START

Terrorism-centric Behavior Recognition and Adversarial Threat Characterization

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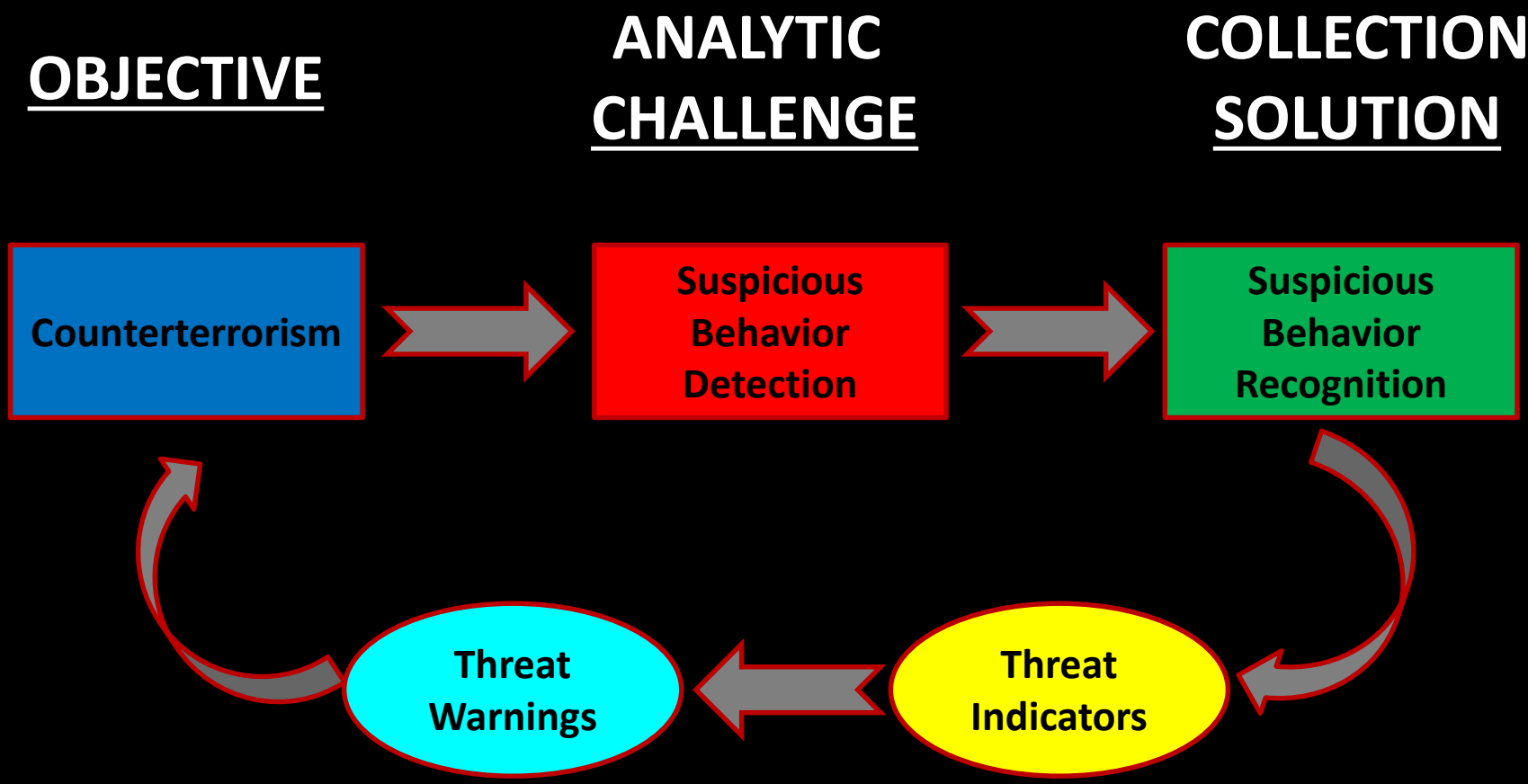
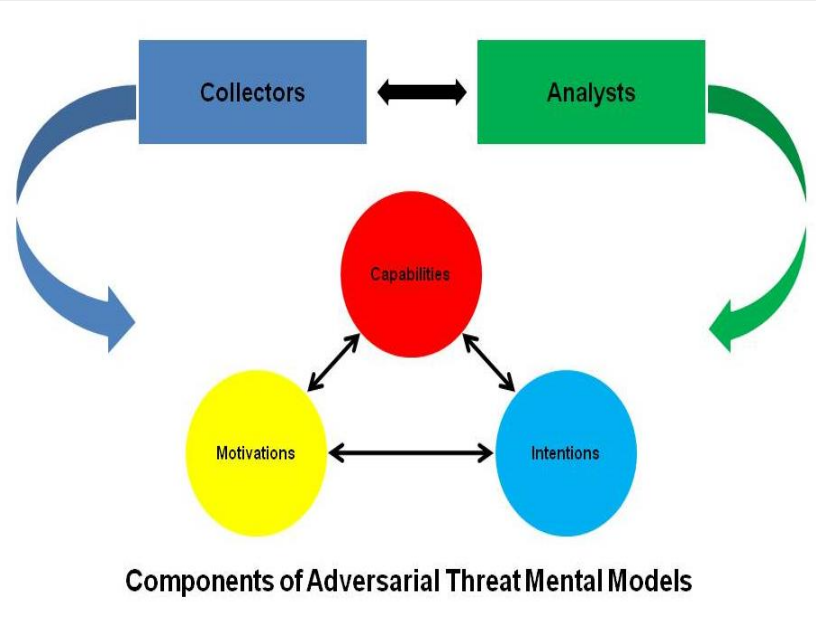
The Intelligence Challenge



Why Situational Awareness Matters



Components of Adversarial Threat Mental Models

- Open source material data and our experience strongly indicate intelligence-driven strategies require consolidating physical, informational, and behavioral sciences into logical, cohesive overlays or patterns applied to human terrain data (e.g., individuals & groups in operational environment)

- Situational awareness of real world phenomena within specified temporal and spatial domains (e.g., perception of environmental elements) forms common intelligence picture of potential adversarial threats

- Situational awareness provides 'what to report' as well as 'what if' and 'so what' for intelligence data

- Situational awareness is foundational component of CT grounded in actionable, credible subject matter expertise

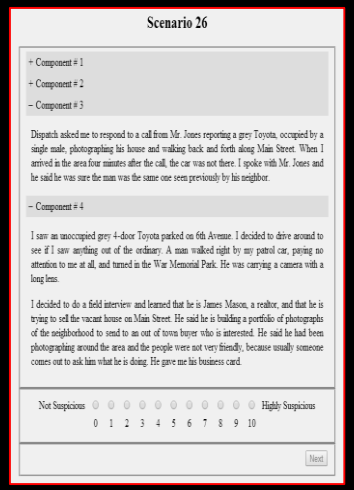
Methods

- Designed web-based situational awareness assessment tool (SAAT©) to generate dataset using SME developed text-based scenarios measuring collectors' recognition of terrorism-centric behaviors (Chronbach's α = 0.92; 1,056 collector judgments) and analysts' adversarial threat characterization (α = 0.91; 528 analyst judgments)

- Scenarios have 1-6 components & multi-component scenarios include mix of behaviors (non-suspicious, generic suspicious, traditional criminal & terrorism-centric behaviors) representing cascading information

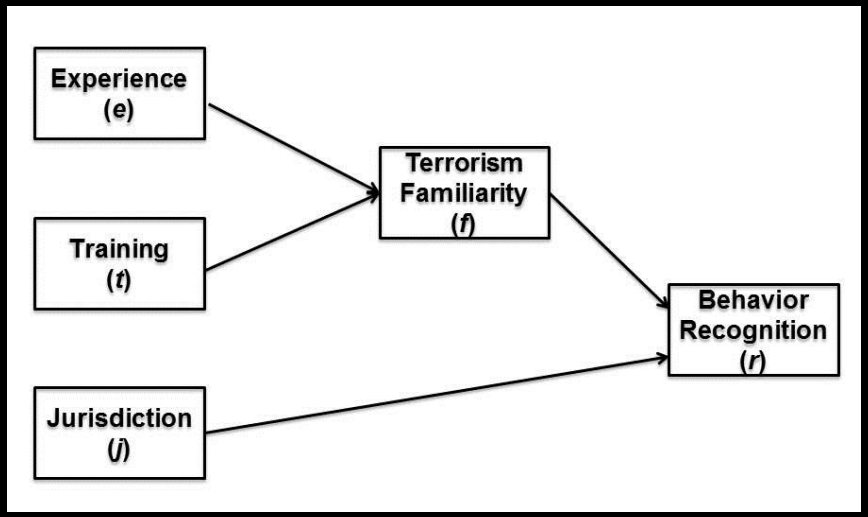
- Individuals respond to each information element sequentially prior to presentation of next component in scenario; emulating information recall, SAAT© allows individuals to review previous components contained within current scenario before rating component

- Collectors were active law enforcement personnel & professional intelligence analysts completed analyst's version. Statistical power considerations used to determine study group size. Collectors and intelligence analysts who completed SAAT© in mid-2013 recruited drawing on research team's contacts within law enforcement and intelligence communities.



Situational Awareness Assessment Tool [SAAT©]

Predicting Collectors' Terrorism-centric Behavior Recognition



- Use force directed graphing combined with OLS regression & difference of means testing to delineate underlying differentials in collectors' mental models
- Specify Bayesian network for collectors' recognition of terrorism-centric behaviors
- Apply Monte Carlo simulation to estimate conditional probability distributions to identify implicit mental models underlying collectors' recognition of terrorism-centric behaviors

Bayesian Network Results

[A] Training

	Training	Recruiting	Funding	Weapons Acquisition	Materials Acquisition	Expertise Acquisition	Eliciting Information	Surveillance	Testing Security	Deploying Assets
Low	No	0.2467	0.0956	0.1551	0.1831	0.2531	0.2263	0.1531	0.1819	0.1291
	Yes	0.1454	0.1314	0.1527	0.1912	0.1779	0.1378	0.1215	0.2051	0.0973
Average	No	0.5962	0.7205	0.5494	0.6090	0.5798	0.6617	0.7049	0.6761	0.5994
	Yes	0.6644	0.6542	0.6629	0.6261	0.6029	0.7230	0.6708	0.6235	0.6637
High	No	0.1571	0.1839	0.2955	0.2079	0.1671	0.1120	0.1419	0.1419	0.2715
	Yes	0.1903	0.2142	0.1844	0.1826	0.2191	0.1392	0.2076	0.1714	0.2390

[B] Terrorism Familiarity

	Terrorism Familiarity	Recruiting	Funding	Weapons Acquisition	Materials Acquisition	Expertise Acquisition	Eliciting Information	Surveillance	Testing Security	Deploying Assets
Low	Not	0.5532	0.0098	0.1785	0.2000	0.5629	0.5551	0.1863	0.1873	0.1951
	Slightly	0.1940	0.1098	0.1069	0.1035	0.0402	0.1185	0.1795	0.1930	0.1079
	Moderately	0.1200	0.1292	0.2066	0.2133	0.2396	0.1021	0.1342	0.1708	0.1122
	Very	0.0619	0.1903	0.0142	0.2129	0.0148	0.1535	0.0084	0.3142	0.0187
Average	Not	0.4293	0.9659	0.0439	0.4215	0.4117	0.4215	0.7971	0.7902	0.4039
	Slightly	0.5288	0.6062	0.8515	0.8515	0.7620	0.7789	0.7765	0.7581	0.6913
	Moderately	0.7415	0.7381	0.6702	0.6208	0.5903	0.7473	0.5791	0.6396	0.7148
	Very	0.6239	0.3290	0.6123	0.4516	0.5232	0.6652	0.8181	0.3632	0.5181
High	Not	0.0176	0.0244	0.7776	0.3785	0.0254	0.0234	0.0166	0.0224	0.4010
	Slightly	0.2772	0.2830	0.0416	0.0445	0.1974	0.1026	0.0435	0.0489	0.2008
	Moderately	0.1385	0.1327	0.1232	0.1659	0.1700	0.1506	0.2867	0.1896	0.1730
	Very	0.3142	0.4806	0.3735	0.3355	0.4619	0.1813	0.1735	0.3226	0.4632

Interpretation:

Training **overall has normalizing effect on response distribution associated with recognizing each behavior**

Terrorism Familiarity **increases probability of high response especially to recruiting, weapons acquisition, expertise acquisition, eliciting information, surveillance & testing security**

Key Findings

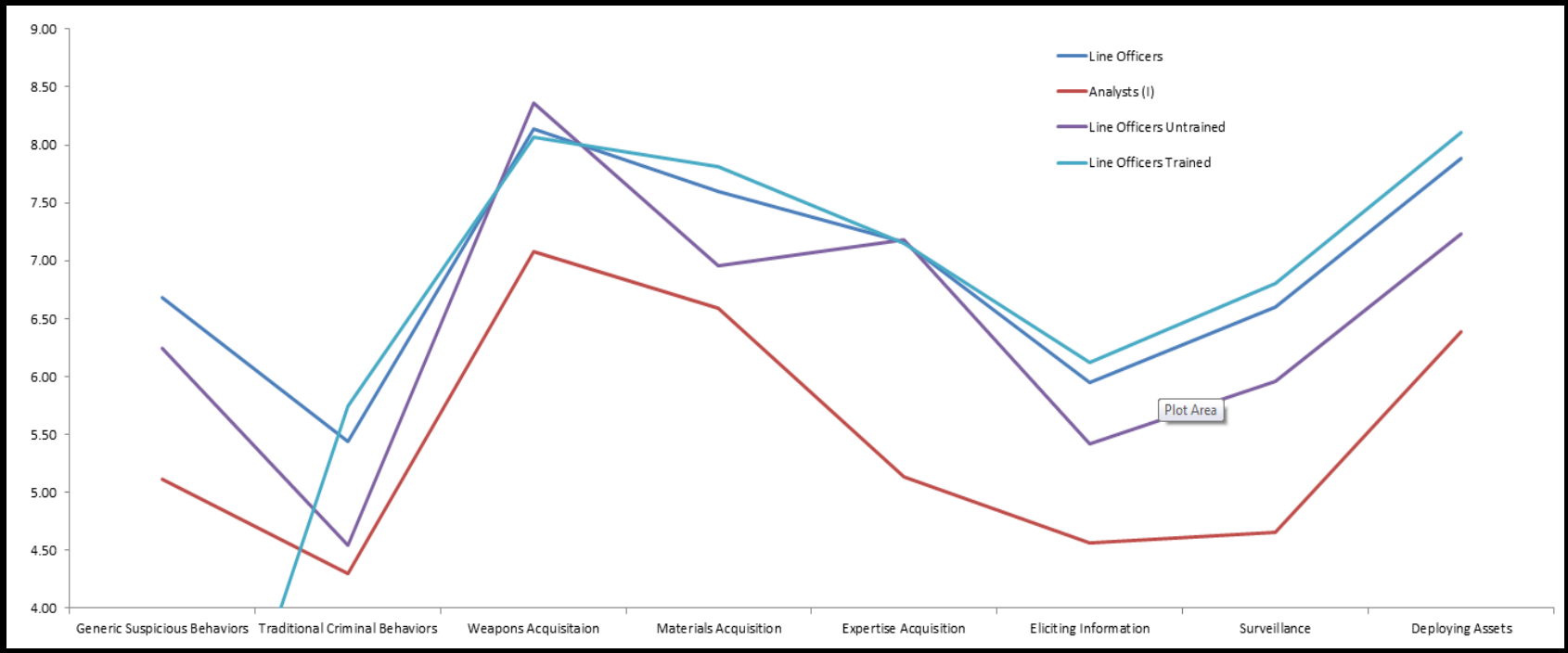
- ***Terrorism-centric behaviors*** **which may be encountered during routine policing are contingent probabilistically on interplay *of jurisdiction*, *training*, *experience* & *terrorism familiarity***

- ***Recognition of those behaviors (i.e., situational awareness) embedded in different contexts increases/decreases as function of those factors***

- ***Training*** **overall has normalizing effect on response distribution associated with recognizing each behavior (increased precision)**

- ***Terrorism Familiarity*** **increases probability of high response especially to recruiting, weapons acquisition, expertise acquisition, eliciting information, surveillance & testing security**

Collector-Analyst Behavior Recognition and Threat Characterization Relationship



- **OLS linear regression to delienate relationship between collectors and analysts (in terms of behaviors and components)**

Impact of Collectors' Behavior Recognition on Analysts' Adversarial Treat Characterization

[A] Collector-Analyst OLS Regression

	Component	Behavior
	Regression Coefficient (t statistic) (R^2)	Regression Coefficient (t statistic) (R^2)
Untrained Low Familiarity	0.70 (0.95)*** (0.45)	0.68 (1.95) (0.49)
Untrained Moderate Familiarity	0.59 (3.07)** (0.30)	0.84 (3.29)* (0.73)
Untrained High Familiarity	0.65 (5.79)*** (0.60)	0.62 (2.78)* (0.66)
Trained Low Familiarity	0.69 (2.91)** (0.28)	0.86 (2.72) (0.65)
Trained Moderate Familiarity	1.51 (6.99)*** (0.69)	1.64 (6.41)** (0.91)
Trained High Familiarity	0.88 (7.48)*** (0.72)	0.91 (5.61)** (0.89)

[B] Behavior

	Untrained Moderate	Untrained High Familiarity	Trained Low Familiarity	Trained Moderate	Trained High Familiarity
Untrained Low Familiarity	0.31	0.37	0.38	0.10	0.14
Untrained Moderate Familiarity		0.43	0.42	0.22	0.28
Untrained High Familiarity			0.49	0.18	0.23
Trained Low Familiarity				0.17	0.22
Trained Moderate Familiarity					0.43

[A] Component

	Untrained Moderate Familiarity	Untrained High Familiarity	Trained Low Familiarity	Trained Moderate Familiarity	Trained High Familiarity
Untrained Low Familiarity	0.27	0.23	0.24	0.11	0.08
Untrained Moderate Familiarity		0.09	0.46	0.03	0.02
Untrained High Familiarity			0.07	0.31	0.25
Trained Low Familiarity				0.03	0.02
Trained Moderate Familiarity					0.43

- **Moderate to high domain-specific expertise (i.e., terrorism familiarity) improves goodness of fit to analysts' adversarial threat characterizations**
- **Untrained collectors with low self-reported terrorism familiarity tended to have judgments about whether behaviors being manifested were terrorism-centric that corresponded weakly with assessments made by professional intelligence analysts**

Key Findings

- Relationship between trained collectors and analysts is stronger in terms of goodness of fit than relationship between untrained collectors and analysts (increased accuracy, where analyst is assumed to be ground truth)

- Moderate to high domain-specific expertise (i.e., terrorism familiarity) improves goodness of fit to analysts' adversarial threat characterizations

- Untrained collectors with low self-reported terrorism familiarity tended to have judgments about whether behaviors being manifested were terrorism-centric that corresponded weakly with assessments made by professional intelligence analysts

Policy Implications

- Training and terrorism familiarity improve collectors' precision and accuracy
- Unlike jurisdiction or experience which are relatively fixed, training & terrorism familiarity are relatively malleable & can be enhanced in short-term
- Analysis suggests relying on non-specialists in human collection can generate information supporting intelligence-driven, targeted CT operations by performing *'find'* function of F3EA [find, fix, finish, exploit, and analyze] if collectors possess heightened terrorism-centric behavior recognition
- Underscores importance of developing robust capacity to isolate features of problem set - including non-relevant aspects - and identify information that may inform prioritizing risks by putting premium on context & not just collection

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