

Manufacturing 2030

Strategies for Next Generation Manufacturing

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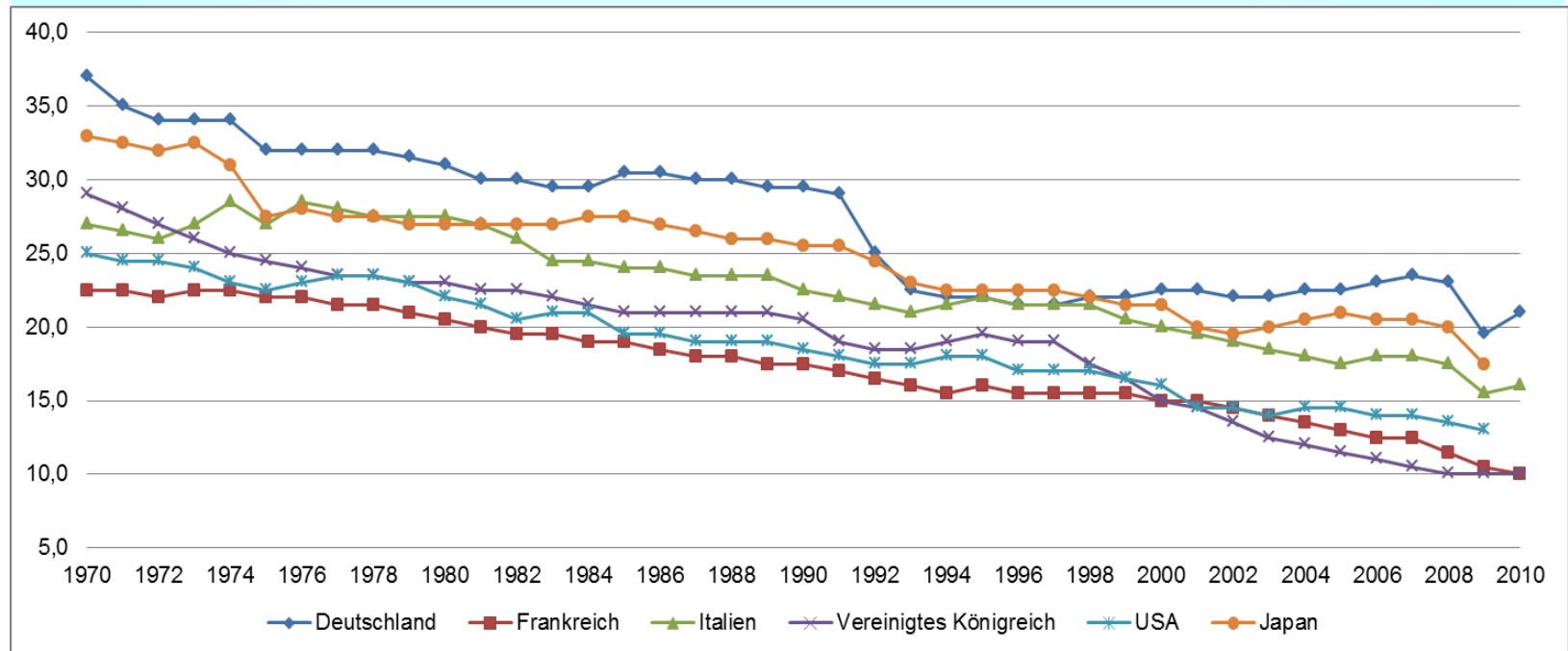
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Share of Manufacturing of the national BIP

40 Years of de-industrialisation in US and Europe

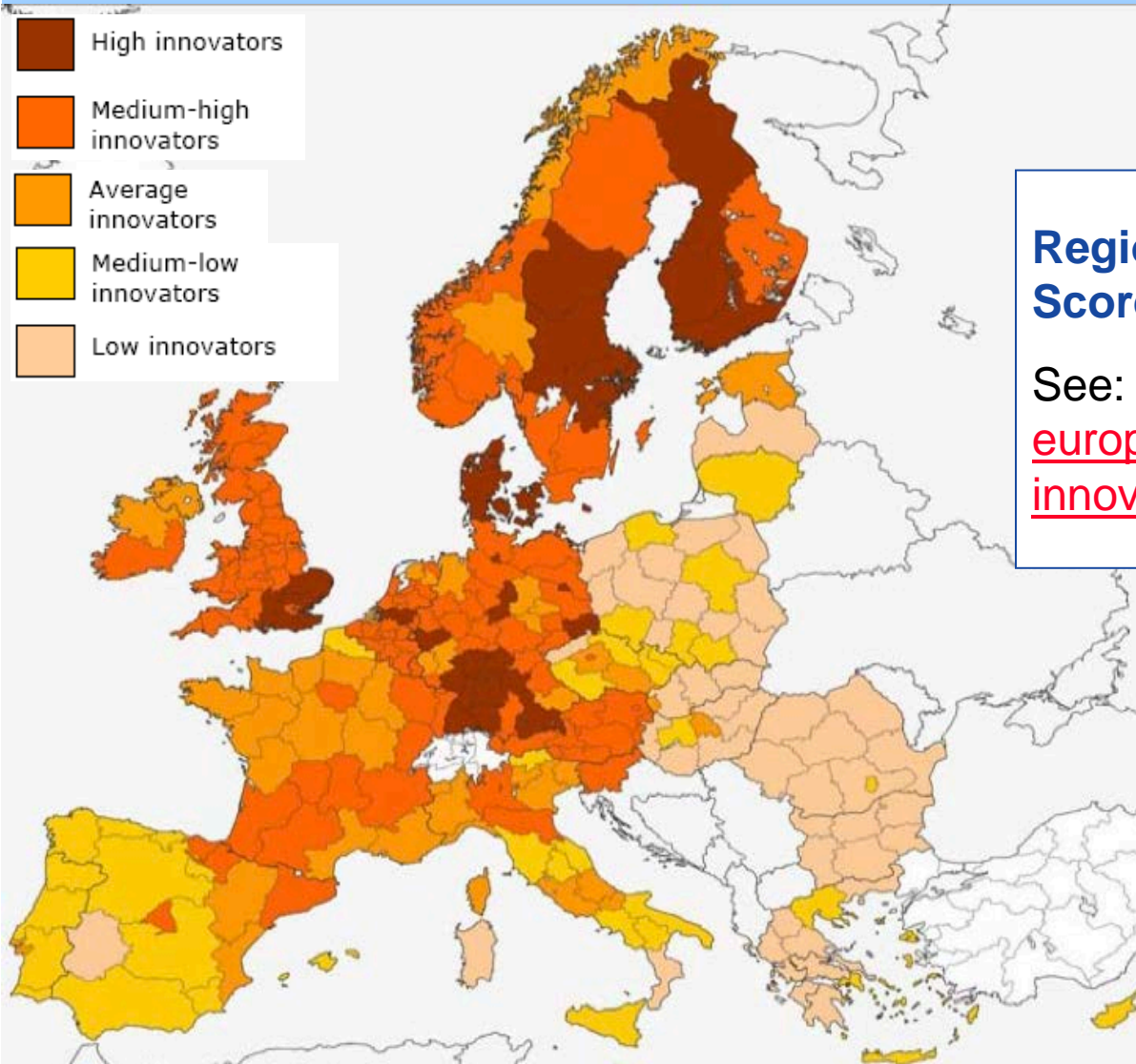


Globalization

Migration of Production and Consumption to lower developed areas



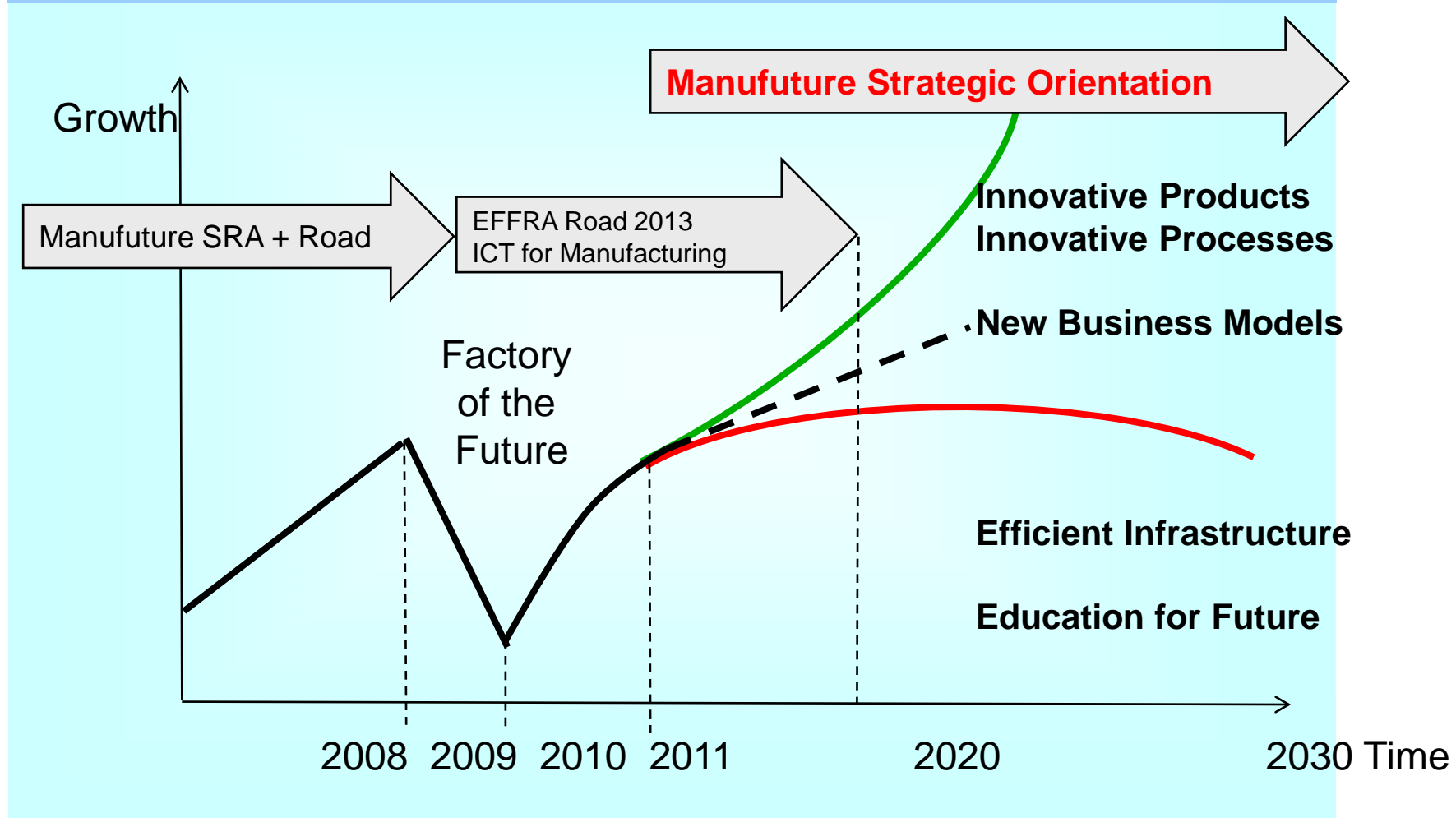
Innovative Regions in Europe



Regional Innovation Scoreboard (2009)

See: <http://www.proinno-europe.eu/page/regional-innovation-scoreboard>

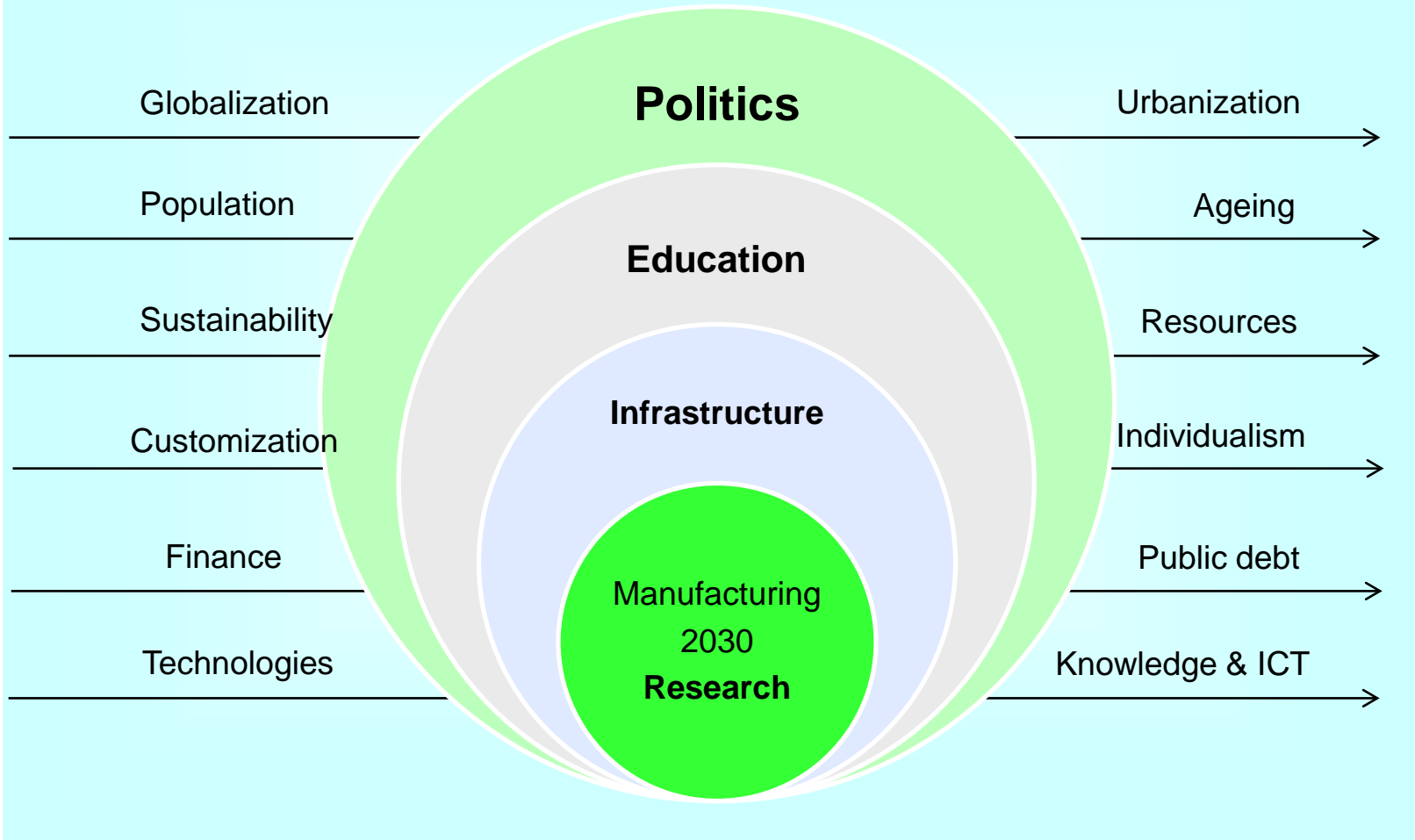
Manufuture Activities



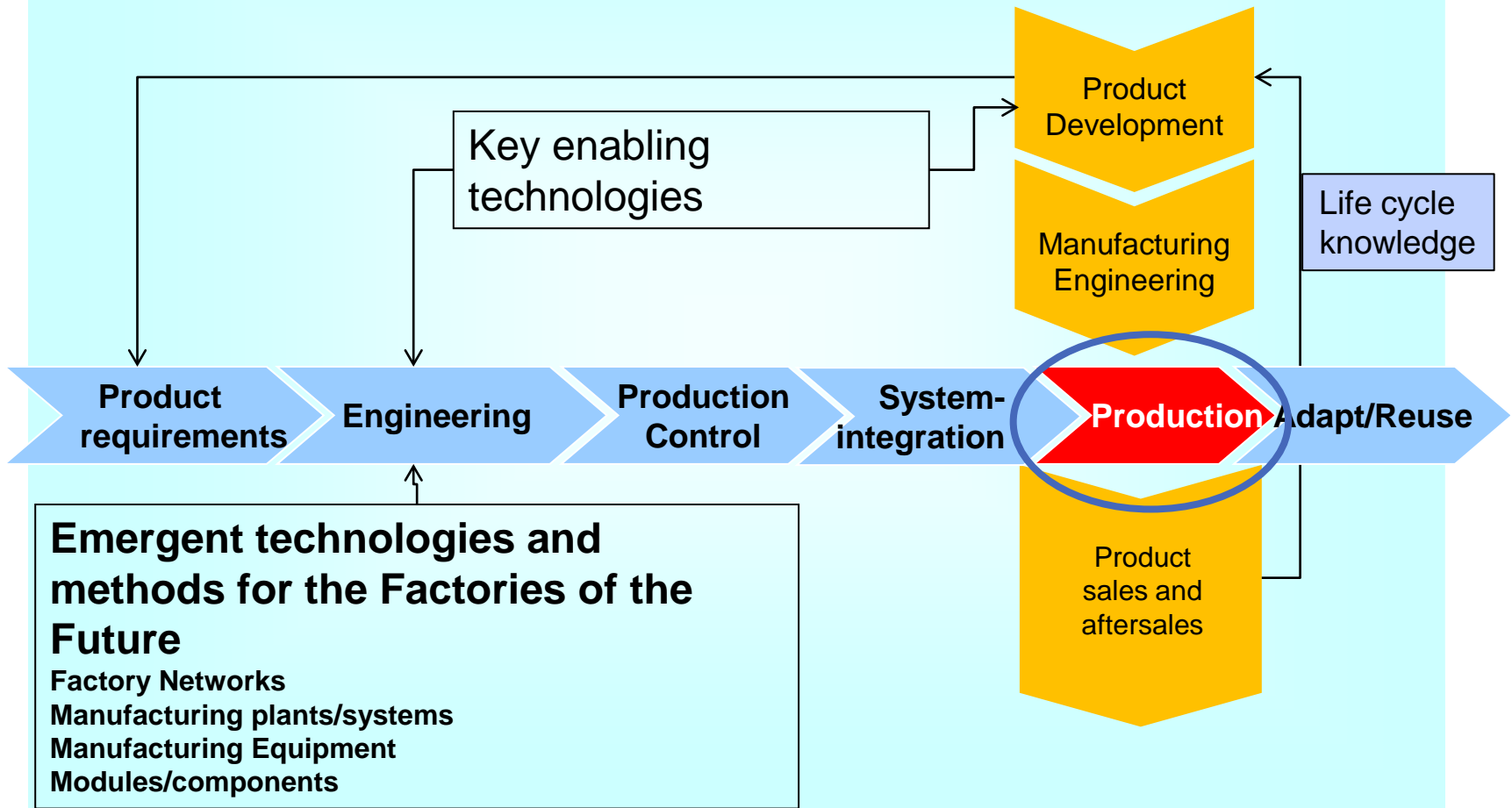
Megatrends with Impact on Manufacturing

- **Ageing**
 - Future markets and products
 - Human work and organization
- **Individualism**
 - Individual and customized products
 - Relation of human being and work conditions
- **Knowledge in the global ICT**
 - Knowledge driven Product-Development
 - Optimization of manufacturing processes
 - IP and IT security
- **Globalization**
 - Global process-standards in OEMs
 - Products and manufacturing technologies for the global markets
 - Local conditions and regulations
 - Competition of locations
- **Urbanization**
 - Environment, Mobility, Traffic, ...
 - New products for mega-cities
 - Work in mega-cities
 - Factories in urban environment
- **Sustainability**
 - Priorities for economic, ecologic, social efficiency of manufacturing
- **Finance**
 - Turbulences in finance of investment
 - R&D and long term assets
 - Economic cycles
- **Public debt**
 - Adding value - Resilience
 - Growth for employment
 - Taxes, general conditions

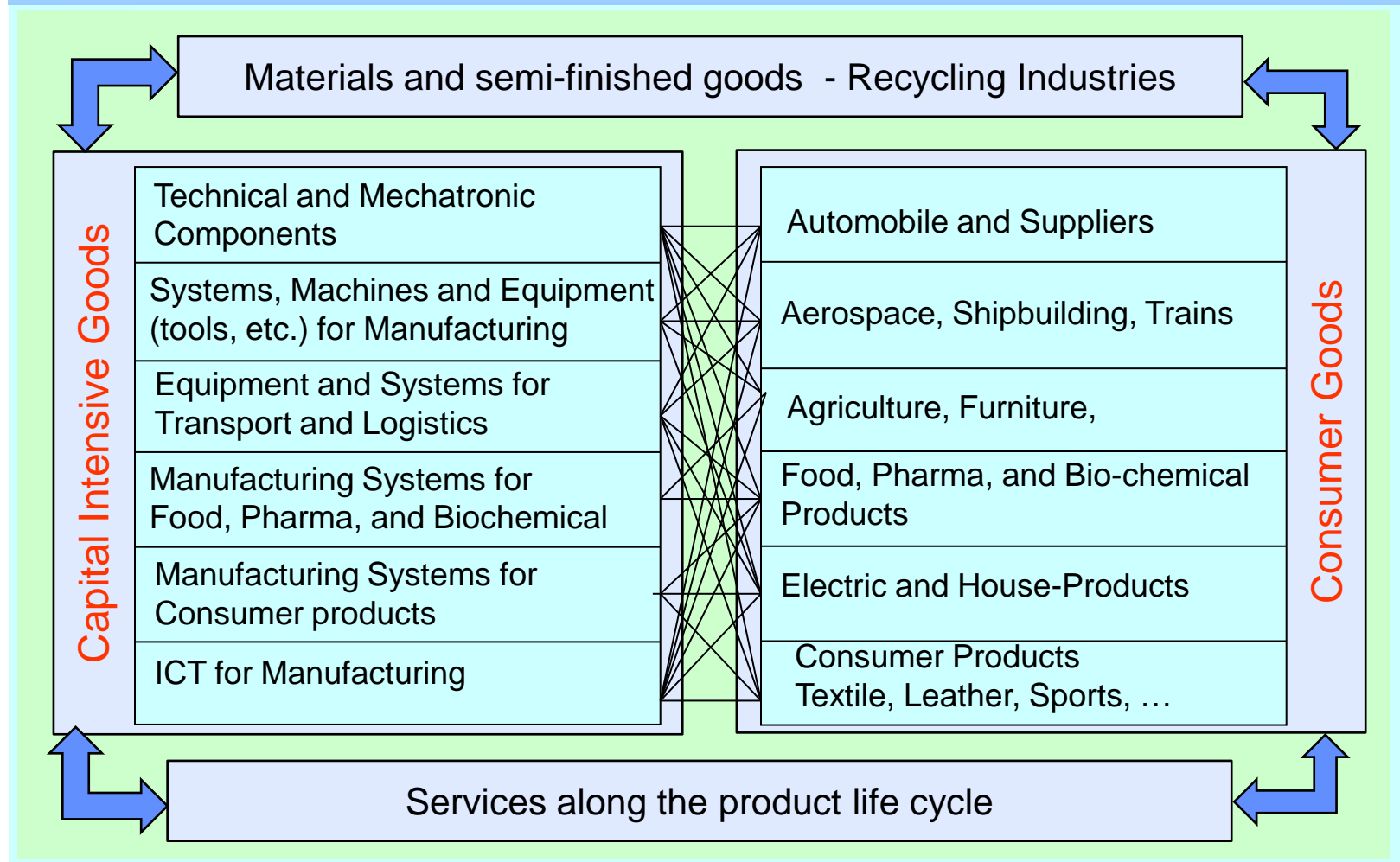
Megatrends and fields of Actions



Manufacturing technologies are the key enabler for adding value

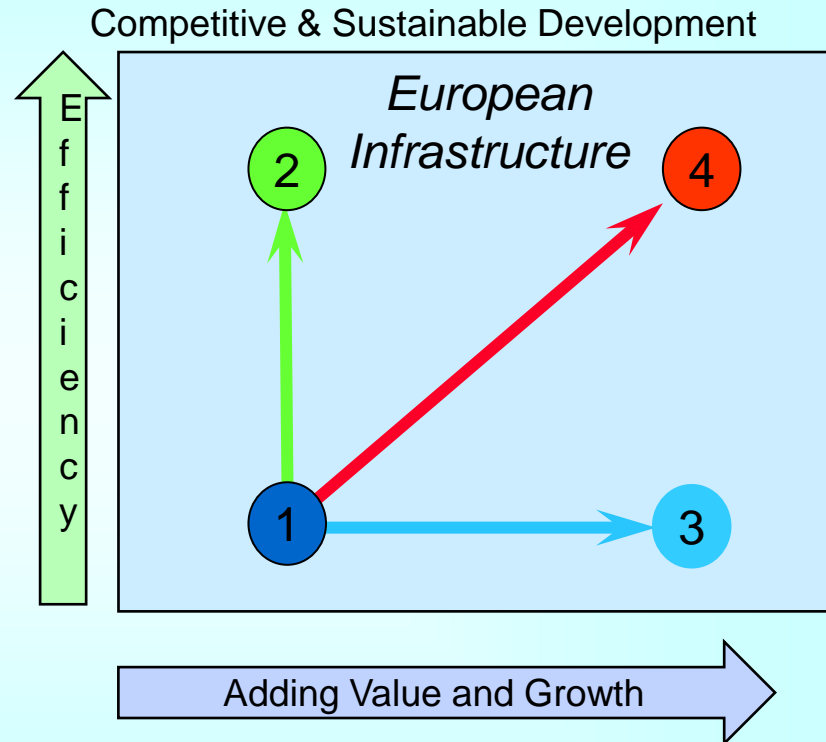


Industrial Sectors of Manufacturing



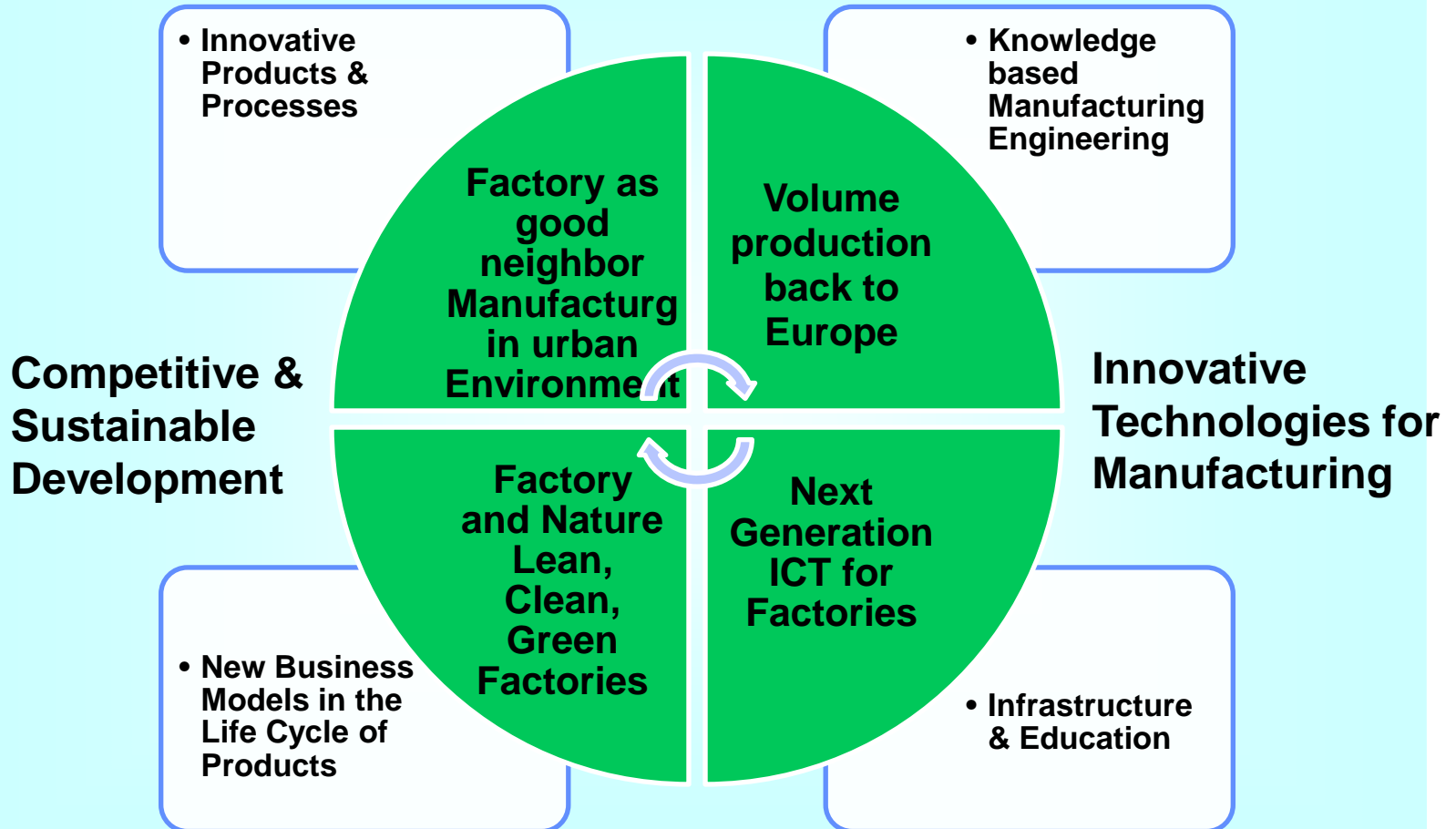
Strategic Objectives

- 1 Strengthen Customization
- 2 Leadership in Sustainable Manufacturing
- 3 Global Standards
- 4 Factories of the Future
4 Major Factories

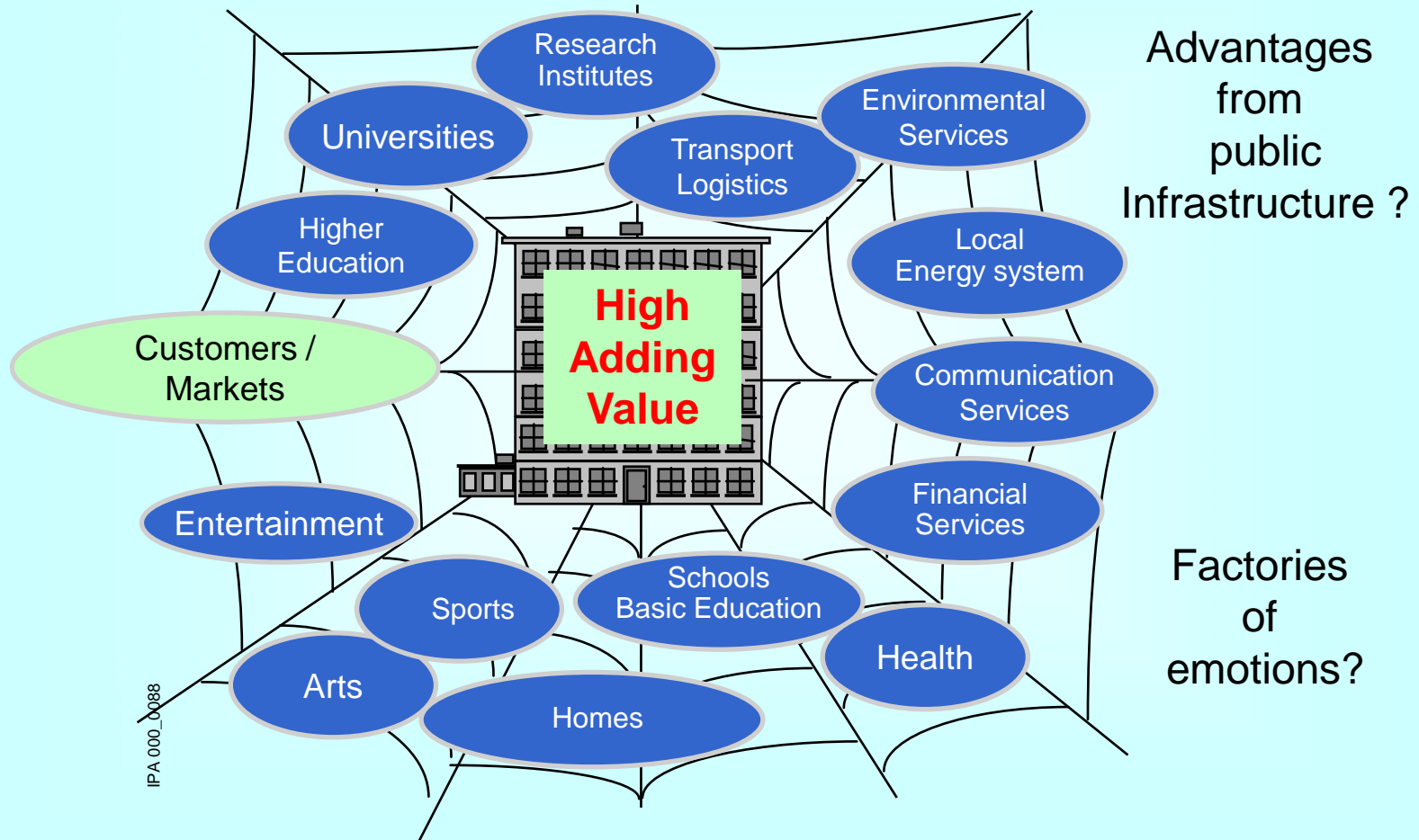


Technical, economic, ecologic and social Standards

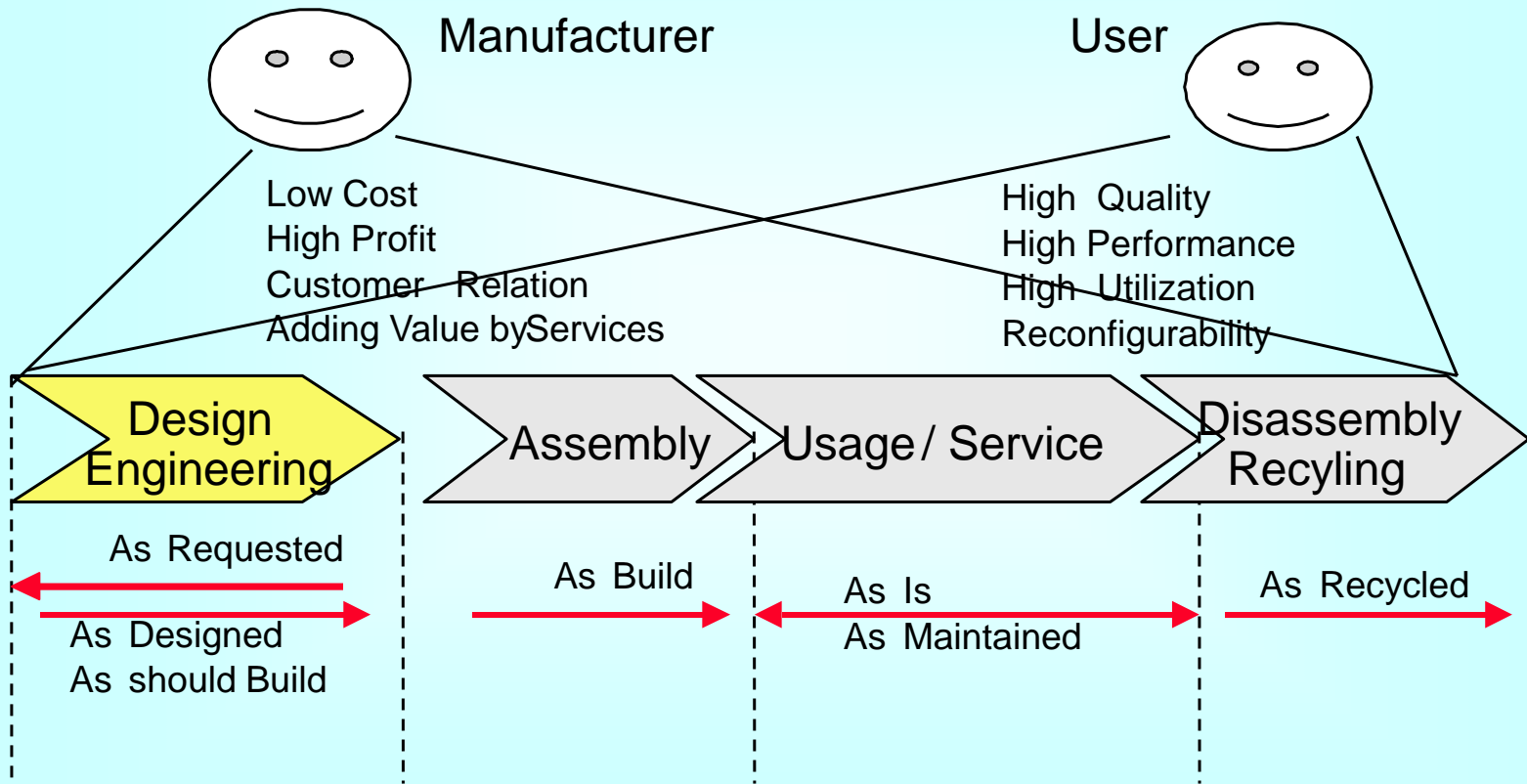
Topics of the Strategic Innovation Agenda



Manufacturing in the Urban Environment



Masnufacturing in the Value Chain



Manufacturing in the value chain

High Adding Value & Competition

Natural
Sources

Material
Parts

Components
Mechatronics

Assembly

Efficiency

Usage
Maintenance
Services

Waste

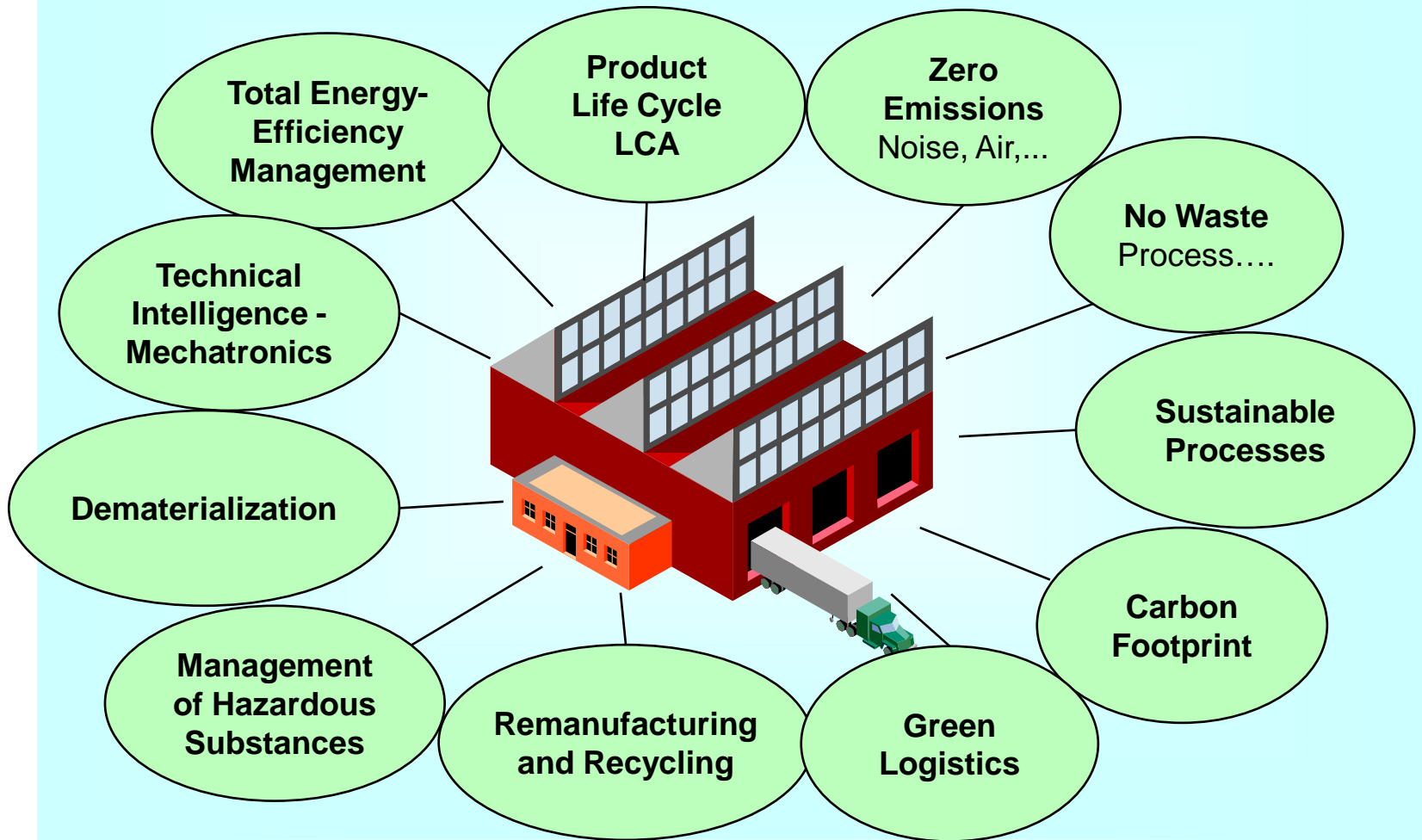
Recycling

Re-
manufacturing

Dis-
Assembly

Retrieval & Reobtain Environment and Value

Factory and Nature - The Green Factory: Lean, Clean, Green



Technologies beyond Borders

High Performance

cost, time, quality

Dimensions

micro- and nanoscale

Environmental

clean, sustainable

Generative Processes

additive technologies

Adaptive Processes

self-organisation

Energy Efficiency

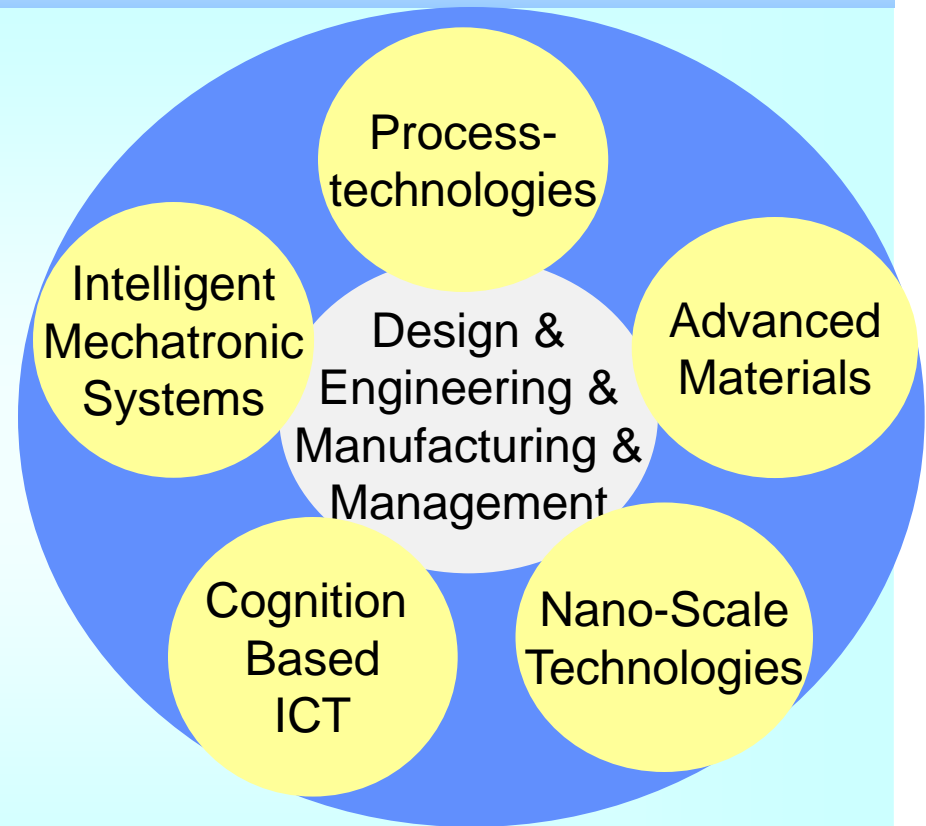
electric, heat,

Material Efficiency

material, air, oil,...

Management Efficiency

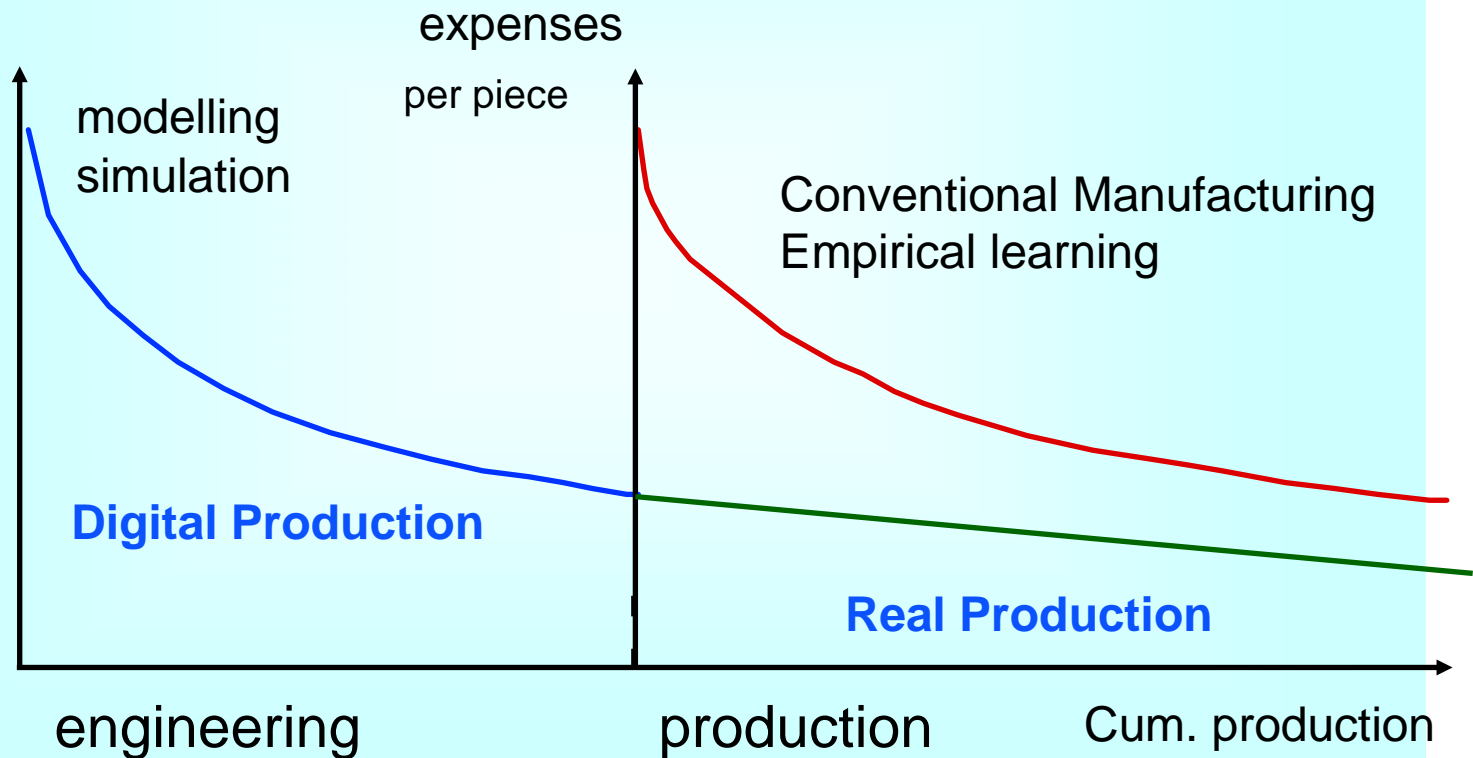
organization, optimisation



Implementation in intelligent manufacturing systems in all sectors of manufacturing

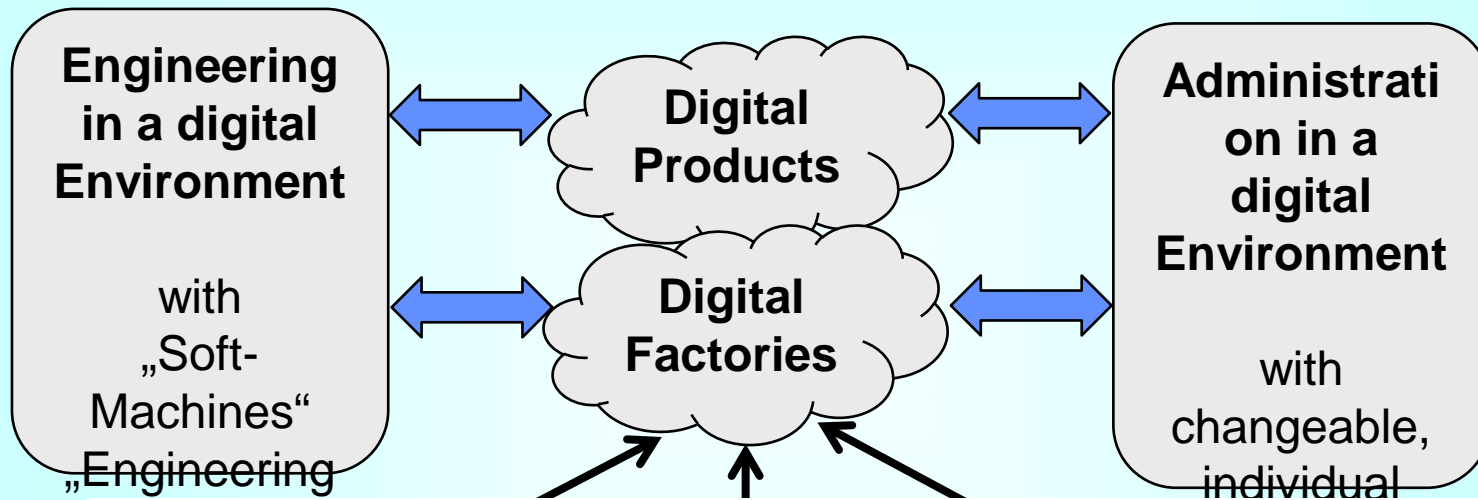
New Age: digital – real manufacturing

Benefits in early Phases

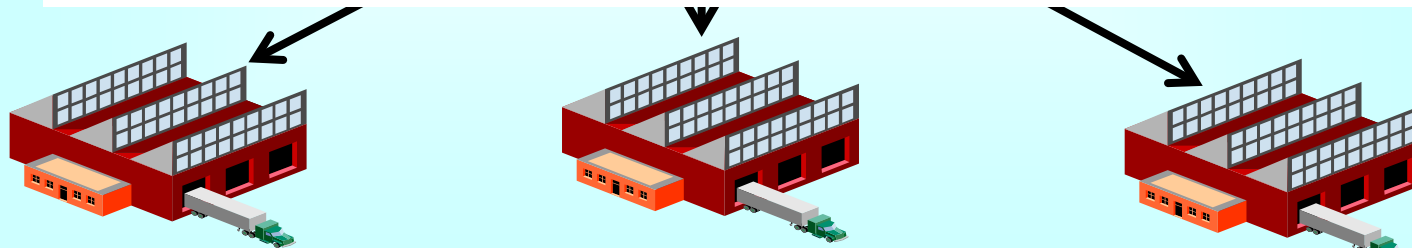


Manufacturing in the digital Age

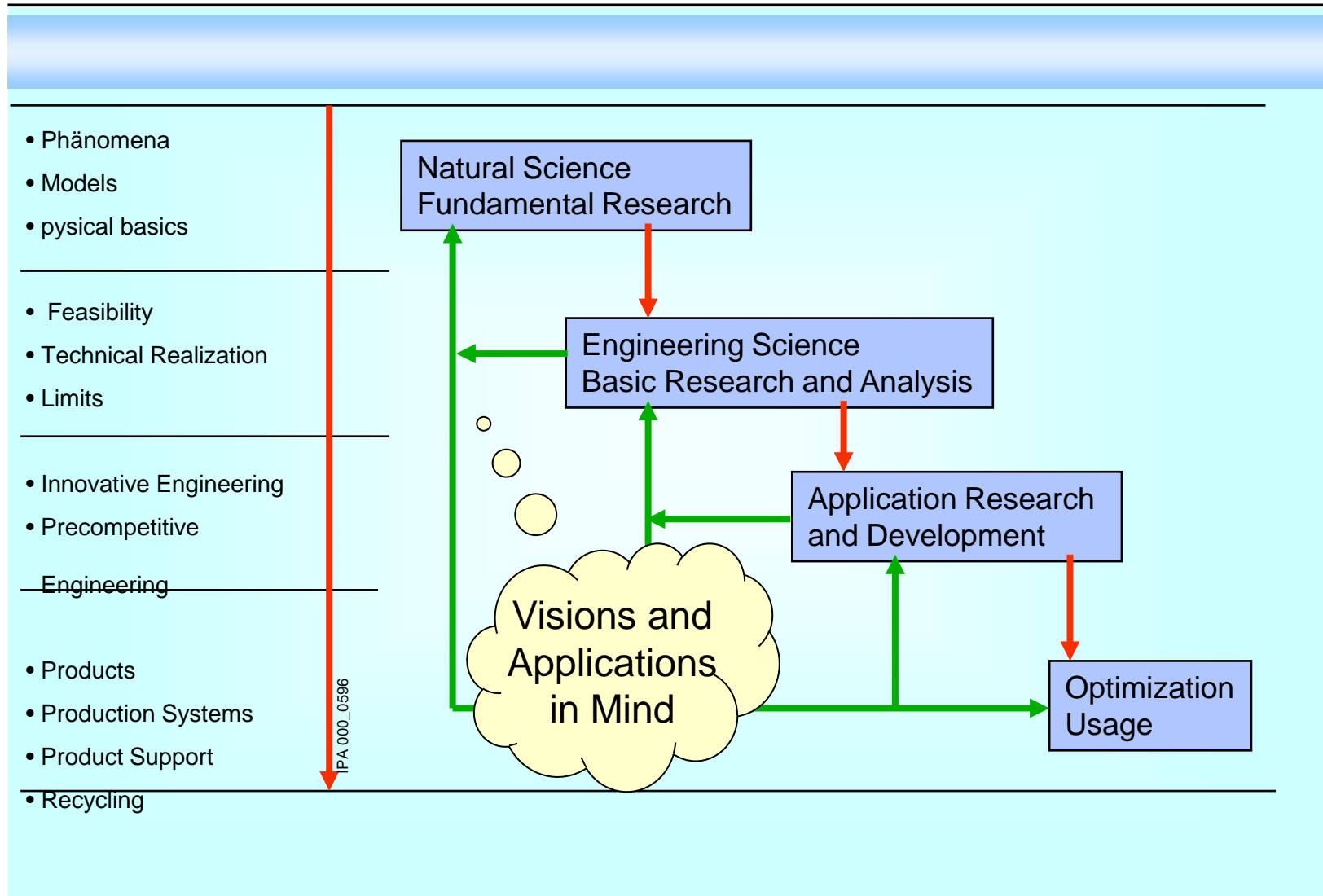
Threats: ICT-Security, gap digital-real world, ICT costs, bureaucracy



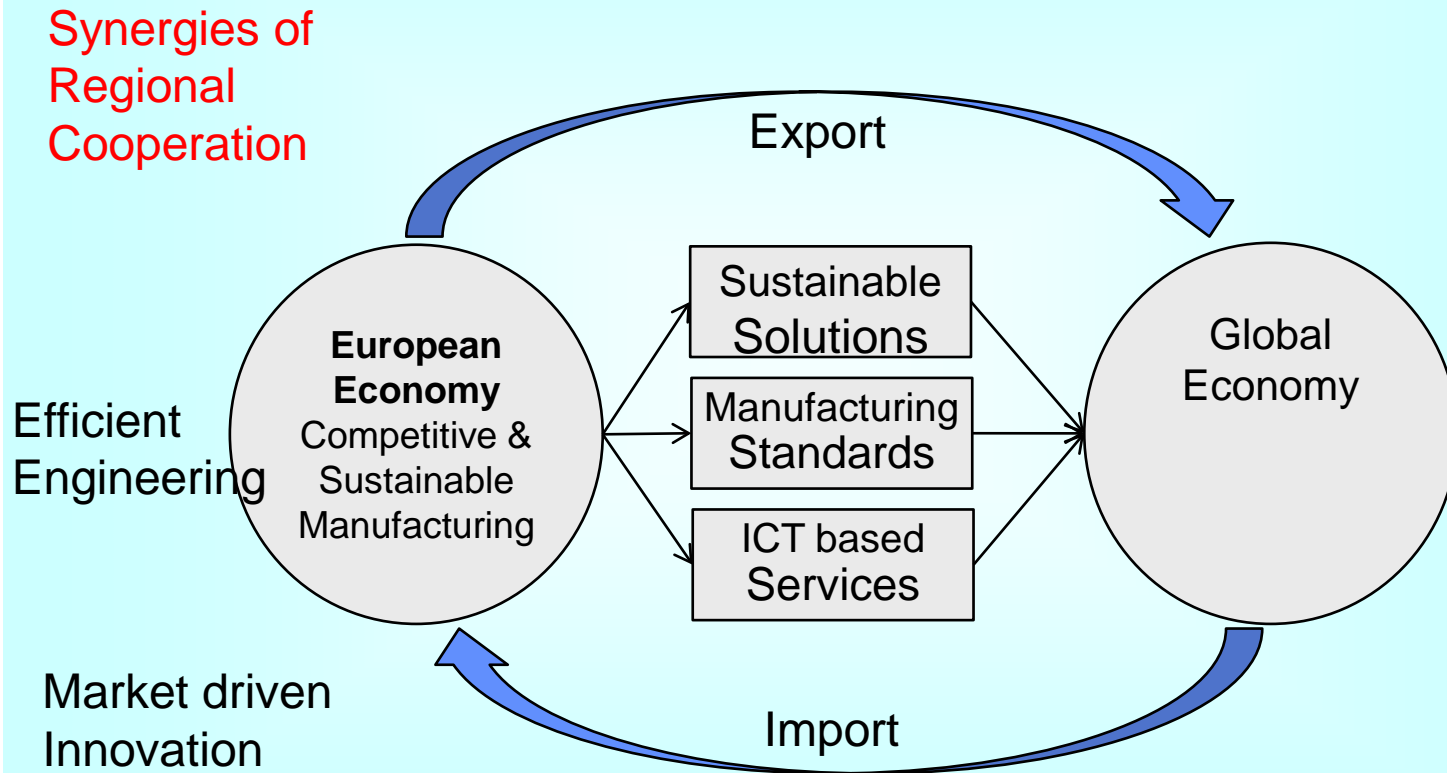
Global ICT - Networks – Product Life-Cycle Management – real time IT



Opportunities: Tools for Engineers (soft Machines), IT-Services, Efficiency of Engineers



Strategies for global Markets



Conclusions

- Stopp de-industrialization by increasing manufacturing
- Megatrends influence manufacturing
-they are a new Chance for Europe

- Major Topics for Factories of the Future

- Digital age for manufacturing
- Research and Education – European Infrastructure
- High adding value by competitive and sustainable development

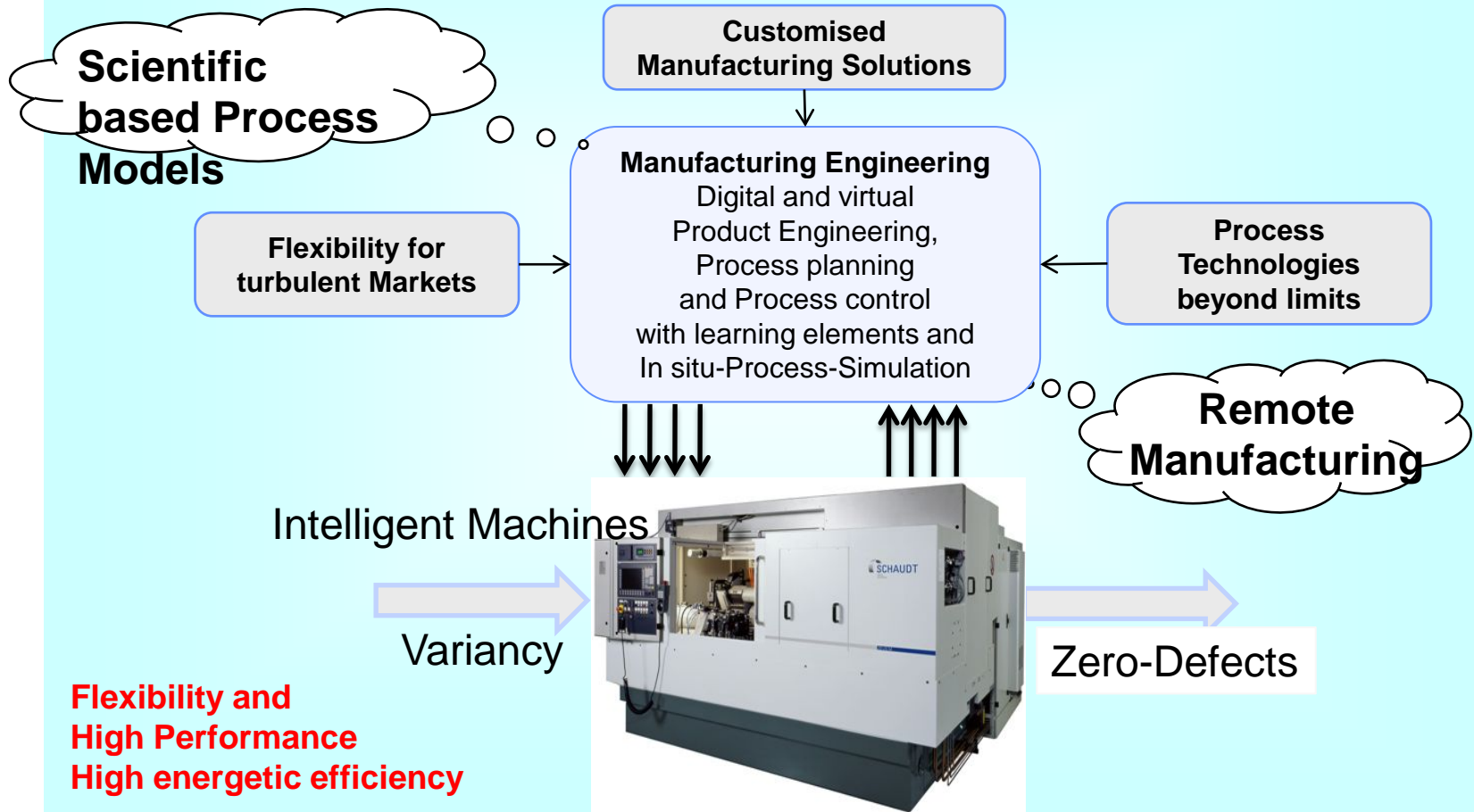
Volume Production (back) to Europe

- European Trendsetting: **design oriented products, customized mass products**
- Research focus: **basic and low-technologies**
- Customization: **design to manufacturing**“ and from „**customer order to delivery**
- Make use of **flexible Automation and Technical Intelligence**:
 - Lean, clean, green manufacturing
 - Integration of process knowledge in the machine control and monitoring systems
 - IT- support for technicians and workers, e-learning at work
 - On-line peripheral services: maintenance, process know how
- Human oriented interfaces for workers: in-situ simulation and visualization
- products and work for low skilled labor, education and training with IT-Support
- Regional orientation: work conditions in line with the way of life, flexible time- and wage- systems

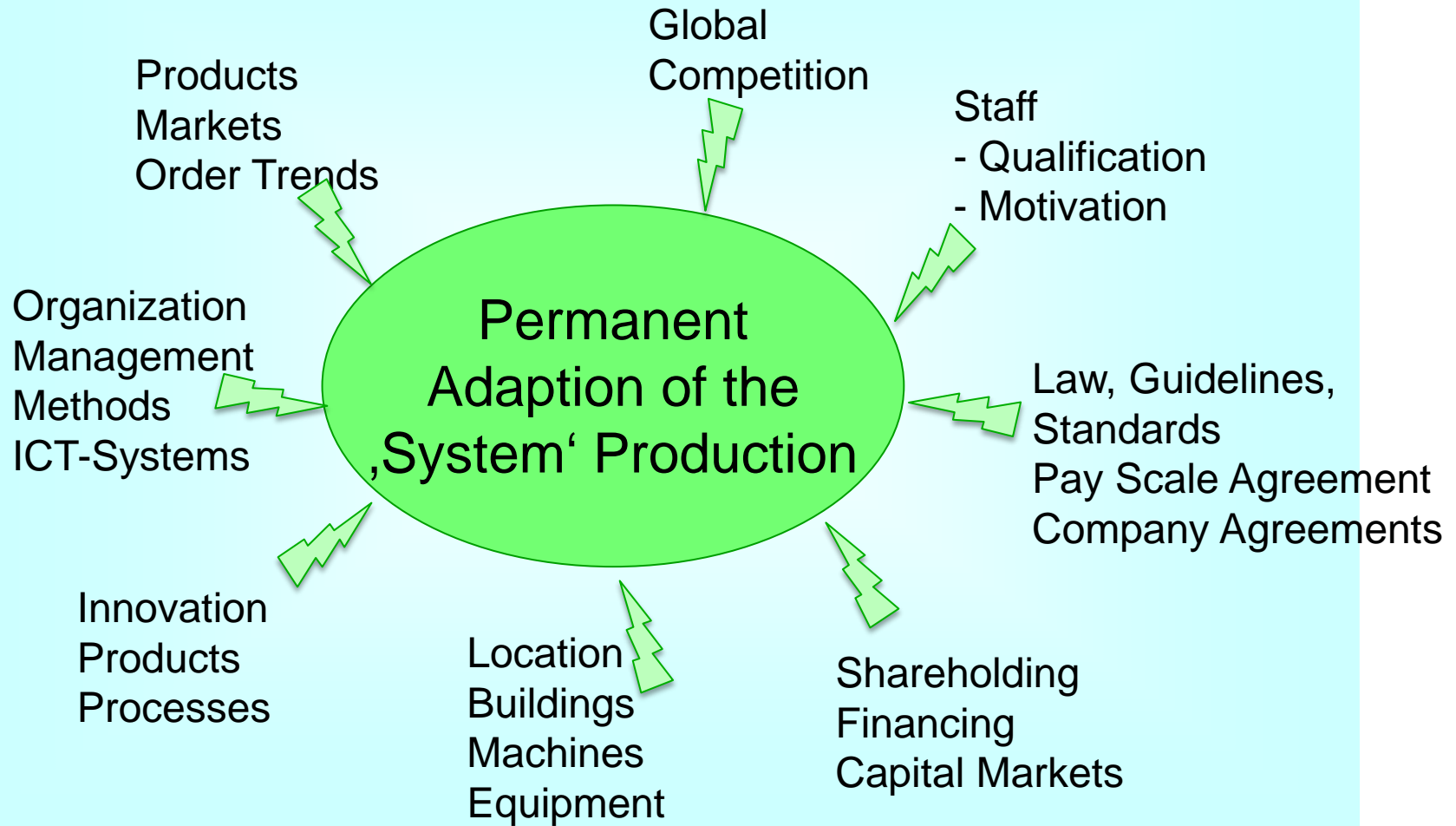
Back Up

Knowledge based Manufacturing Engineering

Increasing the quality and efficiency of manufacturing engineering



πάντα ῥεῖ - "Panta rhei"- Everything is flowing



Grand Challenge: Dematerialisation of Products

■ Reduction of the material-consumption by:

- Light weight construction, multi-material design, joining technologies
- Miniaturisation of dimensions (parts, components, products)
- Intelligent engineering with specialised materials (function oriented
 - Implementation of new technologies (Nano, Graphene etc.)
 - Integration of functions (adaptronic, sensors, actors)
- Mechatronik components, Embedding electronics, MID
- Reduced process chains (near net technologies)
- Process capability (waste, scrap, defects etc.)
- Recycling technologies, remanufacturing technologies

■ ...is a contribution to reduce energy consumption

Manufacturing in urban environment & mega cities

- Products: customized technical consumer goods, design oriented products, configurable/modular construction
 - **Emotional manufacturing**
 - **Zero Emissions** of processes and factories: Noise, Air, Fluids, Waste....
 - Short **Process chains**, integration of processes
 - **Desktop Machines**: small, medium dimensions
 - Intelligent **green logistics**
 - **Digital products – digital factories**
 - **Human centered workplaces**
 - **Tele working**
- Factory layout: flexible, open, integrated, lowest floor space
- Production System: human centered, flexible hours of work, event-driven organization