

CS468552-R

Which Project Delivery Method Is Best for Your Project, and Why?

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Learning Objectives

- Identify pro's and con's of currently available Project Delivery Methods.
- Identify ways to streamline the Project Delivery and integrate your team.
- Understand how Technology and Innovation are changing the structure of Project Teams, Risk and Responsibilities.
- Decide which procurement method is best for their project approach, and the legal structure of their delivery team.

Description

One of the first questions Owners face at project onset is “Which Project Delivery Method should we use?” Design-Bid-Build is slowly becoming extinct, especially for large, complicated projects with challenging schedules. CM @ Risk is a more attractive method, even though it doesn’t quite describe how we work. Design-Build is on the rise, but many owners still feel like they are paying a premium by pre-selecting the team. Lastly, IPD still leaves a lot to be desired, as most of the Owners are still not willing to share the Risk but expect the Benefits. So, if none of those methods are aligned with how we work, what does the future of project delivery look like? In your experience, are any of the current contracts and procurement methods truly aligned with how we ideally need to work? Join this vibrant Roundtable and share your thoughts and experiences about technology-driven delivery, innovation, risks and constraints of where our Built Environment industry is inevitably headed.

Speaker:



In his current role at Jacobs, Marin focuses on leveraging his extensive AEC/O industry experience to help project teams discern project technology & innovation constraints and opportunities. He is passionate about developing the most suitable project execution strategy that leverages advanced Virtual Design & Construction tools and workflows in innovative ways to help streamline the Design/Construction delivery, and achieve a digital handover of the Built Environment suitable for the Owner’s Asset Lifecycle Operation & Management process. He focuses his Leadership and Advocacy for enhancing the Built Environment both internally at Jacobs

to raise awareness as we *Challenge Today and Reinvent Tomorrow*, and externally with existing and potential / new clients.

For more detail, visit <https://www.linkedin.com/in/marinpastar/>

Moderator:



Brian Myers, CM-BIM

Jacobs I Senior Digital Delivery Leader

Brian has been in the industry for 30 years including 14 years implementing BIM in production environments. He has worked in BIM management for healthcare projects both on the design side and the construction side of our industry, managing project teams and technology. Additionally, Brian is an advocate for exploring and creating process efficiencies that meet client and overall project needs.

For more detail, visit <https://www.linkedin.com/in/revit/>

Roundtable Discussion Agenda

Thank you for considering being a part of what I hope becomes a very vibrant discussion around the important and evolving topic of Project Delivery! With Autodesk University going Virtual this year, I hope that the few classes that allow some live back and forth interaction provide valuable insights to your professional practice. The Live session will be limited to 75 attendees so please plan accordingly! It is definitely a higher max number of attendees than the typical limit of 30 participants during the in-person AU events, but it is certainly not open without limits. This is to allow for 90 minutes of interaction and discussion, which brings me to an important ask: *Please don't be Shy!* The virtual meeting platform will allow all the participants to post live questions in the meeting chat, but you also have the ability to virtually raise your hand, ask questions, and engage in the discussion! Brian and I will do our best to get everyone engaged and discuss all the questions during the allotted 90 minutes for the discussion.

The nature of the roundtable class is structured around the discussion, so I will do my best to keep the presentation aspect of this event down to a minimum. The goal is for everyone to review the Handout information prepared herein, and use a few key slides during the live event to introduce the topic, and guide the Project Delivery discussion/evaluation along the following key agenda topics:

1. **Project Delivery Methods – A brief overview**
2. **Contractual Obligations, Instruments of Service & Liability**
3. **Collaboration & Use of Technology**
4. **Roles & Responsibilities: Who is doing What, and Why?**
5. ***Budget & Schedule Considerations***
6. ***Conclusion/Summary***

If there are aspects of Project Delivery that are not mentioned in this agenda, please *feel free to ask questions* and we will certainly evolve the conversation any way the participants take it! That is the beauty of this class – it can be whatever you want it to be!

Part 1: Project Delivery Methods – A brief overview

There are a lot of options for Owners to choose from when it comes to Project Delivery and procurement method. Ultimately, they are the ones that determine how and when they spend their money. As mentioned previously, every procurement method has pro's and con's, and may be considered a viable option that suits the needs of any given project.

A lot has been written about each and every one of the procurement methods. From official AIA contract documents and general conditions to various industry expert blogs, you will likely find some similar praises and criticisms of each of the procurement methods mentioned. This is not supposed to be an exhaustive overview of each of the delivery methods, but a conversation starter focusing on some of the key highlights of each.

Design-Bid Build (DBB)

Perhaps one of the most traditional Project Delivery methods used before the age of Building Information Modeling and tools and technologies commonly found on jobsites today. Potentially the simplest procurement method as it is very linear. Design is a distinctive phase and is completed to 100% before the projects are Bid, Awarded, followed by the Construction Phase.

DBB Contractual Agreements:

- Owner contracts with Architect; Architect contracts with Consultants/Engineers
- Owner contracts with General Contractor (GC) after 100% Design is complete; GC collects bids from, and contracts with Subcontractors

DBB Benefits:

- Very simple for Owners that do not have Design/Construction experience
- Competitive Cost Nature: Contractors are bidding against each other to win the project.
- Procurement method of choice for Federal projects where 3 bids are a requirement.

DBB Drawbacks:

- Slow Project Delivery: Design needs to be 100% done before construction can begin
- Lack of Constructability: Project is strictly Design Intent until Bid since the Design is completed in a silo from construction
- Lack of Cost certainty during design and risk of project being overbudget
- Lack of Design Optimization with Construction Insights
- Finger-pointing between designers and contractors during any conflicts.
- Guarded approach to Conflicts and project Changes: Designers and Contractors are on the opposite teams often working against each other, not together.
- Low cost transparency since most projects are lump-sum
- High cost of non-optimal activities (RFI's, ASI's, Rework, Conflict Resolution, Change Orders etc.)

Construction Manager @ Risk (CMAR)

CM @ Risk is a very popular type of a Construction Management project delivery method in which the Construction Manager is hired by the Owner early during the Design Phase of the project and integrated as part of the Project Delivery team. The CM provides constructability and cost insights as part of their preconstruction services. They typically on-board major trade subcontractors (Mechanical, Electrical, Plumbing, Structural) during the Design process and involve them into varied forms of a “Design Assist” process with the design architects and engineers. The Construction Team is able to establish a “Guaranteed Maximum Price” or GMP during the Design phase, and start the construction process before the Design is 100% complete.

CMAR Contractual Agreements:

- Owner contracts with Architect; Architect contracts with Consultants
- Owner contracts with Construction Manager (CM) during early Design phase; CM selects major trade Subcontractors, develops the GMP and starts construction prior to 100% Design Completion

CMAR Benefits:

- CM is At Risk, so they have incentives to act at the Owner’s interest and efficiently manage the Cost and Schedule
- Construction can progress more rapidly and parallel to the Design Process, resulting in faster speed to market and lower general conditions cost.
- Increased collaboration between the Design and Construction Teams through Design Assist.

CMAR Drawbacks:

- Since the GMP is established early in the process, there is no “competitiveness” in the process and the Owner is not sure if they are getting the best price
- If the project is at risk of going overbudget, the CM will typically respond by trying to reduce scope and/or lower quality.
- There is a lot of overlap in responsibilities (and duplicated work) between designers and trade subcontractors, that the Owner pays for.
- Potential for conflicts between Design Intent and Constructability since they are often occurring parallel to each other.

Design-Build (DB)

Contrary to the common belief that Design-Build is a fairly recent Project Delivery method due to the rapid increase in popularity over the past 15 years, Design-Build is a very old procurement method reaching back to one of the oldest forms of construction, the concept of “Master Builder”. There are many different forms of Design-Build approach, typically sorted into “Contractor-Led” or “Architect-Led”. Within those two distinct forms, the Architect can either work for the contractor, be in a joint-venture with the contractor, or be a full-service contractor providing Design Services as well as Construction Services.

DB Contractual Agreements:

- Owner enters into a single set of integrated contracts with the Design-Builder

DB Benefits:

- Single point of responsibility for both Design and Construction
- Faster and more integrated Design and Construction
- Reduced amount of coordination issues
- Collaborative approach to project delivery and conflict resolution
- Increased ability to control the budget

DB Drawbacks:

- Limits the Owner's involvement in Design – Sacrifices in Design Quality / Creativity
- Contractors making Design Decisions that should be made by Designers
- Lack of Competitive Nature – Owners not sure if they are getting the best price
- Lack of Checks and Balances – potential for Quality to suffer
- Depends heavily on Trust in the Design-Build contractor

Integrated Project Delivery (IPD)

Perhaps one of the most recent Project Delivery methods, IPD evolved over the last 20 years along with implementation of Technology into the world of Design and Construction, as well as the constant strive to improve efficiency through lean construction. The objective of IPD is to involve all key participants in a collaborative environment, and leverage Technology and Innovation to increase productivity, reduce waste, avoid overruns, improve quality, and reduce conflicts between Owners, Architects, Engineers and Contractors.

IPD Contractual Agreements:

- Typically, all major parties including Owner, Architect, Engineers, Contractor and major Trade Subcontractors all enter into an agreement together with the intent on sharing Risk and Rewards

IPD Benefits:

- Tailored to take full advantage of BIM and VDC Technology
- When executed successfully, tremendous savings of Cost and Time
- Improved Construction Quality
- Significantly reduced amount of rework and conflicts
- Collaborative resolution of conflicts since all parties suffer when there are outstanding conflicts
- Project success depends on success of each and every party in the delivery team

IPD Drawbacks:

- Success heavily relies on Trust, which is typically not the starting point
- Team Members are selected on qualifications, not cost
- Lack of Consistency in IPD Contracts – almost every IPD contract is fairly unique
- Owners are hesitant to participate in sharing the Risk with the Designer and Contractors
- Increased amount of coordination requires more labor than traditional delivery
- Not as well suited for simple projects as it is for repetitive, large complex projects

Part 2: Contractual Obligations, Instruments of Service & Liability

Even though there are a lot of similarities between Contract Documents and contractual obligations between Owners, Architects, Engineers, Contractors and Subcontractors, there are also a lot of differences that stem from the very nature of each type of project delivery.

Design-Bid Build (DBB)

DBB is a very traditional delivery method with very clear and distinct obligations set forth by the AIA document A201, General Conditions of the Contract for Construction. Architects and Engineers are responsible for delivering Construction Documents (2D Drawings) and Specifications as basis for bidding the Construction of the project. Means and Methods strictly lie in the Contractor's scope of work, and so does the production of Shop Drawings and Submittals. Architects and Engineers of Record are liable for the Design of the project, and the Contractors are liable for the Construction of the projects. When conflicts arise, there is always finger-pointing on whether the conflict resulted from Errors and Omissions of the Design Team, or Construction Coordination by the Construction Team.

Construction Manager @ Risk (CMAR)

Similarly to DBB, CMAR is fairly similar to DBB in terms of Contractual obligations and Liability. In some instances where the Design Assist (DA) process is more evolved, the DA Subcontractor may actually finish the design and become the Engineer of Record (EOR) and assume liability for both the Design and Construction of the Engineering Systems. Due to the varying nature of CMAR contracts, the General Conditions of the contract are often modified to reflect the nature of the specific project delivery approach. The instruments of Service are often the same as DBB, 2D Construction Documents and Specifications, even though some Project Teams opt into sharing 3D Design Intent BIM Models with heavy "not for construction" disclaimers to protect the liability of the Design Team.

Design-Build (DB)

Since the Design and Construction Teams are jointly liable for all aspects of the project, they work a lot more collaboratively together. The same entity provides both the Design and Construction of the project, allowing them to blur the lines between design and construction and achieve many efficiencies that way. They typically work collaboratively in 3D BIM models and produce 2D documentation only for the purpose of obtaining Building Permits and other necessary reviews by Authorities Having Jurisdiction (AHJ's).

Integrated Project Delivery (IPD)

Similar to DB, the project team works collaboratively together and is jointly liable for all aspects of the project. Unlike DB, the project team includes the Owner who shares in the Risk and Liability for the project as an equal part of the Project Delivery Team. IPD lends itself to 3D BIM modeling and deep integration of technologies in Project Delivery. Instruments of Service vary, but typically include various forms of 3D BIM models co-authored by the entire project team.

Part 3: Collaboration & Use of Technology

Each of the Project Delivery methods relies to varied extents on collaboration between Owners, Designers and Contractors, and leverages Technology to different extents in order to successfully deliver the scope of work.

Design-Bid Build (DBB)

Use of Technology in DBB can be described as siloed at best. There is typically little to no continuation of Design Technology efforts into Construction. Design Team chooses their document authoring platforms in a silo without any input or coordination with the contractors and vice versa. Because the instruments of service are still 2D Drawings and written specifications, the Design Team is looking to produce the best set of 2D documents that will serve the project for bidding, and for protecting the Design Team from any downstream liability. As such, very little attention is given to accurate 3D modeling to allow time for robust 2D detailing and profitability. Since the Construction Team only gets the 2D drawings and specifications as their deliverables (or sometimes lower quality 3D models that are specifically marked to be “not for construction”), they typically evaluate their Technology approach after bidding, which may include robust VDC services like Construction Modeling and Coordination, Laser Scanning, Field Layout etc. Unfortunately, all of the 3D modeling has to start from scratch which is a tremendous work redo effort costing the project significant time and money.

Construction Manager @ Risk (CMAR)

Unlike DBB, the use of Technology in the CMAR procurement method is typically a bit more streamlined. Since the Construction Team is onboarded during the early design phase, there is a varied amount of technology coordination based on several factors including technical prowess of the project teams, levels of comfort and trust between the team members etc. The sliding scale on use of technology is vast, going from barely using technology at all and delivering the project similar to DBB to very technically savvy delivery teams working in near-IPD type setting, under CMAR contracts. Though there still typically isn't any 3D model co-authoring, a lot more attention is given to 3D Design coordination reviews including Trade Subcontractors that provide input to the Design Team via regular Design Assist meetings. Unfortunately, since the instruments of service are still 2 Dimensional, any construction modeling efforts typically start from scratch, but at least with some constructability intelligence coming from the Design Phase. The level of Construction Phase technology use varies with the technical capabilities of the Construction Team, but typically leverages major VDC technologies especially on large and complex projects.

Design-Build (DB)

Since the complete project liability lies completely with a single Design-Build entity, the use of technology is typically more widespread. The Project Team can collaboratively make decisions about platforms, tools, roles and responsibilities, and jointly author the instruments of service in whichever way they see fit. This is definitely more streamlined for true Design-Build firms than it is for Joint-Ventures between Designers and Contractors, where Trust and comfort level can still be a critical factor in the success rate of leveraging technology.

Integrated Project Delivery (IPD)

Ideally, since the success of any design or construction partner in an IPD depends on the success of the entire project, the use of technology should be carefully planned at project startup to make sure there are no downstream surprises in the overall project approach. However, one of the biggest drawbacks to IPD is that Trust is earned over time. Since IPD is geared towards heavy use of Design and Construction Technology at its core, new IPD teams typically experience an adjustment period as they learn the technical capabilities, strengths and weaknesses of the individual team members. If there are some early major challenges or gaps in the originally planned IPD delivery process, this can take a toll on the critical Trust component and send the IPD Team into the blame-assessing mode, setting up the entire project for failure.

Part 4: Roles & Responsibilities: Who is doing What, and Why?

Even though the general roles of the Owner, Architect, Engineer, Contractor and Subcontractors are fairly consistent, there are very distinct differences in terms of actual responsibilities with regards to process, timing and deliverables between the different types of Project Delivery.

Design-Bid Build (DBB)

DBB is perhaps the simplest and most straightforward procurement method when it comes to roles and responsibilities. Design team is responsible for Design and production of Construction Documents and Specifications, review of submittals and shop drawings and other traditional Construction Administration tasks. Contractors Bid the project, are responsible for the Construction Schedule, Means, Methods, Shop Drawings and Submittals. It is a fairly siloed approach to Design and Construction, but most certainly straightforward.

Construction Manager @ Risk (CMAR)

There are a lot of different “flavors” of CMAR projects, which is where it can get very complicated and either help or hurt the project. Since the Design and Construction teams are a bit more integrated and they vary in levels of technical capabilities, typically the most technically capable team takes on more responsibilities, like 3D modeling and Design/Construction Coordination, scanning, logistics and 4D model-based scheduling, 5D model-driven Quantity Take Off (QTO), Asset Data Tracking, Design/Construction issue tracking, Reality Capture integration etc. It is important to clearly define roles and responsibilities in an overall Design/Construction/Lifecycle BIM Execution plan, make sure that all parties are performing the tasks they are responsible for, and most importantly, staying in their lane! Otherwise, there may be parallel efforts occurring between the Design and Construction partners, without even knowing it is happening, which often leads to costly duplication errors and needs for rework that can derail the project schedule, and cost tremendous amounts of additional money.

Design-Build (DB)

Even though one entity is responsible for both the Design and Construction of the project, it is equally important to set the clear expectations about roles and responsibilities at project inception. Designers are typically responsible for preliminary design and not all the way to 100% construction document level. When the design is developed enough to convey intent to the

Owner, the Construction team takes over with constructability and detailing. Often times, the Design time, quality and design transparency are considered the drawbacks to Design-Build, since the team is fairly quick to advance to construction in order to optimize the schedule and cost, and not devote enough time to design exploration and design detailing. In case of Joint-Venture DB Teams, setting clear role expectations and adhering to a realistic schedule is critical to project success. Otherwise, the team can resort to parallel efforts which may lead to costly design changes during the construction phase, which has tremendous negative impact on the project budget and schedule.

Integrated Project Delivery (IPD)

Roles and Responsibilities are of utmost importance in IPD project. Typically, Owner, Architects, Engineers, Contractor and Subcontractors are all individual entities with very distinct project Roles, and rely on each other to deliver their part accurately, on-time, and on-budget. Goal-setting, communication and transparency are paramount to project success. Due to the integrated and collaborative nature of this type of Project Delivery, making certain there are no duplicated efforts and that every party “stays in their lane” is not only important to making sure the work get executed correctly, but also the key ingredient in building Trust between the project team members, which is the primary pre-requisite for IPD project success.

Part 5: Budget & Schedule Considerations

Each of the Project Delivery methods has very distinct pro's and con's when project Budget and Schedule are considered.

Design-Bid Build (DBB)

Most Owners still believe that this is the most economical procurement method due to the competitive nature of bidding process. Design Fees are heavily considered as part of hiring the architects and Engineers to provide their traditional (and considered lowest-cost) Design and Documentation services, and the contractors bid against each other to provide the lowest bid, and win the work. However, there are several inefficiencies with the DBB process that, when considered holistically, may tell a different true story about the total cost of DBB. First, the delivery process is extended due to the linear nature since the Design needs to be 100% completed before bidding the project and starting construction. This may result in revenue loss from slower speed to market. Additionally, since the construction process will likely take longer since the Contractors are starting from scratch, the General Conditions line item likely costs more. If the project bids overbudget, there is a significant Value Engineering effort that needs to happen, which likely costs additional Time and Money, and sacrifices the project scope and/or quality. DBB typically has a lot more non-optimal activities like RFI's and ASI's which cost a lot of time and money to process, and even more money to resolve, often resulting in costly change orders. Because the contractors had to bid as lean as possible to win the project, they are often relying on finding items the Design Team may have missed on the documents, to request change orders that allow them to build profit back into the project (there are several books written on the topic of “Contractor's Guide to Change Orders”.) This is not a collaborative team effort which causes delays and additional budget changes, which typically more than offsets any

efficiencies from the lower design fees or the competitive bid process, which can often make this procurement method the most expensive in lieu of most economical.

Construction Manager @ Risk (CMAR)

One of the biggest criticisms of CMAR is that the Owner is pre-selecting the team based on Qualifications and not based on cost. There is typically no competitive bidding for the major trades as they are locked into the contract early-on, and they work with the Construction Manager to fit the scope into the agreed-upon GMP. This may cause several issues, like CM's being very conservative while establishing the GMP, leaving the Owners wondering if they are getting the best value for their money. Additionally, if there is any indication that the project may go over the agreed-upon GMP due to any unforeseen conditions (or even errors/work redo beyond the planned contingencies), the contractors typically advise towards either reduction in scope or quality. When things go smoothly, CMAR can provide a great value to the Owner and produce very successful project. Likewise, when there are problems, it may leave the Owners wondering why they chose to go with this procurement method to begin with. One of the benefits of CMAR is certainly the potential for schedule acceleration compared to DBB. The project is typically executed in multiple bid packages in order to enable parallel design and construction process, as well as optimizing the critical path schedule by evaluating the long lead-time components and making sure there are no bottlenecks to slow down the construction process.

Design-Build (DB)

Cost and Time are big drivers of Design-Build projects. The premise is, since the Design and Construction is done by the same entity, the overall process can advance a lot more rapidly and thus take less time, and cost less money. Design is performed concurrently with Construction and with strict budget in mind. Arguably one of the most economical ways to deliver projects, optimizing cost and time often sacrifices the Design Quality and exploration to fit the Owner's custom needs. Decisions need to be made rather quickly and any changes down the road are typically very costly and sometimes not even feasible due to the amount of cost/time impact, leaving the Owner "stuck" with the decisions they made early in the project, when they may not have had all the facts they needed to make those decisions.

Integrated Project Delivery (IPD)

Even though IPD is geared towards leveraging Technology and Lean processes to reduce waste and improve efficiency, the amount of time spent communicating and collaborating between all of the different parties creates a very labor-intensive process. Design and Construction optimization from the collaborative nature of this project delivery method is designed to offset the additional labor needed, and produce leaner and more efficient projects that are executed with ease. IPD typically delivers projects with less construction waste leveraging a much more coordinated approach, which should result in lower overall construction cost. Even though advanced and costly technologies are an added cost compared to traditional projects, the time and budget efficiencies they create more than offset the associated hard and soft costs. When delivered successfully, IPD should produce some of the most cost effective and fastest projects, especially for very large, complex and repetitive project types.

Conclusion: Enhanced Delivery Method?

Given the brief overview of the most common project delivery methods, it is clear that there is no “winner” that will prevail over the others for all projects. Does this mean none of the project delivery methods are fully adequate to support how we can best deliver projects, or do we simply need to choose the delivery method that fits the best? Do we need a new project delivery method that would combine the best of all worlds?

Perhaps we are at the brink of developing new procurement methods. Maybe we should consider a “*Buildable Design-Bid-Build*” project delivery that would blend design intent with construction coordination, means and methods and retain the competitive bid process, but enable utilization of BIM and VDC to the fullest extent, with little to no loss of project delivery intelligence and minimal work redo. A process that would natively enable precoordination and construction scheduling/logistics during the Design phase, and bidding Construction installation from shop-drawing ready models vs. 2D Construction Documents.

What would the contracts look like in this Enhanced Delivery? How about “Design” fees? Roles and Responsibilities? Liability? Rewards and Penalties? How about Deliverables – would we be delivering much more intuitive “Digital Twins” at the end of this Enhanced Delivery process? Just some food for thought for our discussion! Come ready to engage in this discussion!

Additional Resources:

Design-Bid Build: <https://en.wikipedia.org/wiki/Design%E2%80%93bid%E2%80%93build>

Construction Management: https://en.wikipedia.org/wiki/Construction_management

Design Build: <https://en.wikipedia.org/wiki/Design%E2%80%93build>

Integrated Project Delivery: https://en.wikipedia.org/wiki/Integrated_project_delivery

Construction Disconnected: <https://www.plangrid.com/ebook/construction-disconnected/>

Design-Build Trends, Challenges and Risk Mitigation: <https://www.constructionexec.com/article/design-build-trends-challenges-and-risk-mitigation>

Strengths and challenges of IPD: <https://www.constructiondive.com/news/the-strengths-and-challenges-of-integrated-project-delivery/519561/>

Choosing a Project Delivery Method for Your Construction Project: <https://esub.com/blog/choosing-a-project-delivery-method-for-your-construction-project/>

Why is design-bid-build still the No.1 process? <https://www.constructiondive.com/news/the-dotted-line-why-is-design-bid-build-still-the-no-1-process/517308/>

Integrated Project Delivery: A guide: https://help.aiacontracts.org/public/wp-content/uploads/2020/03/IPD_Guide.pdf