



Caltrans 2026 BIM4I Peer Exchange

Building the Future Together: Partnering to Turn Ideas into Actions

Summary Report

Sacramento, California | March 12, 2026

Hybrid Format | May Lee State Office Complex

Prepared for: California Department of Transportation (Caltrans) Building Information Modeling for Infrastructure (BIM4I) Program



Executive Summary

The 2026 Caltrans BIM4I Peer Exchange convened Caltrans and peer state DOT leaders for a focused working session on how digital delivery programs move from pilot efforts to durable institutional practice. Organized around ISO 19650 as a shared framework, the discussion centered on how agencies define, govern, exchange, and use information across design, construction, operations, and asset management. Participants represented Caltrans and six peer state Departments of Transportation (DOTs): Iowa Department of Transportation (Iowa DOT), Minnesota Department of Transportation (MnDOT), Montana Department of Transportation (MDT), Pennsylvania Department of Transportation (PennDOT), Texas Department of Transportation (TxDOT), and Washington State Department of Transportation (WSDOT).

A consistent message throughout the exchange was that the value of BIM4I lies not in modeling sophistication alone, but in structured information that can be trusted, reused, and carried forward across the asset lifecycle. Participants repeatedly emphasized that information requirements must be defined with downstream users in mind before project delivery begins. When design, construction, maintenance, operations, and asset management needs are not aligned early, agencies are forced into repeated manual reconciliation at each handoff. ISO 19650 was discussed as a practical framework to help clarify organizational, project, asset, and exchange information requirements.

The presentations showed that progress depends as much on organizational design as on technical capability. Caltrans outlined its BIM4I implementation framework through ISO 19650 and emphasized the importance of information requirements, multi-platform coordination, and growing asset management involvement. PennDOT described its district-based path toward broader digital delivery institutionalization and its increasing focus on asset management. TxDOT emphasized the support infrastructure required to scale pilots statewide. MnDOT demonstrated how governance, asset data strategy, and lifecycle-based information management can produce measurable design, inspection, and funding benefits. MDT highlighted the importance of embedding digital delivery into permanent organizational structure and creating dedicated liaison roles to bridge pre-construction and construction. Iowa DOT illustrated both the value of interoperability standards and the challenges that arise when responsibility for maintaining and applying those standards is not clearly assigned. WSDOT showed how data dictionaries and shared property definitions can improve interoperability for specific asset classes such as traffic signs.

Across the day, several broader conclusions emerged. First, durable digital delivery programs require formal governance, defined organizational ownership, and repeatable processes supported by clear standards, rather than reliance on individual champions. Second, GIS is increasingly serving as the practical integration layer between project-delivery information and long-term asset systems. Third, national coordination is becoming more important as agencies confront the same interoperability, funding, and lifecycle data challenges. The exchange confirmed that while no single DOT has solved all these issues, the participating agencies are converging around a common set of questions and a shared direction for moving forward.



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Background

On March 12, 2026, the California Department of Transportation (Caltrans) hosted its first BIM4I peer exchange: a focused, small-group working session following the 2026 BIM4I Summit. The peer exchange brought together approximately 24 participants representing Caltrans headquarters alongside digital delivery leaders from six peer state departments of transportation: Iowa Department of Transportation (Iowa DOT), Minnesota Department of Transportation (MnDOT), Montana Department of Transportation (MDT), Pennsylvania Department of Transportation (PennDOT), Texas Department of Transportation (TxDOT), and Washington State Department of Transportation (WSDOT), several of whom participated virtually. Alexa Mitchell, Enterprise Digital Delivery Services Director at HDR, facilitated the day's sessions.

The event's theme, "Building the Future Together: Partnering to Turn Ideas into Actions," reflected the program's current stage: moving from early pilots and awareness building toward the development of shared standards, structured information requirements, and scalable delivery practices.

The peer exchange was organized around ISO 19650 as a shared conceptual framework, one that Caltrans is actively adopting and that several peer DOTs are exploring or implementing at varying stages of maturity. Unlike the larger public-facing Summit, the peer exchange was intentionally structured to support candid discussion: participants were invited to share not only their successes but their challenges, gaps, and uncertainties.

This report synthesizes the principal findings from the morning and afternoon sessions, drawing on session transcripts, the official peer exchange agenda, and presentation materials. Speaker remarks have been paraphrased rather than presented as a verbatim record, and key takeaways are highlighted following each major topic.



Figure 1. Participants in the 2026 Caltrans BIM4I Peer Exchange at the May Lee State Office Complex in Sacramento, California, on March 12, 2026



Table 1. Peer Exchange Participating Organizations and Key Participants

Name	Organization	Role / Title
Allen Melley	PennDOT	Chief, Digital Delivery Section (Virtual)
Alexa Mitchell	HDR	Enterprise Digital Delivery Services Director (Facilitator), Caltrans Consultant
Amy Fong	Caltrans	BIM4I Program Delivery and Guidance Manager
Andre Tokmakov	Caltrans	Division of Design (Virtual)
Angela Boardman	MnDOT	Digital Delivery Coordinator (Virtual)
Arnica MacCarthy	Caltrans	Environmental (Virtual)
Daniel Armstrong	Caltrans	Division of Construction
Devin Porr	Caltrans	BIM4I Program Director
George Moore	Caltrans	Division of Construction
Jacob Tambunga	TxDOT	Director of Digital Delivery
Jim Mahugh	WSDOT	Assistant State Design Engineer / WSDOT Digital Delivery Lead (Virtual)
Jonathan Yeo	Caltrans	Construction Manager
Kevin Huang	Caltrans	BIM4I Design Manager
Linda Chia	Value Management Strategies (VMS)	Caltrans Consultant
Lynn Hiel	Caltrans	Senior Bridge Engineer, BIM Specialty Branch
Mark Counts	Caltrans	Chief, BIM4I Survey Systems
Matt Miller	Iowa DOT	Director, New and Emerging Transportation Technologies (Virtual)
Mina Pezeshpour	Caltrans	Office Chief, Bridge Design South / BIM4I Group Lead
Nicole Williams	Kimley-Horn	Roadway Practice Leader (TxDOT Guest)
Omar Khan	Caltrans	Division of Design
Pat Lane	MDT	Digital Delivery Program Director
Paul Pak	Amheart Solutions	Caltrans Consultant
Shawn Blaesing	Iowa DOT	Maintenance GIS Coordinator / Digital Delivery Lead (Virtual)
Subu Nujella	Caltrans	CADD Manager
Suresh Dhakal	Caltrans	BIM4I Delivery and Guidance Engineer
Thomas Hamski	Iowa DOT	BIM Bridge Engineer (Virtual)
Tony English	Caltrans	Structure Construction Manager
Trisha Stefanski	MnDOT	Asset Management Program Office Director (Virtual)



Morning Session — Presentations: Defining BIM Standard Requirements Per ISO 19650

Welcome and Context Setting

Devin Porr, Caltrans BIM4I Program Director, opened the peer exchange by framing the day's purpose. The peer exchange followed two intensive days of the BIM4I Summit, and the smaller format was intentional—designed to shift from public presentation to working dialogue. Porr described the event as an opportunity to sit at the table with peers who are grappling with the same questions as Caltrans. He emphasized honesty about what is known, what is not, and what the path forward looks like when no one in the country has fully solved it yet.

Introductions revealed a group with diverse institutional contexts but consistent themes: all were navigating the challenge of moving BIM4I from a pilot or initiative to standard organizational practice; all were working to connect design-phase digital information to construction, asset management, maintenance, and operations; and all were managing the pace of technology development and the slower rhythms of policy, procurement, and workforce readiness.

The opening discussion also surfaced a perspective that extended the day's themes beyond design and construction. Matt Miller, Iowa DOT's Director of New and Emerging Transportation Technologies, noted that structured infrastructure data has value well outside any individual agency's internal operations: accurate, structured models are a practical foundation for work zone data exchange, commercial vehicle routing, and eventually autonomous vehicle readiness (data that flows outward to private industry and the traveling public, not just inward to maintenance crews). Miller also noted a LinkedIn post from that morning in which the ISO group announced it was renaming "Building Information Modeling" to "Building Information Management," dropping the word "modeling" entirely. He observed that the change confirmed what most practitioners already understood: the field had always been about managing information, not producing geometry.

Caltrans BIM4I Implementation Framework: Why ISO 19650 Matters

Mark Counts, Chief of BIM4I Survey Systems, and Lynn Hiel, Senior Bridge Engineer and BIM Specialist, opened the morning's formal presentations with an overview of Caltrans' approach to BIM4I implementation through the lens of ISO 19650. The session was framed not as a technical lecture but as an orientation to establish common language for the day's discussions.

Counts opened by grounding the conversation in operational scale. Caltrans manages more than 50,000 miles of highway network and delivers approximately 2,000 miles of new project information per year. Reframing "project delivery" as "information delivery" is itself a paradigm shift: engineers trained to think about the physical object they are putting in the ground, not the information that accompanies it. Without treating information as part of the asset (not merely a byproduct of construction), the agency has no path to using that information at scale for operations, maintenance, or AI-enabled asset management. Counts noted that without structure, scaling cannot happen; sending 100 survey crews into the field without a common data protocol produces 100 incompatible datasets, not a coherent infrastructure record.

Hiel introduced ISO 19650 as a framework for structuring how information is managed throughout the infrastructure lifecycle. The standard, adopted by 44 countries, establishes a discipline for the managed



exchange of information in collaborative, secure environments. Its core concept is the distinction between the project information model (PIM), built during delivery, and the asset information model (AIM), which governs operations and maintenance. Most organizations spend years building sophisticated PIMs and then fail entirely to operationalize the transition to the AIM; the handoff from project delivery to asset management is precisely where information value is most often lost.

The ISO 19650 framework organizes information governance through four sequential states: work in progress, shared, published, and archived. Counts illustrated these using an email analogy (drafting in your personal application, sharing with a reviewer, transmitting to the final recipient, archiving the thread) to explain why no single common data environment (CDE) is realistic for a large organization. Civil 3D for design, Trimble Connect for survey, Autodesk Construction Cloud (ACC) for construction management, and Bentley MicroStation for plan preparation are all legitimate work-in-progress environments. The ISO 19650 framework provides the structure to understand which platform should serve which information state and how information transitions between states at defined, validated handoff points.

Hiel described the concept of creating trust in information through validated digital handshakes. The digital handshakes are reliable promises between information providers and information receivers, documented with quality control reports and acceptance criteria. She also referenced the forthcoming revision to ISO 19650, noting that the 2026 update will combine Part 2 (project delivery) and Part 3 (operations) into a single nine-step lifecycle process. The update signals a broader recognition that siloed project and asset thinking must give way to integrated lifecycle information management.

Key Takeaways

Caltrans' 50,000-mile network delivers approximately 2,000 miles of new project information per year, reframing project delivery as information delivery is a prerequisite for managing that data at scale. ISO 19650 provides the framework for structuring information across the lifecycle: defining what is needed, by whom, and in what form, so that data accumulates authority rather than being recreated at every handoff. The multi-platform CDE reality (different tools for different information states) is not a deficiency but a natural organizational condition that the ISO 19650 framework is designed to accommodate.

Peer DOT Approaches to Developing Information Requirements

Following the Caltrans framework overview, representatives from five peer state DOTs presented their approaches to developing information requirements in support of design-to-construction delivery, asset management, and operations. Each agency's stage of maturity and institutional context shaped how ISO 19650 concepts were applied in practice.

PennDOT — Allen Melley, Chief of Digital Delivery (Virtual)

Melley described a program already past the early phases most peer DOTs are still navigating, moving from early digital delivery adoption toward broader institutionalization along a district-by-district ramp that extends through 2030. PennDOT had set a strategic goal of fully digital project delivery by 2025 and achieved it through an incremental, district-by-district ramp-up. The path forward is structured as a mandatory, district-by-district ramp: each of PennDOT's 11 districts must deliver two digitally delivered projects in 2027, three in 2028, and four in 2029. By 2029, every integral abutment bridge entering



design statewide must be delivered digitally. By 2030, five projects per district are required, and all new and reconstruction projects initiated in design (across the entire agency) must be delivered digitally. That endpoint is the practical definition of full institutionalization: not a program that runs alongside traditional delivery, but one that has replaced it.

A significant policy direction shapes PennDOT's approach: the agency does not want to prescribe design software in the future, thus evaluating IFC as a software-agnostic outcome is something they are focusing on to inform future requirements and free themselves of proprietary software mandates. PennDOT has piloted IFC deliverables on two bridge projects (one delivering IFC contractually while the other using IFC for information only), though road portions of those projects have used proprietary file formats. The agency is working toward making IFC the standard contractual deliverable across project types. PennDOT is currently piloting IFC as a contractual deliverable for bridge structures through its Advanced Digital Construction Management System (ADCMS) program, with the pilot entering construction in early 2026. To help contractors understand what they are receiving and what they can rely on, PennDOT publishes for every project a Model Element Breakdown Structure, a document that specifies exactly which objects are in the model at each design milestone, at what level of detail and information, updated by the design team as the project progresses. Melley noted that contractors have found this one of the most useful documents PennDOT produces: it answers the question every field team has when they open a model for the first time: what can be trusted, and what is still incomplete.

Melley noted that PennDOT is now developing its asset management strategic plan. Having achieved delivery-phase digital maturity, the agency is identifying the readily available assets for which construction-generated digital data can most readily be connected to operations and maintenance systems. Utility data capture is an active initiative: PennDOT is developing data schemas using ASCE 75 as a foundation, working with contractors to collect and submit utility data in structured formats, and pursuing legislation that would require digital utility records from highway occupancy permit holders.

PennDOT has also developed a distinctive approach to contractor engagement that addresses one of digital delivery's most persistent adoption barriers: the risk that contractors without BIM capabilities will be unable to compete effectively on model-based projects. On every digital delivery project, PennDOT provides all bidders with free access to Bentley Infrastructure Cloud so they can view, interact with, and extract data from the model before submitting a bid. This is paired with a mandatory pre-bid conference dedicated to training contractors on how to use the model viewer and extracting the information relevant to their scope. Melley described this as "leveling the playing field," ensuring that a guiderail subcontractor, for example, can go directly to the model and pull exactly the information needed to bid their portion of the work, without requiring a full BIM team or software investment.



Key Takeaways

The conversation highlights PennDOT as an example of a DOT that has progressed beyond early digital delivery adoption into the transition to institutionalize agency-wide digital project delivery by 2025 through a deliberate, district-by-district ramp-up with mandatory production targets that fully replace traditional delivery by 2030. Key takeaways include PennDOT's strategic emphasis on scalability and sustainability, avoiding prescribed design software by moving toward IFC as a software-agnostic contractual deliverable, clearly defining model reliability through the Model Element Breakdown Structure, and piloting these requirements through its Advanced Digital Construction Management System. With delivery-phase maturity largely achieved, the agency is now shifting focus to connecting construction-generated data to long-term asset management, starting with high-value assets such as utilities and aligning data schemas with national standards while pursuing legislative support. Equally notable is PennDOT's proactive contractor engagement model, which reduces barriers to participation by providing free model access and mandatory pre-bid training, effectively leveling the playing field and supporting broader industry adoption of digital delivery practices.

TxDOT — Jacob Tambunga, Director of Digital Delivery

Tambunga described TxDOT's program as rapidly scaling through a leadership-driven push to expand model-based delivery across the agency. What began as a small set of voluntary pilot efforts has grown to more than 30 pilot projects, with every district expected to have a digital delivery pilot project let by the end of 2027. He emphasized that TxDOT is using these pilots to define how digital delivery should work across project types, with a focus on improving data flow across the asset lifecycle rather than on models alone.

TxDOT's current delivery approach remains hybrid and is still being defined through pilot projects. Tambunga explained that some models may be contractual in MALD pilots, but none of the projects are purely 3D with no 2D companion information; quantity summaries, standards, and other supporting documents are still expected to remain in PDF form. He noted that when PDFs remained available, field teams relied on them more than the digital model, reinforcing the need to reduce redundant 2D content and clarify controlling-document hierarchy. The shift in contractor attitudes was itself hard-won: TxDOT has engaged the Associated General Contractors in ongoing dialogue since 2018, and Tambunga described the arc frankly, from skepticism to active requests for digital models and additional data. Tambunga also noted that IFC-based workflows are continuing to improve; he described the translation from design software into construction platforms such as Trimble Business Center as a workflow that remains in active development but is showing promise.

Tambunga was candid about the support structure required to sustain rapid expansion: five resident Bentley engineers, Engineering Services technical support, regional project-manager coverage, weekly office hours, district champions, and a growing library of SOPs, recorded materials, and on-demand training resources. He noted that much of this support is interim, with the long-term goal of building enough familiarity across the agency for districts and engineering support teams to carry more of the work directly.



Key Takeaways

Rapid program scale-up requires dedicated support infrastructure (regional project managers, resident engineers, district champions, and just-in-time on-demand training) that must grow in parallel with the pilot portfolio, not after it. When a 2D companion document exists alongside a 3D model, contractors will use the 2D document; TxDOT's experience confirms that reducing redundant plan set content and enforcing model precedence through contractual clarity are necessary to drive genuine model adoption. TxDOT's rapid scale-up has required a strong headquarters support structure and a clear statewide target of having every district pilot digital delivery by the end of 2027.

MnDOT — Trisha Stefanski, Asset Management Program Office Director (Virtual)

Stefanski described her view of the national digital delivery landscape, grounded in a recent development she characterized as significant: the inaugural meeting of AASHTO's Digital Delivery and Asset Management Standards Task Force in early 2026. The response was largely positive; only one participant expressed skepticism about the value of developing digital delivery standards at the national level. Stefanski framed AASHTO's engagement as an important development, the moment when the fragmented, state-by-state development of digital delivery standards begins to coalesce around shared national frameworks that give all DOTs a foundation to build from rather than starting independently.

As manager of MnDOT's Asset Management Office, Stefanski manages a program that spans 78 asset classes, from bridges and pavements to culverts, traffic signs, and guiderail, with data governance structured through Informatica as the central integration platform. A foundational step in building that program was deciding, asset class by asset class, what data was worth collecting and at what frequency. Stefanski described MnDOT's process for identifying organizational information requirements (OIR) using a maturity spectrum for managing their asset classes. The spectrum ranges from "minimum maintenance" (where no inventory or condition data required) through reactive, cyclical, and condition-driven tiers. At the highest level, "condition plus," assets such as bridges and pavement are routinely monitored, inspected, and maintained against long-term performance targets. Assigning every asset class to a tier before building any workflows forced MnDOT to answer the fundamental governance question first: what does each stakeholder actually need from this data, and how often? The result was a program designed around defined information exchange requirements rather than around what was technically possible to collect. The program was built in part with support from a NiceConnect Grant, which funded early data infrastructure work. Stefanski's perspective reinforced a theme that surfaced throughout the day: the most consequential digital delivery questions are not about 3D models per se, but about what happens to information after construction (how it is structured, where it lives, and who can use it).

MnDOT has developed quantified evidence of the program's value. Using asset data captured through digital delivery workflows, designers were able to reduce design time by approximately 30 percent on projects where existing asset conditions were available in structured, accessible form at the outset, eliminating field reconnaissance that would otherwise happen mid-design. As-built and LiDAR-based asset records have generated an estimated \$2 million per year in avoided inspection and inventory labor costs across MnDOT's network. A culvert inventory pilot (one of the first asset classes to be fully digitized) returned a net present value of approximately \$23,000 per culvert, based on improved



inspection scheduling, reduced emergency repair costs, and extended service life from earlier intervention. Stefanski described that a fundamental change in how MnDOT distributes maintenance funding to its districts was the most consequential downstream application. Previously, MnDOT allocated based on historical spending (essentially rewarding past patterns regardless of actual asset need). MnDOT is moving toward distribution based on asset life cycle data: the count of assets in each district, the frequency and unit cost of required maintenance activities, and in the most sophisticated version, a performance optimization model that calculates how much improvement in asset condition each dollar buys. The practical effect is that districts with better asset data receive more accurately calibrated funding, creating a direct organizational incentive to keep inventories current. This is the downstream consequence that connects digital delivery to agency finance and budget leadership, not only to project engineering.

MnDOT's experience illustrates what it looks like when digital delivery is conceived from the outset as a lifecycle information challenge rather than a design-phase technology initiative. The program's governance, tooling, and asset class scope were designed around the question of what operations and maintenance need, not around what design can produce.

Key Takeaways

The real promise of digital delivery lies not in modeling sophistication but in disciplined lifecycle information management. Stefanski was clear in articulating that MnDOT's success is grounded in governance, defining what data matters, who needs it, and when. By tying asset data to maintenance strategy, funding allocation, and long-term performance outcomes, MnDOT has demonstrated tangible efficiencies, cost savings, and better investment decisions at scale. Nationally, AASHTO's early momentum signals a pivotal shift from fragmented, state-by-state experimentation toward shared standards that can accelerate adoption and consistency across DOTs. These developments point to a maturing digital delivery landscape where success is defined not by what is built during design, but by how information supports operations, finance, and asset stewardship over decades.

MDT — Pat Lane, Digital Delivery Program Director (delivered in the afternoon session due to morning time constraints)

Lane opened with a premise that few practitioners say aloud but most recognize: there is a meaningful difference between what the top ten percent of a DOT's staff can demonstrate on a pilot project and what everyone in a large organization needs to be able to do on any project. The goal of standards and information requirements is not to showcase what is possible; it is to define workflows that a full organization can execute consistently and reliably.

Lane provided a candid and substantive account of organizational transformation, describing MDT's recent agency-wide restructure and the emergence of digital delivery as a structural program pillar rather than a temporary initiative. The restructuring reorganized engineering functions into four domains: Project Development and Delivery (incorporating pre-construction, construction, digital delivery, and environmental); Planning and Modal Operations; Asset Strategy, Operations, and Maintenance; and General Operations. Digital delivery (previously defined as an initiative with a start and end date) is now embedded in the organizational structure as a permanent function. Lane also



offered a note of discipline that applies to many DOTs: for a large-geography state with a small population and constrained budget, the accelerating pace of technology development is as much a risk as an opportunity. The concern is not just affordability but focus: the danger that a promising new tool displaces investment in platforms the agency has already made and that still have unrealized value.

Lane described MDT's legacy project workflow as "over the wall engineering": each group completes its work and throws it to the next, with information flowing back only as a memo or an email, disconnecting pre-construction from construction as thoroughly as any organizational silo could. The delivery model that emerged from the restructuring was designed to dismantle that pattern. MDT's design work is modeled in Civil 3D while construction uses Trimble Business Center. For all earthwork projects, design project managers are required to extract model data from Civil 3D and pass it to construction, where it is imported into Trimble Business Center and built into a construction model provided to the contractor for information only. This workflow has been in place long enough that contractors now expect it: when they receive a project without a digital construction model, they push back.

The most significant organizational innovation Lane described was the district automation engineer: a new position embedded in each of Montana's five districts whose sole responsibility is to bridge the data gap between pre-construction and construction. The position reports to the district construction engineer but was jointly hired by both pre-construction and construction sides. Its mandate is to coordinate data flow, QA/QC, and constructability review across the project handoff. In practice, having an experienced person with both data and engineering knowledge review Civil 3D models before they were passed to Trimble Business Center dramatically improved construction model quality. Every district construction engineer, once they experienced the benefit, wanted another. The position was difficult to sell initially; it became impossible to do without. Montana also implemented e-ticketing for all asphalt plant mix projects in 2025.

Lane was direct about the limitations of Montana's current approach. Model-based data is not being delivered contractually yet because translation from Civil 3D to field equipment sometimes produces unacceptable errors (in one test, the discrepancy amounted to over 50,000 cubic yards of earthwork that was missed in the model). Data security is an emerging challenge driven by the state's broader IT consolidation under the Department of Administration, requiring new security reviews for field technology tools. Lane's response has been to reframe security as a shared responsibility: educating field staff about why tools must be vetted before deployment and positioning them as security partners rather than subjects of a policy they did not choose.

Key Takeaways

Embedding digital delivery as a structural organizational function (rather than a temporary initiative) is a prerequisite for sustained program momentum through leadership transitions and budget cycles. Montana's district automation engineer, a liaison whose sole job is to bridge the data gap between pre-construction and construction, was described as highly valuable: a position that was initially difficult to fund became so valuable that every district wanted an additional one. The foundation for model-as-legal-document delivery lies in trusted survey data and standardized design processes, not in the tools used to produce the model.



Iowa DOT — Thomas Hamski, Shawn Blaesing, and Matt Miller (Virtual)

Iowa DOT was represented by three staff members spanning the full digital delivery lifecycle: Thomas Hamski, BIM Bridge Engineer and digital delivery co-lead; Shawn Blaesing, Maintenance GIS Coordinator and digital delivery co-lead; and Matt Miller, Director of New and Emerging Transportation Technologies. Together, they offered a candid perspective: Iowa is progressing meaningfully, but executive buy-in and dedicated organizational support remain unresolved challenges.

Miller brought a distinct operational perspective rooted in his background in construction and public-facing data systems. He described a project with Delaware DOT in which e-ticketing data (collected for materials tracking) was repurposed through the ISO 15143-3 equipment data standard to flag active work zones in real time. Because Caterpillar, John Deere, and other equipment manufacturers all conform to the same ISO standard, the contractor's activated equipment generated a real-time signal of worker presence in the work zone as a byproduct of the e-ticketing workflow. No one had anticipated this when the e-ticketing program was designed. Miller's point was not about work zone safety specifically but about what interoperability standards make possible: when data is structured to a common specification, it can serve purposes its original collectors never imagined. That only happens through standardization, which is why the national standard-setting work represented by AASHTO's task force matters as much as any individual agency's pilot.

Hamski and Blaesing described serving in two different roles to keep Iowa's digital delivery grants and pilot projects moving, a workload both noted they are working to address as the program matures. Iowa DOT's leadership is actively evaluating an organizational structure for digital delivery that would be most effective. Because the most effective structure is still being determined, Iowa DOT has chosen to delay formalizing a dedicated position. A digital delivery role without sufficient embedded authority across divisions would make it difficult for the role to influence the strategy and direction intended to support. Instead, coordination and decision-making are occurring within existing governance structures. One outcome of this approach, as Blaesing noted, is that participation in some ancillary asset team discussions has shifted, and the agency is continuing to assess how visibility into certain asset-related decisions is maintained. Iowa's discussion highlighted the challenges of sustaining progress when no one is structurally empowered to lead the effort. Iowa's IT consolidation (completed two years prior) compounded the challenge by reducing IT continuity and support capacity.

Iowa's technical work is progressing through grant-supported workflow development rather than a fully institutionalized statewide program. Hamski and Blaesing described current efforts to document existing data flows, define future-state workflows, improve CAD-to-GIS extraction and QA/QC processes, develop geodatabase templates for road asset data collection, and explore how contractor-submitted field data can better support downstream asset management. They made it clear that many technical and governance questions remain unresolved.

Blaesing reflected on an early multi-discipline BIM pilot that became a pivotal learning experience for Iowa. While the effort successfully consolidated design elements, construction pay items, and maintenance attributes into a shared dataset, it also revealed the complexities of aligning information needs across disciplines. She noted that assets such as traffic barriers carry different meanings depending on perspective (design focuses on geometry and specifications, construction on pay items,



and maintenance on component counts required for repair). When these perspectives are not fully reconciled before delivery begins, the resulting model requires manual edits to reconcile data at each exchange. The experience highlighted the importance of taking time upfront to establish shared, cross-functional information requirements to support smoother transitions and more effective downstream use.

Key Takeaways

Iowa DOT's experience highlights steady technical progress in digital delivery, tempered by ongoing organizational and governance challenges. Representatives emphasized that standards and interoperability unlock the greatest long-term value, enabling data to be repurposed in ways not originally anticipated, as illustrated by real-time work zone insights derived from standardized e-ticketing data. While Iowa continues to advance through grant-funded pilots (improving workflows, CAD-to-GIS processes, and asset data collection), the absence of a fully institutionalized organizational structure places additional strain on staff and limits scalability. Early BIM pilots reinforced a critical lesson: successful digital delivery depends less on tools and more on upfront, cross-functional agreement on information requirements to support seamless lifecycle use of data.

WSDOT — Jim Mahugh, Digital Delivery (Virtual)

Mahugh opened with a diagram that illustrated, simply and precisely, why the data dictionary work matters. Each phase of a traffic sign's life currently deposits its information into a separate, isolated box. Design data is contained in OpenRoads files, construction data (including as-built drawings) is captured and stored in PDF files, and maintenance data is stored through WSDOT custom maintenance management system. No box talks to the others; every handoff is manual. The goal of the data dictionary work is to replace those isolated boxes with a connected flow. Mahugh presented WSDOT's experience building that connection as a direct contribution to one of the industry's most persistent interoperability problems: the absence of standard property sets for common civil infrastructure objects. His presentation centered on a nine-step process WSDOT developed to extract civil asset data from OpenRoads into IFC and back, in which he identified three critical break points (between design in OpenRoads, construction through PDF as-builts, and maintenance in WSDOT's HATS system) where no established standard property set exists.

To address the lack of interoperability for traffic sign data, WSDOT is using ADCMS program funds to build a data dictionary using the buildingSMART Data Dictionary (bSDD) Service. Developing the traffic sign data dictionary from scratch required approximately 40 to 60 work hours for the first iteration, including the use of a data programming intern. The process is faster on subsequent asset types. WSDOT's data dictionary for traffic signs has 42 properties organized into seven property groups. This investment will enable a full digital lifecycle process for traffic signs. WSDOT estimated that a fully digital process for traffic sign inventory, inspection, and as-built record keeping would save the agency approximately \$361,000 per year, from reduced inventory labor, faster plan sheet production, faster inspection cycles, and more accurate as-built records. WSDOT manages approximately 400,000 signs. Mahugh identified AASHTO as the appropriate governing entity for shared data dictionaries rather than individual agencies registering independently.



Mahugh described WSDOT's effort to partner with Caltrans and Oregon on developing shared data dictionaries, a project that has encountered challenges in securing ADCMS grant funding. He framed the broader challenge as a naming convention problem: civil infrastructure does not yet have the equivalent of the product libraries that exist in architectural BIM, where standard properties are established and supported by software vendors natively.

Key Takeaways

The absence of standard property sets for common civil objects is a structural interoperability gap that forces each agency to independently develop custom solutions and prevents software vendors from building reliable native tools. WSDOT's experience building a traffic sign data dictionary in bSDD illustrates both the path and the challenge: the work is achievable (40-60 hours for the first dictionary) and the savings are measurable (\$361,000/year estimated), but the effort only produces national value if coordinated through AASHTO rather than replicated agency by agency.

Moderated Discussion — Defining BIM Standard Requirements

Following the peer DOT presentations, the group transitioned to a moderated discussion covering four interlocking themes: the ISO 19650 information requirements hierarchy and how to apply it in practice; the evolving ISO 19650 standard and its pending revisions; the multi-platform CDE reality and how the framework helps organizations make better decisions about it; and the status of asset management integration at Caltrans.

The OIR/PIR/AIR/EIR Hierarchy: Clearing Up the Confusion

The discussion of the information requirements framework generated significant energy, with multiple participants describing confusion (within their own organizations and across the industry) about what the terms OIR, project information requirements (PIR), asset information requirements (AIR), and exchange information requirements (EIR) actually mean in practice.

Hiel and Mitchell offered the most clarifying descriptions. An OIR is not an asset-specific requirement; it is the organizational business reason for needing information. Legislation, federal reporting mandates, internal agency policies, and service obligations to the public are all OIR territory. Two concrete examples of OIR that resonated most:

- A federal Model Inventory of Roadway Elements (MIRE) 2.0 Fundamental Data Elements requirement, requiring DOTs to have a complete roadway inventory and conditions data collection on all public roads by September 30, 2026.
- A state assembly bill requiring agencies to provide data to support mandatory trucking route designations.

These are requirements that exist independent of any particular project or asset class (the "why" behind everything else).

PIRs are what most practitioners are most familiar with: the information requirements for delivering a specific project. AIRs are the information requirements for maintaining and operating a specific asset class over time. EIRs are the most granular layer: the specific model formats, naming conventions, and delivery protocols for transferring a particular dataset at a particular project milestone. The cascade



flows from top to bottom: organizational requirements generate asset and project requirements, which in turn define the exchange requirements at each handoff.

Blaesing returned to Iowa's early multi-discipline BIM pilot as the clearest practical illustration of this challenge. The pilot produced a dataset combining design elements, construction pay items, and maintenance attributes, but, because the information requirements of each downstream stakeholder had not been defined before the project started, the data had to be manually manipulated to realize the benefits. Unless all three parties define their requirements together before delivery begins (working through the OIR, AIR, and PIR simultaneously) the resulting model will force manual reconciliation at every handoff. The ISO 19650 framework, properly applied, forces the stakeholder conversation before the work begins, not in the middle of it.

Counts offered a concrete internal Caltrans example of what the lack of defined OIRs costs in practice. Two Caltrans groups collect similar data on the same highway network: one spending approximately \$5 million every two years on pavement-related asset analysis; another spends approximately \$10 million every three years on safety device inventory. Because organizational information requirements have never been defined at the enterprise level, these programs run in parallel without coordinating their data collection. Caltrans operates six MTLs (Mobile Traffic LiDAR Survey) units that currently run at only 30 to 40 percent of their capacity. With an OIR framework in place, those units could serve both programs simultaneously at a fraction of the combined cost and produce a base digital asset information model for the network as a byproduct. The example illustrates the ISO 19650 premise in financial terms: the cost of not defining organizational requirements is not an abstraction but a quantifiable, recurring overspend on duplicated collection of data that already exists somewhere in the agency.

Devin Porr raised a practical question: does identifying OIRs have to precede PIR development, or can Caltrans start with PIRs and work upward? Hiel acknowledged the tension: for project delivery alone, starting with PIR is workable. But for an enterprise program with ambitions beyond project delivery (connecting project data to statewide asset management, supporting AI and predictive analytics, delivering on federal reporting obligations), PIR-only development creates a ceiling. Programs that want to build toward the full lifecycle vision need to invest in the organizational requirements conversation.

Key Takeaways

The OIR/PIR/AIR/EIR cascade is the structural logic of ISO 19650: organizational business requirements generate asset and project requirements, which define the exchange protocols for each digital handshake. Programs that develop PIRs in isolation from OIRs and AIRs produce project delivery solutions that cannot connect to the enterprise needs they were ultimately intended to serve. The ISO 19650 framework reduces costly reconciliation by forcing the downstream stakeholder conversation before the work begins. The cost is not abstract: Caltrans' own programs show that without defined OIRs, separate divisions independently spend millions collecting overlapping data on the same network.



ISO 19650 Revisions: What's Changing and Why

Lynn Hiel of Caltrans reported on significant revisions underway to the ISO 19650 standard, having reviewed the draft revision documents of the British Standards Institute shortly before the peer exchange. The revisions, issued for public comment through May 2026, with the final standard expected in fall 2026, combine ISO 19650 Parts 2 (project delivery) and Part 3 (operations) into a single nine-step lifecycle process. By treating projects as updates to assets (rather than treating assets as the downstream beneficiaries of projects), the revised standard shifts the conceptual center of gravity to the asset lifecycle.

Hiel noted that the revision also updates terminology throughout. The BIM Execution Plan becomes the Information Production Plan, a shift signaling that information is the fundamental object, and that modeling is a means to that end, not the end itself. Even practitioners who have internalized the concepts will face a communication challenge as the vocabulary changes, explaining to colleagues and executives what an "information production plan" is will require a new round of education.

Key Takeaways

The revision to ISO 19650 (combining project delivery and operations standards into a single nine-step lifecycle process) signals a structural shift: assets at the center, projects as updates to assets, and information management as the organizing discipline. The accompanying terminology changes will require a new communication effort with internal audiences as the updated standard is adopted.

Multi-Platform CDE Reality: Framework as Decision Tool

The morning's ISO 19650 presentation surfaced a practical organizational question: if a single CDE is not realistic for a large, multi-division DOT like Caltrans, how should the organization think about its CDE strategy? Counts used the ISO 19650 information states framework to reframe the question. Rather than asking "which platform should we use," the more useful question is "which platform serves which information state?" Work-in-progress environments differ by discipline and phase; the published state, where authoritative contractual deliverables are issued, is where a single document management environment is most appropriate.

Peer DOT participants shared a range of CDE strategies. PennDOT uses ProjectWise as its primary published-state environment. MDT uses Autodesk Construction Cloud (ACC) and is actively working to invite contractors into the environment. Iowa DOT described evolving CAD-to-GIS and interoperability workflows across multiple platforms rather than a single consolidated platform strategy. TxDOT is building a regional support structure in part to help districts navigate the multi-platform environment.

Key Takeaways

The ISO 19650 information states framework provides a practical tool for CDE decision-making: rather than asking which single platform to adopt, organizations can ask which platform best serves each information state and build protocols for validated transitions between them. A federated data environment, supported by application programming interfaces (APIs) and interoperability protocols, is more realistic than a single unified CDE for large, multi-division public agencies, and the ISO 19650 framework accommodates and explains this reality.



Asset Management Integration: Emerging Engagement

Participants also pointed to early signs of growing interest from Caltrans asset management staff. During the discussion, Mark Counts reported that Robert Hogan, Office Chief of the Pavement Management System, said his group would join the ISO 19650 working group, and Amy Fong added that Acting State Asset Manager Diana Campbell had also expressed interest. These comments suggested that engagement from asset owner divisions may be starting to increase.

Daniel Armstrong of Caltrans described the absence of asset management representatives from current BIM discussions as "the elephant in the room," a gap that makes it difficult to define AIRs and OIRs without the people who will actually use the data. Amy Fong reported that traffic safety, maintenance, traffic operations, and other asset owner divisions have been receiving the BIM4I message and beginning to understand what their roles in a BIM-enabled organization would look like. The challenge is that these divisions have no dedicated staff for BIM-related work; engagement is an "other duties as assigned" function. Porr acknowledged that the BIM4I program may need to forge and test asset management workflows before handing them to asset custodian divisions to operate.

Key Takeaways

Early interest from Caltrans pavement management and asset management staff suggests that asset owner engagement may be increasing, but sustained participation will likely require more than informal interest. For most asset owner divisions, BIM-related involvement still competes with primary workloads as an "other duties as assigned" responsibility.

Afternoon Session — Extended Discussion

With the morning's peer DOT presentations complete (including Pat Lane's MDT overview, which had been deferred from the morning agenda due to time constraints and delivered at the opening of the afternoon), the group transitioned to the day's most extended open discussion. Participants worked through a shared "parking lot" of topics covering CDE governance, CAD-to-GIS workflows, asset management data continuity, utility data schemas, and the role of federal frameworks and funding in accelerating national progress.

Cross-Disciplinary Discussion: Data Continuity, Standards, and Federal Context

The extended afternoon discussion covered a wide range of topics in an open format, with participants raising questions from a shared "parking lot" list. Several recurring themes shaped the substance of the conversation.

From CAD to GIS: The Integration Backbone

Multiple participants described GIS as the most practical integration layer for connecting project-delivery data to asset management systems. Iowa DOT's Shawn Blaesing described the frustration of a workflow in which digital as-built data (carefully collected during construction) ends up in a model-based or PDF file that never makes its way into the agency's GIS asset system. The result is that a maintenance staff member looking for information about a specific guardrail installation must dig



through plan set PDFs hoping to find a material sheet, rather than querying a spatial database for all relevant attributes.

PennDOT's asset management strategic plan is focused on identifying which assets are candidates for CAD-to-GIS data transfer and what schemas are required to make the transfer meaningful, leveraging existing standards like ASCE 75 for utility data and MnDOT's GIS schemas for road assets. Blasing confirmed that Iowa DOT is sharing its geodatabase templates with other states, and that peer-to-peer schema sharing significantly accelerates the work. Counts noted that Caltrans is building this GIS integration through the Connected Project Infrastructure (CPI) initiative, in which survey data from approximately 90 field crews flows through GIS as the primary data backbone, not just as a final output, but as the active exchange medium between design engineers, surveyors, right-of-way agents, and construction staff.

Key Takeaways

GIS is the most practical integration backbone for connecting project-delivery data to asset management. Peer-to-peer schema sharing (Iowa's geodatabase templates, MnDOT's GIS schemas) significantly reduces the cost of independent development.

The Pay Item Problem: Connecting Objects Across the Lifecycle

A technical exchange in the morning session surfaced a specific interoperability challenge that sits at the intersection of design, construction, and asset management: the impossibility of using pay item codes as reliable unique identifiers for physical objects. Iowa DOT's Thomas Hamski and Matt Miller described the problem directly: a single pay item (guardrail, for example) typically appears multiple times on a project, and the bid item number assigned to it often changes between design and the final bid proposal, making it impossible to trace the object from one phase to the next. The result is that the same physical asset has a different identifier in design, construction, and asset management, which is precisely why CAD-to-GIS transfers break down and why maintenance staff cannot find information about specific installed assets.

MDT's Pat Lane described a proof-of-concept developed in partnership with Infotech that addresses the problem directly: tying pay items to civil objects as unique items within the data exchange between Civil 3D and AASHTOWare, so that even when the same pay item appears multiple times, each instance is traceable as a distinct physical object. Lane indicated that Montana intends to share the solution and make it available to other states at no cost once the proof of concept matures. This discussion highlighted that some interoperability problems arise not only from data standards or CDEs, but also from how bid items and physical objects are identified.

Key Takeaways

The inability to trace a physical asset across design, construction, and asset management using a consistent identifier is one of the most difficult challenges in creating a digital thread. Montana's proof-of-concept with Infotech is exploring a method for connecting physical objects and their pay items, which will be openly shared with other states.



Utility Data and Schema Development

PennDOT's utility data initiative prompted a broader conversation about how agencies handle utility information across the project lifecycle. Melley described PennDOT's challenge: utilities within the public right-of-way are frequently installed without generating a digital record that survives in GIS asset systems. Legislation requiring digital utility records from highway occupancy permit holders is being pursued. In the interim, the agency is developing data schemas using ASCE 75 as a foundation.

Hamski of Iowa DOT noted that making utility data collection a compensated bid item (paying contractors specifically for the data collection workflow) is an important incentive mechanism. Contractors who see data collection as an unfunded burden will do it poorly or not at all; contractors who are paid for it with a clear specification will invest in the tools and training to do it properly. The principle extends beyond utilities: anywhere that owners want contractors to generate data that the contractor does not intrinsically need for its own purposes, compensation and clear specification are necessary conditions for quality outcomes.

Key Takeaways

Legislative mandate, clear specifications and appropriate contractor compensation through bid items are key enablers for advancing the collection of quality digital utility datasets.

Federal Framework and Formula Funding

Iowa DOT raised the federal policy landscape as a structural factor shaping what is possible at the state level. The current grant-based funding model for digital delivery innovation (including ADCMS grants and pooled fund studies) is not a scalable national solution. Individual states compete for small grants that fund individual pilot projects, while the foundational investments in data standards, training infrastructure, and interoperability protocols that would benefit everyone are difficult to fund project-by-project. Miller's position was that digital delivery infrastructure investment should be treated the same way pavement, bridge, and safety investments are treated: as recurring, formula-allocated program costs rather than discretionary grant competitions.

Porr noted that he had recently discussed the USDOT's digital delivery RFI with FHWA contacts and found that the framing of the federal interest is not always aligned with how state DOTs are experiencing the challenges on the ground. AASHTO's emerging engagement with digital delivery standards was cited as a potential vehicle for advocacy around funding structures that support sustained program development rather than one-time pilots.

Key Takeaways

Participants described grant-based funding as useful for pilots but insufficient for long-term national scale. Some advocate for formula-style funding that would treat digital delivery infrastructure more like recurring program investment, and AASHTO's emerging standards role was discussed as a possible vehicle for advancing that conversation.



Governing and Managing Standards: Shared Lessons

The day's closing discussion addressed the governance of BIM standards and requirements (how agencies move from piloting to policy, and what organizational structures are needed to sustain standards over time as technology and practice continue to evolve).

Pat Lane framed the governance question in terms of customer service: the purpose of information standards is to define what each downstream stakeholder needs and how they want to receive it. Digital delivery programs focused primarily on design-to-construction handoffs will eventually need to expand their stakeholder definition to include operations, maintenance, regulatory compliance, and public data consumers. That expansion requires governance structures broad enough to include all of those voices, which in turn requires organizational authority to convene them.

Several participants returned to the theme of institutionalization versus dependence on individual champions. Iowa DOT's experience illustrated how difficult it is to sustain momentum when digital delivery responsibilities remain distributed across staff without dedicated authority. By contrast, Montana's organizational restructure, TxDOT's district champion model, and PennDOT's codified implementation path were discussed as examples of more durable organizational support.

Mitchell closed by highlighting a theme that echoed throughout the day: although participants arrived from different organizations and at varying stages of maturity, they left with a shared understanding that the core challenges are universal. Questions about OIR versus PIR, CDE selection, engaging asset management stakeholders, sustaining momentum through leadership changes, and funding the infrastructure needed to move beyond pilots remain unresolved across the industry. No single DOT has resolved these issues. The value of a peer exchange lies in shared learning, creating space to compare experiences, align on priorities, and recognize that these challenges are being addressed collectively rather than in isolation.

Key Takeaways

BIM programs that are institutionalized at the practice level (embedded in organizational structure, supported by written standards, and governed by documented procedures) survive leadership transitions that programs dependent on individual champions do not. The fundamental governance challenges facing digital delivery programs are shared across all participating DOTs: defining information requirements across the full stakeholder ecosystem, connecting project data to asset management, sustaining programs through leadership change, and securing the funding structures that convert pilots into standard practice. The peer exchange reinforced that these questions are shared across participating DOTs and remain unresolved across the industry.



Acknowledgements

The Caltrans 2026 BIM4I Peer Exchange was made possible through the dedicated efforts of Caltrans BIM4I program staff, Division and District champions, and the support of a consultant team from Value Management Strategies (VMS), HDR, Michael Baker International (MBI), and Amheart Solutions.

Caltrans extends sincere appreciation to the peer state DOT representatives from PennDOT, TxDOT, MnDOT, MDT, Iowa DOT, and WSDOT whose candor, experience, and willingness to share both successes and challenges gave the day its substance and value.

The Peer Exchange was a collaboration of the following organizations and individuals:

Caltrans

- Amy Fong
- Andre Tokmakov
- Arnica MacCarthy
- Daniel Armstrong
- Devin Porr
- George Moore
- Jonathan Yeo
- Kevin Huang
- Lynn Hiel
- Mark Counts
- Mina Pezeshpour
- Omar Khan
- Subu Nujella
- Suresh Dhakal
- Tony English

VMS

- Linda Chia, Senior Organization Development Consultant

HDR

- Alexa Mitchell, Enterprise Digital Delivery Services Director (Facilitator)
- Matt Blake, Digital Delivery Principal Advisor

MBI

- John Wilkerson, Director of Digital Delivery
- Pooya Haddadi, Department Manager - Structures
- Scot Becker, Director of Asset Management and Bridge Technologies

Amheart Solutions

- Paul Pak, Partner (Rapporteur / Report Author)

Caltrans also extends gratitude to the Department of General Services for providing the venue and facility support. Caltrans values the time, energy, and expertise that all attendees brought to the peer exchange. Together, Caltrans looks forward to “Building the Future Together” and “Partnering to Turn Ideas into Actions.” Thank you.



References and Attachments

The following materials informed the preparation of this report and are available upon request:

- Session transcripts
- Presentation slides provided by Caltrans and participating peer DOTs
- Raw meeting notes compiled during the peer exchange
- Peer exchange photographs used in this report

For inquiries, please contact bim4i@dot.ca.gov.



Appendix A. 2026 Caltrans BIM4I Peer Exchange Agenda

Caltrans 2026 BIM4I Peer Exchange

Building the Future Together: Partnering to Turn Ideas into Actions

Date: March 12, 2026

Location: May Lee State Office Complex, 651 Bannon Street, Sacramento, CA 95811

Room: SE.245

Format: Hybrid



Peer Exchange Agenda

Time	Session Title and Description
8:00 AM	<p>Caltrans Welcome, Opening Remarks, and Introductions</p> <p>Description: Short introductory talks: Caltrans BIM4I leaders thank participants for coming, introduce meeting objectives and desired outcomes, provide an overview of agenda for the day, explain emergency protocols (safety exits in case of fire, etc.), point out location of restrooms.</p> <p>Desired Outcome: Set the tone for a day of collaboration, innovation and shared vision for future of BIM4I.</p>
8:05 AM	<i>Caltrans Welcome and Safety Moment (Devin Porr, Caltrans BIM4I Program Director)</i>
8:10 AM	<i>Opening Remarks (Rich Foley, Caltrans Division Chief for Engineering Services)</i>
8:20 AM	<i>Introductions as Needed (All)</i>
8:30 AM	<p>Presentations: Defining BIM Standard Requirements (Per ISO 19650)</p> <p>Description: Short presentations followed by a moderated discussion focusing on ISO 19650 basics, Caltrans' BIM4I implementation approach, and peer DOTs methods for developing OIR/PIR/AIR/EIR requirements to support delivery, operations, and maintenance.</p> <p>Desired Topics:</p> <ul style="list-style-type: none"> • <i>Overview of ISO 19650 (Caltrans)</i> • <i>Differentiating between BIM4I, VDC and CADD</i> • <i>Approach to defining Organizational Information Requirements (OIR). Information related to performing the mission of a DOT, such as federal reporting, safety and environmental compliance, managing capital improvement program funding, etc.</i> • <i>Asset Information Requirements (AIR). Information related to maintenance and operation activities, such as keeping an accurate inventory of assets and their conditions</i> • <i>Project Information Requirements (PIR). Information needed for delivering projects for construction</i> • <i>Exchange Information Requirements (EIR). Refers to the model formats, and naming convention for models to be delivered at specific time and for a specific purpose</i> <p>Desired Outcome: Educate participants on ISO 19650 standards and set context for the day's discussions. Provide examples what's done, in progress, or planned.</p>
8:30 AM	Short Presentation: <i>Approach for BIM4I Implementation per ISO 19650 (Devin Porr – Caltrans)</i>
8:40 AM	<p>Short Presentation: <i>Overview of ISO 19650 (Caltrans – Mark Counts to coordinate with other Caltrans staff)</i></p> <p><i>The speaker will provide an overview of ISO 19650 concepts and how to determine ISO-compliant requirements, with practical examples</i></p>



Time	Session Title and Description
9:00 AM	Short Presentation: Approach to Developing Requirements to Support Design-to-Construction (Allen Melley, PennDOT)
9:20 AM	Short Presentation: Approach to Developing Requirements to Support Design-to-Construction (Jacob Tambunga, TxDOT)
9:40 AM	Short Presentation: Approach to Developing Requirements to Support Asset Management (Trisha Stefanski, MnDOT) Topic of interest to address: Getting buy-in from asset management. What are some strategies you have used to convince that BIM lifecycle data is an improvement over keeping siloed data
10:00 AM	Short Presentation: Approach to Developing Requirements to Support Design-to-Construction (Pat Lane, MDT)
10:20 AM	Morning Break
10:35 AM	Short Presentation: Approach to Developing Requirements to Support: <ul style="list-style-type: none"> • Design-to-Construction exchanges (Thomas Hamski), • Construction-to-Maintenance exchanges (Shawn Blaesing) • Operations (Matt Miller)
11:00 AM	Short Presentation: Approach to Developing Requirements to Support Design-to-Construction (Jim Mahugh, WSDOT)
11:20 AM	<p>Moderated Discussion: Defining BIM Standard Requirements (Per ISO 19650)</p> <p>Description: Moderated discussion focusing on what “successful” implementation of ISO 19650 information requirements looks like and how to measure it.</p> <p>Topics/Questions for Discussion:</p> <ul style="list-style-type: none"> • How are standards (information requirements) developed? And who is responsible for developing them? • What is the relationship between all the BIM4I requirements? How do all requirements fit into the development and management of a statewide digital twin? • How do the requirements influence the development of products and services to create a digital experience? • What does successful implementation of information requirements look like? • How do you evaluate or measure success? • How do you plan to report progress? • What key performance indicators have you established or are thinking about? <p>Desired Outcome Collect various examples of how BIM is helping DOTs better achieve organizational objectives, such as optimization of pavement and bridge lifecycle costs, maintenance budgets for ancillary assets (e.g. signing, and safety assets), accessibility compliance (e.g., ADA ramps, sidewalks), work zone performance (vehicle hours of delay), environmental and sustainability (e.g., stormwater runoff compliance rate), etc.</p>
12:00 PM	Lunch (Not Provided)



Time	Session Title and Description
1:00 PM	<p>Demonstrations: Tools that Enable Implementation of Information Requirements</p> <p>Speakers: TBD</p> <p>Description: Demonstration of using ISO 19650 concepts to host, verify or exchange information requirements.</p> <p>Topics/Questions for Discussion:</p> <ul style="list-style-type: none"> • What activities did you do to develop or configure the technology being used? Who is responsible for leading, developing, testing, accepting and implementing these tools or technologies? • What procedures did you develop, are developing, or are planning to develop to configure, test, accept and implement? Who is responsible for each of those tasks? • How is feedback captured to determine effectiveness of standards and procedures being piloted? <p>Desired Outcome: Share strategies and lessons learned for the developing/configuring, testing, accepting, implementing and incorporating feedback after pilot projects</p>
2:30 PM	Afternoon Break
2:45 PM	<p>Moderated Discussion: Governing and Managing Standards Requirements</p> <p>Description: Moderated discussion to share current efforts to develop, test and implement new standards and procedures, as well as brainstorming ideas to manage them after the piloting phase</p> <p>Topics/Questions for Discussion:</p> <ul style="list-style-type: none"> • Establishing and maintaining governance <ul style="list-style-type: none"> ○ What divisions or bureaus should govern what? • Supporting pilots from initial testing through deployment of formalized processes? <ul style="list-style-type: none"> ○ What is your process for transitioning from piloting standards, procedures and the use of technology to formal policy? ○ What kind of support do you provide for your districts or project teams to pilot standards and procedures? • Aligning, adjusting or establishing resources to support maintenance of BIM standards and processes <ul style="list-style-type: none"> ○ How will you work with others in your organization to keep standards and procedures up to date? What mechanisms do you need to properly govern the newly developed standards and procedures once they become policy? ○ What type of support do you need or anticipate needing to develop, test/pilot, implement, and improve new standards and procedures? <p>Desired Outcome: Share strategies and lessons learned from pilot projects for short and long-term management of standards and procedures</p>
3:15 PM	Parking Lot Items and Wrap Up
4:00 PM	Peer Exchange Adjourned