

BC Women in Infrastructure

Digital Capital Projects:

Using Analytics to make more informed decisions

May 27th, 2021

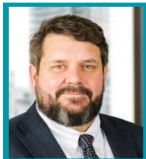


Our Panel



Facilitator
Tara Rogers
Director, Financial Advisory
Infrastructure and Capital Projects

Tara is on the steering committee for BC WIN. She joined Deloitte in October 2020 and is focused on growing the Capital Projects practice within BC. Tara has 25+ yrs experience in the infrastructure sector having worked in several different jurisdictions in a variety of different roles.



Subject Matter Expert
Guy Lembach
Partner, Financial Advisory
Infrastructure and Capital Projects

Guy Lembach is based in Calgary. Formally a professional engineer and practicing lawyer, Guy brings over 20+ years of practical experience in the engineering, construction, infrastructure and capital investment field(s) advising on project performance management, construction litigation support, and how organizations can use technology to enhance their delivery of services.



Subject Matter Expert
Angela Choi
Senior Manager, Financial Advisory
National Value Creation Services

Angela is a leader in PropTech M&A, operational and transformational real estate and operational strategy and has depth of expertise in guiding complex, multi-million dollar operational, facilities management and workplace projects. She enables successful organization- wide solutions that facilitates project alignment with the overarching strategy.



Subject Matter Expert
Karen Berkhout
VP, Marketing & Communications
IOTICITI

Karen has 20 years' experience leading high-performance teams in technology, financial services, airline, telecom, development, and the arts. Karen has broad expertise in strategic planning, marketing, corporate comms, M&A, and the execution of national and international programs.

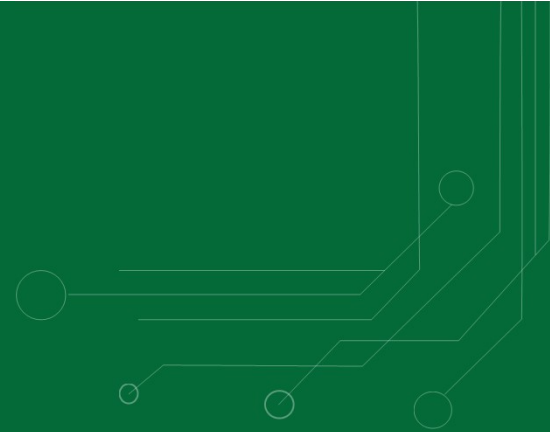


Subject Matter Expert
Alessandra Toteda
Senior Manager, Financial Advisory
Financial Advisory Forensic

Alessandra is in the Intelligence Team of Deloitte's Forensic service line. Alessandra is a lawyer and member of the Law Society of Upper Canada. At Deloitte, she specializes in the collection and analysis of open-source information, including social media, traditional media, and deep and dark web intelligence collection.



Strategy to initiative for Infrastructure and Capital Projects



Strategy to initiative | Overview



Strategy

strat·e·gy/'stradəjē

A method or plan chosen to bring about a desired future, such as **achievement of a goal or solution to a problem.**

(source: *business dictionary.com*)



Capability

ca·pa·bil·i·ty/
kā-pə-'bi-lə-tē

The ability to do something

(source: *business dictionary.com*)



Initiative

in·i·ti·a·tive/
i'niSH(ē)ədɪv/

The ability to _____ for _____ (achieving a goal/ or solving a problem) leveraging
_____ (technology)

Strategy to initiative | Initiative Example



The ability to easily access project performance data to drive effective decision making leveraging an integrated reporting platform



The ability to leverage real time data to increase field productivity by adopting field actualization technology

The ability to accelerate design to enhance capital efficiency by leveraging machine learning

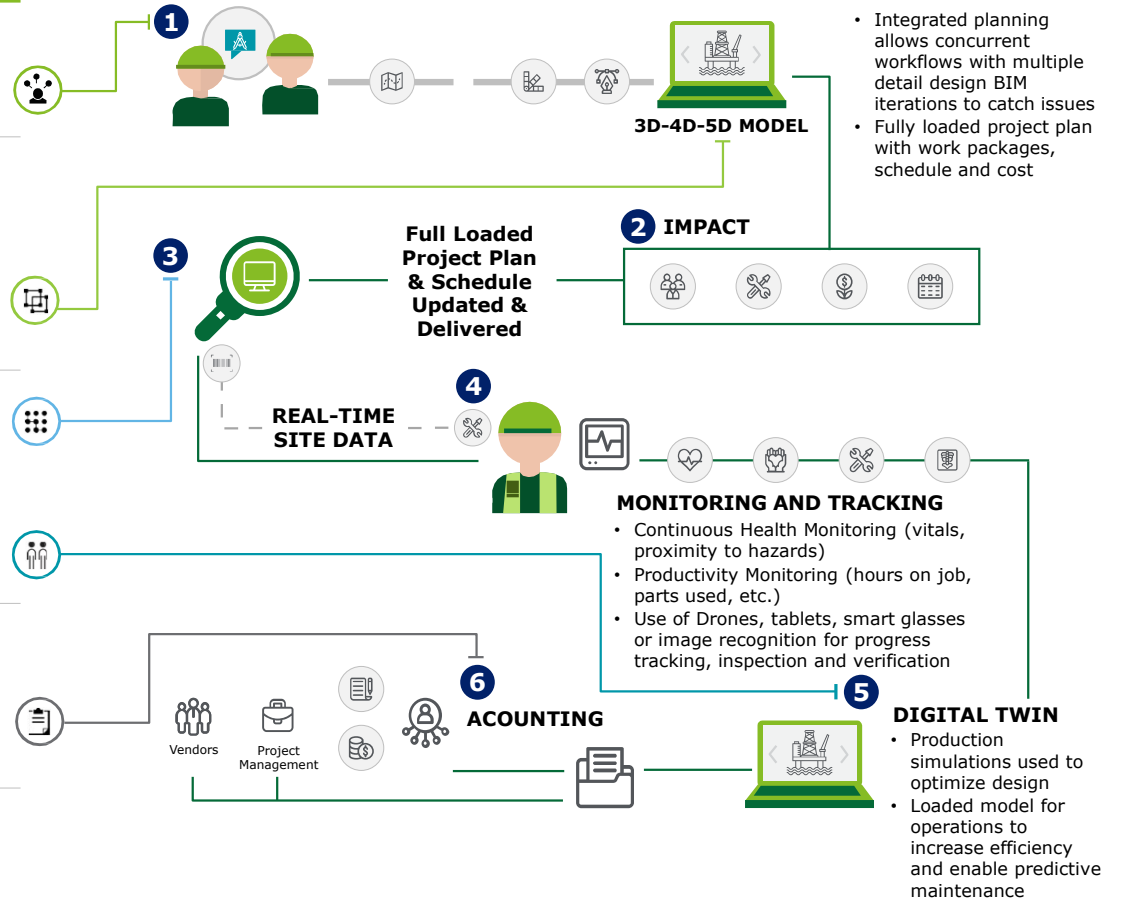


Deloitte Vision of the Future

Capital Projects

Insights into the Project Execution

Integrated Reporting Platform	<ul style="list-style-type: none"> • Cross vendor multiple disciplinary integrated project reporting platform to collect, document and visualize project data • One platform to include resources, skills, schedules and acceptance criteria
3D-4D-5D Model	<ul style="list-style-type: none"> • Platform for collaborative planning that allows concurrent workflows with multiple detailed design Model iterations • Incorporates best design practices by use of templates or data from past projects for accelerated, repeatable, scalable designs • Fully loaded project plan with work packages, schedule and cost based on 3D Model • Link to Model for reduced administrative overhead and improved vendor performance
Foresight Through Predictive Analytics	<ul style="list-style-type: none"> • Comparative analytics from similar past projects including leading indicators, predictions on project success / failure • Predictive insights based on external factors and unstructured data • Proactive risk prediction • Use of Drones, tablets, smart glasses or image recognition for progress tracking, inspection and verification • Productivity and safety monitoring (vests, cards or hard hats)
Digital Twin	<ul style="list-style-type: none"> • Allows for optioneering, modelling of what if scenarios and rapid screening of process alternatives. • Digital Twins can be used during FEED phase to run production simulation to optimize design • Fully loaded Digital Twin helps optimize performance during operations and enables predictive maintenance increasing efficiency, reducing cost and decreasing risk
Invoice Reconciliation & Contract Value Capture	<ul style="list-style-type: none"> • Robotic Process Automation (RPA) for invoicing • Automated Invoice Reconciliation • Pre-emptive invoice validation • Field Actualization



Deloitte Vision | Lifecycle View

We imagine the future state digital capital project along its life cycle and how this might transform the core processes, the flow of information and the supporting back-office processes.



Economic Model



Mobile Connected Workforce



Material Tracking



Real Time Data Capture



Drones and Image Recognition for inspection



Intelligent Asset Management

Strategy & Planning

Design

Procurement

Construction

Commissioning and Turnover

Integrated Planning Control and Decision Support



Scalable Delivery

- Scale project delivery and system requirements using **project risk and complexity**
- Probabilistic economic model



Artificial Intelligence

- **AI** enables accelerated project delivery options to include:
 - Facility design
 - Generation of all governance templates and content
 - WBS, estimate, schedule and AWP
- **5D design** aligned to WBS and AWP



Real-time tracking

- **Real time procurement tracking** and warehouse management using RFID or similar
- Drone enabled site survey



Integrated Data Platform



Real-time Data



Historic Data



Predicted Data

- **PMIS** set-up to support all aspects of project execution and oversight
- **Drone** enabled
 - 3 way verification of Site vs Fabrication shop vs Model
 - Progress Validation
- **Safety validation** using wearable technology (digital twinning)
- **Field actualization technology** to enable real-time data for: LEMS, progress, invoice validation
- **3D printing** options for critical items or items requiring reverse engineering



Predictive Maintenance

- **5D model** based predictive maintenance and spare inventory management

Scan the barcode below



What technology are you currently using:

- a. PMIS
- b. Predictive Analytics
- c. 3D-4D-5D BIM
- d. Digital Twin?
- e. Limited technology in my project management



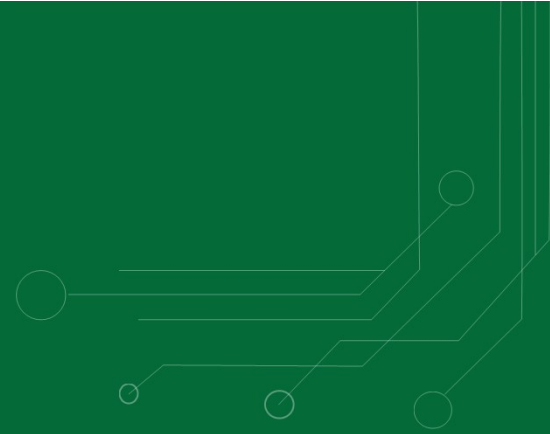
What technology are you planning to use in the next 6mths to a year:

- a. PMIS
- b. Predictive Analytics
- c. 3D-4D-5D BIM
- d. Digital Twin?
- e. No plans





Looking Ahead – Iotciti



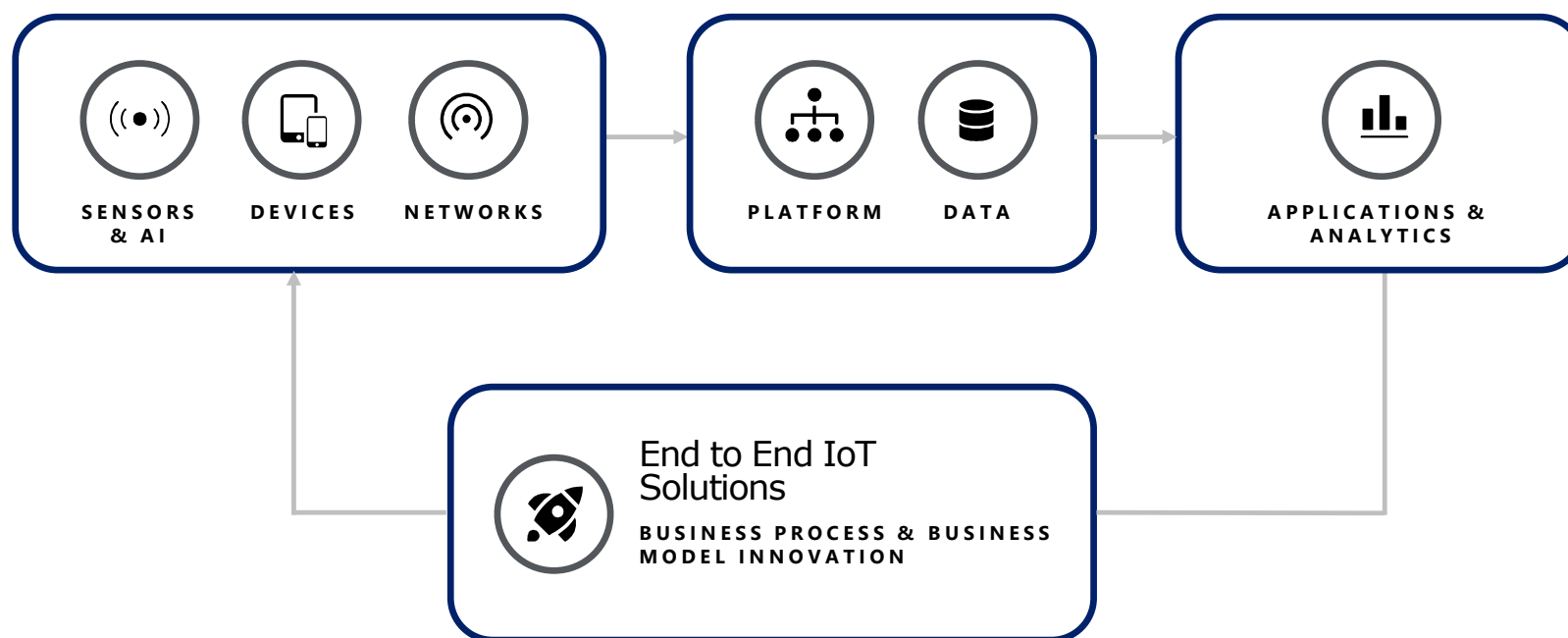
Do you use IoT in your home? E.g. Nest





How exactly does IoT work?

The Internet of Things (IoT) is a world of intelligent, connected devices that generate data companies can use to transform business. Sensor networks and Artificial Intelligence feeds data architectures which can then be analyzed to reveal hidden insights that inform **accurate** decisions and actions in **real-time**.



Construction



Current Environment and Challenges:

- Industry often has labour/ skill shortages and as result is looking to further **simplify and enable technology solutions**;
- Workers are paid hourly and their **productivity** is essential for profitability, but is **difficult to track**;
- Health and safety is a major concern, whereby **proper precautions must be in place** and continuously evolving based on regulations;
- Construction projects are **becoming more complex** and economic uncertainty poses a risk to supply chain security making controlling costs a major concern; and
- **Theft and material management** critical for controlling costs and as a result, solutions for managing and tracking materials are becoming more essential.



Ioticity Connect™ is a complete IoT solution that can be layered on multiple technologies operating on existing and/ or new platforms.

Safety and Emergency Response

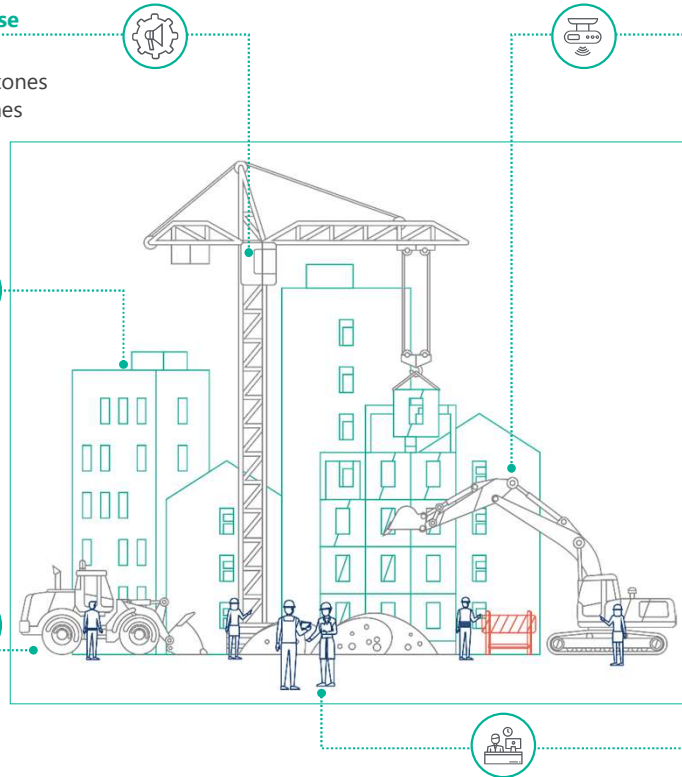
- Locate your workforce
- Geo-fencing around danger zones
- Reduce incident response times
- Reduce evacuation times
- Automatic safety equipment location

Environmental & Site Management

- Air quality monitoring enclosed areas or outside for ozone levels, smoke, concrete dust etc.
- Noise levels
- Spill detection, bin levels
- Weather (incl. wind/ fire) monitoring

Material Monitoring and Management

- Supply chain delivery monitoring
- Inventory monitoring
- Unauthorized detection/alerts
- Theft detection and inventory control
- Automatic detection of location of inventory



Asset Monitoring

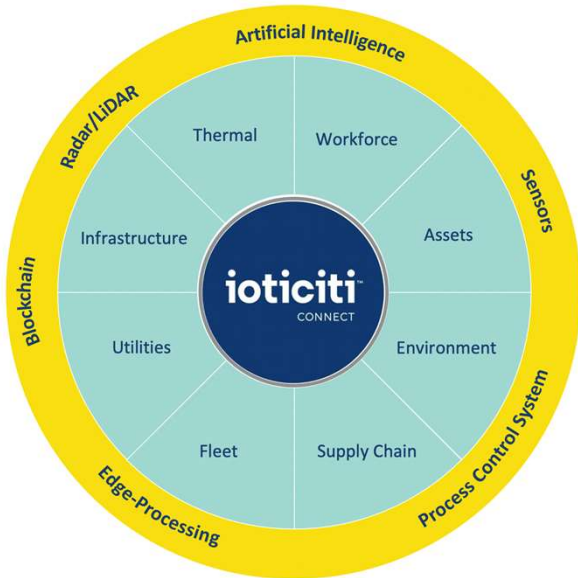
- Fleet location and tracking
- Unauthorized entry detection/alerts
- Automatic location of safety equipment, high value tools or hazardous chemicals
- Automatic detection of location of rental equipment
- Predictive malfunction alerts or overheating of machinery

Workforce Monitoring

- Worker location
- Clocking arrival, departure and time on site
- Contact tracing, including historical records of movements
- Site security and monitoring access
- Linking equipment/tool use to user credentials (e.g. authorized use, training certification, etc.
- Monitoring safety compliance, including wearing PPE
- Thermal heat monitoring

Making impact with IoT accelerators, solutions and tools

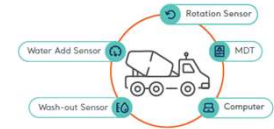
ALL of Ioticiti's solutions come with the Ioticiti Connect IoT Platform and Process Control System



END-TO-END INDUSTRIAL IoT SOLUTION FROM ONE PROVIDER

- ❑ Dispatch, monitor and report all worksite functions
- ❑ In house solutions use IoT sensors and AI for real-time data
- ❑ Improve safety, efficiency and sustainability of operations
- ❑ Holistic approach to IoT/AI solutions including network
- ❑ Ioticiti's Process Control System allows integration with all existing technologies (vendor agnostic)
- ❑ Protected and secure

CONSTRUCTION USE CASES



Mobile HQ™

SMART JOBSITE TRAILER

Our mobile data operations centre tracks all personnel, equipment, environmental factors & supply-chain onsite through sensors, AI, wearables, and fleet applications

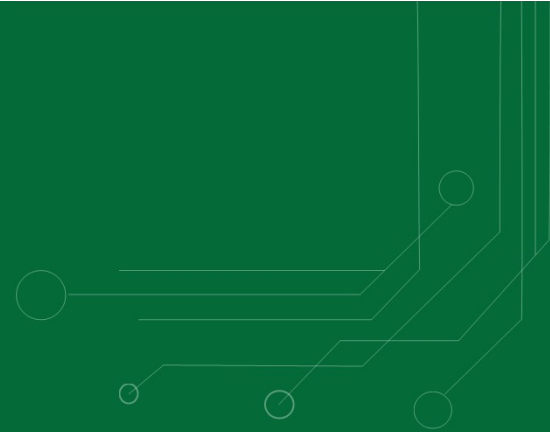
Ready-Mix

FLEET/SUPPLY CHAIN APPLICATION

Ioticiti Connect™ for Ready Mix enables real-time dispatch, monitoring and reporting to ensure just-in-time delivery, verified amounts and quality – all time-stamped and documented for invoicing and record-keeping.



Looking Ahead – Open Source Intelligence



Are you using social media in your work?



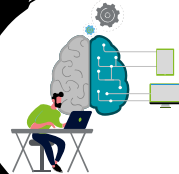
What is **OPEN-SOURCE INTELLIGENCE**

We collect and analyze publicly available information to help our clients get ahead of emerging risks, take advantage of opportunities, and make intelligent decisions that drive profitable outcomes.

We use an innovative combination of best-in-class technology and a team of intelligence analysts, forensic investigators, public relations professionals, and lawyers.

Leveraging more than 12 network analysis and social media collection and analysis tools, we can amass and analyse data from more than 650 million public sources covering more than 130 languages.

These data sources include social media networks, traditional and digital media, proprietary databases (e.g. corporate profiles) forums, blogs, deep and dark web sources, and Online chat boards.



Deloitte Intelligence

Deloitte's Intelligence team collects and analyzes publicly available information to enable organizational decision-making. Valuable insight can be derived from collecting and analyzing publicly available information to get ahead of emerging risks, take advantage of opportunities, and make intelligence decisions that drive positive outcomes.



Reputation

Identify incidents and online chatter that can influence reputation or trust in the organization and its leaderships



Events

Monitor and prepare for critical events to inform response strategies



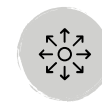
Sentiment Analysis

Collect and analyse public sentiment, themes and key influencers driving the chatter about key events, programs and announcements.



Financial Crime

Identify indications of fraud, corruption, and connections to adverse parties by monitoring media and proprietary databases.



Extended Enterprise

Identify risks related to third parties such as suppliers or partners



Innovation & Competition

Obtain insights on public sentiment around industry innovation and competitors



Brand & Reputation

Identify emerging signals that can influence reputation or trust in your brand or leadership



Workplace

Identify trends related to leadership, culture, workplace conduct and employee voices

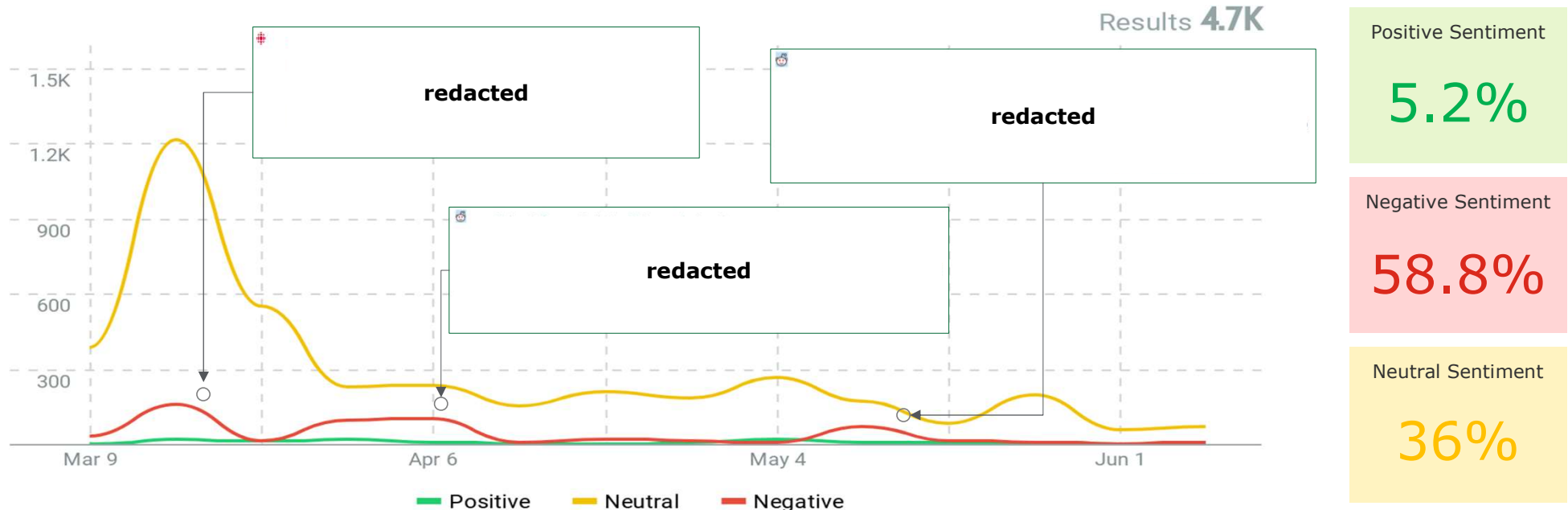


Geospatial Analysis

Use social media, satellite, and other geospatial data to monitor and understand geographic locations of interest

Open-Source Intelligence | Example 1

Sentiment Analysis - "Next Normal" Workplace Research



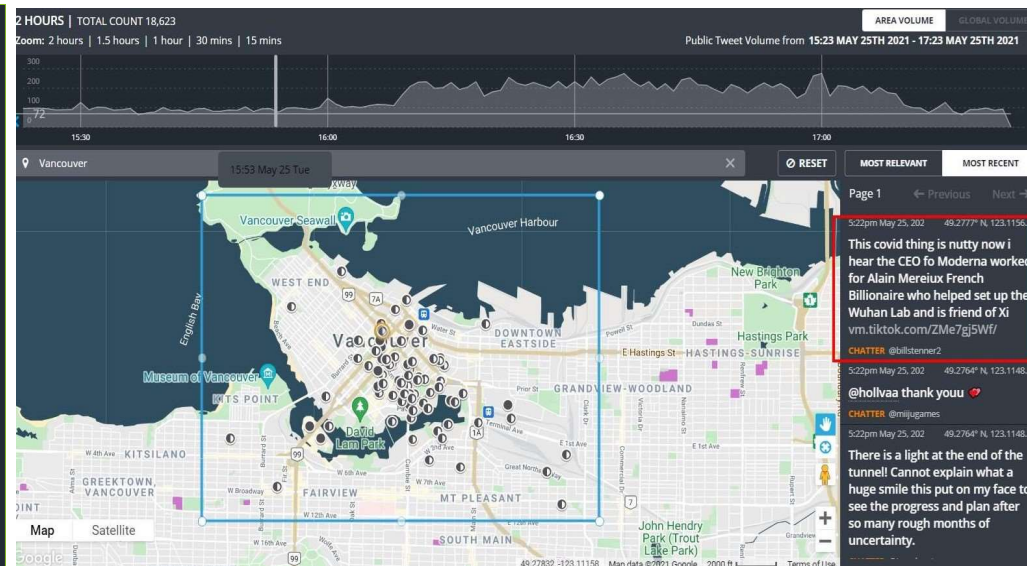
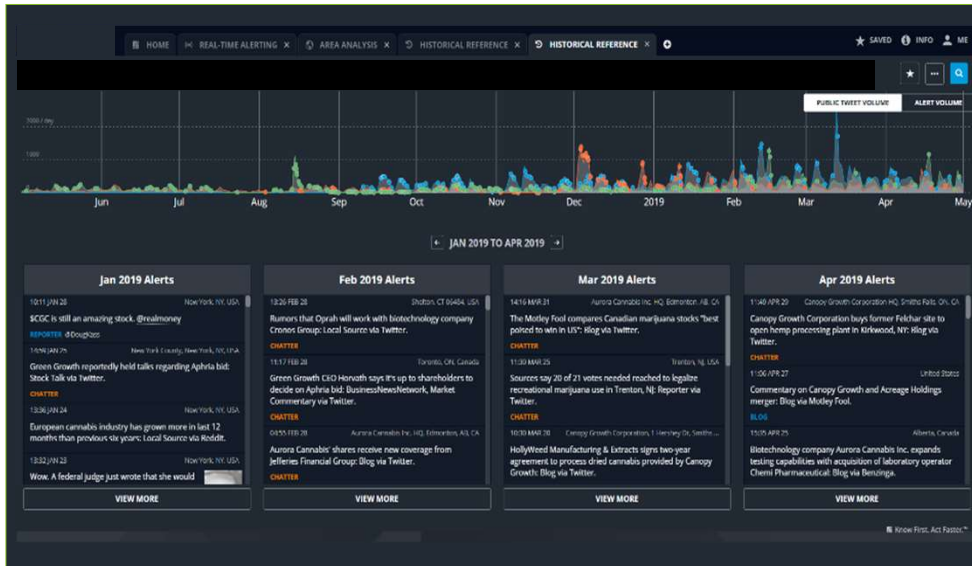
Themes Identified

- Physical Security in the Office
- Physical & Mental Health
- Remote Working & Productivity
- Public Transit & Building Access

- Working from home is causing minor operational issues relating to IT & infrastructure, but overall is perceived by employees as increasing well-being and productivity.
- Apprehension towards the use of public transit and concerns over parking and building access once employees return to work.
- Concern over proximity issues in shared office spaces and in consistency of leadership over strategic approach to health and safety.

Open-Source Intelligence | Example 2

Geospatial Analysis – Incident Response



Process

- Rapid Mobilization
- Active Monitoring
- Geospatial Analysis
- Real-time Intelligence

- The client was concerned with damage to critical infrastructure and the safety of its employees as a result of protests near their facilities.
- Over the course of 7 days, using urgent alerting and active monitoring technology, along with manual searches of relevant social media accounts, blogs and forums, Deloitte provided real-time intelligence regarding the situation on the ground, pulled from social media and satellite imagery.



| Questions and Answers |



| Thank you for your time and participation |