Imperatives of Geospatial Predictive Analytics for the Defence & Security Forces

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CLAWS

Security related incidents always have a spatial component associated with it

Geospatial data, we know not only identifies ,the geographic location of the entity on earth but technologies have enabled the addition of the context of time and space to traditional data, so that the changes over a period of time and exactly the location where those changes are taking place can be observed.

This data can be stored and mapped on a topographical sheet.

Predictive Analytics is an area of data mining that deals with extracting information from data and using it to predict trends and behavior patterns. Often the unknown event of interest is in the future, but predictive analytics can be applied to any type of unknown data whether it be in the past, present or future.

Forecasting methods for prevention and early detection of violence and destructive events.

Geospatial Predictive Modeling

It is assumed that the occurrences of events being modeled are limited in distribution or belongs to a set which has limited elements.

Occurrences of events are neither uniform nor random in distribution – there are spatial environment factors like infrastructure, topography, etc. which constrain and influence the locations where the events occur.

Geospatial predictive modeling is a process for analysing events through a ***geographic filter*** in order to make statements of likelihood for event occurrence in the future.

Geospatial Predictive Modeling

Deductive method The deductive method relies on qualitative data or a subject matter expert (SME) to describe the relationship between event occurrences and factors that describe the environment. As a result, the deductive process generally will rely on more subjective information. This means that the modeler could potentially be limiting the model by only inputting a number of factors that the human brain can comprehend

Inductive method The inductive method relies on the empirically-calculated spatial relationship between historical or known event occurrence locations and factors that make up the environment (infrastructure , socio-culture, etc.). Each event occurrence is plotted in geographic space and a quantitative relationship is defined between the event occurrence and the factors that make up the environment. **The advantage of this method is that software can be developed to empirically discover the events**

GEOSPATIAL PREDICTIVE ANALYTICS - USE CASES IN THE COMMERCIAL SECTOR

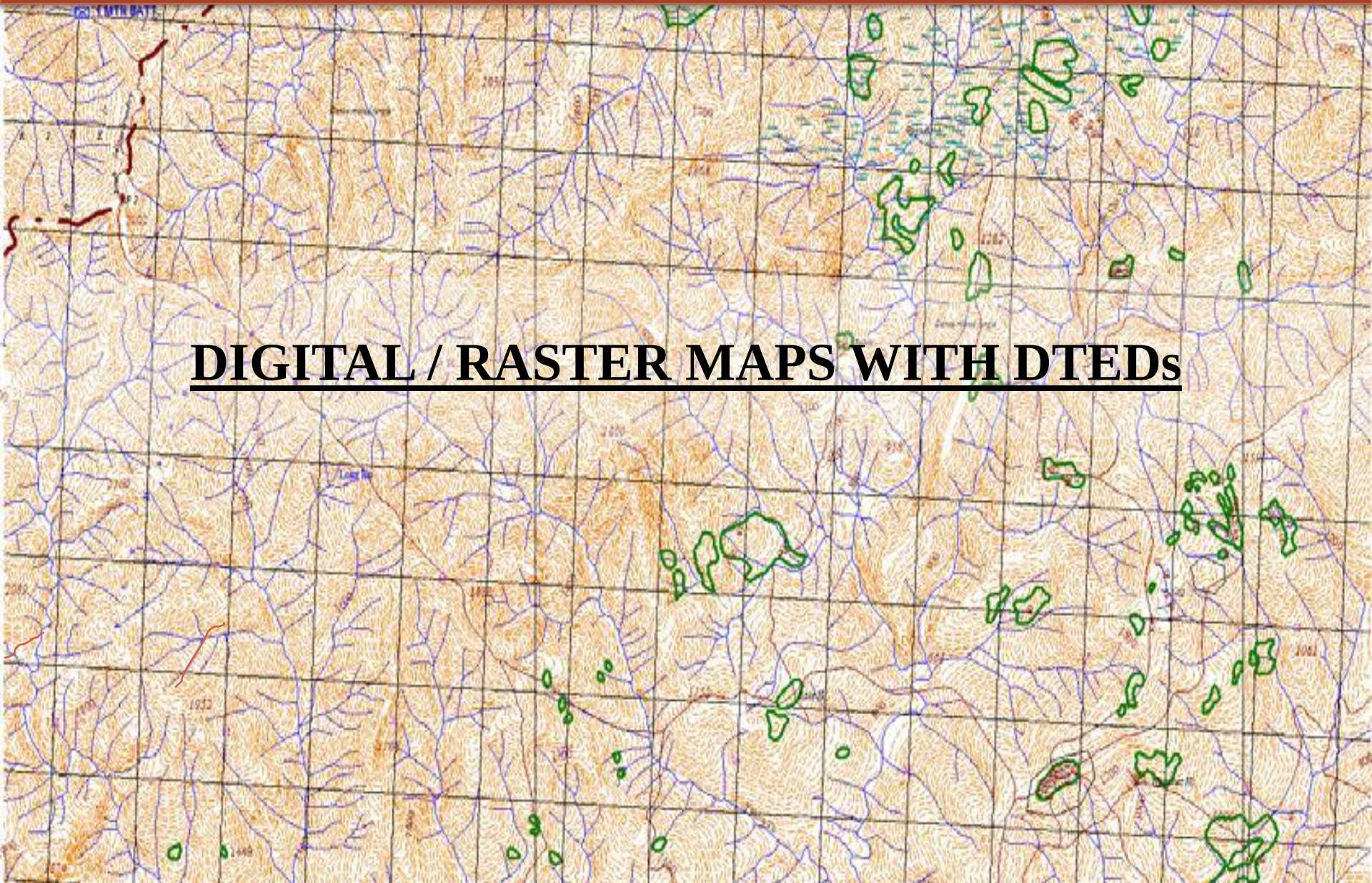
Location for Establishing Commercial Space

Enhancing Public Health

Creating Emergency Action Plans

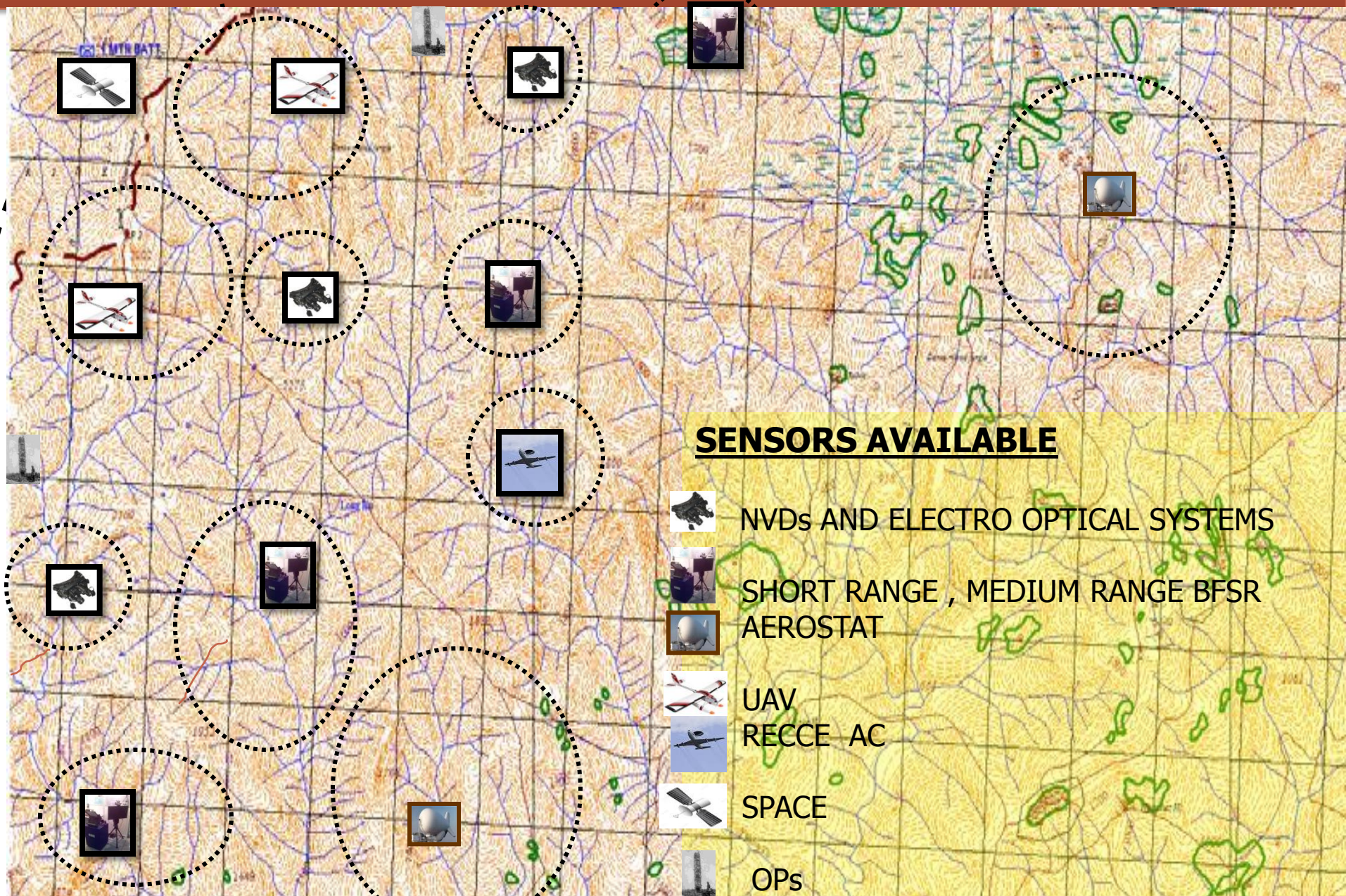
Risk Analysis & Fraud Detection

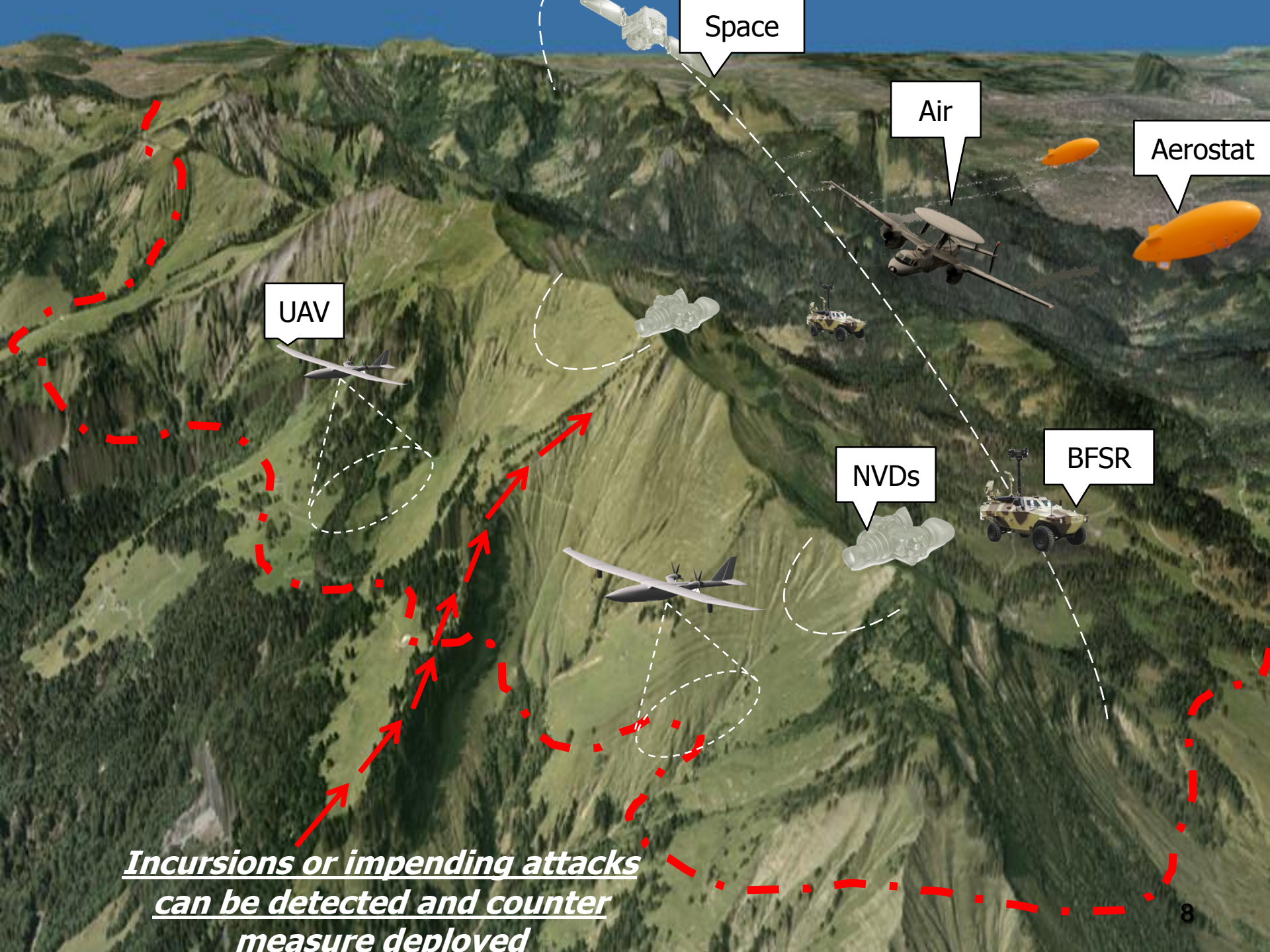
TERRAIN ANALYTICAL LAYER IN DIGITAL MAPS



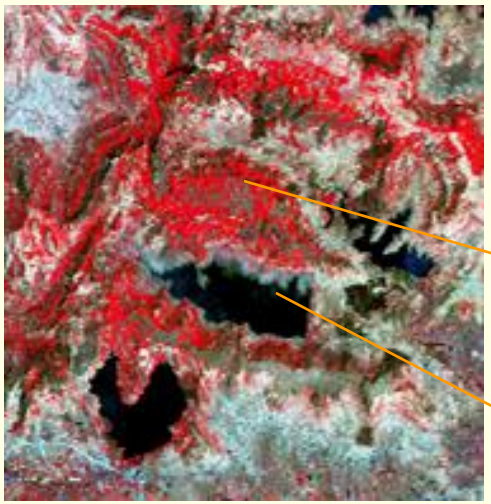
DIGITAL / RASTER MAPS WITH DTEDs

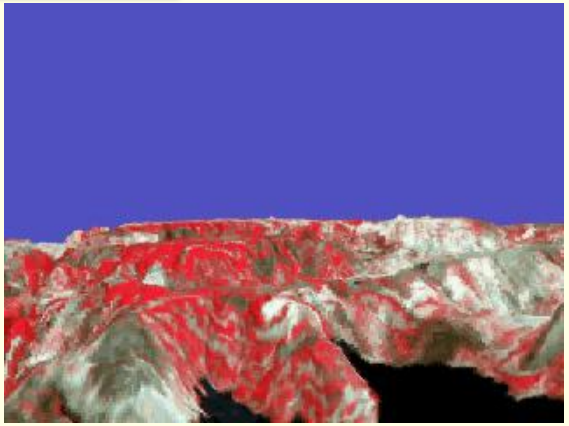
TERRAIN ANALYTICAL LAYER IN DIGITAL MAPS




Space
Air
Aerostat
UAV
NVDs
BFSR
Incursions or impending attacks can be detected and counter measure deployed

TRANS BORDER ANALYTICS USING TIN





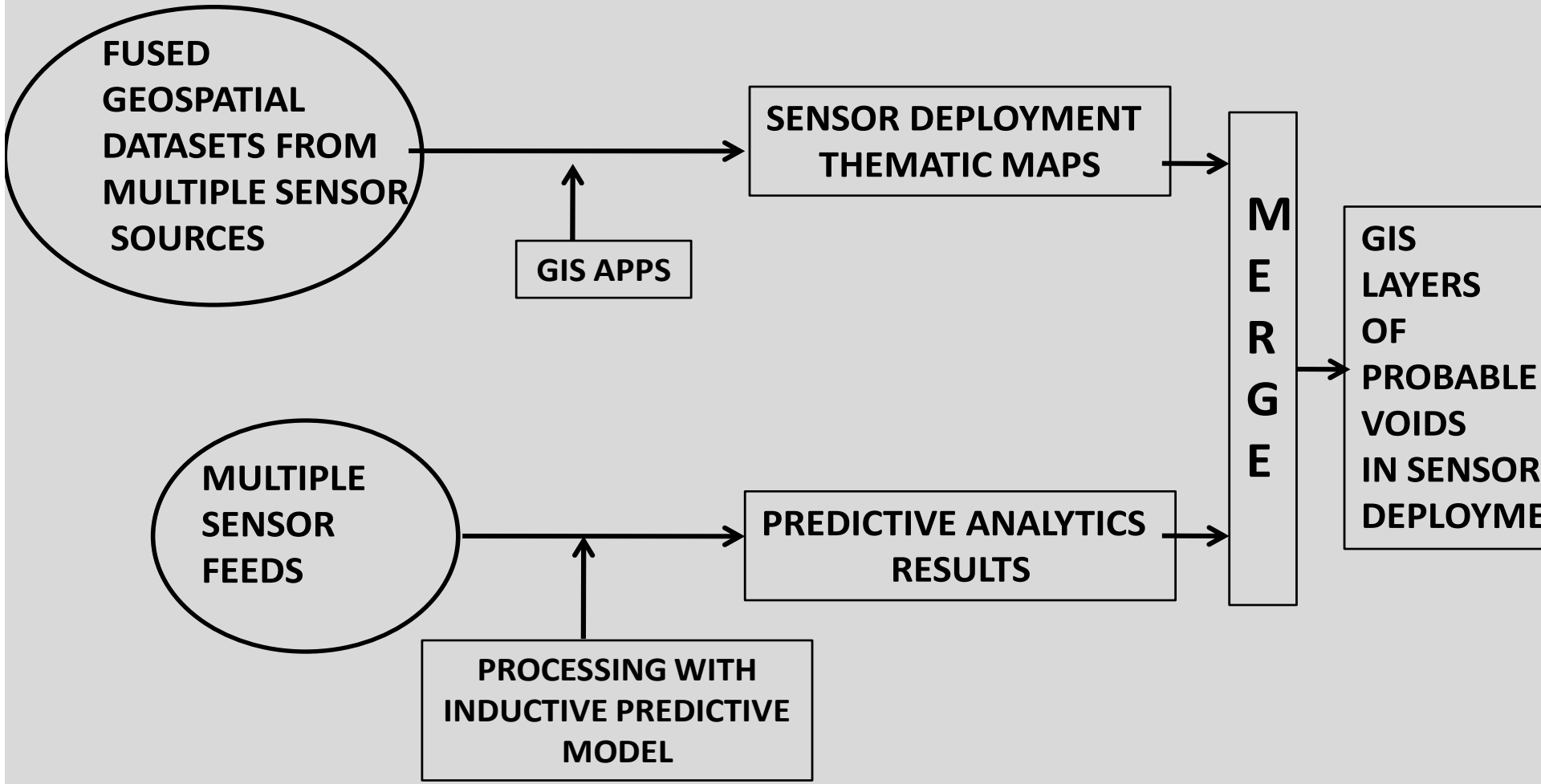
PLATEAU

LAKE

RIVER

- **Drones and Satellites** imaging technology provides a ‘no risk’ means of reconnaissance.
- **Images or video feeds** are captured and analyzed for **frame by frame changes**.

SMART SENSOR GRID CONCEPT



SMART SENSOR GRID FOR NATIONAL SECURITY

- DISASTER RECOVERY GRID
- RAILWAY GRID
- POWER GRID
- OIL AND NATURAL GAS GRID
- SMART CITIES GRID
- GRIDS FOR ALL CRITICAL ASSETS
- LEAs CAN HAVE IT AS THEY WANT
- STATES CAN HAVE IT AS THEY WANT

SMART SENSOR GRID FOR NATIONAL SECURITY

A sensor deployment map doesn't exist as of now

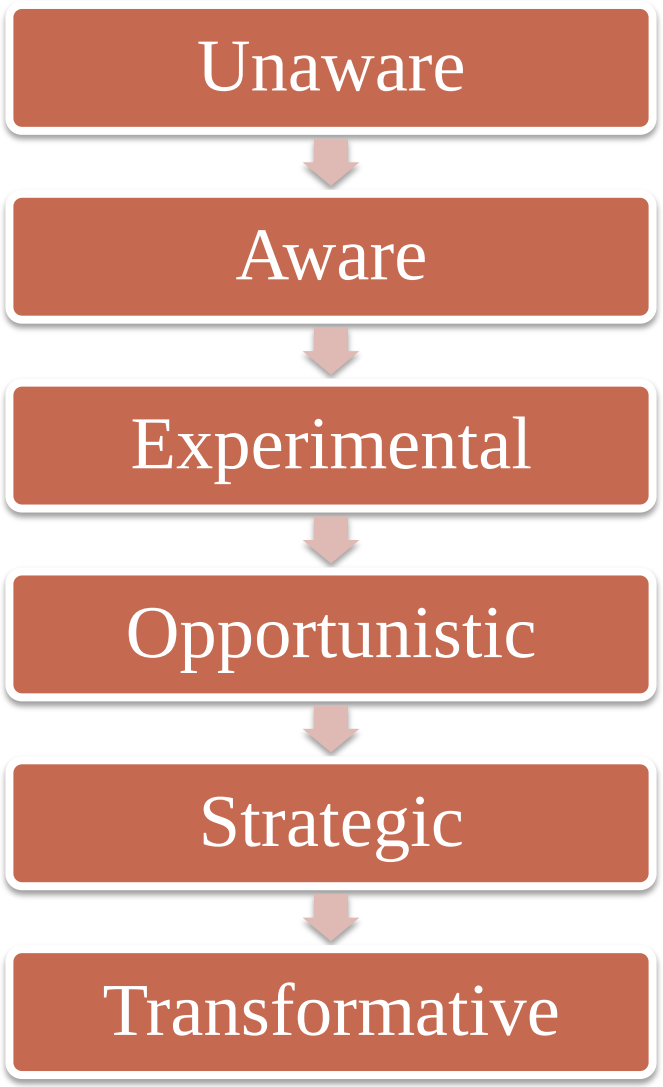
Can rise alerts on a GIS map of the whole nation

Can form input for the C4I2 systems

Visualisation tools at INCP

IMPLEMENTATION STRATEGY

- Evolutionary Approach.
- Cater pillaring and leap frogging.
- Utilise already existing expertise in commercial market.
- Exploit further commercial technological developments as & when they occur.
- Start small using existing data.
- Identify use cases and then deploy at bigger scale



TAKE AWAY

Network centric warfare, maneuver warfare, counter terror operations, counter-insurgency operations and covert operations all stand to gain from geospatial predictive analytics since it offers options and permutation/ combinations to decision makers to firm on plans and strategies.

Big data can combine multiple data sources in the same view with dashboard like applications in real time and GIS can fuse the spatial data into the applications.

It can be a Web based application and will be able to generate report which will be shared across the stake holders

Geospatial Predictive Analytics platform will analyse the patterns in the disparate data generated from various locations and come up with models which can be a valuable input for operations to be carried out and ensure frequency of untoward incidents come down in future