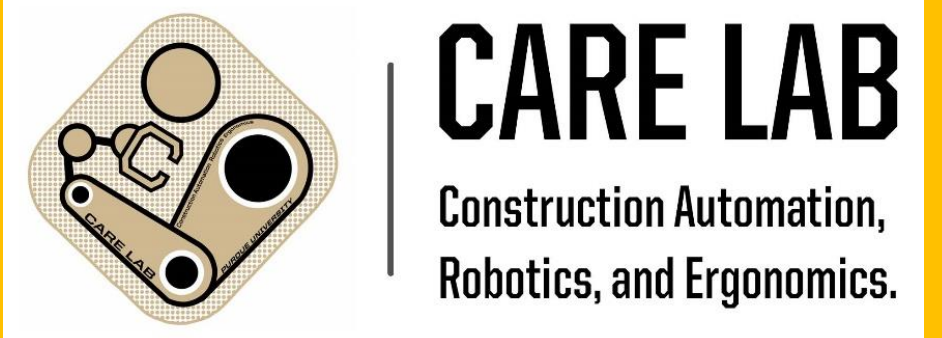




Life Cycle Integration of Building Information Modeling in Infrastructure Projects



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Problem Statement

Business process

Unclear definition of information requirement by Asset Operation and Maintenance (O&M) for different phases of a project's life cycle

Technology compatibility

Incompatibility between design models and Geographic information system (GIS) software

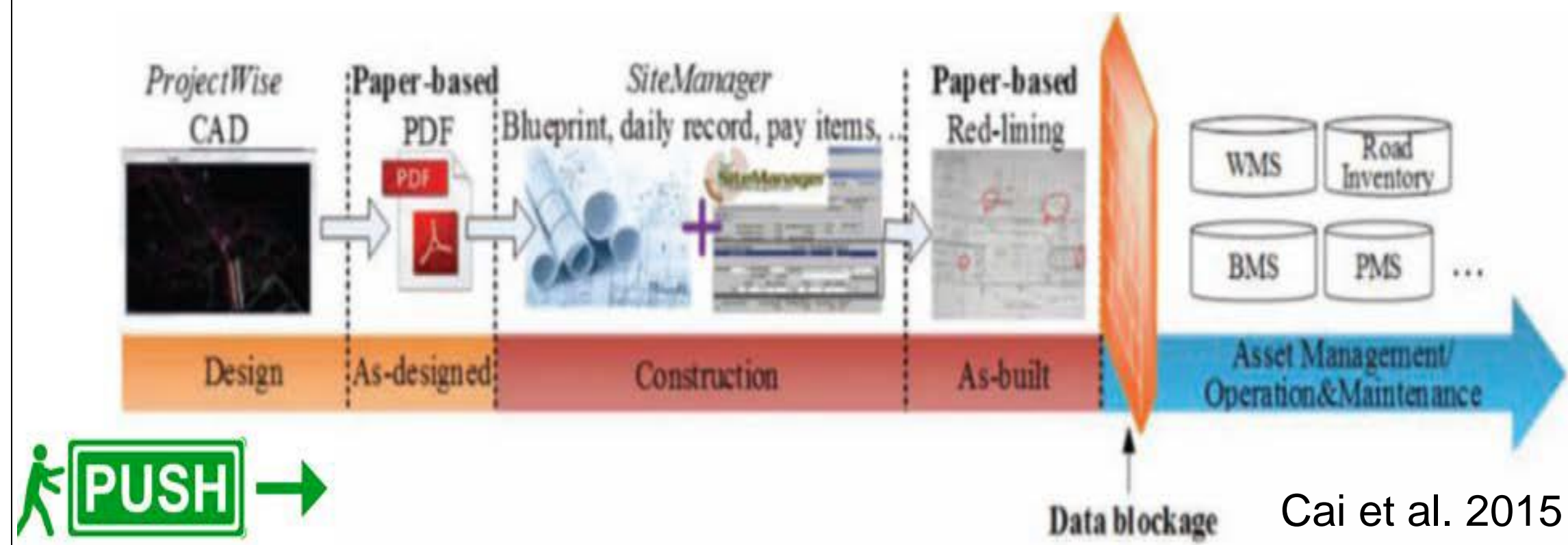


Figure 1. Current push type information flow at INDOT

Study Objectives

Identify data needs and information requirements for O&M.

Evaluate current processes and technologies in design and construction documentations.

Convert data needs during O&M to pay items during construction phase and design requirement of plan assets.

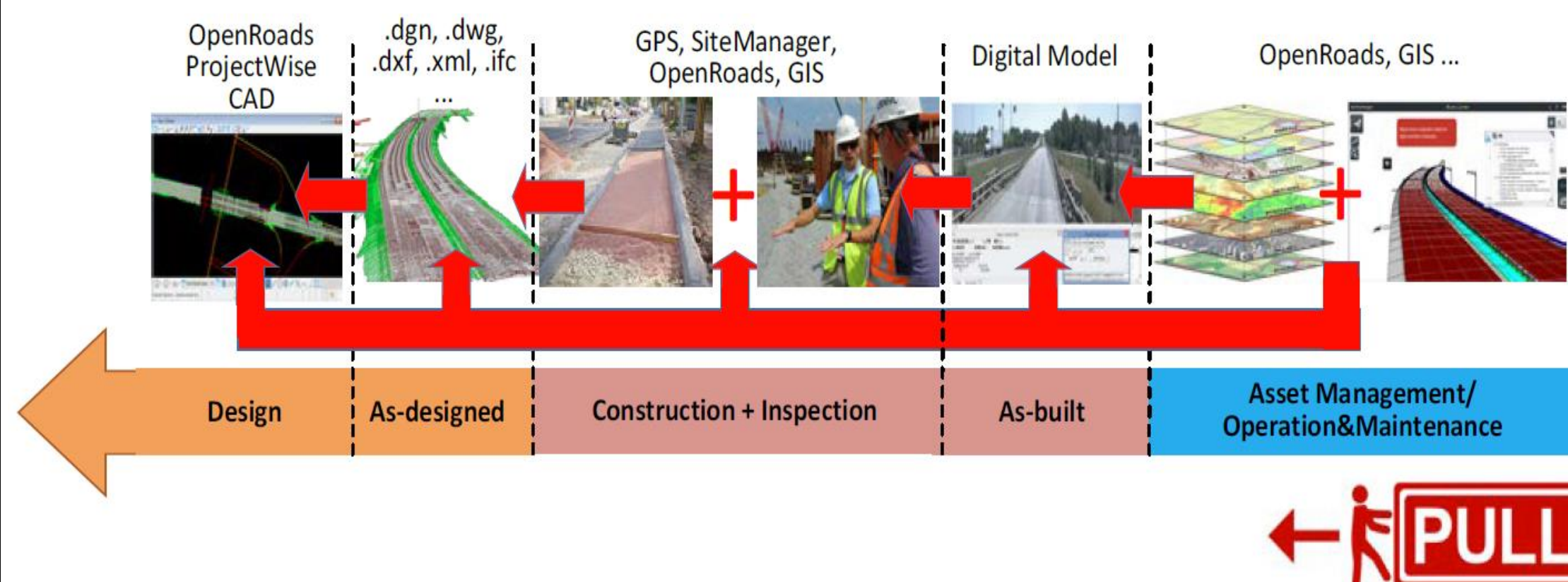


Figure 2. Proposed pull type information flow for INDOT

For more details about this work and CARE Lab, please see the link below: <https://polytechnic.purdue.edu/care-lab>

Main challenges

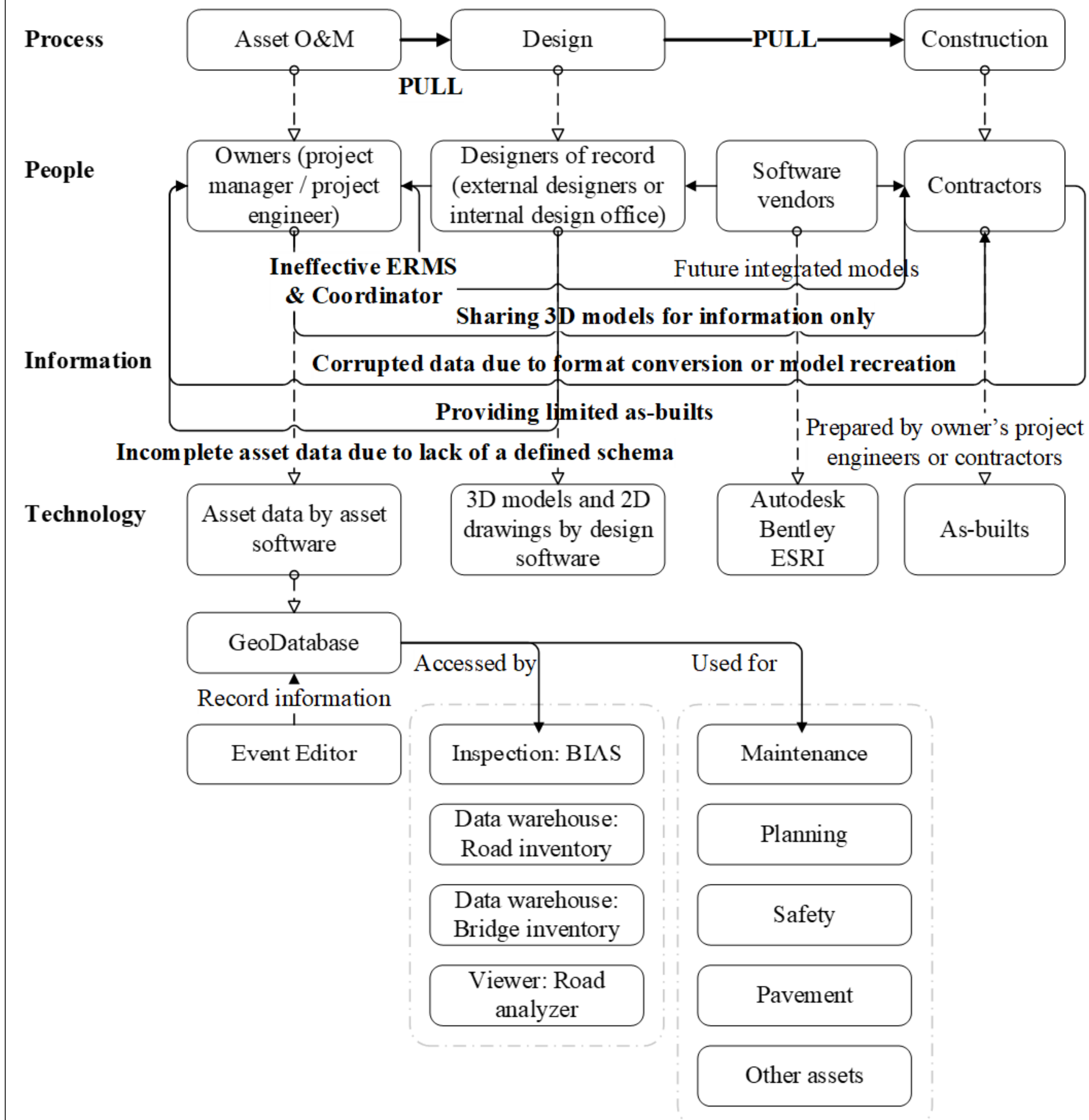


Figure 3. Current workflow with identified gaps

Process

The data of upstream design and construction phases is pushed over to downstream asset O&M phase without considering the data need.

Technology

Consultants and contractors can use any software, which creates an isolation of data transmission due to the different file formats.

People

Consultants are not willing to share digital files with contractors, even with signing the waiver.

Information

Data provided by consultants and contractors does not completely meet the need of owners, not to mention the missing or uncollected as-built attributes of assets. Only as-builts in PDF or hard copy are provided to owners, while owners expect the digital file.

Recommendations and Implementations

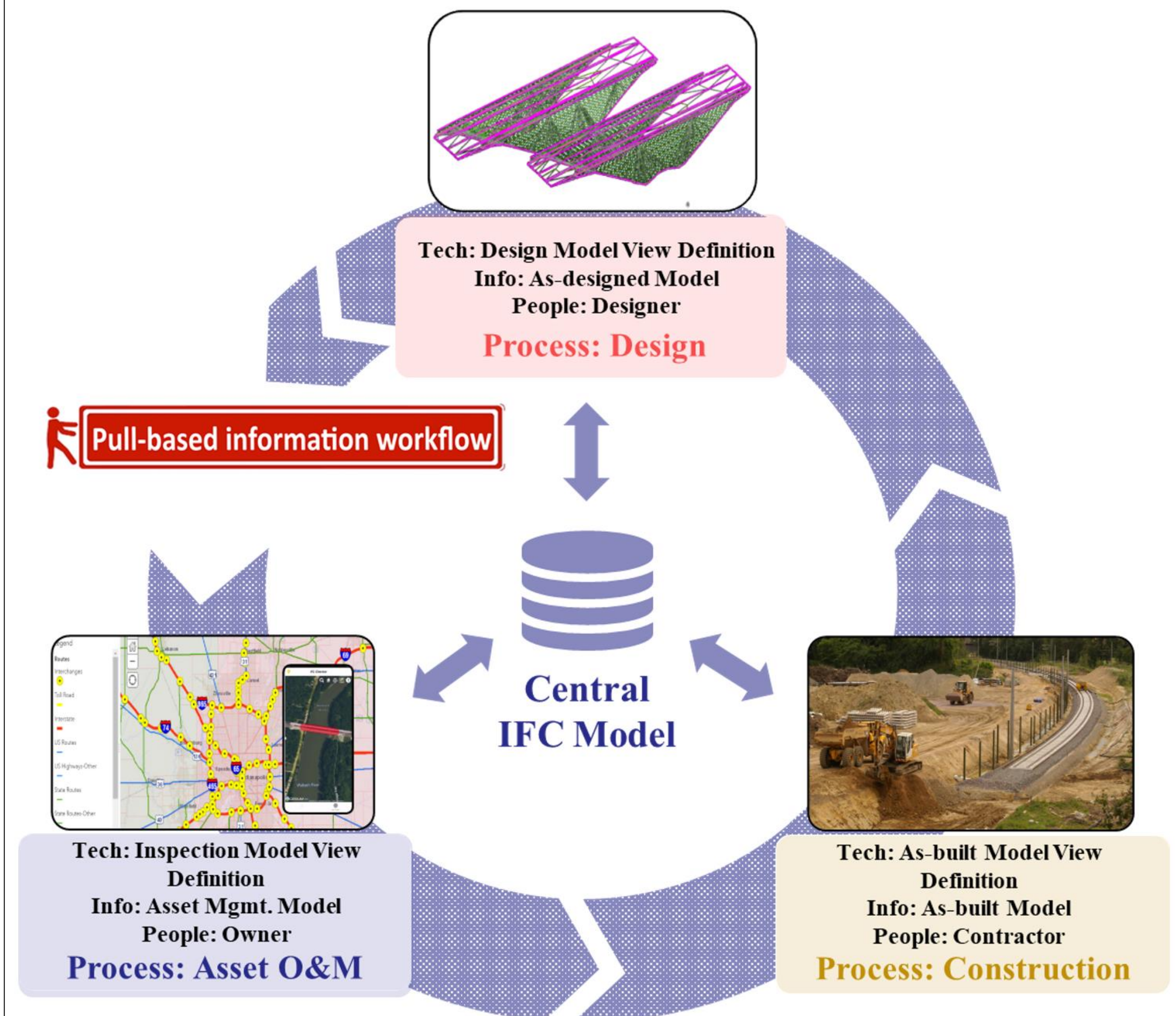


Figure 4. Life cycle integration of BIM in infrastructure projects

Process

State DOTs can use pull-based workflow to require upstream phases to provide information based on data needs of downstream phases.

Technology

State DOTs can use the proposed IFC-central model to alleviate information management problems among different stakeholders, such as (1) window-based IFC connector application to extract information from IFC files to serve various information retrieval needs different phases, and (2) mobile application to collect bridge maintenance data to be stored into the central IFC model directly from the inspection site.

People

State DOTs can outline responsibilities among key project stakeholders in what information to collect and create with what IFC-compliant format and approach.

Information

State DOTs can define the deliverables, formats, timing, and responsible parties of different types of information at different stages.