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caLIBRAte nano risk governance

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

10th International Conference
Prevention of Accidents at Work
Radisson Blu Park Royal Palace Hotel
Vienna, Austria

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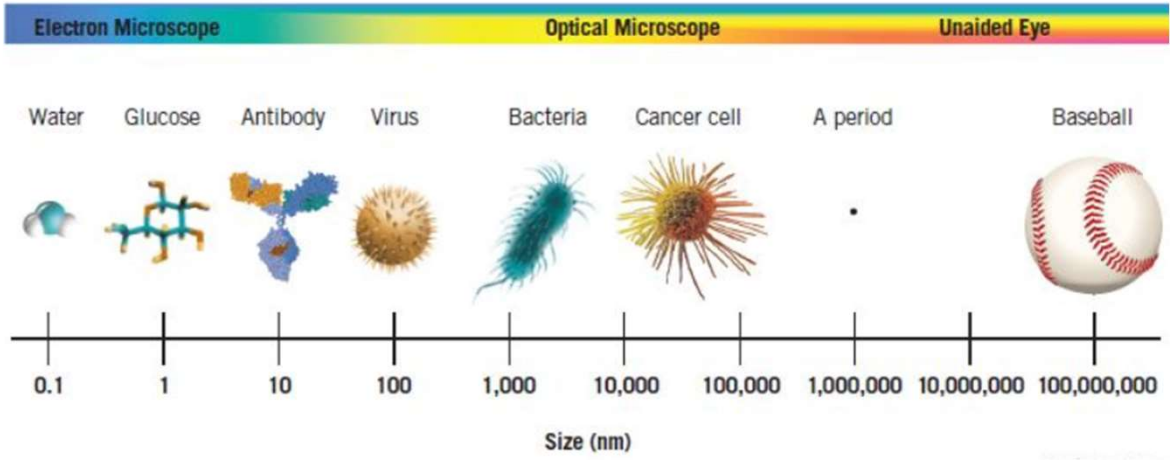
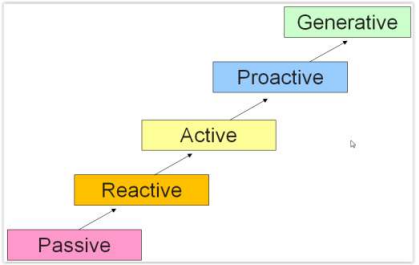
Take home messages

- What is nano?



- What does it have to do with safety maturity?



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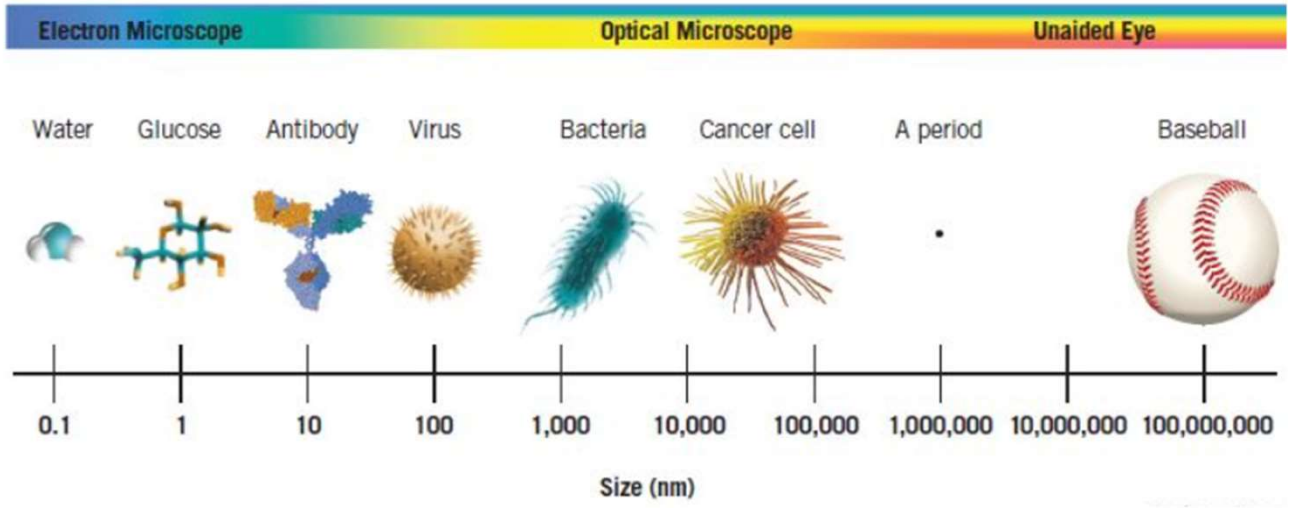
What is nano?

- Nano – Greek ‘nanos’ meaning ‘dwarf’
- One billionth (nanosecond, nanometer, etc.)
- Nanoparticles = 1-100 nanometers (nm); $1x10^{-9}$ m



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Nanotechnology - properties

Can act differently than they would if they were larger :

- Smaller size gives a high surface area
- Strength & durability
- Solubility & porosity
- Melting point
- **Conductivity**
- **Reactivity**
- Etc.

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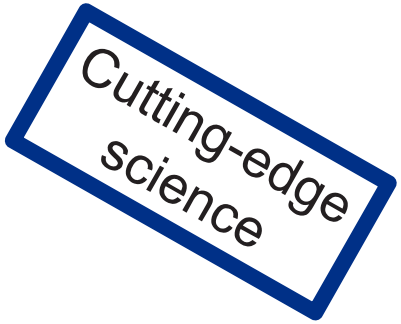
Nanotechnology - applications

- Health care (monitoring, diagnosis, screening)
- Medicine/pharmaceuticals (drug delivery and treatment)
- Energy (generation, transmission, storage)
- Agriculture, manufacturing, construction & automotive
- Food and beverages
- Clothing (wearables and smart textiles)
- Electronics, security and the internet
- Cosmetics



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Nanotechnology - implications

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

- What are the safety and health risks? Earlier examples asbestos, radiation

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Study

How do academia and industry attain and apply knowledge about nano?

- Semi-structured interviews with OSH professionals
  - Six **academic** institutions
  - Six **industrial** companies

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

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Five topics

1. **Risk comprehension**: Understanding the risks

2. **Information gathering**: Attaining guidelines, standards, safety info.

3. **Actions**: Identifying and handling risks

4. **Communication**: Educating and training employees, students, etc.

5. **Compliance**: Adherence to strategies, standards, guidelines, etc.

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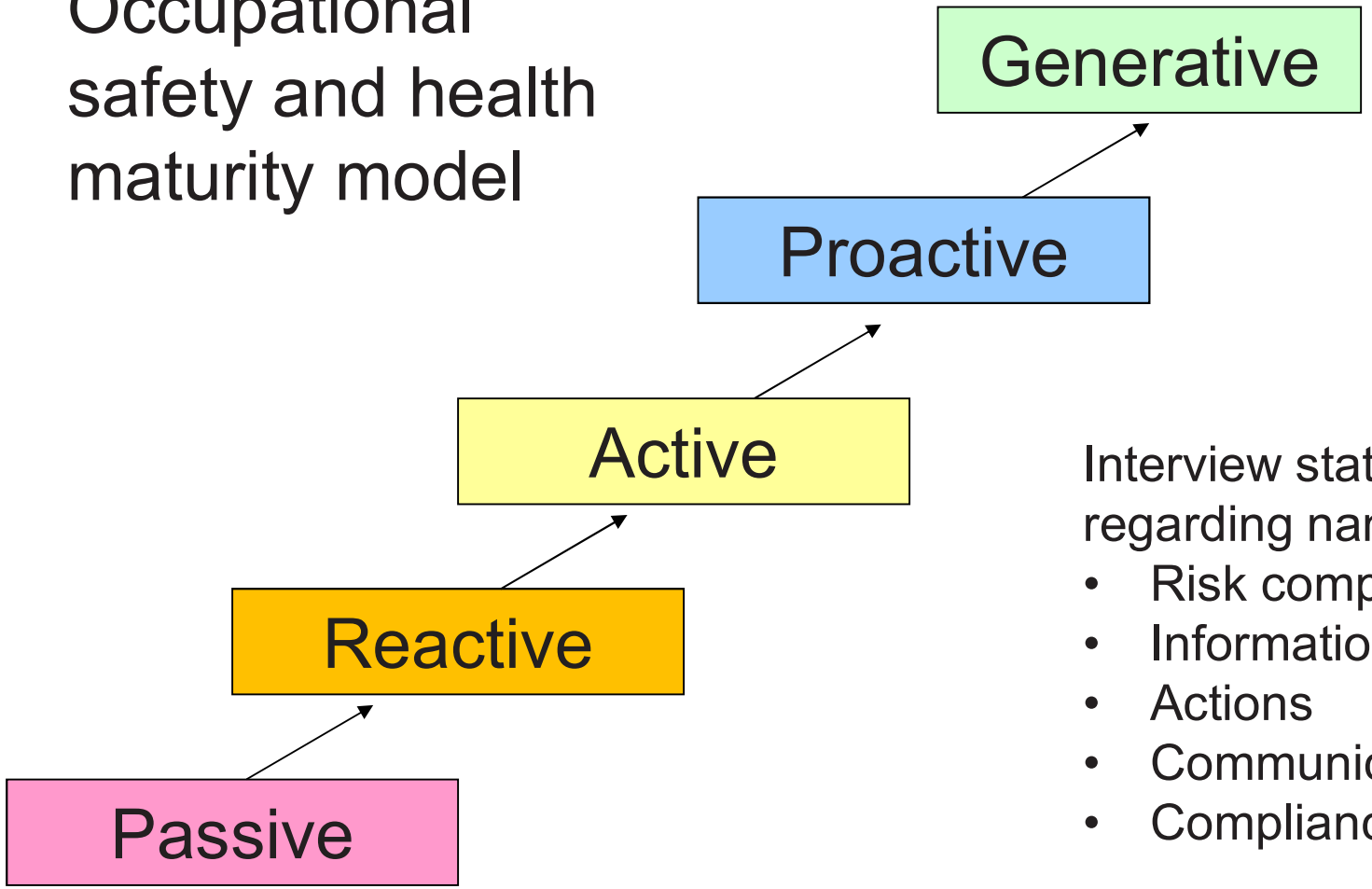
Occupational safety and health maturity model



Interview statements regarding nano:

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

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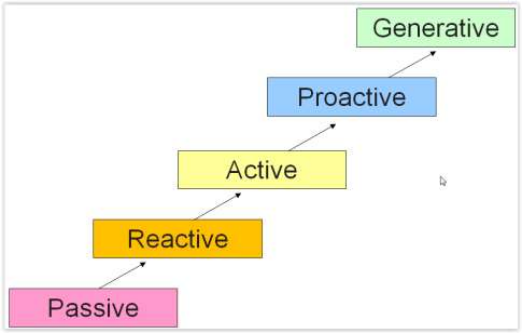
Coding interview statements

Examples

1. **Comprehension**: Risks as a part of the job (passive)
2. **Information:** Up-to-date on legislation, certification (proactive)
3. **Action**: Trust in labelling from suppliers (active)
4. **Information**: Adapting info to context, reinforcing training (proactive)
5. **Compliance**: Walk the talk, PPE (proactive)



Results (%)

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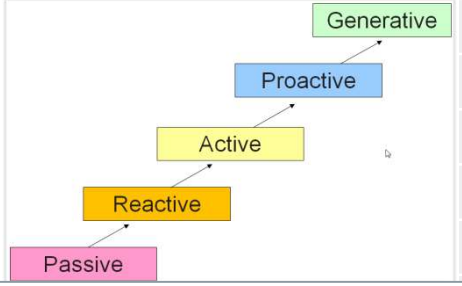
OSH themes / Safety culture level	Risk comprehension	Information gathering	Actions	Communication	Compliance
6 Academia (n=169 statements)					
	0	0	0	0	0
	4	3	6	5	5
	11	12	18	11	10
	0	3	6	2	5
	0	0	0	0	0

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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

Affiliation

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  - CaLIBRAte project WP 4, EU Horizon 2020 research and innovation programme under grant agreement No 686239

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Denmark

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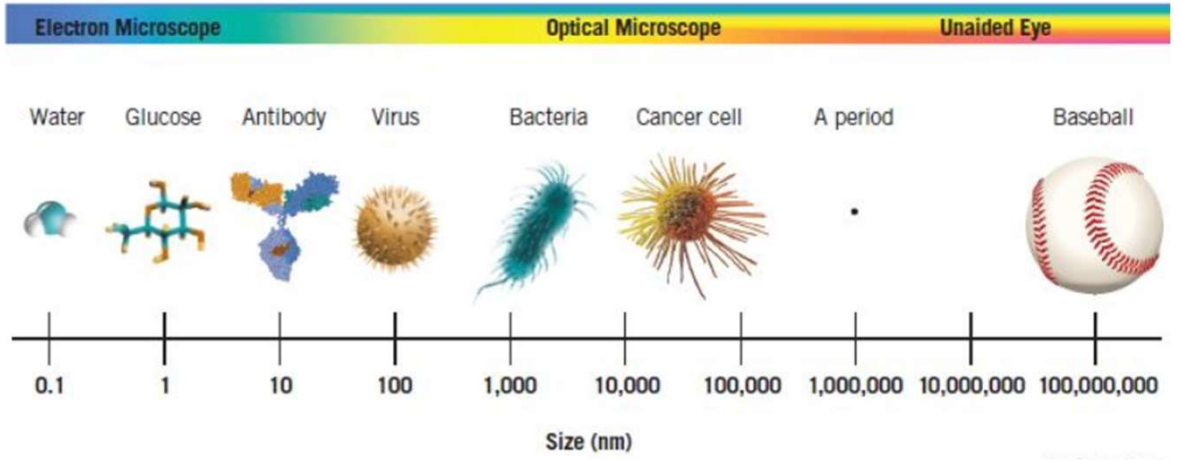

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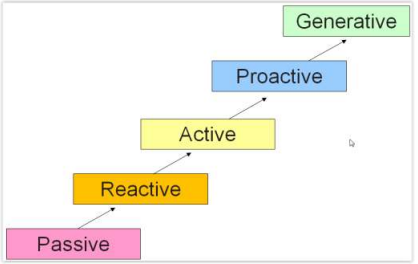

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Thank you for your attention

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