Christopher J. Forsgren
Geospatial Researcher
Idaho National Laboratory

INL/CON-20-60489

Virtual Prototyping for Construction Management using Digital Engineering

Idaho National Laboratory

Idaho National Lab Facts

- 890 Square Miles
- 4000+ Employees
- 900+ Buildings and Structures
- EBR-I became the first power plant to produce electricity using atomic energy. (1951)
- 1.5 hours from Yellowstone

Data Driven Approach to High Precision Construction

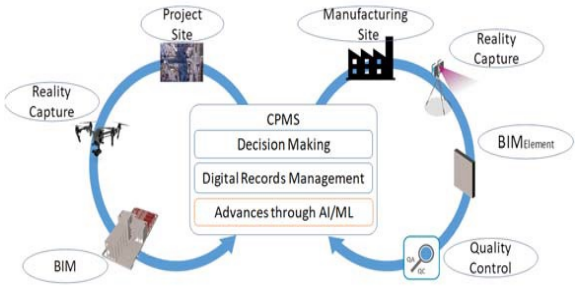
Purpose

To develop a predictive analytic tool for construction evaluation of critical faculties, using Building Information Model (BIM) and drone flyovers

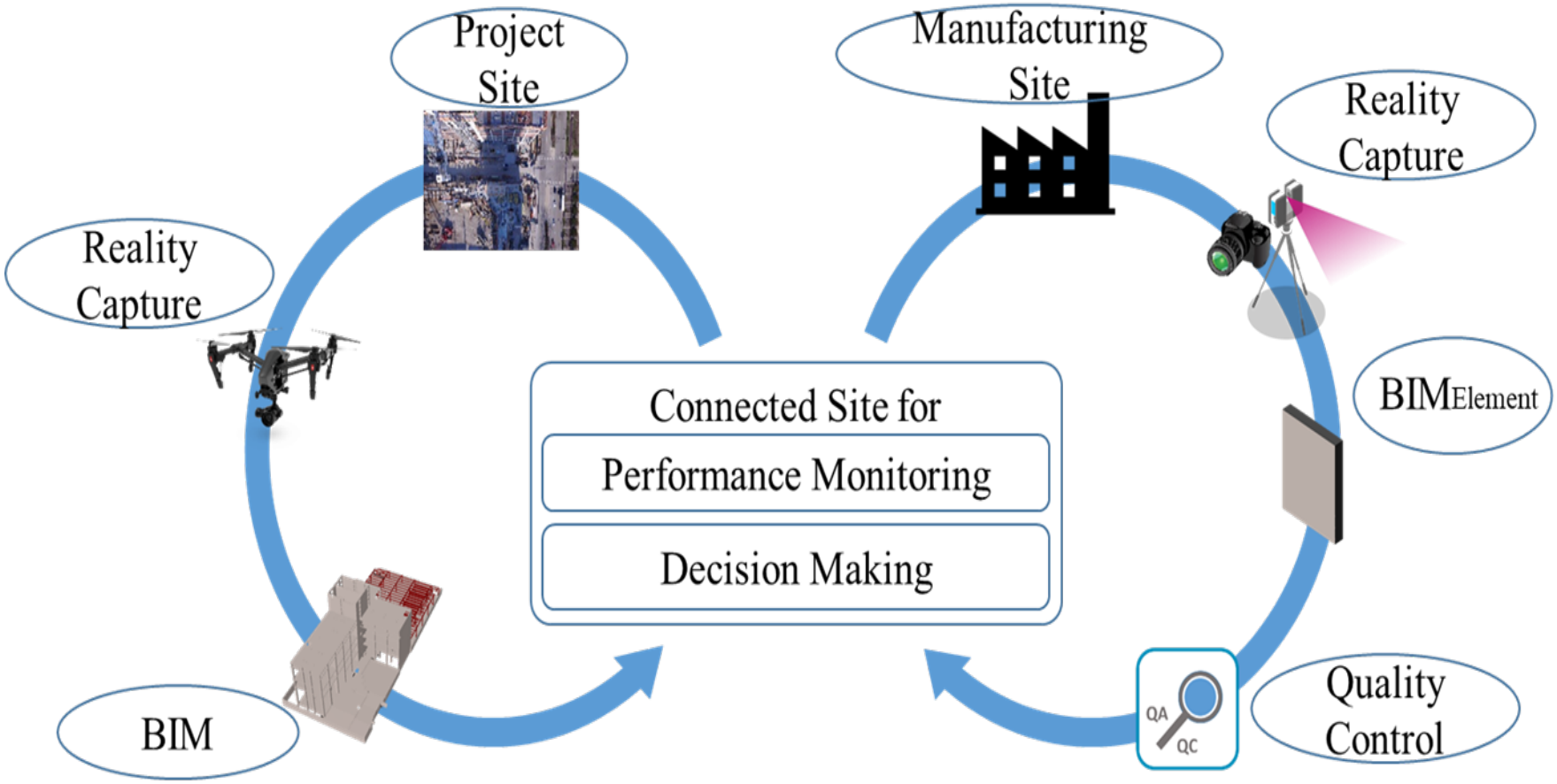
Working with:

Kevin Han Ph.D. NC State University

Christopher Ritter INL Digital Engineering



Holistic Approach to Performance Management at Project Site and Off- Site Facilities



Virtual Prototyping for Construction Management using Digital Engineering

- Project Components
- BIM Model
- Drone Flights
- Image Processing with High Performance Computing (HPC)
- Terrestrial LiDAR Scan
- ArcGIS Pro

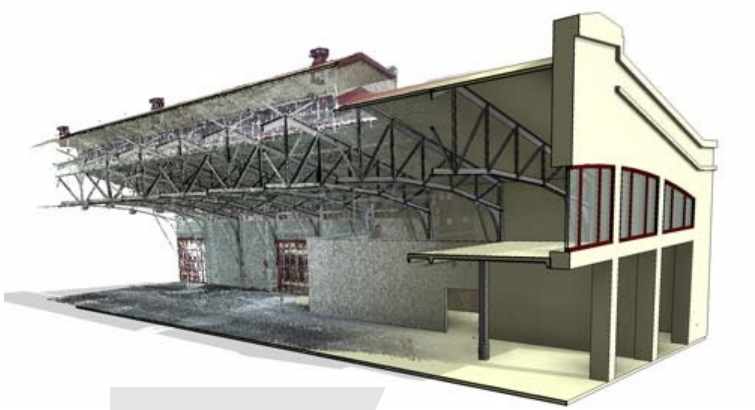
Sample Preparations Laboratory

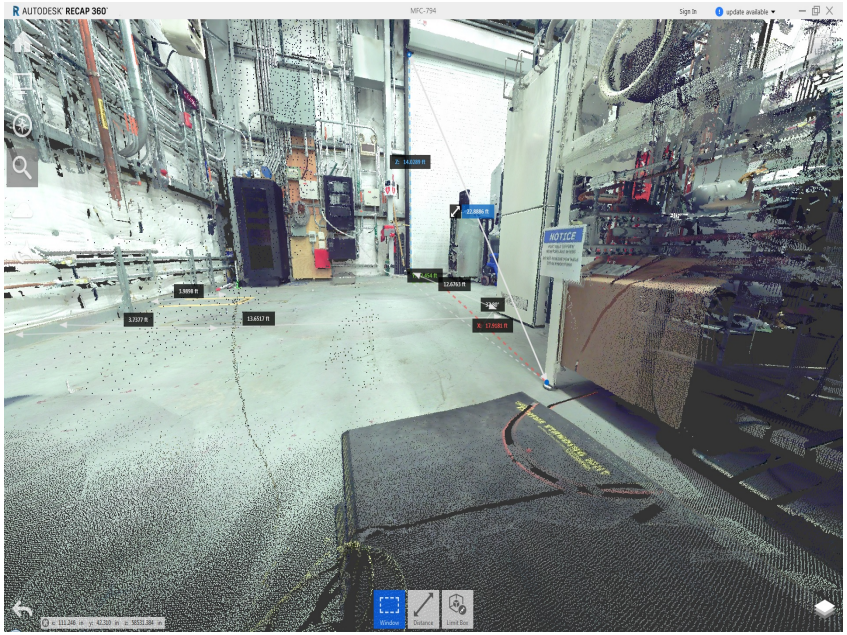
Sample Preparation Laboratory REVIT Model

SPL BIM Model

- Geo-referenced REVIT
- Building Build-Phase

Terrestrial LiDAR with Scan to BIM

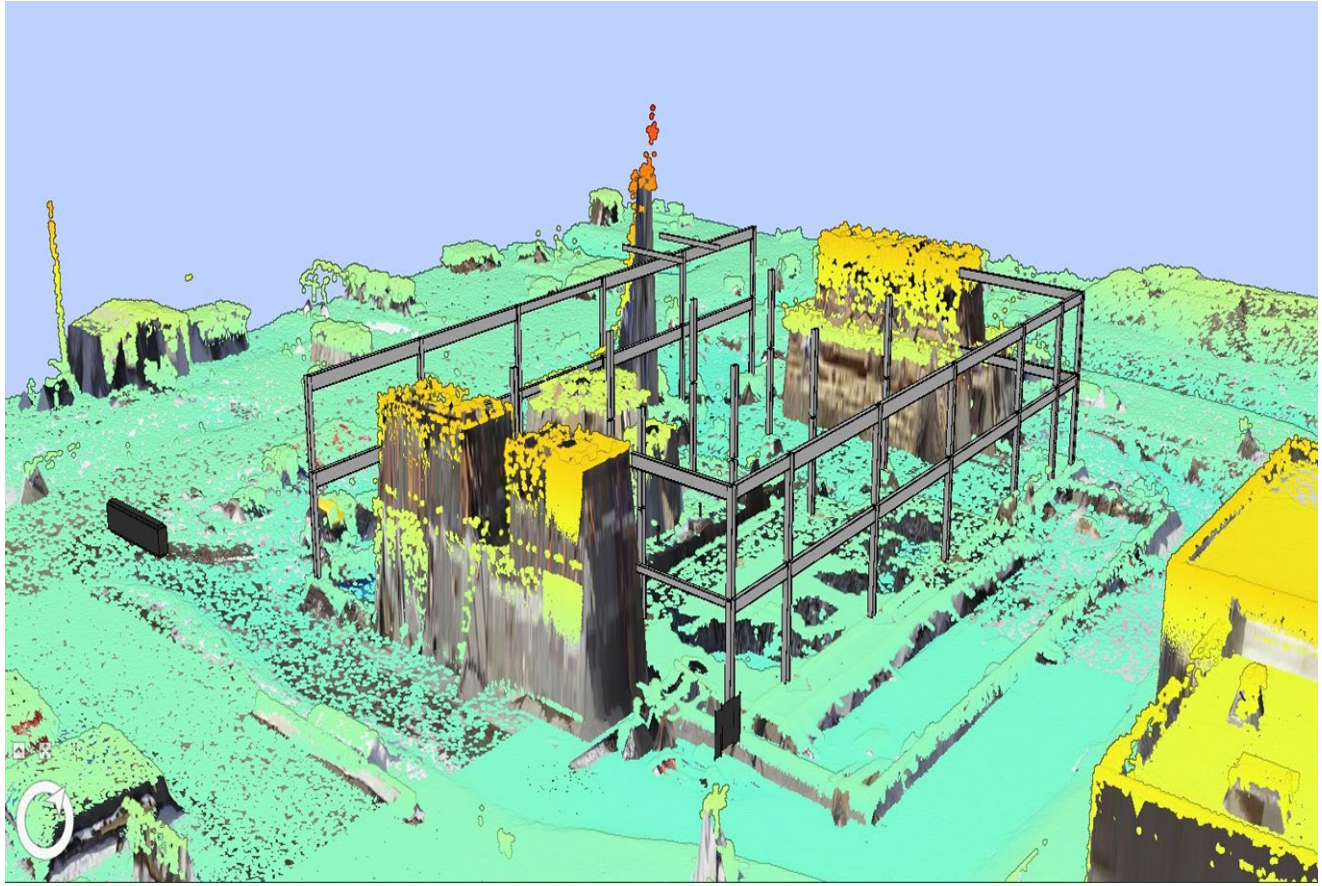




Terrestrial LiDAR

Drone Flight

- LAS Point cloud from stereo pair
- DEM from stereo pair



Drone Imagery

- Drone DEM with BIM and imagery over-laid
- ArcGIS Pro
- 3D visualization with Scene
- Portal

Sample Preparations Laboratory

Digital Twin Construction

- Enhanced building schedule and design capabilities.
- Visualization of current construction schedule and planning
- Digital twin methods can reduce fabrication and construction defects.
- More modularity and off-site component builds

- Future work
- VR from terrestrial lidar scan
- Augmented reality
- Better reporting and milestone recording

Questions