Digital and « green » transition

Luxembourg Event 2022

European Investment Bank

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DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Économie

Luxembourg stratégie

Luxembourg Strategy, the directorate for economic strategic foresight

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- Facilitate decision-making & strategic coherence
- Provide methodological support (megatrend analysis, strategic planning & anticipatory innovation)
- Flesh out the notion of economic resilience
- Build scenarios and a vision of possible futures for the national economy in 2050
- Stress-test and future-proof strategies and policies
- Stimulate public debate on possible futures
    - **Understanding the current situation**
    - **Anticipating its future evolution**
    - **Planning for systemic change**

Definitions (1/2)

- **Digital transition**: “Digital technologies present **enormous growth** potential for Europe. Digital solutions that put **people first** will open up new opportunities for businesses, encourage the development of trustworthy **technology**, foster an open and **democratic** society, enable a **vibrant and sustainable** economy, help **fight climate change** and **achieve the green transition**.”

(European Commission, 2021)

- Digitalisation can enable emission reductions, but can have adverse side-effects unless appropriately governed.

(IPCC, 2022)

- A technological means to enhance productivity and well-being, reduce costs, create jobs, improve services

Definitions (2/2)

- **"Green" transition**: "To overcome the existential threats climate change poses, the European Green Deal is Europe's new **growth** strategy, which will transform the Union into a **modern, resource-efficient and competitive** economy (…) make Europe **climate neutral** by 2050, boost the economy through **green technology, create sustainable industry and transport**, and **cut pollution**.

  (European Commission, 2019)

- A means to preserve the **habitability** of the planet and ensure the continued supply of vital goods and services (food, clean air and water, materials, medicine, shelter, nitrogen-carbon-water cycling)

Transition, where to?

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Net-zero **emissions** by 2050

Halve (not double) **Domestic Material Consumption** by 2060

Halt **biodiversity losses** by 2030, recovery & restoration by 2050

No net land take by 2050

UNITED NATIONS PARIS CLIMATE AGREEMENT

Global Material Resources Outlook to 2060

OECD BETTER POLICIES FOR BETTER LIVES

UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

European Commission

Science for Environment Policy

FUTURE BRIEF:
No net land take by 2050?

Current perceptions on priorities, Luxembourg

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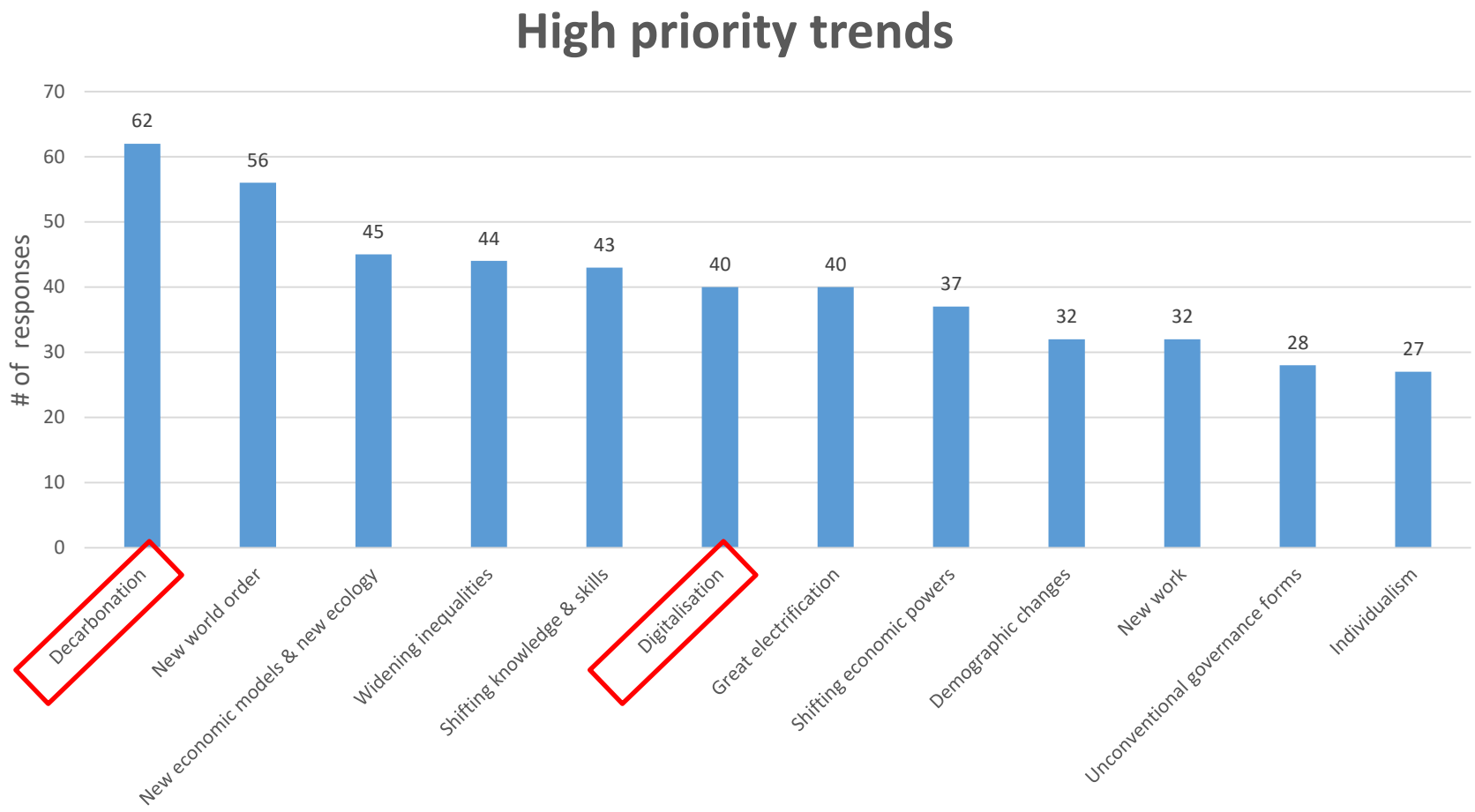

Source: Luxembourg Strategy (2022), *Megatrends survey*. Luxembourg: ministry of the Economy

De-carbonised digitalisation?

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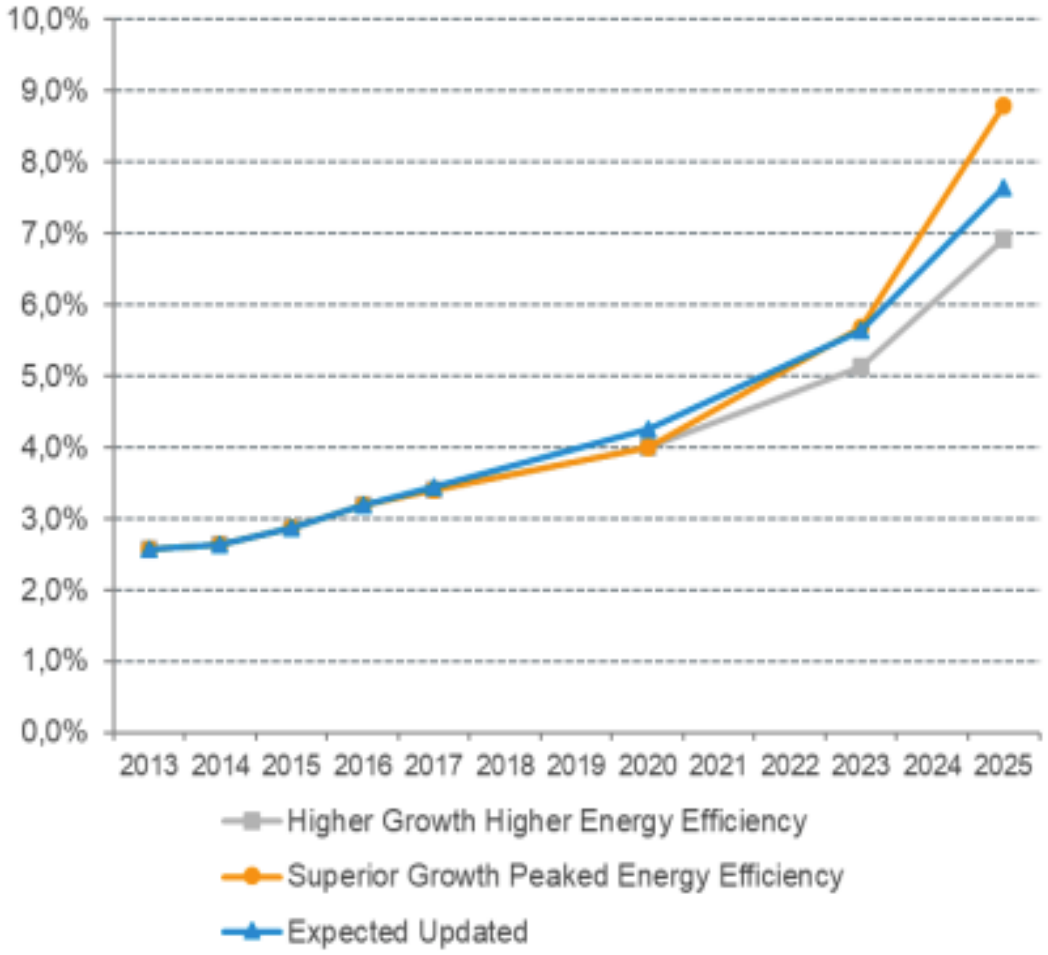
Graphique 15 – Projections de la part du numérique dans les émissions mondiales de GES



Source : Shift Project, Lean ICT Materials Forecast Model, 2018

Related reference:
France Stratégie (2020), Maîtriser la consommation du numérique : le progrès technologique n'y suffira pas. Working paper. n° 2020-15, October.

De-materialised digitalisation?

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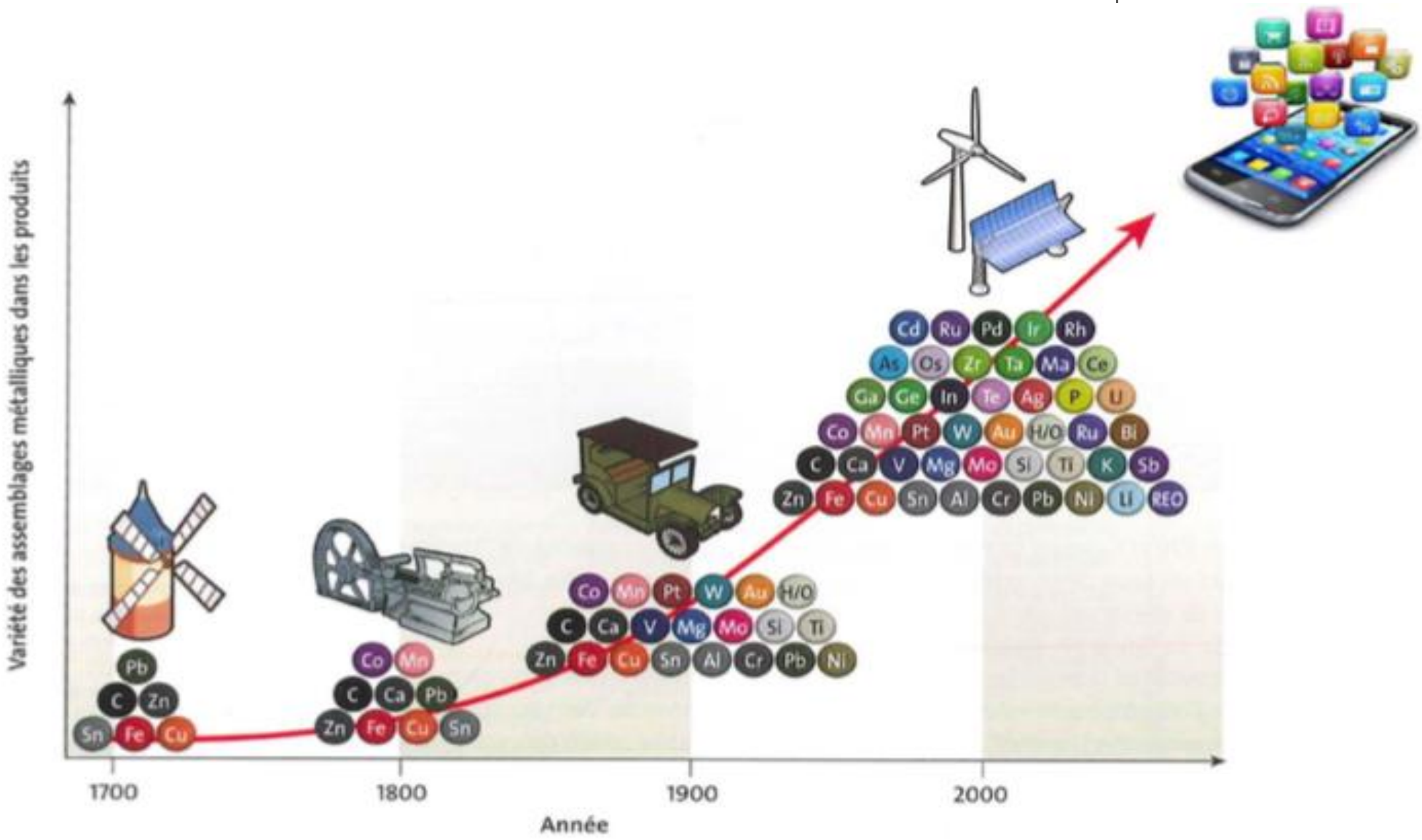

Source : Van Schaik et Reuter, revue Géosciences, n° 15

Exponential growth in ICT, automation, internet use, devices per persons, screen time

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Today, the world counts **5 bln internet users**, with an average **7hrs/day** spent on internet, thereof **2,5hrs on social media**.

(DataReportal, 2022)

Proportion of persons in France using their smartphones to… (France Stratégie, 2020)

Digital and green, are we transitioning?

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- Digital technologies account for up to 10% of Europe's energy consumption, and 4% of its greenhouse gas emissions.

European Commission (2022) Shaping Europe's digital future

- Their global energy consumption (approx. 9%/year) and emissions (1.2%/year) are is rising fast.
- High resolution video transfers exploded over the last 5 years.
- The increase in data flow makes up for datacenters (1% global electricity use) efficiency gains.

The Shift Project (2020) Plan de transformation de l'économie française, Usages numériques

- The connected world continues to grow faster than it did before the pandemic: s- and e-commerce with double digit growth rates, including, since COVID, for groceries
- Digitalisation takes land: e-commerce warehouses and data centers are fastest growing factors of land-take in France.

Lafay (2022) Comment Internet bétonnise la France. France Culture, June 10, 2022

Reformulation of the equation

- The “green” digitalisation we should pursue is one that helps us :
  - reduce rather than increase our footprints,
  - reduce rather than increase our vulnerabilities.
- “We need to ensure that digital technologies do not consume more energy than they save.” (European Commission, 2022)
- How to make digital and green mutually beneficial, knowing that digitalisation is a heavy energy and materials consumer and boosts consumption?
- The fact that production and consumption are growing, and with them energy and material throughputs, makes this is even harder to achieve than in a stable economy

Virtuous “green” digitalisation?

- Substitution of physical by virtual uses: video conferences or teleworking instead of car/plane use
- Efficient energy management, network stability with intermittencies
- Optimisation in supply chains, production, public transport
- Global navigation satellite services to facilitate environmental and climate monitoring, and connect remote areas,
- GHG monitoring and carbon project verification
- Monitor remote sites for functionality and reduce downtime
- Anticipate maintenance problems, extend equipment life and reduce waste
- Facilitate the sharing of equipment and facilities, of excess heat and industrial by-products

Virtuous “green” digitalisation?

- Robots in residual waste sorting
- E-health
- Computer vision and artificial intelligence algorithms to solve space debris accumulation
- Use digital tools for critical stock management and strategic coordination of critical resources needs (food, water, energy sources, rare earths, medical equipment, microchips...) in order to prevent shortages and waste;
- EU Open strategic autonomy and single market

Digital for food production

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- Automated greenhouses for vegetable production, **if** the process to automate cultivation results in less soil, energy, water, fertilisers, pesticides being used

Digital fire-fighting

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- Drones in fire fighting planning and monitoring

Source: World Bank (2019) Integrating green and grey infrastructures. WRI

Going further in the twinning

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- Green transition should not be reduced to green technologies, but also to nature-based or passive solutions, and green, in addition to grey infrastructures
- Ex pumps, sluices, drains to manage floods or floodplains to store excess floodwater
- Combining data-monitored engineered infrastructures with nature-based ones can be cost effective and resilient in case of outages.

Source: World Bank (2019) Integrating green and grey infrastructures. WRI

Passive or IT-assisted air conditioning?

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Solar chimney, Luxembourg Cooperation in Niger, 2016

Digital for earth observation & climate change adaptation

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- Digitalisation can enhance preparedness to physical hazards, extreme weather events or forest fires.
- Open data for understanding of disaster phenomena
- Real-time monitoring, remote sensing, satellites imagery, machine learning, for the assessment and management of flood risks.
- Early warning and enhanced disaster management.

Flood damage in Erftstadt-Blessem in Rhein-Erft-District of Germany. 17 July 2021

Dual transition exposed to hazards & disruptions

- **Prepared for** blackouts, water shortages, extreme weather events, physical damage on datacenters or transmission lines. Double by their low-tech, energy-independent equivalents
- **De-complexify**: Complexity and interdependence of digital systems makes them prone to failure, and reliable on in-built redundancies that ensure continuing service if an outage or disaster should occur. Complex devices that are difficult to recycle
- **Secure supply** of multiple components provided by different suppliers across the globe. Assess geopolitically what is extractable and producible in Europe under existing physical and regulatory constraints, without lowering social and environmental standards.
- Consider rising energy and material prices, cyberthreats, mass surveillance risk, loss of democratic control, social alienation

How to make digital green & resilient?

- Distinguish **vital public** digitalisation (health, electricity network stability and flexibility, water and sanitation …) from **private entertainment** digitalisation (streaming, video, shopping apps, social media …)
- Reduction energy and material needs, 3 agendas have to be transposed simultaneously: **efficiency, circularity and sobriety**.
- Digital sobriety, data hygiene, cap on data transfers intensity and number of connected terminals per person.
- Regulate to reverse **overconsumption and planned obsolescence**, limit advertising and youth screen time, promote reparability and reuse of devices
- Opportunity cost of digitalisation: displaces resources for other uses

“Why must the future be digital?”*

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- Digitalisation should not be the purpose and sole content of education. Instead it should be a means to enhance general knowledge, learning capacities and independent judgment.
- “The alleged sustainability benefits of digital technologies may turn out to be ill-founded, as rebound and adverse secondary effects may be substantial. Digitalisation, then, might be at odds with sustainability unless the digital regime is re-oriented towards inclusive practices, democratic governance and environmental regulation.” Andersen et al. (2021)
- Resilience thinking urges to **combine all means**, not one at the expense of another: high and low-tech, assisted and passive, green and grey, technological and behavioural …

***Reference:** Palms (2021) Why must the future be digital? Delano.lu. Editorial

“Why must the future be digital?”*

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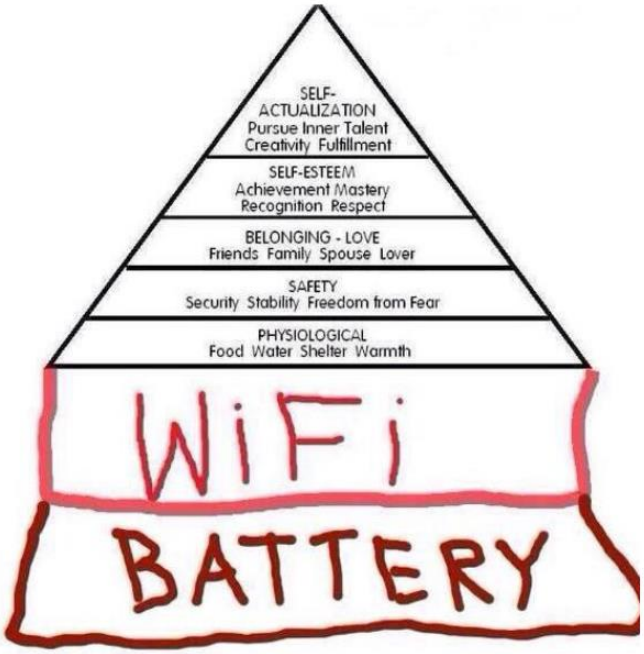
- Technological progress will not be enough (…) to compensate the effects of an exponential growth of internet traffic
- The foreseeable explosion of the number of things connected to the internet is also likely to bring about an increase in energy consumption related to their production (…)
- It is only by accepting to recognise the helplessness of technology alone to achieve the target of reducing technology-related energy consumption that it will be possible to develop relevant public policies, i.e. usage- and eco-design-centred policies.

France Stratégie (2020)



Maslow’s pyramid of needs, revisited

*** Reference:** Palms (2021) Why must the future be digital? Delano.lu. Editorial

Next steps for a net-zero carbon and no-net ecological losses type of digitalisation

- Make do with what we have: 10% energy consumption and 4% emissions
- Public research on the biophysical reality check net footprints of the data industry, IoT, automation, cryptocurrencies
- Concentrate green digitalisation on public goods value creation
- Derive criteria and list projects, which ensure and demonstrate, under a life cycle perspective, the feasibility of achieving decoupling and lower overall footprints through “green” digitalisation
- Develop monitoring indicators of the net gain of “green” digitalisation
- Use our screen time to **#getreal**

References

Andersen et al. (2021) On digitalization and sustainability transitions. Environmental Innovation and Societal Transitions 41 (2021) 96–98

DataReportal (2022) Digital 2022: Global Overview Report. Report. Available at: https://datareportal.com/reports/digital-2022-global-overview-report (Accessed: 13 June 2022)

European Commission (2022) Shaping Europe's digital future. Available at: https://digital-strategy.ec.europa.eu/en/policies/green-digital (Accessed: 13 June 2022)

European Commission (2021) 2030 Digital Compass: the European way for the Digital Decade. Communication. Available at: https://ec.europa.eu/reform-support/what-we-do/digital-transition_en (Accessed: 13 June 2022)

European Commission (2019) The European Green Deal. Communication. Available at: https://ec.europa.eu/reform-support/what-we-do/green-transition_en (Accessed: 13 June 2022)

IPCC (2022) Climate Change 2022: Mitigation of Climate Change. Working Group III contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926

Junker (2020) Pour une école éveillant à la sobriété numérique. Luxemburger Wort, Briefe an die Redaktion.

The Shift Project (2022) Plan de transformation de l'économie française, Usages numérique. Report. Available at: https://theshiftproject.org/wp-content/uploads/2021/04/TSP-PTEF-V1-FL-Numerique.pdf (Accessed: 13 June 2022)

Thank you for you attention

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