

# The pressing need for a global digital ecosystem



[UN Development Programme](#)

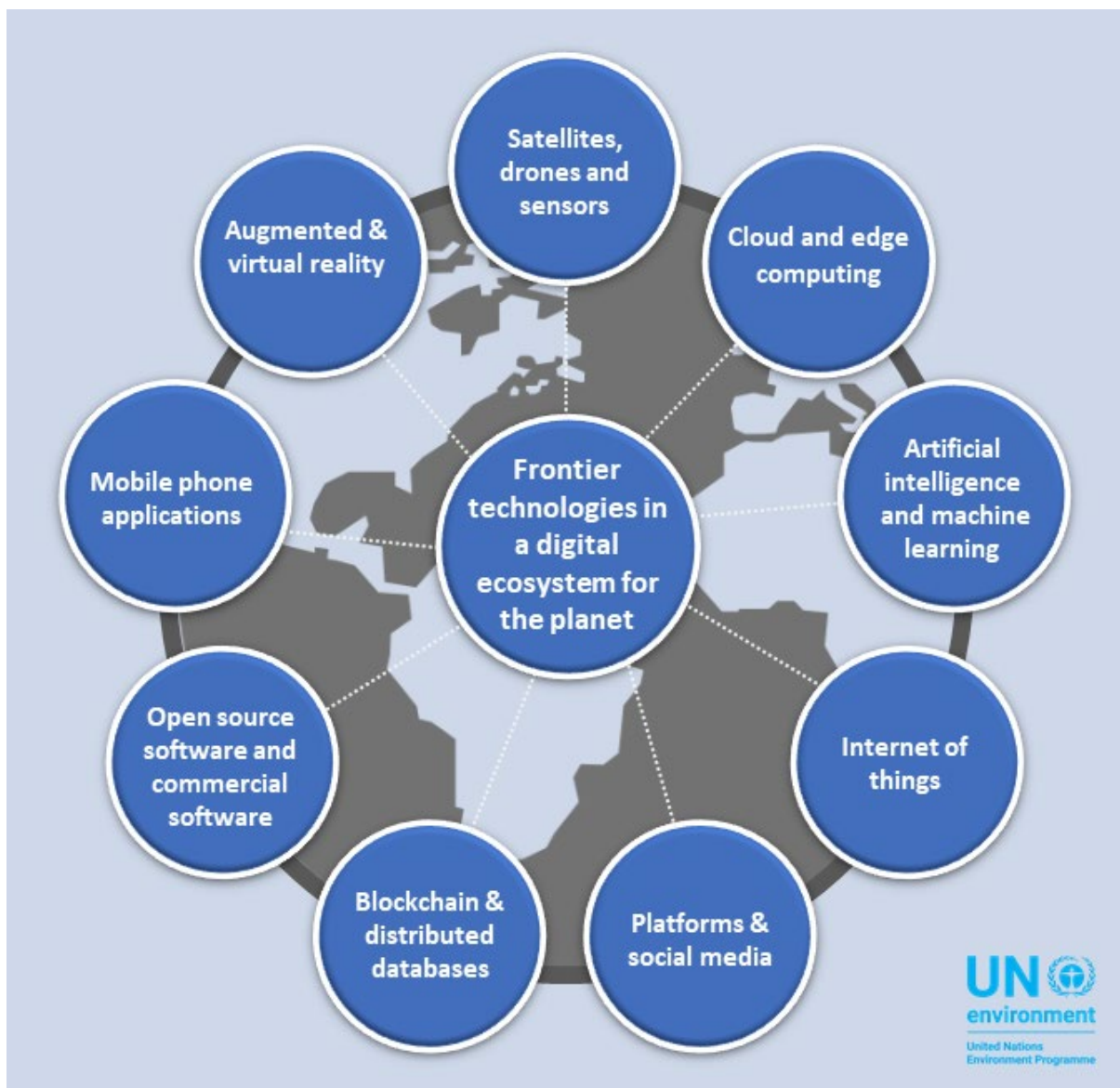
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We are at a pivotal moment in the history of our stewardship of this planet. To guide the political action which is required to counter the speed, scope and severity of the environmental and climate crises, we must acquire and deploy data sets and frontier technologies. We have given ourselves 10 more years to achieve the Sustainable Development Goals. But the next 12 months will be critical.

All evidence shows that we are not on track to avert the two greatest existential environmental challenges on our doorstep: the climate and nature crisis. We are not even effectively measuring global progress against the SDGs. Sixty-eight percent of the 93 environmental SDGs indicators cannot be measured due to a lack of data. To bridge this gap, UNDP is working with a wide variety of partners on digital ecosystem for the entire planet.



**Figure 1.** A range of frontier digital technologies can be combined to monitor the sustainable use of natural resources.

## What's at stake?

Over 90 percent of all data has been generated during the last two years. Mobile devices connect five billion people. New satellite technologies image the entire surface of the earth every day. Cloud computing and AI algorithms allow us to monitor, detect and predict environmental and climate threats. On top of this, social media has become a political force.

While there is broad recognition that humanity must capitalize on this massive increase in data generation and processing power, there is no common vision, directed strategy, or governance framework.

### Satellites



**4,987 Satellites** in orbit in 2019<sup>12</sup>  
**5,700 generated scenes** per day (open source)  
Landsat archive **32 years** - over **5 million scenes**<sup>13</sup>  
Entire **terrestrial surface** imaged every day

### Digital platforms



Every minute of the day in 2018:  
Youtube users watch **4,333,560 videos**  
Amazon ships **1,111 packages**  
Uber users take **1,389 rides**<sup>19</sup>

### Sensors



**15.4 billion sensors** in 2015  
**75 billion** by 2025<sup>14</sup>

### Censuses and surveys



More than **7 billion people** are covered by censuses every 10 years<sup>20</sup>

### Internet of Things



IoT creates **400 zettabytes of data** per year<sup>15</sup>

### Citizen science



**500 million records** on eBird<sup>21</sup>  
**58 million records** on Artportalen<sup>22</sup>  
**16 million records** on iNaturalist<sup>23</sup>

### Mobile phones



**5 billion unique phones** offering opportunities for geocoded data collection as well as daily movements<sup>16</sup>

### Publications and doc



Over **2.2 million scientific articles** on science and engineering<sup>24</sup>  
Over **50,000 corporate sustainability reports**<sup>25</sup>

### Mobile apps



**3 million unique apps**<sup>17</sup>

### Administrative data



Governments, utility companies, and other services providers maintain data related to **registration, transaction and record keeping**<sup>26</sup>

### Internet access



Over **4.4 billion people**, **57.3%** of population<sup>18</sup>

### Finance data



Financial databases cover **189 countries** to date<sup>27</sup>

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**Figure 2.** The types data that can power a planetary digital ecosystem.

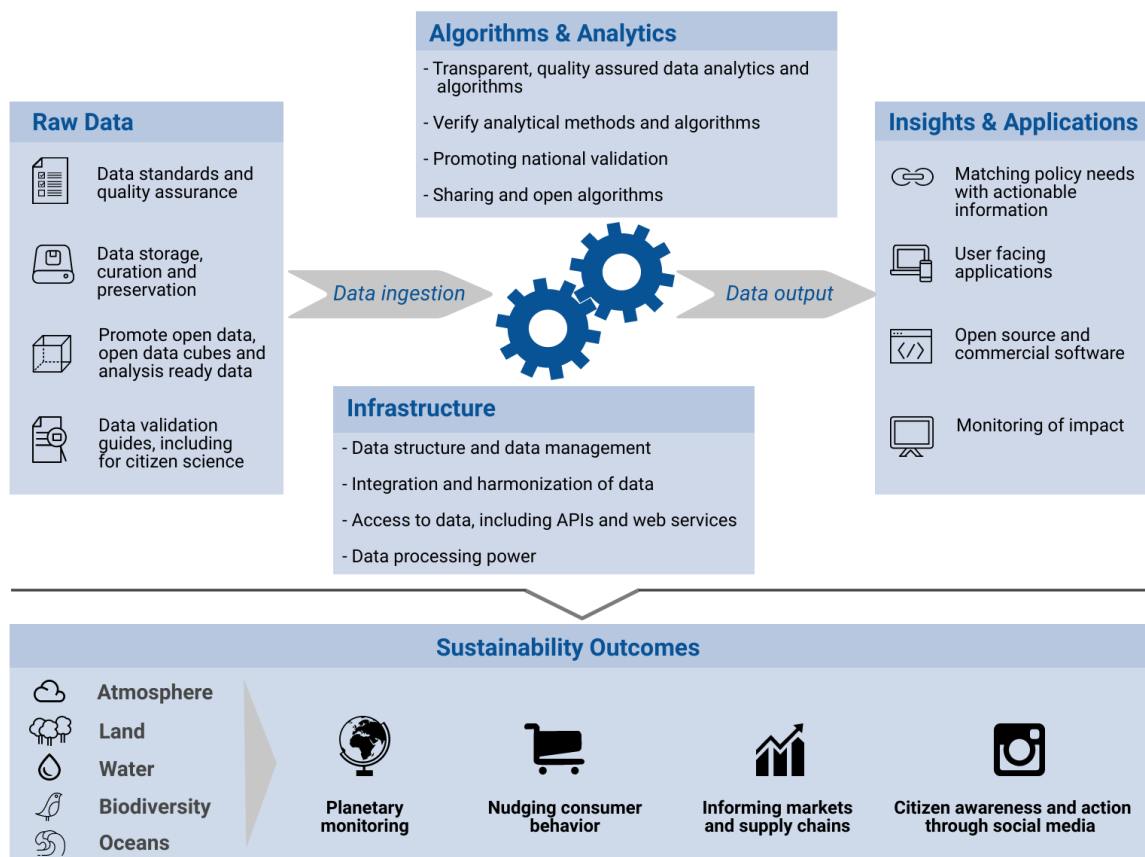
The public and private sector are building data sets, digital infrastructure, algorithms and insights for the environment. But these are haphazard and fragmented. In a new — and welcome — development, the private sector is beginning to offer digital public goods and analysis. But this is happening without a broader understanding of the long-term business models and incentives that should finance and sustain these services. A global conversation is needed to determine how these efforts can best sustain global public goods, protect privacy, achieve interoperability and keep standards high. Finally, we need to decide how to govern and pay for a digital ecosystem.

### **Building a digital ecosystem**

As data flows through the ecosystem, it is eventually transformed into insights that can be used for sustainable decision.

- **Raw data:** The foundation of a digital ecosystem is numerous data sources, small and big, on the environment together with social and economic data.
- **Infrastructure:** The infrastructure will store, process and connect existing databases. It must seek to improve metadata, discoverability and accessibility.
- **Algorithms and analytics:** Data and supporting infrastructure are the backbone of the digital ecosystem. But these will require algorithms and analytics in order to extract actionable insights and business intelligence.
- **Insights and applications:** End-users need to integrate information streams into metrics and performance dashboards. They must be comprehensible to decision-makers, investors, consumers and citizens.

# A Digital Ecosystem for the Planet



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**Figure 3.** A global digital ecosystem will use data, infrastructure, algorithms and insights to meet the SDGs.

## What is being done?

The foundations of a global digital ecosystem are being built and tested by in the public and private sector. The following examples show how they can provide environmental insights and intelligence that are better, faster, and cheaper.

The European Commission’s Joint Research Centre, Google Earth Engine and UNEP developed the [sdg661.app](#) for Water-Related Ecosystems. The [Surface Water Viewer](#) shows changes in global water based on satellite images and AI.

The [UN Biodiversity Lab](#) aims to help countries increase the amount of spatial data and analysis used in their 6th National Reports to the Convention on Biological Diversity (CBD). It combines over 100 global high-quality spatial data sets with analysis, visualization, and storytelling tools. It was developed by UNDP, UNEP, and the CBD Secretariat, with funding from the Global Environment Facility and UNDP Innovation Facility.

[The Space Climate Observatory \(SCO\)](#) goal is to combine satellite and field data with scientific research to model, predict and track climate change and its impact. It harvests information from [20 space](#) agencies.

[Earth Challenge 2020](#) will help engage millions of global citizens to collect and share one billion open and interoperable data points.

[Icebreaker One](#) — aims to unlock the finance, data and innovation needed to address our climate and biodiversity emergencies.

## **Overcoming risks**

Four governance risks need to be addressed.

**1. Monopolies linked to global data sets:** Much of big data are held by a handful of companies. This is a risk. It also creates concerns in terms of privacy, data security and dependencies. We need to understand what incentives, safeguards and standards are needed to ensure that environmental data and processing power are used to help humanity solve long-term global environmental challenges rather than exacerbate existing inequalities and digital colonialism.

**2. Quality, transparency and openness of data and algorithms:** As companies take an increasing role in generating digital public goods, we need to ensure that the quality of data and algorithms are not compromised by the allure of short-term profits.

**3. Protecting individual privacy, data security and intellectual property:** There must also be a recognition that some data will, of necessity, remain only at the national level and be governed by national priorities, context and culture.

**4. Direct environmental impacts:** as reliance on computers and data centres grows, governments and technology companies need to implement measures to **reduce their direct environmental impact.**

### **Building the dream**

Building a digital ecosystem for the planet may sound like an ambitious dream. But humanity has achieved similar fantastic visions. The Large Hadron Collider at CERN in Switzerland and the Human Genome Project are just two impressive examples.

Similar cooperation is now needed to build a digital ecosystem for our planet. This is the next logical progression. And our security depends on it.

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*An extended version of this article is available [here](#). Follow-up articles on [20 key processes](#) and [20 key priorities](#) are also available.*

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