Process automation and Design Optimization



Simone Genovese

Project Manager



Alexandre Mugnai

Business Development Manager



Chiara Viani

Head of Marketing & Sales

Agenda



Introduction

Automate your simulation process
Explore your designs space
Identify relevant performance metrics

AVEVA Dynamic Simulation use-case

Compressor model simulation
Design space exploration strategies
Select a robust design

Scale to Enterprise

Make simulation data accessible
Execute distributed simulation processes
Turn data into engineering knowledge

ESTECO is an independent software provider, highly specialized in **numerical optimization** and **simulation data management**.



Our products

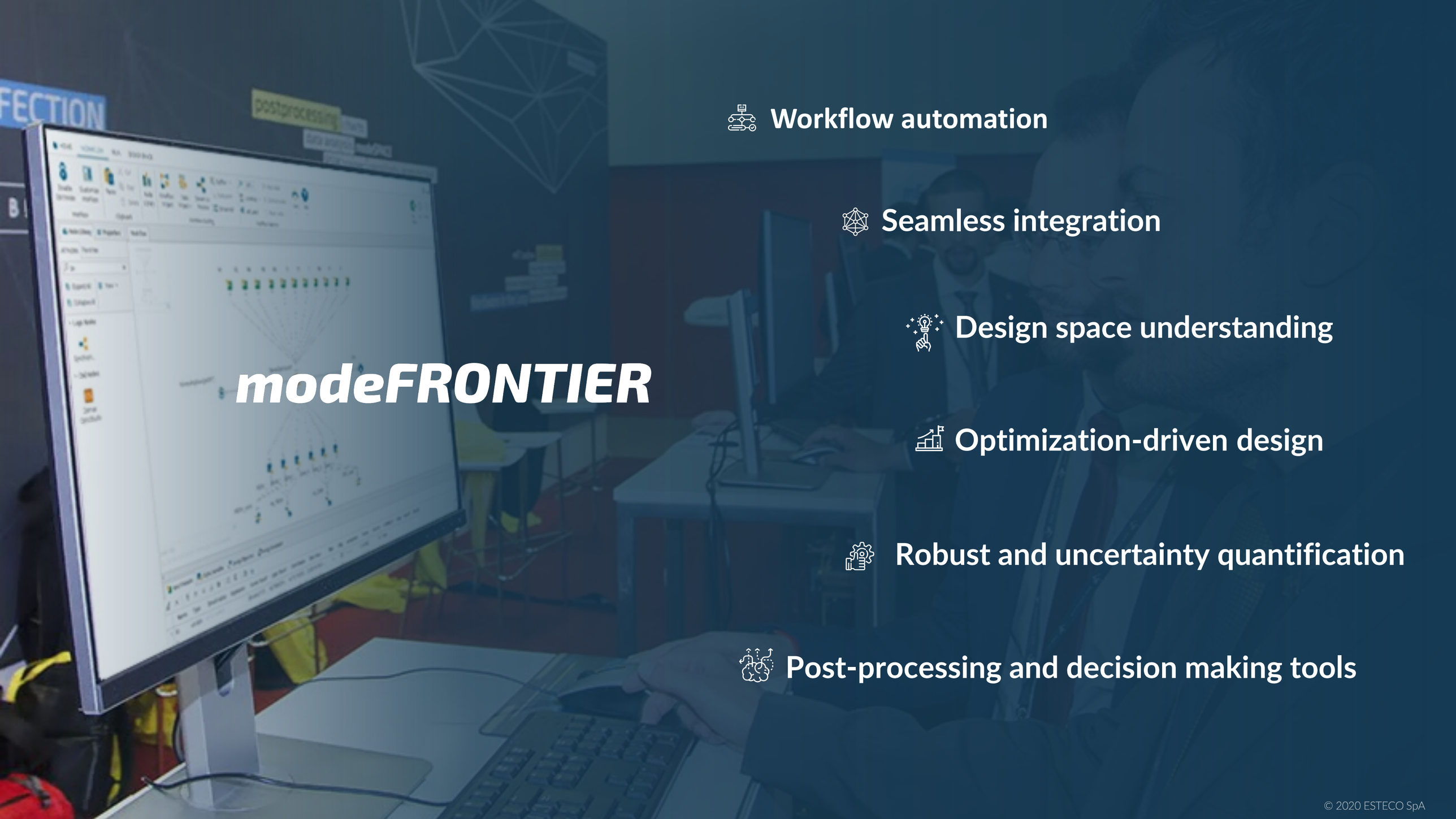
modeFRONTIER

The comprehensive solution for process automation and optimization in the engineering design process

VOLTA

The collaborative web platform for Simulation Process and Data Management (SPDM) and design optimization

© 2020 ESTECO SpA



modeFRONTIER

- Workflow automation
- Seamless integration
- Design space understanding
- Optimization-driven design
- Robust and uncertainty quantification
- Post-processing and decision making tools

© 2020 ESTECO SpA

Process Automation

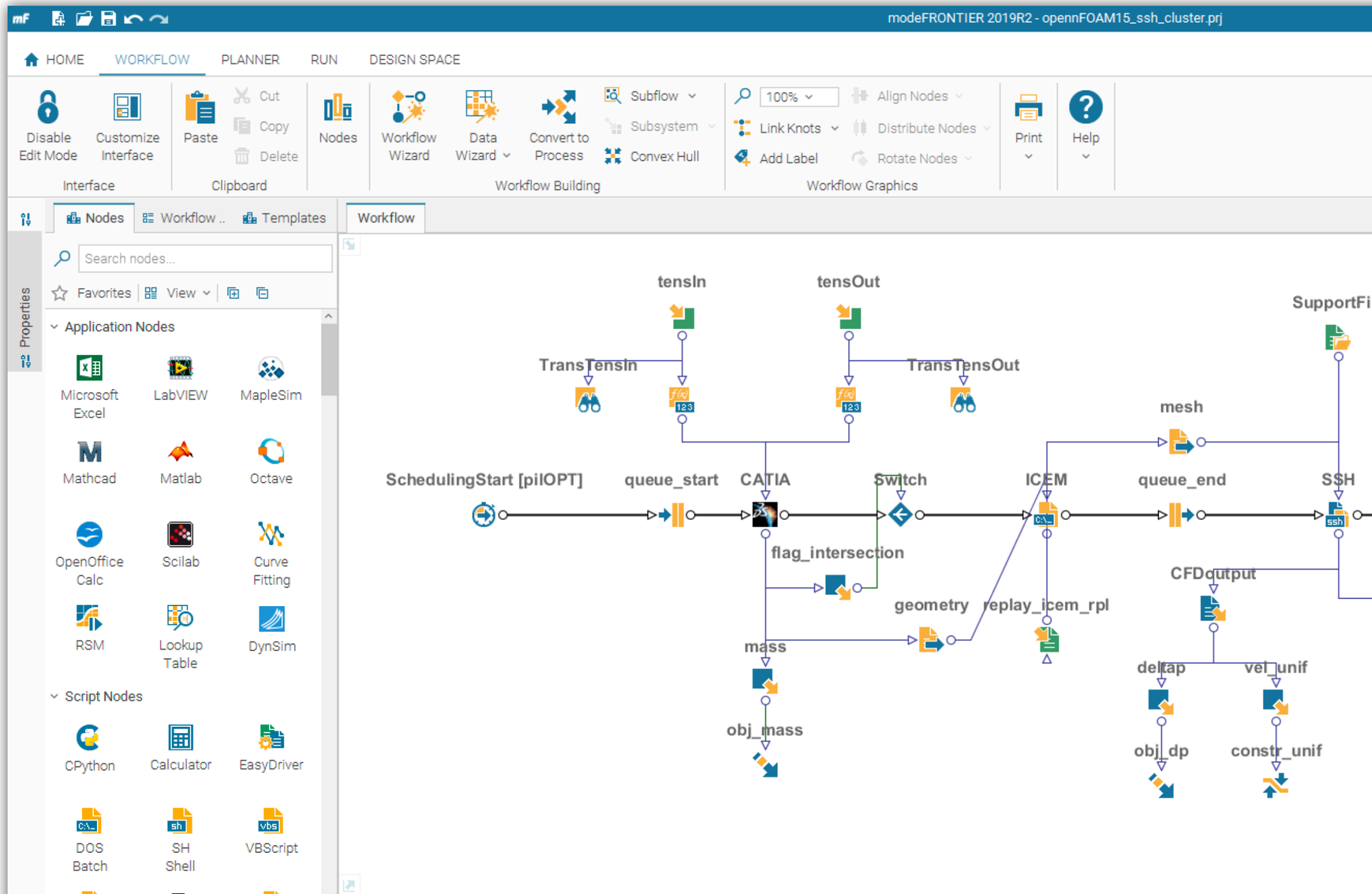
Save time
Automatically run repetitive simulations

Reduce operational costs
Execute complex simulation chains

Improve performance
Evaluate thousands of design simultaneously

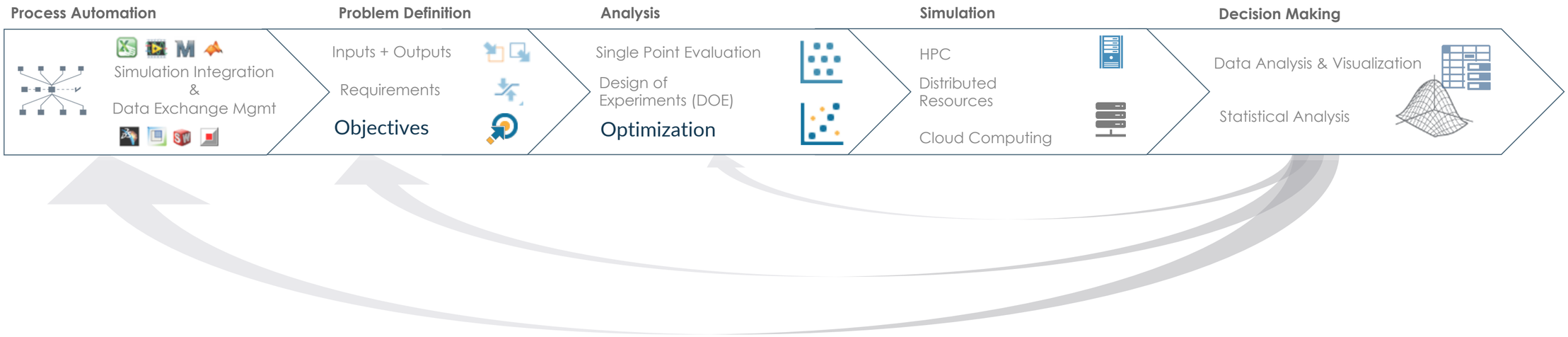
Technical partnership

AVEVA



Optimization-driven design

Highly iterative design process



Explore multi-disciplinary design projects with conflicting objectives

Pick the right design with a full suite of optimization algorithms

Deliver better, more competitive products in less time

Engineering Data Intelligence

Simplify complexity and make better decisions with advanced data analysis and visualization tools

Design Charts

Multi-Variate Analysis

Sensitivity Analysis

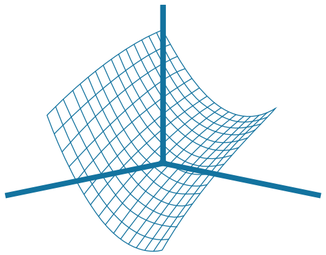
Statistical Distribution

Response Surface Models

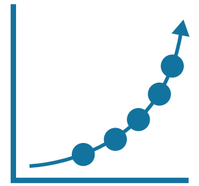
Multi-Criteria Decision Making



DOE techniques



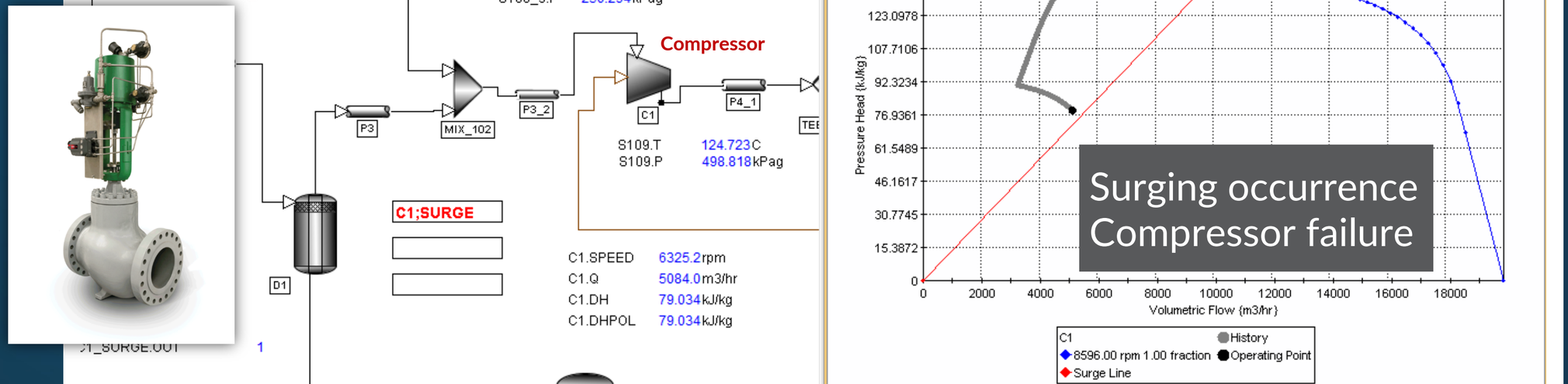
Response Surface Models



Optimization sessions

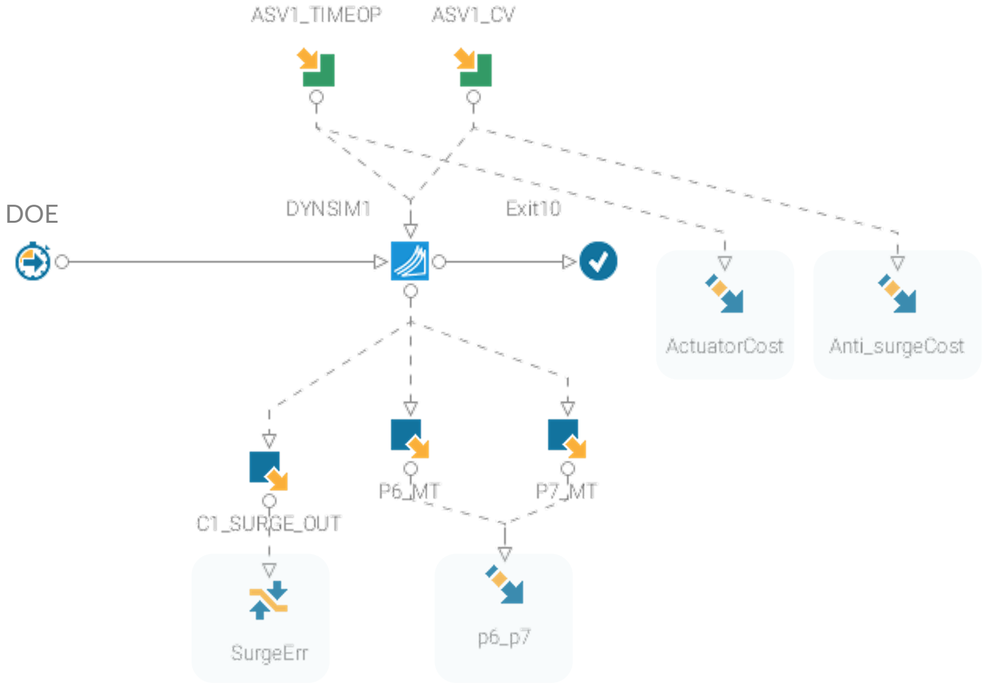
Using modeFRONTIER coupled with DynSim to design a better Anti-surge line preventing from surge, enabling stable operation at low cost while saving up hours of computational time.

Multistage compressor model



Process Automation

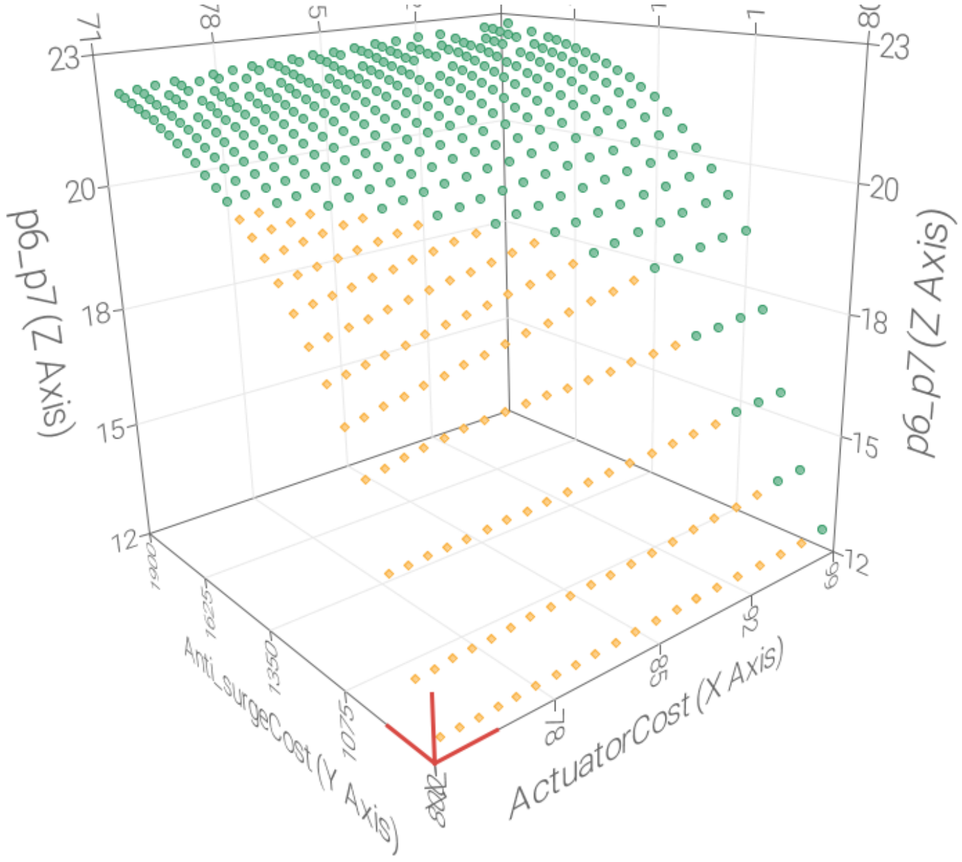
Simple process automation Workflow



<Constraint>
Surge OUT = 0

<Objective function>
Pipe holdup minimization

Full-factorial DOE



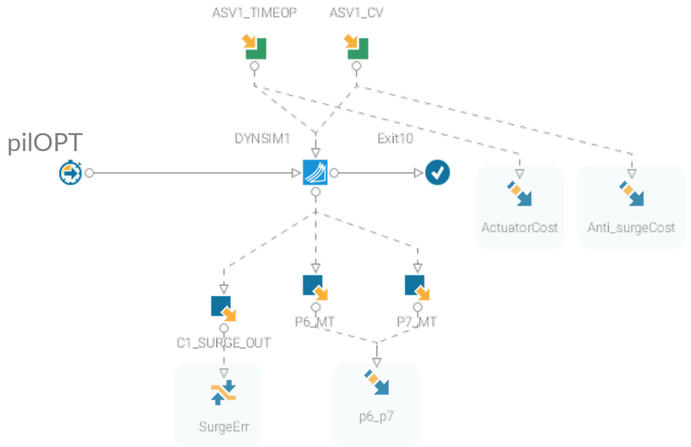
Unfeasible
Feasible

50(s)/case ×520 = **7.2(h)**

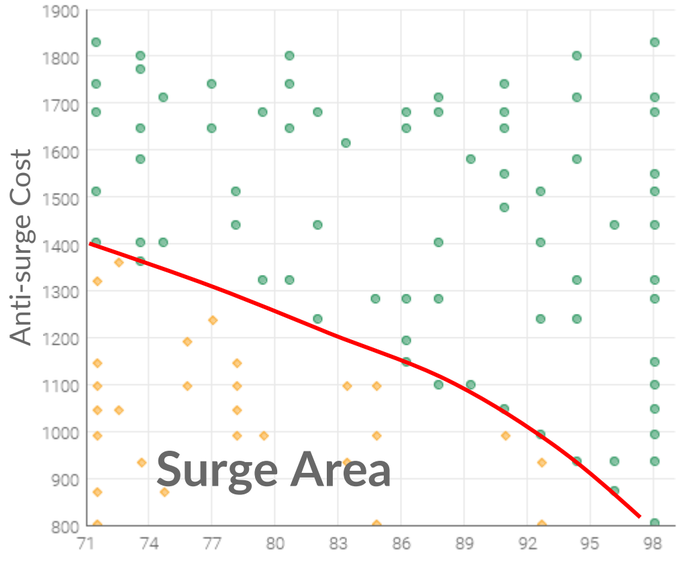
Adopt the optimization-driven design

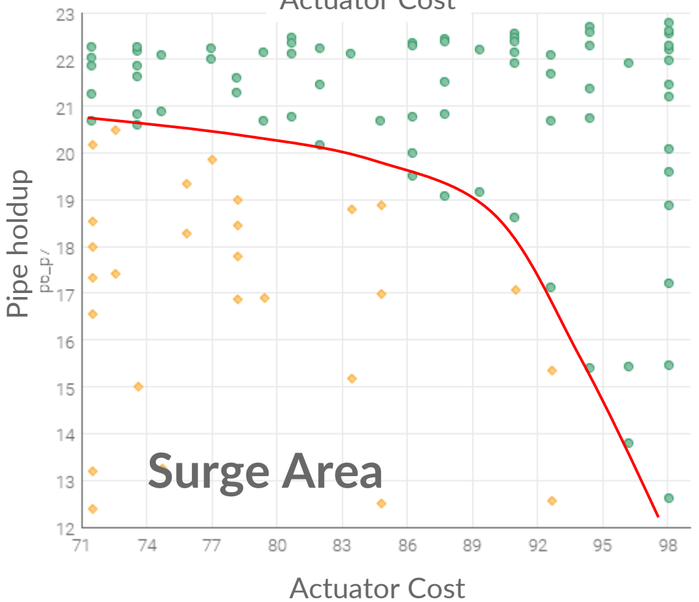
Make the best out of time and computational resources available exploiting the internal adaptive algorithm strategy

- set up an initial investigation of the design space when little knowledge is available
- generate new design ideas
- rapidly identify variable correlations
- identify promising areas of the design space to be further exploited



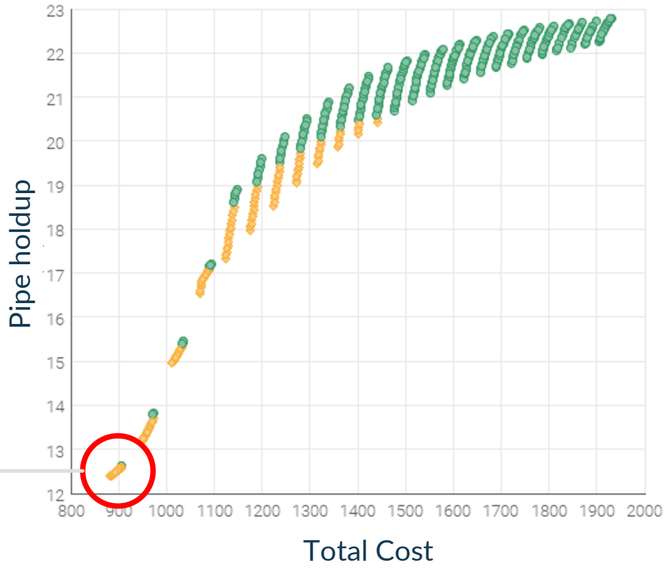
50(s)/case ×100 = **1.4(h)**

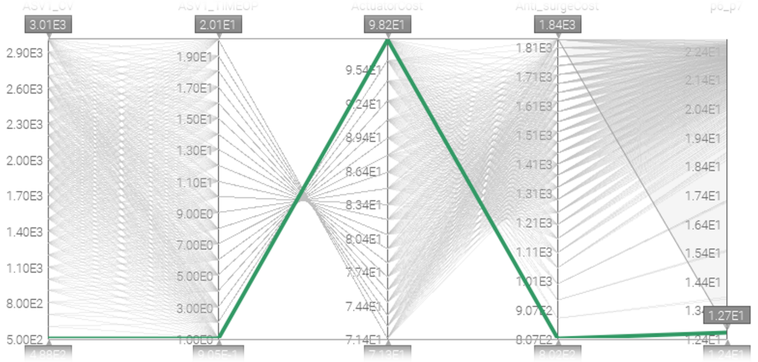




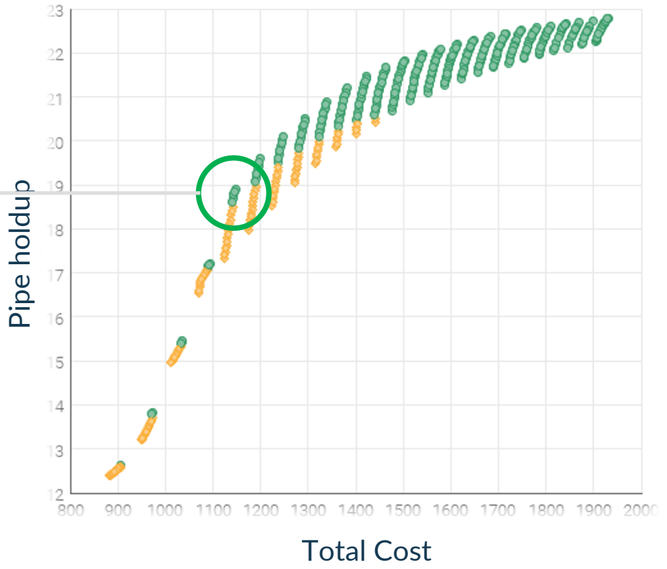
Engineering Data Intelligence

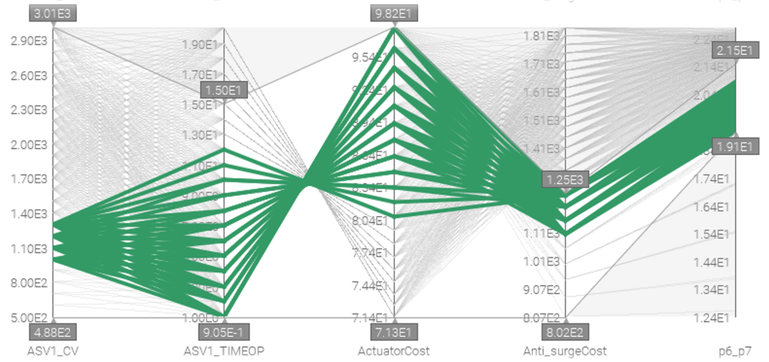
Best design but not Robust





Robust solutions





Take-away Points



Process Automation

Automate the simulation and evaluate 500 different designs automatically

Optimization-driven design

Allowed us to reduce the simulation time from 7 hours to 1.4 maintaining the same KPI quality

Engineering Data Intelligence

Gave us an in-depth view of the solutions, allowing to select a more robust one

Plant \ 'plant \

the land, buildings, machinery, apparatus, and fixtures employed in carrying on a trade or an industrial business

Merriam-Webster

Scale up

modeFRONTIER

across the enterprise with the collaborative web platform

VOLTA

ESTECO

Execute enterprise-wide optimization strategies with VOLTA

Coordinate design teams to run, visualize and share results of modeFRONTIER projects across different departments and organizations

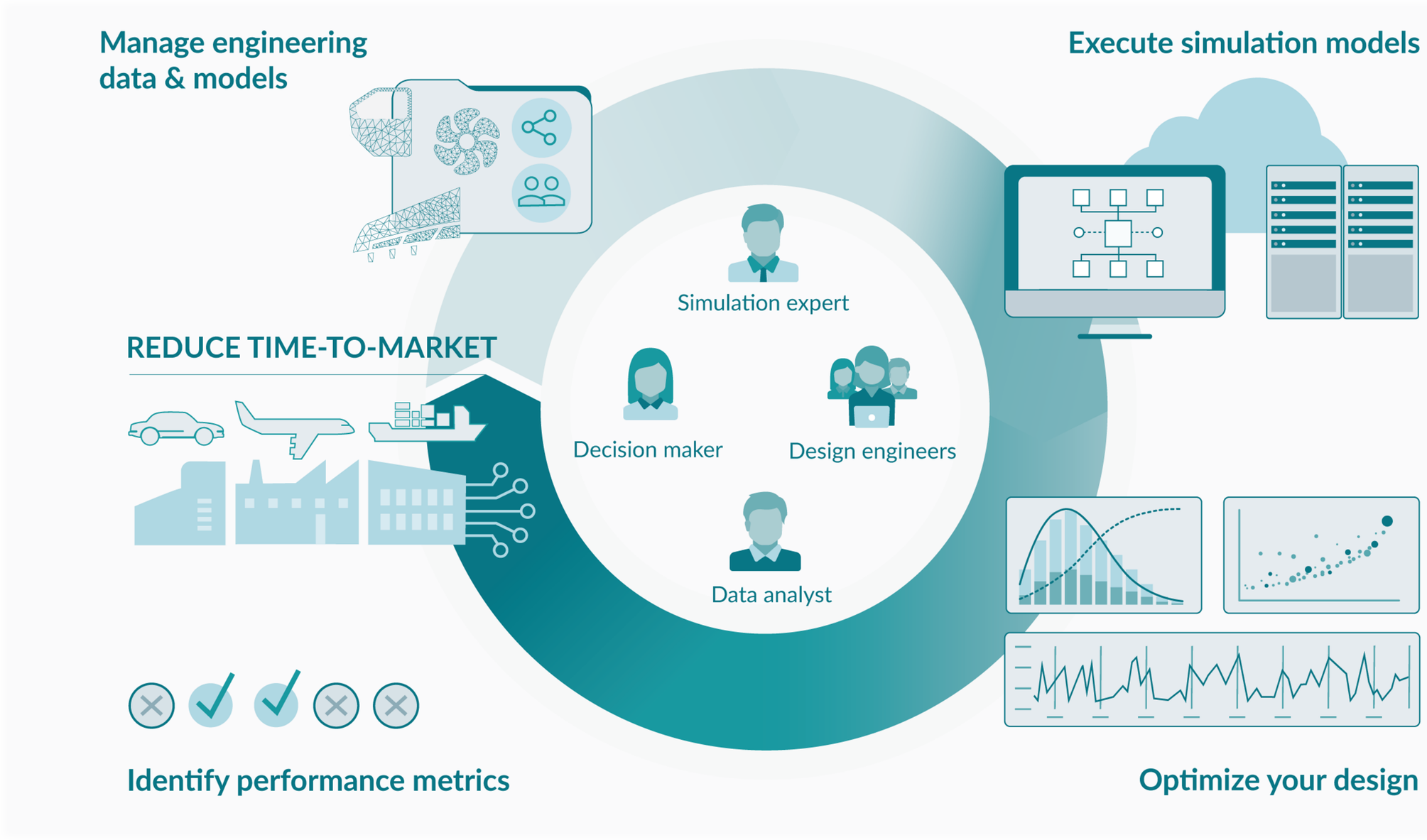


VOLTA

The collaborative web platform for SPDM and design optimization

© 2020 ESTECO SpA

VOLTA


Manage engineering data & models
Execute simulation models
Simulation expert
REDUCE TIME-TO-MARKET
Decision maker
Design engineers
Data analyst
Identify performance metrics
Optimize your design

VOLTA advisor



Simone Genovese
Project Manager
genovese@esteco.com



Alexandre Mugnai
Business Development Manager
mugnai@esteco.com



Chiara Viani
Head of Marketing & Sales
viani@esteco.com

esteco.com