

# Welcome and introduction

The logo for the Advanced Manufacturing Network is a blue rounded rectangle containing the text "Advanced Manufacturing Network" in a white, sans-serif font. The word "Advanced" is on the first line, "Manufacturing" is on the second line, and "Network" is on the third line. A small red circle is positioned to the right of the word "Manufacturing".

Advanced  
Manufacturing  
Network

European Metrology Network for Advanced Manufacturing  
Stakeholder Meeting 2021

11 October 2021

Harald Bosse, [harald.bosse@ptb.de](mailto:harald.bosse@ptb.de)

# Outline

## EMN Advanced Manufacturing Stakeholder Meeting 2021

11 OCTOBER 2021

Open online event

EUROPEAN  
METROLOGY  
NETWORKS



### European Metrology Network for Advanced Manufacturing stakeholder meeting 2021 Agenda



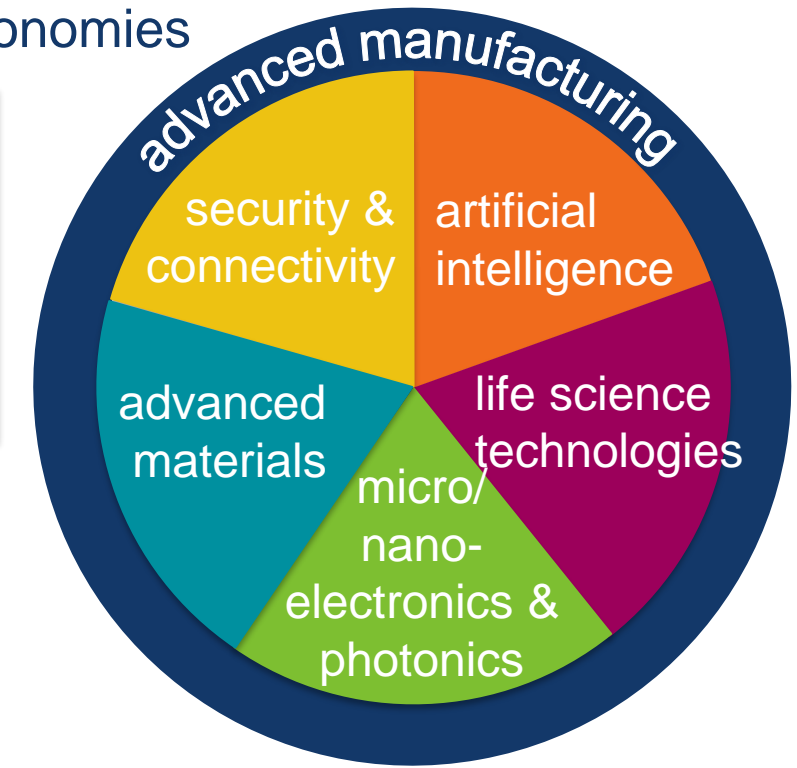
**Time** 11 October 2021 13:00 – 17:30 (CEST)

**Place** Online Meeting

Time	Item	Speaker
13:00	Welcome and introduction	Harald Bosse, Acting EMN Chair
13:15	EURAMET and the role of EMNs	Jöm Stenger, EURAMET Chairperson
13:30	Keynote: Challenges and trends in advanced manufacturing - also related to metrology	Hans Hansen, DTU, CIRP president
14:10	Overview of EMN partner organisations: <ul style="list-style-type: none"><li>- ETP ManuFuture</li><li>- EFFRA and Made in Europe Partnership</li><li>- NanoFabNet</li><li>- euspen</li></ul>	Maurizio Gattiglio Željko Pazin Steffi Friedrichs Dishi Phillips
15:00	Break	
15:15	Keynote: Assuring manufacturing quality in the Industry 4.0 environment	Thomas Engel, Siemens
15:45	Keynote: The role of shop floor metrology and process data as critical enablers for smart manufacturing	Paul Maxted, Renishaw
16:15	EURAMET activities related to EMN Advanced Manufacturing: <ul style="list-style-type: none"><li>- EMN MATHMET</li><li>- TC-IM WG M4D</li></ul>	Markus Bär, PTB Daniel Hutzschenreuter, PTB & Sascha Eichstädt, PTB
16:30	Forum discussion on metrology needs for advanced manufacturing	All
17:30	End of the meeting	

## Advanced manufacturing (EC): one of six Key Enabling Technologies (KETs)

- Applications in multiple industries
  - full exploitation of KETs: creating advanced & sustainable economies
- European Technology Platform **MANUFuture**:
  - Vision 2030 strategy document (HLG, 12/2018):
- **Manufacturing: backbone of European economy**
- 2014: 2.1 million enterprises, 30 million people, 1 710 B€. However: European manufacturing has been losing ground
- In 2030, European manufacturing will be competitive at global level due to its high-performance and technological level, targeting **zero-defect, zero-delay, zero-surprise and zero-waste production processes**



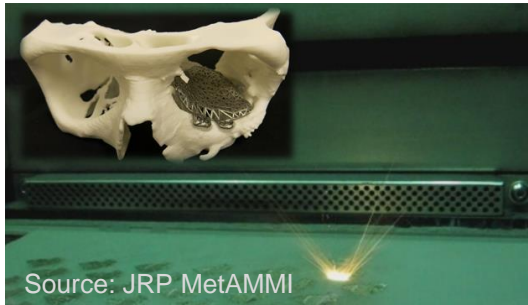
prioritised **KETs** in the Horizon Europe programme 2021-2027 (EC)



# Metrology demands in Advanced Manufacturing

## Aim for production processes:

### zero-defect



#### Example:

- Additive Manufacturing:
- in-process metrology
  - fast & holistic metrol.

### zero-delay



#### Example:

- Machine tools:
- improved control by 5G sensor technology
  - sensor integration: metrology data interface

### zero-surprise



#### Example:

- Lithography tools:
- full simulation of relevant processes
  - metrology tools using AI data algorithms

### zero-waste



#### Example:

- Machine tools & Additive Manufacturing:
- less scrap via hybrid manufacturing chains (MT & AM)
  - reduced energy consumption by advanced machining processes

General structure of manufacturing chains

- Advanced Materials
- Smart Manufacturing Systems
- Manufactured Components and Products



EMN sections

# Examples of Joint Research Projects (JRP) related to advanced manufacturing

JRPs in IND Calls 2014 & 2017 related to advanced manufacturing

Project #	Acronym	Project name (coordinator)
17IND02	<a href="#">SmartCom</a>	Communication and validation of <u>smart data</u> in IoT-networks (PTB)
17IND03	<a href="#">LaVA</a>	<u>Large Volume Metrology Applications</u> (NPL)
17IND04	<a href="#">EMPRESS 2</a>	Enhancing process efficiency through <u>improved temperature meas.</u> 2 (NPL)
17IND05	<a href="#">MicroProbes</a>	Multifunctional <u>ultrafast microprobes</u> for on-the-machine measurements (PTB)
17IND08	<a href="#">AdvanCT</a>	<u>Advanced CT</u> for dimensional and surface measurements in industry (PTB)
17IND12	<a href="#">Met4FoF</a>	Metrology for the <u>Factory of the Future</u> (PTB)
14IND03	<a href="#">Strength-ABLE</a>	Metrology for <u>length-scale engineering</u> of materials (NPL)
14IND07	<a href="#">3D Stack</a>	Metrology for manufacturing <u>3D stacked integrated circuits</u> (LNE)
14IND09	<a href="#">MetHPM</a>	Metrology for <u>highly-parallel manufacturing</u> (NPL)
14IND12	<a href="#">Innanopart</a>	Metrology for <u>innovative nanoparticles</u> (NPL)
14IND13	<a href="#">PhotInd</a>	Metrology for the <u>photonics industry</u> - optical fibres, waveguides & appl. (MIKES)
14IND14	<a href="#">MNm Torque</a>	<u>Torque measurement</u> in the MN•m range (PTB)
15HLT09	<a href="#">MetAMMI</a>	Metrology for <u>additively manufactured medical implants</u> (LNE)
19ENG07	<a href="#">Met4Wind</a>	Metrology for enhanced reliability and efficiency of <u>wind energy systems</u> (PTB)

A high level of coordination for the topic of Advanced Manufacturing is missing!  
=> EMN AdvanceManu

JRPs in HLT & ENG Calls related to adv. manuf.



# European Metrology Networks (EMN)

## EURAMET'S EUROPEAN METROLOGY NETWORKS

### Close collaboration in measurement science with a new sustainable structure

The vision of EURAMET and its members is to ensure Europe has a world-leading metrology capability, based on high-quality scientific research and an effective and inclusive infrastructure, that meets the rapidly advancing needs of end users. EURAMET's European Metrology Networks (EMNs) help realising this aim.

Currently there are nine EMNs: [Advanced Manufacturing](#), [Climate and Ocean Observation](#), [Energy Gases](#), [Mathematics and Statistics](#), [Quantum Technologies](#), [Radiation Protection](#), [Smart Electricity Grids](#), [Smart Specialisation in Northern Europe](#), and [Traceability in Laboratory Medicine](#).

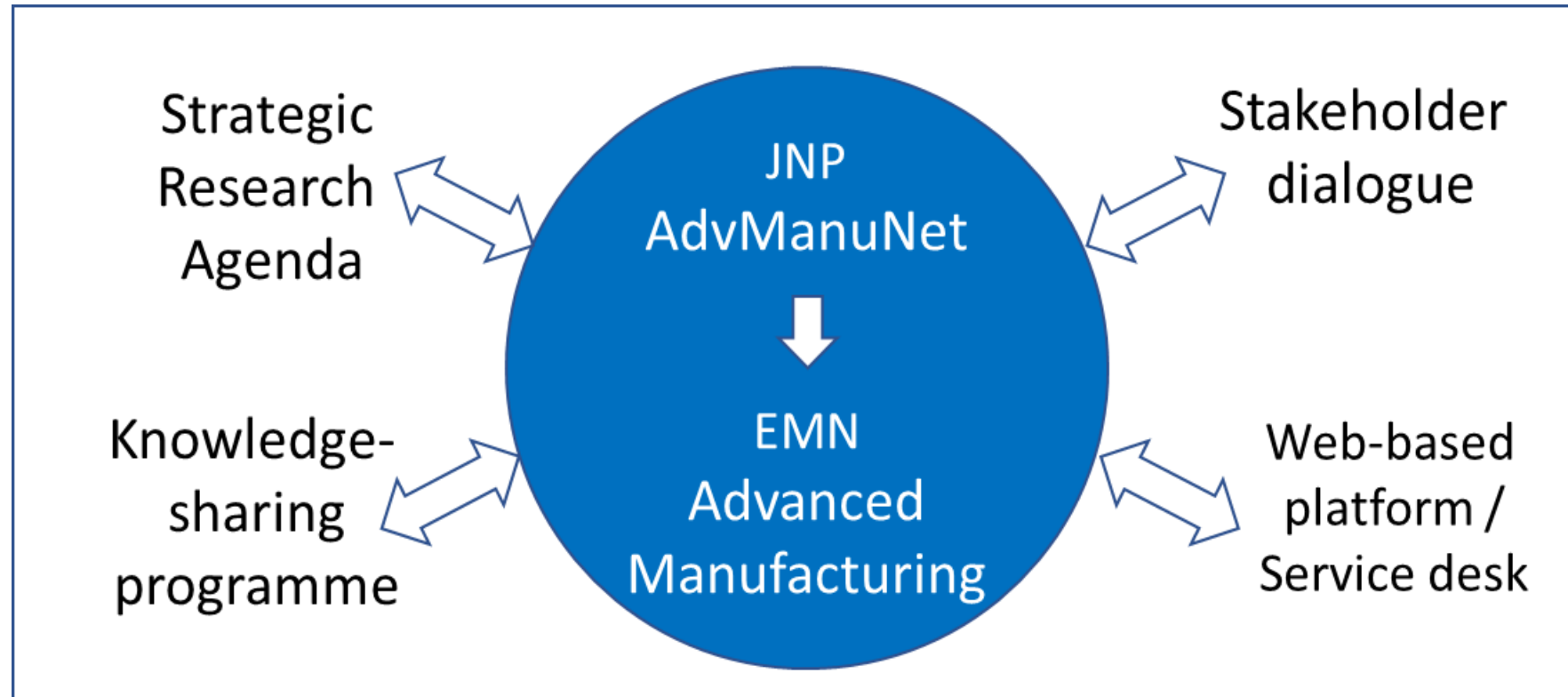
The EMNs will analyse the European and global metrology needs and address these needs in a coordinated manner. EMN members will then formulate common metrology strategies including aspects such as research, infrastructure, knowledge transfer and services. The members will be committed to contributing to the EMN, helping to establish sustainable structures that are strategically planned from the outset.

By providing a single point of contact for information, underpinning regulation and standardisation, promoting best practice and establishing a comprehensive, longer-term infrastructure, the EMNs aim to create and disseminate knowledge, gain international leadership and recognition, and build collaboration across the measurement science community.



# EMN for Advanced Manufacturing

JNP: funded project within EMPIR to accelerate process of establishing EMN



EMN: European Metrology Network for Advanced Manufacturing:  
 - Sustainable network operated by national metrology institutes



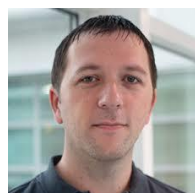
# Background of the EMN: JNP as supporting project



## JNP [19NET01](#) AdvManuNet 4 years, start 6/2020: Project partners



euspen HQ, UK:  
Dishi Phillips



NPL, UK:  
Daniel O'Connor



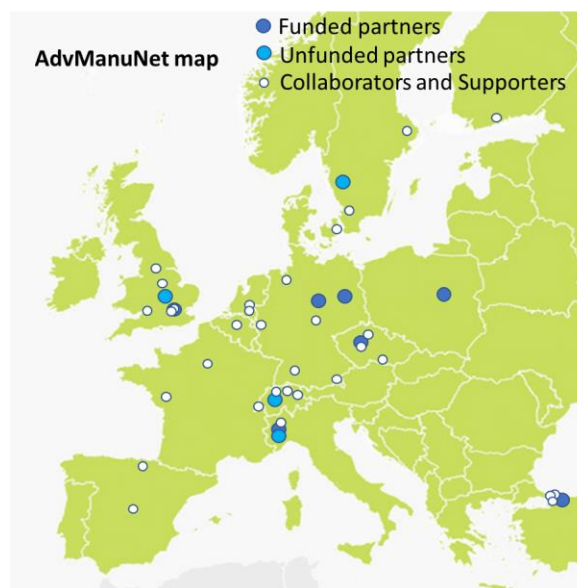
METAS, CH:  
Felix Meli



PTB, DE:  
Harald Bosse  
JNP coordination



PTB, DE:  
Anita Przyklenk



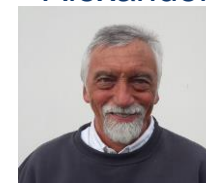
INRIM, IT:  
Alessandro Balsamo



POLITO, IT:  
Carlo Stefano Ragusa



BAM, DE:  
Alexander Evans



CMI, CZ:  
Vit Zeleny



RISE, SE:  
Olena Flys



GUM, PL:  
Dariusz Czulek



TUBITAK UME, TR:  
Tanfer Yandayan

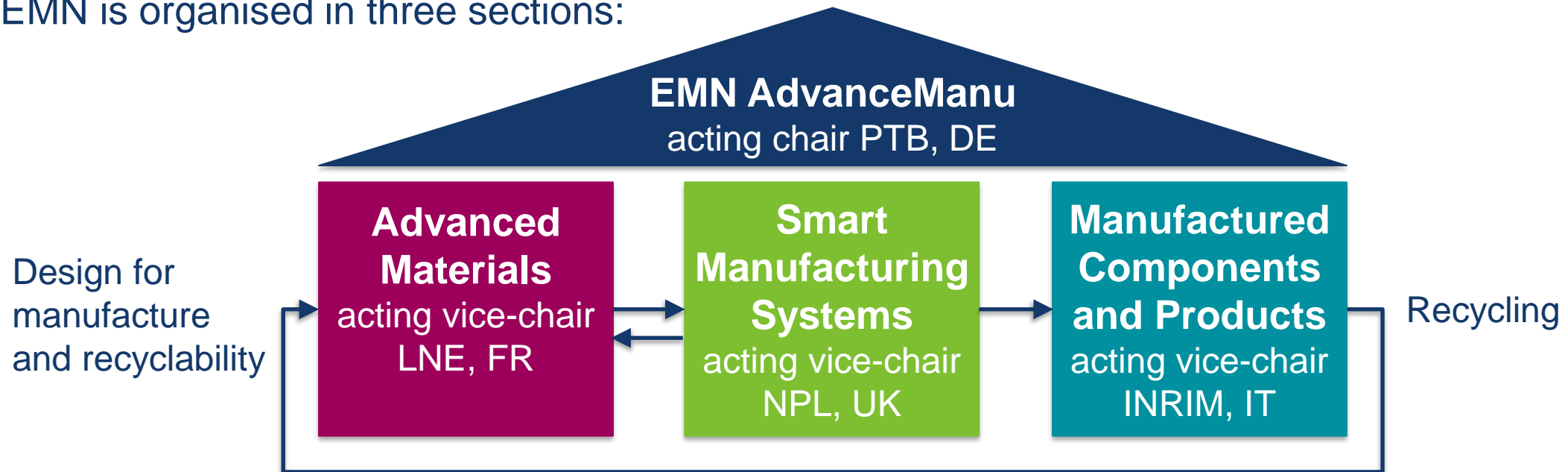
## EMN AdvanceManu 18 member institutes:

- BE: SMD
- CH: METAS
- CZ: CMI
- DE: PTB, BAM
- DK: DFM, DTI
- ES: CEM
- IT: INRiM
- FI: VTT-MIKES
- FR: LNE, CNAM
- NL: VSL
- PL: GUM
- PT: IPQ
- SE: RISE
- TR: TUBITAK-UME
- UK: NPL



# EMN for Advanced Manufacturing

- EMN for Advanced Manufacturing approved on June 7, 2021
- EMN partnering organizations: ETP ManuFuture, EFFRA / Made in Europe, NanoFabNet, euspen
- EMN is organised in three sections:



- Stakeholder meeting on Oct. 11; EMN 1<sup>st</sup> General Meeting (kick-off) on Oct.12, 2021
- Engage with Stakeholders (Large companies & SME, industry organiz., networks, academia, ...)
- Prepare Strategic Research Agenda (SRA / Roadmap) for Metrology for Advanced Manufacturing
- Prepare [Orientation Papers](#) for calls of the [European Partnership for Metrology](#) ➡ [Green Deal](#)

# JNP / EMN activities

## OPEN ACCESS

IOP Publishing

Meas. Sci. Technol. 32 (2021) 111001 (14pp)

Measurement Science and Technology

<https://doi.org/10.1088/1361-6501/ac0d25>

## Perspective

# New European Metrology Network for advanced manufacturing

Anita Przyklenk<sup>1,\*</sup>, Alessandro Balsamo<sup>2</sup>, Daniel O'Connor<sup>3</sup>, Alexander Evans<sup>4</sup>, Tanfer Yandayan<sup>5</sup>, Sibel Asli Akgöz<sup>5</sup>, Olena Flys<sup>6</sup>, Dish Phillips<sup>7</sup>, Vit Zeleny<sup>8</sup>, Dariusz Czulek<sup>9</sup>, Felix Meli<sup>10</sup>, Carlo Stefano Ragusa<sup>11</sup> and Harald Bosse<sup>1</sup>

## Introductory Meeting of EMN Advanced Manufacturing

The European Metrology Network for Advanced Manufacturing has been approved by the General Assembly of EURAMET on 7 June 2021.

In this introductory meeting

- an overview will be given on the objectives of the EMN,
- the support provided by JNP AdvManuNet will be presented and
- the next steps within the EMN will be discussed.

The meeting will be complemented by a keynote presentation of a stakeholder council member and an overview of partner organisations of the EMN.

## EVENT INFORMATION

### DATE

2021-06-23 to 2021-06-23

### LOCATION

Online Meeting

### CATEGORIES

EMNs (European Metrology Networks), EMN Advanced Manufacturing



Workshop at virtual euspen IEC on  
June 7, 2021, 13:00 – 17:00  
Metrology for Advanced Manufacturing

## Metrology for Digital Transformation

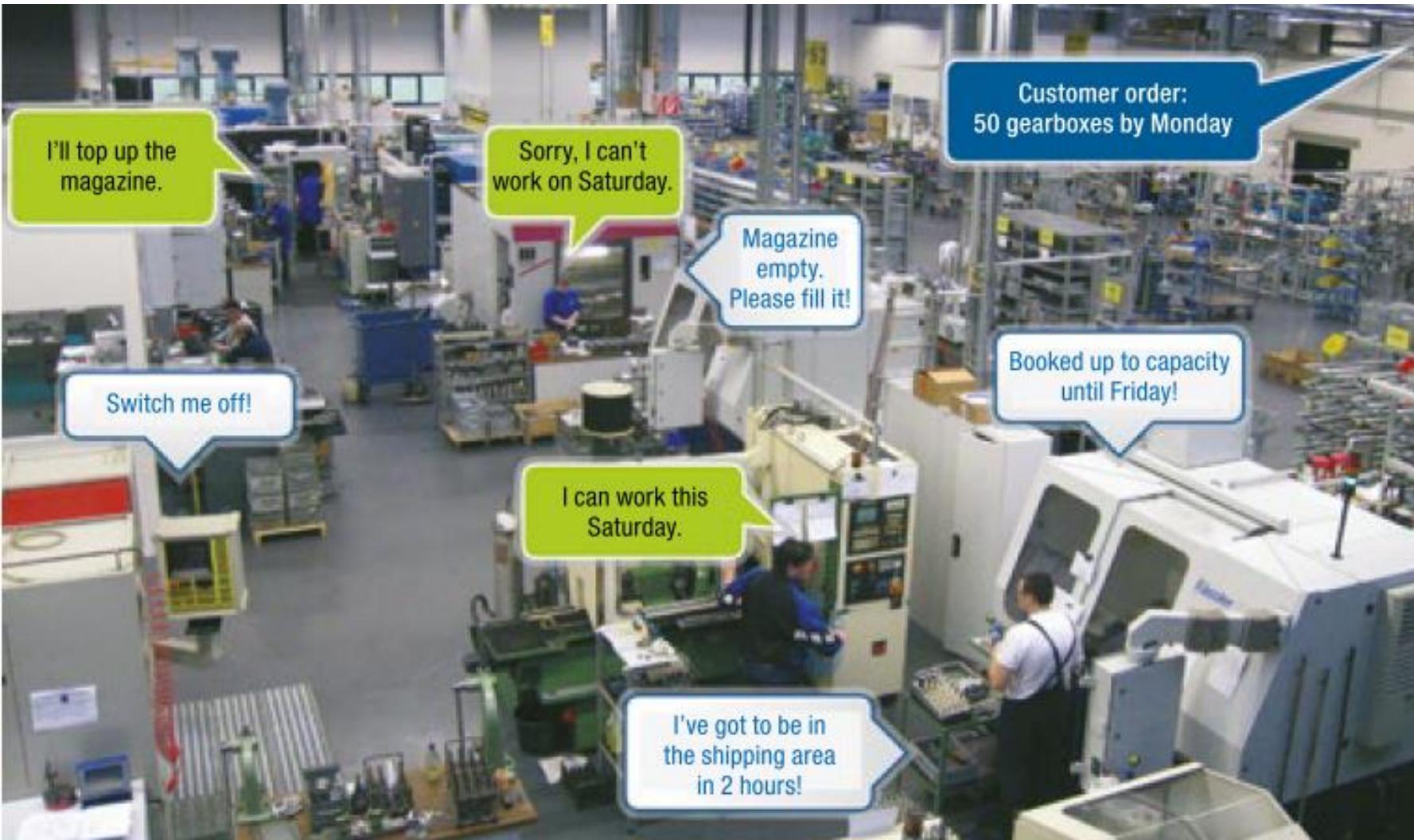
Online Sessions



EMN contribution to Online Sessions:  
[EMN for Advanced Manufacturing and its view on DT](#)



# Digitalization in manufacturing industry: INDUSTRY 4.0



Source: FhG IAO

## Industry 4.0:

Flexible manufacturing infrastructure with autonomously interacting manufacturing systems

## Challenges for metrology:

- Trusted quality for measurements in integrated systems
- Reliability of sensors and measurement systems
  - Reliable communication of measurement systems
- ! - metrolog. data interfaces
  - result, uncertainty, SI-units
- Validated results:
  - ! - virtual meas. instruments
  - ! - validated data analysis SW
- Synchronization of instruments/machines
  - network time protocols, 5G, ...



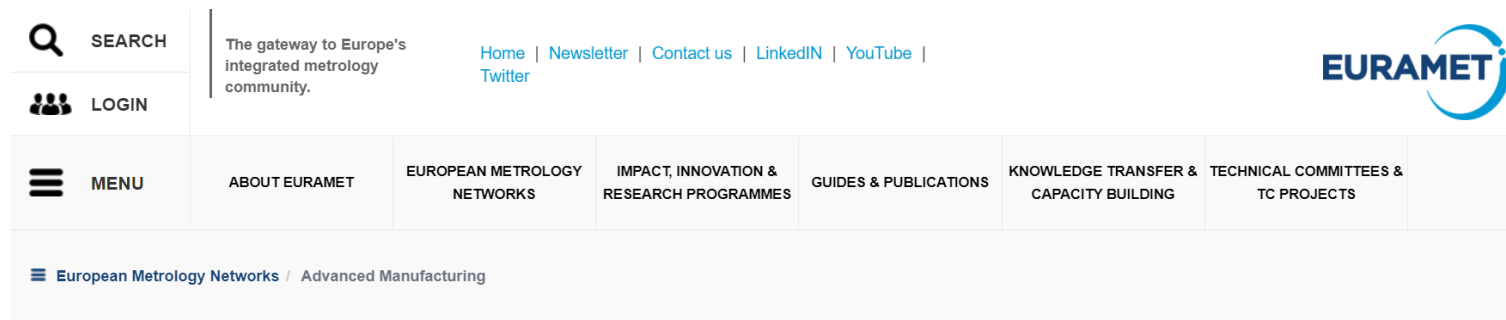
# EMN contacts



Acting EMN Chair: Harald Bosse, [harald.bosse@ptb.de](mailto:harald.bosse@ptb.de)

<https://www.euramet.org/european-metrology-networks/advanced-manufacturing/>

=> [advancemanu@euramet.org](mailto:advancemanu@euramet.org)



## EMN FOR ADVANCED MANUFACTURING

Advanced manufacturing requires new and enhanced metrology methods to assure the quality of manufacturing processes and the resulting products.

The newly approved European Metrology Network for Advanced Manufacturing will drive the high-level coordination of the metrology community in this field and will foster the impact of metrology developments for advanced manufacturing.

The network is run by National Metrology Institutes (NMIs) and Designated Institutes (DI) in close cooperation with stakeholders interested in advanced manufacturing. The objectives of the network are to set up a permanent stakeholder dialogue, to develop a Strategic Research Agenda for the metrology input required for advanced manufacturing technologies, to create and maintain a knowledge sharing programme and to implement a web-based service desk for stakeholders.



## MENU

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## NEWS

[SEE ALL EURAMET NEWS](#)

**New network for Advanced Manufacturing held introductory meeting**  
28-06-21

Please subscribe to **NEWSLETTER** if you are interested:

<https://www.euramet.org/meta-menu/subscribe-to-newsletter/>

# Acknowledgement



Thanks to all colleagues who provided input for this talk,  
in particular those from the JNP AdvManuNet / EMN AdvanceManu

Thank you very much for your attention!



The project JNP 19NET01 AdvManuNet has received funding from the EMPIR programme co-financed by the Participating States and from the European Union's Horizon 2020 research and innovation programme.



The EMPIR initiative is co-funded by the European Union's Horizon 2020 research and innovation programme and the EMPIR Participating States

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<= Next talk

