



TERBINE[®]

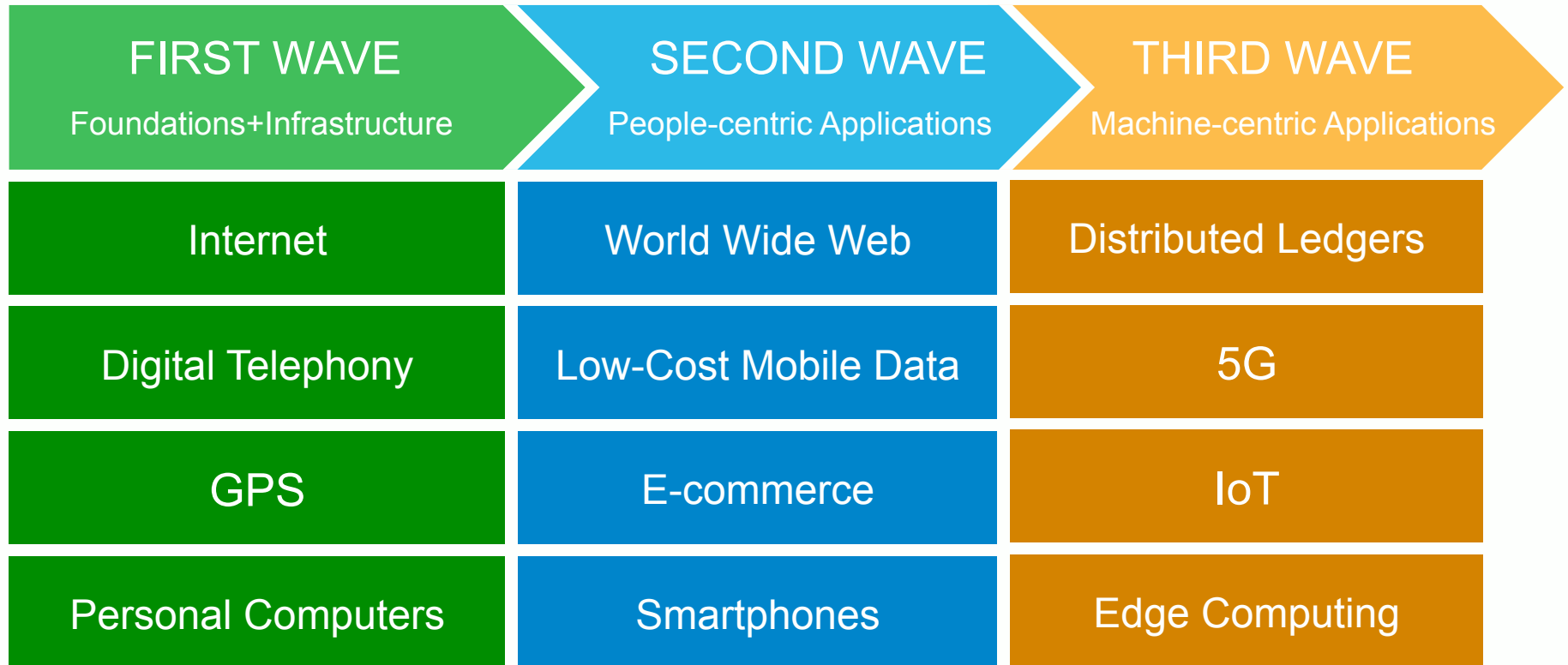
Applying Data From the IoT to Achieve Better Risk Outcomes

David Knight
Marsh Technology Risk Forum



terbine.io
terbine.com

THE THREE WAVES OF TECHNOLOGY ADOPTION AND PROGRESSION



THE THIRD WAVE IS BASED ON MACHINE-GENERATED DATA & ARTIFICIAL INTELLIGENCE



According to Cisco projections, the amount of data generated by the IoT alone will reach 600 zettabytes by 2020

(for comparison, the total amount of all global data in 2012 was 2.7 zettabytes)

MACHINE-GENERATED DATA = IOT

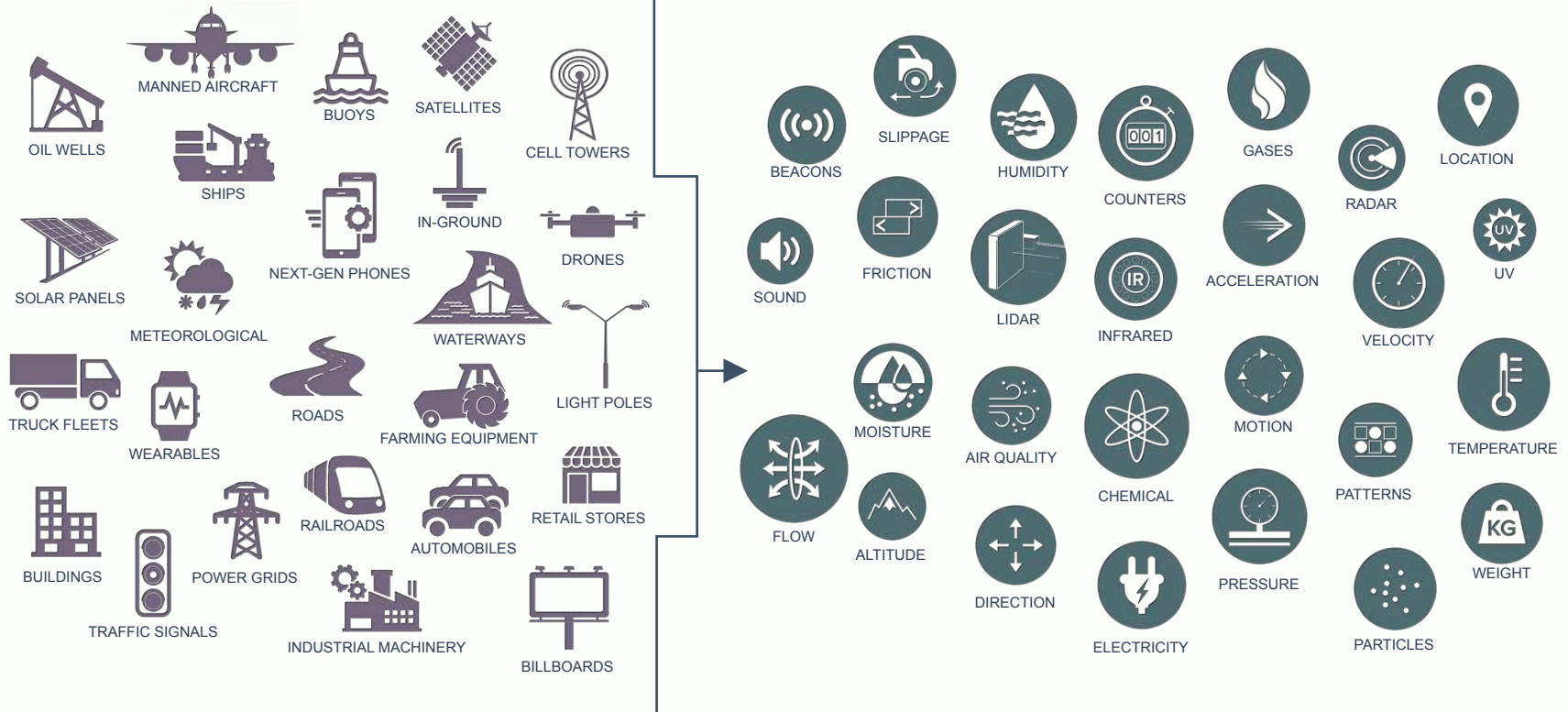


THE INTERNET OF THINGS (IOT)

Not since the Web and smartphones has the world seen an explosion of devices and applications like the IoT – and it is already starting to dwarf everything before it

WHERE IS ALL OF THIS MACHINE-GENERATED DATA COMING FROM?

SENSORS ARE TURNING UP EVERYWHERE...IN A DIZZYING ARRAY OF SENSOR TYPES...AND RESULTING DATA



THE ABUNDANCE OF IOT DATA IS DRIVING THE NEED FOR *CURATED* DATA EXCHANGE



DATA MARKETPLACES ARE EMERGING

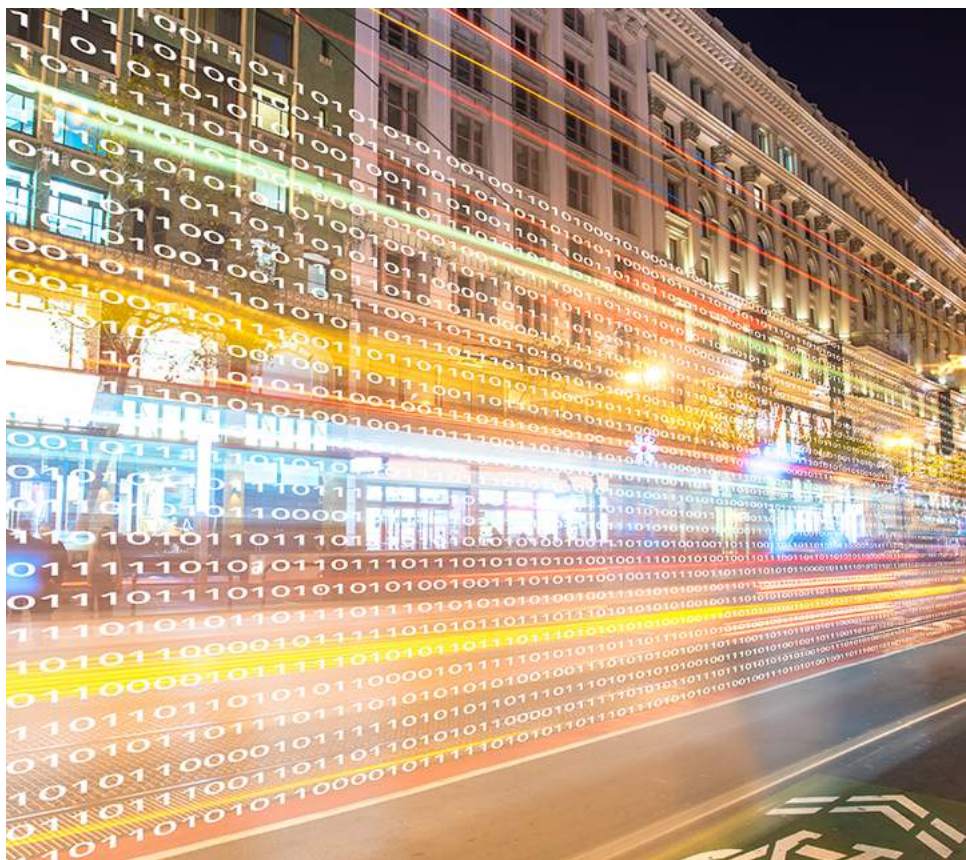
Major industries are transforming into data-driven ecosystems, creating the need to frictionlessly exchange data between **tens of thousands** of commercial, governmental and research entities, whilst dealing with **core issues of ownership rights, liability, data monetization, regulations and licensing**

THE DATA SHARING PROBLEM



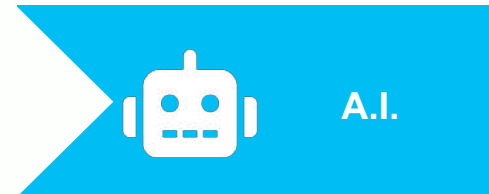
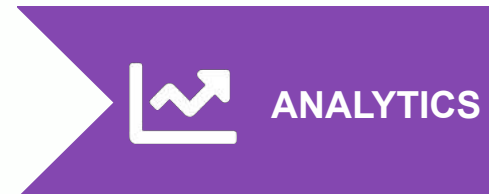
The old “by hand” methods of curating, exchanging, licensing, monetizing, tracking and other issues pertaining to data usage have kept the inter-organizational use of machine-generated data very limited, particularly when crossing between industry sectors

TERBINE BRINGS THE SCALABLE SOLUTION



Terbine provides the ability for all participants in the new logistics ecosystem to frictionlessly exchange the data moving from and to systems and organizations, whilst handling the key business, regulatory and monetary issues at Internet speeds

A FRICTIONLESS ENVIRONMENT FOR ACCESS TO PHYSICAL-WORLD DATA FEEDS



THE BIGGEST PROBLEM IS THAT IOT DATA ISN'T INHERENTLY DISCOVERABLE

There are many formats in which machine-generated / IoT datasets are generated, and the vast majority contain nothing that gives clues as to what's inside.

Data sample:

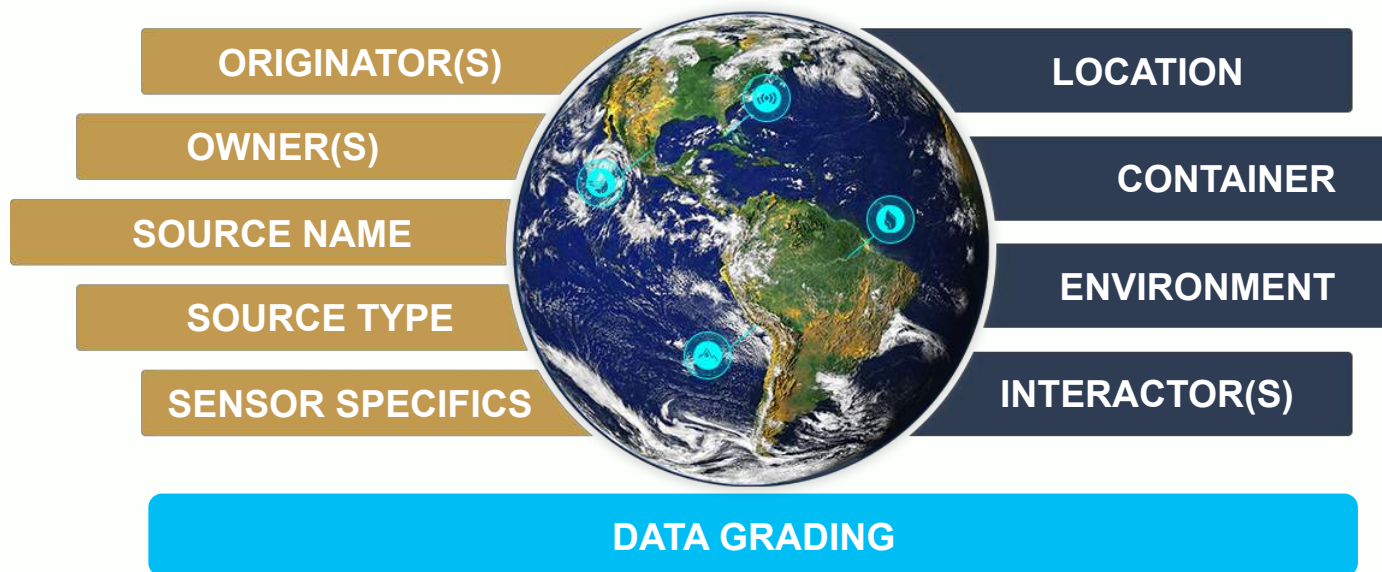
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[{"lat":37.79824400,"lon":-122.23572800,"time":"2018-05-16 23:58:15","value":"99.00"},{"lat":0.00000000,"lon":0.00000000,"time":"2018-05-16 23:58:30","value":"99.00"}, {"lat":0.00000000,"lon":0.00000000,"time":"2018-05-16 23:58:45","value":"99.00"},{"lat":37.78453600,"lon":-122.41953600,"time":"2018-05-16 23:59:15","value":"101.00"}, {"lat":0.00000000,"lon":0.00000000,"time":"2018-05-16 23:59:15","value":"101.00"},{"lat":37.71293200,"lon":-122.17008000,"time":"2018-05-16 23:59:15", "value":"101.00"}, {"lat":37.78474400,"lon":-122.41946400,"time":"2018-05-16 23:59:30","value":"101.00"}, {"lat":37.79824400,"lon":-122.23572800,"time":"2018-05-16 23:58:15","value":"99.00"}, {"lat":0.00000000,"lon":0.00000000,"time":"2018-05-16 23:58:30","value":"99.00"}, {"lat":0.00000000,"lon":0.00000000,"time":"2018-05-16 23:58:45","value":"99.00"}, {"lat":37.78474400,"lon":-122.41946400,"time":"2018-05-16 23:59:30","value":"101.00"}, {"lat":37.78474400,"lon":-122.41946400,"time":"2018-0
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SOLVING THE DISCOVERABILITY PROBLEM

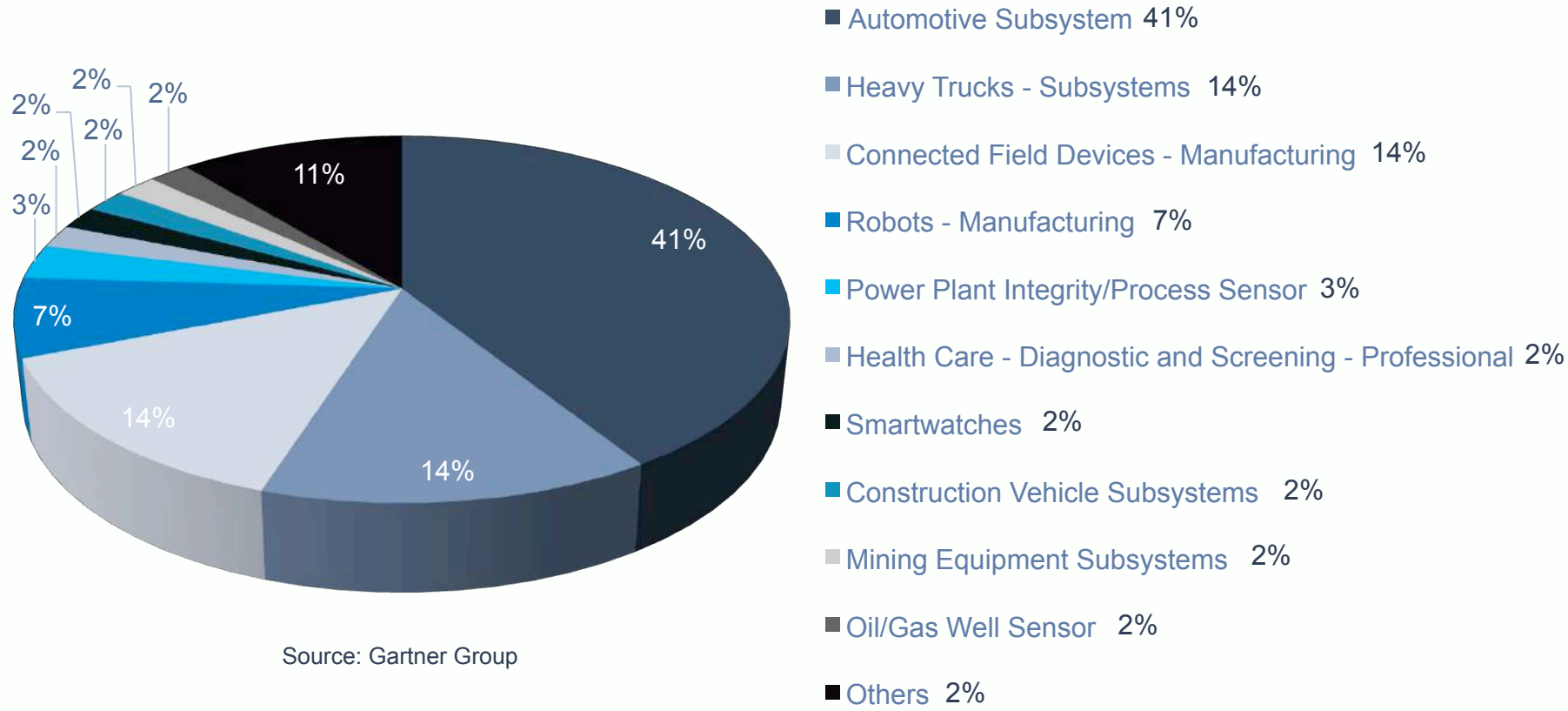
Terbine thoroughly contextualizes and characterizes IoT data sources

PROVENANCE



CONTEXT

TRANSPORTATION & LOGISTICS DOMINATE IOT DATA GENERATION



Source: Gartner Group

ITS AMERICA

DATA EXCHANGE

POWERED BY TERBINE

- ITSA's mission-driven research revealed that an ITSA-sponsored, transportation-specific IoT data exchange would accelerate cooperation between, and innovation among, its public, commercial and academic members
- ITSA partnered with Terbine to provide the first **commercial-grade system for curating transportation-related IoT/sensor data** on a global scale
- ITSA and Terbine are specifically pursuing use-cases/pilots pertaining to risk

ITS AMERICA
DATA EXCHANGE
POWERED BY TERBINE



ITS AMERICA

DATA EXCHANGE

POWERED BY TERBINE



Panasonic



IOT DATA FEED EXAMPLE: GREATER CHICAGO AREA

The screenshot shows the Terbine.io search results for 'Chicago speed camera'. The search bar at the top contains the text 'Chicago speed camera'. Below the search bar, the results are displayed in a grid. On the left, there is a sidebar with a list of filters: Location Category, Location Type, Container, Environment, Interactor, GICS Code, Source Name, Source Type, Sensor Type, Manufacturer, Measurement Unit, and Format. The main content area shows two search results. The first result is titled 'Speed Camera Violations / Chicago, ...' and includes a description: 'This dataset reflects the daily volume of violations created by the City of Chicago Red Light Program for each camera. The data reflects...'. It also shows metadata: Terrestrial, Radar, and Numeric Count. The second result is titled 'Speed Camera Violations Around Parks And Schools / Chicago' and shows metadata: Terrestrial, Counter, and Numeric Count. Both results have an 'Add To Workspace' button.

Speed Camera Violations

Relevant to:

- Route optimization for commercial fleets, ride sharing, and subscription based mobility services
- Insurance carriers for risk selection/DMV records, variable pricing based on zip codes that are more dangerous with higher rate of violations, parametric event insurance based on time of day when most dangerous
- Municipalities profit if trend data shows downward trend as they seek to be insured
- Police use to see correlation between speeding and other crimes in those areas

IOT DATA FEED EXAMPLE: GREATER CHICAGO AREA

Description

Overview Context Provenance Technical

Speed Camera Violations Around Parks And Schools / Chicago

Description: Daily volume of violations that occurred in Children's Safety Zones. Children's Safety Zones are areas of increased traffic enforcement an eighth of a mile around parks and schools. Enforcement hours are between 7 am and 7pm. The Automated Speed Enforcement Cameras are used in conjunction with pedestrian refuge islands, safety zone signage, speed humps, traffic signal improvement, lead pedestrian intervals, pedestrian timers and "Stop for Pedestrian" signs for the Children's Safety Zone Program. All cameras are geolocated. The data spans from July 1, 2014 to June 26, 2018. Processed from raw data.

Metadata Created: 07/10/2018
Last Modified: 07/10/2018

Data sample:

```
INTERSECTION,CAMERA ID,ADDRESS,VIOLATION DATE,VIOLATIONS,X COORDINATE,Y
COORDINATE,LATITUDE,LONGITUDE,LOCATION 31ST ST AND MARTIN LUTHER KING
DRIVE,3101 3100 E,3100 MARTIN LUTHER KING DR,CHICAGO,IL 60608,123.100
```

Data origination and typing is done within Terbine and made discoverable by human and AI users

Provenance

Overview Context **Provenance** Technical

Speed Camera Violations Around Parks And Schools / Chicago

Source Name: Automated Speed Enforcement
Source Type: Camera
Sensor Type: Counter
Manufacturer:
Make:
Model:
Version:
Originator(s): City of Chicago, Chicago Department of Transportation
Owner(s): City of Chicago, Chicago Department of Transportation

Context

Overview **Context** Provenance Technical

Speed Camera Violations Around Parks And Schools / Chicago

Location Category: Terrestrial
Location Type: Fixed
Location: Street Address: , City: Chicago, State/Territory: Illinois, Postal Code:
Container: Roadways
Environment: Urban
Intersect:
GUID Code(s): Highways & Railtracks, Health Care Technology
Legal Type: Dpensorce
Regulatory Type: NULL

Technical

TERBINE SEARCH TAGS DEVELOPERS WHAT IS THIS?

Chicago speed camera

Search Results

Overview Context Provenance **Technical**

Speed Camera Violations Around Parks And Schools / Chicago

Measurement Unit: Numeric Count
Format: CSV
GUID: 01a72c57-05db-4217-b421-4b5d589b6d4d
Has Schema Entry: INTERSECTION, CAMERA ID, ADDRESS, VIOLATION DATE, VIOLATIONS, X COORDINATE, Y COORDINATE, LATITUDE, LONGITUDE, LOCATION
Has Changelog: Covered by Creative Commons 2.0

- + Location Category
- + Location Type
- + Container
- + Environment
- + Intersect
- + GUID Code
- + Source Name
- + Source Type
- + Sensor Type
- + Manufacturer
- + Measurement Unit
- + Format

RELEVANCY OF IOT DATA TO RISK MANAGEMENT



Risk Selection - more violations for specific known commercial fleet drivers, the less likely insurers are to offer them insurance

Pricing - variable based on safety of drivers to follow the law

Structure - is there a policy that doesn't respond if the driver is speeding?

APPLYING IOT DATA TO RISK MANAGEMENT



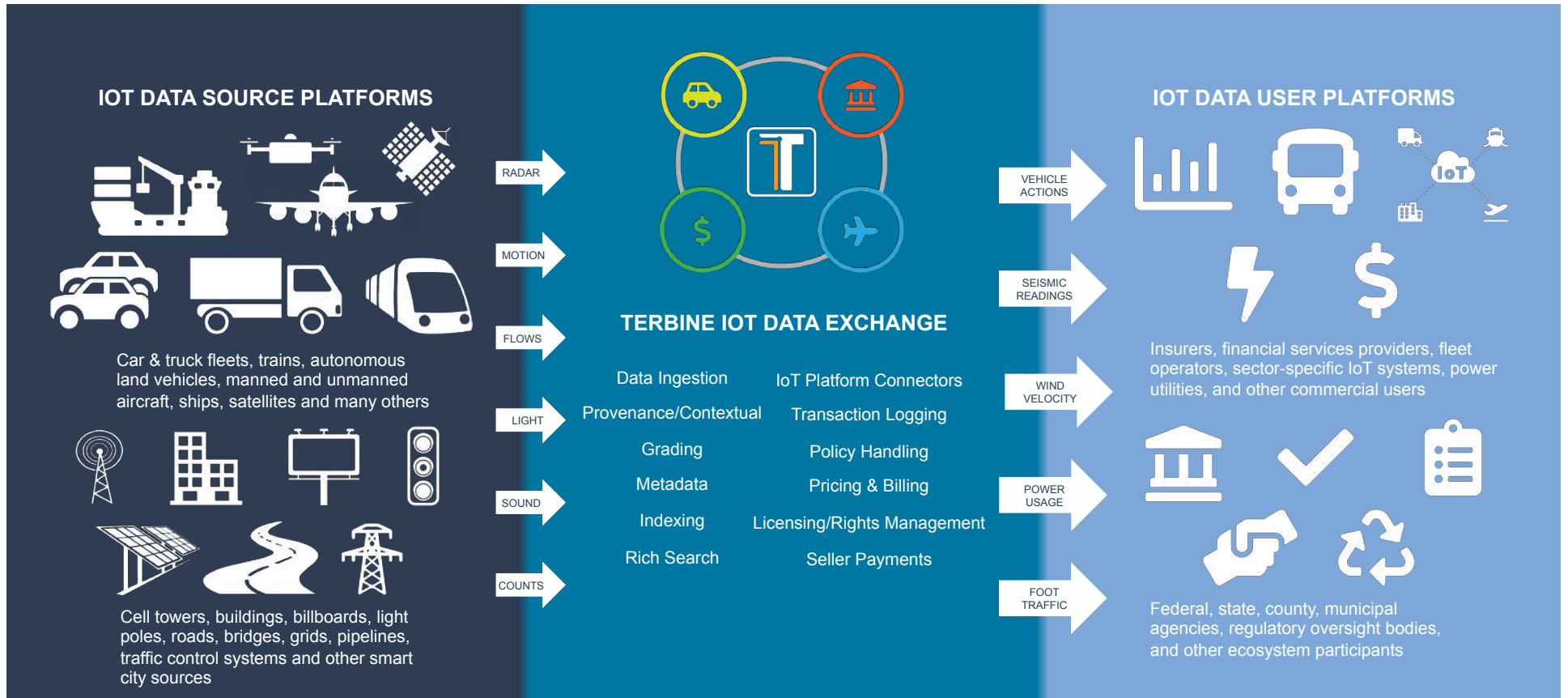
**Feb 17, 2017 – Berlin, Germany
Launch of \$250M IBM Watson IoT Facility**

MARSH Tech and Risk Forum *Special Offer to Forum Participants*

Three Risk Management Pilots are being offered at Terbine's cost, including

- ✓ *Project consulting, deep data research, full access to Terbine system of 5,000+ sensor data feeds from public agencies included*
- ✓ *Terbine's Advanced Search Team will capture and codify new public data sets YOU specify for your use-cases*
- ✓ *Intent is to solve a real business challenge, the results of which we can share*

TERBINE IS EMERGING AS THE CURATOR/PROCESSOR FOR IOT DATA FEEDS



COMING SOON: ON-LOCATION SITUATIONAL AWARENESS USING AUGMENTED REALITY





TERBINE[®]

TAKE THE PULSE OF THE EARTH

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