nquiringminds

AI POWERED ANALYTICS

DATA SHARING

SECURE IOT CONNECTIVITY

FOR SMARTCITIES AND INDUSTRY

"**nquiring**minds develop truly smart solutions for the emerging SmartCity market. In development for six years, this portfolio of applications build on our cores strengths in security, iot and deep AI analytics."

Nick Allott CEO **nquiring**minds

"NquiringMinds is doing really exciting work through the internet of things to transform urban environments. Harnessing the power of technology and the internet is vital for the future of British prosperity. And I am delighted I will be able to help Nquiringminds seek new opportunities for its business in one of the world's fastest growing markets."

Theresa May, UK Prime Minister
November 7 2016 India-UK TECH Summit

TECHNOLOGY PLATFORMS

All of **nquiring**minds Smart City solutions are based two core products. Our TDX platform handles data in the cloud; out InterliNQ platform handles data at the sensors. Together they provide the foundation of a SmartCity .
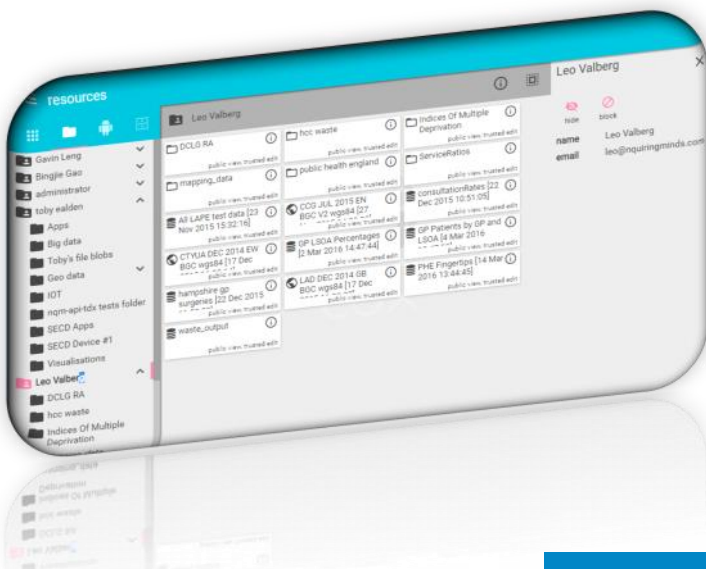
Trusted Data Exchange

A cloud based data platform. Designed with the connected economy in mind it allows sharing of data, data analytics processes and visualisations.

A GDRIVE FOR DATA: A CROSS ORGANISATIONAL COLLABORATIVE DATA PLATFRO - PRACTICAL DATA SHARING

Security is at the heart of the design of the TDX. The real world is complex. Organisation have a tendency to hoard data, due to security concerns. By tackling these security concerns head on, we can open the floodgates and produce rich collaborative data at scale

FEATURES

- AI Powered Analytics
- Data Visualisation
- Data Ingestion
- Data Sharing
- High Security

MACHINE LEARNING
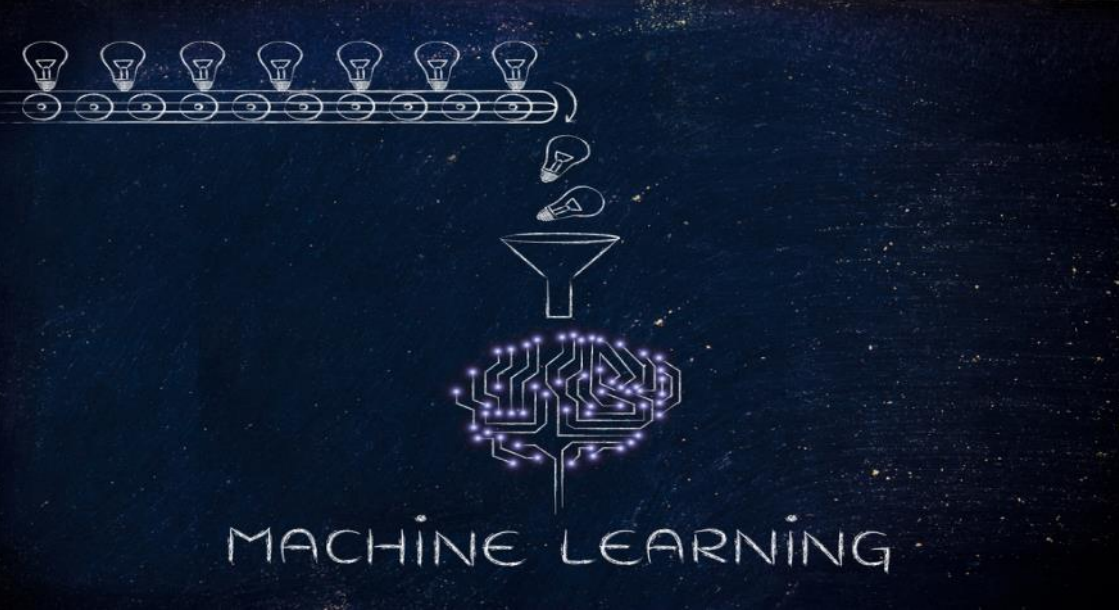
TDX: Data Bots

Autonomous computing agents

The TDXs unique architecture is built upon modular, autonomous computing agents called data bots. These data bots can be run on any data host: in the cloud, on edge routers, even on web pages. Data bots are used to import, data, visualise data, process data and even publish websites.

" USING DATA BOTS WE CAN PROCESS BILLIONS OF RECORDS RAP-IDLY AND SECURELY ACROSS MULTIPLE CLUSTERS, HOSTED ON DIFFERENT DOMAINS

- Dr Leo Valberg, Chief Data Scientist
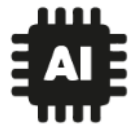
Data Importers allow us to ingest data at scale	Live data stream adaptors can ingest data at speed	Data visualisation are deployed as self contained web applications	Advanced AI, machine learning, mathematical and statistical processes

InterliNQ

InterliNQ is an end to end platform for IOT device development and integration. Interoperability and security are the most often cited issues for IOT take up; InterliNQ solves both of these problems. An open source driver model, means new sensors can typically be integrated in days. A full end to end security model, considers device and data issues from, sensor to router to the cloud.

InterliNQ is typically available as licensable software, but it can also be provided on reference hardware.
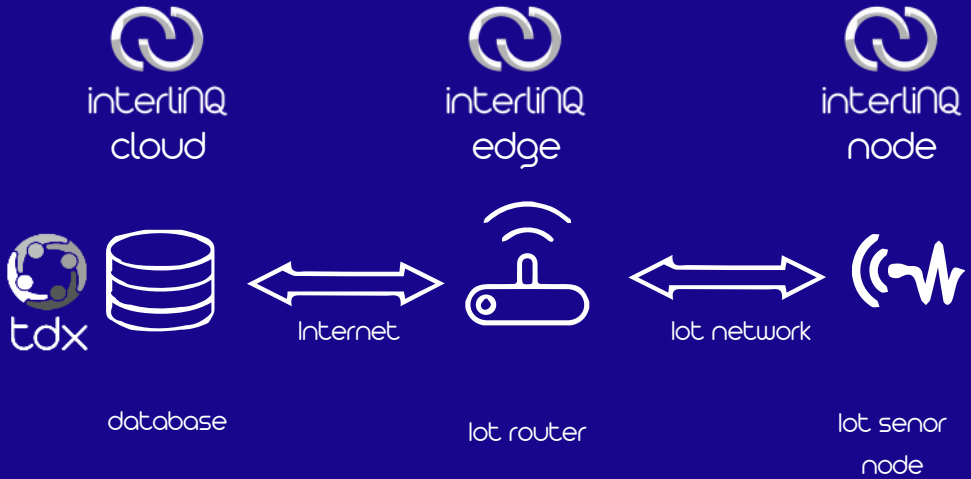
INTERLINQ ALLOWS OUR CUSTOMERS TO DEVELOP AND DEPLOY IOT DEVICES QUICKLY BUT WITH CONFIDENCE

- Dr Alex Mereacre, Chief Hardware Engineer

FEATURES

- Easy to integrate sensors
- Multi radio support
- Edge processing
- Secure data storage
- Resilient architecture
- Device management
- Hardware security
- IOT Optimised Crypto
- Strong identities

interliNQ cloud   **interliNQ edge**   **interliNQ node**

tdx

database   Internet   Iot router   Iot network   Iot senor node

The InterliNQ software stack comes in three flavours: InterliNQ Cloud, InterliNQ Edge and InterliNQ Node. Each is a piece of software middleware that can be optionally integrated onto secure hardware platform. The can be used together, or each on its own depending on the deployment scenario.

InterliNQ Cloud

Is used for legacy sensor integration. Sitting on the cloud, web drivers can be quickly written to rapidly make sensors interoperable with each other.

InterliNQ Node

The ultimate in security, provides hardware enhanced security right down to the sensors level.

InterliNQ Edge

Is deployed on IOT routers. It provides device management, edge processing, secure cloud comms and resilient data management. The edge router can be fully managed from the TDX .

Sensors can be rapidly integrated from any IOT network: ZIgbee, LoRa, SigFOX, BLE, 434, 868 etc.

SMART CITY
ANALYTIC APPLICATIONS
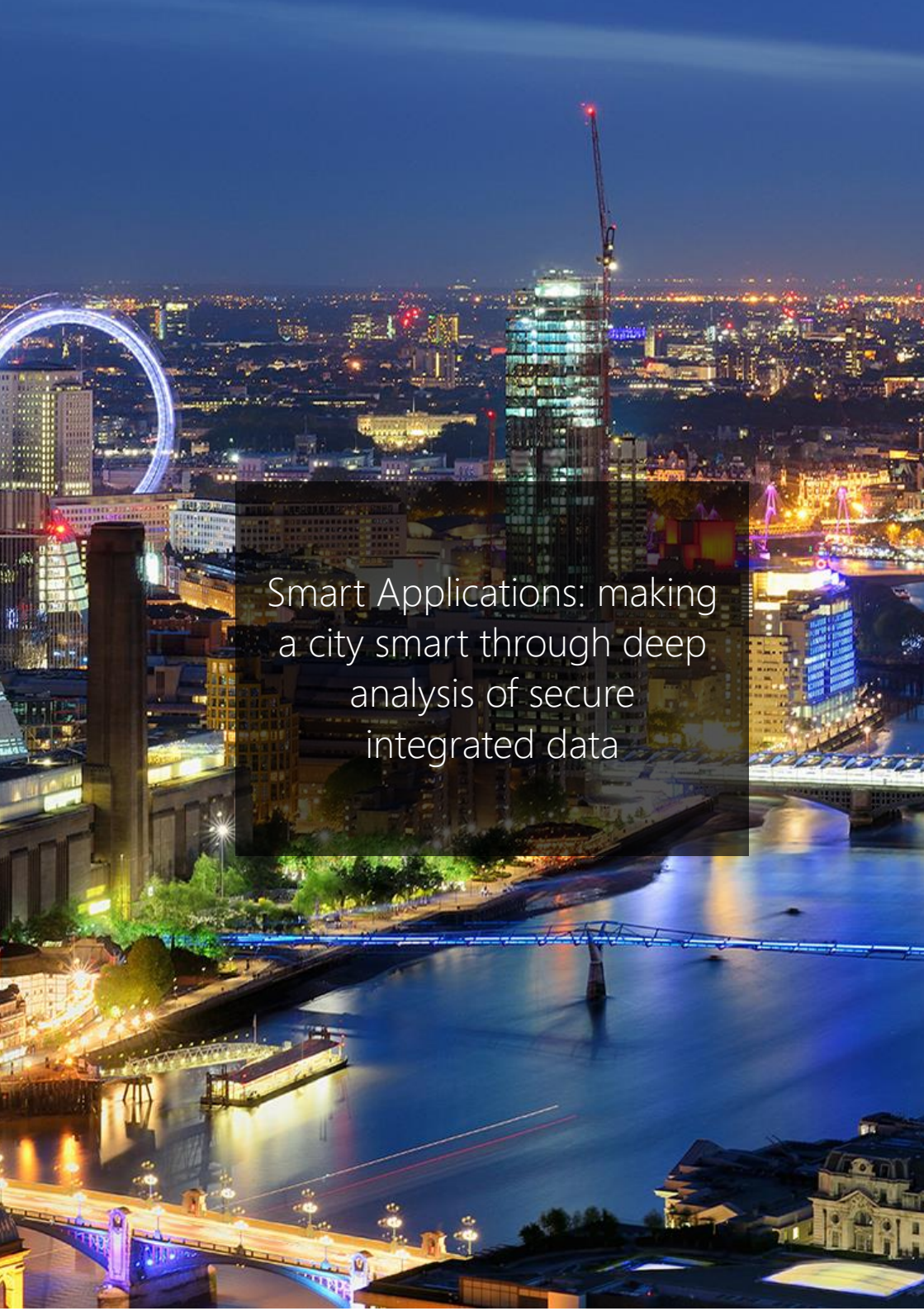
Smart Applications: making a city smart through deep analysis of secure integrated data

Business Rates NQR

Generating Revenue for Cities

A Smart City is one that manages its assets intelligently. Business rates represent major income for local government. The more incomes raised the more it can invest back into public services. The Business Rates NQR helps cities achieve this objective by providing both advanced fraud detection, and rates optimisation techniques.

Fraud detection

By securely merging data sets from diverse sources, such as utilities, land registry, companies house, and applying AI algorithms we can detect potential fraud and triage it for workflow managed inspection.

Rates Optimiser

Analyses the local economy by sector and region. Calculates optimal rates and dispensations to maximise both economic growth and tax revenue.

FEATURES

- Pre integrated datasets
- Highly secure
- Fraud detection
- Economic analysis
- Cluster by industry
- Analyse by region
- Integrated workflow

City Planner NQR

A growing city, must respond to changing demands. How do you plan your schools, hospitals, roads and waste centres? Where do you put them how big and when do you commission them? CPN help solve these problems using national level small area population forecasts.
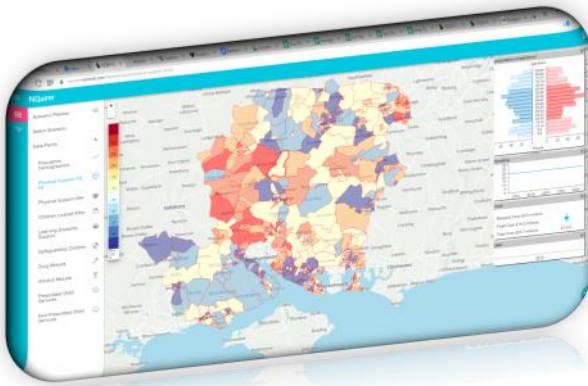
OVERPROVISION AND UNDERPROVISION OF INFRASTRUCTURE IS PROFOUNDLY EXPENSIVE. RIGHTSIZING INVESMENT SAVES MONEY

Planning Scenarios

New build is the biggest driver on services and infrastructure demand. Our tools allow you to model different build, migration and ageing scenarios.

Demand Modelling

The demand of each services can be modelled using a different mathematical algorithm, providing hyper local demand estimates, for intelligent investment.

FEATURES

- National small area population forecasts
- Configurable planning simulators
- Budget inspection and projection by services
- AI powered demand and behaviour analysis
- Long term projections using modelling techniques

Care Services NQR

Health and social care, absorbs a large percentage of local and central government budgets. Against a backdrop of diminishing budgets and an ageing population the situation is becoming untenable. Technologies which allow us to prioritise and allocate finite resources against these social problems are essential.
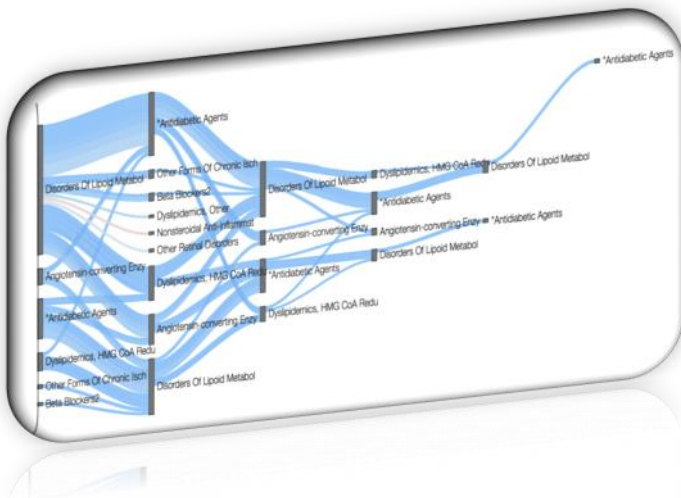
Secure data combining

Personal care records are highly sensitive. However, only by combining data sets can we understand citizen flow across the care system. The TDX provides the ability to handle this problem.

AI predictive technologies

Using statistical techniques, neural networks and Bayesian technology we can mine consolidated data sets, to analyse cost, detect trends and evaluate effectiveness of interventions.

FEATURES

- Highly secure data
- Cross organisation data sharing
- Predictive modelling
- Clustering of patient records
- Forward projections using demographic models
- Integrates with work-flow

GP Workforce NQR

Predictive and operational tools for primary care

Primary health care is in crisis. New technology is needed not only to help anticipate this demand, but to effectively managing it, by prioritising scant resources. GP Workforce NQR is sophisticated tool which analyses and predicts both the demand (who many people, coming with what illnesses), and the supply (how many doctors) at a micro local level. Tools exist to model different strategies to alleviate demand for example workforce substitution
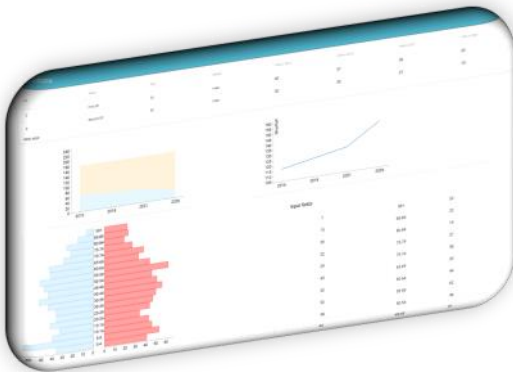
SOME PRACTICES ARE HAVING TO CLOSE THEIR DOORS, OTHERS ARE REDUCING THE LEVEL OF SERVICE, BECAUSE THERE JUST AREN'T ENOUGH DOCTORS AND EVER MORE DEMANDS ON SERVICES

- Dr Krishna Kasaraneni, chairman of the British Medical Association

How it works

Our technology is based on a GP pressure tools which received BBC coverage and won several governmental award. It combines multiple data sets, and GP data feeds to produce a national level view of the primary care crises. Practically, tools are provide to help a GP manage their resources better.

FEATURES

- Local population forecasts
- Supply capacity model
- Forward predictions of both supply and demand
- Hotspot identification
- Workforce tools at both GP and CCG level

Waste Management NQR

Intelligent management of waste collection and disposal

Recycling and waste processing is a complex business. Waste comes in multiple types, some recyclable, some not. It can be collected from roadside or at a recycling centre. Recycling can take place at multiple centres, and could involve multiple steps and processing locations. The recycling is often done by many different subcontractors at different rates. And lastly the volume waste is dependent on behaviour of citizens, which can depend on location of centres.
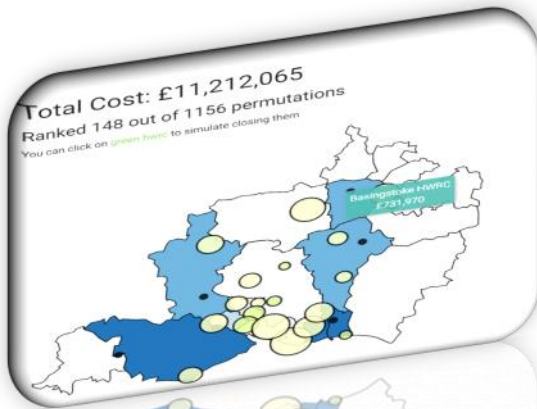
How it works

The Waste Management NQR works by processing massive data sets relating to waste processing weighbridge data. It can calculate the permutations of different closure scenarios, this generated 63 billion data records. It models user behaviour, based on propensity to travel. And finally it securely folds in confidential contract values. The result gives strong data backed recommendation on how to configure the service.

FEATURES

- Processes massive data sets

- Fully integrates with weighbridge fees

- Securely handles confidential contract into

- Predicts future demand based on demographics

- Simple to understand financial conclusions

OCDP—Open City Data Platform

The Open City Data Platform, is build upon the TDX and provides a way for local government to publish data to their citizens, on an open data portal. Out of the box we support many import formats, visualisation components and export formats. Full functioning interactive data website can typically be created in a matter of weeks
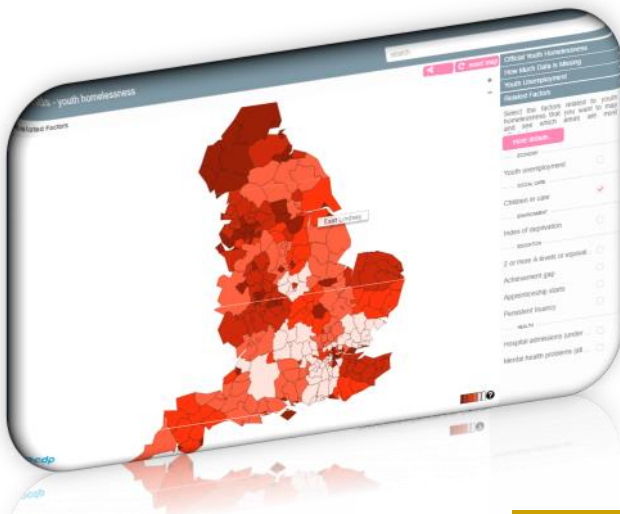
Extensibility

Using the TDX DataBot API, it is very easy to extend the OCDP to support new formats, and custom visualisations. IOT support is built in, providing simple to use IOT analysis and dash-boards.

Existing customers

The OCDP is live with many diverse customers, for many different purposes. CenterPoint uses it to publish homeliness data, WAHSN uses it to publish Alcohol health data and Southampton City council for energy usage.

FEATURES

- Import multiple data formats
- Build in visualisation components
- Exports as JSON, CSV, XML and Linked Data and PDF
- Highly scalable
- Fine grained permissioning on publishing

Workflow NQR

Data analysis, if it is to have impact, must result in action. Our workflow module provides an simple method to push the results of the analysis and prioritisation, to people actually doing the work. Work items are typically triaged and manged from one of the analytical systems. Individual work items can be sent to registered individuals or teams of people .
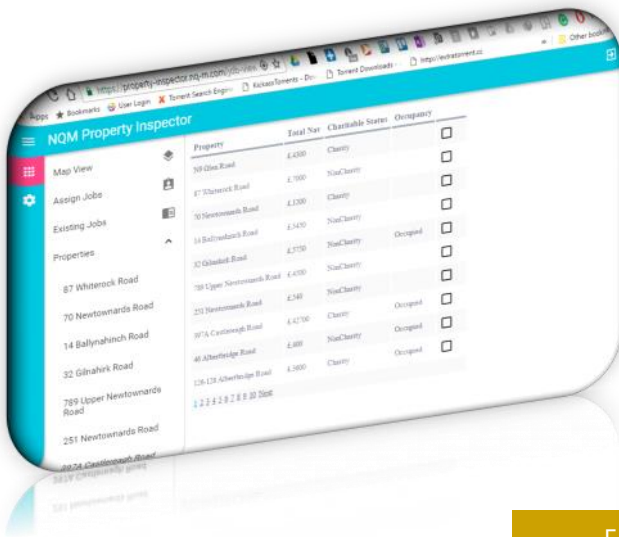
How is it used

The workflow engine by nature is highly generic and can be used many different ways. It has been used to schedule manual data cleaning operations on core data, to schedule physical building inspections for the Business Rates NQR, and is being used extensively in combination with our Fleet Management solutions.

FEATURES

- Fine grained permissioning
- Full audit logs
- High data security
- Works on mobile and desktop
- Works across different organisations
- Can support crowd sourcing

IOT SOLUTIONS

Practical IOT sensor solutions built on a cyber-resilient interoperable, IOT backbone

Parking LiNQ

Parking LiNQ aggregates real time parking information from multiple sources. These can be partners sensors, or pre-existing legacy sensors already deployed within the city. This data is analysed real-time within the TDX, optionally integrated with other sources, and finally turned into both web and mobile applications .
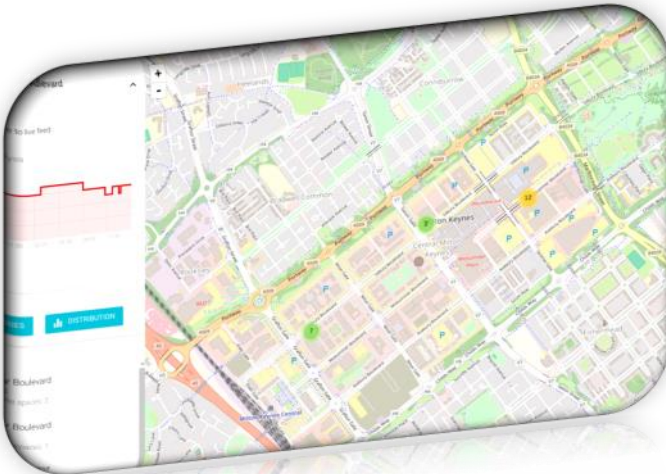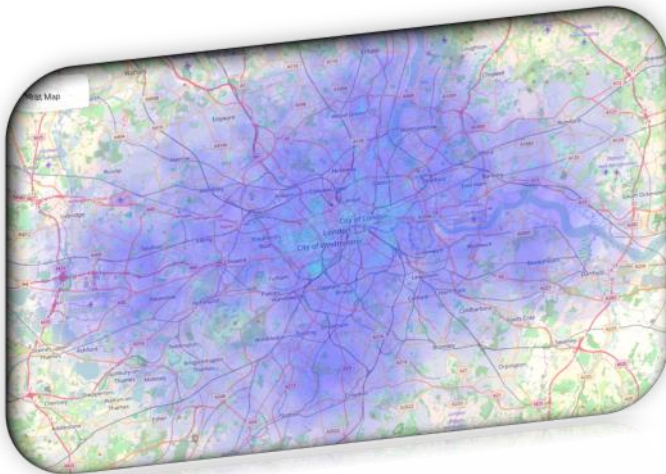

Sensor Partners

FEATURES

- Works with multiple parking sensor types

- Data can be shared across organisational and geographic boundaries

- Flexible analytics and triggers

- Web and mobile applications built on top

Enviro LiNQ

Flexible environmental sensors deployed on city street furniture. Sensor solutions exist for particulates, carbon monoxide, carbon dioxide, hydrogen sulphide, nitrous oxide and ozone. The sensor units are both physically and computationally robust, supporting caching and edge processing. Analytical solutions are build at scale in the TDX, turning distributed sensor data into visualisations and actionable intelligence.

Sensor Partners

FEATURES

- Wide support of gas and particulates

- Physically robust externally mountable sensors

- Remotely programmable using edge processing

- Locally cached data

Traffic LiNQ

Traffic LiNQ is a complete solution for urban mobility sensing. A number of alternatives for sensing can be integrated: camera based sensors using visual recognition, Wi-Fi based sensing monitoring mobile users, or at the other end, it can be integrated with mobile network or GPS service providers. The analytical solutions turn motion detection into deep insight and information feeds to aid city planning and operations.


Sensor Partners

FEATURES

- Traffic volume sensing
- Traffic speed sensing
- Pedestrian volume
- Pedestrian speed
- Local edge processing at sensor
- Options for Wi-Fi and camera sensing

Fleet LiNQ

FleetLiNQ provides full fleet management capabilities, with optional integrated workflow using our workflow NQR platform. Location information can be provided through ODB2 GPS dongles, basic in vehicle dongles, vehicle APIs or mobile application. The fleet management application works on desktop and mobile.
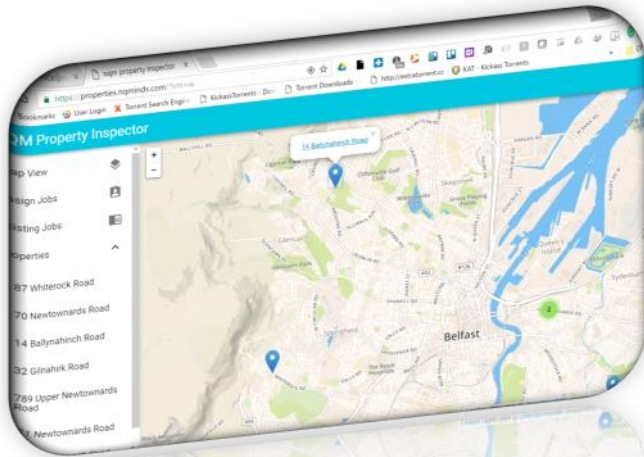
Sensor Options

FEATURES

- Flexible tracker options
- Geofencing
- Additional ODB2 parameters
- Eco tracking
- Historical location views
- Optional integrated workflow

Cam LiNQ

CCTV feeds and image processing

Camera CCTV feeds are easily integrated with out TDX using the InterLiNQ platform. We support both our preferred camera suppliers and easy integration of pre existing camera assets. Data is stored as JPG of MP4 in the TDX with associated meta data. Applications support everything form live view, basic archive search to complex visual processing delivered through our data bot architecture.
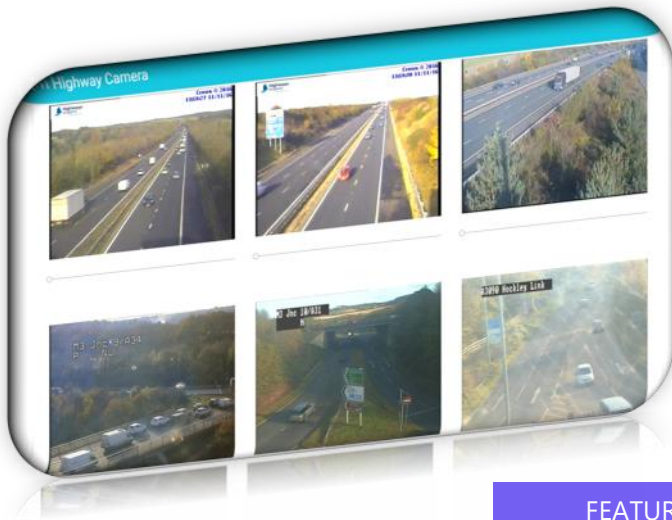
Sensor Alternatives

FEATURES

- Works with external and in building CCTV
- Supports edge processing of images
- Supports offline caching for resilience
- Supports image and streaming video

Building LiNQ

Building LiNQ is able to aggregate a wide portfolio of building sensors including: temperature, humidity, electricity usage, gas usage, CO_2 levels, smoke alarms, PIR sensors and window and door sensors. These InterliNQ edge based solutions have been tested at scale and are highly resilient and flexible

Wide application support

These building sensors have been deployed for many different purposes. Importantly the privacy preserving InternliNQ security model allows it to be used for several purposes at the same time. Proven use cases include: energy tracking, telecare, security, predictive maintenance and refurbishment analysis.

FEATURES

- Wide array of supported sensors
- Can use multiple IOT networks
- Fully programmable from the cloud
- Efficient use of networking
- Multiple backhauls supported

Mobile Worker LiNQ

Mobile worker LiNQ is the mobile complement of the TDXs workflow NQR. Available as both an Android and iPhone application, it can be configured for both phone an tablet use. Fully integrated into the mobile phone, it is both power and network efficient. It is designed to work robustly even when there is no mobile signal.
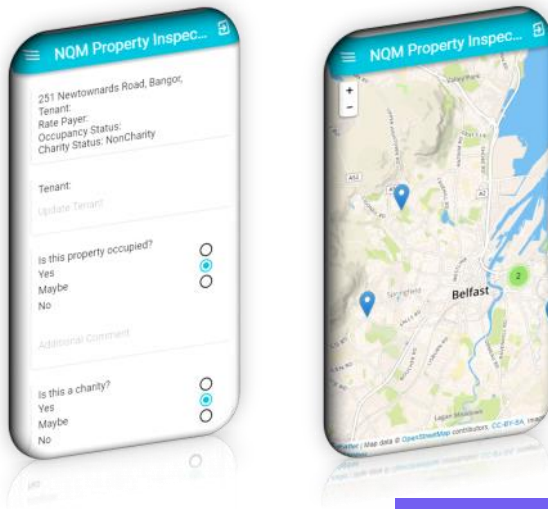
How its used

The Mobile worker LiNQ can be used in many different scenarios. Business rates NQR has mobile workflow models for building inspection. Fleet solutions use mobile workflow both for delivery and taxi services. New solutions can be built on top of the core framework very easily, in very short time frames.

FEATURES

- Secure data storage and communication
- Access to all phone sensors including GPS
- Local caching of data for offline usage
- OTA programmable
- Strong authentication

COMPANY BACKGROUND

Security

Security underpins everything we do. Without security there can be no trust in the system. Without trust there will be no service uptake

Big Data Security

Sharing data between organisation is the biggest challenge for Smart Cities and Connected Indusgtry. Our TDX supports true peer to peer security with federated authentication.

IOT Security

Securing the very small is particularly challenging. Low power devices, with narrow band networks deployed in physically in secure environments, presents hard challenges. Only by combining engineering excellence with security expertise can hope to address these problems. We have national defence customers for our IOT security solutions

Enterprise Security

No matter how smart the sensor, or deep the data analysis, it is only useful, when it is put in the hand of the people who need to enact the data. Securing the end to end is essential. nquiringminds have proven solutions for mobile, laptop and BYOD scenarios.

nquiringminds

The Neuron

nquiringminds neural logo represents both "intelligence" and "connectivity". The connected economy, smart cities, industry 4.0— none of these can be realised within these two vital characteristics. The fact that many of our employees are experts in AI and neural networks might have something to do with it as well
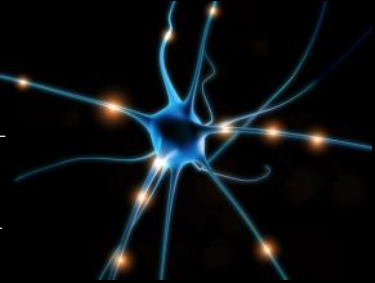
NQR

All our analytics solutions bare the NQR suffix. Pronounced "enquirer" it both reflects with the company branding, and it does what it says on the tin; these analytic tools enquire the data for you

LiNQ

We use the LiNQ suffix, for the solution end points, whether these are IOT or and user device. "NQ" echoes the company name again, but LiNQ is important as it has the dual connotations of security and again, connectivity .

AWARDS

CISCO pioneers **IOT TOP 15**

GSMA MOBILE WORLD CONGRESS
BARCELONA 22-25 FEB 2016
Top 10 B2B movers and shakers

ENTREPRENEURS **UNITE** CYBERSAVVY **2016**

CabinetOffice
Open Data Champion

Best of British | UK Trade & Investment

Innovate UK
Parlimentary Nomination
For Innovation

IoT UK | **Boost**
South England
Most Developed Proposition

CUSTOMERS

Hampshire County Council

BELFAST CITY COUNCIL

Liverpool City Council

SOUTHAMPTON CITY COUNCIL ®

Cambridgeshire County Council

NHS England

Centre for Implementation Science

T Deutsche Telekom

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nquiringminds

Gamma House, Enterprise Road
Southampton Science Park
Chilworth Hampshire SO16 7NS
UK

www.nqminds.com

info@nqminds.com

@nqminds

+44(0) 2381 159 585