Impact of Big Data on Food Safety Risk Management and Decision Making of Government and Food Supply Chains

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ICMSF
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Makan
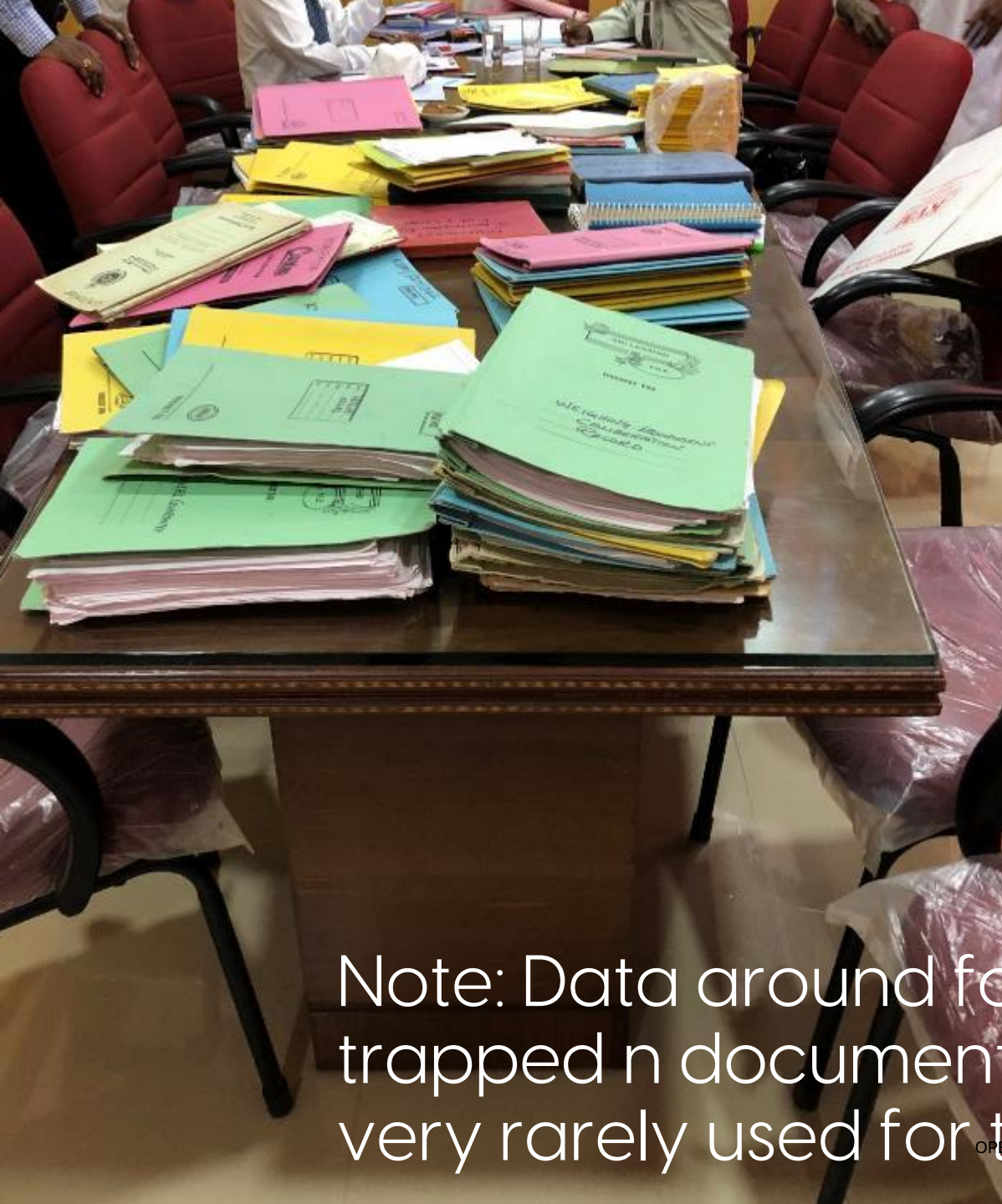**(Home)**

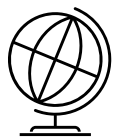**Kappada**
(Clothes)

Roti
(Bread)

DATA

Note: Access to Data is a fundamental requirement

Note: Data around food safety is normally trapped n documents and records and is very rarely used for trend analysis

OPEN DATA/ بيانات مفتوحة

Data

Dubai's data

160 + Countries

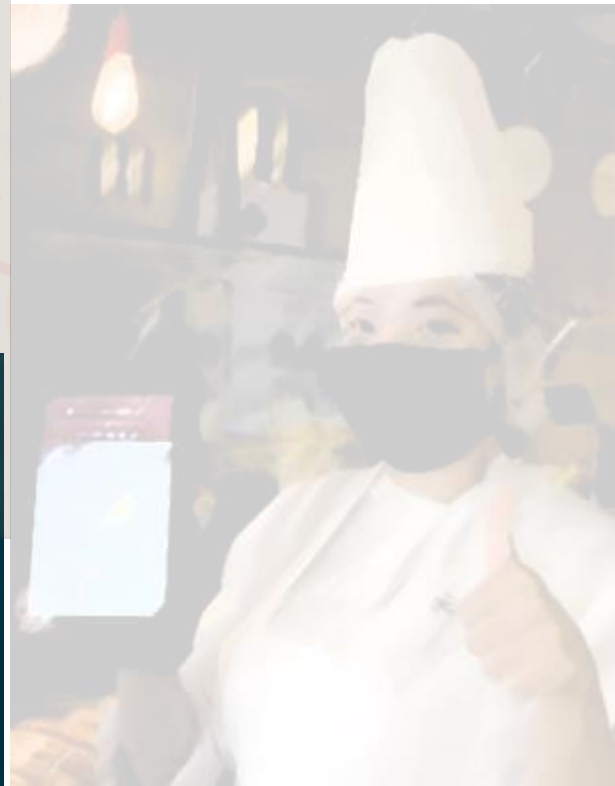Food is imports from 160+ Countries

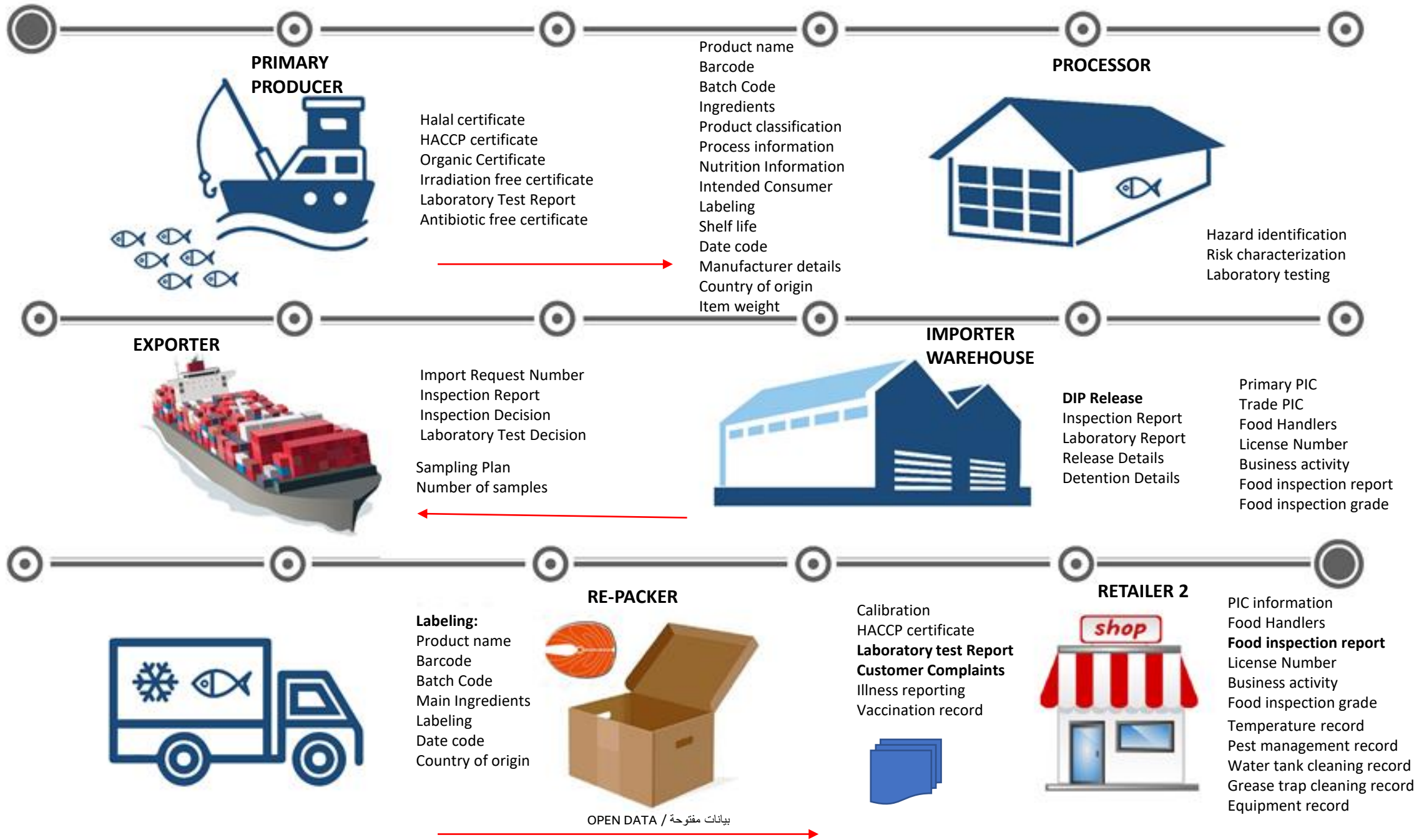## 30,000 Food Businesses

Restaurants, Traders, Manufacturers

300,000+ Inspections

100,000+ Laboratory tests

Note: Data can come from numerous sources in structured and unstructured form

بيانات مفتوحة / OPEN DATA

PRIMARY PRODUCER

Halal certificate
HACCP certificate
Organic Certificate
Irradiation free certificate
Laboratory Test Report
Antibiotic free certificate

Product name
Barcode
Batch Code
Ingredients
Product classification
Process information
Nutrition Information
Intended Consumer
Labeling
Shelf life
Date code
Manufacturer details
Country of origin
Item weight

PROCESSOR

Hazard identification
Risk characterization
Laboratory testing

EXPORTER

Import Request Number
Inspection Report
Inspection Decision
Laboratory Test Decision

Sampling Plan
Number of samples

IMPORTER WAREHOUSE

DIP Release
Inspection Report
Laboratory Report
Release Details
Detention Details

Primary PIC
Trade PIC
Food Handlers
License Number
Business activity
Food inspection report
Food inspection grade

RE-PACKER

Labeling:
Product name
Barcode
Batch Code
Main Ingredients
Labeling
Date code
Country of origin

Calibration
HACCP certificate
Laboratory test Report
Customer Complaints
Illness reporting
Vaccination record

RETAILER 2

PIC information
Food Handlers
Food inspection report
License Number
Business activity
Food inspection grade
Temperature record
Pest management record
Water tank cleaning record
Grease trap cleaning record
Equipment record

بيانات مفتوحة / OPEN DATA

Master Data

Master data describes people, places, or things that an organization cares about. For example, a food manufacturer, address, and contact information, a food they make are master data

Transactional Data

Transactional data describes an event that master data participates in- Like a laboratory test report associated with the manufacturer, an inspection report etc

Unstructured Data

Unstructured data that comes from emails, notifications that are not through the system etc

Metadata

Data that provides information about other data, such as when and how it was gathered. Metadata can also provide context with details such as the source, type, owner, and relationships to other data sets. It can make tracking and working with specific data easier.

Variety

Velocity

Volume

Value

Veracity

Variability

Visualization

Food Safety Department

- Food Inspection
- FIRS Item Details
- Imported Products 3 years
- FIRS - From Consignments to Lab Tests
- Foodwatch Startup Inspections Details
- Food Samples Testing - Labware and GIAFS
- Food Reports
- Data of Imported Food Statistics
- Item Registration and Label Assessment Report
- Consignment Country Statistics
- Double Action and Wrong Status
- Inspection Business Records

Note: Creating customized visualization tools for team is an important part of data utilization

Dubai Municipality

Note: Role of the organization

Food Safety n & Security

Pest Management

Waste and Environmental Services

Training of Food Handlers

Permits for Food Transportation Vehicles

Digital Journey
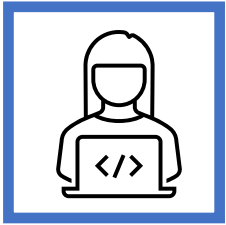
2002

Food Inspection

2004

Food Trade

Process
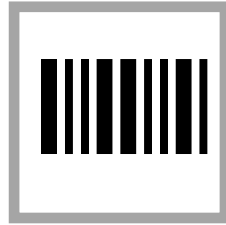
2007

Food Product

Registration

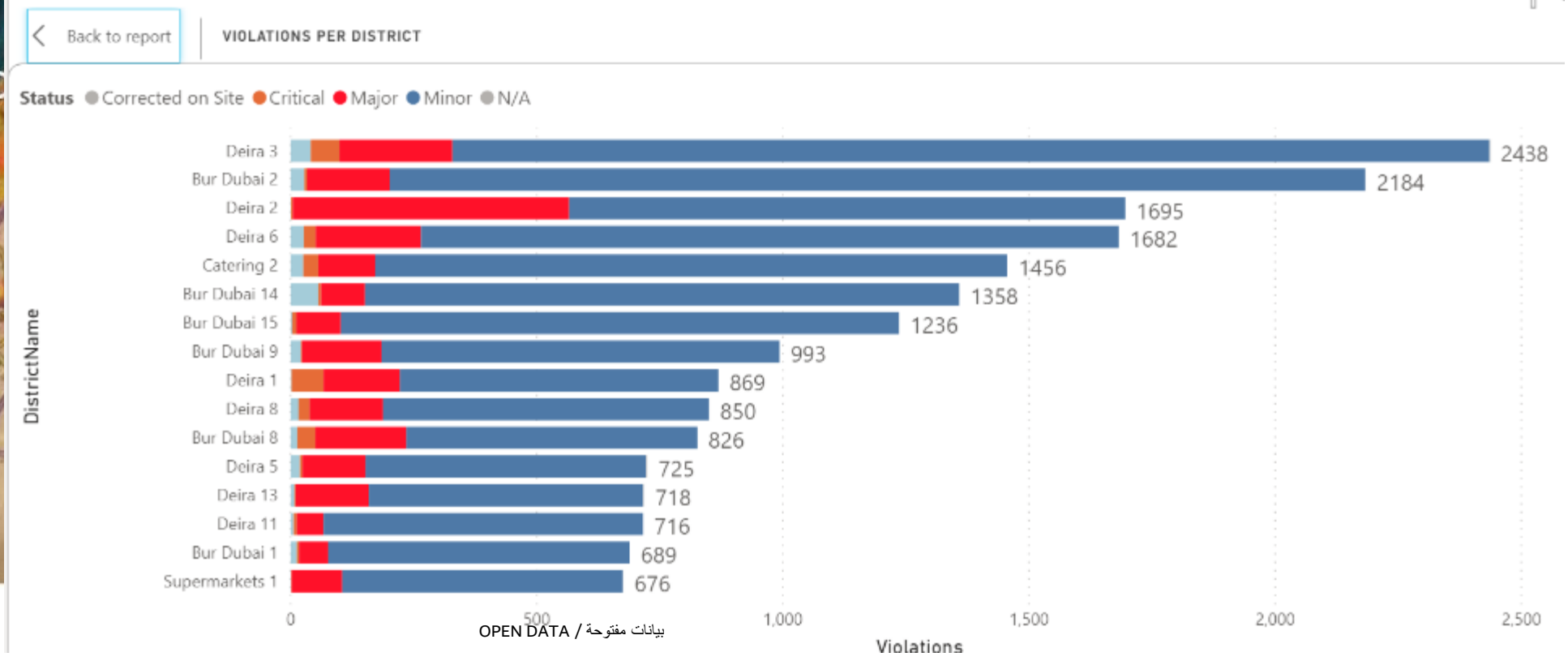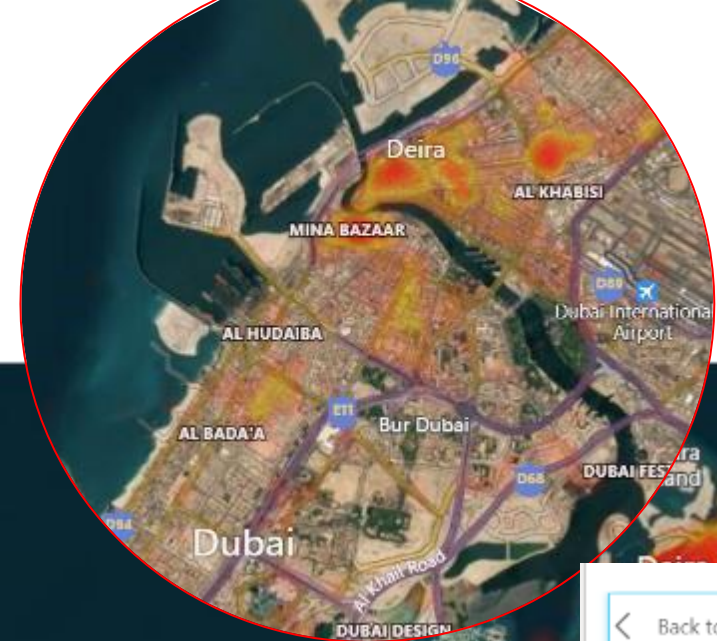**2007**

Laboratory Test

Reports
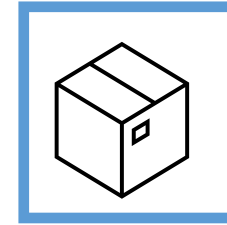
2012

Food Label

Information
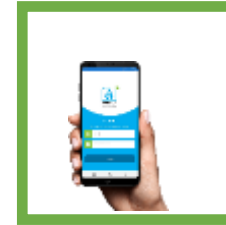
2018

Food Safety

Management

System

Note: Map showing the hot-spots for food safety violations
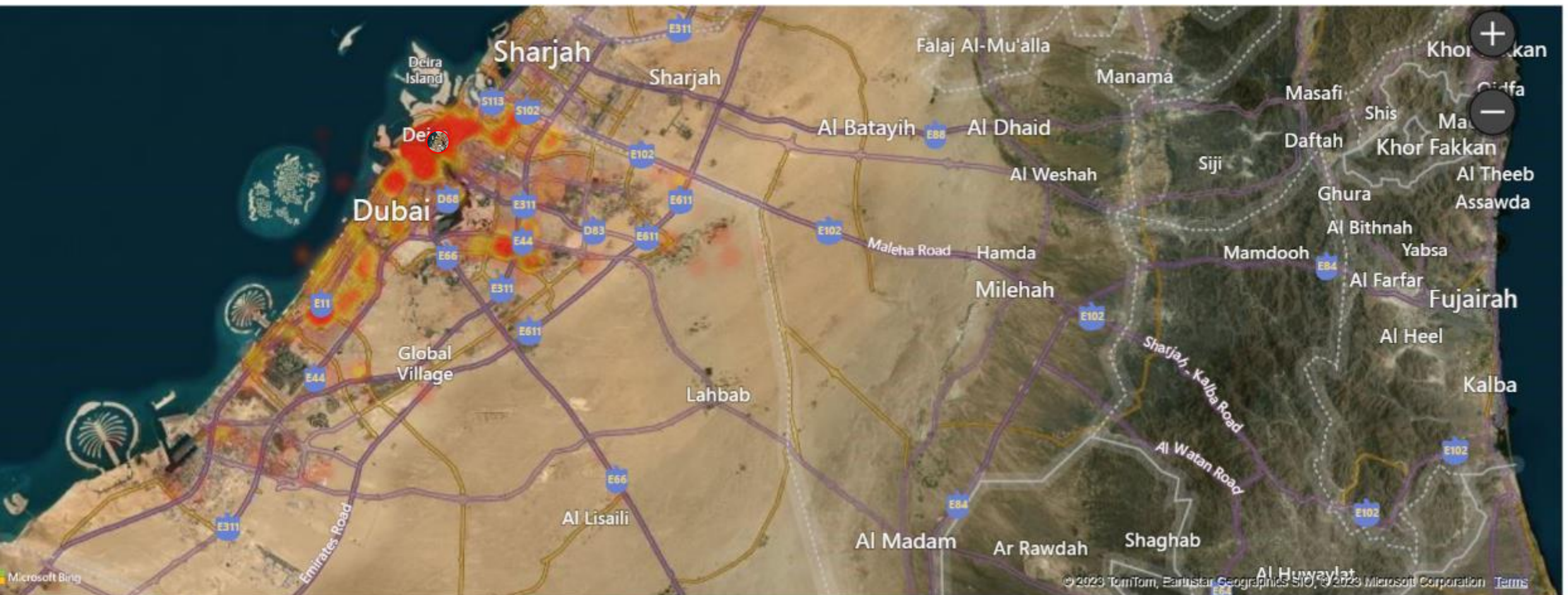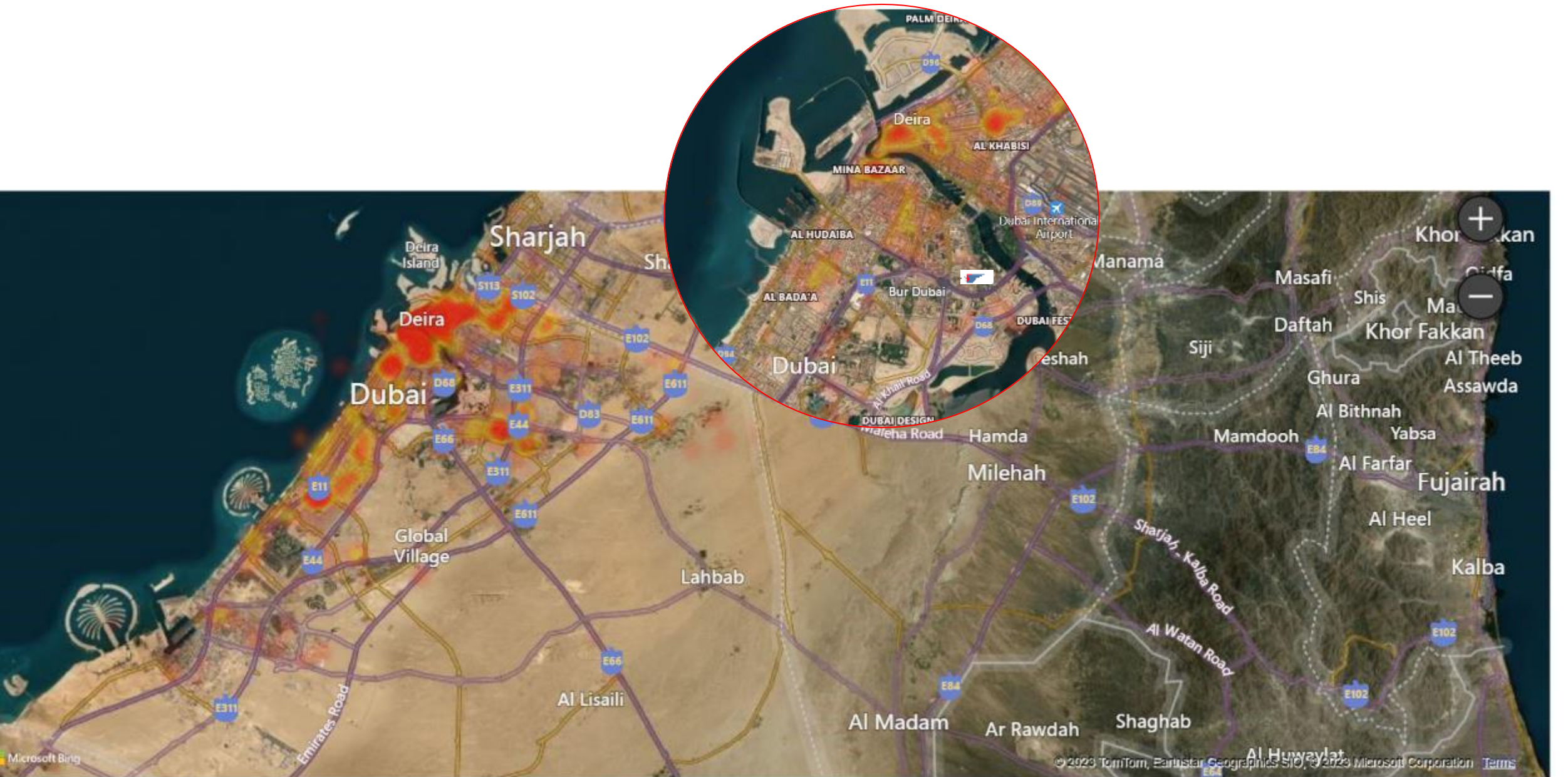
بيانات مفتوحة / OPEN DATA

بيانات مفتوحة / OPEN DATA

Note: Identify predictors of critical risk factors that contribute to foodborne illness using the food inspection data
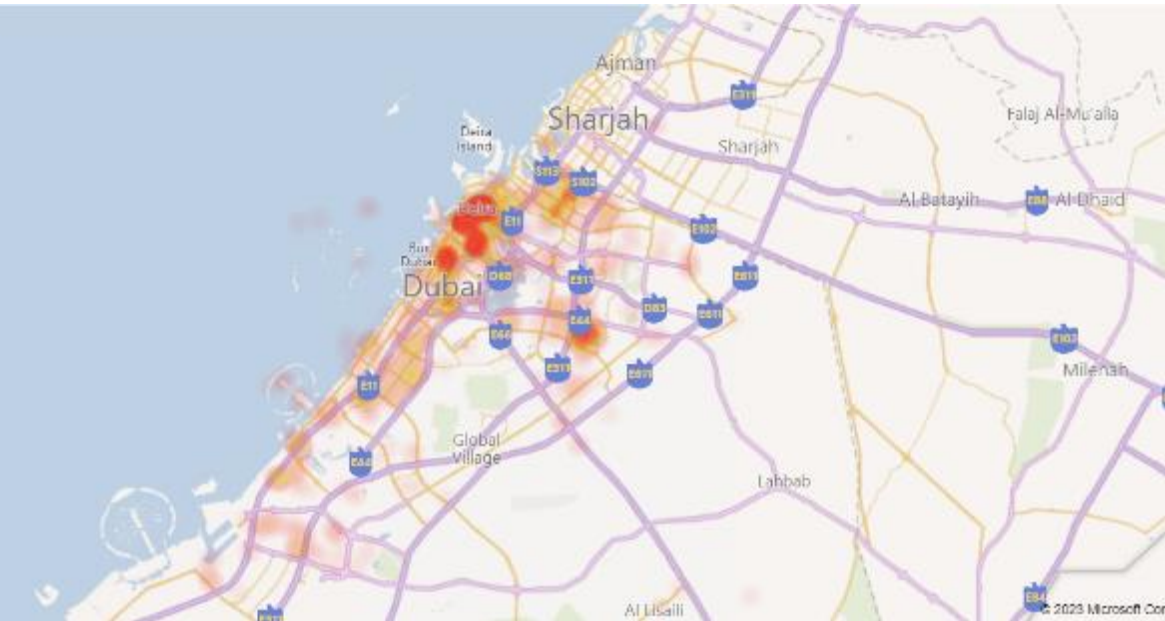
بيانات مفتوحة / OPEN DATA

Note: Identify predictors of critical risk factors that contribute to foodborne illness using the food inspection data

VIOLATIONS PER ACTIVITY

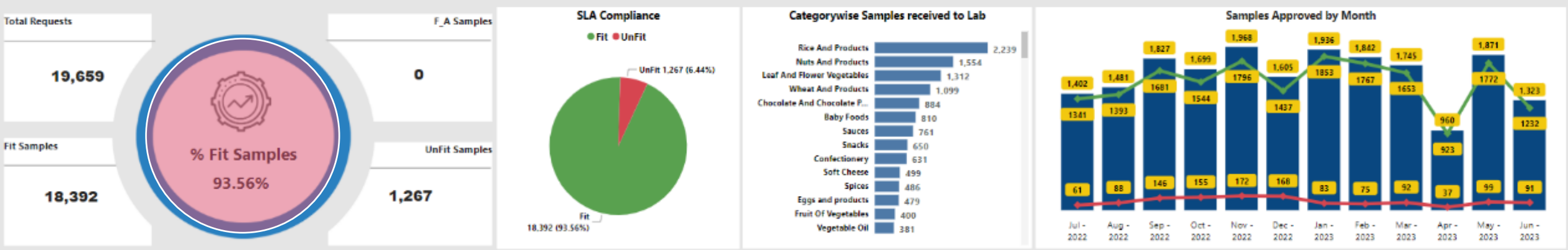Status ● Corrected on Site ● Critical ● Major ● Minor ● N/A ● Opportunity For Imporvement

بيانات مفتوحة / OPEN DATA
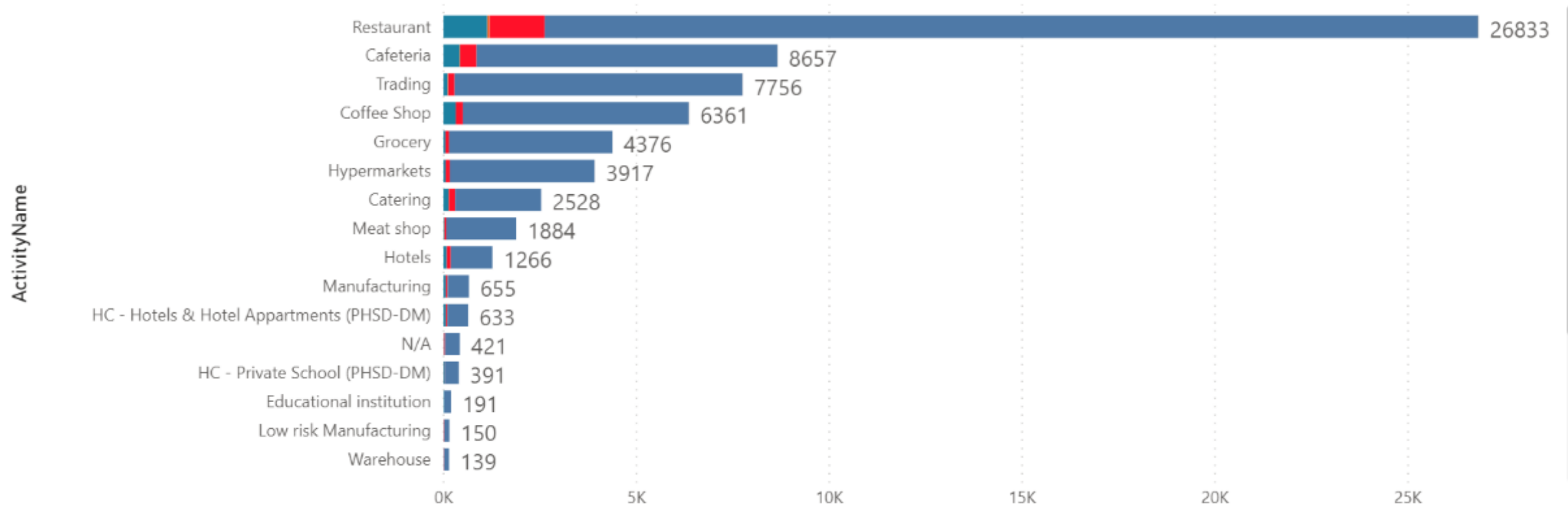
Pest Hotspots Comparison

Note: Data can be as simple as combining pest related issues picked by inspectors and consumer complaints. Such data can be used to validate approaches for prevention

GEO LOCATION – DENSITY

بيانات مفتوحة / OPEN DATA

Note: Laboratory test reports can provide valuable insights on long and short-term trends in food safety. Important to identify what foods are tested, why, from where and what is done with the results

بيانات مفتوحة / OPEN DATA

Note: Data on imports, type of food, contaminar[...] association/attribution with countries etc can b[...] used for risk management
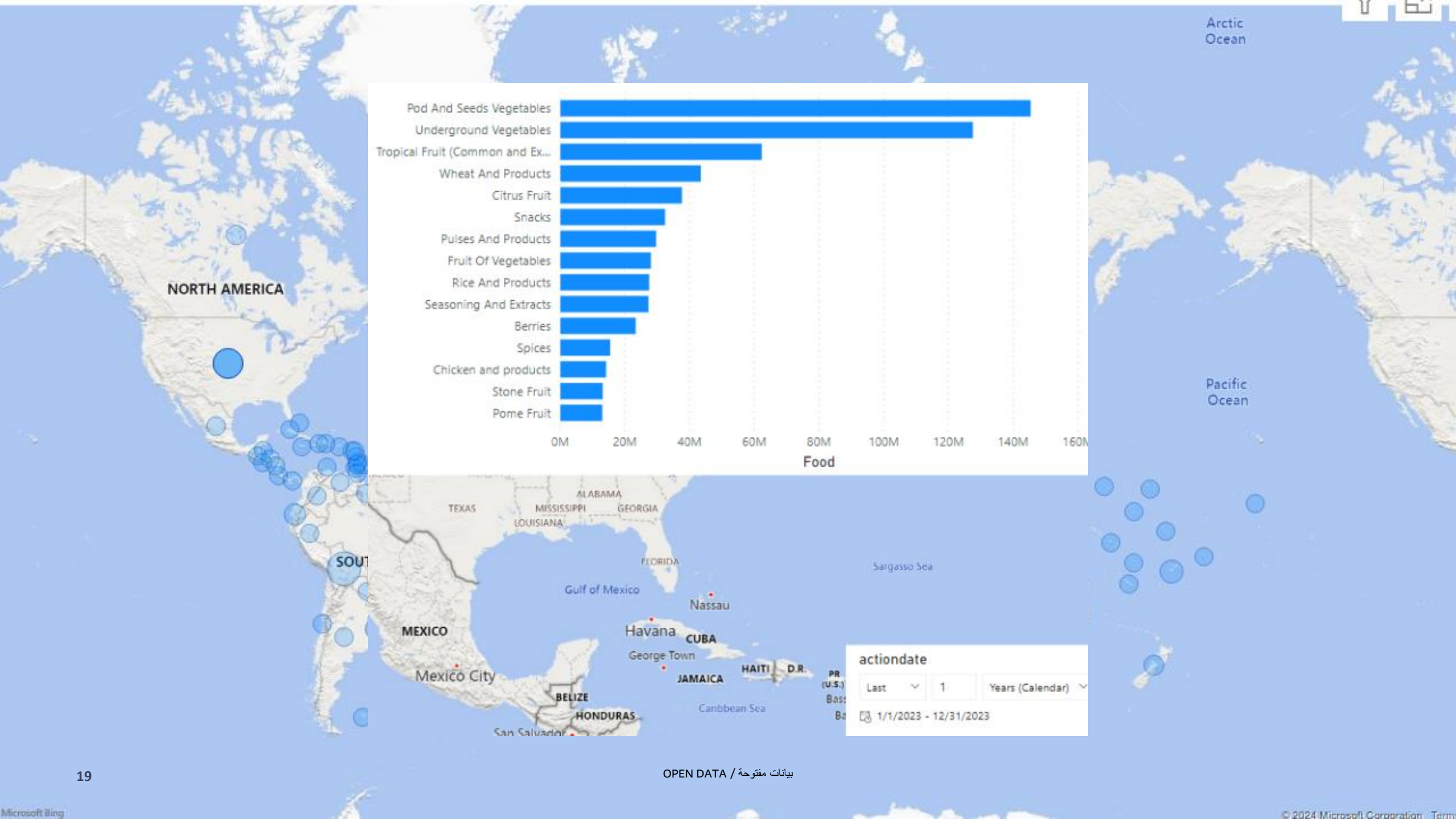
بيانات مفتوحة / OPEN DATA

Note: Potential data sources for regulators

بيانات مفتوحة / OPEN DATA

Note: Decision making is the most important part. Risk management decisions have to be data driven

Photo Source: DM Team

OPEN DATA / بيانات مفتوحة

Daily Transactional Decisions

Cross-functional Decisions

Strategic Decisions
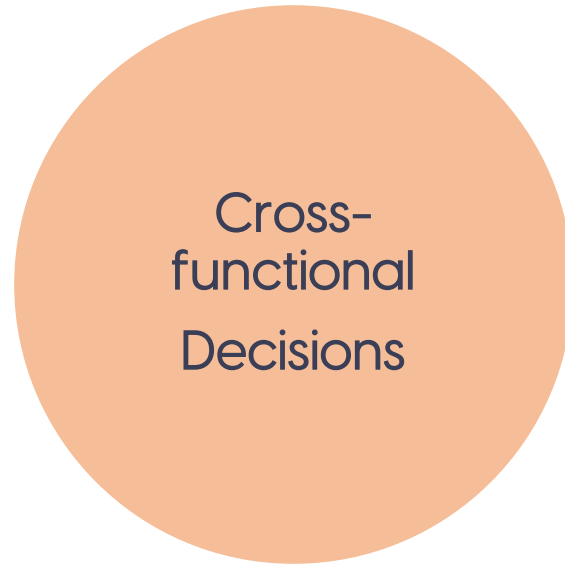
Note: Decision making is the most important part. Risk management decisions have to be data driven

Note: Some examples of how the regulatory and industry use data for decision making

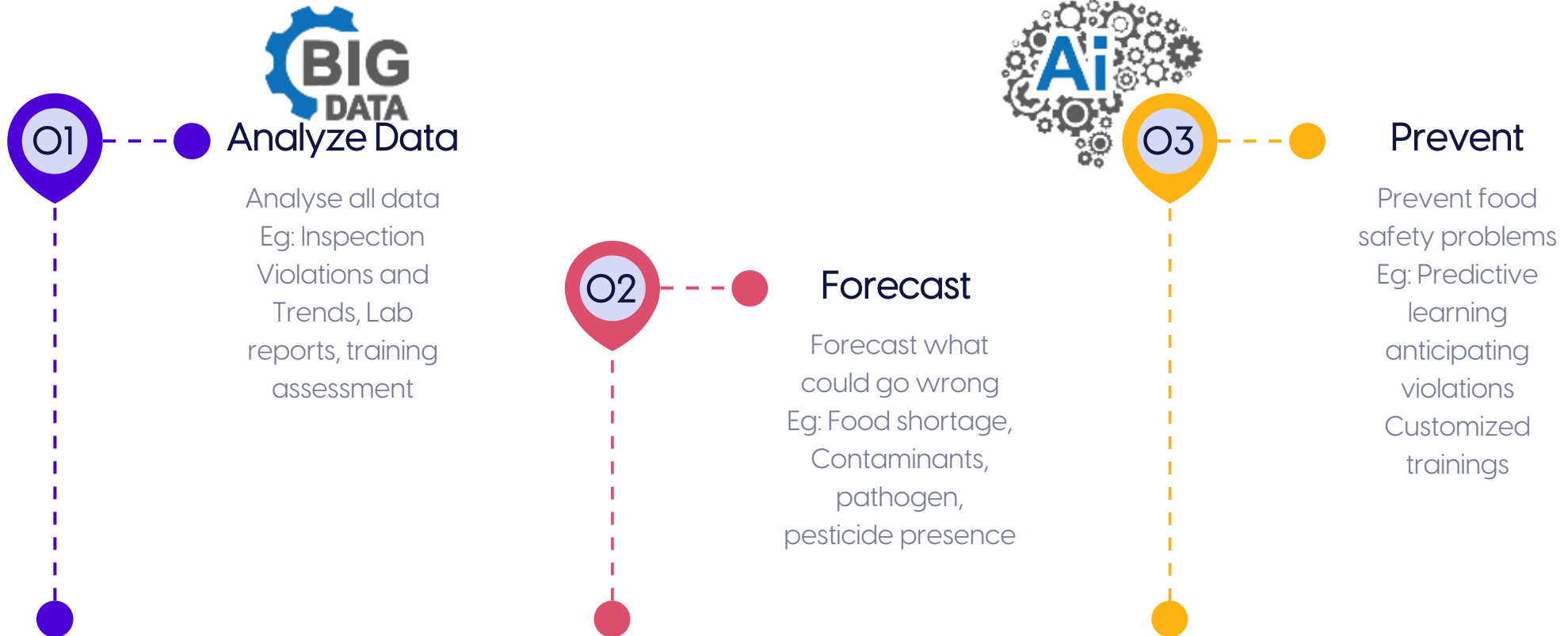| Food Inspection	Food Trade Control	Food Industry	Food Studies and Systems	Awareness and Applied Nutrition
• Identify trends in food safety violations • Take targeted measures to reduce the violations	• Analyze food import data and identify trends associated with specific products, countries, importers • Establish and reevaluate control measures such as focused inspections/ testing etc	• Train and empower workforce • Utilize digitalization tools • Identify trends and derive insights • Utilize data for decision making • Respond to initiatives	• Identify trends in foodborne diseases from surveillance data • Analyze food testing data- at the point of entry as well as market • Establish risk management strategies	• Educate the Food Business Operators • Modify the training and education strategy based on the risk factors identified • Educate consumers

Future Roadmap

Creating the Future

O1 Analyze Data

Analyse all data
Eg: Inspection
Violations and
Trends, Lab
reports, training
assessment

O2 Forecast

Forecast what
could go wrong
Eg: Food shortage,
Contaminants,
pathogen,
pesticide presence

O3 Prevent

Prevent food
safety problems
Eg: Predictive
learning
anticipating
violations
Customized
trainings

AGILE MODEL OF GOVERNANCE

Note: Work done almost a decade ago using public data.

Bloomberg

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CityLab | Housing

Chicago Is Predicting Food Safety Violations. Why Aren't Other Cities?

A case study in applying data-based civic solutions to other places.

Note: Gamification is a key component of learning reinforcement. Dubai's app for food businesses engages and empowers food industry