



*Modelling in a materials characterisation Test Bed.
FormPlanet case*

Dr. Esther Hurtos, EURECAT

Esther.hurtos@eurecat.org

EMMC 2019, Vienna, 27th Feb. 2019



- 1 What is FormPlanet?
- 2 Modelling in FormPlanet
- 3 Materials Informatics integrative role for Modelling and Characterisation
- 4 Modelling within the test bed exploitation plans
- 5 Other considerations
- 6 On Eurecat

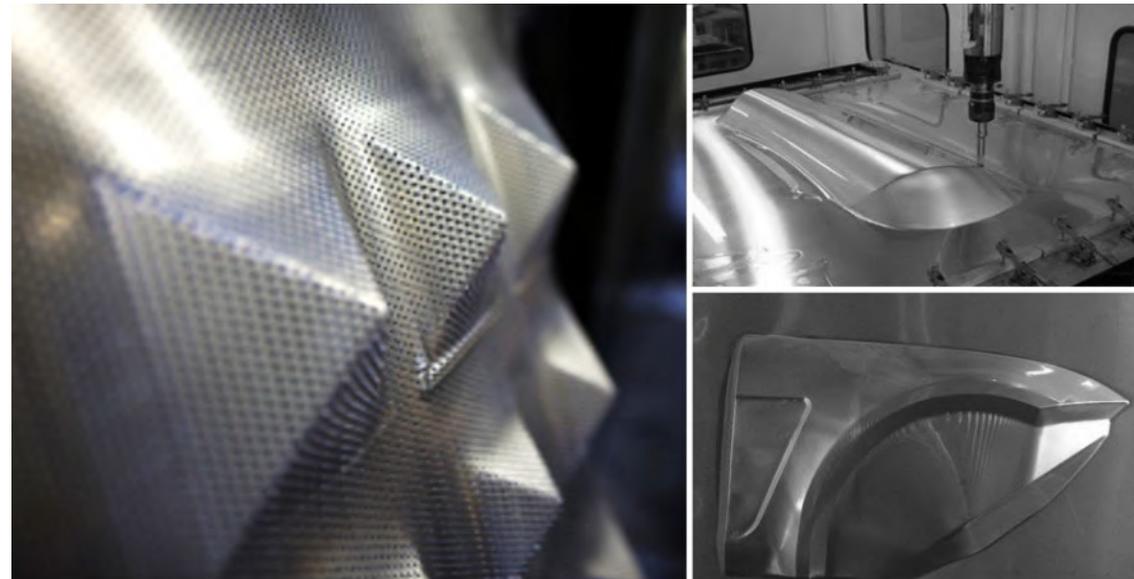




Facts and figures:

- **Test bed funded under the topic: DT-NMBP-07-2018 OITB for Characterisation (IA)**
- **3 years duration, from 1/01/2019 to 31/12/2021**
- **Budget: 7,7 M€, of which 6,9 M€ funded by the EC**
- **18 participants from 9 different countries**
- **9 industrial companies in the sheet metalworking industry value chain as early users and validators**

- **Coordinated by Eurecat, RTO, ES**
- **Grant agreement ID: 814517**



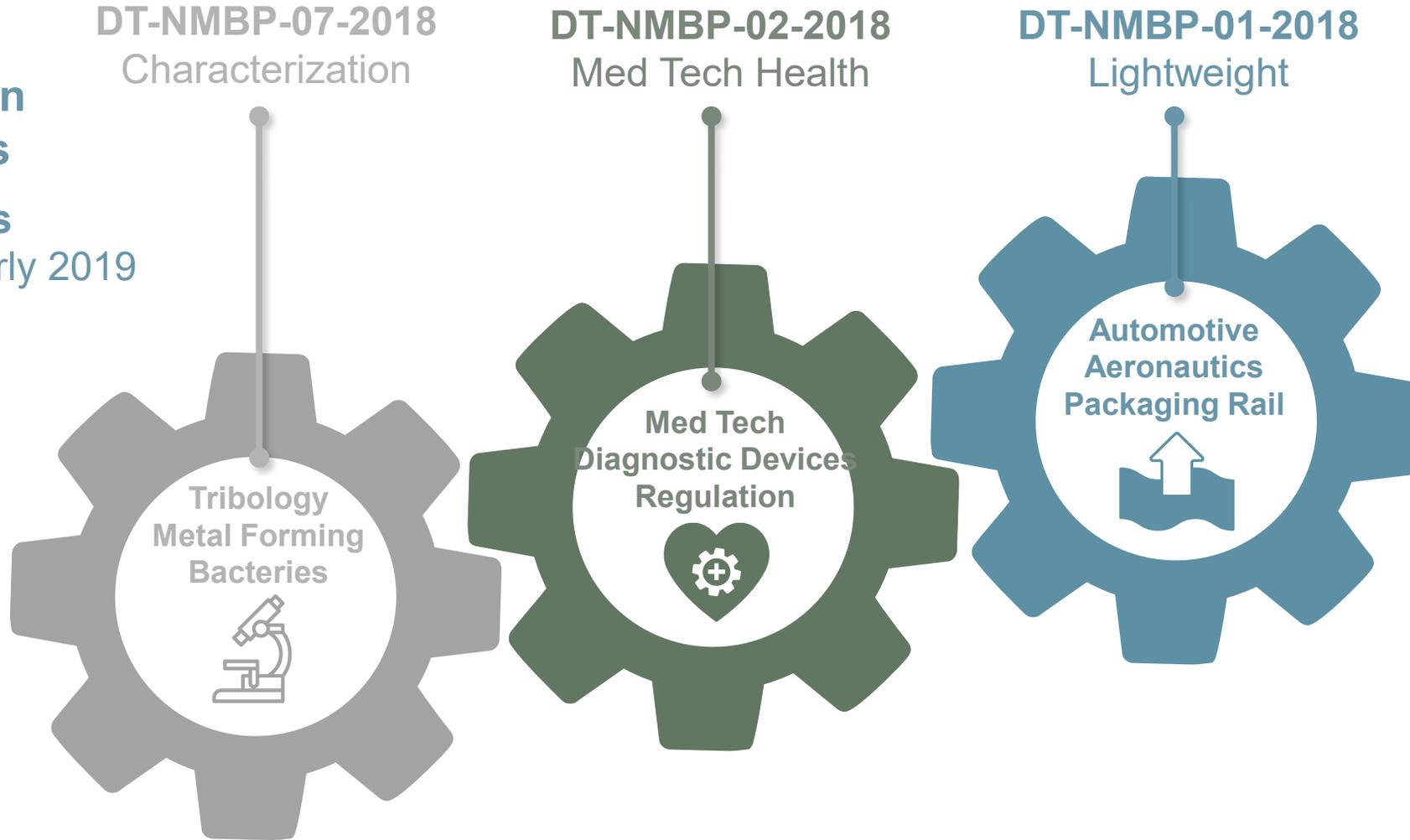


FormPlanet as part of the current European Test Bed ecosystem



Open Innovation Test Beds

10 projects
Starting early 2019



So far EC Contribution of **98,9€** million

Source: Jorge Costa Dantas Faria. Officer DG Research and Innovation. EC





To develop and demonstrate an integrated ecosystem (Test Bed) offering novel testing methodologies to:

- **characterize** sheet material properties,
- **predict** part performance and
- **prevent** production losses,

to the **sheet metal forming** industries to tackle the upcoming challenges in formability and part quality assessment.

It includes the development of:

- **New testing methodologies** and **FE approaches** to predict formability and part performance
- **monitoring** and **inspecting NDT**.

The potential of the novel approach will be proven in several industrial demonstrators.





FormPlanet Consortium

eurecat



5 technology providers



4 service providers



8 industrial companies





FormPlanet Technology Offer



LTU (SE)

- Crash resistance tests
- Crashworthiness modelling
- SMM to characterize post necking behavior and fracture strain
- Smart material data characterization
- Efficient simulation methodologies for light-weight sandwich solutions
- Micromechanical characterization (Microtomography)

Fraunhofer-IWU (DE)

- High temperature FLC-characterization
- Quality inspection by 3MA system
- In-process monitoring by HFIM and laser tracking

COMTES (CZ)

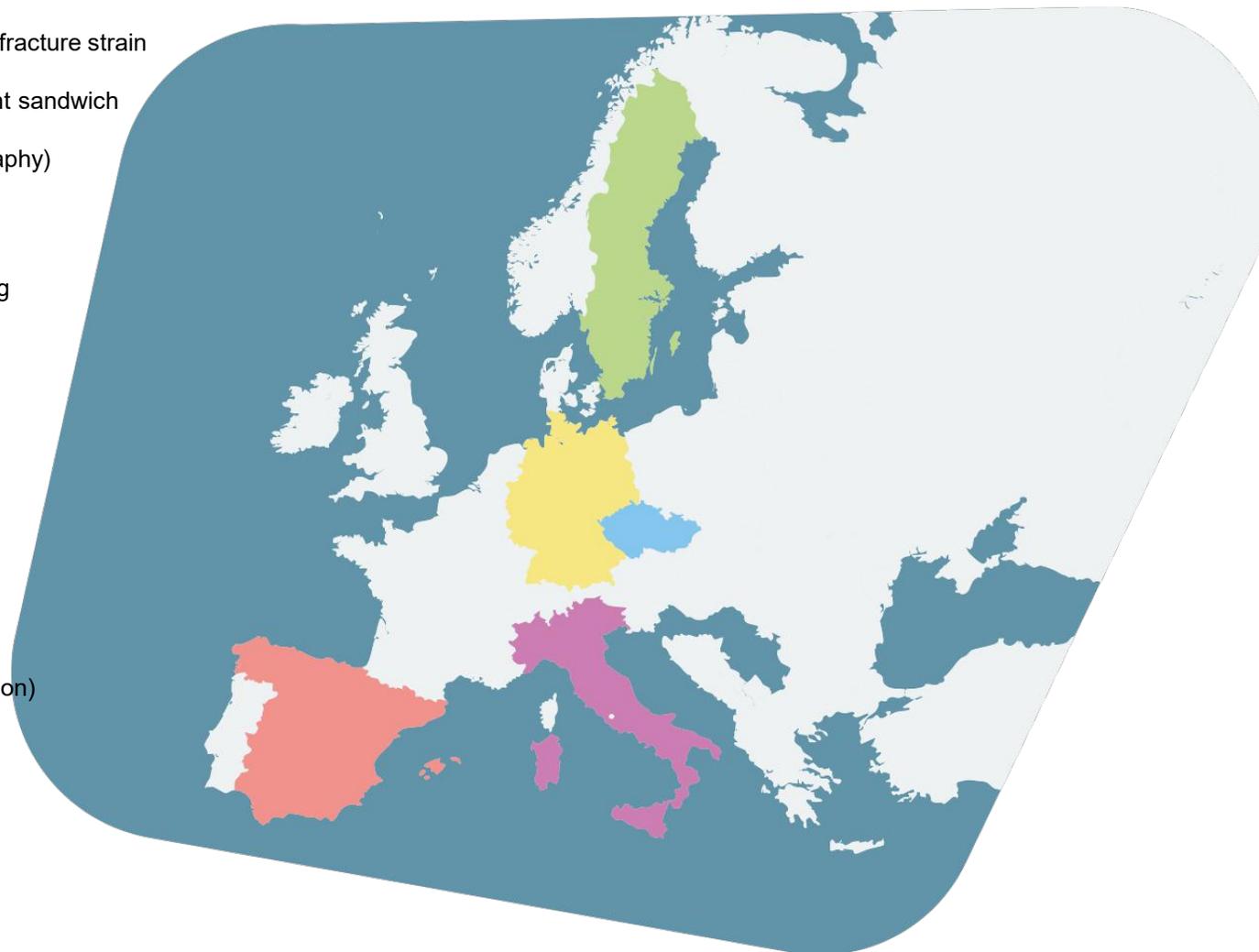
- Micro-tensile tests
- Crash resistance tests
- Improved FLC with non-linear strain path

UNIPI/LEMOTEC (IT)

- H-embrittlement tests
- FEM H embrittlement behavior
- Industrial on-line diffusible H measurement

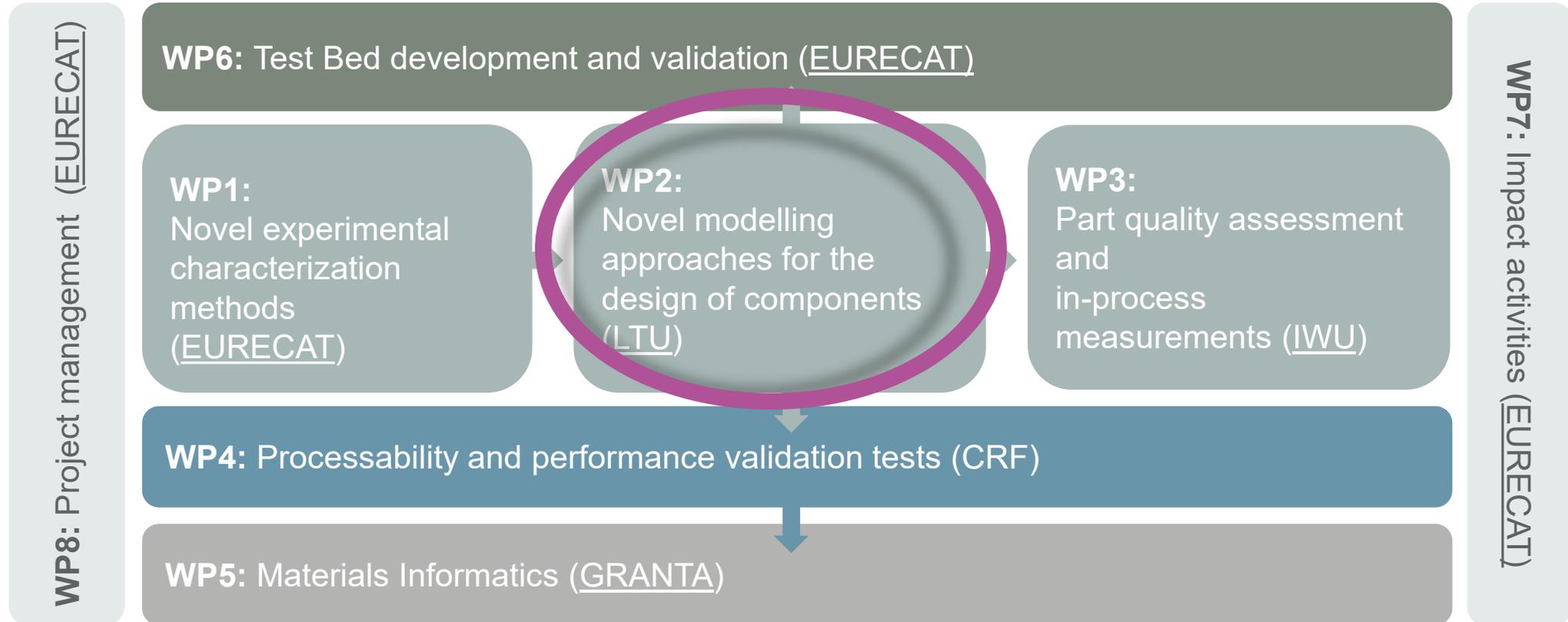
EURECAT (ES)

- Edge fracture resistance tests
- Micromechanical characterization (nanoindentation)
- Fracture toughness tests in thin and thick plates
- Fatigue tests (durability)
- Implementation of fracture mechanics based properties in FE modelling
- In-process failure detection by thermography
- Prototyping by incremental sheet forming





Modelling at the centre of the FormPlanet WorkPlan





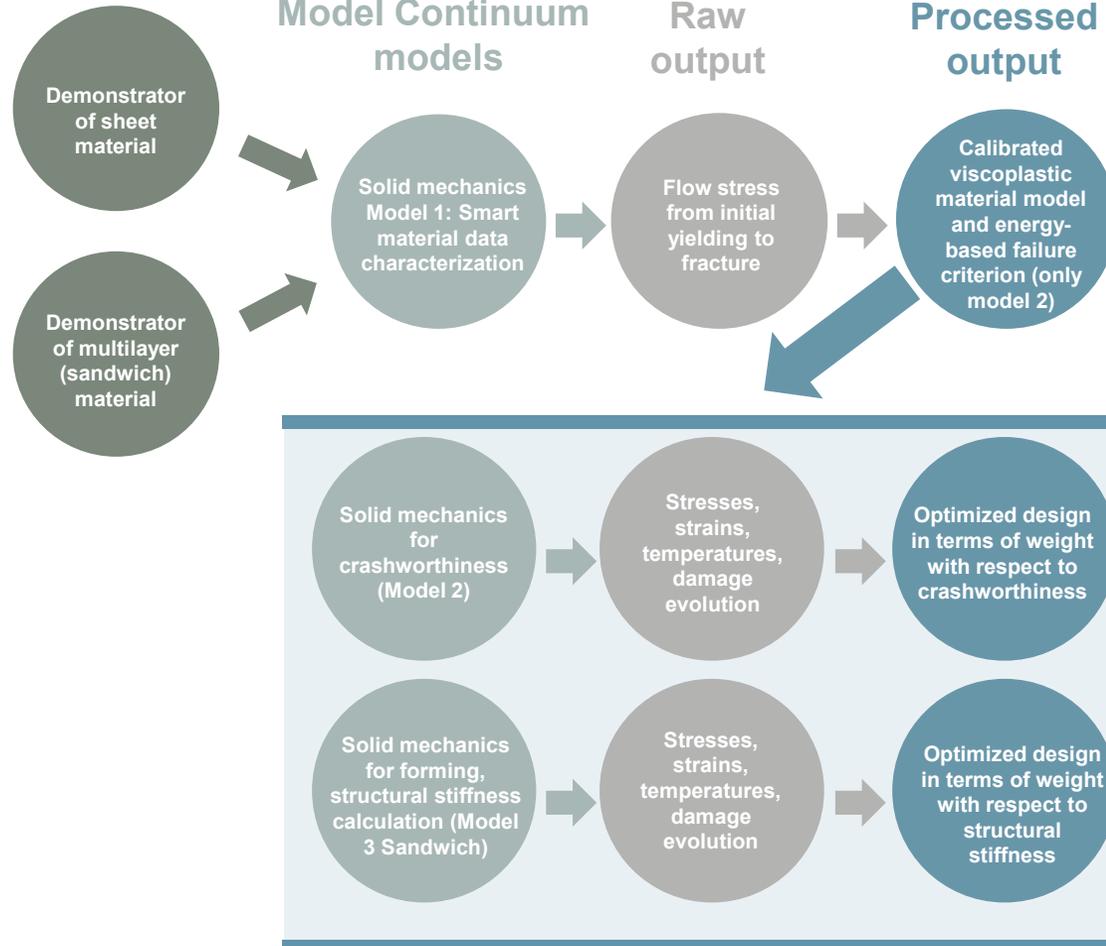
Modelling in FormPlanet



Modelling aims:

- Implement fracture-mechanics based failure criterion (FEM)
- Develop time and cost efficient characterization techniques of post necking behavior and failure
- Develop simulation methodologies for light-weight sandwich solutions

User case input





Modelling applied to a FormPlanet demonstrator:



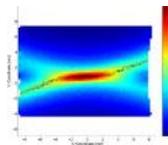
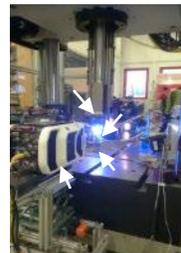
Multilayer sandwich material

Lamera

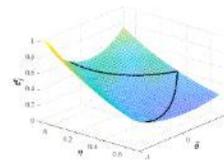
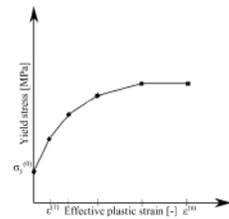
Battery pack containers of Hybrix™ lightweight material.



Model
Continuum
models



Raw
output



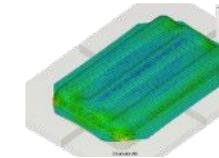
Processed
output

Calibrated
material
models
for FEA



FEA
of forming
operation

FEA
results



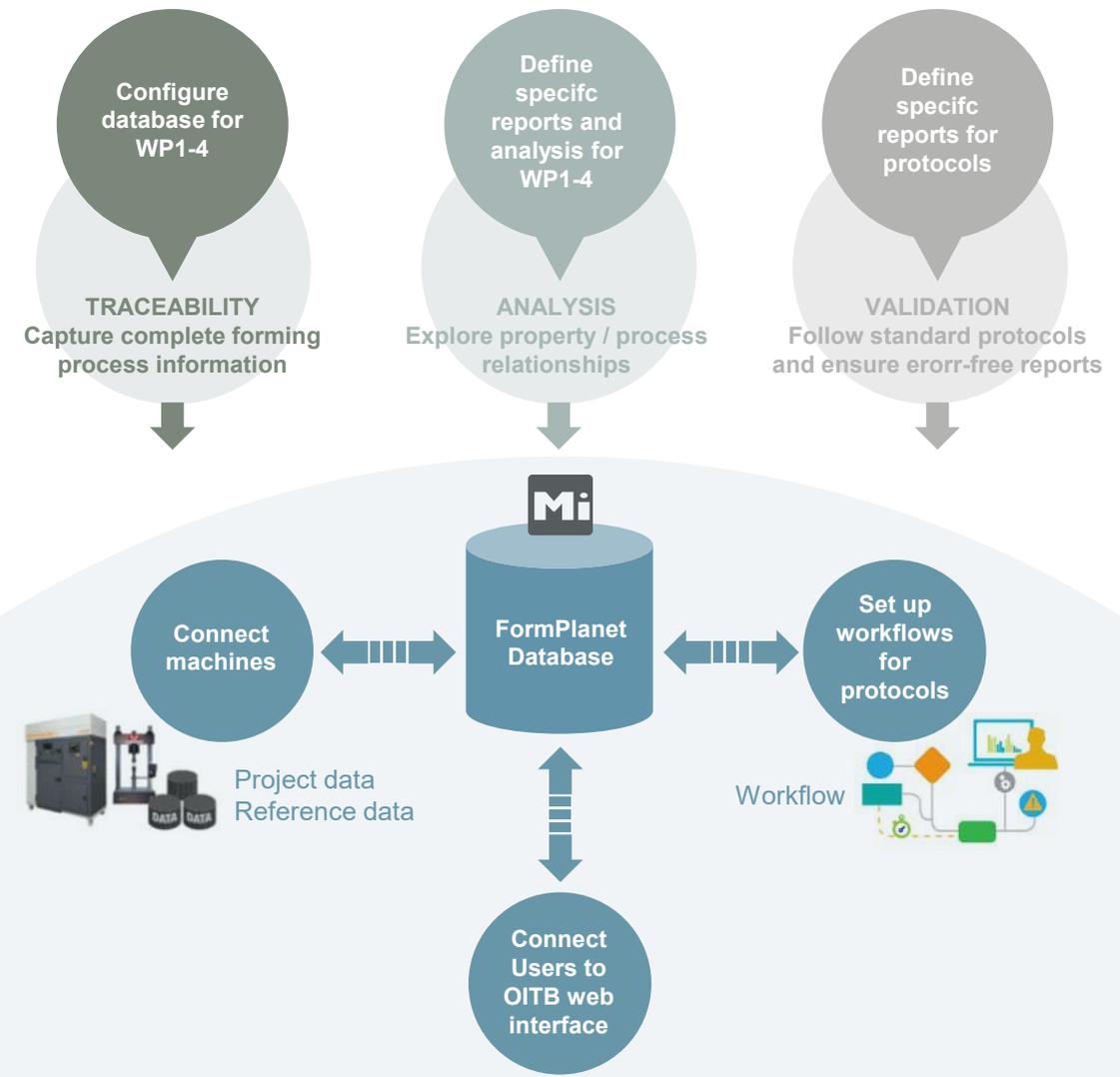
Optimized design in
terms of weight
with respect to
structural stiffness



Bringing value and impact for a company, while generating success stories to engage others.



Materials Informatics integrative role for Modelling and Characterisation





Modelling in the FormPlanet Test Bed exploitation



Target Customers: Companies in the sheet metal manufacturing value chain.

“Modelling only” business:

- **Modelling as a product:** Deliver calibrated proper models for direct implementation in a commercial FE code. Models calibrated by cost efficient experiments at circumstances reflecting the customer application.
- **Modelling as a service:** For instance, optimizing an structural component design made of High Strength Steel sheet, with respect to its crashworthiness.

“Modelling in a testbed service pack” business:

- **Modelling as a part of a more complex integrated service:** For instance, to support a component development service, where material, geometry and manufacturing process conditions are determined.

Which modelling exploitation route will be more demanded?

Which one generates more value to the customer company?





FormPlanet across innovation hubs and beyond



Open Test Bed business model

- Can other / existing modelling services be offered via FormPlanet testbed? **Yes!**
- Can FormPlanet models be re-used / offered via other modelling market places? **Yes!**

The EC funded Project plans to establish a “Minimum Viable FormPlanet Test Bed”:

- Developing a service portfolio complete and reliable enough to satisfy early customers.
- Demonstrating an integrated operational functioning by a distributed network of physical labs.
- Showing financial sustainability without public funding (from the EC or others), after the project end.

Future possibilities:

- On line modelling services?
- ...?





On Eurecat



Eurecat, the main technology center in Catalonia



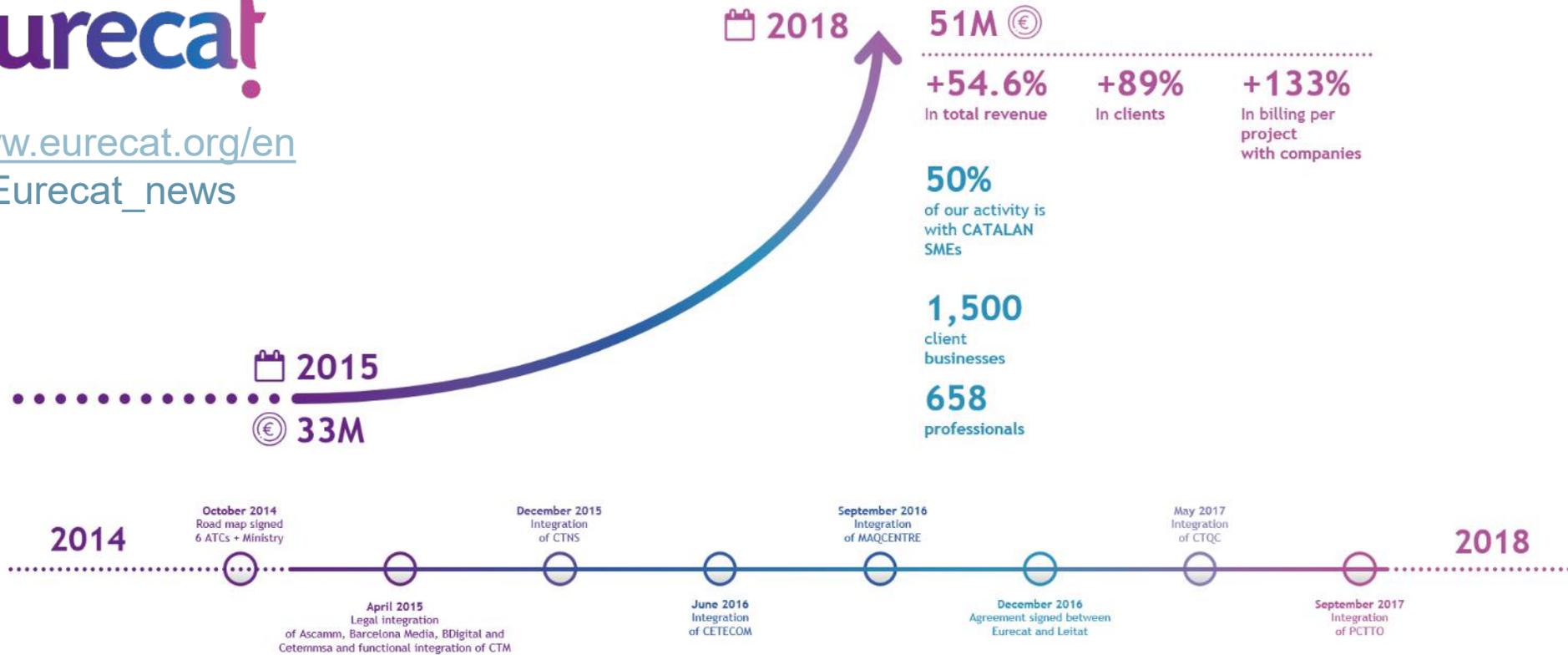
Mission

Becoming a key agent in public-private cooperation for research and innovation.



www.eurecat.org/en

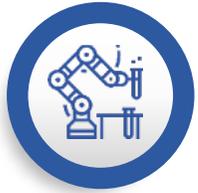
@Eurecat_news





Eurecat, fields of knowledge

eurecat



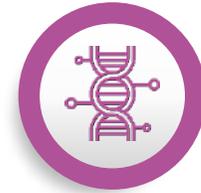
Industrial area

1. Advanced materials and manufacturing processes
2. Functional printing
3. Interactive and autonomous robotics
4. Sustainability



Digital area

1. Data science & Big Data analytics
2. Artificial Intelligence and IoT
3. Multimedia technologies and user experience
4. Cybersecurity



Biotechnology area

1. Omic sciences
2. Food safety and toxicity
3. Bioactive components



160

Large R&D projects



81

patents



7

spin-offs

In Europe: H2020 + FP7: 116 projects, 30% coordinated





esther.hurtos@eurecat.org

A project coordinated by:

eurecat



This project has received funding from the EU's Horizon 2020 research and innovation programme under grant agreement No 814517.