Ch3. Metrics: Human development for the Anthropocene
Part 1: Frame

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Discussion

1. Do you know the concept of **Anthropocene**? Could you define it?

2. What is in your opinion the difference between the **Gross Domestic Product** (GDP) and **Human Development Index** (HDI)?

3. If we take into account the **carbon emissions** and the **footprint**, how that could affect the **HDI**? The HDI will increase (decrease)? Why?

4. Could we develop a **single metric** to work out human well-being by combining the **HDI** with **carbon emissions** and **footprint**?

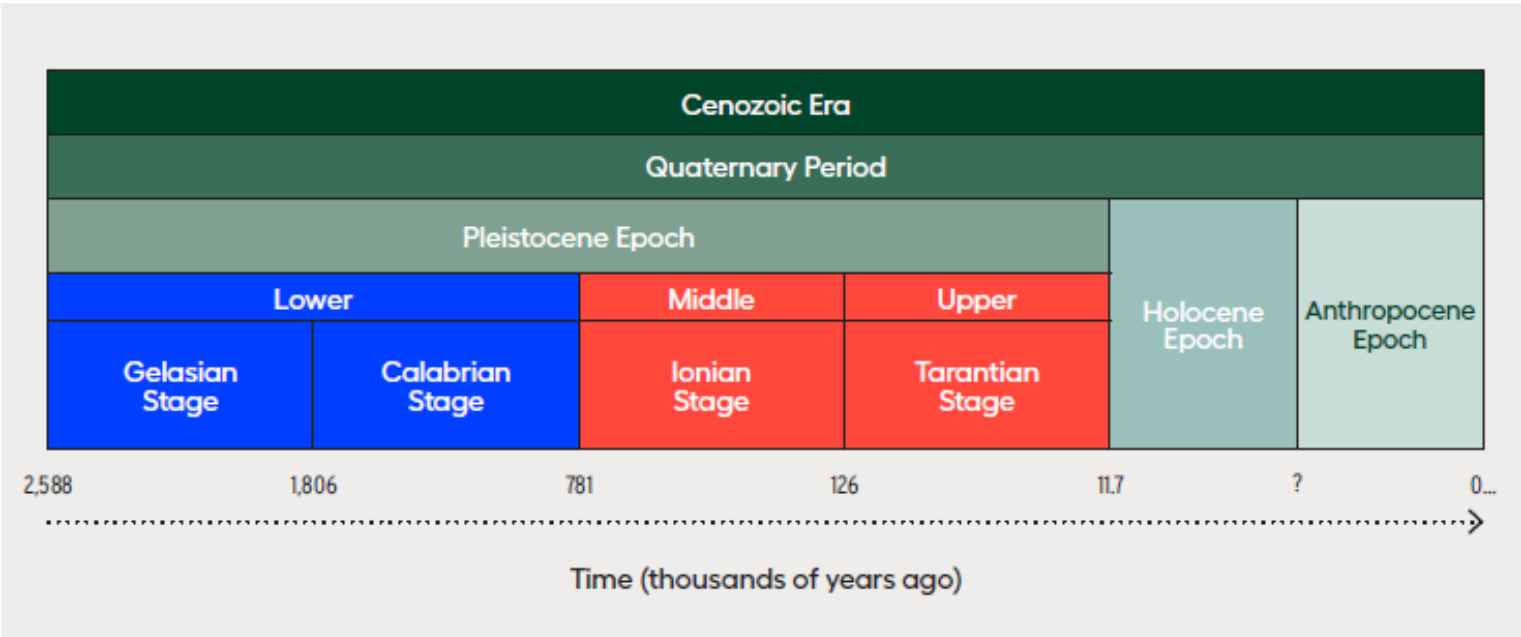
Chapter structure

1. Definition of Anthropocene
2. Frame: Frame: Bringing the Anthro into the Anthropocene
3. Frame: The Anthropocene and the Economy
4. Metrics: One index to rule them all?

Anthropocene

The (recent) story of the planet over time can be represented in Geological Time Scale

Figure: Geological Time Scale



Source: Malhi 2017.

Anthropocene

Earth system scientists introduced the term **Anthropocene** at the turn of the 21st century

They confronted a range of observations of recent changes to the planet that contrasted with the palaeoenvironmental record of the **Holocene** (which is estimated to have started about 11,700 years ago) and indicated that the planet was operating in a no analogue state—that is, without precedent in the history of the planet

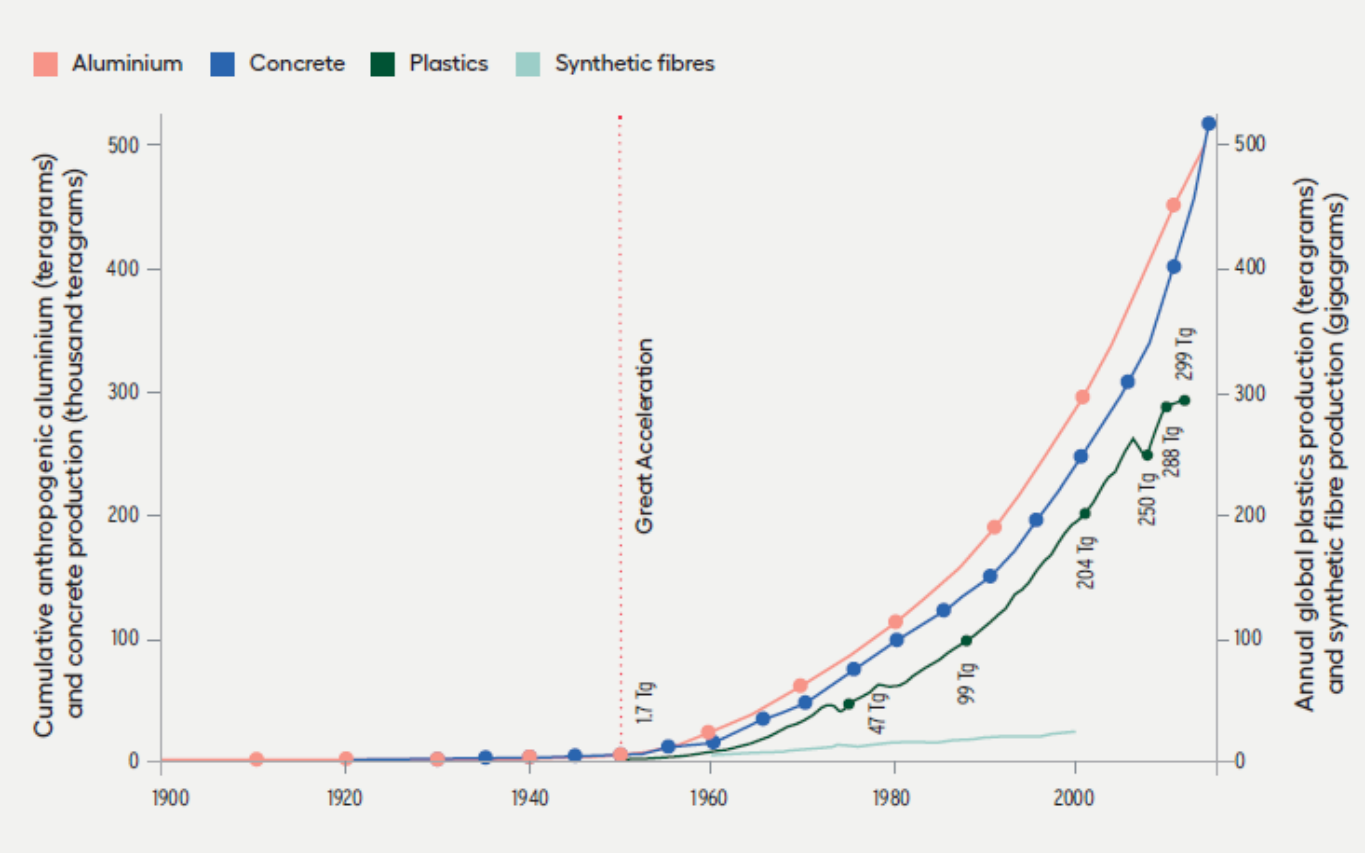
The Anthropocene **is not yet formally established as a new geological epoch**, but several geologists and Earth system scientists propose dating its beginning to the mid-20th century

- The growth in new **anthropogenic materials**
- The peak in **radionuclides fallout consequential to atomic bomb testing during the 1950s**

Anthropocene

The starting of the Anthropocene would correspond to the Great Acceleration of human pressures on the planet that have the potential to **leave a geological imprint**

Figure: Beginning of the Anthropocene



Source: Waters and others 2016.

Anthropocene. Geologists and Earth system scientists

Mining, **landfills**, **construction** and **urbanization** have resulted in the greatest expansion of new minerals that do not exist in the natural world as rocks (in the **geological sense of having the potential for long-term persistence**)

Pure elemental **aluminium** is one of these materials, and as much as 98 percent of the aluminium on Earth has been produced since 1950

Another is **plastics**, whose current annual production equals the global human biomass

Anthropocene. Geologists and Earth system scientists

The **disruptions of the global biogeochemical cycles of carbon and nitrogen** also leave detectable signals visible in ice cores, reflecting rapid increases in the concentrations of carbon dioxide and methane

A unique and globally dispersed geological signature corresponds to the radioactive fallout from **atmospheric nuclear weapons** tested in the mid-20th century.

Anthropocene. Ecologists and sustainability scientists

Four characteristics make the **Anthropocene biosphere** unlike anything that has ever existed on the planet:

- **Homogenization of flora and fauna** through deliberate or accidental transfer of species across the globe
- **One species (humans) consuming 25–40 percent of land net primary productivity** (that is, the biomass and energy made available by plants to all life on Earth)
- **Human-directed evolution of plants and animals**, marginalizing natural biomes—something unprecedented in the last 2.4 billion years
- Increasing impact of **new technologies** as the biosphere interacts with the technosphere

Anthropocene

For more information about the Anthropocene visit: The Anthropocene (wikipedia).

For the **documentary**, the **book**, the **art project** "The Anthropocene" visit: The Anthropocene project.

Two more documentaries that explains The Anthropocene:

- The Anthropocene: Has earth shifted out of its Holocene state?
- The Anthropocene: The age of mankind

Frame: Bringing the Anthro into the Anthropocene

"Most 'classic' writings on sustainability present people as the problem, not as a collective source of strength. [. . . They] frame the discourse in terms of the Earth's finite resources and rising population. [. . .] We have moved away from framing it exclusively around limits to growth and conserving natural resources. Instead, we emphasize the ***connections between communities****,* ***ecosystems*** *and* ***social justice****." Harini Nagendra*

Frame: Bringing the Anthro into the Anthropocene

"Unlike other concepts that have highlighted the impact of human pressures on the environment, the Anthropocene describes a state change in the Earth system, viewed as an ***interdependent***, ***co-evolving social-ecological system****, as well as a new way of thinking about our recent and current epoch*

Anthropocene thinking ***takes us away from reductionist linear cause-effect analysis of equity and sustainability****, to underline the fully intertwined character of human and ecological systems, and the co-evolving fates of sustainability and equity." Melissa Leach, Belinda Reyers and others*

Frame: Bringing the Anthro into the Anthropocene

Bringing the Anthro into the Anthropocene has **two consequences**:

1. It presents a challenge as to **how to imagine and pursue human development**

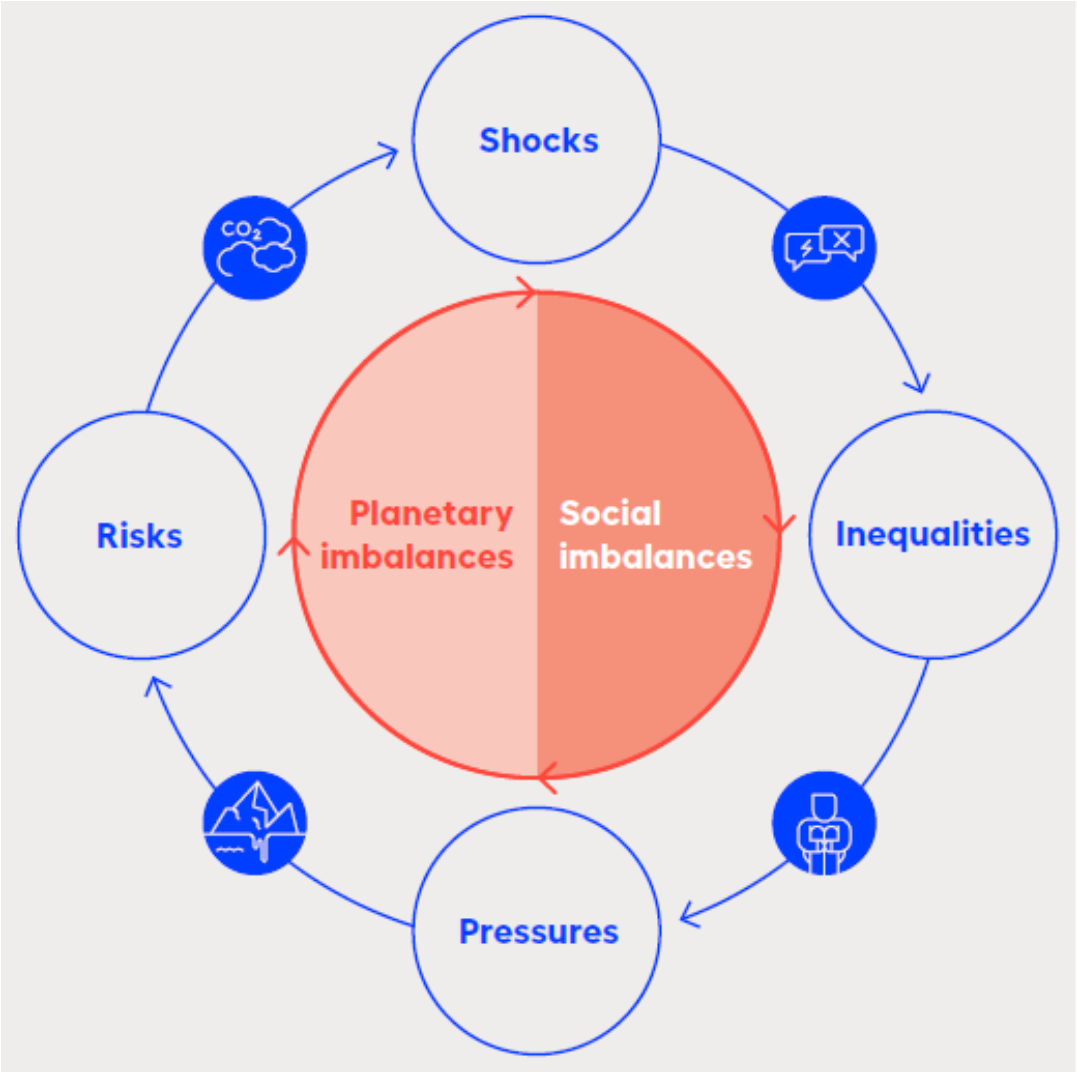
   Addressing social imbalances, the hemisphere on the right in the figure in the next slide, has always been at the core of the human development

   But until now the other hemisphere, planetary imbalances, has not been systematically brought into the human development journey.

2. The human development approach has not yet been fully leveraged to inform how to **address the challenges in the hemisphere on the left** in the figure in the next slide

Frame: Bringing the Anthro into the Anthropocene

Figure: Planetary and social imbalances reinforce each other



Frame: Bringing the Anthro into the Anthropocene

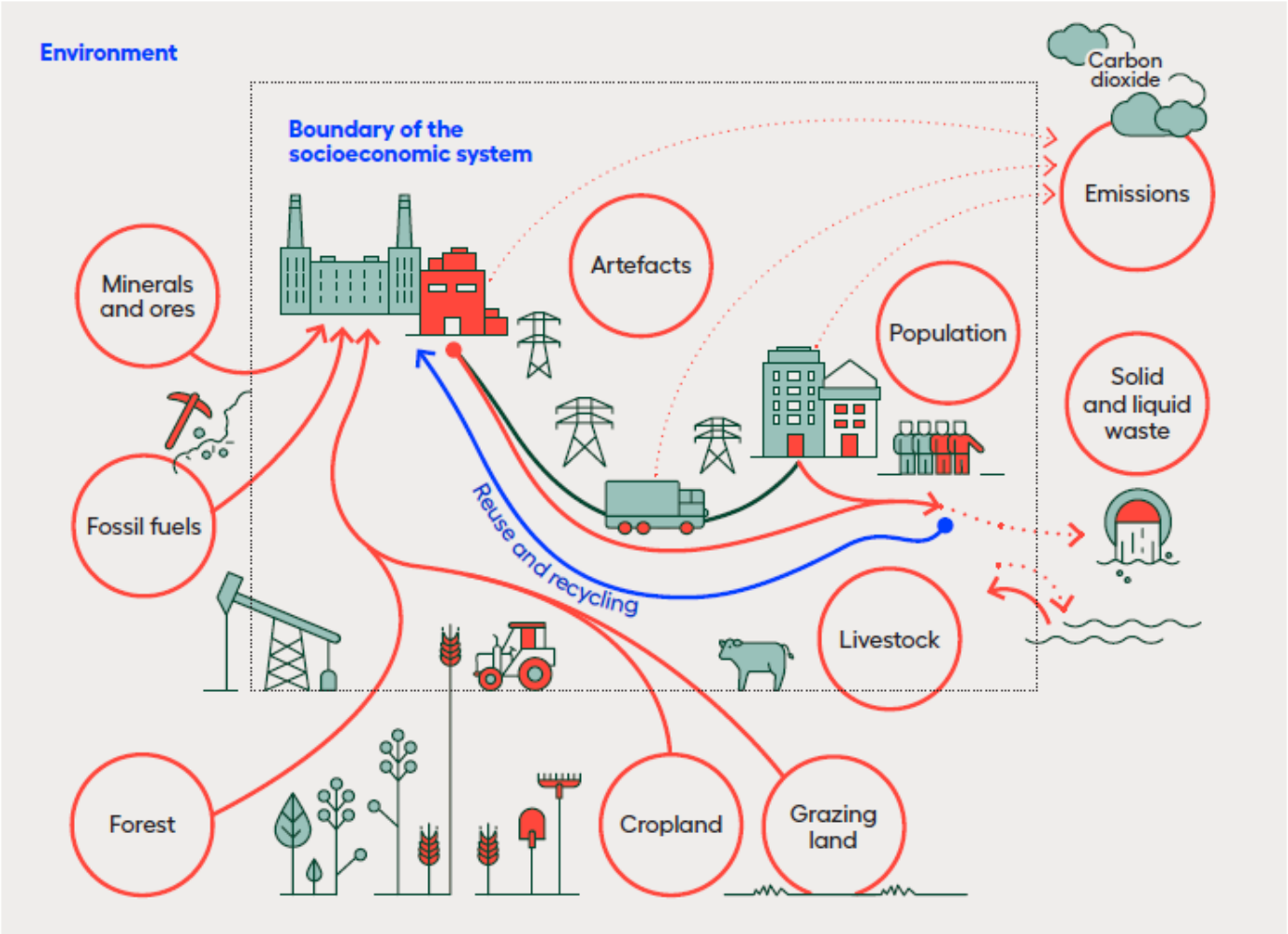
Mapping human societies' embeddedness in the biosphere: **Energy and material flows**

Human societies are embedded in the biosphere and depend on it. But by extracting from it for economic activities that shape consumption and production patterns, they have also been depleting it

To make the **interactions between social and ecological systems more visible**, it is useful to look at material and energy flows in our societies and their impact on planetary processes (figure in the next slide)

Frame: Bringing the Anthro into the Anthropocene

Figure: Human societies are embedded in the biosphere



Source: Haberl and others 2019.

Frame: Bringing the Anthro into the Anthropocene

Along with the physical evidence this added dimension of the Anthropocene is essential to **framing a new human development narrative**

It places people's **interactions with nature in historical**, **social** and **economic contexts**, informed by insights from the **natural sciences**

This is reflected in new fields such as the **climate-economy literature** and in the **resurgence of interest in environmental history**

Frame: Bringing the Anthro into the Anthropocene

Historical analysis places the current moment of the Anthropocene in perspective but also shows how much of **human history** has been influenced by occurrences in the **natural world**

In the words of historian Kristina Sessa, “The idea that objects, animals, and other non-human entities (volcanoes, oak trees and solar radiation, for instance) shape the development of human affairs, that they possess historical agency in some form, has forced scholars to **rethink** some of their basic assumptions about **government**, **power**, and **culture**.” (Sessa, 2019)

Frame: Bringing the Anthro into the Anthropocene

The opportunity for an holistic analysis provided by the Anthropocene is something novel in **two ways**:

1. The Anthropocene is an encapsulation of the concept that modern human activity is large relative to planetary processes, and therefore that human social, economic, and political decisions have become entangled in a web of planetary feedbacks

   This **global planetary entanglement** is something new in human history and Earth history.

2. The Anthropocene is a catalyst for **systematic thinking** about the interdependence of people and nature, including the Earth system

Frame: Bringing the Anthro into the Anthropocene

Due to the heavy deterioration of the human environment and natural resources, in 1983, the United Nations created the **Brundtland Commission**

The Brundtland approach to defining **sustainable development** as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" was a watershed moment

It brought together the ethical imperative of fulfilling the basic subsistence requirements of people today—putting **poverty eradication** squarely at the centre of the concept—with an obligation to our descendants rooted in **intergenerational justice**

Frame: Bringing the Anthro into the Anthropocene

The Brundtland Commission put **people at the core**, instead of defining what needed to be sustained for consumption or production. And rather than asking for the preservation of a pristine state of nature, it emphasized the ability of each generation to use resources, allowing for some fungibility across resources

The Report of the World Commission on Environment and Development: Our Common Future (the Brundtland report) can be downloaded from the United Nations webpage (link).

For more information about the Brudtland Commission visit the Brundtland Commission (wikipedia).

Frame: Bringing the Anthro into the Anthropocene

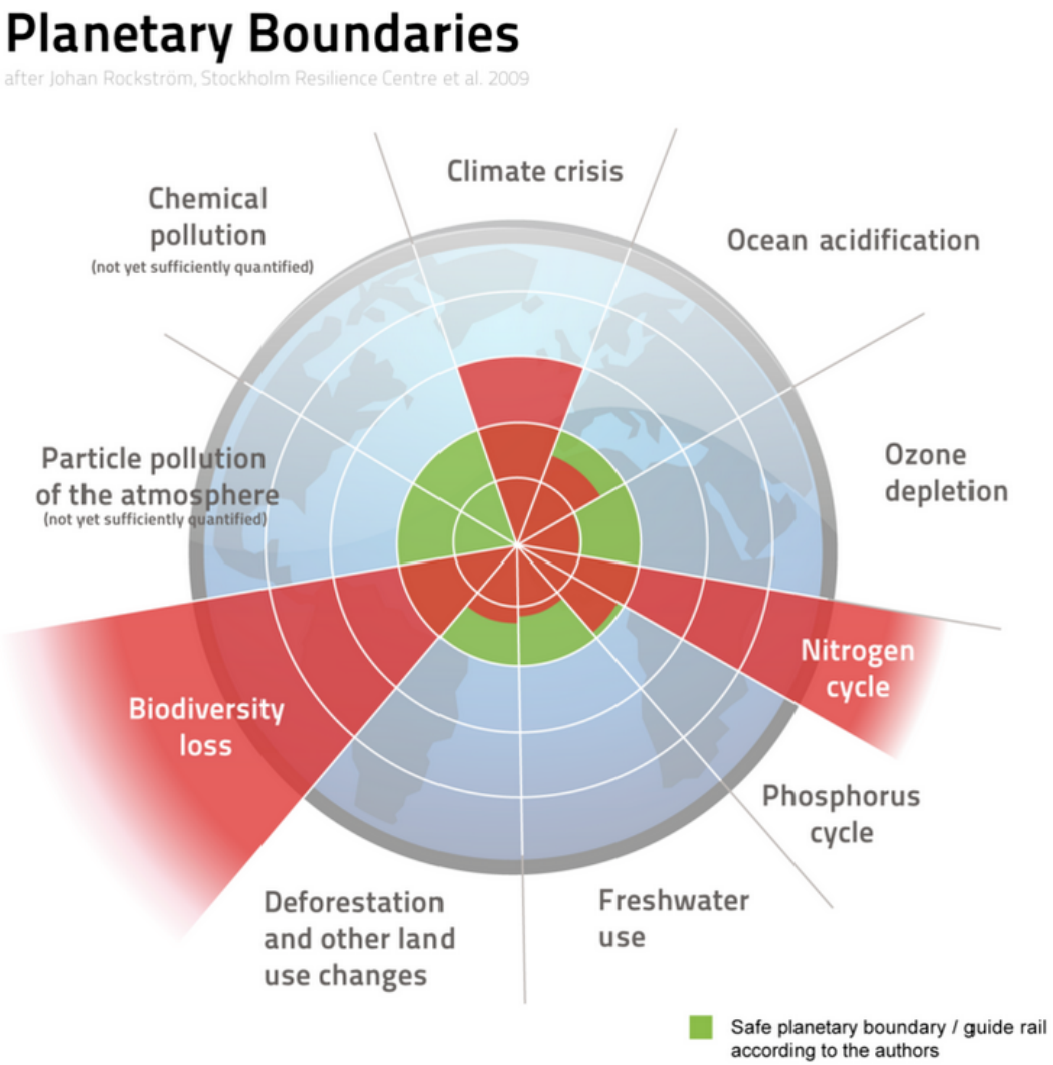
A prominent framework to summarize how changes in the Earth system and the biosphere underpin human prosperity in fundamental ways is the **planetary boundaries approach**

In 2009 Johan Rockström and colleagues identified what they denoted a **safe operating space for humanity**

The framework is based on scientific evidence that **human actions** since the Industrial Revolution **have become the main driver of global environmental change**

Frame: Bringing the Anthro into the Anthropocene

The Earth system process boundaries mark the **safe zone** for the planet to the extent that they are not crossed. As of 2009, two boundaries have already been crossed, while others are in imminent danger of being crossed



Frame: The Anthropocene and the economy

To define an operating space that is not only safe, from the **Earth system** sciences perspective, but also **socially just**, Kate Raworth proposes "The Doughnut" framing approach

The Doughnut, or Doughnut economics, is a visual framework for sustainable development – shaped like a doughnut or lifebelt – combining the concept of **planetary boundaries** with the complementary concept of **social boundaries**

The name derives from the shape of the diagram, i.e. a disc with a hole in the middle

The **centre hole** of the model depicts the proportion of people that lack access to life's essentials (healthcare, education, equity and so on) while **the crust** represents the ecological ceilings (planetary boundaries) that life depends on and must not be overshot

Frame: The Anthropocene and the economy

The diagram was developed by Oxford economist **Kate Raworth** in the Oxfam paper A Safe and Just Space for Humanity and elaborated upon in her book Doughnut Economics: Seven Ways to Think Like a 21st-Century Economist

For more information about **Doughnut (economic model)** visit:

- https://www.kateraworth.com/
- Doughnut (economic model) (wikipedia).

For a video about **Doughnut (economic model)** visit: Kate Raworth (TED talk).

The Anthropocene and the economy. Discussion

1. In a planet facing important **challenges** as climate change, lost of biodiversity, nature cycles unbalances, could the **economy keep growing in the long term**?

2. To frame the economic growth within the limits of the planet, Kate Raworth introduces the concept of **doughnut**. She connects that concept to other **ancient culture symbols** as the Maori Takarangi, the Taoist Ying-Yang, the Buddhist endlessness knot. Could we study this problem also by using the **political framing** introduced in previous slides: ecofeminism, the concept of power, governance?

3. Kate Raworth introduces the concept of **regeneration** by introducing the example of **circular economies in cities**. Could we extend that concept to industries or other business? How that concept could contribute to create **new business models**?

4. She also introduces the concept of **redistribution** not only to redistribute wealth, but also to introduce the concept of **work in networks**. Related to this point, what do you expect to learn from the app development?