



Intelligent Reasoning
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- The Innovation Exchange (IIX) is located at IBM's Technology Campus in Dublin.
- We are building pan-European partner networks as part of a vibrant Irish ecosystem.
- The IIX was launched 5 years ago to stimulate economic, scientific and societal opportunity through a collaborative model.
- We connect scale and enterprise level capabilities with the subject matter expertise of our partners.

The human race has long philosophised on how seemingly independent societal and environmental events and activities are linked, at the IBM IIX we call this **Intelligent Reasoning**.

The **'butterfly effect'**, **'chain reactions'**, **'root cause analysis'**, **'causality'** and many other concepts have been the focus of intensive research and investigation for decades.

Understanding accurately what factors impact the performance of any system, economy or otherwise requires a **360° view of the interrelated environment**.



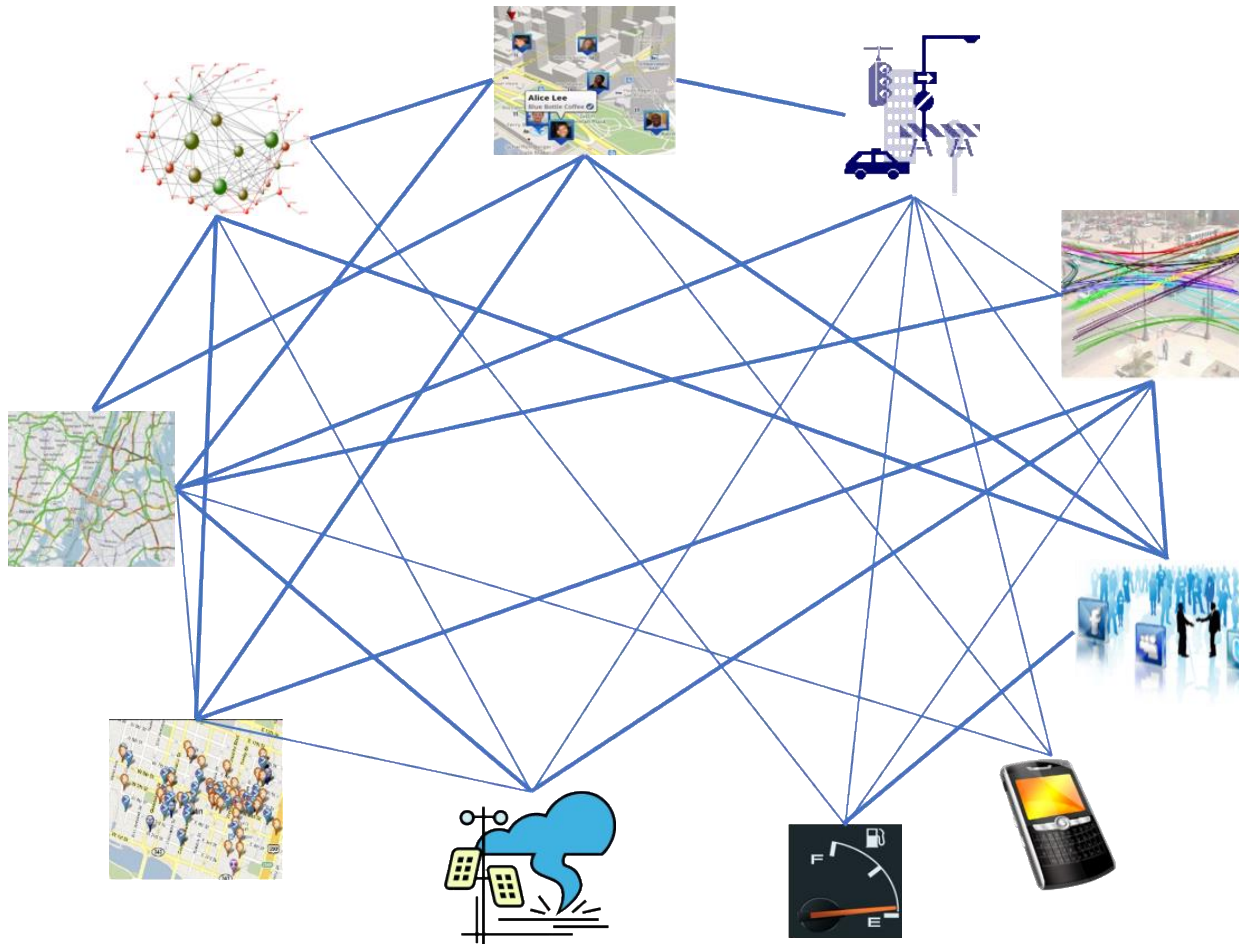
Technology: The availability of Artificial Intelligence (AI) technologies has been accelerated by recent developments in deep learning (Neural Networks). Compute power is becoming relatively commoditized so we can process volumes of data at scale like never before.

Data: IoT and digital devices are ubiquitous, data is available “everywhere”. General Data Protection Regulation (GDPR) has provided a clear outline of the regulatory guidelines under which data is collected, stored and processed.

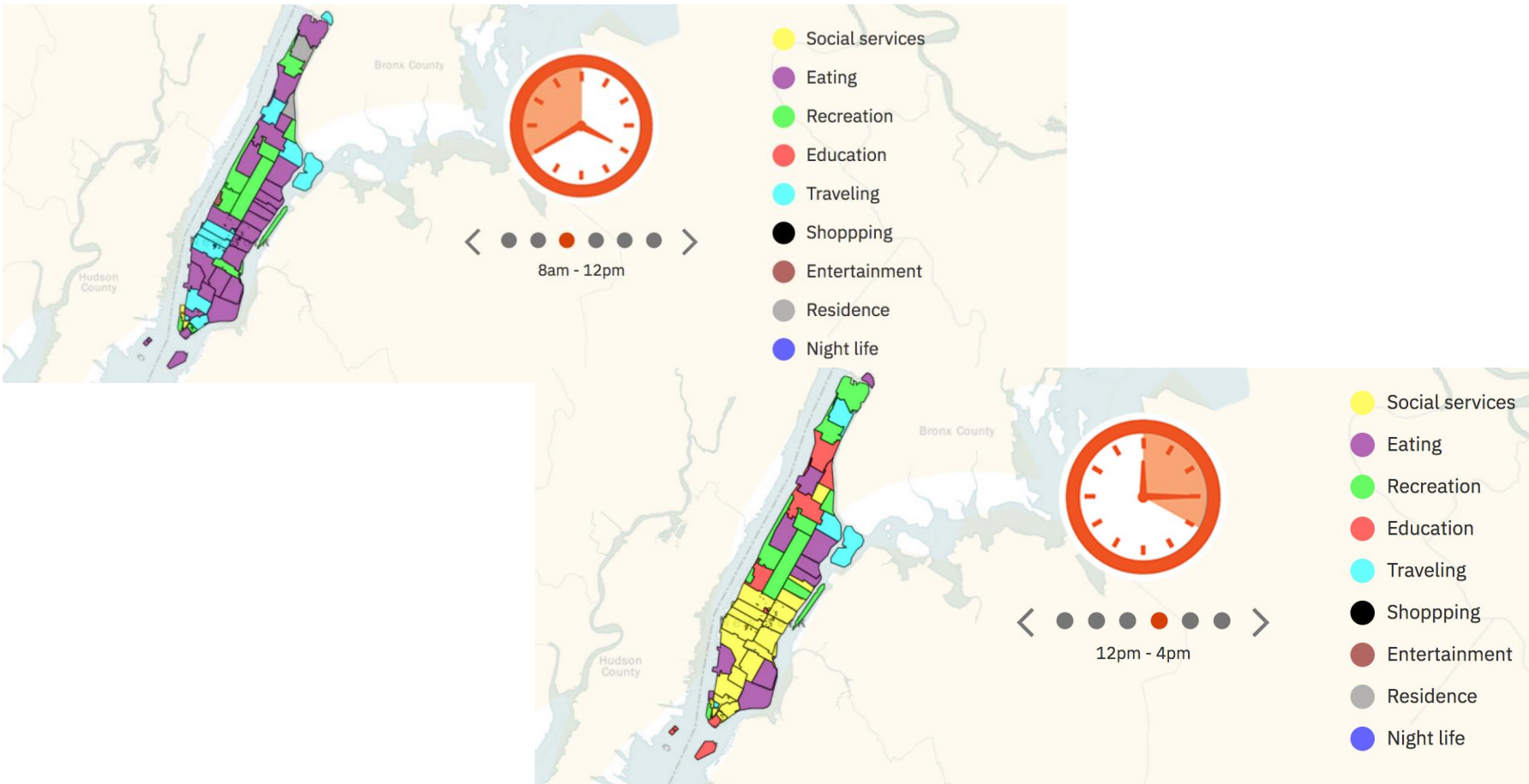
Innovation: Cross industry and sector collaboration with partnership models that incentivise the engagement of each.

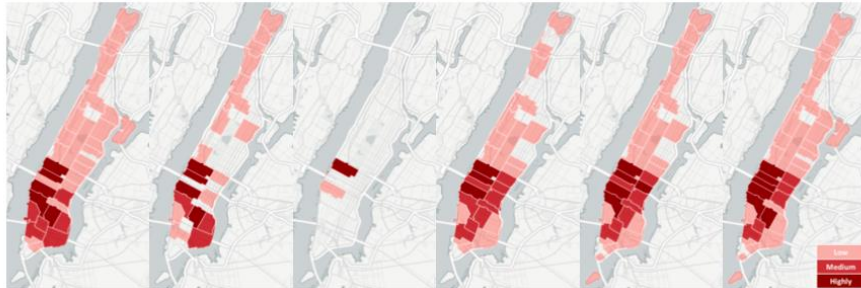
Any progress in the development of Artificial Intelligence Capabilities must be built on Trust and Transparency.

Can we predict **Telecommunications Network Demand** more accurately by linking different urban data sources together using an **Intelligent Reasoning Platform (I-Reas)**?



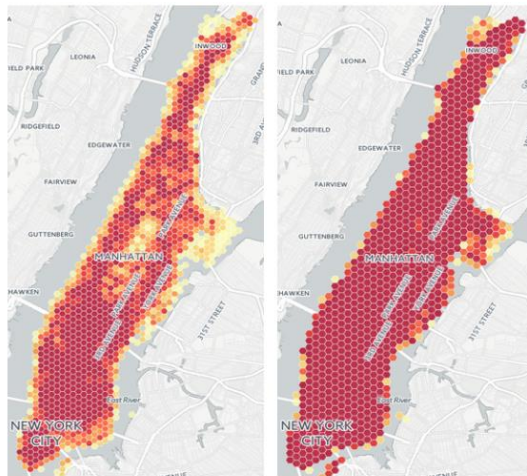
The function of each region in a city is dynamic – it changes hourly, weekly seasonally, using AI it can be measured dynamically.





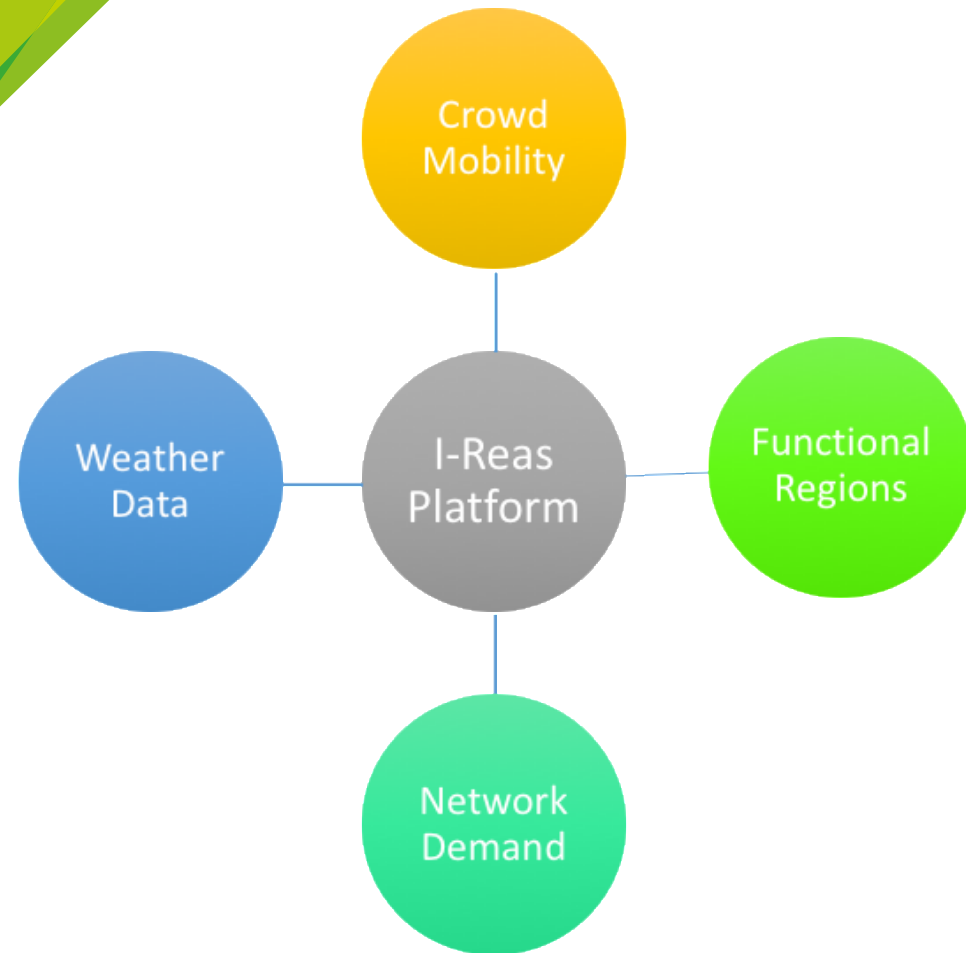
(a) 12AM- (b) 04AM- (c) 08AM- (d) 12PM- (e) 04PM- (f) 08PM-
04AM. 08AM. 12PM. 04PM. 08PM. 12AM.

Mobility patterns in a city follow specific patterns, but we can predict how events might impact them e.g. a sports event or civil demonstration by analysing previous events in time.



(a) Monday.

(b) Sunday.



Using the Intelligent Reasoning Platform we fused:

- Telecommunications Network Demand Data
- Crowd Mobility Patterns (Aggregated and Anonymised)
- Mappings of regional usage patterns
- Weather Data

The Platform was trialled with two major European Network Providers to **Predict Network Demand**.

It out performed the existing state of the art significantly.

We proved that using Neural Networks we could link data to “Reason” changes in the network.

One of the key features of the intelligent reasoning platform is the ease of portability to different use cases that require data driven reasoning.

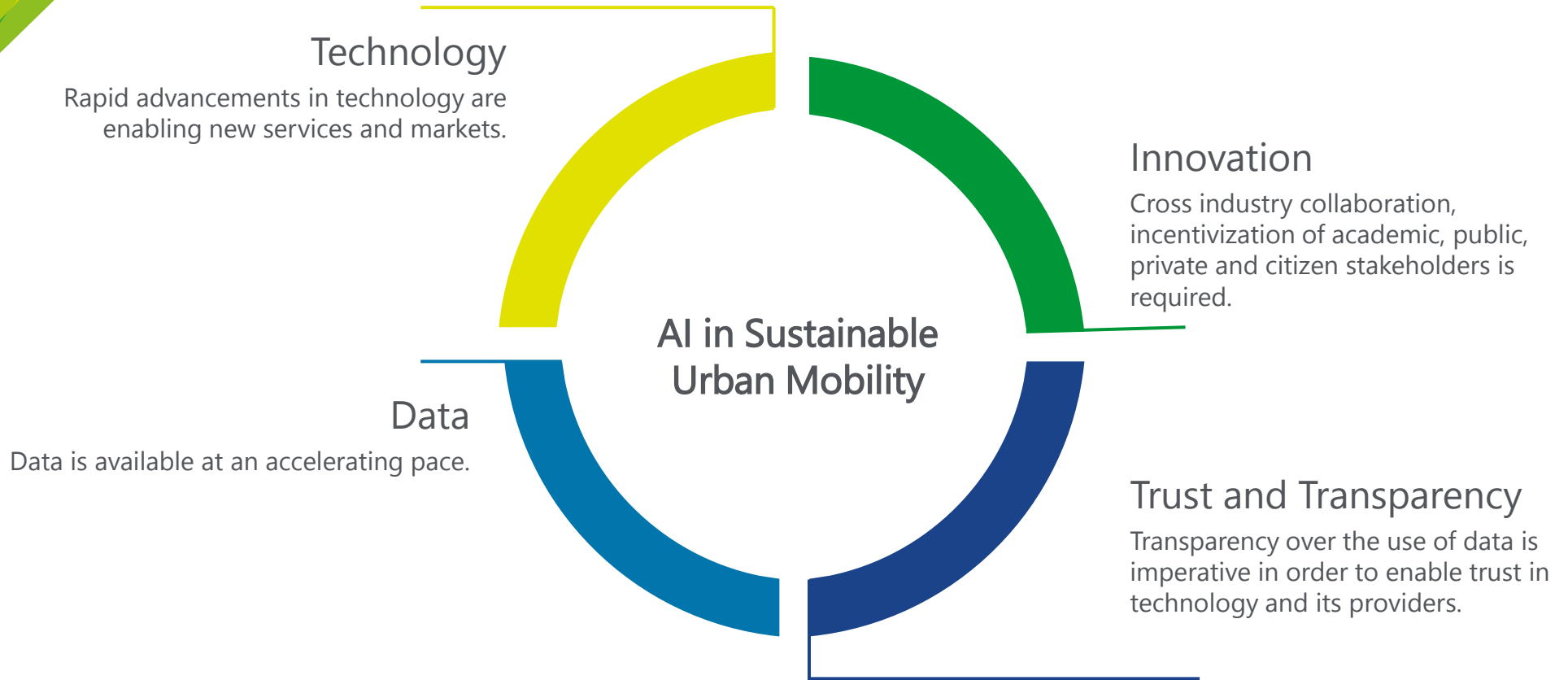
Dublin has one of the most successful bike-sharing systems in Europe.

The Smart Docklands Initiative provided the IIX the opportunity to partner with Smart Docklands members to build a forecasting model for **bike movements across Dublin.**

The model helps city planners to plan for **and promote sustainable commuting in Dublin.**

Bicycle commuter flow patterns can be used to **plan and maintain the cycling infrastructure in Dublin.**







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Current and former members of the IBM Innovation Exchange working on this platform include:

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- Teodora Sandra Buda
- Haytham Assem
- Lei Xu



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