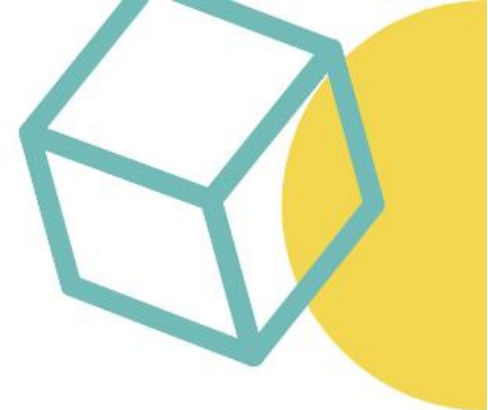


3DP Pilot – High Performance Production through 3D–Printing

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Outline

- Purpose, Rationale and Objectives
- Implementation
- Demo-cases
- Support for 3DP Pilot Members





1. Why 3D printing?

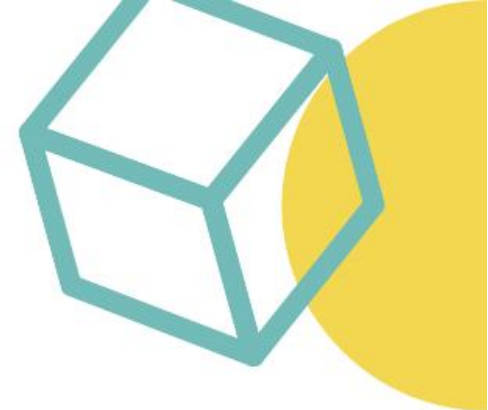
- Promising technology able to empower the transition from mass production to mass customization in several leading sectors.

2. What are the challenges?

- 3DP capabilities and actors still operate in largely disconnected value chains in Europe due to:
 - i. fragmented efforts in technology deployment;
 - ii. lack of connection between 3DP tech suppliers and aggregated demand.

3. What is the main purpose?

- Accelerate market uptake of 3DP applications in Europe through the development of industry-led transregional demonstration platforms and projects that connect 3DP capabilities and actors.



4. Why a cross regional initiative?



Add-value to what already exists at regional level.





RIS3T Galicia-Região Norte



VANGUARD INITIATIVE



Interreg
Espanha - Portugal
IMPACT RIS3T

Fundo Europeu de Desenvolvimento Regional
Fundo Europeu de Desenvolvimento Regional



UNION EUROPEA
UNIÃO EUROPEIA

3DP Pilot rationale and objectives

To address industry **needs**, in their ‘**smart**’,
‘**green**’ and ‘**competitive**’ paths...

...By enabling co-development, deployment
and uptake of **AM-related solutions**...

...Through the timely development of **cross-regional
demonstration projects** connecting capabilities and actors

Doing so, the 3DP Pilot will contribute to the emergence
of new VCs and will reinforce existing ones

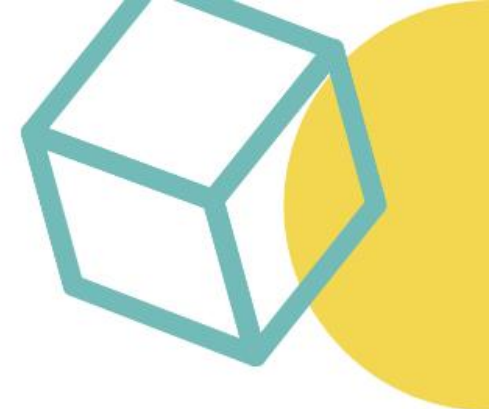


XUNTA
DE GALICIA



AGÊNCIA NACIONAL
DE INOVAÇÃO

Implementation – The sequence



Industry Needs

- Target group: (Downstream) SMEs, Tech-suppliers and start-ups
- Looking for Expertise/Equipment, market/visibility
- *‘Demonstration’ and ‘cross-regional’*

3DP Pilot ‘Treatment’

- Actors: Facility Centres, Tech-suppliers, etc.
- Benefiting from Co-development /deployment, visibility/market

Projects Implementation

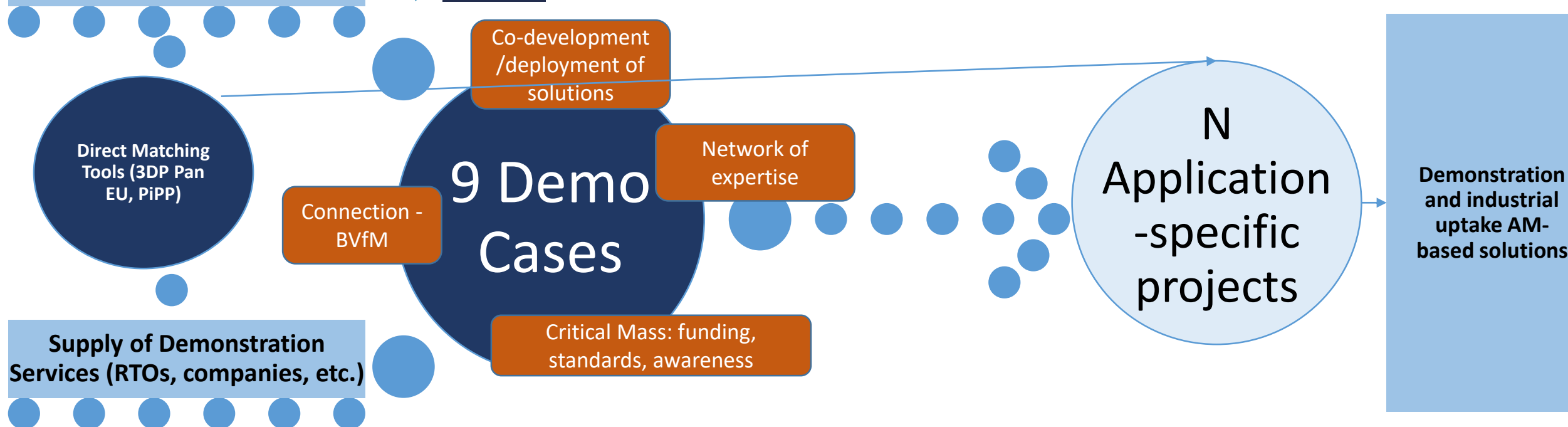
- Funding support, Spill overs and feedback loops
- *Towards Sustainable and Smart VCs*



Implementation – The ‘back end’

Industry Needs (suppliers, end-users, etc.)

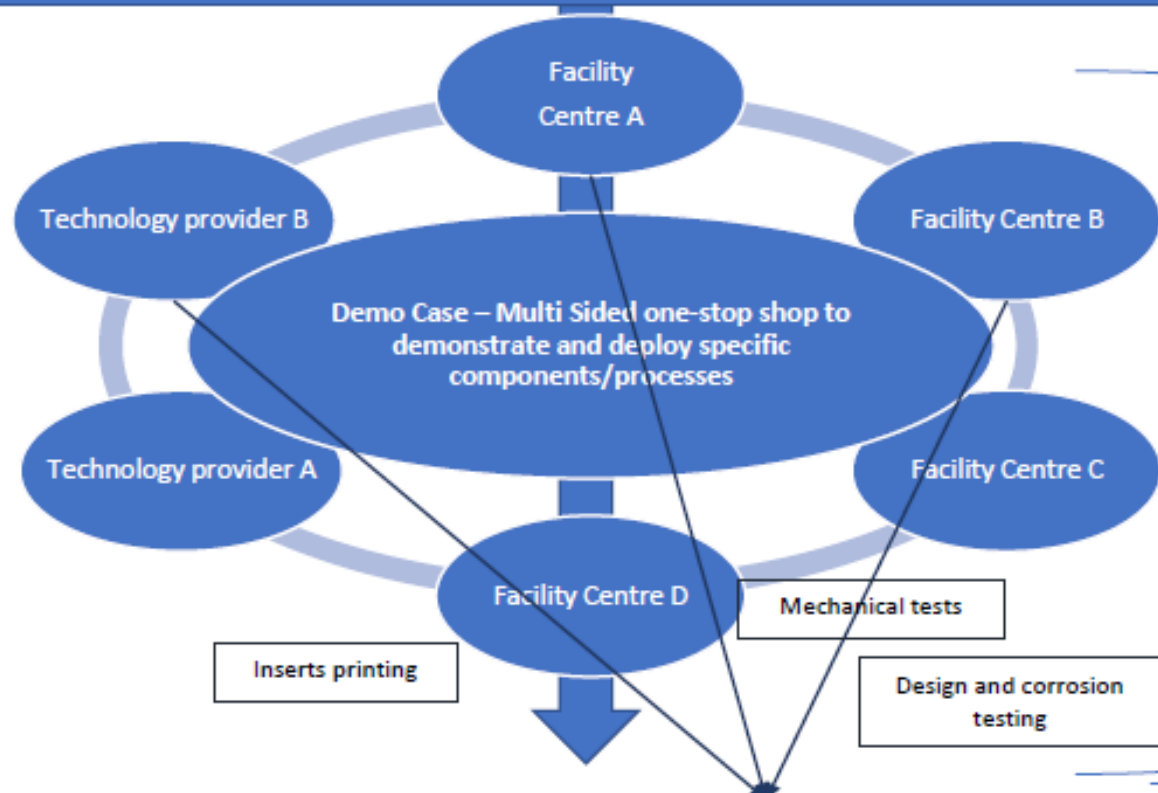
- 1) ‘Demo Cases’ for emerging / complex solutions (‘anticipate & develop’);
- 2) ‘Direct’ connections for others.



2 ‘Cross-Demo Cases’ (Transversal) Actions (‘Awareness’ and ‘Benchmark Properties’)

The concepts of 'Demo cases' and application-specific projects

Industrial/End-users need for demonstration services in specific areas (technologies-materials-challenges)



Business Model 'Demo Case'

- Value Proposition and Clients. 'Multisided platform' offering:
 - ▷ End-users: Access to BVfM demonstration services and support in project implementation
 - ▷ Facility Centres/technology providers: Broadened customer base and knowledge/expertise
 - ▷ Investors: Lowered risk and high return on (portfolio of) projects
- Costs and Investments.
 - ▷ Selection, Coordination and Management
 - ▷ Tangible and Intangible Innovation-related Investment
- Revenue generation:
 - ▷ Membership fees
 - ▷ Project fees/return

Business Model 'Application-specific project'

- Value Proposition and Clients. Demonstrated, certified and commercialised new products/processes
- Costs and Investments.
 - ▷ Phase 1: demonstration activities (40% private co-funding; remaining costs to be covered by in-kind contributions other partners and public funding)
 - ▷ Phase 2: industrial uptake (approximately 60% private co funding and the remaining by public/private sources in the form of debt (lending) or equity or subsidy (depending on industrial risk))
 - ➔ 'Cross regional' I in tangible and intangible assets, along/across VC(s)
- Revenue generation.
 - ▷ Products commercialisation through existing private legal entity (single SME) / entities (VC consortium)

Application-specific project 3

- Phase 1 : Demonstration Activities provided by a cross regional network of actors
- Phase 2: Industrial uptake, impacting VCs cross regionally

Applicati
on-
specific
project 1

Applicati
on-
specific
project 2

3D-printing

Lead Regions

Demo-Cases

1. Hybrid Components
2. Repairing
3. Integrated Electronics
4. Healthcare
5. Built
6. Large Parts
7. Collaborative Robots
8. Maintenance
9. Additive-Subtractive

IT: Emilia Romagna
IT: Trentino
AU: Upper-Austria
IT: Emilia Romagna
NL: South-NL
ES: Aragon IT: Piemonte
ES: Catalonia
NL: South-NL
IT: Lombardy NL: South-NL

Multi-materials components by hybrid 3D Printing manufacturing
Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects
Multi-material 3D printing: Structural integrated electronics in 3D printed parts
Medical Devices and Healthcare demo case: 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis...and beyond?
AM in the Built Environment
3D-Printed large parts and complex shapes (mono-material) through emerging 3DP technologies
Efficient collaborative robot through 3D printing optimization
Provide a toolset for maintenance for 3DP and a training course for employees to do the maintenance
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

Transversal Action 1	Elaborating cross-regional solutions for raising awareness (among SMEs) on AM-related opportunities <u>Lead Region(s)</u> IT: Lombardy NL: South-NL
Transversal Action 2	Building an international Benchmark for AM mechanical properties for various materials” <u>Lead Region(s)</u> BE: Flanders/Wallonia

28 cooperating regions:

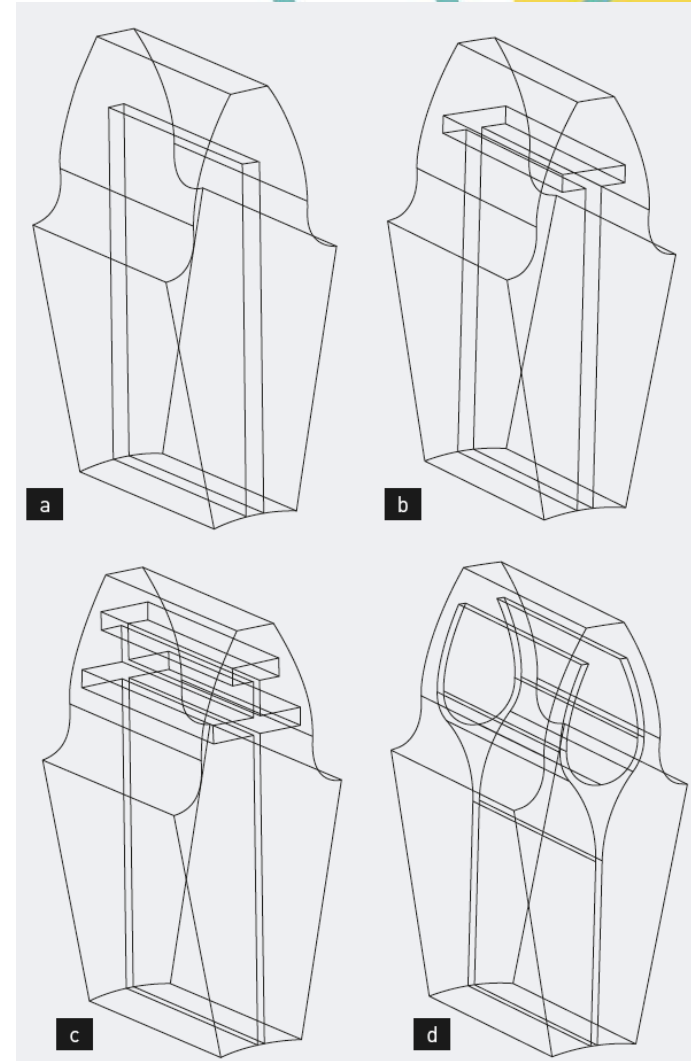
AU (2): Lower Austria; Upper Austria
BE (2): Flanders; Wallonia
DE (5): Baden-Wurttemberg; Nord Rhine Westphalia; Northrhine-Westphalia; Saxony; Thuringia
ES (3): Aragon; Asturias; Catalonia;

FI (1): East and North Finland
FR (1): Auvergne Rhône Alpes
IT (6): Emilia-Romagna; Lombardy; Piemonte; South Tyrol; Trentino; Veneto
NL (2): East Netherlands; South-Holland

PL (1): Malopolska
PT (1): Norte
SE (3): Gävleborg; Region Örebro County; Varmland
SL (1): Slovenia



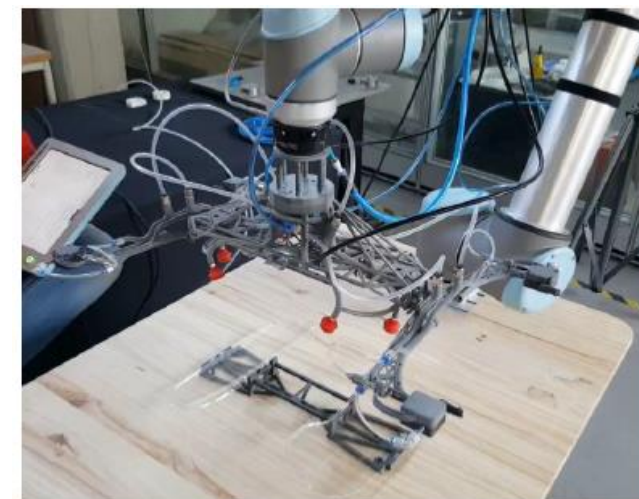
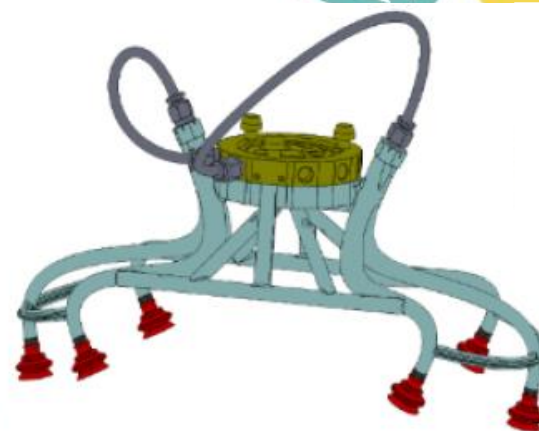
Demo-case	HYBRID COMPONENTS: Multi-material components by hybrid 3D Printing
Main Objectives	To facilitate the uptake and deployment of 3D Printed innovative ultra-light hybrid components based on different materials and structure combinations.
Industry Demand/ Challenges	Lack of knowledge and demonstration facilities to develop 3D Printed innovative ultra-light hybrid components based on different materials and structure combinations. Material and energy savings, higher recyclability, freefrom design, etc. can be achieved through the deployment of the considered solutions.
Application Sectors, Areas and Techs	<u>Sectors:</u> Automotive, Sporting goods, Ship building, Aeronautics, Aerospace, Healthcare, etc. <u>Areas:</u> 3D printed metal inserts with composite combinations for different industrial applications such as hard trim interior products, structural elements, external components, and powertrain elements. <u>Techs:</u> DMLS, SLS, FDM, SLA, EBM, MJP, LMD, DLP, LOM.



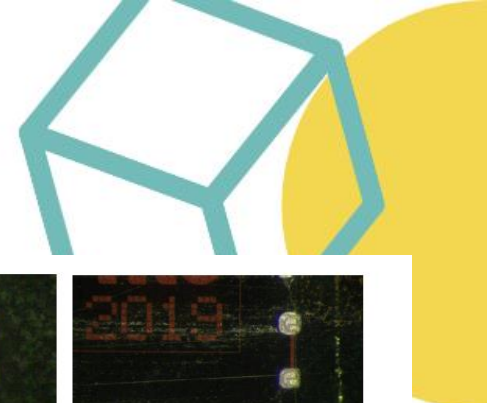


Demo-case	REPAIRING: Innovative hybrid (subtractive/additive) manufacturing approach for repairing added value damaged objects
Main Objectives	To combine subtractive and additive manufacturing in one step and make the process automated.
Industry Demand/ Challenges	Up to now repairing of parts was a difficult task (hand-made, skill-dependent, non-repeatable). 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.
Application Sectors, Areas and Techs	<u>Sectors:</u> Foundry, Hot stamping, Injection molding, CFRP fabrication, Energy. <u>Areas:</u> Dies and Molds; wear-prone components (e.g., Pelton turbines). <u>Techs:</u> Milling + DLD, WAAM, LENS, DMG Lasertec 3D, Laser scanning and 3D Surface reconstruction.

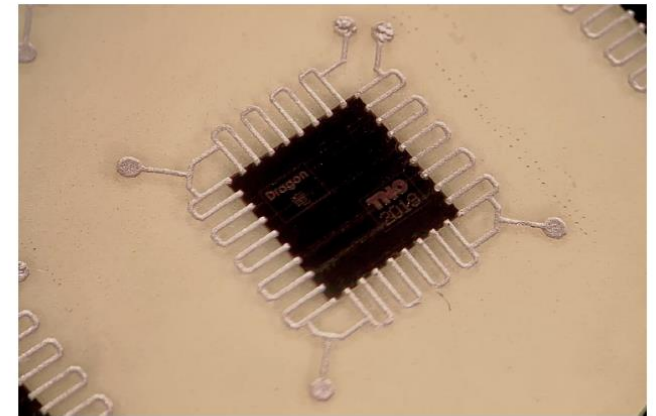
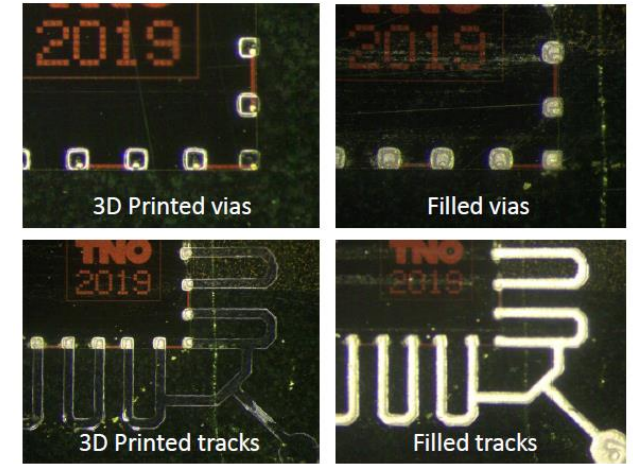




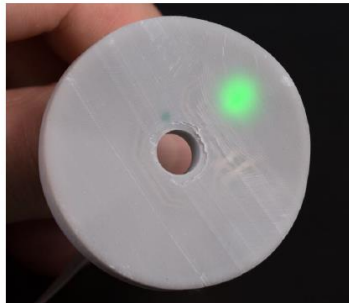
Demo-case	COBOTS: Efficient collaborative robot through 3D printing optimization
Main Objectives	To design, develop and manufacture on demand and customized new concepts and solutions for helping in the automation of industrial processes (e.g. gripping, handling...) and assembling of components in collaborative robotic stations with advanced grippers.
Industry Demand/ Challenges	Light-weight, reduced time to market & reduced cost, reduction of components, lower maintenance and less assembling, collaborative robotic stations/applications, and related opportunities.
Application Sectors, Areas and Techs	<p><u>Sectors:</u> Automotive, Consumer Goods, Machinery and Tooling, Creative Industries, Agri-Food, Sports & Leisure; (any manufacturing and assembling industry mainly related with polymer transformation and industries with handling applications).</p> <p><u>Areas:</u> Design/development of complex grippers for the handling (extraction, positioning, ...) of soft parts</p> <p><u>Techs:</u> Any 3DP technology able to provide customized solutions to current manufacturing process, allowing the deployment of 3D printing and cobots.</p>



Demo-case	Structural integrated ELECTRONICS in 3D printed multi-material parts
Main Objectives	To go from 2D printed electronics to 3D printed electronics using multi-material inkjet 3DP technology.
Industry Demand/ Challenges	To create fully functional parts in one printing job, using 3 materials in parallel and inline processing.
Application Sectors, Areas and Techs	<p><u>Sectors</u>: Automotive, Robotics in Manufacturing, Consumer goods, Aerospace (structural health monitoring, passenger entertainment,...), Construction (structural health monitoring, ...), Medical (bio-sensor devices,...), and more.</p> <p><u>Areas and Techs</u>: freeform design (avoiding assembly steps), inkjet based multi-material 3DP of integrated electronics.</p>



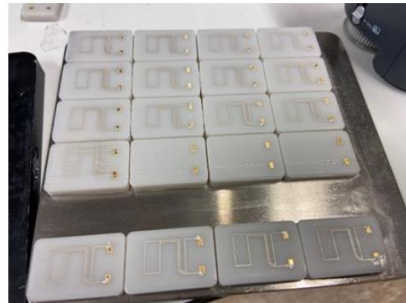
Embedded 50 µm chip with all (28) functional interconnects



Functional accelerometer



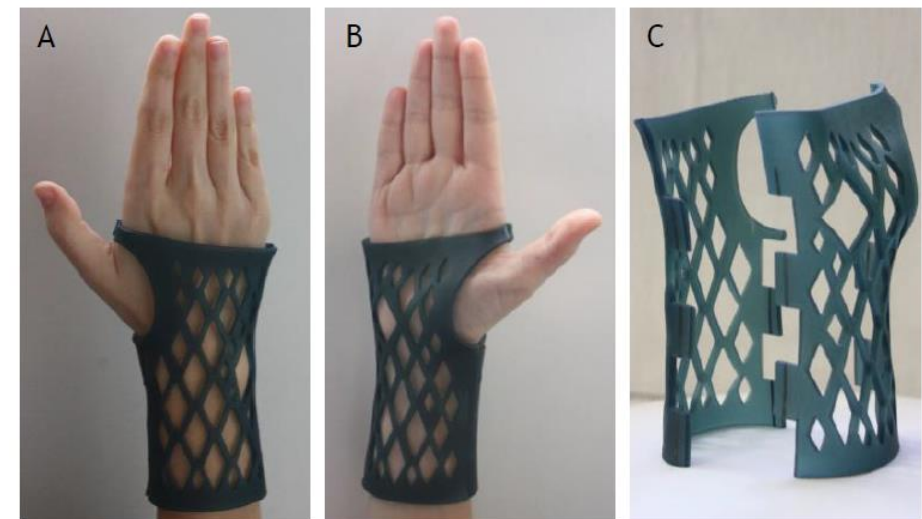
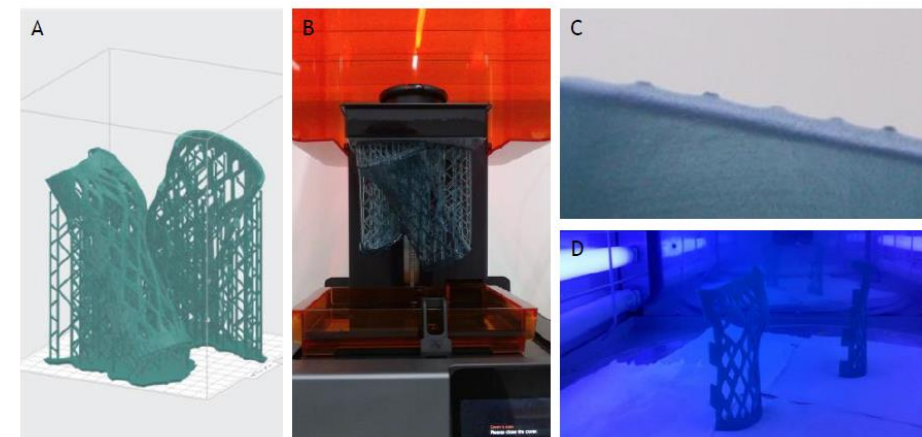
Fully embedded electronics

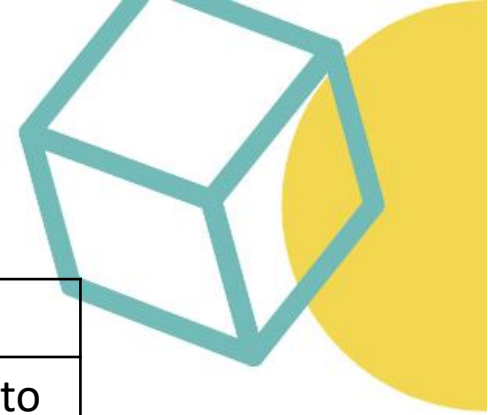


Reliability test structures

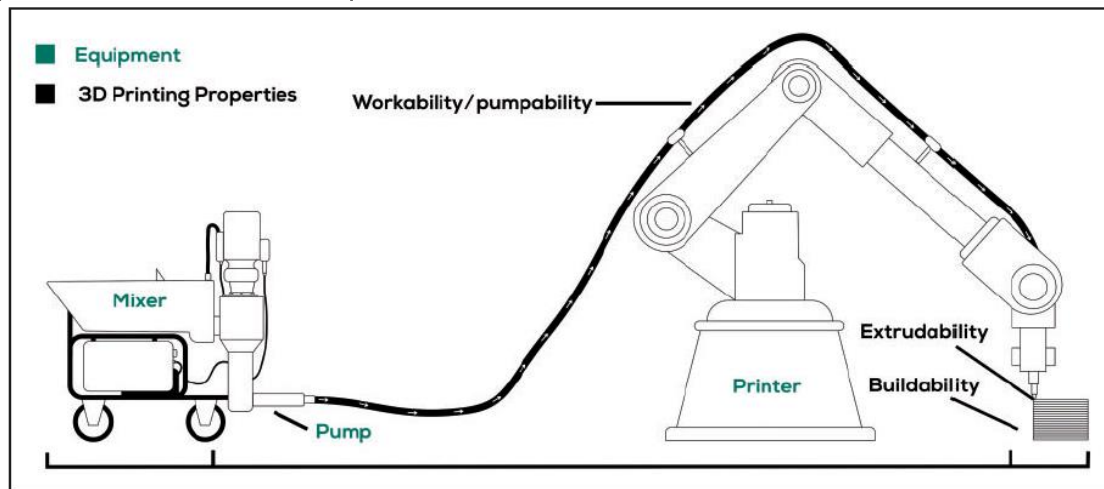


Demo-case	HEATHCARE: 3D-Printed customized components for orthosis, exoskeleton and exoprosthesis
Main Objectives	To demonstrate the feasibility, the value, the sustainability and the efficacy, as well as safety, of the 3DP technology once applied to medical problems, i.e. devices.
Industry Demand/Challenges	The custom-fit and lightweight design opportunities of AM are not/not sufficient explored.
Application Sectors, Areas and Techs	<u>Sector:</u> Healthcare <u>Area and Techs:</u> 3D Printed Orthotics and other medical devices using metal, polymer or ceramic AM techs,

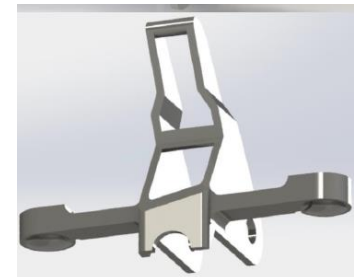
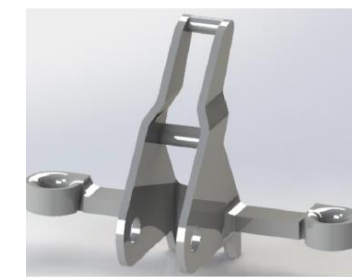
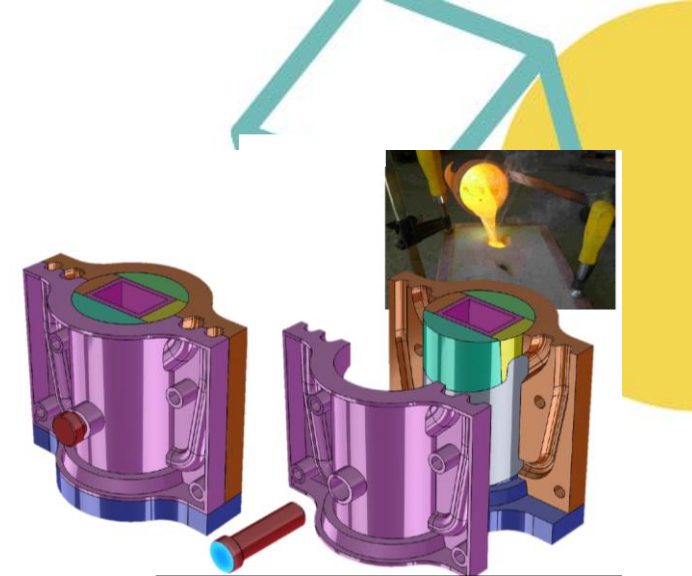




Demo-case	AM in the BUILT Environment
Main Objectives	To explore new possibilities for the transition in the building and construction sector to digitization, robotization.
Industry Demand/ Challenges	Industry challenges are the optimization of costs, carbon footprint, structural design, planning, building physics, etc. Deployment of 3D printed solutions in the construction sector
Application Sectors, Areas and Techs	<u>Sector</u> : Construction. <u>Areas and Techs</u> : Virtual design and testing, Digital twins/Moch-ups concepts, solutions for design and prototyping, sensors, 'building information management'.

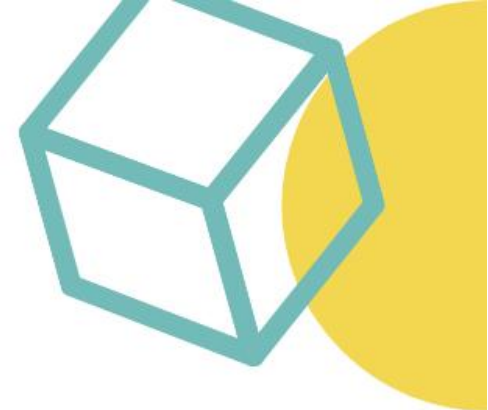


Demo-case	3DP for MAINTENANCE
Main Objectives	To increase the use of AM in Maintenance, by creating a catalogue/toolbox for maintenance we want to show how AM can contribute to become more flexible, quicker, cost effective, lower stocklevels, reduce CO2 footprint.
Industry Demand/ Challenges	In maintenance the opportunities of AM are not/not sufficient explored. AM can offer: Flexibility, stocklevel reduction, cost models, impact on CO2 footprint, supply chain, digital warehousing, reduction on raw materials use.
Application Sectors, Areas and Techs	<u>Sectors and Areas</u> : Machine Tools, Tooling (mould, die, ...), Logistic & travel maintenance (ground, air and sea, possibly space in the future), Other industry (chemical, food, power plants...); obsolete spare parts in general; small series /one offs for replacing critical parts. <u>Techs</u> : Metal-, polymer printing

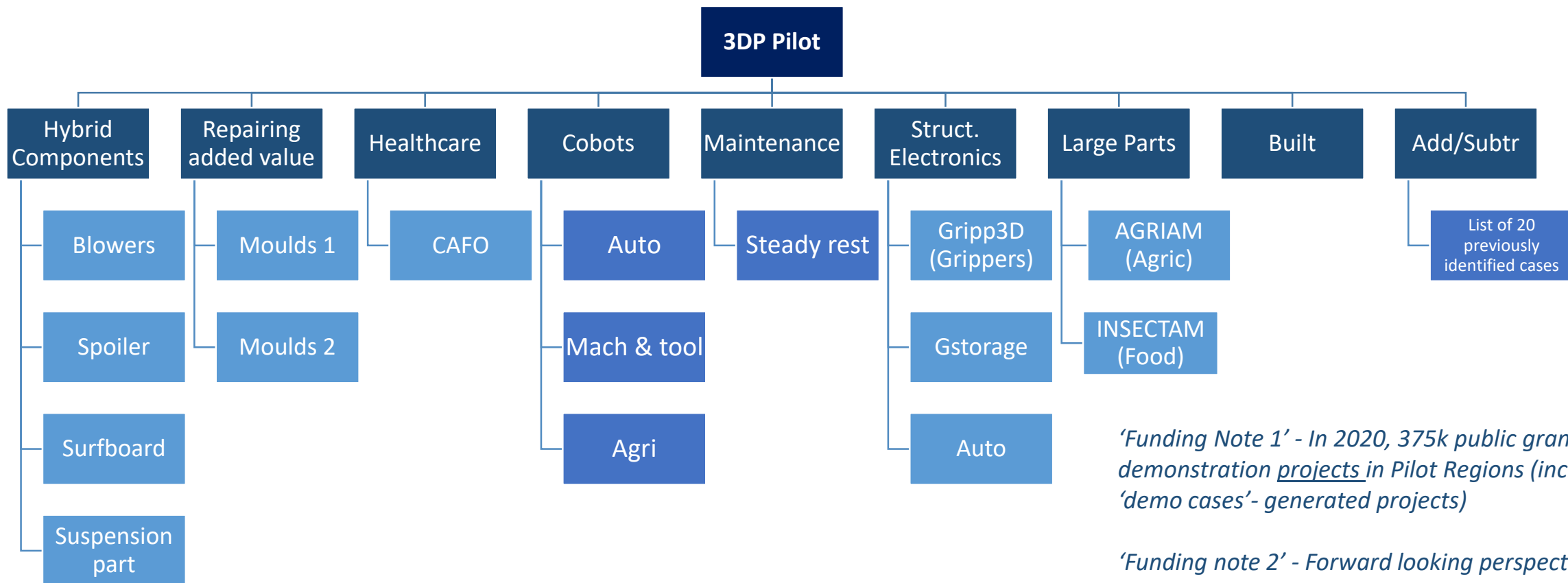


Demo-case	LARGE-PARTS: 3D-Printed large parts and complex shapes through emerging 3DP technologies
Main Objectives	To make a one-stop-shop offering SMEs with relevant solutions to test and validate 3D Printing-based solutions for large parts.
Industry Demand/ Challenges	Over the last years, more emerging industrial needs related to printed large parts with complex shapes have emerged.
Application Sectors, Areas and Techs	<p><u>Sectors:</u> Automotive, aerospace, tooling, shipbuilding, railway, construction, architecture and art.</p> <p><u>Areas and Techs:</u> 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.</p>



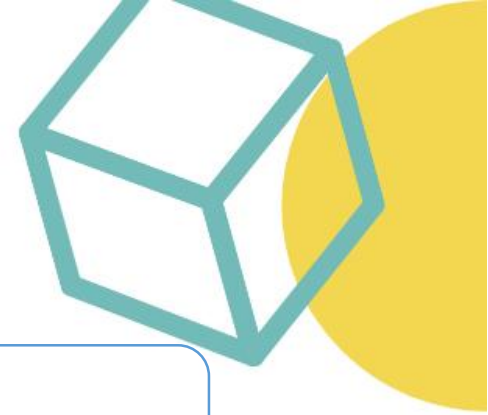


The 3DP Pilot 'Portfolios' of projects – Illustrative overview in 2021

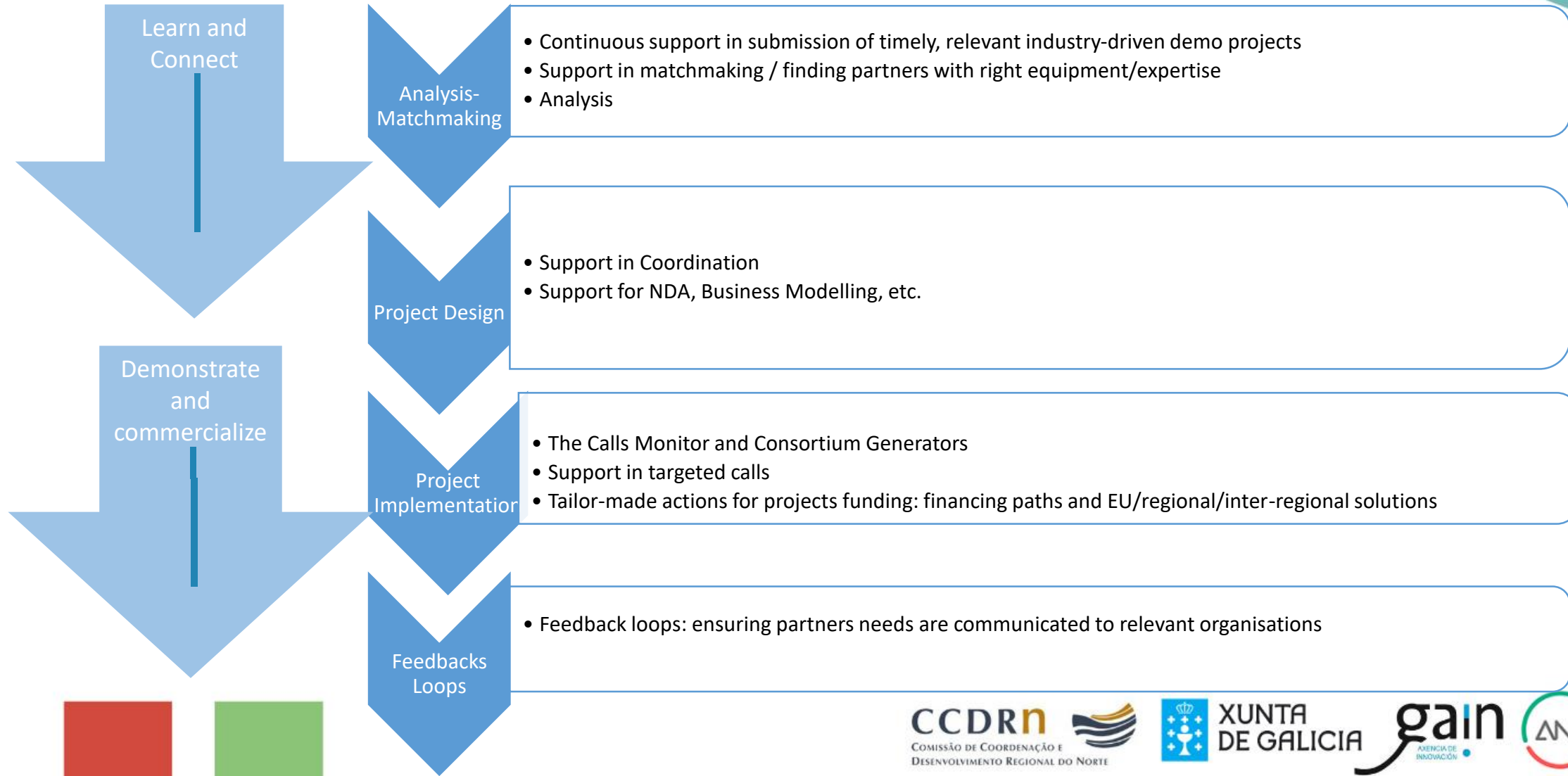


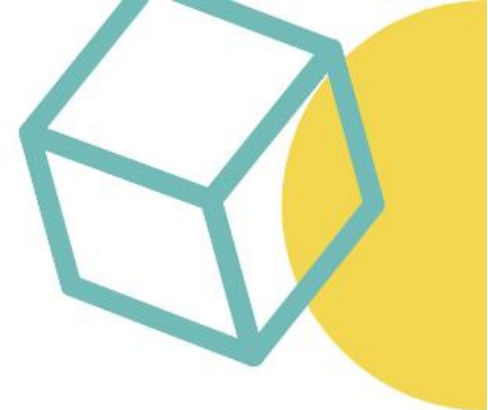
'Funding Note 1' - In 2020, 375k public grant secured for demonstration projects in Pilot Regions (incl. 240k for 'demo cases'- generated projects)

'Funding note 2' - Forward looking perspective: targeted actions to embrace regional and EU funding opportunities

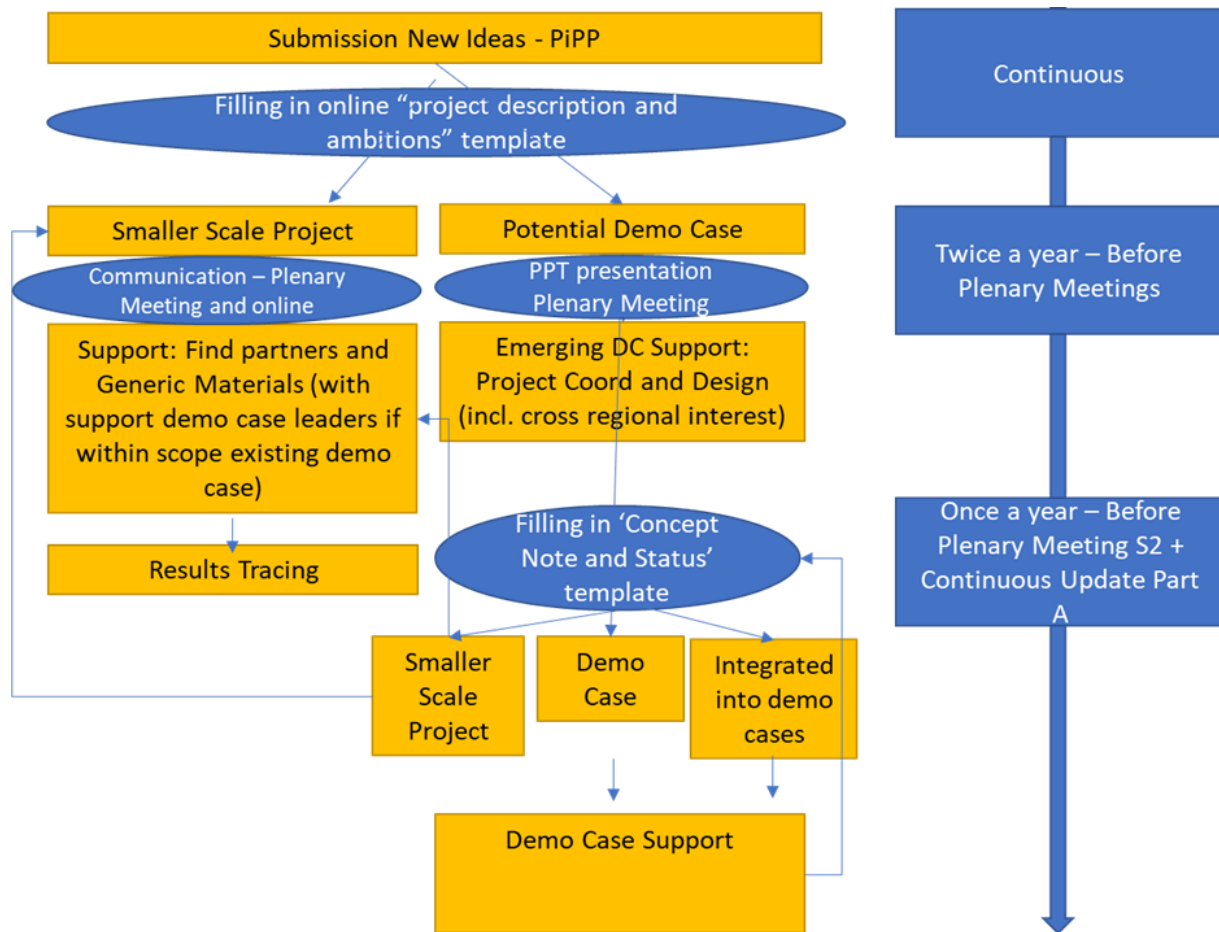


Support for 3DP Pilot Members – integrated approach





Always open to New Ideas – Process and results so far



- *5 new ideas submitted in 2019, 5 new demo cases implemented in 2020*
- *New application-specific projects outside the scope of demo cases were also generated (new demo cases in the future?)*
- *4 new project ideas submitted*
- *Submission remains open*

3dP
PilotPitchingPlatform

Flexible and open platform able to address evolving industry needs

Thank you

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