

Using ECMWF's Forecasts 2022: Visualising Meteorological Data

9th June 2022

INFO
DESIGN
LAB

Visualising data for impact

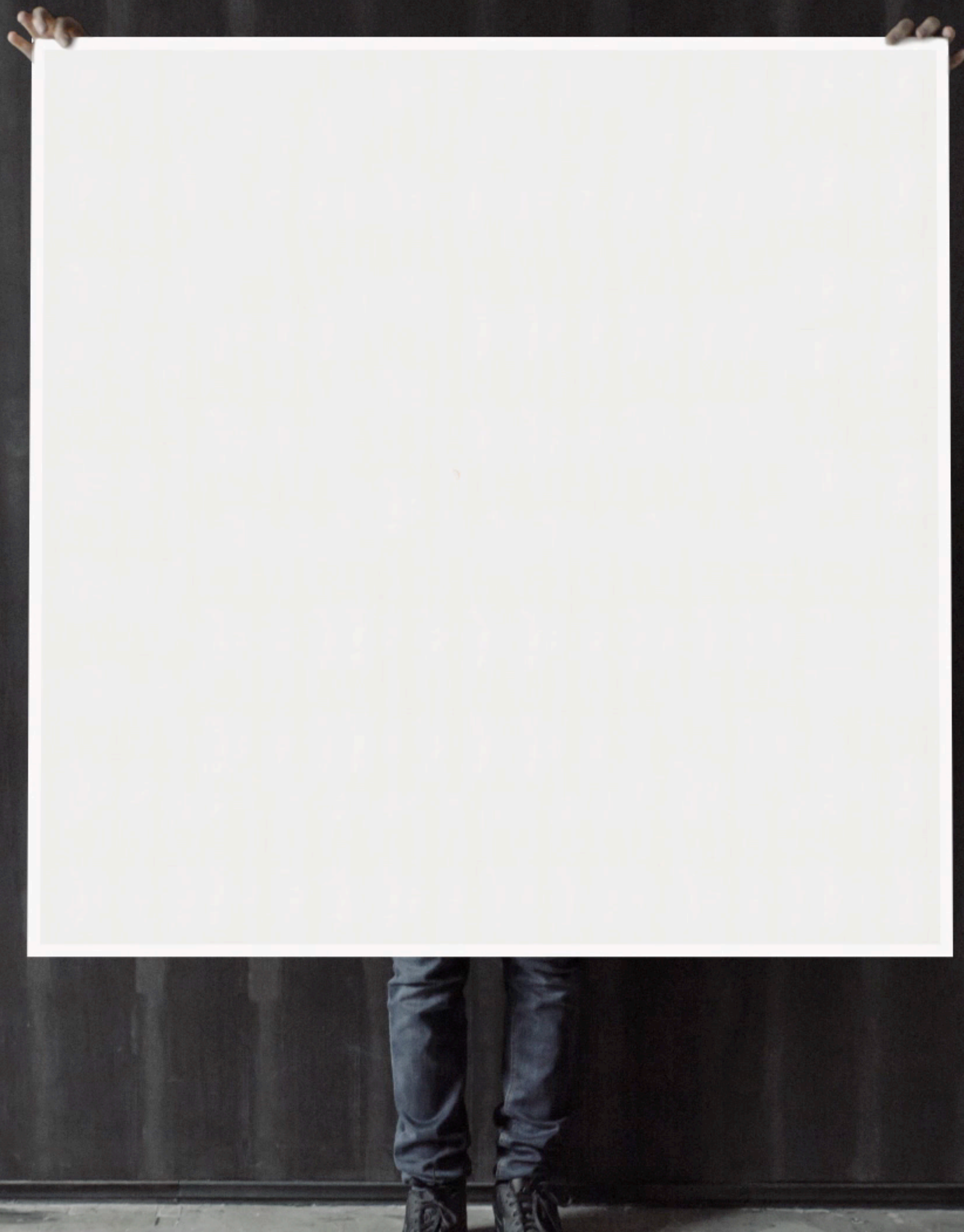
A participatory journey from
data to storytelling

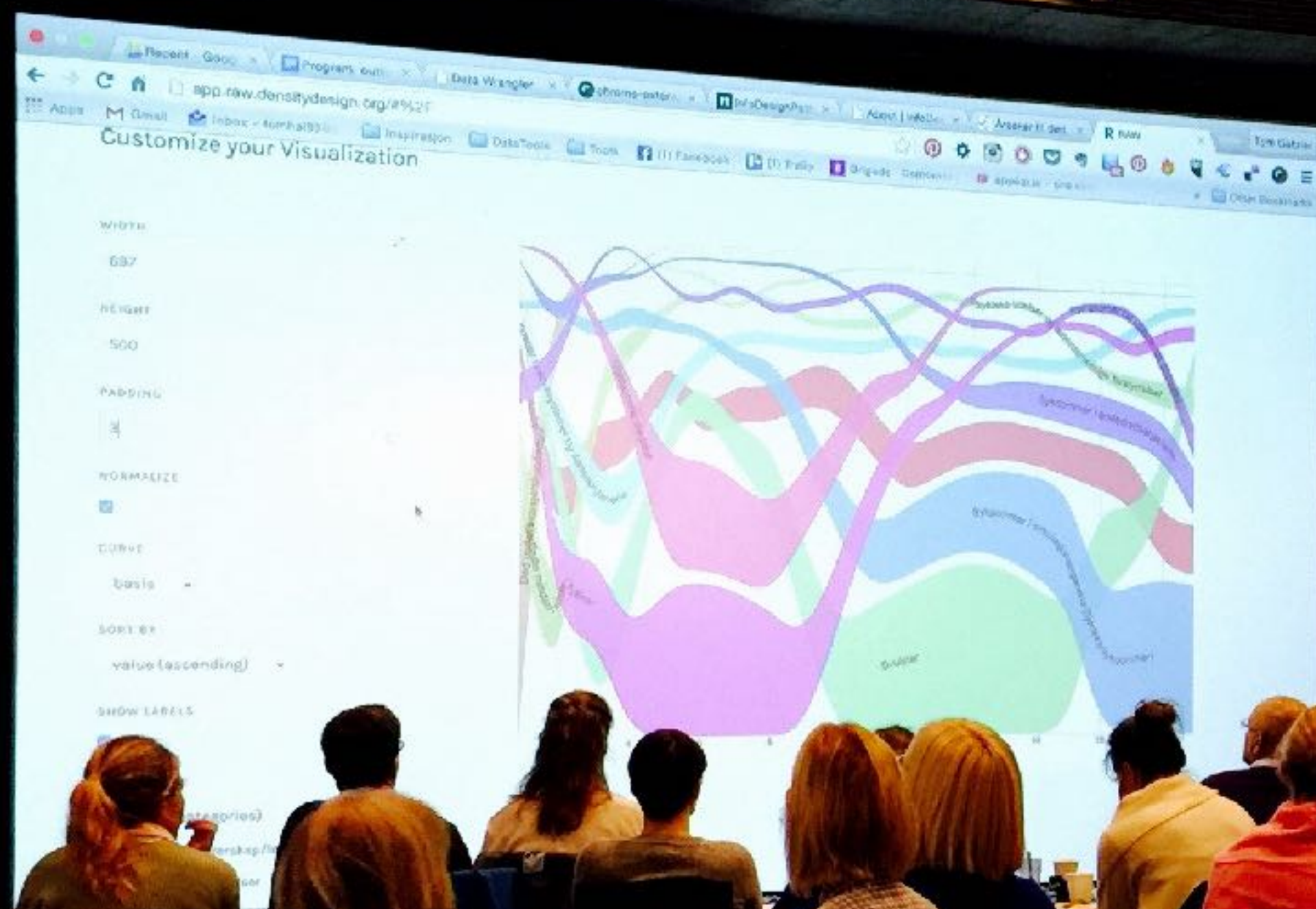
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When we began to teach Information Design and Data Visualization, about a decade ago, it was immediately clear that starting any course with a brief about a complex dataset would make some students' life difficult.

When not there in form of a table about GDP, GDP growth, emissions or climate, many students would find it hard to relate to the dataset. Many of them would go "What?", they would feel under pressure because the content, inevitably, was a barrier.

Things were different if the data was about the group, telling something about who we are, where we come from, what we are. This approach dramatically changed the learning environment and, in no time, students were smoothly finding our own way into the data visualization world.

The brief would require some weeks of preparation from our side. We would gather information about the students through a survey that they would fill in by hand. We would also take photos of the students and save them into line drawings. All this would be the starting point to build about organizing information.

The results have been inspiring. Witnessing the surprise and joy on the students' when they were handed the dataset has shown how the next year...



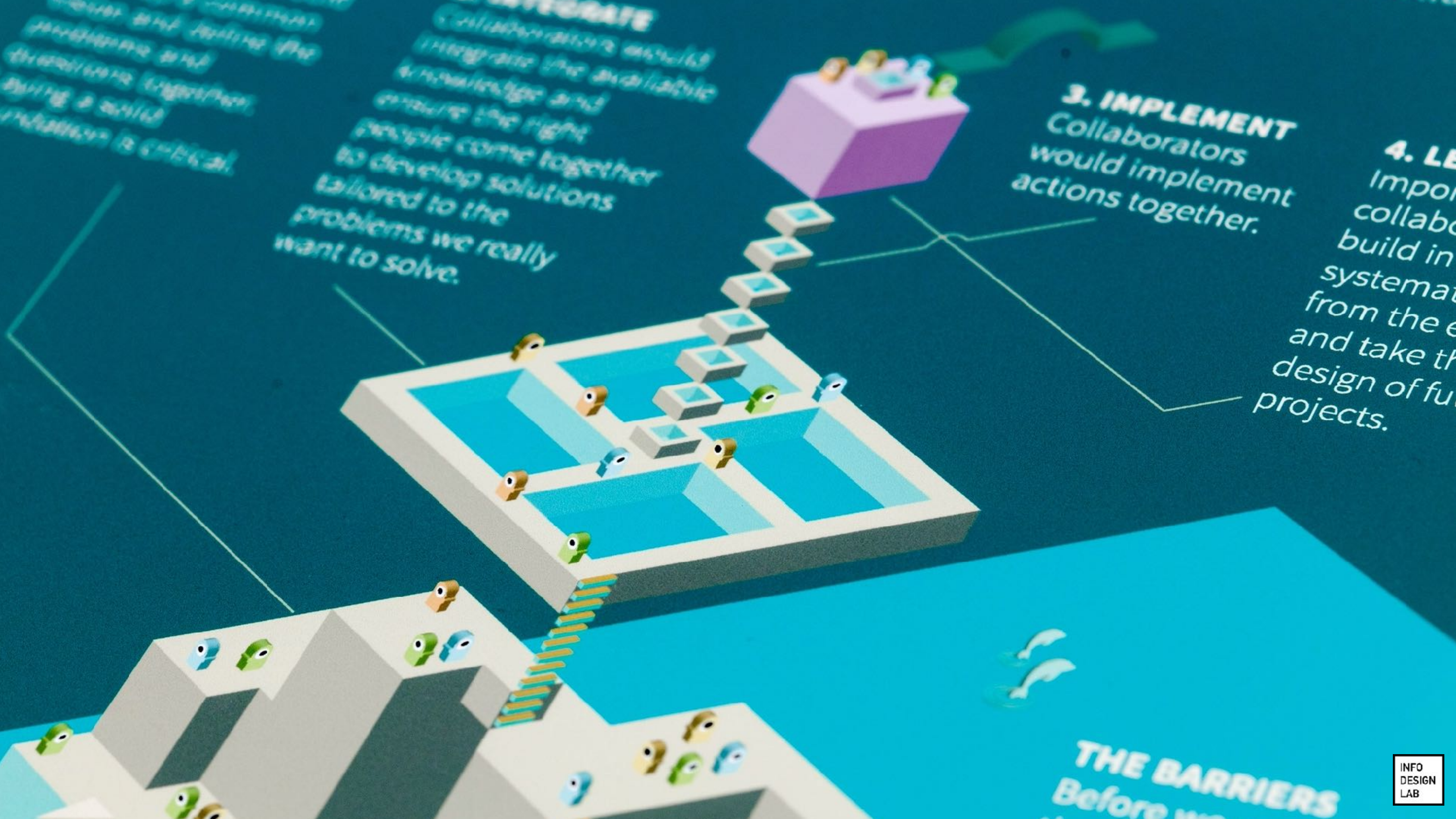


collaborators must
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3. IMPLEMENT
Collaborators
would implement
actions together.

4. LEARN
Important
collaborators
build in
systematic
from the e
and take th
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projects.



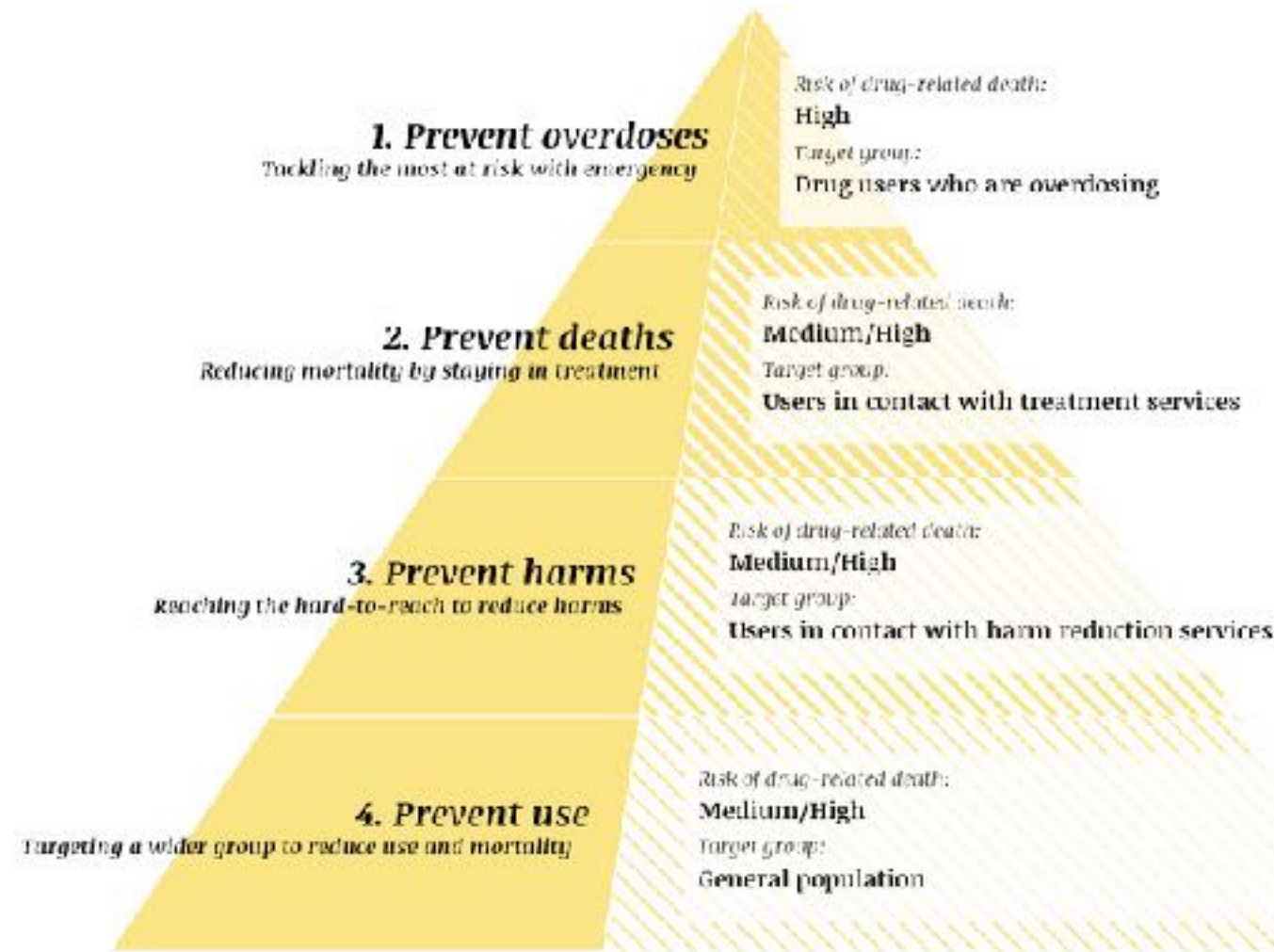
THE BARRIERS
Before we





WHAT WORKS TO PREVENT DRUG MORTALITY

SOURCE: EDR 2017

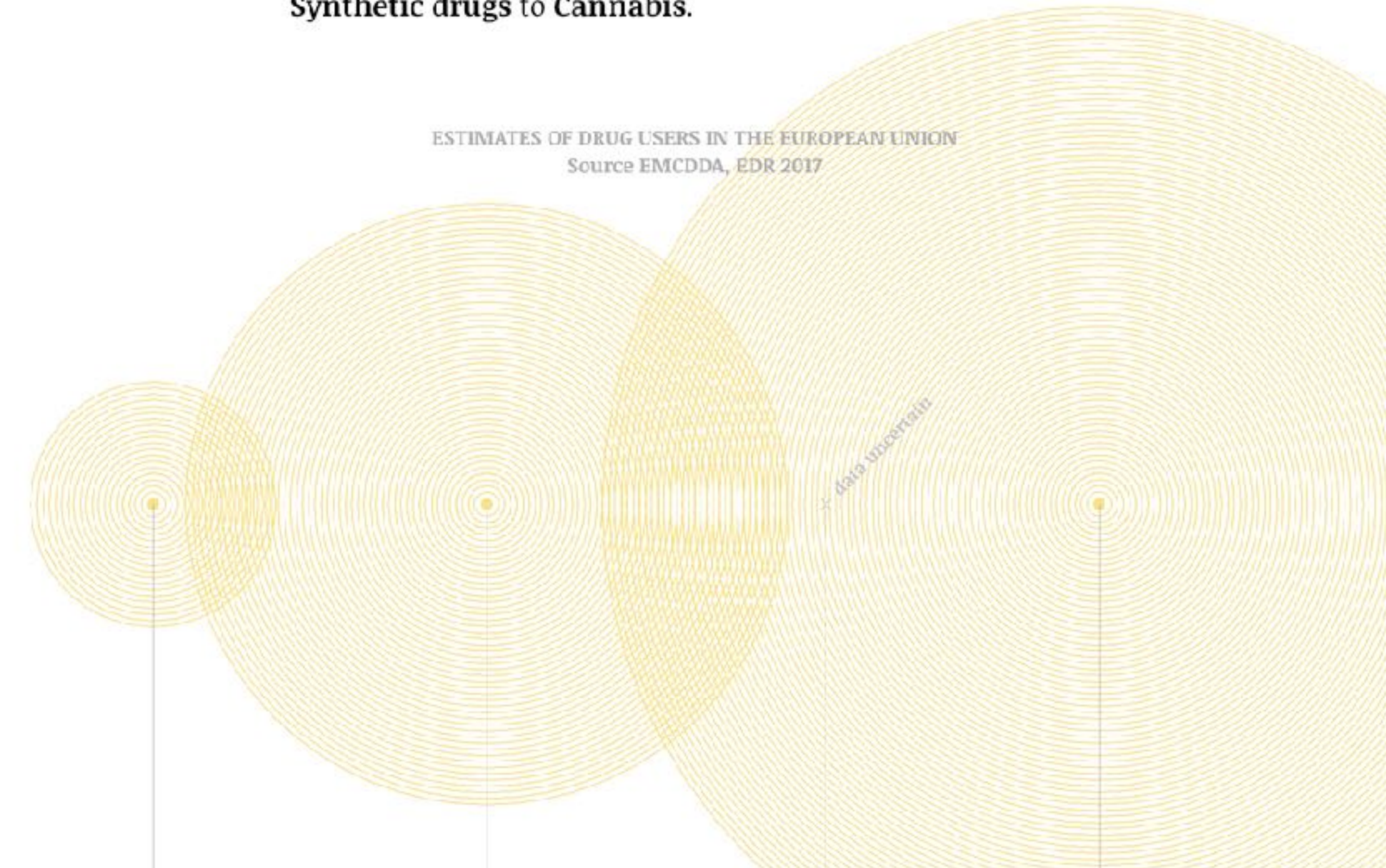


The number of people who die because of drugs is heavily influenced by **the drugs used** and **how these drugs are consumed**.

The European drug market offers a wide range of substances ranging from **Opioids** to **Stimulants**, from **Synthetic drugs** to **Cannabis**.

ESTIMATES OF DRUG USERS IN THE EUROPEAN UNION

Source EMCDDA, EDR 2017



Opioids

1.3 million users

Opioids are a class of drugs that act as powerful pain relievers. In 2015 in Europe it was estimated that there were 1.3 million high-risk opioid users.

Stimulants

8 million users

Stimulants are a class of drugs that increase alertness, energy and attention. In 2015 in Europe it was estimated that there were almost 8 million recent users of stimulants.

Synthetic drugs

data uncertain

Synthetic drugs are new substances created synthetically in illegal labs. The number of users is uncertain but their availability on the market shows that there is a demand.

Cannabis

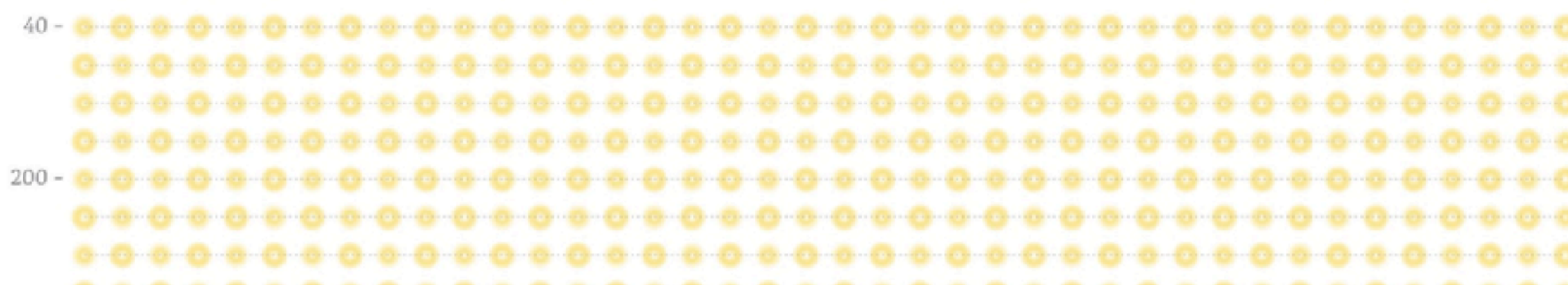
22.1 million users

Cannabis is the illicit drug most likely to be used in Europe. In 2014 in Europe it was estimated that there were 23.5 million recent users.

European Monitoring Centre for Drug and Drug Addiction

Drug mortality is preventable. Here's how.

In 2015, **8441** people in Europe died because of **overdose of drugs**. They accidentally or intentionally took more than the normal amount or the drug was too potent.



**The world is thirsty
because it is hungry.**



*'...shows that
collective
responsibility is
essential for
assessing and
monitoring progress
and for meeting
internationally
agreed targets
and goals.'*
Kofi Annan

Water

a shared responsibility



The United Nations
World Water Development
Report 2





Source: Water Footprint

For food
496
liters per day

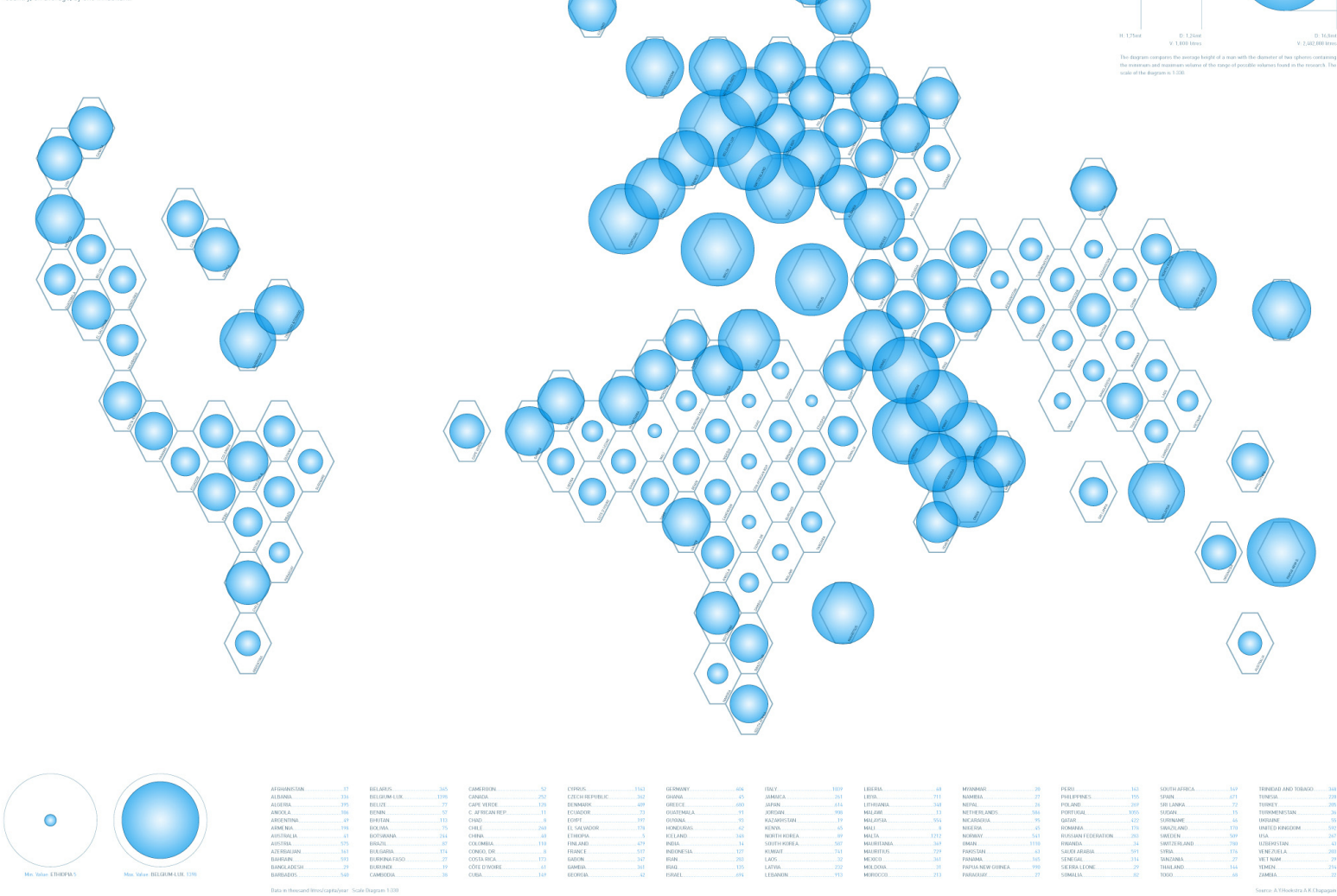




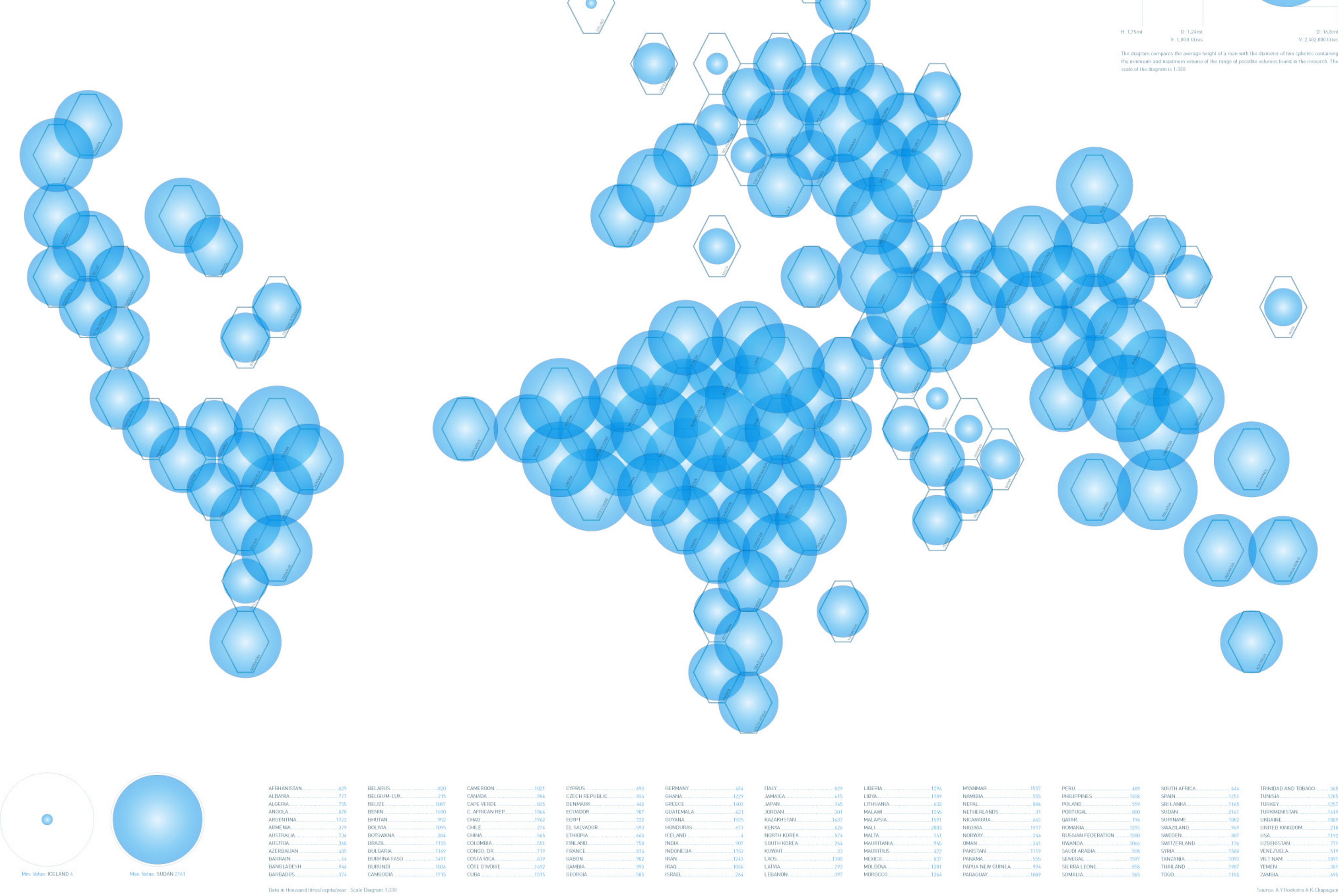
THE WATER CRISIS

Today more than 1 billion people do not have access to clean water. By 2050, if present water consumption trends continue, nearly half the world population will be living in areas that are chronically short of water. The basic problem is that the world's water resources are neither infinite nor fixed: it can be neither increased nor decreased. As populations grow, access to clean water is available to fewer and fewer people. Pollution of water resources is another major problem.



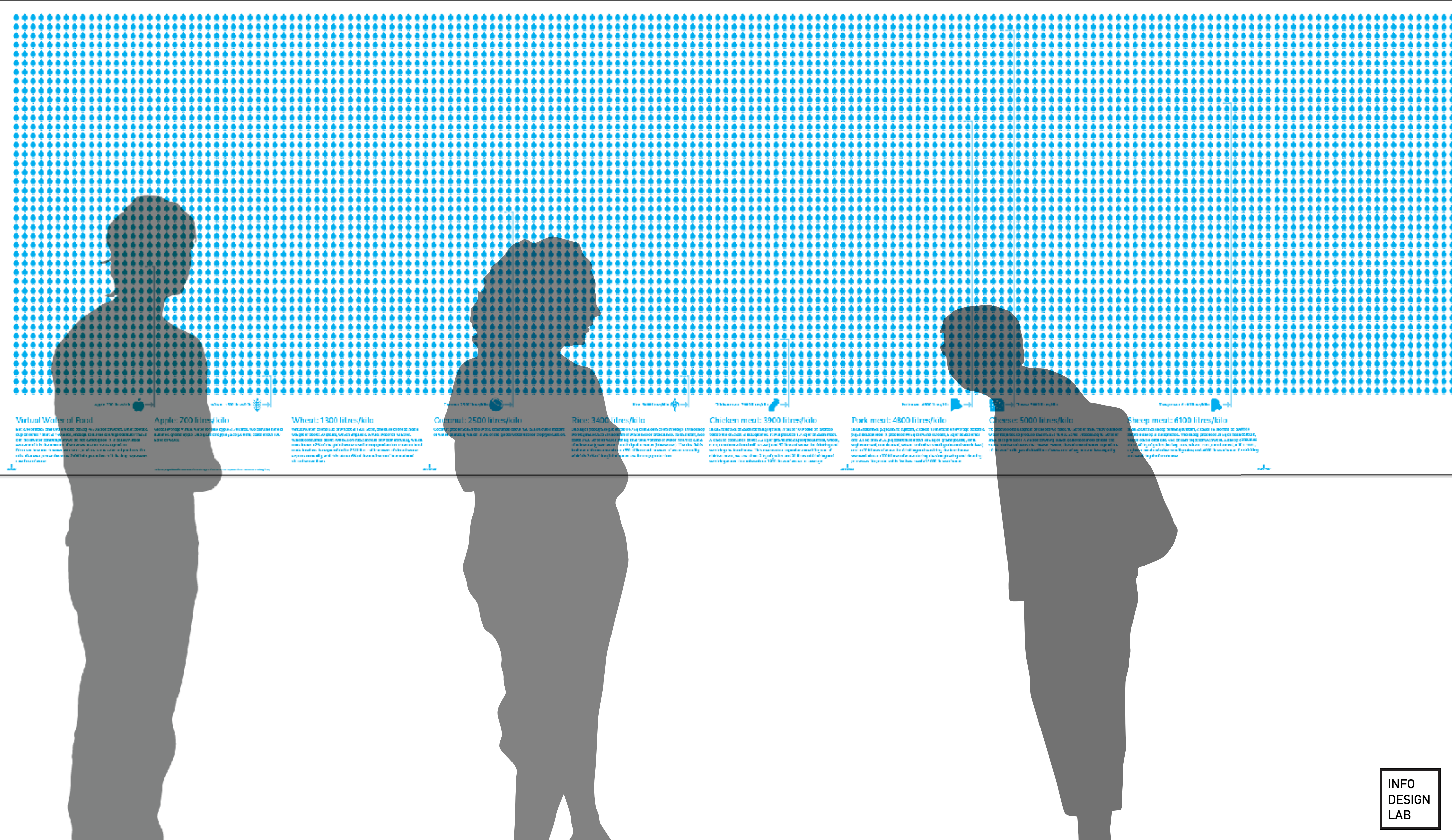


Volume of national water resources used for the Agricultural Goods domestically produced and consumed in each country, on average, by one inhabitant.



Source: A.Y.Hookstra, A.K.Chapagain





Virtual Water of Food

It is estimated that the world's population will reach 9 billion by 2050. To feed this growing population, the world will need to produce 70% more food by 2050. This will require a significant increase in water resources, as water is essential for food production. The world's water resources are being depleted at an alarming rate, and this is a major concern for the future of the world's population.

Apple: 700 litres/kilo

Apples are a popular fruit, and they are also a major source of water. It takes 700 litres of water to produce one kilo of apples. This is because apples are grown in areas with high water requirements, and they are also a major source of water for the world's population.

Wheat: 1300 litres/kilo

Wheat is a major crop, and it is also a major source of water. It takes 1300 litres of water to produce one kilo of wheat. This is because wheat is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Cornmeal: 2500 litres/kilo

Cornmeal is a major crop, and it is also a major source of water. It takes 2500 litres of water to produce one kilo of cornmeal. This is because cornmeal is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Rice: 3400 litres/kilo

Rice is a major crop, and it is also a major source of water. It takes 3400 litres of water to produce one kilo of rice. This is because rice is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Chicken meat: 3900 litres/kilo

Chicken meat is a major source of water. It takes 3900 litres of water to produce one kilo of chicken meat. This is because chicken meat is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Pork meat: 4800 litres/kilo

Pork meat is a major source of water. It takes 4800 litres of water to produce one kilo of pork meat. This is because pork meat is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Chicken: 5000 litres/kilo

Chicken is a major source of water. It takes 5000 litres of water to produce one kilo of chicken. This is because chicken is grown in areas with high water requirements, and it is also a major source of water for the world's population.

Sheep meat: 6100 litres/kilo

Sheep meat is a major source of water. It takes 6100 litres of water to produce one kilo of sheep meat. This is because sheep meat is grown in areas with high water requirements, and it is also a major source of water for the world's population.





THE WATER WE EAT
www.angelamorelli.com/water



thewaterweeat.com

What if I told you:
***you eat 3496 litres of
water***

Our **domestic consumption** is
137 litres of water everyday.
This is how we manage those
137 litres

🚰 **30%** Flushing toilet



Water for Domestic
Consumption

137 litres

🚰 30%

🚰 35%

Can you visualize 15400 litres
of water in your head?



The Global Water Footprint of Humanity
With Prof Tony Allan, inventor of the Virtual Water concept

Co-designing data visualizations
with the readers and above all
with the content experts can
really help us meet our audience
where they are.

1. The collaboration with the IPCC
2. Designing the co-design process
3. User engagement
4. The tools to support the co-design process

**The collaboration with
the IPCC.**

01

ipcc
INTERGOVERNMENTAL PANEL ON climate change



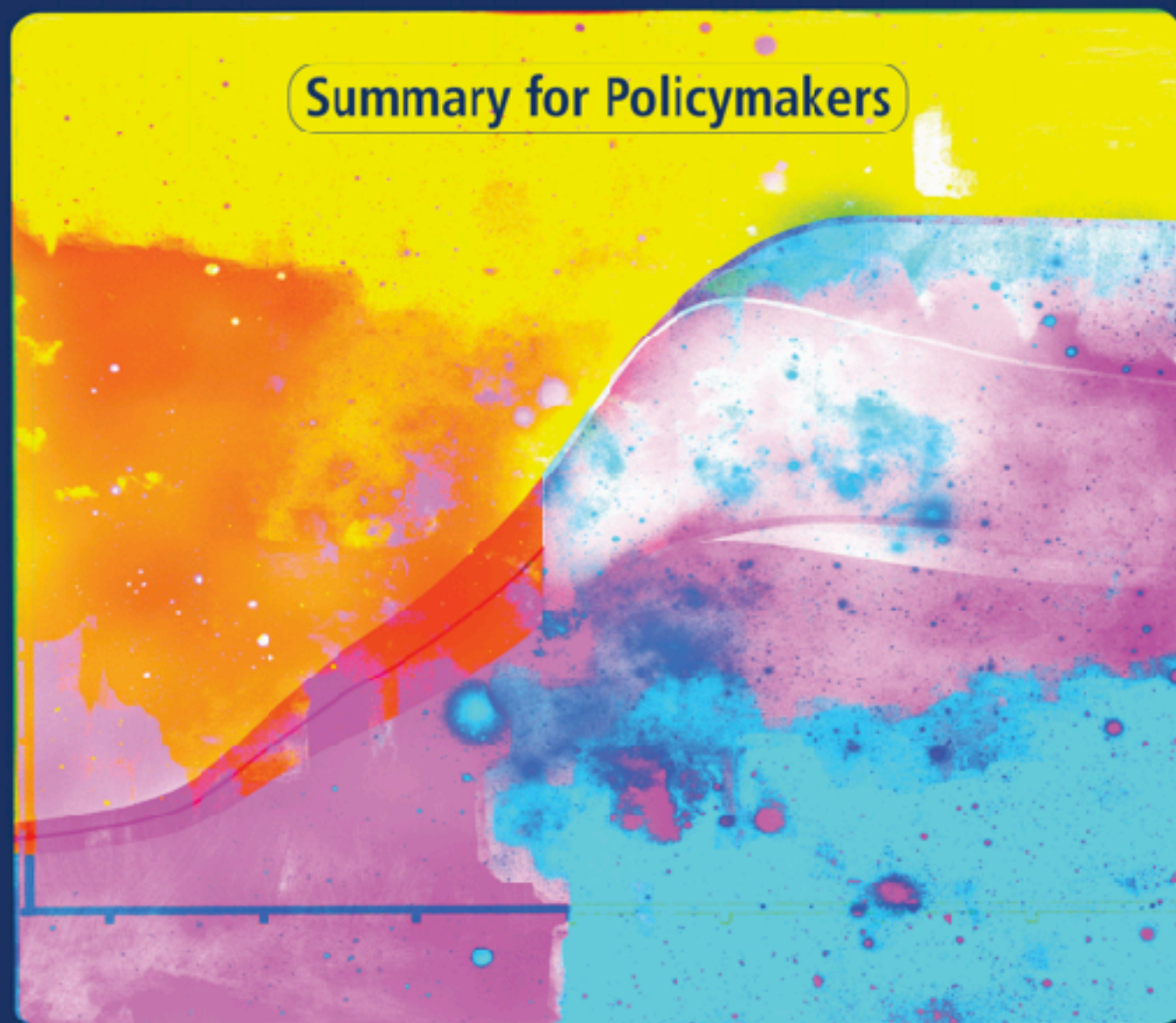
SUMMARY FOR POLICYMAKERS

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Global Warming of 1.5°C

An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

Summary for Policymakers

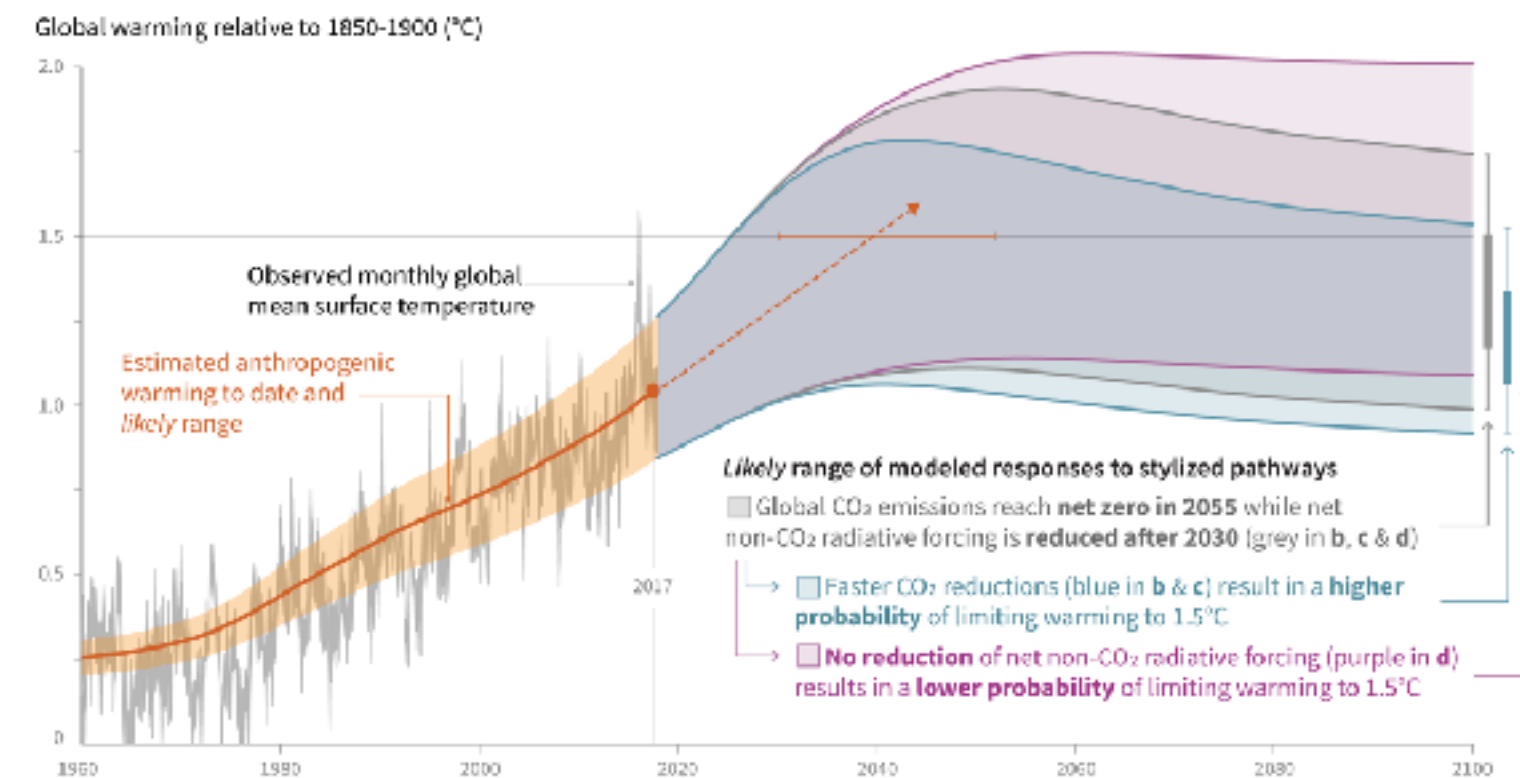


WG I WG II WG III

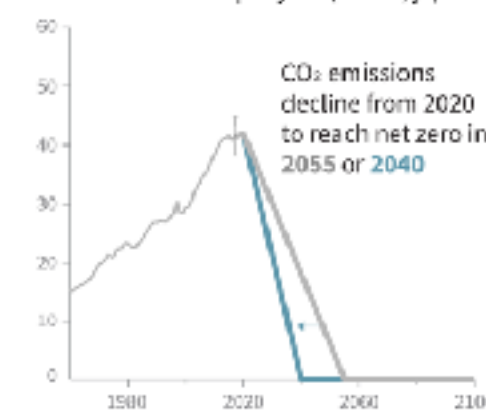


Cumulative emissions of CO₂ and future non-CO₂ radiative forcing determine the probability of limiting warming to 1.5°C

a) Observed global temperature change and modeled responses to stylized anthropogenic emission and forcing pathways

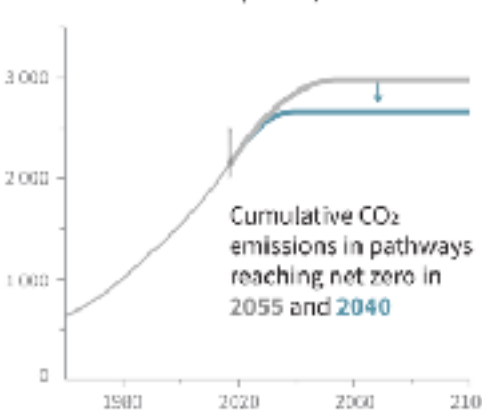


b) Stylized net global CO₂ emission pathways
Billion tonnes CO₂ per year (GtCO₂/yr)



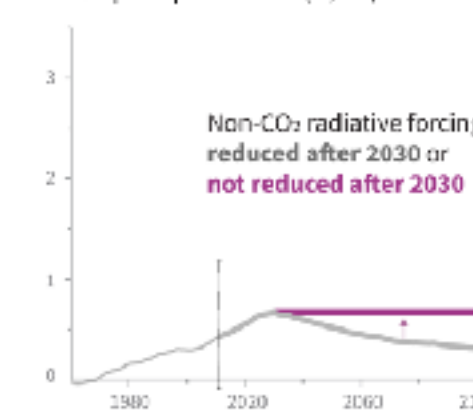
Faster immediate CO₂ emission reductions limit cumulative CO₂ emissions shown in panel (c).

c) Cumulative net CO₂ emissions
Billion tonnes CO₂ (GtCO₂)



Maximum temperature rise is determined by cumulative net CO₂ emissions and net non-CO₂ radiative forcing due to methane, nitrous oxide, aerosols and other anthropogenic forcing agents.

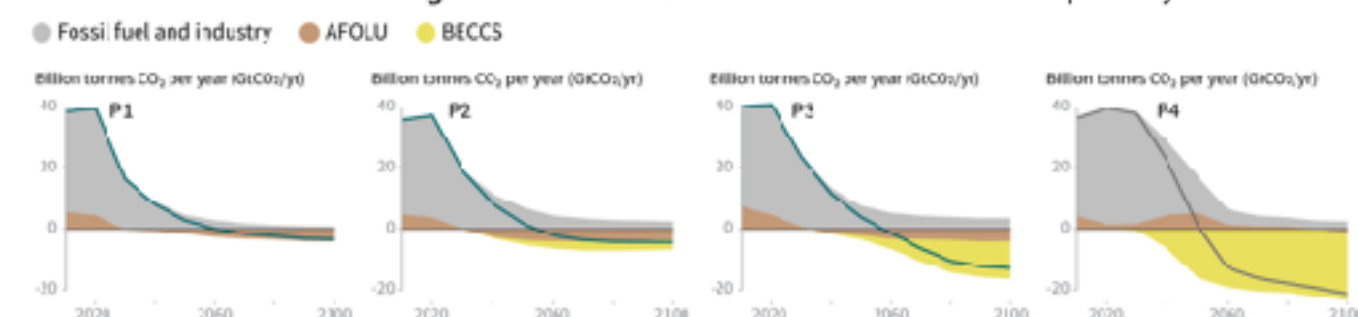
d) Non-CO₂ radiative forcing pathways
Watts per square metre (W/m²)



Characteristics of four illustrative model pathways

Different mitigation strategies can achieve the net emissions reductions that would be required to follow a pathway that limits global warming to 1.5°C with no or limited overshoot. All pathways use Carbon Dioxide Removal (CDR), but the amount varies across pathways, as do the relative contributions of bioenergy with Carbon Capture and Storage (BECCS) and removals in the Agriculture, Forestry and Other Land Use (AFOLU) sector. This has implications for emissions and several other pathway characteristics.

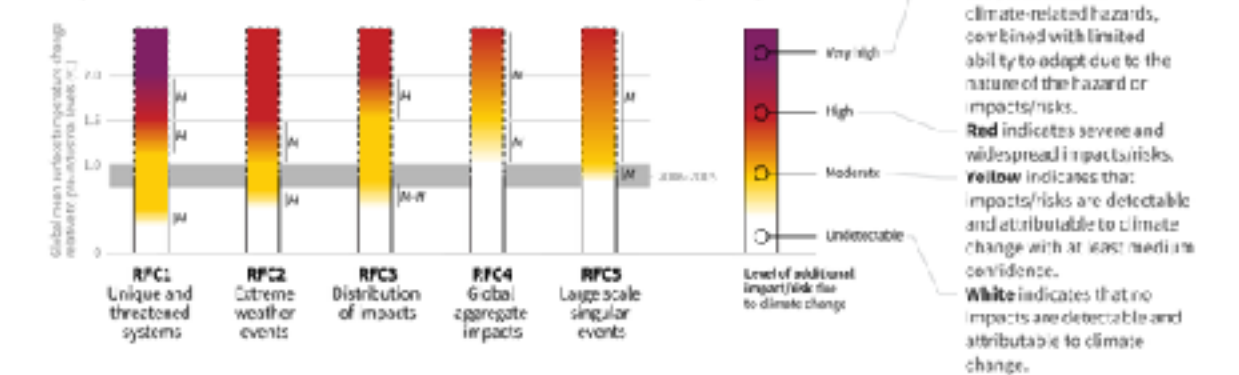
Breakdown of contributions to global net CO₂ emissions in four illustrative model pathways



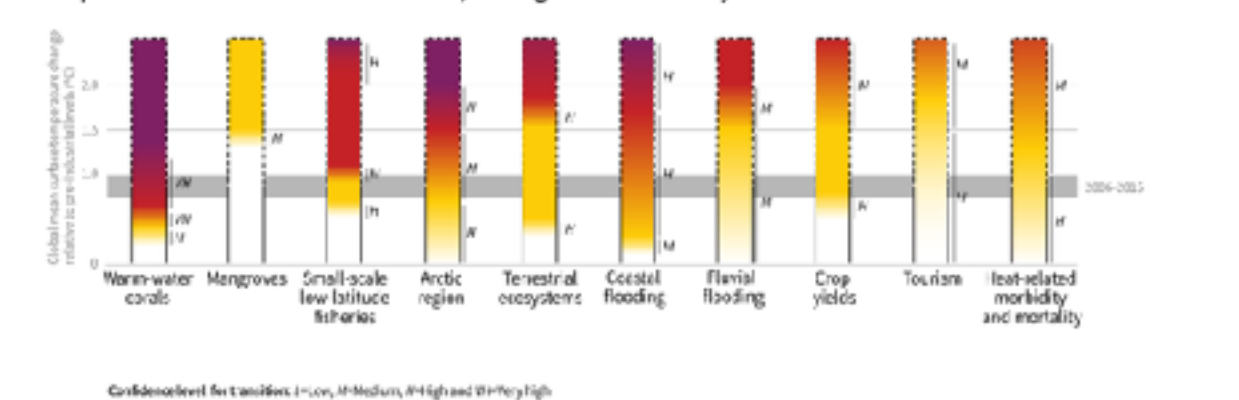
How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



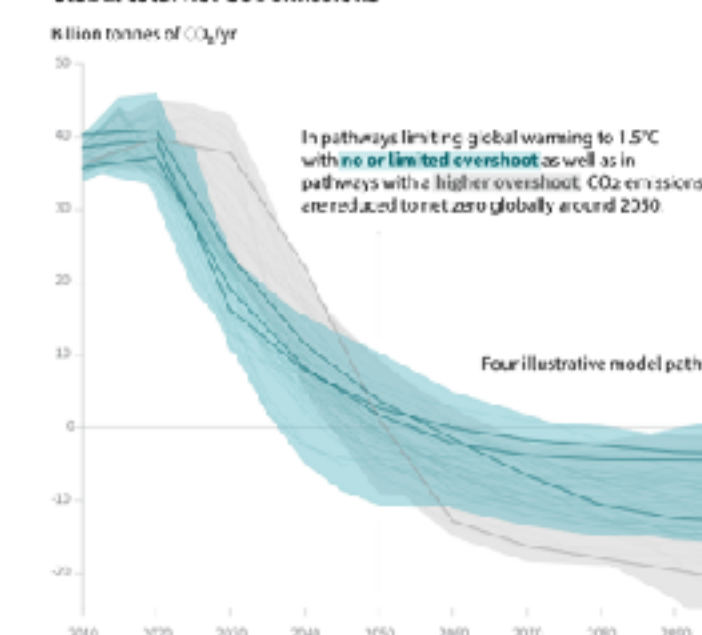
Impacts and risks for selected natural, managed and human systems



Global emissions pathway characteristics

General characteristics of the evolution of anthropogenic net emissions of CO₂, and total emissions of methane, black carbon, and nitrous oxide in model pathways that limit global warming to 1.5°C with no or limited overshoot. Net emissions are defined as anthropogenic emissions reduced by anthropogenic removals. Reductions in net emissions can be achieved through different portfolios of mitigation measures illustrated in Figure SPM.3b.

Global total net CO₂ emissions



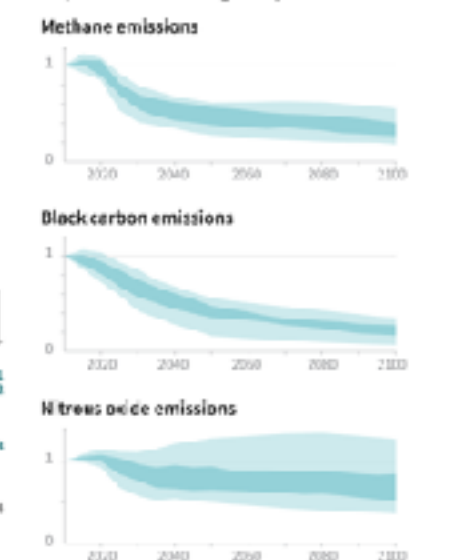
Timing of net zero CO₂. Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios.

Pathways limiting global warming to 1.5°C with no or limited overshoot

Pathways with higher overshoot

Pathways limiting global warming below 2°C (Not shown above)

Non-CO₂ emissions relative to 2010. Emissions of non-CO₂ forces are also reduced or limited in pathways limiting global warming to 1.5°C with no or limited overshoot, but they do not reach zero globally.



Indicative development

Mitigation options that have a high potential to reduce global warming are larger than for local and regional climate change.

Length shows st



Source: IPCC Special Report

Climate Change and Land

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

Summary for Policymakers

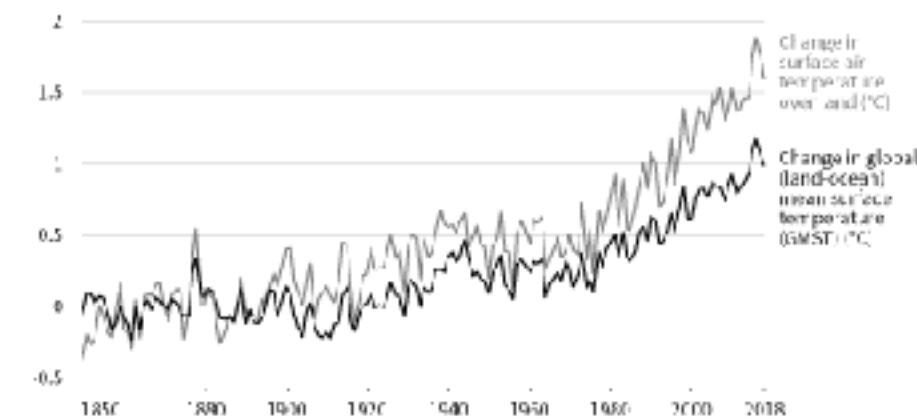


Land use and observed climate change

A. Observed temperature change relative to 1850-1900

Since the pre-industrial period [1850-1900] the observed mean land surface air temperature has risen considerably more than the global mean surface (land and ocean) temperature (GMST).

CHANGE in TEMPERATURE rel. to 1850-1900 (°C)

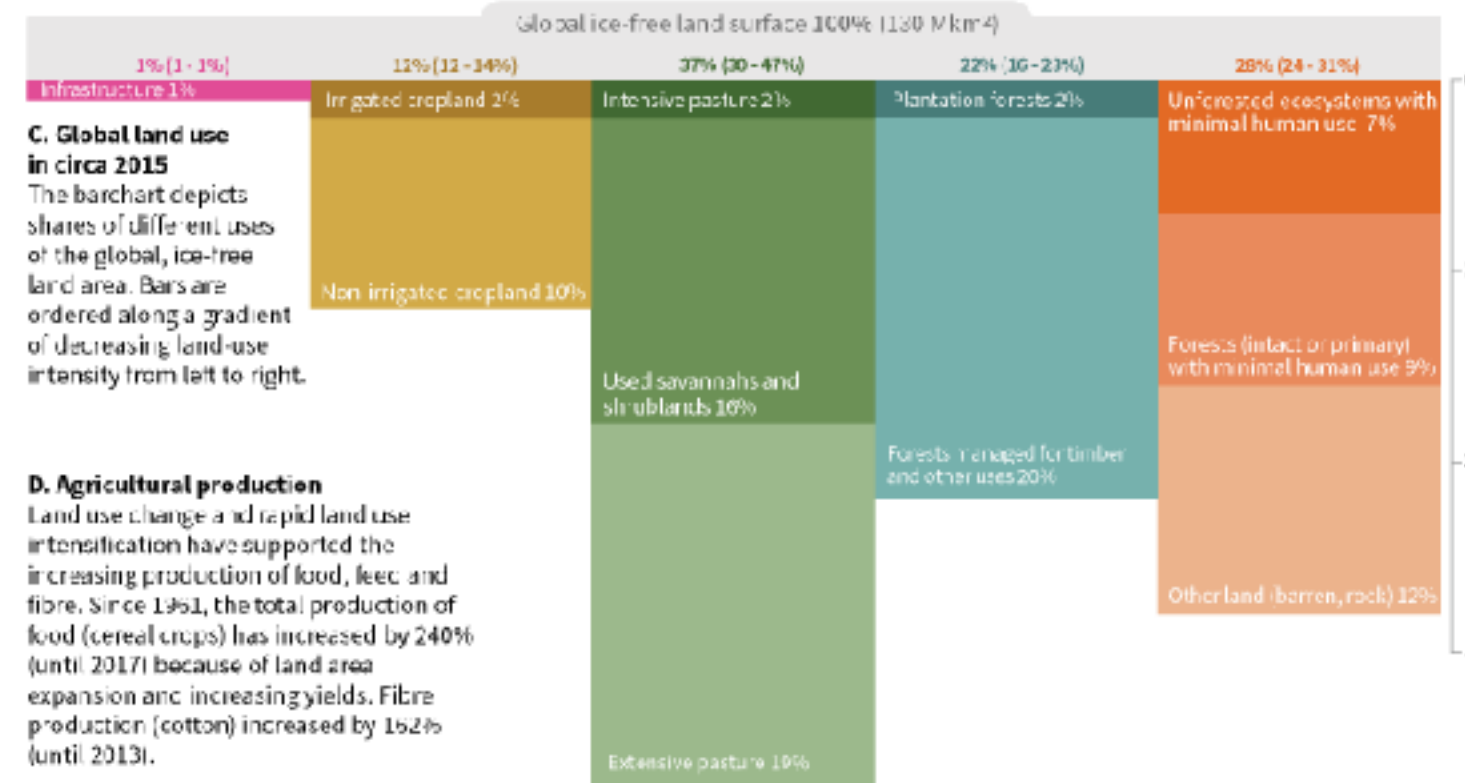
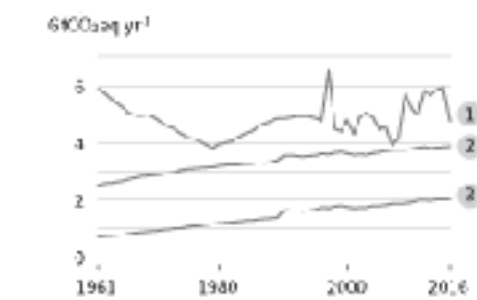


B. GHG emissions

An estimated 23% of total anthropogenic greenhouse gas emissions (2007-2016) derive from Agriculture, Forestry and Other Land Use (AFOLU).

CHANGE in EMISSIONS since 1961

- Net CO₂ emissions from FOLU (GtCO₂/yr)
- CH₄ emissions from Agriculture (GtCO₂eq/yr)
- N₂O emissions from Agriculture (GtCO₂eq/yr)



C. Global land use in circa 2015

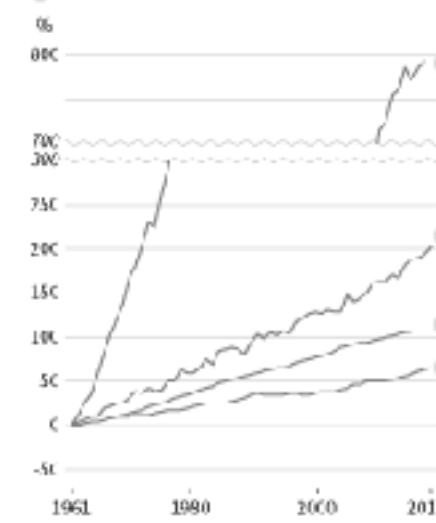
The bar chart depicts shares of different uses of the global, ice-free land area. Bars are ordered along a gradient of decreasing land-use intensity from left to right.

D. Agricultural production

Land use change and rapid land use intensification have supported the increasing production of food, feed and fibre. Since 1961, the total production of food (cereal crops) has increased by 240% (until 2017) because of land area expansion and increasing yields. Fibre production (cotton) increased by 152% (until 2013).

CHANGE in % rel. to 1961

- Intergovernmental Fertiliser use
- Cereal yields
- Irrigation water volume
- Total number of ruminant livestock



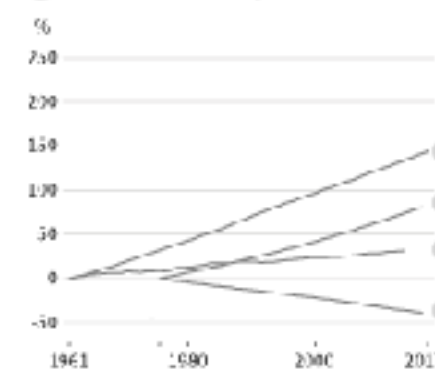
Subject to copy edit and layout

E. Food demand

Increases in production are linked to consumption changes.

CHANGE in % rel. to 1961 and 1970

- Population
- Prevalence of overweight+obese
- Total calor. resp. capita
- Prevalence of underweight



Subject to copy edit and layout

F. Desertification and land degradation

Land-use change, land-use intensification and climate change have contributed to desertification and land degradation.

CHANGE in % rel. to 1961 and 1970

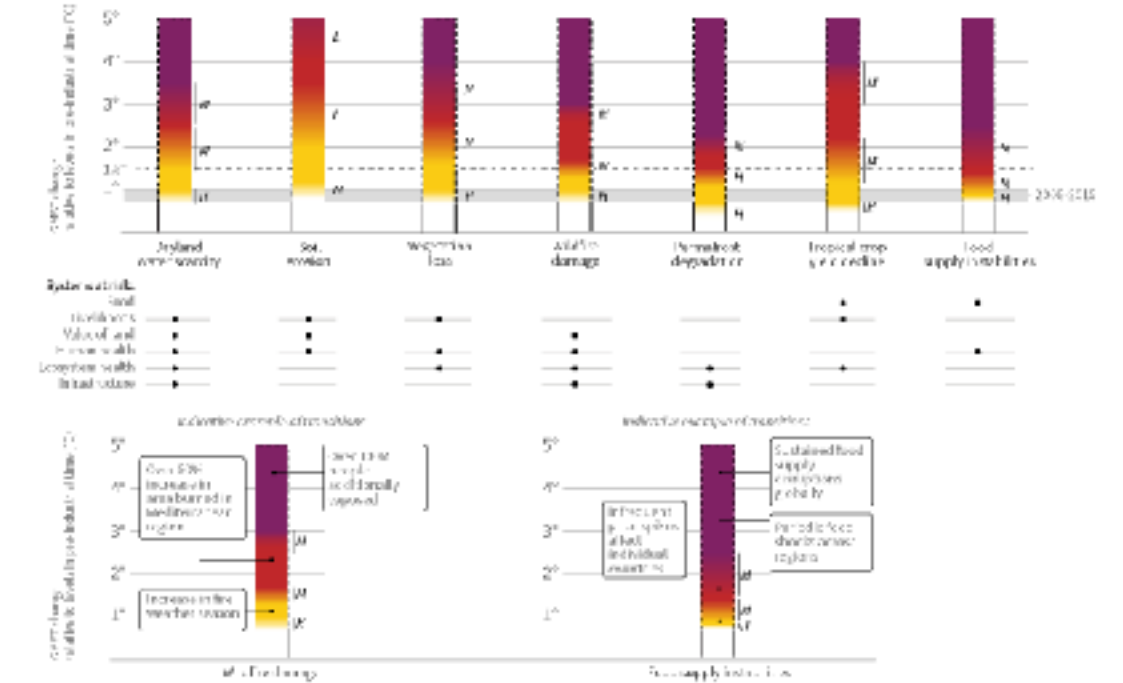
- Population in areas experiencing desertification
- Dryland areas in drought annually
- Global water deficit



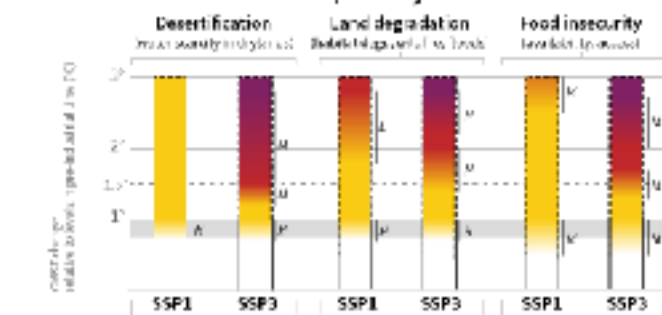
SPM approved draft IPCC SRCCL | Page 4

A. Risks to humans and ecosystems from changes in land-based processes as a result of climate change

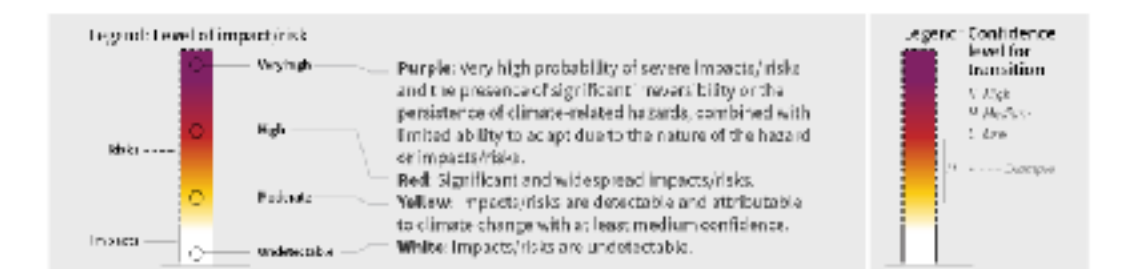
Increases in global mean surface temperature (GMST), relative to pre-industrial levels, affect processes involved in desertification (lower soil fertility), land degradation (soil erosion, vegetation loss, wildfires, permafrost thaw), and food security (crop yield and food supply instability). Changes in these processes drive risks to food systems, food, livelihoods, the value of land, and human and ecosystem health. Changes in one process (e.g., wildfire or water scarcity) may feed into compound risks. Risks are local, non-specific and differ by region.



B. Different socioeconomic pathways affect levels of climate related risks



Socioeconomic choices can reduce or increase climate-related risks as well as influence the rate of temperature increase. The SSP1 pathway illustrates a world with low population growth, high income, and technological innovation, time prudent and low GHG emissions on systems, effective land use regulation and high adaptive capacity. The SSP2 pathway has the opposite trends. Risks are lower in SSP1 compared with SSP2 given the same level of climate increase.

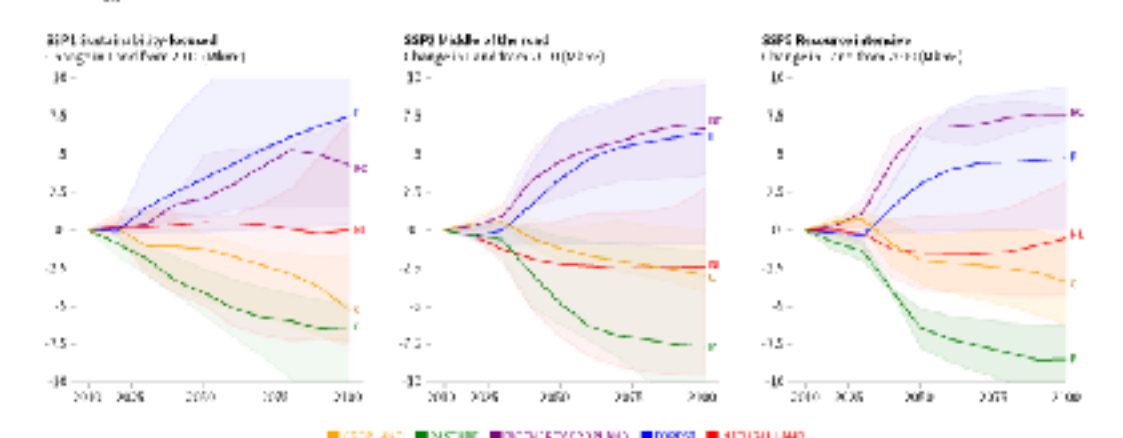
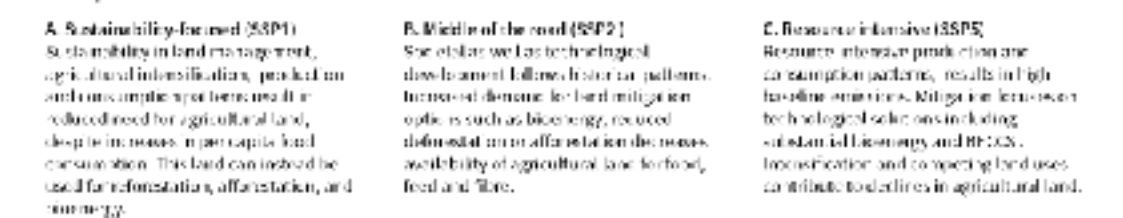


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SPM approved draft IPCC SRCCL | Page 13

A. Pathways linking socioeconomic development, mitigation responses and land

Socioeconomic development and land management influence the evolution of the land system including the relative amount of land used for cropland, pasture, forests, and other uses. The lines show the median values integrated Assessment Models (IAMs) for three alternative socioeconomic pathways (SSP1, SSP2 and SSP3) at RCP4.5. Shaded areas show the range across models. Note that pathways illustrate the effects of climate change mitigation but not those of climate change impacts in multiple line.



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INTERGOVERNMENTAL PANEL ON climate change

Climate Change 2021

The Physical Science Basis

Summary for Policymakers

WG1

Working Group I contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

WMOUNEP

INFO
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LAB

Climate change is already affecting every inhabited region across the globe with human influence contributing to many observed changes in weather and climate extremes

a) Synthesis of assessment of observed change in **hot extremes** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in hot extremes

- Increase (41)
- Decrease (0)
- Low agreement in the type of change (2)
- Limited data and/or literature (2)

Confidence in human contribution to the observed change

- High
- Medium
- Low due to limited agreement
- Low due to limited evidence

Type of observed change since the 1950s

b) Synthesis of assessment of observed change in **heavy precipitation** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in heavy precipitation

- Increase (19)
- Decrease (0)
- Low agreement in the type of change (8)
- Limited data and/or literature (18)

Confidence in human contribution to the observed change

- High
- Medium
- Low due to limited agreement
- Low due to limited evidence

Type of observed change since the 1950s

c) Synthesis of assessment of observed change in **agricultural and ecological drought** and confidence in human contribution to the observed changes in the world's regions

Type of observed change in agricultural and ecological drought

- Increase (12)
- Decrease (1)
- Low agreement in the type of change (28)
- Limited data and/or literature (4)

Confidence in human contribution to the observed change

- High
- Medium
- Low due to limited agreement
- Low due to limited evidence

Type of observed change since the 1950s

Each hexagon corresponds to one of the IPCC AR6 WGI reference regions

North-Western North America

IPCC AR6 WGI reference regions: **North America:** NWN (North-Western North America), NEN (North-Eastern North America), WNA (Western North America), CNA (Central North America), ENA (Eastern North America), **Central America:** NCA (Northern Central America), SCA (Southern Central America), CAR (Caribbean), **South America:** NWS (North-Western South America), NSA (Northern South America), NES (North-Eastern South America), SAM (South American Monsoon), SWS (South-Western South America), SES (South-Eastern South America), SSA (Southern South America), **Europe:** GIC (Greenland/Iceland), NEU (Northern Europe), WCE (Western and Central Europe), EEU (Eastern Europe), MED (Mediterranean), **Africa:** MED (Mediterranean), SAH (Sahara), WAF (Western Africa), CAF (Central Africa), NEAF (North Eastern Africa), SEAF (South Eastern Africa), WSAF (West Southern Africa), ESAF (East Southern Africa), MDG (Madagascar), **Asia:** RAR (Russian Arctic), WSB (West Siberia), ESB (East Siberia), RFE (Russian Far East), WCA (West Central Asia), ECA (East Central Asia), TIB (Tibetan Plateau), EAS (East Asia), ARP (Arabian Peninsula), SAS (South Asia), SEA (South East Asia), **Australasia:** NAU (Northern Australia), CAU (Central Australia), EAU (Eastern Australia), SAU (Southern Australia), NZ (New Zealand), **Small Islands:** CAR (Caribbean), PAC (Pacific Small Islands)

Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850–1900

a) Change in global surface temperature (annual average) as reconstructed (1850–2000) and detected (1850–2020)

b) Change in global surface temperature (annual average) as simulated using human & natural and only natural factors (both 1850–2020)

Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling

Observed warming is driven by emissions from human activities, with greenhouse gas warming partly masked by aerosol cooling

Contributions to warming based on two complementary approaches

a) Warming in response to greenhouse gas emissions since 1850–1900, as reconstructed from attribution studies

b) Warming in response to greenhouse gas emissions since 1850–1900, as reconstructed from attribution studies

Multiple climatic impact-drivers are projected to change in all regions of the world

Multiple climatic impact-drivers are projected to change in all regions of the world

Number of and & coastal regions (a) and open-ocean regions (b) where each climatic impact-driver (CID) is projected to increase or decrease with high confidence (dark shade) or medium confidence (light shade)

a) Heat & Cold, Wet & Dry, Wind, Storm & Ice, Other, Coastal

b) Open Ocean

Future emissions cause future additional warming, with total warming dominated by past and future CO₂ emissions

Future emissions cause future additional warming, with total warming dominated by past and future CO₂ emissions

a) Future annual emissions of CO₂ (left) and of a subset of key non-CO₂ drivers (right) across five illustrative scenarios

b) Selected contributions to non-CO₂ GHG warming (left) and non-CO₂ GHG warming (right) across five illustrative scenarios

Contribution to global surface temperature increase from different emissions, with a dominant role of CO₂ emissions

Contribution to global surface temperature increase from different emissions, with a dominant role of CO₂ emissions

Changes in global surface temperature in 2050–2100 relative to 1850–1900

SSP1-1.9, SSP2-2.6, SSP4-4.5, SSP5-1.0, SSP5-4.5

Human activities affect all the major climate system components, with some responding over decades and others over centuries

Human activities affect all the major climate system components, with some responding over decades and others over centuries

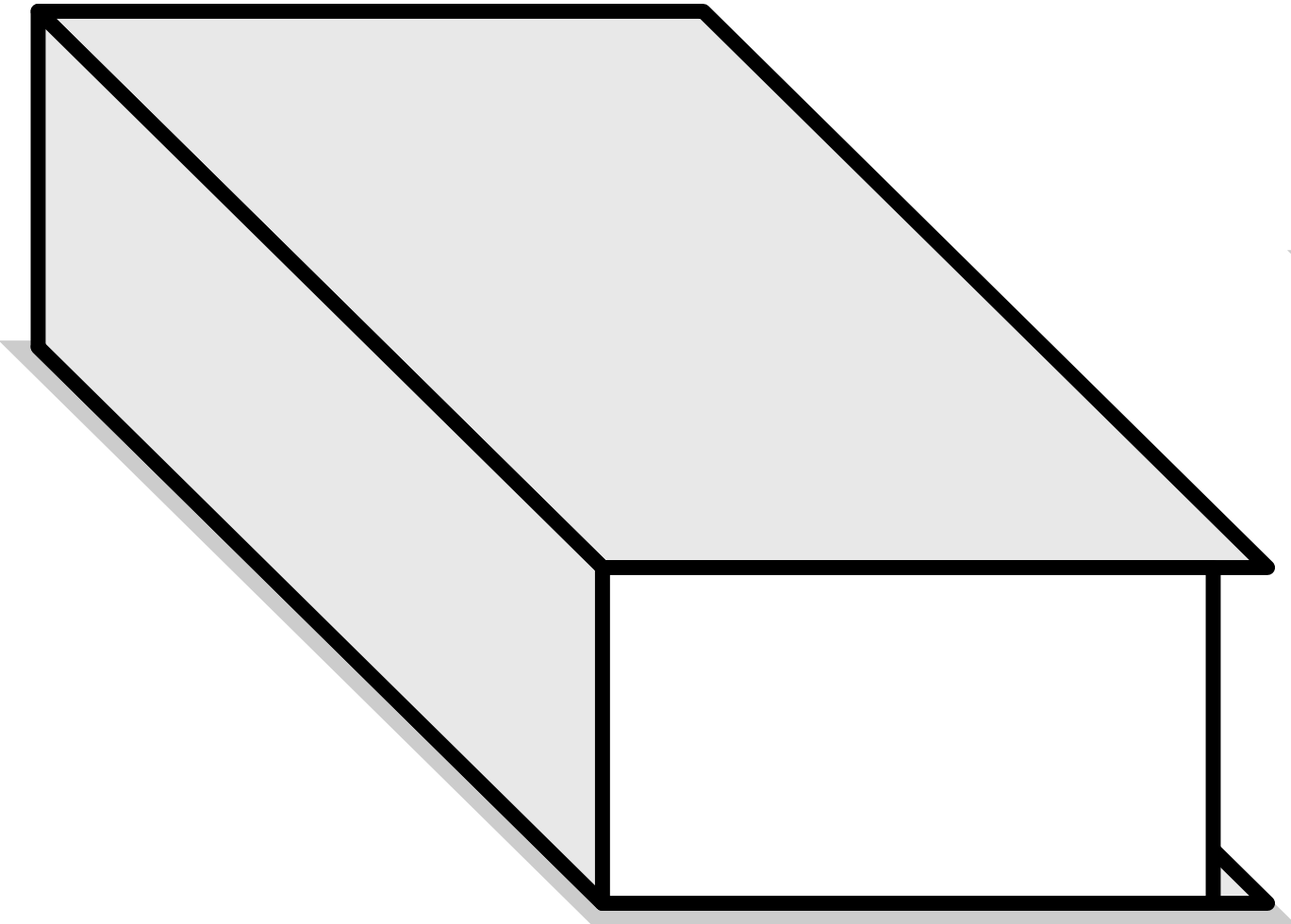
a) Global surface temperature change relative to 1850–1900

b) September Arctic sea ice area

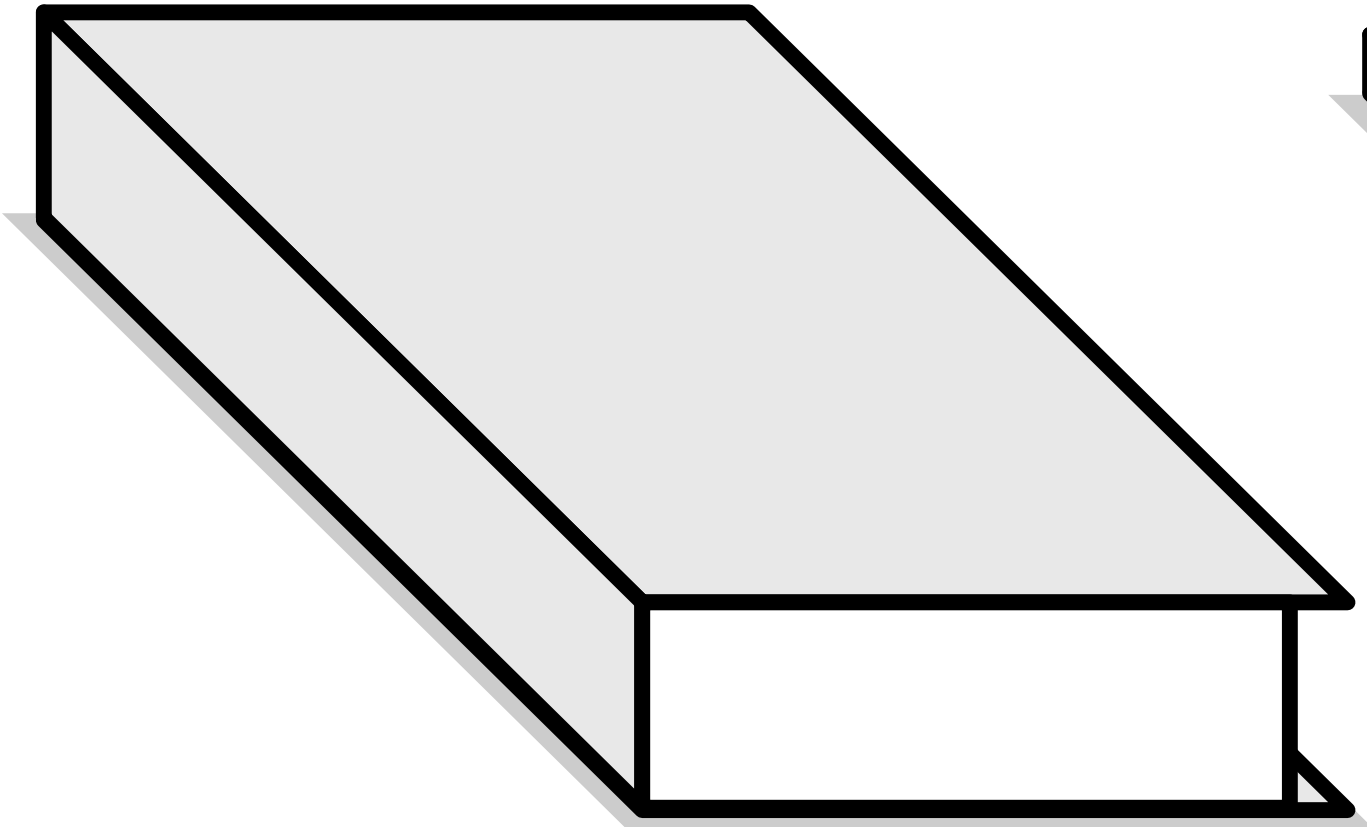
c) Global ocean surface pH is measure of acidity

d) Global mean sea level change relative to 1900

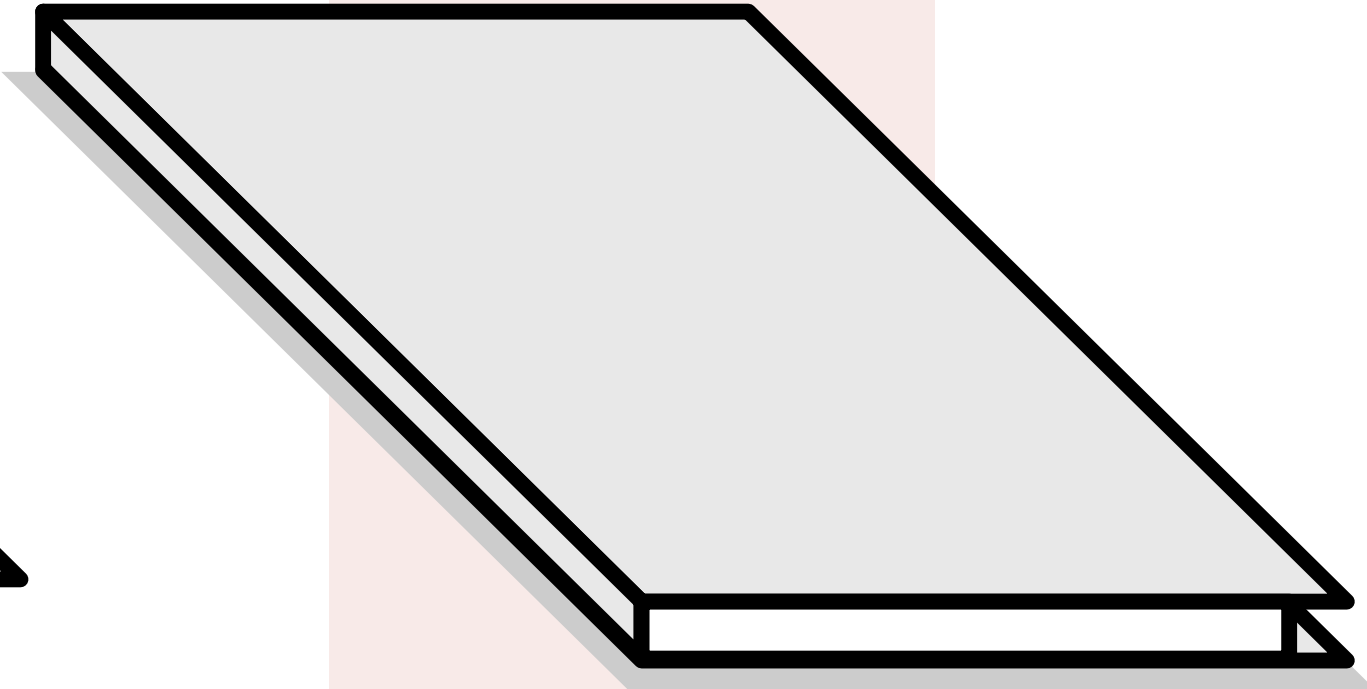
IPCC Special Reports consist of:



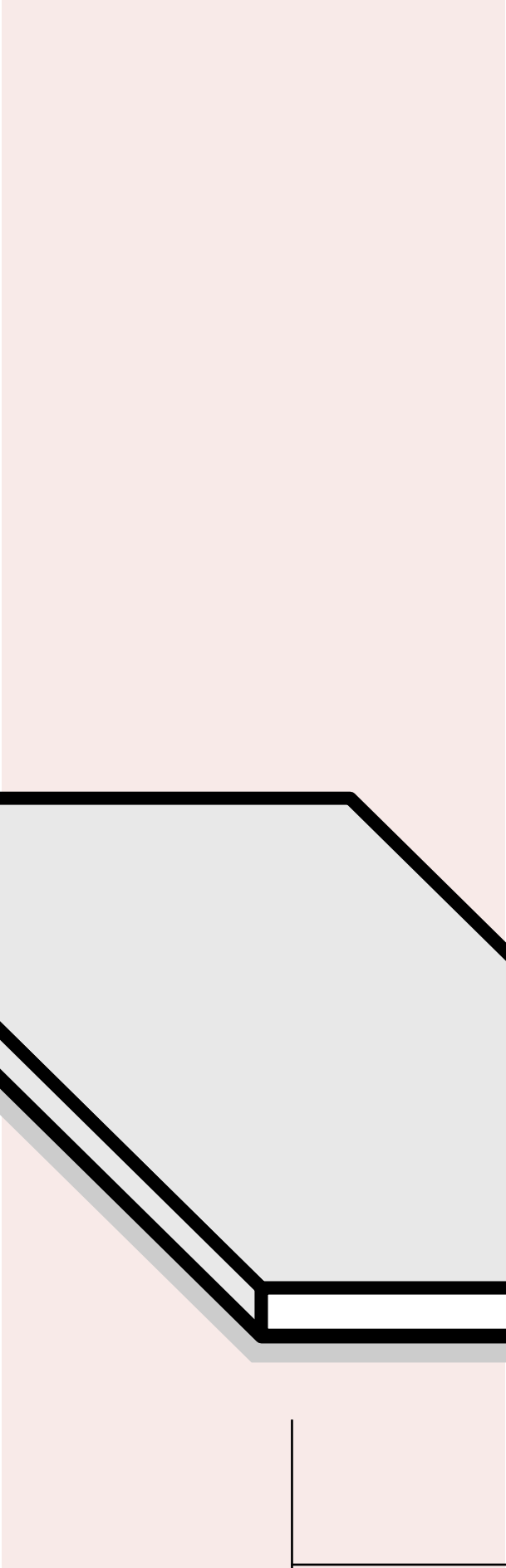
Full report



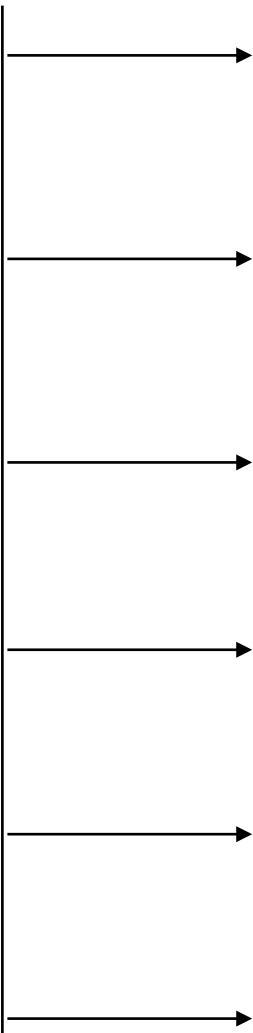
Technical summary



Summary for Policymakers



SCIENCE and POLICY
INTERFACE



Global Warming of 1.5°C

An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

Summary for Policymakers



WG I × WG II × WG III



Climate Change and Land

An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems

Summary for Policymakers

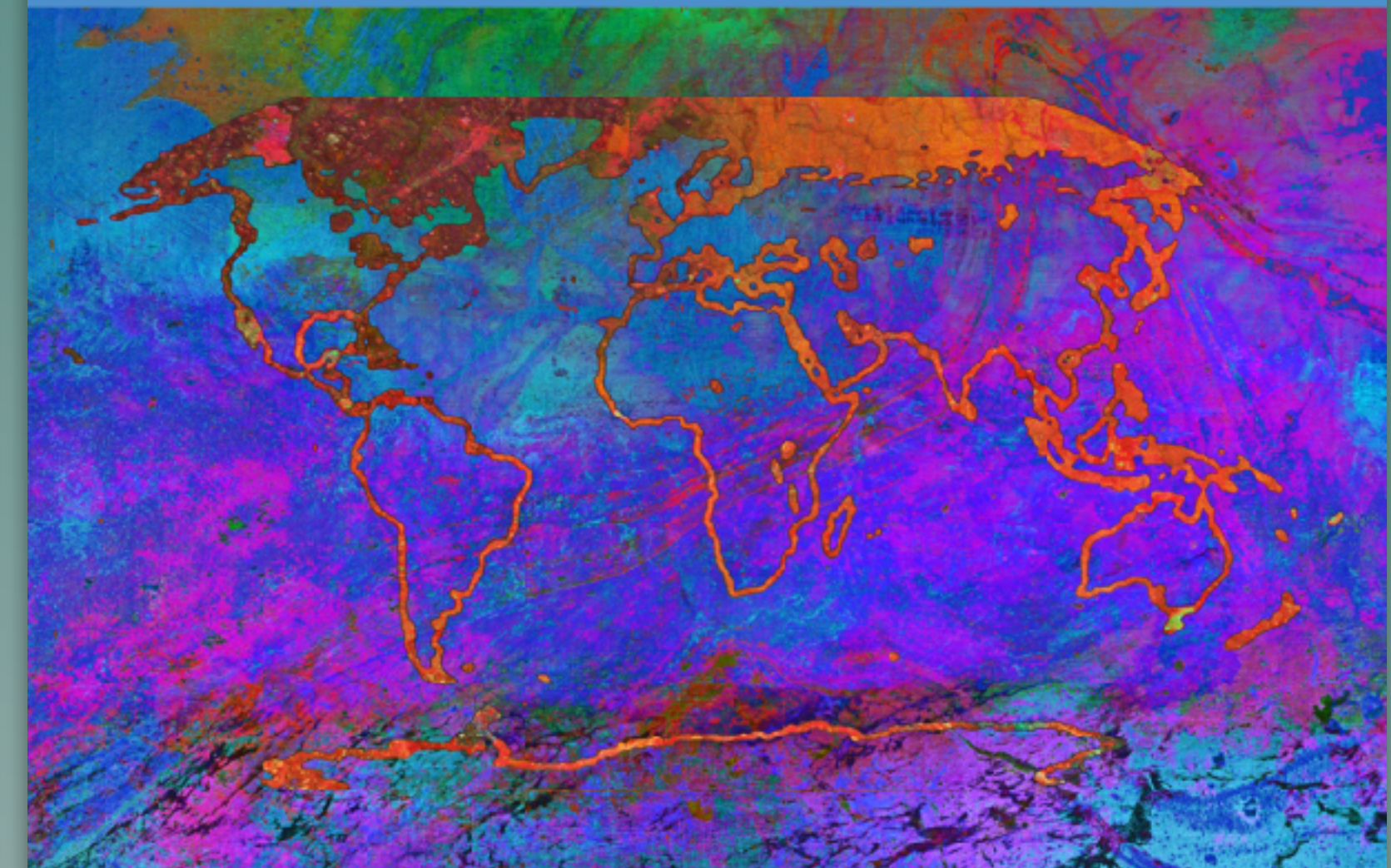


WG I × WG II × WG III



Climate Change 2021 The Physical Science Basis

Summary for Policymakers



WGI

Working Group I contribution to the
Sixth Assessment Report of the
Intergovernmental Panel on Climate Change





Anna Pirani

Head of IPCC Technical Support Unit Working Group 1



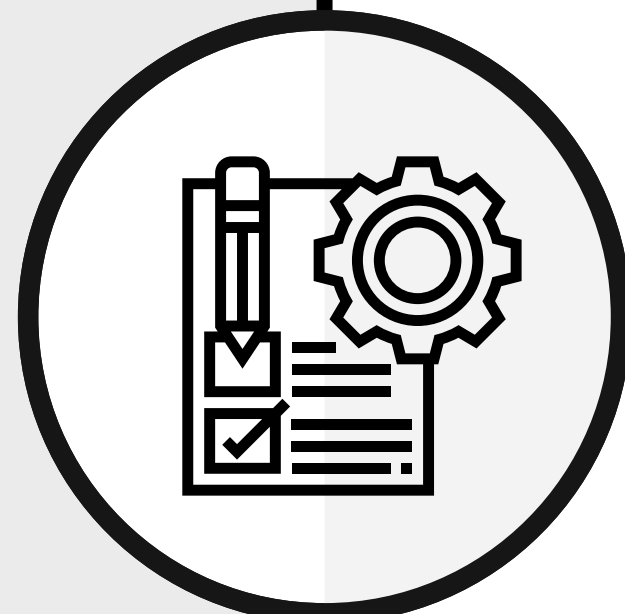
Lead Author Meeting



Draft submitted and compiled



Review



Review Comments to CLAs



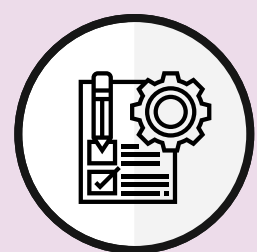
First Lead
Author Meeting



**Internal Draft
submitted and
compiled**



Internal Review



Review comments to
CLAs and team



Second Lead
Author Meeting



**First Order Draft
submitted and
compiled**



Expert Review of First
Order Draft



Review comments to
CLAs and team



Third Lead
Author Meeting



**Second Order Draft
submitted and
compiled**



Expert and
Government Review
of Second Order Draft



Review comments to
CLAs and team



Fourth Lead
Author Meeting



**Final Order Draft
submitted and
compiled**



Final Government
Distribution of
Final Order Draft



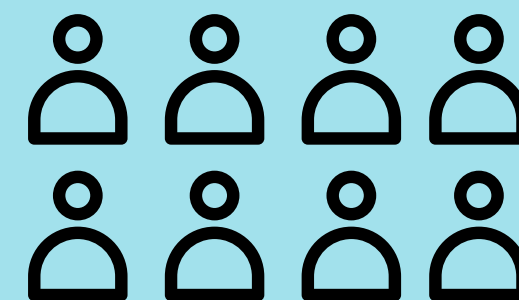
Review comments to
CLAs and team



Pre-approval



**Session of IPCC:
Approval word
by word of SPM**



234

14000

78007

+1300

1500

54

247

435500

388000

2000000

33000000











SPM Special Report on Climate Change and Land
50th Session of IPCC
August, Geneva, Switzerland 2019

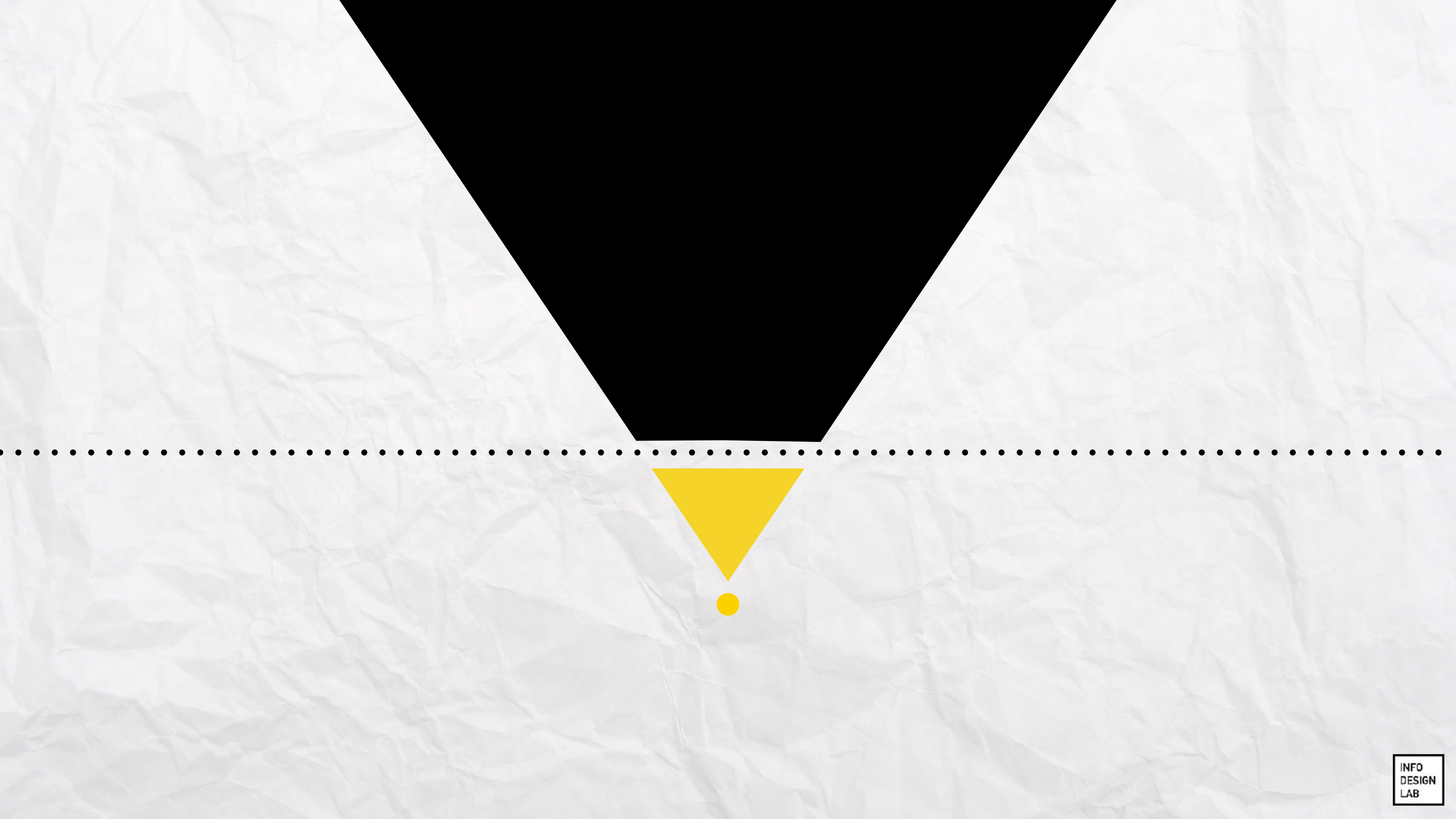


SPM Special Report on Global Warming 1.5 °C
48th Session of IPCC
October, Incheon, South Korea 2018

Designing the co-design process.

02

Leadership



User engagement.

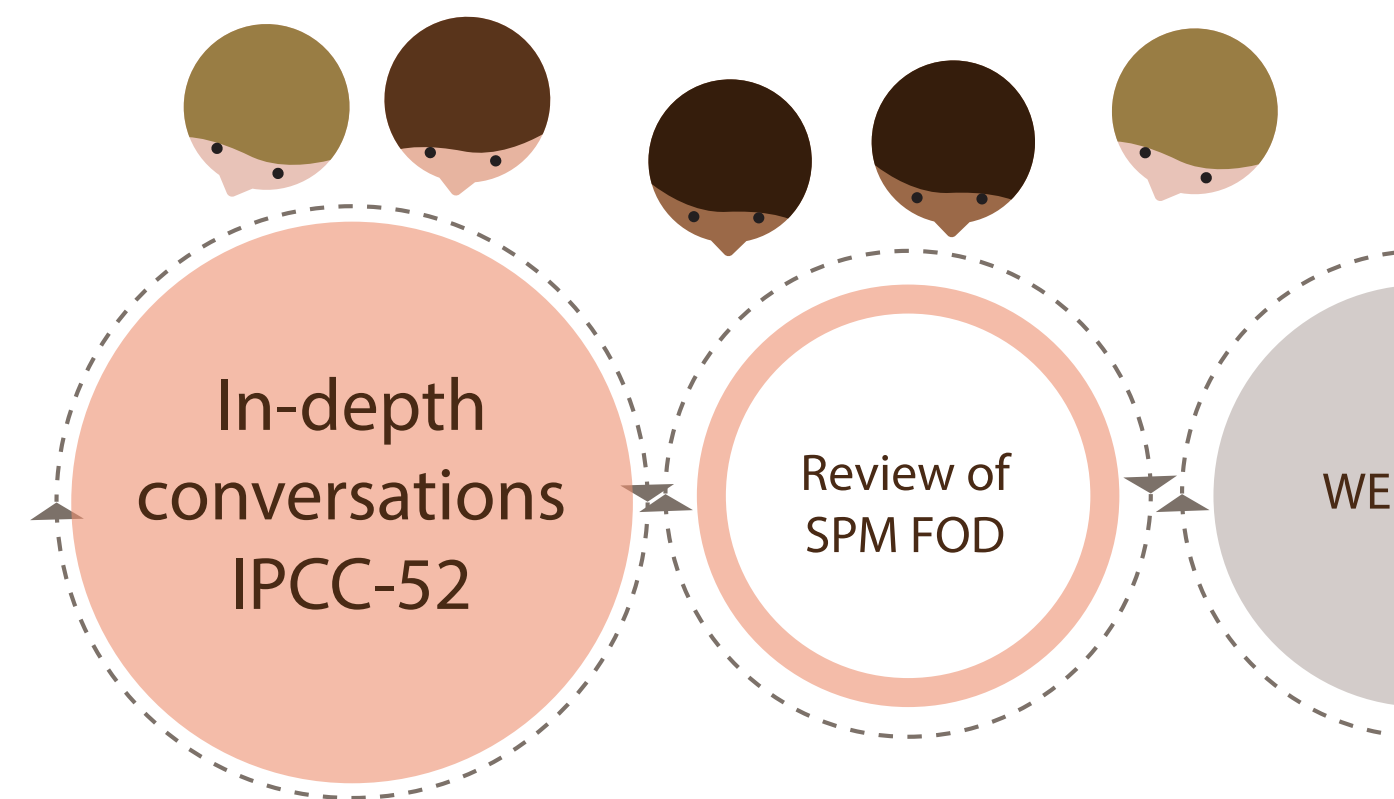
03

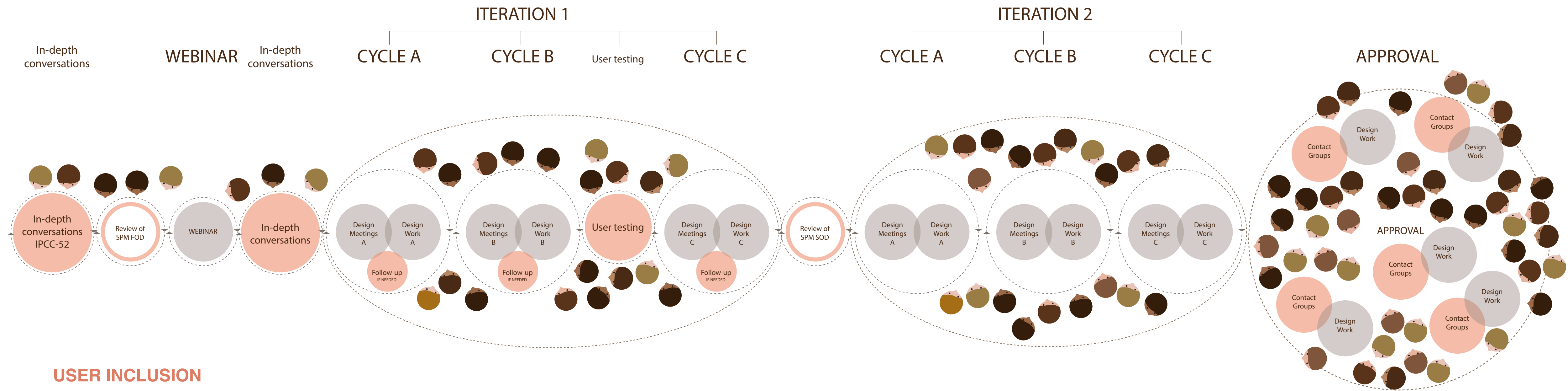
“It is exceptionally hard to inspire change in someone when you don't know anything about them.”

OLIVIA VAGELOS | IDEO

In-depth
conversations

WEB





USER INCLUSION

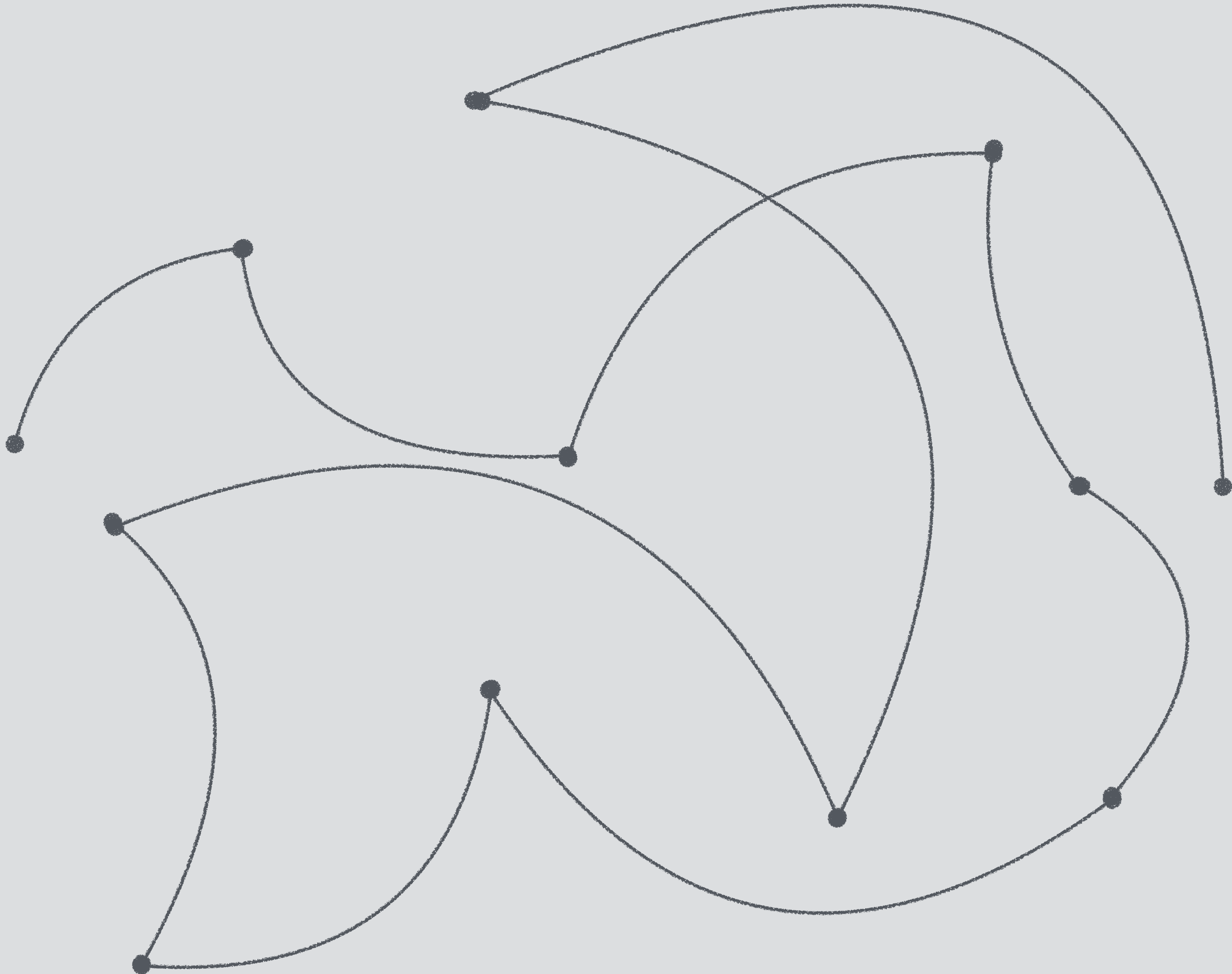
1. **In-depth conversations** to check the needs of the expressed target group
2. **Follow-up conversations** for quick reality checks during the design iterations (if needed)
3. **User testing** to measure if the co-designed SPM figures fulfil the intent
4. **Review comments** on the SPM figures
5. **Contact groups** during approval



User-testing session of draft figures for policy-makers
Performed with the Tyndall team

**The tools to support the
process.**

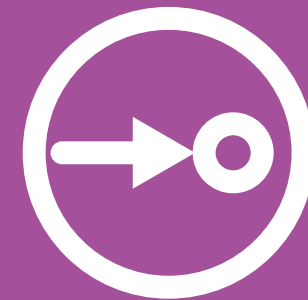
04



INFORMATION VISUALIZATION

THE INTENT

of a data visualization



INFODESIGNLAB.COM

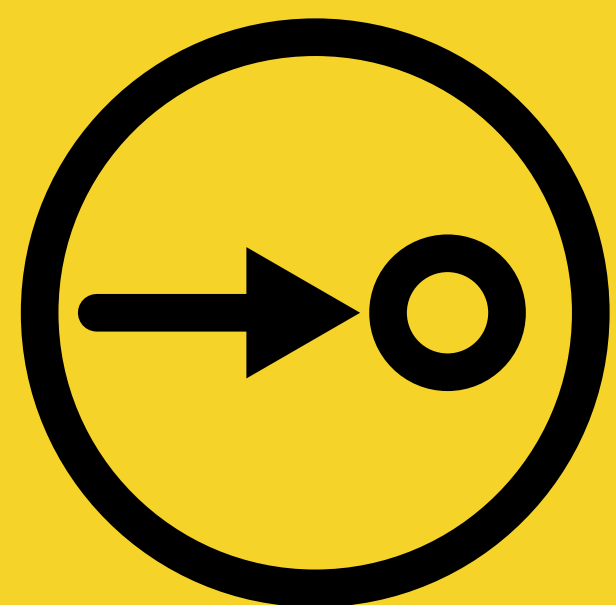
INFORMATION VISUALIZATION

THE VISUAL

narrative

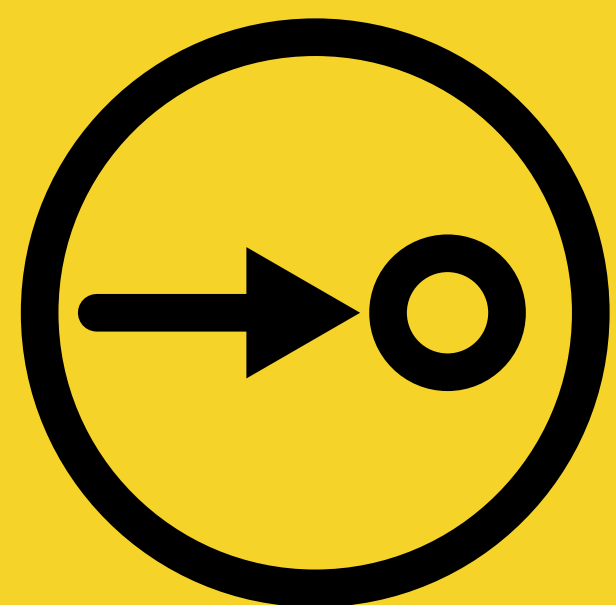


INFODESIGNLAB.COM



The intent

The **goal** that the visualization aims to achieve.

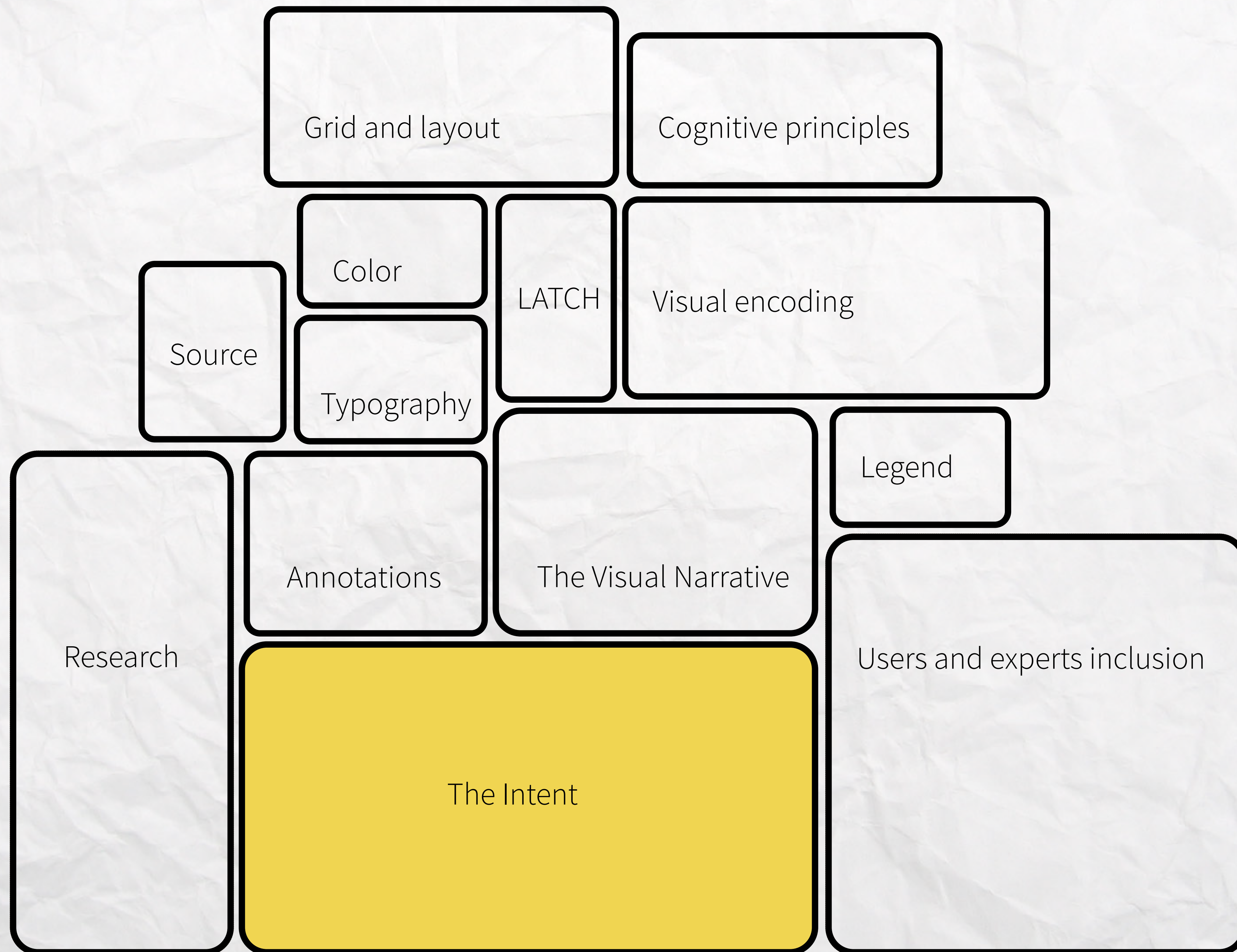


The intent

The **goal** that the visualization aims to achieve.

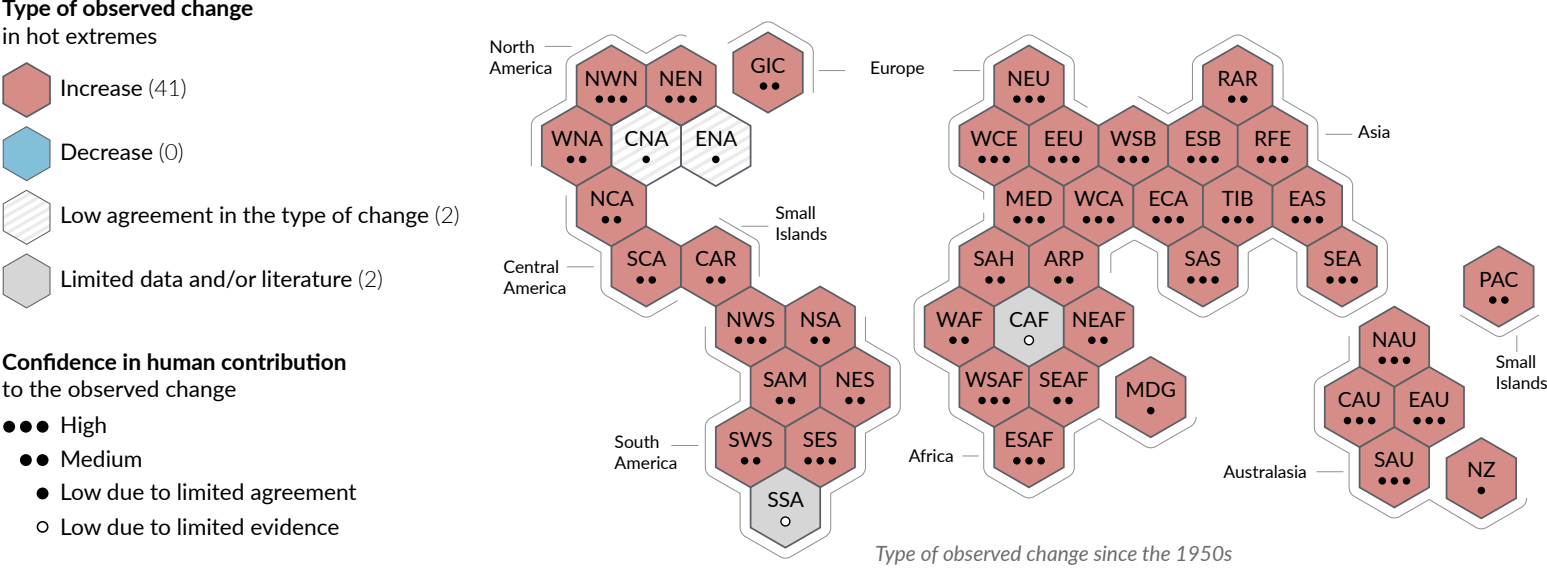
Ask yourself: Why am I **creating** this chart? What is the **one thing** I want people to remember? What do I want people to do with that information?

You should always be able to write a good **headline** that describes in one short sentence what you want people to remember, the pattern you want to convey.

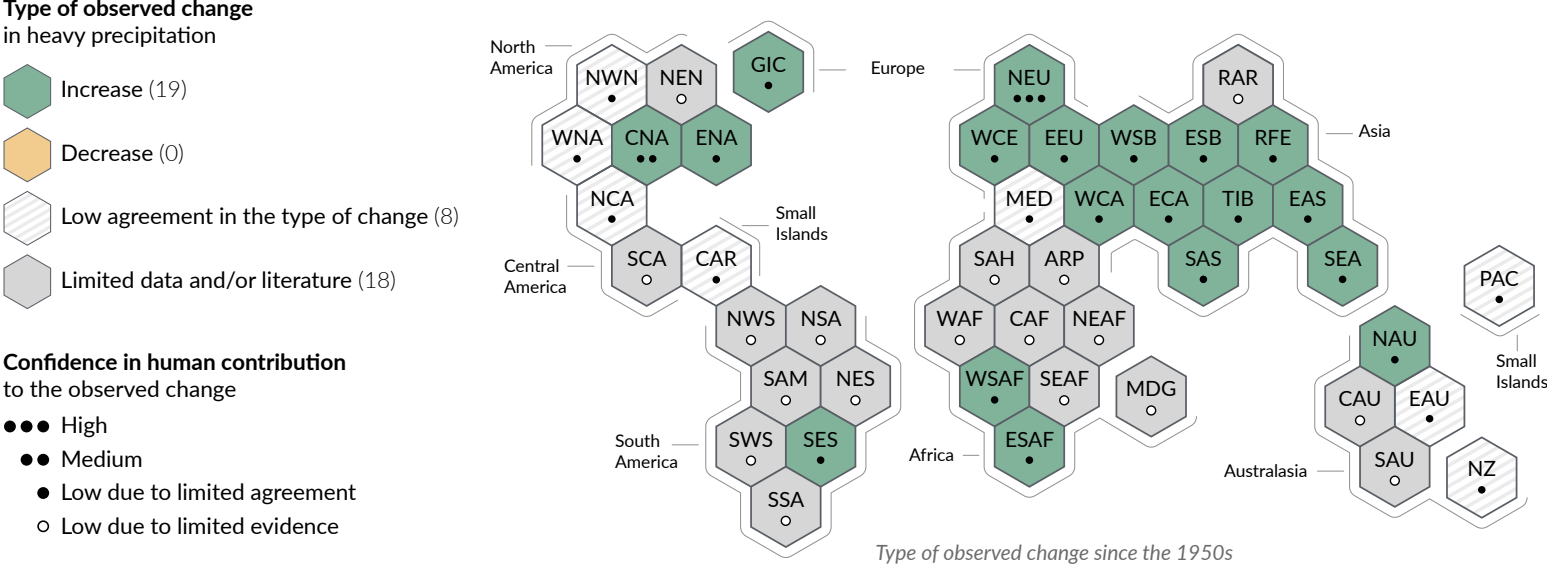


Climate change is already affecting every inhabited region across the globe with human influence contributing to many observed changes in weather and climate extremes

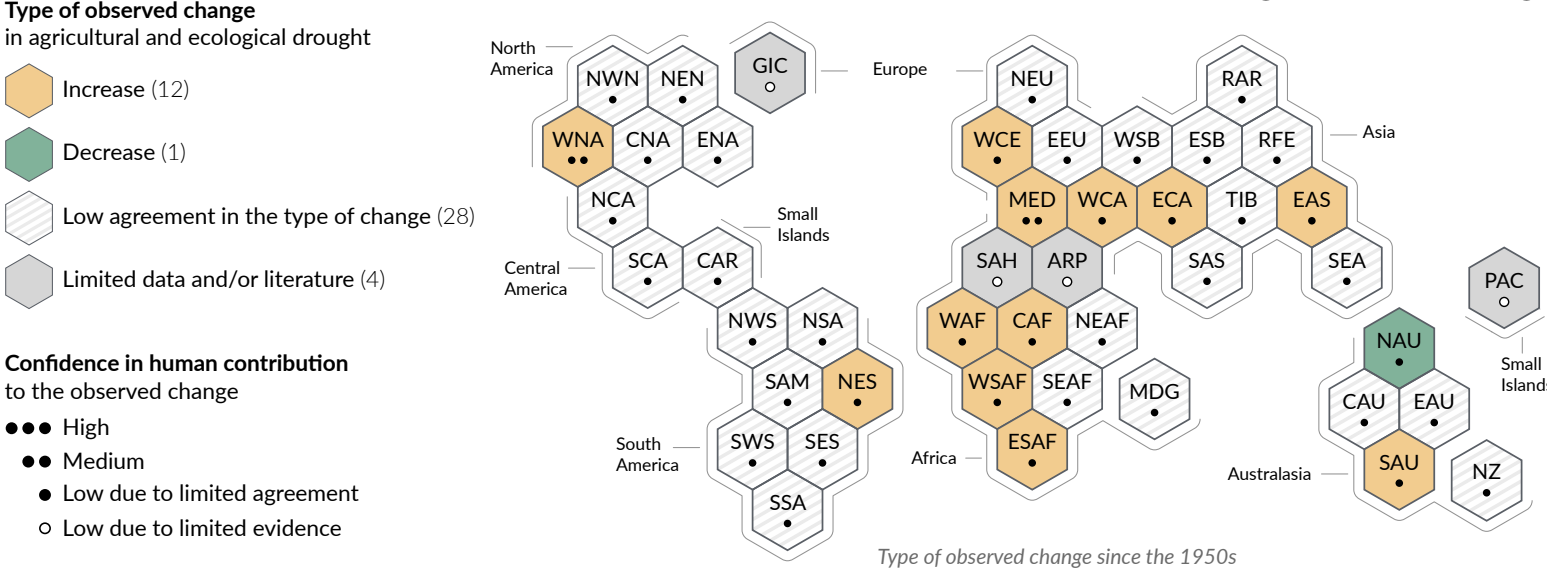
a) Synthesis of assessment of observed change in hot extremes and confidence in human contribution to the observed changes in the world's regions



b) Synthesis of assessment of observed change in heavy precipitation and confidence in human contribution to the observed changes in the world's regions

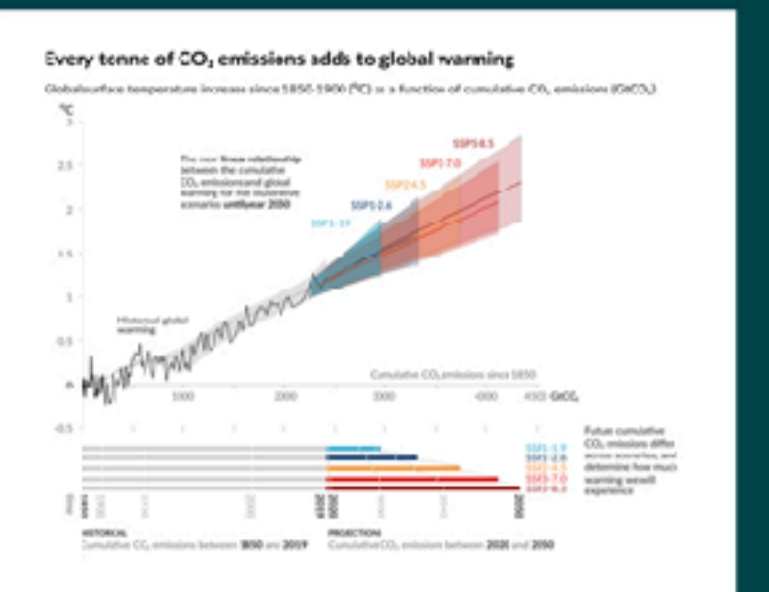
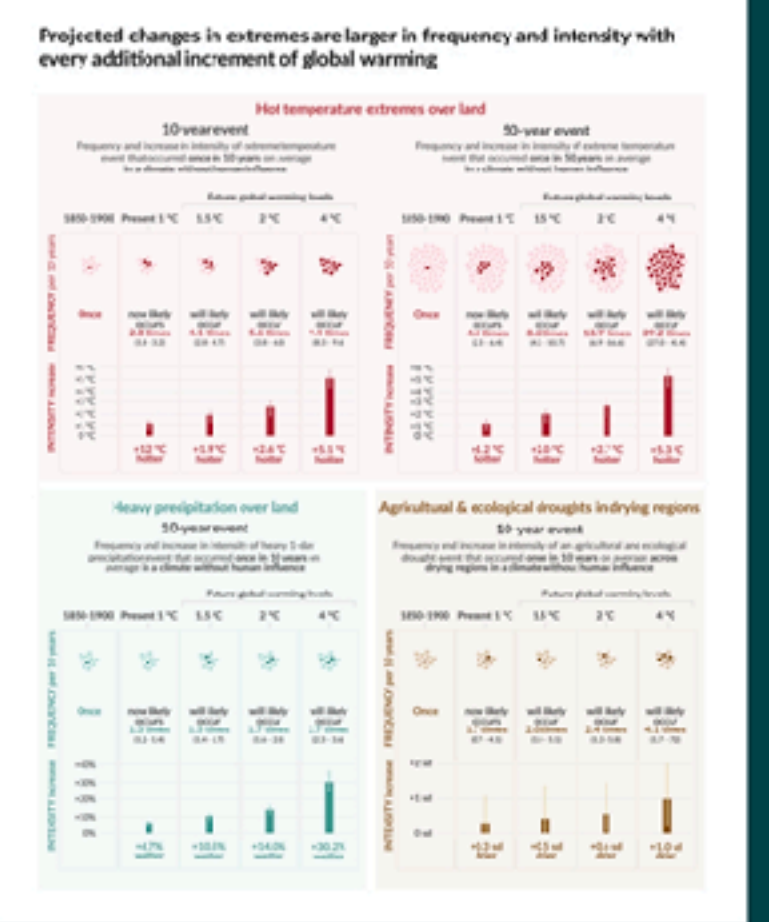
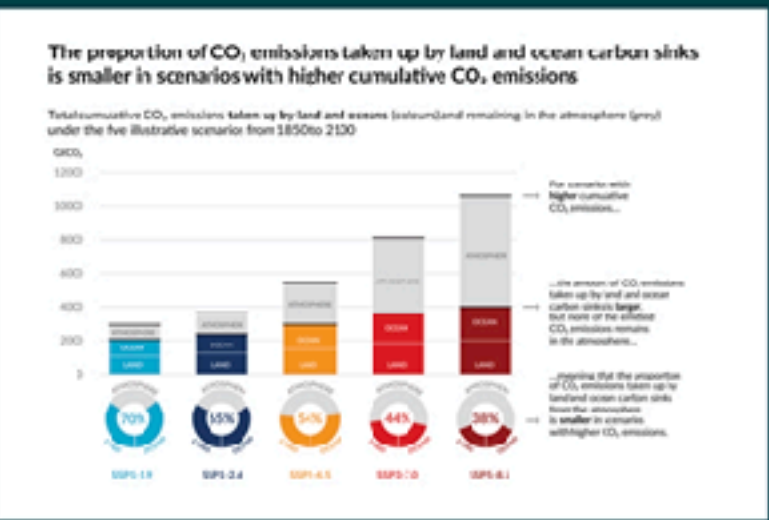
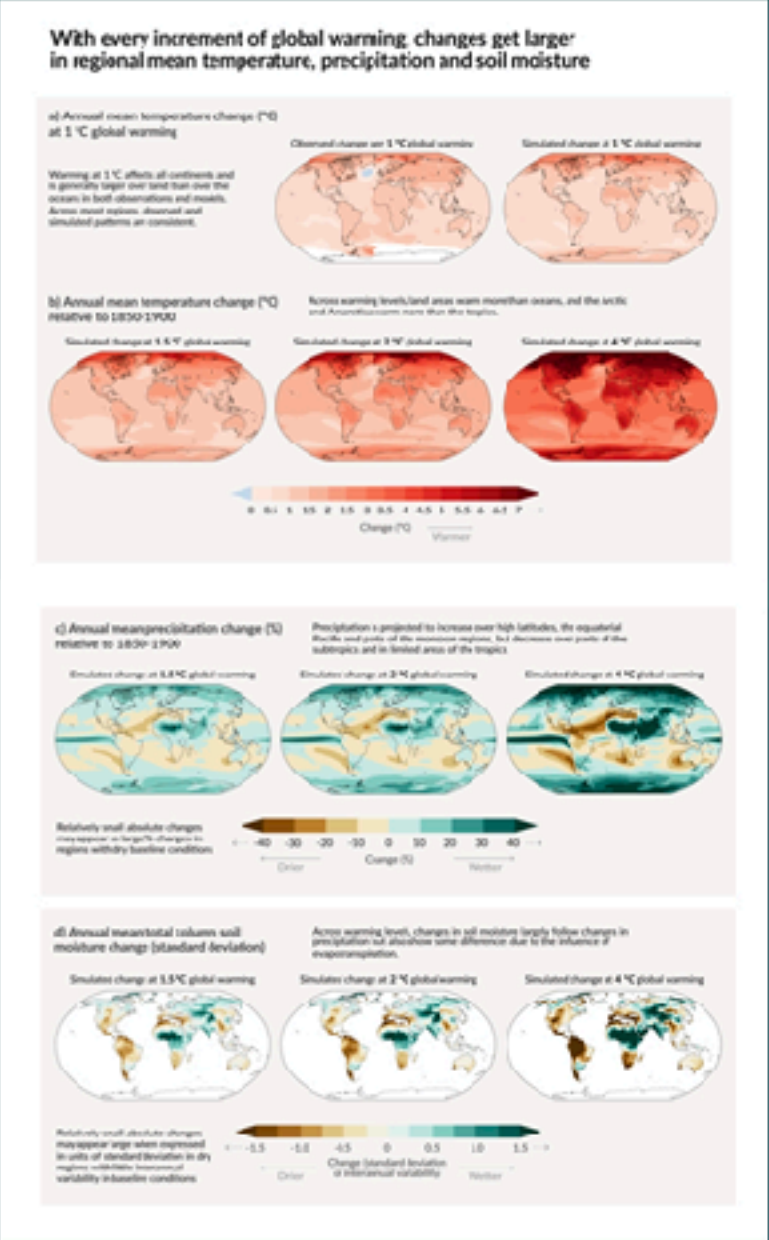
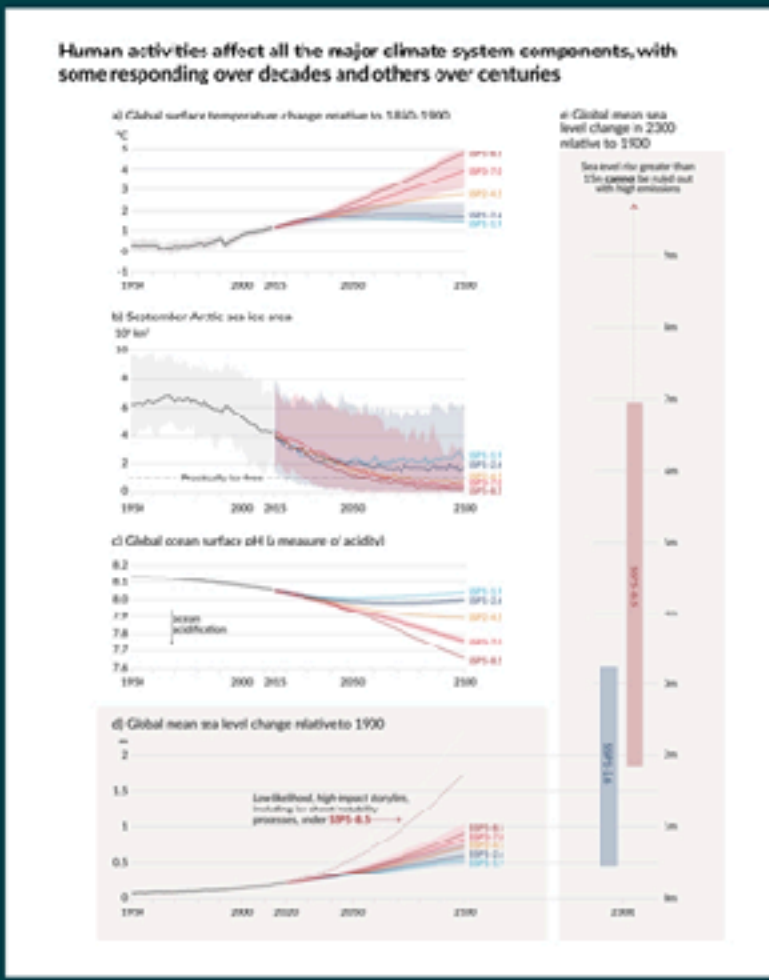
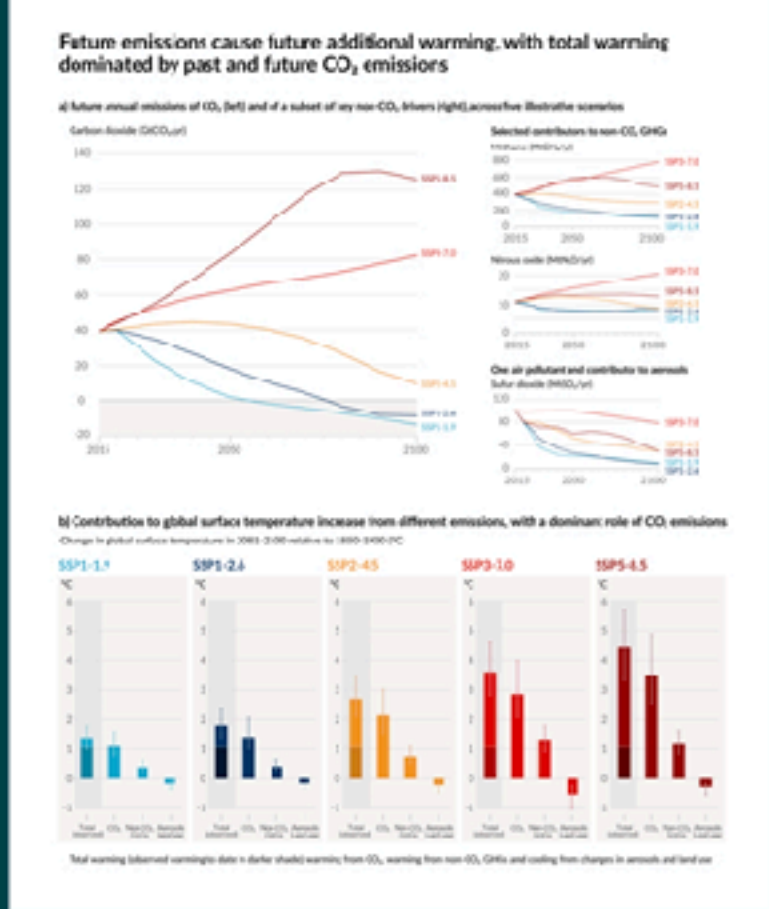
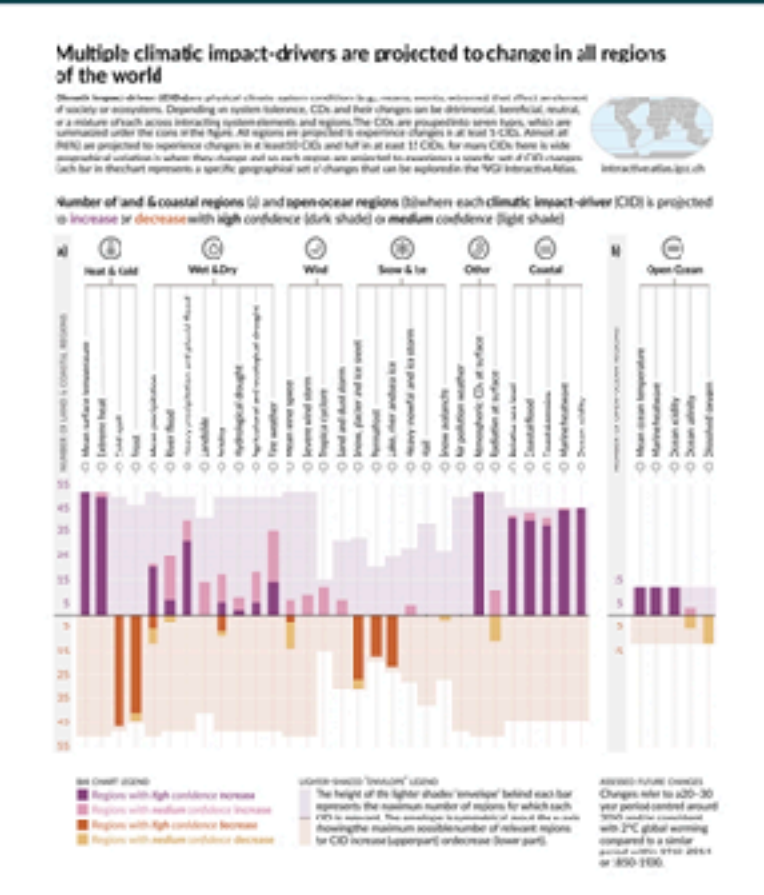
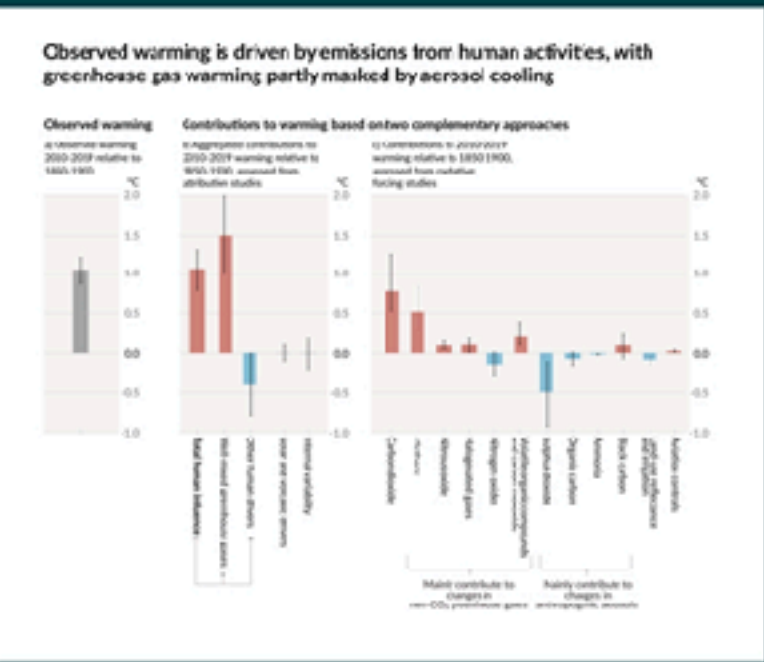
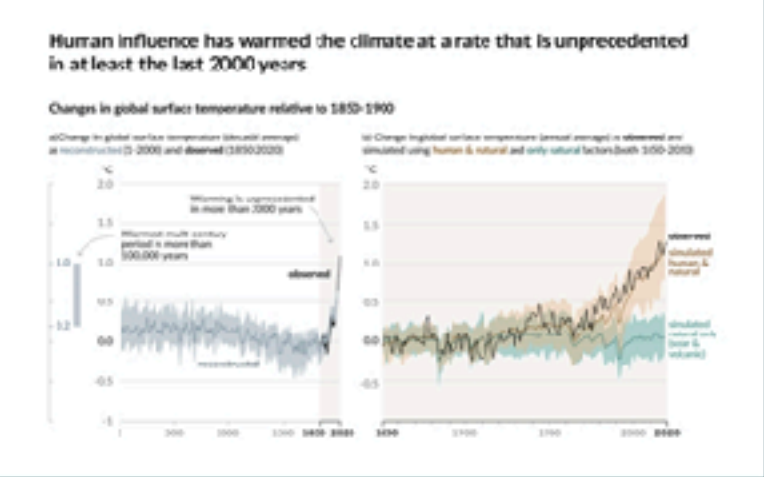


c) Synthesis of assessment of observed change in agricultural and ecological drought and confidence in human contribution to the observed changes in the world's regions



Each hexagon corresponds to one of the IPCC AR6 WGI reference regions

IPCC AR6 WGI reference regions: North America: NWN (North-Western North America), NEN (North-Eastern North America), WNA (Western North America), CNA (Central North America), ENA (Eastern North America), Central America: NCA (Northern Central America), SCA (Southern Central America), CAR (Caribbean), South America: NWS (North-Western South America), NSA (Northern South America), NES (North-Eastern South America), SAM (South American Monsoon), SWS (South-Western South America), SES (South-Eastern South America), SSA (Southern South America), Europe: GIC (Greenland/Iceland), NEU (Northern Europe), WCE (Western and Central Europe), EEU (Eastern Europe), MED (Mediterranean), Africa: MED (Mediterranean), SAH (Sahara), WAF (Western Africa), CAF (Central Africa), NEAF (North Eastern Africa), SEAF (South Eastern Africa), WSAF (West Southern Africa), ESAB (East Southern Africa), MDG (Madagascar), Asia: RAR (Russian Arctic), WSB (West Siberia), ESB (East Siberia), RFE (Russian Far East), WCA (West Central Asia), ECA (East Central Asia), TIB (Tibetan Plateau), EAS (East Asia), ARP (Arabian Peninsula), SAS (South Asia), SEA (South East Asia), Australasia: NAU (Northern Australia), CAU (Central Australia), EAU (Eastern Australia), SAU (Southern Australia), NZ (New Zealand), Small Islands: CAR (Caribbean), PAC (Pacific Small Islands)

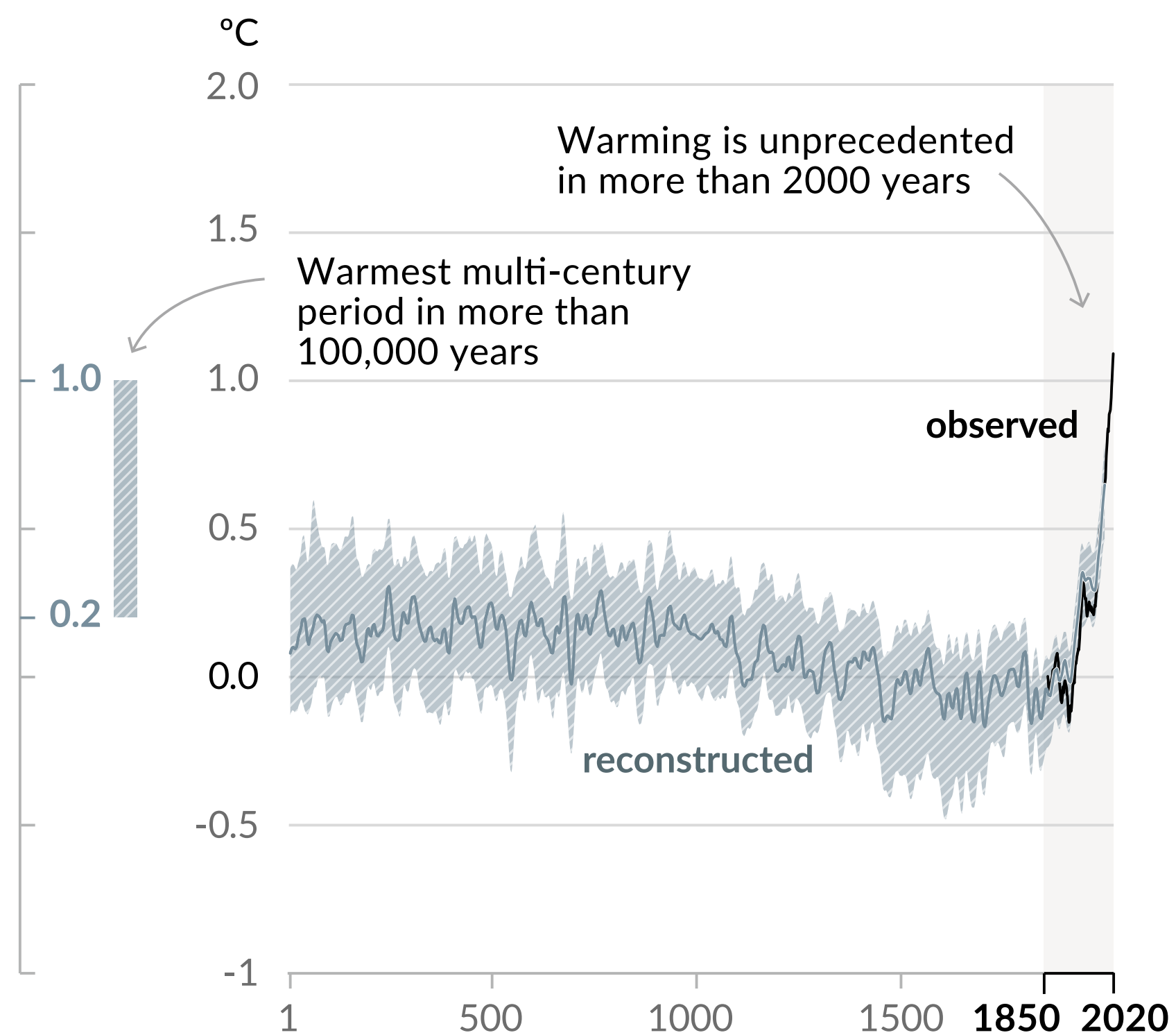


IPCC, The Physical Science Basis, Working Group I contribution to the 6th Assessment Report

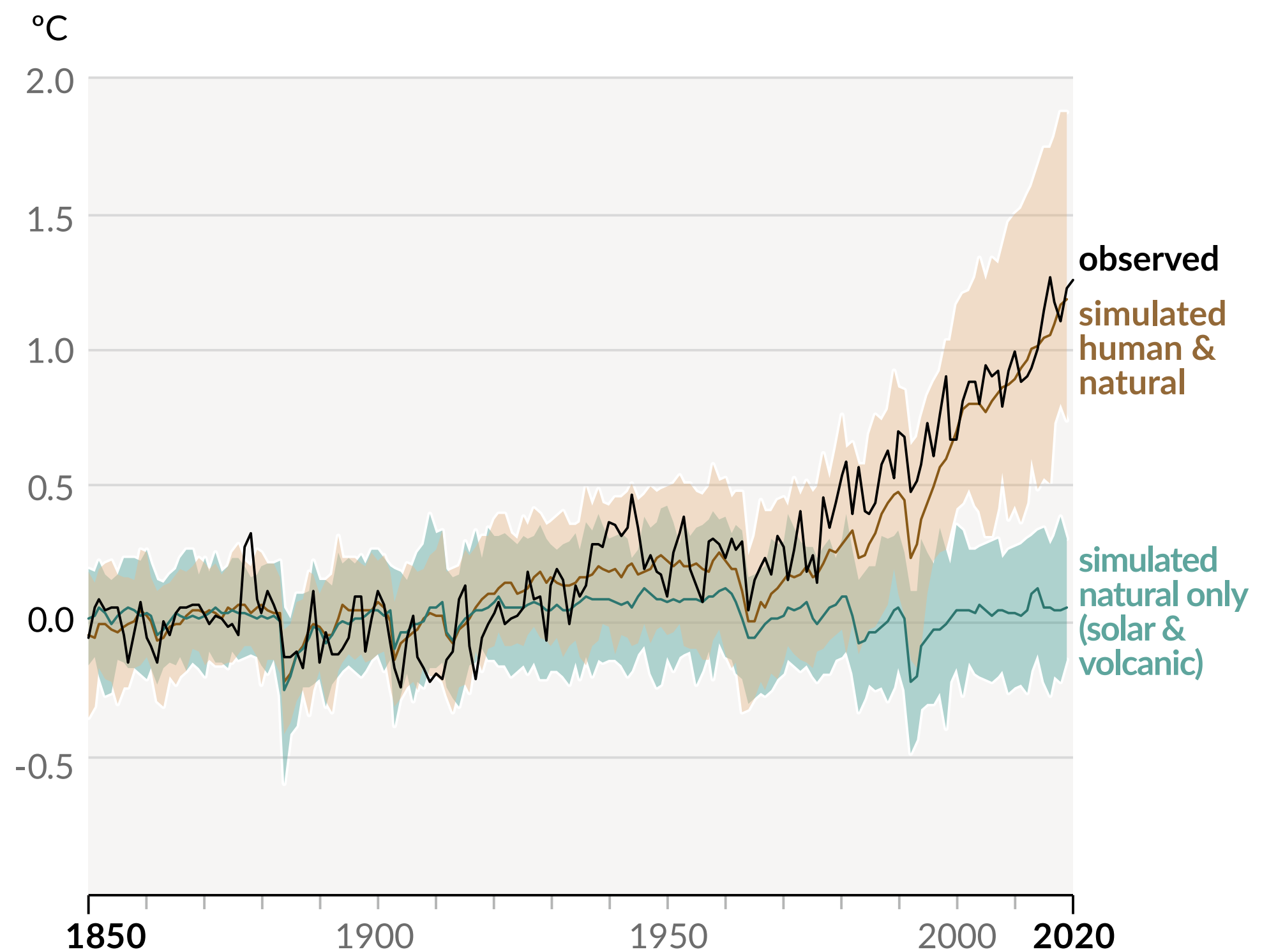
Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

Changes in global surface temperature relative to 1850-1900

a) Change in global surface temperature (decadal average) as **reconstructed** (1-2000) and **observed** (1850-2020)



b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850-2020)



Visual: SPM.1

Human influence has warmed the climate at a rate that is **unprecedented** in at least the last 2000 years

SOURCE: The Physical Science Basis, IPCC

Working Group I contribution to the 6th Assessment Report

DESIGN MEETINGS 1A.1

6 Section meetings

Section A
Section B
Box SPM.2 Fig 1
Section C
Section D
Box SPM.3 Fig 1

DESIGN MEETINGS 1A.2

4 Cluster meetings

Cluster 1: SPM.1, 2, 3, 4
Cluster 2: SPM.6, Box3 Fig
Cluster 3: SPM.7,Box2 Fig, SPM.10
Cluster 4: SPM.5, 8, 9

10 suggested intents

- INTENTS as a result of the cluster meetings

WRITESHOP

- DAY 1: revising SPM structure

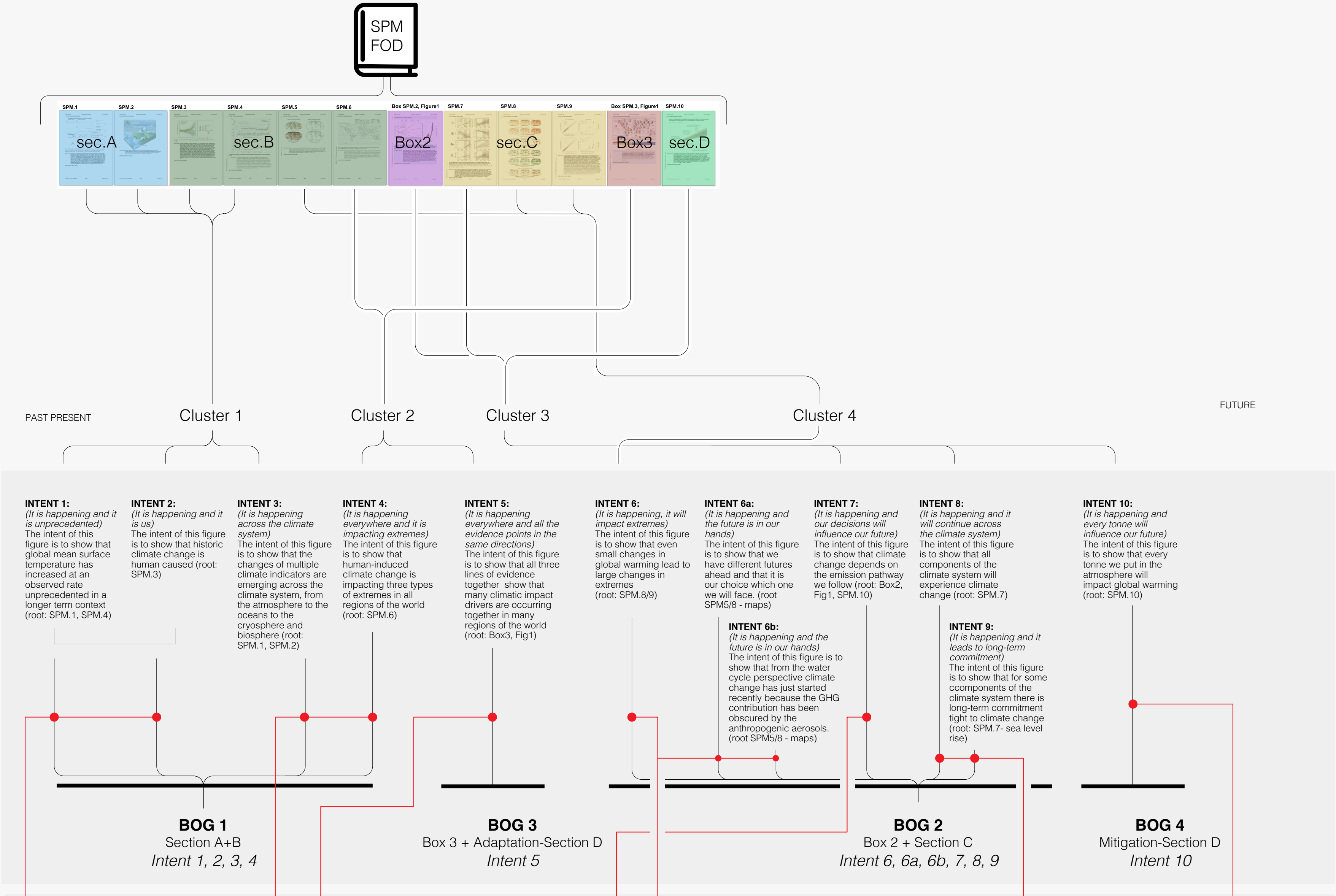
The10 INTENTS discussed in the design-cluster meetings might have to be re-shuffled in line with the evolution of the SPM narrative

- DAY 2: how TS underpins SPM

- DAY 3: SPM narrative HS and visual intents

8 INTENTS

the intents' family tree





SPM Special Report on Climate Change and Land
 50th Session of IPCC
 August, Geneva, Switzerland 2019



SPM Special Report on Global Warming 1.5 °C
 48th Session of IPCC
 October, Incheon, South Korea 2018



The visual narrative

It is **what** we show (and **how** it looks) in order to fulfil that intent.

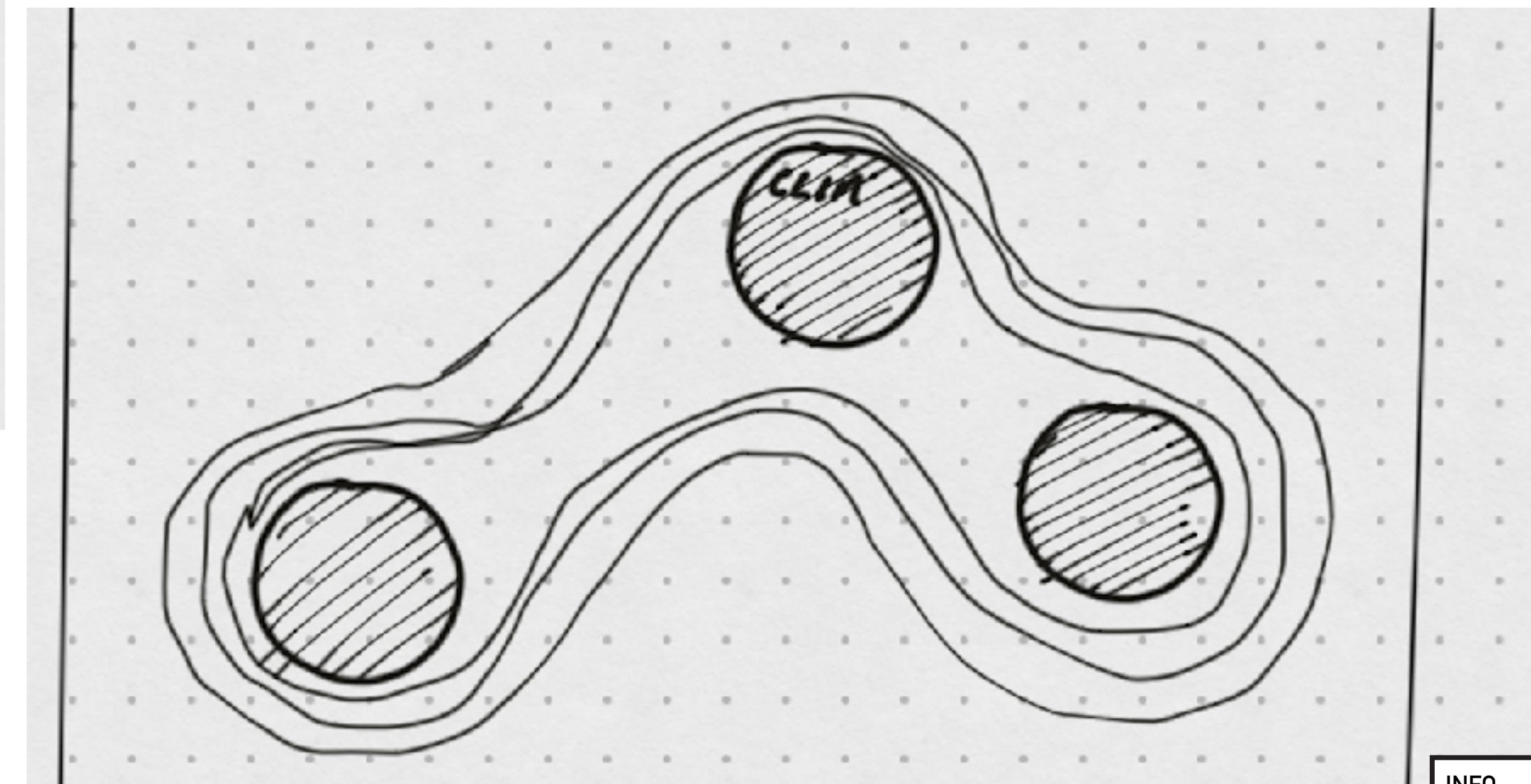
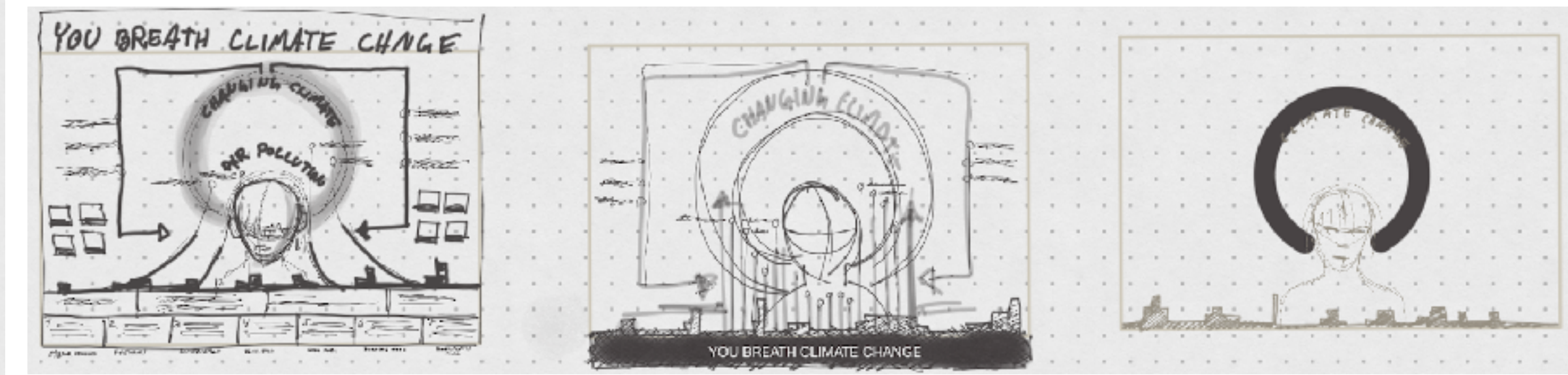
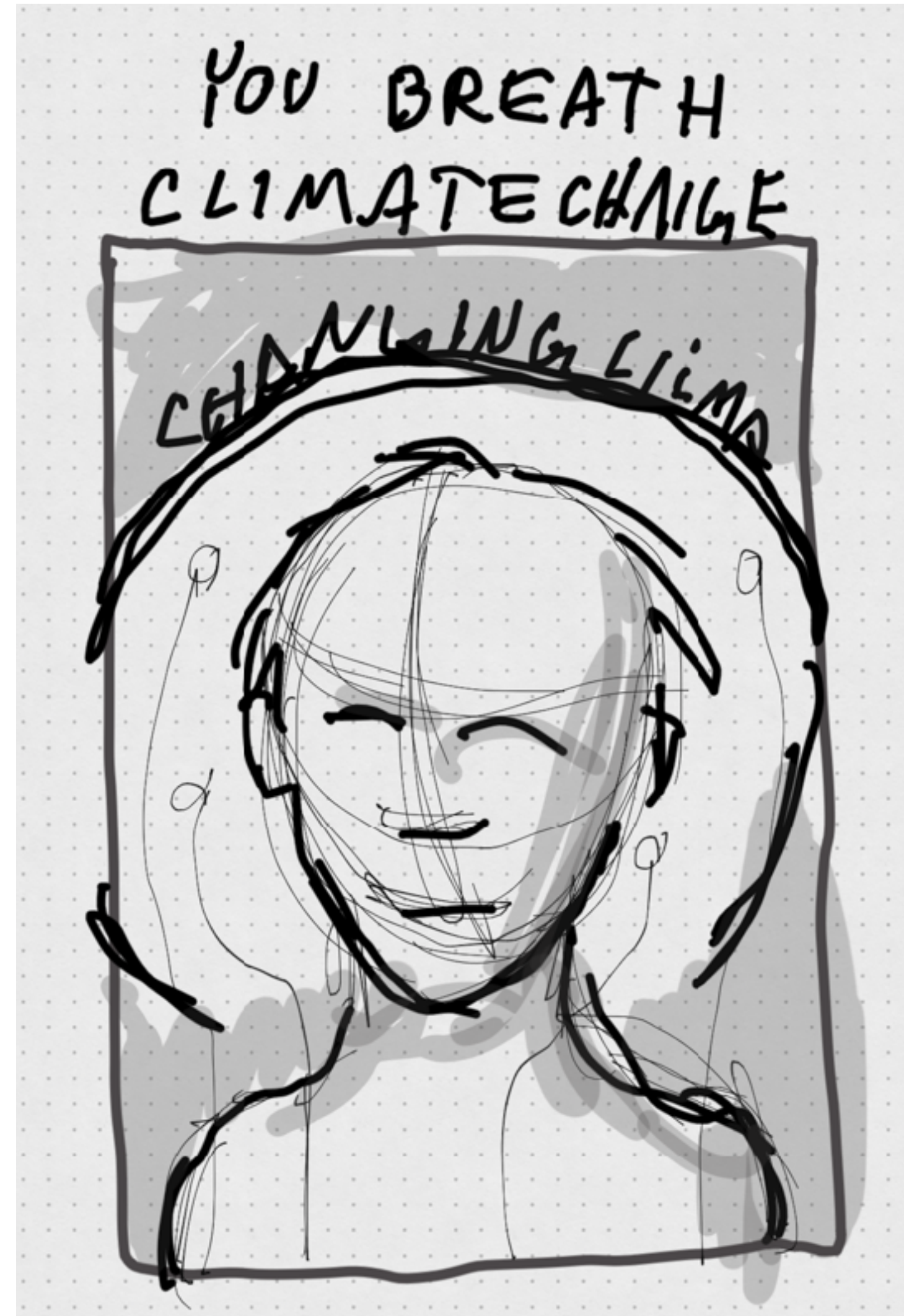
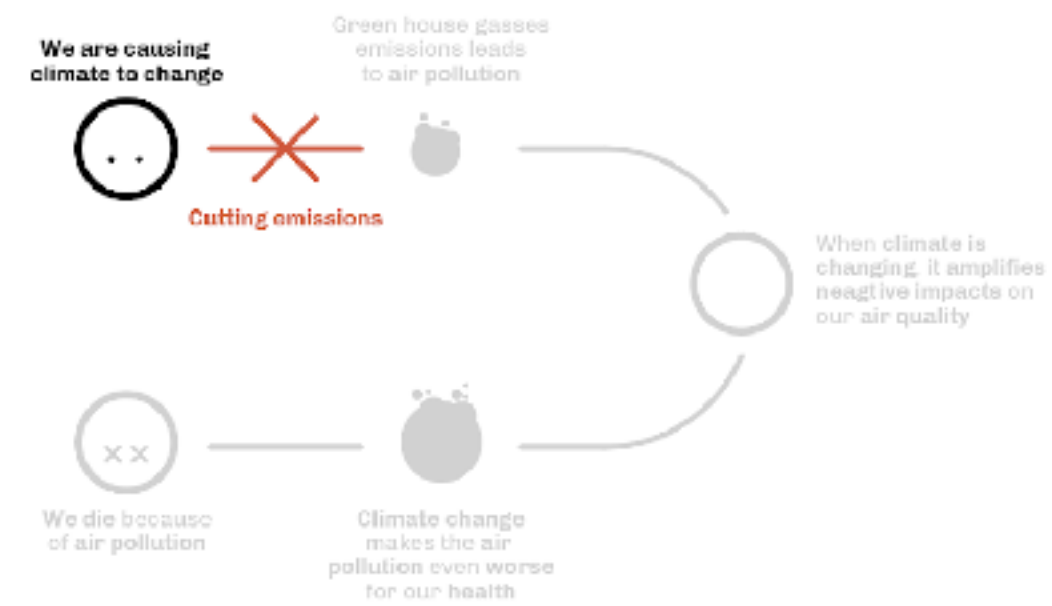
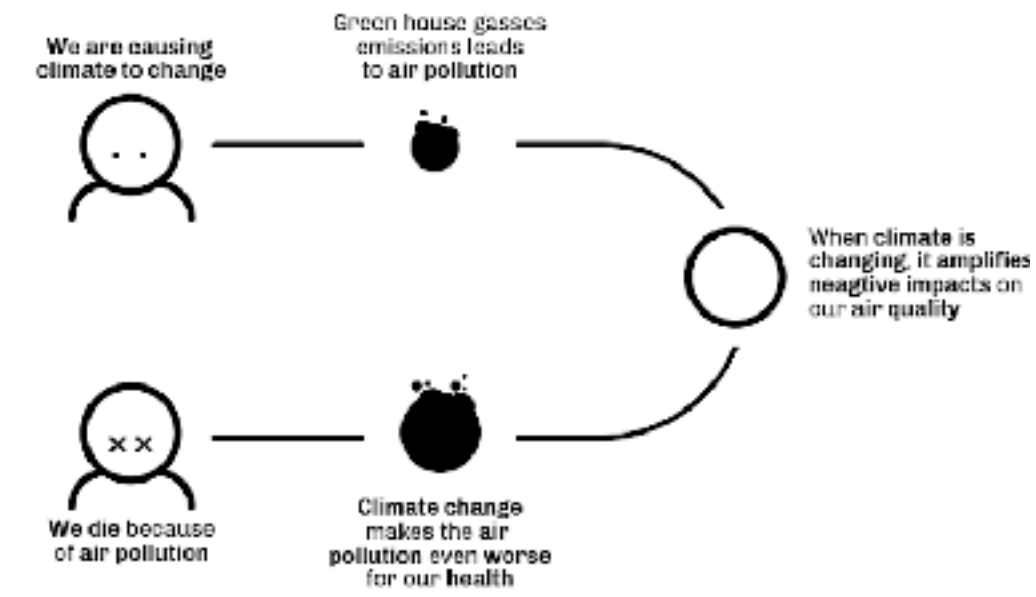
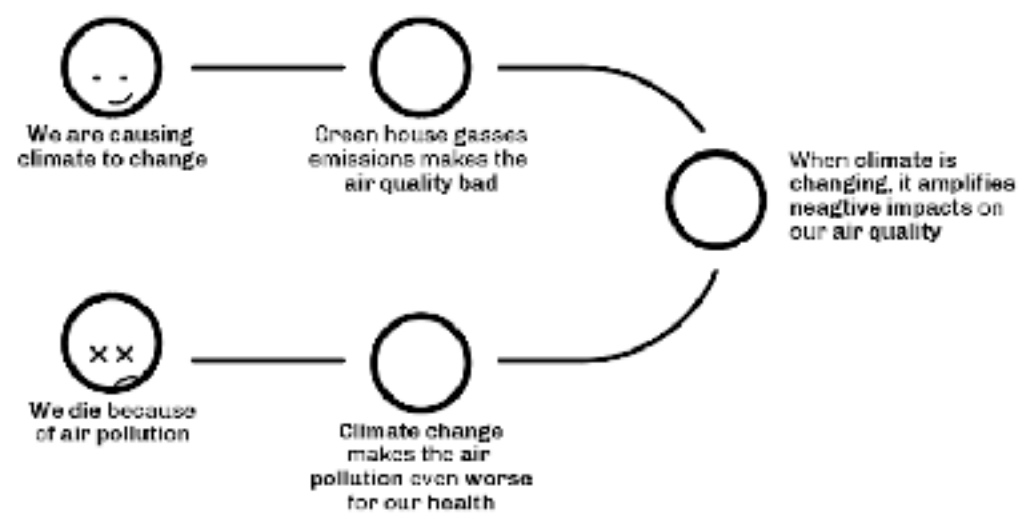


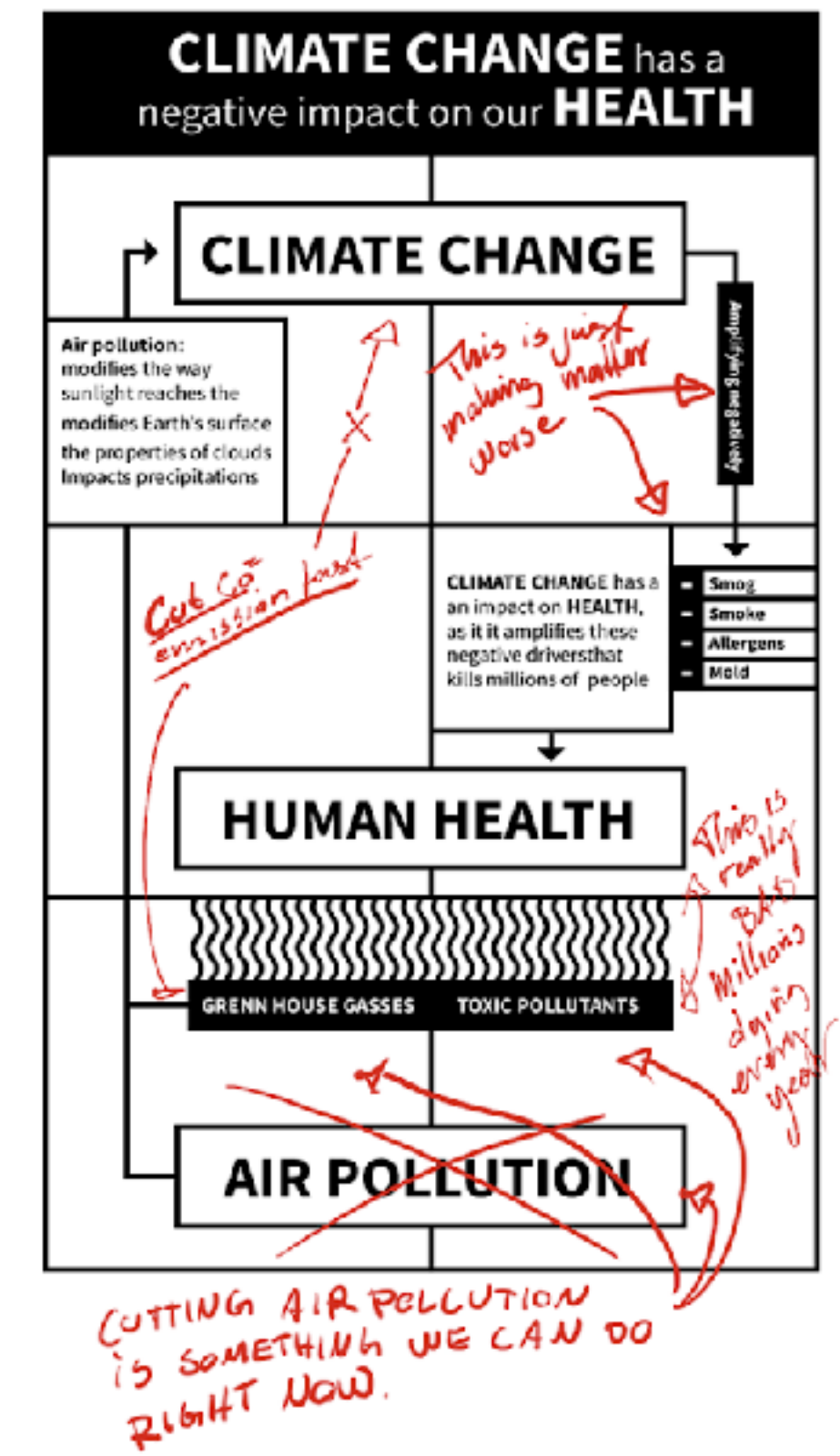
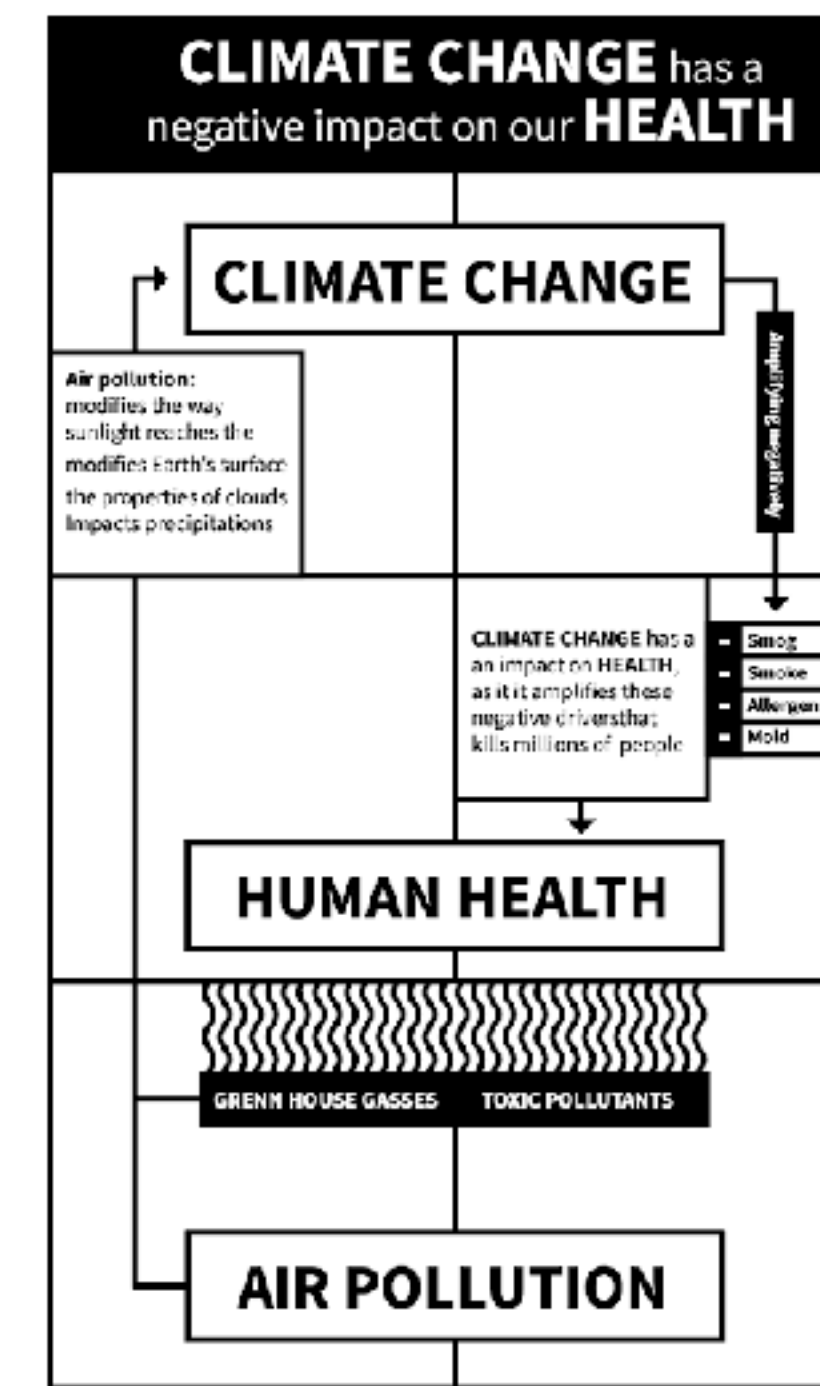
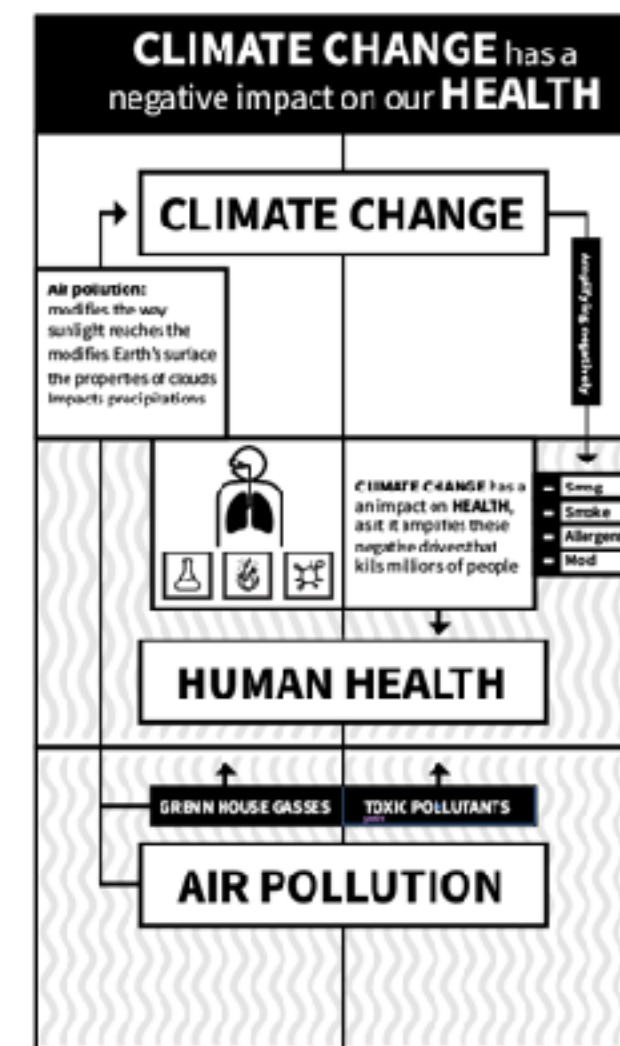
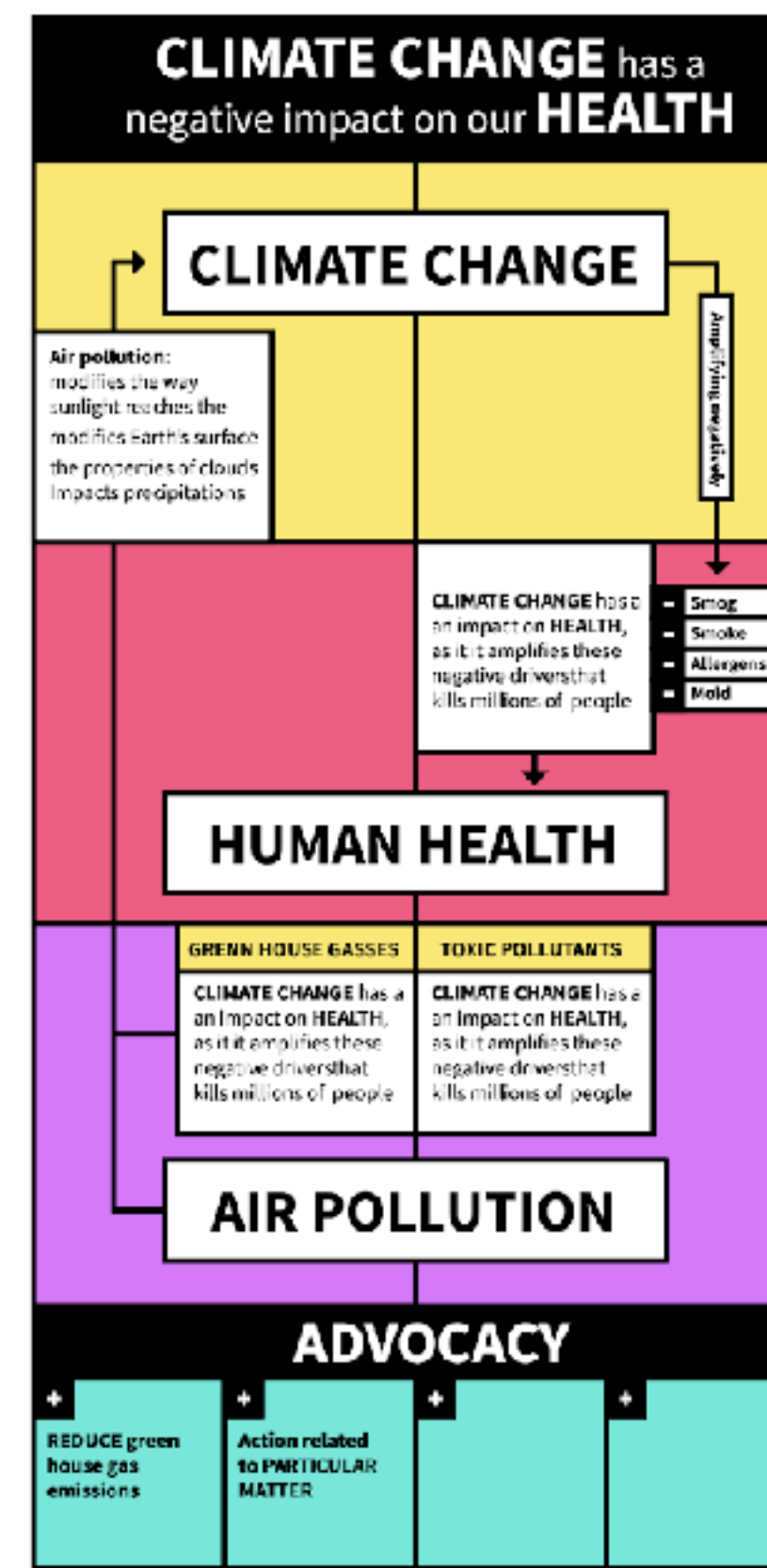
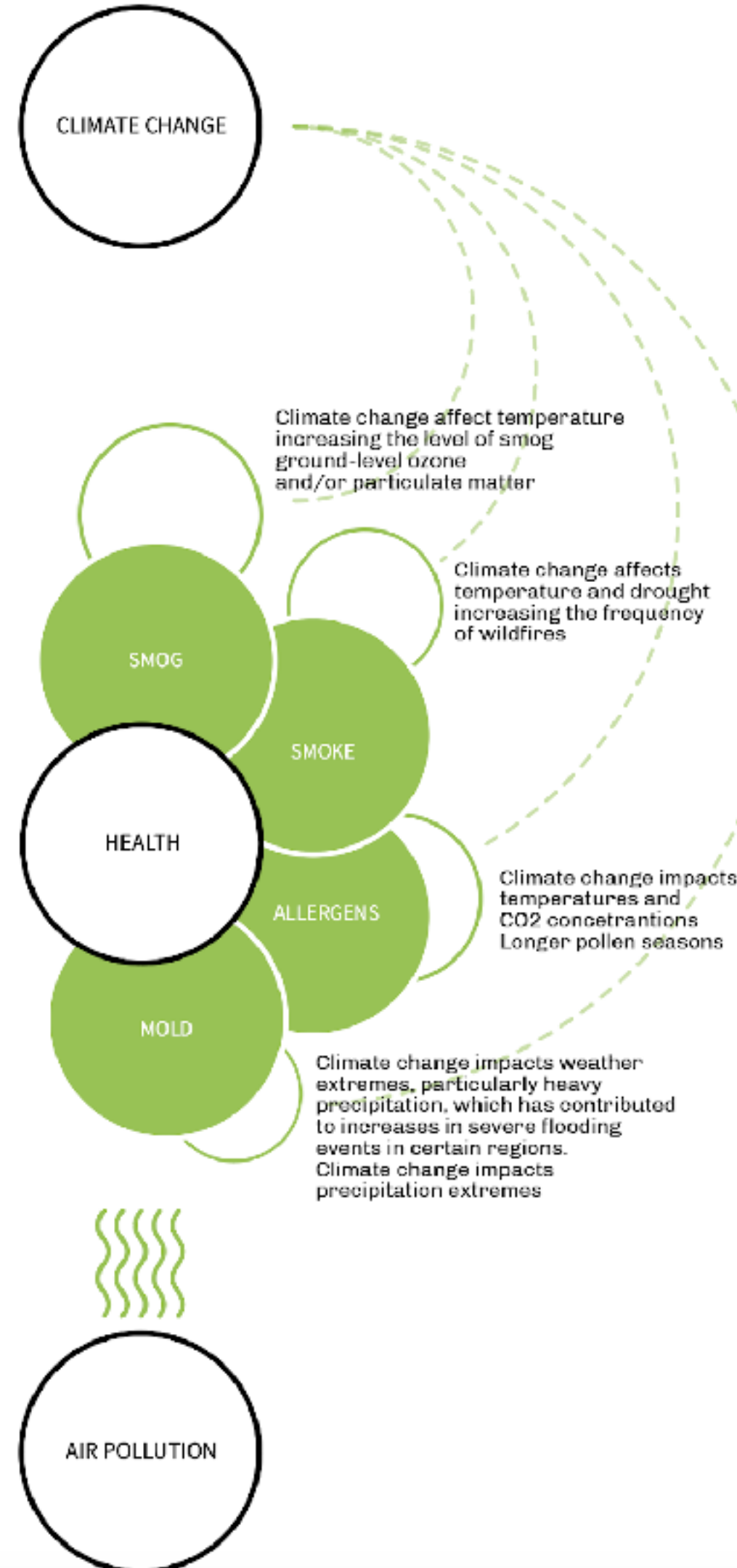
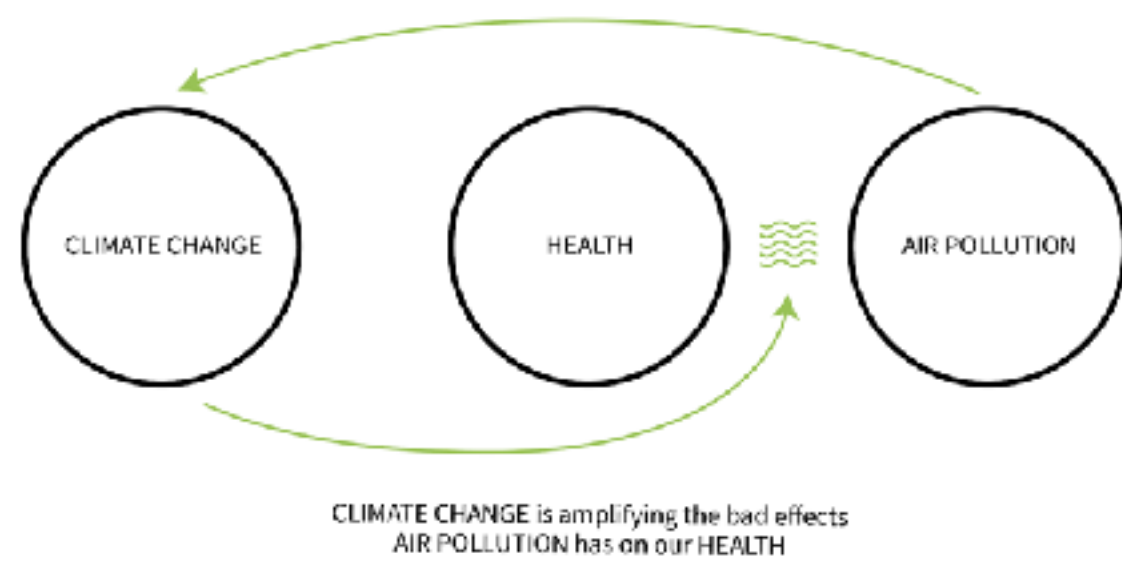
The visual narrative

It is **what** we show (and **how** it looks) in order to fulfil that intent.

How do I keep the promise described in the **title**?

What type of **chart** do I need? What data? What type of **organisation**? How do I use color, typography, space, annotations to fulfil the intent?

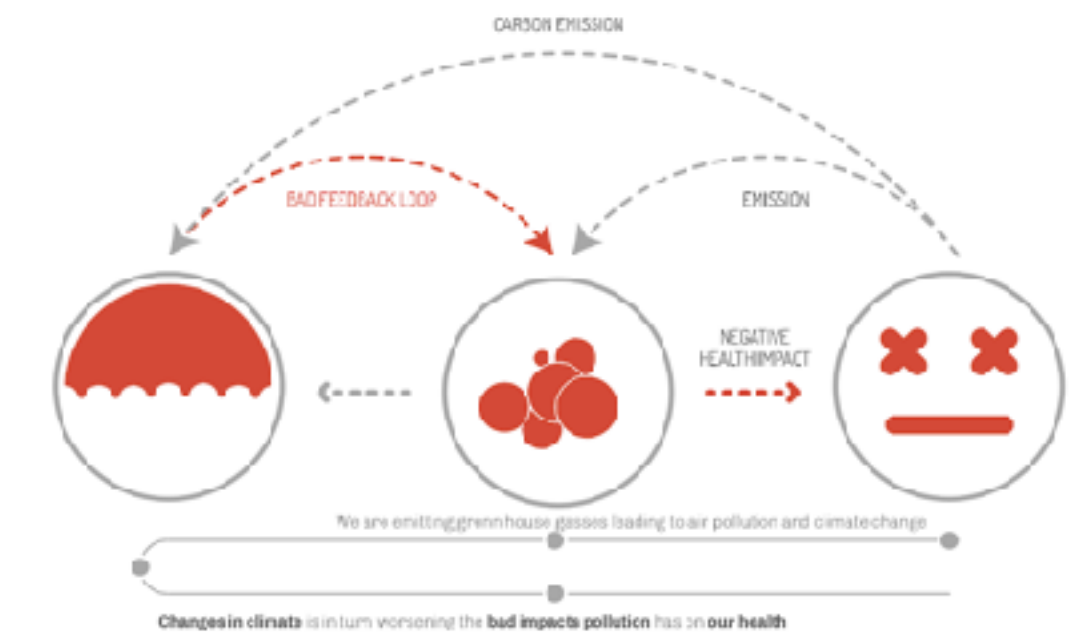


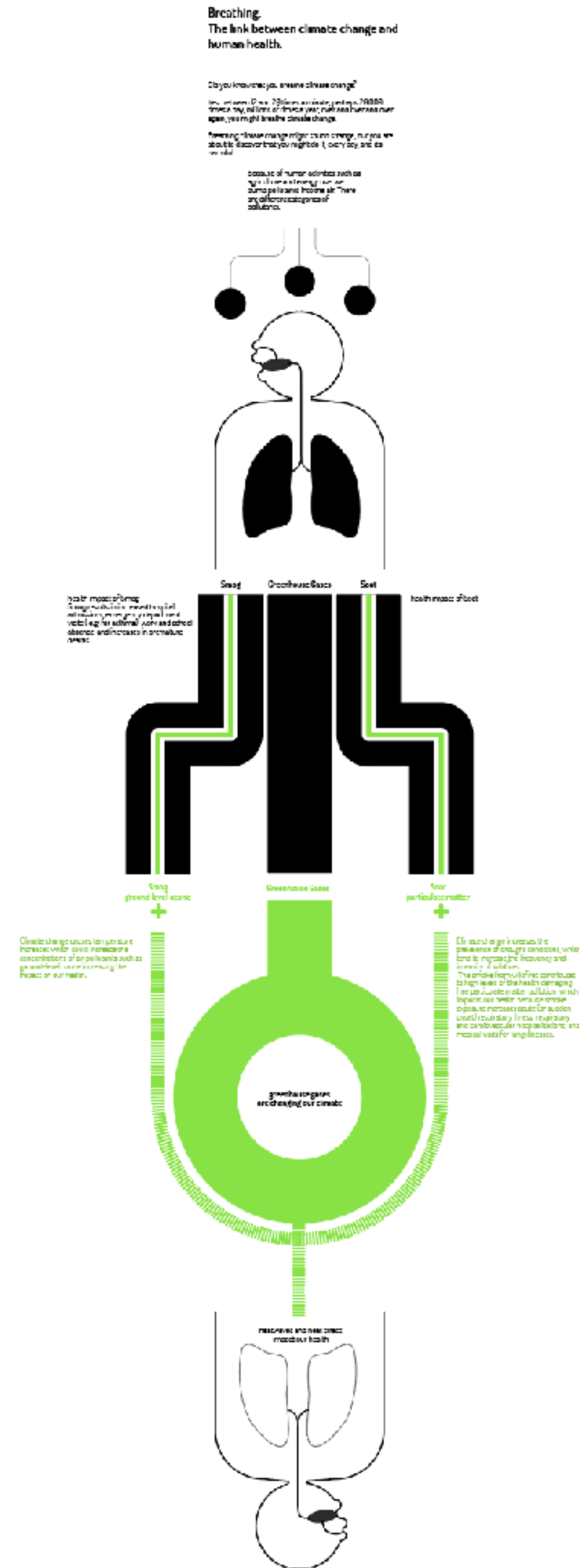
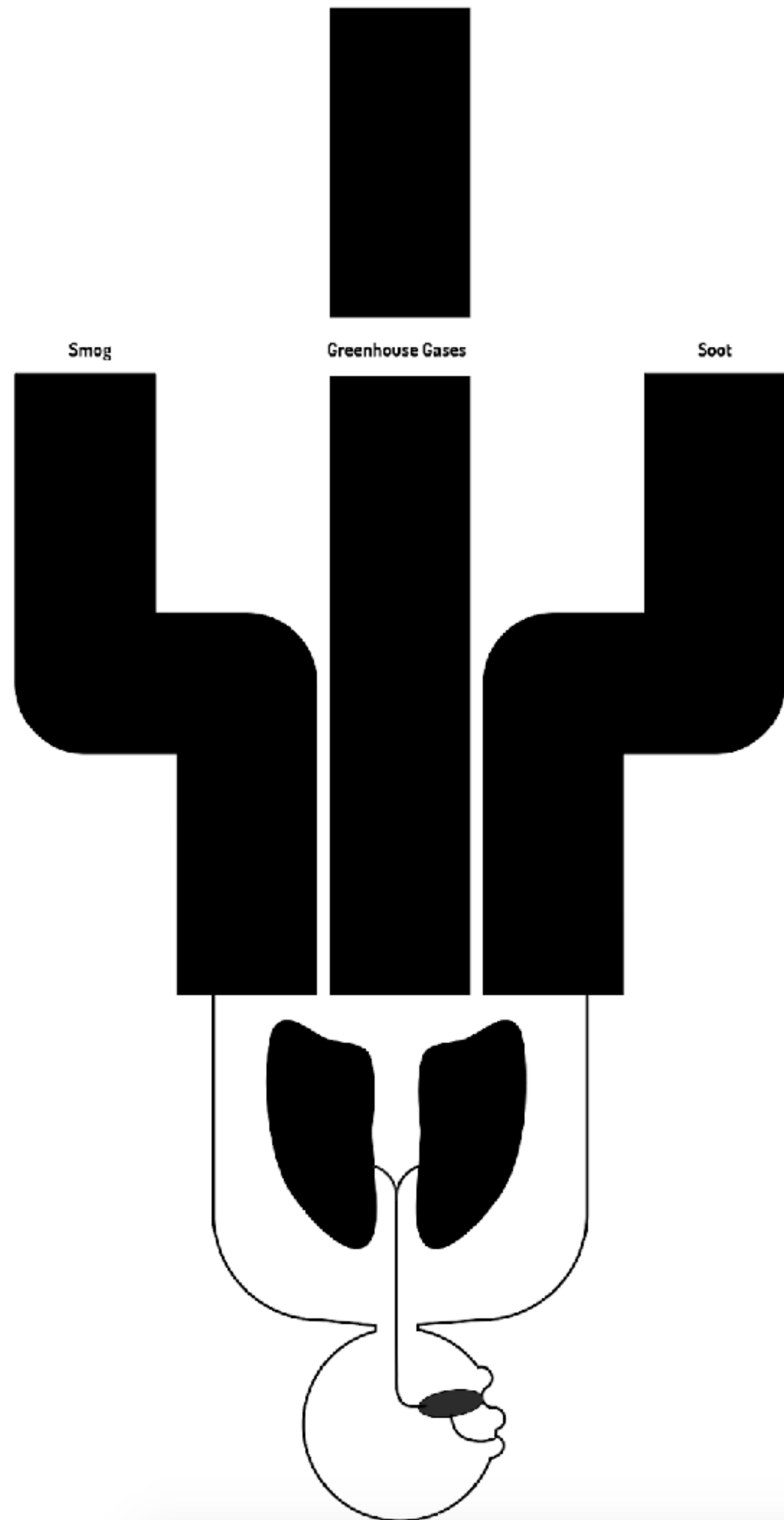


You are breathing climate change?

Smog results in increased hospital admissions, emergency department visits (e.g. for asthma), work and school absence, and increases in premature deaths.

Climate change increases the prevalence of drought conditions, which tend to increase the frequency and intensity of wildfires. The smoke from wildfires contributes to high levels of the health damaging fine particulate matter pollution, which impacts our health because smoke exposure increases acute (or sudden onset) respiratory illness, respiratory and cardiovascular hospitalizations, and medical visits for lung illnesses.

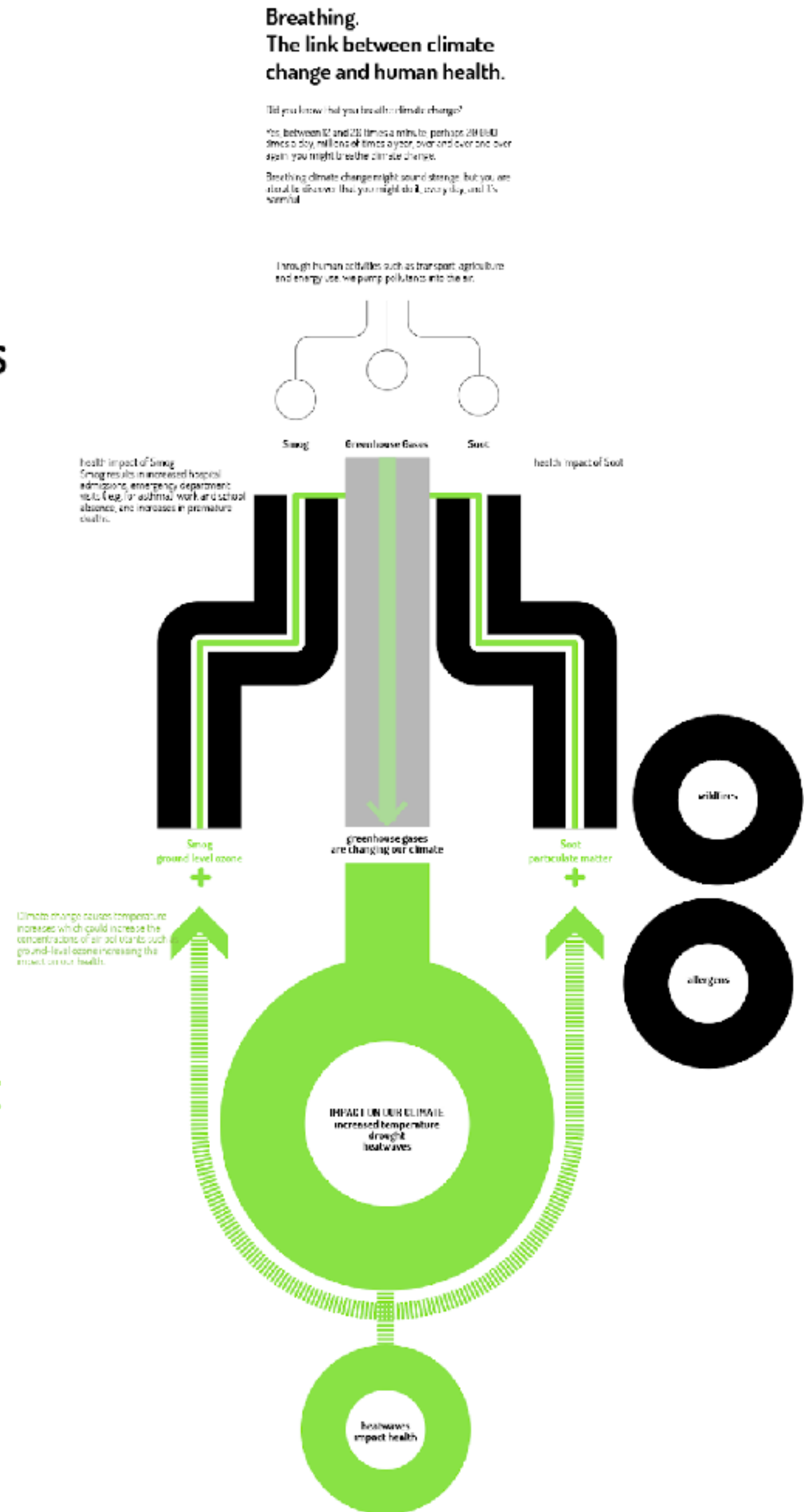




SOURCES

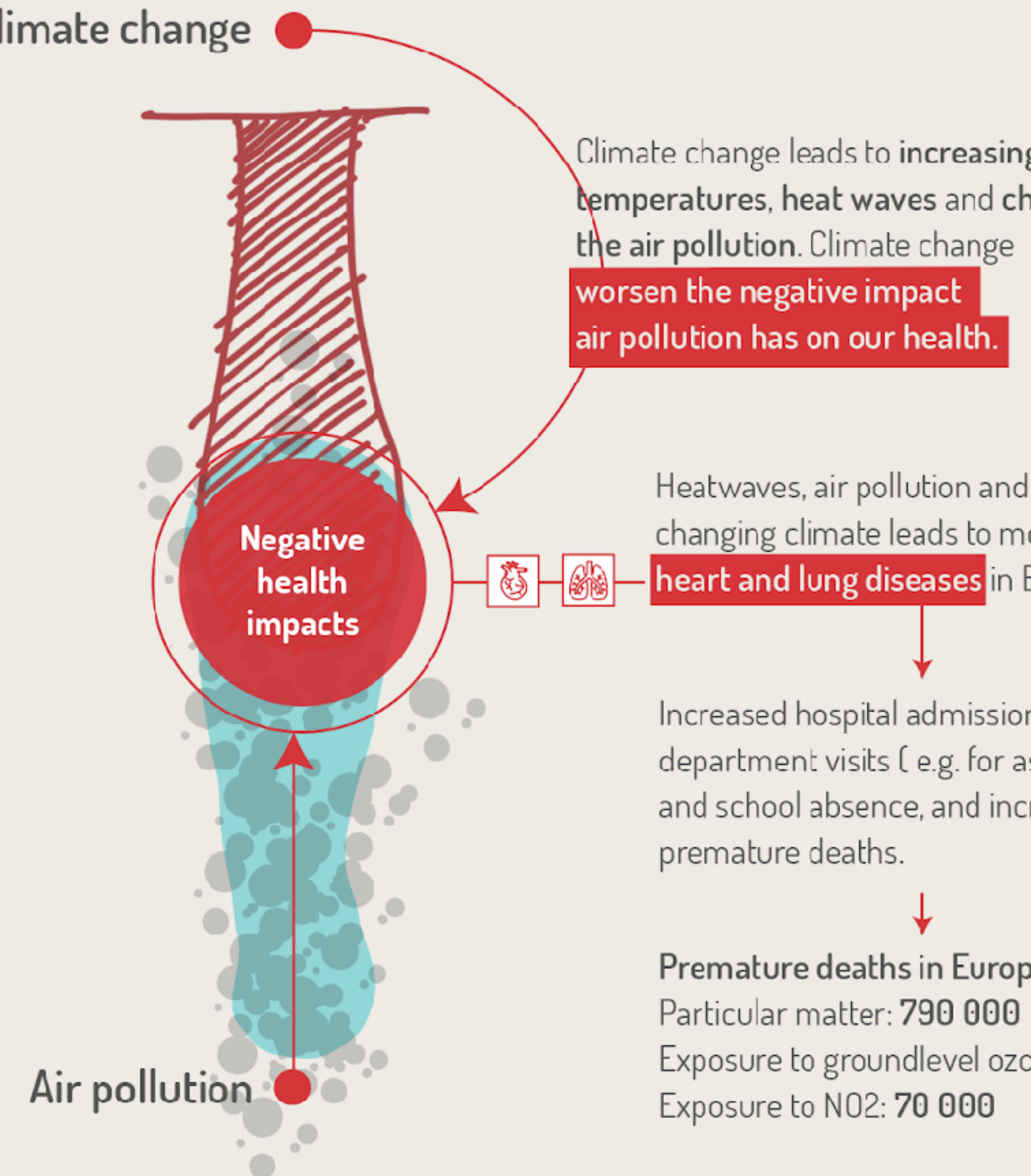
HEALTH IMPACT

CLIMATE



Climate change harms human

Climate change



Climate change harm human health

Climate change leads to **heat waves**.

When **extreme heat** and **air pollution** act together, the adverse negative effects impacts on human health may increase.

Negative impacts on

Human HEALTH

Air pollution

- Carbon Dioxide
- Fluorinated gases
- Methane
- Nitrogen Oxides
- Nitrous Oxides
- Particulate matter
- Sulphur Dioxide
- Tropospheric Ozone
- Volatile Organic Compounds/Carbon Monoxide

Climate change harm human health

Climate Change

Climate change leads to **heat waves**.

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Negative impacts on

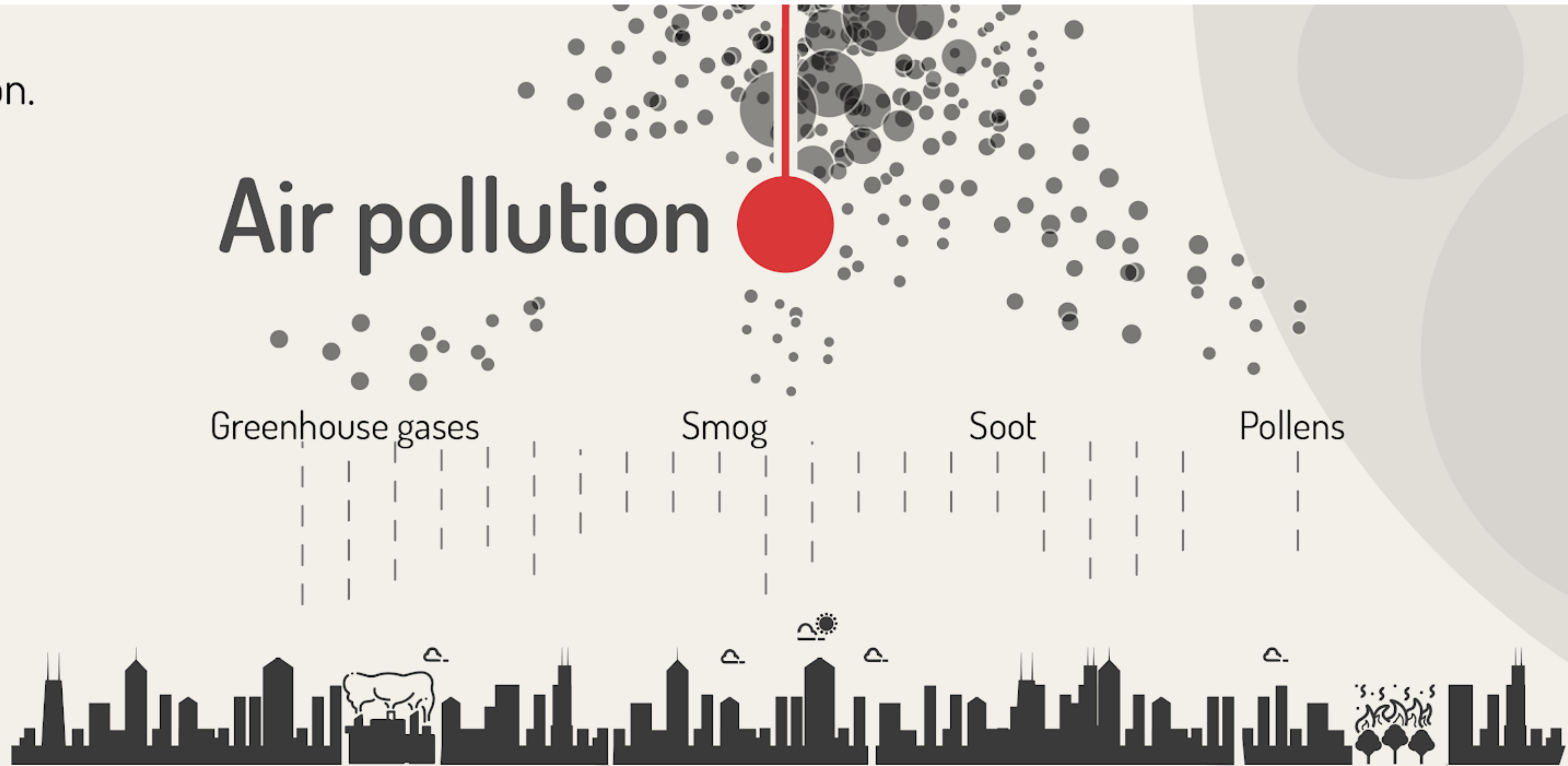
Human HEALTH

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- Carbon Dioxide
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- Sulphur Dioxide
- Tropospheric Ozone
- Volatile Organic Compounds/Carbon Monoxide

sed
itation.

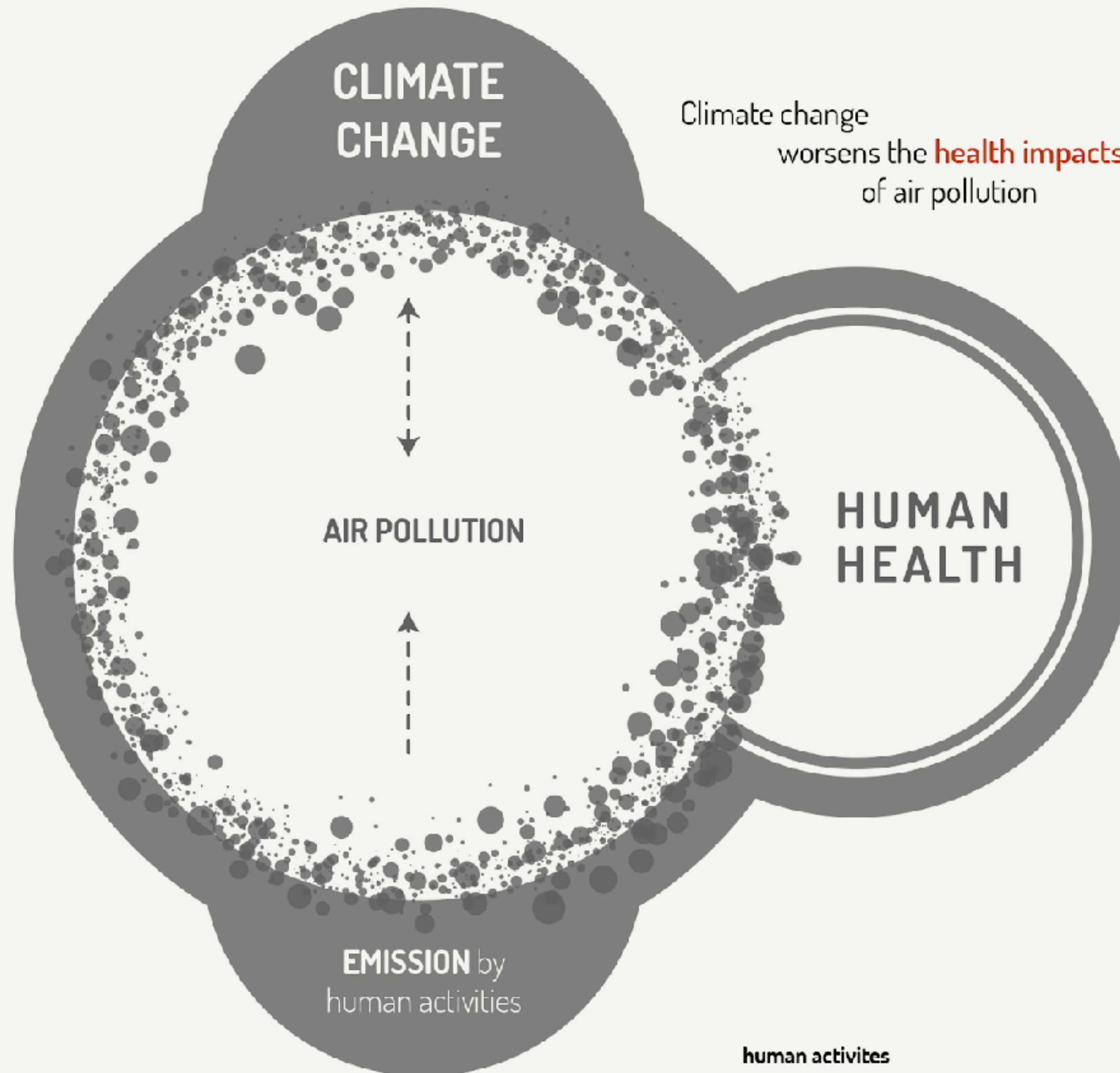
Air pollution



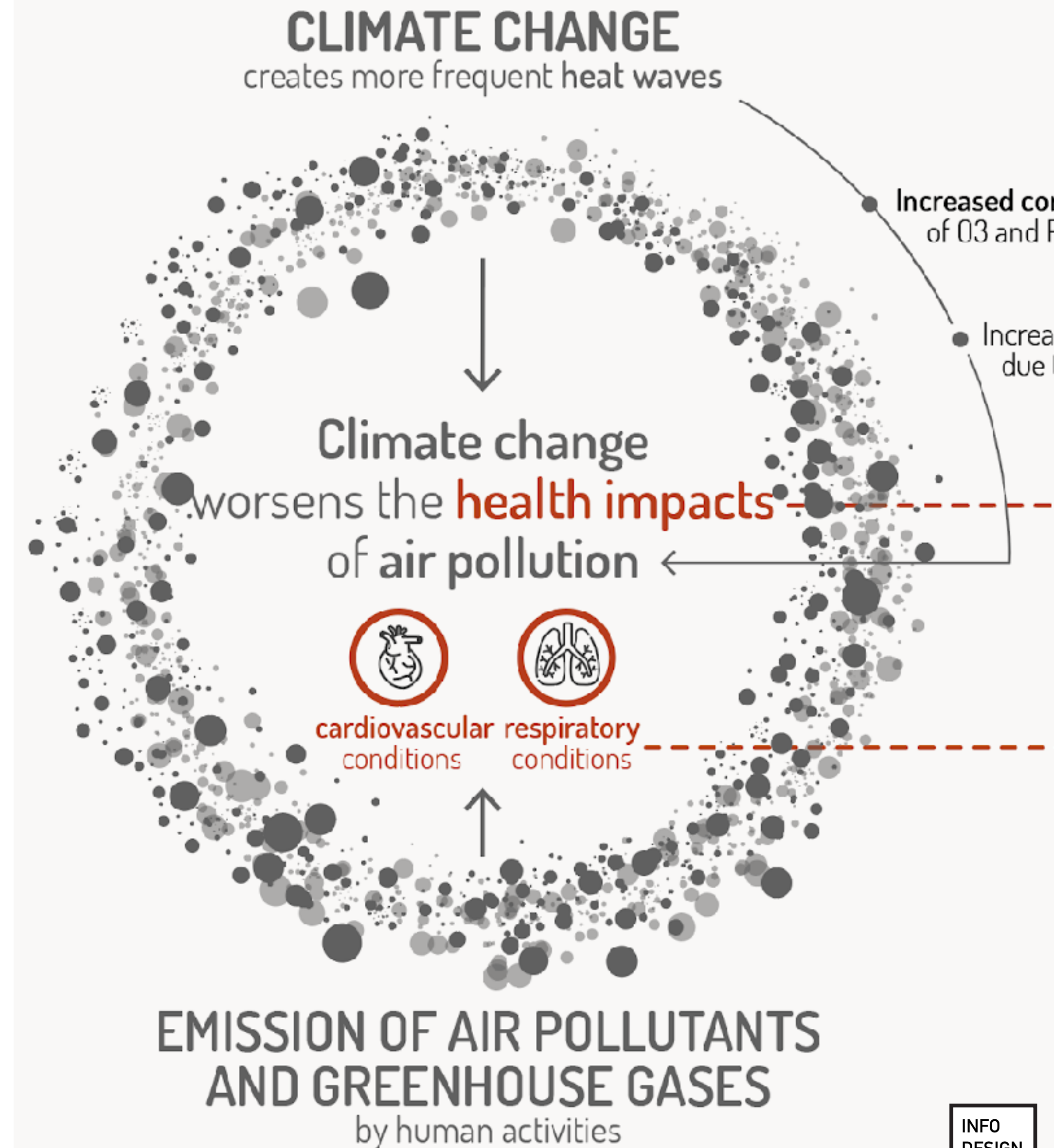
Human activities cause air pollution

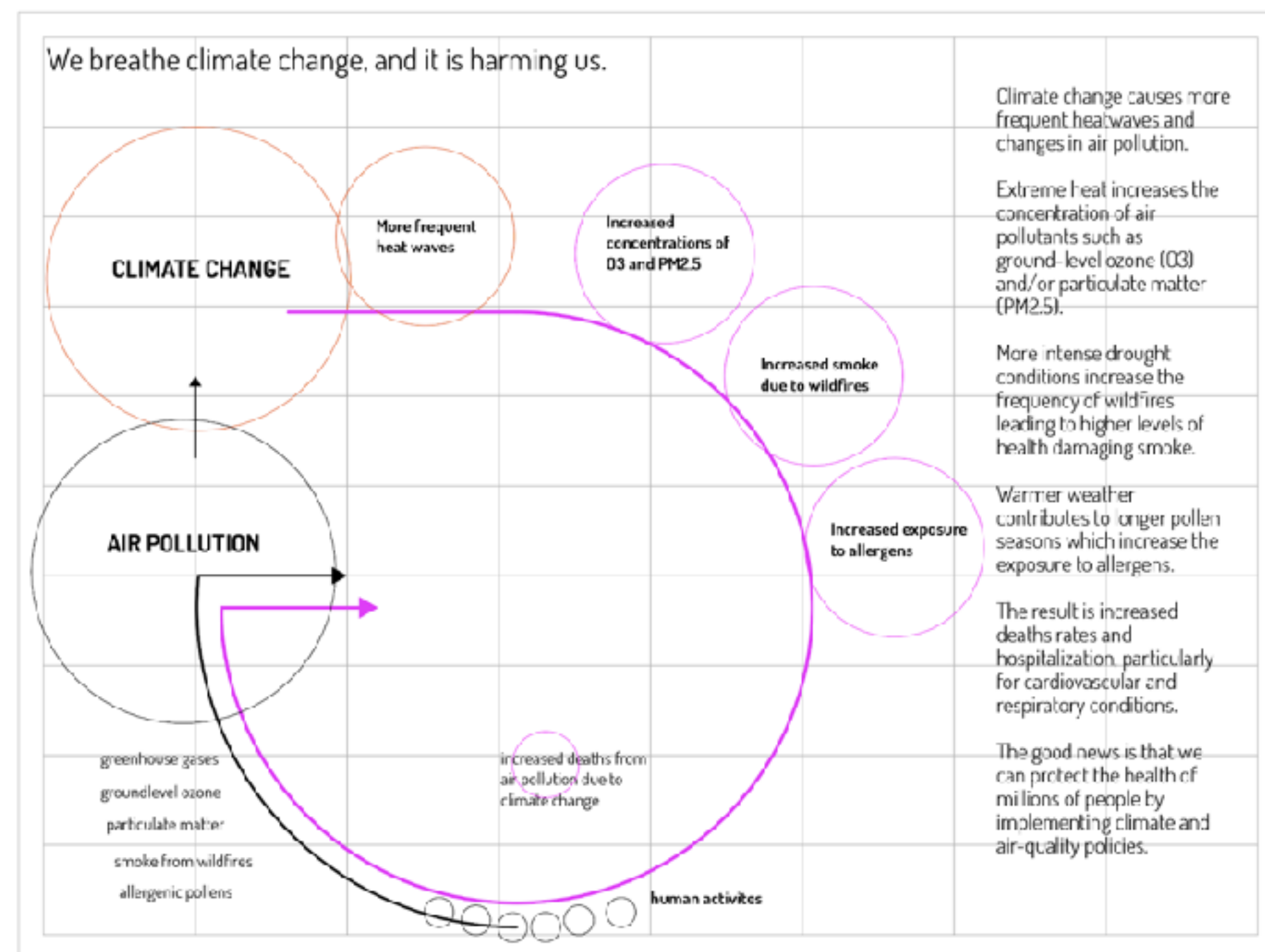
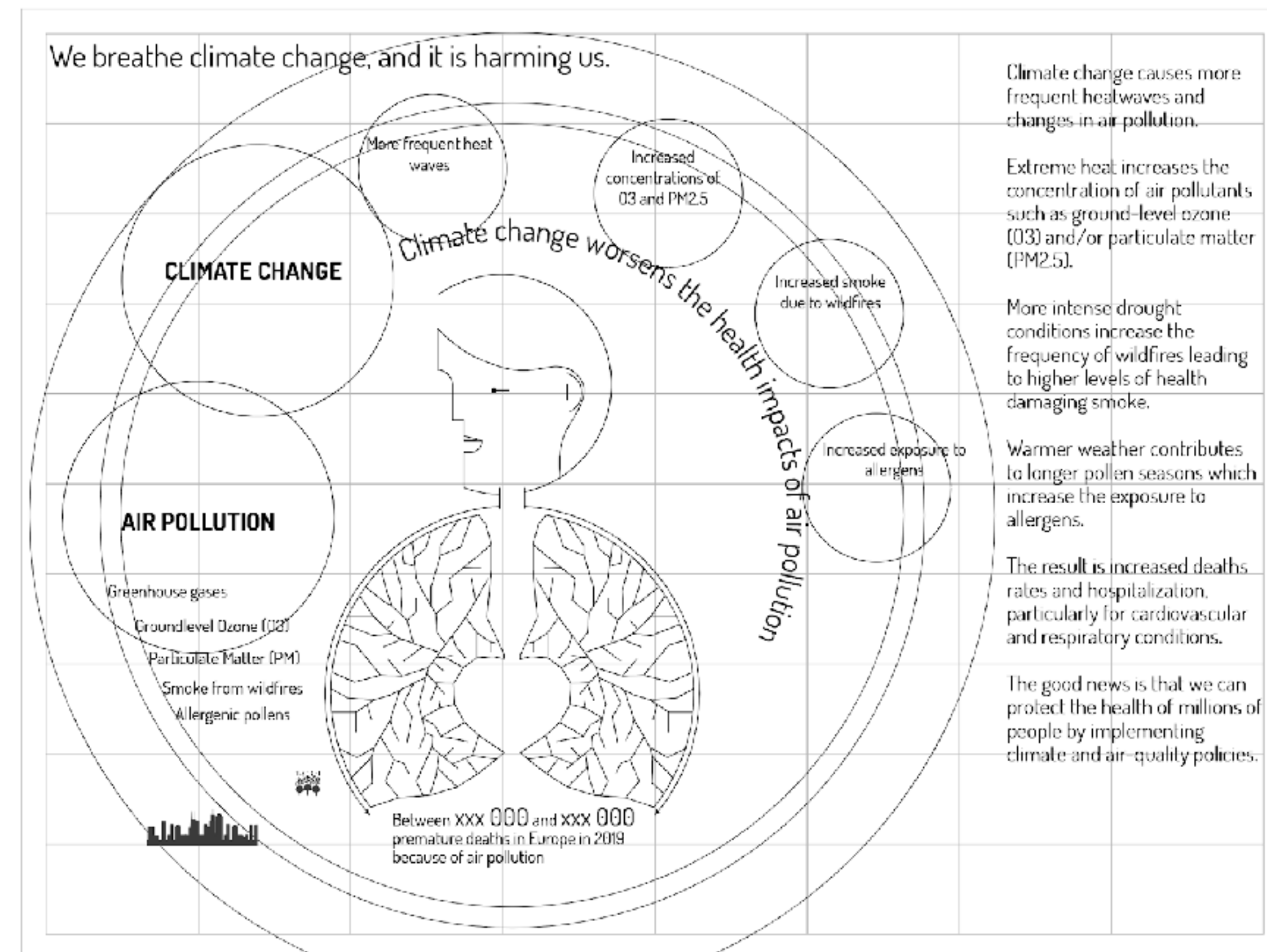
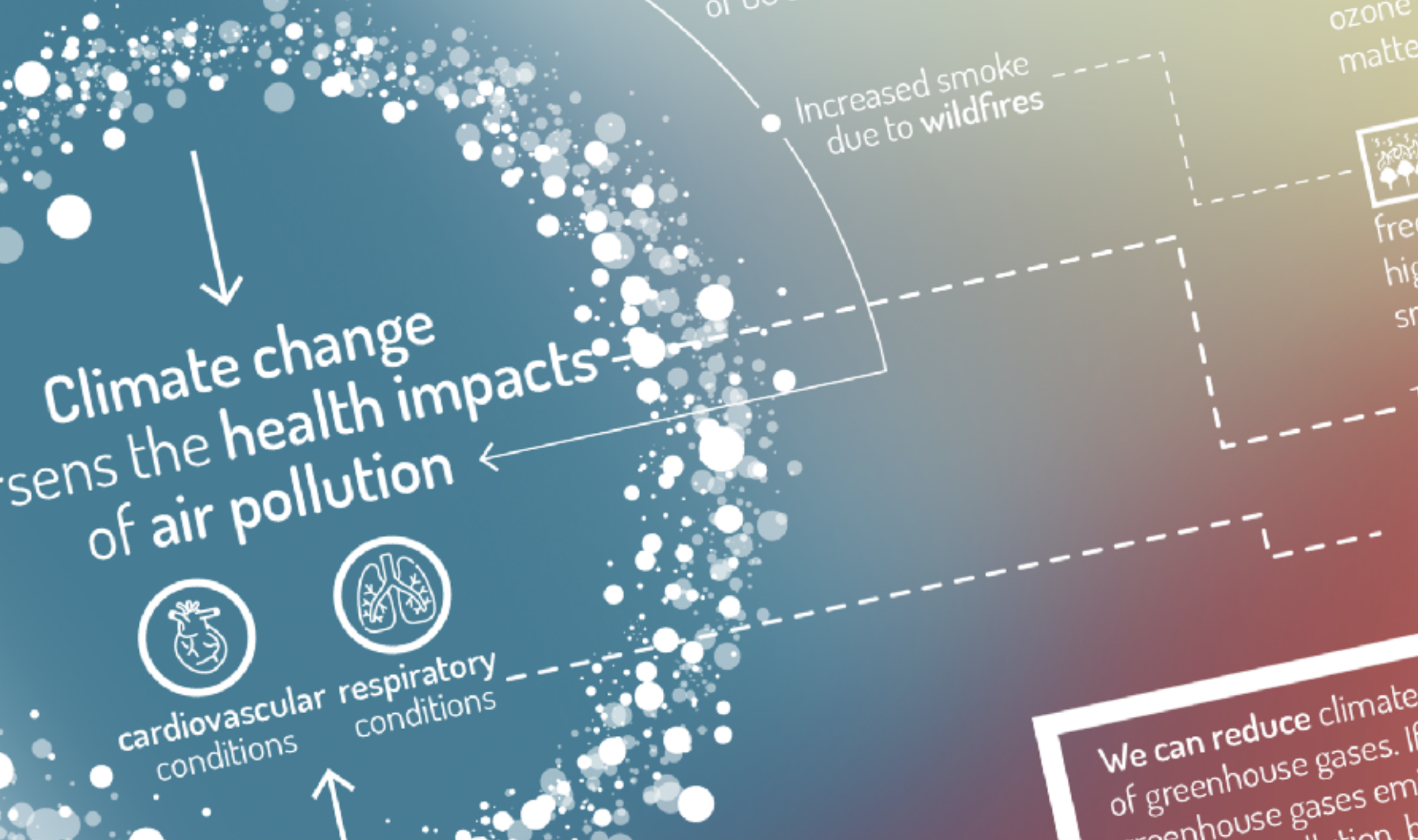
Powerplants, factories, transport, construction, demolition, combustion of fossil fuels, combustion of wood, dust blown by the wind, wildfires.

We breathe climate change, and it is harming us.



We breathe climate change, and it is harming us.





←

ExhaustionH2020

39 Tweets



EXHAUSTION

⋮

✉

🔔

Following

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@ExhaustionH2020 Follows you

Research consortium working to design strategies to reduce health impact from heat waves and air pollution in Europe. EXHAUSTION is a EU-funded H2020 project.

📅 Joined June 2019

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Tweets

Tweets & replies

Media

Likes

EXHAUSTION

ExhaustionH2020 @ExhaustionH2020 · Apr 13

We BREATHE climate change. And it is harming us. The good news is that we can do something about it. www.exhaustion.no



💬

↻ 7

❤ 12

📤

←

ExhaustionH2020

39 Tweets



EXHAUSTION

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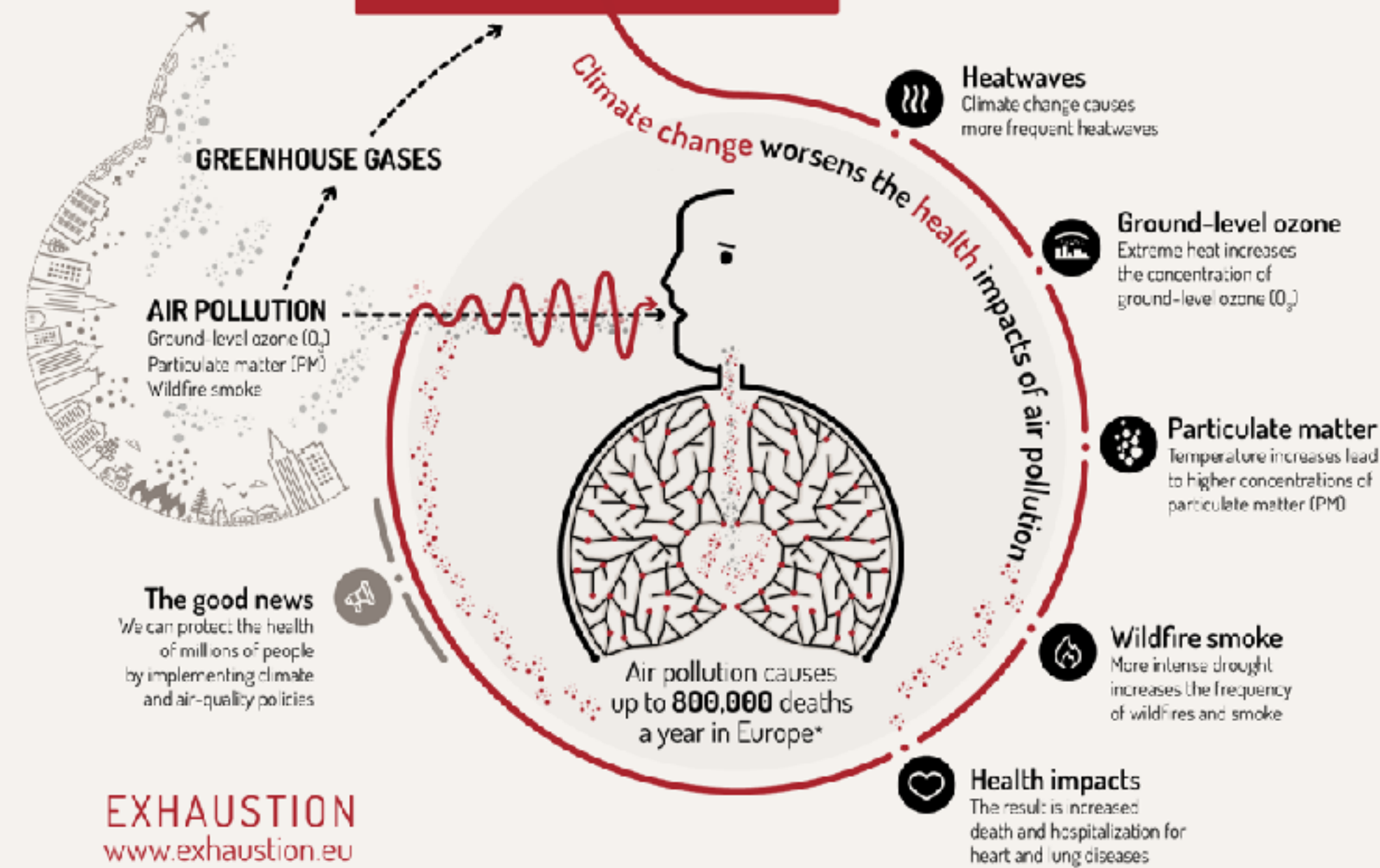
↻ 7

❤ 12

📤

INFO
DESIGN
LAB

WE BREATHE CLIMATE CHANGE



EXHAUSTION



We breathe climate change

BY GUNNELL E. SANDANGER, MIRIAM S. DAHL, KRISTIN AUNAN, INFO DESIGN LAB
PUBLISHED 24.06.2020

SHARE TO: TWITTER / FACEBOOK / EMAIL

Air pollution is the largest single environmental risk to human health in Europe. With climate change, increasing temperatures and more wildfires, the health impact of air pollution may be amplified.

What are the links and connections between heat stress, air pollution, wildfires, health and climate change?

Alexandra Valta is a math teacher in Athens. Her family has a summer house in Mati, a coastal village less than one hour drive north of Athens. Two years ago a terrible wildfire hit the area.

"It was a Monday, a very nice day, and also really hot. We started to see smoke and I called my husband who was on his way. He said he could see fire and smoke. The electricity was out. We saw the fire on the

Air pollution is the single largest environmental health risk in Europe.



The narrative arc

It is the journey we offer to our readers.



The narrative arc

It is the journey we offer to our readers.

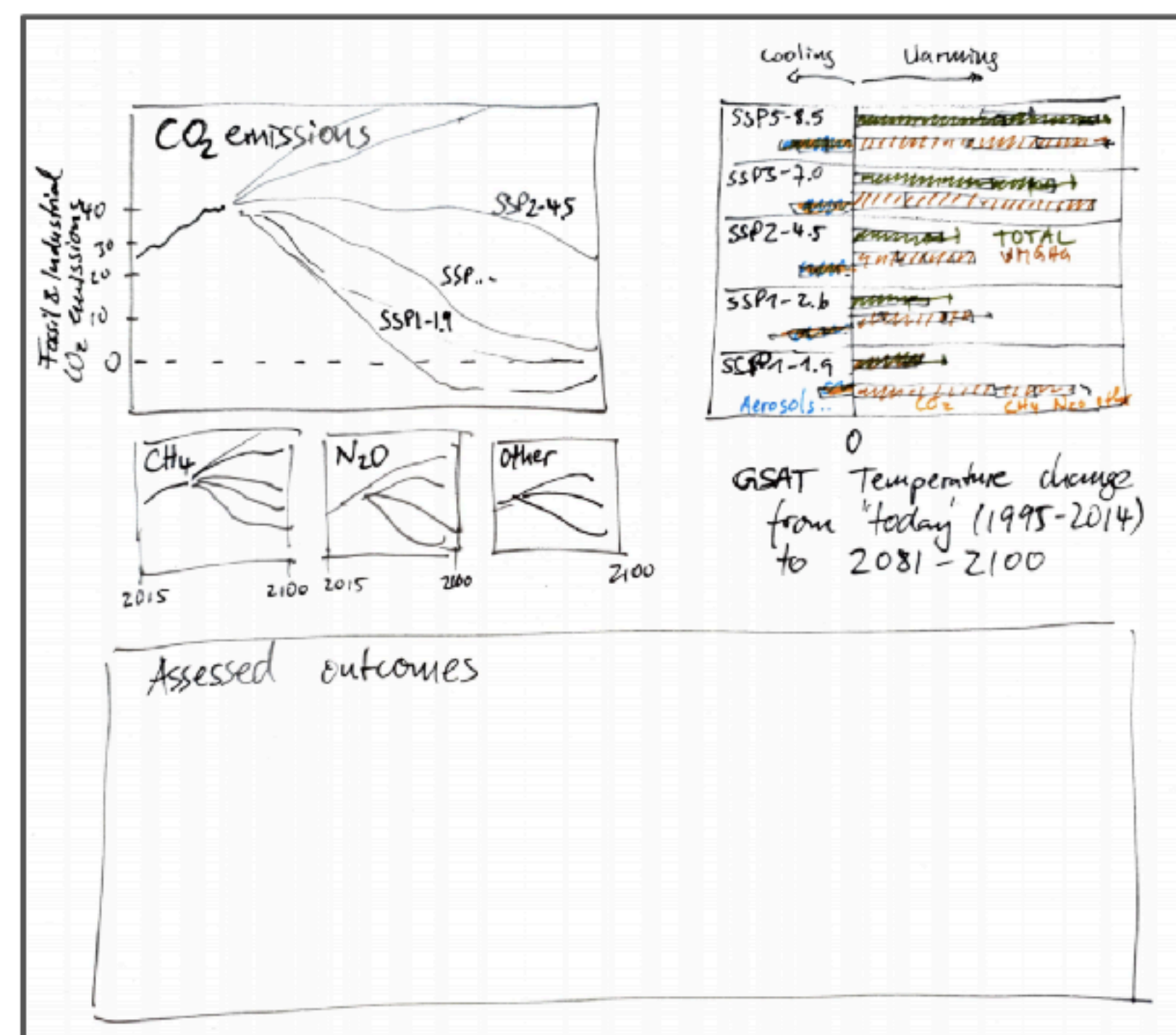
Imagine being on a stage to **present** your (future) figure. Describe the intent, the core pattern and what the figure shows to a lay audience, in order to empower them to communicate the same message using the same figure.

On data: Email exchange with Malte, Sebastian, Chris

Malte:

Thanks. Promising figure. A few points:

- Yes, we are happy to provide the emulator data for the figure.
- On the assessed future temperature implications per forcing driver, that would need to be discussed also with Chapter 7, where the assessment of the "holistic emulators" is done in Box 7.1 and also the individual forcing contributions. I guess once we have the finalised FaIR and MAGICC versions (which are then both calibrated to the latest Chapter 4 total tas projections), it would then be good to use those for that part of the figure with an agreed methodology. I hence also copy in Piers.
- On the Assessed temperature outcomes. One specifically important point I think are the 1.5 crossings and whether that could be shown for both the peak temperatures and first crossings "from below to above" as well as the other way around, i.e. "from above to below" as otherwise policymakers will immediately infer that the 1.5C target is lost, whereas they overlook that many scenarios come back by 2100 to just below 1.5C in the median. That is more for @Sebastian and Chapter 4, but in terms of the messaging of the overall IPCC report, that is a crucial bit, I feel.
- Just to understand what exact data you need. Is it something along the sketched PDF? I.e. do you want bar graphs for the induced temperatures "by emission driver", say stacking the median contributions of CO₂, CH₄ and N₂O + OTHER on top of each other with a total warming uncertainty bar... same for the net cooling species (could also be CH₄, for SSP1-1.9 where concentrations fall from today to 2100), and then a total total bar for each of the SSP scenarios?



Wireframe

This figure illustrates how **future emissions** influence future global warming, or in other words, **that our actions influence our future**.

Key distinguishing factor between scenarios are their emissions

Tagline: Our actions do influence our future.

Highlight the dominant role of CO₂ and also the role of non-CO₂

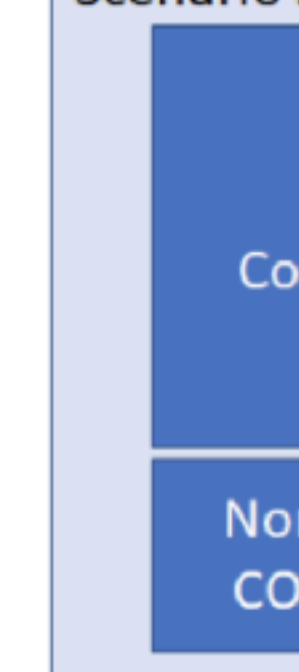
Tagline: CO₂ is the elephant in the room

Temperature evolution and timing of **crossing** temperature levels depends on the emission scenario.

Tagline: Our decisions determine the level of climate change

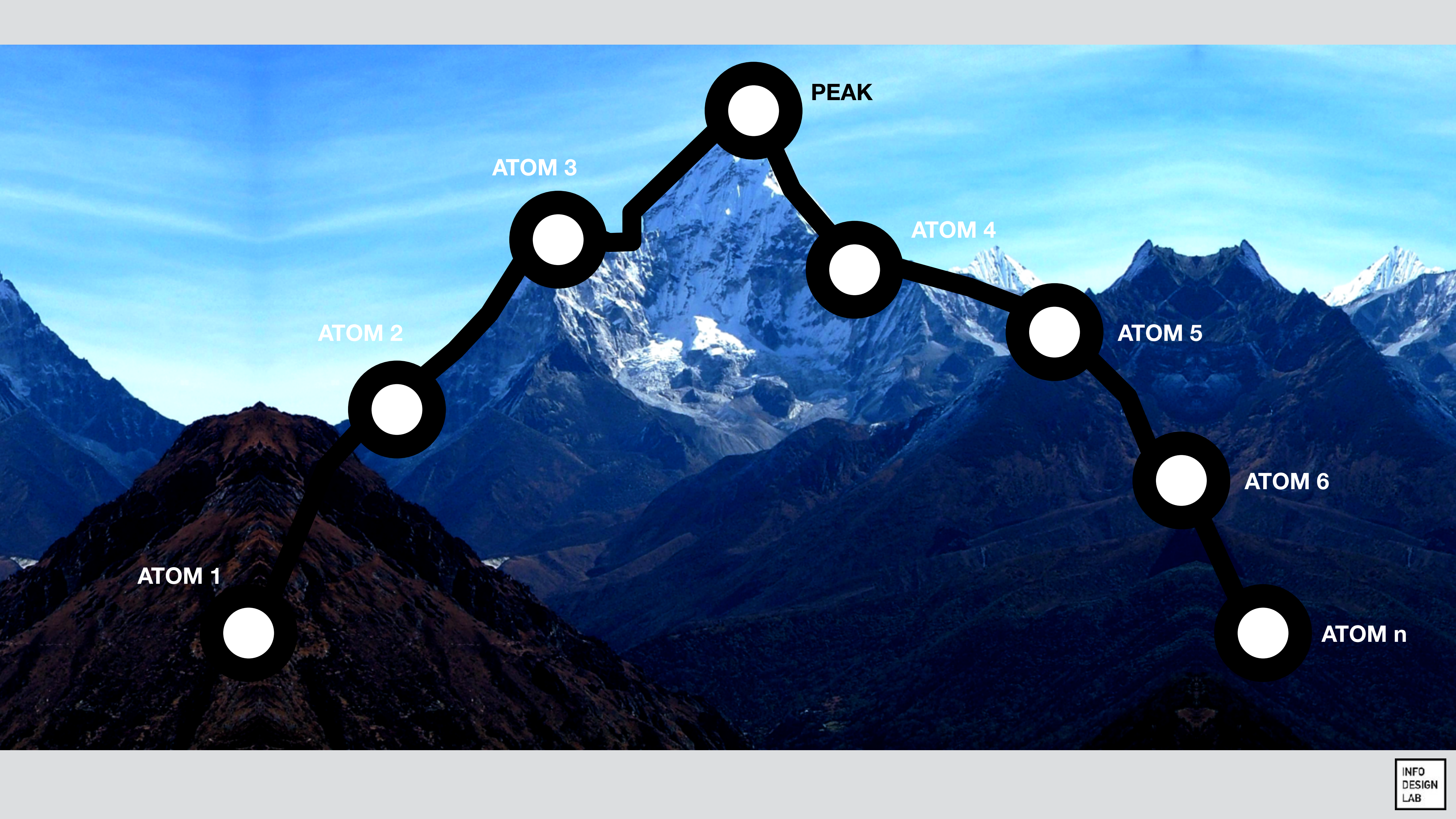
Wireframe

Scenario



Assessed





ATOM 1

ATOM 2

ATOM 3

PEAK

ATOM 4

ATOM 5

ATOM 6

ATOM n



The slide books

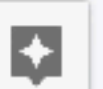
Recording the history of everything we work on.





IPCC SPM1 graphics

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THE
MAKING OF

Harry Potter



***'No story lives unless
someone wants to listen.'***

– J.K. Rowling

Using ECMWF's Forecasts 2022: Visualising Meteorological Data

9th June 2022

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