ODRL Policy Chains for the DGA's Altruism and Intermediation Frameworks

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Abstract

The EU's Data Governance Act (DGA) establishes two structurally distinct channels for voluntary data sharing: a civic pathway via a Data Altruism Organisation (DAO) for general-interest objectives, and a commercial channel via a Data Intermediation Service Provider (DISP) for economic exchange. Both channels impose permissions, prohibitions and duties, currently governed by prose. The DGA's promise of trustworthy data sharing depends on compliance decisions at machine speed. Although machine-readable vocabularies for some of these obligations exist, it remains a work in progress because of ever-evolving legislation. In this context, we modelled both channels as Open Digital Rights Language (ODRL) policy chains, using the Data Privacy Vocabulary (DPV)'s DGA extension to represent actors and obligations, and the Trust Envelope model to capture the intended usage of each exchange. This paper presents a complete lifecycle: from a discoverable shared data pool, through a donation or commercial listing offer, to a concrete usage agreement, and finally to an access request for each channel. The same data point produces structurally different policy chains – the destiny component of a Trust Envelope – depending on the sharing channel: purpose-bound under altruism, commercially scoped under intermediation. Machine-readable policy chains make trustworthy data sharing actionable by reducing legal and technical barriers. The patterns we establish are structurally transferable to successor and analogous frameworks, including the Data Act, as the EU's digital legislation landscape consolidates.

1 Introduction

Data generated as a by-product of human and social activity has been historically siloed or handled by whoever held the infrastructure under self-chosen terms. The Data Governance Act (DGA) [2] aims to make that situation more deliberate by creating structured channels through which data holders and subjects can share data with defined parties, under defined conditions, for defined purposes. Yet, introducing such structure does not by itself ensure participation, as data sharing actors differ significantly in their readiness and ability to comply. Data sharing actors can be categorised into three groups [15]: the *acting* (already sharing compliantly), the *willing* (want to share but face cost and effort barriers), and the *unwilling* (not inclined to comply). Legal frameworks address the *unwilling* through restriction and say comparatively little about reducing the compliance cost for the *willing*. The DGA puts

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forward permissions, duties, and other constraints across a chain of some of these actors – particularly the *willing* – but expresses them entirely in legal prose. For an organisation without dedicated legal infrastructure, determining whether a given data exchange is compliant, and demonstrating that compliance to others, requires effort that scales poorly and concentrates the economic and civic benefits of data sharing among those already equipped to navigate it. To give an example of a complexity: a DISP's provision criterion under Art. 12 alone runs to fifteen sub-clauses. Machine-readable policy offers a path out of that compliance burden.

Two of the DGA's four chapters are relevant here. Chapter III establishes a framework for Data Intermediation Service Providers (DISPs): neutral brokers who facilitate access between data holders or subjects and data users under commercial or reciprocal terms, subject to a neutrality obligation that prevents them from exploiting the data for their own purposes. Chapter IV establishes a framework for data altruism: the voluntary making available of data by companies or individuals to registered Data Altruism Organisations (DAOs) for general-interest objectives. Both channels impose layered obligations on a chain of actors that are currently enforced through contracts and human judgement. That approach is not neutral and is difficult to scale: it favours those with the resources to absorb the compliance cost.

In response to this challenge, Esteves et al. [7] demonstrate that the DGA's altruism and intermediation frameworks can be expressed using ODRL [12] and the DGA extension of the Data Privacy Vocabulary (DPV) [14]: identifying the key actors and obligations that require formal representation. This approach has since been extended to the health domain under the Electronic Health Data Space (EHDS) [4]. Furthermore, Slabbinck et al. [15] introduce the Trust Envelope model: a unique, signed association of a data unit with its provenance and a usage policy specific to a given exchange, contextualising the data's history and its intended destiny in a single artefact. The policy chains in this work represent that destiny component, applied to the DGA's two sharing channels.

This paper models those two channels as ODRL policy chains, using the DPV's DGA extension to represent actors and obligations, and the Trust Envelope model to capture the destiny of each exchange. We show that a single data point – vehicle movement data from a logistics company – can produce structurally different policy chains depending on the channel, while representing the type of *willing* actors the DGA aims to enable, including civic organisations, research institutions, and smaller data holders. In both cases, constraints propagate downstream, and no party can broaden the usage conditions of what they received. Hence, the contributions of this paper are twofold: a complete ODRL policy chain for the DGA altruism channel, from a donation offer to a purpose-bound usage agreement and an evaluation request for researcher access (Section 4); and a parallel chain for the intermediation channel over the same data resource, demonstrating how the same data point produces a structurally different trust envelope under commercial terms (Section 5).

To ground the modelling, we developed a use case centred on vehicle movement data shared under two contrasting scenarios: voluntary data altruism and commercially brokered intermediation. This use case, introduced in Section 3, is drawn from the incentivising trust framework [15], which treats trust envelopes as a mechanism for aligning the interests of data holders and recipients along a policy chain. The remainder of this paper is structured as follows. Section 2 introduces the relevant regulatory and technical context. Section 3 presents the use case across both sharing channels. Sections 4 and 5 develop the two policy chains. Section 6 discusses an overview of the policy chains, limitations and regulatory resilience. Section 7 concludes the paper.

2 Background

In this section, we introduce the regulatory and technical foundations on which the use case rests.

2.1 The Data Governance Act: Key Actors and Obligations

The DGA [2] entered into force in June 2022 and became applicable in September 2023. It sits within a broader package of EU digital legislation, alongside the Data Act, the Digital Markets Act, and the Digital Services Act, which altogether attempt to govern how data is accessed, shared and reused across a single data market [13]. Where the General Data Protection Regulation (GDPR) [1] governs the processing of personal data, the DGA concerns itself with the conditions under which data (personal and non-personal), held by public sector bodies, companies and individuals can be made available for reuse in a trustworthy and structured way.

The DGA introduces four mechanisms for this. Chapter II governs the reuse of protected public sector data. Chapter III establishes a notification and registration framework for Data Intermediation Service Providers (DISPs): neutral brokers who facilitate access between data holders or subjects and data users without using the data for their own purposes. Chapter IV introduces the concept of data altruism: the voluntary making available of data by individuals or companies for general-interest objectives, collected and managed by registered Data Altruism Organisations (DAOs). Chapter V establishes the European Data Innovation Board.

This work concerns Chapters III and IV. A DISP under Art. 11 DGA must notify a competent authority and, once notified, is subject to a set of obligations under Art. 12 DGA[1], most notably a neutrality obligation that prohibits the DISP from using intermediated data for its own purposes, conditioning services on data reuse, or applying discriminatory terms between data holders or subjects and data users. A DAO under Arts. 18–19 DGA must register with a competent authority, operate on a non-profit basis, and collect data only for the general-interest purposes listed in its registration[2].

2.2 Incentives for Data Sharing

The DGA's premise is that data sharing should be voluntary and trustworthy. However, the existing incentive landscape is structurally broken. Entities with sufficient data infrastructure have already captured the incentive mechanism for their own benefit, often through terms that leave data subjects with little meaningful choice. Those who wish to share data voluntarily and for legitimate purposes (for instance, civic organisations, research institutions, or smaller data holders) face compliance costs that render the DGA's channels burdensome to adopt. The evidence is visible in the DGA's own registers: as of early 2026, only five Data Altruism Organisations (DAOs) are recognised across the entire EU [11], while DISP registrations span multiple Member States and continue to grow [10]. The regulation works well in practice for channels with a clear economic incentive, and struggles where the incentive is civic.

As previously introduced, this work targets the *willing* [15], and the DGA itself signals this intent: where there is a level playing field in the data economy, undertakings compete on

[1] DISPs *notify* under Art. 11 while DAOs *register* under Art. 18: notification grants an immediate right to operate; registration confers recognised status and the right to use the common logo under Art. 11.9.

[2] Under Art. 21.3 DGA, data subjects must provide GDPR consent for their personal data to be processed, while data holders use the DGA permission mechanism defined in Art. 2.6. These legal bases are structurally distinct.

the quality of their services [2]. Machine-readable data usage conditions, i.e., policies, are one mechanism for lowering the barrier to entry into that playing field. As previously mentioned, Esteves et al. [7] demonstrate that semantic web technologies can model the DGA's altruism and intermediation frameworks in a machine-readable form by identifying the key actors and obligations that require formal representation. The present work builds on that foundation, extending it with models for data pools, i.e., asset collections in ODRL terms, and data usage requests.

The DGA's two channels offer structurally different incentives to *willing* actors. The altruism channel offers civic benefit: data donated for urban planning, climate research, or public health contributes to outcomes the data holder or subject may value independently of financial return. The intermediation channel offers economic benefit: under Art. 2.11(a) DGA, a DISP may not only facilitate raw data access but also enable the derivation of insights from aggregated or enriched data. This opens a value stream of new services that neither the data holder nor a downstream user could produce alone. Beyond direct financial return, both channels offer a further incentive that is less visible but equally consequential: sharing through a certified DGA channel signals trustworthiness to downstream partners, replacing assumed trust with verifiable compliance. This is precisely the context in which Trust Envelopes add value: each exchange, whether civic or commercial, requires its terms to be explicit, specific and verifiable.

2.3 The Data Privacy Vocabulary and its DGA Extension

The Data Privacy Vocabulary (DPV) [14] is a W3C community effort for representing information associated with data processing in a machine-readable and interoperable form, while aligning with data protection requirements. DPV provides a modular architecture: a core specification covering purposes, processing operations, legal bases, data categories and rights, extended by jurisdiction-specific and law-specific modules. The `eu-dga` extension [7, 5] instantiates this for the DGA, defining key actors such as data holders, DAOs, DISPs, and data users, alongside compliance concepts such as `eu-dga:DGACompliant` status. This work uses the `eu-dga` extension to ground ODRL policy chains in DGA-specific terminology, annotating actors, obligations and data categories in a way that is both legally precise and machine-readable.

2.4 The Open Digital Rights Language

The Open Digital Rights Language (ODRL) is a W3C Recommendation that provides an information model, vocabulary and encoding mechanisms for expressing statements about the usage of content and services [12]. An ODRL policy associates a set of rules with an asset and is identified by a mandatory `uid` (unique identifier). The policy class has three subclasses. An `odrl:Set` expresses generic rules with no required party roles. An `odrl:Offer` is a unilateral proposal from an assigner, typically directed at a wider audience, and does not itself grant any rules. An `odrl:Agreement` is a concluded policy that binds both an assigner and an assignee.

Rules are of three kinds: an `odrl:Permission` allows an action to be exercised on an asset if all constraints are satisfied and any attached duties are fulfilled; an `odrl:Prohibition` disallows an action on an asset if all constraints are satisfied; and an `odrl:Duty` is the obligation to exercise an agreed action. Each rule specifies an action and a target asset, and may carry one or more `odrl:Constraint`s, each of which compares a `leftOperand` to a `rightOperand` via a relational operator. When multiple constraints apply to the same rule, all must be satisfied, unless stated otherwise via logical constraints.

Furthermore, ODRL is designed to be extended through profiles that introduce domain-specific actions, operands and constraint types [18]. This extension mechanism is how DPV-

ODRL [6] concepts such as `dpv-odrl:Purpose` enter the policy listings as first-class constraints.

2.5 Trust Envelopes

For the *willing* actor, the barrier to data sharing is cost: the effort of specifying terms, demonstrating compliance, and maintaining an auditable record of each exchange. Without a consistent way to make the terms of an exchange explicit and verifiable, each transaction relies on assumed trust between sender and recipient. This assumption systematically disadvantages those without the legal infrastructure to formalise it otherwise.

The Trust Envelope model [15] addresses this directly. Each act of data exchange is encapsulated in a unique, signed document associating the data unit with two components: its *history* (provenance – who generated the data, when and under what conditions) and its *destiny* (a usage policy specific to the intended processing by the recipient). The policy chains in this work represent the *destiny* component of each envelope, applied to the DGA's two sharing channels, capturing what may be done with the data, by whom, and under which conditions, at each hand-off in the chain.

3 Use Case: Sharing Vehicle Data for Civic and Economic Purposes

In this section, we motivate and introduce a use case that will be used throughout the paper to showcase how a single data point can be used to derive distinct insights, and thus incentives, for the involved actors. In this context, a logistics company's fleet generates vehicle movement data continuously. Until recently, this data was discarded or siloed, but the DGA makes it potentially useful to urban planners, traffic researchers and smart city operators. The logistics company has no interest in operating a data business as the infrastructure costs alone are a reasonable deterrent. It does, however, have an interest in cities running better. Its trucks are stuck in the same traffic as everyone else.

This use case follows that data through two structurally different sharing channels that the DGA provides, using the same underlying data point to show how channel choice produces different policy chains and trust envelopes, different actor relationships and different obligations: all expressed as ODRL policy chains grounded in DPV's DGA extension and the Trust Envelope model (Section 2.5).

3.1 Actors

The scenario involves five actors. Omashu Freight is a logistics company acting as the data holder (`eu-dga:DataHolder`[3]): the entity that generates and controls the vehicle movement data. The White Lotus Data Collective is a registered DAO (`eu-dga:DataAltruismOrganisation`) that collects data made available by data holders and subjects for general-interest objectives. Kyoshi Exchange is a registered DISP (`eu-dga:DataIntermediationService`): a neutral broker facilitating access between data holders or subjects and data users without using the data for its own purposes. Professor Zei is a `eu-dga:DataUser` in the first stream: a researcher with a declared purpose of urban traffic

[3]The DPV's DGA extension is available at https://w3id.org/dpv/legal/eu/dga, with a suggested prefix of `eu-dga`.

modelling. The Ba Sing Se Urban Authority is a `eu-dga:DataUser` in the second stream: a commercial actor paying for access to derive operational insights.

The DGA creates two structurally different incentive channels through which Omashu Freight, a *willing* actor, can share the same raw data: sharing it for civic benefit to the White Lotus Data Collective under Chapter IV, or listing it commercially with Kyoshi Exchange under Chapter III. These channels produce different policy chains, different actor relationships, and different legal obligations, all from the same underlying data point. Figure 1 provides an overview of the two resulting policy chains. The following sections model each chain in turn.

3.2 A Shared Starting Point: The Data Pool Resource

Before either sharing channel begins, the data needs to be discoverable. The White Lotus Data Collective maintains a growing pool of donated data from multiple contributors. A catalogue entry describes what is available, under what general conditions, and from whom: so that downstream parties can query it before any policy is written or any agreement is concluded. Both streams, modelled as `odrl:AssetCollection`[4] instances in Listing 1, begin from this shared resource, modelled via the `odrl:source` property associated with the `http://example.org/omashu-freight/data-pool` identifier.

Listing 1: Data Pool Resource.

```
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix dpv: <https://w3id.org/dpv#> .
@prefix eu-dga: <https://w3id.org/dpv/legal/eu/dga#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .

<http://example.org/catalogue/dao-mob> a odrl:AssetCollection ;
    odrl:source <http://example.org/omashu-freight/data-pool> ;
    dcterms:title ''DAO Mobility Data Pool Resource''@en ;
    dcterms:description ''Pool of vehicle movement data available for data altruism''@en ;
    dcterms:publisher <http://example.org/party/white-lotus-dao> ;
    dcterms:spatial <http://example.org/location/EU> ;
    dpv:hasPurpose dpv:DataAltruism ;
    dpv:hasData dpv:AnonymisedData ;
    eu-dga:hasDAO <http://example.org/party/white-lotus-dao> .

<http://example.org/catalogue/disp-mob> a odrl:AssetCollection ;
    odrl:source <http://example.org/omashu-freight/data-pool> ;
    dcterms:title ''DISP Mobility Data Pool Resource''@en ;
    dcterms:description ''Pool of vehicle movement data for commercial intermediation''@en ;
    dcterms:publisher <http://example.org/party/kyoshi-exchange> ;
    dpv:hasPurpose dpv:CommercialPurpose ;
    dpv:hasData dpv:NonPersonalData ;
    eu-dga:hasDISP <http://example.org/party/kyoshi-exchange> .
```

4 First Stream: Data Altruism

Omashu Freight decides to make available one quarter's worth of vehicle movement data to the White Lotus Data Collective, under the condition that it is used exclusively for urban general-interest purposes. The incentive is civic: better traffic modelling benefits the city, and Omashu Freight's own fleet operates in that same city.

[4]The ODRL vocabulary is available at `http://www.w3.org/ns/odrl/2/` with a suggested prefix of `odrl`.

[6]Icons used in this work created by Freepik, HAJICON, DinosoftLabs, gravisio and Iconpro86 all sourced from Flaticon.

Figure 1: Overview of the Omashu Freight use case. The shared asset collection (`dao-mob` and `disp-mob`) gives rise to two distinct policy chains: a trust envelope associated with altruism activities under Chapter IV of the DGA and a second trust envelope associated with commercial activities via intermediation under Chapter III (commercial brokering through Kyoshi Exchange).[6]

Under Chapter IV DGA, the White Lotus Data Collective operates as the custodian of donated data. It receives data from contributors such as Omashu Freight, holds it under its registration obligations, and grants access directly to data users for general-interest purposes. There is no separate broker in this chain: the DAO itself is both the recipient of the donation and the entity that concludes usage agreements with downstream users.

Each hand-off in this chain produces a Trust Envelope [15] where a downstream party inherits both the data and the conditions attached to it from the previous link. The envelope is a record of one specific exchange: this party, this purpose, these conditions, this moment. It serves its function for that transaction. If another party comes along, or the same party wants the data for a different purpose, they can request a new one. The data pool sits there; envelopes are issued against it as needed, each capturing a distinct relationship independently

of the others.

4.1 Altruism Offer

Omashu Freight offers the White Lotus Data Collective the right to use its share of the data pool. This is the first link in the policy chain: the `eu-dga:DataHolder` provides the `eu-dga:DataAltruismOrganisation` the permission to use a purpose-bound, time-limited subset of the catalogue. The condition is urban general-interest use only, scoped to the improvement of transport mobility. Commercial use of the data is explicitly prohibited: Omashu Freight makes the data available for civic benefit, not for a commercial purpose. Listing 2 provides an example of how to model such an offer, using the DPV-ODRL profile[7], and in turn DPV[8] concepts, to bound the offer to particular purposes. ODRL's `odrl:dateTime` is also used to restrict the allowed usage until the end of 2026.

Listing 2: Omashu Freight grants White Lotus DAO use for general-interest purposes.

```
@prefix dpv: <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<http://example.org/policy/donation-offer> a odrl:Offer ;
    odrl:uid <http://example.org/policy/donation-offer> ;
    odrl:profile dpv-odrl: ;
    odrl:assigner <http://example.org/party/omashu-freight> ;
    odrl:assignee <http://example.org/party/white-lotus-dao> ;
    odrl:target <http://example.org/catalogue/dao-mob> ;
    odrl:permission [
        odrl:action odrl:use ;
        odrl:constraint [
            odrl:leftOperand dpv-odrl:Purpose ;
            odrl:operator odrl:isA ;
            odrl:rightOperand dpv:ImproveTransportMobility ], [
            odrl:leftOperand odrl:dateTime ;
            odrl:operator odrl:lteq ;
            odrl:rightOperand "2026-12-31T23:59:59Z"^^xsd:dateTime
        ] ] ;
    odrl:prohibition [
        odrl:action odrl:use ;
        odrl:constraint [
            odrl:leftOperand dpv-odrl:Purpose ;
            odrl:operator odrl:isA ;
            odrl:rightOperand dpv:CommercialPurpose ] ] .
```

4.2 Usage Agreement

The White Lotus Data Collective concludes a read-only usage agreement directly with Professor Zei. The DAO can only grant, and further restrict, what it received: Listing 3 showcases the reached agreement between the DAO and Professor Zei, where he is given the right to read the available data at `http://example.org/catalogue/dao-mob`, until the end of 2026, and if he is located in a specific metropolitan area. The purpose constraints from the original offer remain intact: access is permitted only for the improvement of transport mobility

[7]The DPV-ODRL profile is available at `https://w3id.org/dpv/mappings/odrl` with a suggested prefix of `dpv-odrl`.

[8]The DPV vocabulary is available at `https://w3id.org/dpv`, with a suggested prefix of `dpv`.

(*dpv:ImproveTransportMobility*), a data altruism purpose under Chapter IV DGA, and prohibited for commercial purposes.

Listing 3: White Lotus DAO grants Professor Zei read access for transport mobility improvement.

```
@prefix dpv: <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<http://example.org/policy/researcher-agreement> a odrl:Agreement ;
    odrl:uid <http://example.org/policy/researcher-agreement> ;
    odrl:profile dpv-odrl: ;
    odrl:assigner <http://example.org/party/white-lotus-dao> ;
    odrl:assignee <http://example.org/party/prof-zei> ;
    odrl:target <http://example.org/catalogue/dao-mob> ;
    odrl:permission [
        odrl:action odrl:read ;
        odrl:constraint [
            odrl:leftOperand dpv-odrl:Purpose ;
            odrl:operator odrl:isA ;
            odrl:rightOperand dpv:ImproveTransportMobility ], [
            odrl:leftOperand odrl:spatial ;
            odrl:operator odrl:eq ;
            odrl:rightOperand <http://example.org/location/city-metro> ], [
            odrl:leftOperand odrl:dateTime ;
            odrl:operator odrl:lteq ;
            odrl:rightOperand "2026-12-31T23:59:59Z"^^xsd:dateTime ] ] ;
    odrl:prohibition [
        odrl:action odrl:use ;
        odrl:constraint [
            odrl:leftOperand dpv-odrl:Purpose ;
            odrl:operator odrl:isA ;
            odrl:rightOperand dpv:CommercialPurpose ] ] .
```

4.3 Request

Once the usage agreement is in place, an ODRL policy reasoner can evaluate whether a concrete access request is permitted [16]. In this context, Professor Zei submits a request to read anonymised vehicle movement data for transport mobility improvement purposes. This request can be structured as a `sotw:EvaluationRequest` [8], as illustrated in Listing 4, carrying the real-world context needed to check it against the active usage agreement: who is asking, what they want to do, which piece of data they want to access, and when. Furthermore, given that the agreement restricts usage to a certain location, information about said location also needs to be passed to the policy reasoner. Listing 4 provides an example of how to model such information using the State of the World model introduced by Esteves et al. [8]. Together, both pieces of contextual information can then be evaluated by an ODRL policy reasoner to allow or deny access to the requested data. Given that the request fulfils the constraints of the usage agreement, access can be allowed.

Listing 4: Professor Zei requests read access for transport mobility improvement purposes.

```
@prefix dcterms: <http://purl.org/dc/terms/> .
@prefix dpv: <https://w3id.org/dpv#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix sotw: <https://w3id.org/force/sotw#> .
```

```
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<http://example.org/request/researcher-oct> a sotw:EvaluationRequest ;
    sotw:evaluatedParty <http://example.org/party/prof-zei> ;
    sotw:evaluatedAction odrl:read ;
    sotw:evaluatedTarget <http://example.org/catalogue/dao-mob> ;
    sotw:requestParameter [
        sotw:describesFeature dpv:Purpose ;
        sotw:value dpv:ImproveTransportMobility ], [
        sotw:describesFeature sotw:TemporalData ;
        sotw:value "2026-03"^^xsd:gYearMonth ] .

<http://example.org/sotw/researcher-oct> a sotw:SotW ;
    sotw:context <http://example.org/sotw/location> .

<http://example.org/sotw/location> dpv:hasLocation <http://example.org/location/city-metro> .
```

5 Second Stream: Data Intermediation

Omashu Freight decides to list the same vehicle movement data commercially with Kyoshi Exchange under a separate asset collection (`disp-mob`), distinct from the altruism catalogue (`dao-mob`): the same underlying data, but governed by an entirely different trust envelope. The incentive here is economic: the Ba Sing Se Urban Authority is willing to pay for access to derive operational insights for city traffic management, and Omashu Freight has an interest in that revenue stream. Where the first stream was driven by civic benefit, this stream is driven by commercial terms.

Under Chapter III DGA, Kyoshi Exchange operates as a neutral broker. It connects Omashu Freight directly with the Ba Sing Se Urban Authority, facilitating the commercial relationship between them without becoming a party to the data itself. Kyoshi Exchange cannot use the intermediated data for its own purposes, condition its services on data reuse, or apply discriminatory terms: obligations that flow from the neutrality requirement under Art. 12(a) DGA. This is structurally distinct from Chapter IV: there is no DAO, no "donation", and no general-interest purpose requirement. The same data point that Omashu Freight made available altruistically in the first stream is here governed by an entirely different trust envelope.

Each hand-off again produces a Trust Envelope destiny component [15]. The constraints propagate downstream and no party can broaden what they received: but the nature of those constraints is now commercial.

5.1 Commercial Listing Offer

Omashu Freight offers Kyoshi Exchange the right to distribute its vehicle movement data under commercial terms. The condition for sharing is no longer altruistically-bound but commercial: access is conditioned on payment, i.e., the offer carries a duty to compensate. Listing 5 showcases such an offer, where Kyoshi Exchange is obliged to pay Omashu Freight 100 euros before being able to distribute the asset. This is the first link in the intermediation policy chain.

Listing 5: Omashu Freight grants Kyoshi Exchange distribute right on payment.

```
@prefix dpv: <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
```

```
<http://example.org/policy/intermediation-listing> a odrl:Offer ;
  odrl:uid <http://example.org/policy/intermediation-listing> ;
  odrl:profile dpv-odrl: ;
  odrl:permission [
    odrl:assigner <http://example.org/party/omashu-freight> ;
    odrl:assignee <http://example.org/party/kyoshi-exchange> ;
    odrl:action odrl:distribute ;
    odrl:target <http://example.org/catalogue/disp-mob> ;
    odrl:constraint [
      odrl:leftOperand dpv-odrl:Purpose ;
      odrl:operator odrl:isA ;
      odrl:rightOperand dpv:CommercialPurpose ] ;
    odrl:duty [
      odrl:assignee <http://example.org/party/kyoshi-exchange> ;
      odrl:assigner <http://example.org/party/omashu-freight> ;
      odrl:action [
        rdf:value odrl:compensate ;
        odrl:refinement [
          odrl:leftOperand odrl:payAmount ;
          odrl:operator odrl:eq ;
          odrl:rightOperand "100.00"^^xsd:decimal ;
          odrl:unit <http://dbpedia.org/resource/Euro> ] ] ] ] .
```

5.2 Data User Agreement

Kyoshi Exchange concludes a usage agreement with the Ba Sing Se Urban Authority. Unlike the first stream, where the altruistic constraint propagates from the donation, the governing constraint here is commercial: the Authority pays a per-use fee and access is scoped to a specific city and time window, as showcased in Listing 6. Kyoshi Exchange can only grant what it received: the right to distribute, narrowed further to read access for a specific user under specific commercial conditions.

Listing 6: Kyoshi Exchange grants Ba Sing Se Urban Authority read access.

```
@prefix dct: <http://purl.org/dc/terms/> .
@prefix dpv: <https://w3id.org/dpv#> .
@prefix dpv-odrl: <https://w3id.org/dpv/mappings/odrl#> .
@prefix odrl: <http://www.w3.org/ns/odrl/2/> .
@prefix rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .

<http://example.org/policy/intermediation-operator-access> a odrl:Agreement ;
  odrl:uid <http://example.org/policy/intermediation-operator-access> ;
  odrl:profile dpv-odrl: ;
  odrl:permission [
    odrl:assigner <http://example.org/party/kyoshi-exchange> ;
    odrl:assignee <http://example.org/party/bssua> ;
    odrl:action odrl:read ;
    odrl:target <http://example.org/catalogue/disp-mob> ;
    odrl:constraint [
      odrl:leftOperand dpv-odrl:Purpose ;
      odrl:operator odrl:isA ;
      odrl:rightOperand dpv:CommercialPurpose ], [
      odrl:leftOperand odrl:spatial ;
      odrl:operator odrl:eq ;
      odrl:rightOperand <http://example.org/location/ba-sing-se> ], [
      odrl:leftOperand odrl:dateTime ;
      odrl:operator odrl:lteq ;
```

```
    odrl:rightOperand "2026-05-31T23:59:59Z"^^xsd:dateTime ] ;
  odrl:duty [
    odrl:assignee <http://example.org/party/bssua> ;
    odrl:assigner <http://example.org/party/kyoshi-exchange> ;
    odrl:action [
      rdf:value odrl:compensate ;
      odrl:refinement [
        odrl:leftOperand odrl:payAmount ;
        odrl:operator odrl:eq ;
        odrl:rightOperand "5.00"^^xsd:decimal ;
        odrl:unit <http://dbpedia.org/resource/Euro> ] ] ] ] .
```

5.3 Comparing the Two Envelopes

Table 1 summarises the structural differences between the two streams. The same data point, Omashu Freight's vehicle movement data, produces two entirely different trust envelopes (policy chains) depending on the channel through which it is shared. The altruism channel produces a purpose-bound, civic envelope governed by Chapter IV DGA. The intermediation channel produces a commercially scoped envelope governed by Chapter III DGA. Both envelopes represent the destiny component of a Trust Envelope [15]: what may be done with the data, by whom, and under which conditions. The policy chain is the machine-readable expression of that destiny. In both cases, constraints propagate downstream and no party can broaden what they received.

Feature	**First Stream**	**Second Stream**
DGA chapter	Chapter IV	Chapter III
Primary actor	DAO	DISP
Asset collection	dao-mob	disp-mob
Omashu Freight incentive	Civic (cities run better)	Economic (payment / insights)
Key constraint	Purpose	Price + compliance
Downstream user	Professor Zei (researcher)	Ba Sing Se Urban Authority

Table 1: Structural comparison of the altruism and intermediation policy chains (destiny components of Trust Envelopes) for the same underlying data point.

6 Discussion

6.1 Policy Chain Overview

The first chain addresses the DGA altruism channel (Chapter IV), modelling the voluntary making available of data from a data holder to a DAO and the DAO's direct conclusion of an access agreement with a downstream data user. The chain runs from a donation offer (Listing 2), through a discoverable data pool (Listing 1), to a purpose-bound access agreement (Listing 3), to an evaluated access request (Listing 4). Purpose constraints propagate intact across each hand-off: no downstream party can broaden what they received.

A parallel chain models the DGA intermediation channel (Chapter III): the same data point made available commercially through a DISP to a downstream data user. The chain runs from a commercial listing offer (Listing 5) to a commercially scoped access agreement (Listing 6). The constraint here is commercial: payment and a commercially-bound purpose replace altruism as the governing condition.

Together, these chains demonstrate that the same underlying data point, Omashu Freight's vehicle movement data, produces structurally different policy envelopes, in the sense of the Trust Envelope model [15], depending on the sharing channel. They also clarify a structural point about the DGA itself: Chapter III and Chapter IV define separate and independent frameworks. A DAO and a DISP serve different roles and do not collaborate within a single chain. This separation is reflected explicitly in the modelling and has consequences for how ODRL policy chains should be constructed for each channel.

The policy chains presented here have practical implications for how the DGA's two sharing channels are implemented. First, the structural separation of Chapter III and Chapter IV has direct consequences for system design. A platform that assumes a DAO and a DISP collaborate within a single chain will model the wrong actor relationships and produce incorrect policy chains. Second, the constraint inheritance pattern, where no downstream party can broaden what they received, provides a verifiable guarantee that purpose and commercial conditions propagate without degradation. Machine-readable policy chains are useful here for audit and compliance demonstration.

The choice of channel should not be viewed solely through the lens of what each actor gains or gives up. It is worth noting first that the impulse to share data without commercial return is not hypothetical: it appears in practice across sectors and scales, from individuals donating health readings to research collectives, to companies making operational data available for urban planning purposes. The DGA aims to institutionalise that impulse by creating a recognised legal category for it. At the time of writing, five DAOs have been registered across four Member States and thirty-one DISPs across eight Member States under the respective Chapter IV and Chapter III frameworks [11, 10]. While these are not large numbers, they do suggest that both channels are beginning to attract the kinds of actors they were designed for.

Under the altruistic channel, Omashu Freight relinquishes control over downstream use: once the data is donated to the White Lotus Data Collective, the DAO becomes custodian and Omashu Freight cannot direct who receives it or for what precise purpose, beyond the purpose lock encoded in the policy. What it gains is relief from the operational overhead of managing access agreements. There is also a benefit in legal simplicity: there is no price to negotiate, no commercial counterparty to vet, and no revenue to audit; and the less tangible but real benefit of positioning itself as a civic contributor. For organisations that operate within the cities their data describes, this is quite a notable consideration: better traffic modelling benefits the infrastructure their own fleet depends on. The downstream data user, Professor Zei in our use case, gains access to data that would otherwise require a commercial arrangement, at no cost, but accepts a narrow purpose constraint: the data may not be repurposed for commercial ends, and any deviation from the declared research objective constitutes a breach of the usage agreement.

Turning to the commercial channel, the calculus shifts. Omashu Freight retains indirect control via the policy chain: the commercial listing (Listing 5) specifies the permitted actions, and Kyoshi Exchange, as a registered DISP, is bound by the neutrality obligation under Article 12(a) DGA not to use the data for its own purposes or to offer discriminatory terms [2]. What Omashu Freight gains is compensation and, relatedly, a reason to invest in data quality: data that is being shared is data that needs to be accurate, current, and well-described. The Data Act reinforces this logic at a broader level, requiring data holders making data available to recipients to do so on fair, reasonable and non-discriminatory terms [3]. The downstream data user, the Ba Sing Se Urban Authority, gains broader operational latitude (a commercial purpose is permitted) and access to data with contractual guarantees, but bears a financial cost and is subject to spatial and temporal constraints that are now commercially enforceable. The

policy chain makes these trade-offs explicit and machine-readable, which is precisely where its value lies: the same data, the same holder, two structurally different bargains.

6.2 Limitations: Technical, Societal and Economic

The policy chains presented here are illustrative. The ODRL listings model the structural relationships between actors and constraints but have not been validated against an operational ODRL policy evaluation engine. The `eu-dga` vocabulary is a work in progress: concepts such as the full expression of the neutrality obligation under Art. 12(a) DGA are not yet covered, and are noted as gaps throughout. This work addresses only Chapters III and IV of the DGA. Chapter II (public sector data reuse) and Chapter V (the European Data Innovation Board) are out of scope. Withdrawal, conflict resolution, and post-withdrawal duty flows are explicitly deferred to future work.

Beyond the technical limitations of the model, there are broader societal and economic constraints worth acknowledging. The DGA's architecture assumes a supply of *willing* data holders, organisations that have both the data and the motivation to share it. In practice, willingness is unevenly distributed. Organisations with legal infrastructure are better positioned to navigate registration requirements, compliance obligations and contractual enforcement, creating a structural asymmetry that policy chains alone cannot correct. Smaller entities may lack the capacity to participate meaningfully as data holders under either channel, even where the DGA provides a formal pathway for them to do so.

There is also a question of ecosystem readiness. The altruistic channel depends on the availability of registered DAOs capable of acting as custodians for donated data. Five such organisations are currently registered across the EU, covering domains including health, energy and environmental data [11]. The commercial channel requires a functioning market of registered DISPs: thirty-one are currently registered, spread across eight Member States [10]. These numbers indicate that the ecosystem is forming, but that it is still early. A policy chain that is formally correct but directed at an ecosystem that does not yet operate at scale is, at best, infrastructure yet to be employed. The Data Act, which became applicable in September 2025, introduces complementary obligations for data holders of connected products to make data available on fair and non-discriminatory terms, and explicitly cross-references the DGA's intermediation framework [3]. This layering of instruments suggests the regulatory direction is stable, but the practical uptake will depend on factors such as organisational capacity, legal literacy, and economic incentive, that neither regulation can fully determine on its own.

6.3 Regulatory Resilience

A legitimate concern for any work that maps legal articles to machine-readable policies is what happens when the law changes. The DGA sits within a broader package of EU digital legislation alongside the Data Act, the Digital Markets Act, and the Digital Services Act, whose enforcement intersections are only beginning to be mapped [13]. The European Commission's Digital Omnibus proposal [9] is actively pursuing consolidation across this package, which could modify or renumber the very provisions this work cites. If Art. 12 DGA is amended, do the listings break?

The answer, we argue, is not necessarily so. The contribution of this work is the *patterns*: a purpose constraint, whatever its legal basis, maps to an `odrl:Constraint` that survives each hand-off in a chain of agreements. A neutrality obligation, whatever its source, maps to an `odrl:Prohibition` set on the intermediary. A downstream access agreement regardless of incentive inherits the constraints of the agreement above it. To illustrate this point concretely:

even in the event that the DGA were substantially revised or repealed, the functional requirements for data intermediation services and altruistic data sharing do not disappear with it. The Data Act independently establishes analogous obligations, notably the duty of intermediaries to act neutrally and the requirement to make data available under fair, reasonable, and non-discriminatory conditions [3]. The modelling approach presented here is therefore applicable as long as the underlying regulatory intent persists, which the current trajectory of EU data law strongly suggests it will.

7 Conclusions and Future Work

The DGA's promise is that data sharing becomes easier, more trustworthy and more structured across the EU. Whether that promise is kept depends partly on whether the obligations it creates can be supported by automated or semi-automated compliance tooling: reducing the interpretive burden on organisations that must navigate these obligations without dedicated legal infrastructure at every step. This paper has shown that two of those obligations, the purpose-bound civic channel of Chapter IV and the commercially scoped channel of Chapter III, can be expressed as ODRL policy chains, grounded in the DPV-DGA extension and the Trust Envelope model, in a way that is both legally precise and machine-readable.

The two chains demonstrate that the same data point produces structurally different trust envelopes depending on the sharing channel and that constraints propagate downstream without any party being able to broaden what they received. They also clarify a structural point about the DGA itself: a DAO and a DISP serve independent roles under separate chapters and do not collaborate within a single policy chain. Getting this separation right matters for implementation.

The patterns established here – purpose propagation, constraint inheritance and channel-specific policy chains – are structurally transferable across analogous regulatory frameworks, as the Trust Envelope model intends. Developed against the DGA, they are applicable to successor frameworks as the EU's digital legislation landscape consolidates.

Future work will address what this paper has explicitly deferred. The neutrality obligation under Art. 12(a) DGA will be modelled as an `odrl:Prohibition` set on the DISP. Withdrawal and post-withdrawal duty flows under Art. 21(3) DGA remain open. The provenance component of each Trust Envelope, representing the history of the data pool resource, is a natural complement to the destiny chains modelled here, and is left for future work. Full validation against a live ODRL reasoner remains as future work; existing enforcement infrastructures such as rule-based web agents [17] provide a candidate pathway toward executable policy chains.

The relationship between the policy chain model and the broader European dataspace movement also warrants closer attention. The DGA explicitly frames its governance architecture around the vision of common European data spaces: domain-specific environments in which data can be shared and pooled across organisations and Member States in compliance with Findable, Accessible, Interoperable and Reusable (FAIR) data principles [2]. These dataspaces already employ ODRL and structured dataset descriptions for the commercial exchange of data and the DGA was drafted with that development in view. The Trust Envelope model occupies a complementary position: where dataspace architectures define the infrastructure and interoperability layer, the policy chain approach models the obligations and permissions that govern what may be done with data once access is granted. A dedicated comparison of trust-envelope-based policy modelling against other linked-data approaches must also be performed: examining their respective trade-offs in expressiveness, auditability and integration within operational dataspace architectures, constitutes a natural and timely extension of this

work.

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Declaration on Generative AI

During the preparation of this work, the author(s) used Grammarly in order to: Grammar and spelling check. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

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