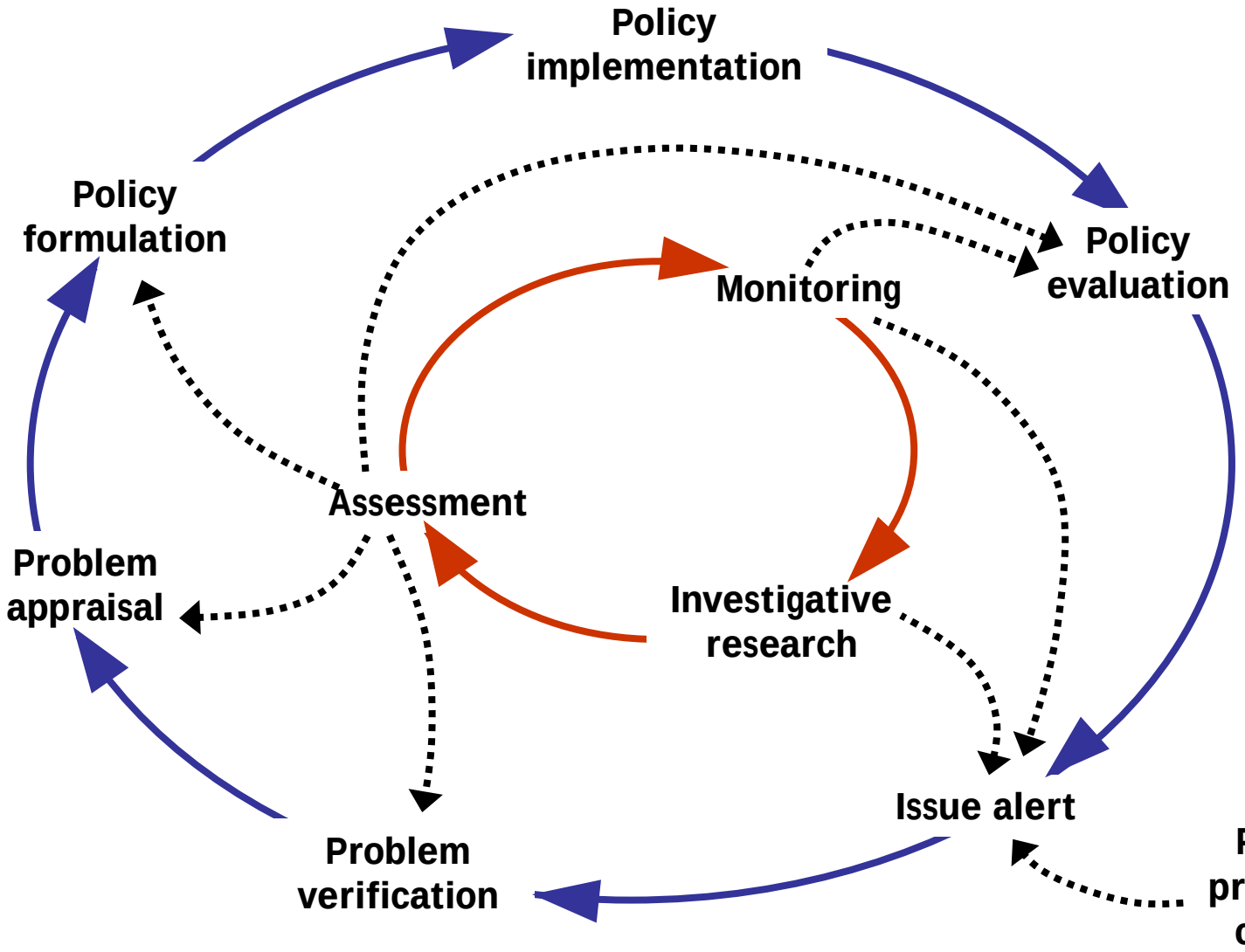
The science of integrated assessment

David Briggs

Imperial College London

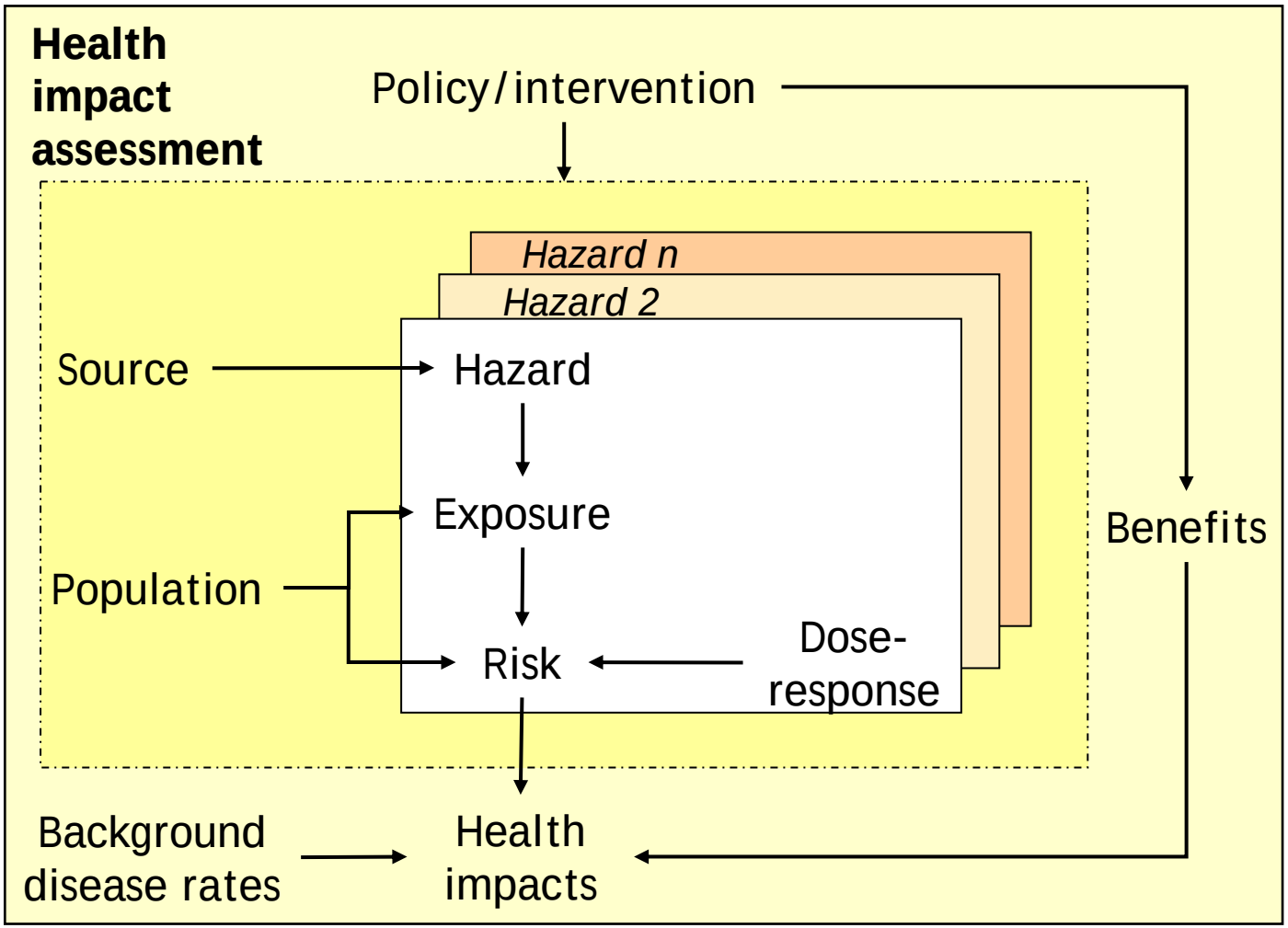
Assessment and the policy cycle



Types of assessment

1. Diagnostic
   - Is their a risk?
   - What is its cause?
   - Where might we act?
2. Summative
   - What are the effects of current policies?
   - Are they meeting their targets?
   - Does the policy need to change?
3. Prognostic
   - What will happen if we intervene?
   - What are the relative costs and benefits of different interventions?
   - Which option is best?

Risk and health impact assessment



Systemic risks

Complex risks set within wider environmental, social, economic and political systems

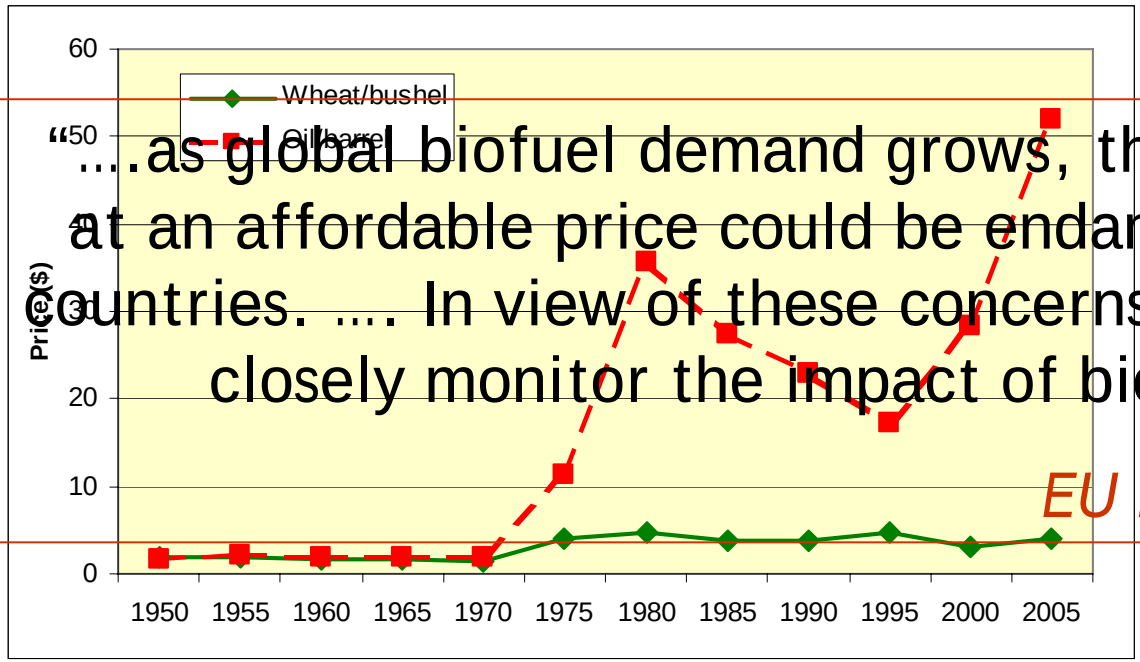
Examples:

- Climate change
- Food security
- Energy security
- Water security
- Transport
- Waste management
- Housing
- Air pollution
- Indoor air pollution

Complexity and multiplicity

- Causes
- Pathways
- Agents
- Settings
- Effects
- Scales

The example of biofuels



"…as global biofuel demand grows, the availability of food at an affordable price could be endangered in developing countries. …. In view of these concerns, the Commission will closely monitor the impact of biofuel demand."

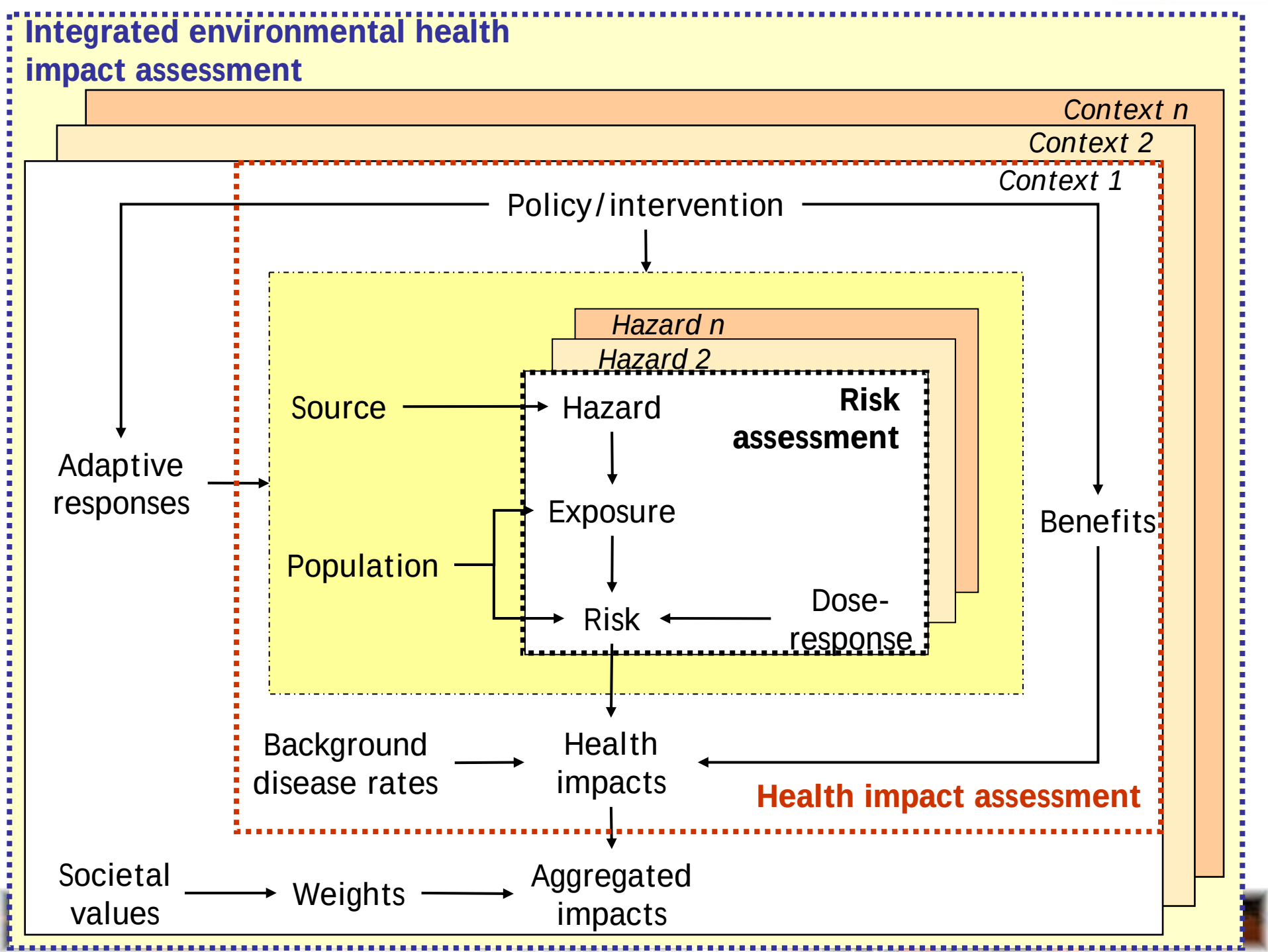
EU Biofuels Strategy 2003

"With oil prices now high enough to stimulate potentially massive investments in fuel crop production, the world farm economy – already struggling to feed 6.5 billion people – will face a fuel vs. food competition for land."

Lester Brown 2006 Plan B 2.0.

Implications

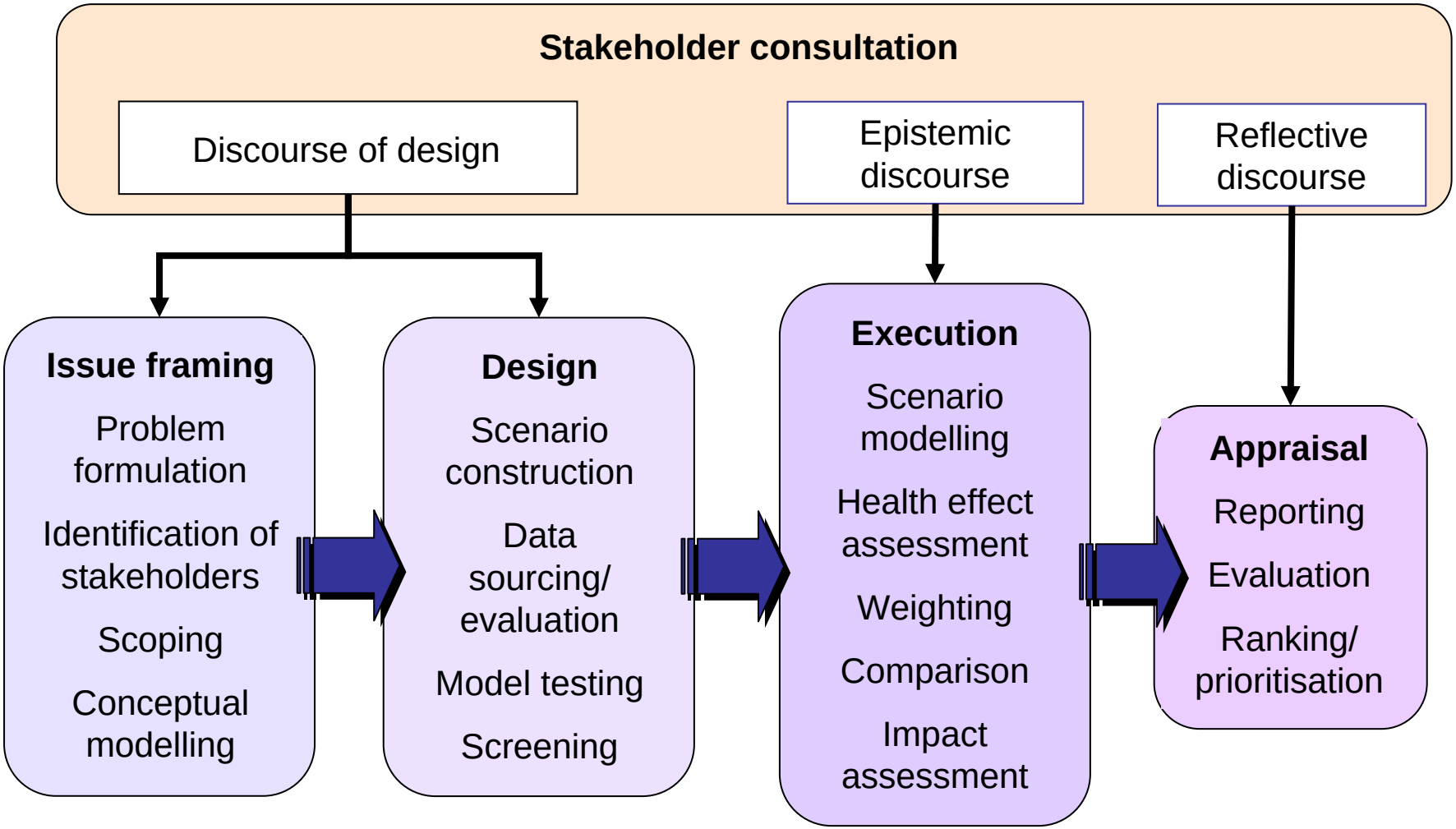
1. Policies
   - Integrated – co-ordination of different policies
   - Collaborative – between different policy areas/actors
   - Precautionary – pre-emptive (and in context of uncertainty)
   - Multi-objective – aimed at achieving (and balancing) multiple policy goals
   - Accountable – based on clear, transparent *a priori* criteria
2. Assessment
   - Systemic – whole systems analysis
   - Forward-looking – what if?
   - Divergent – full range of impacts
   - Balanced – positive and negative effects
   - Dynamic – adaptation and behaviours


Integrated environmental health impact assessment
Context n
Context 2
Context 1
Policy/intervention
Hazard n
Hazard 2
Source
Hazard
Risk assessment
Exposure
Adaptive responses
Population
Risk
Dose-response
Benefits
Background disease rates
Health impacts
Health impact assessment
Societal values
Weights
Aggregated impacts

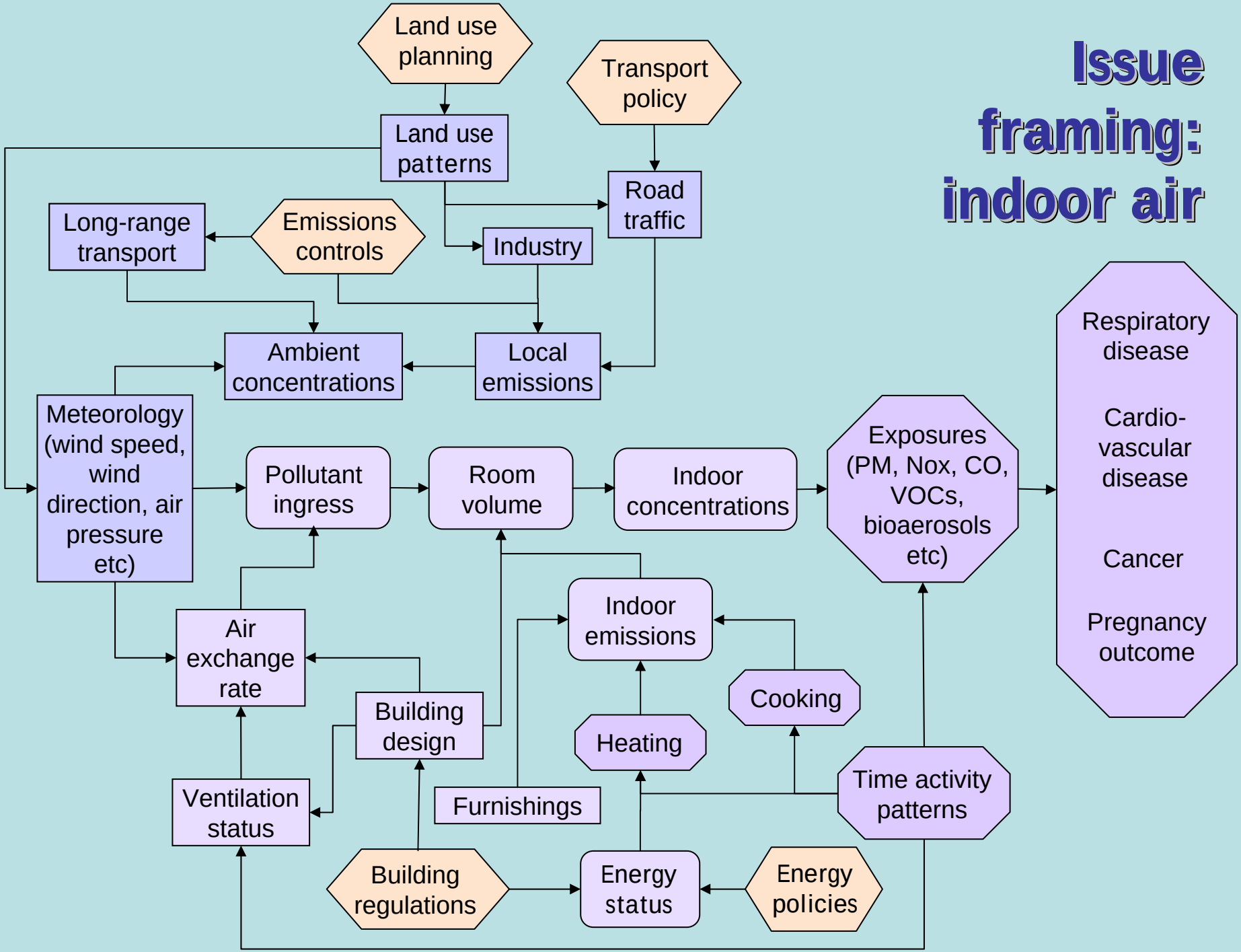
Integrated environmental health impact assessment

A means of assessing health-related problems deriving from the environment, and health-related impacts of policies and other interventions that affect the environment, in ways that take account of the complexities, interdependencies and uncertainties of the real world.

The integrated assessment process



Issue framing: indoor air



Scenarios

	Prescriptive	Descriptive	Predictive	Probabilistic
Orientation	Outcomes	Contexts	Trends	Processes
Approach	Normative	Qualitative	Quantitative	Quantitative
Methods	Expert judgement	Stakeholder consultation	Extrapolation	Models
Outputs	Assumptions (fixed states)	Narratives Pictures	Predictions of future states	Predictions of system behaviour

Exposure assessment

1. Methods
   - Monitoring
     - Environmental (ground- and space-based)
     - Biomonitoring
   - Modelling
     - Indicators
     - Statistical
     - Deterministic
2. Challenges
   - Predictive/forward looking
   - Complete
     - All relevant exposures, via all pathways
     - Across whole population
   - Consistent
     - Time- and spatial scales
     - With ERFs
3. Implications
   - Inter-conversion
   - Approximation

Retrospective

Sparse/unrepresentive

Availability of input data

Validation

Exposure-response functions

1. Methods
   - Epidemiology
   - Toxicology
2. Challenges
   - Multiple exposures
     - Compound exposures (same mode of action)
     - Conjoint exposures (different mode of action)
     - Cumulative exposures (over time)
     - Consecutive exposures (predispositional and protective effects)
   - Completeness
     - All relevant health outcomes and exposures
     - Over whole exposure period
   - Consistency
     - Between exposures and health outcomes
     - Between population groups
     - Between sources of evidence (toxicology, epidemiology)
     - Over time
     - With available exposure data
3. Implications
   - Approximation
     - Expert judgement
     - Analogy

Conclusions

1. Weaknesses
   - Uncertainty
     - Issue-framing
     - Assessment
     - Appraisal
   - Indeterminacy
     - Different assumptions give different answers
2. Strengths
   - Inclusiveness
     - Risk factors
     - Stakeholders
     - Policy issues
   - Honesty and realism
     - Reveals limits of knowledge
     - Reflects real-world complexity

Combined weight of evidence will often dwarf uncertainties in individual elements of the assessment

Exposes uncertainties, rather than hiding them by ignoring difficulties in issue-framing stage

Thank you

For more information see:

www.intarese.org

and

www.heimtsa.org