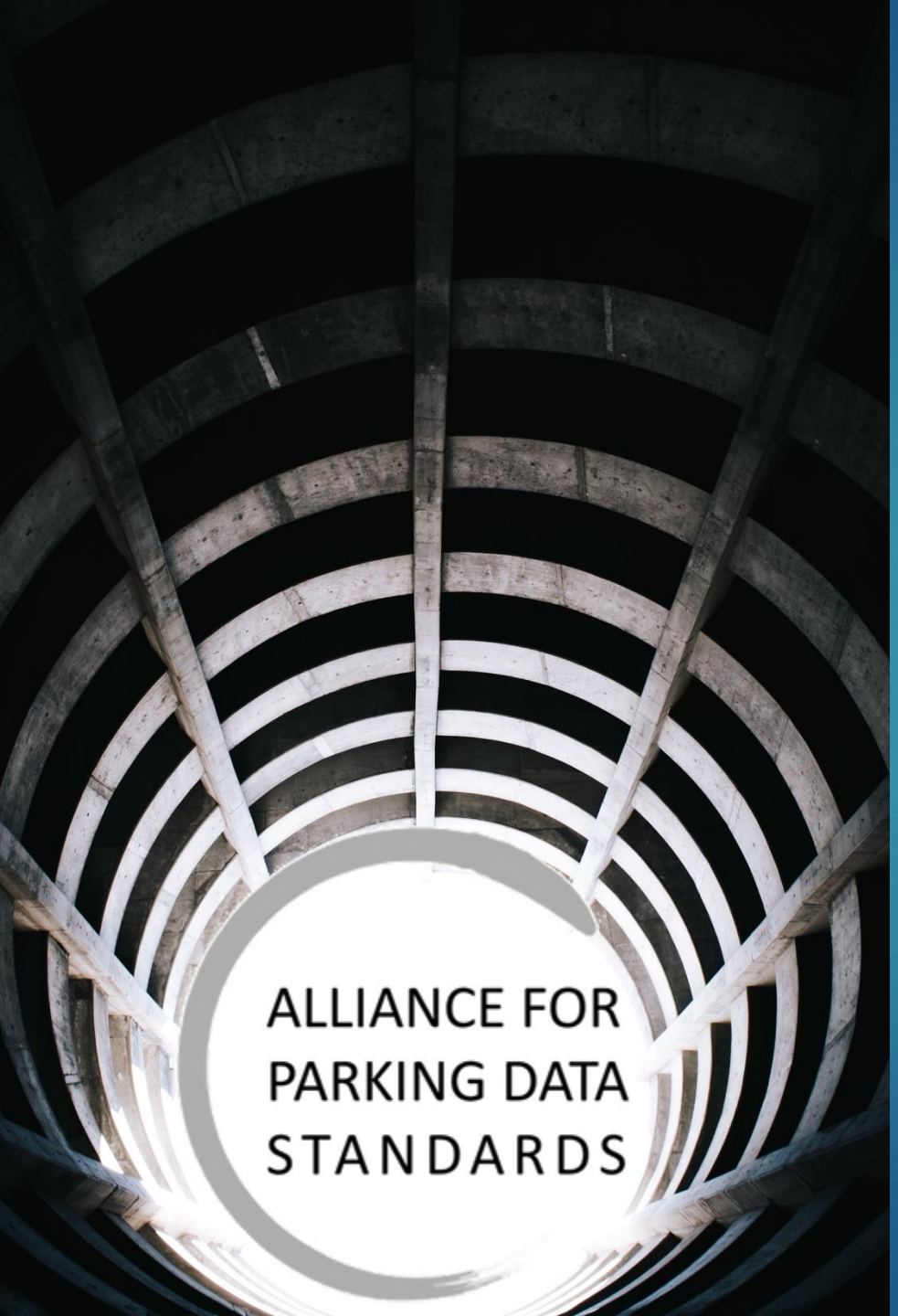
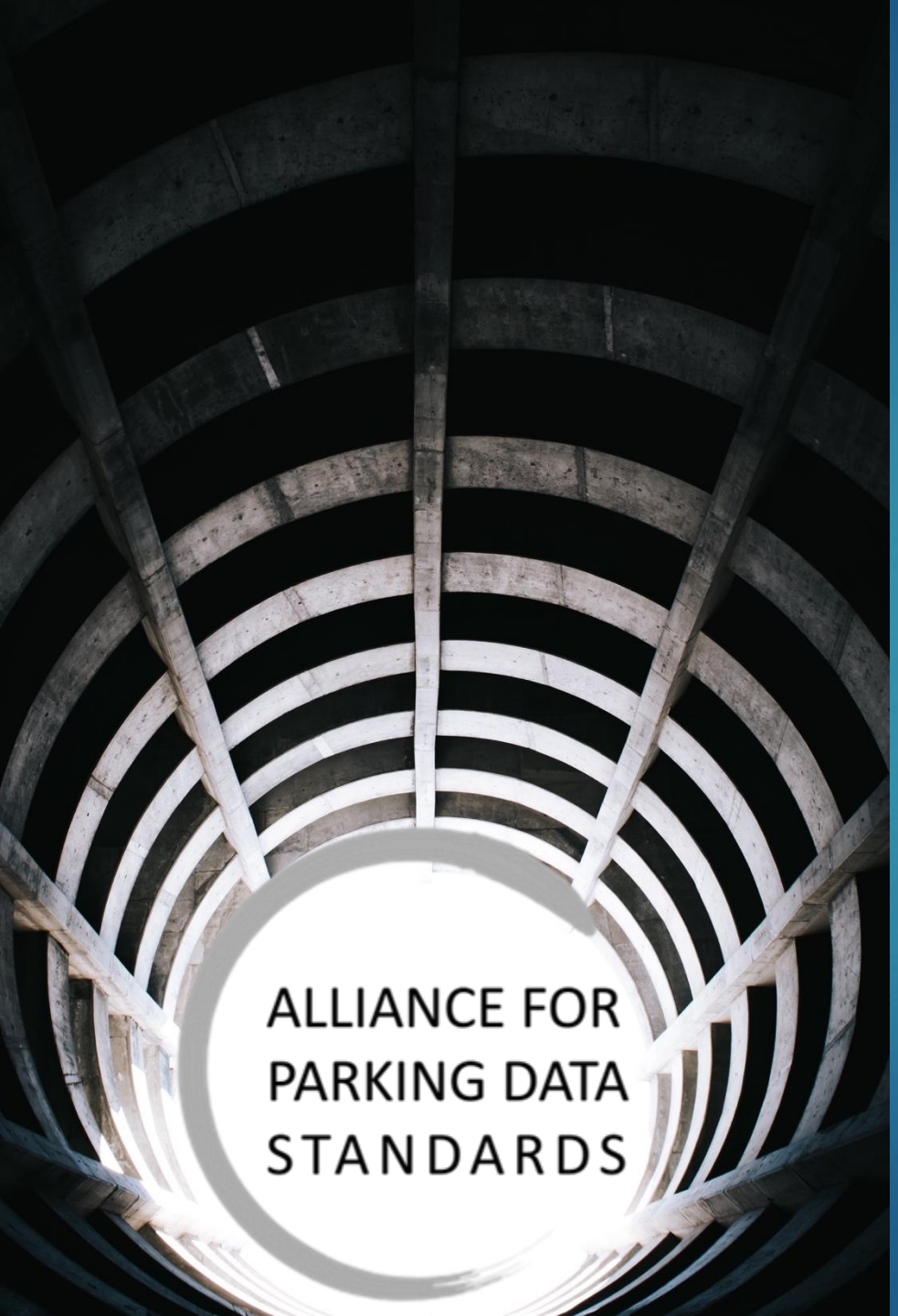


Introduction to APDS

Markus Schneider, September 2022 (Update 09/23)

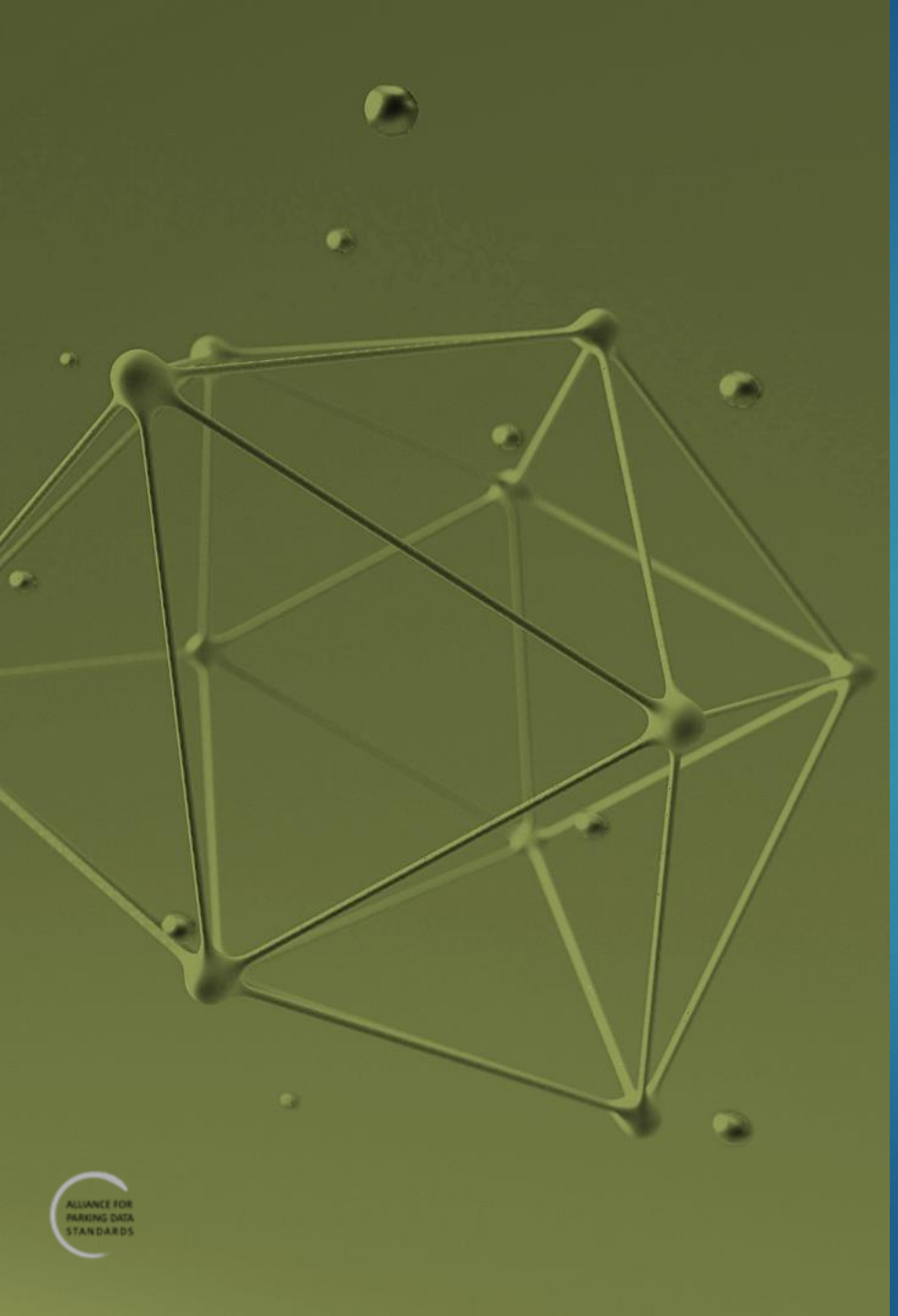


Introduction to **APDS**

- APDS
  - Genesis
  - Data Model, Data Domains
  - API
- Related Standards
  - ISO TS 5206-1
  - DATEX II
  - NeTEx

APDS
how it started

- Founding Organisations
  - British Parking Association
  - European Parking Association
  - IPMI International Parking and Mobility Institute
- Sponsors
- Affiliates



Data Model
Data Domains

APDS Standard Components

DATA MODEL

- The actual core of the standard
- Expressed as a UML data model specifying all attributes and dependencies

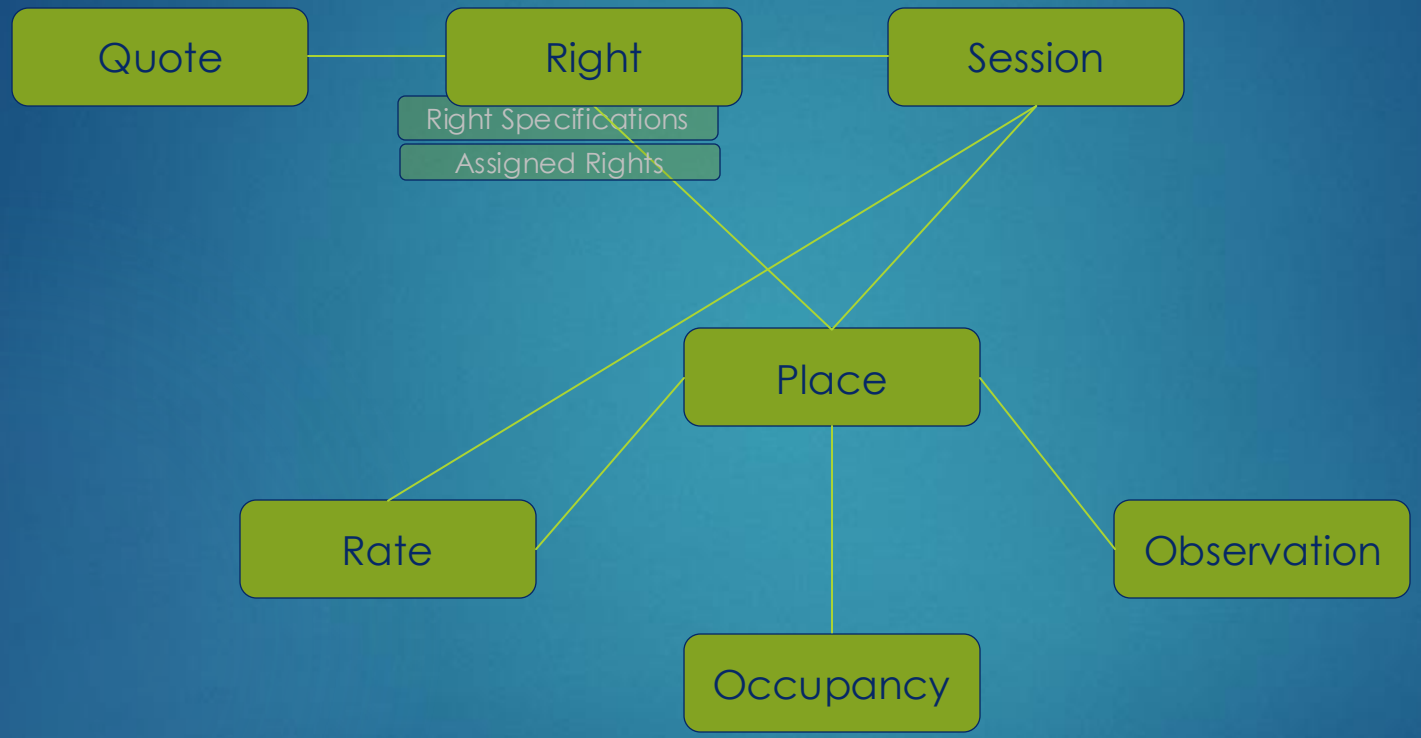
SPECIFICATION DOCUMENTS

- Overview
- Information Model
- Data Dictionary
- Use Cases

API

- Interface representing the APDS data model
- OpenAPI-formatted
- Ready to use for adopters

APDS Data Domains



Place Domain

- Entry point when trying to find available parking locations
  - Where is the car park located?
  - Who runs it?
  - What are the opening times?
  - Other detailed characteristics (e.g. EV charging points, height/width restrictions)
  - Related/dependent parking areas → Place Hierarchy
  - What is the current / expected level of occupancy?
- Links to…
  - So-called Right Specifications (applicability, eligibility)
  - Applicable rates/tariffs

Place Hierarchy

Occupancy Domain

- Provides Space Availability Information
  - Supply (number of spaces per category)
  - Current conditions
  - Expected conditions
  - How has data been collected? (counted automatically/manually, estimated, …)
  - When was the last snapshot taken?
  - What is the configured interval for updates?
- Links to…
  - A place / group of places

Place Domain
Electrical Infrastructure

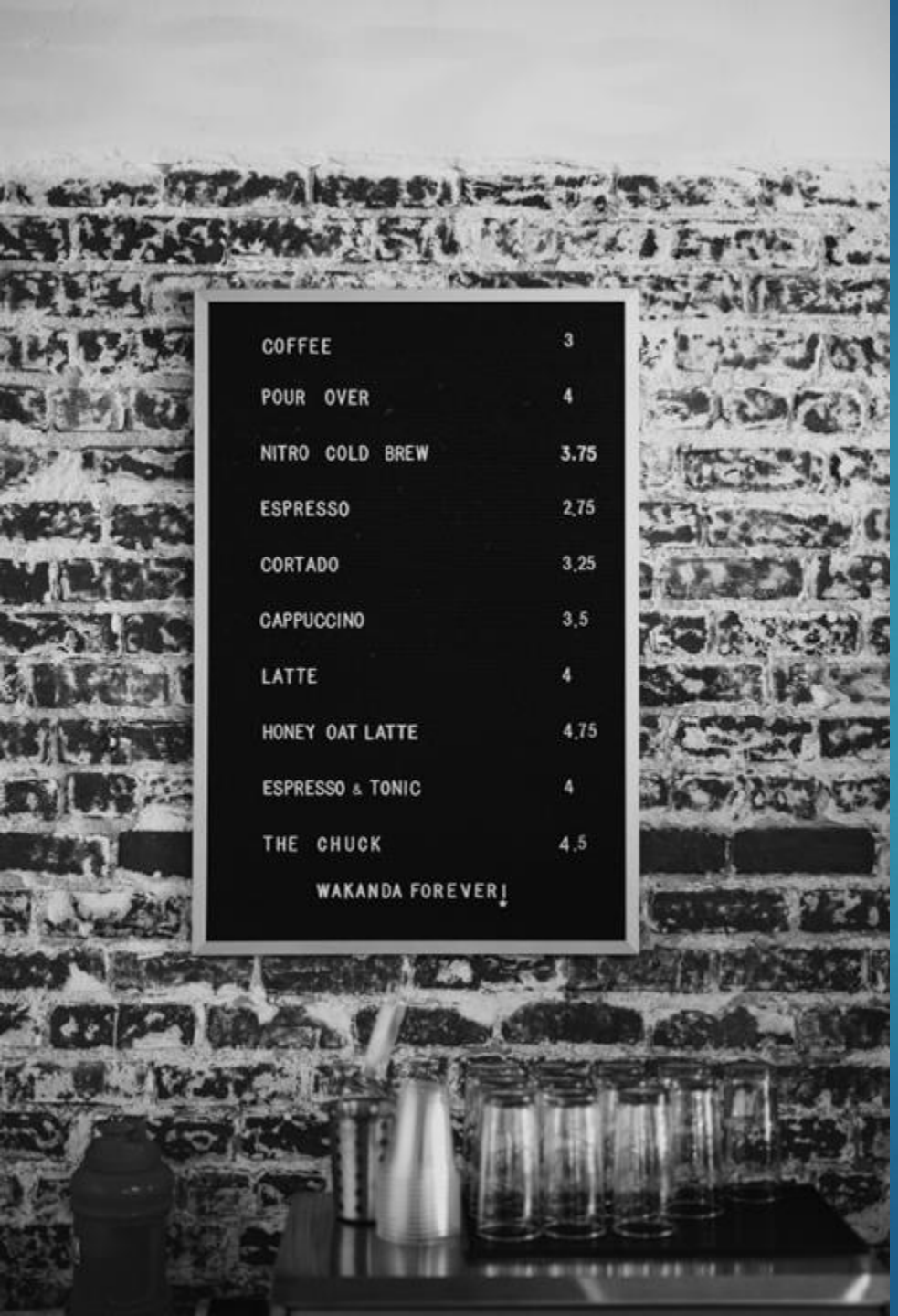
- Availability of EV charging options (incl. detailed characteristics)
- Status information about charge points
- Motivation: EV information linked to parking information

Rights Domain ▶ Right Specifications Sub-Category

- Validity Information
  - When exactly do certain rules apply?
    (e.g. "Monday – Friday 9 to 5, however not on holidays")
  - Concept of platform-definable "periods"

- Eligibility Information
  - For which types of vehicles does it apply?
    (e.g. type of propulsion engergy)
  - What are other qualifications that need to be met?
    (e.g. membership to a certain group of users)

- Applicability Information
  - Which tariffs to apply?



Rates Domain

- Is child to one or more Right Specification(s)
  - Can be further constrained (times)
- Describes the typical pricing information
  - Time increments
  - Pricing
  - Tarriff types (e.g. incremental vs. flat)

Observation Domain

- Used by Enforcement Services
  - can hold vehicle details
  - captured images / videos
  - Who observed it?
  - When and how was it seen? (human / ANPR scan car, …)
- Observation
  - directly related to a parking area
  - with just geo-spatial information

Assigned **Rights** Domain

- Describes Parking Rights
  - Singular / multi-use
  - Threshold-based
  - Time-based
- Points to
  - Right Holder/Owner
  - Issuer
  - Right Specification that it is based on
  - Quote that started it
  - Details about payments made
  - Assignment of payments/receivables

Sessions Domain

- Describes the act of using Assigned Rights
  - Has defined start and end time
  - Can consist of one or more so-called segments
  - Describes the vehicle used
- Points to
  - The user
  - The underlying assigned right(s)
  - The car park (and potential sub-locations

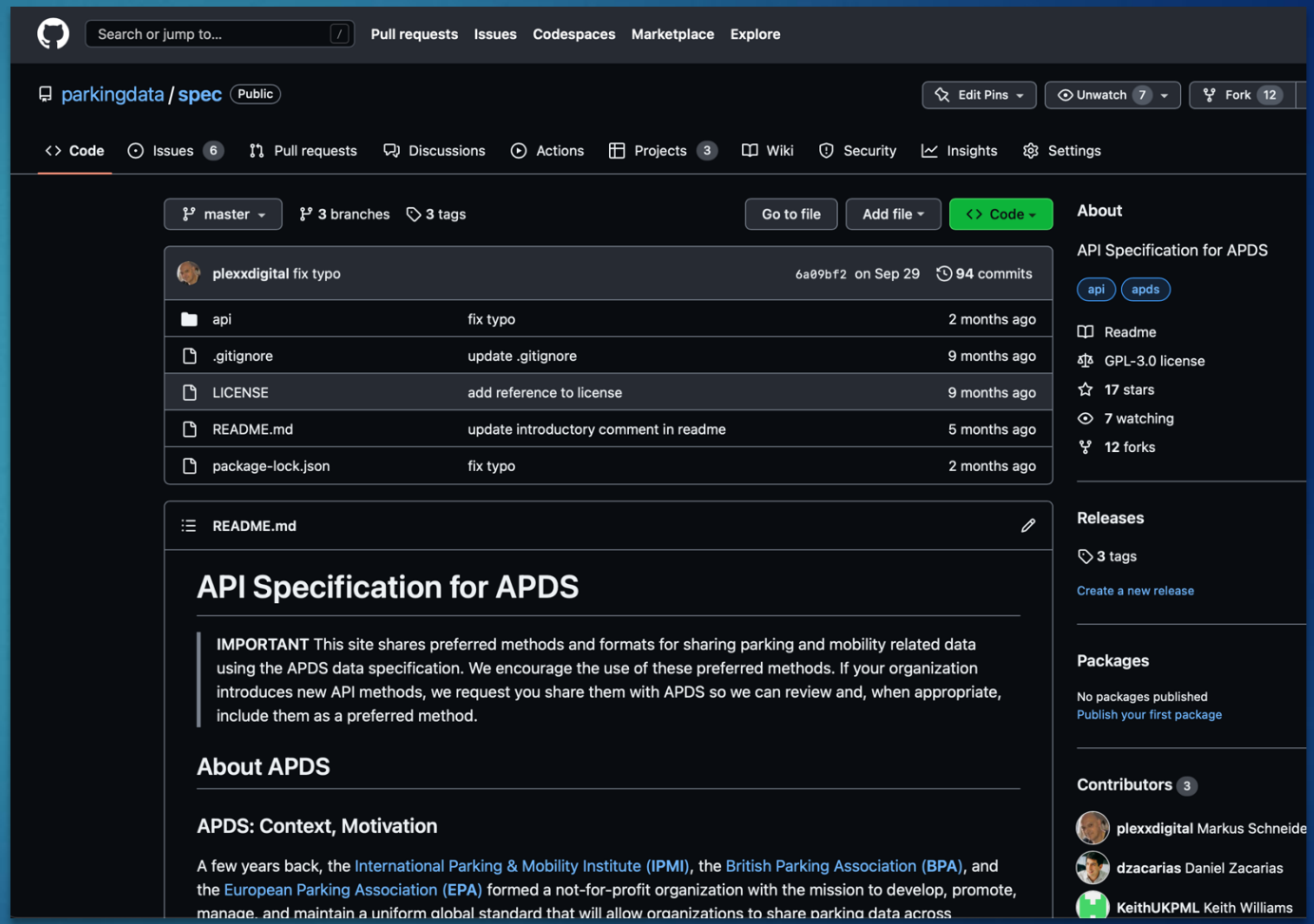
Quotes Domain

- Describes options to choose from
  - to obtain adavance tariff information (with the offering entity doing the math)
  - Typically used for pre-booking / reservation
- Can be turned into an Assigned Right

APDS **API**

APDS **API**

- Publicly available interface specification
  - Representing the full APDS data model
  - Documented using OpenAPI
  - Licensed under MIT



APDS API

THE API PROVIDES FILTER CRITERIA TO SUPPORT TYPICAL USE CASES

- Give me a list of all places within a radius of 1000 meters around the following geo point…
- Give me all parking sessions for the vehicle with license plate ABC123
- Reduce the returned data to occupancy information only
- Limit information to the following places: …
- Which sessions occurred between …. And …
- Give me a list of places matching the following criteria (e.g. surface lots only)

APDS

DATEX II Part 6

ISO/TS 5206-1

CEN NeTEx

Related Standards

ISO TS 5206-1

MARCH 2022

"The International Organization for Standardization (ISO) has formally adopted a global parking data specification based on the APDS specifications for vehicle parking and mobility data.

Following a formal review and consideration process, the 30 contributing National Standard Bodies participating in ISO's Intelligent transport systems Technical Committee (ISO/TC204) voted strongly in favor of developing and adopting the APDS standard as an ISO Technical Specification This is published as ISO TS 5206-1 "Intelligent transport systems — Parking — Part 1: Core data model."

This first version of the ISO standard is an exact duplicate of APDS v4

DATEX II

*FROM THE **DATEX II** WEBSITE:*

> DATEX II is the electronic language used in Europe for the exchange of traffic information and traffic data.
>
> DATEX II is a multi-part Standard, maintained by CEN Technical Committee 278, Road Transport and Traffic Telematics, see www.itsstandards.eu .

CEN Technical Committee 278 addresses Intelligent Transport Systems (ITS), and is responsible for the standardisation of the DATEX II data model.

DATEX II Parts

1. Context and framework
2. Location referencing
3. Situation publication
4. Variable Message Sign (VMS) Publications
5. Measured and Elaborated Data Publications
6. **Parking Publications**
7. Common data elements
8. Traffic management publications and extensions dedicated to the urban environment
9. Traffic signal management publications dedicated to the urban environment
10. Energy infrastructure
11. Publication of machine interpretable traffic regulations
12. Facility related publications

DATEX II

JUNE 2022

> The Alliance for Parking Data Standards is thrilled to announce that the CEN Technical Committee has revised its DATEX II Parking Publication based on the APDS data model. DATEX II is a multi-part Standard, maintained by CEN Technical Committee 278, Road Transport and Traffic Telematics.

NeTEx Network Timetable Exchange

NETEX IN A NUTSHELL

> NeTEx is a CEN Technical Standard for exchanging Public Transport schedules and related data.

NETEX PARTS

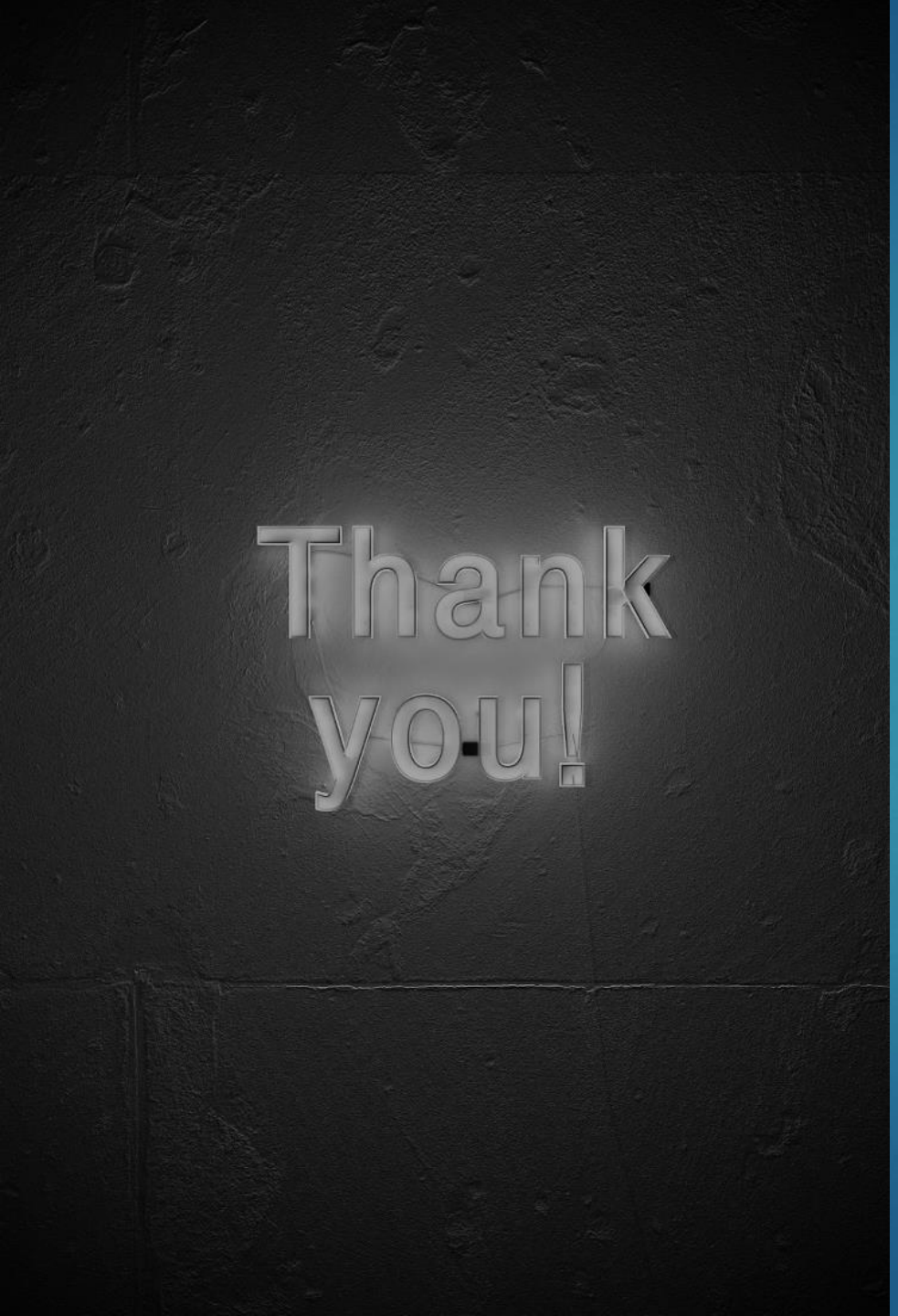
1. Part 1 describes the Public Transport Network topology (CEN/TS 16614-1:2014);
2. Part 2 describes Scheduled Timetables (CEN/TS 16614-2:2014);
3. Part 3 covers Fare information (CEN/TS 16614-3:2015)
4. Part 4 European Passenger Information Profile – EPIP (CEN/TS 16614-4:2017)
5. Part 5 **Alternative modes** exchange format (CEN/TS 16614-5:2021)
6. Part 6 European Passenger Information Accessibility Profile – EPIAP (under definition)

So why APDS?

Harmonisation, Interoperability

- Comes from the very industry that uses it
- Blueprint for a world-wide standard
- Covers a specific area/scope, and does this well (includes dynamic and transactional data)
- Adopter-friendly,
  comes with a full-blown API specification (pull + push)
- Good base format for alternative representations,
  e.g. NeTEx and DATEX II
- Willing to learn from the user base
  and adjust where required

Q&A



Thank you!