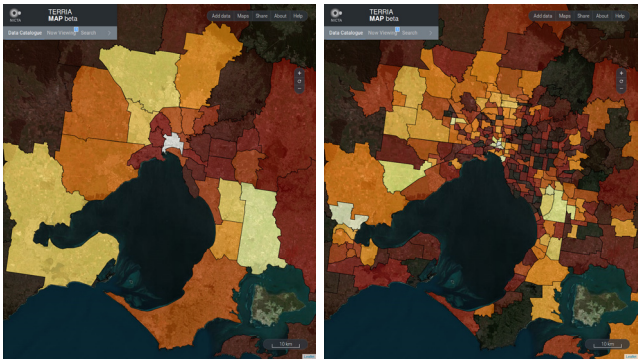
Terria: Spatial Predictive Analytics

Terria is developing a suite of analytics tools to extract insight and make probabilistic predictions using data in a Terria map deployment. These tools are built from state of the art machine learning algorithms designed specifically for large-scale spatial inference.

Federating and visualising spatial datasets is only the first step toward unlocking the knowledge they contain. Below are some examples of Terria's spatial analytics capability.



Spatial Detailing

Often, a spatial dataset is released as an average over regions (such as states or statistical areas) that may be too large to provide useful information. By finding other related datasets provided at a higher detail level, Terria can automatically infer their statistical relationship and use it to estimate the original dataset in greater detail.

Figure 1: Estimating a high spatial detail dataset (right) from a low detail crime dataset (left) using spatial detailing.

Spatial Community Discovery

Complex datasets can be difficult and time-consuming to analyse, even for domain experts. Terria's machine learning algorithms provide an automated approach to summarise complex data objectively, making it easier to understand.

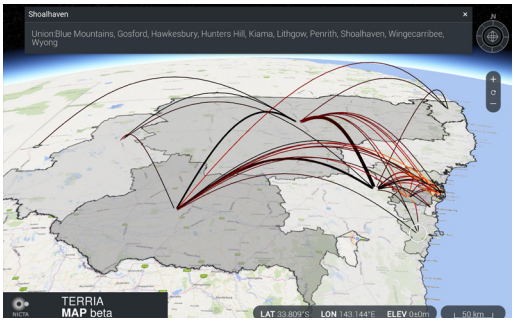
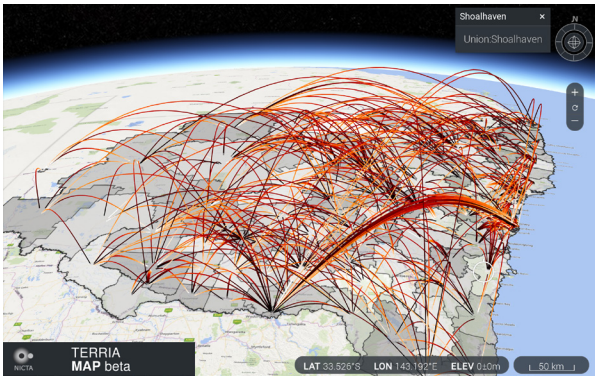


Figure 2: Taking a migration dataset (right) and summarising it (left) while preserving its key underlying structure using spatial community discovery.



Spatial Prediction and Active Sampling

Using cheap or easily acquired data as a proxy for more expensive or detailed sampling is an efficient way to build models. Terria's algorithms take a probabilistic approach to this problem by providing both a predictive model that fuses multiple data sources, and a measure of how certain this model is at each point in space. This allows the user to quantify the risk of a decision, and to automatically determine where and how to sample in the future to reduce that risk as quickly as possible.

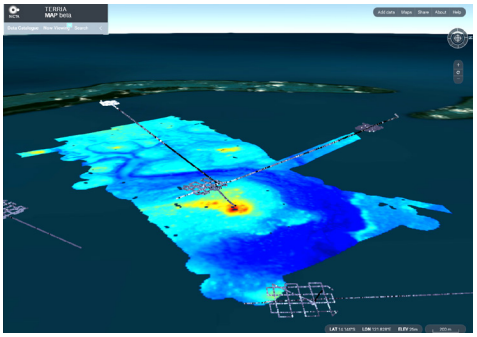
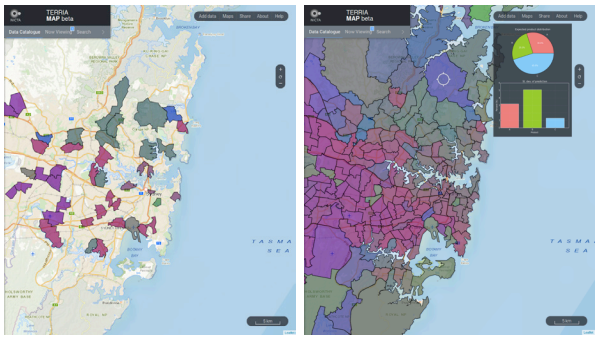


Figure 3: Terria's algorithms fuse bathymetry data with more detailed vehicle-generated imaging to produce a probabilistic habitat model while planning future vehicle tracks to maximally reduce model uncertainty.



Spatial Demand Distribution Prediction

Many companies provide a range of products or services whose demand varies regionally with demographic. Terria's specialised spatial regression algorithm is able to predict this variation by relating sparse sales data with a variety of spatial demographic information.

Figure 4: The recorded product distributions at existing shopfronts (above) and the predicted distributions with associated variances for the entire region (right).

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NICTA

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Terria is a NICTA company specialising in software for web-based spatial data analytics and visualisation. Our federated spatial data exploration technology enables compelling spatial data websites such as the Australian National Map, the Australian Renewable Energy Mapping Infrastructure and the UNEPFI Global Risk Map.

Our spatial predictive analytics technology provides a range of advanced spatial detailing, summarisation and prediction techniques. We provide a web-based platform which combines our federated spatial data discovery technology with our analytics technology to provide advanced spatial data analytics for a large number of industries including environment, energy, finance, and demographics.

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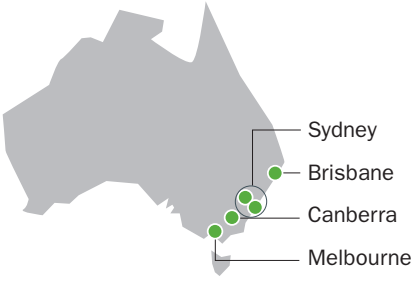

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