Market research Service Providers

Positioning Service Providers in emerging data spaces

Reading Guide and Context

Context

- The **Centre of Excellence Data Sharing & Cloud (CoE-DSC)** functions as a central hub that aims to unlock value potential in data sharing.
- The CoE-DSC **supports communities of data sharing initiatives** (consisting of service providers, end-users, industry bodies and knowledge institutes) with realising use cases at scale by providing them with relevant tools, knowledge, and best practices.
- In addition, the CoE-DSC **monitors the impact of the EU data strategy**, such as the new proposals for regulation (e.g., Data Act, Data Governance Act), the **DIGITAL support programme** and in this capacity will **work together with the EU Data Spaces Support Centre** (DSSC).
- As such, the CoE-DSC **contributes to the advancement of data spaces** for various themes and sectors, at the national and EU level.
- One of the key factors leading to the success and adoption of data spaces is the **direct involvement of end-users** (for sharing and consuming the data) **and data space service providers** (SPs), serving as intermediaries between end-users.
- In this market enquiry, which focuses on SPs, the CoE-DSC has developed **insight into the positioning of existing SPs**, **their offerings** and **their opinion and response** to the EU data strategy and its forthcoming regulation, EU reference architecture initiatives (e.g., OPEN DEI, IDSA, GAIA-X) and other private/public initiatives (EU Common Data Spaces, SIMPL, etc.), as well as emerging data sharing initiatives in NL (e.g., SCSN, HDN, TROEF, etc.).
- The enquiry is based on the following 3 questions:
    1. To what extent are SPs*aware of developments in EU data strategy and forthcoming legislation, EU reference architecture and emerging data spaces in NL and their possible impact (e.g., requirements, opportunities) on them and their customers?
    2. To what extent are SPs currently positioned in the domain of data sharing and what type of propositions do they offer to whom?
    3. To what extent could CoE-DSC use insights from report to support SPs and advance development of data spaces?

How to read the report

- The intended audience for this report consists of other SPs, data sharing initiatives and end-users (data service providers and consumers)
- The report is divided into 4 sections:
    1. **Management summary** see pages 6 – 8.
    2. **EU and NL developments.** Key findings related to the potential impact of developments in public/private initatives see pages 10 – 16.
    3. **Positioning SPs.** Key findings related to the **positioning of service providers in data spaces** see pages 18 – 20.
    4. **Next steps for CoE-DSC**. Key findings to further define CoE-DSC support development & realisation data spaces see page 22.
- In the Appendix is an **overview of current offerings** by individual service providers in the scope of this report see pages 30 – 39.
- Note: the outcomes and structure of this report could be used for larger quantitative research amongst SPs.

* in scope of this interview

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List of interviewees

Overview of participating companies that have contributed to the report

CoE-DSC reached out to SPs and iSHARE based on their market position and involvement in Dutch data space to provide the project team insights and validate assumptions with regards to the positioning of SPs.

Interviewees

Organisation	Name	Role	Department
kpn	Sven van der Meer	Commercial Product Manager KPN IoT & Data	Telcom, IT & IoT solutions
	Rutger Rienks	Senior Innovation Consultant KPN Data	
VISMA	Elsbeth Bodde	Product Manager Visma Connect	IT & cloud solutions
	Marnix Vermaas	Business Architect Visma Connect	
ORACLE	Machiel Bolhuis	Director Standards & Technology Policy EMEA	Global Standards Policy & Compliance
RosemanLabs	Roderick Rodenburg	CEO & Founder Roseman Labs	Privacy-enhancing technology
amsix	Ruben van den Brink	Chief Technology Officer AMS-IX	Internet exchange solutions
centric	Ben van Lier	Director Strategy & Innovation Centric	Cloud solutions
SOVity	Sebastian Kleff	CEO & Co-founder sovity	Data space solutions
leafcloud	Niek de Jong	CEO Leafcloud	
INTERCONNECT	Bart-Jan Rijlaarsdam	Business Unit Manager Cloud & Security	Cloud solutions
iSHARE	Gerard van der Hoeven*	Executive Director iSHARE	
	Rajiv Rajani*	Chief Technology Officer iSHARE	

*iSHARE is an existing trust framework for data sharing and is as such not considered a service provider. iSHARE was interviewed to provide project team insights to validate assumptions.

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Most important terms used in document

Overview of terminology used in report

Terminology

Term	Definition	Source
Data space	A data space is a distributed infrastructure that enables trustworthy data transactions organised based on commonly agreed principles and standards ('trust framework').	Open DEI
Data space end-user	A data space end-user is an organisation (public/private) that participates in a data space through their trusted system environment (e.g., PaaS, SaaS) by adhering to the agreed data space trust framework and transacting data as a data consumer and/or data provider.	Data Sharing Canvas
Data space authority	A data space authority is the entity that acts as a governing body on behalf of data space participants and manages and maintains the agreed trust framework and network.	Data Sharing Canvas
Data space service provider	A data space service provider – hereafter referred to as 'SP' – is an organisation (e.g., cloud-based service providers, consultant) that provides services to define, manage and/or operationalise a data space, typically governed by a service agreement.	CoE-DSC
Governance	The management and maintenance of the agreed trust framework and network for data sharing, ensuring quality and trust throughout the data space.	Data Sharing Canvas
Connector	A connector is the dedicated communication server for sending and receiving data in compliance with the agreed trust framework and the interface between internal systems of data space end-users and the data space(s) ecosystem.	IDS RAM
Intermediary service	A service that (technically and legally) connects one or more data space end-users to the data space(s) ecosystem, thereby enabling them to establish relationships and execute data exchange with other members in the data space.	IDS RAM
Interoperability	The ability of systems of different actors to facilitate many-to-many data sharing and to have clear, shared expectations for the contents, context, and meaning of that data.	Data Sharing Canvas
Federation	The technical enablement of interoperability and portability of data. Through federations, data owners (users) can exchange and utilise their data with commonly agreed upon rules and control on whom and for what to grant access. Through federations, SPs can set up their infrastructures in a trusted and distributed manner.	GAIA-X

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Key findings

- The European Commission (EC) plans regulatory and supporting initiatives to stimulate innovation in data sharing across sectors and generate new value

- Forthcoming EU regulations (e.g., Data Act, Data Governance Act, CSSD) aim to regulate data access, portability and data sharing in a level-playing field

- Service Providers (SPs) take on 3 response types to EU regulatory developments which are:

  - **Monitoring** regulatory initiatives on a regular basis only to stay informed and form a basic understanding of the potential impact

  - **Anticipating** by defining impact on client requirements and own services, with a focus on compliance

  - **Developing** new business ideas based on the impact and potential effects of EU regulation, with a focus beyond compliance

- In general, SPs only monitor forthcoming EU regulations. Some SPs anticipate with focus on compliance for their own products and services (e.g., cloud switching under Data Act), and supporting their clients become compliant (e.g., mandated IoT data sharing under Data Act)

- In other EU initiatives (e.g., SIMPL, DSSC), the EC supports development of European data spaces across sectors in which organisations share data based on common agreed principles and through distributed infrastructures. Also in the NL data spaces are in development (About 50 spaces with 400 million public/private funding)

- SPs in scope of research have offerings to design, operationalise and manage data spaces for two segments: the governing bodies of data spaces and their end-users

- For governing bodies SPs prepare offerings for:

  - **Governance services:** Support developing trust frameworks for the design, operationalisation and governance of data spaces

  - **Intermediary services:** Provide technical and functional components to host and facilitate trusted data sharing between participants.

  - **Federated cloud services:** Provide components and governance to establish a trust cloud infrastructure provided by multiple providers to meet existing market demand for federated cloud use (e.g., geo-location, multi-cloud strategy, specific use cases).

- For end-users SPs prepare offerings for:

  - **Connector:** Implement connector to facilitate execution of trusted data exchange among participants in line with agreed usage control policies

  - **Data & cloud readiness:** Ensure that (existing) data & cloud services are ready and compatible to facilitate data sharing use cases

- While supply side for data spaces is slowly developing, actual market demand for services (i.e. SMEs, corporates, authorities) is limited and hampering market growth

- The CoE-DSC will further use outcomes for developing activities to bring together supply and demand in projects to stimulate market demand (see next slide)
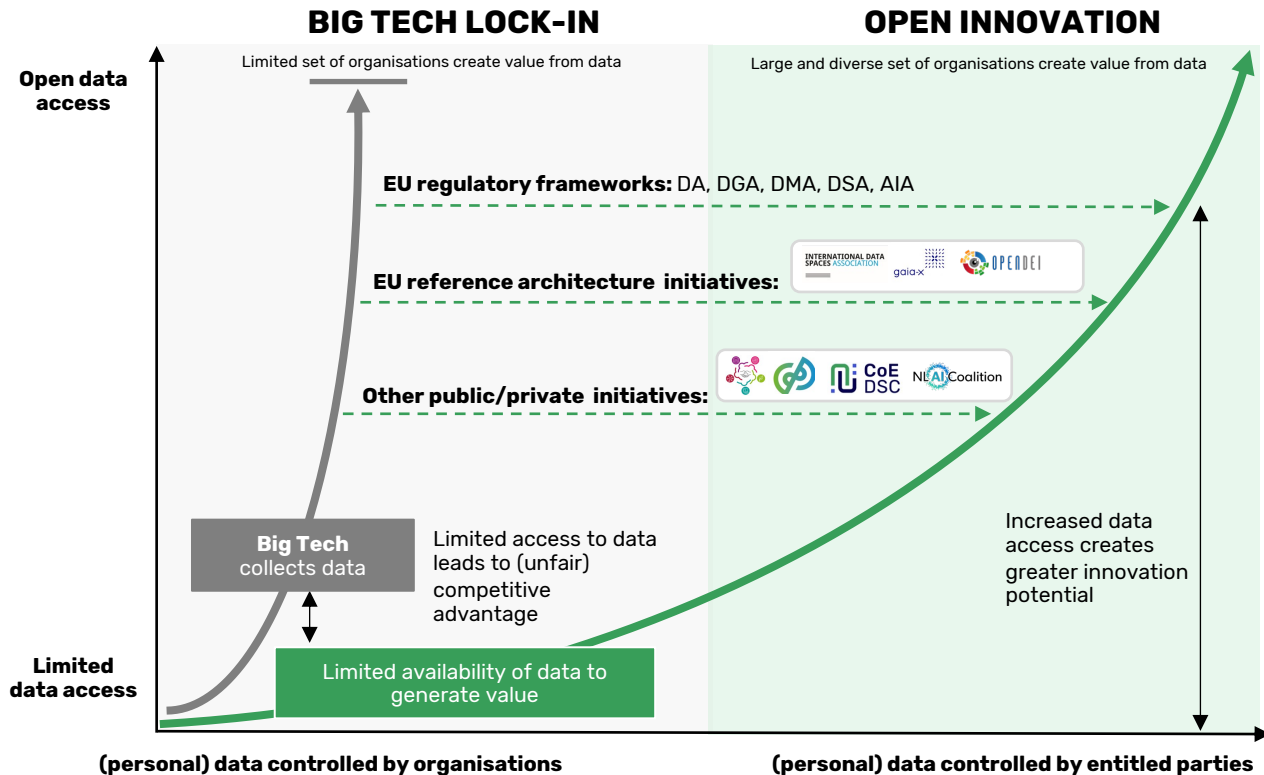
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Proposed next steps for CoE-DSC

	Key learning	Proposed next steps	Track
Next steps for CoE	• Supply side is developing, but market demand for services is still limited, hampering data space adoption	• Set-up use cases where SPs and end-users directly work together in one environment to create tangible results • Create insight in demand for data sharing services through another research effort amongst public/private organisations	Data Spaces
	• SPs predominantly monitor forthcoming EU regulation and do not anticipate on opportunities beyond compliance	• Evaluate the potential value impact of forthcoming legislation per act and per SP category, not only for EU data strategy but also other legislation as well (e.g., ESG)	Data Spaces
	• The case for cloud switching is clear for SPs and their customers	• Develop whitepaper/position paper describing different interoperability/switching scenarios for cloud services, with focus on standardisation and interoperabililty • Develop / or participate in tests and proof of concepts to gain experience and bring back results to cloud SPs (local)	Harmonisation
	• Service building block model is validated by SPs and could be re-used as model for future work of CoE-DSC.	• Present results market research to CoE-DSC community to address a broader audience of SPs • Use service block model as structure on website to categorise SPs and support supply and demand matching	Community

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EU initiatives support innovation in data sharing to generate new value

BIG TECH LOCK-IN

OPEN INNOVATION

Limited set of organisations create value from data

Large and diverse set of organisations create value from data

Open data access

Limited data access

EU regulatory frameworks: DA, DGA, DMA, DSA, AIA

EU reference architecture initiatives:

INTERNATIONAL DATA SPACES ASSOCIATION   gaia-x   OPENDEI

Other public/private initiatives:

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Big Tech collects data

Limited access to data leads to (unfair) competitive advantage

Limited availability of data to generate value

Increased data access creates greater innovation potential

(personal) data controlled by organisations

(personal) data controlled by entitled parties

Explanation

→ Control over personal data lies in the hands of a few large Big Tech corporations. Neither the generators of the personal data nor data owners have an equal shot to reap the benefits of data sharing

⇢ EU regulatory drivers, and public and private initiatives reduce data monopolisation, initiate data exchange and lowers barriers for market parties and individuals to share data under EU values.

→ As a result, data sharing stimulates innovation and economic returns from data which are distributed more fairly among various market parties and individuals

Source: INNOPAY analysis based on IMEC, Universiteit Gent

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Forthcoming EU regulations aim to regulate increased data availability, access and portability

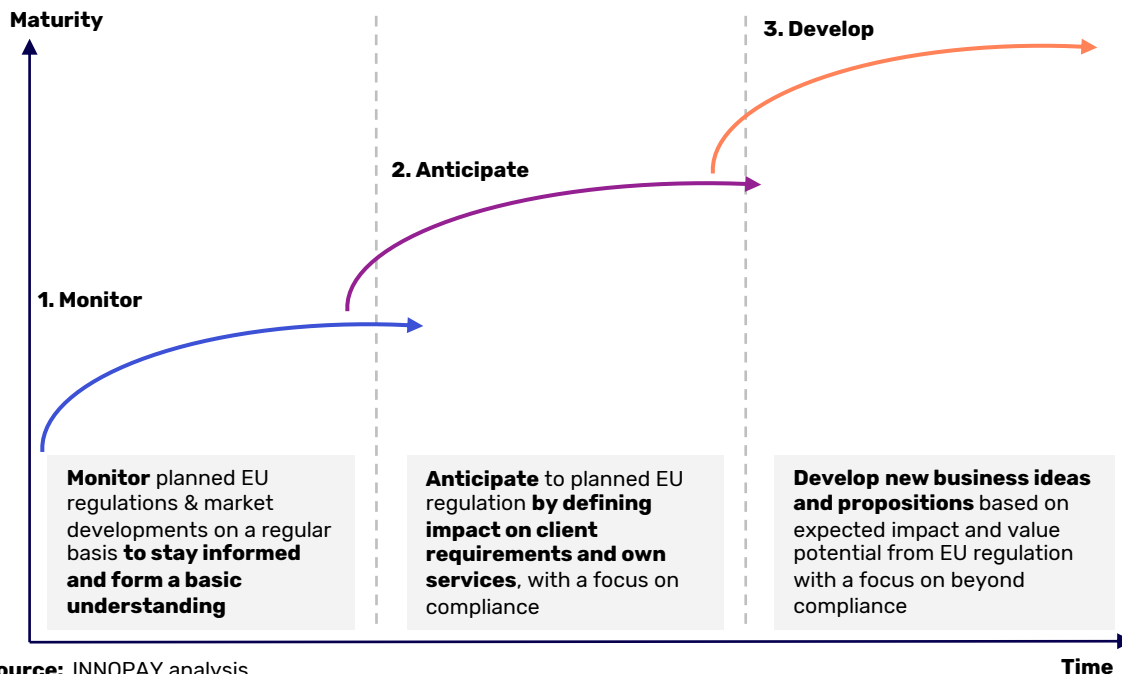|	**Data Governance Act**	**Data Act**	**Digital Services Act**	**Digital Markets Act**	**Artificial Intelligence Act**
What is the rationale?	Aims to boost data sharing by establishing intermediary trust and making more data available	Aims to regulate access and portability of data in B2C, B2B & B2G relations	Aims to create an online environment that is safe for users, transparent, and free from discrimination	Aims to prevent "gatekeepers" from imposing unfair market conditions on its platform' users	Aims to manage associated risks with development and use of AI in systems
What is in scope?	• Sets rules and conditions for the **data intermediary services (DIS)** to facilitate interoperable data sharing • Facilitates **re-use of protected public data** for the public interest (e.g., pandemic) • Facilitates **data altruism** (i.e. voluntarily sharing data without any reward) through designated services	• Facilitates **IoT data portability** from devices to users and mandated 3rd parties • **Mandates B2G data sharing** in situations of exceptional need (e.g., pandemic, natural disaster) • Facilitaties **switching between cloud services** • **Addresses unfair contractual terms** on access and portability of data (between SPs and their customers)	• Sets **rules** for online platforms' **to report on any type of abuse on online platforms** (e.g., illegal content) • Defines new **obligations for effective interventions to protect users** on online platforms	• Obligates gatekeepers (e.g., Spotify, Amazon) to **facilitate data portability** for data generated on its **core platform** • Rules for **data and service interoperability** (e.g., message from Signal to Whatsapp) • Rules for **advertisement transparency** for users and advertisers • Rules for gatekeepers to **not prioritise their offerings** over others	• Classification of risks • Rules for **free use of "minimal-risk AI"**. This includes applications such as AI-enabled video games or spam filters • Rules to make sure "**high-risk" AI systems more robust** and deliver reliable outcomes • Rules for **banning "high-risk" AI** systems considered a clear **threat** to society

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New regulations are / or will soon go into force, members states are currently prepraring for adoption

EU Data Strategy legislation timelines

| 2020 | 2021 | 2022 | 2023 | 2024 |

Data Governance Act (DGA)
25 Nov · 16 May · 3 Jun · 23 Jun · 24 Sep

Digital Services Act (DSA)
15 Dec · 4 Oct · 27 Oct · 16 Nov · 1 Jan

Digital Markets Act (DMA)
15 Dec · 18 Jul · 13 Oct · 1 Nov · 2 May · Aug '24

Application period subject to gatekeeper designation process

Artificial Intelligence Act (AIA) — Proposal phase
21 Apr

Data Act (DA) — Proposal phase
23 Feb

Today

Legend:
- EC proposal
- EC acceptance
- Legislation published
- Legislation into force
- Period for MS to adopt legislation

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SPs take on 3 responses to planned regulatory developments : monitor, anticipate and develop

Response model regulatory developments & initiatives

Maturity

3. Develop

2. Anticipate

1. Monitor

Monitor planned EU regulations & market developments on a regular basis **to stay informed and form a basic understanding**

Anticipate to planned EU regulation **by defining impact on client requirements and own services**, with a focus on compliance

Develop new business ideas and propositions based on expected impact and value potential from EU regulation with a focus on beyond compliance

Time

Examples of concrete actions by SPs

Monitor

- SPs task employees to monitor planned regulation
- Monitoring entails following regulations and (public) initiatives on a periodic basis by reading updates via established channels (e.g., EC website , news articles, and webinars).

Anticipate

- SPs task employees to anticipate to planned EU regulation by participating in lobby groups or defining compliance impact on own services and propositions
- Lobbying in groups (e.g., trade boards) entails direct communication with EC to negotiate definitions, outcomes and actual texts prior to implementation

Develop

- Preparing for compliance could entail applying for required licences to offer services in EU.
- SPs task employees to define new business opportunities as a result from planned EU regulation to position the company ahead of competitors in domain of data sharing, and in particular data spaces.
- This could include research and development, prototyping and developing new technology and services

Source: INNOPAY analysis

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SPs in general monitor forthcoming EU Data Strategy regulations, only outcomes of Data Act are anticipated for

During the interview 5 regulatory packages from EU Data Strategy were explained & responses were validated by participating SPs:

Regulation	Response SPs	Explanation response and examples from interviews
Data Governance Act	Monitor	Overall, SPs are not aware of the contents of DGA (e.g., concepts of data altruism or data intermediary services), nor do they consider this yet as an opportunity for them as a service provider or for their clients.
Data Act	Anticipate	**With regards to Internet of Things (IoT) data portability:** • SPs understand that heavily impacted industries aim to be excluded from mandated data sharing of IoT data (e.g., automotive, agri). **With regards to cloud switching:** • SPs with cloud offerings that are affected by mandated cloud switching and portability requirements actively participate in lobby groups to direct the outcomes (e.g., performance, standardization, implementation costs). • Small SPs with cloud offerings recognize cloud switching as a customer requirement and develop offerings (e.g., multi-cloud strategies, geolocation, sustainable CPU) that facilitate the interoperability of cloud providers by using standardised open-source technology.
Digital Services Act	Monitor	SPs are not directly affected by DSA but promote the implementation of DSA to halt further lock-in effect of big tech companies.
Digital Markets Act	Monitor	SPs monitor DMA based on the data potential that it unlocks by creating new network effects and data sharing transactions
Artificial Intelligence Act	Monitor	Overall, SPs are not aware of the exact contents of AIA but monitor developments.

During the interview, several other regulatory packages were mentioned by SPs: Non-exhaustive

Regulation	Response SPs	Explanation response and examples from interviews
ESG-related (CSRD, CSDDD)[1]	Develop	One SP focuses on developing services related to ESG-related regulation (e.g., unlocking peer-to-peer ESG data exchange).
GDPR	Develop	MPC providers strongly focus on developing services for data collaboration while preserving privacy (GDPR)
Cyber Resilience Act	Anticipate	Some SPs anticipate on CRA regulation by preparing client's services, solutions and products for proposed cybersecurity rules.
NIS2 directive	Anticipate	Some SPs anticipate on NIS2 regulation by preparing their own and client's services for proposed requirements for cyber risk management, penetration testing, incident response and remediation.

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SPs primarily monitor (semi-)public initiatives, Dutch cloud providers see value in initiatives for standardisation & innovation

During the interview 7 initiatives were presented & responses were validated by participating SPs:

	EC initiatives with funding from DIGITAL Europe Programme:				Public/private reference architecture initiatives:		
				Non-exhaustive			Non-exhaustive
Rationale	**European Common Data Spaces**	**SIMPL**	**Alliance for Industrial Data, Edge and Cloud**	**Data Spaces Support Centre**	**International Data Spaces Association**	**Open DEI**	**Gaia-X**
	Ensure that more data becomes available for use in the economy and society	Develops common middleware that enables cloud-to-edge federations	Brings together stakeholders in cloud and edge to jointly define strategic investment roadmaps	Boosts the development of interoperable data spaces by investigating the need for data spaces	Develops data space reference architecture to make data sharing interoperable	Stimulate alignment between EU data space architecture, platforms and pilots	Develops an ecosystem where data can be shared and accessed in a secure setting
Response SPs	Monitor				Monitor		Anticipate
Explanation response	• SPs monitor EU initiatives that emerge from EU DIGITAL Europe Programme but this is rarely translated into concrete activity within the organisation. • Some SPs indicate that EU initiatives funded by EU Digital Europe Programme would benefit from direct collaboration with market players to ensure tangible outcomes.				• Most SPs but monitor public and private developments from a distance. • Some SPs are actively involved in Gaia-X. Especially for smaller cloud SPs, Gaia-X could further leverage their business and support innovation and developments in cloud services.		

Source: INNOPAY analysis

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SPs monitor or participate in Dutch data space initiatives, concerns are raised over end-user adoption

During the interview an overview of Dutch data space initiatives and key figures were presented & responses were validated by participating SPs:

Dutch data spaces in development - categorised per sector / theme

Non-exhaustive
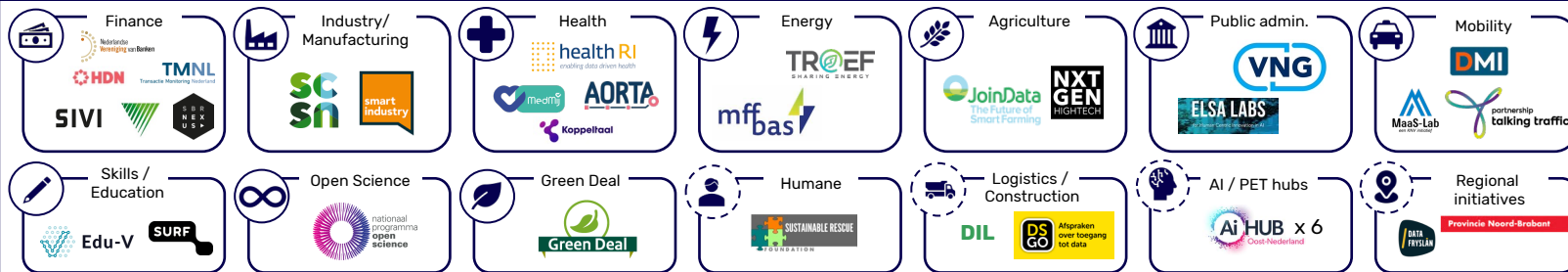
Key figures from desk research	• **50 data space initiatives in NL.** Currently, about 50 data space initiatives are in development, and more are expected in the coming years. • **EU 400 mln of (public) funding was released for the development of data spaces**. Both the Dutch government and market parties fund the development of data space initiatives. Fundings are likely to increase through initiatives such as the National Growth Fund. Data space development time is estimated at a minimum of 5 years. • **0,3% of Dutch organisations currently support Data Space development.** Only about 0,3% of Dutch organisations (future end-users and SPs, counting for 2000) support the development of (at least) one data space initiative. Support remains limited to providing review input on designs and plans. • **450 Dutch organisations are currently connected to a 'live' Data Space.** Currently, about 450 Dutch organisations are connected to 'live' data spaces (mainly connected with HDN and SCSN)
Response SPs	Monitor
Explanation response	• Few SPs are currently directly involved in the development of Dutch data space initiatives. Reasons for the little involvement of SPs can include a lack of awareness and understanding of existing data spaces or too premature development stadium of existing data spaces for SPs to deliver value. • Those SPs that are involved, aim to gain a competitive advantage from the very start. • All SPs consider end-users' participation key to success, adoption and scaling data space initiatives.

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SPs confirm rise of two market segments for data spaces: end users and authorities

1

Data Space End-user

2

Data Space Authority

	Data Space End-users are the organisations that participate in a data spaces (or similar concepts) through their trusted cloud environment by adhering to agreements and transacting data as either a Data Service Consumer or Data Service Provider.	Data Space Authority is the entity that acts as a governing body on behalf of data space participants and manages and maintains the agreements and network. This includes monitoring compliance and settling disputes to facilitate participants in data sharing.
Market segment		

	SPs connect end-users with data space networks through their trusted cloud environment (e.g., IaaS, PaaS). This implies adhering to relevant agreements as defined by the data space authority.	SPs support authorities with defining the trust agreements and operationalise and manage the data spaces. In addition, SPs provide authorities the intermediary services and connectivity to (federated) cloud infrastructure to support data sharing use cases
Service provider role		

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At least 5 types of data space service blocks are identified to define, realise and manage data spaces

High-level model data space service building blocks

Data Space Authority

Governance **1**

Connector **4**

Intermediary **2**

Connector

End-user **5**

End-user

3

Software-as-a-service

Platform-as-a-service

Infrastructure-as-a-service

☁ **Federated cloud**
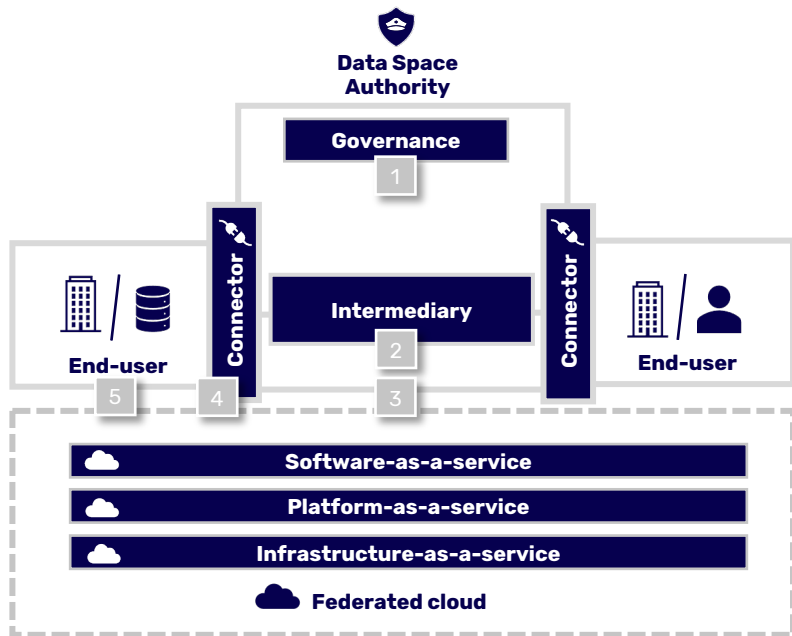
Explanation

Service building blocks for data space authorities:

1 **Governance**: Support with defining the BLOFT[1] agreements for the design, operationalisation and governance of data spaces

2 **Intermediary**: Provide technical and functional components to host and facilitate trusted data sharing between participants.

3 **Federated cloud**: Provide technical, functional components and the governance structure to establish a trust cloud infrastructure in which there is a choice of interoperability, portability and services to meet specific demands and use cases for cloud use (e.g., geo-location, multi-cloud strategy).

For end-users:

4 **Connector**: Implement connector to facilitate execution of trusted data exchange among participants in line with agreed usage control policies

5 **Data & cloud readiness**: Ensure that (existing) data & cloud services are ready and compatible to facilitate data sharing use cases

Learnings from interviews:
• SPs validated building blocks and d model
• SPs do see some overlap between services in practice (e.g., connector with intermediary services)
• Also, SPs provide services under different labels but with similar characteristics
• Model does not show difference between sectoral and cross-sectoral domains

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CONCEPT

Inquiry among interviewed SPs shows a growing range of services relevant for data spaces

Services offered by SPs

Service building blocks	Examples of offerings in use or in development	Interviewees
Governance: Support for defining the BLOFT agreements for the design, operationalisation and governance of data spaces	Offerings around Business and Legal services such as: ✓ Strategy & advisory services to define trust framework (e.g., membership registry, automated onboarding tools) ✓ Legal advisory services for compliance assessment (e.g., DPIA) or sector-specific compliance (e.g., E-Act)	VISMA, amsix, centric
Intermediary: Provide technical and functional components to host and facilitate trusted data sharing among participants.	Offerings around Operational and Functional components: ✓ IAA management tools (e.g., DID, DAPS (VC/VP), ParIS) ✓ Publish and query tools (e.g., metadata broker, vocabulary hub, clearing house) ✓ Taxonomy and ontology tools & services ✓ App stores ✓ Orchestration services (e.g., PETs) ✓ Audit & compliance tools ✓ Policy registry tools	kpn, RosemanLabs, VISMA, centric
Connector: Implement connector to facilitate execution of trusted data exchange among participants in line with agreed usage control policies	Offerings around Technical components: ✓ Build-in cybersecurity services ✓ Build-in intermediary services ✓ Build-in baseline interoperability services for advanced data usage (e.g., fo, AI, or federated learning) ✓ Integration services to apply connectors within existing software packages	SOVITY, VISMA
Data & cloud readiness: Ensure that (existing) cloud services are ready and compatible to facilitate data sharing use cases in data spaces	Offerings around Cloud services for end-users: ✓ Strategy & advisory services for data literacy (i.e., support with an interpretation of data), data governance, data quality, data migration, multi-cloud or (hybrid) cloud transition ✓ Implementation & integration services for data quality and data migration ✓ Taxonomy and ontology tools & services for internal data & cloud management ✓ (Cloud) managed services & support services for data management, data quality, cloud infrastructure & security	centric, VISMA
Federated cloud: Facilitate connectivity to federated cloud infrastructure to meet specific demands and use cases for cloud use.	Offerings around Federated Cloud for authorities: ✓ Cloud processing capabilities for data apps (e.g., for formatting/mapping or locally executing AI algorithms)	VISMA, ORACLE, iNTERCONNECT, leafcloud

Source: INNOPAY & TNO analysis   **Note:** KPN is foremostly focussed on hosting services and components

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Proposed next steps for CoE-DSC

Next steps for CoE

	Key learning	Proposed next steps	Track
	• Supply side is slowly developing, but market demand for services is still limited hampering adoption.	• Set-up use cases where SPs and end-users directly work together in one environment to create tangible results • Create insight in demand for data sharing services through another research effort amongst public/private organisations	Data Spaces
	• SPs predominantly monitor forthcoming EU regulation and do not anticipate on opportunities beyond compliance	• Evaluate the potential value impact of forthcoming legislation per act and per SP category, not only for EU data strategy but also other legislation as well (e.g., ESG)	Data Spaces
	• The case for cloud switching is clear for SPs and their customers	• Develop whitepaper/position paper describing different interoperability/switching scenarios for cloud services, with focus on standardisation and interoperabililty • Develop / or participate in tests and proof of concepts to gain experience and bring back results to cloud SPs (local)	Harmonisation
	• Service building block model is validated by SPs and could be re-used as model for future work of CoE-DSC.	• Present results market research to CoE-DSC community to address a broader audience of SPs • Use service block model as structure on website to categorise SPs and support supply and demand matching	Community

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1. Management summary

2. SPs response to EU initiatives

3. SPs position in emerging data space landscape

4. Next steps for CoE-DSC

5. **Appendix**

   1. Classification services required for development & realisation data spaces

   2. Current offerings by individual service providers

Governance services support with defining agreements for the operationalisation and management of data spaces
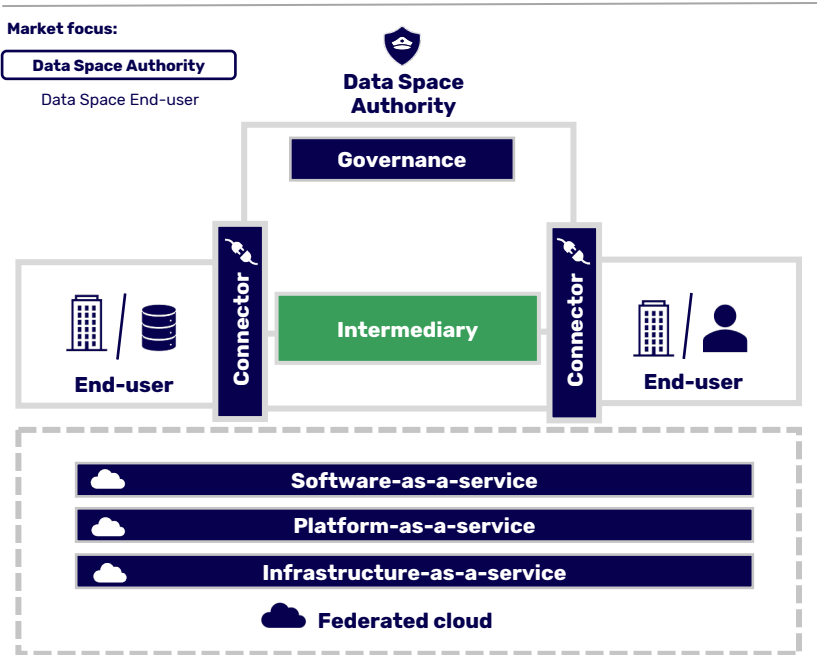
Model

Market focus:

Data Space Authority

Data Space End-user
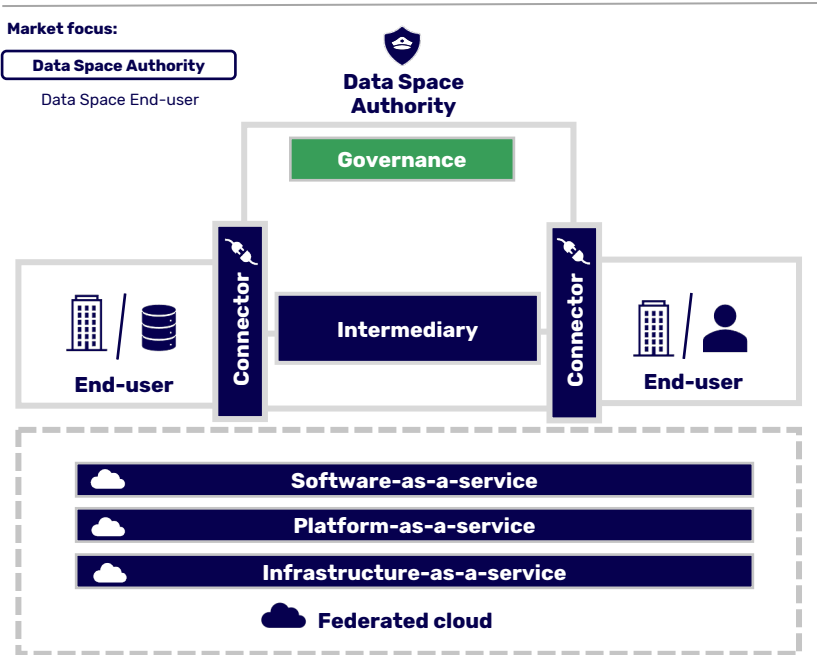
Description

Definition service type	Support for with defining the BLOFT[1] agreements for design, operationalisation and governance of data spaces
Sub-service types	Non-exhaustive list of examples of governance services
Business	• Strategy & advisory services to define trust framework (e.g., membership registry, automated onboarding tools
Legal	• Legal advisory services for compliance assessment (e.g., DPIA) or sector-specific compliance (e.g., E-Act)
Operational	
Functional	
Technical	
Cloud	

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Intermediary services support with functional and technical components to host trusted data sharing in data spaces

Model

Market focus:

Data Space Authority

Data Space End-user

Description

Definition service type	Provide technical and functional components to host and facilitate trusted data sharing participants.
Sub-service types	Non-exhaustive list of examples of intermediary services
Business	
Legal	
Operational	
Functional	• IAA management tools (e.g., DID, DAPS (VC/VP), ParIS) • Publish and query tools (e.g., metadata broker, vocabulary hub, clearing house) • Taxonomy and ontology tools & services • App stores
Technical	• Orchestration services (e.g., PETs) • Audit & compliance tools • Policy registry tools
Cloud	

Federated cloud services facilitate interoperable computing services in data spaces to match end-users needs

Model

Market focus:

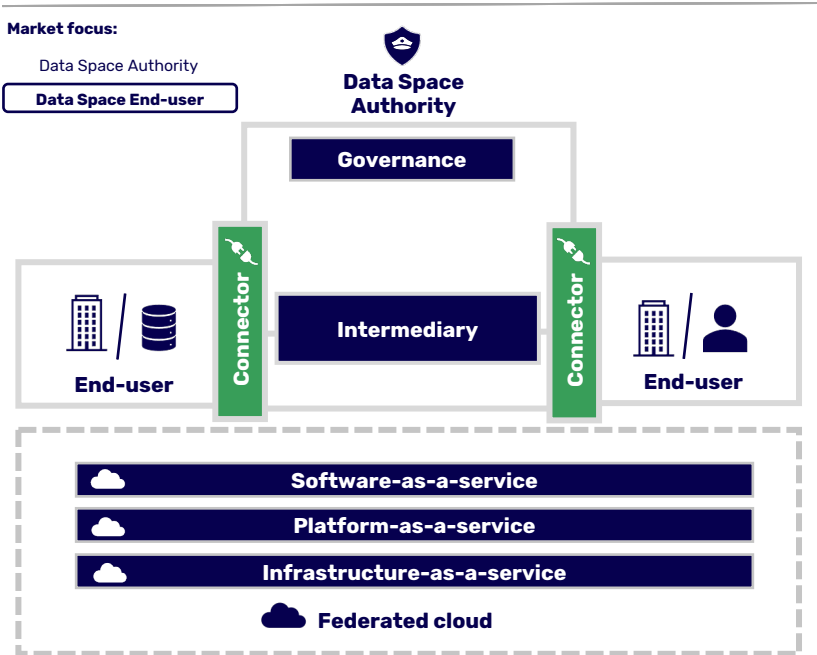Data Space Authority

Data Space End-user

Description

Definition service type	Provide technical, functional components and the governance structure to establish a trust cloud infrastructure in which there is a choice of interoperability, portability and services to meet specific demands and use cases for cloud use (e.g., geo-location, multi-cloud strategy).
Sub-service types	Non-exhaustive list of examples of federated cloud services
Business	
Legal	
Operational	
Functional	
Technical	• (Cloud) processing (computing) capabilities for data apps, e.g., for data apps for managing semantics (format conversion or mapping) or for locally executing AI-algorithms based on Federative Learning or secure MPC
Cloud	

Source: INNOPAY & TNO analysis
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Connector services implement critical connector component to facilitate trusted data sharing in data spaces

Model

Market focus:

Data Space Authority

| Data Space End-user |

Data Space Authority

Governance

Connector   **Intermediary**   **Connector**

End-user   **End-user**

Software-as-a-service

Platform-as-a-service

Infrastructure-as-a-service

Federated cloud

Description

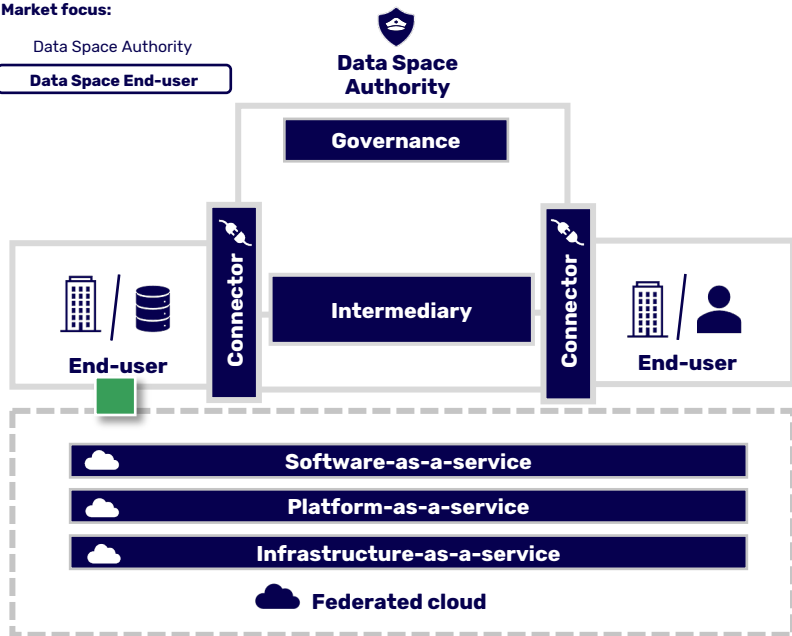| Definition service type	Implement (IDS ready) connector component to facilitate trusted data exchange using container technology
Sub-service types	**Non-exhaustive list of examples of connector services**
Business	
Legal	
Operational	
Functional	
Technical	Generic services: • Build-in cybersecurity services Value-added services: • Build-in intermediary services • Build-in baseline interoperability services for advanced data usage (e.g., fo, AI, or federated learning) • Integration services to apply connectors within existing software packages
Cloud	

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Cloud-readiness services ensure that end-users internal systems are able to integrate with data spaces

Model

Market focus:

Data Space Authority

Data Space End-user

Data Space Authority

Governance

Connector

Intermediary

Connector

End-user

End-user

Software-as-a-service

Platform-as-a-service

Infrastructure-as-a-service

Federated cloud

Description

Definition service type	Ensure that (existing) cloud services are ready and compatible to facilitate data sharing use cases
Sub-service types	Non-exhaustive list of examples of cloud-readiness services
Business	
Legal	
Operational	
Functional	
Technical	
Cloud	• Strategy & advisory services for data literacy (i.e., support with an interpretation of data), data governance, data quality, data migration, multi-cloud or (hybrid) cloud transition • Implementation & integration services for data quality and data migration • Taxonomy and ontology tools & services for internal data & cloud management • (Cloud) managed services & support services for data management, data quality, cloud infrastructure & security

CoE DSC

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3. SPs position in emerging data space landscape

4. Next steps for CoE-DSC

5. **Appendix**

    1. Classification services required for development & realisation data spaces

    2. Current offerings by individual service providers

One-pager assessment framework Service Provider

Section with company information

Section to assess current data space type of services and/or opportunities for future during interviews

Name	< Name company >	< Logo company >
General info	< General information of company >	
Current proposition	< List current propositions in Data Spaces segment >	
Footprint	Global / Europe / Netherlands	

Sector focus: Industrial, Health, Agriculture, Mobilitiy, Green deal, Energy, Public, Finance, Skills, EU OSC[1]

Initiatives	< List participating data-sharing initiatives >

Market focus	**End users** (DSP, DSC)		**Data space authority**	
Service type	**Cloud services**	**Connector**	**Intermediary**	**Governance**

Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)

Business	**Strategy development support** (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)	**Support with branding & marketing**	
Legal	**Support designing & managing legal governance**	**Support on defining impact of applicable (domain-specific) rules & regulation**	**Support on developing legal arrangements** for participant onboarding & network participation
Operational	**Support on operational governance** for management of agreed service levels & procedures	**Support with toolings or automation** for monitoring incidents, testing, tracking & tracing and auditing data transactions	
Functional	**Defining & managing identity management**	**Support with UX designs & customer journey flows**	**Defining & implementing privacy features or Privacy-Enhancing Technology (PET)**
Technical	**Defining & implementing technical specifications for data transactions** (e.g., clearing, broker, ontology, taxonomy)	**Support with defining and implementing security features**	
Cloud	**Support to ensure end-user's system readiness**	**Support for federative cloud interoperability**	

Source: INNOPAY analysis

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One-pager assessment for Oracle

ORACLE

Market focus	End users (DSP, DSC)		Data space authority	*Validated*
Service type	Cloud services	Connector	Intermediary	Governance (**)

Name	Oracle Corporation (Austin)	**ORACLE**
General info	Oracle is a cloud technology company that provides organizations around the world with computing infrastructure and software to help them innovate, unlock efficiencies and become more effective. Oracle has 3 main focus areas: Oracle Cloud Infrastructure, Oracle Cloud applications and Oracle Global Business Units dedicated to Oracle's industry-specific solutions.	
Current proposition	Oracle provides the infrastructure and data management platform services for a data space provider (Systems Integrator) to assemble robust and secure solutions in a sovereign cloud environment.	

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobilitiy	Green deal
	Energy	Public	Finance	Skills	EU OSC[1]

Initiatives	(European Health Data Space) Gaia-X participant

Assessment framework specification of services
(either provided already by SP or considered an opportunity by SP)

Business	**Strategy development support** (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)	**Support with branding & marketing**	
Legal	**Support designing & managing legal governance**	**Support on defining impact of applicable (domain-specific) rules & regulation**	**Support on developing legal arrangements** for participant onboarding & network participation
Operational	**Support on operational governance** for management of agreed service levels & procedures	**Support with toolings or automation** for monitoring incidents, testing, tracking & tracing and auditing data transactions	
Functional	**Defining & managing identity management**	**Support with UX designs & customer journey flows**	**Defining & implementing privacy features or Privacy-Enhancing Technology (PET)**
Technical	**Defining & implementing technical specifications for data transactions** (e.g., clearing, broker, ontology, taxonomy)	**Support with defining and implementing security features**	
Cloud	**Support to ensure end-user's system readiness**	**Support for federative cloud interoperability**	

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CoE DSC

One-pager assessment for Sovity

Validated

Market focus	End users (DSP, DSC)		Data space authority	
Service type	Cloud services	Connector	Intermediary	Governance

Name	Sovity GmbH (Dortmund)	SOVITY
General info	Sovity GmbH is a Fraunhofer's spin-off to establish Data Space technology across the globe.	
Current proposition	• Sovity Connector-as-a-Service • Sovity Data space-as-a-Service	
Footprint	Global / Europe / Netherlands	
Sector focus	Industrial · Health · Agriculture · Mobilitiy · Green deal · Energy · Public · Finance · Skills · EU OSC[1]	
Initiatives	Catena-X · Mobility Data Space · Sovity product · IDSA Reference Testbed	

Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)

Business	Strategy development support (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)		Support with branding & marketing
Legal	Support designing & managing legal governance	Support on defining impact of applicable (domain-specific) rules & regulation	Support on developing legal arrangements for participant onboarding & network participation
Operational	Support on operational governance for management of agreed service levels & procedures		Support with toolings or automation for monitoring incidents, testing, tracking & tracing and auditing data transactions
Functional	Defining & managing identity management	Support with UX designs & customer journey flows	Defining & implementing privacy features or Privacy-Enhancing Technology (PET)
Technical	Defining & implementing technical specifications for data transactions (e.g., clearing, broker, ontology, taxonomy)		Support with defining and implementing security features
Cloud	Support to ensure end-user's system readiness		Support for federative cloud interoperability

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One-pager assessment for Visma

VISMA

Validated

Name	Visma Connect B.V. (Oslo)	VISMA
General info	Visma is a Norwegian software group that mainly offers SaaS solutions to companies and governments	
Current proposition	• Visma Connect – Accountability Reporting • Visma Connect – Sustainability Reporting • Solutions: Data Exchange, Taxonomies and Portals	
Footprint	Global	Europe	Netherlands

Sector focus

Industrial	Health	Agriculture	Mobilitiy	Green deal
Energy	Public	Finance	Skills	EU OSC[1]

Initiatives	Logius tender for data sharing Gov't • ESG Clearing House • Taxonomy services for SBR

Market focus	End users (DSP, DSC)		Data space authority	
Service type	Cloud services	Connector	Intermediary	Governance

	Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)		
Business	Strategy development support (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)		Support with branding & marketing
Legal	Support designing & managing legal governance	Support on defining impact of applicable (domain-specific) rules & regulation	Support on developing legal arrangements for participant onboarding & network participation
Operational	Support on operational governance for management of agreed service levels & procedures	Support with toolings or automation for monitoring incidents, testing, tracking & tracing and auditing data transactions	
Functional*	Defining & managing identity management	Support with UX designs & customer journey flows **	Defining & implementing privacy features or Privacy-Enhancing Technology (PET)
Technical	Defining & implementing technical specifications for data transactions (e.g., clearing, broker, ontology, taxonomy)	Support with defining and implementing security features	
Cloud	Support to ensure end-user's system readiness	Support for federative cloud interoperability	

* Visma focuses on defining & managing semantic standardisation & harmonisation services.
** Visma offers support with UX designs & customer journey flows for reporting portals.

☐ = in scope

CoE DSC

One-pager assessment for KPN

Validated

Market focus	End users (DSP, DSC)		Data space authority	
Service type	Cloud services	Connector	Intermediary	Governance

Name	Koninklijke KPN (Rotterdam)	kpn
General infop	KPN develops IT-infrastructure services to enable data exchange between organisations and IoT-devices. In particular, KPN focuses on hosting and scaling functional and technical data sharing components as defined by Data Space Authorities.	
Current proposition	• KPN Data Services HUB • KPN IoT Services • KPN Health Exchange	

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobilitiy	Green deal
	Energy	Public	Finance	Skills	EU OSC[1]

Initiatives	TROEF (Energy) • weCity (Smart City) • SCSN (Industry) • DASLOGIS (Logistics) • NXT GEN HIGH TECH (Agriculture) • i4Trust (Smart Building) • Structura-x (GAIA-X)

	Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)		
Business	Strategy development support (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)	Support with branding & marketing	
Legal	Support designing & managing legal governance	Support on defining impact of applicable (domain-specific) rules & regulation	Support on developing legal arrangements for participant onboarding & network participation
Operational	Support on operational governance for management of agreed service levels & procedures	Support with toolings or automation* for monitoring incidents, testing, tracking & tracing and auditing data transactions	
Functional	Defining & managing identity management	Support with UX designs & customer journey flows	Defining & implementing privacy features or Privacy-Enhancing Technology (PET)
Technical	Defining & implementing technical specifications for data transactions* (e.g., clearing, broker, ontology, taxonomy)	Support with defining and implementing security features*	
Cloud	Support to ensure end-user's system readiness*	Support for federative cloud interoperability*	

* KPN focuses on hosting and scaling implementations on the infrastructure level.

☐ = in scope

CoE DSC

One-pager assessment for Centric

centric

Validated

Name	Centric (Gouda)	● centric
General info	Centric offers software & IT assessments, cloud infrastructure, industry-specific solutions, and an extensive portfolio of related services	
Current proposition	• Centric Data Exchange • Centric Cloud Journey	
Footprint	Global	Europe	Netherlands

Sector focus: Industrial, Health, Agriculture, Mobilitiy, Green deal, Energy, Public, Finance, Skills, EU OSC[1]

Initiatives	IPCEI CIS • Cloud Infrastructure Coalition (CIC) • Common Ground (VNG)

Market focus	End users (DSP, DSC)	Data space authority
Service sub type	Cloud services	Connector	Intermediary	Governance

Assessment support type: (either provided already by SP or in development by SP)

Business
- Strategy development* (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)
- Support with branding and marketing of initiative/ data space*

Legal
- Support on designing & managing legal governance*
- Support on defining impact of any applicable rules & regulation*
- Support with developing legal arrangements for onboarding & participation*

Operational
- Support on configurating operational governance for management of agreed service levels & procedures*
- Support with toolings or procedures to monitor incidents, test, track & trace and audit data transactions*

Functional
- Defining & managing identity management*
- Support with UX designs & customer journey flows of use cases*
- Defining & implementing privacy features or Privacy-Enhancing Technology (PET)*

Technical
- Defining & implementing technical support for data transactions (e.g., clearing, broker, taxonomy, connector)*
- Support with defining and implementing security features (e.g., fraud detection)*

Cloud
- Support to make end-user's system ready for data space connector(s)*
- Support for federative cloud interoperability*

* Centric focuses on the development, management and implementation of Cloud and PaaS/SaaS applications.

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CoE DSC

One-pager assessment for AMS-IX

Validated

Name	AMS-IX (Amsterdam)	amsix
General info	AMS-IX is involved with the consortium AMdEX. AMdEX is an innovation project fieldlab initiated by AMS-IX, SURF, UvA, DEXES & Amsterdam Economic Board. AMS-IX is the penholder of the steering group of AMdEX, whereas other parties are members of the consortium. The plan is to transfer to an operational facility this year.	
Current proposition	• AMdEX	

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobility	Green deal
	Energy	Public	Finance	Skills	EU OSC

Initiatives	travel/aviation – government - smart buildings & facility management – staffing statistics for different interacting organisations – logistics – patient data for research

Market focus	End users (DSP, DSC)		Data space authority	
Service type	Cloud services	Connector	Intermediary	Governance

	Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)		
Business	Strategy development support (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)		Support with branding & marketing
Legal	Support designing & managing legal governance	Support on defining impact of applicable (domain-specific) rules & regulation	Support on developing legal arrangements for participant onboarding & network participation
Operational	Support on operational governance for management of agreed service levels & procedures*		Support with toolings or automation for monitoring incidents, testing, tracking & tracing and auditing data transactions
Functional	Defining & managing identity management	Support with UX designs & customer journey flows	Defining & implementing privacy features or Privacy-Enhancing Technology (PET)
Technical	Defining & implementing technical specifications for data transactions (e.g., clearing, broker, ontology, taxonomy)		Support with defining and implementing security features
Cloud	Support to ensure end-user's system readiness		Support for federative cloud interoperability

* AMS-IX focuses on digital enforcement of data exchange agreements.

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CoE DSC

One-pager assessment for Roseman Labs

RosemanLabs
PRIVACY BY DESIGN

Validated

Name	Roseman Labs (Utrecht)	**Roseman**Labs PRIVACY BY DESIGN
General info	Roseman Labs is a start-up that offers a decentralised data analytics solution to enable data analysis across multiple parties without the need for these parties to expose sensitive source data. The solution uses MPC to provide strong data-privacy properties. The software is characterized by very low computational overhead resulting in the possibility to perform complex operations on datasets of up to hundreds of millions of records.	
Current proposition	• Virtual Data Lake (built on secure MPC)	

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobilitiy	Green deal
	Energy	Public	Finance	Skills	EU OSC[1]

Use cases	Cyber risk information sharing; Network optimisation using smart meter data; Benchmark studies to reduce gender pay gaps; Access of healthcare data for research

Market focus	End users (DSP, DSC)	Data space authority

Service type	Cloud services	Connector	Intermediary	Governance

	Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)		
Business	Strategy development support (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)	Support with branding & marketing	
Legal	Support designing & managing legal governance	Support on defining impact of applicable (domain-specific) rules & regulation	Support on developing legal arrangements for participant onboarding & network participation
Operational	Support on operational governance for management of agreed service levels & procedures	Support with toolings or automation for monitoring incidents, testing, tracking & tracing and auditing data transactions	
Functional	Defining & managing identity management	Support with UX designs & customer journey flows	Defining & implementing privacy features or Privacy-Enhancing Technology (PET)
Technical	Defining & implementing technical specifications for data transactions (e.g., clearing, broker, ontology, taxonomy)	Support with defining and implementing security features	
Cloud	Support to ensure end-user's system readiness	Support for federative cloud interoperability	

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CoE DSC

One-pager assessment for Leafcloud

Validated

Market focus	**End users** (DSP, DSC)	**Data space authority**

Service type	**Cloud services**	**Connector**	**Intermediary**	**Governance**

Name	Leafcloud (Amsterdam) — leafcloud
General info	Leafcloud is an Amsterdam-based environmentally friendly cloud infrastructure provider
Current proposition	• Leafcloud Cloud servers • Leafcloud Networking • Leafcloud Storage • Leafcloud Kubernetes

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobilitiy	Green deal
	Energy	Public	Finance	Skills	EU OSC[1]

Data space initiatives	

Assessment framework specification of services
(either provided already by SP or considered an opportunity by SP)

Business	**Strategy development** (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)	**Advice on branding & marketing**
Legal	**Advice on designing & managing legal governance** / **Advice on applicable (domain-specific) rules & regulation**	**Advice on legal arrangements** for participant onboarding & network participation
Operational	**Support or advice on operational governance** for management of agreed service levels & procedures	**Support with toolings or automation** for monitoring incidents, testing, track & trace, auditing data transactions
Functional	**Defining & managing identity management** / **Support with UX designs & customer journey flows**	**Defining & implementing privacy features or Privacy-Enhancing Technology (PET)**
Technical	**Defining & implementing technical specifications and for data transactions** (e.g., clearing, broker, ontology, taxonomy)	**Support with defining security features** (e.g., identity assurance)
Cloud	**Support and advice for end-user's system readiness***	**Support for federative cloud interoperability***

* Leafcloud focuses on **hosting** and **scaling implementations** on the infrastructure level.

= in scope

CoE DSC

One-pager assessment for Interconnect

INTERCONNECT

Validated

Market focus	End users (DSP, DSC)		Data space authority	
Service type	**Cloud services**	**Connector**	**Intermediary**	**Governance**

	Interconnect Services B.V. ('s-Hertogenbosch)	iNTERCONNECT
Name		
General info	Interconnect is a Dutch cloud infrastructure provider for ata & cloud centers.	
Current proposition	• Interconnect Datacenter • Interconnect Cloud	

Footprint	Global	Europe	Netherlands

Sector focus	Industrial	Health	Agriculture	Mobilitiy	Green deal
	Energy	Public	Finance	Skills	EU OSC[1]

Data space initiatives	Brainport Industries

	Assessment framework specification of services (either provided already by SP or considered an opportunity by SP)		
Business	**Strategy development** (e.g., roadmap, business case, value proposition, use cases, roles & responsibilities)		**Advice on branding & marketing**
Legal	**Advice on designing & managing legal governance**	**Advice on applicable (domain-specific) rules & regulation**	**Advice on legal arrangements** for participant onboarding & network participation
Operational	**Support or advice on operational governance** for management of agreed service levels & procedures		**Support with toolings or automation** for monitoring incidents, testing, track & trace, auditing data transactions
Functional	**Defining & managing identity management**	**Support with UX designs & customer journey flows**	**Defining & implementing privacy features or Privacy-Enhancing Technology (PET)**
Technical	**Defining & implementing technical specifications and for data transactions** (e.g., clearing, broker, ontology, taxonomy)		**Support with defining security features** (e.g., identity assurance)
Cloud	**Support and advice for end-user's system readiness***		**Support for federative cloud interoperability***

* Interconnect focuses on **hosting** and **scaling implementations** on the infrastructure level.

☐ = in scope

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