



Building Information Modeling for Infrastructure (BIM4I) Program



BIM4I Implementation Plan Update



September 2026

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Executive Summary

The California Department of Transportation (Caltrans) identified implementing Building Information Modeling for Infrastructure (BIM4I) as a strategic action. Caltrans published a BIM4I Initiative Implementation Plan in April 2023. Subsequently, Caltrans established the BIM4I Program under the Division of Project Management in 2024. This BIM4I Implementation Plan Update coordinates previous BIM4I implementation efforts with the [BIM4I Program 2026-2030 Strategic Plan](#) and addresses needs identified in the BIM4I Assessment Report, which was completed in January 2026.

This BIM4I Implementation Plan Update establishes the priorities and milestones for BIM4I implementation at Caltrans. It focuses on implementation activities that address inter-disciplinary collaboration, discipline maturity, and workforce development. This update serves as a baseline for Divisions to develop their own Roadmaps for BIM4I and for Districts to develop their own Work Plans to align with the implementation efforts. The BIM4I Program implementation strategy involves development teams formed from District and Division staff to explore and assess technical solutions that are then formalized into updated standard operating procedures that are proven to accomplish BIM4I Program goals.

The BIM4I Implementation Plan Update proposes a robust progress and performance monitoring dashboard. The dashboard would track performance of the BIM4I Program progress and pilot project outcomes. The dashboard is proposed to draw from task plans that define implementation activities using standard fields that populate a database visualized by the dashboard. The dashboard would report progress across Caltrans subdivisions, project characteristics (including size, complexity, and work types), and track resources spent on the program. The BIM4I Program implementation plan also includes an initial risk register with a prioritized list of risks and mitigations. The risk register should become a living document that is updated semi-annually.

The BIM4I Program Implementation Plan Update deployment strategy draws on an agile project management approach suitable for coordinating large teams-of-teams that need to choose practices and strategies to address their unique context. This ensures that BIM4I implementation results in a technical solution that is acceptable for users within their District or Division context, adequately addresses user needs, and controls technology risks.

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Introduction

The California Department of Transportation (Caltrans) is pursuing Building Information Modeling for Infrastructure (BIM4I) to initiate a transformative shift in its approach to delivering and managing transportation projects and asset lifecycle management.

Background

Caltrans identified BIM4I implementation as a strategic action in support of its [2020-2024 Strategic Plan](#), recognizing the need for more integrated, data-driven, and collaborative project delivery practices. Subsequently in 2021, Caltrans identified Project Delivery Division leads for BIM4I efforts in Construction, Design, Engineering Services, Environmental Analysis, Project Management, and Right of Way and Land Surveys. Caltrans published a [BIM4I Initiative Implementation Plan](#) in April 2023. Later that year, the Division of Construction published an implementation plan for [Digital Construction Management Technology](#) in response to Assembly Bill 1037, enacted in 2022. To further coordinate these efforts, Caltrans established the BIM4I Program under the Division of Project Management in 2024 to lead the BIM4I implementation efforts, with Division leads becoming part of the cross-divisional program.

The BIM4I Program has convened [annual BIM4I Summits](#) starting in 2024. The summits brought together contractors, consultants, partners, and internal staff to exchange lessons learned and provide feedback on BIM4I implementation. The BIM4I Program developed a 5-year [BIM4I Program 2026-2030 Strategic Plan](#) to provide unified direction and a framework for the statewide development and deployment of BIM4I. The BIM4I Program 2026-2030 Strategic Plan identified the need for maturity and gap assessments, which were completed in January 2026.

Purpose

This BIM4I Implementation Plan Update coordinates previous BIM4I implementation efforts with the BIM4I Program 2026-2030 Strategic Plan and addresses needs identified in the BIM4I Assessment Report. It establishes a plan for implementing BIM4I over the five-year period from 2026 through 2030.

This BIM4I Implementation Plan Update establishes the priorities and milestones for Caltrans. It focuses on implementation activities that address inter-disciplinary collaboration, discipline maturity, and workforce development. This plan serves as a baseline for Divisions and Districts to make their own more detailed

roadmaps or task plans as needed. A BIM4I Program Roadmap will be developed to communicate the key milestones and priorities.

Strategic Alignment

The BIM4I Program 2026-2030 Strategic Plan is aligned with the Caltrans mission, vision, goals, and values. Caltrans is committed to innovation, collaboration, and long-term stewardship; these principles are central to the implementation of BIM4I.

The BIM4I Program 2026-2030 Strategic Plan establishes the vision and mission statements for the BIM4I Program, which are in the box to the right of this page. The plan further establishes five Focus Areas, each with associated goals and objectives. This BIM4I Implementation Plan Update provides a group of activities that address all five focus areas and supports each of the goals and objectives in the five-year horizon from 2026 to 2030.

BIM4I Program Vision

Leading digital innovation by integrating BIM4I into Caltrans project delivery and asset lifecycle management practices.

BIM4I Program Mission

Develop, implement, and maintain seamless digital project delivery and asset lifecycle management processes through collaboration with stakeholders.

BIM4I Program

The BIM4I Program leads the BIM4I implementation and integration efforts for Caltrans. The desired goal of the BIM4I Program is to integrate BIM4I into Caltrans project delivery and asset lifecycle management practices. Caltrans has a **BIM4I Program Director** who oversees the activities of the BIM4I Program.

There is also a BIM4I Program Committee that provides strategic direction and guidance to the BIM4I Program for the implementation of BIM4I throughout Caltrans. The committee members are comprised of Caltrans executive management as listed in the BIM4I Program Committee Charter.

Implementation requires developing policies, procedures, standards, guidance, and training. **All Project Delivery Divisions and each District will need to contribute expertise and support to make the program successful.**

Activities

This BIM4I Implementation Plan Update includes a series of activities with sub-tasks that advance each of the focus areas, goals, and objectives in the Caltrans BIM4I Program 2026-2030 Strategic Plan. Appendix A describes the deployment strategy for developing, testing, formalizing, and updating standard operating procedures (SOPs) in an incremental, agile process using pilot projects. Appendix B summarizes the alignment between the activities and the strategic plan. The timelines for each activity are reported using fiscal year (FY) quarters, i.e., July 1 to September 30, 2026, is “Q1 FY27.”

Activity 1: Monitor Implementation and BIM4I Performance

Develop and implement BIM4I Program controls. This includes a reporting system, dashboard, and a risk register. The dashboard will monitor implementation progress and BIM4I performance outcomes as described in Appendix A. The dashboard would facilitate tracking implementation progress and BIM4I performance across the BIM4I Program as a whole and segmented according to involved Divisions, Districts, work types, project size, and BIM4I uses. The next chapter of this plan provides suggested metrics for consideration. Appendix C provides a starting point for the program risk register.

Outcomes: A dashboard to transparently monitor BIM4I Program implementation progress and BIM4I performance. A risk register to track BIM4I Program risks, ratings, prioritization, and mitigation measures.

Tasks

- 1.1 **Define BIM4I Program Performance Metrics:** Create a suite of metrics to monitor progress of the implementation across all Divisions and Districts.
- 1.2 **Define BIM4I Pilot Project Performance Metrics:** Create a suite of metrics to monitor progress and outcomes of applying BIM4I on projects.
- 1.3 **Establish Measurement Methods:** Determine how to collect the information for each metric, the reporting time interval, workflow for capturing the data, and evaluate the baseline and target for each metric as applicable. Appendix A describes how to implement Task Plans to capture the data.
- 1.4 **Implement the Reporting System:** Create the database and forms to collect the data and set up the dashboards. Test with stakeholders, incorporate feedback, and refine the reporting system.

- 1.5 **Deploy the Reporting System:** Publish the dashboard, distribute forms as necessary to collect data semi-annually. Use the dashboards to generate insights and distribute to stakeholders.
- 1.6 **Maintain the Reporting System:** Adjust metrics, database, forms, and dashboards as needed in response to feedback and stakeholder needs.
- 1.7 **Manage Risks:** Develop a risk register and update semi-annually to proactively manage risks associated with how BIM4I is used on projects as well as the implementation process.

Table 1: Timeline for Activity 1

No.	Task	Start	End
1.1	Define BIM4I Program Performance Metrics	Q1 FY27	Q1 FY27
1.2	Define BIM4I Pilot Project Performance Metrics	Q1 FY27	Q1 FY27
1.3	Establish Measurement Methods	Q2 FY27	Q3 FY27
1.4	Implement the Reporting System	Q4 FY27	Q1 FY28
1.5	Deploy the Reporting System	Q2 FY28	Ongoing
1.6	Maintain the Reporting System	Q2 FY28	Ongoing
1.7	Manage Risks	Q1 FY27	Ongoing

Roles and Responsibilities

Table 2: Roles and Responsibilities for Activity 1

Role	Responsibilities
BIM4I Program Committee	- Provide strategic input to monitor progress and performance. - Receive semi-annual reports.
BIM4I Program Director	- Plan the work and secure the resources to execute the work with guidance from the BIM4I Program Committee. - Responsible for ensuring each task is executed. - Prepare semi-annual reports.
BIM4I Project Delivery Division Leads	- Provide input into the risks, metrics, and measurement methods. - Assist in testing the forms and dashboards. - Complete any distributed forms.
Districts	- Provide input into the risks, metrics, and measurement methods. - Receive semi-annual reports. - Complete any forms distributed by the BIM4I Program.

Resources

- Technology:** Allocate resources and establish a dashboard and forms to populate the dashboard database.
- Staffing:** Staff time to execute tasks such as establishing reporting system.
- Coordination:** As identified in Table 2.

Responsible Division(s): Division of Project Management

Supporting Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Right of Way and Land Surveys, Districts

Activity 2: Division BIM4I Roadmaps

Each relevant Division (i.e., Construction, Design, Engineering Services, Environmental Analysis, Project Management, and Right of Way and Land Surveys) establishes a Roadmap for BIM4I within the Division purview. The Division of Engineering Services BIM4I Roadmap is an example of a Division BIM4I Roadmap. The Division BIM4I Roadmaps are coordinated with the BIM4I Program Roadmap and with other Division BIM4I Roadmaps to develop a statewide approach for implementing BIM4I. This activity ensures that each Division is planning for how BIM4I affects information exchanges between Divisions and project development phases, while maintaining independence and autonomy in how BIM4I is used by the Division.

Outcomes: BIM4I Roadmaps for each Division to align BIM4I efforts around a shared understanding of how Divisions will exchange digital information to support project delivery functions, as well as how BIM4I will benefit each Division. The Division BIM4I Roadmaps will assist the Districts to plan their resources to support Divisions with pilot projects and manage expectations for technology and workflow changes that will affect productivity and training needs.

Tasks

2.1 **Create Division BIM4I Roadmap Task Force:** Form a Task Force responsible for developing the Division BIM4I Roadmap. Include staff from the Division and identify liaisons in Divisions that exchange information with the Division during project delivery.

2.2 **Identify Elements for BIM4I Roadmap:** Coordinate with the BIM4I Program Director to identify relevant elements for the Division BIM4I Roadmap. The Division BIM4I Roadmap should address:

- which BIM4I use cases to develop and when,
- which project types or criteria to address and when,
- how to strengthen data management practices,
- anticipated technology changes,
- anticipated training needs,
- coordination with other Divisions for linear versus parallel developments,
- milestones for changes to SOPs affecting how Districts deliver projects.

2.3 **Prioritize Use Cases for Roadmaps:** Identify, prioritize, and assign milestones for implementing BIM4I use cases considering dependencies between other Divisions, such as how different disciplines exchange information during project delivery. The Roadmap Task Force should consider a range of BIM4I use cases and objectives including

- Incorporating model-based information into project delivery processes,
- Managing model-based and model-derived information in a Common Data Environment (CDE),
- Use of 3D models for visualization,
- Applications of 4D (Scheduling) & 5D (Cost) models, if feasible,
- Exchanging model-based or model-derived design information,
- Integration or delivery of GIS-based information,
- Development and delivery of Digital As-Builts,
- Applications of technologies creating or using digital project information including Unmanned Aerial Systems (UAS), e-Ticketing, and geospatial positioning.

2.4 **Prioritize Project Types:** Identify, prioritize, and assign milestones for implementing the priority BIM4I use cases on different types of projects. Consider how project characteristics including work type and contract value affect the risk of implementing new workflows or technologies, as well as how other Division BIM4I Roadmaps prioritize project types.

2.5 **Consider Change Management:** Evaluate the technology and staff change management needs, including changes to the design authoring software configuration, CDE deployment, workflow changes, and training needs. Review BIM4I use case and project type/complexity milestones to ensure that they accommodate the time needed for change management.

2.6 **Create Division BIM4I Roadmap:** Document the priorities, milestones, and other BIM4I Roadmap elements into a concise roadmap. Present the Division BIM4I Roadmap to the BIM4I Program Director and Districts.

2.7 **Coordinate with Districts:** Coordinate with Districts to identify projects that can support the Division's needs for developing and testing technology, workflows, and/or guidance prior to updating SOPs as described in Appendix A. Partner with Districts to deliver projects, develop or test BIM4I methods, capture feedback, provide technical support, or deliver training.

2.8 **Monitor Progress:** Work with the BIM4I Program Director to report progress on executing the Division BIM4I Roadmap.

Table 3: Timeline for Activity 2

No.	Task	Start	End
2.1	Create Division BIM4I Roadmap Task Force	Q1 FY27	Q1 FY27
2.2	Identify Elements for BIM4I Roadmap	Q1 FY27	Q3 FY27
2.3	Prioritize Use Cases for Roadmaps	Q2 FY27	Q4 FY27
2.4	Prioritize Project Types	Q2 FY27	Q4 FY27
2.5	Consider Change Management	Q3 FY27	Q1 FY28
2.6	Create Division BIM4I Roadmap	Q3 FY27	Q1 FY28
2.7	Coordinate with Districts	Q1 FY28	Ongoing
2.8	Monitor Progress	Q1 FY28	Ongoing

Roles and Responsibilities

Table 4: Roles and Responsibilities for Activity 2

Role	Responsibilities
BIM4I Program Committee	Monitor progress of Divisions in implementing the BIM4I Roadmaps.
BIM4I Program Director	- Provide guidance in the development of Division BIM4I Roadmaps. - Support Divisions to coordinate roadmaps with other Divisions and with Districts. - Monitor progress of Divisions in implementing the BIM4I Roadmaps.
BIM4I Project Delivery Division Leads	- Lead the development of the BIM4I Roadmap for their Division. - Coordinate with other Division BIM4I Roadmap Task Forces to represent Division interests and needs. - Coordinate with Districts to identify projects to develop or test BIM4I methods, provide support, or deliver training.
Districts	- Provide input to Division BIM4I Roadmap Task Forces as appropriate. - Identify projects that fit with Division BIM4I Roadmap milestones for developing and testing BIM4I methods. - Provide feedback to the Divisions during the delivery of projects developing or testing BIM4I methods. - Provide resources to train staff on new methods or technologies.

Resources

- Technology:** Use software applications to develop the Roadmaps and to publish official Roadmaps to websites.
- Staffing:** Staff time to participate in the Roadmap Task Force and to create and execute roadmaps.
- Coordination:** As identified in Table 4.

Responsible Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Project Management, Division of Right of Way and Land Surveys

Supporting Division(s): Division of Traffic Operations, Districts

Activity 3: District BIM4I Work Plans

Each District establishes a Work Plan for how to allocate project resources to support BIM4I implementation, including developing and testing BIM4I methods on projects and preparing staff to use new BIM4I SOPs as they are established. The Division BIM4I Roadmaps provide the priorities and milestones for BIM4I implementation.

Outcomes: Each District has a Work Plan to manage expectations for District staff and how project resources are needed to support BIM4I implementation. New BIM4I methods are developed with District input and tested by Districts to confirm expected outcomes and user acceptance before being formalized into SOPs. District staff are adequately prepared to implement BIM4I SOPs when they are released.

Tasks

- 3.1 **Create District BIM4I Work Plan Task Force:** Form a Task Force responsible for developing the District BIM4I Work Plan.
- 3.2 **Review BIM4I Roadmaps:** Coordinate with the BIM4I Program Director to review the BIM4I Program Roadmap and individual Division BIM4I Roadmaps. Evaluate how the District projects and staff may be affected by BIM4I implementation.
- 3.3 **Identify Elements for District BIM4I Work Plan:** Coordinate with the BIM4I Program Director to identify relevant elements for the District BIM4I Work Plan. The work plan should address:
 - Projects that have the complexity, work type, and timing that fit with Division milestones for developing and testing BIM4I methods.
 - Anticipated technology changes and the impact on District staff.
 - Anticipated training needs and the impact on District resources.
 - Milestones for new SOPs being released that Districts need to plan for.
- 3.4 **Identify Potential Pilot Projects:** Review programmed projects to identify projects that have the complexity, work type, and timing that fits with Division milestones for developing and testing BIM4I methods. Prioritize projects to recommend for the pilot project program as described in Appendix A.

- 3.5 **Plan Technology Change Management:** Review milestones for technology changes and create a plan to implement hardware and/or software updates to prepare for when new SOPs are released.
- 3.6 **Plan Staff Training:** Review milestones for new SOPs being released and create a plan to train staff to implement the SOPs on new projects starting after the release date.
- 3.7 **Document District BIM4I Work Plan:** Review inputs to the District BIM4I Work Plan with BIM4I Project Delivery Division Leads to confirm expectations. Document the potential pilot projects, key milestones, and resource needs into a District BIM4I Work Plan. Present the District BIM4I Work Plan to the BIM4I Program Director.
- 3.8 **Monitor Progress:** Monitor Division BIM4I Roadmap progress and any changes to milestones and adapt District BIM4I Work Plan accordingly. Monitor progress with the District BIM4I Work Plan and review resource allocation, as necessary.

Table 5: Timeline for Activity 3

No.	Task	Start	End
3.1	Create District BIM4I Work Plan Task Force	Q1 FY28	Q1 FY28
3.2	Review BIM4I Roadmaps	Q1 FY28	Q2 FY28
3.3	Identify Elements for District BIM4I Work Plan	Q2 FY28	Q2 FY28
3.4	Identify Potential Pilot Projects	Q1 FY28	Ongoing
3.5	Plan Technology Change Management	Q3 FY28	Q4 FY28
3.6	Plan Staff Training	Q3 FY28	Q4 FY28
3.7	Document District BIM4I Work Plan	Q1 FY29	Q2 FY29
3.8	Monitor Progress	Q3 FY30	Ongoing

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Roles and Responsibilities

Table 6: Roles and Responsibilities for Activity 3

Role	Responsibilities
BIM4I Program Committee	Monitor progress of Districts in executing the BIM4I Work Plans.
BIM4I Program Director	- Provide guidance in the development of District BIM4I Work Plans. - Support Districts to coordinate Work Plans with Divisions. - Monitor progress of Districts in executing the BIM4I Work Plans.
BIM4I Project Delivery Division Leads	- Provide input on the District BIM4I Work Plans and how they align with the Division BIM4I Roadmaps. - Provide updates to Districts regarding progress in developing, testing, and formalizing BIM4I methods into SOPs and any changes in milestones or project characteristics.
Districts	- Develop District BIM4I Work Plans. - Identify projects that align with District BIM4I Work Plan milestones. - Provide the technology and training resources for project staff in accordance with the Division BIM4I Roadmap milestones.

Resources

- Technology:** Use software applications to create the District BIM4I Work Plans. Deploy technology updates in accordance with Division BIM4I Roadmaps.
- Staffing:** Staff time to participate in the development of the District BIM4I Work Plans. Allocate staff time for training in accordance with Division BIM4I Roadmaps and District projects.
- Coordination:** As identified in Table 6.

Responsible Division(s): Districts

Supporting Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Project Management, Division of Right of Way and Land Surveys, Division of Traffic Operations

Activity 4: Engage Internal and External Stakeholders

Develop and execute a plan to coordinate and track the many stakeholder engagement activities identified in the BIM4I Program 2026-2030 Strategic Plan, including change management and communications management. A stakeholder engagement plan typically identifies stakeholders, assigns a liaison

for each stakeholder, lists the engagement objectives, identifies suitable channels, and tracks engagement activities.

Outcomes: Measurable progress executing the stakeholder engagement activities identified in the BIM4I Program 2026-2030 Strategic Plan. Streamlined and coordinated engagement with internal and external stakeholders to ensure that BIM4I implementation addresses both Caltrans and external partners. Ultimately, a BIM4I implementation that supports high user acceptance and achieves the objectives identified in the BIM4I Program 2026-2030 Strategic Plan.

Tasks

- 4.1 **Identify Internal and External Stakeholders:** Consolidate existing stakeholder lists. Review the BIM4I Program 2026-2030 Strategic Plan stakeholder engagement strategies and identify any additional internal and external stakeholders to meet all engagement needs. Document the engagement needs for each stakeholder.
- 4.2 **Coordinate with Related Initiatives:** Identify related internal initiatives such as developing asset information framework, requirements, and the Digital Products Catalog (DPC) that support asset lifecycle management. Meet with initiative leads to identify areas requiring coordination and mutual interests that can be streamlined or consolidated.
- 4.3 **Identify Leads for Each Stakeholder:** Assign a person to lead engagement with each stakeholder. In some cases, there may be multiple engagement leads based on different engagement objectives. Regional stakeholders may have engagement leads from a District. Consider succession planning for engagement leads for critical stakeholders.
- 4.4 **Identify Stakeholder Engagement Channels:** Identify channels (e.g., BIM4I website, BIM4I Summit, working groups, e-newsletters, training, webinars, social media) to reach each stakeholder to fulfill the engagement needs.
- 4.5 **Consider Tracking and Update Mechanisms:** Consider how stakeholder engagement will be tracked or how to measure the outcomes, as well as how often the plan needs to be updated. The plan should be a living document and can scale to meet the coordination needs. It can be as simple as a spreadsheet, could be a database and dashboard, or could be a formal document.
- 4.6 **Create a Plan:** Create the plan and tools needed to track engagement. The title of the plan could be the BIM4I Change Management and Communication Plan.

4.7 **Execute the Plan:** Engage stakeholders using the identified channels, track engagements, maintain contact lists, and routinely review performance. Update the plan as needed to accomplish the objectives identified in the BIM4I Program 2026-2030 Strategic Plan.

Table 7: Timeline for Activity 3

No.	Task	Start	End
4.1	Identify Internal and External Stakeholders	Q1 FY27	Q1 FY27
4.2	Coordinate with Related Initiatives	Q1 FY27	Ongoing
4.3	Identify Leads for Each Stakeholder	Q1 FY27	Q1 FY27
4.4	Identify Stakeholder Engagement Channels	Q2 FY27	Q2 FY27
4.5	Consider Tracking and Update Mechanisms	Q2 FY27	Q4 FY27
4.6	Create a Plan	Q2 FY27	Q4 FY27
4.7	Execute the Plan	Q4 FY27	Ongoing

Roles and Responsibilities

Table 8: Roles and Responsibilities for Activity 3

Role	Responsibilities
BIM4I Program Committee	Assist with establishing stakeholder relationships as needed.
BIM4I Program Director	- Plan the work and secure the resources to execute the work. - Responsible for ensuring each task is executed. - Outreach and collaborate with external stakeholders, such as construction industry. - Execute the work.
BIM4I Project Delivery Division Leads	- Assist with identifying stakeholders, engagement needs, and viable channels for accomplishing objectives. - Lead assigned stakeholder engagements and track engagement activities in accordance with the plan.
Districts	- Assist with identifying stakeholders, engagement needs, and viable channels for accomplishing objectives. - Lead assigned stakeholder engagements and track engagement activities in accordance with the plan.

Resources

- **Technology:** BIM4I website with published BIM4I materials for Caltrans staff and stakeholders. Potentially, forms, a database, and a dashboard for tracking and reporting engagement activities.
- **Staffing:** Staff time from BIM4I Program and IT to support and maintain the BIM4I website and any tracking tools. Staff time for engagement activities.
- **Coordination:** Internal coordination as identified in Table 8. External coordination via established working groups or planned engagements.

Responsible Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Project Management, Division of Right of Way and Land Surveys

Supporting Division(s): Division of Information Technology, Division of Maintenance, Division of Research, Innovation, and System Information, Division of Traffic Operations, Division of Transportation Planning, Office of Asset Management, Districts

Activity 5: Procure, Configure and Deploy CDE(s)

According to ISO 19650, a CDE is an agreed source of information for a project or asset for storing, managing, and sharing data in a managed process. A CDE *solution* refers to the technology to support the CDE, while a CDE *workflow* refers to the managed processes. This activity is to procure a CDE solution, develop CDE workflows, configure the CDE solution to implement the workflows, and deploy the CDE for use on project. This will involve all the steps identified in Appendix A to develop, test, formalize, and release the CDE as a SOP.

Outcome: A configured CDE solution, CDE workflows documented in a procedure manual, with the CDE solution provisioned for project staff who are trained in how to execute the CDE workflows as a SOP.

Tasks

- 5.1 **Document Requirements for the CDE Solution:** Based on prior testing of CDE solutions, document the technical requirements for the CDE to support the procurement process.
- 5.2 **Procure the CDE Solution:** Procure a CDE solution that meets the technical requirements. Consider a phased approach to the number of users as part of the license agreement based on the plan for developing and testing the SOPs and how the SOPs will be rolled out onto projects.

- 5.3 **Develop the CDE Workflows:** Using ISO 19650-2 and experience on prior testing of CDE solutions, refine and test the CDE workflows and metadata for managing project information using pilot projects per Appendix A.
- 5.4 **Configure CDE Solution for Users:** Configure user group permissions for different categories of internal and external users based on the read/write access needs to data at different stages in the project. Consider using mock advertisements to test the configurations for bidders in a simulated advertisement process to ensure that concerns identified in the risk register are fully mitigated. Use ISO 19650-5 and work with the Division of Information Technology Infrastructure Management to address cybersecurity needs.
- 5.5 **Develop a CDE Procedures Manual:** Document the CDE workflows into a procedures manual that clearly identifies how to implement the CDE workflows based on project delivery roles, which should align with user group permissions in the CDE solution configuration. Consider how to allocate the responsibility for establishing new projects on the CDE. Develop and test the procedures manual, as well as training for users, using pilot projects per Appendix A.
- 5.6 **Deploy CDE:** Once the procedures manual is released as a SOP for projects, install the CDE solution on user's workstations, provision licenses, and add users to appropriate user groups to assign permissions. Provide user training consistent with the procedure manual and their project roles.

Table 9: Timeline for Activity 5

No.	Task	Start	End
5.1	Document Requirements for the CDE Solution	Q1 FY27	Q2 FY27
5.2	Procure the CDE Solution	Q1 FY27	Q4 FY29
5.3	Develop the CDE Workflows	Q4 FY27	Q4 FY28
5.4	Configure CDE Solution for Users	Q3 FY28	Q1 FY29
5.5	Develop a CDE Procedures Manual	Q3 FY28	Q4 FY29
5.6	Deploy CDE	Q1 FY30	Ongoing

This section deliberately left blank. Activity 5 continues on the next page.

Roles and Responsibilities

Table 10: Roles and Responsibilities for Activity 5

Role	Responsibilities
BIM4I Program Committee	Provide strategic input regarding policies or requirements for the CDE.
BIM4I Program Director	- Manage the procurement of the CDE solution. - Form a development team to develop the CDE workflows, configure the CDE solution, and develop the procedures manual. - Monitor progress with developing and deploying the CDE. - Secure resources for this activity.
BIM4I Project Delivery Division Leads	- Provide input on requirements for the CDE solution. - Represent Division as a member of the CDE development team. - Provide training and support for implementing the CDE on projects.
Districts	- Request resource allocation as needed and appropriate. - Identify projects to develop and test CDE procedures and provide feedback. - Provide the CDE technology and training resources for project staff in accordance with BIM4I Program Roadmap milestones. - Outreach and collaborate with external stakeholders, such as construction industry, e.g., for mock advertisement to test configuration.

Resources

- Technology:** Resources to procure CDE platform and licenses (in phases) for use in development, testing, and deployment on projects as a SOP.
- Staffing:** Vendor, BIM4I Program staff and IT support to configure the CDE solution, staff time to test CDE workflows and provide feedback.
- Coordination:** As identified in Table 10.

Responsible Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Project Management, Division of Right of Way and Land Surveys

Supporting Division(s): Division of Information Technology Infrastructure Management, Division of Procurement and Contracts, Division of Research, Innovation, and System Integration, Districts

Activity 6: BIM4I Education and Training

The BIM4I Program 2026-2030 Strategic Plan identifies needs for training in addition to the basic training that project staff will need to adapt to new SOPs. It also identifies several strategies for deploying training both to internal staff and external partners. The BIM4I education and training should be coordinated with the Division and BIM4I Program Roadmaps, District BIM4I Work Plans, and the stakeholder engagement plan that addresses change management needs.

Outcome: Measurable progress preparing the internal and external workforce for adopting new BIM4I SOPs. Demonstrably effective training resources that support a range of stakeholder needs, including on-demand training, role-based training, tiered training modules, and targeted training sessions.

Tasks

- 6.1 **Review Initial Training Needs:** Review the BIM4I Program 2026-2030 Strategic Plan and stakeholder engagement plan to identify training needs and delivery strategies not specific to the Division BIM4I Roadmaps, e.g., data security requirements and compliance training. Review existing training and education material and determine if materials meet immediate needs.
- 6.2 **Deliver Initial Training:** Identify existing materials, procure materials, or develop new materials to meet initial training needs. Deliver and track initial training in accordance with the stakeholder engagement plan. Capture feedback from recipients on the effectiveness of the training.
- 6.3 **Identify Future Training Needs:** Review Division and Program BIM4I Roadmaps to identify the type and timing of training needs. Update the stakeholder engagement plan to incorporate these training needs. Work with Divisions to create a plan for developing and delivering the training, considering strategies identified in the BIM4I Program 2026-2030 Strategic Plan.
- 6.4 **Support District BIM4I Training Deployment:** Review District BIM4I Work Plans to identify the type and timing of training needs. Work with Districts to identify training strategies, such as on-demand (web-based), targeted sessions for external partners, and train-the-trainer models for in-person support and training for project teams.

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Table 11: Timeline for Activity 6

No.	Task	Start	End
6.1	Review Initial Training Needs	Q1 FY29	Q2 FY29
6.2	Deliver Initial Training	Q3 FY29	Q1 FY30
6.3	Identify Future Training Needs	Q4 FY29	ongoing
6.4	Support District BIM4I Training Deployment	Q1 FY30	ongoing

Roles and Responsibilities

Table 12: Roles and Responsibilities for Activity 6

Role	Responsibilities
BIM4I Program Committee	Provide strategic input on training needs and delivery models.
BIM4I Program Director	- Responsible for securing resources, delivering, and tracking training that is not specific to the Division BIM4I Roadmaps. - Support Districts to identify training strategies to prepare the workforce for new BIM4I SOPs per Division BIM4I Roadmaps. - Outreach and collaborate with external stakeholders to identify and meet external partner training needs.
BIM4I Project Delivery Division Leads	- Responsible for developing training that is specific to the Division BIM4I Roadmaps. - Support Districts to identify strategies and deliver training to prepare the workforce per Division BIM4I Roadmaps. Responsible for providing training to District trainers as needed.
Districts	- Responsible for delivering training to implement the new SOPs in accordance with the Division BIM4I Roadmaps and District BIM4I Work Plan. - Track training completion in accordance with Activity 1. - Outreach and collaborate with external stakeholders, such as construction industry to identify training needs.

Resources

- Technology:** Learning management tools for online, on-demand training. Training development tools, e.g., PowerPoint, media editing software. Training delivery tools such as webinar platforms with transcript and recording capability. Website to host on-demand training materials that do not need to be managed through a learning management system.
- Staffing:** BIM4I Program staff to maintain electronic training materials. Division staff time to develop training and support Districts to deliver training. Division staff time to deliver training.
- Coordination:** As identified in Table 12.

Responsible Division(s): Division of Construction, Division of Design, Division of Engineering Services, Division of Environmental Analysis, Division of Project Management, Division of Right of Way and Land Surveys

Supporting Division(s): Division of Maintenance, Division of Research, Innovation, and System Information, Division of Traffic Operations, Division of Transportation Planning, Districts

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Measuring Progress and Performance

There are two categories of metrics to evaluate the BIM4I Program's success. The first measures the progress of implementing BIM4I across all Caltrans Districts and Divisions. These are BIM4I Program Metrics. The second category measures the effectiveness of BIM4I on projects. These are BIM4I Performance Metrics.

BIM4I Program Metrics

The Activities described above provide a structure for a holistic BIM4I implementation through updated SOPs for staff in each District and Division. Each of the Activities involves work by many development teams within the Districts and Divisions. Appendix A describes the Deployment Strategy for executing this Plan. As part of that deployment strategy, the BIM4I Program Director tracks the active tasks throughout the agency using task plan forms that Division and District teams fill out.

Task plans facilitate tracking, managing, and coordinating this department-wide implementation. Task plans should use a standard form that populates a database to facilitate dashboards that report progress across Districts and Divisions. Each team lead should check in with the BIM4I Program Director and update progress semi-annually.

Demographic Metrics

Demographic information enables segmenting the dashboard to analyze progress across:

- ☐ Divisions,
- ☐ Districts,
- ☐ Functional units,
- ☐ Pilot project BIM4I use cases,
- ☐ Pilot project types,
- ☐ Pilot project work types, and
- ☐ Pilot project size.

Productivity and Cost Metrics

Tracking costs and labor hours supports developing finance letters, workload planning, information for project managers to manage the budget, and demonstrating the level of investment. It may be possible to automate collecting these metrics from existing accounting systems.

Metrics include:

- Labor hours by classification,
- Direct costs, and
- Project schedule performance.

Development Work Type Metrics

There are six areas of work that are needed to update the SOPs. Task plans should track what types of work are involved to ensure that all implementation needs are being addressed. These areas are:

1. **Technology:** Providing stable and functional hardware and software that serves users in the office and field work environments. The technology area includes procuring, testing, and configuring new hardware and software, setting up testing environments, establishing acceptance requirements, acceptance testing, and deploying technology to users.
2. **Workflows:** Developing, testing, and documenting workflows that accomplish the stated goals in a repeatable and reliable manner.
3. **Information Requirements:** Clearly and comprehensively documenting the requirements for information to be exchanged.
4. **Policy:** Developing interim manuals and guidance to provide clear direction to project teams and issuing BIM4I Memorandums.
5. **Workforce Development:** Developing training materials, holding training classes, creating job aids, and providing technical support.
6. **Deployment Support:** Stakeholder engagement, outreach, and providing resources for supervisors, managers, and project managers to estimate the time and resources for applying the new methods on initial projects.

BIM4I Piloting and Performance Metrics

The BIM4I Assessment Report introduced two piloting stages, the Evaluating stage, and the Assessing stage. In the Evaluating stage, the focus is on proving the technology architecture and developing the workflows. In the Assessing stage, the goal is to verify that the new workflows and technical resources (a) accomplish the intended goals and (b) meet the needs of users before being formalized into SOPs. These could be tracked using a standard form for pilot project check-ins. Example metrics at each project stage are shown below.

Design Metrics

Pilot project check-ins could occur at each milestone, such as Project Approval & Environmental Document (M200), 60% Constructability Review (M313), 90% Constructability Review (M315), PSE to DOE (M377), Ready-To-List (M460), Approve Contract (M500), and Contract Acceptance (M600). Metrics could include:

- ❑ Number of projects using a BIM Execution Plan (BEP),
- ❑ Number of BIM4I model standards compliance checks completed,
- ❑ Number of CADD standards compliance checks completed,
- ❑ Number of clashes detected and resolved, and
- ❑ Number of design reviews completed using the federated model.

Advertising Stage Metrics

These metrics would track how much and how consistently digital information is being provided to contractors to support their bidding processes. These include:

- ❑ Number of projects with digital files provided,
- ❑ Number of projects with documentation for the digital files (e.g., BEP and information regarding how the files are organized),
- ❑ Number of projects with open data format deliverables,
- ❑ Number of contractor firms represented at the pre-bid meeting,
- ❑ Number of firms downloading digital files,
- ❑ Number of bidders,
- ❑ Number of bidder inquiries, and
- ❑ Bid price analysis (range, median, deviation from engineer's estimate).

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Construction Stage Metrics

These metrics would track how digital information is being used in construction, the outcomes, and how much digital information is delivered to support maintenance, operations, and asset management functions. These include:

- ❑ Number of projects with supplemental CADD files provided,
- ❑ Number of projects with documentation for the CADD files,
- ❑ Number of projects with deliverables using open data formats,
- ❑ Number of partnering sessions related to BIM4I,
- ❑ Number of projects producing digital as-built records,
- ❑ Number of projects providing digital record deliverables,
- ❑ Number of Requests for Information related to BIM4I,
- ❑ Number and value of issues and claims resolved using digital information,
- ❑ Number and value of design changes resulting from errors or omissions,
- ❑ Time taken to complete design changes,
- ❑ Number of days early or late completing the project, and
- ❑ Cost analysis (deviation from bid price and total construction cost).

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Risk Management

The BIM4I Project Delivery Division Leads identified risks in the following seven categories:

- **Financial:** Incurs unbudgeted costs.
- **Operational:** Interruption to normal business operations.
- **Legal/Compliance:** Violates a regulation, policy, or rule of law.
- **Security/Fraud:** Unauthorized intervention by a bad actor.
- **Reputation:** Loss of credibility.
- **Safety:** Causes physical harm to people.
- **Competitive:** Loss of business partners.

The identified risks have been expanded into a risk register that is in Appendix C. The BIM4I program will establish and maintain a risk register as part of Activity 1. The risk register in Appendix C is an initial source. The risk rating process is subjective; initially, risks are rated to prioritize and to inform the strategy for managing risks. The product of probability and severity ratings informs the urgency of managing the risk. The probability and severity ratings themselves inform the strategy for managing risks. There are four strategies:

- **Accept:** Applicable to low probability, low severity risks.
- **Manage:** Applicable to high probability, low severity risks.
- **Mitigate:** Applicable to low probability, high severity risks.
- **Avoid:** Applicable to high probability, high severity risks.

Risk management is an ongoing process. The risk register should be a living document that is revisited quarterly and explicitly identifies the risk management strategy for each identified risk. Once the mitigation or management strategies are in place, the risks should be reassessed. Risks that are fully addressed should be retired.

Appendix A: Deployment Strategy

This BIM4I Implementation Plan Update is for the BIM4I Program as a whole. It is designed to use an agile approach to managing the activities required to implement BIM4I throughout the project delivery process at Caltrans. There is a robust set of metrics to track progress across Divisions, Districts, and strategic focus areas. The risk assessment prioritizes risks based on the probability and impact of the risk events and identifies mitigation measures that are incorporated into the activities of the plan.

Disciplined Agile Delivery

The deployment strategy draws on [Disciplined Agile Delivery \(DAD\)](#), which is a people-first, context-sensitive, learning-oriented hybrid agile approach for organizations to evolve their way of working. The Project Management Institute owns the intellectual property for DAD though its origins are in the technology industry. DAD is a tested, streamlined process that addresses the development, technology architecture (e.g., hardware, software, and their configurations), management, requirements, documentation, and governance aspects of a technology-driven change.

Caltrans cannot interrupt project development to implement BIM4I, a circumstance that agile project management was designed to address.

DAD recognizes that teams need to be able to choose the practices and strategies to address their unique context. This implies that the implementation teams have both the technical basis and the domain expertise to make good choices. Agility implies both an implementation process that can adapt quickly and that the people doing the implementation work are willing to adapt when needed to keep progressing towards the overall objectives. DAD recognizes that similar organizations have similar problems with similar solutions; it embraces the need to look to existing solutions at peer organizations and consider how they might be localized to the organization's context.

Goal-Driven Deployment

DAD teams are goal-driven, rather than regimented in how they do the work. DAD recognizes that stakeholder needs are multifaceted and that there are multiple techniques or practices to consider in developing the solution. The goal-driven approach enables more flexibility to scale more easily and adapt to changing stakeholder needs.

DAD identifies three phases, each of which has its own goals, along with ongoing goals. The three phases are inception, development, and transition. Figure 1 is a goal diagram for the BIM4I Program. This BIM4I Implementation Plan Update is the last activity in the inception stage. Previous activities included developing the BIM4I Program 2026-2030 Strategic Plan and the BIM4I Assessment Report.

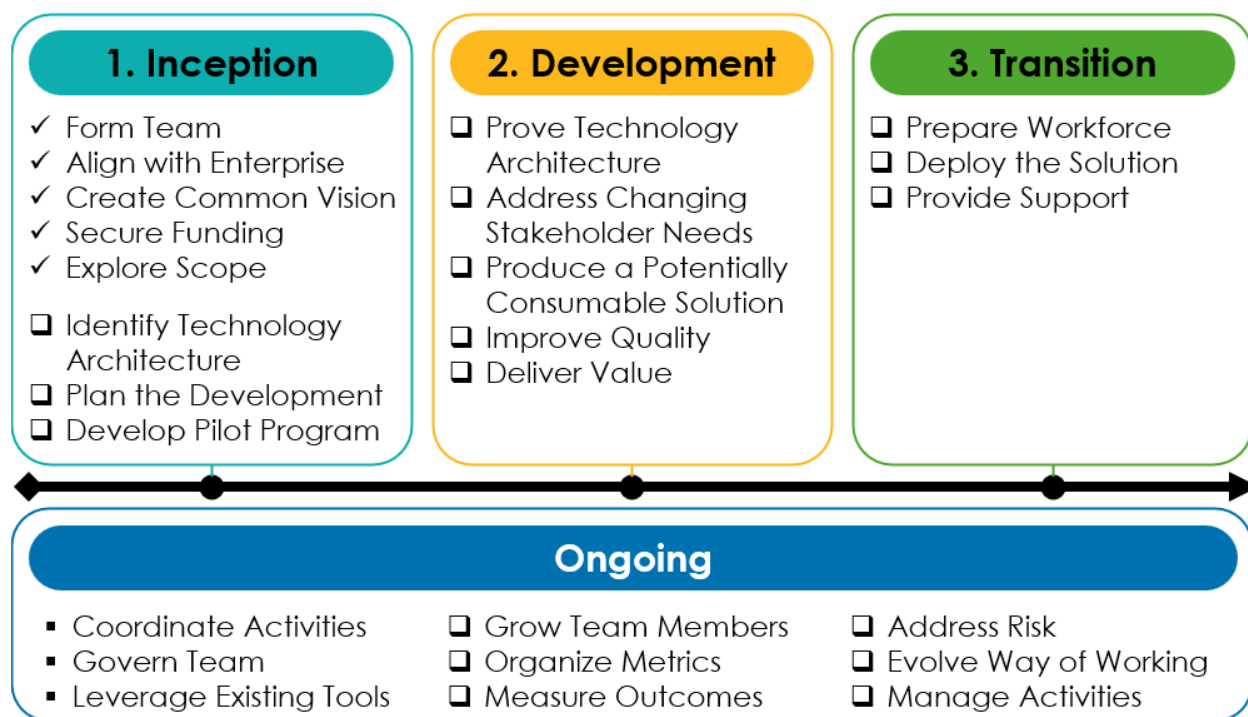


Figure 1: Goals for the Three Phases and Ongoing Goals

As Figure 1 shows, many of the inception goals have already been accomplished. The team has formed the BIM4I Program 2026-2030 Strategic Plan to establish the alignment with Caltrans strategic goals and established a vision. The BIM4I Assessment Report explored the scope, and the BIM4I Program Director secures resources in partnership with the BIM4I Program Committee.

The remaining goals for the inception phase are identifying the technology architecture, planning the development, and developing the pilot program. Of the ongoing goals, three are already underway. These are coordination activities, team governance, and leveraging existing tools. This BIM4I Implementation Plan Update identifies metrics and risks to initiate the ongoing goals associated with measuring outcomes and addressing risks. It will also provide a structure for managing the development activities in a way that supports tracking metrics and managing risks. The activities identified in this plan address the development and transition phase goals.

Delivery Lifecycles

DAD supports a range of delivery lifecycles that are defined for different contexts. A delivery lifecycle establishes roles and responsibilities over the delivery period. The delivery lifecycles that apply are the Program lifecycle, which is for managing a team-of-teams (i.e., for BIM4I implementation program management), and the Exploratory lifecycle, which applies to the individual development activities driven by the Districts and Divisions to move the program forward across Caltrans.

BIM4I Program Management

The [Program lifecycle](#) is designed for developing solutions to complex problems that require a large team to do the work, and where the solution is a platform or a suite of closely coupled solutions. This describes how the disciplines interface within the context of a project and how the Districts interface with one another and headquarters. The technology stack represents closely coupled technical solutions for each discipline; the technical solutions produce data that needs to integrate within a Common Data Environment (CDE) to deliver a project.

Program Team-of-Teams

The Program lifecycle structures the team-of-teams and establishes the roles and responsibilities for teams through the initiation and operations phases. It is designed to support the needs of self-organizing teams. The core teams are:

- [Program Management](#): Provides executive authority and oversight, allocates resources, coordinates the team of teams, and tracks progress.
- [Technology Architecture Ownership](#): Makes decisions regarding the technology stack, provisions technology, and represents technology constraints.
- [Product Ownership](#): Represents the end users and domain requirements and makes decisions on features and the user interface.
- [Development Teams](#): Do the work to develop the technology solution within the constraints of the technology architecture and product requirements.

Program management is performed by the BIM4I Program Director with support and guidance from the BIM4I Program Committee. Technology architecture and Product ownership are performed by the BIM4I Project Delivery Division Leads with concurrence by the BIM4I Program Director. Development teams are formed by the Districts and headquarters Divisions. Each of these groups is

independently responsible for planning and delivering its work, proactively moving efforts forward, and engaging with the BIM4I Program Director as needed.

Table 13 describes the team responsibilities during the initiation and development phases. Detailed responsibilities for Districts and Divisions are defined in the Project Delivery (PD) Directive [PD-17](#), "Building Information Modeling for Infrastructure (BIM4I) Implementation".

Table 13: Team-of-Teams Responsibilities in for BIM4I Program Management

Team	Initiation Phase	Development Phase
BIM4I Program Committee	Establish the vision. Provide guidance to develop enterprise technology architecture and roadmap.	Monitor metrics and Division Roadmaps / District Work Plans.
BIM4I Program Director	Coordinate vision, enterprise technology architecture, and roadmap. Secure resource needs.	Coordinate team activities. Assign work items, provide technology architecture strategy, and communicate direction. Implement metrics tracking and distribute resources.
BIM4I Project Delivery Division Leads	Provide technology architecture and product subject matter expertise to establish strategy, assess gaps, and develop roadmap.	Serve as a champion within their Division and as a task leader, product owner, and/or technology architecture owner for development activities.
Divisions	Provide domain context to support all decisions related to technology architecture, product, and standards.	Receive work items to execute, communicate dependencies, issues, and feedback to BIM4I Program Director. Report on metrics.
Districts	Provide domain context to support all decisions related to project delivery and workforce development.	Receive work items to execute, communicate dependencies, issues, and feedback to BIM4I Program Director. Report on metrics.

Program Lifecycle

In the Program lifecycle, the BIM4I Program Director coordinates work done in parallel by teams in the Districts or Divisions. The BIM4I Program Director also coordinates integration and cross-team testing. Figure 2 shows the program lifecycle for BIM4I.

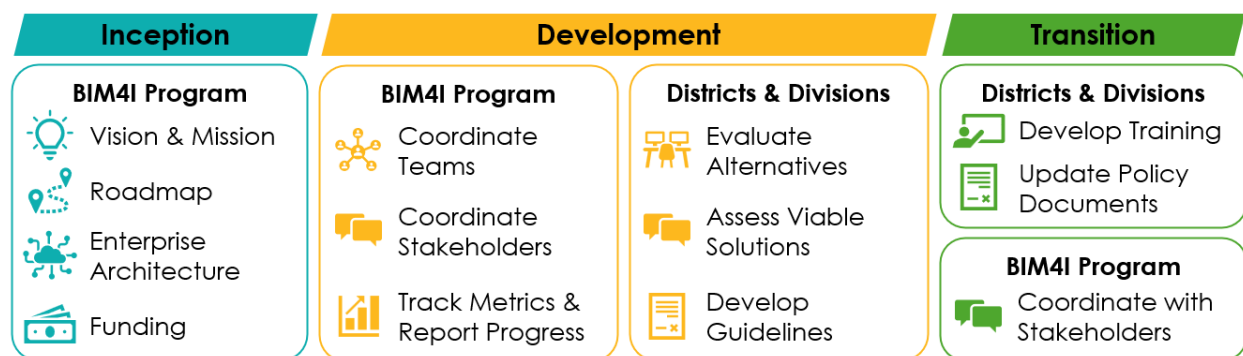


Figure 2: Program Lifecycle for BIM4I at Caltrans

Once the results demonstrate a consumable solution, that solution gets released into production. In the BIM4I context, “released into production” means:

- ❑ deploying software or updating software configurations,
- ❑ formalizing processes and procedures into updated standards and guidelines,
- ❑ issuing a BIM4I Memorandum, and
- ❑ delivering training so project teams can implement the new SOPs independently.

The BIM4I Program Director uses the following tools to coordinate the work:

- **Task Plans:** The Division and District teams fill out task plan forms that describe the work items in a way that feeds the metrics dashboard.
- **Pilot Project Program:** This is a structured approach to managing the activities being executed using the Exploratory lifecycle. This is described in more detail below.
- **Dashboard:** A visual reporting tool that facilitates analyzing and tracking progress in focus areas such as data standards, workflow standards, and workforce development across projects, Districts, and Divisions.

Pilot Project Program

The [Exploratory lifecycle](#) is based on the Lean Start-Up principle and provides a structured way to develop solutions that minimizes up-front investments. The Exploratory lifecycle is effectively a pilot project approach to developing a technical solution. It tests small incremental solutions under real-world project delivery conditions and measures the outcomes, makes refinements, and tests the next increment. The increments could be new software product or a new configuration for a software product to add features or resources. It could also be a new workflow with an existing software product, or even new training materials to introduce a workflow. Figure 3 shows the Exploratory lifecycle.

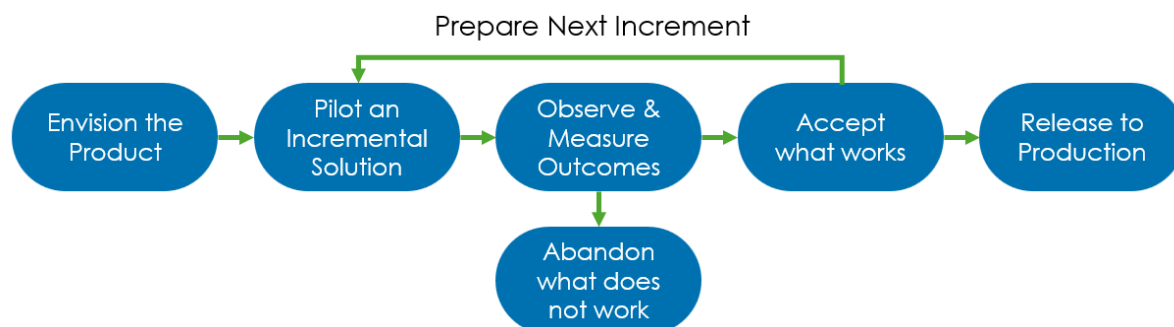


Figure 3: The Exploratory Lifecycle

Each pilot project is a single test of an incremental solution. Pilot projects are important because they enable solutions to be tested in a real production environment and capture meaningful feedback from independent testers. Pilot projects occur during the Development phase of the Program Lifecycle.

Two-Stage Piloting

The BIM4I Assessment Report introduced five stages in developing a solution, as shown in Table 14. The Evaluating and Assessing stages refer to the two pilot project stages. In the Evaluating stage, the increments being tested are small and the testers are often part of the development team. In the Assessing stage, many small increments have been consolidated into a larger increment, and the testers tend to be independent of the development team.

Table 14: BIM4I Gap Assessment Model Development Stages

Level Name	Description	Level Threshold
Not Started	No action taken.	Initial action taken.
Evaluating	Exploring options, early piloting where norms are defined within project execution.	Insights from pilots are compiled into a set of norms to be tested in each District.
Assessing	Preliminary norms defined and tested through broader piloting.	Feedback from piloting and incorporated into an updated set of norms that are ready to formalize into the policy framework.
Formalizing	Finalized norms being incorporated into policy framework.	Updated policy documents have been reviewed and adopted as agency policy.
Deployed	Standard operating procedure across the agency program.	Agency policy is updated, and norms are part of SOPs.

The Evaluating stage results in a “minimum viable product,” which is a combination of a software configuration, workflow documentation, and exchange requirements documentation. The Evaluating stage requires a team

with more in-depth software and domain expertise than the typical user base. The development team needs to innovate workflows, configure software, create documentation, and solve problems with each of these aspects.

In the Assessing stage, the minimum viable product is independently tested to ensure that it accomplishes the objectives and is consumable by typical users. The Assessing stage can be likened to user acceptance testing. It needs to confirm that the technology stack, software customizations, and workflows are acceptable for end users. The development team may need to provide training or support to the independent testing team, and these needs should be documented to help develop training materials in the Formalizing stage.

When the development team lead is satisfied that the acceptance criteria are met, it is time to conclude piloting and move into the Formalizing stage. The acceptance criteria are:

- The technology is stable and meets functional and ergonomic needs.
- The workflows are developed, tested, and documented sufficiently so that independent teams can implement them in a standard way.
- Requirements for information exchange are documented clearly and comprehensively.

Releasing to Production

In the context of BIM4I, releasing to production is the Formalizing stage, in which a validated solution is incorporated into the policy framework and then deployed to users. This includes updating standards, provisioning, or updating software on user workstations, training users, and issuing a BIM4I Memorandum.

The work in the Formalizing stage needs to accomplish the following:

- Update policy and guidance to provide clear direction to project teams.
- Work with the District and Division supervisors and managers to allocate resources for training.
- Provide guidance to District and Division project managers to estimate the time and resources for applying the new methods on initial projects.
- Issue a BIM4I Memorandum to clarify when projects need to move to the new technology and/or workflow.

Once the BIM4I Memorandum is issued, the solution has moved to the Deployed stage.

Pilot Project Roles and Responsibilities

DAD recognizes primary and supporting roles. Primary roles are actively engaged in developing solutions whereas supporting roles provide as-needed assistance typically to provide subject matter expertise related to technology architecture or business needs.

The relevant DAD primary and supporting roles are:

- **Product Owner:** represents the needs and desires of the stakeholder community and decides what solutions to build and when.
- **Technology Architecture Owner:** owns the technology architecture decisions for the team and proactively manages risks associated with the technology stack.
- **Team Lead:** guides a self-organizing team in performing technical activities and meeting commitments to the product owner.
- **Team Member:** in the Evaluating stage, designs, tests, and analyzes the solution for stakeholders.
- **Stakeholder:** someone who is affected by the outcome of the solution, including end users and supervisors or managers.
- **Independent Tester:** in the Assessing stage, implements the draft guidelines or beta technical solution in a production environment and provides feedback to the development team to evaluate the acceptance criteria.

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Table 15 identifies DAD role assignments within the BIM4I Program.

Table 15: DAD Responsibility Assignments on Pilot Projects

Role	Responsible Parties	Pilot Project Responsibilities
Product Owner	BIM4I Program Director and Division Leads	✓ Work with Team Leads to develop task plans. ✓ Represent user needs and make final decisions about workflows. ✓ Check in with Team Leads to monitor progress on task plans. ✓ Coordinate with Stakeholders to identify pilot projects.
Technology Architecture Owner	BIM4I Program Director and Division Leads	✓ Work with Team Leads to develop task plans. ✓ Manage technology-related risks. ✓ Clarify technology requirements. ✓ Resolve issues with technology.
Team Lead	BIM4I SME Workgroup Member	✓ Work with the product owner to develop task plans. ✓ Develop and maintain the BEP for the project. ✓ Support the Team Members to develop solutions and resolve issues.
Team Member	District and/or Division project delivery staff	✓ Deliver the pilot project in accordance with the BEP. ✓ Work with the Team Lead to develop solutions and to identify and resolve issues.
Internal Stakeholders	District and/or Division Supervisors and Managers	✓ Contribute requirements to help plan task plans. ✓ Allocate resources to pilot projects. ✓ Participate in after-action reviews. ✓ Articulate training and resource needs.
External Stakeholders	Industry working group and pilot project partners	✓ Participate in mock bids and pilot projects as contractor, permit agency, or reviewer. ✓ Participate in after-action reviews.
Independent Tester	District and/or Division project delivery staff	✓ Deliver a project using a refined technology and/or workflow solution with minimal support. ✓ Document issues and work with the Team Lead to resolve them. ✓ Participate in after-action reviews.

Task Plans

Task plans implement the [DAD Work Item List](#) process, which break the implementation work down into small, achievable increments that can be iterated quickly to develop a solution. A task plan should be limited to a scope that can be described with clearly defined objectives with finite resource needs and within a short time boundary.

Work plans should include the following information:

- ❑ Names of the individuals fulfilling core roles, such as: Team Lead, Product Owner, and Technology Architecture Manager.
- ❑ The requirements for the solution expressed as features or outcomes that the solution achieves.
- ❑ The product and technology architecture constraints for the solution.
- ❑ Clear acceptance requirements for the solution and associated documentation.
- ❑ The start date and end date.
- ❑ How the work will be resourced, such as staff hours, budgeted expenses, and how to allocate the resources on timesheets and expense reports.
- ❑ A series of incremental tasks with associated deadlines.
- ❑ Demographic information to support program management, such as the relevant District and/or Division and which disciplines are involved.

Task plans should not span across the BIM4I development stages identified in Table 14. However, they can span multiple increments shown in Figure 3. Each development team (which is typically self-organizing and comprised of staff within a District or Division) should develop its own task plan with the BIM4I Program Director.

A task plan for a development team working on a minimum viable product in the Exploring stage would capture tasks like gathering requirements, configuring software, after-action reviews from trials or pilot projects, and issues to fix in the next increment. A task plan for the independent testing team in the Assessing phase would capture tasks to onboard and support pilot projects with the Districts. This would include communicating resource needs, identifying priorities, providing initial training, providing ongoing support, routine check-ins, and after-action reviews.

Appendix B: Activity Strategic Alignment

This appendix organizes the relevant tasks according to the focus areas they support. Each table presents the associated goals, objectives and task identifiers associated with each proposed activity.

Focus Area 1: Engagement, Transparency, Awareness, Education, and Outreach

Goal 1: Increase Stakeholder Awareness and Understanding

- Objective 1 is Develop and distribute educational materials, which is addressed in Activity 2, Activity 3, and Activity 6.
- Objective 2 is Conduct targeted engagement sessions to enhance knowledge sharing, which is addressed in Activity 2, Activity 3, Activity 4, and Activity 6.

Goal 2: Foster Collaboration and Process Improvements through Stakeholder Engagement

- Objective 1 is Communicate BIM4I implementation materials with internal stakeholder needs, which is addressed in Activity 4.
- Objective 2 is Strengthen engagement with external stakeholders and partners to align BIM4I implementation with industry needs, which is addressed in Activity 4.

Focus Area 2: Data Management and Security

Goal 1: Establish Data Management Practices for Secure, Efficient and Reliable Use of BIM4I Deliverables

- Objective 1 is Strengthen data validation within BIM4I project deliverables, which is addressed in Activity 2, Activity 3, and Activity 5.
- Objective 2 is Enhance secure data-sharing protocols through a common data environment and enterprise data management system, which is addressed in Activity 5.
- Objective 3 is Provide data security requirements and compliance training to all BIM4I users, which is addressed in Activity 6.

Focus Area 3: Digital Workflows, Standards Development, and Compliance

Goal 1: Develop & Implement Digital Workflows and Processes

- Objective 1 is Develop and integrate digital workflows across all stages of project delivery, which is addressed in Activity 2 and Activity 3.
- Objective 2 is Assist BIM4I users with adoption of digital workflows, which is addressed in Activities 2, 3, 5, and 6.

Goal 2: Develop and Implement Data Standards

- Objective 1 is Standardize BIM4I data requirements, including modeling practices, metadata, and interoperability standards, which is addressed in Activity 2 and Activity 3.
- Objective 2 is Align BIM4I data standards with industry and regulatory guidelines, which is addressed in Activity 2 and Activity 4.

Goal 3: Comply with BIM4I Regulations and Policies

- Objective 1 is Monitor compliance with Assembly Bill (AB) 1037 from 2022 and other relevant regulations, which is addressed in Activity 1.
- Objective 2 is Establish a comprehensive compliance framework for BIM4I adoption, which is addressed in Activity 1.

Focus Area 4: Executing BIM4I: Use Cases, Pilots, and Deployment*Goal 1: Establish a Structured Approach to Piloting BIM4I Initiatives*

- Objective 1 is Define/prioritize BIM4I use cases to be deployed through project delivery phases, which is addressed in Activity 2.
- Objective 2 is Identify and launch pilot projects based on defined selection criteria, which is addressed in Activity 2 and Activity 3.
- Objective 3 is Define criteria and methods for evaluating pilot success and transition to deployment, which is addressed in Activities 1, 2, and 3.

Goal 2: Scale Successful BIM4I Pilots into Full-Scale Deployment

- Objective 1 is Develop a structured plan for scaling BIM4I adoption, which is addressed in Activity 2 and Activity 3.
- Objective 2 is Integrate BIM4I technologies into standard project delivery, which is addressed in Activity 2 and Activity 3.

Focus Area 5: Training and Workforce Development*Goal 1: Build and Sustain Internal Staff Competencies*

- Objective 1 is Establish structured, role-based training program for new and current employees, which is addressed in Activity 2, Activity 3, and Activity 6.
- Objective 2 is Develop BIM4I expertise across the Districts, which is addressed in Activity 3 and Activity 6.

Goal 2: Expand BIM4I Knowledge & Adoption Among External Partners and Contractors

- Objective 1 is Provide targeted training sessions tailored to external partners, which is addressed in Activity 4.

- Objective 2 is Develop and distribute guidance materials to support contractor adoption, which is addressed in Activity 4.

Goal 3: Establish Working Groups to Drive BIM4I Implementation

- Objective 1 is Form specialized working groups to lead technical activities within the BIM4I Implementation Plan Update, which is addressed in Activity 2, Activity 3, and Activity 4.

Appendix C: Risk Register

The risk register includes risks identified by the BIM4I Project Delivery Division Leads in a workshop in October 2025. The risks identified were expanded into this risk register, which includes the following information:

- Risk: A brief description of the risk event.
- Cause: The root cause of the circumstances that lead to the risk event occurring.
- Effect: The consequence to Caltrans if a risk event occurs.
- Type: The category of negative outcome, e.g., time, cost, safety.
- Probability (P): A rating between 1 (low) and 5 (high) of the likelihood of the event occurring.
- Impact (I): A rating between 1 (low) and 5 (high) of the severity of the negative outcome if the event occurs.
- Urgency (U): The product of the Probability and Impact ratings between 1 (low) and 25 (high).
- Mitigation Notes: Actions that can mitigate either the probability of the risk occurring or the severity of the negative outcome should the event occur.

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Table 16: Risk Register

Risk	Cause	Effect	Type	P	I	U	Mitigations
Quality Management	No clear workflows, insufficient training, or no clear Quality Control (QC) processes for digital deliverables	Inability to produce quality deliverables leads to potential cost or schedule overruns in construction	Cost, Time	4	5	20	Develop standards Develop job aids Conduct outreach
Quality Management	QC procedures do not have clear pass/fail criteria, methods are insufficient, or people lack the experience to execute	Quality issues escape to the final deliverables resulting in potential cost or schedule overruns	Cost, Time	4	5	20	Develop standards Develop job aids Conduct outreach
Quality Management	No standards or QC protocols for model-based deliverables	Non-standard files released for bidding creating confusion for bidders may lead to higher unit prices or fewer bidders	Cost	5	4	20	Develop standards Develop job aids Conduct outreach
Buy-in from Maintenance/Operations	Cannot implement asset data transfers without buy-in from Maintenance & Operations who steward and use the data.	Time and cost incurred collecting data that is not used or is not fit for purpose.	Cost, Time	4	4	16	Coordinate with Maintenance/Operations staff to identify their as-built data needs
Lack of internet connectivity	Remote rural sites are not adequately covered by cellular data or broadband.	Unable to access digital data or unaware of changes to digital files stored on the cloud because they cannot synchronize, leading to delays or rework	Time, Cost	4	4	16	Cellular data availability as pilot project criteria Technology requirements for offline functionality
Quality Management	Quality Control procedures do not have clear pass/fail criteria, methods are insufficient, or people lack the experience to execute	Quality issues undetected, resulting in acceptance of unsafe infrastructure	Safety	3	5	15	Develop standards Develop job aids Conduct outreach
Worker distraction	Using technology in the field requires focus, which could lead to a person being distracted while exposed to heavy equipment	Negative safety outcomes for workers	Safety	3	5	15	Train field workers on safe use of technology
Compliance with professional practice laws	How to seal surveys and designs is controlled by state law.	Unable to provide digital data as the primary source of information because it cannot be sealed in compliance with the law. Need to spend time and money on developing traditional deliverables	Cost, Time	5	3	15	Work with Legal to develop compliant methods
Legal requirements for sharing data	New guidelines are needed for how to legally share data.	Unable to provide digital data as the primary source of information because each discipline needs to be sealed separately to clearly establish professional responsibility. Need to spend time and money on developing traditional deliverables	Cost, Time	5	3	15	Work with Legal to develop compliant methods

Risk	Cause	Effect	Type	P	I	U	Mitigations
Return on Investment	Savings in using BIM4I process/deliverables may be difficult to calculate or are not tracked	Unable to demonstrate the return on investment for BIM4I implementation erodes support for transformation and leaves less efficient processes in place	Cost, Time	5	3	15	Define metrics to track costs and benefits of BIM4I implementation
Delayed resource allocation	It takes a long time to allocate resources.	Delays in implementing BIM	Time	3	4	12	Identify resource needs when planning implementation activities
Slow deployment of functional units	Functional units not ready for change in workflow/deliverables.	Benefits of new workflows and deliverables are delayed or missed.	Cost, Time	4	4	12	Prove technology architecture early. Plan and deliver training
Contractors are not ready to use digital information	Contractors lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which affects their risk profile and costs.	Increased caution using digital information results in increased checks or hesitation and delays in executing work	Cost, Time	4	3	12	Develop standards Conduct outreach
Project resourcing process does not align to BIM4I needs	BIM4I changes the job functions and level of effort for engineers, surveyors, and technicians working on projects.	Project resources are misallocated for executing BIM4I resulting in missed KPIs or misaligned levels of effort leading to missed opportunities to improve the design with BIM.	Cost, Time	4	3	12	Document BIM4I competencies and align to job families Provide workflow aligned training
Change in deliverables	Designers need to learn a new process to produce different kinds of deliverables	Time and cost incurred during the learning curve not adequately budgeted	Cost, Time	4	3	12	Provide guidance to project managers and District design managers on resource needs
Scalability	Procedures and standards may not be adequate for Districts to follow	Confusion leads to wasted time or lack of consistency in how digital deliverables are created, reviewed, and delivered	Cost, Time	4	3	12	Prove technology architecture early. Plan and deliver training
Need to transition efforts from piloting to training	Wrong balance of developing enhanced workflows vs. updating standard workflows.	Old, inefficient workflows continue because staff have not been trained in new, more efficient methods.	Cost, Time	4	3	12	Prove technology architecture early. Plan and deliver training
Training in new workflows and deliverables	Training is costly to develop and deploy	Costs incurred for workforce development that are not adequately budgeted	Cost, Time	4	3	12	Develop training materials that can be deployed asynchronously

Risk	Cause	Effect	Type	P	I	U	Mitigations
External Agency coordination	Lack of outreach or clear messaging for external agencies.	External agencies do not support BIM4I and continue to require traditional deliverables.	Cost, Time	4	3	12	Work with external partners to clarify alternate formats e.g., Right of Way (ROW) exhibits, PDFs, GIS layers, etc.
Contractors are not ready to use digital information	Contractors lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which affects their risk profile and costs.	Mistakes interpreting digital information result in rework, causing delays and potential cost increases	Cost, Time	2	5	10	Develop standards Conduct outreach
Cost/Benefit of implementing	BIM4I is costly to implement, and the benefits are not clear or easy to measure.	BIM4I has a negative return on investment.	Cost	2	5	10	Define metrics to track costs and benefits of BIM4I implementation
Fairness in bidding violations	Common Data Environment is not properly configured to limit contractors' access to files prior to the bidding window.	Access to source data and files may be allowed prior to bid opening, violating rules and invalidating a bid.	Time, Legal	2	5	10	Validate the CDE security workflows with mock bids
Unapproved information shared	Controlled Unclassified Information (CUI) or other sensitive materials not properly marked or CDE not properly configured.	Unauthorized access to digital data	Legal	2	5	10	Validate the CDE security workflows with simulated CUI or sensitive materials
Vendor locking files	Data hosted on a vendor service is locked by a vendor.	High costs to regain access to data.	Cost	2	5	10	Adopt open data standards Conduct outreach
Vendor locking files	Data hosted on a vendor service is locked by a vendor.	Loss of access to data and an inability to comply with sunshine laws.	Legal	2	5	10	Legal review of terms and conditions
Public agencies not ready for digital delivery	Public agencies lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which limits their ability to perform reviews and/or issue permits.	Permitting agencies require plans, leading to duplicated source of truth, less efficient design process, and increased design time and cost.	Cost, Time	5	2	10	Develop standards Conduct outreach
Public agencies not ready for digital delivery	Public agencies lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which limits their ability to perform reviews and/or issue permits.	Delays in issuing permits.	Cost, Time	3	3	9	Work with external partners to clarify alternate formats e.g., ROW exhibits, roll plot PDFs, GIS layers, etc.

Risk	Cause	Effect	Type	P	I	U	Mitigations
Contractors are not ready to use digital information	Contractors lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which affects their risk profile and costs.	Fewer bidders lead to a less competitive environment and higher costs for Caltrans	Cost	2	4	8	Develop standards Conduct outreach
Public agencies not ready for digital delivery	Public agencies lack the hardware, software, skillsets, experience, and/or have not yet developed processes for using digital data, which limits their ability to perform reviews and/or issue permits.	Incomplete reviews lead to issues in construction that cause cost and/or schedule overruns	Cost, Time	2	4	8	Work with external partners to clarify alternate formats e.g., ROW exhibits, roll plot PDFs, GIS layers, etc.
Interruption of competitive bidding	More technically capable contractors have an advantage in bidding.	Some contractors always win and others lose more than typical. Some contractors stop bidding on Caltrans work, leading to less competition and higher costs.	Cost	2	4	8	Develop standards Conduct outreach
Lack of funds to implement BIM4I	Discontinuation of BIM4I Finance Letter	Loss of overall long-term investment ceases development of more efficient workflows. Possible impacts on ability to meet regulatory requirements.	Legal, Cost, Time	2	4	8	Prioritize activities aligned with AB 1037 requirements Track implementation investments and outcomes
California Transportation Commission Support	District requests more funding for BIM4I without demonstrating clear value or benefits.	CTC considers BIM4I too costly and denies further funding, stalling implementation and leaving less efficient processes in place	Cost, Time	2	4	8	Define metrics to track costs and benefits of BIM4I implementation
Additional costs for small businesses	Small businesses need to buy new hardware and software, train staff, and potentially hire new staff.	Increased construction cost or loss of participation by small businesses leading to missed targets for small business participation	Cost, Legal	4	2	8	Adopt open data standards Conduct outreach Provide software licenses, support & training for small businesses
Time spent on coordination	Extensive coordination is needed to implement BIM4I across the program.	Time and cost incurred that is not adequately budgeted	Cost, Time	2	2	4	Use the BIM4I Program website and/or an internally facing site to provide asynchronous coordination materials like plans, webinars, slide shows
Unapproved information shared	No NDA in place	Unable to seek legal recourse for unauthorized access to digital data.	Legal	2	2	4	Validate the CDE security workflows with simulated CUI or sensitive materials