

From Fragmentation to Alignment: Leveraging DSSM for Dataspace Interoperability

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1 Management summary

Dataspaces promise smarter collaboration across sectors and borders, but fragmentation is a growing risk. Similar problems are solved differently, lessons learned are hard to reuse, and overlapping initiatives compete for attention and funding. Too often, discussions jump straight to frameworks and tools instead of starting from a shared view on requirements. This makes convergence harder instead of easier.

The model is intended for policy makers, programme leads and architects who need a common frame to talk about direction, design choices and market development. The DSSM classifies items along two dimensions:

- Differentiation – generic (reusable across sectors and initiatives) versus specific (linked to a particular sector, use case or context).
- Dynamics – stable (mature and predictable) versus responsive (still evolving under regulation, technology or practice).

These dimensions create four quadrants (Common, Adaptive, Specialized, Unique – see Figure 2). Common covers mature, widely shared elements that should be standardised and reused. Adaptive contains generic but evolving elements where initiatives should keep requirements generic and signal direction to regulators and the market. Specialized groups stable, sector-specific needs that require tailored solutions with domain experts. Unique covers exploratory needs that have no mature solutions yet and demand co-design and innovation.

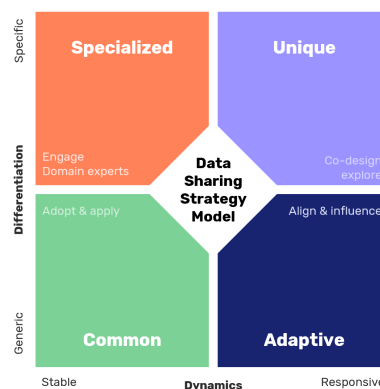


Figure 1 - DSSM Model

The strength of the DSSM is that it does not stop at requirements. It positions four elements in one model: requirements (what is needed), solutions (how needs are addressed), agreements (legal, semantic and governance arrangements) and market services (what providers actually offer). By mapping all four, it becomes visible where they are aligned and where gaps or misalignments exist. For example, in Identity & Attestation Management, national eIDs and contracts are largely Common, while EU-level eIDAS 2.0 wallets and trust frameworks are still Adaptive. The DSSM makes this tension between short-term national interoperability and long-term European convergence explicit. Practically, the DSSM helps:

- policy makers focus regulation, funding and standardisation on generic requirements and convergence paths;
- programme leads decide where to reuse, where interim solutions are acceptable and where joint innovation is needed;
- architects test solution fit, advise on alignment and provide structured input for decisions.

The key call to action is to establish a shared requirements baseline early in each programme and to use the DSSM to confront this with existing solutions, agreements and services. This creates a common view of the “as-is” and “to-be” situation and enables coordinated roadmaps instead of isolated choices.

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2 Introduction

Sharing data through dataspace offers opportunities for smarter collaboration across sectors and borders. At the same time, fragmentation is a real risk: similar problems are solved differently, lessons learned are hard to reuse, and a growing variety of partial solutions makes coordination and governance difficult.

In many initiatives, discussions jump quickly to preferred frameworks or tools without first agreeing on the underlying requirements. This solution-first approach makes convergence across programmes, sectors and countries harder instead of easier.

Purpose and audience

This document introduces a requirements-first way of thinking about interoperability in dataspace, supported by the Data Sharing Strategy Model (DSSM). The DSSM itself is explained in Section 2; here, it is enough to say that it provides a simple structure to position requirements and the solutions, agreements and market services around them. The document is intended for:

- policy makers who set direction and create enabling regulation and funding;
- programme and initiative leads who are responsible for designing and running dataspace;
- architects and experts who translate requirements into concrete designs and who need a common frame to compare frameworks, standards and services.
- Readers do not need prior knowledge of the DSSM; the model is introduced step by step and illustrated with concrete examples.

Scope and structure

The primary context is data space initiatives. When we distinguish between "generic" and "specific", or between "stable" and "responsive", we usually do so from a European perspective, while recognising that what is generic or stable in one country or sector may be specific or evolving in another. The rest of the document is organised as follows:

- Section 2 introduces the DSSM and its two dimensions, and explains the four quadrants at a high level.
- Section 3 shows how requirements, solutions, agreements and market services can be positioned in the DSSM, and uses Identity & Attestation Management as an example.
- Section 4 explains how different roles (policy makers, programme leads, architects) can apply the DSSM in practice.
- Section 5 links the DSSM to planning and execution, showing how a requirements baseline can be turned into roadmaps and actions.

3 The Data Sharing Strategy Model

The **Data Sharing Strategy Model (DSSM)** as depicted in Figure 1 was developed to bring clarity into discussions interoperability between data spaces. Too often, debates start with preferred solutions or frameworks, while the underlying requirements remain unclear. This leads to fragmentation, duplication, and slow progress.

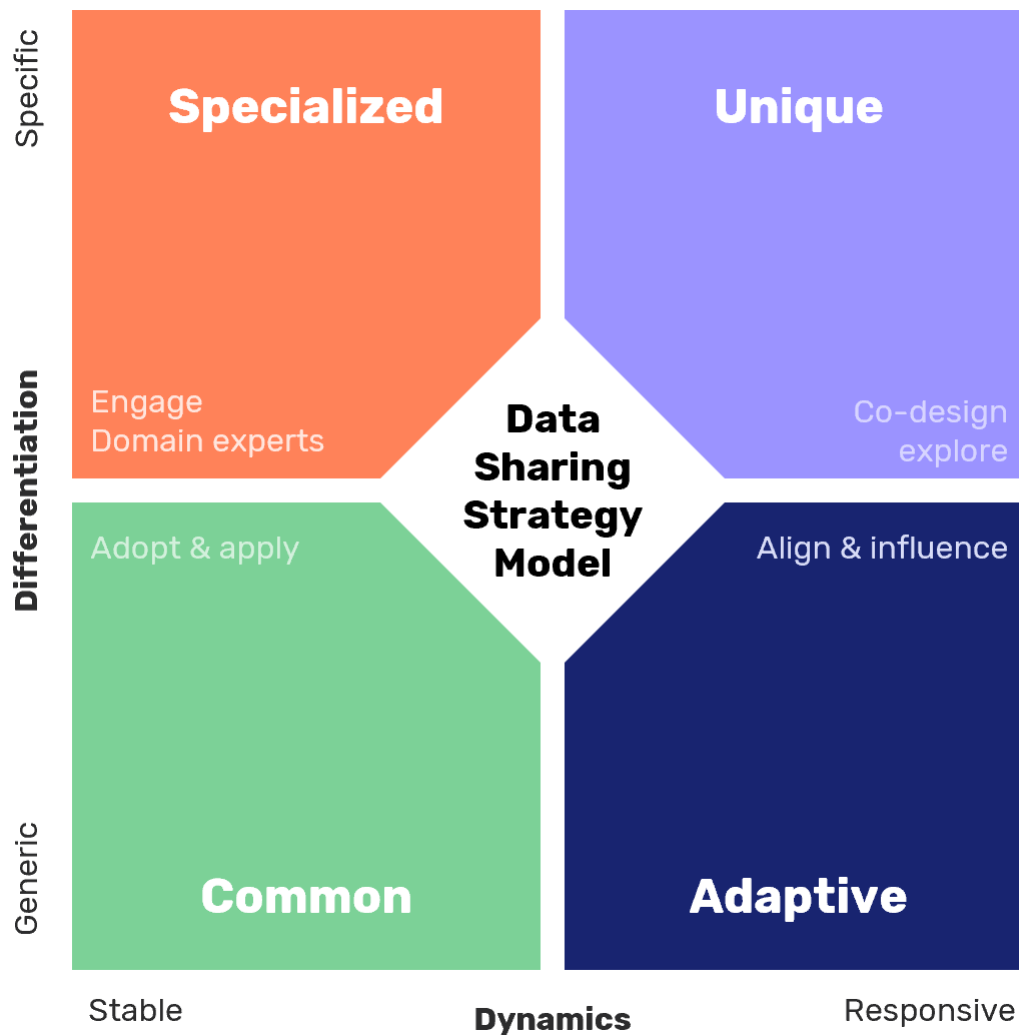


Figure 1 - DSSM Model

The DSSM addresses this by providing:

- **A common classification language for requirements, solutions, agreements and market services.** Stakeholders can classify consistently, reducing miscommunication between program leads, architects, and decision-makers.
- **A transparent way to expose overlaps, gaps, and misalignments.** By mapping requirements first, it becomes visible where initiatives face the same needs, where solutions exist, and where the market still falls short.
- **Guidance for decision-makers.** The model creates a structured, evidence-based way to discuss interoperability, balancing initiative autonomy with the need for convergence at sectoral, national, or international level.

The DSSM is not created from scratch. It is based on the **Multimodality Business Activity Model**¹, an academically grounded model that has been successfully applied in digital transformation contexts. The application to dataspace is comparable: both involve multiple stakeholders, evolving requirements, and the challenge of aligning solutions across contexts. For the DSSM, the model has been adjusted and refined to the dataspace context.

The DSSM classifies requirements, agreements, solutions, and market services along two dimensions:

- **Differentiation:** some elements are generic, applying broadly across initiatives or sectors and ideally reusable; others are specific, tied to a single initiative, sector, or local constraint and often requiring customization.
- **Dynamics:** some elements are stable, mature and unlikely to change in the short term; others are responsive, evolving due to regulation, technological change, or emerging practice.

Each quadrant of the DSSM has its own character. Understanding them helps program leads, architects, and policymakers to see what type of requirement they are dealing with, what kind of solution fits, and what role the market can play:

- **Common (Generic + Stable):** requirements that are broadly shared and mature. They lend themselves to reuse and standardization. Solutions in this quadrant are proven, widely adopted standards. The market typically already offers established services to cover them.
- **Adaptive (Generic + Responsive):** generic requirements that are still evolving. They are influenced by changing regulation, emerging practices, or new technologies. Solutions are not yet stable, and market services are often incomplete or experimental. Initiatives should keep the requirement generic and signal clearly to the market what direction is needed.
- **Specialized (Specific + Stable):** requirements that are stable but unique to a sector or initiative. Solutions are tailored and predictable, often supported by sector-specific practices. Market services in this quadrant are niche, targeted at a defined audience rather than reusable across many domains.
- **Unique (Specific + Responsive):** requirements that are unique and evolving, often in new or experimental areas. They demand co-design and close cooperation between stakeholders. Solutions are under active development, and market services rarely exist yet. Investments or joint innovation projects are usually required.

Context and scope are essential for interpreting this figure. What is considered generic in one domain or country may be specific in another, and what is stable today may become responsive tomorrow. Scope can be defined at the level of a sector, a nation, or internationally. In this document, we generally use a European context: this creates a shared frame across Member States and encourages initiatives to remain aware of international developments that can be leveraged in local or sectoral settings.

¹ [The Multimodal Business Activity Model: A tool to classify business activities to support decision-making in digital](#) (Sprokholt, Nieuwmeijer, 2024). Furthermore, intensively used in digital transformation programs by Anderson MacGyver

4 Confronting Requirements, Solutions, Agreements and Market Services in the DSSM

The strength of the DSSM is that it does not stop at requirements. It also positions agreements, solutions and market services in the same model. By mapping all three, it becomes clear where alignment exists and where gaps must be addressed.

- Requirements show what is needed, classified by differentiation (generic vs. specific) and dynamics (stable vs. responsive).
- Solutions show what approaches exist today: proven standards, emerging frameworks, or tailored components.
- Market services show whether vendors and communities already provide reliable offerings, whether only pilots exist, or whether services are missing entirely.
- Agreements show the legal, semantic, organizational, and governance arrangements that must be in place to make interoperability operational. These can be standardized and stable, evolving under regulation, sector-specific, or exploratory.

By confronting these four elements together, initiatives and policymakers can:

- **Reuse where possible (Common):** when requirements, solutions, services, and agreements are all aligned and mature, standardization and reuse are the logical path.
- **Adapt where needed (Adaptive):** when requirements are generic but solutions, agreements, or services lag behind, initiatives should keep requirements generic and signal to the market and regulators what direction is needed.
- **Implement predictably (Specialized):** when requirements are stable but specific to a sector or initiative, tailored solutions and sectoral agreements are valid, while documenting them for possible convergence in the future.
- **Co-design where unavoidable (Unique):** when requirements are unique and evolving with no mature services or agreements, multi-stakeholder exploration and innovation must be initiated.

In this way, the DSSM becomes a practical tool to identify the gap between the current and the target situation and, on that basis, to plan an evolution or roadmap for requirements, solutions, market services and agreements across the quadrants.

Figure 3 summarises the typical characteristics of each quadrant in a concrete example domain (identity and attestation). The columns describe:

- **Requirements:** what is needed in that quadrant.
- **Solutions:** the types of technical or organizational approaches currently used.
- **Market Services:** the availability and maturity of operational services from providers.
- **Agreements:** the legal, semantic and organizational arrangements that underpin trust and interoperability.

The examples are positioned from a European perspective and reflect the current situation (around 2025). In a future target situation (for example 2030), the same requirements, solutions, services or agreements might move to a different quadrant as they mature, become more widely reused, or are harmonised at European level.

Quadrant	Requirements	Solutions	Market Services	Agreements
Common (Generic + Stable)	Mature, broadly reusable, well-defined across initiatives. Example: National identity needs in domestic contexts.	Proven standards and widely adopted implementations. Example: National eIDs such as eHerkenning (NL), DigiD.	Established offerings with predictable availability. Example: National eID providers already deliver mature services.	Legal: standardized contracts and trust frameworks. Semantic: national attribute vocabularies. Organizational: stable governance of national schemes. Example: eHerkenning legal and governance frameworks.
Adaptive (Generic + Responsive)	Generic but evolving due to regulation, practice, or technology; not yet harmonised. Example: Cross-border identity verification under eIDAS 2.0.	Frameworks and tools still under development; partial and unstable. Example: EU IdentityWallet.	Pilot or partial services; vendors expected to mature them. Example: EU Wallet pilots across member states.	Legal: Personal- and Business Wallet obligations still in development. Organizational: National Accreditation Bodies not available Example: EBSI conformant wallets
Specialized (Specific + Stable)	Predictable but unique to a sector or initiative; detailed and stable. Example: Healthcare-specific digital ID formats.	Tailored implementations or sector-specific solutions. Example: UZI-pas for healthcare professionals in NL.	Niche offerings not reusable beyond the sector. Example: UZI services used only in Dutch healthcare.	Legal: sectoral compliance contracts. Semantic: healthcare-specific vocabularies. Organizational: governance boards in healthcare. Example: UZI trust and compliance structure.
Unique (Specific + Responsive)	Unique, changing, exploratory; not yet clearly defined. Example: Experimental cross-sector trust schemes.	Co-designed components under active development. Example: New governance models for multi-sector data exchange.	Market services absent; development requires joint investment. Example: No ready service for experimental cross-sector credentials.	Legal: bilateral MoUs or pilots. Semantic: experimental ontologies for interoperability. Organizational: ad-hoc coalitions without stable governance. Example: experimental multi-sector credentialing pilots.

Figure 2 - Characteristics of each DSSM quadrant

Example: DSSC Building Block: Identity & Attestation Management

As an example we use the DSSC Building Block: Identity & Attestation Management². This building block ensures that participants in a dataspace can be uniquely identified and that their identity and attributes can be attested in a trustworthy and verifiable way. It combines identity management (knowing who a participant is) with attestation (proving that certain claims about that participant are valid). Attestations can concern, for example, technical certification, organizational roles, or compliance with legal frameworks. Together, these mechanisms form the foundation for trusted interactions between organizations, systems, and services within and across dataspaces. In this example, all four DSSM elements – requirements, agreements, solutions and market services – can be positioned in the model. The core requirement is classified as Adaptive, one key solution is Common, and market services are split between Common (domestic) and Adaptive (EU pilots). Agreements reveal the same picture: Common at national level and Adaptive at EU level. This makes the misalignment between the current and the desired situation explicit: short-term services and contracts exist nationally, while long-term direction depends on further market development and European agreements. Decision-makers can use this mapping to identify the gap between “as-is” and

² <https://dssc.eu/space/BVE2/1071255737/Identity+&+Attestation+Management>

“to-be” and, on that basis, plan an evolution or roadmap that balances immediate interoperability with strategic European alignment and signals where new services and agreements are urgently needed.

Aspect	Description	Local context (NL)	EU context	Reasoning
Requirement	Organizations must be able to verify each other's identities before exchanging data.	Stable within national borders → Common (generic + stable).	Still evolving under eIDAS 2.0 → Adaptive (generic + responsive).	National requirements are clear and mature; EU-wide requirements are still being defined.
Agreements – Legal	Contracts and trust frameworks that define how identity is recognized.	Common: standardized legal agreements in national eID frameworks. Note: EORI has legal restrictions	Adaptive: new obligations under eIDAS 2.0 still being refined and implemented.	National contracts are proven; EU obligations are shared but not yet stable.
Agreements – Semantic	Attribute vocabularies that describe identity data.	Common: vocabularies for identity attributes are mature nationally (KvK and EORI, BSN).	Adaptive: attribute alignment across EU borders still under development.	National vocabularies are well-defined; EU-level semantics need harmonization.
Agreements – Organizational	Governance structures for identity schemes.	Common: stable governance models for national schemes.	Adaptive: federated governance for EU schemes still in design.	National governance is established; EU governance is incomplete and experimental.
Agreements – Overall	Legal, semantic, and organizational arrangements underpinning trust.	Common: stable national frameworks.	Adaptive: EU frameworks in evolution.	Agreements exist nationally but must converge at EU level to enable interoperability.
Solutions	Technical mechanisms to prove identity.	Common: national eIDs (eHerkenning, DigiD) are proven domestically.	Adaptive: EU eIDAS 2.0 Wallet is still under development.	National solutions are stable and widely used; EU solution is evolving and not yet fully operational.
Market Services	Operational services offered by identity providers.	Common: national providers deliver mature services.	Adaptive: EU Wallet pilots exist but are not widely available.	Market is complete nationally but fragmented at EU level; scaling requires EU services.

Figure 3 - Mapping of requirements, agreements, solutions and market services on the DSSM

5 Applying the DSSM in Practice

The DSSM can be applied differently depending on goals and roles. By using the same model, policy makers, program leads and architects work from a shared structure while focusing on their own responsibilities. Policy makers use it to steer policy and guideline development, program leads to plan and manage development and deployment initiatives, and architects to design and implement capabilities and solutions. This supports alignment and collaboration across roles while reducing gaps and unnecessary overlap.

To make these differences explicit, Figure 5 positions the collaboration and approach of each role across four quadrants of the DSSM. The quadrants distinguish between requirements that are generic or sector-specific and between those that are stable or still evolving. This makes clear how each role should act when dealing with common building blocks, adaptive frameworks, specialized sector solutions or Unique innovation pilots.

Quadrant	Policy Makers	Program Leads	Architects
Common (Generic + Stable)	Coordinate with European and national bodies to ensure generic requirements are regulated and supported, and promote adoption of proven solutions with funding or incentives for reuse.	Share practices with other DSIs and keep the program aligned with common standards, adopting established solutions and avoiding unnecessary reinvention.	Work with technical peers across initiatives to keep implementations consistent and ensure solutions are applied as designed, with semantic and technical consistency.
Adaptive (Generic + Responsive)	Engage in European consortia (e.g. DSSC, Gaia-X) to influence direction, shape frameworks and anticipate regulatory evolution while keeping initiatives aware of EU-level progress.	Compare notes with other DSIs and join alignment forums, balancing speed with alignment and using interim solutions while preparing for convergence.	Contribute to technical pilots and standards groups, evaluating emerging tools, testing feasibility and feeding results back into evolving frameworks.
Specialized (Specific + Stable)	Respect sectoral autonomy while encouraging gradual convergence where possible, allowing DSIs to maintain sector-specific solutions and documenting them for transparency.	Coordinate within the sector and share lessons across similar initiatives, implementing known approaches with a focus on stability and predictability.	Work with sector-specific experts to design tailored solutions while tracking which elements can later be elevated to generic.
Unique (Specific + Responsive)	Facilitate multi-stakeholder exploration and fund innovation pilots, providing space for experimentation under controlled governance.	Engage partners across sectors, build trust for joint pilots and co-design and test new concepts, documenting outcomes to inform future direction.	Work hands-on in pilots and innovation labs, prototyping and exploring governance and semantic models while assessing scalability options.

Figure 4 - Collaboration and approach for policy makers, program leads and architects

Policy makers

Policy makers set the boundaries and direction for data sharing across domains and borders. For them, the DSSM is a way to distinguish which requirements should be treated as generic and supported by regulation, funding or European alignment, and which can remain under the control of individual Data Space Initiatives while still following a path towards convergence over time. It allows them to structure evidence-based discussions with stakeholders, focusing on concrete requirements and visible gaps in market services rather than abstract solutions.

Their approach is to create clarity and predictable incentives. Using the DSSM, they ensure that national or sectoral programs remain connected to European developments and that choices are explainable and consistent across quadrants, from common and stable elements to Unique and experimental ones.

Program leads

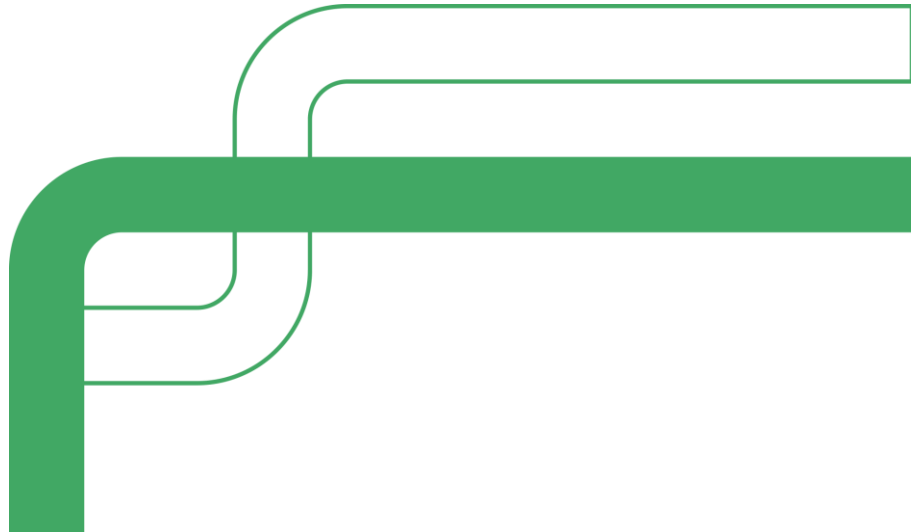
Program leads are responsible for delivering results within DSIs. The DSSM helps them map their initiative's requirements and confront these with available solutions and services, making clear where reuse is possible and where additional development or pilots are needed. It supports them in managing the tension between autonomy and alignment: moving fast where necessary while reducing fragmentation and preparing for adoption of shared solutions.

Their approach is to balance direction with pragmatism. They use the DSSM to compare their program's requirements with other initiatives, to maintain a visible list of gaps and to engage the market on missing services. In doing so, they can show transparently when divergence from generic solutions is temporary, justified and on a path towards convergence.

Architects

Architects translate requirements into solution designs and advise both program leads and policy makers. The DSSM gives them a structured way to position requirements, solutions and market services consistently and to test whether chosen solution directions match the type of requirement in each quadrant. It helps them clarify where technical adaptation, standardisation or co-design is required and where sector-specific innovation is appropriate.

Their approach is to ensure technical soundness and interoperability across initiatives. They work closely with program leads on feasibility and with policy makers on future-proofing, while using the DSSM to keep classification and design choices consistent across DSIs and over time.



Colofon

Tekst