Geospatial Enabled Analytical Solutions for Defence & Security Forces

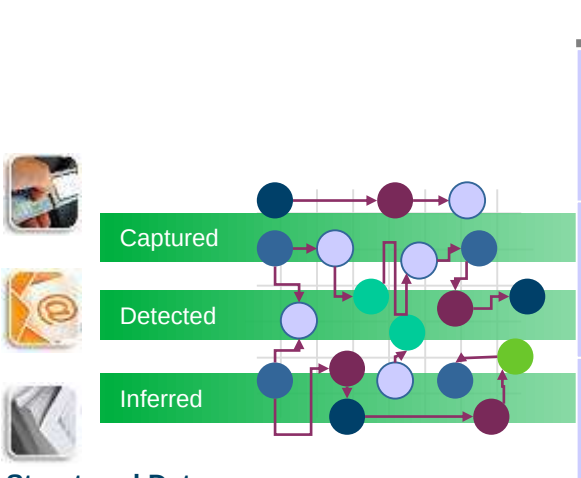
Col Pradeep Bhat (Retd)
Associate Director, Govt Industry Solutions
IBM India Pvt Ltd

Data – The New Natural Resource

Unlike all other natural resources, Data is a commodity, which is created with time, will always be in abundance and gets more enhanced the more it is consumed

Geo Enabled Data Analytics

Defence & Security Forces can improve their operational effectiveness by increasing the level of geo-enabled analytical sophistication



Structured Data
Geospatial Data
Unstructured Content

Made consumable and accessible to <u>everyone</u>, <u>optimised</u> for their specific purpose, through:

Analytics Sophistication

	Descriptive Analytics	Predictive Analytics	Prescriptive Analytics	Cognitive Analytics
	What happened?	What could happen? *Simulation*		How can the system learn with experience? *Cognition*
	How many, how often, where?	What if these trends continue? *Forecasting*	How can we achieve the best outcome? *Optimization*	How can we get reasoning behind the decisions? *Cognition*
	What exactly is the problem?	What will happen next if? *Predictive Modelling*	How can we achieve the best outcome and address variability? *Stochastic Optimization*	How can we interact in a natural language? *NLP*
	What actions are needed?			

The Landscape – Devices & Apps

Org Levels

- Dets/ SubUnits
- Field Units
- Field Fmn HQs
- Comd & Army HQs
- Tri-Service & External Organisations
- IBM Cloud & Cognitive Services, Google, ESRI, MapMyIndia, Digital Globe, Mapbox, Pitney Bowes...

Devices

- IaaS & PaaS
- Platforms

App & GIS Deployment

- Mobile/ Rich Client/ Web Client
- Local Server applications
- Private Cloud
- Federated Cloud/ Govt of India Cloud
- Service Providers
- Developers

App & GIS Versions

- Mobile/ Desktop
- Workgroup
- Enterprise
- Cloud
- As a Service

The Landscape – Users & Data

Communities

Ops & Int

Logistics

Admin

Self Service

User Interactions

Self Service – Individuals & Appointments

Collaborative – User Groups & Communities

Enterprise – Within & across the organisation

Services

Geolocation

Spatial Analytics

Decision Support

Analytical Data Types

Structured

Semi-structured

Unstructured

GIS Data Sources

Internal

Other Govt Orgs

Private Sources

Platform Providers

Security

Users/Appts – Ids, Role based Access

Apps – Code, Runtime, In Execution

Data – At Rest, In Transit Encryption

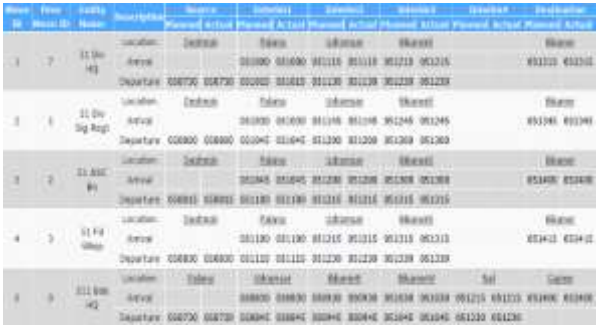
Content – Masking, Redaction

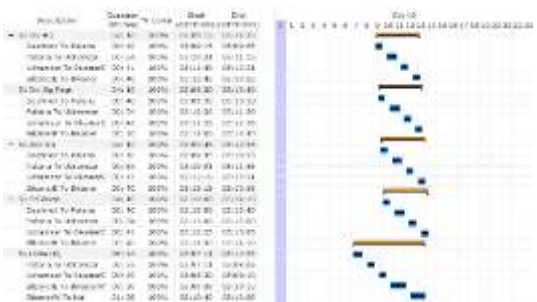
Democratization of IT - Analytics as a Service

Use Case: Convoy Scheduling & Optimisation

- Convoy of vehicles carrying weapons and soldiers have to be transported from certain locations to other locations based on various constraints
- Objective is to create an optimal schedule with real time updates and changes so that the constraints are met and convoys reach the destination on or before the desired time

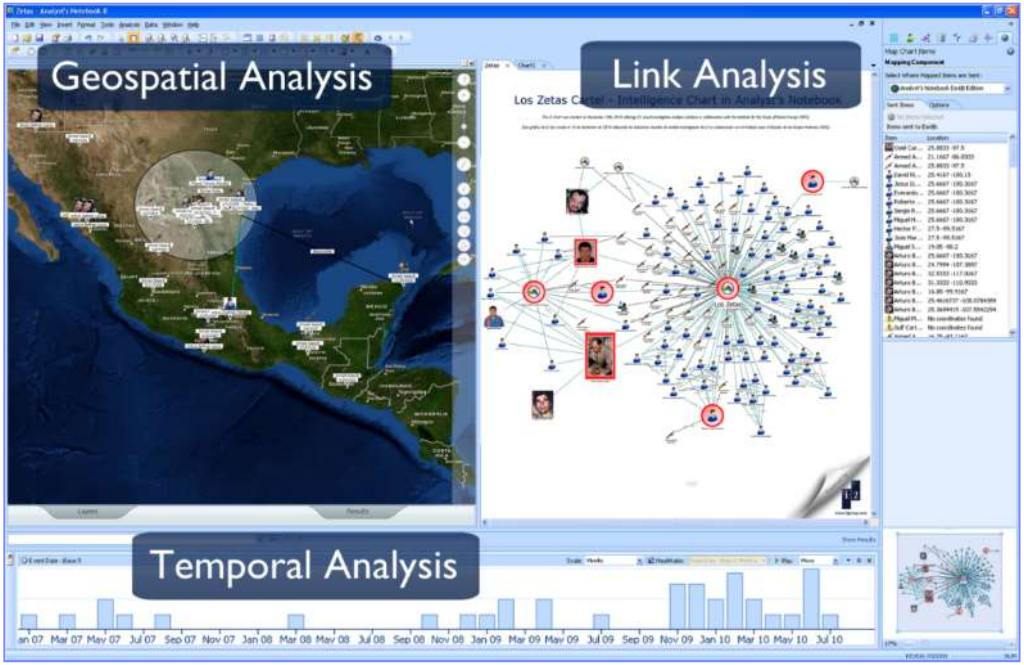
Solution components: IBM ILOG CPLEX & Optimisation Studio, Google Maps integration





IBM i2 Analyst's Notebook ESRI Integration

- IBM i2 Analyst's Notebook Connector for Esri integrates Esri's ArcGIS Server geospatial functionalities to the visualization capabilities of IBM i2 Analyst's Notebook.
- Enables users to perform association, temporal and geospatial analysis in a single work environment and build a detailed and robust analysis picture more quickly.



WHO/WHAT

WHERE

WHEN

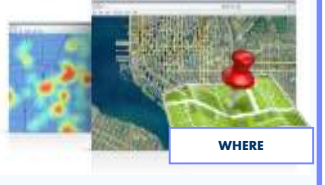
IBM i2 Analyst's Notebook Connector for Esri

Reduce dependencies on specialist geographic information system (GIS) analysis teams for faster response times

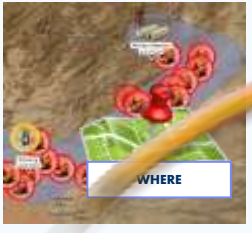
- Enable intelligence analysts with authorized access to perform fundamental geospatial analysis without having to depend on specialist GIS analysis teams.
- Share workload and help specialist GIS analysis teams concentrate on in-depth geospatial analysis tasks

Specialist GIS Analysis Teams

Intelligence Analysis Teams

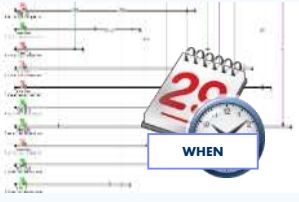


Specialized GIS Analysis



Intel. Analysis Related GIS

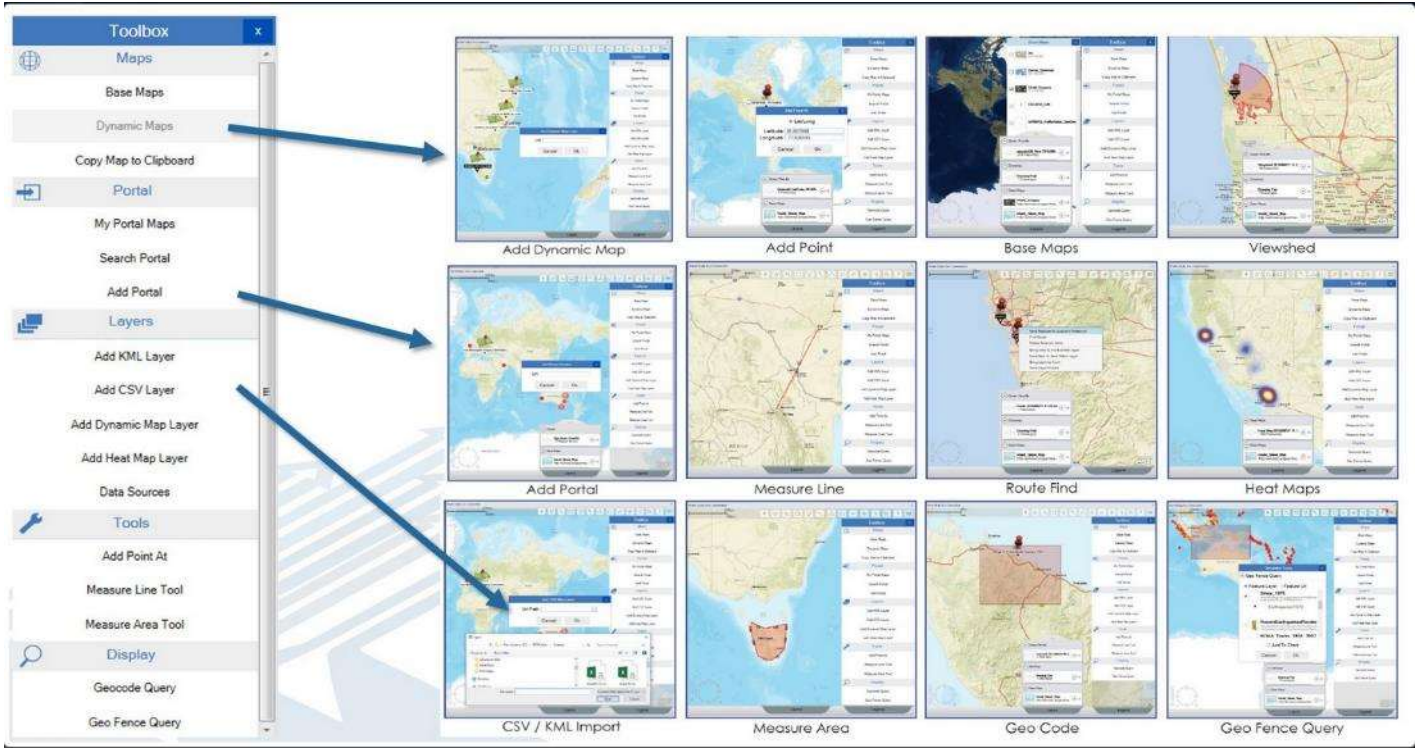
Link Analysis



Temporal Analysis

Point Duty's Esri GIS Connector for IBM i2 ANB

Point Duty's Esri Connector for i2 Analyst's Notebook provides i2 Users with access to full range of Esri's current functionality including ArcGIS Portal and persistent map to chart data linking



IBM Integrated Operations Centre

SOPs Management :

Event correlation and rules

Roles & Permissions
& UI setup

Key Process Indicators

Situational Awareness

Multi Stakeholders
Inclusion

Event Management

Resource
Management

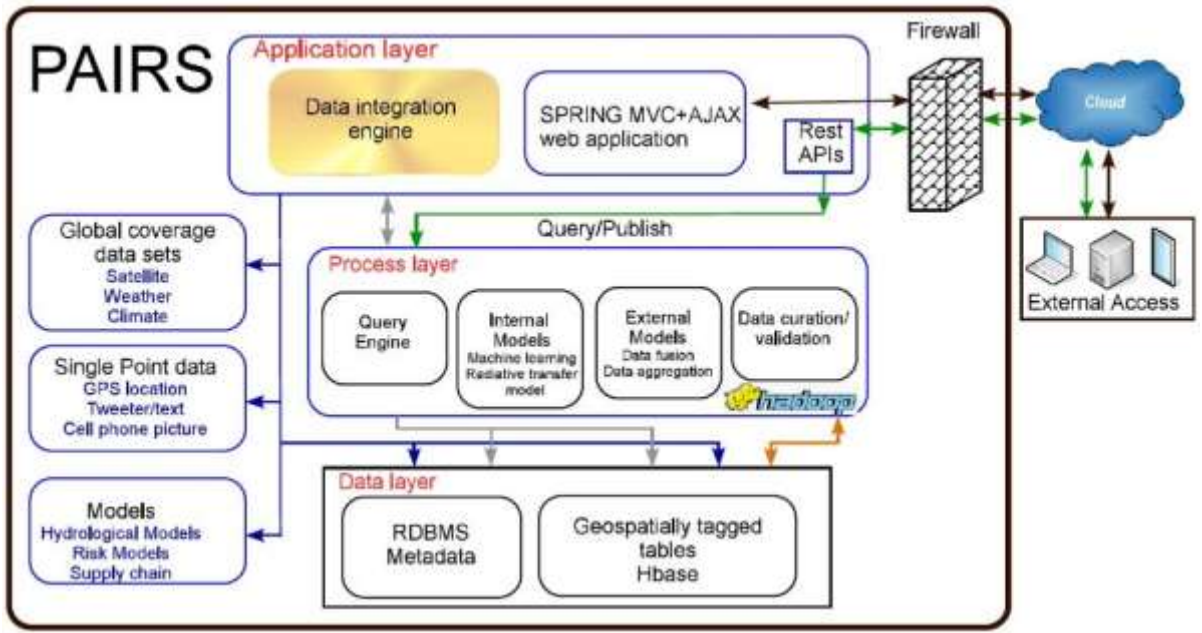
User Centric Charting

Data Structures

IBM PAIRS

IBM PAIRS (Physical Analytics Integrated Data Repository and Services) - A platform specifically designed for massive geospatial-temporal data.
IBM PAIRS Geoscope - A unique cloud-centric information and analytics service that can accelerate the discovery of new insights from massive, complex geospatial-temporal data.

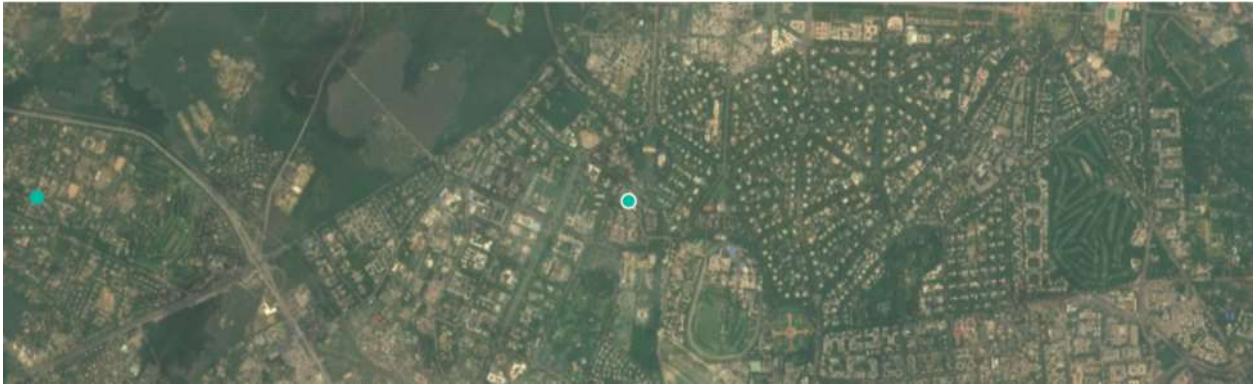
For more information: https://ibmpairs.mybluemix.net/

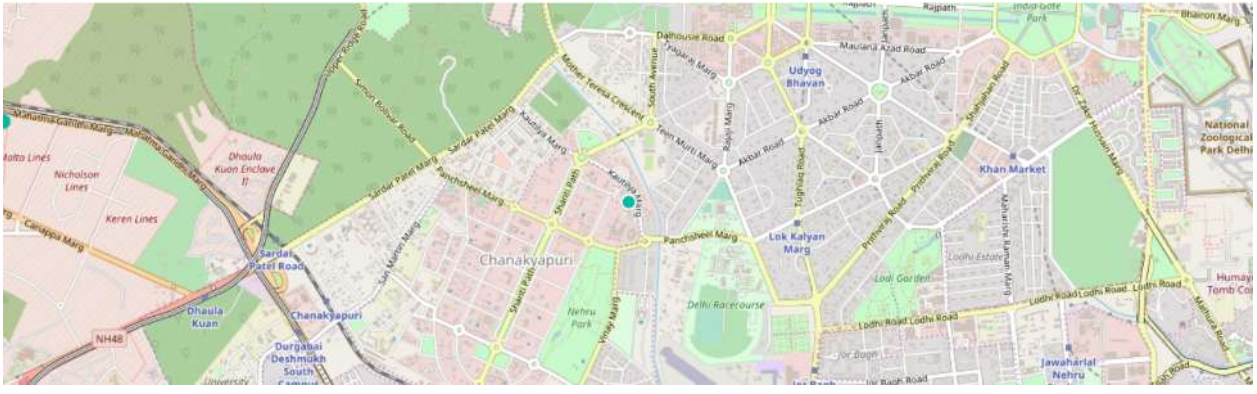


IBM PAIRS Example – Landsat Imagery

Example of a query to produce a single composite image for a larger area by aggregating multiple timestamps

- Satellite - Landsat 8, level 1 (USGS and NASA satellite imagery)
- Landsat8 Level 1 Spectral Image of Band 4 (Red)



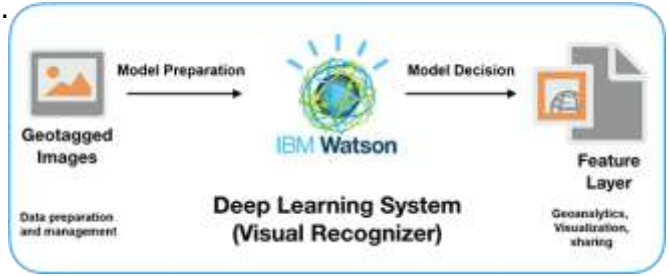


Leveraging Deep Learning - CAFO

- Locate Concentrated Animal Feeding Operations (CAFOs) from Satellite imagery - a Watson Machine Learning model with TensorFlow trained on satellite images pulled from ArcGIS to recognize a concentrated animal feeding operation (CAFO)

Leveraging Visual Recognition – Georgia Power

- Identifying broken electrical insulators at Georgia Power using Watson Visual Recognition and Esri ArcGIS.
- Georgia Power uses aerial photography to capture images of their insulators. Then, we can visualize the data and pass the images to Watson Visual Recognition which infers whether a given image contains a damaged or broken insulator. Georgia Power has over 17,000 miles of power lines and 160,000 structures to analyze.



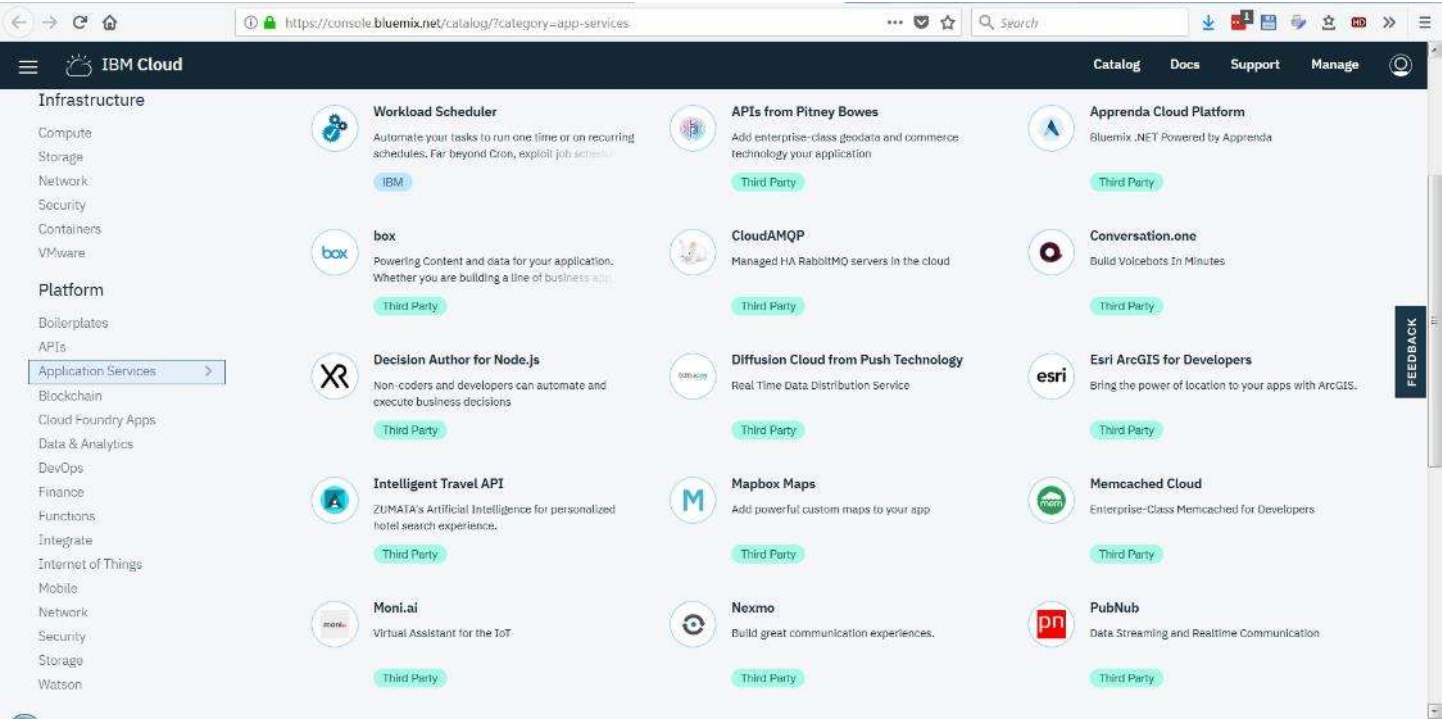
Leveraging Visual Recognition – OmniEarth

- Application of machine learning to aerial imagery to help solve complicated, multi-layered and information-heavy problems too daunting for conventional approaches.
- OmniEarth solution uses advanced geoanalytics, powered by the IBM Watson Visual Recognition cognitive service, to process, clarify and fuse vast amounts of satellite and aerial imagery with other data sets
- “If we can determine how much water a property needs on every given day,” says Chelsea Minton, senior sales engineer at OmniEarth, “and then compare that to how much that property is actually using, we can calculate exactly how much potential that property or that homeowner has to save water.”

Geospatial Tools & APIs on IBM Cloud Platform

Geospatial Analytics
GEO Web Services
Weather Company Data

APIs from Pitney Bowes
ESRI ArcGIS for Developers
Mapbox Maps



Thank You