



INNOVATION
PLASTURGIE
COMPOSITES



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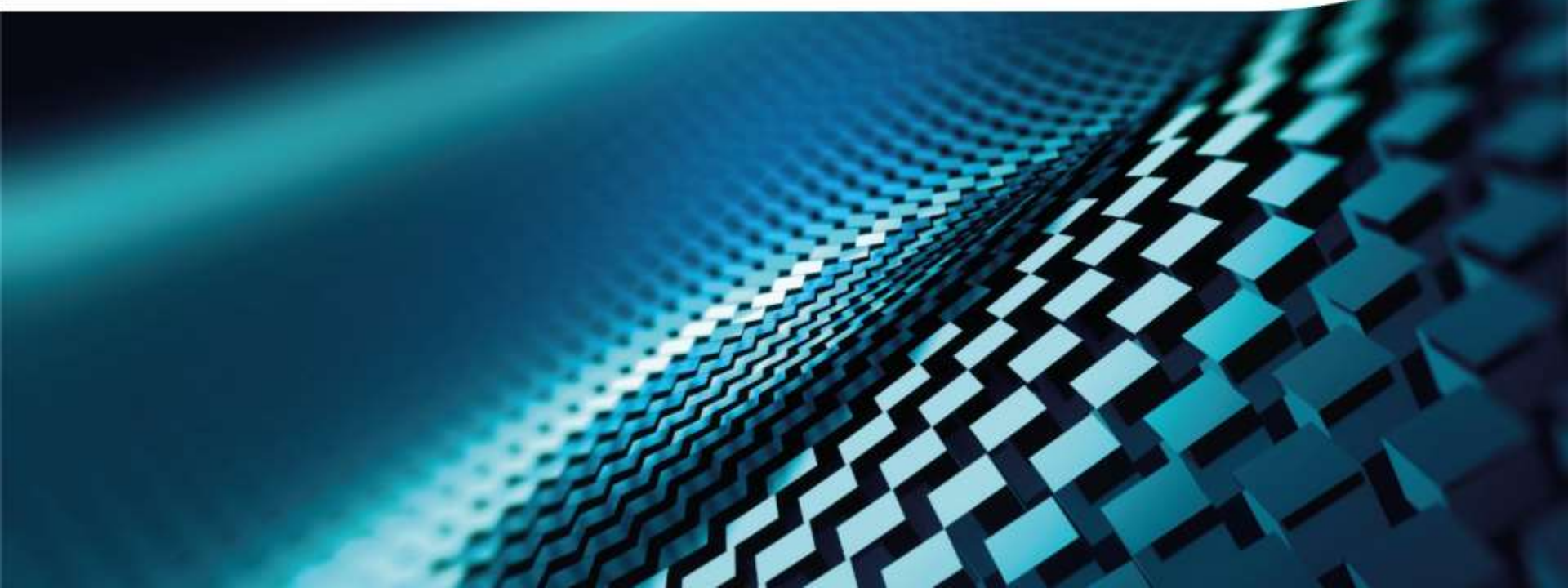


EMMC INTERNATIONAL WORKSHOP

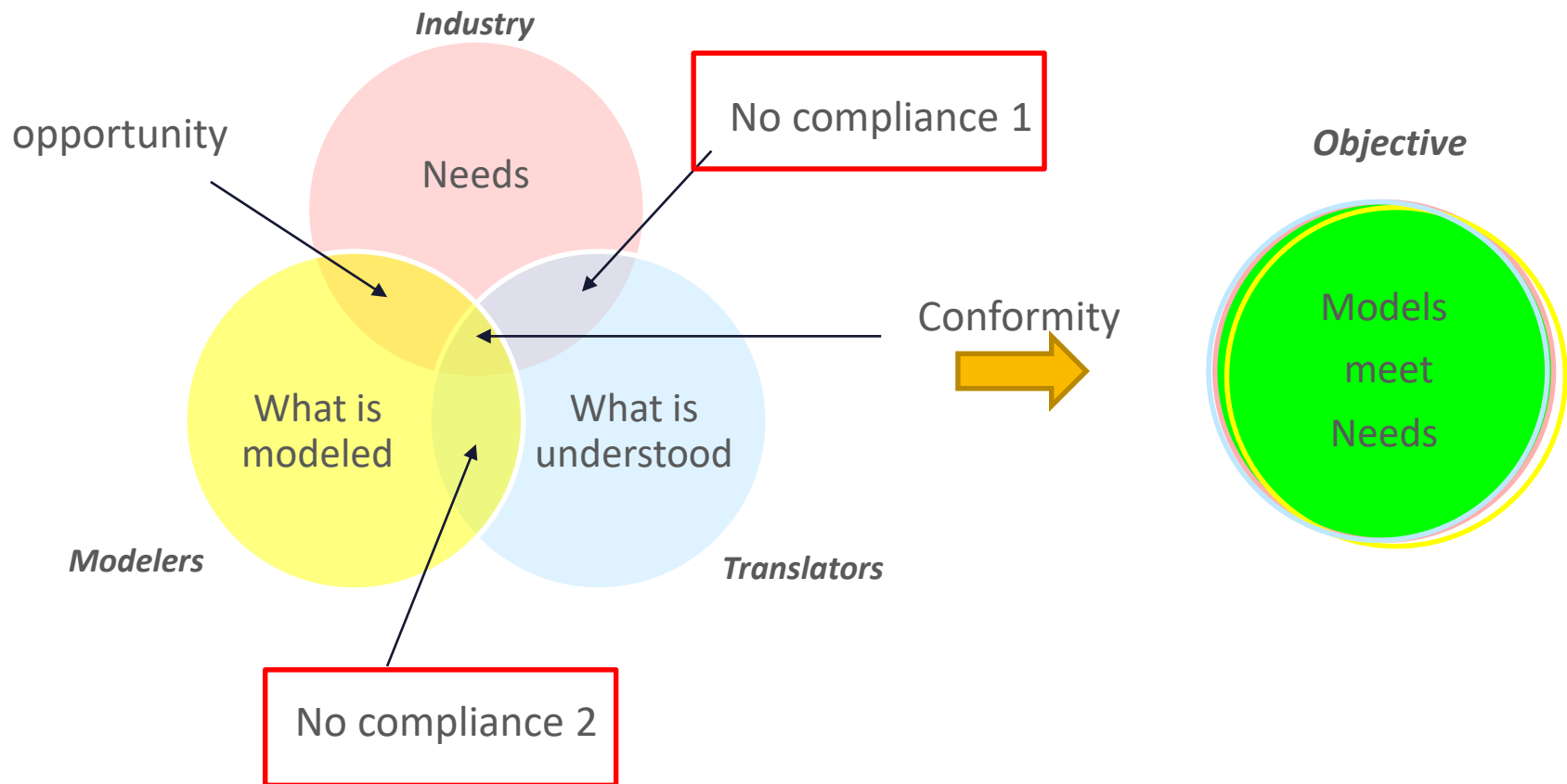
SESSION 3: TOWARDS THE TRANSLATOR AS A KEY PROFESSIONAL

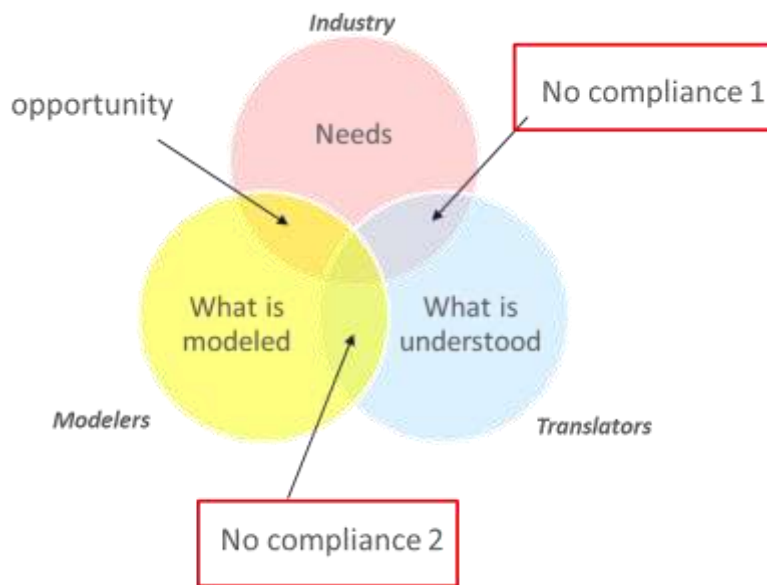
February, 25th 2019, Vienna

How to make an academic a professional translator ?



➡ Translation = bridging the gap between modellers and industry





Industrial Translator:

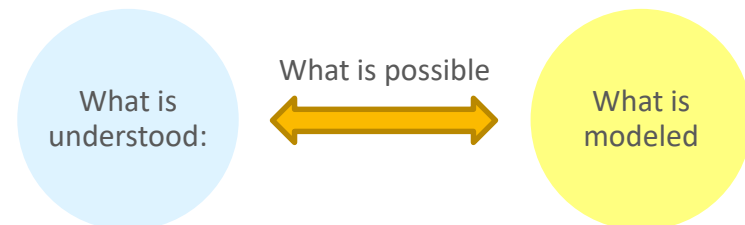
- + Closed to the industrial need ●
- Often not aware of the full potential of modelling ➡ **No compliance 1**

Academic translator:

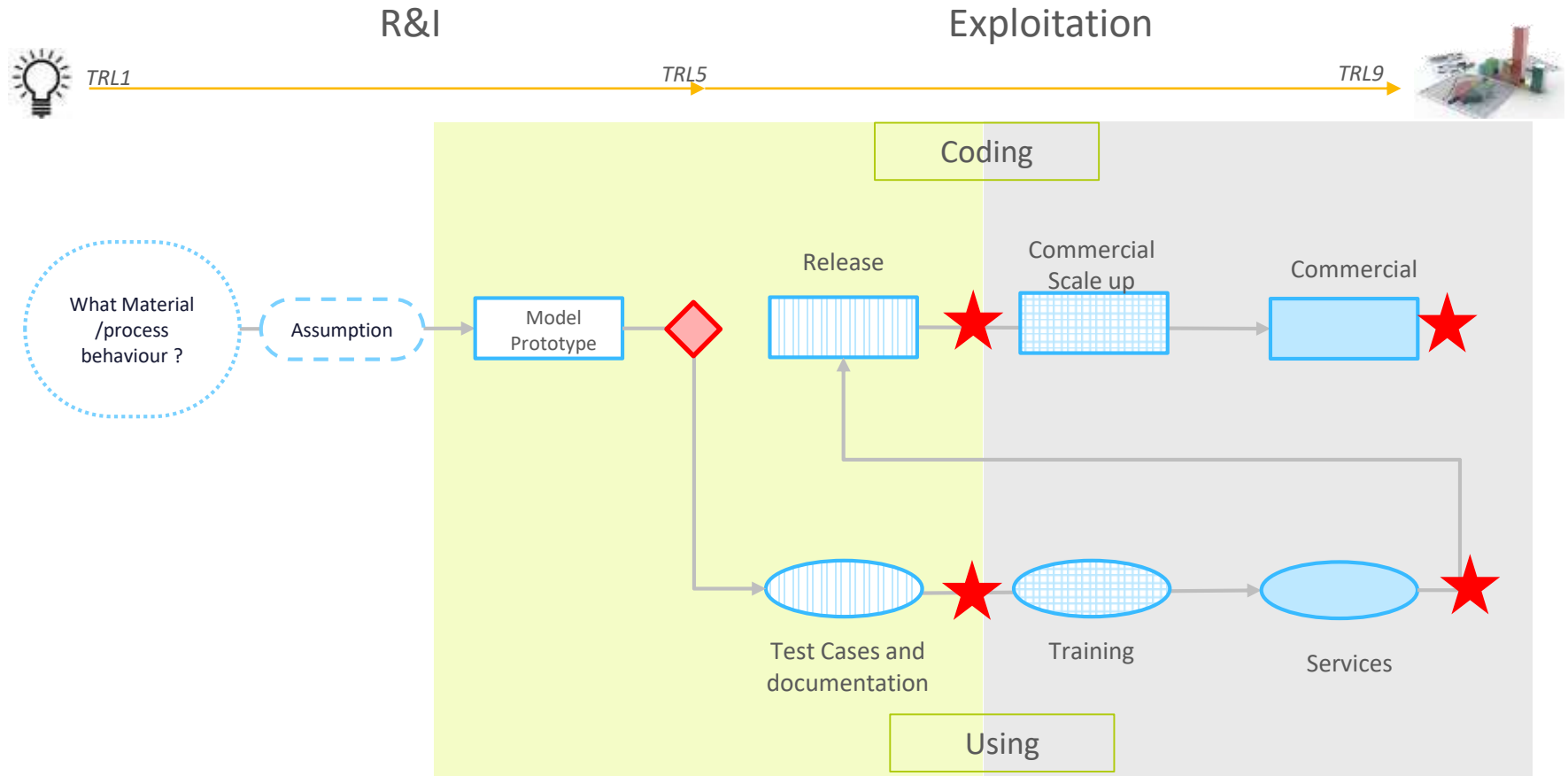
- + Own advanced model for new potential needs ●
- Often not fully aware of the constraints of industrial problems ➡ **No compliance 2**

Challenge:

Understand both worlds and speak both languages!



What is possible ? Models maturation sequence



Academic models
Commercial models



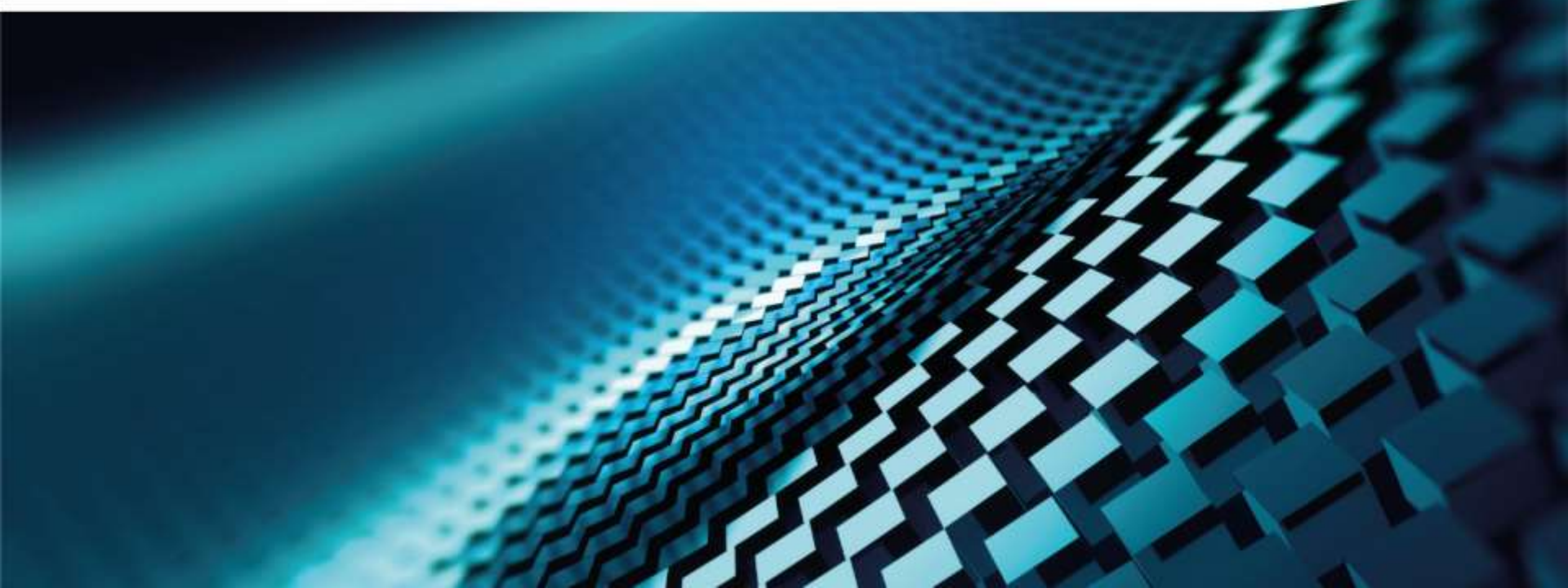
Crossroads

- Quality of the code
- Experimental validation



OK for translators

Academic translator in practice



IPC at a glance

IPC is an Industrial Technical Centre whose expertise is dedicated to innovation in plastics and composites in France. Since 2016, the profession has new means to support all companies, especially micro-enterprises and SME, regardless of the process used, thanks to a contribution established to finance R&D, innovation, technology transfer and skills.

OUR GOAL :

To improve the **competitiveness of our national industry** through **innovation** and the supply of **technological means for participating industrial beneficiaries**.



EXPERTISE
RESEARCH &
DEVELOPMENT

Our activities

- R&D
- Services
- Collective actions
- Training

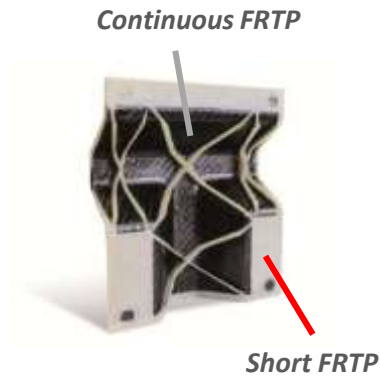
Our competencies

- Smart Materials
- Design & simulation
- Additive Manufacturing
- Smart Hybrids
- Recycling

Case 1 : Composite process modelling

➔ Needs

- Improve and validate manufacturing of a structural composite thermoplastic product by hybrid overmoulding
 - By improving modelling accuracy
 - By designing a demonstration tools
- The product is a combination of :
 - Continuous Fibre Reinforced Thermoplastic composite (CFRTP)
 - Short Fiber Reinforced Thermoplastic (SF RTP)

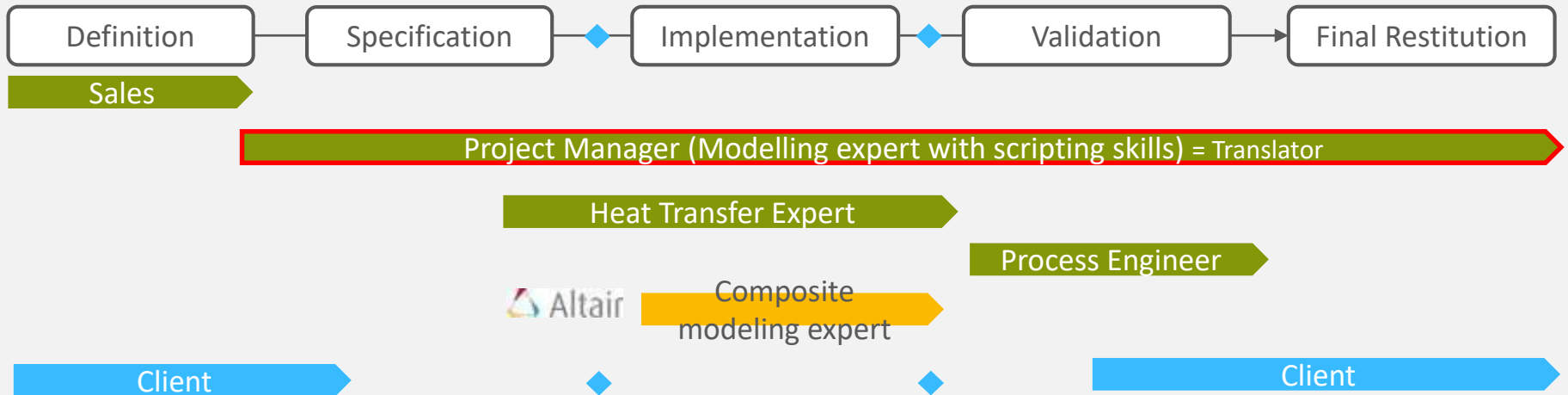


➔ Challenges

- Interoperability, combination into a workflow of different models
- Handle subcontracting for composite process modelling

Case 1 : Composite process modelling

➡ Commercial Strategy



- Subcontractor : our first choice was an academic but answer too ambitious in the frame of the project

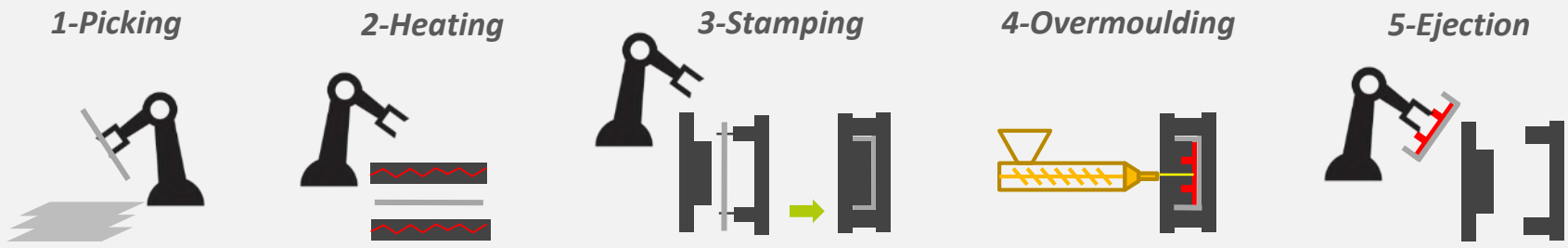


Translation risk: over-promised

Case 1 : Composite process modelling

Process Workflow

— Continuous FRTP
 — Short FRTP



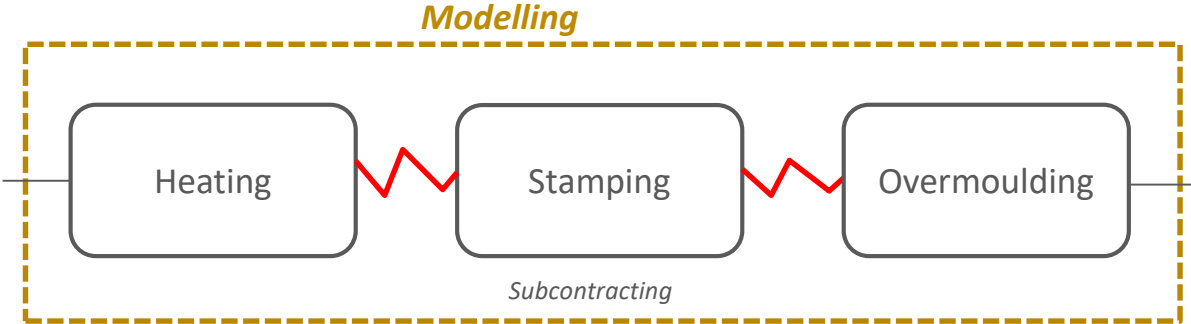
Several steps

Many material parameters into account (number of plies, thicknesses, woven structure...)

Modelling Workflow

Material input

- CFRTP
- SFRTTP



Material output

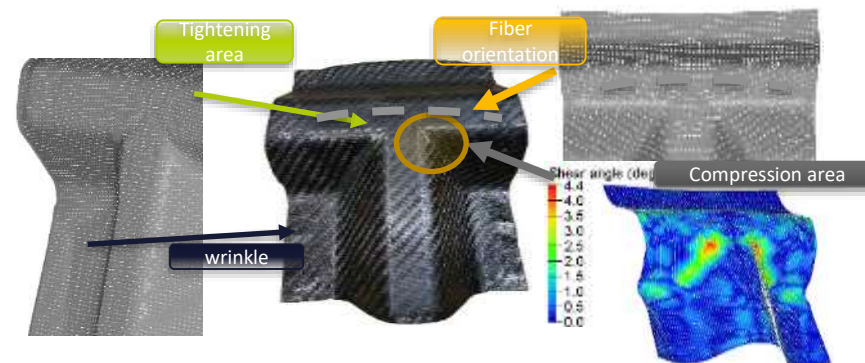
- Fiber orientation
- Warpage
- Polymer Flow
- Internal stresses

 Link to chain models

Case 1 : Composite process modelling

➔ Results

- A better definition of the process sequence
 - Shorten the cycle time
 - Increase robustness
 - Reduce trial and experiments
- A improvement in product design
 - Crash engineers
 - To get fiber directions due to forming history
 - Product engineers
 - To study formability
 - To optimize the initial flat ply shape to avoid wrinkles



Case 1 : Composite process modelling

⌚ Lesson learned

1. Be modest
 - Right expert facing the right problem (models map vs expert map)
 - Large models possibilities : choose the best approach

2. Be pragmatic
 - Cost and delay to respect
 - Availability of material data (!! vs what is possible !!)

3. Be agile
 - Different scenario in mind

Case 2 – Injection tool modelling

➔ Need

- Design a new version of a body actuator mold.
 - The product is made by injection
 - The actual mold lifetime is over
- Improve the manufacturing performance of production :
 - by improving quality
 - by increasing productivity

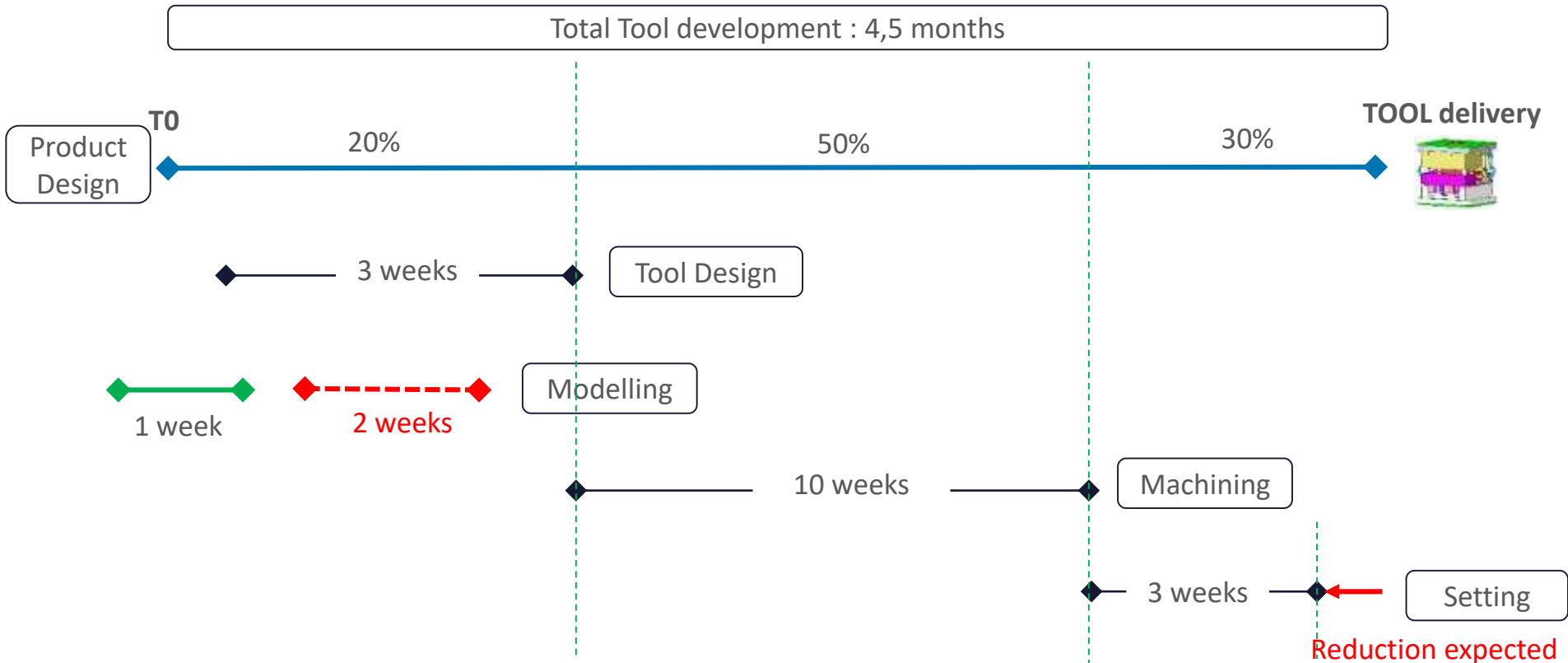


➔ Challenge

- SME
- Integrate advanced modelling
- Tool delivery time respect

Case 2 – Injection tool Design

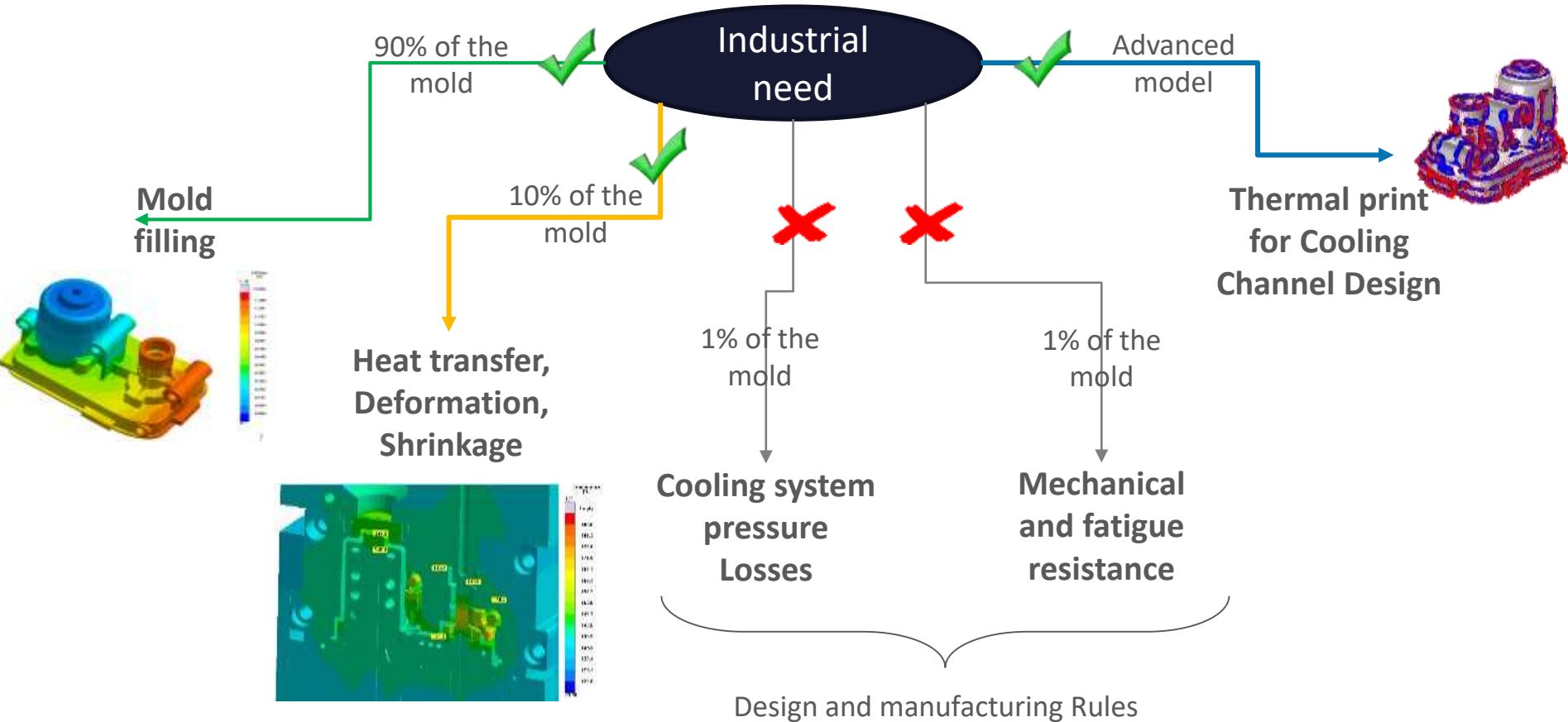
Challenge



**Budget for the modelling step (including overcost) : 10 000 €
without delay for the design phase**

Case 2 – Injection tool Design

Modelling scenarios



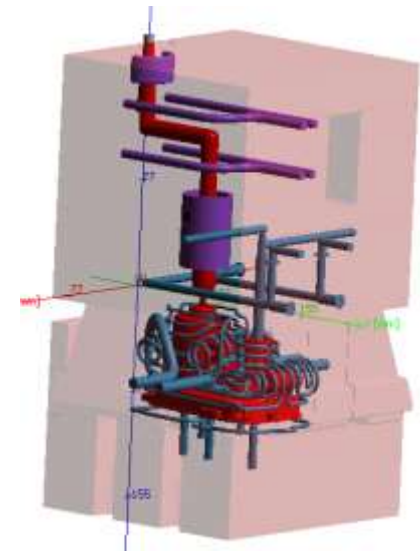
Case 2 – Injection tool Design

➡ Results

- Direct outcome
 - Productivity : +35%
 - Quality of product : +40%
- Indirect outcome : Decrease in mold tuning

➡ ROI

- Investment : 10000 €
- Direct benefit : 48 000 €
- Indirect benefit : 9000 €
- ROI : 4,7

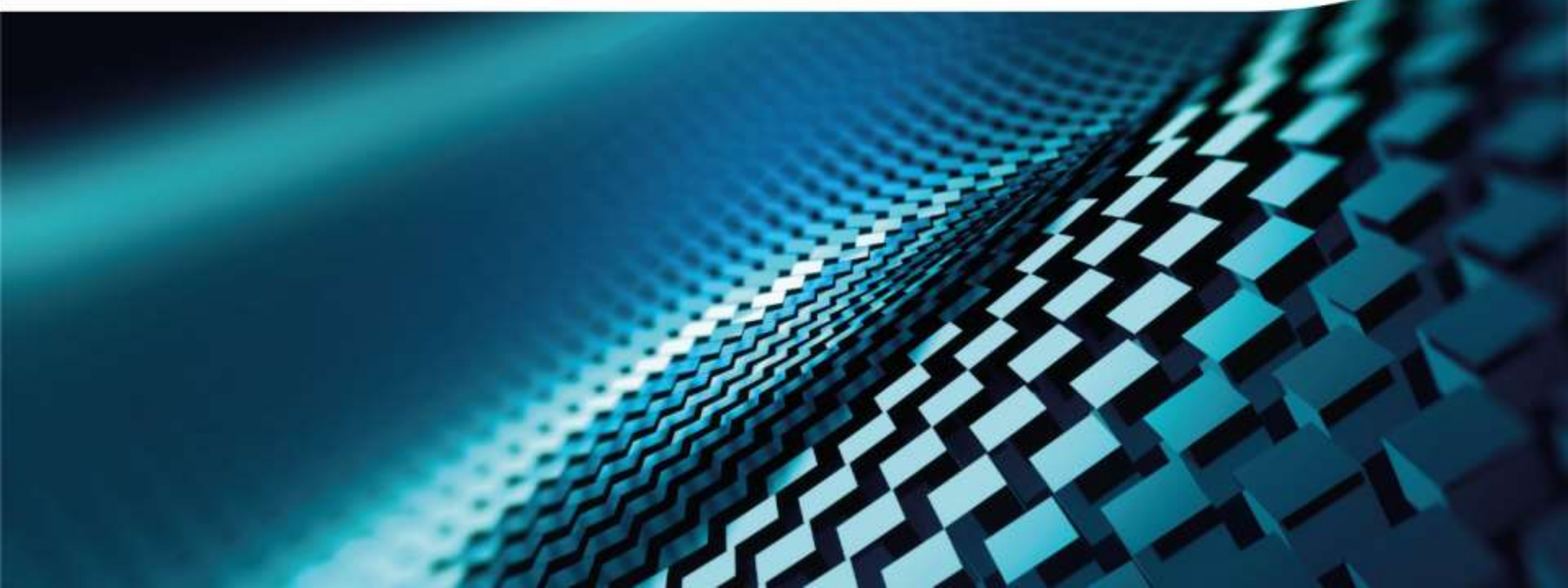


Case 2 – Injection tool Design

➡ Lesson learned

1. Be realistic
 - Balance between investments and expected return
2. One-shot models rarely succeed : Communicate with makers
3. Be a good teacher
 - During the quotation step
 - During the restitution

Conclusions



➡ Barriers for the translation process

- Identify suitable software modules for best compliance (quality, time, cost)
- Combination into workflows
 - Partnership or subcontracting management
 - Interoperability between models
- Accessibility to models / Flexible licensing models
 - Is translation possible without pay-per-use model & license server ?

➡ Business model for translation

- Need a differentiation between consultancy services
 - Capacity to provide customized workflows with neutrality
 - Access to a model database at different maturity levels
 - Collaborative model for workflow management

➔ Why

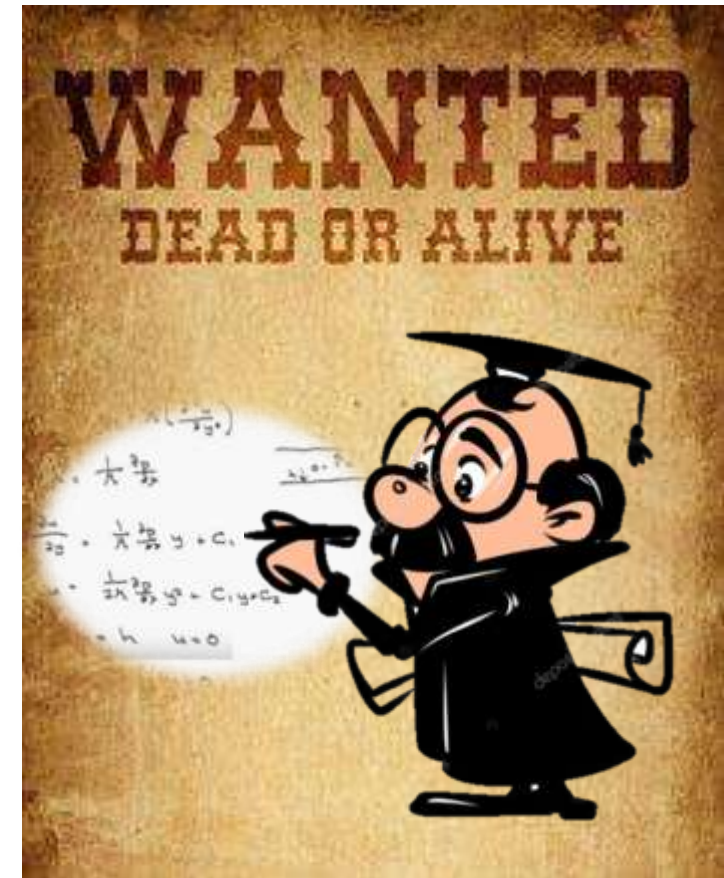
- Translate industrial need into models that “industrial” translator can’t handle
- Take advantage of academic models SoA

➔ Who

- Academic modeling expert with industrial vision

➔ How

- Large knowledge of models possibilities including commercial software
- Don’t mistake your models with reality : communicate with makers
- Balance between investments and expected return
- Give good argumentation on your choices



THANKS FOR YOUR ATTENTION !

