
EMERGING TECHNOLOGIES

New Skill Needs in the Field of Nanotechnology

Aspects of Technology Management

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Organisation

Nanotechnology and Environmental Technology - Technology Management at Fraunhofer IAO

■ Survey

for the States Baden-Württemberg and Hessen

- *Future potentials of micro- and nanotechnology for environmental technology in Baden-Württemberg, (May 2004)*
- *Application of nanotechnology in environmental technology – Innovation potentials for companies (June 2005)*

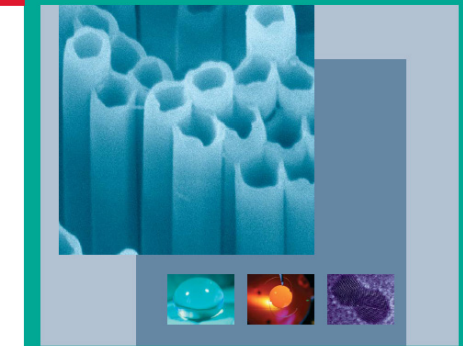
■ Objectives

- *Identifying future potentials for the application*
- *Identifying hot spots of research and industry*
- *Initiating a discussion process on a future strategy*
- *Matching functionalities*

Hessisches Ministerium für Wirtschaft,
Verkehr und Landesentwicklung

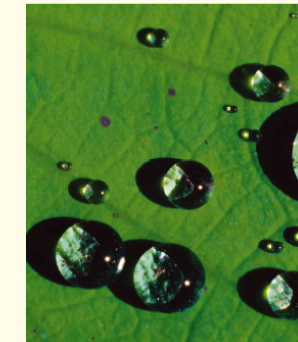


Einsatz von Nanotechnologie in
der hessischen Umwelttechnologie
Innovationspotenziale für Unternehmen



hessen »
Umwelttechnik

www.hessen-nanotech.de
www.hessen-umwelttech.de



Zukunftspotenziale der Mikro- und
Nanotechnologie als Schlüsseltechnologie
für die Umwelttechnik in
Baden-Württemberg



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Lessons Learned from the Studies referring to Skills

Structure of Branch and Research

- High costs for infrastructure/ manpower, especially for SMEs
- Application and transfer of results from nanotechnology basic research in industrial/ large scale is sophisticated and not only a technical question
- profit is mostly realised at the end of value chain, Technology driver are major enterprises and spin-off, but little SMEs
- Research is opportunity driven, not solution or application oriented
- Alliances and cooperation are mostly supported in R&D
- Mostly big players or start-ups work in nanotechnology

Application of Nanotechnology

- “There are still not enough points of contact between the two technologies. Environmental technology knows too little about the possible applications of nanotechnology, and nanotechnology doesn’t know what environmental technology needs”
- Commercial products with nanotechnology are developed in cooperation of enterprises and reserachers



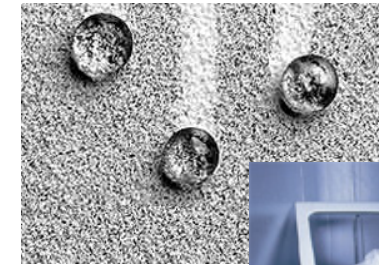
Technology Management to encourage Application of Nanotechnology

■ Technical View:

What can Nanotechnology do from a application view?

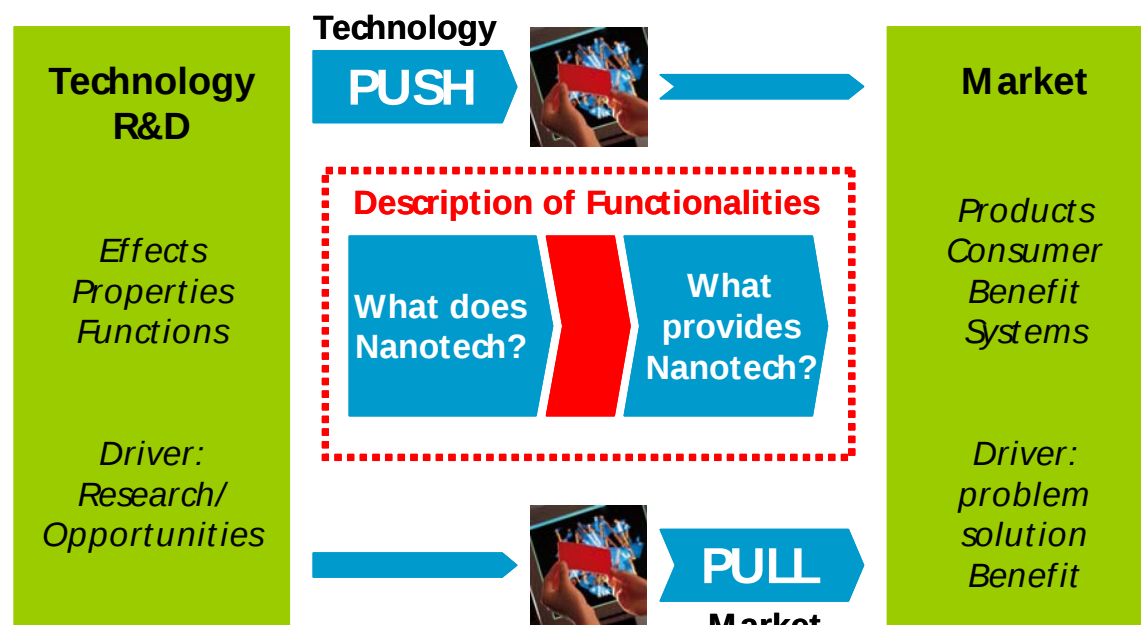
Which functionalities and effects are provided?

What are the feasible functionalities for products/ processes?



■ Methodological Approach:

Efficient, quick and targeted match of opportunity driven nano science (technology push) with consumer benefit and the solution driven approach (market pull)

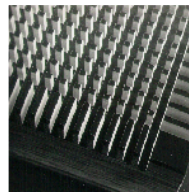


Nanotech: Management of Technology and Innovation

Changing environment conditions

- smaller, lightweight devices
- reduction of space for components
- decrease in weight of component
- convergence and integration of technologies

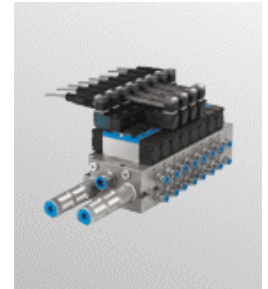
... Nanotechnology as a key future technology (Driver, Enabler, ...)



Factors of Influence

- applied functionalities
- available and required competencies of the company
- integration of different discipline
- activities of competition
- stage of technology
- substitution of technology
- Required R&D-budget
- Time to market

Market potential



- Components
- New Manufacturing processes
- New services
- ...

Integrated Management of Technology Development and Innovation

Necessary Skills

Technology

Assessment

Methods

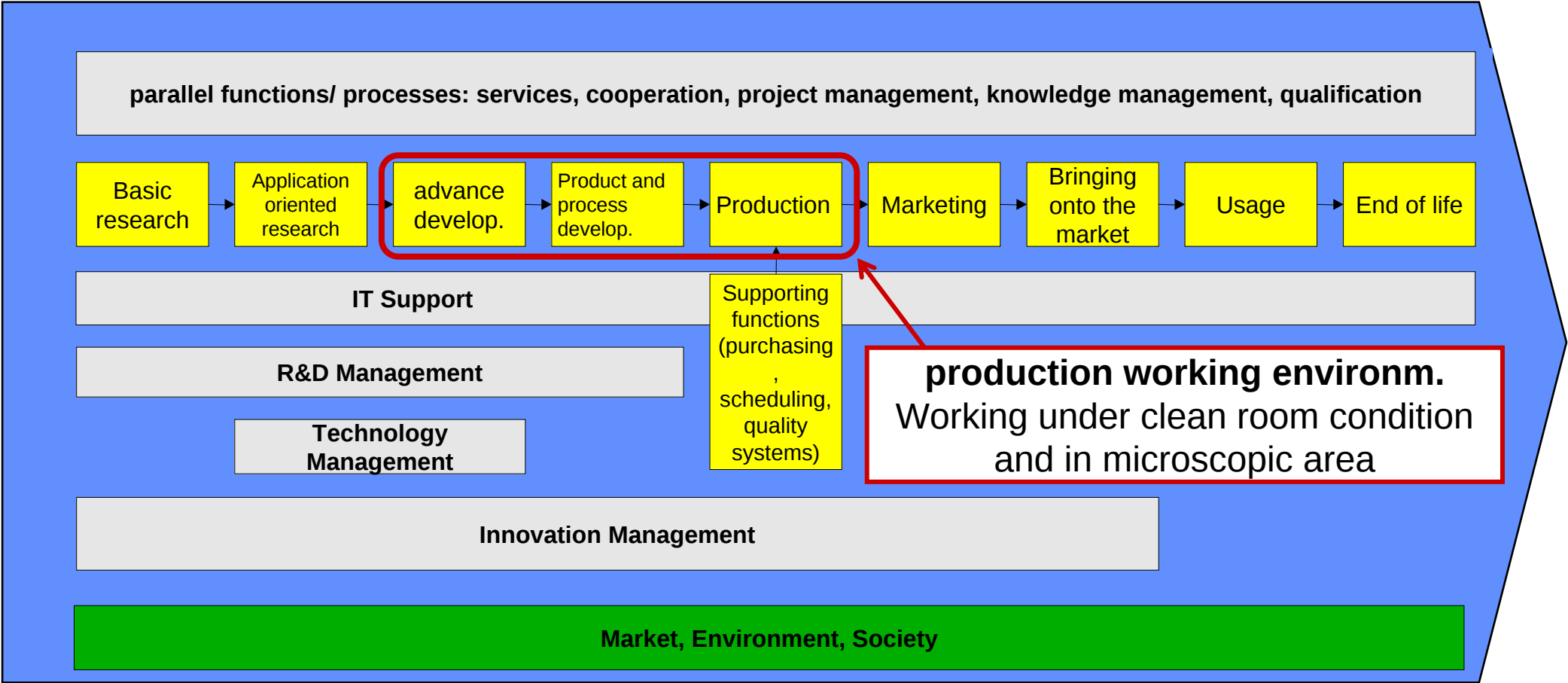
Science

Integration

...



Process and Value Chain of Nanotechnology



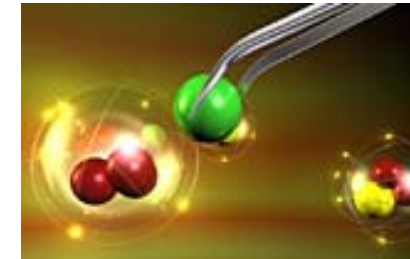
Issue »Nano Production Working Environment«

■ Characteristics:

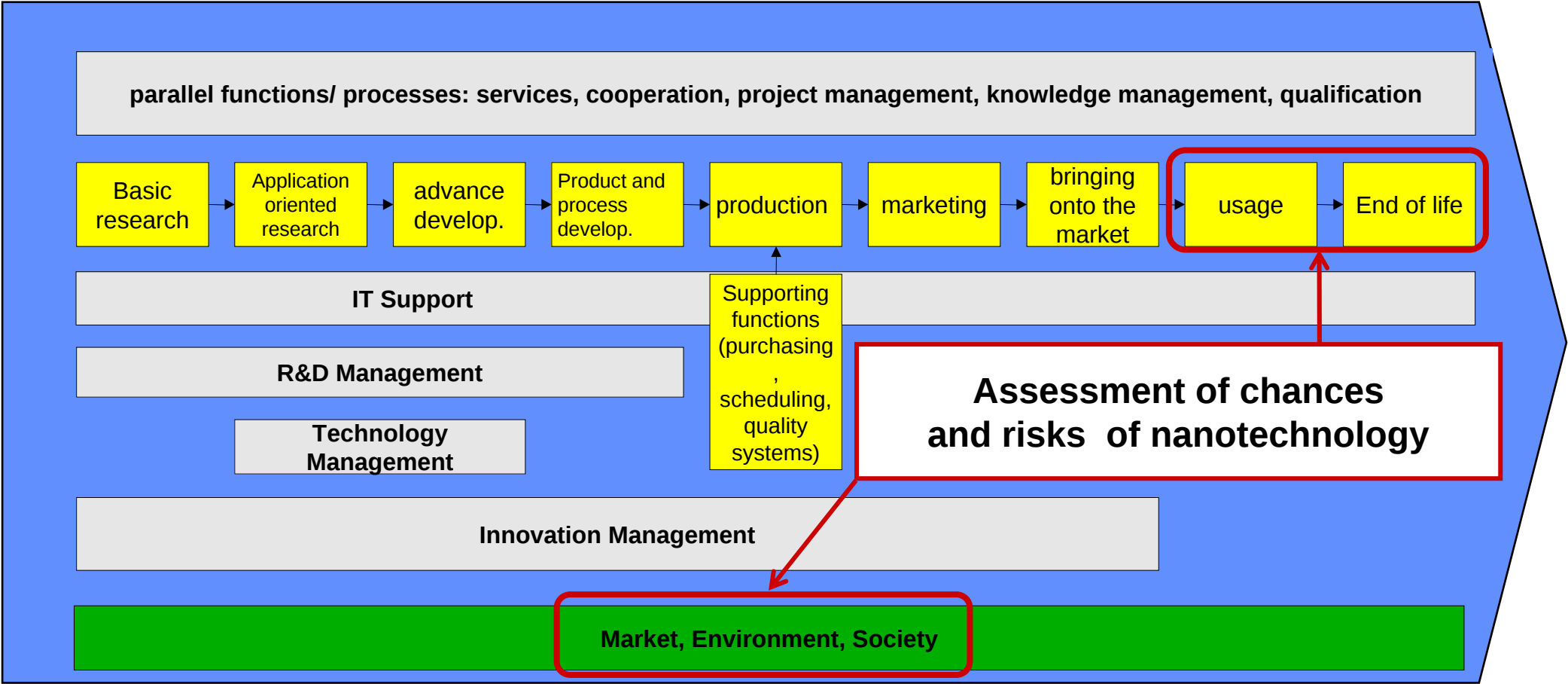
Working place characterised by traditional production technology,
Clean room condition microscope working place

■ Challenges:

- Produced materials are not detectable without tools (microscope, micro spikes...) → simulation and Telepräsenzmodelle necessary
- Working place and factory layout: production, clean room, microscope, screen
- Quality management
- Information allocation
- cooperative collaboration between scientists and engineers



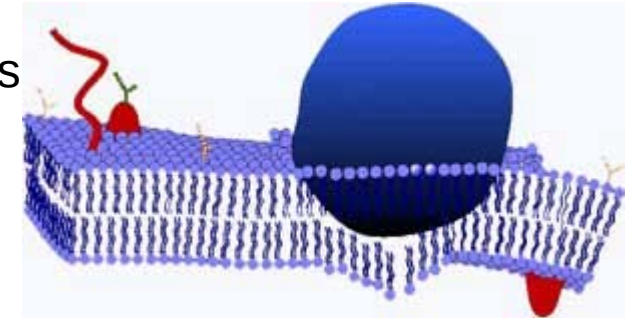
Process and Value Chain of Nanotechnology



Issue »Assessment of Chances and Risks of Nanotechnology«

■ Characteristics:

Chances and risk are partly unclear/ ambiguous, different sections nanotechnology are unified wrongly



■ Challenges:

- to bring nanotechnology into awareness
- to define and outline the sections for the public
- How will society be change by the broad usage of nanotechnology?
- How can nanotechnology be applied in other technology

