FROM SIMULATIONS TO MOVEMENT
asc(s – Concentrated Competences for the Future of Mobility

The asc(s – Automotive Solution Center for Simulation e. V. – is a non-profit association promoting the research and implementation of innovative simulation methods in the vehicle development process. Since 2008, we have been networking leading players from industry and science. To this end, we bundle the interests and needs of our members in the pre-competitive field. Our current group of about 50 members includes automotive manufacturers and suppliers, software and hardware producers, engineering service providers, universities and research facilities. Our members are on a par with each other, irrespective of borders, and use their expertise to actively shape the topics of the asc(s as an open association.

These topics include various research segments for industrial applications that define the future of mobility:

- Autonomous driving
- E-mobility
- Connectivity
- Car sharing & services
- Lightweight design & resource efficiency
- Digitisation
- HPC & cloud computing
- Data analysis & artificial intelligence
- Edge computing and distributed ledger technologies
- Digital twins & Industry 4.0

In order to advance these research and development areas and to set new impulses, the asc(s brings together suitable project partners. Networking generates a wide range of synergy effects as a result of the different competences of the participants. Members benefit from a globally unrivalled research and development landscape focused on the areas of CAE (Computer Aided Engineering), driving simulation and HPC (High Performance Computing). This allows for a reduction in costs and time, and furthermore, the research results and simulation solutions are made available to the association members, thus giving them a clear competitive advantage.

Branch office, Board of Directors and Mentor Board

The experienced staff in the branch office, with their engineering knowledge and scientific know-how, are responsible for the operational business, the dialogue with members, the organisation of events, project management, etc. The five-member board of directors sets the strategic direction of the asc(s. In shaping the five focus areas (see pp. 06/07), the board is supported by a mentor board, which is composed of one industrial and one scientific representative within the association for each of the focus areas.
Invest Knowledge – Benefit from Surplus Values

As an asc's member, you benefit from networked knowledge, technological strength and many other advantages and services.

NETWORK
Being a multiplier, the asc's offers access to a comprehensive range of networking opportunities. Our constantly growing network not only effectively expands the expertise amongst our membership, but also constantly opens up new cooperation opportunities.

EVENTS
As a platform for technology transfer, we promote dialogue amongst our members by organising workshops and conferences. This is where knowledge transfer and pre-competitive exchange on the necessary research and development steps become the cornerstone for new initiatives.
In our working groups, we activate the combined know-how of our members to specify research questions and standardisation needs collaboratively. As we are driven by a common vision, cutting-edge technologies are not only to be used, but also to be moulded on the basis of concrete development goals and implementation strategies.

Through our collaborative projects, we bring masterminds and experts from science and industry together in a decisive way to increase progress and innovation many times over. From the initial idea to implementation: the ascis branch office provides support in all phases of research initiation and project implementation.

Regardless of whether you are a decision-maker, expert, manager or junior employee, our network benefits from the know-how of each individual. The digital transformation poses new challenges for everyone. That is why we not only invest in networking, but also in the practical and application-oriented education and training of our stakeholders.
Virtual Vehicle Development as a Highly Complex Process

Shaping the future of mobility is a multi-faceted process which is constantly changing due to new requirements and social influences. Those topics that strongly influence future technological developments are contributed by the asc(s members and discussed and promoted within the association.

Be it mobility services and concepts, apps, cybersecurity or new materials – the industry is in constant flux.

The Five Focus Areas

In order to manage and provide a clear overview of all current and future challenges, the issues at asc(s are currently categorised into the following five focus areas:
Vehicle physics
Mapping of physical effects and correlations to increase functionality, reliability and comfort.

Vehicle propulsion
Development and optimisation of conventional and alternative drive technologies to increase energy efficiency and dynamics.

Vehicle structure
Optimisation of weight and costs through efficient lightweight design, while considering quality, safety and resource efficiency.

Vehicle automation and connectivity
Methods for configuration and validation in virtual driving tests: driver assistance systems, autonomous driving, vehicle connectivity, HMI and traffic flow optimisation.

Numerics & digitisation
Optimisation of CAE solver technologies and development of new HPC and IT landscapes for cloud computing, smart data, artificial intelligence, Industry 4.0 and Internet of Things (IoT).
Computer Simulation –
Game or Game Changer?

Computer simulations have been supporting the vehicle development process for decades. Ridiculed as a toy in the beginning, they have now established themselves as a powerful and indispensable tool in many development areas. Automobile manufacturers and suppliers recognised the advantages of computer simulation early on and invested in research and method development.

This has resulted in simulation applications that support classical system design, early testing or virtual commissioning. The essential value of computer simulations manifests itself in two ways: by supporting decision-making at an early stage and by reducing the need for a considerable number of physical tests and prototypes. Used correctly, computer simulation opens up significant potential for reducing development costs and time-to-market. Driven by external influences on the automotive industry, computer simulations are being applied in more and more areas. But is their effectiveness enough to act as a game changer in the face of the current rapid development?

The automotive industry is undergoing an unprecedented time-sensitive transformation process. Digitisation and computer simulation are experiencing a rapid development. Computer simulation is playing an increasingly strategic role in measures to increase efficiency and accelerate the development process.

It is vital for computer simulation methods to be able to map core technologies that will be used in future generations of vehicles at the very start of development. However, as long as simulation has unclear modelling and approximation gaps to the corresponding physical system, the potentials described above cannot be fully exploited and the current situation will not change.

So, can we solve new problems with established simulation methods? Or does true product innovation also require the fundamental redesign of simulation applications? How can we lend more credibility and confidence to simulation?

These simple questions are not easy to answer given the complexity of the issue. However, it soon becomes apparent that more importance and attention must be assigned to the research and development of new simulation methods and their quality assessment through processes and models. Just as the product itself is subject to ever shorter innovation cycles due to digitisation, the development of simulation methods must also confront this time-related dilemma and always stay one step ahead.

The asc(s strives to establish computer simulation as a permanent game changer with the help of member-driven measures. Join us on this journey towards greater competitiveness.
The ENVITED Research Cluster

Translating the vision of autonomous driving into reality requires a fundamental digital transformation. In this, computer simulation is going to be a game changer as a strategic element of both product development and the product life cycle. ENVITED pools leading experts from research, virtual development, validation and release of automated vehicles to stay one step ahead.

The ENVITED research cluster is a long-term and member-driven initiative with the goal of adding strategic value to simulation through new methods, collaborative processes and cross-domain knowledge transfer.

With the support of our members, we generate a unique research and development platform in the pre-competitive field from which all participants will benefit.

In order to strengthen the transfer of technology between science and industry, the following four fields of action have been defined for the ENVITED research cluster:

**INNOVATION HUB**
The Innovation Hub discusses current and future challenges and requirements regarding new simulation methods, environments, processes and standards. New research and standardisation approaches are to be evaluated in working groups and advanced to concrete collaborative research projects, which are financed by the public sector or by cluster contributions.

**DATA MARKET**
The Data Market aims to make data (e.g. simulation models and environments, training data for artificial intelligence or benchmark models and results) from different sources available to cluster members in a centralised and processed form. It also seeks to develop processes and approaches that create added value for the end user through meta-data, data extraction, quality assurance measures and certification methods.
ECOSYSTEM
In order to unlock the full potential of simulations, reliable simulation methods and processes must be developed that enable virtual acceptance of highly automated vehicle functions. The Ecosystem is intended to research and advance methodologies for machine-supported continuous verification of the validation of automated driving functions across different company boundaries. To this end, different approaches are evaluated and exemplarily implemented and tested in concrete collaborative research projects.

CAREER CHANNEL
The increasing digitisation in the development process and the use of the latest simulation technologies require new, well thought-out training and further education concepts, as the established teaching content is no longer sufficient for these. Based on the expert knowledge of the cluster members, the Career Channel is to provide training concepts and measures on current and future developments.
HPC – We Make It Count

As a member of the asc(s, you have access to the cutting-edge and secure HPC resources of the High Performance Computing Centre Stuttgart (HLRS) for carrying out research and development projects with high data volumes in virtual vehicle development, such as crash or aerodynamics calculations.

At the heart of the facility at the University of Stuttgart is the approx. 38 million euro Apollo 9000 system called Hawk – the second fastest supercomputer in Europe with a peak performance of 26 petaflops.

Each year, the asc(s) makes computing resources worth over 100,000 euros available for pre-competitive research and development projects.
simpulse days: Giving Impulses – Merging Competences

Events organised by the asc(s, such as networking events, conferences and workshops, are held under the name simpulse days. These internal industry meetings are used to present the latest technologies, discuss innovative solutions for future challenges, establish new contacts and initiate cooperation.

The topics of these events are geared to the requirements of the members and provide an ideal basis for joint dialogues.

The annual events, such as the Fireside Talk on a changing highlight topic or the Symposium Driving Simulation SDS, which was held for the seventh time in 2021, are also in great demand.
Welcome to the asc(s: Become a Member and Benefit

Become a member of the asc(s now and be part of a diverse and interdisciplinary network with innovation leaders from science and industry. By paying an annual membership fee and a one-off admission fee, you will gain access to a globally unique research and development landscape and benefit from a wide range of services and surplus values:

- Strengthen your contacts with existing and future business partners as well as junior staff
- Draw on established and trustworthy structures for the exchange of knowledge and experience within a network of highly competent people
- Not only use cutting-edge technologies, but also actively and efficiently shape them within the network
- Strengthen the influence of our association with your company know-how so as to enhance the significance and visibility of simulation as a strategic development element
- Provide your simulation experts with easy access to extensive knowledge as well as to training and further education measures

And here's how:
Step I:
Send your membership application form to the asc(s) branch office.

Step II:
Your membership application will be reviewed by our board of directors.

Step III:
After review and approval, you will receive a written confirmation of acceptance.
The asc(s would like to say thank you

Our sector network thrives on the diverse competences of our members and partner companies. We would like to take this opportunity to thank them for their valuable expertise, countless impulses and innovations, as well as for the many years of excellent cooperation. We look forward to many more years of shaping the future of mobility together.

The images for this brochure were created by Mr Patrick Etter and Mr Benjamin Stollenberg for asc(s Automotive Solution Center for Simulation e.V. We also obtained licences for various images and illustrations from © Just Supper (cover image), © DAIMLER AG (pp. 4-6), Fotolia © LaCozza (p. 7), Adobe Stock © Gorodenkoff (p. 8), © Patrick (p. 11), © Leandro (p. 18), Hawk © Ben Derzian (p. 13) and Dreamstime. Our special thanks go to all photographers.
From simulations to movement.

ASAM Standards in the Domain Simulation

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**Empowered R&D**
- Computational workflow automation with simulation data sharing
- User and application-centric experience with automated HW matching
- Full-stack professional support with application expertise

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**About Rescale**

Rescale™ is the global leader for enterprise big compute. Trusted by the Global Fortune 500, Rescale empowers the world’s top executives, IT leaders, engineers and scientists to securely manage product innovation and perform groundbreaking research and development faster at a lower cost.

Rescale’s ScaleX platform solutions transform traditional fixed IT resources into flexible hybrid, private, and public cloud resources—built on the largest and most powerful high-performance computing infrastructure network in the world. Rescale offers hundreds of turnkey software applications on the platform which are instantly cloud-enabled for the enterprise.

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**Intelligent Computing for Digital R&D**


Rescale complements your software and cloud or on-prem resource to deliver a turnkey simulation experience

600+ R&D applications optimized on the latest hybrid-cloud HPC infrastructure

“DENSO runs cloud-based high-performance computing at scale, and we are always investigating ways to optimize performance and cost savings. Rescale’s data-driven control plane approach helps us complete our simulation jobs faster than ever, while remaining very cost-effective.”

- Nate Moss, Senior CAD Analyst, DENSO
Comparison of FE models and Simulation results

• ModelCompare provides a comparison of two similarly discretized FE models and portrays their differences in terms of geometry (mesh), material identifiers (ID) and thickness.

• SimCompare provides a comparison of two FE simulation results based on arbitrary node/element data functions.

Professionals

scapos was founded in December 2008 for the sales, marketing and support of technical computing software, developed by various Fraunhofer Institutes.

Products

Its products include numerous products from the CAE area, including: the co-simulation environment MpCCI, the scalable solver library SAMG and ModelCompare (all from Fraunhofer SCAI), inline analysis software for 3D data in manufacturing quality assurance from Fraunhofer IFF, optimisation software for nesting and packing applications from Fraunhofer SCAI and the FEMZIP simulation-data compression tool from the Fraunhofer SCAI spin-off SIDACT.

Network

Its customers range from large industrial corporations and research institutes to SMEs. Besides its own sales and marketing activities, scapos works with more than 20 distribution partners’ worldwide.

European R&D Projects

In addition to its marketing and sales activities, scapos also offers project management in the context of the European Commission’s R&D funding programme. Its competence for that role has been successfully demonstrated in the management of major EC-funded R&D projects (such as Fortissimo and ExaNoDe) and also builds on strategic planning activities linked to the EC HPC Programme (within the European Technology Platform for HPC, ETP4HPC).

scapos AG
Schloss Birlinghoven 1
53757 Sankt Augustin

Phone +49 2241 14-2820
info(at)scapos.com
www.scapos.com

Technology from:

Fraunhofer
VIRTUAL VEHICLE’s Automated Drive Demonstrator (ADD) is an open vehicle platform for testing V2X communication, algorithm development, multi-sensor concepts, and real-time sensor fusion.

ALP.Lab GmbH has developed a sophisticated testing environment on public roads and proving grounds offering testing capabilities for the ADD, e.g., access to road-side unit measurements for vehicle system validation. In addition to real-world testing, Virtual Validation becomes an essential technological brick in test strategies and raises significant needs for reliable Modelling & Simulation as a strategic capability within companies. The proposed solution is represented by a structured top-down approach referred to as System Simulation Governance for ensuring cost-effective and smart use of modelling and simulation. The resulting simulation credibility is based on a credible simulation process supporting virtual validation and approval.

To read more about VIRTUAL VEHICLE, please visit our website: www.v2c2.at
SCALE – IT-Solutions for CAE

SCALE offers software solutions and IT services for process and simulation data management in the automotive and other industries.

SCALE’s lineup is the integrative software solution SCALE.sdm for end-to-end simulation data and process management. It includes the product modules LoCo for management of CAD and CAE model data and processes, CAVIT for analyzing and reporting of result data from simulation and test, and Status.E for project organization and monitoring of requirements. SCALE.sdm supports the entire lifecycle of the typical CAE design workflow:

CAD data -> meshing -> model assembly -> solving -> post processing -> assessment -> reporting and monitoring

Furthermore, SCALE.sdm can be applied perfectly for Systems Engineering. The project requirements are initially recorded in SCALE.sdm and tracked throughout the product development process. This allows to monitor the product maturity at various levels.

To accompany our products, we offer IT services on customization, adaption, extension and integration into existing company infrastructure. On customer request, the software modules can be individually combined or integrated as desired.

In addition to software development and standard products, SCALE offers consulting services for assessing and optimizing your IT environment, requirements analysis, IT architecture design, project planning and management, etc.

The name SCALE stands for „Scalable Solutions in Simulation Data and Process Management“ and our staff at SCALE are a mix of experienced CAE engineers and professional computer scientists.

The majority of our employees is based at the Dresden site and benefit from the excellent scientific environment there.

SCALE offices can be found in Dresden, Ingolstadt, Stuttgart and Braunschweig. International partners cover support and customer relationships worldwide.

More information at www.scale.eu.

empowering your CAE processes

www.scale.eu

IT-SERVICES

CONSULTING

SCALE.sdm
Software Solution for Simulation Data Management

LoCo
SCALE.model

→ Models and Processes

CAVIT
SCALE.result

→ Results: Test and Simulation

Status.E
SCALE.project

→ Project Management and Requirements

PASSION FOR ELECTRIFIED, AUTOMATED AND HIGHLY-CONNECTED VEHICLES.

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3D Mapping Solutions – High-Quality kinematic Surveying

Located in Holzkirchen, Germany, and Pittsburgh, USA, 3D Mapping Solutions is one of the leading experts in the fields of high-quality kinematic surveying, high-fidelity digital twins of real-world roads, intelligent maps and future-driven road data of any kind.

3D Mapping Solutions specialized in high-precision and high-resolution mapping of road networks, test and race tracks as well as proving grounds. 3D Mapping Solutions produces high-precision digital maps (Ultra HD Maps) as a basis for user-specific developments, for advanced ADAS or driving function developments or test and validation applications for autonomous driving.

Another important field of activity is the computation of high-resolution digital road surface models as a basis for a wide range of development applications, especially in the areas of tire development, durability, noise analysis, vehicle dynamics and driving comfort simulation. 3D Mapping Solutions also supports the creation of 3D environment models for perfect visual and material representation for any desired level of detail.

The services of 3D Mapping Solutions are available worldwide. Multisensor Mapping systems are permanently present in Europe, USA, Japan and China. The 3D Mapping Road Data Collection of public roads or road networks additionally offers ready-to-use highly accurate and up-to-date data sets as HD maps or road surface models.

www.3d-mapping.de
LS-DYNA and more

DYNAmore GmbH – Gesellschaft für FEM-Ingenieurdiensleistungen – is your contact partner for consulting, training, support and sales activities concerning the finite element software LS-DYNA. The product portfolio consists of LS-DYNA, LS-OPT, LS-PrePost, additional complementary programs as well as numerous FE models for crash simulations (dummies, barriers, pedestrian impactors human models, etc.).

The range of services includes qualified support for all application areas of LS-DYNA as well as general FEM consulting services. DYNAmore is one of the top addresses for pilot and development projects for the simulation of nonlinear dynamic problems. The services provided by DYNAmore also include software development for finite element solver technology and simulation data management as well as consulting and support for modern, massively parallel computer systems. Trainings including seminars, workshops, webinars, support and information days as well as LS-DYNA user conferences are also part of the DYNAmore portfolio. More detailed information can be found on our support and tutorial websites. With the Material Competence Center (MCC), DYNAmore offers another unique value. The service of the experts for material characterization and parameter identification from the MCC, which is located in Leinfelden-Echterdingen near Stuttgart, includes the development of predictive material cards and model technology for polymers, metals and composites. But also the derivation of methods for their calibration and validation is part of the MCC’s range of services.

You will find DYNAmore in Stuttgart, Dresden, Ingolstadt, Berlin, Langlingen, Braunschweig, Munich, Zurich (CH), Linköping (S), Gothenburg (S), Versailles (F), Turin (I) and Dublin, Ohio (USA).
Automotive Solution Center for Simulation e.V.
Curiestraße 2
70563 Stuttgart | Germany
Phone.: +49 711 699 659-0
Fax.: +49 711 699 659-29
E-mail: info@asc-s.de
Web: www.asc-s.de

Your contact person
Dipl.-Ing. Alexander F. Walser | Managing Director