Department for Transport

Digital Traffic Regulation Orders (D-TRO) Alpha

Public Version of Slide Deck

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Introduction & Background

Service Vision

The Digital Traffic Regulation Orders (D-TRO) service is an API first digital platform to receive, store and share digital TRO information, transforming the use of traffic order information through open data and modernising enforcement on the road network.

Introduction to Traffic Regulation Orders

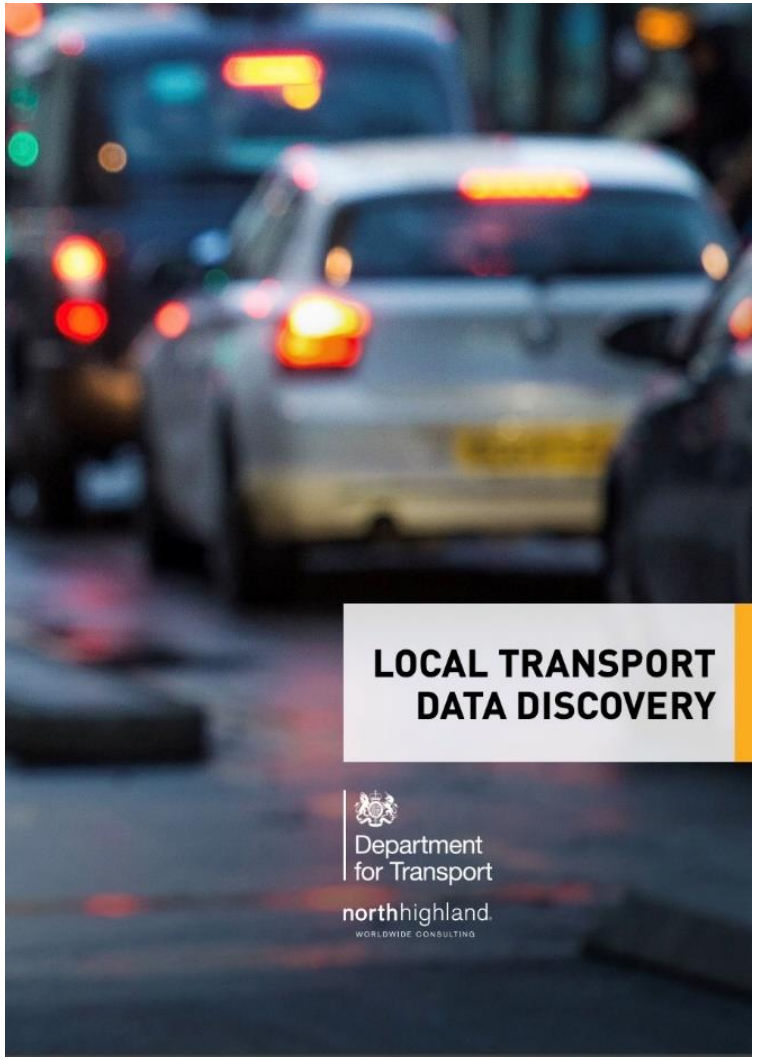
Traffic Regulation Orders

What is a Digital Traffic Regulation Order D-TRO?

- Current TROs are “made” and published as paper documents by Traffic Authorities (TAs) by law, following a process of consultation and approvals.
- Many authorities already also have a digital version of their TROs (including a map for example) and design / maintain their TROs digitally, but still have a legal, paper-based final output.
- Accessing a text-based TRO, or one of many digital formats of TROs, is difficult for stakeholders.

Local Transport Data Discovery (North Highland, 2018)

- Deep data dive into how the DfT should be working on future digitalisation of services
- Concluded that TRO-making process is labour-intensive, time consuming and costly
- Recommended starting a process to streamline & digitalise TROs



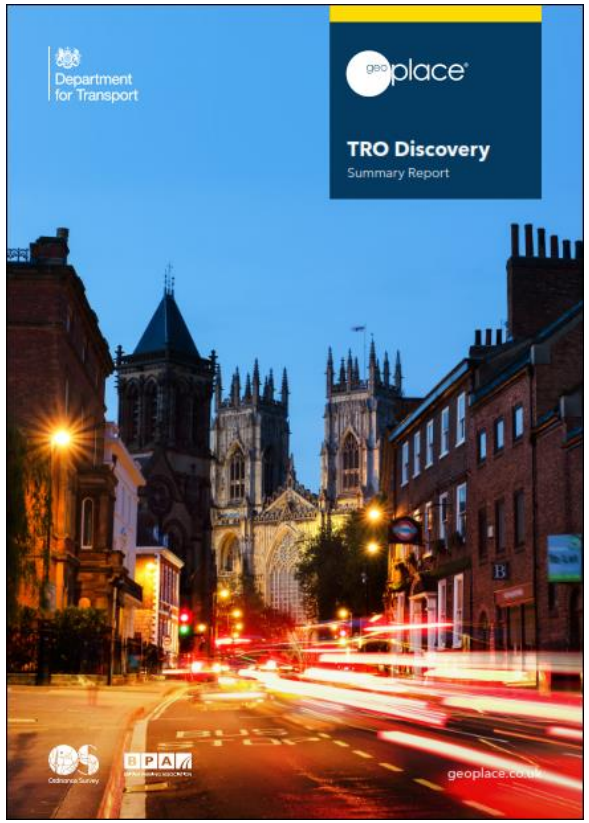
The Benefits of D-TROs

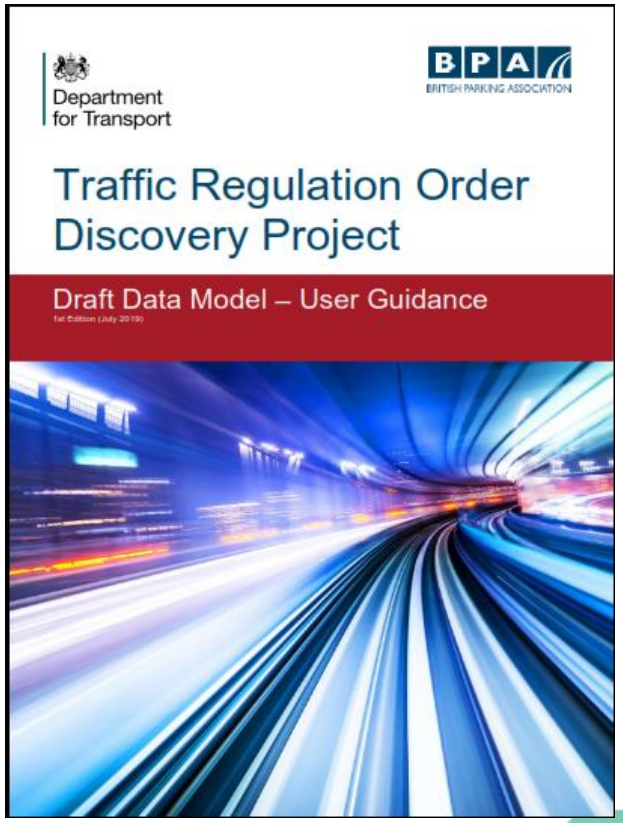
- **More efficient** - saving Local Authorities money, reducing overheads and conflicts
- **Single source** of accurate, up-to-date data on TROs (Supporting move towards autonomous vehicles)
- **Open data** will lead to product development and innovation for road users and others, as well as better communication
- Able to **respond quickly** to changing needs, including as a result of legislation changes and scale/pace of development (instant real time system)
- The service will meet currently **un-met needs**, the data economy is poorly served by TRO data
- Puts UK at the **forefront** of the Future of Transport

D-TRO Timeline

TRO Discovery (BPA/Geoplace, 2019)

- **Studied TRO processes & how this data is made available and used across the country**
- **British Parking Association, Ordnance Survey, Geoplace**
- **Three outputs**
  - User Research
  - User Guide
  - Draft Data Model





TRO Policy Alpha (PA Consulting, 2020)

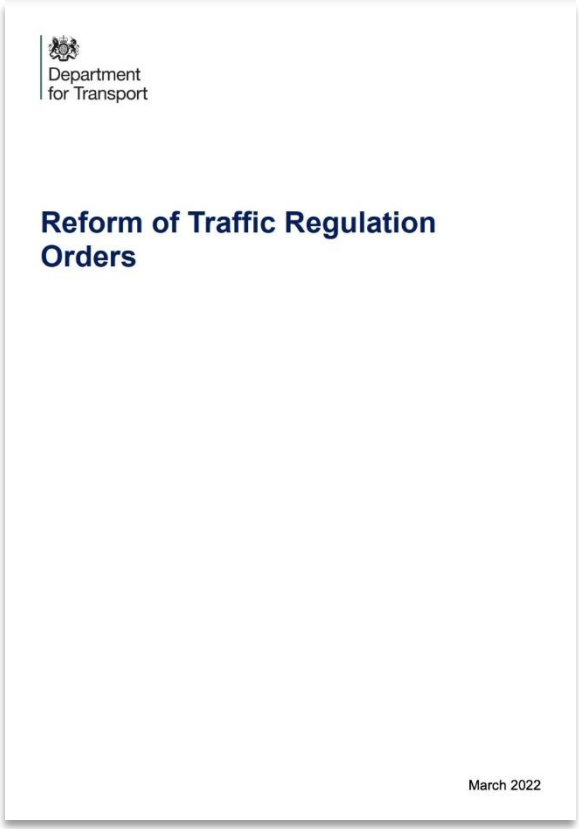
- PA Consulting commissioned to identify improvements to the TRO legislative process in England
- Strongly recommended development of digital TRO data to a standardised model as a matter of priority

TRO Data Model Alpha (Valtech, 2021)

- Recommend that a centralised data service should be used for D-TRO
- Developed and iterated the Data Model that had been validated following on from the Discovery
- Illustrated the expected market deployment of the TRO data model
- Showed how TRO data from LAs would be made available

TRO Policy Consultation (DfT, 2022)

- **Suggested amending TRO requirements that affect:**
  - data sharing
  - publishing practices
  - approvals for certain special events orders
- **Awaiting publication of the response**



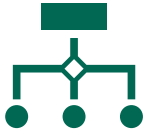
D-TRO Alpha (Informed Solutions, 2023)

- **Alpha study to review options for digital TRO data publication and distribution by:**
  - looking at options for storage and distribution of orders (centralised vs federated)
  - reviewing Use Cases
  - building and testing a prototype
  - building out a Beta backlog
  - identifying benefits
  - providing costings for Beta

Alpha Scope

Goal 1

Research and decide on a centralised versus federated service strategy.



Goal 2

Continue iteration and validation of the TRO Data Model with users.

Goal 3

Research and prototype how the D-TRO service will work in real-life scenarios.

Goal 4

Define the scope of the minimum viable product for the D-TRO service.

User Research

Understanding users and their needs

- Understand Users and their needs
- Solve a Whole problem for Users
- Provide a joined-up experience across all channels
- Iterate and improve frequently

Our research goals

There were two separate stages to our research

Stage 1

- To research and evaluate the advantages and disadvantages of a centralised versus federated service strategy (Goal 1)

Stage 2

- To validate the D-TRO model with users (Goal 2)
- To research and validate what users need from a D-TRO service (Goal 3)
- To explore the problems users are currently trying to solve to inform and support the user journey mapping and scoping of the service (Goal 4)

Methodology: User research

Purpose

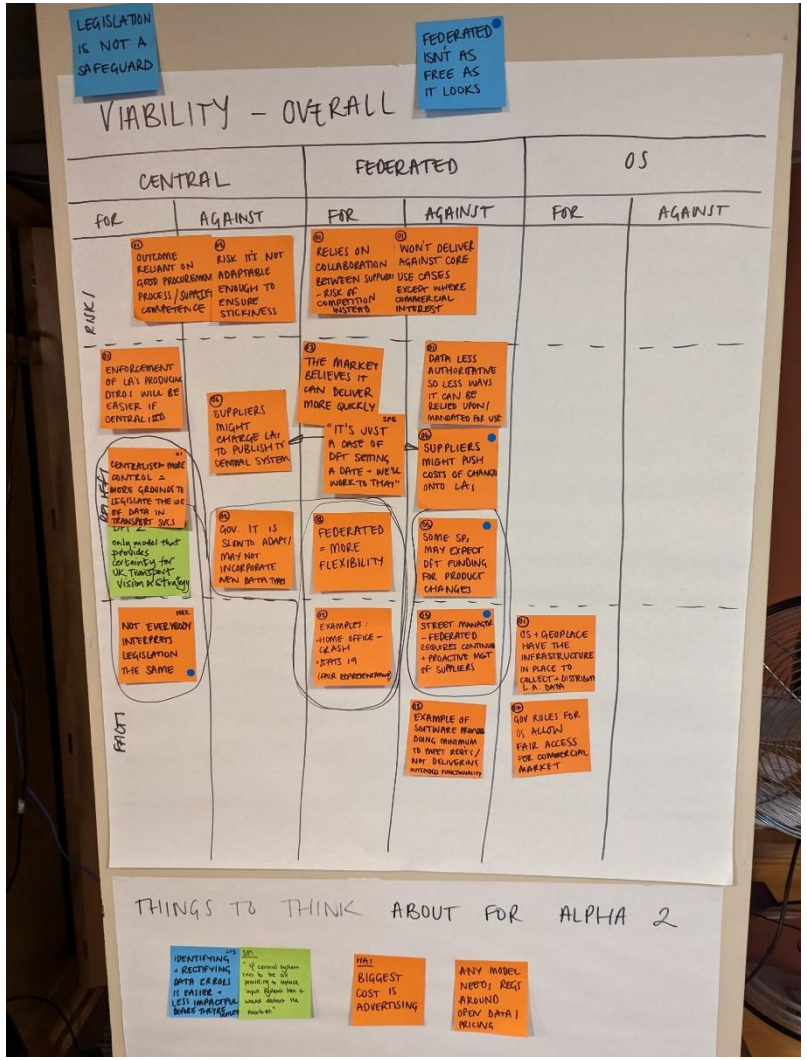
In working towards these goals, the purpose of our user research has been to:

- improve the team's understanding of users and their needs
- test different design ideas and service prototypes with likely users
- learn how to build or improve the service so that it helps users achieve their goal

User interviews and analysis

Our primary method of interacting with users was through one-to-one user research sessions

- Semi-structured qualitative interviews conducted via Microsoft Teams
- Guided by a User Research Discussion Guide appropriately designed for the user group and research objectives and agreed with DfT
- Recorded by written note (and using MS Teams in Stage 1)
- From synthesis of raw interview data, we identified challenges, pain points and opportunity areas
- We captured these findings and insights through key quotes and user stories which have in turn have helped us iterate the personas and high-level user journey



Methodology: Who have we engaged with? (1)

We engaged **28** high priority organisations to consult with as part of our user research…

9 Traffic Authorities

We spoke to a cross-section of Traffic Authorities of differing size, region, digital maturity, and who are served by different TRO solution providers. This included all participants in the TRO Data Model pilot. We also spoke to the Traffic Penalty Tribunal.

Organisation	No. of Interviews
Wolverhampton City Council / Transport for the West Midlands	2
Transport for London	2
Essex County Council	2
Cambridgeshire County Council	2
Derbyshire County Council	2
City of York Council	2
Camden	1
Hertfordshire	1
Cheshire West & Chester	1
Traffic Penalty Tribunal	2

4 TRO Solution Providers

We spoke to the leading providers of TRO solutions to Traffic Authorities. We wanted to understand their perspective on the DTRO service and data model and how they would publish data to the service.

Organisation	No. of Interviews
BUCHANAN COMPUTING	3
one.network	2
appyway	2
StatMap® Advanced. Reliable. Simple. Choose any three.	2

4 TRO Data Consumers

We spoke to a cross-section of current and potential users of digital TRO data, including several global mapping and traffic analytics companies. We wanted to understand their data requirements and how they would interact with the D-TRO service.

Organisation	No. of Interviews
Google	2
	1
here	2
grid	1

Methodology: Who have we engaged with? (2)

6 Utility Providers

We spoke to a cross-section of electricity, gas, water and telecoms utility providers. We wanted to understand their perspective on the D-TRO service, particularly for publishing, receiving, discovering, accessing, and using digital TRO data for Street Works purposes.

Organisation	No. of Interviews
UK Power Networks; Southern Gas Networks; Severn Trent Water; Openreach; Cadent Gas; Thames Water	1 (hosted in a workshop format)

3 DfT Stakeholders

We spoke to representatives from DfT Policy, Data, and Economist. We wanted to understand their perspective on the D-TRO service and to gain insights into future legislative programmes and strategic policy goals.

Organisation	No. of Interviews
DfT Policy and Legislation	1
DfT Data Insights	1
DfT Economist	1

2 Other Organisations

We spoke to several key organisations who have led and supported earlier phases of Discovery and Alpha projects, and who have an interest in the publication, storage and sharing of digital TRO data. We wanted to understand their perspective on the D-TRO service model and standard.

Organisation	No. of Interviews
Geoplace	2
Ordnance Survey	1

Methodology: Surveys and user consultation

Online TA survey

- SurveyMonkey online survey issued to all TAs
- A brief survey about TROs that mirrored the questions in the TA UR discussion guide
- >80 responses providing good cross-section of TAs nationally
  e.g. high / low digital maturity, urban / rural TAs, big / smaller TAs

Online Query Parameter survey

- SurveyMonkey online survey issued to a panel of potential data consumers (TAs, SPs & SCs)
- Designed to understand how users would query the D-TRO service
- 10 responses

Prototype user consultation via GitHub

- Publication of Documentation to support D-TRO Alpha Prototyping
- Monitoring of unmoderated feedback and comments from users

Our Users: Traffic Authorities

Traffic Authorities

API usage: weekly

Publish	Consume

Types of TRO

Permanent	Temporary	Special Order	Notices

User groups

Highway Authority Officers
Parking Officers
Consultation Managers
Appeals Officers
Traffic Penalty Tribunal Officers

What do Traffic Authorities do?

- Highway Authorities are statutorily responsible for maintaining public roads within their area to a standard that ensures they are safe and passable taking account of volumes and type of traffic use and ensuring appropriate safety and warning signs are in place. This includes making repairs as swiftly as possible and maintaining records of these works and repairs and extends to regulating the activities of developers in relation to the highway. Under the Road Traffic Regulation Act 1984, Traffic Authorities create and use Traffic Regulation Orders (TROs) to manage the road network, to prohibit or restrict use where necessary with the aim to improve road safety and access.

How do Traffic Authorities interact with TROs?

- Some TAs have procured supplier services and software that handle the process of creation and management of TROs. Some TAs have developed their own tools. Some TAs are paper-based.
- Different users within the TAs require access to different data. For example, someone that works with PCN appeals may need access to historic TROs. TAs often have different people or departments supporting the permanent TRO and TTRO data.
- They are responsible for decisions regarding TROs and during the consultation period of a TRO. Others may need to access historical TRO data for the tribunal process.
- TAs are legislators in their local domain, but also consumers of TRO data when coordinating with others for street works or conducting highways works.

User Needs

- **To get accurate and accessible information for all users of the road network.**
- **To ensure consistency between the legal TRO document and what is 'on the ground.'**
- **To understand what their neighbours are doing regarding TROs as it impacts how traffic moves into their area.**
- **To get a digital/spatial representation of all TROs that allows creation of map-based schedules.**
- **To query D-TROs primarily by name, type of TRO, type of regulation (e.g. speed limit) and status (e.g. approved)**
- To be able to publish and access TRO data as open data.
- To be transparent and engaging about local issues and to use evidence and data to inform policy and communicate this with residents
- To access technical assistance required with transition to D-TROs
- To reduce the overheads (resource, time and cost) in dealing with appeals and challenges to parking fines.

Pain Points

- Handling legacy / non-digital TROs in digital systems
- Non-digital TROs are expensive and time consuming to produce, communicate, distribute, and share.
- Existing digital TROs need to be compliant with D-TRO data model and migrated.

SOURCES
TRO Alpha
TRO Data model alpha research
TRO Discovery use-cases
D-TRO Survey (2023)

Our Users: Solution Providers

Solution Providers

API usage: hourly or daily

Publish | Consume

Types of TRO

Permanent | Temporary | Special Order | Notices

User groups

Local permanent TRO providers
National permanent TRO providers
Local TTRO providers
National TTRO providers

What do Solution Providers do?

- Solution Providers are companies providing digital solutions and services to assist Traffic Authorities in the process of creating Traffic Regulation Orders (TROs) spanning the key stages of **drafting, public consultation and publication**. These solutions are sometimes transforming TROs from text- and schedule-based traffic orders into digital map-based orders.
- They also share TROs in a digital form for consultation and information purposes, such as providing a feed of verified TROs to sat-nav companies and/or Utilities companies.

How do Solution Providers interact with TROs?

- Solution Providers work with Traffic Authorities to help produce, manage, and publish digital TROs in spatial software systems.
- There are a small number of suppliers which tend to focus on either permanent TROs or TTROs.
- Some solution providers provide onward data services to data consumers.

User Needs

- **To access TRO information such as parking bays, kerbside information and speed limits in order to publish these for their end-users**
- **To query D-TROs primarily by geographic area, status (e.g. approved), type of regulation (e.g. speed)**
- To be supported when there are changes in the data model.
- To be provided with a document that defines data standard when in place to adapt systems to fit.
- To query D-TROs by date updated.

Pain Points

- Making adjustments to sealed TROs
- Uncertainty about a standardised data model
- Impacts to their business model

SOURCES
TRO Alpha
TRO Data model alpha research
TRO Discovery use-cases
D-TRO Survey (2023)

Our Users: Service Consumers

Service Consumers

API usage: near real-time

Consume

Types of TRO

Permanent | Temporary

User groups

Mapping providers
Bus operators
Commercial fleets
Connected car suppliers
Kerbside services
Members of the public
National Parking Platform

What do Service Consumers do?

- Service consumers represents a wider range of user that accesses TRO data currently or in the future. Service consumers use this data to provide services such as in-vehicle satellite navigation and map production across the country. These maps are used for fleet routing and management, kerbside services and will enable new services such as the National Parking Platform. They may also be needed by automated vehicles.
- The centralised service is *not* intended for members of public to look up local TROs.

How do Service Consumers interact with TROs?

- Service consumers are only involved with the consumption of TRO data. This is currently done from various sources. Some TRO data is provided directly from TAs, some from Solution Providers on behalf of TAs, and in some cases, directly from TRO advertisement in newspapers. Throughout the user research, service consumers express a desire for centralised access to authoritative data on a standardised D-TRO.

User Needs

- **To access all TROs nationally to reduce costs and improve coverage and quality.**
- **To be able to identify relevant TROs.**
- **To get data about navigable attributes and access restrictions.**
- **To query D-TROs primarily by type of TRO, type of regulation (e.g. speed limit) and status (e.g. approved)**
- A single consistent form of authoritative TRO data.
- Accurate and up-to-date information about changes to TROs.
- Authoritative speed limit data.
- Access to high quality TRO data in terms of location in coordinates and timings.
- A single standard output and source that matches global systems.
- Spatial information that is agnostic to the mapping source so I do not have to use a specific map provider.

Pain Points

- Inconsistent data standards
- Data needs to be obtained from multiple sources in many formats.
- Poor data quality

SOURCES
TRO Alpha
TRO Data model alpha research
TRO Discovery use-cases
D-TRO Survey (2023)

version 1.0.1

Goal 1 findings: Centralised versus Federated

Building on its previous work, DfT commissioned a Stage 1 Alpha phase to research and evaluate the advantages and disadvantages of 2 options:

1. A **centralised service** operated by DfT or another body to deliver a digital service to publish, store and share digital TRO data
2. A **federated model** where TAs and SPs deliver their own separate but interconnected services for publishing, storing and sharing digital TRO data

Raw data from this research was synthesised to identify a set of key findings. We evaluated our user research findings against 24 criteria organised under the following 3 themes:

1. Desirability

How likely is each option to meet user needs?

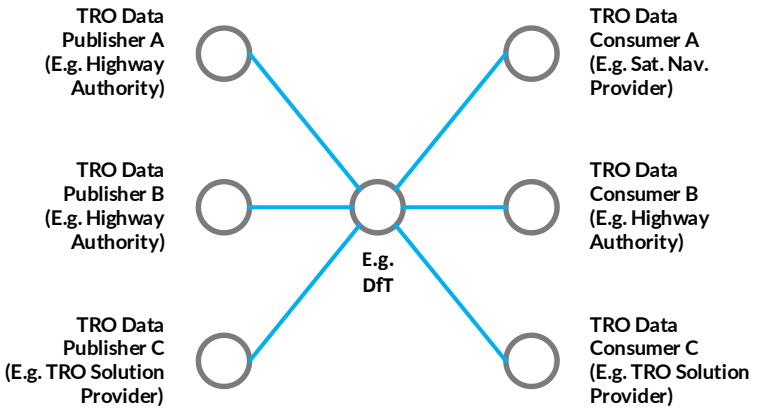
2. Feasibility

How likely is each option to work from a policy, delivery, technical, operational and cost point of view?

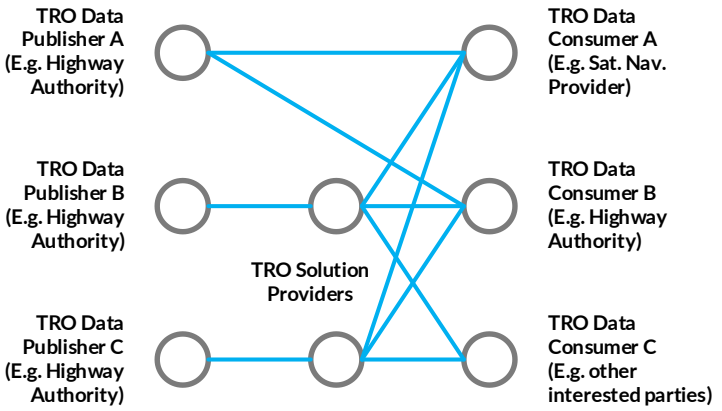
3. Viability

How likely is each option to succeed both now and in the future, and to what extent can outcomes be controlled?

Centralised Service



Federated Model



Goal 1 findings: What our users said

Desirability

Overall, users believe that the centralised option is more desirable

"Having one central data point... would be really beneficial both in time and money..."

Utilities

"Federated would be a holy mess"

Solution Provider 4

"I feel quite neutral about it to be honest"

Highway Authority 6

"Street Manager replaced what was a federated solution... I just wouldn't want to make the mistakes that were made in the past... because there was clear market failure…"

Department for Transport 2

Feasibility

Overall, users believe that the centralised option is more feasible

"Having one point of contact is much more efficient"

Service Consumer 2

"Centralised gives a clearer, more direct route for the information from both sides…"

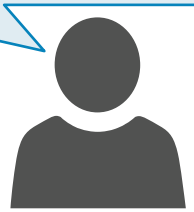
Highway Authority 5

"There is more scope for trialling and innovation in a federated approach"

Solution Provider 2

"You know, autonomous vehicles don't know where the edge of Sheffield and Barnsley is... they just want that one source of data."

DfT stakeholder 2



Viability

Overall, users believe that the centralised option is more viable

"Only a centralised system is capable of delivering near real-time data for creating intelligent traffic management systems"

Service Consumer 2

"I think the easiest system, or the quicker system to get operational is centralised because you have that demand on Local Authorities. It's on them then rather than their Service Provider…."

Highway Authority 5

"If you have a more federated model, you do have more incentive to innovate and potentially diversify"

DfT stakeholder 1

"It's just a case of DfT setting a date and we'll work to that"

Solution Provider 6

Goal 2 findings: Validating the D-TRO model with users

Location & TRO quality

- It is common for text-based schedules to reference a location using two points along a road section which are described with directionality
- But this directionality can also be understood to refer to the restriction type (e.g. speed limit, restricted access)

> ***"We used our standard method of describing a road length for the bus gate, but the adjudicator ruled that it did not account for traffic flow in both directions and so was ambiguous and not enforceable. This resulted in us having to refund all related Penalty Charge Notices (PCNs) which cost the county over £1M"***

Query parameter survey

- 10 respondents – 2 TAs, 3 SPs, 5 SCs
- Primary query parameters:
  - Location / Geographic area – point, bounding box, postcode
  - Start / End dates
  - TA / TRO reference number
  - Status e.g. approved
  - Type of TRO
  - Type of regulation

As a SP, I need to provide TRO information such as parking bays, kerbside information and speed limits so these can be published for end-users

As a SP, I need to query D-TROs by point location, so they are relevant

As a SP, TA or SC, I need to query D-TROs primarily by geographic area (e.g. bounding box), status (e.g. approved) and type of regulation (e.g. speed, road closure), and also by type (e.g. permanent/temporary), name, date updated, date added and vehicle type so they are relevant (e.g. roadworks)

As a SC, I need to query TROs by reference number or Traffic Authority so street works can be planned

As a TA, I need to query D-TROs by location (including postcode) so their enforceability can be checked for correctness

As a SC, I need to query temporary TROs by start/end date so they are relevant

Goal 2 findings: Validating the D-TRO model with users

Solution Provider Prototype evaluation

- We evaluated the experience of solution providers interacting with the D-TRO learning materials, data model, API and central store.
- 3 Solution Providers have been involved since 2018 and have reviewed all three versions of the data model
- 1 SP has only been involved since 2020 and seen latest version 3.1.1
- Two of them have successfully published and consumed D-TROs on an individual basis (e.g cURL)
- From this evaluation we have captured user needs for **onboarding**, **publishing** and **consuming**

"There was a big change from the first to the second version of the model. The Valtech model was quite a re-wiring and put together quite differently"

"We are pleased to see the new DTRO model and the way it reflects the needs and requirements of TAs. On this basis we have nothing to worry about."

"The model covers everything we need. There will be some weird esoteric cases, but I am confident it covers 99.9% of what we need"

"As a solution provider, I need real world examples (with realistic data items) (e.g JSON examples) so I can learn"

"As a solution provider, I need to access our users API keys during on-boarding

"As a solution provider, I need time to upgrade between API versions so I can refactor my data model alignment"

"As a solution provider, I need to pass on validation errors to our users so they can check standards compliance"

"As a solution provider, I need to enable our users to consume data (including access based on spatial queries)"

Goal 2 Findings: User Prototype feedback (2)

2 SPs submitted a total of 18 D-TROs over the course of the prototype

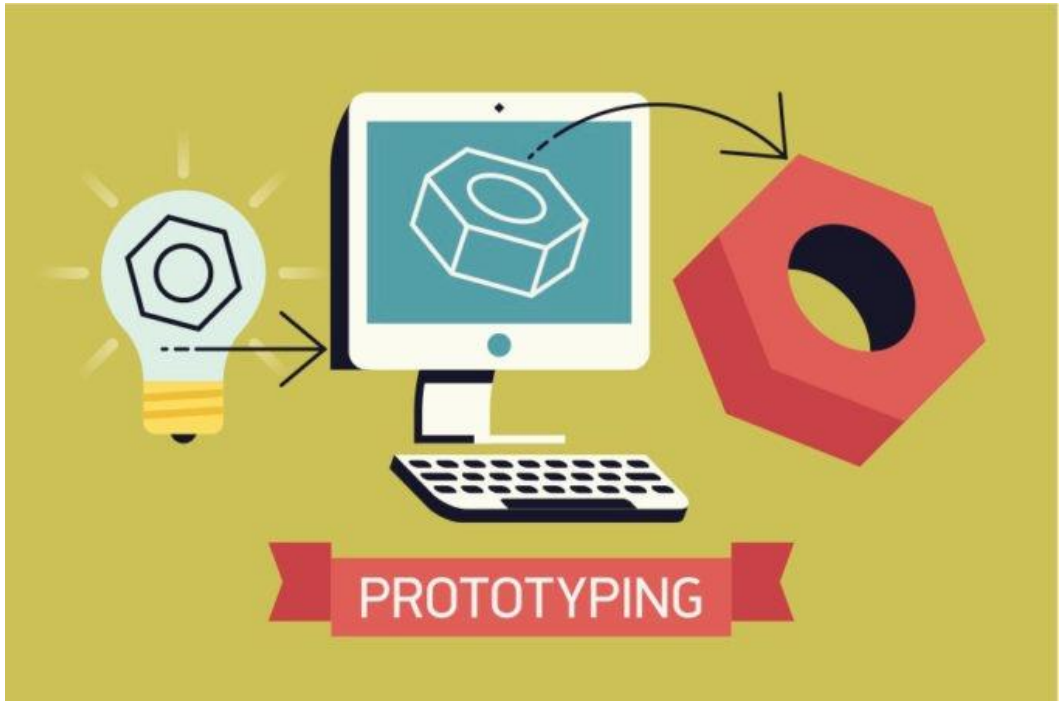
- We sent a survey to a range of users to request feedback on search endpoint query parameters. This resulted in addition of regulation start and end time parameters.
- We also validated the inclusion of spatial querying through a bounding box as this was consistently ranked in the top two most important parameters for finding D-TROs by consumers.
- An attempted upload of a large D-TRO (3MB) resulted in a need to find a storage solution that could support larger D-TROs. This prompted a switch from the use of Firestore to CloudSQL.

Goal 2 Findings: User Prototype feedback (1)

Involvement of the SPs and consumers was voluntary, with no financial incentive provided

We developed and shared multiple options for providing feedback, including:

- Holding prototype briefing meeting where we outlined what we wanted from the users and how they could provide feedback
- Providing access to a GitHub repository containing service documentation where users could raise service issues
- Creation of a feedback tracking process to ensure comments were addressed and any learning was captured
- Individual walkthroughs of the Service Blueprint with options to directly add feedback



Goal 3: What do users need from a D-TRO service

Service assumptions for consuming TRO data

What we heard from users in the first round of interviews

Bulk data consumers e.g. SatNav, mapping

SatNav / mapping companies needing access to all TROs affecting movement through the network including TTROs

Access to all TROs nationally improving coverage and quality of products and reducing cost e.g. Suppliers wanting data for products to serve future (currently unknown) applications

Routing and management

Bus operators needing to identify changes to proposed and temporary TROs with specific impacts on their routes and network – ability to filter by geographical area, stage of publication, type of order

Commercial vehicle and HGV fleet companies needing to plan and optimise their distribution networks and schedules

Parking and kerbside services

All TROs related to parking, kerbside conditions and restrictions e.g. Suppliers who need dynamic kerbside restriction data to provide services for delivery companies

All TROs related to parking to enable and maintain the **National Parking Platform**

Local authority services

Accurate, consistent and accessible information for all road users and vehicles within their area

Maintaining and improving consistency between the legal TRO and ‘signs and lines’

Enabling a complete digital map of TROs to support road and traffic management applications

Monitoring TROs for neighbouring authorities to assess impacts of traffic moving into their area

Goal 3 findings: Solution Providers using the D-TRO service

Solution Providers

API usage: hourly or daily

Publish | Consume

Types of TRO

Permanent | Temporary | Special Order | Notices

User groups

Local permanent TRO providers
National permanent TRO providers
Local TTRO providers
National TTRO providers

"There is nothing missing. The model is very comprehensive and sophisticated. We will have no problem providing our customers data"

"It is possible to publish data that conform to the data model but that does not guarantee it will make sense and is unusable in the real world"

"Publishing proposed orders would make it more complex and we are not sure whether it would warrant the additional work. It would require another point of integration"

Publishing D-TROs

As an SP, I need to know how to access the API securely (e.g. token, IP range) so I can publish D-TROs [SP.8]

As an SP, I need to publish data on behalf of our users so they can meet their statutory requirements (e.g. proposal, consultation, making, revocation) [SP.15]

As an SP, I need to provide TRO information such as parking bays, kerbside information and speed limits so these can be published for end-users [SP.29]

Alignment with D-TRO model

As an SP, I need to align our internal data model with DFT models so compliant publishing is scalable [SP.18]

As an SP, I need data model changes to be released on a controlled time-scale so I can plan when to upgrade between versions (e.g. three versions) [SP.12]

As an SP, I need time to upgrade between API versions so I can rework my data model alignment [SP.25]

Data validation

As an SP, I need data submissions to be checked for validity so they are reliable (e.g. realistic date range inputs) [SP.16]

Documentation

As an SP, I need to have a single real example across all documentation, so it is understandable [SP.7]

As an SP, I need to know which is the latest version of any documentation so I can learn effectively [SP.13]

Consuming D-TROs

As an SP, I need to enable our users to consume data (including based on spatial queries) [SP.5]

Goal 3 findings: Service Consumers using the D-TRO service

Service Consumers

API usage: near real-time

Consume

Types of TRO

Permanent | Temporary

User groups

Mapping providers
Bus operators
Commercial fleets
Connected car suppliers
Kerbside services
National Parking Platform

"We expect the new service to have a very positive impact on our data quality in all respects. It will help us plug the gaps and increase our coverage"

"The new service will speed up access to data and allow us to publish near real-time data such as TTROs"

"From the consumer side having clarity around what data means is important. There can be a lot of variability in terms of precision / accuracy and completeness across nationally aggregated data"

"Coverage is very important to use. We need data for the UK not just England"

API query parameters

As a SP, TA or SC, I need to query D-TROs primarily by:
- geographic area (e.g. bounding box)
- status (e.g. approved)
- type (e.g. permanent / temporary)
- regulation (e.g. speed, road closure

and also by name, date updated, date added and vehicle type so they are applicable (e.g. roadworks) [S.SP.30]

As a Service Consumer, I need to query temporary TROs by start / end date so they are applicable [S.SC.33]

As a Service Consumer, I need to query TROs by reference number or Traffic Authority so street works can be planned [S.SC.34]

Access to authoritative data

As a Service Consumer, I need access all TROs nationally, so costs are reduced, and data coverage and quality improves

As a Service Consumer, I need access to a single source of current, complete and consistent TRO data so they are authoritative

As a Service Consumer, I need accurate and up-to-date information about changes to TROs so the data are current and timely

As a Service Consumer, I need authoritative speed limit data so I can publish accurate and reliable information

As a Service Consumer, I need access to high quality TRO data in terms of geographic location, geometry and timings so I can publish spatially and temporally accurate and reliable information

Mapping standards

As a Service Consumer, I need a single standard output format and source that matches global systems so data are interoperable

As a Service Consumer, I need spatial information that is agnostic to the mapping source, so I do not have to use a specific map provider

Goal 4: What do TAs need when making TROs?

Engagement

"We only have a passing interest in the end-users of the D-TRO service. Our focus is being legally compliant at the local level"

For TPT to use the D-TRO service it would need to be able to render the full legal TRO in a readable format for use by the public and the Adjudicator"

"Ideally, we would do every stage of the TRO process digitally. Everything would be in one place "a one-stop shop" "

"We are putting our TROs into the hands of our service provider to meet the DfT requirement"

Investment

"We are keen to be involved but need to see what it entails first"

"Resourcing and funding will be the major challenge and limitation. In other words, who is going to do it?

"It will need a lot of investment to make it successful"

Efficiency

"We already have a simplified process in place but would welcome more simplifications"

"We know the existing TRO process is antiquated and inefficient - we are waiting for DfT to modernise the regulations"

"Legal are resistant to change – if DfT could change the regulations to allow digital signatures it would help us get rid of the parallel paper record"

"Removing the requirement to advertise in the newspapers would save us time and 10s of thousands of pounds a year"

"The challenge of a standard data model is that we could lose the ability to innovate"

Consistency

"We have differing levels of digital maturity for our TROs depending upon when they were created"

We are concerned that DfT will not take account of the variations in practice. We all have different interpretations of the same thing"

"Digitising TROs appears to be simple. But there are 298 authorities across the country and nearly all use totally different methods and definitions for producing their TROs"

Enforceability

"A totally enforceable order will require legal order plus lines and signs. Much of our lining needs remedial work - in these areas it is not possible to enforce orders"

"We have multiple sources of regulations and legislation which are running behind change on the streets e.g. scooters, delivery robots. It's a legal minefield!"

The Traffic Management Act Part 6 allows us to enforce moving traffic offences. We need ensure we have bullet-proof TROs for these solutions. As a result, all our orders are now map-based."

"With Civil Parking Enforcement extending to all districts we will accelerate our digitalisation"

Goal 4 findings: TAs making TROs (1)

Traffic Authorities

API usage: weekly

Publish | Consume

Types of TRO

Permanent | Temporary | Special Order | Notices

User groups

Highway Authority Officers
Parking Officers
Consultation Managers
Appeals Officers
Traffic Penalty Tribunal Officers

Policy conditions

As a TRO Officer, I need resources (e.g. people, funding from TMA sc6) so TROs can be digitised [I.15]

As a TA, I need to take ownership of civil parking enforcement so digitisation of kerbside static TROs can be funded [I.10]

As a TA, I need legislation to regulate new forms of transport (e.g. robots) so the D-TRO is legally enforceable [I.11]

Creating TROs

As a Traffic Authority, I need to create TROs so statutory responsibilities are met (i.e. not just Highway Authorities) [I.1]

As an SP, I need to provide TRO information such as parking bays, kerbside information and speed limits so these can be published for end-users [S.SP.29]

As a TRO Officer I need to create TROs as text, so they are understandable [I.29]

As a TA, I need to create text-based location schedules, so they are understandable. [I.47]

As a TA I need to create visual monochrome map schedules, so they are reproduceable [I.42]

As a TRO Officer I need to sign a TRO under delegated powers, so production is efficient (e.g. no legal team involvement) [pI.13]

As a TA I need to create innovative local regulations, so traffic managed well (e.g. fuzzy time around football match) [I.43]

As a TRO Officer I need to create ‘emergency’ TROs at short notice so traffic can be managed [I.37]

As a TRO Officer I need to create anti-terrorism TROs at short notice and without consultation so public order can be maintained [I.23]

As a TRO Officer I need to create temporary TROs with a short time limit (e.g. one week) so traffic disruption is minimised [I.21]

As a TA I need to create a designation order so responsibility can be passed between two TAs (e.g. boundary change) [I.44]

Goal 4 findings: TAs making TROs (2)

Traffic Authorities

API usage: weekly

Publish | Consume

Types of TRO

Permanent | Temporary | Special Order | Notices

User groups

Highway Authority Officers
Parking Officers
Consultation Managers
Appeals Officers
Traffic Penalty Tribunal Officers

TA Check accuracy

As a TA, I need to continuously update my inventory of highway assets (lines and signs) so the TRO is legally enforceable [I.6]

As a TRO Officer, I need to check the actual lines and signs so new TROs are appropriate [I.32]

As a TA, I need to create a TRO with location and regulation that matches actual lines and signs so it is enforceable [I.41]

TA Store

As a TRO Officer I need to search existing TROs by road name, so time is saved [I.30]

As a TRO Officer, I need to set an expiry on TTROs (or retrieve expired TTROs) so volume is managed [I.27]

TA Share

As a TRO Officer I need to consult the public affected by a proposal, so challenges are minimized [I.36]

As a TRO Officer, I need to produce a paper TRO so enforcement teams can process fines [I.26]

TA Use

As a TRO Officer I need to co-ordinate with neighbouring TAs' TROs (including their experimental orders) so traffic disruption is managed within my territory (e.g. additional signs) [I.24]

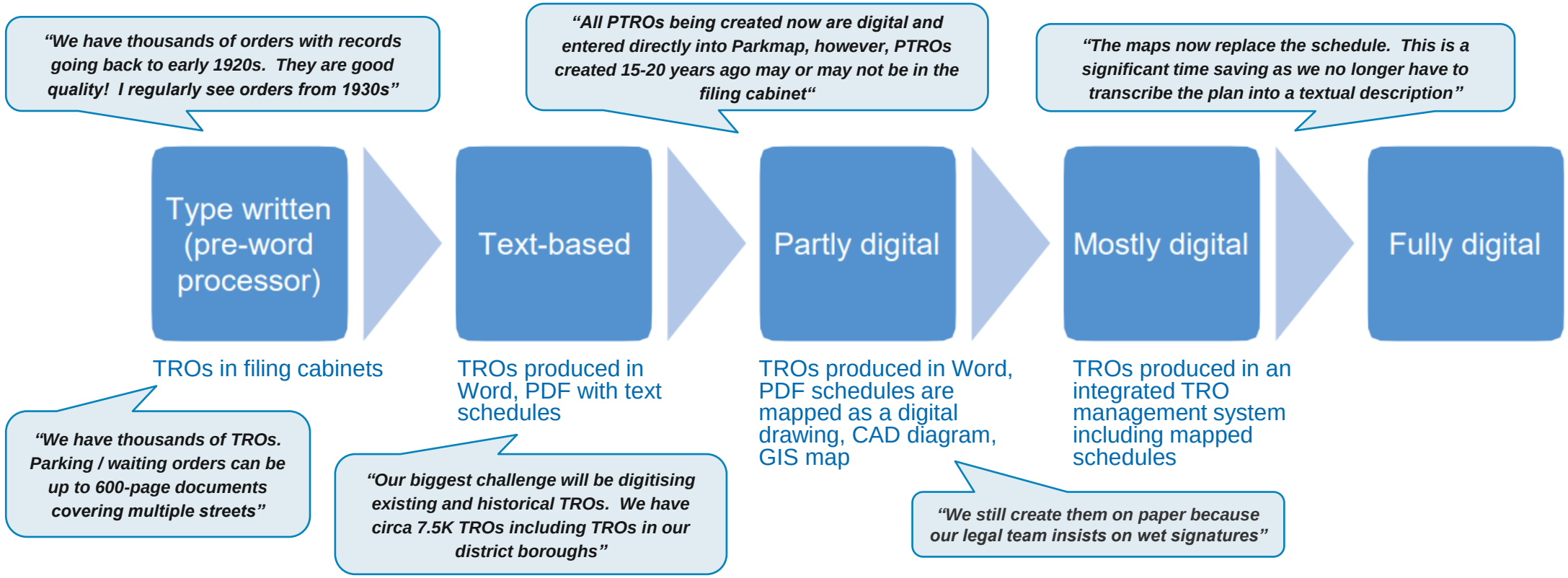
As a TA, I need to update location names in text so ownership can be modified (e.g. boundary change) [I.39]

As a TA, I need to assume TRO powers from the lower-tier district level so efficiency can be realised (e.g. revoking their TROs and replacing with ours) [I.38]

As a TRO Officer, I need to control TROs made by other traffic authorities so strategic traffic management is protected (e.g. red routes) [I.25]

TA Digital Maturity

It is increasingly common for TROs to be created and stored digitally. However, the degree of digitisation – and what different TAs mean by 'digital' – is very variable.



TA Digital Maturity: Current state

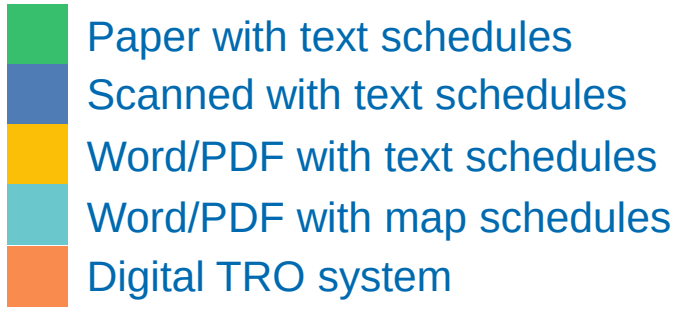
Results from TA survey

- TROs relating to moving restrictions are still predominantly text-based
- Adoption of Civil Parking Enforcement legislation by TAs has significantly increased digitalisation of kerbside parking TROs and use of map-based schedules
- Despite availability of the one.network digital publication and mapping platform, temporary TROs are still held by TAs as text-based orders to provide the legal basis for enforcement

Permanent TRO Moving Orders

Permanent TRO Kerbside Parking Orders

Temporary TROs



Source: DfT D-TRO Online Survey with TAs – July 2023

Alpha Research Findings & Considerations

The D-TRO service is the foundation for a future national platform for standard TRO data

Traffic Authorities

The D-TRO service will not change their current core responsibilities to maintain the legal and enforceable order

They see the potential and opportunity embodied in the D-TRO data model and standard to help them achieve their priorities of consistency, efficiency and enforceability

They are waiting for DfT to modernise the legal and regulatory framework for TROs

They need DfT to invest in their modernisation

Solution Providers

The D-TRO service will not change the existing market for Solution Providers allowing them to continue to expand their customer base and support their TA users

They are both producers and consumers of D-TROs

As producers their role is strengthened as they are the conduit for the production and publication of standard D-TRO data

As consumers the service provides them with future market opportunities for new products and services

To realise these opportunities, they will need to invest in improving data quality and aligning with the D-TRO data model and standard

Service Consumers

The D-TRO service will create a single-source of authoritative and standard TROs on a national basis which will transform consumer access to these data

For service consumers, the service will have a major positive impact on data quality and coverage – it will speed up access to data and allow near real-time publication

It will create future market opportunities for new products and services

Data quality will be paramount – data must be complete, consistent, current, clean, credible and compliant

Only a standard data model mandated by legislation can achieve this

This Alpha prototyping phase has for the first time demonstrated this potential

D-TRO: Show & Tell

Department for Transport

Research methodology: D-TRO Alpha prototype pilot

- User testing of the prototype was carried out using a pilot methodology. This meant users carried out tasks in their own time and we collected feedback on tasks in various channels including Github, FigJam service boards and face-to-face interviews.

- The reason for this methodology is because the tasks users needed to complete in order to interact with the prototype included reading and understanding documentation, meeting with their team members to discuss implications for their existing systems, data model mapping, writing scripts to connect servers to the API.

- All these tasks are complex and would need to happen between other work. We also had the additional constraint of preserving users' commercial privacy. We would expect to have seen low to no user research participation if we had asked to view technical files solution providers were working on.

Prototype: User journey and tasks

1. Review the central data model
2. Understand how to send and find D-TROs through the API
3. Explore the API and data model using test records
4. Send D-TROs to the central data store
5. Retrieve D-TROs from the central store and use the data

Supporting tasks

Publishers

Initial exploration to map data from their existing TRO solution to central data model

Consumers

Map D-TRO data to their existing data models and systems

Publishers/Consumers

Setting up scripts on servers to send or extract data through the API

1. Review the central data model

Touch points

Face-to-face technical briefing

Data model documentation

Github contributor forum

Findings

- In-person discussions aid understanding. Regular meetings should take place as part of service governance.

- The documentation was clear but the more detail the better. Users would like real-life examples of D-TROs to learn from. The data model is very comprehensive and should support most use cases - it will need to be iterated as new scenarios are identified.

- TROs are nuanced and complex. It is useful to build the model collaboratively with TRO experts from TAs and SPs
- It is essential to support feedback channels in the service both digitally and in-person.

2. Understand how to send and find D-TROs through the API

Touch points

Face-to-face technical briefing

API documentation

Findings

- In person discussions aid understanding
- Regular meetings should take place as part of service governance

- The API documentation was well understood and should be continued to be iterated and tested during Beta

3. Explore API and data model using test scenarios

Touch points

Test environment sandbox

Findings

- Users found it useful to have an API swagger interface to explore different scenarios.
- Some SPs would expect this to be more comprehensive with full model and validation in a downloadable format they could use with any language.
- This was a limitation of the prototype and would be supported in Beta.

4. Send D-TROs to the central data store

Touch points

API

Supporting tasks

Solution providers
map to own database

Findings

- Prototype users were able to successfully upload D-TRO records to a central database prototype.
- The initial API service could not support the record size for some D-TROs. We learnt through user research that documents are likely to be large because of consolidated TROs. The API service was updated as a result to handle larger record uploads.
- SPs will need time to map to their existing systems, also update user interfaces in their software.
- This is a complex piece of work that they would need to carry out each time there is a major change to the data model or validation rules.
- We would expect them to begin this work in Beta. The service governance framework needs to map updates to SPs' own roadmaps.

5. Retrieve and use DTROs from the central store

Touch points

API

Supporting tasks

Consumers map D-TRO data to own systems

Findings

- Consumers were able to use data from D-TRO records added to the central store.
- Google successfully mapped D-TRO data onto a Google Maps interface.
- Google said they would prefer the mapping protocol to match their mapping protocol. However, the service is a countrywide data asset and so needs to adhere to UK national grid.
- Data translation will NOT be offered as part of the service so consumers will need to do translation tasks themselves.

End-to-end service: User journey and tasks

1. Onboard and get API keys
2. Review the central data model
3. Understand how to send, find and use D-TROs through the API
4. Explore the API, data model, validation rules using test records
5. Send D-TROs to the central data store
6. Retrieve D-TROs from the central store and use the data
7. Ask for a change to the data model, validation rules or data ownership
8. Clarify rejected records or report an error in a D-TRO

Supporting tasks

Publishers

Map data from existing TRO solution to central data model.

Publishers

Redesign and implement new user journeys in TRO software to match data model

Consumers

Map D-TRO data to their existing data models and systems

Publishers/Consumers

Setting up scripts on servers to send or extract data through the API

End-to-end service: User journey and tasks

What we learned

- **Onboard and get API keys**
  Onboarding to be able to publish to the API will involve two user groups TAs and their solution providers. Onboarding for publishers should be triaged during Beta to make sure the right people from TAs/SPs have access to the information they need to get setup on the API.

- **Request a change to the data model, validation rules to data ownership**
  The data model should be able to be adapted over time but this change should be carefully managed to allow TAs and their solution providers to make necessary changes within their own roadmaps.

- **Clarify rejected records or report an error in a D-TRO**
  Users believe the service should NOT become a monitoring service and that data accuracy obligation should remain with TAs. Therefore, the service will notify TAs of reported areas for them to address.

Solve a whole problem for users

Make sure everyone can use the service

Make the service simple to use

Make sure everyone can use the service

Create a secure service which protects users' privacy

Provide a joined-up experience across all channels

Iterate and improve frequently

Department for Transport

Service Design

Define the initial scope of a supporting end-to-end service

Objectives

- Understand why and how the TROs are made and used
- Understand who might be involved in making D-TROs and who might benefit from using D-TRO data
- Understand the user needs, benefits and barriers of all potential service users for the D-TRO service
- Explore how we might deliver a service that supports people to effectively share and consume D-TRO data from the central store

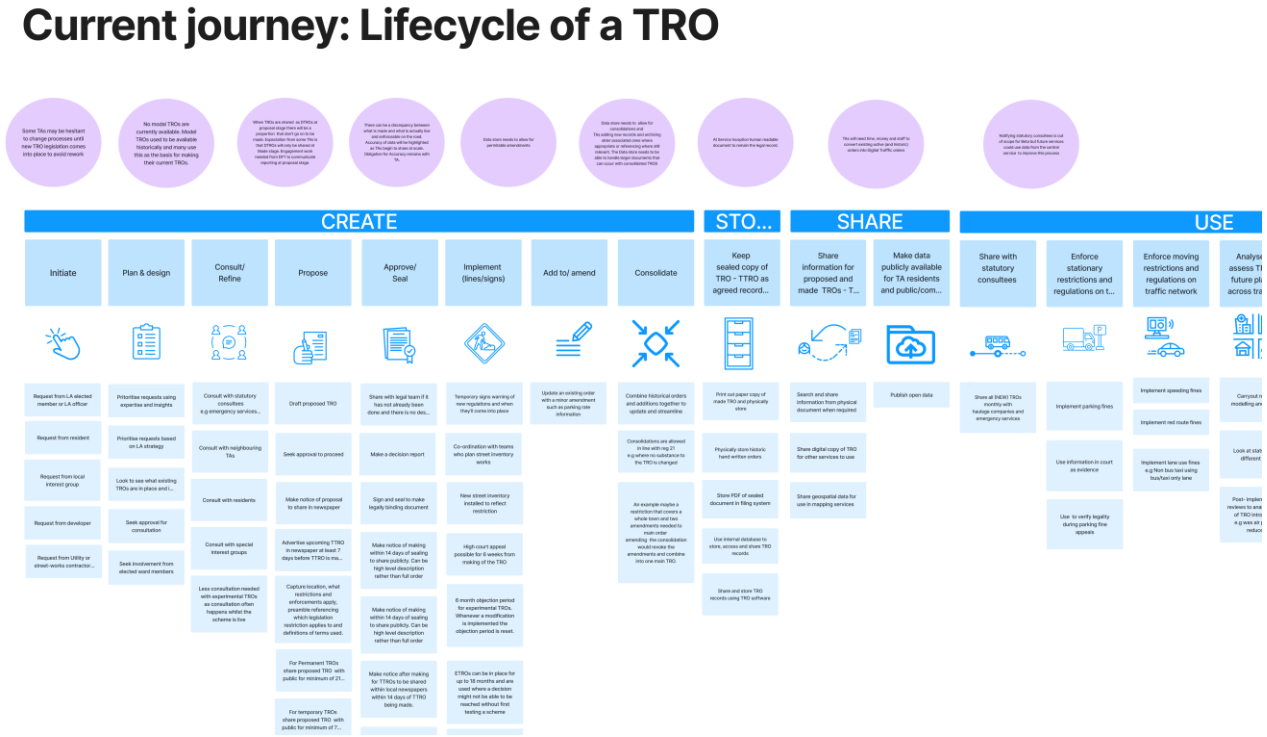
Supporting activities

- User research interviews with TAs, SPs, and TRO Data Consumers
- Surveys with TAs
- Service safaris with comparative services to explore service patterns and learnings. BODs, Street Manager and NSG
- Mapping high-level journeys
- Mapping what the end-to-end service might need working with SMEs, and iterated with TAs, SPs, Consumers and DfT

The lifecycle of a TRO

Understanding the ‘as is’ landscape

- Understand why and how the TROs are made and used
- Understand who might be involved in making D-TROs and who might benefit from using D-TRO data
- Understand the user needs, benefits and barriers of all potential service users for the D-TRO service
- Explore how we might deliver a service that supports people to effectively share and consume D-TRO data from the central store



What channels are currently used?

Paper with text description

End-to-end digital solution

Mixture of physical and digital

Legal record PDF printable

Open data on mapping interface

Fragmented, inconsistent, localised
Difficult to get a full view of what's happening across England

Who is information shared with and how?

1

With public during consultation period online, in newspapers and other paper comms to check proposals suitability

Expensive, slow & dated

2

With statutory consultees during consultation and once TROs are made for better planning.

Manual sharing via email.

3

With Tribunals Service when providing evidence in court for penalties or assessing enforceability of a penalty.

Specified format required

4

As part of open data strategy so public can see what restrictions apply in their area

Viewable on an interactive map

5

With mapping services who provide a countrywide view of road networks and services

Currently scraped together from multiple sources

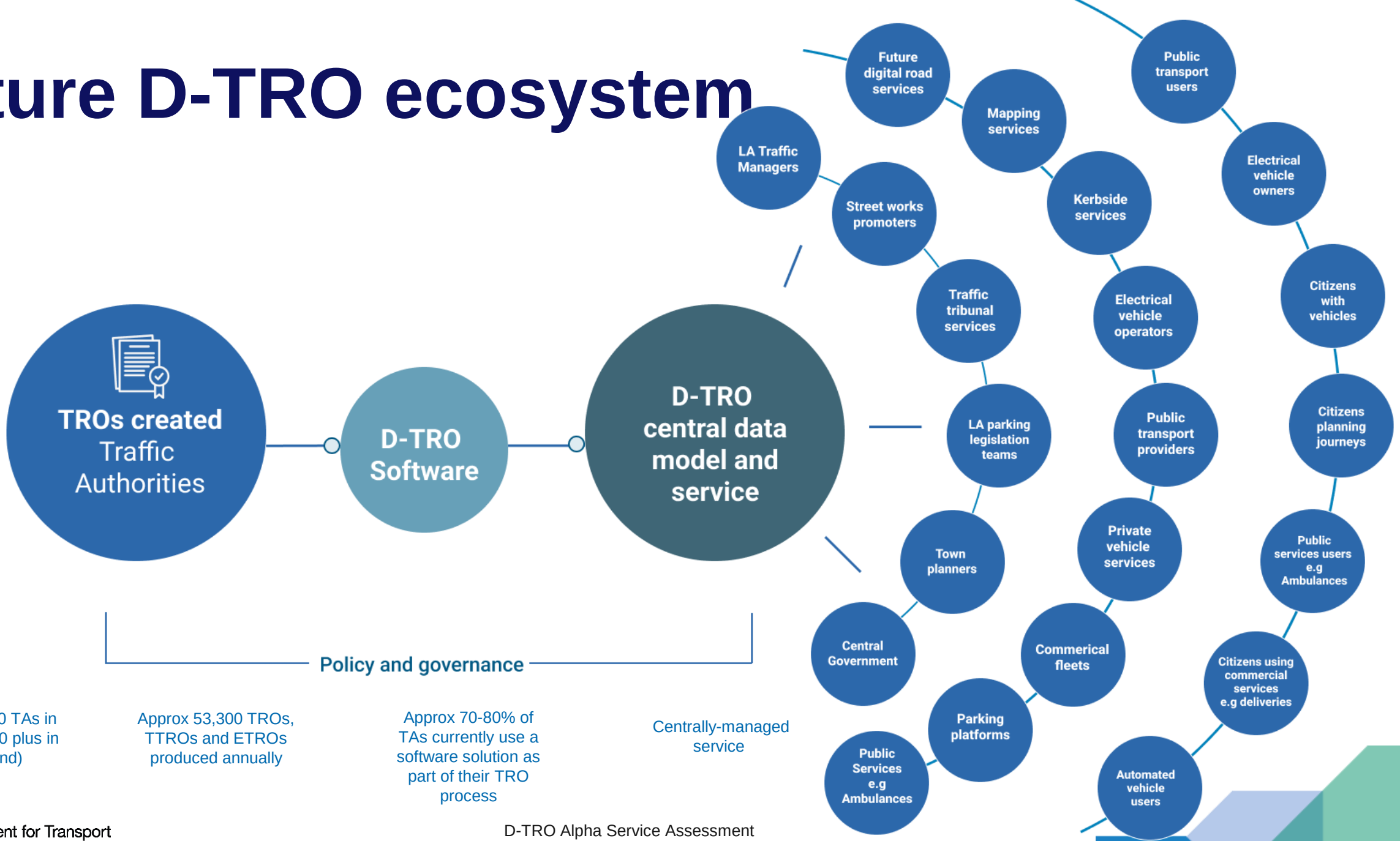
1 - 4 currently supported by other digital solutions, although not everyone is using them.
5 is currently unsupported

Understanding the lifecycle of a TRO

Considerations for service:

- Supporting varying data loads
- Supporting amends and consolidations
- Expectations on when D-TROs should be published
- Governance and guidance to support new processes

Future D-TRO ecosystem



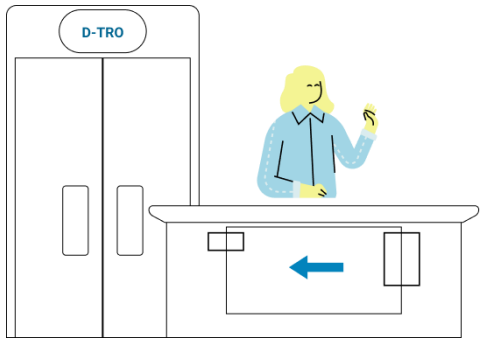
Approx 400 TAs in the UK (300 plus in England)

Approx 53,300 TROs, TTROs and ETROs produced annually

Approx 70-80% of TAs currently use a software solution as part of their TRO process

Centrally-managed service

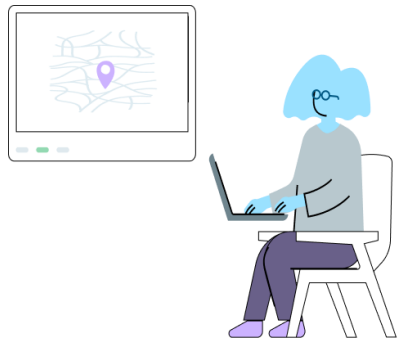
Future D-TRO service



Access

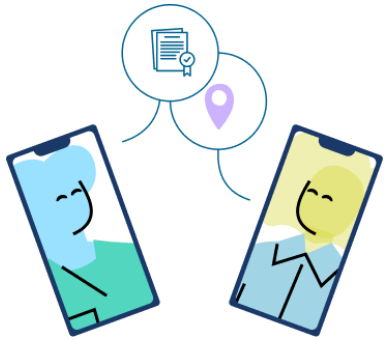
Publishing

Receive/Store



Find and Use

Share

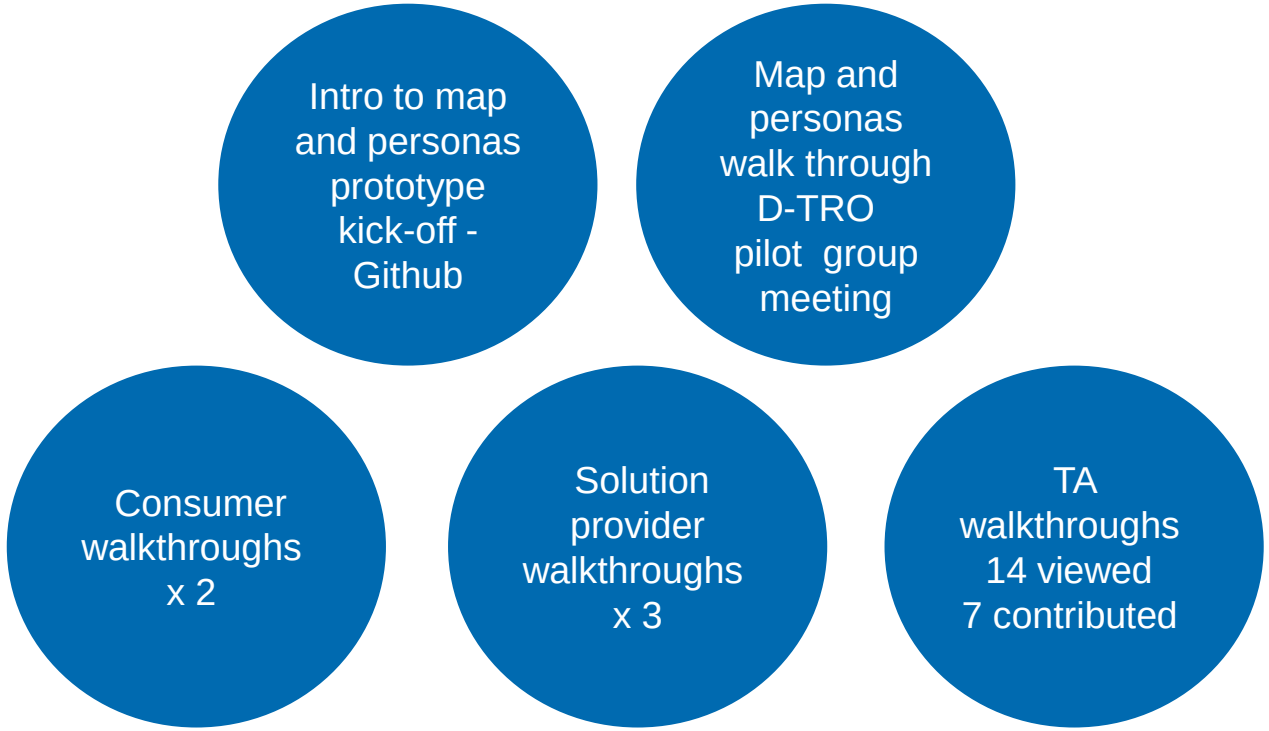


Seek support

Governance

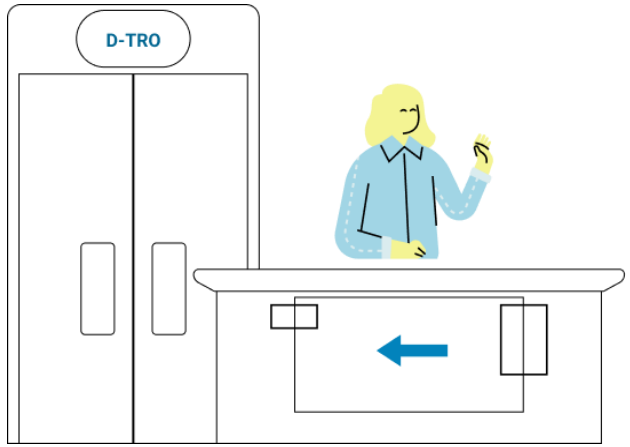
What we did

Research and co-creation



Engagement & iteration

Accessing the D-TRO service (1)



Traffic Authorities

Solution Providers

Consumers

Service principles

- Clear and informative
- Sets expectations
- Enables people to self-serve
- Provides support when needed

Support users to

- Find the service and understand who can use the service
- Understand the actions they need to take to onboard
- Get set-up on the service
- Complete tasks across user groups

Accessing the D-TRO service (2)

Service portal

Supported sign-up for publishers (TAs/SPs)
Self-serve sign-up for consumers

Guidance and advice

Who is the service for, Introduction to D-TROs, What's required to sign up

Technical documentation

Interface control document , data model, validation guide

Test environment

Access to test environment for Solution providers

API Access

Access to test and live keys per a TA to share with SPs.

D-TRO validation

Validated TAs' TRO data is ready to publish to live service

Account management

TA admin and back up admin to support self-serve, Consumer roles tagged with org and data usage, SP access to test environment and potential to access API keys if needed

Offboard

Ability to revoke keys if TA ceases to exist or if consumers break terms of the service in this should impacted users would be consulted before changes

Publishing Data (1)

Publishers

Solution Providers

Service principles

- Proactive – helps spots errors
- Adaptive – can evolve over time
- Simple to add data to
- Collaborative

Support users to

- Provide D-TRO data in the correct format
- Understand when there are errors and why
- Report issues or send suggestions for additions or changes
- Share best practice and learnings

Publishing Data (1)

Data validation checks

For all published D-TROs automatic check to ensure published data is meeting the data standard. Validation can become smarter over time as the service evolves.

Reporting points

To support publishing at different reporting points including at notice of proposal, notice of making, revocation, amendment.

Timeliness of publishing

D-TROs should be published to the store as close to the time of reporting point (notice of proposal, notice of making etc) as feasible.

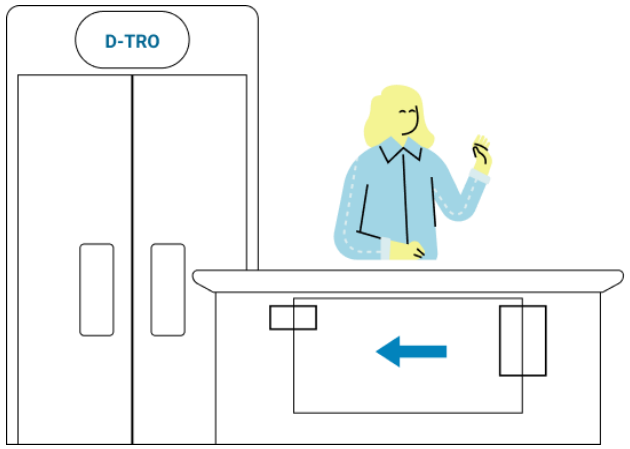
Amendments

Support amendments to existing D-TROs where there is no change of meaning to the order for example a parking rate change does not need to be readvertised or consulted on.

Consolidations

The service should support TAs to make consolidations with a function to archive previous additions through the API.

Consuming D-TRO data from the central store (1)



Traffic Authorities

Consumers

Solution Providers

Service principles

- Flexible – can work with other services
- Accurate – provides useful data and feedback channels to improve quality
- Timely – provides up to date information
- Adaptive – can evolve over time
- Simple to consume data from
- Collaborative

Support users to

- Check all live TROs in a specified location.
- Check TROs at specific points in time.
- Check for TROs that may become live in the future.
- Report issues with D-TROs
- Send suggestions for additions or changes to the service or data model

Consuming D-TRO data from the central store (2)

Finding the correct D-TROs

Research was carried out with consumers to understand which search queries were most useful for their needs these were added to the API specification.

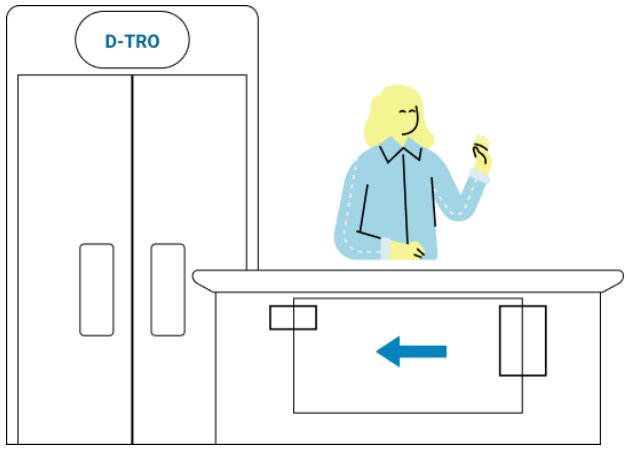
Data model format

To support publishing at different reporting points including at notice of proposal, notice of making, revocation, amendment.

Informing statutory consultees

The option of a notifications service was explored in Alpha. This service feature was deprioritised as the need is currently being met. Those consultees who work across a number of TAs such as bus operators will be able to sign up to the service as data consumers.

Seeking support from the service (1)



Traffic Authorities

Consumers

Solution Providers

Service principles

- Responsive
- Collaborative
- Human

Support users to

- Report and resolve issues
- Send suggestions for additions or changes to the data model or service
- Get help with tasks when needed.

Seeking support from the service (2)

Support during onboarding

A service support team should be available to help with queries for publishers and consumers trying to onboard.

Enquiry about rejected D-TRO

A feedback mechanism such as a support email or feedback form linked to ticketing system should be available from the public website so that publishers (either TA or their SP can raise a clarification about a rejected D-TRO). A lightweight database should keep a record of rejected D-TROs for a set amount of time to aid with enquires.

Amendments errors and additions

A feedback mechanism such as a support email or feedback form should be available from the public website so that consumers can flag where they think they see and incorrect D-TRO for example D-TRO in the wrong location.

Change to data ownership

The central service should proactively keep informed about any upcoming changes to TAs and instigate communication and planning when a future change is publicised.

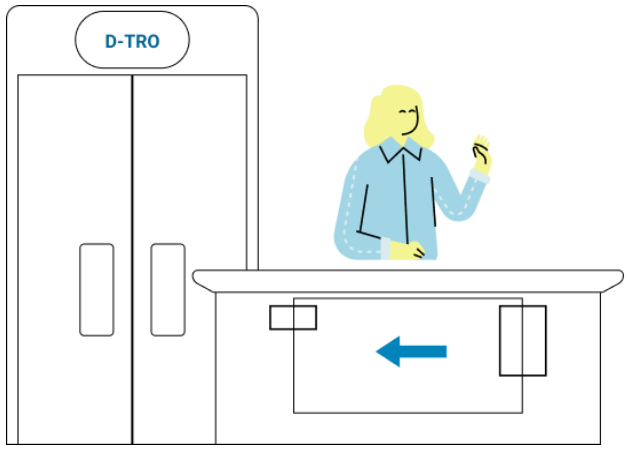
TAs should easily be able to report upcoming change through a feedback mechanism or governance meetings.

Technical support

Service desk to help with technical questions such as API implementation

Proactive check-in with SPs and TAs to check that the documentation is understandable and usable.

Service Governance



Traffic Authorities

Consumers

Solution Providers

DfT

CSO

Governance needs

- A transparent change and additions process which demonstrates how decisions have been made and who benefits from the change.
- A change schedule which meets need of stakeholders across the system. For example, major changes might be limited to twice a year.

  Multiple versions of the data model in use for set time periods to allow for changes to be implemented.
- Agreement on impact of new legislation or data model changes to older records.

Building blocks of governance

People

Process

Policy

Culture

Types of Governance in the service (1)

Inline quality assurance

Managed and implemented by the central service and supported by service support team.

Technical Governance

Prioritised and agreed with service users, central service and DfT.

Planned and communicated to agreed schedules between user groups.

Strategic governance

An independent steering group whose role is to drive strategic decisions balancing needs across different service users and stakeholders.

A good incubator for a steering group would be TTF who already host several comparable industry working groups such as Smarter Parking.

Chaired by impartial chair who understands TRO domain but can balance perspectives from different groups against strategic vision.

TA reps (Patrol group)
Industry reps, Central gov reps

Types of Governance in the service (2)

Agreeing data model and validation rules

As the data model is used it will need to be iterated and extended in response to user feedback. Feedback needs to be collected and balanced against the strategic vision. Change will need to managed against different user groups' needs.

Collecting & Prioritising feedback

Feedback channel
Proactive surveys sent at agreed time periods.

A prioritisation framework for feedback and future roadmap should be clear and accessible to all the governance group.

Strategic decision framework

The governance group will need to manage changes to the data model prompted by changes to legislation and policy

Version control

Multiple versions available to allow people to prepare for updates.

Process for managing what version of the data model a DTRO was validated against.

Technical documentation

Service Users will need to be provided with updated documentation ahead of a version change to be able to prepare for new versions of the data model.

Accessibility and assisted digital support

Service portal

Service support

Guidance

Technical documentation

Technical competence: Low ⟷ High

- Majority of Traffic Authorities
- Some TAs e.g. TFL
- Solution Providers
- Consumers

Technical Architecture

- Choose the right tools and technology
- Make new source code open
- Use and contribute to open standards, common components & patterns
- Operate a reliable service
- Iterate and improve frequently

Department for Transport

Technology Principles

- The D-TRO service must adhere to DfT strategic technology choices and GDS technology principles.
- DfT must possess the skills, knowledge and experience needed to work with the target architecture.
- PAYG serverless cloud services are used to afford value for money and avoid technology lock-in.

Cloud First

- Hosted in GCP (PaaS and SaaS)

Open Source

- Built using open-source language and libraries

Serverless

- Cloud Run for scalability, flexibility and cost-efficiency

Design for Failure

- Loosely-coupled micro-services

Making Source Code Open - Use Open Platforms and Common Standards

- All Alpha source code has been made publicly available. All Beta source code will be maintained in public DfT repositories.
- User interfaces (e.g., Support Portal) will apply GOV.UK Design System patterns.
- Open-source libraries have been used throughout.
- APIs will be secured using oAuth 2.0.
- OpenAPI specifications are published for each API, alongside technical documentation and user guides.

Security, Privacy and Availability

- The Beta solution has been assessed with DfT Security colleagues to explore threat vectors and preventative controls.

- A DPIA has been conducted with DfT stakeholders to ensure security is considered up-front (as well as being frequently reviewed and prioritised) throughout Beta.

- Automated monitoring and alerting will be implemented to continually assess API usage; highlighting any emergent threats and/or malicious usage patterns. This information will be used to complement ongoing risk assessment methods with DfT colleagues throughout the Beta phase.

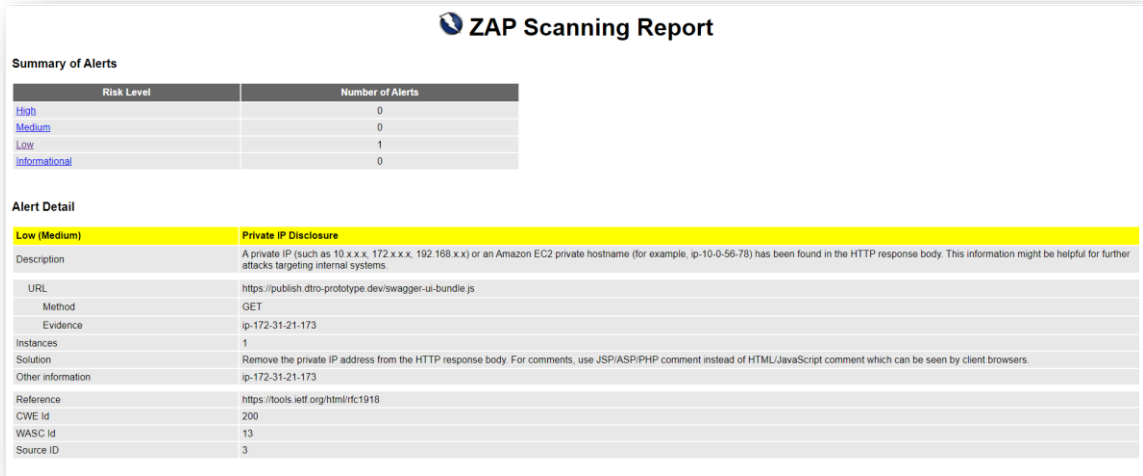
Security, Privacy and Availability

- The proposed Beta architecture applies end-to-end encryption (both in transit and at rest) for data served and stored by the solution.

- Development of the solution will be supported by automation to test the service against common web exploits (using OWASP ZAP) and any outdated software dependencies whenever a change is made. This helps identify any vulnerabilities up-front in early development environments.

- The service will be formally penetration tested during Beta prior to public use.

- The architecture has been designed for High Availability. How publishers of D-TROs will implement resiliency in their systems is explored during the on-boarding process.



ZAP Scanning Report

Summary of Alerts

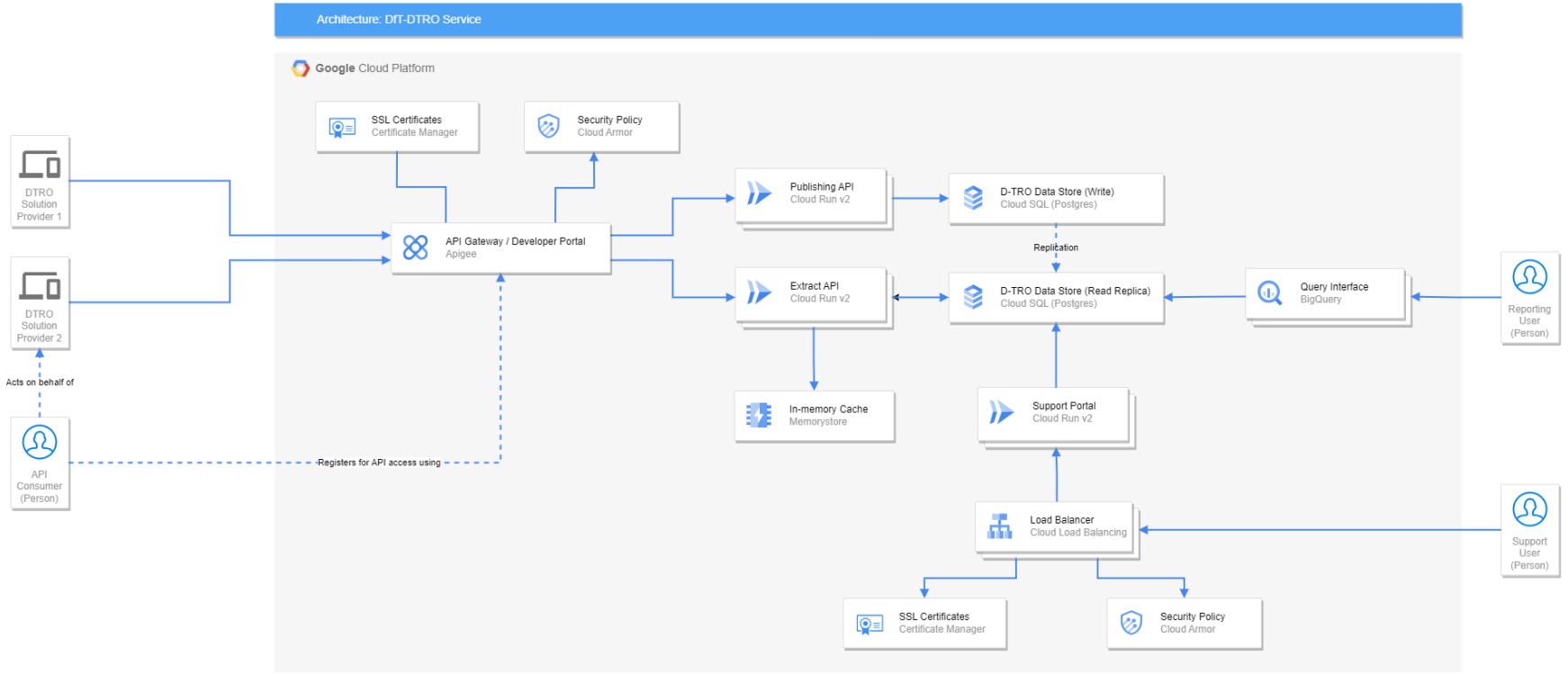
Risk Level	Number of Alerts
High	0
Medium	0
Low	1
Informational	0

Alert Detail

Low (Medium)	Private IP Disclosure
Description	A private IP (such as 10.x.x.x, 172.x.x.x, 192.168.x.x) or an Amazon EC2 private hostname (for example, ip-10-0-56-78) has been found in the HTTP response body. This information might be helpful for further attacks targeting internal systems.
URL	https://publish.dtro-prototype.dev/swagger-ui-bundle.js
Method	GET
Evidence	ip-172-31-21-173
Instances	1
Solution	Remove the private IP address from the HTTP response body. For comments, use JSP/ASP/PHP comment instead of HTML/JavaScript comment which can be seen by client browsers.
Other information	ip-172-31-21-173
Reference	https://tools.ietf.org/html/rfc1918
CWE Id	200
WASC Id	13
Source ID	3

Proposed Beta Architecture

The Beta architecture has been designed with input across DfT Architecture, Information Security, Knowledge and Information Management, Data Protection and Accessibility specialist team members.



Thank you

Appendix

Account management	Considerations
TA account roles - Admin and back-up admin to support self-serve	- Supported sign-up through the service e.g. via email so the correct lead admin role is created as many different people interact with TROs in LAs/TAs
SP account roles - Roles potentially linked to TAs for API access	- Potential to support a more complex account management including solution providers if there are a lot of support request during onboarding
Consumer account roles - Tagged with organisation and data usage to use during service monitoring	- Ability to self-serve. Consider whether TAs would have to sign-up again to consume or whether they could use the same account?
Revoke API keys - TA ceases to exist - Consumer breaks *terms of service*	- When a TA ceases to exist, this would be proceeded by months of planning for change of ownership to D-TROs with all impacted TAs and the central operating service. - A user API should never be revoked without prior communication and resolution management.

Onboarding	Considerations
Publicly available website - Supported sign-up for publishers (TAs/SPs) - Self-serve sign-up for consumers	- Meet accessibility guidelines and follow established GDS service patterns. - Supported sign-up for TAs to onboard correct admin team members
Guidance and advice - Who is the service for, Introduction to D-TROs, What's required to sign up	- To be written for non-technical users. - Clear and understandable. - Communication and engagement from DfT to support service transformation.
Technical documentation **-** ICD, data model, validation guide	- Clear, simple, comprehensive with real life examples
API control - Access to test and live keys per a TA to share with SPs.	- Service risk – Publishing onboarding happens across user groups - Explore options for API access for SPs in Beta
D-TRO record health check - Validate TAs' TRO data is ready to publish to live service	- Each TA should provide a real example of a TRO ensuring compliance with the data model. Watch out for 'gaming the system' by SPs
Test environment **-** Access to test environment	- SPs and TAs should have access to a test environment where they can explore the model in preparation for production-ready D-TROs

Publishing	Considerations
Validation checks for all published D-TROs – automatic check to ensure published data is meeting the data standard. Validation can become smarter over time as the service evolves.	- Error messages should be flagged per a D-TRO and specify where the issue is so SPs can support TA users to resolve issues. - Validation can be improved and expanded over time as the service learns from how the data model is used.
Reporting points - to support publishing at different reporting points including at notice of proposal, notice of making, revocation, amendment.	- Most data consumers we spoke to the most value in using the data is for those orders which are 'live' on the street there is not currently a reporting point for this. The next best indication is those order which have notice of making, notice, notice after making which indicates those orders are made and legal. - The data model can receive other reporting points. For TAs who commented on the service blueprint the majority expectation is that the D-TROs would be published to the central store once made. Support and engagement will be needed to communicated any other expectations from DfT. - SPs acknowledged that wider reporting points would be more technically complex for them to support within their workflows. This may have an impact for TAs and SPs getting prepared to use the service for the first time. - SPs were unsure of the use cases for publishing at notice of proposal. If this becomes required, communication and engagement will be needed to support desired behaviour.

Seeking support	Considerations
Support during onboarding A service support team should be available to help with queries for publishers and consumers trying to onboard.	A service support team should be available to help with queries for publishers and consumers trying to onboard.
Enquiry about rejected D-TROs	A feedback mechanism such as a support email or feedback form linked to ticketing system should be available from the public website so that publishers (Either TA or their SP can raise a clarification about a rejected D-TRO. A lightweight database should keep a record of rejected D-TROs for a set amount of time to aid with enquires.
Flagging possible incorrect D-TROs when in use	A feedback mechanism such as a support email or feedback form should be available from the public website so that consumers can flag where they think they see and incorrect D-TRO for example D-TRO in the wrong location.
Asking for addition to the data model or validation rules	A feedback mechanism such as a support email or feedback form linked to ticketing system should be available from the public website so that both publishers and consumers can send feedback about the data model or validation rules. This should also be supported by the governance strategy which should agree how feedback is proactively collected and prioritised within a governance group

Publishing	Considerations
Timeliness of publishing	- For bulk consumers the most value is having an accurate view of what is live on the road. Meaning time of publishing should be close to when an order comes into effect.
Consolidations and amendments API.	- The data model should support amendments to existing D-TROs where there is no change of meaning to the order for example a parking rate change does not need to be readvertised or consulted on. The service should support TAs to make consolidations with a function to archive previous additions through the

Consuming

Finding the correct D-TROs
Research was carried out with consumers to understand which search queries were most useful for their needs these were added to the API specification.

Data model format
Some consumers may require the format of the data they want to ingest to differ from what is provided from the D-TRO service. e.g. Google want street-by-street data. At inception the service will not offer a translation service.

Informing statutory consultees
The option of a notifications service was explored in Alpha. This service feature was deprioritised as the need is currently being met. Those consultees who work across a number of TAs such as bus operators will be able to sign up to the service as data consumers.

Seeking support	Considerations
Upcoming change to TA split, merger, boundary change	- The central service should proactively keep informed about any upcoming changes to TAs and instigate communication and planning when a future change is publicised. - TAs should easily be able to report upcoming change through a feedback mechanism or governance meetings.
Technical help – e.g. documentation, API specification, etc	- Consumers and TAs/SPs should be able to ask for help through a service desk if they are struggling to understand any parts of the technical documentation. - They should also be able to leave comments through a feedback function. - The research team in Beta proactively check-in with SPs and TAs who have their own systems to check that the documentation is understandable and usable.

Governance	Considerations
Agreeing data model and validation rules	As the data model is used it will need to be iterated and extended in response to user feedback. Feedback needs to be collected and balanced against the strategic vision. Change will need to managed against different user groups' needs.
Collecting + Prioritising feedback	Service users should have a feedback channel which is always open to leave feedback. The Governance group will need to agree how often feedback is proactively collected and through what channels e.g. qualitative interviews, surveys. The prioritisation framework for feedback and future roadmap should be clear and accessible to all the governance group. For example, how many people will be benefitted by this change?
Strategic decision process	The governance group will need to manage changes to the data model prompted by changes to legislation and policy

Governance	Considerations
Number of versions available at one time and Compatibility of versions	Whenever there is a new version of the data model or validation rules available this should be implemented alongside the previous version so that SPs and TAs have time to plan for the change without D-TRO records breaking. Record data management will need to be implemented to record which version of the data model D-TROs were validated against as legislation updates.
Technical documentation	Service Users will need to be provided with updated documentation ahead of a version change to be able to prepare for new versions of the data model.