Handling uncertainty in health policy decision making

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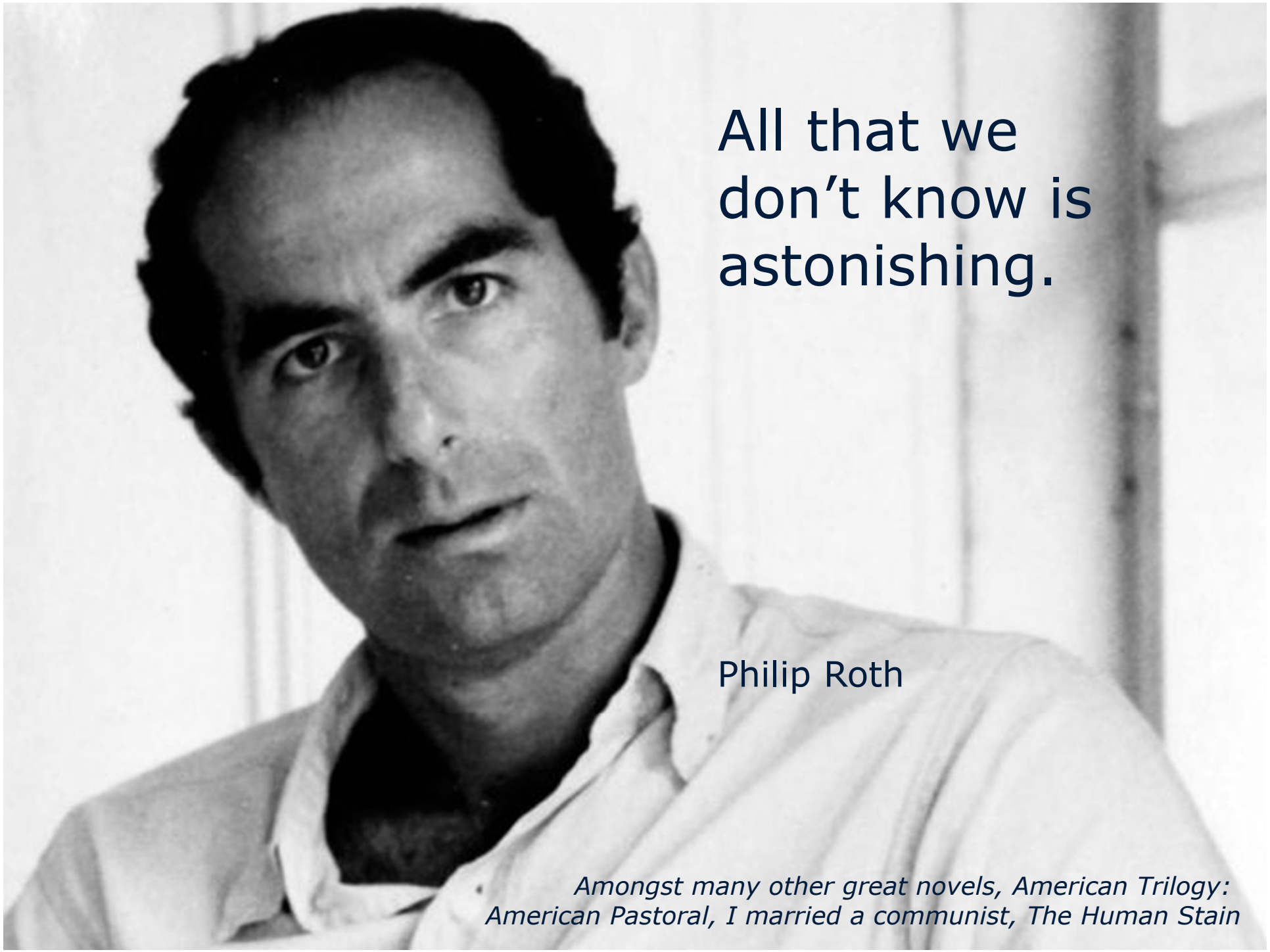
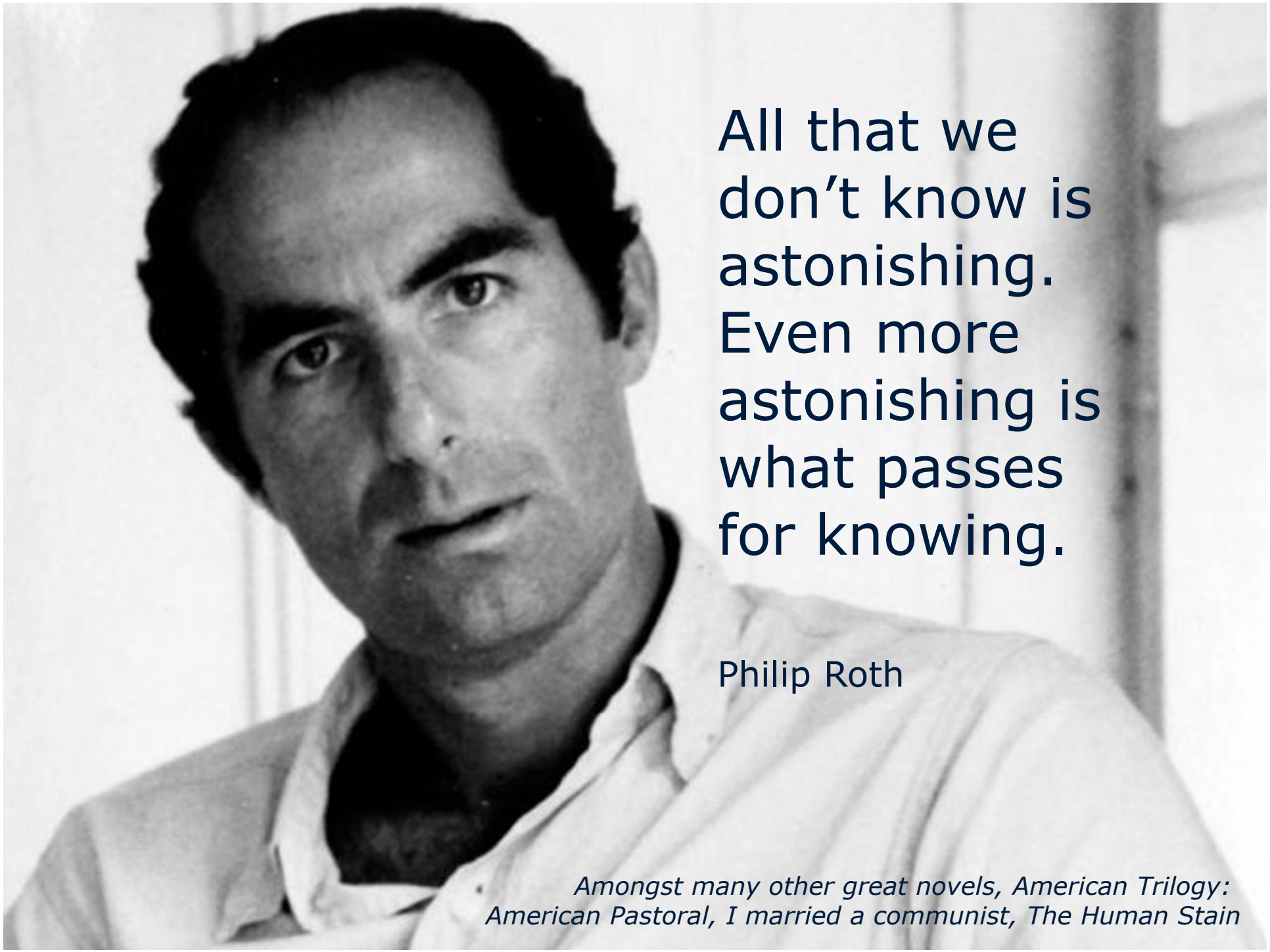

All that we don’t know is astonishing.
Philip Roth
Amongst many other great novels, American Trilogy: American Pastoral, I married a communist, The Human Stain

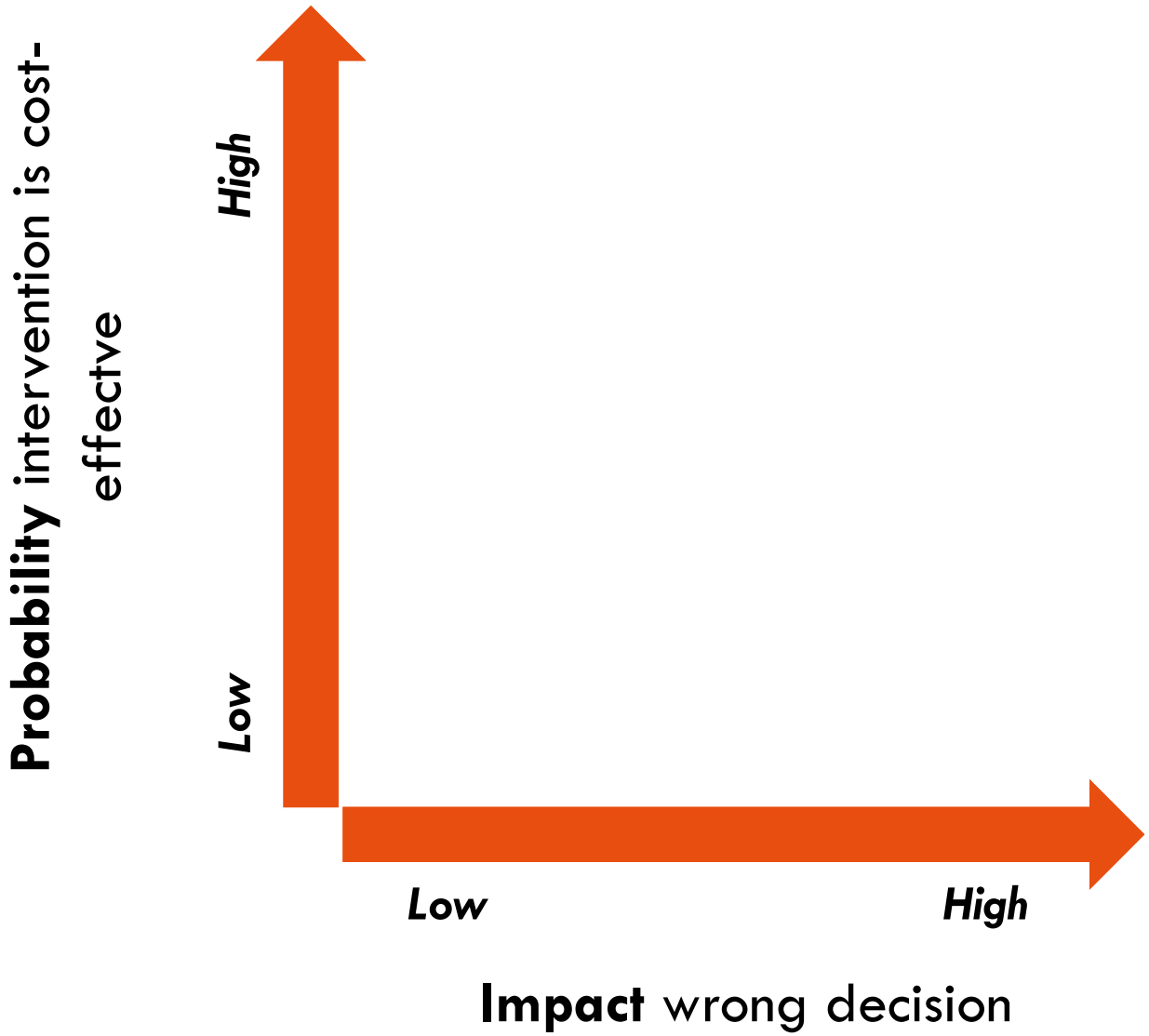

All that we don’t know is astonishing. Even more astonishing is what passes for knowing.
Philip Roth
Amongst many other great novels, American Trilogy: American Pastoral, I married a communist, The Human Stain

Topics in this presentation

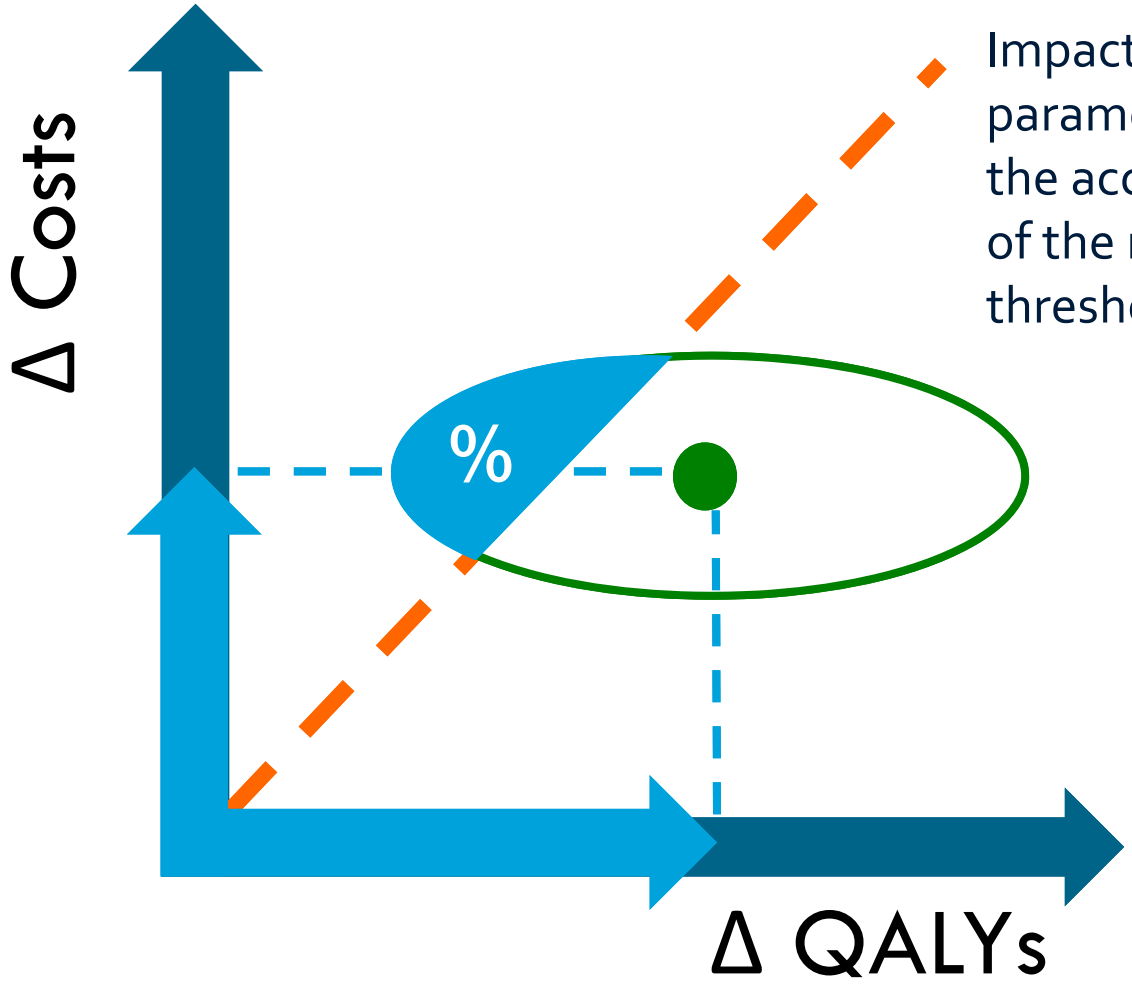
- **Uncertainty matters**
- Uncertainty intolerance
- Ways forward


Probability intervention is cost-effectiv
High
Low

Risk


Probability intervention is cost-effectve
High
Low
Low
High
Impact wrong decision

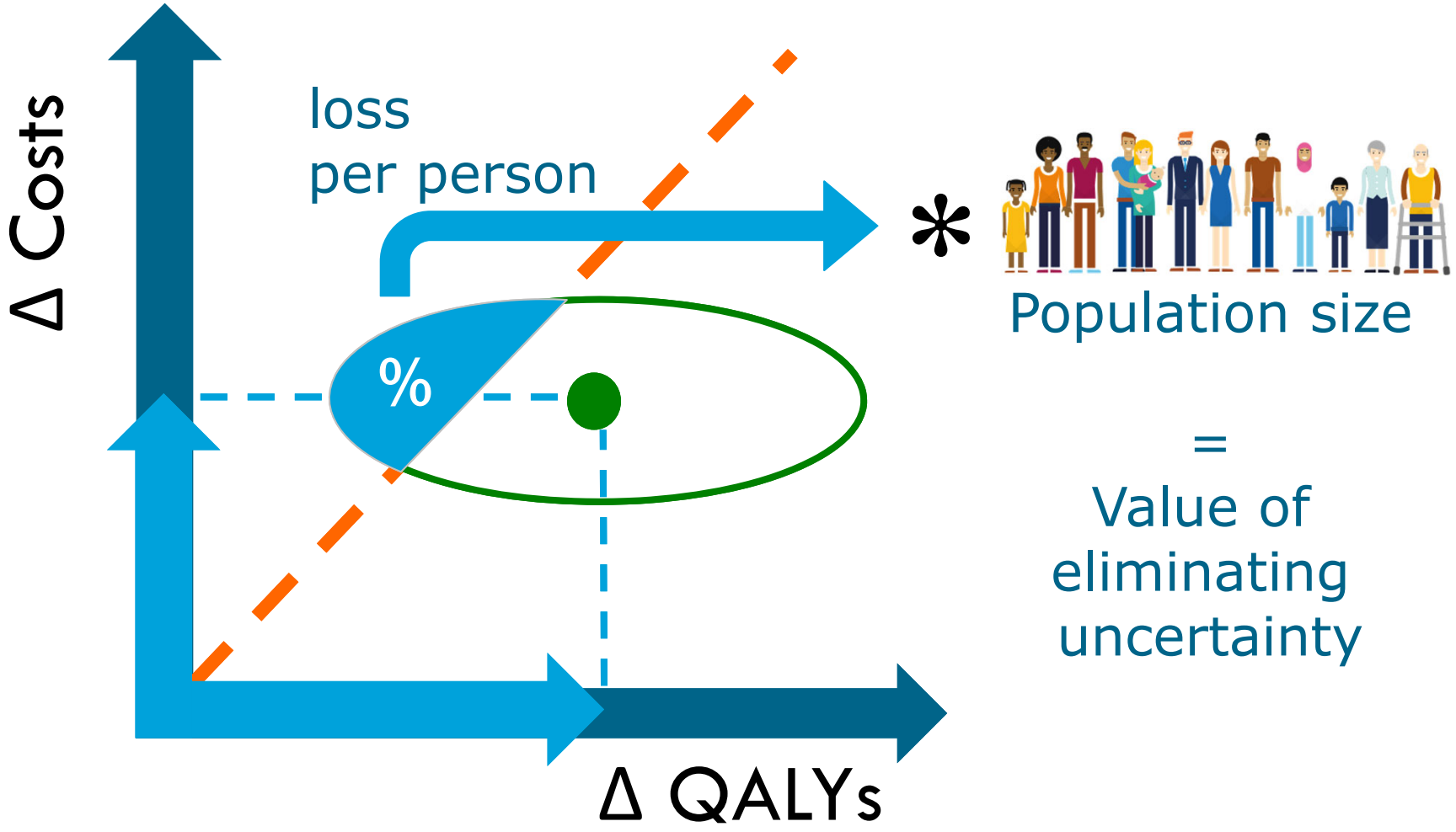
Probability

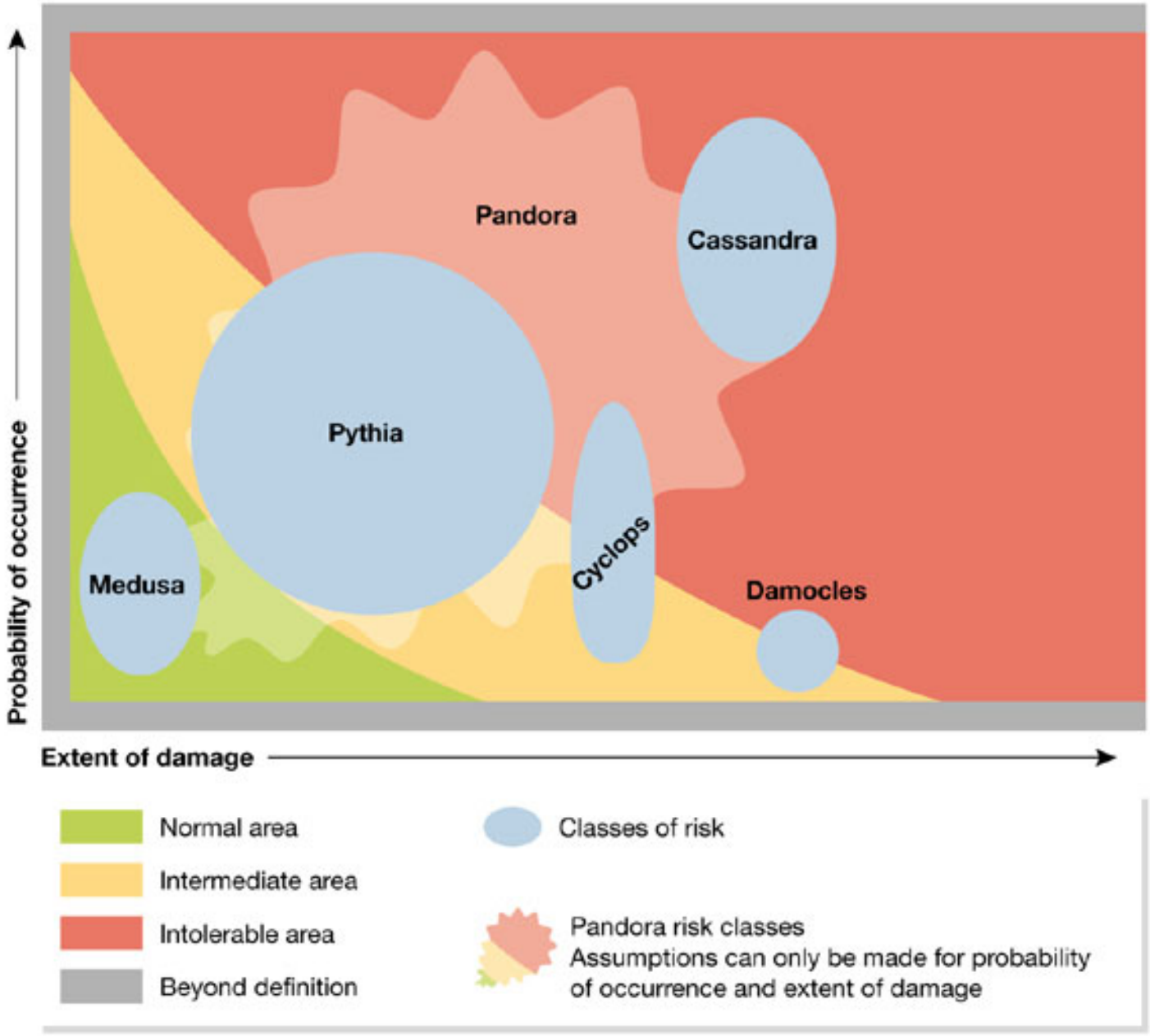


Impact of all uncertain model parameters simultaneously, on the acceptability of the outcome of the model, relative to the threshold

Probability & impact = Risk

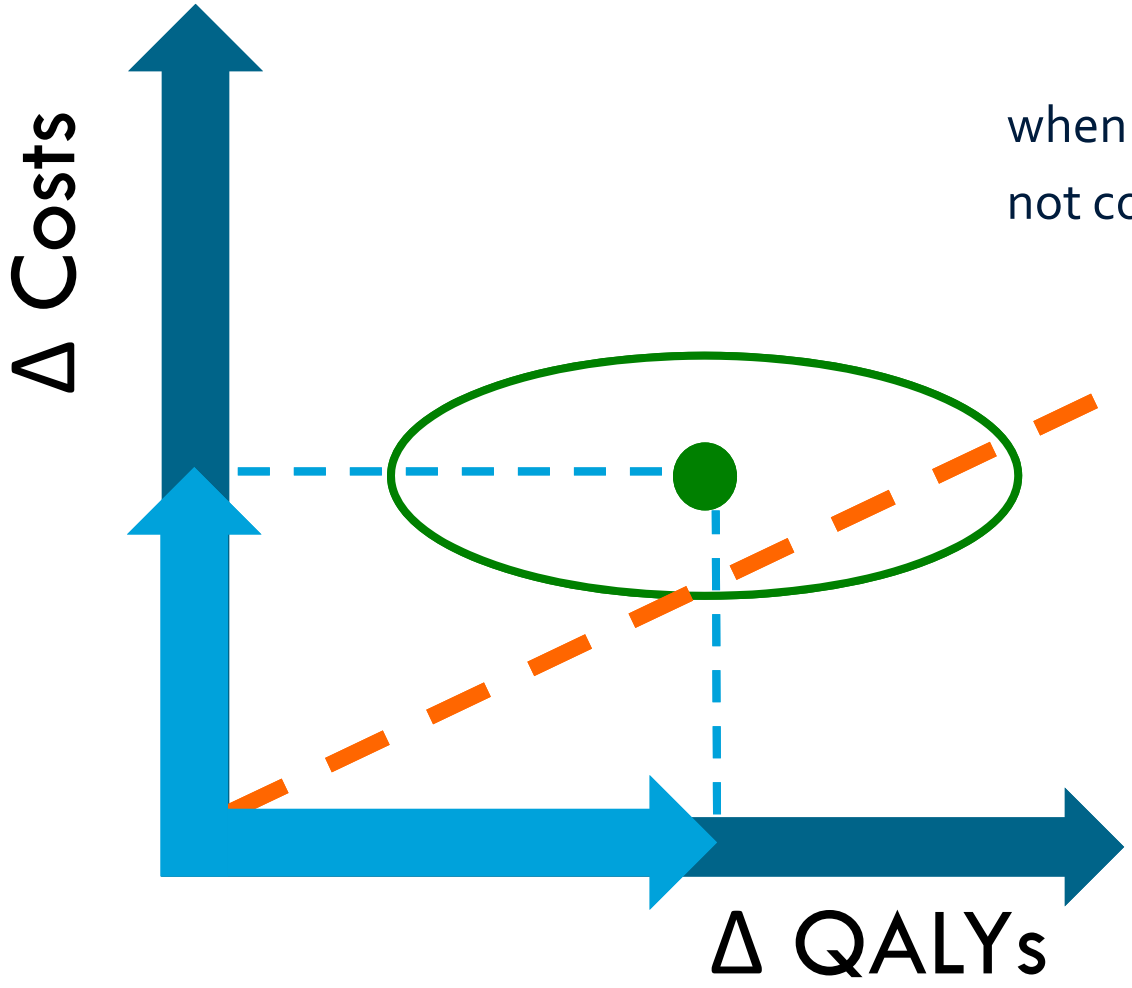
Value of information





Klinke & Renn
Systemic risks: a new challenge for risk management,
Volume: 5, Issue: S1,
Pages: S41-S46

Net loss



when recommending a
not cost-effective intervention

Topics in this presentation

- Uncertainty matters
- **Uncertainty intolerance**
- Ways forward

Value of science for society

"Of all its many values, the greatest must be the freedom to doubt."

Richard Feynman

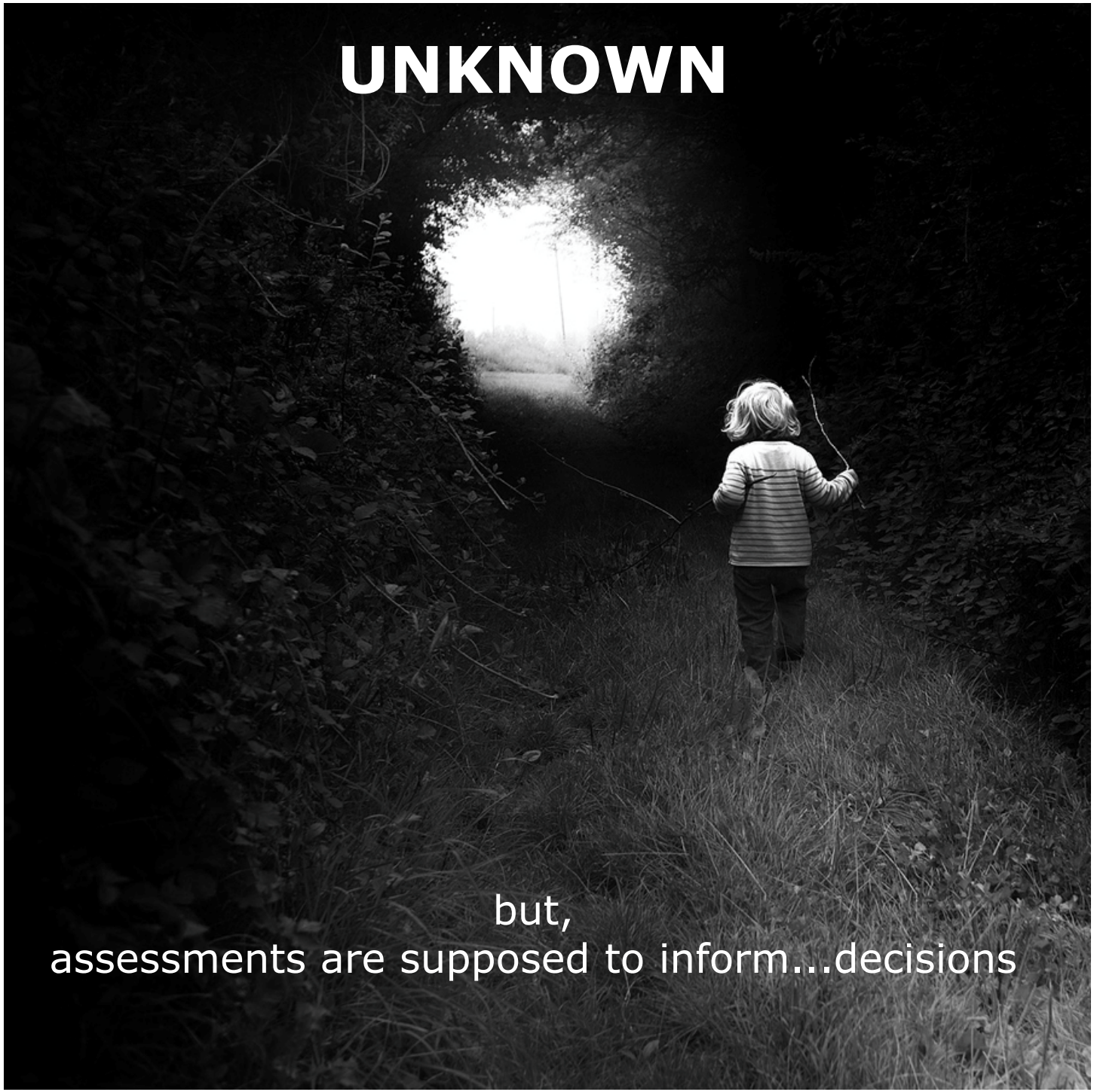
Journal of Cell Science

ESSAY

The importance of stupidity in scientific research

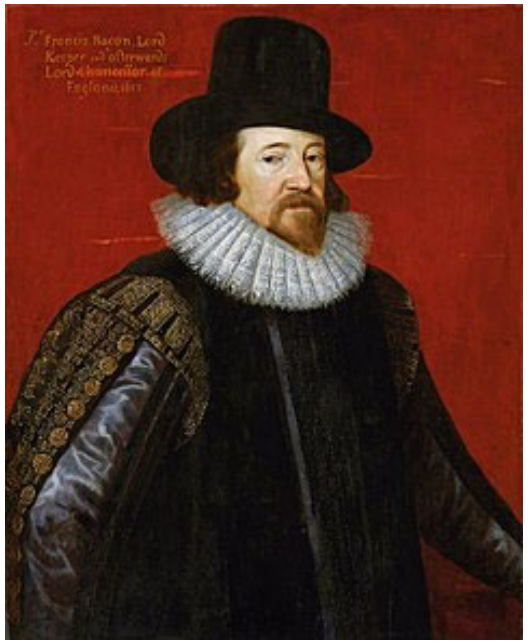
Martin A. Schwartz

Journal of Cell Science 2008 121: 1771 doi: 10.1242/jcs.033340


UNKNOWN
but,
assessments are supposed to inform...decisions

Knowledge is power

(Scientia Potentia Est
Attributed to Francis Bacon; Thomas Hobbes, Leviathan, 1668)



- Uncertainty intolerance Van Asselt; Grutters
  - Uncertainties are deemed irrelevant & evaded
  - Unwillingness to demand and systematically produce uncertainty information
  - Lack of openness towards the possible inconclusiveness of science

Uncertainty intolerance

- "Society" prefers quantification
- Consequence is dramatic simplification
  - Model = blinder
  - Ignoring uncomfortable knowledge and aspects of which we know little
- Generates controversies and erodes trust
  - Fails to take stakeholder views into account
  - Increases fragility to unknowns

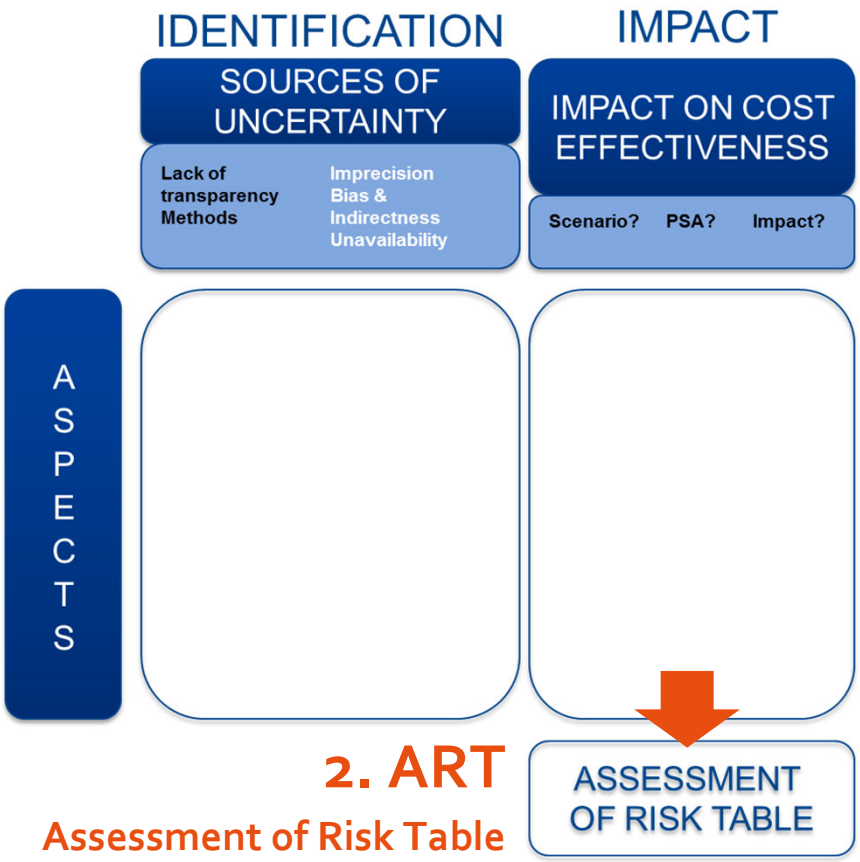
Topics in this presentation

- Uncertainty matters
- Uncertainty intolerance
- **Ways forward: a framework for**
  - **identification,**
  - **assessment,**
  - **communication of uncertainty**

Framework: TRUST, ART & ARC

1. TRUST

TRansparent Uncertainty aSsessmenT

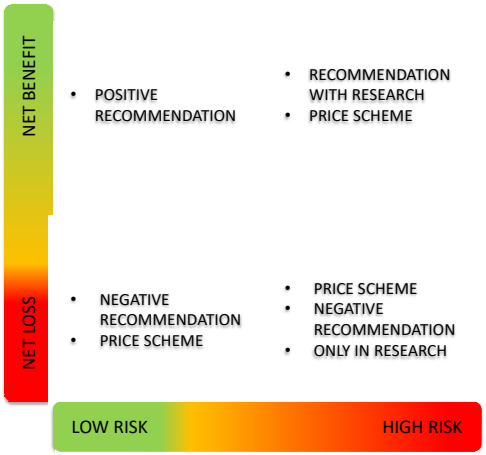


2. ART

Assessment of Risk Table

3. ARC

Appraisal of Risk Chart



Development of the framework

- Literature review
- Group interview with stakeholders of Dutch Health Care Institute
- Application on case studies
- Interviews with policy advisors and researchers (n=10)

Identifying: Understanding uncertainty as a two-dimensional concept (Walker W. et al., 2003)

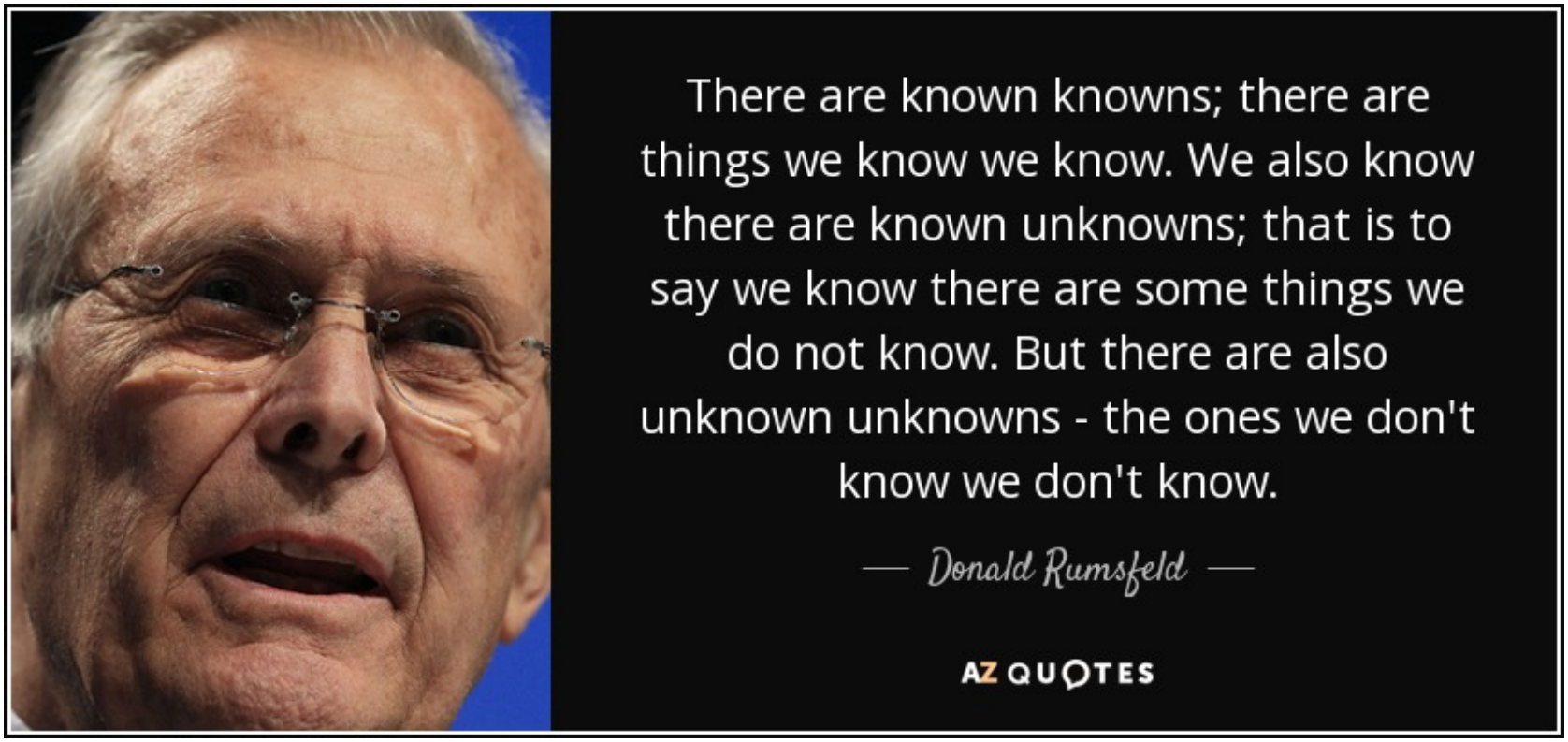
Level (*source*)

- From determinism to ignorance

Location (*model aspects*)

- Model context / boundaries
- Model structure
- Model inputs / parameters
- Model implementation
- Model outcome (accumulated)

Level of uncertainty: Known knowns, known unknowns, unknown…



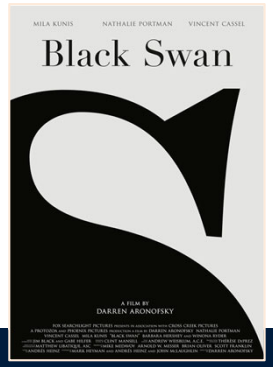
Level (*source*) of uncertainty

Level of uncertainty

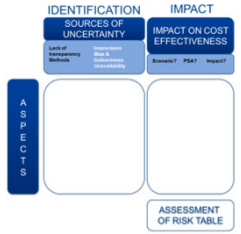
Known known
Imprecision

Known unknown
Bias:
Lack of observations
Conflicting observations

Unknown unknown
Ignorance



TRUST: Aspects of the assessment

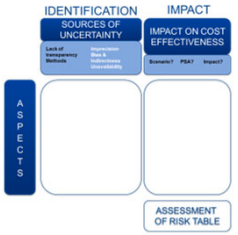


ASPECTS

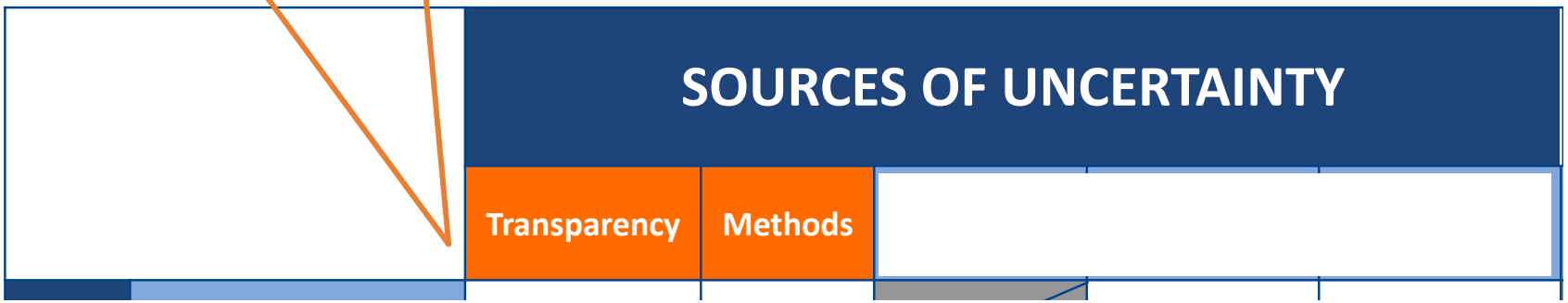
- Context/ scope
- Model structure
- Selection of evidence
- Model inputs
- Model implementation
- Model outcomes

- Scoping/ definition of the decision problem
- Identification and selection (systematic review)
- e.g. (relative) effectiveness, quality of life, resource use and costs
- e.g. running time, usability for decision making

TRUST: identification of uncertainty

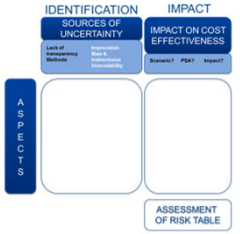


Clarity in presentation
Description/justification of methods

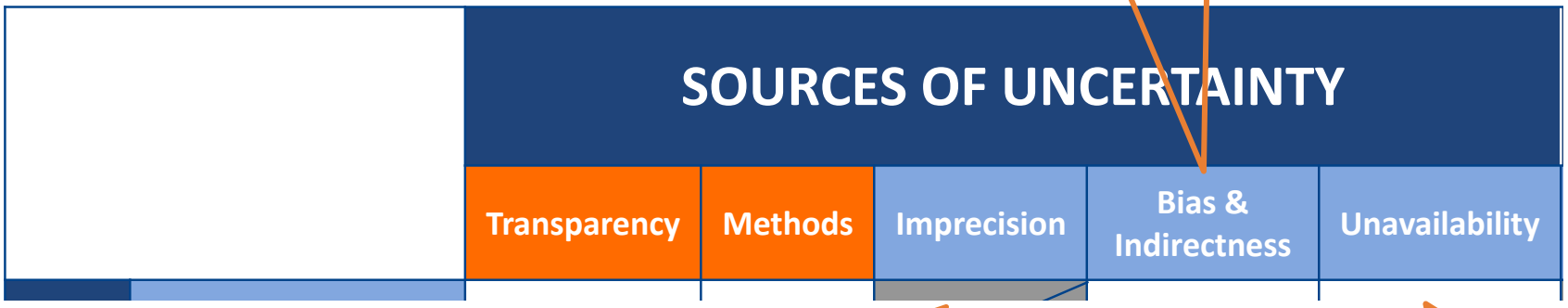


Are best research practice guidelines followed?
Is the 'reference case' followed?

TRUST: identification of uncertainty



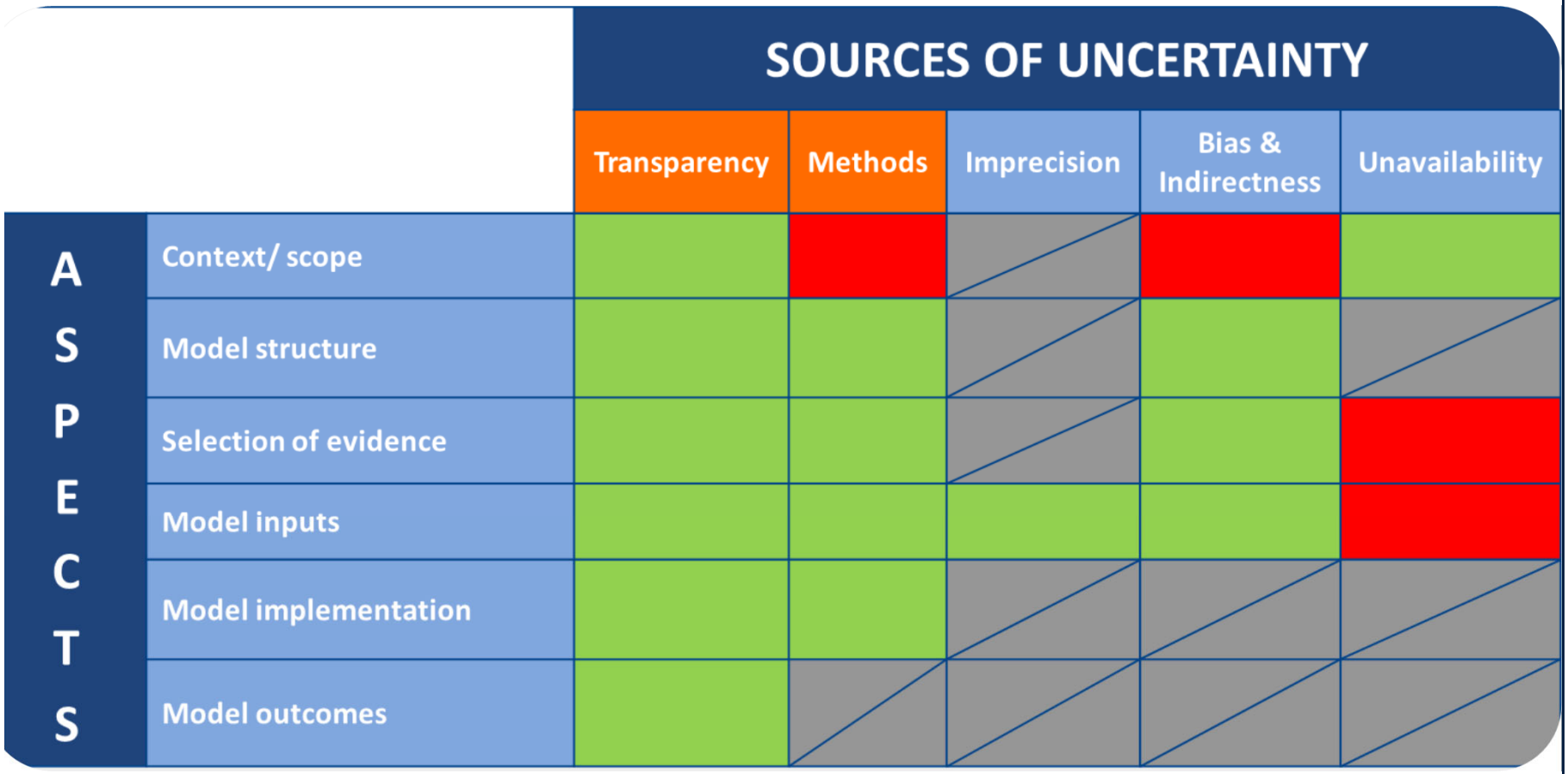
Not the 'ideal' observations



Limited number of observations, large confidence interval

No observation

TRUST: identification of uncertainty



TRUST: Impact on cost effectiveness

IMPACT ON COST EFFECTIVENESS		
Included in PSA?	Explored through a scenario analysis?	High impact on cost effectiveness?

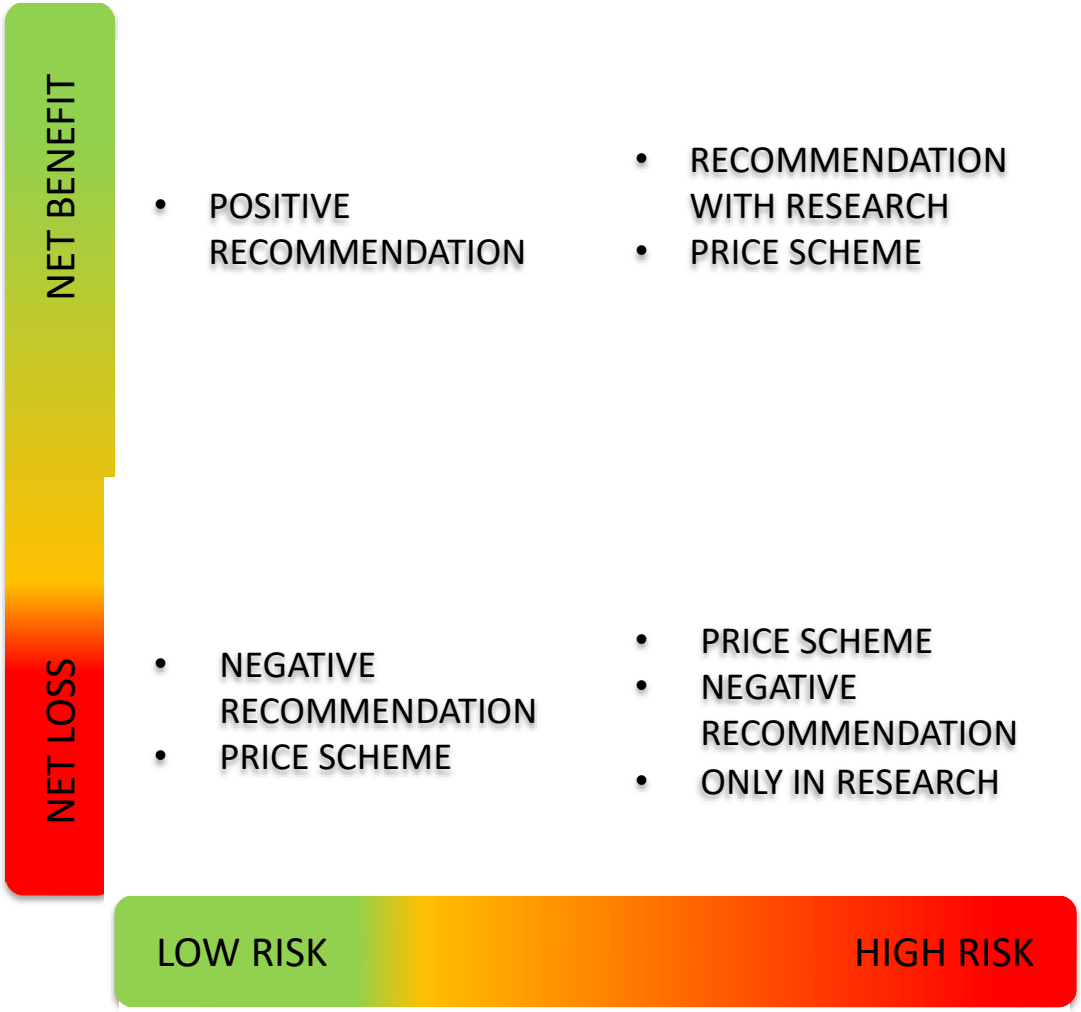
TRUST:
identification and impact on cost effectiveness

		SOURCES OF UNCERTAINTY					IMPACT ON COST EFFECTIVENESS		
		Transparency	Methods	Imprecision	Bias & Indirectness	Unavailability	PSA?	Scenario?	High impact?
ASPECTS	Context/ scope								
	Model structure								
	Selection of evidence								
	Model inputs								
	Model implementation								
	Model outcomes								

Assessment of Risk Table (ART)

Summary of cost effectiveness results (threshold € 20,000)			
ICER (mean)	€ 27,000	ICER (lower)	Not reported
% cost-effective	36 %	ICER (upper)	Not reported
Risk metrics			
EVPI (A):	€ 2.4 m		
Net loss (B):	€ 4.5 m		
Risk (A+B):	€ 6.9 m		
Uncertainties with high impact identified in TRUST tool			
In PSA:	Relative effectiveness	Cost of the technology	
Not in PSA:	Different use of the technology	Adverse event risk associated with radiation	Impact on quality of life; model structure

Appraisal of Risk Chart (ARC)



Framework: TRUST, ART & ARC

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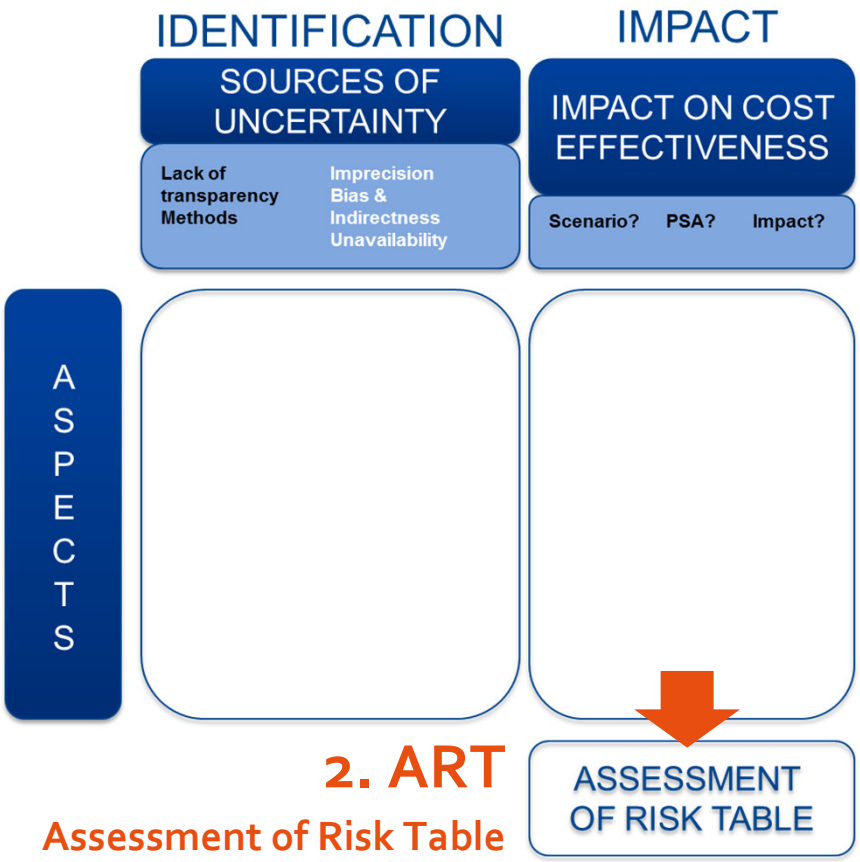

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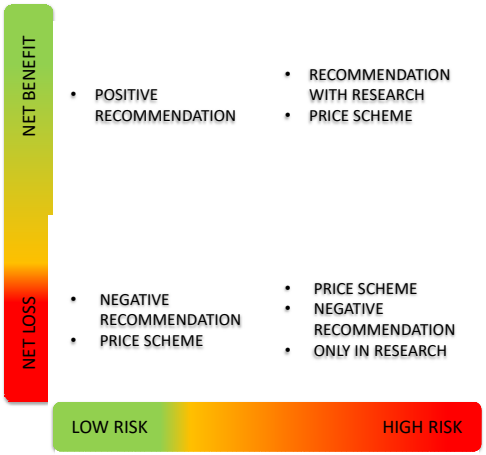

Conclusion

- We show probability (of cost-effectiveness), but probability ≠ risk
- In some/many cases, risk itself is uncertain,
- But society is uncertainty intolerant (and so are we…),
- And models are often used as blinders,
- As a result, decision making is hampered.

- Ways to do better:
  - Identify
  - Assess
  - Communicate
  - & Manage
  - Uncertainty

Question 1

- Does the TRUST tool contain the information needed and is it clear?

		SOURCES OF UNCERTAINTY					IMPACT ON COST EFFECTIVENESS		
		Transparency	Methods	Imprecision	Bias & Indirectness	Unavailability	PSA?	Scenario?	High impact?
ASPECTS	Context/ scope								
	Model structure								
	Selection of evidence								
	Model inputs								
	Model implementation								
	Model outcomes								

Question 2

- Is the information in ART complete and understandable?

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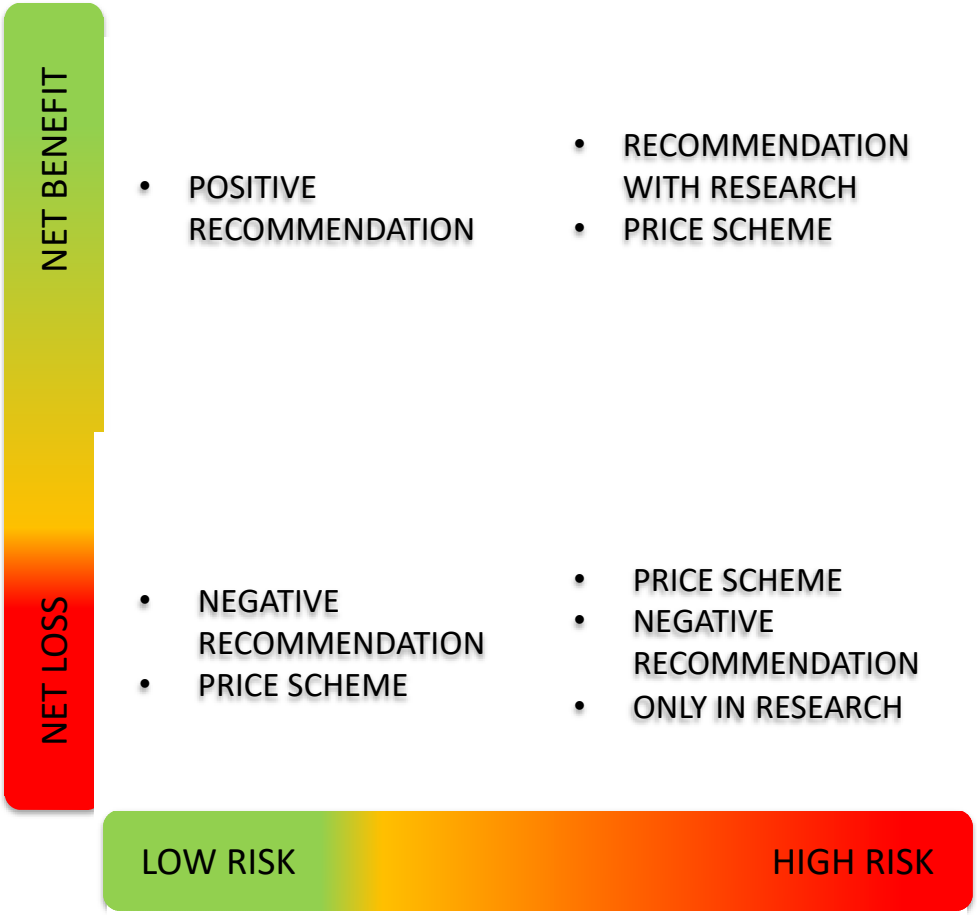
Question 3



Are the risk management options in the risk assessment chart clear and complete?

Thank you!

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