

# IOTWeek

Dublin — June 20-23, 2022



## Cognitive Digital Twins for Optimized Manufacturing Operations

Kostas Kalaboukas

Head of Innovation Management and New Solutions Development

Gruppo Maggioli - Greek Branch

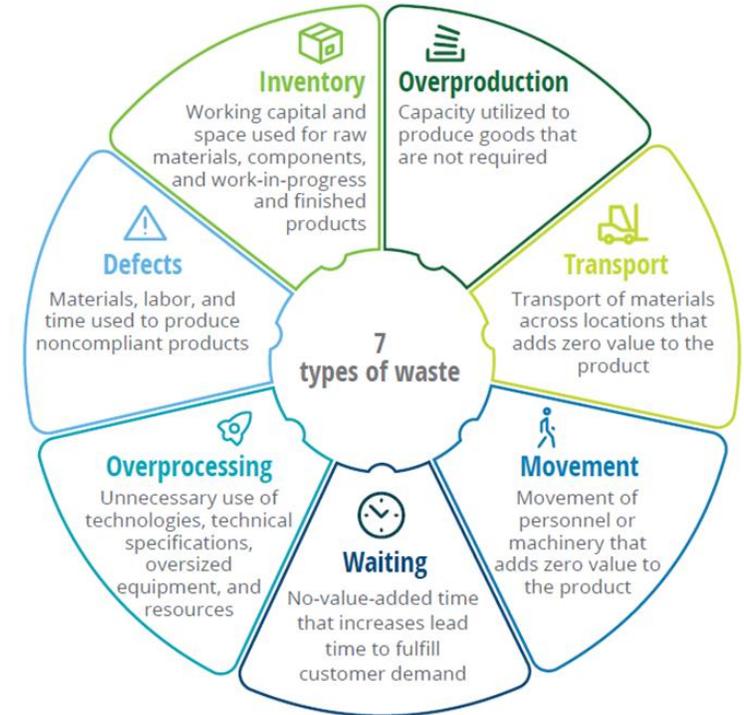
**GLOBAL VISION:**

**IoT TODAY AND BEYOND**

**IoTForum**

# Waste reduction and treatment

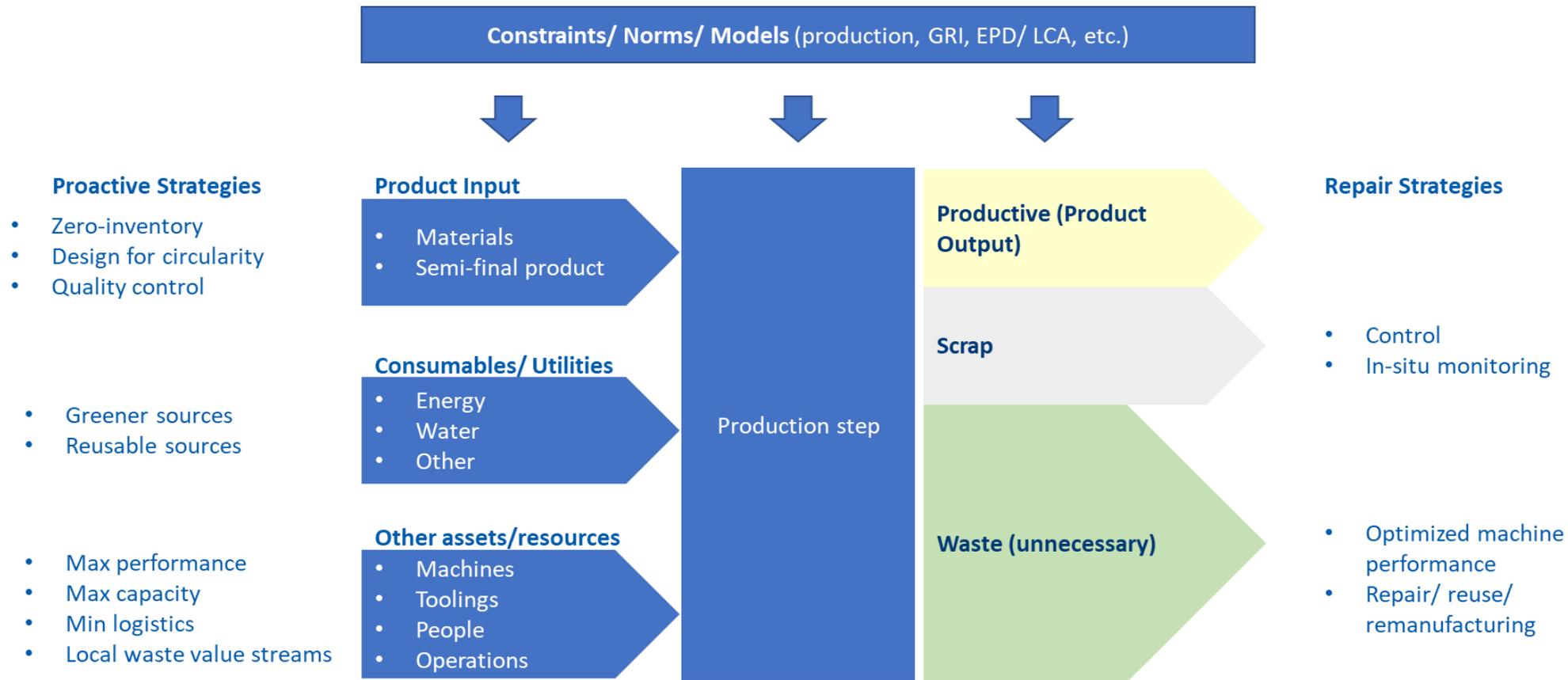
|                   |  |      |
|-------------------|--|------|
| <b>REGENERATE</b> | <ul style="list-style-type: none"> <li>• Shift to renewable energy and materials</li> <li>• Reclaim, retain, and restore health of ecosystems</li> <li>• Return recovered biological resources to the biosphere</li> </ul>   | <br> |
| <b>SHARE</b>      | <ul style="list-style-type: none"> <li>• Share assets (e.g. cars, rooms, appliances)</li> <li>• Reuse/secondhand</li> <li>• Prolong life through maintenance, design for durability, upgradability, etc.</li> </ul>          | <br> |
| <b>OPTIMISE</b>   | <ul style="list-style-type: none"> <li>• Increase performance/efficiency of product</li> <li>• Remove waste in production and supply chain</li> <li>• Leverage big data, automation, remote sensing and steering</li> </ul>  | <br> |
| <b>LOOP</b>       | <ul style="list-style-type: none"> <li>• Remanufacture products or components</li> <li>• Recycle materials</li> <li>• Digest anaerobic</li> <li>• Extract biochemicals from organic waste</li> </ul>                         | <br> |
| <b>VIRTUALISE</b> | <ul style="list-style-type: none"> <li>• Books, music, travel, online shopping, autonomous vehicles etc.</li> </ul>  | <br> |
| <b>EXCHANGE</b>   | <ul style="list-style-type: none"> <li>• Replace old with advanced non-renewable materials</li> <li>• Apply new technologies (e.g. 3D printing)</li> <li>• Choose new product/service (e.g. multimodal transport)</li> </ul> | <br> |



1) McKinsey, *The circular economy: Moving from theory to practice*, 2016  
 2) Dwek, Mauricio. (2017). *Integration of material circularity in product design*.

[https://www2.deloitte.com/content/dam/insights/us/articles/6515\\_CIR-Digital-lean-DSN/DI-Digital-lean-DSN.pdf](https://www2.deloitte.com/content/dam/insights/us/articles/6515_CIR-Digital-lean-DSN/DI-Digital-lean-DSN.pdf)

# CDTs supporting circularity



# A deployment approach to circularity

Model the Supply Value Chain



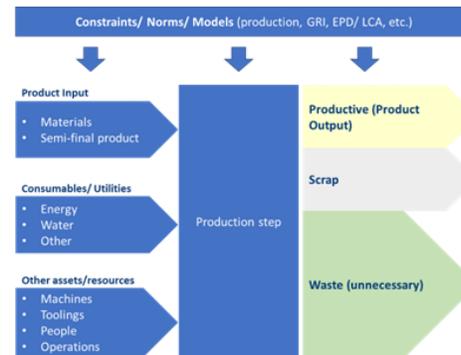
Elaborate on manufacturing process



Define **waste/scrap** circularity strategies



Define **Consumables/Utilities** circularity strategies



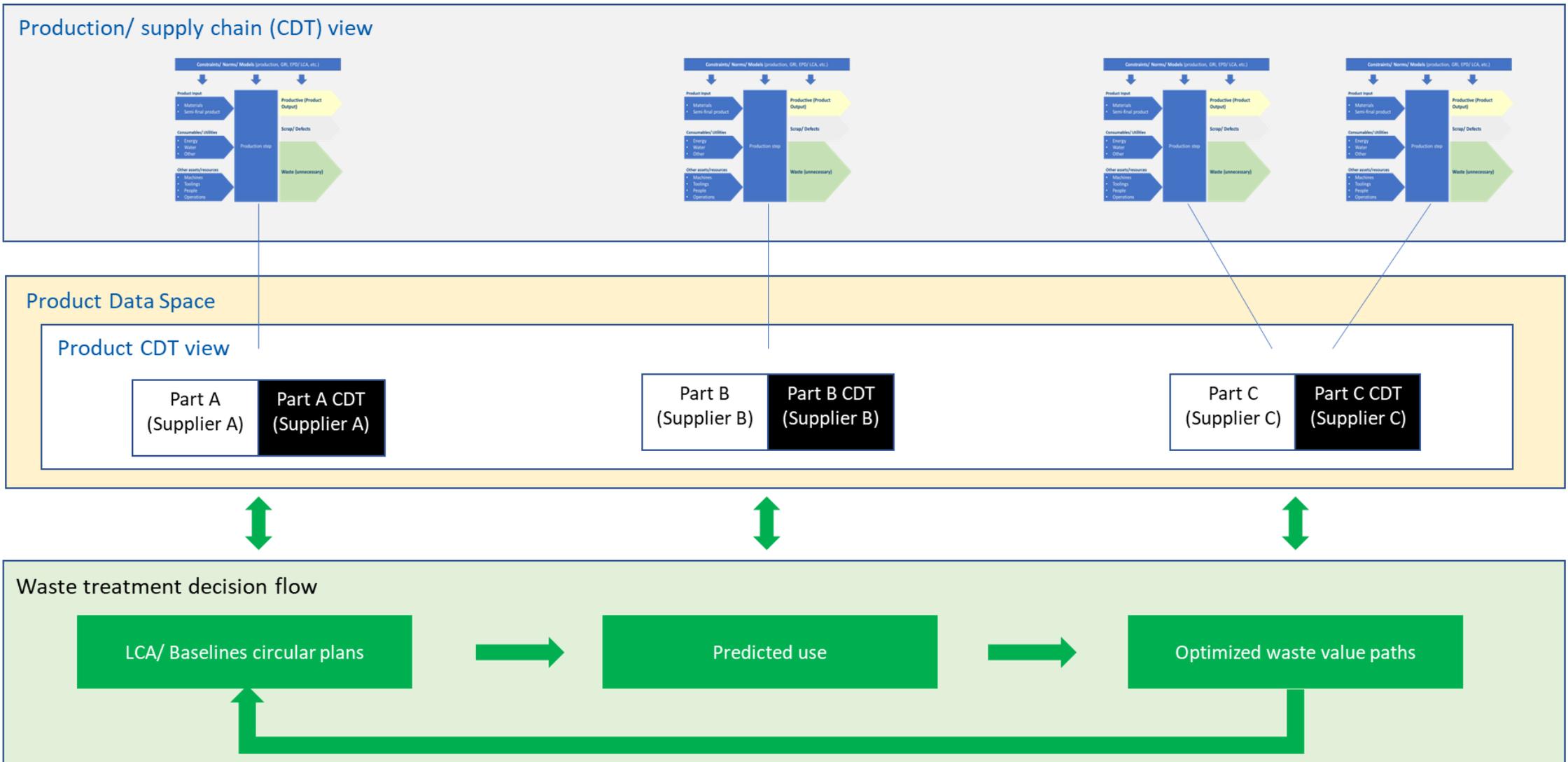
- Define stakeholders/ roles
- Define paths for scrap/waste
- Define process phases/owners for internal manufacturing
- Initial KPIs

| Scrap/Waste           | Potentials for Circularity |       |                           |         |                 |
|-----------------------|----------------------------|-------|---------------------------|---------|-----------------|
|                       | Maintain                   | Reuse | Refurbish/ Re-manufacture | Recycle | Exchange (CbD)* |
| Material              | X                          |       |                           |         |                 |
| (semi-) Final Product |                            |       |                           | X       | X               |
| Toolings              |                            | X     | X                         |         |                 |

\* CbD: Circular by Design

| Scrap    | Potentials for Circularity |                        |                 |                  |
|----------|----------------------------|------------------------|-----------------|------------------|
|          | RES                        | Energy Recovery/ reuse | Water Treatment | Share/ Reuse ... |
| Energy   | X                          |                        |                 |                  |
| Water    |                            |                        | X               | X                |
| Oil      |                            | X                      |                 |                  |
| Other... |                            |                        |                 |                  |

## Data spaces as enabler for circular supply chains



# MIRA platform for digital twins

Create your **digital twin of an asset/operation** (factory, equipment, process, building)



**Real-time monitoring** with data from different information sources

**Visualizations** and views on top of the digital twin



**Simulation** and **predictive analytics**



**What-if scenarios** and **assess impact**

**Optimization scenarios** (scheduling, planning, etc.)

# Reference cases



# IOTWeek

Dublin — June 20-23, 2022

## Energy and Process/Production Optimization



Optimized LPG production  
Location: Izmit, Turkey



Virtual Production Line and Energy Efficiency  
Location: Timisoara, Romania



Optimized operation in waste-to-fuel plant  
Location: Ljubljana, Slovenia



Energy-based production scheduling  
(fabric factory)  
Location: Piacenza, Italy

## Water monitoring and reuse



Reduce water by Reuse and digital smart control  
Locations: Terneuzen, Netherlands, Böhlen, Germany



Water Treatment and Re-Use within  
Peroxide Production Units  
Location: Livorno, Italy



Antwerp harbor and Albert canal quality monitoring  
Locations: Antwerp, Belgium  
Water reuse and cooling water tower process optimization  
Locations: Antwerp, Belgium



Waste to fuel water reuse  
Location: Ljubljana, Slovenia



Optimized Water Use in Meat Production  
Location: Timisoara, Romania



Water Treatment and Re-use within Refinery  
Location: Izmit, turkey



**IOTWeek**

Dublin — June 20-23, 2022

**Demo**

**EKTOS**  
Let us test  
your IoT solution



PIACENZA  
CASHMERE

# Optimized production scheduling in spinning machine (fabric factory)

Location: Piacenza, Italy

IOTWeek

Dublin — June 20-23, 2022

- Digital twin of a spinning machine
- Production scheduling optimization based on energy consumption
- Focus on optimizing idle status of the machine (currently 30% energy wasted due to inefficient scheduling)





# IOTWeek

Dublin — June 20-23, 2022

# Thank you!

Find more:

Kostas Kalaboukas

Head of Innovation Management and New Solutions Development  
Maggioli S.p.A - Greek Branch

Tel: +30 210 0083 985

[www.linkedin.com/in/kostas-kalaboukas-4044b7a/](https://www.linkedin.com/in/kostas-kalaboukas-4044b7a/)

[Kostas.Kalaboukas@maggioli.gr](mailto:Kostas.Kalaboukas@maggioli.gr)

GRUPPO

Maggioli

[iotweek.org](https://iotweek.org)