Angles on Cx: Architects and Integrated Project Delivery

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Learning Objectives

1. Educate Cx Providers on the AIA Integrated Project Delivery
2. Help Cx Providers educate Architect’s to understand Commissioning
3. Educate Owners on the similarities between the AIA IPD Process and the Cx Process
Typical Project Team Configuration to Mid 1970’s

- Architect
- Mechanical Engineer
- Elec. Engineer
- General Contractor
- Elec. Contractor
- Mech. Contractor
• How successful have you been working with Architects?
  ○ Very Successful
  ○ Somewhat Successful

• There are many similarities between the AIA IPD approach and the Cx Process
  ○ The Building Commissioning Association, among others, is working with the AIA to educate Architects about the benefits of Cx
On November 5, 2007, the American Institute of Architects (AIA) in collaboration with the AIA California Council introduced the Integrated Project Delivery Guide.
• Integrated Project Delivery (IPD) is 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.
Benefits of the AIA Integrated Project Delivery

- A significant benefit of IPD is the opportunity to more clearly and comprehensively define and measure project outcomes. One key area for improvement is to set more aggressive goals for sustainability. Many architects have already incorporated energy efficient design principles into their work, and these efforts continue to expand within the profession—IPD will only enhance these trends.
Benefits of the AIA Integrated Project Delivery

• With the 2030 target for carbon-neutral buildings, the AIA seeks to dramatically increase the number of high-performance buildings constructed in the coming decades, and IPD will play a key role in that effort.

The AIA IPD was born as a result of the AIA 2030 Challenge
Benefits of the AIA Integrated Project Delivery

- New technologies have emerged that when utilized in conjunction with collaborative processes, are demonstrating substantial increases in productivity and decreases in requests for information, field conflicts, waste and project schedules.
Benefits of the AIA Integrated Project Delivery

- Owners are increasingly demanding methodologies that deliver these outcomes. Integrated processes are being acknowledged and encouraged in sustainable rating systems. New energy codes include recommendations regarding integrated processes.
Benefits of the AIA Integrated Project Delivery

• IPD provides positive propositions for the three major stakeholder groups:
  ○ Owners
  ○ Designers
  ○ Contractors
Benefits of the AIA Integrated Project Delivery

• Owners:

Early and open sharing of project knowledge streamlines project communications and allows owners to effectively balance project options to meet their business enterprise goals. Integrated delivery strengthens the project team’s understanding of the owner’s desired outcomes, thus improving the team’s ability to control costs and manage the budget, all of which increase the likelihood that project goals, including schedule, life cycle costs, quality and sustainability, will be achieved.
Benefits of the AIA Integrated Project Delivery

• Designers:

The integrated delivery process allows the designer to benefit from the early contribution of constructor’s expertise during the design phase, such as accurate budget estimates to inform design decisions and the pre-construction resolution of design-related issues resulting in improved project quality and financial performance. The IPD process increases the level of the effort during early design phases, resulting in reduced documentation time, and improved cost control and budget management, all of which increases the likelihood that project goals including schedule, life cycle costs, quality and sustainability will be achieved.
Benefits of the AIA Integrated Project Delivery

- Contractors:

  The integrated delivery process allows constructors to contribute their expertise in construction techniques early in the design process resulting in improved project quality and financial performance during the construction phase. The constructor’s participation during the design phase provides the opportunity for strong pre-construction planning, more timely and informed understanding of the design, anticipating and resolving design-related issues, visualizing construction sequencing prior to construction start, and improving cost control and budget management, all of which increase the likelihood that project goals, including schedule, life cycle costs, quality and sustainability, will be achieved.
Traditional Project Delivery

• **Teams**
  Fragmented, assembled on “just-as needed” or “minimum-necessary” basis, strongly, hierarchical, controlled

• **Process**
  Linear, distinct, segregated; knowledge gathered, “just-as-needed”, information hoarded; silos of knowledge and expertise

• **Risk**
  Individually managed, transferred to the greatest extent possible

• **Compensation / Reward**
  Individually pursued; minimum effort for maximum return; (usually) first-cost based

• **Communication / Technology**
  Paper-based, 2 dimensioned; analog

• **Agreements**
  Encourage unilateral effort; allocate and transfer risk; no sharing
Gaps between disciplines resulting in:
- Poor coordination
- Lost details
- Costly change orders
- Delays in schedule
Comparison of Traditional and IPD

• Traditional Project Delivery

  **Teams**
  Fragmented, assembled on “just-as needed” or “minimum-necessary” basis, strongly, hierarchical, controlled

• Integrated Project Delivery

  **Teams**
  An integrated team entity composed key project stakeholders, assembled early in the process, open collaborative
Comparison of Traditional and IPD

• Traditional Project Delivery

  **Process**
  Linear, distinct, segregated; knowledge gathered, “just-as-needed”, information hoarded; silos of knowledge and expertise

• Integrated Project Delivery

  **Process**
  Concurrent and multi-level early contributors of knowledge and expertise; information openly shared; stakeholder trust and respect
Comparison of Traditional and IPD

• Traditional Project Delivery
  
  **Risk**
  Individually managed, transferred to the greatest extent possible

• Integrated Project Delivery
  
  **Risk**
  Collectively managed, appropriately shared
Comparison of Traditional and IPD

• Traditional Project Delivery
  **Compensation / Reward**
  Individually pursued, minimum effort for maximum return:
  (usually) first-cost based

• Integrated Project Delivery
  **Compensation / Reward**
  Team success tied to project success; value-based
Comparison of Traditional and IPD

• Traditional Project Delivery
  **Communications / Technology**
  Paper-based, 2 dimensioned; analog

• Integrated Project Delivery
  **Communications / Technology**
  Digitally based, virtual; Building Information Modeling
  (3, 4 and 5 dimensional)
Comparison of Traditional and IPD

- Traditional Project Delivery
  **Agreements**
  Encourage unilateral effort; allocate and transfer risk; no sharing

- Integrated Project Delivery
  **Agreements**
  Encourage, foster, promote and support multi-lateral open sharing and collaboration; risk sharing

For more information on contractual arrangements: [www.aia.org/ipdg](http://www.aia.org/ipdg)
IPD & Commissioning helps fill the gaps in coordination.

IPD & Commissioning encompasses “All”.
• IPD promises better outcomes, but outcomes will not change unless the people responsible for delivering those outcomes change. IPD requires that all project participants embrace the following Principles of Integrated Project Delivery:
Principals of Integrated Project Delivery

- Mutual Respect and Trust
- Mutual Benefit and Reward
- Collaborative Innovation and Decision Making
- Early Involvement of Key Participants
- Early Goal Definition
- Intensified Planning
- Open Communications
- Appropriate Technology
- Organization and Leadership
Mutual Respect and Trust

In an integrated project, owner, designer, consultants, contractor, subcontractors, and suppliers understand the value of collaboration and are committed to working as a team in the best interest of the project.
Mutual Benefit and Reward

All participants or team members benefit from IPD. Because the integrated process requires early involvement by more parties, IPD compensation structures recognize and reward early involvement. Compensation is based on the value added by an organization and it rewards “what’s best for project” behavior, such as by providing incentives tied to achieving project goals. Integrated projects use innovative business models to support collaboration and efficiency.
Collaborative Innovation and Decision Making

Innovation is stimulated when ideas are freely exchanged among all participants. In an integrated project, ideas are judged on their merits, not on the author’s role or status. Key decisions are evaluated by the project team and, to the greatest practical extent, made unanimously.
Early Involvement of Key Participants

In an integrated project, the key participants are involved from the earliest practical moment. Decision making is improved by the influx of knowledge and expertise of all key participants. Their combined knowledge and expertise is most powerful during the project’s early stages where informed decisions have the greatest effect.
Early Goal Definition

Project goals are developed early, agreed upon and respected by all participants. Insight from each participant is valued in a culture that promotes and drives innovation and outstanding performance, holding project outcomes at the center within a framework of individual participant objectives and values.
Intensified Planning

The IPD approach recognizes that increased effort in planning results in increased efficiency and savings during execution. Thus the thrust of the integrated approach is not to reduce design effort, by rather to greatly improve the design results, streamlining and shortening the much more expensive construction effort.
Open Communication

IPD’s focus on team performance is based on open, direct, and honest communication among all participants. Responsibilities are clearly defined in a no-blame culture leading to identification and resolution of problems, not determination of liability. Disputes are recognized as they occur and promptly resolved.
Appropriate Technology

Integrated projects often rely on cutting edge technologies. Technologies are specified at projects initiation to maximize functionality, generality and interoperability. Open and interoperable data exchanges based on disciplined and transparent data structures are essential to support IPD. Because open standards best enable communication among all participants, technology that is compliant with open standards is used whenever available.
Organization and Leadership

The project team is an organization in its own right and all team members are committed to the project team’s goals and values. Leadership is taken by the team members most capable with regard to specific work and services. Often, design professionals and contractors lead in areas of their traditional competence with support from the entire team, however specific roles are necessarily determined on a project-by-project basis. Roles are clearly defined, without creating artificial barriers that chill open communication and risk taking.
Traditional delivery and contracting approaches contemplate separate silos of responsibility that yield inefficiencies whenever there is a hand-off from one silo to another. IPD represents a behavioral change in the industry by breaking down the silos of responsibility, requiring close cooperation among all major participants and aligning participant success to project success.
Setting Up an Integrated Project

IPD strategically realigns participant’s roles, underlying motivations, and sequences of activities on a project to utilize each participant’s best talents and abilities at the most beneficial moment. Success is centered on the project under an integrated delivery approach and relies on collaboration. The focus is on collectively achieving shared goals rather than meeting individual expectations.
Success is measured by the degree to which common goals are achieved.
Considerations in setting up an IPD Project:

- IPD Team Building and Functioning
- Defining and Measuring Project Outcomes
- Defining Roles, Responsibilities and Scope of Services
- Legal Considerations
IPD Team Building and Functioning

- Project Team Formation and Team Building
- Team Communication
- Project Team Decision Making
- Team Member Dispute Resolution
- Team Continuity, Withdrawal / Re-Assignment
IPD Team Building and Functioning

- Project Team Formation and Team Building
  - The project team is the lifeblood of IPD.
  - Project participants come together as an integrated team, with the common overriding goal of designing and constructing a successful project.
  - IPD demands that participants work together when trouble arises.
  - The ability of team members to adapt to a new way of performing their services, and individual team member’s behavior within the team is critical to the success of the project.
IPD Team Building and Functioning

• Project Team Formation and Team Building
  ○ The project team is formed as close as possible in time to the project’s inception.
  ○ Two categories of team members:
    - Primary Participants:
      » Owner (Operations and Maintenance Managers), Architect, Mechanical & Electrical Engineers, Commissioning Authority, Construction Manager, General Contractor and Mechanical Sub-contractor
    - Key Supporting Participants
IPD Team Building and Functioning

- Team Communication
  - Successful team operations rely on collaboration, which, in turn, relies on fluid and open communication. Creating an atmosphere and mechanisms that adequately shares information between and among team members is essential to a successfully project. The development and use of a communication protocol streamlines communications and facilitates the transfer of project data between participants and between technologies.
IPD Team Building and Functioning

- Project Team Decision Making
  - A successful IPD project has decision making methods and processes that each team member accepts and agrees to abide by. Decision making abilities are not vested in a single team member, rather all decisions are made unanimously by a defined decision making body.
  - All decisions are made in the best interest of the project.
IPD Team Building and Functioning

• Team Member Dispute Resolution
  ○ To preserve both the team and the project, these disputes are resolved internally in IPD without the necessity of filing claims and adopting adversarial positions.
  ○ Disputes are resolved by the project’s decision making body, which makes decisions unanimously in the best interest of the project.
IPD Team Building and Functioning

• Team Continuity, Withdrawal / Re-Assignment
  ○ Every effort should be made to maintain the continuity of the team. Withdrawal of team members, whether through assignment or voluntary termination, is highly discouraged. At the start of the project, the team decides the few instances, if any, where withdrawal is acceptable.
Defining and Measuring Project Outcomes

- Goals & Standards
- Project Costs
- Project Schedule
- Project Quality
- Operational Performance
- Sustainability
Defining and Measuring Project Outcomes

• Goals & Standards
  ○ Goals remain the owner’s area. The team may present alternatives and council. The owner determines the program and what it wants to achieve. However, standards based upon goals and used to judge project success and compensation are jointly agreed upon. It’s necessary for parties to be comfortable with the agreed-upon anticipated outcomes.
Defining and Measuring Project Outcomes

• Goals & Standards
  ○ Goals such as economic, standards of project duration, cost and energy efficiency may be measured to determine when attained.
  ○ Quality of construction and design creativity are less measured and may require a weighted index, comparison structures and independent evaluators. The team also determines when the standards will be measured.
Defining and Measuring Project Outcomes

• Project Costs
  ○ The overall project cost is a prime metric that is established at the project inception and tracked throughout the life of the project with agreed upon emphasis on life cycle and sustainable components. The potential for a direct connection between the design and quantity survey during all phases creates a powerful tool to determine and manage the project cost. This is one of the prime opportunities to see the efficiency possible with IPD.
Defining and Measuring Project Outcomes

• Project Costs
  ○ A significant benefit of IPD is the opportunity to replace “value engineering” with target pricing or target values design processes. It promotes designing to a detailed estimate, rather than estimating a detailed design. If this is properly done, conventional “value engineering” vanishes. Also by tying the decision process to the schedule, alternatives that require information can proceed on parallel paths until the appropriate “last responsible moment”.
Defining and Measuring Project Outcomes

• Project Schedule
  ○ One of the main potential benefits of IPD is the reduction of construction time due to the extensive planning and changes to project processes. The ability to link schedule, phasing and detailed construction sequencing during design provides efficiencies in material procurement.
Defining and Measuring Project Outcomes

- Project Quality
  - New technological tools available to IPD team members, including BIM, provide the opportunity to reduce errors within design documents as well as conflicts between trades - all well before purchasing of systems and products. The measurement of quality is based upon metrics appropriate to the project type and is compared to similar previously completed projects.
Defining and Measuring Project Outcomes

- Operational Performance
  - The establishment of performance criteria for major building systems is made during early design. Aligned with the project goals and set within the advice of the major trades participating in the project along with the associated design professionals. The opportunity exists for financial performance metrics of the completed project to be established and tracked after completion.
Defining and Measuring Project Outcomes

• Sustainability
  ○ One key area of opportunity for improvement from traditional delivery approach is to set more aggressive goals for sustainability. Metrics can be established for lifecycle goals for all aspects of a project. Rating criteria may be melded into the overall goals and incremental steps monitored throughout the design and delivery process. The opportunity also exists to set goals for carbon footprint and incorporation of alternative energies.
Project Execution/Redefining Project Delivery

- In an integrated project, the project flow from conceptualization through implementation and closeout differs significantly from a non-integrated project. Moving design decisions upstream as far as possible to where they are more effective and less costly suggests a re-thinking of typical project phases.
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Conceptualization

- Begins to determine WHAT is to be built, WHO will build it and HOW it will be built. The owner determines the program and what it wants to achieve through the OPR. The performance goals are developed by the team. The cost structure is developed earlier and in greater detail than a conventional project. The preliminary schedule is developed and linked to developing model and communication protocols are identified and key parameters agreed.
Criteria Design

• During Criteria Design, the project begins to take shape. Major options are evaluated, tested and selected. Aspects such as; scope, form, adjacencies and spatial relationships, selection and initial design of major building systems, cost estimate and schedule of the project are finalized, allowing the team to proceed with confidence to the next level of detail.
Detailed Design

• The Detailed Design phase concludes the WHAT phase of the project. All key design decisions are finalized. The building is fully and unambiguously defined, coordinated and validated, prescriptive specifications are completed based on prescribed and agreed systems, Cost and construction schedule are established to a high level of precision.
Implementation Documents

• Effort shifts from WHAT is being created to documenting HOW it will be implemented. The goal of Implementation Documents phase is to complete the determination and documentation of how the OPR will be implemented, not to change or develop it. The traditional shop drawing process is merged into this phase as constructors document how systems and structure will be created. This phase generates the documents that third parties will use for permitting, financing and regulatory purposes.
Agency Coordination / Final Buyout

• Agency Review commences in Criteria Design and increases intensity during the final review period. Early agency involvement minimizes agency comments and required changes to the design as submitted for permit.

• IPD assumes early involvement of key trade contractors and vendors, so buyout of work packages they provide occurs through development of prices throughout the design phases, culminating at the conclusion of Implementation Documents.
Construction

- The benefits of the integrated process are realized in this Phase. In IPD the design and its implementation are finalized during the Detailed Design and Implementation phases. Therefore, construction contract administration is primarily a quality control and cost monitoring function. Because of the effort put into the design phases, construction under IPD will be much more efficient.
Closeout

• Closeout of an integrated project greatly depends upon the business terms agreed by the parties, the closeout includes calculation of appropriate credits and deducts. Some issues, however, such as warranty obligations, occupancy and completion notification, remain unchanged due to statutory and legal requirements. Other issues, such as punch list correction, are not significantly affected by integrated project delivery.
Many similarities between IPD and CX Process

- In the Cx Process it’s preferred that the Cx Authority work directly for the Owner.
  - Why?
    - The CxA provides a consistent level of assurance that the Owner’s best interest will be served.
    - The Owner’s best interest is the project.
Many similarities between IPD and CX Process

- The CxA must possess:
  - Organizational Skills
  - Documentation Skills
  - Communication Skills
  - Team Building Skills

To effectively lead and coordinate the Cx Team
Commissioning Process

• Cx offers significantly greater and more cost effective benefits when it begins early in design.
• The Cx process provides a means of linking the traditional fragmented phases of the design and construction process, because it encourages the project team to communicate and solve problems earlier in the design phase.
• Cx is a team effort and requires communication, coordination and cooperation among all parties involved with the project.
• The CxA provides leadership by communicating goals for the Cx process, including identification of roles and responsibilities of team members.
• Cooperation by all parties contribute to successful Cx.
Commissioning Process

- Cx process is intended to ensure all systems operate as intended,
- But it is much more that that:
- Cx is a process that will ensure optimum quality for everything that is designed, acquired and constructed -
- Resulting in a building that is ideally suited for the Owner’s operations, with sustainable operability.
- Each Step of the Cx process is intended to assure quality of the effort at hand, which is critical to the next step of the project.

The CxA has the knowledge and training to have substantial involvement as a primary participant in an IPD project, setting the goals for Project Quality, Operational Performance and Sustainability.
• The Building Commissioning Handbook
References

• Building Commissioning Guidelines
• ACG Commissioning Guideline
Web Site Resources

• AIA Integrated Project Delivery
  ○ www.aia.org/ipdg
  ○ www.aiacontractdocuments.org
  ○ www.ipd-ca.net

• Commissioning
  ○ BCA - www.bcxa.org
  ○ ACG - www.commissioning.org/
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Thank-you

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