



**Ethics and research**



# General Ethical Principles

A computing professional should...

**Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing**

**Avoid harm**

**Be honest and trustworthy**

**Be fair and take action not to discriminate**

**Respect the work required to produce new ideas, inventions, creative works, and computing artifacts**

**Respect privacy**

**Honor confidentiality**

# PROFESSIONAL RESPONSIBILITIES

Strive to achieve high quality in both the processes and products of professional work

Maintain high standards of professional competence, conduct, and ethical practice

Know and respect existing rules pertaining to professional work

Accept and provide appropriate professional review

Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks

Perform work only in areas of competence

Foster public awareness and understanding of computing, related technologies, and their consequences

Access computing and communication resources only when authorized or when compelled by the public good

Design and implement systems that are robustly and useably secure

# Example: Axiology and Artificial Intelligence

## Two different opinions:

Science and research in AI should be seen as neutral and value-free; the value of science is given by its users.

Science and research in AI Research is not neutral, is always rooted in certain values and beliefs – its axiology – which serve certain purposes.



# Sustainability Concepts

## Weak Sustainability

- Natural, human and reproducible capital can be substituted for each other.
- Natural, human and reproducible capital are an aggregate, homogeneous stock.
- Natural capital should be used efficiently over time.
- As long as depleted natural capital is replaced with even more valuable reproducible and human capital, then the value of the aggregate stock will increase.
- Maintaining and enhancing the value of this aggregate capital stock is sufficient for sustainability.

## Strong Sustainability

- Cannot always substitute for natural capital with reproducible or human capital.
- Cannot view natural, reproducible and human capital as a homogeneous stock.
- Certain environmental sinks, processes and services are unique and essential, subject to irreversible loss, and there is uncertainty over their future value and importance.
- Maintaining and enhancing the value of the value of the aggregate capital stock is necessary but not sufficient.
- Sustainability also requires preserving unique and essential natural capital.

# Big Data and Research

Recent reports of malpractices by major Big Data-enabled enterprises such as Facebook and Google compromise user privacy.

**Are there other examples of unethical Research? First we need to ask ourselves, what is the relationship between Bigdata and Reerach?**

General definitions of Big Data:

“the current techniques and technologies may not be able to handle [its] storage and processing” (Suthaharan, 2014, p. 70).

“a capacity to search, aggregate, and cross-reference large data sets” (Boyd & Crawford, 2012, p. 663)

Authors differentiate between:

- Research with Big data
- Research on Big Data



# Axiology and Data use

Both fields are similar but different:

- Research with Big Data need not always be research on Big Data issues
- Research on Big Data may involve other methods

What defines topics on both fields?

## Axiology

Research is always rooted in certain values and beliefs – its axiology – which serve certain purposes.

In the view of axiology, science is seen as neutral and value-free; the value of science is given by its users.  
Authors differentiate between two Axiologies:

Administrative Axiology

Critical Axiology

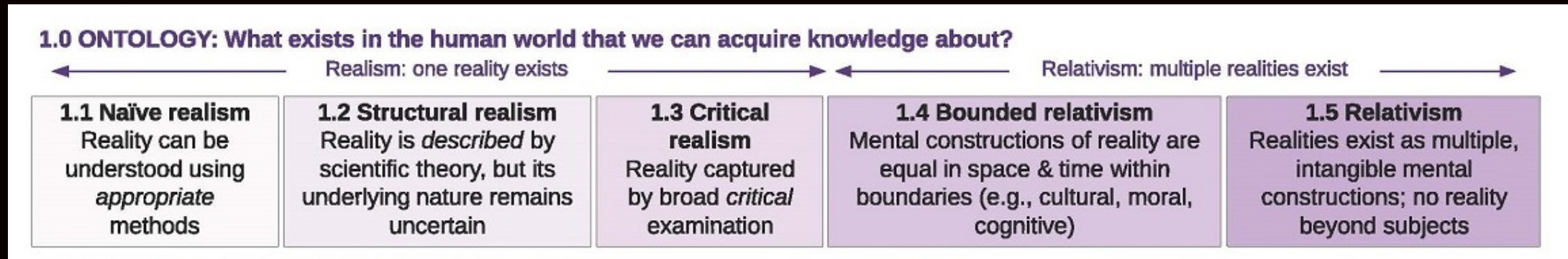




# Axiology, Ontology and Epistemology

Heuristics are mental shortcuts that can facilitate problem-solving and probability judgments. These strategies are generalizations, or rules-of-thumb. We use heuristics to make decisions fast, based on general rules, or logics that may be or not optimal. They are related to cognitive biases. Biases and heuristics are part of our automatic or intuitive system of thinking, and they occur without our awareness.

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## 2.0 EPISTEMOLOGY: How do we create knowledge?

### 2.1 Objectivism

Meaning exists within an object: an objective reality exists in an object independent of the subject

### 2.2 Constructionism\*

Meaning created from interplay between the subject & object: subject *constructs* reality of object

### 2.3 Subjectivism

Meaning exists within the subject: subject imposes meaning on an object

# Axiology, Ontology and Epistemology

Our Ontology and Epistemological position impacts/determines our theoretical perspective

## 3.0 THEORETICAL PERSPECTIVE: What is the philosophical orientation of the researcher that guides their action/research?

Knowledge acquisition is deductive, 'value-free', generalizable ←→ Knowledge acquisition is inductive, value-laden, contextually unique

### Application: to predict

#### 3.1 Positivism

Natural science methods (posit, observe, derive logical *truths*) can be applied to the social sciences

#### 3.2 Post-positivism

Multiple methods are necessary to identify a *valid* belief because all methods are imperfect

**3.3 Structuralism** The source of meaning comes from the formal structure found in language & can apply to all aspects of human culture

### Application: to understand

**3.4 (Social) Constructivism** Meaning making of reality is an activity of the individual mind

**3.5 Interpretivism** Natural science methods cannot apply to social science; interpretations of reality are culturally derived & historically situated

#### 3.5a Hermeneutics

Hidden meaning (of language) exists in texts, practices, events & situations, beneath apparent ones

#### 3.5b Phenomenology

The essence of human experience of phenomena is only understood when the researcher separates their own experiences

#### 3.5c Symbolic interactionism

The researcher must take the position of those researched (interaction) by sharing language & other tools (symbols)



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## Application: to emancipate or liberate

**3.6 Critical theory** Research & theory should be used to change situations (focuses on power relations, critiques assumptions & evolves)

### 3.6a Emancipatory

The subjects of social inquiry should be empowered

### 3.6b Advocacy or participatory

Politics & political agendas should be accounted for

### 3.6c Feminism

The world is patriarchal & the culture it inherits is masculine



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**Application: to deconstruct**

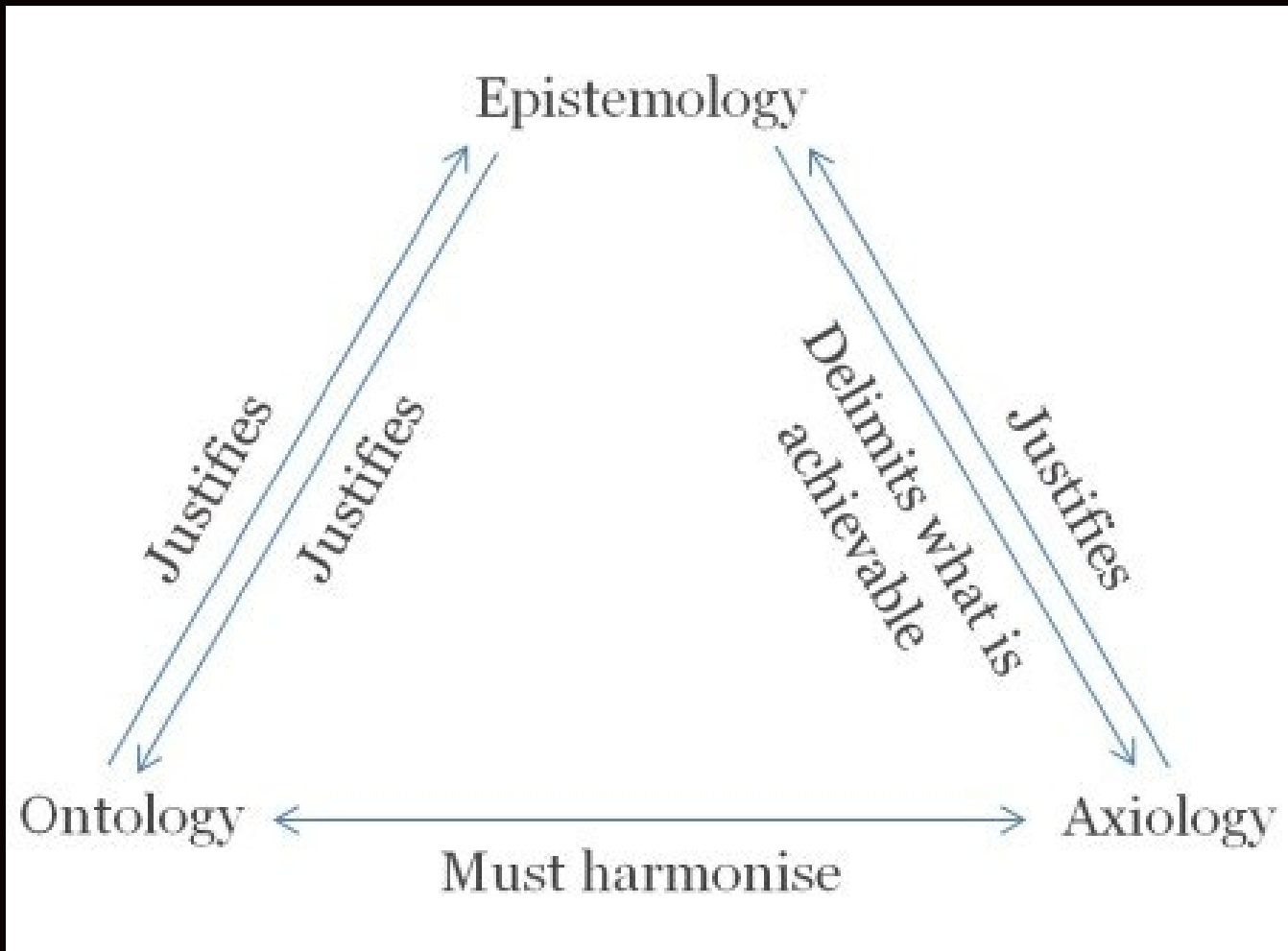
**3.7 Post-structuralism** Different languages & discourses divide the world & give it meaning

**3.8 Post-modernism** Truth claims are socially constructed to serve interests of particular groups, methods are equally distrusted; might not be possible to arrive at any conclusive definition of reality

**Application: any or all**

**3.9 Pragmatism** All necessary approaches should be used to understand research problem

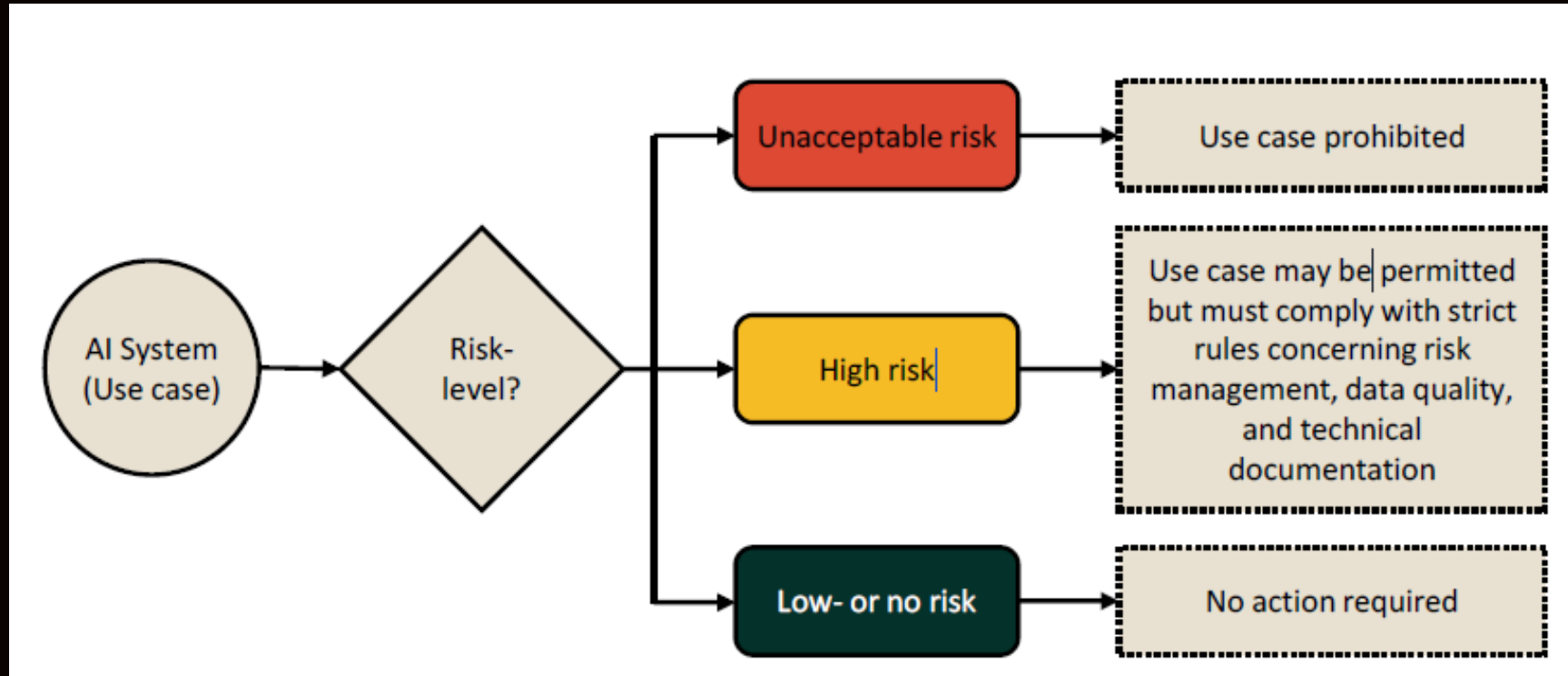
# Axiology, Ontology and Epistemology



Delimiting and justifying what we do as researchers generates limits to Science.

# Limits to Research: Axiology in AI & Biomedical science

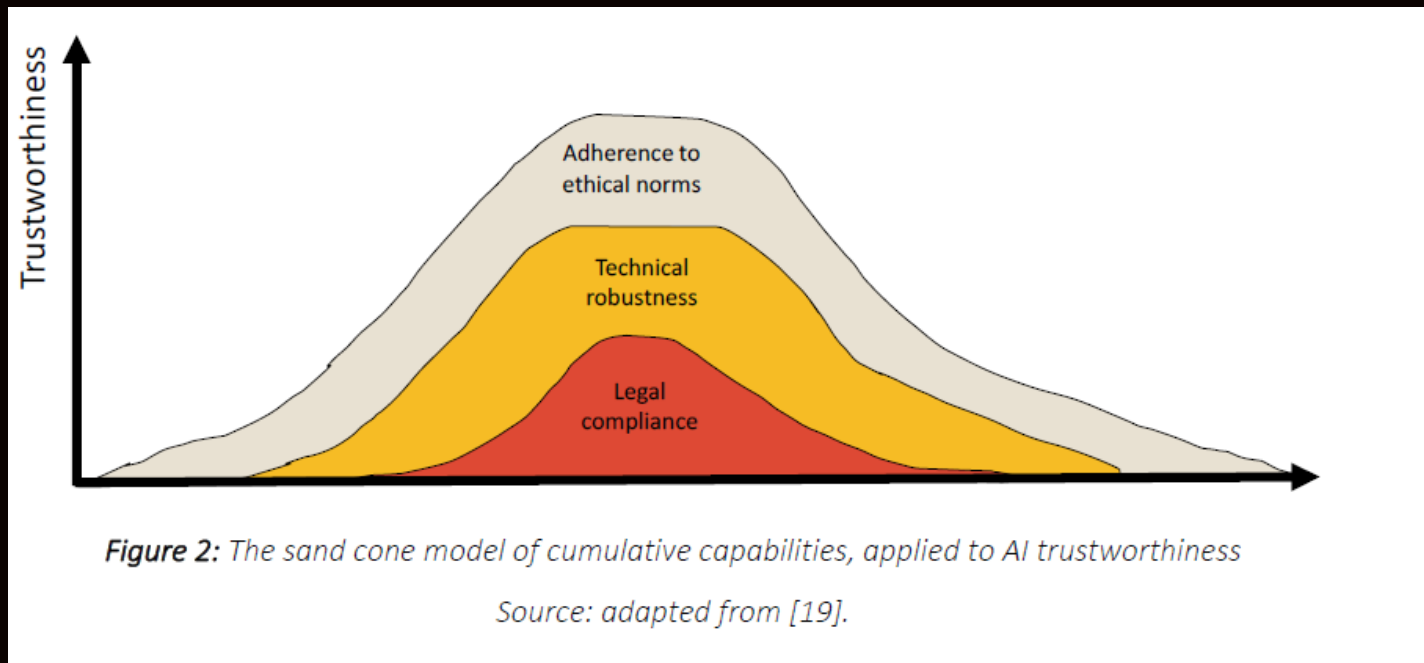
Risk categories for AI use cases under the AIA





# Principles for trustworthy AI and BS

- 1. Lawful:
- 2. Technically robust
- 3. Ethical



# Example of AI Failure

## 1. Privacy intrusion (Lawful)

- consent to use the data
- consent to use the data for the intended purpose

## 2. Algorithmic bias (technical)

- Systematically disadvantages (or even exclusion) one group based on personal identifiers such as race, gender, sexual orientation, age or socio-economic background

## 3. Explicability (Ethical)

algorithms may reinforce (i) epistemic and (ii) normative concerns that can lead to unfair outcomes



# AI and industry

BY TACKLING BIAS IN AI SYSTEMS  
THROUGHOUT THE DEVELOPMENT AND  
MANAGEMENT OF THESE SYSTEMS,  
BUSINESSES CAN...

Mitigate risk

Maintain strong brand reputation

Have a superior value proposition

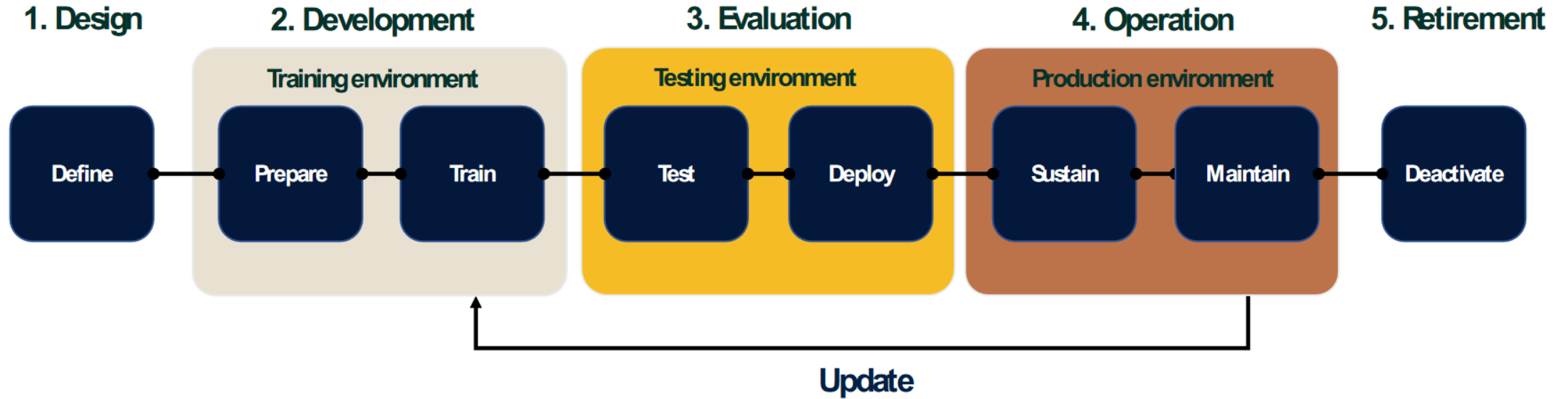
Stay ahead of forthcoming legislation

Be a competitive leader in the  
fast-paced industry

Why is this relevant not only for  
academic research?



# Identifying bias in technology lifecycle



*Figure 8: The five stages of the AI life cycle*

# THE PROBLEM



Statistical/ Computational Biases

Human Biases

Systemic Biases