BÜRO FÜR UMWELTETHIK

Gene Drives

A wider ethical perspective

Self-Propagation of Artificial Genetic Elements:
Gene Drives, Risks & Tipping Points
Bremen, 19.06.2018

Dr. Uta Eser

A wider ethical perspective

I. Conceptual Clarifications
II. Problem Orientation
III. Risk and Precaution

I.

Conceptual clarifications:

Facts, Values, and Norms

A matter of facts ?

There will be no more polar bears

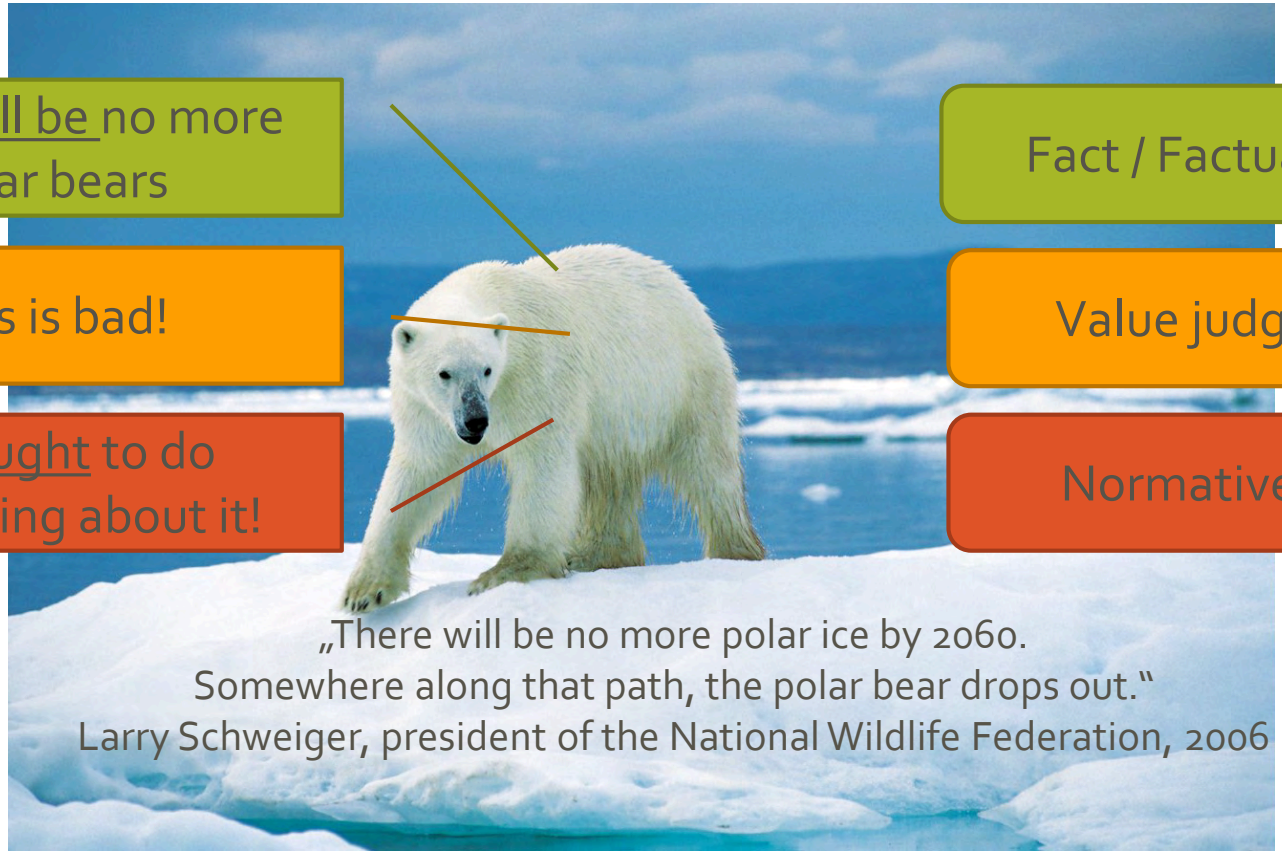
This is bad!

We ought to do something about it!

Fact / Factual claim

Value judgement

Normative claim



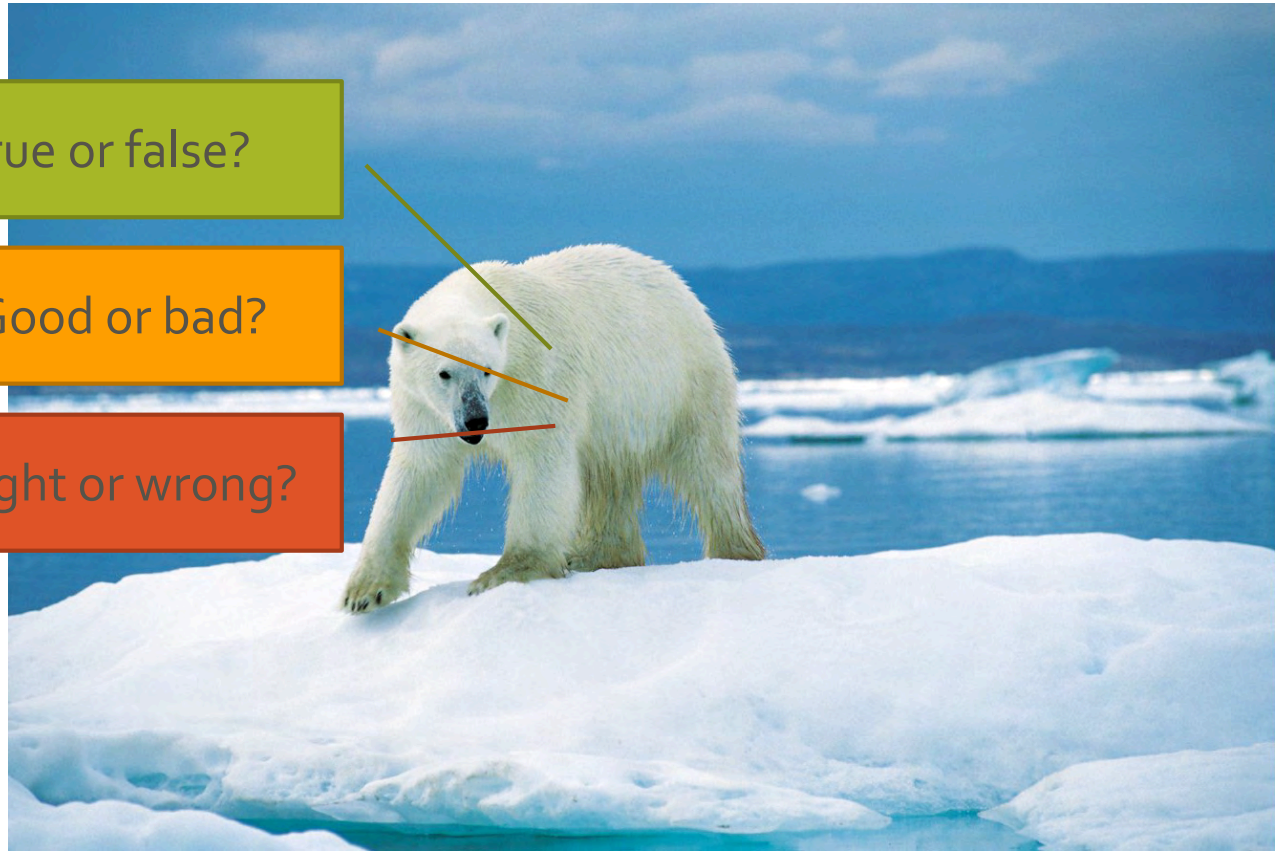
Polar bear on ice flow in Wager Bay (Ukkusiksalik National Park, Nunavut, Canada) / Ansgar Walk - Creative Commons

Disagreement

Fact: True or false?

Value: Good or bad?

Norm: Right or wrong?



➔ Values and norms stay in concealment behind presumed „facts"

Example

"The **deliberate and particularly effective propagation of artificial genetic changes** through SPAGE will inevitably lead to a new stage of intervention into natural ecosystems at a depth previously unknown." (https://www.genetip.de/en/project_tasks/)

1. **Scientific** question: true or false?
2. **Evaluative** question: good or bad?
3. **Normative** question: right or wrong?

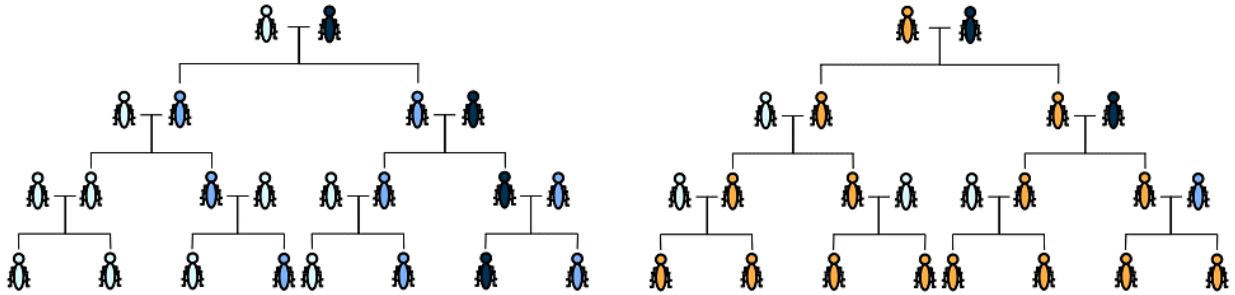


Image from https://www.genetip.de/de/aufgabenstellung/

Our questions: Fact or Value?

Value

Value

Value

Value

Facts

Facts

Norm

Facts

Facts

At the conference we will discuss th uestions:

- How powerful and reliable are current SPAGE technologies?
- How vulnerable are affected systems and how can relevant tipping points be identified by prospective risk assessment?
- How to regulate these technologies in the light of the precautionary principle?
- Can risks combined with self-enforcing dynamic processes (tipping points) be identified?

Thick concepts

Definition:

Concepts that combine evaluation and non-evaluative discription

Examples

- Generous
- Cruel
- Selfish
- Dangerous

SPAGE/ Gene Drives

- Reliability
- Vulneration
- Regulation
- Risk

II.

Problem Orientation:

Gene Drive Technology as Tool

Gene drives – a (powerful) tool

Tools are means to specific ends

➔Their assessment depends on the purpose of use

Nail

Window

Head

Technology-centred approach

Applications of Gene Drives

BOKU I S R
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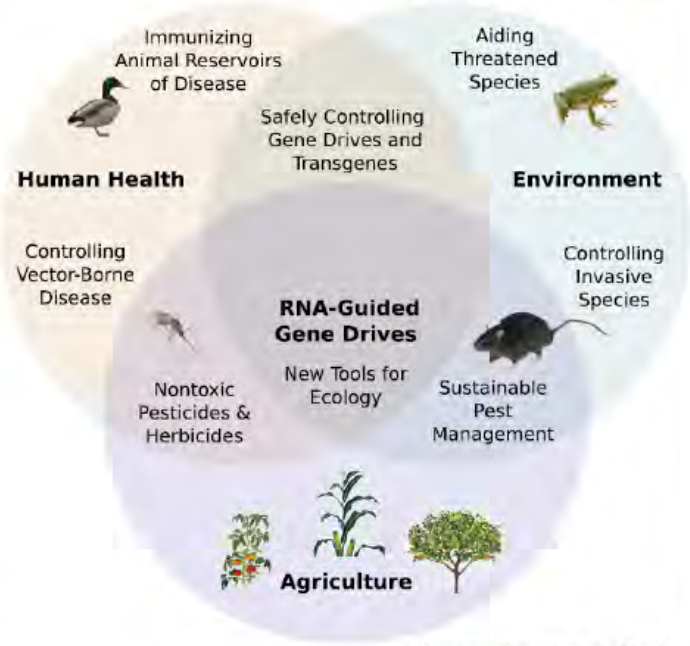
- Medical:
  - Immunization or elimination of disease vectors
- Agricultural:
  - Elimination of plant and animal pests
  - Control of pesticide-resistant weeds
- Ecosystem ‚engineering':
  - Invasive species (e.g. in New Zealand)
  - Immunization of endangered species



Source: Esvelt et al. 2014

14

Source: Giese et al. GeneTip 2018, 14

Problem-centred approach

"If your only tool is a hammer every problem looks like a nail."
(Paul Watzlawick)

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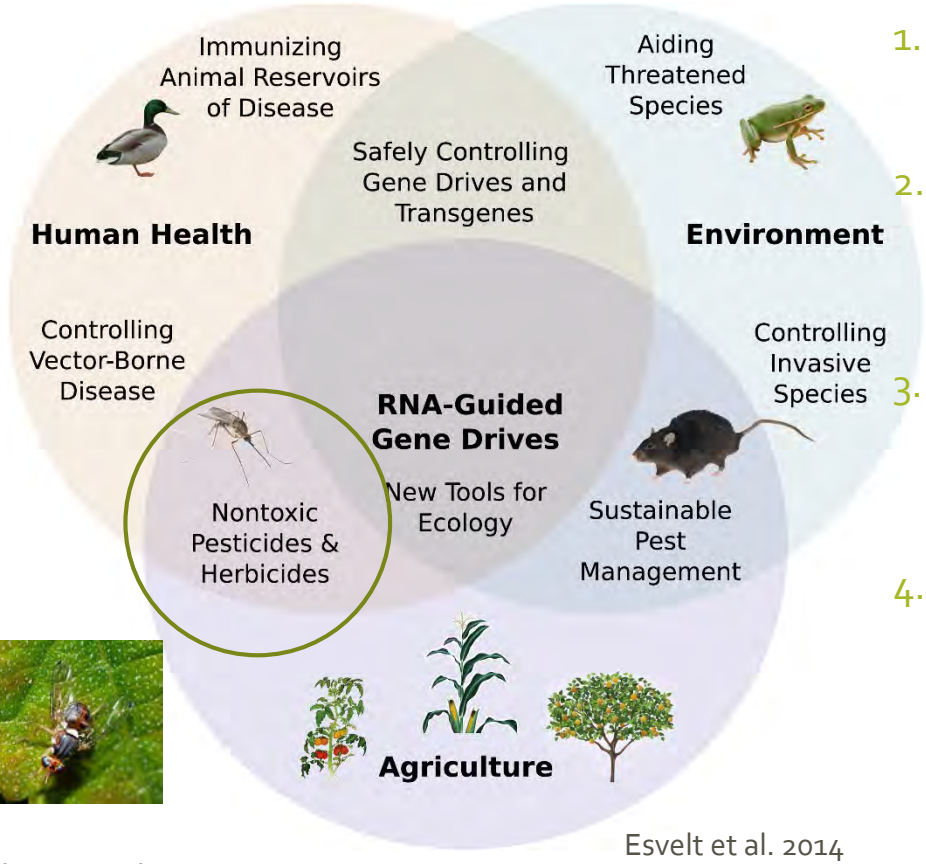
Step 1: What's at stake?

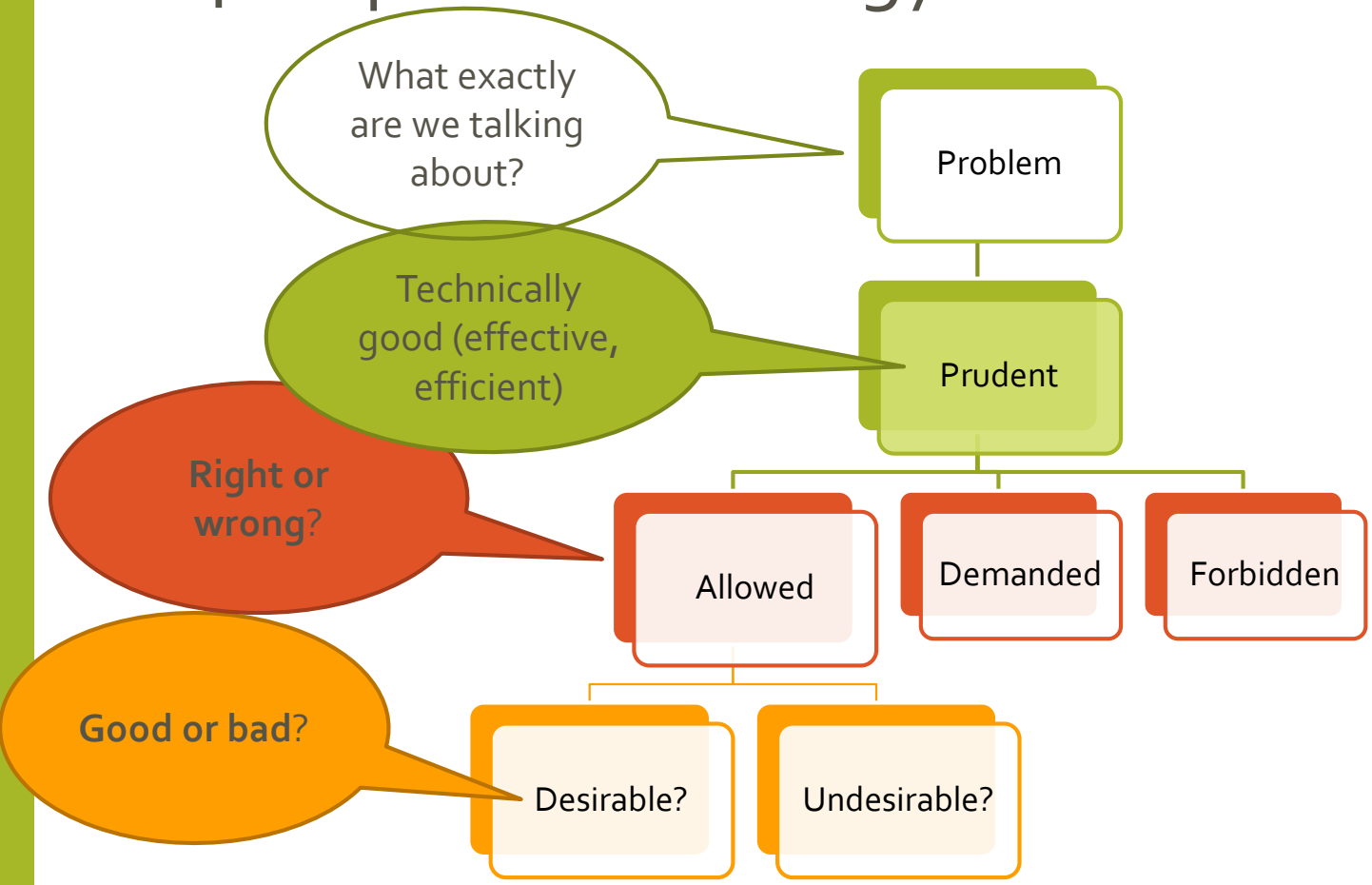


Esvelt et al. 2014

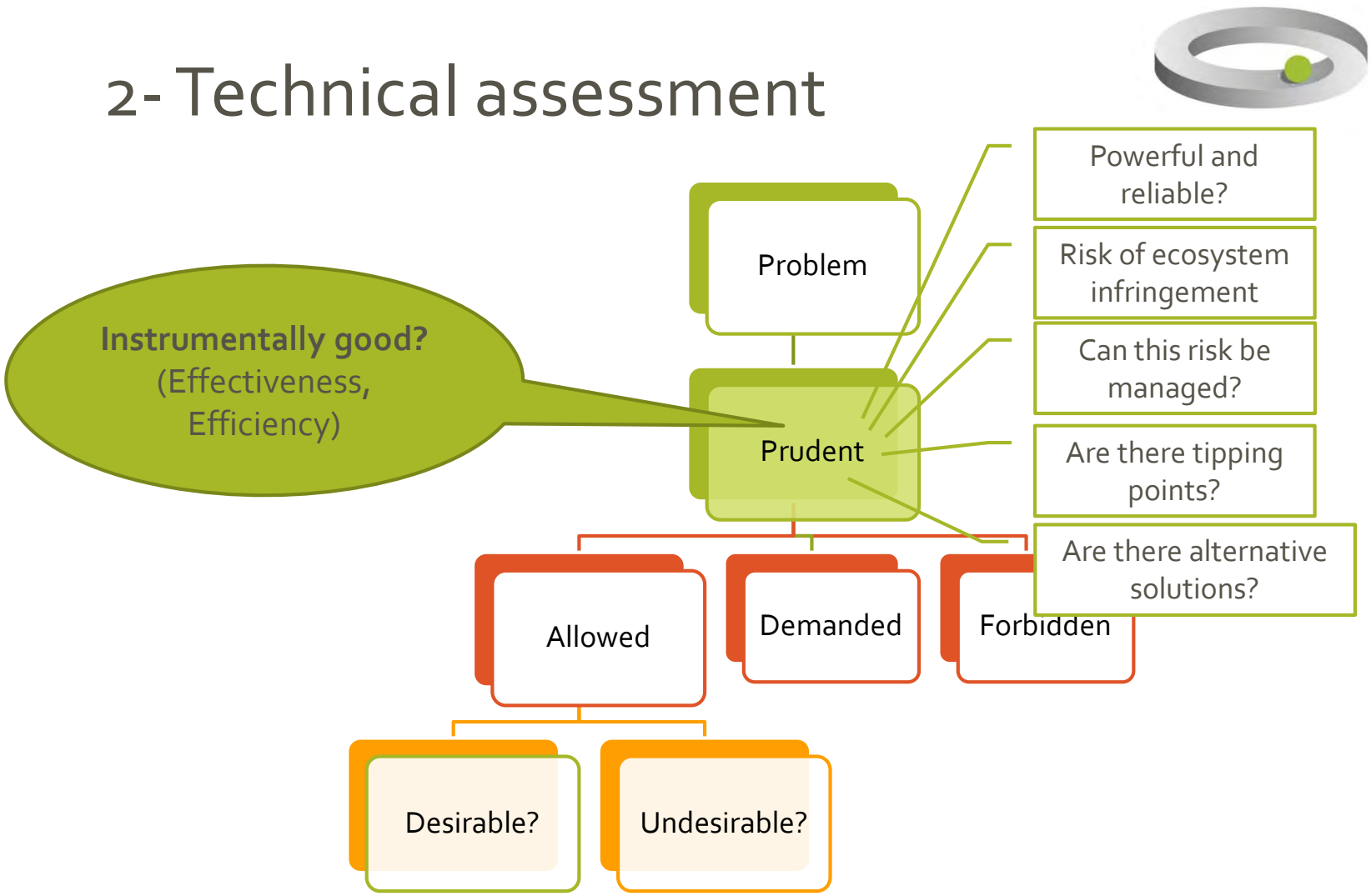
1. Definition of the problem at stake
2. Technical assessments:
   Is GD an **appropriate** tool
   (= effective and efficient)
3. Moral assessment:
   Are we **allowed** to use this tool?
4. Ethical assessment:
   Do we **want** to use this tool?

Olive Fruit Fly /
Alvesgaspar – Wikimedia Commons

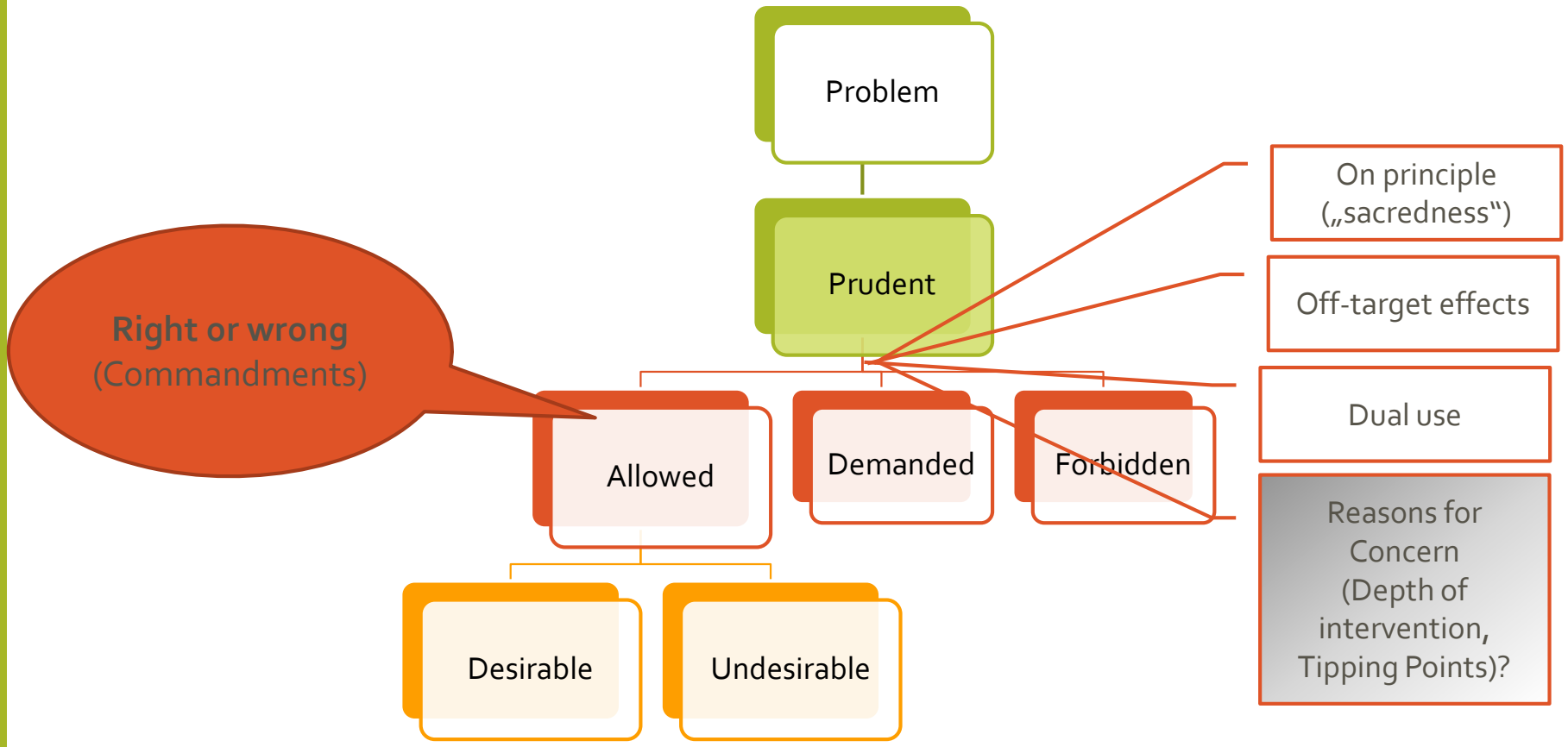
4 Steps of Technology Assessment



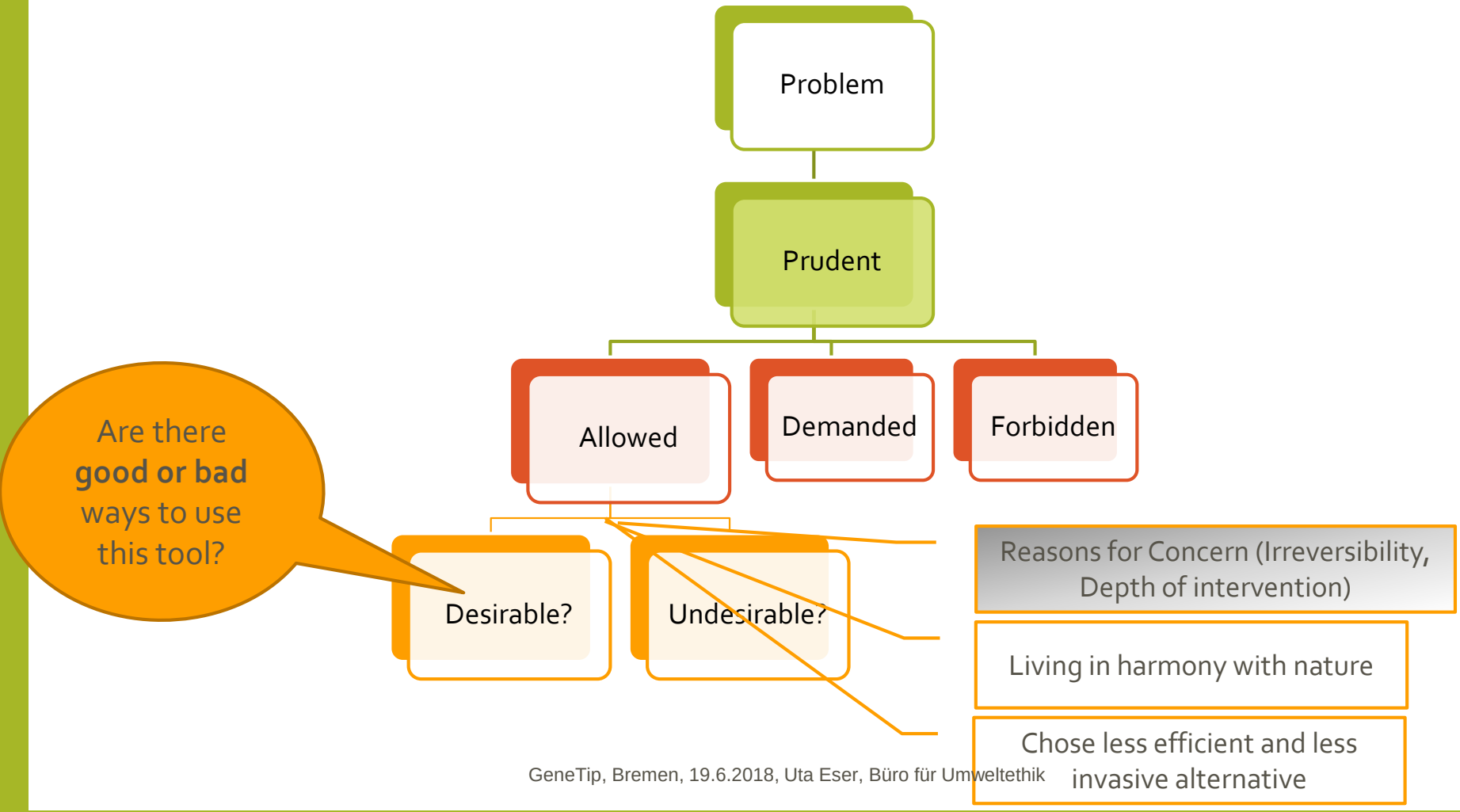
2- Technical assessment



3- Normative Assessment



4- Evaluation



Rio-Declaration (1992)

Principle 1

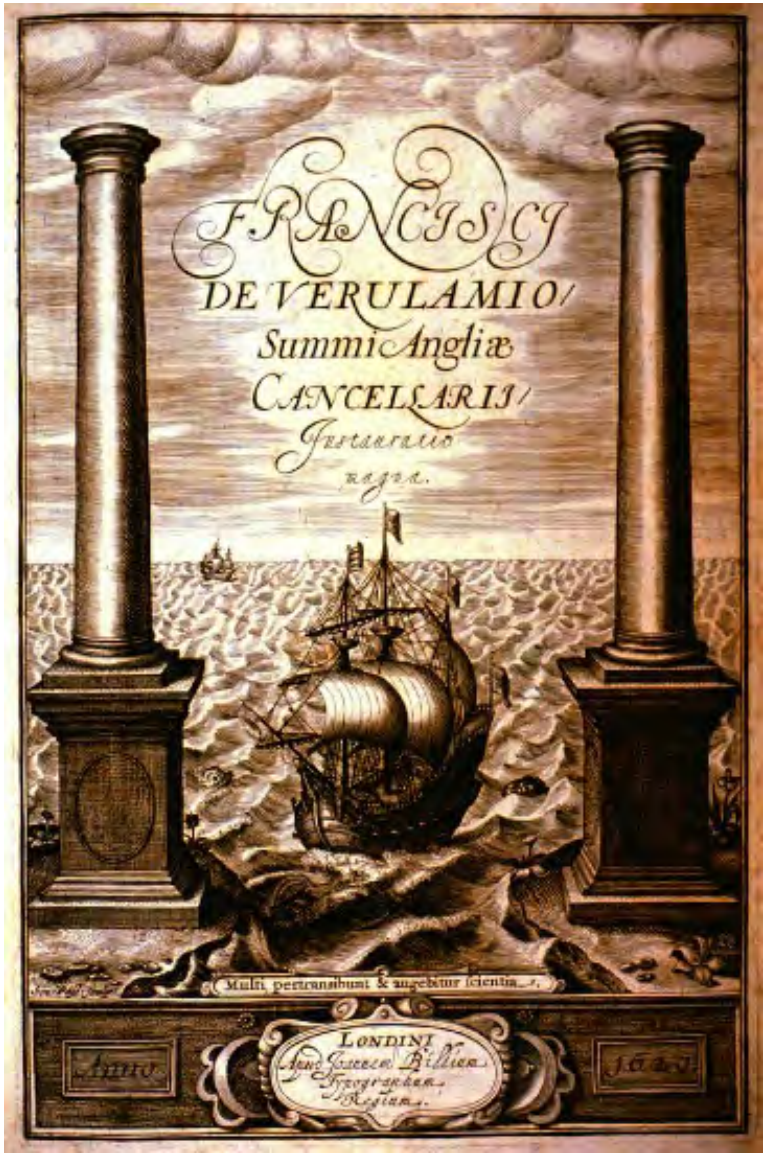
- Human beings are at the centre of concerns for sustainable development.
- They are entitled to a healthy and productive life **in harmony with nature**.

Romolo Tavani - Fotolia

III.

Risk and Precaution

Risk



Francis Bacon (1629):
Great Instauration.
Frontispiece – Wikimeadia Commons

Risk

Much to lose!

A lot to win!

https://www.aktion-mensch.de/ueber-uns/chronik/chronik-detail.html#abschnitt-1984-1993

Trade-offs

Potential losses

Potential benefíts

Small Steelyaed/ Andreas Praefcke – Wikimedia Commons

Rio-Declaration (1992)

- **Principle 15**
- In order to protect the environment, the **precautionary approach** shall be widely applied by States according to their capabilities.
- Where there are threats of serious or **irreversible damage**, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Better Safe Than Sorry Hard Hat Decal / duradecals - ebay

Nothing to lose …

"You had much better go with us, Chanticleer," said the ass. "We are going to Bremen. **At any rate that will be better than dying.** You have a powerful voice, and when we are all performing together it will have a very good effect."

So the cock consented, and they went on all four together…

Town Musicians of Bremen by Gerhard Marcks (1953) / Wuzur – Wikimedia Commons

IV

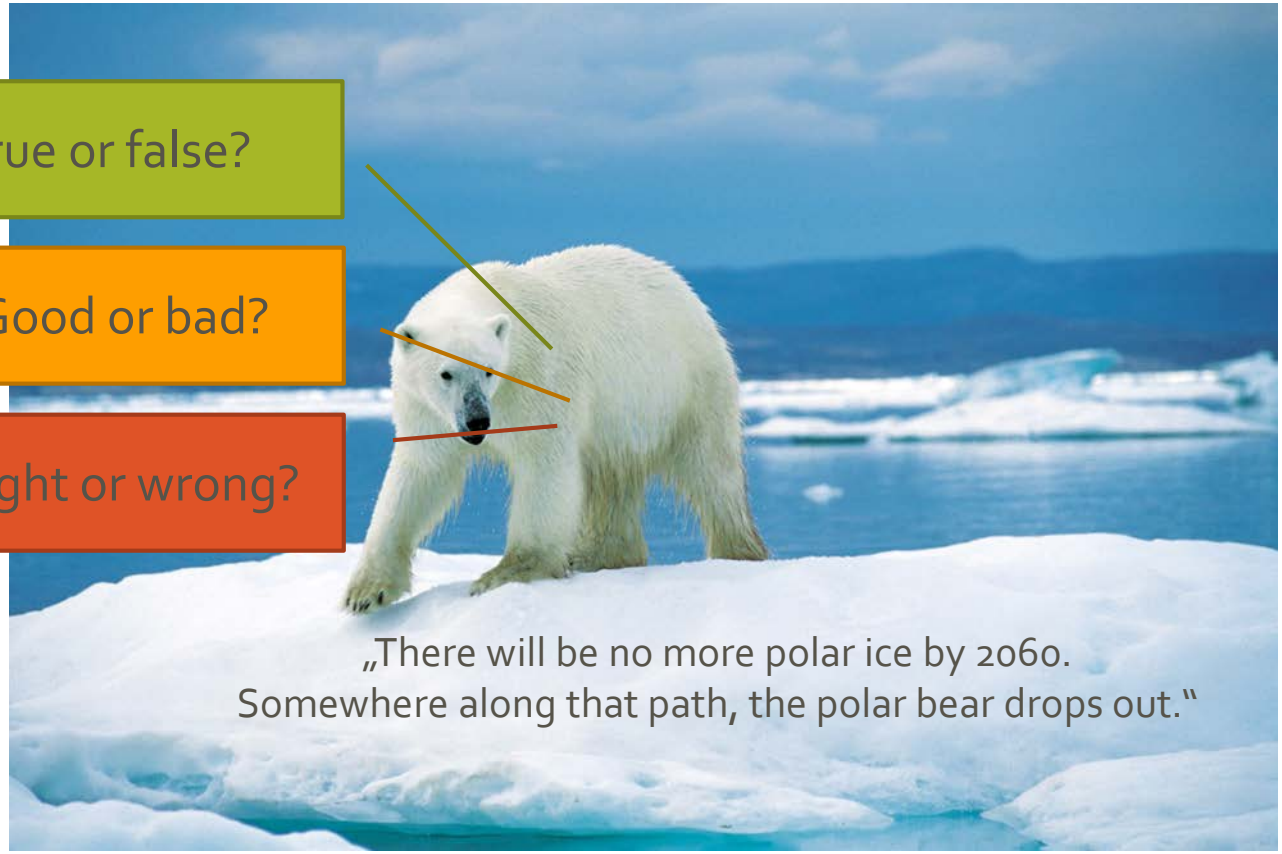
Summing up

Facts, Values, and Norms

Fact: True or false?

Value: Good or bad?

Norm: Right or wrong?



„There will be no more polar ice by 2060.
Somewhere along that path, the polar bear drops out."

➔ **Values and norms stay in concealment behind presumed „facts"**

4 Steps of Assessment

What exactly are we talking about?

Problem

Instrumentally good? (effective, efficient)

Prudent

Right or wrong?

Allowed

Demanded

Forbidden

Good/bad Better/worse

Desirable?

Undesirable?

Precautionary Principle

Thank you

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