# SMART MANUFACTURING:

## *Optimized Plant & Supply Networks*

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ACEEE Market Trends
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# Why Smart Manufacturing?

- A new, bold strategy for U.S. competitiveness that marries information, technology and human ingenuity and transform manufacturing from fixed, supplier-driven production to flexible, demand-driven production

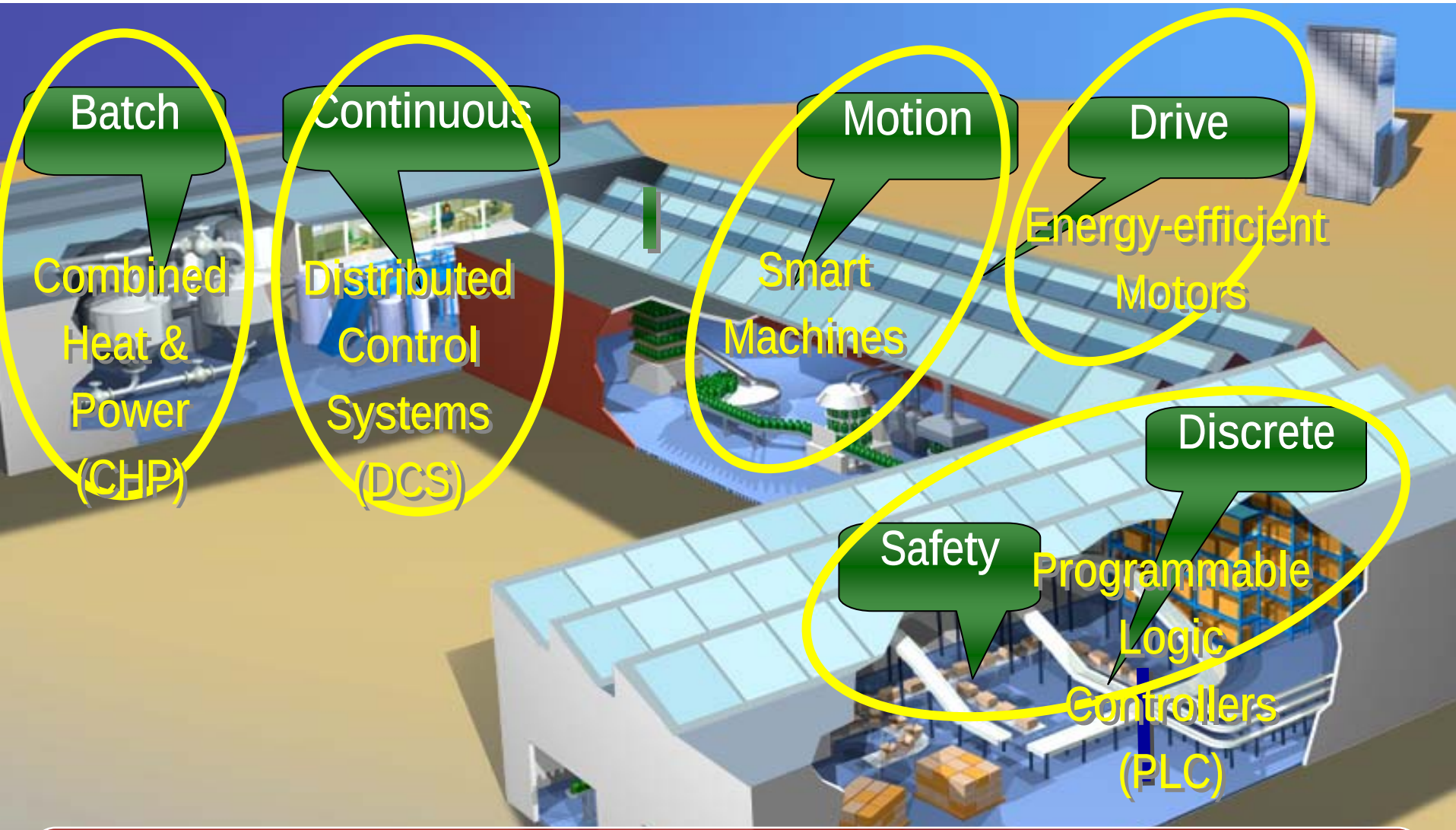
- Enable sustainable manufacturing

- Enable sustainable production of nationally strategic goods (e.g., Bio/Nano, Clean Energy, Green/Tech, and DOD needs.)

- Increase U.S. manufacturing competitiveness by fundamentally changing how products are invented, manufactured, shipped and sold; it will improve worker safety and protect the environment by making zero-emissions and zero-incident manufacturing possible

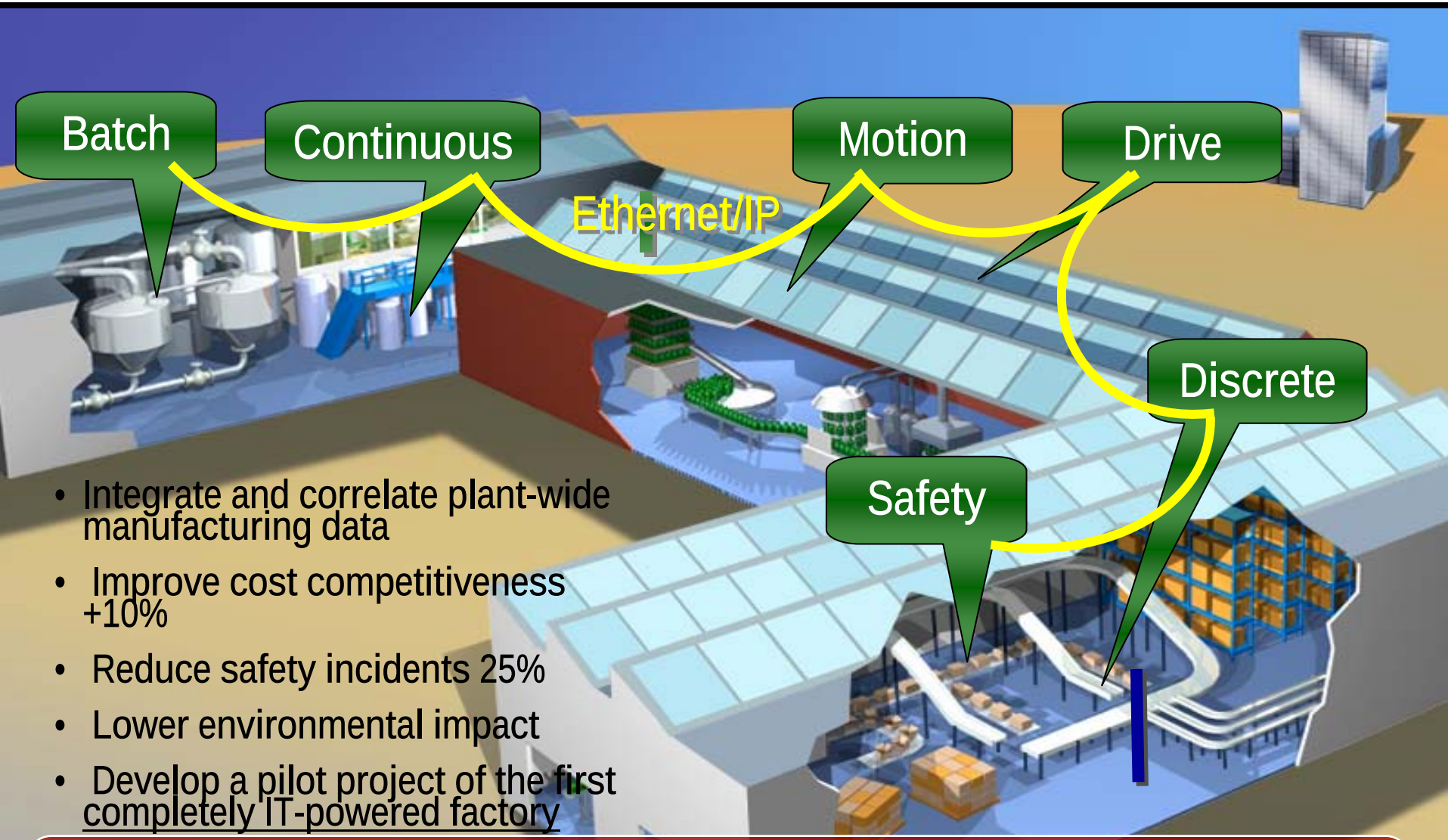
- Revitalize the 21st Century industrial community model (jobs!) and U.S. manufacturing

# Current Situation: Islands of Efficiency




Today, most plants use multiple separate manufacturing technologies

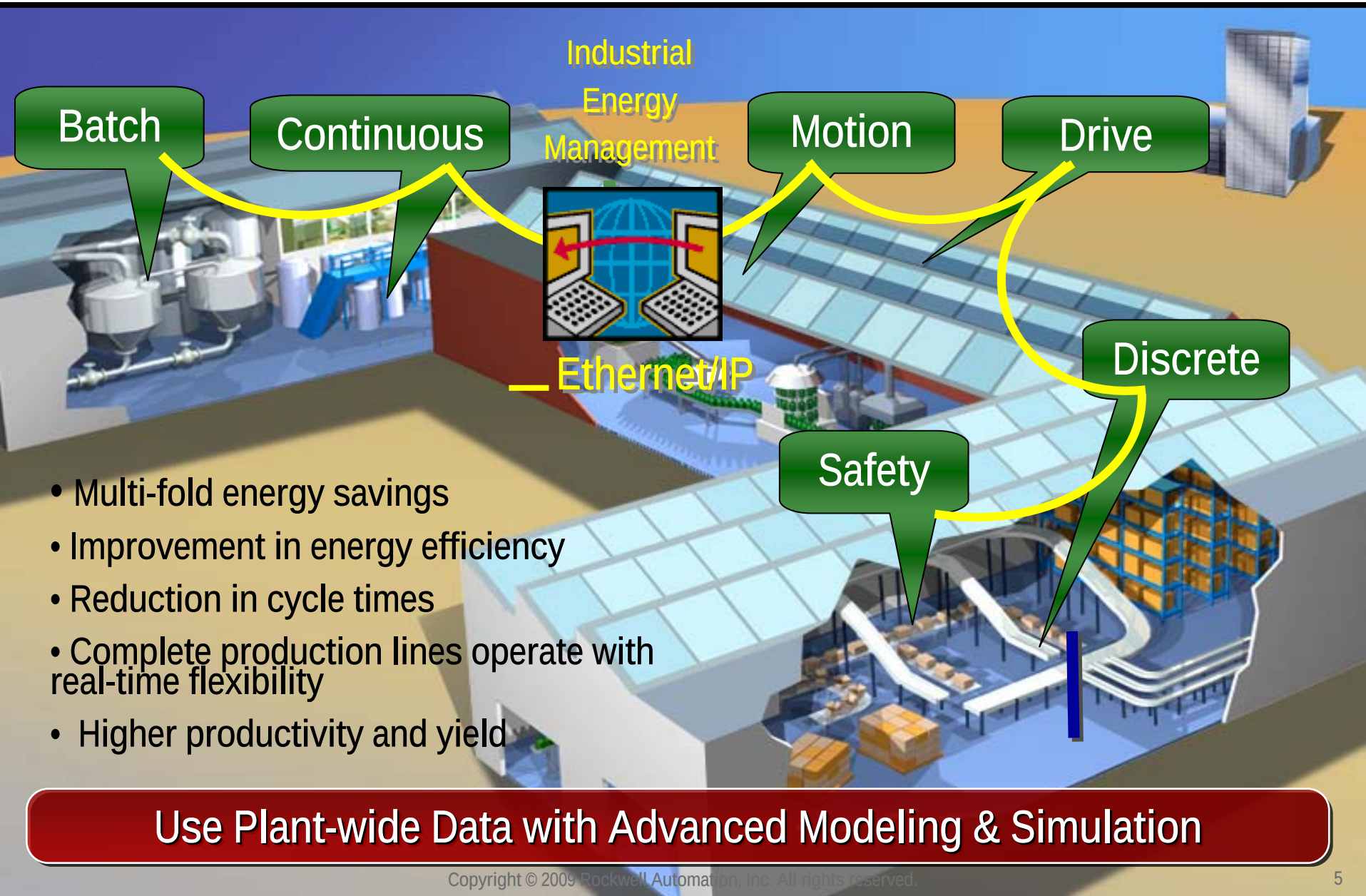
# Plant and Enterprise-Wide Integration




- Integrate and correlate plant-wide manufacturing data
- Improve cost competitiveness +10%
- Reduce safety incidents 25%
- Lower environmental impact
- Develop a pilot project of the first completely IT-powered factory

**Essential first step to creating "Manufacturing Intelligence"**

# Plant-wide Optimization

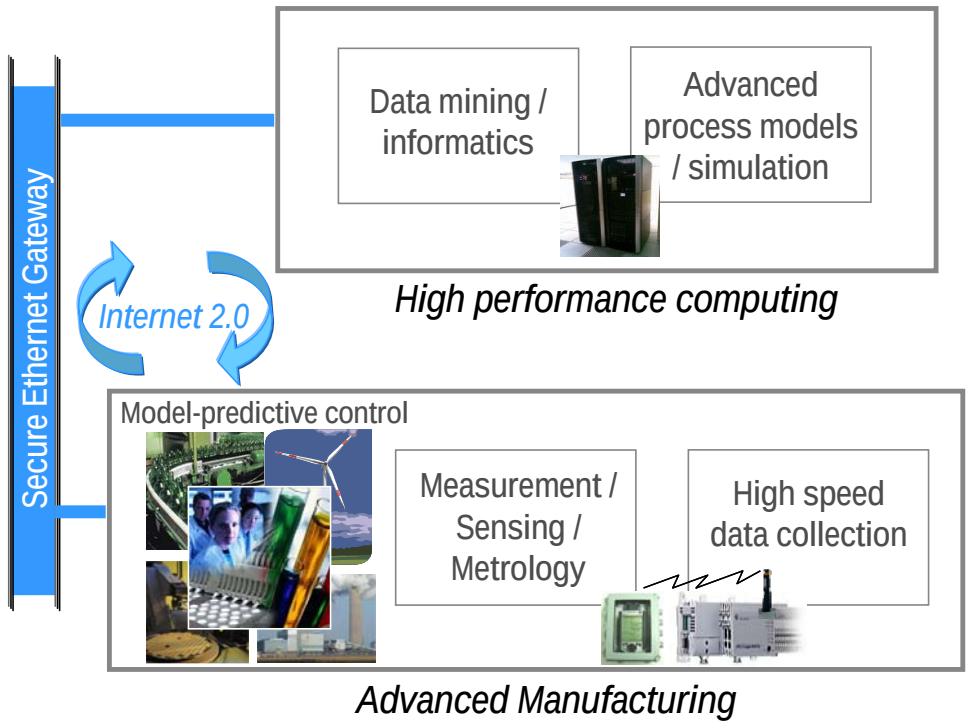



- Multi-fold energy savings
- Improvement in energy efficiency
- Reduction in cycle times
- Complete production lines operate with real-time flexibility
- Higher productivity and yield

**Use Plant-wide Data with Advanced Modeling & Simulation**

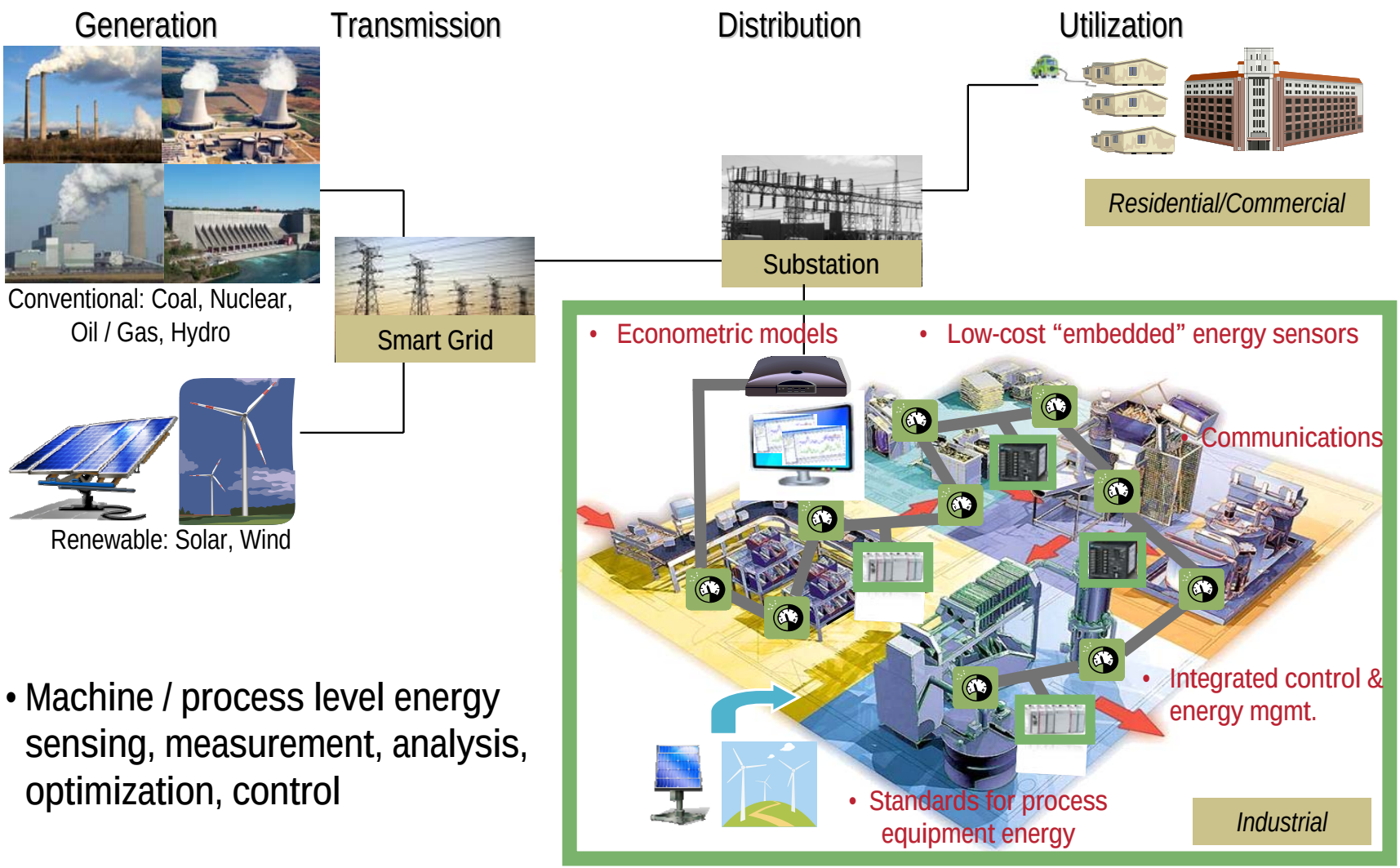
# Using Manufacturing Intelligence

- IT-enabled, next generation manufacturing systems will utilize Internet 2.0 for optimization and control
  - High speed data collection, secure transmission, data mining
  - Advanced process models and simulation to optimize yield, sustainability (e.g., energy consumption)
- High performance computing platforms connected to manufacturers data enable use of advanced models and simulation
- An open platform approach could reduce the cost of modeling and simulation 80%




**Internet 2.0 links Smart factory data to HPC collaboration test beds**

# Sustainability: Industrial Energy Management

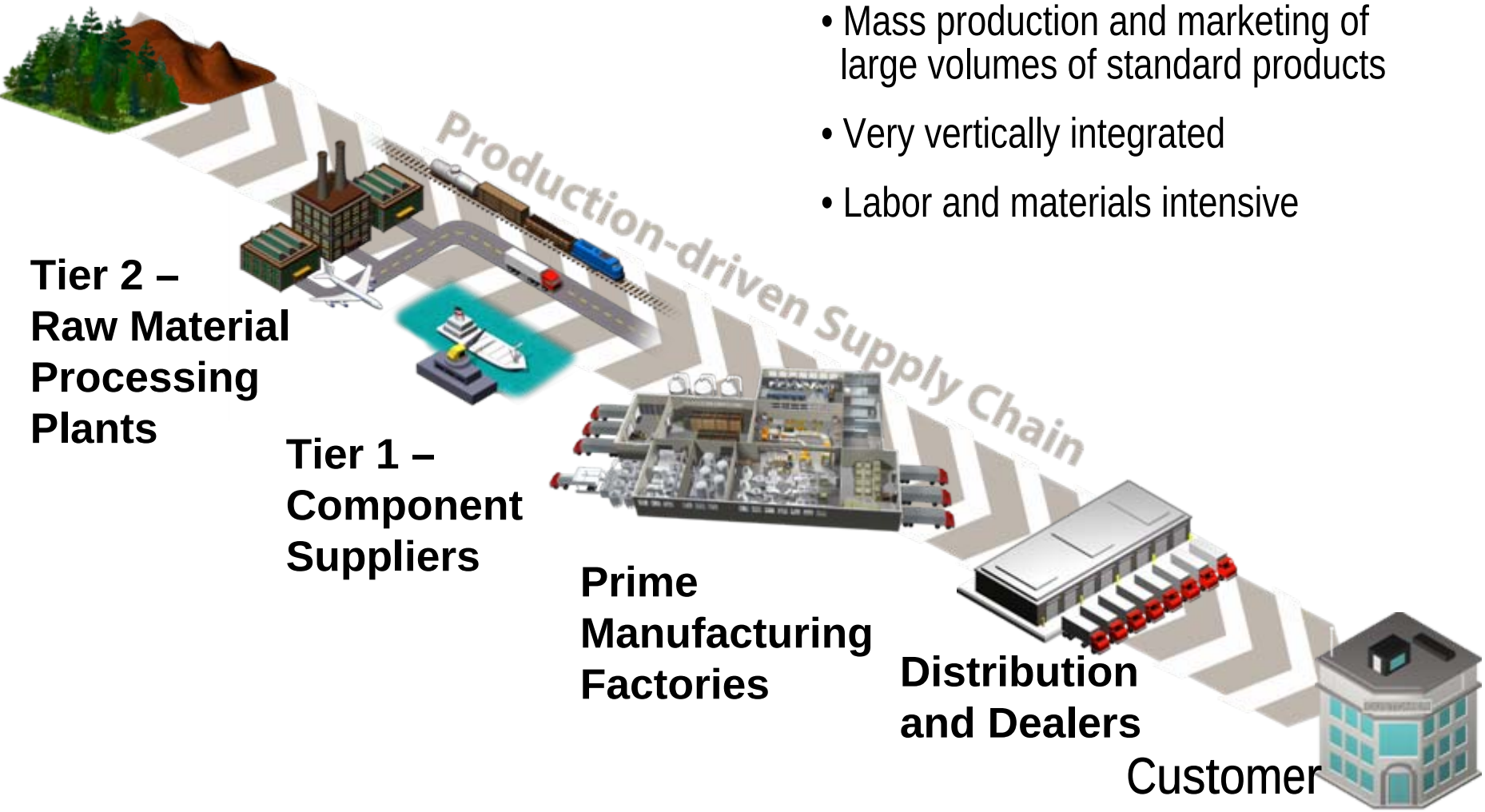



- Machine / process level energy sensing, measurement, analysis, optimization, control

**Transform factories from passive to active energy management**

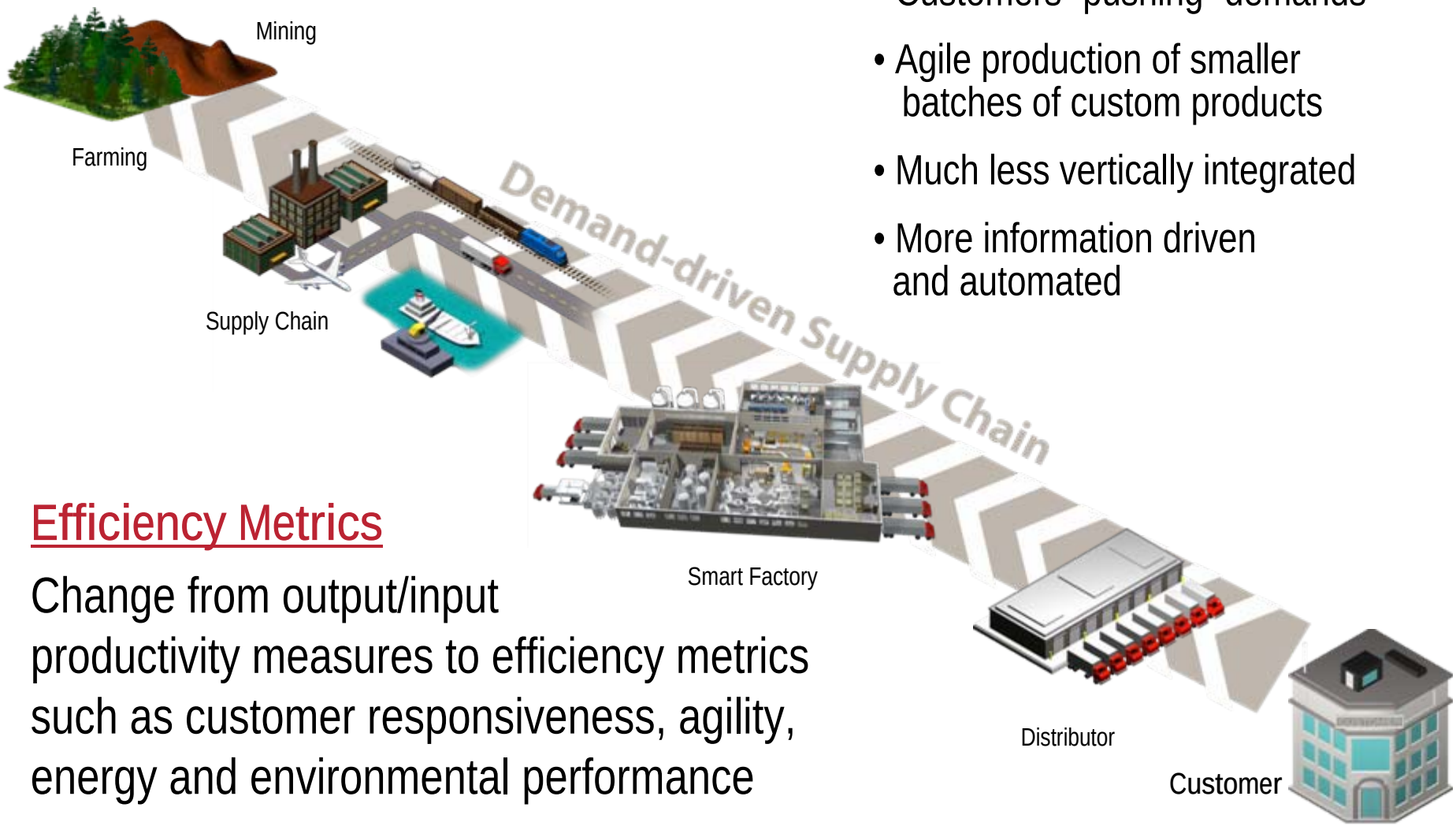
# Current Supply Chains: Production Driven

- Mass production and marketing of large volumes of standard products
- Very vertically integrated
- Labor and materials intensive




*Productivity the key economic metric: P = output / input*

# Phase 2: Supply Chain-wide Optimization



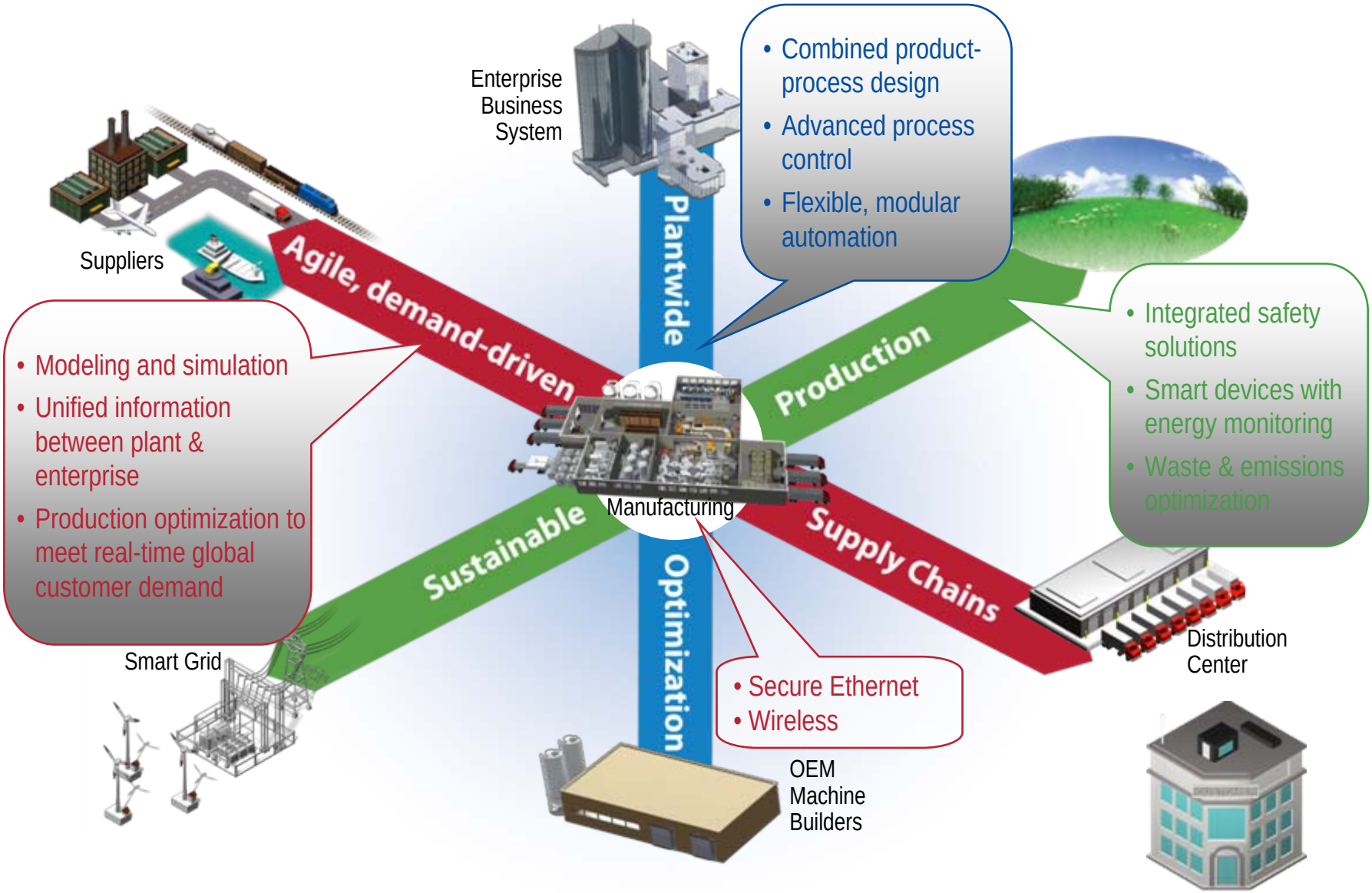

- Customers “pushing” demands
- Agile production of smaller batches of custom products
- Much less vertically integrated
- More information driven and automated

## Efficiency Metrics

Change from output/input productivity measures to efficiency metrics such as customer responsiveness, agility, energy and environmental performance

# Optimized Plant & Supply Networks:

## *Smart Manufacturing Applied Research Opportunities*



# Where are we today and what can we accomplish?

- At a crossroads
- U.S. Government participation
  - R&D Needs
- Workforce development
- Headwinds
  - Budget
  - Regulatory environment
  - Global competition