

Contributing to a Vision for Cross-Disciplinary Informatics

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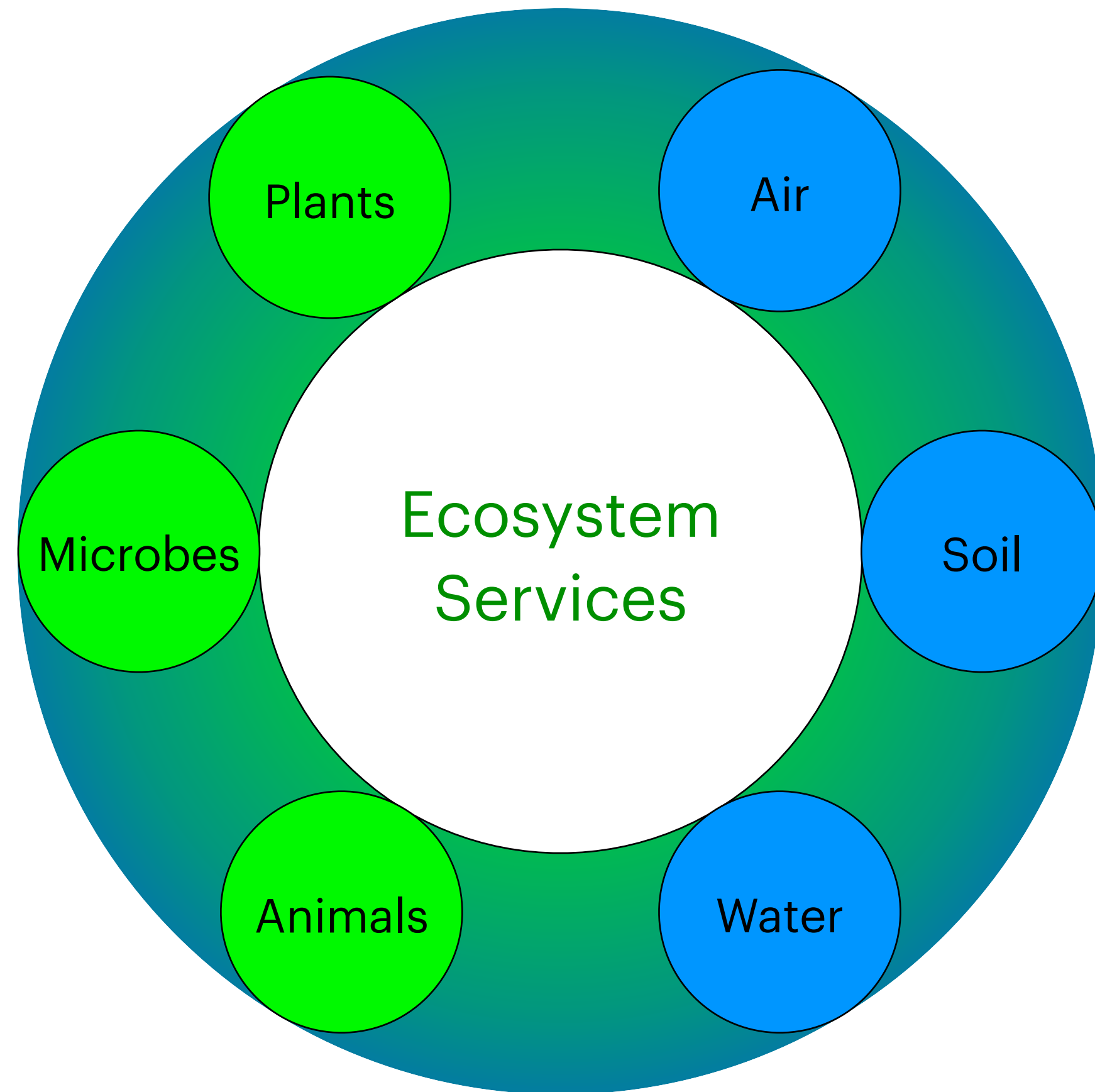
Abstract

As the problems humanity faces become ever more obvious and dangerous, the need for interdisciplinary, cross-disciplinary and trans-disciplinary research and solutions becomes ever more apparent. The problems themselves are often intertwined in complex ways - for example the impact of climate change on human health, food & water security, disasters, and so on and how all of these are exacerbated by human population growth and a general lack of recognition that humanity is part of the ecosystem upon which Earthly life depends. Underpinning our ability to understand and solve these complex problems are data of all kinds, more importantly the information that has and continues to be garnered through obtaining and analyzing these and most importantly their inclusion in the larger body of knowledge and ways of knowing that hopefully leads to the wisdom needed to directly address the root causes of each problem. Over the past decades, through involvement in projects on science topics as diverse as quasars and stellar pediatrics, solar physics, social science, and a wide variety of Earth Science topics; where informatics topics such as data management and curation, systems and framework development; and tools and methodologies such as Use Cases, Natural Language Processing, Deep Learning, Knowledge Graphs, Information Models, etc. were included; a number of principles and lessons learned which unite the technical underpinnings of these projects have come to the fore. These will be discussed in this presentation.

Contributing to a Vision for Cross-Disciplinary Informatics

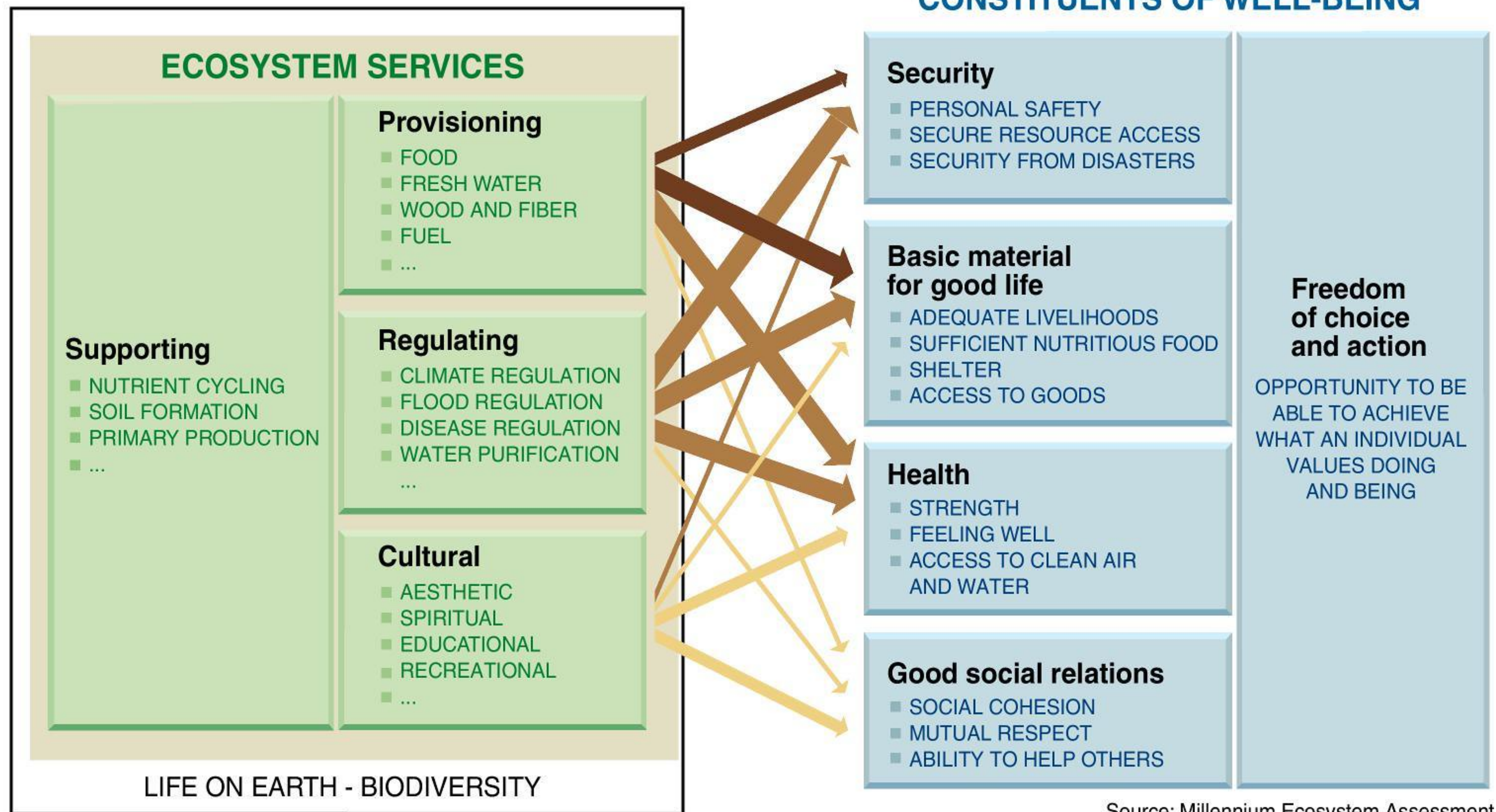
Ruth Duerr, December 2021

Humanity's well being depends on Ecosystem Services



Some ecosystem services:

- Fresh water
- Food
- Fiber
- Habitat
- Recreation and tourism
- Spiritual health
- Cultural identity
- Pollination
- Pest and disease management
- Erosion prevention
- Protection from natural disasters
- Carbon sequestration and storage
- Air and water pollution control
- Nutrient cycling
- Soil fertility



ARROW'S COLOR
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

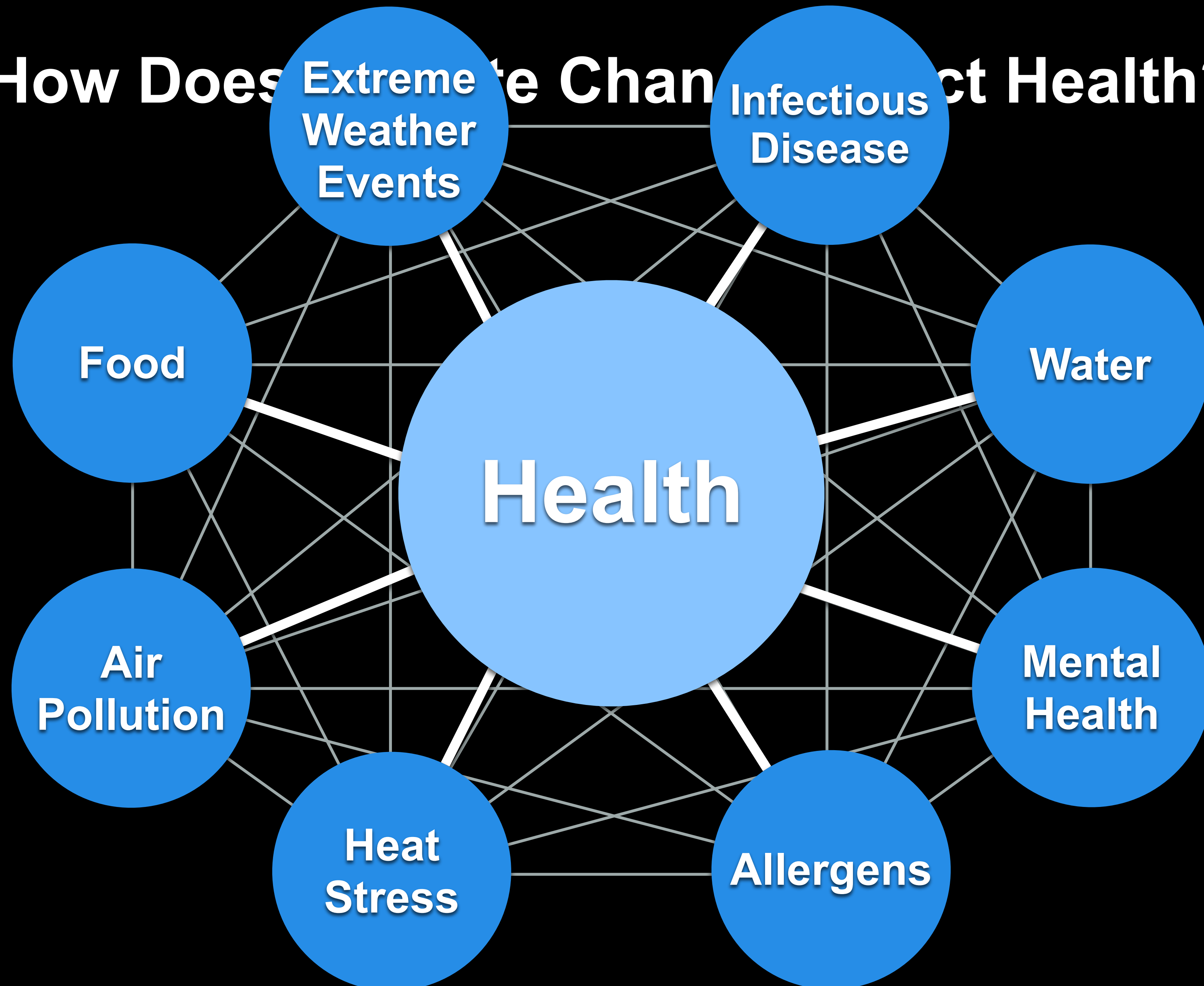
ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

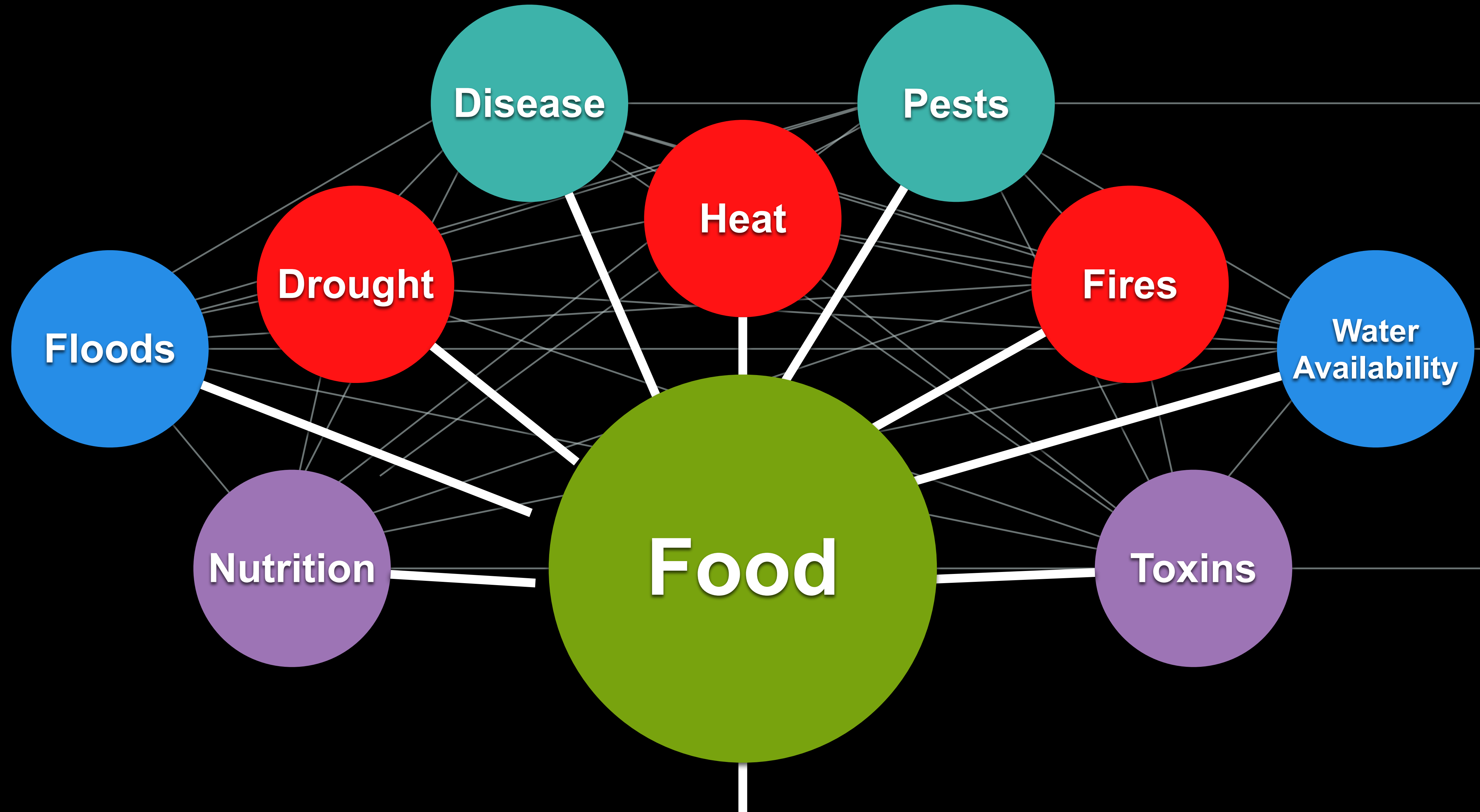
How Does Climate Change Affect Health?

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graph TD; Health((Health)) --- ExtremeWeatherEvents((Extreme Weather Events)); Health --- InfectiousDisease((Infectious Disease)); Health --- Water((Water)); Health --- MentalHealth((Mental Health)); Health --- Allergens((Allergens)); Health --- HeatStress((Heat Stress)); Health --- AirPollution((Air Pollution)); Food((Food)); ExtremeWeatherEvents --- InfectiousDisease; InfectiousDisease --- Water; Water --- MentalHealth; MentalHealth --- Allergens; Allergens --- HeatStress; HeatStress --- AirPollution; AirPollution --- Food; Food --- ExtremeWeatherEvents; ExtremeWeatherEvents --- Water; InfectiousDisease --- HeatStress; Water --- AirPollution; MentalHealth --- Food; Allergens --- ExtremeWeatherEvents; HeatStress --- InfectiousDisease; AirPollution --- MentalHealth; Food --- HeatStress; Food --- InfectiousDisease; Food --- Water; Food --- MentalHealth; Food --- Allergens; Food --- HeatStress; Food --- AirPollution; Food --- Food;
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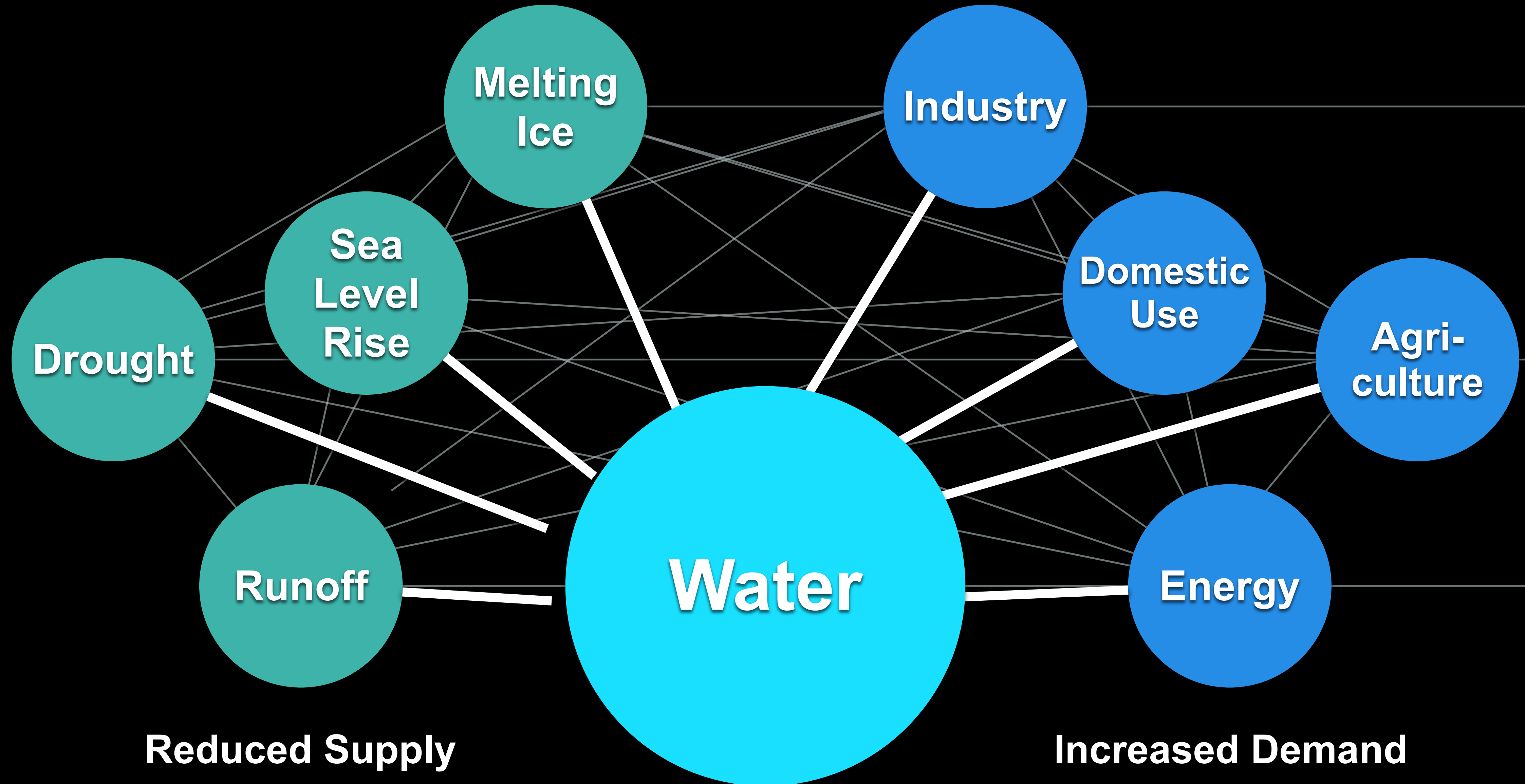
The diagram illustrates the interconnectedness of various health factors influenced by climate change. The central node, **Health**, is linked to seven other nodes: **Extreme Weather Events**, **Infectious Disease**, **Water**, **Mental Health**, **Allergens**, **Heat Stress**, and **Air Pollution**. Additionally, a node for **Food** is present but not directly connected to the central **Health** node. All nodes are interconnected by a network of lines, representing the complex and multifaceted nature of these health impacts.



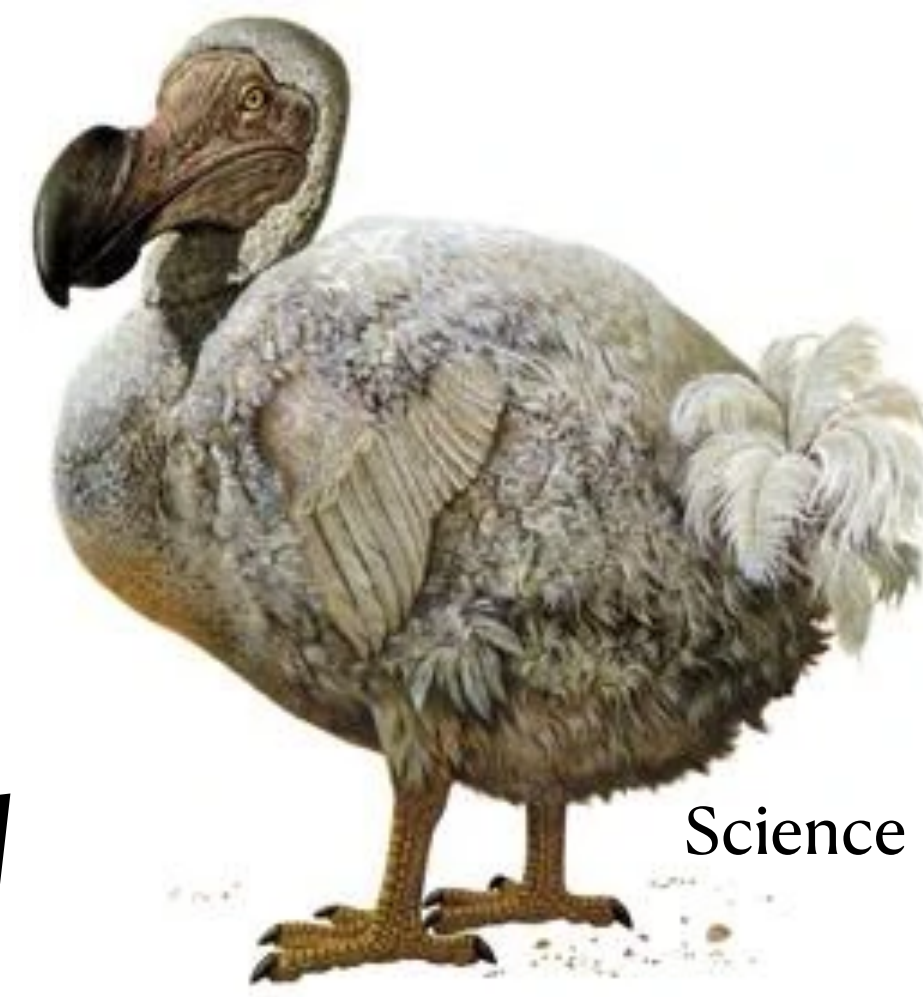
How Does Climate Change Affect Food Supply?



How Does Climate Change Affect Water Availability?



What future are you working towards?



Science Photo Library

What future are you working towards?


What Are the Climate “Tipping Points”?



Permafrost thaw
and methane
release



Coral reef
die-off



Amazon shift
from rainforest to
savannah



Boreal forest
northward shift



West African
monsoon shift



Indian
monsoon shift



Shutdown of the
ocean conveyor
belt

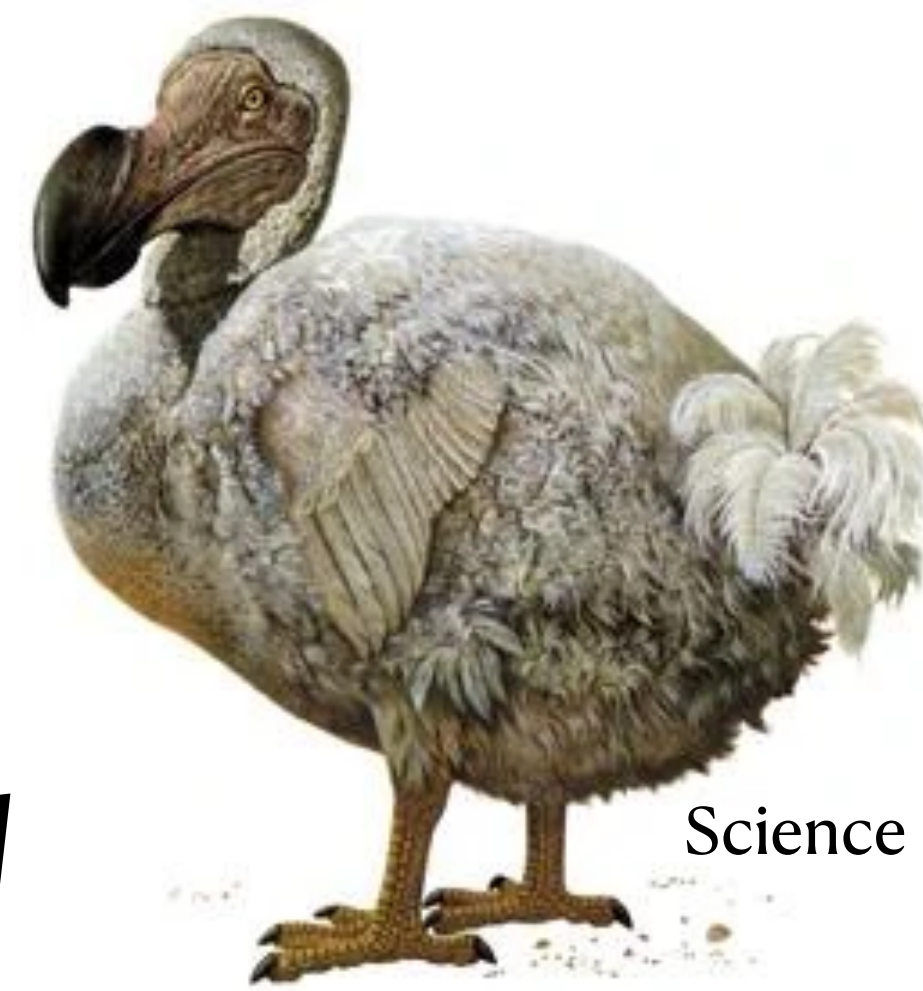
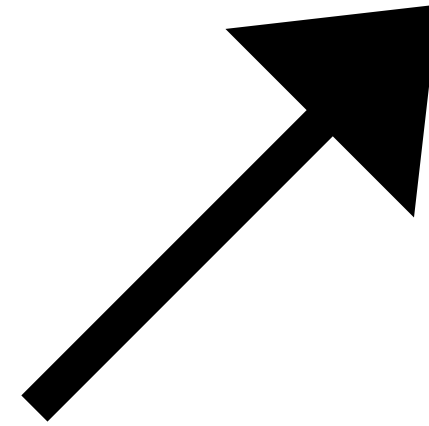


West Antarctica
ice sheet
disintegration

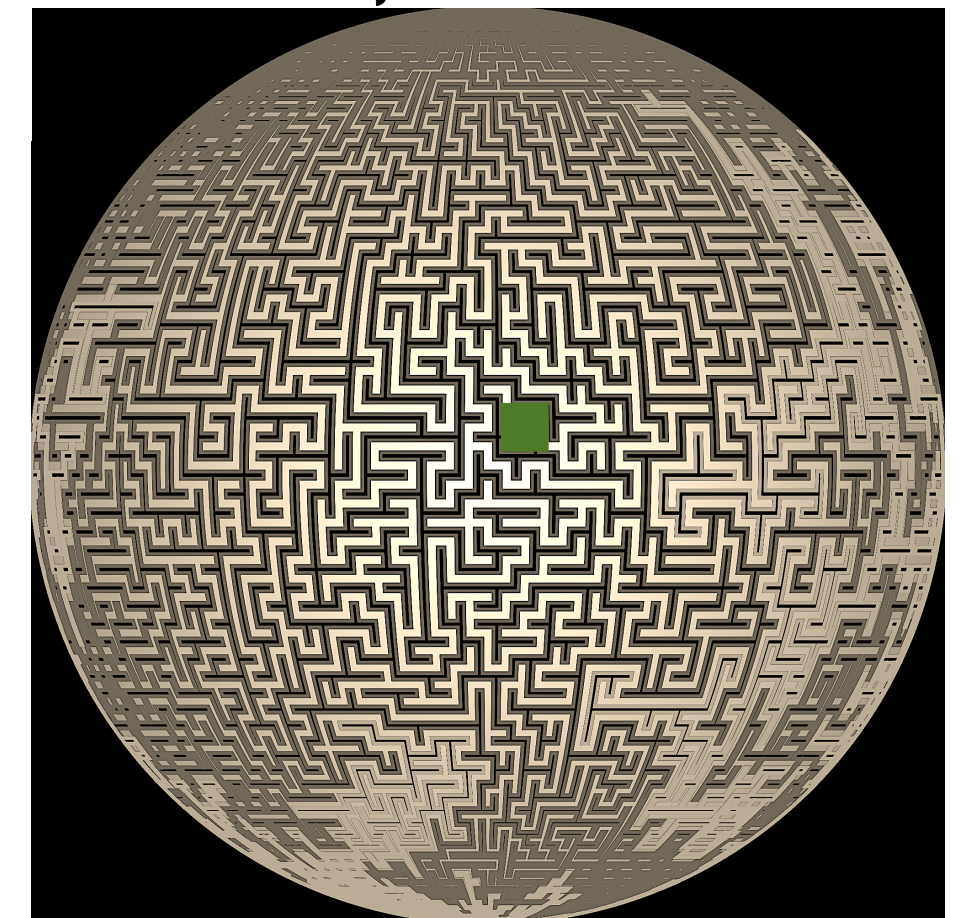


Greenland
ice sheet
disintegration

What future are you working towards?



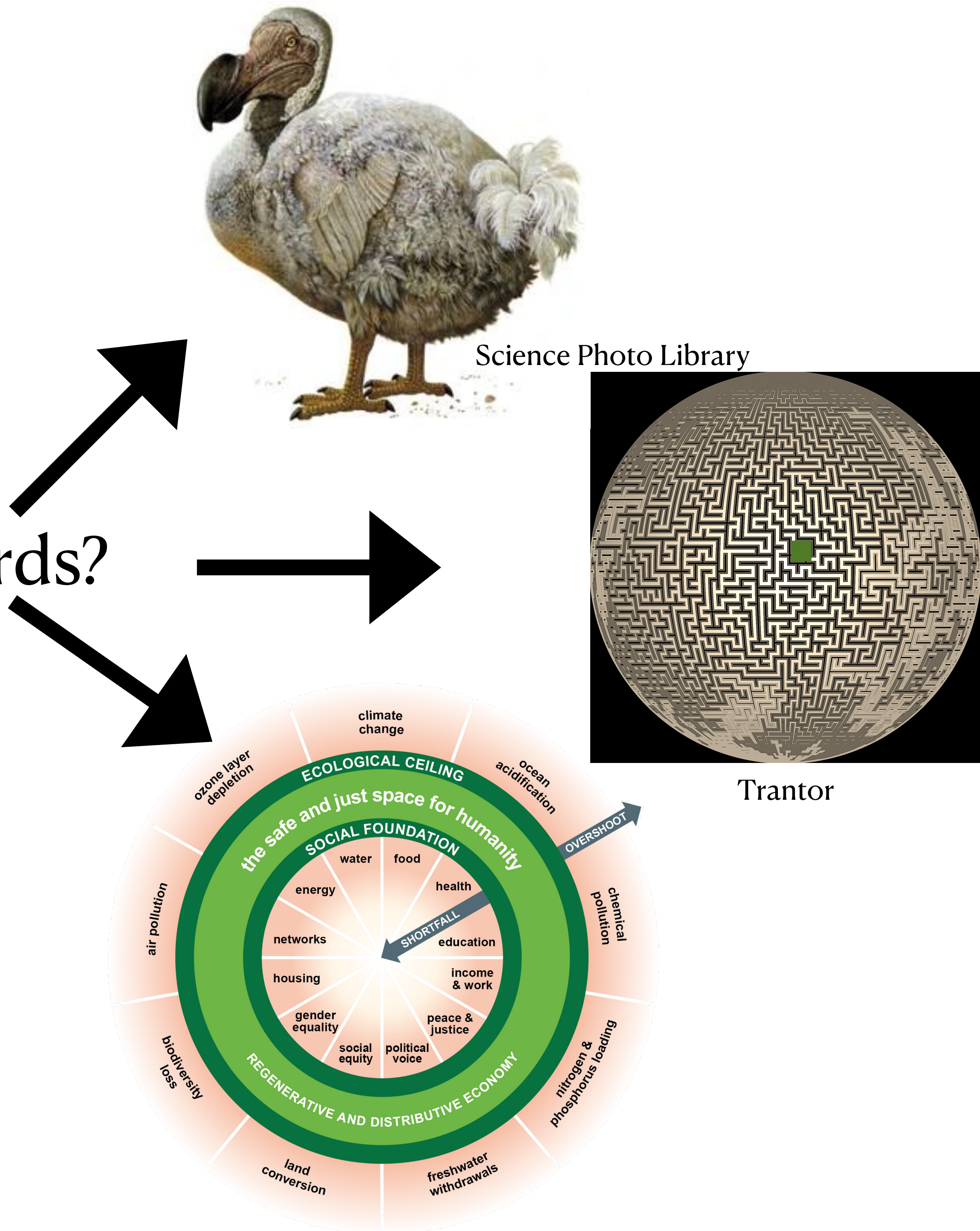
Science Photo Library



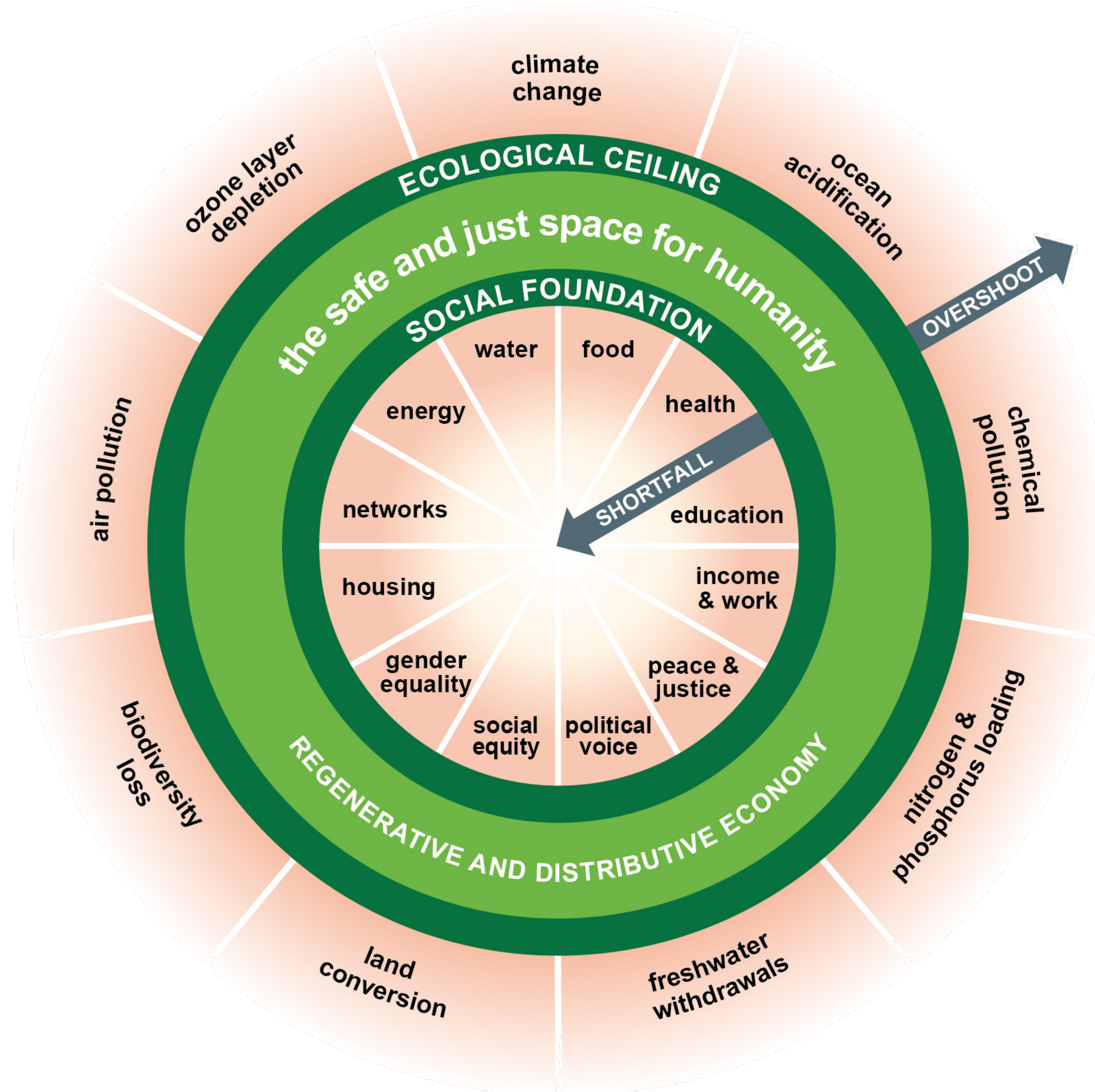
Trantor



What future are you working towards?



The donut economy



More than just FAIR, you have to CARE



Language Matters

(Or is that Community matters?)



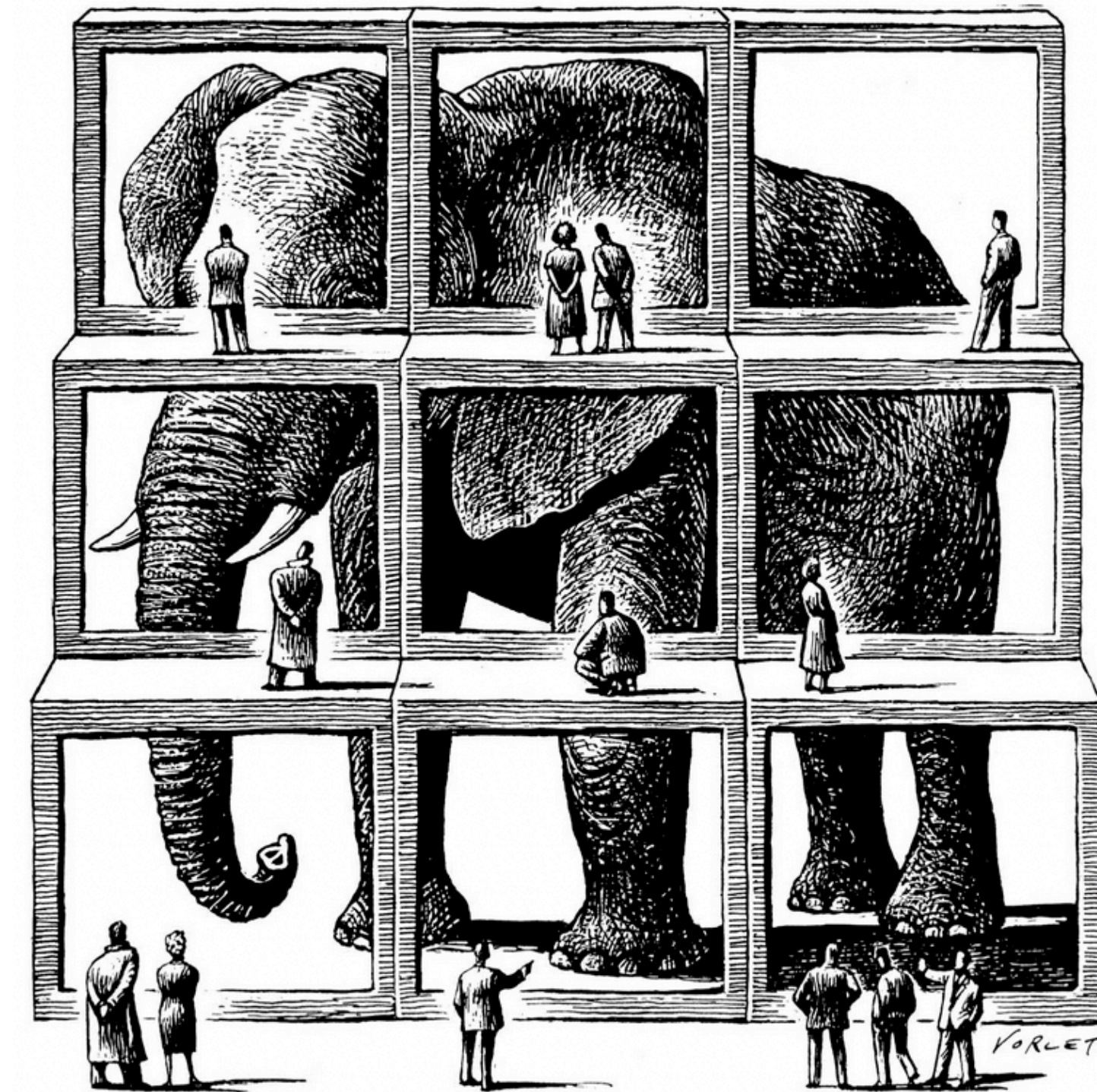
Content without context is useless!



By ziliun.com - <https://teacherhead.com/2017/05/12/context-is-king-shortblog/>, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=64372250>

Without context, a piece of information is just a dot. It floats in your brain with a lot of other dots and doesn't mean a damn thing. Knowledge is information-in-context ... connecting the dots.

- Michael Ventura



by elizaveta anatskaya

There are no silver bullets!



In Summary

