

um
2026

modeFRONTIER core updates Key enhancements and product direction

Danilo Di Stefano
modeFRONTIER product manager

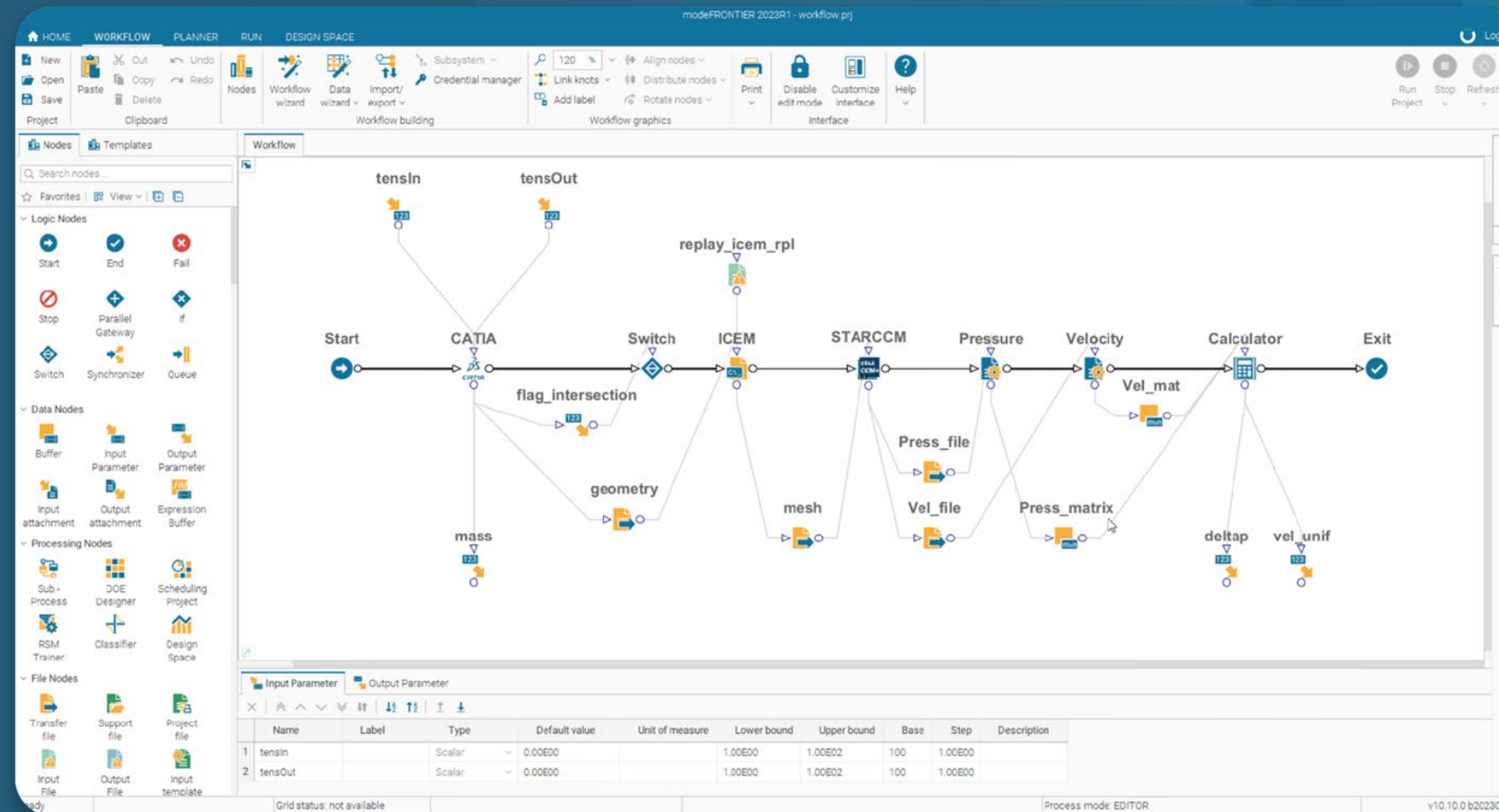




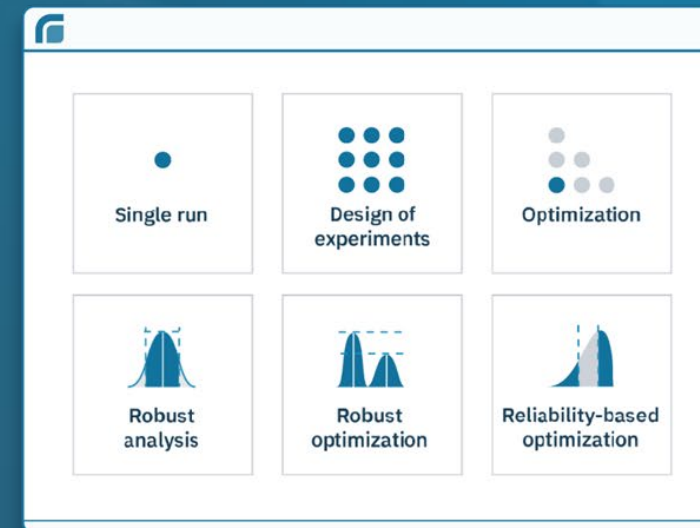
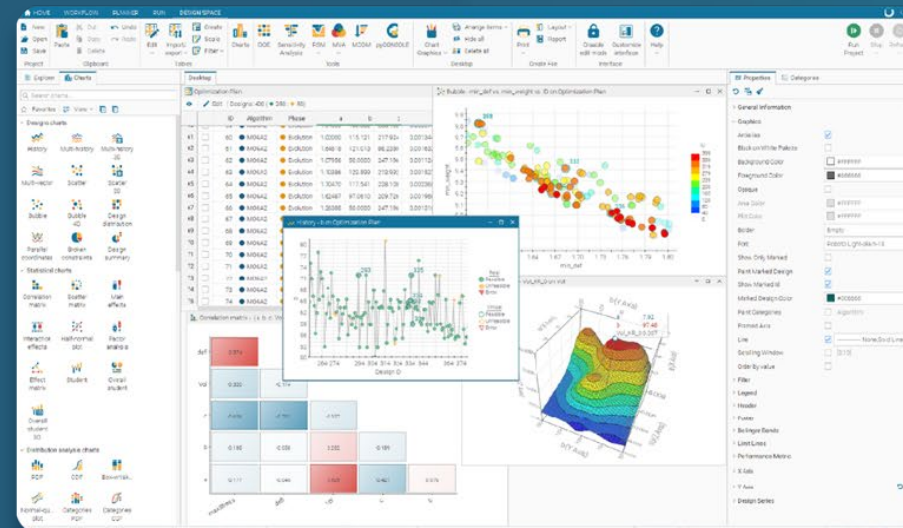
Core updates and new capabilities



The vendor agnostic software for process automation and design optimization.



Automatically explore the design space with AI-enabled methods and accelerate product development.



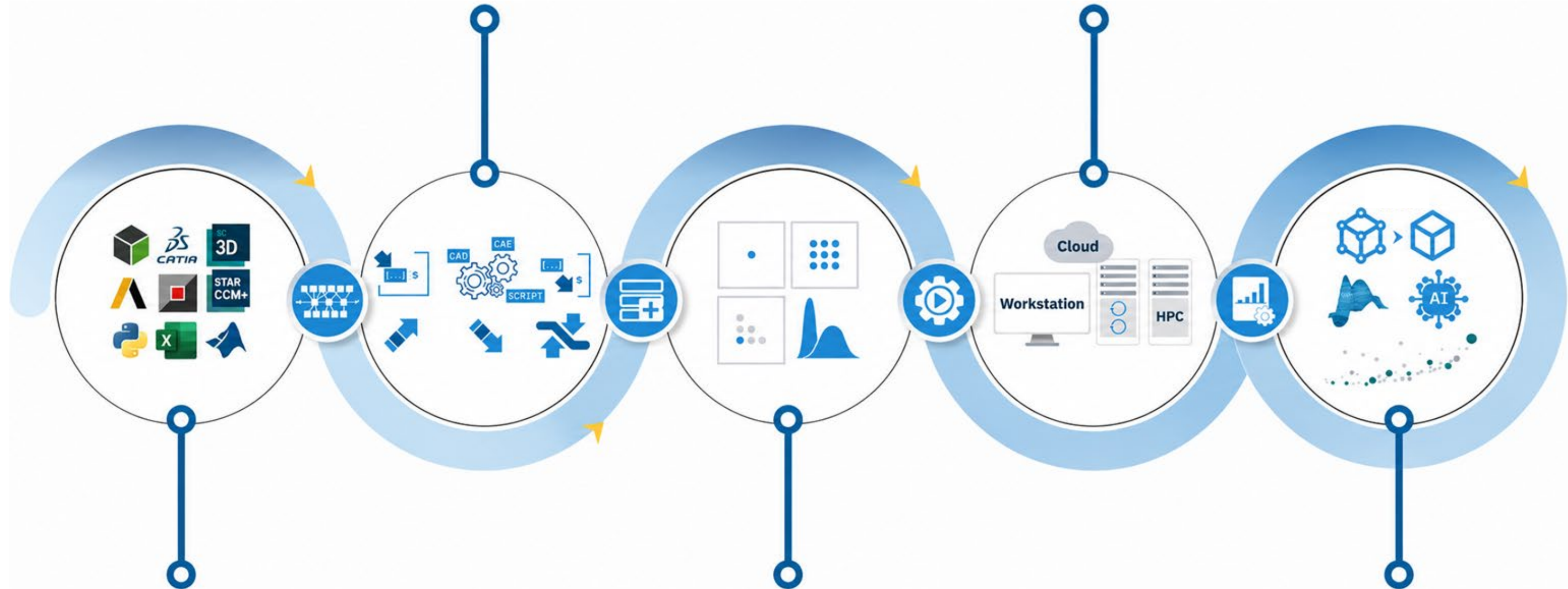
The modeFRONTIER process flow

Problem definition

Inputs, outputs, optimization objectives and constraints.

Execution at scale

Smart use of computational resources.



Process automation

Simulation integration and data exchange management.

Evaluation strategy

Design exploration or optimization studies.









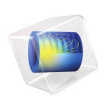











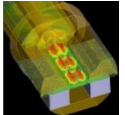





















Insights

Data driven modeling and visualization.

The concept behind the modeFRONTIER workflow

Upload model
in the system

Seamless integration with any engineering application

 Abaqus FEA	 Adams/Car	 Adams/View	 Ansa	 ANSYS Workbench	 ASMI	 AVL AST	 CATIA	 COMSOL	 CREO Elements/Pro
 CST Microwave	 Dymola	 Part of Keysight ESI	 Excel	 FMI	 Grasshopper	 GT-Suite	 Hypermesh	 JMAG designer	 Keysight ADS
 Keysight empro	 LightTools	 Madymo	 Maplesim	 Mathcad Prime	 MATLAB	 Metapost	 MSC Nastran	 Python	 Romax Designer
 ROMbox ESTECO	 SFE Concept	 Simcenter 3D	 Simcenter Amesim	 Simcenter Flowmaster	 Simcenter StarCCM+	 SimulationX	 SolidWorks	 SolidWorks flowsimulation	 SpaceClaim
 Wave	 VOLTA ESTECO								

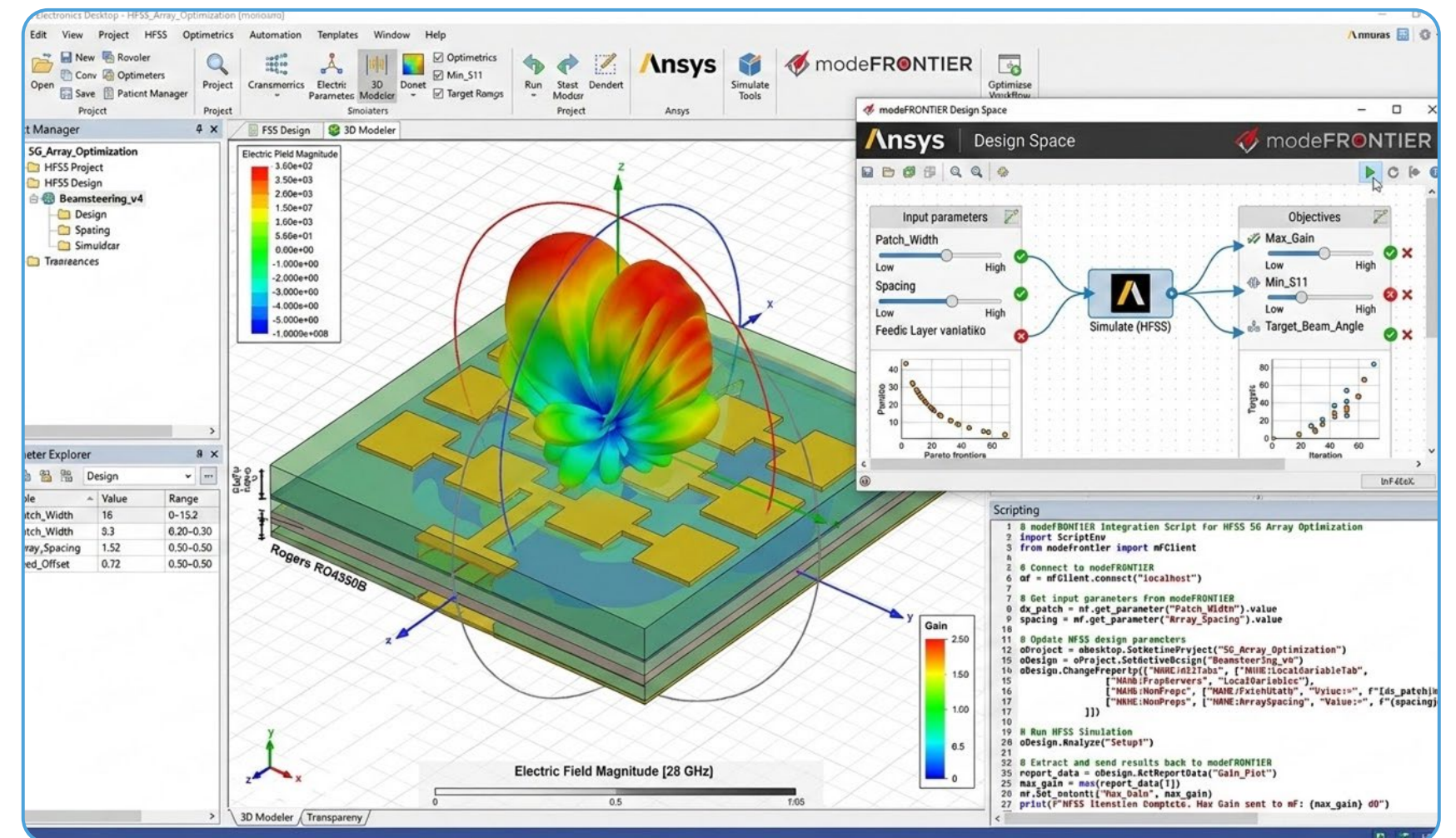


Direct integration with Ansys EDT

STATUS: in roadmap for 2026Q4

The native integration with Ansys Electronics Desktop (AEDT) enables electromagnetic and thermal engineers to automate complex tasks.

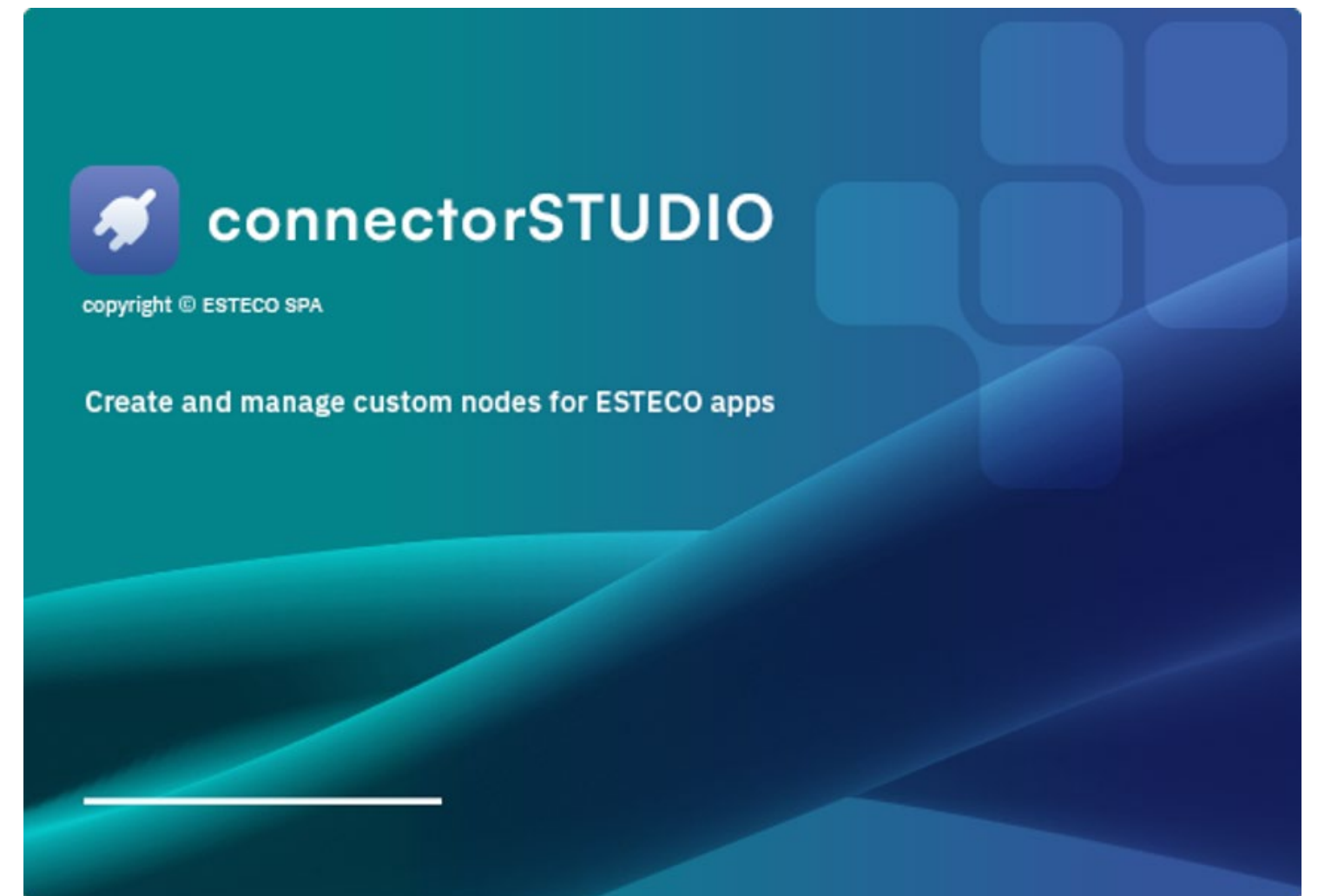
- **Seamless automation:** orchestrate HFSS, Maxwell, and Icepak workflows without the need for Ansys Workbench.
- **Python ecosystem:** leverage AEDT's scripting capabilities within modeFRONTIER for customized engineering automation.
- **Direct parameterization:** introspect and control AEDT design variables directly.
- **Optimized performance:** scale multidisciplinary studies across high-frequency and low-frequency applications.



connectorSTUDIO

STATUS: released in 2026R2

A brand-new dedicated app for building custom connectors, replacing the legacy myNODE with specialized nodes. Integrate external software and scripts directly into modeFRONTIER workflows with professional-grade flexibility.



connectorSTUDIO capabilities



Intuitive GUI

Configure properties, parameters, and behaviors through a modern interface without complex coding.



Native feel

Custom connectors behave exactly like standard integration nodes for absolute consistency.

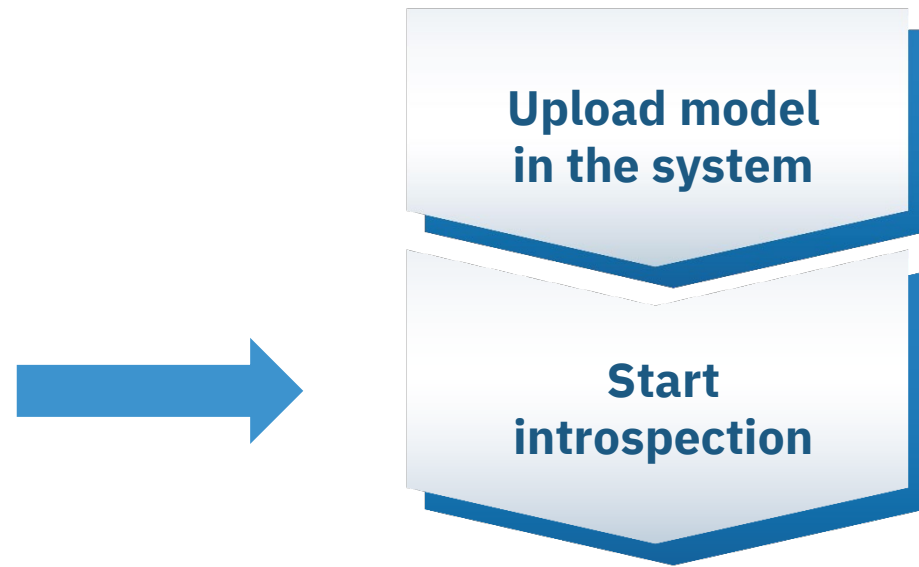


Instant sharing

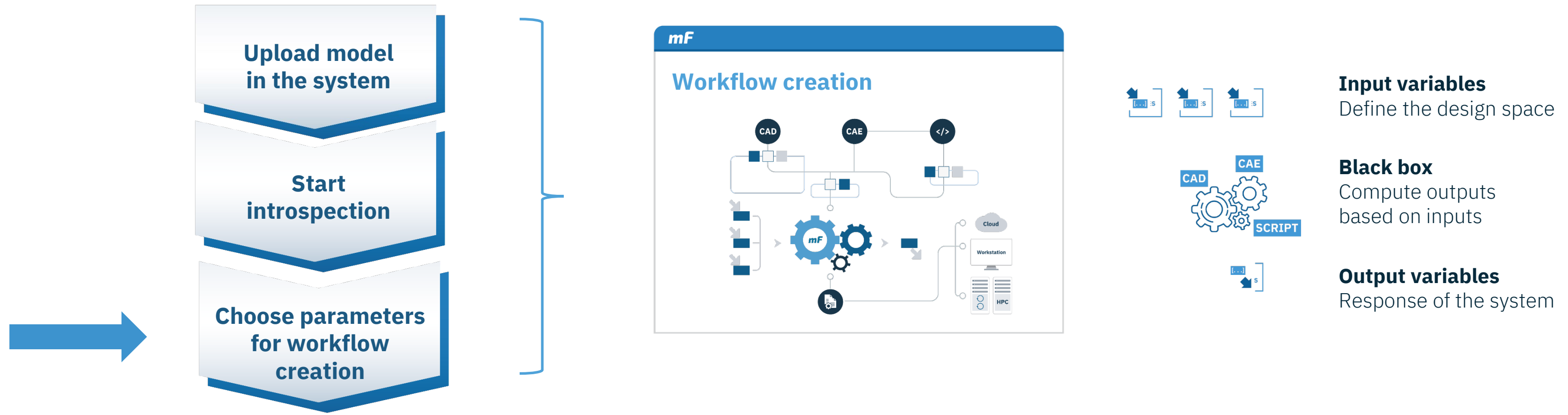
Export as MYN format for zero-effort sharing and automatic deployment across installations.



The concept behind the modeFRONTIER workflow

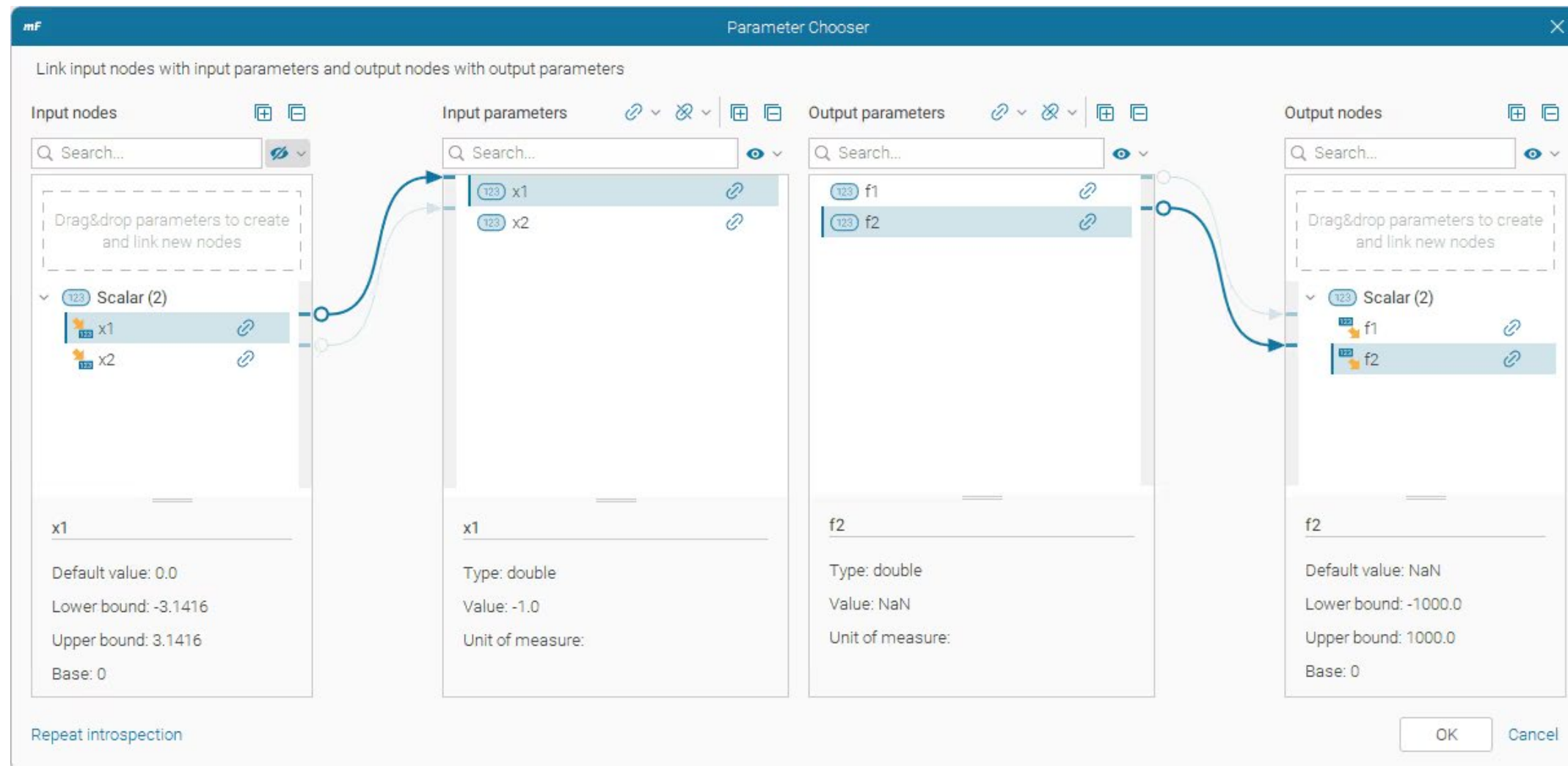


The concept behind the modeFRONTIER workflow



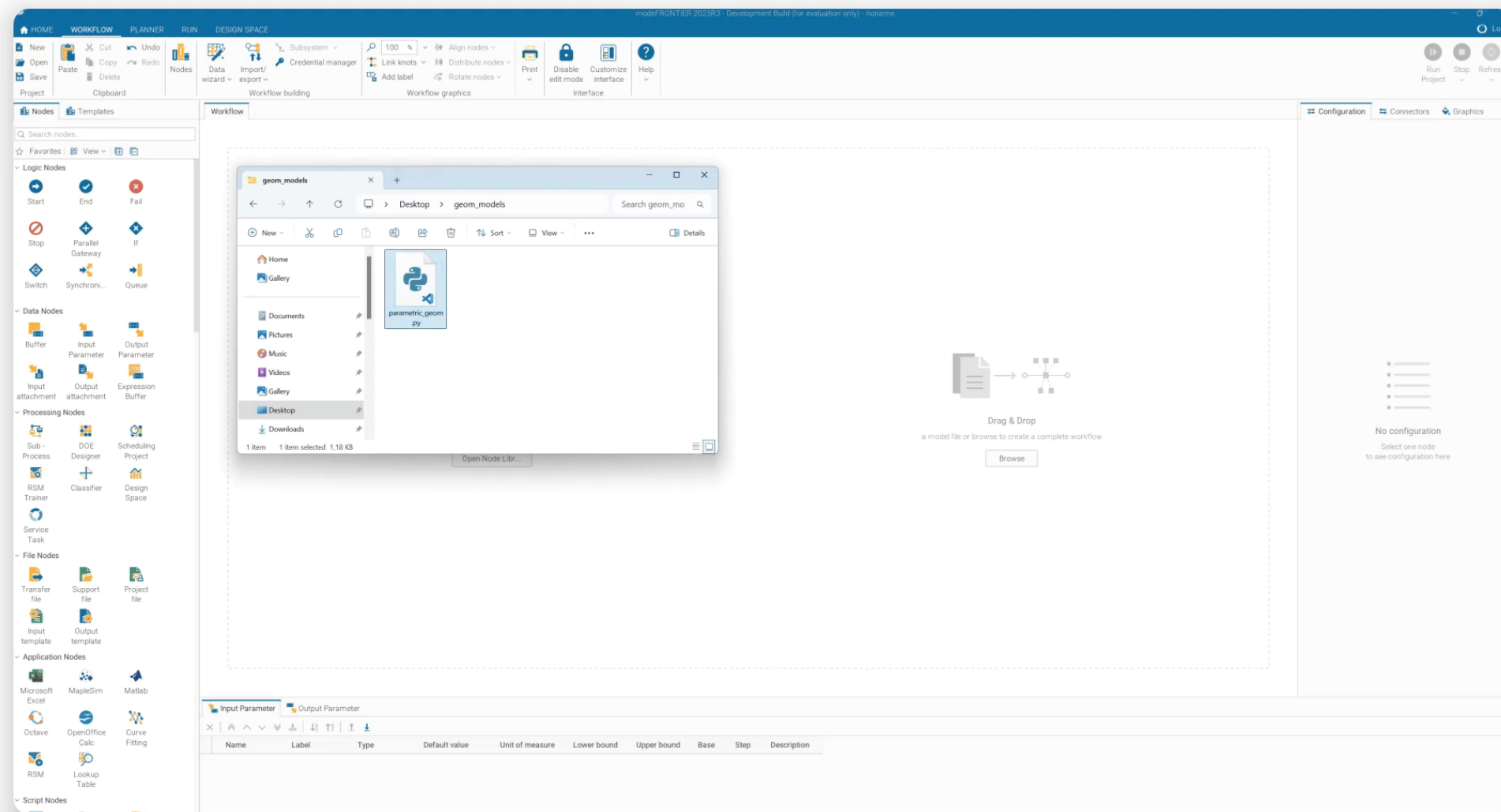
New parameter chooser

STATUS: incremental release



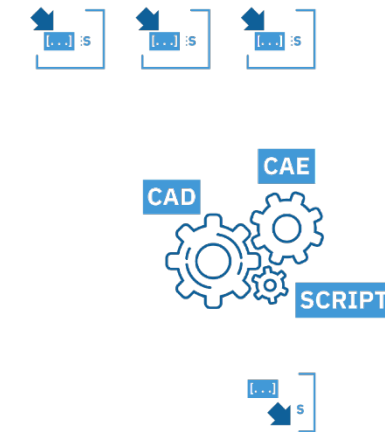
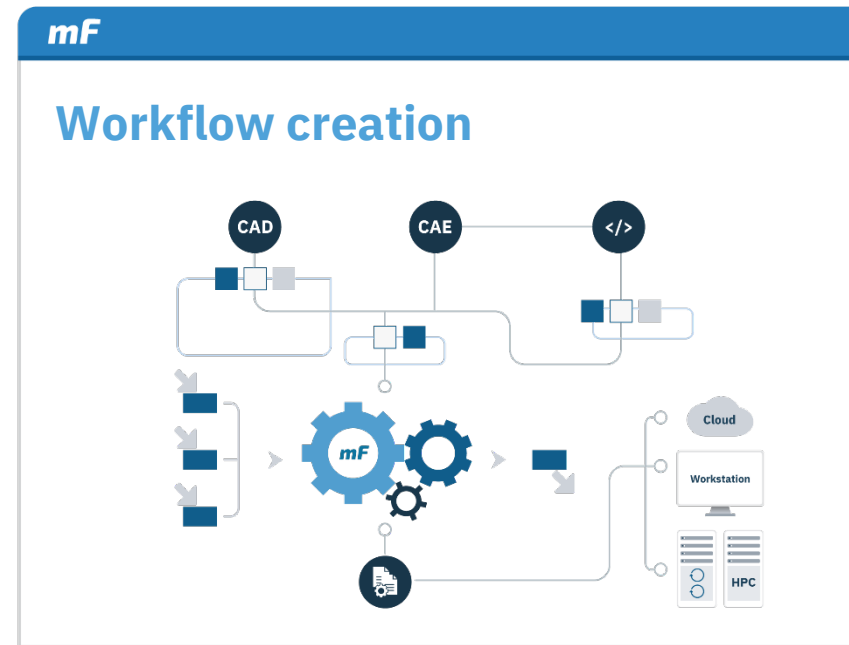
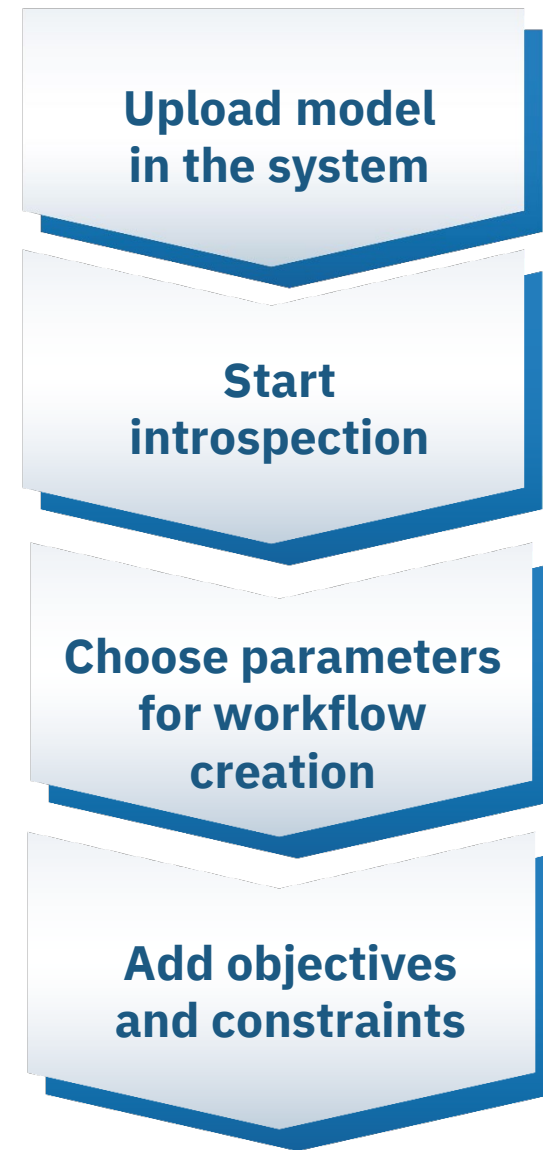
- Side-by-side visualization: easily compare inputs and outputs.
- Flexible workflow building: view and link any data node in the workflow.
- Streamlined navigation and filtering: quickly find and connect nodes and parameters.
- Automatic linking of parameters and nodes: reduce time and effort.
- Enhanced visualization of linked items.

Automated tagging for scripting nodes



- Faster setup & workflow creation: eliminates manual variable mapping. Instantly extracts I/O parameters with a single click.
- Zero mapping errors & high reliability: replaces risky manual associations with 100% accurate, automated synchronization.
- Effortless maintenance & scalability: automatically detects code updates and new variables.

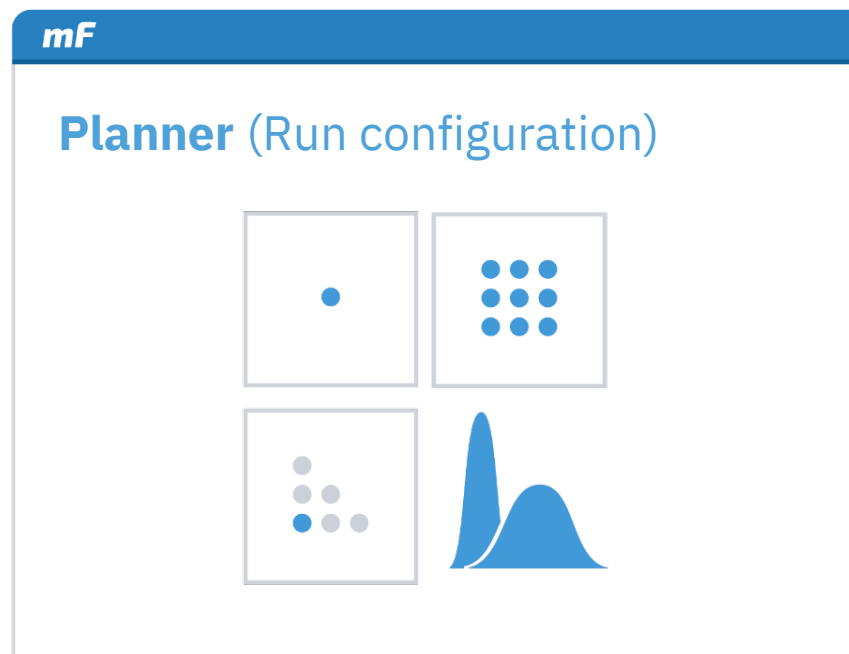
The concept behind the modeFRONTIER workflow



Input variables
Define the design space

Black box
Compute outputs based on inputs

Output variables
Response of the system



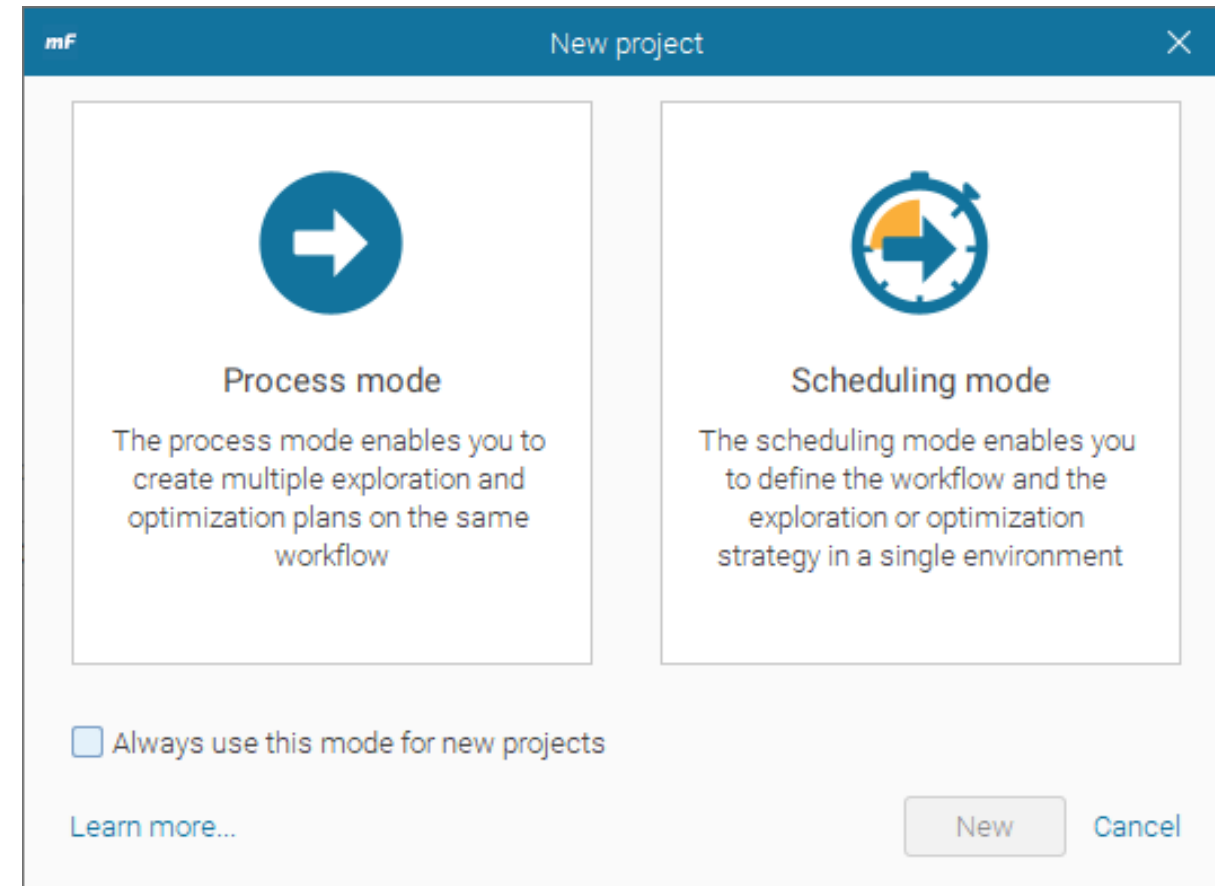
Evaluation strategy
Single run, DOE, Design Optimization, or Robust and Reliability analysis

Objectives
A quantity you want to minimize or maximize

Constraints
A limit you want to respect

Embracing Process mode





- Decoupled Workflow and Design exploration strategy: swap DOE algorithms, robust design evaluations, or meta-models dynamically on the same workflow without editing the automation pipeline.
- Multi-scenario flexibility: Process mode allows you to establish, run, and compare multiple optimization plans simultaneously inside the same project environment.



Please note that classic Scheduling mode is slated for future deprecation and will not receive upcoming feature update.

RSM trainer module in the Planner

The Planner can now train RSMs. The process is triggered automatically once the Session table is evaluated. RSMs are directly saved to the Design space.

 Input domain	Variables Scalar: 5	Parameters No parameters
 Output domain	Variables Scalar: 2	Parameters No parameters
 RSM trainer	RSMs to be trained: 2	
 Run options	Concurrent design evaluations: 1 Manage working directory: Keep files Log detail level: FINE - Most detailed ... and 6 more	

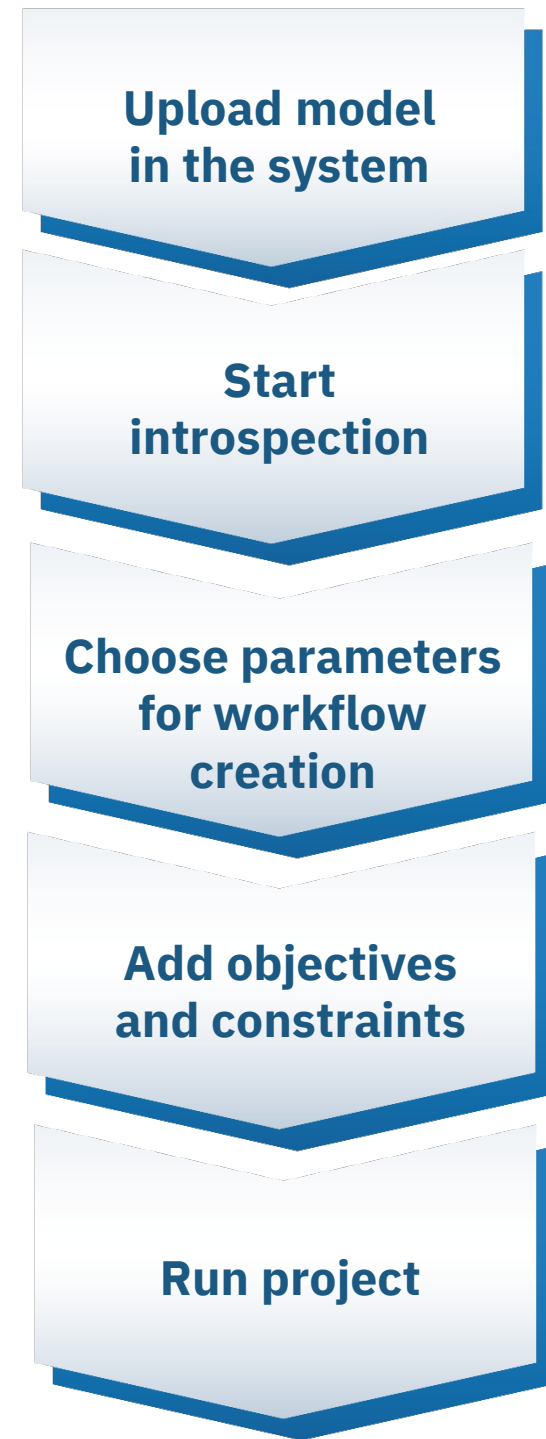
Model	Training Progress
1 defl_KR_0	Finished
2 defl_STEP_0	Finished
3 stress_KR_0	Finished
4 stress_STEP_0	23 %
5 weight_KR_0	Ready
6 weight_STEP_0	Ready


```

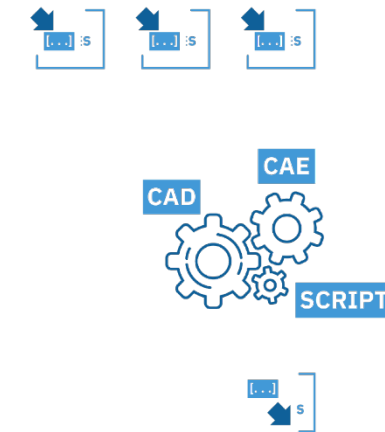
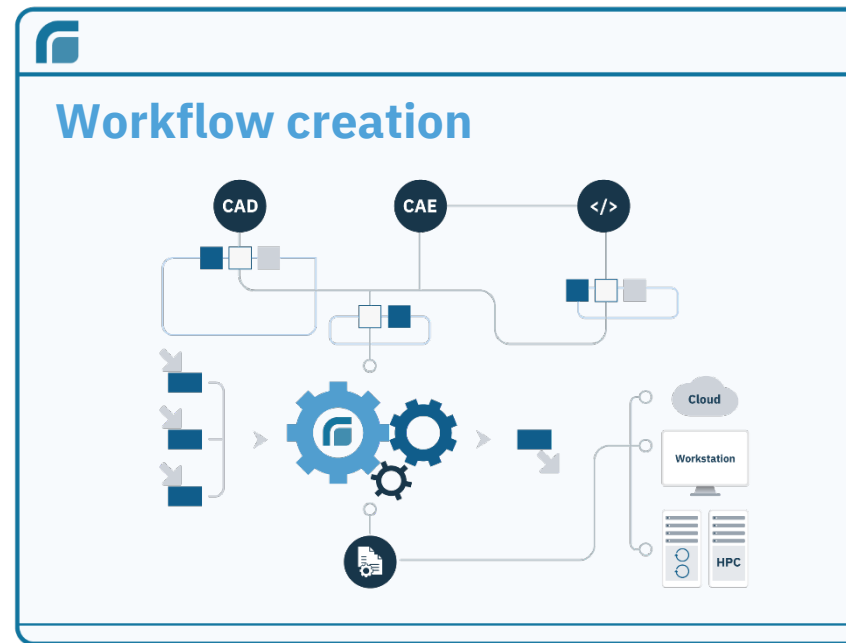
RSM log
defl_KR_0 Sync with RSM training gadget
14:54:06:318 Variogram noise: 0.0
14:54:06:347 WARNING - Decomposition failure
14:54:06:347 - Attempting by increasing noise
14:54:06:348 Variogram noise: 6.322975172842561E-14
14:54:06:405 Likelihood: 2344.576738479457
14:54:06:474 Leave-one-out predictive probability: 2822.30
14:54:06:476 Variogram range: 0.47590078492348353
14:54:06:477 Variogram sill: 0.2554887682265397
14:54:06:478 Variogram noise: 6.322975172842561E-14
14:54:06:478 TRAINING COMPLETED
14:54:06:574 ----- TRAINING ERRORS -----
14:54:06:574 Maximum absolute error: +3.0495E-09
14:54:06:574 Average absolute error: +2.5855E-11
14:54:06:574 Maximum relative error: +1.0174E-04%
14:54:06:574 Average relative error: +1.2938E-06%
14:54:06:582 --- CHAUVENET CRITERION - OUTLIERS ---
14:54:06:582 ID: 00217
14:54:06:582 ID: 00361
14:54:06:582 -----
14:54:06:584 EXIT
  
```

New suite of Run analysis gadgets specifically designed to track the progress while executing plans with the RSM Trainer module.

The concept behind the modeFRONTIER workflow



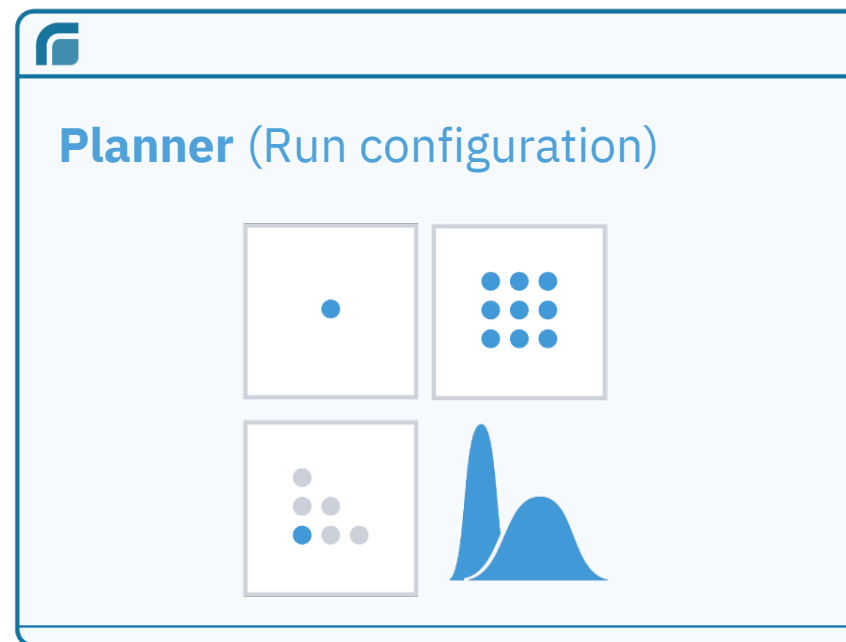
Design evaluation



Input variables
Define the design space

Black box
Compute outputs based on inputs

Output variables
Response of the system



Evaluation strategy
Single run, DOE, Design Optimization, or Robust and Reliability analysis

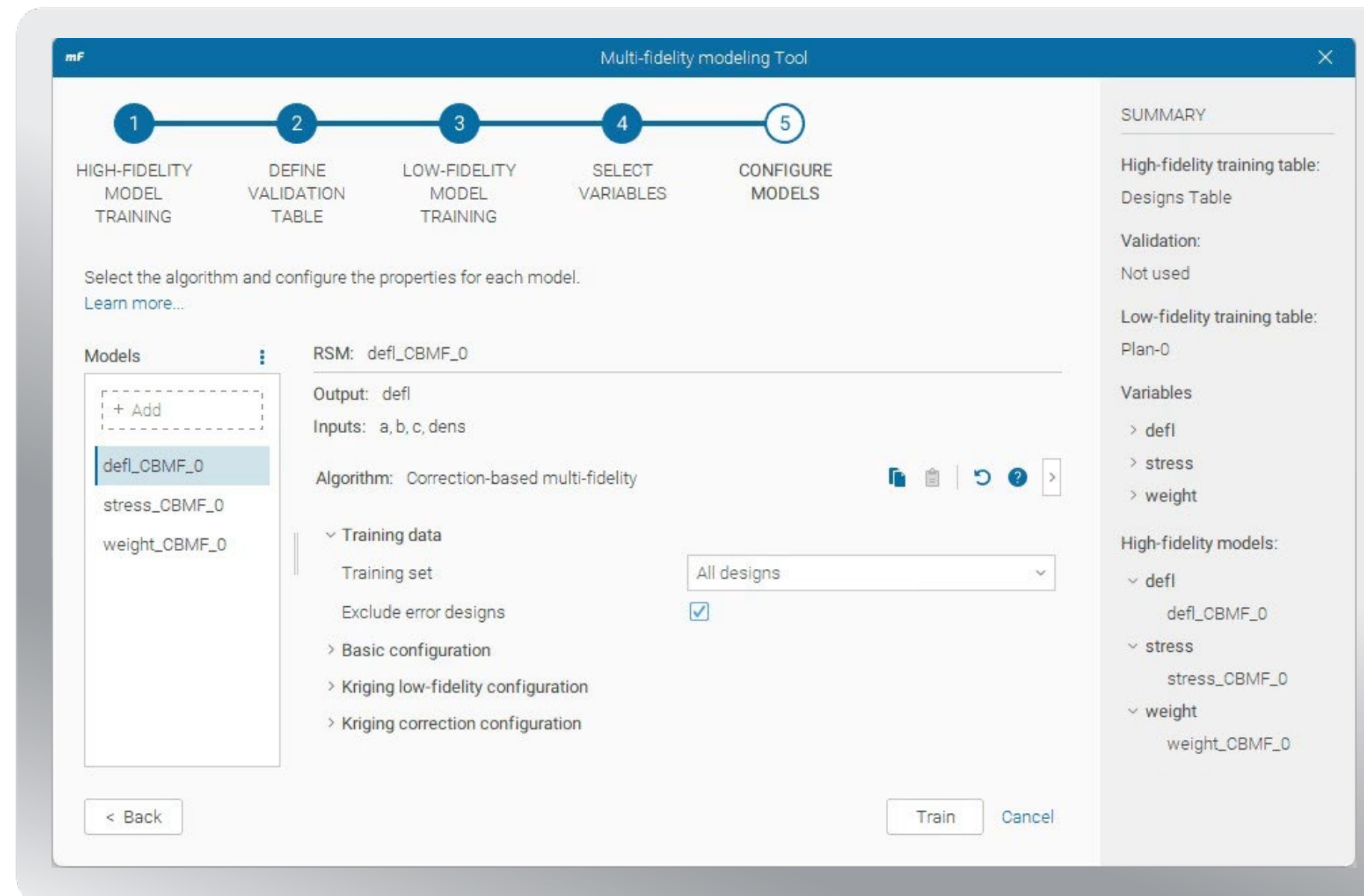
Objectives
A quantity you want to minimize or maximize

Constraints
A limit you want to respect

Multi-fidelity RSM algorithm

STATUS: finalized in 2026R2

Bridge the gap between rapid computation and high accuracy. Integrate knowledge extracted from high-fidelity simulations with low-fidelity data.



Real-world impact

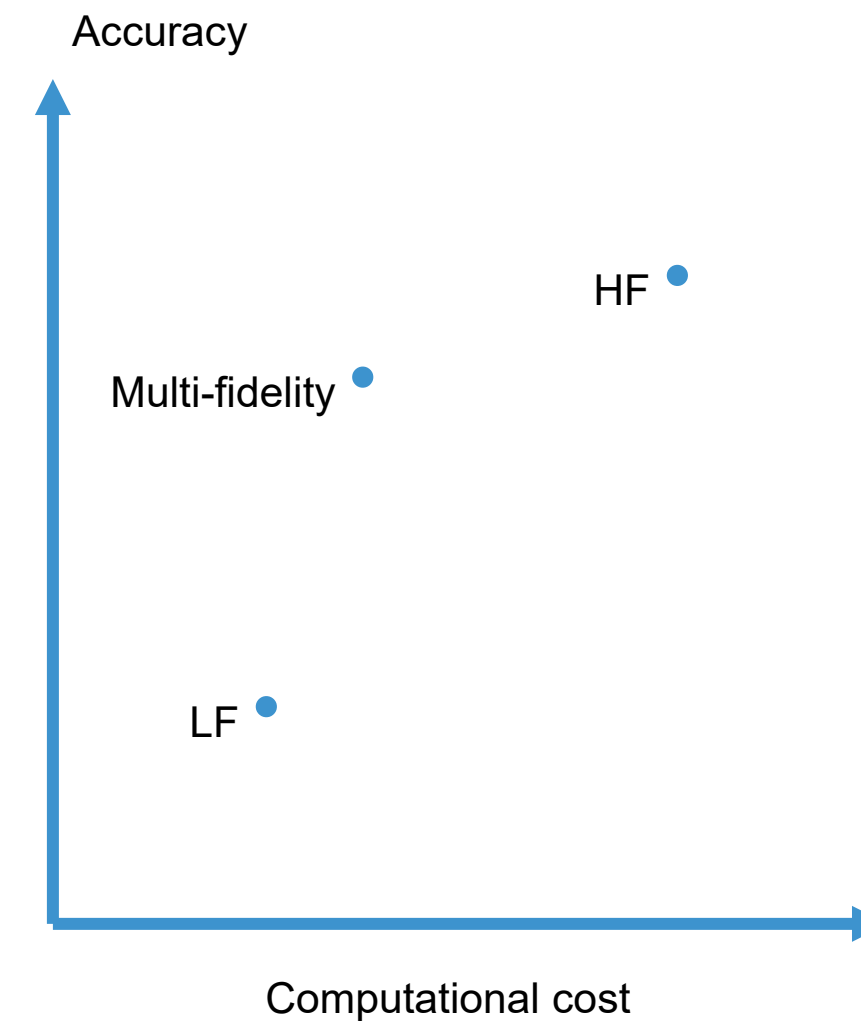
Benefits and applications in real design problems.

Benefits:

- Overall affordable computational cost.
- Improved accuracy over LF alone.
- Better coverage than HF alone.

Applications:

- Aerodynamic design optimization.
- Structural analysis.
- Any field with expensive simulations.



External control via pyFRONTIER

STATUS: workflow API in roadmap

- Drive, configure, and execute modeFRONTIER projects directly from any external Python interpreter or favorite IDE.
- Seamlessly bridge modeFRONTIER with external platforms or automated simulation pipelines.
- Dedicated Python APIs: use a robust, specialized API layer to build, manipulate, and automate optimization loops entirely via code.



myRSM

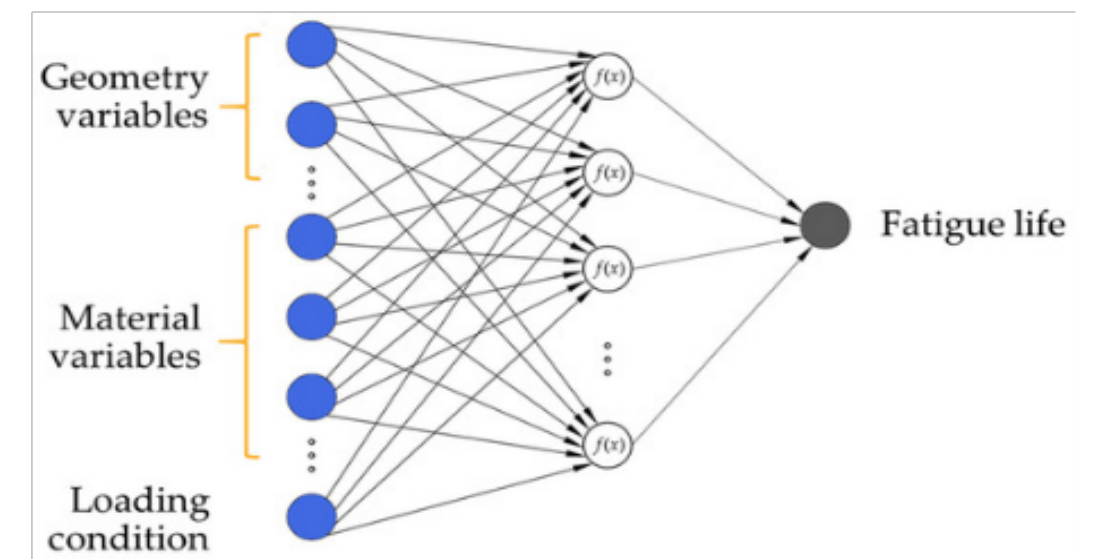
modeFRONTIER-ready sharable surrogate models

STATUS: in roadmap for 2026Q3

Enhanced Customization: plug-in Python-based RSM training algorithms directly inside modeFRONTIER.

IP-Safe collaboration: export a single, self-contained file keeping proprietary code secure.

Streamlined workflow: distribute ready-to-use RSM algorithms to end-users even without granting access to original modeling logic.

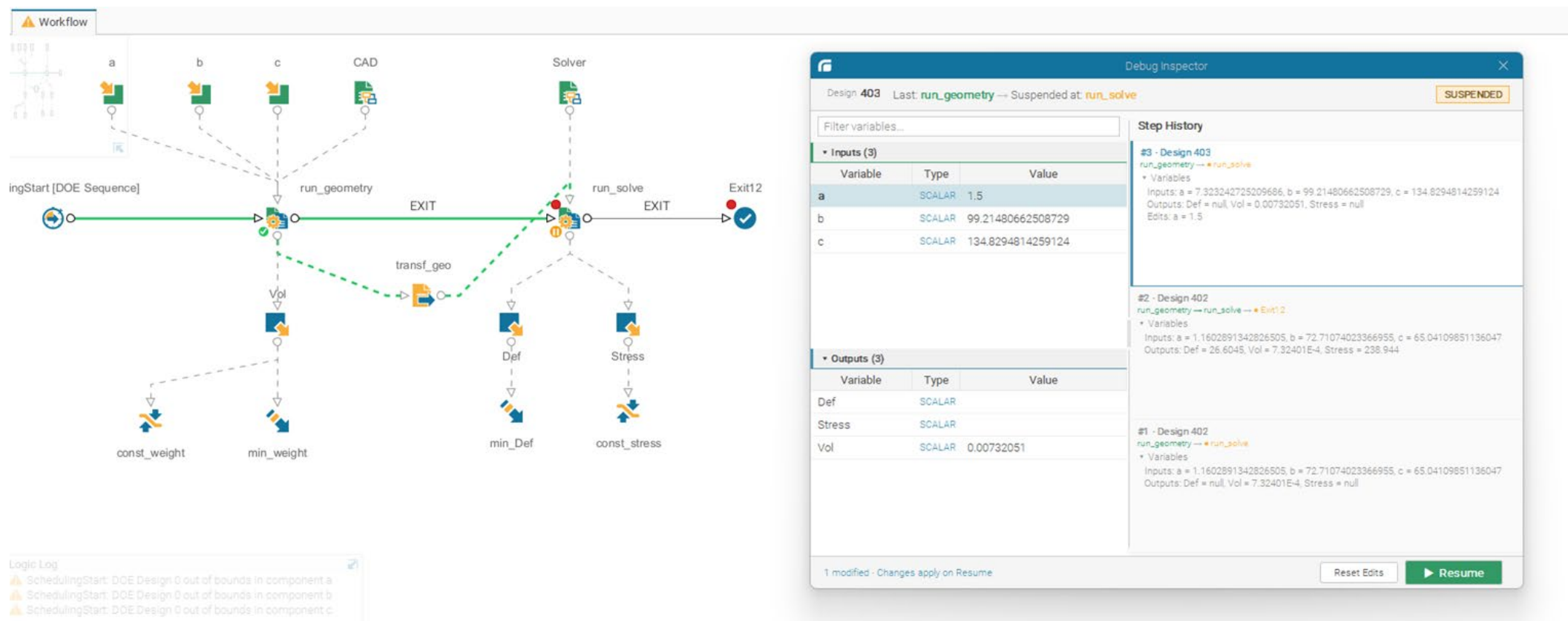




Off-roadmap ideas and prototypes



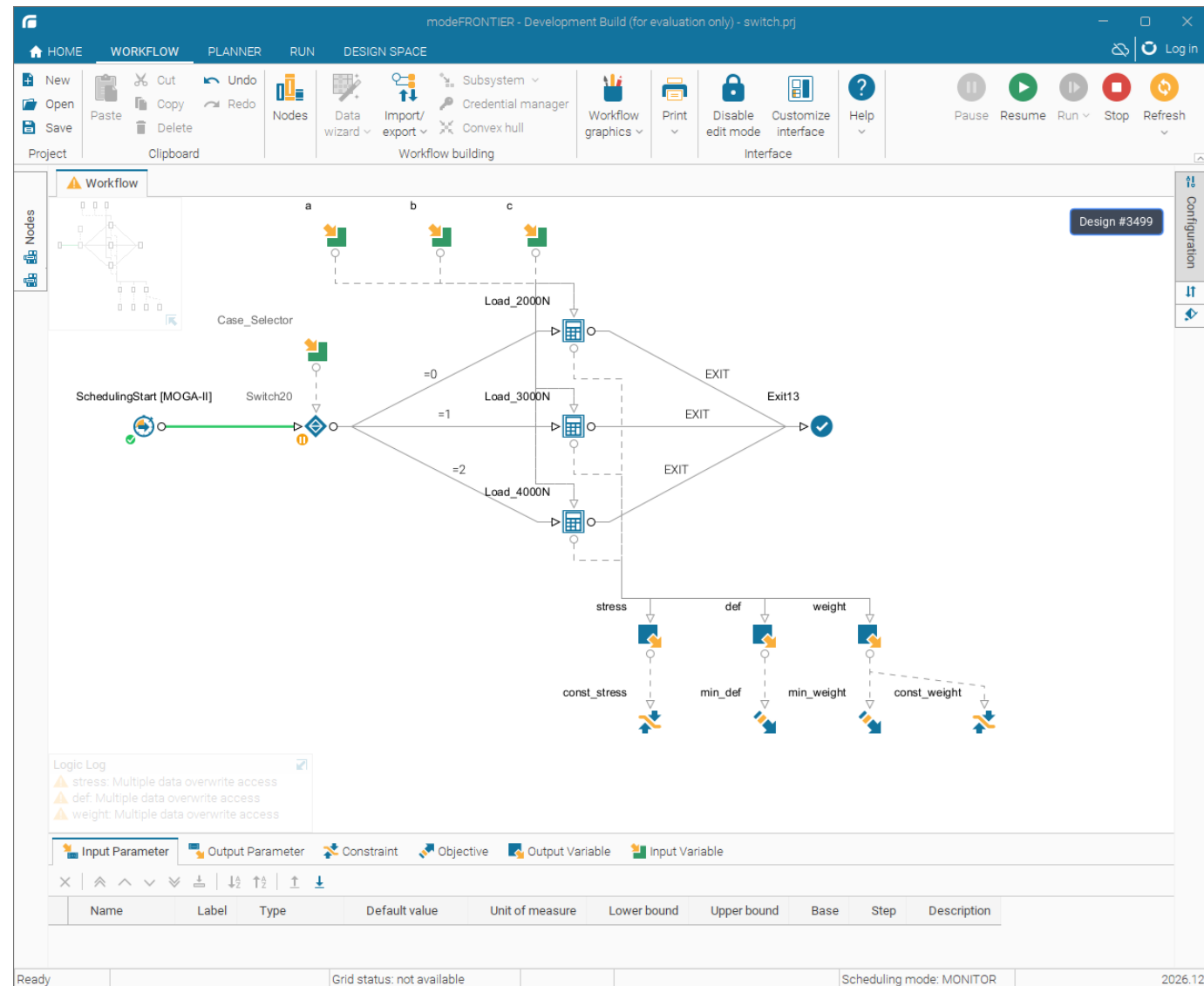
Workflow debug mode



Instant insight & troubleshooting

- Suspend & inspect: stop workflow execution.
- Granular control: inspect real-time input and output values for individual designs.
- Prevent re-runs: fix model errors on the fly and click 'Resume' to continue.

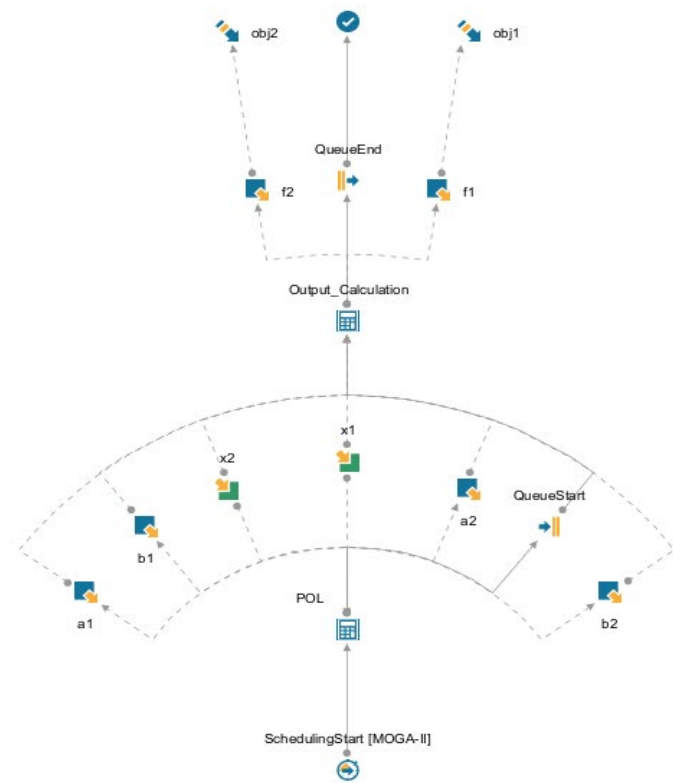
Interactive run



Dynamic run control: Pause & Resume

- Zero data loss: stop massive optimization loops at any point and resume later, safely keeping 100% of your already evaluated design history.
- Preserve algorithm logic: retain the exact evolutionary state and internal memory achieved by the optimizer (e.g., MOGA-II) up to the moment of the pause.
- Operational flexibility: pause for IT maintenance or resource reallocation without forcing the algorithm to restart its space exploration from scratch.

Automated workflow layouts



mf Layout Configuration

Layout: Radial

Configuration

Node distance: 50

Layer distance: 60

Edge routing: Radial Polyline

Center nodes policy: Directed

Layering strategy: Hierarchical

Edge bundling strength: 0

Apply Cancel

Subsystem Credential manager Convex hull

100% Link knots Add label

Align nodes Distribute nodes Rotate nodes Workflow Layout

Print Disable edit mode Customize interface Help

Run Stop Refresh Project

flow building Workflow graphics Interface

mf Layout Configuration

Layout: Hierarchic

Configuration

Layout orientation: Left to Right

Node distance: 50

Layer distance: 100

Edge routing: Orthogonal

Enable automatic edge grouping

Emphasize critical paths

Apply Cancel

Instant clarity in one click.

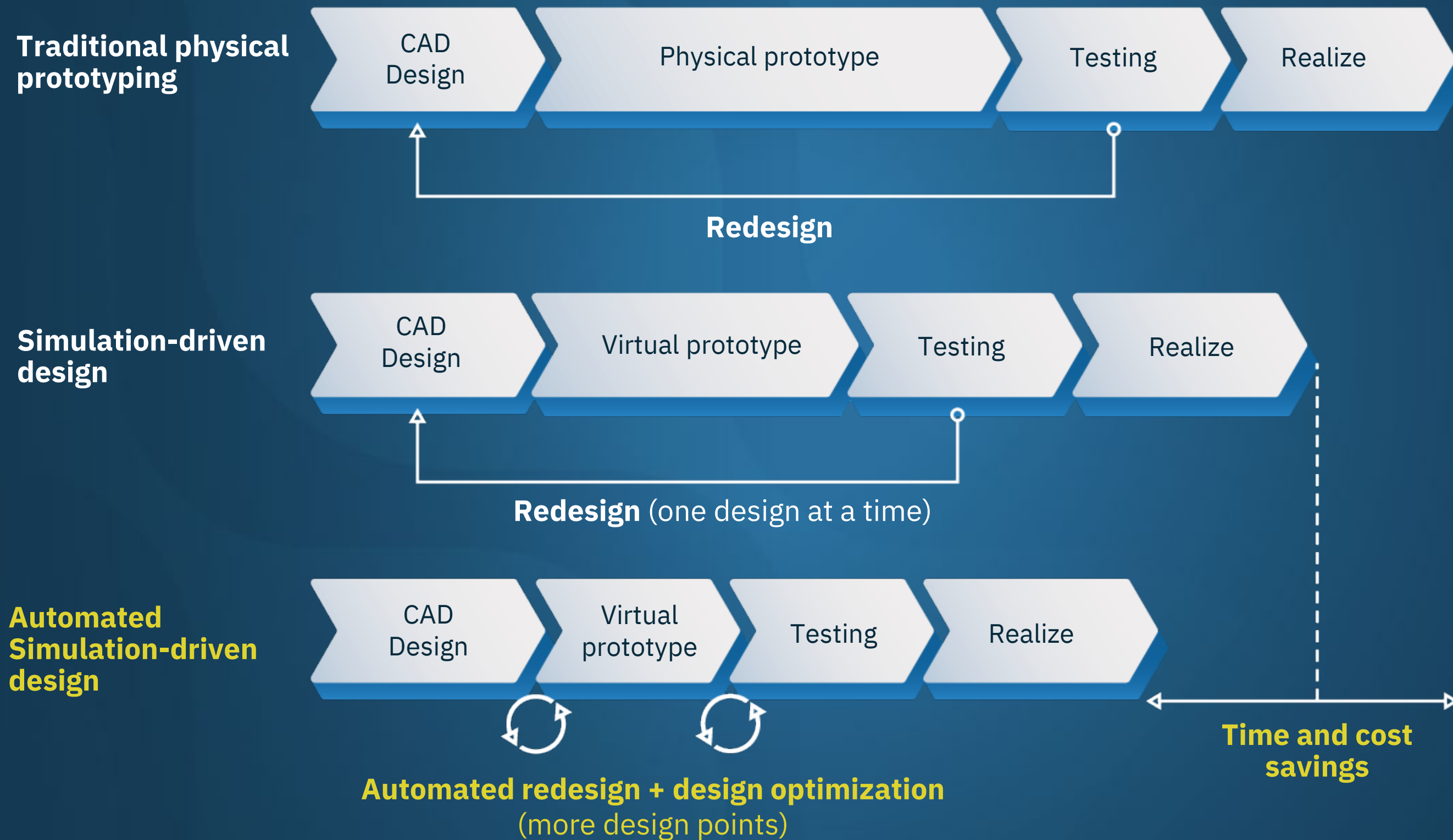
Choose a radial configuration to clearly visualize centralized dependencies, or a hierarchic left-to-right structure for sequential engineering flows. This automation instantly transforms complex pipelines into clean and standardized visual assets.



Product direction



Business challenge: time and cost savings



The foundation of Physics

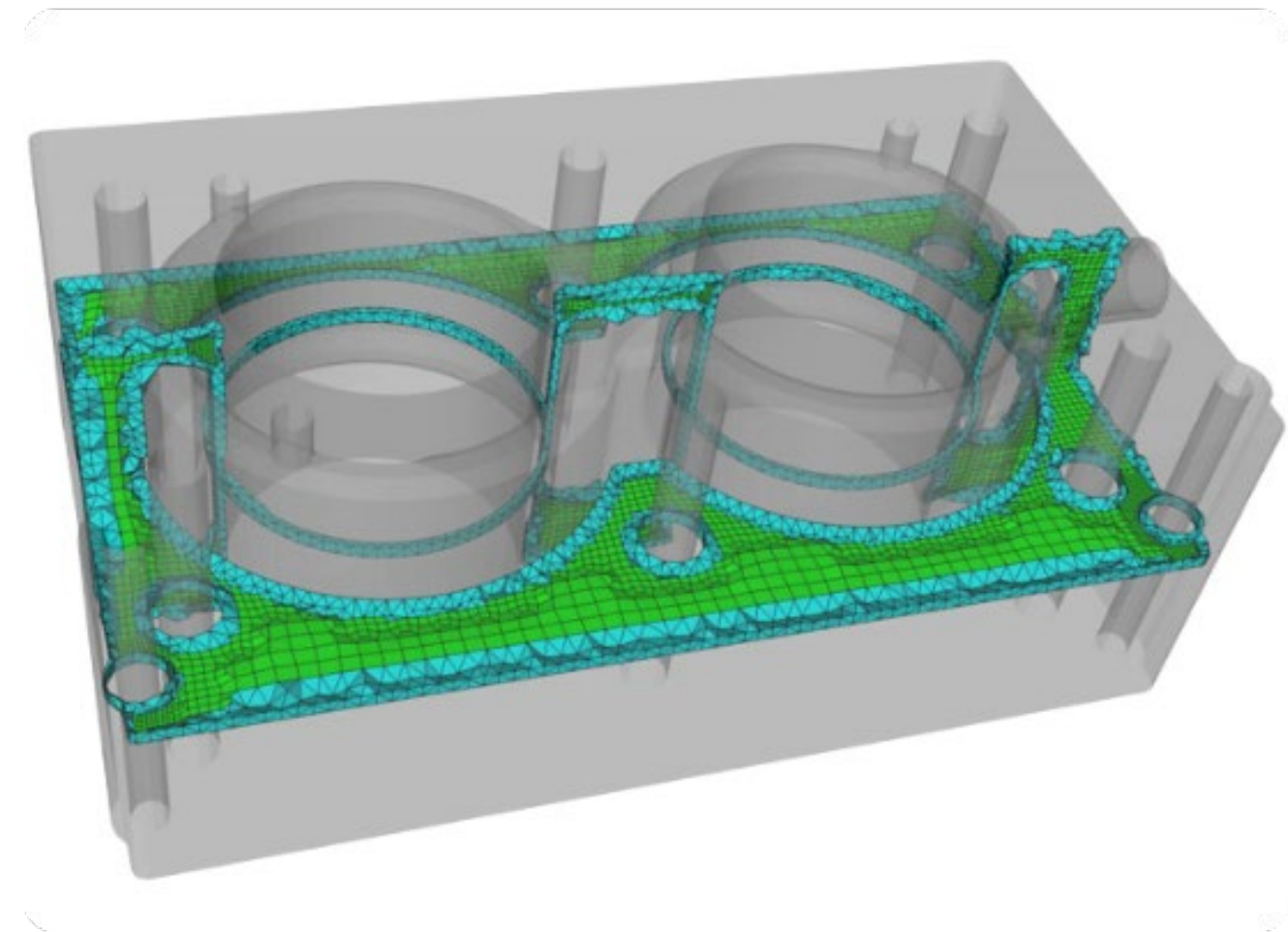
Solver Orchestration

Direct integration of third-party CAD and CAE simulation tools.

Automation of complex workflows to eliminate repetitive manual tasks.

Strict focus on physical fidelity.

Physics based solvers – Exploring an implicit function



Efficiency via Metamodels

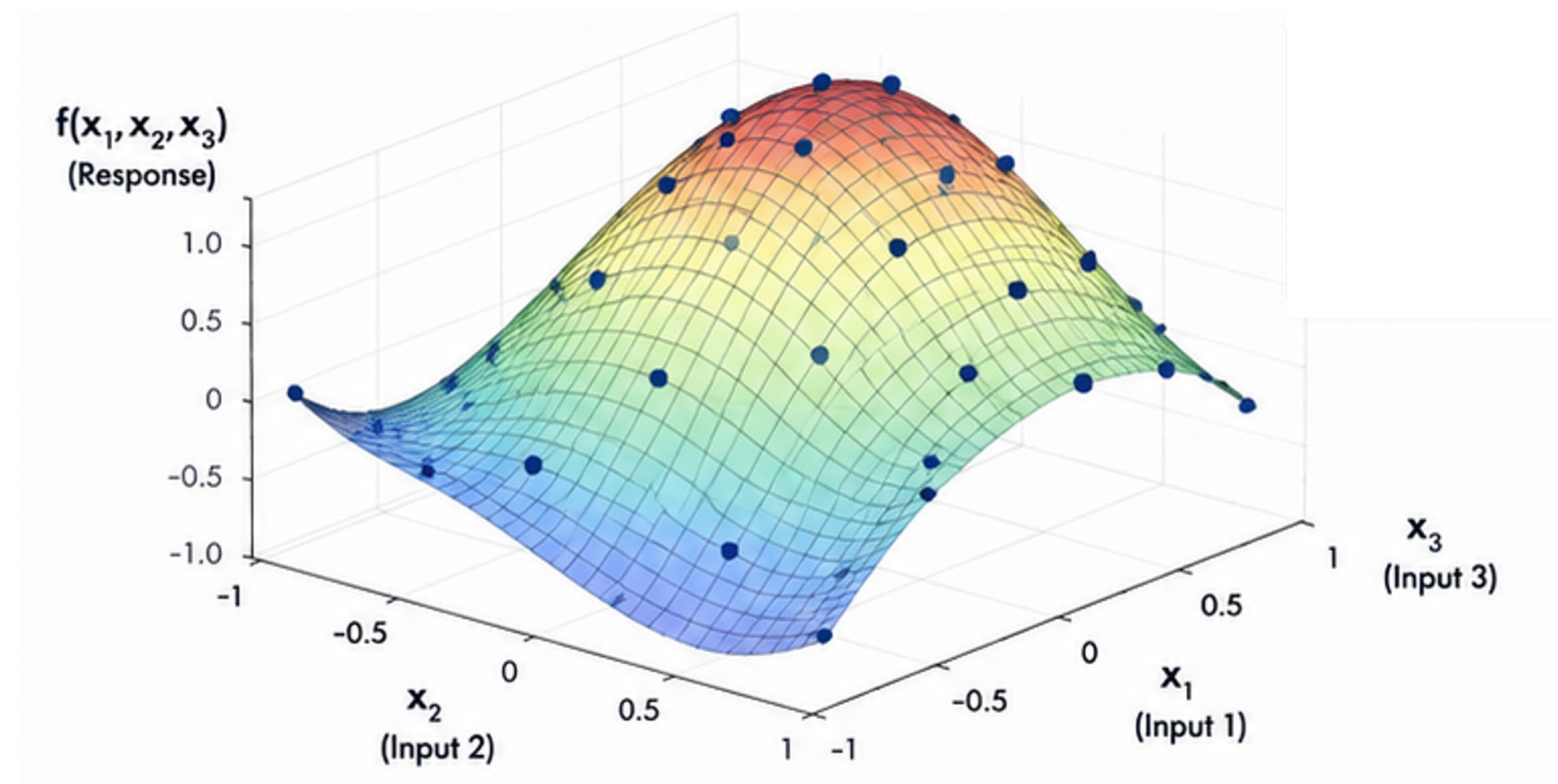
Scaling the Design Space

Response Surface Models (RSM) to approximate solver behaviors.

Rapid exploration of thousands of design variants in seconds.

Drastic reduction in computational costs during design optimization.

RSM – Exploring an approximated or interpolated function



Data driven n-dimensional predictors

Reduced Order Models (ROM)

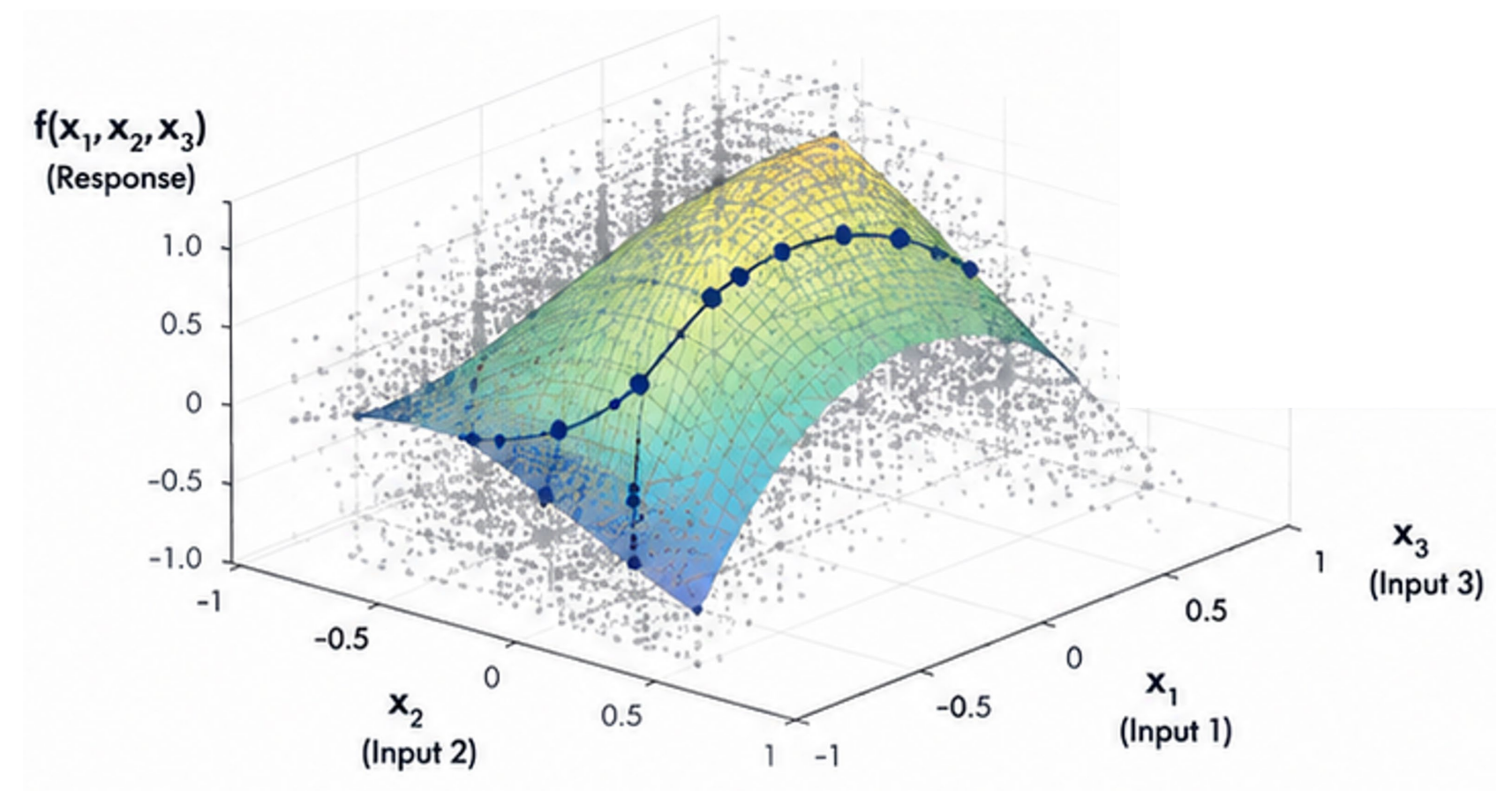
Unlocking the value of historical simulation data.

Proper Orthogonal Decomposition (POD) for high-fidelity feature extraction.

Democratizing complex simulations for non-expert engineering teams.

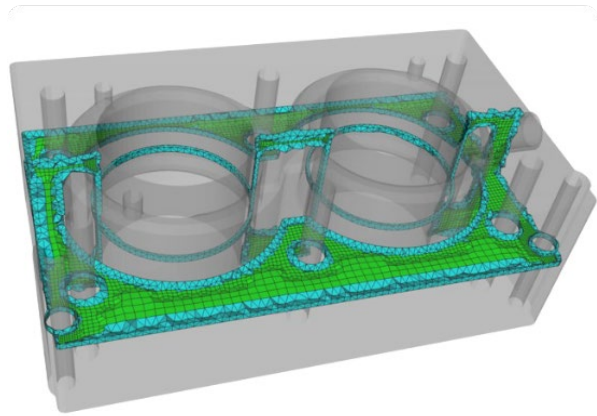
Empowering Digital Twins with real-time, instantaneous predictive capabilities.

ROM – Exploring a projected function

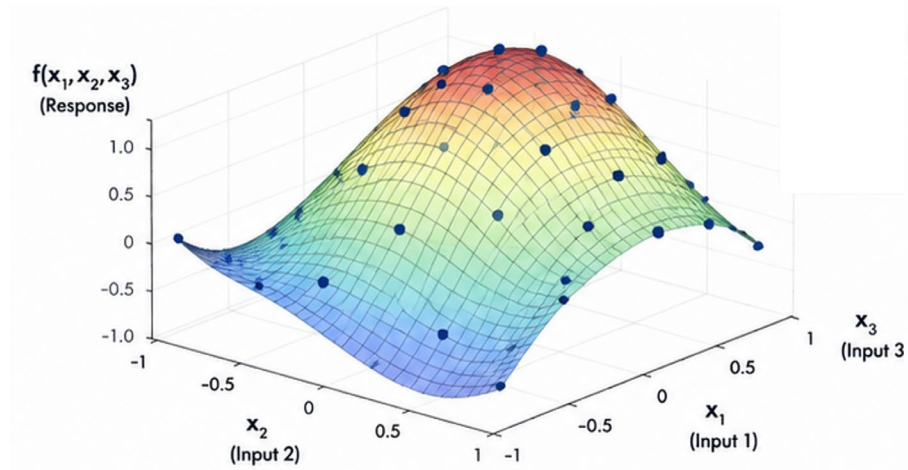


Who's next?

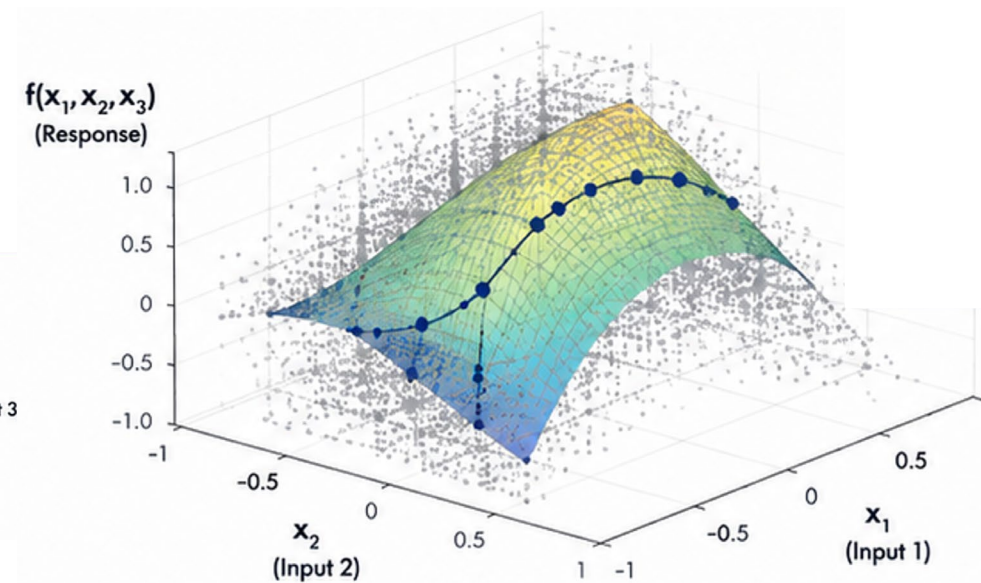
Physics-Based Solvers:
Automation of complex
CAD/CAE workflows.



Metamodels:
Introduction of RSM, Kriging,
and Neural Networks.



Data-Driven (ROM):
Reduced Order Models
for real-time predictions.



**Present &
Beyond**

Agentic AI
Autonomous decisions
models



Preparatory work – removing bottlenecks

The Bottleneck

To move from predictive ML to autonomous action, AI agents (both internal and external) need to orchestrate complex simulation flows.

The logic

Agents require a declarative blueprint of what can be run, configured, and processed in modeFRONTIER

modeFRONTIER Planner: an actionable registry





The Planner is moving toward a formalized system where every atomic operation is systematically recorded and made exportable in a native JSON format:

DOE & Optimizer: clear logic for sampling and search paths.

RSM Training: explicit datasets and training recipes.

Post-processing: programmatic creation of charts and analytics.

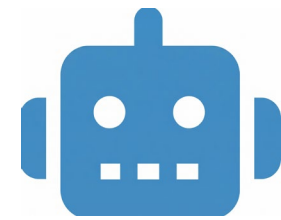
Automation workflow: the underlying dependency graph.

 Input domain Edit Remove	Variables Scalar: 5	Parameters No parameters
 Output domain Edit Remove	Variables Scalar: 2	Parameters No parameters
 RSM trainer Edit Remove	RSMs to be trained: 2	
 Run options Edit Remove	Concurrent design evaluations: 1 Manage working directory: Keep files Log detail level: FINE - Most detailed ... and 6 more	

Present and beyond: agentic AI

Today, 2:30 PM, *AI across the stack: research frontiers at ESTECO*

Agentic AI



Lowering the learning curve directly inside the modeFRONTIER Planner. Intelligent agents assist with automated node setups, workflow configurations, and strategy selection using natural language.

AI Copilot



Integrating natural language democratizes modeFRONTIER optimization through two prototypes: the AI Copilot assistant guides workflow setup and answers queries, while the Pareto navigator translates user preferences into optimal design decisions.



THANK
YOU

