Fintraffic

Fintraffic Developer Day

16.2.2022

Introductions

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Agenda

1. Fintraffic in general
2. Fintraffic open data and services
3. Digitraffic – data and API’s
4. Digitraffic – current topics & best practices
5. Case example: Here
6. Digitraffic development roadmap
7. Related services and data sources
   - Digitransit
   - Finap.fi
   - Digiroad
8. Discussion, Q & A
   - also in english

Be active! Ask!

- We will present in Finnish, but you are welcome to ask questions in English
- We will be using screen.io tool to get your feedback
  - Please visit (mobile or PC): fintraffic.screen.io/ekosysteemi
- Please also use Teams chat to give feedback and/or ask questions!
- The session will be recorded and the recording together with the slides will be published online https://www.fintraffic.fi/fi/fintraffic-developer-day

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2. Fintraffic open data and services & reusable components
3. Digitraffic – data and API’s
4. Digitraffic – current topics & best practices
5. Case example: Here
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Fintraffic in brief

We offer and develop traffic control and management services on land, at sea and in the air.

We also produce digital services and up-to-date open-source traffic data for operators and end users in the transport ecosystem.

Our services support the mobility of citizens, the needs and logistics of the business community, the operations of the security authorities and the competitiveness and welfare of Finland.

We employ 1,100 professionals.

Fintraffic’s services have a broad impact

Railway Traffic

- 500,000 trains per year
- 82 million passengers per year
- Rail network 6,000 km
- 470 professionals

Air Navigation Services

- Air traffic control services at 22 airports
- 280,000 aircraft movements per year (190,000 at Helsinki-Vantaa)
- 440 professionals

Road Traffic

- Roads carry 90% of passenger transport in Finland
- More than 120 million km driven in vehicles every day
- Road network 78,000 km
- 90 professionals

Vessel Traffic Services

- Shipping carries 90% of exports and 80% of imports
- 30,000 visits by foreign vessels per year
- 29 ports
- 100 professionals

We also produce digital services and up-to-date open-source traffic data for operators and end users in the transport ecosystem

Traffic Authorities and parties in Finland

LIIKENNE- JA VIESTINTÄMINISTERIÖ

- **The Ministry of Transport and Communications** is responsible for the provision of safe and secure transport and communications connections and services. It also enables the use of new digital services. The aim is to create a favorable operating environment for the services and new business models.

TRAFICOM Liikenne- ja viestintävirasto

- **The Finnish Transport and Communications Agency Traficom** promotes the transport system and traffic safety and ensures that everyone in Finland has access to high-quality, secure and reasonably priced communications connections and services. Traficom supports sustainable development and boosts digitalisation by means of, for example, experiments in automation and robotics. Traficom is an authority serving people and businesses in licence, registration and approval matters related to transport and communications.

Finnish Transport Infrastructure Agency

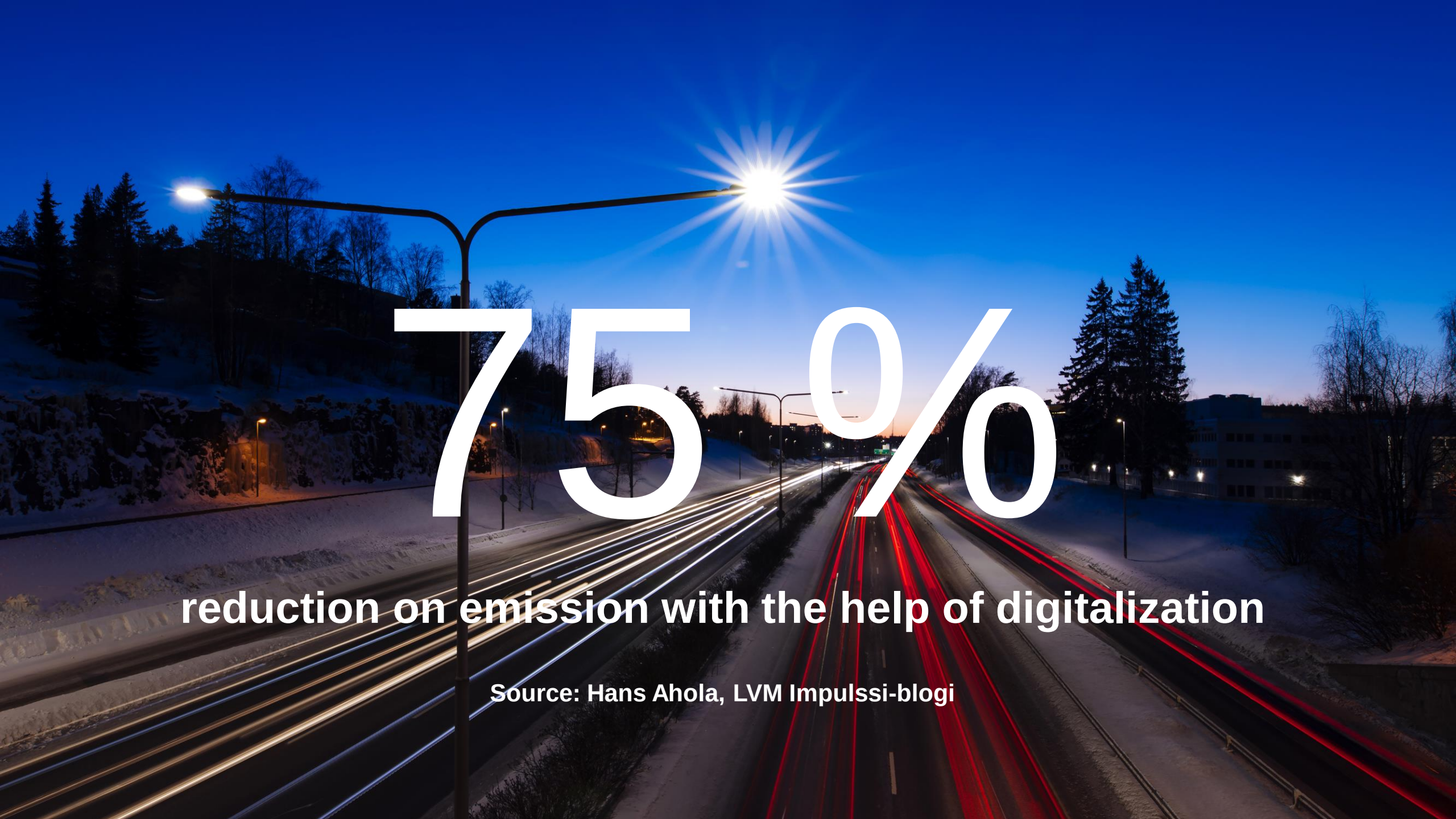
- **Väylävirasto (Väylä), The Transport Infrastructure Agency,** which operates under the Ministry's guidance, is responsible for road, railway and waterway construction and maintenance. The Transport Infrastructure Agency outsources the work to businesses through competitive tendering.

Fintraffic

- **Traffic Management Company Fintraffic Ltd** is a wholly state-owned group with special assignment operating under the ownership steering of the Ministry of Transport and Communications. The Group provides advanced traffic control and management services and ensures the safety and reliability of all transport modes. It is also responsible for the collection, management and use of traffic control data.

Traffic Data Ecosystem


Fintraffic
13%
spent of logistics and travel.


75 %
reduction on emission with the help of digitalization
Source: Hans Ahola, LVM Impulssi-blogi

The transport system of the future will be shaped by development arcs specific to each mode of transport and by overall developments

2025 | 2030 | 2030 +

People and organisations increasingly learn how to leverage technology

SMART TRAFFIC AND TRANSPORT SYSTEM

SMART TRAFFIC CONTROL

Real-time situational picture across all modes of transport, at the macro and micro levels

Smart traffic lights, signals and cameras

Data broker operator collects and processes information for the entire ecosystem to use

Drone register and drones covered by traffic control

Traffic control automation, national control centres covering multiple modes of transport

Autonomous vehicles in contact with each other and with the infrastructure

Driver free to focus on other tasks

SMART TECHNOLOGY ACROSS MODES OF TRANSPORT

Significant reduction in emissions

Vehicles create the situational picture

Transport crowdsourced and electrified

5G networks facilitate introduction of new technology

Autonomous buses

Autonomous truck convoys on motorways

Congestion charges and road tolls

Electric, autonomous cars

Autonomous / remotely controlled rail transport

Drones for passenger transport

Shore-piloted vessels with extensive autonomous capabilities

Increased number of remotely piloted aircraft

Vessel shore-based piloting increasingly common

Smart vehicles connected with each other

Massive passenger influx in rail transport

Remote air traffic control services becoming more common

Automatic drone remote control system

Smart shipping lanes; navigation aids and sensors collect information on the environment

Autonomous cars, remote control on controlled roads

New safety systems allow larger traffic volumes

Trains are significantly faster

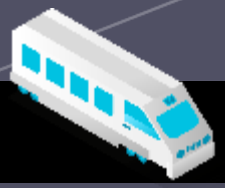
Drones are connected to the transport ecosystem and generate data

Ports and vessels optimise their operations dynamically

2030 +

2030

2025



SMART ROAD TRAFFIC | **SMART RAIL TRAFFIC** | **SMART AIR TRAFFIC** | **SMART MARITIME TRAFFIC**


Global traffic market estimated growth by 2030
70%

We have already more than 130 organizations involved – join us!

We offer:

- an agile testing and development scene for smart traffic and mobility services

- a fair digital operating environment

- close co-operation with traffic authorities without bureaucracy

We **develop:**

- the rules for sharing data

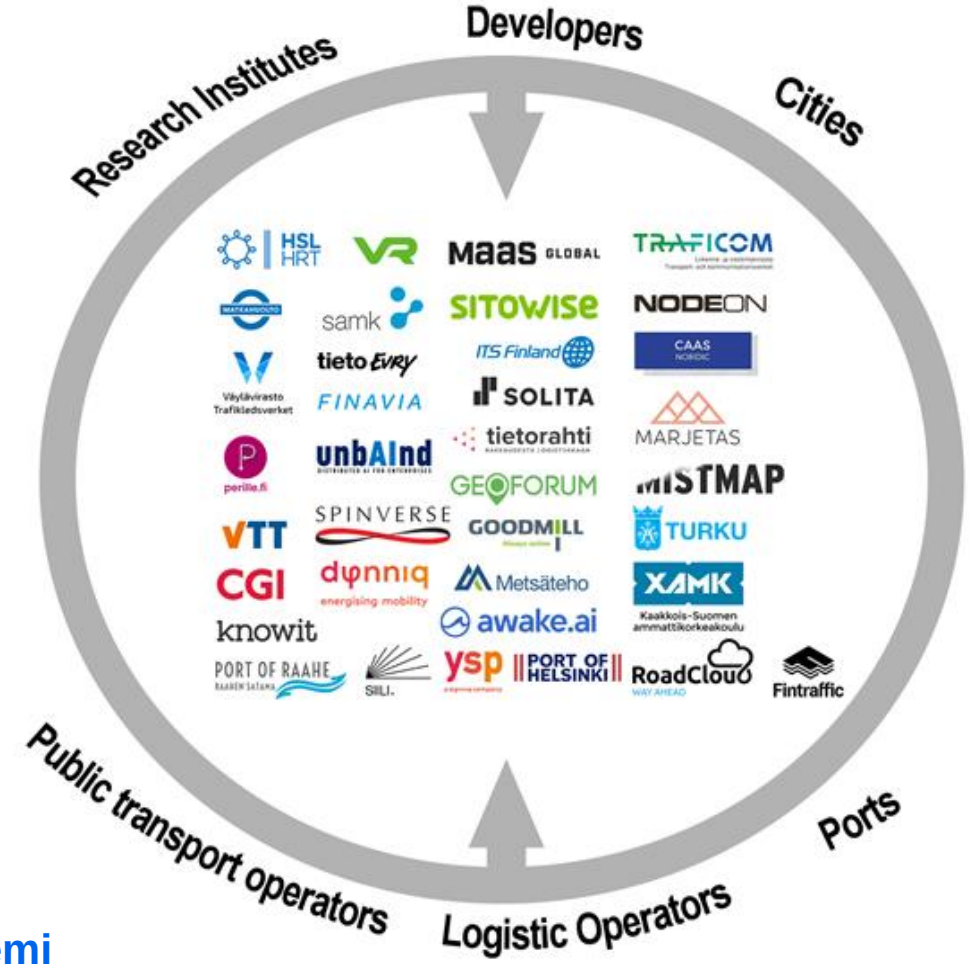
- data architecture

- situational awareness

- logistics information

- public transport information

- EU collaboration



fintraffic.fi/liikenteenekosysteemi
fintraffic.fi/en/trafficecosystem

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1.1+

Billion

API calls / quarter

25%

year-on-year growth

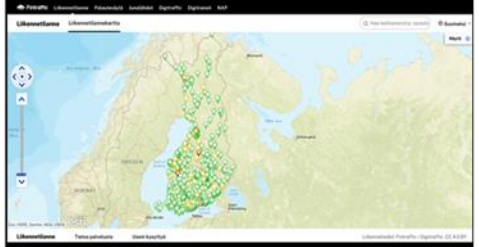
We offer a wide range of data and services

Digitraffic

- Open traffic data
- Open interfaces

- Road, railway and maritime data with open APIs
- 100+ APIs
- 10+ M API Calls / day
- Active developent forum
- https://www.digitraffic.fi

Traffic Situation



- Real time situation of the traffic system
- Also available as a mobile app

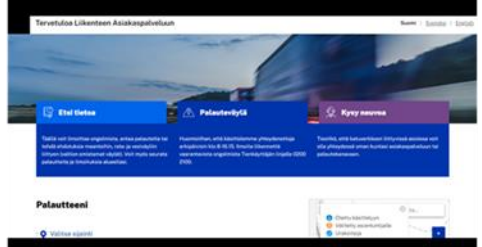
- Bauer Media / Radio Nova utilizes our solution
- Data from both Fintraffic and other providers sources (e.g. EV charging stations)
- https://liikennetilanne.fintraffic.fi

Train Departures

- Train schedules in real time
- Virtual Monitor

- Realtime train schedules:
- https://www.junalahdot.fi

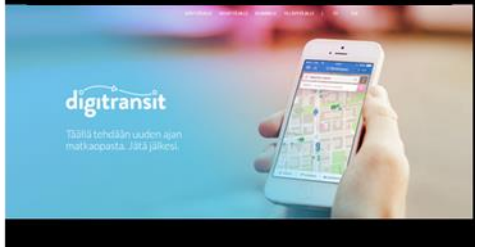
Feedback Channel



- Channel for feedback on traffic networks

- Feedback and realtime monitoring
- https://palautevayla.fi/

Digitransit



- Public transport route and timetable information

- Public transport data, route planner
- https://www.digitransit.fi
- https://opas.matka.fi

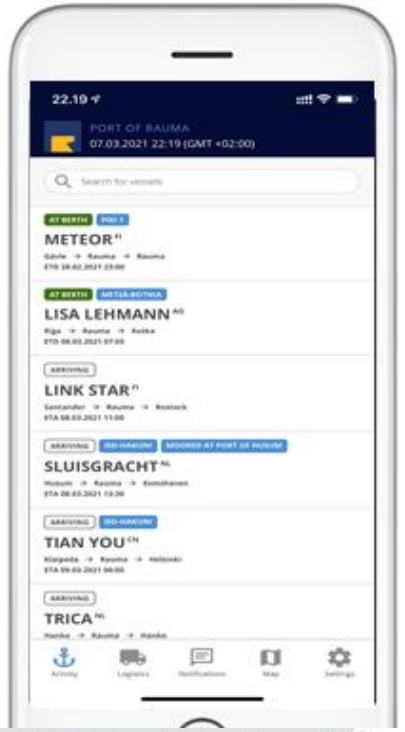
Port Activity application

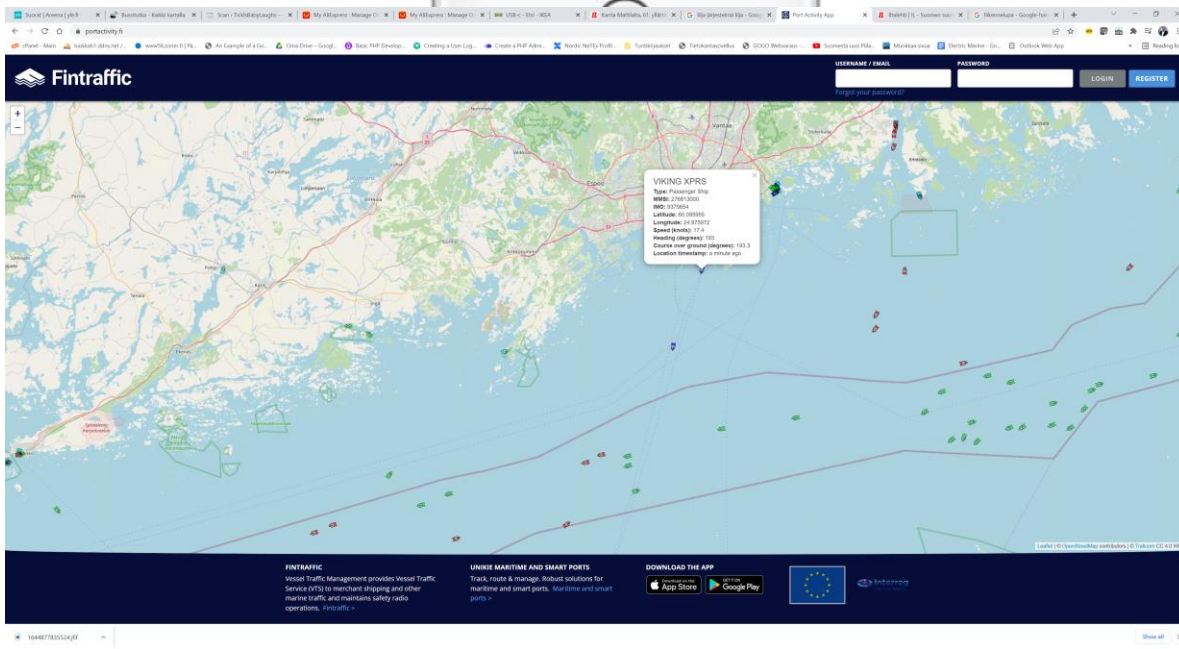
More than ten Finnish ports have already signed up to use Port Activity, and it is also being used in Sweden. The Baltic Sea is one of the world's busiest shipping areas, with more than 2,500 vessels on the move around the clock. Every year, 17 per cent of all global maritime transport passes through its ports. The aim is to encourage other countries around the Baltic Sea to start using the app, before sailing on into global waters.

By sharing schedule data, and thereby making ports more efficient, the app can generate considerable savings in terms of both money and emissions.

The port app was born as part of the EU-funded STM EfficientFlow project, which sought to create new tools to streamline maritime transport, improve safety and reduce emissions by utilising modern data and information sharing. The project's closing seminar was held at the beginning of June, and Port Activity will now continue on its own journey to promote more efficient port visits.

The real-time sharing of schedule data boosts the efficiency of the entire logistics chain. The app collects schedule data on the port's various stakeholders from a number of different systems in real time and then collates it in one place. It informs users of any potential schedule changes. This enables everyone to keep fully abreast of the situation, so they can plan their own schedules accordingly.



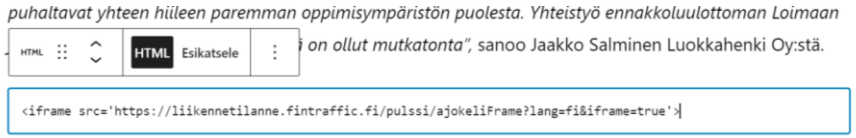


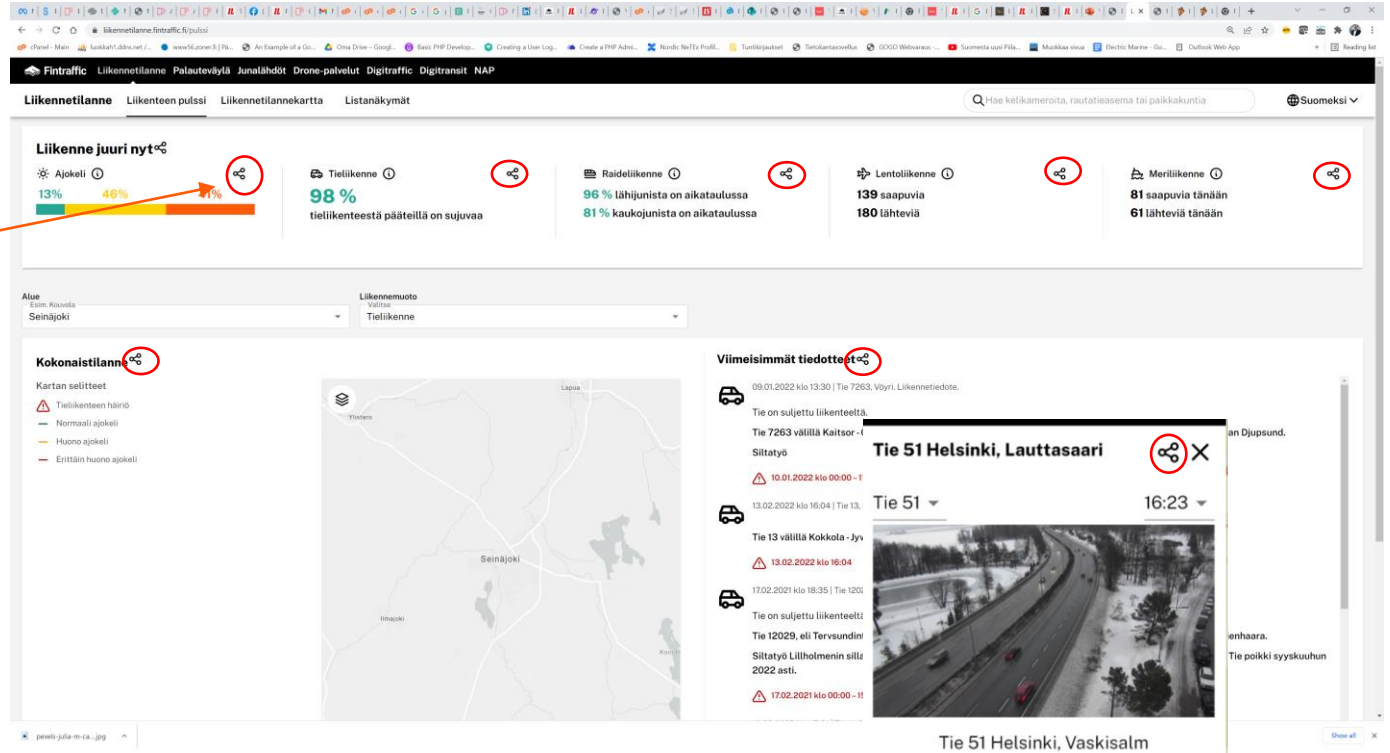

SHARING
IS
CARING

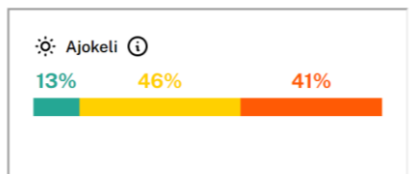
How to use sniplets of Fintraffic services in your site?

- We encourage the use of Fintraffic sniplets in your sites and continue promote the use of our capabilities.
- Examples of services that already have sharing enabled:
  - Liikennetilanne
  - Digitransit
  - Junalähdöt

How does it work in practice?







junalahdot.fi/pasila

cPanel - Main | luokkah1.ddns.net /... | www56.zoner.fi | Pä... | An Example of a Go... | Oma Drive – Googl... | Basic PHP Develop... | Creating a User Log... | Create a PHP Admi... | Nordic NeTEx Profil... | Tuntikirjaukset | Tietokantasovellus | GOGO Webvaraus -... | Suomesta uusi Piila... | Muokkaa sivua | Electric Marine - Go... | Outlook Web App | Reading list

Junien aikataulut reaaliajassa

Junalähdöt-aikataulupalvelussa pystyt tarkastamaan junien lähtö-ja saapumisajat kaikilta Suomen henkilöliikenneasemilta. Tiedot pohjautuvat junien reaaliaikaisiin kulkutietoihin.

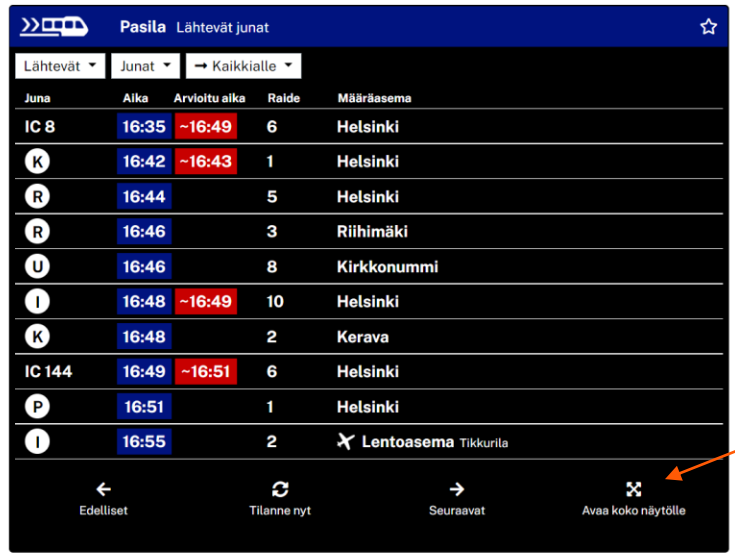
Haku ☆ Suosikit

Hae asemaa tai junaa nimellä

Pasila (PSL)

Hae asemaa sijaintisi perusteella

Näytä lähin asema



pexels-julia-m-ca....jpg

Show all

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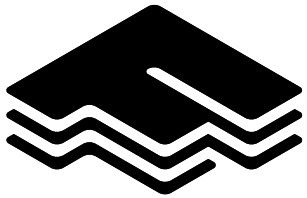
https://fintraffic.screen.io/ekosysteemi

Warming up ☺



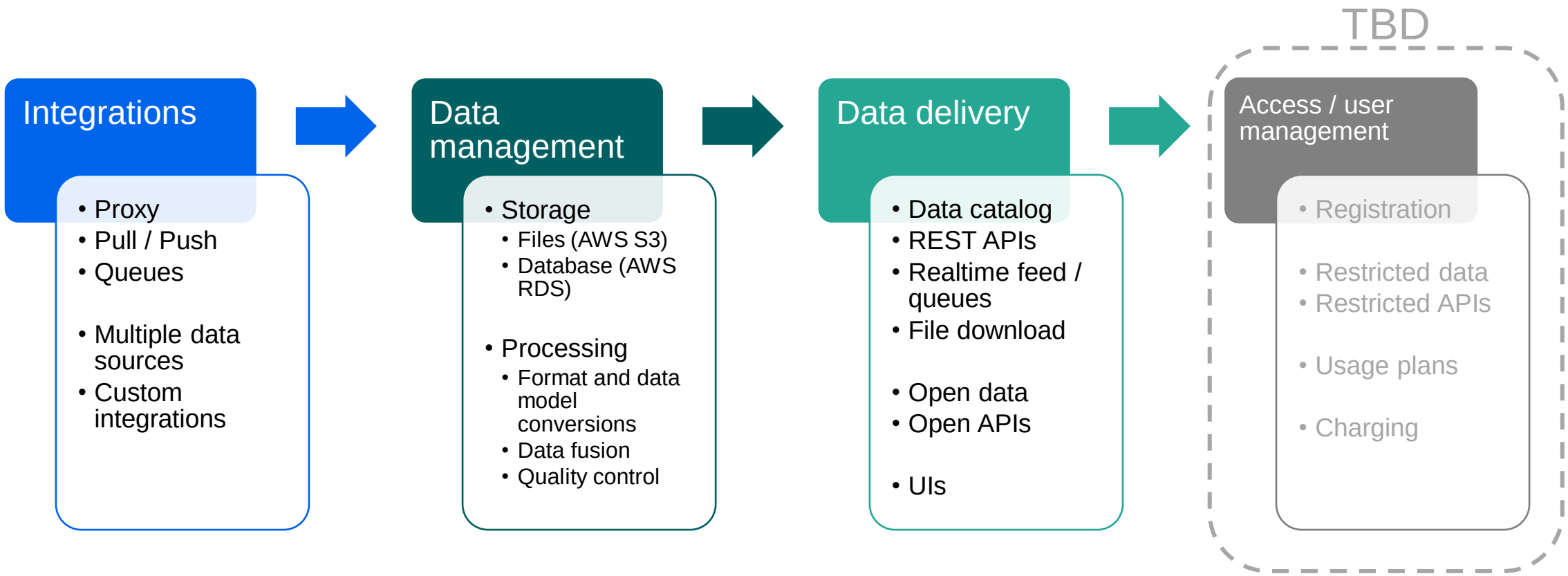
Digitraffic - https://www.digitraffic.fi/

- Open data (CC BY 4.0)
- Open source (EUPL 1.2)
- ~100 APIs
- ~1 TB of data delivered every day
- Runs on AWS
- Active user group

Digitraffic

Information about open data for application development from Finnish road, railway and marine traffic.

Digitraffic – architecture

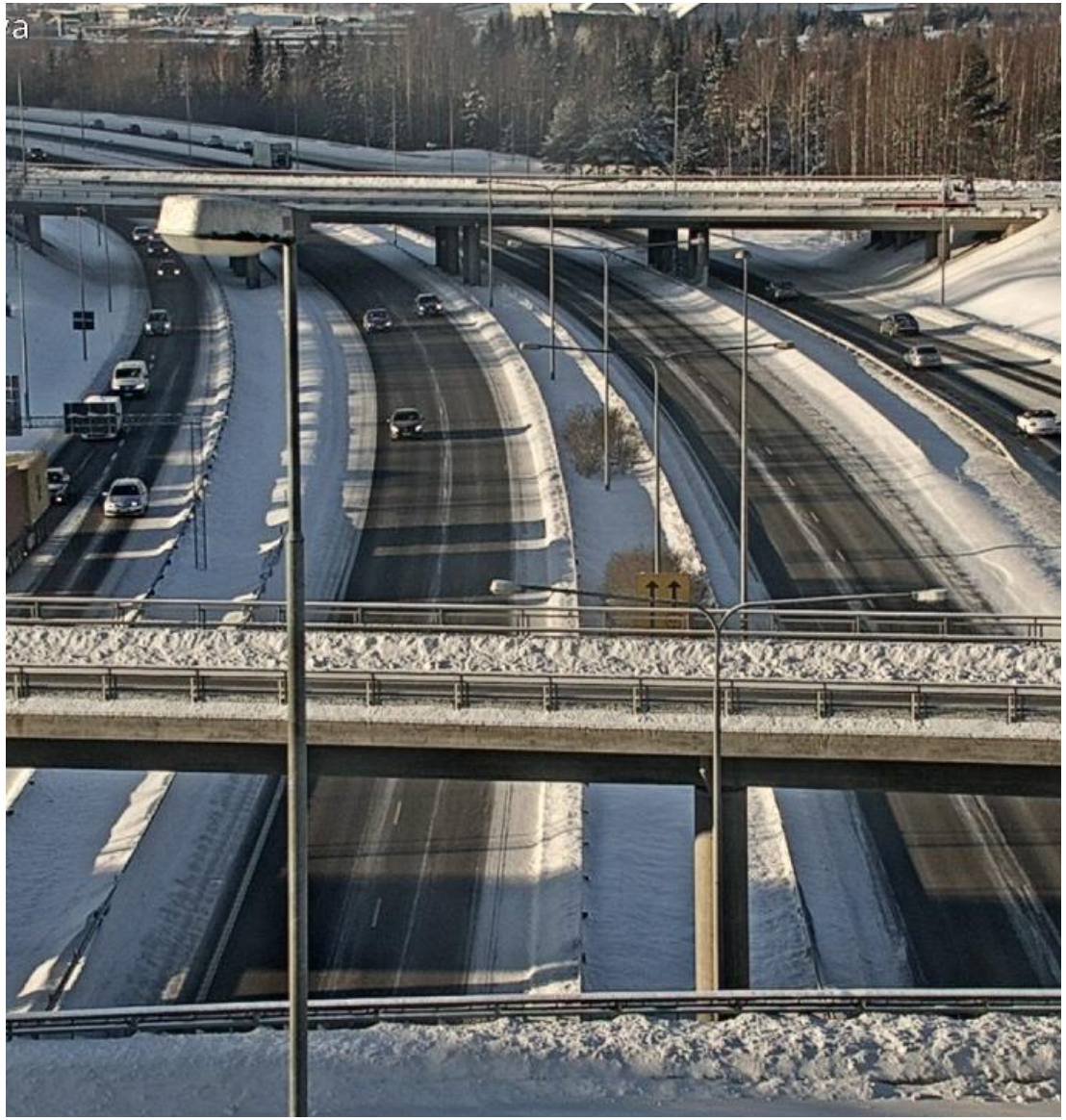


Digitraffic – road data

- Traffic volumes (realtime & history)
- Traffic incidents
- Weight restrictions
- Roadworks
- Road weather conditions
- Road weather forecasts
- Road weather camera images
- Variable message signs (VMS)
- Road maintenance

Pilot projects in 2022:

- *Incidents on street network (roadworks etc.)*
- *Street maintenance*
- *Street weather conditions*



Digitraffic – rail traffic

- Train timetables
- Train tracking
- Train locations (GPS)
- Route sets
- Train compositions
- Track works and traffic restrictions
- Railway infrastructure
- Yearly plans for maintenance and construction works

2022:

- *Railway passenger information*
- *Active track works*
- *Information on bus replacements*

Digitraffic – marine traffic

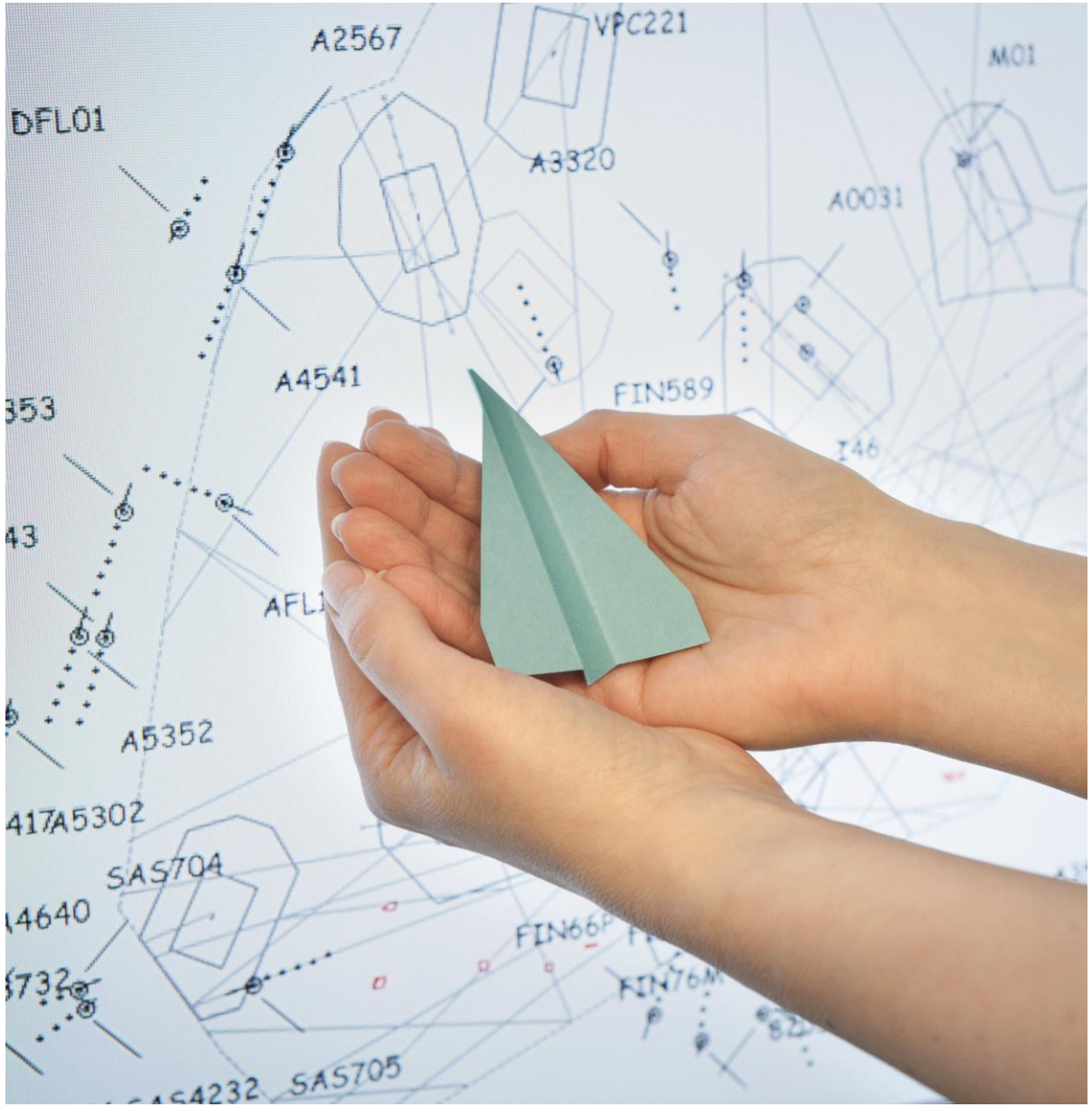
- Vessel location and metadata (AIS)
- Portcalls
- Nautical warnings
- Sea state information
- Ice-breaking routes (DirWays)
- Faults in aids to navigation
- Disruptions in marine traffic

- Enhanced port call timestam information (Port Activity) – <u>not open data</u>

Digitraffic – air traffic

- For the moment, no air traffic data is available via Digitraffic.
- What would be the most interesting dataset (or service) around air traffic data?

➥ fintraffic.screen.io/ekosysteemi



Kuva: Fintraffic

Data can answer multiple questions

Rail traffic	Road traffic	Maritime traffic
• Is my train on schedule? • Where is my train right now? • Which train can take me from A to B at time C? • Which trains are the next to arrive and depart on station X? • Which types of cars is my train composed of? • What services do these cars provide? • Was my train on schedule two months ago?	• What are the road weather conditions like right now? How about 3 hours from now? • When was the road last plowed? • Where are the road maintenance vehicles right now and what are they doing? • Are there any incidents or roadworks affecting my planned route? • Is traffic flowing normally? • How is the traffic flowing now in comparison to yesterday / lasth month / last year.	• What vessels are in harbour X at this time? • Which vessels are arriving / departing next and when? • Where is the vessel right now? • What kind of vessel is that? • Are there any active warnings for marine traffic? • Are there any disturbances in marine traffic? • Are the aids of navigation working properly?

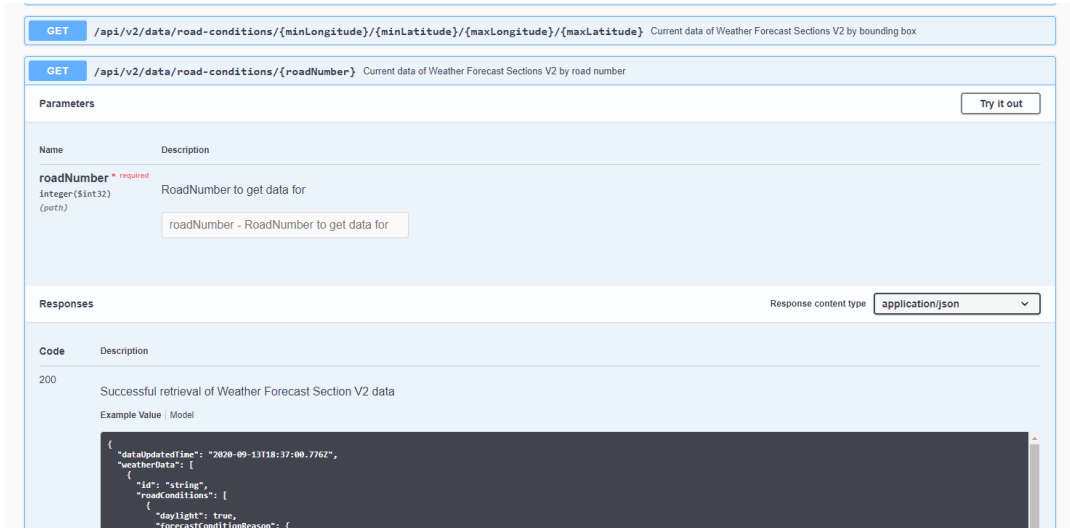
APIs and data formats

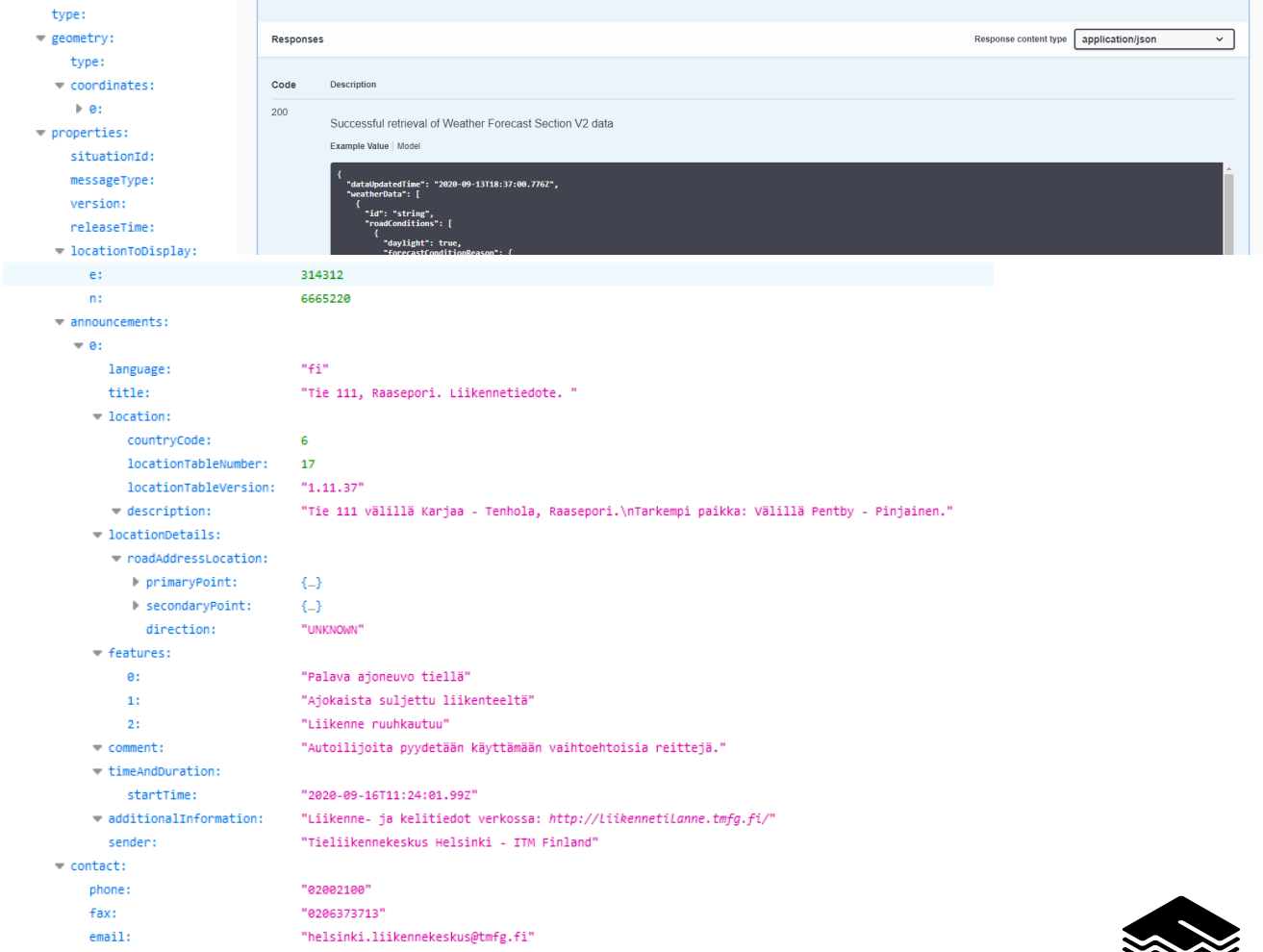
APIs

- REST
- MQTT / Websocket
- GraphQL
- Swagger documentation

Data

- JSON / GeoJSON
- XML

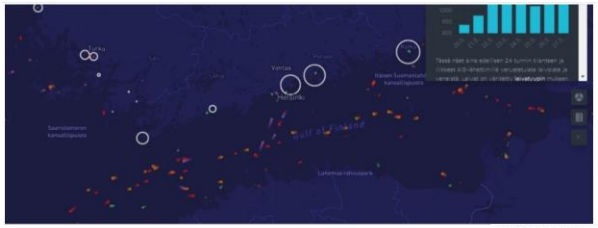




Digitraffic - statistics

Year	Data (TB)	Change	API calls (in millions)	Change
2019	295,1		2 626	
2020	343,6	16 %	3 281	25 %
2021	385,58	12 %	4 095	25 %

Examples



Digitrafficilla vaikuttavuutta: Pohjoinen kasvuvyö kee tietoa näkyväksi datavisualisoinnin keinoin

Julkaistu 28.5.2020

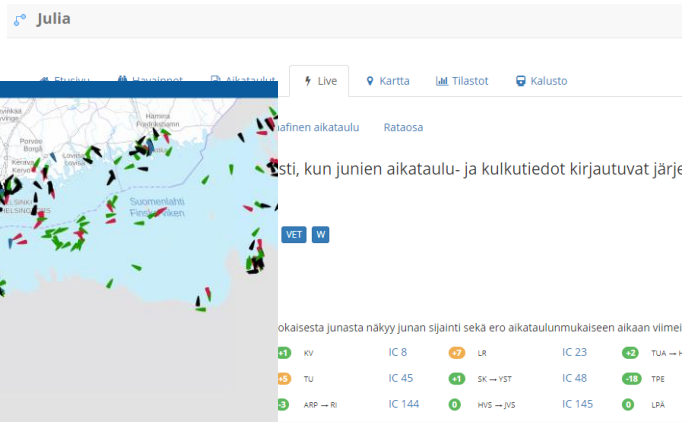
Nordic Way3 kehittää Pohjoismaiden rajat ylittäviä älyliikenteen ratkaisuja – tiedonvaihto ja automaatio hankkeen ytimessä

Julkaistu 12.11.2021

Miltä kuulostaisi, jos tulevaisuudessa autosi kommunikoisi sujuvasti tienvarressa olevien opasteiden, hälytysajoneuvojen ja liikennevalojen kanssa? Entä ajatus siitä, että vuonna 2050 kuolemaan johtaneet tieliikenneonnettomuudet voitaisiin välttää älykkäiden liikenneratkaisujen avulla?

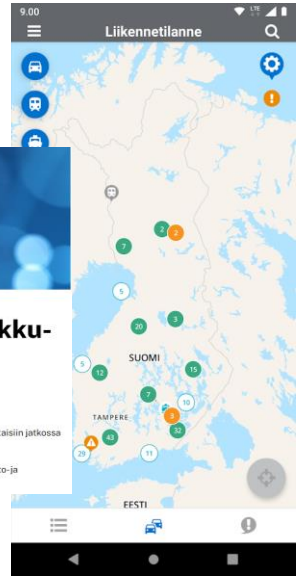
Uusi sovellus helpottaa ammattikuljettajien arkea joukkoistetun datan avulla

Julkaistu 20.7.2021



Digitraffic suunnittelutyössä: Nodeonin älykkään liikenteen -hankkeissa avoin data tuo suunnitteluun reaaliaikaista olosuhde- ja tilannetietoa

Julkaistu 29.4.2020



Fintraffic ja Telia kehittämään uuden sukupolven liikkumistietoa

Julkaistu 29.10.2021

Fintraffic ja Telia Finland ovat käynnistämässä tutkimus- ja kehityshanketta, jotta matkapuhelinverkosta kerättävää väkijoukkojen liikkumistietoa voitaisiin jatkossa hyödyntää osana yleistä maantieliikenteen laskentaa.

Uuden sukupolven liikkumistietoa on tarkoitus käyttää entistä kohdennetumpaan liikennesuunnitteluun sekä hyödyntää esimerkiksi tiestön eri ylläpito- ja kunnossapitotehtävissä.

Digitraffic suunnittelutyössä: Avoin data l nin tuotekehitykselle

Julkaistu 10.3.2020

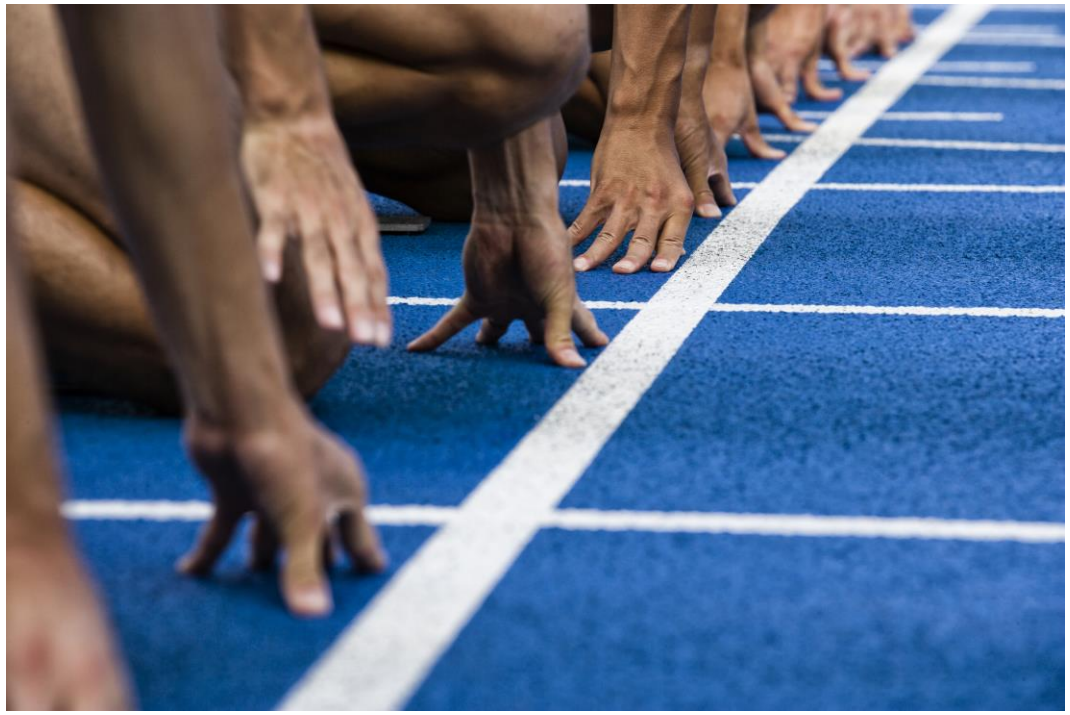
Port Activity vuoden 2021 Seatrade Awardsin finaaliin – innovatiivinen satamasovellus synnytti uuden ekosysteemin

Julkaistu 15.9.2021

Fintrafficin ylläpitämä Port Activity -sovellus valittiin SAMK:n tekemän hakemuksen pohjalta vuoden 2021 Seatrade Awardsin finalistiksi uudessa Port & Terminal Digital Technology Award -kategoriassa. Palkintotapahtuma järjestetään yhteistyössä Lloyd's Listin kanssa.

How to get started

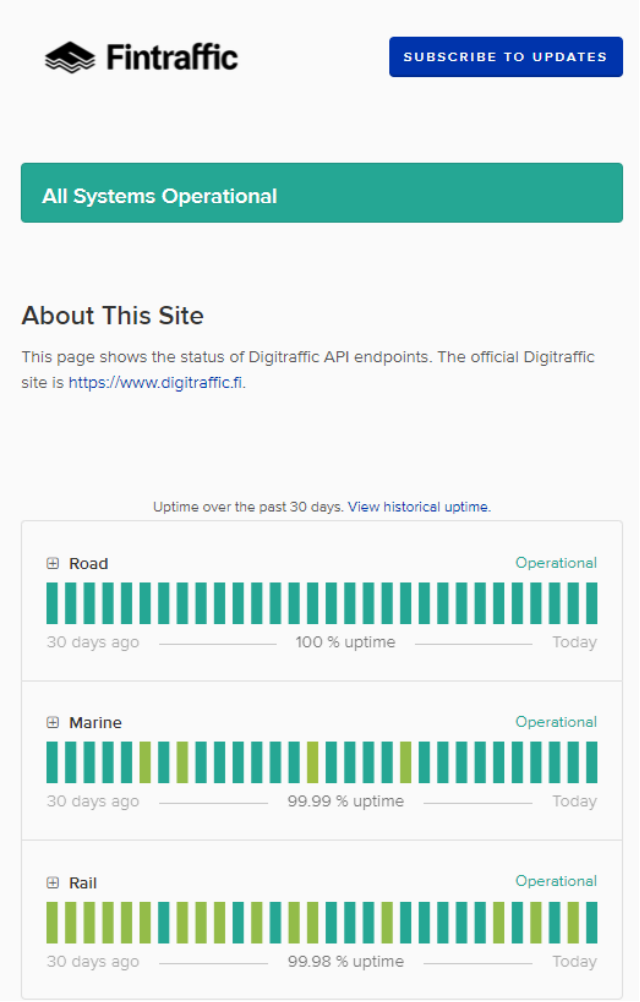
1. Check the website https://www.digitraffic.fi/
2. Test the APIs in Swagger and/or in browser
3. Get familiar with the data
4. Study other applications using data from Digitraffic (Liikennetilanne, Juliadata etc.)
5. Try, experiment, innovate! Contact other developers via discussion forums.



Support channels

- Discussion forums
  - Road - https://groups.google.com/g/roaddigitrafficfi
  - Rail - https://groups.google.com/g/rata_digitraffic_fi
  - Marine - https://groups.google.com/g/meridigitrafficfi

- Status information - https://status.digitraffic.fi/



Useful links

- https://www.digitraffic.fi/
  - https://tie.digitraffic.fi/swagger/
  - https://rata.digitraffic.fi/swagger/
  - https://meri.digitraffic.fi/swagger/
- https://status.digitraffic.fi/
- https://github.com/tmfg
- https://www.fintraffic.fi/fi/liikenteenekosysteemi

We are here to help you prosper!

- In what ways could we serve you, the data users, even better in the future?
- Your feedback is valued and very welcome!

fintraffic.screen.io/ekosysteemi

Please give feedback :)

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Digitraffic - current topics & best practices

- API versioning and RESTfulness
- Tips & Tricks
- Other APIs to use

API versioning and RESTfulness

API versioning and RESTfulness

Why are the APIs being updated?

- Harmonization of road, marine and rail APIs
- Clearer API paths that conform to REST principles
- More coherent APIs
- Easier to maintain
- Does not include:
  - Infra-API
  - GTFS

API versioning and RESTfulness

How will the APIs be updated?

- Remove path-level distinction between “data” and “metadata”
- More descriptive paths:
  - /api/<datatype>/<version>/<resource> OR
    /api/<datatype>/<version>/<resource>/<subresource>
  - Examples:

    /api/v#/metadata/tms-stations

    → /api/tms/v#/stations

    /api/v#/data/tms-data

    → /api/tms/v#/stations/measurements

API versioning and RESTfulness

- Prefer suffixes in URLs instead of Accept headers or path for indicating data formats:

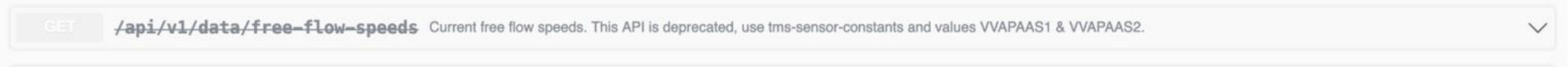
  /api/v/data/traffic-messages/simple
  → /api/traffic-message/v/messages
  /api/v/data/traffic-messages/datex2
  → /api/traffic-message/v/messages.datex2
  /api/v/data/traffic-messages/datex2/{GUID}
  → /api/traffic-message/v/messages/{GUID}.datex2

- Default format without suffix is normal REST style JSON
- Keep the (sub)resource as the last element of a path
- Use query parameters instead of path parameters

API versioning and RESTfulness

Deprecation and removal of old APIs

- New API documentation for all APIs published by end of 2022
- Migrate step by step, starting with road
- New APIs will be first published as beta in test environment
- Old version will be deprecated after release of a new version
- Deprecated APIs will be marked in Swagger descriptions and removed 6 months after deprecation
- Deprecation and removal notices will be posted on Google Groups and Digitraffic web page



Tips & Tricks

Tips & Tricks: Identification header

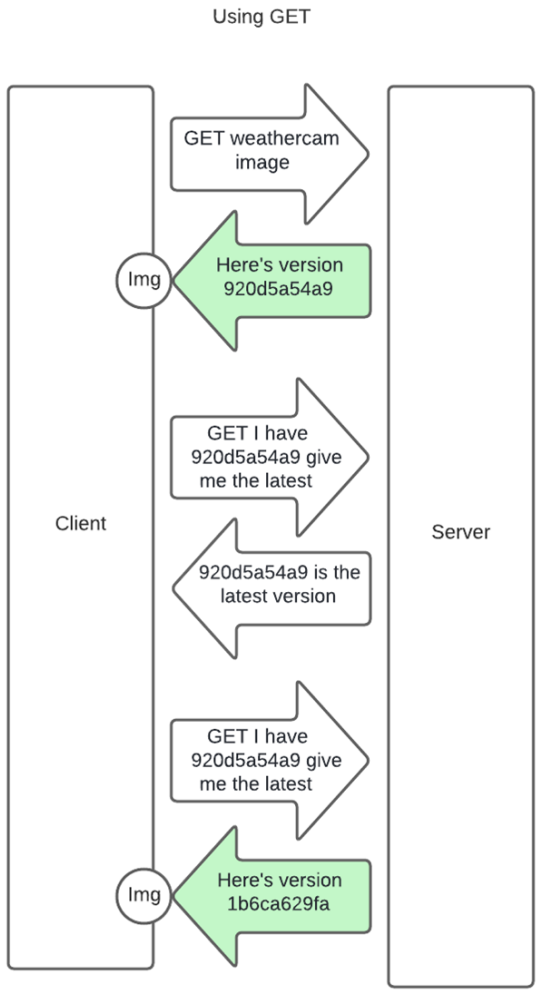
- Use HTTP header Digitraffic-User in the form of Company/Application 1.0
- Digitraffic team can identify your application from the header
- This helps investigating issues and provide user support
  - Increase in request counts
  - Increase in transferred data
  - Malformed requests
- Do not include personal information in requests (name/email)

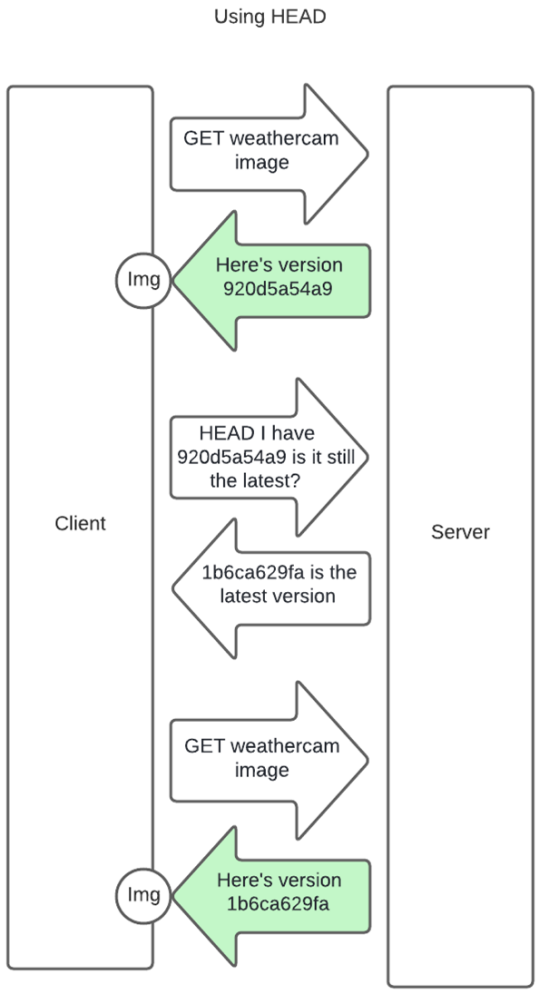
Tips & Tricks: Conditional requests

- Weather camera image API returns an ETag HTTP header
- Header indicates image version
- By including an ETag in a request, an HTTP 304 response is sent if the image has not been updated
- Prevents unnecessary transfers of images that have not been updated
- Browsers use ETag transparently

Additional information: https://www.digitraffic.fi/en/instructions/

Tips & Tricks: Conditional requests





Tips & Tricks: Restrictions

- Update intervals for most data are available on the Digitraffic site
- Try to limit your requests to update intervals - more frequent queries do not have any advantages
- Most APIs have usage restrictions
- If a query is being restricted, HTTP 429 is returned
- Current restrictions are very loose, more restrictions are likely to follow

Tips & Tricks: Infra-api & Jeti-api

- API returns lots of data with heavy calculations - use row and property filtering
- Most endpoints return json, geojson, jsonl, html, csv, xlsx and png.
- Include only needed properties with **propertyName**
  - tilirataosat.json?propertyName=nimi,numero
- You can also fetch deeply
  - tilirataosat.json?propertyName=nimi,kunnossapitoalue.nimi
  - Don't overuse!
- Filter rows with ***cql_filter***. Subset of ECQL syntax.
  - tasoristeykset.json?cql_filter=tilirataosa='1.2.246.586.1.32.1405'
- Use pagination
- See also FAQ, examples and changelog (always use the latest API version)

Other APIs to use

GraphQL

- Query language that enables e.g. filtering and delimiting responses on the basis of fields
- Queries are sent as JSON in POST requests
- Currently available for railway data
- Examples: https://www.digitraffic.fi/en/railway-traffic/
- Try it out: https://rata.digitraffic.fi/api/v2/graphql/graphiql

MQTT

- Protocol for push-style reception of data
- Suitable for creating e.g. real time UIs
- Restrict your subscription to a subset of the data where possible
- Examples for different modes of transport:
  - https://www.digitraffic.fi/en/road-traffic/#websocket-api
  - https://www.digitraffic.fi/en/marine-traffic/#websocket-api
  - https://www.digitraffic.fi/rautatieliikenne/#websocket-mqtt

Source code

- Open source under the EUPL 1.2 license
- Pull requests are welcome ☺
- https://github.com/tmfg/digitraffic-road
- https://github.com/tmfg/digitraffic-marine/
- https://github.com/tmfg/digitraffic-rail
- https://github.com/tmfg/digitraffic-cdk

Break – continue 14.19

Agenda

1. Fintraffic in general
2. Fintraffic open data and services & reusable components
3. Digitraffic – data and API’s
4. Digitraffic – current topics & best practices
5. Case example: Here
6. Digitraffic development roadmap
7. Related services and data sources
   - Digitransit
   - Finap.fi
   - Digiroad
8. Discussion, Q & A
   - also in english

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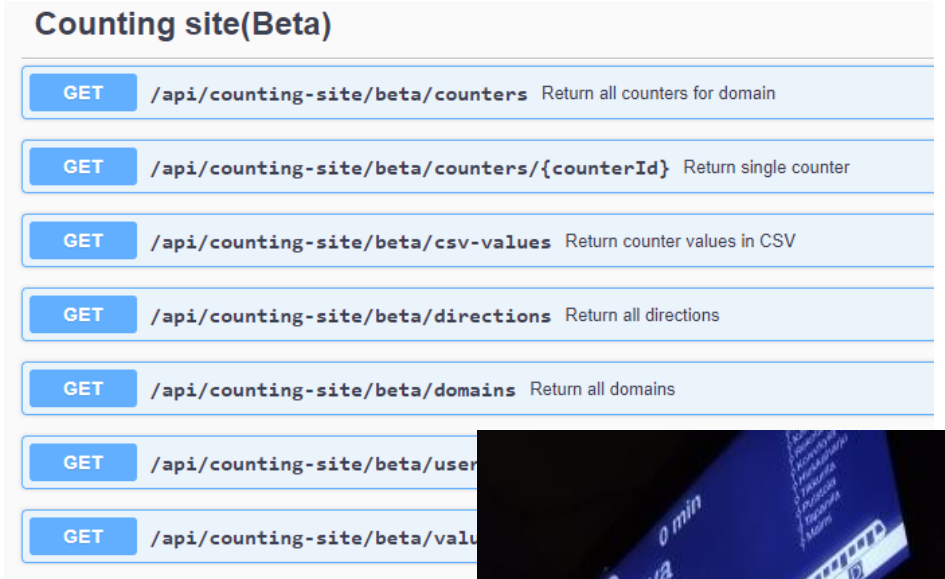
Digitraffic development roadmap

Upcoming datasets
Walking and cycling counting sites (in beta)
Traffic data from cities and municipalities
GTFS-RT for railway traffic
Railway passenger information



Digitraffic development roadmap

Data catalog development

- We want to build a data catalog that enables data and service providers to
  - display their data and services
  - share their data
  - connect with data users
- What kind of functionalities would you like to see in the catalog?
  - Share your thoughts fintraffic.screen.io/ekosysteemi

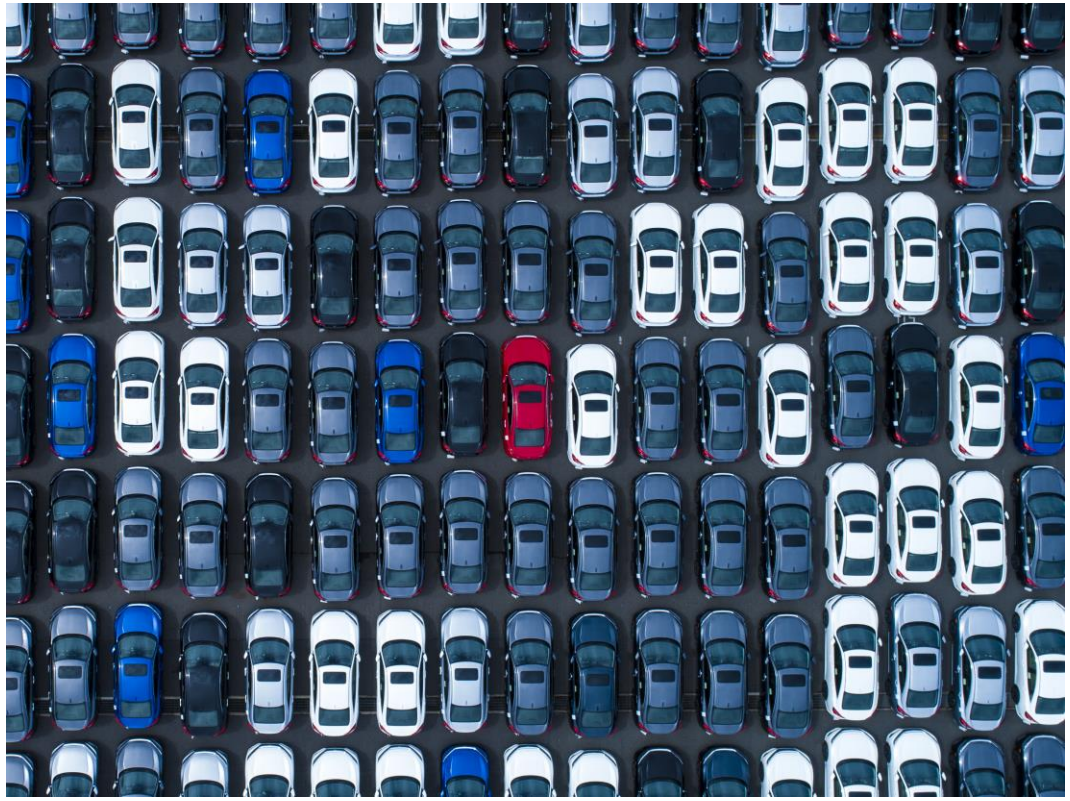
Digitraffic development roadmap

The challenge:

We would like to have a better understanding about the use cases of the data.

And support the use cases that have major impact.

And have better control to unwanted API usage



Digitraffic development roadmap

Solution?

Voluntary registration to get:

- user-spesific api-key
- more loose throttles on APIs
- better support
- early access to beta APIs
- to showcase your application

- Comments?
  fintraffic.screen.io/ekosysteemi

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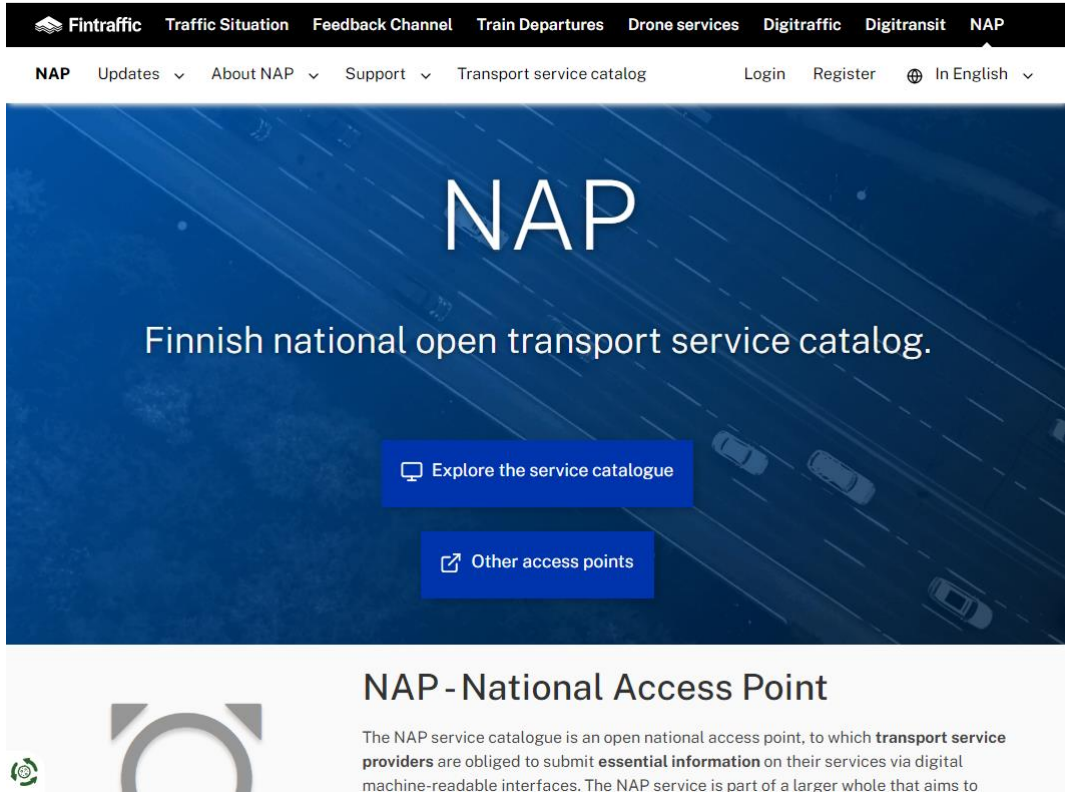
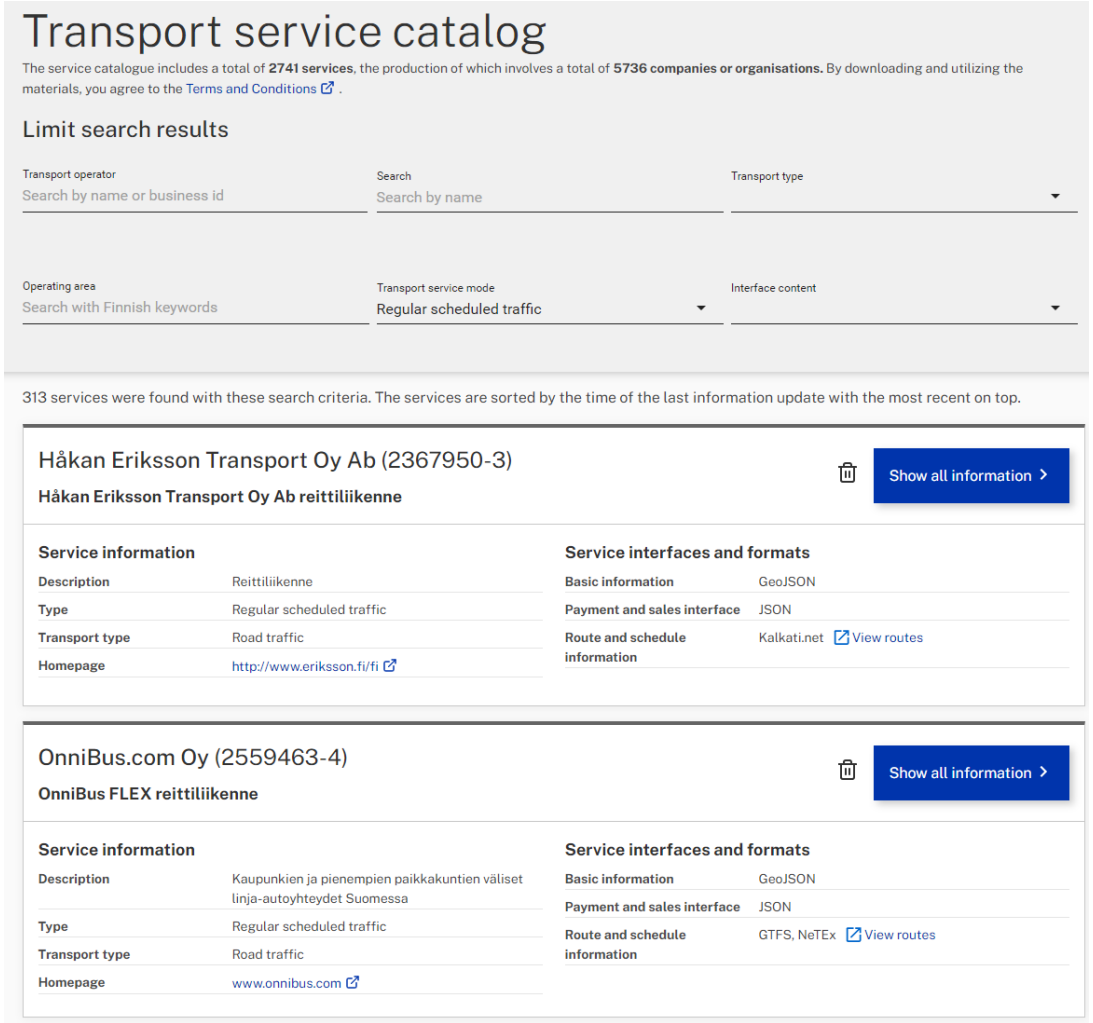
Finap.fi – National open transport Service cataloq

- Finap.fi – National access point for multimodal transport data
- Catalog and data concerning transportation services operated in Finland
  - Bus and taxi operators, PTA's, MaaS and dispatch services, sea/waterway traffic route and timetable information…
- Finnish NAP implementation of EU's 2017/1926 Multimodal travel information services (MMTIS)



Finap for the developers

- Service offers API for the developers
- API is available from Finap.fi and from this site https://github.com/tmfg/mmtis-national-access-point/blob/master/docs/api/README.md
- Interface doesn't require authentication
- Developer API functionalities are basically the same what the actual Finap.fi "Transport service catalog" site offers for users
  - Offers possibilities to make searches (individual / group) about the services and access their data and relevant 3rd party API's (pricing, booking, realtime locations, dispatch, availability queries etc.)



FINAP

Open transport data Service cataloq

For who and why?

NAP is targeted for authorities and 3rd party service developers as an access point to relevant multimodal transport service data. NAP is mainly a catalog of services but also contains data feeds / dumps from transport service providers. No registration is needed to Access the data. NAP provides data sets, contacts points and API's which makes development of new multimodal services possible.

Focus groups

Transport service providers, transport authorities and developers

Available Data

Service areas, routes, schedules, tariffs, availability time, accessibility, booking/sales and payment API's. Information contents may vary. Availability and accessibility of open transportation data is based on Finnish transportation law.

Data formats

JSON / GeoJSON, XML/Kalkati, NeTEx, GTFS, GTFS RT(through API), Siri (Through API)

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KEEP
CALM
AND
HAPPY
CODING

Thank you!

Please give feedback!

fintraffic.screen.io/ekosysteemi