

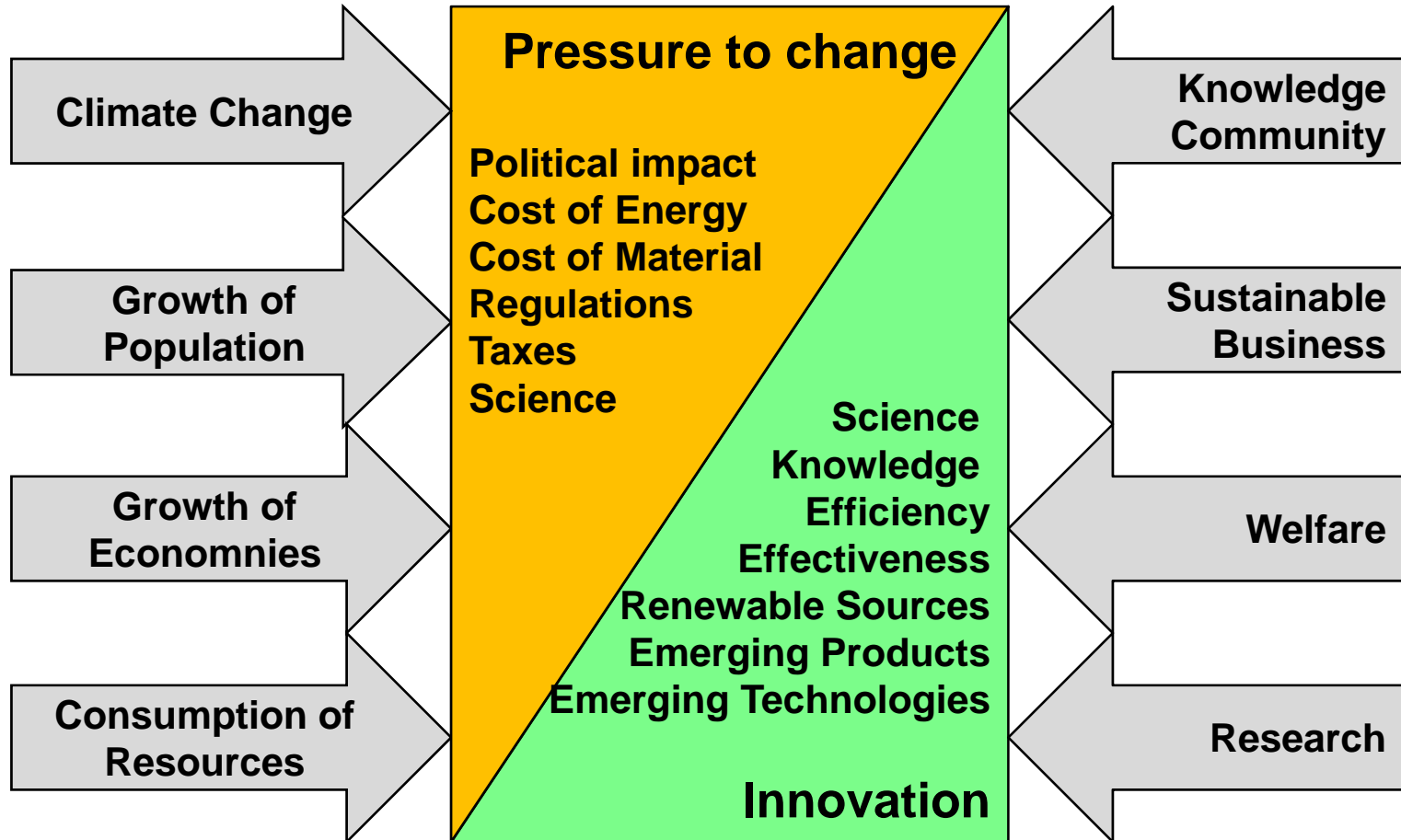
EU Workshop

Cleaner Production

Engelbert Westkämper

Manufuture Sustainable Manufacturing in Europe

Sustainability in the Focus of the Global Development



ManuFuture Model

Changing Paradigms of Manufacturing Competitive and Sustainable Manufacturing (CSM)

From....

- cost, economic
- cheap labor
- Quality
- Taylorism
-

Enterprises
Management



Products

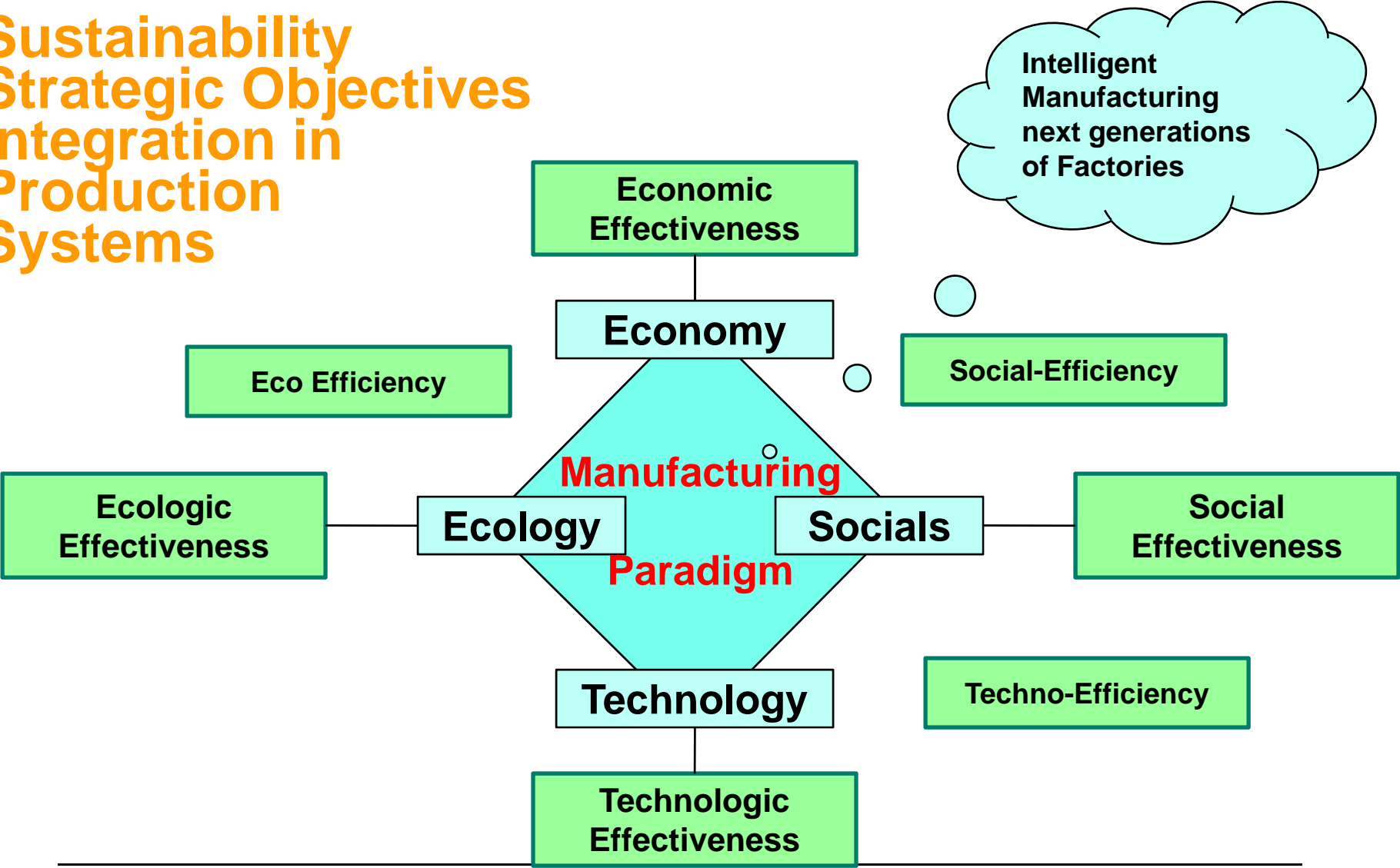
Process

to...

- High Adding Value
 - Competition
 - Sustainability
 - Innovation
- in the Knowledge
Economy and
Society



Sustainability Strategic Objectives Integration in Production Systems



Factories are Products

Manufuture Vision

**High Adding Value, Competition and Sustainability
in Manufacturing Industries**

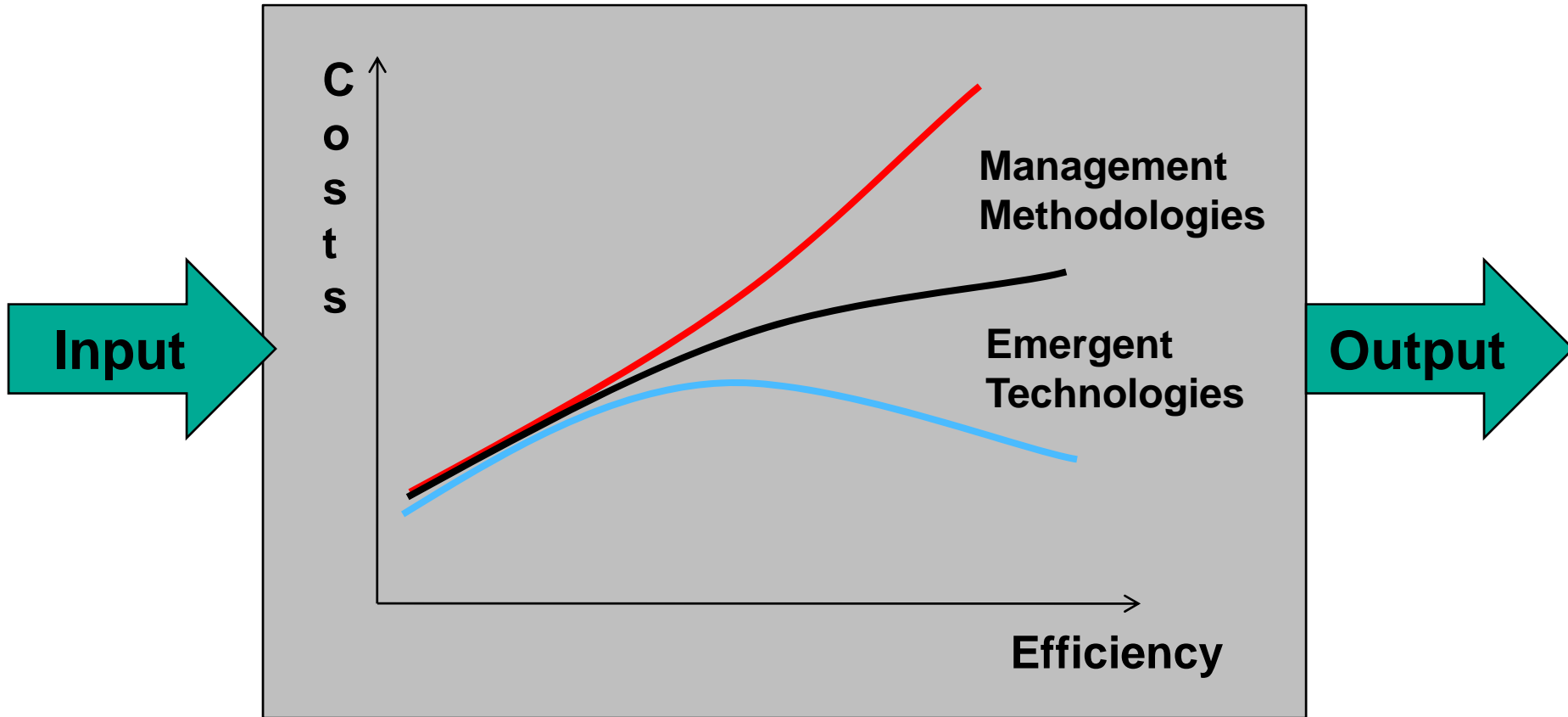
Research for
Next
Generations
of Factories

- Life cycle management
- Adaptive, configurable
- Networking
- Knowledge based
- Digital Engineering
- New Taylorism

Enabling
Technologies

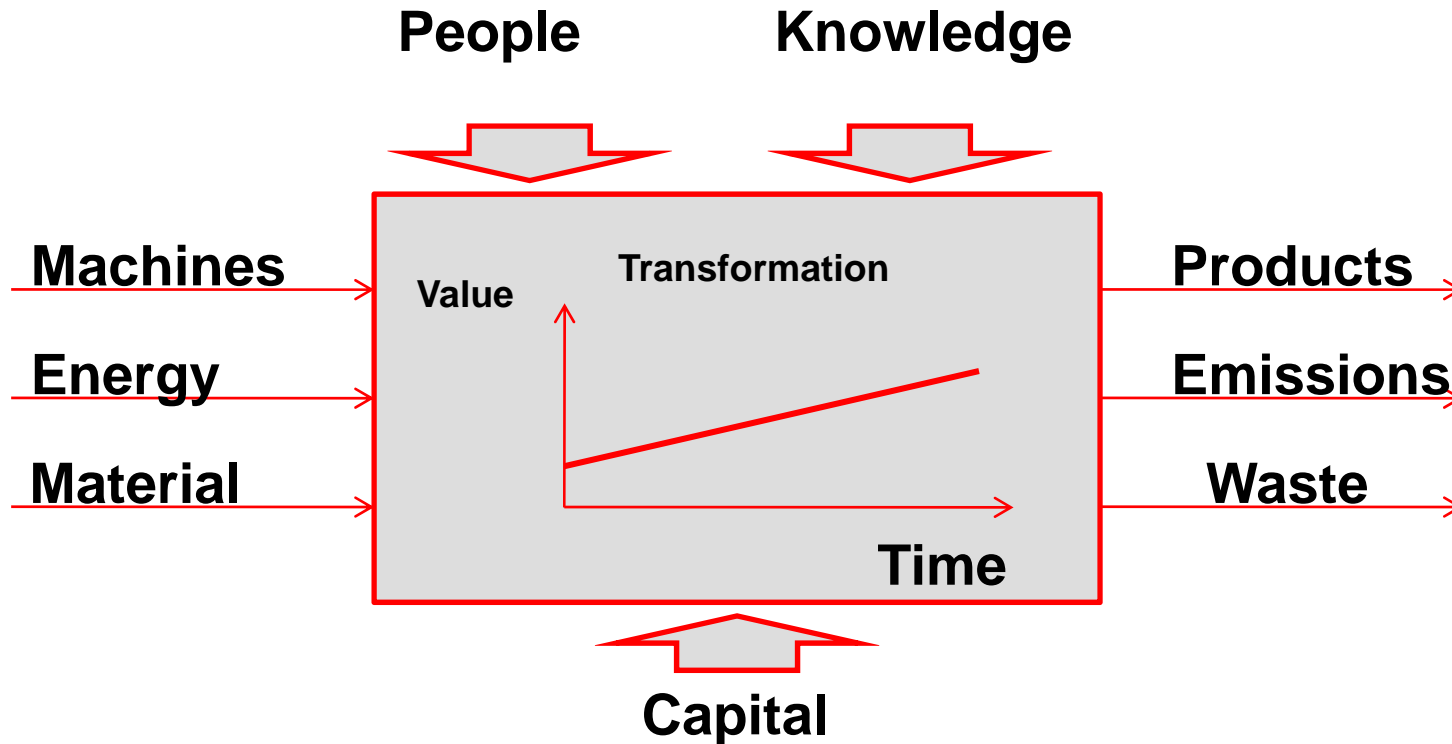
 **Intelligent Manufacturing**

Efficiency of Resources in the Transformation Process



Sustainable Manufacturing

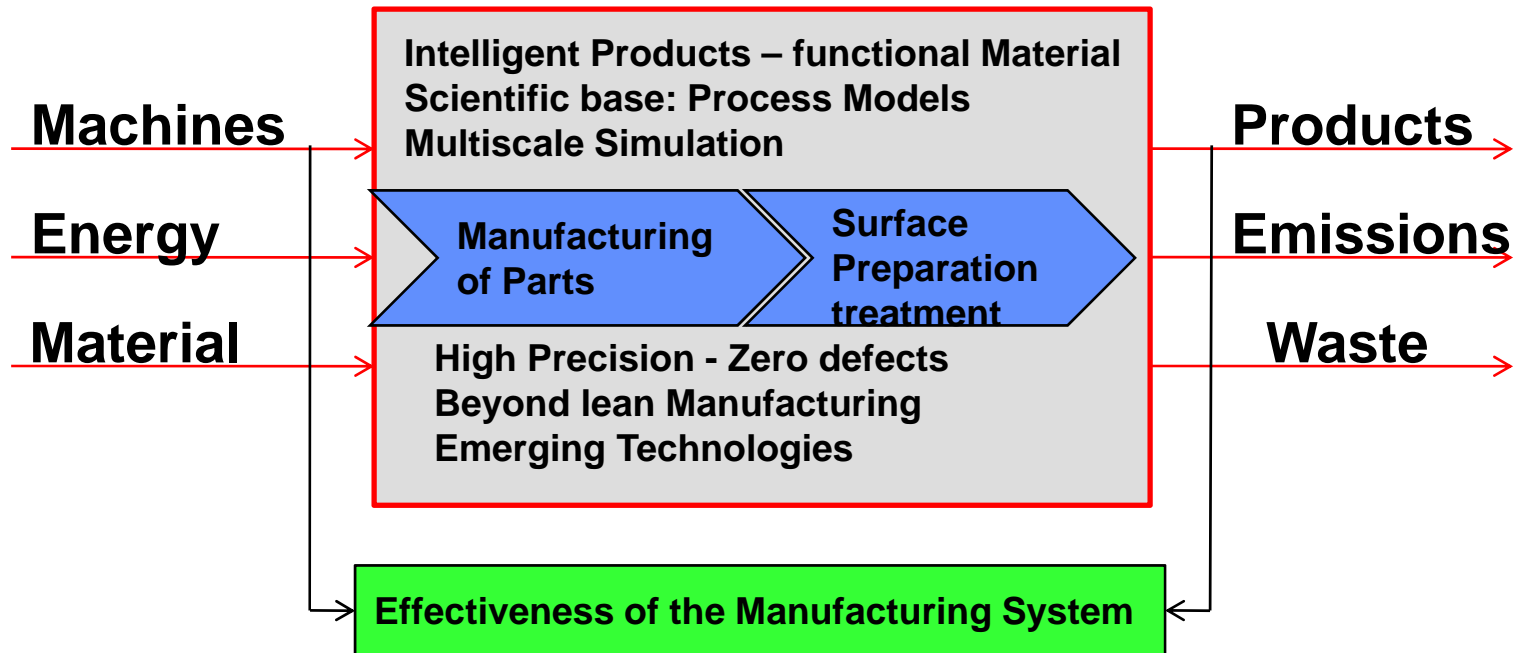
Manufacturing Transformation Process



Cleaner Production

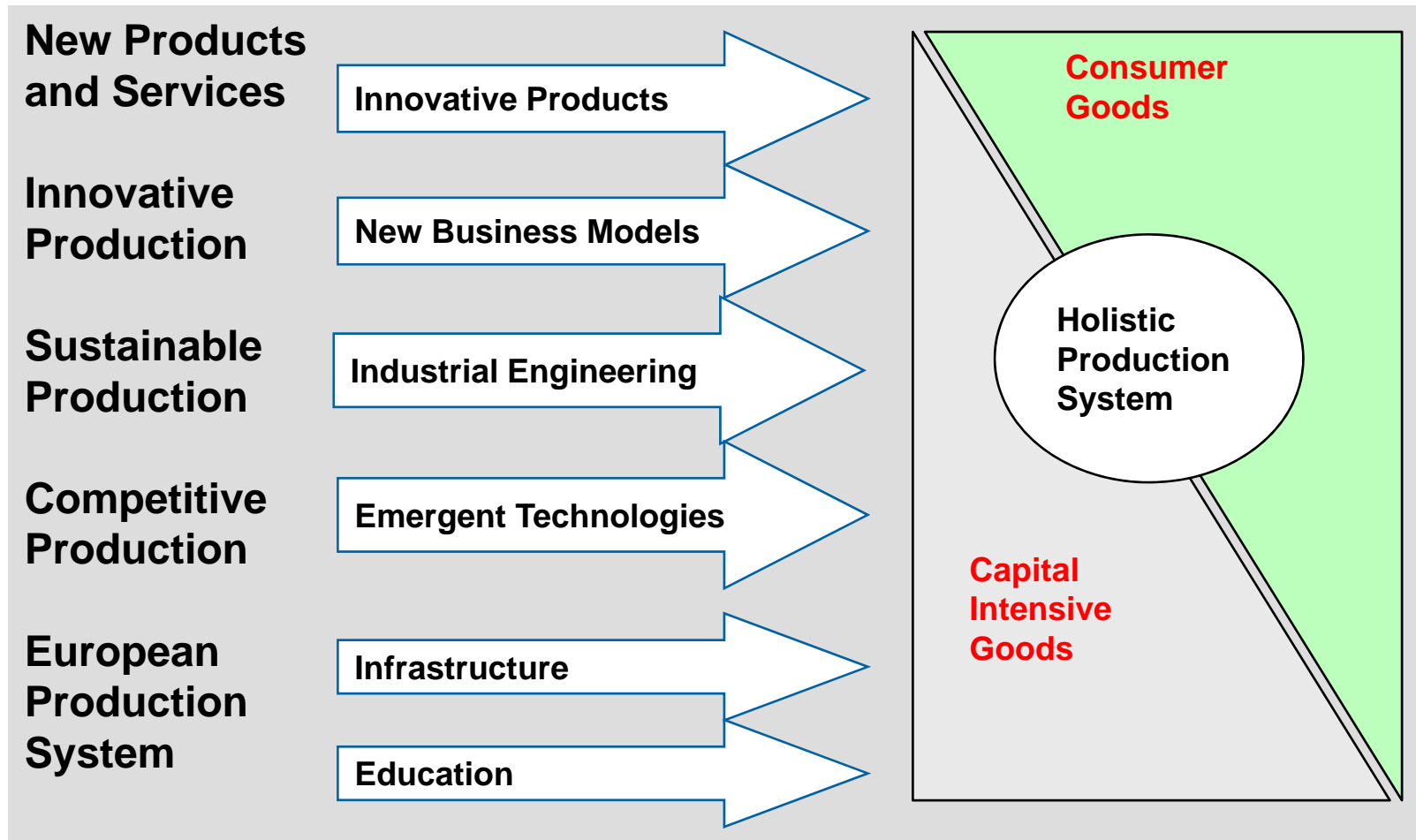
Product and Process Engineering
For effectiveness: economic, ecologic, social
Efficiency of the Resources
Knowledge Integration

Digital Engineering



Manufuture

High Adding Value and Sustainability in Manufacturing



Technologies beyond Borders

High Performance

cost, time, quality

Dimensions

micro- and nanoscale

Environmental

clean, sustainable

Generative Processes

rapid technologies

Adaptive Processes

self-organisation

Energy Efficiency

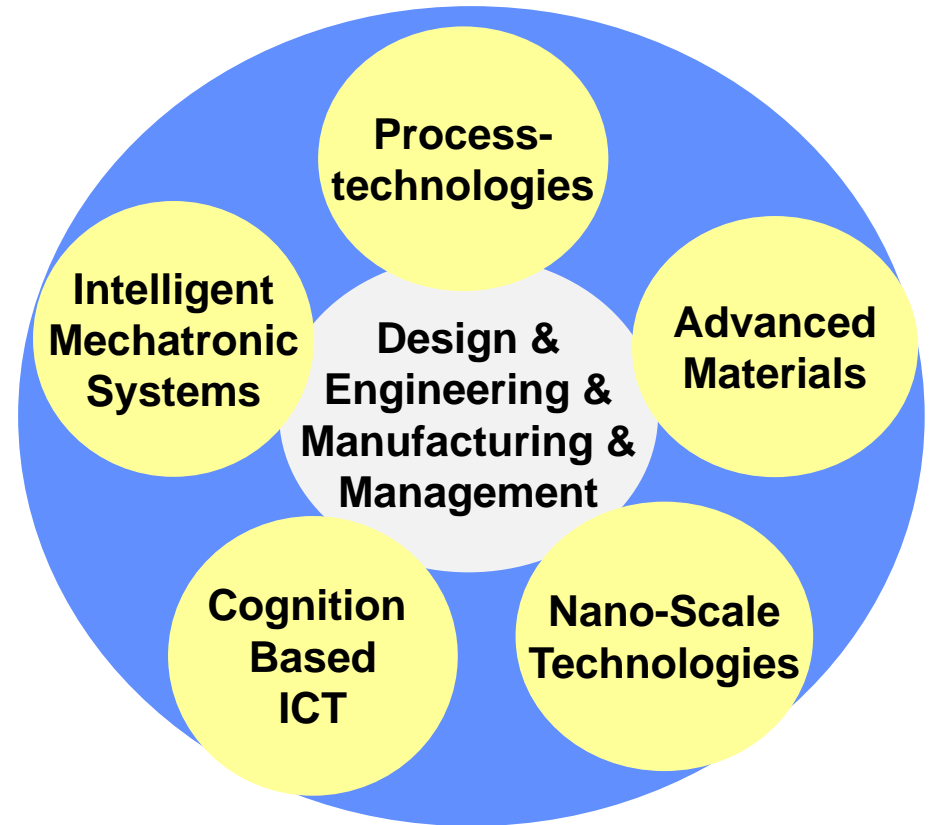
electric, heat,

Resource Efficiency

material, air, oil,...

Management Efficiency

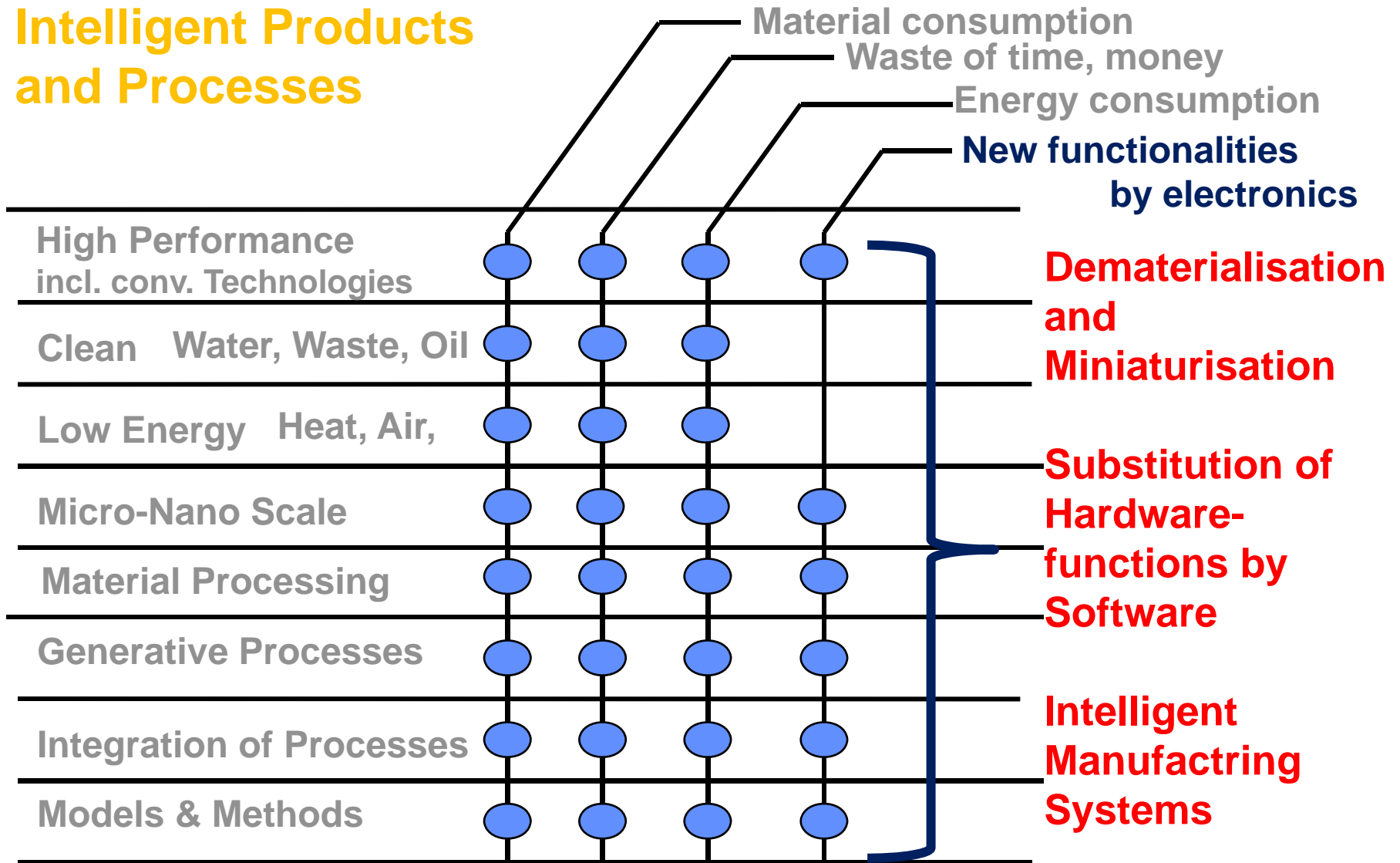
organisation, optimisation



**Implementation in intelligent manufacturing systems
in all sectors of manufacturing**

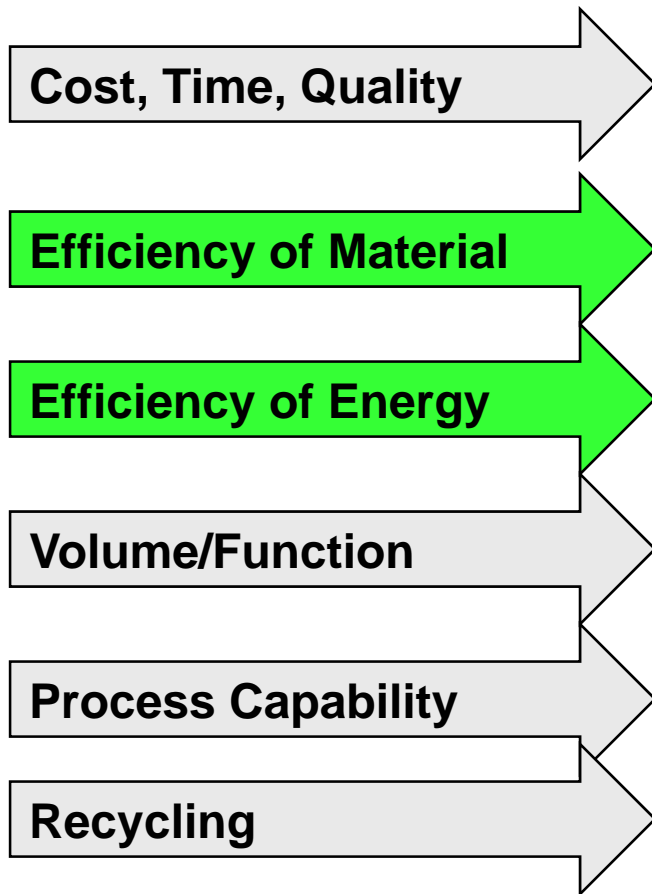
Emergent Technologies

Intelligent Products and Processes



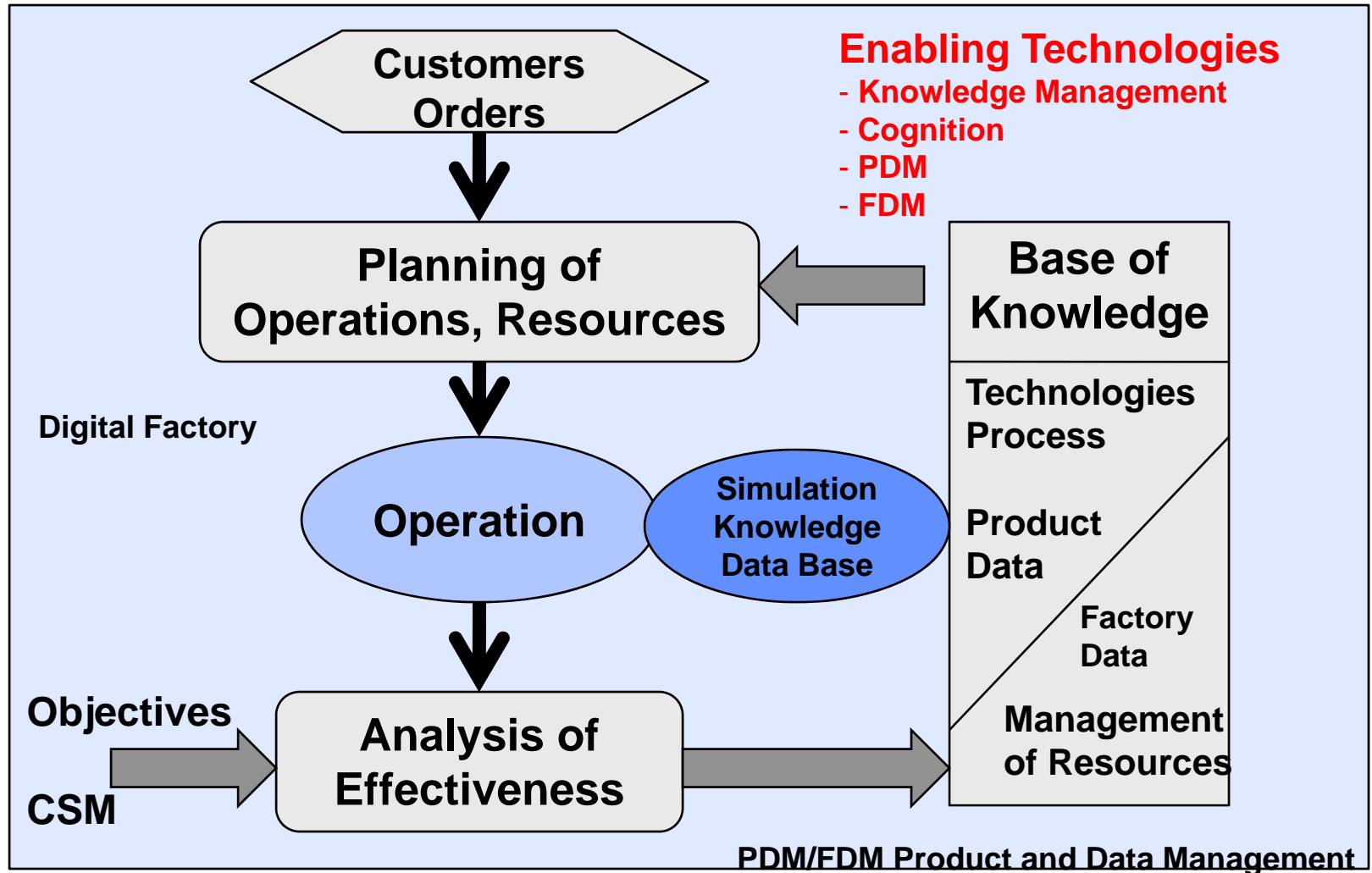
Advanced structural and functional Materials

Increase the technical Efficiency of Material and Material processing in the chain from atoms to parts

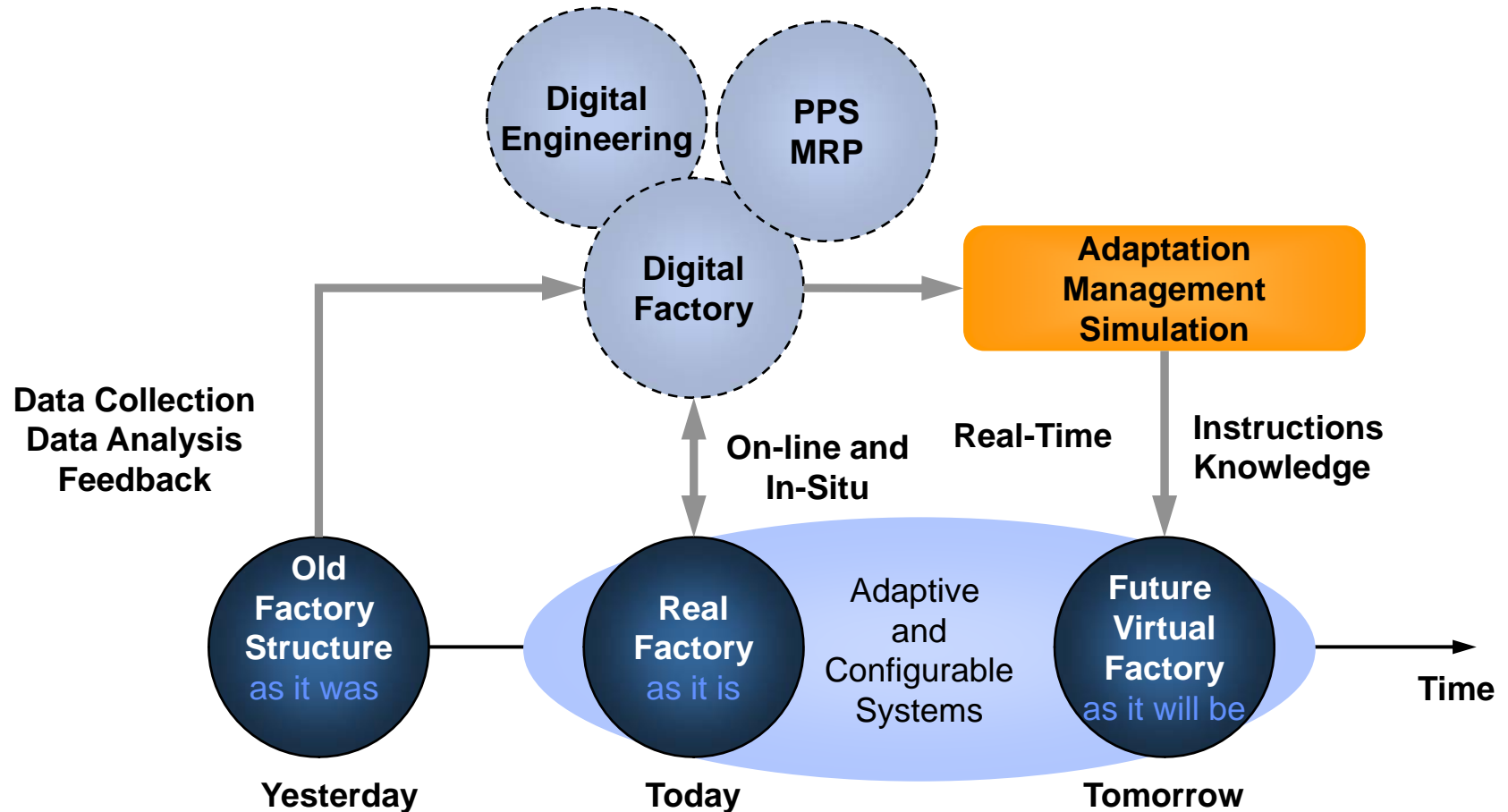


- **Functional Materials**
 - Composites
 - Adaptive Materials
 - Focus on process chains
- **Material-Engineering**
 - Grading and Integration of functions
 - Analysis, Modeling, Simulation
- **Near Net Technologies**
 - Generative Technologies
- **Nano-Materials** – process technologies
 - Nano scale surfaces
 - Nano- electronics
- **Avoiding hazardous Substances**

Learning Manufacturing

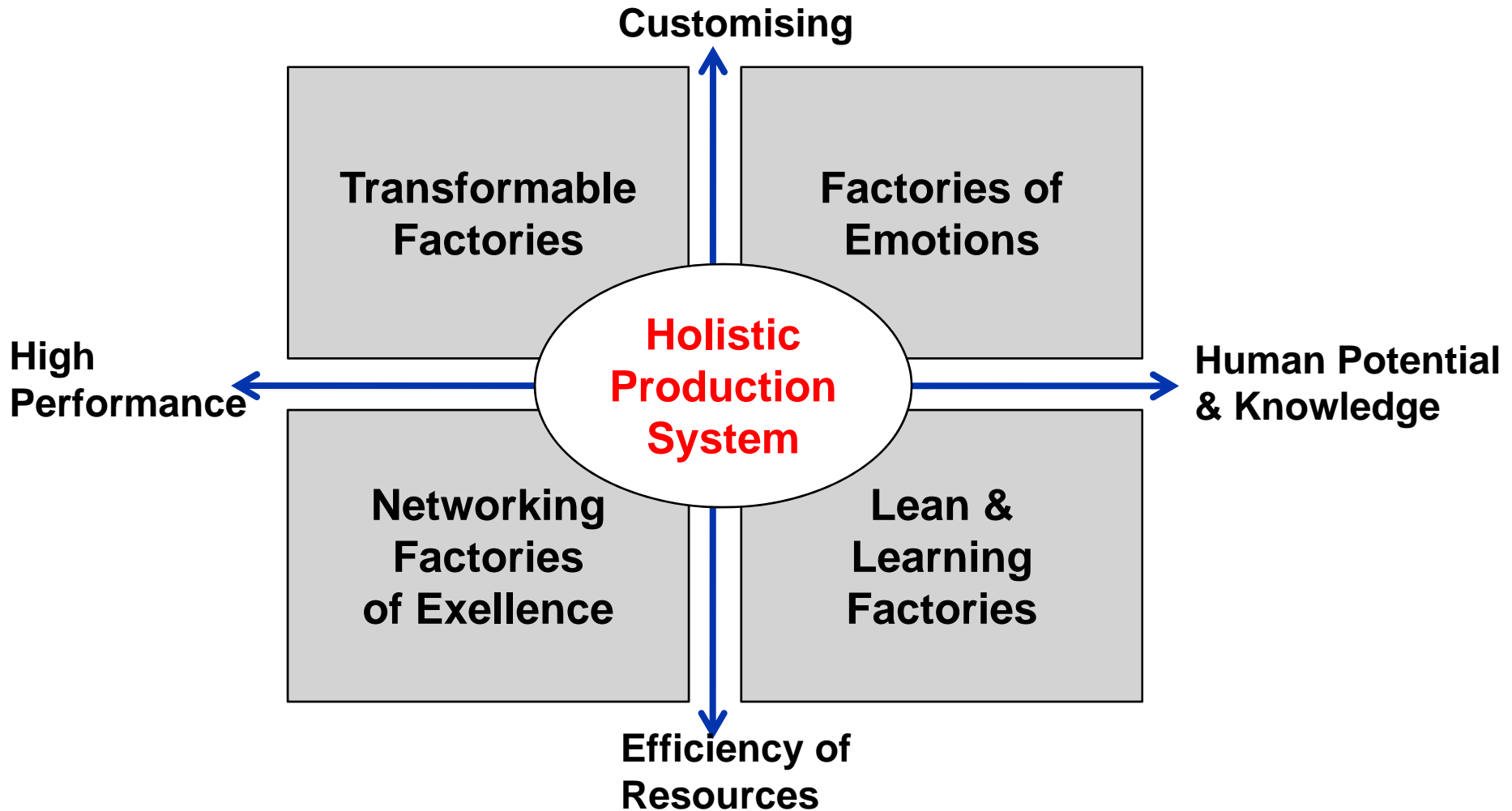


Digital Factory: Near Reality and Real-Time



Factories of the Future

Follow CSM- Paradigm



Sustainable Factories

“... strong need for further research in the interplay between technology, social, economic and ecological systems...”

Products for
Emergent Markets

**Knowledge based
Competitive and
Sustainable
Factories**

Factories are Products

- Business Models**
- Sustainable Business
 - Survival in the turbulent Environment
 - Life Cycle Management

- Eco Design of Products and Processes**
- LCA/LCC
 - Industrial Engineering
 - Knowledge based Factories

- Emergent Technologies**
- Low energy
 - Low material
 - High Efficiency
 - clean Manufacturing

- Production System**
- Culture
 - Innovation
 - Methodologies

ManuFuture Implementation

Manufuture Documentation

Vision

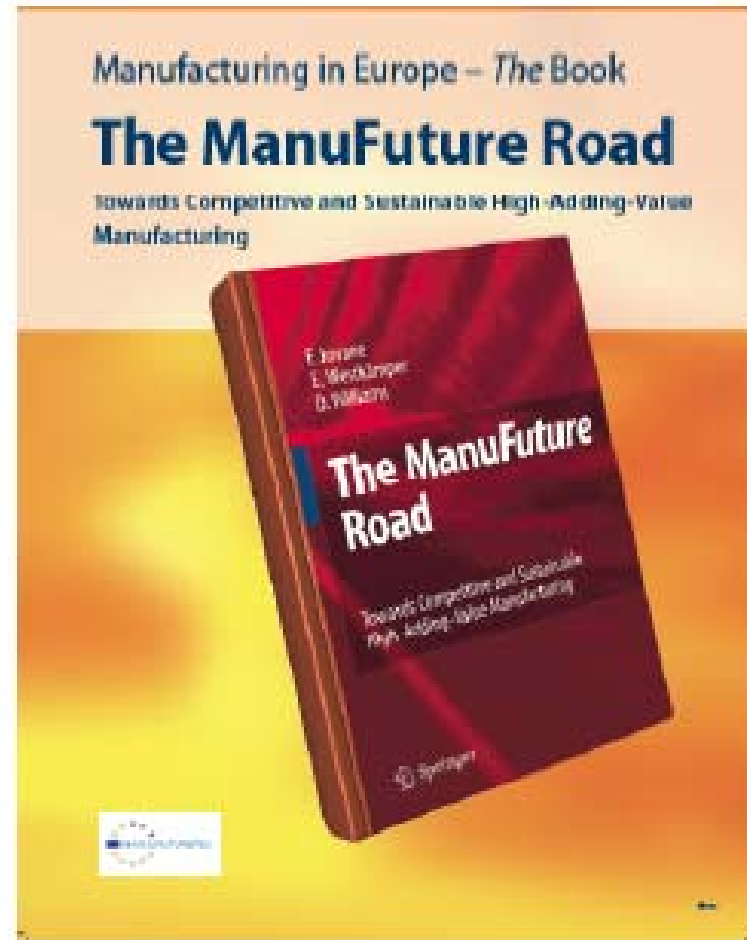
Strategic Research Agenda

Paradigm:

Competition, Sustainability and
High Adding Value

Leadership Roadmap

Proactive Actions



Summary

- Manufacturing has to be transformed from cost driven to Competition and Sustainability
- Adaptive Systems, Digital Engineering, emerging Processes and Networking characterize the technical development towards next Generations of Factories.
- Manufuture defined the Road Map for next steps towards **sustainable Manufacturing**
- **Cleaner Production** is a strong and innovative contribution for implementation of the Manufuture Strategy