We Build Fair, Sovereign, and Value-adding Data Spaces

Progress Report 2024

Introduction

Dear Readers,

Digital transformation increases business' competitive ability and ensures prosperity within our society. Artificial Intelligence (AI), in particular, offers enormous potential for innovation and growth. Five resources are necessary for AI to be successful, namely (1) models and algorithms, (2) people with the necessary expertise, (3) the computing infrastructure to train the models, (4) money, as well as, finally, (5) data as the "raw material" for AI.

In Germany and Europe, we have access to all of these resources in sufficient quantities. However, unlike in other economic regions, these resources are not in the hands of a few individuals and are also not subject to state control. In fact, they are shared among many different market participants. This is the case for data in particular, which can only be utilized for AI, when data providers trust data users and if they contribute to AI's potential to deliver value creation.

Fraunhofer ISST develops technologies, systems, and business solutions for a equitable data economy. Data Spaces is an example of this, forming a decentralized infrastructure for data ecosystems. This enabled us to record numerous achievements in 2024, as some examples show:

- Fraunhofer ISST is the coordinator of the European Data Spaces Support Center (DSSC) and we are working on strategic branch initiatives, such as Catena-X for the automotive industry, Manufacturing-X for industrial manufacturing, and Sphin-X in healthcare.
- We bring together key players from the economic, scientific, and political sectors, such as during our panel for international data-sharing at the German federal's government's Digital Summit in Frankfurt in November 2024, our commitment to a shared AI strategy between Germany and France, or with Federal President Steinmeier's participation in a workshop discussion.

- Fraunhofer ISST promotes the use of data space technologies and concepts internationally, for example in international R&D projects with Japanese and Chinese partners such as Fujitsu and Huawei.
- We drive knowledge transfer in the economy and in society. Our podcasts, media contributions, and events such as Digital Week Dortmund (#diwodo) are good examples.

We are pursuing our vision for a social data market economy, focusing on the healthcare and industrial manufacturing sectors, as well as IT service providers, smart mobility, and smart cities. Our Data Space Technologies department forms the foundation necessary for R&D work.

My gratitude goes to all our partners, clients, and networks who placed their trust in us in 2024 and continue to do so. I would also like to thank my excellent team at Fraunhofer ISST, with whom I have been implementing and developing this vision for around ten years now. Together, we are driving innovation from data, promoting digital transformation in Germany and Europe. This journey is not yet at its end. I look forward to the next steps.

Yours sincerely,

Prof. Boris Otto
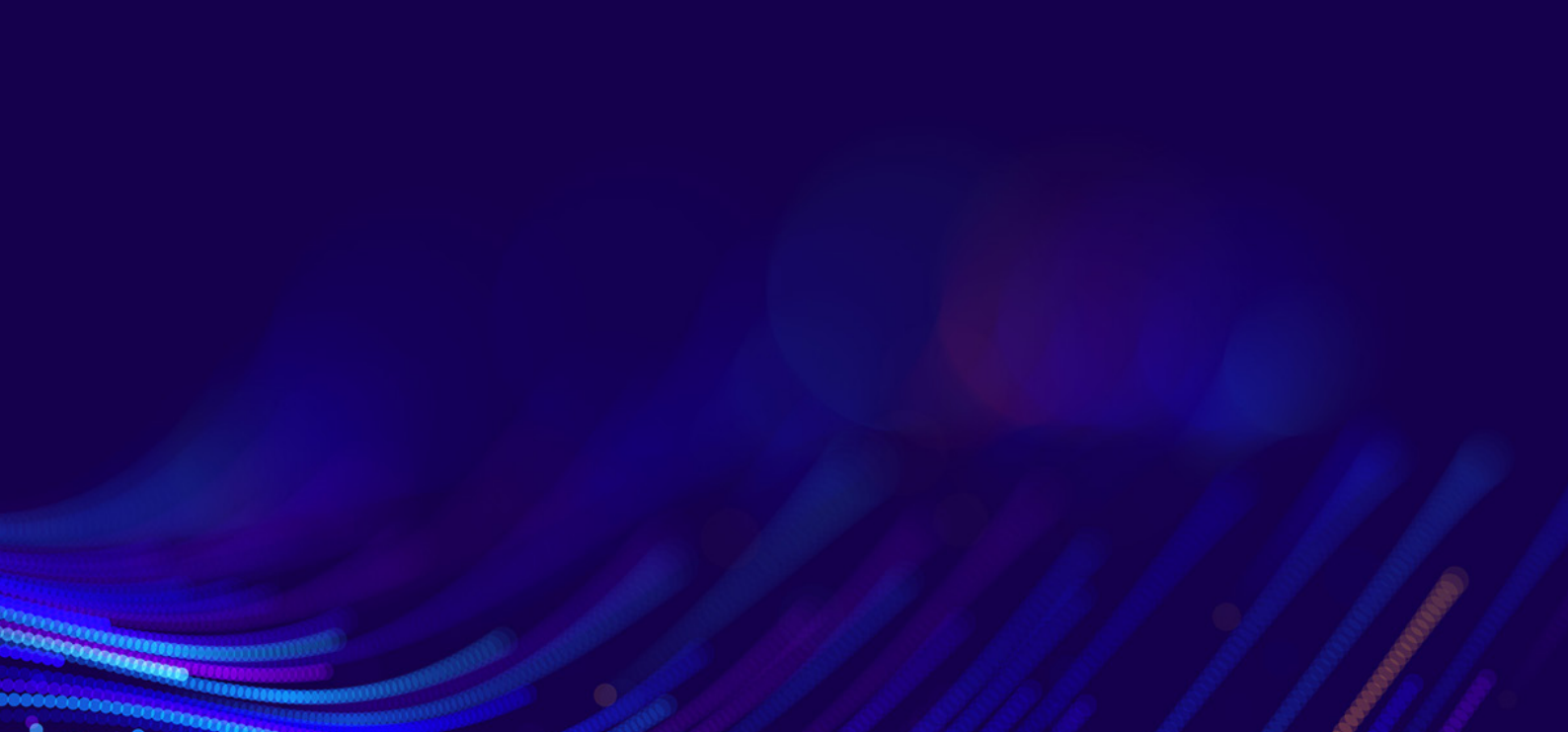*Institute Director*

Contents

Making Intelligent
Use of Data Together

Our Mandate

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To make intelligent use of data together and shape a valuable digital future

Digital transformation imbues almost all areas of life and the economy, and it produces data to an extent that is historically unprecedented. Whether in industrial production, in healthcare, in mobility, or in public administration, new digital processes, connected applications, and intelligent systems are emerging everywhere. Data is far more than a byproduct in this. Used correctly, it forms the foundation for better decisions, innovative business models, and a sustainable vision for the future.

As a result, the pressure on companies and organizations to act is growing: We must digitalize processes, implement resources more efficiently, and manage complex changes faster. Data is playing an increasingly central role — not only internal data, but particularly data that must be shared and utilized beyond corporate and industry boundaries.

Approaching data usage strategically — internally and in the ecosystem

On the one hand, our own data sets need to be strategically deciphered, subjected to qualitative validation, and utilized in a targeted manner in order to translate them into new processes, products, or business models. On the other hand, the internal view alone is no longer enough to meet current challenges. Innovation, resilience, and sustainable value creation develop in places where data is interconnected whilst retaining contextual depth, shared comprehensively, and used with confidence — for example, through entire supply chains, between public institutions, or inside networks that transcend industry boundaries.

The ability to utilize data strategically and share it with partners is increasingly a deciding factor in competitive ability, innovative strength, and future viability. It concerns established industrial enterprises as well as start-ups, municipal bodies, and international concerns. This new form of cooperation also marks the transition into a data economy, within which data is not only managed internally, but is strategically deciphered as a collectively used resource. This change poses great challenges: Technological, legal, and cultural prerequisites must be created, so that data can be shared in a secure, fair and sovereign manner.

## Trust and security as the basis of the data economy

How can data networking be successful without participants losing control over their data or overstepping legal or ethical limits? The answer lies in clear operating principals and technical frameworks that create trust: standards, legal security, and transparent governance. Only when these prerequisites are specified can data be shared in a secure and sovereign manner. This occurs in what is known as data spaces, enabling intercommunication over industry boundaries and national borders, whilst at the same time protecting business interests and the data itself.

Our mission: Build bridges and enable innovation

The path to a functioning data economy is demanding — technically, legally, and organizationally. It is even more important that strong partners work together on solutions that create trust, embed diverse perspectives, and enable innovation. Fraunhofer Institute for Software and Systems Engineering ISST considers itself a shaper and agent of this revolution. Our mission is to actively shape responsible and sovereign data handling in the economy and in society — not only as a supplier of technology, but as a facilitator, a driving force, and a bridge between disciplines, sectors, and interests.

As part of the Fraunhofer-Gesellschaft and European research, we are uniting applied research with practical relevance, technological expertise, and regulatory understanding. Together with partners from industry, management, start-ups, and science, we are developing robust and sustainable solutions for the data economy of tomorrow — with a clear objective: Our designs should not only be technically convincing, but also viable in the economy and relevant in society.
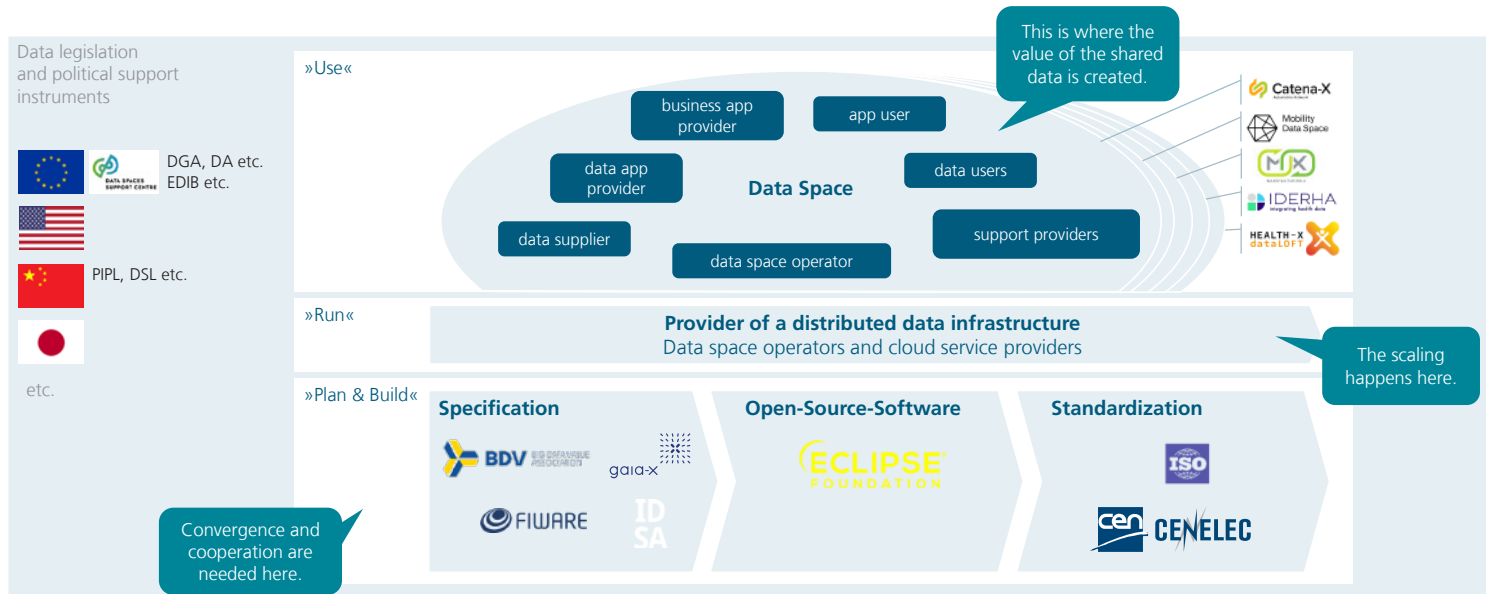
Legende: DGA – Data Governance Act; DA – Data Act; EDIB – European Data Innovation Board; DSSC – Data Spaces Support Centre; PIPL: Personal Information Protection Law, DSL – Data Security Law.

Think systematically, act based on the big picture

A collective understanding, basic parameters, and cross-sectoral cooperation is required for viable data spaces and ecosystems to develop. At Fraunhofer ISST we are actively shaping this revolution — on three closely interlocking levels, which together create the prerequisites for a sustainable data economy:

- **Plan & Build**
  The collective vision is at the forefront. Together with commercial, scientific, and public sector partners, we are developing strategies, reference architecture, and governance models. During this process, we are dealing with key questions such as interoperability, data ownership, and trust — for example, in projects relating to Gaia-X, International Data Spaces (IDS) or the European Data Strategy.

  Building on this, we are implementing the technical foundations: Connectors, interfaces, and integration solutions, which enable secure and interoperable data networking. We are automating processes, building scalable infrastructure, and forming technical components so that they can meet the demand of operators and user groups.

- **Run**
  A data space is only successful, if it also works when being used. We assist in establishing robust operating models, monitoring access, and ensuring continuous development. Legal security, data protection, sovereignty, and compliance are at the heart of this, as well as the scalability and stability of infrastructure. We are therefore ensuring that data spaces remain trustworthy and perform well over the long term.

- **Use**
  The value of data only emerges when it is applied. We are accompanying our partners in the identification, implementation, and integration of concrete use cases into existing structures — whether in manufacturing, healthcare, in mobility, or in the urban space. At the same time, we are demonstrating how networked data can develop new business models, efficient processes, and more value for society. We refer to these three levels as dynamic action frameworks. They emphasize the following: The development of a sovereign data economy is a cooperative, continuous design process, in which we actively participate on an individual level.

Assume responsibility — enable innovation

Sharing and using data is not only a technical or legal challenge — it is also a question of mindset. Those who assume responsibility, create the foundation for innovation, resilience, and sustainable growth. Our vision is of a data economy that builds trust, promotes participation, and creates economic as well as societal value. As part of this, we align ourselves with the European principles of sovereignty, fairness, and sustainability: They protect the right to freedom and at the same time create room for innovation. By transferring these values into technical infrastructure, viable business models, and transparent governance, we are contributing to a digital future, which is effective at the same time as being responsible.

We believe that progress emerges when people and organizations are ready to share knowledge and responsibility. We are therefore inviting you to forge new paths with us, as partners in research, industry, public administration, or civil society. Let's work together on solutions, which are not only technologically well founded, but also create trust — for a strong economy, a networked society, and a Europe on its own sovereign digital journey. The possibilities are there. Let's use them — together.

Data Strategies for Sustainable Success: We Support Your Transformation.

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As co-initiators and pioneers of data spaces, we have a thorough understanding of developments in the data econo-my and their potential. It is our aim to shape access to the data economy in a practical and needs-based way — with flexible cooperation models oriented to the individual requirements and aims of our partners. As part of this, we are promoting the exchange of knowledge and networking through active participation in data spaces.

From research to practice

The strategic use of data is increasingly becoming a central determinant of success for businesses and value creation net-works. As an applied research institute with technological and methodological expertise, we are supporting you to recognize and harness data-based potential. In collaboration with you, we are identifying relevant data resources and developing methods to integrate these into your processes and business models in a targeted manner.

Individual opportunities for collaboration

Our forms of collaboration are flexible and align themselves to concrete problems and needs. We offer various forms of support. Whether it's a brief analysis, collaborative workshop, or long-term development project — we tailor every project to meet the requirements and capability of our partners. This enables us to foster practical collaboration at the interface of research, innovation, and commercial application — particular-ly in the complex and dynamic field of the data economy.

Overview Of Our Proposal

ANALYSIS

Workshops & Consulting

Short-term, practical impulses for brainstorming and strategy development.

Analyses & Research Studies

Analysis of potentials and strategic options to support decision-making processes.

DEVELOPMENT

Individual Research & Development

Development of individual application-oriented solutions that enable technology and process optimization in companies.

Strategic Innovation Partnership

Co-creative research and development for strategic transformation and systemic change of business processes and models.

Consortial Research Projects

Collaborative research initiatives to develop industry-specific innovations as part of funding programs.

TRAININGS

Trainings & Keynotes

Further education and customized training on technologies, methods and innovation topics.

Research Meets Practice:
Our Strengths For Your Projects

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Fraunhofer ISST works on the data economy's central interfaces, on a political, economic, and technical level. This allows us to connect scientific expertise, operational business expertise, and practical experience with a far-reaching network from which our partners benefit long-term.

Non-profit and independent: As a non-profit organization, we are a neutral and long-term research and development partner, supporting you to find custom solutions and appropriate collaboration partners.

Outstanding research and practical expertise: We combine future-oriented research with the development of practically relevant concepts and solutions for the data economy.

Global reach and network: We promote the exchange of experiences in initiatives and networks that transcend industry boundaries and provide access to relevant industry participants — locally as well as internationally.

Close involvement with standards and policy: Through our close cooperation with political institutions and standards committees, you will receive early insight into new regulations and current data economy trends.

We look forward to working with you.

Are you interested in collaborating or do you have any questions about our activities? We will be pleased to advise you and look forward to hearing from you.

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Areas of Expertise

Data spaces with technological expertise

Our Areas of Expertise

Expertise in the development of sovereign data spaces

Our contribution to the implementation of sovereign data spaces encompasses principal tasks throughout the entire development and implementation process. In order to approach these tasks with innovative strength and commitment to quality, we pool our expertise in six areas of expertise.

They form the technical focal points in which we pool our methodological and technological expertise. They form the foundation with which we systematically process problems related to data spaces — from architecture to implementation, from infrastructure to governance.

Cloud transformation

We shape and test scalable, secure Cloud infrastructures which serve as the technical foundation for running networked data spaces.
[Further information] ↗

Data science

We develop and test methods to harness large and shared databases — from classical methods of analysis to AI-supported approaches.
[Further information] ↗

Data spaces and data ecosystems

We research and shape the technical, conceptual, and organizational foundations of reliable and interoperable data spaces.
[Further information] ↗

Free and Open-Source Software (FOSS)

We believe in transparent, open software development and purposefully integrate reusable OSS components into data space architecture.
[Further information] ↗

Software engineering

We develop modular software solutions, that support applications in data spaces efficiently and can be adapted flexibly.
[Further information] ↗

Strategic data management

We develop approaches and tools to systematically record and manage data as a strategic resource and harness it for long-term use.
[Further information] ↗

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Intelligent
Data Usage
in Healthcare

Personalized and data-centric medicine crossing sector boundaries

Exceptional medical care does not end at the exit door of a single practice or hospital. It is sustained by interdisciplinarity and cross-sectoral collaboration between specialized teams. In order for them to develop their full potential, they are dependent on good and quickly accessible data — a particularly great challenge in the decentralized healthcare sector with its strict data protection and data security requirements.

That is why we are developing software technologies for the data-supported healthcare of tomorrow. That encompasses interoperable healthcare data spaces and applications that are based on them, such as clinical process optimization, mobile health apps or therapy algorithms.

As a long-term research partner of the **Medical Informatics Initiative (MII)** and of data space initiatives such as the **International Data Spaces Association**, we have an insight, transcending industry boundaries, into the development of data sharing models in data spaces, as well as specific expertise in its implementation in healthcare.

Interoperable IT solutions that follow standards and take regulatory requirements into account

We develop complex data ecosystems that take international standards (IHE, HL7) and regulatory requirements like those in the **European Health Data Space (EHDS)** or in the **Medical Devices Regulation (MDR)** into account. After all, effective IT

solutions for healthcare must enable sovereign use of healthcare data that transcends industry boundaries.

Consequently, in collaboration with **providers of healthcare IT solutions**, we create scalable, interoperable IT landscapes as a well-grounded basis for efficient data usage and the development of new, more attractive forms of healthcare delivery. In collaboration with our connector Ivy.connect, we offer an **IHE-based solution** for file-based data exchange and support profiling and validation in the framework of the **FHIR standards** (Fast Healthcare Interoperability Resources).

More individualized treatment through targeted use of data between care and research

On this technological basis, we support **healthcare providers** in introducing file-based solutions founded on the **Electronic Case File (EFA)**. Our **virtual consent assistant and data trust models** support secure data transfer. We are developing **intelligent algorithms** for early detection of factors influencing successful treatment, which harness individual patient data in a targeted manner to support treatment.

Data-based business models for pharmaceutical and MedTech businesses

With overarching infrastructure and interfaces for data sharing, we are assisting **pharmaceutical and MedTech businesses** to develop data-based services and business models. Our solutions for the sovereign usage of healthcare data enable close integration and **feedback between healthcare and research**, supported by Real-World Evidence (RWE).

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Healthcare is oriented towards stereotypes: male, white, average weight. However, illnesses and the impacts of treatments differ depending on gender, age, build, and ethnicity. Trackable, useable, interoperable, and differentiated data is the foundation for precise medicine. When we are able to compare patient data in real time, we can reach an new level of individualized care."

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Healthcare Project Highlights 2024

HealthTrack-X — digital supply chains for sustainable healthcare treatment

Treatment with medical products is a central pillar of the healthcare sector.
The project HealthTrack-X aims to make the journey along the value chain more transparent. This is done through the development of a cross-sectoral digital infrastructure to make medical products more traceable throughout their entire lifecycle. Whether it be production, logistics, in hospitals, in the outpatient sector, or disposal — HealthTrack-X connects all involved participants on one shared, interoperable platform, so that they can respond faster and in a more targeted manner to shortages, callbacks, or supply risks.
Fraunhofer ISST develops platform architecture and shapes interoperable interfaces and data models. This produces an interconnected infrastructure that is compliant with data protection regulations and supports the exchange of data between all participants in the supply chain. **Go to the project webpage** ↗

ADLeR — digital emergency assistance for greater safety and confidence in everyday life

A quick emergency alert can save lives, but not all people in an emergency situation are in the position to issue an emergency alert independently. The project ADLeR (system of assistance for digitalizing the rescue chain) is developing intelligent infrastructure for automatic detection and reporting of emergencies in the private domain, in particular for elderly people and people with disabilities. Through a combination of Smart Home technology, digital emergency detection, and qualified first responder alerting systems, they are intelligently augmenting the rescue chain, without restricting informational self-determination.
Fraunhofer ISST is devising a data space, compatible with Gaia-X, that enables the sovereign exchange of relevant emergency data. The institute is also developing interfaces to digitally connect sensors and actuators, as well as software components, in order to automatically detect and report (in accordance with data protection regulations) critical healthcare events, such as falls or cardiovascular disorders. **Go to the project webpage** ↗

A central research data platform for Bochum Medical Faculty

With eight providers and over 600,000 treatments annually, the University Hospital of Bochum (UK RUB) is one of the largest university consortiums in Germany. Using an overarching strategy, the hospital wishes to systematically unlock this potential for research, teaching, and treatment.
This involves the preparation, structuring, and anonymized collection of patient care data in compliance with data protection regulations, before it is fed into a central research data platform. The aim is to develop a Data Integration Center (DIC) and connect it to the Medical Informatics Initiative (MII), enabling high quality research and creating a sound decision-making framework for clinical application.
Fraunhofer ISST is developing interfaces between local data management (LDM) systems, the central data platform (ZDM), as well as the Trusted Third Party (TTP), and is supporting the implementation of data sharing across different locations. Further partners: EY, EY-Parthenon and vitagroup.
Go to the project webpage ↗

Intelligent
Data Use
in the Cloud
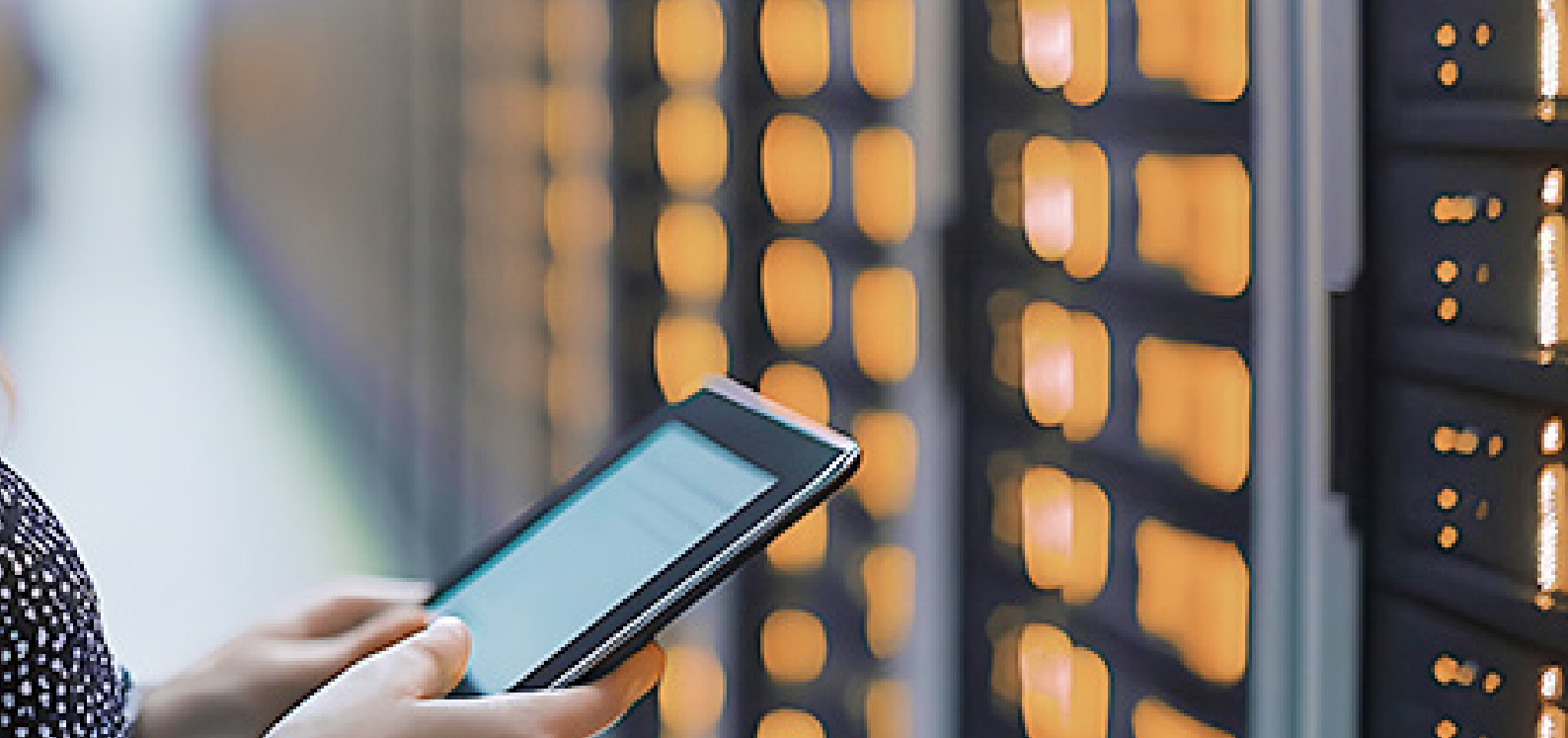
Cloud Infrastructure for Lower Running Costs and Greater Sustainability

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It is a long time since sustainability and the data economy have been viewed as separate disciplines. The opposite is true: Every new Cloud-based IT solution and every new data center increases IT energy demand. In order to achieve the targets of the Paris Climate Agreement and to comply with the German federal government's Energy Efficiency Act, it is essential to consider Green Cloud computing in order to reconcile economic and ecological goals.

We are therefore developing solutions that enable the use of shared data in a sovereign manner, whilst reducing the costs and carbon footprint of Cloud configurations.

We are integrating **data space technologies** that allow Cloud users data sovereignty when accessing **data spaces such as Catena-X** and develop custom solutions for **Cloud-based edge monitoring**. We are supporting providers and users with **best-practice configurations** for their Edge Cloud solutions. In the course of this, our main focus at the moment is on **reducing energy consumption**.

Data Space as a Service for industry

Data spaces are increasingly establishing themselves as an instrument for the secure and **sovereign exchange of data** in the industrial sector. A good example of this is **Catena-X**, a network for the automotive industry. Fraunhofer ISST has been

one of the driving forces for the development of data spaces from the beginning and can now draw on considerable experience from countless past and current data spaces projects from various sectors.

An increasing number of established data spaces also requires an increasing number of technology providers that can enable participation in data spaces. We are therefore supporting **IT service providers** in **incorporating data space technologies** and the associated services into their portfolios. This results in the development of new business domains and the expansion of existing service offerings related to **digital sovereignty**.

Large Language Models for data spaces

By **integrating Large Language Models (LLM) into data space technologies**, we are making it possible to find the right data within a data space if it is not freely available but is subject to **terms of use**. The user asks the LLM questions and at first, they receive an estimation of how well the data can generate an answer. The participants also analyze the raw data themselves. Finally, the requester can accept the data's terms of use in order to then access the raw data and actually generate the answer. It is therefore guaranteed that the **data ownership** of all participants is preserved and that at the same time, the data accessible within the data space is used in the most ideal way.

Less energy consumption for software and by software

It is often unclear how energy-efficient and sustainable a piece of software is. Therefore it is important to **monitor** the software during operation in order to calculate the level of energy consumption. Our tool **Automatic Recommender for Resource Configuration (ARRC)** determines the energy consumption of the software that is currently running. From that, it automatically issues suggestions for reducing energy consumption. The suggestions are **deployment configurations**, which can be implemented without interfering with the existing software infrastructure. ARRC gives us a foundation for operating software cost-efficiently and sustainably without having to redevelop it.

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Increasing usage and regulatory requirements are making the energy-efficient incorporation of IT an increasingly important determinant of success for Cloud providers — in terms of both economic and environmental targets. Intelligent analytics tools enable operators and users of Cloud solutions alike to use resources more efficiently. And data space technologies create more opportunities to use data securely and without loss of sovereignty over business boundaries and national borders."

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IT Service Provider Highlights 2024

IPCEI-CIS — Energy efficiency in the Edge Cloud Continuum

In the project "IPCEI-CIS Sustainability-Focused Orchestration in the Edge Cloud Continuum," T-Systems International GmbH and the Fraunhofer-Gesellschaft are collaborating to integrate energy efficiency into the entire technology ecosystem of the Edge Cloud continuum.

As part of this collaboration, we are developing innovative solutions, integrating energy consumption and the optimization of such as core components in the management and orchestration of the Edge Cloud ecosystem. This includes the development of benchmarking and metric systems, algorithms for calculating energy consumption across the entire value chain, and the creation of archetypes of typical energy consumption. Energy consumption can also be estimated with the assistance of Artificial Intelligence.

Go to the project webpage ↗

Data Space Research Lab — open initiative for developing Eclipse Dataspace Components with Huawei

The focus of the Data Space Research Lab is on international data exchange from an industrial perspective, taking account of European associations such as the International Data Spaces Association (IDSA) and Gaia-X AISBL. The lab offers companies in Europe, China, and around the world a mature infrastructure for the shared use of their valuable data resources. Our LLM integration is also employed to locate the right data for this purpose. In the Lab, we use Open Source Software (OSS), such as Eclipse Dataspace Components (EDC), to develop data spaces as standard infrastructure technology for the collective use of data in line with global standards and specifications. An example of this is the data space Boot-X, which gives its users the opportunity to focus on their actual business cases and to simply use the data space as a Cloud-based service. The Lab contributes heavily to OSS projects and, in doing so, promotes a common basis for data-driven collaboration.

Go to the project webpage ↗

DiMeKI — Knowledge and Technology Transfer (KTT) in non-academic research institutions with the assistance of AI

In a world shaped by major societal challenges, the demands on inter- and transdisciplinary exchange between the spheres of science, society, the economy, and politics are increasing, as well as on the related transfer of technical knowledge to industry — both relating to the practical aspects of Knowledge and Technology Transfer (KTT) and research into KTT.

Digitalization is a core societal challenge that needs to be addressed with regard to both transfer research and transfer in practice. DiMeKI aims to use AI to support organizational transformation within KTT and to enable the development of a unified digital method for supporting the KTT of non-academic research institutions. The German Research Center for Artificial Intelligence (DFKI) and Fraunhofer ISST is applying and evaluating this method as a prototype.

Go to the project webpage ↗

Intelligent Data Use for Mobility and Smart Cities

Data-Based Approaches to Climate Protection, Sustainability, and Innovation

The European Green Deal is pursuing great aims: Traffic-related emissions are to be reduced by 90 percent by 2050. To achieve this, 75 percent of inland freight traffic currently handled by road is to be shifted to rail and inland waterways. In 2022, rail accounted for only 17 percent of freight traffic across the EU. Inland waterways accounted for five percent. This is only one example among many that shows that climate and demographic challenges are enormous and they require entirely new approaches to resolve them[1].

How can we use data-based approaches to overcome the significant environmental, societal, and economic challenges related to mobility and public spaces? We are addressing this research issue in the "Mobility & Smart Cities" department at Fraunhofer ISST.

Mobility and traffic are some of the most pressing topics in Germany and Europe. Issues such as environmental pollution, noise pollution, and land use, as well as **new mobility needs and requirements**, precipitated by technical innovations like, for example, **electro mobility** and **self-driving vehicles**, but also by new approaches such as **shared mobility**.

using data fairly and with sovereignty is the key to new models that deliver both environmental and economic advantages.

Greater quality of life through data?

In many towns, the enormous potential for data-based innovation remains untapped. There is a lack of comprehensive concepts for **using urban data intelligently,** such as with the use of a **digital twin**. But the demand for integrated data approaches is growing: **Efficient support of urban development** via municipal heat planning is but one example. Enabling **citizens to more fully engage** via participation in critical planning and development projects is another. **Collectively**

Strategies for trustworthy and integrated use of data

We are contributing to the **digital transformation of Smart Cities** and mobile use cases, and are helping to leverage the opportunities associated with these.
Our **research and development activities** are aimed, among other things, at: Mobility organizations and providers, automotive manufacturers, transport companies, transport infrastructure companies, municipalities and regions, municipal utilities

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1 https://germany.representation.ec.europa.eu/news/eu-kommission-empfiehlt-klimaziel-fur-2040-90-prozent-weniger-emissionen-2024-02-06_de

and organizations, and tourism companies and associations. What we offer:

■ **Data spaces**

The promotion of data sharing by developing technological components, regulatory frameworks, and suitable business models that preserve the data ownership of data providers.

■ **Data custodians**

The design and implementation of data custodians as a neutral entity in data ecosystems for preserving, relaying, collecting, and enriching data, for managing permissions, as well as for anonymization and pseudonymization.

■ **Municipal data strategies**

Municipal support with the preparation of data strategies by developing data competencies; for example, in the design of data governance, data quality, as well as data integration — taking into account statutory provisions (e.g., the EU Data Act).

■ **Data platforms and digital twins**

We are helping towns to develop integrated databases and to lay the foundations for digital twins, from organizing the use cases to implementing them operationally within the consortium.

■ **Edge Cloud architecture**

Development of Edge Cloud architecture and support in the implementation of cloud adaptation.

■ **Data evaluation and data science**

Approaches for the secure and anonymized evaluation of data resources (using federated learning, for example).

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Our mobility and our towns are changing. We have a desire for greater sustainability and a greater quality of life, and are searching for solutions to the pressing climate and demographic challenges of our time. Improved data management and the well designed, shared usage of data facilitate new approaches to improving our mobile lifestyle in the towns and wider communities of tomorrow. We would like to make our own contribution to this digital transformation."

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Mobility and Smart City Highlights 2024

FDOONE — networked data spaces according to the FAIR principles

The project "FDOOne — FAIR Digital Object One" aims to connect data spaces according to a standard that satisfies the FAIR principles (Findable, Accessible, Interoperable, Reusable). The aim is to standardize the fragmented digital space. There are three focal points: connecting data spaces using secure data transfer in AI applications, building confidence in AI, and promoting the AI ecosystem with an improved framework for companies.

Fraunhofer ISST is contributing its expertise on data spaces (e.g., International Data Spaces (IDSA) and Eclipse Dataspace Components (EDC)) to a concept for optimal networking. In addition, a use case is to demonstrate data exchange between FDO-, EDC- and AAS-based data spaces. Fraunhofer ISST is responsible for implementing a prototype of the technical infrastructure, supplemented by workshops to prepare for industrial implementation.

Go to the project webpage ↗

Scale DTM — building blocks for scalable, decentralized data custodian models

Scale DTM is compiling competitive, scalable, and easily expandable data custodian architecture that promotes collaborative data processing and value creation. This does not only relate to the exchange of data, but to the fiduciary execution of code as a service provided by the data custodian.

The project examines two key challenges of decentralized data custodian models: the identification of a data custodian and the negotiation of its custodianship. Fraunhofer ISST is developing suitable approaches using Gaia-X and International Data Spaces (IDS) and technological building blocks based on Eclipse Dataspace Components (EDC). This produces a solution, augmented with a Trusted Parties Database (known as a whitelist) for purposes of identification, which is compatible with open source where necessary, and uses an enhanced Eclipse Dataspace Connector (EDC) contract negotiation for automation. Go to the project webpage ↗

Deploytour — Resilience in the tourism industry using a collaborative European data space

DEPLOYTOUR is aiming to develop a "European Tourism Data Space" (ETDS). This is one of the European Commission's 14 data spaces known as "Common European Data Spaces," and forms the basis for a data ecosystem within the tourism industry. The aim is to adequately represent the deeply fragmented tourism sector, which is particularly susceptible to external influences. Five heterogeneous use cases are therefore already being implemented in the project, defining what they require from data space. In particular, Fraunhofer ISST is contributing its experience and knowledge from the development of the Eclipse Dataspace Components (EDC), the Data Spaces Support Centers (DSSC), and the International Data Spaces Association (IDSA), as well as from existing data space initiatives. The institute is therefore particularly involved in shaping the technical architecture and implementation, as well as the governance structure. Go to the project webpage↗

Intelligent
Data Use
in Industry

Optimal, Cross-company Supply Chains Using Data-driven Production

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Companies in the DACH region are not yet exploiting the potential of their data. This is the finding of a recent industry barometer conducted by MHP Management- und IT-Beratung GmbH. The bottom line: "The lack of a forward-looking data strategy (e.g., AI or digital twins) prevents data-based decision-making and innovation. 91 percent of companies in the US have already advanced further and treat data as a strategic asset — in China this stands at 78 percent and in the DACH regions, only 64 percent."[1]

And yet, manufacturing companies today have access to an increasing amount of movement and process data for their products. The physical flow of goods has long been part of a digitally networked end-to-end system. One thing is crucial: The relevant information must be accessible at the right place at the right time. Our challenge is to noticeably improve complex manufacturing and supply chain processes using optimized data analysis, internally as well as across different companies, and to develop innovative solutions that create real value.

With this in mind, we are developing digital solutions that help companies to shape their business processes in an adaptable, efficient, and pro-active fashion. Our focus is on helping to shape **digital transformation in industry** in a systematic and practical way, whilst being forward-looking, open to new technologies, and geared towards the specific challenges of our partners.

We are supporting corporate digitalization projects from **planning to conception and prototype implementation**. We are combining methodological expertise, technological know-how, and a deep knowledge of industrial processes. Our contribution aims to **improve central processes in a sustainable way**, particularly in the areas of demand and capacity management, customer order processing, as well as the transformation of industrial value creation geared towards Industry 4.0.

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1   https://www.mhp.com/de/insights/was-wir-denken/industrie-40-barometer-2025-data-driven-production

A companion on the data space journey

Fraunhofer ISST is one of the first initiators of data spaces in Germany and Europe. As an independent, practice-oriented partner, we support industrial manufacturing companies from the basic **development of a data strategy**, all the way to **technical execution of their own data space solutions**, and **integration into existing industry data spaces**.

Keep a closer eye on your own data

On the basis of a well-founded **data strategy**, we work for (and with) companies on **organizing their data** in a way that increases the **quality** and utility of AI applications, reduces data retrieval processes, and improves the implementation of data applications.

Data-driven solutions for greater oversight and security

We support companies in **implementing Digital Product Passports (DPP)**, protecting their intellectual property with **digital watermarking**, and using **digital twins** to support manufacture, maintenance, and decision-making along the value chain.

In addition to specific industrial applications, we also advise our partners on **the strategic and operative implementation of innovative technologies**, such as Large Language Models (LLM) and Free and Open Source Software (FOSS).

"

Resilience in global supply chains, compliance with documentation requirements, the need for gains in efficiency to remain competitive:All these are factors that demand improved use of data. We are seeing a number of promising approaches in which industry (be it a single company or a whole sector) is embarking on a strategic approach to data management and using data spaces for the sovereign exchange of data. Catena-X as a network in the automotive industry is a very good example of this."

Dr. Jürgen Schmelting

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Industry Project Highlights 2024

DB Schenker Lab — digitalization solutions with a low time to market

The DB Schenker Enterprise Lab for Logistics and Digitization is helping to accelerate the digital transformation of a logistics service provider's processes. The Lab is a strategic, long-term collaboration between DB Schenker, Fraunhofer IML, and Fraunhofer ISST, agilely developing new approaches and testing prototypes.
Fraunhofer ISST is developing innovative logistics solutions and process innovations, working closely with Schenker AG. For example, this includes a project for automating learning for digital twins using process data. In another pioneering project, the suitability and use of Generative AI and Retrieval Augmented Generation for efficient provision of a knowledge and decision-making basis is being developed. Go to the project webpage ↗

Factory-X — A sovereign data space for the mechanical and plant engineering industry

Within the Manufacturing-X project family, the Factory-X flagship project explicitly addresses an industry that is of great importance to the German economy: mechanical and plant engineering. It is creating a data space for sovereign participation in future-oriented technologies for sharing and using data collaboratively.
In the kernel known as Factory-X, Fraunhofer ISST is helping to develop the core technological functionality of the data space, which follows a decentralized architecture. The developments are being made available in an Open Source repository. Fraunhofer ISST is contributing its considerable expertise in this area to the project and is sharing the results with global standardization committees. The institute is also involved in developing a solution for monitoring the condition of production plants.
Go to the project webpage

Greater trust in data exchange across organizations — with the security framework from Fujitsu and Fraunhofer ISST

A lack of trust continues to hamper the widespread introduction of data ecosystems. Fujitsu and Fraunhofer ISST have collaborated on the development of "Levels of Assurance for Data Trustworthiness (Data LoA)" — the concept of a security framework that aims to promote trust and transparency across business boundaries and national borders, thereby overcoming issues such as a lack of trust, and reducing risks.
Data LoA provides a structured method for evaluating the trustworthiness of data, enabling data consumers to confidently assess the reliability of third-party data. At the same time, providers are able to clearly communicate the trustworthiness of their data and thus promote transparency. Data LoA thereby contributes to a responsible environment for data exchange and encourages organizations to collaborate.
Go to the project webpage ↗

About
Fraunhofer ISST

Fraunhofer ISST In Figures

Scientifically strong, socially diverse and financially stable

Based in Germany, the Fraunhofer-Gesellschaft is one of the leading applied research organizations. It plays a central role in the innovation process, with a focus on research in key technologies relevant to the future and the transfer of research findings to industry, strengthening our business location and benefitting our society as a whole.

The Fraunhofer Institute for Software and Systems Engineering ISST is one of 75 institutes within the Fraunhofer-Gesellschaft. As part of the Fraunhofer ICT Group, Fraunhofer ISST, founded in 1992, develops data space technologies for sovereign data exchange from its site at Dortmund Port and builds pioneering data ecosystems together with its partners.

191
employees
74 students | 61 women | 21 from non-European countries
Last updated at end of 2024

€12.25 million
Operating expenses
Last updated at end of 2024

€8.95 million
Proceeds from research and industry
Last updated at end of 2024

around 60
scientific publications
In 2024

€4.57 million
institutional funding
Last updated at end of 2024

3
spin-offs
Valoon | SIMPL | Sovity
Since 2021

3
completed doctorates
and around 30 PhD students in 2024

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Prof. Boris Otto

The Institute Management

Prof. Boris Otto

Director at the Fraunhofer Institute for Software and Systems Engineering ISST and Chair of Industrial Information Management at TU Dortmund University

Professor Boris Otto (born 1971 in Hamburg) is an industrial engineer and business information scientist. He has been the director of the Fraunhofer Institute for Software and Systems Engineering ISST in Dortmund since 2017. Since 2013, he has also been Chair of Industrial Information Management at TU Dortmund University. Boris Otto received his doctorate in engineering from the Faculty of Mechanical Engineering at the University of Stuttgart and qualified as a university lecturer at the School of Management at the University of St. Gallen. In his research and teaching, he focuses on industrial data ecosystems, data spaces, and data management in industrial companies.

He is Deputy Chairman of the Board of the Catena-X Automotive Network e. V., a member of the Board of the Gaia-X European Association for Data and Cloud AISBL and the International Data Spaces Association (IDSA), a member of the Supervisory Board of the European Health Data Alliance (EDHA), and Coordinator of the EU Data Spaces Support Center (DSSC). In addition, Boris Otto is chair of the steering committee at Fraunhofer ICT Group and is thereby a member of the Fraunhofer-Gesellschaft presidential council. He is a founding shareholder and member of the Board of Directors of CDQ AG, St. Gallen, and a member of the Research Council Industrie 4.0, the Supervisory Board of SICK AG in Waldkirch, the Advisory Board for Mobility Data of the Baden-Württemberg Ministry of Transport, Bosch Data Strategy Advisory Board, as well as the Advisory Board for Digitalization and Artificial Intelligence at the Physikalisch-Technische Bundesanstalt (PTB) in Braunschweig and Berlin.

Our Culture

With open eyes and creative minds, we are shaping the digital world of tomorrow

Successful research and development rely on interdisciplinary and multifaceted partnerships. As an institute of the Fraunhofer-Gesellschaft, we believe it is vitally important to establish an open culture that embodies the following:

- **Enthusiasm:** We believe in what we do. To those who think something can't be done, we say: **"Yes, it can."** An open atmosphere for discussion and a wide range of further training and career opportunities are important to us. Because those who take the long view can't stay still.

- **Freedom:** Research demands a high degree of freedom. We decide for ourselves what we are working on and ensure a good balance in our professional and private lives. Our colleagues take center stage.

- **Responsibility:** Freedom is only possible if it is accompanied by a sense of responsibility, and we believe this is true at every single stage of a process.

- **Team:** No single person can do everything. In order to be innovative, we need to work together. Because every single person is important, we believe in flat hierarchies, interdisciplinary teams, and leadership principles developed by everyone.

- **Diversity:** We don't need to know where someone comes from — we want to know where they are heading. This is why the Fraunhofer Institute for Software and Systems Engineering ISST takes a decisive stance against all forms of discrimination on the basis of origin, skin color, gender, or sexual orientation.

- **Passion:** Shaping the future at Fraunhofer ISST is more than just a job. It is a deep sense of purpose.

- **Spirit of research:** You can only really change the digital world of tomorrow if you are allowed to think outside the box today. Groundbreaking ideas must be allowed to grow and mature. We are building the framework for this with programs such as **"Fraunhofer AHEAD"** for spin-offs and **"Fraunhofer TALENTA"** for female scientists.

- **Cutting-edge research needs cutting-edge professionals:** For many years now, the Fraunhofer-Gesellschaft has been one of the most popular workplaces among STEM graduates. And at Fraunhofer ISST, we are always on the lookout for new talent. Want to create new space for data?
  Then read about current job vacancies on our website.

#thisISSTunning #changestartswithus

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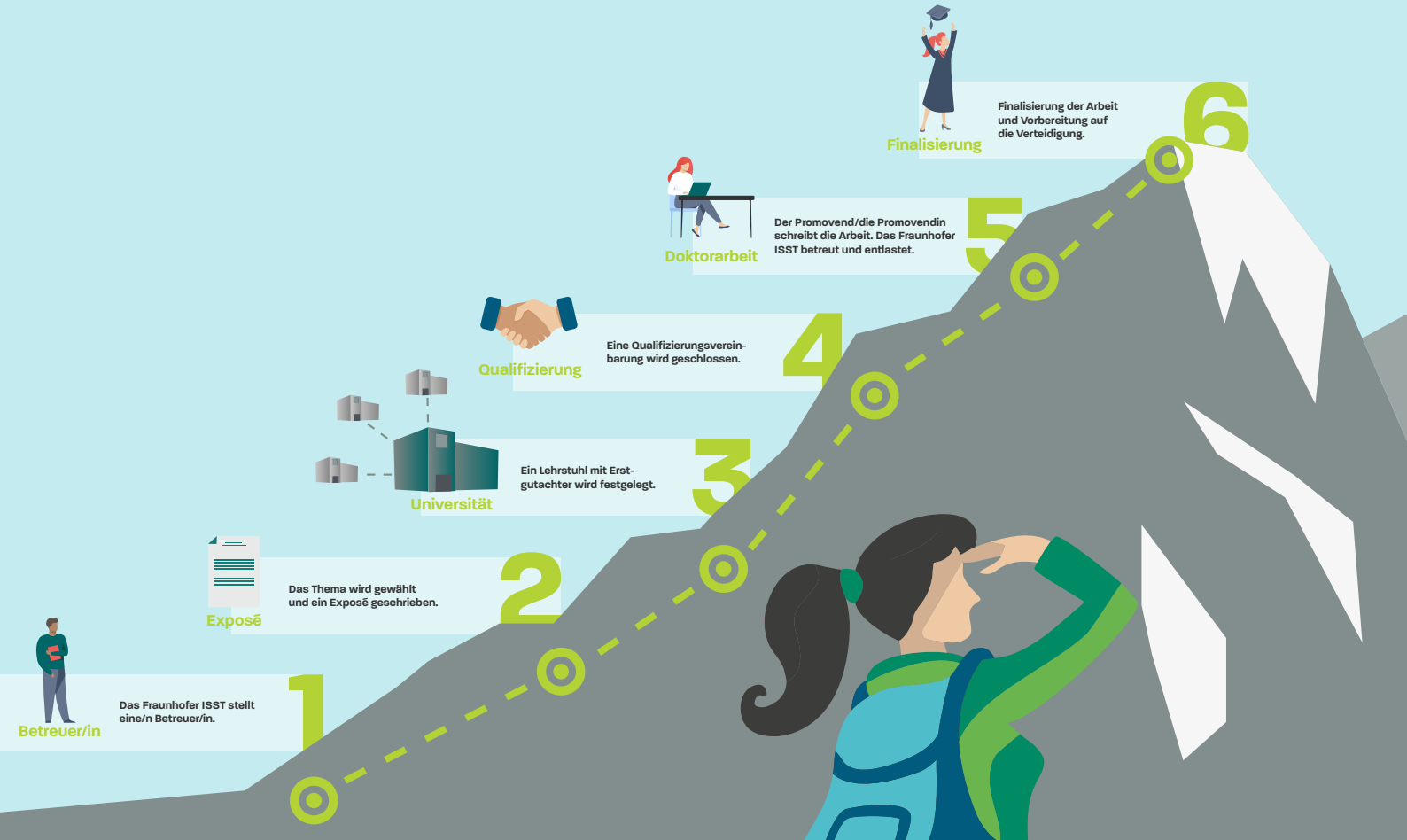✉ lea.gisela.ellen.krammer@isst.fraunhofer.de

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6 Finalisierung — Finalisierung der Arbeit und Vorbereitung auf die Verteidigung.

5 Doktorarbeit — Der Promovend/die Promovendin schreibt die Arbeit. Das Fraunhofer ISST betreut und entlastet.

4 Qualifizierung — Eine Qualifizierungsvereinbarung wird geschlossen.

3 Universität — Ein Lehrstuhl mit Erstgutachter wird festgelegt.

2 Exposé — Das Thema wird gewählt und ein Exposé geschrieben.

1 Betreuer/in — Das Fraunhofer ISST stellt eine/n Betreuer/in.

Studying for a PhD with Fraunhofer ISST

The Research Schools: achieving doctoral success together

Aimed at collectively providing support to PhD students during their doctoral studies, the Research Schools at the Fraunhofer Institute for Software and Systems Engineering ISST collaborate with professors from TU Dortmund University, Witten/Herdecke University, the Technical University of Braunschweig, and the University of Koblenz.

At the Research Schools, doctoral students from Fraunhofer ISST work together with those from universities in a mutual dialog-based approach that teaches the basics of scientific research in interdisciplinary groups. The Research Schools span a variety of fields and disciplines: information systems, healthcare, and computer science. They aim to not only enhance the scientific quality of dissertations at Fraunhofer ISST and at its affiliated universities, but also provide support for strategically publishing findings in publication media that relate to the specialist fields. Hands-on workshops on different scientific subjects are organized in the Research Schools to allow doctoral students to benefit cumulatively from the knowledge they have acquired and share it with one another.

PhD Students 2024

Dr. Marcel Altendeitering
"Design Principles for Data Quality Tools" (TU Dortmund University)

Data quality is a fundamental aspect of data management within organizations. Despite the accessibility of numerous tools, organizations have to contend with data quality issues due to changes in the organizational and technical environment. The dissertation presents results from nine individual studies; among them, four practical case studies on the design and implementation of data quality tools. A cross-case analysis assisted in pooling the design knowledge available, leading to the formulation of 13 generalized design principles. The design knowledge, based on empirical evidence, enables managers to develop customized data quality tools and forms a basis for further research.
Supervisor: Prof. Falk Howar (TU Dortmund University and Fraunhofer ISST)

Dr. Marcel Altendeitering

Dr. Daniel Tebernum
"A design theory for data catalogs" (TU Dortmund University)

Effective data management is essential, and data catalogs are important tools in the collection, management and democratization of data. In his dissertation, Daniel Tebernum investigates what shape data catalogs should take in order to tap the immense potential of data for research and value creation in today's data-driven world. His dissertation delivers a design theory for data catalogs and provides design knowledge in the form of design principles, features, architectures, models, and methods for supporting researchers and practitioners in implementing and executing data catalogs. The results of the study will be used to further develop and improve data catalogs in areas of research such as data spaces and data marketplaces.
Supervisor: Prof. Falk Howar (TU Dortmund University and Fraunhofer ISST)

Dr. Daniel Tebernum

Dr. Simon Scheider
"Moving towards people-centric data spaces — a research approach based on design science" (TU Dortmund University)

Due to economic, ethical, legal, and technical challenges in the use of personal data in organizational value chains, European infonomics is faced with an untapped innovation potential. The concept of data spaces has emerged as a problem-solving approach in recent times. However, there has been little research into data spaces for personal data. This dissertation adopts the Design Science Research (DSR) methodology to close this gap. Initially, an analysis phase is conducted to narrow the focus of the DSR study (i.e., taxonomy and archetypes) and to clarify the requirements (i.e., requirements engineering and supporting design principles). A human-centric reference system architecture is then developed for a (market) space for personal data. The DSR approach incorporates several methods to iteratively construct and evaluate the artifact. Management contributions cover novel design knowledge about privacy-oriented data spaces, taking into account their legal, ethical, economic, and technical constraints.
Supervisor: Prof. Boris Otto (TU Dortmund University and Fraunhofer ISST)
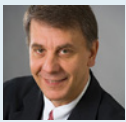

Dr. Simon Scheider

The Advisory Board

Our advisors from business, research, politics, and administration

Fraunhofer ISST is assisted by its advisory board. Its members support the market-focused approach to research at the institute with their practical experience and specialist knowledge from their respective technical fields.

Paul Schwefer
Management Consultant at Fair Sourcing and Chair of the Advisory Board

Prof. Volker Gruhn
Chair of Software Engineering at the University of Duisburg-Essen and Chair of the Supervisory Board of adesso SE

Dr. Reinhold Achatz
Coach for Innovation, Technology, Entrepreneurship, and Sustainability

Dr. Nicola Jentzsch
Lead for Innovation and Digitalization at Deutsche Bundesbank
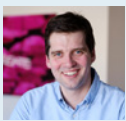
Maximilian Ahrens
Managing Director of T Digital at Deutsche Telekom
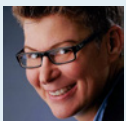
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Kuenheim Familiaris GmbH

Prof. Svenja Falk
Managing Director at Accenture Research

Prof. Dr. Christine Legner
Head of the Information Systems Department at the University of Lausanne

Dr. Christiane Fricke
Head of the Non-University Research Organizations, EU International Affairs Group of the Ministry of Culture and Science of the State of North Rhine-Westphalia

Dr. Henriette Litta
Managing Director of Open Knowledge Foundation Deutschland e. V.

Oliver Ganser
Vice President of Processes, Digitalization, Governance, and Catena-X in the Purchasing and Supplier Network at BMW I Chair and director of the industrial consortium of Catena-X Automotive Network e. V.

Dr. Sebastian Ritz
CEO of German Edge Cloud GmbH & Co. KG

Michael Schmelmer
Member of the Board of Managing Directors at C.H. Boehringer Sohn AG & Co. KG

Our Networks

It is impossible to build data spaces acting alone — such developments can only succeed if they are the result of a joint effort involving many different players. Fraunhofer ISST is therefore involved in numerous professional, regional, and Fraunhofer-wide networks, allowing it to collaborate and exchange ideas with partners.

Memberships*

- Eclipse Foundation
- European Alliance for Industrial Data AISBL, Edge, and Cloud
- Gaia-X, European Association for Data and Cloud
- Catena-X Automotive Network e. V.
- Data Competence Center for Cities and Regions (DKSR)
- German Association for Information Technology, Telecommunications and New Media (BITKOM e.V.)
- HL7 Benutzergruppe in Deutschland e.V. (German HL7 User Group)
- International Data Spaces Association
- MedEcon Ruhr e.V. (Network of the Healthcare Sector in the Ruhr)
- Informatik Dortmund e. V. (AIDO) alumni (Dortmund Computer Science)
- Windo e. V. (Consortium of Scientific Institutes in Dortmund)
- EHDA e. V., European Health Data Alliance

* partly as coordinating institute for the Fraunhofer-Gesellschaft

Fraunhofer-Gesellschaft

- Fraunhofer ICT Group (iuk.fraunhofer.de↗)
- Working Group Digital Health in the Lead Market Health (Fraunhofer Group for Health↗)
- Fraunhofer Cloud Computing Alliance (cloud.fraunhofer.de/en.html↗)
- Fraunhofer Big Data and Artificial Intelligence Alliance (bigdata-ai.fraunhofer.de/en.html↗)
- Fraunhofer Cluster of Excellence Cognitive Internet Technologies (cit.fraunhofer.de/en.html↗)
- Fraunhofer Academy (academy.fraunhofer.de/en.html↗)

University Collaborations

As an institute of the Fraunhofer-Gesellschaft, we work at the intersection of science and industry. Fundamental research at universities gives us valuable input that encourages transfer to industry with a focus on specific applications.

The following chairs and professorships form the core of our scientific network:

Prof. Boris Otto
Chair of Industrial Information Management, TU Dortmund University

Prof. Jan Cirullies
Professor of Business Administration (specializing in supply chain management and digital logistics), Fachhochschule Dortmund — University of Applied Sciences and Arts

Prof. Wolfgang Deiters
Professor for Healthcare Technologies, Bochum University of Applied Sciences

Prof. Falk Howar
Professor of Rigorous Software Engineering, TU Dortmund University

Prof. Christian Janiesch
Chair for Enterprise Computing, TU Dortmund University and Senior Scholar at Fraunhofer ISST

Prof. Jan Jürjens
Institute for Software Engineering IST, University of Koblenz

Prof. Sven Meister
Chair of Health Informatics, Witten/Herdecke University

Prof. Frederik Möller
Junior Professor for Data-Driven Enterprise, Technical University of Braunschweig

Prof. Jakob Rehof
Chair XIV of Software Engineering, TU Dortmund University

Prof. Christian Schwede
Professor of Big Data Analytics, Bielefeld University of Applied Sciences

Publications

Knowledge transfer is one of the most important functions of applied research at Fraunhofer ISST.

Fraunhofer ISST employees regularly publish articles for scientific and specialist journals. We also publish our scientists' conference papers, studies and white papers.

All of the scientific publications are listed on the Fraunhofer ISST website: https://www.isst.fraunhofer.de/en/publica ↗

A selection of the most important publications in 2024:

Kaneko M., Guggenberger T.M., Otto B.

European Data Regulation Requirements for Data Spaces
(2024) 30th Americas Conference on Information Systems, AMCIS 2024

Jussen I., Möller F., Schweihoff J., Gieß A., Giussani G., Otto B.
Issues in inter-organizational data sharing: Findings from practice and research challenges
(2024) Data and Knowledge Engineering, 150, art. no. 102280

Lohr M., Peldszus S., Jürjens J., Staab S.
Fast, Favorable, and Fair Blockchain-based Exchange of Digital Goods using State Channels
IEEE International Conference on Blockchain and Cryptocurrency, ICBC 2024, 279-287

Sama M.R., Lyczkowski E., Petry M., Kiess W., Jürjens J.
5G-Enabled Flexible Security Framework for Industrial Applications
IEEE International Conference on Communications, ICC 2024, 708-714

Ahmadian A.S., Franke S., Gnoguem C., Jürjens J.
Privacy-Friendly Sharing of Health Data Using a Reference Architecture for Health Data Spaces
4th Eclipse Security, AI, Architecture and Modelling Conference on Data Space, eSAAM 2024, 103-112

Wulfert T., Woroch R., Strobel G., Schoormann T., Banh L.
E-commerce ecosystems as catalysts for sustainability: A multi-case analysis
(2024) Electronic Markets, 34 (1), art. no. 58

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(2024) Proceedings of the Annual Hawaii International Conference on System Sciences, pp. 6159 - 6168

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(2024) Electronic Markets, 34 (1), art. no. 41

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Design Principles for Quality Scoring-Coping with Information Asymmetry of Data Products
(2024) Proceedings of the Annual Hawaii International Conference on System Sciences, pp. 4526 - 4535

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(2024) Journal of Public Health (Germany)

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Speaking the Same Language or Automated Translation? Designing Semantic Interoperability Tools for Data Spaces
(2024) International Conference on Web Information Systems and Technologies, WEBIST - Proceedings, pp. 209 - 217

Peldszus S., Burger J., Jürjens J.
UMLsecRT: Reactive Security Monitoring of Java Applications with Round-Trip Engineering
(2024) IEEE Transactions on Software Engineering, 50 (1), pp. 16 - 47

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(2024) Proceedings - Winter Simulation Conference, pp. 1551 - 1562

Großer K., Ahmadian A.S., Rukavitsyna M., Ramadan Q., Jürjens J.
Benchmarking requirement template systems: comparing appropriateness, usability, and expressiveness
(2024) Requirements Engineering, 29 (4), pp. 481 - 522

Schumacher C., Stilling J., Kriege J., Buchholz P.
Live fitting of process data within digital twins of manufacturing to use simulation and optimisation
(2024) Journal of Simulation, 18 (5), pp. 813 - 834

Strube T., Nowak T., Pokotylo M., Kuhlenkötter B.
Reliable and Content-specific Support for Keyword Selection through AI and Statistics Characterising Educational Content with Large Language Models & Agreement Analyses
(2024) Current Directions in Biomedical Engineering, 10 (4), pp. 627 - 630

Großer K., Rukavitsyna M., Jürjens J.
A Comparative Evaluation of Requirement Template Systems (Summary)
(2024) Lecture Notes in Informatics (LNI), Proceedings - Series of the Gesellschaft fur Informatik (GI), P-343, pp. 47 - 48

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(2024) JMIR Formative Research, 8, art. no. e58549

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Design Features for Data Trustee Selection in Data Spaces
(2024) Proceedings of the 13th International Conference on Data Science, Technology and Applications, DATA 2024, pp. 559 - 570

Opriel S., Möller F., Strobel G., Otto B.
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(2024) Business and Information Systems Engineering

Deshmukh R.A., Collarana D., Gelhaar J., Theissen-Lipp J., Lange C., Arnold B.T., Curry E., Decker S.
Challenges and Opportunities for Enabling the Next Generation of Cross-Domain Dataspaces
(2024) CEUR Workshop Proceedings, 3705

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Designing a Reference Architecture for Collaborative Condition Monitoring Data Spaces: Design Requirements and Views
(2024) Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics), 14621 LNCS, pp. 355 - 369

Schoormann T., Möller F., Chandra Kruse L., Otto B.
BAUSTEIN—A design tool for configuring and representing design research
(2024) Information Systems Journal, 34 (6), pp. 1871 - 1901

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(2024) IEEE Transactions on Engineering Management, 71, pp. 2379 - 2402

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(2024) Proceedings - Winter Simulation Conference, pp. 3070 - 3081

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(2024) Journal of Medical Internet Research, 26, art. no. e55714

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POTENTIALS AND BARRIERS OF THE METAVERSE FOR CIRCULAR ECONOMY
(2024) Proceedings - Winter Simulation Conference, pp. 3034 - 3045

Boiting M., Tschorn N., Suravee S., Yordanova K., Halek M., Jagoda F.A., Lüdtke S., Burmann A.
eDEM-CONNECT: An Ontology-Based Chatbot for Family Caregivers of People with Dementia
(2024) Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST, 578 LNICST, pp. 73 - 91

Nagel R., Walda M.-K., Meyer J.P.
IntraDataspace: An architecture of a company-internal Dataspace
(2024) ACM International Conference Proceeding Series, pp. 53 - 56

Hefft D., Große N., Kreyenborg A., Kiklhorn D., Henke M.
Approaches And Research Directions For Adapting Rapid Prototyping In Industrial Service Development: A Systematic Literature Review
(2024) Procedia CIRP, 130, pp. 562 - 572

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(2024) Current Directions in Biomedical Engineering, 10 (4), pp. 653 - 656

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Getting ready for the European Health Data Space (EHDS):
IDERHA's plan to align with the latest EHDS requirements for the secondary use of health data
(2024) Open Research Europe, 4, art. no. 160

Becker S., Altendeitering M.
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Our Communication

As an independent research organization with a public mandate, communicating our research findings is vital to us. We are a digitalization institute that offers a variety of ways to access our projects and subject areas, particularly online.

The Data Space Experts podcast
In our podcast "Die Datenräumer" (The Data Space Experts), experts from the Fraunhofer Institute for Software and Systems Engineering ISST talk about the potential held in innovative data handling. Listeners are given comprehensive insights backed by research and hear about specific examples of how companies are already using data to their advantage — and will benefit from it even more in the future.

The podcast is available at www.isst.fraunhofer.de/podcast ↗ and wherever you get your podcasts.

Data Researchers video series
In Data Researchers, his personal video series, Prof. Boris Otto sheds light on some of the latest topics in digitalization in a concise, informative, and well-founded way.

Boris Otto is in demand at a national and international level as a digitalization expert in the fields of data economy, data spaces, and data management in industrial enterprises. In his easy-to-understand and entertaining videos, he explains the latest developments in these areas and puts them in context — from industry-oriented data spaces such as Manufacturing-X to other aspects, like user focus in data spaces and the Future Research and Innovation Strategy of the German federal government.

The videos are available at www.isst.fraunhofer.de/vlog ↗ and on the Fraunhofer ISST Youtube channel↗.

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