Safety culture and perceptions and practice with nanomaterials in academia and industry

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Affiliation

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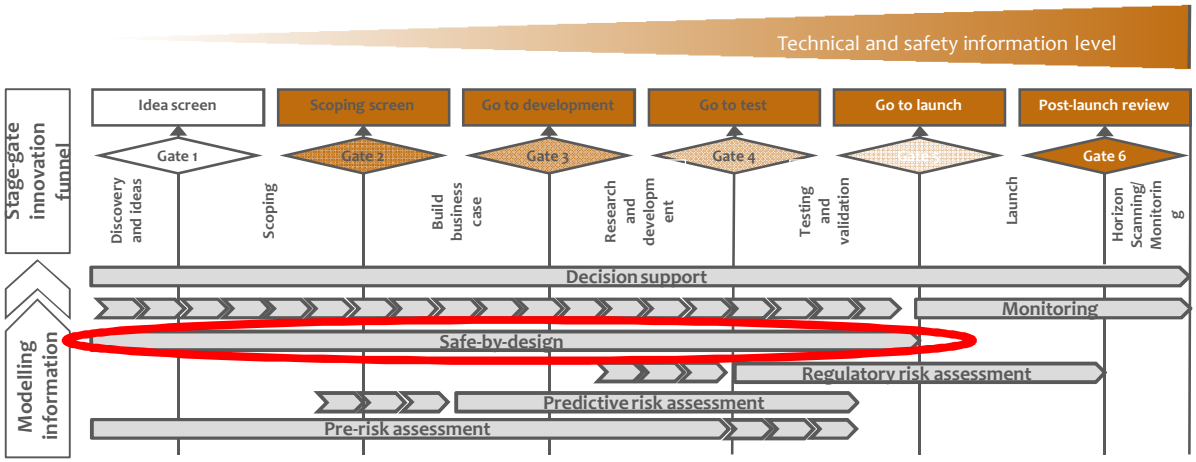
Background

- Work and research with nanomaterials (NM) has primarily focused on innovation, toxicity, governance, safety management tools, and public perceptions

- Knowledge of the **application** is greater than of its **implications**

- **Precautionary principle**: Appropriate precautionary measures should be taken even when the cause and effect relationships are not fully established scientifically

Stage-gate model



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Presentation objective

- Preliminary results of a study of OSH professionals in **academia** and **industry** and their perceptions and actions in attaining and applying knowledge about nanomaterials in relation to a safety culture model

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Method

- Semi-structured interviews with OSH professionals (2016-2017)

- **Five** academic institutions
- **Five** industrial companies

- **Five** topics regarding nanomaterials (coded in Nvivo pc program)
- **Five-step** safety culture ladder model

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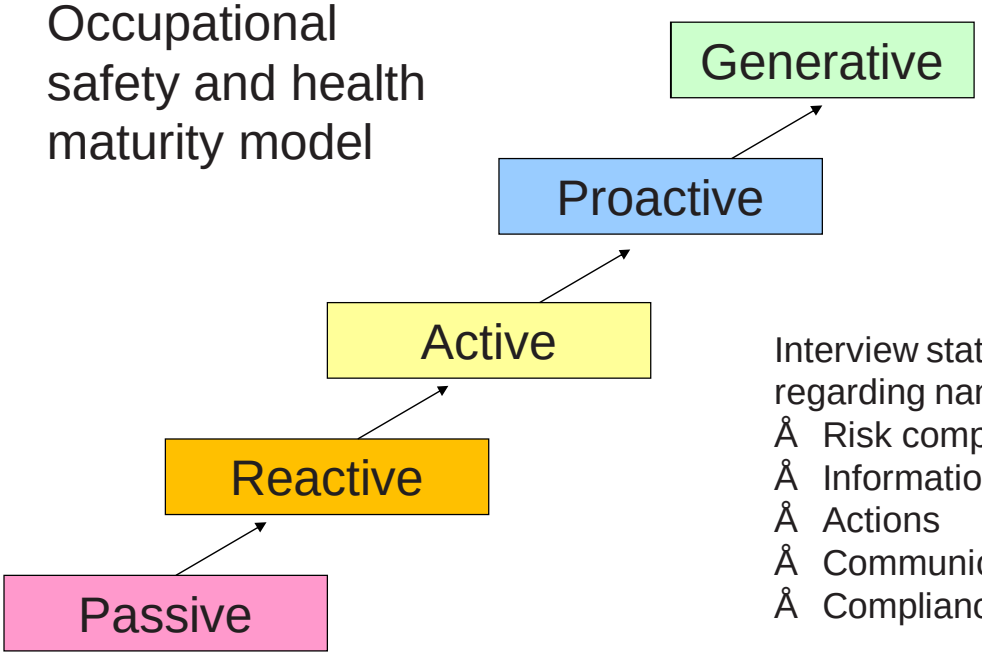
Occupational safety and health maturity model



Interview statements regarding nano:

- Risk comprehension
- Information gathering
- Actions
- Communication
- Compliance

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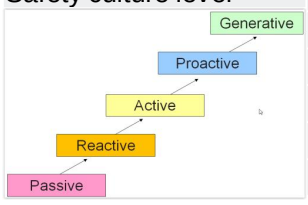
Results

- Approximately 300 relevant interview statements were coded

OSH themes / Safety culture level	Risk comprehension	Information	Actions	Communication	Compliance
					

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- No ôexemplaryô statements
- Majority of statements are ôactiveô

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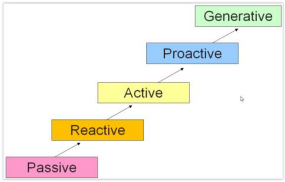
1. Risk comprehension

ÅNano-safety through planning and procedures (proactive)

ÅVarious information and system checks (active)

ÅLack of understanding of when and where NM were dangerous (reactive)

ÅRisks as a part of the job (passive)



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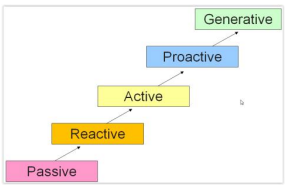
2. Information

ÅUp-to-date legislation, certification (proactive)

ÅCooperation with suppliers and consultants, safety data sheets, SOPs (active)

ÅCurrently available OSH information for NMs was described as too complicated to understand, insufficient, impractical and inaccessible (õ**nano information jungle**ò on the internet) (reactive)



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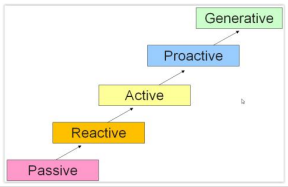
3. Actions ï handling NM

ÅEliminating NM contact, designated NM handlers; involvement in design and layout of lab and equipment selection (proactive)

ÅHierarchy of prevention and ϕprecautionary principleô(active)

ÅTrust in labelling from suppliers, focus on equipment (reactive)

ÅNo risk assessment of measures ï only small amounts (passive)



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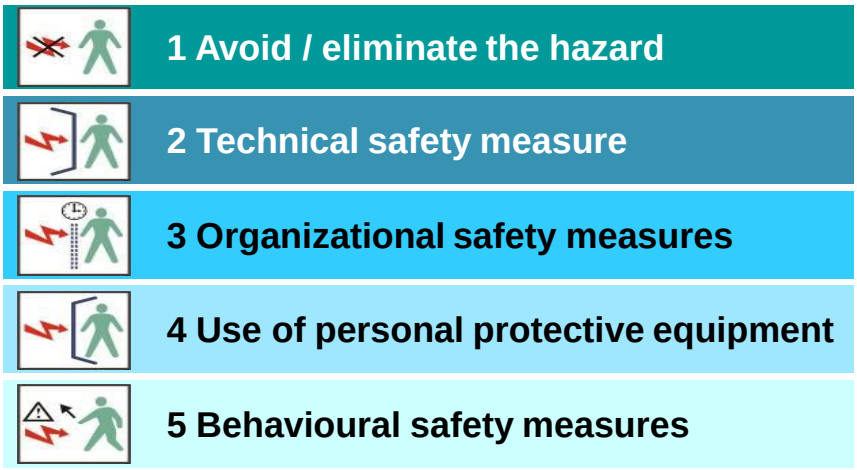
Hierarchy of OSH measures



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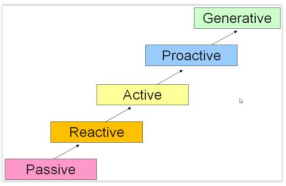
4. Communication

ÅPrimary introduction focused on procedures (academia) vs. practice (industry)

ÅAdapting info, reinforcing training, certification training (proactive)

ÅSpecific nano intro, formal training (active)

ÅGeneral info, self help, buddy system training (reactive)



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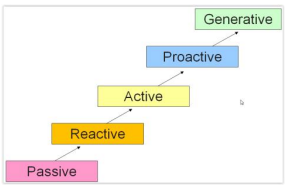
5. Compliance

Åo Part of the jobô(reactive) vs. Zero tolerance for risks (proactive)

ÅLevel of compliance was reflective of managerial attitude (walk the talk), the type of assignments, availability and applicability of PPEs.



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Structural differences

Academia vs. industry - provide challenges in affecting and sustaining cultural change in safety, e.g.:

- Size and organisational structure (smaller and less complex in academia)
- Turnover, cultural and linguistic diversity (greater in academia)
- Academia rarely audited by OSH authorities and professionals

- Nano-specific OSH program ï more common in industry
- Powder vs. liquid based NM applications

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Needs

- Information that is easily accessible, applicable and low level of complexity (easily understandable)

- Nano-specific OSH programs that cover all aspects of the life-cycle - from research and design to disposal

- Allow for flexible deployment of multilevel and integrated OSH initiatives to support sustainable nanotechnology and operational excellence

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Implications

- Politicians, engineers to collaborate with communication experts and social scientists in effectively **framing** information on NM
- Both **credibility** and **culture** need to be taken into consideration

Thank you for your attention

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