

Manufacturing Visibility is the Missing Layer

Extending MTConnect for Supply Chain Data Propagation



The Problem Isn't Capacity

- Surge demand exposes hidden supply chain fragility
- Sub-tier manufacturers remain undiscoverable
- Production bottlenecks emerge too late
- Visibility gaps delay response, not capability



The Visibility Gap

- No real-time view of manufacturing state
- No mechanism to expose latent capacity across suppliers
- Data exists, but remains fragmented
- No standard for propagating production signals



Limits of Today's Standards

We can describe manufacturing

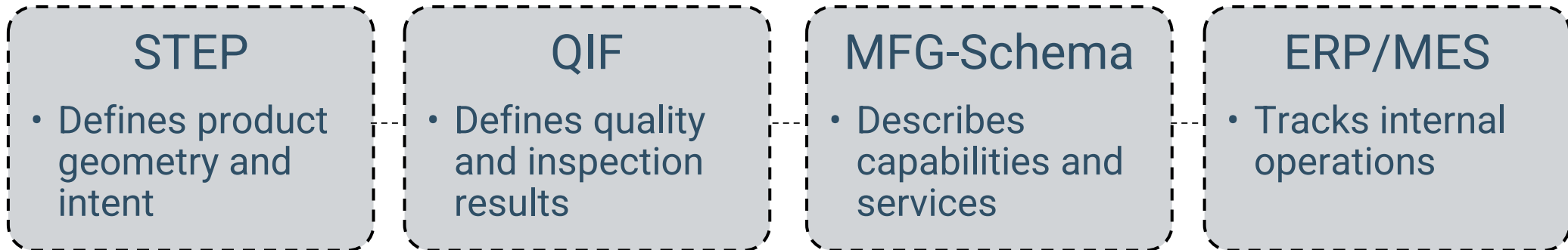
But we cannot see it



What We Can Describe Today

Data exists, but remains isolated

Across domains, systems, and standards



What We Cannot See

Machine State

- Real-time machine availability

Flow State

- Work-in-progress status

Completion State

- Batch completion events
- Production readiness signals

Historical State

- Historical execution data access
- Environmental conditions



A Missing Data Layer

Not a new standard

A way to connect existing ones

Through real-time production data



MTConnect as a Foundation

- Open standard for machine-level data
- Widely adopted across CNC equipment
- Normalized, vendor-neutral structure
- Real-time streaming via REST
- Proven in production environments



The Constraint: No Historical Access

- Agents limited by buffer size
- Historical context quickly lost
- No long-horizon query capability
- Not aligned with traceability requirements
- Limits integration with enterprise systems



Extending MTConnect with Historical Access

- SQL-backed Adapter
- Familiar MTConnect Agent
 - Removes dependency on buffer constraints
 - Queryable across extended time ranges
 - Long-term traceability
- Preserves full MTConnect compatibility



Reference Architecture for Data Access

TAMS Connect Architecture

- Central data collection across machines
- Historical MTConnect Agent over database
- OpenAPI layer for extensibility
- Plugin for filtering and data packaging
- Secure exposure of production signals

Open Standards/Information Models = Future-proof



From Data to Propagation

From internal data

To external signals



Linking to MFG-Schema

- MFG-Schema describes static capabilities
- MTConnect provides dynamic production state
- Link via discoverable web references
- Enables hybrid static + real-time visibility
- Supports supply chain discovery workflows



Dynamic Supply Chain Signals

- Publish machine readiness events
- Signal batch completion status
- Expose high-level availability
- Safely share signals across domains
- Enable external polling and discovery
- Extends MFG-Schema beyond static discovery



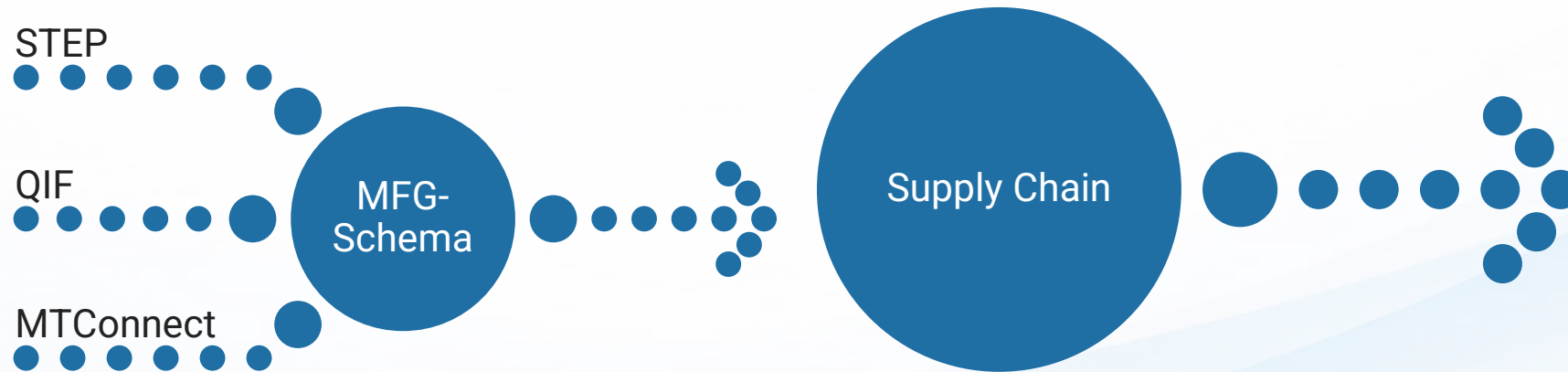
Example: Pickup & Readiness Signal

- MATERIAL_UNLOAD indicates completion
- Batch identifier associated with output
- Location enables logistics coordination
- External systems detect readiness automatically
- No manual communication required

```
1 <MaterialUnload dataItemId="shipping_request"  
2   subType="REQUEST">  
3   READY  
4   <PartGroupId subType="BATCH">  
5     W01742  
6   <Location>  
7     34.1061° N, 117.2900° W<  
8   </Location>
```



Extending the Digital Thread



MTConnect + QIF in Production

- MTConnect transports QIF results in production
- Connects execution events to inspection outcomes
- Enables in-process quality communication
- Aligns execution with metrology standards
- Bridges shop floor and quality systems



Packaging Production + Quality Data

- Aggregate data by part or work order
- Combine MTConnect execution history
- Attach QIF inspection results
- Generate portable “quality + production” packages
- Enable downstream consumption



What this Enables

- Real-time supply chain visibility
- Faster surge production response
- Discoverability of hidden capacity
- Long-term traceability (20+ years)
- Data-driven logistics coordination



Build the Visibility Layer

Extend standards to enable real-time manufacturing visibility

