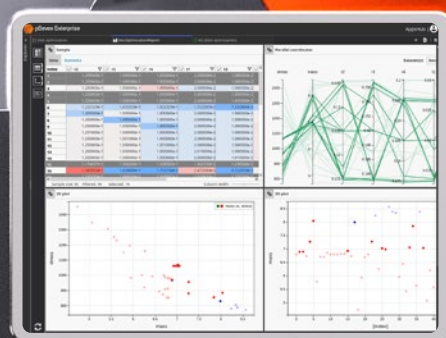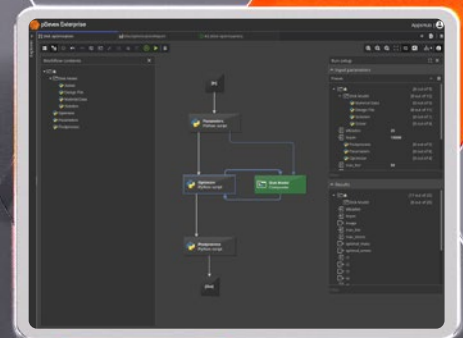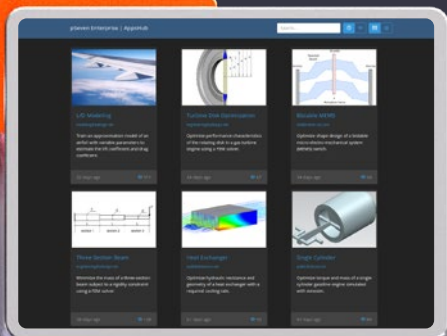# DATADVANCE

BUILD, DEPLOY AND OPERATE DIGITAL TWINS AT SCALE WITH PSEVEN ENTERPRISE,

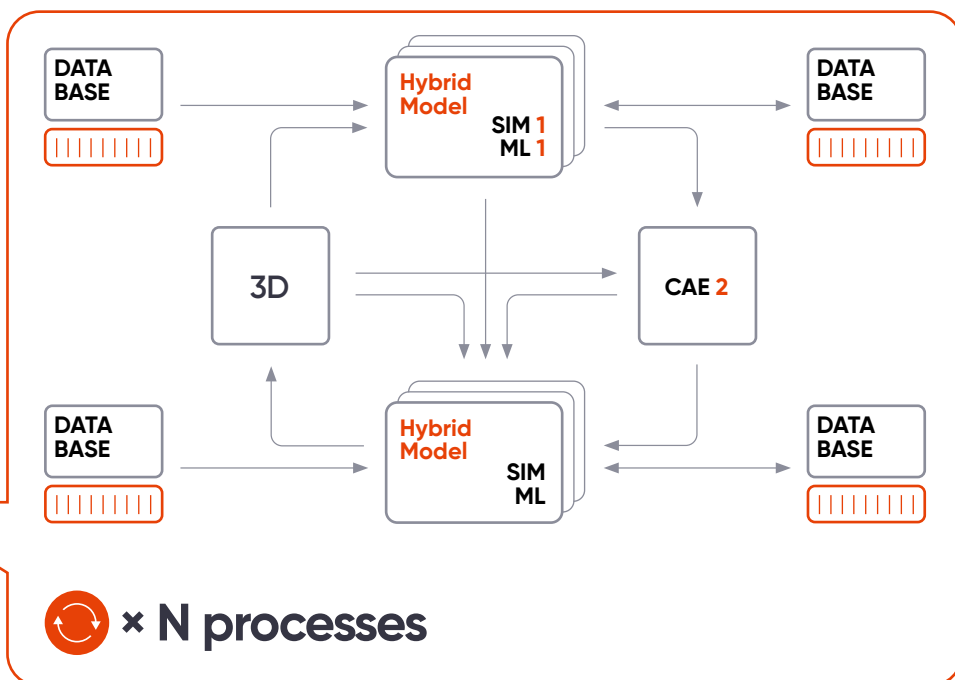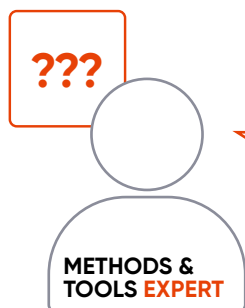### a Cloud-native Low Code Platform

BUSINESS
CHALLENGES

1 Bring the best product to market on time and on budget: the best performance, best manufacturability, best reliability at lowest cost.

2 Reduce product/asset operating costs while increasing its efficiency and profitability.

Regularly Build, Deploy, Use and Operate different Models and Processes at Scale

Software industry has developed various solutions to these challenges: functional mock-up, simulation driven design, Model-Based Systems Engineering, Digital Twins, and Artificial intelligence. Implementing these solutions means that companies need to digitize core engineering processes towards optimal product design, optimal process design, real-time asset monitoring, optimization and more at the scale of the whole company.
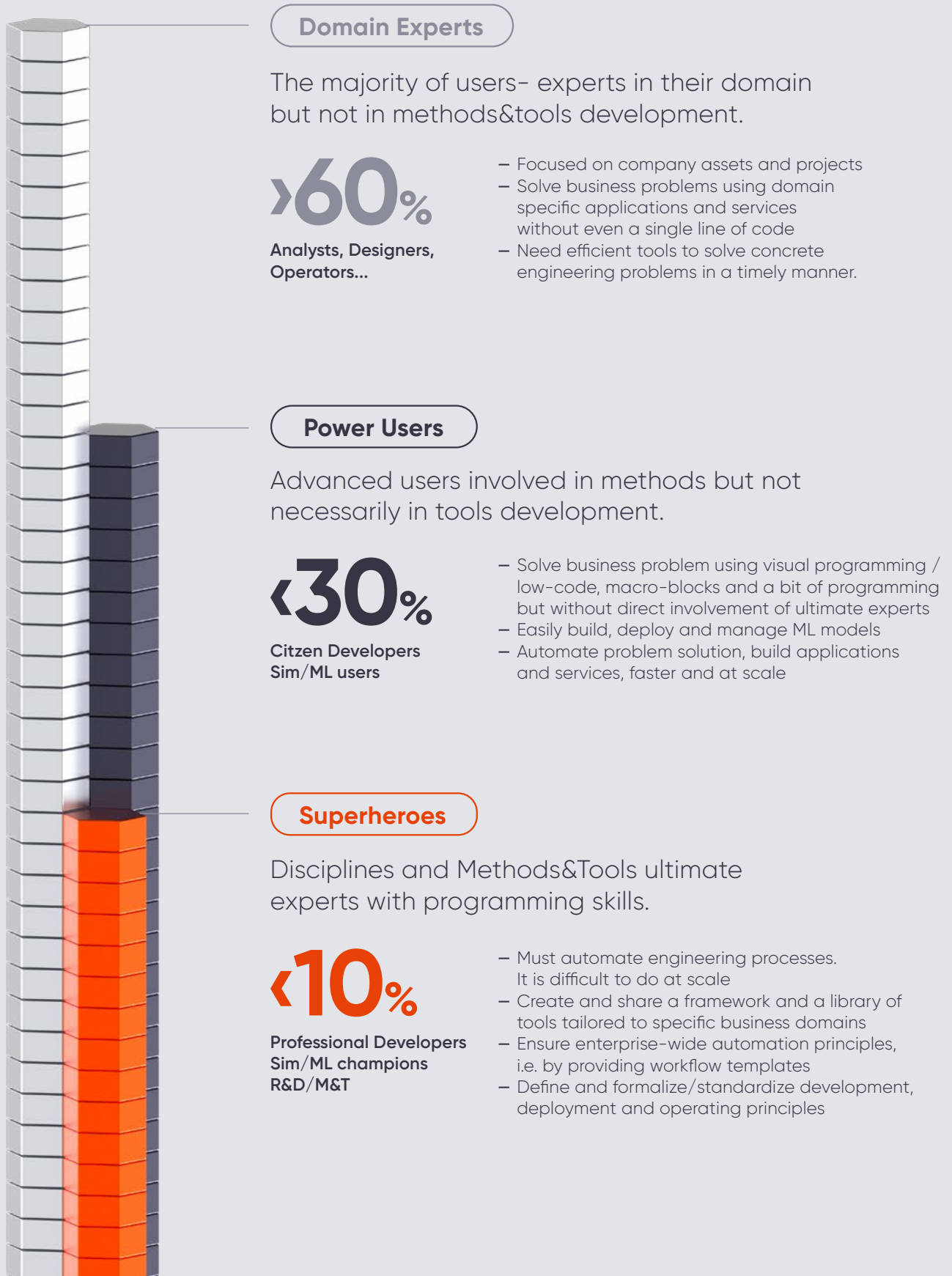
Product design processes include simulation and analysis, validation and certification, design optimization etc., which require different CAD/CAE tools.

For the optimal process design, machine learning methods can be added to the previously mentioned tools, as data mining, data analysis, uncertainty and reliability analysis are involved.

To reach the Digital Twins level, companies need to handle product and process design in a real time. Data is coming from the asset to the databases through data processing processes. This might require building Hybrid models combining physics-based simulations and machine learning.

The need to digitize such engineering processes at scale, meaning that there is a variety of products and processes, makes the task very complicated even for technologically advanced organizations. It would require number of experienced engineers, professional software developers and data scientists. Do companies really need all of them and what is an alternative?

TYPICAL ENGINEERING POPULATION OF A COMPANY

Domain Experts

The majority of users– experts in their domain but not in methods&tools development.

›60%

Analysts, Designers, Operators...

– Focused on company assets and projects
– Solve business problems using domain specific applications and services without even a single line of code
– Need efficient tools to solve concrete engineering problems in a timely manner.

Power Users

Advanced users involved in methods but not necessarily in tools development.

‹30%

Citzen Developers Sim/ML users

– Solve business problem using visual programming / low-code, macro-blocks and a bit of programming but without direct involvement of ultimate experts
– Easily build, deploy and manage ML models
– Automate problem solution, build applications and services, faster and at scale

Superheroes

Disciplines and Methods&Tools ultimate experts with programming skills.

‹10%

Professional Developers Sim/ML champions R&D/M&T

– Must automate engineering processes. It is difficult to do at scale
– Create and share a framework and a library of tools tailored to specific business domains
– Ensure enterprise-wide automation principles, i.e. by providing workflow templates
– Define and formalize/standardize development, deployment and operating principles

SOLUTION

One of the answers to this challenge is the low code. Low code platform pSeven Enterprise by DATADVANCE empowers each group of engineers to build, deploy and operate different models and processes at scale. This becomes possible with a 3-layer structure of platform's key capabilities.

● 1st Layer

Fundamental set of features like cloud-native scaling, multi-user collaborative environment, Machine Learning and Optimization.
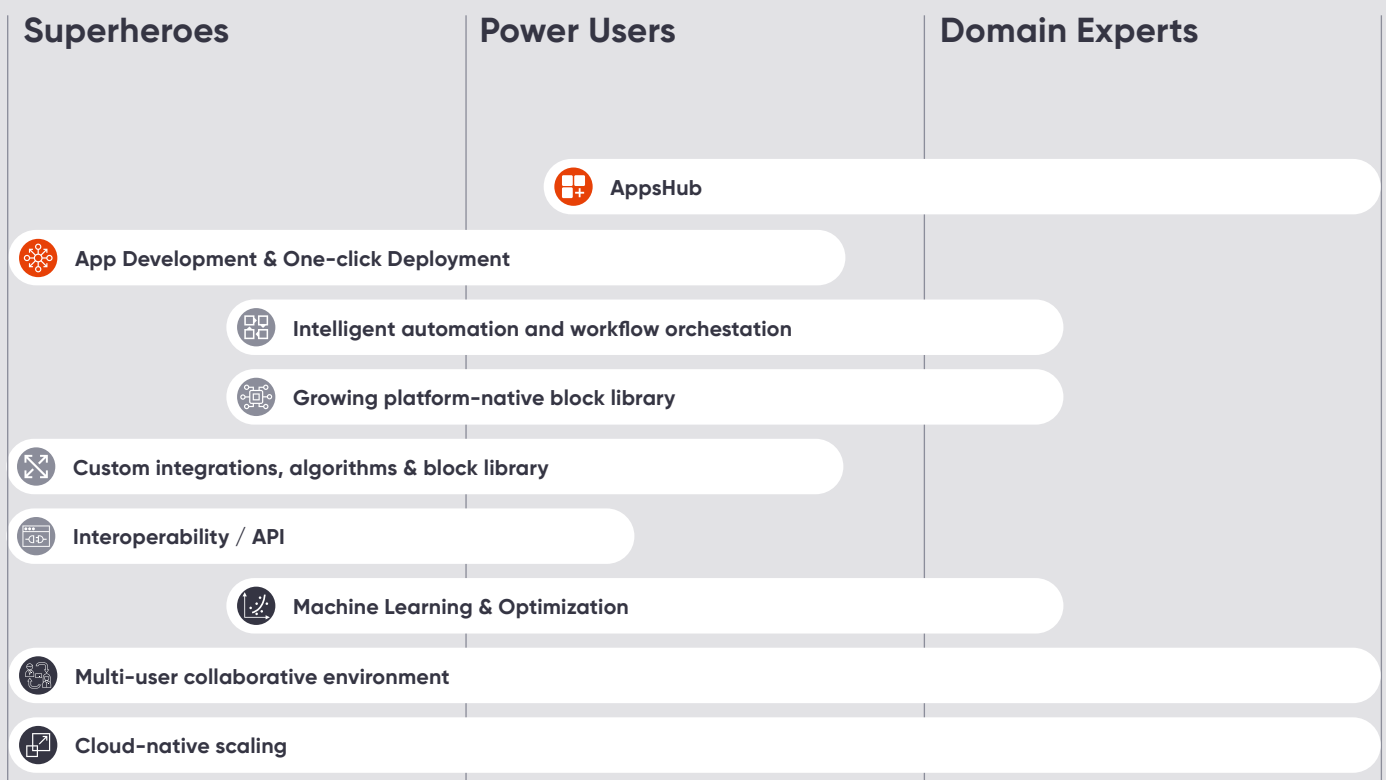
● 2nd Layer

The workflow automation, the library of standard integration methods, the means to develop custom integration, algorithms, and the interoperability via open API.

● 3rd Layer

Development and straight forward publishing of applications as bundled web App with custom UI for the domains.

3 LAYER STRUCTURE OF PSEVEN ENTERPRISE CAPABILITIES

Superheroes	Power Users	Domain Experts
	AppsHub	
App Development & One-click Deployment		
	Intelligent automation and workflow orchestation	
	Growing platform-native block library	
Custom integrations, algorithms & block library		
Interoperability / API		
	Machine Learning & Optimization	
Multi-user collaborative environment		
Cloud-native scaling		

BENEFITS OF USING PSEVEN ENTERPRISE

PRODUCTIVITY GAIN, REWORK REDUCED
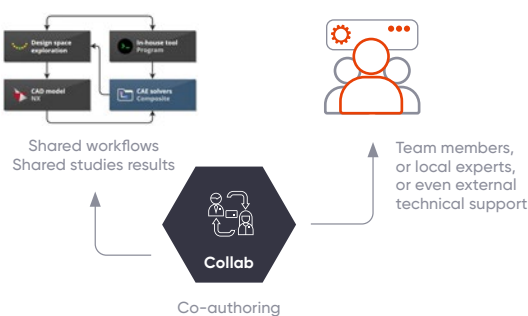
Efficiency Increase
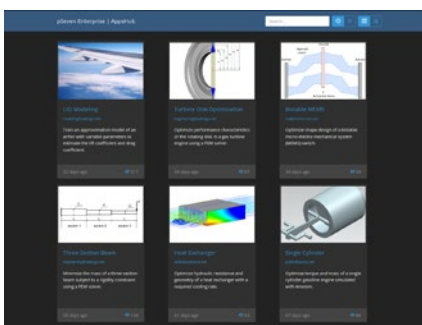
AppsHub Gallery of web apps published by power users

Power users can elaborate and share best practices and make sure they won't be altered once spread within organization.

Best practices are captured in pSeven Enterprise workflows. Power users tune the workflow and publish it in a few clicks in AppsHub as a custom web App. Any authorized user can then access workflow via a small app. It doesn't allow any modification of the workflow.

Users can either run apps in a standard pSeven Interface, or in a custom UI meant to hide the complexity of pSeven workflow. This way, power users can give access to complex methods through a simple interface that any engineer can use.

Shorter Development Cycle

Shared workflows
Shared studies results

Collab
Co-authoring

Team members, or local experts, or even external technical support

Superheroes can keep control of their methods and processes. They can seamlessly update them when they are shared. Power users and domain experts can focus on engineering tasks and project.

Centralized server-side deployment and execution of workflows in pSeven Enterprise implies that all users are running methods/processes from a single location. When workflow authors need to update their workflow, they only have to do it once from that location. All users will then benefit from the update seamlessly.

Faster time to market. More flexibility and capacity to adapt to market evolutions
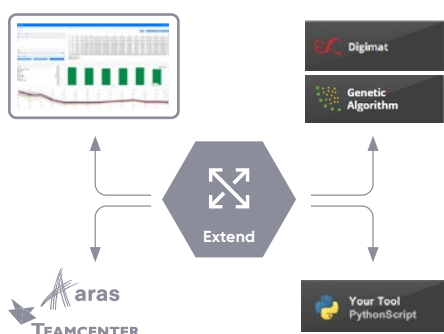
Integrate engineering framework with other enterprise collaborative environments

pSeven Enterprise has been designed as a scalable open platform with open API. It enables interoperability with external collaborative environments like SPDM, PLM, ERP also running in the Cloud. Existing functionalities can be easily extended by integrating your own technology or by developing custom blocks.

AUTOMATION AT SCALE

pSeven Enterprise

Improved Collaboration Between Teams and Enabling Multidisciplinary Approaches. Better Product, Faster.


Export

Import
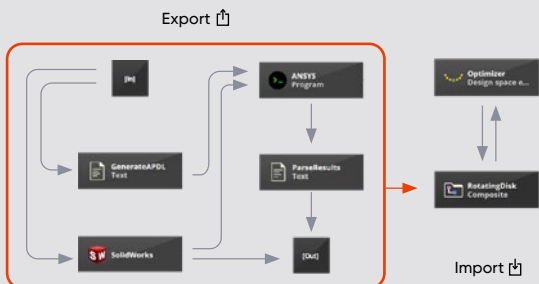
Run multidisciplinary analysis when discipline teams are not integrated

pSeven Enterprise offers several collaboration capabilities, such as:

— **Shared workspaces.** They are designed for a department or a team to share and edit workflows, results and files depending on the user roles, just as like using Google Docs.
— **Nested workflow logic.** Different workflows can be created separately by different teams. Then they can be assembled into a master workflow. No file transfer is required! All users are working in the same environment. Sharing is simply managed with fine access control rights.

Better control on assets and IT expenses. Smooth transition to industry 4.0. More flexibility in operations.

SERVER

Local

Laptop

Scale

Workflow

Resource manager
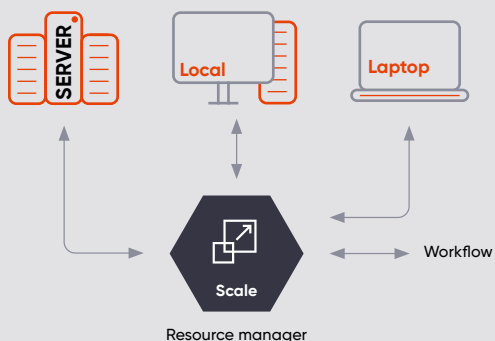
Leverage internal and external (Cloud) IT means to update business model without disruption
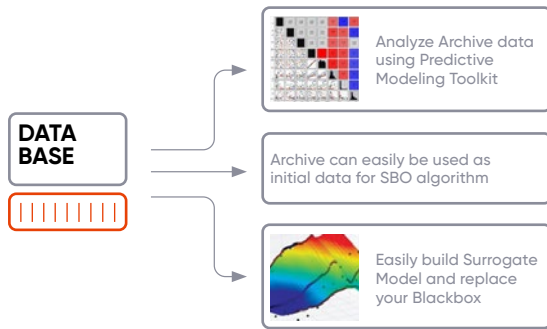
pSeven Enterprise runs in public or private (on-prem) Cloud. It allows deep integration of all computing means of organizations. Integration is transparent for end users and independent from changes in IT strategy. Companies can then decide to switch to external IT resources without end users even noticing the change.

Besides, scalable nature of pSeven Enterprise allows IT organizations to leverage their internal servers and assets to accelerate amortization. It becomes possible with capabilities like «fire & forget» to delegate workflow execution to server and a built-in resource manager. pSeven Enterprise scales with your needs!
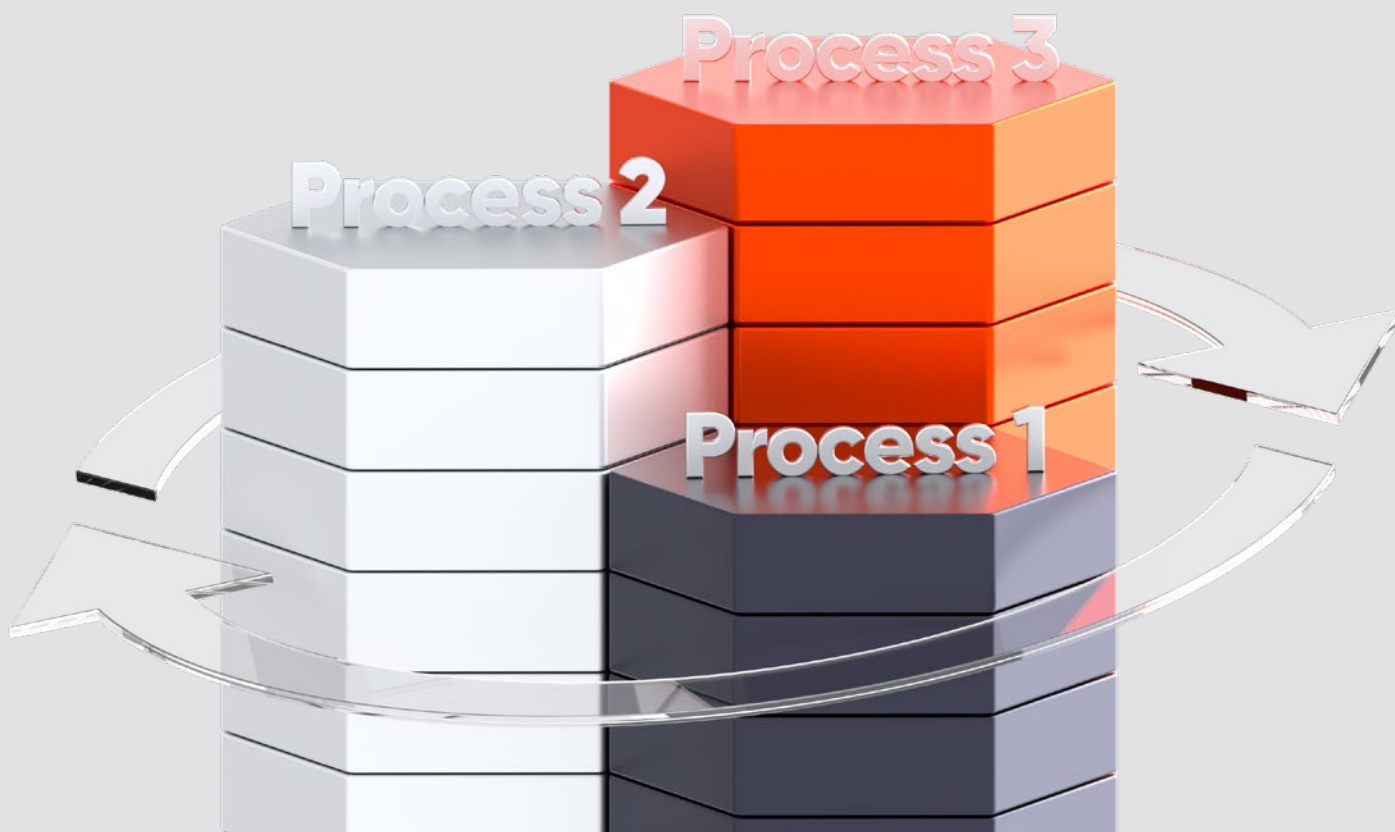
KNOWLEDGE CAPTURE AND TRANSFER

## Better product knowledge. Design process acceleration thanks to predictive ML models

DATA BASE

Analyze Archive data using Predictive Modeling Toolkit

Archive can easily be used as initial data for SBO algorithm

Easily build Surrogate Model and replace your Blackbox

Capitalize on data related to similar engineering activities conducted by different teams from different locations

The architecture of pSeven Enterprise being monolithic and centralized, no matter where people are located. Users have the capability of workflow co-authoring directly in the Cloud, right from their browsers. If they use same workflows, a common archive can be defined to collect key data from workflows executed by all teams.

When sufficient data is gathered, it can be used for subsequent predictive model building. Such predictive model can then be shared. It can substitute a complete workflow for fast evaluations, resulting in a shorter design cycle.

Easy access to data. Easy reuse. Shorter design cycle by avoiding rework

SPDM

PM

CAE

CFD

STRUCT
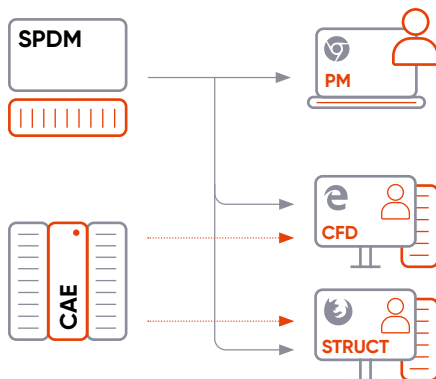
Speed-up development cycle and avoid rework

Process capture in pSeven Enterprise workflow is a way to automate and standardize design methods. It makes design process more robust resulting in less rework. It also helps to better organize engineering data and reuse it.

Ultimately, pSeven Enterprise can be coupled with other native Cloud SPDM system to ensure full traceability of design process.

Integration of pSeven Enterprise with SPDM is one of the most value-added setups in Engineering organizations. While SPDM deals with design cycle and multi-team collaboration at upper level, pSeven automates engineering workflows and tools at lower level. Such bi-level setup brings robustness, speed and full traceability to product development cycle.

Reduce loss of knowledge. Make engineering organizations more profitable. Democratize technology

Frontend Custom UI

Backend Workflow

Extend

Rest API
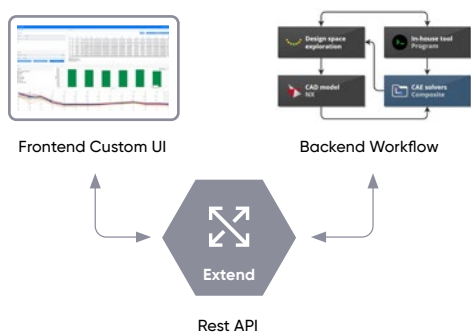
Capitalize on engineering knowledge and avoid loss due to employee turnover

Superheroes capture engineering processes in a pSeven Enterprise workflow. They turn them into an easy-to-understand standard modularized visual representations. Other users can then easily take over and maintain such workflow even without a priori knowledge of the method/logic.

CUSTOMER CASE

Smart-engineering tools dedicated to sports product design

GOAL

Make design development easier, faster and smarter, that's the ultimate graal of many companies.

SOLUTION

By providing a simple interface called "Technical configurators", accessible for their "non experts" engineers in Simulation and Optimization, **Decathlon** allows its development engineering team to be autonomous in optimizing their product easier and to globally accelerate their time to market.

Decathlon has explored through a collaboration with Datadvance and its solution pSeven Enterprise, this idea of server-based solution for predictions and optimization powered by approximation models.

From input simply given on a web page form, pSeven enterprise handles in the background the request to expert's module of Design of Experiment, Optimization, Surrogate models and Simulation.

As it has full interoperability with other tools, pSeven also allows to combine in-House routines dedicated to cost estimate, environmental impact and so on, to finally qualify the good design regarding multiple complex parameters, exposed as tunable variables.

All is triggered thanks to use of external REST API made available in pSeven Enterprise which ensure the connection and the whole orchestration.

RESULTS

Once developed and validated, each "Technical Configurator" is released and hosted in a "Design Application Store" to be used by the community of engineering team. It is worldwide easily accessible and user-friendly.

BENEFIT

Ultimate benefit is to obtain an almost real time prediction of performance of a product taking into account a growing number of new parameters.
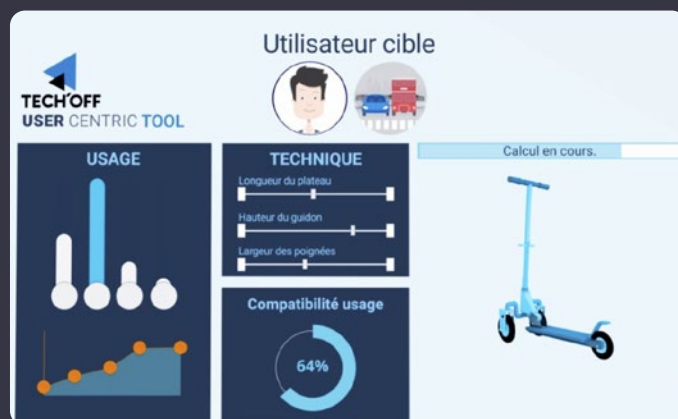
Courtesy of Decathlon
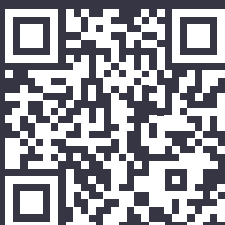
Interested in the solution?

Contact us to request a free 60-days assisted demo!

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Tel.: +33 (0) 5 82-95-59-68,

info@datadvance.net