

# Food Truck Activity Based Intelligence (ABI) DEMONSTRATION SCENARIO

EVENT: Big Data Bus  
LOCATION: Wherever the bus is...  
DATES: Various  
TARGET AUDIENCE: “Big Data” Analysts that need to assess business activities across multiple information streams with respect to geo-location to find the non-obvious relationships within their “big-data” environment

## BACKGROUND

Human intelligence, or HUMINT, is the collection of intelligence by means of interpersonal contact. In days past this was done without intelligence gathering technologies, primarily by conversations, interviews, and interrogations. Since the advent of e-mail, and now social networking, HUMINT data can be gathered, sifted, collated and analyzed to gather useful information to support a mission need. The need for this type of intelligence is just as relevant in the state/local law enforcement activities as recently demonstrated in the apprehension of the “Boston Marathon Bomber” suspect, monitoring, tracking and analysis of gang-related activity as it is for extending the analysis capabilities for traditional supply-demand analysis and sales & operations planning to provide activity based intelligence to end-to-end supply chain planning and execution processes.

Geospatial intelligence, or GEOINT, is the exploitation and analysis of geospatial data and information to describe, assess, and visually depict natural and man-made features, and location-based events on earth.

GEOINT data sources include imagery, full motion video (FMV) and mapping data, collected by either commercial or government satellite, aircraft (UAVs, reconnaissance, commercial aircraft or by service subscription), or by other means, such as maps, demographic databases and open source databases, census information, GPS waypoints, utility schematics, or any data about infrastructure or events on earth.

A strong correlation can be established between HUMINT and GEOINT, where location and location behavior over time, combined with personal observations and opinions can provide important insights to analysts and decision-makers. The analysis intersection of HUMINT and GEOINT information can be referred to as activity based intelligence (ABI).

The Office of the Undersecretary of Defense for Intelligence has defined ABI as “a discipline of intelligence where the analysis and subsequent collection is focused on activity and transactions associated with an entity, population, or area of interest.”



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ABI is concerned with providing answers to the 5 “Ws” and hopefully H that requires sifting through petabytes of data and fusing the “right” data to create actionable intelligence product ;

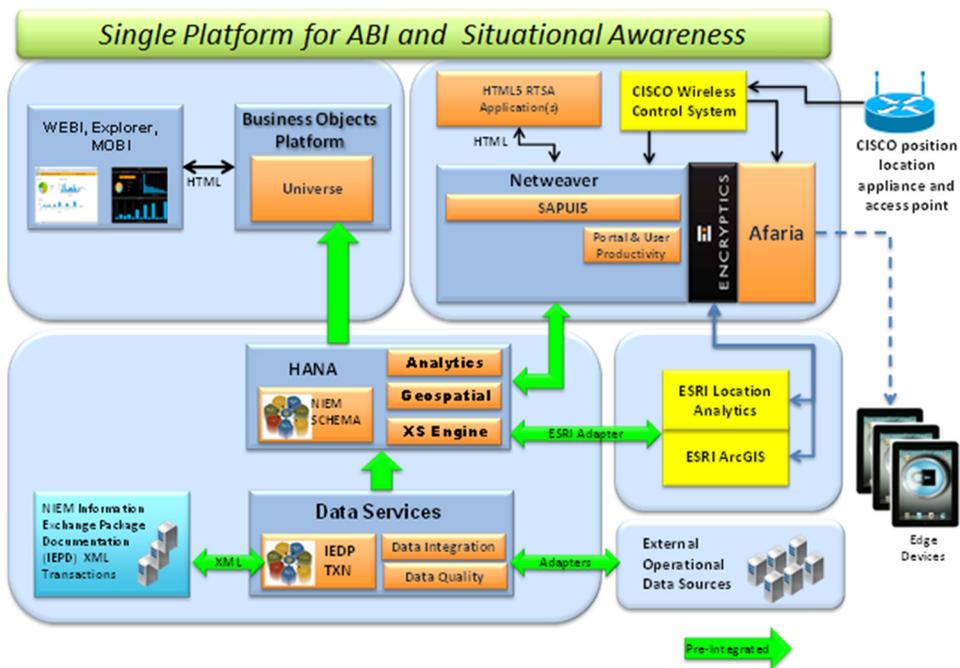
- **Who** - A person (POI), group or organization of interest ...
    - *Depending on their location and history of activity can determine the level of interest in the POI or group*
  - **What** - Is going to perform an activity ...
    - *POI location with respect to infrastructure resources (stores, warehouses, etc.) in potential area of interest compared to historical patterns of behavior with the same/similar situation.*
  - **When** – At a given time ...
    - *Continuous POI tracking and projection based on fusion of social event information (twitter, facebook, RSS news feeds, email, documents, web site analytics, web site crawling, etc.)*
  - **Where** – At a given location ...
    - *Continuous POI tracking and projection based on fusion of social event information (twitter, facebook, RSS news feeds, email, etc.)*
    - *Execution of predictive analytic functions to forecast location events*
  - **Why** – For an unknown reason ...
    - *Ability to model prior behaviors and use predictive methods to project new behaviors*
- and
- **How** – Using an unknown method to carry out the activity
    - *Provide the ability to link or graph the relationships and the strength of the relationships found in the data to facilitate real-time decision tree analysis.*

In order to facilitate the discipline or process of ABI, analysts must have a transparent method of traversing the “4 Vs of big data”, Volume, Velocity, Variety and Veracity aspects of data from multiple sources. The objective is help the analyst determine if an ordinary event is ordinary or will it have an adverse impact on the business by providing the capability to: a) assess the context of the pending event; b) assess the intent of the POI or group responsible for the event; c) model event behaviors and monitor/measure performance indicators of current events as compared to historical events/behaviors and d) provide the capability to project/predict future events and the impact of future events.

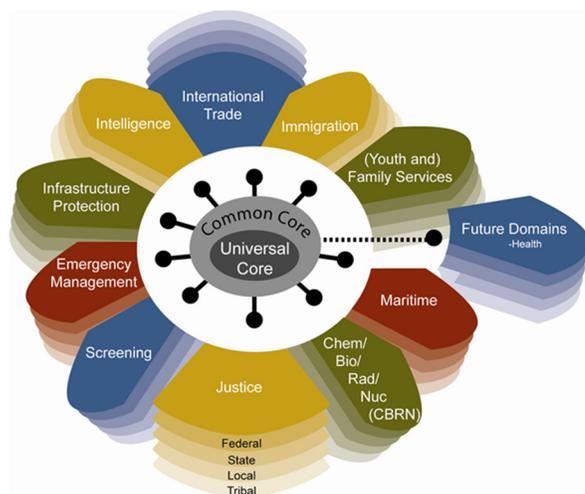
SAP NS2 has created a Rapid Deployment Solution (RDS) to address the activity based intelligence platform needs through a coupling of SAP and partner technologies. At the heart of SAP’s architecture for OLTP and OLAP processing is HANA. HANA is an in-memory database appliance that can perform high speed in-memory transaction processing (i.e. SAP Business Suite) and big-data analytics on the same data without the need for an ETL process to load a separate data warehouse and have the ability to scale to petabyte data stores. Figure 1 illustrates the architecture for this Rapid Deployment Solution.



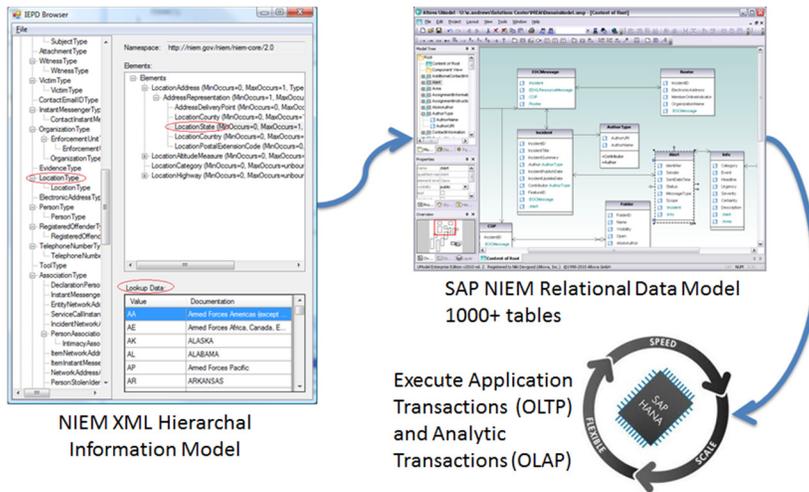
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Within HANA, is an open source data schema based on the **National Information Exchange Model (NIEM)** which was developed in partnership by U.S. Department of Justice and the Department of Homeland Security. NIEM is designed to develop, disseminate, and support enterprise-wide information exchange standards and processes that can enable jurisdictions to effectively share critical information in emergency situations, as well as support the day-to-day operations of regulatory agencies throughout the nation. It is through the use of this standard that state, local, federal, tribal and the industrial base that supports the government can share information and collaborate.



By re-casting the NIEM V2 XML model into a relational model, HANA can execute transaction based applications for emergency management, situational awareness, public safety as well as simultaneously providing real-time analysis based on the OLTP execution. All within the same platform on a single database.



**Situational Awareness Demonstration Scenario Context:**

1. The basis of the scenario is to assess the activity of food trucks in the Washington DC area based classification, frequency of activity, sentiment of customers with respect to their location(s) over a given period of time.
2. By gathering this information, an analyst can uncover patterns of behavior of food trucks, where they usually are, and “atypical” locations of food trucks.
3. By using the predictive analytics functions within HANA, the analysts can project: which food trucks and food truck classifications will yield higher sentiments and more activity using time series analysis (i.e. double, triple exponential smoothing); using Apriori association algorithm to detect correlation of food truck proximity to other food trucks or pre-defined geo-fences; using the anomaly detection algorithm to detect when food trucks within a given geo-fence for a long period of time suddenly decides to move to a different location within the city. Through the use of these predictive functions, HANA can create a specific analytics view that can be used to drive a native Netweaver HTML 5 application, a BOBJ dashboard and alert or a geographic overlay to be used by an ArcGIS application.
4. Architecture Implementation



- a. Data services is used to capture data from yelp and twitter regarding the location of food trucks within Washington DC and the sentiments that the food truck patrons post on these social media sites
- b. Using the text analysis functionality within data services (in the next release, the HANA text analysis function will be used) sentiment analysis is performed on the data captured from yelp and twitter and ETL to HANA
- c. In the next iteration of the demonstration scenario, HANA will perform continuous time series analysis (exponential smoothing) within a user defined geo-fence to predict the most popular food truck classifications and the associated food trucks; using the anomaly detection algorithm in tandem with the Apriori algorithm to detect when a specific food truck has left its “normal” geo-location to do business in a neighborhood that is not associated with the food truck classification (cuisine, i.e. an Asian food truck suddenly moves to a neighborhood where the demographics suggest that Mediterranean cuisine is preferred).
- d. HANA interfaces with ArcGIS to provide a geo-overlay
- e. HANA drives BOBJ dashboard for real-time situational awareness analytics
- f. HANA interfaces with the ArcGIS mobile application on the iPad via web service to allow a field operative to capture and log real-time sentiment events to update the HANA database and BOBJ analytics



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SAP NS2 and Critigen have co-developed a solution that uses fused HUMINT and GEOINT analytical methods to demonstrate the potential of these capabilities to the Intelligence Analyst.

## INTRODUCTION

The SAP NS2/Critigen solution can be used by the Analyst to specify “what needs to be known” to run against “big data” archives and live web services. The solution rapidly sorts and filters out the noise from these data sources. The Analyst can then further refine the search criteria terms until the desired results are achieved. The combination of these results with GEOINT-based location and time-based analysis further enriches the intelligence solution, providing new insights into POI behaviors, and correlation and verification of unexplained or questionable HUMINT. These data, when combined provide a powerful, reliable and convincing intelligence story.

The SAP NS2/Critigen solution uses textual analytics to rapidly assess “big data” sources based on refined criteria combined with location analytics that provide spatial insights to POI behaviors and movements. This effective and compelling fusion of HUMINT and GEOINT methods provides a combination of capabilities that can generate pertinent and actionable intelligence to drastically improve time to decision for both analysts and decision-makers.

## PRODUCTS DEMONSTRATED

### SAP NS2 RDS-SA Solution

This is a desktop dashboard-based solution that accesses hosted server-side data using web services.

### CRITIGEN GITract (aka Food Truck) Solution

This is a mobile iPad GIS solution that accesses hosted server-side data using web services. Food Truck and SA RDS share the same web services data.

## TECHNOLOGY COMPONENTS

Food Truck SOLUTION	
Business Objects Data Services	ArcGIS Server 10.1
<ul style="list-style-type: none"> <li>Multi Source/Open Source Data</li> </ul>	<ul style="list-style-type: none"> <li>Heat map geoprocessing</li> </ul>
<ul style="list-style-type: none"> <li>Unified Metadata</li> </ul>	ArcGIS Runtime for iOS 2.3.2
<ul style="list-style-type: none"> <li>Data Quality</li> </ul>	<ul style="list-style-type: none"> <li>Grey base map</li> </ul>
<ul style="list-style-type: none"> <li>Data Integrator</li> </ul>	<ul style="list-style-type: none"> <li>Map control for layer management</li> </ul>
<ul style="list-style-type: none"> <li>Text Analytics</li> </ul>	<ul style="list-style-type: none"> <li>Feature services</li> </ul>
HANA	<ul style="list-style-type: none"> <li>REST endpoints</li> </ul>
<ul style="list-style-type: none"> <li>HANA Studio</li> </ul>	<ul style="list-style-type: none"> <li>Graphic layer management</li> </ul>
Business Objects Enterprise	<ul style="list-style-type: none"> <li>Radius tool</li> </ul>
<ul style="list-style-type: none"> <li>WEBI</li> </ul>	
<ul style="list-style-type: none"> <li>Explorer</li> </ul>	



• Dashboards	
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**UNIQUE TECHNOLOGY BUILT INTO THE Food Truck APP**

For our application development, we did not want to be constrained by any vendor limitations, so we developed own application objects. The following are a list of some of those unique capabilities that Critigen built into the Food Truck app:

- Custom-built interfaces
- Legend controls
- Callout classes
- Drawing tools
- Time controls and visualizations
- Animations, styles, logic, and interactions
- The clustering capability is native iOS code, whose logic originated from different sources and different languages (ActionScript, JavaScript, etc) – this is executed on the iOS device itself (no server required)

**DATA SOURCES**

Food Truck SOLUTION	
Source Data	Source Data
<ul style="list-style-type: none"> <li>• Yelp</li> </ul>	<ul style="list-style-type: none"> <li>• ArcGIS Online base map data</li> </ul>
<ul style="list-style-type: none"> <li>• Twitter</li> </ul>	<ul style="list-style-type: none"> <li>• Embassies-Washington, DC</li> </ul>
<ul style="list-style-type: none"> <li>• Reuters</li> </ul>	<ul style="list-style-type: none"> <li>• HANA Geospatial Data Mart</li> </ul>

**INTELLIGENCE ANALOGS**

DEMONSTRATION TERM	INTELLIGENCE TERM
Food truck	Person of interest (POI)
Food truck locations	Places where the POI visits or stays
Food truck name	POI name or alias
Food type	Intelligence category of POI
Food truck picture	Picture of POI
Sentiment	Qualitative intelligence value rating
Food truck customer	Observer/Intelligence gatherer
Embassy	Location-of-interest
Food truck sentiment and location analysis	Social media sentiment and locational behavior analysis of persons-of-interest



## INTELLIGENCE USE CASE

USE CASE	
<b>Name</b>	Social media sentiment and locational behavior analysis of persons-of-interest.
<b>Goal</b>	To assess the movements and activities of, and observations about persons-of-interest.
<b>Pre-conditions</b>	Persons-of-interest are known. Criteria for semantic text analysis are known. The identity of credible HUMINT sources is known. Category, names and locations of locations-of-interest are known.
<b>Post-conditions</b>	Target person(s)-of-interest have been identified and located. Actionable intelligence has been developed. Evidence is presentable and queued up for decision options. Time to decision has been dramatically improved.



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DEMONSTRATION FLOW – Food Truck		
<b>Step 1</b> (REF: GITract)	DEMO INTRODUCTION	In this demonstration, we’re going to show you an Esri GIS-enabled mobile GIS application, tightly-integrated with SAP NS2’s RDS-SA solution. This capability provides analysts with information about what’s happening now, enabling communication of significant intelligence like never before. Critigen employed both server-side and mobile device location analytics to portray intelligence information in an intuitive, easy-to-use mobile map interface. The combination of the mobile GIS app with SAP’s RDS-SA provides a collaborative platform within a secure environment for immediate use by intelligence analysts and managers alike.
<b>Step 2</b> (REF: GITract)	DEMO	Open the app and clear the map. Next, pull up the <b>bottom menu</b> . Pick the <b>5 Star</b> and then <b>1 Star</b> food truck rating buttons. Point out the changed display. Explain the colors of the ‘sentiments’.
	INTEL	An intel analyst can select various sentiment ratings to quickly classify POI activities that are visualized on the map display.
<b>Step 3</b> (REF: GITract)	DEMO	Next, grab the left <b>time slider</b> button and move it to the left. Then grab the right <b>time slider</b> and move it to the left to create a specific time period. Note the changed display. Explain that there are less food trucks displayed due to the limited time period.
	INTEL	The analyst can further refine the location activities of POI’s by filtering by a time period of interest.
<b>Step 4</b> (REF: GITract)	DEMO	Return the <b>time slider</b> to its maximum extents. Next, collapse the <b>bottom menu</b> , and pull the <b>left menu</b> out. Scroll through the food truck list. The trucks in this list have been filtered and selected using the textual analytics of the SAP NS2 RDS-SA app. We’re accessing these data through secure web services.
	INTEL	The analyst can review the filtered HUMINT text for POI sightings or perhaps surveillance sources. When combined with locations, the fused intelligence can provide new insights into patterns and trends.
<b>Step 5</b> (REF: GITract)	DEMO	Next, choose the <b>+ icon</b> in the upper right corner. Then choose the <b>radius tool</b> . Next, choose a location to anchor the circle. Then adjust the <b>radius slider</b> right and left to show how you can adjust the circle. Note that a <b>green flag</b> appears next to some of the food trucks listed. This means that these trucks were located within the circle radius.

DEMONSTRATION FLOW – Food Truck		
	INTEL	If analysis is required around a specific location of interest, the radius tool would help to verify if POIs have frequented specific sites or facilities.
<b>Step 6</b> (REF: GITract)	DEMO	Next, pull up the <b>bottom menu</b> and tap the <b>clear radius select</b> button. Close the <b>bottom menu</b> . Go to the <b>left menu</b> and choose 3 food trucks. Note that the map display is changing to show only the food truck locations you've chosen. Then, tap the <b>search window</b> , and type in "kim". Up pops the "Kimchi ..." food truck. Tap on the food truck to select it. Dismiss the <b>keyboard</b> . Next, tap the <b>limit selection</b> button on the bottom of the <b>left menu</b> . Note that it now shows only the 4 food trucks you selected.
	INTEL	The analyst can select a number of POI's that could be alleged associates, and review their locations and associated HUMINT to either confirm or deny collusion.
<b>Step 7</b> (REF: GITract)	DEMO	Next, tap the <b>arrow</b> button on the right of one of the selected food trucks. You can now see all the sentiments for that truck. Scroll through the list by swiping upwards. Tap on left side of the <b>left menu</b> to dismiss the sentiments. Next, collapse the <b>left menu</b> . Now, tap on the <b>+ icon</b> and choose the <b>analytics</b> button. Next turn the <b>Cluster Truck Locations</b> switch to the on position. Note that the numbers in the circles indicate how many times the selected trucks visited that location. Then turn the <b>Reverse Cluster Display</b> switch to the on position. Explain that now the locations that are least visited are highlighted.
	INTEL	In this case, the analyst can evaluate the frequency of POI visits to specific locations of interest. The analyst can also determine the reverse trend – visits to locations of interest that are infrequent or even unique, representing anomalies to patterns of behavior and activities.
<b>Step 8</b> (REF: GITract)	DEMO	Now, turn the <b>Cluster Truck Locations</b> and <b>Reverse Cluster Display</b> switches to the off position. Then turn the <b>Generate Heat Map</b> switch to the on position. Explain that this map is being rendered using a server-side process that generates an interpolated grid layer from the currently selected data set. Next, turn the <b>Generate Heat Map</b> switch to the off position, and dismiss the <b>analytics menu</b> .
	INTEL	The heat map provides a dramatic visualization of the density of POI visits at locations throughout the area of interest (AOI). This provides a quick view to the analyst to assess frequency of visits and activities behavior within the AOI.

DEMONSTRATION FLOW – Food Truck		
<b>Step 9</b> (REF: GITract)	<b>DEMO</b>	<p>Now, tap on the <b>+ icon</b> and choose the <b>add truck sighting</b> button. Tap on the map where the truck is located (near the Lincoln Memorial). Using the iPad’s location services, we could also choose to use our current position. Tap the <b>photo</b> button. You could attach a photo that you took of the truck. Tap in the <b>Truck Name</b> box. Type in “kim”. Choose the “Kimchi ...” food truck. Next, tap on the 5 stars button. Tap on the <b>check mark</b> button on the form. Note that a warning appears: “This truck sighting is within an area of interest: Lincoln Memorial”.</p>
	<b>INTEL</b>	<p>This capability could be used by field surveillance teams or agents that are gathering information at public events. Photographs and HUMINT ‘sentiments’ provide an improved level of verification which greatly enhances the value of the collected intelligence.</p>
<b>Step 10</b> (REF: GITract)	<b>DEMO SUMMARY</b>	<p>Discuss the other functions, like choosing a single truck location and reviewing the attributes. Also, show the <b>select, reverse select</b> and <b>unselect</b> buttons at the bottom of the left menu. Finally, tap the <b>e-mail icon</b> on the <b>+ icon</b> menu. Type in the person’s e-mail and send them the micro-site link.</p> <p>Together with our SAP NS2 partners, we can handle big data – whether it’s HUMINT or GEOINT. We can organize it, optimize its storage, metadata tag it, and provide rapid, secure access, and the analytical tools to leverage it. From server side to dashboard to desktop to mobile, we can provide you with the right solutions to serve your intelligence enterprise.</p> <p>In a matter of weeks Critigen assembled this app using our SCRUM process for rapid application development. This demonstrates how we could quickly assemble a prototype based on <u>your</u> requirements.</p>