Technological Trends and Challenges in the Process Industries
Mr. Axel Lorenz, Siemens AG, Vice President, Global Head of Process Automation Industries
Four Sectors Cover the Global Trends – New Organization of Siemens AG effective October 2011
Market Requirements and Challenges

Market situation
- Global competition (M&A)
- Dynamic consumer and market requirements
- Environmental concerns
- Commercial, legal and safety regulations

Challenges
- Continuously increased productivity
- Accelerated product introduction
- Optimized and more flexible production
- Assured product quality

Increased productivity
Reduced costs (TCO)
Production efficiency
Energy Efficiency and Sustainability
Innovation

MAV and TIA make complexity manageable and ensures continuously improved competitiveness
The Petrochemical Industry Needs Answers for these Questions

- Which saving potentials can be offered over the lifecycle?
- Which advantages are inherent to an integrated architecture?
- How to optimize production processes with adequate systems?
- Which energy efficiency potentials can be utilized?
- How to manage potentials and leverage workforce excellence?
Integrated Engineering Down to the Process Control System

Consistent information flow, from the product design right down to production on the basis of an integrated tool chain.
The Integration of Plant Planning and Automation Engineering Facilitates the Realization of a Parallel Planning Process

The time to market can only be minimized through an integrated approach throughout all planning phases!

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<tr>
<th>Process</th>
<th>Serial</th>
<th>Serial, minimized through tools</th>
<th>Parallel</th>
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<td>Product</td>
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Further optimization through individual tools largely exhausted
Saving Potentials of a Typical Project
Example: Discontinuous Production Process

This example demonstrates savings in terms of project runtime by up to 11 weeks (12.5%) and cost savings by up to 530 man-weeks (19%) through integrated engineering.

The full utilization of all saving potentials requires the optimum cooperation of all tools and teams.

Example project:
- Total investment: 40 million EUR
- Project runtime: 88 weeks
- Planning & EI&C expenditures: 2300 MW
- Automation expenditures: 500 man-weeks

Savings:
- Project runtime: 11 weeks
- Planning & EI&C: 10% = 230 MW
- Automation: 60% = 300 man-weeks
Seamless link of the field, control, MES and ERP levels while also integrating all in- and outbound logistics
Which Advantages Are Offered by an Integrated Architecture?

- Engineering
- Fewer interfaces
- Modularity
- Scalability
- Integrated diagnostics
- Interface to ERP
- Economization of redundant data storage
Main Automation Vendor (MAV) and Main Electrical Vendor (MEV)
A Partner for all Dimensions of a Project

Legend for reference:
DCS – Decentralized Control System
PI & AN – Process Instrumentation and Analytics
HIST – Plant Historian
SIS – Safety Instrumented System
MCC – Integration of Motor Control Center
F&G – Fire & Gas detection system
PU – Integration of Package Units
MES – Manufacturing Execution System

MAV deliver automation solutions for a plant
MEV deliver electrical solutions for a plant

Smooth integration for efficient project delivery
"These initiatives deserve the same long-term investments that manufacturers made in ERP for transaction processing."

Gartner, July 2009
On the Way Toward Digital Enterprise
Software is becoming increasingly important for implementing the digital factory!

Siemens is a pace-setter in the technical domain, comparable to SAP in the transactions domain.
Comprehensive Services over the Complete Lifecycle

Product Lifecycle Services

- Online Support
- Technical Support
- Field Services
- Migrations
- Product Service Contracts
- Repair Services
- Spare Parts
- Commissioning
- Water Related Services
- Remote Services

Value Services

- Integral Plant Maintenance
- Energy & Environmental Services (e.g. Consulting)
- Condition Monitoring & Reliability
- Training Services
- Metallurgical Services
- IT Security

Maintain the highest performance of your assets over the time

Foster new performance potentials to face new challenges

More than 17,000 Service experts in 295 locations worldwide!
## Optimized Availability of the Automation System
### From Simple Service Support to Lifecycle Service Agreement

<table>
<thead>
<tr>
<th>Service set A</th>
<th>Service set B</th>
<th>Service set C</th>
<th>Service set D</th>
<th>Service set E</th>
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<td>Basics: Spare parts, hotline, repairs, fault rectification, remote support</td>
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The variety of different products and methods, and the partly high sensitive production processes, require a reliable and efficient supply of energy and raw materials.
Higher Added-Value in each Process Automation Functionality
A few Examples to Increase Overall Plant Efficiency

- **Engineer**
  - COMOS

- **Operate**
  - APG
  - High-efficiency Drives

- **Optimize**
  - APC
  - Energy Management

- **Maintain**
  - Plant Asset Management
  - Simulation

Supply
Energy Optimization and Utilization of Energy Efficiency Potentials

- Energy-efficient devices and processes
- Energy management processes → amenities
- Consideration of energy aspects during production planning
- Energy data management
- Industrial demand response
- Utilization of regenerative energy sources
- Waste heat recovery
- Proof for sustainable production
- CO₂ footprint and other resources
- Energy management at the lifecycle's start

Increase Sustainability and Energy Efficiency
Energy Optimization with Advanced Process Control (APC) Embedded in SIMATIC PCS 7

- **Reduced energy consumption**
  (typically by 3 to 10%)

- **Minimized standard deviations**
  (typically by up to 200%)
  and faster compensation

- **Considerably increased yield**
  (typically by 2 to 10%)

- **Increased throughput rate**
  (typically by 1 to 5%)

- **Optimized transitions between operating points**
  (faster operating point changeover +
  minimized production downtime)

- **Minimized manual interventions**
  (reduced operator stress)
Optimized Plant Utilization and Increased Operator Performance Based on Advanced Graphics and GUI

- **Improved representation concept**
  - Discreet colors for pipelines, status indications (e.g. manual/automatic) and striking colors for alarm or locking indications

- **Effective Alarm Management**
  - Situational awareness and easy decision making

- **Extended Measured Value Displays** with operating range and limit value display for operation, control and diagnosis

- **Curve Representation** showing optimum operating range and pattern recognition with the help of Kiviat diagrams

**Increase of Productivity**
Facilitate Predictive Operation
Fast Response Times
Energy Optimization with Plant Asset Management for Intelligent and Real Assets

- **Asset management for pumps**
  - supports the avoidance of malfunctions
  - protects the equipment
  - supports predictive maintenance
  - facilitates increased plant availability
  - supports energy savings

- **Asset management for heat exchangers**
  - supports predictive maintenance
  - facilitates increased plant availability
  - helps to avoid energy wasting

- **Online performance monitoring**
  - supports optimized operation
  - supports predictive maintenance
  - supports energy savings
Information Management and Data Consistency with COMOS Throughout the Entire Lifecycle

- **Holistic plant management**
  - Integrated view across all lifecycle phases
  - Consistent project handover throughout engineering and operations

- **Collaborative engineering**
  - Shorter engineering cycles
  - Significantly lower project cost
  - Faster time-to-market

- **Efficient plant asset management with real-time process data**
  - Shorter amortization period
  - Lower maintenance costs
  - Regulatory compliant documentation
Optimized Plant Utilization Based on Operator Training and Simulation

- Training without risks for persons and assets
- Training of behavior in critical situations
- Test for compliance with regulations
- Memorization of automatisms
- Optimization of operation
- Adjustable time behavior
- Defined training scenarios
- Assured performance through regular training

Qualification of plant operators in a safe environment without risks, coupled with preparation for critical situations
Innovative Software Systems open up new Perspectives for Production Technology

Yesterday
Local automation technology

Today
Communication-aided automation

Tomorrow
Optimization of the entire production process with innovative software systems

The future
Self-optimization of cyber-physical systems, based on analysis of virtual models of options
Thanks for your attention

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