

SMART PHONES



SOCIAL AND ENVIRONMENTAL RISKS IN THE LIFECYCLE OF MOBILE PHONES

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WORK PACKAGE 4

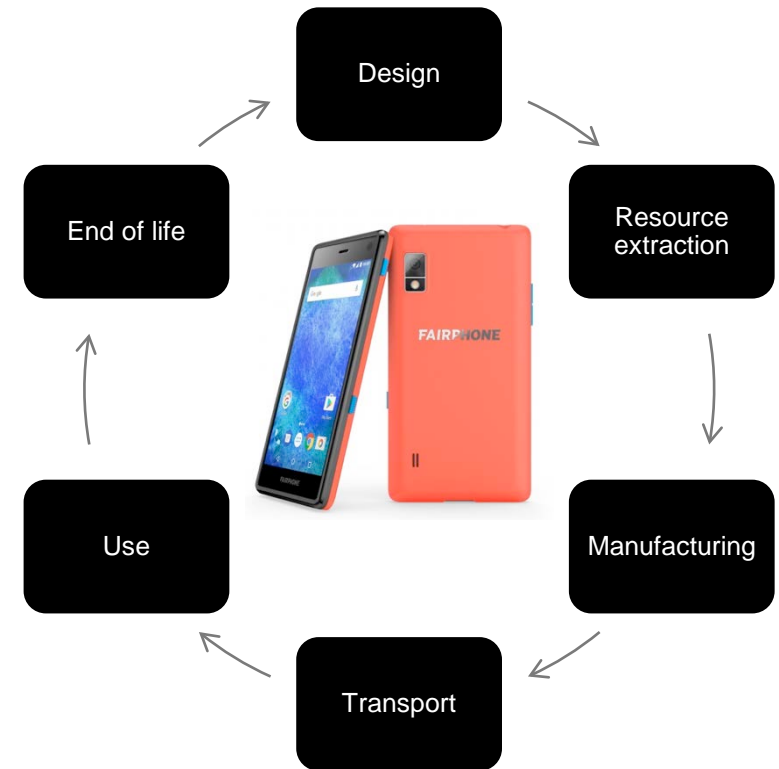
MOBILE PHONES

Risk Catalogue: what are the social and environmental risks in the lifecycle of a mobile phone?

Identification of hotspots: which of these risks are considered hotspots in the mobile phone lifecycle?

Regulation of selected hotspots: what modes of regulation sustain a hotspot and how do they interact with each other?

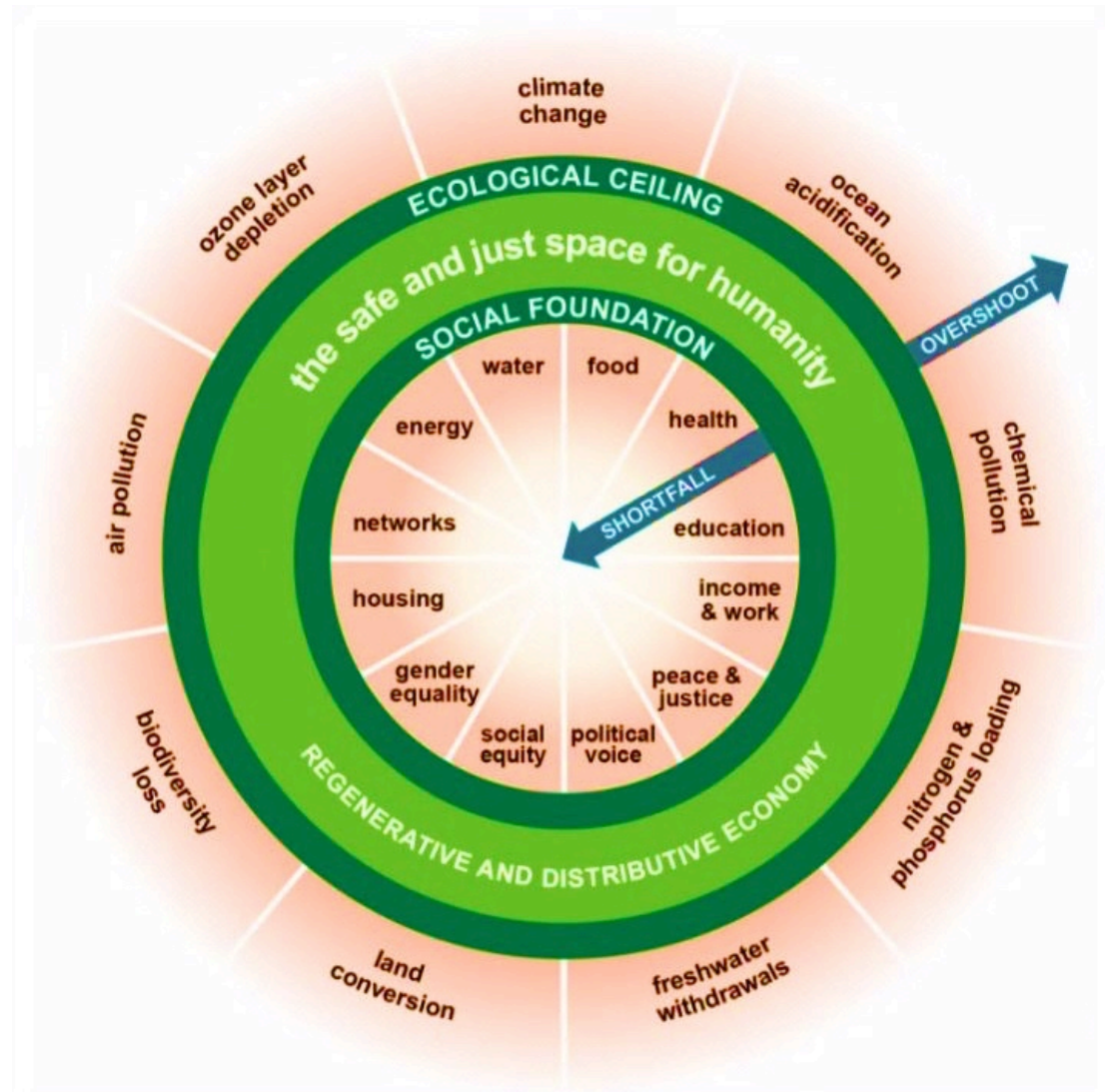
Regulatory interventions: how and where to intervene to counter these hotspots in the mobile phone lifecycle?



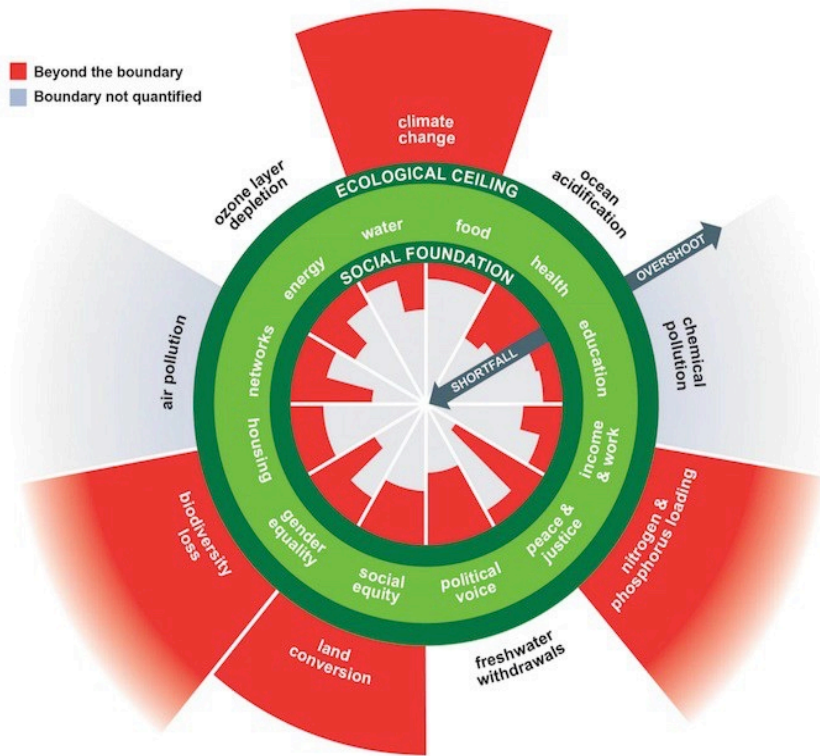
FRAMEWORK

Planetary boundaries:

- Ecological ceiling
- Social foundation



RISK CATALOGUE



Risk: externalities that pose a threat to defined planetary and social boundaries.

Hotspot: a significant breach of social or planetary boundaries in a product's life cycle, e.g. resource use that results in peak climate gas emissions or an activity that violates a community's access to clean water.

RISK MAPPING

Literature Review

We searched several large databases with a set of search terms that focused solely on identifying risks (challenges, impacts, consequence, etc.) in the mobile phone lifecycle. The result was a collection of 304 articles and reports from academic resources and non-governmental organisations, such as unions, worker organisations, environmental organisations, and human rights organisations. We combined this material with data from Life Cycle Assessments (LCA) of several mobile phones and input from our stakeholders.

ANALYSIS

Each risk contributes to the crossing of one or more planetary boundaries or to the decline in one or more social dimensions that form the social foundation:

The nine planetary boundaries

Climate change

Chemical pollution

Ocean acidification

Change in biosphere integrity

Stratospheric ozone depletion

Biogeochemical flows

Land-system change

Atmospheric aerosol loading

Introduction of novel entities

The twelve social dimensions

Food

Income & Work

Water & Sanitation

Health

Education

Energy

Social equality

Gender equality

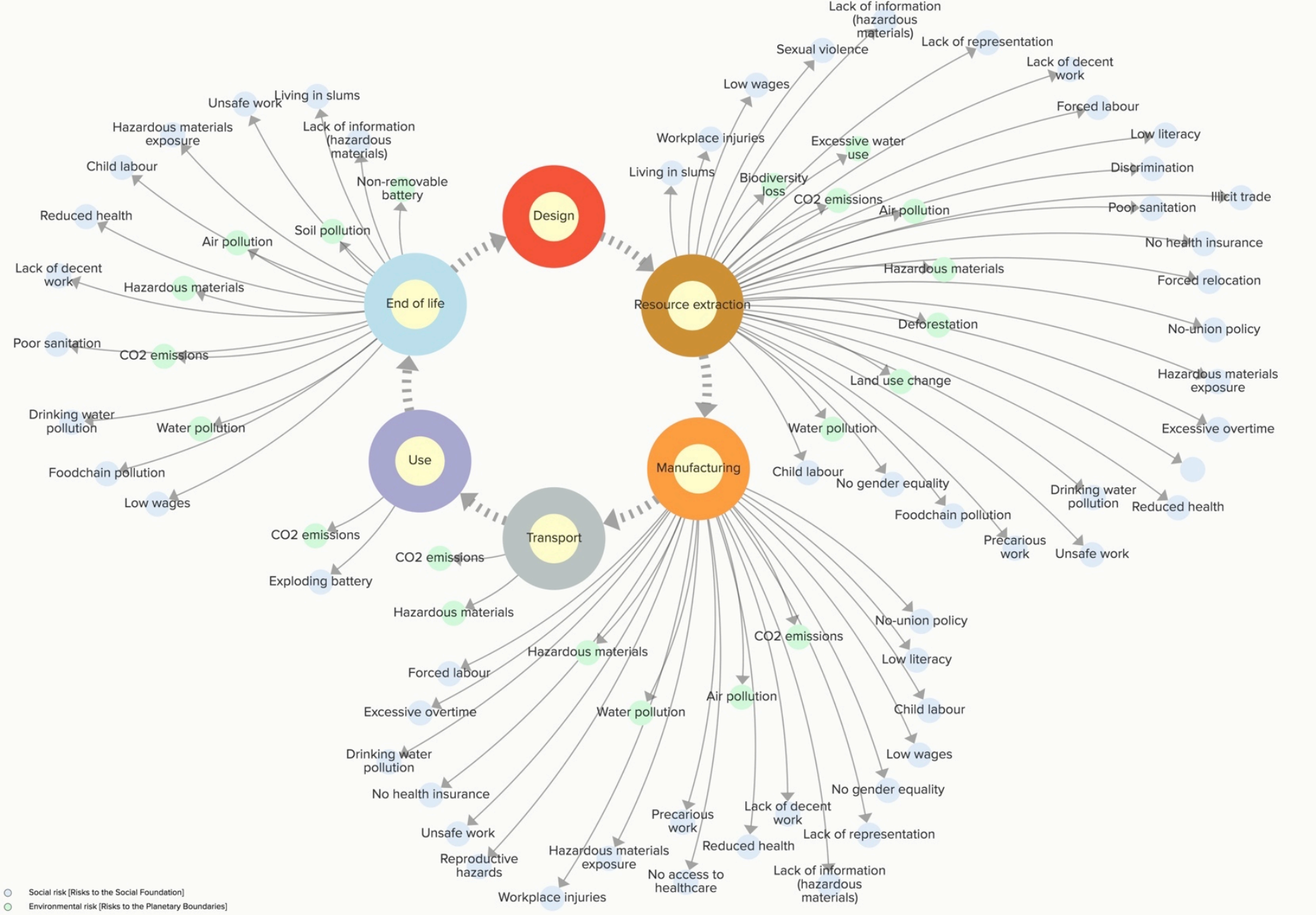
Voice

Peace & Justice

Housing

Networks





○ Social risk [Risks to the Social Foundation]
○ Environmental risk [Risks to the Planetary Boundaries]

Mobile Phone Lifecycle - Risk Catalogue -

This map presents the social and environmental risks per phase in the mobile phone lifecycle. We identified six phases:

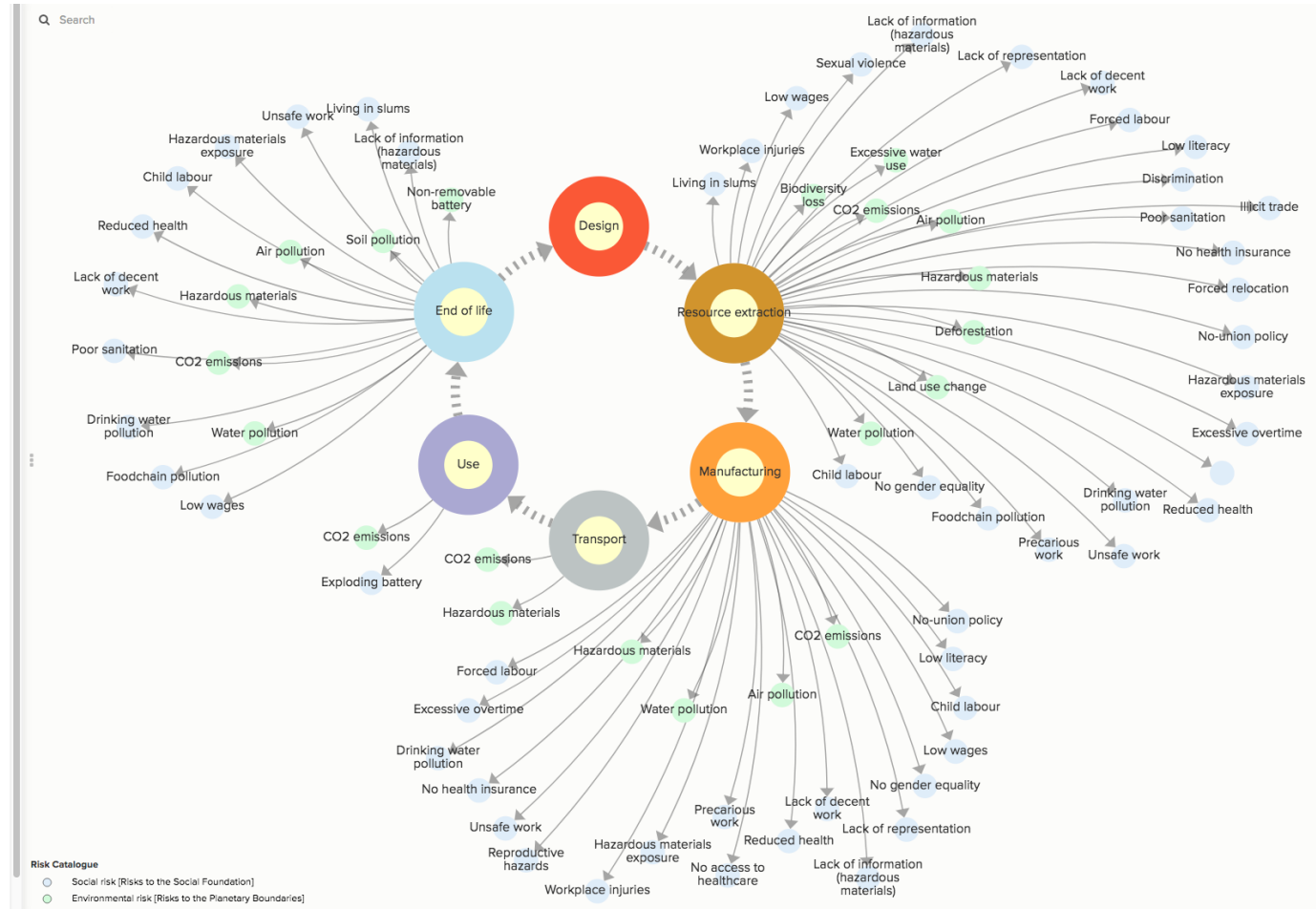
1. Design
2. Resource extraction
3. Manufacturing
4. Transport
5. Use
6. End of life

This map and its categories are based on an analysis of 304 academic articles and reports by research institutions and non-governmental organisations. In the coming weeks we will describe each risk and provide links to central documents and other resources.

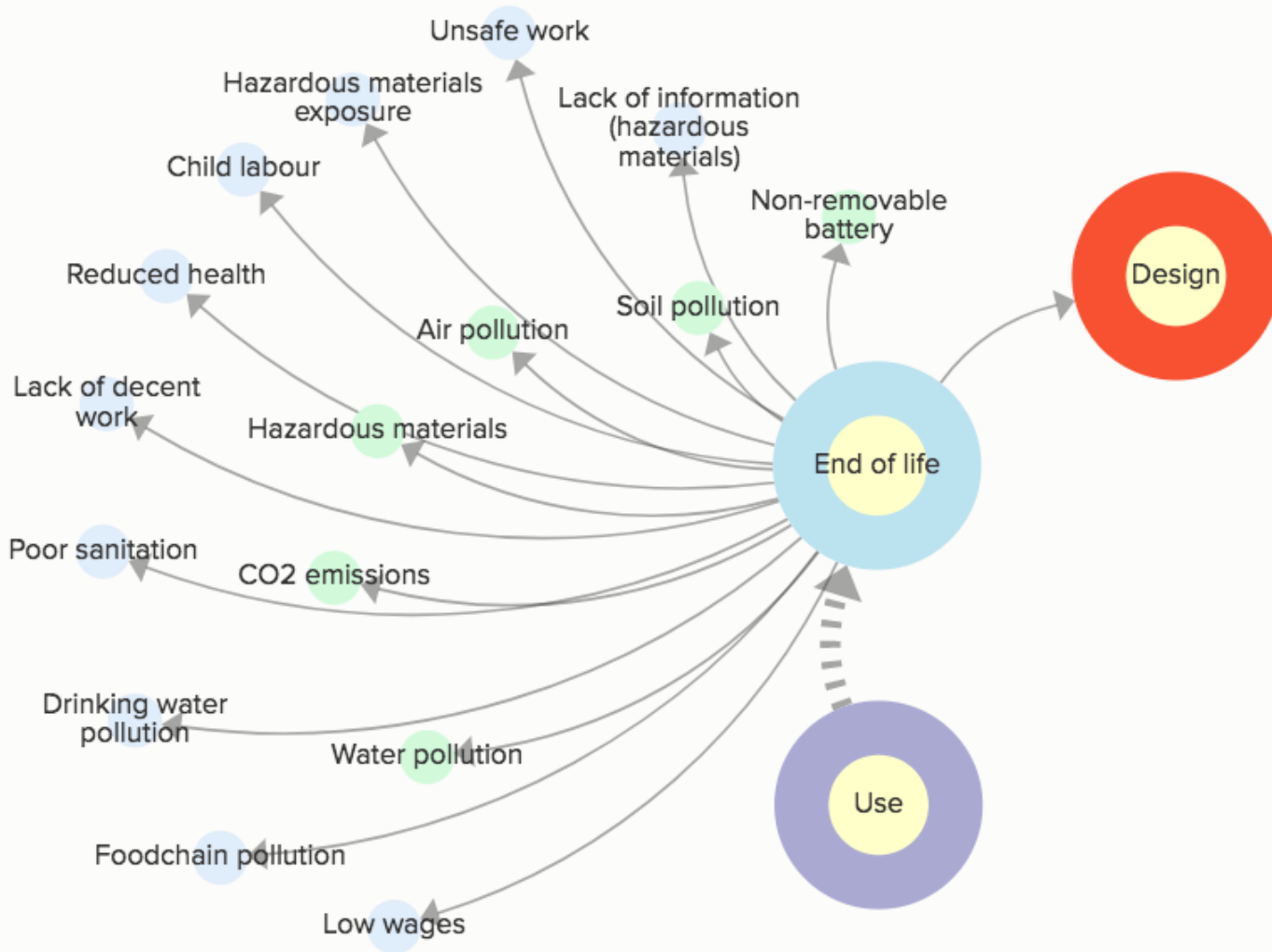
The analysis is a work in progress by the participants and stakeholders in Work Package 4 of the SMART project, led by the Department of Informatics of the University of Oslo.

In the future we will map the regulatory ecology (refs 1, 2) of selected risks (sustainability hotspots) in order to understand who and what sustain these hotspots and to formulate modes and ways for regulatory intervention.

Information about how we developed this Risk Catalogue can be found in this presentation. This research is part of the SMART project, a research project led by the University of Oslo. SMART has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 693642.



Risks in the End of Life Phase



Hazardous materials

ENVIRONMENTAL RISK

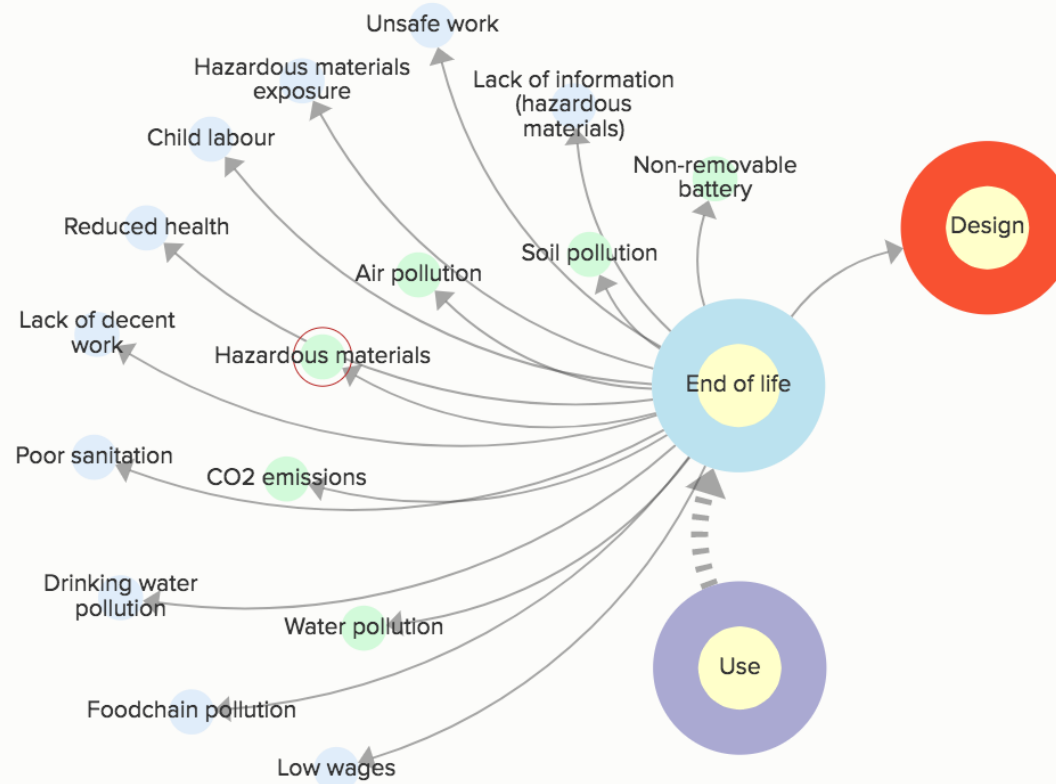
A hazardous material is any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Hazardous materials, also called dangerous substances (EU) or toxic substances (US), can be engineered materials or naturally occurring materials (mobilised by human activities such as burning or mining).

Hazardous materials, as a risk in the *End of life* phase of the mobile phone lifecycle, are chemicals, heavy metals, and plastics. These materials can affect people (see Hazardous materials exposure) and the environment. Hazardous materials are a risk to the Introduction of novel entities, one of the nine Planetary Boundaries. VOCs (see below), a particular group of hazardous materials, are also a risk to Stratospheric ozone depletion, another Planetary Boundary.

In the End of life phase, hazardous materials are released in particular through artisanal urban mining of e-waste in the form of open incineration and dumping of e-waste. The literature mentions the following hazardous materials as being released in the air, soil or water:

- Persistent organic pollutants (POPs) are mostly man-made organic chemicals that bio-accumulate in people, animals, and the environment. POPs released from improper e-waste handling of mobile phones are dioxins (e.g. PCDDs incl. TCDD; furans, and PCBs) and toxic heavy metals.
- Toxic heavy metals are heavy metals that are particularly toxic for the environment. Antimony, arsenic, cadmium, chromium, lead, and mercury are often released during improper e-waste handling.
- Volatile organic compounds (VOCs) are mostly man-made organic chemicals that can vaporise and pollute the air. VOCs released from improper e-waste handling of mobile phones are most often benzenes and derivatives, such as

Q Search



HOT SPOT

Hotspot: a significant breach of social or planetary boundaries in a product's life cycle, e.g. resource use that results in peak climate gas emissions or an activity that violates a community's access to clean water.



HAZARDOUS MATERIALS

Mobile phone battery:

- Pb Lead
- Cd Cadmium
- Ni Nickel
- Hg Mercury
- Li Lithium
- Mn Manganese
- Zn Zinc
- As Arsenic
- Be Beryllium
- Cu Copper
- Cr Chromium
- Co Cobalt

BATTERY



Risks:

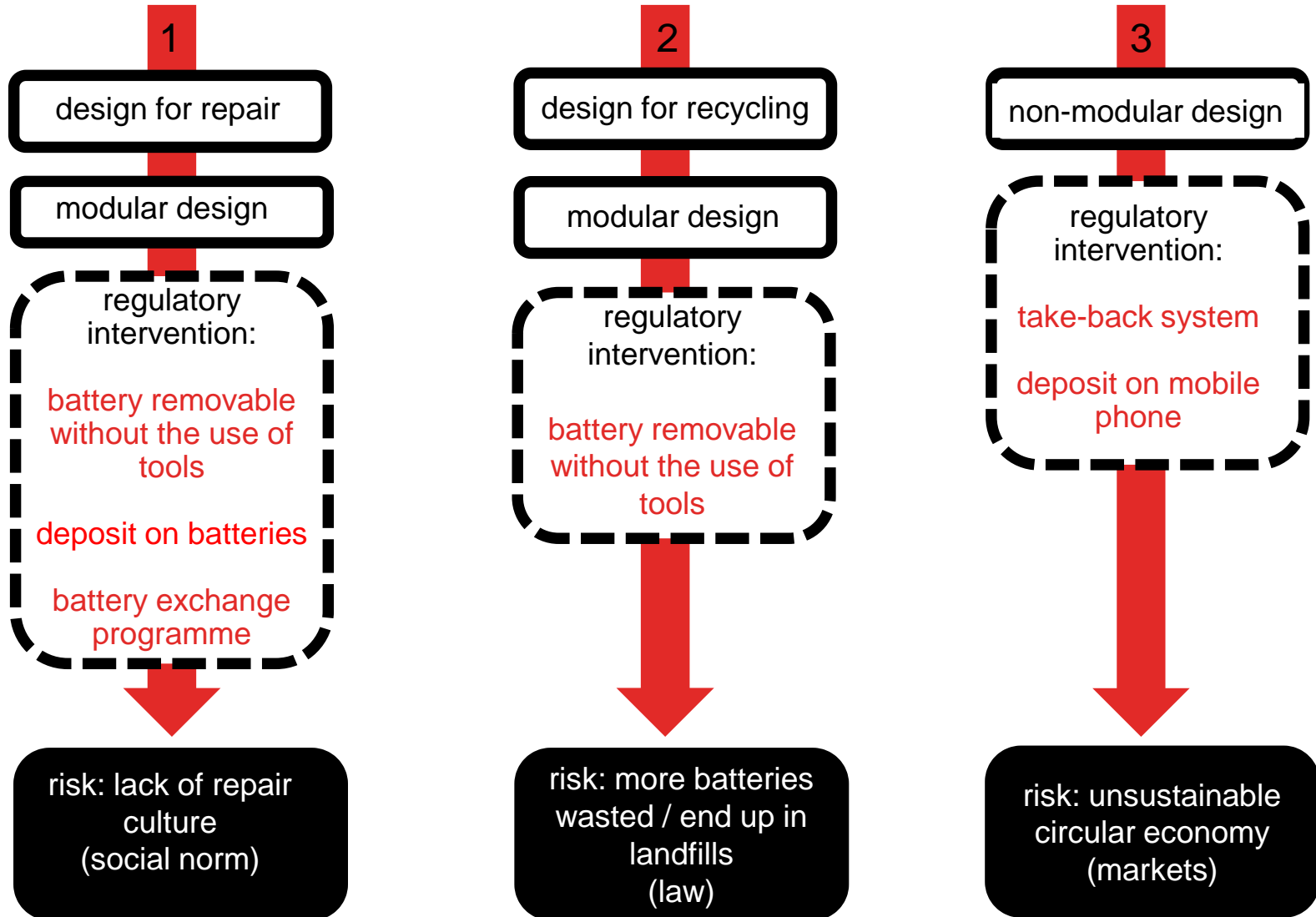
- Exploding
- Non-removable
- Hazardous materials
- Water pollution
- Reduced health
- Conflict
- Illicit trade
- Child labour
- Low wages
- Slums
- Poor sanitation

Regulatory interventions through interaction of law and market:
deposit on batteries

Regulatory intervention through design:
battery removable without the use of tools

BATTERY

SCENARIOS FOR REGULATION



SUSTAINABLE MARKET ACTORS FOR RESPONSIBLE TRADE

MORE INFO ON SMART.UIO.NO



THANK YOU