



Globalisation, technology and sustainable development

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***10th RSHM International Network of Schools Conference
Porto, Colégio do Rosário, 29th June 29, 2009***



Factories are Products *Made in Europe* and used in the world

Brasil is the food supplier

Russia is the gas station

India is the administration

China is the factory

USA is a bit of all
+ technology
leader

Europe is the factory of factories + design / fashion





Manufacturing: a European Impact

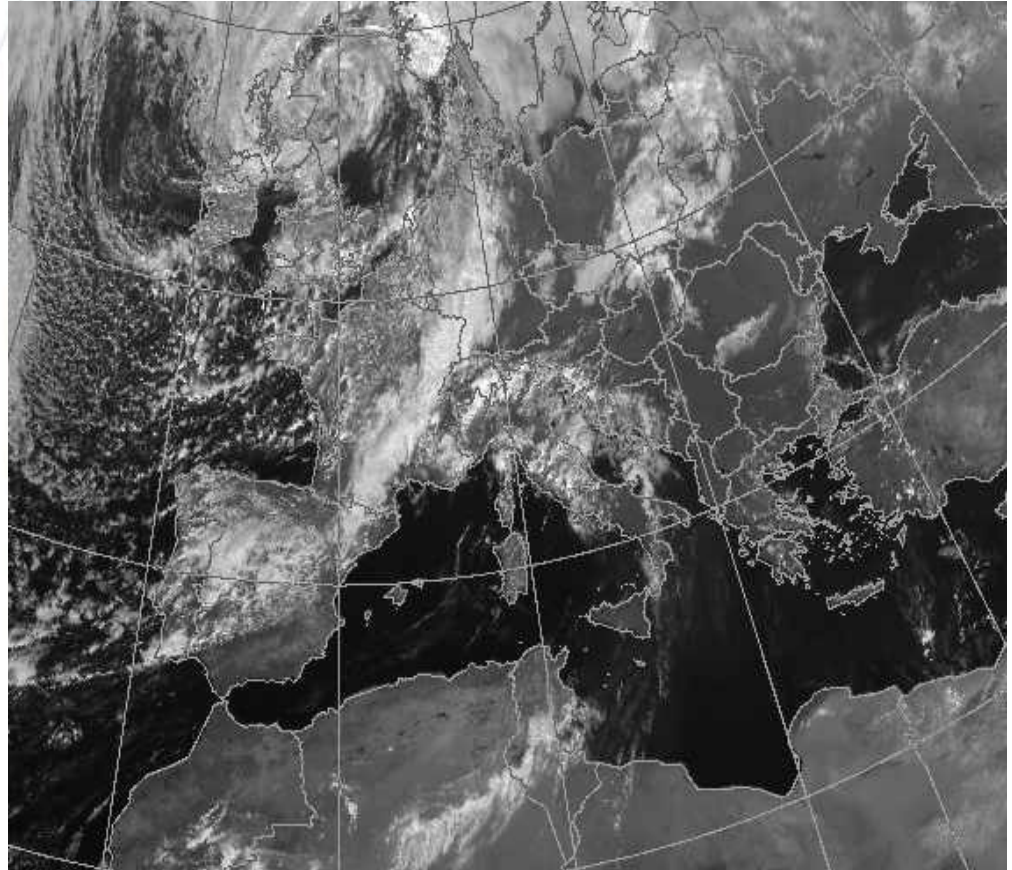
Manufacturing related activity counts:

75% of EU GDP

70% of Employment

18% of global international trade

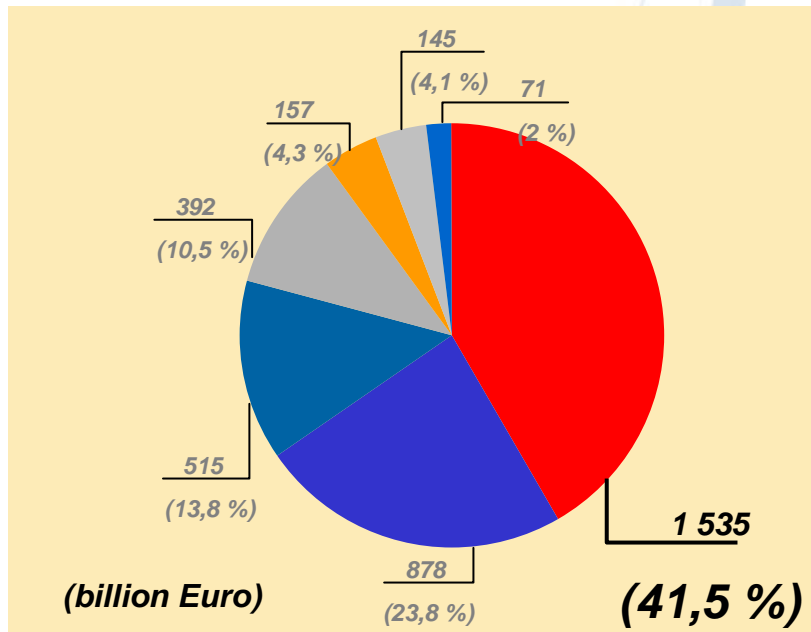
2.5 million enterprises of which 99% are SMEs



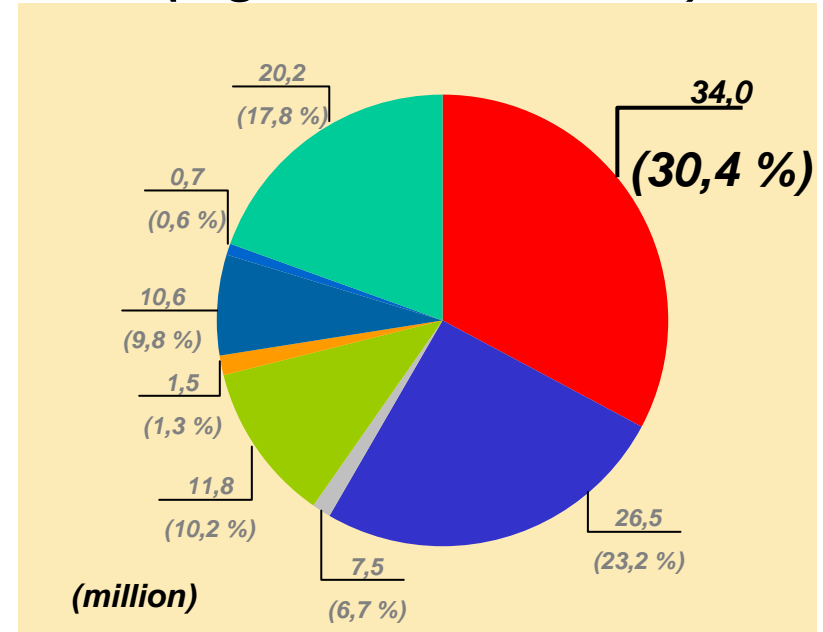


High Adding Value RTD for Manufacturing

Value Added



Jobs (1 generates another)



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



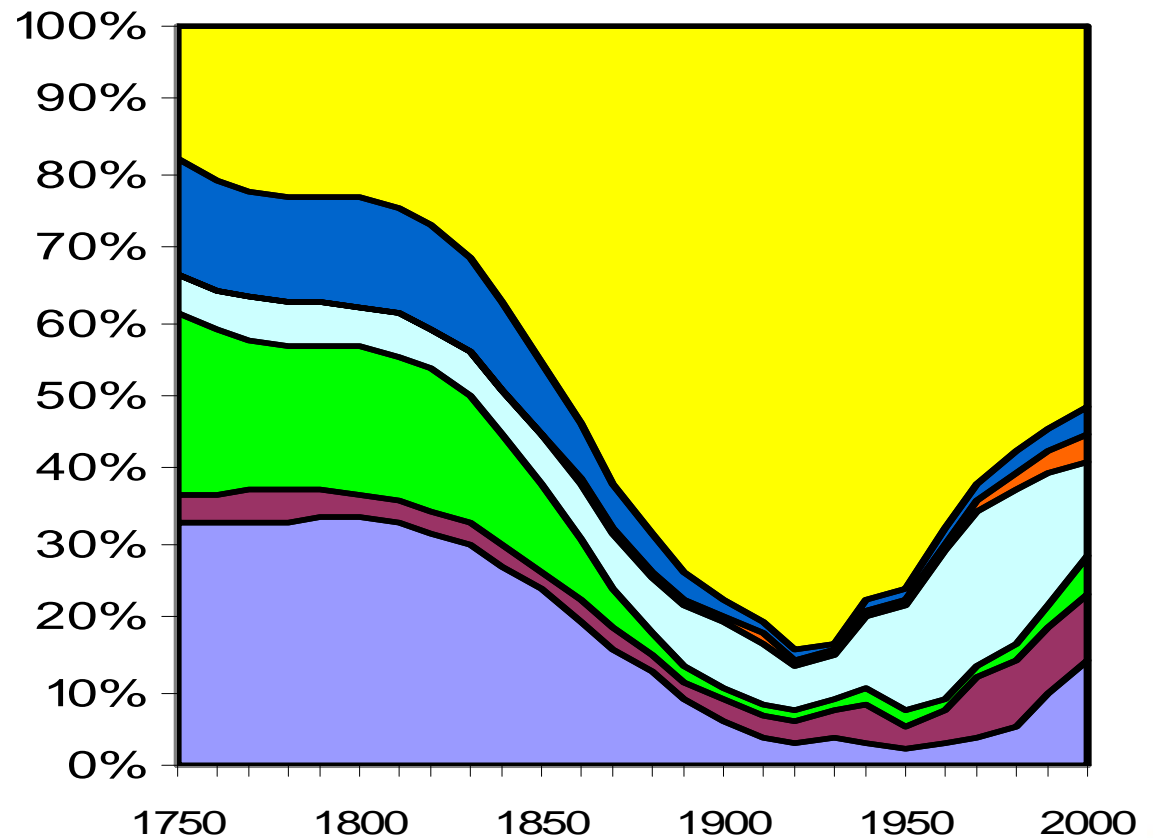
Changes in the Contribution to Global Output

Source:

Mitchell Tseng, CIRP

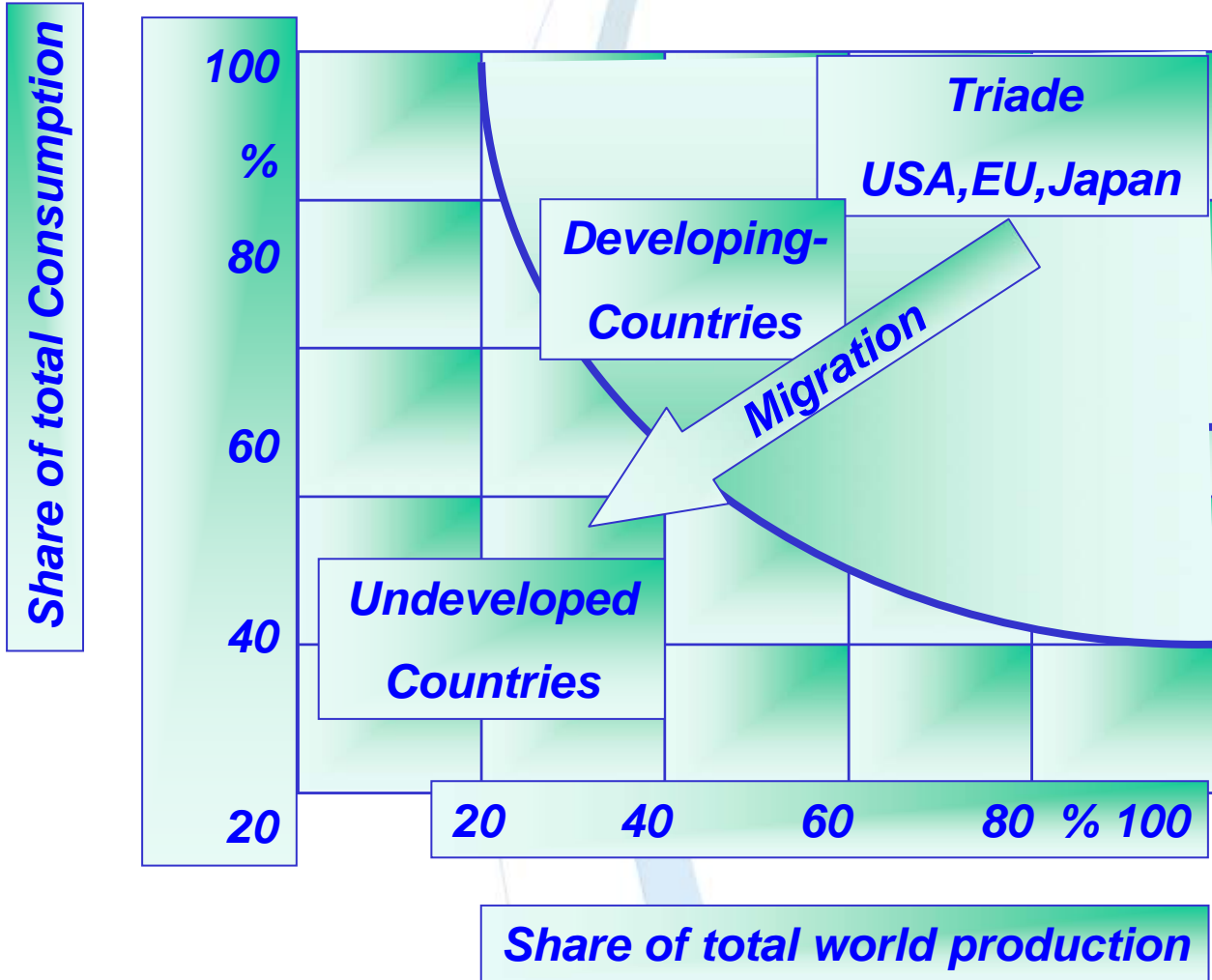
Shares of World Manufacturing Output by Civilization or Country, 1750-2000 (in percentages. World=100%)

- West
- Other s
- Brazil & Mexico
- Russia/ USSR
- India/ Pakistan
- Japan
- China



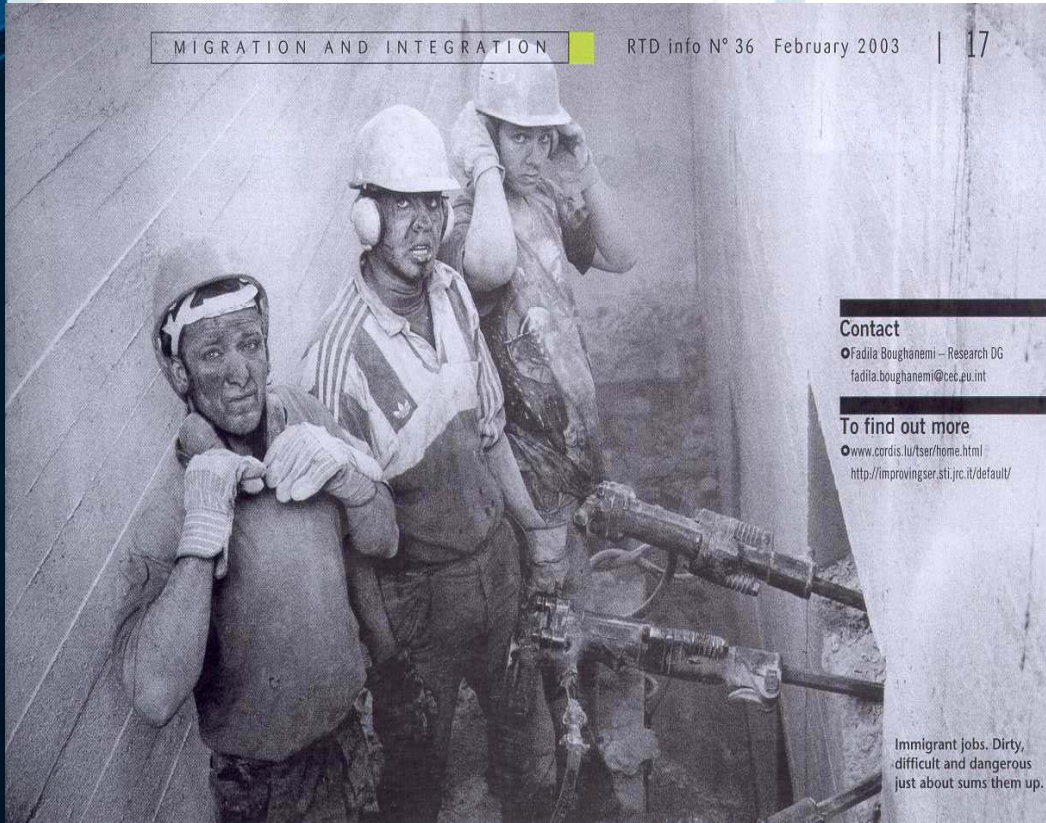


Changes in Production and consumption





EU Manufacturing under pressure

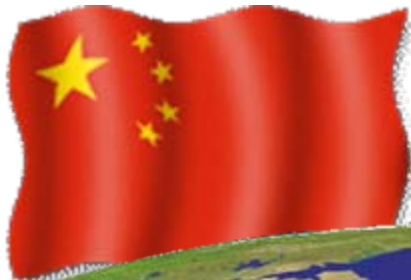


Migration of manufacturing activities to lower wage economies

Deindustrialisation accompanied by loss of productive employment and R&D capability



Challenges for European Manufacturing



semiconductor

electronics

cars

machines

steel

software

Globalisation: dynamic context



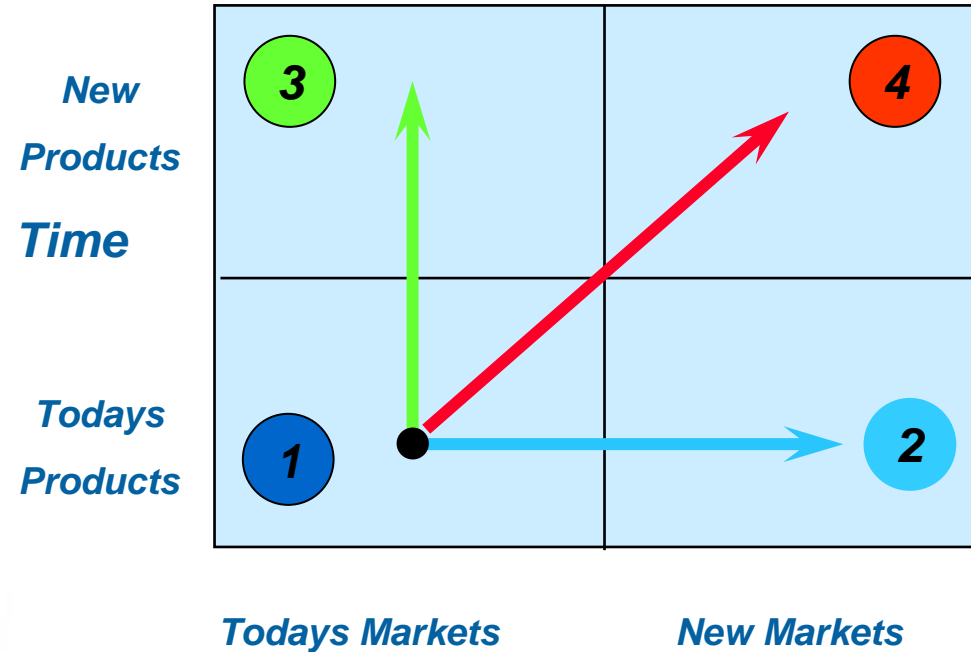
Sustainable wave of change



Research and Technology for High Added Value

\$, €

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



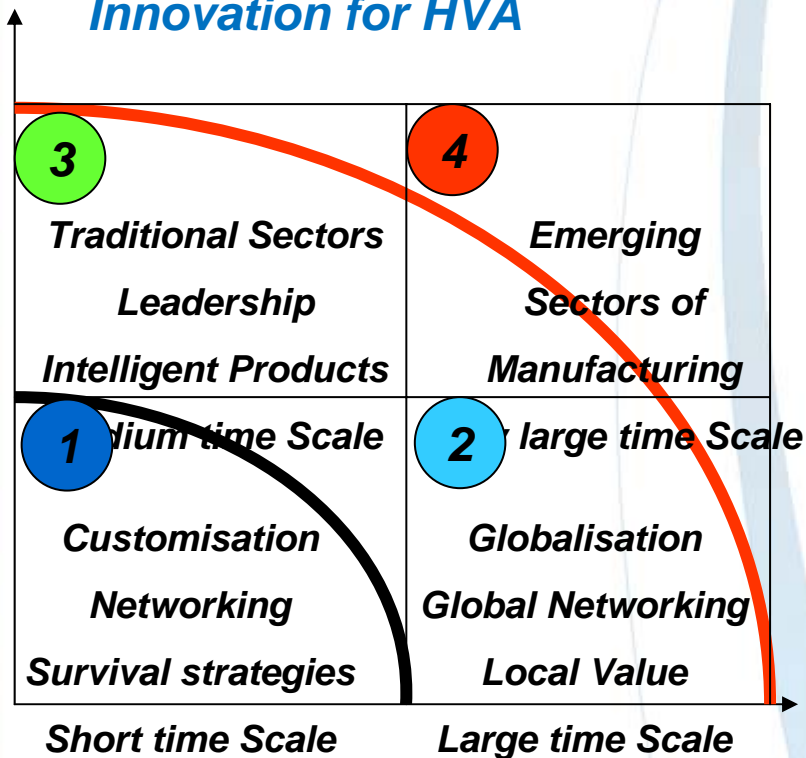
- Knowledge based Manufacturing for competition*
- Leadership in Technologies*
- Environmental friendly and European culture of Manufacturing*



Priorities of Manufuture High Adding Value

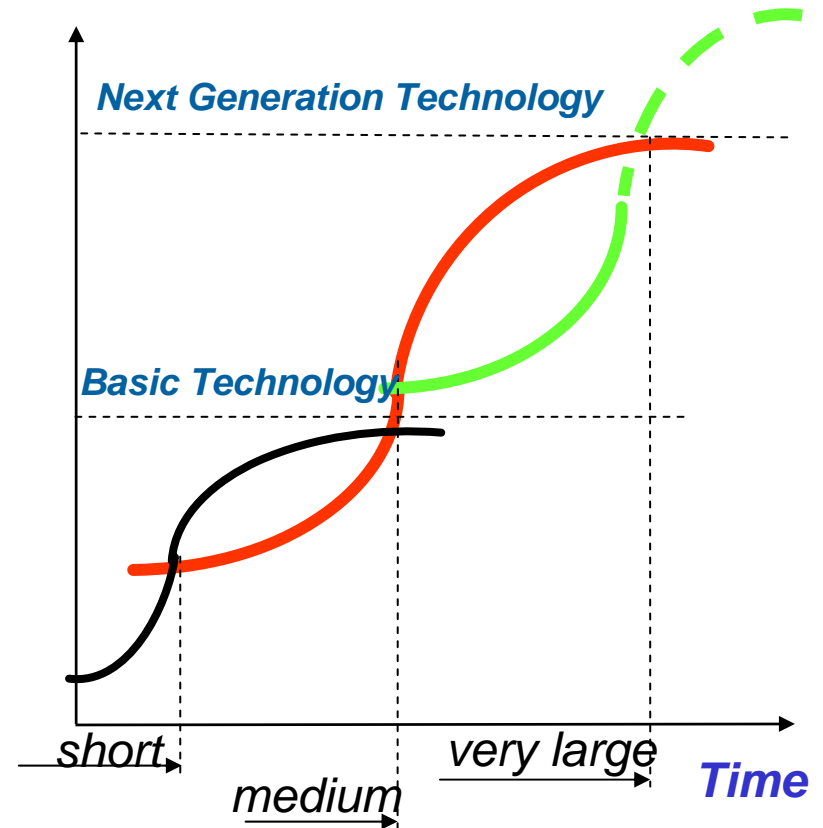
Market View

Innovation for HVA



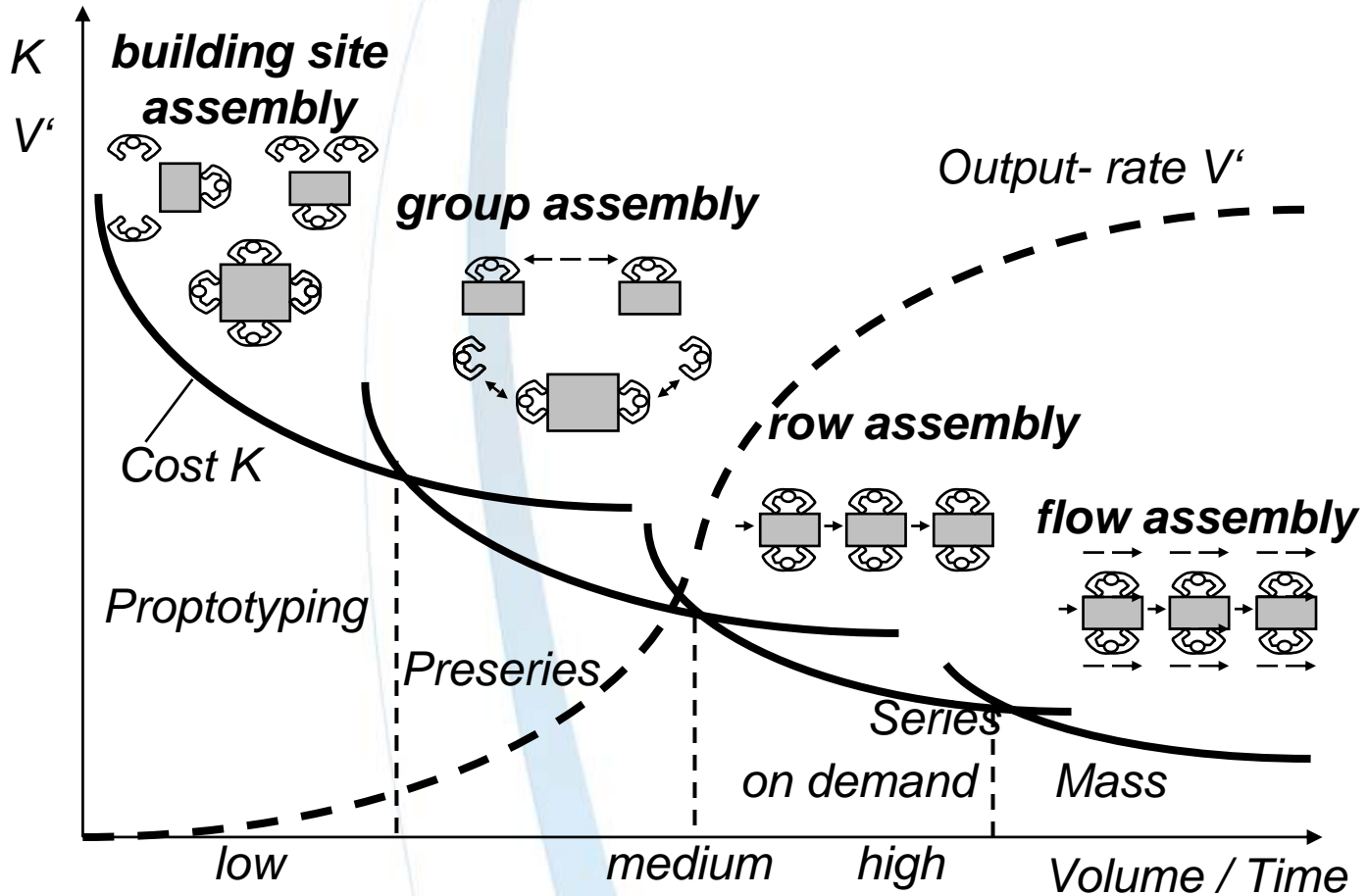
Market and Growth

Technology Life Cycles



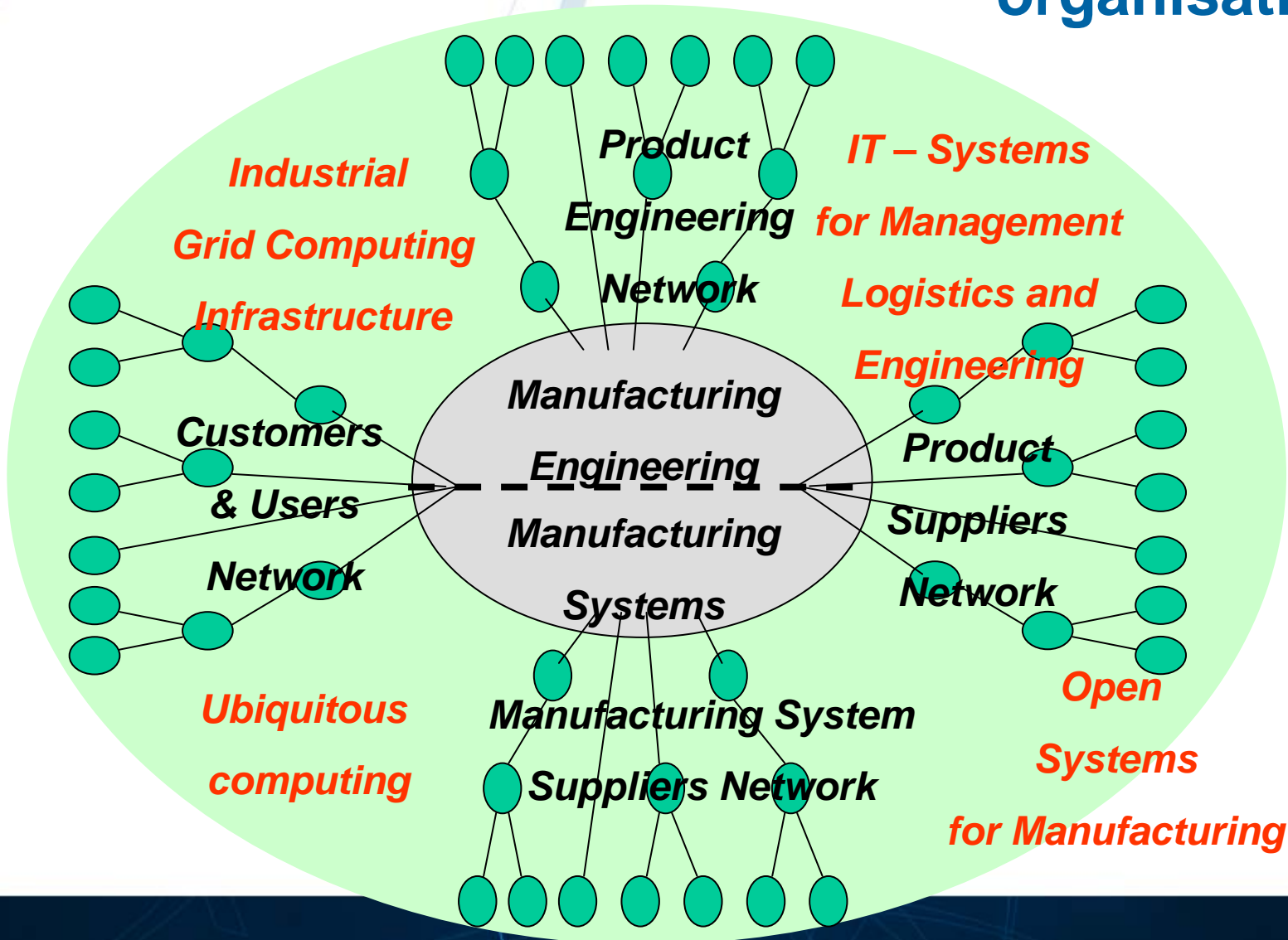


Adaptation of Systems (work+technology) for Changing Volume





Manufacturing Networks: people + technology + organisation

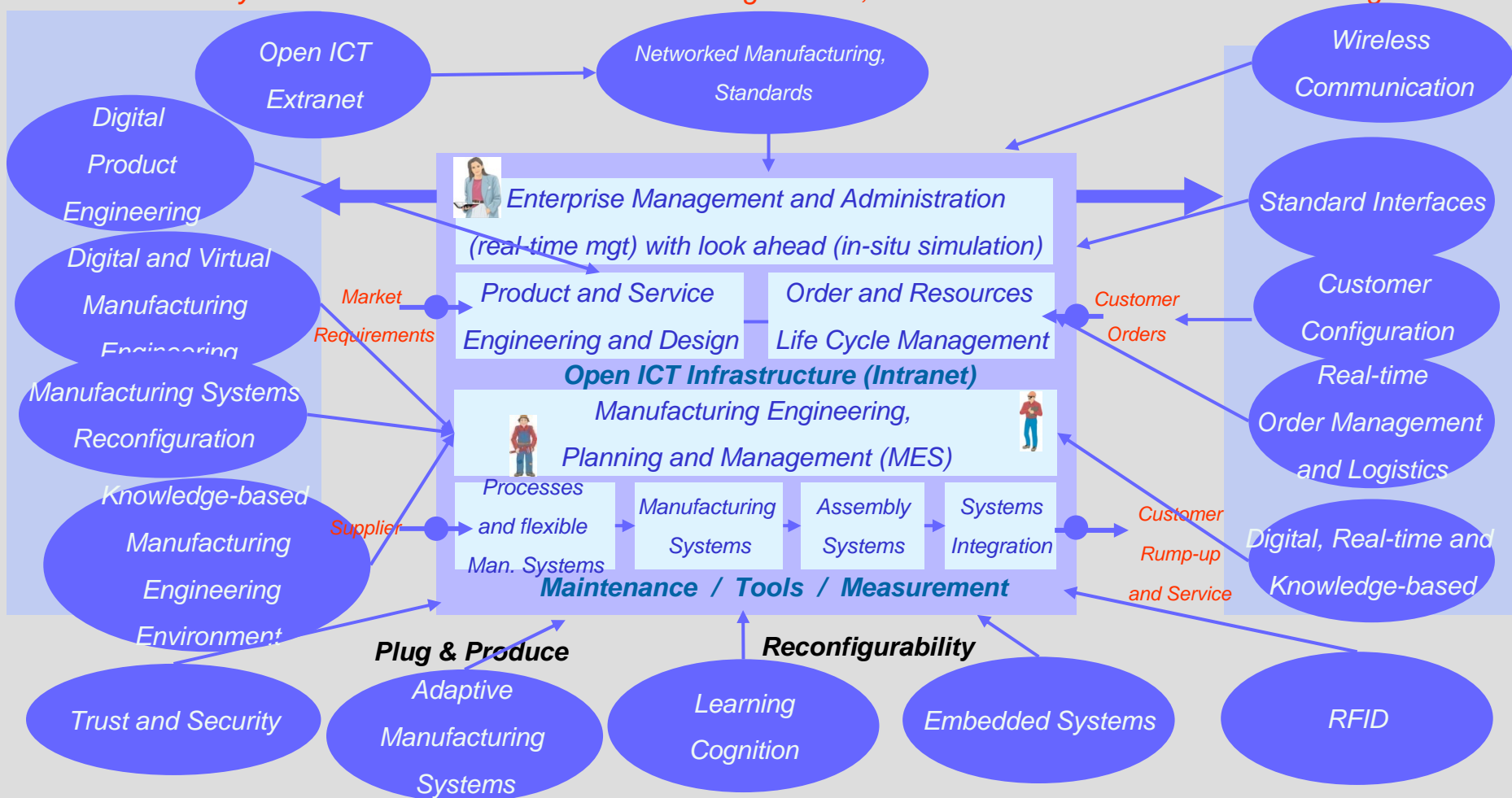




The Knowledge Based Factory ICT Enabled Manufacturing

ICT for MANUFACTURING

on the way from Data-driven Factories to Knowledge-based, Real-time and Networked Manufacturing





Manufacturing: the Future in EU

From the first industrial
revolution to the

*New Global Industrial
Revolution*

New geo-political
conditions (demand/new
opportunities),
concerning **market**,
society, **technology** are
and will be changing
dramatically.

1756 – 1907 – 1956 – 1970 – 1982 -
?



A high-speed sailing race is depicted, with a boat heeling sharply to the right, creating a large splash of white water. The boat's hull is black with the letters 'hi' visible. The sails are white and yellow. In the background, another boat is visible, and the sky is a clear blue. The overall scene conveys a sense of intense competition and dynamic movement.

Transformation
of industry
of the economic infrastructure
of the social tissue

Governance of change



Towards a Knowledge-based manufacturing

ManuFuture



Compete by
REDUCING COSTS

Cheap
labour,
Automation

MANUFACTURING
Research-Innovation based



European industrial sectors

Compete by
HIGH VALUE ADDED

High performance
Customization
New business
models
New human capital

learning

A photograph of a forest with many tall, thin, vertical tree trunks. The ground is covered in green grass. The lighting is soft, suggesting a slightly overcast day or a shaded forest interior.

« The only sustainable competitive advantage is the ability to learn faster than our competitors »

Arie de Geus, formerly of Royal Dutch/Shell



The Growth Paradox

- **Shareholders and markets put a continuous pressure on management for continuous company growth**
 - modest growth is penalized
 - fast growth is rewarded, even if an illusion
- **Growth through mergers and acquisitions**
 - fast but risky



The Growth Paradox

- **High-tech high-growth businesses appeal**
 - suggest differentiation, sophistication, high quality
 - global markets and businesses
 - highly competitive
 - uninterrupted spirals of lucrative growth
- **Chemistry, pharma, semiconductor**
- **Consumer electronics, automotive, aerospace**



TABLE 1 - 1

Portion of Selected Firms' Market Value That Was Based on Expected Returns from New Investments on August 21, 2002

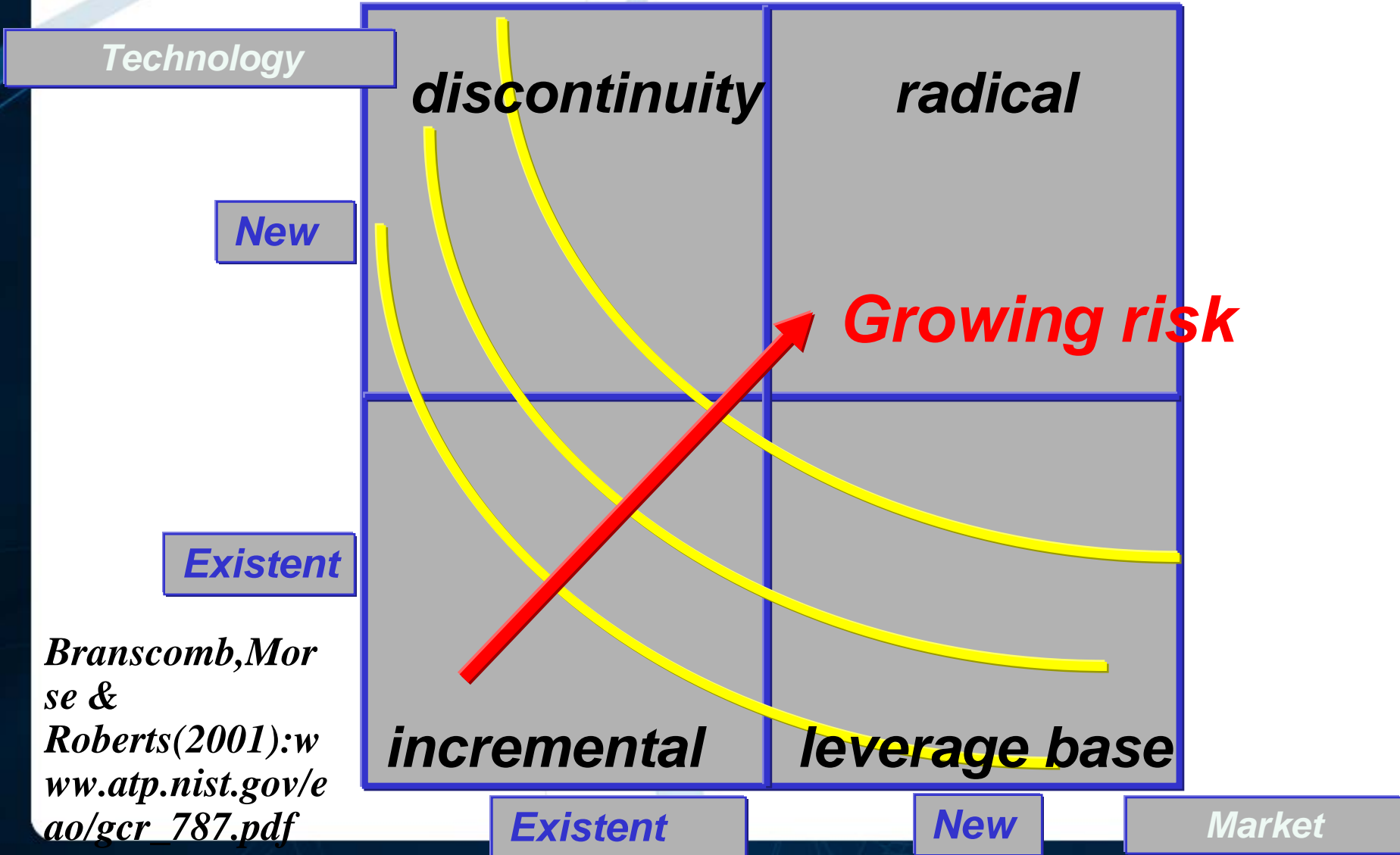
Fortune 500 rank	Company Name	Share Price	Percent of Valuation That Was Based on:	
			New Investments	Existing Assets
53	Dell Computer	\$28.05	78%	22%
47	Johnson & Johnson	\$56.20	66%	34%
35	Procter & Gamble	\$90.76	62%	38%
6	General Electric	\$32.80	60%	40%
77	Lockheed Martin	\$62.16	59%	41%
1	Wal-Mart Stores	\$53.88	50%	50%
65	Intel	\$19.15	49%	51%
49	Pfizer	\$34.92	48%	52%
9	IBM	\$81.93	46%	54%
24	Merck	\$53.80	44%	56%
92	Cisco Systems	\$15.00	42%	58%
18	Home Depot	\$33.86	37%	63%
16	Boeing	\$28.36	30%	70%
11	Verizon	\$31.80	21%	79%
22	Kroger	\$22.20	13%	87%
32	Sears Roebuck	\$36.94	8%	92%
37	AOL Time Warner	\$35.00	8%	92%
3	General Motors	\$49.40	5%	95%
81	Phillips Petroleum	\$35.00	3%	97%

Source: CSFB/HOLT; Deloitte Consulting analysis.

- ***Markets value more the future business than the present business***
- ***Managers and investors stimulated to run higher risks***
- ***Story of greed and fear***



Innovation - risks



Branscomb, Morse & Roberts(2001):
www.atp.nist.gov/eaogcr_787.pdf



Sustainability – the European perspective

- **EU has set as goal for 2010 to become the most competitive and dynamic knowledge-based economy in the world, capable of *sustainable growth with more and better jobs and social cohesion***

Lisbon EU Summit, March 2000



Sustainability – the European perspective

- Vision of the European production system in 2010
knowledge and technology, capital, resources and needs are harvested and regulated so that people can live better consuming less material resources and less energy
- Notion of **suficiency** in a service-based economy selling **satisfaction of needs instead of ownership** of products
 - *mobility instead of cars*



Sustainability – the European perspective

- **Sustainability = economic growth + environmental protection + social cohesion**
 - economic growth supports social development but respects the environment
 - social policies generate economic growth
 - environmental policies are economically effective



To Ensure Sustainability

- 1. Break the connections between growth, resource usage and waste**
- 2. Develop and implement an integrated product policy**
- 3. Significantly reduce the GDP growth dependence from transportation costs**
- 4. Reduce gas emissions contributing to greenhouse effect 1% each year up to 2020**
- 5. Eliminate support to production and consumption of fossile fuels by 2010**



To Ensure Sustainability

- 6. Increase the penetration of alternative fuels in cars to 20 % in 2020**
- 7. Ensure that chemical production is harmless for the health or the environment by 2020**
- 8. Promote a more balanced regional development reducing differences in economic activity**
- 9. Increase the average employment rate in Europe and aim at 50 % employment for the age 55-64 in 2010**



The Constraints to Sustainability

1. Globalisation

- . increasingly competitive economic growth
- . constantly changing business environment
- . service-intensive manufacturing and products
- . geo-political factors may limit access to resources and energy



The Constraints to Sustainability

2. Socio-demographic changes

- . European society (workforce) growing old
- . increased social diversity (immigration and enlargement)
- . new products, services, competencies vs new needs
- . importance of work force mobility



The Constraints to Sustainability

3. Environmental Issues

- . Increasing public scrutiny on product and process environmental weight leading to stricter legislation
- . Changes in consumer preferences calling for more ecological materials and products

price elasticity regarding ecological products



The Constraints to Sustainability

4. Social Values

- . Public acceptance of new technologies is crucial

genetically modified foodstuff, genetic engineering, nuclear energy vs renewables to reduce CO2 emissions

- . Security issues may conflict with privacy

IT systems, traceability and remote computing



The Constraints to Sustainability

5. Legislation

- environment, security and privacy under more strict regulation
- European and international legislation on trade, labour market and environment determinant
- uncertainty in share of power and authority in policy implementation among regional, national and European levels



The Constraints to Sustainability

6. Advances in Science and Technology

- novel materials, micro-electronics, information and communication technologies, bio-technology and nano-technology
- new engineering and manufacturing processes radically alter scope and scale of manufacturing, allowing for an enormous variety of product and process innovation
- development of industrial standards and IPR system



Main challenges

– economy, industry, society

- **Sustainable growth in the forthcoming decades calls for the conciliation of**
 - economic development**
 - natural resource and environmental protection**
 - improving quality of life and increasing social cohesion**



Main challenges

– **economy, industry, society**

- **Constraining and determinant factors**
 - **company competitiveness**
 - **advances in science and technology**
 - **legislation and standards**
 - **social values and public opinion**



Main challenges

– economy, industry, society

**it does not only regards politicians
or entrepreneurs**

it regards us all !!!