

Introduction – What is a Data Warehouse?

A Data Warehouse is the central data repository for consolidating and storing all important information throughout an Asset's Life Cycle. It's a special type of database with a focus on the ability to Consolidate Data from Multiple Sources. It should provide a dynamic class structure capable of being extended without affecting the application structure or performance. In order to facilitate consolidation it must provide flexible data import and export Capabilities. During the consolidation process it should provide data validation, change tracking and complete asset history. Once the data is consolidated it should provide robust search and reporting features and provide simple navigate and browse interfaces.

How does Lifecycle Server meet these requirements?

Lifecycle Server is a scalable, standards-based technical data warehouse. It provides highly flexible storage and retrieval as well as core modules that combine to deliver comprehensive change management and configurable data integrity analysis. The main goal of a Lifecycle Server implementation is significant reductions in the cost of interoperability and data handover traditionally associated with large capital projects. The sooner data management via Lifecycle Server begins the greater the potential savings for a capital project.

Lifecycle Server is based on the principles of the EPISTLE (European Process Industries STEP Technical Liaison Executive) Generic Entity Framework for data models. As such, it relies on storing data in a highly normalized data model that is accompanied by a class library. This flexible core addresses one of the toughest IT problem faced by the process industry today, consolidating and integrating data during the design and handover phase.

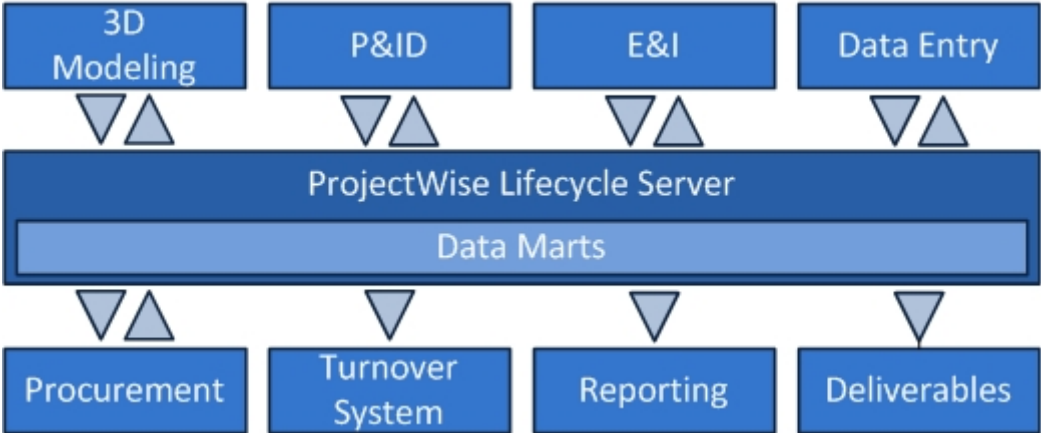
Lifecycle Server's core design principle provides a platform for identification and consolidation of data elements from disparate sources. As information is generated and then released from different disciplines, contractors, or vendors, Lifecycle Server provides comprehensive quality-checking methods to ensure that accepted information is complete, correct, and consistent. Contextual data about where information originated and the conditions under which it has been shared is held as well. Lifecycle Server can offer a complete picture of the digital plant as it is being designed, as it is being built, and as it is being operated. Providing access to a single source of truth enables better, more cost-effective decisions for the entire life cycle of the process facility.

How is Lifecycle Server used in the Industry today?

The need for clean, consistent and complete data spans every aspect of every project from conceptualization through to decommissioning and abandonment. ProjectWise Lifecycle Server and ProjectWise Integration server, the primary components of the DigitalPlant Solution, provide organizations with flexible, efficient data collection, consolidation, storage and distribution functionality that enables organizations to implement their business processes on a trusted data source. In short ProjectWise Lifecycle Server and ProjectWise Integration Server provide an Engineering Information Management System used to capture technical data and

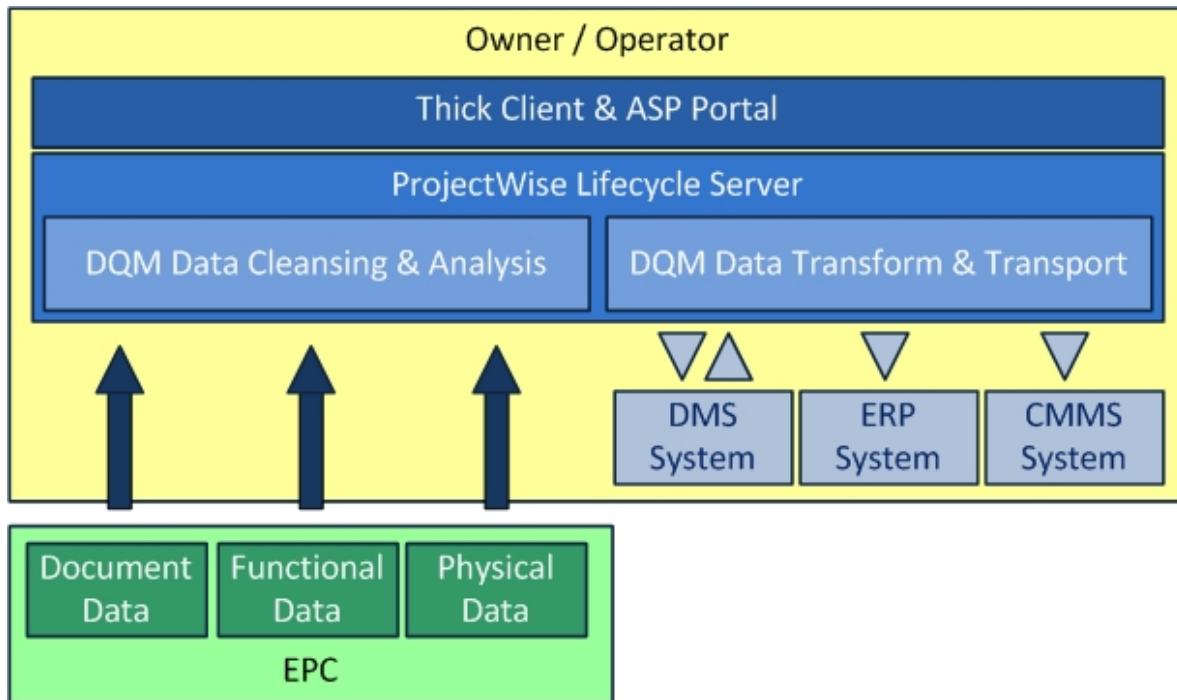
documentation associated with a physical asset. The DigitalPlant Solution simplifies how you manage, search, process, store, publish, and retrieve engineering data and related documents.

Lifecycle Server’s flexible core allows it to assume various roles in the industry. For the EPC, it plays the role of a staging database collecting a set of engineering data (while possibly meeting the engineering automation requirements) and allowing for the QA/QC process to take place prior to handover.



As a staging database Lifecycle Server reduces risk for an EPC risk by providing choices in design tools and tool transition strategy. EPCS are also able to leverage their existing knowledge base by defining and consistently applying their business rules in a managed framework. This managed environment also facilitates a better working relationship with Owner / Operators who become more involved in the handover process at earlier and consistent intervals.

For the Owner / Operator Lifecycle Server along with ProjectWise integration Server acts as a Content and Data Management hub for the various staged handovers from contractors. Information can be collated, shared, reviewed, and ultimately compared against contractual requirements to verify compliance by the contractors.



Lifecycle Server maximizes information reuse and accuracy and offers a solution that is scalable, deployable and provides a platform for connecting the design data to the Enterprise. It supports de facto industry standards for Data via the ISO 15926 compliant OpenPlant Schema and provides a way for Owner / Operators to effectively communicate their data requirements to contractors and vendors. When Lifecycle Server is used throughout the design process to capture and analyze staged data handover milestones it facilitates efficient and timely start up of operational systems with quality assured data. Operational costs and safety risks associated with missing, difficult to find or incorrect data are minimized.

Overview of the advantages Lifecycle Server offer to an organization

- Master Tag Management
 - The application provides a single, searchable tag register for managing all tagged items, properties and relationships
- Industry Neutral Environment
 - The data repository represents a single source of truth, including engineering registers (Line List, Cable Schedule, Valve List, etc.) for all engineering data, from any source.
- Comprehensive Management of Change
 - The framework provides change management that segregates proposed changes from as-built data. It also provides an environment for definition of workflows and sign off responsibilities for the management of all tags and tag data regardless of source.

- Full State Control
 - The framework provides full state control over all component lifecycles. State control is also governed by security ensuring state change is done only by approved users.
- Data Quality Management
 - Configurable data quality rules can be applied to data coming in from any source before it is committed to the repository.
- Integrated Security Control
 - Security is tightly integrated into the system, data creation and modification as well as approval and workflow can be defined down to the component attribute level.
- Flexible Architecture
 - The storage and retrieval engine is based on advanced database theory which provides an environment capable of modeling any client RDL.
- Document and Data Cross Referencing
 - The framework provides a single environment to view versioned data, proposed and as-built, linked to versioned documents held in various document management systems.
- Data Integration Platform
 - The framework includes a fully documented API, Data Streams and integration with Bentley Data Exchange. These features combine to produce a highly configurable integration platform that facilitates Engineering Automation.
- Complete Multi-Language Support
 - Lifecycle Server supports multiple languages offering full double byte character set support in both its User Interface and Data Storage Layer.

Who uses Lifecycle Server today?

ProjectWise Lifecycle Server is a project proven platform. There are over 22 Servers in production and testing today servicing 24 projects worldwide. Owner / Operators like Chevron, BP, Petro-Canada and Southern Company as well as Engineering Firms like KBR, MW Kellogg , AMEC and Black & Veatch have adopted it on multiple projects, Some Owner / Operators are attempting to position it as a project standard and expect it to potentially play a role in 30 – 40 projects over the next 5 – 10 years.

Lifecycle Server is providing clean, complete and consistent engineering data to projects worldwide. It is the effective basis for reuse and management of information and enables handover of engineering data to operations.



It provides reliable, auditable management of change from Engineering and Procurement through to Operations & Maintenance. It's becoming an industry standard for providing effective lifecycle information management from Conceptualization through Operations.