Digital Engineering @ NRIC

Implementation of digital engineering principles applied to micro reactor design and construction

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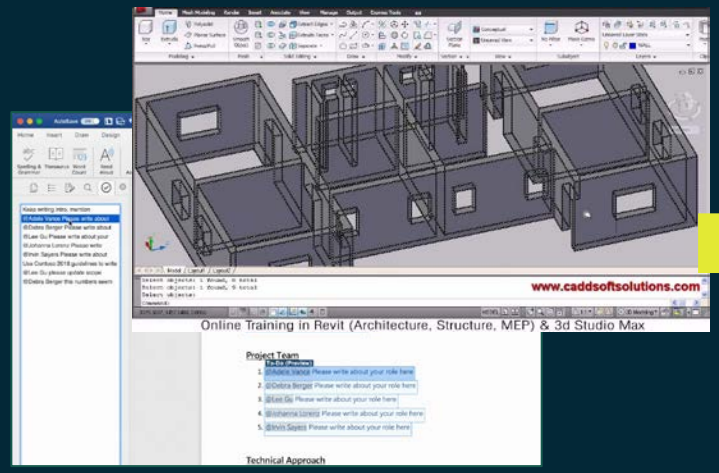
What is Digital Engineering?

Stone Tablet

Paper Blueprint



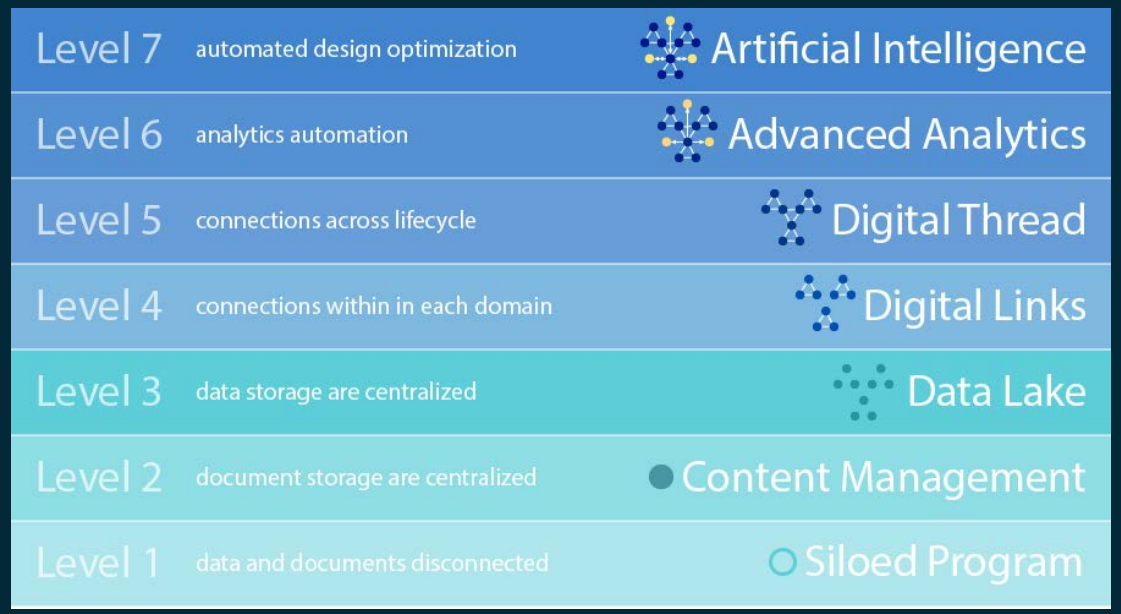
Information Management

Digital Engineering

1. Use Models
   MBSE & BIM
2. Source Of Truth
   Central Datawarehouse
3. Technological Innovation
   Lab and University Research
4. Infrastructure and Environment
   Cloud Computing & HPC
5. Transform Culture
   Training & Culture Integration

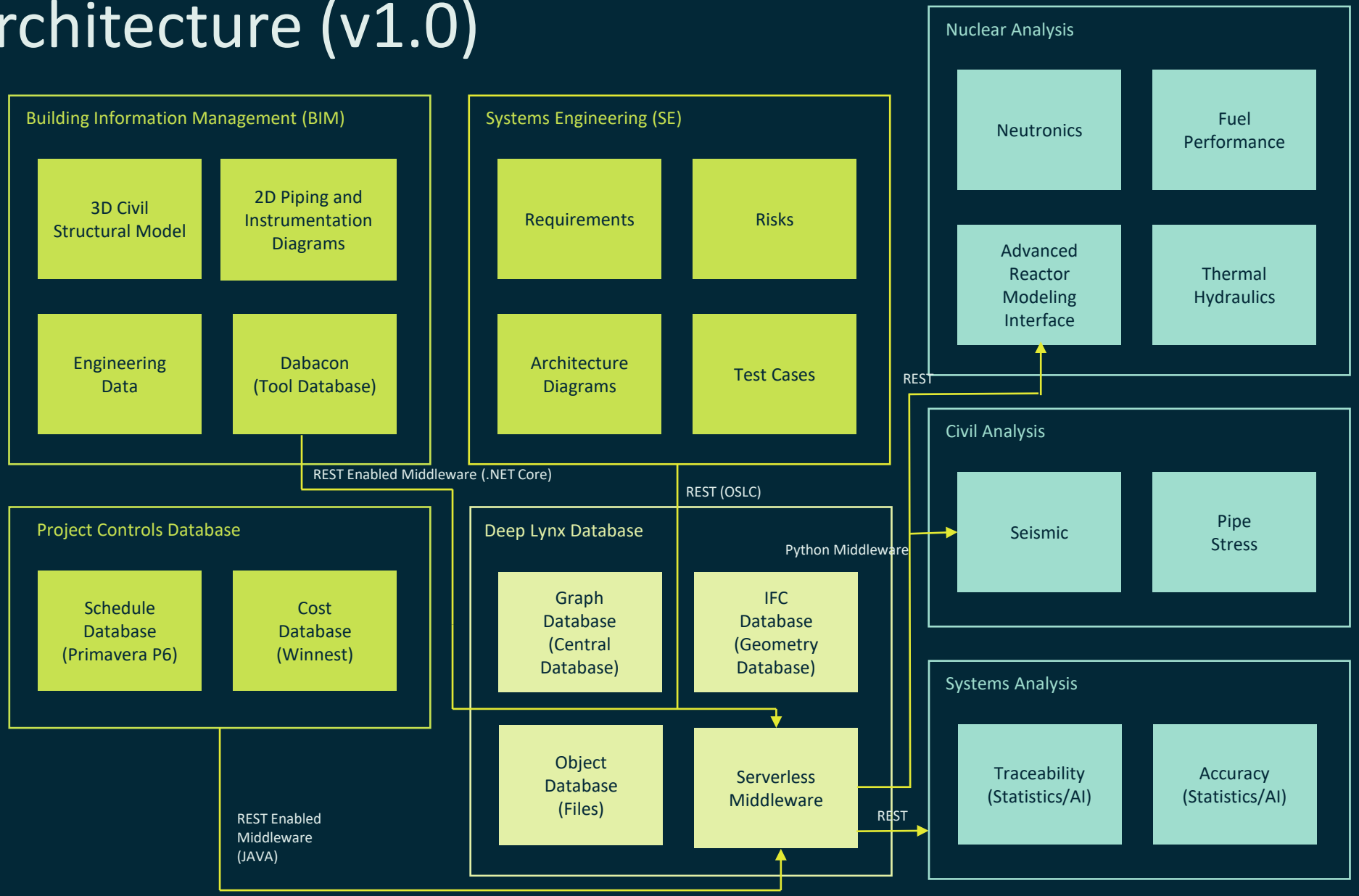
Opportunity

- Significant program impacts, for example published impacts at Mortenson Construction demonstrate
  - **600 cumulative day** direct **schedule reductions**
  - **25% productivity increase**
  - Use across 416 VDC programs
- **40% improvement** in first-time quality through use of digital twins (Boeing)
- Expected **$30M** savings at NNSA
- Proven across engineering domains: Construction (Mortenson VDC), Aerospace (Boeing 777), Automotive (Bugatti)



Example Derivative Solution: Plant Digital Engineering Architecture (v1.0)

- Cloud-based service of industry leading COTS tools
- Automation of design, modeling, & analysis integration
- Visualization of traceability between siloed tools
- Analysis of overall system traceability and accuracy



Work Package

- Scope
  - This work scope will utilize model-based systems engineering (MBSE) to design traced physical, functional, and requirements models. These models will be developed in a data-first paradigm where the underlying database is the authoritative source of truth which generates visual representations of the data. To develop these models a data model will be developed and infrastructure will be deployed to DOE internal and/or cloud systems.
- Key Personnel
  - Chris Ritter, Chief Architect
  - Peter Suyderhoud, MBSE Architect
  - Jason Kuipers, Senior Software Engineer
  - Nancy Gomez, Infrastructure Lead
- Deliverables
  - Model-Based Systems Engineering (MBSE) Tool Study: **April 2020**
  - Tool Infrastructure (installation and configuration) and Data Model: **May 2020**
  - Export to report from operational database of ZPPR Cell requirements: **June 2020**
  - Conceptual level architecture (functional/physical) of ZPPR Pre-Conceptual design: **September 2020**
  - Prototype Model-Based Systems Engineering (MBSE) Digital Engineering Integration: **September 2020**
- Project Start: April 1, 2020
- Major Risks
  - IT Infrastructure Challenges with COVID-19

NRIC National Reactor Innovation Center

Thank you

Idaho National Laboratory