Vanguard Initiative - 3DP Pilot

3DP Pilot 'Remote Plenary Meeting' – Detailed Agenda

Thursday 26 November 2020

Remote Participation – Register here (registration is compulsory)

1. Context and Generic Objectives

Over the last months, the 3DP Pilot made **substantial progress** in terms of enabling the implementation of industry-led cross regional demonstration projects in strategic fields: funding solutions were leveraged and secured for various projects.

By reinforcing and duplicating the progress made, the Vanguard 3DP Pilot has the **ambition to address the industry needs further** and to continue facilitating the **deployment and uptake of 3D Printing solutions**, contributing to the emergence of smarter, more sustainable, more resilient and more competitive value chains.

In this context, the **plenary meeting will aim at**:

- Providing members and interested 'external' actors with an overview of the objectives, progress made and upcoming opportunities of the Pilot.
- Offering to members the opportunity to 'pitch' new project ideas, which are not under the scope of the current 'demo cases' developed within the Pilot (see Annexes for a list and descriptions of these demo cases). In order to timely address emerging industrial needs, the 3DP Pilot remains open to new ideas. A dedicated email focusing on this process will be sent to members during the week of the 2nd of November 2020.
- Further developing, during distinct sessions, 8 demo cases and 2 transversal actions that are, among others[1], currently implemented within the Pilot. See below for more information about the structure of the 3DP Pilot (See Annex 1) and the scope of the demo cases and transversal actions that will be discussed during the day (see chapter 3).

[1] In particular, as listed in Annex, 9 demo cases are currently implemented in the Pilot. During the Plenary Meeting, 8 demo cases out of the 9 demo cases will be discussed in detail.

2. Detailed Agenda

09h00-10h15 **State of Play of the Pilot - The objectives, progress, and opportunities *(Plenary Session, Open to all)***

10h15 – 10h30 *Break – Possibility to meet in the 'networking breakout-room', where you can discuss and share information of interest to our community!*

10h30 – 17h00 **Project-dedicated sessions - Further work on cases' development *(VI 3DP Pilot members only)***

N.B.: The chapter 3 of the present document provides a brief description of all projects listed in the table below.

Timing	Room 1	Room 2
10h30 – 11h30	"Multi-materials components by hybrid 3D Printing manufacturing" (Demo Case Leader: Luca Tomesani, UNIBO, Emilia Romagna)	
11h30 – 12h30	"Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects" (Demo Case Leader: Paolo Gregori, Trentino Sviluppo, Trentino)	"Efficient collaborative robot through 3D printing optimization" (Demo Case Leader: Oscar Alonso, Leitat, Catalonia)
12h30 – 13h00	*Break – Possibility to meet in the 'networking breakout-room', where you can discuss and share information of interest to our community!*	
13h00 - 14h00	"Multi-material 3D printing: Structural integrated electronics in 3D printed parts" (Demo Case Leader: Hannes Fachberger, Profactor, Upper-Austria)	Transversal Action 1 - Elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities" (Leaders: Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL)
14h00 – 15h00	"Medical Devices and Healthcare demo case: 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis and…beyond?" (Demo Case Leader: Alberto Leardini, IOR, Emilia Romagna)	Transversal Action 2 - Building an international Benchmark for AM mechanical properties for various materials" (Leader: Thomas Kairet, Sirris, Flanders/Wallonia)
15h00 – 16h00	"AM in the Built Environment" (Demo Case Leaders: Maaike Riemersma and Theo Salet, TUE, South-NL) (TBC)	"Provide a toolset for maintenance for 3DP and a training course for employees to do the maintenance" (Demo Case Leader: Coen de Graaf, Brainport, South NL)
16h00 – 17h00	"3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies." (Demo Case Leaders: José Antonio Dieste, Aitiip, Aragon and Giulia Marchisio, CIM40, Piemonte)	

3. Demo cases and transversal actions to be discussed during the meeting – A brief overview

Below a brief description of the demo cases and transversal actions that will be discussed on the 26th of November is provided. In all described projects, leaders and partners are **still looking for complementary expertise and synergies outside of the regions** already participating in the project. Regions/organisations can join and bring e.g. additional and relevant complementary technical/technological expertise in the targeted fields, possible 'use cases'/relying on their own industry needs, etc.

1. Demo Case – Multi-materials components by hybrid 3D Printing manufacturing (10h30 – 11h30)

Project Title and leading regions	Multi-material components by hybrid 3D Printing, led by Emilia-Romagna (University of Bologna, contact details: luca.tomesani@unibo.it)
Demo Case Leader(s)	Luca Tomesani, UNIBO, Emilia Romagna
Main Objectives of the project	The demo-case aims at facilitating the uptake and deployment of 3D Printed innovative ultra-light hybrid components based on different materials and structure combinations. In order to do so, the demo case connects existing and complementary innovation facilities in the Regions through the creation and management of a common platform. The main focus is currently focusing on a combination of 3D printed metal inserts with composite combinations for different industrial applications such as hard trim interior products, structural elements, external components, and powertrain elements.
Scope of the project – Addressed Industry Challenges	The demo case aims at providing SMEs required knowledge and demonstration facilities to develop 3D Printed innovative ultra-light hybrid components based on different materials and structure combinations. Material and energy savings, higher recyclability, free from design, etc. can be achieved through the deployment of the considered solutions.
Scope of the project – Targeted Application Areas	Targeted application areas include Automotive, Sporting goods, Ship building, robotics, rotor blades, motorcycle parts, aircraft structures (fuselage and wings), aeronautics interior parts, satellite parts, manufacturing equipment and prosthetics.
Scope of the project – Targeted Technologies	The demo case combines, among others, the following subsequent main steps: Design, 3DP Printing, Composites, Moulding and Testing techniques. TRL levels considered in the scope of this project range from 4 to 9, depending on the applications.

<table>
<tr><td></td><td>Following specific technologies are relevant: DMLS, SLS, FDM, SLA, EBM, MJP, LMD, DLP, LOM</td></tr>
<tr><td>Application-specific cases developed (i.e. Smaller Scale projects generated by the Demo Case) – Illustrative list</td><td>
<table>
<tr><td></td><td>Sector of lead Company (NDA)</td><td>Regions Involved</td><td>Status</td></tr>
<tr><td>1</td><td>Tier 1 Automotive</td><td>E-R, Saxony</td><td>NDA signed Business plan fully finalised</td></tr>
<tr><td>2</td><td>Tier 1 Automotive</td><td>Auvergne-Rhône-Alpes, E-R</td><td>Project description finalised and NDA signed</td></tr>
<tr><td>3</td><td>OEM Automotive</td><td>East-NL, E-R</td><td>Project description finalised and NDA signed, funding secured</td></tr>
<tr><td>4</td><td>Tier 1 Automotive</td><td>E-R, Orebro</td><td>Project description finalised and NDA signed, funding secured</td></tr>
<tr><td>5</td><td>Sporting Goods</td><td>Saxony, E-R</td><td>Project description and NDA signed</td></tr>
<tr><td>6</td><td>Shipbuilding</td><td>East NL, Saxony, E-R</td><td>Project description and NDA signed</td></tr>
</table>
</td></tr>
<tr><td>Cross Regional Dimension – Other regions/organisations can join !</td><td>Participating/co-leading regions:

Emilia Romagna [IT], Aragona [ES], Norte [PT], Baden Württemberg [DE], Saxony [DE], Lombardy [IT], Auvergne-Rhône-Alpes [FR], Region Örebro Lan [SE], Slovenia [SI], East Netherlands [NL], Veneto [IT], Trentino [IT], South Netherlands [NL], Upper Austria [AT], Piemonte (IT) etc.

Illustrative list of organisations:

CIRI MAM University of Bologna [IT], TUC Chemnitz [DE], German Aerospace Center (DLR) [DE], Institute of Vehicle Concepts [DE], Politecnico di Milano [IT], Centre Technique de la Plasturgie [FR], Alfred Nobel Science Park [SE], Fiberneering bv [NL], Han [NL], Nadir tech [IT], etc.</td></tr>
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2. Demo Case - Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects (11h30 – 12h30)

<table>
<tr><td>Project Title</td><td>Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects (Lead region: Trentino)</td></tr>
<tr><td>Demo Case Leader(s)</td><td>Paolo Gregori, Trentino Sviluppo, Trentino</td></tr>
<tr><td>Main Objectives of the project</td><td>The main objective is to combine subtractive and additive manufacturing in one step and make the process automated. This will fasten up the repairing process, make it more reliable and repeatable. Using 3d printing to repair parts instead of replacing the entire component can be very convenient and cheaper for the company.</td></tr>
<tr><td>Scope of the project – Addressed Industry Challenges</td><td>Up to now repairing of parts was a difficult task (hand-made, skill-dependent, nonrepeatable). The use of hybrid manufacturing techniques (subtractive + additive) can be a solution for repairing high-value components (e.g. dies, propellers, shafts). The CAD-CAM process is still demanding task and challenge to be faced and moreover still impossible to automatize.</td></tr>
<tr><td>Scope of the project – Targeted Application Areas</td><td>The demo case targets application areas such as dies and moulds for foundry, hot stamping, CFRP fabrication, Wear-prone components in the energy industry (Pelton turbines).</td></tr>
<tr><td>Scope of the project – Targeted Technologies</td><td>The demo case targets the following hybrid machines: milling + DLD, WAAM, LENS, DMG Lasertec 65 3D (2017), High-precision laser scanning and 3D surface reconstruction.

The demo case requires high TRL levels (TRL 7/8).</td></tr>
<tr><td>Application-specific cases developed (i.e. Smaller Scale projects generated by the Demo Case) – Illustrative list</td><td><table>
<tr><td>Sector of lead Company (NDA)</td><td>Regions Involved</td><td>Status</td></tr>
<tr><td>Die Injection Moulding</td><td>Italy</td><td>Just started</td></tr>
</table></td></tr>
<tr><td>Cross Regional Dimension – Other regions/organisations can join!</td><td>Leading Region: Trentino (IT)

Participating/co-leading regions:

Flanders (BE), Värmland (SE), South-Netherlands (NL), Aragon (SP) Tampere (FI), Emilia Romagna (IT), East-Netherlands (NL), Upper Austria (AT), Norte (PT), Piemonte (IT), etc.

Illustrative list of organisations:

Materialise (BE), Sirris (BE), KU Leuven (BE), Karlstad University (FI), High Tech NL/Brabant/Brainport Development (NL), Aitiip (ES), Tampere University (FI), Art-ER (IT), UNIBO (IT), Oost NL (NL), RECENDT (AT), FH OÖ Furschungs & Entwicklungs GmbH (AT), INEGI (PT),</td></tr>
</table>

	Steinbeis (DE), Leitung Clusterland Business Upper Austria – OÖ Wirtschaftsagentur GmbH (AT), CIM4.0 (IT), Ecoplus (AT), etc.

3. Demo Case - Efficient collaborative robot through 3D printing optimization (11h30 – 12h30)

Project Title	Efficient collaborative robot through 3D printing optimization
Demo Case Leader(s)	Oscar Alonso, Leitat, Catalonia
Main Objectives of the project	Technical/technological perspective: Design, develop and manufacture on demand and customized new concepts and solutions for helping in the automation of industrial processes (e.g. gripping, handling…) and assembling of components in collaborative robotic stations with advanced grippers. Business perspective: Support SMEs through the design of lightweight multi-material grippers combining polymers and silicones of different hardness for advanced functionalities to solve customized needs in the industrial environment.
Scope of the project – Addressed Industry Challenges	Light-weight, reduced time to market & reduced cost, reduction of components, lower maintenance and less assembling, collaborative robotic stations/applications, and related opportunities.
Scope of the project – Targeted Application Areas	Any manufacturing and assembling industry mainly related with polymer transformation -e.g. Automotive, Consumer Goods, Machinery and Tooling, Creative Industries, Sports & Leisure-; and industries with handling applications -automotive, agri-food, etc.-.
Scope of the project – Targeted Technologies	Any 3DP technology able to provide customized solutions to current manufacturing process, allowing the deployment of 3D printing and collaborative robotics. TRL level can go from 4 to 9.
Application-specific cases developed (i.e. Smaller Scale projects generated by the Demo Case) – Illustrative list	Sector of lead Company (NDA) Automotive Industrial Agri-food
An illustrative 'success case' implemented	Design and development of complex grippers for the extraction and positioning of polymer parts from injection moulding machines in the automotive and industrial sectors. Design and development of an advanced gripper for the handling of chicken wings and preparation of trays, implementation of the gripper in a spider robot within the packaging machine.
Cross Regional Dimension – Other regions/organisations can join !	Participating/co-leading regions: Catalonia (ES), Aragon (ES), Tampere (FI), Emilia-Romagna (IT), South Tyrol (IT), East-Netherlands (NL), Flanders (BE), Upper Austria (AT), Norte (PT), Gävleborg (SE), Piemonte (IT), etc.

	Illustrative list of organisations: Tampere University of Finland (FI), ART-ER (IT), University Bologna (IT), NOI Techpark (IT), UniBZ (IT), INEGI (PT), Oost NL (NL), 3D print network East Netherlands (NL), Saxion university for applied sciences (NL), Smart industry fieldlabs (NL), DIH hero (NL), DIH agro robotics (NL), Sirris (BE), Materialise (BE), Linz Center of Mechatronics GmbH (AT), CIMES hub (FR), TECOS (SL), Aitiip (ES), etc.

4. Demo Case - Multi-material 3D printing: Structural integrated electronics in 3D printed parts (13h-14h)

Project Description (External, a continuously updated communication document)	
Project Title	Multi-material 3D printing: Structural integrated electronics in 3D printed parts
Demo Case leader	Hannes Fachberger, Profactor, Upper-Austria)
Main Objectives of the project	The main objective is to go from 2D printed electronics to 3D printed electronics using multi-material inkjet 3DP technology. By making use of freedom of design offered by 3DP and avoiding assembly steps few prototypes of different use-cases should be elaborated in order to demonstrate the capability of inkjet based multi-material 3DP of integrated electronics.
Scope of the project – Addressed Industry Challenges	The challenge to be addressed is to create fully functional parts in one printing job, using 3 materials in parallel and inline processing.
Scope of the project – Targeted Application Areas	Automotive, aerospace (structural health monitoring, passenger entertainment,…), construction (structural health monitoring, …), medical (bio-sensor devices,…), and more.
Scope of the project – Targeted Technologies	Multi material ink jet printing (TRL5)
Application-specific cases developed (i.e. Smaller Scale projects generated by the Demo Case) – Illustrative list	

Sector of lead Company (NDA)	Regions Involved	Status
Automotive	South Tyrol (IT): NOI Techpark, Röchling Upper Austria (AT): Profactor	Concept discussed test structures prepared
Robotics in Maufacturing	Upper Austria (AT): FerRobotics, Profactor Aragon (ES): Leitat	Project design finalised; funding secured
Consumer goods	Upper Austria (AT): Profactor Bilbao (ES): Tormesh Solutions	Project design finalised

Cross Regional Dimension – Other regions/organisations can join !	Leading/Participating/co-leading regions: Upper Austria (AT), Saxony-Anhalt (DE), Catalonia (ES), Flanders (BE), South-Netherlands (NL), East-Netherlands (NL), Aragon (ES), South Tyrol (IT), Upper Austria (AT), Piemonte (IT), etc. Illustrative list of organisations: KU Leuven (BE), Antleron (BE), Materialise (BE), Sirris (BE), High Tech NL/Brabant/Brainport Development (NL), OostNL (NL), Semicon cluster Nijmegem (NL), Chip Integration Technology Centre (NL), HAN Automotive campus Arnhem (NL), 3D print network East Netherlands (NL), Novio Tech Campus (NL), Tecnopackaging (ES), Aitiip (ES), Arasol (ES), NOI Techpark (IT), University of Bologna (IT), Röchling Automotive, Tier 1 supplier (IT), Polito (IT), ART-ER (IT), Linz Center for Mechatronics BBmbH (AT), RECENDT (AT), Kompetenzzentrum Holz GmbH (AT), PRODINTEC-IDONIAL (AT), TECOS (AT)

5. Transversal Action 1 - Elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities" (13h00 - 14h00)

Project Title	Elaborating cross-regional solutions for raising **awareness** (among SMEs) on AM-related opportunities (i.e. the elaboration of a 'Pan-EU AM-opportunities dissemination strategy')
Transversal Action Leader	Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL
Main Objectives of the project	Generally, there is a lack of awareness (among SMEs, especially late adopters but not only) on the possible added value/benefit of additive manufacturing compared to traditional/well-known techniques. The project aims to create a "One Minute Guide" , to be integrated in the 3DPanEU Platform, to support SME's in their search for applications. The "Guide" will not provide answers, but will link SME's to websites, people, institutes where answers might be found.
Scope of the project – Addressed Industry Challenges	Generally SME's do not know where they can obtain the information they need More specifically, there is a lack of easily available knowledge on e.g. • Design possibilities and general impacts (life-time, reduce number of components, light-weight) • Actual cost comparisons additive vs traditional manufacturing techniques • The best possible post-processing techniques for given parts' characteristics, etc. • Adaptations requested to business models • IPR agreements • Certification/standards aspects • Impact and integration in the supply chain ➔ Perceived costs outweigh perceived gains
Scope of the project – Targeted Application Areas	All relevant industrial sectors in the participating regions, like Manufacturing, Automotive, Aerospace, Chemical.
Scope of the project – Targeted Technologies	All relevant printing techniques in metal, polymer, hybrid.
Cross Regional Dimension	AM is used across all regions. SME's face the same challenges, with a regional "touch". A cross regional would help to benefit from each other experiences and connect best practices. A structure where you

	can approach the "Guide" on a cross regional level, but also on a regional level, taking into account what the regional requirements and assets are, enables SME's to find the right answers to their specific situation/questions. The "Guide" will be complementary to our other activities (focussing on the uptake of this technology) and will be integrated (preferably) in the 3DPanEU Platform.

6. Demo Case - Medical Devices and Healthcare demo case: from 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis to a broader scope? (14h00 – 15h00)

Project Title	3D-Printed customized components for orthosis, exoskeleton and exoprosthesis
Demo Case Leader(s)	Alberto Leardini, IOR, Emilia Romagna
Main Objectives of the project	The overall objective is to demonstrate the feasibility, the value, the sustainability and the efficacy, as well as safety, of the 3DP technology once applied to medical problems, i.e. devices. More specifically, the demo case aims currently at setting up cross regional demonstration projects in order to further investigate, test and demonstrate 3D Printed Ankle and Foot Orthotics. In the coming months, the demo case will aim at further broadening, based on the discussions during the 26th of November, the objectives and scope of the demo case.
Scope of the project – Addressed Industry Challenges	The demo case focuses currently on Ankle and Foot Orthotics. In the coming months, the aim will be to broaden further, based on the discussions during the 26th of November, the objectives and scope of the demo case.
Scope of the project – Targeted Application Areas	The sole targeted application area is healthcare.
Cross Regional Dimension – Other regions/organisations can join!	Participating/co-leading regions: Saxony [DE], Wallonia [BE], North Rhine-Westphalia [DE], East Netherlands [NL], Flanders [BE], Emilia Romagna [IT], Aragon [ES], Veneto [IT], South Netherlands [NL], Friuli Venezia Giulia [IT], Upper Austria [AT], etc. Illustrative list of organisations: CRP (IT), Materialise (BE), Antleron (BE), Nadir Tech (IT), Flame3D (BE), Aitiip (ES), etc.

7. Transversal Action 2 - Building an international Benchmark for AM mechanical properties for various materials (14h00 – 15h00)

Project Title	Building an international Benchmark for AM mechanical properties for various materials
Transversal Action Leader	Thomas Kairet, Sirris, Wallonia/Flanders

Main Objectives of the project	AM process quality control is often done by additional follow up samples on the build plate that are tested to ensure conformity of the process. This generates data with a variability from job to job and powder batch. Using statistical process control tools to qualify AM for production requires an intrinsic understanding of the variability of the process and therefore it has to be on a very large dataset. Sharing data can be a way forward to build quickly a robust dataset with a large number of samples. This will allow any company to evaluate the performance of their process with respect to an international bench summarizing the data coming from various machines, various powder suppliers, various batches.

8. Demo Case - AM in the Built Environment (15h00 – 16h00)

Project Title	AM in the Built Environment
Demo Case Leader(s)	Maaike Riemersma and Theo Salet, TUE, South-NL
Main Objectives of the project	The objective of the demo case is to explore new possibilities for the transition in the building and construction sector to digitization, robotization. The demo case focuses on deploying 3D Printed solutions in the construction sector in order to redirect the focus from object oriented to process-oriented industry. In this project, a particular attention is devoted to (among others); virtual design and testing, the digital twins/Moch-ups concepts, the investigations of various solutions for design and prototyping to be then taken up by possible end-users, sensors, 'building information management', etc.
Scope of the project – Addressed Industry Challenges	Industry challenges are the optimization of costs, carbon footprint, structural design, planning, building physics, etc.
Scope of the project – Targeted Application Areas	The main targeted sector for this demo case is construction.
Scope of the project – Target Technologies	Digital BIM platform, BIM to robot, User interaction, non-destructive testing, statistical analysis Eurocode, numerical modelling, experimental data to teach AI
Cross Regional Dimension – Other regions/organisations can join!	Regions: Saxony-Anhalt (DE), South-Netherlands (NL), Aragon (ES), Emilia-Romagna (IT), Norte (PT), East-Netherlands (NL), Malopolska (PL), Norte (PT), South-Netherlands (NL), Piemonte (IT), Auvergne-Rhône-Alpes (FR), Saxony (DE), Upper-Austria (AT), Asturias (ES), etc.

9. Demo Case - Provide a toolset for maintenance for 3DP and a training course for employees to do the maintenance (15h00 – 16h00)

Project Title	3DP for Maintenance
Demo Case Leader(s)	Coen de Graaf, Brainport, South NL
Main Objectives of the project	Increase the use of Additive Manufacturing in Maintenance, by creating a catalogue/toolbox for maintenance we want to show how AM can contribute to become more flexible, quicker, cost effective, lower stocklevels, reduce CO2 footprint.
Scope of the project – Addressed Industry Challenges	In maintenance the opportunities of Additive Manufacturing are not/not sufficient explored. Due to a lack of awareness, not knowing how to address the different challenges and using the opportunities AM can offer. Flexibility, stocklevel reduction, cost models, impact on CO2 footprint, supply chain, digital warehousing, reduction on raw materials use.
Scope of the project – Targeted Application Areas	• Machine maintenance • Mould and die maintenance • Logistic & travel maintenance (ground, air and sea, possibly space in the future) • Other industry (chemical, food, power plants…) • Obsolete spareparts in general
Scope of the project – Target Technologies	Metal-, polymer printing as from TRL 7
Activities and Roles' Matrix	See below/end of document
An illustrative 'success case' implemented (*Optional*)	Using AM to produce moulds for small series /one offs for replacing critical parts.
Cross Regional Dimension	In this multi-regional consortium we use the best practices of each region combined with specific expertise on certain technology fields and specific markets/application to create a comprehensive toolbox/catalogue for the benefit of SME's and larger companies. For example: Saxion (EAST-NL) has a strong affinity with AM and has done and is active in multiple projects related to metal, polymer and even concreter printing. East-NL is currently not an AM manufacturing hub and therefore the knowledge developed within the projects need to be implemented elsewhere
Key achievements and next steps	The first key achievement is the established connection between the project partners and the creation of the working groups. Next steps(Q-4 2020 – 2021) will be the inventory of best practices in above

	mentioned application areas. Parallel we will create some design models and execute the actions as described in the activities.

Activities and Roles' Matrix :

WORKPACKAGES							
	project management		**content**				**communication**
		scenario based design modelling	process description (repair/replace/improve parts	post processing	cost modelling	collect best practices &usecases	
Lead	**Slovenia, Ales Hancic**	**East-NL, Ivo Vrooijink**	**East-NL, Ivo Vrooijink**	**East-NL, Ivo Vrooijink**	**South-NL, Paul van Kempen**	**Gavleborg, Sima Valizadeh**	**Slovenia, Ales Hancic**
join	South-NL- Coen de Graaf	Auvergne Rhone-Alpes, Franck Simon	South-NL, Paul van Kempen	Slovenia, Ales Hancic	Auvergne Rhone-Alpes, Franck Simon	Auvergne Rhone-Alpes, Franck Simon	South-NL- Coen de Graaf
		Slovenia, Ales Hancic	Auvergne Rhone-Alpes, Franck Simon			East-NL, Ivo Vrooijink	
			Slovenia, Ales Hancic			Slovenia, Ales Hancic	
						South-NL, Paul van Kempen	

10. Demo Case - 3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies (16h00 – 17h00)

Project Title	3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies.
Demo Case Leader(s)	José Antonio Dieste, Aitiip, Aragon and Giulia Marchisio, CIM40, Piemonte
Main Objectives of the project	The objective is to make a one-stop-shop offering SMEs with relevant solutions to test and validate 3D Printing-based solutions for large parts.
Scope of the project – Addressed Industry Challenges	Over the last years, more emerging industrial needs related to printed large parts with complex shapes have emerged.
Scope of the project – Targeted Application Areas	Targeted application areas include automotive, aerospace, tooling, shipbuilding, railway, construction, architecture and art.
Scope of the project – Targeted Technologies	The demo case addresses the design, manufacturing and repairing of high value components, fabrication or reparation of moulds or tooling, addition of material on existing parts, stiffening ribs, cladding, new technologies for large parts printing, thermoplastic BAAM, continuous fibre composite printing for large parts At this stage, the demo case focuses on two specific solutions being developed in Aragon and Piemonte: - AiTiip-developed solution based on advanced WAAM metal Additive Manufacturing technologies, and also resin based 3D printing, with innovative Mobile Robot solutions and AI. - Polito (Torino) developed solutions focusing on laser metal deposition for high-performance lightweight multifunctional complex 3D components. TRL level ranges from at least TRL 5/6
Application-specific cases developed (i.e. Smaller Scale projects generated by the Demo Case) – Illustrative list	

Sector of lead Company (NDA)	Regions Involved	Current Status
MOSES. PRODUCTOS SL. expert company focus in the transformation of Fossil based, Biobased and Biodegradable materials using extrusion-	ARAGON, EMILIA ROMAGNA, SLOVENIA	Project designed, funding secured

	compounding techniques and plastic moulding processes. MOSES aim is to develop the most appropriate material for the specific product of its clients that meets the requirements set by its customers targeting the packaging, medical sectors, agrifood and agricultural machinery.		
	READI PROJECT (CERVERA TECHNOLOGY 3D printing). RED DE EXCELENCIA EN FABRICACIÓN ADITIVA READI A.1.5 Additive manufacturing of large parts: metal / polymer (WAAM, LMD, BAAM, FDM). (M1-M30) Participants: IDO, AIT, AIM	ARAGON, ASTURIAS, GALICIA AND CATALONIA	Project designed. Synergies to be further investigated
	INSECTOPIA2050 S.L. (INSECTOPIA) is an entrepreneurial initiative launched by two Aragonese women who have more than 20 years of experience in design, implementation and development of R & D & I projects linked	ARAGON, SLOVENIA	Project designed; funding secured

	to the agri-food sector.		
Cross Regional Dimension – Other regions/organisations can join!	Involved regions: Aragon (ES), Emilia Romagna (IT), Norte (PT), Baden-Wurttemberg (DE), Lombardy (IT), Thuringia (DE), Northrine-Westphalia (DE), Asturias (ES), Madrid (ES), Auvergne Rhône Alpes (FR), Slovenia (SE), Piemonte (IT), etc. Illustrative list of organisations: CIRI MAM University of Bologna (IT), Produtech (PT), Politecnico di Milano (IT), DLR (DE), Aitiip (ES), Polito (IT), etc.		

A.1 / Annex 1 - Description of the Pilot's objectives and concepts

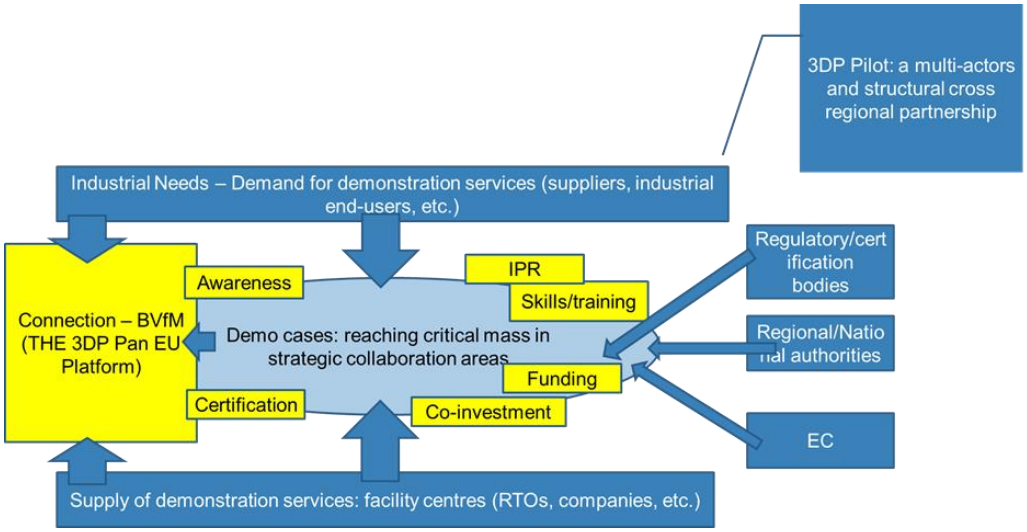
The 3DP Pilot Objectives

Pursuing the final goal of supporting the transitions towards a smarter, more sustainable and more competitive industry, the key objective of the Vanguard 3DP Pilot is to accelerate market uptake and deployment of 3DP-enabled solutions in the EU through the development of industry-led, transregional demonstration platforms (i.e. 'demo cases', see below) that connect 3DP capabilities and actors that were operating in largely disconnected and fragmented value chains in Europe.

Bringing prototypes to production by securing the reproducibility of application remains a critical point for the industry, which hampers the uptake of 3DP solutions by SMEs. Beyond connecting existing capabilities and addressing information asymmetry, the partnership also aims at fostering co-investment by 1) addressing horizontal challenges (e.g. certification) and 2) ensuring availability and accessibility to equipment and infrastructures that will effectively serve the needs of the industry. Doing so the 3DP Pilot will contribute to the emergence of new value chains.

The Concept of Demo Cases and Smaller Scale Projects (i.e. Product/application-specific projects within or outside demo cases)

Demo cases are industry-oriented, cross regional demonstration 'platforms' that focus on strategic collaboration areas, which are aligned with the content of key EU strategic roadmaps (EFFRA, AM-Motion, etc.). Demo cases allows to reach critical mass in strategic and emerging cooperation areas, which, in-fine, ensures an efficient connection of the (Pan-EU) demand and supply of demonstration services in a specific field, enabling the uptake and deployment of the associated strategic solutions. Demo cases follow the "test before invest" function of 3DP PAN EU / DIHs

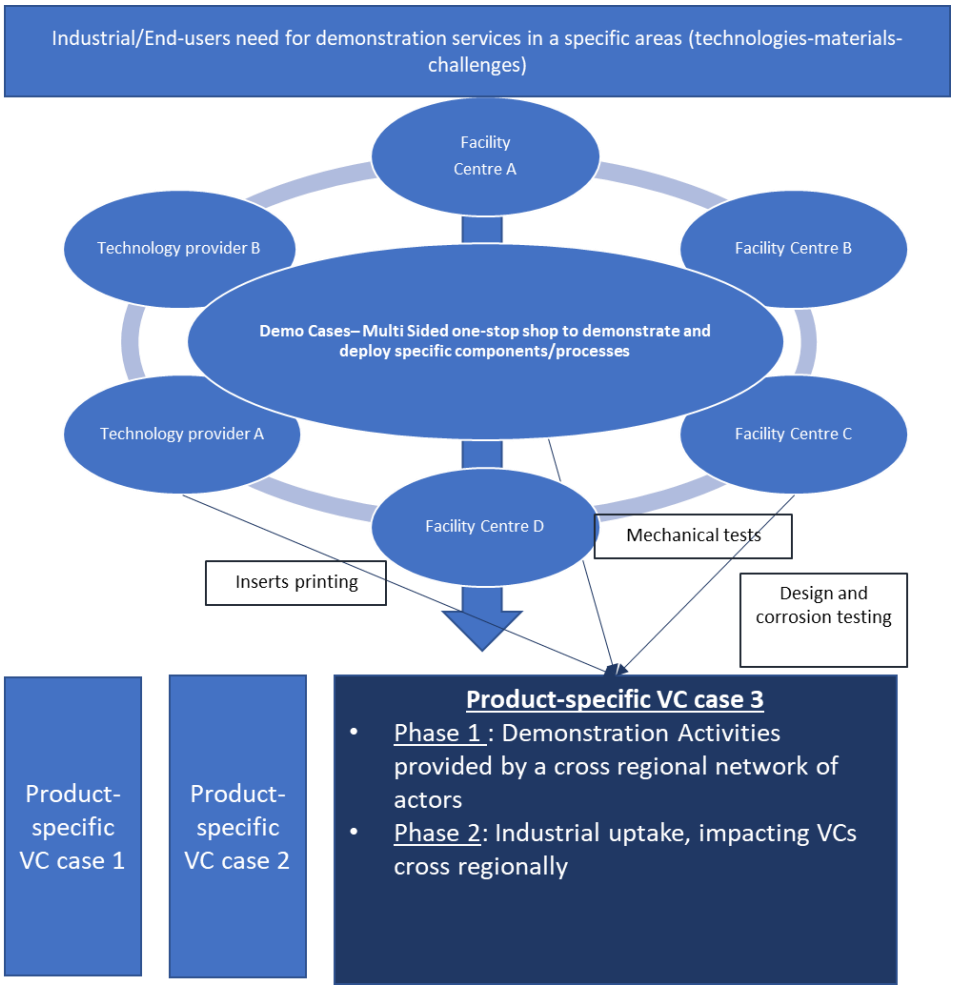


At a more operational level and for clarity purposes, the figure below presents an overview of the 'standard' structuration and concept of a demo case and of the product/application specific

projects that are developed and implemented through demo cases. In a nutshell, the overall concept and process is as follows:

1. Industrial needs to test and validated 3DP-related solutions are identified and expressed by the industry in specific fields (i.e. demo case's scope)
2. The demand is treated by a centralised / virtual platform (demo case), which has the following mandate:
   - Build a strong network of partners dedicated to the development of the technology and its applications across Europe
   - Facilitate knowledge sharing among partners and across European regions
   - Support the adoption of appropriate measures to protect intellectual property rights
   - Attract, identify and select manufacturing projects based on promising technological and economical characteristics whose likelihood of success increases by mobilizing competences across European regions
   - Back selected projects by creating a dedicated pool of partners whose competences are conducive to success and by providing secretariat services to the partners involved
   - Facilitate access to finance for the selected projects
   - Promote through appropriate channels the technology, its various applications, its network of partners and its activities towards stakeholder groups
   - Facilitate co-investment in expertise and equipment in case needed (missing capabilities)
   - Industrial projects are then being implemented, with technical-technological-economical feedbacks loops process organised through the platform
3. Once the partners and associated expertise/equipment identified, a product/application-specific case can be developed. Unlike 'demo cases' these 'business cases', while still involving demonstration activities, are focusing on a single very specific application or product and are led by one or several companies (i.e. 'smaller scale' projects). Very often, such projects can be divided in two distinct phases: a first phase covers the demonstration activities provided by the network of facility centres and technology providers, then a second phase (once phase 1 is successful) focuses on the industrial uptake (investment in new production lines, etc.).

The figure below illustrates the process of generating (through established demo cases) Product/application-specific demonstration projects.



Cross-demo cases action lines / Transversal action lines

Aspects such as awareness, skills/training, funding, standards/certification, etc. are to some extent 'transversal' (i.e. relevant to many demo cases, without clear distinctions) and are therefore treated within the Pilot as cross-demo action lines.

Annex 2: List of current Demo Cases and Transversal Actions implemented

Below, the list of the 9 **demo cases** currently being developed (see separate documents for a description for each case).

"Multi-materials components by hybrid 3D Printing manufacturing" (Demo Case leader: Luca Tomesani, UNIBO, Emilia Romagna)
"Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects" (Demo Case leader: Paolo Gregori, Trentino Sviluppo, Trentino)
"Multi-material 3D printing: Structural integrated electronics in 3D printed parts" (Demo Case Leader: Hannes Fachberger, Profactor, Upper-Austria)

“Medical Devices and Healthcare demo case: 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis…and beyond?” (Demo Case leader: Alberto Leardini, IOR, Emilia Romagna)
“AM in the Built Environment” (Demo Case Leaders: Maaike Riemersma and Theo Salet, TUE, South-NL)
“3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies.” (Demo Case leaders: José Antonio Dieste, Aitiip, Aragon and Giulia Marchisio, CIM40, Piemonte)
“Efficient collaborative robot through 3D printing optimization” (Demo Case Leader: Oscar Alonso, Leitat, Catalonia)
“Provide a toolset for maintenance for 3DP and a training course for employees to do the maintenance” (Demo case Leader: Coen de Graaf, Brainport, South NL)
“Additive-subtractive high precision & high finish production (high-end metals): a focus on elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities” (Demo case Leaders: Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL)

In addition to this, the **following transversal actions** (i.e. cross demo cases) are being developed:

Transversal Action 1 - Elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities (Leaders: Bianca Maria Colosimo, Polimi, Lombardy and Coen de Graaf, Brainport, South NL)
Transversal Action 2 - Building an international Benchmark for AM mechanical properties for various materials” (Leader: Thomas Kairet, Sirris, Flanders/Wallonia)