



Visual Analytics Tools for improved Social Network Analyses

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Presentation overview

- Research Context
- Situation Awareness and Sensemaking in Complex Environments
- SNA Capability Framework
- Visual Analytics tools for SNA
- Future Works

Intelligence and SNA

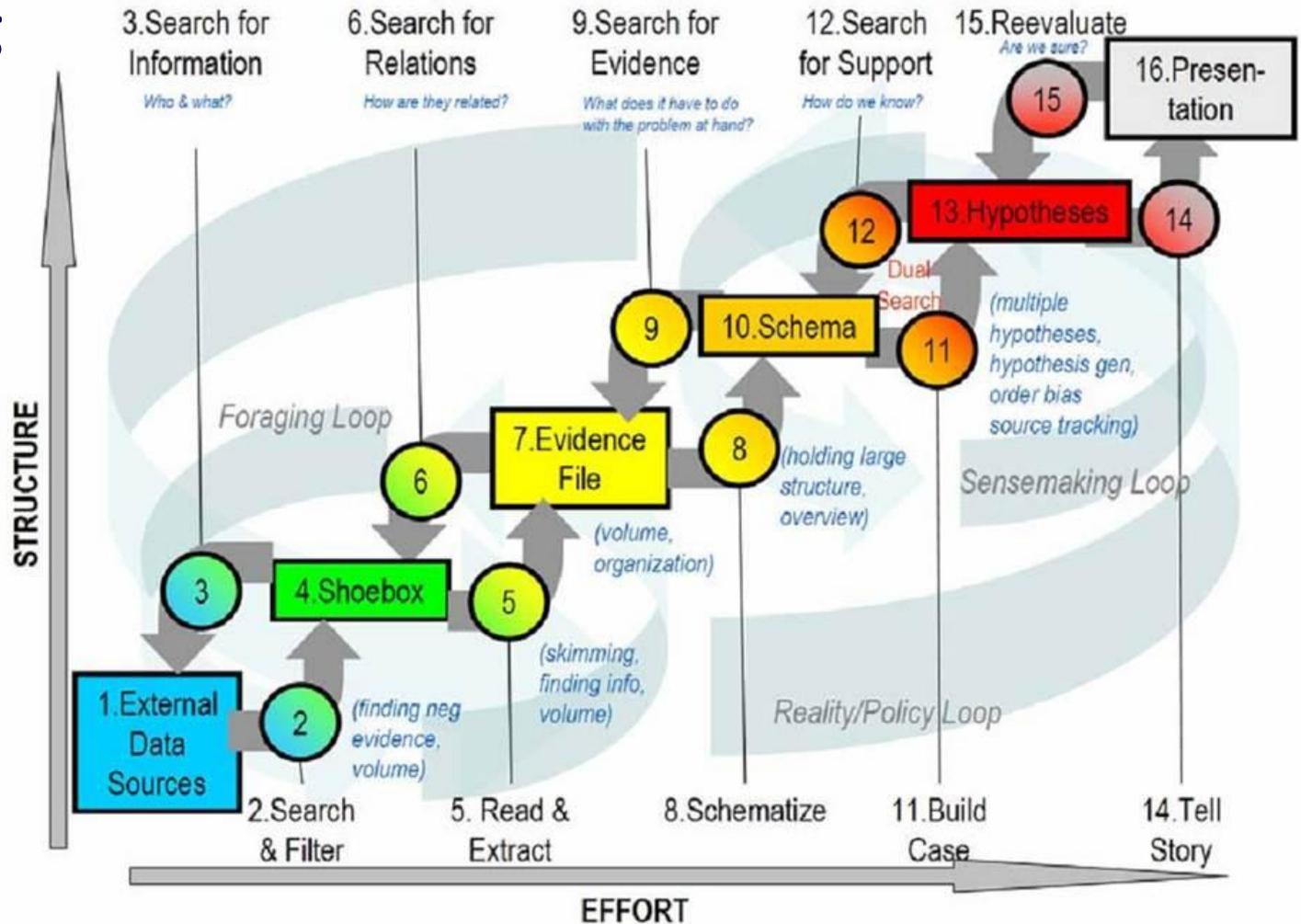
- Operational environment (culture)
 - Elusive and changing adversary
 - Networks are embedded within local population
 - Different social structure and nature
 - Covert networks
- Increased complexity of social networks to analyse and other networks related to them (e.g., criminal, communication, or financial networks, etc.)
- SNA to increase SA and:
 - Understand of network composition/mechanics/interconnections of (red, white, etc.)
 - Identify social networks areas of pressure
 - Know better where and what to investigate
 - Reveal social networks changes/anomalies/evolution
 - Understand our impact
 - Attempt to predict or know what to monitor



Sensemaking

“A process to successively build and refine representations and fit data with representations to meet the requirements of a task”

Sensemaking



Pirolli, P. and Card, S.K., (2005), The sensemaking process and leverage points for analyst technology

Tasks in Complex Environments

- Data analysis & recursive decision-making = cognitively burdensome tasks;
- Difficulties to locate relevant information/data sources;
 - Missing data and data reliability issues;
- Lack of opportunities for results validation;
- Time critical decision making process;
- Domain experts are not always computer experts;
- Complex Environments require many visualisation tools and perspectives;
- Dynamic aspect of the situation increases the complexity of the task;
- Complex tasks require multiple domain experts → multiple perspectives.

Visual Analytics Definition

examine evidence, infer meaning,
test truth

“Visual analytics is the science of
analytical reasoning facilitated
by **interactive** **visual interfaces**.”

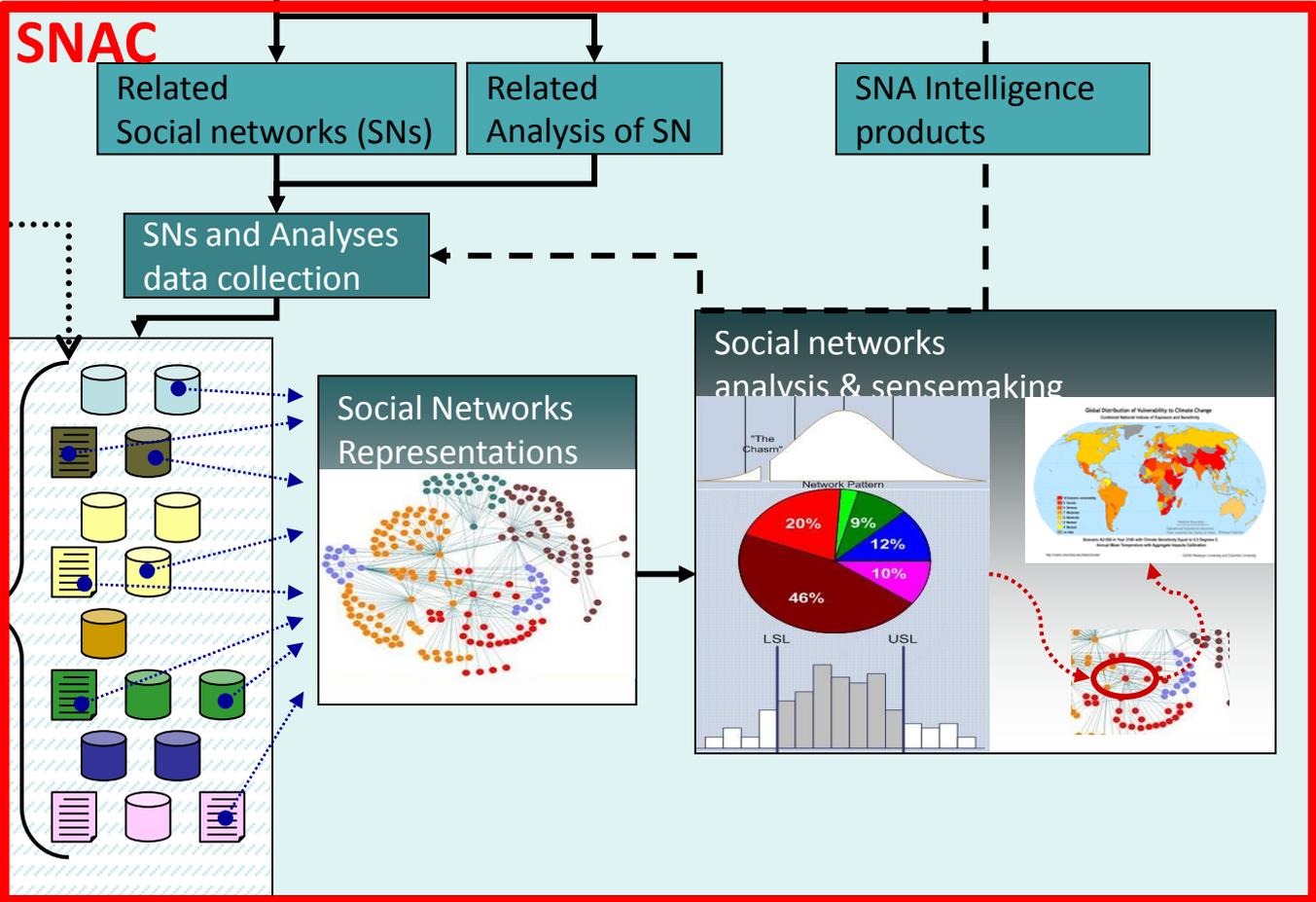
ask questions, test hypothesis,
filter results, explore information,
record thinking process

take advantage of human brain's
aptitude for visual pattern
recognition

Human Are Good at Visual Pattern Finding



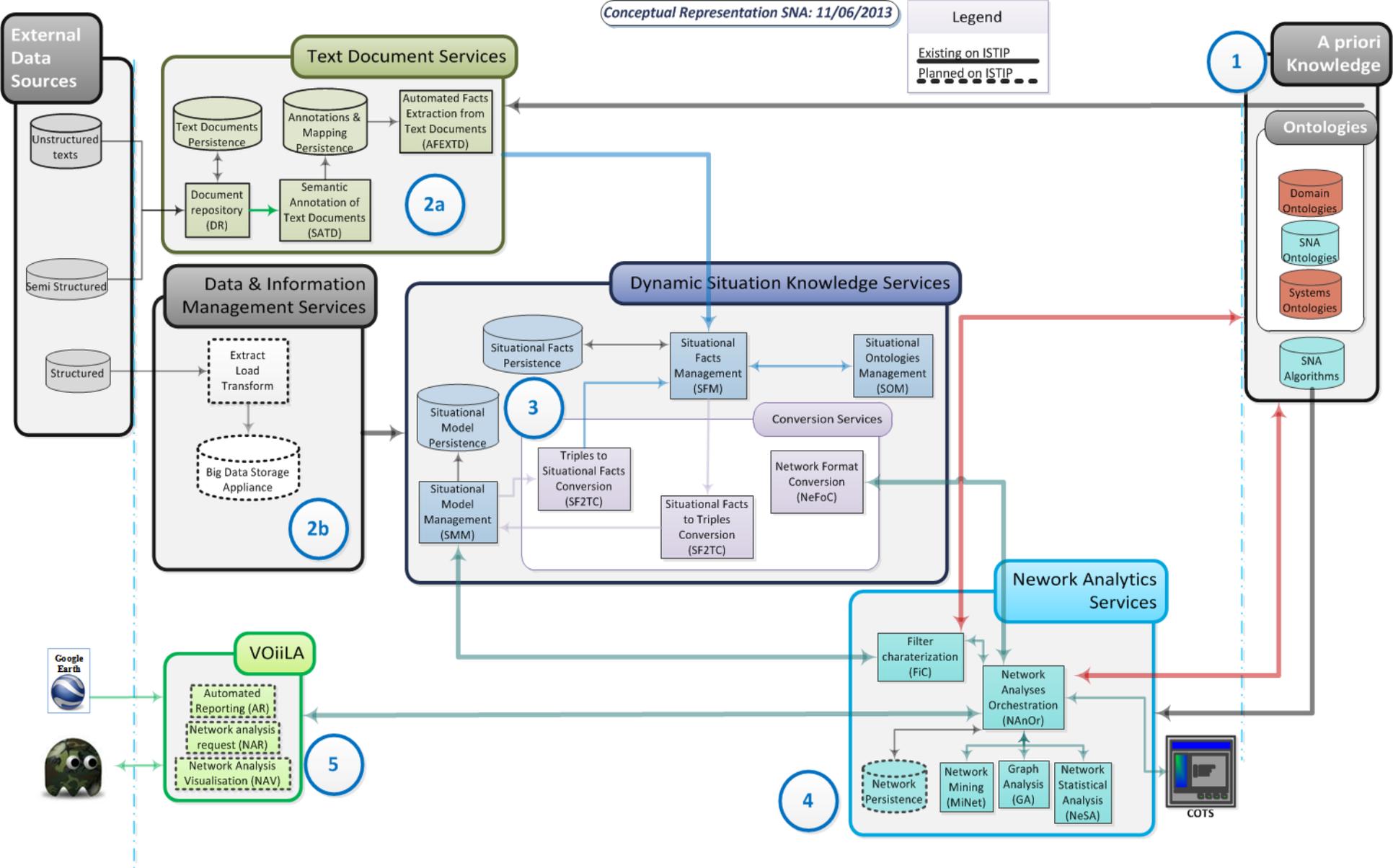
Counter Insurgency objectives - INT

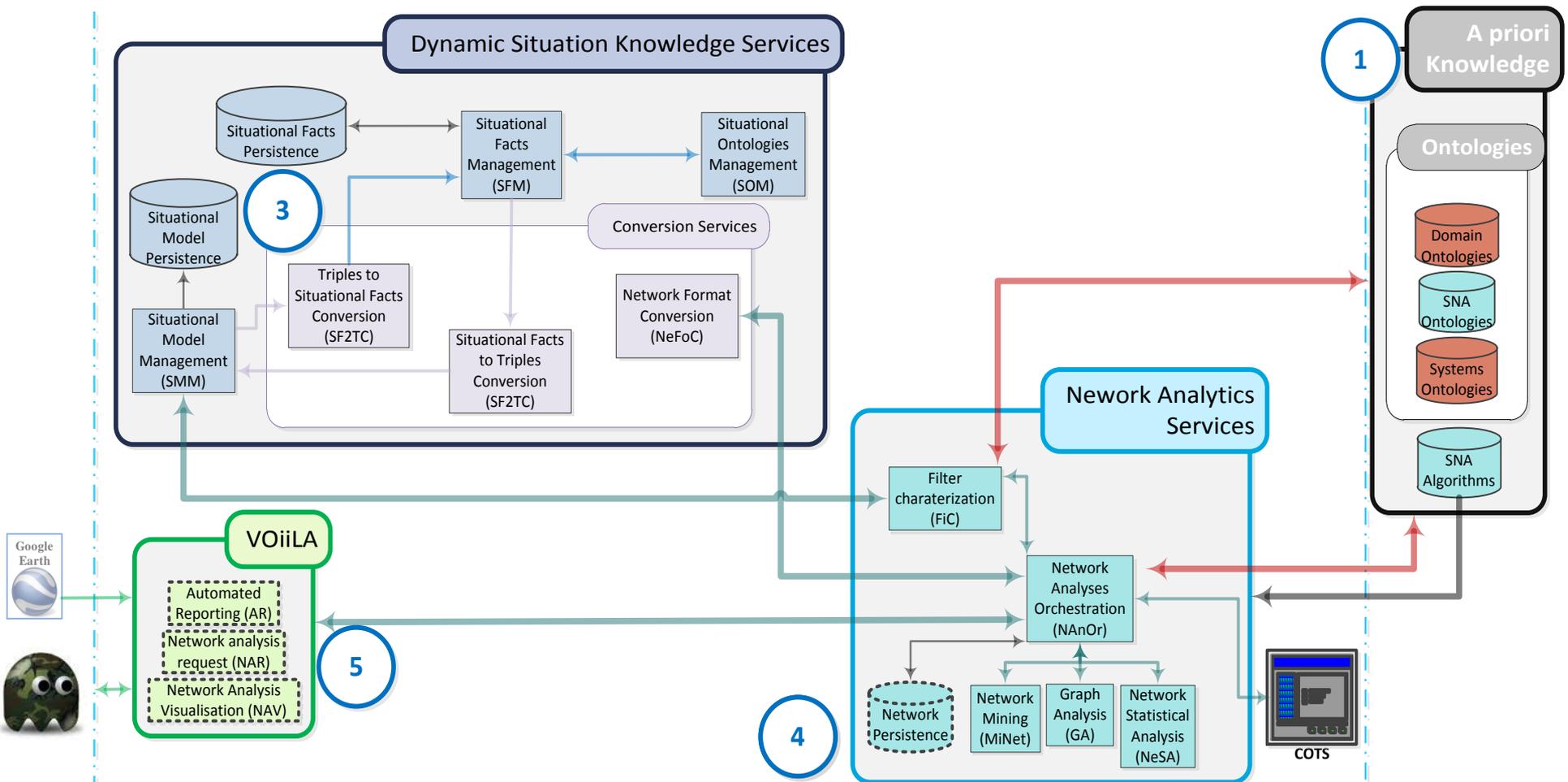


Social Networking

- HUMINT
- IMINT
- GEOINT
- SIGINT
- ELINT
- MASINT
- COMINT
- OSINT
- TECHINT
- FISINT
- FININT

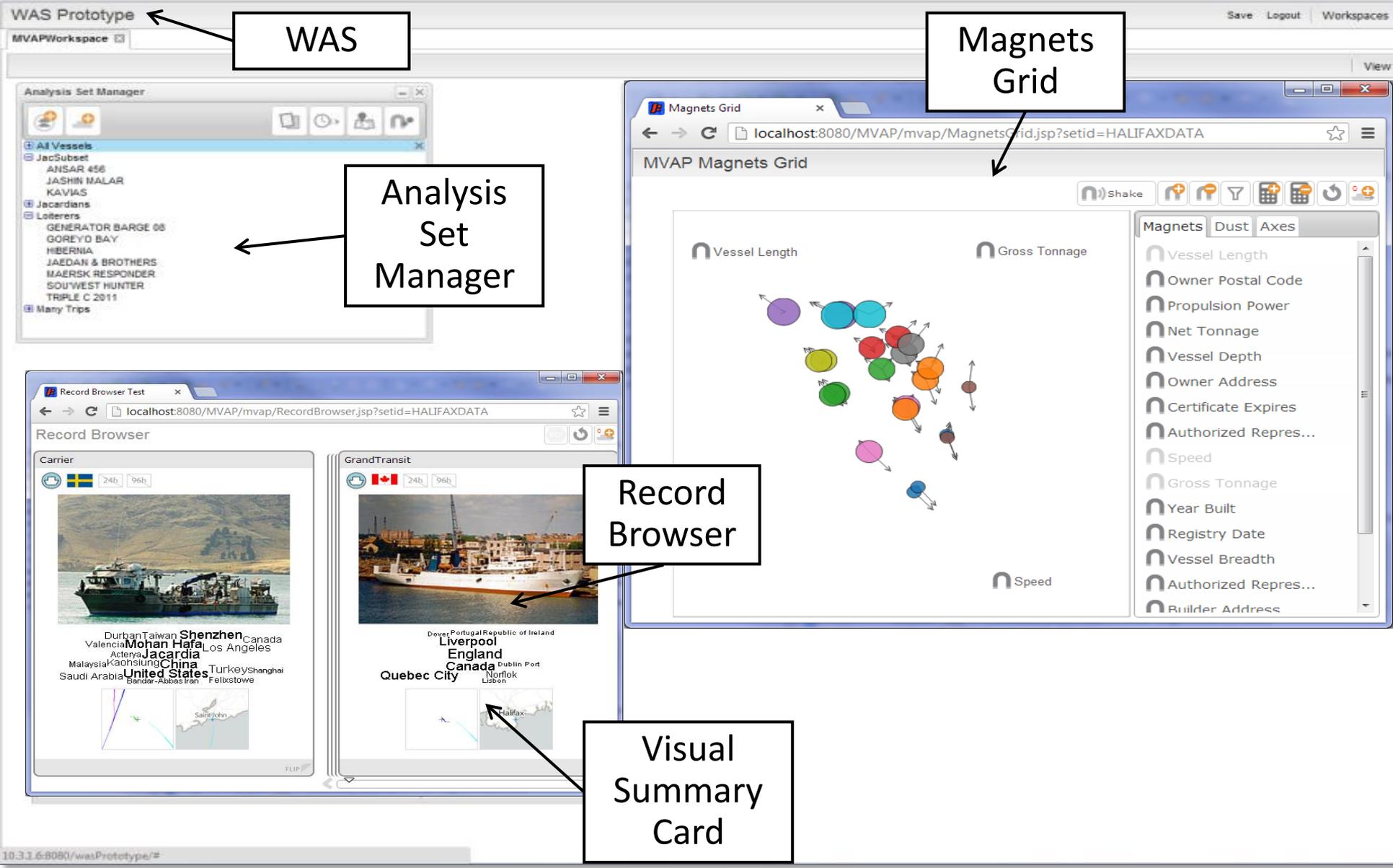
Existing on ISTIP
Planned on ISTIP





MVAP Apps and WAS Workspace – Maritime Domain

- Widgets
 - Analysis Set Manager
 - Record Browser
 - Visual Summary Cards
 - Timelines
 - Magnets Grid
 - Map and Timeline
 - Route ribbons
 - Close Encounter Popup
- Services
 - Archive Builder
 - Word Cloud Generator
 - Data-Acquisition tools
- Framework
 - Login
 - Persistent workspaces



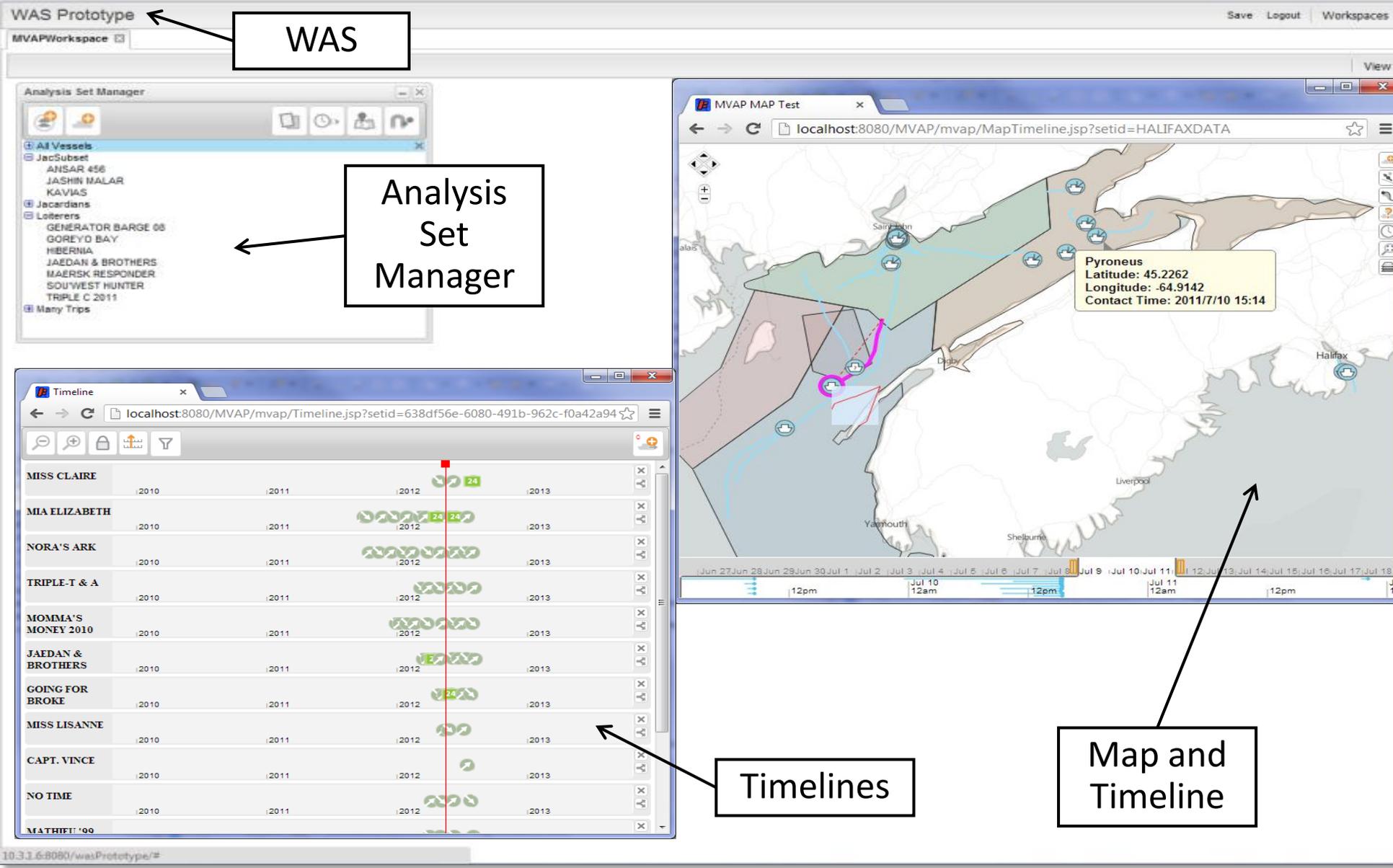
WAS

Magnets Grid

Analysis Set Manager

Record Browser

Visual Summary Card



Broadly Applicable Apps: Visual Summary Cards and Record Browser

Record Browser

The Record Browser displays two visual summary cards for individuals: Abdul Rabid (ID 1.1) and Halik Qualquim (ID 3.1). Each card features a profile picture, a network diagram, a word cloud, and a grid of category icons. Abdul Rabid's card includes icons for Religious (Green Crescent), Tribal (Map of Afghanistan, Gold Ring, Person), Economic (None), Events (None), Political (Afghanistan Flag), Criminal (Gun, Marijuana), and Insurgent (None). Halik Qualquim's card includes icons for Religious (Green Crescent), Tribal (Map of Afghanistan), Economic (Dollar Sign), Events (Hand with Fingers Spread), Political (Afghanistan Flag), Criminal (Gun), and Insurgent (None). A central lock icon is positioned between the cards, and a bottom navigation bar with a blue bar and arrows is at the bottom.

Category	Abdul Rabid (1.1)	Halik Qualquim (3.1)
Religious	Green Crescent	Green Crescent
Tribal	Map of Afghanistan, Gold Ring, Person	Map of Afghanistan
Economic	None	Dollar Sign
Events	None	Hand with Fingers Spread
Political	Afghanistan Flag	Afghanistan Flag
Criminal	Gun, Marijuana	Gun
Insurgent	None	None
Related	3.1, 2.2	1.1, 2.3, 3.2

Broadly Applicable Apps: Magnets Grid – Axes Constraints

MAGNETS GRID

TAMRIK

BUKHTALI

JASHTUN

DAILZAI

GHU

GOVERN
SUPPORT

 INSURGENT SUPPORT

SHAKE MAGNETS  CREATE ASET

MAGNETS DUST AXES

X-AXIS

GROUP NAME

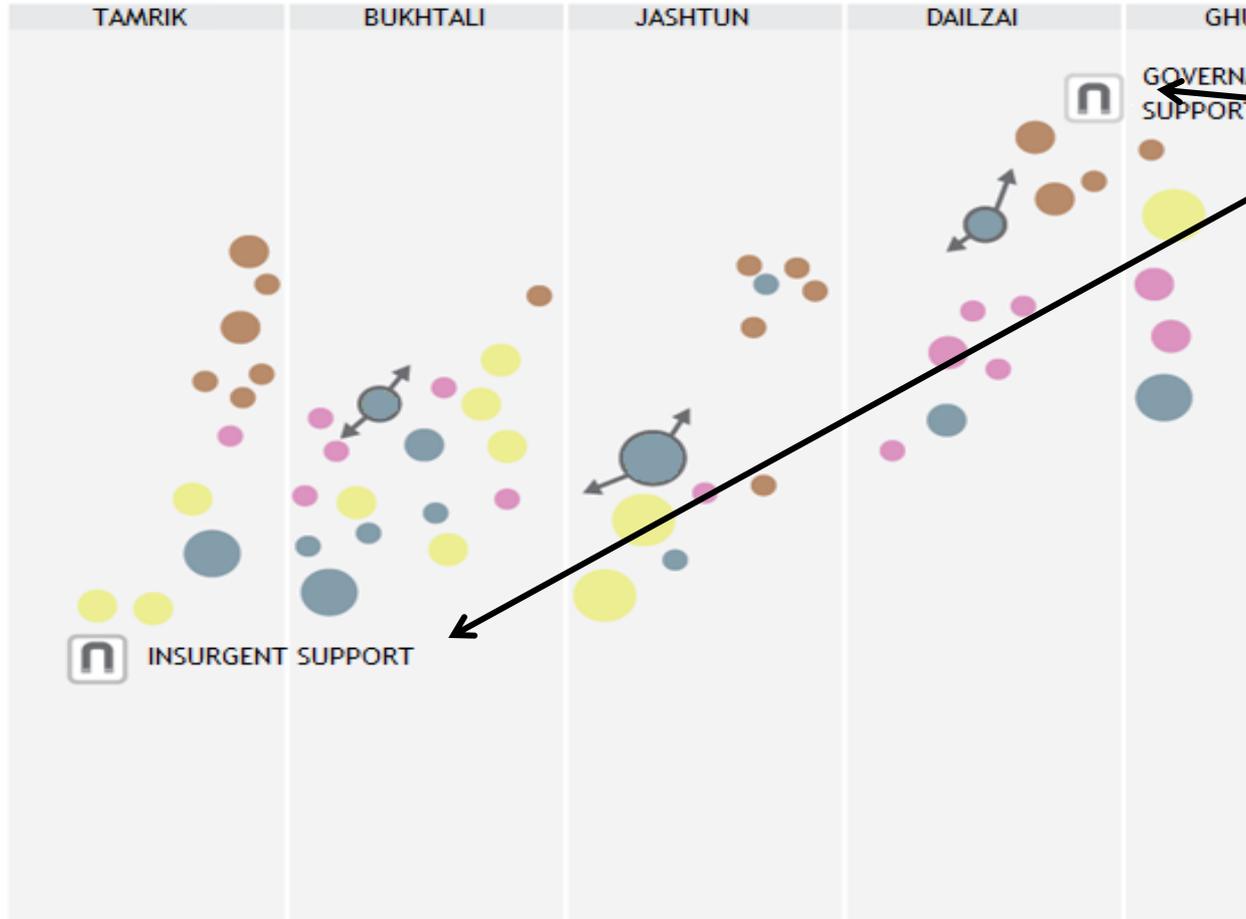
- TAMRIK
- BUKHTALI
- JASHTUN
- DAILZAI
- GHUWANI

Y-AXIS

SELECT ATTRIBUTE

Broadly Applicable Apps: Magnets Grid - Magnets

MAGNETS GRID



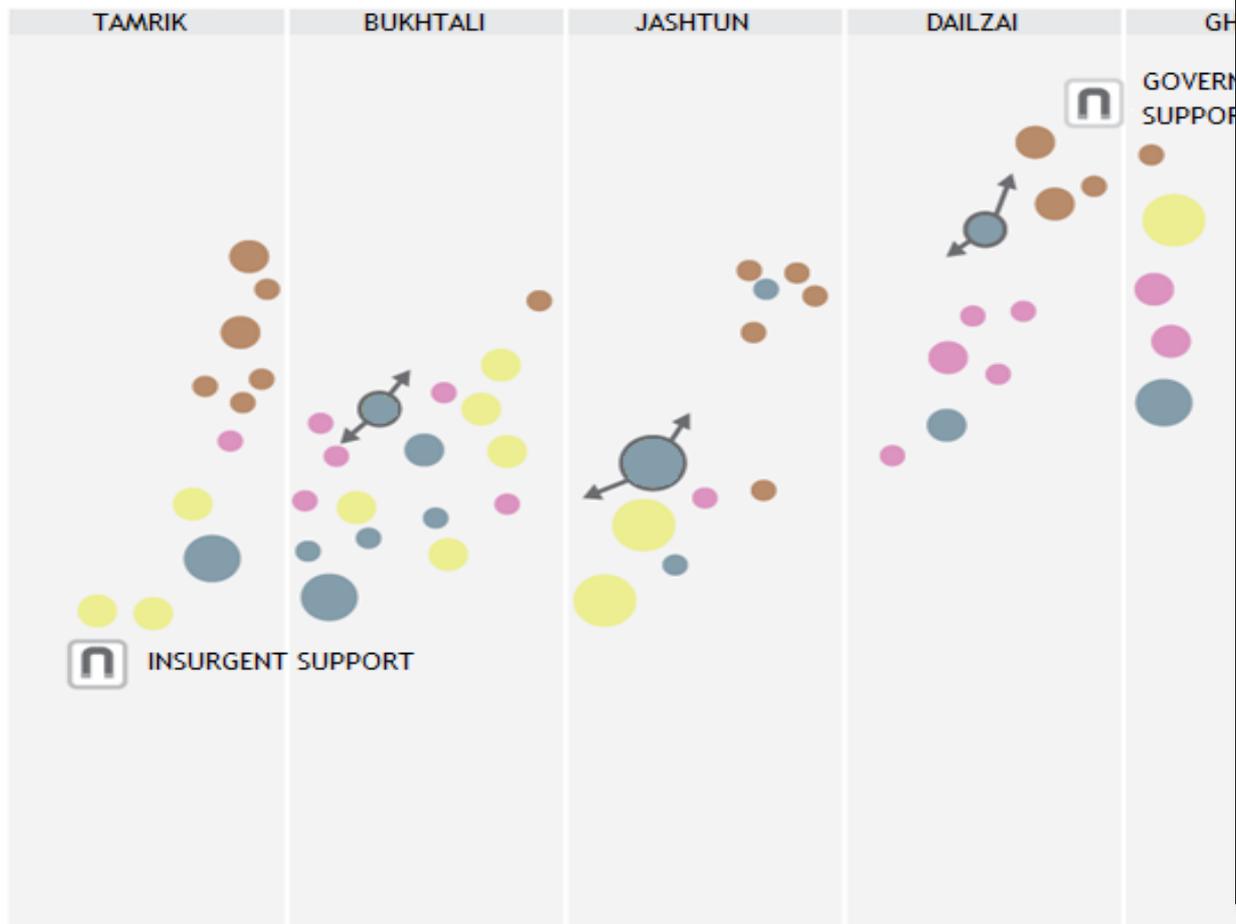
SHAKE MAGNETS CREATE ASET

MAGNETS DUST AXES

- GOVERNMENT SUPPORT
- INSURGENT SUPPORT
- COALITION SUPPORT
- POSITIVE LINKS WITH OTHERS
- INFLUENCE
- # REPORTS
- AGE

Broadly Applicable Apps: Magnets Grid – Dust Properties

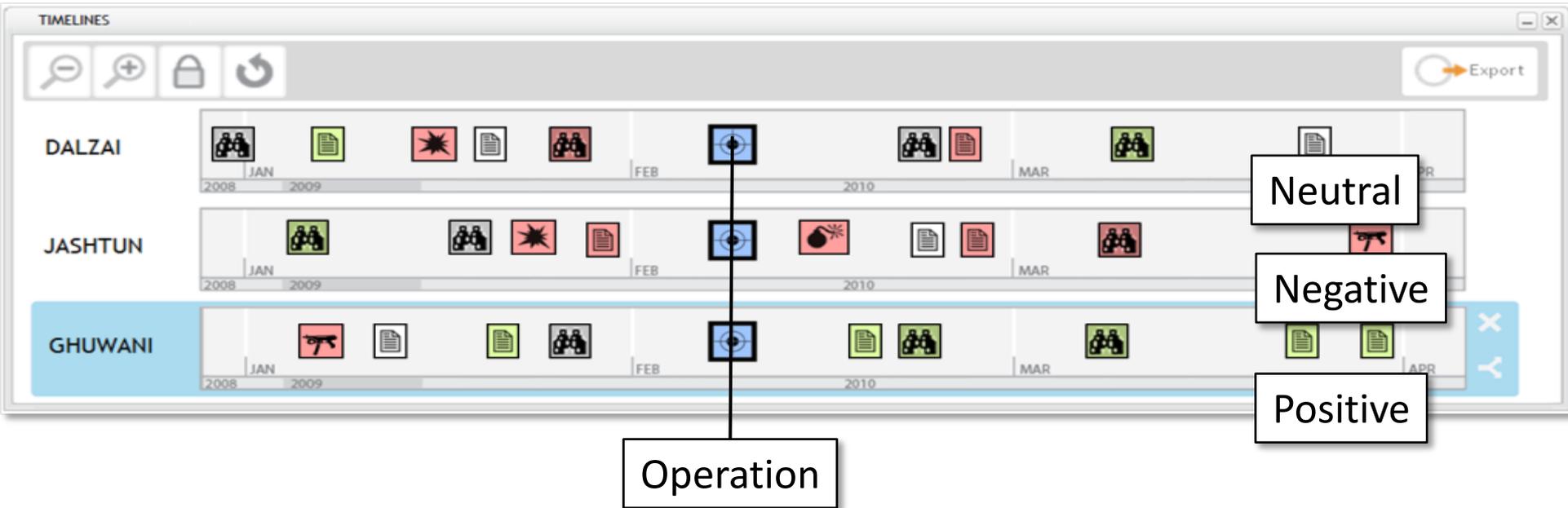
MAGNETS GRID



The screenshot shows the 'SHAKE MAGNETS' application interface. At the top, there are buttons for 'SHAKE MAGNETS' and 'CREATE ASET'. Below these are three tabs: 'MAGNETS', 'DUST', and 'AXES', with 'DUST' currently selected. The main content area displays a legend for 'COLOUR' and 'RADIUS'. The 'COLOUR' legend has a dropdown menu set to 'ROLE' and lists four categories: RELIGIOUS (blue square), POLITICAL (pink square), ECONOMIC (brown square), and TRIBAL (yellow square). The 'RADIUS' legend has a dropdown menu set to '# VIOLENT INCIDENTS' and lists five categories: no reports (smallest dot), 1-4 reports (small dot), 5-9 reports (medium dot), and 10+ reports (largest dot).

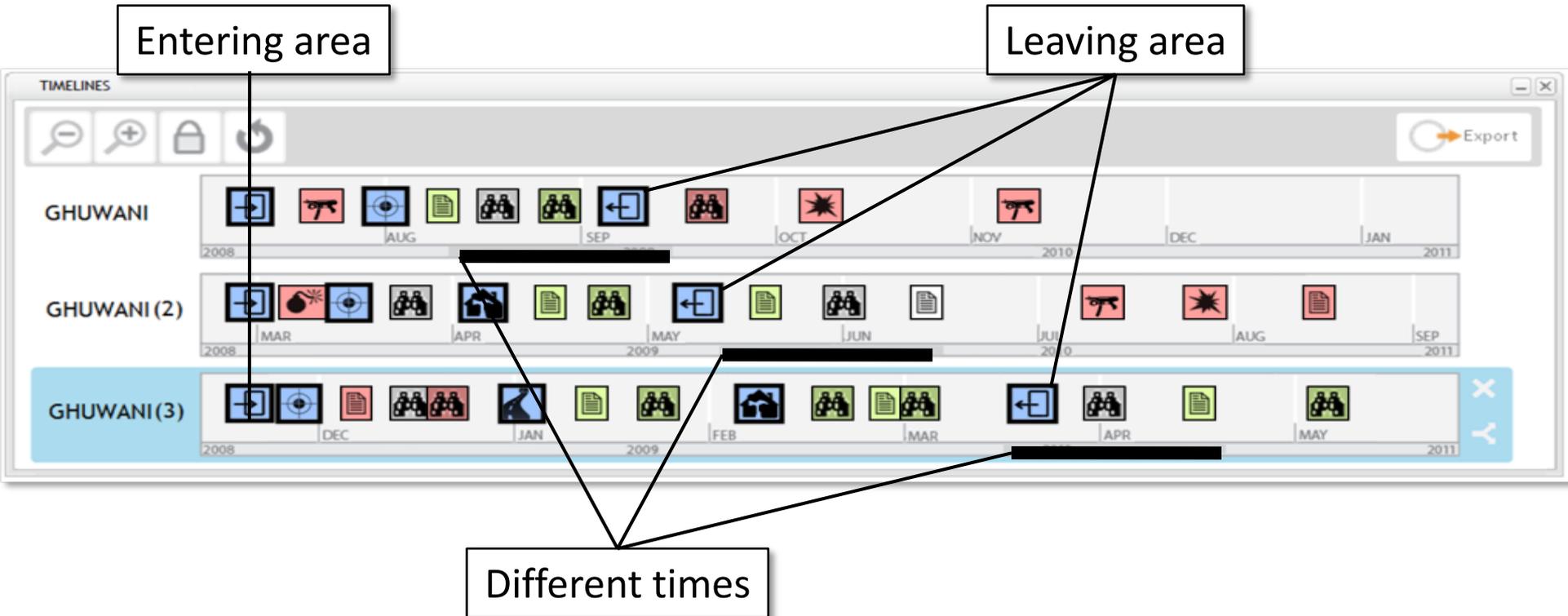
Broadly Applicable Apps: Timelines

Effect of an operation on coalition support from different tribal groups



Broadly Applicable Apps: Timelines

Comparison of the effect of operations on coalition support of a specific tribe at different periods in time.

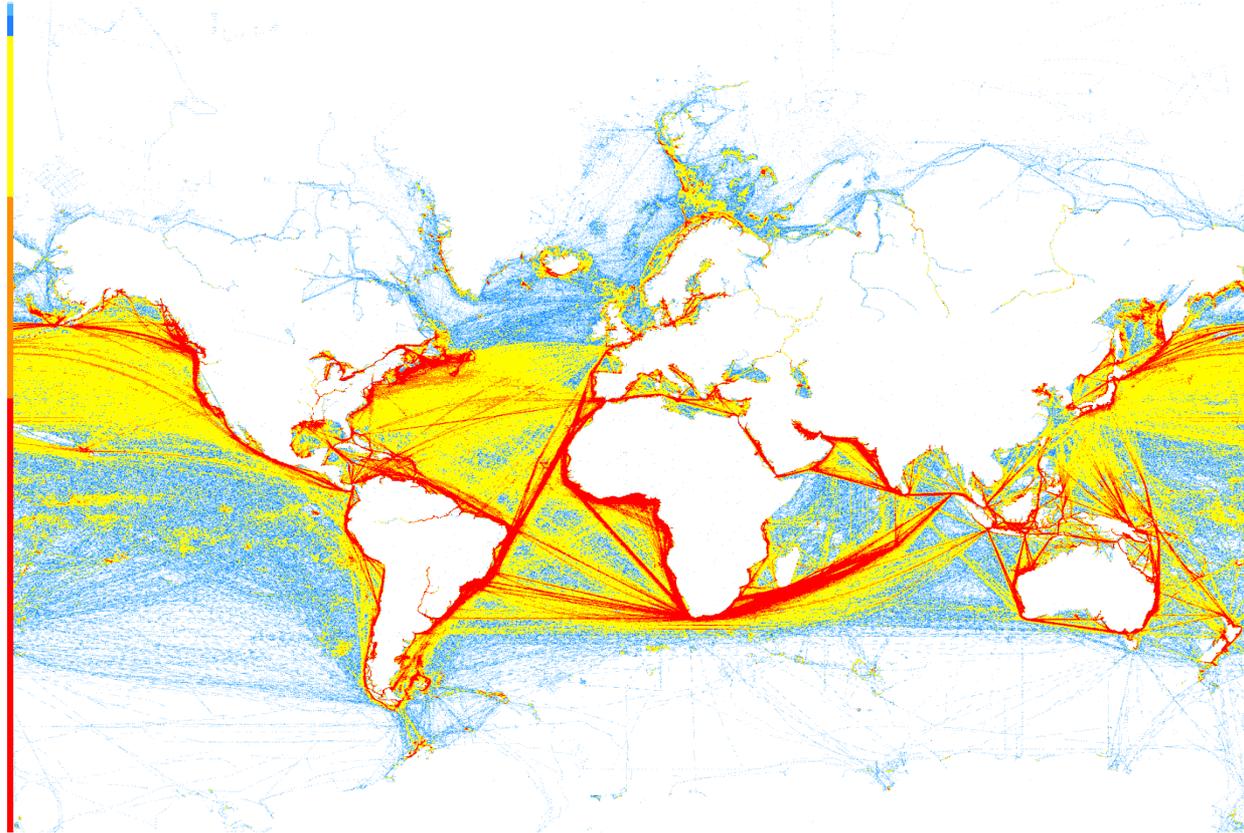


Future Works

- Finalise the adaptation of current generic widgets to SNA COIN context;
- Develop the Graph Analytics widget;
 - Graph diagram of nodes and links;
 - Statistical outputs;
 - Contextual information for the Intelligence Analyst;
 - Exploit temporal components.
- Keep on developing use-cases;
- Instantiate change detection use-cases;
- Investigate other visualisation means significant to a SNA capability – Traffic Density Visualisation;
- Validate current widgets with real SNA data;
- Leverage the reasoning services available on the SOA platform;
- ...

Traffic Density Visualization

- Tinkering with this idea
- Map layer
- Insurgency events
- Positives vs. negatives polarities



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POUR LA DÉFENSE ET LA SÉCURITÉ DU CANADA

