



# New methods in developing large-scale, distributed, real-time systems

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# Problem Space

- Our Verticals
  - Automotive
  - Semiconductor
  - Medical Devices
- Our Applications
  - Plant System Integration – MES, ERP, Maintenance
  - Plant Automation – Cell or Station Controller
  - Real-Time Data Mining
  - Advanced Process Control – APC, R2R
  - Process Health
  - Plant Infrastructure Management – energy, air, environmental systems
  - Material Handling
  - Track and Trace – RFID, barcodes, Vision
  - Smart Equipment
- It is not your old SCADA – multiple applications converging



# Beyond SCADA

- **Continuous Improvement Platform**
  - Distributed
  - Real-time
  - Cross-Domain
  - Heterogeneous
  - Scalable
- No longer about moving data, it is all about information, events and **distributed intelligence** – application logic moving into infrastructure
- **Can't replace everything** – integrating with legacy hardware, software and protocols
- **Resulting Complexity** – Implementation, Support, Change
- **People factor** – expertise and continuity of the systems

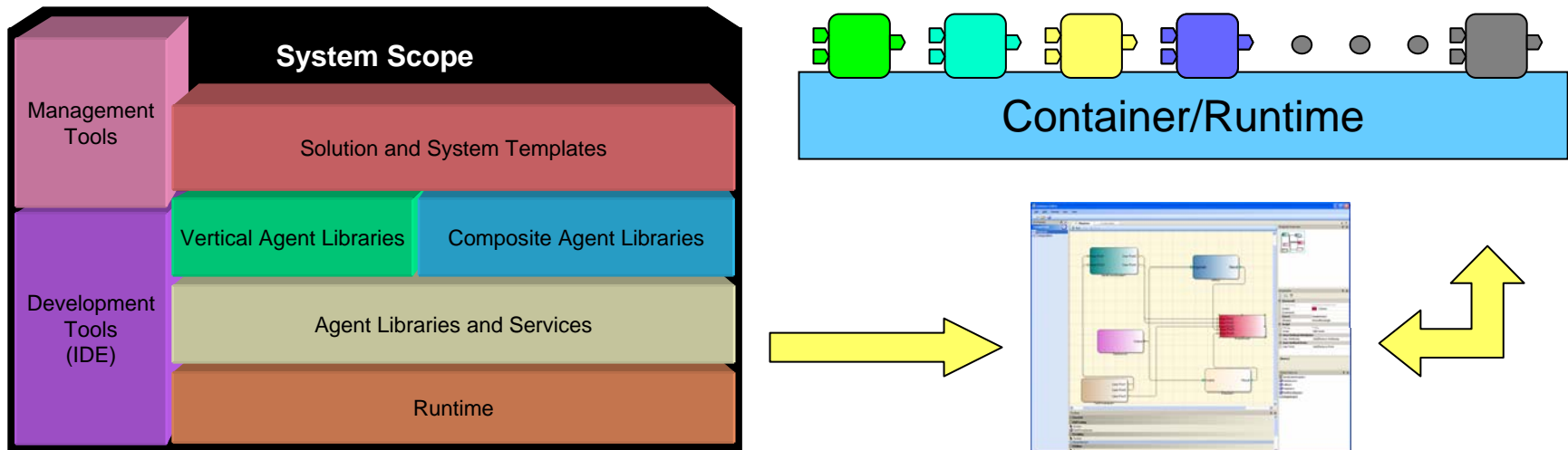


# Rethink architecture ...

- **Methodology**
  - Composite Applications – combining Reusable Configurable Services
  - Metadata-based
  - Event-based using Reactive Agents pattern
  - Dual-Mode Agents
- **Infrastructure**
  - Metadata-driven
  - Distributed Software Container running on COTS inexpensive hardware
  - Guaranteed Concurrency, Event Delivery, QoS
  - Non-disruptive Deployment
  - Build-in forensic – logging and monitoring, instrumentation
- **Tools**
  - Metadata-driven and metadata-generating
  - Software Factory for Software Factories
  - Domain Specific
  - Role Specific

# Tools

- Built on the Software Factory concepts
  - reusable abstractions
  - build systems in the domain by instantiating, adapting, configuring and assembling runtime components
  - respond faster to changing requirements
  - predictable and scalable consistency of quality
  - incorporate pre-built, standard functionalities into software which is typically disaggregated by domain





# Beyond SCADA Revisited

- We are moving from the traditional software pyramid to the flat continues **Info-Structure**
- We need industrialized approach to the system development – enabled by the **Software Factories**
- To accommodate new challenges presented by hardware and software advancements, geopolitical, economical and societal changes, regulations – **Continuous Improvements** must be fundamental part of the system on architectural and approach levels