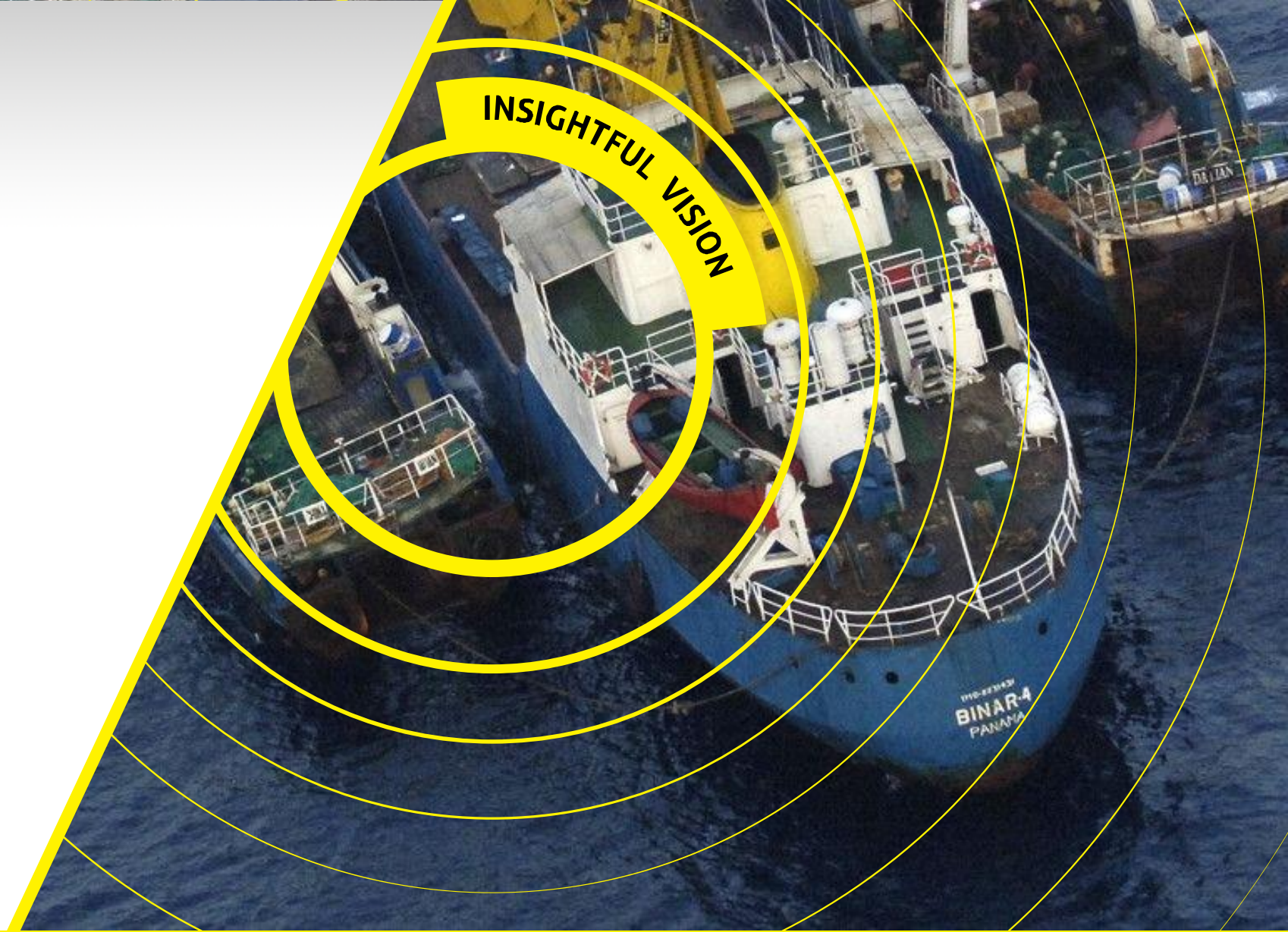


# The Evolution of Remote Sensing: **From Data to Solutions** KINGFISHER

Mr. Alexander Imas  
Senior Director Marketing & Sales





# iSi Company ID



# KINGFISHER – Better Decision Making



“A satellite based ISR solution for the maritime domain.”

The power of the KINGFISHER is in improving:

- Threat prevention: Early Detection of Non-Cooperative vessels, in remote areas, before they turn into threats
- Operational efficiency: Better use of ISR assets



# KINGFISHER Deals With Many Challenges:



## Environmental

Detection of oil spills  
correlation with AIS history of polluting  
vessels



## Oil & Gas

Peripheral monitoring of facilities and  
vessel movements



## Illegal Fishing

Detection of Non-cooperative fishing  
vessels  
AIS analysis for fraud detection and  
vessels without fishing permit



## Immigration

Detection of vessels suspicious for human  
trafficking



## Military Conflicts

Detection of military activity in remote areas  
Port monitoring  
-Classified capabilities-

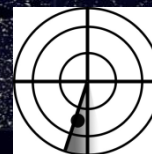
# Comparison: KINGFISHER & other maritime ISR



UAV



MPA



OTH RADAR

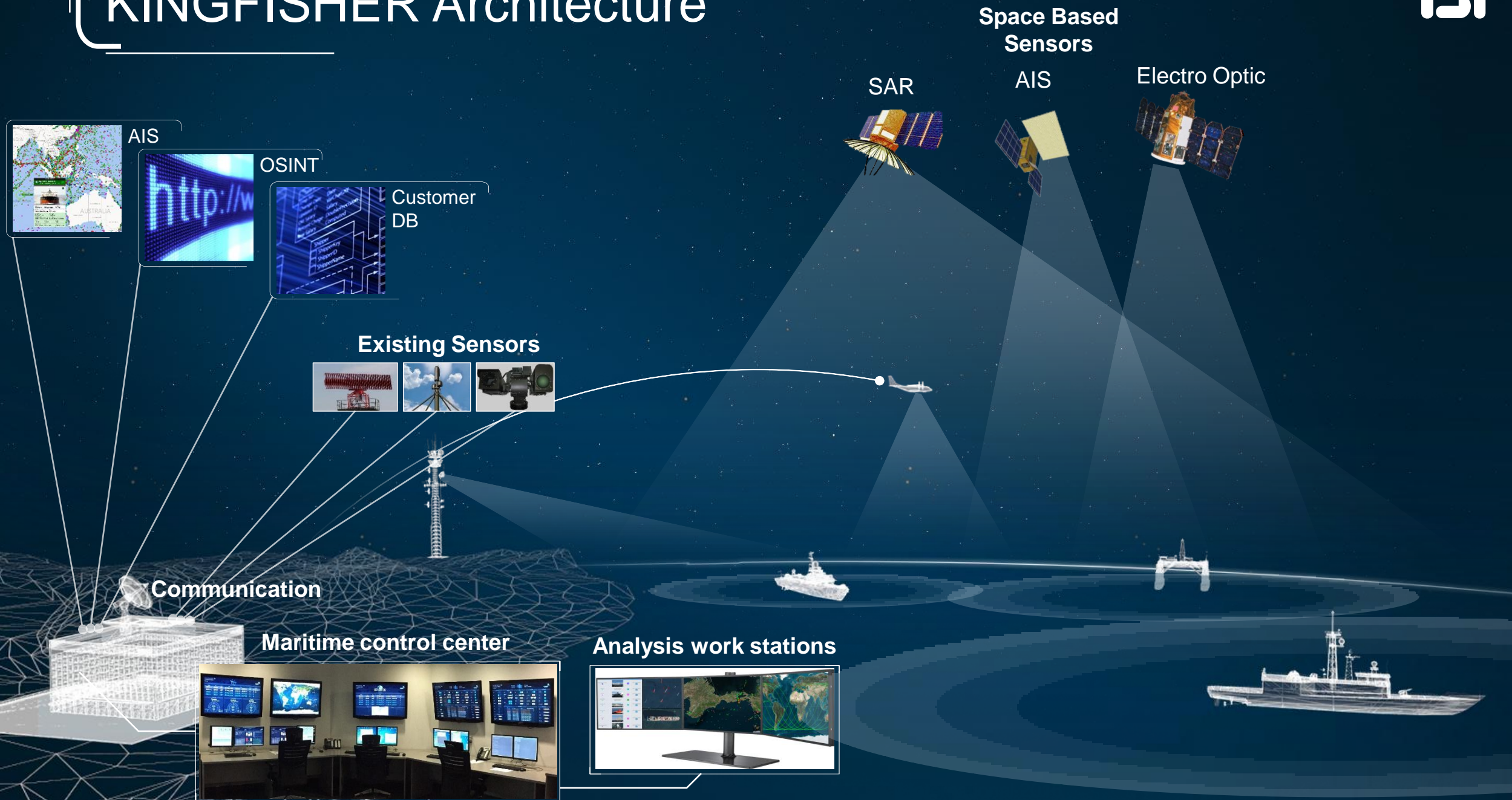


KINGFISHER

Range from coastline	~130 NM	~1200 NM	~200 NM	Unlimited
Area of Interest (AOI)	200 sqkm (RADAR range) Dynamic	1,000 sqkm (RADAR range) Dynamic	360 sqkm Fixed	Unlimited
Endurance	3 platforms per 1 ROI	3 platforms per 1 ROI	Continuous	AIS – update every 3 hours Imagery – update 5 times per day
Access to AOI	Limited	Limited	Limited	Unlimited
Cost	Medium (~1.5 M USD per 1 platform a year)	High (20K-60K USD per flight hour)	Medium (12 M USD cost)	Lower for normalized service




# KINGFISHER Architecture



# Multi Sensor Analysis Cycle

**SICHEM PALACE**



© J. Dohrn  
marineTraffic.com

דגל: Malta  
אורך x רוחב: 112m x 19m  
קו קוואטרן: 5.4m

CALL SIGN: 9HA3856  
IMO: 9304318  
MMSI: 256227000

הודעה: 2 min ago  
(קוד AIS: 1706)  
מצב: Underway using Engine  
מהירות: 14.0kn / 17k  
שם: JORF LASFAR  
ETA: 2015-07-29 20:00 (UTC)

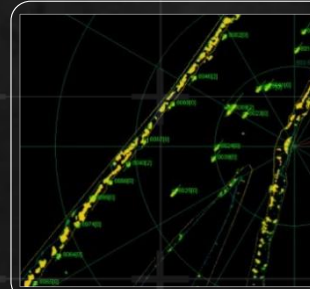
- הודעה על תצפית
- פרטים...
- היסטורית מיקום
- היסטורית מיקום
- Port Calls
- Nearby Vessels

[Add to Fleet](#)

פרטים כלליים

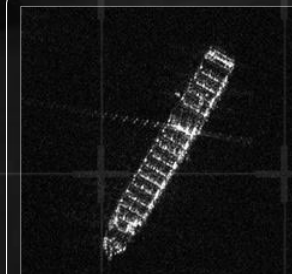
## Satellite & Ground AIS

...  
Base layer,  
rule based  
analysis,  
Suspicious  
vessels list



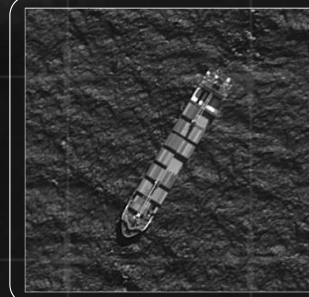
## RADAR

...  
Integration of  
radar output



## SAR Satellites

...  
Detection of non  
cooperative  
vessels



## EO Satellites

...  
Vessel  
Identification



## OSINT

...  
Dossier  
creation



# Analysis Stages

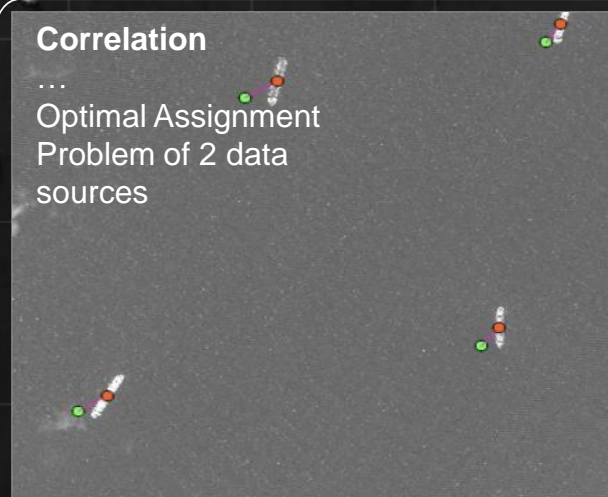
## Detection

...  
Deep Learning  
For target detection,  
EO & SAR



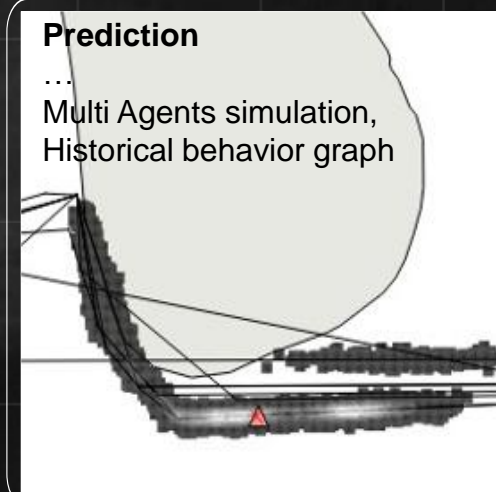
## Correlation

...  
Optimal Assignment  
Problem of 2 data  
sources



## Prediction

...  
Multi Agents simulation,  
Historical behavior graph



## Anomaly Detection

...  
Rule based, Machine learning



## Human Analysis

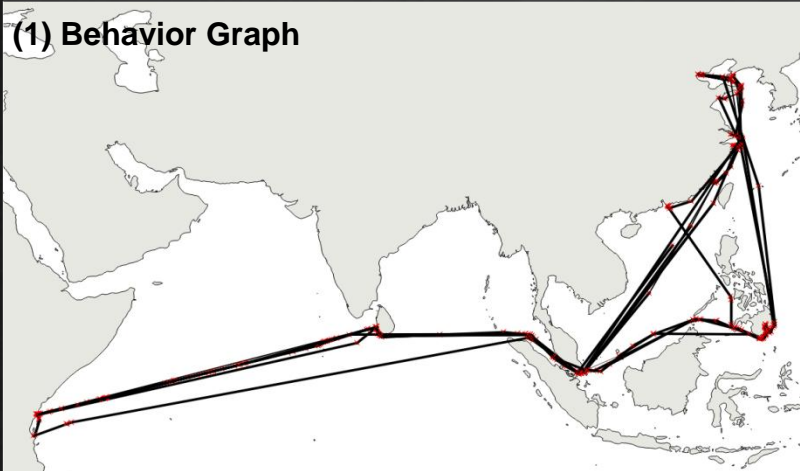
...  
Insights,  
Decision  
making



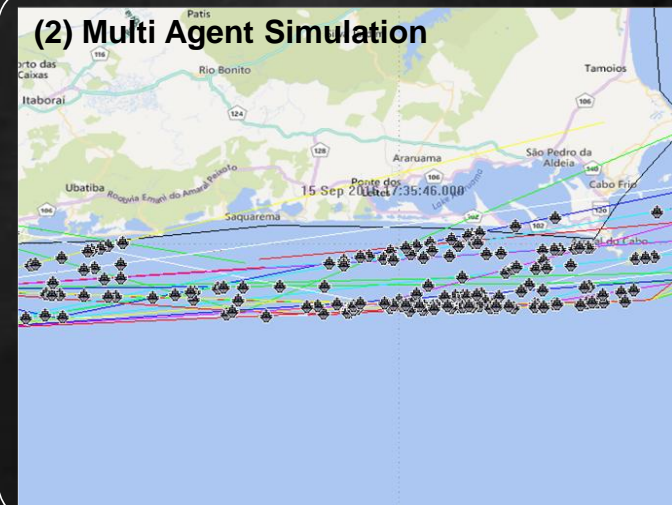


# Prediction Algorithm

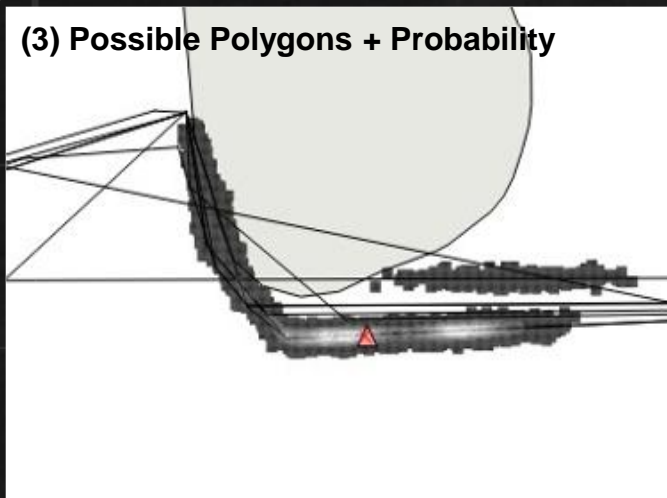
(1) Behavior Graph



(2) Multi Agent Simulation



(3) Possible Polygons + Probability



A series of concentric yellow arcs, resembling a radar or sonar scan, are centered on the left side of the slide. The arcs are of varying radii and are set against a light gray background that transitions to white on the right. One of the arcs is thicker and has a yellow banner attached to its right side.

INSIGHTFUL VISION

## Case Study #1

### **Chin Horng 3 – IUU Fishing Detection**



# Automatic Alert Based on AIS analysis



17.02.2016 Detection of  
suspected ship activity

Ship name: Chin Horng  
no.3

MMSI: 416889800

Call sign: BL2316

Flag: Taiwan



## Historical AIS data analysis

- Analysis of previous routes shown that its average cruise speed is **12 knots**
- In the current case, the ship sailed 500 Nautical miles in 76 hours: **6.5 knots (average)**





## Historical AIS data analysis

- Analysis of previous routes shown that its average cruise speed is **12 knots**
- In the current case, the ship sailed 500 Nautical miles in 76 hours: **6.5 knots (average)**
- If this ship was sailing in its cruise speed between those 2 points it was engaged in **fishing activity** for about **32 hours**

500NM

**32**  
Hours

# OSINT

Correlation with OSINT DB revealed that it is illegal ship

- fishing license expired at 30.03.2013 and was not renewed



1											Positive List			
2	No	Registry	Name of Vessel	Gross Tonnage	Length (LOA, )	Call Sign	Owner of Vessel	Atlanti o Ocean (ICCAT)	Indian Ocean (IOTC)	East Pacific Ocean (IATTC)	West Pacific Ocean			
3	15	TAIWAN	CHIEN CHYANG	465	42.08	BH-3200	SHIN YANG FISHERY CO. LTD.	○			○			
18	16	TAIWAN	CHIEN TUI 102	436	48.6	B2E2	HUNG CHUAN FISHERY CO., LTD	○			○			
19	17	TAIWAN	CHIEN TSAO 322	436	48.6	BV2V	CHIEN TSAO FISHERY CO. LTD.	○			○			
20	18	TAIWAN	CHIEN WEI 3	708	56.7	BI-2201	CHIEN WEI FISHERY CO. LTD.		○		○			
21	19	TAIWAN	CHIN CHANG HONG	463	42.88	BH-3166	CHAN YI HSIUNG OCEANIC ENTERPRISE CO.,LTD.		○		○			
22	20	TAIWAN	CHIN CHANG LONG	363	47.84	BH-3013	CHIN CHANG STN OCEAN ENTERPRISE CO.	○			○			
23	21	TAIWAN	CHIN CHANG MING	556	47.6	BI-2443	CHIN CHANG MING FISHERY CO. LTD.	○			○			
24	22	TAIWAN	CHIN CHANG MEN	704	50.12	BI-2362	CHIN CHANG MEN FISHERY CO. LTD			○	○			
25	23	TAIWAN	CHIN CHEN MING	740	55.26	BI-2413	CHIN CHEN AING FISHERY CO. LTD		○		○			
26	24	TAIWAN	CHIN CHENG WEN	721	56.61	BI-2316	CHIN CHENG WEN FISHERY CO. LTD.	○			○			
27	25	TAIWAN	CHIN HONG S	708	55.3	BI-2316	KTN YUN FISHERY CO. LTD.		○		○			
28	26	TAIWAN	CHIN HSIANG MING	661	43.28	BH-3138	CHIN HSIANG MING FISHERY CO. LTD	○			○			
29	27	TAIWAN	CHIN HSING 112	369	49.6	BI-2764	CHIN HSING FISHERY CO. LTD.		○		○			
30	28	TAIWAN	CHIN HUNG YUN JV	708	55.3	BI-2317	CHYI YU FISHERY CO. LTD.		○		○			
31	29	TAIWAN	CHIN LI HONG	436	42.2	BH-3021	HUI YUAN OCEANIC ENTERPRISE CO.,LTD.	○			○			
32	30	TAIWAN	CHIN LIANG HONG	333	40.85	BH-2816	CHIN LIANG HONG OCEAN ENTERPRISE CO. LTD	○			○			
33	31	TAIWAN	CHIN MENG HSIANG 36	751	57.91	BI-2179	CHIN MENG FISHERY CO.,LTD.		○		○			
34	32	TAIWAN	CHIN SHUN 101	896	53.15	BI-3288	CHIN SHUN FISHERY CO.,LTD.	○			○			
35	33	TAIWAN	CHIN SHUN KUO	747	57.6	BI-2342	SHUN HE FISHERY CO. LTD.	○			○			
36	34	TAIWAN	CHIN YAO ZUNG 3	706	54.85	BI-2086	SAN CHI FISHERY CO., LTD.		○		○			
37	35	TAIWAN	CHIN YONG MING	708	54.85	BI-2265	CHIN YONG WEN FISHERY CO.,LTD.			○	○			

The ship is reported **48 meters** length using the AIS transmitting while the ship's exact length is **55 meters**



OSINT



© Jiri Rezac Photography



28.04.2013

A tuna transshipment on the high seas in the Indian Ocean was detected between Chin Horng No. 3 and the Panama-registered reefer vessel Tuna Queen



INSIGHTFUL VISION

## Case Study #2

# South China Sea Islands Military Activity



# Scarborough Shoal - Reef in the South China Sea

Scarborough Shoal



235 KM

Philippines

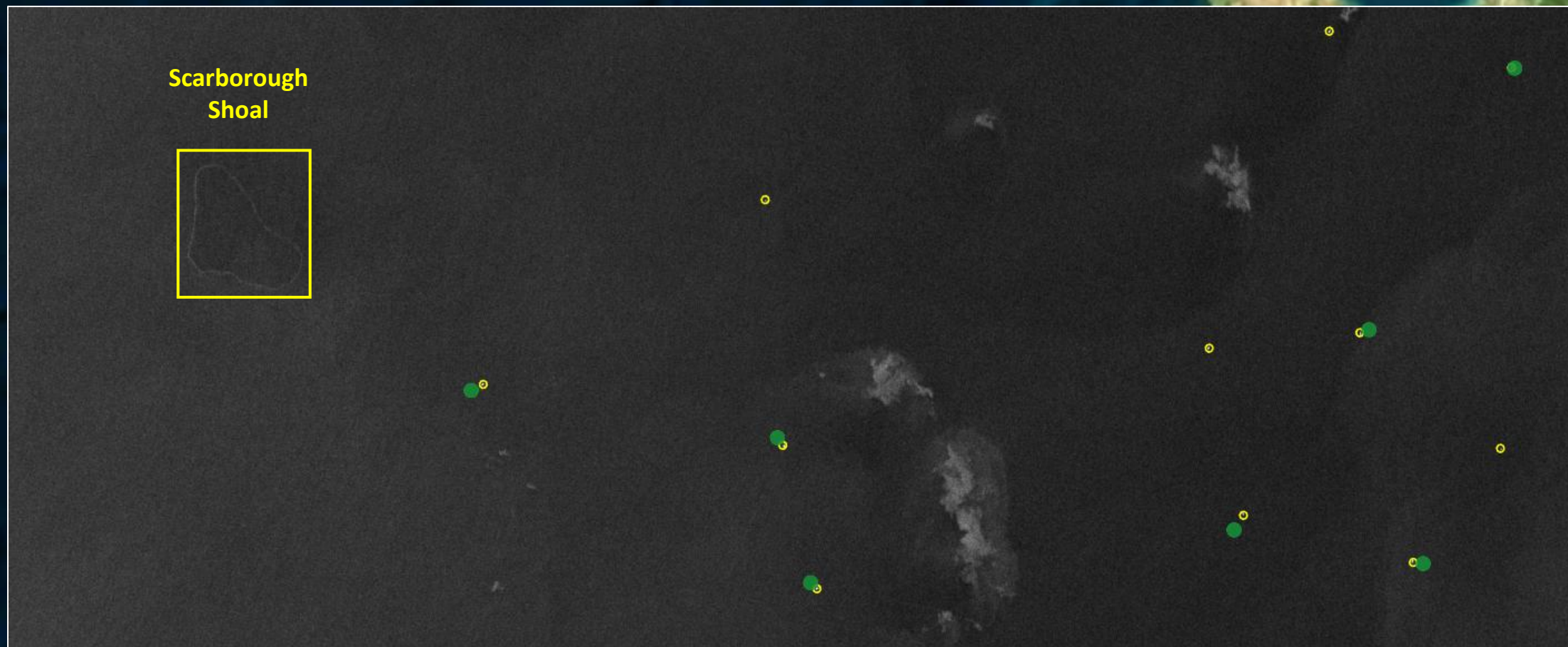


# Stage 1: Satellite AIS Analysis

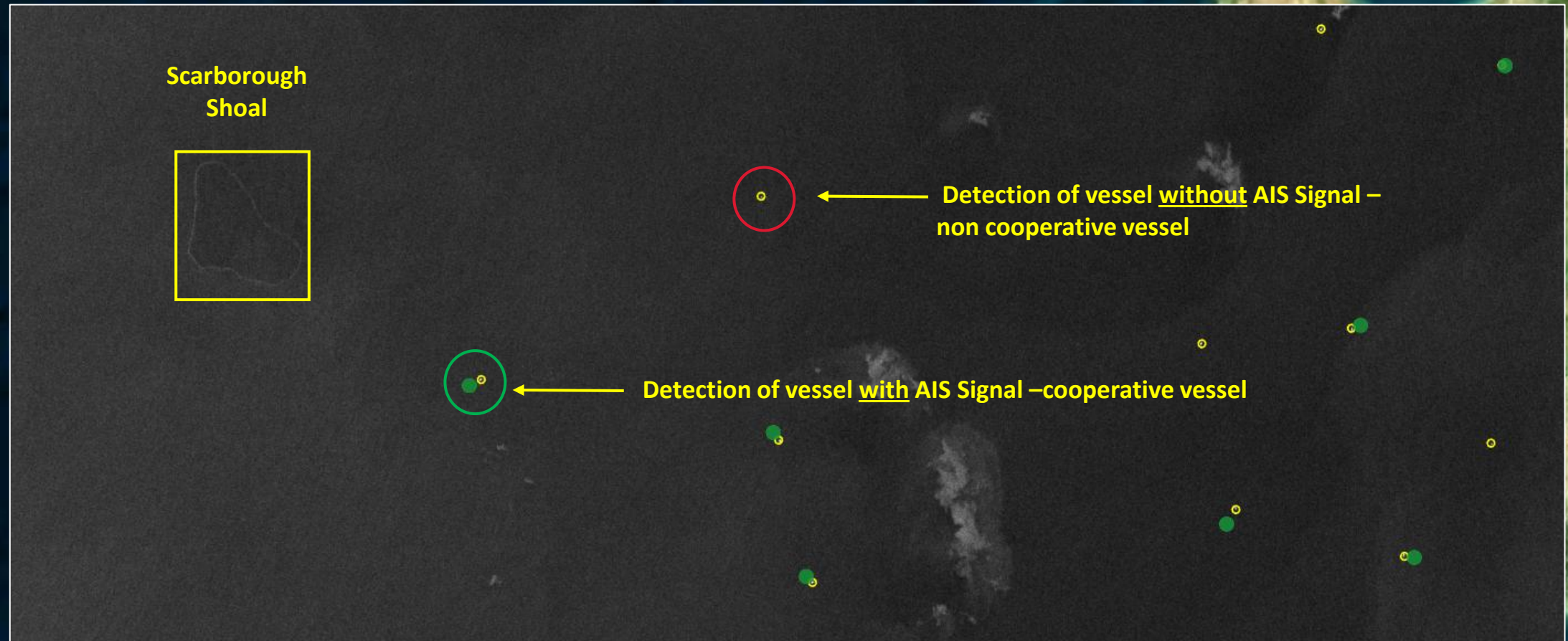




## Stage 2: SAR Imagery for detection of vessels without AIS

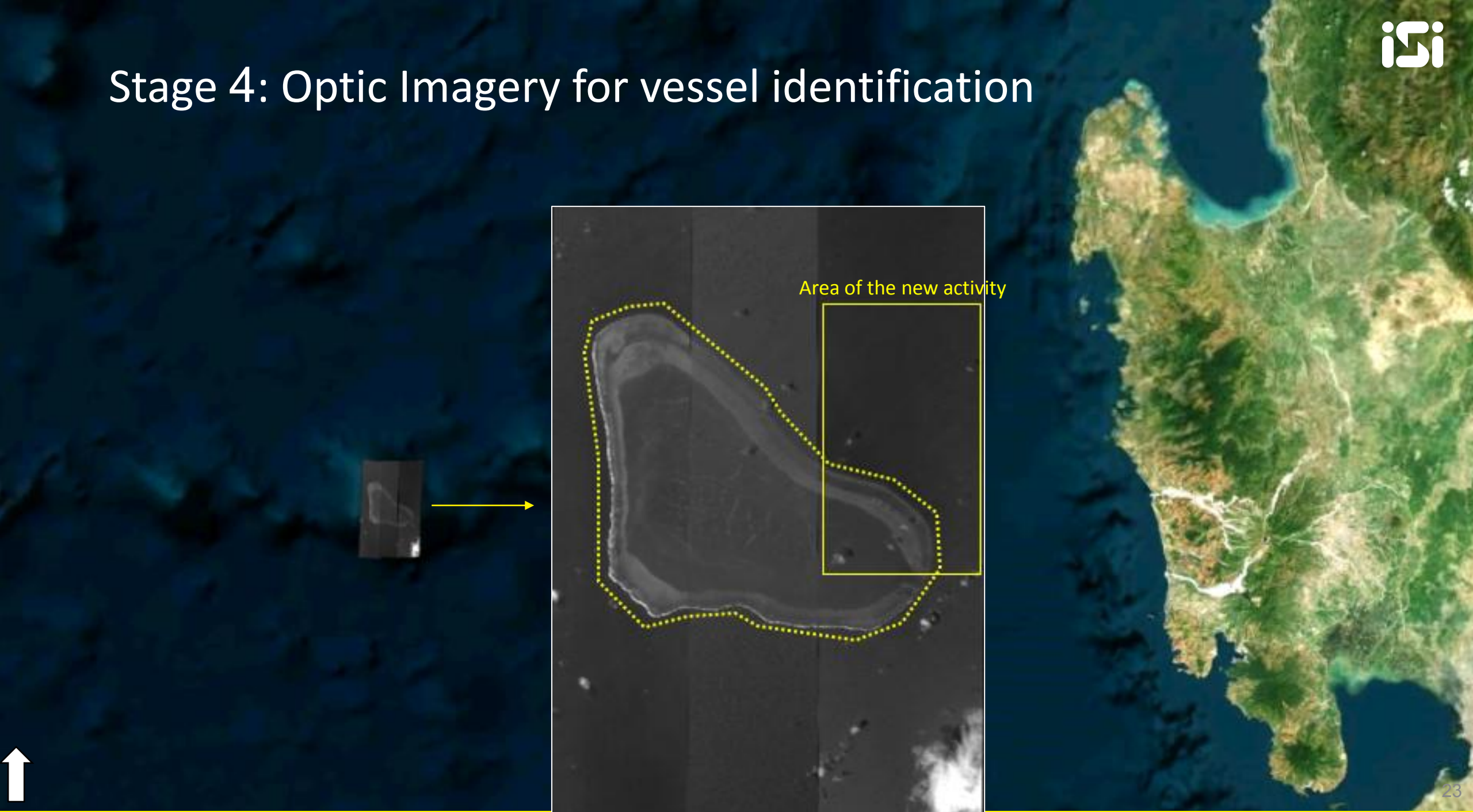


## Stage 3: Correlation of SAR detection & AIS signals





## Stage 4: Optic Imagery for vessel identification

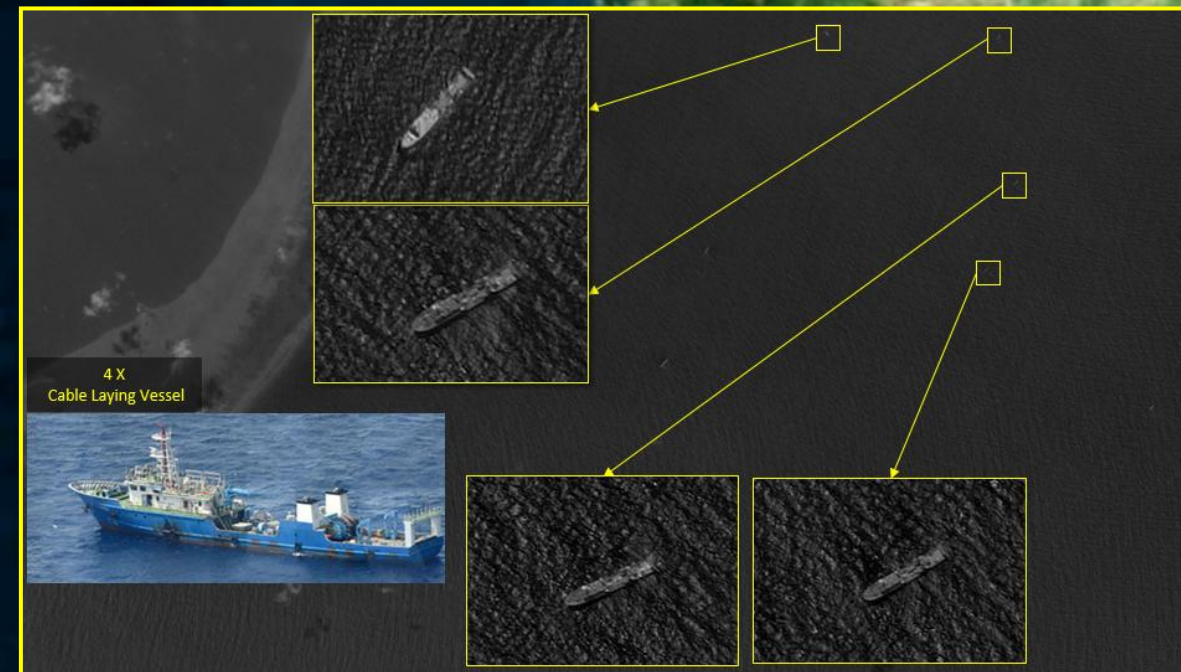
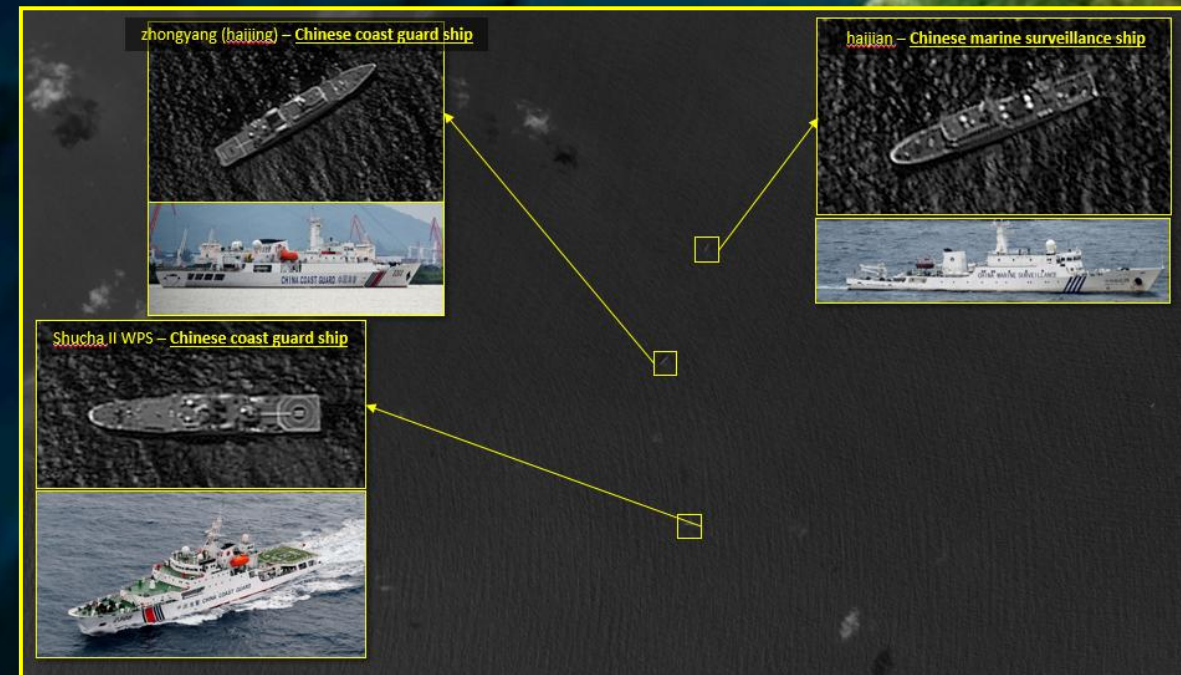


# Stage 4: Optic Imagery for vessel identification

Area of the new activity -  
china's naval ships detection



Zoom-in on the detected  
naval activity





The background features a series of concentric yellow arcs on a white background. A yellow banner is positioned within the arcs, containing the text "INSIGHTFUL VISION".

Thank You