BREAKING DOWN SILOS BETWEEN MODELLING AND SIMULATION

a MODSIM report from Dassault Systèmes

DASSAULT SYSTEMES

INTRODUCTION

A silent revolution is underway across industry sectors as greater numbers of leaders embrace simulation-driven design as a more efficient and effective solution to product innovation, development and manufacturing.

Simulation-driven modelling and design (MODSIM) empowers your engineering, design and analyst teams to stay one step ahead by understanding and predicting product behaviour as early as possible in the development process.

CAD and CAE technologies have evolved but engineering practices and workflows have not kept pace. Most modelling and simulation functions today perform as specialised, siloed disciplines, with each using separate and often incompatible software tools.

When a designer shares information, it must be translated and reworked into simulation software. Rigid handovers to analysts slows down collaboration, disrupts innovation, and prevents timely delivery of more sophisticated products without additional resource.

By championing MODSIM within your business and undergoing change management, you can break down the walls between disciplines and free-up analysts and designers to innovate in harmony. The result will be a leaner design and engineering approach, which can revolutionise the productivity of teams, using one model to allow the right product to be delivered to market faster.

In September, Dassault Systèmes held a MODSIM event, during which we heard how leadership champions have organised their simulation and design functions in a new way, the importance of change management and what value they have seen.

As a result, we successfully spread the word to more MODSIM champions and helped our event attendees to define a MODSIM strategy for their own organisations.

Over the next few pages, this e-book, which accompanies the event, highlights some of the key insights and advice from our passionate MODSIM experts. We hope you'll join them on their journey and discover for yourself, the power of MODSIM to transform your business.
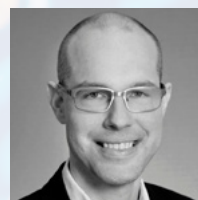
Peter Krantz,
CATIA Sales Director, EuroNorth,
Dassault Systèmes

WHAT IS MODSIM?

Simulation-driven design is a fundamentally different approach to product development in which simulations are brought forward to those doing the modelling.

Product designers no longer have to wait for feedback until the design is finished. They can have their hypotheses, ideas, and design choices intermittently tested, and learn from them.

This provides immediate insight into a modification's impact on properties such as weight and energy consumption.

In practice, simulation-driven design offers several concrete advantages, including:

● **Shorter time-to-market** - Design cycles are quicker than before, and fewer test runs and prototypes are required.

● **Higher product quality** - Constant feedback from simulations helps to optimise product designs.

● **More innovative products** - Product designers are given more room to experiment, which stimulates innovation. Engineers learn from the simulation.

> *The job of engineering is changing. Engineers now need to design and simulate for the experience rather than the product. To do this, they need to think not only about the product itself but about its usage too. Product realisation has become more complex as the products themselves have become more autonomous, more connected, more software intensive. As a result, teams need to work in a more collaborative way, removing the silos that currently exist between design and all areas of manufacturing, including electronics, mechanical and software developers. They need a platform environment where everyone can see everything related to the product, where automation increases speed efficiencies and where full transparency ensures that design and manufacturing is a direct execution of initial product specifications. MODSIM makes this happen.*

– **Olivier Sappin,** CATIA CEO at Dassault Systèm

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EXPERIENCES OF MODSIM FROM DIFFERENT ORGANISATIONS

Jaguar Land Rover and SCANIA are two organisations that have come a long way on the journey towards an integrated way of working with simulation driven-design. During our event, Jose Garcia-Urruchi, Head of Digital Engineering Capability for Jaguar Land Rover and Kent R. Johansson, Senior Technical Advisor at Scania spoke about the transition to MODSIM and how it is impacting the overall strategy of their businesses.

“ *We need to shorten the development cycles - that's what the market demands. The integration of silos therefore is critically important and is part of a much bigger digital transformation of the Jaguar Land Rover business. We are moving towards a more agile operating model across the whole company, which will allow us to develop products in a shorter window of time - typically two weeks. We are reorganising the whole company around technology available to us.* **3D**EXPERIENCE *is becoming the backbone for engineering and manufacturing. What we are trying to do is to create an organisational structure with roles and processes that make the most of the technology.”*

– **Jose Garcia-Urruchi,** Head of Digital Engineering Capability for Jaguar Land Rover

“ *I see MODSIM as simulation-based product development rather than design because it helps to shorten lead times and increase flexibility across departments. At SCANIA we often talk about that the odd variants are the normal. Every truck is unique and every truck is built on customer demand. With this approach we can simulate more variants and optimise them so that they really fit the customers. We can forecast and problem-solve much earlier in the process and this allows us to see the success of MODSIM. With simulation we can deliver better trucks and make our customers more successful.”*

– **Kent R. Johansson,** Senior Technical Advisor at Scania

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BREAKING DOWN SILOS WITH CHANGE MANAGEMENT

THE CHALLENGES

● Industrial organisations struggle to be innovative as products become more and more complex.

● Rigid legacy processes and lack of cross-functional interaction results in rework and increased lead times.

● The transition to simulation-driven design is dependent on employees in modelling and simulation departments having a basic knowledge of each other's skills and tools.

● Leverage flow of data in real-time across the E2E process is key to predicting product behaviour, optimising design and accelerating collaboration.

● Ample modern simulation tools are extremely complex. But modelling experts should also be able to simulate with these tools. This requires a simpler user interface for entering assumptions and rules.

● Ideally, all tools and information should come together on one platform that everyone can access, providing democratisation of data. The designer can see exactly which simulations have been performed in the 3D model (traceability), and the simulation shows which models were used as input.

62% of organisations see culture as the number one hurdle to digital transformation

(Source: Capgemini Sweden)

" To succeed with agile engineering, change management is key. Change management is mainly about identifying stakeholder relationships, implementing proper communication and training, as well as addressing concerns and managing resistance. It needs to start at the top and work its way down through the organisation. It takes time and money and requires a positive internal culture whereby it's acceptable to fail and learn."

– **Caroline Segersteen Runervik,** Head of Market for Capgemini Sweden

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TO ENSURE ENGAGEMENT AND SPEED DURING THE CHANGE MANAGEMENT PROCESS, FIVE PRINCIPLES SHOULD BE FOLLOWED:

1 Shared Vision

Create, visualise and spread a meaningful vision that guides people at all levels through the transformation journey.

2 Swarming

Recruit change agents within the organisation and use the energy and wisdom of the crowd to effectively reach the whole organisation.

3 Prototyping

Rapidly create tangible solutions within a culture whereby it's ok to fail. Continuously improve by relying on data-based decision-making.

4 Co-design

Collaboratively involve target groups including sales and marketing functions, to ensure end-to-end buy-in from all areas of the business.

5 Empowerment

Build on the potential of managers and employees by providing resources, enablement and leeway.

" *In order to get the most of the* **3D***EXPERIENCE platform you need to democratise both access to data and capability. We are recruiting engineers to cover a broader range of functionality than in the past. No longer specialisms in just one area. This is essential for survival - it's never a good time to go through a transformation but you have to do it. We are committed to being a zero carbon company - the ability to simulate more efficiently enables us to optimise the environmental efficiency of our products."*

– **Jose Garcia-Urruchi,** Head of Digital Engineering Capability for Jaguar Land Rover

" *If you want to be competitive, you need to develop and iterate at speed. This involves a generative design approach where time taken up by non value-added tasks is reduced by automation. Consumers will no longer wait for five years between an idea and being able to buy that idea, so speed is vital. So too is sustainability. Companies need to design, simulate and build to reduce a product's potential impact on the environment. By having everyone on the same platform, this type of innovation can happen more easily. The future is MODSIM - bridging the gap between design and simulation."*

– **Olivier Sappin,** CATIA CEO at Dassault Systèm

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THREE LEVELS OF MATURITY

The transition to simulation-driven design requires a well thought-out personnel policy, support from the boardroom, and the right technical solutions.

Once these conditions have been met, the change can be initiated. But what does such a change process look like? We distinguish three levels of maturity:

- **Linking modelling and simulation:** The 3D modelling tools and simulation tools can communicate with each other, for example through a universal data format.

- **Overarching platform:** All tools work via one platform, so that all people have access to the same applications and data. The development process is now fully traceable and transparent, with a single source of truth.

- **Close collaboration:** Silos are fading. Now, simulation experts and product developers work closely together on modelling and on faster simulations. One manager oversees the entire process

66 *Dassault Systèmes is offering a comprehensive framework for MODSIM with the 3DEXPERIENCE platform. It allows you to move simulation earlier into the design phase, which is very important in eliminating the dependancy on physical prototypes and to study a greater number of variants."*

– **Florian Jurecka,** Vice President SIMULIA, Dassault Systèmes

66 *Our 3DEXPERIENCE platform drives MODSIM by offering digital continuity between the design and simulation data. It provides integrated CAD and CAE/CFD environments. Any design changes that you do on your model will automatically update on the simulation model. You're also able to look at the different physics within a problem. For example, in mobile phones you may want to look at the antenna performance to ensure best connectivity or assess whether or not the phone will resist being dropped from various heights without damage. Moving simulation earlier in the cycle enables team members to assess hundreds of design variants against requirements. Full automation of the modelling and simulation processes is key to speeding up the simulation itself and empowers multiple design exploration studies."*

– **Dhiraj Nahar,** Industry Process Success Director, Dassault Systèmes

66 *The beauty of the 3DEXPERIENCE platform is that any designer, depending on his skills can model a product at various levels of abstraction. The most common one is 3D modelling. You can enrich the 3D modelling by adding model-based design elements that remove the need for drawings, which are problematic as they provide inconsistencies between design and manufacturing and are prone to errors. So 3D designing is one way to enrich the manufacturing information of the 3D model. In the 3DEXPERIENCE platform you can define the requirement, the functional specification, plus simulate and validate the functional specification because a lot of the errors come from inconsistencies between these functions. You do not do the design and then validate it by CAE - you use the CAE specification as the target of your design. With 3D modelling and simulation you can get this part right first. It shortens the development time, reduces cost and ensures a higher quality."*

– **Daniel Pyzak,** Mechanical Industry Process Consult, Dassault Systèmes

THE MANAGEMENT JOURNEY. OVERCOMING CHALLENGES

During our MODSIM event, delegates had the opportunity to voice their own challenges on the road to becoming champions for simulation-driven design

THE TOP FOUR CHALLENGES WERE:

1. **Availability of budget**
2. **Getting started**
3. **Resistance to change**
4. **Project management**
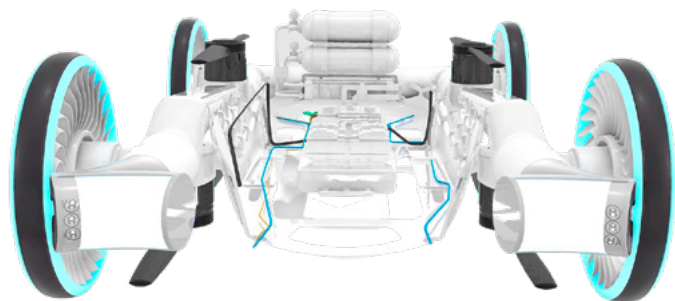
" *This transformation is costly, there is no getting around it so having buy-in and support from the very top of the organisation is essential. Your people are important to overcoming all these challenges. At Jaguar Land Rover, we identified 20% of people who would not be able to embrace the change that we were implementing. 5it can be overcome. Think about the long-term benefits of being more attractive to a new era of talent. Start small, align the value to the company strategy and state the business case for future survival. We are reorganising the whole of the Jaguar Land Rover business around the new available technology and creating a structure with roles and processes that make the most of that technology.*"

– **Jose Garcia-Urruchi,** Head of Digital Engineering Capability for Jaguar Land Rover

" *All four challenges need to be overcome from senior management. The benefits are huge because you are completely transforming the company so to justify the expense, senior leaders need to be brave and really consider the long-term benefits of organisational change. One of these is attracting the very best engineers who can both simulate and design and are therefore better equipped for the future. There are of course short-term bottom-line benefits of speed and profit but true organisational change will make your company fit for the future of engineering roles and product complexities.*"

– **Olivier Sappin,** CATIA CEO at Dassault Systèmes

AFTERWORD
Simulation-driven design is the future

This holistic approach to product development is not yet the norm across industries. But, with your leadership and support, I predict this will change in the coming years, if only because products are becoming increasingly complex.

An electric car, for example, consists of mechanical components, electrical systems, sensors, and software. Everything is intertwined. A small change in the shape of the car, the battery or air conditioning can have a major impact on range and driving comfort.

In an ideal situation, all systems are simulated integrally. From airplanes and electric trains to smart lawnmowers and white goods; one big simulation in retrospect no longer suffices.

Early and frequent simulations ensure a constant feedback loop. Your product designers can in the virtual world experiment to their heart's content with new materials and other manufacturing methods.

Even more advanced is the experience simulation where the end-user is invited to the virtual twin to participate in the virtual experience of the product. This leads to better and more innovative products, which go to the market faster. So you are always one step ahead of the competition.

Would you like more information?

Are you interested in what simulation-driven design can do for your business? Let our experts take you on a MODSIM management journey to see how your company can benefit.

Peter Krantz,
CATIA Sales Director, EuroNorth,
Dassault Systèmes

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Dassault Systèmes, the **3D**EXPERIENCE Company, is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations.
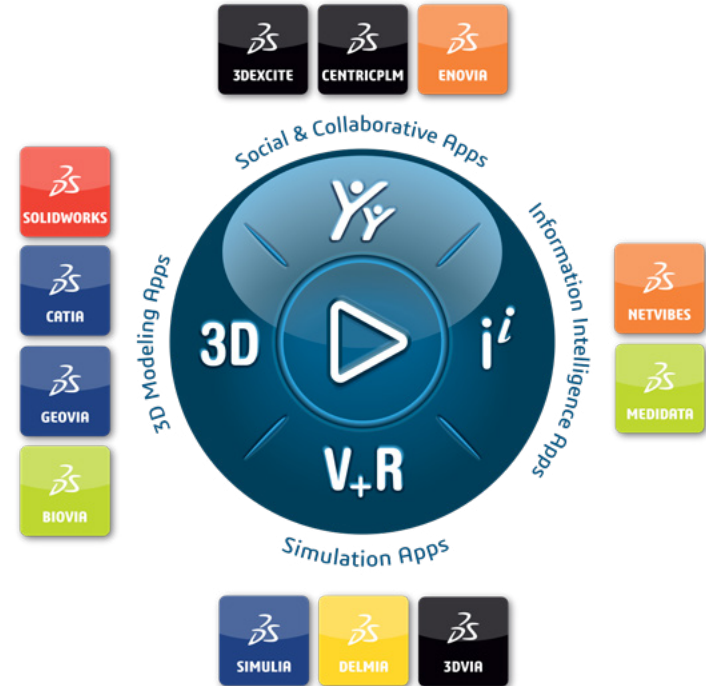
By creating 'virtual experience twins' of the real world with our **3D**EXPERIENCE platform and applications, our customers push the boundaries of innovation, learning and production.

Dassault Systèmes' 20,000 employees are bringing value to more than 270,000 customers of all sizes, in all industries, in more than 140 countries. For more information, visit **www.3ds.com**

Our 3DEXPERIENCE® platform powers our brand applications, serving 11 industries, and provides a rich portfolio of industry solution experiences.

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