

The Digital Collage

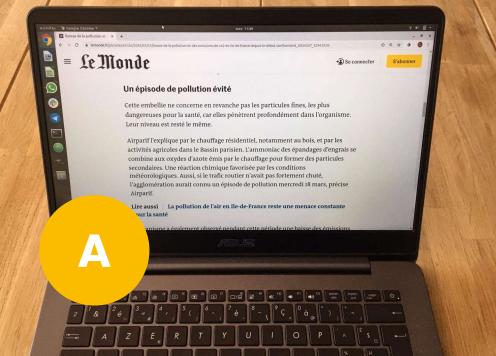


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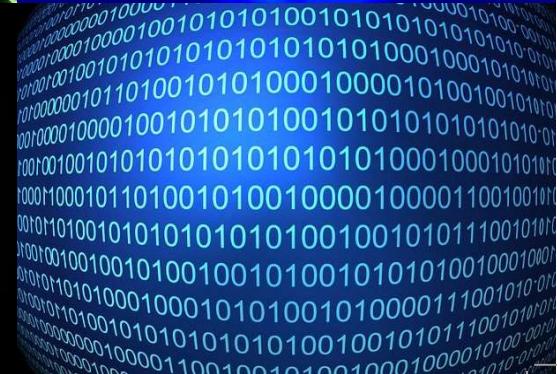
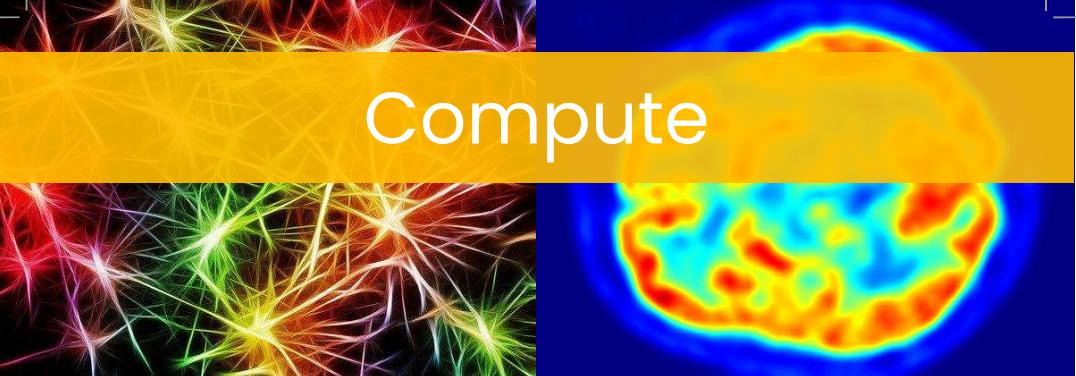
Share



Communicate and trade



Compute



B

Digital technology helps us to share and leverage knowledge through encyclopedias, MOOC, tutorials ...

It also allows us to manage the sharing of objects, activities, time, trips ...

set 1

C

Digital technology enables us to perform many computations that would otherwise be impossible, from a query on a search engine to scientific work in many areas, through big data.

set 1

The **Digital Collage** is a fun and collaborative 3-hour workshop with a pedagogy similar to that of the Climate Fresk. **The objective of the workshop is to raise awareness and train participants about the challenges of sustainability in the digital world.** It also aims to explain the main lines of actions for a more sustainable digital technology.

The authors of the Digital Collage are Aurélien Déragne & Yvain Mouneu. Sandra Sydow, Françoise Orand, Jeffrey Belt & Francesca Corlay contributed to this English version.



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A

Digital technology allows us to communicate over long distances, directly or via social networks. It is also useful for providing information.

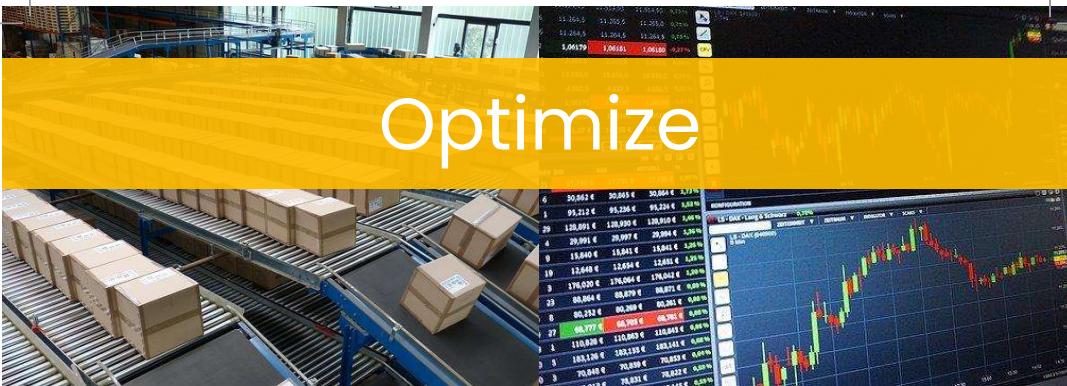
Finally, it enables trade: advertising, e-commerce, payment, etc.

set 1

Be entertained

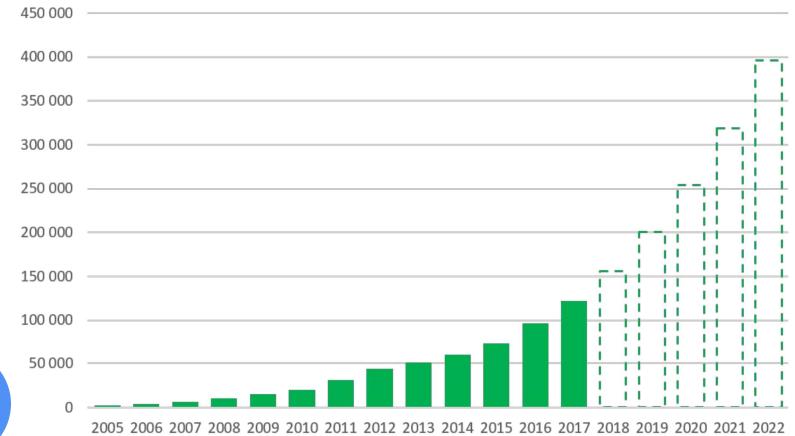


Optimize



Internet and networks

"Internet Protocol" global traffic (Petabytes/month)



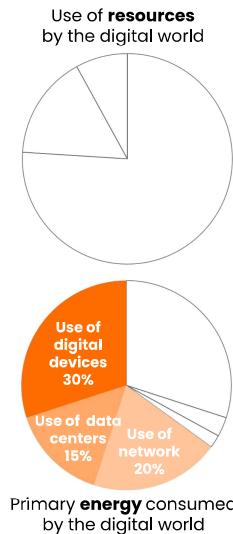
Data source: annual reports "Cisco Visual Networking Index:Forecast and Trends", 2013 → 2018

1

Electricity consumption during use



2



Data source: GreenIT.fr report "Environmental footprint of the digital world", 2019

1

Internet is globally interconnected hardware: on one side, there are digital devices operated by users, and on the other side, network infrastructure and data centers.

60% of humanity uses Internet, and the volume of data exchanged is growing exponentially.

set 1

2

When used, digital devices, network infrastructure and data centers consume electricity.

The use phase of digital technology represents at least 5% of global electricity, and could reach 20% by 2030. Digital devices consume the majority of electricity.

The majority of the electricity in the world is produced by consuming fossil fuels.

set 1

D

Movies, TV shows, video games ...
Digital technology has become an important vehicle for entertainment and gaming.

set 1

E

Digital technology is speeding up flows and optimizing industry and services: logistics, transport, stock markets, financial management, public services, assisted design, automated controls, security ...

set 1

Data source: "We Are Social" report and Hootsuite report "Digital 2021: Global Digital Overview"

Data sources: Enerdata "Expected world energy consumption increase from digitalization", 2018 / IEA report "Electricity Information: Overview", 2020

Using a computer



3

Data centers



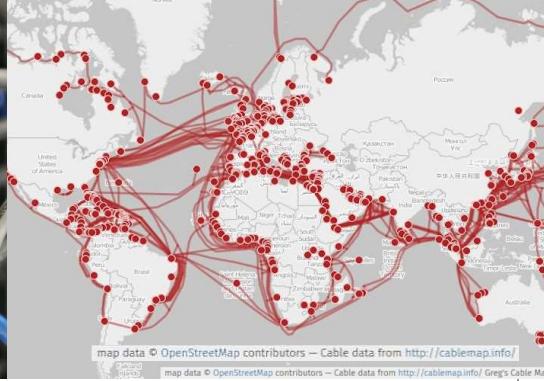
5

© Photo credit: BalticServers.com

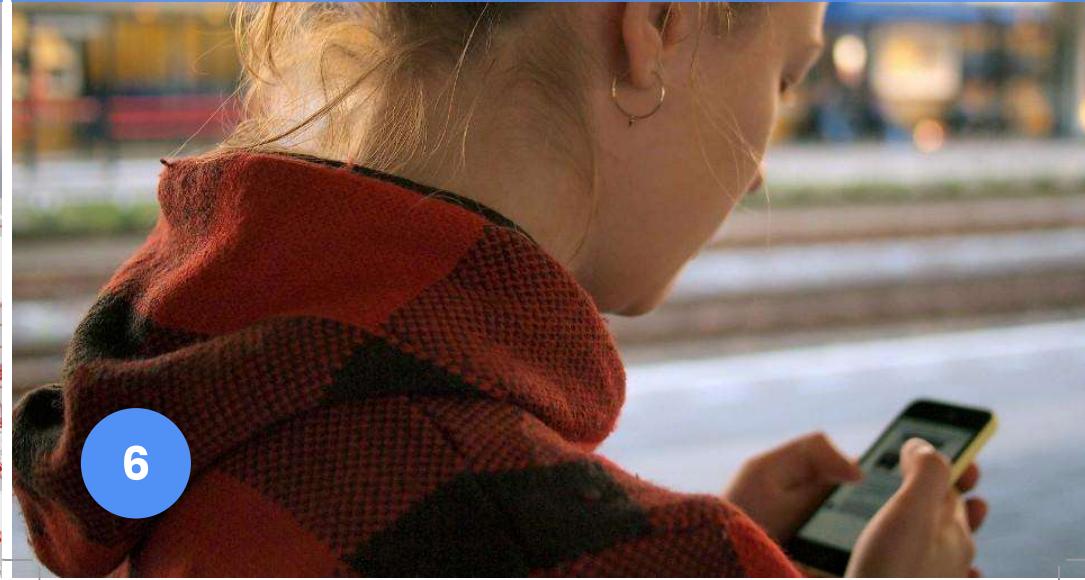
Network infrastructure



4



Using a smartphone



6

5

Consisting of servers, these are centers of storage and data processing, critical for the use of internet. There are several hundred million servers in operation worldwide. They must be supplied with electricity.

3

Everything starts with using digital devices ...

Approximately 1.4 billion computers are in use worldwide.

set 1

6

Everything starts with using digital devices ...

Approximately 3.5 billion smartphones are in use worldwide.

set 1

set 1

4

This is the infrastructure required to use the internet and networks: terrestrial and submarine cables, relay antennas, satellites, connection cabinets, routers, internet boxes ...

This infrastructure must be supplied with electricity.

set 1

Using a digital device

34 billion devices on Earth



7



34 billion devices on Earth

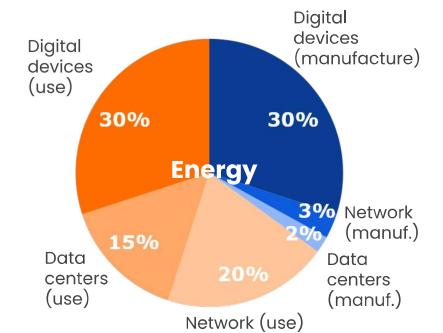
Fossil fuel consumption

9



Data source: GreenIT.fr report 'Environmental footprint of the digital world', 2019

Primary energy consumed
by the digital world



Electronic waste

8



© Photo credit: Muntaka Chasant

Technical obsolescence

10



9

More than 80% of all primary energy consumed in the world are fossil fuels: coal, oil and gas.

Burning fossil fuels emits CO₂ which is the main man-made greenhouse gas.

set 2

7

Everything starts with using digital devices ...

A total of 34 billion digital devices are in use worldwide: in addition to computers and smartphones, there are also televisions, tablets, printers, video game consoles, Internet of Things (IoT), video cameras, advertising screens ...

This number increases significantly each year.

set 1

8

At the end of their life, digital equipments we use become "waste electrical and electronic equipment" (WEEE). This is accelerated by technical and psychological obsolescence.

Globally, 17% of this waste is collected with the intent of being recycled. What is not recycled is incinerated, buried, or ends up in illegal channels.

set 2

Data sources: 85% according to BP report "Statistical Review – 2019"
81% according to IEA report "Key World Energy Statistics 2020"

10

This represents the reduction of the product's lifespan due to technical factors:

- **Hardware** obsolescence: fragile, difficult to repair, expensive spare parts ...
- **Software** obsolescence: incompatibilities, slowdowns, expired support ...

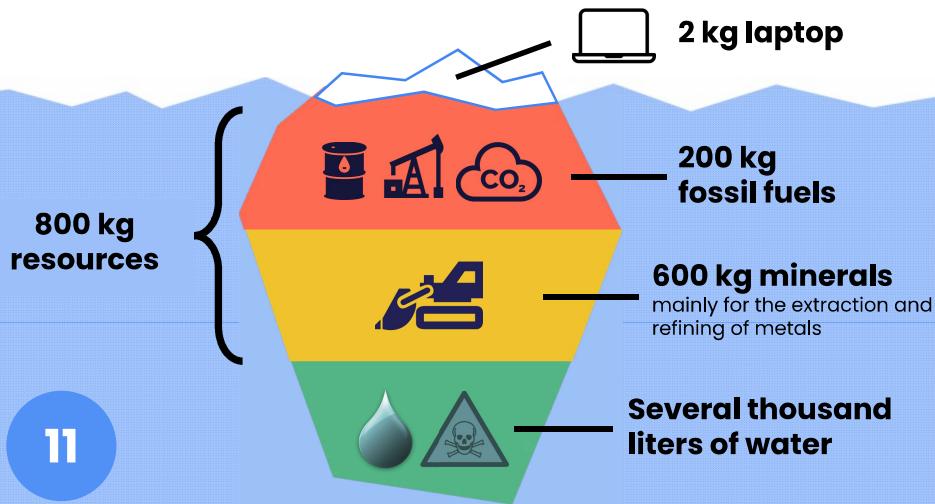
The obsolescence is "programmed" when the reduction of life is a deliberate design choice.

set 2

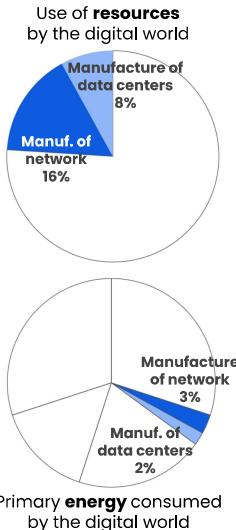
Data source: ITU report "Global E-waste Monitor 2020", p.23

Data source: GreenIT.fr report "Environmental footprint of the digital world", 2019

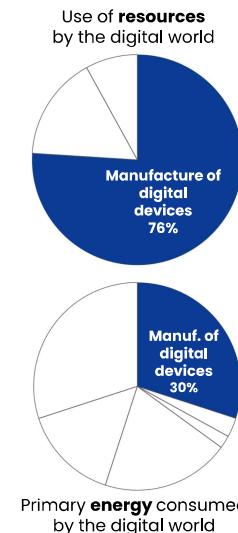
Ecological rucksack



Manufacturing network and data centers



Manufacturing digital devices

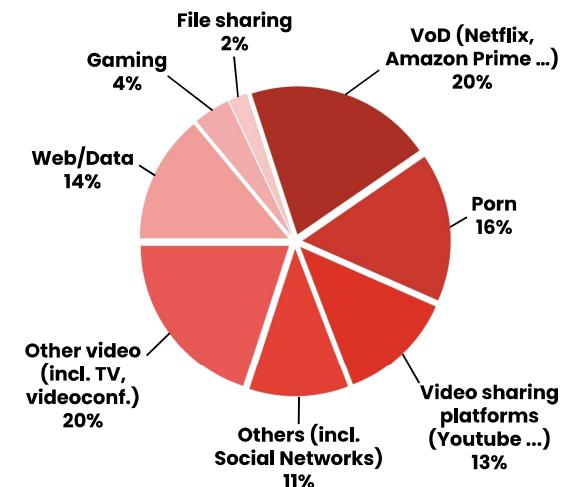


Internet traffic distribution

Distribution of online data streams in 2018 worldwide

Online Video = 80%

14



Data sources: "Cisco VNI Global IP Traffic Forecast 2017–2022", p. 13 / "The Unsustainable Use of Online Video", The Shift Project, 2019

13

Extraction, components production, assembly, transport: industries are required to produce the elements of network infrastructure and the data centers that we're using.

Manufacturing requires both energy and resources, especially metals.

set 2

11

This card focuses on the manufacturing part.

The ecological rucksack accounts for all natural resources involved from the extraction of raw materials to the finished product. For example, the manufacture of a 2kg computer requires 800kg resources.

set 2

12

Extraction, components production, assembly, transport: industries are required to produce the digital devices we use. Manufacturing requires both energy and resources, especially metals.

Manufacturing digital devices uses a large proportion of the energy and most of the natural resources used by digital technology.

set 2

set 2

14

This card focuses on "Internet and networks".

80% of all global data streams that pass through internet are video streams: "Video On Demand", video sharing platforms, pornography and video shared on social networks ...

Extraction and refining



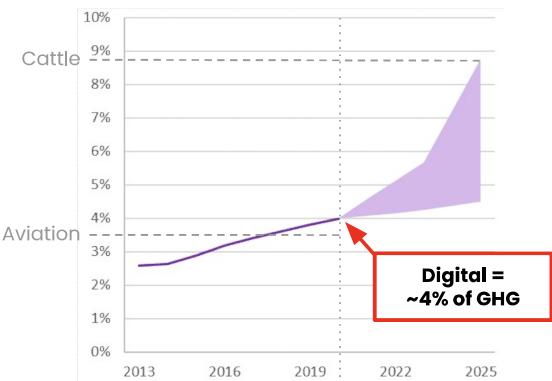
15

Incineration and landfills

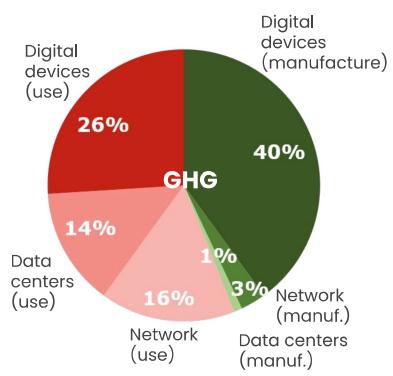


17

Greenhouse gas emissions



16



Metals



18

Data source left: The Shift Project report "Lean ICT, Towards digital sobriety", 2018, p. 18
Data source right: GreenIT.fr report "Environmental footprint of the digital world", 2019

17

Some electronic waste, and the part that is collected but not recycled, ends up in landfills or incinerators.

We speak of "energy recovery" for incineration: burning waste to produce energy. Incineration emits polluting gases and leaves about 300 kg of solid waste and ash per ton of waste burnt.

These gases, buried residues and waste can pollute soil, water and air.

set 3

18

Digital equipment is mainly composed of metals, for example there are more than 50 in a simple smartphone:

- common metals: iron, alum., copper ...
- precious metals: palladium, gold, silver ...
- rare metals: neodymium, cobalt, lithium ...

These metals stem from ores extracted from the earth's crust that are eventually refined.

set 3

15

Raw materials are extracted from the earth's crust and refined to obtain the fossil fuels and metals needed for digital equipment.

The extraction and refining of these resources are industrial processes that are energy-intensive, chemical-intensive and freshwater-intensive. They cause significant local pollution and sometimes social and ethical problems. Moreover, these resources are finite, existing in limited quantities.

set 3

16

Because of fossil fuels, the digital sector is responsible for about 4% of man-made greenhouse gas (GHG) global emissions.

This contributes to climate change.

set 3

Water stress

19



Psychological obsolescence

BLACK
FRIDAY

Special
offer!

21

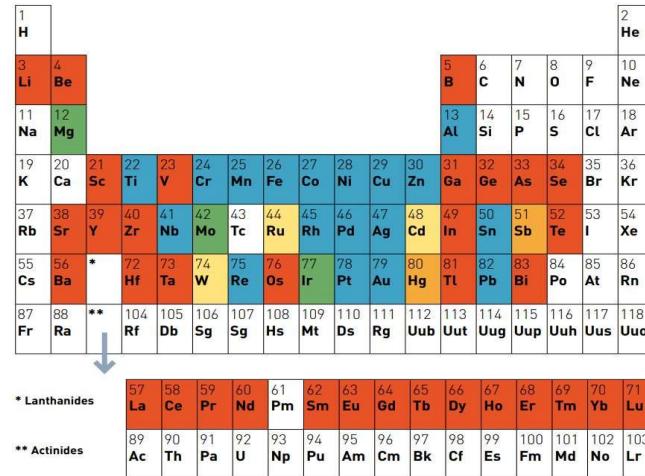


Partial recycling

Material
recycling rate
(End-of-life
recycling rate)



20



Data source: UNEP report "Recycling Rates of Metals: A Status Report", 2011, p.19

Illegal export & unregulated landfill

22



© Photo credit: Muntaka Chasant

21

This represents the reduction of the product's lifespan and duration of use due to psychological factors: the product image is quickly devalued to the user due to frequent range renewals, intensive marketing, change of trends ...

For example, a French study shows that 88% of people change their smartphone while the old one still works.

set 3

19

Mining operations consume a lot of freshwater.

For the many deposits located in areas subject to water stress, these freshwater needs compete with agricultural and daily needs of local populations.

set 3

22

At least 60% of electronic waste is managed through illegal channels.

They are then often reprocessed in disastrous human and environmental conditions to extract some valuable items before leaving the remains, often toxic, in unregulated landfills.

set 4

Data source: [French guide] ADEME "la face cachée du numérique", 2019

Data source: UNEP report "Waste Crimes, Waste Risks: Gaps and Challenges [...]", 2015

20

Properly collected electronic waste can come into the recycling system. A small portion of the material can be separated and recycled, less than 20% for a smartphone. Most of it remains non-recyclable, and thus ends up in landfills or incineration.

The first limitation of recycling is that it is a very partial solution, but there are also other limits to recycling.

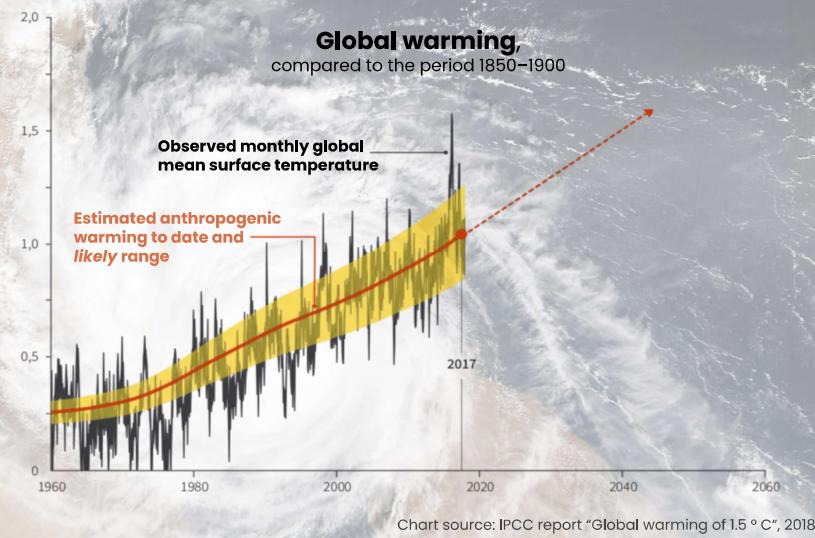
set 3

Data source: [French study] INSEE "L'économie et la société à l'ère du numérique", 2019

Data source: [French report] France Stratégie "La consommation de matériaux du numérique: un secteur loin d'être dématérialisé", 2020, p.24 à 26

Climate change

23



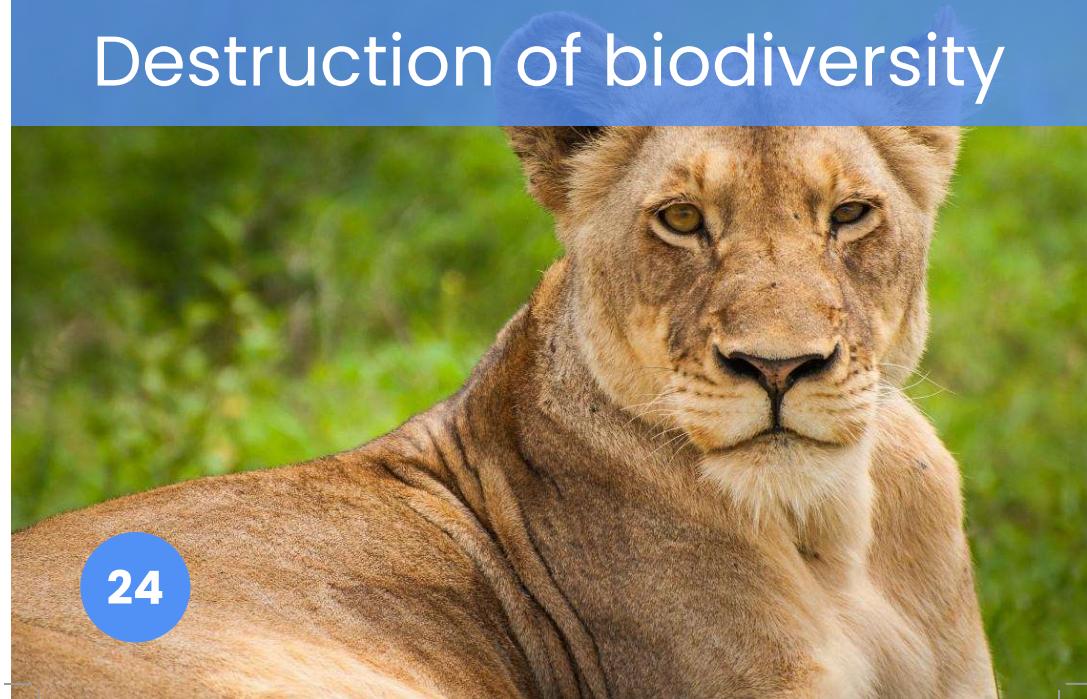
Non-use of still functioning equipment

25



Destruction of biodiversity

24



Soil, water and air pollution

26



25

Because of technical and psychological obsolescence mechanisms, many still functioning equipments become unused and are stored in drawers ... and are often thrown away years later.

According to several national numbers, it is estimated that more than 1 billion smartphones lie unused in our homes around the world.

set 4

23

The greenhouse gases emitted by human activities generate additional greenhouse effect resulting in an increase of the average temperature. This causes an increase in the number and intensity of many extreme weather events: heatwaves, droughts, floods, cyclones, fires ...

For further information, we recommend to attend the "Climate Fresk" workshop.

set 4

26

Soil, water and air pollution are caused by extraction and refining of natural resources, equipment manufacturing and toxic residues from electronic waste.

These local pollutions destroy ecosystems, and thus harm biodiversity. They can also harm human health.

set 4

Data source: [French report] Senate "100 millions de téléphones portables usagés", 2016

Data source for extraction and refining: [French report] France Stratégie, "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p. 27

24

Climate change and pollution are major causes of biodiversity loss.

Biodiversity is itself vital for agriculture and human life.

For further information, we recommend to attend "The Biodiversity Collage" workshop.

set 4

Data source: IPBES Report of the Global Assessment of Biodiversity and Ecosystem Services", 2019

Data source: IPCC report "Climate change 2014 – Synthesis report"

Social and ethical impact



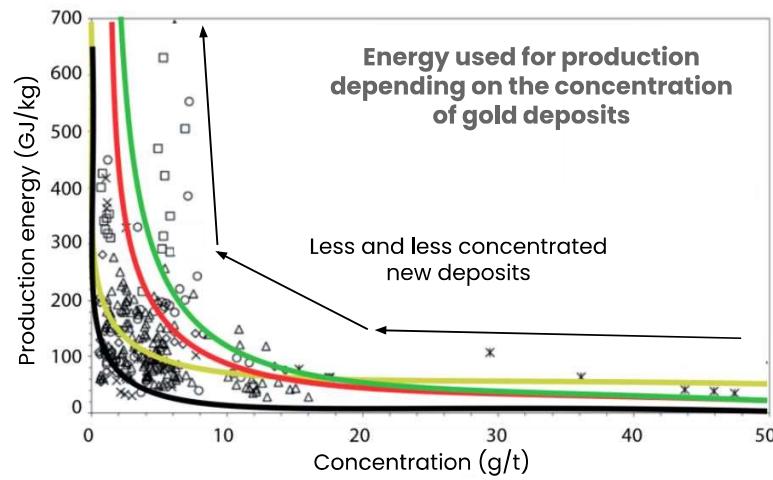
© Photo credit: Candra Firmansyah



27



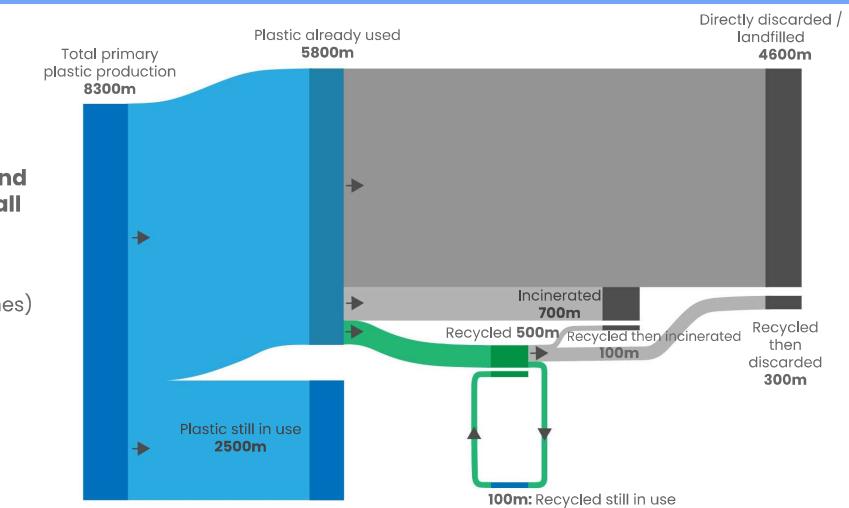
Resource shortages



28

Data source: [French book] "Matières premières et énergie – Les enjeux de demain", Olivier Vidal, 2018, p.50.
The different colors of the curves correspond to different calculation methods.

Downcycling and other recycling limitations



Data source: publication "Our World in Data", based on Geyer et al. (2017), CC-BY-SA by Hannah Ritchie & Max Roser (2018)

Physical health



30

29

Many materials cannot be recycled: they're downcycled, meaning that they lose quality at each cycle. After having been "cycled" once or twice, they become non-recyclable.

In addition, any industrial recycling process requires energy and raw materials.

set 5

27

Extraction and refining of natural resources, equipment manufacturing and electronic waste processing can be made under indecent working conditions.

There are, in particular, issues linked to child and forced labour, insufficient wages to ensure a decent life, or lack of protection against substances harmful to health.

set 4

30

Air, water and soil pollution can have significant impacts on human health: cancers, breathing problems, poisoning ...

set 5

28

Fossil fuel energy and mineral resources are limited: the more a resource is extracted, the more it shrinks, and the more its extraction comes at important economic, energetic and ecological costs.

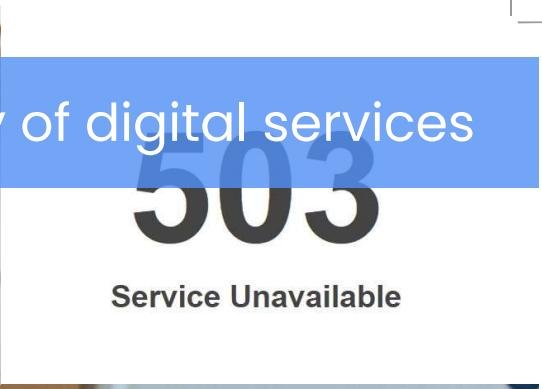
Temporary shortages and price spikes are possible. Lack of resources can lead to geopolitical tensions and breakdowns in digital services.

set 4

Mental health



Geopolitical tensions



33

The exponential demand for certain essential resources for digital technology can cause shortages and arbitrations between usages.

This can lead to geopolitical tensions between exporting and importing countries and come to conflicts.

Moreover, mining can finance armed conflicts.

set 5

Data source: [French report] France Stratégie, "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p. 29

31

Intensive digital use, especially smartphones and social networks, can cause anxiety, addiction problems, impaired concentration or accentuate our cognitive biases. Children and teenagers are particularly vulnerable.

set 5

34

Internet of Things (IoT), blockchain, artificial intelligence, enhanced human, cloud gaming, 5G, autonomous vehicles, augmented reality, robots, IT for Green, smart cities ...

Useful or futile, new uses of digital technology are emerging or spreading exponentially. Above all, this evolution is a collective movement from which an individual finds it difficult to get himself or herself out.

set 5

32

Without some key resources - metals and energy - to fuel and produce new devices, network infrastructures and data centers, breaks in continuity of digital services are possible.

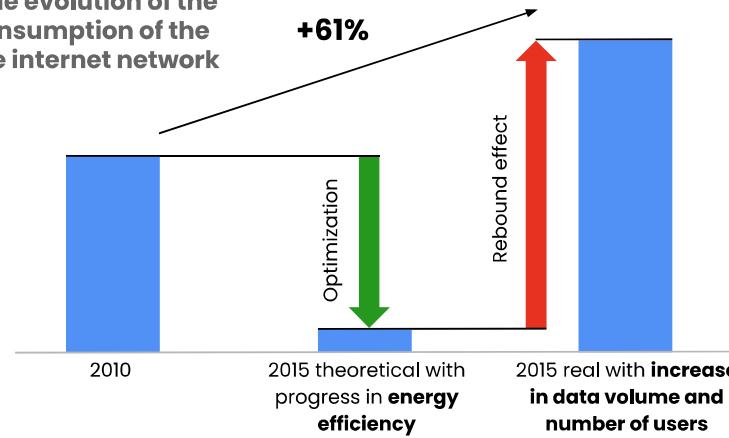
This critical non-renewable resource would then be missing when it is most useful: calculate, communicate, share, optimize ...

set 5

Data source: [French report] "Anxiété, dépression et addiction liées à la communication numérique" study (Marie-Pierre Fouquet-Courbet et Didier Courbet, 2017)

Rebound effect

Example of the evolution of the electricity consumption of the global mobile internet network



35

Data source: "Moore's Law and ICT Innovation in the Anthropocene" study, D. Bol, T. Pirson & R. Dekimpe, 2021

Buy second-hand / reconditioned



S2

User

Company

Reduce the number of our devices

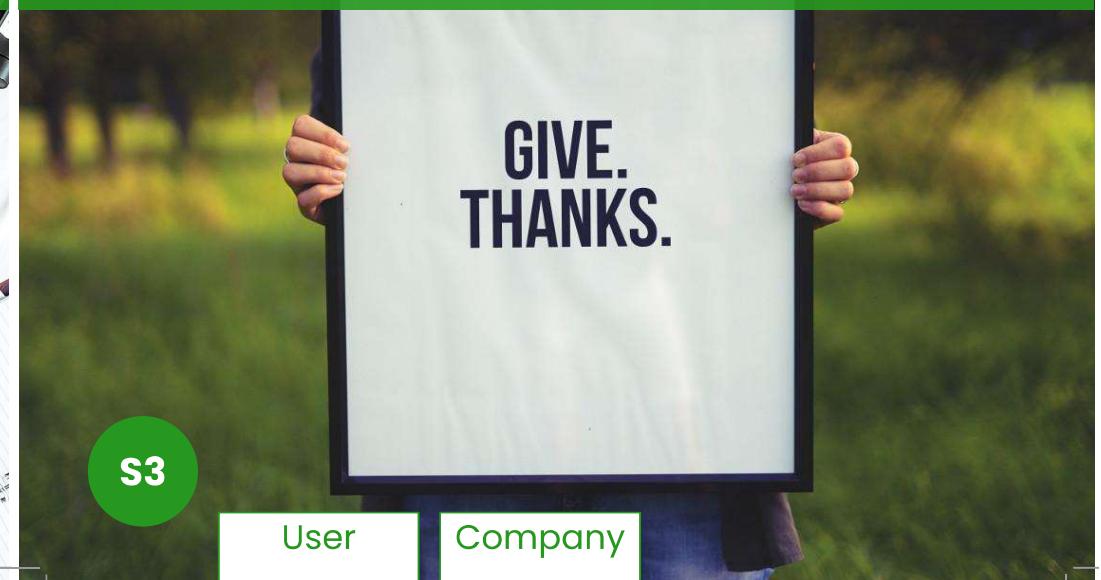


S1

User

Company

Extend life of our unused equipment



S3

User

Company

S2

This extends the equipment's lifespan.

The used equipment can be professionally reconditioned and sold with a warranty.

35

Resources and energy have always been optimised, but efficiency gains expected from innovations are generally offset by an increase in usage and an adaptation of behaviour: this is the rebound effect. It can be direct or indirect.

A realistic scenario of technological progress must therefore anticipate the multiple rebound effects.

Action

set 5

S3

Give or sell our unused functional equipment extends its lifespan. It will be far more useful in the hands of someone else than in a closet!

For non-reusable, out of service and/or obsolete equipments, improve the collection rate and the recycling rate.

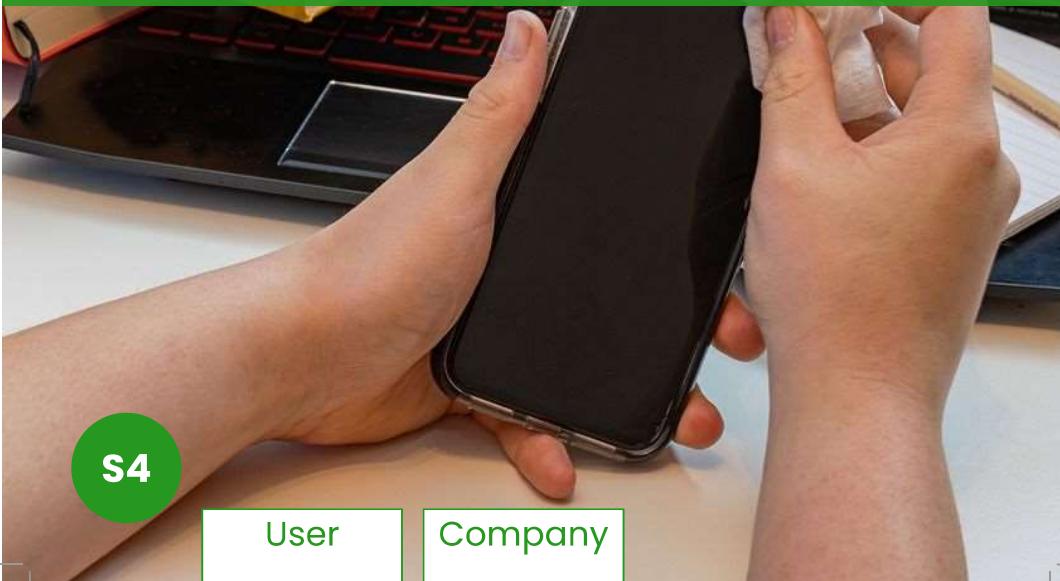
S1

- Question the need to purchase digital
- Avoid over-equipment (e.g. smartphone pro + personal)
- Learn about the sustainability and repairability indexes to buy sustainable equipment

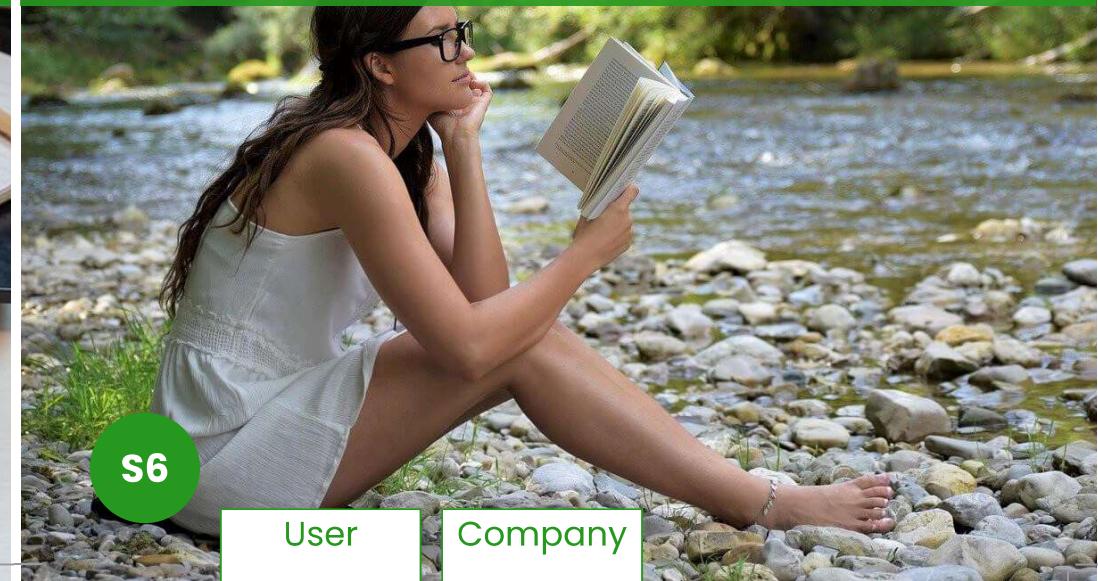
Action

Action

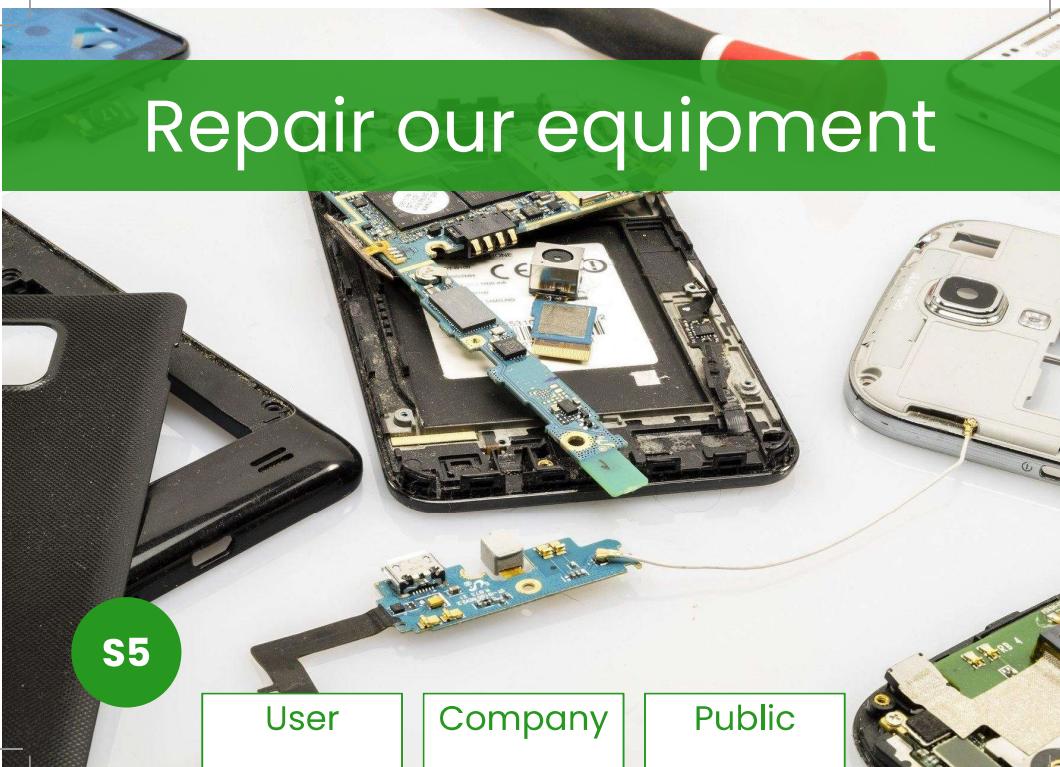
Protect and take care of our equipment



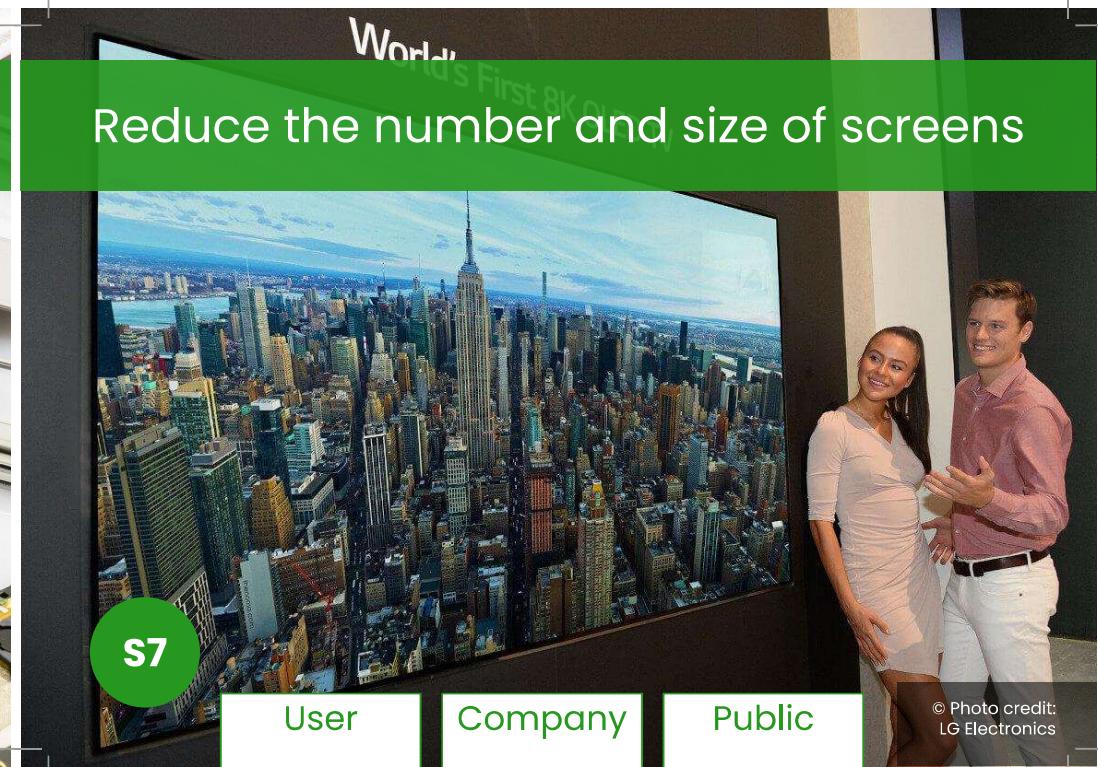
Exercise digital sobriety



Repair our equipment



Reduce the number and size of screens



© Photo credit:
LG Electronics

S6

To avoid multiple rebound effects, the most effective way is to exercise digital minimalism, or sobriety in our use of digital technology.

Action

S4

This extends the life of the equipment.

- Use a cover, shell, screen protector, carrying bag ...
- Avoid extreme temperatures and charge levels.

A goal may be to make last our smartphone 6 years and our computer 12 years: 3 times the current average.

Action

S7

Do we need large advertising screens? Or a touch screen on our washing machine?

Screens are everywhere and the average size of TV screens has more than doubled in 20 years.

A smaller screen requires less resources and energy during production. It then uses less power when in use.

Action

Data source: Statista 2021 study, USA figures, from 1998 to 2018 the average size goes from 23 to 47"

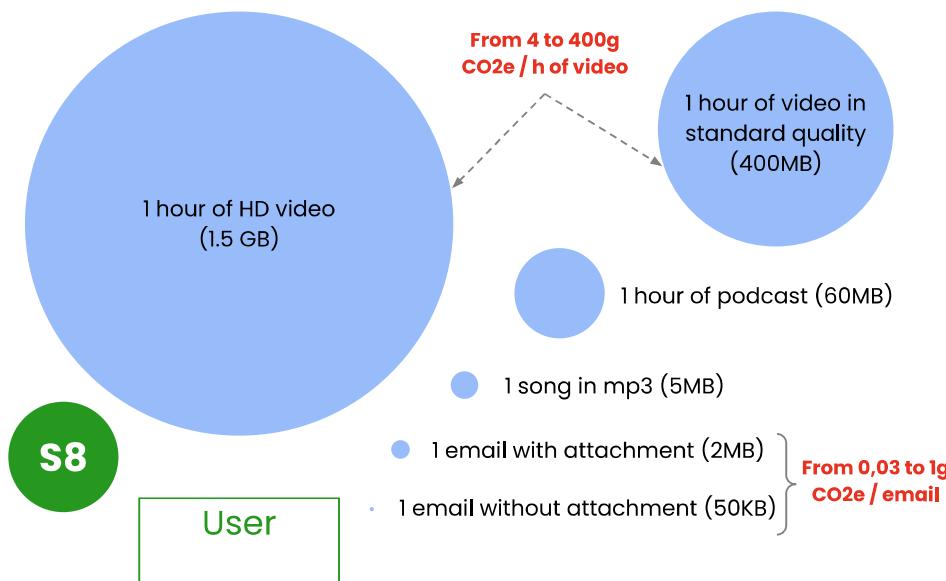
S5

In case of failure or breakage: repair! This can be done by a professional, in a "Repair Café" or oneself.

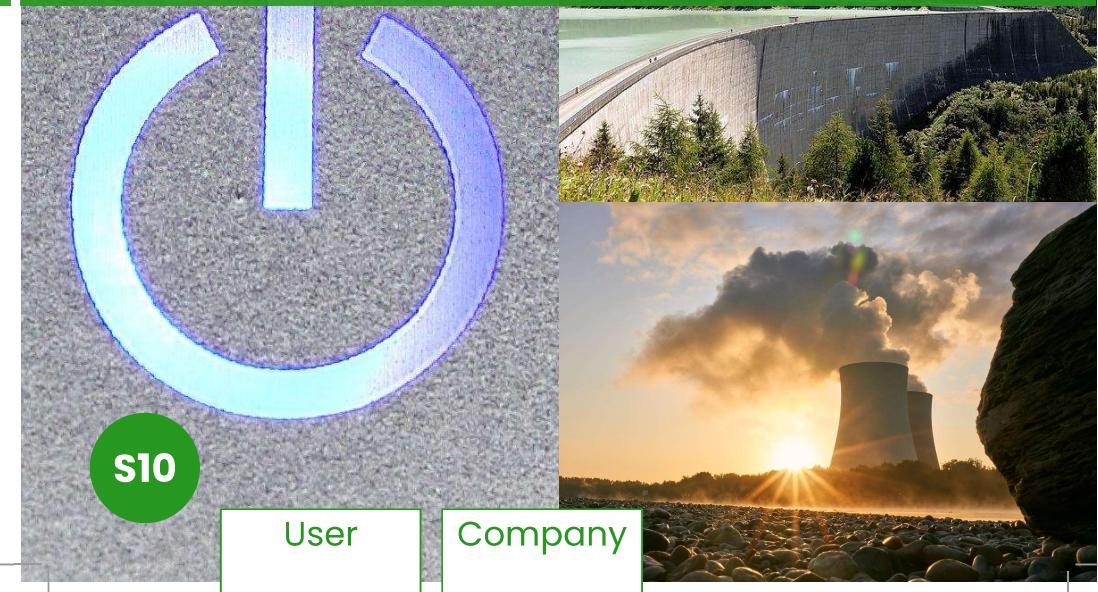
At the collective level, it can be translated into creating a compensation fund replenished by manufacturers, to impose the availability of spare parts, or to punish the intentional irreparability.

Action

Rationalize our digital uses



Limit our electricity consumption



Un-digitize our activities



Adjust purchasing policy



S10

Reduce the unnecessary:
for example, an internet box consumes
as much as a refrigerator.

Also favour low-carbon electricity, but
each energy has multiple impacts: CO₂,
biodiversity, resource extraction,
pollution ... and the "renewables" are
also problematic. There is no "clean"
energy. The most effective way is to
reduce consumption.

Action

S8

- Use a reduced video quality
- Question our heavy use of video
- Prioritize internet access via cable or WiFi,
avoid 3G / 4G ~ 6 times more
energy-consuming
- Regularly delete unused / outdated data
 - Unsubscribe to unread emails
- Back up data locally (on USB, hard drive ...) rather than on a "cloud" server

Action

S11

- Space hardware renewal periods
- Consider the durability of hardware
AND software
 - Opt for long term repair and
maintenance contracts
 - Share the pro and personal
equipment, for example via a "Bring
Your Own Device" policy

Action

S9

- Not everything has to be digital, and you can for example:
- Think "low tech": simple and accessible
 - Prefer paper in certain situations
 - Maintain non-digital access to public and business services
 - Favour local purchases and pay small amounts in cash
- ... And you, what non-digital activity makes you happy?

Action

Eco-design digital services

S12

Company

Raise awareness around us

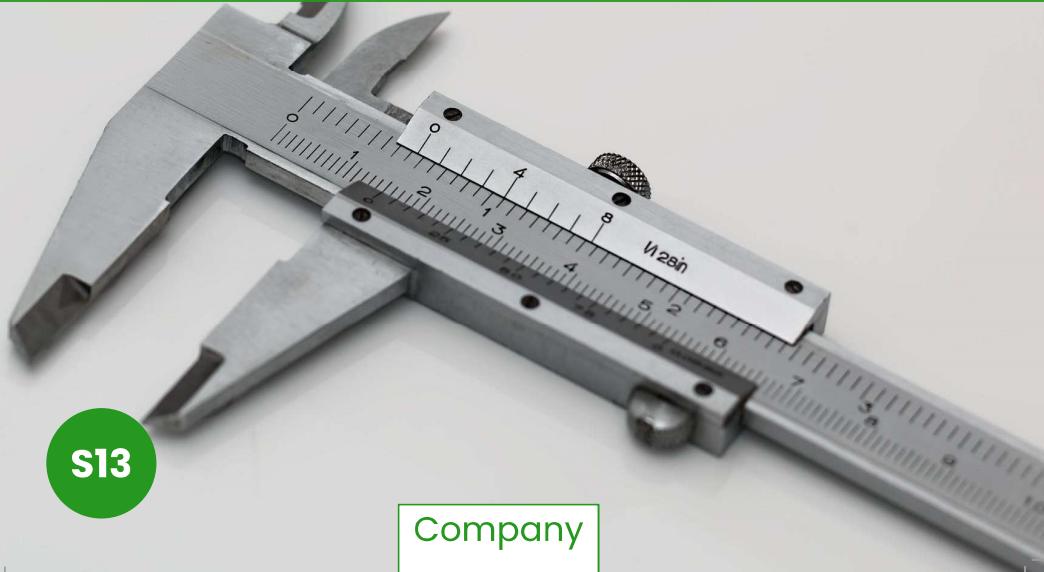
S14

User

Company

Public

Measure our environmental impact



S13

Company

S15

Public

Extend the legal warranty period

10 years
warranty

S14

In-depth knowledge of the problem and its potential solutions is a strong incentive to take our employees, partners, customers, political representatives, friends and family or students to a transition towards a more sustainable digital technology.

Action

S12

Eco-design digital services through a set of best practices that reduce environmental impacts while increasing performance.

You can assess the environmental performance of your website on ecometer.org.

Eco-design also means optimising your hosting: shared server, high energy efficiency, free cooling ...

Action

S13

Measure our environmental impact on several criteria, for example by conducting Life Cycle Analyses (ISO 14044), to target more precisely main areas for improvement.

In companies in particular, measurement is an essential step towards a more sustainable digital environment: 1. understand, 2. measure, 3. avoid, 4. reduce

S15

This will extend the lifespan of equipment, thus reducing the amount of equipment manufactured.

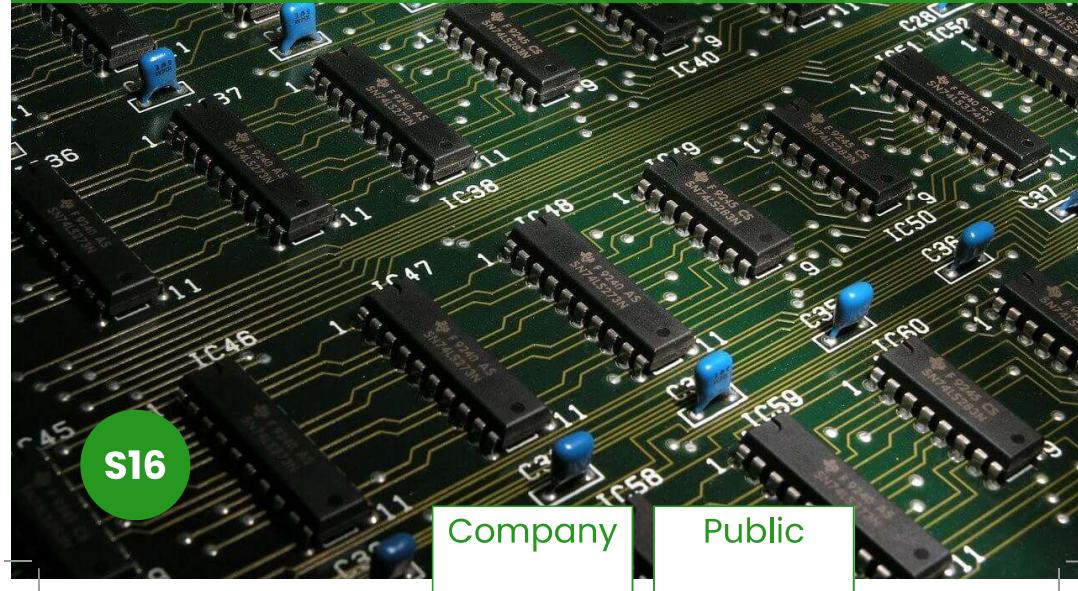
This is only interesting if the repair is preferred towards the "exchange with new" during the warranty period.

A realistic legal warranty period could be 10 years.

Action

Action

Improve hardware design



Company

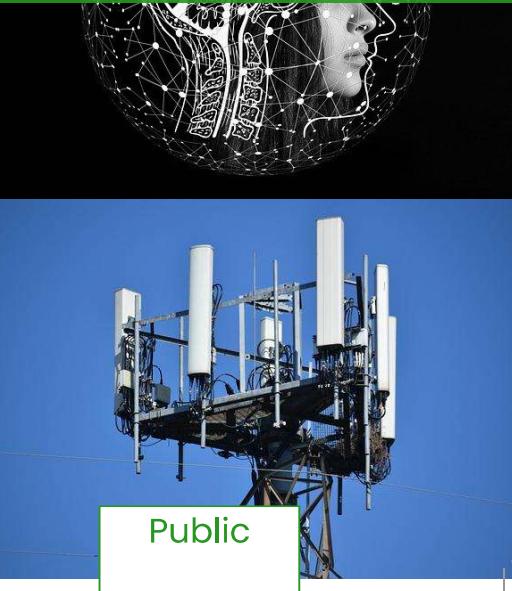
Public

Question new uses



S18

© Photo credit: TechCrunch



Public

Mise à jour logicielle

Get out of software obsolescence

Installer

Plus tard

Friday
20

Calendrier
Productivité

Impossible de restaurer cette app sur cet appareil.

Vous possédez peut-être déjà cette app. Si elle n'apparaît pas sur votre appareil, vous ne pouvez la restaurer que sur un iPhone doté d'iOS 10 (ou version ultérieure).

S17

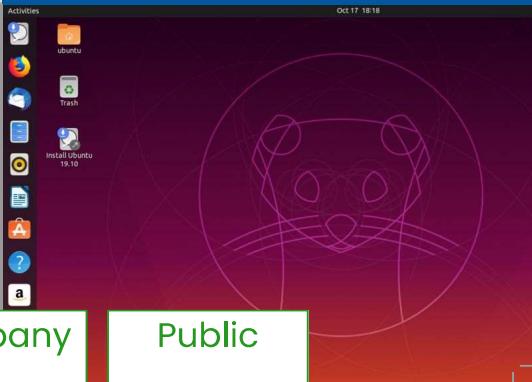
User

Company

Public

Your Windows / PC
is out of support

As of January 14, 2020, support for Windows 7
has come to an end.



S18

Pool



User

Company

Public



S19



S18

Weight the expected benefits against the environmental impacts for each new use and technology.

For example: a 5G deployment involves higher absolute power consumption, additional antennas on top of existing ones, and huge needs in energy and raw materials to manufacture new 5G-compatible equipment.

Action

Data source: [French report] Haut Conseil pour le Climat 'Maîtriser l'impact carbone de la 5G', 2020

S16

- Display and take into account a repairability index (ease of disassembly, availability / price of spare parts) and a sustainability index (reliability of equipment, adaptability, modular design, impacts on the entire production chain ...)
- Choose equipment with a label: TCO or EPEAT for example

Action

S19

Pooling allows us to maximize the use of equipment and reduce their number. Do we need:

- 50 internet/Wifi boxes in all 50 apartments of a co-property lot?
- 4 different telecom networks?
- to have both pro and personal computers?

A complementary solution is pay-per-use: paying for the use of a product and not for the product itself encourages the production of goods with a long lifespan.

Action

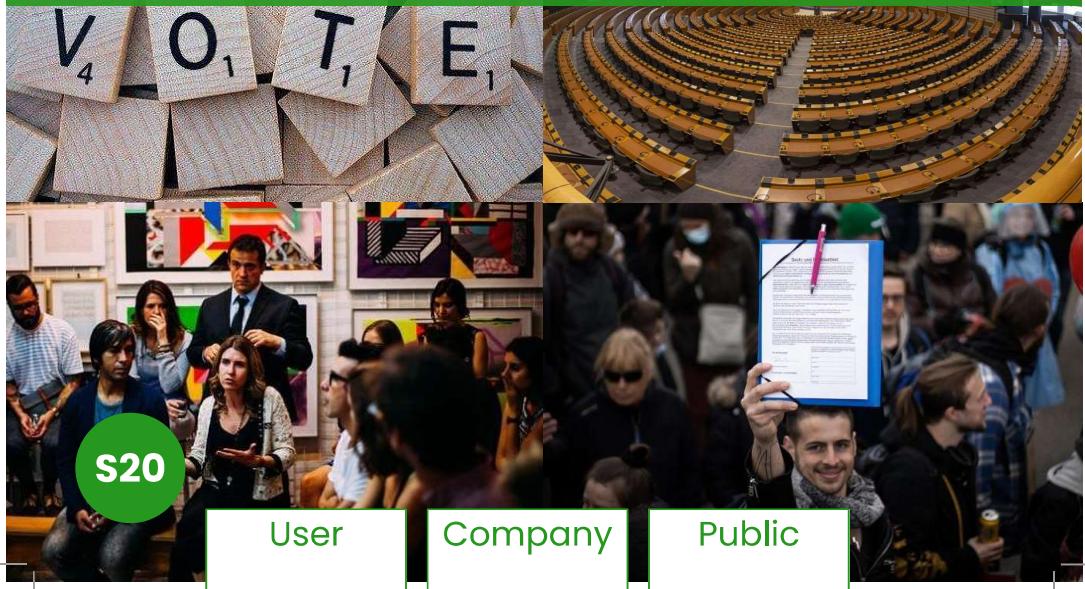
S17

- Separate bug fixes vs. feature updates
- Impose reversibility of software updates
 - Open source the software code at the end of their technical support
 - Favor free / light software / with a long term support
- Clean the system regularly and uninstall unused software

If necessary, you will certainly find help around you or through community initiatives.

Action

Contribute to collective choices



Data sources (1/2)

By default, data are global even from French reports

Card 1, "Internet and networks":

Recto: annual reports "Cisco Visual Networking Index:Forecast and Trends", 2013 -> 2018
Verso: 'We Are Social' report and Hootsuite report "Digital 2021: Global Digital Overview"

Card 2, "Electricity consumption during use":

Recto: GreenIT.fr report "Environmental footprint of the digital world", 2019
Verso: Enerdata "Expected world energy consumption increase from digitalization", 2018
IEA report "Electricity Information: Overview", 2020

Card 3, "Using a computer": GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 6, "Using a smartphone": GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 7, "Using a digital device": GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 8, "Electronic waste": ITU report "Global E-waste Monitor 2020", p.23

Card 9, "Fossil fuel consumption":

Recto: GreenIT.fr report "Environmental footprint of the digital world", 2019
Verso: BP report "Statistical Review – 2019"
81% according to IEA report "Key World Energy Statistics 2020"

Card 11, "Ecological rucksack": [French report] ADEME "Modélisation et évaluation des impacts environnementaux de produits de consommation [...]", 2018, p.25

Card 12, "Manufacturing digital devices": GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 13, "Manufacturing network and data centers": GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 14, "Internet traffic distribution": "Cisco VNI Global IP Traffic Forecast 2017–2022", p. 13 / "The Unsustainable Use of Online Video", The Shift Project, 2019

Card 16, "Greenhouse gas emissions":

Left: The Shift Project report "Lean ICT, Towards digital sobriety", 2018, p. 18
Right: GreenIT.fr report "Environmental footprint of the digital world", 2019

Card 17, "Incineration and landfills": [French report] Senate "Recyclage et valorisation des déchets ménagers", 1999

Card 18, "Metals": [French infographic] Ingénieurs Sans Frontières "Des métaux dans mon smartphone ?"

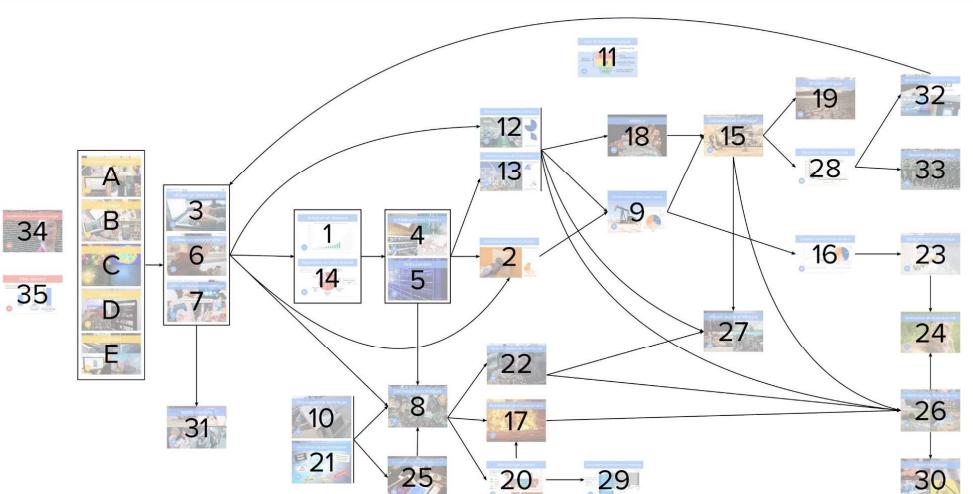
Card 19, "Water stress": [French report] France Stratégie "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p.24 à 26

Card 20, "Partial recycling":

Recto: UNEP report "Recycling Rates of Metals: A Status Report", 2011, p.19
Verso: [French study] INSEE "L'économie et la société à l'ère du numérique", 2019

Bonus action

Correction



S21

Data sources (2/2)

By default, data are global even from French reports

- Card 21, "Psychological obsolescence": [French guide] ADEME "La face cachée du numérique", 2019
Card 22, "Illegal export & unregulated landfill": UNEP report "Waste Crimes, Waste Risks: Gaps and Challenges [...]", 2015
Card 23, "Climate change":
 Recto: IPCC report "Global warming of 1.5 ° C", 2018
 Verso: IPCC report "Climate change 2014 – Synthesis report"
Card 24, "Destruction of biodiversity": IPBES "Report of the Global Assessment of Biodiversity and Ecosystem Services", 2019
Card 25, "Non-use of still functioning equipment": [French report] Senate "100 millions de téléphones portables usagés", 2016
Card 26, "Soil, water and air pollution":
 for extraction and refining: [French report] France Stratégie, "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p. 27
Card 28, "Resource shortages":
 Recto: [French book] "Matières premières et énergie – Les enjeux de demain", Olivier Vidal, 2018, p.50
 Verso: [French report] ADEME "L'épuisement des métaux et minéraux: Faut-il s'inquiéter?", 2017
 [French report] France Stratégie "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p. 11
Card 29, "Downcycling and other recycling limitations": publication "Our World in Data", based on Geyer et al. (2017), CC-BY-SA by Hannah Ritchie & Max Roser (2018)
Card 31, "Mental health": [French report] "Anxiété, dépression et addiction liées à la communication numérique" study (Marie-Pierre Fourquet-Courbet et Didier Courbet, 2017)
Card 33 "Geopolitical tensions": [French report] France Stratégie, "La consommation de métaux du numérique: un secteur loin d'être dématérialisé", 2020, p. 29
Card 35 "Rebound effect":
 Recto: "Moore's Law and ICT Innovation in the Anthropocene" study, D. Bol, T. Pirson & R. Dekimpe, 2021
 Verso: [French report] France Stratégie "Maîtriser la consommation du numérique: le progrès technologique n'y suffira pas", 2020, chapitre 3, p.57
Card 54 "Protect and take care of our equipment": French ADEME report "Étude sur la durée de vie des équipements [...]" 2012, p.43
Card 57, "Reduce the number and size of screens": Statista 2021 study, USA figures, from 1998 to 2018 the average size of screens goes from 23 to 47"
Card 58, "Rationalize our digital uses": The Shift Project "Ibyte Model", 2019
Card 59, "Limit our electricity consumption": [French guide] ADEME "Réduire sa facture d'électricité", 2019 – p.19
Card S18, "Question new uses": [French report] Haut Conseil pour le Climat "Maîtriser l'impact carbone de la 5G", 2020

S20

Support collective progress:

- Vote and express your opinion to your elected representatives, deputies, senators, mayors ...
- Build coordination between citizens to put pressure on decision-makers
- Lobby for these issues within your company or organisation

Action

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S21



Action