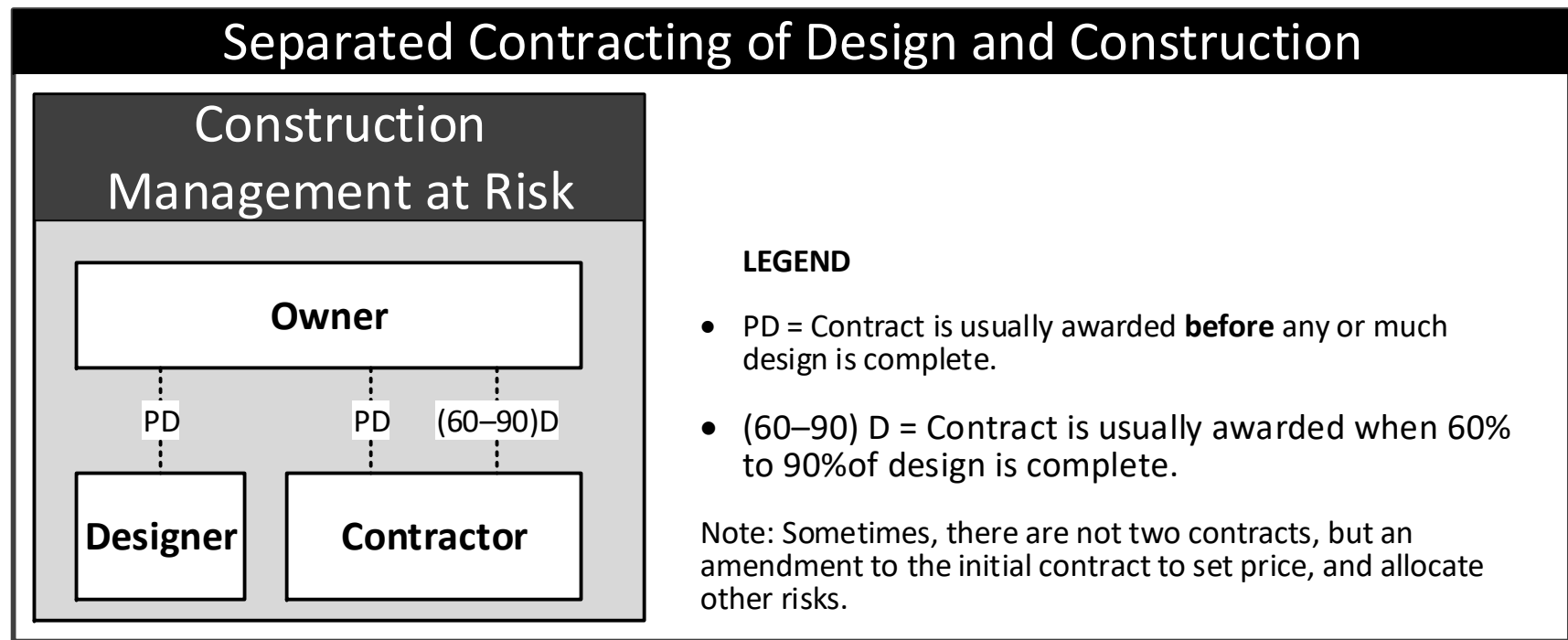
LEGEND

- PD = Contract is usually awarded **before** any or much design is complete.
- (10-30) D = Contract is usually awarded when 10% to 30% of design is complete.
- (90-100) D = Contract is usually awarded when design is nearly complete.

Design-Build (DB)

- The owner enters into a single contract with an entity that will design and build the project
- This contract will combine design and construction services
- Design-builder entity acts as the single point of responsibility with the owner
- Design-builder may be a joint-venture between, mostly construction, firms
- Different variations depending on timing
 - ▣ Competitive DB
 - ▣ Bridging DB
 - ▣ Progressive DB (two step approach similar to CMR)
 - ▣ Collaborative DB (2 step with incentive mechanisms similar to IPD)

Construction Management at Risk



Construction Management at Risk (CMR)

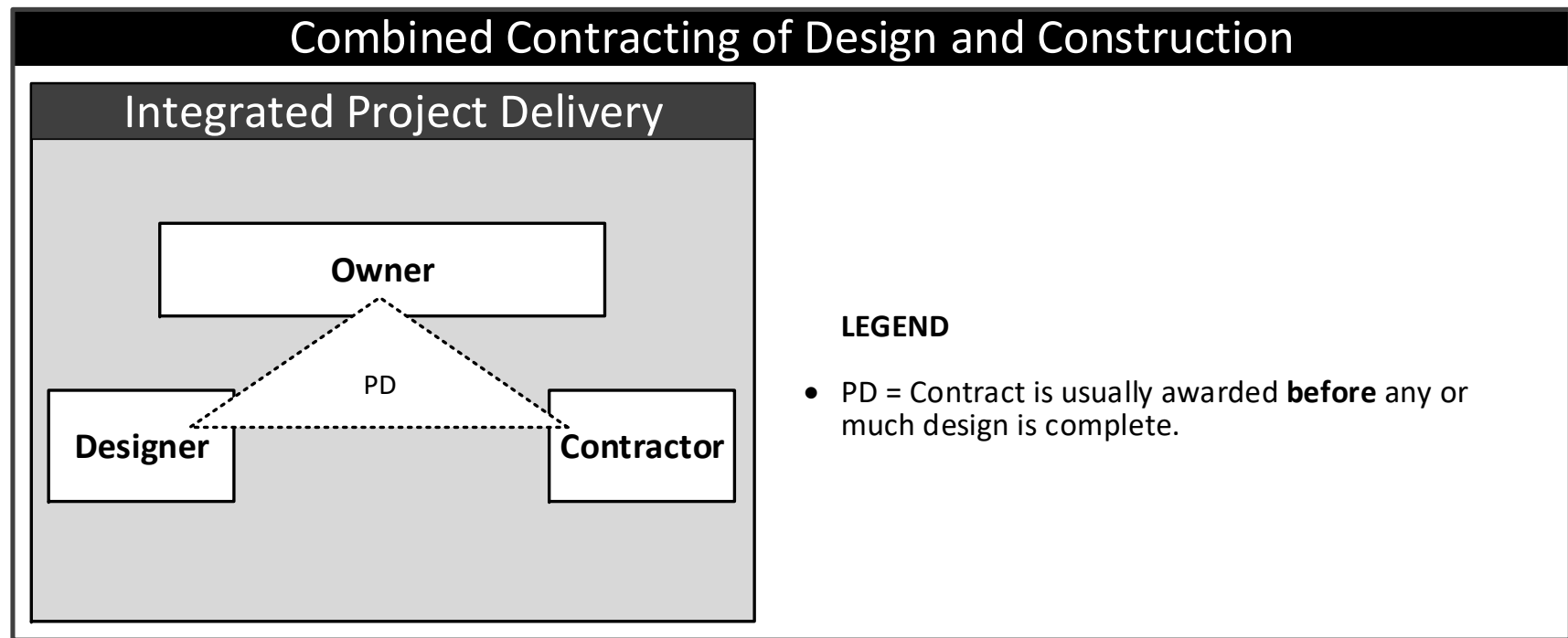
- The owner contracts separately for design and construction services, which is similar to DBB.
- The contractor is retained early on to review and comment on the design before it is finalized
- Two-steps:
 - ▣ Early pre-construction
 - ▣ Construction and late pre-construction (usually starting at 60-90% design complete)
- Also known as
 - ▣ General Contractor as a Construction Manager (GC/CM) → Washington state
 - ▣ Construction Manager as a General Contractor (CM/GC) → elsewhere

Construction Management at Risk (CMR)



- Under CMR a firm
 - ▣ “acts as [a] consultant to the owner in the predesign and design phases, but as the legal equivalent of a general contractor during the construction phase. When a CM is bound to a price, either fixed or a GMP, the most fundamental character of the relationship is changed” as defined by the Construction Management Association of America (CMAA 2017).
- This change in role occurs when the CMR assumes a risk by committing to deliver the project according to the contractual requirements typical of a construction contract between an Owner and a General Contractor.
- Once the role changes, the Owner-CMR relationship changes as the construction manager begins to protect themselves.

Integrated Project Delivery

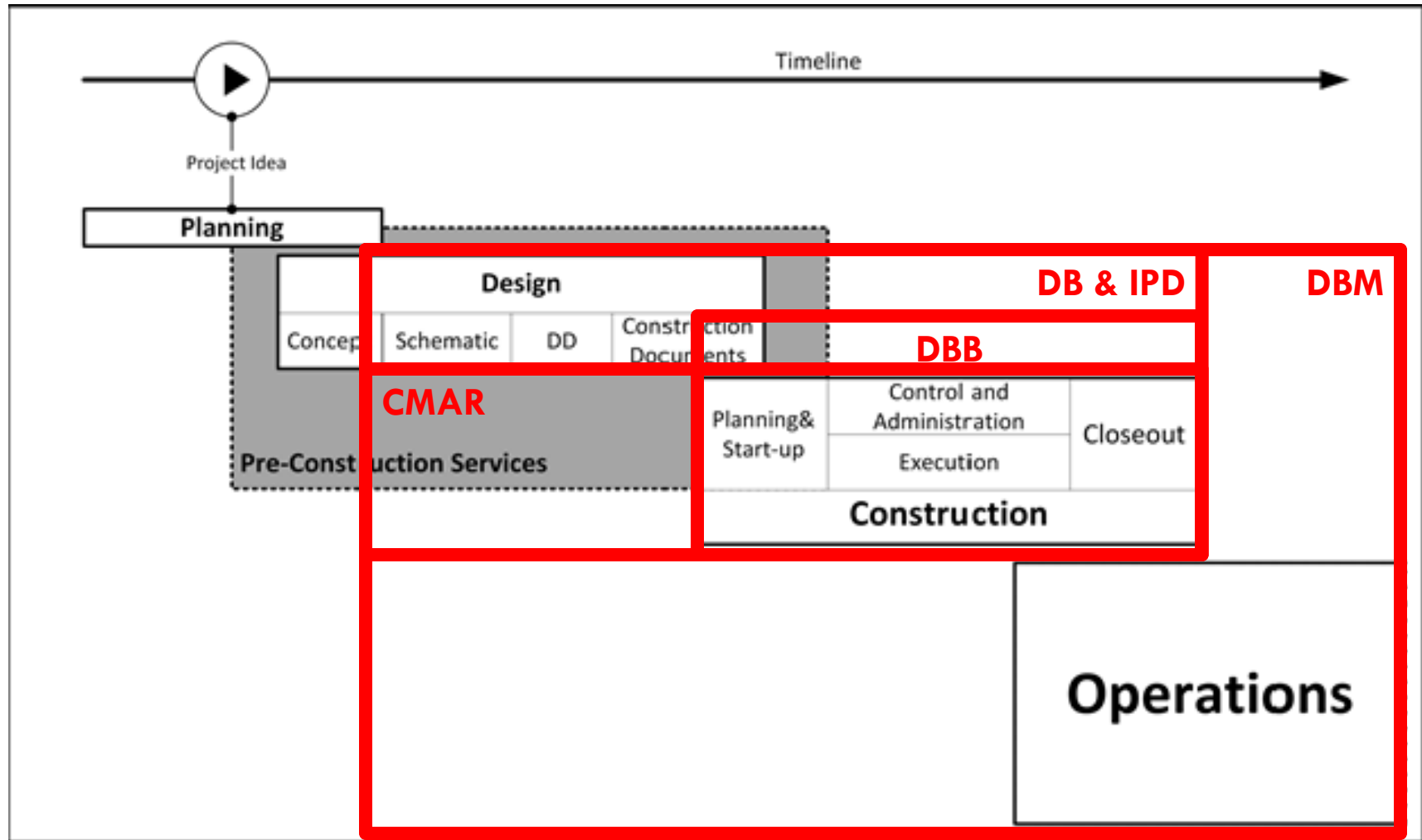


Integrated Project Delivery (IPD)

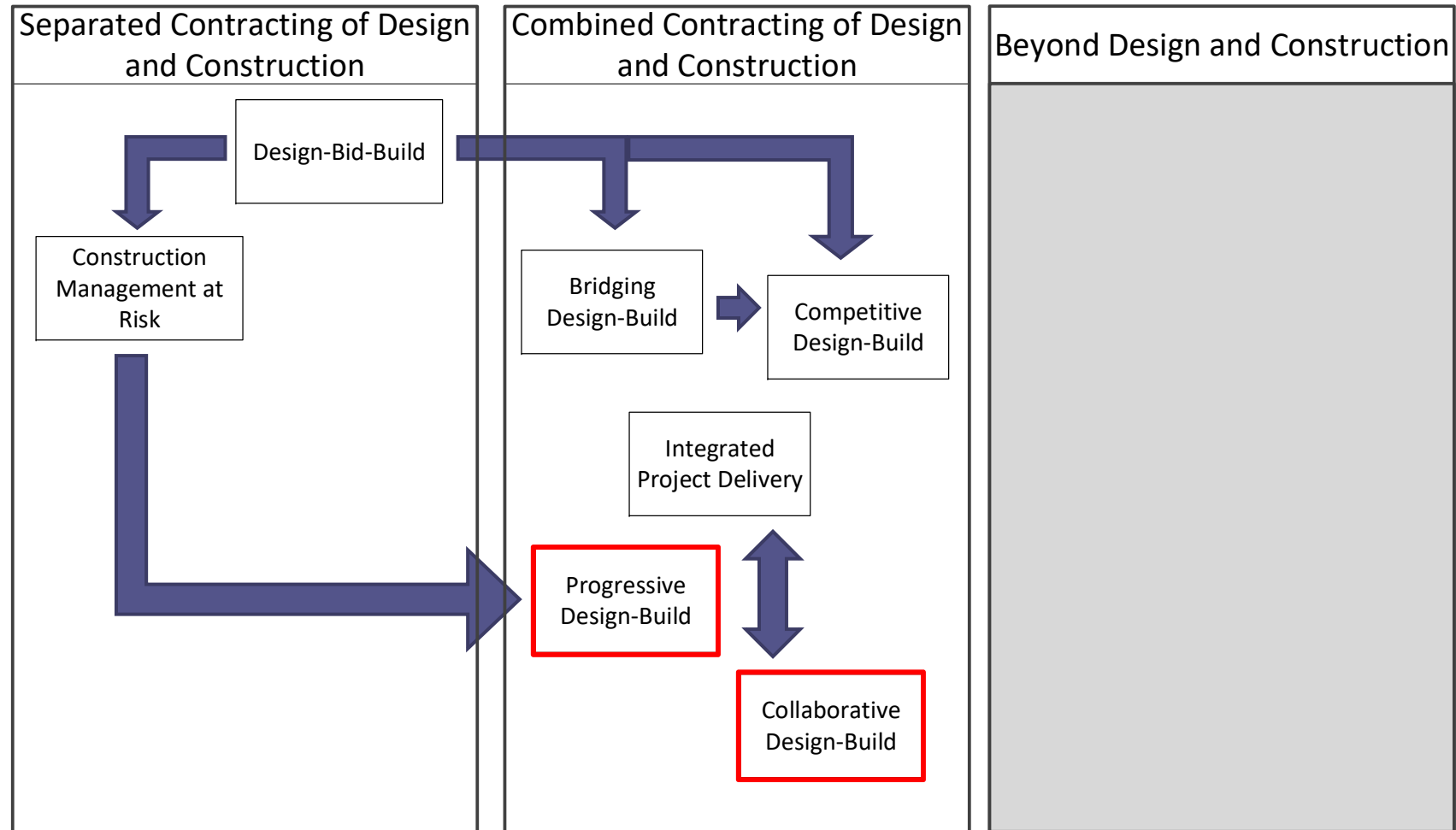
[...] a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to optimize project results, increase value to the owner, reduce waste, and maximize efficiency through all phases of design, fabrication, and construction (AIA 2007; backcover)

- IPD substantially differs from all the other project delivery methods in the fact it relies on one multi-party contractual agreement.
- At a minimum contractual parties include the three main parties, the owner, the designer, and the general contractor
 - ▣ but can sometimes incorporate additional parties, such as specialty designers and contractors, or vendors

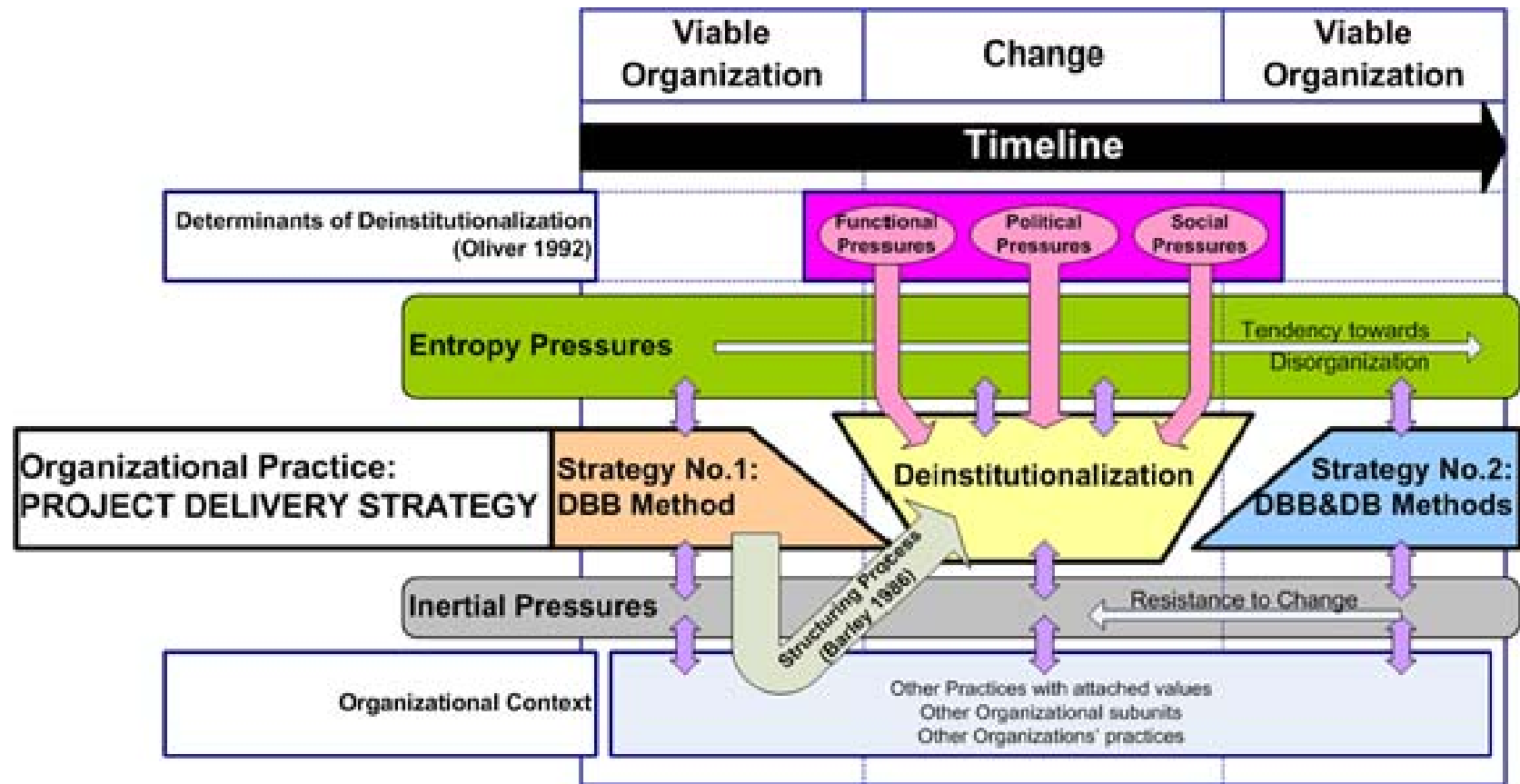
PDM vs. Project Life



Comprehensive Project Delivery Toolbox

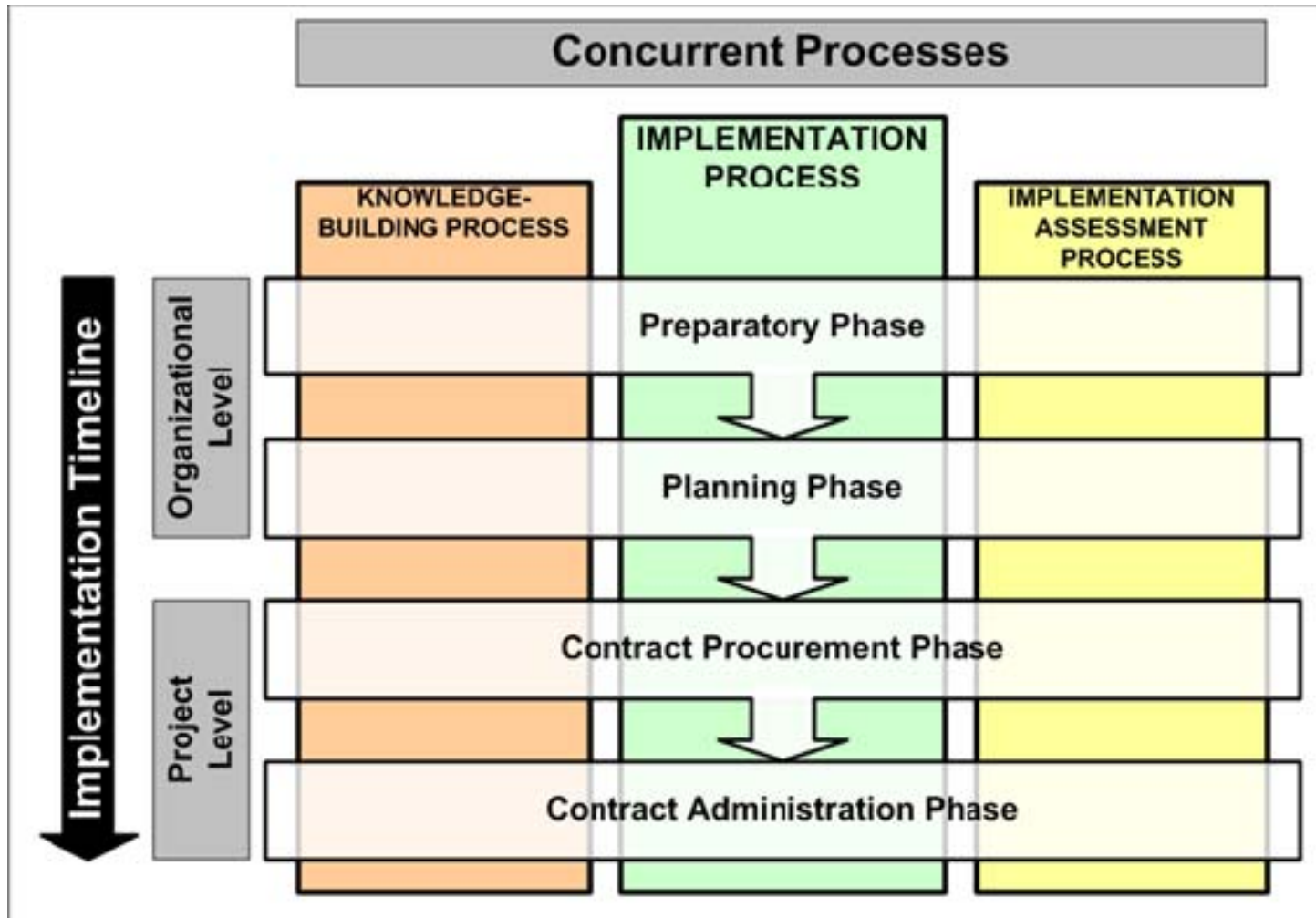


Changing Project Delivery Strategy: Add to the Toolbox



Migliaccio, G.C., Gibson, G.E., and O'Connor J.T., (2008). Changing Project Delivery Strategy: An Implementation Framework. *SAGE Journal of Public Works: Management and Policy*, 12(3), 483-502.

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NCHRP

REPORT 787

Guide for Design Management on Design-Build and Construction Manager/ General Contractor Projects

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□ Advantages of CMR

- Encouragement for, and facilitation of, **Innovation**

- Embedment of **Collaborative Partnering**

- **Flexibility**

- As seen in how it was the answer for UDOT and Osceola County, two polar opposite programs with polar-opposite needs

- The need for “105% plans” to facilitate innovation and risk allocation

- The need for “10% plans” to facilitate a need for speed

Reflections



- ❑ No single method can allow sophisticated owners to optimally achieve their project objectives
- ❑ A comprehensive project delivery toolbox is usually necessary to match a project's objectives and constraints to the right delivery method
- ❑ Adopting a new approach to delivery projects requires significant organizational changes
 - ❑ Modifications to work processes
 - ❑ Revision of existing organizational structures.
- ❑ This process of adaptation encompass many different aspects of the organization's interests and require significant efforts.

Reflections

- CMR mutates an organization's delivery DNA by
 - ▣ Changing cultural setting toward **collaboration**
 - ▣ Educating parties to collaborate around **flexibility**
 - ▣ Encouraging and facilitating **innovation**
 - ▣ Acting as a necessary building block toward a level of maturity in project delivery
 - ▣ Opening the door to other approaches that rely on **collaboration**, **flexibility** and **innovation**



Questions ?

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