



The Confiance.AI Programme – Engineering dependable AI systems

Hugo Guillermo **CHALÉ GÓNGORA**

Director Product Line & Systems Engineering - Head Complex Distributed Systems
Thales Corporate Engineering
INCOSE PLE WG Outreach Lead

INCOSE AI Systems WG – AI Explorer 15th June 2022



MOST MATERIAL TAKEN FROM

2

Systems-of-Systems Conference, 8-10 June 2022, Rochester NY

Engineering Dependable AI Systems

M. ADEDJOUMA ^(a,b), Ch. ALIX ^(c), L. CANTAT ^(b), **E. JENN** ^(d,c)
J. MATTIOLI ^(c), B. ROBERT ^(d,b), F. TSCHIRHART ^(b), J.-L. VOIRIN ^(e)

^(a)CEA, France – ^(b)IRT SystemX, France - ^(c)Thales, France - ^(d)IRT Saint Exupery, France - ^(e)Thales DMS, France

See <https://www.confiance.ai/>

THE CONFIANCE.AI PROGRAMME

3

TECHNOLOGY



- Reliability, robustness
- Lawfulness & Compliance
- Accuracy
- Security
- Safety

INTERACTIONS



- Transparency
- Explainability
- Accountability
- Oversight & control

ETHICS



- Fairness
- Privacy
- Diversity & inclusion
- Sustainability

45M€ budget

Confer to industrial partners the means to develop new critical systems, products and services based on trustworthy AI

FEDERATIVE ENVIRONMENT, METHODS, TOOLS AND USE CA
Open / Interoperable / Maintained



QUALITY ASSURANCE – ENGINEERING



AIRBUS

Air Liquide

Atos



Inria

NAVAL GROUP

Renault Group

SAFRAN



sopra+steria

SystemX

THALES
Building a future we can all trust

Valeo

www.confiance.ai

Programme focus areas

FEDERATIVE ENVIRONMENT, METHODS, TOOLS AND USE CASES

Open / Interoperable / Maintained

Data
and knowledge

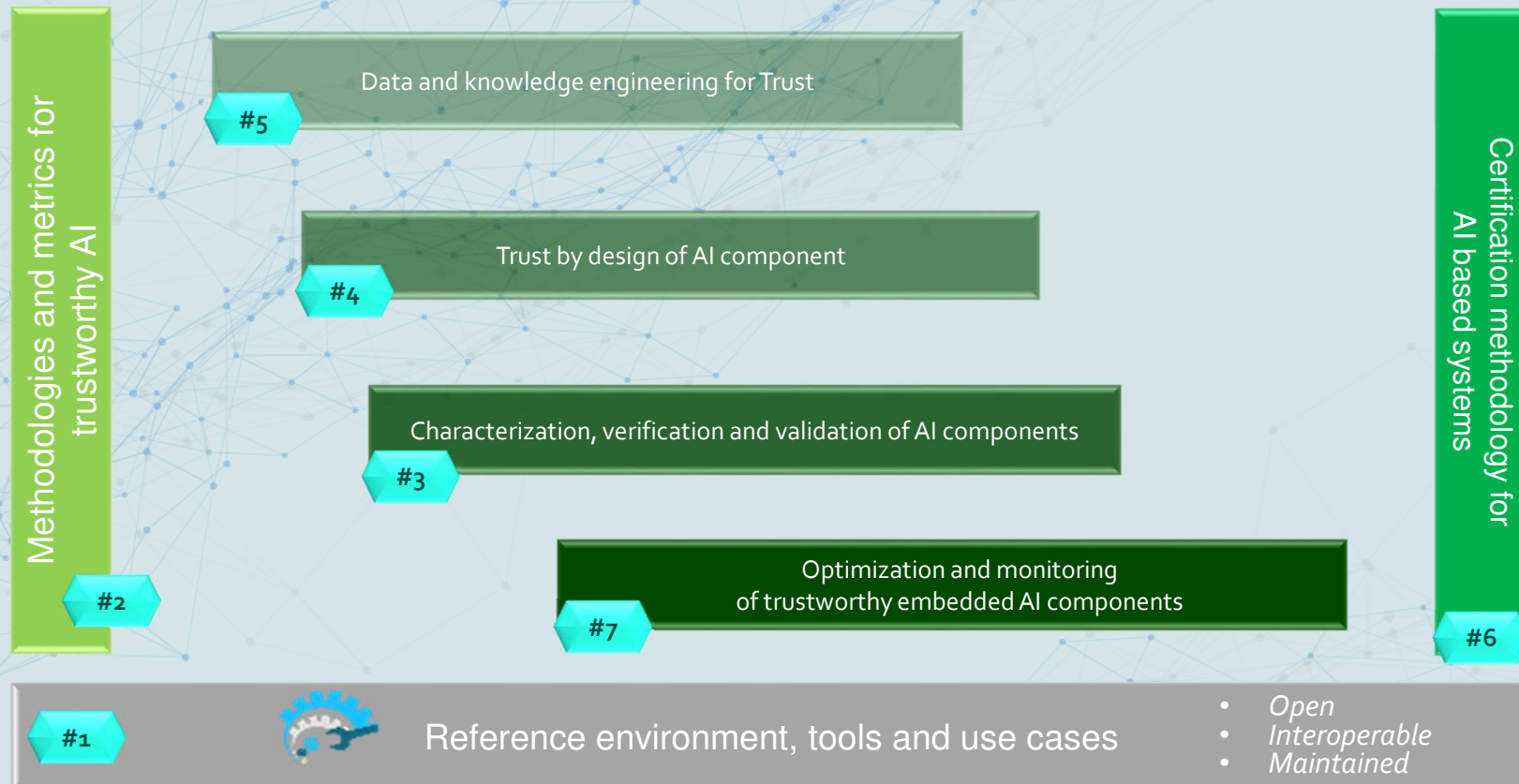
Design

Evaluation

Embedded
systems

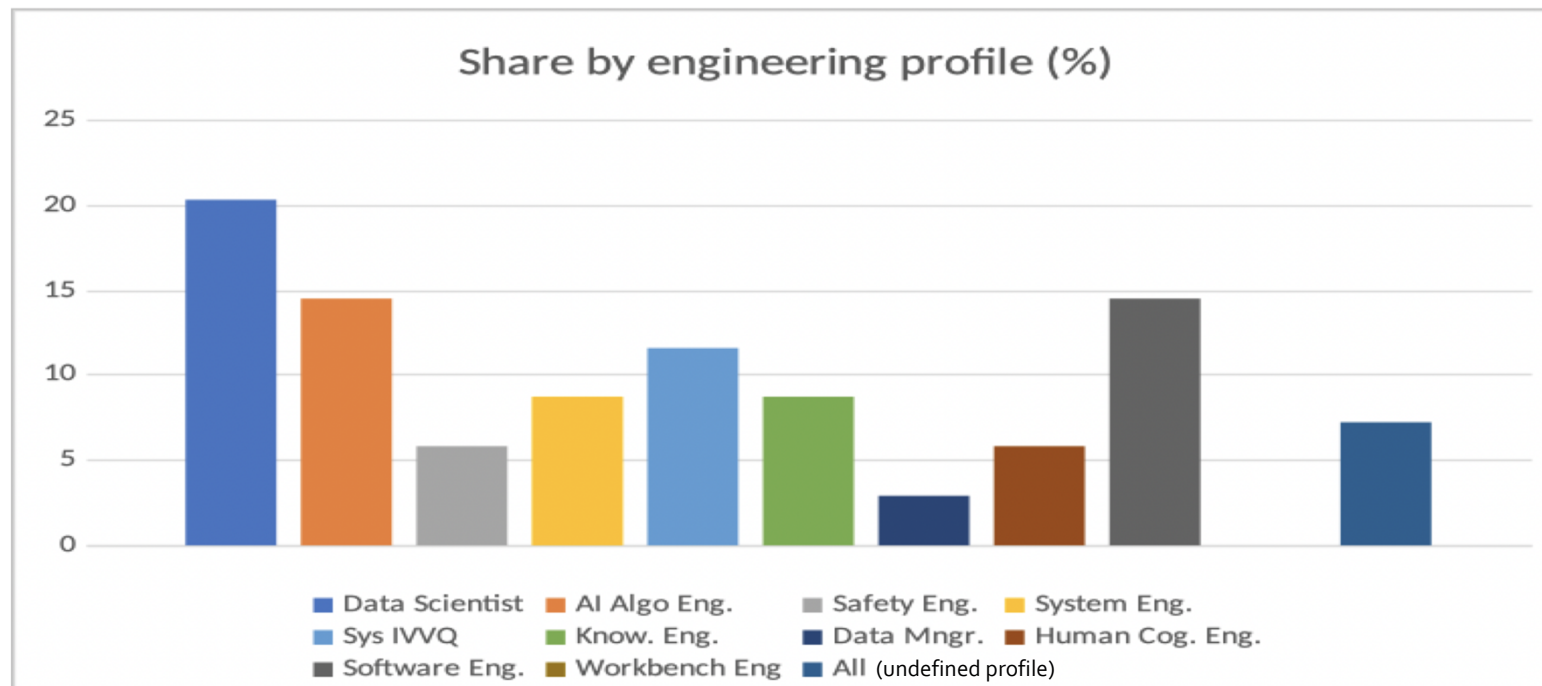
QUALITY ASSURANCE – ENGINEERING

Programme organisation



INDUSTRIAL PARTNERS INTERVIEWS, AN HEAVY PROCESS

- 9 Industrial Partners, 1 questionnaire, 10 different interviewee profiles
- Preparation, dissemination/collection, results processing - Jan to Dec 2021
- 52 completed questionnaires of 140 questions (some not answered)
- 3583 responses to individual questions, classified in 18 subjects



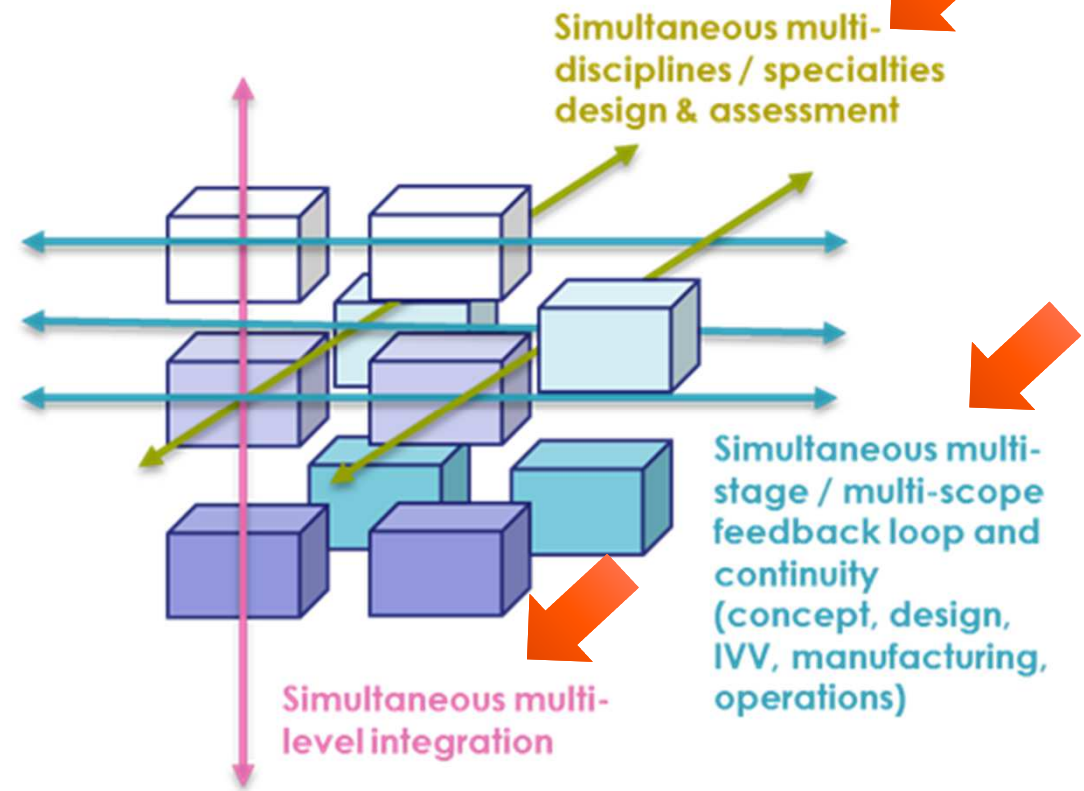
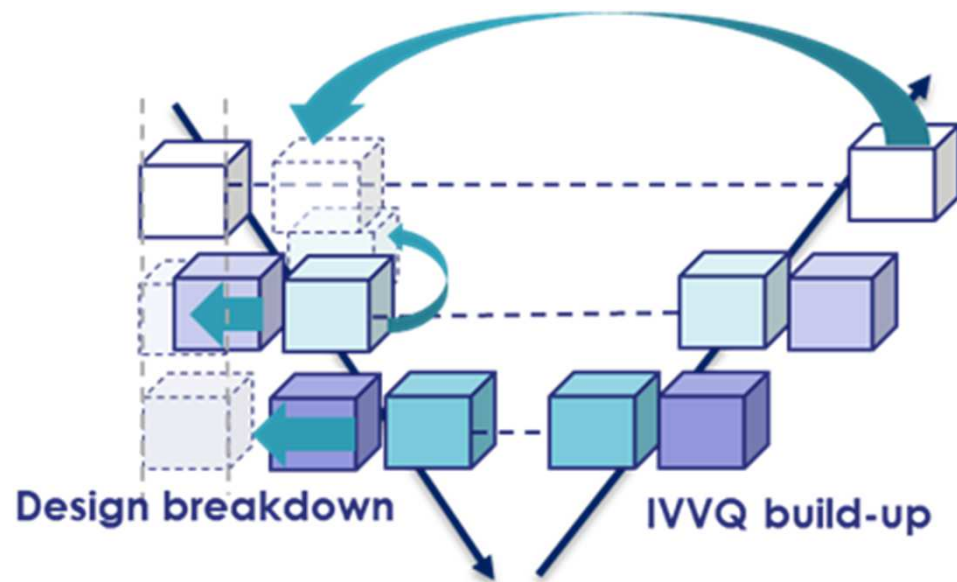
Subject	#
Confidence	5
General	12
Algorithm	3
Data	16
HCI	7
Knowledge-based	14
Machine learning	9
ODD	6
Requirements	9
Design	6
Assessment	6
Deploy	20
Supervision	6
Certification	8
Interoperability	2
Lifecycle	2
Safety	2
Other	8

INDUSTRIAL PARTNERS INTERVIEWS, MAIN HIGHLIGHTS

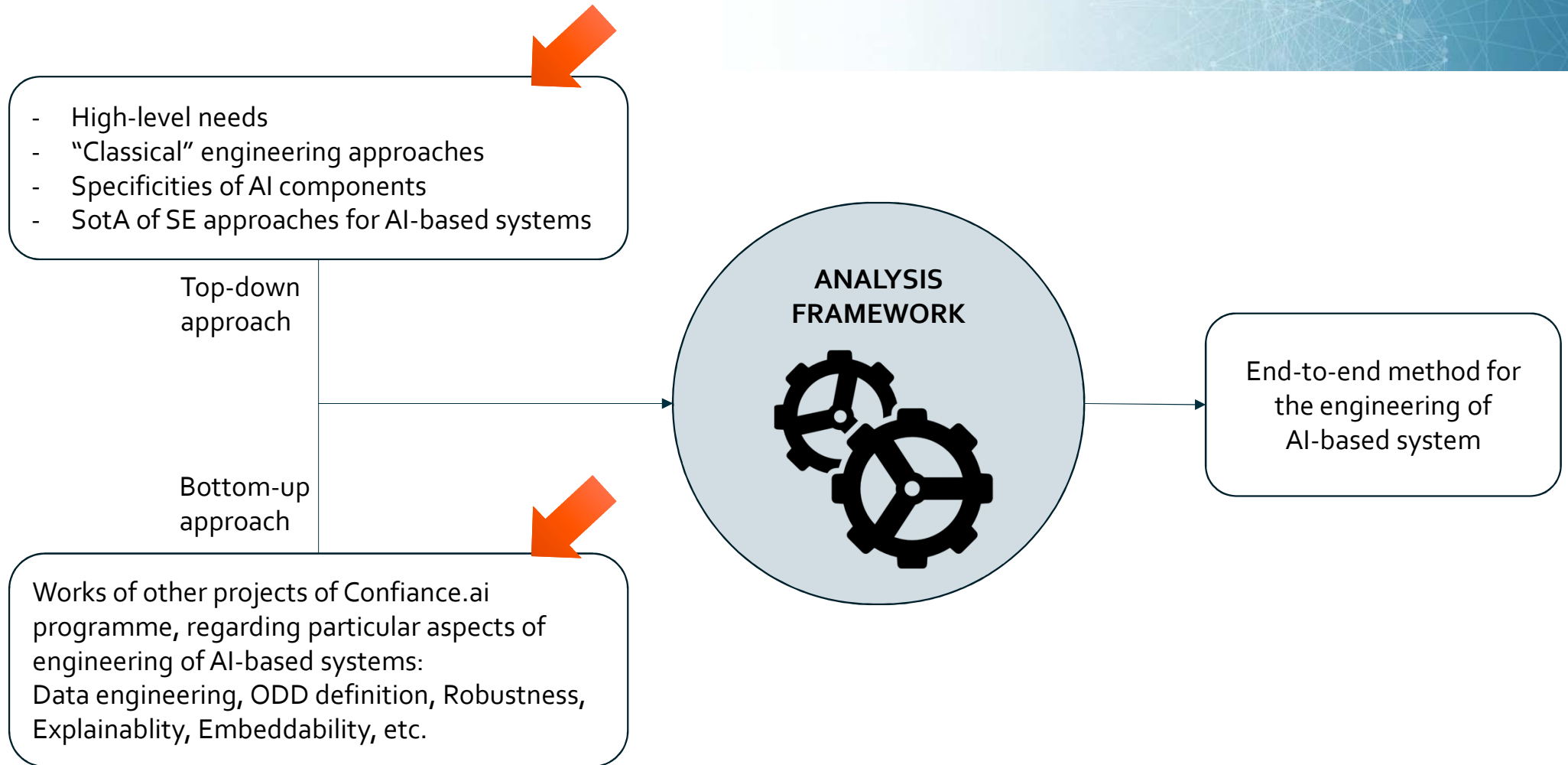
- Many industrial partners already implemented AI components in a solution, and plan to do it for more and more applications in almost all activity domains
- Lack of methods and tools around the Operational Design Domain (definition & monitoring)
- Commercial ML tools are widely used without any complaint in upstream phases
- Knowledge-based approaches are little used
- AI agent are expected to behave as trustworthy co-workers
- There are concerns about safety when using AI components for mission and/or safety critical systems
- Little use of methods for design, assessment, deployment, monitoring, certification of AI components

**High expectations of Confiance.ai
Support transition from Proofs of Concepts to Dependable Systems (of
Systems) engineering**

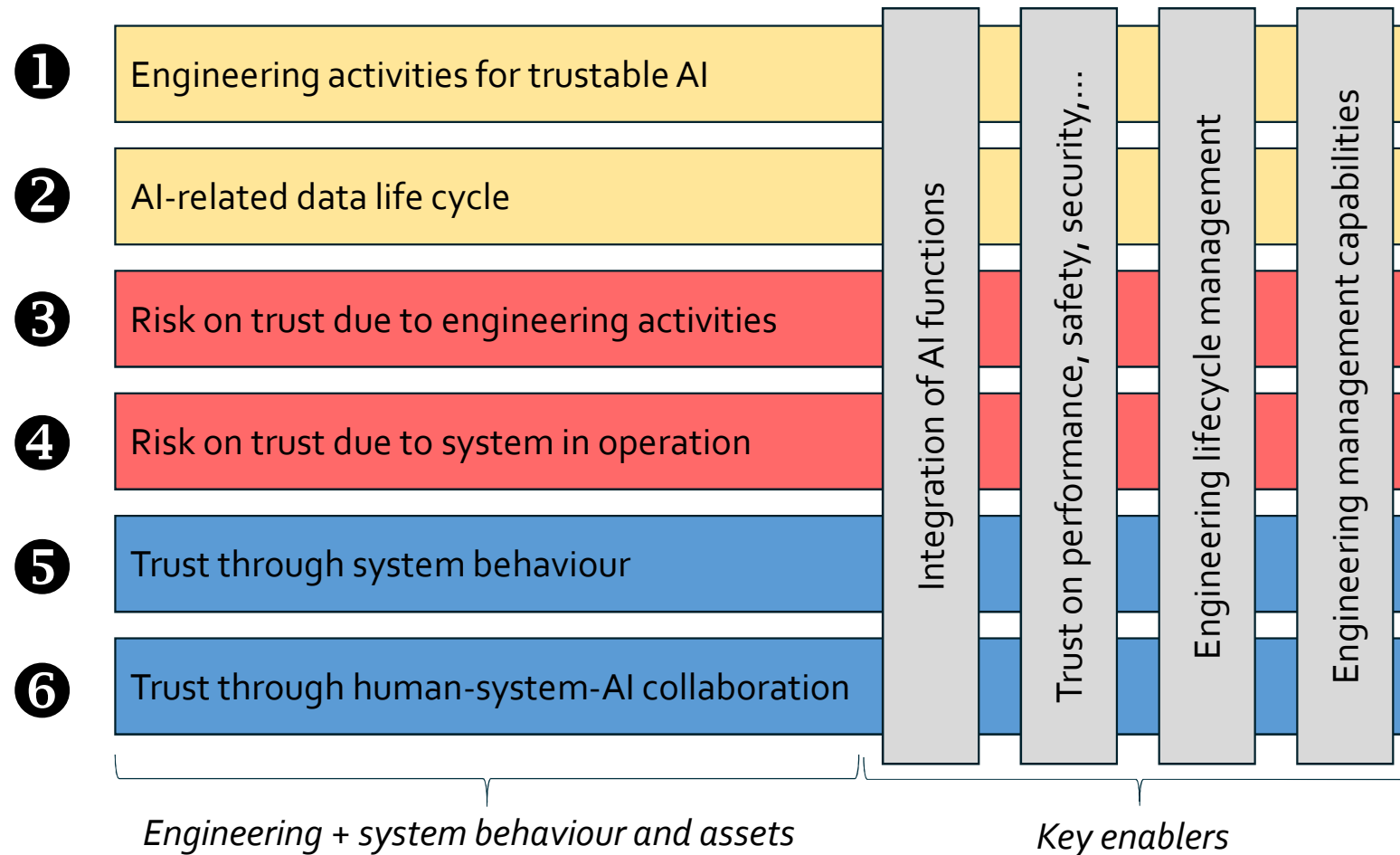
TARGET : AN END-TO-END METHOD TO ENGINEER DEPENDABLE AI-BASED SYSTEMS



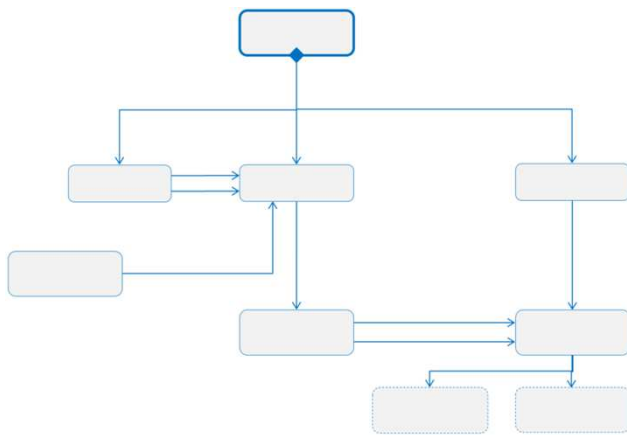
NEEDS FOR AN ENGINEERING ANALYSIS FRAMEWORK



THE ANALYSIS FRAMEWORK IS BASED ON SEVERAL VIEWPOINTS



DEFINITION AND IMPLEMENTATION OF VIEWPOINTS

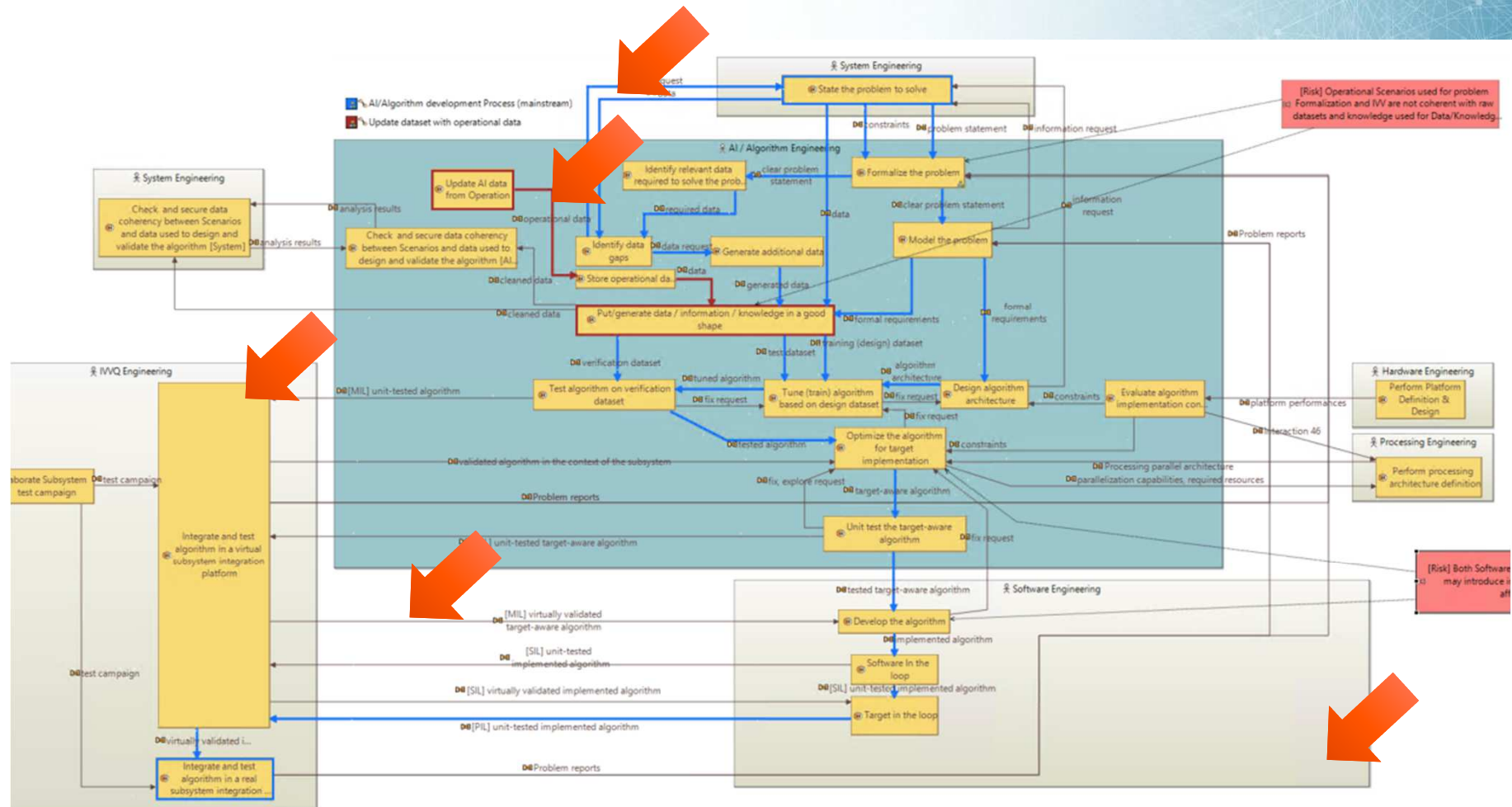


Each Viewpoint is associated with a meta-model

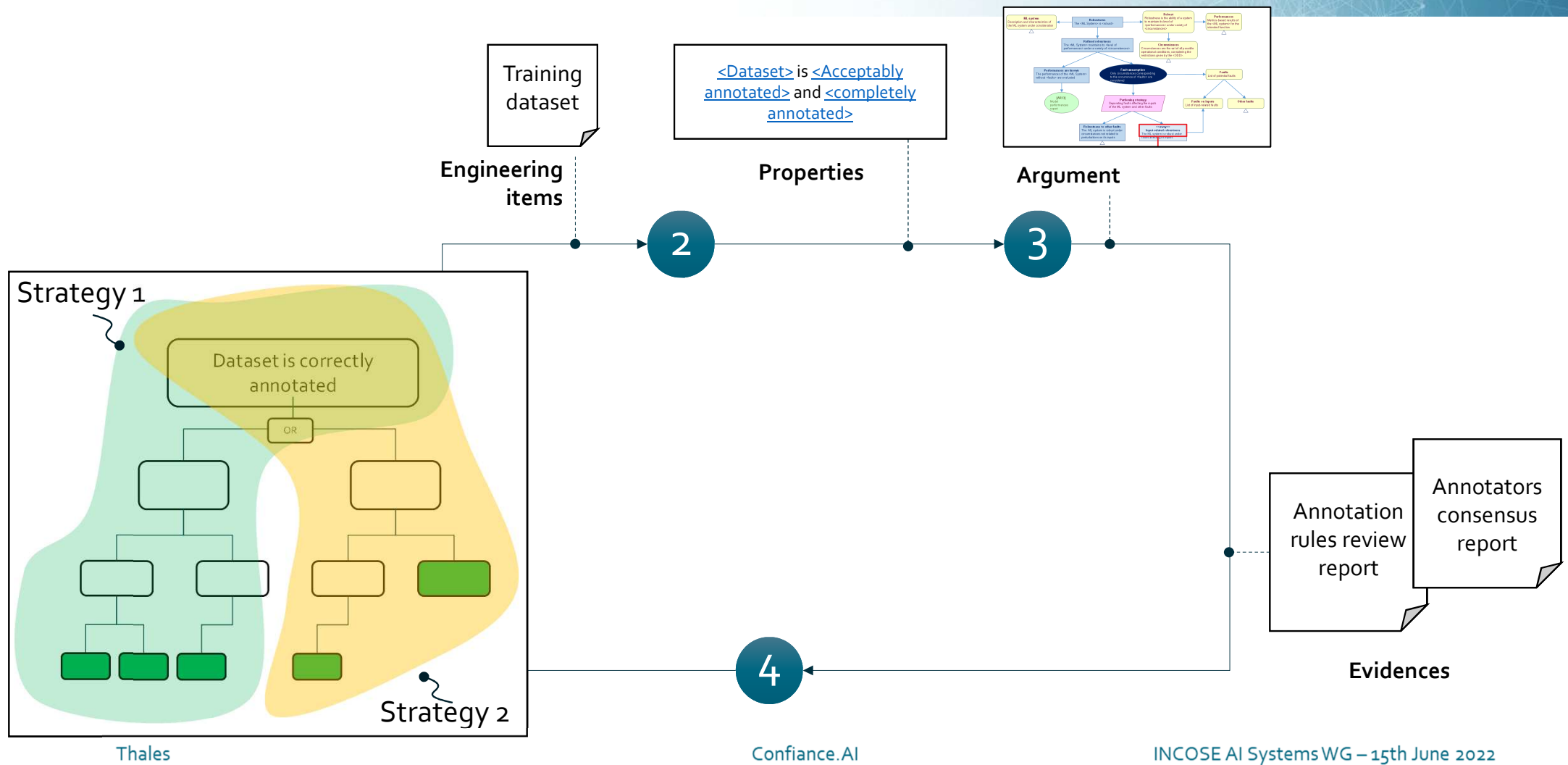
Implementation of each concept of the meta-model by a modeling object

In our case: an adaptation of the ARCADIA method and Capella tool...
But this could be done with different frameworks.

EXAMPLE OF MODELING THROUGH THE ANALYSIS FRAMEWORK

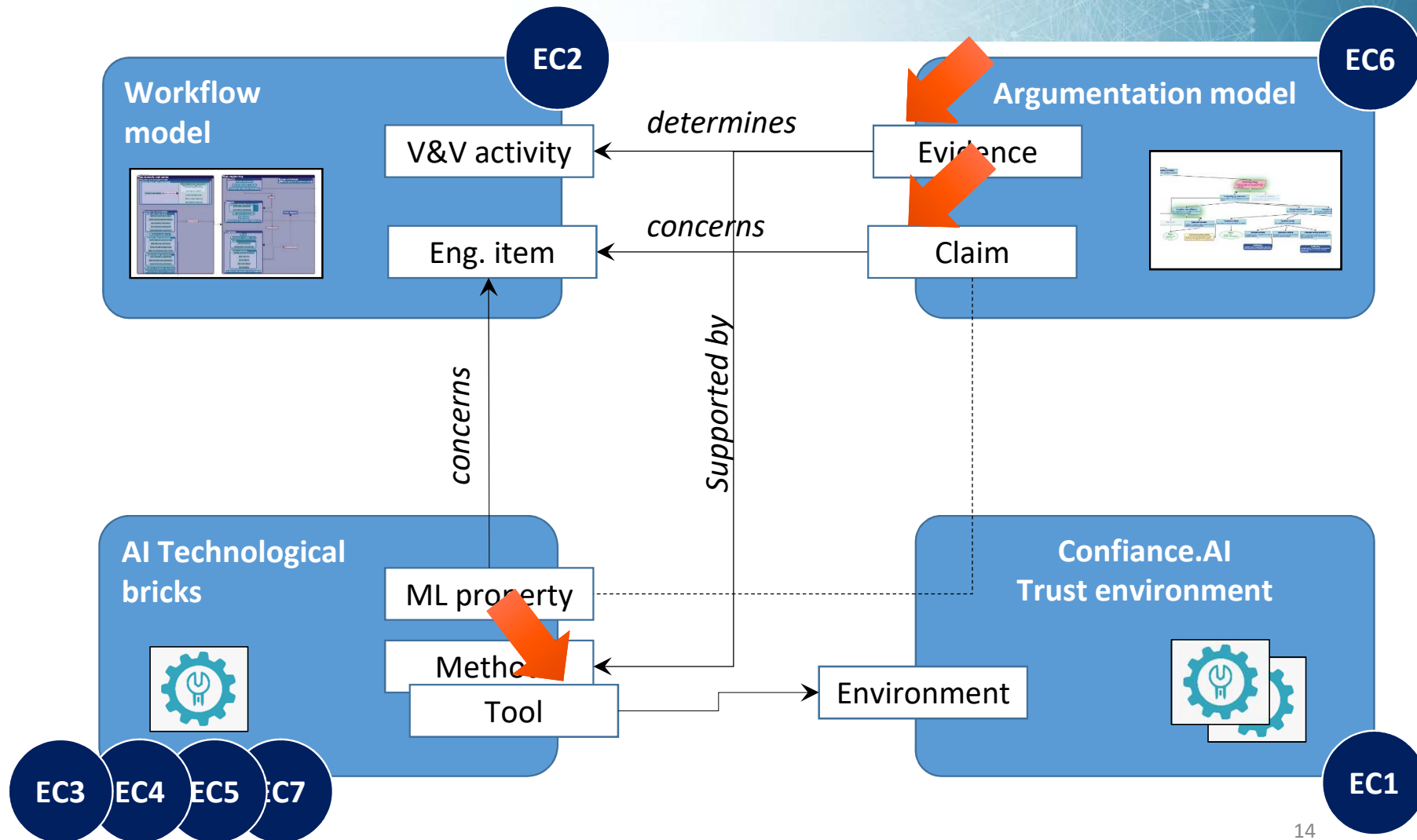


AUGMENTING THE WORKFLOW WITH VERIFICATION ACTIVITIES

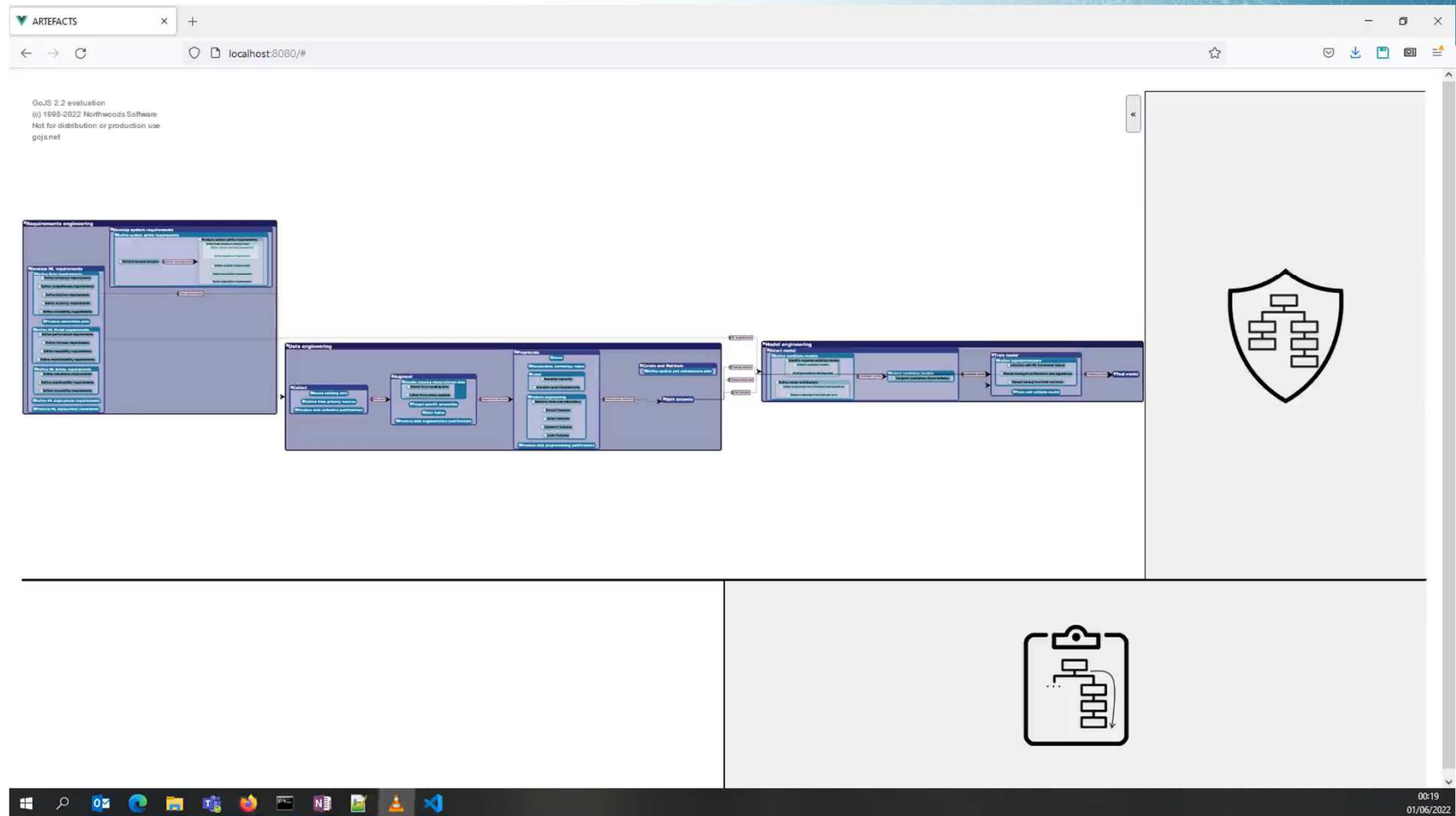
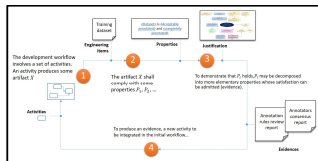


INTERACTIONS BETWEEN THE PROGRAMME'S PROJECTS

14

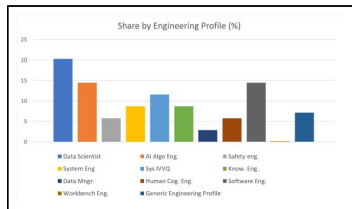


THE ARTEFACT TOOL

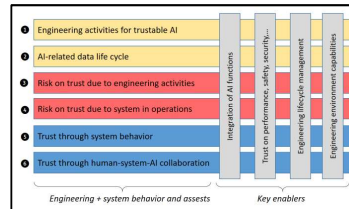


STATUS AND FUTURE WORK

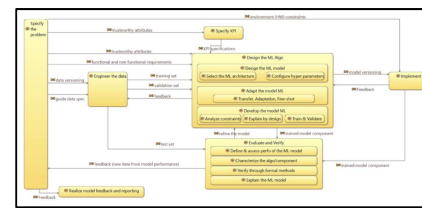
16



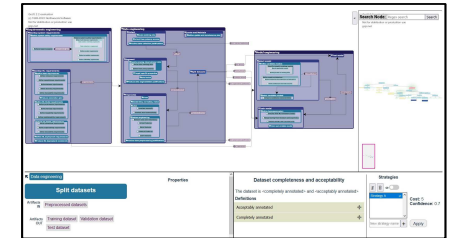
Industrial needs



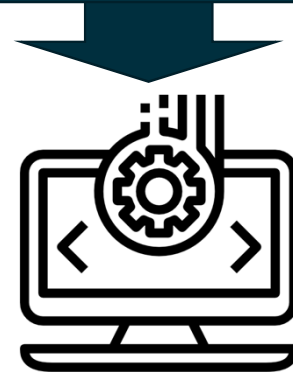
Analysis framework



Models



V&V support tooling



Trust Environment



www.confiance.ai
contact@irt-systemx.fr