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Risk Assessment for Nanotechnology



Overview

- What is risk assessment?
- Why do we do risk assessment?
- What do we think will be different about risk assessment for nano-materials as opposed to that for 'normal' materials/substances?
- What do we know and what don't we know?
- What examples or models do we have available?
- How are we going to find the 'right' questions to ask?



Hazard and Risk

- **Hazard**
 - a source of potential harm
- **Risk**
 - the chance of something happening that will have an impact on objectives (size and probability)
- Hazard → Risk requires a pathway



Risk assessment

- **Risk assessment** – process of
 - identifying risks
 - analysing risks
 - evaluating risks



Why do we assess risks?

- To understand
 - how they arise
 - What their impacts might be
- But really, so that we can **manage** them – by applying risk ‘treatments’ which may include controls (procedural, physical)
- Risk assessment is a component of risk management



AS/NZS 4360: 2004 Risk Management





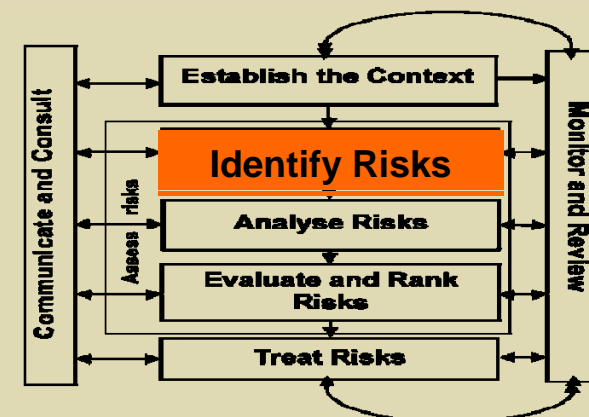
Examples of ways we identify risks

We look at

- What can happen, and when and where it can happen, and
- How it can happen

Tools

- Past experience
- Checklists
- Judgements
- Flowcharts
- Brainstorming



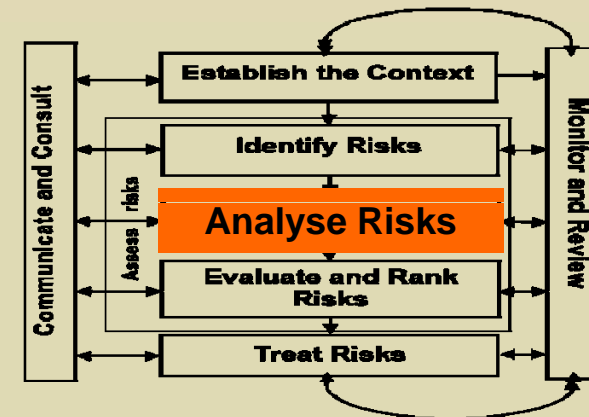
Examples of ways we ‘analyse’ risks

We seek to understand the risk

- Estimate the size of possible effects or consequences of an event (if it should occur)
- Estimate the likelihood of the those effects occurring

Tools

- Statistical analysis
- Models and simulations
- Interviews



Examples of ways we evaluate risks

We want to compare the estimated levels of risk to –

- Decide whether a risk needs treatment
- Whether we should undertake an activity
- What the priorities are for treatment

Use pre-established criteria



What will be different?

- Conceptually risk assessment for nano-materials will probably be the same

BUT

- We need to be aware of the particular risks that are posed by difference forms of materials and substances and different uses
- And there will be a great deal more uncertainty because of what we know and what we don't know



Uncertainty

- Lack of knowledge arising from changes that are difficult to predict or events whose likelihood cannot be accurately predicted
- may occur when
 - there is a problem in `defining the issues' (i.e. defining the problem)
 - the set of possible outcomes is unknown
 - the probabilities or the size of the outcomes cannot be calculated
- exists when the results of a certain course of action cannot be expected (or predicted) with certainty



What kinds of uncertainty?

- Uncertainty about what might happen
- Uncertainty about the size of the effect(s)
- Uncertainty about probability or likelihood that the effects will occur



Risk and Uncertainty

- **Risk** – where we know the odds (probability or likelihood)
- **Uncertainty** – where we don't know the odds, but may know the main parameters
- **Ignorance** – *where we 'don't know what we don't know'*

certainty



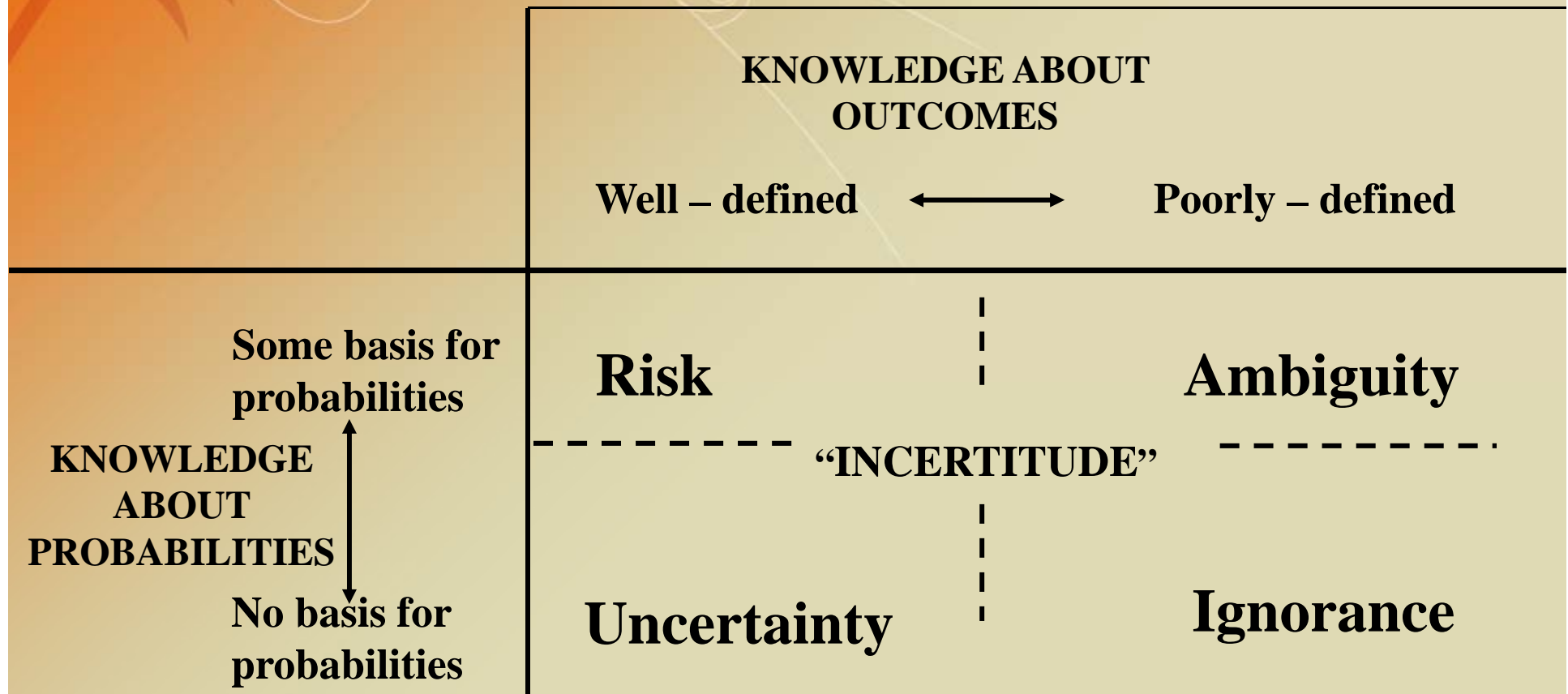
risk

uncertainty

ignorance

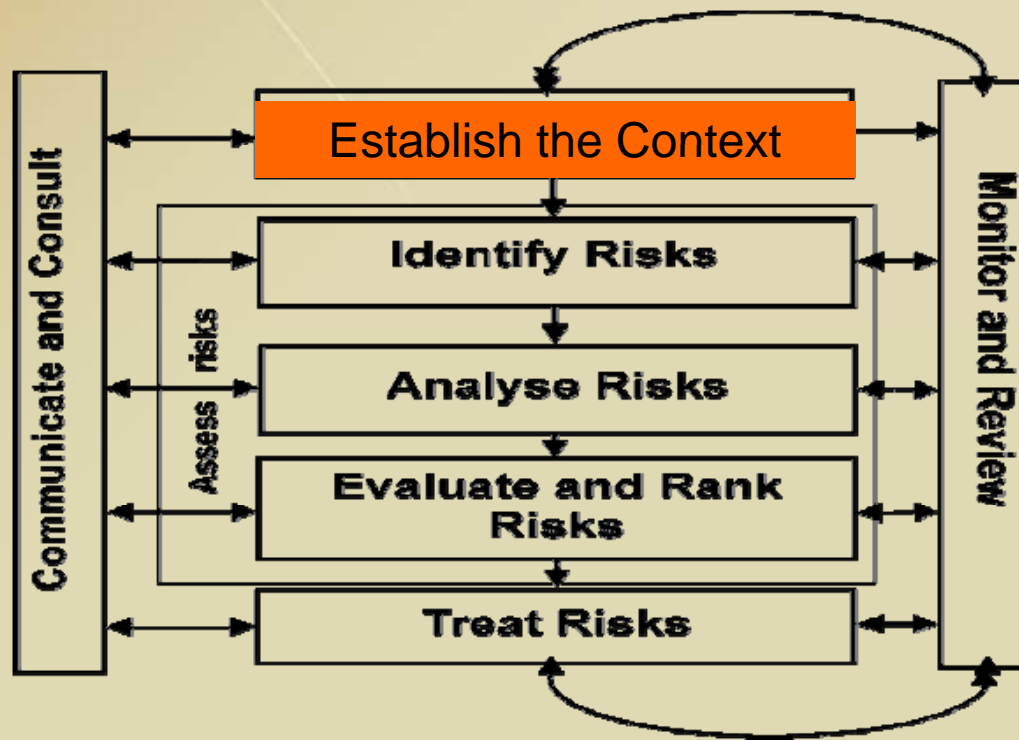


Uncertainty

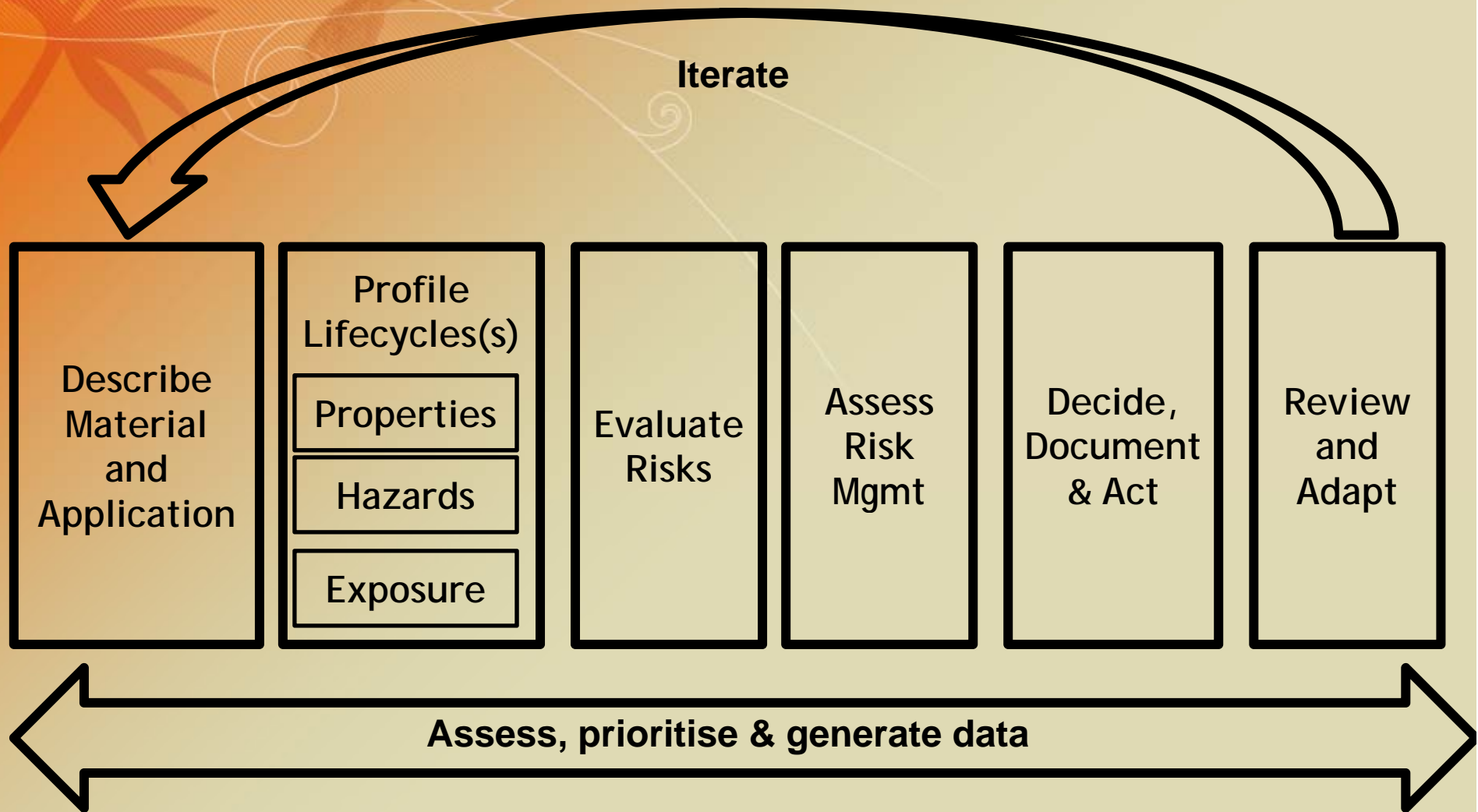


Do we need new models?

Probably not....



DuPont Nano Risk Framework



What questions should we ask?

- How are we going to find the ‘right’ questions to ask?



How do we get involved?

- Community involvement



Sources and further information

US Nanotechnology Initiative – Understanding risk assessment of nanotechnology

- http://www.nano.gov/Understanding_Risk_Assessment.pdf

OECD report: Nanotechnology: an example of risk management and regulation in an emerging technology (2005)

- <http://www.oecd.org/dataoecd/1/7/35742898.pdf>

EPA Nanotechnology White Paper (2007)

- <http://www.epa.gov/OSA/nanotech.htm>

OCED Studies in Risk Management : assessing societal risks and vulnerabilities (2006)

- <http://www.oecd.org/dataoecd/36/18/36099961.pdf>

DuPont Nano Risk Framework (2007)

- <http://nanoriskframework.com/page.cfm?tagID=1081>

European Commission ...*opinion on* The appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies

- http://ec.europa.eu/health/ph_risk/committees/04_scenihr/docs/scenihr_o_003.pdf

Your thoughts and questions?

ENVIRONMENTAL RISK MANAGEMENT AUTHORITY
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