

# SIMULIA Multibody Simulation User Group Meeting 2017 PROGRAM



**3DEXPERIENCE®**

## **WELCOME LETTER**

On behalf of Dassault Systèmes and SIMULIA, I would like to welcome you to our Second Multibody Simulation User Group Meeting.

It has been a very exciting year for all of us in SIMULIA. In North America, several major new customers became involved with Simpack, and our technical staff is growing in response. We have also been very busy in development with two new releases of Simpack since last year's meeting. We are excited to share with you these new product enhancements and to introduce you to new technical staff and technology partner solutions.

The User Group Meeting is designed especially for you, our users, with select customers presenting their MBS projects to enable you to learn more about other applications of Simpack you may not be familiar with. You will also be able to learn more about the development of Simpack within the SIMULIA environment from our own presentations.

As part of the SIMULIA brand, focused on realistic simulation, Simpack is now the core multibody simulation (MBS) component of Dassault Systèmes and is a cornerstone of the broader Dassault Systèmes offering across multiple brands.

Simpack is the technology leading MBS software for mechanical and mechatronic designs and is recognized for its excellence in the sectors of Virtual Prototyping and 3D-Simulation. Simpack is used within the automotive, aerospace, railway, general mechanical industries, and wind energy sectors, for simulating the motion of any mechanical system. Particularly well-suited for high frequency transient analyses including the acoustic range, Simpack was primarily developed to handle complex non-linear systems with flexible bodies and harsh shock contact.

Our agenda is packed with interesting technical content. We are very pleased to announce that Jim Alanoly of Ford is our Keynote speaker with a presentation on Model Based Simulation using Simpack together with other simulation products. Jim has extensive experience with the deployment of simulation technology throughout Ford Motor Company on a worldwide basis.

We have technology partners rFpro, cosin scientific software (FTire), and Concurrent Real-Time who will present their own product advances and how they relate to Simpack. I thank them for their support of the meeting.

Our customer presentations from Honda and Ford will highlight the progress of their use with Simpack for Vehicle, Driveline, and Engine simulation.

We also have presentations on modeling electric vehicles and autonomous vehicle modeling incorporating other solutions from SIMULIA, including Abaqus.

This year you can also experience Realtime Simulation live in action with our Simpack Realtime Simulator on site!

Finally, I would like to thank each one of you, our customers, for making this MBS User Group Meeting a successful event. You are our most important asset. We would not be where we are now without your continuous support and enthusiasm.

Let's move forward together with the common goal of using simulation to power innovation!

I hope you will find this event interesting, stimulating and entertaining – I look forward to meeting all of you.



**Sumanth Kumar,**  
*VP Simulia Growth, Dassault Systèmes SIMULIA*

SIMULIA aims to provide state-of-the-art simulation technology that our customers can confidently use in a production environment. We advance that technology in three ways:

First, we continually develop our existing products, adding new features, improving performance and making them easier to use. Second, we broaden our offerings by acquiring companies that take us into new areas of simulation. Finally, we partner with companies that have products and technology that complement what we provide.

In each case, we are always looking to provide our users with the best and latest technology. A case in point is Simpack, which was acquired by Dassault Systèmes in July 2014. Simpack provides the best, most robust, multibody simulation (MBS) technology available. It can routinely solve problems that other MBS products struggle with. It offers the capability to solve Simpack models in real-time, allowing, for example, an automotive engineer to adjust suspension parameters in the model and get immediate feedback on the change in ride and handling using a driving simulator.

Simpack models are typically much smaller than FEA models, between 50 and 2000 degrees of freedom with a frequency range of 0 to 10 kHz. Simpack uses relative coordinates to assemble the system of equations, whereas most other MBS products (and Abaqus models using connectors) use absolute coordinates. While this makes it more complex to develop the equations, it results in far fewer equations overall and hence significantly reduced run times and greater robustness and accuracy. The matrices that Simpack solves are dense, unlike the sparse matrices that Abaqus generates. This means that the solvers in Abaqus and Simpack are very different, each highly tuned to the types of equations being solved.

Simpack complements the rest of the SIMULIA portfolio. Any part in a system model can be made flexible using an Abaqus superelement so the fidelity of the model can easily be increased as the design matures. Loads determined using Simpack can drive an Abaqus simulation, and fe-safe can calculate the durability of the components. Isight can automate and optimize Simpack workflows, CATIA Systems/Dymola can be used for controls, hydraulics and non-mechanical aspects of the system model, and they can be used to manage all the Simpack data. Future releases of our products will significantly increase this interoperability. However, Simpack will continue to be open using flexible bodies from other FEA tools, controls from MATLAB® and Simulink®, and tire models like CDTire and FTire, for example.

Find out more about SIMULIA and Simpack at [3DS.com/SIMULIA](http://3DS.com/SIMULIA) and [Simpack.com](http://Simpack.com)



**Leading MBS Technology  
for Technology Leaders**



## **AGENDA**

### **CHAIRMAN:**

**Wulf Roever, Senior Manager, Technical Sales, SIMULIA, Dassault Systèmes**

#### **8.00 REGISTRATION OPENS**

9.00 Opening Remarks

*Robert Solomon, Director, Business Strategy SIMULIA, Dassault Systèmes*

9.10 SIMULIA Corporate Overview & Strategy

*Sumanth Kumar, Vice President, SIMULIA Growth, Dassault Systèmes*

9.30 Keynote: Model Based Systems Engineering for Vehicle Structure Development

*Jim Alanoly, Core CAE Methods Supervisor, FORD Motor Company*

10.00 Simpack Realtime Overview

*Robert Solomon, Director, Business Strategy, SIMULIA, Dassault Systèmes*

#### **10.10 BREAK & PARTNER EXHIBITION**

10.30 FTire: More Than Rubber and Cord. Thermal, Flexible Rim, and RealTime

*Gerald Hofmann, Partner, cosin scientific software*

11.00 Concurrent Real-Time Company and Simulation Workbench Overview

*Wes Nardoni, NAM Marketing; Ramesh Praveenkumar, Development, Concurrent Real-Time*

11.30 rFpro & Dassault Systèmes Products: Integrated Development Software for Human and Autonomously Driven Vehicles

*Matt Daley, Head of Operations, rFpro*

### **CHAIRMAN:**

**Robert Solomon, Director, Business Strategy SIMULIA, Dassault Systèmes**

#### **12.00 LUNCH**

1.00 Integrated Dynamic Engine Simulation for Chain Whine Predictions

*Wulf Roever for Salah Hanim, Engine NVH, Ford Motor Company*

1.30 Design of a Virtual Tire Test Bench for Tire Optimization

*Anthony King, CAE Specialist, Honda R&D Americas*

2.00 Simpack Development Update

*Wolfgang Trautenberg, Director, Structures R&D Technology, SIMULIA, Dassault Systèmes*

#### **2.30 BREAK & PARTNER EXHIBITION**

2.50 Abaqus and Simpack Integration Update

*Victor Oancea, Director R&D Technology SIMULIA, Dassault Systèmes*

3.20 Acoustic Analysis with Simpack & Wave 6

*Brad Heers, Business Development Executive, SIMULIA, Dassault Systèmes*

3.50 Planetary Gear System – Gear Whine – Transmission/Differential

*Wulf Roever, Senior Manager, Technical Sales, SIMULIA, Dassault Systèmes*

4.20 Full Electric Vehicle Modeling using Simpack, Dymola, Abaqus

*Bernardo Mendez, Solution Consultant SIMULIA CoE, Dassault Systèmes*

4.50 Closing Remarks



# SIMPACK MULTIBODY SIMULATION

## REALTIME DRIVING SIMULATOR

### SIMPACK

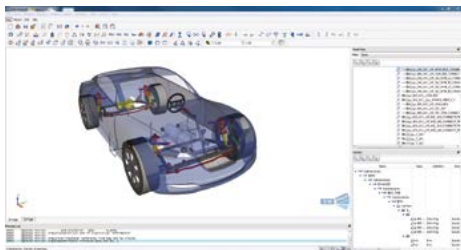
As part of the SIMULIA brand, focused on realistic simulation, Simpack is now the strategic multibody simulation (MBS) component of the Dassault Systèmes 3DEXPERIENCE® portfolio.

Simpack is the leading MBS software for mechanical and mechatronic designs and is internationally recognized for its excellence in the sectors of Virtual Prototyping and 3D-Simulation. Simpack is used for non-linear multibody simulation and is renowned for its ability to integrate flexible bodies.

Cars, trucks, engines, rail vehicles, wind turbines and airplanes are only a few of the industrial sectors Simpack is used in.



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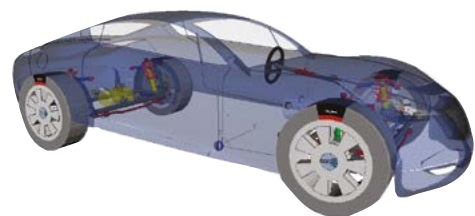


### SIMPACK REALTIME

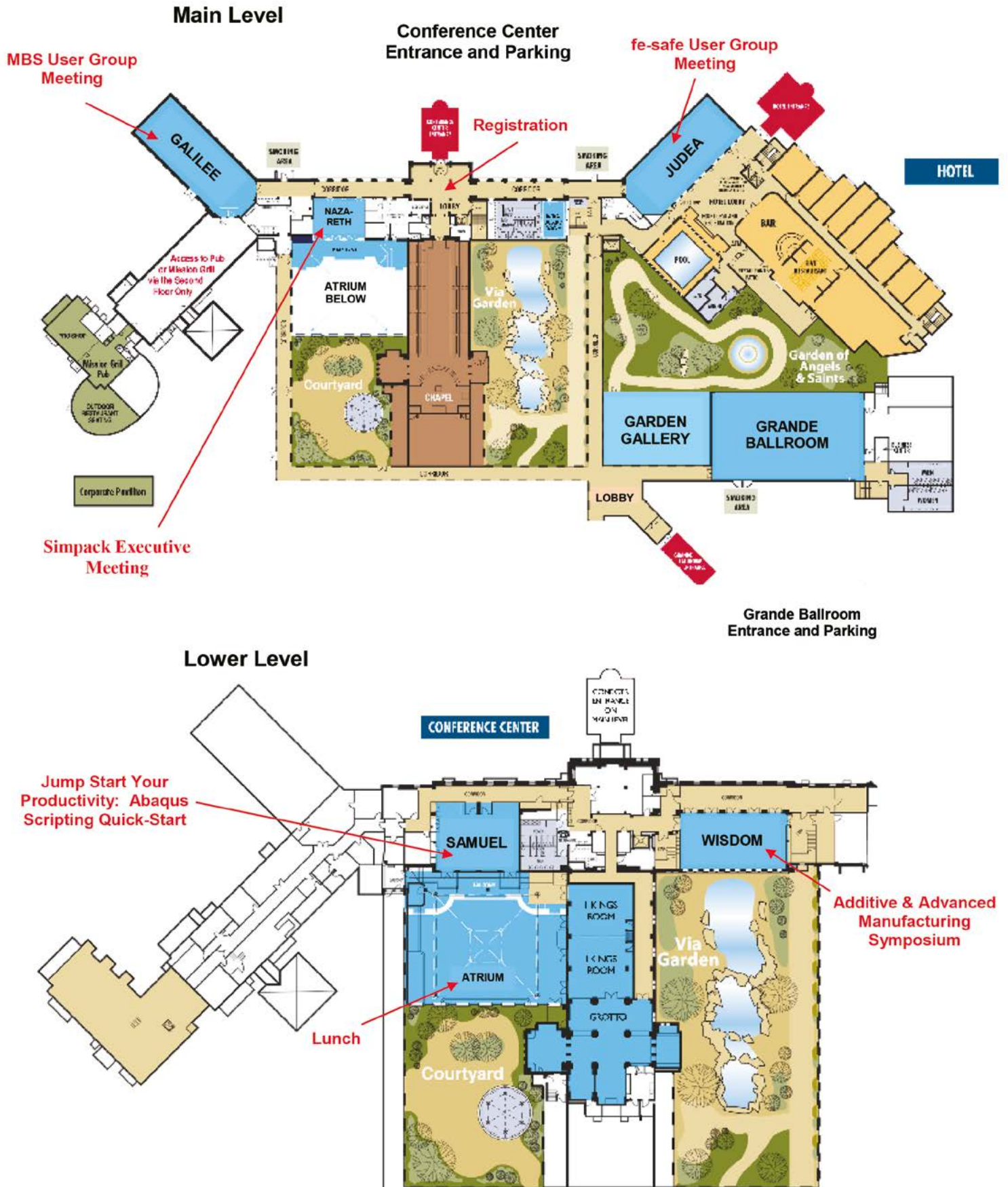
As a next step, by using Simpack Realtime, the virtual world (Simpack model) can be connected to the real world (hardware) to perform Hardware-in-the-Loop (HIL) simulations. These realtime simulations are used in various studies, from Handling/Ride Simulators to Advanced Drivers Assistance Systems.

### HIGHLIGHTS

- Complete systems, including flexible bodies and detailed force elements, can be run directly in realtime
- Direct use of high-fidelity models: no model simplification needed
- Multi-core support; automatic parallelization
- Zero turnaround time
- Permits usage of non-linear frequency dependent bushings and mounts
- Multiple interfaces, e.g. dSPACE, Concurrent, Simulink®, rFPRO, Steering wheels, UDP.
- TMEasy, MF-Tyre, CDTire, FTire support

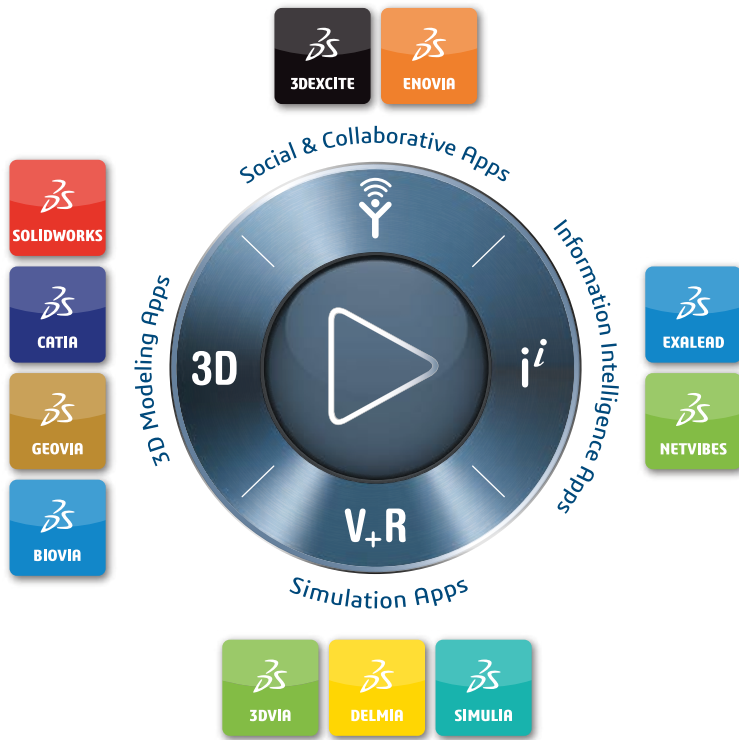


## Venue Map



## NOTES

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Our **3DEXPERIENCE®** platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes, the **3DEXPERIENCE®** Company, provides business and people with virtual universes to imagine sustainable innovations. Its world-leading solutions transform the way products are designed, produced, and supported. Dassault Systèmes' collaborative solutions foster social innovation, expanding possibilities for the virtual world to improve the real world. The group brings value to over 210,000 customers of all sizes in all industries in more than 140 countries. For more information, visit [www.3ds.com](http://www.3ds.com).

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