

Synergies between Research and Innovation Funding: Stairway to Excellence
Warsaw, 27 April - 2016

Synergies between R&D and innovation in Lower Silesia

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CAMT – FPC

Wroclaw University of Science & Technology



1. Introduction
2. Regional economical and R&D potential
3. EU Excell. Center for Advanced Manufacturing Technologies/FPC of Wroclaw University of Technologies
4. R&D Projects of CAMT/FPC
5. Regional an European R&D acivities
5. Program EIIT - KIC AVM

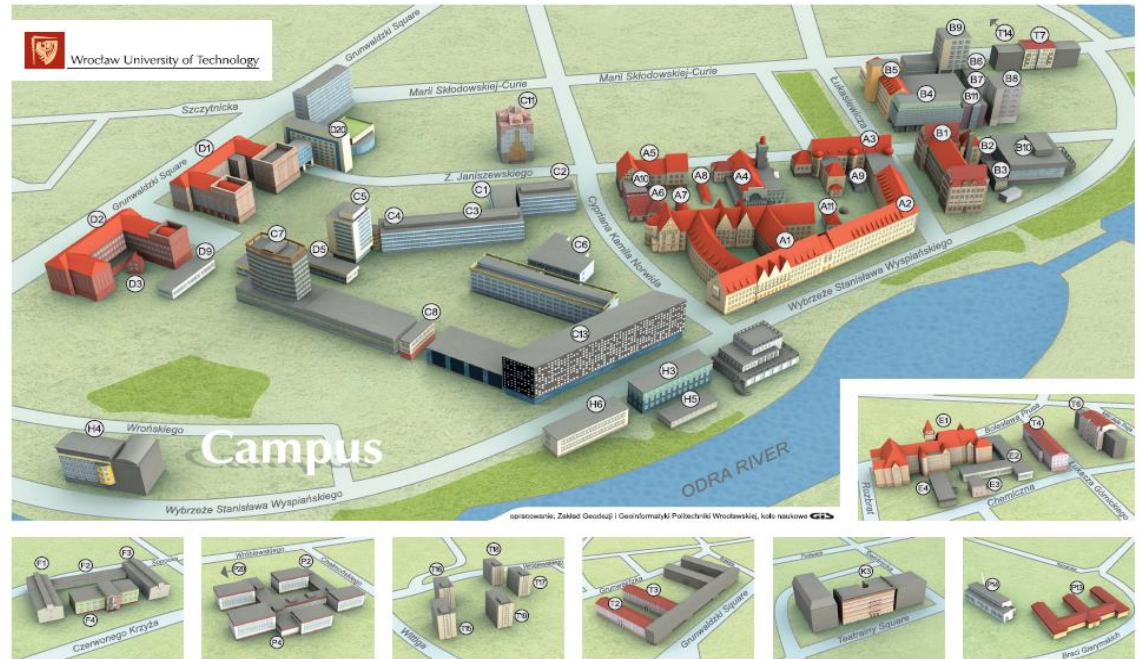


Facts and figures

Employees: 4 078
Academicians: 1 893
Administration: 2 185

Academicians:
Professors: 268
Associate professor: 311
PhD: 1269

Students: over 35 000
Foreigners: 615
Student Associates: 43
Scientific Organisations: 116
Student Culture Centres: 22



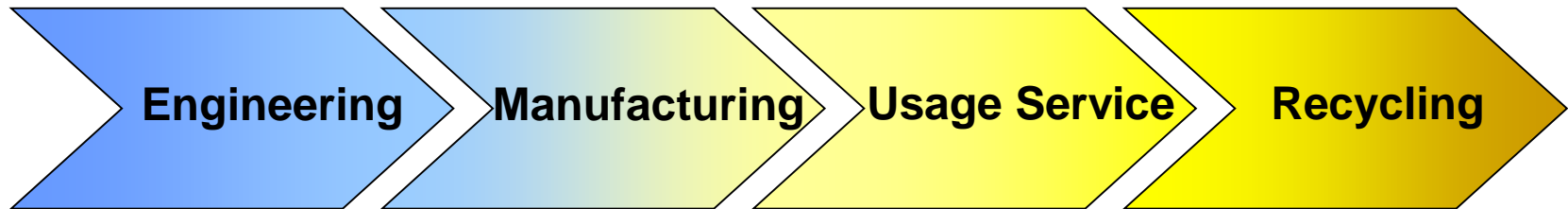
Centre for Advanced Manufacturing Technologies CAMT

- Excellence Centre for Advanced Manufacturing Technologies (CAMT) was established in 1997 at the Faculty of Mechanical Engineering of Wrocław University of Technology (EU Project)
- CAMT is acknowledged as a leading research centre and a technology provider in Europe
- The Centre consists of 78 person (including 5 professors, 26 doctors and as many as 28 Ph.D. students and 15 specialists, 4 adm.)



CAMT R&D Key Challenges

Paradigm: Life Cycle Orientation



Paradigm: Product Integrated Knowledge (Intelligent Products)

- Adaptive ... Processes, Systems, Structures
- Digital and Virtual ... Engineering Methods and Tools
- Integrated Networks ... Supply Chain and E-Manufacturing
- Knowledge based ... Process Control and Engineering
- High Performance ... Quality, Time, Cost
- New Taylorism ... „Scientific Management by Workers”



Fraunhofer Project Center at CAMT



Wrocław University of Technology



Fraunhofer

IWS

By virtue of the contract signed on 24th September 2008, our research centre became a part of the international Fraunhofer Research Centre (FRC), established in association with Fraunhofer Gesellschaft and with Institut für Werkstoff- und Strahltechnik (IWS) in particular, in the area of laser and generative technologies. Together with our international partners, we conduct research in the field of development and application of laser, special and hybrid technologies.



Politechnika Wroclawska

Cooperation network in Europe

- 1 INESC Porto
José Carlos Caldeira
- 2 Fa tronik
Rikardo Bueno
- 3 CETIM
Michel Carton
- 4 Loughborough
Robert M. Parkin
- 5 Politecnico di Milano
Francesco Jovane
- 6 ITIA
Tolio Tullio
- 7 Synesis
Emanuele Carpanzano
- 8 TNO
Arun Junai
- 9 Fraunhofer
Reimund Neugebauer
Eckhard Beyer (IWS)
Werner Hufenbach (ILK)
Lothar Kroll (IWU)
- 10 University of Patras
George Chryssolouris
- 11 Tampere University
Reijo Tuokko



Companies representing in Industrial Board at Mechanical Eng. Faculty and CAMT/FPC

3M

DIG DOLNOŚLĄSKA IZBA
GOSPODARCZA **25 LAT**

faurecia


Business Centre
Club



RONAL[®]



UTC Aerospace Systems



Dolnośląska Izba
Rzemieślnicza
we Wrocławiu

Parker



Legnicka Specjalna
Strefa Ekonomiczna S.A.



SANDEN

Delivering Excellence

KGHM ZANAM



Wałbrzyska Specjalna Strefa Ekonomiczna



BOSCH



Volkswagen Motor Polska

Whirlpool
CORPORATION

sitech

CINNOMATECH - www.cinnomatech.pl

The Cluster brings together more than 50 companies, among which are the following firms:



Politechnika V



Manufuture 2011 EU Project



www.manufuture2011.eu

ORGANISED BY



Wrocław
University
of Technology



Innovation
and Science Park



DOLNY
ŚLĄSK



DOLNOŚLĄSKA IZBA
GOSPODARCZA

SUPPORTED BY



Ministry of Science
and Higher Education
Republic of Poland

PROMOTED BY



MAIN MEDIA PARTNERSHIP



MEDIA PARTNERSHIP



ManuFuture 2011

The motto of the conference was "West and East Europe in high added value Global manufacturing - the facts of today and the challenges of tomorrow." So, the main theme was European cooperation in the manufacturing.



Politechnika Wroclawska

European memberships and activities of CAMT-FPC

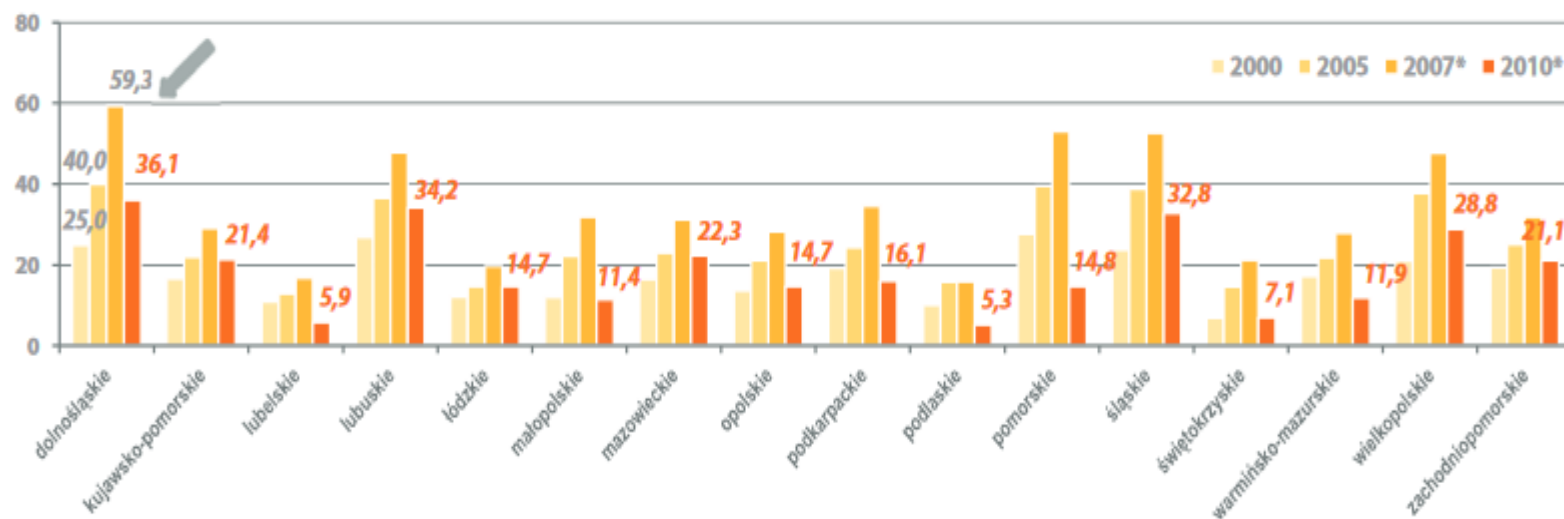
- Excell. **CAMT** Centre for Advanced Manuf. Techn. – since 1997
- **ETP ManuFuture** (ISG – HLG Groups) – EC since 2004
- **EFFRA** Member – EC – since 2008
- **FPC** Fraunhofer Project Centre – since 2008
- **DPIN** - Lower Silesian Innovation and Science Park - since 2008
- **PPP** expert groups by EC - since 2010
- **MARGE** European-German Excellence Cluster - since 2014
- **KET** Excellence Center – EC – since 2015
- **KIC AVM** WG-s and Steering Committee – EC – since 2015
- **EPT ManuFuture Conferences** Org. Wroclaw 2011,
Warsaw 2011- **Nano Mat**, Vilnius 2013, **Re-Ind.** 2016 Bratislava,



▪ How long can we be attractive?

Lower Silesia is characterised by **the highest in Poland share of the export generated in the gross domestic product**. Maintaining the first position of the region in this respect is evidence of its special resources (particularly the natural resources) and of the high level of competitiveness and innovation on the international markets. This is a very favourable tendency in the period of high uncertainty on global markets resulting in reducing the value of export in other voivodeships of the country. The main attribute and developing factor characteristic for the region is the competitive pricing. Lack of policy supporting the economy based on non-price competitiveness will reduce the investment attractiveness of Lower Silesia.

Chart 1. Share of export in GDP (%) in Polish voivodeships. Source: WARR S.A. "Expert Project – Lower Silesia Development Strategy 2020" (p. 96) based on the analysis included in: Komornicki T., "Ocena charakteru, struktury, i intensywności polskiego eksportu w kontekście celów polityki regionalnej, na poziomie województw w ujęciu dynamicznym."



EU Projects – networking, innovation, transfer. **Reg. LS.**

- Innovative Energy Portal CZ-PL
- RAINOVA (*A Regional Approach To Innovation for Vet and Learning Communities*)
- Smart Framework for SME ´s focused on Modern Industrial Technologies
- Next Generation Science Park
- Science Park Without Walls
- ENBUS spreads awareness, motivation and information
- NUCLEI Network of Technology Transfer Nodes for Enhanced open Inn.
- TRANS³Net Increased effectiveness of transnational knowledge and technology transfer
- SYNERGY SYnergic Networking for innovativeness Enhancement of euRopean SME ´s focused on hiGh-tech industrY



EU GREAT - HORIZON 2020

- “European guide and recommendations for the combined funding of large-scale RDI initiatives”: to identify key issues required to combine different funding mechanisms and support the scale up of research into market
- Call: H2020-NMP-CSA-2014 (New materials and Production technologies), type CSA (Coordination and support action)
- Leader: Fundacion Tecnalia Research & Innovation, consortium: 12 members
- Budget: 991 325 €, duration: 24 months
- **Result: started in January 2015**

FUTURING - HORIZON 2020

- “Futuring European Industry”: to define the strategy for re-industrialization of Europe
- Call: H2020-NMBP-2016-2017 (Nanotechnologies, Advanced materials, Biotechnology and Production), type CSA (Coordination and support action)
- Leader: University of Patras, consortium: 13 members
- Budget: 1 470 126 €, duration: 18 months
- **Result: accepted in April 2016**



ICEMTA - International Center of Manufacturing Technologies and **Applications (UTC Group)**

- Wroclaw University of Technology - Centre for Advanced Manufacturing Technologies - Fraunhofer Project Center
- **Lower Silesia Region - financing**
-  **UTC Aerospace Systems** R&D Center



Politechnika
Wroclawska



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ICEMTA R&D areas

- Design and product development
- Materials Engineering
- Manufacturing technologies (mainly AM)
- Manufacturing processes and lines (robotics and lasers)
- Interdisciplinary experimental research for mechanical engineering
- Industrial testing and validation mainly for aviation



ICEMTA R&D areas



The development of academic staff and students

- Classrooms for students;
- Research laboratories;
- Dual studies;



Abilities of Tests:

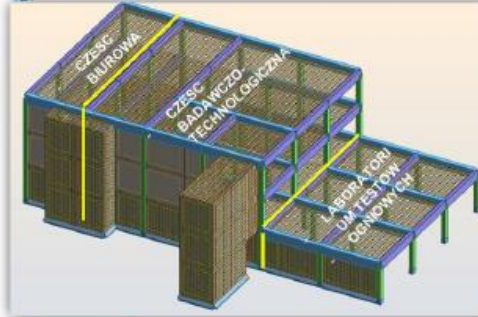
- Environment tests;
- Electromagnetic compatibility tests;
- Corrosion resistance tests;
- Testing resistance to vibration; - Fatigue strength tests; - fire tests; - Dust test, - dirt tests;

Development of innovative products and materials:

- Hydraulic parts, electro-hydraulic, mechanical, pneumatic;
- Sensor;



UTC Aerospace Systems



Politechnika Wroclawska

Prototyping

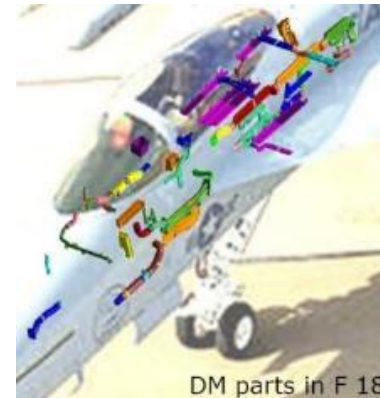
- Fast Prototyping;
- Innowacyjne Manufacturing processes;



AMPHORA - ADDITIVE MANUFACTURING PROCESSES AND HYBRID OPERATIONS RESEARCH FOR INNOVATIVE AIRCRAFT TECHNOLOGY DEVELOPMENT

Duration: 2014 - 2018

The objective of the project - development of methods for designing and manufacturing of aircraft components with additive technologies. tion essential for reduction of environmental pollution.



*Beneficiary: PZL Mielec, Sikorsky - Lockheed Martin
Wroclaw University of Technology,
Centre for Advanced Manufacturing Technologies - Fraunhofer Project Center
Kielce University of Technology, Lublin University of Technology, Pabianice Tool Factory PAFANA
Funding program/body: InnoLOT - NCBiR*



LASER DRILLING TECHNOLOGY OF COLLING CHANNELS IN MULTILAYER STRUCTURES USED IN MODERN GAS TURBINES AIRCRAFT ENGINES (WSK-RZESZÓW)

Duration: 2013 - 2015

The aim of the project is to develop a new technology of inclined laser drilling holes in multilayer ceramic materials used in aircraft engines and improve the stability and accuracy of geometry, positioning and shape of the laser-rilled holes in the components of effusion combustion chambers.



Beneficiary: *WSK-Rzeszow Pratt &Whitney
Wroclaw University of Technology,
Centre for Advanced Manufacturing Technologies - Fraunhofer Project Center
Department of Material Sciences - Rzeszow University of Technology
Funding program/body: InnoTech - NCBiR*



Partnership CAMT/FPC

- Nifco Poland
- WABCO Polska Sp. z o.o.
- PZL Mielec Sp. z o.o.
- HS Wrocław Sp. z o.o.
- ABB Sp. z o.o.
- Philips Lighting Poland S.A.
- POLAR S.A. Whirlpool
- APATOR Toruń
- DGS Sp. z o.o.
- DeLAVAL
- ltd.



DESIGNING A NEW GENERATION OF CAR SEATS AT SITECH VW Group

Duration: 2013 - 2016

The project aim is to develop a new generation of car seat with distinctly increased features for passenger safety, while reducing the weight and manufacturing cost, without loss of ergonomics and comfort. modern car body construction.



Materiał: blacha S420MC
Wymiary próbek: 75x40x5 mm



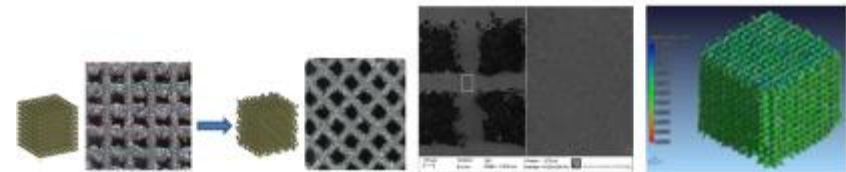
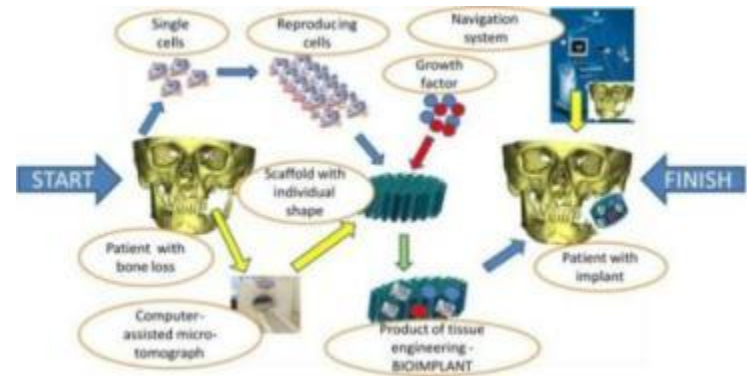
Beneficiary: SITECH Polkowice VW GROUP
Wroclaw University of Technology,
Centre for Advanced Manufacturing Technologies -
Fraunhofer Project Center
Funding program/body: InnoTech - NCBiR



BIOIMPLANTS FOR THE TREATMENT OF BONE LOSS IN ONCOLOGICAL PATIENTS

Duration: 2010-2013

The project is aimed at developing a therapy for patients after tumour removal in the cranio-maxillo-facial area. The proposed solution involves new implants which geometry restores original shapes of patients' facial bones, what is hard to achieve by manual procedures with autologous bone or synthetic graft substitute. The implants will be scaffolds - tissue-supporting structures, filled with stem cells (from fat tissue), growth factors and antibiotics.



Beneficiary: Warsaw University of Technology

Partner: Wrocław University of Technology,

Centre for Advanced Manufacturing Technologies - Fraunhofer Project Center



High pressure composite vessels for hydrogen/CNG storage (EU Projects)

Main parameters:

- Nominal Working Pressure: ≥ 700 bar
- Burst pressure: ≥ 1575 bar
- Number of cycles: **45000**
- Conditions: $-45^{\circ}\text{C} \div 90^{\circ}\text{C}$ and $0 \div 95\% R_H$
- Materials: **CFRC, GFRC, PE, PA**



Our experience in "vessels" projects



HORIZON 2020 - Wroclaw Centre of Excellence -Teaming 2-nd STEP Commercial Institution Laser and Sensors Technologies - LST.Ltd

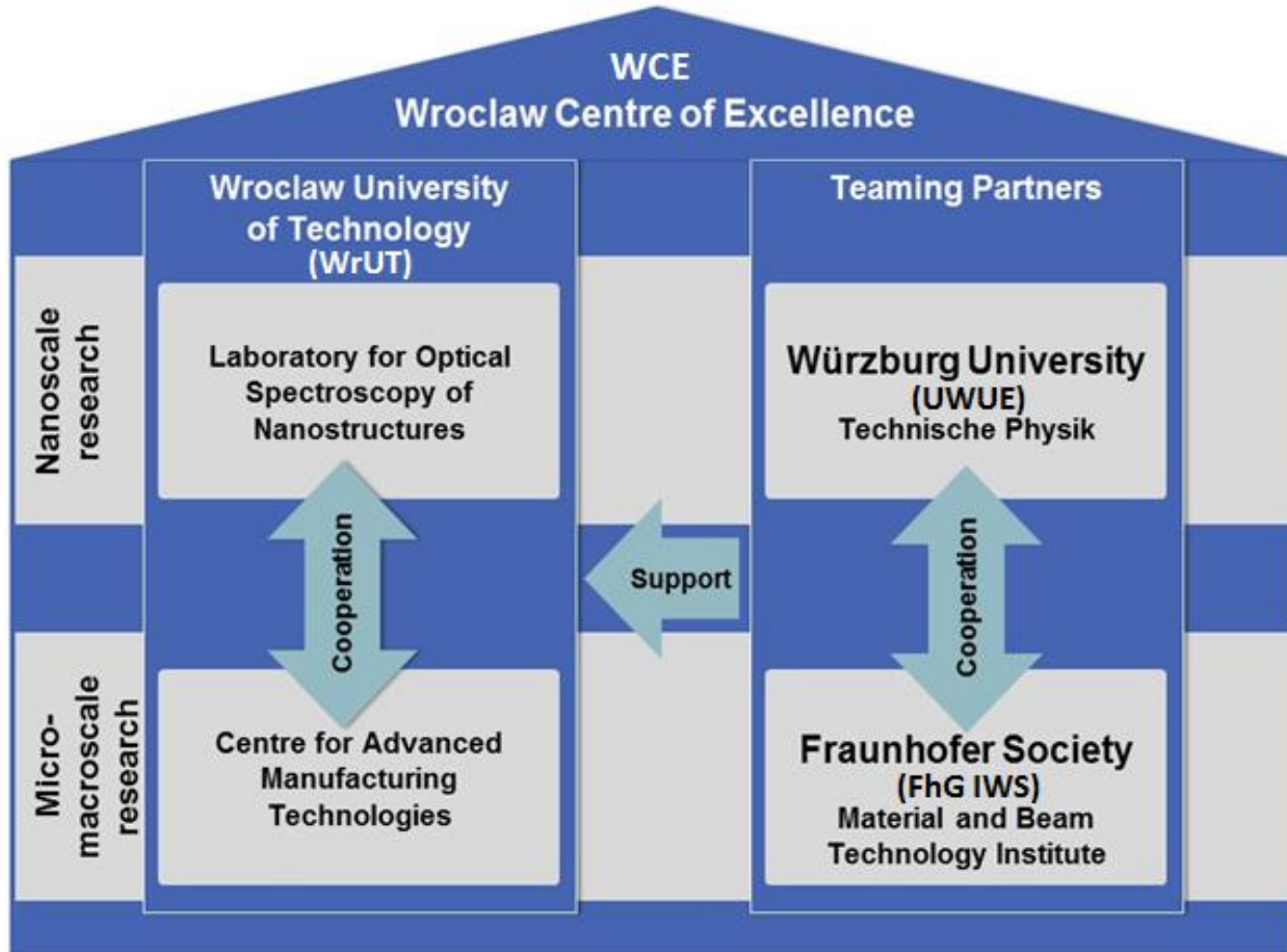
- “Wroclaw Centre of Excellence”: to prepare a business plan for a new independent R&D centre in Wroclaw and prepare application for the second stage call
- Call: H2020-WIDESPREAD-2014-1 (Spreading Excellence and Widening Participation), type CSA (Coordination and support action)
- **Budget: 495 100 €, duration: 12 h**

- **Consortium:**
 - Wroclaw University of Technology (WrUT)
 - National Centre for Research and Development (Polish NCBR)
 - Fraunhofer Institute for Material and Beam Technology (FhG IWS)
 - University of Würzburg (UWUE)

- **Budget for 2-nd STEP 5-7 years:**
 - 1. ca. 15 mln Euro - Teaming
 - 2. ca. 10mln Euro - IRA International Research Agenda (If. Step2 will be positive evaluate)



WCE – Laser and Sensors Technologies

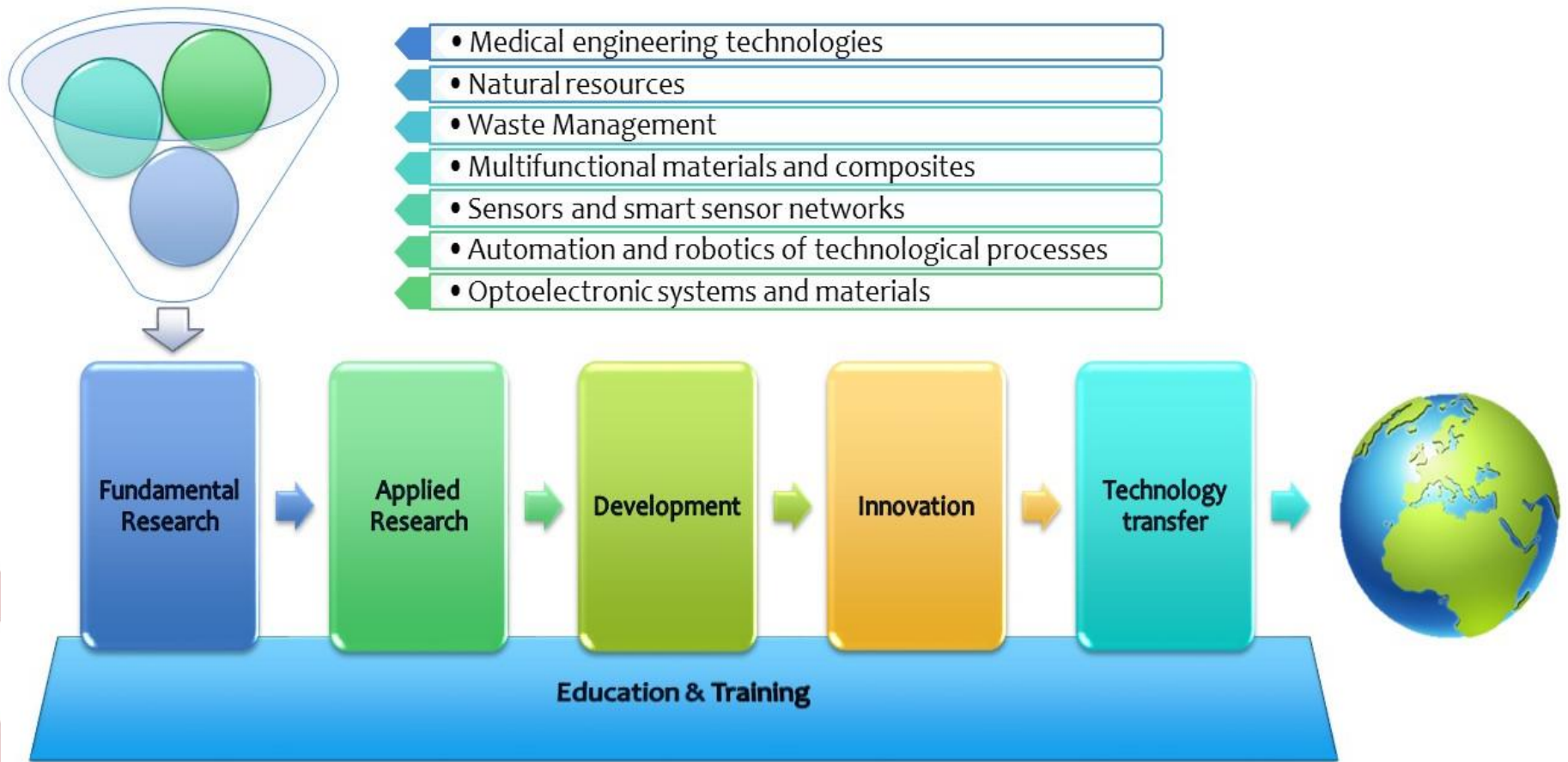


WCE LST - research areas

- Advanced materials and manufacturing technologies
- Nanophotonics
- Additive manufacturing
- Automation and robotics
- Sensors
- Optoelectronics and optomechatronics
- Biotechnologies
- Management



WCE LST specializations and structural pillars according to Smart Specialization Strategy



HORIZON 2020 - KIC AVM - Added Value Manufacturing

(ca.200 R&D partners and ca.100 Ind. Partners - dedline June 2016)

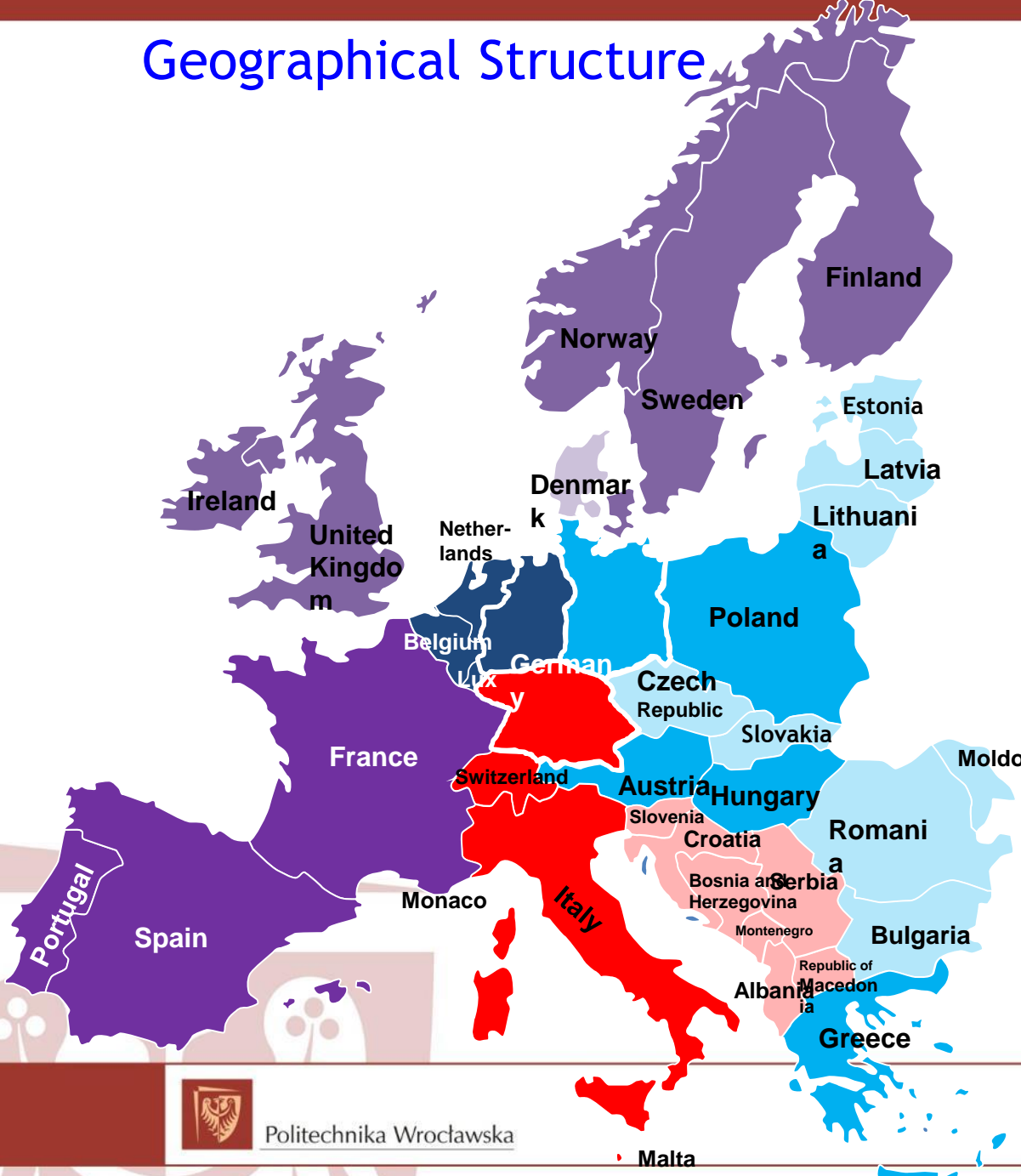
Duration: 2017 – 2022; Budget: ca. 800 mln Euro (EIIT 25%)

Approaches delivered by different partners

- Geographical structure
 - Thematic structure
 - Operational structure
 - Sectorial perspective
-
- **Human-centred & Customer-focused manufacturing**
 - **Advanced manufacturing processes**
 - **Digital, virtual & resource efficient factories**
 - **Adaptive & smart manufacturing systems**
 - **Collaborative & mobile enterprises**



Geographical Structure



- North (partner)
- North (no partner yet)
- East (partner)
- East (no partner yet)
- South (partner)
- South (no partner yet)
- West
- Central

CLCs regions



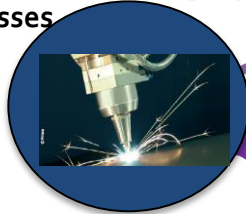
Thematic structure

(CLCs core themes mapping)

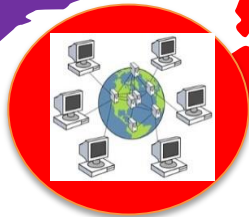
Human-centred & Customer-focused manufacturing



Advanced manufacturing processes



Digital, virtual & resource efficient factories



Collaborative & mobile enterprises



Adaptive & smart manufacturing systems

Indicatively the following priority sectors may be mapped to the CEE regions



- Aerospace
- Automotive
- Biomedical
- Cross sectorial manufacturing
- OEM Suppliers
- etc.

Focus on the Supply Chains, leveraging existing regional industry clusters

Companies interlinked with full supply chains

e.g.

OEM

OEM

Hidden Champions /
Product ownership companies

OEM

Supply chain triangle for complete manufacturing systems

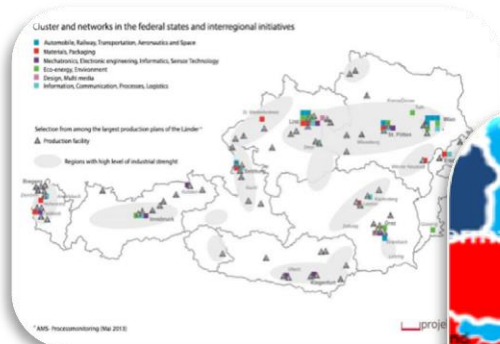
Supplier

Technology Providers

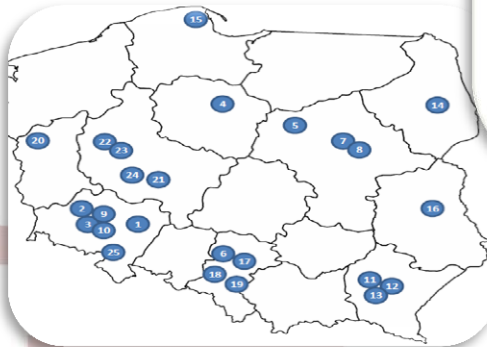
ICT +
Automation Providers



Core partners and their network to drive the innovation capability of the CEE Supply Chains



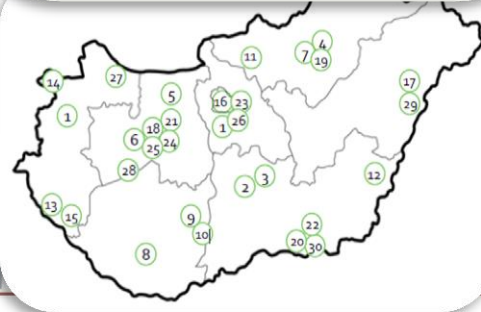
Austria



Poland



Hungary



Saxony (Germany East)

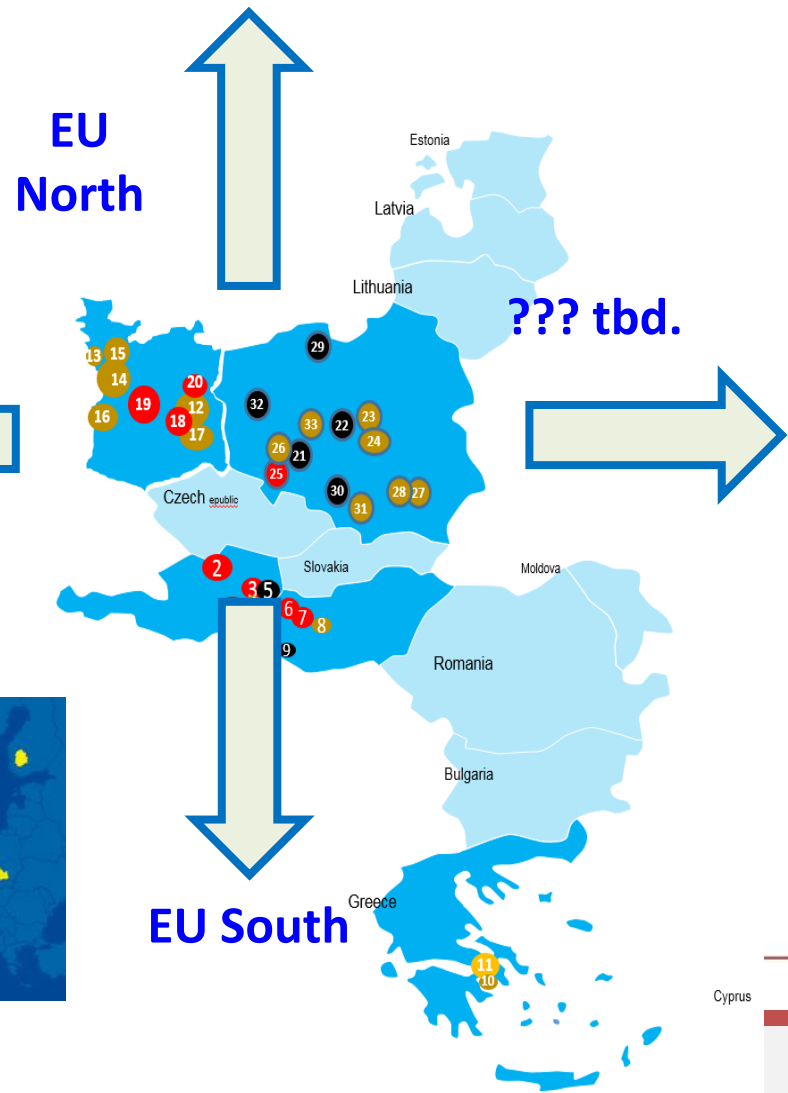


Greece



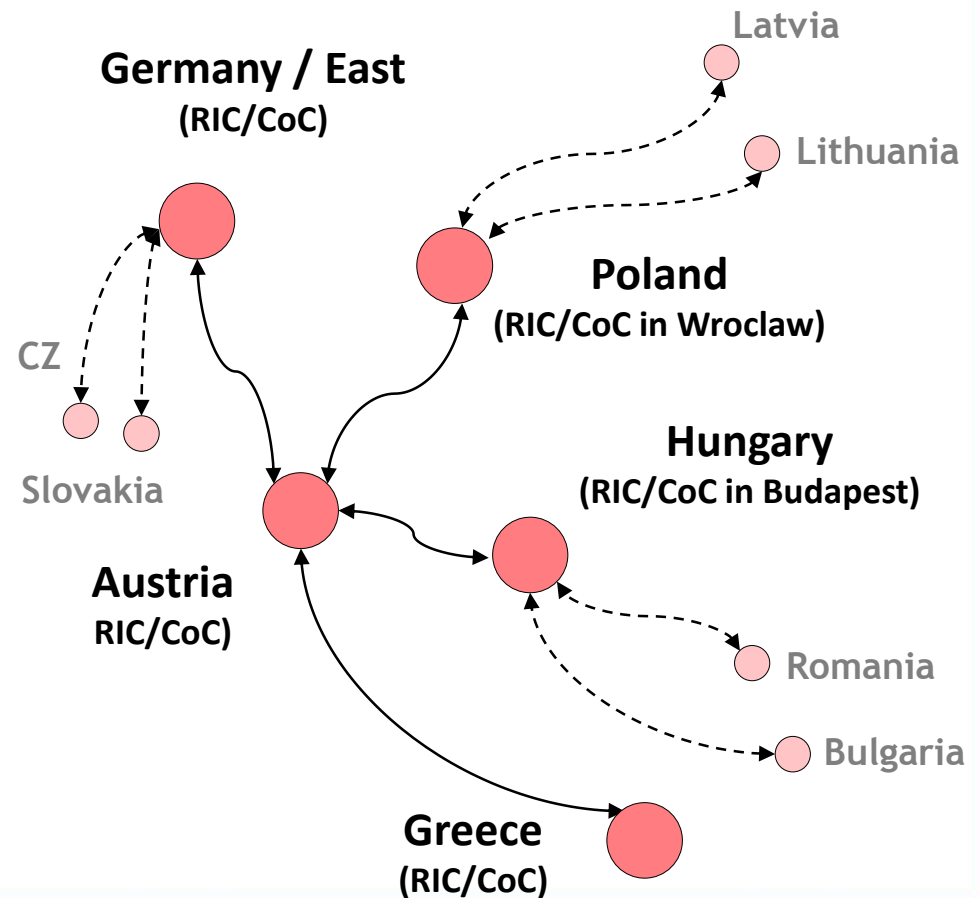
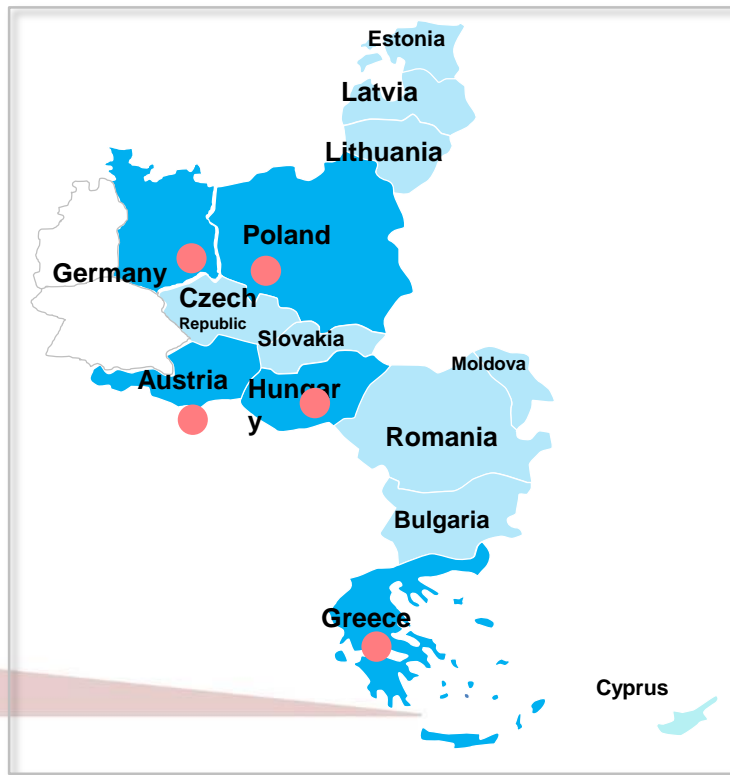
Core partners and their network of the CEE Supply Chains

- **Poland: Lower Silesia,**
- **TU Wroclaw WCE-CAMT and Clusters & PTP**
- **Eastern Germany: Fraunhofer IWU and TU Chemnitz with Automotive Cluster of East Germany (ACOD)**
- **Austria: TU Vienna and national platform (Magna, Infineon, BRP Rotax, etc.)**
- **Hungary: MTU Sztaki/TU Budapest and ...**
- **Greece: LMS Patras ...**



Strong connection of CEE to the Vanguard Initiative as a cluster of innovative regions

Structural approach for CEE CLC (proposal) inclusive RIC's (Regional innovation center) and/or CoC's (Center of Competence)



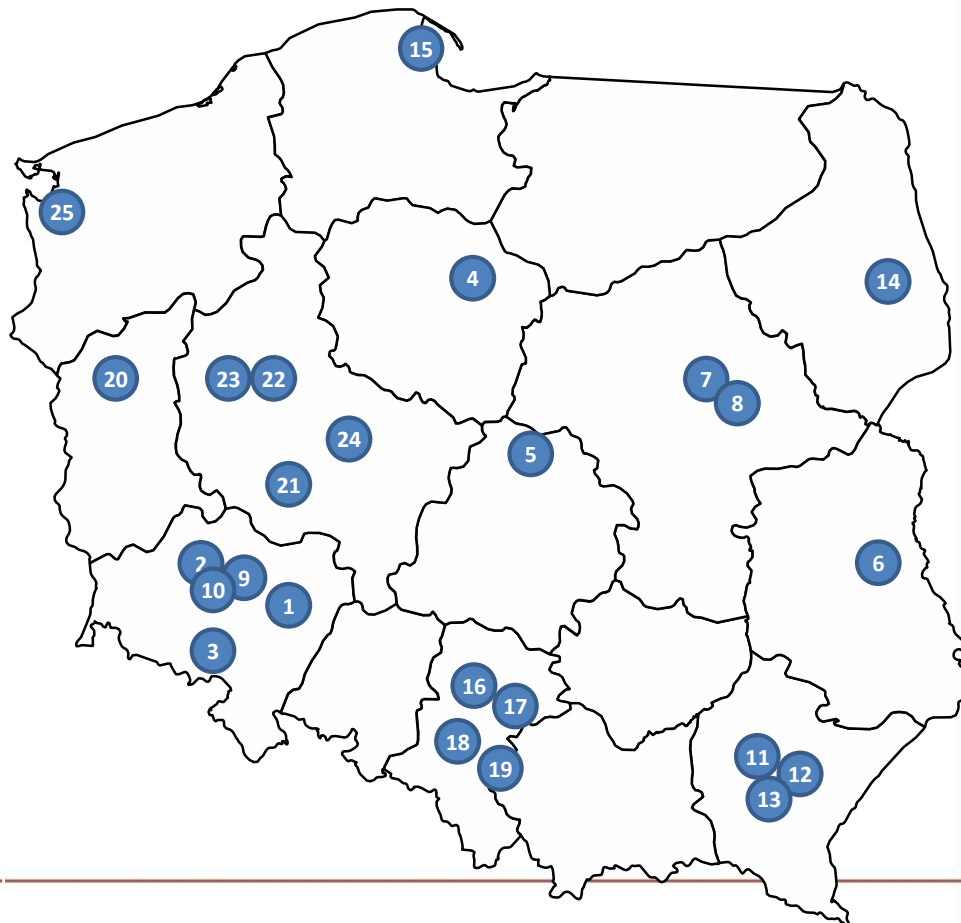
Proposed PL RIC and PL CC

- Poland: R&D: 16 technical universities, 38 industrial institutes plus industry - clusters of OEMs and SMEs
- KIC AVM declared partners:
 - **Wroclaw (WCE/CAMT-FPC) - Polish virtual office of CEE CLC**
 - Kraków (Cracow University of Technology and AGH University of Science and Technology) - automotive R&D
 - Warsaw/Radom (Institute for Sustainable Technologies) - advanced materials, R&D equipment
 - Rzeszów (Rzeszów University of Technology) - “Aviation Valley” with 86 aerospace companies
- Negotiations with next partners - Poznań and Gliwice



Polish industrial clusters

No	Cluster name	Industry	Members
1	Cluster of Innovative Manufacturing Technologies CINNOMATECH	machine industry	53
2	Lower Silesian Metal Cluster	metal industry	13
3	Stone Cluster	stone industry	18
4	Bydgoszcz Industrial Cluster	plastics	87
5	Kutno Technology Cluster	machine industry	22
6	Eastern Metalworking Cluster	metal industry	82
7	General Aviation Construction and Technology Cluster	aviation	21
8	Technological Support of Innovative Aeronautical Projects	aviation	23
9	Lower Silesian Automotive Cluster	automotive	24
10	Lower Silesian Aviation Cluster	aviation	18
11	Aviation Valley	aviation	95
12	Plastics Processing Cluster POLIGEN	plastics	16
13	Subcarpathian Cooperative Connection – Light and Ultralight Aviation Cluster	aviation	40
14	Metal Cluster	metal industry	206
15	Cluster of Pomeranian Special Economic Zone	machine industry	9
16	Mining Machines Cluster	machine industry	17
17	The Polish Wire Ropes Cluster	metal industry	11
18	Silesian Technopolis	production technologies	8
19	Silesian Aviation Cluster	aviation	76
20	Metal Cluster of Lubuskie Province	metal industry	26
21	Ostrów Cluster of Automatics	metal industry	11
22	Polish Cluster on Innovative Forging Technologies Hefajstos	metal industry	23
23	Greater Poland Railway Cluster	machine industry	26
24	Wielkopolska Aerospace Cluster	aviation	29
25	Metalika Metal Cluster	metal industry	30



Thank you for your attention

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