

# Digitalizing environmental sustainability

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UNEP Digital Transformation Task Force

- 
- A large, semi-transparent image of Earth from space occupies the right side of the slide. It shows a detailed satellite view of the African continent and the Middle East, with clouds and landmasses clearly visible against the dark void of space.
- 1. Context setting
  - 2. UNEP's Digital Transformation programme
  - 3. Immediate priorities & collaboration opportunities

# Two core forces sweeping the planet...

**Climate crisis**  
**Nature crisis**  
**Pollution crisis**

**Must solve in  
next 10 years**

Compounding environmental crises

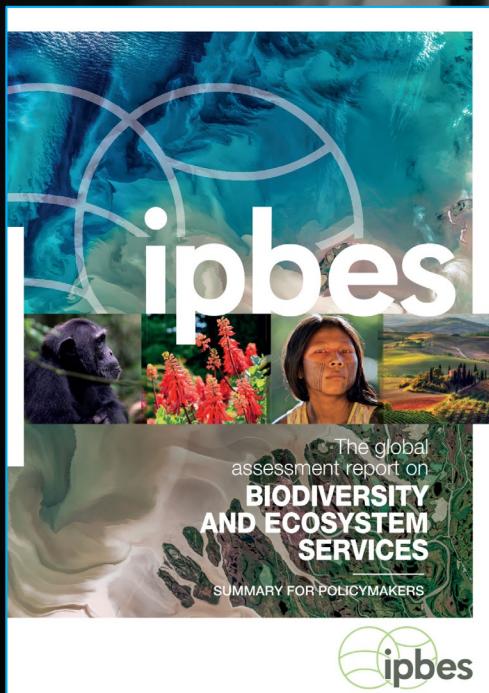


Digital Transformation

**How are we going to  
harness data and digital  
transformation to solve  
global environmental  
challenges in ten years?**

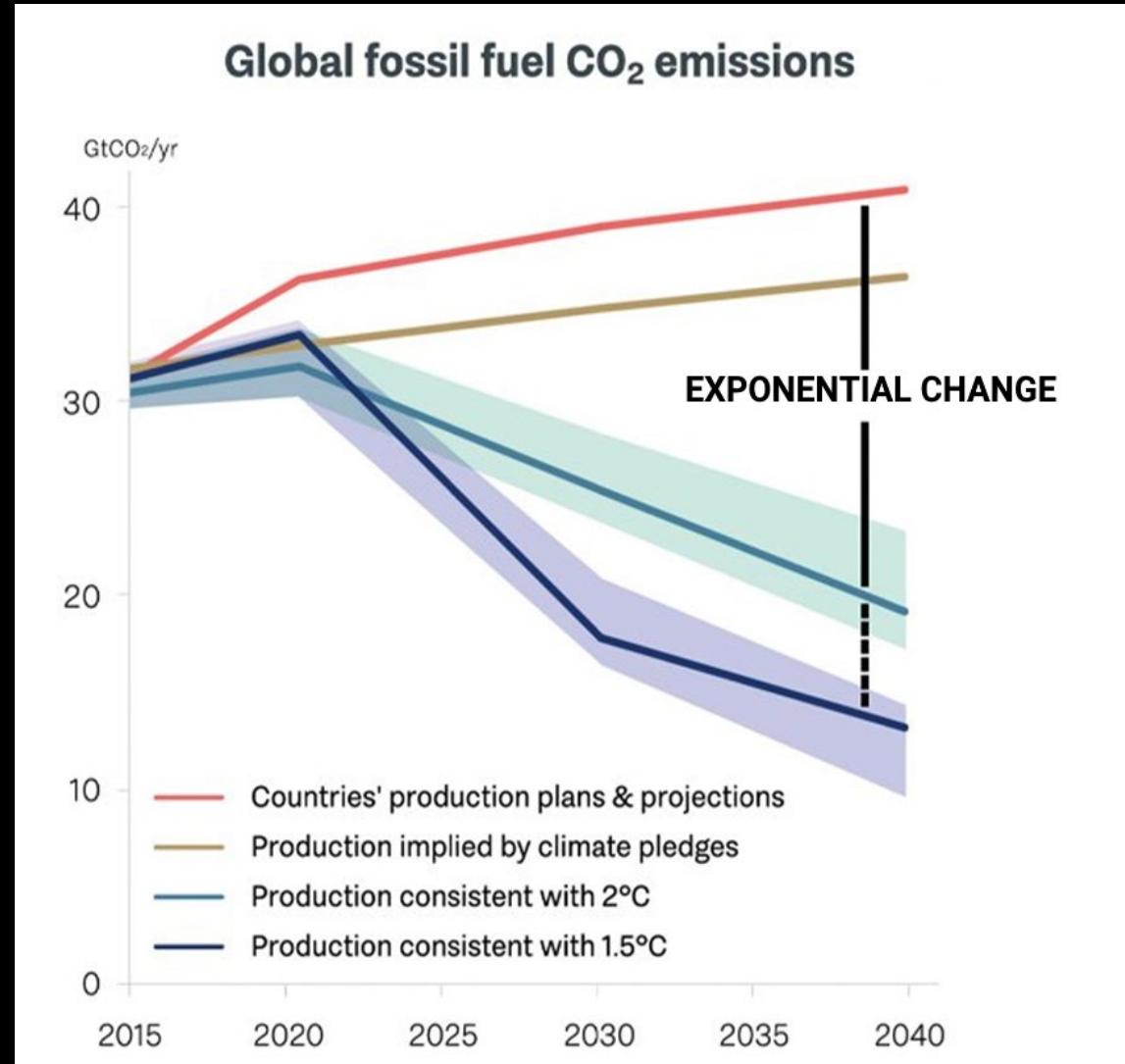
**Economy**  
**Social relationships**  
**Institutions**  
**Humanity**

# Every scientific assessment gives us 10 years to solve these planetary problems while also achieving the SDGs

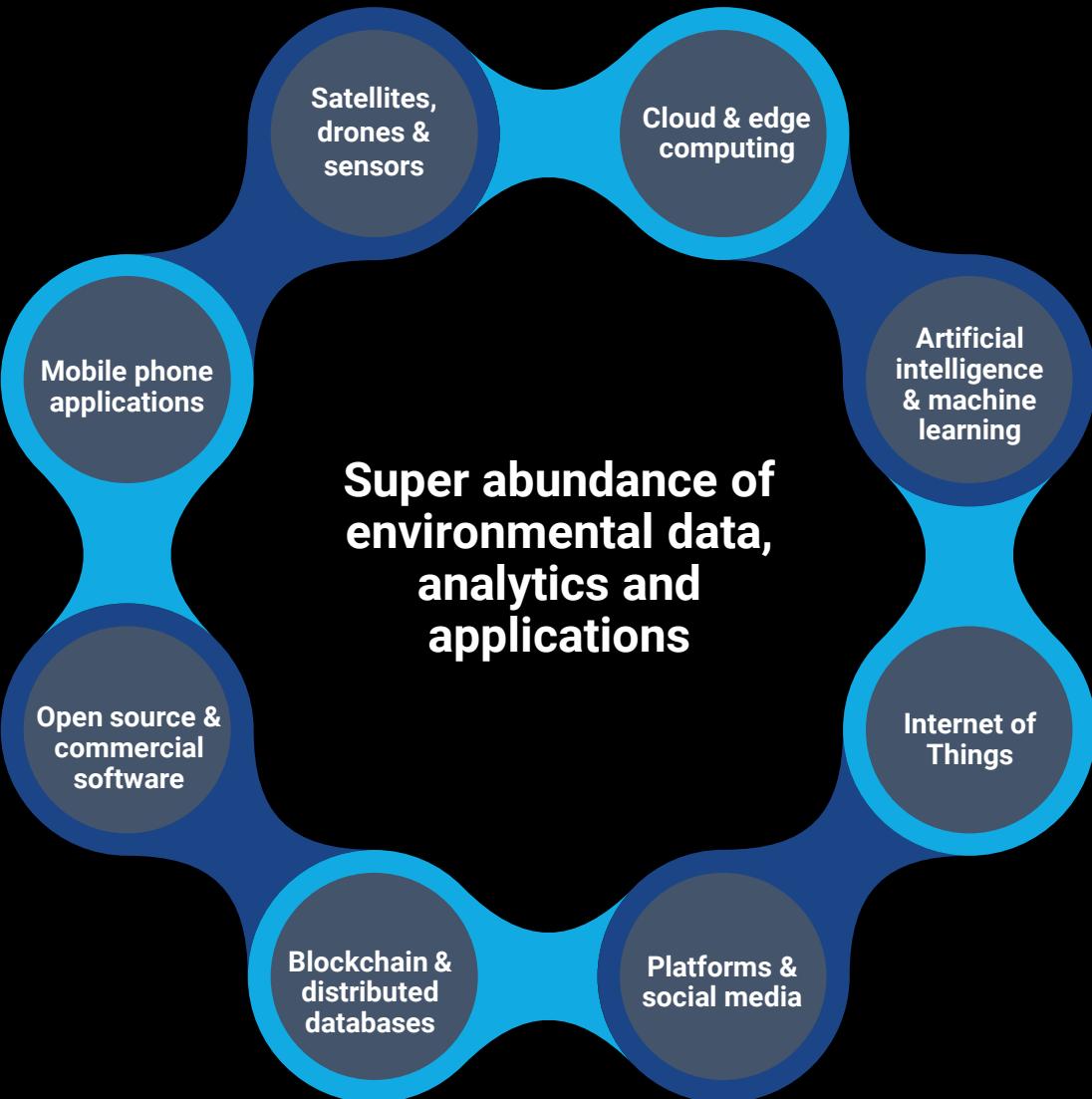


Digital transformation must catalyse **exponential change** and fundamentally alter **incentive structures** of the economy.

We must **amplify** and **accelerate** sustainable consumption and production behaviors by consumers, companies and investors.



Convergence of 8 core digital technologies offer more potential than ever before to unleash a revolution in digital environmental sustainability



Unprecedented  
Capabilities  
to Shape and Shift

Economic incentives  
Human behaviours  
Collective intelligence

We are standing at a pivotal moment in human history.



**Decisions we take today to address climate change and digital transformation will influence the future trajectory of human evolution and life on this planet.**

# What new capabilities do data and digital technologies bring to environmental sustainability and resilience?



**Monitor & Track** the use of natural resources, the health of our life support systems and major changes to ecosystems.

Measuring  
Transparency / Feedback



**Analyze** unprecedented sources of environmental and socio-economic information to extract insights; **Optimise** the use of natural resources; and **Predict** future environmental trends and risks.

Sense-making  
Understanding complexity



**Automate** SMART systems to embed and value sustainability and efficient use of natural resources into algorithms, platforms and filters of the digital economy.

Automating sustainability  
Shaping incentives



**Connect, Communicate, and Collaborate** to share ideas, information, & innovations at the speed of light and planetary scale.

Amplifying ideas  
Innovating

# VIRTUAL FLASH QUIZ

1. The Ant Forest App in China successfully influenced the low-carbon lifestyle behaviours of how many people ?

- a. 1 million
- b. 10 million
- c. 500 million



2. How many trees per day can be seeded by a single reforestation drone?

- a. 1,000
- b. 50,000
- c. 100,000



3. Cloud computing can increase capacity to conduct complex environmental computations and global modelling by a factor of ?

- a. 100
- b. 1,000
- c. 10,000



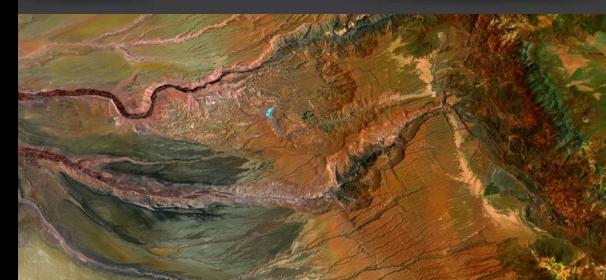
4. Digital nudging can successfully influence the online purchasing behaviors of consumers by what percent ?

- a. 10%
- b. 25%
- c. 50%



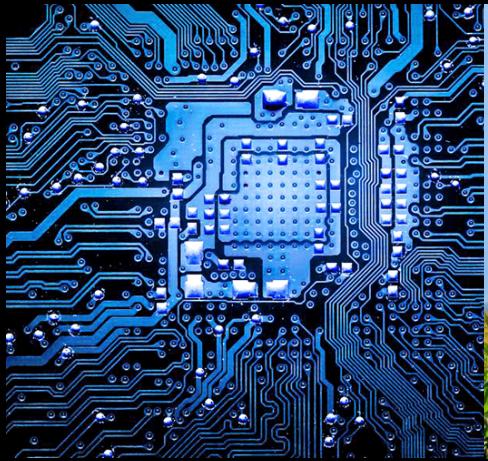
5. AI can improve the predictive accuracy of renewable energy forecasting by how much?

- a. 5%
- b. 30%
- c. 50%



Digitalizing environmental sustainability can **positively impact** foundational sectors of the economy:

Measuring + sense-making + automating + innovating + amplifying



Information



Food



Transport



Energy



Materials

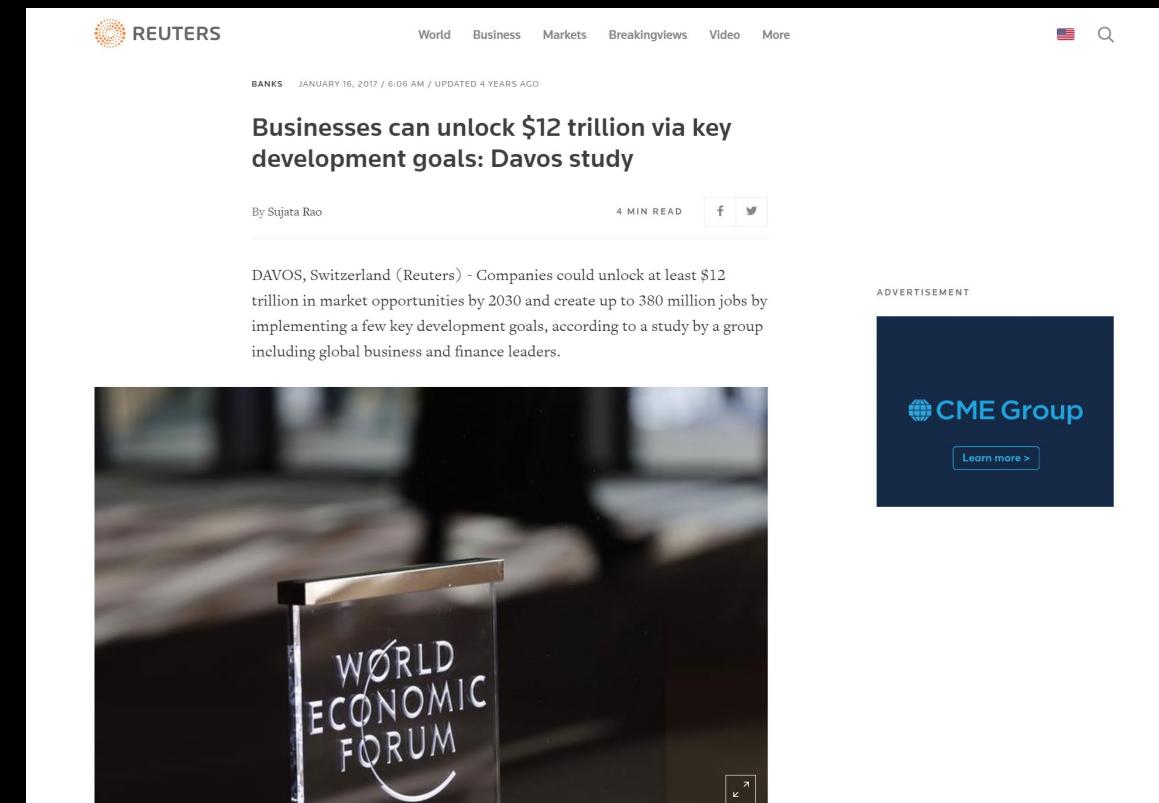
- Decarbonize (10-20% reduction)
- Dematerialize (90% reduction)
- Detoxify (10-100X less waste)
- Drive Sustainability (60% of SDGs)

# Meaningful and Intelligent Public Private Partnerships to are key to realizing this vision

Driving Public Good and sustainable development is also a tremendous market opportunity.

*“Achieving the global goals opens up an economic prize of at least \$12 trillion by 2030 for the private sector and potentially 2-3 times more”*

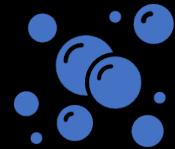
Driving environmental sustainability through digital technologies is one of the largest economic opportunities in the history of human civilization.



The screenshot shows a news article from Reuters. The header includes the Reuters logo, a navigation bar with links to World, Business, Markets, Breakingviews, Video, and More, and a search icon. The main headline reads "Businesses can unlock \$12 trillion via key development goals: Davos study". Below the headline is a byline "By Stjata Rao" and a "4 MIN READ" button with social sharing icons for Facebook and Twitter. The text of the article discusses how companies could unlock at least \$12 trillion in market opportunities by 2030 by implementing key development goals. A small image of a World Economic Forum sign is shown at the bottom. To the right, there is an advertisement for CME Group.

The need for profound transformational change in the global economy is not only more urgent than ever, it is also more possible than ever.

Policy makers must help overcome **four grand challenges**:



1. Environmental data is highly fragmented, unstructured, of variable quality and lacking a global governance framework



2. Public-private partnerships are needed to transform environmental data into insights that can shape economic incentives and consumer behaviors



3. Must close the digital divide while strengthening digital literacy and engagement by all stakeholders



4. Our own institutions must undergo their own digital transformation process & understand their role & value proposition in the digital ecosystem

But digital transformation to accelerate environmental sustainability is incomplete without also governing **negative impacts**:



Increasing concentration  
of power in few hands



Loss of employment  
opportunities



Increasing inequality  
and marginalization



Decreasing privacy and  
human agency

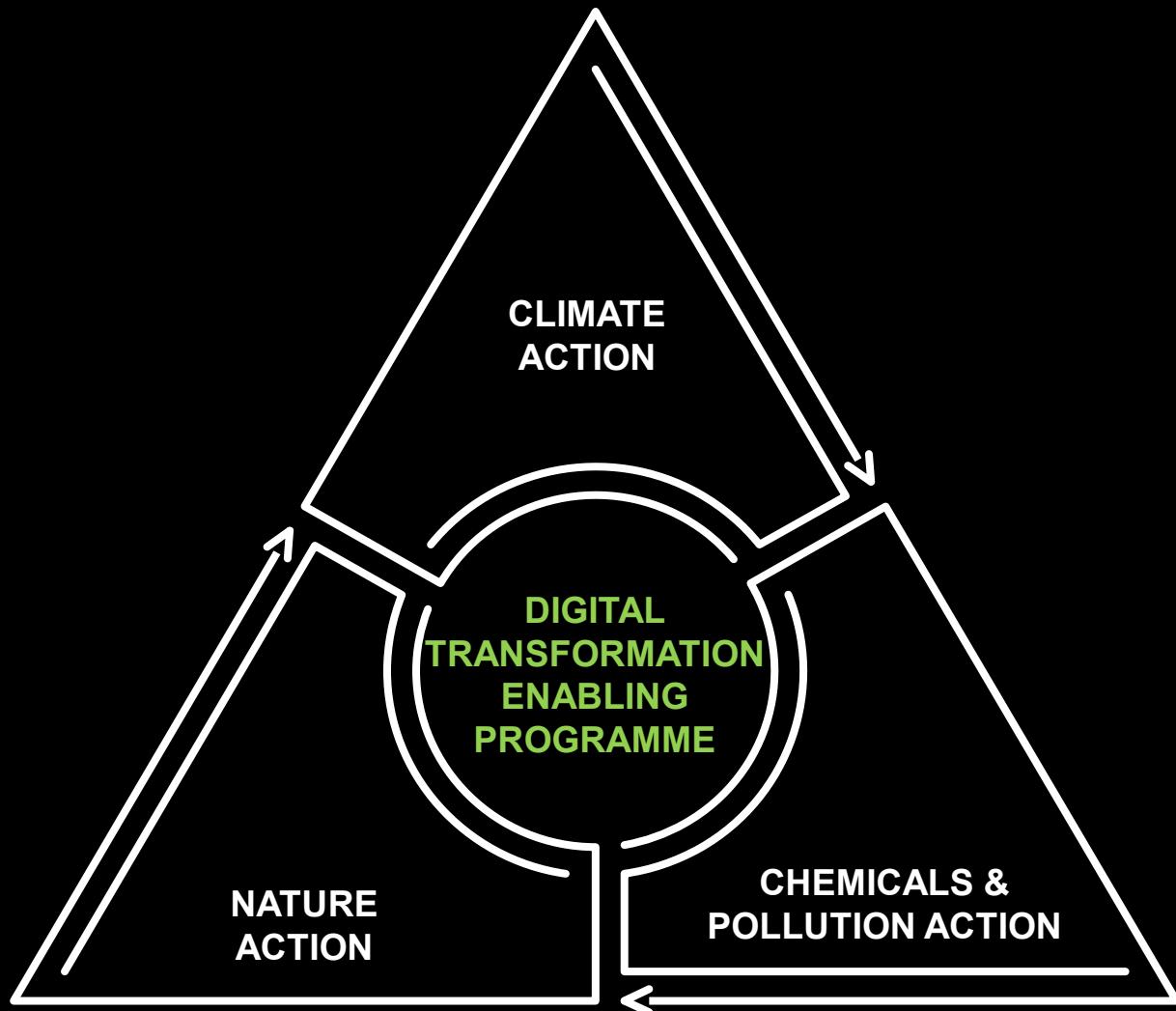


Increasing misinformation,  
polarization & social fragility



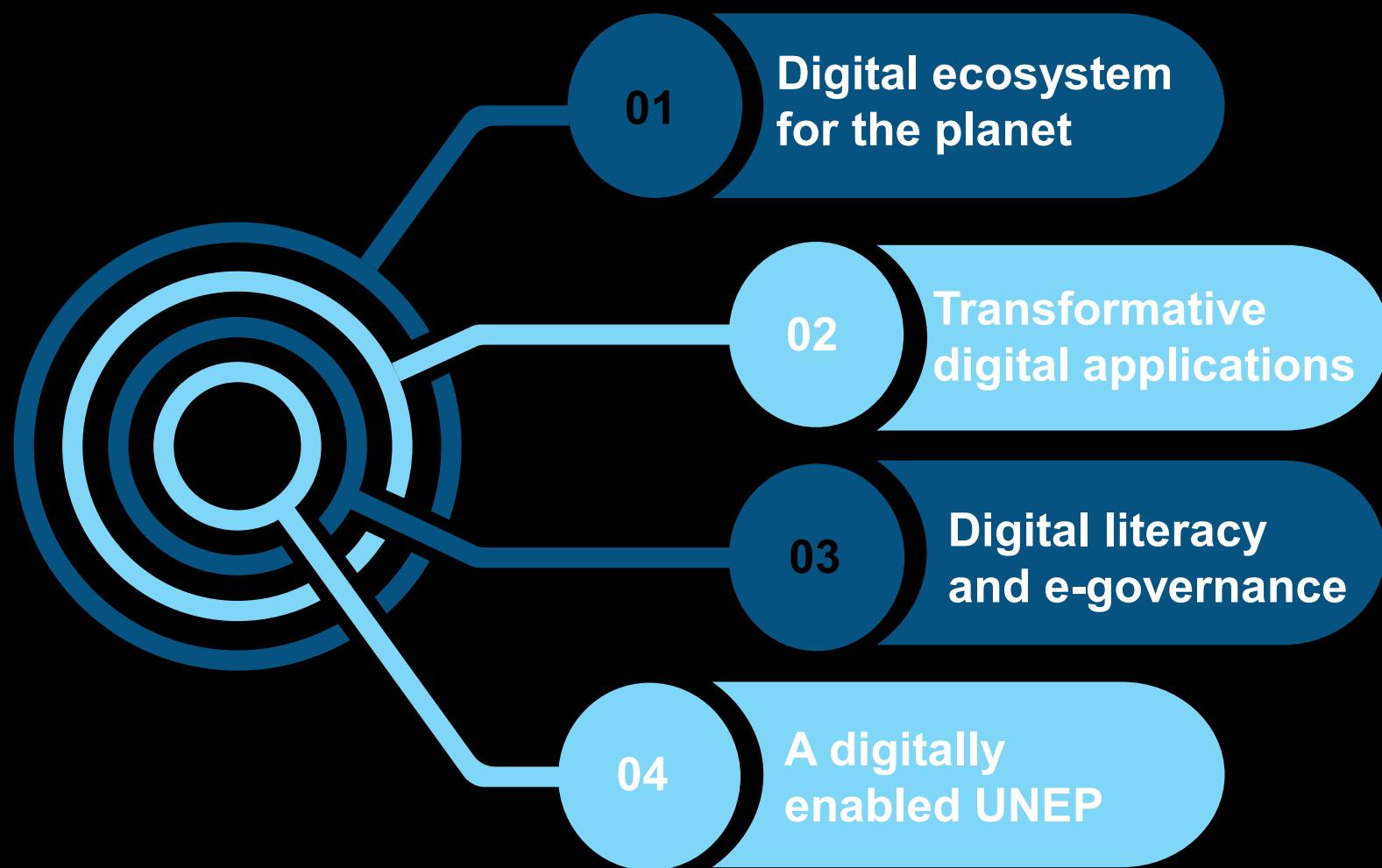
Environmental footprint  
(Energy, e-waste, materials)

# UNEP's digital transformation priorities: 2022-2025



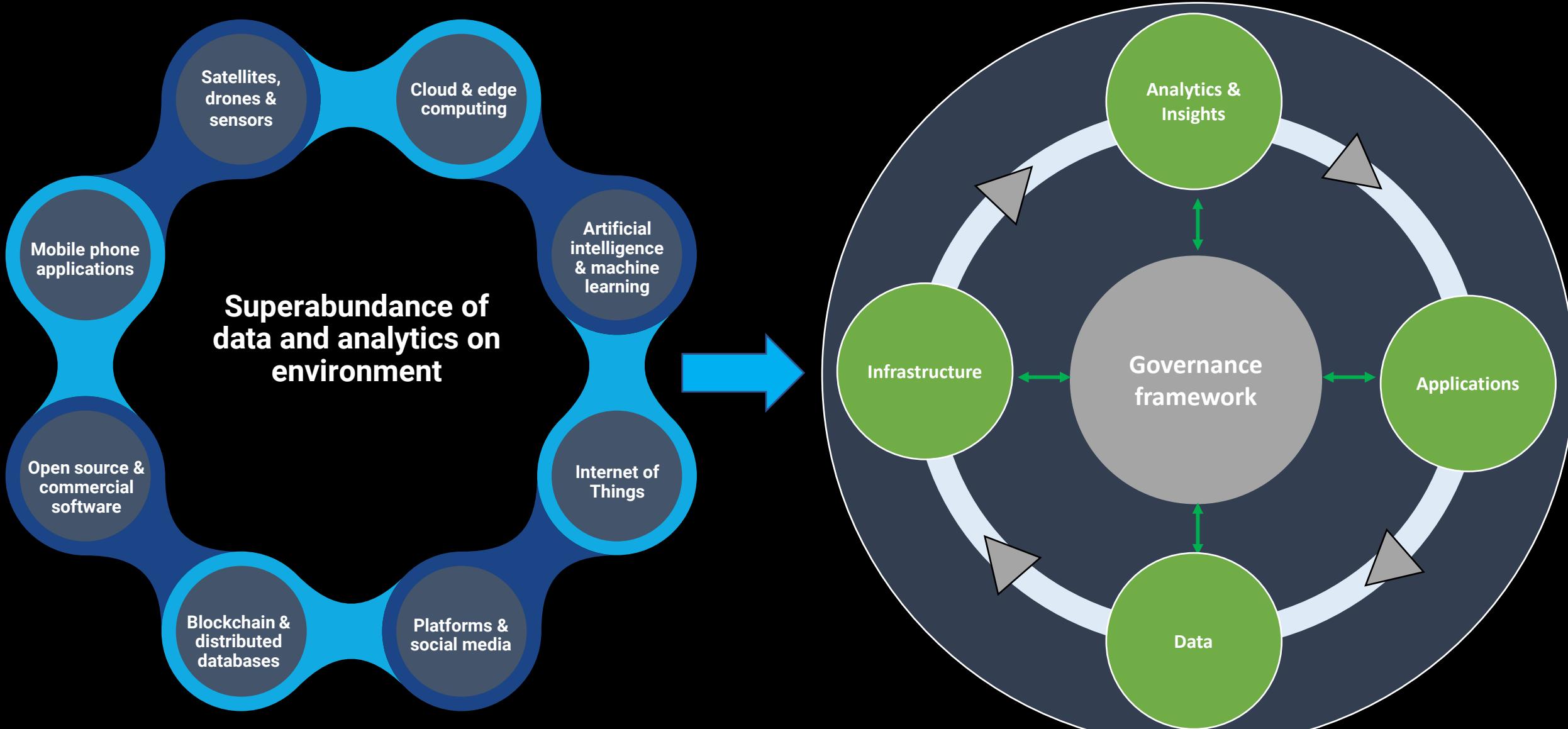
Harness data and digital technologies to **amplify and accelerate** sustainable consumption & production incentives and behaviors by governments, companies, investors and consumers **to achieve climate, nature & pollution action targets and a circular economy.**

# UNEP's digital transformation priorities: 2022-2025



**Four Strategic Actions to Speed and Scale Climate, Nature and Pollution Action  
in a Circular Economy**

1. A digital ecosystem for the planet is needed to produce data and predictive analytics about the environment as digital public goods:



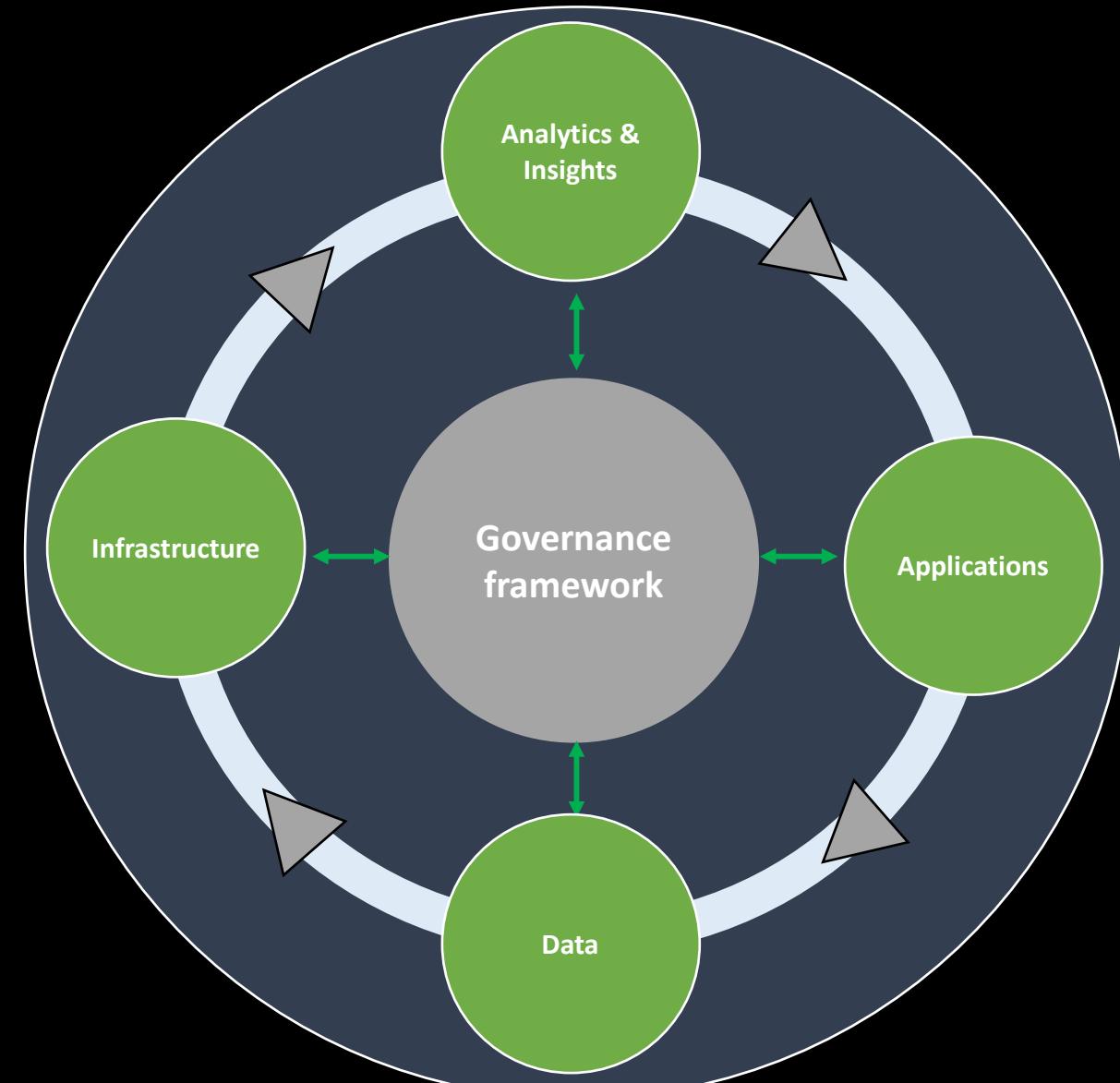
# 1. A digital ecosystem for the planet is needed to produce data and predictive analytics about the environment as digital public goods:

## Must federate:

- 700 platforms
- 7,000 data providers
- 400 million data resources for earth observation

Must deliver digital public goods in the form of **actionable, real-time and predictive insights** that can advance the SDG agenda and drive collective action on climate, nature and pollution targets.

**Inclusive Governance framework** and **sustainable business models** are needed to protect public interest and ensure trust.



2. Accelerate the integration and application of environmental data, analytics, and norms to inform and transform core pillars of the digital economy

## International environmental digital cooperation:



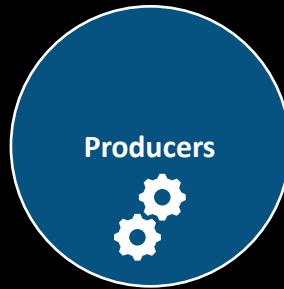
1. Bring transparency to global & national progress on SDG and MEA goals and risks

*32% of Environmental SDGs can be measured at global level*



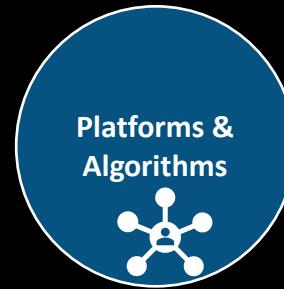
2. Align capital to environmental goals through ESG data, analytics & disclosures

*95 trillion in global market capitalization, 1 trillion in ESG funds.*



3. Measure & disclose the environmental & climate performance of product supply chains

*50% of global market cap discloses env. data to CDP. Only 2% score A*



4. Integrate & code environmental metrics into content, products, algorithms & filters

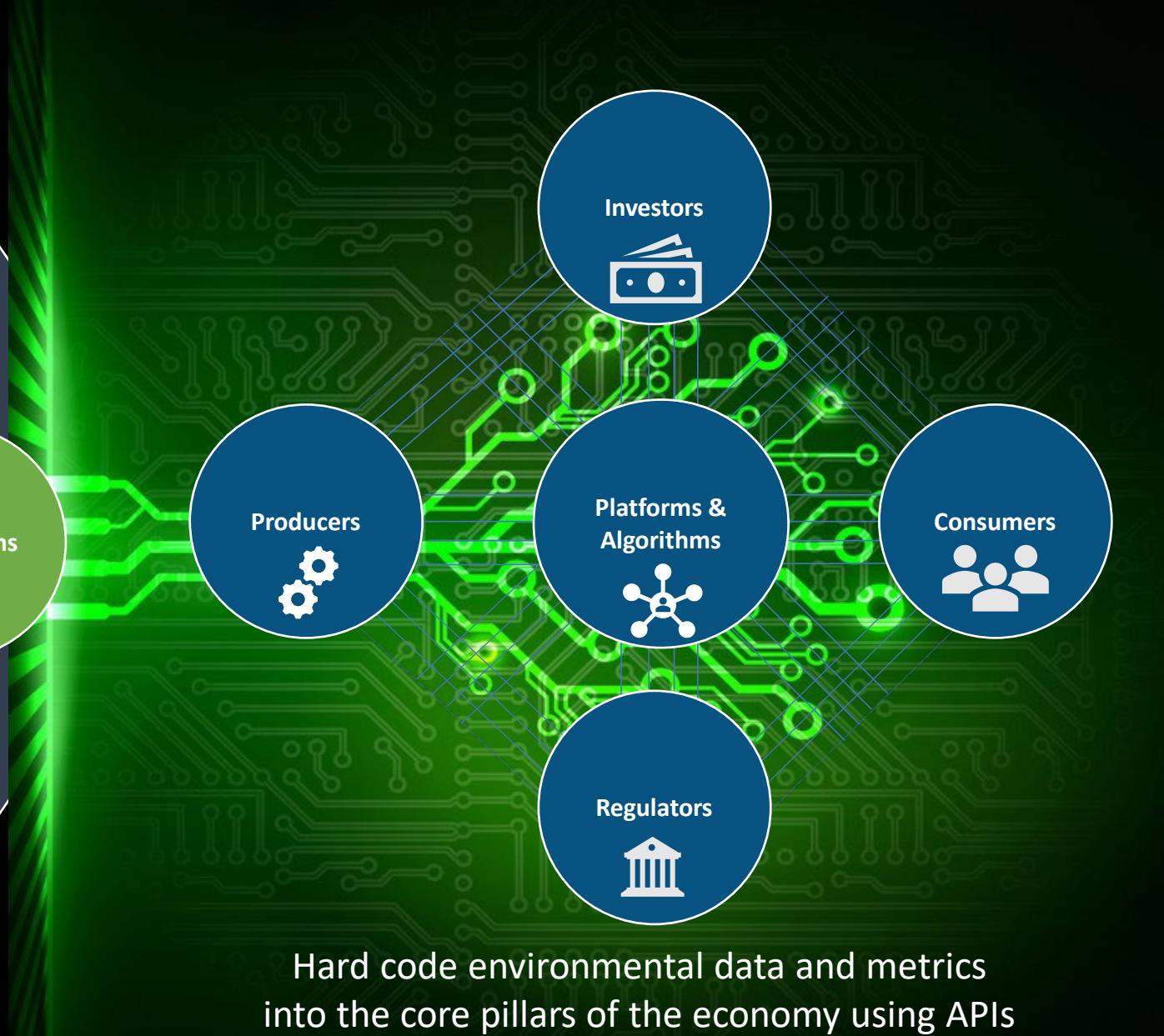
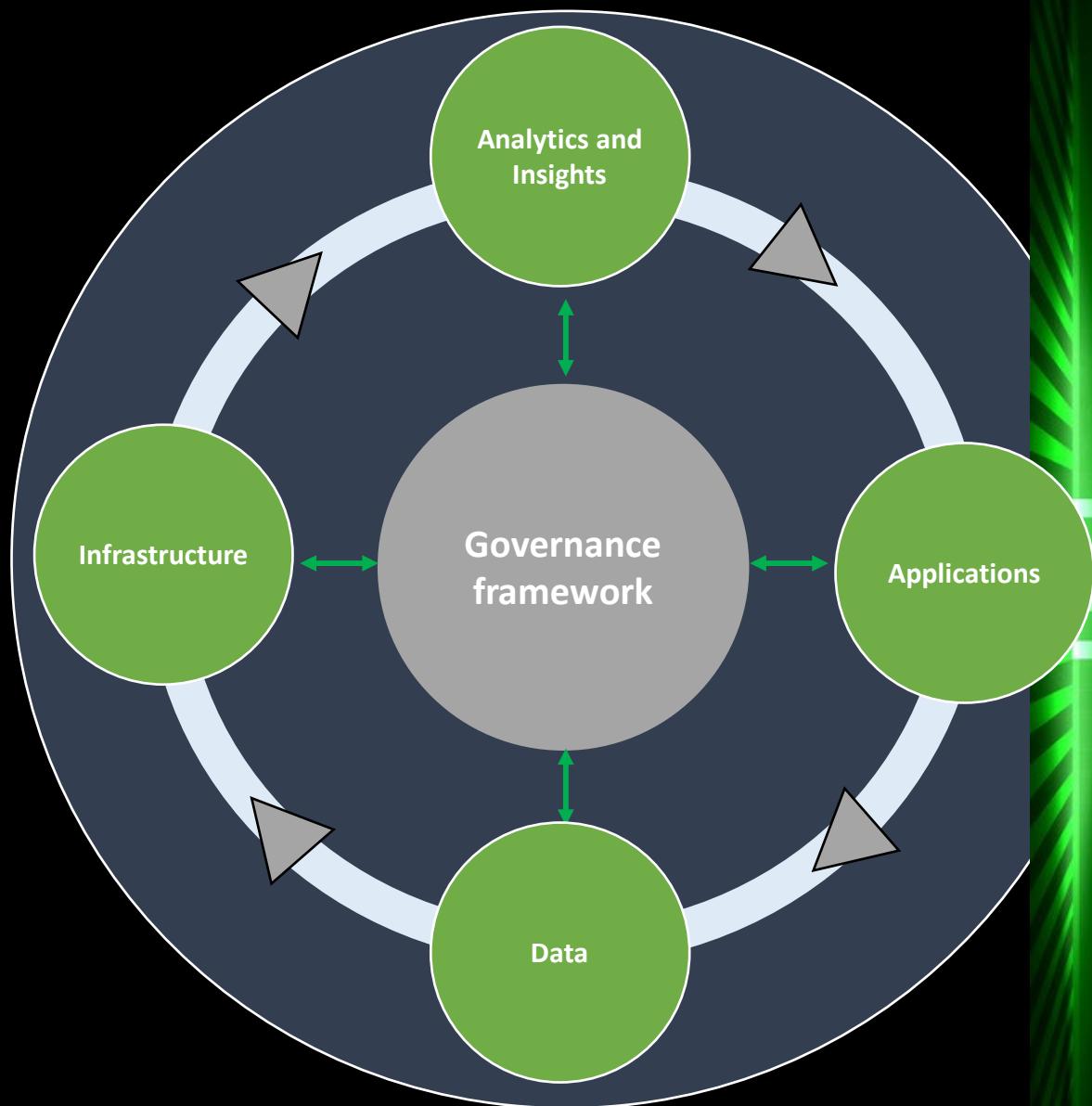
*350 million products on Amazon, 25k are branded Climate Pledge Friendly*



5. Incentivise & nudge sustainable behaviours, lifestyles and livelihoods

*4.5 billion internet users, 2.5B gamers, 2B digital consumers*

## 2. Accelerate the integration and application of environmental data, analytics, and norms to inform and transform core pillars of the digital economy



Hard code environmental data and metrics  
into the core pillars of the economy using APIs

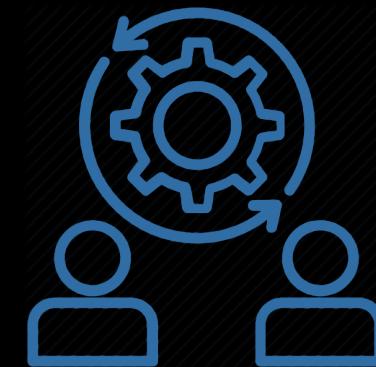
### 3. Strengthen the environmental digital literacy of stakeholders and support e-governance applications for public participation and citizen science



Help to close the digital divide and ensure no one is left behind as environmental goods and services are digitalized.



Help deploy digital tools for e-governance, public participation in decision-making and citizen science applications.

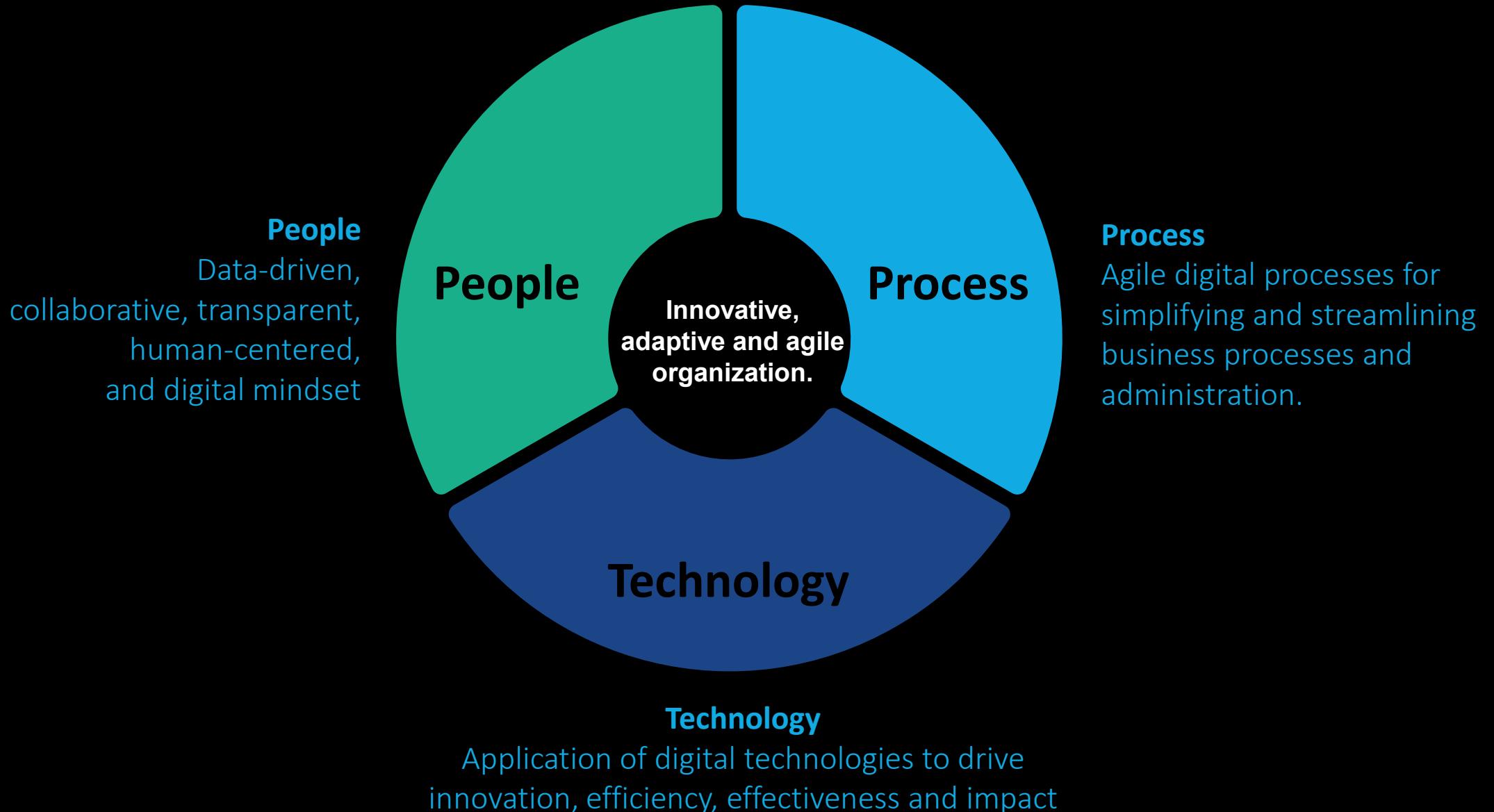


Enable stakeholders to engage in policy-making on environmental digital transformation.

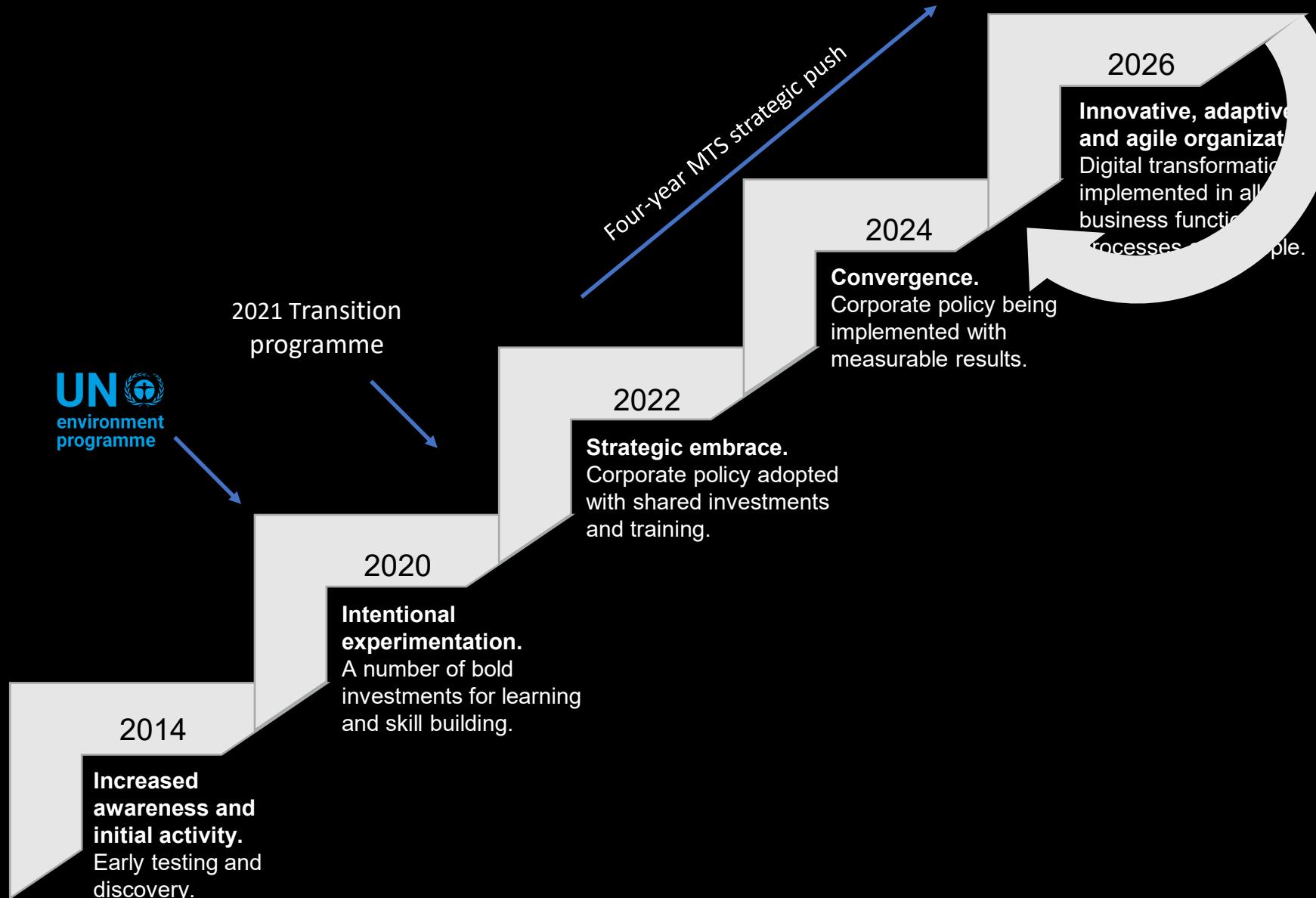


Use competitions and challenges to spark open innovation on environmental priorities.

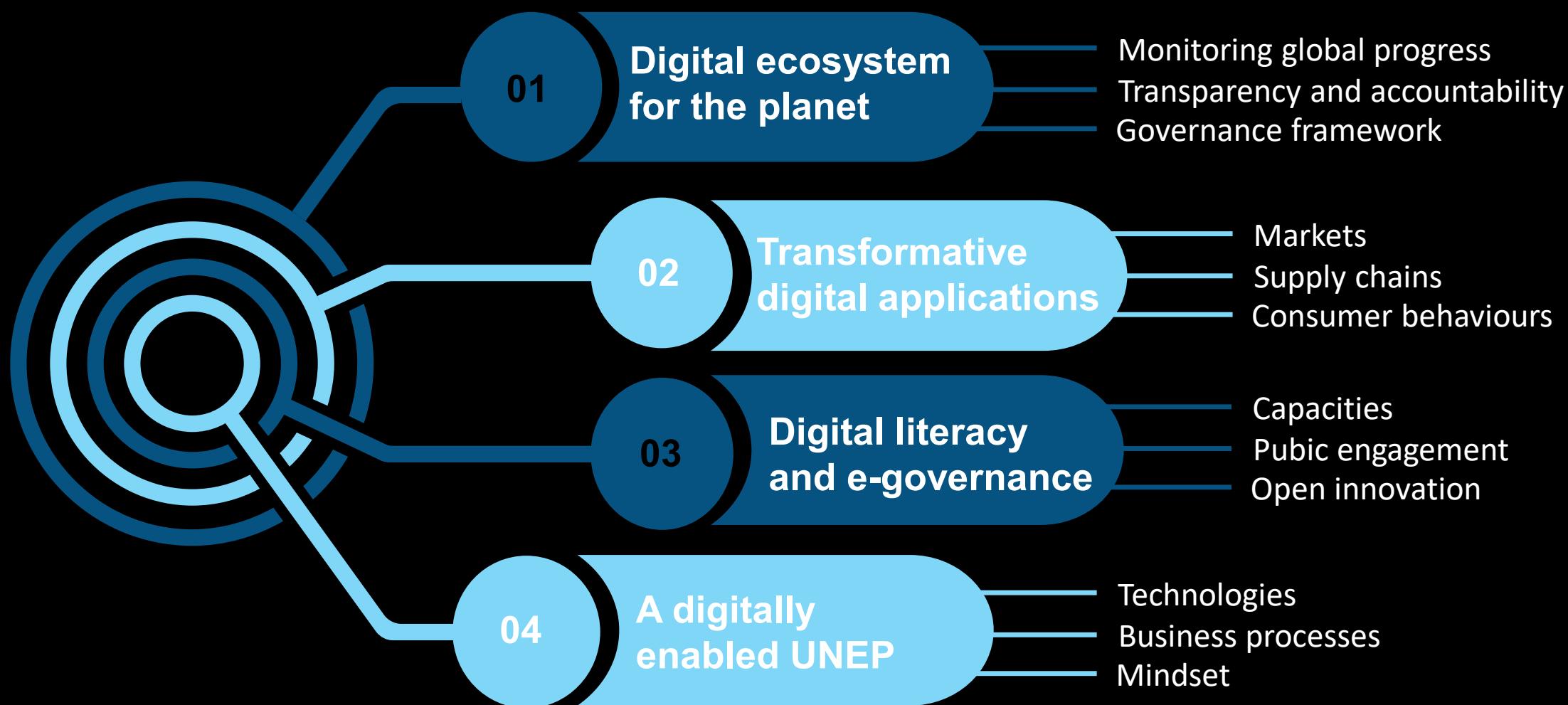
#### 4. Embrace a digital transformation agenda in our own institution



# DIGITAL READINESS ASSESSMENT AND TRANSITION PLAN



# UNEP's digital transformation priorities: 2022-2025



**Four Strategic Actions to Speed and Scale Climate, Nature and Pollution Action  
in a Circular Economy**

# Early priorities in our digital transformation agenda

## 1) Digital Ecosystem

- a. World Environment Situation Room (WESR)
- b. Global Environmental Data Strategy (GEDS)
- c. Addressing SDG and MEA data gaps / custodian of 26 SDG indicators
- d. Data for the Environment Alliance (DEAL)
- e. Climate Science Information Center / Facebook Partnership

## 2) Digital applications

- a. Action plan for the UN Roadmap on Digital Cooperation
- b. Green digital finance alliance / accelerate ESG
- c. Digital product passports, lifecycle analysis and eco-labelling
- d. Greening digital filters and nudges in e-commerce platforms and games

## 3) Digital literacy and engagement

- a. Digital readiness assessments for environmental agencies
- b. Earthshot prize and open innovation competitions
- c. Environment and digitalization as IGF Best Practice Forum

## 4) Digitally enabled UNEP

- a. Priorities for climate, nature and pollution action
- b. Federate digital ecosystem
- c. Digital innovation and experimentation fund



# Building a global environmental data strategy



**In 2021, UNEP would like to convene a global stakeholder consultation process to seek consensus on 6 key questions:**

- 1) Is environmental data different from other kinds of public data?
- 2) Who should own environmental data and how can an essential set be managed as a digital public good?
- 3) What core principles and safeguard should govern public-private collaboration in the creation or application of environmental digital public goods?
- 4) How can environmental data be licensed, shared and quality controlled using the emerging API ecosystem ?
- 5) What business models can be used to finance digital public goods?
- 6) How to mitigate the environmental impacts of ICT in terms of energy, e-waste and materials?

# Let's connect, collaborate and combine efforts to harness data and digital transformation to save the planet !

Thank you for your attention

Coordinator of the Digital Transformation Task Force  
Head of Policy and Innovation, Crisis Management Branch

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**David Jensen**  
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GET IN CONTACT

## DIGITAL TRANSFORMATION TASK FORCE

### VISION AND STRATEGY

  
**David Jensen**  
Strategy, agility and co-leadership

  
**Eva Duer**  
Environmental law and MEAs

  
**Sam Barratt**  
Operationalising digital partnerships

  
**Jillian Campbell**  
Data, statistics and SDG indicators

  
**Mayan Mojado**  
Digital communication and partnerships

  
**Charles Sebukeera**  
Data visualisation and end-user decision-making

  
**Xi Ling**  
Environmental engineering, science and management

  
**Jason Jabbour**  
Science, technology and policy interface

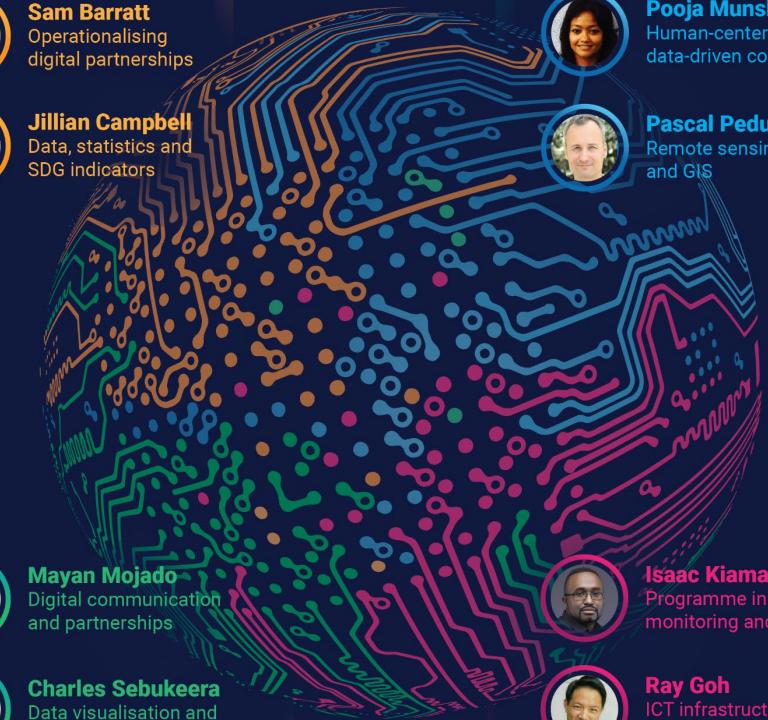
### DATA AND ANALYTICS

  
**Magda Biesiada**  
Geospatial analysis

  
**Abdelmenam Mohamed**  
Private sector fundraising and stakeholder navigation

  
**Pooja Munshi**  
Human-centered design, data-driven communications

  
**Pascal Peduzzi**  
Remote sensing and GIS



APPLICATIONS AND OUTREACH

DIGITAL INFRASTRUCTURE

Reading

# Medium

## The promise and peril of a digital ecosystem for the planet

Key decisions are needed in the next 12 months to set in motion a robust architecture and governance framework

**Are these the 20 top multi-stakeholder processes in 2020 to advance a digital ecosystem for the planet?**

What does the landscape of stakeholder processes look like and who should be challenged to meet our targets for a digital ecosystem for the planet?

**Are these the 20 top priorities in 2020 for a digital ecosystem for Earth?**

What are concrete targets in 2020 for realizing a robust and equitable digital ecosystem for the planet?

# Examples

# Digital transformation and green house gas emissions

In 2015, ITU calculated the ICT carbon footprint was 740Mt CO<sub>2</sub>e including embodied emissions, or **1.4%** of global carbon footprint.

New estimates varying from **2-4%** of total Greenhouse Gases (GHGs).

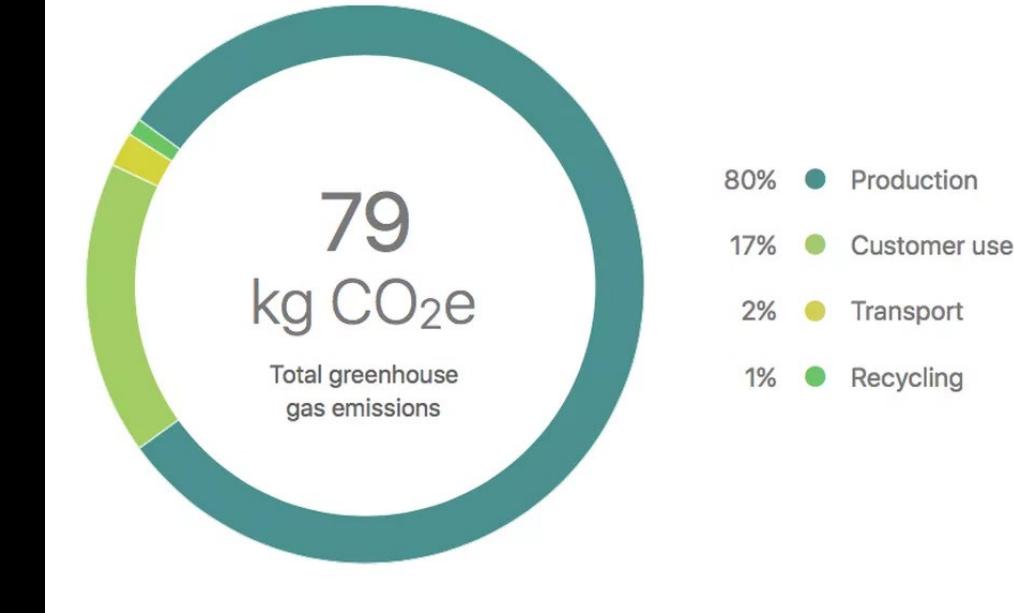
Global data centre electricity demand in 2019 was around 200 TWh, or around **0.8%** of global final electricity demand.

Focus is often on major improvements on efficiency.

But embedded emissions within the ICT devices (e.g. phones) account for **80-90%** of the footprint.

Mobile phones are used for an average of 2 years and only **10%** of phone are recycled.

Greenhouse Gas Emissions for iPhone X—64GB model



# Digital transformation and e-waste

A record **53.6 million metric tonnes** (Mt) of e-waste is reported generated worldwide in 2019, up 9.2 Mt in five years.

The amount of e-waste is rising **3X** faster than the world's population. Now at **7.3 kg** per capita per year (Europe at 22 kg).

The value of raw materials in the global e-waste generated in 2019 is equal to approximately **\$57 billion USD - 69 elements**

In 2019, only **17.4 per cent** of e-waste was officially documented as formally collected and recycled. Increases in recycling rates are not keeping pace with growth rates.

Global e-waste will reach **74 Mt by 2030**, almost double the 2014 figure.

Only **78** countries have e-waste legislation.

The ITU, the Plenipotentiary Conference, established a target to increase the global e-waste recycling rate to **30 per cent** by 2023.



# Digital transformation, green technologies and mineral intensity

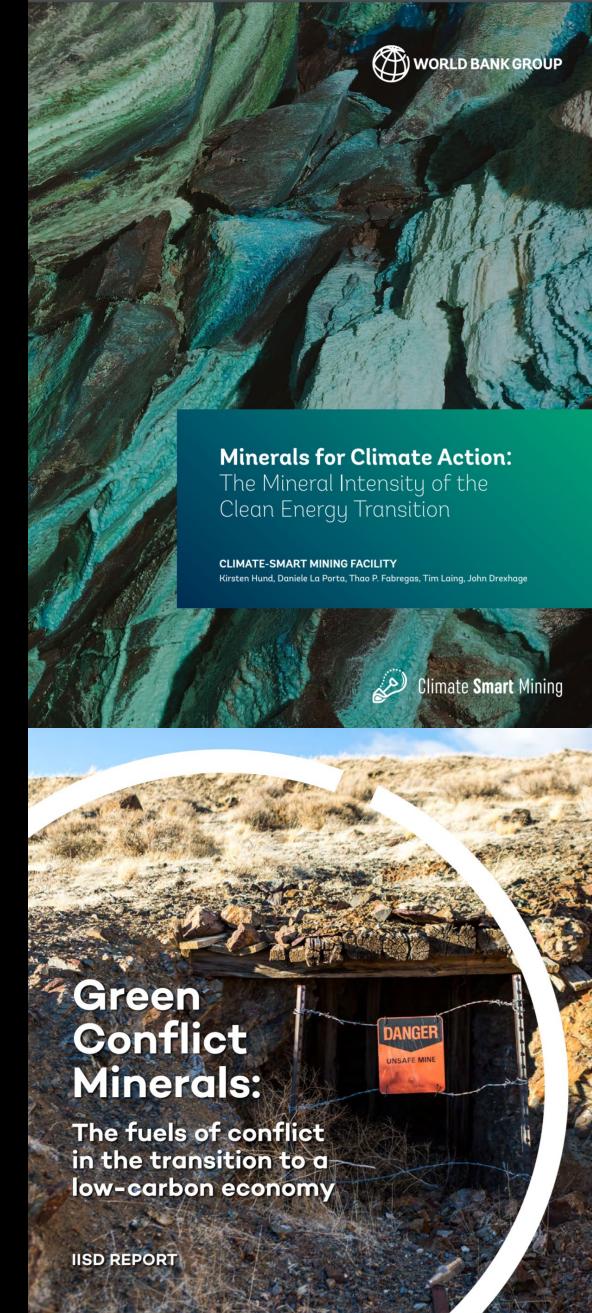
The mining sector will play a **key role** in the transition toward a zero-net emissions future by 2050 driven by green and renewable technologies.

Demand for green energy technologies, and the underlying minerals is predicted to **increase dramatically** in the years and decades ahead.

E.g. demand for the minerals required for solar panels—including copper, iron, lead, molybdenum, nickel and zinc—could increase **by 300** per cent through 2050.

Important **geopolitical implications** in terms of minerals sourcing and global supply chains.

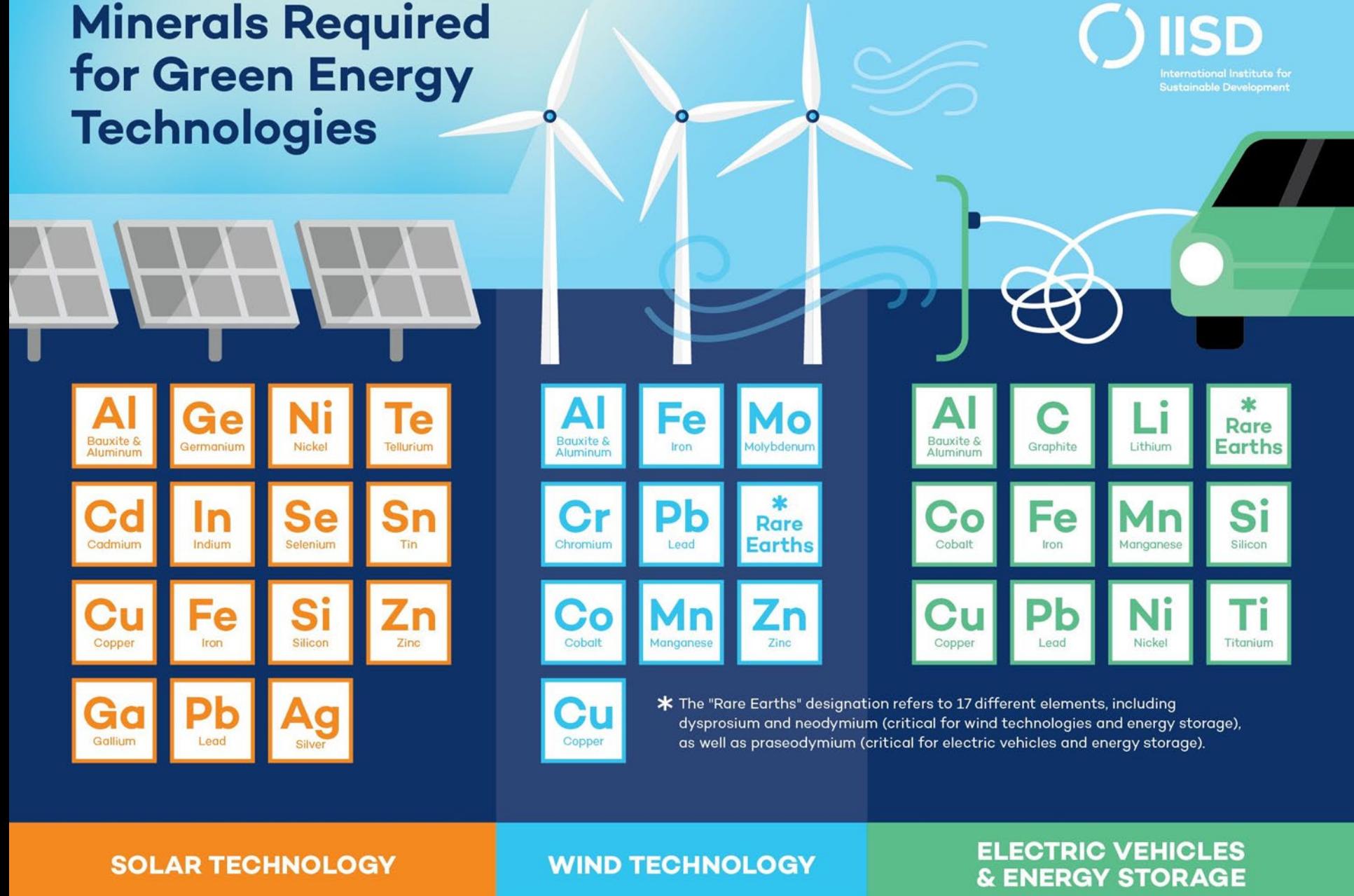
Many countries lack capacities to **mitigate negative social and environmental impacts** from the mining sector.



# Minerals Required for Green Energy Technologies

Percent of global reserves  
located in fragile states

Copper	41%
Bauxite	44%
Graphite	73%
Cobalt	70%
Iron	42%
Lithium	21%
Tin	69%
Rare earths	58%
Zinc	52%



# Digital Transformation Task Force

Key duties of the task force include:

- Elaborating the digital transformation elements of the MTS and POW
- Conducting digital readiness assessments and inventories
- Understanding needs and opportunities of regions, partners and MEAs
- Identifying and supporting trailblazing projects and digital champions network
- Aligning internal policies to digital transformation goals
- Coordinating external strategic policy engagement

Mandate from Jul-Dec 2020

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**Pascal Peduzzi**  
Remote sensing and GIS

**Isaac Kiama**  
Programme innovation, monitoring and visualization

**Ray Goh**  
ICT infrastructure and digital transformation

**Yaxuan Chen**  
Economic policy

**Robert Rodriguez**  
ICT innovation, planning and execution

APPLICATIONS AND OUTREACH

DIGITAL INFRASTRUCTURE

# Transformative power of digital: enables global analysis

enables global level analysis...

How long do you think it would take to process 3 million satellite scenes (1.8TB) covering over 30 years of data to extract the location global surface water ?

The process takes more than 10 million hours of computing time and 600 years to run on a modern desktop computer.



## Example analysis:

The Aral Sea has shrunk by around 80 percent since 1985

Google earth engine accomplished this processing in 45 days using 10,000 computers in parallel in the cloud.

# Transformative power of digital: saves time and resources

One pollution-detecting drone can do the work of how many environmental inspectors?



One drone can do the work of 60 environmental inspectors.

One reforestation drone can seed how many trees per day?



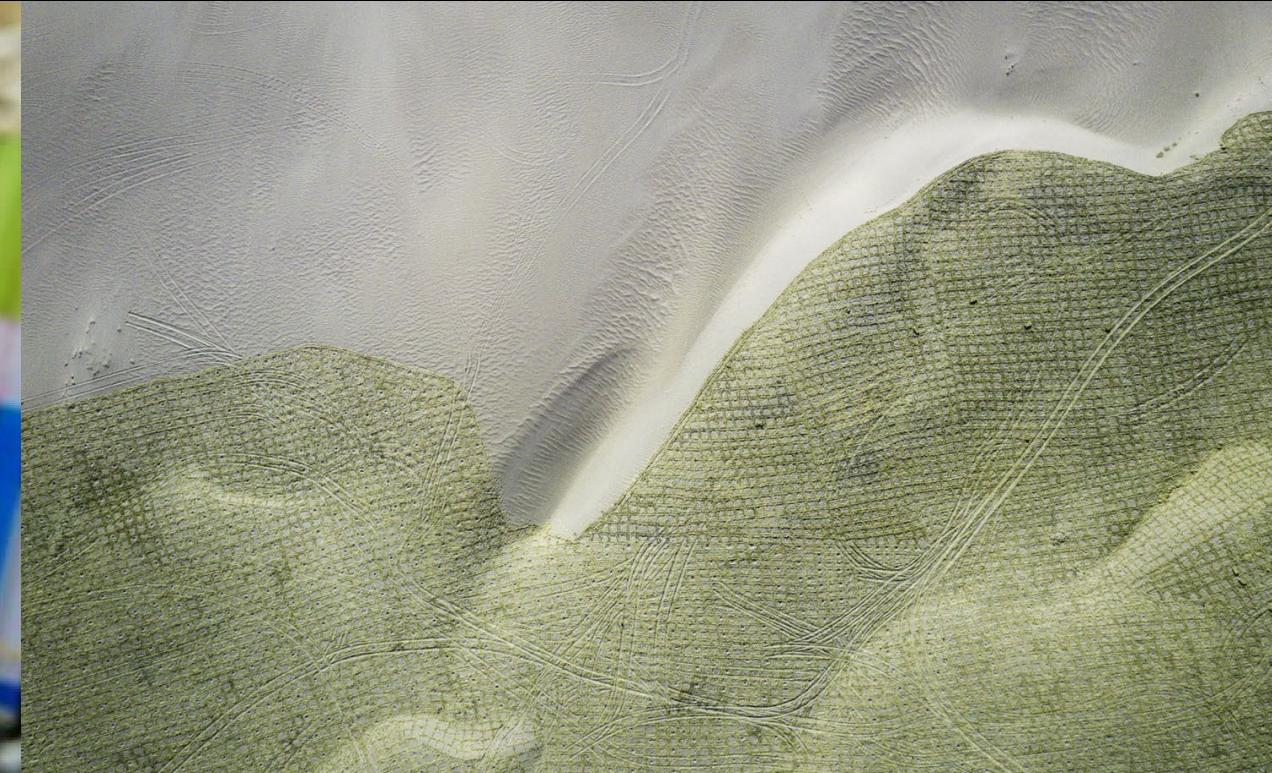
An astounding 100,000 trees a day.

# Transformative power of digital: achieves scale....

How many people can Alipay incentivize to adopt low carbon behaviors using a dedicated app and gamification?



How many million trees were planted and carbon emissions reduced ?



By mid 2019,  
over 500 million people  
had joined.

122 million trees planted  
reducing carbon emissions by  
over 6 million tons

# Transformative power of digital: improves efficiency...

Smart Agriculture will boost yields **by 30%**



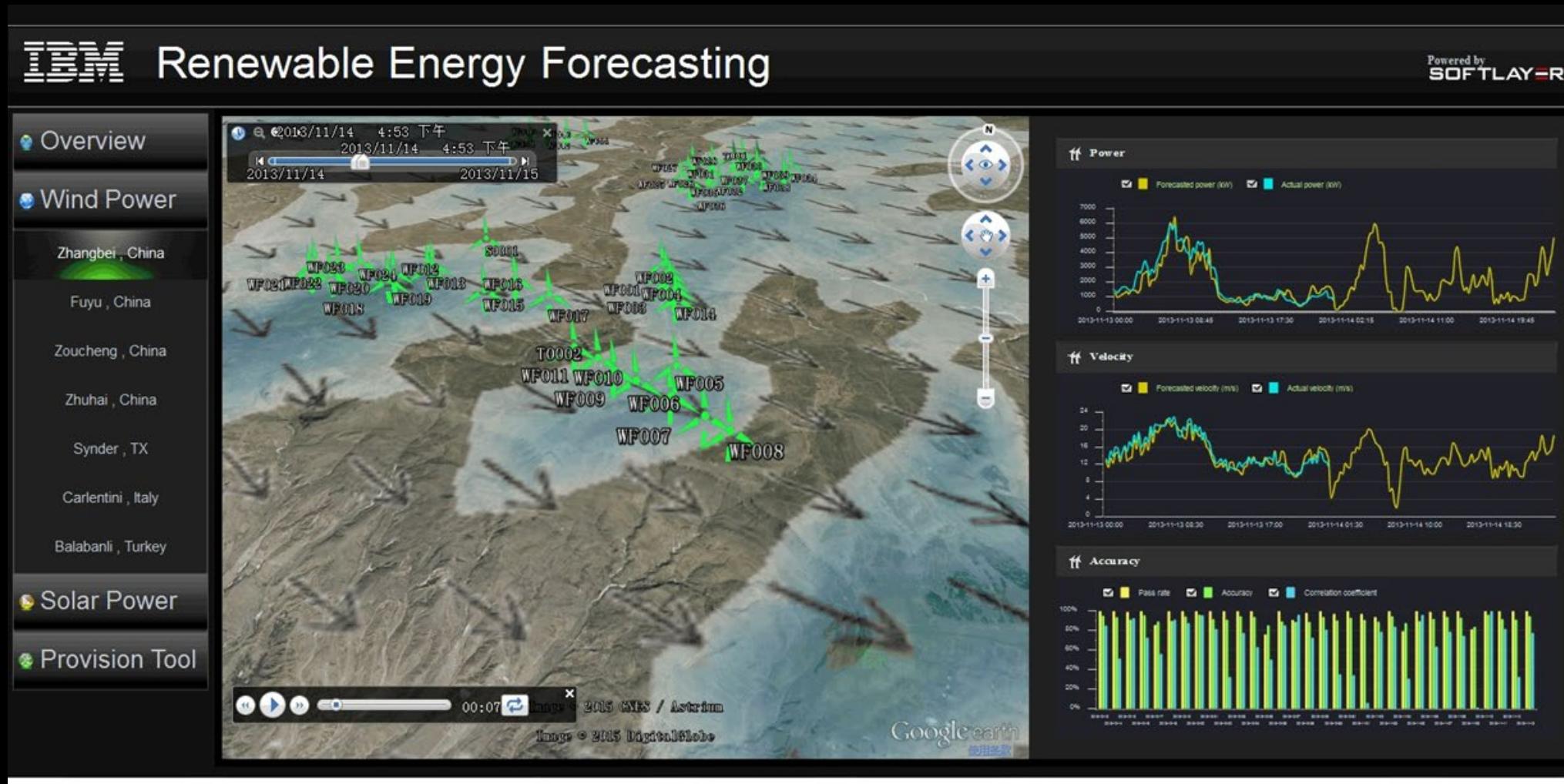
Smart Agriculture will **avoid 20%** of food waste.

Vertical farming can use **70% less** water compared to traditional agriculture.



Targeted micro dosing of herbicides using robotics can lead to potential savings of **over 90%**.

# Transformative power of digital: improves predictive accuracy



AI-driven renewable energy forecasting system is up to 30% more accurate than the next-best conventional system.

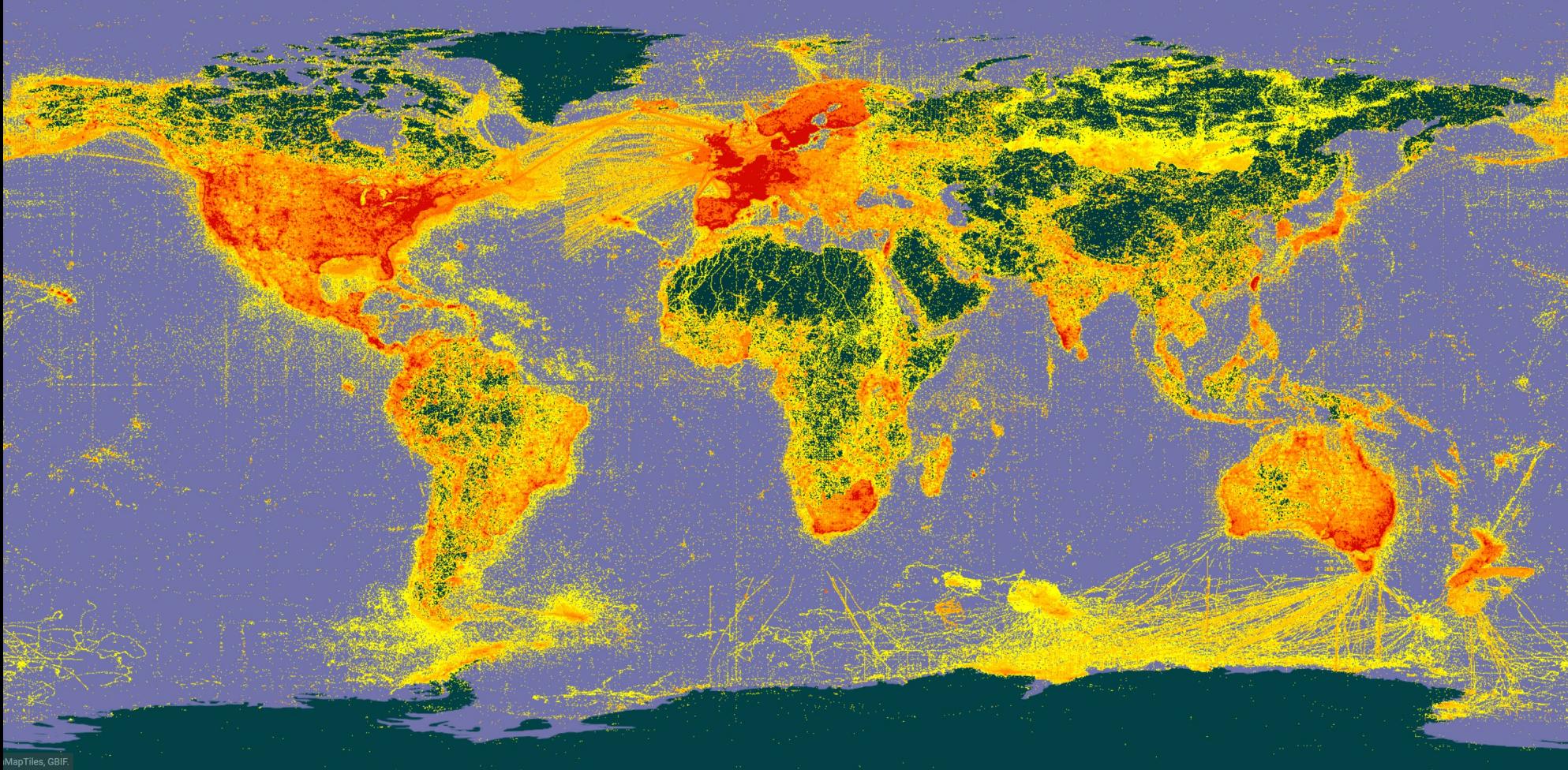
# Transformative power of digital: offers emotional immersion....

The emotional impact of VR has proven to increase awareness, evoke empathy, and elicit action:



48% of virtual reality charity content viewers were likely to donate to the causes they experienced. An acceptable response rate with a mail campaign is 0.5 - 2.5 percent.

# Transformative power of digital: collective action at scale



The Global Biodiversity Information Facility has mobilized 1 million people around the world to collect more than 1 billion species occurrence records.

# Transformative power of digital: nudging consumers

Lazada developed a **BeatPlasticPollution collection** for World Environment Day 2018 and exposed it to 14 million clients that wouldn't normally buy green.

Using digital nudging techniques,  
**7 million people purchased.**  
Conversion ratio of 50%.  
Unheard of level of success.  
Green Consumer Segment  
created.

The screenshot shows the Lazada homepage with a search bar and navigation links. A prominent banner at the top features the text "BEAT PLASTIC POLLUTION" in large white letters, with logos for World Environment Day and UN Environment. Below the banner, there are sections for "CLOTH DIAPER" and "REUSABLE BAGS". The "CLOTH DIAPER" section displays products like "Enfant Baby Lampin Cloth Diaper" and "Smart Babies Washable Cotton Diapers". The "REUSABLE BAGS" section displays products like "Women Girl Canvas Eco Shopping Tote Shoulder Handbag Beach Bag" and "Kobwa Foldable Reusable Eco Friendly Wallet Style Grocery Bag". Both sections include "SHOP NOW" buttons.