Data Fusion of Infrastructure Condition with Project Planning, Prioritization, Execution

Leveraging an integrated data warehouse

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BLUF

The art of infrastructure project planning presents a unique set of challenges for data fusion. Integrating site Computerized Maintenance Management System (CMMS) and supporting unique and evolving prioritization rules while developing justification for budget are just a few of the circumstances that face a modern enterprise when it comes to project planning, prioritization, and execution. How does a site level enterprise leverage BUILDER information to support infrastructure planning and execution projects?

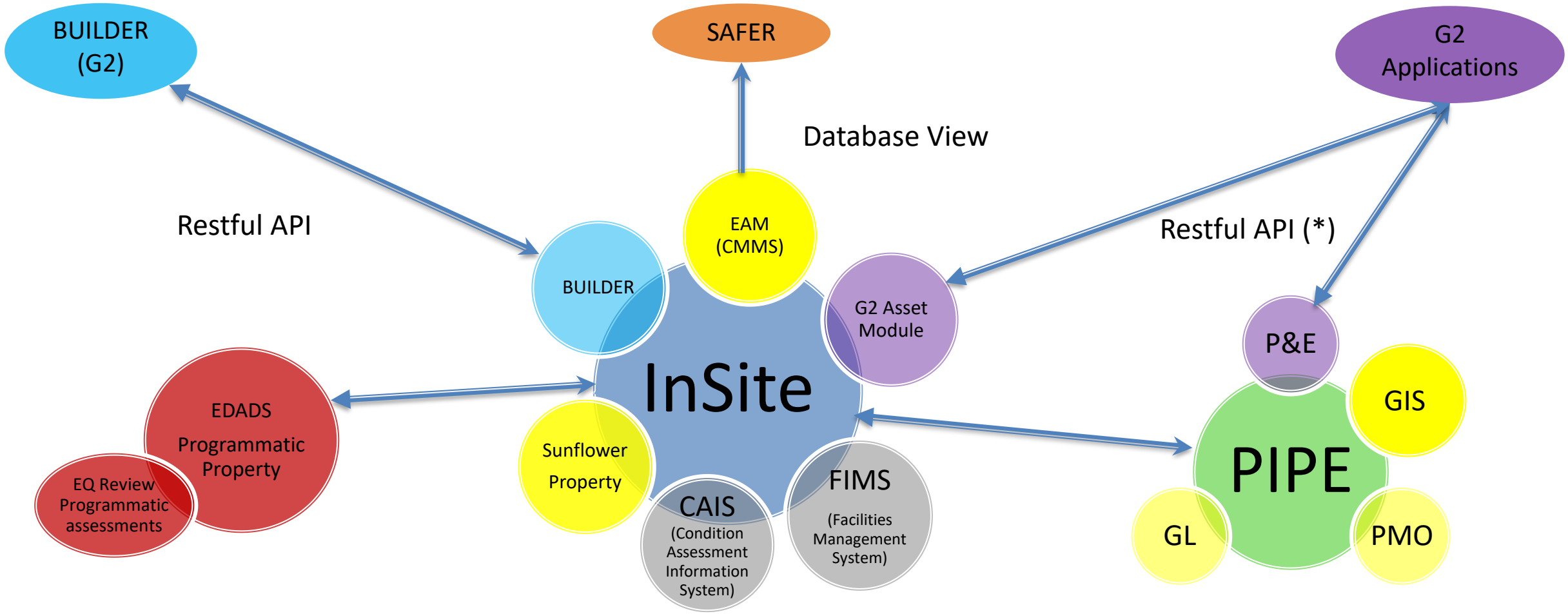
InSite and PIPE work together to realize a computerized decision-making system that links condition with project prioritization

Why data fusion?

- Improve data-driven enterprise decision-making
- Improved data integrity/fidelity
- Support for a rigorous validation and verification process with known validated data pedigree data
- Provides a rich common analytic data source
- Improved source history functionality
- Insulates enterprise from application lifecycle changes
- Provides a scalable environment to accommodate rapidly evolving data sources and frameworks

Integration is a quest for pristine data

Livermore enterprise infrastructure data overview



Many authoritative sources, one repository

Data fusion across authoritative infrastructure data

InSite integrates CMMS inspection and computed BUILDER condition data for improved decision making

- LLNL's InSite application provides an integrated bridge between LLNL's inventory assets and condition data (CMMS) with the NNSA BUILDER application through the interaction with DIGON's SPIRE Application Program Interface (API)
- InSite insulates LLNL's CMMS solution from changes in G2/BUILDER and insulates BUILDER from changes in LLNL's CMMS solution
  - InSite is not affected by changes to CMMS or G2 BUILDER
- InSite leverages LLNL infrastructure data to facilitate complex modeling using a graphical interface
- InSite allows LLNL to validate, verify, and translate asset inventory and inspection data for introduction to the BUILDER application

InSite data Wearhouse provides a centralized data repository for infrastructure data

InSite Authoritative Source Inventory (computerized decision-making system)

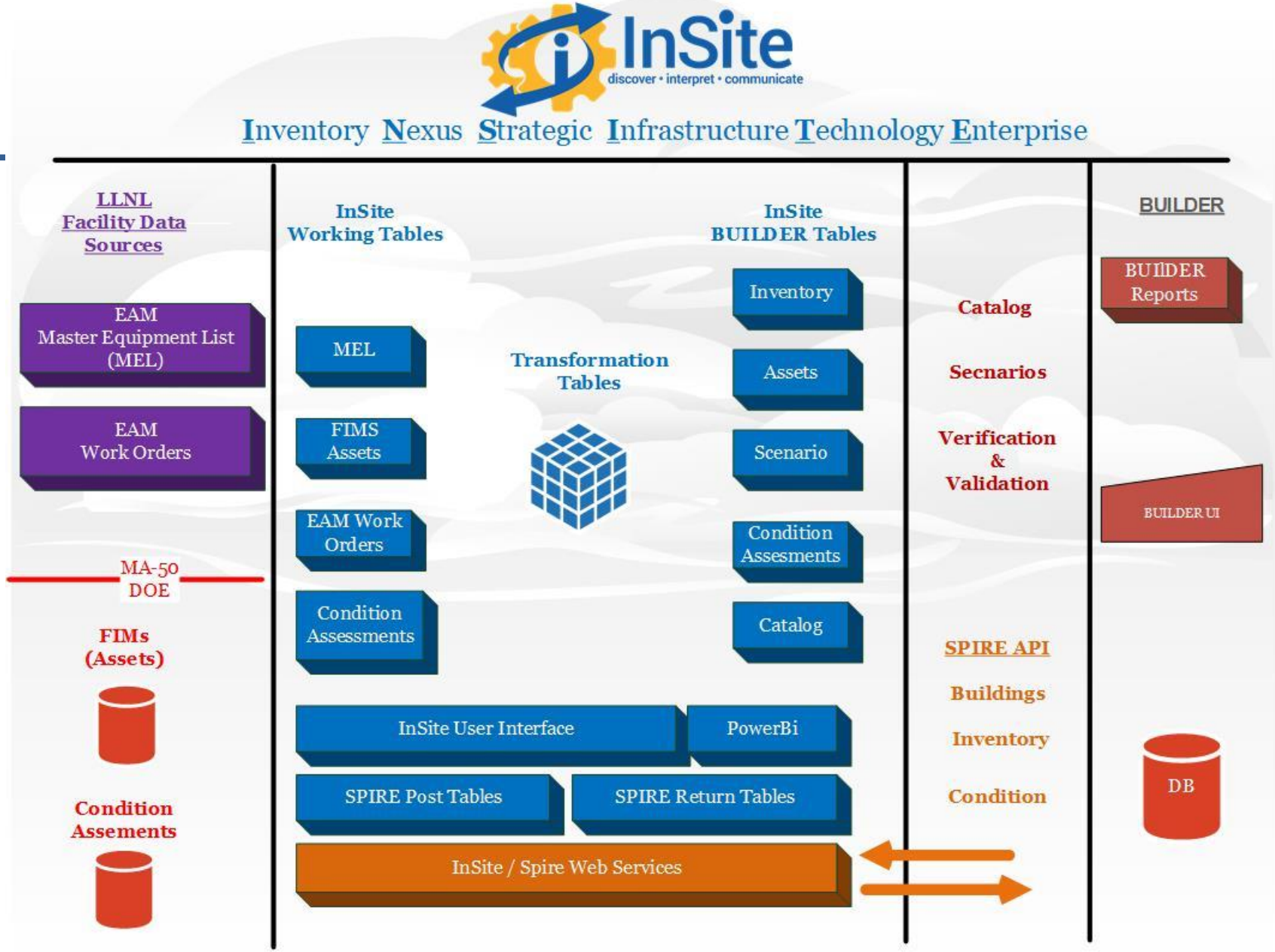
- **BUILDER (G2) (2 way)**
  - Assets
  - Inventory
  - Condition
  - Section data
  - Functionality **
- **Condition Assessment Information System (CAIS)**
  - Inspection deficiency data (MA-50 view)
- **Facility Information Management System (FIMS)**
  - FIMS data through (MA-50 view)

- **InSite**
  - CMMS Transformations
  - BUILDER History (since 2018)
  - Processing history
  - Master Equipment List (MEL)
  - Asset extension table
  - EAM Assets
  - EAM Inspections(heartbeats)
  - EAM Work Orders
  - EAM ranking
  - Reporting Views
  - SAFER View
- **EDADS (PRWG Inventory) ***
  - Programmatic equipment condition

- **PIPE (G2) (2 way)****
  - G2
    - Planning
    - Execution
    - Budget
    - Asset Module
  - Project Management Office Data (PMO)*
  - General Ledger
  - Site Development Plan
  - Prioritization
  - Survey
  - Pre-FIMS

* Requires manual data entry
** Possible Future

InSite relates equipment and building condition directly to projects and overall portfolio prioritization


InSite
discover • interpret • communicate
Inventory Nexus Strategic Infrastructure Technology Enterprise
LLNL Facility Data Sources
EAM Master Equipment List (MEL)
EAM Work Orders
MA-50 DOE
FIMs (Assets)
Condition Assements
InSite Working Tables
MEL
FIMS Assets
EAM Work Orders
Condition Assessments
Transformation Tables
InSite BUILDER Tables
Inventory
Assets
Scenario
Condition Assesments
Catalog
InSite User Interface
PowerBi
SPIRE Post Tables
SPIRE Return Tables
InSite / Spire Web Services
Catalog
Secnarios
Verification & Validation
SPIRE API
Buildings
Inventory
Condition
BUILDER
BUILDER Reports
BUILDER UI
DB

InSite/PIPE technology stack is based on common industry standard frameworks

Front-End

Back-End

IDE/other

DIGON/SPIRE Application Program Interface (API) enables communication between authoritative databases

Sync Processing Feature

- BUILDER Building
- BUILDER Inventory
- BUILDER Inventory Section
- BUILDER Condition

- SPIRE BUILDING
  - Update
  - Create
  - Delete
- SPIRE Inventory
  - Update
  - Create
  - Delete

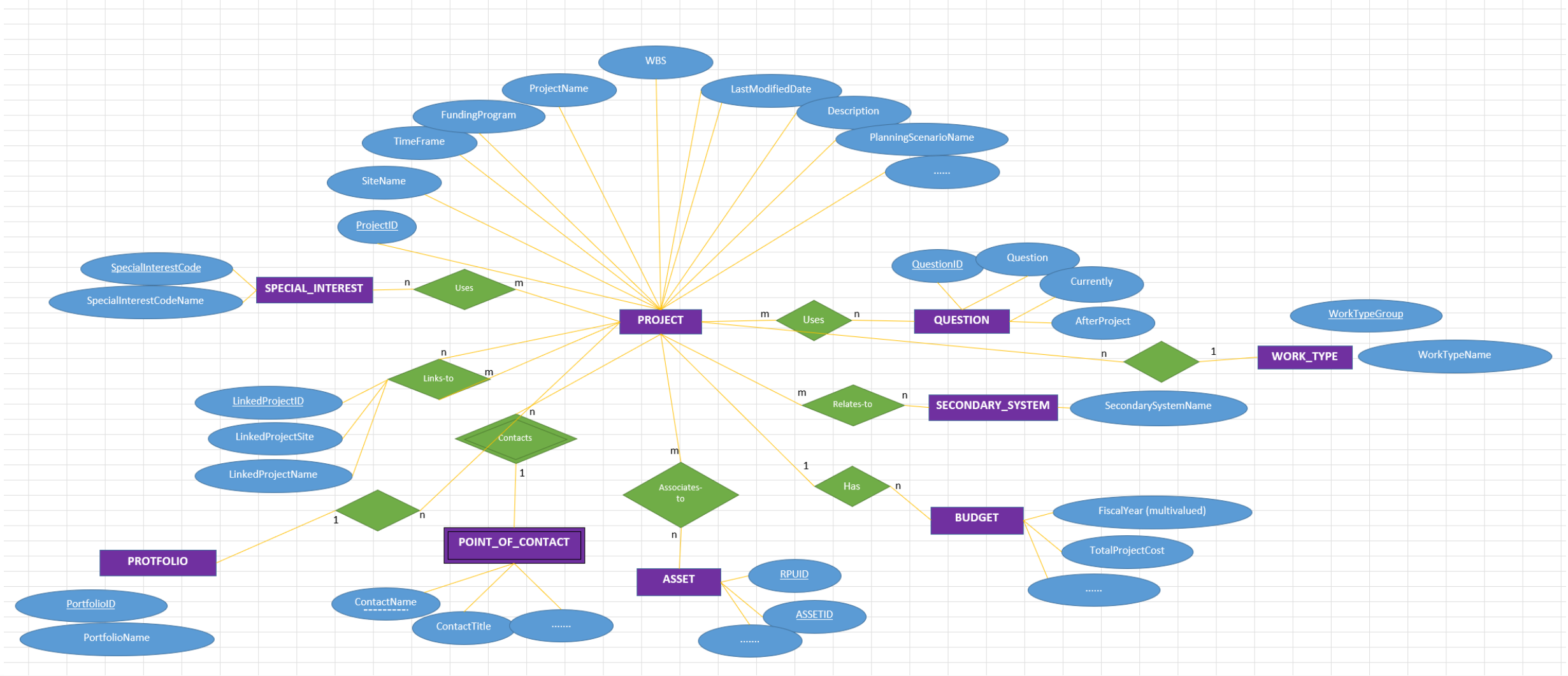
- SPIRE Inventory Section
  - Update (standard & replace)
  - Create
  - Delete
- SPIRE Condition
  - Update
  - Create
  - Delete

Each end-point has
Post & Return tables
that store the transaction

Project Infrastructure Planning & Execution (PIPE)

Project Infrastructure Planning & Execution (PIPE) is the critical link between condition data/risk and project/portfolio/ prioritized

PIPE relational data model spans the entire NNSA G2 project and portfolio planning data sets



PIPE G2 Application Program Interface (API) supports the project planning, execution and asset module objects

- Project Planning Objects
  - Projects
  - Project Details
  - Portfolios
  - Budget Details
  - Linked Projects
  - Contacts
  - Questionnaires
  - Scores
  - Schedules
  - Related Assets
  - Capabilities

Project Execution Objects

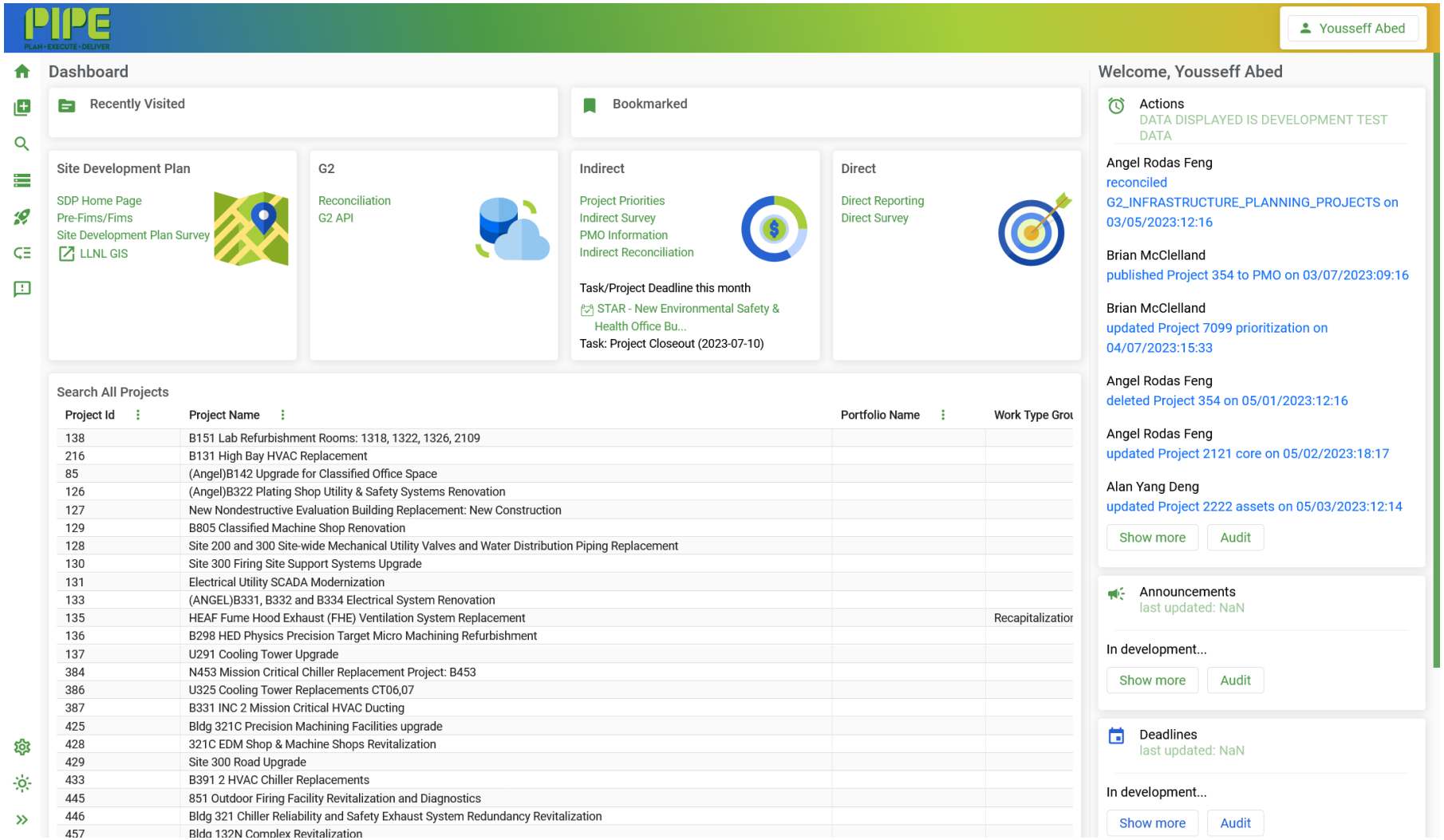
- Milestones
- Tasks
- Budget
- Schedule performance

Asset Module Objects

- Asset Data
- Capabilities
- Dependencies
- ERI
- Assets to projects
- ECFWG

PIPE preserves and manages the inter relationship between a complex set of objects

PIPE can customize and tailor interpretation of functionality based on unique “User Islands”



Examples of PIPE “User Islands”

Direct Budget Process

Indirect Budget Process

Site Development Plan

G2 Integration

Conclusion

Using a central integrated infrastructure data warehouse to organize infrastructure information while automating your workflow by using a highly configurable Project Infrastructure Planning and Execution (PIPE) application to drive decision-making process can better position site enterprise investments to be realized.

This approach leads to investment decisions that are based on data driven integrated infrastructure knowledge rather than a notional understanding of needs.

Leveraging BUILDER information throughout the project planning phase allows the organization to make decisions based on assessments and BUILDER output. Add the creation of an open application architecture that interacts with various data sources such as Project Management Office (PMO), General Ledger (GL), Property, CMMS, BUILDER, Facilities Management System (FIMS), Condition Assessment Information System (CAIS), G2 Asset Module, G2 project Planning an Execution module, Site Development Plan, Geographic Information System (GIS) increases your chances of a well-planned and transparent data driven infrastructure project.

Creating this fused data infrastructure environment paves the way for a highly effective, realistic decision-making environment that can be used to drive infrastructure investments as well as provide sound project justification.

Abstract

Problem Statement (50 words or less):

The art of infrastructure project planning presents a unique set of challenges for data fusion. Integrating site Computerized Maintenance Management System (CMMS) and supporting unique and evolving prioritization rules while developing justification for budget are just a few of the circumstances that face a modern enterprise when it comes to project planning and execution. How does a site level enterprise leverage BUILDER information to support infrastructure planning and execution projects?

Approach, Results, Conclusions (500 words or less):

Using a central integrated infrastructure data warehouse to organize infrastructure information while automating your workflow by using a highly configurable Project Infrastructure Planning and Execution (PIPE) application to drive decision-making process can better position site enterprise investments to be realized. This approach leads to investment decisions that are based on data driven integrated infrastructure knowledge rather than a notional understanding of needs. Leveraging BUILDER information throughout the project planning phase allows the organization to make decisions based on assessments and BUILDER output. Add the creation of an open application architecture that interacts with various data sources such as Project Management Office (PMO), General Ledger (GL), Property, CMMS, BUILDER, Facilities Management System (FIMS), Condition Assessment Information System (CAIS), G2 Asset Module, G2 project Planning an Execution module, Site Development Plan, Geographic Information System (GIS) increases your chances of a well-planned and transparent data driven infrastructure project. Creating this fused data infrastructure environment paves the way for a highly effective, realistic decision-making environment that can be used to drive infrastructure investments as well as provide sound project justification.

InSite is LLNL's centralized data warehouse drives infrastructure decisions