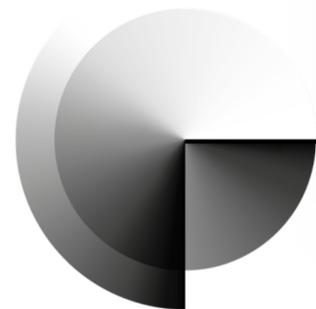


2021 World Manufacturing Report

# DIGITALLY ENABLED CIRCULAR MANUFACTURING

**Marco Taisch**

Scientific Chairman, World Manufacturing Foundation



**WORLD  
MANUFACTURING  
FOUNDATION**

**World Manufacturing Forum 2021**

October 21<sup>st</sup>, 2021

Live streamed from Cernobbio, Lake Como - Italy



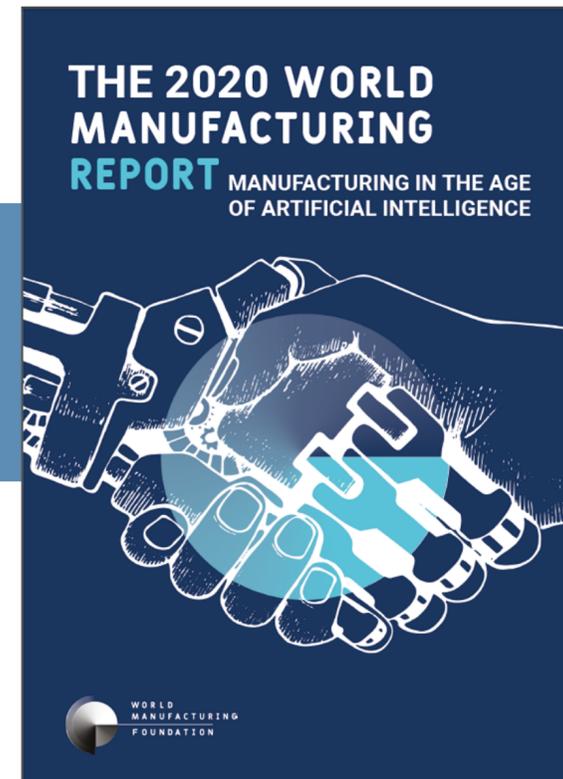
# The World Manufacturing Report THROUGH THE YEARS



2018



2019



2020



2021

# Why Digitally Enabled Circular Manufacturing?

Addressing the environmental impact of manufacturing is a must

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Policymakers globally are pushing the sector towards circularity and environmental sustainability

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There can be no full circular transition without digital transformation

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# Circular Manufacturing perpetuates the reuse of resources by managing the whole life cycle of a product

## Five Strategic Goals of Circular Manufacturing

*(Source: World Manufacturing Foundation)*



**Redesign Products & Materials Selection**



**Conserve & Recover Resources**



**Develop New Ways of Production**



**Implement Service-based Model**



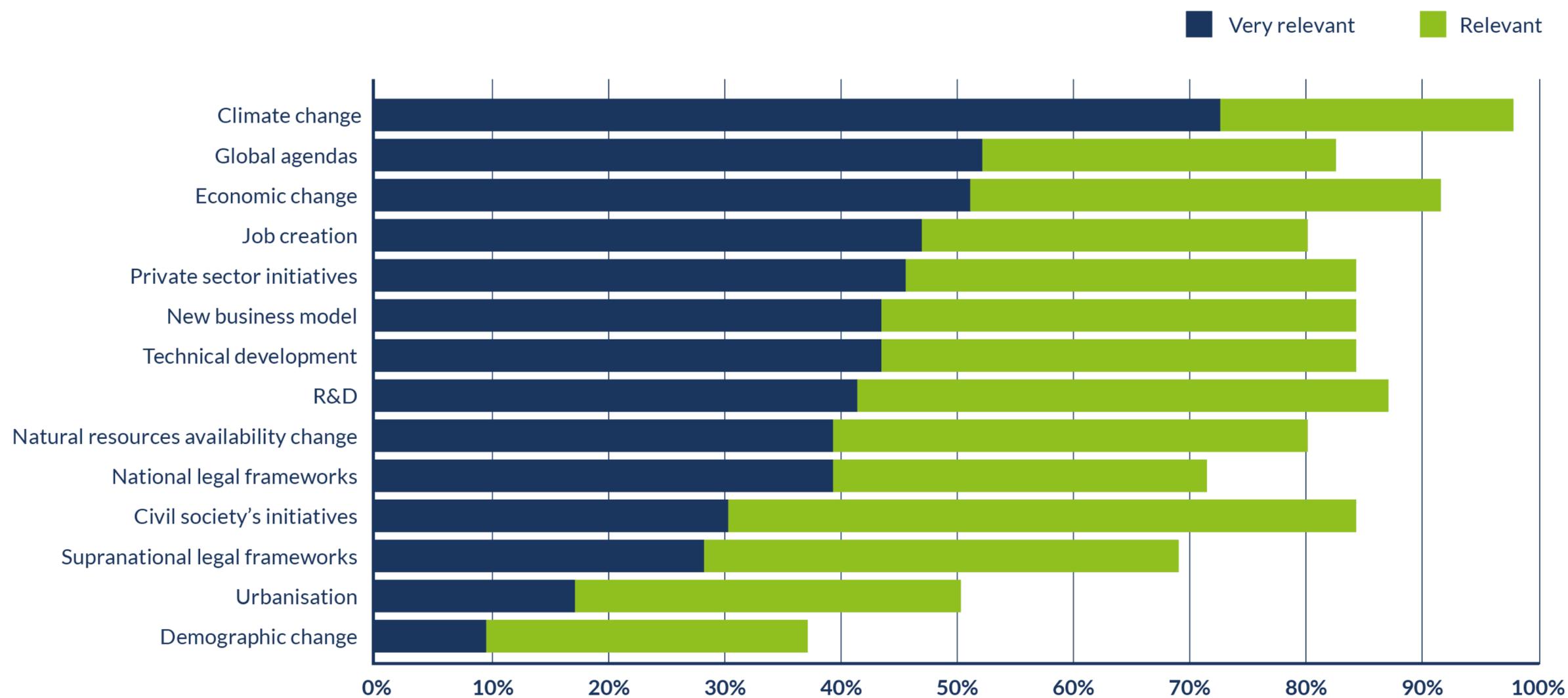
**Shift to Renewable Raw Materials**



# Key drivers are accelerating the transition to the circular economy

## Drivers of the circular economy

(Source: OECD)

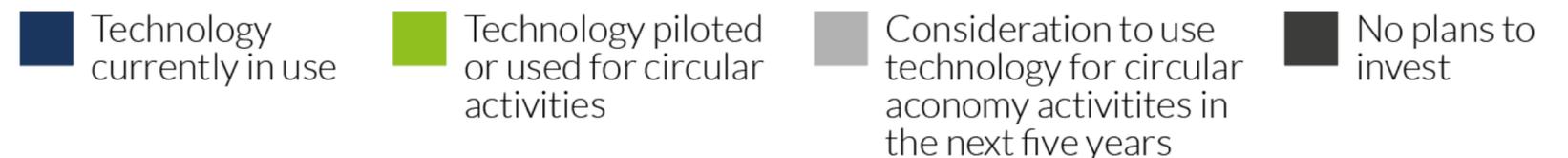
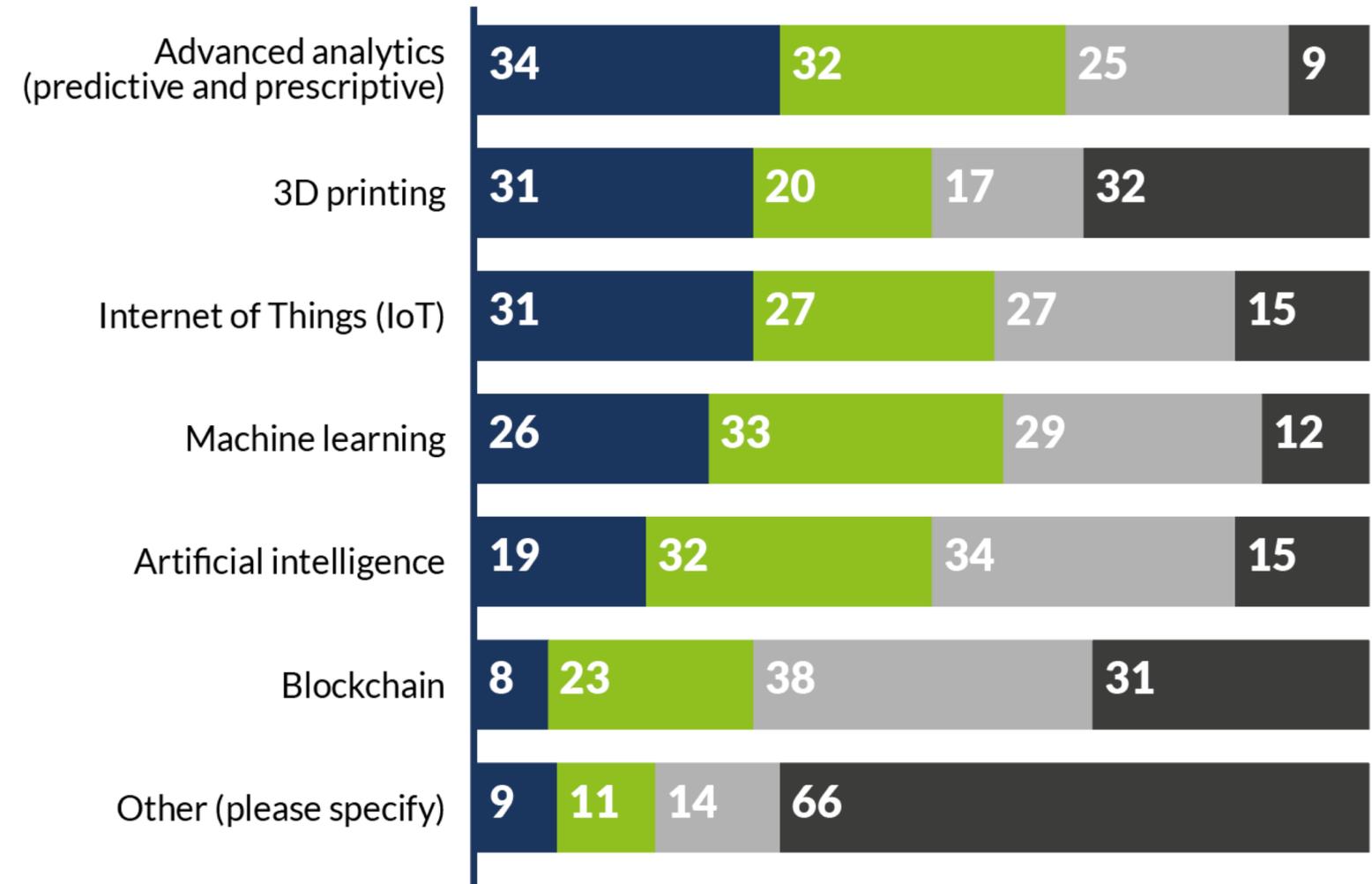




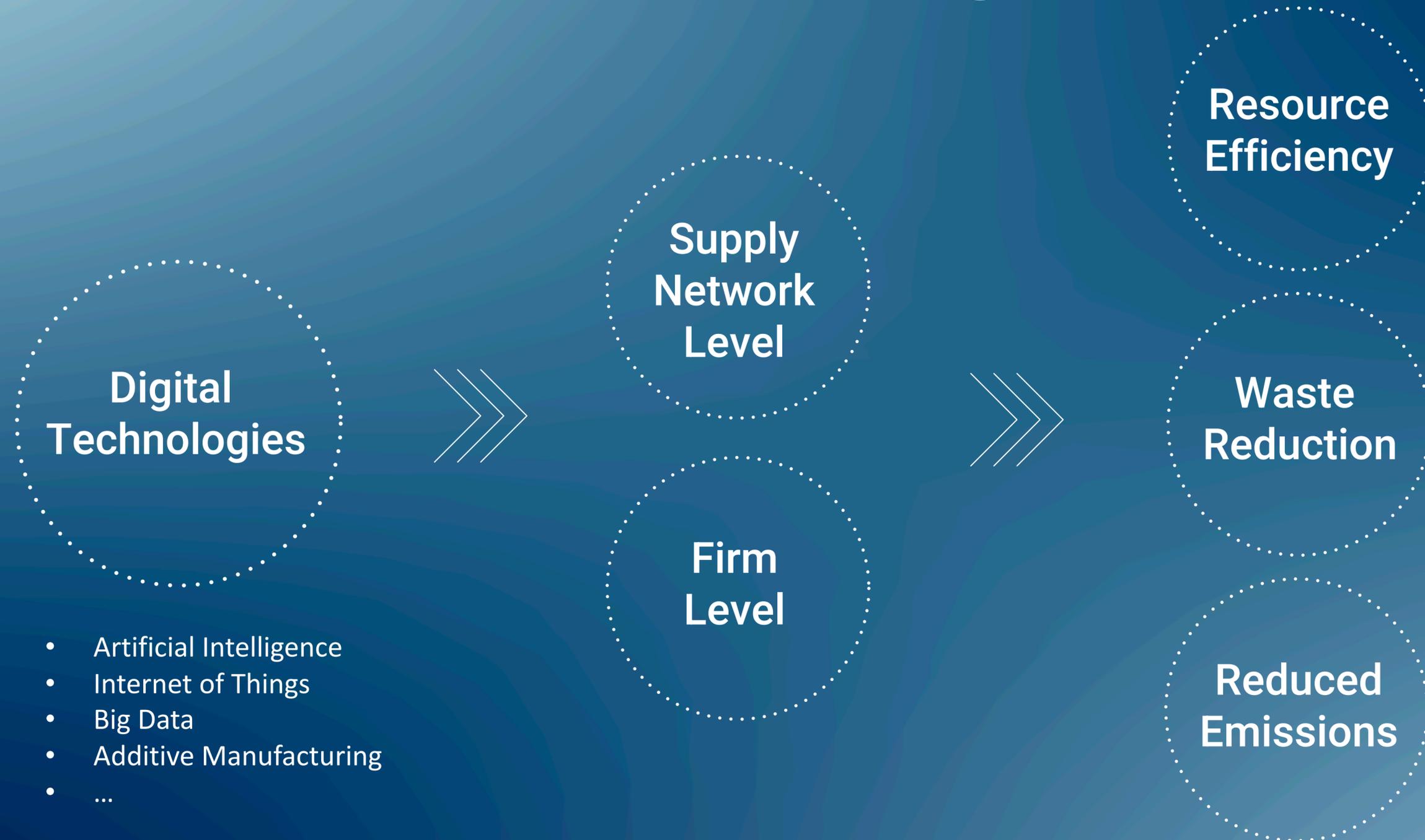
# Digital Technologies are important enablers for circular manufacturing

## Digital Technologies Used to Enable Circular Economy Activities

(Source: Gartner)



# How can Digital Technologies enable Circular Manufacturing?

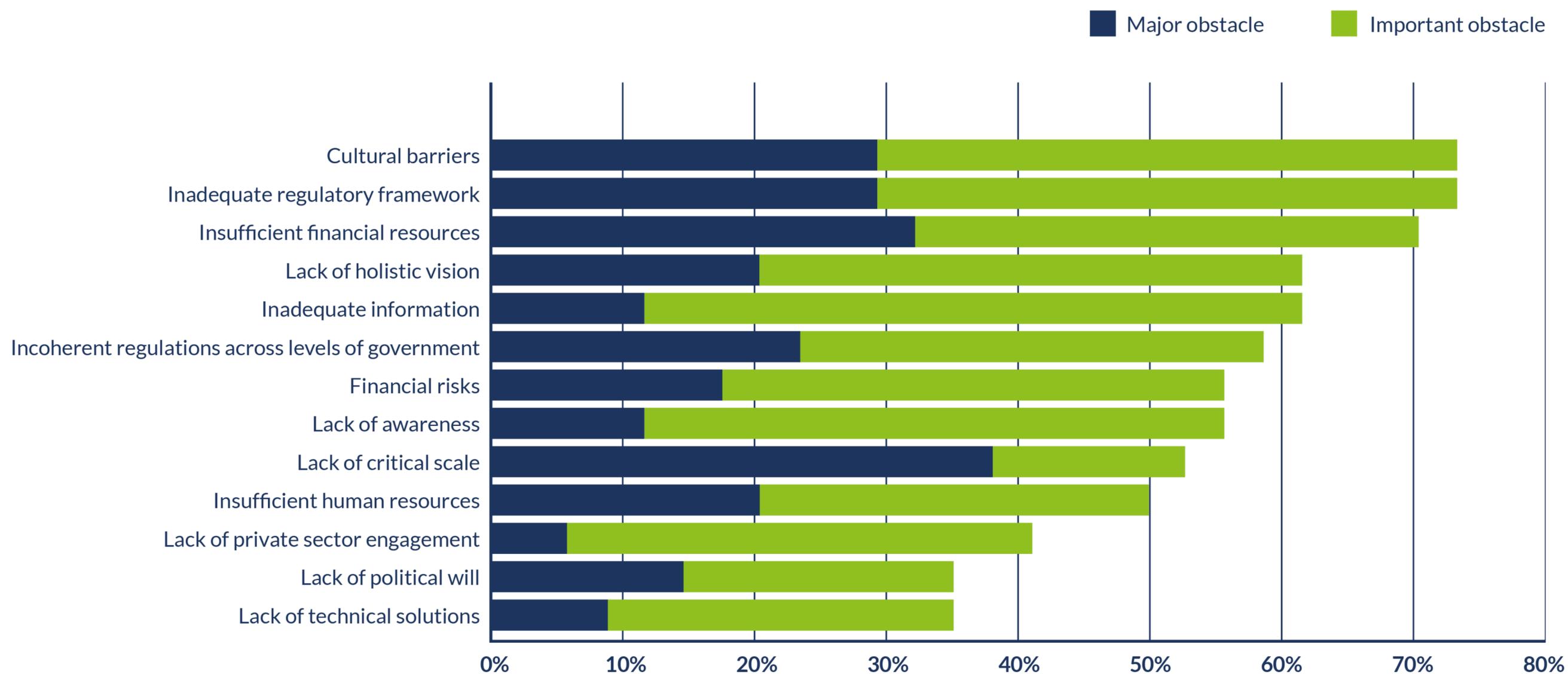




# Challenges need to be overcome in the circular transition

## Obstacles to the circular economy

(Source: OECD)



# Enablers for circular manufacturing



## CONSUMER LEVEL

- Awareness
- Transparency
- Digital Literacy
- ...



## COMPANY LEVEL

- Digital Transformation
- Supportive Policy Framework
- Skills and Competencies
- ...



## VALUE CHAIN LEVEL

- Data Sharing
- Infrastructure and Networks
- Standardisation of Requirements
- ...

# 10 Key Recommendations

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by the World Manufacturing Foundation

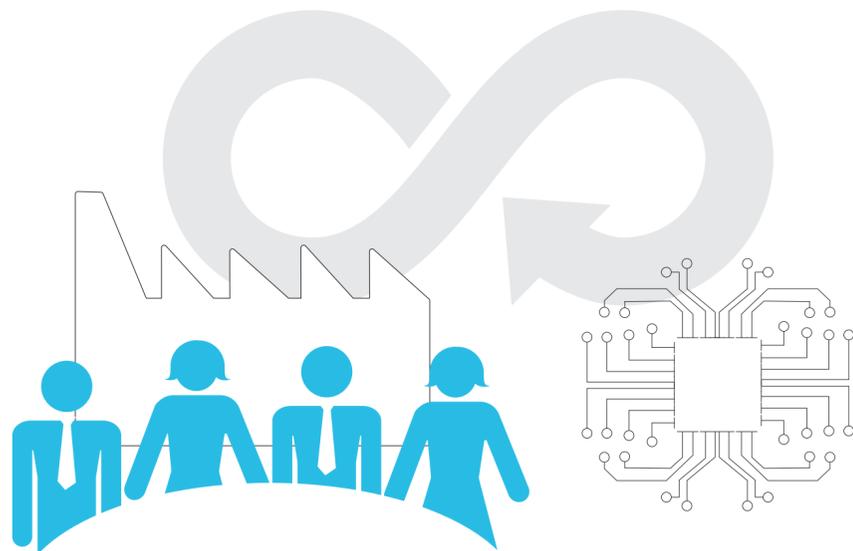


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# 1

## **PROMOTE A CIRCULAR MINDSET THAT EMBRACES THE OPPORTUNITIES OF THE CIRCULAR ECONOMY AND ENABLING THE ROLE OF DIGITAL TECHNOLOGIES**

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- Acknowledge that the circular transition is a must
- Define new key performance indicators related to circularity
- Educate citizens on sustainable consumption



---

# 2

## **DRIVE CIRCULARITY THROUGH CONSUMER RESPONSIBILITY, PROACTIVITY, AND CONSCIOUS DECISION-MAKING**

---



- Inform on circularity and the environmental impact of consumption
- Demand sustainable products from companies
- Take advantage of the sharing economy to increase utilisation of products



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# 3

## **ENABLE COOPERATION AMONG RELEVANT STAKEHOLDERS IN BUILDING CIRCULAR VALUE CHAINS**

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- **Facilitate information sharing in the value chain**
- **Promote shared standards, certifications, and common sustainability metrics**
- **Engage all relevant stakeholders in technology implementation**

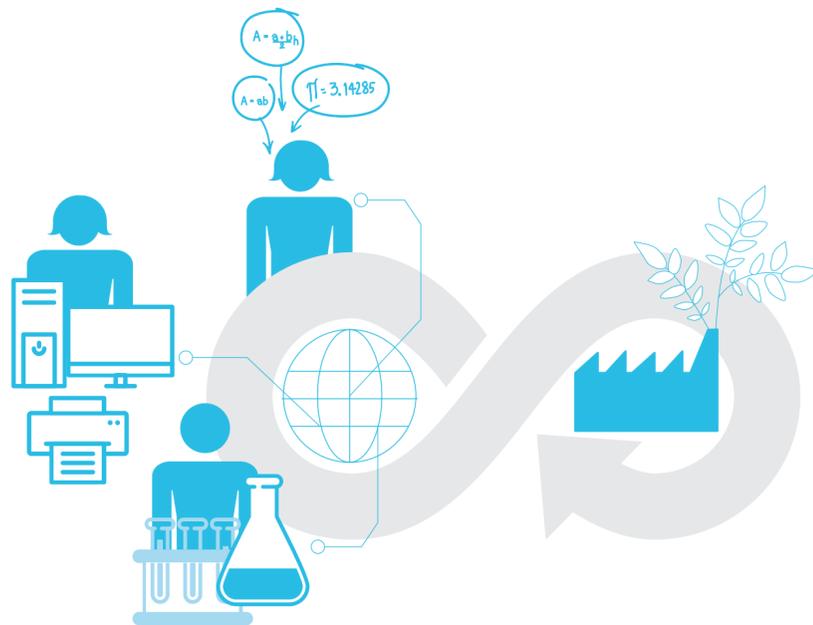
# 4 PROMOTE BUSINESS MODELS AND VALUE PROPOSITIONS THAT EMBRACE CIRCULARITY



- Encourage product-as-a-service models
- Design products to facilitate eventual recovery, remanufacturing, and reuse
- Exploit industrial symbiosis platforms to trade waste and surplus assets

# 5

## IMPLEMENT POLICIES GLOBALLY THAT RECOGNISE DIGITAL TECHNOLOGIES AS THE MAIN ENABLER FOR CIRCULAR MANUFACTURING



- Increase commitment to global initiatives for the circular economy
- Address the digital divide globally, especially in least developed countries
- Set up sandboxes and testbeds to promote learning, experimentation, and innovation



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# 6

## **PROMOTE ECONOMIC MEASURES THAT DRIVE THE TRANSITION TO THE CIRCULAR ECONOMY AND ADOPTION OF ENABLING TECHNOLOGIES**

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- **Devise taxation schemes to drive resource efficiency and the use of secondary materials**
- **Incentivise companies and investors to invest in circular projects**
- **Provide incentives to consumers to drive circular behaviour**

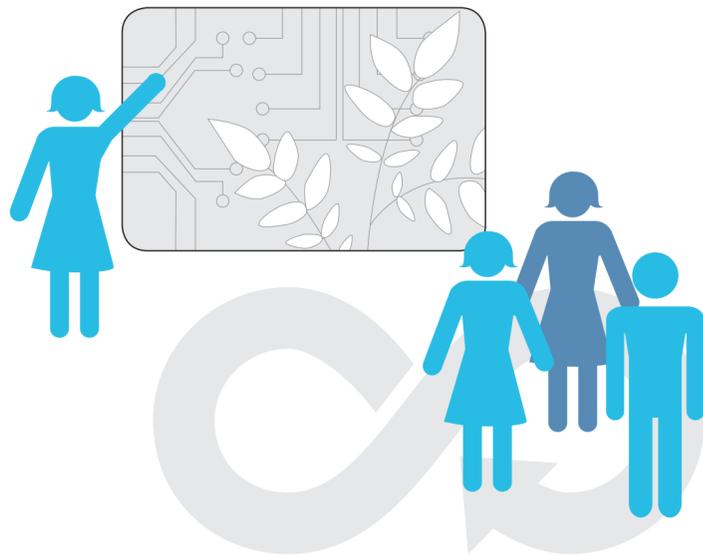


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# 7

## **TRAIN THE WORKFORCE FOR DIGITALLY ENABLED CIRCULAR MANUFACTURING**

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- **Update skills and competencies to work with enabling digital technologies**
- **Prepare the workforce for emerging green occupations**
- **Reinforce the sustainability component in school curricula**

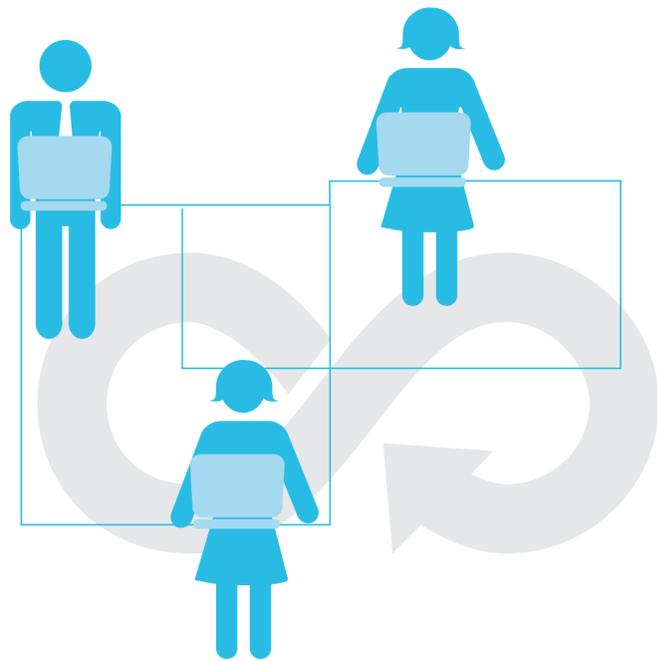


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# 8

## LEVERAGE ON DATA TO SUPPORT THE CIRCULAR TRANSITION IN THE MANUFACTURING SECTOR

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- Promote a data-driven culture in organisations
- Exploit data from the value chain to drive product and production innovation
- Create shared data spaces that facilitate trustworthy data sharing



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# 9

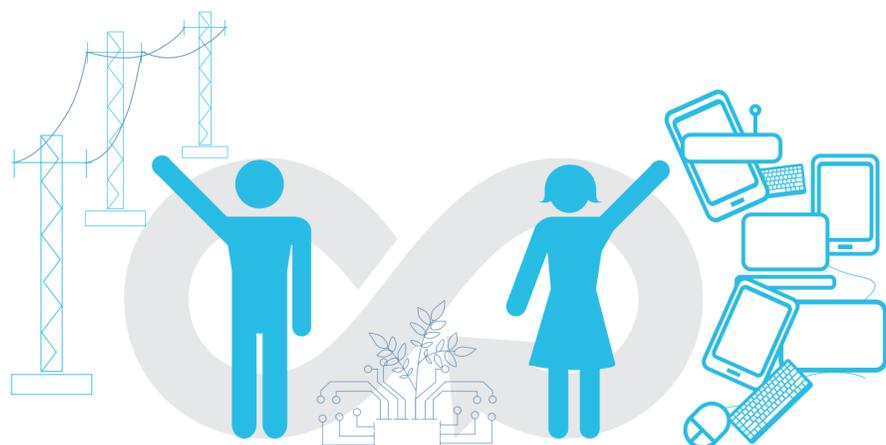
## EMPOWER SMES IN THEIR TRANSITION TO CIRCULAR MANUFACTURING

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- Address lack of information on the potential of technologies to achieve circularity
- Provide capital and assist in building a skilled workforce
- Increase access to data to support circular objectives and leverage on new sustainable business opportunities

# 10 ADDRESS THE POSSIBLE NEGATIVE ENVIRONMENTAL IMPACT OF DIGITAL TECHNOLOGIES



- Perform a holistic and realistic assessment of technology impact
- Leverage on circular business models to deal with electronic waste
- Promote policies to address the unintended negative impact of technologies on the environment

# THE 2021 WORLD MANUFACTURING REPORT

DIGITALLY ENABLED  
CIRCULAR MANUFACTURING



## Report Highlights

50+

CONTRIBUTORS  
GLOBALLY

30+

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Case Studies from  
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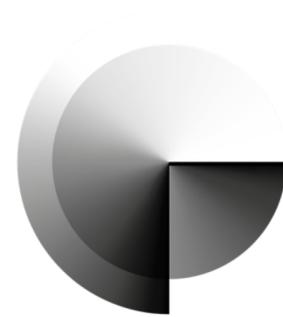
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