

DevOps for Sustainability?

A winning duo

**AGILE/
DEVOPS
GLOBAL
CONFERENCE**

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Disclaimer!

I'm not a DevOps expert



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AGE: 28 yo

NATIONALITY: Italian

DEGREE: MSc Mathematical Engineering @Polimi

PASSIONS: *Innovability*, technology, foreign cultures & languages, travelling with a backpack on my shoulders

LIFE GOALS: be passionate about what I do, be able to create value for Society through my job

Graduated in Mathematical Engineering from Polytechnic of Milan, I have tried since my studies to combine my passion for technology with the intention of developing solutions capable of creating value for the society. The focus of my work has always been the application of emerging technologies to tackle business issues, such as optimization, analytics, AI, Blockchain and Quantum Computing...

Today, I am a Blockchain Technology Strategist and co-lead of NTT DATA's Championship Sustainability Goals, which explores applications of technology to support a more sustainable world

I feel my nature is to be polyedric, dynamic and curious, being able to contaminate my soul with different passions and abilities: Engineering and Arts, Maths and foreign languages, programming and travelling...

With the approval of the **United Nations Global Agenda for Sustainable Development**, a clear judgment was expressed on the **unsustainability** of the **current development model**, not only in **environmental** terms, but also in **economic** and **social** terms

On 25 September 2015, the United Nations approved the **Global Agenda** for Sustainable Development and its **17 Sustainable Development Goals**, articulated in 169 Targets to be achieved **by 2030**



All **countries** are called to contribute to achieving the objectives, defining their own **IMPLEMENTATION STRATEGY**, which can and must involve all the components of the society along **3 main directions**:

**ENVIRONMENTAL
PROTECTION**

**SOCIAL
DEVELOPMENT**

**ECONOMIC
DEVELOPMENT**

The Goals



Green IT is critical for the sustainable future of companies

Assumptions we must start taking into consideration

01

Climate change **remains the greatest global challenge** we are facing and will face in the years ahead, both short and long term

02

Companies and governments have set **ambitious targets to achieve NetZero / carbon neutrality** in few years

03

Governments will foster political actions, **companies will** (have to) **rethink their business practices**

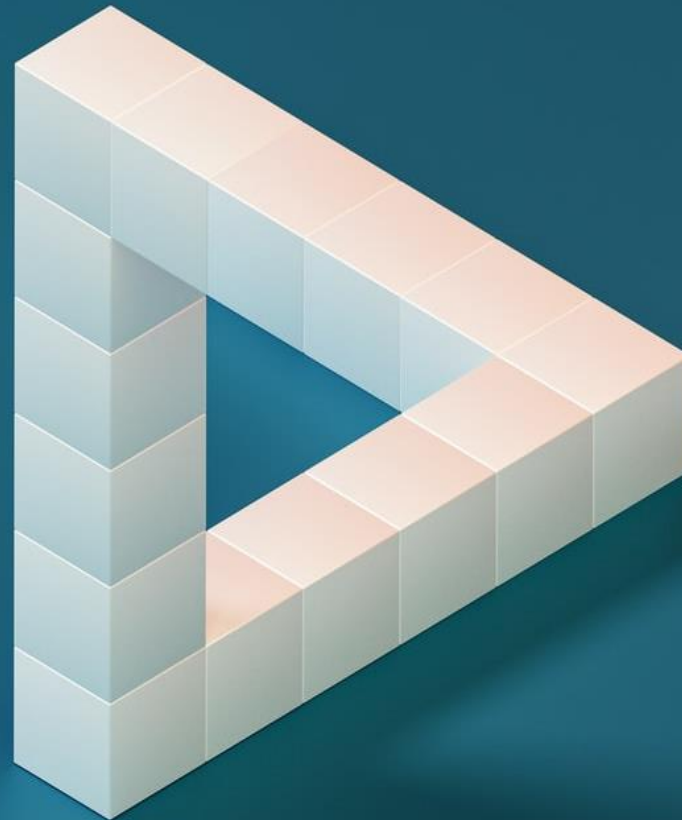
04

To accomplish the set goals, an **immense shift along the entire IT value chain is required**

The «Green IT Paradox»

IT emissions already amount to **3% of all CO₂ emissions**,
by 2030 that figure is destined to **triple** due to the exponential diffusion of digital technology

The role of the IT factor in the path towards NetZero is very often considerably **underestimated**



Digital companies are guided and supported by IT capabilities, but at the same time are also among the major contributors to emissions that hinder the achievement of sustainability objectives

Greater use of new technologies will gradually cause a greater impact

Main reasons to pursue Green IT actions today



**IT EFFICIENCY and
COST
IMPROVEMENT**



**PRE-EMPTING
UPCOMING
REGULATIONS**



**PRE-EMPTING
CHANGE IN
MARKET BEHAVIOR**



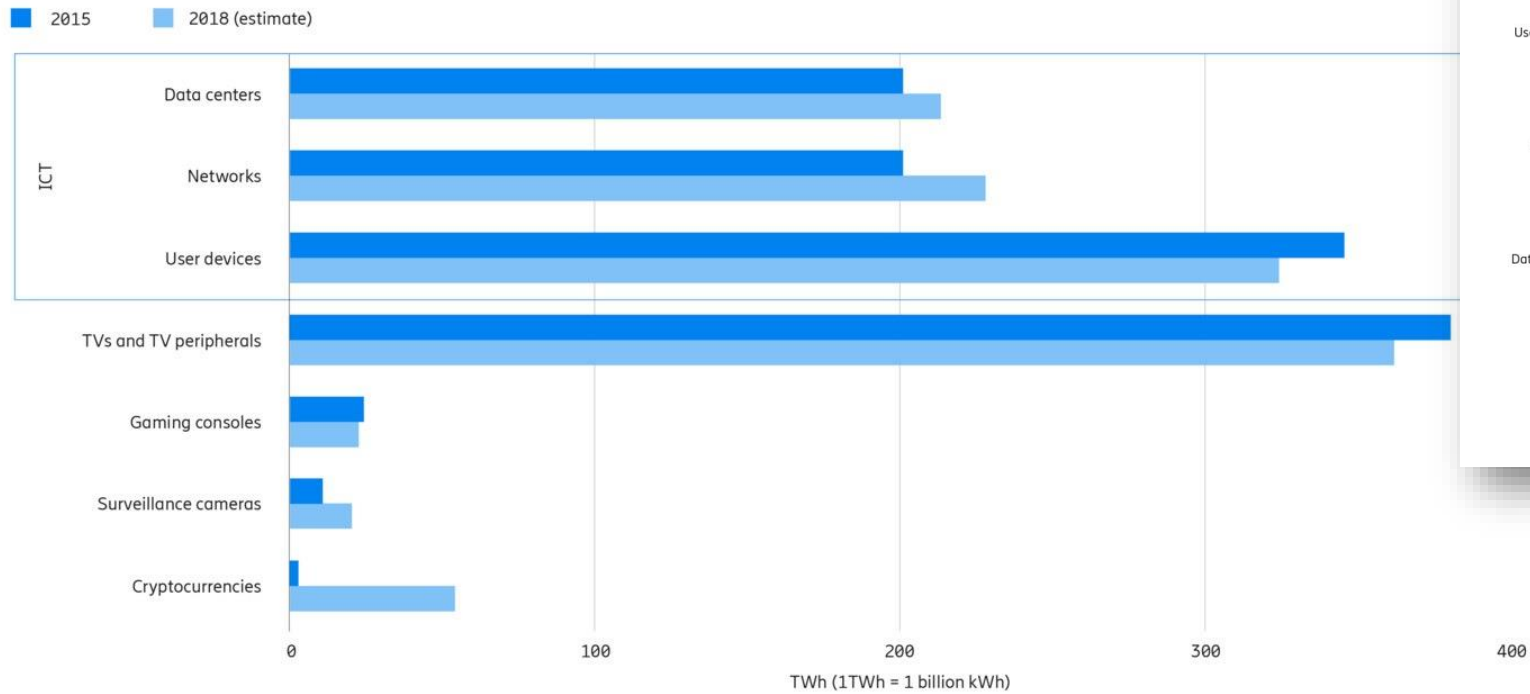
**STRENGTHENING
COMPANY
PURPOSE**



**INCREASE
EMPLOYEE
SATISFACTION**

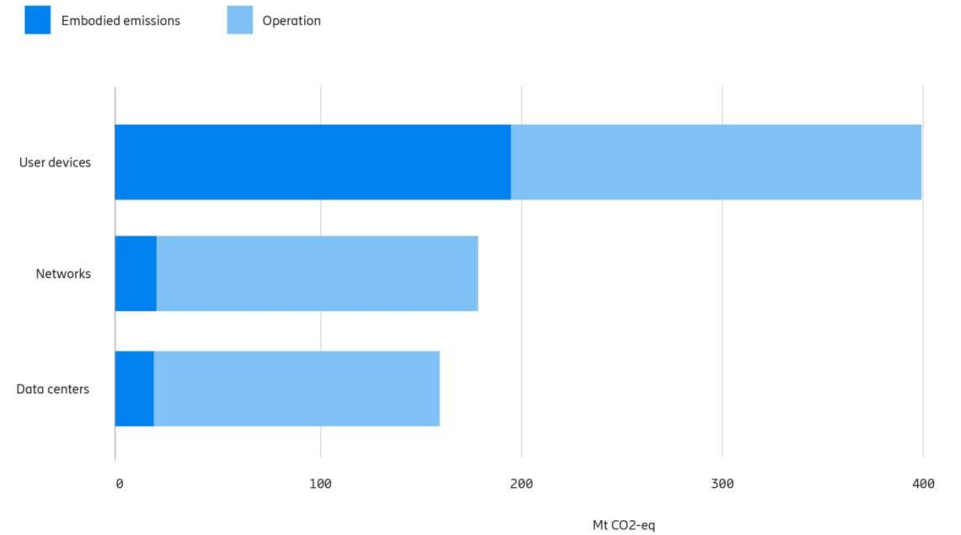
Most consuming operations

The operation aspects of ICT electricity consumption in perspective



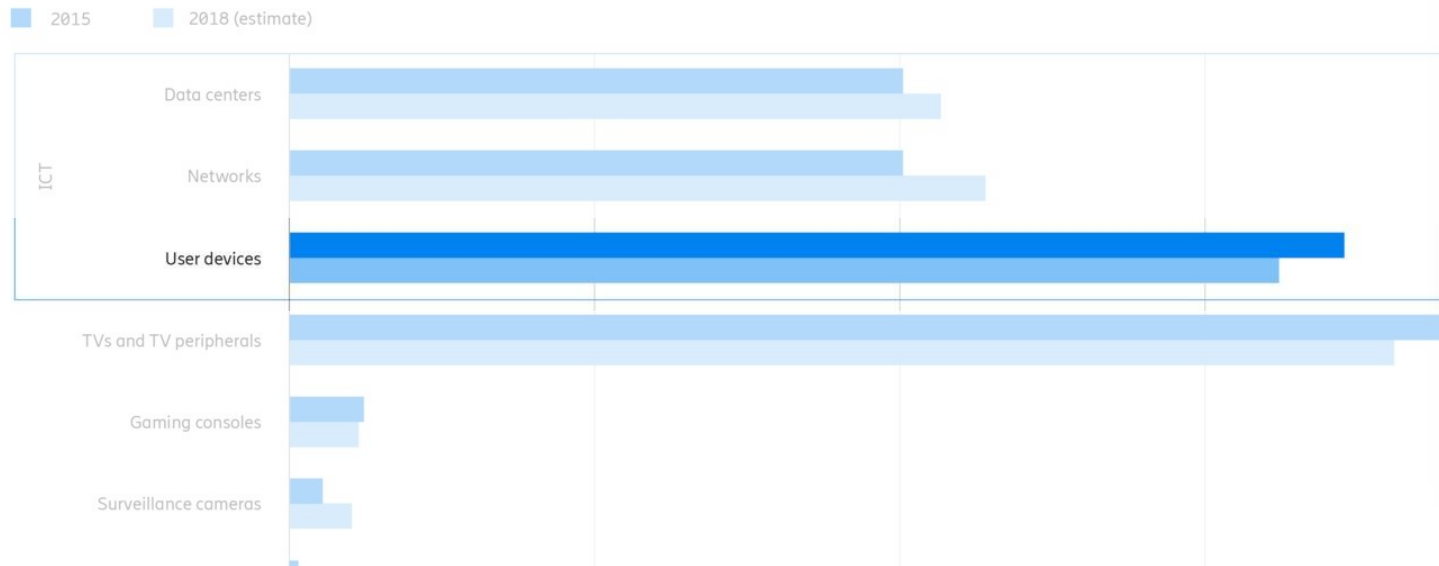
Data centers include enterprise networks (intranet)
Company offices, transport, etc. are included in ICT electricity consumption

Distribution of ICT's carbon footprint (2015)

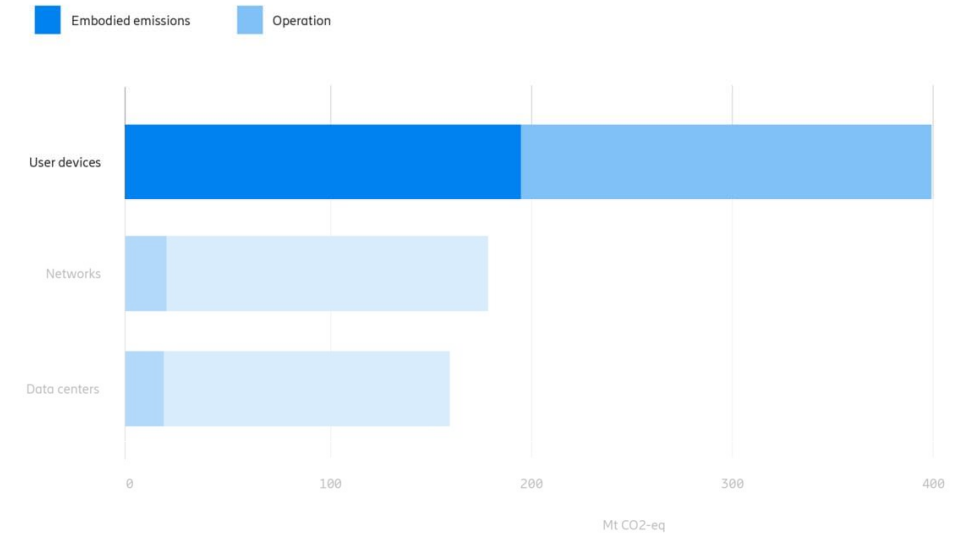


While developing software, user devices are PCs!

The operation aspects of ICT electricity consumption in perspective



Distribution of ICT's carbon footprint (2015)

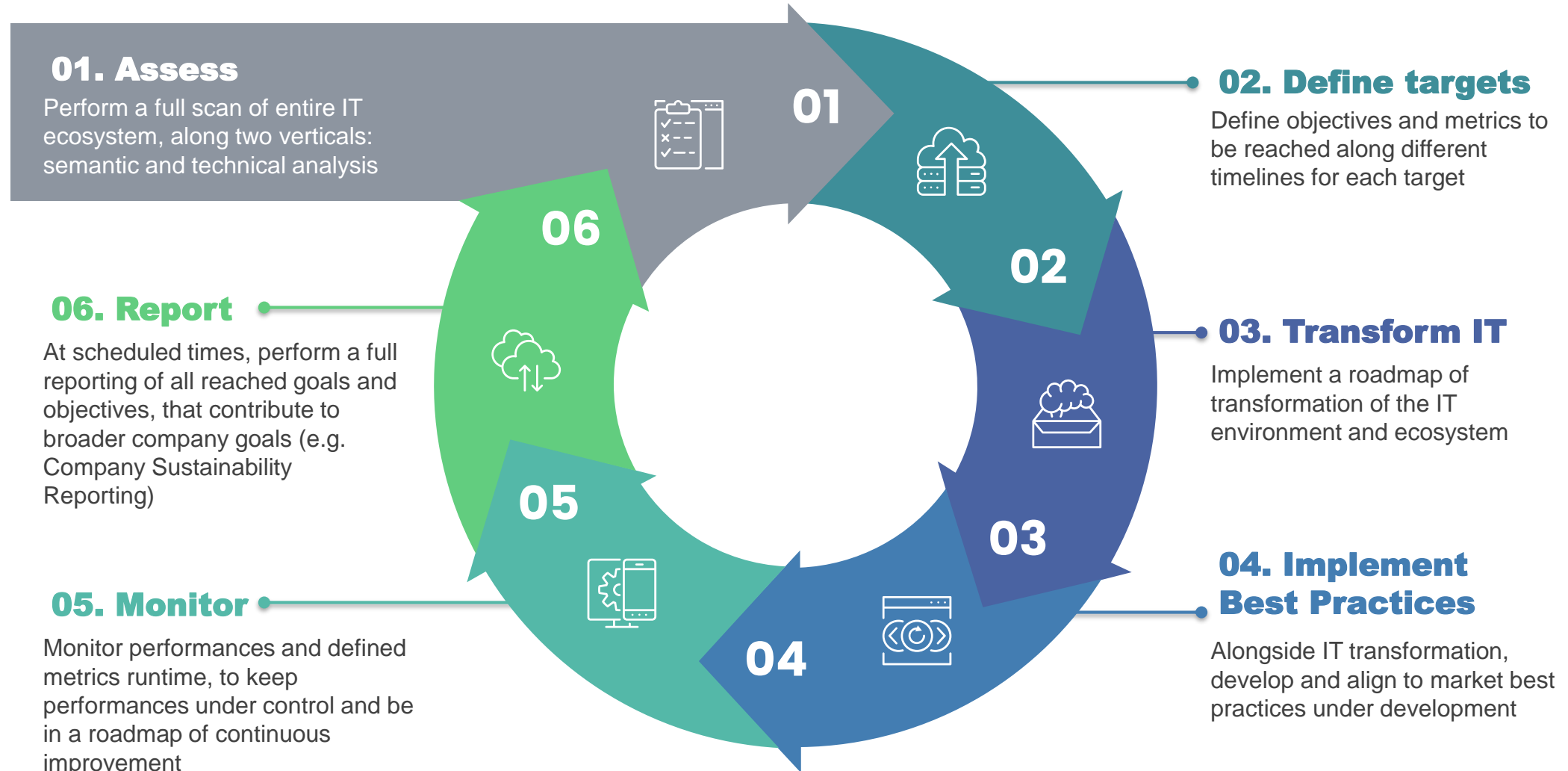


Consumption is not ONLY on applications running in production: it's the **whole development process that consumes**, the less **optimized** it is, the higher its impact is!

Company offices, transport, etc. are included in ICT electricity consumption

The approach towards a Green IT roadmap definition

A consolidated approach for a brand new topic



Three points of view



Systems
Approach



IT
Optimization



IT Workforce
Management

Systems Approach

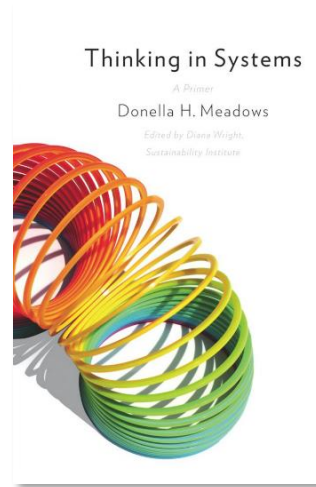


Systems Approach

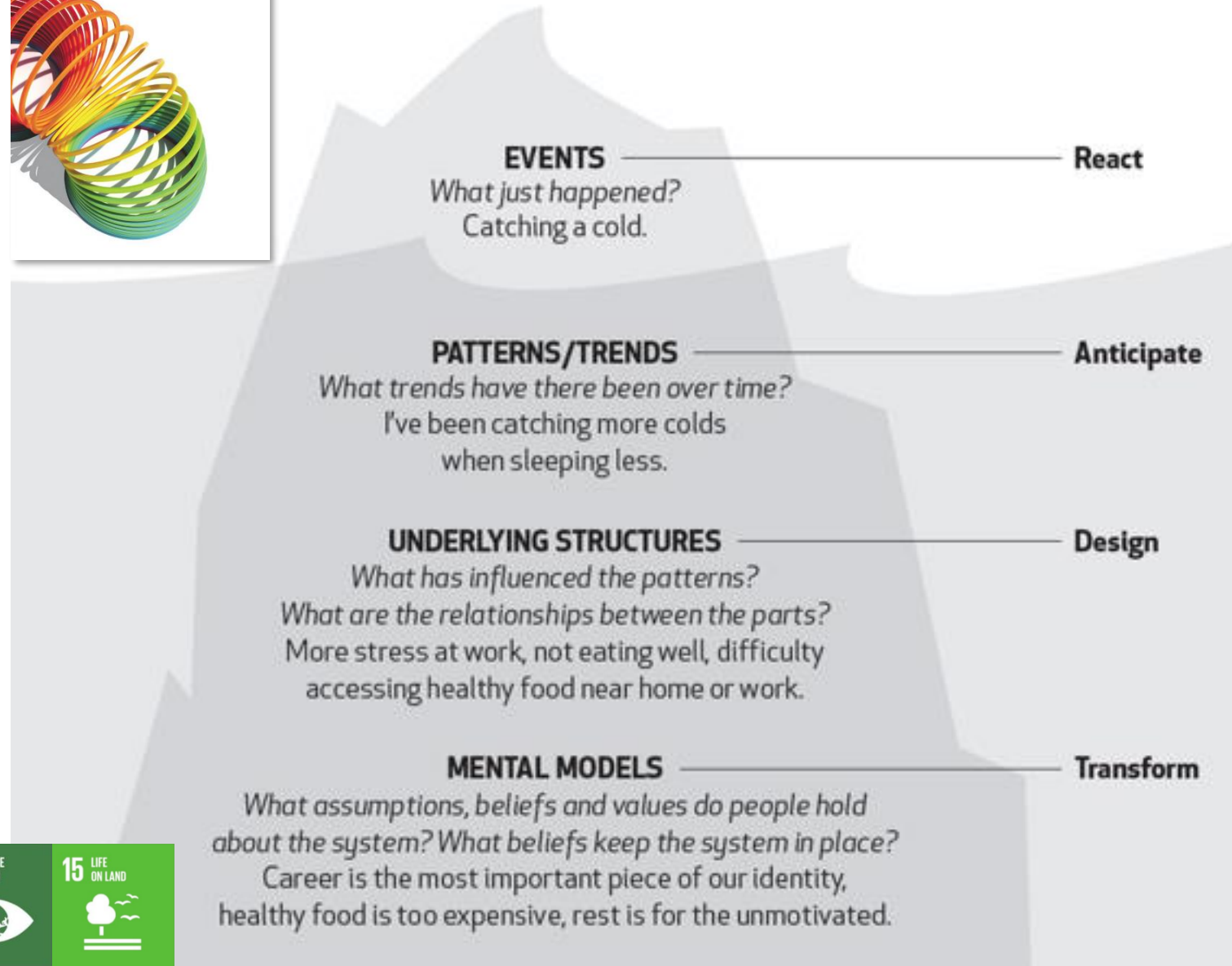
Often, when dealing with hard issues, the easy solution is to move them outside of our scope, rather than to fix them. This is particularly common with sustainability problems, but we are now becoming aware that there is no room out there left to shift such issues, and they have to be faced by every individuals and organizations “internally”.

Furthermore, care must be taken that the resolution of a local sustainability problem does not generate unwanted and unexpected consequences in other contexts. Therefore, any approaches to sustainability should be holistic in nature, and consider our scope as a system in a wider “system of systems”.

Mindsets as **Systems Thinking**, and their technical facets like Systems Engineering, should be adopted.



THE ICEBERG A Tool for Guiding Systemic Thinking



IT Optimization



- Efficiency
- Cleanness
- (Test) automation
- Collaboration



The characteristics of DevOps approaches are the same as those sought by Sustainability!

- Efficiency
- Cleanness
- (Test) automation
- Collaboration

When setting up work, choose “Green” technologies



IT Optimization: a benchmark with Quarkus.io

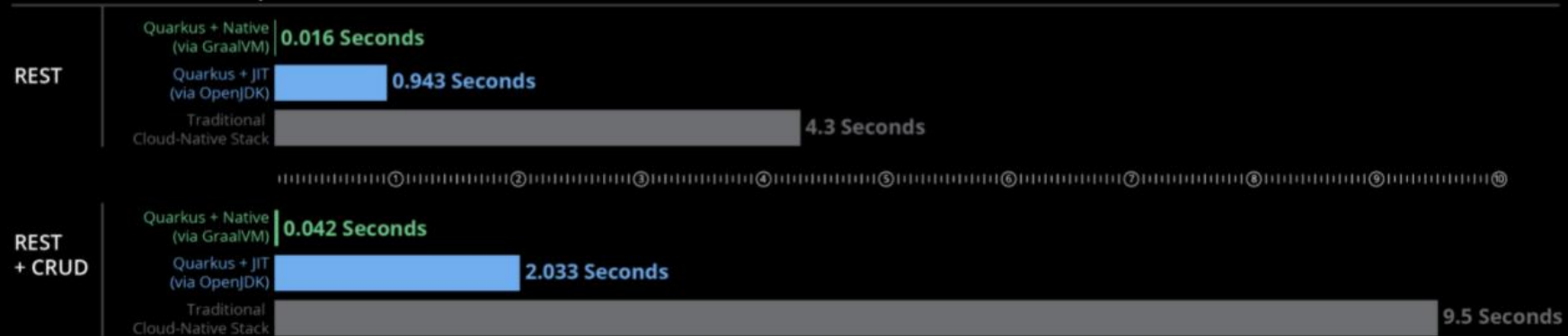
```
$ ./my-native-java-rest-app  
Quarkus started in 0.008s
```

Memory (RSS) in Megabytes*

*Tested on a single-core machine



BOOT + First Response Time





IT Optimization: cattle versus pets





IT Optimization: cattle versus pets

An example: the adoption of **serverless paradigms**, that is to turn off the servers when they are not used (i.e. when nobody calls them) and turn them back on very fast as soon as a client invokes an API.

Reimplementing all current software to go to AWS Lambda would have higher costs than benefits, but there exist some frameworks in Java that are moving in the direction of *serverless*, that are worth considering because they facilitate migrations with relatively little impact.

The most popular frameworks are:

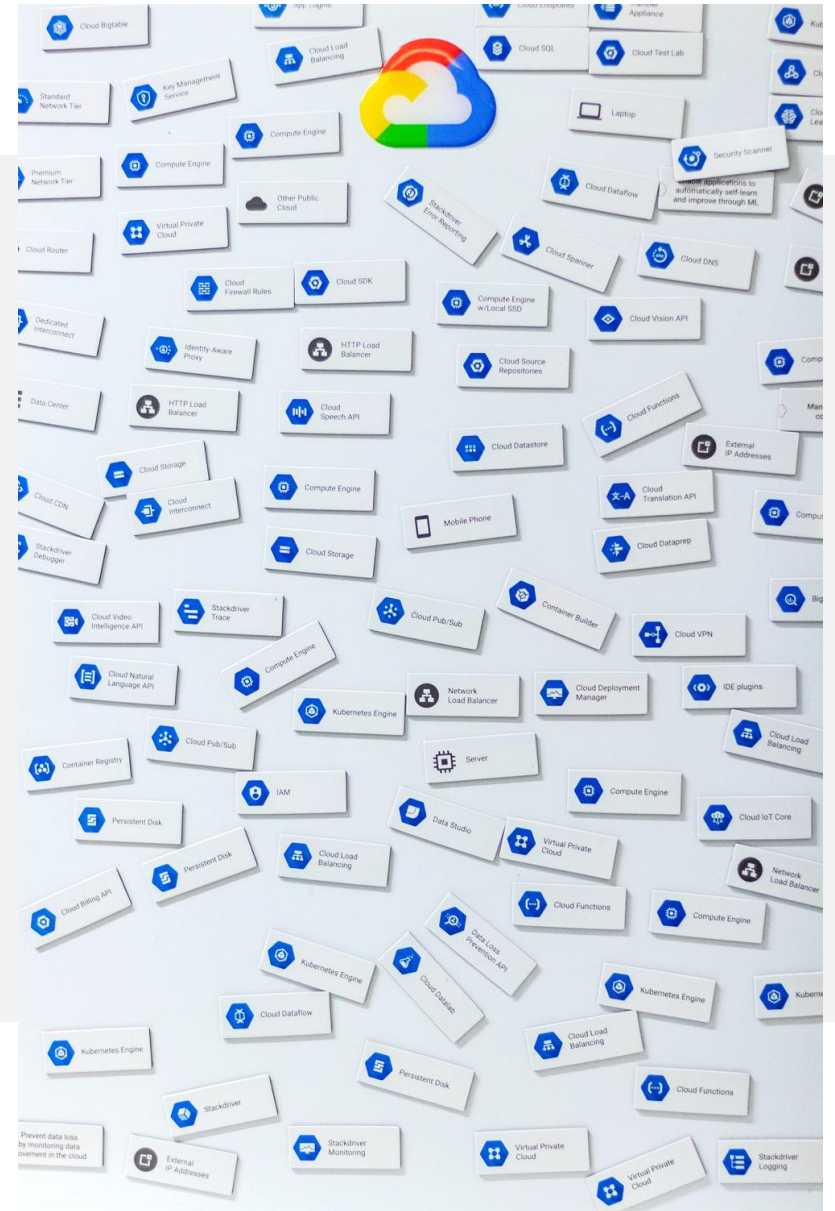
- Spring (Boot) NATIVE (<https://spring.io/blog/2021/06/14/spring-native-0-10-0-available-now>)
- QUARKUS (<https://quarkus.io/>)
- HELIDON (<https://helidon.io/#/>)

The key concept in these cases is to **minimize the startup time in a process/container** that in the Java world has traditionally always been the Achilles' heel, to facilitate fast response mechanisms starting from the "server or container off" state.




IT Workforce Management

- Disposable environments
- Elastic scaling





IT Workforce Management



Hybrid models (mix of physical and digital) will be the road to the new normal in 2021. The “remote work is here to stay” buzzword is a clear indication of that. Nearly 70% of organizations with remote working experiences believe that the productivity benefits of remote working are sustainable and replicable beyond the pandemic.

Clearly, such benefits also reflect to less commuting and therefore a much lower impact on urban pollution, and to more energy-efficient business real estates.

Personal assets such as development environments should be considered as well: the advent and growth of cloud-native SaaS Web IDEs as opposed to standard VDI, besides further improving consistency and deployment speed, and allowing for power-saving thin-clients at the developer-side, will also optimize the server-side resource consumption (elastic and light Kubernetes containers vs. full-stack VM's).

So what?



DevOps can be rethought

Having Sustainability drivers
in mind



A winning duo

Optimization and Sustainability go
on well together 😊



Why would a company care?

Because Sustainability is a need and
a challenge that has to be faced

So what?

01.

DevOps can be rethought

Having Sustainability drivers
in mind

02.

A winning duo

Optimization and Sustainability go
on well together 😊

03.

Why would a company care?

Because Sustainability is a need and
a challenge that has to be faced

What's next?

04.

Measure

05.

Implement best practices

06.

Optimize according to new drivers

NTT DATA is a steering member of GSF

The Green Software Foundation is a non-profit with the mission to create a trusted ecosystem of people, standards, tooling and best practices for building green software



TOKYO – Sep 16, 2021 – **NTT DATA**, a global digital business and IT services leader, today joined the Green Software Foundation, an organization devoted to reducing CO2 emissions caused by software, as a Steering Member. NTT DATA strives to formulate and promote global standards on software and system development that address climate change by working toward carbon neutrality.

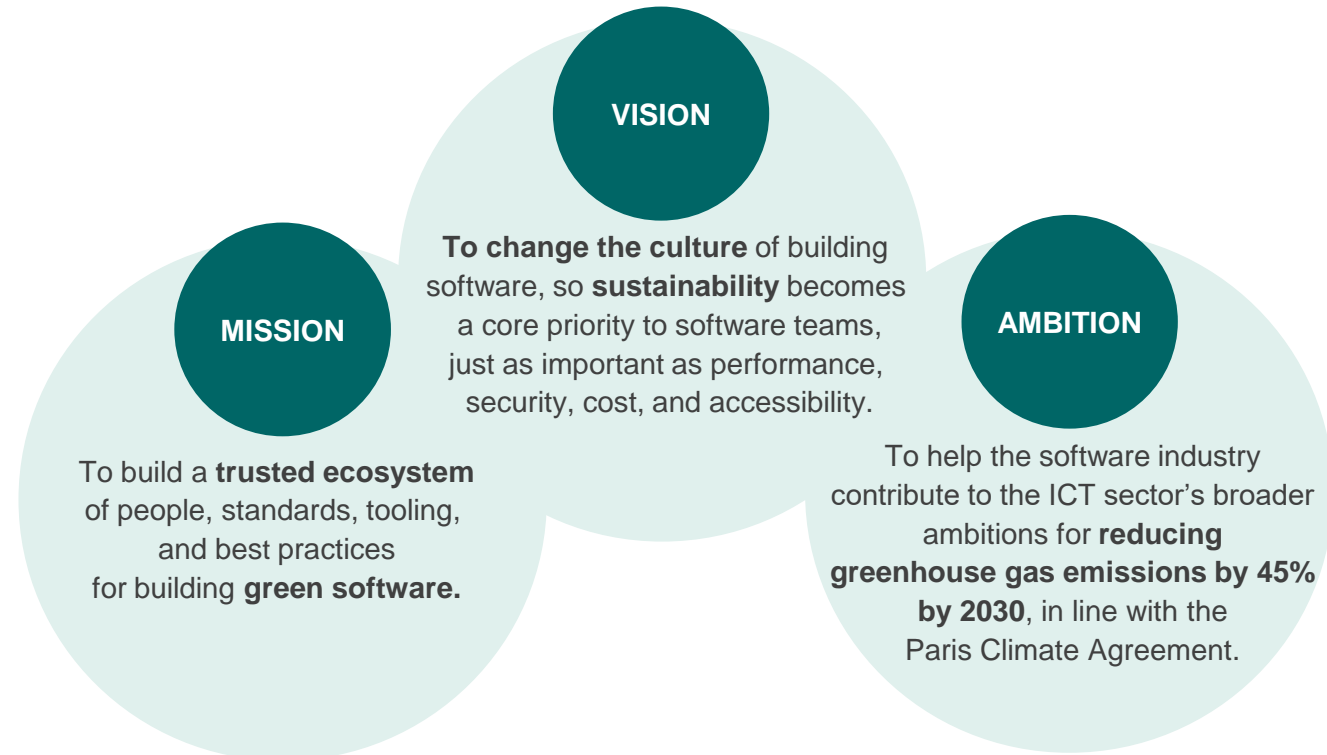
NTT DATA's Green Innovation Activities

NTT DATA has developed its "NTT DATA Carbon-Neutral Vision 2050" as part of its efforts to ensure that society will achieve carbon neutrality. Through the advancement of "Green Innovation," NTT DATA will contribute to efforts seeking to realize carbon neutrality for society, not just for NTT DATA, via the utilization of digital technologies and joint development with its clients.

Joining the Green Software Foundation^(*)

As a measure to further advance Green Innovation, NTT DATA joined the Green Software Foundation as a Steering Member on September 16, 2021.

The Green Software Foundation is a non-profit organization jointly founded in May 2021 by the Linux Foundation, in collaboration with four companies: Accenture, Citilab, Microsoft, and Thoughtworks. This organization has set as its goal "a 45% reduction in



NTT DATA has joined it as the 6th steering member. We are promoting the greening of software globally.



Sustainability is not just about environment

Three more directories: People, Governance, Community

Evaluate the company's contribution to the worker in terms of: health, safety, compensation, well-being, satisfaction, personal and job development, commitment to improving inclusiveness and eliminating discrimination and work barriers

Assess the company's mission in terms of: **ethics**, commitment to **social and environmental issues**, **transparency**, **anti-corruption**, **responsible supply chain**, and formal stakeholder participation in decision-making processes



Evaluate company impact on the community in terms of: social and civic engagement, philanthropy, charity, involvement of local populations, and business model focused on economic development of the area while respecting diversity

Assess company impact on the environment in terms of: waste reduction, use of renewable energy, production of services with a positive impact on the environment, introduction of environmental protection practices including awareness raising activities



**One of the most difficult things
is not to change society, but to
change yourself**

Nelson Mandela



**“Do not go where the path
may lead, go instead where
there is no path and leave a
trail”**

Ralph Waldo Emerson

