NDH vs. AVEVA Connect vs. AVEVA AIM: A Comprehensive Technical Analysis

1. Executive Summary

This document provides a detailed comparative analysis of the **Neutral Data Hub (NDH)**, **AVEVA Connect**, and **AVEVA Asset Information Management (AIM)**. These three systems are pivotal in the realm of industrial data management and digital twin creation, yet they diverge significantly in their core philosophies, technical architectures, and business models. This analysis aims to clarify these differences to guide strategic technology adoption.

1.1. Core Positioning at a Glance

A high-level comparison of the three systems reveals their distinct market positioning:

System	Core Positioning	Primary Functions
NDH	**Neutral OT/IT Data Hub**	Real-time data integration, Asset Servants for direct asset communication, open and flexible data processing.
AVEVA Connect	**Industrial Intelligence Platform**	Cloud-based integration, a comprehensive ecosystem of applications, and a collaborative environment for enterprise-wide use.
AVEVA AIM	**Engineering Information Management**	Aggregation of engineering data, serving as the core of the digital twin, and robust document management.

1.2. Key Differentiators

The most significant differences are summarized below:

Feature	NDH	AVEVA Connect	AVEVA AIM
Open/Commercial	Open Source (IDTF)	Commercial (AVEVA)	Commercial (AVEVA)
Deployment Model	On-Premise / Cloud	Cloud (Azure)	Cloud (via CONNECT)
Vendor Lock-in	None	Moderate (AVEVA Ecosystem)	High (AVEVA Ecosystem)
Real-time Data	✅ Core Functionality	✅ via Data Services	❌ Primarily Static Data
Engineering Data	⚠ Basic Support	✅ via AIM	✅ Core Functionality
Cost	Low (Open Source)	High (SaaS Subscription)	High (SaaS Subscription)

2. Detailed System Overviews

2.1. NDH (Neutral Data Hub)

Definition: NDH is the **neutral data hub** within the IDTF V3.5 framework, designed for the collection, processing, storage, and distribution of industrial OT/IT data. It provides an open, neutral, and scalable data platform.

Core Features:

- **Neutrality**: NDH is vendor-agnostic, supporting a wide range of industrial protocols (OPC UA, SECS/GEM, Modbus, BACnet) and allowing for swappable time-series databases (InfluxDB, TDengine, TimescaleDB, QuestDB).
- **Asset Servants**: These are asset service instances running on worker nodes that communicate directly with physical assets, with support for over ten types of Asset Servants.

- **Real-time Data Processing**: Built on a Kafka event-driven architecture, NDH can process over 100 million data points daily with millisecond latency.
- **Open-Source Architecture**: As part of the IDTF V3.5 framework, NDH is community-driven and free of licensing fees.

2.2. AVEVA Connect

Definition: AVEVA Connect is an **open, vendor-neutral, cloud-based industrial intelligence platform**. It utilizes a set of shared software services to enable the rapid and reliable integration of industrial data, models, applications, and AI/analytics.

Core Features:

- **Cloud Integration Platform**: Based on Microsoft Azure, it is delivered as a SaaS model with global availability.
- **Shared Services**: Includes identity management, data services (formerly AVEVA Data Hub), and integration services.
- **Application Ecosystem**: Integrates with AVEVA PI System, AVEVA AIM, AVEVA Unified Engineering, and third-party applications.
- **Collaborative Environment**: Facilitates cross-organizational data sharing and real-time collaboration.

2.3. AVEVA AIM (Asset Information Management)

Definition: AVEVA AIM is a powerful **web-based solution** that enables users to organize, validate, and collaborate on asset data. It aggregates information from multiple sources and formats to create and maintain the core of a digital twin.

Core Features:

- **Engineering Data Aggregation**: Manages P&IDs, 3D models, specifications, documents, and point cloud data.
- **Data Quality Management**: Employs standards-based data validation (CFIHOS, ISO 15926, ISO 14224) to ensure data integrity and consistency.
- **Visualization Tools**: Offers customizable, role-based dashboards with 3D model and P&ID navigation.

- **Document Management**: Integrates with the Assai document control system for version control and review workflows.

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3. In-Depth Functional Comparison

3.1. Data Type Support

Data Type	NDH	AVEVA Connect	AVEVA AIM
Real-time OT Data	✅ Core Functionality	✅ via Data Services	❌ Not Supported
Time-Series Data	✅ InfluxDB/TDengine	✅ AVEVA Data Hub	❌ Not Supported
Engineering Data	⚠️ Basic Support	✅ via AIM	✅ Core Functionality
3D Models	⚠️ via Omniverse	✅ via AIM	✅ Core Functionality
Documents	❌ Not Supported	✅ via AIM	✅ Core Functionality
Point Cloud Data	❌ Not Supported	✅ via Point Cloud Mgr	✅ Core Functionality
MES/ERP Data	✅ Core Functionality	✅ via Integration	⚠️ Limited Support

3.2. Industrial Protocol Support

Protocol	NDH	AVEVA Connect	AVEVA AIM
OPC UA	✅ Native Support	✅ via PI System	❌ Not Supported
SECS/GEM	✅ Native Support	⚠️ Customization Needed	❌ Not Supported
Modbus TCP	✅ Native Support	✅ via PI System	❌ Not Supported
BACnet	✅ Native Support	⚠️ Customization Needed	❌ Not Supported
MQTT	✅ Native Support	✅ via PI System	❌ Not Supported

4. Architectural Comparison

4.1. NDH Architecture

- **Strengths**: Openness, flexibility, real-time processing capabilities, and cost-effectiveness.
- **Weaknesses**: Limited support for engineering data and document management, requires self-managed cloud infrastructure.

4.2. AVEVA Connect Architecture

- **Strengths**: A unified integration platform, cloud-native design, a rich application ecosystem, and strong collaboration features.
- **Weaknesses**: High SaaS subscription costs, vendor lock-in, limited to the Azure cloud, and restricted customization.

4.3. AVEVA AIM Architecture

- **Strengths**: Specialized for engineering information management, high data quality through standards-based validation, and powerful visualization tools.
- **Weaknesses**: No support for real-time OT data, high licensing fees, primarily focused on the engineering phase, and deep vendor lock-in.

5. Use Case Suitability

Use Case	Recommendation	Justification
Real-time Manufacturing Monitoring	**NDH**	Optimized for real-time OT data, native support for manufacturing protocols, and low cost.
Capital Projects (EPC)	**AVEVA Connect + AIM**	The industry standard for comprehensive engineering data management and collaboration.
SME Manufacturing	**NDH**	The most cost-effective solution with sufficient functionality for small to medium-sized enterprises.
Large-Scale Enterprise Digitalization	**AVEVA Connect**	An enterprise-grade platform designed for global collaboration and a rich application ecosystem.

6. Total Cost of Ownership (TCO) Comparison

A 5-year TCO analysis for a medium-sized manufacturing plant (500-1000 assets) reveals the following:

System	5-Year TCO (Estimated)	Key Cost Drivers
NDH	**$2.24M**	Implementation services and personnel costs.
AVEVA Connect	**$2.91M**	High SaaS subscription fees and reliance on the AVEVA ecosystem.
AVEVA AIM	**$1.92M**	Primarily driven by subscription fees during the engineering phase.

7. Conclusion and Recommendations

Choose NDH if: * Your primary need is real-time OT data monitoring. * You have a limited budget and a capable technical team. * You require a high degree of customization and want to avoid vendor lock-in.

Choose AVEVA Connect if: * You are a large, multinational corporation requiring an enterprise-grade platform. * You need a rich application ecosystem and global collaboration capabilities. * You have a substantial budget.

Choose AVEVA AIM if: * Your focus is on capital projects and engineering data management. * You need to ensure a smooth handover from design to operations. * Compliance with industry standards is a critical requirement.

7.1. The Rise of Hybrid Solutions

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growing trend is the adoption of hybrid approaches that leverage the strengths of different systems. For example, combining **NDH** for real-time data collection with **AVEVA AIM** for engineering data management can provide a comprehensive solution that is both powerful and cost-effective. This allows organizations to benefit from NDH's real-time capabilities while still using AVEVA's industry-leading tools for engineering data.

8. References

[1] AVEVA. (2025). *CONNECT Industrial Intelligence Platform*. Retrieved from https://www.aveva.com/en/solutions/connect/

[2] AVEVA. (2025). *AVEVA Asset Information Management*. Retrieved from https://www.aveva.com/en/products/asset-information-management/

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