Perspectives on AI and Analytics at scale

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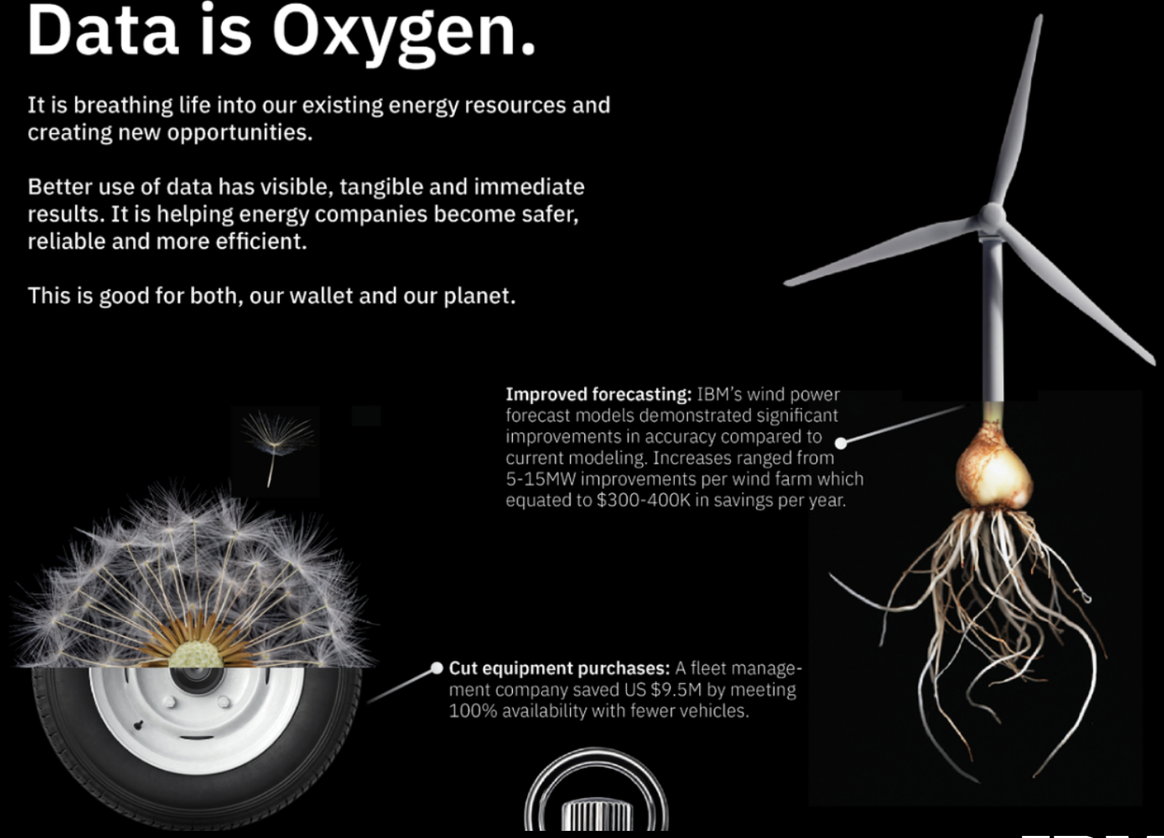

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What do we do with Utilities ?

Setting the stage

We use our expertise and advanced technology to enable utilities' journey through the Energy Transition

1. Build the digital foundation for the enterprise infused with AI

2. Create operational and market platforms

3. Deliver impactful industry offerings – Business Value out of the box

Solutions areas where we drive business outcomes
3 Areas of focus – 6 Core solutions

Operations Innovation

Advanced Distribution Management Systems (ADMS)

Services and accelerators for integrating, data modeling and governing, planning, implementing, hosting and maintaining electric and gas network OMS, ADMS/DMS, GIS, EMS, DERMS, PMUs, and SCADA systems

Customer Engagement

Customer Billing

Services and accelerators for planning, implementing, and managing Oracle CC&B, SAP IS-U, and related customer information systems

Work & Asset Optimization

Asset Performance Management (APM)

Applying advanced analytics to improve asset performance through health monitoring and predictive maintenance programs

Operations Innovation

Smart Metering

Services and accelerators for planning, implementing, integrating, hosting and maintaining systems and processes for deployment and operation smart meters

Customer Engagement

Cognitive Customer care

Services and accelerators for planning and delivering customer transformation programs, with a focus on cloud-based conversational engagement and customer relationship management (CRM) offerings

Work & Asset Optimization

Field Service reinvention

Optimizing the assignment and safe execution of work through a combination of mobile, IoT, and cognitive services and accelerators

We deliver value globally, at scale…

10 of 10

of the world's largest publicly listed electric utilities work with IBM

>100

utility AMI implementations, globally

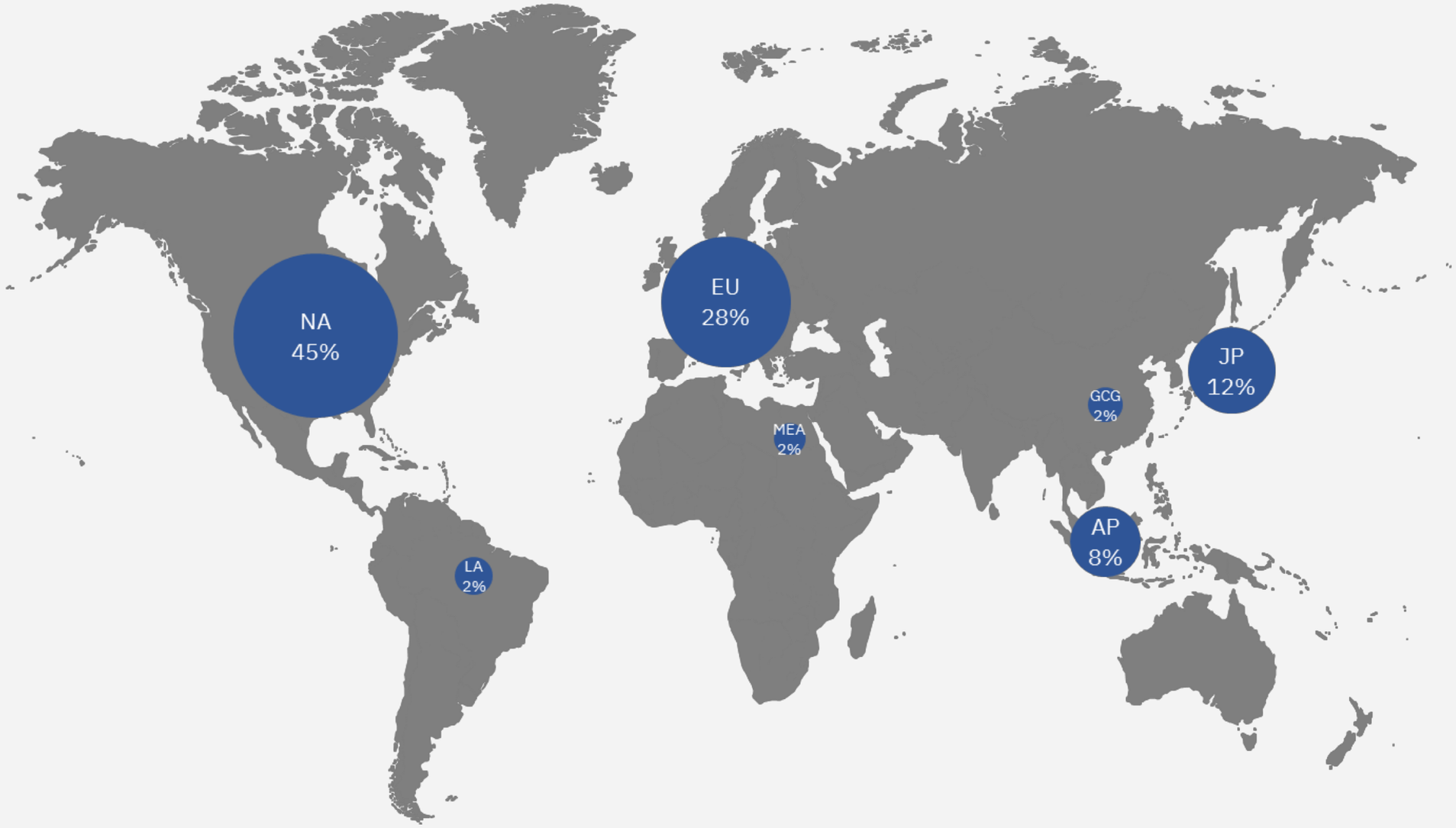
9 of 10

of the world's largest publicly listed water companies work with IBM

Successful engagements completed with utility clients in

55

countries



… to a rich set of EE&U industry leading clients

What trends are we seeing?

Some thoughts on the Utility landscape

Digital technology is redefining possibilities in Energy, Environment and Utilities

Artificial Intelligence

Forces utilities to re-conceptualize customer and utility operations

Mobile

Enables people to manage their energy footprint anytime, anyplace

APIs/Microservices

Fosters the rapid creation of an energy integration ecosystem

Cloud

Instantiates the cheap and agile systems required for industry disruption

Blockchain

Creates a proxy for traditional infrastructure lowering barriers to market entry

Internet of Things

Spawns the data driven utility of the future

Cybersecurity

Safeguards the critical infrastructure foundational to the world economy

Hyperlocal Geolocation

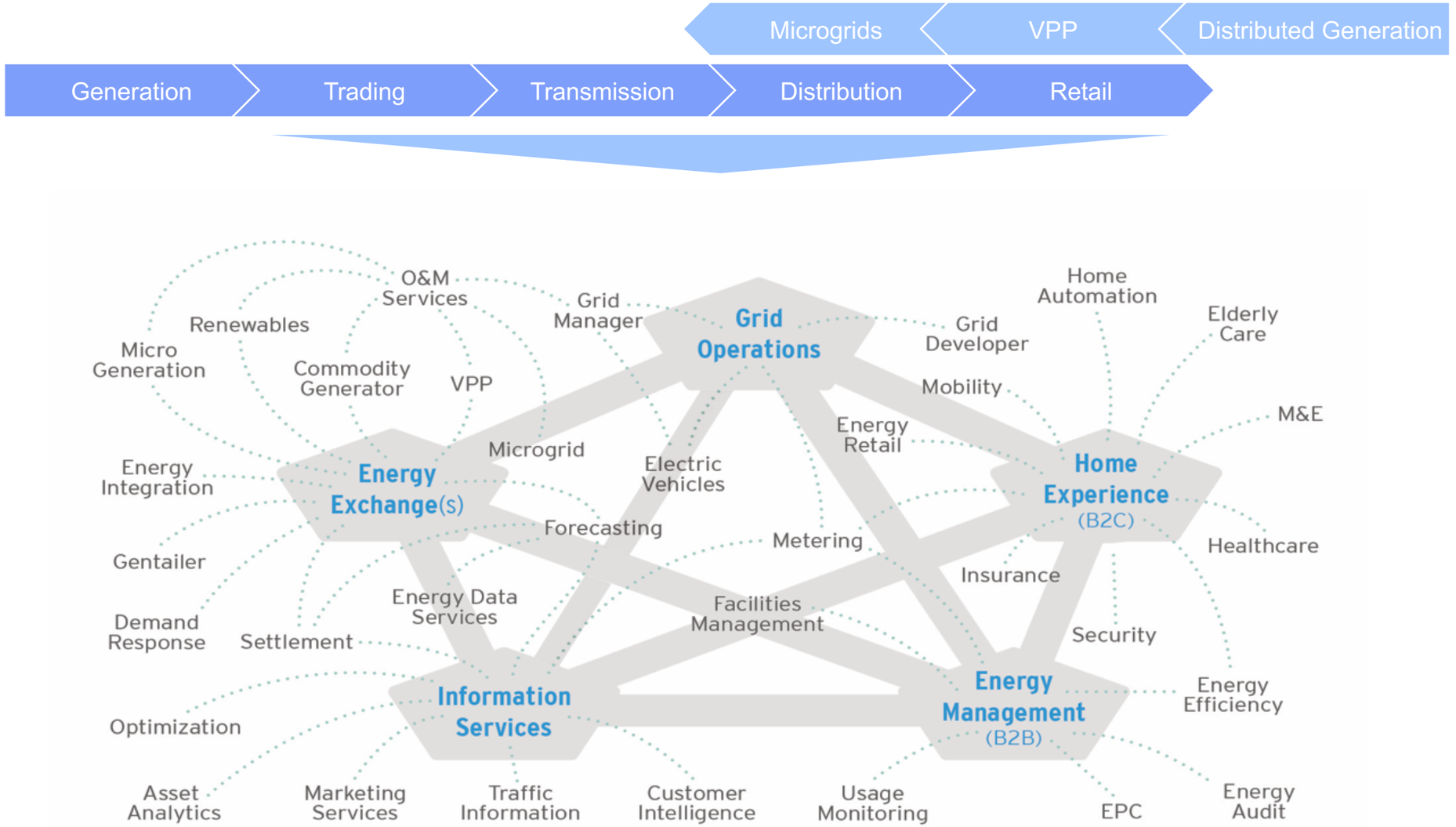
Makes possible mobility as a service driving the sustain-able electrification of the transportation sector

Analytics

Leverages data to enable disruptive innovation creating the new industry order

Embrace your role in the energy integrator ecosystems. Business Platforms and Data will be fundamental – Electricity flows (So should data and insights!)

Energy will be integrated on the back of more flexible and digitally enabled ecosystems / business platforms



For business platforms to become reality, we need Data and AI -- AI Ladder

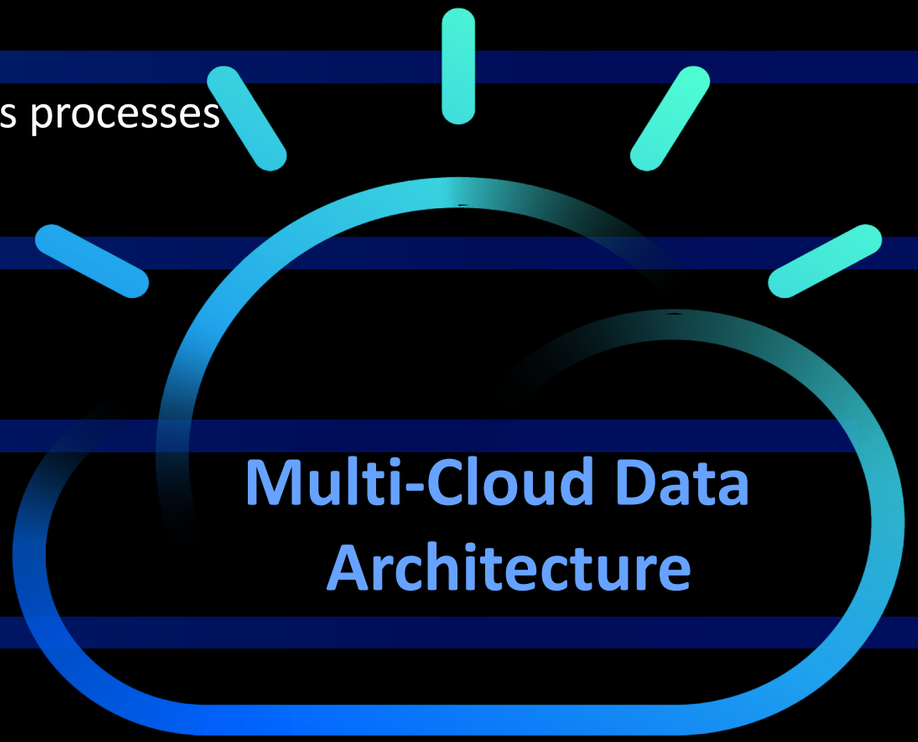
TRUST & INFUSE – Deploy trusted AI-driven business processes

ANALYZE - Scale insights with ML everywhere

ORGANIZE - Create a trusted analytics foundation

COLLECT - Make data simple and accessible

Data of every type, regardless of where it lives



MODERNIZE your data estate for an AI and multi-cloud world

There is no AI without an IA

(information architecture)

80%

of data is either inaccessible, untrusted or unanalyzed

81%

do not understand the data required for AI

> *"No amount of AI algorithmic sophistication will overcome a lack of data [architecture] ... bad data is simply paralyzing*

MITSloan Management Review

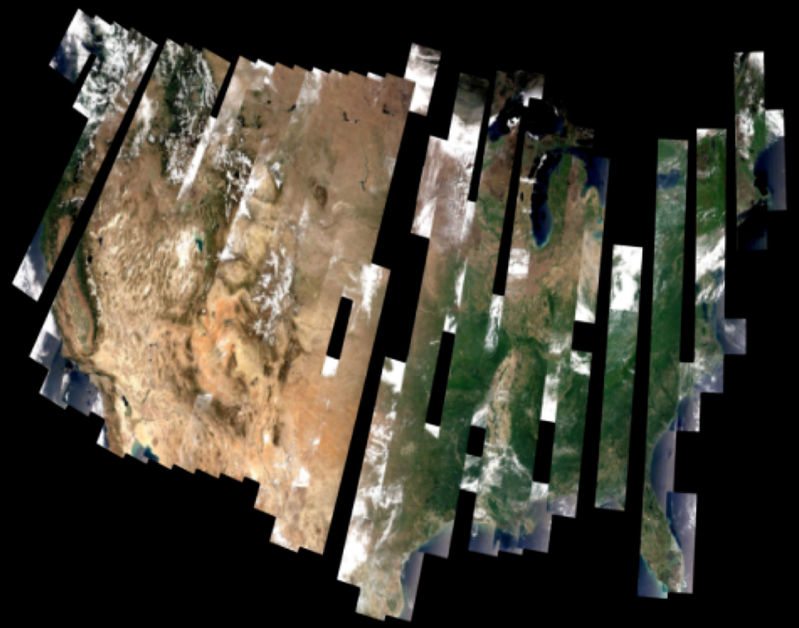
3 Technologies- 3 Industry Solutions at Utility scale

How and why we built it?

PAIRS Geoscope and Vegetation Management - IoT
PowerAI Vision - AI
TenneT - Blockchain
–

PAIRS Geoscope and Vegetation Management

IoT at Scale



Geospatial & Temporal Data is Prevalent
Why Aren't Organizations Using it to Their Advantage?

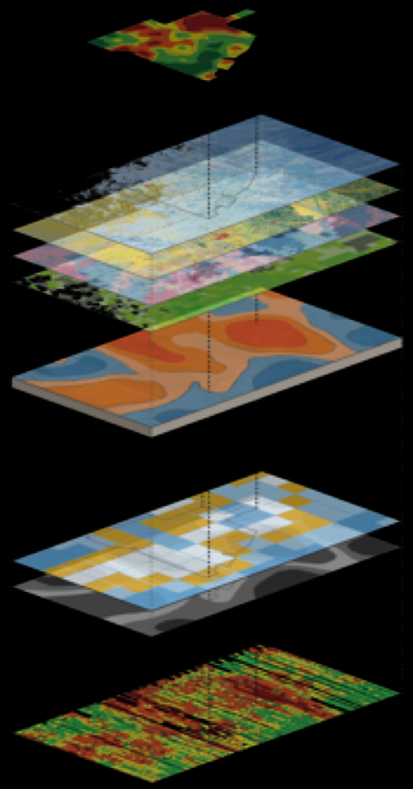
Data stored in **varying locations, formats, projections, units,** etc.

Files kept in **billions of individual "scenes"**

Specialized knowledge required to **ingest, align, curate & query** scenes

IBM PAIRS Geoscope

Curated repository of data optimized for large-scale geospatial-temporal analytics



Streamlined data preparation

- Cataloged library of data layers stored in common formats & projections
- Extensible by ingesting, curating & aligning proprietary data to a common grid
- Create purpose-built layers by combining & correlating public & private data

Optimized querying of multiple data sets

- Retrieve relevant information with flexible space & time resolution
- Use built-in data operations & models or extend with custom calculations
- Apply capabilities to built-in, customer-supplied & combined data sets

Fast time to value with more accurate & trustworthy results

An “A-ha Moment” at ONCOR - Veg Management

PowerAI Vision

AI at Scale

Data Science is a Team Sport

DYLAN
Data Engineer

IRIS & JON
Subject Matter Expert & Line of Business User

DANIELLE
Data Scientist

SAM
Software Developer

BETH
Business Analyst

STEP 1
Extract Data

STEP 2
Prepare Data

STEP 3
Build Models

STEP 4
Train Models

STEP 5
Evaluate Models

STEP 6
Deploy Models

STEP 7
Use Models

STEP 7
Monetize

“I could not figure out how to properly create tags on images. **It only worked 25% of the time and it was super frustrating.”**

“We are talking about **saving seconds at scale**...in the current tool, I don’t know how much time is left for each task, **making it hard to budget my time.”**

“What you are looking for with mistakes is that the **system has a concept of confidence.** Right now **I can’t tell what to fix.”**

“With models there are many experiments. **Without notes or a log for the model I can’t keep track.”**

IBM PowerAI Vision

IBM PowerAI Vision: ”Point-and-Click” AI for Images & Video

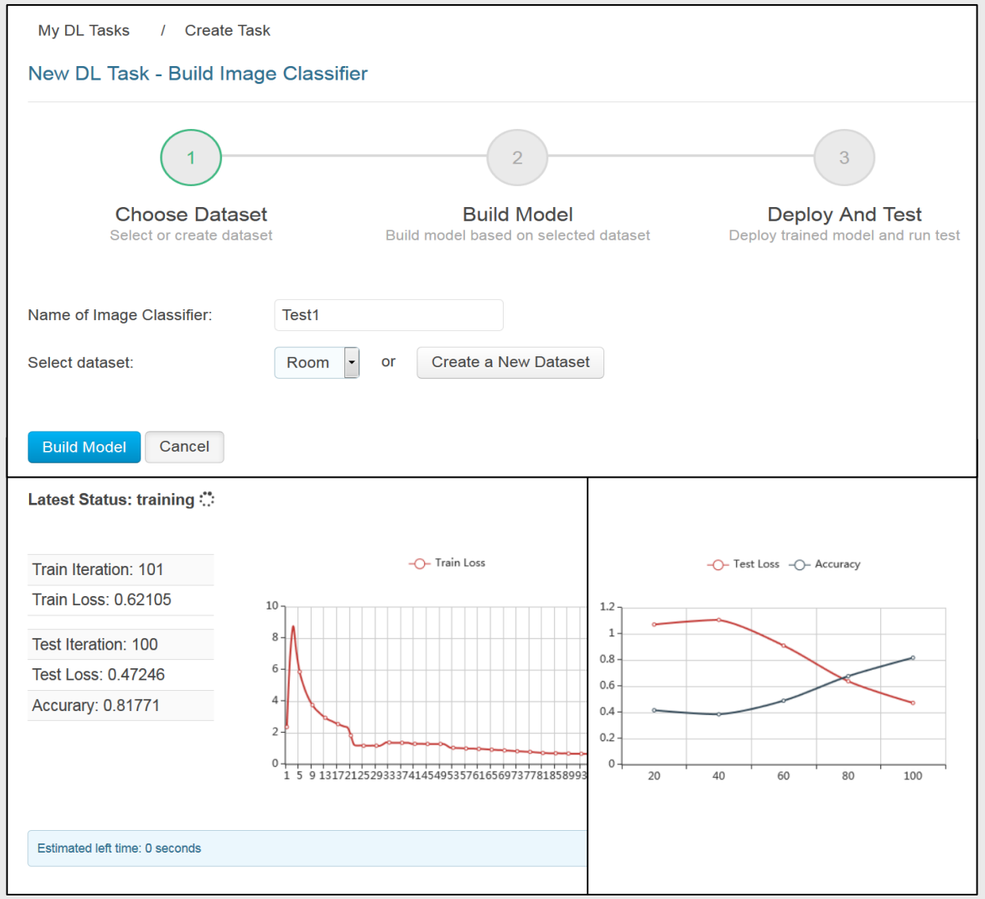
Label Image or Video Data

Broken conductors

Broken Bonds

Broken Glass Insulators

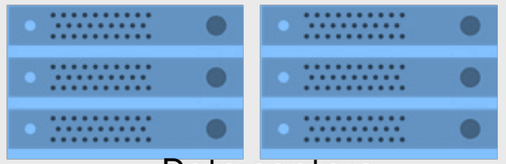
Auto-Train AI Model



Package & Deploy AI Model

AI glasses for VR

UAS

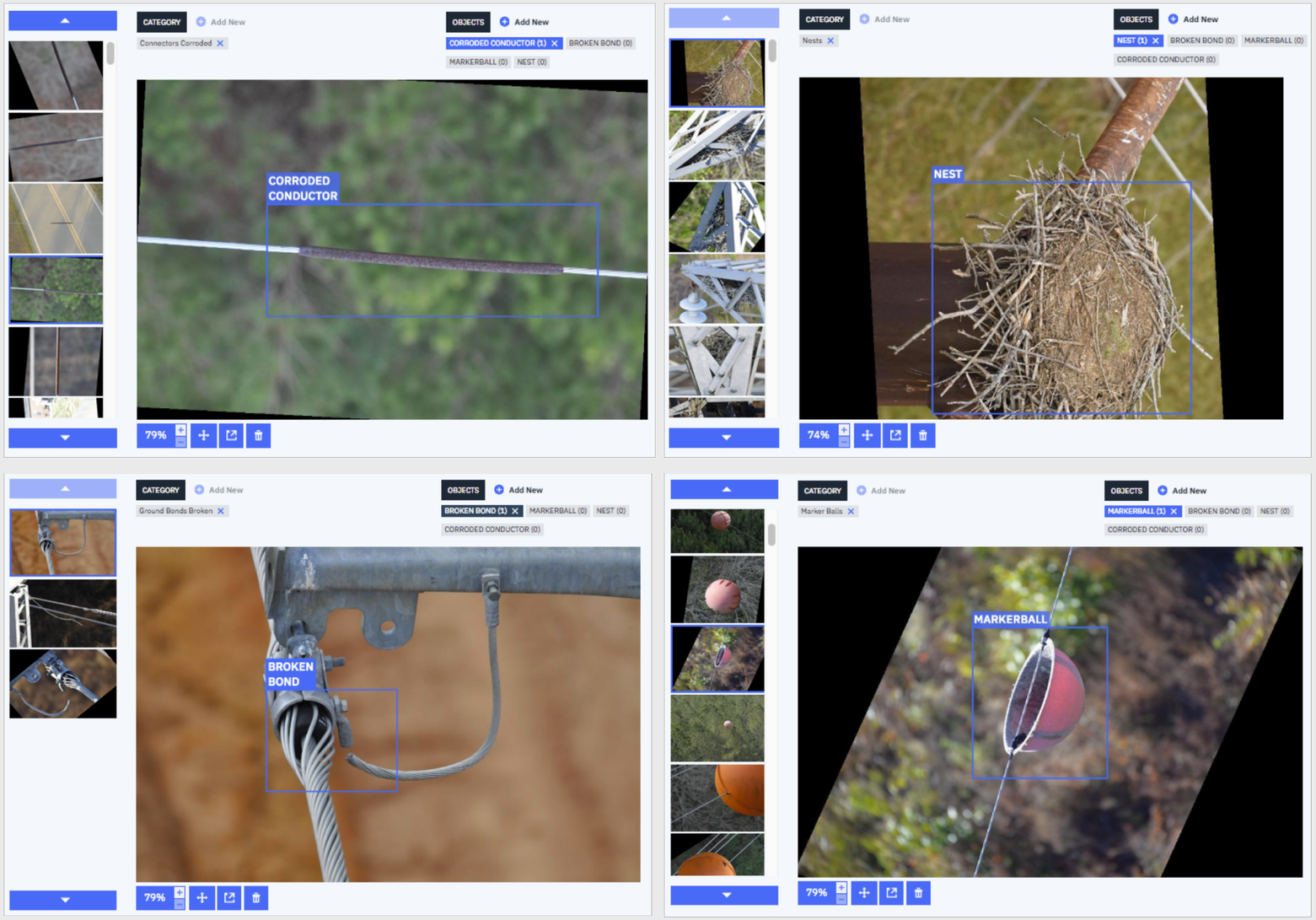


Data centers

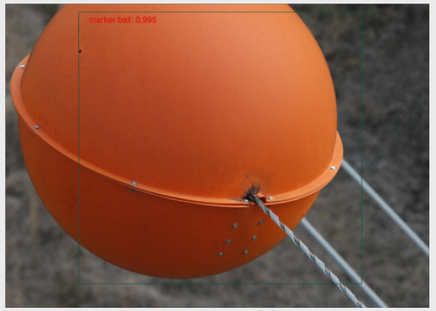
LABEL → TRAIN → DEPLOY

Detection of defects

Auto label objects for training



Broken Bond: 0.99



Marker Balls : 99

Bird nest: 0.995

Training

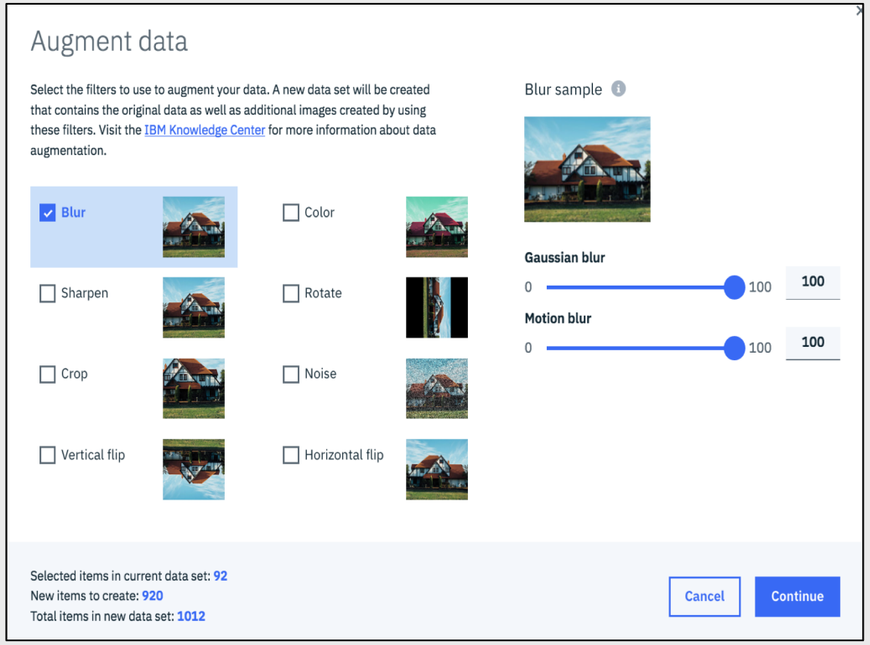
Inference

Augment limited datasets for higher accuracy

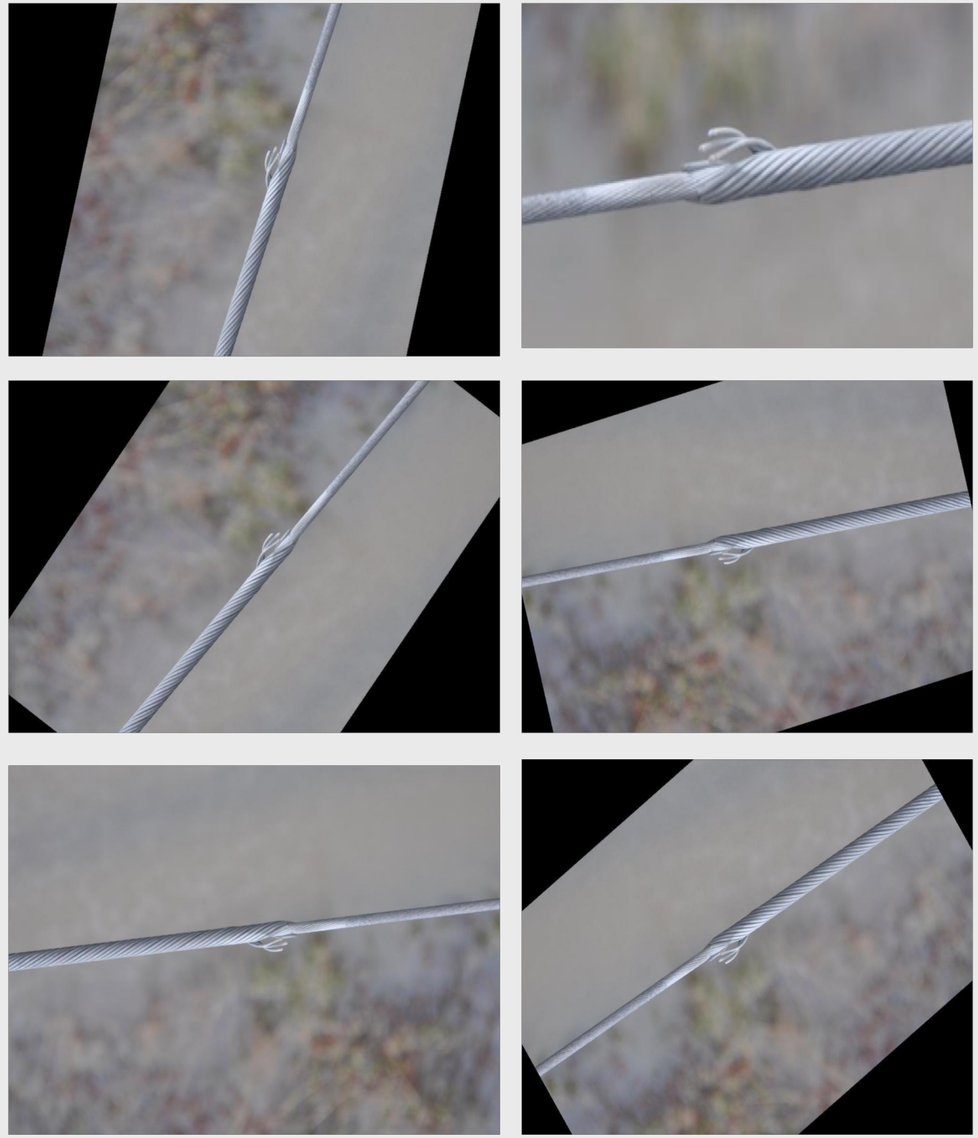
work with limited data

- Generate variety of images for initial datasets
- Software can apply filters to augment data and increase images for training
- Augmented data reduces overfitting for small datasets and increases accuracy

Limited dataset



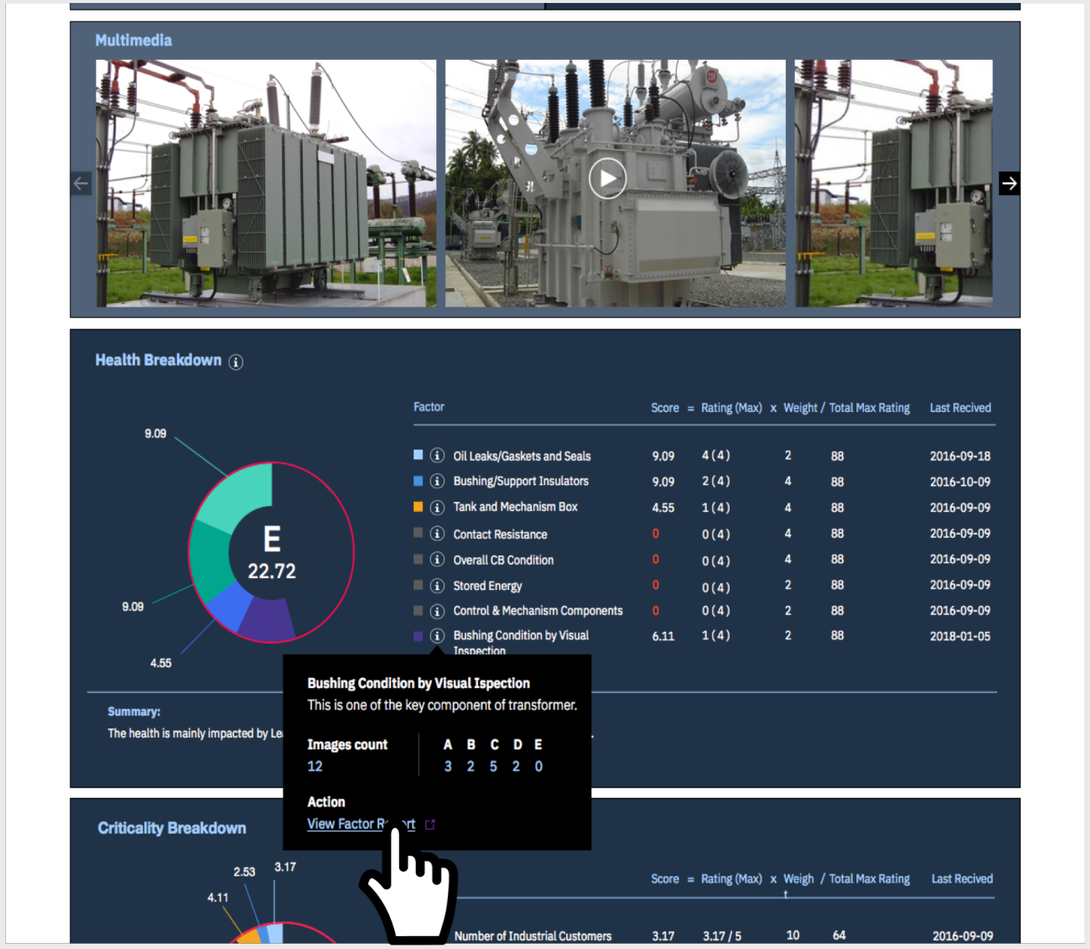
Inbuilt augmentation algorithms



Augmented datasets

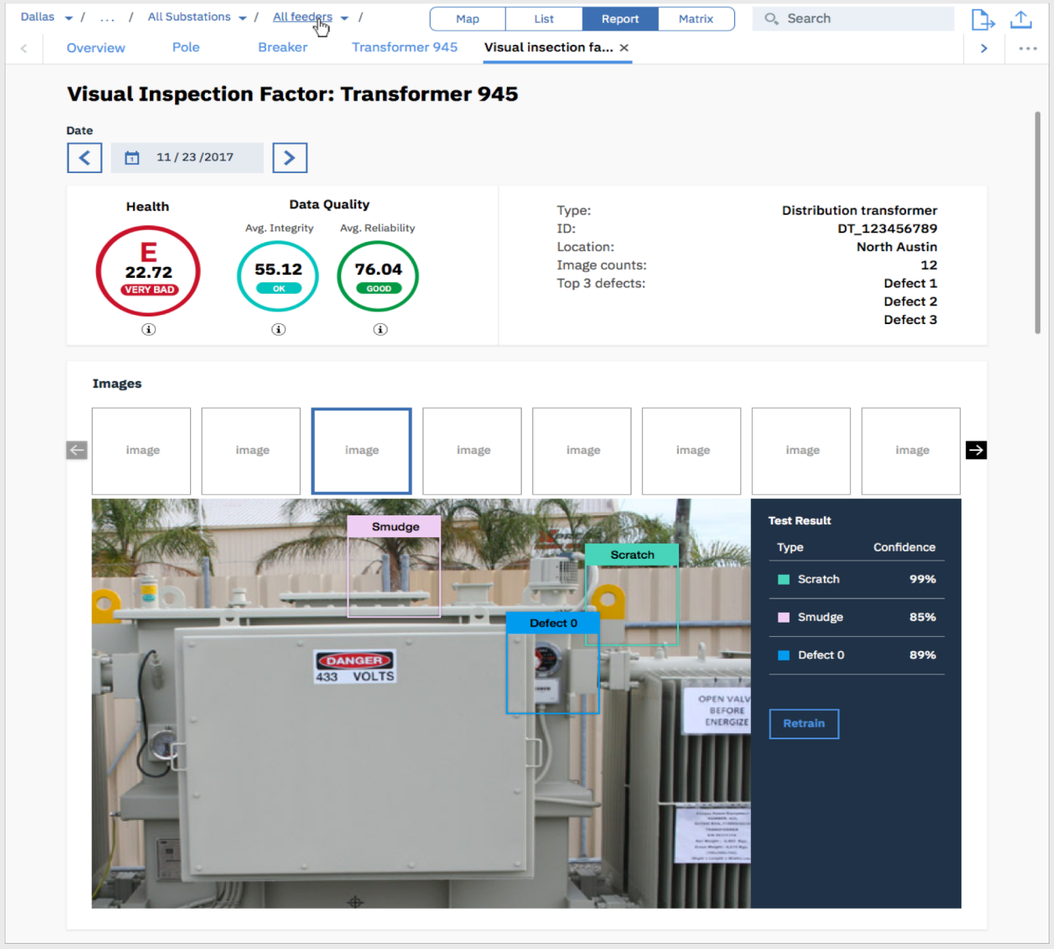
Enhancing actionable insights with computer vision

WatsonIoT Insights for Energy



KPI dash boards

IBM PowerAI Vision

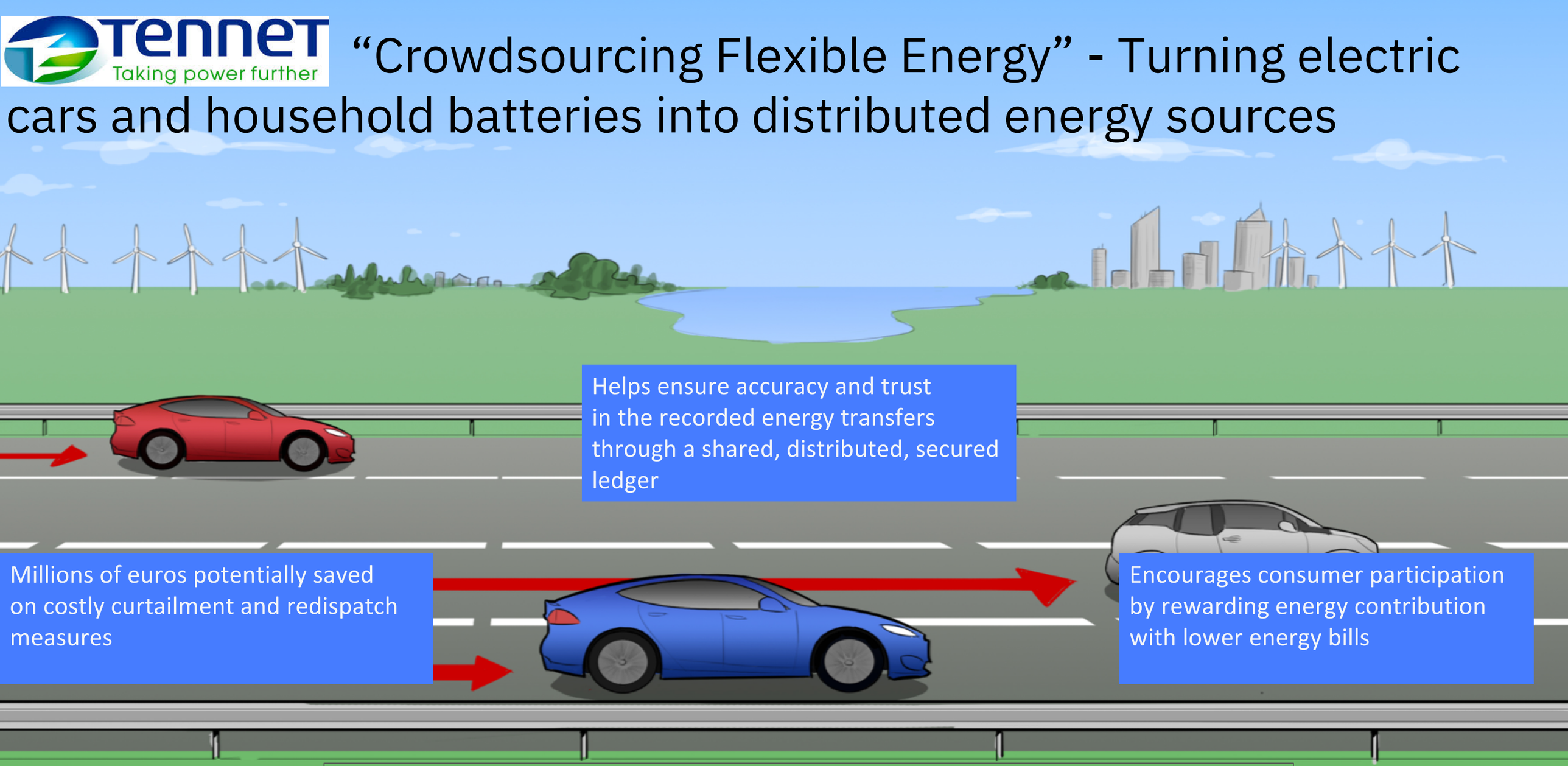


Visual insights

Crowdsourcing Flexible Energy

Blockchain at Scale

“Crowdsourcing Flexible Energy” - Turning electric cars and household batteries into distributed energy sources



Helps ensure accuracy and trust in the recorded energy transfers through a shared, distributed, secured ledger

Millions of euros potentially saved on costly curtailment and redispatch measures

Encourages consumer participation by rewarding energy contribution with lower energy bills

“We believe that blockchain could potentially form the basis for a new European energy system and become a standard for other European countries.”

—René Kerkmeester, Digital Transformation Lead, TenneT TSO B.V.

What was the method?

Design Thinking and Agile at scale

Design Thinking combined with Agile….Key to Success

Use Agile and Minimum Viable Products to deliver projects, and “build” new capabilities faster and better.