

CADA

cadaconsulting



// helping organisations realise more value from data

CASE STUDY: GEOSPATIAL DESIGN AT SCALE

Our client had been contracted to design sustainable drainage interventions across a large town in the UK to alleviate flooding from rainfall in a socially-beneficial way. The strategic objective was to capture a target volume of surface water. The traditional design approach identified intervention opportunities on a street-by-street basis. This was a laborious process and was difficult to assess how successful each intervention was towards meeting the strategic target.

We recommended the development of design rules to give an indication of when a given intervention type might be used based on geospatial properties of roads, buildings and land usage. We liaised with the design teams to agree the initial rules and subsequently applied them at a town level to provide an assessment of the opportunities, viability and prioritisation of intervention types and locations.

OUTCOME

We created a digital assessment and visualisation tool that was used to inform the client's strategic planning for the town. The client intends to use this novel process and tool in the future for other large towns.



Identification



Planning



Delivery



Training



Proof of concept

CASE STUDY: GEOSPATIAL DESIGN AT SCALE

HOW WE ADDED VALUE



Identified the potential of developing rules from tacit knowledge, coupled with data, to create a strategic perspective of the design challenge. Worked with our client to pitch the concept to the ultimate client.



CADA planned and led all aspects of this development while our client ran the traditional design process in parallel.



This was a novel approach compared to the standard methods used throughout the industry. We therefore developed the process iteratively via 2-week sprints with extensive stakeholder review to maintain engagement. Early prototyping was essential to communicate the outcomes and to focus on how we could extract the most value for the end-client.



The assessments were delivered via a web-hosted dashboard that enabled stakeholders to interrogate the results at their convenience. Several scenarios were presented with their associated predicted performance measures.



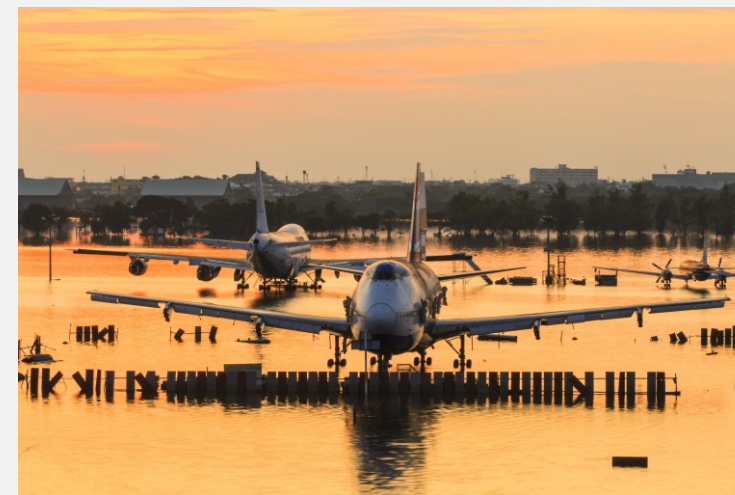
CASE STUDY: EXPOSURE OF CRITICAL INFRASTRUCTURE TO FLOODING

An assessment was being undertaken at Government level for a country concerned with flooding due to sea-level rises and surge events. We supported the modelling team to improve data use to better meet the project requirements and support stakeholder engagement.

OUTCOME

We devised a framework for the calculations of risk for a large range of assets that were deemed critical national infrastructure, or of significant importance.

To enable quick assessment of potentially conflicting expert judgements, we developed a web-based data entry and visualisation tool. This enabled users to alter metrics in a workshop environment and see the impact on assessment via real-time geospatial data visualisations.



Identification



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CASE STUDY: EXPOSURE OF CRITICAL INFRASTRUCTURE TO FLOODING

HOW WE ADDED VALUE



Identified the value of managing data in a more structured manner and how this could facilitate an improved communication process with the client.



Audited the assessment models and framework, identifying areas to improve quality and more beneficial outcomes.

Combined unstructured assessment data from Excel with geospatial asset data to provide enhanced visualisations.



Developed a proof of concept tool that allowed non-technical users to change specific metrics and see the output from the assessments updated in real-time.

Provided an accessible geospatial representation of the assessments that enabled multiple stakeholders to interrogate the data with ease.



CASE STUDY: RAIL PASSENGER SURVEY INSIGHT

The National Rail Passenger Survey (NRPS) was the largest published rail passenger satisfaction survey in the world. More than 50,000 passengers a year were surveyed over 30 specific aspects of service predominantly via quantitative questions, with some free text comments. The quantitative data was analysed to produce a report, along with a dashboard to interrogate the data. As there was no detailed analysis of passenger's text submissions, CADA investigated the potential to glean more in-depth insight.

OUTCOME

We used advanced Natural Language Processing (NLP) algorithms to categorise each comment and provide an indication of the positive/negative sentiment of the comment. This was used to enrich the original dataset to uncover additional insight and allow for further investigation.

The data was presented in a web-based tool to provide an accessible means to view and interrogate by multiple stakeholders including the public.



Identification



Planning



Delivery



Training



Proof of concept

CASE STUDY: RAIL PASSENGER SURVEY INSIGHT

HOW WE ADDED VALUE



Identified the benefits of analysing the free-text comments to provide further insight from readily available data.

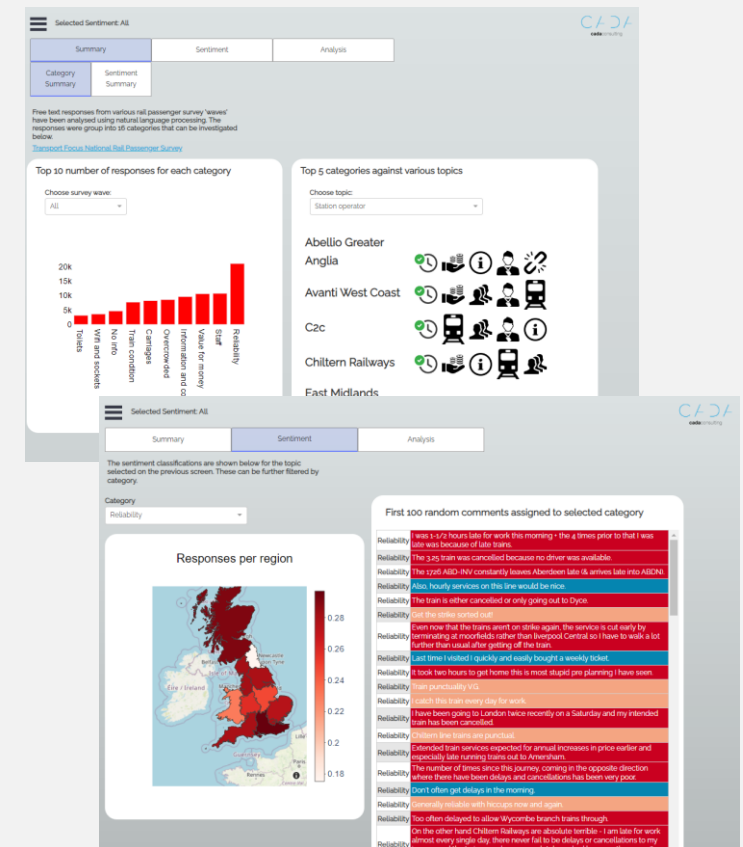


Utilised natural language processing algorithms to categorise the comments into topics and assess their sentiment.

Applied machine learning techniques to develop insight beyond that typically provided using the quantitative survey results.



Developed a proof-of-concept web application to allow a wide range of users to explore data relevant to them in an accessible manner. For example: Train Operating Companies, Network Rail, public rail users, Local Authorities, user groups.



CASE STUDY: TIDAL POWER FEASIBILITY

Our client was tasked with assessing the feasibility of potential offshore tidal lagoon schemes in a region of the UK.

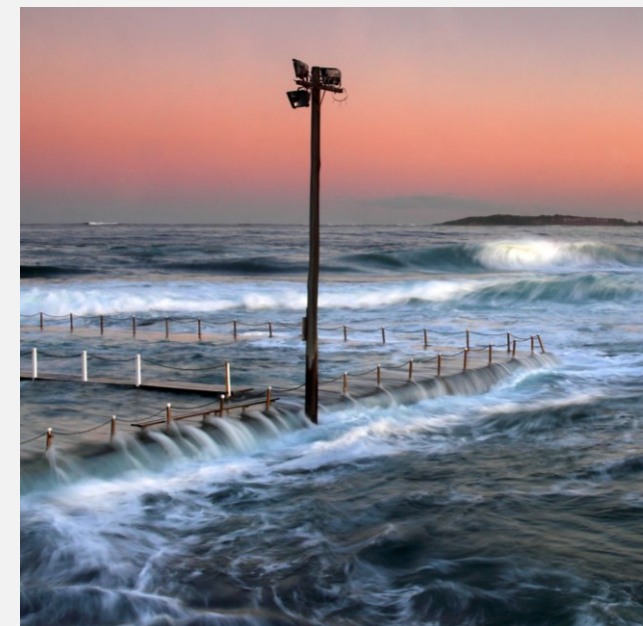
Previous assessments of cost and energy generation were based on complex calculations in spreadsheets. CADA identified that far greater value could be extracted from the calculations if a data-focused approach was adopted.

We recast the calculations in Python and undertook a series of collaborative two-week development sprints to add functionality.

OUTCOME

A graphical software tool capable of assessing four orders of magnitude more configurations, to a higher fidelity and with greater confidence.

The tool enabled our client to propose a range of first-pass designs to support the business case for tidal power as part of the UK energy mix. Delivering this additional value put them in a prime position for the next stage of business case development.



Identification



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Proof of concept

CASE STUDY: TRANSPENNINE ROUTE UPGRADE RESOURCING INSIGHT

The Transpennine Route Upgrade (TRU) is a ~£2Bn rail programme of track and station improvement to deliver better services across the North. CADA supported a key organisation in the delivery Alliance to better manage resources across the programme through data insight and communication.

We worked collaboratively with the Programme Management team to develop requirements and operationalise desired enhancements to the existing process.

OUTCOME

We provided insight into where the data quality was poor to improve planning focus, while also highlighting pinch points on resource levels and skills.

We also delivered a planning tool to ingest data from multiple sources and present valuable insight through an accessible interactive dashboard.



Identification



Planning



Delivery



Training



Proof of concept

CASE STUDY: TRANSPENNINE ROUTE UPGRADE RESOURCING INSIGHT

HOW WE ADDED VALUE



Identified where data insight could assist with planning decisions and interventions.



Provided bespoke reports for senior leadership to aid resource planning.



Worked with Senior Leadership team to understand 'top-down' needs, coupled with close collaboration with Project Managers to appreciate operational constraints.

Developed automation tools to collate data across each Alliance organisation's spreadsheets into a single, controlled database.

Automated quality checking to give early warnings of errors or areas of concern.



Developed a dashboard accessible to all Alliance members to interrogate the data.



CASE STUDY: SEA LEVEL RISE IMPACT UNCERTAINTY

CADA were a named partner for a European Union Horizon 2020 project, EuroSea, helping to improve and integrate Europe's ocean observing and forecasting systems for sustainable development. Our task was to develop novel ways of communicating how uncertainty in sea level rise predictions impacts on the likely flood damage at a city scale.

Previously, only a handful of sea level rise scenarios were used to assess the inundation impact over land. The concept was to simplify the calculations to allow tens of thousands of scenarios to be run, while still retaining confidence in the results of the impact at a city level.

OUTCOME

We created a framework to combine the large number of simulations and visualise the results in a meaningful form. The interactive proof of concept tool was used to engage stakeholders and demonstrate how modelling and visualisation can support early-stage investment decisions.



[Link to Oceanography paper](#)



Identification



Planning



Delivery



Training



Proof of concept

CASE STUDY: SEA LEVEL RISE IMPACT UNCERTAINTY

HOW WE ADDED VALUE



Facilitated a workshop to connect the various stakeholders, bringing together technical specialists with those managing the risks.



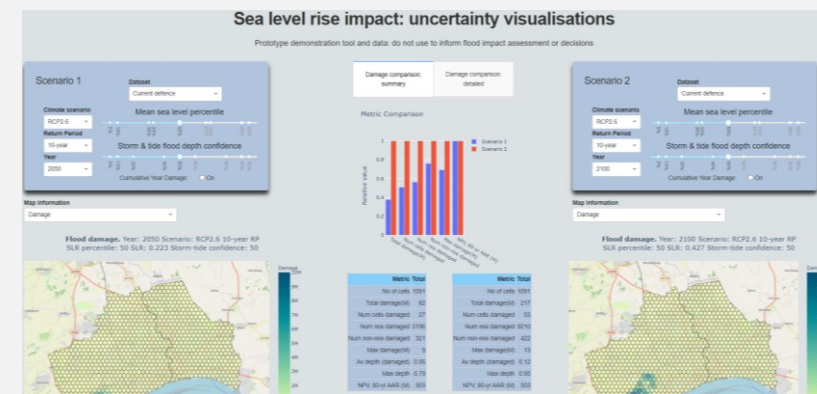
Created and managed the requirements and framework to help span the gap between detailed science and public understanding.



Developed scripts to collate and convert the results of tens of thousands of scenarios into meaningful outputs which could be interpreted and understood by the public, economists and scientific community.



Developed a web-based graphical tool (shown on the right) to enable interactive analysis and enhanced communication. The tool was used as the focal point of a European workshop to gain feedback on the applicability of the research.



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