

mobilityDCAT-AP in Practice: Compliance Analysis of European NAPs and the Belgian Reference Implementation

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Abstract

National Access Points (NAPs) play a central role in implementing the ITS Directive by providing harmonised access to mobility data across Europe. mobilityDCAT-AP offers a semantically rich metadata model to support cross-border interoperability, yet its practical adoption has not been systematically evaluated. This paper presents the first comprehensive compliance analysis of mobilityDCAT-AP implementations across five European NAPs. Using validated and normalised RDF graphs, we assess adherence to mandatory, recommended, and controlled-vocabulary requirements, and identify common modelling and syntactic issues that hinder interoperability. Belgium's Transportdata.be, developed through an extended CKAN stack, is examined as a reference implementation demonstrating that full mandatory compliance is achievable. Our results reveal substantial differences in implementation maturity, with controlled vocabulary usage and dataset completeness emerging as key barriers to cross-portal queries. Based on these findings, we provide technical recommendations, validation tools, and stakeholder engagement strategies to support future deployments and strengthen Europe-wide mobility data integration.

Keywords: mobilityDCAT-AP, DCAT-AP, National Access Points, CKAN, semantic web, transportation data, metadata compliance, ITS directive

Introduction

The European Commission's Delegated Regulations under the ITS Directive (2010/40/EU)[1] require that transport and mobility data be made available through harmonized National Access Points across EU Member States. These NAPs in each of the EU Member States aim at enhancing discoverability of the existing mobility datasets and services by their documentation through metadata. The mobilityDCAT-AP specification[2], developed through extensive collaboration in the NAPCORE [3] project, provides a robust semantic framework for describing mobility datasets with harmonised metadata.

The Resource Description Framework (RDF)[4] provides mobilityDCAT-AP's technical foundation, representing metadata as subject-predicate-object triples where entities are identified by globally unique URIs rather than text strings. This URI-based approach enables semantic interoperability:

<<https://w3id.org/mobilitydcap/transport-mode/regional-and-local-rail>> unambiguously identifies rail transport across all NAPs regardless of language, allowing automated cross-border queries that would be impossible with literal text like "train," "Zug," or "tåg." Combined with controlled vocabularies—standardized URI sets for transport modes, data formats, and update frequencies—RDF enables machines to understand semantic relationships without human interpretation, transforming Europe's NAPs from isolated catalogs into a queryable, integrated mobility data space.

This paper emerges from practical implementation experience of mobilityDCAT-AP, combining technical development expertise from redpencil.io with operational and standardization insights from NGI, which operates Belgium's NAP Transportdata.be on behalf of the Belgian ITS Steering Committee. As an active NAPCORE member, NGI has contributed both to the standard's development and to engaging data providers in its adoption, offering unique perspectives on both technical and organizational challenges.

Our contributions include:

- Analysis of mobilityDCAT-AP implementation patterns across five European NAPs

- Documentation of successful practices from the Belgian implementation
- Technical recommendations
- Practical resources for NAP operators seeking to improve their mobilityDCAT-AP compliance
- Insights from standard development and data provider engagement

Methodology and data collection

Data sources

The NAPCORE Github repository currently lists 6 adopters who've implemented mobilityDCAT-AP[5]. Our analysis covers 5 national access points. The Latvian portal was excluded from this study as access to its data feed could not be secured within the project timeframe. The endpoints were accessed on 2025-11-12 (Table 1).

Table 1 - overview of mobilityDCAT-AP endpoints

Country	RDF endpoint	Datasets	Collection date
Austria	https://www.mobilitydata.gv.at/api/mobility_dcat/en https://www.mobilitydata.gv.at/api/mobility_dcat/de	23	2025-11-12
Belgium	https://transportdata.be/catalog.xml	189	2025-11-12
Denmark	https://businessservice.dataudveksler.app.vd.dk/api/Metadata?format=dcap	165	2025-11-12
Germany	https://mobilithek.info/mobilithek/api/v1.0/export/datasets/mobilitydcatap	20	2025-11-12
Sweden	https://trafficdata.se/catalog.xml	50	2025-11-12

Preprocessing and corrections

Several endpoints contained syntactic errors, typographical mistakes, or namespace inconsistencies that prevented reliable analysis:

- Use of `dcap:Dataset` instead of `dcap:dataset` when linking datasets to their catalog
- Use of `dcap:distribution` (the property) instead of `dcap:Distribution` (the class) as `rdf:type`
- Incorrect embedding of HTML content in RDF/XML
- Representation of datasets as a list structure rather than using multiple `dcap:dataset` statements
- Typographical errors in the mobilityDCAT-AP namespace, where <https://w3id.org/mobilitydcat-ap> was used instead of the correct <https://w3id.org/mobilitydcat-ap#> (observed in the Austrian and Danish catalogs).
- incorrectly reusing the dataset identifier for its distribution

Some of these issues, particularly the namespace inconsistencies, align with known challenges discussed in the mobilityDCAT-AP community (see GitHub issue #112 [6]). The prevalence of the missing trailing hash in namespace URIs across multiple implementations (Austria, Denmark) suggests this may stem from ambiguous documentation or examples rather than isolated implementation errors.

The DCAT-AP identifier usage guidance explicitly addresses the identifier reuse issue, noting that "datasets and distributions are distinct entities and should have different URIs" to avoid conflation of metadata about the dataset itself with metadata about specific access methods [7].

We corrected these issues and normalized RDF graphs to ensure syntactic validity before running SPARQL queries. This is a limitation to be considered when interpreting compliance results. Corrected datasets and executed queries are available at <https://github.com/redpencilio/mobilitydcatap-study>. It should be noted that by correcting these syntactic errors to enable analysis, our compliance scores may overstate actual production compliance levels—in practice, portals with uncorrected errors would fail validation and interoperability tests, representing a more fundamental compliance issue than missing metadata properties alone. However, these implementation errors could be considered bugs which are likely easy to fix, hence we choose to treat them differently.

Compliance assessment approach

We evaluated each dataset against mobilityDCAT-AP, focusing on:

- Presence of mandatory, recommended and optional properties across `dcap:Catalog`, `dcap:Dataset`, `dcap:Distribution` classes
- Usage of controlled vocabularies for semantic interoperability

- Internal consistency across all resources of a given class
- Cross-portal comparability

Results and evaluation

The mobilityDCAT-AP 1.1.0 specification structures properties into three tiers: mandatory (required for basic compliance), recommended (strongly encouraged for production use), and optional (specialized use cases). Table 2 presents compliance across these tiers, revealing that implementation challenges extend well beyond mandatory requirements.

A property is considered "fully compliant" only when it has a compliance rate of 1.0 (present on all entities of that class). Partial compliance (e.g., 80% of entities having a mandatory property) is scored as non-compliant, ensuring strict adherence to the specification.

Table 2 - overview of mobilityDCAT-AP compliance by Property Tier

Catalog	Class	Mandatory	Recommended	Optional
BE	Catalog	100.0%	100.0%	25.0%
	Dataset	100.0%	44.4%	26.7%
	Distribution	100.0%	33.3%	0.0%
DE	Catalog	83.3%	0.0%	25.0%
	Dataset	85.7%	22.2%	13.3%
	Distribution	100%	33.3%	0.0%
DK	Catalog	83.3%	0.0%	25.0%
	Dataset	71.4%	22.2%	6.7%
	Distribution	50.0%	0.0%	0.0%
AT	Catalog	66.7%	0.0%	0.0%
	Dataset	71.4%	11.1%	6.7%
	Distribution	25%	66.7%	12.5%
SE	Catalog	33.3%	40.0%	25.0%
	Dataset	85.7%	22.2%	6.7%
	Distribution	50.0%	33.3%	0.0%

Interpretation

Belgium's perfect mandatory coverage (100% across Catalog, Dataset and Distribution) demonstrates that comprehensive compliance is achievable. Other portals show class-specific weaknesses, with Distribution the most underspecified. Austria's 25% Distribution mandatory coverage stems primarily from missing access URLs, preventing actual data retrieval (see Appendix A for detailed property analysis).

Recommended property coverage reveals systematic neglect across all portals except Belgium. Catalog-level recommended properties show zero adoption on three out of five portals, indicating that properties like catalog language, license, and modification dates are universally ignored despite facilitating portal-wide metadata management. Dataset-level recommended properties fare only slightly better, with Belgium reaching 44.4% coverage while others achieve 11.1-22.2%. This gap matters because recommended properties enable critical use cases: transport mode classification, contact points for quality feedback, and network coverage for infrastructure queries.

Partial compliance—where properties appear on some but not all entities—proves particularly problematic. Germany provides update frequency (`dct:accrualPeriodicity`) on only 25% of datasets (5/20), forcing users to

verify property presence individually. Sweden specifies mobility data standards on only 25% of distributions (18/71), creating format ambiguity for 75% of distributions. These inconsistencies undermine the automation benefits that standardized metadata promises.

Near-universal zero coverage of optional properties stems from our scoring method; optional properties are by their very definition not required for every dataset. Even so, it seems most portals implement minimally, treating optional metadata as overhead. Belgium's 25-27% optional coverage at Catalog and Dataset levels represents strategic investment in enhanced discoverability, while other portals provide effectively zero optional metadata regardless of potential value.

The distribution of missing properties highlights two independent dimensions of maturity:

- Technical implementation quality
- Metadata completeness policies enforced on data providers

A property missing on all instances in a portal typically indicates an issue with technical implementation quality, whereas completeness policies and stakeholder outreach are required to make sure it is present on all datasets.

Usage of controlled vocabularies

Controlled vocabularies are fundamental to achieving semantic interoperability across European NAPs. By requiring specific URIs from standardized vocabularies (such as the EU Vocabularies for themes, frequencies, and file formats), mobilityDCAT-AP ensures that metadata can be reliably queried, aggregated, and interpreted across national boundaries. For example, a transport mode described as <https://w3id.org/mobilitydcap/transport-mode/regional-and-local-rail> in Belgium can be automatically recognized and processed by systems in Germany or Denmark, enabling cross-border mobility services to discover relevant datasets without manual intervention. Without controlled vocabularies, each NAP might use different terms or representations for the same concepts (e.g., "train," "railway," "rail transport"), making automated data discovery and federation effectively impossible. Additionally, controlled vocabularies enable precise faceted search interfaces and reliable data quality validation—two critical capabilities for NAP operators managing hundreds of datasets from diverse data providers. We validated controlled vocabulary usage by loading the catalog metadata into a SPARQL endpoint and querying per property for the used vocabularies in each catalog.

Table 3 - usage of controlled vocabularies

Property	BE	DE	DK	AT	SE
Catalog level					
language	100% (4C)	-	-	-	100% (1V)
publisher	100% (1C)	100% (2V)	100% (165F)	100% (1C)	-
spatial	100% (2V)	100% (2V)	100% (165F)	100% (2V)	-
themeTaxonomy	100% (1C)	-	-	-	-
Dataset level					
accrualPeriodicity	100% (11C)	25% (2C)	-	-	100% (3C)
conformsTo	7% (3C)	-	28% (2C)	-	-
language	100% (4C)	-	-	-	100% (2C)
publisher	100% (70C)	100% (30F)	100% (165F)	100% (9C)	100% (6C)
spatial	100% (415F)	100% (30F)	100% (165F)	-	100% (22C)
theme	100% (1C)	100% (3C)	-	-	100% (1C)
georeferencingMethod	24% (4C)	-	48% (4C)	-	-
intendedInformationService	-	-	-	-	-
mobilityTheme	100% (53C)	100% (5C)	92% (59C)	100% (72F)	98% (72C)
networkCoverage	12% (7C)	-	-	-	98% (10C)
transportMode	100% (23C)	15% (3C)	-	-	28% (18C)
Distribution level					
format	100% (13C)	100% (8C)	-	-	100% (5V)

language	-	-	-	-	-
publisher	-	-	-	100% (9C)	-
applicationLayerProtocol	100% (3C)	-	-	100% (5V)	-
communicationMethod	72% (2C)	-	-	100% (2V)	27% (3C)
grammar	37% (4C)	-	-	22% (3V)	-
mobilityDataStandard	100% (7C)	100% (76C)	100% (9C)	-	25% (4C)

Legend

- = property not found or not filled in at all

Y% (XC) = Y% of entities have property, X unique values, URIs from Controlled vocabulary

Y% (XV) = Y% have property, X unique values, URIs from own vocabulary

Y% (XF) = Y% have property, X unique values, Free text

Analysis of controlled vocabulary adoption across five European National Access Points reveals significant variation in mobilityDCAT-AP compliance. While core properties show strong adoption—notably mobilityTheme achieving 92-100% codelist usage across all portals—critical interoperability gaps persist. Belgium's transportdata.be demonstrates the most comprehensive implementation with consistent codelist usage across properties like transportMode (100%), format (100%), and accrualPeriodicity (100%). However, Austria's portal undermines harmonization by using free-text controlled vocabularies instead of standard URI-based codelists for technical properties (applicationLayerProtocol, communicationMethod), preventing machine-readable interoperability. Universal gaps exist for intendedInformationService (0% across all portals) and distribution language metadata (0%), while adoption of geographically-critical properties like georeferencingMethod varies dramatically (0-48%). There is also an inconsistency in how the controlled vocabularies are used, sometimes these are linked directly but in other cases an indirection is used. Examples are dct:spatial/dct:identifier on the Belgian portal or Germany's implementation of mobilityDataStandard (mobilitydcatap:mobilityDataStandard/dcterms:conformsTo).

These findings suggest that while the mobilityDCAT-AP specification provides a solid foundation, achieving true cross-border data harmonization requires stricter validation tooling and clearer implementation guidance to prevent divergent national interpretations.

Cross-Portal Interoperability: Potential vs. Reality

MobilityDCAT-AP's design for semantic interoperability enables queries that span multiple NAPs. Consider a real-world scenario: discovering real-time rail data across Europe (Figure 1).

```
PREFIX mobilitydcatap: <https://w3id.org/mobilitydcat-ap#>
PREFIX dcat: <http://www.w3.org/ns/dcat#>
PREFIX dct: <http://purl.org/dc/terms/>
SELECT ?dataset ?title ?accessURL ?country ?periodicity
WHERE {
  ?dataset a dcat:Dataset ;
    dct:title ?title ;
    mobilitydcatap:transportMode ?transportMode;
    dct:spatial ?country ;
    dct:accrualPeriodicity ?periodicity ;
    dcat:distribution/dcat:accessURL ?accessURL .
  VALUES ?transportMode {
    <https://w3id.org/mobilitydcat-ap/transport-mode/regional-and-local-rail>
    <https://w3id.org/mobilitydcat-ap/transport-mode/long-distance-rail>
  }
}
```

Figure 1- example query for discovering rail data

This query

- Works on Belgium (100% transport mode, accrualPeriodicity compliance)
- Fails on Germany (15% transport mode, 25% accrualPeriodicity)
- Fails on Denmark (0% transport mode, 0% accrualPeriodicity)
- Fails on Austria (0% transport mode, 0% accrualPeriodicity, 0% accessURL)
- ~ Partial on Sweden (28% transport mode coverage)

This demonstrates that even basic cross-border queries fail on multiple dimensions due to incomplete property coverage, undermining the vision of seamless European mobility data integration.

The Belgian Implementation: A Reference Case

Belgium's Transportdata.be demonstrates a comprehensive mobilityDCAT-AP implementation using CKAN infrastructure. While several European NAPs utilize CKAN (including Sweden's trafficdata.se), the extent of schema customization and RDF profile development significantly impacts standard coverage. Our implementation represents one of the most complete CKAN-based approaches, achieving full controlled vocabulary compliance across dataset, distribution, and catalog levels.

extending CKAN

To facilitate adoption across the European CKAN community, we developed an extension that builds upon the established ckanext-dcat foundation while adding mobilityDCAT-AP compliance. This practical implementation, powering Belgium's Transportdata.be, demonstrates how existing portal infrastructure can be enhanced for mobility data standards.

A technical challenge emerged from mobilityDCAT-AP's requirement for mandatory dcat:CatalogRecord elements, which the upstream ckanext-dcat didn't fully support. Our team created a pull request[8] to enable this support in the main ckanext-dcat plugin and is awaiting feedback from the CKAN community.

The extension is currently running in production on Transportdata.be, handling 189 datasets on 12 November 2025 with full mobilityDCAT-AP compliance. While the implementation is tailored to Belgium's specific requirements, it demonstrates the scope of CKAN customization necessary for comprehensive standard coverage. Our code is publicly available on github[9], providing a reference implementation for other NAP operators considering CKAN-based solutions. Together with Sweden's implementation, these examples show that CKAN can effectively support mobilityDCAT-AP, though achieving full compliance requires substantial custom development beyond the base ckanext-dcat plugin.

SHACL validation insights

To ensure compatibility we validated metadata quality by using SHACL shapes provided by the NAPCORE community. To facilitate reproducible analysis and support other implementers, we contributed a Dockerfile[10] that packages the validation tooling into an easily deployable container.

However, we identified validation inconsistencies between specifications: the NAPCORE SHACL shapes require an intermediate node pattern for properties like dct:license while the parent EU DCAT-AP specification mandates direct linking for these properties. E.g.: NAPCORE SHACL requires dct:license/dct:identifier where EU DCAT-AP requires dct:license. This discrepancy means datasets can be valid according to one standard but fail validation against the other, potentially explaining some compliance variations observed across NAPs.

Despite achieving 100% compliance on required properties, SHACL validation of Transportdata.be revealed instructive gaps between practical implementation and formal validation:

The most prevalent issue involves legislation references where datasets use human-readable strings ("MMTIS", "RTTI") instead of proper ELI URIs for dcat:applicableLegislation. Similarly, distributions include multiple access conditions (e.g., both free-of-charge AND licence-provided) where SHACL requires exactly one, reflecting real-world scenarios poorly captured by current cardinality constraints.

Notably, our finding that mobilitydcatap:dataFormatNotes lacked multilingual support for what are essentially translation variants led NGI to raise this with NAPCORE, resulting in a unanimous vote on 17 November 2025 to add multilingual support—demonstrating how implementation experience directly drives specification evolution.

These findings reveal that high controlled vocabulary coverage (Table 3) does not guarantee SHACL conformance. More importantly, they show that most violations represent correctable modeling decisions rather than fundamental barriers, addressable through refined data provider guidance.

Stakeholder Engagement and Metadata Quality

Technical infrastructure alone cannot ensure mobilityDCAT-AP compliance—data providers must be convinced to

supply comprehensive metadata. NGI's experience as operator for Transportdata.be highlights the importance of stakeholder engagement. An example of this is the strategy chosen to clearly communicate potential benefits, besides legal compliance, for data owners of meticulous metadata provision on the NAP, such as enhanced discoverability of datasets and services through propagation on other dataportals (e.g. the Belgian federal dataportal and EU dataportal) and ultimately additional usage. However, as not all data providers can be assumed to fully comprehend the semantic concepts of mobilityDCAT-AP to the full extent, the NGI provides tailored help with filling out the metadata required by means of dedicated call organised by the their helpdesk contact@transportdata.be.

Allocating sufficient means to the NAP helpdesk and a tailor-made, personalised approach to explain legal requirements stipulated by the ITS Directive for each data provider can therefore be seen as key to achieving Belgium's high compliance rate. Additionally, the close connection of the NGI with both data providers and data (re)-users of the Belgian NAP, allows for the communication of additional needs and/or proposed changes to the mobilityDCAT-AP model through participation in the NAPCORE project.

This experience suggests that successful NAP implementation requires equal attention to both technical standards and stakeholder engagement strategies—a lesson relevant for other European NAPs pursuing higher compliance rates.

Concrete guidance for implementations

Based on the above analysis and our own experience with implementing mobilityDCAT-AP, we can position some guidance for new implementations.

Understand the semantic underpinning of mobilityDCAT-AP

Some of the data quality issues above are easier to understand through knowledge of RDF. The use of labels over URIs, or incorrect use of URIs does not present issues within a single system, but will fail to integrate across systems. A clear understanding by technical implementers changes requirements from obligatory actions to clean patterns.

Engage with your stakeholders

A personal approach towards stakeholders seems paramount to achieving initial success. Motivating data providers and data users creates local value in the portal.

Use a solid technical basis for the portal

Ensure early on the technical solution can be adapted to the full mobilityDCAT-AP standard. Be it CKAN, homegrown, or another off the shelf solution, a future version should include the full specification correctly to facilitate data exchange. Like other platforms, our CKAN extension can be a starting point.

Keep a continuous eye on metadata quality

To make data truly findable across NAPs, quality is key. Both from a stakeholder management perspective as well as from a technical one. Metadata is only valuable if it can be trusted upon, is regularly updated and complete. Run metadata quality reports at set dates to monitor quality and completeness. The SHACL validation Docker container may help to get started.

Participate in the standardization process

When theory meets practice, the world shows its true face. As we discovered too, sometimes the standard is insufficient. In order to share across borders the standard must be sufficient for our real needs. Watch for changes in the standard, and actively create issues when the standard is insufficient. Gathering feedback will help mature the implementation.

Conclusion

This paper presented the first comprehensive compliance analysis of mobilityDCAT-AP implementations across European National Access Points, revealing significant variations in adoption maturity. Our findings demonstrate that while the specification is technically viable—as evidenced by Belgium's 100% compliance rate—successful

implementation requires addressing both technical and organizational dimensions. The analysis identified two critical success factors: robust technical infrastructure (with proper handling of mandatory elements) and sustained stakeholder engagement to ensure metadata completeness from data providers.

The stark differences in controlled vocabulary usage and the prevalence of syntactic errors across NAPs highlight the need for better implementation guidance and validation tools. Our contributions—including the open-source CKAN extension, SHACL validation Docker container, and corrected datasets—provide practical resources for NAP operators seeking to improve their mobilityDCAT-AP compliance. The Belgian experience particularly demonstrates that investing in helpdesk capacity and personalized data provider support yields measurable improvements in metadata quality. Furthermore, our identification of validation discrepancies between DCAT-AP and mobilityDCAT-AP specifications, along with NGI's successful advocacy for multilingual support in NAPCORE, demonstrates how implementation experience can directly influence standard evolution.

Looking forward, achieving the vision of seamless cross-border mobility data sharing will require continued collaboration between technical implementers, NAP operators, and the NAPCORE community. We recommend that future work focus on creating comprehensive validation pipelines that can be integrated into existing portal infrastructure, and establishing best practices for data provider onboarding. As the ITS Directive's requirements continue to evolve, the lessons learned from these early implementations will be crucial for ensuring that Europe's mobility data infrastructure can effectively support the next generation of intelligent transport services.

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APPENDIX A

Table 4 - Catalog properties

Property (M/R/O)	http://mobilitydata.at/Mobility_Access_Point_Austria	https://du-portal-ui.dataudveksler.app.vd.dk/	https://mobilithek.info/	https://trafficedata.se	https://transportdata.be
description (M)	0/1	1/1	1/1	0/1	1/1
spatial (M)	1/1	1/1	1/1	0/1	1/1
homepage (M)	1/1	0/1	1/1	1/1	1/1
publisher (M)	1/1	1/1	1/1	0/1	1/1
record (M)	0/1	1/1	0/1	0/1	1/1
title (M)	1/1	1/1	1/1	1/1	1/1
language (R)	0/1	0/1	0/1	1/1	1/1
license (R)	0/1	0/1	0/1	0/1	1/1
modified (R)	0/1	0/1	0/1	1/1	1/1
issued (R)	0/1	0/1	0/1	0/1	1/1
themeTaxonomy (R)	0/1	0/1	0/1	0/1	1/1
dataset (O)	0/1	1/1	1/1	1/1	1/1
hasPart (O)	0/1	0/1	0/1	0/1	0/1
identifier (O)	0/1	0/1	0/1	0/1	0/1
identifier (O)	0/1	0/1	0/1	0/1	0/1

Table 5 - Dataset properties

Property (M/R/O)	http://mobilitydata.at/Mobility_Access_Point_Austria	https://du-portal-ui.dataudveksler.app.vd.dk/	https://mobilithek.info/	https://trafficedata.se	https://transportdata.be
distribution (M)	23/23	165/165	20/20	50/50	189/189
description (M)	23/23	165/165	20/20	50/50	189/189
accrualPeriodicity (M)	0/23	0/165	5/20	50/50	189/189
spatial (M)	0/23	165/165	20/20	50/50	189/189
mobilityTheme (M)	23/23	151/165	20/20	49/50	189/189
publisher (M)	23/23	165/165	20/20	50/50	189/189
title (M)	23/23	165/165	20/20	50/50	189/189
georeferencingMethod (R)	0/23	79/165	0/20	0/50	45/189
contactPoint (R)	0/23	165/165	0/20	50/50	189/189
keyword (R)	0/23	0/165	20/20	49/50	0/189
networkCoverage (R)	0/23	0/165	0/20	49/50	23/189
conformsTo (R)	0/23	46/165	0/20	0/50	14/189

rightsHolder (R)	23/23	165/165	4/20	0/50	0/189
temporal (R)	0/23	0/165	2/20	0/50	189/189
theme (R)	0/23	0/165	20/20	50/50	189/189
transportMode (R)	0/23	0/165	3/20	14/50	189/189
applicableLegislation (O)	0/23	0/165	0/20	0/50	0/189
assessmentResult (O)	0/23	0/165	0/20	0/50	0/189
hasVersion (O)	0/23	0/165	0/20	0/50	0/189
identifier (O)	23/23	0/165	0/20	50/50	189/189
intendedInformationService (O)	0/23	0/165	0/20	0/50	0/189
isReferencedBy (O)	0/23	0/165	0/20	0/50	0/189
isVersionOf (O)	0/23	0/165	0/20	0/50	0/189
language (O)	0/23	0/165	0/20	50/50	189/189
identifier (O)	0/23	0/165	20/20	0/50	0/189
relation (O)	0/23	0/165	0/20	0/50	0/189
issued (O)	0/23	4/165	0/20	50/50	189/189
modified (O)	0/23	165/165	20/20	50/50	189/189
versionInfo (O)	0/23	0/165	0/20	0/50	0/189
versionNotes (O)	0/23	0/165	0/20	0/50	0/189
hasQualityAnnotation (O)	0/23	0/165	19/20	50/50	26/189

Table 6 - Distribution Properties

Property (M/R/O)	http://mobilitydata.at/Mobility_Access_Point_Austria	https://du-portal-ui.dataudveksler.app.vd.dk/	https://mobilithek.info/	https://trafficedata.se	https://transportdata.be
accessURL (M)	0/23	165/165	76/76	71/71	214/214
mobilityDataStandard (M)	0/23	165/165	76/76	18/71	214/214
format (M)	0/23	0/165	76/76	71/71	214/214
rights (M)	23/23	149/165	76/76	0/71	214/214
applicationLayerProtocol (R)	23/23	0/165	0/76	0/71	214/214
description (R)	23/23	0/165	0/76	61/71	22/214
license (R)	0/23	0/165	76/76	71/71	132/214
accessService (O)	0/23	0/165	0/76	0/71	0/214
characterEncoding (O)	0/23	0/165	0/76	0/71	117/214
communicationMethod (O)	23/23	0/165	0/76	19/71	155/214
dataFormatNotes (O)	0/23	0/165	2/76	0/71	51/214

downloadURL (O)	0/23	0/165	70/76	0/71	33/214
grammar (O)	5/23	0/165	0/76	0/71	80/214
sample (O)	0/23	0/165	0/76	0/71	0/214
temporal (O)	0/23	0/165	3/76	0/71	0/214

Legend: (M) = Mandatory property (R) = Recommended property (O) = Optional property N/A = No entities of this type in catalog