

SMART DIGITAL SOLUTIONS



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Fraunhofer Institute for Experimental Software Engineering IESE

Software is a part of our lives. Embedded into everyday equipment, into living and working environments or modern means of transportation, countless processors and controllers make our lives simpler, safer, and more pleasant. We help organizations to develop software systems that are dependable in every aspect, and empirically validate the necessary processes, methods, and techniques, emphasizing engineering-style principles such as measurability and transparency.

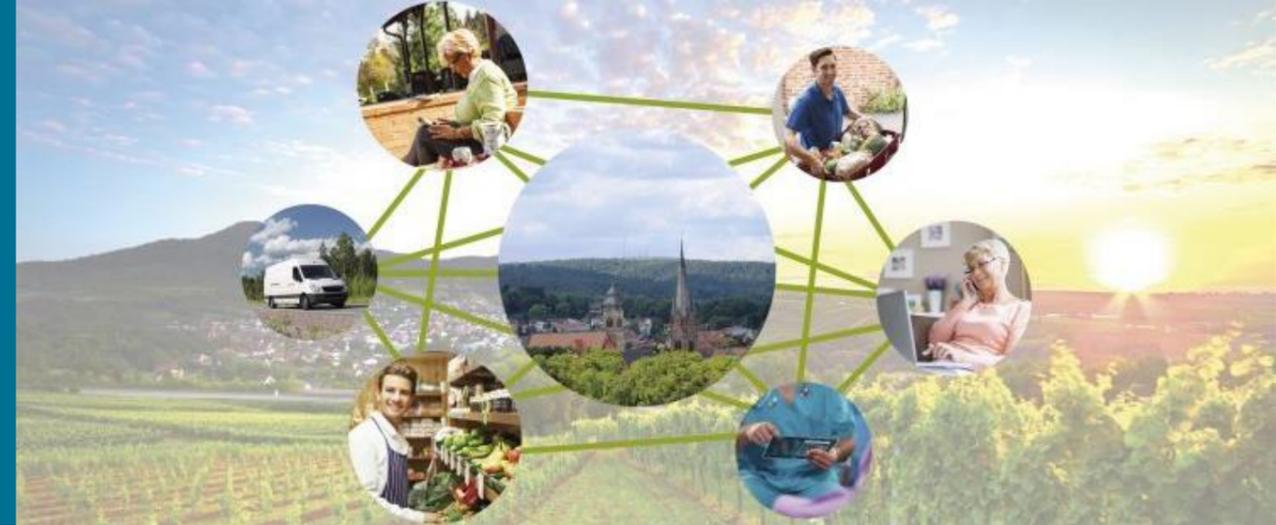
The Fraunhofer Institute for Experimental Software Engineering IESE in Kaiserslautern has been one of the leading research institutes in the area of software and systems engineering methods for more than 20 years. With its applied research, the institute develops innovative solutions for the design of dependable digital ecosystems, thereby accelerating the economic and social benefits for its customers. The focus of Fraunhofer IESE is on topics such as "Autonomous Systems", "Industrie 4.0", and "Smart Farming", as well as on digital solutions for rural and urban areas.

In more than 1,500 customer projects, the institute has already transferred cutting-edge research into sustainable business practices, successfully contributing its competencies in the areas of Processes, Architecture, Data, Security, Safety, Requirements Engineering, and User Experience.

Fraunhofer IESE is one of 72 institutes and research units of the Fraunhofer-Gesellschaft. Together they have a major impact on shaping applied research in Europe and contribute to Germany's competitiveness in international markets



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Division Head SDS

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The digital transformation puts software and systems engineering at the heart of business and makes them the core of new, sometimes disruptive innovations that increasingly challenge established companies and success models.

Where previously disciplines and application areas could be clearly distinguished, we are currently experiencing a rapid fusion of products and services in the direction of digital ecosystems, which require a multidisciplinary approach. Big Data and Artificial Intelligence (AI) promise completely new possibilities: from Smart Mobility to Industry 4.0. Across domains, business and technical processes increasingly depend on available data and software.

The division "Smart Digital Solutions" at Fraunhofer IESE deals with what concrete applications of digital innovations and intelligent solutions for tomorrow's digital society will look like and how they will evolve. Our focus is on how to transform AI-based solutions into products and services with guaranteed qualities (such as trustworthiness) and on the development of digital ecosystems for rural and urban areas.

Department "Data Science (DS)"

Due to the increasing digitalization and networking of systems, the amount of available data is also growing rapidly. At the same time, the number of applicable approaches from the areas of Machine Learning and Artificial Intelligence is increasing. More and more companies are asking themselves what benefits can be derived from data and AI, be it by increasing efficiency and effectiveness in business and operational processes, better controlling of risks, or even the identification and development of new data-based products and services.

The department "Data Science" collaborates with companies to identify innovative, data-driven solutions, analyzes their potential, technical feasibility, and acceptance, and supports the implementation, operation, and maintenance of a reliable solution. We combine the necessary analytical know-how with software engineering competence and knowledge from the application domain. Within the framework of our Data Science training courses, we also transfer these skills directly to companies.

The use of AI is becoming increasingly widespread in industry, but also in our everyday life. As long as we do not operate in critical areas, the opportunities outweigh the risks. But what about the risks if an autonomously driving vehicle runs a red light and endangers pedestrians? Or if an AI specifically discriminates against certain groups of people when assessing job applications?

A special focus of the "Data Science" department is therefore to assure the required qualities of an AI-based system (such as dependability or trustworthiness). For this purpose, we are conducting research together with national and international partners on appropriate procedures and software components for systematically assessing all uncertainties of an AI-based decision and significantly reducing the risk of wrong decisions.

Competencies

- Data Analytics and KI
- Data Engineering

Department "Digital Society Ecosystems (DSE)"

Digitalization offers many new opportunities to make life in rural areas fit for the future. In our department "Digital Society Ecosystems", we try to exploit the potential of digital ecosystems for society with innovative solutions and concepts for the future.

Projects such as "Digital Villages" and "Smarte LandRegionen" are our flagship projects, in which we work together with model municipalities to shape digitalization at the regional level. The initial idea was to create a digital ecosystem for municipalities and then to extend this to entire regions. A digital platform as the core of this ecosystem is intended to drive digitalization in rural areas. This platform with concrete solutions can already be used throughout Germany today.

In the meantime, this and many other projects do not only address digitalization of rural areas, but also the topic of Smart Cities. At Fraunhofer IESE, we are mainly working on the design and development of digital ecosystems in the context of smart cities and urban districts. The Smart City Atlas from Bitkom, which we helped to design, for the first time systematically focuses on those cities that are already on the way to becoming Smart Cities and have already gained initial experience. By using new technologies, networked infrastructures are to be created in order to meet urban challenges such as the energy and transportation transition.

As an end-to-end provider of digital platforms for rural and urban areas, the department "Digital Society Ecosystems" covers the entire lifecycle process: from the establishment of a digitalization strategy to the operation of a platform and the onboarding of partners.

Competencies

- Conception, development, operation, and evaluation of digital platforms
- Impact of software ecosystems on the digital society

Department Head DSE

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