IOTWeek

Dublin — June 20-23, 2022

IoT for Manufacturing Repurposing of advanced textile solutions: a case study

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INTELLIMECH® CONSORZIO PER LA MECCATRONICA

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GLOBAL VISION:

IoT TODAY AND BEYOND

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MISSION
Applied research and technology transfer to **fill the gap** between research and industries

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Manufacturing Repurposing: Case Study

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One of the world's leading producers of a wide range of chemical intermediates, polyamide polymers, engineering plastics, synthetic fibers and nonwovens. **Headquartered in Bergamo** (Lombardy, IT), which bore the **largest brunt of the initial COVID-19 impact** in Italy.

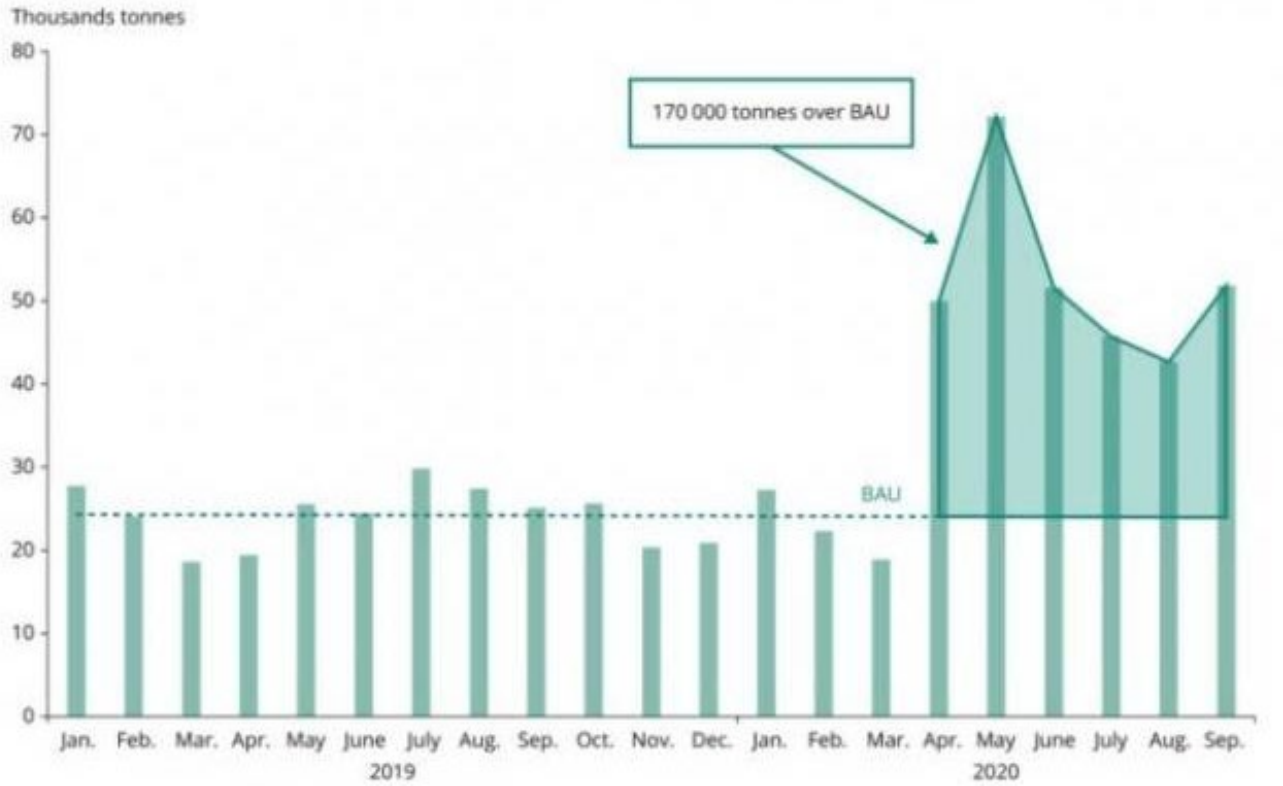
Its **business areas** includes:

- Specialty chemical
- High performance polymers
- **Advanced textile solutions**

Manufacturing Repurposing: Case Study

Shortage of critical items during COVID-19

Face masks imports to the 27 EU Member States from the rest of the world



https://www.eea.europa.eu/data-and-maps/figures/total-net-imports-of-face

The costs incurred by Italy to import masks from China from February to August 2020 correspond to 2.66 billion euros

Need for reducing dependence on non-European countries

Manufacturing Repurposing: Case Study

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Business Repurposing during COVID-19

- **EXPERIENCE:** high performance polymers and advanced textile
  - Significant fall in demand due to COVID-19
    NEED to access new markets
    - **OPPORTUNITY**: Meltblown nonwoven fabric filtering material for PPEs was produced in minimum quantities in Europe

DRIVEN FACTORS

Business proximity to growing markets
(high performance polymers and advanced textile solutions)

Market sustainability both in the short (PPEs) and in the long term
(meltblown filtering applications extend beyond the medical field)

Resources availability (financial resources, physical assets, workforce,...)

Supply chain (identification of suitable and interested partners)

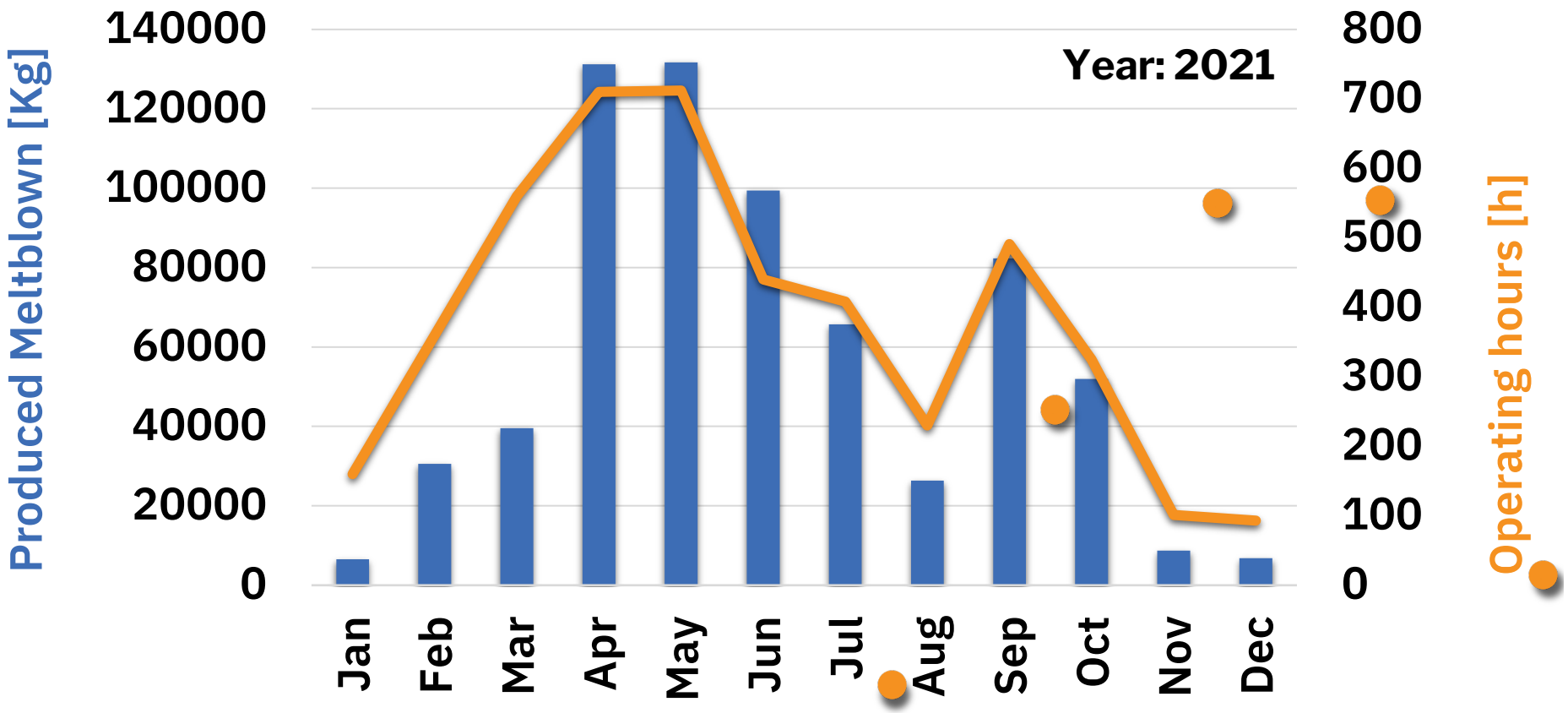
Investment: 10 million euros for a certified meltblown plant to produce filtering tissue for PPEs
> **Reduce dependence on imports from non-European countries**

Establish a local supply chain to produce PPEs in partnership with third parties. The decentralized structure allows them to be flexible in the management of variable demand volumes.

Early identification of future exploitation for these investments. PPEs production is only sustainable in the short term, until competition from abroad returns.

Business Repurposing during COVID-19: **ISSUES**

1. Identification of process parameters for a specific application



Business Repurposing during COVID-19: **ISSUES**

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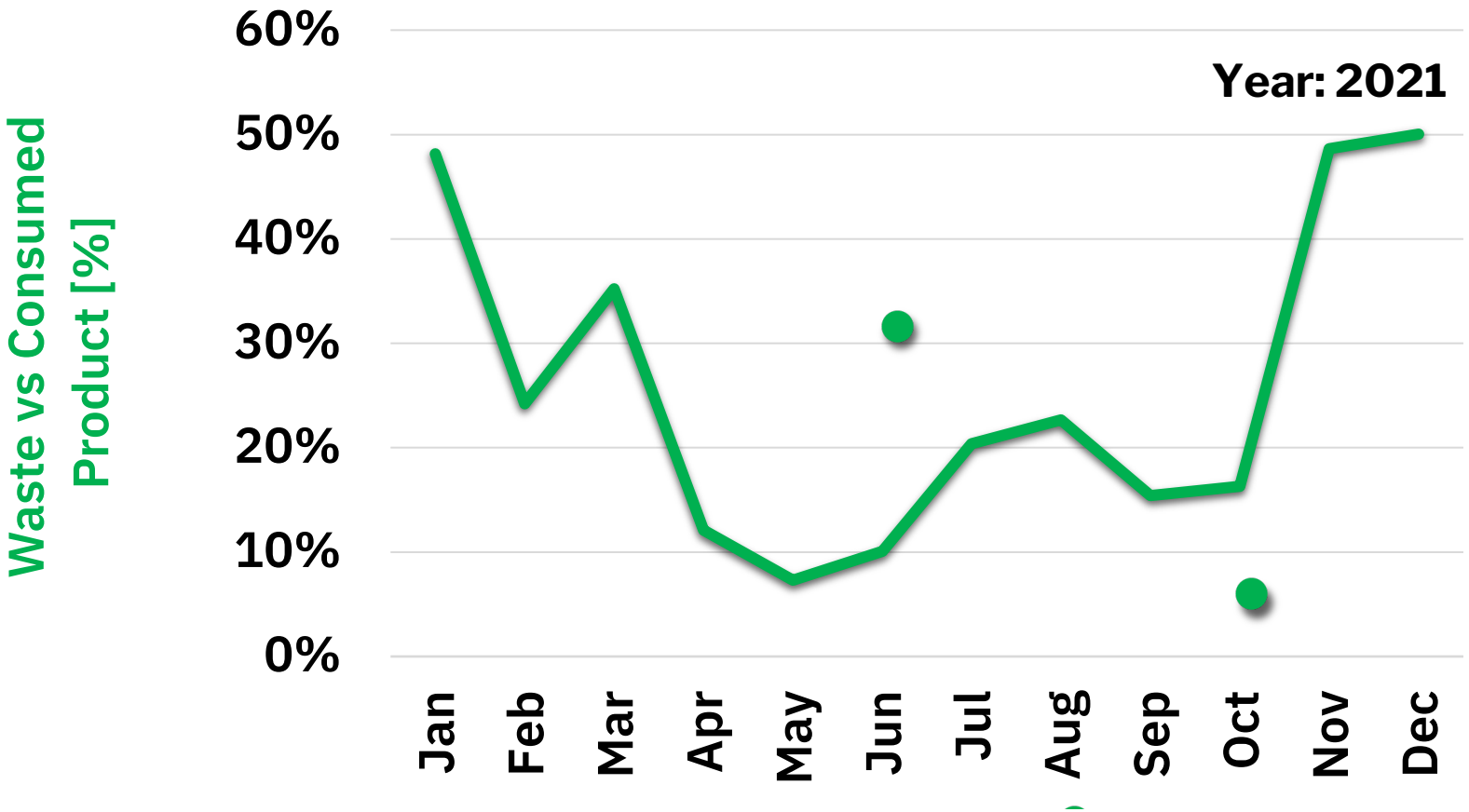
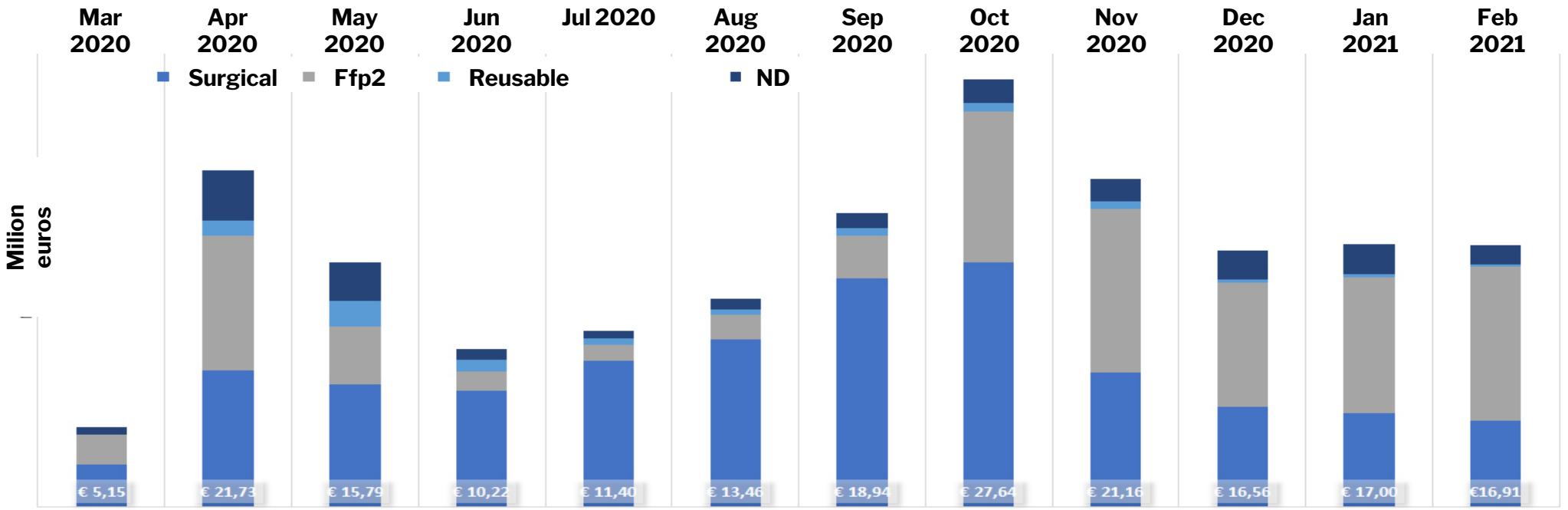


Manufacturing Repurposing: Case Study

Business Repurposing during COVID-19: **ISSUES**

1. Identification of process parameters for a specific application

2. Dynamic and volatile market



https://pharmacyscanner.it/mascherine-protettive-in-farmacia-le-ffp-2-doppiano-a-valori-le-chirurgiche/

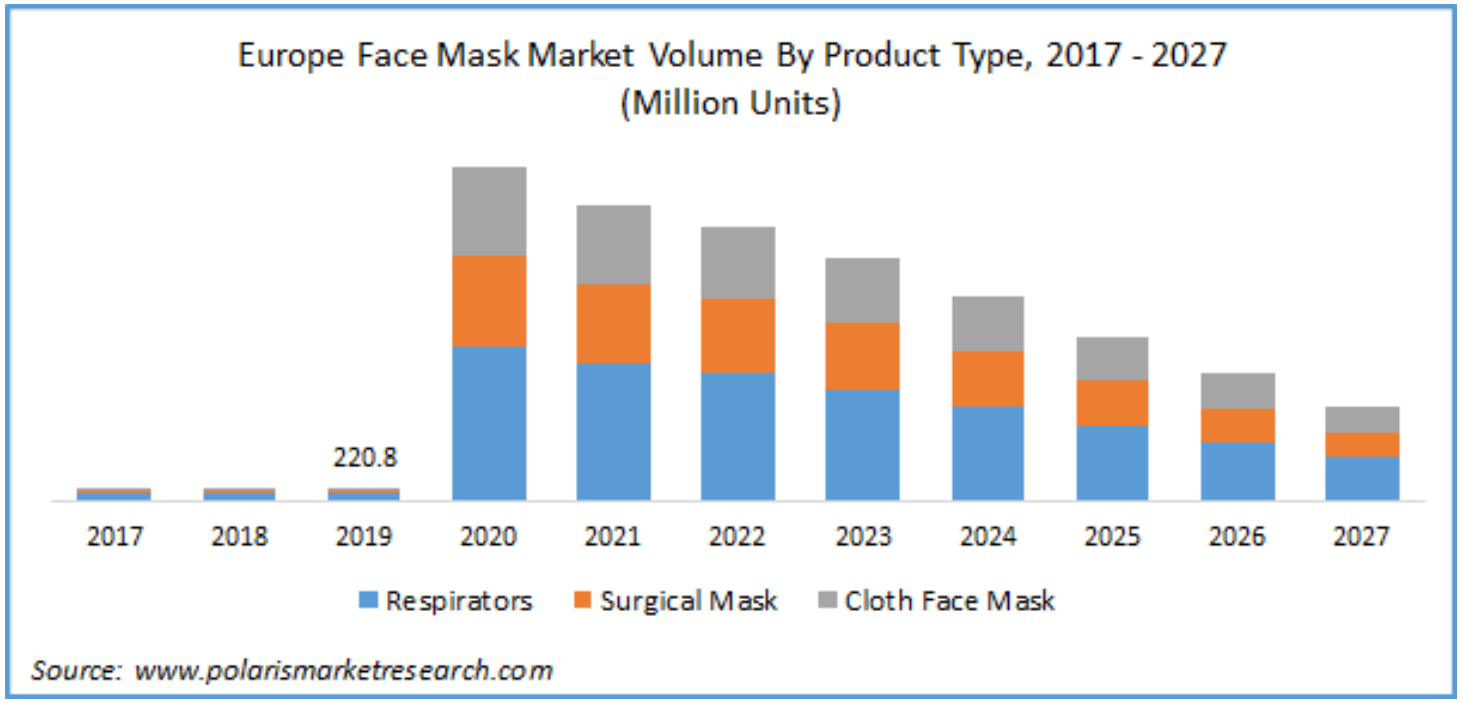
Manufacturing Repurposing: Case Study

Business Repurposing during COVID-19: **ISSUES**

1. Identification of process parameters for a specific application

2. Dynamic and volatile market

3. PPEs market is not sustainable in the long term



Manufacturing Repurposing: Case Study

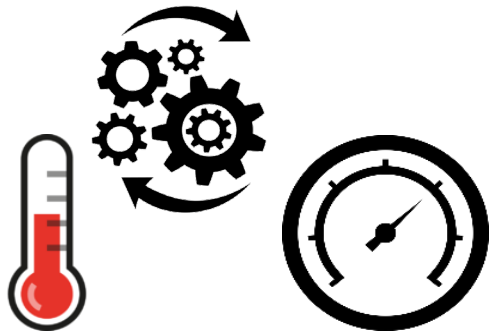
> LESSONS LEARNED: Where to act?

- Improve process control and flexibility to face high demand fluctuations
- Manage waste and minimize consumption of virgin raw material
- Design products to maximize their durability, increase performance and promote effective recycling

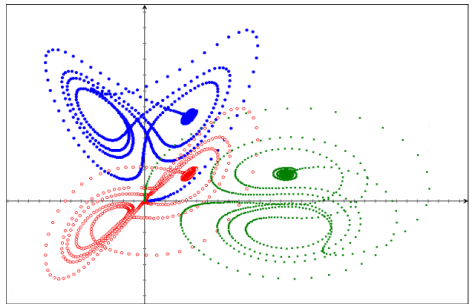
> OBJECTIVES: What to do?

- Collect data and leverage AI and Data Analytics to model processes, enabling quality and process optimization and faster and more reliable Repurposing
- Recycling and recovery of post-industrial scraps and rejects
  > full traceability of purchased materials
  > full process traceability of virgin and post-industrial recycled material

IoT for Repurposing



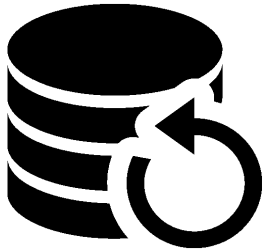
Parameters Selection



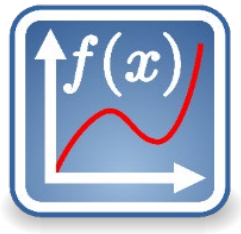
WE ARE HERE

Data Analysis

Validation



Data Historicization



Model Development

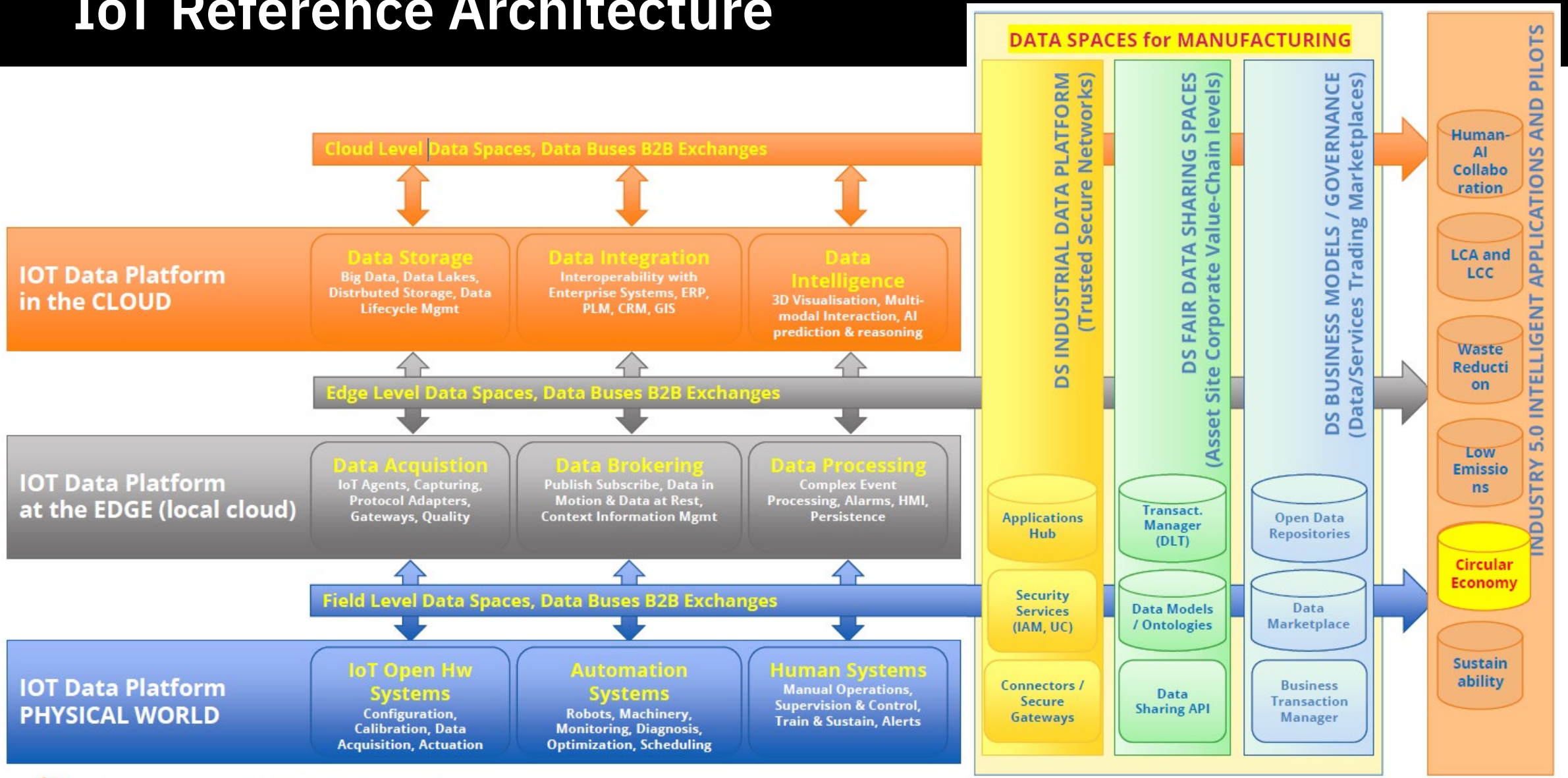
IoT for Circularity

The polypropylene scraps are collected, sorted and regranulated to create new raw material. The nonwovens with recycled content were certified as circular products in 2020, according to the International Sustainability and Carbon Certification (ISCC) system.

Through recovery and recycling, production waste is converted into polymer and then into spunbond nonwoven, eliminating the need for valuable new non-renewable raw materials.

Traceability
Every production step is managed by process management software collecting, for each lot of materials, detailed information on raw material, production line and processes, together with data on packaging and shipping.

IoT Reference Architecture



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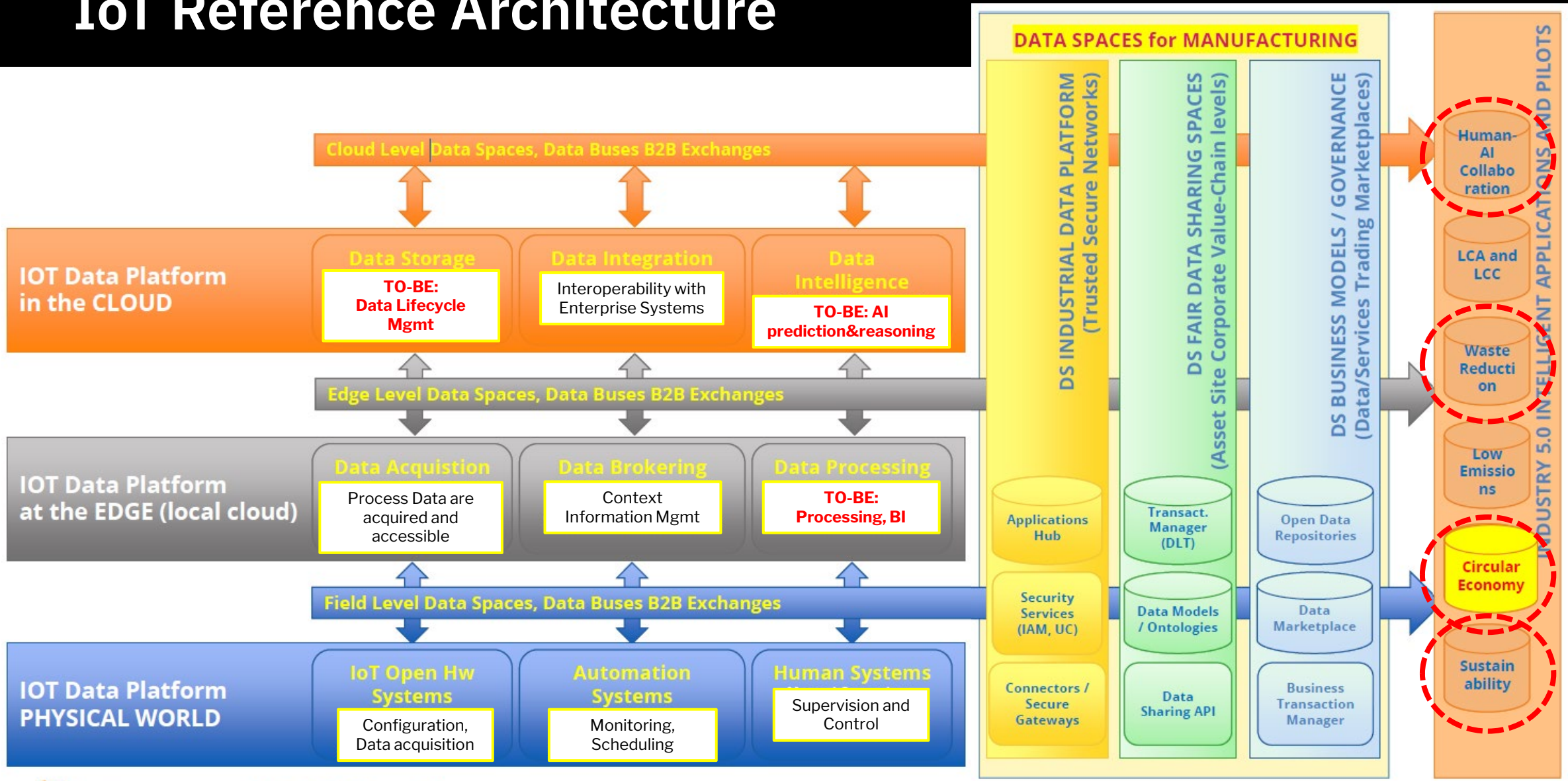
IoT Reference Architecture



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Data Spaces for Manufacturing Pathway

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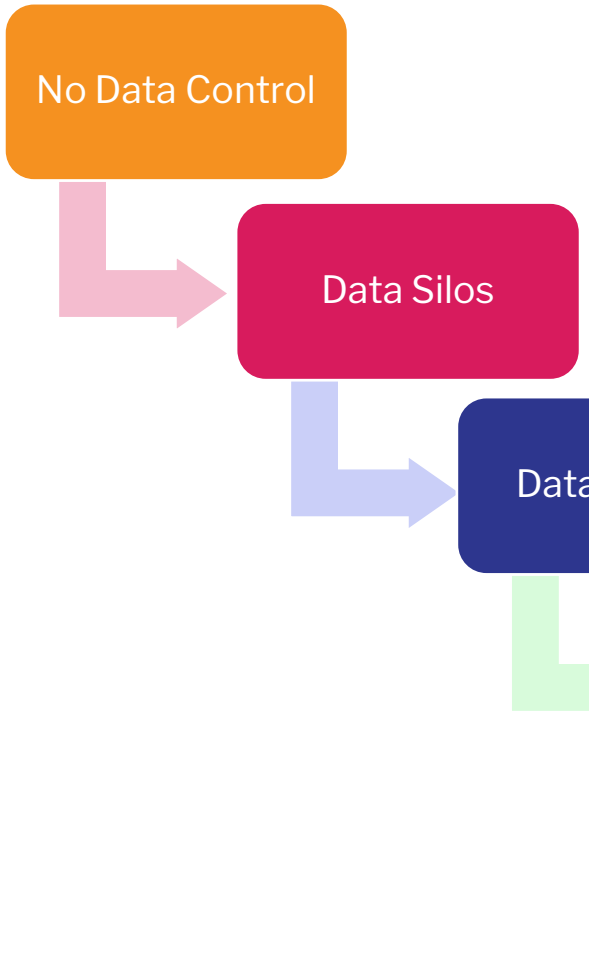
Where we are and where to go



- **AS-IS**:
- Ad-hoc Data Bridges between Enterprise Applications for specific purposes

- **AS-IS:** Standard Data Models
- **TO-BE:** AI-driven support tools
- **TO-BE:** Industrial Platform for Data Processing and Sharing

- **Next TO-BE:**
- Multi-stakeholder Digital Passports

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Thank you!

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https://www.intellimech.it/en/

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