Digital data and sustainability

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Background

Digital technology is a key driver in every transformation strategy, whether for governments, companies or the general public. This obviously includes the higher education and scientific research sector. This rapid increase in the use of digital technology, which rose tenfold during the Covid-19 pandemic, is often cited as a lever for reducing the environmental impact of our organisations, by limiting travel for example. However, for this reduction to be sustainable, the environmental footprint of our use of digital technology must be taken into account. IRD has chosen to make this concern central to its digital transformation strategy and its environmental roadmap.

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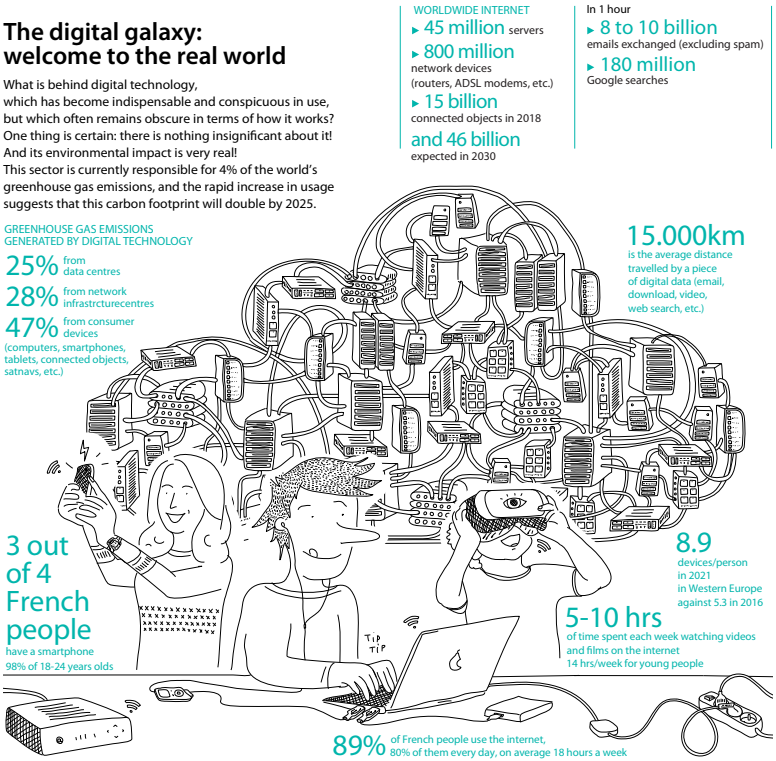
Further reading

Derakhshannia M. *et al.*, 2020 – Data lake governance: Towards a Systemic and Natural Ecosystem Analogy. *Future Internet*, 12 (8) : 126.



Greenhouse gas emissions generated by digital technology (source: ADEME).

What we know

Digital technology is opening up new practices that are transforming the way we work. However, to work properly, we know that digital technology is resource hungry: building equipment such as mobile phones, computers and servers requires rare-earth and precious metals, running data centres and networks requires electricity and water for cooling. To avoid repeating the mistakes of the past, when fossil fuels were used to accelerate economic development, digital technology must be used with due consideration for its environmental impact. In 2018, digital technology was responsible for 3% of global greenhouse gas emissions, roughly the same as emissions from air travel. Some studies predict that within a few years, these emissions will reach a level equivalent to that of private car transport (https://theshiftproject.org/).

Even though producing and storing research data is not the main cause of the acceleration of digital transformation, IRD has chosen to put environmental responsibility firmly at the heart of its commitment to sustainability science. Promoting sustainability science to build pathways towards a more sustainable society also means considering the sustainability of research practices. This issue is naturally part of IRD's digital strategy.

Working towards FAIRS research data

Creating a policy for managing the data produced by IRD and making it openly available falls more broadly within the scope of research data governance at the Institute. This approach must include an environmental responsibility dimension. It is aligned with the national strategy for open science and involves a process whereby scientific outputs are gradually brought into compliance with the FAIR principles: Findable, Accessible, Interoperable and Reusable. The "reusable" principle is an important goal for IRD: it is key to fostering interdisciplinary approaches and addressing thematic challenges, but it also poses an environmental risk if no consideration is given to appropriate data retention practices (what data should be retained? for how long and on what medium?).
It is in some ways an illustration of the friction between SDG 17 (partnership for the Sustainable Development Goals) and SDG 13 (action against climate change). Consequently, in an effort to remain mindful of the environmental footprint of the data produced by science, IRD is keen to add Sustainable to these principles. This means expanding the FAIR principles by adding a fifth that covers the environmental dimension. It aims to minimise and assess the environmental footprint of retaining and distributing digital outputs through the use of FAIRS (Sustainable/Sensitive to the environment) data.

How to develop FAIRS data?

In an effort to further develop the concepts of open science, the FAIRS principles will provide recommendations and practices on how to include the environmental cost of storing the data produced. Several work streams have been identified:

- developing a policy and recommendations for data management and retention: To be shared and implemented, data management rules and good practices need to be widely publicised. This work is included in IRD's Open Science roadmap and in projects to implement storage tools such as DataSuds;
- mapping research data storage and providing tools: Implementing technical solutions that are less resource-intensive requires an understanding of where the data are hosted. This inventory must be aligned with the data management strategy. The use of the latest technologies will make data management more efficient (e.g. data lakes);

- measuring the environmental impact of IRD's digital tools: Governance has encouraged a process of building dashboards to monitor activity within IRD. The aim is to develop indicators to measure the environmental impact of IRD's tools;
- collaborating on processes within joint research units (UMRs): Several structures within IRD, aware of the need to reduce their environmental footprint, have already undertaken work to reduce their infobesity (reducing the use of email, limiting printing, etc.). Supporting them in their efforts is essential to maintain momentum within IRD;
- supporting partners in countries of the South: As most of IRD's research is conducted in developing countries, promoting the implementation of data management solutions in the countries where the data is collected is essential. Beyond the issues of partner sovereignty, these tools will help to limit data transfers over resource-intensive computer networks.

KEY POINTS

IRD is mindful of its environmental impact and has therefore incorporated environmental awareness into its work, particularly in digital projects. This approach operates across sustainability science's three pillars (Science, Development and Support) and in partnership with the higher education and research ecosystem. To ensure maximum buy-in to the process and to make it sustainable, emphasis is placed on being especially sensitive to research data. IRD is proposing to include the sustainability of digital practices as one of the main principles of open science so that FAIR (Findable, Accessible, Interoperable, Reusable) data becomes FAIRS (Sensitive to the environment/Sustainable) data.

SUSTAINABILITY SCIENCE

UNDERSTAND, CO-CONSTRUCT, TRANSFORM

Collective thinking coordinated
by Olivier Dangles and Claire Fréour

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