
Working group II

Skill shortages and gaps in emerging technologies

Report

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INTERNATIONAL WORKSHOP, 11-12 July 2005

Skill shortages and gaps in nanotechnologies. What can be learned from other technologies?

Wolfgang Luther, Future Technologies Division of VDI TZ GmbH, Germany



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CANEUS Approach for Development and Commercialization of Micro and NanoTechnologies for Aerospace Applications

Dr. OUDEA Coumar, EADS-ST, France



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EMERGING TECHNOLOGIES - New Skill Needs in the Field of Nanotechnology

Aspects of Technology Management

Daniel Heubach, Fraunhofer IAO, Germany

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Questions

- 1.** How can we identify future skill shortages and gaps in emerging technologies?
- 2.** What are specific shortages and gaps already identified/estimated for the nanotechnology sector? What are typical skill shortages and gaps experienced by other newly emerging and fast developing technology sectors? What can the nanotechnology sector learn from these experiences?
- 3.** How can skill shortages / skill gaps be tackled and possibly prevented?

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1. How can we identify future skill shortages and gaps in emerging technologies?

- Establish a system for technology monitoring in Germany/EU
- Regular surveys and interviews with scientists and employers with regard to the technological developments
- Identification of occupational profiles (Employees in emerging technologies are „doing something else“)
- Data/ Databases/ Investment in exchange platforms to capture new occupational profiles, new combination of skills (format?)
- In a collaborative way

1. How can we identify future skill shortages and gaps in emerging technologies?

- To have a look at the products, to compare them with older, existing products --> Maintenance staff (What do employees have to know to maintain the product?)
- Look at real on the job developments in companies (keyplayer); work processes, workplace
- Challenge: Multidisciplinary character of nanotechnology
- Challenge: Identification of the „stage“ of an emerging technology
- Systematic research: Analysis of prototypes, technical system, products, natural/scientific principles --> new skill needs

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2. What are specific shortages and gaps already identified/estimated for the nanotechnology sector? What are typical skill shortages and gaps experienced by other newly emerging and fast developing technology sectors? What can the nanotechnology sector learn from these experiences?

- Lessons learned in the past? --> Development of a roadmap for nanotechnology and new skill needs, learn from ICT
- Skill shortages in emerging technologies usually reflect the fact that neither existing work practices nor the official occupational nomenclature acknowledge their existence
- TRL as a basis - Comparison with existing products --> new skills

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2. What are specific shortages and gaps already identified/estimated for the nanotechnology sector? What are typical skill shortages and gaps experienced by other newly emerging and fast developing technology sectors? What can the nanotechnology sector learn from these experiences?

- Europe has already a lack of specialists (microtechnology, chemistry...) --> need for action
- Typical gap experienced by other technologies: insufficient supply of basic natural sciences
- Other useful skills: Entrepreneurship skills, transectoral skills, recycling, quality management, work safety, health (risk management)

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2. What are specific shortages and gaps already identified/estimated for the nanotechnology sector? What are typical skill shortages and gaps experienced by other newly emerging and fast developing technology sectors? What can the nanotechnology sector learn from these experiences?

- --> Creating European Nanotechnology Standards/Norms
 - Non-knowledge of the public, communication with venture capitalists
 - Systematisation of fields of education (R&D, production, marketing, quality, documentation)
 - Innovation management and cross-disciplinary communication are the major skill gaps
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3. How can skill shortages / skill gaps be tackled and possibly prevented?

- Facilitating exchange via Networks, Competence Centers, Training Networks (national/ EU) with a special focus on education and training
- Make educational offers more transparent
- Fascinate young people
- Seek for existing training modules which can be used
- Initiate a collaboration with all stakeholders (round table scientists and employers)
- Ensure two-way communication between public + industry
- R&D training courses in academic research departments for industry

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3. How can skill shortages / skill gaps be tackled and possibly prevented?

- Modular qualification system/ modify existing skills for new fields

- Depends on their causes

Are they temporary or permanent in nature? Are they complex and difficult to acquire etc.? The optimum solution will vary. In the case of emerging technologies, the problem is often political.

- Problem: Flexibility and response time to any demand in Nanotech and Nanobio is according to the Bologna process 5 years minimum (3+2) but probably in most cases 8 years (3+2+3).

- Challenge: Parallelism of market introduction of product and process of qualification

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