ESTECO
USERS' MEETING
NORTH AMERICA

um 2025

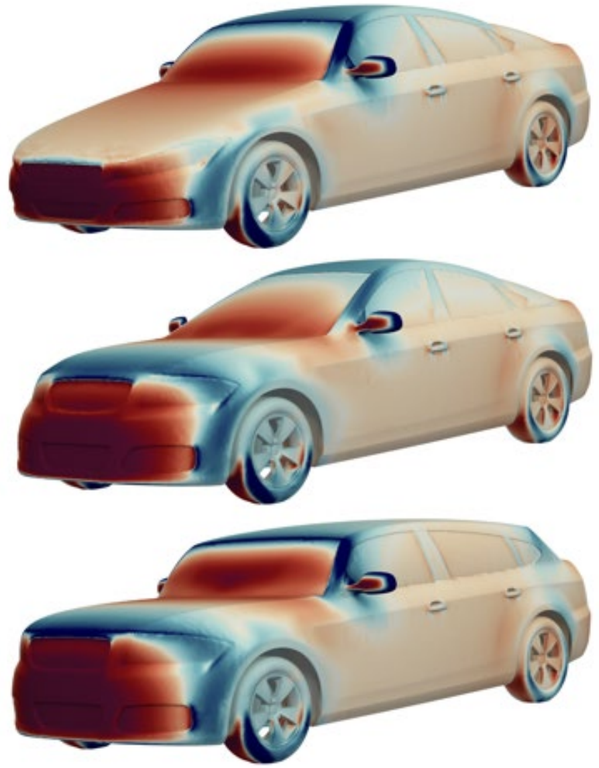
nDAI, a new AI platform for robust and sustainable data-driven modeling

Haysam TELIB
Product manager

Context

- **Engineering is getting tougher**
  Need for high-quality from the very beginning
  High-fidelity simulation have high costs
  Complex & time consuming

- **Extending HiFi capability**
  Push right: Exploit historical knowledge
  Shift left: Democratize & enhance efficiency

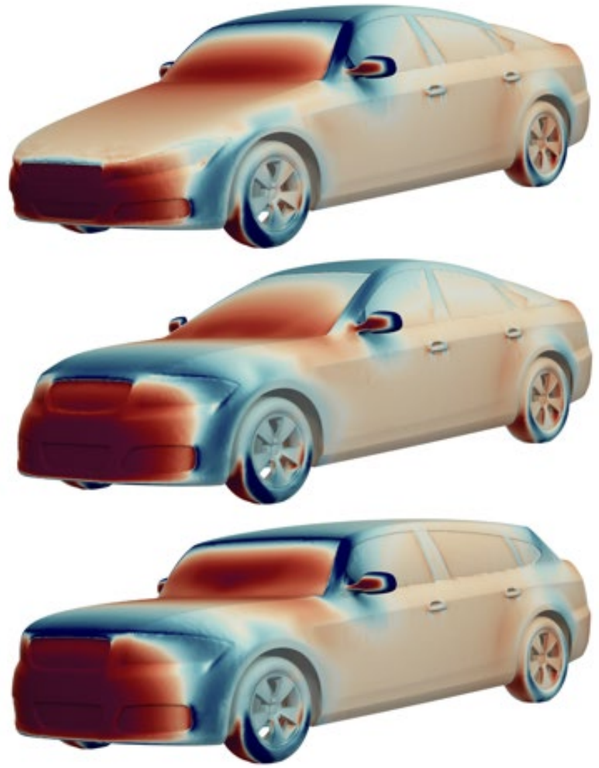


AI/ML is considered a key enabler, but...

- **Cultural gap between engineers and data scientists:**
  Engineers struggle to imagining how to integrate ML in their everyday work

- **Data is dynamic and requires governance:**
  ML models usually have a very short lifespan, putting the governance over all of the ML stack is a very demanding task.

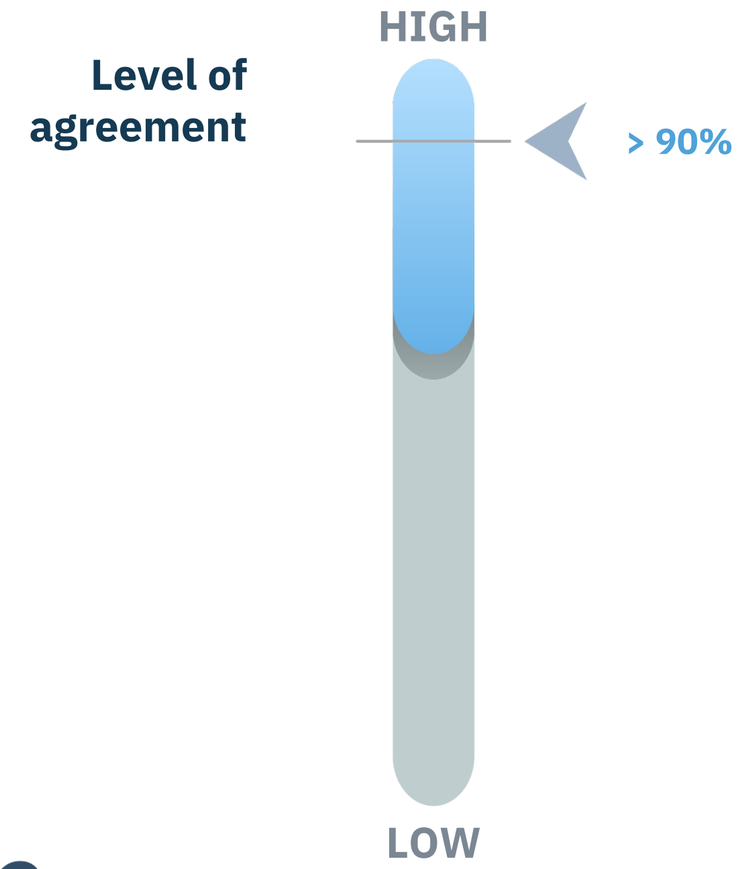
- **Infrastructural challenges:**
  Training requires data to be moved to the right hardware
  Different models require different hardware
  Inference: from Edge to servers



um 2025

Upskilling simulation engineers with AI/ML

Separate roles of simulation engineers and AI/ML will be eliminated.



- *"Engineers and CAE roles will merge, with AI augmenting human capabilities, allowing for higher-value tasks."*
  CTO, Simulation provider

- *"Engineers will need to blend traditional engineering skills with data science capabilities."*
  Product manager, Simulation provider

- *"The role of simulation experts will evolve but remain essential. AI/ML will democratize some aspects, but experts will be needed to provide oversight and ensure accuracy."*
  Director, Simulation user

- *"Engineers are analysts, analysts are engineers."*
  SME, Simulation user

Source: What's the Endgame for Engineering Simulation? | Nafems World Congress 2025, McKinsey & Company

What if you had a collaborative platform to blur the line between data scientists and simulation engineers?

nDAI pillars

Solver, problem, and data agnostic

Multiple model architectures

Distributed architecture

Governance

Agnosticity

Solver

- Pure data-driven
- No request of any solver APIs

Data

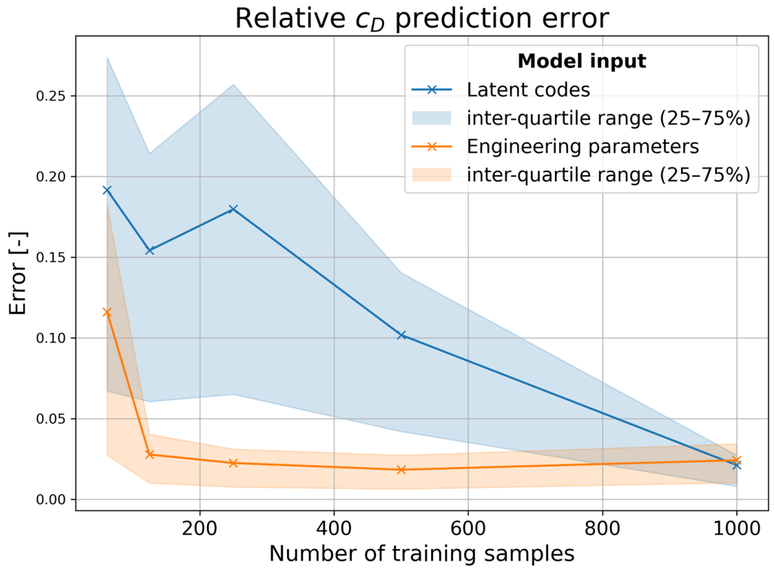
- 0D, 1D, 2D, 3D + 1(time)
- IO of native CAE formats
- Fallback through open formats

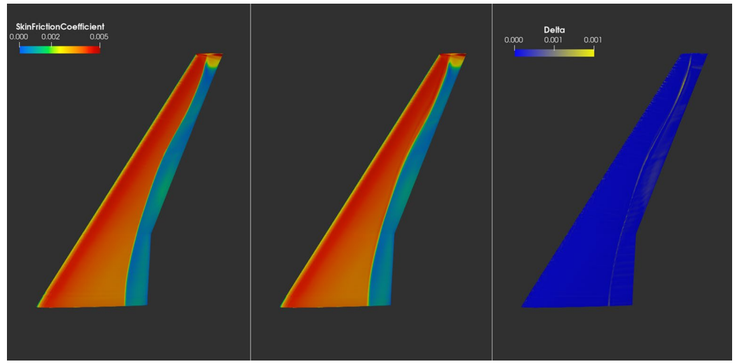
Problem

- No problem specific pre-trained model
- collection of engineering-relevant ML models

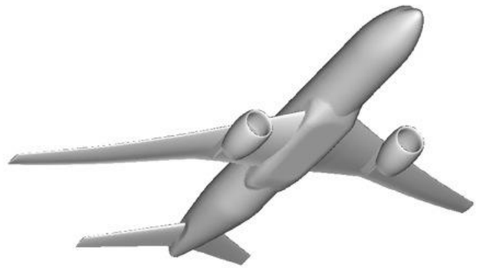
Models

Multiple model architectures





- Different problems require different models
- Different data require different models
- Different objectives require different models



Distributed architecture & Federation

Computing x training and inference

Both UI and computing engines run:

- locally
- on-premise servers/HPC
- Cloud

Data

Training data can be provided through:

- ESTECO’s ecosystem
- file system
- APIs

um 2025

Governance

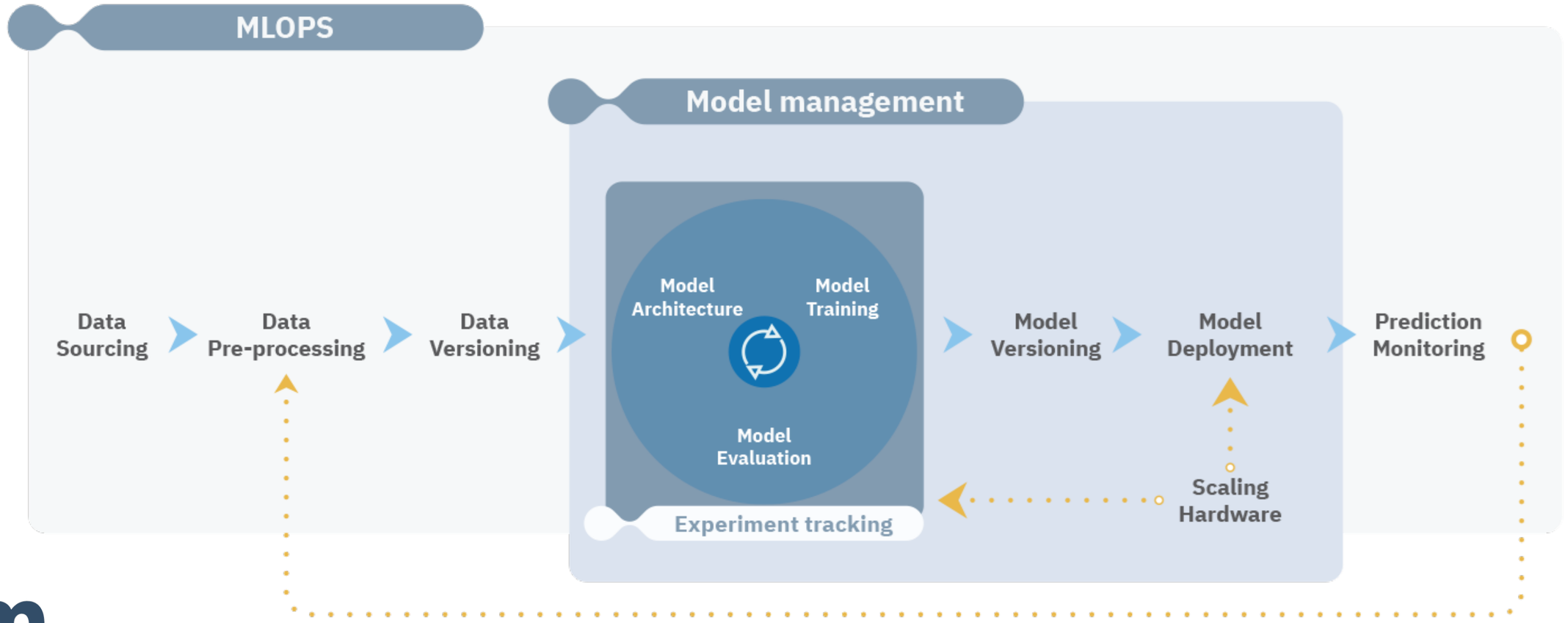
Models

- traceability of data consumed for training
- versioning when retraining

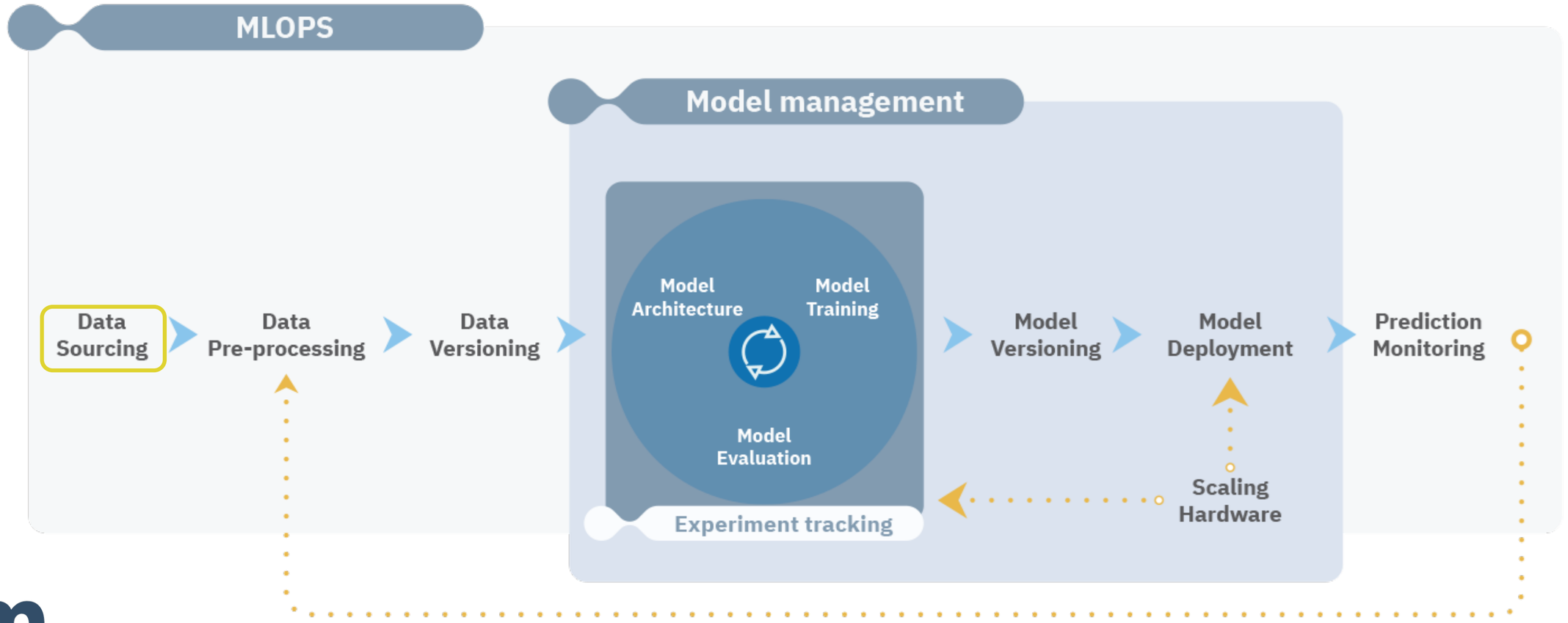
Users

- empower simulation engineer to generate models
- enable company-wide stakeholders to consume the models

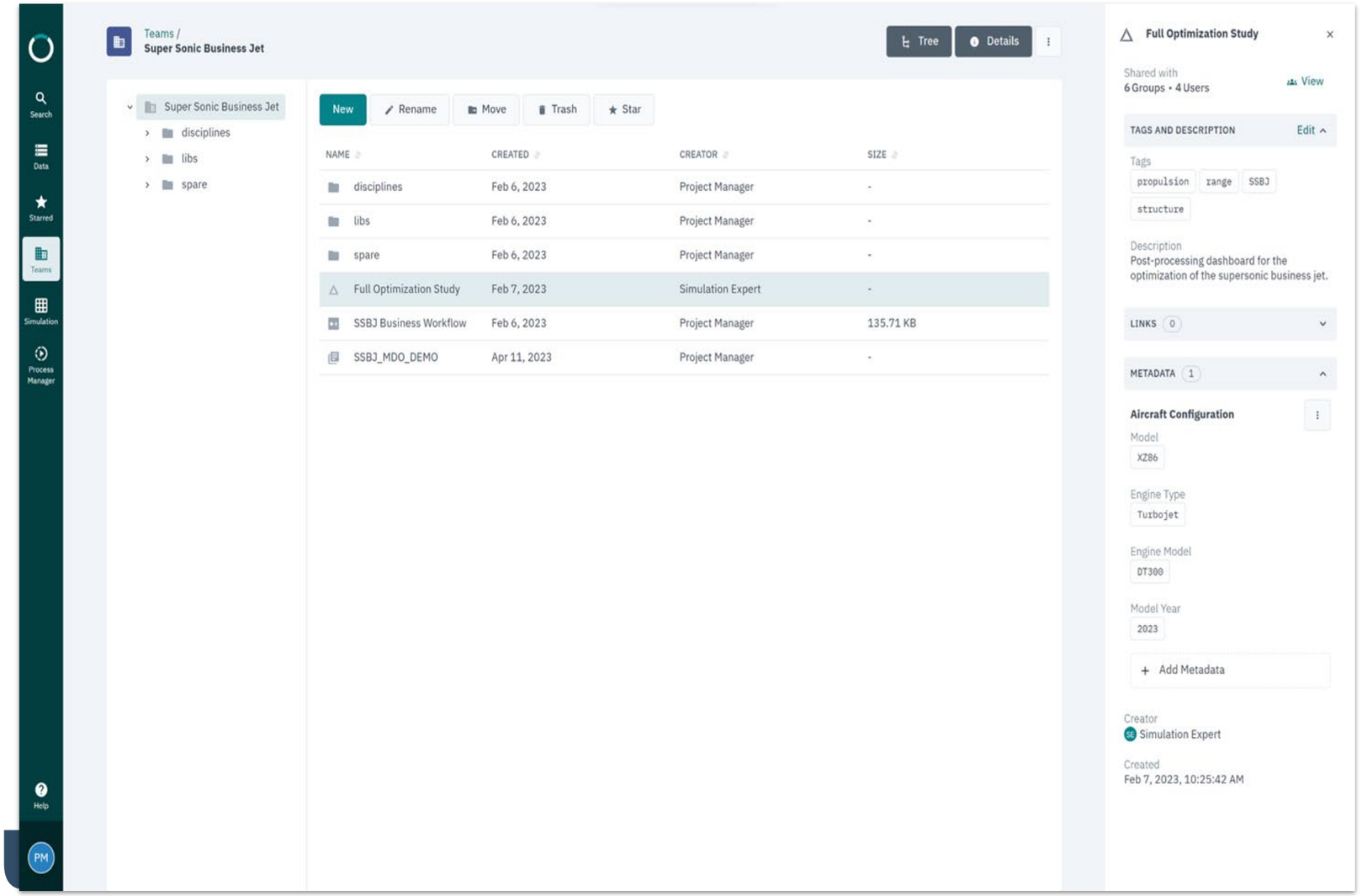
Our MLOps philosophy for nDAI



Data sourcing



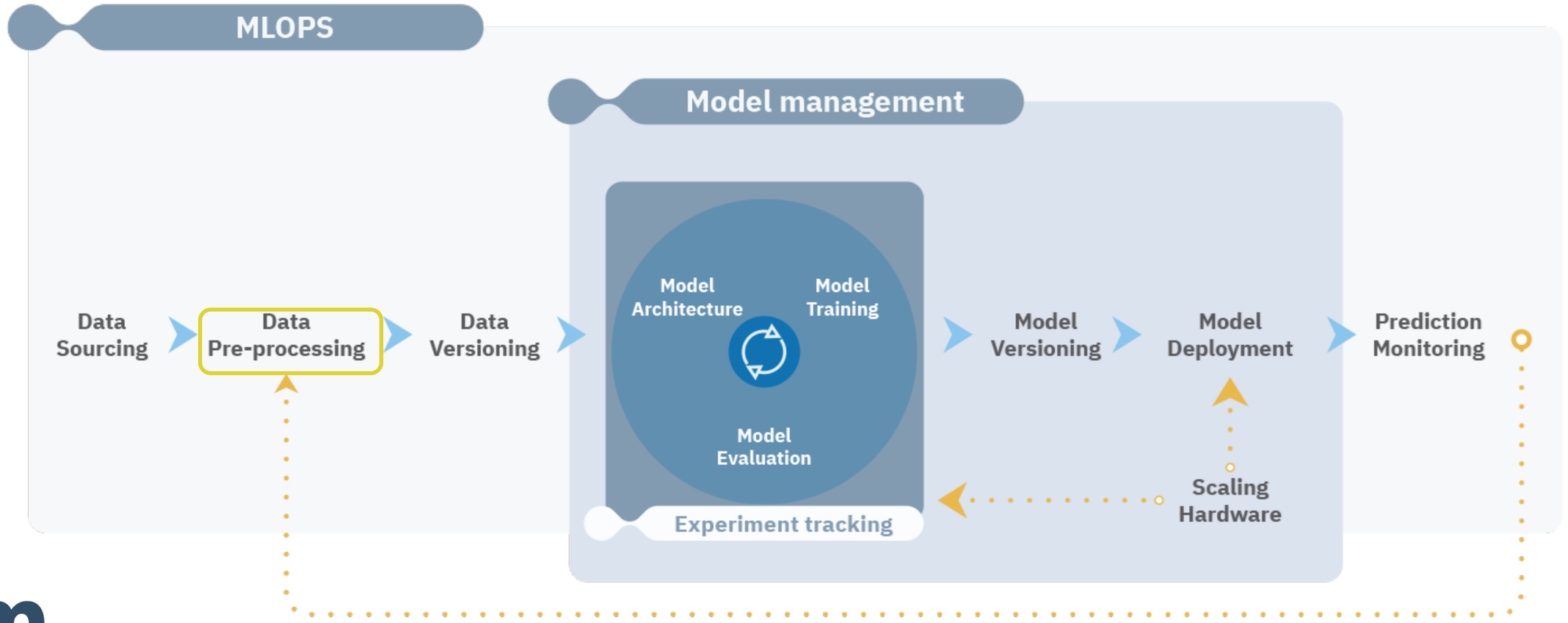
Data sourcing



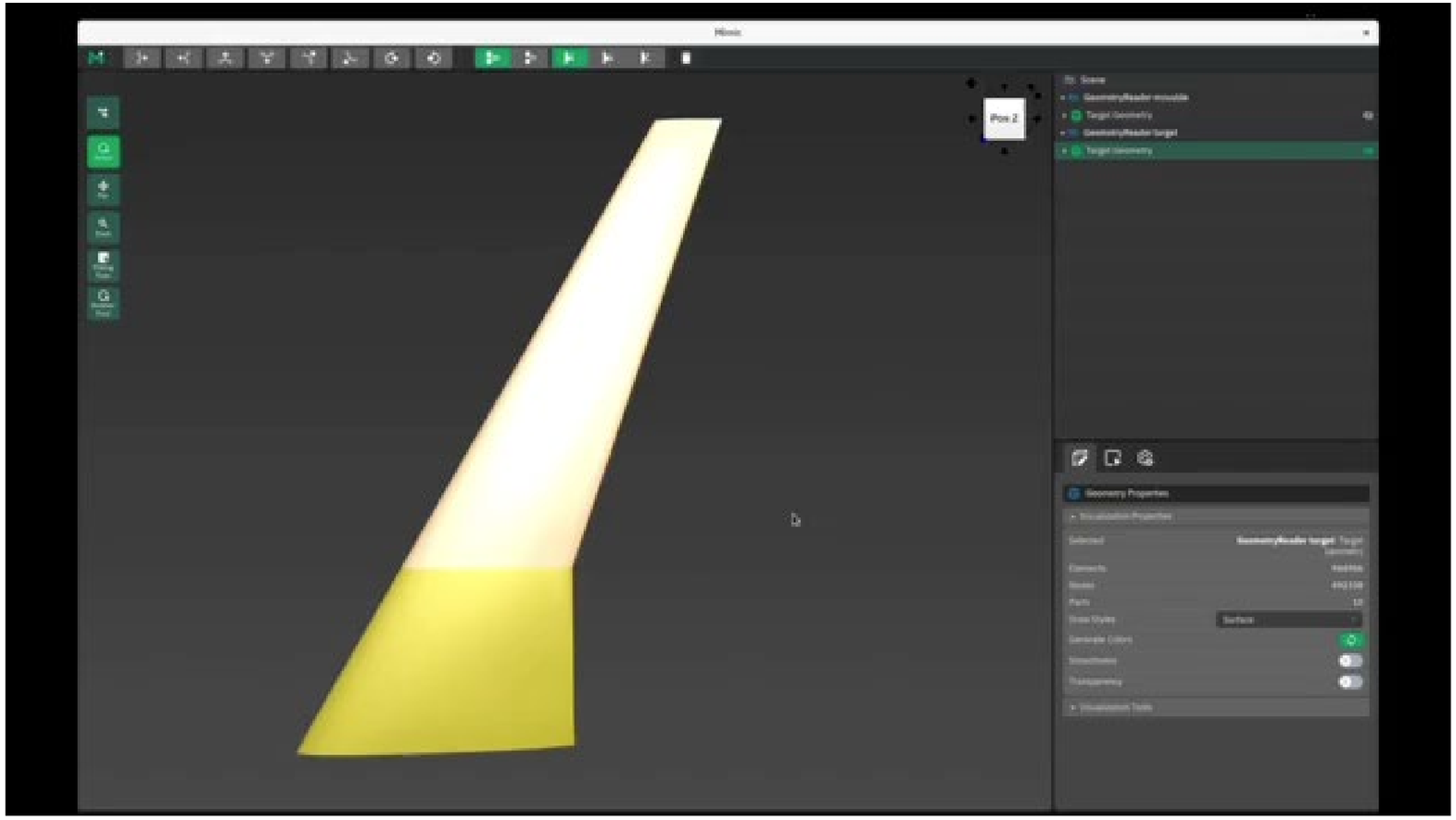
- Identify relevant data within simulatation pool through metadata in VOLTA Data Manager.

2025

Data pre-processing

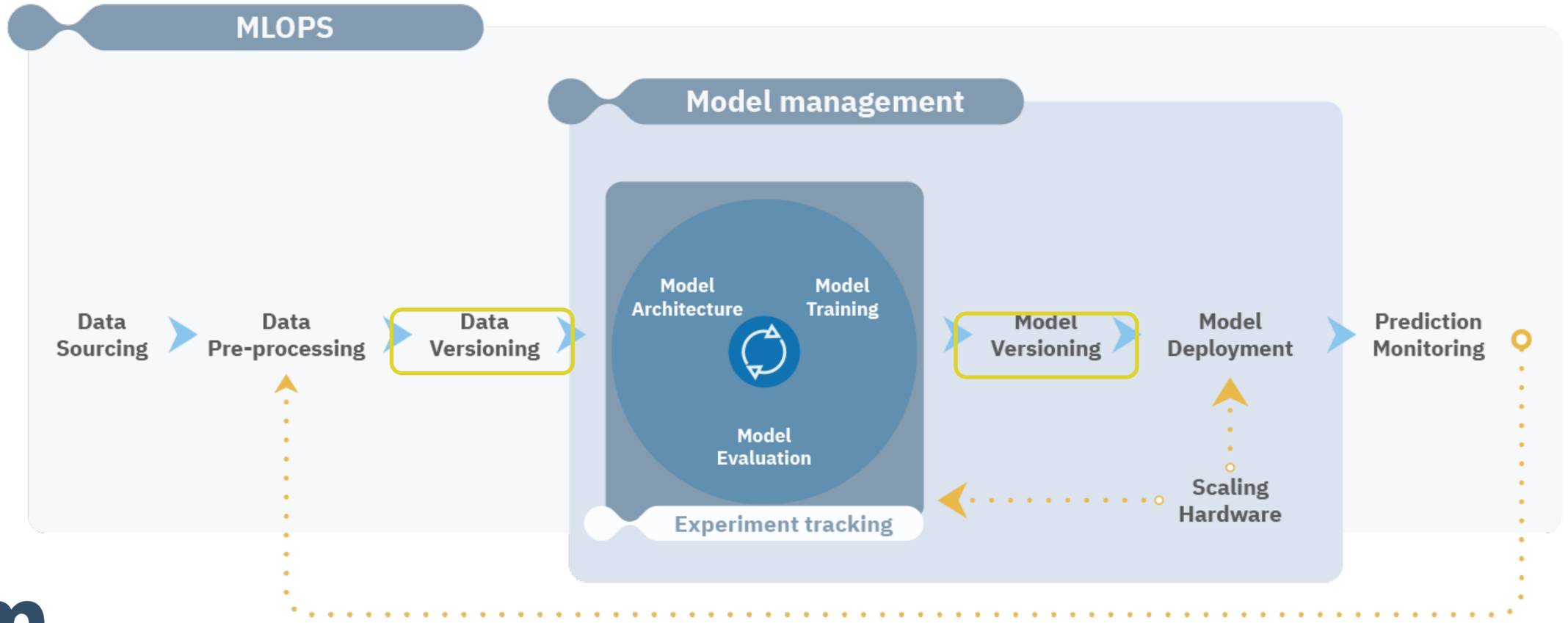


Data pre-processing

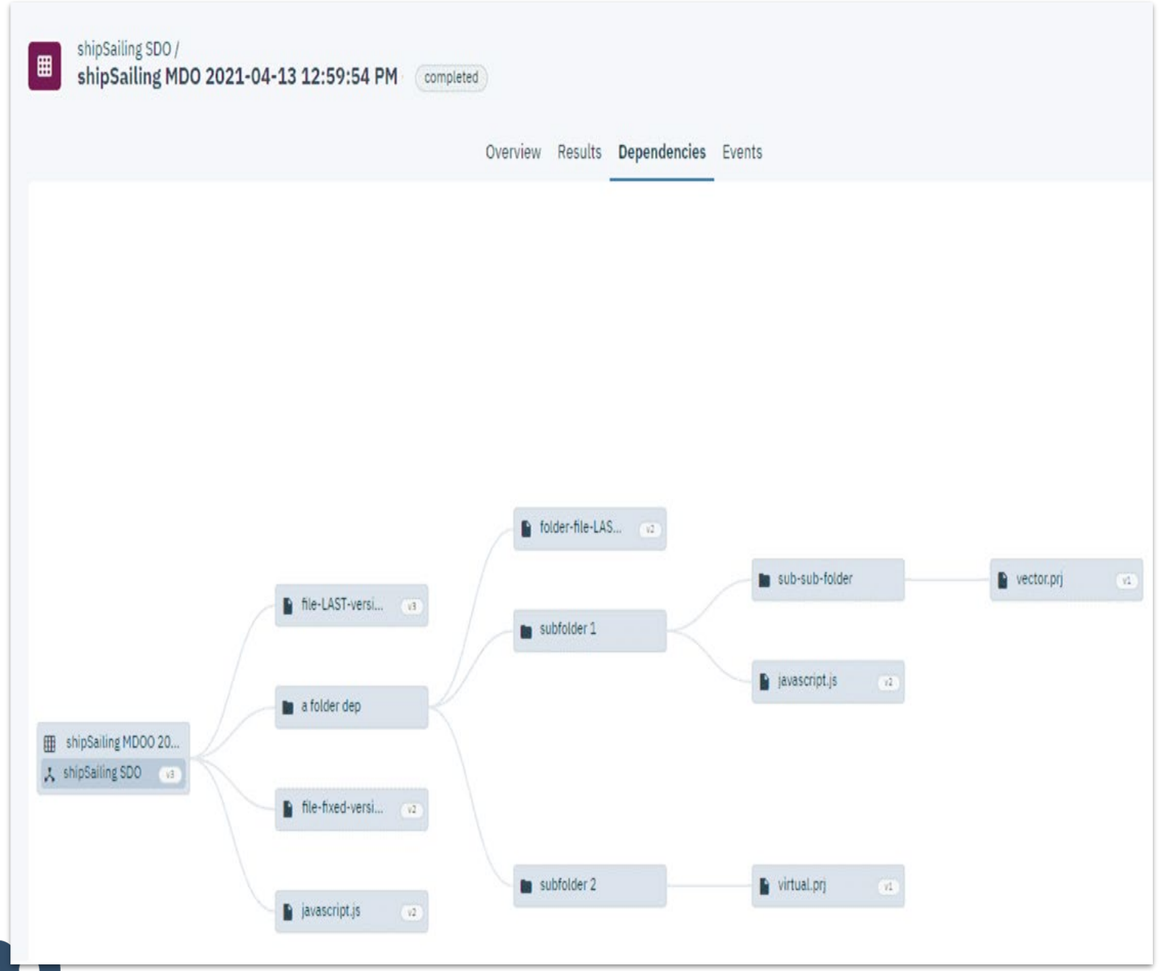


- Data based filtering
- Features identification
- Automatic annotation
- ML-ready transformation

Data/Model versioning & traceability

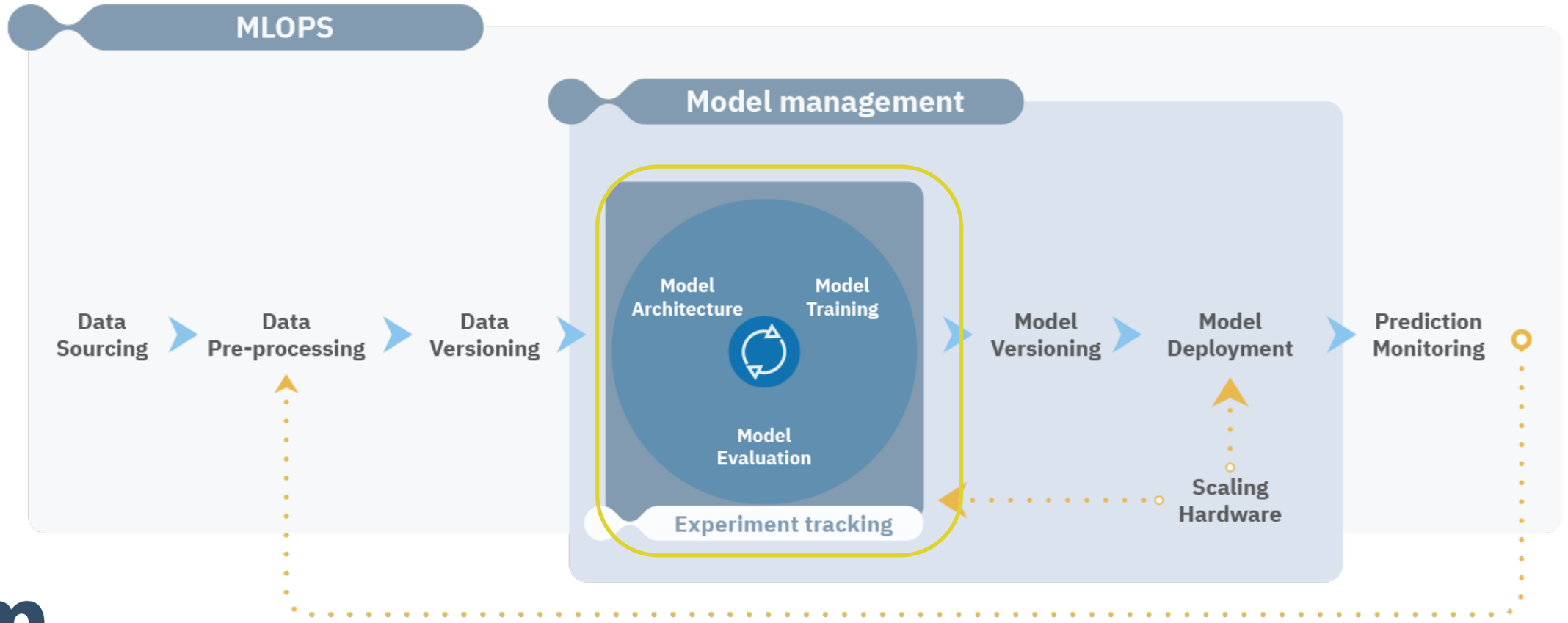


Data/Model versioning & traceability



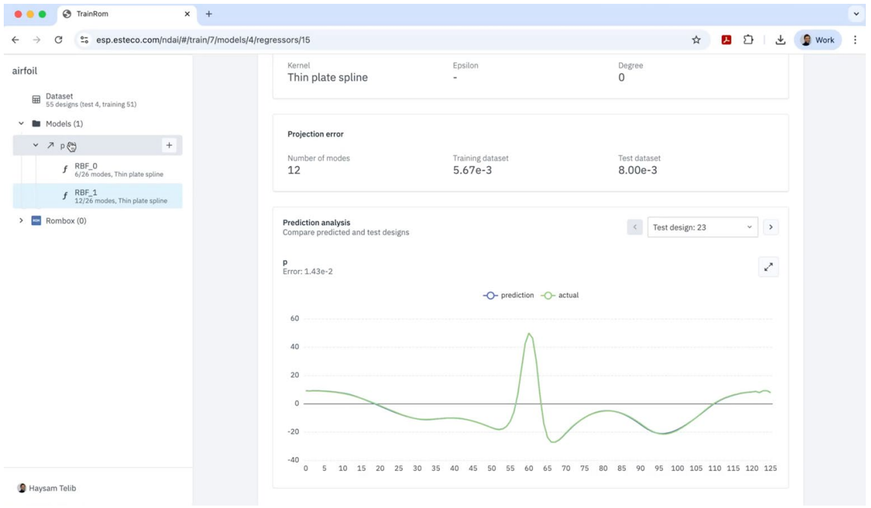
- monitor **model versions** due to retraining
- **trace datasets** that have been used for training

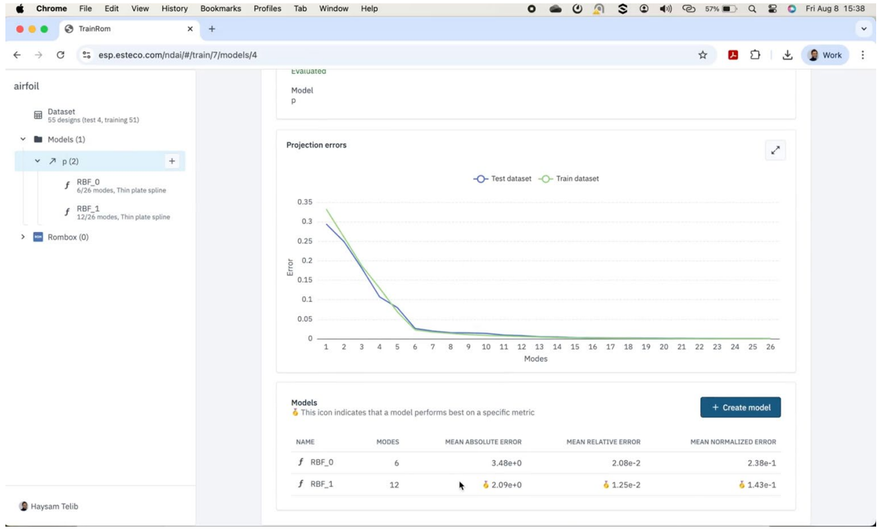
Model selection and testing



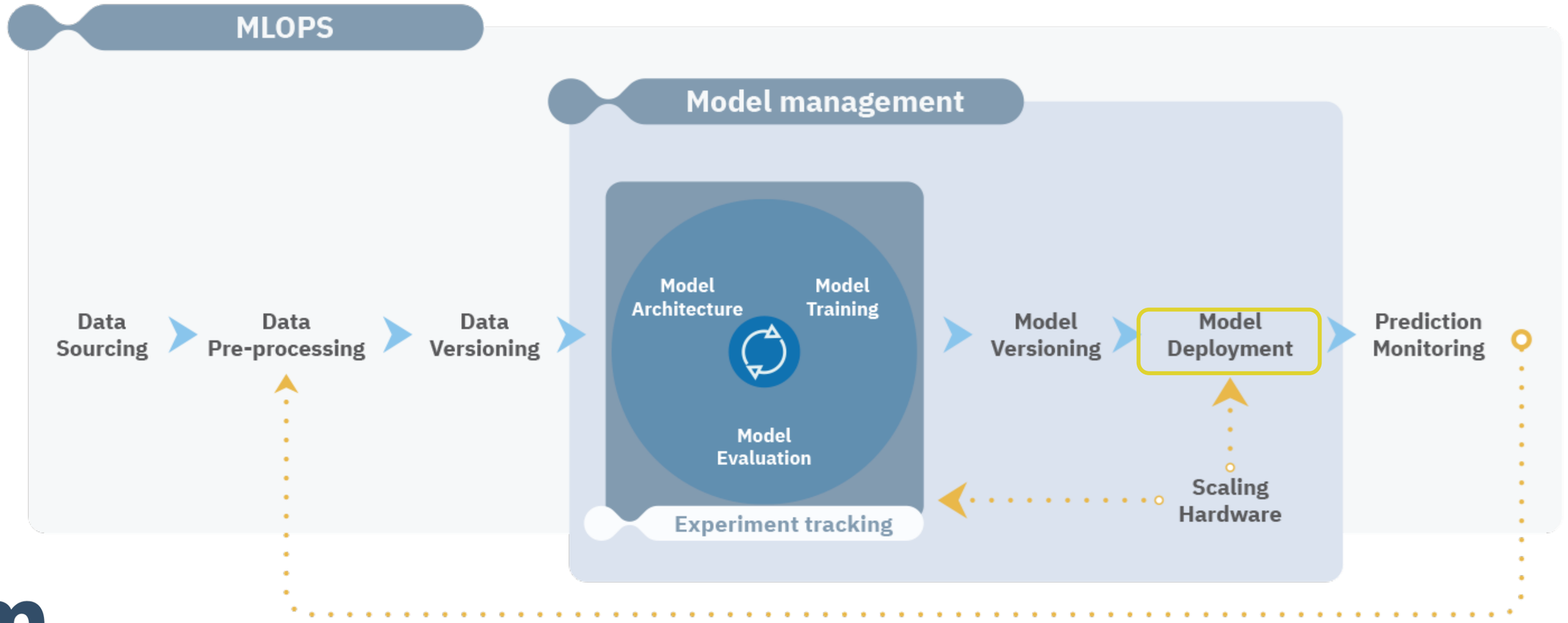
Model selection and testing

- identify most suitable architecture for your problem
- export receipt for model updating

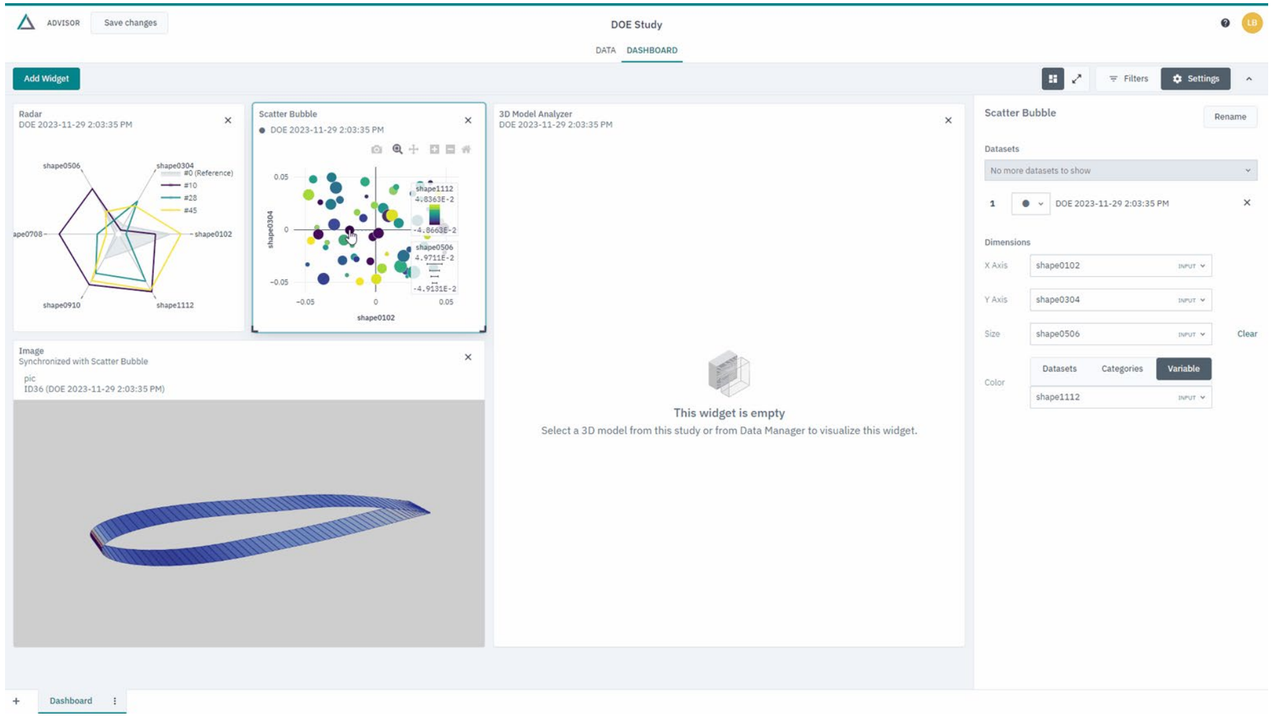




Model deployment



Model deployment



Sharing of model with relevant stakeholders for:

- Multidisciplinary Design Optimization (MDO)
  - modeFRONTIER
  - VOLTA (with versioning and traceability)
- Digital twin and system simulation
  - Python
- Interactive design

An AI ecosystem

- Ability to **create efficiently high-quality data** through **modeFRONTIER**
- Ability to **source data, trace dependencies and share models through VOLTA Data Manager**
- Ability to formalize a **Business Process to learn continuously through BPMN modeler**
- Ability to **exploit a trained model, company wide, in a collaborative fashion**

High level roadmap for nDAI

TO DO

Interactive design
Interactive What-If analysis

Infrastructure on demand
Cloud based computing for training

DOING

VOLTA integration
Training app within VOLTA

Pre- and post-processing
Manipulate geometries and data

Direct mF data import
Transfer data from mF to nDAI seamlessly

Multiple model architecture
Explore different models with the same UX

Geometric deep-learning
Exploit data lakes

DONE

mF prediction node
Consume models in mF

Auto-tuning & grid-search
Find optimal hyperparameters

um 2025

um 2025

ESTECO
USERS' MEETING
NORTH AMERICA

Thank you!

esteco.com