

The background of the slide is a photograph of an industrial setting. On the left, a man in a maroon polo shirt stands next to a large machine with a control panel, pointing at the screen. On the right, another man in a maroon long-sleeved shirt is crouched, working on a large, complex industrial component. In the foreground, a hand holds a tablet displaying a 3D CAD model of a mechanical part. The text "Shaping the Future of Production with Siemens: On the way to Industry 4.0" is overlaid on the left side of the image.

Shaping the Future of Production with Siemens: On the way to Industry 4.0

Siegfried Russwurm
Member of the Managing Board of Siemens AG
CEO Industry Sector

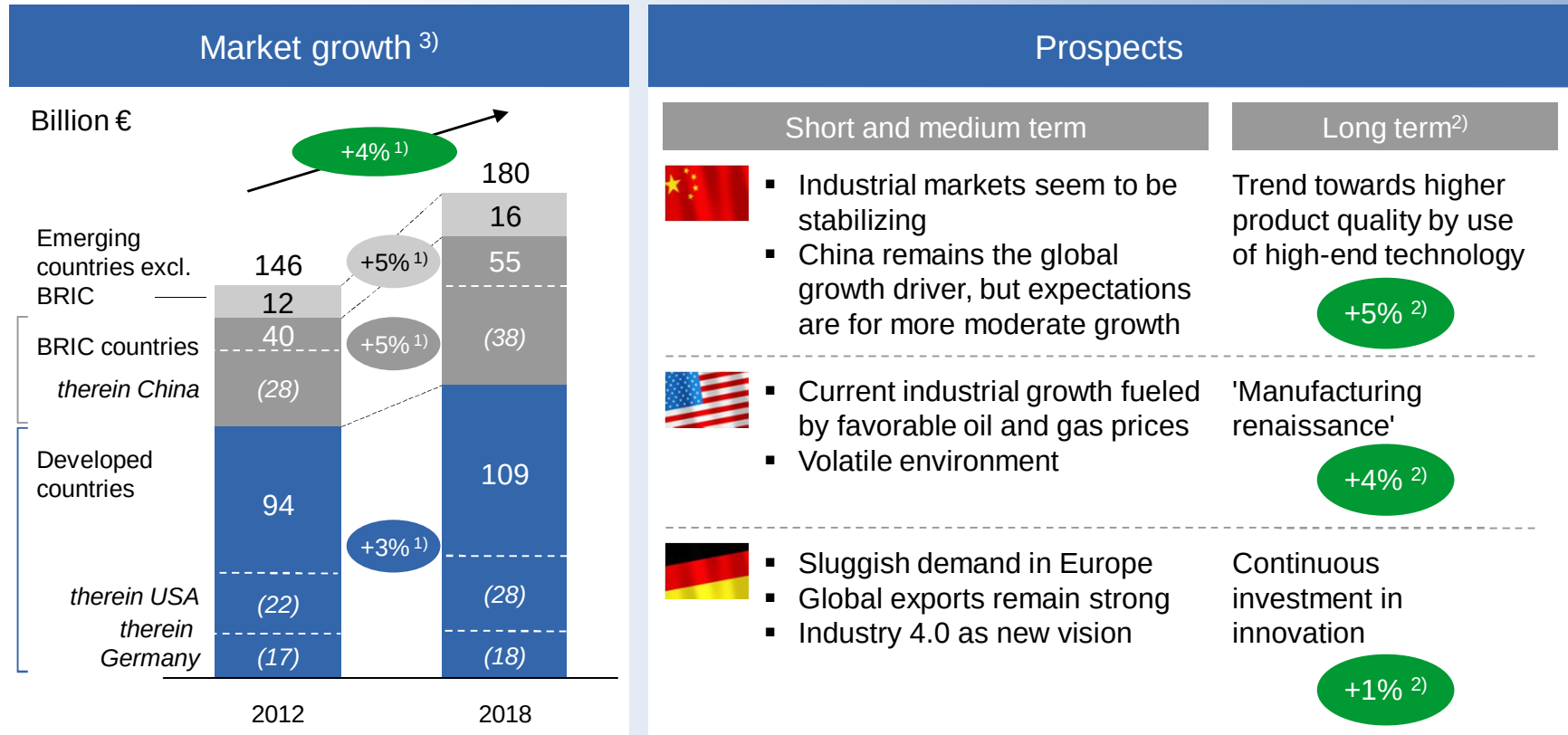
Press Conference
Hannover Messe 2013
April 8, 2013

Manufacturing is changing faster than ever before



Increasing importance of manufacturing industry in all national economies ...

Indicative changes on the global markets for production technology



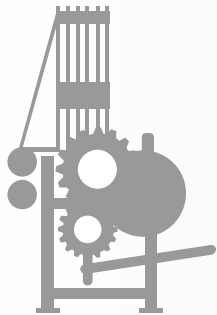
Increasing competitiveness differs from one region to another

The evolution to Industry 4.0 in production

From Industry 1.0 to Industry 4.0

First Industrial Revolution

based on the introduction of mechanical production equipment driven by water and steam power



First mechanical loom, 1784

Second Industrial Revolution

based on mass production achieved by division of labor concept and the use of electrical energy



First conveyor belt, Cincinnati slaughterhouse, 1870

Third Industrial Revolution

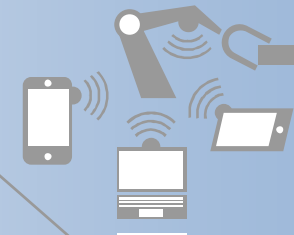
based on the use of electronics and IT to further automate production



First programmable logic controller (PLC) Modicon 084, 1969

Fourth Industrial Revolution

based on the use of cyber-physical systems



Degree of complexity



1800

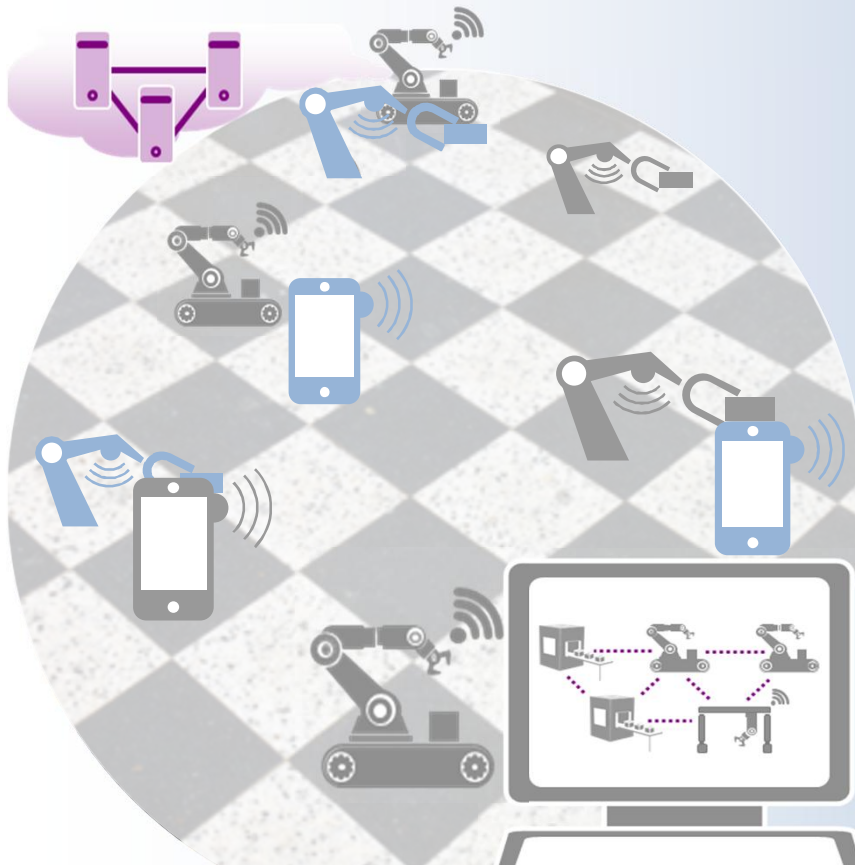
1900

2000

Today

Time

Industry 4.0: Algorithmicized "production chess" within cyber-physical systems



Vision for Industry 4.0

- The **product** to be manufactured **contains all necessary information** on its production requirements
- **Self-organization of integrated production installations** considering the entire value chain
- **Flexible decision on production process** on the basis of the current situation

Decentral cyber-physical systems (CPS) interact via embedded internet-based technologies

Human beings remain essential ...

A photograph of a man and a woman in white lab coats looking at several computer monitors in a laboratory setting. The monitors display various data visualizations, including graphs and tables.

Step 1
Humans conceptualize and design the product

Step 2
Humans determine the production rules and parameters

Step 3
CPS simulates and compares production options on the basis of instructions

Step 4
CPS proposes compliant "optimal" production paths

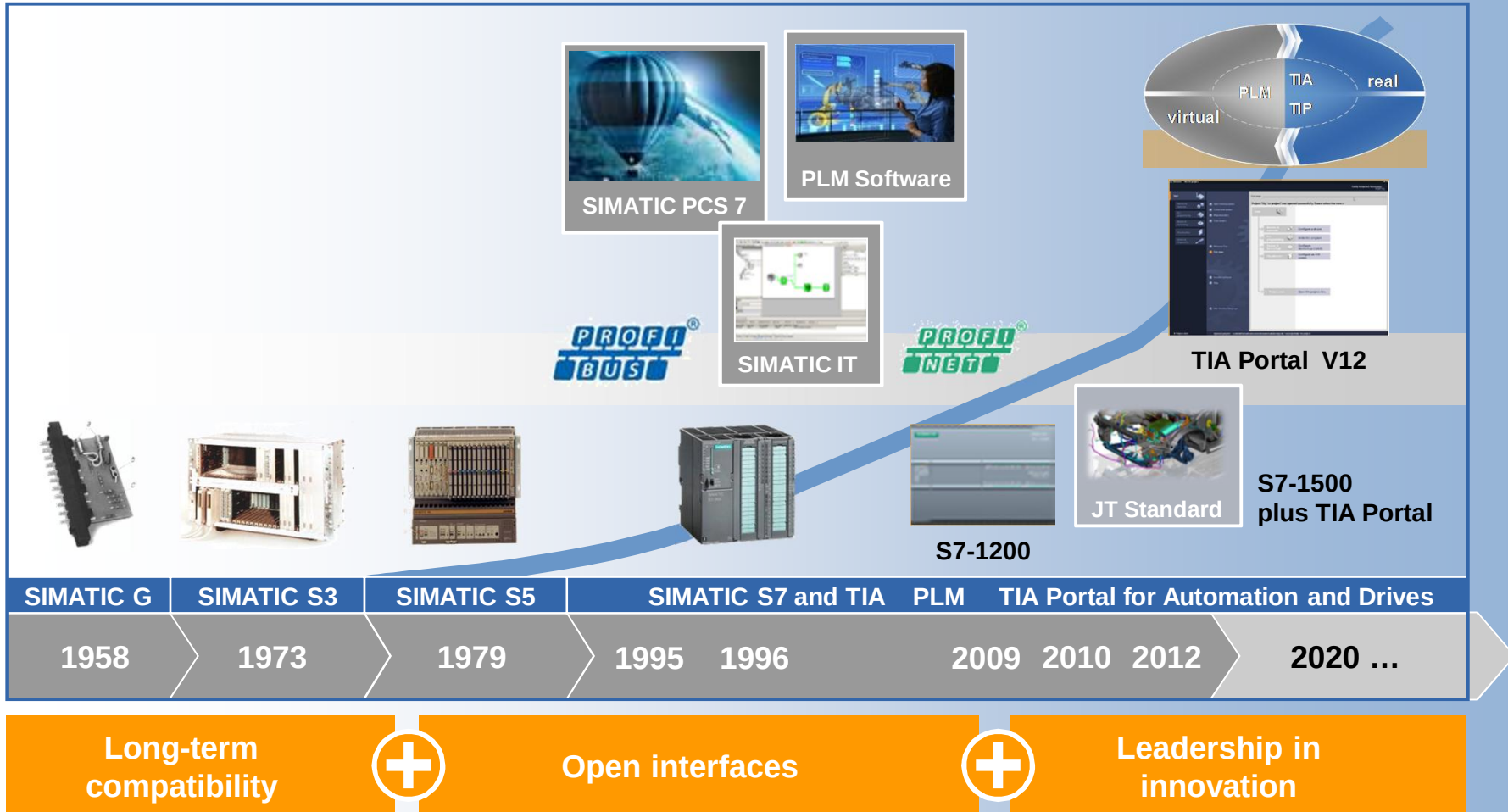
Step 5
Selection of optimal production path and implementation of production

... as creative planners, controllers and decision-makers

The future needs a past

Siemens as trend-setter in production technology

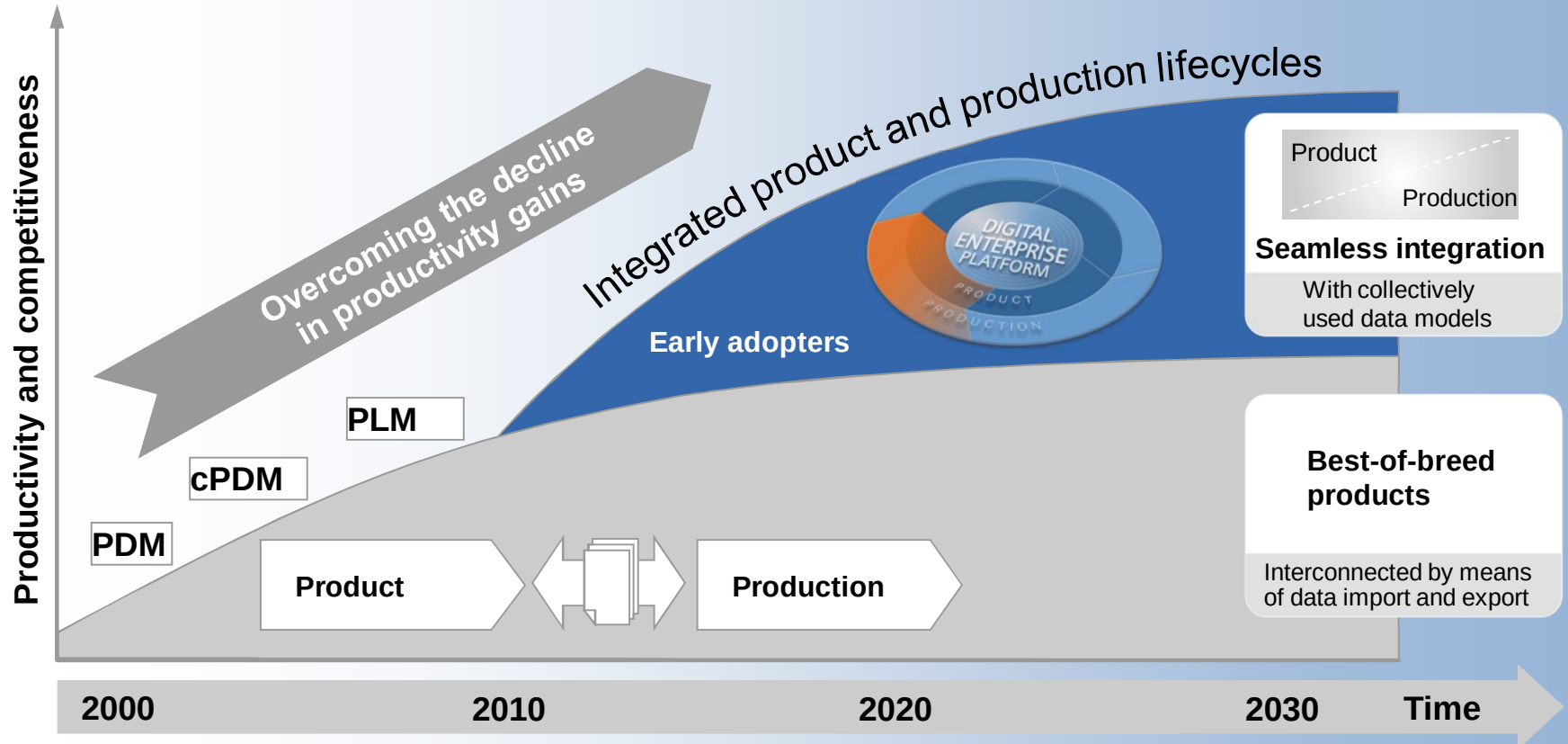
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"Digital Enterprise Platform"

Siemens is preparing the ground for Industry 4.0

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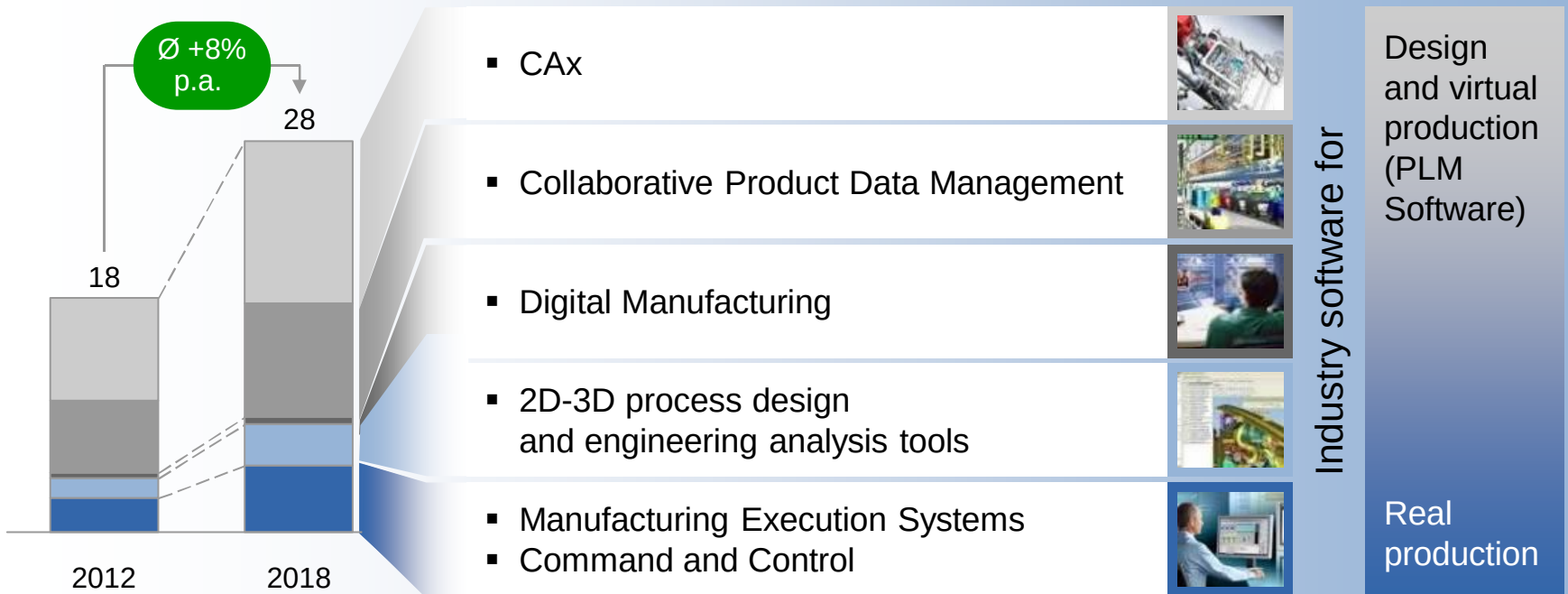


Change of paradigm for the next productivity stage: integration of product planning and production can reduce time-to-market by 50%

Increasing importance of industry software for a competitive production environment

The market for industrial IT and software is expanding by about 8% each year

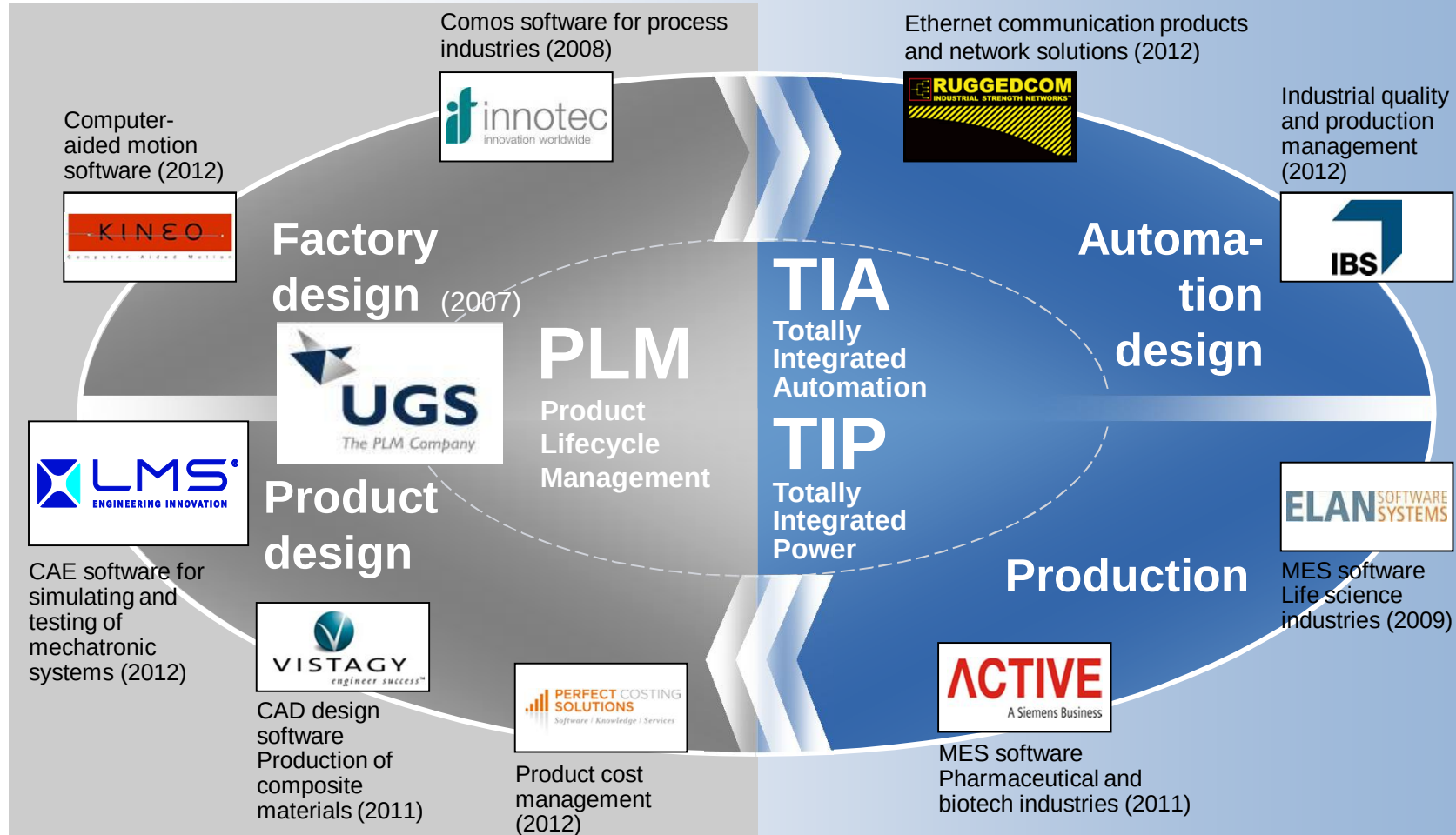
Billion EUR



Siemens Industry employs approx. 7,500 software engineers
Over 70,000 clients with more than 7.5 million PLM licences

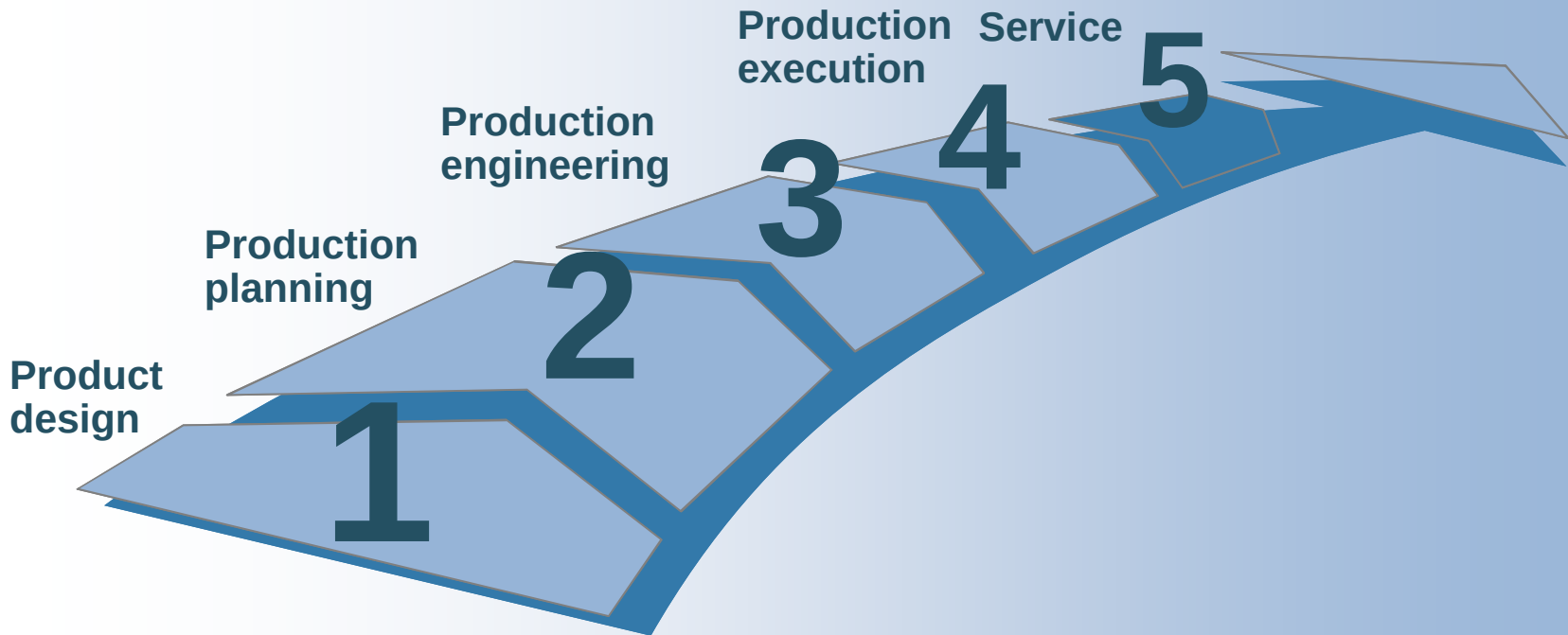
Siemens is linking digital product planning with physical production: 4 billion EUR invested since 2007

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Holistic concept covering the entire process of product development and production

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Intelligent networking



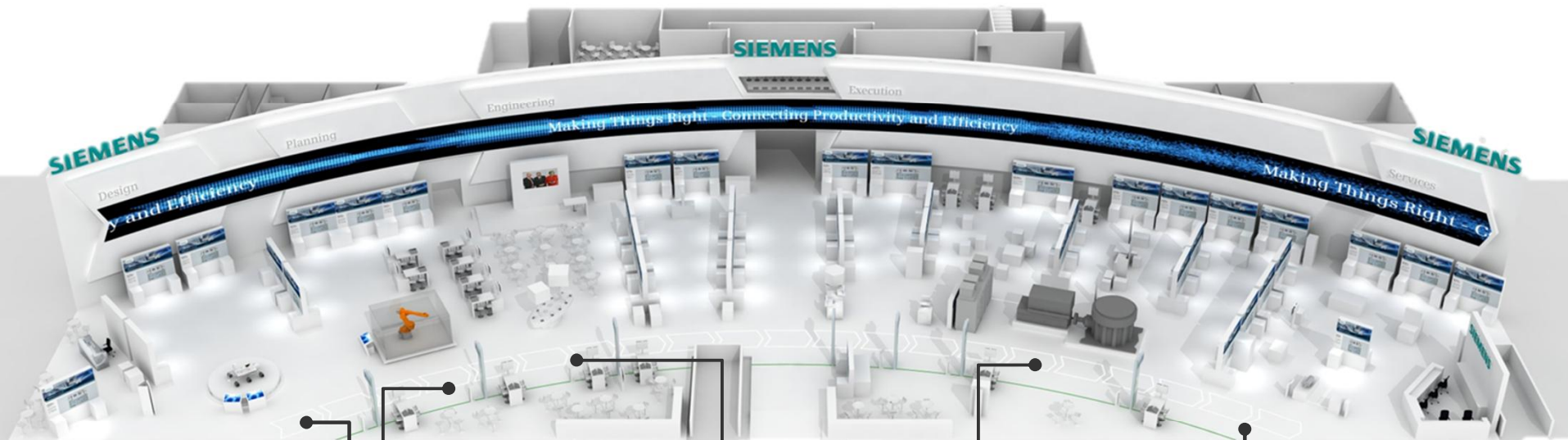
Use of most efficient technologies

The path to Industry 4.0: An integrated product planning and production process enhances productivity, efficiency and flexibility

Siemens Industry at Hannover Messe 2013

Exhibition highlights

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Product design:
Mars rover model



Production planning:
Robot energy efficiency
software



Production engineering:
S7-1500 V12,
TIA Portal



Production execution:
Integrated Drives
Systems



Services:
Condition monitoring
services



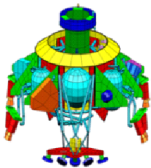
Product design: NASA has chosen Siemens' PLM software for developing its Mars rover "Curiosity"



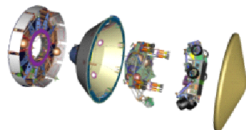
NX CAD



NX CAE & NX CAM



Team center



**Full digital 3D design
for rover and landing capsule**

**Integrated simulation,
analysis and production**

**Data management throughout
the entire lifecycle**

**Digital design, virtual assembly and function simulation in advance
of the construction of the first physical prototype**

Daimler selected our CAD software NX as their platform for worldwide car and truck development

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Large-scale rollout of NX within Daimler and its suppliers

DAIMLER 

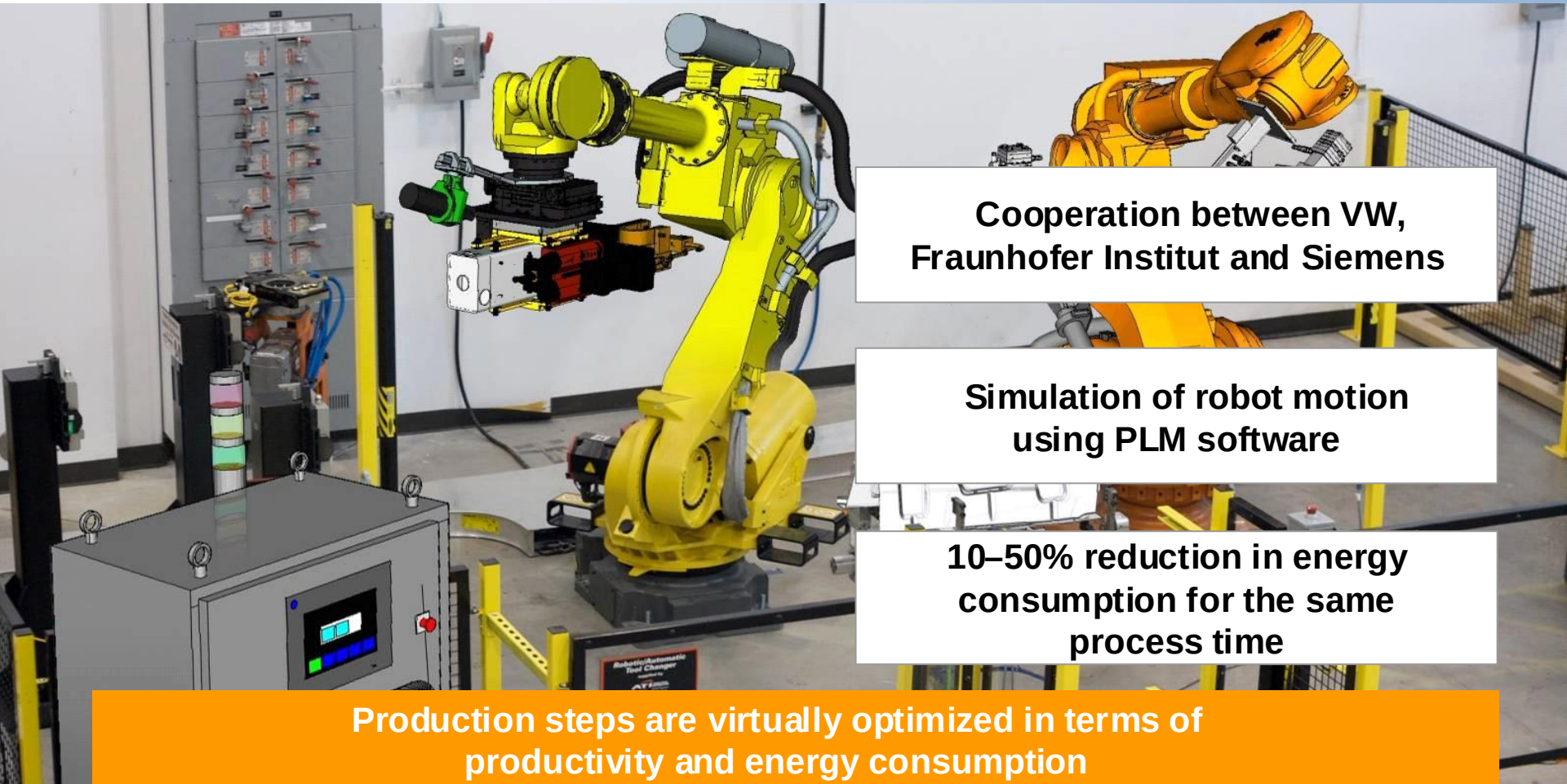
- Move engineering work to one new consistent product development platform:
 - > 20 development centers
 - most important suppliers
- Increase flexibility and innovation:
 - Representation of digital product information in one single worldwide information environment
 - Based on NX and JT standard file format
- Start in first product series in 2012



**Commitment to Siemens PLM Software and its products
for mission critical processes**

Production planning: Virtual optimization of production processes

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**Cooperation between VW,
Fraunhofer Institut and Siemens**

**Simulation of robot motion
using PLM software**

**10–50% reduction in energy
consumption for the same
process time**

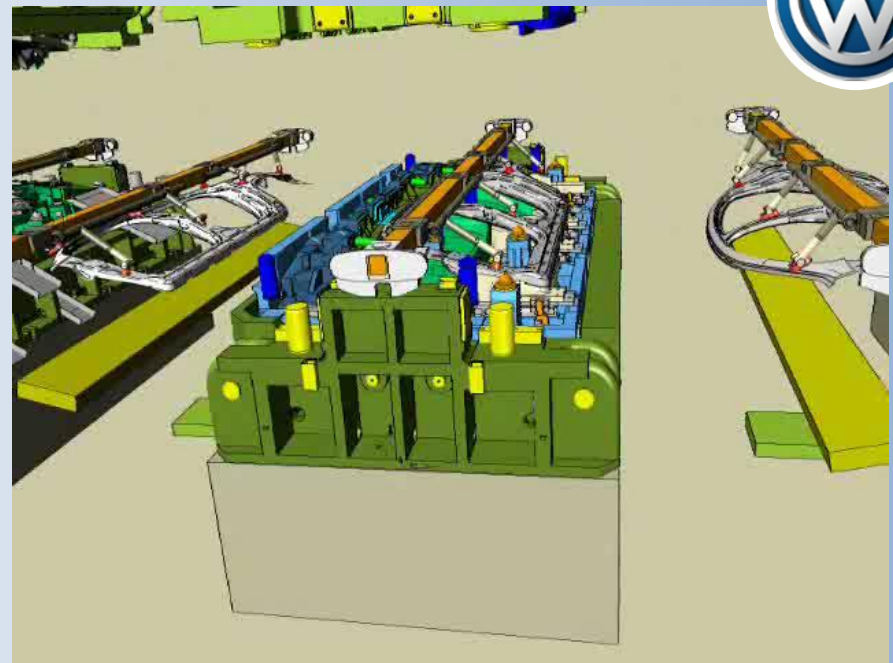
**Production steps are virtually optimized in terms of
productivity and energy consumption**

VW: Boosting productivity in existing drive system through simulation



Press Line Simulation (PLS) for retrofit of a 17-year-old press line

- Control, drive and safety technology from Siemens
- Virtual model simulates all mechanical, electrical and software components for motion control
- Combined use of SIMOTION and PLM software
- Direct data link between PLS and press working line control units
- Performance enhancement and energy savings of up to 40%



Industry software from Siemens can also leverage productivity in already installed systems

Production engineering:

Seamless data integration right through to drive technology

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SIMATIC Controller



- S7-300/400
- WinAC
- S7-1200
- S7-1500

SIMATIC HMI



- Basic panels
- Comfort panels
- WinCC runtime

SIMATIC NET



- Profibus
- Profinet
- IWLAN

TIA Portal

SINAMICS

Complete
Integration of
Sinamics G 120-
Series via
Startdrive V12



SIMOTION

Integration of
communication-
and HMI-features*



SINUMERIK

Next expansion
phases



TIA Portal can enhance engineering efficiency by up to 25%

*work in progress

TIA = Totally Integrated Automation

BMW:

Efficient production with TIA Portal and S7-1500

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Long-term partnership with BMW

- Efficient development of production standard at BMW
- First customer to use TIA Portal in the automotive industry
- In all plants worldwide until 2027
- Use of SIMATIC products and solutions
- S7-1500 for state-of-the-art automation



BMW commits to Siemens for 15 years as single preferred supplier of new automation technology – globally

Production: From individual drive components to Siemens Integrated Drive System

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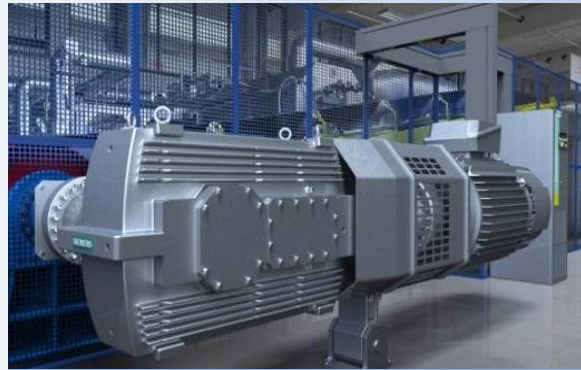
Then



Optimization of single products

- Versatile product portfolio: motors, gearboxes, converter and couplings

Now



Integrated Drive System

- Functional integration of drive train
- Complete integration of drive technology into the world of Totally Integrated Automation (TIA)
- Integration of lifecycle phases for products and production

Tomorrow



Seamless Integration

- Seamless interplay of all components, with distributed intelligence
- Common database, integrated tool chain – throughout the entire lifecycle for products and production

Production:

Integrated Drive System @ vertical mill

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SINAMICS
Perfect Harmony inverter



Motor H-Compact plus
2nd generation



FLENDER
RUPEX RWM 710 coupling



FLENDER
KMPS 396 gear unit



**Increase in output
of up to 15%**

**Higher availability with
shorter restart times and
higher reliability**



**Enhanced energy
efficiency (+5%)**

**Vibration simulation for
the entire system, incl.
working machine**

Horizontal integration for higher efficiency and availability

Services:

IT-based services showing strong market demand

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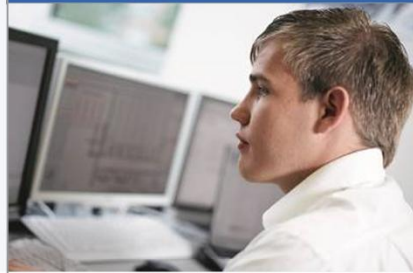
Simatic Remote Services



- Remote access solution for automation customers
- Monitoring, maintenance and repair of plants and machines
- Flexible, affordable, reliable

Enhanced productivity and efficiency

Condition Monitoring



- Proactive condition monitoring of plants, machines and networks
- Early detection and remedy of faults
- e.g. motor condition monitoring

Predictable maintenance, reduced downtimes

Industry Online Support



- Information, advice and dialog forum
- Over 300,000 documents, case studies and tools
- ~1.5 million visits per month
- Smartphone App for mobile access

Information available worldwide, 24/7

Energy Data Management



- Integrated services for greater data transparency
- Energy data management system Simatic b.data
- Identification of concrete energy efficiency measures

Energy consumption and emission transparency

Airbus: Technology-based services for enhanced availability

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**Plant in the Toledo Province:
Production of composite material
components for the A320, A380, A350**

**3-year contract including repairs
and spare parts management**

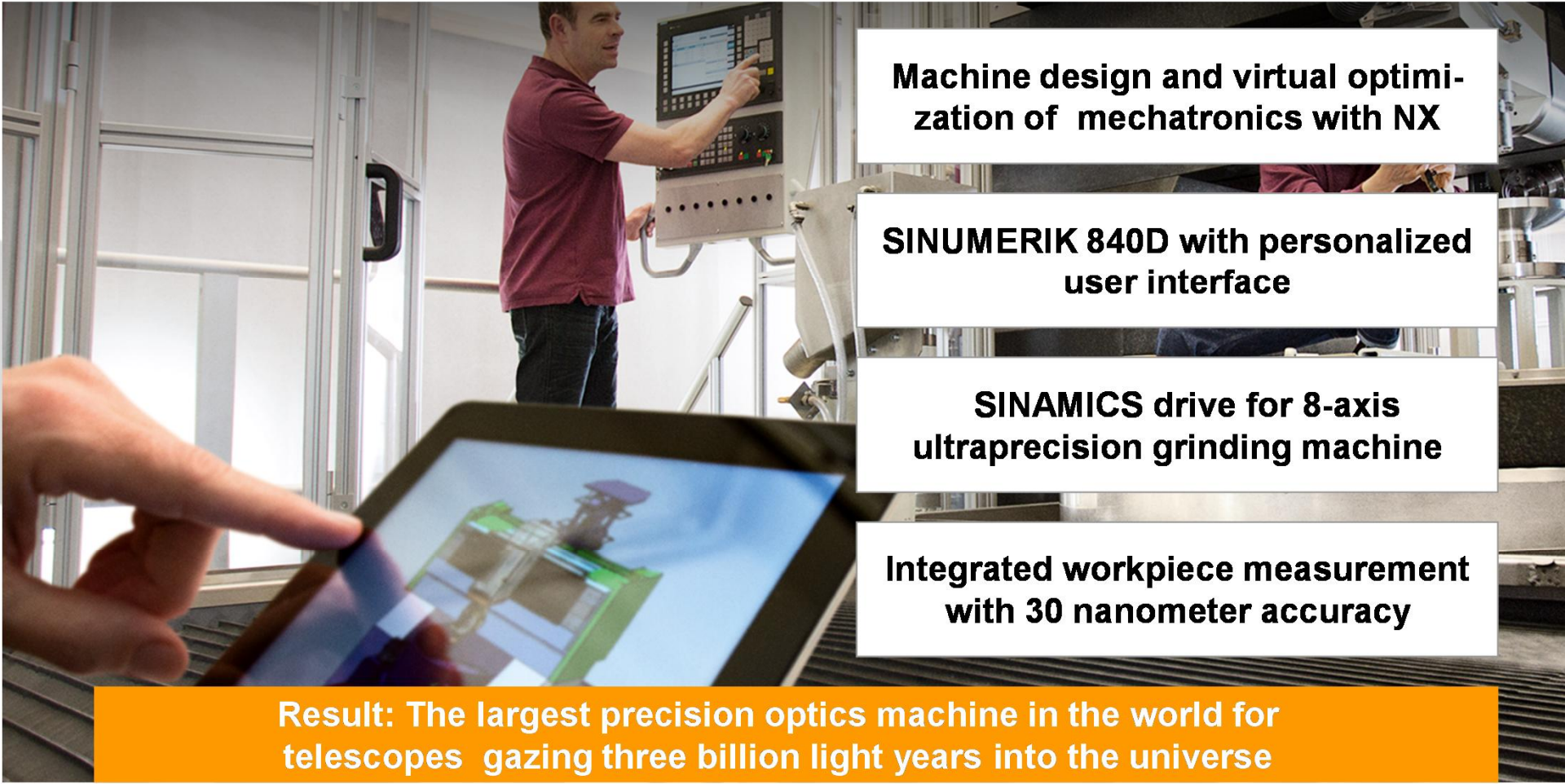
**Since January 2013 Siemens has
been responsible for maintenance
of production facilities**

**Targets: enhanced availability
and less downtime**

**Integrated plant maintenance allows boosting
productivity in aerospace production**

Optotech: Combining CAD software with high-performance hardware creates new precision level

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Machine design and virtual optimization of mechatronics with NX

SINUMERIK 840D with personalized user interface

SINAMICS drive for 8-axis ultraprecision grinding machine

Integrated workpiece measurement with 30 nanometer accuracy

Result: The largest precision optics machine in the world for telescopes gazing three billion light years into the universe

From vision to reality: Shaping the future of manufacturing

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Then



**Local automation
technology**

Now



**Communication-
driven automation**

Tomorrow



**Optimization of the
entire production
process by means of
innovative software
systems**

Thereafter



**Self-optimizing of
cyber-physical
systems on the basis
of analyses of virtual
models of action
scenarios**

SIEMENS

Thank you!

