



In partnership with



Digital Sobriety

A responsible corporate approach

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Digital Sobriety

A responsible corporate approach

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Editorial

Digital technology is a wonderful driver of modernisation and economic and social development, giving us control over our energy and carbon consumption in a great number of sectors, to the point of becoming essential.

However, it is also a significant vector of energy use and greenhouse gas emissions related to the high consumption, even over-consumption, of digital products and services. Thus, digital technology is the cause of 4% of the world's greenhouse gas emissions. This footprint is on a path of strong growth in the order of 8% per year.

The current health crisis is also leading us to reinvent our practices, our organisation, and our management methods through a greater inclusion of remote work. Here as well, digital technologies are heavily solicited, perhaps balancing out other, heavier-consuming behaviours such as travel.

The government has set out a regulatory framework that could impact digital technologies:

- The law on energy and the climate, adopted on 8 November 2019 which commits organisations to becoming carbon neutral by 2050,
- The anti-waste law for a circular economy of 20 February 2020, in particular for the recycling of spare parts and the obligation to inform about digital services' consumption.

Following on the Citizen's Convention on Climate, the government is finalising a "Digital technology and environment" roadmap for late 2020, based on the recommendations of the National Council on Digital Technology. This roadmap will be directed at businesses and government administrations to the benefit of our fellow citizens. In this context, it is urgent to take action to improve digital sobriety to avoid the resulting rebound effects. Many companies and administrations are already doing so.

This report seeks to offer concrete guidance to digital actors within businesses and administrations. It offers a 360° vision of the entire lifecycle of infrastructure and digital services and products.

Like the many Cigref reports, this document is offered as a practical guide and reference for CIOs, CSR managers and their sponsors, CEOs, general managers or secretaries, and executive committee members.

Thanks to all the contributors, this document should inspire you and be useful in orchestrating the actions needed to make progress in companies and administrations. The necessary evolution of skills and practices for all actors is a significant individual and collective challenge to enrich our professions and reinforce the meaning of our actions.

I would like to thank all the members of the working group for the quality of the discussions, the experiences and the best practices that they shared, and for maintaining their commitment and frequent participation despite the current health crisis. This report and the wealth of content found within could not exist without them. I would also like to thank *The Shift Project*, a partner of this working group, in particular Hugues Ferreboeuf and François Richard for their high-quality and enriching contributions to this collective work.

Finally, we would like to thank the group's coordinator, Flora Fischer, for her remarkable work. She methodically, tactfully, kindly and rigorously maintained the high frequency of exchanges that led to the report we are offering to you today.

Happy reading!

Christophe BOUTONNET, Deputy Director of Digital Technology, ENVIRONMENT, TERRITORIES AND SEA
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and **Hervé DUMAS**, CTO, L'ORÉAL,
Co-leaders of the "Digital Sobriety" working group

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Overview

The Cigref working group on digital sobriety, in partnership with *The Shift Project*, gave itself the objective of helping businesses organise their approaches to digital sobriety in a transversal way, starting with the existing work and concrete actions taken in organisations.

This report breaks down the main steps to help you organise your thinking and actions to raise awareness of and implement digital sobriety in large organisations:

- **Identify the prerequisites** to a digital sobriety approach: have executives' sponsorship, modernise infrastructure and architectures, accompany use cases, raise awareness and training.
- **Use strong arguments and action drivers to convince and trigger decisions:** demonstrate the value of "lean" digital projects, anticipate the impact of regulations, collectively define what is required of suppliers, anticipate the impact of upcoming technological breakthroughs.
- **Steer and coordinate actions with dedicated governance:** companies are increasingly working towards coordinating IT and CSR divisions' actions on shared objectives around digital sobriety. You should integrate digital sobriety into the processes and decisions throughout the organisation in a transversal way. This will help you to steer, track, evaluate and improve the organisation's digital sobriety approach.
- **Tools:** to help prioritise and implement digital sobriety actions, a reference of best practices has been drafted. It uses eight key vectors to describe the key steps to take into account in a digital sobriety approach. This reference can be compared to a governance framework used to break down the key domains of action while keeping a philosophy of transversality. It should provide an initial framework that will be useful both for raising awareness and for implementing concrete actions on digital sobriety.



The eight key vectors of a digital sobriety approach

Introduction

For the past ten years or so, we have seen awareness of the environmental impacts of digital technologies progressively increase within companies. Indeed, the growing impact of digital technologies on greenhouse gas emissions, among others, is worrying. The figures speak for themselves:¹

- Digital technologies' energy consumption is currently increasing by 9% per year.
- In terms of greenhouse gas emissions, digital technologies will go from around 3% in 2018 (about the same level as air transport) to around 7% in 2025.
- Only a third of the metals present in smartphones can be recycled.
- Since 1970, the mining of resources has more than tripled.²

The report [‘Lean ICT’: Towards Digital Sobriety](#), published in October 2018 by *The Shift Project*, sheds light on the big trends and factors behind them. One of the conclusions is that the volumes are growing so fast that the energy savings made possible by new technologies are not sufficient to make up for digital technologies' total consumption, and we cannot meet the objectives of the COP 21 in terms of reducing greenhouse gas emissions.

The evolution of digital infrastructure, services and usages' environmental footprint is trending away from the various international commitments made by France and Europe to reducing CO₂ emissions.

Within all organisations that manage information systems for their and their clients' needs, employees are both connected and equipped with many tools and devices. Thus, companies have a non-negligible scope for action to help reduce digital technologies' carbon footprint. They can take action on the choice of infrastructure, architecture, hardware and software as well as the behaviour of their employees, suppliers and end clients.

With the requirements of **their organisation's commitments to society**, the **changing regulations** in this domain, and **its impact on hiring young talent**, the digital divisions of large companies and public administrations have every interest in adopting and/or continuing to develop “digital sobriety” approaches.

Today, there are a great many publications on the topic of the energy, environmental and societal impacts of digital technologies coming from academics, associations, institutions and government

¹ See *The Shift Project* “Executive Summary - ‘Lean ICT’: Towards Digital Sobriety”
https://theshiftproject.org/wp-content/uploads/2019/03/Executive-Summary_Lean-ICT-Report_EN_lowdef.pdf

² See <https://ree.developpement-durable.gouv.fr/themes/pressions-exercees-par-les-modes-de-production-et-de-consommation/prelevements-de-ressources-naturelles/utilisation-des-ressources-naturelles-en-france/article/gestion-et-utilisation-des-ressources-un-enjeu-majeur> (in French)

alike.³ There are many guides that help companies understand and assess the environmental impact of their digital infrastructure and behaviour.⁴

In such a dense landscape, what is the added value of the Cigref working group in partnership with *The Shift Project*? Since 2009, Cigref has studied the problem of information systems' energy consumption by working with several partners to bring the knowledge and expertise needed to reduce digital technologies' CO₂ emissions. Today, the Cigref working group, in partnership with *The Shift Project*, is reaching out to the entire organisation more broadly, maintaining that digital sobriety is an approach that involves the whole company. Taking into account the existing work, this working group insists on the ability of IT and CSR divisions to bring together all departments on this issue to provide an effective, coherent response at scale to environmental and digital problems.

One of the purposes of this deliverable is to demonstrate that it is not just **"virtuous"** but also **beneficial in terms of value** to apply the principle of digital sobriety when making **operational decisions**⁵ concerning **technical** and **digital choices** and to **raise awareness and training** of it internally, which could also have the effect of changing employees' behaviour in their private lives.

What do **IT divisions** currently bring to the **"low carbon" agendas in their companies** and, beyond that, what do they contribute to CSR (corporate social responsibility) on the subject of "digital sobriety"? **What are the prerequisites** to implementing a digital sobriety approach, and **what are the levers that organisations can use** to sustainably reduce digital technologies' environmental footprint? This deliverable will attempt to respond to these questions and will propose a **reference of best practices** that uses eight key vectors that can serve as **a tool to help roll out a digital sobriety approach** for the whole company.

NB: this deliverable does not deal with IT for Green, i.e. the way in which digital technologies can help reduce carbon footprints. We chose to initially only cover the subject of reducing digital technologies' emissions in and by organisations (companies and public administrations). In the same vein, here we will not discuss the social stakes of digital technologies, which are sometimes considered in more global approaches to "responsible digital technology".⁶

³ In October 2019, the French National Council on Digital Technologies launched a working group on the environment and digital technologies, seeking to offer a roadmap for the "convergence of digital transitions and the environment" to the Secretary of State in charge of Digital Technologies.

⁴ See the bibliography at the end of the report.

⁵ For this, the DER (Digital Environmental Repository) from *The Shift Project* is beneficial: it proposes a methodology based on indicators concerning the **production phase** ("Energy Impacts", "GHG emissions", "Metals", "Ore extracted volume", "Devices") and the **use phase** (with the indicators "Energy Impacts", "GHG emissions", "Devices", "Digital actions"). See p. 68 of the report "Lean ICT: Towards Digital Sobriety".

⁶ "Responsible digital technology is a continuous improvement approach that seeks to reduce the environmental, economic and social footprint of information and communication technologies" [source: <https://blog.gen-ethic.com/le-numerique-responsable/>, in French]

1. Current practices in large companies

1.1. What is digital sobriety?

Digital sobriety is an idea that is widely supported today because it encompasses a systemic aspect that is not necessarily found in the concept of Green IT. Frédéric Bordage first proposed this concept in 2008 as part of the GreenIT.fr group. He defines it as “an approach that consists in designing leaner digital services and curbing everyday digital use.”⁷

In addition to trying to **reduce the environmental footprint throughout the lifecycle of digital products and services (production - use - end of life)**, digital sobriety includes a **strong behavioural aspect** that encourages us to temper the boom in usage and devices, which are not always necessary and, above all, sustainable.

Digital sobriety requires a global and transversal approach that concerns the entire organisation and society. Digital sobriety includes stakes that are both strategic and operational. It must be applied to all of an organisation’s digital services and/or technologies but, for this, it must be measurable and measured. Finally, it is essential to raise awareness among all of a company’s employees of the impact that digital technology has on the environment. A better understanding leads to better actions.

Digital sobriety also responds to a question of common sense: knowing how to make the right choices according to digital technology’s added value to the company versus the risks to the environment.

Adherence to this expression of “digital sobriety” is important because it is more “encompassing” and combines technical, economic and societal/behavioural aspects.

1.2. The first actions observed

There are several policies within companies that cover **purchasing, recycling**, the **eco-design** of applications, and the choice of **materials**. But there are few actions taken in terms of behaviour (except for printing) and, especially, technical debt. By technical debt, we mean essentially the historic infrastructure and architecture of information systems. Data hygiene is also an issue that remains underestimated, one which could come into contradiction with the regulatory requirements in certain sectors.

Quite often, new **CEOs** are the ones driving the message of carbon reduction throughout the company, mobilising all divisions. The consideration for the environmental impact of digital technologies

⁷ Frédéric Bordage [<https://www.greenit.fr/2008/05/21/glossaire/> in French]

necessarily impacts **the digital strategy that must combine business with sobriety**, and it is a desire that increasing numbers of young graduates are expressing. Finally, for certain companies, **raising awareness internally** begins with events, challenges, or posters in facilities.

For example, one group gave themselves the objective of making a positive impact on their carbon balance sheet through four major fields of work, which are also intended to raise awareness among employees:

- **Eco-behaviour** throughout the day (email management, encouraging collaborative platforms)
- **Engineering**: developing eco-responsible solutions, testing tools to assess the energy impact of software or sites
- **Data infrastructure** and management
- **Purchasing**: how to influence cloud and equipment providers?

Feedback from

MICHELIN - The group's "Sustainable Digital Technology" approach

To respond to our chairman's desire that "tomorrow, everything will be sustainable at Michelin" as well as the expectations of a growing number of employees, a "Sustainable Digital Technology" working group was created in mid-2019. Each month, it brings together representatives from the Purchasing, Administration, Communication, Sustainable Development and Mobility, Digital, IT, Industry, R&D, and the Services & Solution divisions.

The essentially bottom-up approach to the drafting of the 2019 baseline allowed us to estimate the energy and carbon footprints of our digital activities on a global scale, over their entire lifecycle, both internally and externally (scope 3). This valuation also allowed us to identify our priorities.

Various initiatives are or will be launched, whether concerning user hardware, the operating conditions of our internal data centres, our suppliers (directly or via Ecovadis and CDP) and eco-design. An analysis of our various digital projects showed that we can sometimes make gains in the three aspects People-Planet-Profit and, in any case, we should seek a balance.

Finally, individual behaviour is key in a company of nearly 130,000 people. The topic of digital sobriety was particularly relevant during the 2020 Digital Week, a 100%-online group event that was open to all. On the agenda: the impact of digital technologies, the life cycle, and a first batch of 10 best practices for the start of an initiative that will be here for the long term.

1.3. Priority areas for improvement

The **governance** around digital sobriety is one of the priority areas of work for companies. The issue of the arguments to use to convince all the directors is an essential prerequisite. That is why in this

deliverable we will discuss all the possible levers to trigger decision-making. We have observed that several organisations have a dedicated governance for sustainable development and, in parallel, a governance dedicated to digital technologies steered by CIOs, but there is little to no coordination between the two.

This governance should help to introduce initiatives such as integrating and industrialising digital sobriety in the business cases, that is to say, the ability to **take digital technology's environmental footprint into account throughout a project's decision-making chain**, as well as the parameters corresponding to environmental risks.

The subject of digital sobriety is eminently transversal. **All departments must coordinate with one another.** We need a more ambitious policy, supported at all levels of the company, from top management down to all users. In parallel, we must find **ambassadors for responsible digital technology** beyond IT and CSR and have all the chain's actors participate in this issue (marketing, users/managers, GM, research, purchasing, etc.).

The main observation, however, is that there is a lack of **sponsorship in the divisions** and that there is **not yet enough awareness and training** within companies to promote a major understanding from employees or to be able to propose a digital offering that is entirely eco-responsible from end to end.

Also, we have observed that, in the current landscape, there is a lack of **common operational tools and repositories shared by companies**. Several companies belong to associations that are working on these issues and that have already produced guides of best practices and benchmarks. The INR (*Institut du Numérique Responsable*⁸, Institute for Responsible Digital Technology), for example—represented by several member companies within the working group—has already brought several best practice guides to the community, and offers a “Responsible Digital Technology Label” and training on the topic. Of course, drafting shared reference guides and measures involves consulting and constructive contribution from the ecosystem: IT's environmental balance sheet is a necessity for all, but there is a lack of shared indicators. Certain initiatives are welcome, such as the [Negaoctet](#) project (link in French), for example, which seeks to assess the environmental impact of digital services. Internally, repositories of CSR criteria for purchasing (devices, software, IT services, intellectual services, etc.) are also increasingly widespread. We propose adding another element to this collective effort: a **repository of the best practices** that met the general consensus of the 40 organisations represented in this working group.

The difficulty in obtaining reliable, quantified **information from companies' suppliers is a major obstacle to evaluating digital technologies' global environmental footprint**. You have to work with

⁸ <https://institutnr.org/> (in French)

suppliers to have a systemic impact. This is why the working group organised a hearing for four suppliers (cloud or manufacturers) about their digital sobriety policy: Google, Microsoft, OVH Cloud, and Dell. We will come back to this topic in section 3.4 “Defining requirements of suppliers”.

There are no **environmental impact measures for new technologies** (AI, blockchain, IoT, etc.). Suppliers do not always share their energy consumption nor take into account scope 3 in their analyses. Let us recall that there is a three-scope scale that distinguishes between different sources of greenhouse gas emissions using ADEME’s definition:

The three scopes of greenhouse gas emissions - ADEME

“The main international standards and methods define three categories of emissions:

- **Direct greenhouse gas emissions (or SCOPE 1):** Direct emissions from fixed or mobile installations located inside the organisational perimeter, that is to say, emissions coming from sources held or controlled by the organisation, for example, combustion from fixed and mobile sources, industrial processes other than combustion, emissions from ruminant animals, biogases from landfills, coolant leaks, nitrogenous fertilisation, biomasses, etc.
- **Indirect greenhouse gas emissions (or SCOPE 2):** Indirect emissions associated with the production of electricity, heat or steam imported for the organisation’s activities.
- **Other indirect emissions (or SCOPE 3):** The other emissions indirectly produced by the organisation’s activities that are not included in scope 2, but which are connected to the complete value chain, for example, the purchase of raw materials, services or other products, employee travel, upstream and downstream transport of goods, managing waste generated by the organisation’s activities, use and end-of-life of the products and services sold, fixed production assets and goods, etc.”⁹

Finally, one of the areas for improvement most widely shared by the working group is the **ability to produce dedicated KPIs** (Key Performance Indicators), or that the company’s KPIs take into account the “responsible digital technology” aspect, to identify the levers of action and to track the effectiveness of the initiatives taken.

How can we prioritise these various areas of work to lead a coherent and effective approach to digital sobriety in the company? In this deliverable, we propose a way to prioritise these initiatives:

- **The prerequisites** to a digital sobriety approach
- **The levers of action** to convince and trigger decisions

⁹ https://www.bilans-ges.ademe.fr/en/accueil/contenu/index/page/corporate_reporting/siGras/0

- **Governance:** how to include digital sobriety in the processes and decisions on an organisation-wide scale?
- **Best practices:** a repository of best practices that describes the domains of major steps to be taken into account in a digital sobriety approach.

2. The prerequisites to a digital sobriety approach

2.1. Sponsorship from executives

Many CEOs have implemented policies concerning their companies' contribution to the objective of carbon neutrality laid out by the COP21. Digital technology is taking its place in these policies, and a great majority of organisations are beginning to introduce programmes and/or define strategies to reduce digital technology's environmental impact. In passing, we should also note that digital technology's share is not directly identified in most cases, and its exhaustivity is not assured, notably due to the lack of information from suppliers, as noted in the preceding chapter.

Feedback

PÔLE EMPLOI - Responsible Digital Technology at the heart of the seven IT transformation guidelines at Pôle Emploi

Responsible digital technology is now at the heart of the IT transformation at Pôle Emploi 2022. This is an approach that has been under way for a long time that has allowed us to show such an ambition. One of the most helpful drivers of change at the executive level was being recognised by outside third parties, being part of an ecosystem, creating partnerships with NGOs, working closely with associations and companies in the social and solidarity economy, measuring its performance and levels of maturity using benchmarks, etc. **This recognition from an entire ecosystem with the sharing of best practices helps to raise awareness of the importance and the urgency of the mobilisation needed around this issue in your own company.**

DIGITAL SOBRIETY

The prerequisites to a digital sobriety approach

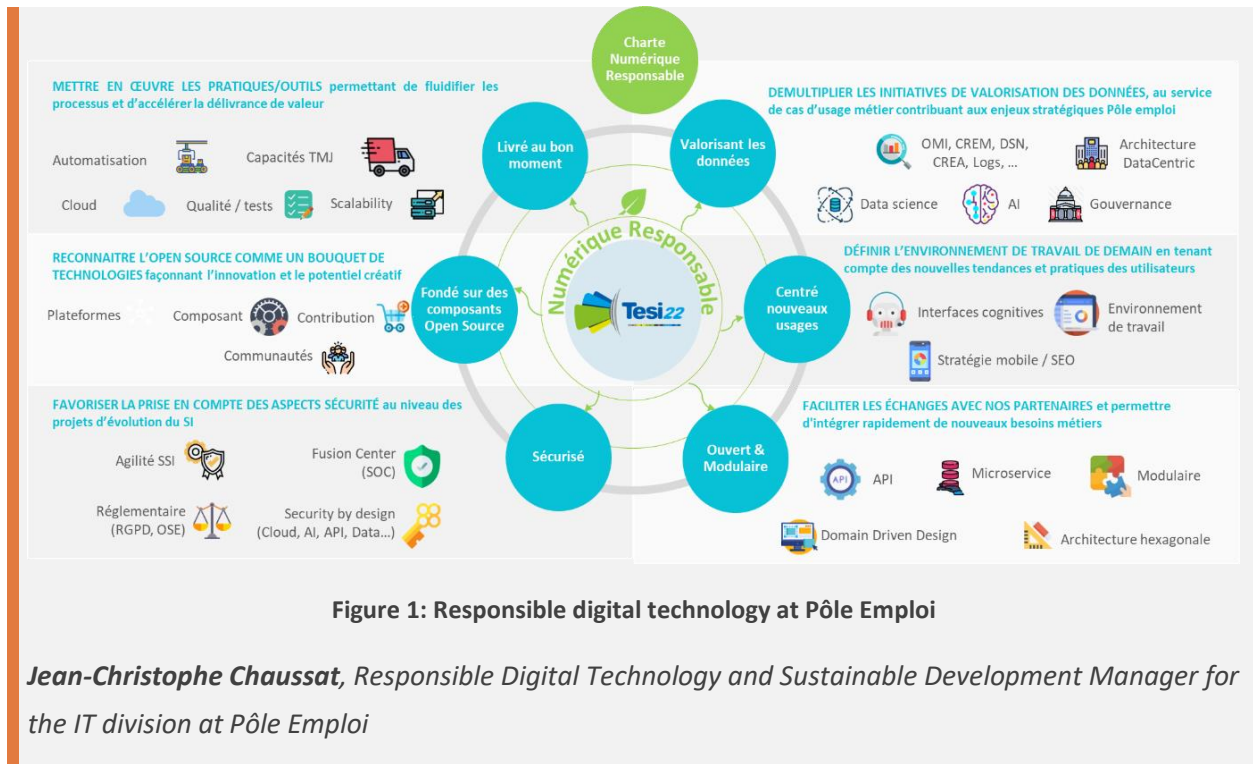


Figure 1: Responsible digital technology at Pôle Emploi

Jean-Christophe Chaussat, Responsible Digital Technology and Sustainable Development Manager for the IT division at Pôle Emploi

INR has developed an interesting tool to take executives' commitment further: the "Responsible Digital Technology" charter.¹⁰

The Responsible Digital Technology Charter is a text that summarises the signatory's commitments in terms of digital technology, whether they represent a company, an association, a small business or a public institution. This charter drives the organisation to evaluate themselves and to constantly try to improve. Furthermore, it allows the organisation to communicate on its approach to quality. This helps it to reach its clients as well as its suppliers and employees. By signing this charter, the organisations affirm their commitment to undertake a "Responsible Digital Technology" approach for their organisation on five key aspects:

- Optimise digital tools to limit their impact and consumption,
- Develop inclusive, sustainable service offerings that are affordable to all,
- Introduce ethical and responsible digital practices,
- Make digital technology measurable, transparent, and easy to read,
- Foster new behaviours and values.

¹⁰ Available online: <https://charte.institutnr.org/> (in French)

2.2. Technical debt

2.2.1. Take into account the impact of infrastructure and architectural choices

There are many studies¹¹ on the level of waste of companies' historical infrastructures. Infrastructure is a choice that impacts the whole company. Therefore, this choice can be made on environmental criteria by asking, "what is the energy efficiency of this infrastructure, and what is the plan to recycle it and recover waste?".

The bigger a data centre is, the more opportunities there are to optimise its energy efficiency. Above all, it is an industrial issue that mainly involves the major suppliers. Certain companies have chosen a shared infrastructure via a shared public cloud. This allows for gains in terms of energy efficiency since the number of machines used is adjusted on demand and in real time. There is no need to run machines 24/7. Investment costs are lower thanks to the proportionality between consumption and resources and, for most data centres, relies on low-carbon electricity.

A lean infrastructure also requires longevity, which is why they must be as robust as possible (both physically and in terms of software), for example by choosing devices according to their repairability index, reusing recycled components and elements in new servers, or choosing hardware and software according to their expected lifespan and the supplier's level of independence (open source modules should be preferred to ensure a longer software lifespan).

The choice of digital service architecture is at the heart of the CIO's prerogatives and is an important responsibility. This entails **designing digital services** so as to only consume what the organisation needs, when it needs it. It also requires considering **changes to skills and practices**.

Introducing the issue of digital sobriety through the company's architecture is relevant because it takes into account the entire life cycle and all the processes, and it is aimed at CIOs, who must not remain stuck in the sole philosophy of energy optimisation.

Anchoring notions of **"frugality" and "pooling" in infrastructure choices** is essential to reducing their impact on the environment. Today, 59% of companies pool their physical hardware, according to the infographic of the AGIT 2020 barometer¹² but, according to this same barometer, only 22% of

¹¹ See for example: Cécile Diguët and Fanny Lopez, *L'impact spatial et énergétique des data centers sur les territoires*, ADEME report, 2019, Summary
[https://www.ademe.fr/sites/default/files/assets/documents/synthese_enenum-20fevrier2019.pdf, in French]

¹² <https://alliancegreenit.org/media/ressource-infographie/infographie-barometre-agit-2020-v3.pdf> (in French)

companies analyse their infrastructure's lifecycle. The danger here is to do little more than optimisation, responding to operational and financial prerogatives to the detriment of a more global study on controlling the reduction of the digital footprint. While switching to the public cloud "naturally" reduces organisations' scope 2, which is often the only scope currently measured, we must not neglect the **rebound effect that the exponential use of digital services and tools** can cause, even over infrastructures that are by nature more efficient in terms of resource consumption. Unfortunately, there is little data allowing us to evaluate scope 3, i.e. the impact on all of an organisation's value chain, which also involves a more transparent sharing of the ecosystem concerned by its own environmental footprint.

Furthermore, while **the switch to shared infrastructures does help to better optimise resources, it makes it more difficult to maintain control over and introduce lean usages**. So, we must remain vigilant about our ability to inform and raise awareness among users and business units about the impact of their requests via indicators that are easy to read and easy to understand. This kind of indicator could be made available or shared by cloud providers who already have tools to measure their resource consumption in real time.

Feedback

AXA - The drivers to create a sustainable information system

To create a sustainable information system, we must either refuse or optimise by influence system requirements: storage capacity (minimise data, for example), energy needs, and machine availability must be reduced. On the other hand, certain requirements must be increased: longevity, maintainability, disassembly/repairability, portability/interoperability, robustness. For this, we identify all the areas in the different levels of architecture (business units, behaviour, development, infrastructure) where we can forgo or optimise.

Three key points to remember for a sustainable information system:

1. **Identify areas where we can forgo or optimise IT:** this work should be done in close collaboration with business units and use cases. We must also use infrastructure to regain control over systems and take measurements.
2. **Introduce a system of constraints:** we must be bold and place constraints on the systems (before the constraints are placed on us). The idea is to formalise, make concrete, even automate a certain number of constraints on usage, data, infrastructure and software by iteration.
3. **Agility in the service of frugality:** agility ensures that the digital product is created as close as possible to its real use case, in particular by closely integrating the business unit into short development cycles. This practice limits the development of features initially requested but ultimately never used.

Céline Lescop, Lead Data Architect & Digital Sustainability, AXA

2.2.2. Take into account hardware life cycle management

Recycling is often seen as enough to manage the issue of hardware's end-of-life, but this is not the solution to be preferred from an environmental standpoint. Not all materials can be recycled. Furthermore, recycling involves a process of destruction/production, itself a generator of emissions. Repair or reuse are solutions to be preferred whenever possible. Certain sectors are specialised in recovering and reconditioning hardware, for example the Ateliers du Bocage,¹³ an adapted and employment insertion company belonging to the Emmaüs movement, which recovers and reconditions professional hardware coming primarily from large companies and administrations, responding to environmental, social and solidarity objectives. Where recovery is not possible, certified channels should be contacted to recycle electric and electronic waste¹⁴ in respect of regulations in force. But obviously one of the key rules is to avoid replacing devices too frequently and/or superfluously, and to maintain them well so they last as long as possible. Progress remains to be made on this issue. According to the AGIT 2020 indicator, only 28% of companies surveyed stated that they were aware of regulation on electric and electronic waste, and 20% stated that they knew the amount of such waste that they produce per year.¹⁵ On a global scale, 85% of digital technology waste is not processed in a certified recycling channel.¹⁶

Also, we must not forget that the company remains liable until final recovery of the waste (article L541-2 of the French Environment Code).

Feedback

SNCF - Managing electric and electronic waste and our reuse policy

Today at SNCF, computers are no longer waste. Instead, they are used electric and electronic goods. Until 2017, computers were systematically destroyed, in particular for reasons of information security.

There were two major turning points:

- In 2017, **outgoing PCs became used hardware.**

¹³ <https://ateliers-du-bocage.fr/nos-solutions/vente-materiel-doccasion/> (in French)

¹⁴ In French, “Déchets d'équipements électriques et électroniques”, commonly referred to locally as DEEE.

¹⁵ <https://alliancegreenit.org/media/ressource-infographie/infographie-barometre-agit-2020-v3.pdf> (in French)

¹⁶ “The Global E-waste Monitor 2020”, p.23 <https://publications.globalewaste.org/v1/file/271/The-Global-E-waste-Monitor-2020-Quantities-flows-and-the-circular-economy-potential.pdf>

- In 2019, e.sncf was accompanied by an external company to **give its hardware a new life** with the support of the Legal, Purchasing, Sustainable Development and IT departments. Since the switch to Windows 10 required us to part with many computers, the old hardware was recovered for reinsertion.

Thierry Vonck, Responsible Digital Technology Representative, SNCF

Organising the policy of reusing workstations is under way in large organisations, as witnessed by the “REEEboot” scheme.¹⁷ This scheme helps associations with projects to reduce social inequality and foster a return to work to obtain the IT equipment needed to bring their projects to fruition. Thanks to this scheme, several companies ensure their devices are reused. The REEEboot project has many objectives:

- Extending workstations’ lifespan beyond their life in the company. This is the best policy to adopt to limit the impact of electric and electronic equipment on the depletion of resources and waste pollution,
- Participate in creating jobs in the social and solidarity economy,
- Help small associations and major organisations get to know each other during an awards ceremony. During this event, the associations present their solidarity initiatives to raise awareness and rally companies to this approach to reuse in companies.

2.3. Digital debts

2.3.1. The impact of usage

The impact of usage can be understood in two ways, either in an individual manner concerning the end user and how they consume the digital products and services available to them, or in a general way in terms of the growing digitisation of processes, which also involves the responsibility of the companies that offer these digital services. Naturally, these two aspects overlap, but the margin for manoeuvre is not the same. The company can have a view of the entire lifecycle of its digital products and services that allows it to measure its impact and, up to a certain point, control the rebound effect of uses in the restricted scope that is the organisation. Unfortunately, the end user’s consumption is hard to measure and also depends on their level of information.

But the mechanism that is at work in this analysis of the impact of usage is the same: it is the rebound effect (or Jevons paradox). While this expression originated in economics, today it can be applied to

¹⁷ <http://reeeboot.fr/> (in French). In a “virtuous cycle” philosophy, the site <http://reeeboot.fr/> integrated a responsible digital service design, eco-design for software and digital accessibility (so that the site functions on old-gen devices with limited bandwidth) from the very start.

many fields. The rebound effect represents the “*reduction or cancellation of energy savings via direct and indirect changes to society’s behaviour, for example by reducing energy costs and thus increasing demand and consumption*”.¹⁸

The problem that we must confront today, in an ultra-digitised world, is how to successfully balance the requirement for optimisation and improved technological performance (from an economic, technical and environmental standpoint), with the exponential and systemic increase in usage which is, in fact, corollary. The more resources are available, the more they are used, of course. As *The Shift Project* says, “*the system of usages is intrinsically linked to the physical reality of infrastructures: the change in the volume of data leads to the growth of the infrastructure that transports, processes and stores it, allowing new use cases to appear, themselves more data-intensive thanks to this new availability. It is this automatic self-fulfilling behaviour that governs how the world’s digital system is evolving today and which digital sobriety is calling into question.*”¹⁹

Companies can act at their own level in the working environment (as we will see in the next section) but also by implementing an eco-design approach to its digital services to reduce the impact of their consumption. It can also try to influence end users’ behaviour by including energy reducing parameters by design, whatever the service or product used. They can also simply provide information or indicators that try to raise awareness more widely, such as the *Carbonalyser add-on*, for example, which shows internet users the equivalent CO₂ emissions of their internet use.

2.3.2. Remodelling the digital work environment

One of the preliminary steps to a transversal approach to digital sobriety is to have it scale to the level of employees’ digital culture. There are two ways companies can go about this: raising awareness and training, for one, and use existing levers to spread messages, such as systematically including a criterion on the alignment with the “digital sobriety” strategy as often as possible in the project portfolio and defining “digital sobriety” criteria for each new project. The latter possibility has the benefit of combining the environment with economic value.

This example is particularly relevant from a standpoint of employees’ digital work environment. Collaborative workspaces use much less energy than sending emails with attachments, and it is a collective performance criterion that everyone can appreciate on a daily basis. The work environment might be the first milestone (one might say Trojan horse) to bring digital sobriety into IT projects.

¹⁸ Article in *Le Monde*, *L’effet rebond pénalise les économies d’énergie et le climat*
https://www.lemonde.fr/planete/article/2011/02/24/l-effet-rebond-penalise-les-economies-d-energie-et-le-climat_5981970_3244.html (in French)

¹⁹ The Shift Project, Intermediate report, “*Déployer la sobriété numérique*”, 2019

Feedback

***VEOLIA - The energy savings from deploying a new digital workplace
(SATAWAD project)***

One of the group's major projects, "SATAWAD" (secure anytime, anywhere, from any device) was the chance to study introducing a new digital workplace as early as 2017. The objective is to facilitate the sharing of information by employees scattered all around the world and make travel easier for employees who move around, both in a secure way. In addition to these advantages, there is a strong environmental aspect to Veolia's IT equipment and usage. The SATAWAD project is a company-wide project driven by general management which impacts more than 130,000 employees in more than 50 different countries. 80% of employees have switched to Chromebook with training and communication.

Using these collaborative tools **reduced greenhouse gas emissions by 52%**, with three main drivers:

1. Using G Suite solutions (instead of Microsoft),
2. Using Chromebooks,
3. Decommissioning the PC infrastructure related to this transformation.

Today, there is an enormous amount of work that goes into teaching users, and sobriety issues are included in all digital transformation programmes.

It is also relevant to suggest combining personal and professional use to curb the proliferation of electronic devices and media within the company and reduce their impact. Remember, the phase with the greatest impact on greenhouse gas emissions in the IT equipment lifecycle is manufacturing. For example, Samsung presented an analysis of the lifecycle of its Galaxy S6 in its 2016 annual environmental report, which confirmed the major impact of the manufacturing phase, in particular "pre-manufacturing", which includes ore and raw material extraction.

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% émission de GES du S6

Figure 2: Samsung, Results of the Global Warming Impact of the Galaxy S6 ²⁰

More and more suppliers and manufacturers are communicating on this subject. For example, Dell also provides detailed public analyses of the carbon footprint of its devices and proposes initiatives to collect and reuse waste.²¹

Proposing solutions and devices to employees that are smoother and more agile in terms of use (collaborative platforms, double-SIM telephones, etc.) and, more importantly, more environmentally friendly can have a positive impact on everyday behaviour, possibly even triggering a virtuous circle. If employees are encouraged to take care of their devices and made aware of the environmental impact of the whole life cycle of their IT equipment, they can replicate this behaviour in their private lives, feeding into this virtuous cycle.

2.4. Raising awareness, a prerequisite to any initiative

2.4.1. Developing awareness and knowledge

The most striking observation in companies is that there is a great lack of knowledge about digital technology's environmental impact. Raising awareness is essential and must concern all employees. To encourage this, **the company must communicate on the scale and use analogies** (for example,

²⁰ Samsung, Annual sustainability report, 2016, p.165
<https://images.samsung.com/is/content/samsung/p5/fr/aboutsamsung/2017/pdf/about-us-sustainability-report-and-policy-sustainability-report-2016-en.pdf>

²¹ Cf. <https://corporate.delltechnologies.com/en-ie/social-impact/advancing-sustainability/sustainable-products-and-services/product-carbon-footprints.htm#tab0=0>

sending a 1-MB email is the equivalent of using a 60-watt lightbulb for 25 minutes²²), as well as digital best practices and environmentally friendly behaviour. It can also call on training providers.²³

2.4.2. Training in eco-design

Naturally, raising awareness and training also concerns the design and development professions in the company. While eco-design methods are understood and standardised,²⁴ they are not always obvious to implement. There is a grey area in development, for example: many companies want to provide their developers with tools to optimise their code but, once again, there is a lack of indicators on servers' energy consumption.

There are online diagnostic tools that measure websites' environmental impact²⁵, which is a way to evaluate your progress in implementing best practices.

Feedback

ORANGE - Reducing software's energy impact

Software is consuming increasing amounts of hardware resources (memory, CPU, etc.). Work on software eco-design began in 2013 with a collaborative project funded by ADEME, in partnership with *Greenspector*: **by optimising the lines of code** (in libraries, loops, etc.), **we could reduce software's energy consumption by 10 to 15%.**

After consultations and discussions with the ecosystem, it became obvious that we should not just focus on the code, but take a three-pronged approach:

- **Limit the number of features** offered to the end customer (which each generate additional lines of code and consume memory (RAM) and CPU resources, etc.) so that they only respond to clients' real needs.
- **Optimise the architecture**: choose the right libraries with the right modularity and scalability to give the developer the right environment in which to be more frugal.
- **Support developers** with recommendations, but above all provide them with measurement tools to track applications' energy consumption throughout the development process.

Marc Vautier, Community Advisor for Orange Experts, Energy & Environment at Orange

²² "If we take its total life cycle into account, simply sending a 1-megabyte (1 MB) email is like using a 60-watt lightbulb for 25 minutes, the equivalent of emitting 20 grams of CO₂," according to Françoise Berthoud as cited in Laure Cailloce, "Numérique le grand gâchis énergétique", CNRS Journal, 2018.

²³ For example, INR provides awareness modules: <https://www.academie-nr.org/sensibilisation/#/> (in French) as well as *La fresque du numérique*: <https://www.fresquedunumerique.org/> (in French)

²⁴ The ISO 14062 standard defines eco-design standards. In particular, ISO/TR 14062:2002 describes current concepts and practices related to integrating environmental aspects into product design and development (the term "product" encompassing both material goods and services).

²⁵ For example: <http://www.ecoindex.fr/> and <http://ecometer.org/>

For now, certain subjects are still research problems, for example, being able to measure the energy consumption of lines of code, or microservices that function off of containers. Since the services are on distributed, virtualised, and containerised architectures with scalability that varies depending on when it is executed (which depends on the load), we can see how complex the problem is. This is why companies recommend working with doctoral students on their theses to study these issues, as well as continuing to develop dedicated training courses (for students and professionals), integrating Green IT in education starting in secondary school, and including eco-design training in engineering courses.

Eco-design must not be seen only from a technical angle but also understood from a business standpoint, starting with functional units and optimising user journeys (“cutting the fat”).

2.4.3. Bringing employees on-board

Raising awareness and training are some of the most widely shared initiatives on the subject of digital technology and the environment: training in responsible digital technology, eco-design, organising internal repair cafés, etc. are increasingly popular with employees. Modelled after the Climate Collage, there is also the “Fresque du numérique”²⁶ (Digital Collage) which is a workshop that allows teams to understand the environmental issues in digital technology in a fun way. It also tries to present an outline of the solutions for sustainable digital technology and open up discussions among participants on the subject to identify potential ways they can take action.

Drafting internal charters on digital ethics in a broad sense also creates constructive collective dynamics that provide great meaning by involving employees in studying how to use digital innovations in a desired and desirable way. In many organisations, we also see executive committees’ desire to raise awareness of the environmental impact of Deep Tech (breakthrough innovations made by young start-ups), their rebound effects, and the potential harm to brand image.

Some companies have preferred challenges to involve all employees as much as possible in a fun, educational way with a social objective around digital technology’s environmental impact.

Feedback

VEOLIA - A collective and solidarity challenge to bring employees on-board

Veolia’s CIO mobilised their teams around a collective and solidarity challenge called “One for All”, the pilot phase of which was launched in late 2019.

²⁶ <https://www.fresquedunumerique.org/> (in French)

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The challenge is part of an organised awareness campaign whose objective is to:

1. Inform and **raise awareness** of digital technology's impact on the environment using impactful figures and inspirational messages while reminding that the IT strategy is a full part of a philosophy of sobriety, frugality and sharing.
2. **Promoting best practices.** The objective is to encourage virtuous practices within headquarters, in particular among IT employees.

In terms of awareness, a manifesto for digital sobriety was shared with the IT community, translated into several languages. Executive committee members were part of the project that fit perfectly with Veolia's *raison d'être*. For mobiles, Veolia promotes the "Mobile Carbonanalyser" tool (proposed by The Shift Project) which informs you of your CO₂ consumption in real time.

In terms of best practices, Veolia's CIO proposed a challenge. The objective of this challenge was to **encourage eco-responsible behaviour at work**. 35 initiatives were identified as applicable by the team in charge of the challenge. All the participants collected points which were paid out to an association that takes part in an economic and solidarity project that partners with the Veolia Foundation. These eco-responsible best practices were quite simple (inspired by ADEME). They were categorised into three families:

1. **The communication methods:** take action on the inbox
2. **The devices:** take action on *smartphones* and *laptops*
3. **The physical work environment** (plastic cups, recycling bins, etc.).

Each employee who wanted to participate in the challenge received a collection representing the 35 best practices in the form of cards ranging in value from 1 to 10 points. Once adopted, each participant was invited to tick them and save them via a **dedicated, serverless internal application**. Individual and team scores were then updated in real time. One point saved equals one euro donated to Up2green, a reforestation association. The challenge took place over one month. Community managers reported on the event, particularly around three community objectives of 5,000, 10,000 and 15,000 points corresponding to the number of trees that the association would plant thanks to everyone's efforts.

At the end of the *One for All* challenge, the IT division was pleased to have reached 12,934 points with a participation rate of 89%. Up2Green will plant 4,800 trees. After 30 years, this will help to store 850 tonnes of CO₂.

Valérie Boidron, Group IS&T, Content and Coordination of Internal and External Communication, and Emilie Ovaert, International Training Programs Director

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One For All Collector

Tous Unis pour Notre Environnement

VEOLIA

Nom du ressourceur: _____

INCLUS NE LÂCHONS RIEN

Famille Appareils J'allume la luminosité de l'écran de mon ordinateur ou de mon mobile. + 1 point #a1	Famille Appareils Je n'utilise plus de téléphone fixe. + 1 point #a2	Famille Appareils Je supprime les économiseurs d'écran animés. + 2 points #a3	Famille Appareils Je ferme les onglets ouverts de mon navigateur lorsque je n'en ai plus besoin. + 2 points #a4	Famille Appareils J'ai supprimé de mon mobile les applications que je n'utilise pas. + 2 points #a5	Famille Appareils J'éteins mon ordinateur le soir. + 3 points #a6	Famille Appareils J'enlève mes notifications quand c'est possible. + 3 points #a7	Famille Appareils Je supprime les fichiers drive dont je suis propriétaire non utilisés depuis 1 an, ou inutilisés. + 5 points #a8	Famille Appareils Je réduis la qualité de visionnage des vidéos Youtube. + 5 points #a9	Famille Appareils J'ai rendu mon PC ou kiosque. J'utilise un chromebook. + 10 points #a10
Famille Mail Je cible mes destinataires lorsque j'envoie un email. + 1 point #m1	Famille Mail Je supprime régulièrement tous les spams. + 1 point #m2	Famille Mail Je n'envoie plus de documents en pièce jointe mais un lien. + 2 points #m3	Famille Mail Je nettoie mes listes de distribution (suppression doubles, erreurs). + 2 points #m4	Famille Mail J'évite la fonction "Répondre à tous" lorsque pas nécessaire. + 2 points #m5	Famille Mail Je limite les envois d'emails en masse. + 3 points #m6	Famille Mail Je nettoie régulièrement ma boîte mail. + 3 points #m7	Famille Mail Je privilégie la messagerie instantanée plutôt que le mail pour un travail d'équipe. + 5 points #m8	Famille Mail Je me désabonne des newsletters que je ne lis plus. + 5 points #m9	Famille Mail Je coupe la caméra en vidéo quand ce n'est pas nécessaire. + 10 points #m10
Famille Bureau Je prends les escaliers plutôt que l'ascenseur. + 1 point #b1	Famille Bureau Je ne connecte pas ma lampe sur la prise verte. + 1 point #b2	Famille Bureau Je ne fais plus imprimer mes tickets de caisse. + 2 points #b3	Famille Bureau Je n'ai plus de lampe de bureau. + 2 points #b4	Famille Bureau Je conserve les feuilles imprimées pour les utiliser en brouillons. + 2 points #b5	Famille Bureau J'imprime en noir et blanc par défaut. + 3 points #b6	Famille Bureau Je minimise les impressions papier. + 3 points #b7	Famille Bureau Je bois mon café/thé dans une tasse ou un gobelet Nespresso. + 5 points #b8	Famille Bureau Je bois de l'eau dans une gourde ou un gobelet Nespresso. Plus de bouteilles plastiques. + 5 points #b9	Famille Bureau Je trie mes déchets dans les bacs dédiés (papiers, piles...). + 10 points #b10
BONUS Je viens au travail en vélo, à pied ou en trottinette. + 1 point #bon1	BONUS J'utilise les transports en commun ou le covoiturage (Odoxi par ex). + 5 points #bon2	BONUS J'écris un article sur la sobriété numérique. + 10 points #bon3	BONUS Je réalise une vidéo sur une initiative écoresponsable. + 10 points #bon4	BONUS Je présente auprès de mon équipe une initiative écoresponsable (en Printaparc par ex). + 10 points #bon5	#WEWORKTOGETHER J'ai adopté cette pratique. Je la coche sur mon collecteur et l'enregistre de suite dans l'application. Scan me				

IS&T - Décembre 2019

Figure 3: "One for All" awareness programme - VEOLIA

Feedback

AG2R LA MONDIALE - The Osterputz Challenge, a great big digital clean-out

In Alsace, the Osterputz is an ancestral tradition. At the end of winter, we celebrate the arrival of spring by cleaning our houses from top to bottom.

Organised by the Division of Organisation and Information Systems (DOSI) in collaboration with the Corporate Social Responsibility (CSR) Division for the past two years, Osterputz is an in-company challenge where everyone contributes to a strong collective result: reducing costs related to computer storage and backups and, for course, reduce the environmental impacts.

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This challenge invites employees to clean out their hard drives, inbox and shared folders of any **obsolete or unused data**, and to adopt best practices for everyday digital storage and backups. It also occurs during Sustainable Development weeks.

For the second year, employees were also encouraged to identify any **unused IT equipment** so they could be reassigned or recycled. Another major goal was to use Osterputz as a chance to **adopt responsible digital eco-behaviour on a daily basis** to help reduce energy waste.

“Responsible digital technology isn’t just for three weeks out of the year: it’s for the whole year, and many years to come!”

Many employees took part, and the objectives were reached, allowing for a donation of €10,000 to the Nicolas Hulot Foundation (which was selected by an online vote) in the first year and to plant 1,000 trees this year.

Annie Steinmetz, DOSI/Environmental Performance

3. Drivers of action

There are several things you can do to convince decision makers of the need for a digital sobriety approach in their business.

3.1. Demonstrate the value of lean digital projects

It is essential that we move beyond the usual opposition between the economy and the environment. There are many ways to demonstrate that digital sobriety generates value. First, because it impacts the company's carbon accounting and, thus, its extra-financial ratings, it saves money, attracts young graduates, and showcases new skills. Here are a few arguments to keep in mind to convince others of the value of a digital sobriety approach:

- **Digital sobriety has a positive impact on the business case:** certain organisations develop “environmental business cases” to measure and forecast the environmental impact of digital technology in each project. It uses the same rules as a traditional business case, taking into account recurring energy costs, machine costs, etc. This provides an indicator in euros of the savings or losses caused by CO₂ emissions.
- **Digital sobriety avoids certain costs**, especially in terms of energy consumption. We could supplement economic and financial statements with an evaluation of the environmental savings made by a digital sobriety approach.

Feedback

SCHNEIDER ELECTRIC - Digital sobriety's ROI at Schneider Electric

In terms of ROI and compared to a growth scenario, Schneider Electric's digital sobriety policy would:

- Save €10 million in costs per year by reducing energy consumption.
- Avoid 60 kT of CO₂. The reduction in CO₂ emissions is equivalent to €2 to 5 million per year.

This approach also yielded other, non-financial advantages:

- To calculate the KPI, the repositories (Application, CMDB repositories) must be updated.
- Green IT supports streamlining messages (technical debt, switching to the cloud).

In short, Schneider Electric highlights the fact that digital sobriety can lead to profitable projects with lower investments and support messages of streamlining.

Thierry Hanau, Responsible Digital Technology Expert at Schneider Electric, seconded to NégaWatt.

- **Digital sobriety attracts talent:** In the current context, the social pressure placed on businesses for them to take into account environmental and energy transition issues is bound to increase. To such a point that the issue is also becoming a hiring issue. Remember that students published “Wake up Call on the environment: A Student Manifesto”.²⁷ The team that drafted it included students from HEC Paris, AgroParisTech, CentraleSupélec, École Polytechnique and ENS Ulm. This manifesto has already been signed by over 32,000 students and clearly states: *“We want to use the leverage we have as students by turning ourselves towards the employers we deem to be in agreement with the grievances we claim in this Manifesto.”*
- **Digital sobriety allows you to improve your image and gain influence:** for this, the **issue of certification** is widely recommended. Having a certification that recognises companies’ environmental performance allows you to gain influence and credibility on these issues (for example, see the “[Numérique Responsable](#)” certification from INR. [ISO 50001](#) certification, which is used to develop an energy management system, is also relevant. It helps companies gain control over their entire energy impact, including the scope of end-client consumption.
- **Digital sobriety is a new lever for developing the ecosystem:** digital sobriety approaches can be used to develop joint projects, even fruitful alliances, such as by:
 - Developing a repair workshop ecosystem (see Reeeboot)
 - Sharing standards of measurement and progress in digital sobriety between companies and making benchmarks
 - Proposing coalitions with the construction sector so there is systematically a way to reuse the heat generated by IT in buildings
 - Getting involved in the European ecosystem, in the Green Deal and the European action plan for a circular economy
- **Digital sobriety is a driver of innovation and of a search for efficiency:**
 - Combine high tech and low tech
 - Do better with less

3.2. Anticipate the impact of regulations

3.2.1. Weak signals

Digital technology’s impact on the environment permeates the public and private spheres. Initiatives are proliferating, and the government’s desire to show exemplarity in the matter augurs a change in legislation. An inter-ministerial circular covers how the government can reduce its energy impact. It includes a measure (measure 20) on responsible digital technology: all **government ministries shall**

²⁷ <https://pour-un-reveil-ecologique.org/en/>

define a responsible digital technology strategy, which must be “operational” in July 2020 and encompasses measures to raise employee awareness, how to use refurbished hardware and select software.

Other initiatives appear to be structural, such as the **Citizens’ Convention on Climate**²⁸ which made 149 proposals, 147 of which the French President retained and some of which address the issue of digital sobriety. Among the proposals, which are intended to result in legislative measures, some concern the taxation of economic actors (p. 427):

- “Introduce a real annual quota of maximum carbon emissions for companies with no granting of free quotas,
- Provide tax benefits to companies with a positive change or balance of their greenhouse gas emissions,
- Create a tax on banks who make investments that harm the climate (up to 40% of the profits made).”
- Other proposals refer to production:
 - “Increase products’ lifespan and reduce pollution from design”
 - “Enforce the law banning planned obsolescence”
 - “Make it mandatory to provide repair options for manufactured products that are sold in France...”
 - “Reinforce and apply the regulations on waste management”
 - “By 2025, all support for innovation must work toward leaving the carbon-based model”
 - “Support employees and companies in the transition”
 - “Reinforce environmental clauses in public contracts”
- Finally, one of the objectives, “Support changes in digital technology to reduce its environmental impact” (p. 153 to 157) is accompanied by the following measures:
 - “Eco-design for products, software and services, and expand reuse
 - Make eco-certification systematic on all digital equipment
 - Promote information and education on digital sobriety practices
 - Make digital players’ commitments to carbon neutrality available to the consumer”

3.2.2. Impactful government bills

Laws are changing quickly in the field of the energy transition. Digital technology is increasingly present in the draft bills that we have seen this year, notably in the **AGEC (Anti-waste for a circular economy) bill 2020-105 of 10 February 2020**. This is the result of a consultation process that began in October

²⁸ <https://www.conventioncitoyennepourleclimat.fr/en/>

2017 and includes 130 articles. This law should give everyone tools to adopt more responsible behaviour and to move towards more sustainable production and consumption. Initially, the bill did not have measures for digital technology. Today, there are two major ones that concern internet service providers and hardware and software manufacturers, which we present below:

Article 13: Information on the emissions related to internet and mobile consumption

After 1 of I of Article 6 of Law No. 2004-575 of 21 June 2004 on confidence in the digital economy:

III. – i[...] “1b. With effect from 1 January 2022, and in compliance with law no. 78-17 of 6 January 1978 relating to data processing, files and freedoms, the persons mentioned in 1 shall also inform their subscribers of the amount of data consumed in providing access to the network and provide the equivalent of the corresponding greenhouse gas emissions. The greenhouse gas emission equivalents corresponding to data consumption are established according to a methodology provided by the French Environment and Energy Management Agency.”

This article requires **internet service providers to provide information to consumers about their data and the related energy consumption** (the equivalent in terms of greenhouse gases). There are two working groups to date in the Environment, Territories and Sea Ministries working on the methodology referred to in this article: one on calculating greenhouse gas emissions led by ADEME, and another on qualifying the data and informing (so that it has meaning) the consumer, led by the Ministry of the Environmental Transition. The results are expected in 2021.

Article 27: Information on the duration of updates for computer and telephone operating systems

I.- Chapter VII of Title I of Book II of the Consumer Code is supplemented by a Section 5 worded as follows:

- Art. L. 217-21 - The manufacturer of goods incorporating digital elements shall inform the seller of the period of time during which updates to the software supplied at the time of purchase of the goods remain compatible with the normal use of the device. Use of the device is considered normal when the features meet the consumer's legitimate expectations. The seller shall make this information available to the consumer. The methods for applying the present article will be specified by decree.
- Art. L. 217-22 - For goods incorporating digital elements, the seller shall ensure that the consumer is informed of the updates, including security updates, which are necessary to maintain the conformity of these goods. The seller shall ensure that the consumer is informed in a sufficiently clear and specific manner of the methods of installing these updates. The

consumer may refuse them. The seller shall inform the consumer of the consequences of refusing installation. In this case, the seller shall not be responsible for any lack of compliance that may result from not installing the update concerned.

- Art. L. 217-23 - The seller shall ensure that the consumer receives the updates necessary to maintain the conformity of the goods for a duration that the consumer can reasonably expect. This period cannot be less than two years. A decree shall establish the conditions under which this period may be longer than two years and vary according to the type and purpose of the goods and digital elements, and taking into account the circumstances and nature of the contract.

This article constitutes an initial victory **against software obsolescence**. The article also stipulates that the information given to users must be clearer, for example concerning the installation and update conditions, in particular for feature updates (which can slow down devices).

Within six months from the promulgation of this law, the Government shall submit to Parliament a report **on the life span of digital and connected devices, on software obsolescence and on options to extend the life span of the equipment concerned**. The report will consider whether the legislation should be changed to require manufacturers of electronic devices and software to **offer corrective updates that are compatible with normal use of the device for a specified period of time**. In particular, the report will present possible ways of limiting the risks of software obsolescence linked to updates of the operating system and the software supplied at the same time the good was purchased, as well as of **requiring a separation between security updates and convenience updates**.

Other provisions are proposed for electric and electronic equipment:

- Funds for repair and reuse were created and will be funded by EPR channels.²⁹
- Obligation for producers to draft five-year plans for eco-design.
- A bonus/malus for EPR eco-contributions with a stronger eco-design incentive. What is new is that these bonuses/malus are displayed on the products.
- Use 3D printing for object repair with a requirement to provide designs for intellectual property.
- Repairability index: indicators are available that will help calculate a score: **the manufacturer will have to calculate and provide all the information on how the score was calculated**.

²⁹ “The principle of Extended Producer Responsibility (EPR) has existed in law since 1975 and is codified in Article L. 541-10 of the French Environment Code.” “Producers, importers and distributors of these products or the components and materials used in their manufacture may be required to provide or contribute to the disposal of waste from them.” [<https://www.ademe.fr/expertises/dechets/elements-contexte/filieres-a-responsabilite-elargie-producteurs-rep>, in French]

This law is powerful leverage that companies can use with their suppliers, whose obligations to the general public in terms of transparency about their products emissions and the lifespan of their hardware and software will no doubt be applicable and valid for any type of business relationship.

3.2.3. Digital Technology and the Environment, a government roadmap drafted jointly by MTE, DGE and DINUM

Cédric O and Elisabeth Borne have asked the CNNum (French National Council on Digital Technologies) to work on both a leaner digital sector and on ways to limit digital technology's impact on the environment. The CNNum has undertaken this work with ADEME, DINUM (Inter-ministerial Digital Technology Directorate), WWF, Greenpeace, HOP (Stop Planned Obsolescence), The Shift Project and many other participants. They have identified **50 initiatives for the European Commission's Green Deal**. Germany is also working on a similar roadmap that includes 70 measures. There is a European dynamic, and Germany intends to make it a strong aspect of its presidency of the EU Council (from July to December 2020).

The recommendations presented by CNNum to the working group's members were developed thanks to contributions from the whole ecosystem. It proposes three areas of work:

1. **Lean digital technology:** better measure digital technology's environmental impact, design better, consume better, reuse better, and repair and recycle digital goods and services. The objective is to reach net zero greenhouse gas emissions in 2030 and to cut digital technology's environmental impact in half.
2. **Digital technology that serves the environmental and solidarity transition:** the objective is to reduce digital technology's greenhouse gas emissions by 10% by 2050 and reconcile high tech and low tech around the major objectives of the environmental and solidarity transition.
3. **The tools and levers for responsible digital technology: this is a toolbox** that seeks to support all of society to arrive at a convergence of these transitions so that the roadmap can be implemented (mobilise actors, raise citizens' awareness, reinforce training and research, and apply, fund and verify the roadmap's roadmap).

Based on the CNNum's proposals, the government drafted **an inter-ministerial roadmap on "Digital technology and the environment"**. Presented by the minister of the environmental transition and the secretary of state for digital technology on 8 October 2020, it includes four aspects and presents the government actions that will drive this policy.

- **Aspect 1 - Evaluating digital technology's environmental performance:** Produce relevant ways of quantifying digital technology's environmental performance and have public and private actors share them. Create up-to-date databases to feed into the evaluation of digital technology's environmental performance.

- **Aspect 2** - Digital innovation that serves the environmental transition: Fund innovation that supports the environmental transition and reduces digital technology's environmental footprint.
- **Aspect 3** - Lean, sustainable digital products: Create a framework of trusted information for consumers. Support digital players in France in developing quality, competitive "green" offerings.
- **Aspect 4** - Raise awareness of sustainable digital behaviour: Raise awareness of bringing lean, sustainable digital technology to all levels of society.

All the initiatives that we have observed in this part, whether institutional, legal or citizens' initiatives are important signals to consider for the evolution of companies' energy transition strategies

Feedback

***ENVIRONMENT, TERRITORIES AND SEA MINISTRIES - MTE, a laboratory
and pilot for the inter-ministerial strategy on digital sobriety***

In its Tech.gouv roadmap, the Inter-ministerial Digital Technology Directorate (DINUM) relies on the government's roadmap and includes a Green Tech initiative for responsible government. This initiative, steered by the Ministry of the Environmental Transition (MTE), supports the digital sobriety measures for the government's information systems and lists and showcases information systems that contribute to environmental responsibility within the administrations.

The MTE has drafted a ministerial roadmap and identified 10 concrete initiatives to improve digital sobriety. Four of them have already been undertaken with the following initiatives and deliverables:

1. Foster systematic eco-design for products

- Late 2020: an eco-design analysis framework
- Second quarter 2021: an initial, adapted version of the inter-ministerial method of value analysis for project evaluation

2. Measure the environmental footprint of the ministry's digital technology with an annual reduction objective

- Fourth quarter 2020: an inter-ministerial inventory of responsible digital technology
- First quarter 2021: an impact analysis and the measures taken on three MTE digital products
- Second quarter 2021: a standardised method to calculate digital technology's footprint created by MTE to be scaled to the inter-ministerial level

3. Support, inform and train decision-makers and agents

- Participated in the Cyber World CleanUp Day (CyberWCUD) on 17 September 2020
- Late 2020: "What is responsible digital technology?" day?

4. Switch to sustainable purchases

- Late 2020: fact sheets for responsible purchases suited to our organisations
- Second quarter 2021: a consolidated version of the "Responsible Digital Purchases Guide"

Christophe Boutonnet, Deputy Director of Digital Technology, Environment, Territories and Sea Ministries

3.3. Anticipate the energy impact of major technological breakthroughs

Companies must be aware that, in a world where energy and resources are becoming rarer, we must think ahead and design the leanest systems possible today. The prospective approach is useful to try to represent potential future scenarios. Here, we rely on the expertise of *The Shift Project*, which is doing this kind of work in its studies. *The Shift Project* drafted scenarios of the change in the energy consumption and greenhouse gas emissions of digital devices and usages in its 2018 study, “Lean ICT: Towards Digital Sobriety”, based on [Andrae and Edler’s model](#).

It shows that **digital energy consumption in the world is increasing by around 9% per year** (in the period from 2015 to 2020), a trend well above the average “expected case” scenario predicted by Andrae and Edler (4%) and barely below their “worst case” disaster scenario (10%). This growth rate corresponds to a doubling in 8 years and is expected to increase in all scenarios that do not include a proactive change in consumption practices (traffic, devices).³⁰

Digital activity ranges from the production to the use of devices, including the growth in network communications (traffic) and data storage. Overall, **the volume of digital activities and uses is increasing faster than progress on energy efficiency in technologies**, hence the inflation observed.

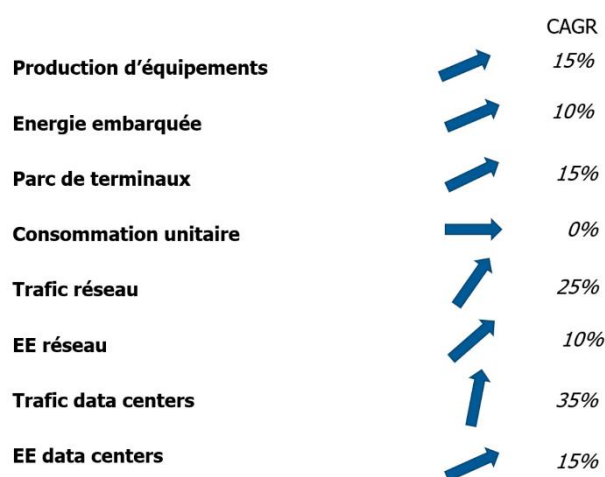


Figure 4: Annual growth rate (CAGR³¹) of digital activity

Source: *The Shift Project* - Lean ICT: Towards Digital Sobriety, 2018

In early 2020, in the intermediate report “[Déployer la sobriété numérique](#)” (Deploying digital sobriety), *The Shift Project* analyses how the current changes in technological innovation impact these scenarios.

³⁰ See <https://theshiftproject.org/article/rapport-intermediaire-deployer-sobriete-numerique/> (in French)

³¹ CAGR stands for *Compound annual growth rate*

We draw on the conclusions of this study, which was presented to the members of the working group and which proposes a focus on impact scenarios concerning IoT, 5G, edge computing and AI.

3.3.1. Internet of Things (IoT)

The 2030 production forecasts vary from 20 to 100 billion connected objects. The principle of IoT is to install a digital module into objects that initially had nothing digital about them and make them communicate. We will have to produce a lot of this type of module, and each module has 3-4 functions to fulfil its use case.

The per-unit energy needed for these connected objects to function is rather low, but the sheer number of them makes their impact on energy consumption significant and could **increase the current consumption of the fleet of devices** by 25% by 2025.

Concerning the energy consumed during production, there is great uncertainty in the results of the measures, and two analyses of the life cycle of the same device can lead to very different results. Globally, the energy used in 2019 represents 1,000 to 1,300 TWh, all devices combined. The increase coming from IoT in 2025 would represent a 7% increase in this energy.

Therefore, the additional energy consumption from IoT in 2025 could be around 200 TWh, not counting the indirect impact on network and data centre consumption. Therefore, we must reflect on the forms of IoT that should be preferred, especially those that may have potential for indirect energy savings.

3.3.2. 5G

The advent of 5G goes hand-in-hand with the use of new frequency bands, which are higher than the existing bands: to have coverage similar to 4G, more sites (about a factor of x3) are needed for 5G. However, 5G stations are more energy efficient than a 4G station in nominal use.

Nevertheless, it is true that the energy consumption of a site to which 5G is added increases by a factor of 2 to 3 after a few years. Therefore, there will be an increase in electricity consumption from radio cover for mobile equipment.

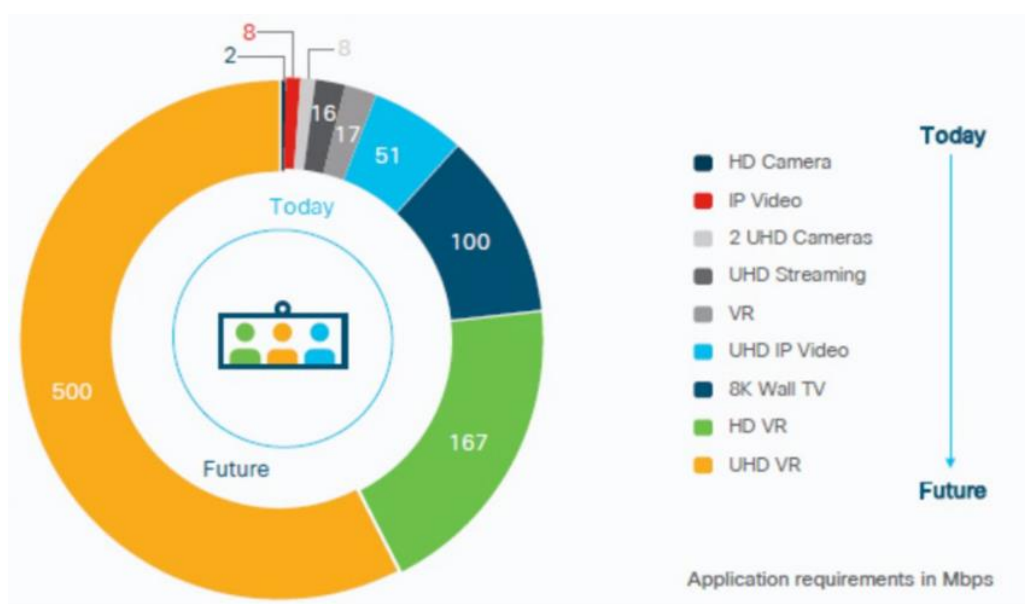


Figure 5: Application requirements in Mbps

Source: *The Shift Project*

If 5G is used massively (coverage of 4G white zones, main support of IoT), then we must expect digital technology's energy consumption to **increase by 35%**. On the other hand, if we choose 5G for a limited number of industrial sites or to relieve city centres, the increase will be limited, potentially counterbalanced by savings elsewhere. The impact will then be "only" **+3% of digital technology's energy consumption**.

3.3.3. Edge computing

In just a few years, we have gone from a traditional client-server model to a centralised cloud model with devices that are not very smart. Edge computing consists in a hybrid distribution of intelligence capabilities with several "layers" of data centres, some of which act as an aggregator and the others (hyper data centres) as the "cores". While we do not yet have a stabilised view of the consequences in terms of infrastructure, **it is clear that edge computing involves more data centres**. Even if edge computing helps avoid some of the traffic passing through network cores, globally its implementation at scale trends towards a scenario of **increased consumption**.

3.3.4. Artificial Intelligence (AI)

AI boost demand for calculation and, thus, servers. It also involves the storage of increasingly significant amounts of data. In AI algorithms' learning phase, we observe a discrepancy between the speed of technological progress (Moore's Law) and computing power needs: **it now increases by a**

factor of 100 every two years, while processing power only doubles every two years. The marginal performance gain becomes increasingly more expensive from an energy point of view.

All the more so since the current trend is not to reserve AI for centralised instances on specific, particularly optimised machines, but have it present at the edge within standard terminals, thanks to specialised AI chips. This is very likely to have an upward impact on energy consumption scenarios.

3.4. Defining requirements of suppliers

For reasons of operational and economic performance, digital service and/or infrastructure providers are necessarily concerned by the subject of energy optimisation. But beyond the economic aspect, they are also subject to a growing responsibility towards their clients, which supposes tight control over and communication around the data related to the environmental impact of their services and hardware. Large organisations need key indicators, transparency, and strong support measures from providers to take into account the environmental footprint of the services and materials they consume. The working group members invited four large providers (Microsoft, Google, OVH Cloud, Dell) to present their digital sobriety strategy. Following these very diverse presentations, the companies want to make these requirements of suppliers:

- Provide access to the electricity consumption data of large cloud providers
- Provide transparent access to the environmental indicators of cloud services (resources, CO₂, water)
- Offer a multi-criteria analysis of the environmental impact of the hardware and software used
- Propose tools that allow users to evaluate their own consumption with information on how to reduce it
- Practice eco-design and share best eco-design practices
- Provide data on hyperscale data centres' energy consumption
- Offer visibility on the energy impact of networks and data flows
- Provide data on the management of the water used to cool data centres and its impact on sustainability
- Offer indicators on servers' estimated lifespan
- Design applications in a modular way
- Push back software and hardware obsolescence as far as possible
- Explain waste management, recycling and device repairability policies
- Provide the share of green energy used

One of the problems shared is that it is difficult to get providers to share scope 3 data on their clients. The consideration for the overall impact of their service is still too weak. While PUE³² is an important indicator, focusing on it is no longer enough.

Of course, companies are aware of their own responsibility in terms of their choice of infrastructure and architecture, but the lack of transparency and, sometimes, the lack of trust in the data shared by their providers is a problem.

“Cloud providers have the power to facilitate the market’s access to less intensive technologies, but the decision comes from the client or the developer. The provider’s role is to offer a choice, a variety of solutions that integrate the aspect of digital sobriety.”³³

The changing regulations risk requiring public communication of services’ and hardware’s environmental impact data, and digital sobriety policies, which are progressively consolidating in organisations over the years, will necessarily take them into account.

Large organisations want to expand their influence through “responsible digital technology” clauses in contracts (for services as well as SaaS, PaaS, IaaS). There are many ways to influence the contract. For example, companies can:

- Integrate digital sobriety into their calls for tender
- Impose a minimum percentage of recycled components or raw materials or reused digital equipment
- Discuss and confront suppliers with the issue of OS-planned hardware obsolescence

Ask digital service providers to display the weight and/or impact of their solution (as is the case for the food distribution sector).

³² Power Usage Effectiveness (PUE) is an energy efficiency indicator used in computing centres

³³ Alban Schmutz, Vice Chairman, Strategic Development & Public Affairs, Chairman of CISPE – OVH Cloud, during his presentation to the Cigref Digital Sobriety WG, May 2020

4. Governance: Integrating digital sobriety in processes and decisions

Companies are increasingly working towards coordinating IT and CSR divisions' initiatives on shared objectives around digital sobriety. In certain organisations, a governance transversal to all the group's IT divisions is being put in place, integrating innovations in Deep Tech and CSR to link the issues together and make sure that new services are more frugal and responsible. But for most organisations, defining such a government is not yet obvious.

There are two possible ways of implementing "digital sobriety" governance.

On the one hand, digital sobriety can fit into a governance that is already in place. For some companies, the executive responsible for digital issues in the company must be deeply convinced of the benefit of implementing digital sobriety. If this is the CIO, they must be the driving force behind the approach. If they are on the executive committee, they must not only be a stakeholder but also a force for progress to drive this aspect within the executive committee's institutions. There must also be a simple tool that quantifies the decisions to take in terms of digital technology's environmental impact (until we have digital carbon accounting). In the meantime, there should be a simple ratio tool that adds the environmental aspect to the financial analysis, either implicitly or explicitly, in executive committees.

On the other hand, if you are "starting from scratch" with a situation where this concept does not exist in a decision-making structure, you should set up a transformation and lead it. For this, there needs to be a project manager and a transversal committee with representatives from the entire company (IT, Purchasing, CSR, HR, Marketing, Business Units, Finance). This committee's role is to elaborate and track the transformation programme and remove obstacles.

In both cases, implementing a strategy for a sustainable information system asks the company to adopt a more holistic point of view by bringing environmental factors into their decision making.

Concretely, taking environmental aspects into account in the decision-making equation requires relying on new indicators about the potential for greenhouse gas emissions, rare metal mining, and the use of drinking water that will help to enlighten decision-making and monitor the transformation's evolution.

Additionally, the decision-making instances must explicitly integrate these aspects into the criteria behind their decisions. For this, guidelines must be set out to facilitate the convergence of the decisions made in different parts of the organisation.

Then, the goal will be to track and verify that the implementation of these decisions is compliant to anticipate and correct any deviation from the initial objectives as soon as possible.

The best practices guide presented hereafter integrates this overview and can serve as a tool to support the implementation of this kind of governance.

Feedback

GROUPE LA POSTE - Establishing “Responsible Digital Technology” governance throughout the Group

The entirety of the company is concerned by responsible digital technology. Therefore, establishing a **system of governance around responsible digital technology** is done **at the group level**. Every quarter, a committee meets and is in charge of steering the governance of best practices around ethical and responsible digital technology. This committee’s guidelines are established between the Group’s IT division and the Social Commitments division.

Since 2018, the committee, initially comprised of IT professionals to share feedback, now brings together representatives of the branches that include IT, CSR, Group Purchasing and the technical and logistics departments in line with IT. In addition, it has developed a roadmap that revolves around 11 workshops, using collective intelligence processes to operate at the Group level to homogenise Group practices and optimise Group processes.

- All committee members are responsible for or contribute to at least one workshop/project in line with their core profession and skills.
- Experts are invited to workshops or committee sessions to provide input to the Group on issues such as data centres, reuse, eco-design, blockchain, regulations, etc.
- Two responsible digital technology referents for the Group and an eco-design referent accompany all projects at the Group level.



Feedback

AIR FRANCE-KLM - The IT 'Matters' programme

*IT 'Matters'*³⁴ is a sustainability transition initiative for IT at Air France-KLM.

It seeks to reduce the environmental impact of the company's digital solutions while refining and applying ethical principles.

It was launched in late 2019 by a group of volunteers and is steered by Air France KLM's CIO in collaboration with the Sustainable Development division.

The initiative relies on three pillars, themselves comprised of several projects.

Pillar 1: Involve and raise awareness among employees to create a dynamic

- Communication project: Progressively raise awareness by spreading best practices
- Local community projects: Local sustainable development initiatives undertaken by employees at various sites

Pillar 2: Equipping ourselves to better understand and transform

- Voluntary innovation project: Using digital technology in service of the company's sustainable development
- Environmental "business case" project: Calculate the environmental footprint of IT projects
- Digital ethics project: Define the company's ethical values towards the use of digital technologies

Pillar 3: Transforming our decision-making processes

- A sustainable management control project: Reporting on the environmental impact of transformation programmes
- Sustainable purchasing project: Refining environmental expectations of our suppliers

Each of these projects is led by a volunteer. Use cases have been launched on all these projects and are under way.

Blaise-Raphaël Brigaud, Chief of Staff to CIO

³⁴ IT 'Matters', because IT matters in the company's sustainable development approach!

5. Best practices

The working group has drafted a **reference guide of the best practices agreed upon by the more than 40 representatives from large organisations that are members of Cigref**. This guide can be compared to a governance framework³⁵ used to break down the key domains of action while keeping a philosophy of transversality. It should provide an initial framework that will be **useful both for raising awareness and for implementing** concrete actions on digital sobriety. Each company is invited to adopt and adapt the generic recommendations within according to its activity and organisational characteristics.

Best practices 35, 81-87 and 89 are derived from the “*Référentiel Green IT : les 65 bonnes pratiques clés*”³⁶ (Green IT Reference Guide: 65 key best practices) from INR. They are identified by a red asterisk.

The repository of 100 best practices in Excel format is available in appendix to this report.

³⁵ For this, it took inspiration from the Cigref – AFAI – IFACI report, IT Governance Audit Guide for Companies in the Digital Era, 2019 [<https://www.cigref.fr/it-governance-audit-guide-for-companies-digital-era-2019>]

³⁶ <https://institutnr.org/wp-content/uploads/2020/06/2020-v3-65-bonnes-pratiques-greenit.pdf> (in French)

5.1. Repository of best practices: 8 vectors



Figure 7: The 8 vectors of the best practices reference guide

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***The Shift Project* is a think tank working towards an economy free of the constraints of carbon.** We are an association operating under the French law of 1901, recognised as being of general interest and guided by the demands of scientific rigour. Our mission is to shed light on and influence the debate on the energy transition in Europe.

ENLIGHTEN

- **We create working groups** around the most sensitive and most decisive stakes of the transition to an economy freed from its dependence on fossil fuels,
- **We produce robust, quantified analyses** of the key aspects of the transition,
- **We make innovative proposals** and take care to offer answers at the right scale.

INFLUENCE

- **We lead lobbying campaigns** to promote our working groups' recommendations among political and economic decision-makers,
- **We organise events** that foster discussions among stakeholders,
- **We build partnerships** with professional organisations, the academic field and international actors.

***The Shift Project* is supported by economic leaders** who want to make the energy transition their strategic priority. Since our founding in 2010, our work has had a notable impact on the creation of national and European public policy.

The *Shift's* everyday management is handled by a ten-strong **team of employees** led by Director Matthieu Auzanneau. Chairman Jean-Marc Jancovici and the **Board** supervise activities, while **project managers** lead the working groups. The think tank enjoys the support of **volunteers** who have created an independent association: *Les Shifters*.

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Achieving digital success to help promote the economic growth and competitiveness of its members, who are major French corporations and public administrations, and users of digital solutions and services

Cigref is a network of major French corporations and public administrations set up in order to develop its members' ability to acquire and master digital technology. It is a unifying player in the digital society, thanks to its high-quality thinking and the extent to which it represents its members. Cigref is a not-for-profit body in accordance with the French law of 1901, created in 1970.

To achieve its mission, Cigref counts on three business units, which make it unique.

1/ Belonging:

Cigref speaks with one voice on behalf of major French corporations and public administrations on the subject of digital technology. Its members share their experiences of the use of technology in working groups in order to elicit best practices.

2/ Intelligence:

Cigref takes part in group discussions of the economic and societal issues raised by information technologies. Founded nearly 50 years ago, making it one of the oldest digital associations in France, it draws its legitimacy from both its history and its understanding of technical topics, giving it a solid platform of skills and know-how, the foundation stones of digital technology.

3/ Influence:

Cigref ensures that its member organisations' legitimate interests are known and respected. As an independent forum in which practitioners and actors can discuss and create, it is a benchmark recognised by its whole ecosystem.

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