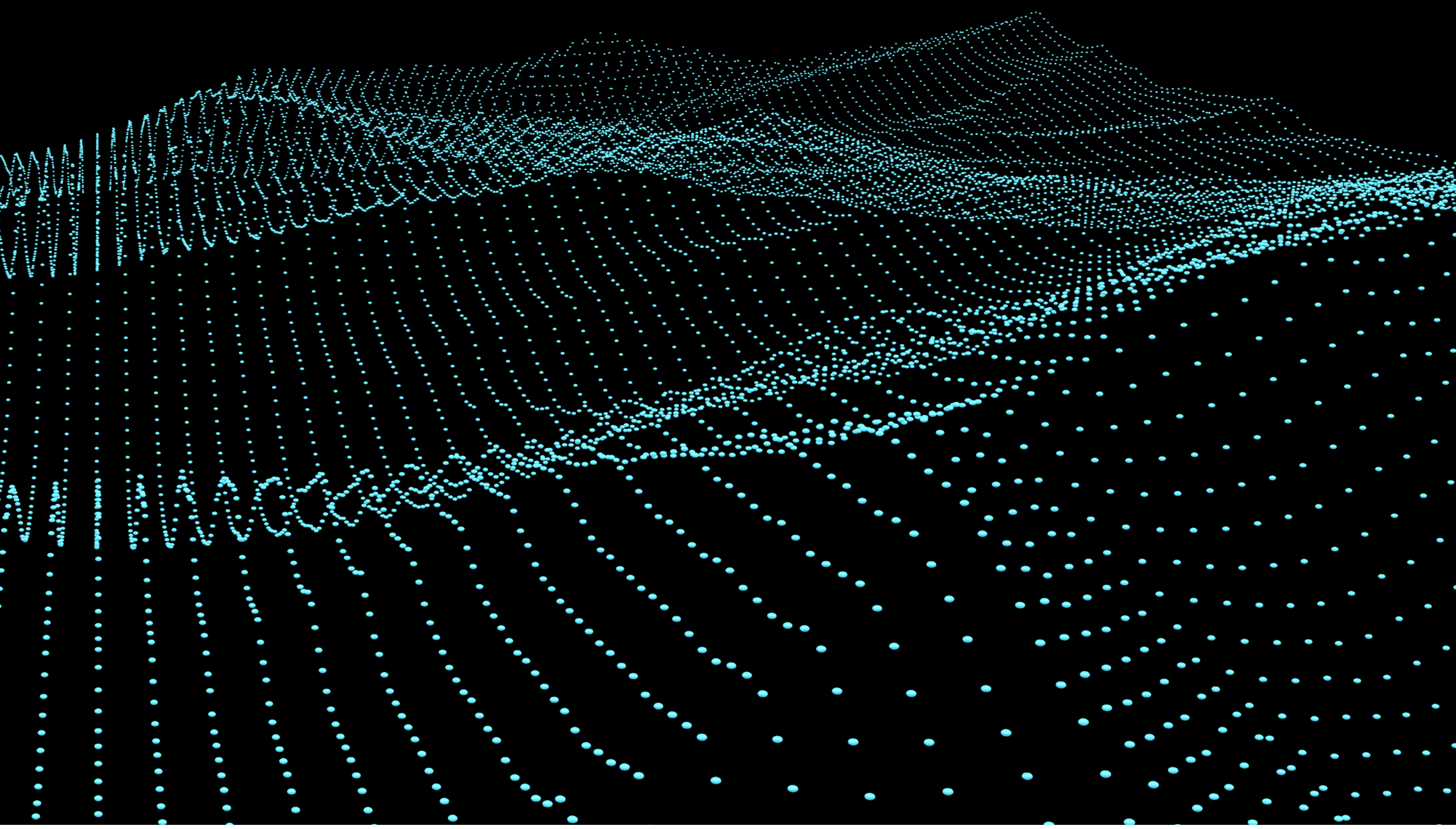
Expanding Digital Sufficiency

EXECUTIVE SUMMARY

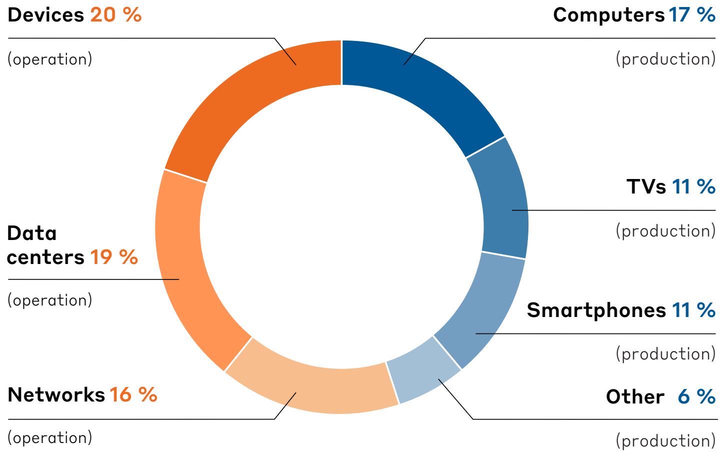
OCTOBER 2020



With the participation of

Rethinking the digitalisation for low carbon transition

- Meeting the challenges of the 21st century requires a better understanding of the physical constraints limiting our physical and economic systems. Global warming and the gradual depletion of our fossil fuel resources combine into the "twin constraints of energy".
- In order to comply with commitments aiming to protect our global survival (such as the Paris Agreement), we need a drastic reduction of energy consumption as well as the resulting greenhouse gas emissions. Since we have limited resources it is mandatory to understand that each physical process, including information transfer, processing or storage as well as the relevant Information and Communication Technology (ICT) device production, is energy consuming.
- **As a result, digital technologies are both a tool and a challenge to shift towards a low carbon economy: while digital technologies do provide tangible opportunities, they are subject to the same constraints as any global system. Therefore, we ought to design digital practices and infrastructures that are resilient and sustainable.**
- The innovation challenge we are currently facing requires measuring the energy costs and environmental footprint associated with the expansion of digital technologies. The digitalisation of our economy ought to be sustainable from an environmental standpoint.
- As of today, our digital growth is not sustainable: the energy consumption of digital activity increases by 9% per annum. Most business models behind mass digitalization require a constant increase in content and data consumption and in the associated infrastructure to remain profitable on the long run. A phenomenon fueled by the "attention economy."
- **Digital sufficiency** involves switching from an instinctive or compulsive use of digital systems to a more controlled use of digital technologies, built from measuring both the associated risks and opportunities.



Final energy consumption of digital technologies by item for production (45%) and operation (55%) in 2017

Source: Lean ICT, The Shift Project 2018

- Implementing digital sufficiency involves overseeing technolog-ical alternatives, considering both the deployment of ICT infra-structures and their associated uses, that protect the essential benefits of digital technology.
- **In this report, The Shift Project provides the tools to assess the energy suitability of smart and communication technologies, in order to help organisations adopt greater environmental considerations in their information systems and take control over their digital practices.**
- **Without such an approach, the policies and strategies we adopt for digital expansion will destroy as much value as they create since, while pervasive, digital transition will not contribute to resolution of the world's current physical and societal challenges.**

Main conclusions

The assessment of new technologies' environmental relevance should be systematic

- Some IoT innovations have a potential for environmental gain, while others are structurally unfit to this end: **therefore, we should neither dismiss these innovations as a whole, nor endorse them without wholesale.**
- Designing a resilient system involves identifying those conditions under which it is appropriate to develop a given digital solution. These conditions are case-specific: so-called "smart" projects should not be **simply** taken at face value, but should be assessed based on **environmental considerations balancing risks and benefits.**
- Total energy consumption (embodied energy & energy released through operations) of a digital layer may outweigh the energy savings from the energy efficiency gains.
- The net energy savings will often only be positive if users follow the energy saving guidelines defined by decision makers.

Organisations can and should manage their Information Systems

- For organisational Information Systems (IS) – **of corporations, public agencies, local authorities** – to become resilient, digital projects must be conducted in rational way from an environ-mental standpoint.

- Considering the widespread use of digital technologies, we have chartered a **systemic approach** that allows organisations to **integrate environmental factors into the strategic and operational management** of their digital projects.
- This integration requires a **company-wide approach** conducted under the guidance of General Management and with the support of IT Department executives.
- Organisations, **regardless of their size**, need to adopt a drastically new approach to digital technologies instead of solely limiting themselves to buying new (potentially useful) optimisation tools and operating them within otherwise unchanged strategies and policies.

Digital practices management is a public policy issue

- **The current digital overconsumption** is the result of well-identified psychological and social trends. This goes beyond individual "good practices": there is an urgent need to firmly recover and **maintain control over our digital interactions on a collective scale.**
- A better **understanding of the structure and impacts of our current digital practices** is essential to ensure that digital technologies fit with our collective goals and address the challenges of the century.
- **A whole array of public actions should be implemented**, from basic digital education, to the regulation of design techniques, and prevention campaigns against "digital obesity".

Bring about a discussion on digital sufficiency

- The discussions and possible solutions to achieve digital sufficiency can also be applied to developing countries. While the baseline contexts and reference pathways are different, the dynamics governing both uses and supply are broadly similar.
- It is essential to nurture social debates on collective technological choices with objective facts. Keeping this in mind, *The Shift Project* plans to update the prospective scenarios elaborated in 2018, in order to shed light on the potential impacts of the technological innovations currently being implemented (IoT, Artificial Intelligence, edge computing, 5G etc.).

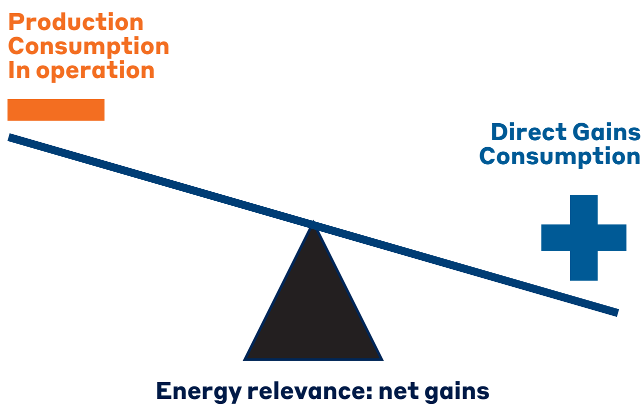
A methodology to assess the energy relevance of connected projects

How efficient are connected technologies?

- At the local level, **technological choices are intertwined with societal decisions.** The emergence of new practices, the influence on other activities (mobility, consumption channels etc.), the interdependence between local governments and private actors in service or maintenance... are dynamics that involve trade-offs that must be understood by local actors.
- Connected solutions, commonly referred to as "smart", are no longer self-contained ("standalone") solutions; they are components of a whole "digital system". **They should be implemented in a fully informed manner**, i.e. by computing all relevant factors. These include technology costs (mostly energy costs and resource consumption), their actual benefits as compared to non-connected technologies, and the indirect effects of their implementation (maintenance costs, the need to create new infrastructure, etc.). Besides, the "need" they are supposed to address should be reappraised and compared to the importance of other unfulfilled "needs".
- Assessing the energy relevance of a new connected layer means being able to measure the net decrease or increase in energy consumption allowed by this layer (taking into account both the energy cost of the production phase and the consumption of the connected equipment in operation).

A methodology and a collection of case studies

- The Smart Technologies Energy Relevance Model (STERM), developed by *The Shift Project* working group, makes it possible to assess the net energy-saving contribution of connected solutions for specific case studies.
- This model is only the embryonic version of a tool, and is intended to be used by both private and public actors to develop genuine operational tools, appropriate for their policies. At *The Shift Project* we decided to implement this mathematical model using Python and to make the code freely available.



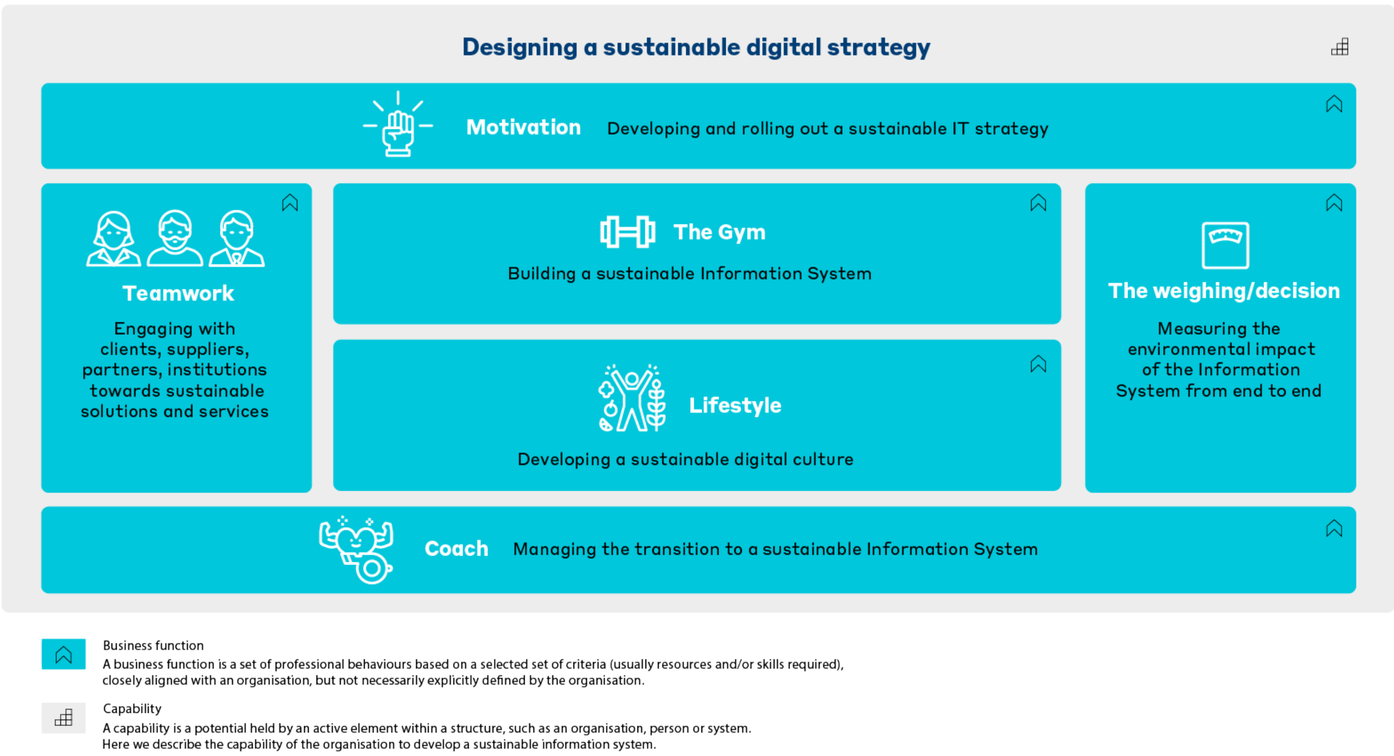
- **Three case studies** provide an illustration of the practical application of this tool and of the required methodology. Two of these case studies are focused on connected lighting (private residence and tertiary office buildings). The third one presents a communicating power meter.

- These studies reveal that a **system may be "smart" even though it is not connected.** This feature should be assessed, considering the additional services it provides, the transversal gains it can generate, and the situations in which these gains can materialise.

- Often, a connected technology may only be a relevant solution where it is part of a broader program. For example it can be aimed at supporting a change in consumption behaviour.

- **The relevance of a technology should not be assumed according to general rules, but assessed for each type of operational case.** Only then will we be able to deploy solely those tools that we know to be truly useful given their environmental cost.

A Guide for the environmental management of Information System



Reference model - high level view - "Get the Information System back in Shape". [Source: The Shift Project, production of the working group]

- **Considering the increasing environmental impact of digital technology, organisations should implement policies for sustainable digital use.**

- Many digital service providers have **greatly optimised their electricity consumption.** This has been done through early initiatives focused on the direct costs of power consumption in server facilities, the introduction of more efficient hardware, and intervention of energy experts...

- **Maximising the digital sector's contribution to carbon neutrality requires us to** not only **optimise the use of energy and natural resources,** but also **to reduce the turnover of equipment and to dedicate resources to the uses with the highest societal value.**

- So far, only a few organizations have **looked holistically at the scope of their information systems**, considering among other things, outsourced services, the impact of infrastructure hardware manufacture, the electricity efficiency of both manufacturing and operating sites, training and management of sustainable digital skills, and choices in software architecture and development. **Where such a comprehensive viewpoint is lacking**, blind spots will lead to option decisions and trade-offs which hide highly significant impacts.

- The digital sector is currently experiencing a **growth dynamic** that is incompatible with physical limitations. As with individuals who need to manage increasing obesity, organisations also need **a program to get their information systems "back**

in shape". The aim of this report is to establish **a common language across industrial sectors** that will guide such programs based on the organizations' knowledge of their information systems.

- The proposed framework can be used to classify initiatives already under way, assess their maturity, strengths and improvement areas, and to benchmark them against the market. This framework, inspired from the practices of a major insurance group and the Open Group standardisation consortium, needs to be adapted to the specific context of each organisation.

A study of our digital practices: improving our understanding in order to make wiser decisions

We need to regain control of our digital practices

- Implementing digital sufficiency requires a better understanding of how our technological choices involve genuine societal choices. **The choice of specific infrastructures and their relevant technologies favours, if only by default, certain types of uses** (whether already existing or emerging).

- **Today, our digital choices tend to rely on automatic behaviours, attention-grabbing designs and business models that generate profit from continuous consumption of pervasive contents.**

- Technologies are not mere tools: they are an additional, structuring dimension of our daily lives, our professional, academic, family, individual and even intimate spheres, and in public spaces.

- **The solution has to be elaborated on the collective scale.** An individual perspective is useful to understand the practical impacts and effects (both positive and harmful) of our practices. However, this individual understanding should fuel debate about collective solutions making it possible to implement actions with a real, large-scale systemic effect.

Public policies that remain to be designed

- **Our digital practices must be addressed in terms of public health policy since they involve health-related risks** (on child development, school and academic performance, information overload, etc.). It is crucial that we build coherent tool-sets adapted to each specific field of our lives (educational, academic, professional, private etc.).

- Several key stakeholders should be involved: public authorities, private actors, national and European regulators, com-munities of designers and consumers, and experts studying the health and sociological consequences of our chosen prac-tices. Working with them, we need to build:

– **Training tools for public institutions** (in education and public administrations) to evaluate the consequences (both positive and harmful) of technological choices.
– **Support materials for people with educational roles** (parents and other educators).
– **Levers to regulate attention-grabbing designs** (autoplay, etc.) and schemes that take advantage of automatic/impulsive consumption behaviours.
– **Reflections on the changes to be made in the economic models of digital product and service providers.**

This report has benefited from the contribution of a number of experts, brought together in a working group led by Hugues Ferreboeuf.

A list of the working group members and the methodology are available in the foreword of the long version of the report.

Press contact:
Ilana Toledano, Communication Officer
+33 (0)6 01 19 64 04 / ilana.toledano@theshiftproject.org

Project contacts:
Maxime Efoui-Hess, "Digital technologies" Project Coordinator
+33 (0)6 35 13 08 37 / maxime.efoui@theshiftproject.org

Hugues Ferreboeuf, "Digital technologies" Project Manager
hugues.ferreboeuf@theshiftproject.org