



Impact of Science

5-7 June 2019, Berlin

Raum E0.42, 11:30-12:45

Grand challenges

Benedikt Fecher (Chair)

Maria de Kleijn

Apollonia Miola



Impact of Science

5-7 June 2019, Berlin

Grand challenges

Benedikt Fecher (Chair)

*Head of the research programme “Knowledge and Society”,
HIIG, Germany*



Impact of Science

5-7 June 2019, Berlin

Grand challenges

Maria de Kleijn

*Senior Vice President analytical services,
Elsevier, The Netherlands*



Integrating grand challenges in an institutional research strategy

June 2019, Maria de Kleijn
SVP Analytical Services



Evolving expectations! From....



**“I was entered at Oxford
and have been properly
idle ever since.”**

Edward Ferrars
in: Sense and Sensibility
(Jane Austen, 1811)

... To:

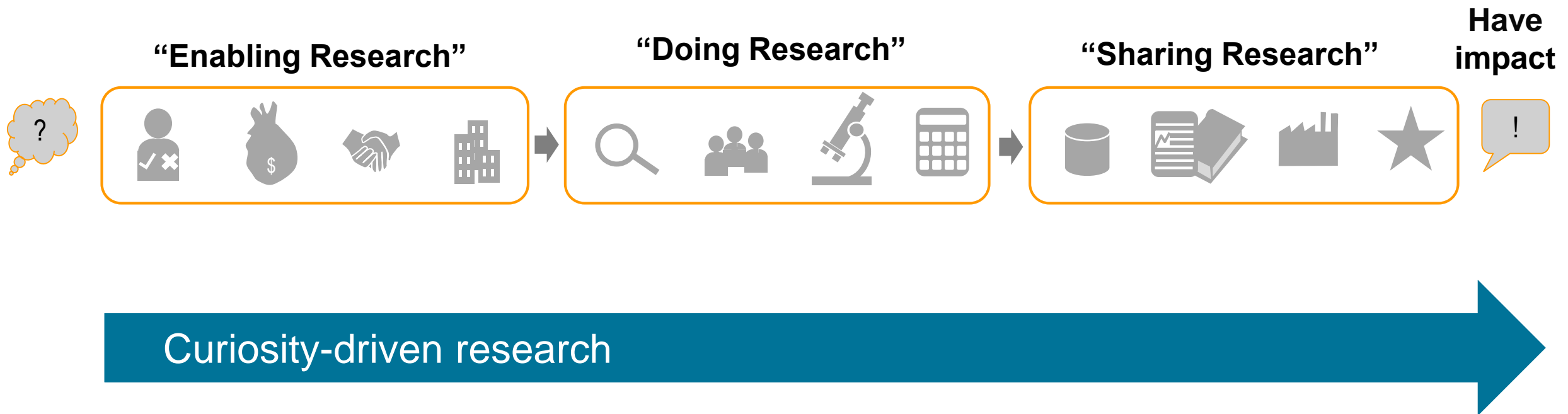
“To respond to the Grand Challenges, business, academia, civil society and government must work together, bringing their expertise and entrepreneurial spirit, to drive us all towards success. “

UK industrial strategy 2018

“A primary objective of the National Science and Technology Council is to ensure science and technology policy decisions and programs are consistent with the President's stated goals. “

Executive Office of the President of the United States, 2019

Match with the research workflow?



We organize research by discipline

Delft University of Technology

The logo for TU Delft, featuring a stylized white flame icon above the text "TU Delft" in white on a blue background.

Faculties and disciplines



Thematic cooperation

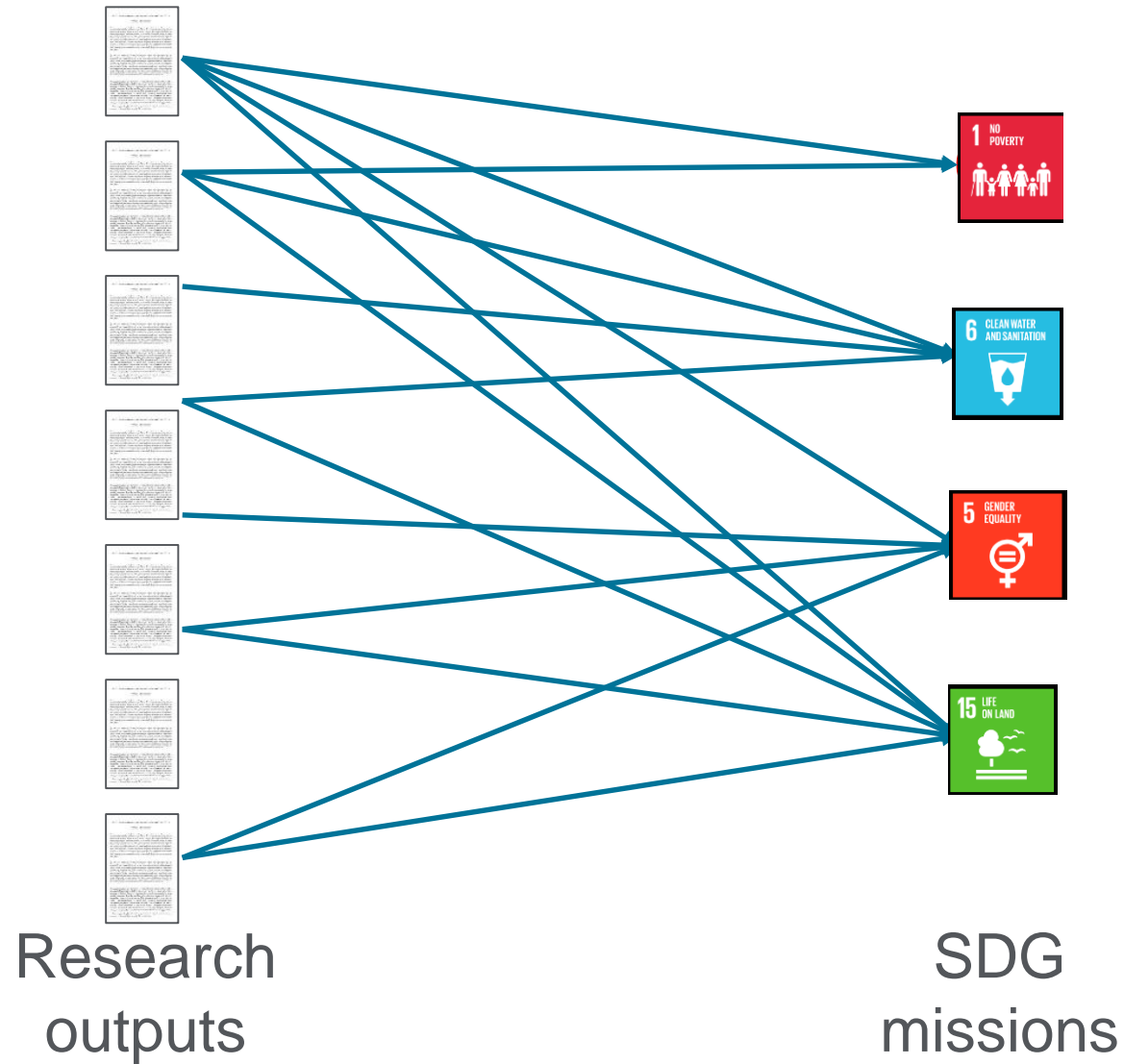


Research Facilities

Sustainable Development Goals: missions



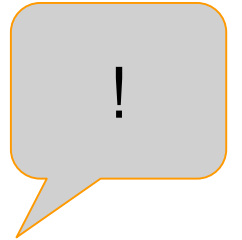
Linking research to missions



The SDGs: targets on impact



Have impact

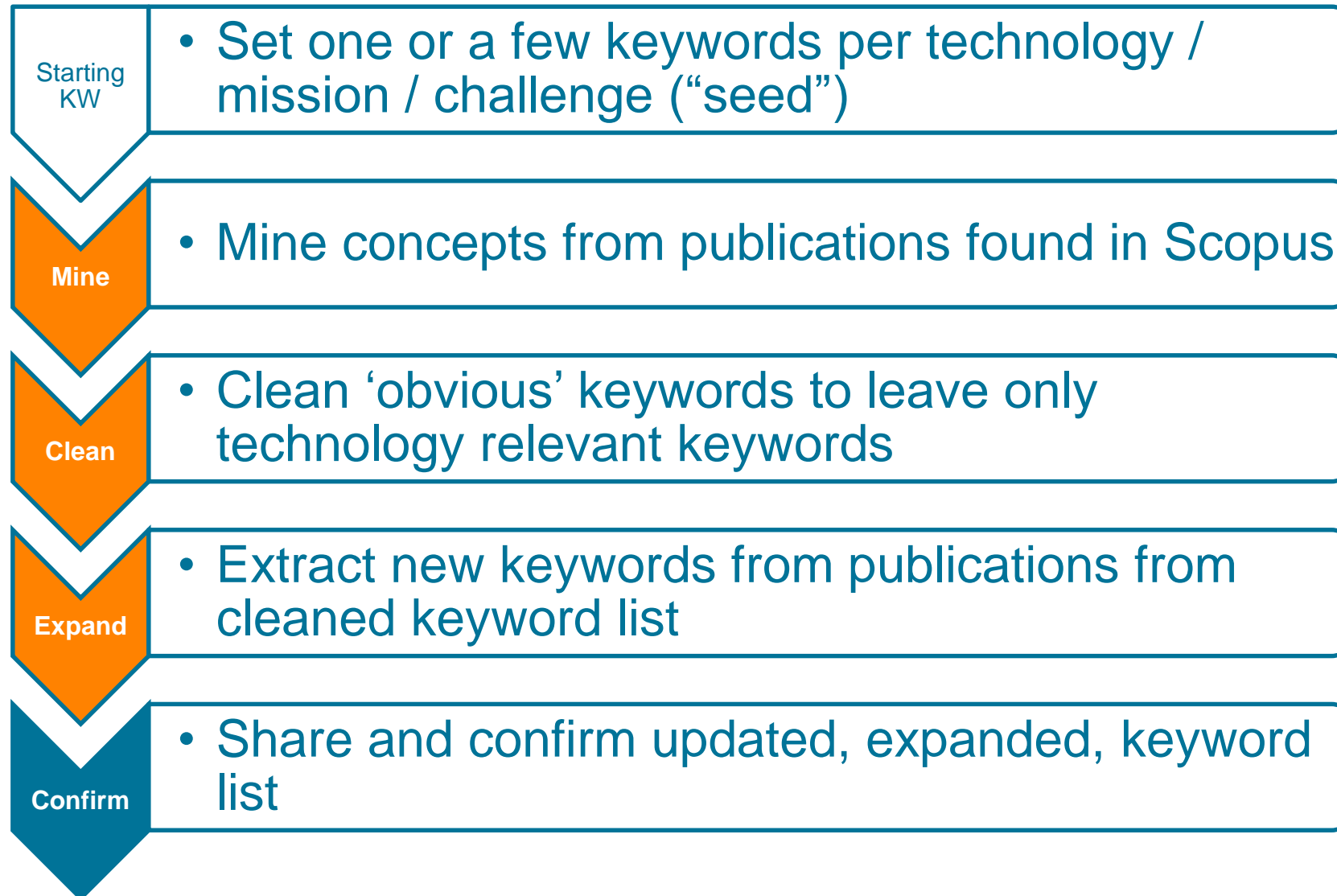


- By 2030, reduce the global Maternal mortality rate to less than 70 per 100,000 live births
- By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births
- By 2030, end the epidemics of AID and combat hepatitis, water-borne Neglected tropical diseases
- By 2030, reduce by one third premature deaths from communicable diseases through prevention and treatment Mental health and well-being
- Strengthen Substance abuse prevention and treatment, including narcotic drug abuse and harmful use of alcohol

Distinct diseases

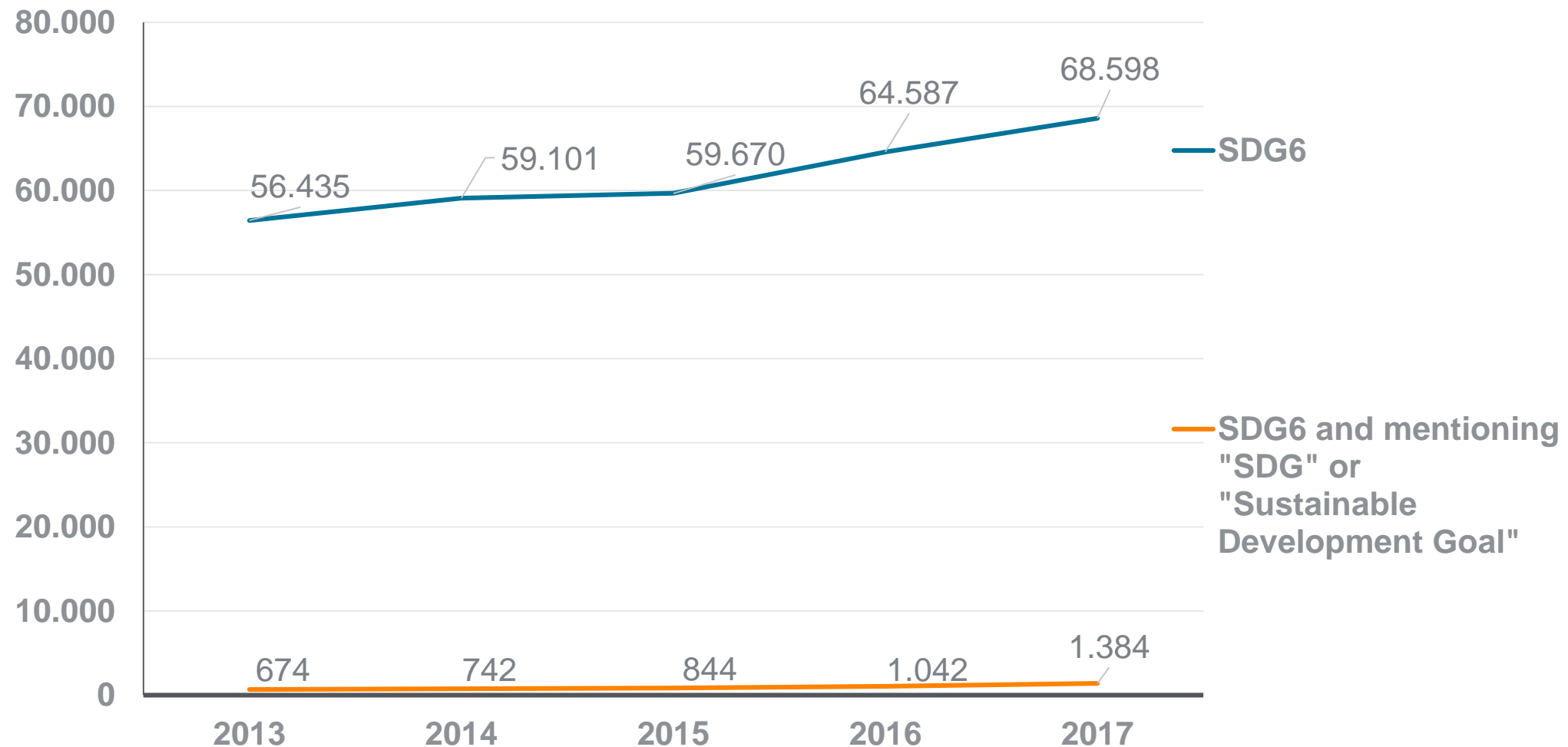
Mix of medicine, social science, economics,...

How to solve: computer assisted keyword definition



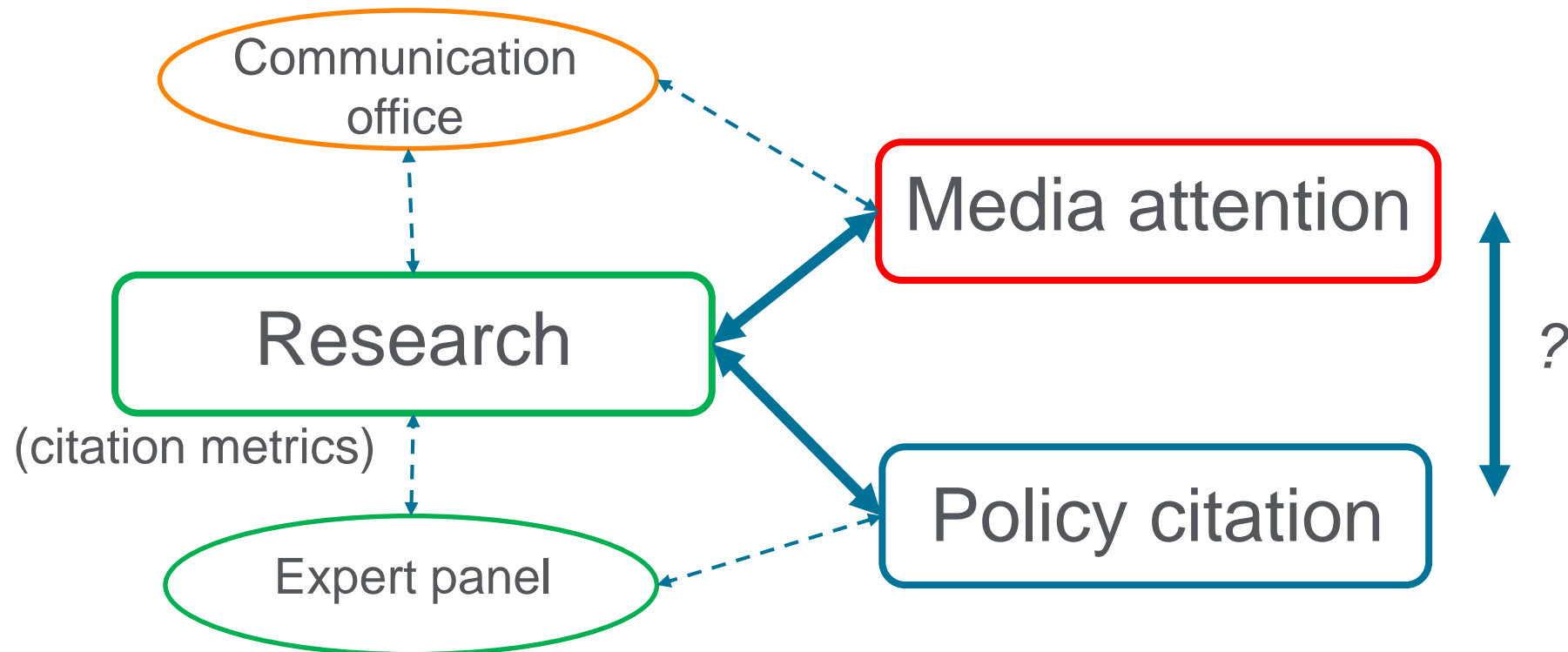
Hence, no issue that most SDG-relevant research does not mention the SDGs

Number of documents. Example SDG6 clean water, world



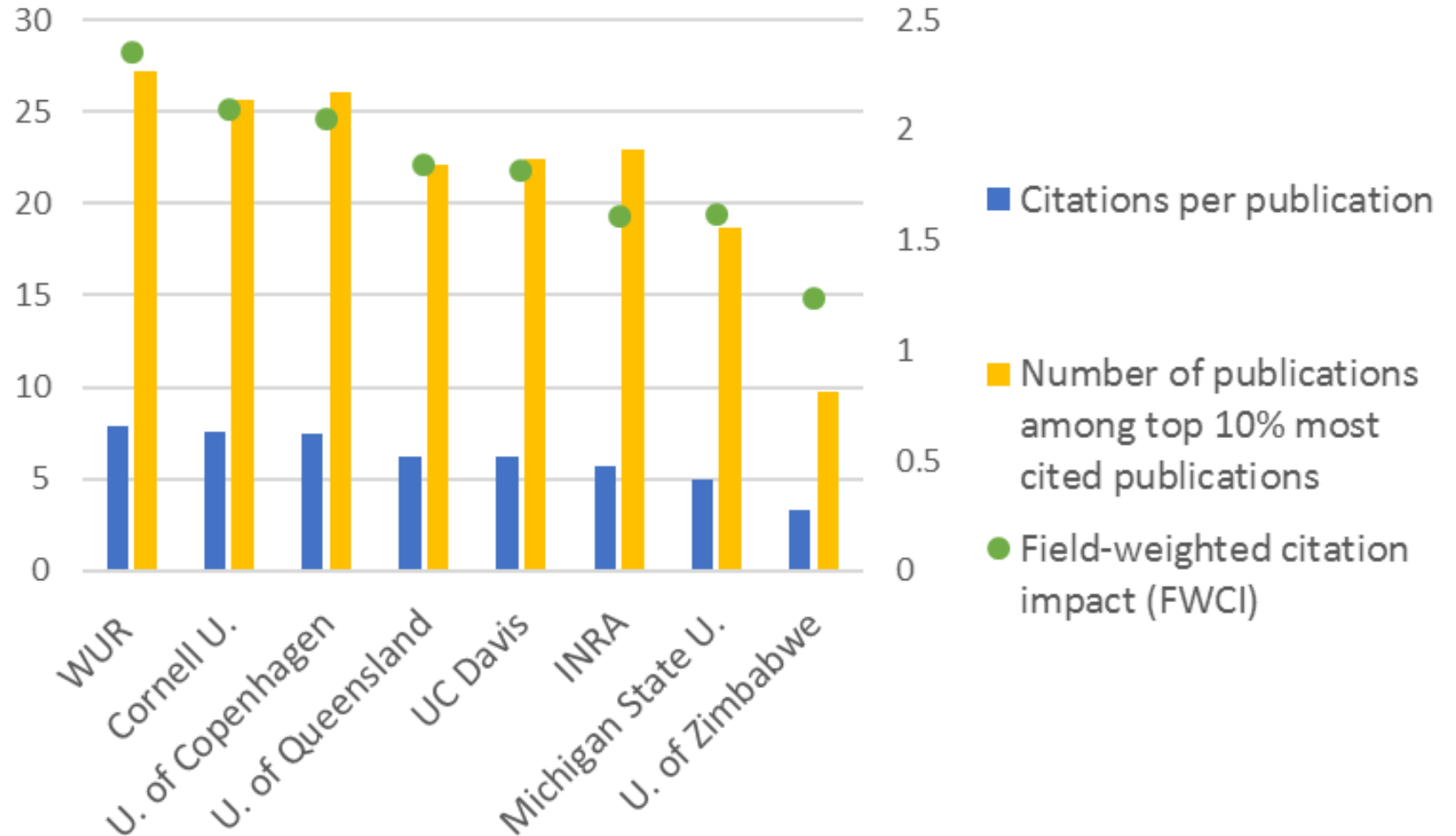
From research to impact? Wageningen case study, SDG2

- Does scientific quality translate into uptake by news media and social media?
- Do relative scientific quality, media attention or social media attention increase the likelihood of being picked up by a policy document?



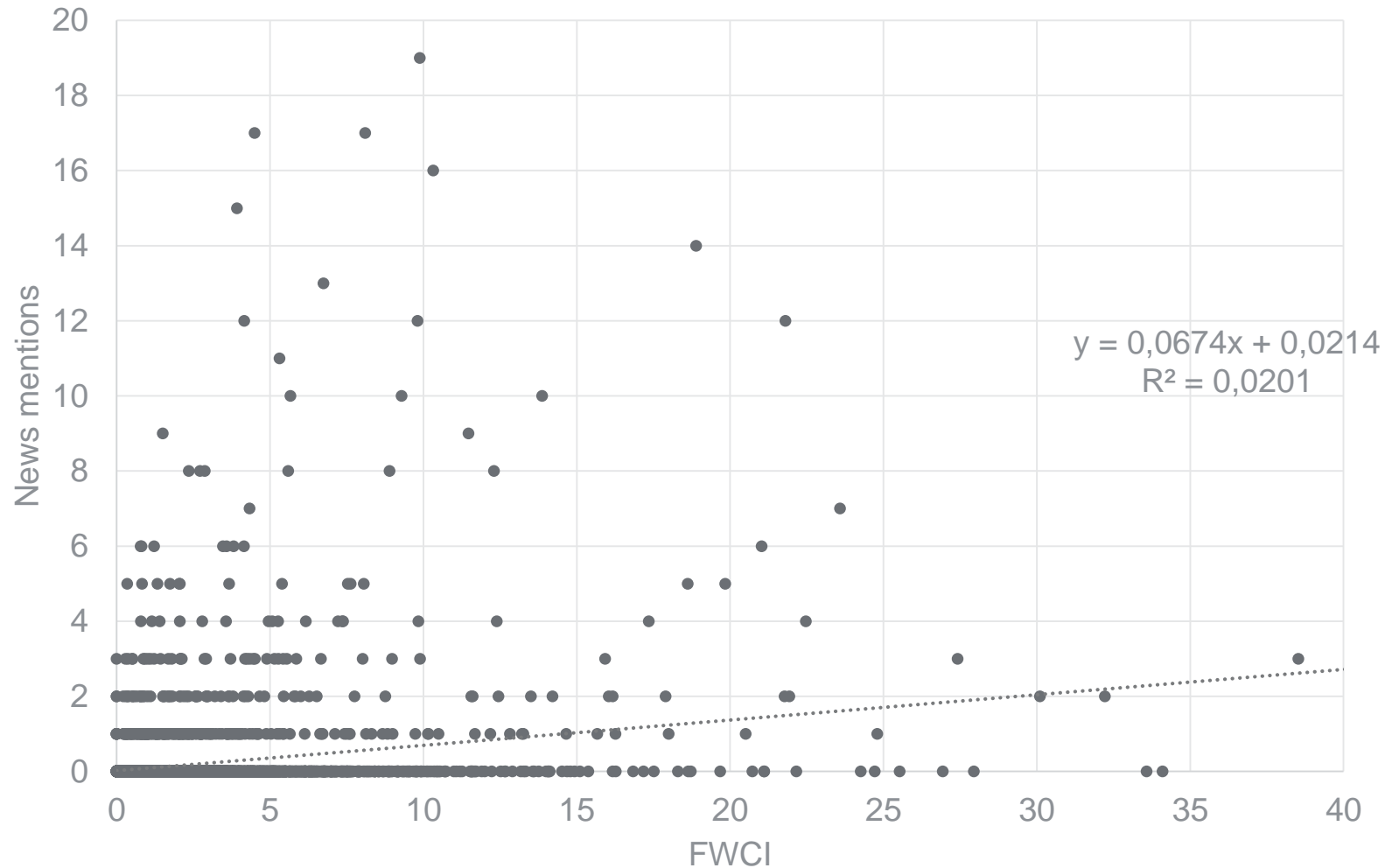
From research to impact? Wageningen case study, SDG2

- SDG2 publication set extracted based on fingerprinted keywords
- Based on document set, relevant comparator institutions selected



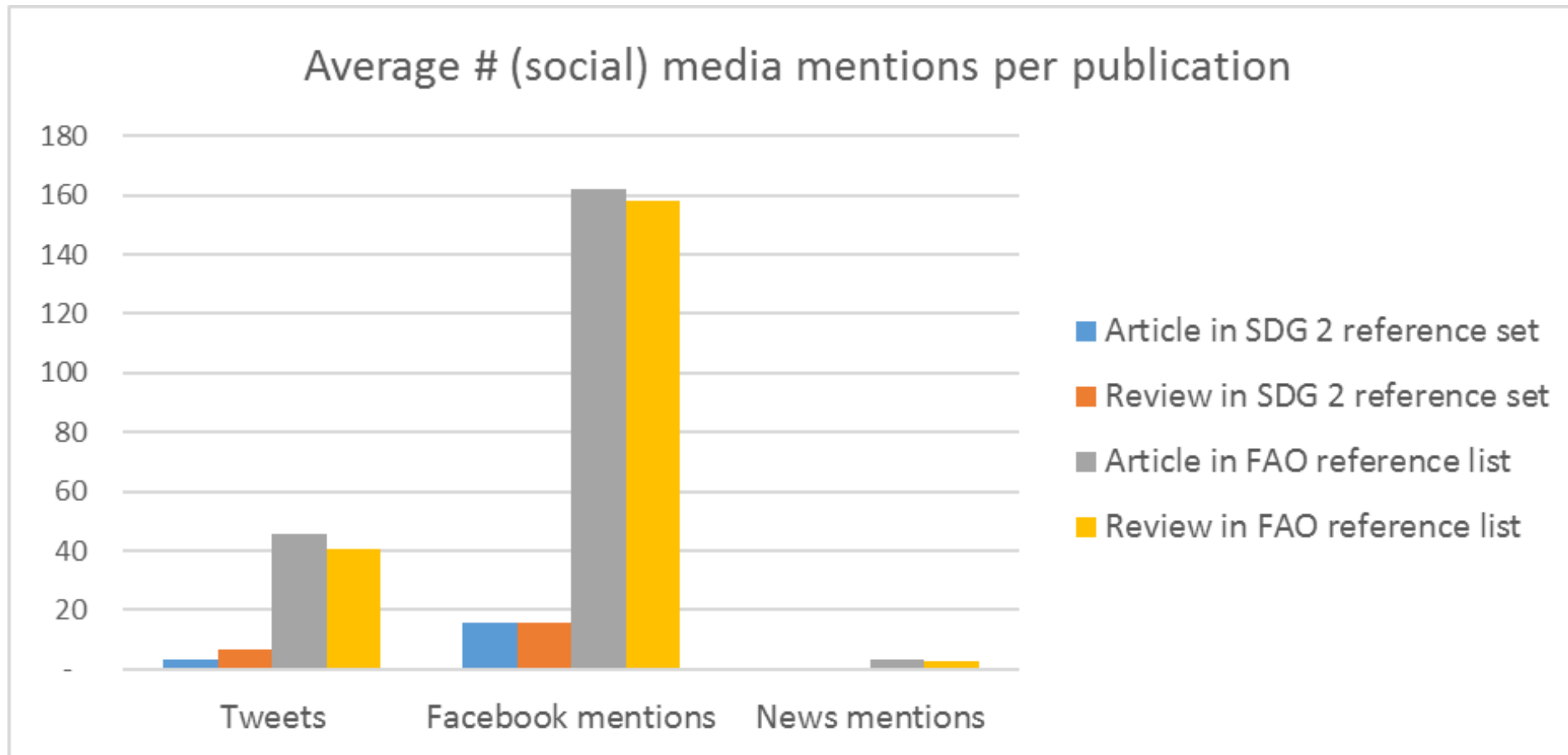
Wageningen SDG2: no correlation between research quality indicators and media success

Example correlation between FWCI and news mentions



Wageningen SDG2: policy documents seem to cite research that's attracted attention

Example SDG2, comparison on/off FAO reference list



Conclusion

- University research is increasingly expected to explicitly drive forward national or global policy objectives
- While research often not organised around these objectives, it is possible to link research outputs to missions ex post
- Analyses based on this linked data can help universities finetune research and impact agenda
- Showcasing impact to the general public seems to be a separate effort, not correlated to scientific success as measured by citations
- While policy seems to cite attention-grabbing research, policy impact may require concerted effort
- Elsevier will continue its effort to provide universities insight into the SDGs

A parting thought...





Thank you





Impact of Science

5-7 June 2019, Berlin

Grand challenges

Apollonia Miola

Knowledge for Sustainable Development

& Food Security Unit, EC Joint Research Centre, Italy



The European Commission's science and knowledge service

Joint Research Centre

Science policy interface framework for SDGs implementation

A. Miola- European Commission - Joint research Center

IMPACT OF SCIENCE CONFERENCE

Grand challenges – session

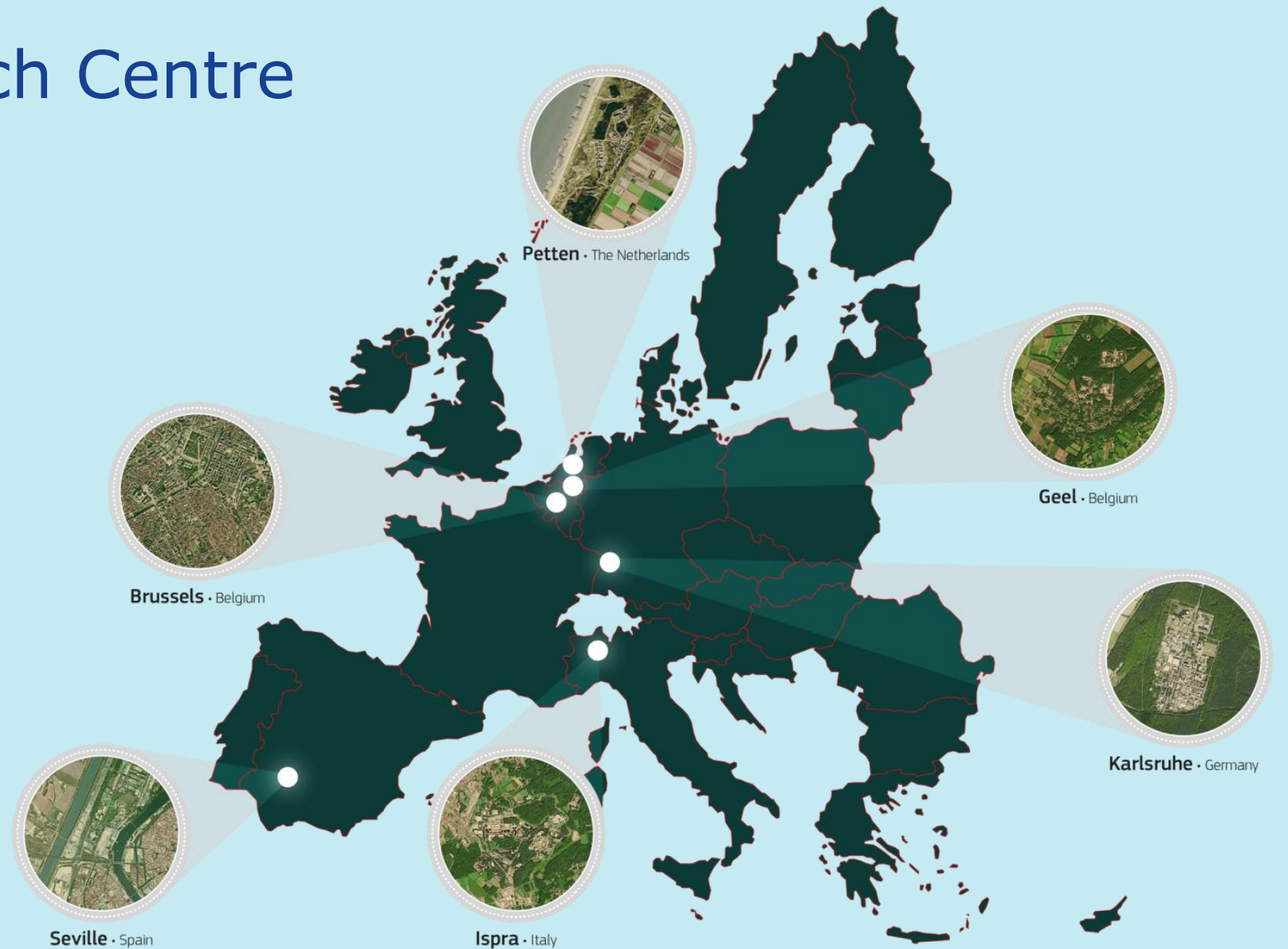
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The Joint Research Centre at a glance

3000 staff

Almost **75%** are scientists
and researchers.

Headquarters in Brussels
and research facilities
located in **5 Member States**.



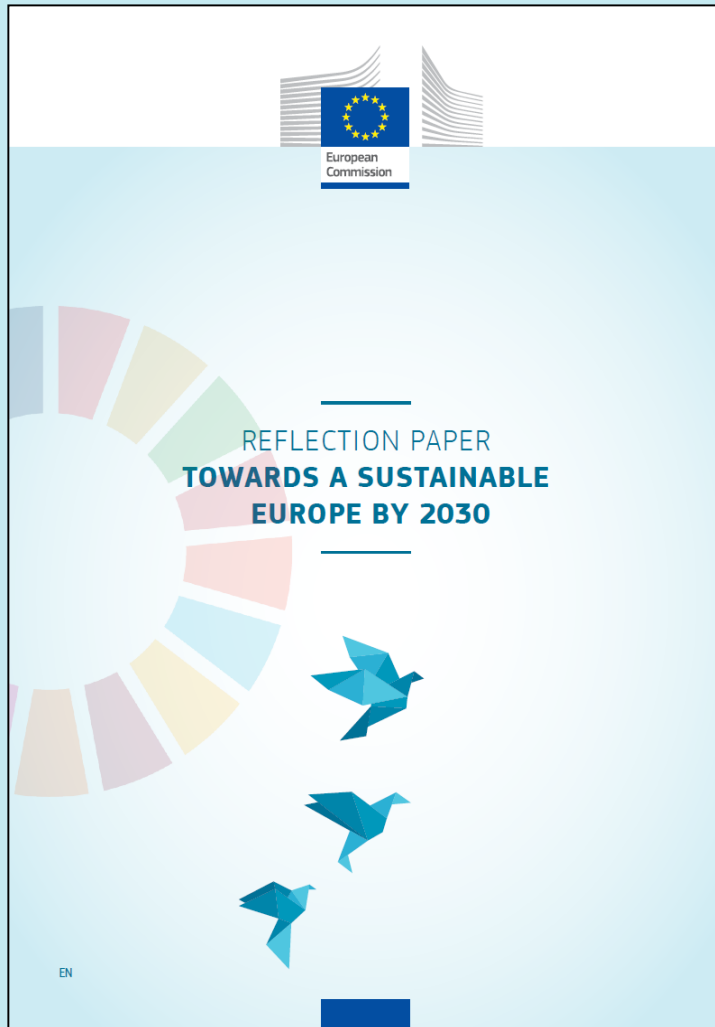
UN SDGs: International context

SUSTAINABLE DEVELOPMENT GOALS



On 1 January 2016, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force

How to build evidence-informed sustainability paths?



"The world is in a flux. Everything is changing for everyone."

The question is whether we are a victim of change, or whether we will embrace and guide it.

To face complex challenges, we need to gear all our science, our financing, taxation, and our governance towards the achievement of the SDGs."

Reflection Paper on "A more sustainable Europe by 2030", 30 January 2019



Sustainable Development Goals

EU approach to sustainable development

The EU approach towards implementing the UN's 2030 Agenda for Sustainable Development together with its member countries.

Multi-stakeholder platform on SDGs

- Role, structure and working methods
- Members
- Meetings
- Feedback on the implementation of the Sustainable Development Goals in the EU
- Support and Advise

EU policies and actions

EU policies and actions contributing to the Sustainable Development Goals.

Statistics to monitor the SDGs in an EU context

The Eurostat website contains a section dedicated to sustainable development where you will find the monitoring report on progress towards the SDGs in an EU context, detailed information on each SDG, visualisation tools as well as direct access to the data.

European Commission > Strategy > Sustainable Development Goals > EU policies and actions >

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

1 NO POVERTY 2 ZERO HUNGER 3 GOOD HEALTH AND WELL-BEING 4 QUALITY EDUCATION 5 GENDER EQUALITY 6 CLEAN WATER AND SANITATION 7 AFFORDABLE AND CLEAN ENERGY 8 DECENT WORK AND ECONOMIC GROWTH 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 10 REDUCED INEQUALITIES 11 SUSTAINABLE CITIES AND HUMAN SETTLEMENTS 12 RESPONSIBLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION 14 LIFE BELOW WATER 15 LIFE ON LAND 16 PEACE, JUSTICE AND STRONG INSTITUTIONS 17 PARTNERSHIPS FOR GOALS

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- Target 11.2
- Target 11.3
- Target 11.4
- Target 11.5
- Target 11.6
- Target 11.7
- Target 11.a
- Target 11.b
- Target 11.c

Overview

Within the EU. the urban dimension is at the very heart of [EU Cohesion Policy](#). More than EUR 100 billion is being invested up to 2020 to support urban mobility, energy efficiency, as well as urban renewal, research and innovation capacity, and regeneration of deprived communities. Making the Union's cities more sustainable is one of the priorities of the [7th Environment Action Programme](#).

Across the globe, the [European development policy](#) seeks to improve living conditions in cities. These efforts are directed to slum upgrading, access to water and sanitation, urban mobility, energy efficiency and affordable housing, land access, and disaster prevention and preparedness. Closer to its borders the EU relies on the [European Neighbourhood Policy](#) and the [Enlargement policy](#).

A full list of EU policies and actions supporting Goal 11 is available below.

EU actions

SDGs: a 'wicked' policy challenge



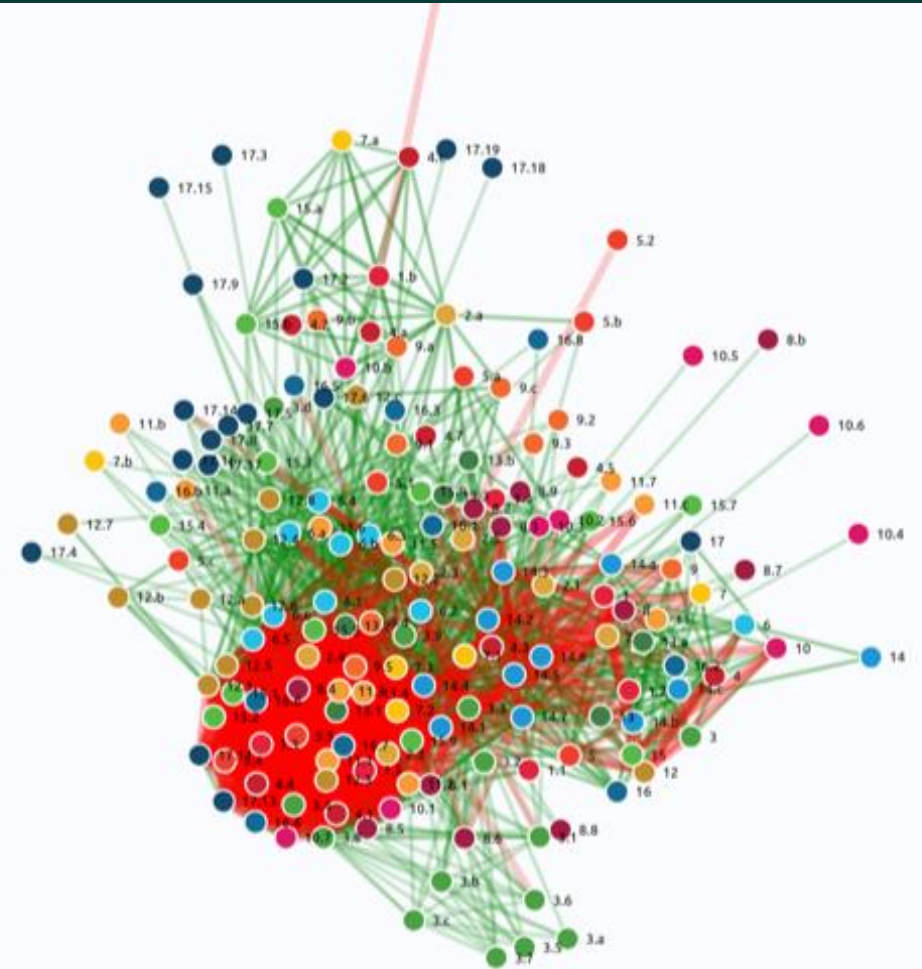
Search

European Commission > Strategy > Sustainable Development Goals >

EU policies and actions

Find out more about how the EU is contributing to the implementation of the 2030 Agenda and towards achieving the Sustainable Development Goals.

In this space you can see which EU policies and actions relate to each Sustainable Development Goal and target. Policies and actions are listed alphabetically. You can learn more about the related policies or actions via links to dedicated thematic websites.



European Commission

Science-based implementation

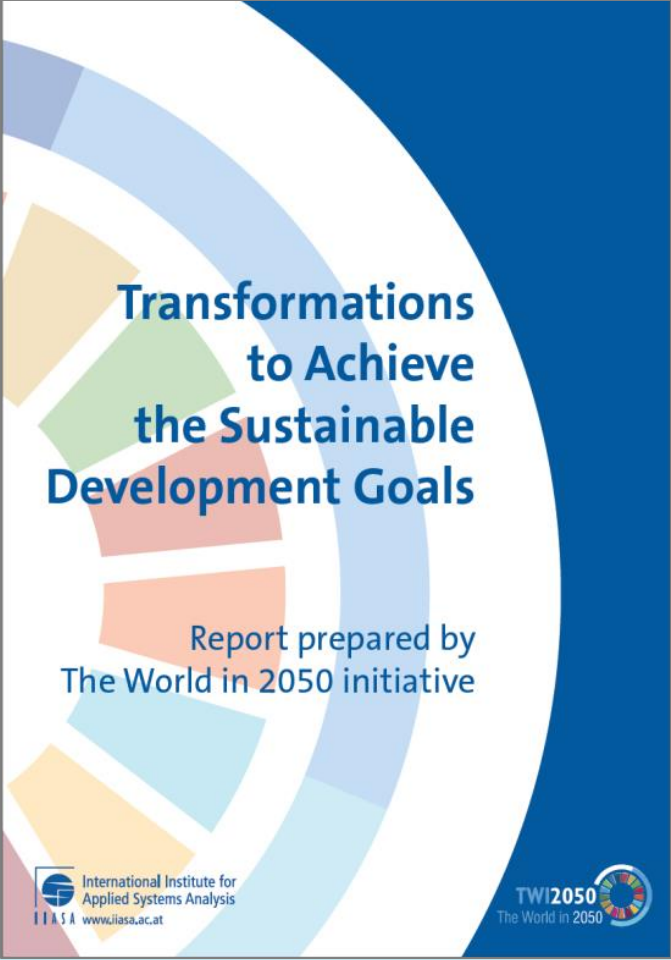
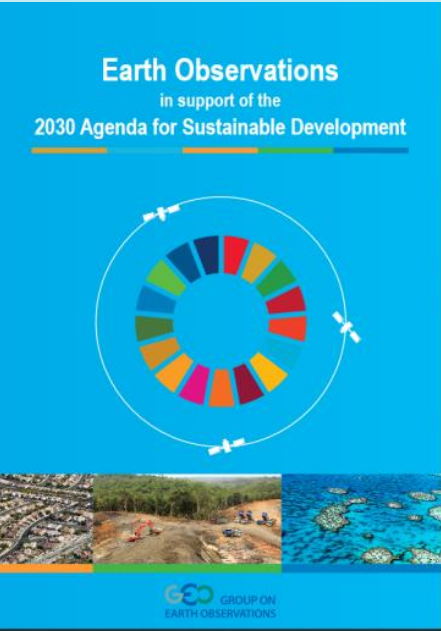




Image credit: © pixelrobot - Fotolia

Infrastructure

Analytics

Applications

Hadoop On-Premise
 cloudera Hortonworks
 MAPR Pivotal
 IBM InfoSphere
 bluedata jethro

Hadoop in the Cloud
 amazon Microsoft Azure
 Google Cloud Platform
 IBM InfoSphere
 CAZENA TREASURE DATA
 alt

Spark
 databricks
 GridGain
 TACHYON

Cluster Services
 amazon web services
 kubernetes
 HPCC SYSTEMS
 docker
 MESOSPHERE

Analyst Platforms
 Palantir
 AYASDI
 Quid enigma
 Digital Reasoning

Analytics Platforms
 Microsoft
 GUAVUS
 Datameer
 Bottlenose

Data Science Platforms
 context relevant
 CONTINUUM DataRobot
 Alpine
 MODE plotly ARIMO
 dataiku tonian

Visualization
 tableau
 Google Cloud Platform
 Qlik looker
 Roambi
 BISSENSE YONDATA

Sales & Marketing
 RADIUS Gainsight
 bloomreach Zeta
 EVERSTRING livefyre
 blueyonder Lattice
 kahuna infer SALTHRU
 VISICA sense

Customer Service
 MEDALLIA
 ATTENSTY CLARABRIDGE
 CLICKFOX
 STELLASERVICE
 NGDATA

Human Capital
 gild
 Connectifier
 textic
 entelo
 hiQ

Legal
 RAVEL
 JUDICATA
 Everlaw
 Brevia
 PREMONITION

NoSQL Databases
 amazon DynamoDB
 Google Cloud Platform
 Microsoft Azure
 MongoDB
 CERO SPIKE
 SequoiaDB redislabs

Graph Databases
 neo4j
 ORACLE
 OrientDB
 InfiniteGraph

MPP Databases
 TERADATA
 VERTICA
 NETEZZA
 Cacton
 kogntio
 SASOL dremio

Management / Monitoring
 New Relic
 APPDYNAMICS
 amazon
 octifio
 Numerify
 splunk
 DATADOG
 Troconan DRIVEN
 Anodot

Search
 TA
 TA
 TA
 TA
 TA
 TA
 TA
 TA

amazon web services Google

Framework
 HADOOP
 YARN
 Spark
 MESOS
 TEZ
 Flink

Health
 JAWBONE GARMIN
 practicefusion fitbit
 Withings VALIDIC netatmo
 kinsa Human API

UPTAKE
 ThingWorx
 samsara
 HELIUM
 ESTIMOTE

Bloomberg | DOW JONES
 THOMSON REUTERS
 YODLEE PREMISE S&P CAPITAL IQ
 quandl xignite CBINSIGHTS
 mattermark StockTwits @estimize PLAID

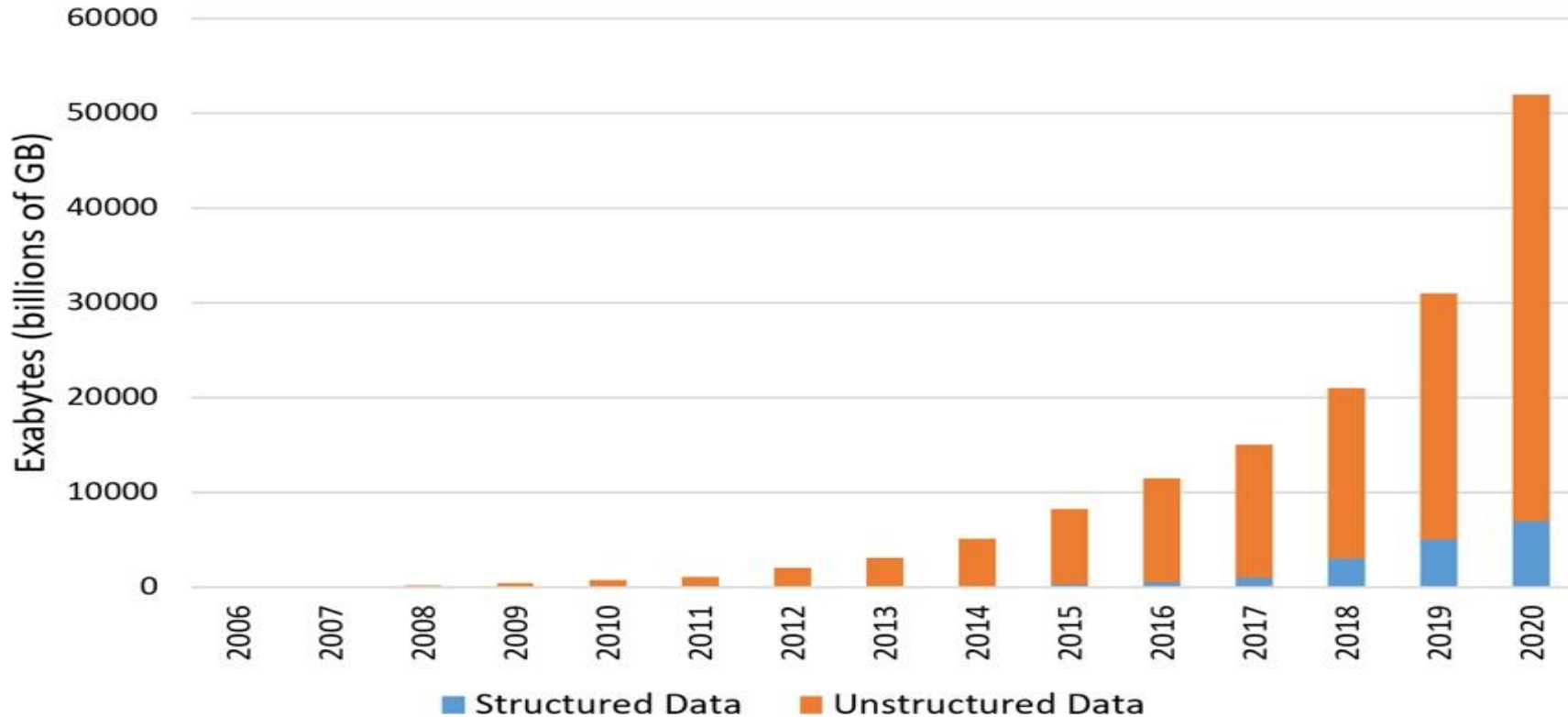
PLANET LABS
 spire
 WINDWARD
 CRUISE SKYCATCH
 Airware DroneDeploy

axiom Experian
 GARMIN foursquare
 CRIMSON HEXAGON CARTODB
 CIRCULATE placemeter BASIS
 EPSILON InsideView
 STREETLINE esri
 factual PlaceIQ
 Sense

qualtrics
 panjiva
 DATA.GOV

GA
 PLURAL SIGHT
 DataCamp INSIGHT
 DataElite
 The Data Incubator METIS

The Cambrian Explosion...of Data



Vertical AI Applications
 facebook
 Clara
 KASIST
 lumiata

Finance
 LendingClub
 Kreditech
 Kabbage
 INSIKT
 Dataminr Lenddo
 AIDYIA iSENTIUM
 sentient

Industries
 eHarmony
 tailNext
 duetto
 BLUE RIVER
 FarmLogs
 Seeq
 select
 BOBEVER

Security
 Apache Ranger
 Zeppelin

Librators & Schools
 GA
 PLURAL SIGHT
 DataCamp INSIGHT
 DataElite
 The Data Incubator METIS

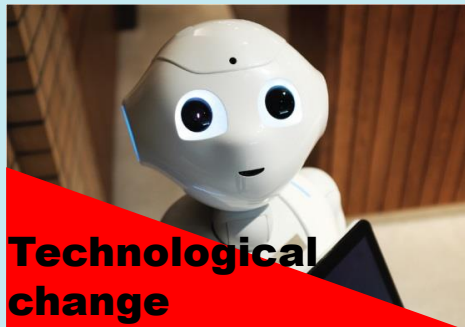
Last Updated 3/23/2016

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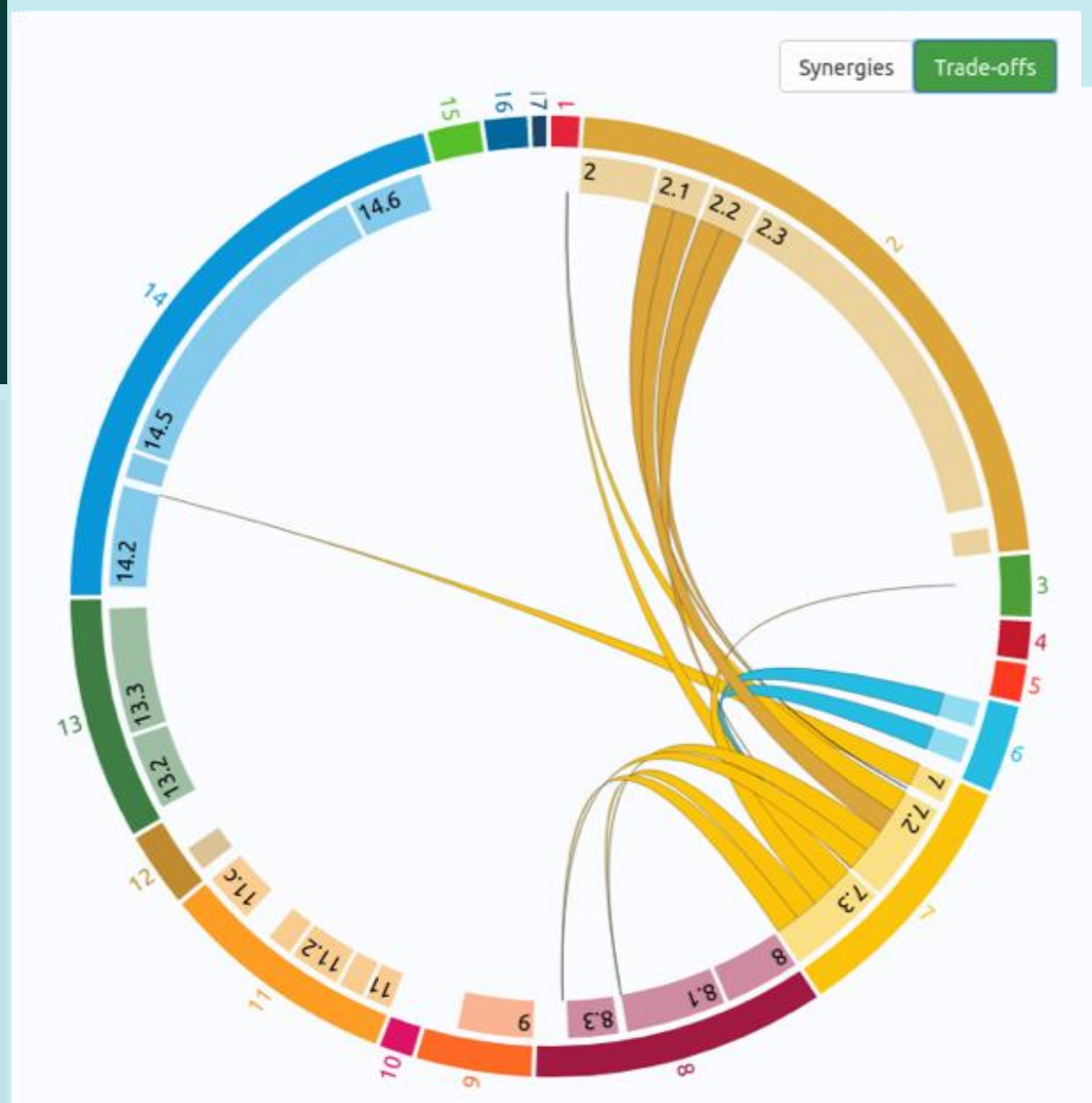
MEGATRENDS_s



Interlinkages among the SDGs

Using knowledge on interlinkages to exploit synergies and minimize trade-offs in the policy process can contribute to overall policy coherence

- Survey of existing publications
- A tool to visualize the cumulated interlinkages from a set of publications
- Meta analysis of the main studies on interlinkages



Climate change and SDGs: Why are climate-resilient pathways needed for sustainable development?

Sustainable development requires managing many threats and risks, including climate change. Because climate change is a growing threat to development, sustainability will be more difficult to achieve for many locations, systems, and populations unless development pathways are pursued that are resilient to effects of climate change.

13 CLIMATE ACTION



IPCC, 2014

Climate change risks and sustainable development

13 CLIMATE ACTION



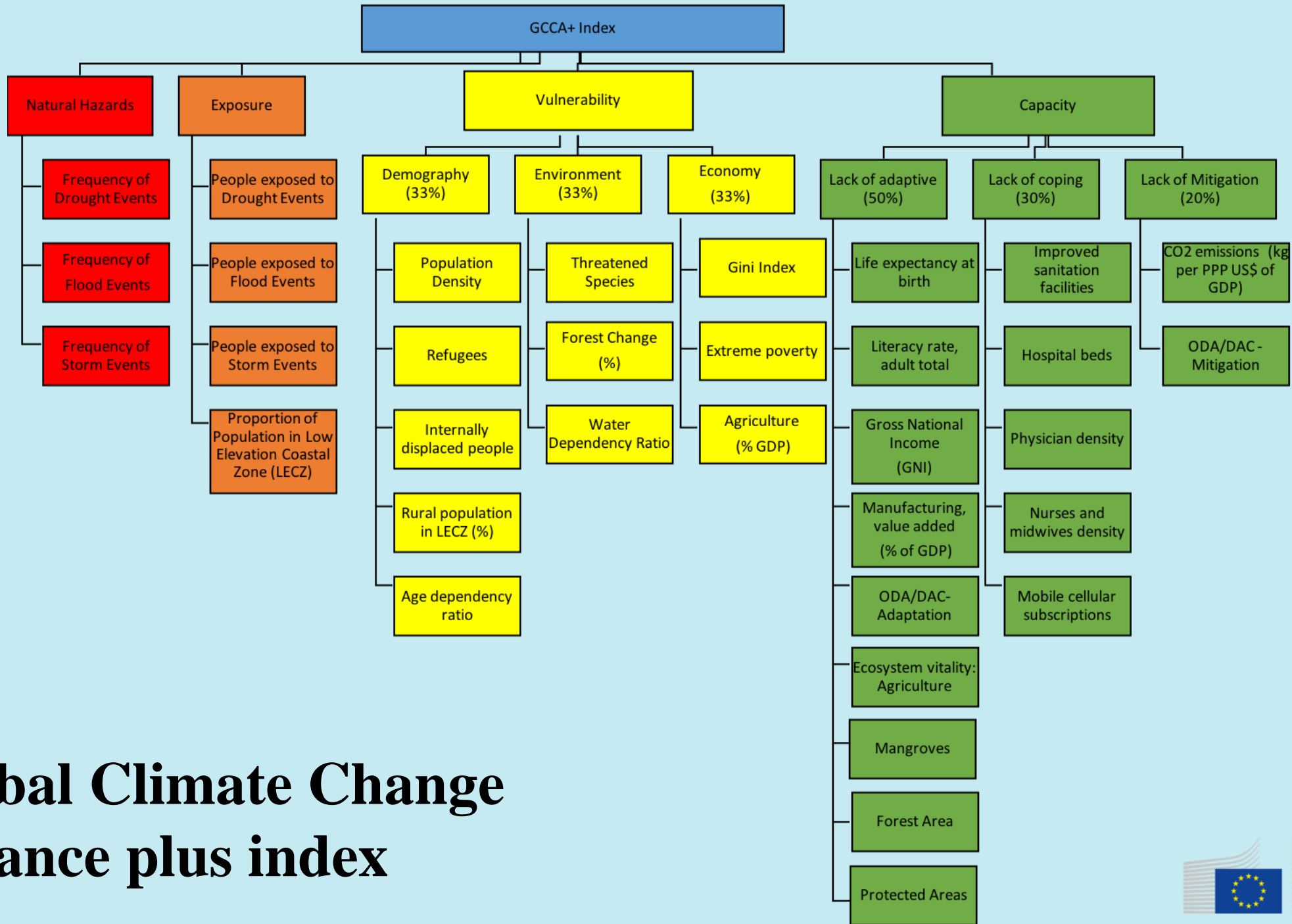
- ❖ Losses of ecosystem services
- ❖ Effects on human health
- ❖ Increasing prices of food commodities on the global market,
- ❖ Increasing risks of floods, droughts, storms
- ❖ Risks of food insecurity
- ❖ Systemic risks to infrastructures from extreme events
- ❖ Loss of biodiversity
- ❖ Risks for rural livelihoods

Climate change risks and sustainable development

- ❖ Losses of ecosystem services: Goal 3, 6, 14, 15
- ❖ Effects on human health: Goal 3
- ❖ Increasing prices of food: Goal 1, 2
- ❖ Increasing risks of floods, droughts, storms: Goal 3, 9, 11
- ❖ Food insecurity: Goal 2
- ❖ Risks to infrastructures: Goal 9, 11
- ❖ Loss of biodiversity: Goal 14, 15
- ❖ Risks for rural livelihoods: Goal 1, 2, 8

13 CLIMATE ACTION



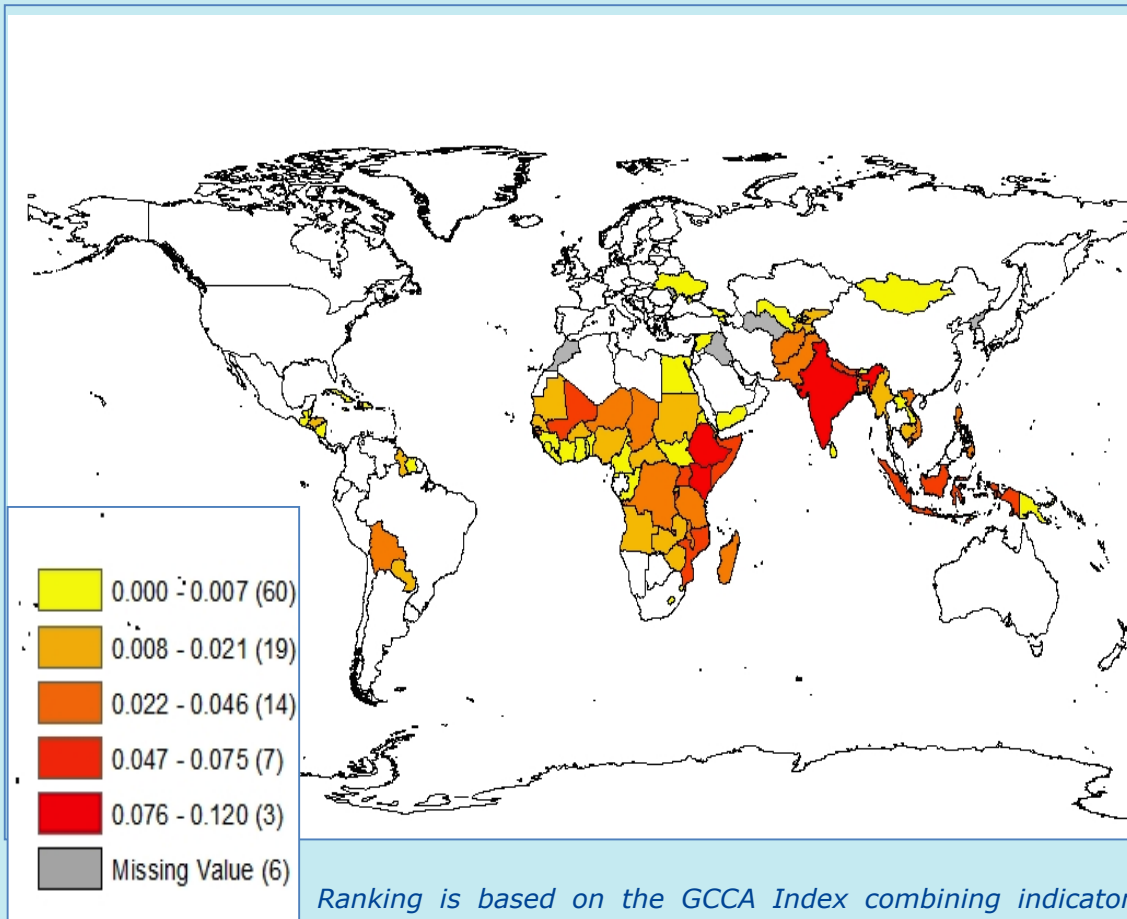


Global Climate Change Alliance plus index



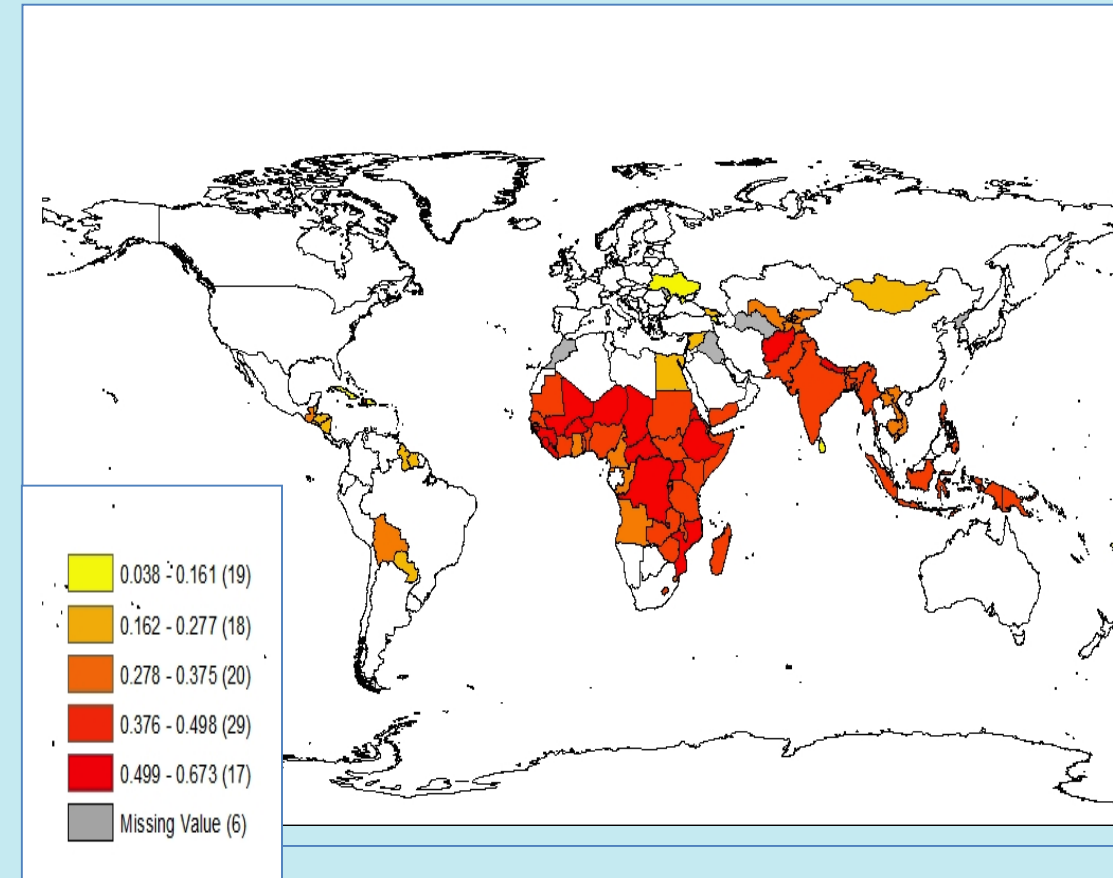
Focus on Climate Change Risk

Countries with no climate extreme events receive the lowest score



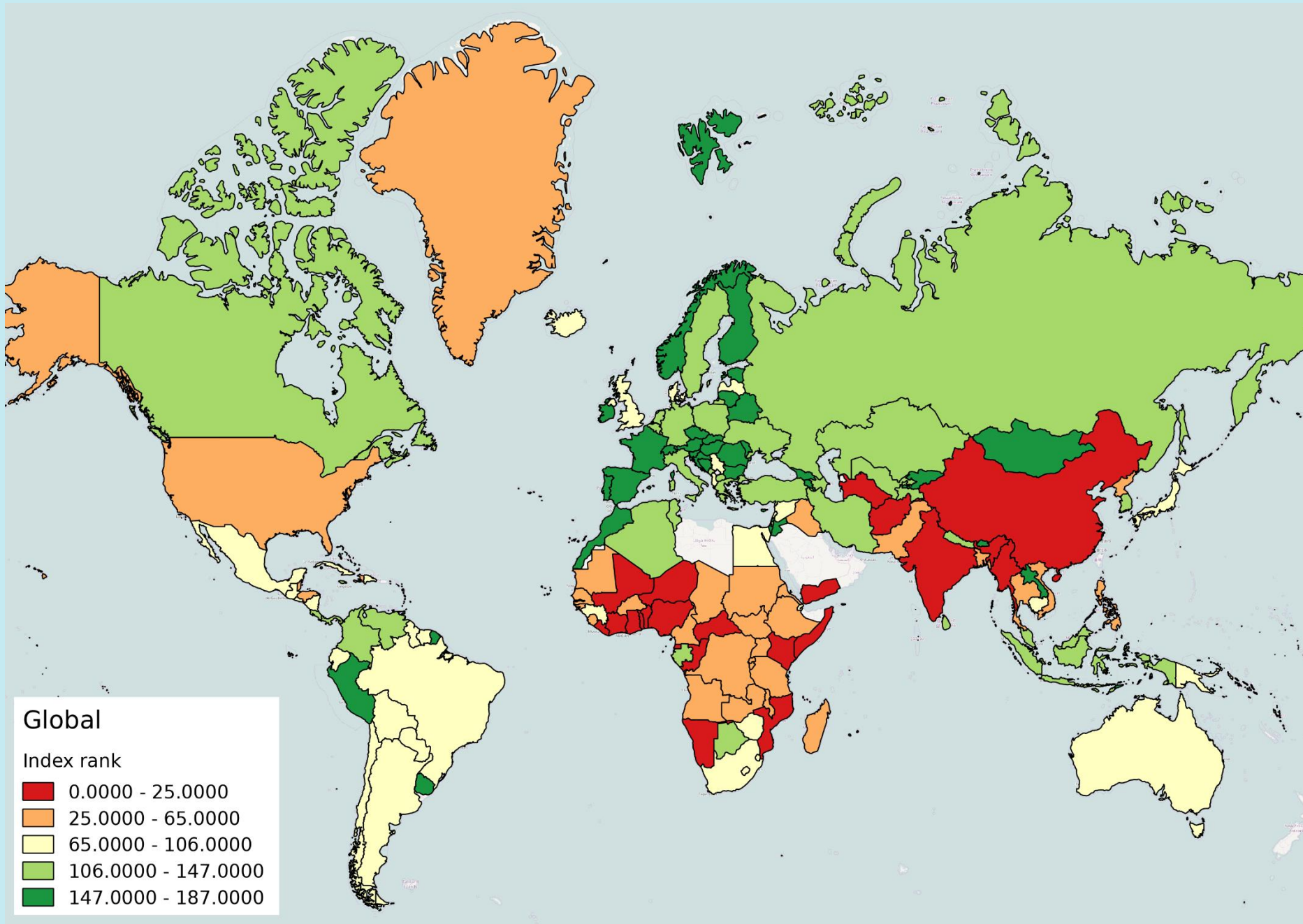
Focus on Development

Ranking attributing the same weight to climate events, vulnerability, and adaptive capacity



Ranking is based on the GCCA Index combining indicators on Climate/weather extreme events, Vulnerability, and Adaptive Capacity. Countries in red have the highest score.

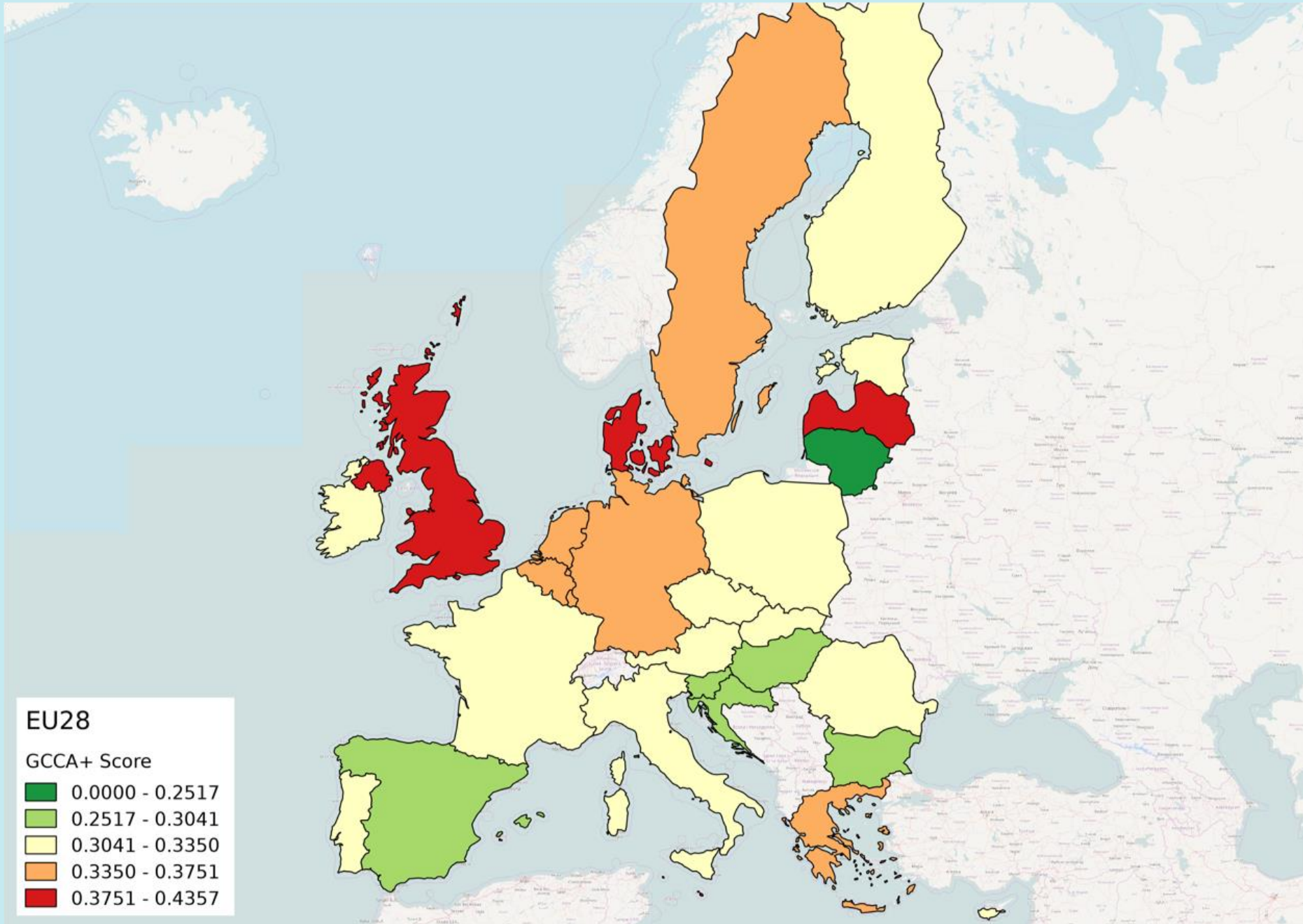
Index on vulnerability to climate change –Global map (index rank)



In the map the lowest rank for the objective of the index indicates the countries the most vulnerable to climate change

Index on vulnerability to climate change –EU 28 (index score)

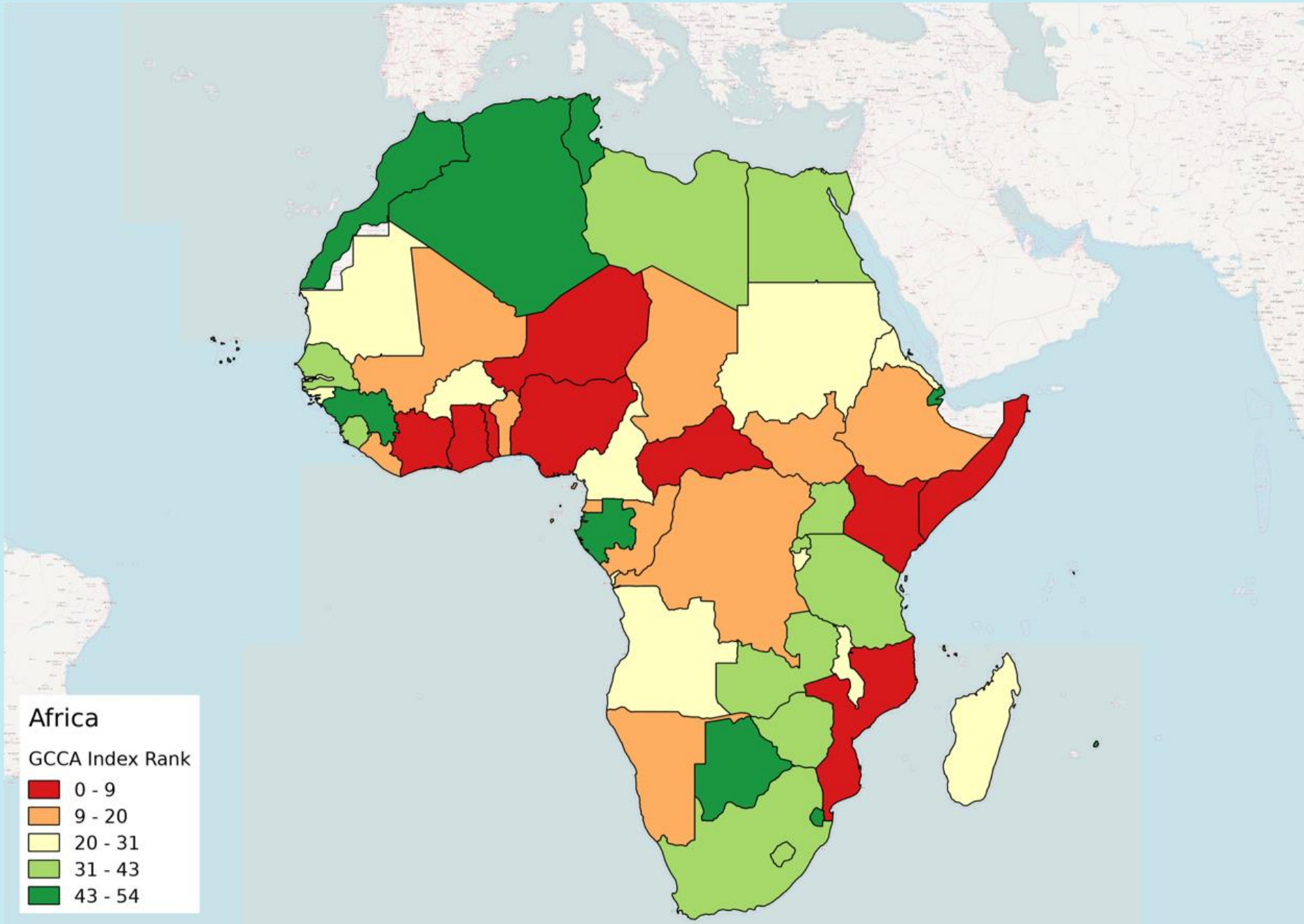
13 CLIMATE ACTION



In the map the highest score for the objective of the index indicates the countries the most vulnerable to climate change

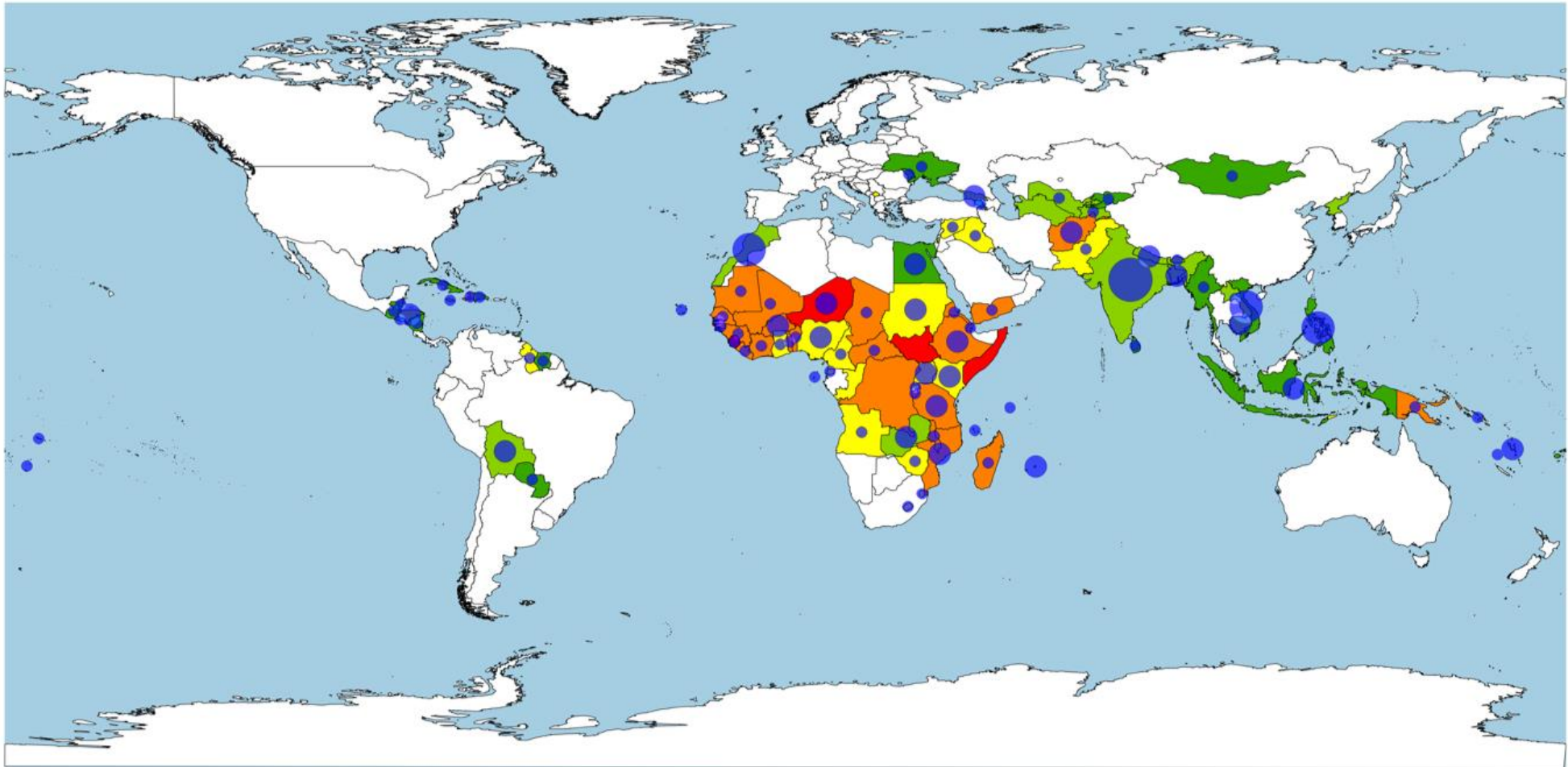
Index on vulnerability to climate change –Africa (index rank)

13 CLIMATE ACTION



In the map the lowest rank for the objective of the index indicates the countries the most vulnerable to climate change

Lack of Capacity | ODA-DAC Adaptation



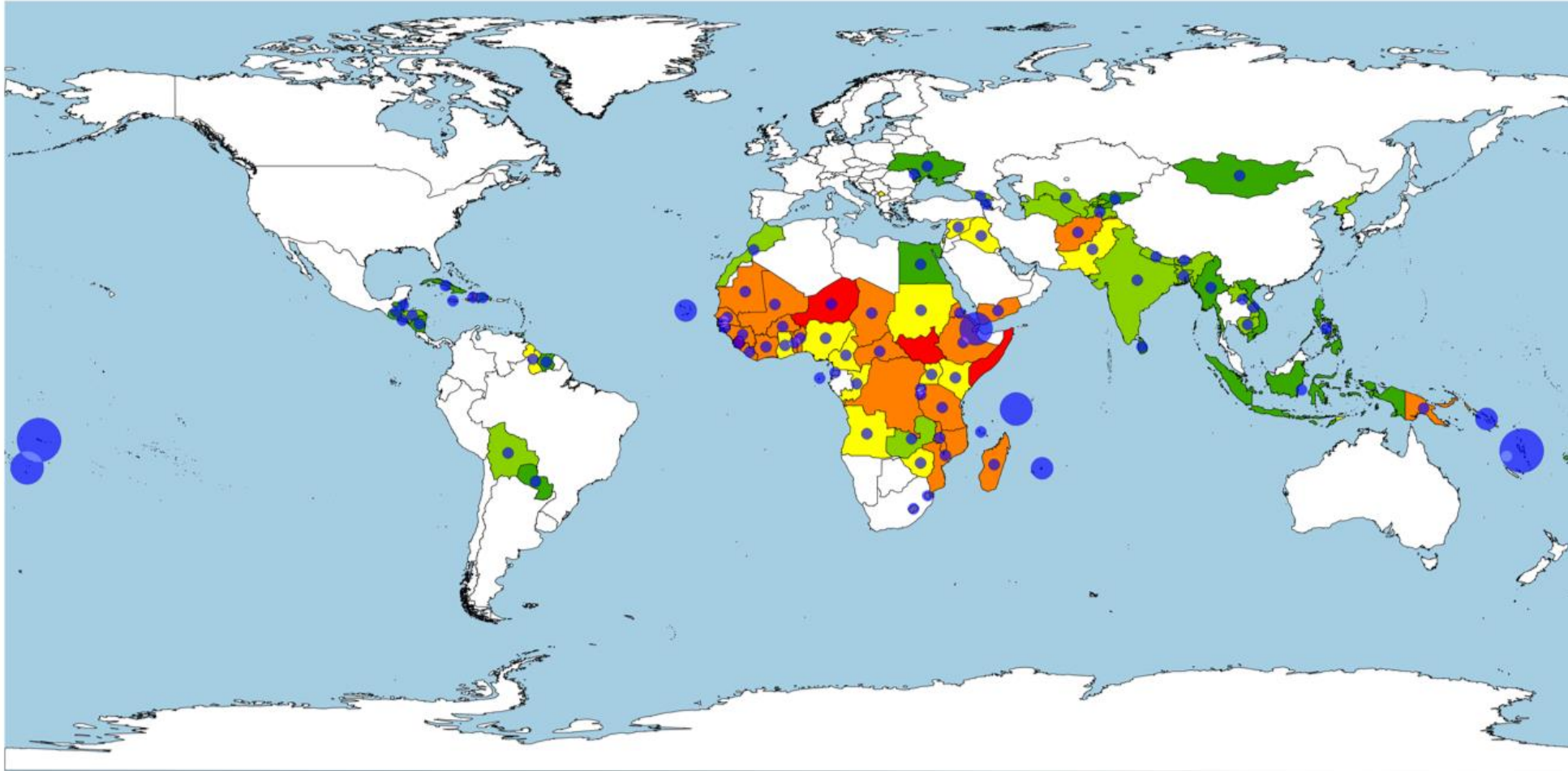
ODA/DAC



Capacity



Lack of Capacity | ODA-DAC Adaptation (pro capite)



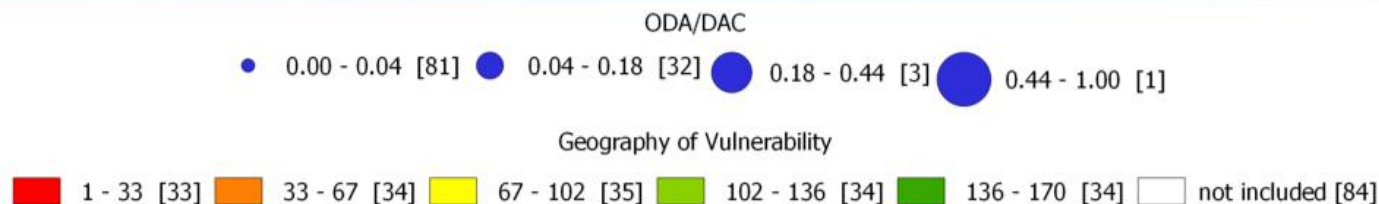
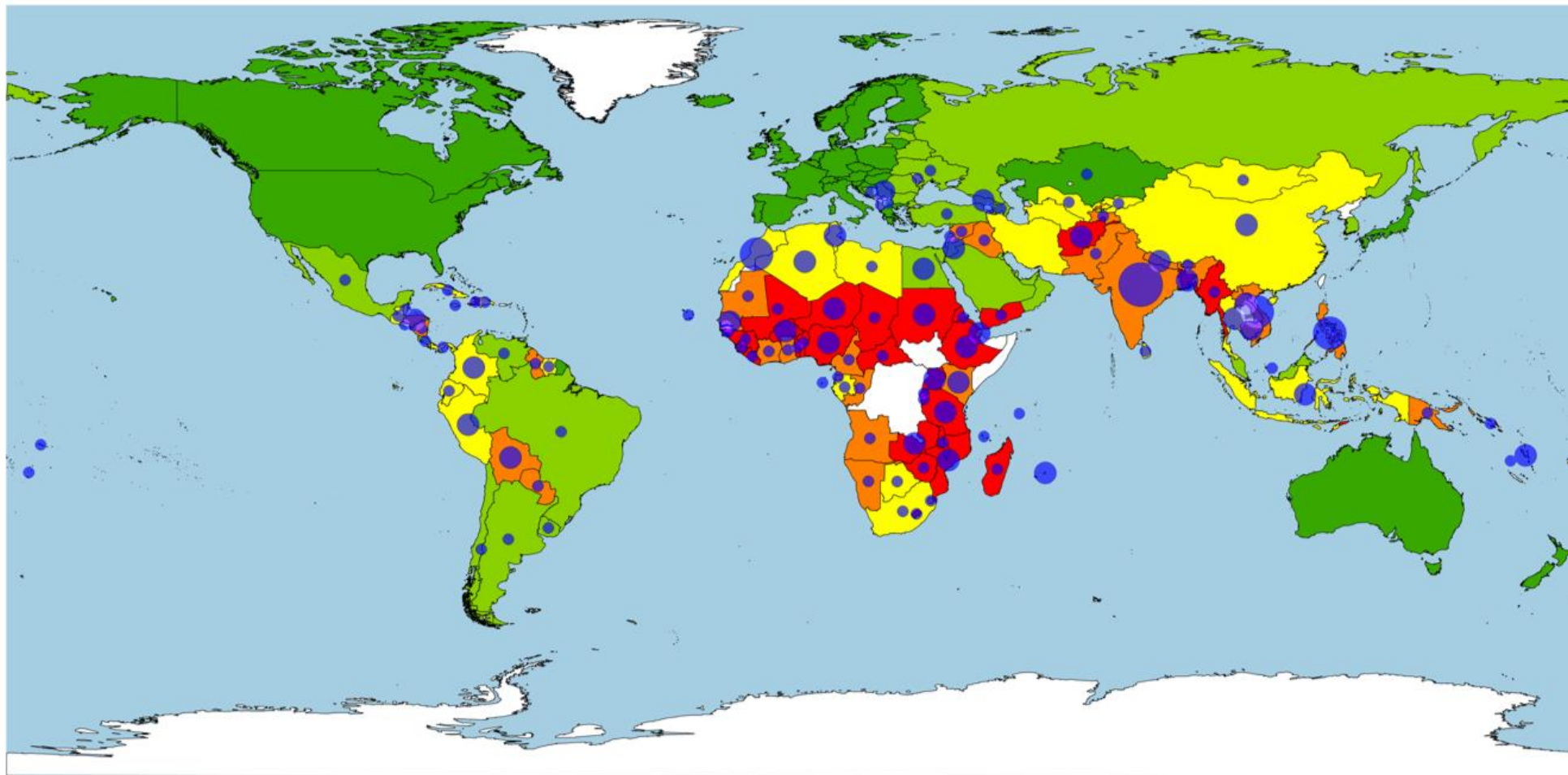
ODA/DAC Pro Capite



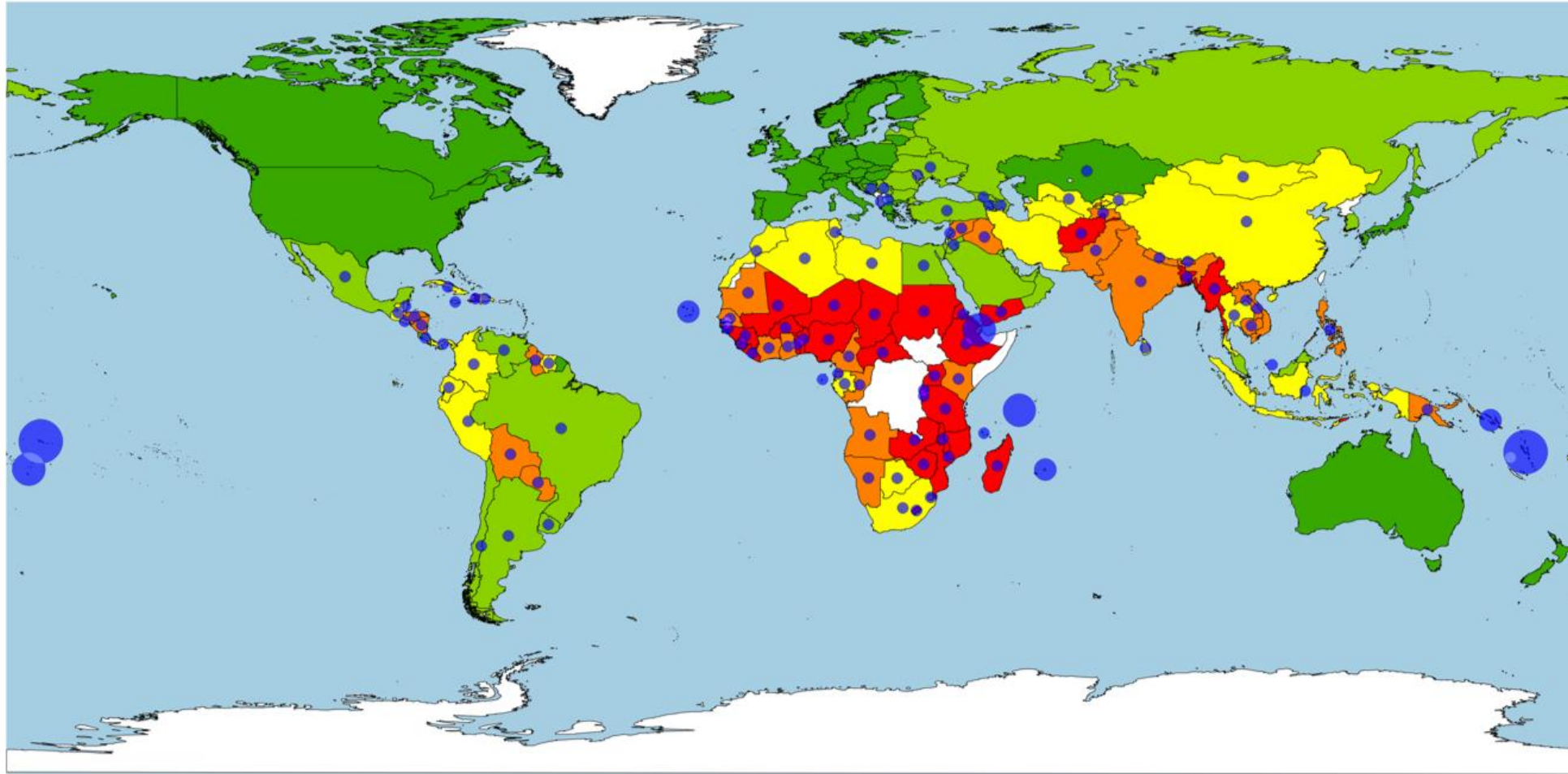
Capacity



Geography of Vulnerability | Overall DAC with aid activities marked adaptation as significant or principal objective (ODA-DAC)



Geography of Vulnerability | ODA-DAC adaptation *pro capite*



ODA/DAC Pro Capite



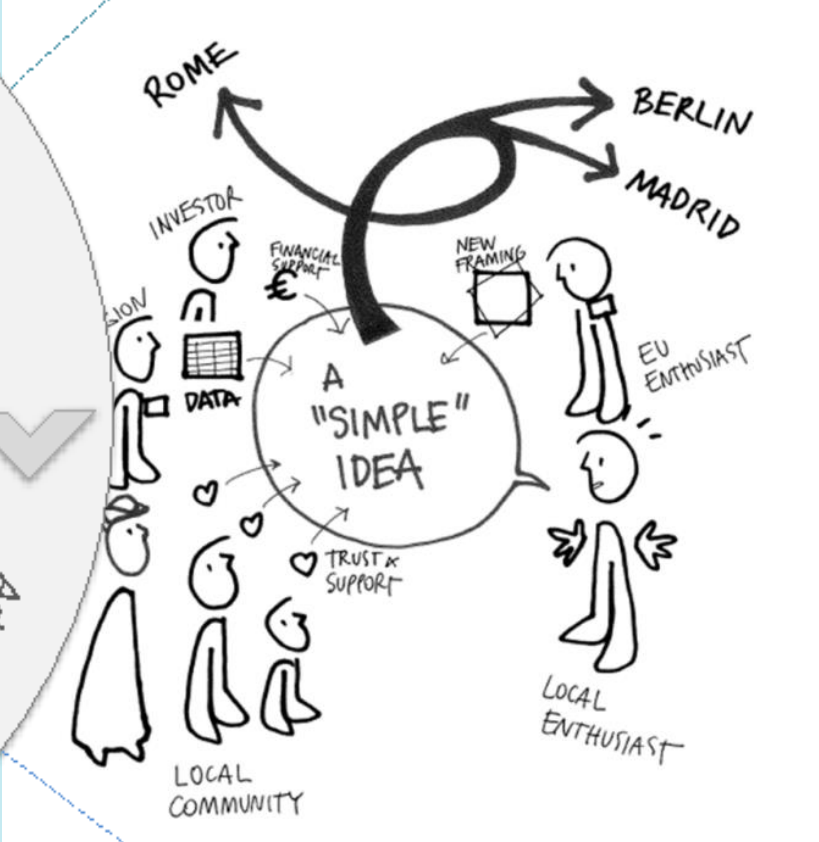
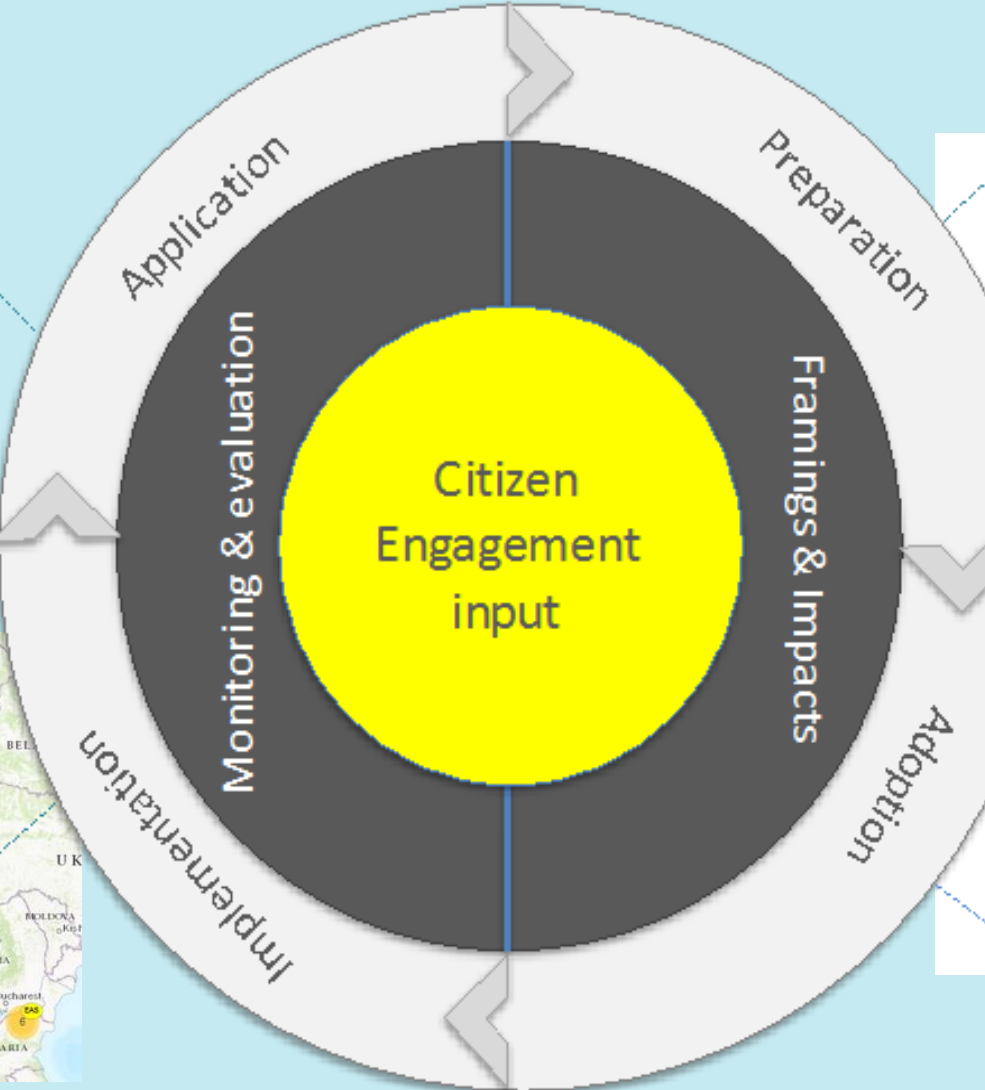
Geography of Vulnerability

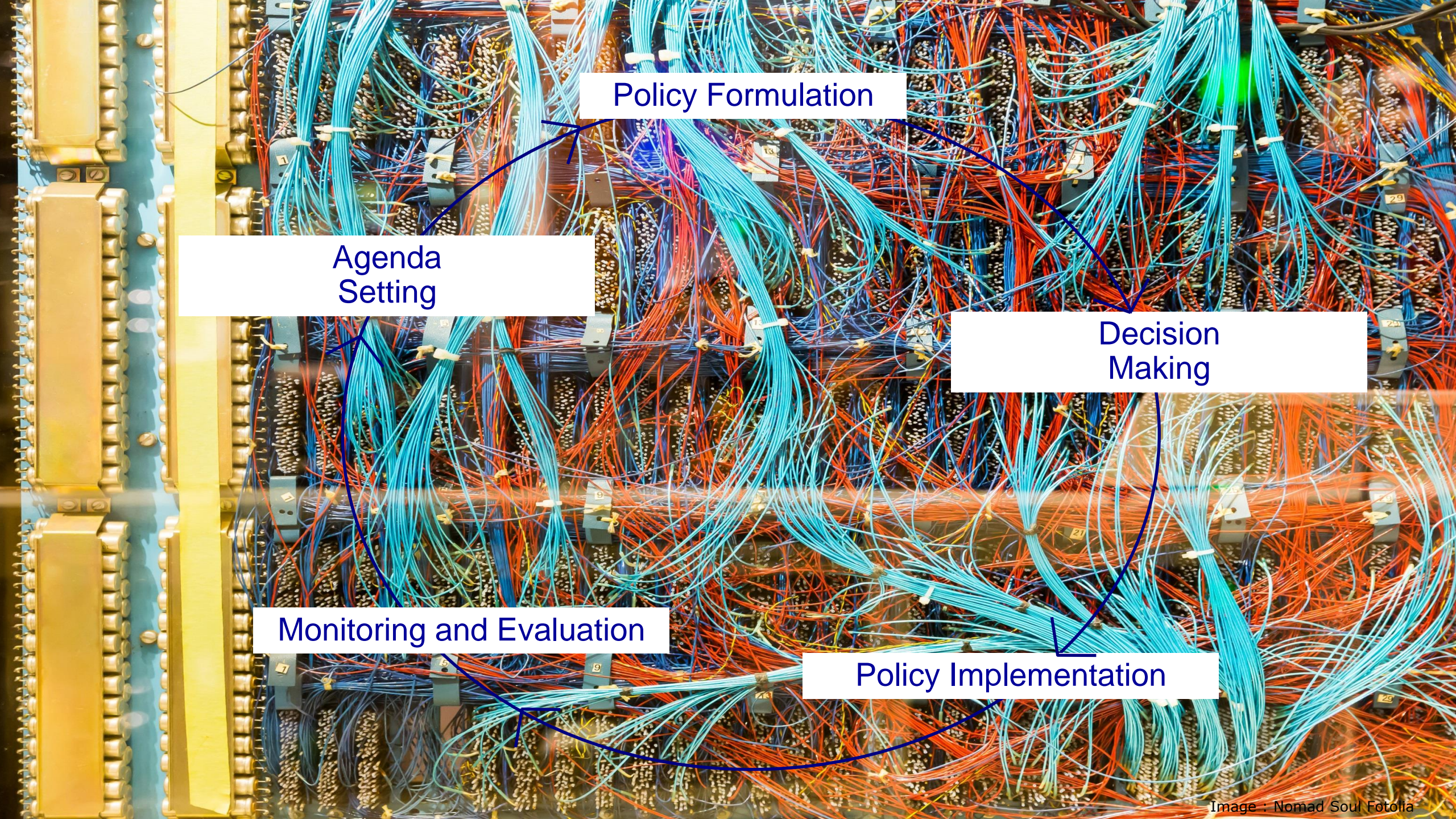


What are the emerging solutions?

Evidence for policy 2.0

Engaging with citizens





Policy Formulation

Agenda Setting

Decision Making

Monitoring and Evaluation

Policy Implementation

Vertical knowledge management

**Disaster Risk
Management
Knowledge
Centre**



**Knowledge
Centre on
Migration and
Demography**



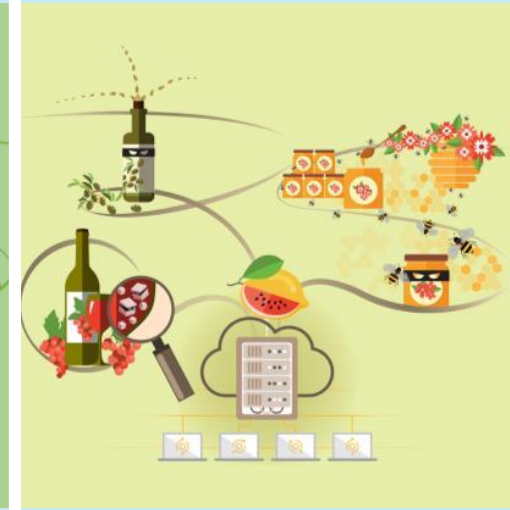
**Knowledge
Centre for
Territorial
Policies**



**Knowledge
Centre on Bio-
economy**



**Knowledge
Centre for
Food Fraud
and Quality**



Horizontal knowledge management

Competence Centre on Composite Indicators and Scoreboards



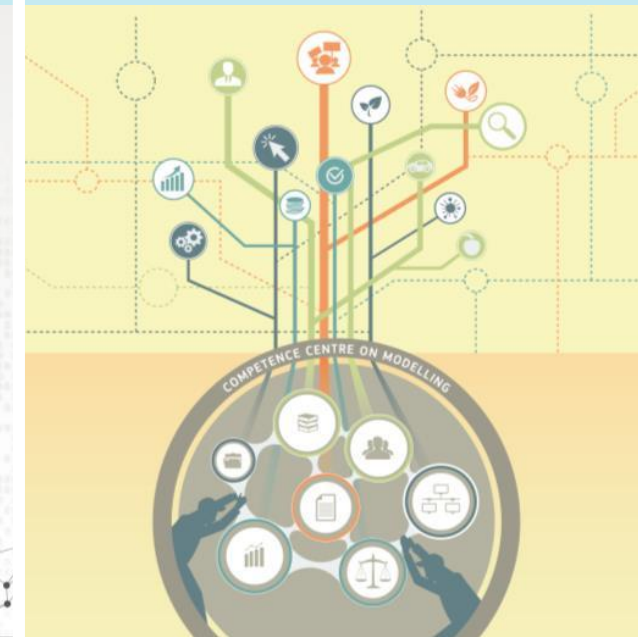
Competence Centre on Microeconomic Evaluation



Competence Centre on Text Mining and Analysis



Competence Centre on Modelling



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