How to estimate the ICT enablement potential? – From methodology to industry practice.

Christian Maasem, Detecon International GmbH
ITU Symposium on ICT, Environment, Climate Change and Circular Economy, 20th of October 2022

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The future possibility to calculate the enablement of ICT infrastructure is an essential key to follow the EU's transition towards a green and digital future.

TOWARDS
A GREEN &
DIGITAL
FUTURE

Key requirements
for successful
twin transitions
in the European Union

JRC SCIENCE FOR POLICY REPORT

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ICT is seen as one key enabler towards a green transition

- **Digital technologies** with their capabilities to dematerialize, improve efficiencies and support cascading impact support, **promote the transition**

- **Prerequisite** is and will be the overall task to **reduce** those **negative impacts influenceable by the industry** first, e.g. from maintaining systems and processes, manufacturing or end of life treatment.

- **Designing a methodology for calculating the ICT enablement can converge these aspects to strive for better in theory**

- **In practice data lakes, standardization and collaboration for use case building will be the next important step to bring the concept to life**
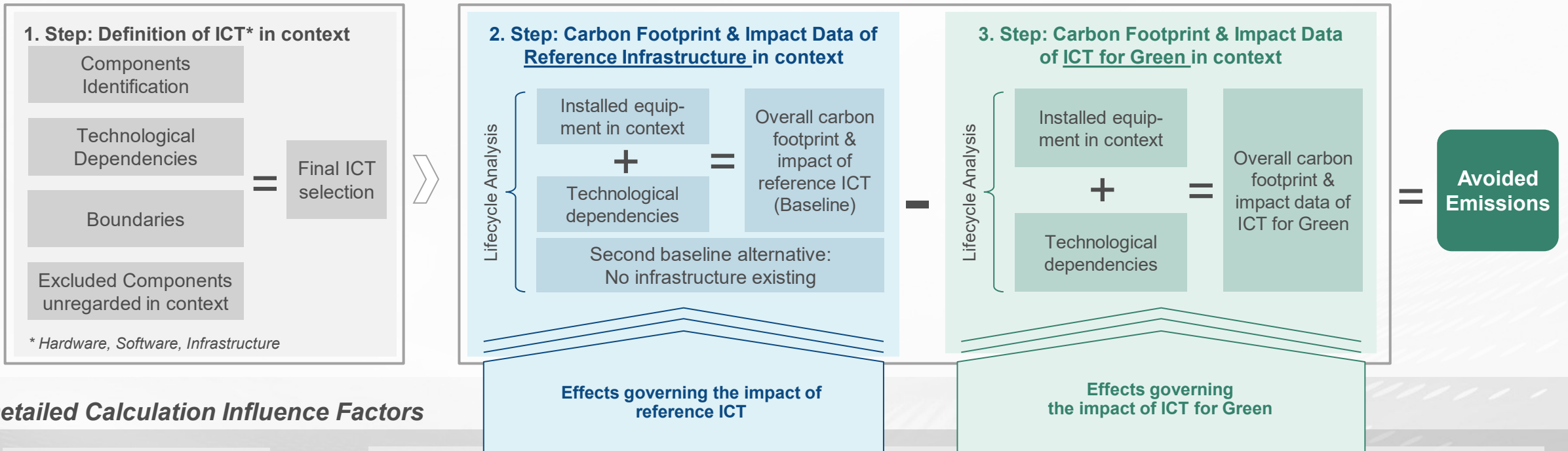
Source: Detecon Research, Muench et. Al. (2022)

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An overview of the Version 1.0 of the ICT Enablement Methodology to calculate avoided emissions in a step-by-step process.

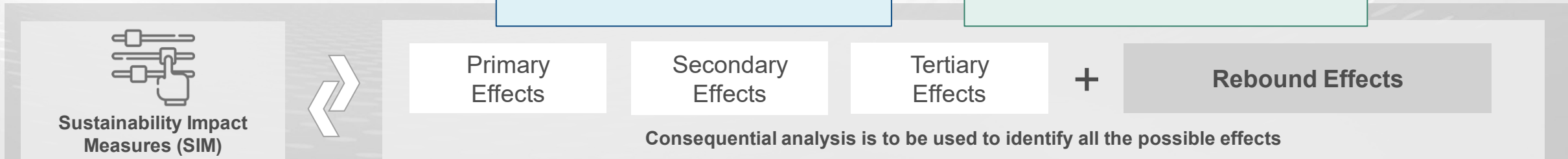*Core Enablement Quantification Calculation*

Version 1.0

Context (Application setting of ICT Enablement Calculation)

1. Step: Definition of ICT* in context

Components Identification

Technological Dependencies

Boundaries

Excluded Components unregarded in context

= Final ICT selection

* Hardware, Software, Infrastructure

2. Step: Carbon Footprint & Impact Data of Reference Infrastructure in context

Lifecycle Analysis

Installed equipment in context

+

Technological dependencies

Second baseline alternative: No infrastructure existing

= Overall carbon footprint & impact of reference ICT (Baseline)

−

3. Step: Carbon Footprint & Impact Data of ICT for Green in context

Lifecycle Analysis

Installed equipment in context

+

Technological dependencies

= Overall carbon footprint & impact data of ICT for Green

= **Avoided Emissions**

Effects governing the impact of reference ICT

Effects governing the impact of ICT for Green

Detailed Calculation Influence Factors

Sustainability Impact Measures (SIM)

Primary Effects

Secondary Effects

Tertiary Effects

+

Rebound Effects

Consequential analysis is to be used to identify all the possible effects

[1] LCA is the base for the quantification [ISO 14040/44 , ETSI ES 203 199]

Source: Detecon Research, s. references at the end

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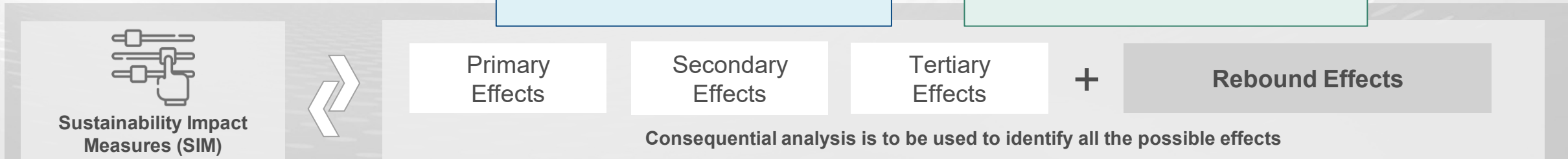## Core Enablement Quantification Calculation

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In future it is important to gather as much data about various impact possibilities from ICT in the form of the main four effects through diverse use cases.
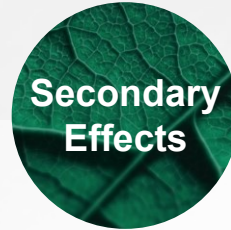
Primary Effects
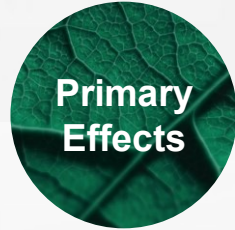
What?

- Impact created by the physical existence of ICTs and the processes involved (GHG emissions, e-waste, use of hazardous substances & use of scarce, non-renewable resources)

Why?

- Visualizing the impacts of manufacturing & operation process to link them with measures of improvement or positive reinforcement by the OEM

Secondary Effects

What?

- Impact and chances created by the use and application of ICTs. This include environmental load reduction effects which can be either actual or potential as well as positive enabling effects

Why?

- Understanding the role of ICT for a green and digital transition, its potential consequences and levers to gather data for an iteration-driven improvement across industries and ecosystems

Tertiary Effects

What?

- Impact and chances that have to do with structural & behavioral effects associated with the used ICT

Why?

- Understanding the long-term effects of ICT for society and infrastructure to prove its hopeful forecasts and to create innovation & positive ecosystem effects to foster enablement on a big scale

Rebound Effects

What?

- Impact caused by an overly increased consumption and emission pollution due to environmental and work efficiency of ICT
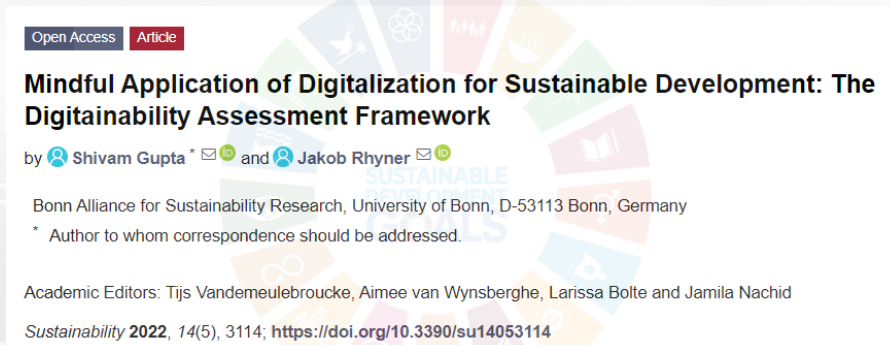
Why?

- Rebound effects are still hardly measurable through a lack of clear cause and effect relationships so that an ecosystem-driven approach as network is needed

Source: Detecon Research & ITU-T L.1410 (2014)

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Deep Dive: Promoting an ecosystem-wide approach through the Digitainability Assessment Framework and the Sustainability Impact Measurements.

The development of the Consequential Analysis step:

- The foundation builds a **traditional LCA approach** for analyzing the impact of the ICT infrastructure itself in context

- The **Digitainability Assessment Framework** (DAF) is introduced as a **consequential analysis** to identify the secondary and tertiary order effects induced as consequence of the ICT deployment and use

- The DAF connects the impact of ICT with the **17 UN Sustainable Development Goals** and their respective subgoals

- This combination enables a **holistic sustainability assessment of ICT infrastructure** – qualitatively and quantitatively

Open Access   Article

Mindful Application of Digitalization for Sustainable Development: The Digitainability Assessment Framework

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Source: Detecon Research

The Sustainability Impact Measures:

- **The Sustainability Impact Measures** are actions to **positively influence the potentially negative impact** of the primary, secondary, tertiary and rebound effects to **improve the ICT enablement quantification**

- Starting point are the **primary effects** as they need to be the starting point for improvement first – confirmed by **EU transition**

- **For example**: Energy consumption would be paired with the parameter energy source and hence the measure of providing green renewable energy.

GHG Emissions   **Circular Economy**   **Energy Consumption**

Lean Processes   **Resource Management**   **Capacity Management**

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Thank you.

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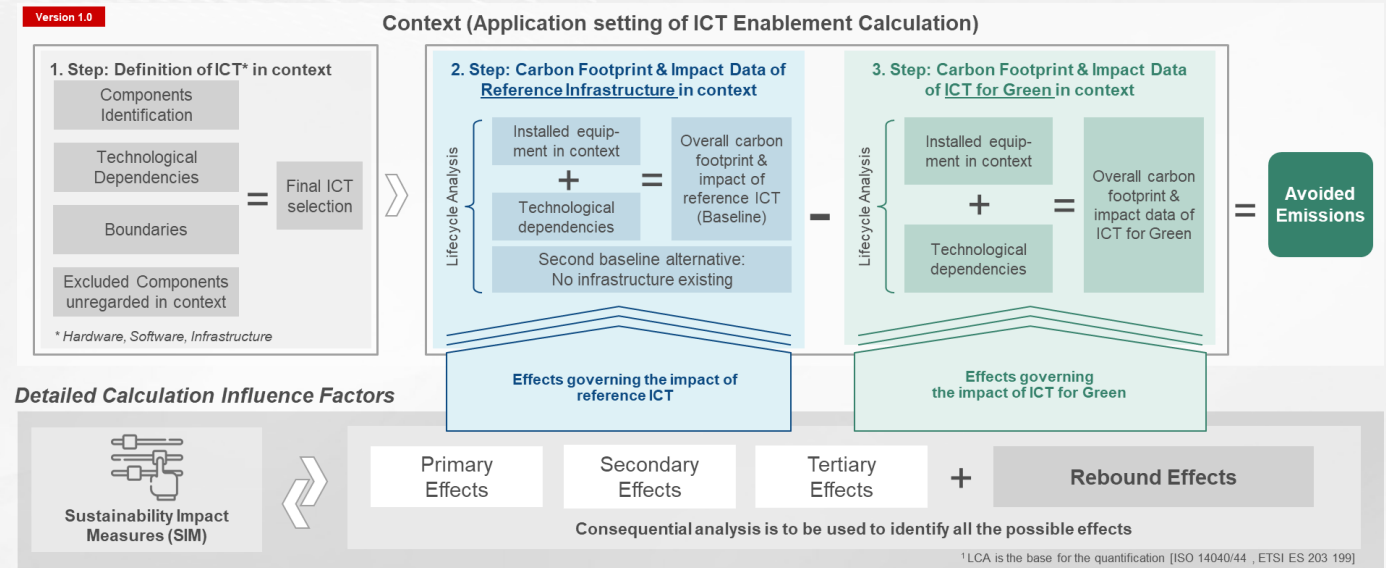Konstantin.Marin@detecon.com

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Core Enablement Quantification Calculation

Version 1.0

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Detailed Calculation Influence Factors

Sustainability Impact Measures (SIM)

Primary Effects | Secondary Effects | Tertiary Effects + Rebound Effects

Consequential analysis is to be used to identify all the possible effects

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Our Key Takeaways: Collaborate to drive Digitainability!

Focusing on creating collaborations across industries with various use cases to fully grasp the ICT enablement through steady application.

Fostering the overall standardization by engaging with the ecosystem to share experiences about any insights regarding data gathering.

Zeroing in on advancing the consequential analysis, enablement impacting effects and any best practices regarding Sustainability Impact Measures.

Source: Detecon Research

HUAWEI

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Overview of the research sources which were used for the development of the methodology about the enablement potential of ICT infrastructure (1/3).

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Overview of the research sources which were used for the development of the methodology about the enablement potential of ICT infrastructure (3/3).

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