



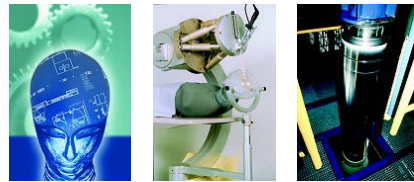
# MANUFUTURE

**Sustainable production technologies and the European Manufuture Technology Platform**

**Dr. Siegfried Stender  
Fraunhofer IPA  
Institute for Manufacturing Engineering  
and Automation**

Fraunhofer IPA Institute for Manufacturing Engineering and Automation

**our mission:**  
“innovative research for our customers”



Fraunhofer



- location: Stuttgart
- app. 350 employees
- operational budget: app. 30 Mio. €
- 3 main fields of work:
  - corporate management
  - automation
  - surface technology
- directors : Prof. Dr.-Ing. Dr. A. Verl  
Prof. Dr.-Ing. Dr. h.c. mult.  
E. Westkämper

Dr.-Ing. Dipl. Wirtsch.-Ing. S. Stender



# Content

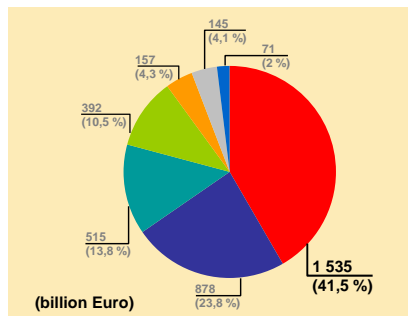
## Sustainable manufacturing

- The manuFuture process
- Priorities
- Manufacturing Conflict of Aims
- ManuFuture SRA and Sustainability
- Strategic Orientation
  - Technologies
  - Life Cycle
  - Business
- Consequencies - ManuFuture RoadMap

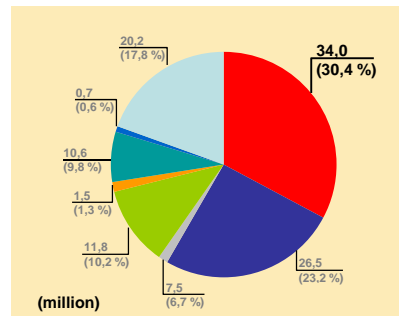


# High Adding Value RTD for Manufacturing

Value Added



Jobs



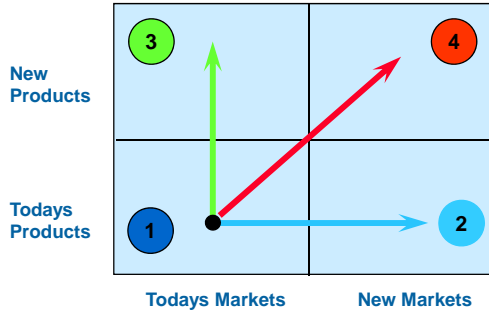
- Manufacturing
- Electricity, gas and water supply
- Wholesale and retail trade; repair of motor vehicles, motor-cycles and personal and household goods
- Hotels and restaurants
- Transport, storage and communication
- Mining and quarrying
- Construction
- Real estate, renting and business activities



## ManuFuture Vision RTD for High Adding Value

### Assuring the Future of Manufacturing in Europe by High Adding Value

- 1 Customisation  
Quality, Cost, Time
- 2 Global Production
- 3 Leadership in Technologies
- 4 New Technologies for  
Emerging Sectors



- ➡ Knowledge based Manufacturing for competition
- ➡ Leadership in Technologies
- ➡ Environmental friendly and european culture of Manufacturing



## From thinking in costs to thinking in value

### Industrial Transformation by Knowledge-based Manufacturing




**MANUFUTURE**  **Factories are Products Made and Used in Europe**

**ManuFuture**  
European Platform for **High Adding Value**  
in Manufacturing Industries

Life cycle oriented  
Networking  
Integrated Knowledge  
Intelligent Systems  
Technologies beyond borders

**European Manufacturing Standards**



**MANUFUTURE**  **European Technology Platform ManuFuture**

ManuFuture is an European Initiative to activate research for Innovation in Manufacturing

Based on:  
- CIRP generic model  
- Vision 2020  
- Strategic Research Agenda

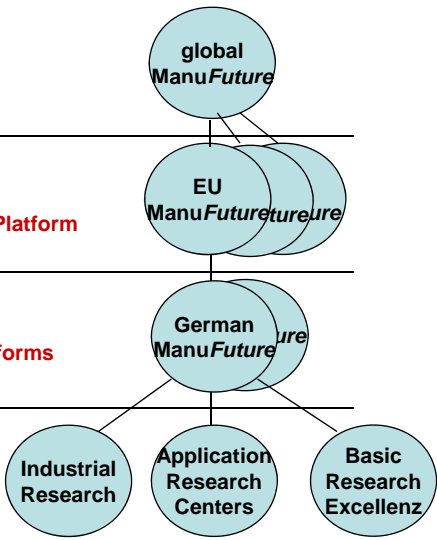
Oriented to:  
- knowledge economies  
- more and better jobs  
- social standards  
- sustainability

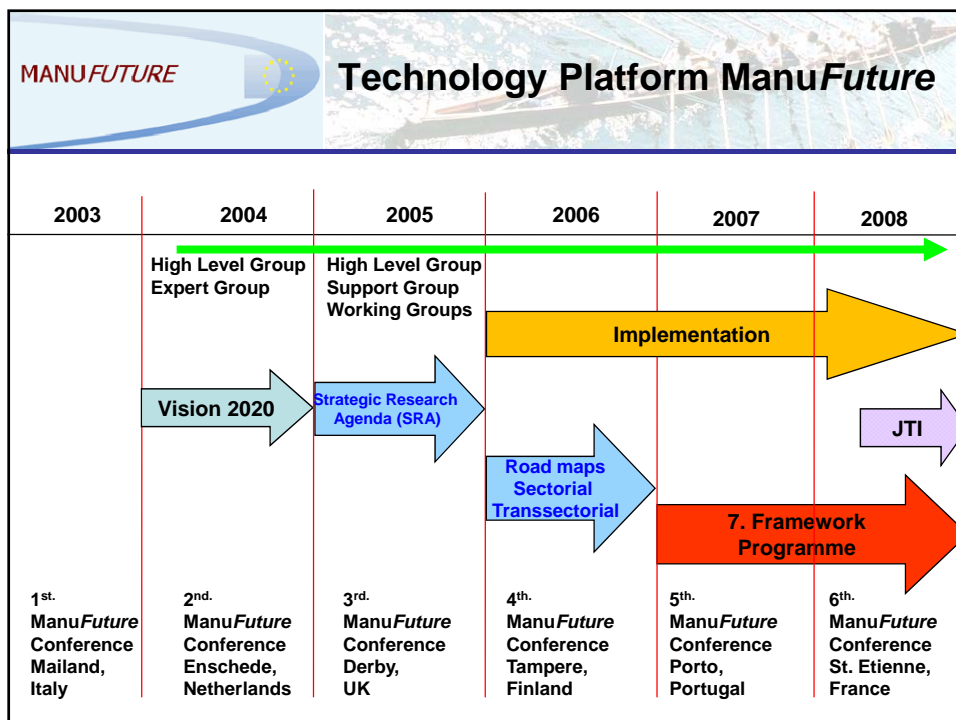
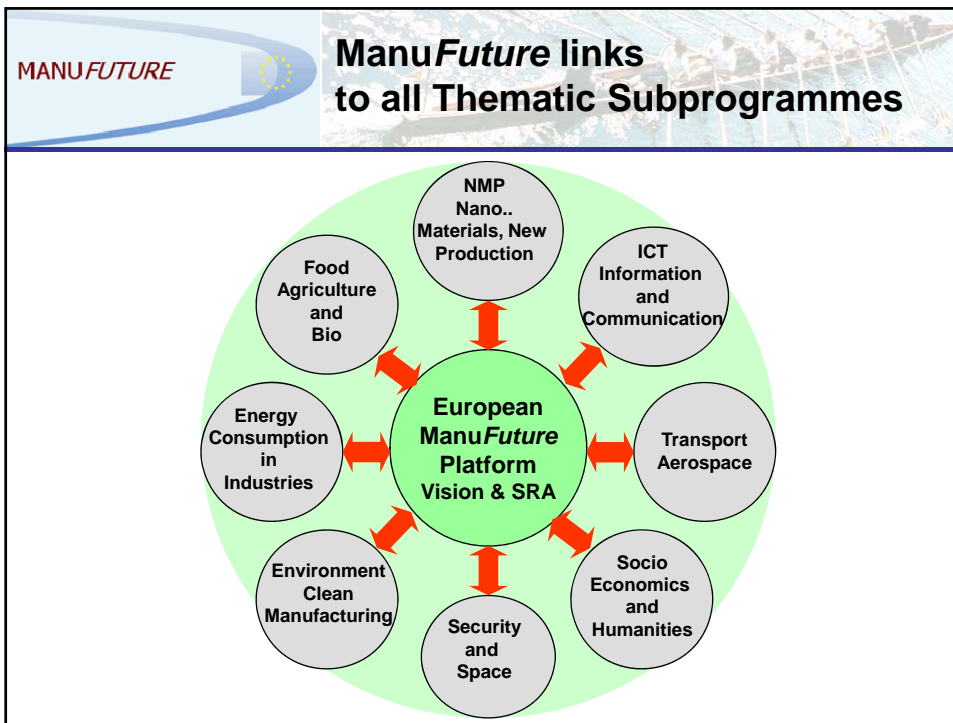
**IMS global**

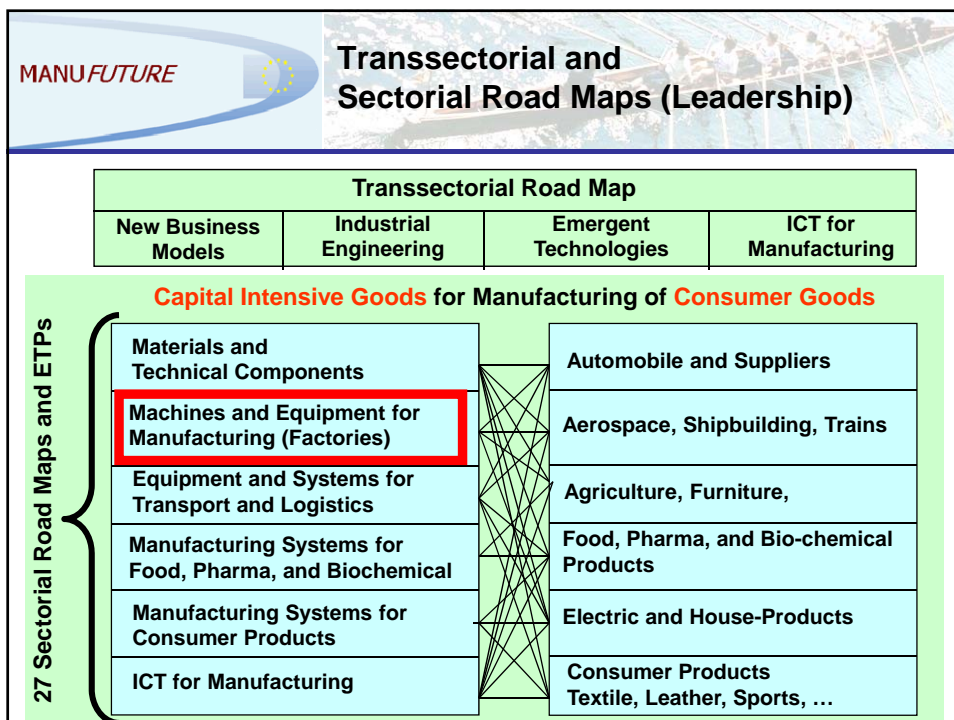
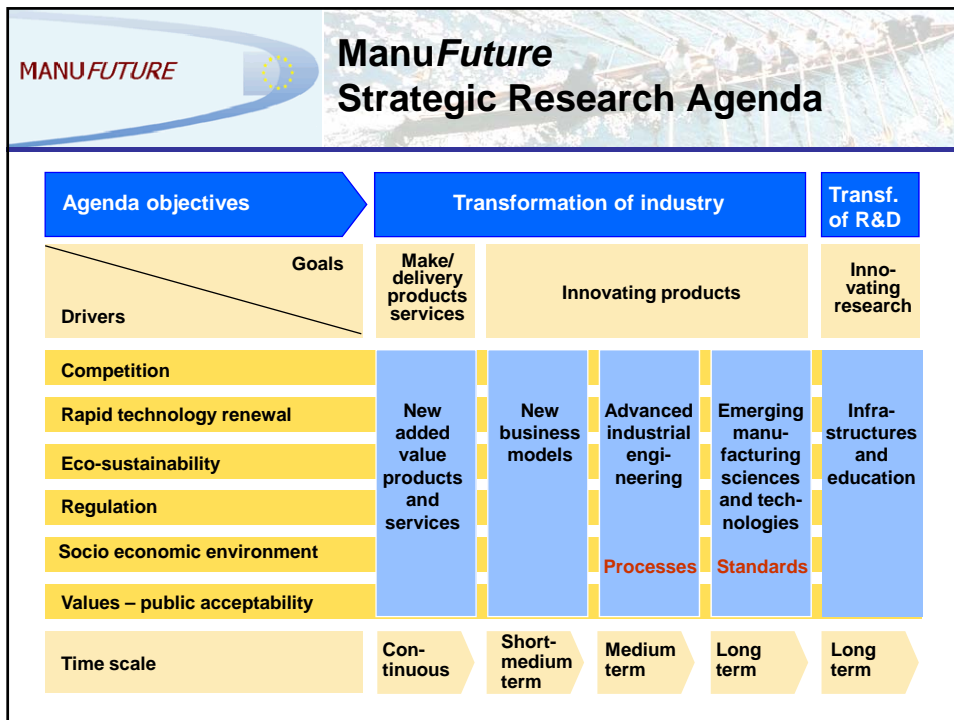
**European ManuFuture Platform**

**Countries National Platforms**

**Regions**

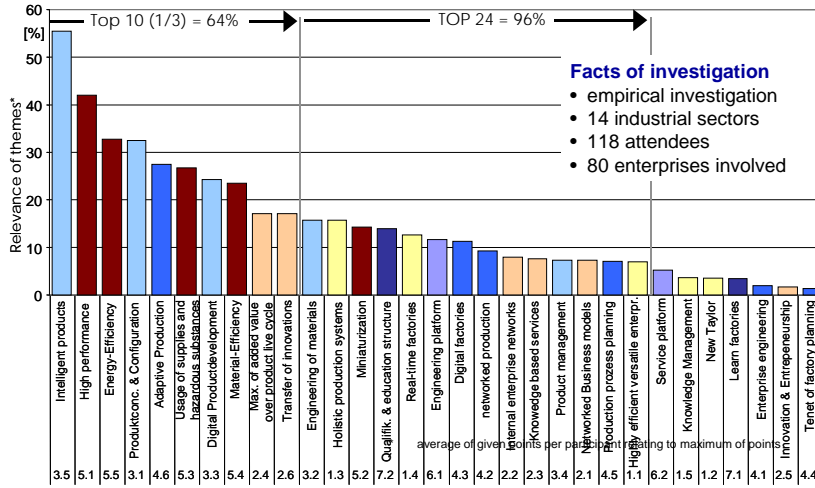




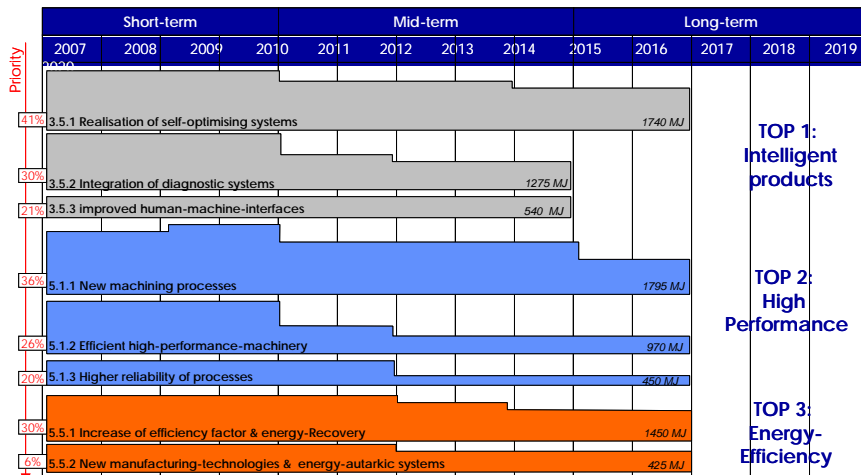


# Machines and Equipment: evaluation of 14 subsectors

## Ranking of themes sorted by relevance

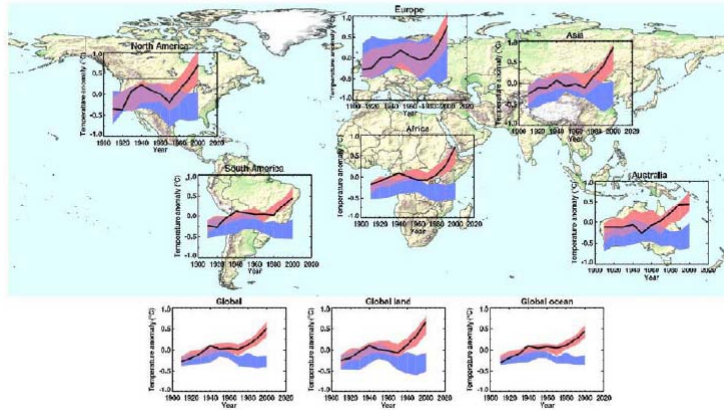


# Machines and Equipment: TOP-Themes 1 to 3

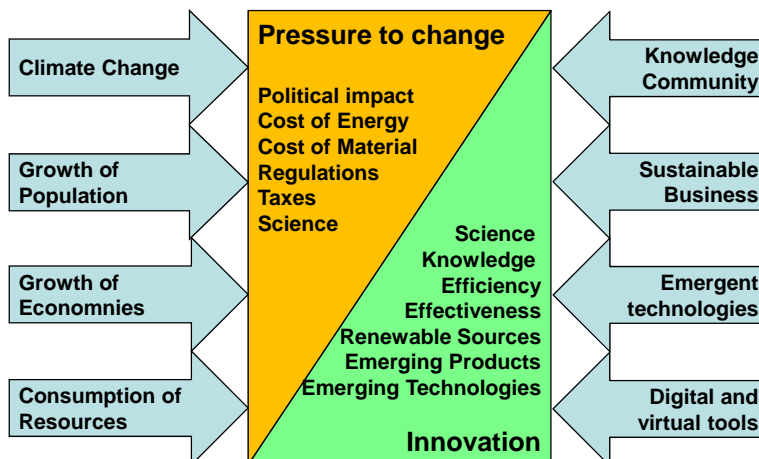


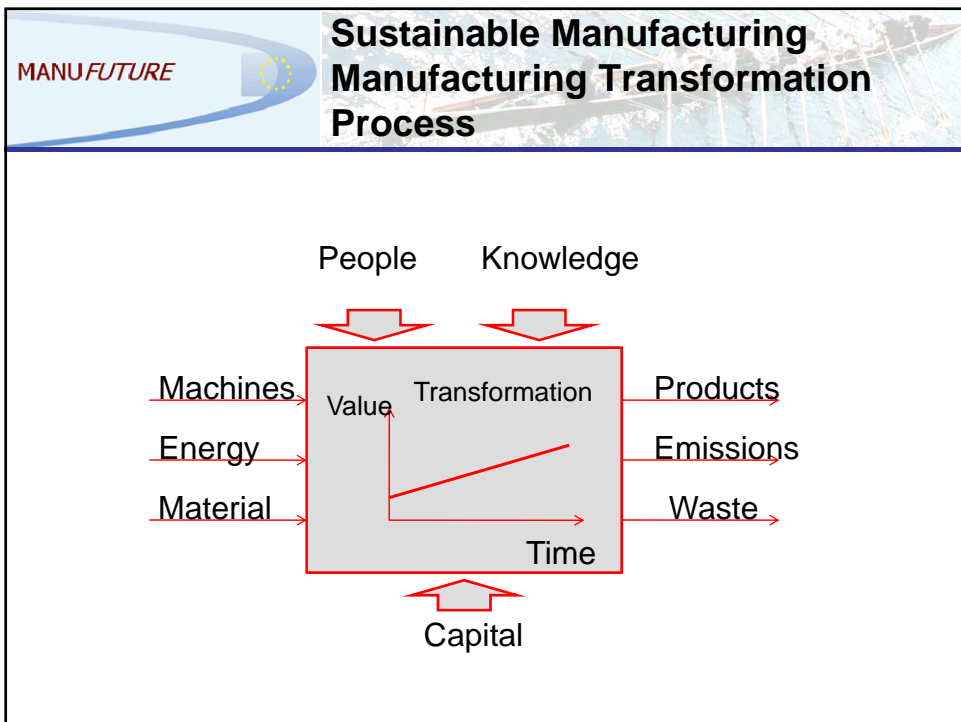
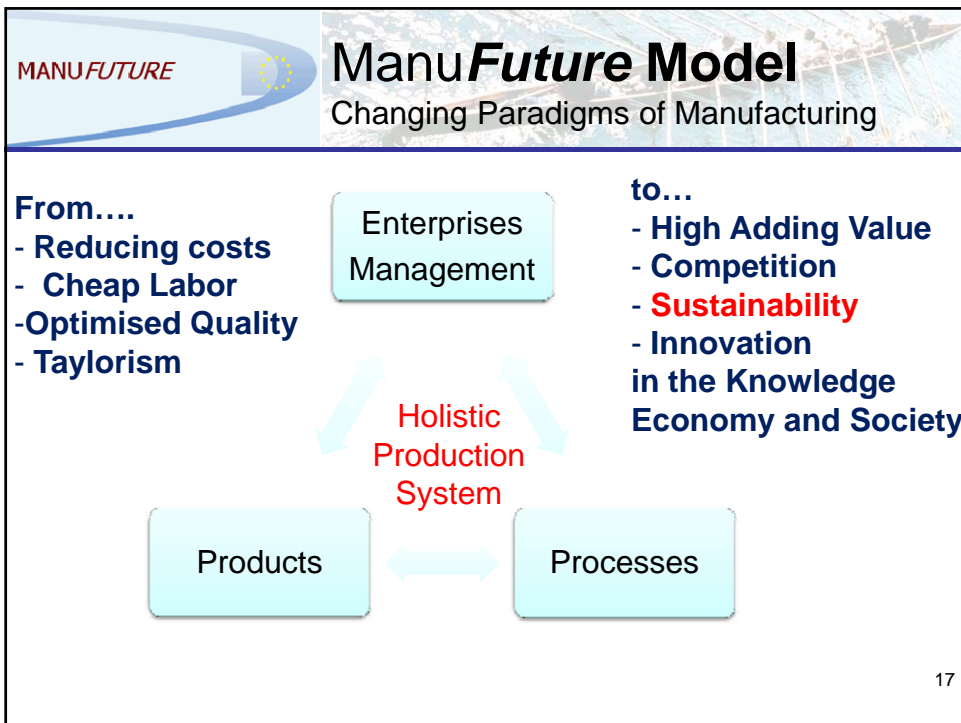


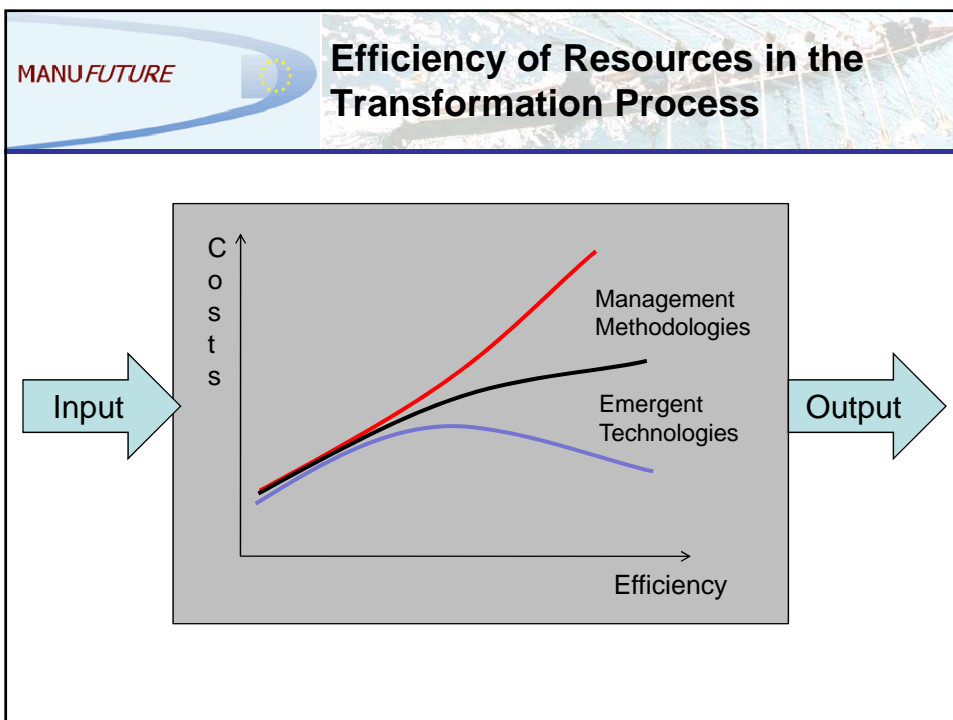
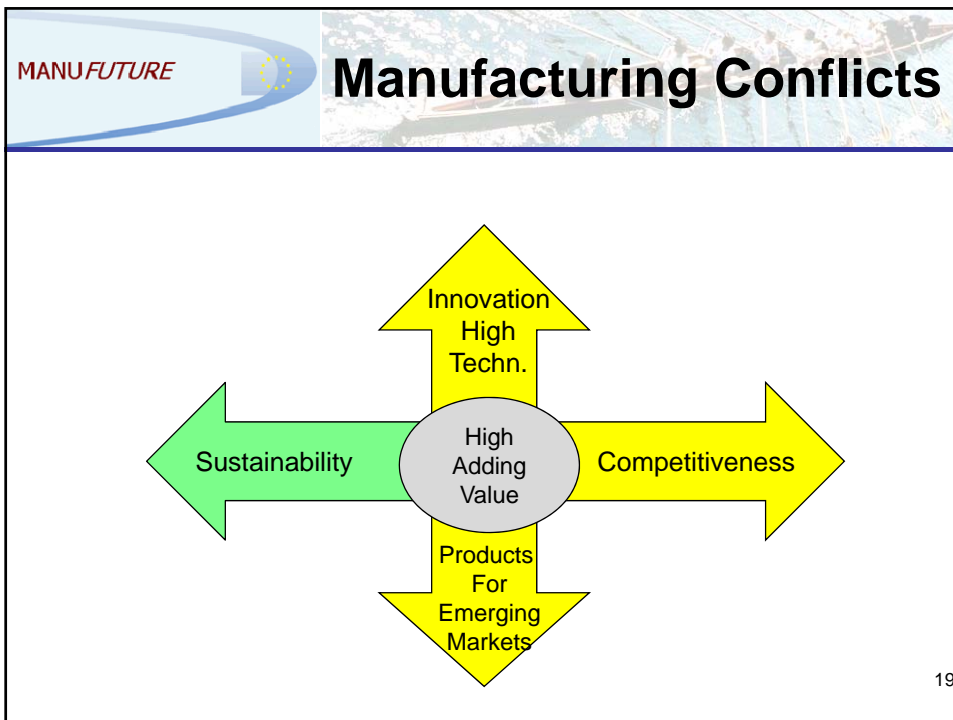
## IPCC 4AR: Temperature Anomalies



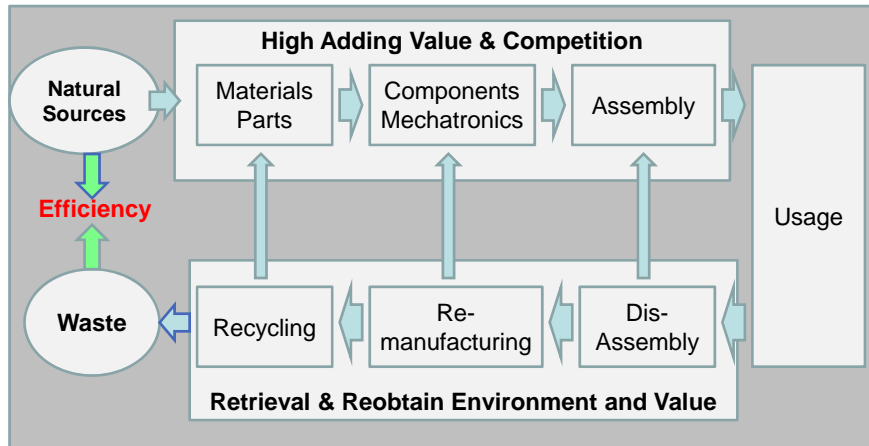
## Sustainability in the Focus of Globalisation





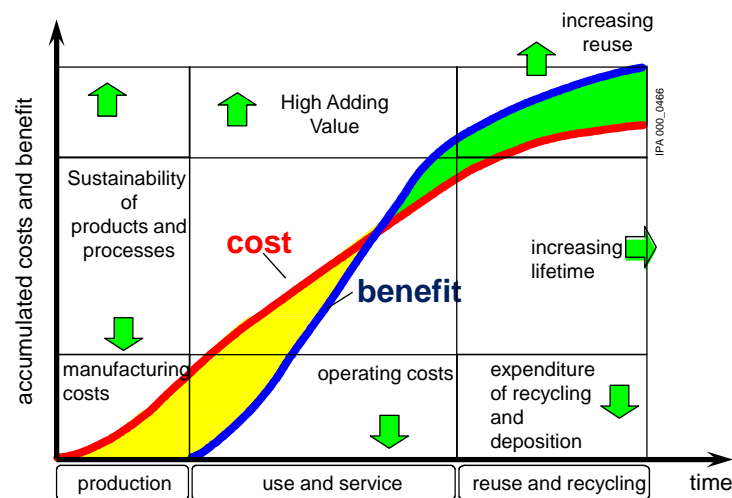


# Life Cycle approach

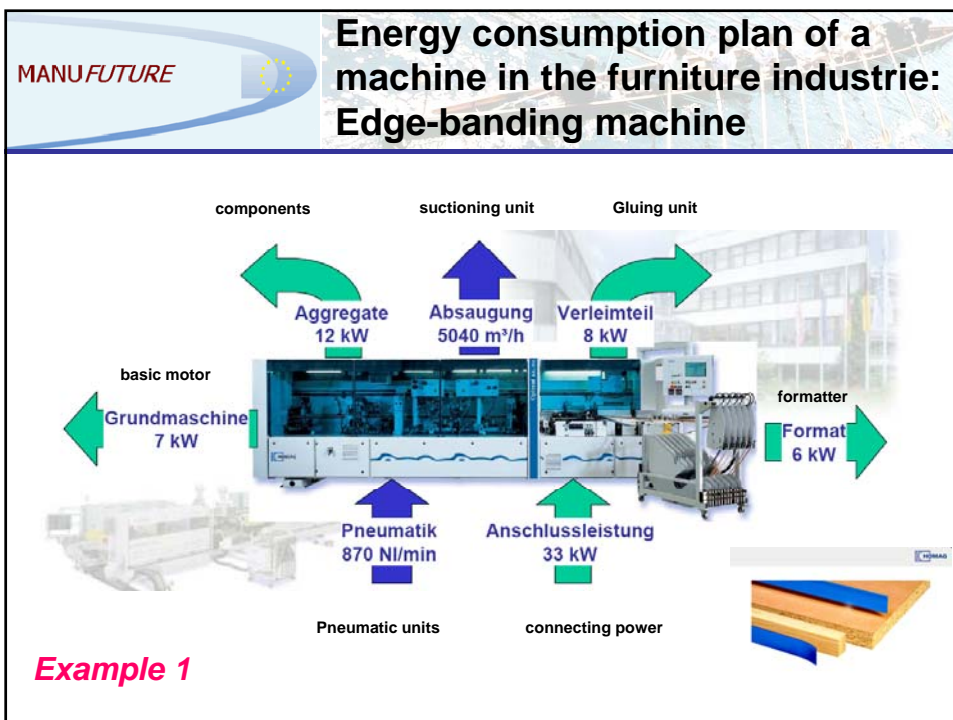
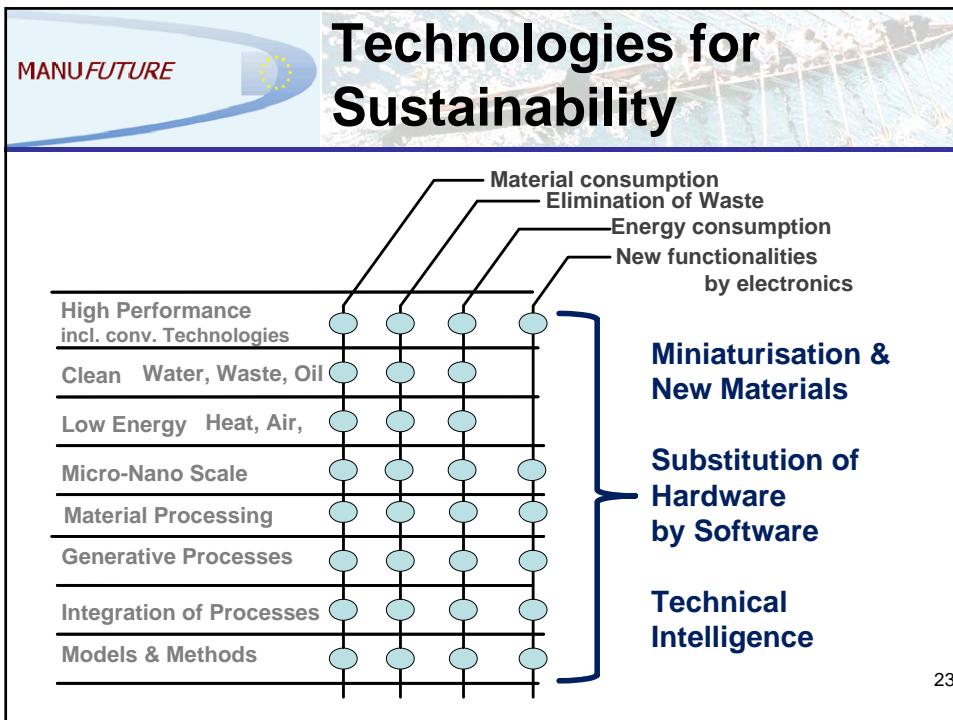


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# Strategies in the Life Cycle



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## Solutions for increasing energy efficiency of a machine

- optimizing the structure of the machine
  - lightweight construction: reducing the weight of moving parts (sparing 28 % of weight through new materials / metallic foam)
  - increase the efficiency of the propulsion tecnic
  - condensation of functions in the mechatronic modules
  - decentralization
- optimizing and substitution of processes
- optimizing the energy consumption of auxiliary functions
- new systems-, equipments-, machine- and component concepts



## Sustainability of a whole company

### Workshop 4

#### Presentation of Kärcher

Sustainability at Kärcher has a long tradition and is based on three pillars:

- Economy (main purpose of a company is to survive and to grow)
- Enviromental issues (good feeling to the enviroment)
- Social issues (what can we do for our employees and what can they do for us and the environment)

Kärcher actually building up its own Corporate Social Responsibility System (CSR) which mainly focus on the enviromental and social issues.



**KÄRCHER**

### Example 2





## Sustainability of a whole company

### Workshop 4

#### Presentation of Kärcher

##### Examples of the Kärcher sustainability system

- Water recycling system (saving of 90.000 m<sup>3</sup> water / year, which means about 350.000 € / year -> ROI = 1,5 years)
- Environmental training for each employee once per year
- Seminars about fuel saving driving (up to 30% reduction)
- Environmental friendly to work (support of public transportation and alternative transportation, e.g. bicycle)
- Environmental checklists for each product
- Yearly updated environmental targets and projects



## Sustainable Manufacturing

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





## Factories for Emerging Products and Technologies



### Factories of Emotions

- Customers
- Humans

### Clean Factories

- Environmental

### Transformable Factories

- Adaptive / Modular
- Configurable

### Factories for Sustainability

- Renewable Energy (Solar, Fuel Cells, Hybrids...)
- Emerging products
- Emerging Technologies

### Low Cost Factories

- Lean, efficient

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## Actions proposed in the ManuFuture Roadmap

### Integration of Sustainability in the European Production System

<ul style="list-style-type: none"> <li>- Survival Strategies</li> <li>- Beyond Lean</li> <li>- New Taylorism</li> </ul> <ul style="list-style-type: none"> <li>• Networking in Manufacturing                             <ul style="list-style-type: none"> <li>- Supply chains</li> <li>- Real time Visibility</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Environment</li> <li>- Energy, Material</li> </ul> <ul style="list-style-type: none"> <li>• Adaptive Manufacturing                             <ul style="list-style-type: none"> <li>- Komponenten</li> <li>- Machines</li> <li>- Systems</li> </ul> </li> </ul>
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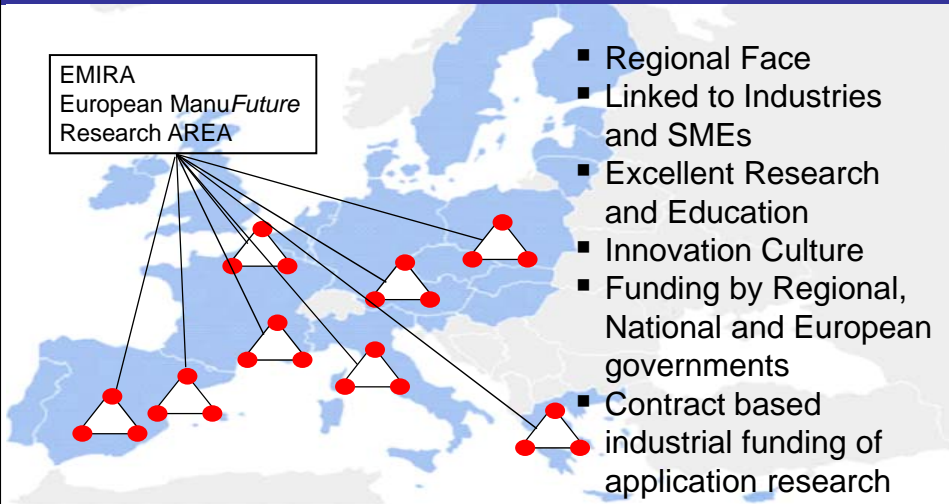
Eco-Design LCC LCA	Digital Engineering Digital Products	Intelligent (Emerging) Products	ICT for Manufacturing Learning
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# Regional K-Triangles

EMIRA  
European ManuFuture  
Research AREA



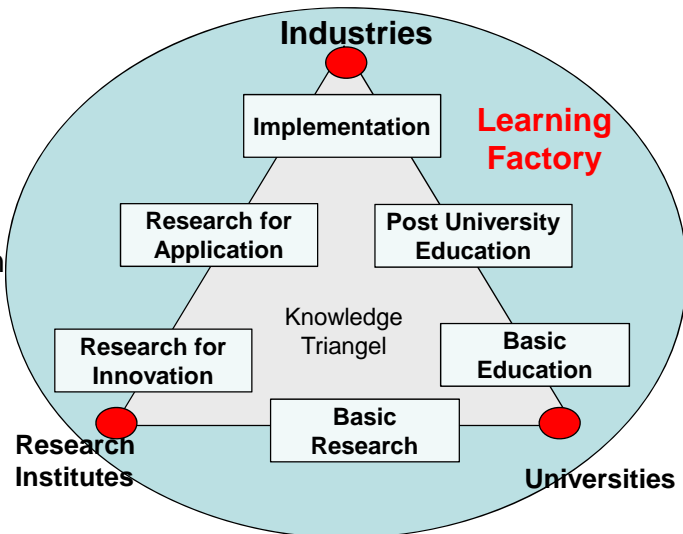
- Regional Face
- Linked to Industries and SMEs
- Excellent Research and Education
- Innovation Culture
- Funding by Regional, National and European governments
- Contract based industrial funding of application research

## The European Way of Innovation in Manufacturing



# ManuFuture Knowledge Triangle

Synergetic Research  
Dual Education  
Regional Orientation





## Conclusions

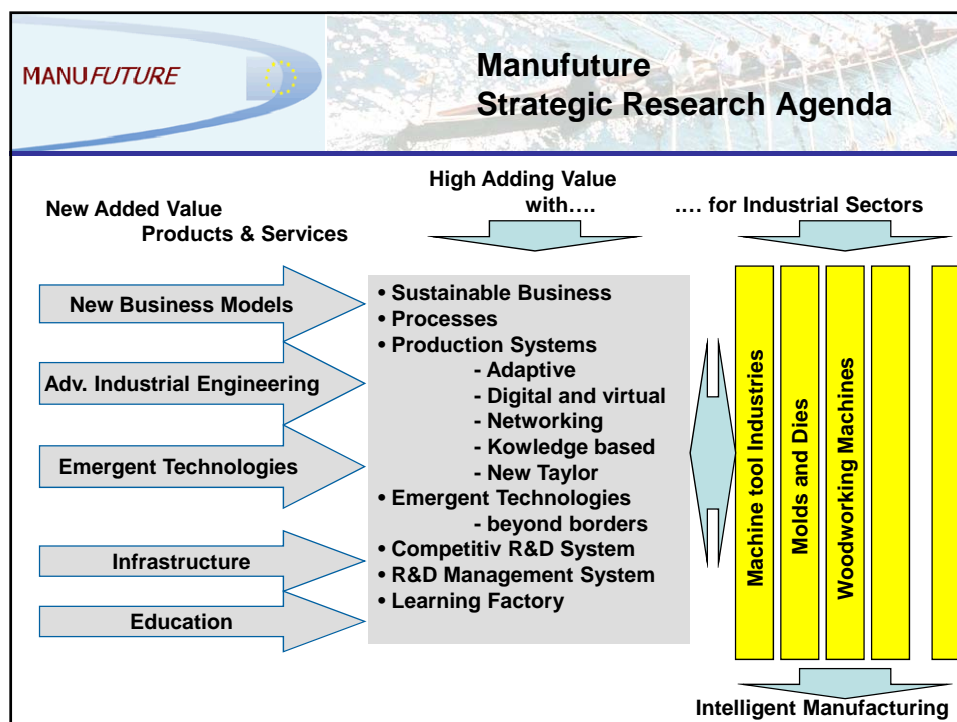


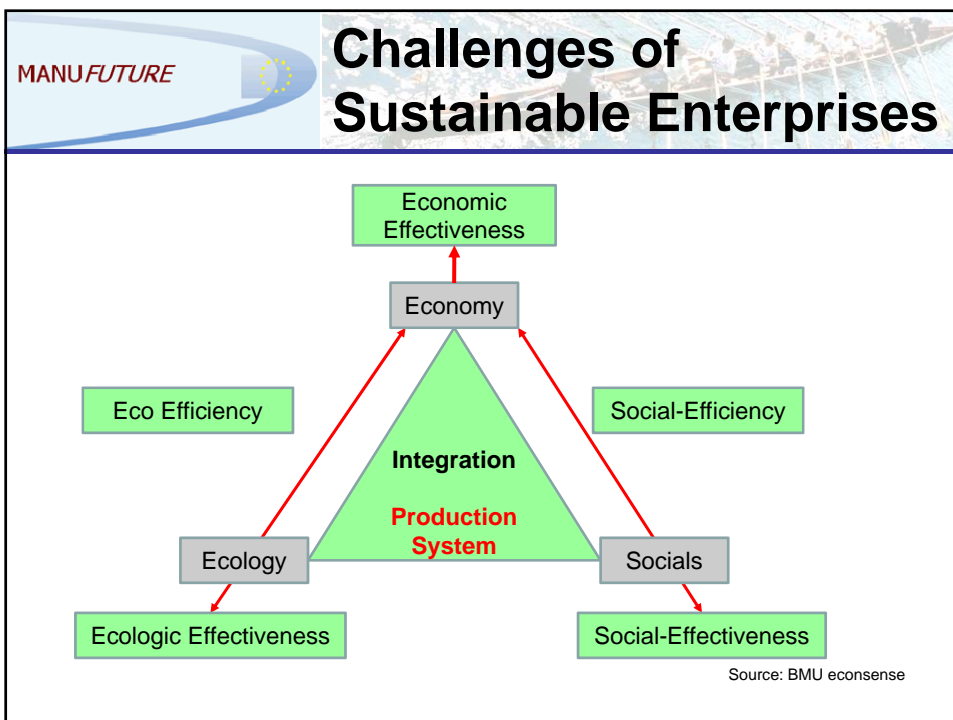
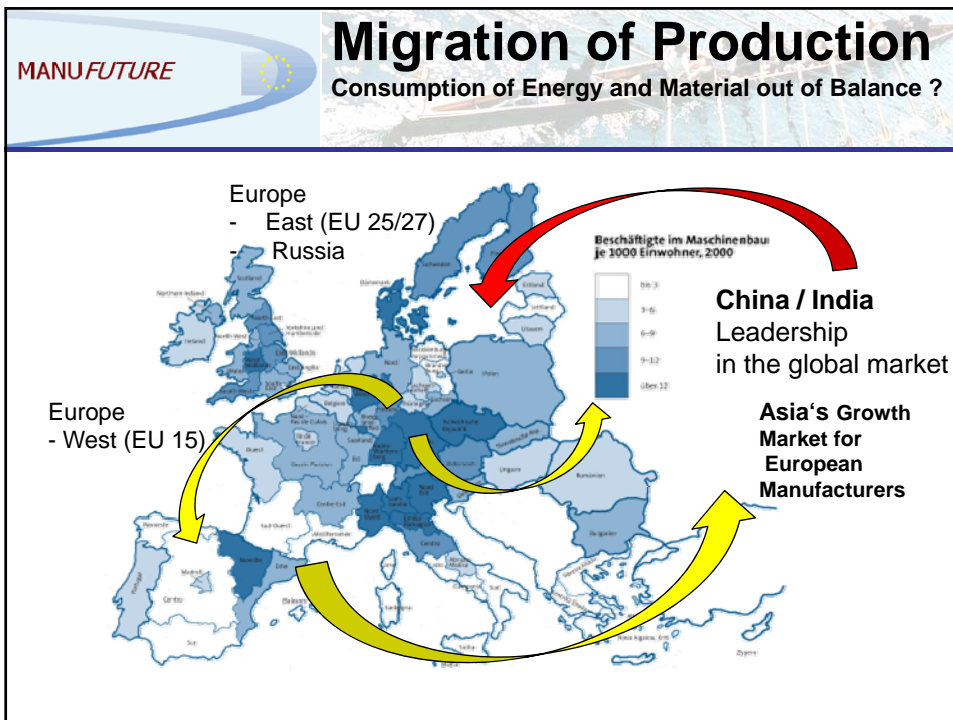
- The pressure to change Manufacturing towards competition and sustainability increases and opens new areas of Innovation
- Research for Manufacturing is essential to transform European Manufacturing
- The *ManuFuture* Platform is oriented to create **High Added Value** in many sectors of industries
- The *ManuFuture* Road defined proactive actions:
  - European Production System
  - Sustainable Business
  - Intelligent (Emerging) products
  - Efficiency of resources (Emergent Technologies)

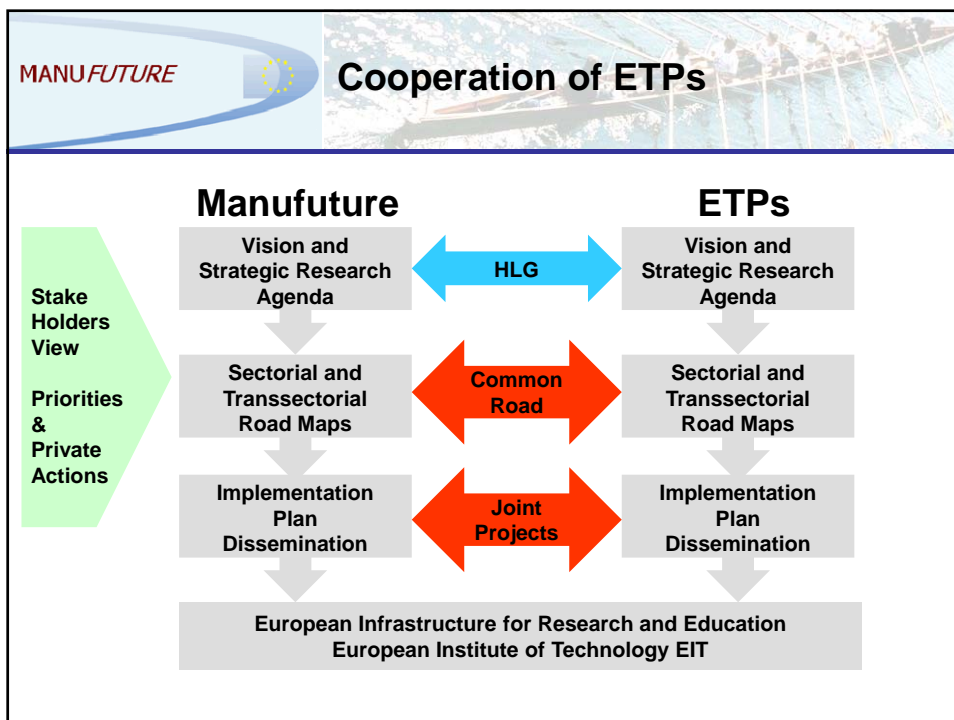
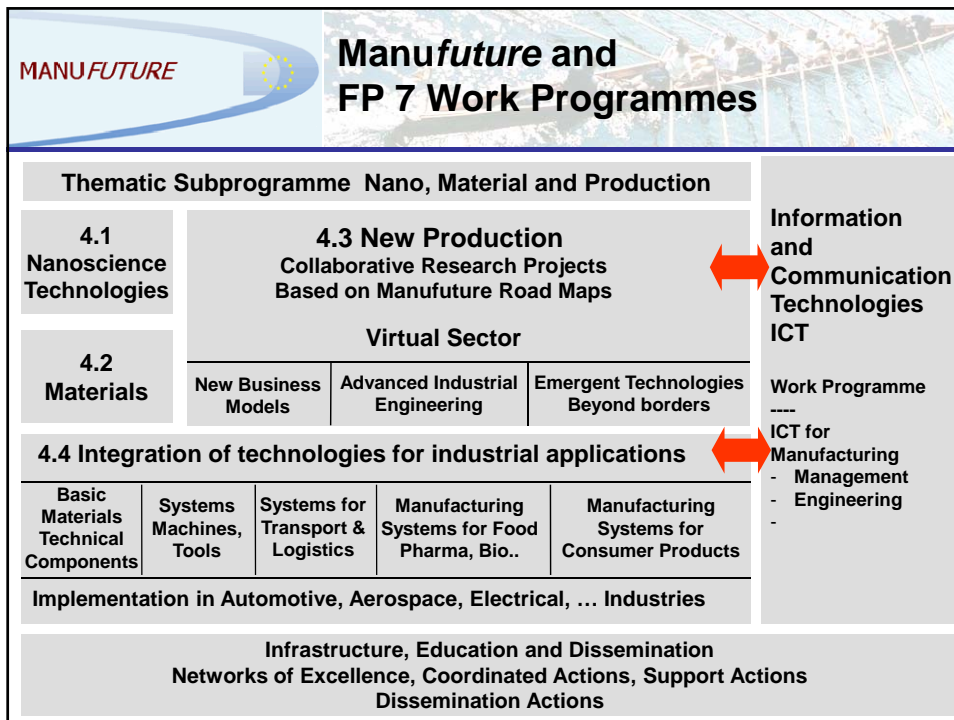


**MANUFUTURE**  **Sustainable Manufacturing**

- The Pressure to change Manufacturing towards Competition and Sustainability increases and opens new areas of Innovation
- Research for Manufacturing is essential to transform European Manufacturing
- The Manufuture Road defined proactive Actions:
  - European Production System
  - Sustainable Business
  - Intelligent (Emerging) products
  - Efficiency of Resources (Emergent Technologies)
- To Fasten the Speed of Diffusion:
  - Knowledge Triangle
  - Learning Factories







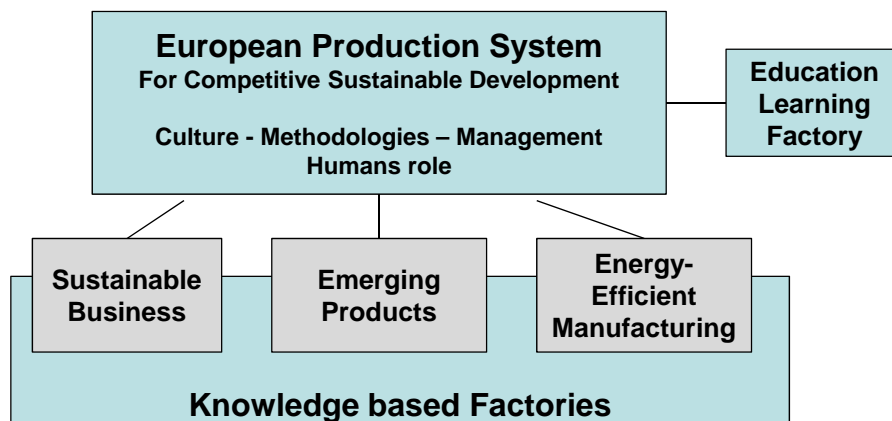
## Definition of Sustainability


The Commission defined [sustainable development](#) as development that "meets the needs of the present without compromising the ability of future generations to meet their own needs."

Sustainability relates to the continuity of [economic](#), [social](#), [institutional](#) and [environmental](#) aspects of human society, as well as the non-human environment.

Go Harlem Brundtland

## Actions for Competitive and Sustainable Development (Lead Projects)




**MANUFUTURE**  **The Vision of MANUFUTURE**

*The World Champion in Manufacturing:  
all Resources for manufacturing*

**Factories made in Europe....**

- Engineering
- Engineering tools
- Planning
- Planning tools
- Machines
- Automation
- Systems
- Equipment (tools...)
- Control systems
- Methods
- Process-Models
- Management
- Services: Training, Finance..



CIAM-MBB-Augsburg 1980

**....the R&D Focus on**


- Adaptive
- Digital
- Networked
- Knowledge based
- High Performance
- New Taylorism

**... with R&D Networks**

- Virtual Research labs
- Basic Research
- Application oriented Research
- Regional Centers

**...over the life cycle**                      **...enable Platforms of Manufacturing**

**Factories made in Europe with european Manufacturing Standards**

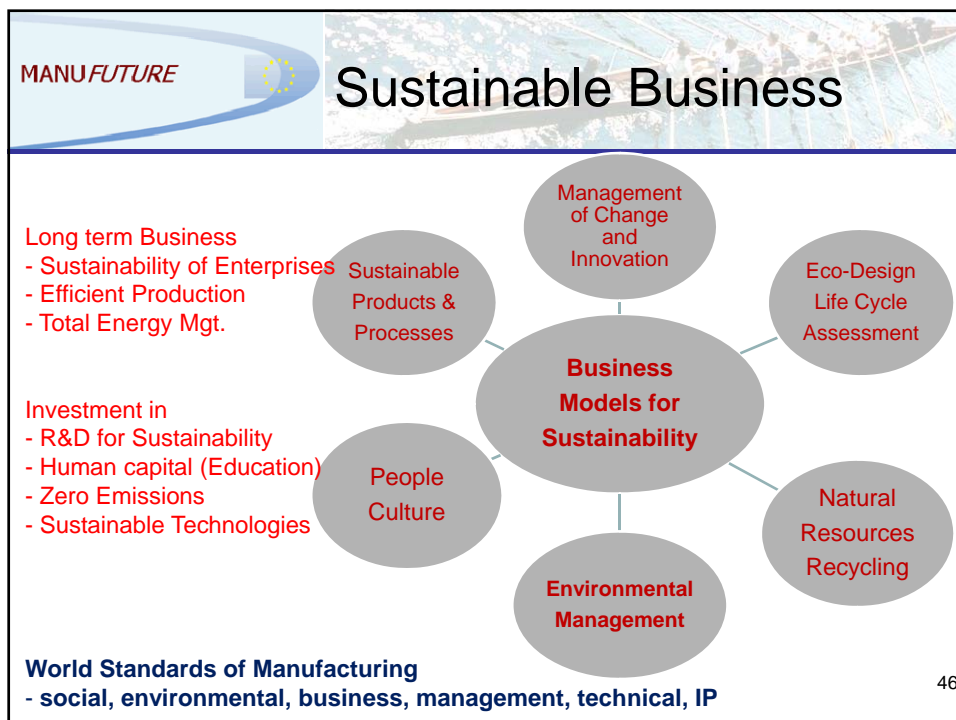
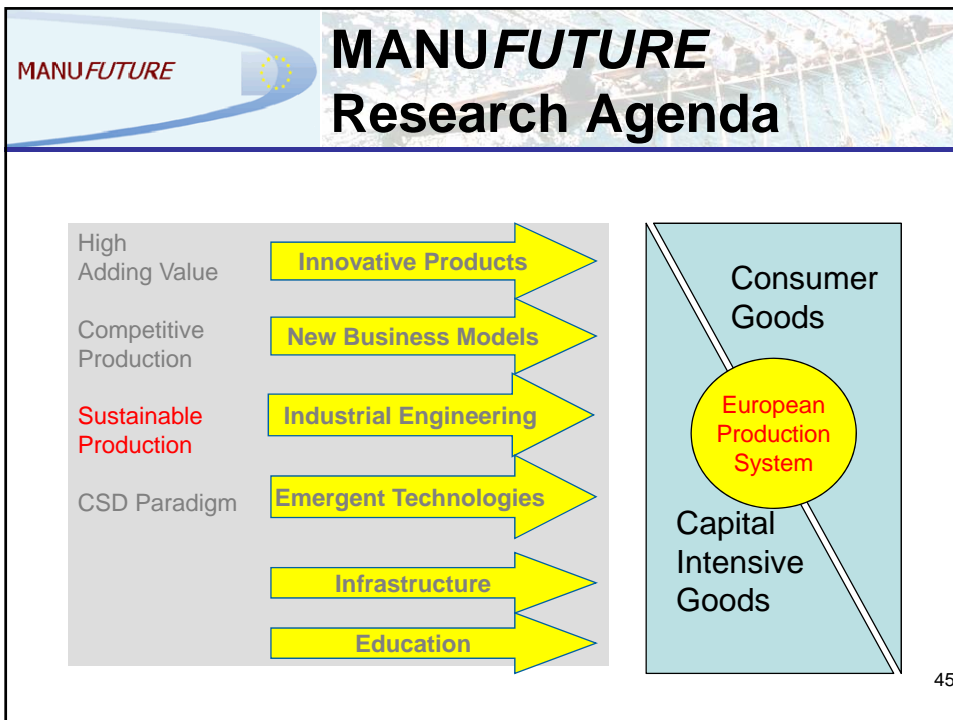
**MANUFUTURE**  **The manufuture way**

**Strategy: World Market for Factories, Machinery and Equipment  
New Business Models in the Product Life Cycle**

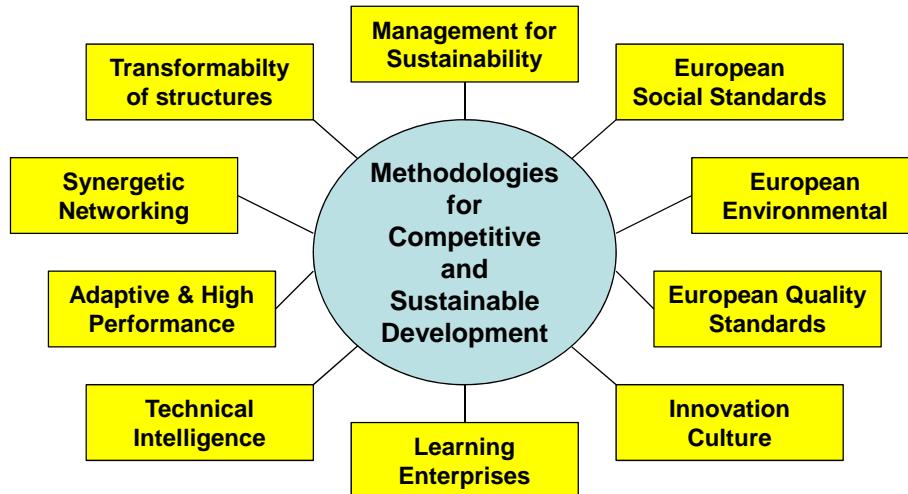
Technologies beyond borders	Digital and Virtual Engineering	Intelligent Manufacturing Systems	Organisation Methods and Systems
<b>High Performance</b> - performance, quality, time, costs <b>Resources</b> - Energy, Air, water, materials	<b>Digital Factory</b> Engineering tools Simulation - Processes, - Logistics	adaptive configurable Knowledge integrated networked New Taylorism	<b>Business Models</b> ERP Models Control and supervision systems Cycle Mgt Services

**European Manufacturing Standards**

Technologies	Engineering Platform	Manufacturing Systems	Management
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## Lead Project: European Production System



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## L2L Conference 2007 From Leipzig to Lisbon

### Potocnic:

Sustainability is all about connections. For example:

- We cannot talk about environmental sustainability without considering energy.
- We cannot reform energy without looking at transport and industry.
- We cannot make changes to transport and industry without considering the effects on jobs and growth.

If the issues and challenges for sustainability are interconnected, our response must be too. We can no longer pretend that it is more important which institution, which discipline, which sector, or even which country finds solutions. Research is internationalised and so must be its answers.

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