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PILOT TEST OF RIDE COMFORT EVALUATION WITH DIM300 AND ADAMS RT/SWIFT RT

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Agenda

- Introduction of S&VL
- Business of S&VL
- Customer's Example and DiM300 Activities
- Real Time Driving Simulator Environment for SUBARU Adams model
- Introduction of SUBARU
- SUBARU Digital Development Process for BEV
- History of Ride Comfort development with Driving Simulator
- Pilot test of Ride Comfort development for BEV
- Benefits of Development Process using Driving Simulator

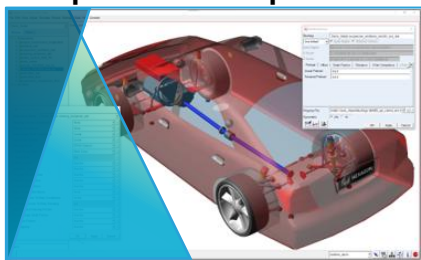


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Introduction of S&VL Inc.

S&VL support the product development process in a one-stop solution by utilizing experimental and simulation technologies.

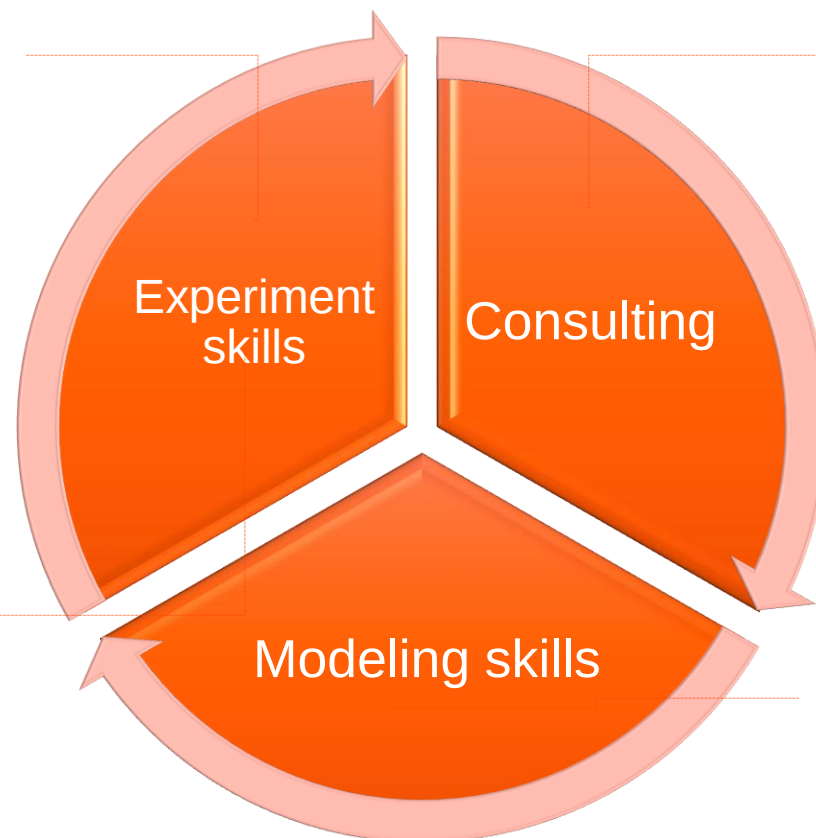
Various experiment skills and simulation skills based on vehicle development experiences



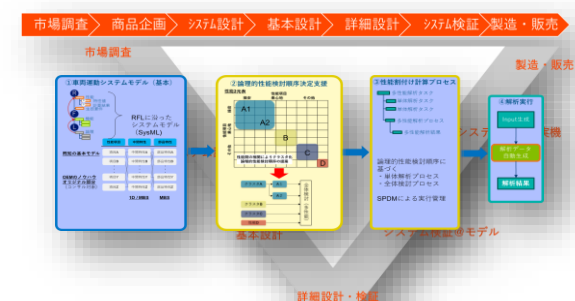
Implement high spec driving simulator in our site



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Solving development issue by rich experienced engineers



We provide the suitable CAE model based on our experience.



2024.7.29 NEW OPEN

Japan's first cutting-edge driving simulator facility "S&VL Technology Research Institute"



Creating the world's most advanced digital development environment

Our company is a specialized service provider of virtual simulation technology with the cutting-edge driving simulator (DiM300) at its core in Japan, and the S&VL Technology Research Institute was established as the first full-scale facility in Japan.

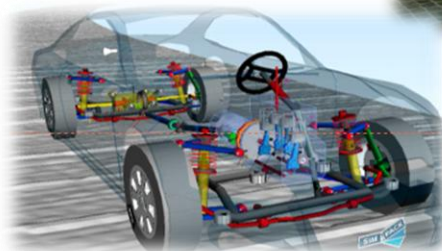
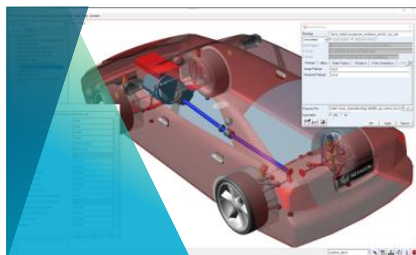


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S&VL Business: One-Stop Driving Simulator Services (DiM300)

① Real-Time modeling service

VICRT, Carsim, Simpack RT, ADAMS, etc...



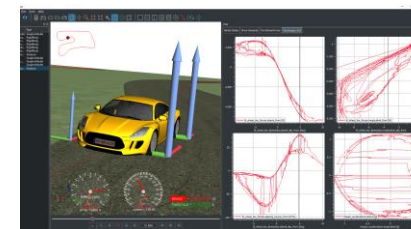
② DiM300 operation service

Carrying out total operation of DiM300
Such as model checking cueing and measurement.



③ Technical consulting

Analyzing the testing results and
propose how to improve the
performances



④ Testing service by DiM300

Provides total test facilities include
DiM300, office space and relaxation space



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Customer Example: Adopt to Real-Time MBS full vehicle model

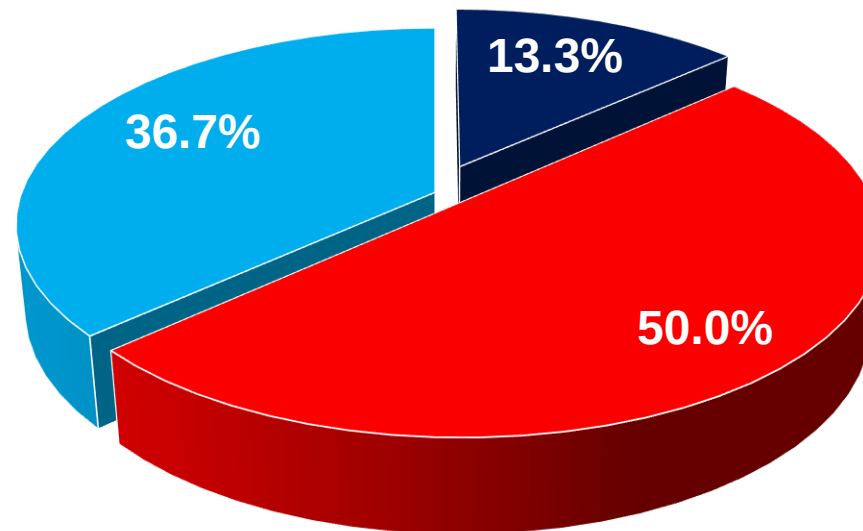
Reduction and re-development vehicle model (Unique Activity of S&VL)
Effect of Reduction of computation Time

Scenario	Computation Time Reduction	
Handling, US/OS		35%
Handling, Pulse steer		46%
Handling, Sine with dwell		41%
Ride Comfort		16%
Choppy Ride		8%
Durability, Durability road		18%
Durability, Pothole		37%

Our Activities (Last 3 months)

Seven leading Japanese car manufacturers visited our facility and conducted test drives, with four of them also carrying out projects using driving simulators. The number of visitors to our company as of the end of March totaled 380 since opened.

S&VL DiM300 Activities (Last 3 months)

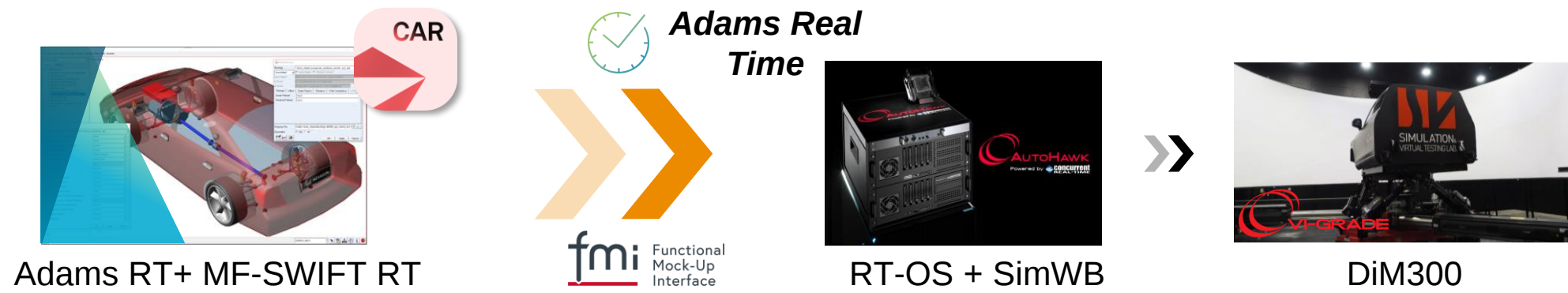


■ Test Drive ■ Customer Project ■ R&D



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Real Time Driving Simulator Environment for SUBARU Adams model



Software Version

Adams : 2023.4 , MF-Tire/MF-Swift : 2312, SimWB : 2023.1-0, VI- DriveSim : 2024.1, RT- OS: RedHawk Linux 8.4 (Ubuntu based)



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Introduction of SUBARU

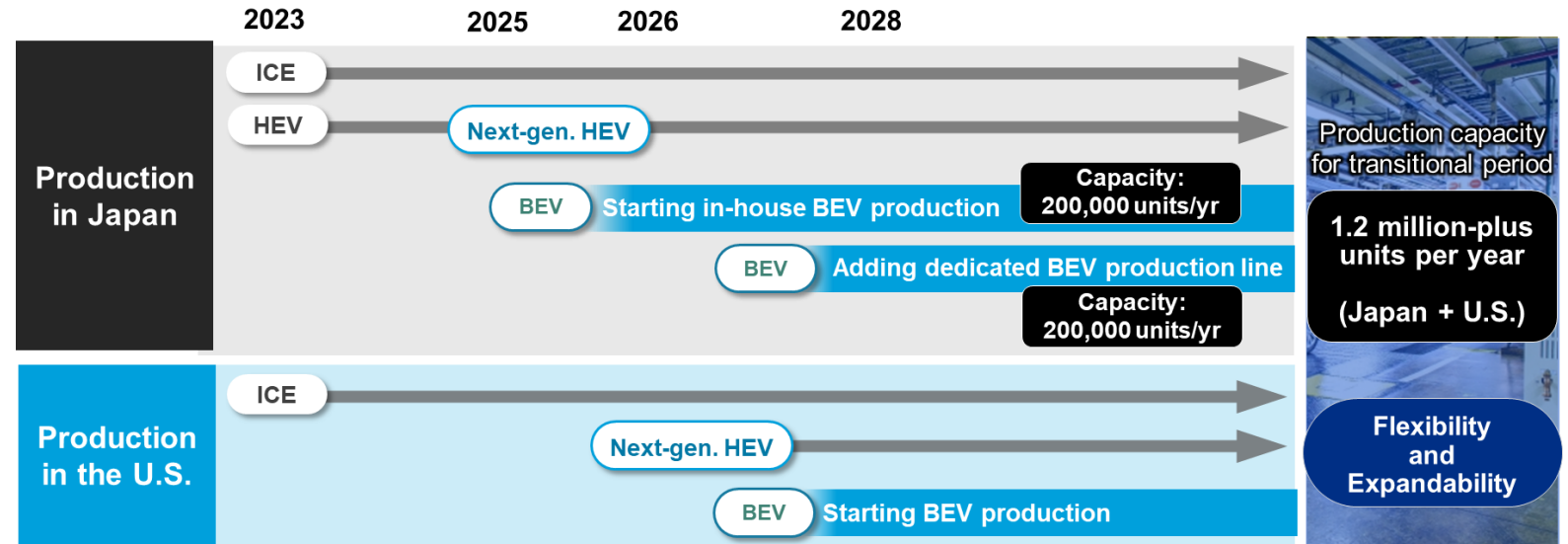
Expansion of BEV Lineup

Introduce four additional BEV models by the end of 2028.

By the end of 2026: **4 SUVs*** *Incl. Solterra

By the end of 2028: **4 more models**

A total of
8 models in
BEV lineup
by the end of
2028



BEV Platform Development:

- New development of many components (chassis changes: suspension type, mounted e-axle, etc.)
- Rapid and parallel development of new models in limited prototypes

➤ The motivation of driving simulator (DS) initiatives

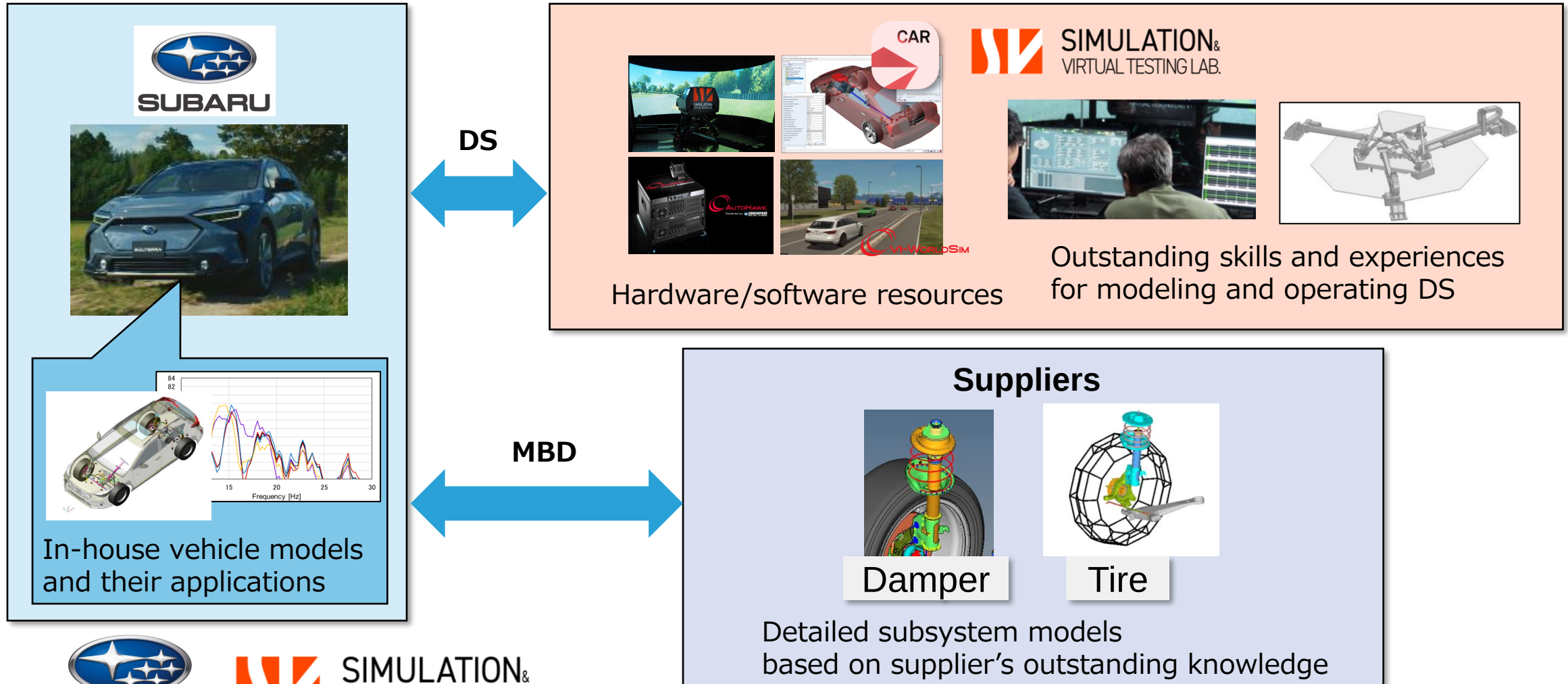
We realize to achieve these challenges by utilizing CAE × DS to determine the vehicle characteristics before prototypes



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SUBARU Digital Development Process for BEV

accelerate the digital development process in collaboration with S&VL (DS) and suppliers (MBD)



History of Ride Comfort development with Driving Simulator

Preliminary DS Evaluations in production vehicle

15 months

- Reduce 1900 to 260 degrees of freedom for ADAMSRT x SWIFTRT
- Explore scenarios and assign members for test drives

DS Utilization for new BEV Development

3 months

- Assessed ride comfort tuning the following
- bushing
 - damper
 - body/chassis rigidity
 - tire property
 - suspension components
 - geometry, etc.

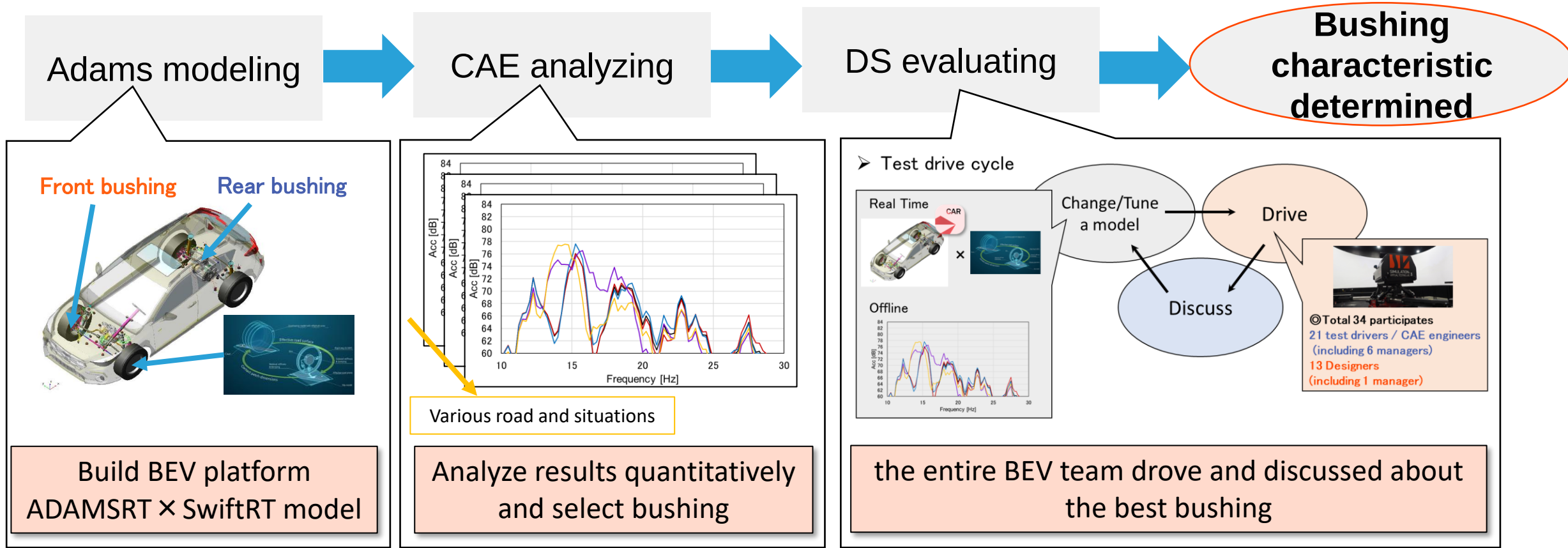
In collaboration with S&VL, We have carried out 5 DS projects by March 2025, including new BEV projects.



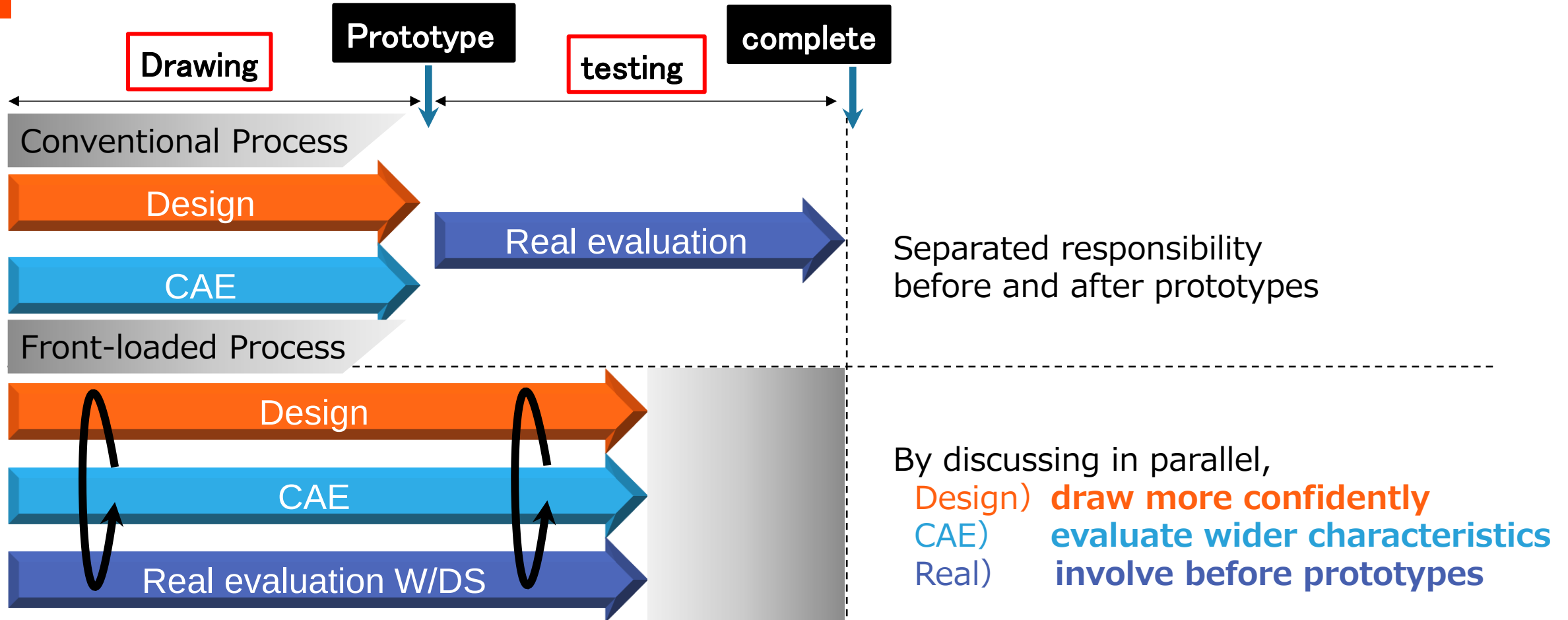
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Pilot test of Ride Comfort development for BEV

- Trial scenario : evaluation of bushing mounted on new BEV
Evaluate ride comfort by changing bushing **stiffness** and **damping**
→ 2 bushings (Front and Rear) × 5 properties × 7 situations = **70 cases at 5 days**



Benefits of Development Process using Driving Simulator



**We completed ride comfort performance a year earlier.
DS application will be expanded to handling and body structure.**



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Thank you very much for your attention

We believe driving simulator technology has great potential, and we're excited to move forward together. Thank you for your time.