

Step by step towards the Silicon Economy

Open Source | *Software and hardware for which the source code is freely available*

Open Ideation | *Innovation concept based on collaborative ideas design*



**silicon
economy**

Blockchain-capable IoT Device to monitor temperature-sensitive goods along worldwide supply chains

Resource Management Service to manage break requests

»Wrapper Toolbox«
Software kit to integrate the Data Space connector in company IT landscapes

Tracking-Tool »Sensing Puck« to monitor transport, e.g. with temperature and acceleration sensors

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Components

AI-based Estimation of Arrival Times (road, rail, waterways)

Stress Detection Service to analyze employees' vital signs

Algorithm for pallet identification

The Silicon Economy is both an economic concept and a network



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ogistics is undergoing a period of change that could not be more fundamental. The digitization of everything and having artificial intelligence in everything really will change everything for everyone. Today, the increasing complexity of logistics and supply chains can only be managed by means of digital platforms on which data can be securely and confidently communicated across borders by means of artificial intelligence.

Following on from the B2C sector, more and more multinational logistics companies are now beginning to build powerful digital platforms in the B2B sector. The race for the leading platform is on and companies are realizing that they will have to face this new challenge together. No logistics company has enough motivation, market power or resources on its own.

The Silicon Economy now provides a technological and organizational framework for the logistics developments of the past ten years and forms the digital infrastructure for artificial intelligence in logistics. It thus puts the concept of the platform economy on a new foundation and creates an alternative to monopolistic platforms that cause isolated solutions and dependencies.



»The Silicon Economy ultimately enables the complete autonomous connection of material, information and financial flows.«

Prof. Dr. Dr. h.c. Michael ten Hompel, Managing Director of Fraunhofer Institute for Material Flow and Logistics IML



»With the Silicon Economy, we are expediting the de facto standardization of processes in logistics.«

Dr. Stephan Peters, Board Member of the Rhenus group

The Silicon Economy and logistics

The joint development of services based on open source makes a significant contribution to the necessary unification of the logistics community with regard to a pragmatic standardization of processes, particularly in the area of digitizing business processes.

As a result, automation potentials are made possible for the orchestration of platform services as well as for the initiation, conclusion of

contracts, billing and documentation of logistics services.

This development will start with standard services – but it will definitely not stop there, because the application possibilities that are currently being developed in the Silicon Economy are as diverse as logistics itself.

The Silicon Economy an Open Source

The Silicon Economy is based on an open source infrastructure and freely available technical components for services and platforms. Using these components will make it possible for a wide variety of the most diverse logistical and industrial platforms to coexist. This gives every company in Germany and Europe, regardless of size, the opportunity to develop new data-based and data-driven business models.

In the Silicon Economy implementation projects – the »Silicon Economy Logistics Ecosystem« project, funded by the Federal Ministry of Transport and Digital Infrastructure, and the »Blockchain Europe« project, funded by the State of North Rhine-Westphalia – the first components for the platform economy of the future are being developed right now:

Mobile applications, algorithms, etc. are available as open source in the Silicon Economy.





No development without application is the guiding principle behind the development projects in the Silicon Economy.

- **Technical components** help set up Silicon Economy services. These include (AI) algorithms, information models and standard process descriptions or functionalities like dashboards. The technical components enable the technical standardization and compatibility of services (de-facto standardization).
- **Platform components** such as brokers as »data and process software« and an IDS connector make it possible to set up platforms. They ensure the compatibility of Silicon Economy platforms.

Added value for logistics companies

For companies, the path to the Silicon Economy is via the use of open source technical and platform components. The prospective benefits of these components are as diverse as logistics itself: companies can improve internal

Die Silicon Economy and the Blockchain

In logistics and in supply chain management, many different, economically independent partners work closely together. Transfer of liability and risk, multilateral data exchange and trust issues are only some of the challenges here. As a key technology, the blockchain technology has the potential to make the data exchange tamper-proof and to automate and autonomize a large number of processes in the value chain.

One example is the smart euro pallet. Instead of paper consignment notes and lengthy, manual invoicing processes, goods can be invoiced close to real time by means of a blockchain. With several hundred million euro-pallets and thousands of logistics service providers in the region, blockchain technology offers real added value.



»**The establishment of the Silicon Economy is fueled by Blockchain technology.**«

*Prof. Dr. Michael Henke,
Director of Fraunhofer Institute for Material Flow and Logistics IML*



»Today, digitization is essentially a question of trust between companies and between network partners.«

Prof. Dr. Boris Otto, Managing Director of Fraunhofer Institute for Software and System Technology ISST

The Silicon Economy and secure data space

In order for the concept of the Silicon Economy to work, data must be exchanged between companies. That is why the integration of an all-connecting secure data space is essential for the Silicon Economy. Only a complete digital infrastructure will enable comprehensive transparency in value added networks and create trust along complete supply chains – from raw material suppliers to end customers. Both of these factors are probably the most important prerequisites for getting all companies to participate.

To ensure data security and data sovereignty, the Silicon Economy accesses the secure data spaces of the International Data Spaces and the European GAIA-X cloud infrastructure.

This means that the Silicon Economy is based on a software infrastructure that companies trust and that they themselves can help to shape.

processes significantly and generate new business. For example, their own IT processes can be compared with the state-of-the-art, and interfaces between customers and service providers can be standardized (»Better Business«). As a result, the integration of additional business units, branches abroad or external locations is simplified. At the same time, business can be extended and new business models can be implemented (»New Business«).

Added value for the industry

As to the development of technical components, implementation is currently concentrating on so-called commodity services. These services are particularly suited for collaborative open source development because they do not represent the economic or intellectual (market-

differentiating) unique selling propositions of a particular company, they can be used by a wide range of users and therefore fulfill the tasks and reap the benefits of a de-facto standard. Science is the trigger for the Silicon Economy. However, the concept and implementation are driven by logistics. In the meantime, more and more companies are joining forces to share the workload and development of Silicon Economy components through joint developments set up outside the funded projects. Cooperation and co-creation are the order of the day. All project results are to be bundled and made available free of charge for the common good.



**Camera device for
picking documentation**

**AI-based service for
identifying pallet quality**

**Software for a
repacking service**

**Arm-bound device for
human-technology inter-
action**

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Components

Geocoding service

**AI-based analysis device for
sensor movement data**

**OpenStreetMap Routing Engine for
truck-specific route optimization**

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