

SIMULIA Analyst Event 2018

Democratization of Simulation and Vehicle Electrification

SMS_ThinkTank™ Commentary

Key takeaways:

- *SMS_ThinkTank™ believes Dassault Systèmes has made considerable progress in enabling the design and design engineering communities to play a greater innovation role throughout the engineering development process.*
- *The system modeling and simulation capabilities provided by the SIMULIA brand are accelerating toward the goal of 'holistic' engineering enabling the development engineering communities to embrace Model Based Systems Engineering (MBSE) methodologies and best practices.*

SMS_ThinkTank™ recently attended the SIMULIA analyst event 2018 at its headquarters in Johnston, Rhode Island. Mr. Scott Berkey, SIMULIA CEO, outlined Dassault Systèmes' continued commitment toward using system modeling and simulation as foundational elements in achieving its overall vision to "imagine sustainable innovation capable of harmonizing product, nature and life". With the focus on the 3DEXPERIENCE platform, Dassault Systèmes is utilizing the power of its SIMULIA brand to provide more powerful and easier to use tools to address the ever-increasing complexity associated with the desires of today's as well as tomorrow's consumers.

In this commentary, we will focus on two of the five areas addressed during this year's event, which play a significant role in addressing the needs for businesses, to bring simulation more center stage as well supporting the transportation industry as one of SIMULIA's major initiatives:

- Democratization of Simulation
- Vehicle Electrification.

In today's world of ever evolving customer demands that directly contribute to the escalation of new very complex engineering technologies and processes, SMS_ThinkTank™ believes that SIMULIA is rapidly addressing these engineering challenges to help their customers achieve sustainable innovation.

Democratization of Simulation

One fundamental approach is to make the best and somewhat challenging to use tools that are commonly used to model products, designs and processes, easier to use by the casual user. Today, the ability to apply advanced simulation tools, techniques, expertise, and experience remains way too often in the hands of a relatively small collective group of CAE and simulation experts within an organization. Such a focus of simulation on highly experienced 'silos' of experts keeps engineering centered on physical testing. Even if an organization understands the importance of utilizing simulation in the early development stages, such an approach is from a business perspective and not sustainable in today's customer driven and highly competitive environment.

SIMULIA focuses on supporting a modern design approach where the empirical aspect of the design moves more into the background while simulation not only starts to dominate but also finds its way into the traditionally non-simulation engineering domains. (Figure 1)

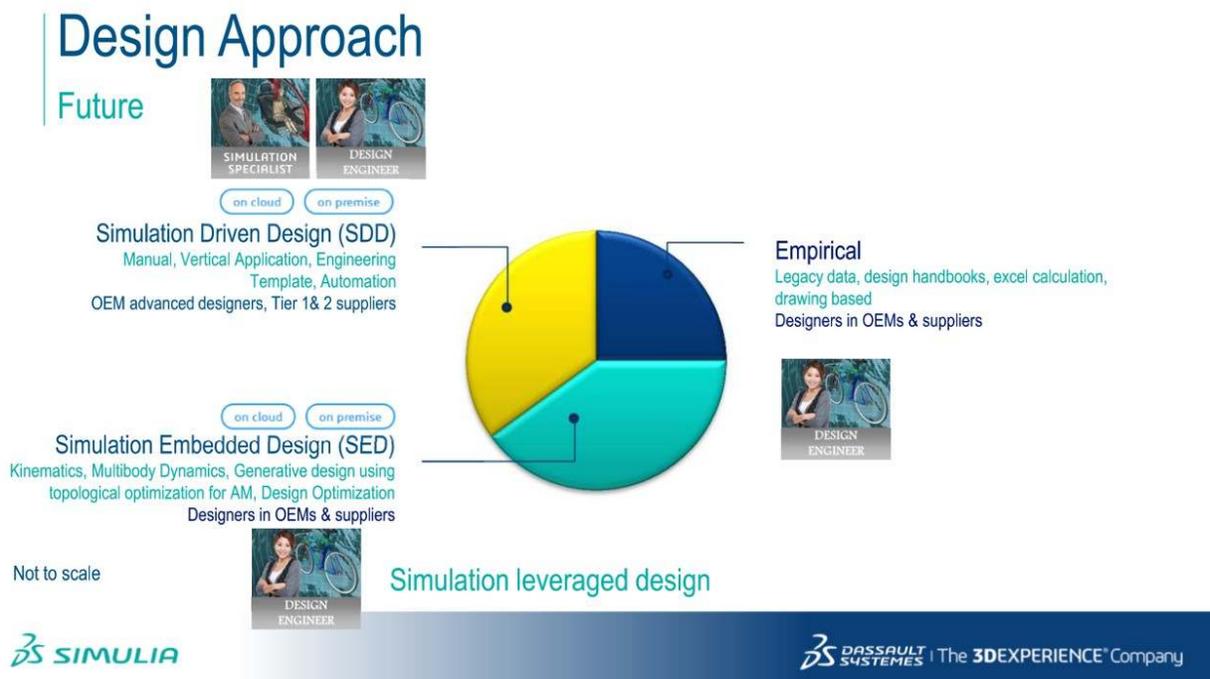


Figure 1: Future "Simulation-Based " Design Approach

(Courtesy of Dassault Systèmes SIMULIA)

To enable such new thinking of democratizing simulation, the key components become:

- Fast turnaround – time from analysis definition to results
- Associative – simulation models need to be fully associative with the design to allow for smooth data transfer and avoid data loss
- Intuitive interface – the interface needs to be visually descriptive for a non-simulation engineer
- Easy to set up – guided with embedded user manuals; automated; template-based; only minimal navigation in the simulation tools itself
- Low cost – deployment and maintenance of the tool

SIMULIA has developed a unique environment for the CAE and systems custodians to develop reusable templates that contain both explicit and implicit tribal knowledge for open-ended collaborative engineering analysis and simulation for the design engineer and/or casual user. It allows for flexibility utilizing vertical apps focusing on industry specific simulation routines or physics and process specific simulation templates. Each of those environments are highly flexible and can be enacted based on the business needs of the specific engineering organization. (Figure 2)

3DEXPERIENCE Democratization Methods

on cloud on premise

When to Use What

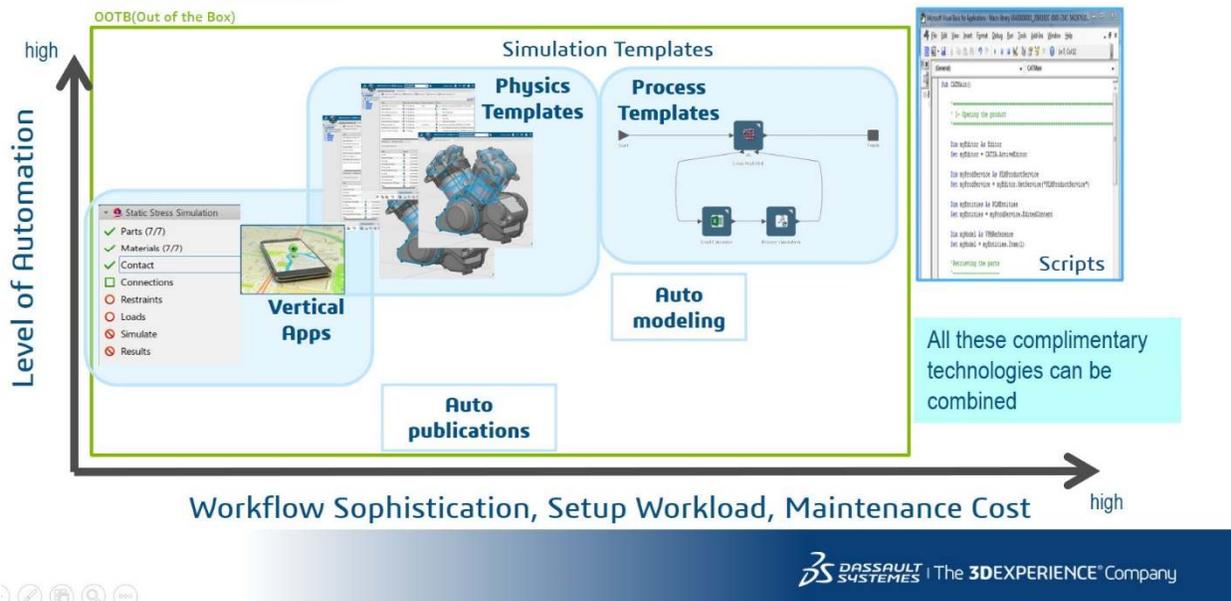


Figure 2: Democratization Methods

(Courtesy of Dassault Systèmes SIMULIA)

Some debate that *Democratization* stifles innovation. This may be a sound point if the tool becomes a fence that denies the designers and builders to dream and explore various possibilities. SMS_ThinkTank™ believes that SIMULIA provides powerful and easy to use tools that companies can customize to better infuse their best practices and tribal knowledge to the many downstream engineering communities.

Vehicle Electrification

In the technologically explosive transportation market, OEMs are struggling with new challenges while trying to respect the existing DNA of their brands:

- Stronger systems dependencies
- Faster Ramp-up of innovative technologies
- Autonomous EV (electric vehicle) driving experience
- Better behavior analysis to improve the driving experience
- New services and usage projection

The electrification of the transportation industry opens new areas of technological challenges - Figure 3.

VEHICLE ELECTRIFICATION | NEW TECHNOLOGICAL CHALLENGES

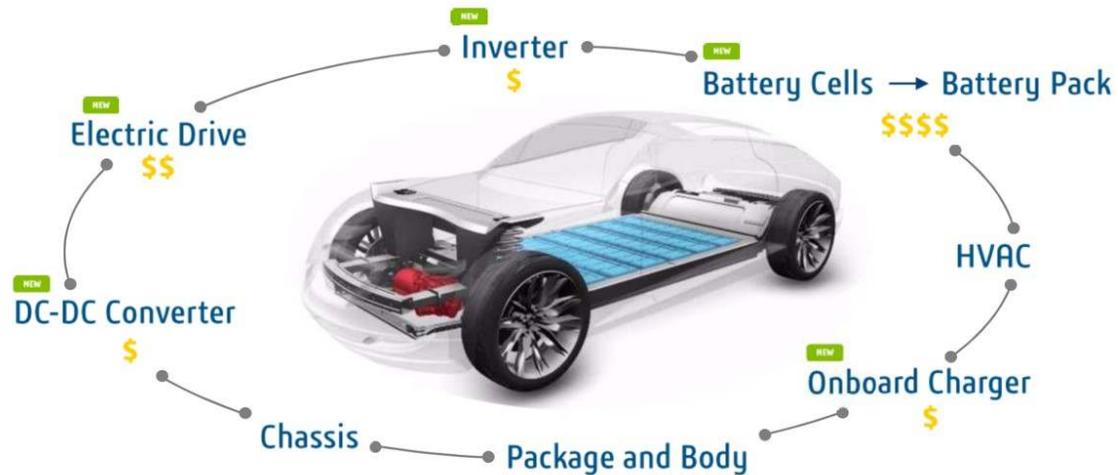


Figure 3: Vehicle Electrification - New Technological Challenges

(Courtesy of Dassault Systèmes SIMULIA)

To meet these challenges, companies must overcome their existing gaps in organization, process and technology. Component design organizational structure must transform into a more holistic purpose-based structure. Traditional silos of engineering excellence must become part of a collaborative engineering community. The adoption of existing and emerging Model Based Systems Engineering (MBSE) standards must be ingrained throughout the systems modeling tool selection process.

To better understand the many faceted topics of Vehicle Electrification, one must consider the initial sequence of operations required to address this Model Based Systems Engineering (MBSE) topic. In the grand scheme of things, consider the traditional “V” model as adapted by the SMS_ThinkTank™ (Figure 4). Note on the left side of the “V”, Requirements, Functional, Logical and Physical appear.

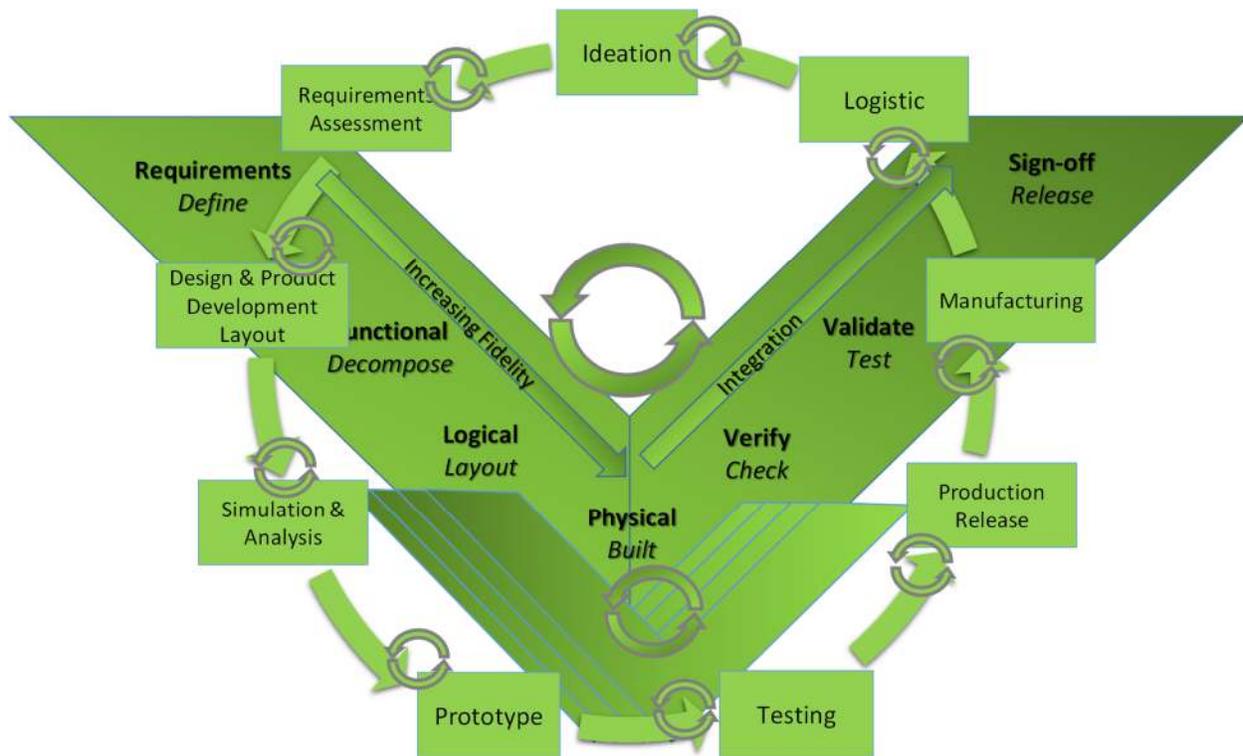


Figure 4: System Modeling and Simulation is an iterative Process

(Courtesy of SMS_ThinkTank™)

The SMS_ThinkTank™ believes the **3DEXPERIENCE** platform delivers a formidable framework called R-F-L-P to support methodologies necessary to transition from an enterprise document-based requirements organization to a more holistic model-based approach reducing the development timeline and ensuring a better product is provided to the customer. (Figure 5)

Utilizing the **3DEXPERIENCE** platform, SIMULIA can apply their solution offerings spanning the multi-scale/multi-physics & science ecosystem (Figure 6) for the various domains of the electric vehicle as shown for example for the electric powertrain and its related processes.

VEHICLE ELECTRIFICATION | MBSE - RFLP

- The **3DEXPERIENCE Platform** delivers a **framework called RFLP** that compiles all of the information required to support MBSE methodologies, like **Modeling Methodology for Systems® (MMS)**.
- **RFLP stands for:**
 - **Requirements (R)**
 - **Functional**, i.e. services or function models (**F**)
 - **Logical**, i.e. logical component models (**L**)
 - **Physical**, i.e. physical component models (**P**)
- **Implementation links among RFLP entities** enable you to monitor traceability for all models.



Figure 5: MBSE - RFLP

(Courtesy of Dassault Systèmes SIMULIA)



Our Technology
Vision

Multiphysics & Science

	Structures	Thermal	Fluids	Electromagnetics	Controls	Geophysics	Biological	Chemical ...
Multiscale								
Functional								
Logical								
Physical (Macroscale Continuum)								
Material Sciences								
Physical (Microscale and Below Non-Continuum)								



The 3DEXPERIENCE™ Company

Figure 6: SIMULIA Multiscale / Multiphysics & Science Ecosystem

(Courtesy of Dassault Systèmes SIMULIA)

Conclusions

Dassault Systèmes has enhanced their system modeling and simulation portfolio to enable the proliferation of once complex engineering analysis tools to the design engineering and designer communities. The SMS_ThinkTank™ believes that if the democratization of CAE tools is employed properly within a development engineering enterprise, a potential reduction in engineering development time may be achieved as a result of exploring more design alternatives and could also reduce the design-analyze cyclic workflows.

Dassault Systèmes is embracing the complex customer processes associated with MBSE (Model Based Systems Engineering). The electrification of vehicles and the ever-evolving engineering demands of autonomous vehicles have captured the public eye. There is an ancient proverb that says, “It takes a village to raise a child”. Considering the relationship of this proverb to the maturity of Model Based Systems Engineering, we believe it will take continents. Dassault Systèmes has stepped up to this challenge by proving significant research across many systems engineering disciplines. The integration of Dassault Systèmes brands coupled with the openness of existing and emerging standards have placed them as one of the strongest PLM players for an enterprise to consider when adopting MBSE methodologies. The acquisitions of DynaSim in 2006 and Geensoft in 2010 set the stage. SMS_ThinkTank™ believes the acquisition of No Magic in 2017 will play a pivotal role in future MBSE capabilities and looks forward to how this MBSE rich acquisition will play a role in future development by Dassault Systèmes.

About SMS_ThinkTank

SMS_ThinkTank™ LLC is the global resource and leader in system modeling and simulation, bringing the worlds of systems engineering and computer aided engineering together. The SMS_ThinkTank™ is a vendor neutral firm which provides strategic systems engineering and CAE management consulting to help enterprises embrace Model Based Systems Engineering (MBSE) to achieve sustainable innovation bringing higher quality products to market faster. SMS_ThinkTank™ helps enterprises in developing the methodologies to support these new technologies including emerging systems engineering and CAE standards. To learn more about SMS_ThinkTank™'s services, visit our website at <http://www.smsthinktank.com> or contact SMS_ThinkTank™ at +1-877-254-5171