ORBICA

CRASH ANALYSIS SYSTEM

GeoIT Wherecamp
14 November 2019

ORBICA.WORLD

Orbica provides solutions & products in digital geography:

- Geospatial
- Software Development
- Remote sensing
- GeoAI

Our purpose is simple

“To enhance billions of lives through the power of geography.”

Client

NZ TRANSPORT AGENCY
WAKA KOTAHI

Orbica

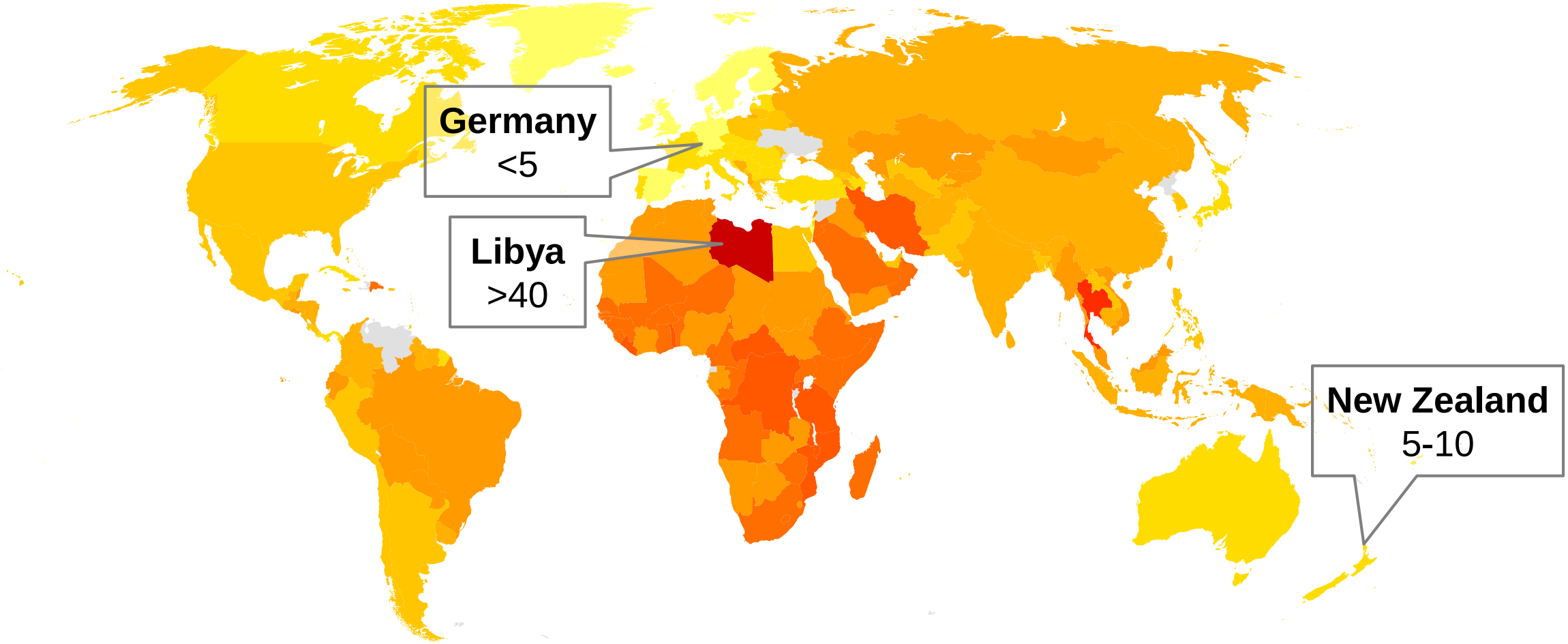
ORBICA

Partner

catalyst
open source technologists

Death Rates from Road Traffic Accidents

Per 100,000 inhabitants. 2013



Death rates from **Road traffic accidents** by country 2013 (per 100,000 inhabitants). no data less than 5 5-10 10-15 15-20 20-25 25-30 30-35 35-40 more than 40

Source: WHO 2013

Global Crashes

1.35M people are killed on roadways around the world annually

8th leading cause of death

3,700 people killed in road traffic crashes daily

- Motorcycles
- Pedestrians
- Bicycles
- Cars
- Buses
- Trucks

Source: WHO 2013

NZ Crashes

1.5M	Crashes since 1980
46,000	Fatal or serious crashes since 2000
$17B	For transport improvements
4.7M	Population (2017)

- Complete, detailed and relatively good data quality
- Crashes occur for many reasons - to be identified / analysed

Project Aim

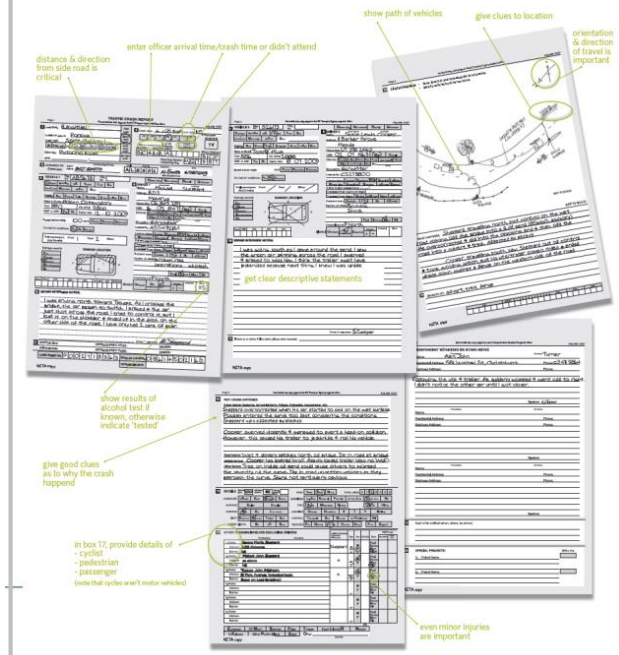
- easy access to crash database
- analysis tools for transport agency & road safety professionals
- empower users to make data-driven decisions

Make NZ road network safer

Old Process

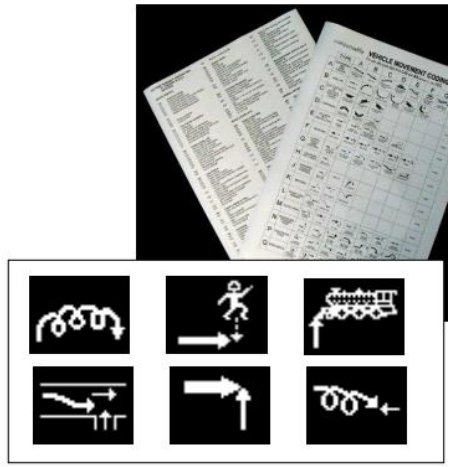
Crash Reports

- Very detailed



Report Processing

- data entry
- crash & factor coding
- georeference



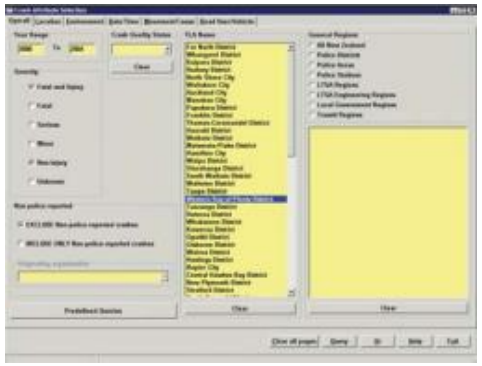
Microsoft Data Warehouse

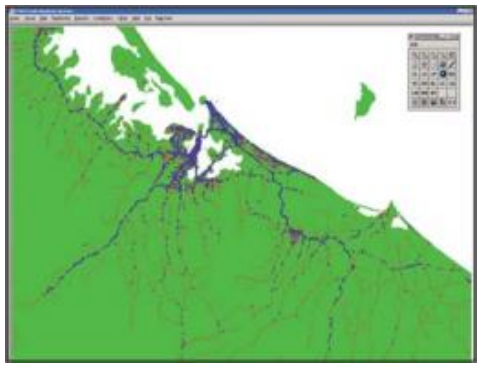
- >100 Fields
- 1.5M records
- Huge amount of docs/images

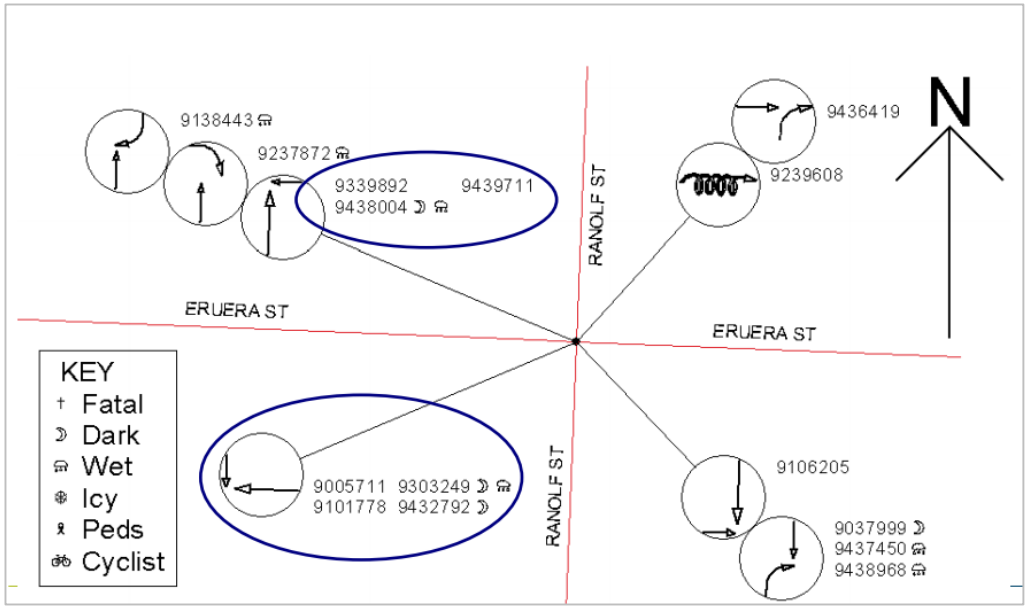
Diffusion

Old CAS

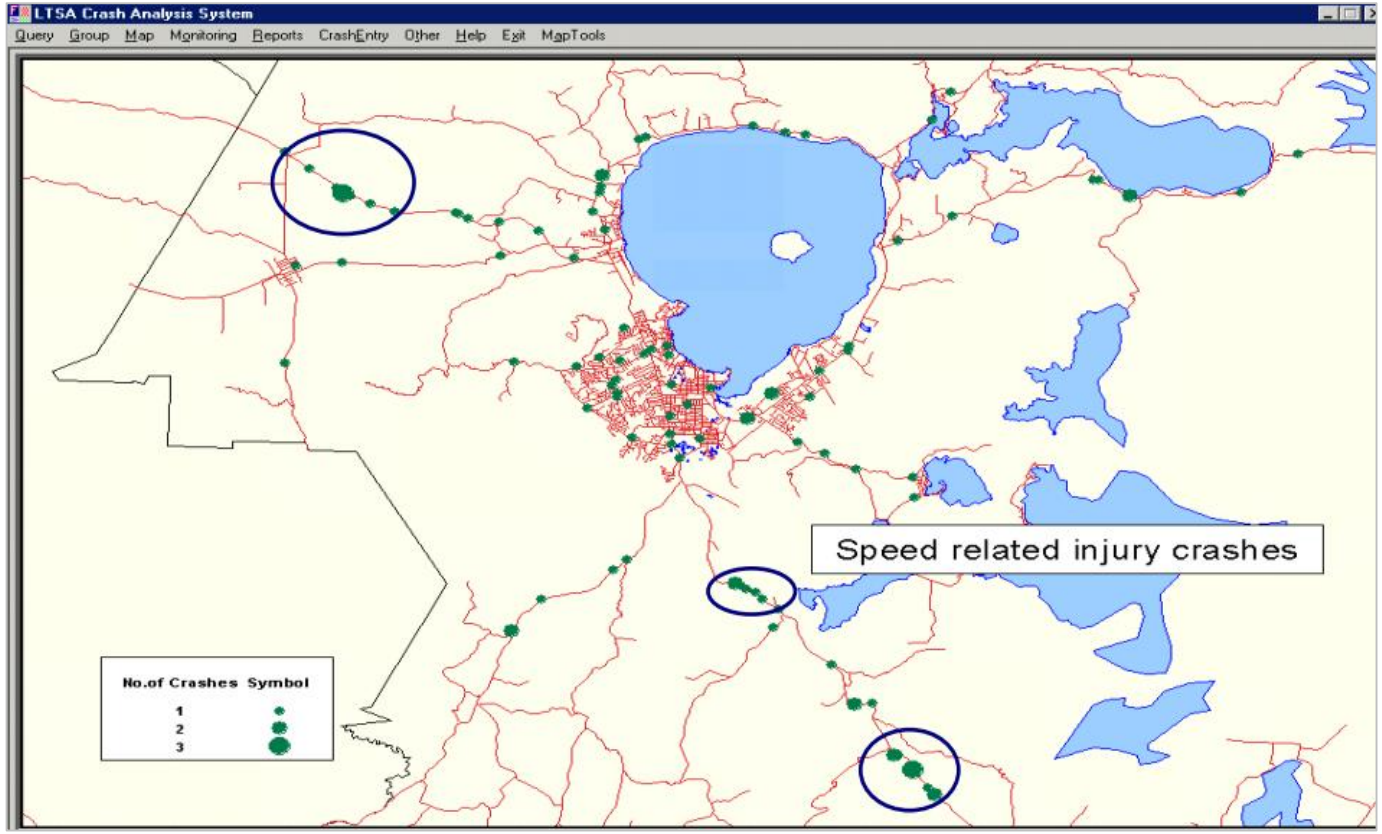
Old Desktop Version







- 20 years old!
- Usable
- Not nice to use



Guidelines

- Open source
- Modern web environment
- Have all old features
- Mustn’t scare away long-term users
- Focus on UI and UX
- Map component central
- Easily create complex queries without code
- Cross platform, browser
- Fully agile development
- High client involvement

Obstacles & Challenges

1.5M

Features to

- Query
- Spatially cluster
- Display in web map
- Display in dynamic collision diagrams

- Query through websocket call
- Result streamed along network
- Label engine based on Spatial index(GRID) & AI(genetic algorithms)
- Hybrid link between diagram and mapping component

Technology Stack

php

NGINX

React

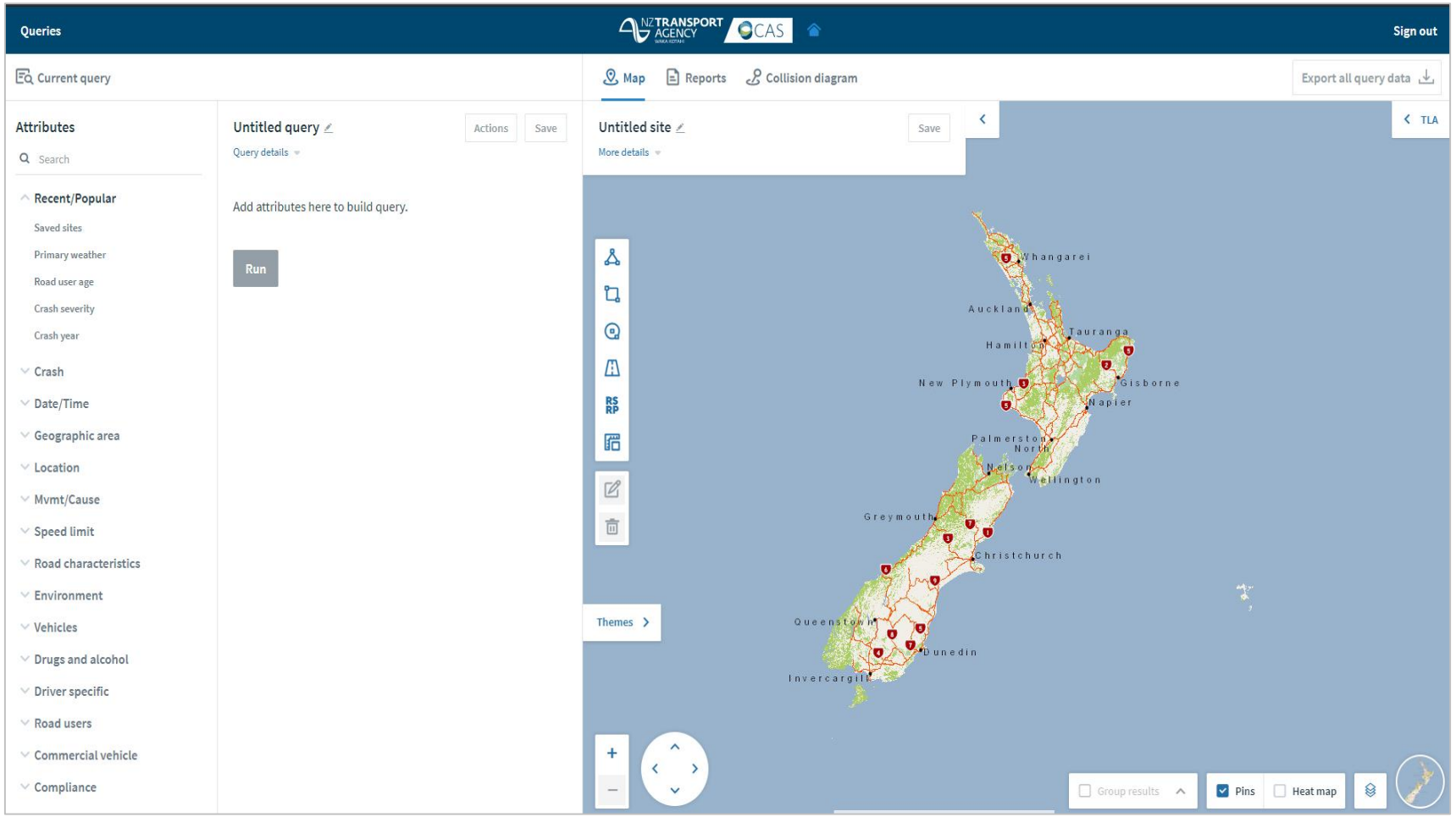
‹TURF›

Leaflet

SilverStripe
Open Source

PixiJS

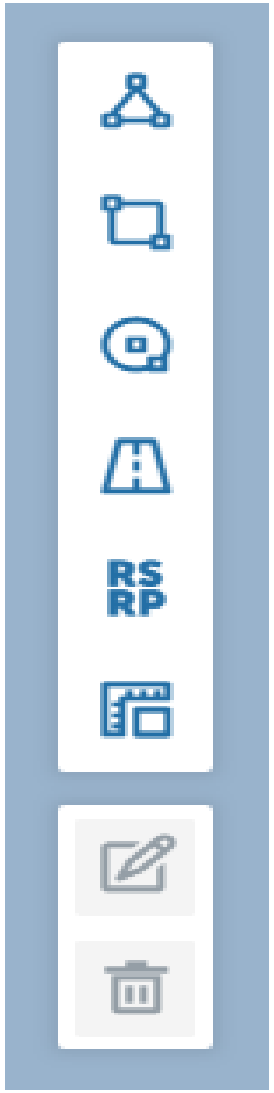
Query Builder



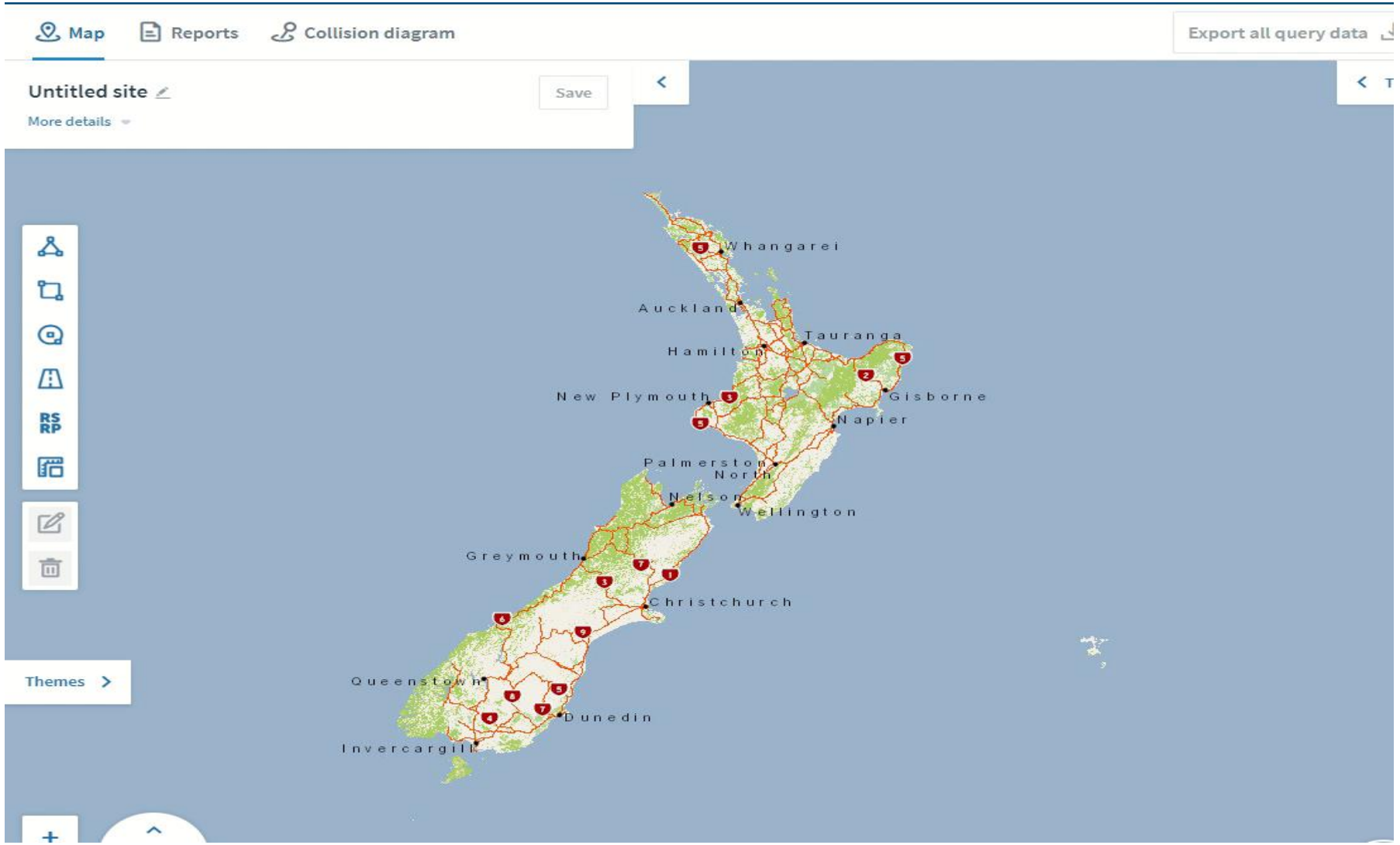
- Easily create complex queries
- No coding
- Spatial & non-spatial
- Intuitive controls e.g. drag and drop
- Save and share queries

Custom Leaflet Control Toolbar

- Goal: To build standardized leaflet control from heterogenous existing leaflet plugins.
- To keep consistent behavior on all menu items, specially on edit and delete.



Custom Leaflet Control Toolbar

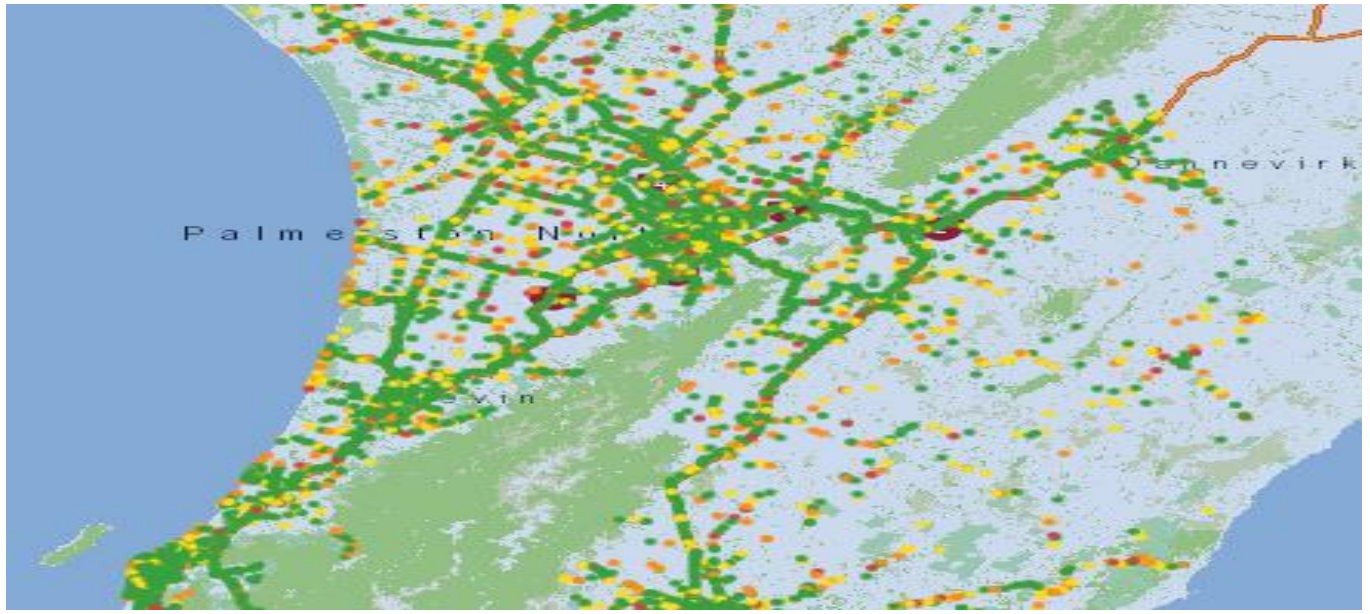


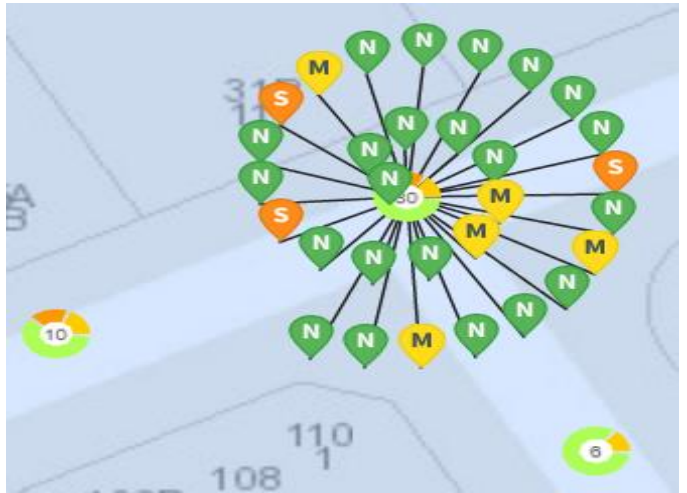
Pixi.js WebGL

- Open source library
- create rich, interactive graphic experiences
- Multi platform
- Powerful, fast, & simple

Leaflet Grouping with Pixi WebGL

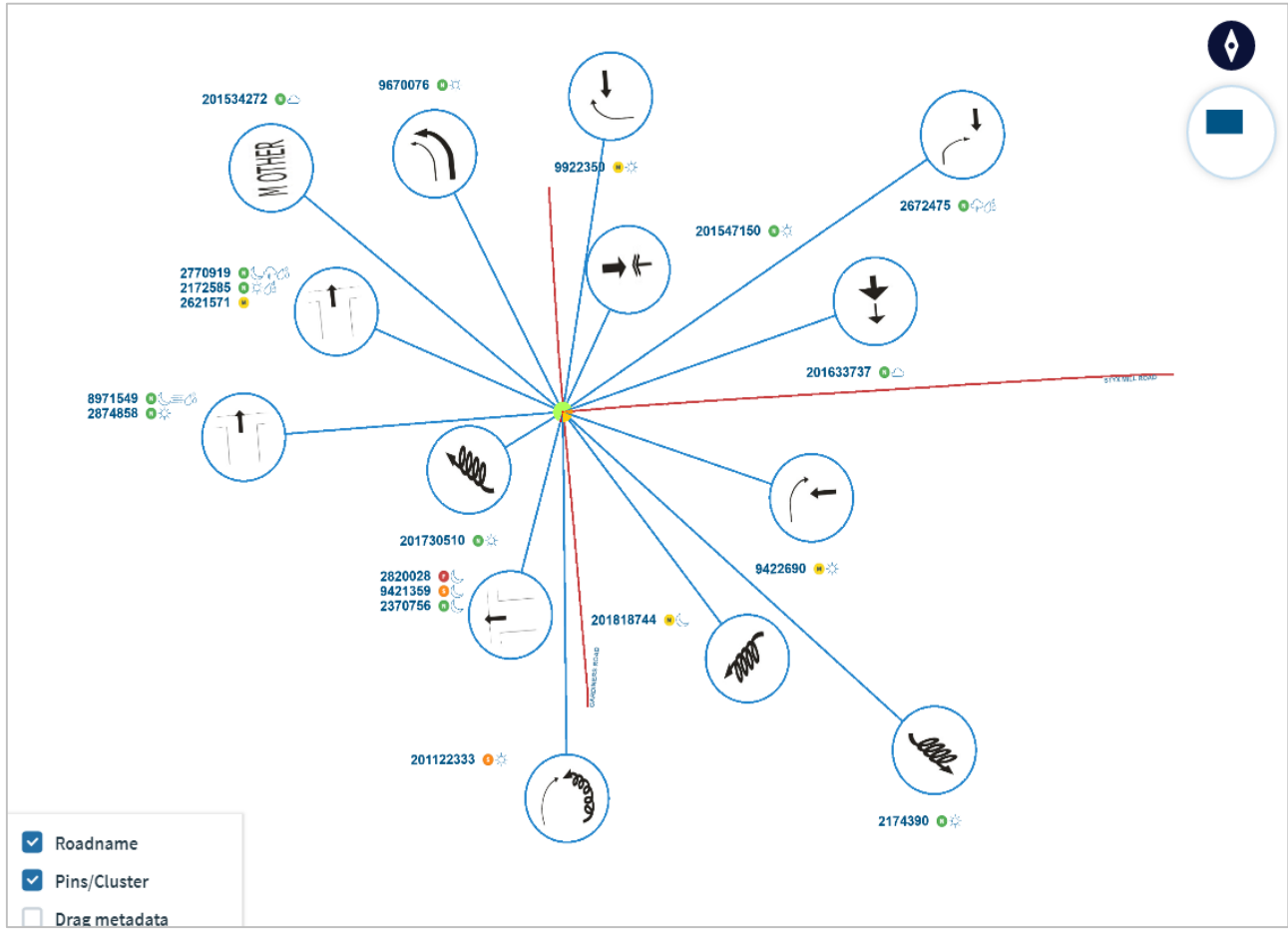
- Need to visualize big data on map
- Used Spatial indexing and clustering algorithm to create groups and markers.
- Pixi.js for rendering.
- Integrated Pixi with Leaflet





Collision Diagram with Pixi WebGL

- Used Spatial indexing (Quadtree)
- Rule based placement of Pixi elements
- Complex algorithm to generate diagram
- Scale change on diagram zoom in/out.
- Draggable components



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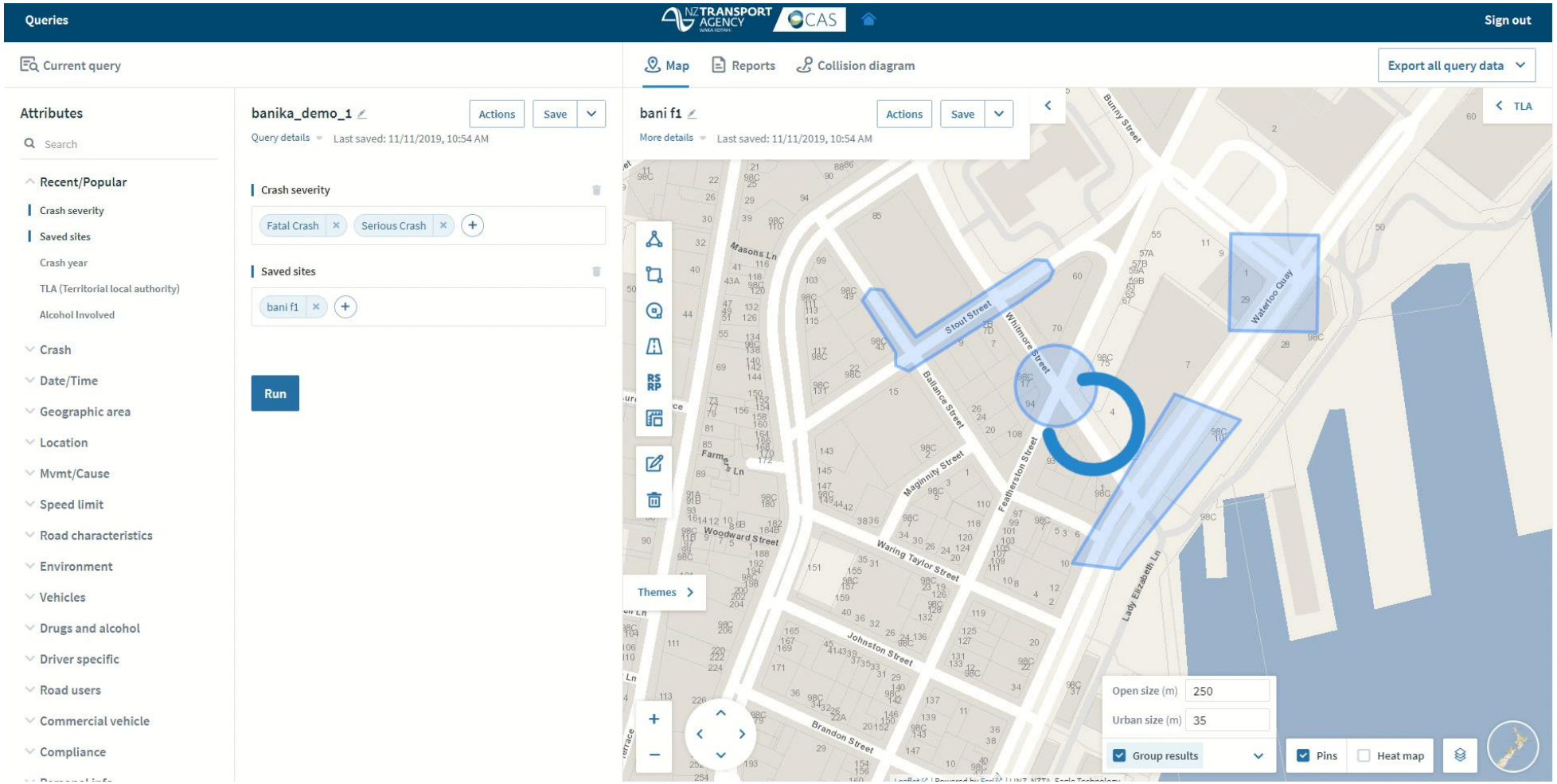
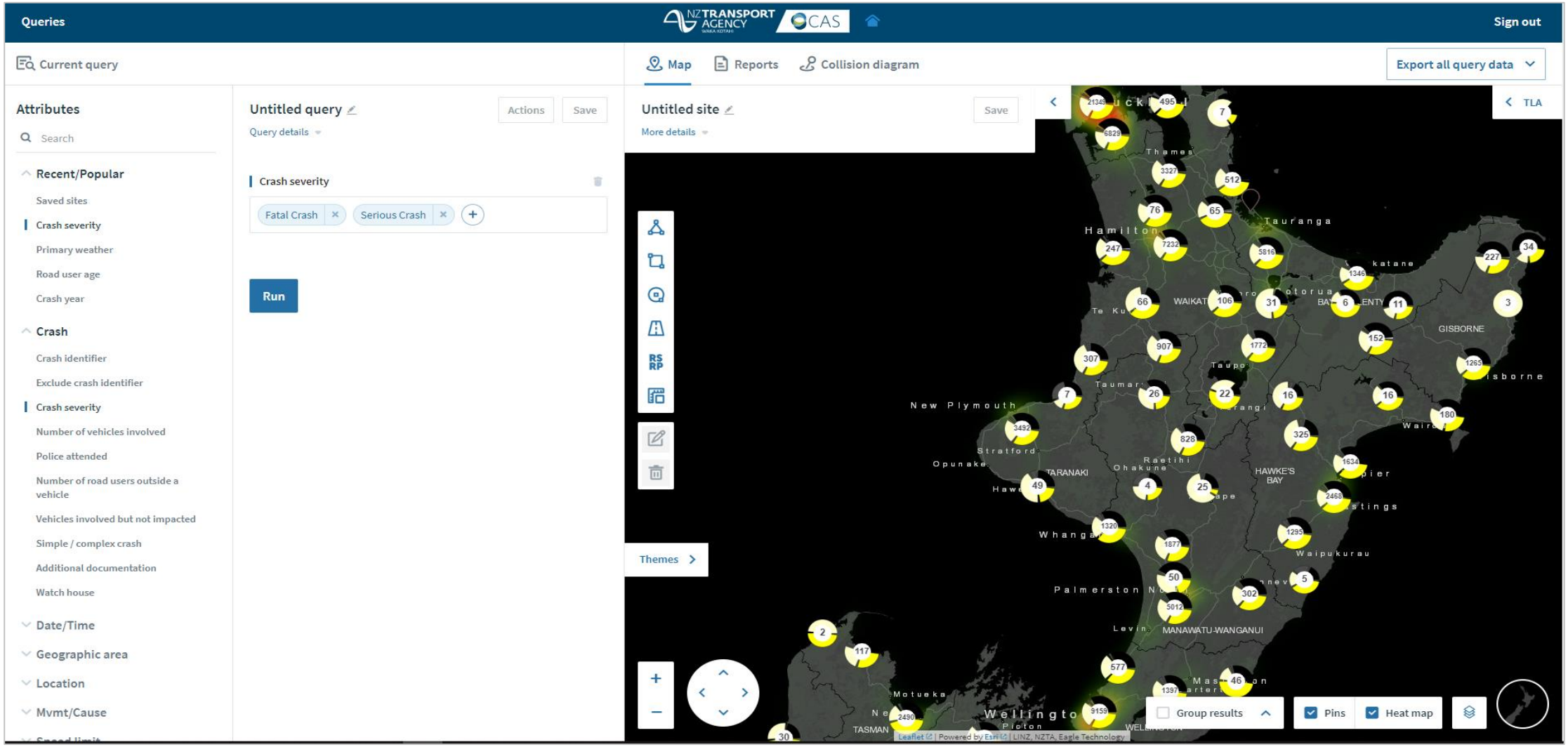
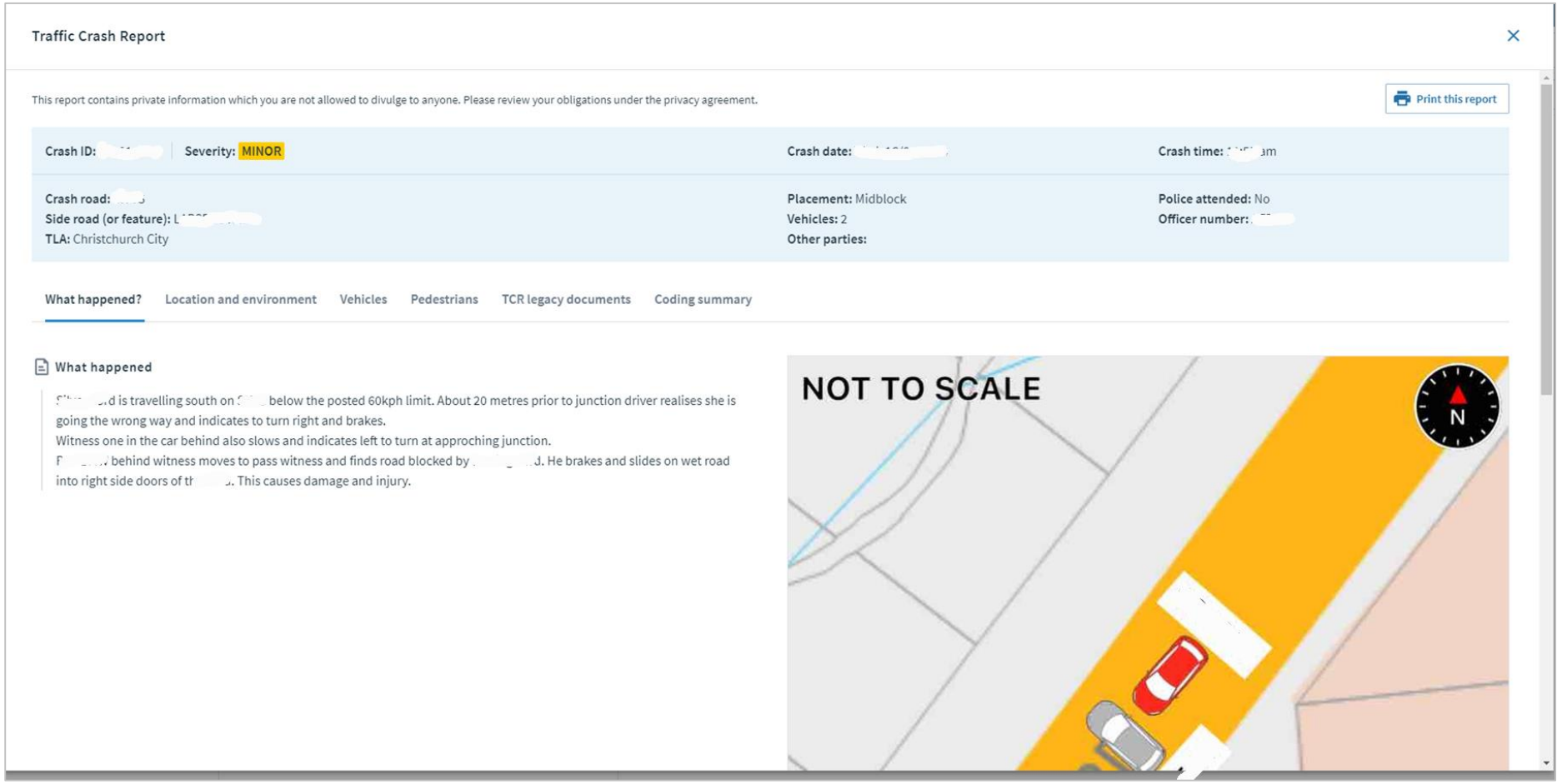


Map Query Results

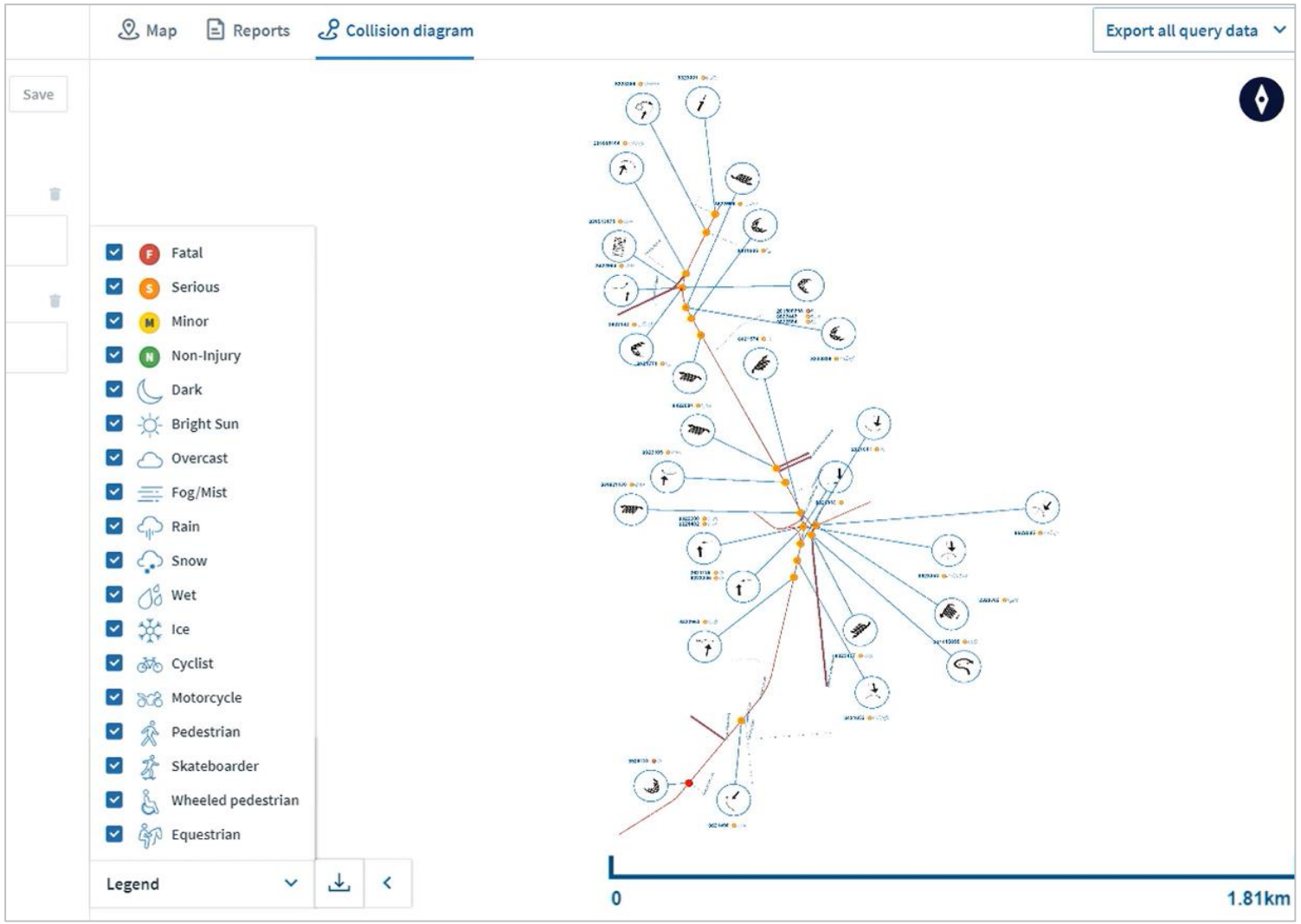


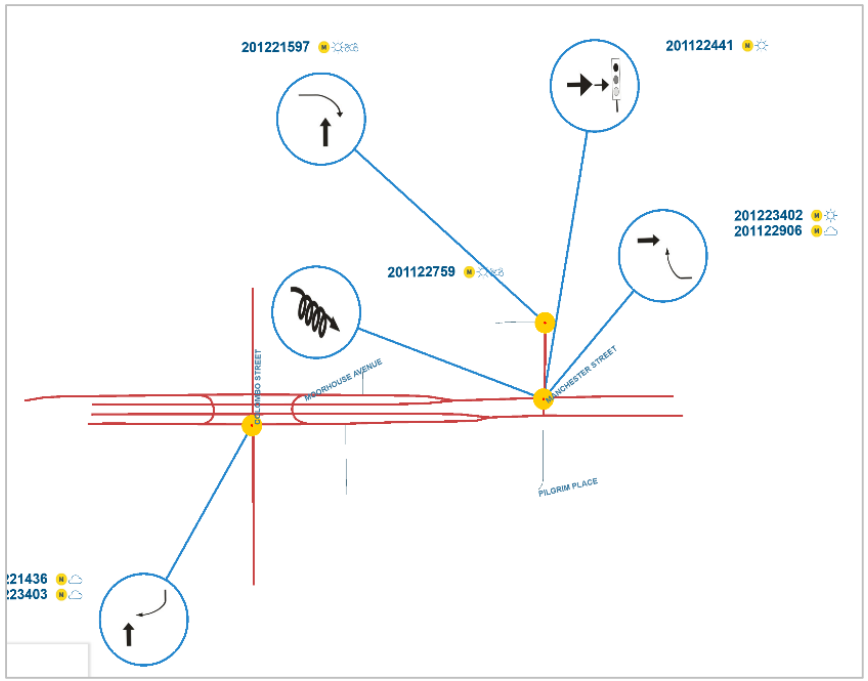
Reports and Charts



Output complex collision diagrams and reports to help experts target and advocate for road safety improvements

Collision Diagrams





Output complex collision diagrams and reports to help experts target and advocate for road safety improvements

Crash Analysis System is now being used by 4000 professionals to make New Zealand's roads safer

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