

# Understanding the Legal Impacts of Integrated Project Delivery and Building Information Modeling

Samuel Wong

California Polytechnic State University, San Luis Obispo  
San Luis Obispo, California

This research paper aims to understand the legal ramifications of using integrated project delivery (IPD) and Building information Modeling (BIM) regarding shared risk and reward between parties and impacts of contract law. Using IPD and BIM allows for projects to be more collaborative and work through issues quickly. However, shared design can lead to legal issues that may cause problems if not resolved or accounted for at the beginning of the project. This paper serves as research to further understand the legal consequences of integrating IPD and BIM into construction projects in the United States. There are some differences to construction contracts when utilizing these two tools when compared to a traditional design bid build delivery method. The use of IPD as a delivery method is becoming more common with complex projects and often these projects benefit greatly from the use of BIM tools. This paper explores some of the discrepancies in contract law and the impact of using shared risk and reward and integrated form of agreement (IFOA) contracts.

**Keywords:** Integrated Project Delivery, Building Information Modeling, Contract Law

## Introduction

### *Integrated Project Delivery*

Integrated Project Delivery is a recently emerging type of project delivery that uses a combined team that includes the owner, general contractor, architect, subcontractors, consultant designers, stakeholders, inspectors, and more. IPD often uses a shared risk and reward system where the project team is responsible for the overall wellbeing of the project. Building a team is essential to the success of an IPD project.

IPD is used in conjunction with Lean tools to help eliminate waste during construction projects. According to the LCI, “waste” refers to both literal material waste and intangible waste such as wait times, poorly assigned personnel, and overproduction (LCI). Everchanging scope of work with more complex projects it is apparent that design and constructability challenges can be better solved with an integrated and collaborative team. Traditionally, team members have designated roles and responsibilities, however these lines can be shifted in an IPD format.

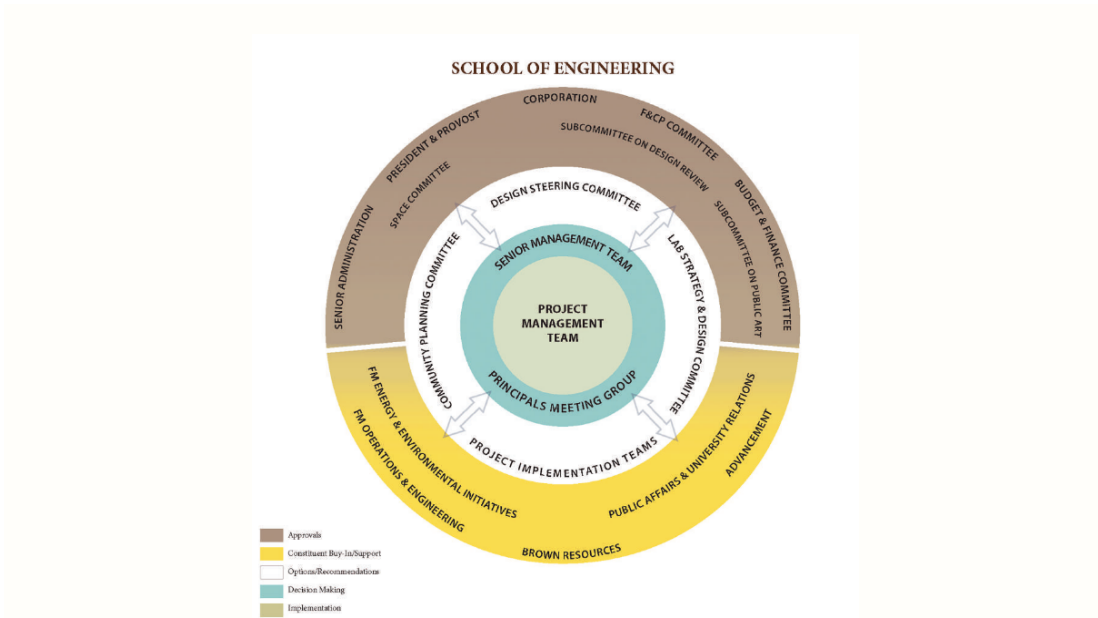


Figure 1: Example of IPD Team from *Integrated Project Delivery: Action Guide for Leaders*

## BIM

Building information modeling, also known as BIM can be defined as “(1) a digital representation of the physical and functional characteristics of a facility; (2) a business process for generating and leveraging building data to de-sign, construct, and operate the building during its lifecycle; and (3) the organization and control of the business process by utilizing the information in the digital prototype to effect the sharing of in-formation over the entire life cycle of an asset (Contractual Perspective for BIM Utilization in US Construction Projects).

BIM can have various uses that can provide value to the owner, architect, design consultants, general contractor, subcontractors, and other project stakeholders. Although there are now many tools to aid with the design and construction process, BIM can be very helpful as a McGraw Hill Construction survey found that “eight two percent of BIM users believed that BIM had a very positive impact on their company’s productivity” (Azhar)

The use of BIM provides many benefits during the construction process as well as during project procurement, project planning and scheduling, and building occupation and operation phases. When used with other collaborative methods, BIM can help reduce errors and constructively issues that may exist. An article from Salman Azhar discusses some of the applications and benefits of using BIM for construction such as “faster and more effective processes, better design, controlled whole-life costs and environmental data, better production quality, automated assembly, better customer service, and lifecycle data” (Azhar).

## Methodology

This research paper aims to explore some of the legal ramifications of using IPD and BIM, focusing on some contract law, integration and shared risk and reward. The methodology used was a qualitative analysis of articles and literature review of books, journals, and articles regarding the use of IPD and BIM. Case study analysis is included to further develop understanding of how processes should function to better serve a project using IPD and BIM. Using literature review identifies major industry leaders of IPD and BIM that have an insight on the best practices for success.

## **Literature Review**

### *Legal Considerations with IPD and BIM*

Legal issues have been a part of construction with definitive roles and responsibilities for each member of the project team. Current construction contract law has precedents with traditional project methods such as design-bid-build. However, an issue arises when using IPD and BIM and current construction contract law. In IPD, collaborative agreements and teaming contracts are often utilized to establish the foundation for cooperation and decision-making among the project team. These agreements outline the shared goals, responsibilities, and dispute resolution processes to foster a collaborative environment (AIA, 2013). An IPD project may involve a multi-party agreement where the owner, architect, contractor, and key subcontractors enter a collaborative contract that establishes the framework for their collective responsibilities and decision-making authority. This contract format is known as an Integrated Form of Agreement.

Integrated forms of agreement have gained popularity in the construction industry as they provide a collaborative and streamlined approach to project delivery. However, the adoption of integrated forms of agreement also presents complex legal implications that require careful consideration. Integrated forms of agreement, such as the ConsensusDocs 300 Series and the American Institute of Architects (AIA) IPD agreements, aim to foster collaboration and risk-sharing among project participants (Integrated Project Delivery: A Guide). These agreements typically involve early involvement of key stakeholders, joint decision-making processes, and shared risks and rewards (Integrated Project Delivery: A Guide).

One of the primary legal implications of using integrated forms of agreement lies in the allocation of risks and responsibilities among project participants. Shifting contracted roles requires careful negotiation and drafting of contractual provisions to ensure that the risks are appropriately assigned based on each party's abilities and expertise (Cullen).

Moreover, integrated forms of agreement introduce unique legal considerations regarding decision-making processes and liability allocation. These agreements often require joint decision-making and collaborative problem-solving among project participants. This can raise challenges related to conflicting interests, differing professional opinions, and decision-making authority (Xie). To address these considerations, integrated forms of agreement may include provisions that outline decision-making protocols, dispute resolution mechanisms, and mechanisms for addressing conflicts of interest.

Additionally, integrated forms of agreement necessitate a comprehensive understanding of the legal landscape to ensure compliance and address potential disputes. Effective contract administration, documentation, and communication are essential to mitigate legal risks and ensure the successful implementation of integrated forms of agreement (Cullen). Regular meetings, progress reports, and documentation of key decisions and actions can help maintain transparency and accountability among project participants (Cullen).

To navigate these legal implications successfully, construction professionals and stakeholders must stay informed about the legal framework surrounding integrated forms of agreement. Proactive measures, such as thorough contract review, clear communication channels, and collaboration-focused strategies, can help mitigate legal risks and foster successful outcomes in construction projects (El-adaway).

There are a multitude of “legal issues created by BIM, which include the following: a. What is considered ‘rendering professional design services;’ b. is a model an end-product or instrument of service; c. who owns the digital information; d. how long must the digital information be kept; e. who pays for the creative efforts, controls information, and assumes or assigns risks; f. what is the applicable standard of care and what constitutes a failure to perform in accordance with that standard?” (Shared Design 4-18). It is vital to distinguish these components as there can be consequences if these aspects of BIM are not discussed during a project’s lifetime.

### *Intellectual property rights and licensing in BIM*

Intellectual property rights and licensing play a crucial role in the implementation of Building Information Modeling (BIM) in construction projects. BIM involves the creation, ownership, and control of digital models, data, and associated content. Several key considerations arise regarding intellectual property in the context of BIM.

Firstly, ownership and control of BIM data and models need to be clearly defined. It is important to establish agreements that address ownership rights and control over the BIM data and models, including the ability to access, modify, and distribute the information (American Institute of Architects). This helps ensure that parties have the necessary rights and permissions to use and share the BIM models during and after the project.

Secondly, copyright and licensing considerations come into play when using BIM content. BIM projects often involve the use of pre-existing content, such as libraries of objects, components, or designs (Shared Design). It is essential to address copyright ownership and licensing rights for these pre-existing content items incorporated into the BIM models. Proper licenses or permissions must be obtained from the copyright holders to avoid copyright infringement (Assad). Additionally, the use of open-source or proprietary BIM software and related content may have specific licensing terms that must be adhered to.

Protecting intellectual property rights and managing licensing agreements is vital in BIM projects (Shared Design). Clear contractual provisions should address ownership, use, reproduction, and distribution of the BIM models and associated data. Confidentiality and non-disclosure agreements can protect sensitive information within the BIM models. Licensing agreements can be established to outline the rights and limitations for the use and distribution of the BIM models and associated content (Shared Design). By addressing these legal aspects, parties involved in BIM projects can safeguard their intellectual property rights, maintain control over the use of their work, and establish a framework for collaboration and sharing.

### *Liability and risk management in IPD and BIM*

In addition to contractual relationships, key contract provisions in IPD projects play a crucial role in addressing risk allocation and decision-making processes. These provisions aim to promote shared accountability and collaborative decision-making among project participants. For instance, IPD contracts typically include provisions that address the allocation of design and construction risks, cost-sharing mechanisms, change management processes, and procedures for resolving disputes (American Institute of Architects). By clearly defining these provisions, parties involved in an IPD

project can anticipate and mitigate potential conflicts that may arise due to uncertainties or changes in project scope (Integrated Project Delivery: A Guide).

Since IPD projects involve close collaboration and integration among different parties, conflicts of interest may arise that compromise fair decision-making or breach fiduciary duties. For example, conflicts of interest may arise when a key project participant has a financial interest in selecting a particular subcontractor or supplier (Integrated Project Delivery). It is essential to address these conflicts upfront through transparency, disclosure, and appropriate mechanisms for conflict resolution.

Ensuring clarity and mutual understanding of contractual obligations is another important aspect of legal implications in IPD projects. Due to the unique nature of IPD, contracts must be carefully drafted to ensure clarity and mutual understanding of the contractual obligations. Ambiguities or gaps in contractual provisions can lead to disputes and legal challenges. Clear and unambiguous language, precise scope definitions, and well-defined performance criteria are essential in mitigating contractual disputes (Shared Design). For example, the contract may clearly specify the deliverables expected from each project participant, the timelines for completion, and the consequences for non-performance (Integrated Project Delivery: A Guide). Furthermore, contract administration and management in IPD projects play a crucial role in ensuring legal compliance and effective project governance. Effective contract administration involves clear communication, documentation, and proper enforcement of contractual obligations (Pishdad). Contract administrators and project managers are responsible for overseeing compliance with contractual provisions, managing project risks, and resolving disputes in a timely manner (El-adaway). By maintaining proper documentation and communication channels, potential legal issues can be addressed proactively, minimizing the likelihood of disputes and delays.

One of the legal ramifications caused by shared risk and reward using IPD and BIM is the discrepancy of the Spearin Doctrine (Reed). This legal principle comes from the case *United States v. Spearin*, 248 U.S. 132 in 1918. This case was a key in construction law, as it protects the contractor from defects in the plans and specifications when they build according to the plans and specifications prepared. When the project decisions are made by the owner, contractor, and designers together, which party is responsible if there are damages?

## **Analysis**

### *Future Trends and Challenges*

As IPD and BIM become more popular, the industry will see a standard being set with how projects are set up and completed. The future of IPD and BIM is changing and contract forms such as AIA and ConsensusDocs will influence how risk and rewards are shared on each project. This analysis explores the emerging technologies impacting the legal aspects of IPD and BIM, potential regulatory developments, and the integration challenges and opportunities associated with these practices in the construction industry.

Emerging technologies and their impact on the legal aspects of IPD and BIM: The rapid advancements in technology, such as artificial intelligence, data sharing, and cloud computing, have significantly influenced the implementation and legal considerations of IPD and BIM. These technologies bring about the following impacts:

1. **Data ownership and control:** With the increased use of BIM, digital models, and associated data, issues of ownership, access, and control arise. Parties involved must clearly define and address ownership rights, permissions, and licensing agreements to ensure proper usage and distribution of BIM models.
2. **Intellectual property rights:** The integration of BIM content from various sources raises copyright and licensing concerns. Parties must obtain proper licenses and permissions for pre-existing content and establish contractual provisions that protect intellectual property rights and confidentiality.
3. **Security and privacy:** As BIM relies on data exchange and collaboration among stakeholders, protecting sensitive information and ensuring data security and privacy become critical legal considerations. Measures such as confidentiality agreements and data protection protocols should be implemented to mitigate risks.

Potential regulatory developments and their implications for IPD and BIM: The legal framework surrounding IPD and BIM is continually evolving to address the unique challenges posed by these practices. Potential regulatory developments include:

1. **Standardization and regulation:** Regulatory bodies and professional organizations are actively working on developing industry standards, guidelines, and best practices to streamline the implementation of IPD and BIM. Compliance with these standards will become essential to ensure legal compliance and mitigate potential disputes.
2. **Licensing and qualification requirements:** As BIM and IPD become more prevalent, regulators may introduce licensing and qualification requirements for professionals involved in these practices. Such requirements would help ensure competency, accountability, and adherence to legal and ethical standards.
3. **Privacy and data protection regulations:** With the increasing reliance on digital technologies and data sharing, regulators may introduce specific regulations regarding data privacy and protection in the context of BIM. Compliance with these regulations will be crucial to maintain stakeholders' trust and avoid legal consequences.

Challenges and opportunities in the integration of IPD and BIM with other construction practices: The integration of IPD and BIM with other construction practices presents both challenges and opportunities:

1. **Legal risk allocation:** Shifting from traditional project delivery methods to IPD requires careful negotiation and drafting of contracts to allocate risks and responsibilities effectively. Clear contractual provisions should address decision-making authority, risk-sharing mechanisms, and dispute resolution processes to ensure fair and efficient collaboration. IPD contracts play a significant role in addressing risk allocation, change management, and dispute resolution processes. By clearly defining these provisions, parties involved in an IPD project can anticipate and mitigate potential conflicts that may arise due to uncertainties or changes in project scope.
2. **Conflicts of interest and decision-making:** The collaborative nature of IPD and BIM can lead to conflicts of interest among project participants. Provisions addressing transparency,

disclosure, and conflict resolution mechanisms should be incorporated into agreements to mitigate conflicts and ensure fair decision-making.

3. **Contractual clarity and administration:** Ambiguities in contractual provisions can lead to disputes and legal challenges. Well-drafted contracts, clear communication channels, and effective contract administration are crucial to minimize the likelihood of conflicts and delays. Regular meetings, progress reports, and documentation of key decisions and actions can help maintain transparency and accountability.

Building trust as a foundation is key to the success of any project. As BIM and IPD are developing, teams will need to trust each other and work together for the wellbeing of the project. Owners, contractors, architects, designers, and subcontractors should have a level of trust for a functioning project that utilizes both IPD and BIM.

## **Conclusions and Future Research**

The adoption of BIM and IPD in the construction industry has brought about numerous benefits, including enhanced collaboration, improved decision-making, and streamlined project delivery. However, the integration of these methodologies also presents complex legal implications that require careful consideration. The use of IPD and BIM promotes collaboration, waste reduction, and improved project outcomes. However, it requires a clear understanding of the legal implications and considerations associated with shared risk and reward, contract law, intellectual property rights, and liability management.

The legal considerations related to IPD and BIM highlight the need for integrated forms of agreement that define the roles, responsibilities, and decision-making processes among project participants. Clear allocation of risks and responsibilities is crucial to ensure fair collaboration and prevent disputes. Intellectual property rights and licensing also play a significant role in the implementation of BIM, requiring clear agreements on ownership, control, and usage of digital models and associated content.

To successfully navigate these legal implications, construction professionals and stakeholders must stay informed about the legal framework surrounding IPD and BIM. Proactive measures such as thorough contract review, clear communication channels, and collaboration-focused strategies can help mitigate legal risks and ensure successful project outcomes. Additionally, as IPD and BIM continue to evolve, the industry can expect potential regulatory developments, standardization efforts, and privacy regulations that will shape the legal landscape.

Overall, understanding the legal ramifications and addressing them early in the project lifecycle is essential for the successful integration of IPD and BIM in construction projects. By fostering collaboration, effective risk management, and clear contractual provisions, construction professionals can mitigate legal risks, enhance project outcomes, and contribute to the continued advancement of IPD and BIM in the industry.

Future research could help better understand the impacts of IPD and BIM using with analysis of case studies with more projects being completed with these tools. Also, if there are lawsuits or cases with issues with contract law, that would help develop contracts for owners, contractors, architects and more. Analysis as contract provisions change can be insightful for the future of IPD and BIM.



## References

- American Institute of Architects. (2022, November 25). Integrated Project Delivery Family - learn - ACD operations. Integrated Project Delivery (IPD) Family. <https://learn.aiacontracts.com/contract-doc-pages/27166-integrated-project-delivery-ipd-family/>
- Assaad, R., El-adaway, I. H., El Hakea, A. H., Parker, M. J., Henderson, T. I., Salvo, C. R., & Ahmed, M. O. (2020). Contractual perspective for BIM utilization in US Construction Projects. *Journal of Construction Engineering and Management*, 146(12). [https://doi.org/10.1061/\(asce\)co.1943-7862.0001927](https://doi.org/10.1061/(asce)co.1943-7862.0001927)
- Azhar, S. (2011). Building Information Modeling (BIM): Trends, benefits, risks, and challenges for the AEC Industry. *Leadership and Management in Engineering*, 11(3), 241–252. [https://doi.org/10.1061/\(asce\)lm.1943-5630.0000127](https://doi.org/10.1061/(asce)lm.1943-5630.0000127)
- Callahan, M. T. (2011). *Shared design*. Aspen Publishers.
- Cullen, P-A., & Hickman, R. J. (2012). Conflicts between contract law and relational contracting. *Lean Construction Journal*, 2012, 49-60. [http://www.leanconstruction.org/lcj/paper\\_2012\\_issue.html](http://www.leanconstruction.org/lcj/paper_2012_issue.html)
- El-adaway, I. H. (2010). Integrated Project Delivery Case Study: Guidelines for Drafting Partnering Contract. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 2(4), 248–254. [https://doi.org/10.1061/\(asce\)la.1943-4170.0000024](https://doi.org/10.1061/(asce)la.1943-4170.0000024)
- Elghaish, Pour Rahimian, F., Brooks, T., Dawood, N., & Abrishami, S. (2022). Web-Based Management System to Share Risk/Reward for IPD Projects. In *Blockchain of Things and Deep Learning Applications in Construction*. Springer International Publishing AG. [https://doi.org/10.1007/978-3-031-06829-4\\_5](https://doi.org/10.1007/978-3-031-06829-4_5)
- Integrated Project Delivery: A guide. The American Institute of Architects. (2007). <https://www.aia.org/resources/64146-integrated-project-delivery-a-guide>
- Cheng, R., Osburn, L., Lee, L., Allison, M., Ashcraft, H., Klawans, S., & Pease, J. (2019). *Integrated Project Delivery: An action guide for leaders*.
- Integrated Project Delivery. Lean Construction Institute. (2022, November 7). <https://leanconstruction.org/lean-topics/integrated-project-delivery-ipd/#:~:text=What%20are%20the%20Benefits%20of,eliminates%20waste%20in%20projects>
- Pishdad-Bozorgi, & Srivastava, D. Assessment of Integrated Project Delivery (IPD) Risk and Reward Sharing Strategies from the Standpoint of Collaboration: A Game Theory Approach. *Construction Research Congress 2018*, 196–206. <https://doi.org/10.1061/9780784481271.020> - <https://ascelibrary.org.ezproxy.lib.calpoly.edu/doi/10.1061/9780784481271.020>
- Pishdad-Bozorgi, & Beliveau, Y. J. (2016). Symbiotic Relationships between Integrated Project Delivery (IPD) and Trust. *International Journal of Construction Education and Research*, 12(3), 179–192. <https://doi.org/10.1080/15578771.2015.1118170>
- The American Institute of Architects, California Council. (2014, July 15). *Integrated Project Delivery: An updated Working Definition - lean IPD*. <https://leanipd.com/wp-content/uploads/2017/11/IPD-A-Working-Definition-FINAL.pdf>



Reed, B. W. (2017, January 24). "Blurred Lines": Important Caveats to Consider with Integrated Project Delivery (IPD). <https://www.stoel.com/legal-insights/article/blurred-lines%E2%80%9D-important-caveats-to-consider-wit>

United States v. Spearin, 248 U.S. 132 (1918)

Xie, H., & Liu, H. (2017). Studying contract provisions of shared responsibilities for Integrated Project Delivery under national and international standard forms. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 9(3).  
[https://doi.org/10.1061/\(asce\)la.1943-4170.0000220](https://doi.org/10.1061/(asce)la.1943-4170.0000220)