

# Europe's Advanced Manufacturing Partnership Factories of the Future



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Executive Director



## Background

# Manufacturing & Europe

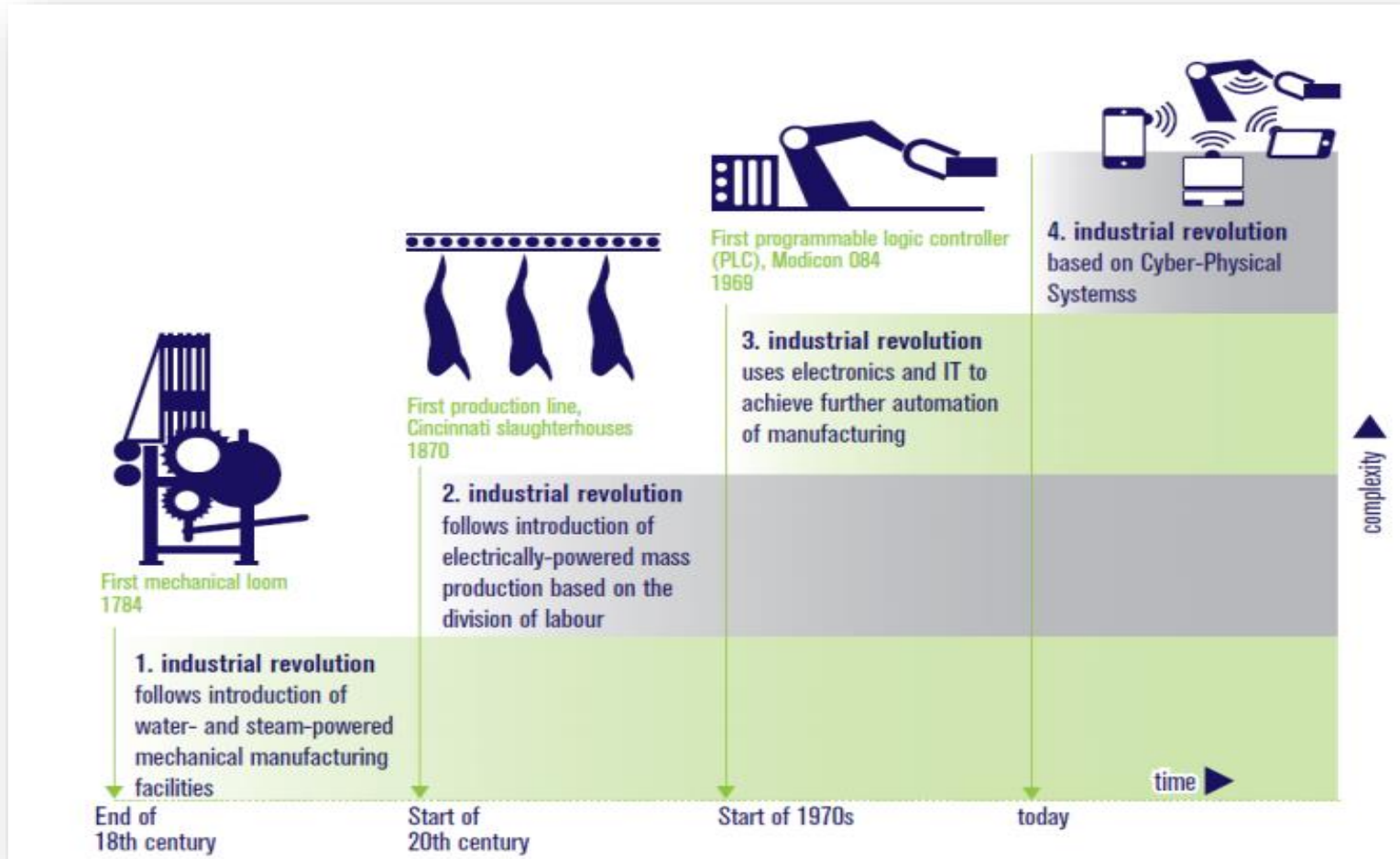
How important is manufacturing?

- Despite the continued fall-out from crisis, manufacturing means a lot for Europe:
  - 20 % Direct jobs
  - 67 % Exports
  - 65 % Business R&D Expenditure
  - Manufacturing in Europe remains diverse
- Importance of manufacturing now recognised by EU and its member states...
- ....but also by Europe's competitors
- Development of more competitive & sustainable industry needs support = 'Factories of the Future'



## Background

# Major Changes in Manufacturing



# Digitalisation & Manufacturing

- 'Digitalisation' affects multiple aspects of manufacturing such as:
  - Process quality – monitoring and control
  - Interconnectivity of machines
  - Plant management
  - Data processing
  - Apps for workers
  - Training
- Advanced manufacturing cannot evolve without digitalisation
- Equally innovations in digitalisation will be driven by the demands of advanced manufacturing
- Manufacturing companies becoming much more involved in developing digital services & ICT-enabled tech. to meet their particular needs



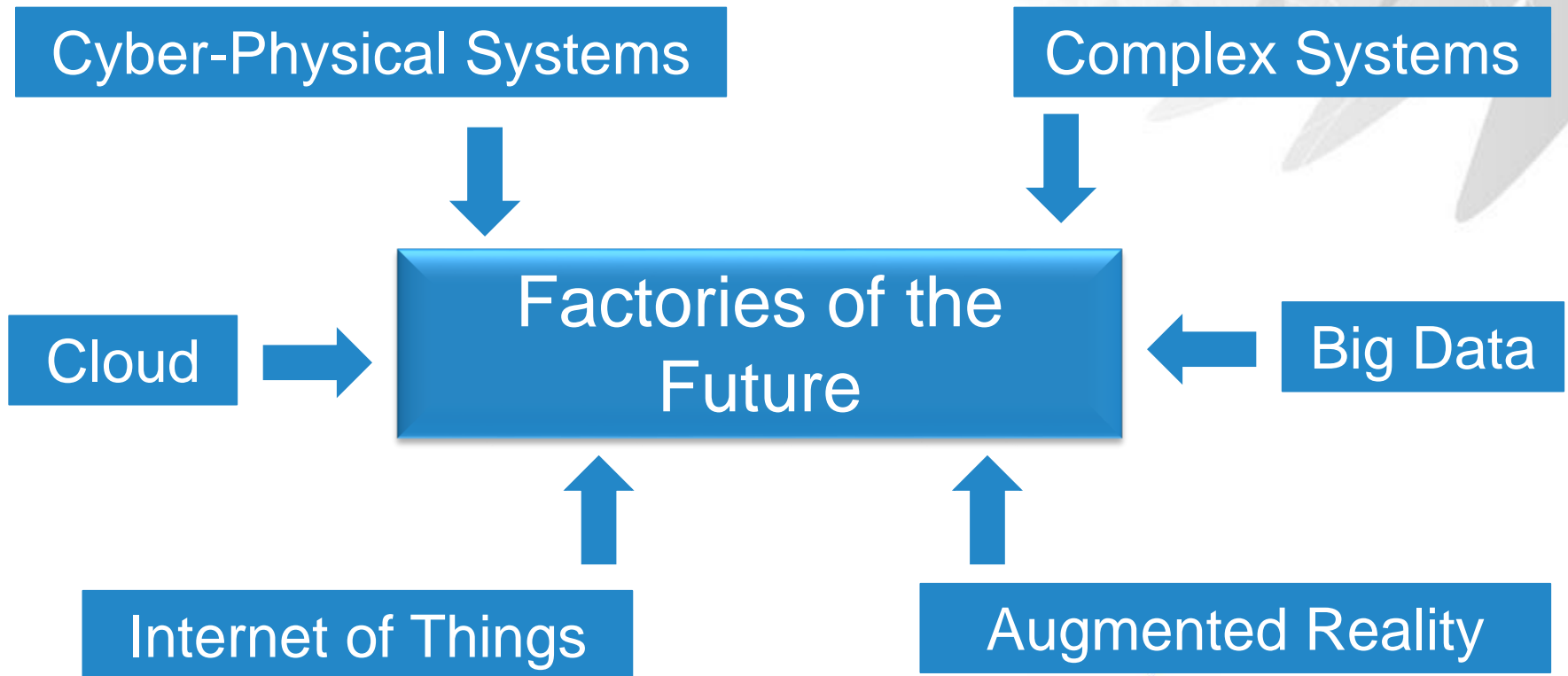
Factories of the Future  
Public-Private Partnership



# Factories of the Future

## Digital Issues

- Selection of digital issues impacting on & being addressed in 'Factories of the Future'



EFFRA

# Europe's Factories of the Future Association



- Representing private side in 'Factories of the Future' PPP
- 170+ members (Large, SME, RTO etc.) from across Europe
- An experienced, engaged and motivated community
- Actively promotes Factories of the Future PPP & projects
- Collaborates closely with EC to develop strategic research agenda ('roadmap')
- Works with national & regional initiatives

[www.effra.eu](http://www.effra.eu)





# EFFRA

## Industry Members



# EU & Research Funding Factories of the Future

Member States



EU Budget



**Horizon 2020 (research fund)**  
**€80 billion**



**Factories of the Future**  
**€1.15 billion**



**Factories of the Future**  
Public Private Partnership





# Realising Industry 4.0 in Europe

## Factories of the Future

- The European Union's pre-competitive, collaborative programme for manufacturing research & innovation
- Launched in 2010 in response to crisis
- Factories of the Future is a contractual **public-private** partnership
- The EU & industry have committed to **support** European research & innovation
- Funded through EU's **Horizon 2020** research & innovation programme
- Budget: **€1.15 billion**



**Factories of the Future**  
Public Private Partnership

Strategic research agenda = **Factories of the Future 2020**

# Realising Industry 4.0 in Europe

## Factories of the Future



**Factories of the Future**  
Public Private Partnership

DIMECC



PRODUKTION2030

MADE

Manufacturing Academy of Denmark

CATAPULT  
High Value Manufacturing



MADE DIFFERENT  
FACTORIES OF THE FUTURE

FLANDERS  
MAKE  
MANUFACTURING INNOVATION NETWORK



IPAR 4.0  
NATIONAL TECHNOLOGY PLATFORM

INDUSTRIE 4.0  
ÖSTERREICH

i4.0  
INDÚSTRIA 4.0



fabbrica  
intelligente

# International Context

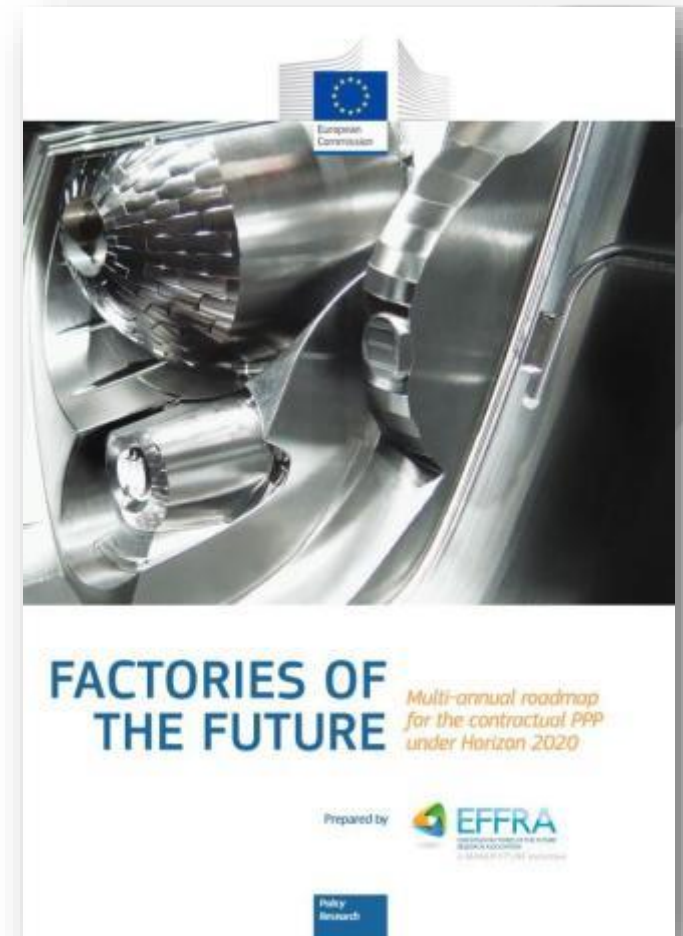
International context: Multiple programmes to support transformation of industry. Examples:

- China: Made in China 2025 (MiC2025)
  - National funding & pilots
- Japan:
  - National strategy + AMRI strategy
  - Industrial Value Chain Initiative (standardisation, strategy etc)
- Rep. of Korea:
  - National funding programmes
- USA: Manufacturing USA
  - State-level PPPs/clusters
- India
  - Make in India
  - National Policy for Advanced Manufacturing
- EFFRA has been represented in US, South African & Russian advanced manufacturing conferences



# Strategic Roadmap

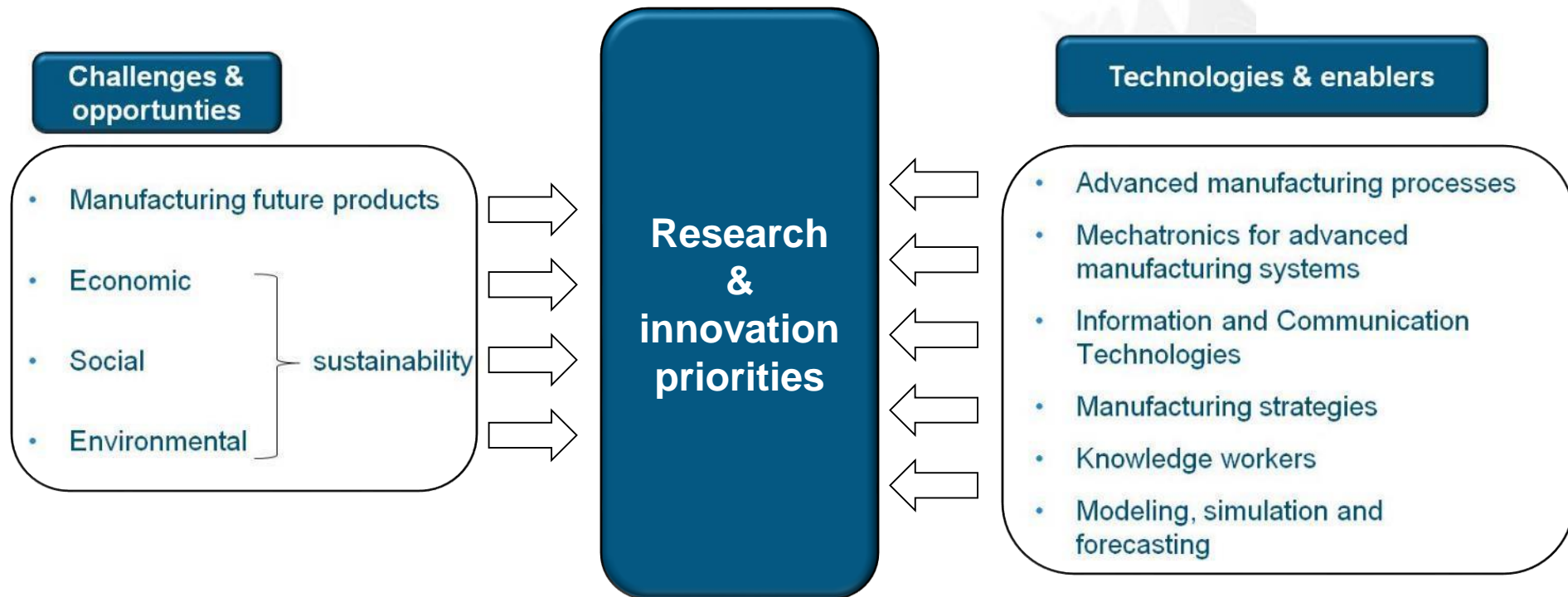
- Covering 2014-2020
- Developed by EFFRA & through broad public consultation
- Identifies megatrends which drive structural changes in manufacturing sectors
- Establishes research priorities which will allow industry to meet these challenges
- Priorities focus on development, application & integration of enablers & technologies
- 'Factories of the Future' call topics based upon research priorities = industry relevant
- Not static: we are developing the Roadmap further





## Background: Strategic Research Agenda

# Defining Research & Innovation Priorities



© EFFRA



# Factories of the Future 2020

## Research & Innovation Priorities

### Challenges & Opportunities

- Manufacturing Future Products
- Economic
- Social
- Environmental

Sustainability

#### Domain 1: Advanced Manufacturing Processes

Innovative processing for both new & current materials or products

#### Domain 2: Adaptive and Smart Manufacturing Systems

Innovative manufacturing equipment at component & system level, including mechatronics, control & monitoring systems

#### Domain 3: Digital, Virtual & Resource Efficient Factories

Factory design, data collection & management, operation & planning, from real-time to long term optimisation approaches

#### Domain 4: Collaborative & Mobile Enterprises

Networked factories & dynamic supply chains

#### Domain 5: Human-Centred Manufacturing

Enhancing the role of people in factories

#### Domain 6: Customer-Focused Manufacturing

Involving customers in manufacturing value chain, from product process design to manufacturing associated innovative services

### Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge Workers
- Modelling, Simulation & Forecasting

# From 2020 roadmap to Factories 4.0 & Beyond

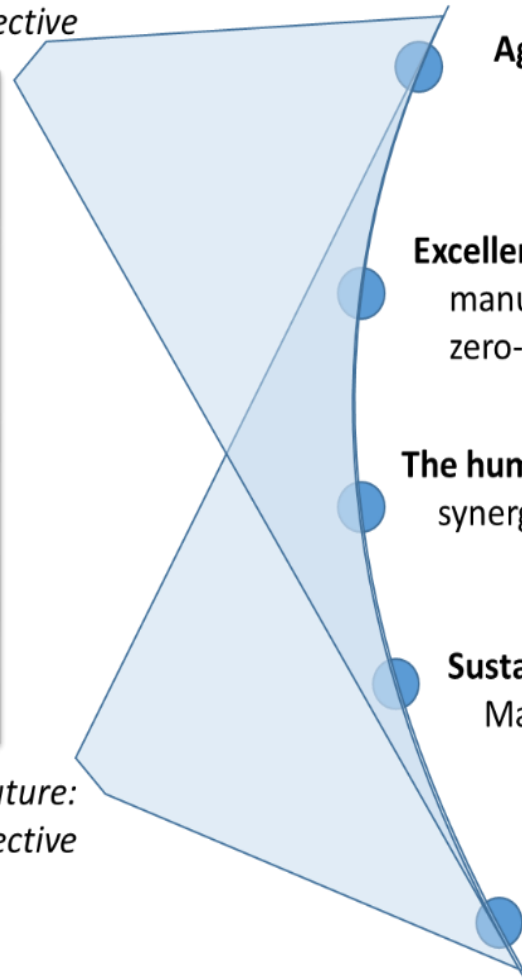
Building on the vision of the FoF 2020 roadmap and public consultation in 2016

→ Key priorities for FoF 18-19-20

*Vision of the factories of the future:  
the challenge perspective*



*Vision of the factories of the future:  
the technology perspective*



**Agile value networks:** Lot-size one - distributed manufacturing

**Excellence in manufacturing:** Advanced manufacturing processes and services for zero-defect processes and products

**The human factor:** Human competences in synergy with technological assets

**Sustainable value networks:** Manufacturing in a circular economy

**Interoperable digital manufacturing platforms:** connecting manufacturing services



### Digitising European Industry

To facilitate coordination of European, national & regional initiatives such as Industrie 4.0 (DE), Smart Industry (NL) (SK), Industrie du Futur (FR)

#### Mainstreaming digital innovation across all sectors:

Setting up a pan-European network of Digital Innovation Hubs

#### Strengthening leadership in key parts

##### of the digital value chain:

- Public-Private Partnerships
- Industrial platforms
- Large scale pilots & test beds

#### Preparing People for the digital age: Skills & Training

##### Regulatory framework:

- Free flow of data & data ownership
- Safety & liability of autonomous systems & Internet of Things

Challenges & opportunities of the Internet of Things

#### CLOUD



##### European Cloud Initiative in a data-driven economy:

- European Open Science Cloud
- European Data Infrastructure
- Widening access & building trust

High Performance Computing

Quantum

#### STANDARDS



##### Fast development in 5 priority areas:

- 5G
- Cloud Computing
- Internet of Things
- Data Technologies
- Cybersecurity

#### DIGITAL PUBLIC SERVICES

##### eGovernment Action Plan:

- New Digital Single Gateway
- eJustice Portal
- “Once-only” principle in Administrations
- Cross-border Health services
- eProcurement & “Once-only” in public procurement

#### To focus investments

(Horizon 2020, EU Investment Plan, EU Structural & Investment Funds, national & regional funds, private sector)

**MOBILISING €50bn of public & private investments**

 #DigitiseEU  
@DSMeu

 DigitalSingleMarket

bit.ly/DigitiseEU

The European Commission in co-operation with Member States will **focus investments in the PPPs** to:

- **Reinforce the role of PPPs as coordinators of EU-wide R&I effort**, national initiatives and industrial strategies by **focusing on key technologies and their integration** including through large scale federating projects;
- **Focus a significant part of the PPPs and national investments on cross-sectoral and integrated digital platforms and ecosystems** including reference implementation and experimentation environments in real setting.

**The Commission will monitor the commitment by the private sector to invest, on average, at least four times as much as the EU investments in the PPPs** and the use of the opportunities offered by financial instruments under EFSI and ESIF.



# WG2

## Topics pan-European platform-building and piloting



### DIGITAL MANUFACTURING PLATFORMS

- Agile Value Networks: Lot-size One
- Zero-defect Processes and Products
- Machines & Human Competences
- Sustainable Value Networks

### PLUG & PRODUCE EQUIPMENT PLATFORM

...



### AGRICULTURAL DIGITAL INTEGRATION PLATFORMS

- Optimize farm operations
- High-precision farming

### DIGITAL SERVICE PLATFORMS FOR RURAL ECONOMIES

...



### SMART HOSPITAL OF THE FUTURE

### SMART AND HEALTHY LIVING AT HOME

- Healthy & independent living
- Early risk detection and intervention

...



### INTERNET OF THINGS FOR ENERGY: INTEROPERABLE AND SMART HOMES AND GRIDS

### BIG DATA SOLUTIONS FOR ENERGY

...



### 5G FOR CONNECTED AND AUTOMATED DRIVING

...

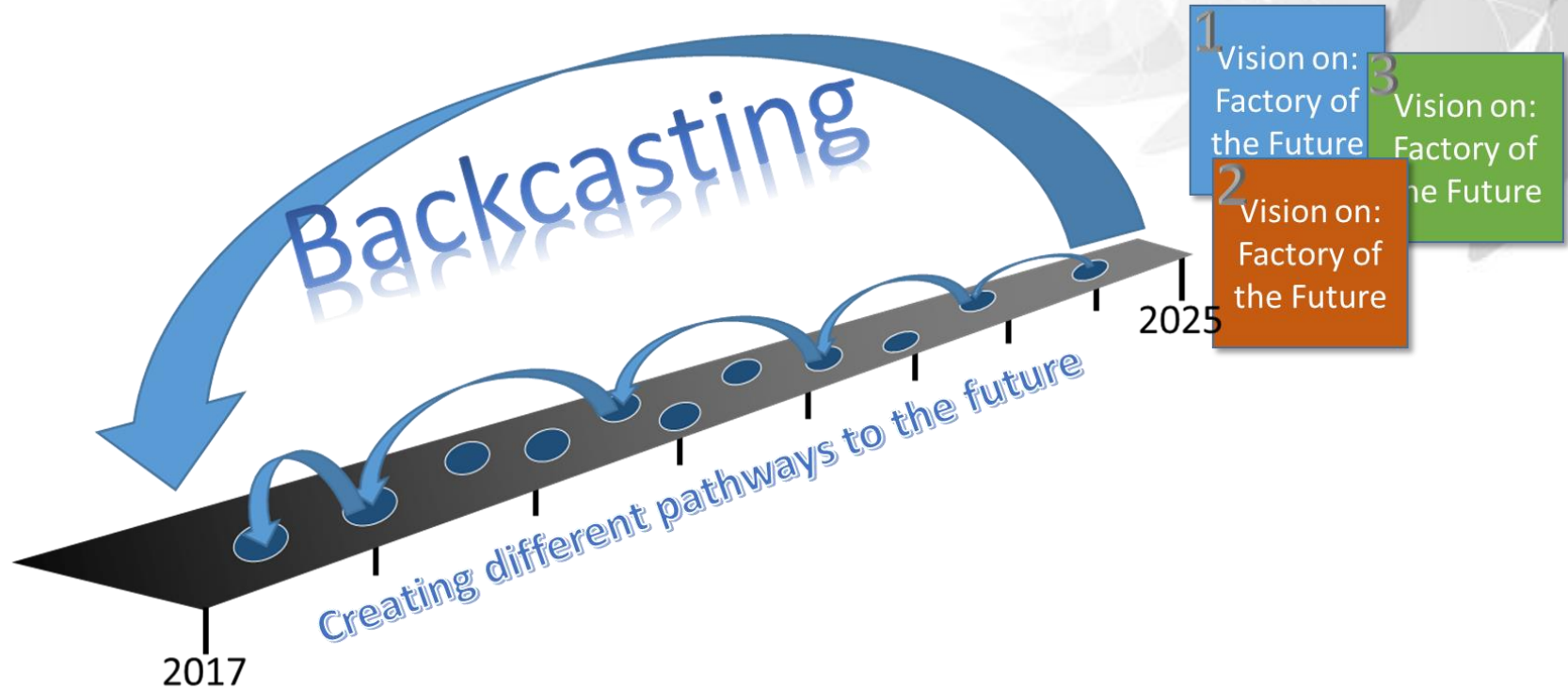
**Cross-cutting platforms, IoT, Big Data, Security...**





# ConnectedFactories

Approach to scenario analysis (WP4)



[www.connectedfactories.eu](http://www.connectedfactories.eu)

# Factories of the Future Achievements to Date

- 250 Projects to date.
- 3,000+ organisations participating
- High involvement of SMEs: 1,000+
- Majority of projects feature **demo activities**
- 800+ results have been reported on EFFRA Innovation Portal
- Close to the market **exploitation** of project results
- Project results enhancing **existing products**



## Overview of FoF projects

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	Nr of projects	Cumulative total
FoF-2010		25 projects					post-project impact & investments												25	25
FoF-2011		36 projects					post-project impact & investments												36	61
FoF-2012			37 projects				post-project impact & investments												37	98
FoF-2013				53 projects			post-project impact & investments												53	151
FoF-2014					25 projects		post-project impact & investments												29	180
FoF-2015						25 projects	post-project impact & investments												28	208
FoF-2016							37 projects	post-project impact & investments											37	245



# FLEXINET

## Intelligent Systems Configuration Services for Flexible Dynamic Global Production Networks

### Challenges & Opportunities

- Manufacturing Future Products
- Economic
- Social
- Environmental

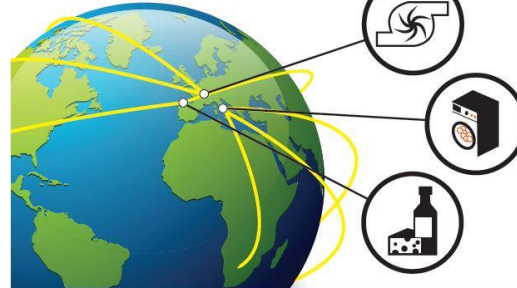
Sustainability

### FLEXINET SERVICES



RE-CONFIGURING YOUR GLOBAL PRODUCTION NETWORKS

[www.flexinet-fof.eu](http://www.flexinet-fof.eu)



Rapid reaction to new business opportunities

Understand product/service change implications

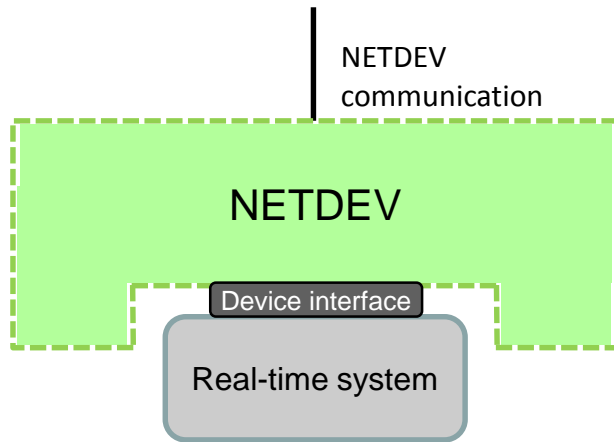
Respond effectively to global complexity challenges

### Technologies & Enablers

- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge workers
- Modelling, Simulation & Forecasting



# Network-enabled Devices -- NETDEVs

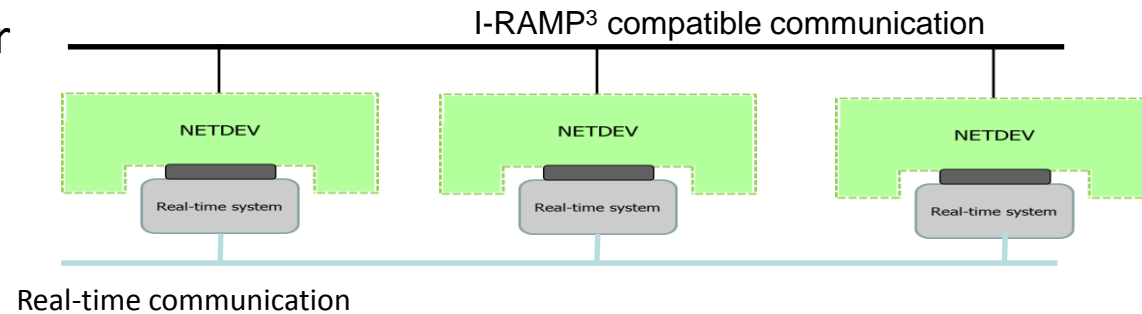


**Intelligent extension of traditional devices, featured with**

- Self-description
- Self-connecting
- Self-awareness and self-adaptation
- Task driven operation
- High level communication

In the Demonstrators, NETDEVs for

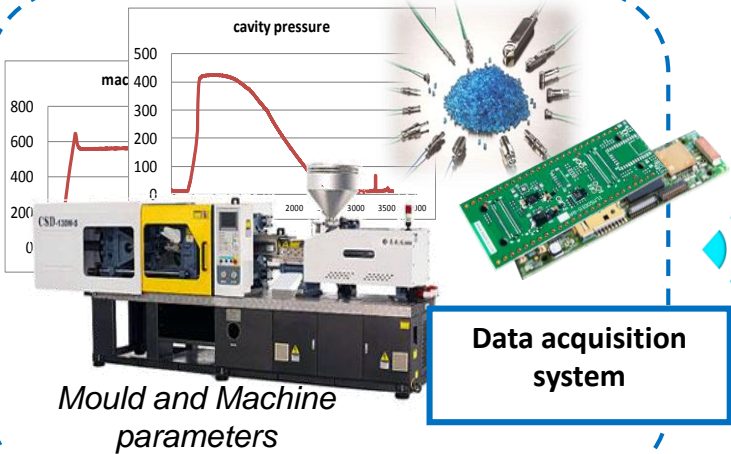
- Servo-presses,
- Welding controls,
- Sensors,
- Cell orchestration,
- Data collection,
- ...





# PREVIEW

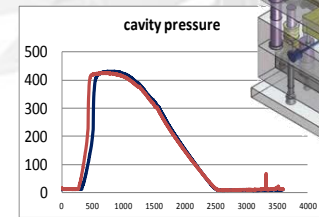
Industrial  
Wireless  
Comms



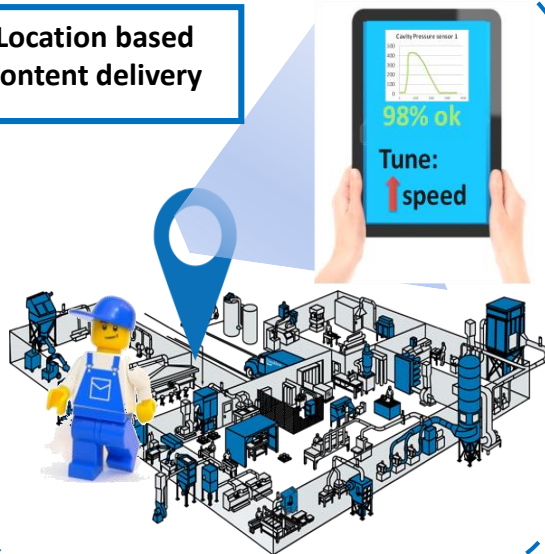
Advanced  
Predictive  
System



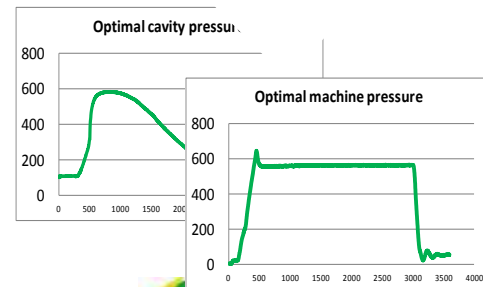
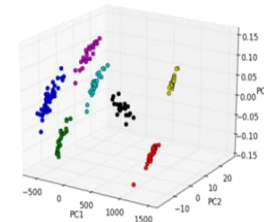
*Mould DNA*



Location based  
content delivery



*Recommended  
setup parameters  
based on  
historical data*





# FoF PPP in 2018-2020

## Budgets:

- Considerable budgets: **more than 500 million Euros!!**
- Contribution from NMPB and from ICT

## Probable FoF NMPB areas:

- Better jobs/human dimension in factories
- Manufacturing excellence
- Flexible and customised manufacturing
- Towards open innovation
- Eco-factories

## Probable FoF ICT areas:

- Platforms
- Making SMEs fit for the digital era: I4MS
- Urban manufacturing
- Cybersecurity in manufacturing

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