

# Private 5G: what is the business case for the manufacturing sector?

STL Partners, Fraunhofer IPT & WZL Aachen

10<sup>th</sup> February 2022



# Our speakers



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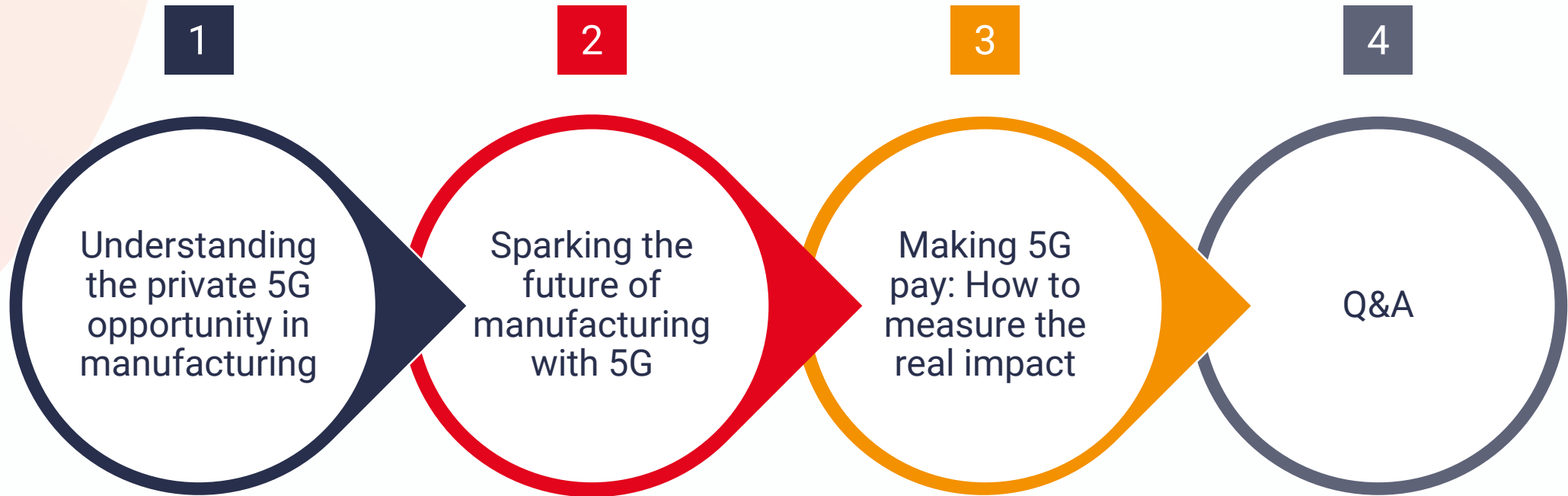


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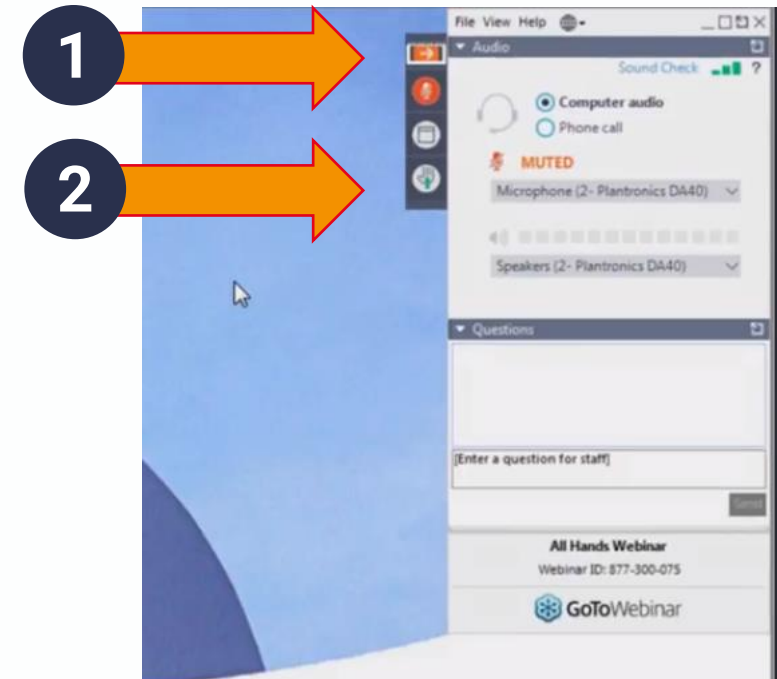
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# Agenda for today's session



# GoToWebinar

- You're in listen only mode
- If you need us, please type a comment
- Feel free to type questions throughout the session for Q&A at the end
- We'll send you the slides and a recording shortly after the session do share with colleagues
- On Twitter? Tweet us @STLPartners @FraunhoferIPT @rwth\_wzl



# Poll: Which of these options does your organisation fall under?

1. Telecoms operator or other network service provider
2. Telecoms vendor
3. Systems integrator
4. Manufacturing company
5. Other



# Understanding the private 5G opportunity in manufacturing

**STL Partners**

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**Matt Bamforth**, Consultant

**Yesmean Luk**, Principal Consultant

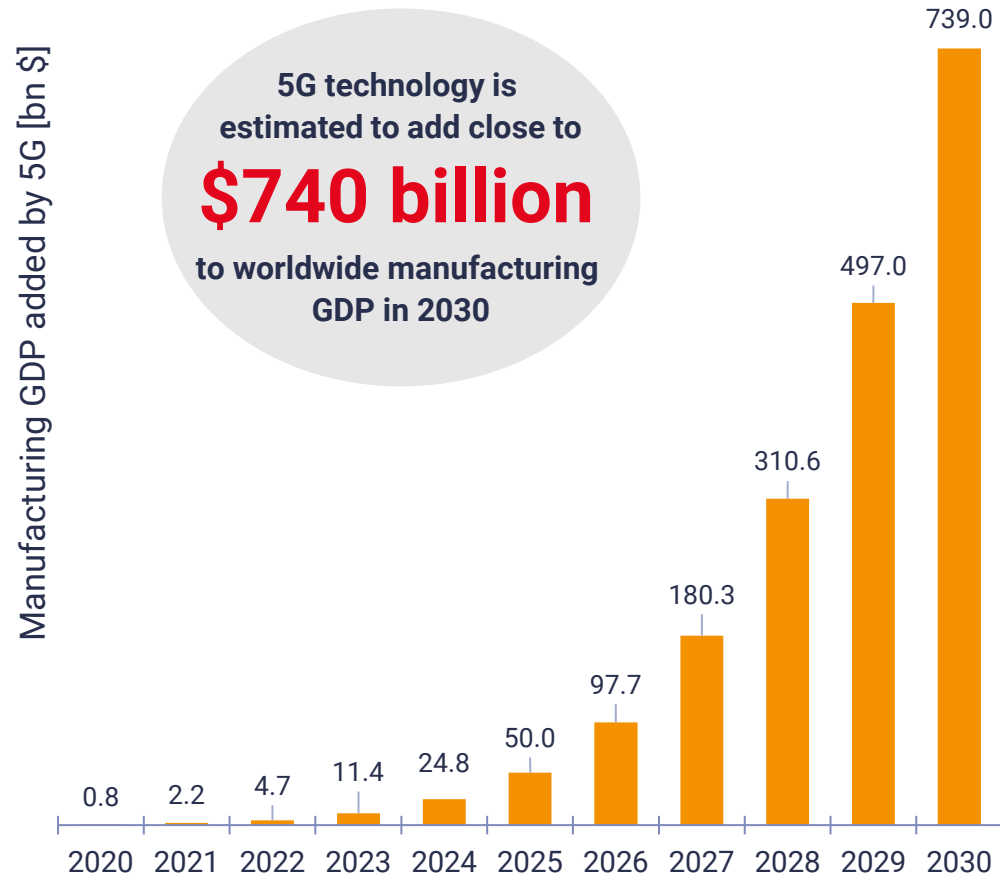


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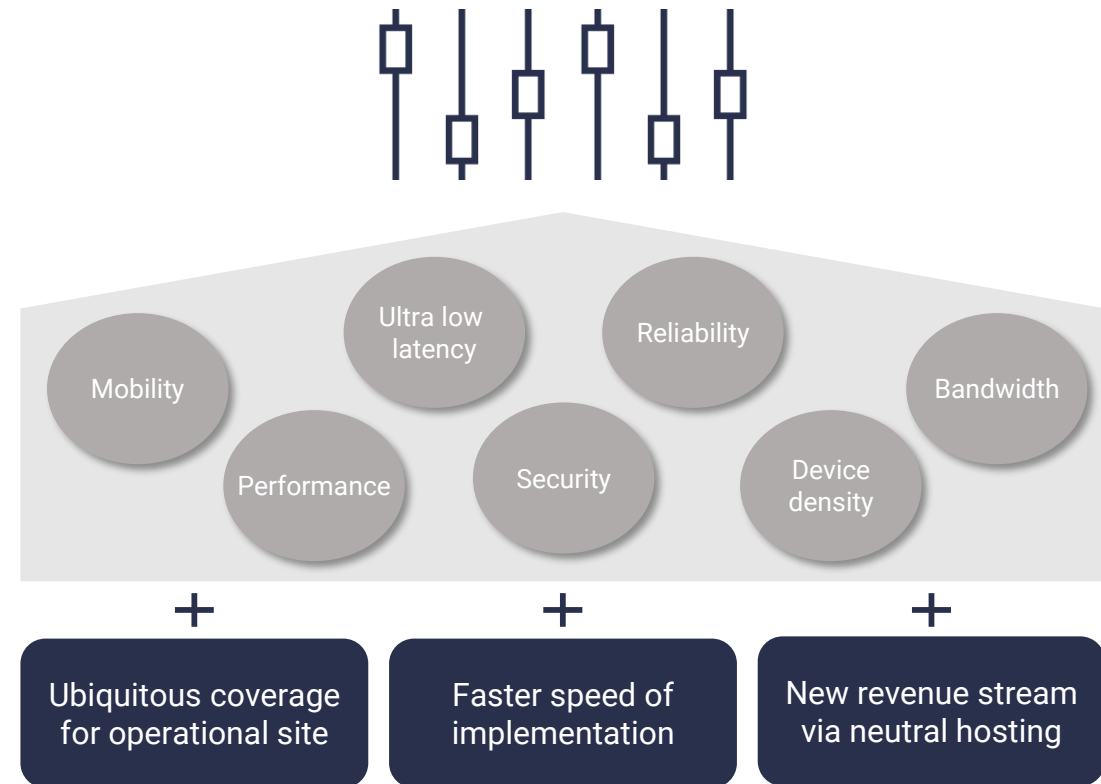


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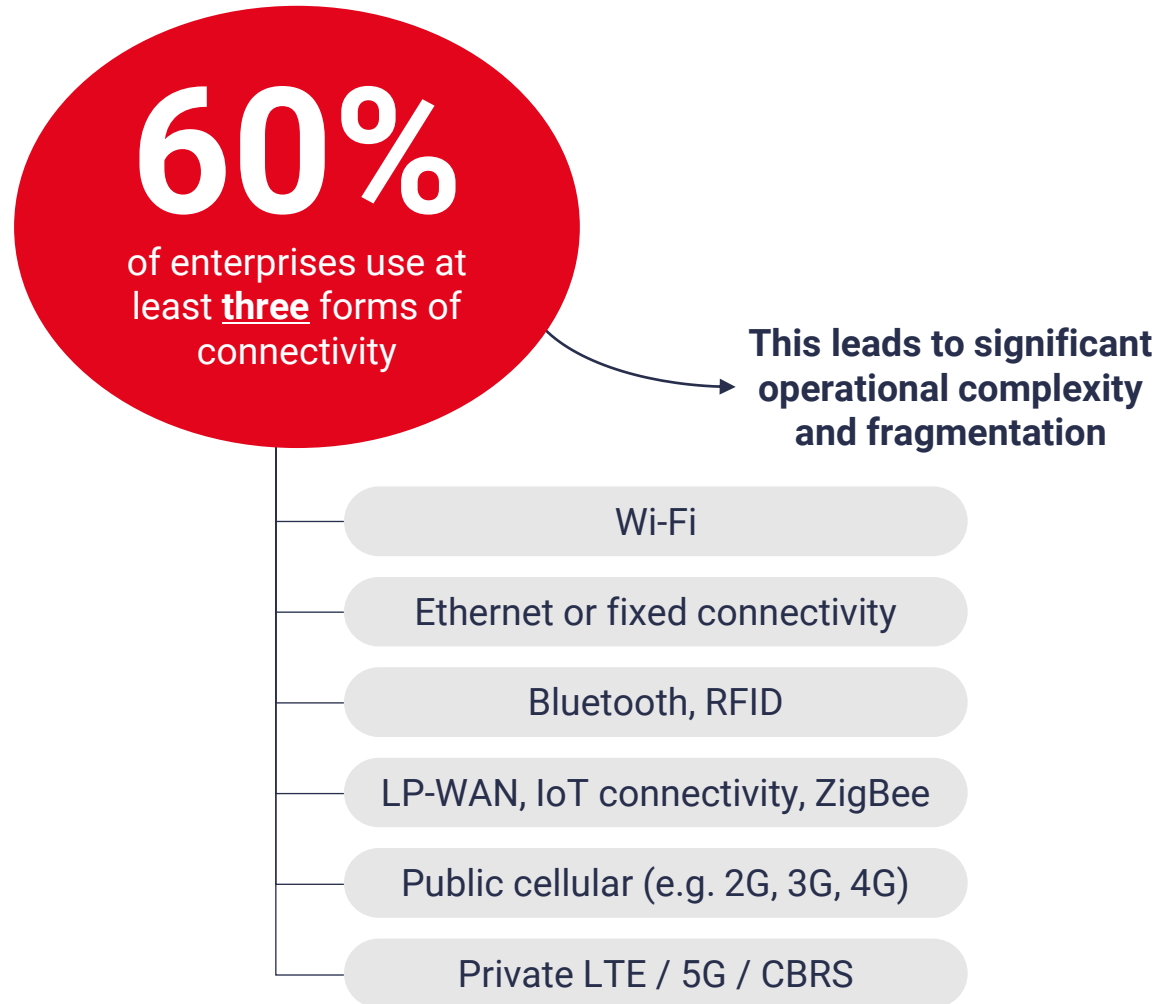
# 5G is touted to be a key pillar in the digital transformation of the manufacturing sector and enable key use cases



Private 5G takes the enhanced capabilities of 5G and delivers it in a tailored way for enterprises



# Private 5G can also address key challenges that enterprises face in having multiple of interfaces to manage



On-premise connectivity will remain a mix of wired and wireless solutions

However, private 5G can help in the following ways...

- ✓ Reduction in operational complexity
- ✓ Less fragmentation
- ✓ Fewer attack surfaces for potential security breaches
- ✓ Lower overall total cost of ownership (TCO)
- ✓ Ease of (data) synchronisation with fewer protocols



# There are a number of challenges for providers looking to capture the private 5G opportunity in manufacturing



Lack of **vertical** knowledge and expertise



Need for a **different** sales approach and specific capabilities



Need to identify anchor use case



**Demonstrate** business value to justify investments

# Many ecosystem players lack the vertical specific knowledge and sales capabilities to address private 5G opportunities



## Lack of **vertical knowledge and expertise**

Private 5G is not just a connectivity solution but an opportunity to address key customer challenges and transform the way of working

The challenge lies in being able to articulate how private 5G can address the most pressing **pain points** for customers

This requires specific knowledge of the industry and of the customers' businesses.



## Need for a **different sales approach and specific capabilities**

Sales teams need to move from a transactional approach to more of a **consultative approach**

This means **working with customers** to understand their challenges and adapting to their requirements

Decisions also often require alignment across different stakeholder groups across IT and OT

# There are also challenges in identifying key use cases for private 5G and quantifying the business value



Need to identify  
**anchor use case**

**1 out of 3 enterprises** cite cost of private network solutions as the most pervasive challenge in deploying a private network

Enterprises need to identify a **standalone anchor use case** that can serve as a strong motivator to **justify the initial investment**

The ROI for private 5G must also be **more favourable than for other connectivity alternatives**



**Demonstrate business value** to  
justify investments

Enterprises want to be able to understand the **impact on key business metrics** before investing

**72% of enterprises** cited a lack of understanding of the private 5G ROI

Customers want to understand the potential impact of private 5G on key business metrics



# Sparking the future of manufacturing with 5G

Niels König, Fraunhofer IPT





## OUTLINE

- 1 Challenges in manufacturing
- 2 Networked, adaptive production
- 3 Proving the added value of 5G

# Challenges in production

## Resilient production

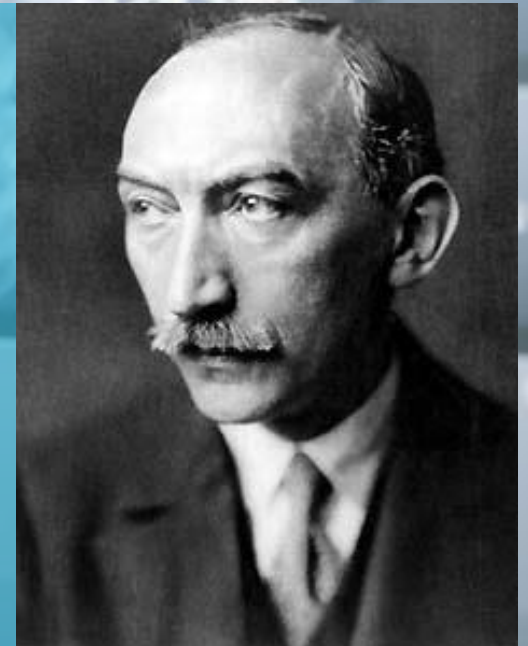
- Efficiency: ability to produce in the best possible economical way
- Effectivity: ability to produce with maximum availability, performance and quality
- Zero defect manufacturing: ability to react on and compensate critical events
- Scalability and flexibility: ability to adapt production to variants and batch size

**Fields of tension:**  
quality vs. time vs. costs vs. scale

## Techno-economic relevance of resilience

*„The dividends sit on the cutting edge of the steel, but the speed of these cutting edges is a function of the machines that move them.“*

**Georg Schlesinger, 1911**



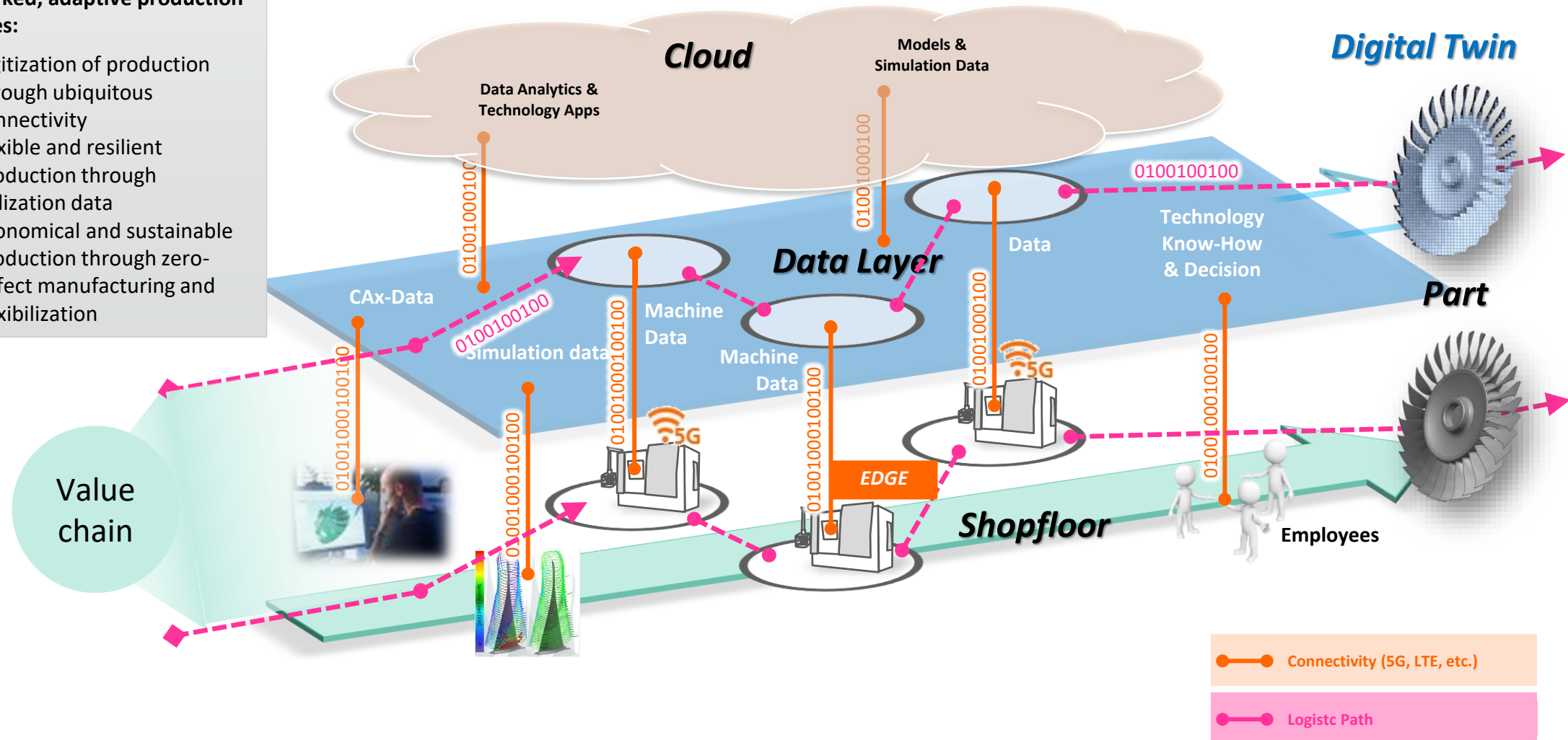


# Production research from the cutting edge to 5G

## Architecture of a networked, adaptive production

### Networked, adaptive production provides:

- digitization of production through ubiquitous connectivity
- flexible and resilient production through utilization data
- economical and sustainable production through zero-defect manufacturing and flexibilization



# 5G

# INDUSTRY CAMPUS EUROPE

5G-Industry Campus Europe is the largest industrial 5G testbed

- 5G indoor networks on 3 different shopfloors with 8.000 m<sup>2</sup> fully equipped with machines and robots
- 5G outdoor network of 1 km<sup>2</sup> at the RWTH Aachen Campus
- 5G-NSA and 5G-SA running on industry spectrum @3.7 – 3.8 GHz
- Simultaneous 4G network running @2.3 GHz as anchor band

Supported by:



Federal Ministry  
of Transport and  
Digital Infrastructure

on the basis of a decision  
by the German Bundestag

5G network supplier:



ERICSSON



IT Center

RWTHAACHEN  
UNIVERSITY



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UNIVERSITY

**fir**  
an der  
RWTH Aachen



# Implementation projects 5G-Industry Campus Europe



MOBILE ROBOTICS



LOGISTICS



DATA ECONOMY



PROCESS MONITORING



CROSS-SITE PROCESSING



SMART SENSORS



# What is missing for 5G roll-out scenarios in industries?

## **Analysis of the contribution of industrial 5G to sustainability**

*How can 5G support companies on their way to net-zero CO2 emissions?*


**Experimental validation**  
e.g. 5G-Testbeds

## **Analysis of the technological and economic impacts**

*What is the economical benefit of 5G use cases?*

**ROI-Tool**  
(next presentation)

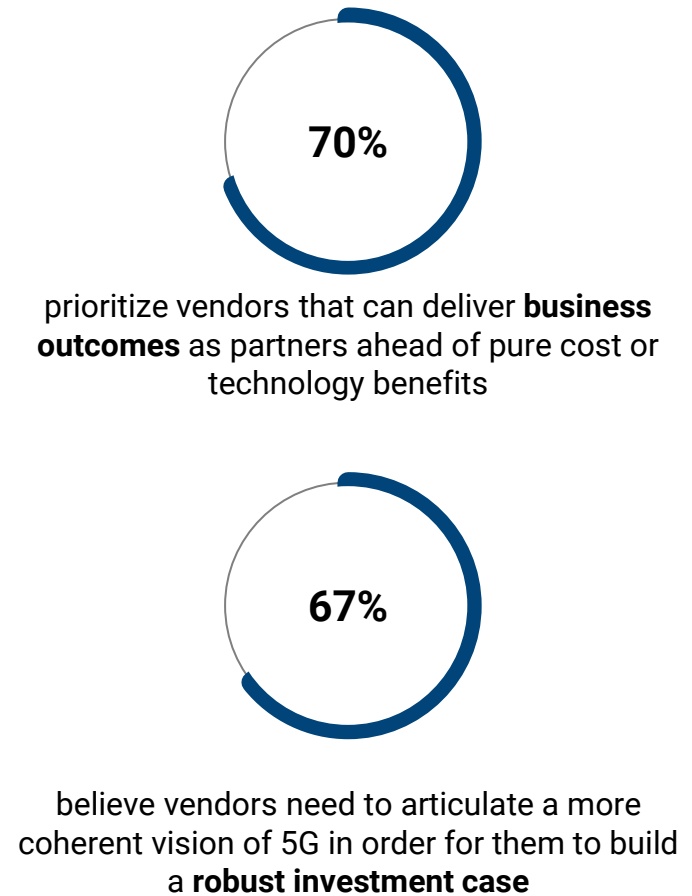




# **Making 5G pay: How to measure the real impact**

Raphael Kiesel, WZL of RWTH Aachen | 10<sup>th</sup> February 2022

# 55% of production companies do currently not plan with 5G due to uncertainty regarding benefits

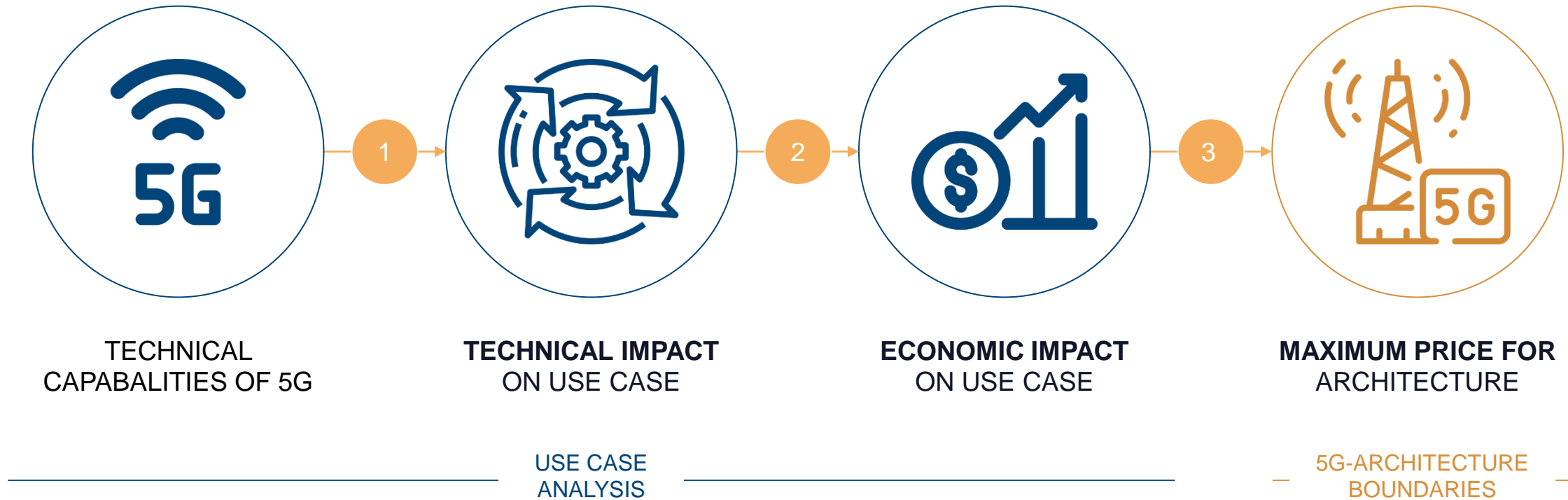






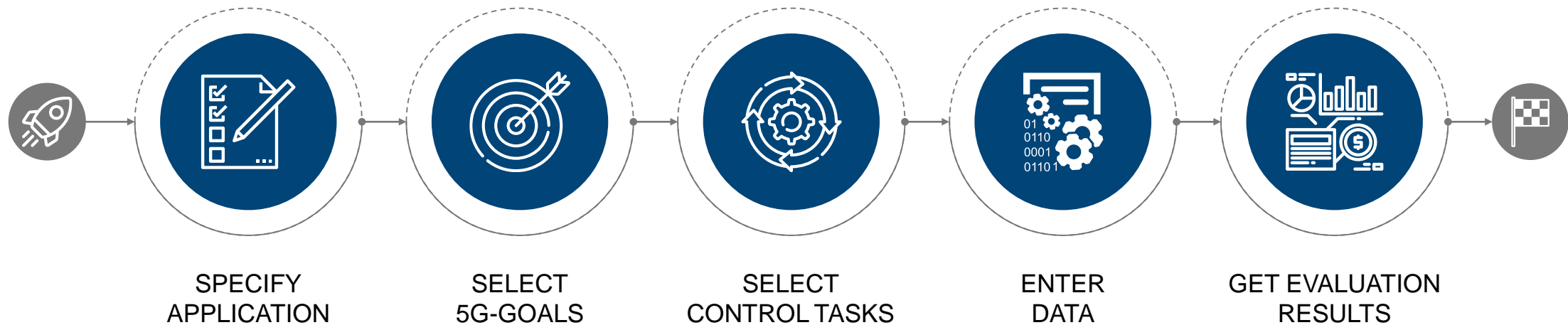
How can we solve these concerns and reveal the impact of 5G in production?

# Main idea of our approach: The benefits define the maximum price!




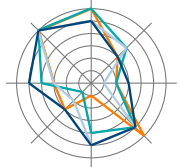














# Our private 5G ROI evaluation model consists of 5 key steps



# Step 1: Specifying the applications

STEP	TYPE	CHOICES & INFORMATION			
1 Application Selection		AGV/ Mobile Robot	Assembly Robot	Drone	Machine Tool
2 Use Case Selection		Control-to- Control	Mobile Control Panel	Mobility Automation	Motion Control
3 Maximum Performance Requirements					
4 Possible Communication Technologies for Application		<div> <div>Application &amp; Use Case Performance Requirements Availability   Latency   Reliability</div> <div></div> <div>Communication Technology Fulfilling Capabilities Availability   Latency   Reliability</div> </div>			

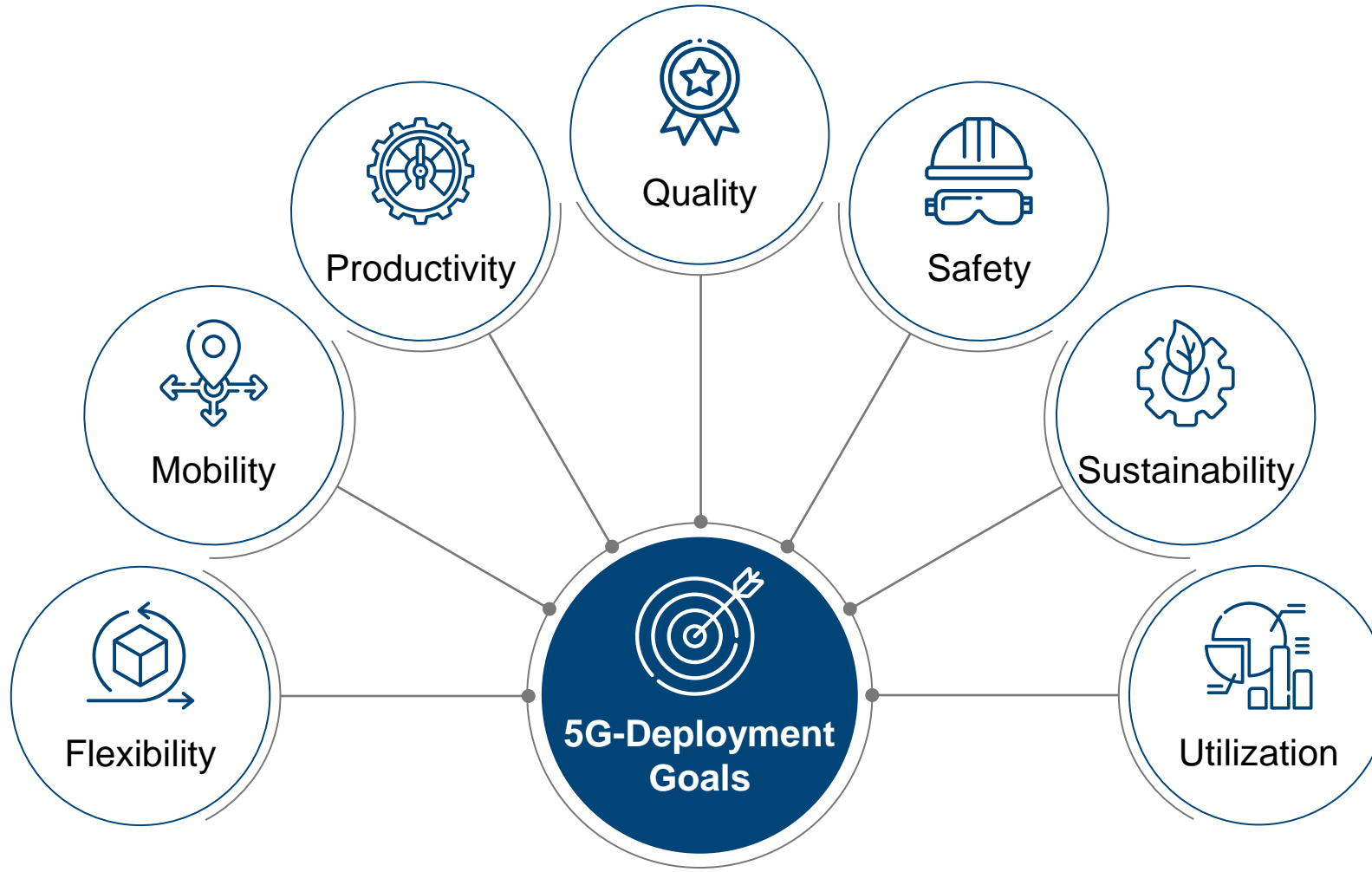
STEP	TYPE	CHOICES & INFORMATION		
5 Communication Technology Selection		4G/LTE-A	Wi-Fi 6	Ethernet (Wired)
6 Component Check		Networked Control System Components		Network Architecture Components
7 Current Application Deployment Definition		Brownfield Application	Greenfield Application	
8 Future Application Selection		Identical Application for 5G Use Case		Different Application for 5G Use Case

 Definition/Selection by User
  Check by User
  Information by Model
  Comparison by Model

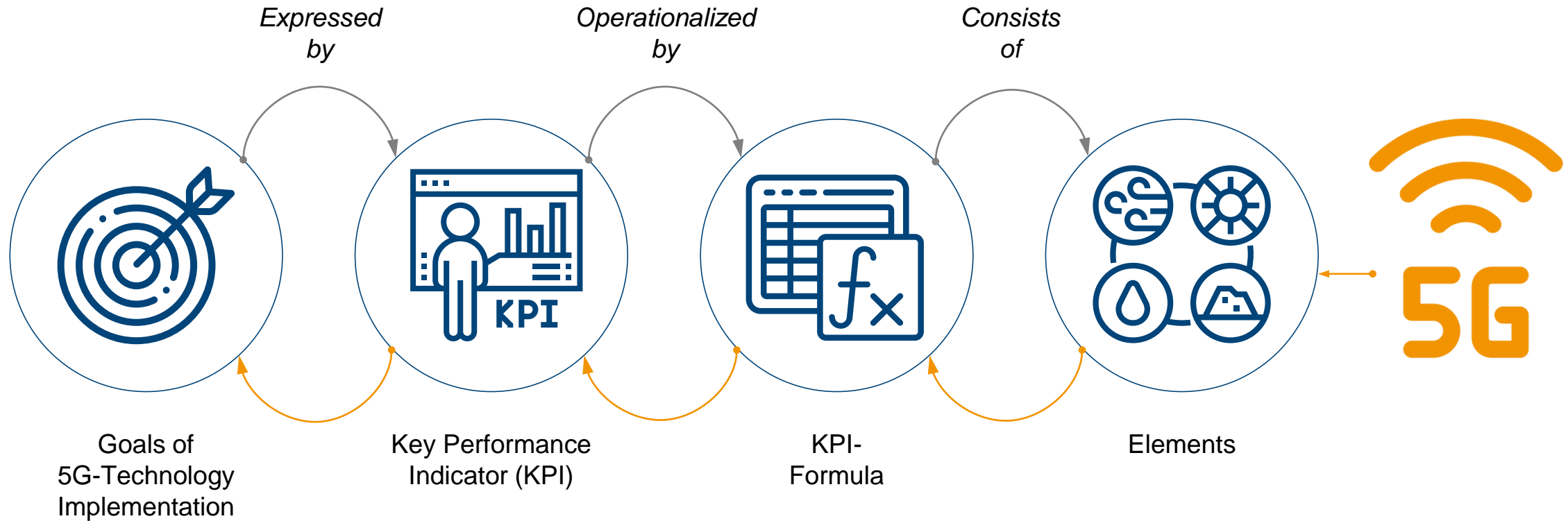




## Step 2: Goal selection: Understanding the technical objectives



# Step 2: Goal selection: What happens in the background?



# Step 2:

## Goal selection: Selecting the economic objectives/outputs

**Beneficial nature  
of investment**



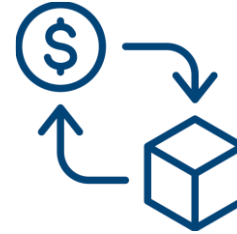
**Net Present Value  
(NPV)**

**Efficiency of  
investment**



**Return on  
Investment (RoI)**

**Operational  
cost savings**



**OPEX/Product**

**Payback time of  
investment**



**Payback  
Period**



# Step 3: Selecting the control tasks

## General Criteria for Control Task Choice



Wireless Control



Availability



Latency

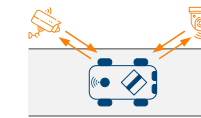


Reliability

## Example: AGV-Specific Control Tasks

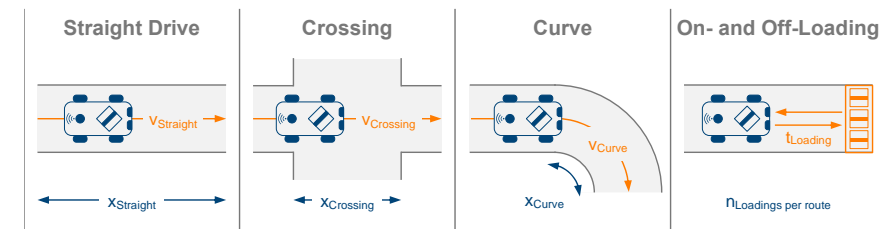
### 1 Necessary Control Tasks

Continuous Monitoring



$t_{\text{Application Production Time}}$

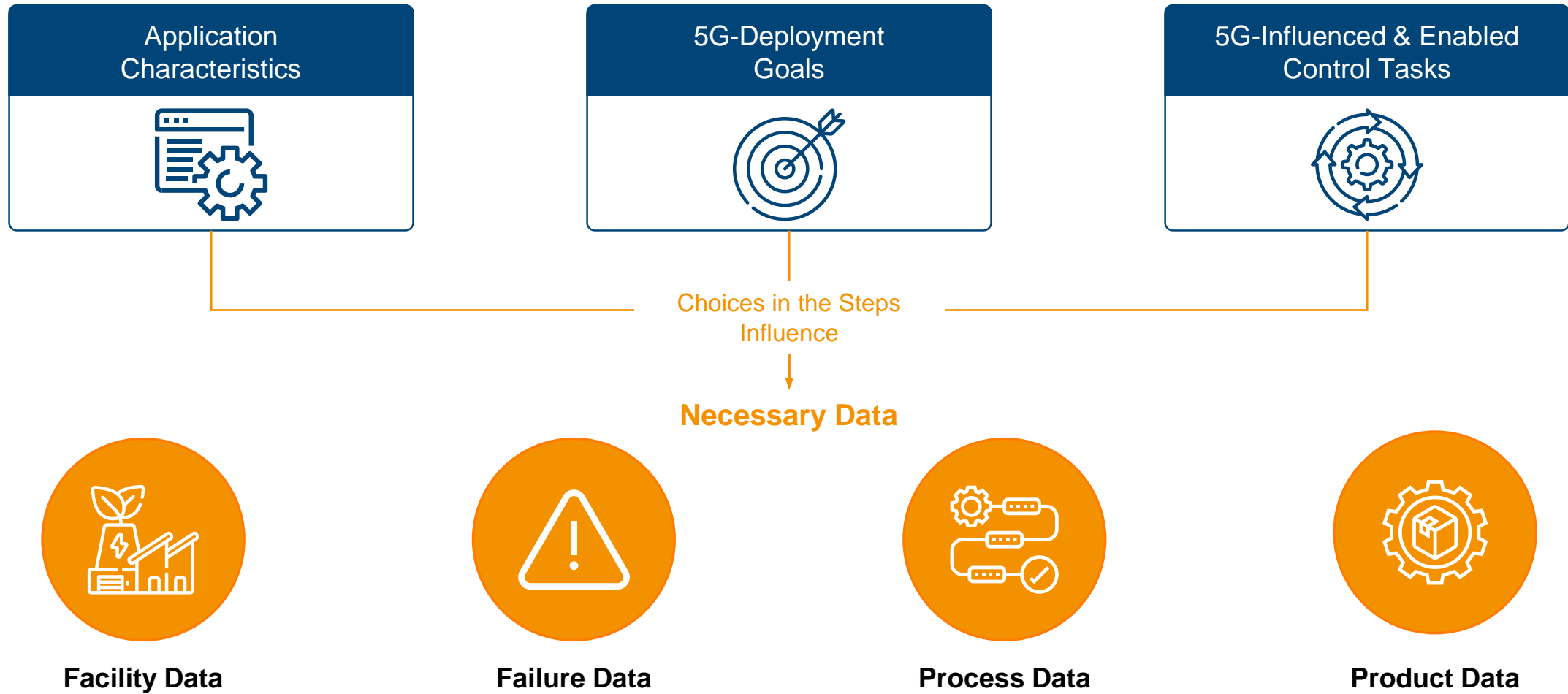
### 2 Configurable Control Tasks



→ Characteristics depending on the use case and not being influenced by the communication technology

→ Characteristics being influenced by the communication technology

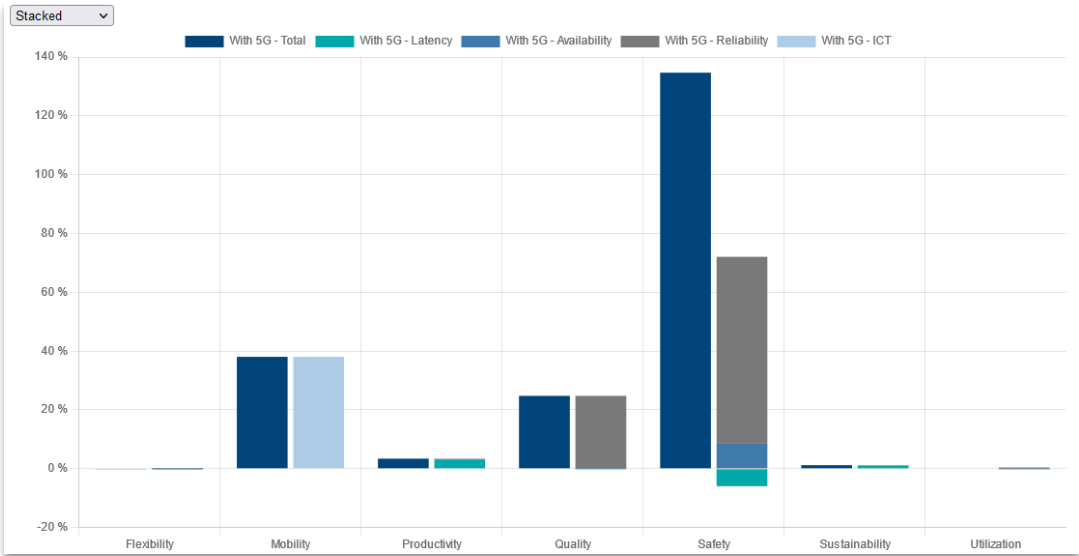
# Step 4: Entering data to build a tailored view



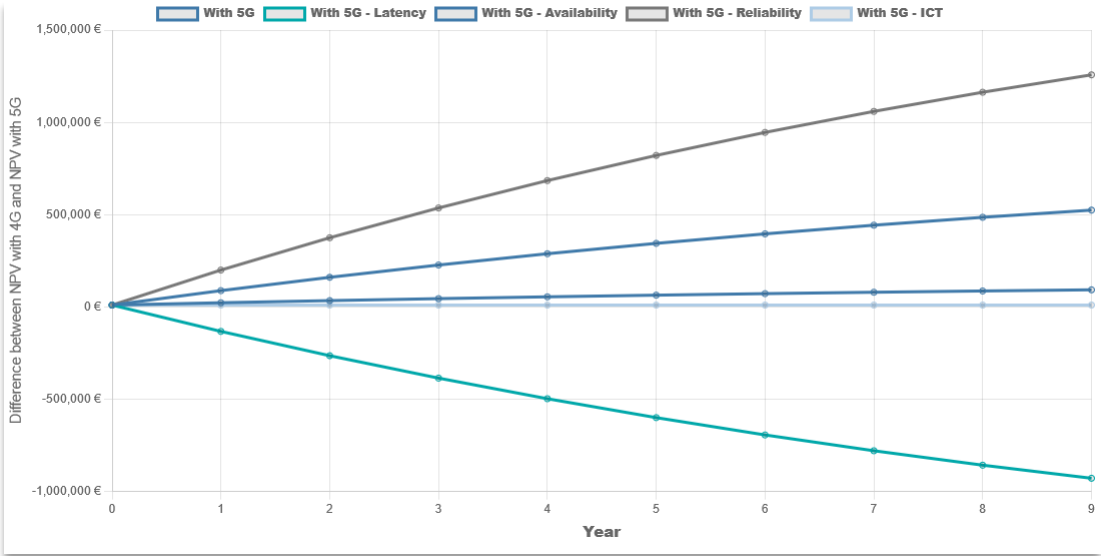
# Step 5: Presenting the evaluation results

Examples!

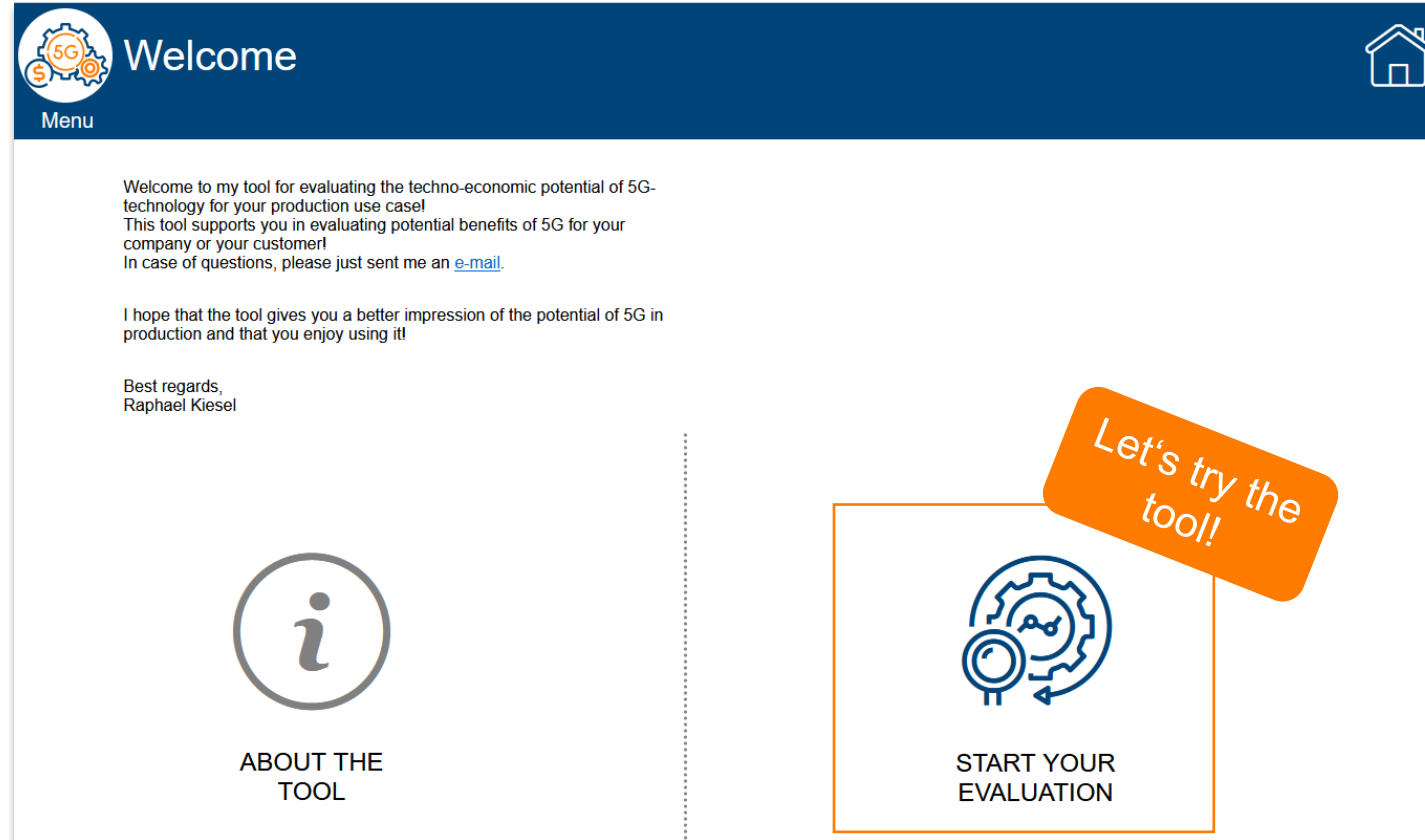
## Technical Goal Evaluation



## Economic Goal Evaluation



# Let's have a look at the tool



# Q&A session



**Niels König**  
Head of Department,  
Coordinator 5G-ICE

**Fraunhofer IPT**



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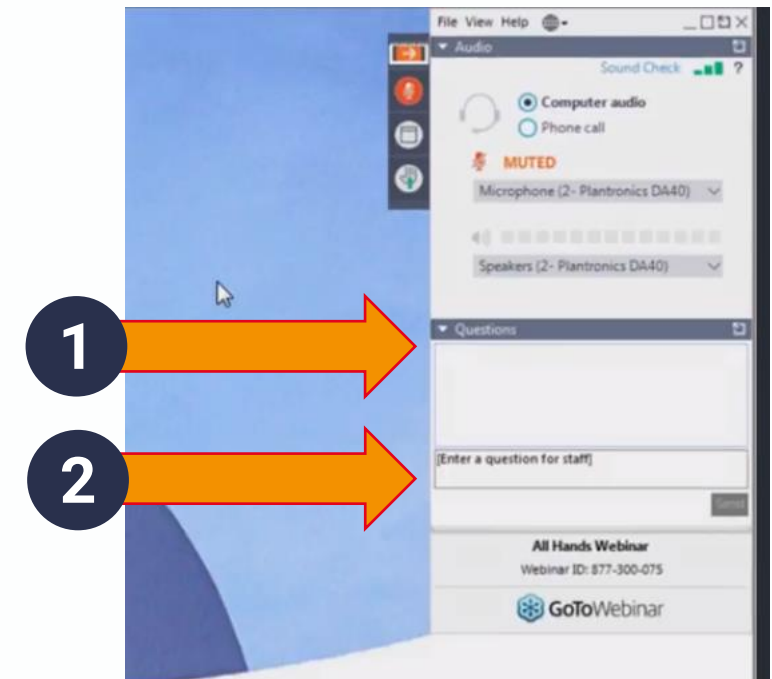
**STL Partners**



**Dalia Adib**  
Director - Consulting

**STL Partners**

Please submit any questions using  
the GoToWebinar control panel





# Thank you to everyone for joining

We hope you enjoyed the session!

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If you have any further questions, please reach out:

- **Book a meeting with us at MWC:** <https://calendly.com/yesmean-luk/mwc-private-5g>
- **Schedule a call:** <https://calendly.com/yesmean-luk/private-5g-roi-tool-call>



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# About us



STL Partners helps telcos and their partners innovate, grow and stay ahead of the competition. STL Partners provide actionable insights and practical guidance on emerging challenges and opportunities, with a focus on innovation and identifying new sources of growth.

STL Partners is driven by results: the mission is to design and drive change that makes telecoms, media and technology clients even more competitive.



The 5G-Industry Campus Europe is the first site in Europe to have a comprehensive 5G network. With an outdoor network of around 1 km<sup>2</sup> and a shop floor of 7000 m<sup>2</sup>, the 5G network will cover the area of the RWTH Aachen Campus Melaten and the entire machine hall of the Fraunhofer IPT.

The 5G network is set up to operate within a frequency band of 3.7 to 3.8 GHz and will additionally have access to a 4G network.



The Fraunhofer IPT develops system solutions for networked, adaptive production. Clients and cooperation partners come from the entire manufacturing industry. IPT combines knowledge and experience in all fields of production technology. In the fields of process technology, production quality, metrology and technology management, IPT offers project partners and clients individual special solutions and immediately realizable results for the manufacture of sophisticated components and high-tech products.



Across the world and for many decades, Laboratory for Machine Tools and Production Engineering WZL of RWTH Aachen University has stood for successful and forward-thinking research in the area of production engineering. In eight different work areas, research activities not only relate to fundamental theories and findings but also to the application of findings in an industrial context. Furthermore, practical solutions are worked out for the purposes of rationalising production.

# Acknowledgements

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If you need further information visit: [www.5gsmart.eu](http://www.5gsmart.eu)

