Breaking Through All The Bits And Bytes To Bring Real Information Modeling To The Factory Floor

John Rinaldi
President, Real Time Automation
W: +1 (262) 439-4999
M: +1 (414) 460-6556
jrinaldi@rtautomation.com
For those not familiar with Industrial Automation...

History...

Practices...

Limitations...
Over 100 Years of Manufacturing....

Little Ability to Externally Monitor...

Manual Recording...

Limited & Painful Connections to Business Systems...

Unsecure Communications...
Brittle Systems....

- Limited Data Types
- Incomplete Data Models
- Inflexible Communication Model
- Inaccessible Data
- Tightly Coupled Control
Many Problems To Solve

1. No Consistent Data Typing
2. No Access To Non-Control Data
3. No Consistent Access To Device Data
4. Difficult to Coordinate Industry Standards
5. Only Proprietary Extensions
6. Inconsistent Mechanisms for Program Execution

....And Much Much More...

- Expensive Integration Efforts
Problems Not Limited to Factory Floor
Problems Are More Acute

1. More Data
2. Mobile Access
3. Integration of Enterprise and Devices
4. Archiving of More Data
5. IT People Wanting Access to Factory Data
6. More Dashboard Type Applications
7. More Database Type Applications
8. More Cloud Type Applications
OPC UA Data Type Model Overview

- Consistent Set of Built-In Data Types
- Set of Standard Types well-known UA Devices
- Extensible Type System
- Discoverable Types
- Types in the Address Space
Built In Types – Understood by all devices

“Root”

Organizes

Types

Organizes

ReferenceTypes

VariableTypes

DataTypes

ObjectTypes

EventTypes

Types

FLOAT

INT16

BINARY

INTEGER
Standard Types – Specific to UA

“Root”

Types

Organizes

ReferenceTypes

VariableTypes

DataTypes

ObjectTypes

EventTypes

Organizes

DATATYPE
BaseDataType

hasSubType

DATATYPE
NodeID

hasSubType

DATATYPE
Structure

hasSubType

DATATYPE
DiagnosticInfo

ALL NODES REFERENCED TO OPC UA FOUNDATION
Extensible Types – Vendor / Group Defined

“Root”

Organizes

Types

Organizes

ReferenceTypes

VariableTypes

DataTypes

ObjectTypes

EventTypes

Organizes

DATATYPE
BaseDataType

DATATYPE
Structure

DATATYPE
ControlBlock

DATATYPE
DriveDiagnostics

ALL TYPES REFERENCED TO VENDOR/TRADE GROUP
Benefits Of The OPC UA Data Type System

- Provides Consistent Data Types for Common Types
- Clients Can Identify & Trace Type Definitions
- Clients Can Discover, Understand, Use New Types
OPC UA Object Type Model

- Variables, Objects or Groups of Objects
- Reusable and consistent across multiple applications
- Extensible & Discoverable
- Types in the Address Space
Variable Types

Consistent reliable reusable variables throughout a device, process or industry wide applications

VARIABLE
Ramp Up Speed

VARIABLE TYPE DEFINITIONS

Variable Type
“Ramp Up Speed”
Attribute list…
Object Types

Consistent reliable reusable objects throughout a device, a process or an industry

VARIABLES

METHODS

References

Events

Reads / Writes

OBJECT TYPE
Simple Object Types
Object types can represent simple items

OBJECT
Drive

OBJECT TYPE DEFINITIONS

OBJECT TYPE
Drive Speed

VARIABLE
Ramp Speed

Variable Type
“Ramp Up Speed”

Attribute list…
Object types can represent machines, processes or anything else.
Coca-Cola Can Identify & Trace Type Definitions

Provides Consistent Models for Components, Devices, Processes, Lines or Plants

Clients Can Discover, Understand, Use New Types
Problem: Tedious and Difficult to Configure Client Devices
   Solution: Standard Models Provide Ease Configuration

Problem: Consistent Access To Data from Device to Device
   Solution: Standardized, Discoverable, Consistent Types

Problem: Current Systems Deliver Data NOT Information
   Solution: UA Designed To Deliver Information

Problem: Difficult To Deploy Industry Wide Info Models
   Solution: Models Referenced To Trade Group Standards

OPC UA PROVIDES MORE PEOPLE WITH MORE ACCESS TO MORE DATA…
Industrial Generator Manufacturer

- System Design Difficulties
- Integration Issues
- Lack of Secure Data Transfer

- Data Consistency
- Hard to Integrate with Business Systems
- Phone & Tablet Access
Benefits of OPC UA Support

- Ease of System Design
- Ease of Integration
- Data Consistency
- Secure Data Transfer
- Integration with Customer Business Systems
- Phone & Tablet Access
Software Stacks

Development Services

Industrial Automation Gateways

John Rinaldi
jrinaldi@rtautomation.com
262-439-4999