

Central BIM Transportation Library Projects Updates

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How We Got Here

- *2021: FHWA publishes a national roadmap for bringing digital design (BIM) to infrastructure*
- Multi-state research studies apply BIM to bridges and highways
- *2024: An FHWA report first proposes the CBTL — a shared national library for this digital content*

Today: two complementary research projects are underway

NIBS (our team) – confirm the need and chart the path to build and deploy the CBTL

WSP – pilot a first CBTL application with state DOTs (a prototype platform for managing shared data definitions)

NIBS Project Objectives

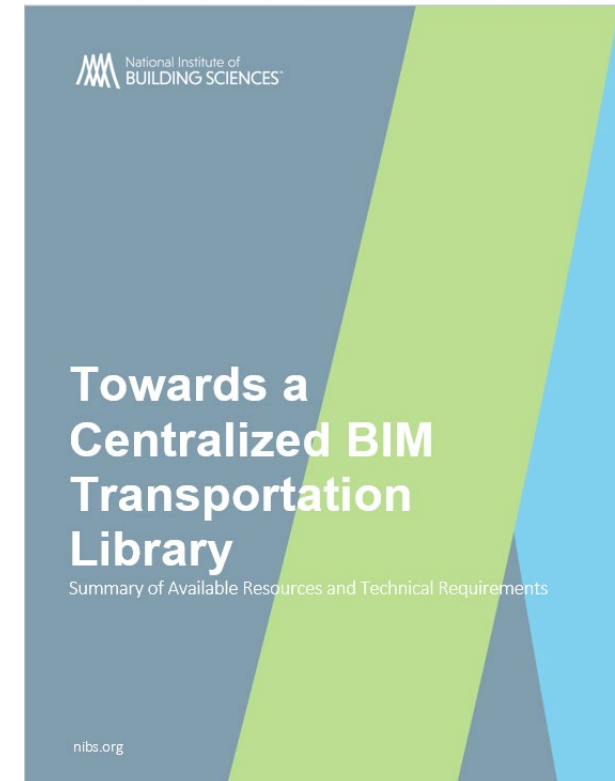
1. Assess bSDD/IFC 4.3 semantic coverage for horizontal construction and document its structural limitations
2. Map existing repositories, standards, and DOT capabilities into technical and architectural requirements for a federated CBTL
3. Evaluate and validate the CBTL technical requirements against real artifacts, repositories, and agency constraints
4. Critically assess the top BIM use cases and score each against the validated technical requirements
5. Develop the testing plan, PoC plan, and deployment plan — from metadata harmonization and standards alignment through governance and national rollout

CBTL Phase 1 Report

Published: September 2025 and available at:

NIBS: <https://nibs.org/centralized-bim-transportation-library-cbtl-report/>

Rosa-P: <https://rosap.ntl.bts.gov/view/dot/86424>



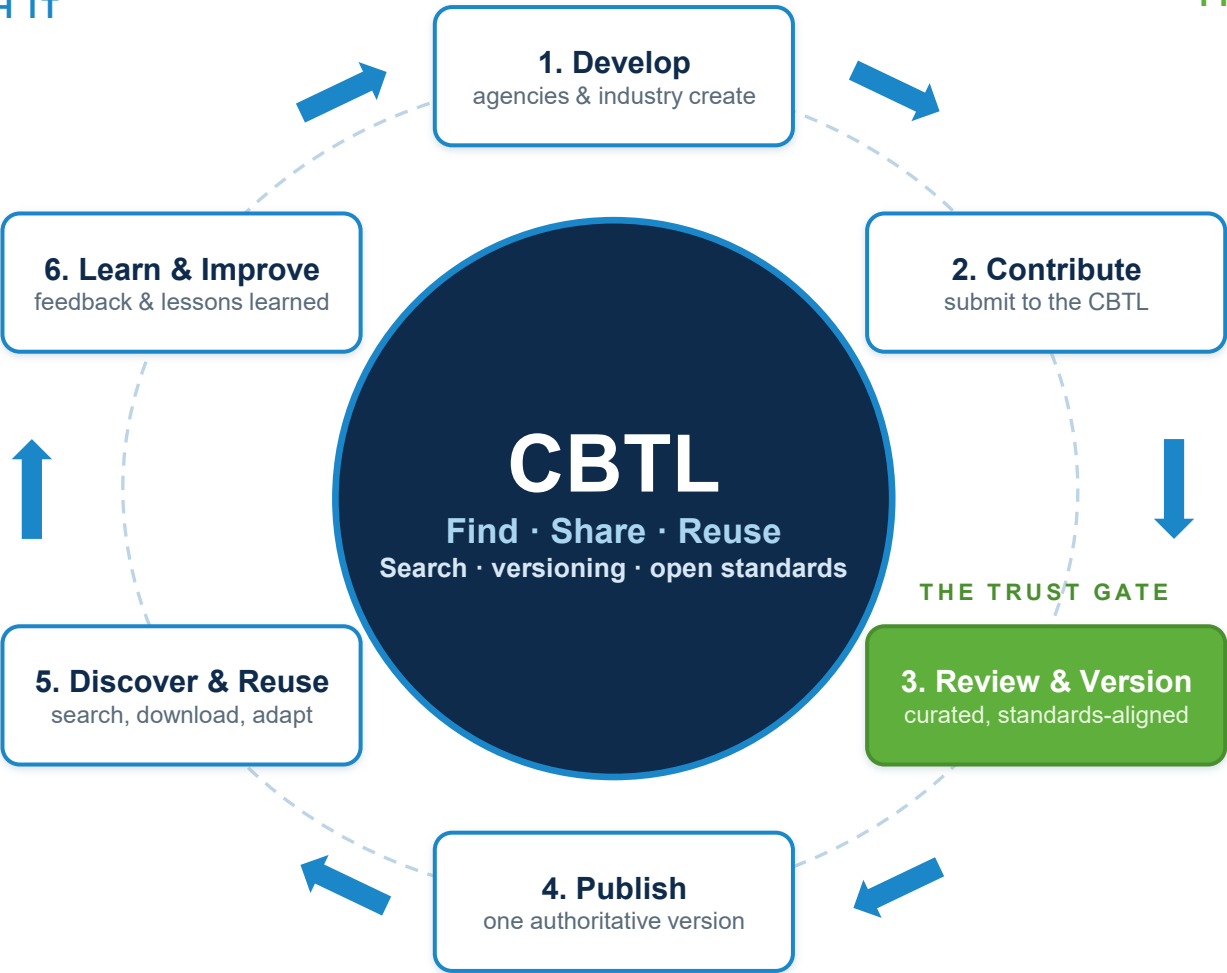
What is the CBTL?

A living library — One shared centralized home for the federated BIM artifacts you already use

THE ARTIFACTS THAT FLOW THROUGH IT

- BIM Models & Object Libraries (OTLs, 3D cells)
- Data Dictionaries
- Model View Definitions (MVDs)
- Information Delivery Manuals (IDMs)
- Information Delivery Specs (IDS)
- Information Exchange Specifications
- BIM Information Needs
- Processes, Workflows & Definitions
- Geospatial Data

Access-controlled: each agency chooses what to share and what stays private



THE PEOPLE WHO NEED THEM

- State DOTs**
adopt & adapt at their own pace
- FHWA**
national alignment & oversight
- Consultants & Contractors**
consistent data, less rework
- Standards Bodies (AASHTO, bSI)**
one home for open standards
- Researchers & Academia**
lessons learned & training

The community feeds the library, and the library feeds the community: contribute once, benefit nationally, with full version history preserved.



Why Now? The Momentum Is Building

National Direction Is Set

- FHWA's national BIM roadmap (2021) and federal innovation programs are pushing the industry toward digital, model-based project delivery.
- Federal grants and multi-state pooled-fund research are already producing valuable digital resources — ready to be shared and reused nationally.
- AASHTO has created a national committee (J-STAN) that can potentially oversee and govern efforts like this.

The Market Is Ready

- Several state DOTs already require open-format digital deliverables on their projects.
- The core technologies needed to build the CBTL are proven and readily available today.
- The missing piece is a shared national home for this work — that's the CBTL.



Why Do We Need It? The Problem Today

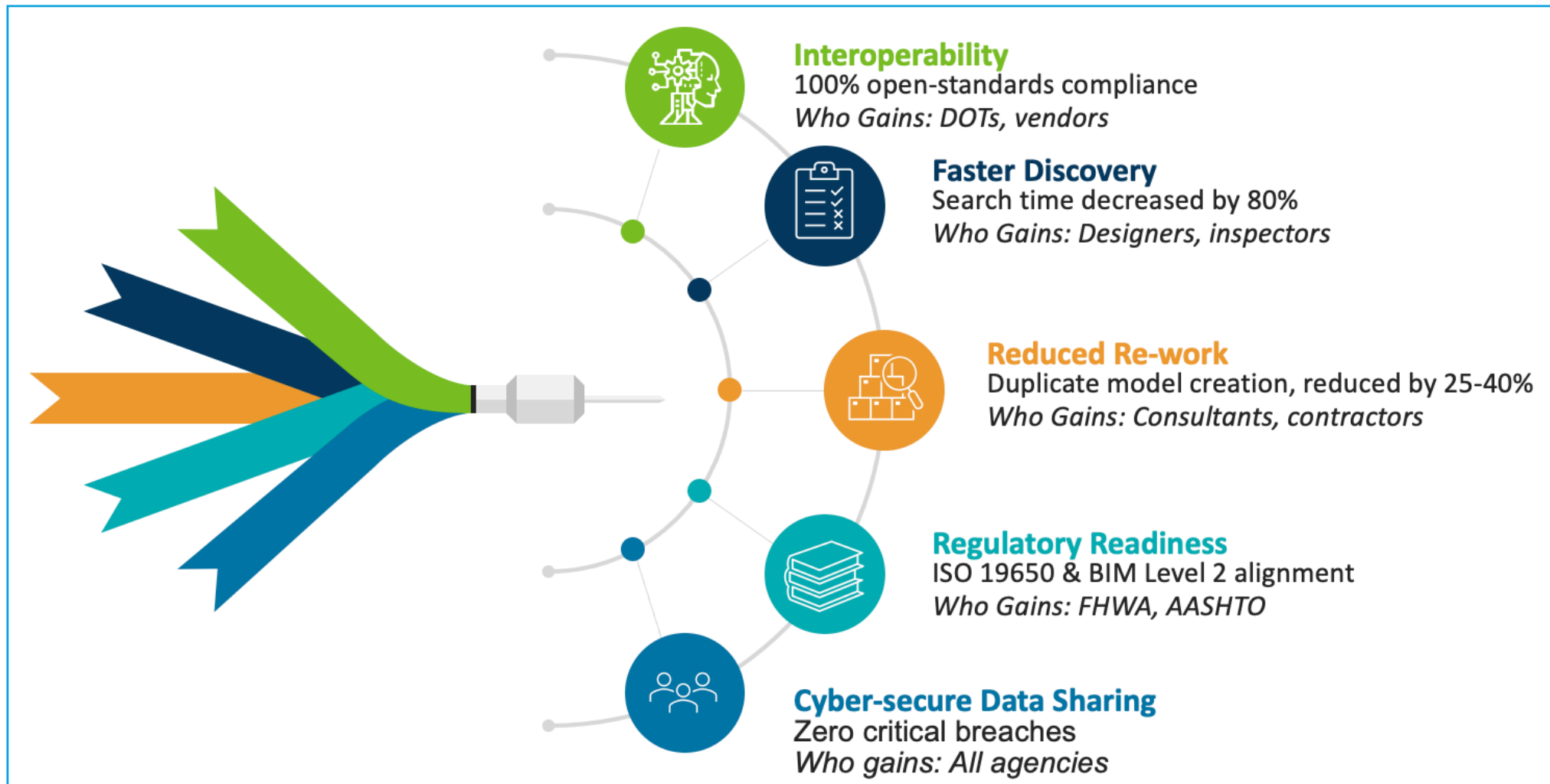
Fragmented Data, Duplicated Effort

- Digital project data is scattered across dozens of disconnected websites, portals, and repositories.
- Each state rebuilds the same libraries and standards from scratch, and consultants must reconcile inconsistent information from project to project.
- Hard-won knowledge is lost as experienced staff retire and lessons stay locked inside individual projects.

The result: wasted time, wasted money, and slower delivery

- Without a shared foundation, every agency solves the same problems alone — progress is fragmented, duplicated, or stalled.

What's the Payoff? Who Gains What

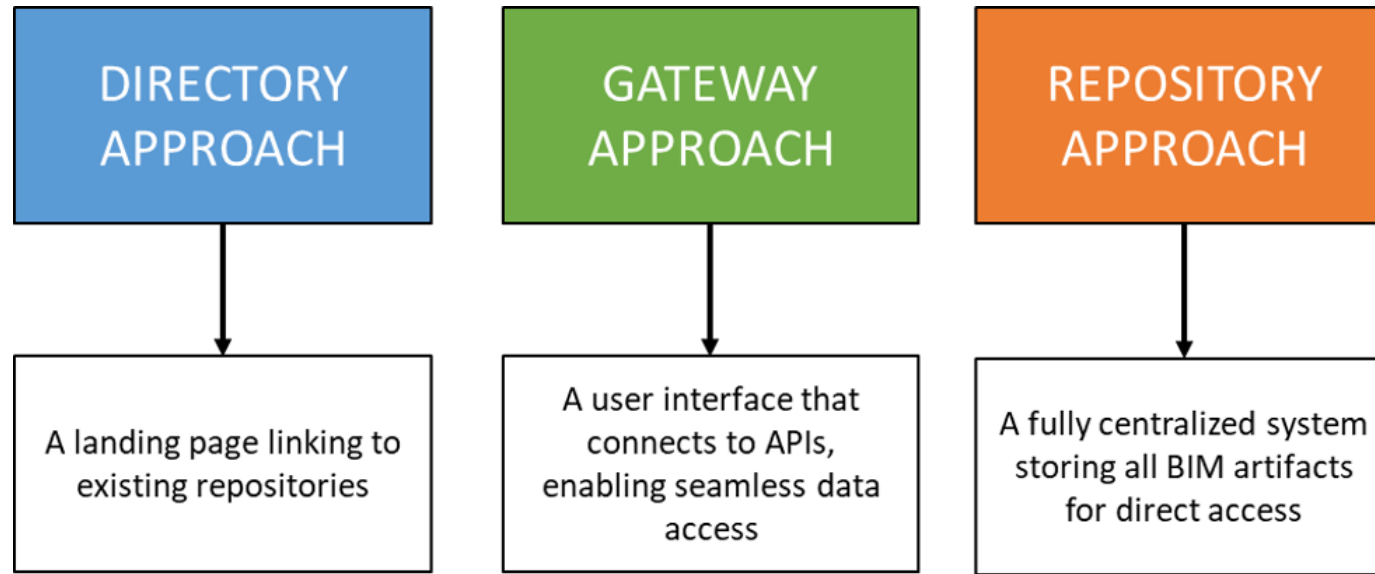


CBTL Technical Capability Matrix — Requirements by BIM Artifact

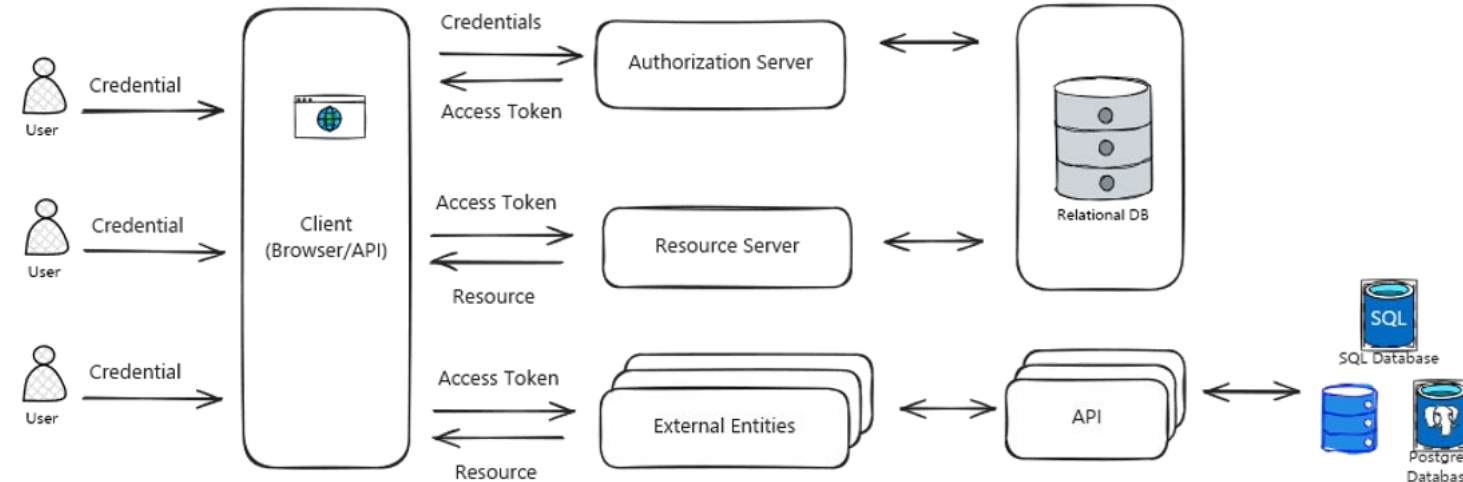
Category	Technical Component	1. Processes & Workflows	2. Information Needs	3a. BIM Models	3b. Object Type Libraries	3c. Parametric Library	3d. 3D Cells	4. Data Dictionary	5. Info Delivery Manual (IDM)	6. Info Exchange Specs	7. Model View Defs (MVD)	8. Info Delivery Spec (IDS)	9. Geospatial Data
Cloud & Data Platform	Cloud-based platform (AWS / Azure / SDC)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Database infrastructure (multi-format)	🟡	🟡	🟡	✓	✓	🟡	✓	✓	✓	✓	✓	✓
Identity, Access & Security	OAuth / OpenID / SSO	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ABAC / RBAC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Zero-trust controls (MFA, least privilege)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Encryption & key management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Audit logging & monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
API Gateway, Middleware & Data Exchange	API gateway & management	—	—	✓	🟡	🟡	🟡	✓	✓	✓	✓	✓	✓
	Middleware validation & governance	—	—	✓	🟡	🟡	🟡	✓	✓	✓	✓	✓	🟡
	Event / message broker	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡	🟡
Artifact Repository & Version Control	Artifact storage (files + metadata)	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
	Version control (IDs, history)	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✓	✗
	Data pipelines & orchestration	—	—	🟡	🟡	🟡	🟡	✓	🟡	🟡	🟡	🟡	🟡
	Automated intake conformance checks	🟡	🟡	🟡	✓	✓	✓	✓	✓	✓	✓	✓	🟡
Semantics, Query & Knowledge Services	Data dictionary / ontology service	🟡	🟡	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Advanced semantic search	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Graph / semantic linking	🟡	🟡	✓	✓	✓	🟡	✓	✓	✓	✓	✓	✓
External Integrations	Standards connectors (bSDD, NTL, SDC)	🟡	🟡	✓	🟡	🟡	🟡	✓	✓	✓	✓	✓	✓
	Agency system connectors (AMS, CDEs)	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✓
Geospatial & Asset Referencing	Geospatial data connectors	—	—	🟡	—	—	🟡	—	—	—	—	—	✓
	Linear referencing & spatial linking	—	—	🟡	—	—	🟡	—	—	—	—	—	✓
User Interface & Engagement	Web UI & role-based dashboards	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	NLP / AI search UI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Training, help, feedback	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Under the Hood: CBTL Architecture

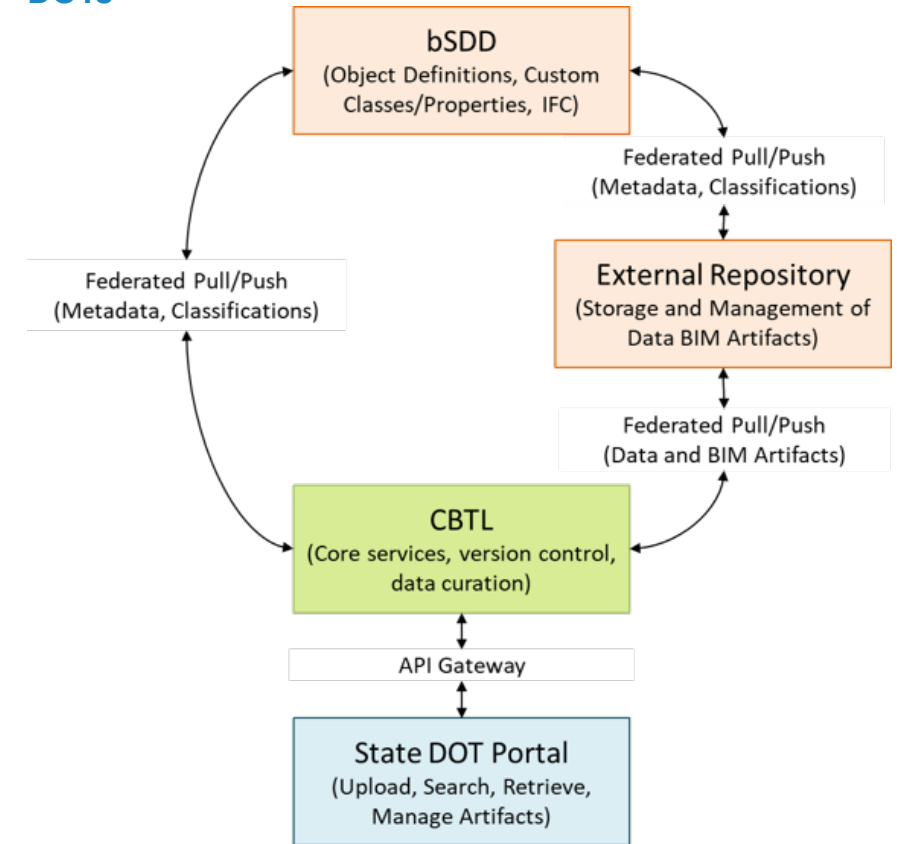
1 | Three implementation approaches — evaluated per artifact



2 | Secure access model — OAuth 2.0 token-based authorization



3 | Federated data flow — bSDD ↔ CBTL ↔ State DOTs



The capability matrix determines which approach serves each artifact — most combine into a hybrid, federated architecture.

Status and Next Steps



Proof of Concept Plan

- Evaluate key uses cases across the DOT community, and FHWA, summarizing context, state of practice and trends, resources, barriers, results, lessons learned, and cross-references/links to supporting information.
- Explore how to create a single interface that connects all libraries and portals
- Define proof of concept method, users, and stakeholders for Phase 5

Deployment Plan

- Gather the data to support use case development.
- As part of use case development, we investigate technology, funding, operations, marketing, human factors research, training, change management and more, ensuring we look at a cross-section of many categories to enable readiness for success.
- Develop a work plan for creating and deploying a CBTL for hosting BIM artifacts and BIM administration of highway infrastructure projects to complement the bSI Data Dictionary and address the limitations.

Final Technical Report, POC and Deployment Plan

- Perform the editorial functions to make the final publishable.
- Deliverable: Final publishable report with 508 Compliance
- NEXT STEPS: Complete Deployment Plan, address review comments. Coordinate with POC project.