Enablement effects of ICT: Methodology, Examples, Learnings
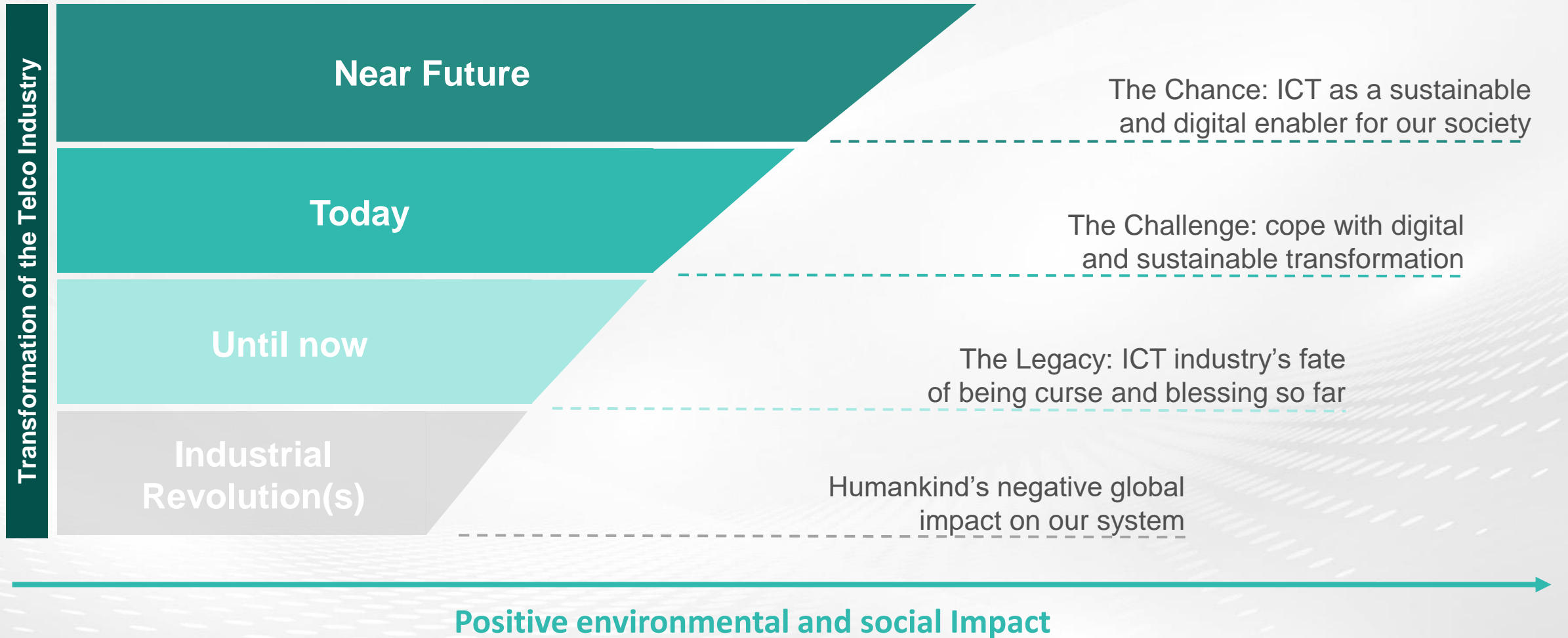
Christian Maasem, Detecon International GmbH

STI Forum, 2nd May 2023

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In the sustainability revolution, ICT's transformation pivots its role to an enabler for society.

Transformation of the Telco Industry

Near Future

Today

Until now

Industrial Revolution(s)

The Chance: ICT as a sustainable and digital enabler for our society

The Challenge: cope with digital and sustainable transformation

The Legacy: ICT industry's fate of being curse and blessing so far

Humankind's negative global impact on our system
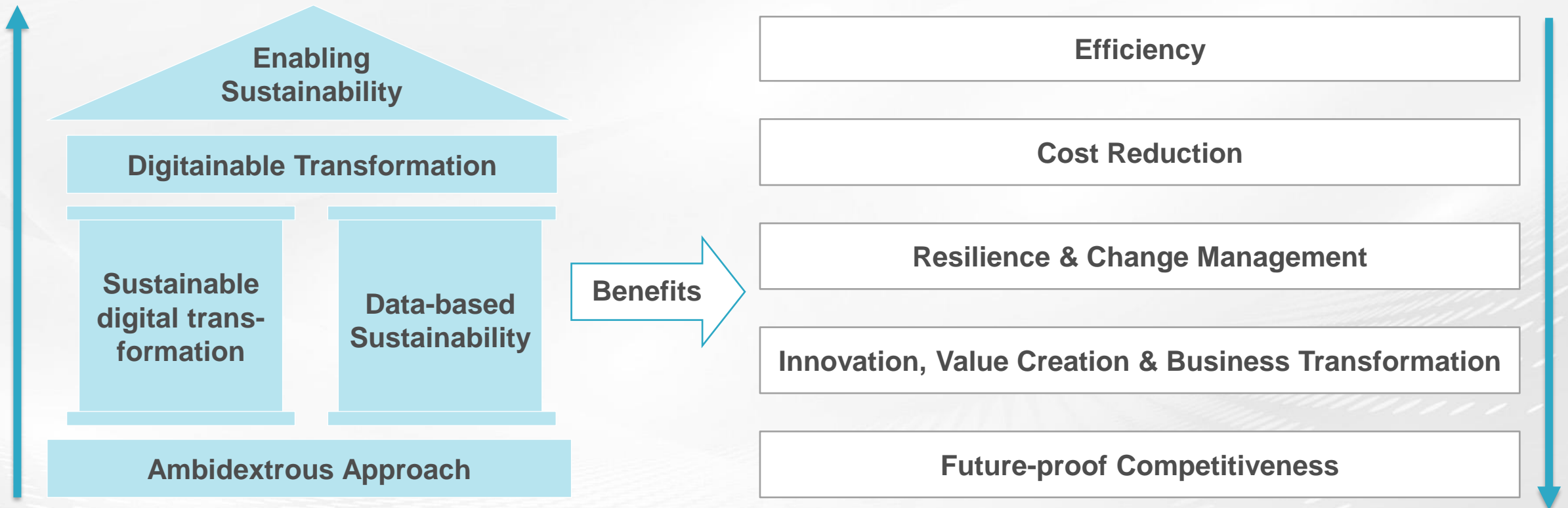
Positive environmental and social Impact

2

Sustainability
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DigiTainability is an ambidextrous approach to foster enablement potential and leveraging ability to execute.

Digitalization   **Sustainability**

DigiTainability…

… is the ability to utilize digitalization to foster sustainability.

Improving resource efficiency and reducing negative **environmental, economic and social impacts** by encouraging **mindful application of digital technologies.**

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DigiTainability is yielding various benefits; from efficiency to data lead value creation

Enabling Sustainability

Digitainable Transformation

Sustainable digital trans-formation

Data-based Sustainability

Ambidextrous Approach

Benefits

Efficiency

Cost Reduction

Resilience & Change Management

Innovation, Value Creation & Business Transformation

Future-proof Competitiveness

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Hands-on solution: Carbon Enablement Calculator
For industries and their ecosystem

Challenge
ICT solutions without overview of the real impacts regarding their direct and indirect effects (Scope 1-3)

Solution
Data-based evaluation framework of carbon impact in ICT-landscape/eco-system, measuring its direct, indirect and consequential effects.

Benefit
Stakeholders empowered to make transparent and informed decisions with holistic view on Scope 1-3 and enabling factors for sustainable ICT and climate action.

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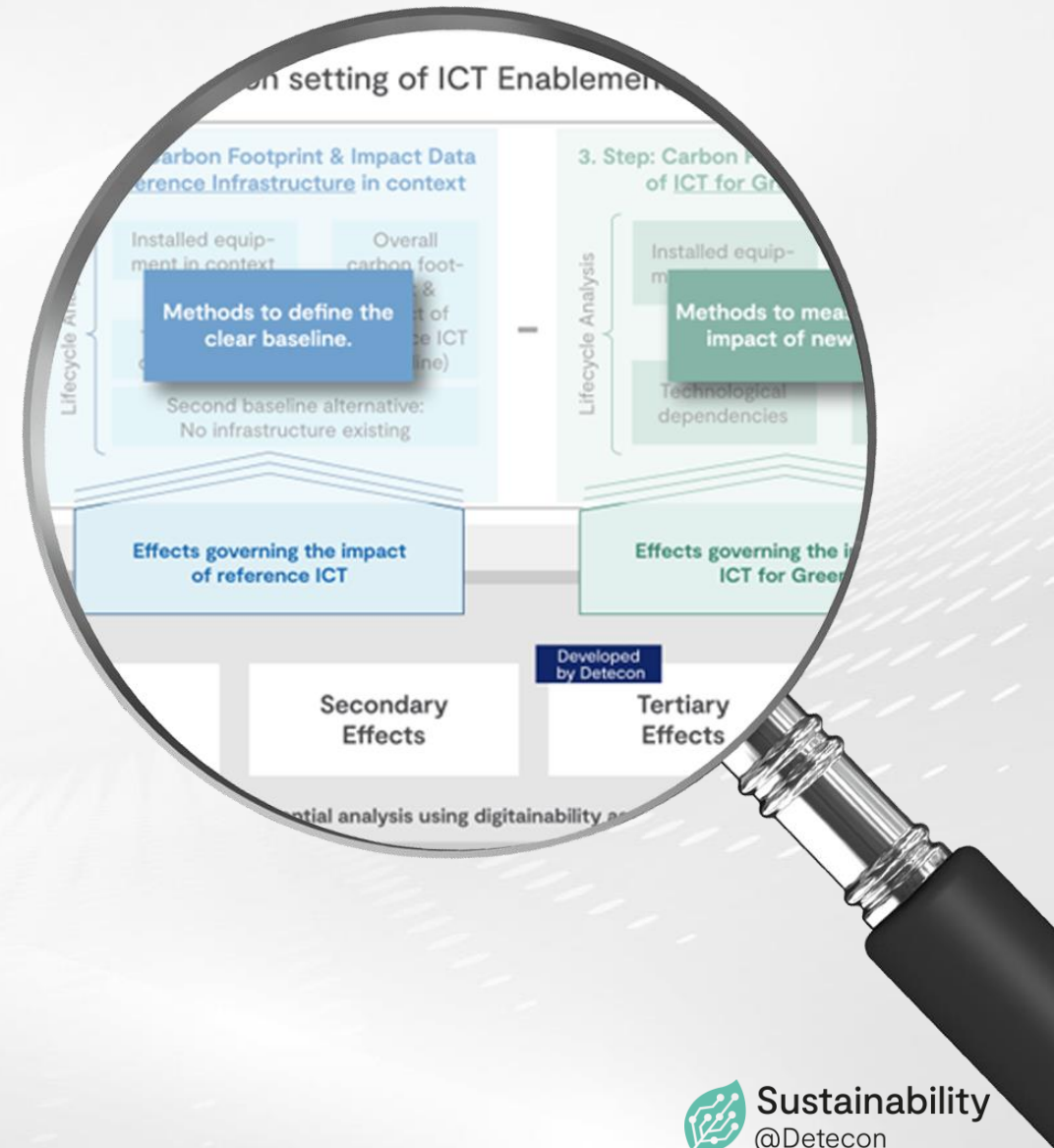
We developed and analyzed the practical application of calculator based on assumptions for a use case of implementing a 5G connectivity in a warehouse.

illustrative

## The Use Case Description:

Private 5G Network + **Edge Computing** → **Automated Guided Vehicle (AGV) & Computer Vision**

- An integrated solution between Edge Computing and private 5G network at a logistics warehouse in Germany
- **Replacing the existing old ICT infrastructure with 5G to achieve:**
  - Optimized routes for the electrical vehicles with reduced electricity consumption and better equipment efficiency
  - Improving inventory management services with handhelds
  - High-resolution video monitoring to foster fast documentation, improved security and optimized maintenance

Germany (North Rhine-Westphalia)	100,000 sqm size of the warehouse	German energy mix, CO_2 emission per kWh: 420g

*Source: Statista Research Department (2022): **Kohlendioxid - Emissionsfaktor für den Strommix in Deutschland bis 2021.***

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In a following step the analysis of the context's carbon footprint and impact will lead to the identification of the primary effects which influence the enablement.
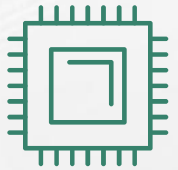
Essential ICT Hardware

Essential ICT Software

Supportive Products

GHG Emissions
During the embedded ICT infrastructure's lifecycle different GHG emissions, particularly CO_2, will be emitted which impact the quantification accordingly.

Waste Management
Especially for the hardware the way of treatment of any disposed compo-nents will have an effect on the enablement effect of the ICT for Green.

Resource Consumption
The selected raw materials influence the primary effects and hence have an impact on the enablement effect, depending on their scarcity, durability, disposability and origin.

Energy Consumption
An important factor regarding any ICT infrastructure is its total energy consumption which will have influence on the emissions as well as resource consumption.

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Once the primary effects are identified, the secondary and tertiary effects have to be identified that is enabled by connectivity through 5G.

Secondary Effects

- Improved processes due to handheld devices operation
- Improving comfort by not lifting heavy and wrong objects
- Remove processes for lean approach
- Reduction of errors in packing and compensation claims
- Optimal positioning and mapping of goods in the warehouse for quick access, saving time and money

Tertiary Effects

- Improved safety and more ethical advantages
- Change in land use patterns
- Optimized business services and delivery
- More job creation
- Preserving privacy
- Saved time

*Source: *All sources used for the development can be found at the end of **02** Carbon Enablement of ICT*

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Use case: Warehouse
Retrospective calculation of former ICT to 5G advancement

The impact of the transversal systems (digitalization, energy or transport) are governed by the higher order effects and not only direct effects.

Primary Effect of 5G:

Savings of more than 60 t of CO_2
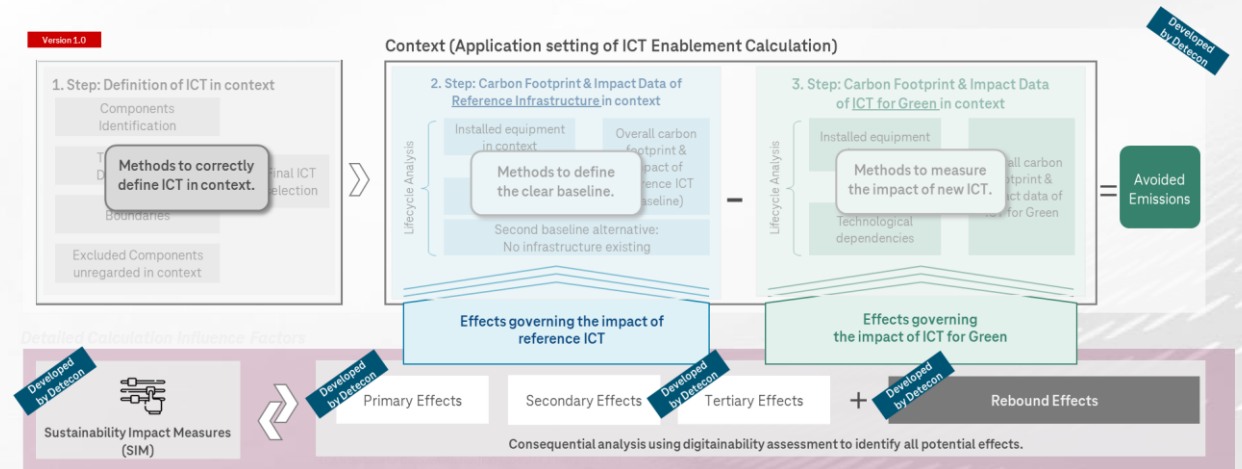Around 12% (compared to former ICT)

Secondary & Tertiary Effects of 5G:

Savings of ca. 15 t of CO_2
Around 1-2% (compared to former ICT)

Rebound Effects of 5G:

Transparent consideration of usually
left out rebound effects with ~+3 t of CO_2

> **Total enablement of ca. 15%, or 72 t of CO_2!**
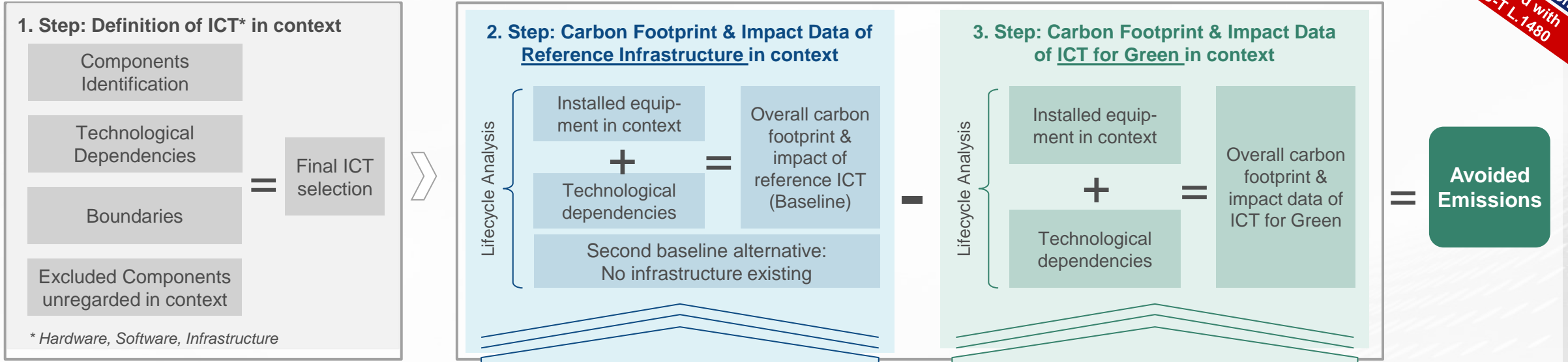
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The independently developed methodology represents a comprehensive approach on how to calculate an enablement factor for ICT for Green.

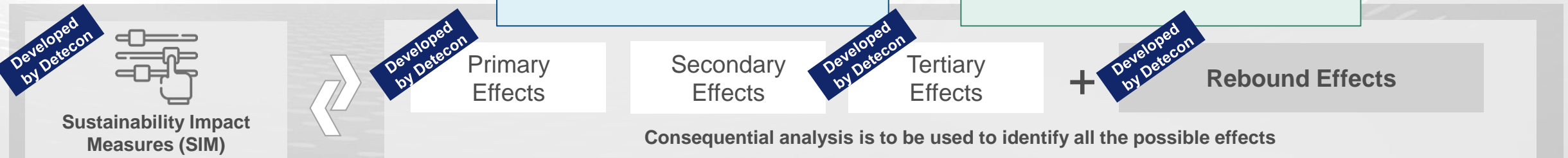## *Core Enablement Quantification Calculation*

Version 1.0

Developed by Detecon
Aligned with ITU-T L.1480

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 equip-ment 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 equip-ment 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

Developed by Detecon

Sustainability Impact Measures (SIM)

Developed by Detecon Primary Effects

Secondary Effects

Developed by Detecon Tertiary Effects

+

Developed by Detecon **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]

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Pave the way
for a greener world!

Step 1: Measure
Collect and **analyze** data to understand your impact and to define sustainability performance improvement measures.

Step 2: Transform
Strategize and integrate leveraging innovative measures, data excellence and technologies to transform your operations.

Step 3: Enable
Empower your stakeholders to drive positive impact and enable coherent actions towards a more sustainable future.

Embrace digiTainability for fostering your role in the sustainability revolution for a greener world.
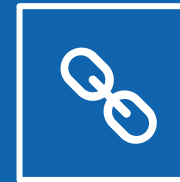
Let's start the Digitainability Journey!

Think big, start small.

Get connected.

Scale fast.

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