

# STATE OF FINNISH DATA SPACES

Experiences of pioneers in building the data economy

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**State of Finnish Data Spaces – Experiences of  
pioneers in building the data economy**

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# Foreword

In 2020, the European Commission published a data strategy for Europe, which presented the concept of data spaces as the backbone of Europe's digital competitiveness. Approximately a year later, Sitra initiated a project to understand these data spaces, which use cases they are suitable for and what business benefits they can enable.

This report compiles our observations over the past few years and lessons learned from the Finnish data space projects we have been involved with. Understanding has been accumulated by coordinating Finland's Gaia-X network and participating more broadly in data space work at the European level. The report aims to give readers a comprehensive view of the current state of Finnish data space work and insights into how the benefits of data spaces could be realised as quickly as possible in the coming years.

In the near future, the data economy will significantly affect business across most sectors. Despite this, only a fraction of Finnish companies see data utilisation as a central part of their operations.

For a company to become interested in the data economy, it must be able to create value from data or understand how it can use data to develop its operations. To benefit from data spaces, a company must have a business model that can exploit data beyond the boundaries of its organisation. Most Finnish companies still have a long way to go.

Internationally, the data economy already fuels highly profitable businesses. The nature of this field is such that those who move first gain the greatest benefits. The bigger the data sets one can access, the more significant the competitive advantage gained. It is challenging for latecomers to close the gap. Finland must hurry if we want to remain at the forefront of digitalisation.

We thank all the companies and stakeholders involved in the Gaia-X Finland work, particularly the consulting firm 1001 Lakes, which interviewed experts developing Finnish data space projects for this report. Lessons learned from the projects and recommendations listed at the end of this report are intended to be used by the Data Spaces Alliance Finland collaboration network, which was launched in April 2024. The aim is for Data Spaces Alliance Finland to bring together Finland's key data space actors and support the competitiveness of Finnish private and public sector players in the European data economy.

25 March 2024

**Anssi Komulainen**  
Project Director, Sitra

# Summary

The greatest opportunities in the data economy lie in collaboration between enterprises, which requires efficient and reliable data sharing across organisational boundaries. Of course, data has been shared between organisations for a long time, but not systematically or efficiently. As data sharing needs diversify and ecosystems expand, data spaces will provide a scalable and secure way to share data between different actors.

This report provides a comprehensive overview of the state of Finnish data spaces and the opportunities they offer from a business perspective. Data space projects are specific activities that contribute to building data spaces for different industries. Finnish data space development is examined from the perspective of three main groups: users, creators and supporters. Users are companies and organisations that use data spaces in their business activities. Creators are the initiators and developers of projects. Supporters are stakeholders that enable data space projects with funding and resources.

Data space resources significantly increase the economic, operational and innovation benefits that ecosystems of different organisations provide to their participants. An ecosystem data infrastructure benefits everyone, but building it is an investment that requires an incentive. Organisations that sponsor data spaces have an important role to play in developing small-scale ecosystems into flourishing data ecosystems that rely on a common data infrastructure.

Throughout Europe, efforts are being made to develop data spaces, and the same ideas are gaining ground on other continents, albeit under slightly different names. Finland has a vibrant data space community for its size, with more than 30 data space projects in 15 different sectors involving well over 100 organisations. Compared to the rest of Europe, Finland is undoubtedly one of the most advanced data space countries, even though Finnish data space projects are mainly at an early stage.

We gathered information about data space projects in different sectors by interviewing experts working on them. From the interviews and background research, we collated the lessons learned and summarised them in targeted recommendations for current and future participants in data space projects, as well as for those involved in and supporting such projects.

The publication of the report is the starting point for the Data Spaces Alliance Finland network, which will be launched at the same time. This will bring together Finnish data space creators and stakeholders sponsoring data spaces. The alliance aims to implement the recommendations of this report and to promote the implementation of data space projects in Finland. The target group of the alliance are the users of data spaces. These are companies and organisations that want to invest and develop their data-driven business by joining existing data ecosystems or by launching new ones. The alliance provides a coherent view of the tools and services that enable data space users to get the most out of them.

# Tiivistelmä

Datalouden suurimmat mahdollisuudet liittyvät yritysten väliseen yhteistyöhön, joka edellyttää tehokasta ja luotettavaa datan jakamista yli organisaatorajojen. Dataa on toki jaettu organisaatioiden välillä jo pitkään, mutta ei kovin systemaattisesti tai tehokkaasti. Kun datan jakamisen tarpeet monipuolistuvat ja ekosysteemit laajenevat, data-avaruudet tarjoavat skaalautuvan ja turvallisen tavan jakaa dataa eri toimijoiden välillä.

Tämä selvitys antaa kattavan kuvan suomalaisten data-avaruuksien tilasta, sekä niiden tarjoamista mahdollisuuksista liiketoiminnan näkökulmasta. Data-avaruushankkeilla tarkoitetaan sellaista konkreettista tekemistä, joka edistää data-avaruuksien rakentamista eri toimialoille. Suomalaista data-avaruuskehitystä tarkastellaan selvityksessä kolmen ryhmän eli käyttäjien, tekijöiden ja tukijoiden näkökulmasta. Käyttäjät ovat yrityksiä ja organisaatioita, jotka hyödyntävät data-avaruuksia liiketoiminnassaan. Tekijät ovat hankkeiden käynnistäjiä ja kehittäjiä. Tukijat puolestaan ovat niitä toimijoita, jotka mahdollistavat data-avaruushankkeita rahoituksella ja resursseilla.

Data-avaruudet voimistavat merkittävästi taloudellisia, operatiivisia sekä innovaatiotoiminnan hyötyjä, joita eri organisaatioiden muodostamat ekosysteemit tarjoavat osallistujilleen. Ekosysteemeissä toimiva datainfrastruktuuri hyödyttää kaikkia, mutta sen rakentaminen on investointi, joka vaatii kannustimen. Data-avaruuksien tukijaorganisaatioilla on merkittävä rooli, kun pienimuotoisista ekosysteemeistä kehitetään kasvavia yhteiseen datainfrastruktuuriin nojautuvia dataekosysteemejä.

Data-avaruuksien kehittämiseen panostetaan ympäri Eurooppaa ja samat ideat ovat saaneet jalansijaa myös muilla mantereilla, vaikkakin hieman eri nimisinä. Suomessa on kokoonsa nähden vilkas data-avaruuksien kehittäjäyhteisö – maasta löytyy yli 30 data-avaruushanketta 15 eri toimialalla, ja niissä on mukana pitkälti yli toistasataa organisaatiota. Eurooppalaisittain vertailtuna Suomi onkin kiistatta edistyneiden data-avaruusmaiden joukossa, vaikka suomalaiset data-avaruushankkeet ovatkin vielä pääosin varhaisessa vaiheessa.

Keräsimme tietoa eri toimialojen data-avaruushankkeista haastatteleamalla niiden parissa työskenteleviä asiantuntijoita. Kokosimme haastatteluista ja taustatutkimuksista esille nousseet opit, ja kiteytimme niistä kohdennettuja suosituksia data-avaruuksien nykyisille ja tuleville osallistujille, sekä data-avaruushankkeiden tekijöille ja tukijoille.

Selvityksen julkistaminen toimii lähtölaukauksena samaan aikaan käynnistyvälle Data Spaces Alliance Finland -yhteistyöverkostolle. Se tuo yhteen suomalaisia data-avaruuksien tekijöitä sekä data-avaruuksia tukevia toimijoita. Allianssi pyrkii toteuttamaan tässä selvityksessä annettavia suosituksia ja edistämään data-avaruushankkeiden toteutumista Suomessa. Allianssin kohderyhmää ovat data-avaruuksien käyttäjät. Ne ovat siis yrityksiä ja organisaatioita, jotka haluavat investoida ja kehittää datavetoista liiketoimintaansa liittymällä jo olemassa oleviin ekosysteemeihin tai käynnistämällä uusia dataekosysteemejä. Allianssi tarjoaa data-avaruuksien käyttäjille yhtenäisen näkymän työkaluihin ja palveluihin, joiden avulla data-avaruuksiin pääsee mukaan.

# Sammanfattning

De största möjligheterna inom dataekonomin ligger i samarbete mellan företag, vilket kräver att data kan delas effektivt och tillförlitligt mellan olika organisationer. Organisationer har delat data redan under en längre tid, men arbetet har inte varit särskilt systematiskt eller effektivt. I takt med att behoven för att dela data blir mer varierade och ekosystemen utvidgas kommer dataområden att erbjuda ett skalbart och säkert sätt att dela data mellan olika aktörer.

Den här rapporten ger en heltäckande bild av läget för finska dataområden och de möjligheter de erbjuder ur ett affärsperspektiv. Projekt kring dataområden är konkreta aktiviteter som bidrar till att bygga dataområden för olika branscher. Utvecklingen av finländska dataområden granskas ur perspektivet av tre grupper: användare, skapare och stödjare. Användare är företag och organisationer som använder dataområden i sin affärsverksamhet. Skapare är initiativtagare och utvecklare av projekt. Stödjare är de aktörer som möjliggör datarumsprojekt med finansiering och resurser.

Dataområden förstärker avsevärt de ekonomiska, operativa och innovationsmässiga fördelar som ekosystem erbjuder sina deltagare. En gemensam datainfrastruktur gynnar alla i ett ekosystem, men att bygga upp den är en investering som kräver uppmuntran. Organisationer som stöder dataområden har en viktig roll när det gäller att utveckla småskaliga ekosystem till växande dataekosystem som bygger på en gemensam datainfrastruktur.

Det görs ansträngningar i hela Europa för att utveckla dataområden. Samma idéer vinner mark även på andra kontinenter, om än under något annorlunda namn. För sin storlek har Finland en livlig gemenskap som utvecklar dataområden, med mer än 30 projekt inom 15 olika sektorer, som involverar långt över hundra organisationer. Jämfört med resten av Europa är Finland utan tvekan ett av de mest avancerade länderna inom dataområden, även om finska projekt fortfarande huvudsakligen befinner sig i ett tidigt skede.

Vi samlade information om olika sektors projekt inom dataområden genom att intervjua experter som arbetar med dem. Vi sammanställde lärdomarna från intervjuerna och vår bakgrundsforskning. Lärdomarna sammanfattades i rekommendationer för nuvarande och framtida deltagare i dataområden, samt för dem som deltar i och stöder projekten.

Publiceringen av den här rapporten är startskottet för nätverket Data Spaces Alliance Finland. Nätverket kommer att sammanföra finländska skapare av dataområden och aktörer som stöder datautrymmen. Alliansen har som mål att genomföra rekommendationerna i denna rapport och att främja genomförandet av dataområdesprojekt i Finland. Alliansens målgrupp är dataområdenas användare. Dessa är företag och organisationer som vill investera och utveckla sin datadrivna verksamhet genom att ansluta sig till befintliga ekosystem eller genom att lansera nya dataekosystem. Alliansen ger en samlad bild av de verktyg och tjänster som gör det möjligt för användare att få tillgång till dataområden.

# 1. Data space provides infrastructure for ecosystems to share data

The most significant opportunities in the data economy stem from inter-company and inter-organisational collaboration, which requires efficient and reliable data sharing across organisational boundaries. Organisations have been sharing data for a long time, but not always so systematically or efficiently. As the needs for data sharing diversify and ecosystems expand, data spaces offer a scalable and secure way to share data among various stakeholders.

Companies and public organisations face challenges in meeting all their customers' needs alone, but in flexible business ecosystems, actors can collaboratively address broader problems with entirely new seamless services.

In Finland, there are ecosystems across various sectors formed by networks of businesses, higher education institutions, research institutions and third-sector actors. Ecosystem participants who play by common rules share information and expertise, enhancing their capabilities by learning from others. Seamless service packages require the cross-organisational utilisation of data. Reliable data sharing requires new technical, administrative and business solutions based on common rules. A data space refers to a digital information area that enables reliable and easy use of data across organisational boundaries.

Data sharing has been ongoing for a long time, for example, in existing supplier networks and research projects and among market participants interested in developing new business models. There are already

existing data platforms, marketplaces, interfaces and other structures intended for data sharing. Despite this, the potential for data sharing has not yet been fully utilised in any industry. Only a few sectors in Finland and elsewhere in the EU, such as transportation and logistics, are further ahead in data sharing and collaborative use than others.

Data sharing is not yet as systematic and efficient as it could be, as it often relies on individual agreements and technical solutions between specific actors. Data must be modified, interfaces tested and agreements negotiated with each partner and for each use case individually. All this manual work and complexity prevent scalable and adaptable data use. In practice, many potentially valuable applications fail because the costs become too high when tailored in this manner. Additionally, smaller ecosystem actors often do not have the opportunity to invest in their data infrastructure. Data spaces address these challenges by offering easily scalable foundational structures for data sharing, regardless of the actor's size.



## 1.1 What capabilities do organisations need in the data economy?

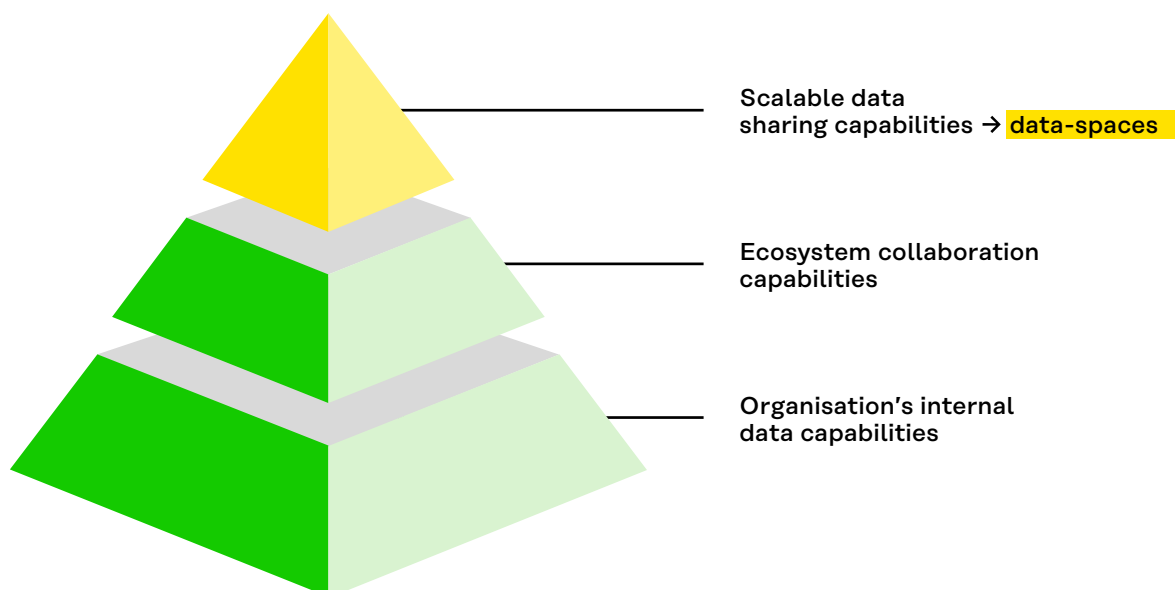
Data spaces are part of the broader context of the data economy. A functioning data economy requires capabilities that build on each other at different levels. These capabilities can be seen as a hierarchy of needs. First, organisations must fulfil their basic needs by bringing their data management solutions up to a decent standard. Participating in inter-company ecosystems can be challenging if the home base is still in disarray.

First, we look at one organisation and how it can use its data to enhance production and business operations. Typically, the need to develop internal data capabilities arises from process optimisation, automation of routine tasks and better utilisation of financial and business information. Data spaces are not yet needed at this level because the activities do not occur across organisational boundaries. However, by developing internal data capabilities, an organisation can improve its readiness to meet the needs of subsequent

levels. Overcoming internal silos and enabling data-driven cooperation between different units is comparable to crossing and collaborating across organisational boundaries. Internally, an organisation can move to a more decentralised, so-called data mesh architecture, where data is treated as products with internal customers. For example, the marketing department might create data products that strategy and customer service functions can utilise.

On the next level, the perspective expands outside the organisation. At this point, the company considers improving customer experience, streamlining supply chains or developing new products and services by sharing data within networks and utilising partners' data. The goal may include developing new network-based business models and solving common, previously challenging issues and customer needs. At this level, expertise in network-like collaboration within the ecosystem, the ability to see the possibilities of cooperation and building trust between actors are crucial. However, in smaller ecosystems, data spaces may not yet be necessary. In such cases, it is possible to manage by customising

**Figure 1.** Different levels of capabilities needed in the data economy.



contractual and technical solutions for data sharing between actors for individual use cases.

On the third level are the ecosystem's capabilities for scalable data sharing. The need for establishing a data space arises when the ecosystem's group of actors expands, use cases diversify and data sharing volume increases. Ecosystem actors can also

invest in developing a data space to accelerate the ecosystem's growth and lower the implementation costs of new data sharing use cases. In other words, transitioning to a data space can either address the challenges brought about by the growth of the ecosystem or be an investment to enable the growth of the ecosystem.



**READ MORE**

## Information and tools for developers of ecosystems and data spaces

Previous Sitra publications cover data space-related topics from technical implementations to governance models and ecosystem operations.

- [Towards a holistic EU Data Governance](#) – This working paper provides lessons and recommendations for utilising data spaces with regulatory support and describes the development perspectives of data space technologies. This working paper provides lessons and recommendations for utilising data spaces with regulatory support and describes the development perspectives of data space technologies.
- [Technology Landscape of Data Spaces](#) covers the implementation technologies and architectures for data spaces.
- [Rulebook for a fair data economy 2.0](#) – Includes tools and contract templates to facilitate the construction of data networks, aiding organisations in building and managing their data ecosystems more effectively.
- [Growth from Data material package](#) – Available (in Finnish) for organisations looking to develop their internal data capabilities, this package offers resources and guidance to enhance data management and utilisation within organisations.
- [Assessment of the development stage of data-utilising ecosystems](#) – This [survey examines the maturity level of data-using ecosystems](#), providing insights into their growth and challenges.
- [Data-driven Competitiveness – handbook and tools \(in Finnish, summary in English\)](#) – Offers a model for sharing data within ecosystems, providing practical tools and strategies for organisations to engage more effectively in data-driven collaboration.
- [Four things everyone should know about the fair data economy](#) – This resource aims to educate about the principles and benefits of a fair data economy, highlighting key concepts and practices for ethical and equitable data management and sharing.

## 1.2 What are data spaces?

The concept of data spaces is familiar but has yet to become mainstream. Before delving into the significance and possibilities of data spaces, it is essential to clarify what they are and are not.

Data spaces are always part of broader ecosystems where loosely connected actors share data and collectively use it to address problems that no single actor could solve alone. Functional ecosystems can exist without data spaces, but data spaces provide advanced ecosystems with reliable frameworks for scalable data sharing in practice.

In data spaces, the rights holders of the data decide who can use their data and under what conditions. These conditions may include, for example, payment for data usage or restrictions on sharing the data further, such as with competitors. The rulebook and technical infrastructure of a data space provide means to monitor data usage and ensure that the data users follow the conditions set by the data rights holders. Additionally, data spaces enable the value derived from data usage to be shared among different actors in the value chain, ensuring that data producers also benefit.

A data space rulebook is a structured set of principles, processes and rules guiding operations within the data space. The rulebook defines the boundaries of a particular data space. Participants in a data space are those actors who have committed to following its rulebook. Each participant has their reasons for being involved in the data space. Some may be data providers, others data users and some both.

Technically, a data space is a decentralised digital system that allows participants to transfer data reliably and securely. Decentralised data spaces should not be confused with centralised data platforms managed by a single organisation, which can also offer frameworks for data sharing.

A data space is a scalable solution for data sharing that is contractually and technically easy to integrate with new participants and new use cases. A use case in a data space refers to a situation where participants create business or societal value using the data space for cross-organisational data sharing. A data space usually supports multiple use cases, makes their implementation cost-effective and enables network effects, as use cases often involve partly the same actors and data sources.

Typical reasons why organisations might not share their data in ecosystems include uncertain incentives, i.e., questioning whether data sharing is worth the effort and fear of data misuse after it is shared.

The volume and detail of new European data-related legislation also pose challenges to businesses. Companies participating in data ecosystems should not have to navigate all the complexities of regulation alone. Ideally, compliance should be effortless and even automated. This ease of use is what data spaces aim for. They create an environment for data ecosystems that are compliant with legislation and technically user-friendly, where participants can focus on developing business solutions that leverage data utilisation.

**Table 1.** Key features of a data space

Data space is	Data space is not
<b>A data space is a tool for ecosystems</b> which allows ecosystem participants to transfer data reliably and securely.	A data space is not the same thing as an ecosystem, which is a network of collaborating entities.
<b>In data spaces, the rights holders of the data decide</b> who can use their data and under what conditions. A data space also facilitates sharing value derived from data use among participants.	Participation in a data space does not require publishing data openly or sharing it uncontrolled without compensation.
<b>A data space is defined by its rulebook</b> , which all participants adhere to.	A data space's technical implementation does not determine it. The same technical infrastructure can support multiple data spaces.
<b>A data space is a decentralised</b> digital system.	A data space is not a data platform managed by a single entity.
<b>A data space is a scalable</b> solution for data sharing. It is technically and contractually easy to add new participants and use cases into a data space.	A data space is not merely a tailored solution for data sharing between two or a few entities for a specific purpose.
<b>A data space typically supports multiple use cases</b> , making their implementation cost-effective and enabling network effects when use cases involve partly the same actors and data sources.	A data space is not equivalent to a use case.
<b>A data space provides legal certainty for data processing.</b>	A data space is more than merely a technical solution for transferring data.

## Terminology debate

The concept of data spaces evolves, and the term has slightly different definitions in different contexts. While several definitions of a data space exist, they all share the same fundamental objective: data spaces enable reliable, fair and transparent data sharing among different parties.

Individuals and organisations are in the driver's seat in data spaces, deciding who can use their data and on what terms. In comparison, in centralised and traditional data platforms, decision-making power is often in the hands of a few, and benefits frequently accrue more to the platform owner than to the users.

This report relies on the terminology created by the European Union-funded Data Spaces Support Centre (DSSC) project.

According to the [DSSC's glossary](#):

*Data space is a distributed system defined by a governance framework that enables secure and trustworthy data transactions between participants while supporting trust and data sovereignty. A data space is implemented by one or more infrastructures and enables one or more use cases.*

Notably, the English word "space" can mean a physical area and a more abstract expanse like outer space. In many other languages, such as German (Datenraum) and Swedish (dataområde), the term "data space" translates to something akin to "data room". The Finnish translation "data-avaruus" literally refers to space as the space between planets, and this could be considered a translation mistake. Nonetheless, we keep using that term as the official Finnish translation from the EU legislative texts, such as the Data Act (DA) and the Data Governance Act (DGA).

Another key term is "data sharing", which data spaces facilitate. This term often carries a negative connotation in the business world, suggesting an expectation that companies should freely give away their valuable data reserves for everyone to use. However, data spaces allow data rights holders to define who can use their data and under what conditions. In the context of data spaces, "data sharing" simply refers to data flow across organisational boundaries.

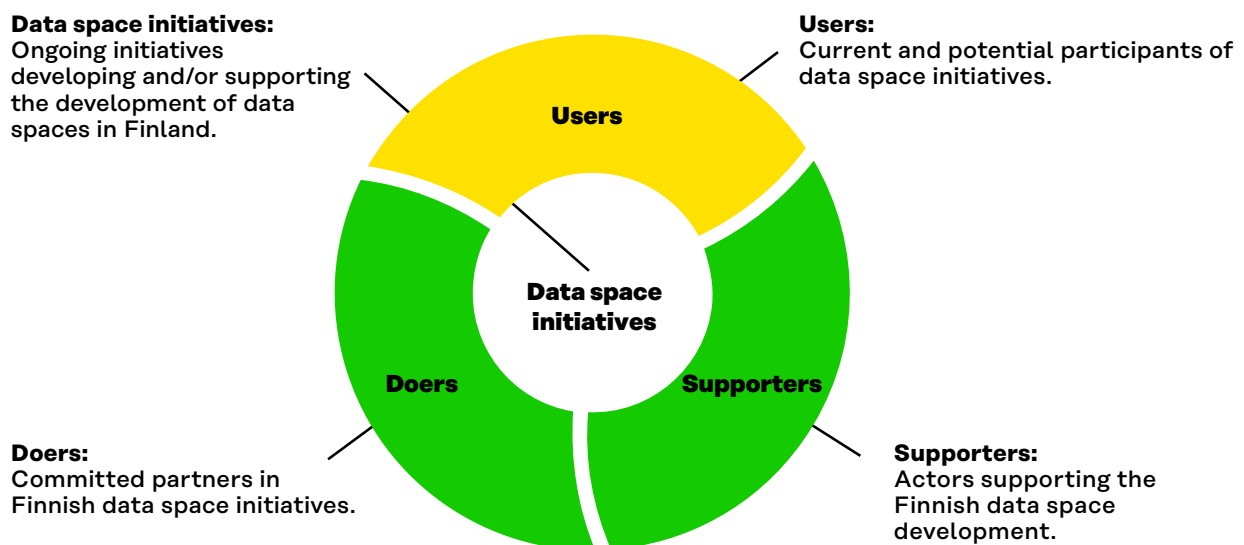
## 2. What benefits do data spaces offer to me?

Data spaces enhance the economic, operational and innovation-related benefits that ecosystems provide to their participants. Therefore, the data infrastructure of ecosystems benefits all participants, but building it is an investment that requires an incentive. Support organisations play a significant role when developing from small-scale ecosystems to growing data ecosystems that rely on shared data infrastructure.

We are examining the development of data spaces from the perspectives of users, creators and supporters. Users are businesses and organisations that use data spaces in their operations. Creators are the initiators and developers of projects. Supporters enable

data space projects by providing funding and resources for their use. Data space projects involve concrete actions that promote the construction of data spaces across various sectors.

**Figure 2.** This report examines three groups in the Finnish data space development.



## 2.1 Users – why join an ecosystem that relies on a data space?

The benefits of the data space and data ecosystem manifest together. There is no joy in having a data space without networked collaboration or an ecosystem. However, an ecosystem that relies on the data space can be more attractive than an ecosystem without a scalable data sharing infrastructure. The data space enables faster and more cost-effective implementation of value-generating use cases with other ecosystem actors.

Typical benefits for users of data spaces:

- **Operational benefits:** improving supply chain efficiency by optimising processes with data.
- **Network effects:** strengthening collaboration and strategic partnerships with other data space users and stakeholders.
- **Risk management:** control over shared data usage, compliance with legal requirements and improved data security.
- **Business diversification and new revenue streams:** easy access to various data sets opens opportunities for developing innovative products and services, leading to new business opportunities and revenue streams.
- **Expanded customer base:** access to the data space can mean access to new customer channels and marketplaces.
- **Cost sharing:** as a shared infrastructure among multiple actors, the data space is a cost-effective way to implement an organisation's use cases.

## 2.2 Creators – why should an ecosystem invest in a data space?

The motives of data space developers reflect those of individual organisations mentioned earlier. If a scalable data-sharing infrastructure is available to ecosystem participants, they will benefit more and the ecosystem will become more attractive. This increases network effects and the value of the ecosystem for all participants.

A challenge is the so-called free riders. The benefits of a functioning data infrastructure come to all ecosystem participants, but some need to be proactive and invest in building the data space and bear the initial risk. So, how do we ensure sufficient incentives for the early actors who invest time and money in developing the data space?

Incentives for early-stage actors to invest in the development of the data space include:

- **Critical mass:** there is no free-rider problem if the key players in an industry commit to developing the data space together.
- **Investment phase governance model:** the initiators of a data space project can create a contractual framework which guarantees early investors revenue streams or other benefits, such as lower operating costs in later phases of the data space.
- **Pioneer advantage:** those involved in the early stages of data space development can achieve a better market position than competitors who join later.
- **External funding:** external investment support reduces risk and can be a critical factor in addition to the other incentives mentioned, encouraging ecosystem actors to start developing the data space.

## 2.3 Supporters – how can we increase the impact of data spaces?

Many organisations, such as funders, industry associations, ministries and research and educational institutions have reasons rooted in their strategies to promote the development of the data economy in Finland or a specific industry. Investing in data spaces can be a means for these supporting organisations to increase their impact.

Data spaces can enhance the impact of investments directed towards supporting data ecosystems or companies' data-driven businesses. Supporting organisations outside of the data ecosystem can play a critical role in transitioning the ecosystem into a

growth-oriented phase and starting to invest in the development of data infrastructure through funding and other forms of support.

## 2.4 Business drivers of data spaces

Operational data spaces benefit their participants and society at large. The objectives for promoting data spaces may be economic and societal. Economic and societal goals do not conflict, but different measures are used to advance them. Each data space also prioritises these differently. Below are typical reasons for establishing data spaces, as identified in the European co-development project [Data Spaces Support Centre](#).

### Typical business reasons for establishing data spaces.

- **Cost sharing**  
A data space is a way to share the costs of implementing and maintaining data infrastructure with other ecosystem actors. It can facilitate meeting common business requirements (e.g., process efficiency, transparency) or regulatory requirements (e.g., statutory responsibility reporting) for all ecosystem actors.
- **New innovations**  
By combining data and their capabilities, participants in a data space can introduce new solutions to the market. No single entity would have the necessary data to implement such a solution alone.
- **Combining forces in the market**  
Through the data space, companies in the same industry can join forces to prevent market concentration among a few dominant market players. Smaller players alone do not have the necessary resources to avoid market concentration.
- **Shared marketplace**  
Through the data space, companies in the industry, in cooperation with other organisations, provide access to comprehensive and high-quality data from that industry. The data space may become a significant marketplace for data and its applications in the industry.
- **Social goal**  
Data spaces can help solve larger societal challenges, such as the green transition and health-related issues, by enabling data sharing between businesses, research institutions and public actors.

Source: [DSSC Starter-kit](#) (modified).



### 3. Finnish data space initiatives, where are we now?

Finland is undeniably among the advanced countries in terms of the development of data spaces. We have over 30 data space projects in 15 industries involving over 100 organisations. However, Finnish data space projects are primarily in the early stages, and compared to other European countries the number of participating companies could be much higher. The accumulated expertise in data spaces needs to be channelled more widely into the Finnish business sector. If we fail to do so, it means a missed opportunity and a risk to the development of the Finnish data economy.

Data spaces are generally discussed in the plural form, referring to data spaces in different industries, such as mobility or energy data spaces. The background for this is the vision described in the [European Commission's 2020 data strategy](#). It speaks of common European data spaces in strategic sectors that ultimately converge or at least seamlessly interoperate, forming a European single market for data.

There is still a long way to go towards a unified European data market, and currently there are only very few operational industry-specific data spaces in Europe. Good international examples of industry-specific data spaces in operation are the German automotive industry's [Catena-X](#) and the [Smart Connected Supply Network \(SCSN\)](#) that streamlines subcontracting chains in the Dutch manufacturing industry. In addition, the [Prometheus-X](#) data space, focusing on skills data, is a strongly developing industry-specific data space.

What are we talking about if there aren't many clear data spaces yet? In this study, the term "data space initiative" is used loosely to refer to concrete, organised and resourced activities that can potentially develop into data spaces, even if they are not yet fully

formed. We are currently in the pre-commercial phase of data space development, where numerous data space initiatives can be maturing in the same industry and country. Over time, the outputs of different initiatives can merge and form clear industry-specific data spaces, where the focus and integration of data sharing in the industry take place. Additionally, different data spaces are expected to interconnect.

The [Data Spaces Radar](#) maintained by the International Data Spaces Association (IDSA) lists about 150 data space initiatives, most of which are in Europe. Many Finnish data space initiatives identified in this study are not yet included in the radar. Preparatory projects for industry-specific European data spaces have also identified hundreds of data sharing initiatives in individual sectors (e.g., the [skills data space inventory](#)).

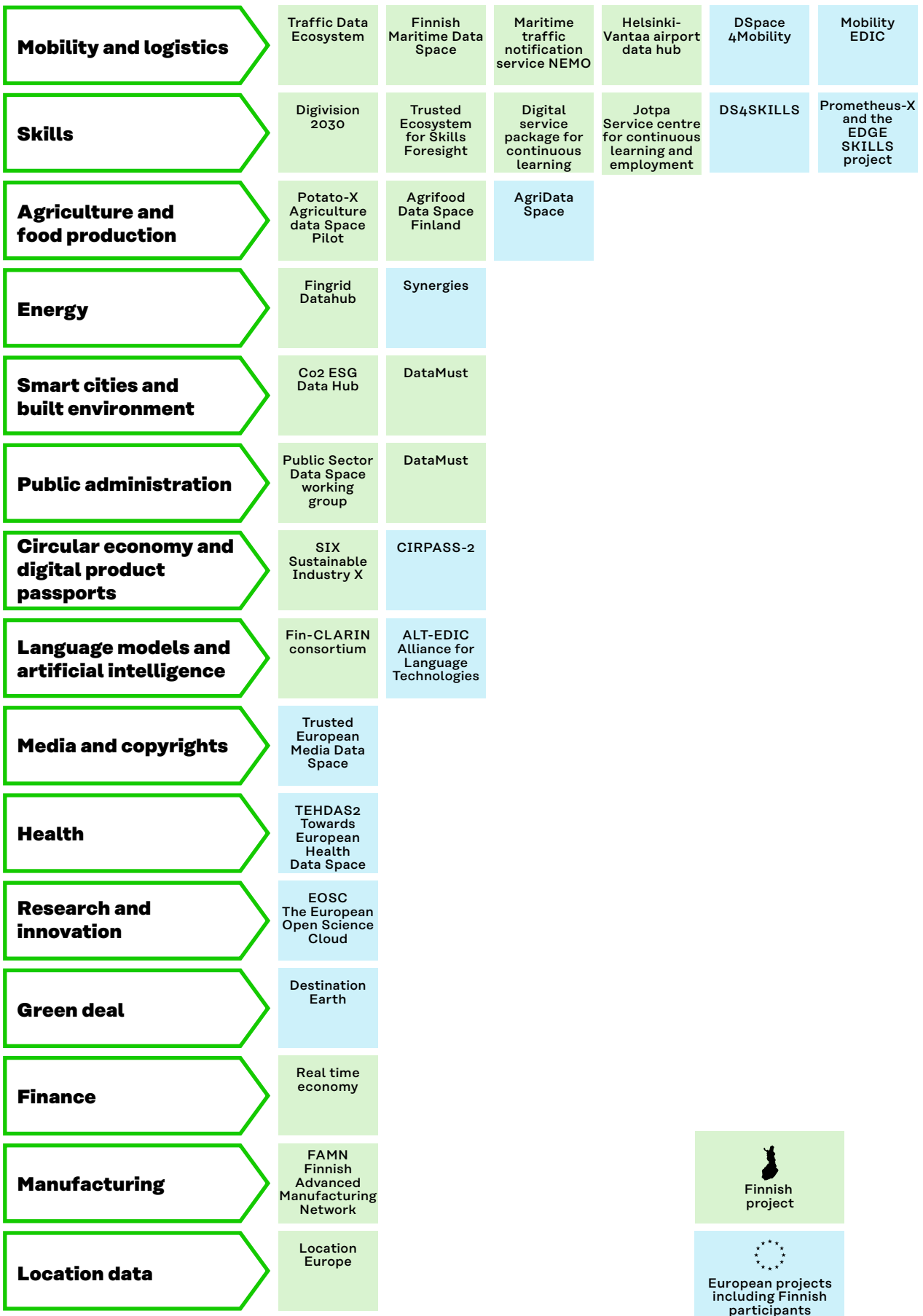
It is also worth noting that data sharing between organisations is a phenomenon that has been around for a while. Various data sharing projects, infrastructures and governance models, which could now be referred to as data space initiatives, have existed for years. Of course, practices and technological possibilities are constantly evolving.

### 3.1 Over 30 data space initiatives across 15 different sectors

This study has selected 15 sectors from Finland through comprehensive background research, each involved with activities related to data spaces (see Figure 3). The following chapter describes nine of these sectors and their respective initiatives. The sector division follows the listing of common European data spaces from the [European Commission's working paper](#), but we supplemented it with the data space sectors identified in the national digitisation strategy called [Finland's Digital Compass](#). In the Digital Compass, the data spaces are presented as part of the digital infrastructure development, mentioning 12 sectors aiming to establish data spaces by 2030. The first implementation plan of the Digital Compass has prioritised five sectors: social and health data, mobility, digital product passports, skills and copyrights.

We identified over 30 data space initiatives from different sectors which are entirely Finnish or European projects with Finnish participants. In total, these initiatives involve over 100 Finnish organisations. The list of data space initiatives is not exhaustive. It is also not clear-cut which activities that enhance data utilisation qualify as data space initiatives. Many of the initiatives started before the concept of data spaces began to be discussed in Finland, and only recently have some been directed towards data space development. For example, [the NEMO project by Fintraffic](#), which develops a maritime data management system, has lately been oriented towards data space development.

**Figure 3.** Key Finnish data space initiatives by sector (as of spring 2024). Appendix 2 provides links to the initiatives shown in the image.



### 3.2 International development of data spaces and Finland's position

With its data strategy published in 2020, the EU aims to become a pioneer in the data-driven society. The strategy aims to create a unified European data market and improve Europe's global competitiveness. At the same time, the EU seeks to establish strategic autonomy in data. To achieve this vision, the European Commission is funding research and development of data spaces with hundreds of millions of euros in the coming years. It is financing common European data spaces in 14 different sectors. We do not know the priorities of the new Commission that will start its term after the 2024 European elections. Still, we can assume that the development of the European data economy will remain on the EU agenda in one way or another.

Germany and France have provided significant national funding for data spaces, putting them at the forefront of data space development in Europe. Other active countries include the Netherlands, Belgium, Spain and Austria. Finland is undeniably among the advanced countries, and in proportion to its size, Finland has many data space initiatives.

The data space discussion is predominantly a European phenomenon. However, there is a need for reliable data sharing between organisations worldwide. For example, in the United States centralised platforms owned or managed by a single entity have been the prevailing solution for

data sharing. The European approach to data spaces emphasises decentralisation and interoperability, aiming to provide a different, potentially more sustainable model for data sharing.

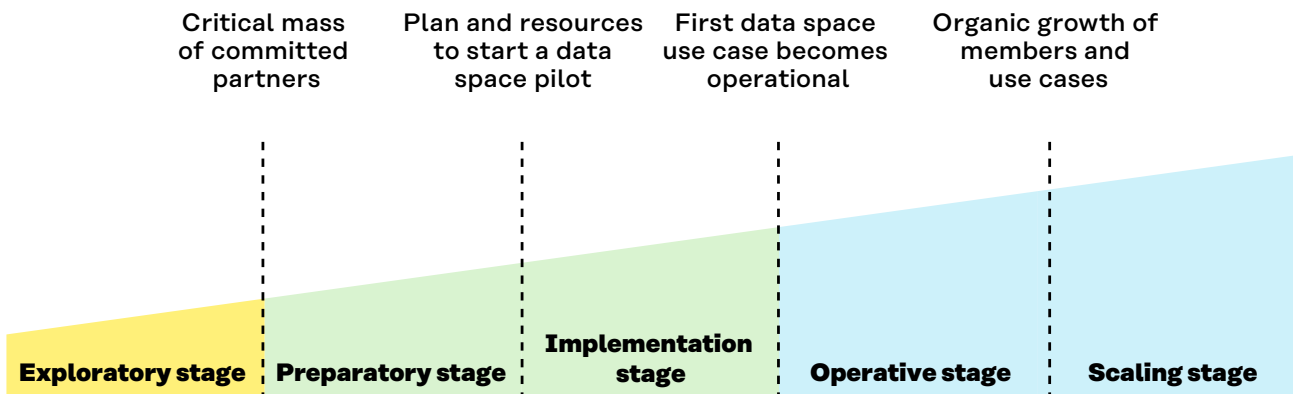
It is possible to connect individual ecosystems by modifying their existing interfaces to create point-to-point connections. To ensure scalability, a bilateral connection can be replaced with a standardised data space connector open to all interested parties. Finland is a pioneer in the development of connector technology. VTT's Data Spaces Innovation Lab (DSIL) is one of the three European data space environments whose connector has received official certification. Additionally, DataSpace Europe is the EU's first official Data Intermediator, facilitating data exchange between different parties.

### 3.3 Stages of development of data spaces

A data space initiative typically progresses through certain stages, evolving from a few stakeholders' ideas through preparation and implementation to become an operational data space that organically expands. The EU-funded Data Spaces Support Centre (DSSC) outlines five stages in the development of a data space:

- 1.** Exploratory phase
- 2.** Preparatory phase
- 3.** Implementation phase
- 4.** Operational phase
- 5.** Scaling phase

**Figure 4.** Stages of development for a data space initiative. Source: [DSSC glossary](#).



**The exploratory phase** is the initial stage from which the development of a data space begins. At this stage, there isn't an actual data space initiative yet, but rather a group of actors seeking to identify other potentially interested stakeholders and draw them in. Other activities related to this phase include early conceptualisation of use cases, gathering requirements and reviewing existing practices or standards in the industry.

**The preparatory phase** commences once the initiators of the data space have garnered a critical mass of committed participants, and this group decides collectively to start a project to build the data space. At this point, it is possible to speak of a data space initiative, though there is still a way to go before it becomes a functioning data space. Typical tasks in the preparation phase include the development of use cases for the data space and the planning and resource acquisition for pilot implementation. Meanwhile, several data space initiatives in the preparation phase may exist within the same industry, some of which may later merge or form an interoperable network of data spaces.

**The implementation phase** of a data space initiative begins when there is a sufficiently detailed plan and resources to

execute the first data space pilot. The data space's governance framework and infrastructure are developed during this phase for the first pilot. Typically, this phase refines which parties are involved in developing the data space and the value they derive from it.

**The operational phase** marks the point from which one can speak of a functioning data space. Previous phases have only discussed data space initiatives. The operational phase starts when the data space has an infrastructure and management model tested in pilot implementations, and the first use case of the data space is put into production, meaning data flows between providers and recipients, and the use case generates the intended value. In the operational phase, the data space's governance framework and technical implementation are already in production, although they continue to be developed.

**The scaling phase** is a developmental stage of a functioning data space, where the data space grows as new participants join naturally, and it is applied to new use cases. At this stage, the data space has an economically and functionally sustainable model where it is possible to grow and respond to changes in the operational environment.

The phases can also be applied as a guideline for evaluating sector-specific data space development. Still, the criteria cannot be used verbatim as multiple data space initiatives may exist within a single industry at different stages.

The table below presents an estimation of the development stages of Finnish data space initiatives from various industries. The sectors most advanced in data space thinking include transportation and logistics, with Fingrid's datahub in the energy industry visible in the operational phase.

**Table 2.** Indicative estimation of the stage of data space development across various industries in Finland.

<b>Industries with data space initiatives in the exploratory phase</b>	<b>Industries with data space initiatives in the preparatory or implementation phases</b>	<b>Industries with data space initiatives in the operational or scaling phases</b>
Public sector	Mobility and logistics	Energy
Circular economy and digital product passports	Skills Agriculture and food production	
Language models and artificial intelligence	Smart cities and built environment	
Media and copyrights		
Health		
Research		
Nature and environment		
Real-time economy		
Manufacturing		
Location data		

## 4. Finnish data space initiatives across different sectors

We collected information on data space initiatives in different industries by interviewing experts in those fields. This chapter contains summaries from nine sectors.

### 4.1 Mobility and logistics

In Finland, mobility and logistics sector is among the most advanced when it comes to data space development. Land, sea and air transport and logistics continuously generate a vast amount of data. Better utilisation of this data enables significant emission reductions and time and cost savings.

Finnish players in the mobility sector are adopting the new EU data regulations relatively quickly and are pioneers in developing digital mobility services.

The state-owned company Fintraffic acts as an orchestrator in the traffic data ecosystem and the maritime data space initiative, as well as a neutral party in many collaborative projects related to data sharing in mobility and logistics.

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#### The traffic data ecosystem

The Finnish traffic data ecosystem aims to share information related to Finnish traffic equitably among various stakeholders to enhance operations and enable new services. The ecosystem already collaborates with over 200 participants, 23 of whom have signed the Traffic Data Ecosystem Rulebook, based on Sitra's Rulebook for a fair data economy rulebook.

Thanks to the data ecosystem, the use of Finnish traffic data increases by 10-15% annually. The data quality has improved, collaboration among stakeholders has intensified and the ecosystem serves as a platform for innovation. Collaboration has also expanded across borders, with Estonia as the first international partner, and there are plans for future Nordic cooperation.

*The ecosystem is not an end in itself; its benefits must be demonstrable.*

Identifying business models remains a challenge in the traffic ecosystem. Currently, participation in the ecosystem is often justified through regulatory requirements. While compliance with legal obligations can be an initial incentive, the ecosystem must also offer solutions that broadly benefit participants in the long term.

Success in building the data ecosystem depends on identifying use cases, funding operations, building trust among stakeholders and implementing appropriate infrastructure and technology solutions.



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DATA SPACE  
INITIATIVE**

*The data ecosystem can enhance the cost-effectiveness of fleets and the utilisation of resources at target ports while reducing carbon emissions.*

## Maritime data space

Currently, the traffic flow in ports is not optimised, and shipping companies lack an easy way to share operational data with other stakeholders, such as ports, other shipping companies and ships. Ships rush at full speed to the vicinity of the continent, waiting until a docking space is confirmed from the port. This rushing increases fuel consumption, environmental impact and transportation costs. Meanwhile, truck drivers on land must consider which ship will dock first and whose cargo they will unload into their vehicles.

Fintraffic coordinated the development of the Finnish maritime data space through two pilot projects co-financed by Sitra. Awake.AI implemented a Just-in-Time Arrival use case, utilising a machine learning algorithm to predict ship arrival times better and enhance journey planning. The company aims to integrate Just-In-Time functionality into its service offerings.

Siili Solutions led a Virtual Port Arrival pilot, designing a method allowing ships to make a virtual arrival notification and secure a docking spot before arriving at the port. The aim was to reduce unnecessary rushing to the port. Siili's pilot is closely linked to Fintraffic's NEMO project, which earned Siili Solutions the prestigious Service Design Award.

These pilots expand Fintraffic's regulatory NEMO data management system into a maritime data space. The pilots provided insights into how a regulatory data management system could facilitate value-added services. A general-purpose data space also supports maritime data sharing use cases beyond statutory data transfer.

Seven organisations participated in the pilots: Awake.AI, E&S Tankers, Borealis Plastics, Siili Solutions, Fintraffic VTS, ESL Shipping and Oxelösund port in Sweden. Taival Consultancy helped participants better understand different business models and value creation assumptions.

Analyses suggested that the Virtual Port Arrival use case could reduce emissions and fuel costs for participating vessels by up to 24% if put into operation. In comparison, the Just-in-Time Arrival use case could save 27% of ports' operational expenses and deliver up to 20% savings in reduced transit times for cargo owners.

The maritime data space development continues, with Fintraffic receiving €2.7 million from the European Commission for 2024-2026 to expand the NEMO data management system with data space capabilities.



**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Air freight arrives at its destination in less than a day, but its departure from the airport can take significantly longer.*

## **Helsinki-Vantaa airport data hub**

Smooth handling of air freight requires close and synchronised collaboration among various stakeholders. Yet, data-driven solutions to support this collaboration are not available. Manual recordings and data transfers during the freight process disrupt visibility of accurate shipment information. Up-to-date and comprehensive freight data are crucial for stakeholders to anticipate and efficiently perform their part in the logistics chain.

The Helsinki-Vantaa airport data hub was a project in which Sitra co-financed the conceptualisation of a data hub with Fintraffic, Finnair Cargo and Finavia.

The goal was to identify data-driven business cases related to air freight handling. The project established a common target state for the key stakeholders, such as logistics service providers, forwarders, air carriers and airport operator.

The project also identified potential business cases for the air freight data space, such as collecting carbon dioxide emissions data for shipments, optimising shipment status through proper packaging dimensions, digital customs processing, a real-time freight status portal and solving regulatory requirements for airport stakeholders.

Business analysis suggested that, if implemented, these business cases could produce up to a 10% cost reduction for airlines and other air freight handling stakeholders, such as forwarders and shippers.

Realising the data hub would require a community at Helsinki-Vantaa to develop the concept together. Alternatively, a neutral party could orchestrate the solution.

## Observations

- Fintraffic's funding and active guidance have been critical factors in initiating and expanding the data ecosystem in the transportation and logistics sector.
- The work on the data ecosystem in the transportation and logistics industry is highly advanced in Finland and offers internationalisation opportunities for ecosystem participants.
- An orchestrator should be appointed or involved from the beginning. During preparation and implementation, the orchestrator focuses on mapping business value, identifying potential use cases and shared goals and establishing a governance model. During the operational phase, the orchestrator ensures compliance with rules and effectively manages the data space.
- The governance model of the data space must be fair to all participants regardless of the size of their organisation. Often, business benefits are not distributed equally among participants, and naturally, the data user receives the greatest benefits. The growth of the data space requires a clear governance model that includes mechanisms for fair cost and value sharing so that all necessary parties benefit from participation.
- In addition to direct funding, funders can promote the long-term development of data ecosystems by guiding other funded projects to participate in networked activities and become users and further developers of existing data sharing infrastructures rather than developing their own data sharing solutions in each project.

## 4.2 Skills

Labour markets and skill requirements are constantly and rapidly changing. According to a World Economic Forum report, employers believe that 44% of the skills needed by workers will undergo significant changes in the next five years. The European Commission states that 77% of EU companies report difficulties finding workers with the necessary skills. Data and digitalisation have a place in skills policy when facing challenges created by rapidly changing skill needs.

Data-driven solutions based on data and analytics have long been developed in various job placement and recruitment portals to match workforce and jobs. However, the potential usage of skills data is broader. Skills data describes individuals' skills, organisational skill requirements and education offerings.

By sharing skills data it is possible to align workers and jobs, improve education to

meet anticipated skill needs, help individuals find learning opportunities and enable companies to enhance their workforce's skills. The so-called MyData principles are central in sharing skills data, as most skills data is personal data. According to the MyData principles, individuals can utilise information about themselves stored in different information systems and grant permission for its use in other services.

The conceptualisation of a unified European skills data space was initiated in the international DS4Skills project, which has a strong representation from Finland. Finland has a lot of activity related to skills data, and data space development has progressed beyond the mapping and preparation phases to pilot implementations and related customer and funding acquisitions. However, it is not yet possible to speak of a domestic skills data space. Instead, several actors are collaborating in various configurations to enhance the usability of skills data.



**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Data spaces can and should be business-oriented because public funding will eventually run out. Imagine what would have happened if CERN had said that the internet project was over when the project funding ended?*

## **Foresight experiment for needed skills**

One project related to skills data, among others, is a pilot funded by Sitra that enables a company to anticipate its future skill needs for the next one, three or five years. The solution would allow companies to compare their organisation's skill profile against their competitors. The participants in the pilot include Headai and ABB from Finland, Visions from France, the European community Prometheus-X and the global company Lightcast.

The pilot participants are building their use cases on a data space solution called VisionsTrust, which is based on the open-source components of Prometheus-X. The skills data space participants can connect data sources and share information within their organisation and between different parties. Through the data space participants can offer new data products and, in turn, utilise AI services that add value to data. Additionally, the data space enables the testing of business models based on skills data and related profit-sharing.

All skills data projects emphasise the role of collaboration in company networks.

Collaboration occurs among Finnish actors and in European-wide networks such as Gaia-X, Prometheus-X, the International Data Spaces Association (IDSA) and the Big Data Value Association (BDVA). The stakeholders also emphasise collaboration across different industries, and skills-related data space activities should increasingly connect with other sectors such as healthcare, smart cities and other data spaces.

At the European level, a community has formed around skills data, equipped with tools to address rapidly changing skill needs using a data-driven approach. The common goal of actors in the skills data space is to promote data spaces as growth-oriented businesses and build new growth companies in the field. Activities solely led by project organisations or purely publicly funded are not sustainable. Customer funded solutions have already been developed to meet customer needs in the skills data area. The goal is to move from pilots to growing business activities quickly.

## Observations

- In a changing world, it's increasingly difficult for businesses to predict the skills they will need in the future. Navigating such situations and making critical decisions for a company's success requires insights that must be extracted from vast amounts of data.
- Collaboration within ecosystems enables the large-scale use of data. Data spaces offer scalable solutions that better serve the information-sharing needs of ecosystems than traditional data sharing solutions.
- One challenge for the data space business in Finland is that the knowledge required for ecosystem-based and collaborative work still needs to be improved.
- The data space project must have a neutral orchestrator to engage all stakeholders, identify common business goals and communicate and encourage critical players to join the developing ecosystem.

### 4.3 Agriculture and food production

Agriculture and the food industry represent about 6% of the EU's gross domestic product. While not often the first sector that comes to mind when discussing the data economy, agriculture, including primary food production, is highly mechanised and generates significant data. This data can enhance land use, the environmental sustainability of cultivation, the traceability of food from "farm to fork" and the economic viability of primary production.

Key data types in the agricultural sector include soil quality, location of cultivation areas, crop yields and machinery usage. Currently, numerous different IT-systems in the agricultural sector handle these data types in a highly inconsistent manner. Data generated from farming and other primary production still has a long and challenging journey before it can be utilised across the food industry. European and Finnish agricultural and food sector data space projects aim to facilitate this journey.



**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Data economy also exists in the field of agriculture.*

## **Agrifood Data Space Finland**

The Agrifood Data Space Finland (AFDSF) consortium is developing a data space for the food industry, driven by the EU's new data regulations. Agricultural entrepreneurs also feel pressured by various rules and reporting obligations.

The Finnish food industry consortium started actively, but practical business projects have been limited so far. The agriculture and food production sector is fragmented, which complicates reaching and engaging stakeholders in shared data-sharing goals and activities. Communicating the idea of a data space in plain language is challenging, making it difficult to arouse interest among agricultural entrepreneurs.

The project's next goal is to add concreteness and expand the user base of the data space first in Finland and then in Europe. The consortium aims to secure funding, engage critical companies and clarify stakeholder cooperation. Nationally, there is also an effort to unify various initiatives related to primary production but encompassing the broader food chain, such as Business Finland's flagship project Food Data Finland. The stakeholders hope for more active communication from the ministerial level. It's important to remember that the agricultural sector is also part of the data economy.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Let's allow farmers to manage the data they create, benefit from it and access value-added services that improve crop yields.*

## **Potato-X – Agricultural Data Space Pilot**

Potato-X is a Sitra co-financed experiment that enables data flow generated by potato farming machinery across organisational and national boundaries while utilising data transmission services. An interoperable network of data transmission services allows for value-added services such as optimising harvests and increasing farmers' profitability and productivity.

Participants in the pilot include Finnish companies 1001 Lakes and DataSpace Europe, which develop data space management models and infrastructure, and Klåvus Group, an importer of potato farming machinery. From Belgium, the agricultural research institute EV-ILVO of the Flanders region and agricultural machinery manufacturer AVR Belgium are participating.

In the pilot, a potato farmer's data flows from the producing machinery to AVR's platform (AVR Connect), connected to ILVO's service (DJustConnect). From there, the data is retrieved through DataSpace Europe's Tritom service to the Finnish farmer's farm

management system (Centria DataSato), where it can be visualised and combined with other farm data.

The pilot integrates services initially developed and offered independently in different times and countries. Combining different services and their ecosystems requires coordination in business rules, consent management and governance models. These are prerequisites for creating an agricultural data space that extends across national borders.

Taival Advisory assists the pilot participants in assessing business value creation, value chains and business models. Based on a preliminary analysis of use cases and assumptions, a cautious estimate is that using the agricultural data space could increase a single farm's gross income by thousands of euros per year. Additionally, the data space would enhance data commercialisation opportunities and increase the size of the data market by hundreds of thousands of euros per year.

## Observations

- Creating ecosystems from scratch is labour-intensive. Initially, it's crucial to identify a few pioneering companies and key players through whom broader use cases can be identified and the logic of the ecosystem and business models can be understood.
- A data space project must demonstrate practical benefits to participants and the value of collaboration.
- When crafting a rulebook that integrates multiple ecosystems, it's essential to consider the regulatory requirements of different countries and ensure compatibility between old agreements made among participants and the new rulebook. The new contractual structure must either incorporate or replace existing contracts.



## 4.4 Energy

CHECK OUT THE  
DATA SPACE  
INITIATIVE

*Data spaces are the right direction for development, where the focus is not always on the public sector but private service developers.*

### Fingrid Datahub

Fingrid, a state-owned company, has been developing the Datahub service for the electricity market for over eight years and has been in operation for two years. Datahub is the information exchange platform for the electricity retail markets, through which data such as electricity contracts and metering information from consumption points can be shared. The Datahub's primary users are electricity retailers, distribution network operators and various service providers not directly involved in electricity sales or transmission.

Fingrid and its subsidiary, Fingrid Datahub, generate profits, but their operations are regulated and primarily based on a public mission. This is why Datahub is considered a neutral entity capable of orchestrating multi-party data sharing.

One of Datahub's goals is to provide electricity market-related data from one place to everyone who needs it for their services and implementation. There are many use cases for electricity market data, such as promoting energy efficiency and reducing emissions, meeting the security requirements of domestic electricity supply and facilitating transportation electrification.

Regarding sharing and utilising electricity market data, Finland is among the leaders, along with Denmark, Sweden and Norway. Finland is also a benchmark in the European distributed data infrastructure for energy (EDDIE) project, which aims to achieve interoperability in the EU electricity sector. Currently, there is no data exchange between national services like Datahub, but a standard is being developed for the retail markets to enable data sharing and utilisation between countries.

## Observations

- The lack of standards and interoperability practices is a significant challenge in the electricity sector. Fingrid Datahub would be a natural and trusted entity for developing and operating the electricity industry's data space.
- A key challenge in the design of the data space for the energy sector is managing user access in compliance with data protection regulations within a decentralised network involving multiple actors. It is crucial to identify who is requesting data and who has the right to access various data types from different sources.

## 4.5 Smart cities and built environment

Smart cities and the built environment are cross-sectoral areas of development for data spaces, intertwining with other sectors such as transport, energy and geographic information system (GIS) data space development. For instance, Finnish initiatives related to smart cities and the built environment address the data needs of emerging responsibility reporting.

Organisational responsibility reporting (ESG: *Environmental, Social, Governance*) includes information about an organisation's sustainability goals, risk management and its impacts on the environment, climate and people. Under accounting law, large companies must report on their sustainability annually, but annual reporting is currently voluntary for others. However, the EU's Corporate Sustainability Reporting Directive (CSRD) will expand reporting requirements. Reporting requires the measurement and transparency of sustainability metrics.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*The most readily understandable driver of the data space projects is cost savings, which can be achieved, for example, by optimising energy use.*

## CO2 Datahub

Two projects are examples in the built environment data space sector: the Finnish CO2 Datahub and the European Construction Data Space. These projects have implemented pilots demonstrating the economic benefits of utilising carbon footprint data in the construction sector. The pilots included, among other things, merging maintenance business data with large property owners' property data and optimising the climate impact of changes related to office space leasing by combining property data with emissions data.

CO2 Datahub introduced new carbon accounting methods, sustainability reporting and data-driven management in construction, logistics and property energy consumption. The project laid the groundwork for operating Finland's built environment ESG ecosystem and helped define international principles for handling carbon footprint data. Participating organisations gained an understanding of defining their supply chain footprint, managing carbon footprint data and parts of the supply chain where the companies can reduce environmental impacts most economically.

After the pilot phase, the CO2 Datahub project continues under KIRAHub, the property and construction sector innovation and data network. The continuation of the other project, the EU-level Construction Data Space in Finland, depends on finding national funding, which has been challenging lately. The project's focus is shifting to France, where local funding is available. Several countries, such as Germany, the Netherlands, France and the United Kingdom, have national networks related to carbon footprint data.

Construction sector projects emphasise the economic motivations of data spaces. Although companies approach data sharing and data spaces from different starting points, activities must be linked to the company's strategy and financial planning. Success requires finding suitable business models for data space activities. Here, experiments that can quickly demonstrate economic benefits are advantageous. New innovations take time and often arise as by-products of solving old problems.



**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Do we dare to give out data, even if it could make a little money, or would our business go under in the process?*

## **DataMust ja LuxTurrim5G**

Many participant organisations, including research institutes, Finnish cities and Traficom, have worked on the Nokia-led LuxTurrim5G project to advance data sharing and utilisation in smart cities' built environments.

Building the next generation 5G data network required densely located base stations in cities. Cities also needed to collect and utilise real-time data such as traffic and emissions. The solution was the installation of smart poles, which house 5G network base stations and various sensors.

During the LuxTurrim5G project, the partners realised that data sharing is more complex than anticipated. The biggest challenge in commercialisation has been creating the courage and trust for different actors to sell and share data. In the DataMust follow-up project, core partners have tackled this challenge by limiting the purposes for which data can be used and the parties involved in

data sharing to sufficiently small "cells" and developing a cellular marketplace where only an orchestrator and a small group of operators operate. The commercialisation of the marketplace is still in progress, but the results of the projects, such as the smart poles and the data sharing based on them, are intended to be utilised going forward.

The infrastructure of the data space, such as the data marketplace platform, is a significant investment target in itself. The most promising projects have been implemented in publicly funded environments and environments utilising private 5G networks, such as ports. The orchestrator of the data marketplace has been identified as a critical success factor in projects. In data spaces, the task of a neutral party is to enable the monetisation and use of data so that trust between parties is maintained. If no one is willing to take on this task, the activity does not materialise.

## Observations

- Companies will only share their data if they believe it will not be misused.
- The biggest driver for data space projects is cost savings, which can justify the investment in data infrastructure. Once a large part of the data infrastructure is ready, other use cases are easier to implement.
- The most critical factor in post-project business is identifying a reliable orchestrator. In the future, companies specialising in orchestration may have business opportunities.
- Data is a tool for achieving a company's business goals, and data spaces should help with this. However, data management and sharing are rarely the core challenges that companies want to solve themselves.
- Organisations must understand their role in ecosystems, which requires them first to have a clear plan on how to use data to support business objectives.

## 4.6 Public administration

The legislation guides public administration activities and sets the framework for disclosing and using information held by authorities. Authorities can only utilise the data the law allows them to collect from customers and other sources as part of their operations. Currently, all data sharing between the authorities is defined on a case-by-case basis. On top of the legal problems comes the semantic interoperability challenges. Many public organisations collect and maintain overlapping information, but the data cannot be reconciled because all organisations provide their information using slightly different terminologies. The vision of the public administration data space is to move from customised data disclosures between

authorities towards data products that can be utilised in many different situations.

The public administration data space focuses on the ability of actors performing public tasks to share information in an understandable and useful form with various stakeholders. The data space reduces duplicated work and data copying, accelerates the development of digital services and provides opportunities for new service concepts that better meet the needs of citizens and businesses.

The public sector data space is a common infrastructure for digital service clusters related to life and business events. The term “service cluster” refers to a group of public and private services from different providers related to an “event” where a change occurs in a person's life or a company's operations that requires interaction with several authorities. One of

the goals of the Finnish digital compass is to define and digitise approximately 40 of the most significant and impactful service clusters related to life and business events by 2030. Often, the same data is useful for different life and business events. The data from previously implemented service clusters would be available as data products through the data space, which could be directly utilised in other use cases.

In Finland, many stakeholders are willing to promote digital service interoperability in public administration. To truly liberate information from its silos to streamline the service production in life and business

events, there needs to be coordination to ensure a common direction and essential technical solutions. The public administration data space has been conceptualised in an informal working group led by Kela. On the other hand, the Virtual Finland test platform provides a platform for experimenting with data space concepts and productisation. The EU Commission's data space plans include the Data Space for Public Administration. However, it has yet to materialise, and Finland has the opportunity to be a pioneer in this regard.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

## Virtual Finland

The public sector data space has been in test use in the Virtual Finland project since 2022 and in operational use for one pilot project since the beginning of 2024. The project has opened the necessary cooperation channels between several authorities. The Ministry for Foreign Affairs has been advancing the digitalisation of life events in collaboration with, among others, the Ministry for Finance, the Tax Administration and the Finnish Immigration Service. One use case that connects these organisations is the standardisation and digitalisation of work-related immigration procedures.

In the Virtual Finland test environment, the project has conducted its experiments as well as experiments carried out and financed by other parties, such as the experiment conducted in collaboration with the [Nordic Smart Government & Business](#) program,

*The goals of the Finnish digital compass can only be achieved with the development of the public sector data space.*

which tested the transmission of standardised business information between the tax authorities and business registers of Finland, Sweden and Norway.

The data space project is expected to achieve more concreteness through successful use cases in the future. Data monetisation also needs to be developed, especially in digitalising life events, where cooperation with companies is also required. The broader goal is to make Finland a pioneer in developing the public sector data space so that Finnish products and expertise can be sold abroad.

## Observations

- Personal data is inevitably involved in most value-generating data sharing use cases. In public administration, cross-administrative handling of personal data is challenging but essential. A national governance model is required to ensure safe and correct data handling of personal data. This governance model should also support the public sector organisations in creating and offering data products.
- Some Finnish public organisations, such as the Tax Administration, are advanced in utilising data across organisations. This expertise could be developed into export products if companies lead the commercialisation.
- Awareness of data spaces needs to be increased across the public sector, and the ministries should establish a shared vision or a national game plan for data spaces.

## 4.7 Circular economy and digital product passports

The growth of the circular economy requires better digitalisation and the sharing of product information across material and industry boundaries between companies, organisations and consumers. A key concept related to the digitalisation of the circular economy is the digital product passport, which provides accurate and reliable information about a product throughout its manufacturing and transportation history. Digital product passports are a means to gather data on the sustainability, raw materials, components and safety of products. They provide transparent information to consumers, promote responsible business practices and accelerate the transition to a circular economy. At best, they can also enable new circular economy business models.

Comprehensive product information can improve companies' productivity, resource efficiency and traceability in the

manufacturing and distribution chain. When data facilitates product maintenance, repairs and refurbishment, products' lifespans can be extended. Data is also needed at the end of the product lifecycle to support the safe recovery and reuse of materials.

Product passports are one of the ways in which the European Commission is aiming for a digital and green transition. In the coming years, EU regulations will define data requirements for digital product information. The Commission has sought solutions for developing digital product passports from various industries, particularly textile products, batteries and electronic devices. The Commission is funding the development of digital product passports in numerous projects. One of these projects is CIRPASS-2, which also involves Finnish actors. In Finnish discussions, digital product passports are closely connected to data spaces. However, the European Commission has not yet linked the circular economy and digital product passports to the development of the common European data spaces.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Intersectoral data sharing is needed to streamline everyone's work.*

## **Mobile work machines battery passport experiment**

The SIX Mobile Work Machines cluster includes leading Nordic manufacturers of mobile work machines such as Sandvik, Kalmar, Valtra, Ponsse, Junttan, Normet and Tana, as well as key technology partners Valmet Automotive, Epec, Danfoss, Hevtec and Nokia. Sitra funded an experiment with the cluster's actors to develop a digital battery passport to improve transparency in the lifecycle of batteries for mobile work machines.

The goal is to help customers get more out of their machines with battery data and to provide valuable data to battery manufacturers for product development. At the same time, the circular economy related to batteries is enhanced and the lifespan of batteries is extended through reuse. With the EU's data regulation, the battery passport directive, which will come into effect in 2024, makes the battery passport mandatory.

The battery passport brings together battery identification data, information on machine usage and data on the battery's lifecycle. This compiled information benefits various stakeholders, such as machine users, industrial company customers and authorities in assessing emissions data for machines and production chains.

As part of the battery passport experiment a prototype of a manufacturing data space was deployed in the Virtual Finland test environment. It is one of the first practical solutions to implement the European Commission's battery passport regulation. The experiment demonstrated how the battery passport can be implemented and how the information it provides can assist industrial actors, for example, in calculating and reducing emissions.

The experiment brought together many actors to discuss data sharing from different perspectives. The project has made significant progress in the utilisation of battery data and the development of digital product passports. The project's product-oriented approach increased the interest and willingness of companies to participate. The use cases have a direct link to companies' customers.

Building trust between ecosystem actors and agreeing on common rules of the game has also been crucial for success. The battery passport experiment is an inspiring example of creating a business-centric data space. The lessons learned from the project can also be applied in other industries where inter-company data sharing would be beneficial.



## Observations

- Achieving the inter-organisational trust necessary for data utilisation is challenging. Companies view data sharing as a risk and may fear that an external party could exploit the data better than they can. The data space must help manage risks and offer value in return.
- Data ecosystem initiatives need to be sufficiently industry-driven and concrete to engage industrial stakeholders.
- Finland has a dynamic reputation in networks that build data spaces. Turning this reputation into concrete success stories requires strategic investment in export promotion, innovation and international collaboration. Additionally, it is crucial to identify and leverage cross-industry opportunities.

## 4.8 Language models and artificial intelligence

Generative artificial intelligence relies on language data and language models created based on that data. The potential use cases and business potential of AI applications utilising language models are abundant. For example, in the media industry AI can significantly speed up content production, or in doctors' work it can expedite the process of documenting patient records.

The language data space aims to collect language data and build language models

that work with all European languages, enabling the wide utilisation of AI in national solutions.

In recent years, several national projects in Finland have been carried out around language data and AI, such as the Language Bank, which manages language resources, the Donate Speech campaign, a speech interface for AI, and the Finnish Poro language model developed by the University of Turku and Silo AI. The Language Resource Infrastructure for AI ([LAREINA](#)) project, funded by Business Finland, aims to create a national data ecosystem around language technologies.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*AI requires language data and language models to function, and Finland has strong expertise in these areas.*

## European Consortium for Language Technologies

There is currently no national data space initiative in the field of language technology in Finland. The national focus has been on connecting to European development efforts. Finland has a long history in language technologies and extensive expertise in building cooperation models. These provide a good foundation for participating in developing a European-level language data space and developing export products.

At the European level, the Alliance for Language Technologies European Digital Infrastructure Consortium (ALT-EDIC), led by France, coordinates the work to establish a language data space. ALT-EDIC aims to create

the prerequisites for establishing a European language data space required for AI solutions.

Finland should participate in international cooperation related to language data spaces. Establishing a Finnish consortium under ALT-EDIC would be beneficial as it would strongly connect the Finnish language data developments to the international networks. The consortium should bring together academic institutions and representatives from the business world. Such a consortium could address industry-specific issues and use cases related to language data, language models and AI across sector boundaries.

### Observations

- Finland needs to develop its national language data spaces network to take part in necessary international collaboration.
- Finland has international-level expertise and tools related to language technologies and language data spaces.

## 4.9 Media and copyrights

Networks for sharing data related to content production, advertising, personalisation and copyrights have long been an integral part of the digitalised media industry. The sector is now also active in developing European data spaces.

Under the leadership of the Ministry of Education and Culture, Finland has played an active role at the EU level and in international organisations in developing

copyright data and infrastructure.

Consequently, copyrights are also one of the five prioritised areas in Finland's Digital Compass where data spaces should be developed. In European data space discussions, copyrights do not appear as a distinct theme, but they are centrally linked to other data spaces, such as media data space and language data space.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*Breaking down language silos is crucial for the global competitiveness of the European media industry.*

### European Media Data Space

The Trusted European Media Data Space (TEMS), funded by the European Commission until 2026, involves 43 partners from 14 countries and includes 8 pilots. Finland's contribution involves the company 1001 Lakes. The pilots share data across organisational boundaries, such as data for fact-checking, and develop multilingual search functions. This enables media content to be searched in one's own language from any content produced in any language spoken across Europe. This business-focused project aims to provide the media industry with tools for data-driven cooperation and open new data-driven business opportunities for industry players.

The goal of the media data space is to enhance the European media industry's innovation capabilities, enabling it to compete with major international platform companies such as Facebook, Amazon, Apple, Netflix and Google. It also aims to support the industry's competitiveness compared to monolingual – particularly English-language – media markets.

The data space aims to facilitate co-production and co-distribution of content and enhance the reuse of information in producing and curating various media content. A common European media data space integrates media players' individual data space activities into a whole that is also connected to other data spaces.

**CHECK OUT THE  
DATA SPACE  
INITIATIVE**

*The creator must be moved from obscurity to the centre in managing copyright data.*

## Copyright infrastructure

The Ministry of Education and Culture coordinates the development of copyright infrastructure in Finland. The aim is to create an overall logic for data utilisation for creative industries using data space thinking. A challenge in the work related to copyright data spaces is the highly fragmented field of actors. A natural national orchestrator for copyright infrastructure has not been found or emerged in Finland. So far, the Ministry of Education and Culture has significantly advanced the theme, but an orchestrator from the industry would be necessary to progress further.

Improved copyright infrastructure would benefit stakeholders in the creative industries, such as content producers, distribution platforms, copyright organisations and end users. More advanced copyright data and its transmission would enable a fairer compensation model for creators, clarify the management of usage rights and promote the creation of new innovative content services. Uniform identifiers and metadata accessible through open APIs would facilitate the recognition of works and the clarification of copyrights. Verified copyright data could also ensure

whether a work is created by a human or artificial intelligence and whether it involves copyrights.

The current state of copyright data transmission has significant technical deficiencies and imbalances among actors. The development should prioritise the benefits received by the creators of the works. From the perspective of data ecosystem balance, it is crucial who manages and provides the metadata related to copyrights. It matters whether copyright organisations or large media content platforms are in charge of the metadata.

Finland has been highly influential in EU-level copyright initiatives, highlighting the connection between copyright issues and the data economy. During Finland's EU presidency references to copyright infrastructure were included in the EU's data and digital strategy. Globally, protecting copyright data from alteration and deletion has become a key theme in the World Intellectual Property Organization (WIPO) activities, responsible for drafting global copyright agreements. Finland has been prominently proactive on this issue.

## Observations

- The most important thing would be to establish common minimum principles for opening rights-related data on an international level.
- So far, the Finnish media industry has not been ready to share data among themselves. Metadata related to content and data related to copyright could serve as good and commercially safe first steps.
- The absence of an orchestrator significantly slows down the national sharing of copyright data.

## 5. Eight lessons from Finnish data space project creators

We have compiled lessons learned from interviews with experts across various sectors, which apply to the development of data spaces regardless of the industry.

### **1 Data spaces need neutral orchestrators.**

Many sectors have recognised the need for a data space orchestrator that could drive progress and foster trust and cooperation among participants. Despite this identified need, the role of the orchestrator often remains unfilled. To gain the trust of ecosystem participants, the orchestrator must be a neutral entity. Balancing this neutrality with the orchestrator's need for a clear motive or revenue model is challenging, as facilitation requires resources and expertise.

### **2 Data spaces provide fair rules of play and level the playing field among participants.**

Power disparities between companies in some industries can hinder cooperation. Data spaces can help to resolve such disparities when it comes to data sharing. Data spaces can create an environment that fosters transparency and openness, offering common practices and rules. Relying on data spaces also makes developing clear, fair and equitable business models for data sharing easier. By involving users and stakeholders in developing the data space and its rule-book, the resulting solutions are more likely to be widely accepted.

### **3 Most Finnish data space projects are still in the pre-commercial stage.**

In Finland and Europe, most data space projects are actively seeking paying customers. Data space projects need to offer clear benefits to potential participants. Concrete use cases prove the benefits of data spaces and enable faster achievement of critical mass. Despite use cases being key to success, practical implementations have been limited in Finnish data space projects. One reason may be that investment in infrastructure is a significant and necessary commitment for piloting use cases. Existing test environments like Virtual Finland's test platform can offer opportunities to materialise use cases without substantial upfront infrastructure investments.

## **4 Thought leadership must be converted into market leadership.**

Finland has successfully been a proactive thought leader at the European level in several industries, such as the circular economy and copyright infrastructure. Thought leadership provides a solid foundation on which market leadership should also be built. The export potential related to the development of data spaces has been well-recognised in many sectors, and some companies have received support from Business Finland for their internationalisation efforts. Transforming thought leadership into exports requires cross-industry efforts to promote exports, innovations and international cooperation. The goal is for Finland to export products and services related to data spaces and not only ideas.

## **5 Collaboration and international connections are essential and require appropriate national investment.**

Most experts interviewed emphasise the importance of cooperation and networking. National cross-industry collaboration and connection with European counterparts in data space development accelerate innovations and improve the competitiveness of Finnish data space projects. Good practices and information about failures and lessons learned should be shared among data space projects. One cooperation mechanism related to the development of data spaces is the European Digital Infrastructure Consortium (EDIC), which enables coordinated cooperation between EU member states. Finland is involved in the mobility EDIC, but there is a desire for Finland to also join, for example, the language technologies and agriculture EDICs. The European Commission-funded projects for implementing common European data spaces are also important networking opportunities. More Finns need to be more involved in European data space projects. A key challenge is the lack of national co-financing, which prevents many actors from benefiting from EU funding and the networks it provides.

## **6 The role of public actors in data space development needs clarification.**

In data space development, public sector actors call for the importance of private sector participation, while the private sector emphasises that it is already operating independently without the public sector. The private sector is already doing a lot of data sharing and is progressing quickly in some areas, even though this is not always explicitly named as data space activity. Improving cooperation and dialogue is key to leveraging the strengths of different sectors and promoting the comprehensive development of Finland's data spaces. Public sector actors must find ways to support and encourage private sector activities without overlap. This requires both parties to commit to open discussion and setting common goals to build a unified playbook for Finland's data space development.

## **7 Regulation can be an accelerator or a hindrance.**

In some sectors, such as mobility and the circular economy, regulations have accelerated cooperation and data space development, while stringent EU regulations are seen as stumbling blocks elsewhere. Meeting regulatory needs can be one of many motives for data sharing and data spaces. However, the activity is not sustainable if regulation is the only driver. Regulation can offer business opportunities by encouraging openness, transparency and improved data availability. Changing legislation and standards requires ongoing monitoring and continuous dialogue between regulators, businesses and other actors. Individual data space projects have limited opportunities to perform such monitoring, but by joining forces, Finnish data space projects can stay more up-to-date with regulatory opportunities and requirements.

## **8 Handling personal data in data spaces is challenging but essential.**

Data protection issues arise in all data spaces in one way or another. The processing of personal data plays a particularly prominent role in data spaces related to skills, energy, mobility, agriculture and the public sector. A high level of data protection enhances trust in data spaces, but at the same time meeting the requirements for personal data processing is challenging. Challenges relate to, among other things, organising and monitoring data permissions in a multi-actor environment. Finnish expertise in human-centric personal data processing (MyData) is valuable. The MyData approach strengthens individuals' rights and control over their data while promoting innovative and sustainable solutions for data utilisation.



## 6. Recommendations

We have synthesised targeted recommendations from interviews and background research for current and future participants of data spaces, as well as for the creators and supporters of data space projects.

### 6.1 Recommendations for current and future users of data spaces

#### **1** Strengthen collaboration within ecosystems.

Organisations must invest in developing their ecosystem collaboration and enhancing their data capabilities. This includes increasing cooperation, networking and identifying and supporting common goals with peers.

#### **2** Seek commitment from the management.

Building data spaces is a long-term effort, the benefits of which materialise once the data space infrastructure is established and a sufficient number of actors share data. Participating organisations must secure executive support for the sustained development of business based on data sharing. Those who champion the data space development within the companies must credibly show to the top management the concrete business benefits achievable with data spaces and how the data space compares to other possible ways of organising data movement between companies. Commitment from the top management ensures the resources and necessary strategic support when the patience of business management is tested.

## 6.2 Recommendations for creators of data spaces

### **3 Share examples and learn from peers.**

By communicating concrete use cases, data space projects strengthen their visibility and increase general understanding of data spaces. Learning from examples accelerates innovation and improves the quality of solutions in all data ecosystems.

### **4 Enhance the impact of international networking by collaborating with other data space projects.**

Through collaboration, Finnish creators of data spaces can best gain international visibility. Data space projects should strive for a solid and sustainable Finnish presence in international data space-related networks, such as Gaia-X, IDSA and others.

### **5 Think big from the beginning.**

Expanding and integrating a data space into common European data spaces should be considered from the beginning when building a data space. Contractual structures and technical solutions should be designed to facilitate the inclusion of new actors and the implementation of new use cases as easily as possible. Additionally, the data space should be prepared to merge with other projects in the same field, thus forming a broad international network.

### **6 Ensure the presence of an orchestrator for the data space.**

The orchestrator's role is crucial for the data space's success. The orchestrator drives the activities forward and promotes trust and collaboration among participants. The orchestrator has a dual role. In the preparation and implementation phases, it facilitates collaboration among participants, secures funding and partners and drives the actual deployment of the data space. In the operational phase, the orchestrator ensures compliance with the data space rulebook.

## **6.3 Recommendations for organisations supporting the development and use of data spaces**

### **7 Develop and use a national playbook for the implementation of data spaces.**

Finland should have a national plan, jointly formed by public administration and private operators, for the development and utilisation of data spaces. The plan should be based on an up-to-date overview of the development of data spaces in Europe and Finland. The playbook should also plan how to make the most efficient use of EU funding instruments.

### **8 Use outcome-based investment funding.**

In the early stages of data space development, a key challenge is to create fair and transparent incentives for the first movers who take the risk and do the work to establish the data space. Without these incentives, a free-rider problem arises where organisations wait for someone else to operationalise the data space. Public funding to build the data space reduces the risk for these first movers, but may not alone create long-term sustainability and commitment from the operators. Part of the investment funding could be outcome-based, dependent on the actual use of the data space, thus benefiting the first movers from the growth of the data space.

### **9 Build state-level international cooperation.**

EU member states are at different starting points in their capabilities to create data spaces. Finland should form a community with the most advanced countries in data usage and digitalisation to accelerate the development of data spaces and related EU policy. This community could include, for example, the Nordic and Benelux countries, which face similar challenges, have comparable resources available and have existing data spaces to connect with.

# References

## Literature

**Data Spaces Support Centre – DSSC. 2024.** DSSC Glossary 3.0. (accessed 19.3.2024).

**Data Spaces Support Centre – DSSC. 2023.** Starter Kit for Data Space Designers 1.0. (accessed 19.3.2024).

**European Commission. 2024.** Second staff working document on data spaces. (accessed 19.3.2024).

**Otto, B., Auer, S., Cirullies, J., Jürjens, J., Menz, N., Schon, J., Wenzel, S. 2016.** Industrial Data Space – Digital Sovereignty Over Data. Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (PDF, accessed 22.3.2024).

**Pitkänen, O., Luoma-Kyyny, J. 2022.** Rulebook for a fair data economy. Sitra. (accessed 25.3.2024).

## Interviews

**Mikael af Hällström**, Development Expert, Finnish Tax Administration

**Esko Kaarlonen**, Chief Architect, State Treasury of Finland

**Harri Ketamo**, Founder and Chairman, Headai

**Jukka Kyhäräinen**, Project Director, Ministry for Foreign Affairs of Finland

**Ilkka Lakaniemi**, Director, Research Center for Knowledge and Innovation, Aalto University

**Janne Lautanala**, Ecosystem and Technology Director, Fintraffic

**Krister Lindén**, Research Director, University of Helsinki

**Harri Nieminen**, Head of Co-development, VTT Technical Research Centre of Finland

**Anu Passi-Rauste**, Marketing Director, Headai

**Juha Salmelin**, Ecosystem Director, Nokia

**Jaana Sinipuro**, CEO, DataSpace Europe

**Fredrik Södö**, Technology and Development Director, Fingrid Datahub

**Anna Vuopala**, Senior Government Adviser, Ministry of Education and Culture of Finland

# Appendix 1: Data Spaces Alliance Finland

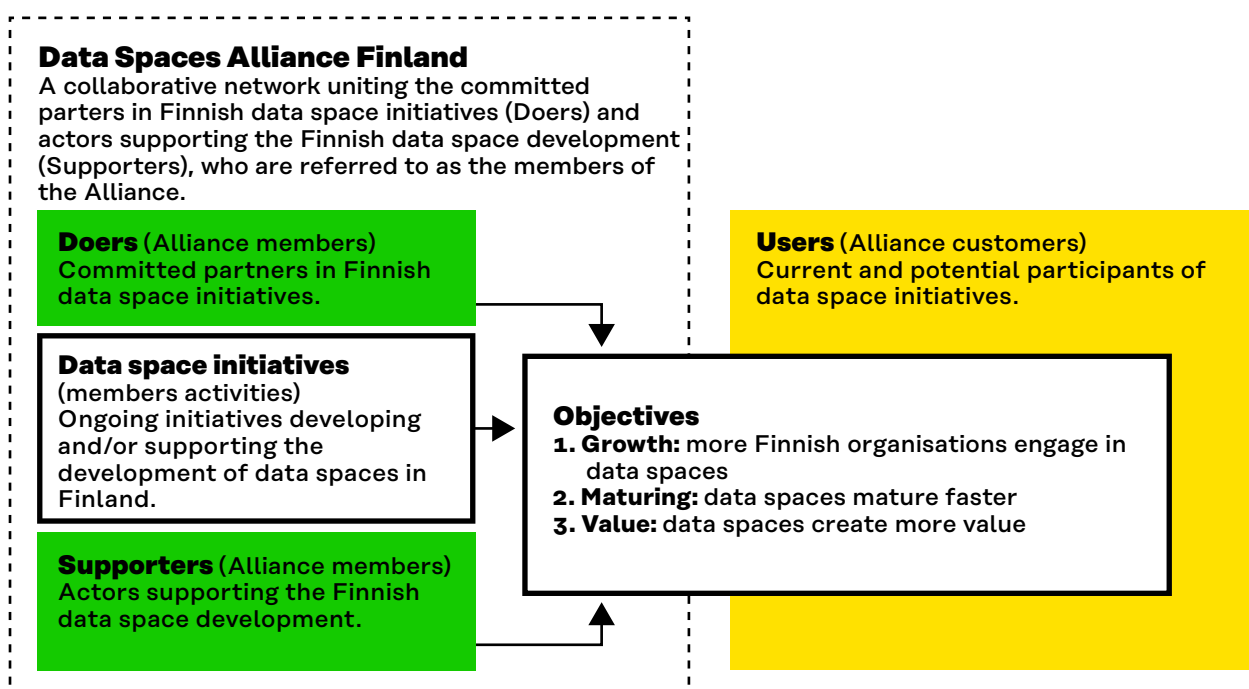
At the time of this report's publication on 10 April 2024, a national collaboration network, Data Spaces Alliance Finland, was launched to bring together the initiators and developers of Finnish data space projects as well as their supporting entities. The alliance implements a cooperation model proven successful in Belgium, the Netherlands and Austria, where local creators and supporters of data space projects are united so that different projects can learn from each other more quickly and communicate their initiatives clearly to a broader audience.

The alliance offers a unified view of tools and services to companies that want to invest in and develop their data-related businesses by joining existing or initiating new data spaces. The alliance supports the growth of data space initiatives by offering networking

and collaborative learning opportunities and an effective way to monitor and connect with European data spaces. By bringing together key players and active data space projects, the alliance enhances the visibility and credibility of Finnish data space activities domestically and internationally.

The accompanying figure summarises the alliance's operational model and objectives. Members can include organisations that act as key partners in a Finnish data space project (creators) and organisations that enable Finnish data space projects through funding and resources (supporters). The alliance's target audience includes businesses and organisations that utilise or could utilise data spaces in their operations (users).

**Figure 5.** Operational model and objectives of the Data Spaces Alliance Finland network.



The Alliance's members signed a memorandum of understanding that establishes a lightweight governance model for the collaboration. Members are organisations that drive data space initiatives or support their development. The first 23 members of the Data Spaces Alliance Finland are: 1001 Lakes Oy, Business Finland, CSC IT Center for Science, DataSpace Europe, Fintraffic, Headai, IOXIO, Kela, Ministry of Transport and Communications, Loihde, National

Land Survey of Finland, MyData Global, Nokia, Nordic Institute for Interoperability Solutions (NIIS), Platform of Trust, Siili Solutions, Sitra, SIX Mobile Work Machines, Smart City Innovation Cluster (SCIC), Struggle Creative, Technology Industries Finland, TIEKE Finnish Information Society Development Centre and VTT Technical Research Centre of Finland Ltd.

# Appendix 2: Further information on Finnish data space projects

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<a href="#"><u>Finnish Maritime Data Space</u></a>	01 Mobility and logistics
<a href="#"><u>Maritime traffic notification service NEMO</u></a>	01 Mobility and logistics
<a href="#"><u>DSpace 4Mobility</u></a>	01 Mobility and logistics
<a href="#"><u>Mobility EDIC</u></a>	01 Mobility and logistics
<a href="#"><u>Air Cargo Data Ecosystem</u></a>	01 Mobility and logistics
<a href="#"><u>Trusted Ecosystem for Skills Foresight</u></a>	02 Skills
<a href="#"><u>DS4SKILLS</u></a>	02 Skills
<a href="#"><u>Prometheus-X and the EDGE SKILLS project</u></a>	02 Skills
<a href="#"><u>Digivisio 2030</u></a>	02 Skills
<a href="#"><u>Digital service package for continuous learning (JOD)</u></a>	02 Skills
<a href="#"><u>Service Centre for Continuous Learning and Employment's (SECLE)</u></a>	02 Skills
<a href="#"><u>Potato-X</u></a>	03 Agriculture and food production
<a href="#"><u>Agrifood Data Space Finland</u></a>	03 Agriculture and food production
<a href="#"><u>AgriDataSpace</u></a>	03 Agriculture and food production
<a href="#"><u>Fingrid Datahub</u></a>	04 Energy
<a href="#"><u>Synergies</u></a>	04 Energy
<a href="#"><u>Co2 ESG DataHub</u></a>	05 Smart cities and built environment
<a href="#"><u>Datamust</u></a>	05 Smart cities and built environment
<a href="#"><u>Public Sector Data Space working group</u></a>	06 Public administration
<a href="#"><u>DataFinland</u></a>	06 Public administration
<a href="#"><u>FINNPASS – The Digital Product Passport (DPP) group for Finland</u></a>	07 Circular economy and digital product passports
<a href="#"><u>Sustainable Industry X (SIX)</u></a>	07 Circular economy and digital product passports
<a href="#"><u>CIRPASS-2</u></a>	07 Circular economy and digital product passports
<a href="#"><u>Finnish Textile and Fashion DPP Consortium</u></a>	07 Circular economy and digital product passports
<a href="#"><u>Fin-CLARIN</u></a>	08 Language models and artificial intelligence
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<a href="#"><u>Trusted European Media Data Space (TEMS)</u></a>	09 Media and copyrights
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<a href="#"><u>Business Finland data economy program</u></a>	Project supporting data spaces
<a href="#"><u>Data Spaces Support Centre (DSSC)</u></a>	Project supporting data spaces
<a href="#"><u>Data Spaces Innovation Lab</u></a>	Project supporting data spaces
<a href="#"><u>IDSA HUB Finland</u></a>	Project supporting data spaces
<a href="#"><u>Road Map of Data Spaces</u></a>	Project supporting data spaces
<a href="#"><u>X-Road 8 "Spaceship"</u></a>	Project supporting data spaces
<a href="#"><u>Gaia-X Hub Finland</u></a>	Project supporting data spaces

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