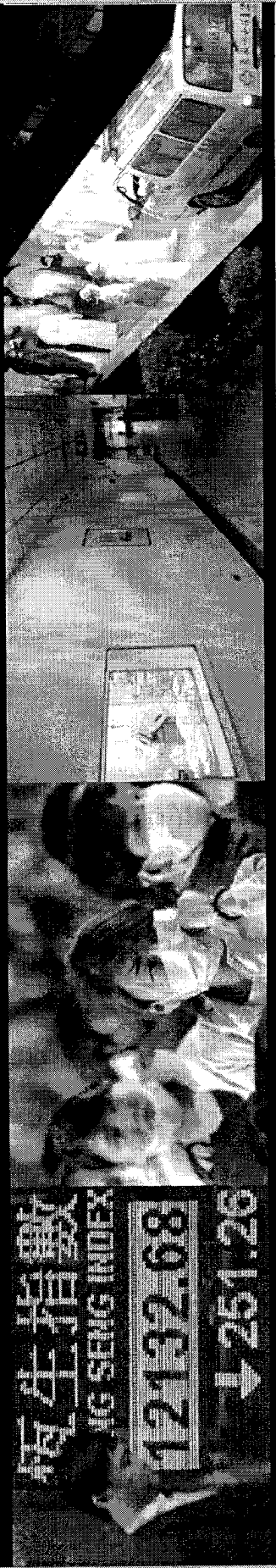


Global Argus

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4 February, 2008

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History

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- R&D began in summer 2004.
- Utilizes COTS and GOTS. Argus has never been an IT research program.
- Began experimental testing in December 2004 with support for Tsunami relief efforts.
- Coverage concentrated in Pacific Rim.
- In August 2005, a plan was requested to move Argus into global operation to track Avian Influenza.

History *(continued)*

- **During 2005 and 2006, development work continued on IT platforms, software, and analytical taxonomies.**
- **Funded in mid-June 2006 to field an operational system.**
- **Began operations in late July, 2006.**
- **Within one month, achieved global reach with coverage of 195 of 196 US-recognized countries.**
- **Achieved initial operating capability in late November, 2006.**
- **Full operational capability was attained in July, 2007, and the final major system was delivered in January 2008.**

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Approach

- **Assemble social disruption key word queries from SME-derived Indicators and Warnings (I&Ws).**
- **Acquire collection and modeling capabilities to capture and analyze articles from the World Wide Web.**
- **Develop and implement an automated cueing and alerting capability.**

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What We Don't Do

- Ground truthing
- Pathogen diagnostics

Argus is a cueing and alerting capability that complements the long established public health and attribution investigation approaches used by other organizations.

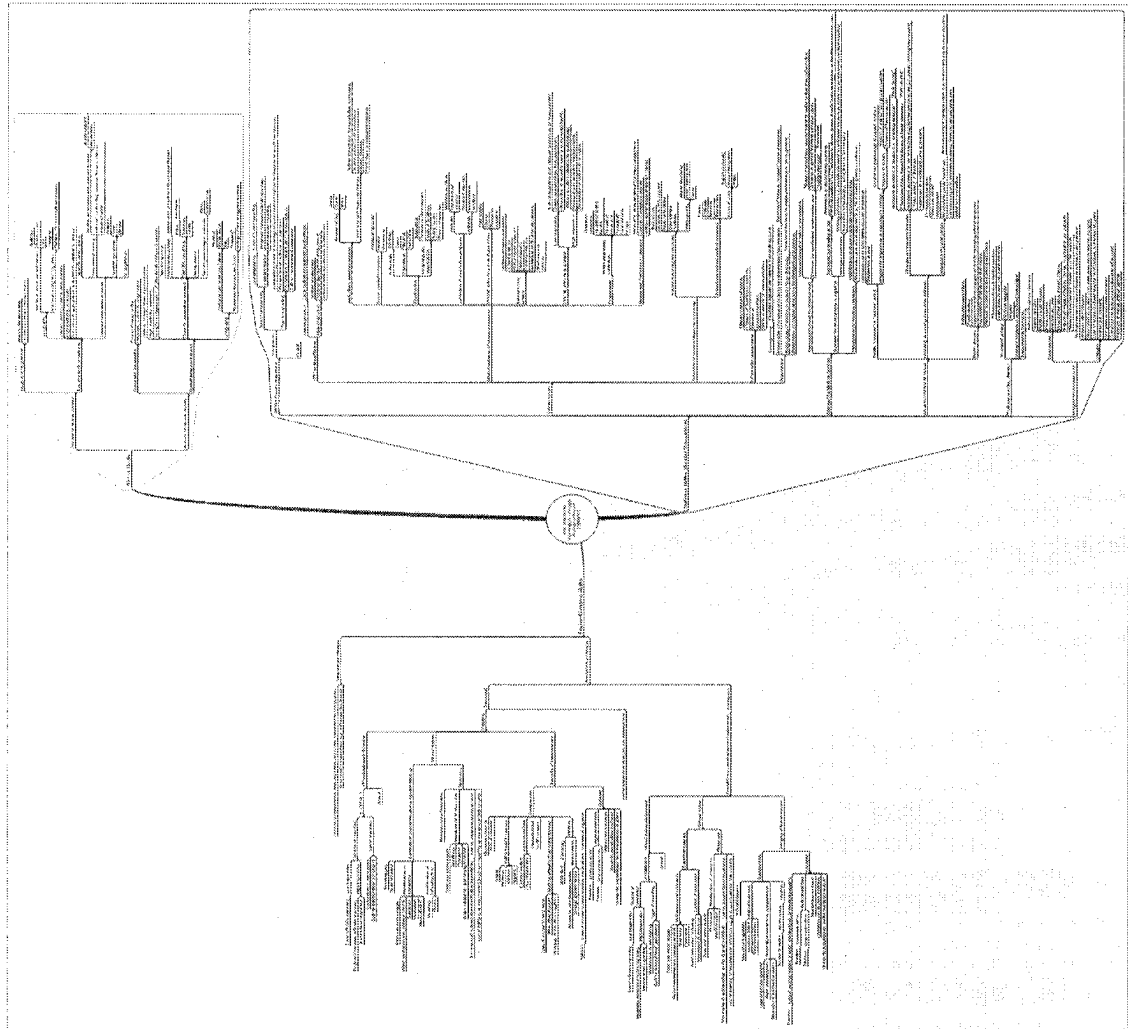
ARGUS is a Radar for Social Disruption

- Epidemics cause social disruption.
- Social disruption is a common feature that can be tracked and used in lieu of direct reporting of disease:
 - **Direct Markers**
 - Unusual disease reported
 - **Indirect Markers**
 - Demand for medical services
 - Local perception of threat
 - Official acknowledgement of threat
 - Official action against threat
 - Integrity of infrastructure

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I&W Concept Map

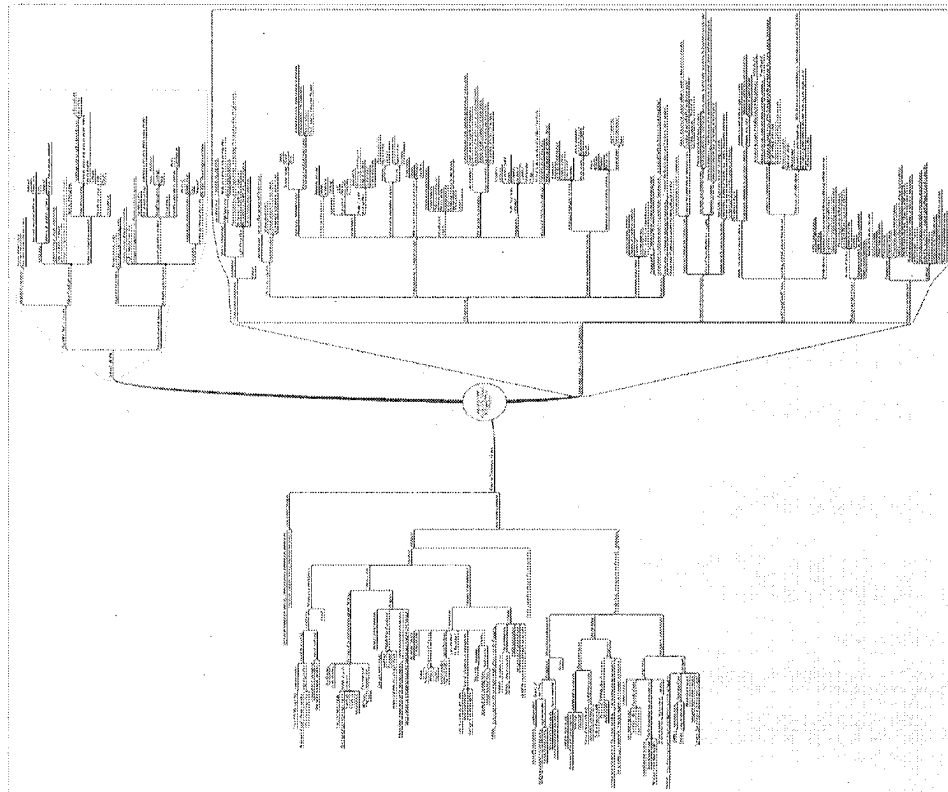
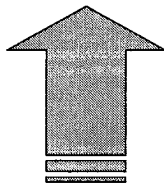
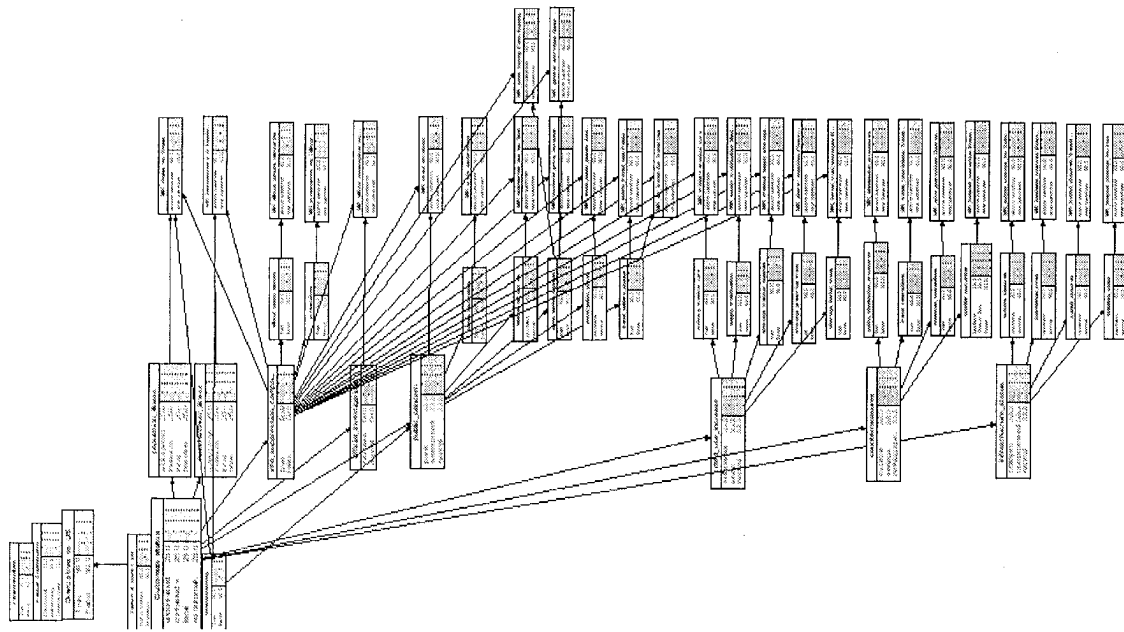


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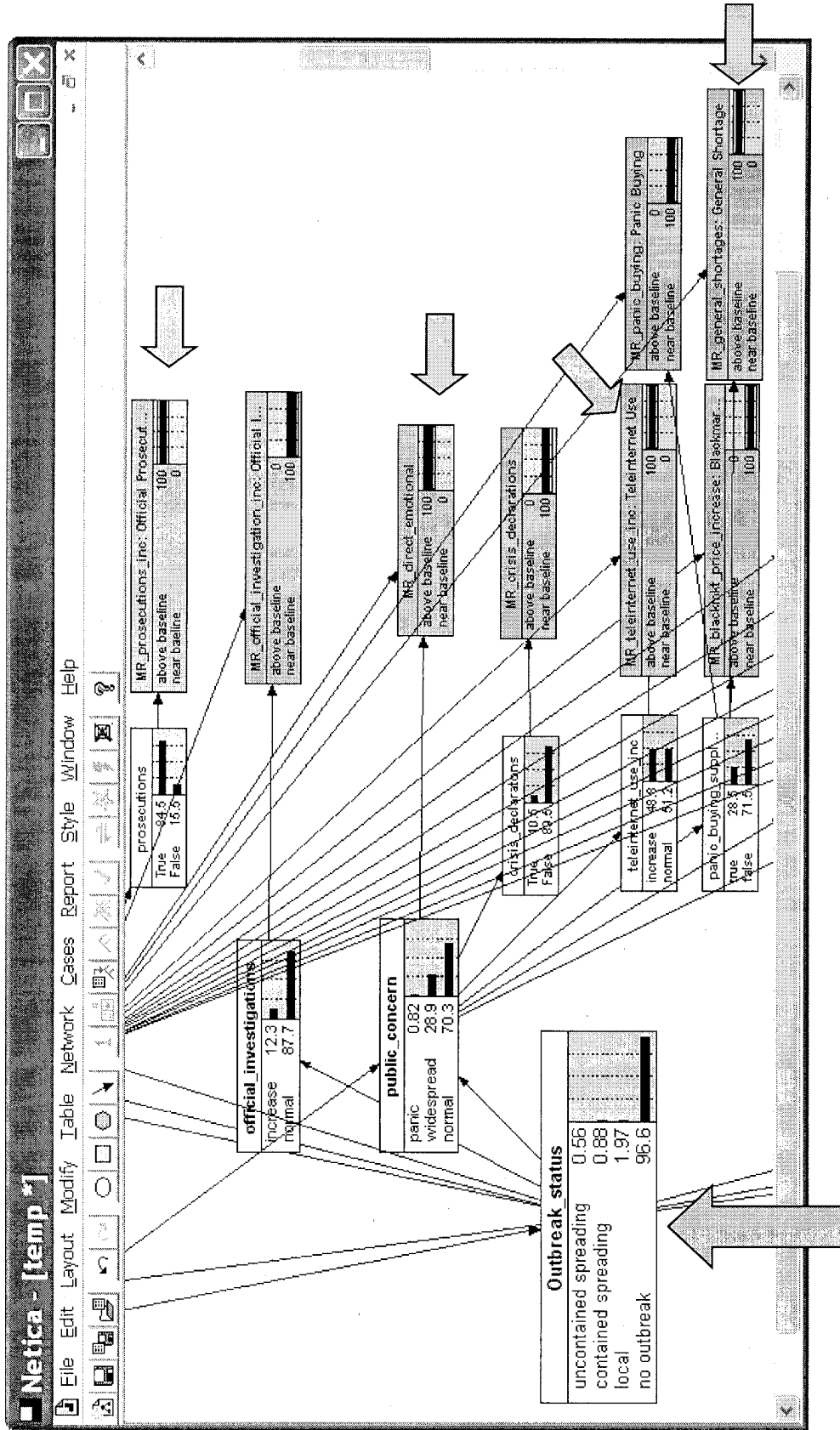
System Summary

- Sources:
 - Media articles (local sources are key)
 - Telecommunication data
 - Satellite imagery
 - Air transportation data
- Scanning Power:
 - Over 9,000 scripted sources (~300/month added)
 - 1 million articles/day accessed with over 250,000/day archived
 - Analysts (36) are collectively fluent in 36 foreign languages
 - Operating in 195 of 196 US-recognized countries
 - Machine Translation: four engines and 14 languages
 - 111 million articles in archive (Baselines back 5 years)
 - Bayesian analyses for article selection, alerting and decision analysis (23 area models in 11 languages)
 - Over 2000 active case files with 190 added/day; Filed 50,000 reports since inception; projecting 40-50,000 reports/yr

ARGUS Alerting Algorithm: Translation of the I&W Concept Map into a Bayesian Causal Model



Prototype: Bayesian Network with Evidence Values Set from Article Frequency Counts



Estimate "probability" of uncontained outbreak

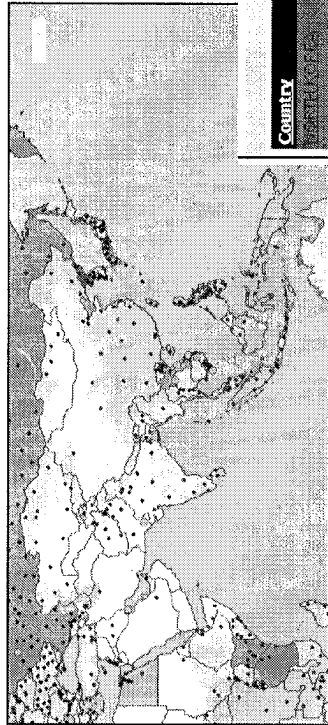
Watchboard – Sample Screenshot



Argus Watchboard™

Home | Search | Alerts | Reports | Settings | Help

Argus Watchboard Biological Event World Map



2007-02-25 17:53:03

Argus Research Operations Center (AROC), Washington DC

The below information is obtained through public intelligence data and is not intended to be used for operational purposes. This information is for informational purposes only and should not be used for operational purposes. For more information and assistance, please contact the appropriate personnel.

Suspecte
Biological A

Country :
National: Italy
Specific Location: Liguria

National media have reported that six people are currently undergoing CBRN (chemical, biological, radiological, nuclear) testing at the offices of Bogliasso. The powder, which was found in an envelope, is currently being tested; anthrax has not been confirmed.

[Senior Analyst Note]

This report suggests the possibility that anthrax has been used as a biological weapon, similar to the attack in October, 2006. The previous two "suspicious powders" were found not to be anthrax.

Currently, over 2000 active, socially disruptive biological events tracked in over 170 countries in near-real time.

Country	Title	Date
MEXICO	Cholera, Hemorrhagic Fever	2/23/2007
INDIA	Suspected Anthrax	2/23/2007
CANADA	Respiratory Disease, Bird Die-Off	2/23/2007
RUSSIA	H5N1 Avian Influenza, Respiratory Disease	2/24/2007
EGYPT	H5N1 Avian Influenza	2/24/2007
TANZANIA	Rift Valley Fever	2/24/2007
KENYA	Rift Valley Fever	2/24/2007
LAOS	H5N1 Avian Influenza	2/25/2007
INDIA	H5N1 Avian Influenza	2/23/2007
NIGERIA	H5N1 Avian Influenza	2/24/2007
TURKEY	H5N1 Avian Influenza	2/24/2007
MEXICO	Respiratory Disease	2/24/2007
AFGHANISTAN	H5N1 Avian Influenza	2/24/2007
PAKISTAN	H5N1 Avian Influenza, Polio	2/24/2007
KUWAIT	H5N1 Avian Influenza	2/25/2007
BANGLADESH	Undiagnosed Human Disease	2/25/2007
SPAIN	Respiratory Disease	2/23/2007
JAPAN	Respiratory Disease	2/23/2007
HONG KONG	H5N1 Avian Influenza, Undiagnosed Equine Disease	2/23/2007
INDONESIA	H5N1 Avian Influenza	2/23/2007
UKRAINE	Respiratory Disease	2/23/2007
PAPUA NEW GUINEA	Undiagnosed Disease (Human, Porcine)	2/23/2007
NORWAY	Respiratory Disease	2/23/2007
CHINA	SARS: Increased Prevention	2/23/2007

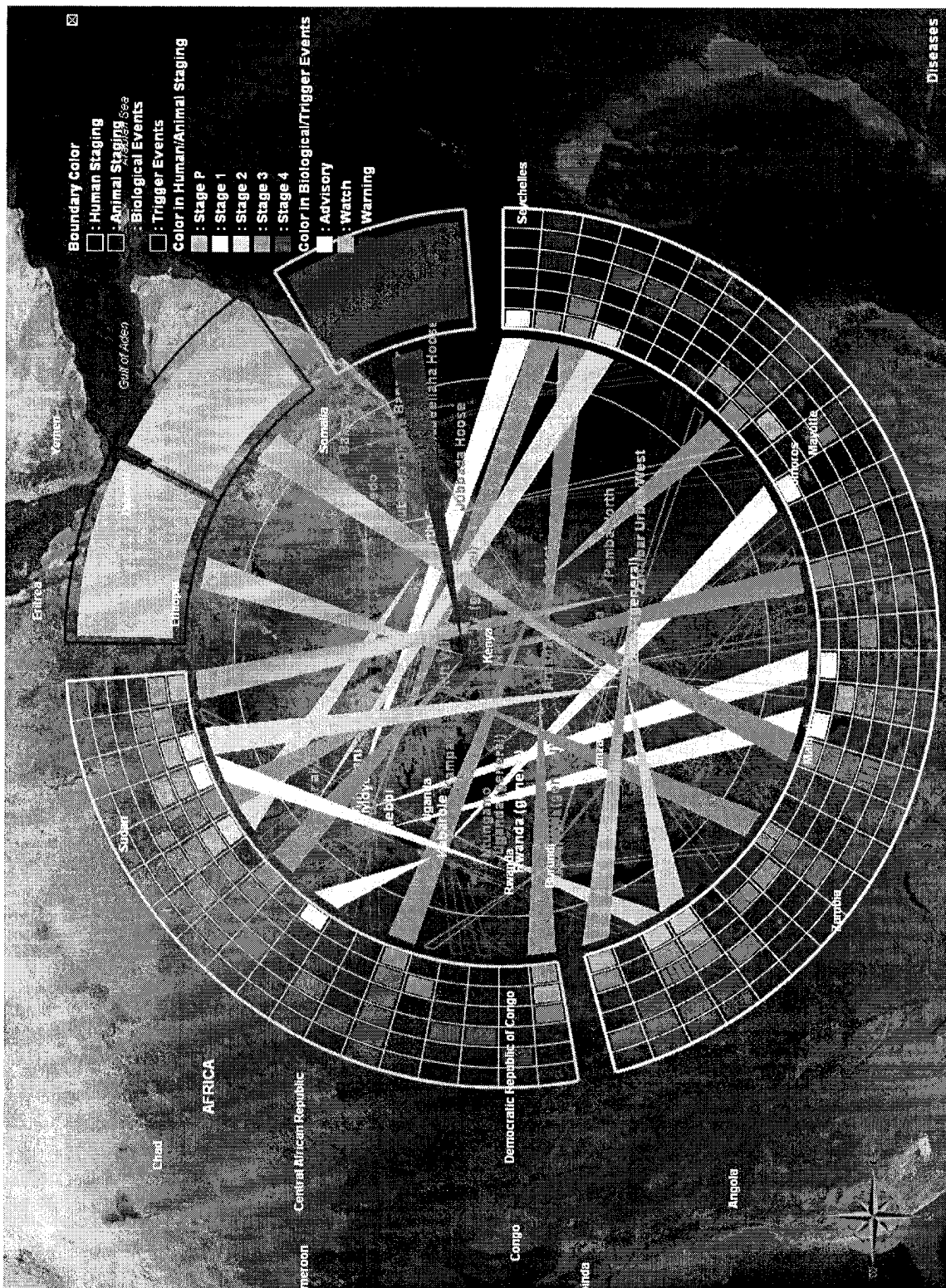
Colors represent different levels of action required: [Yellow: Advisory][Orange: Watch][Red: Alert]

* Bold indicates Reports issued within 24 hrs.

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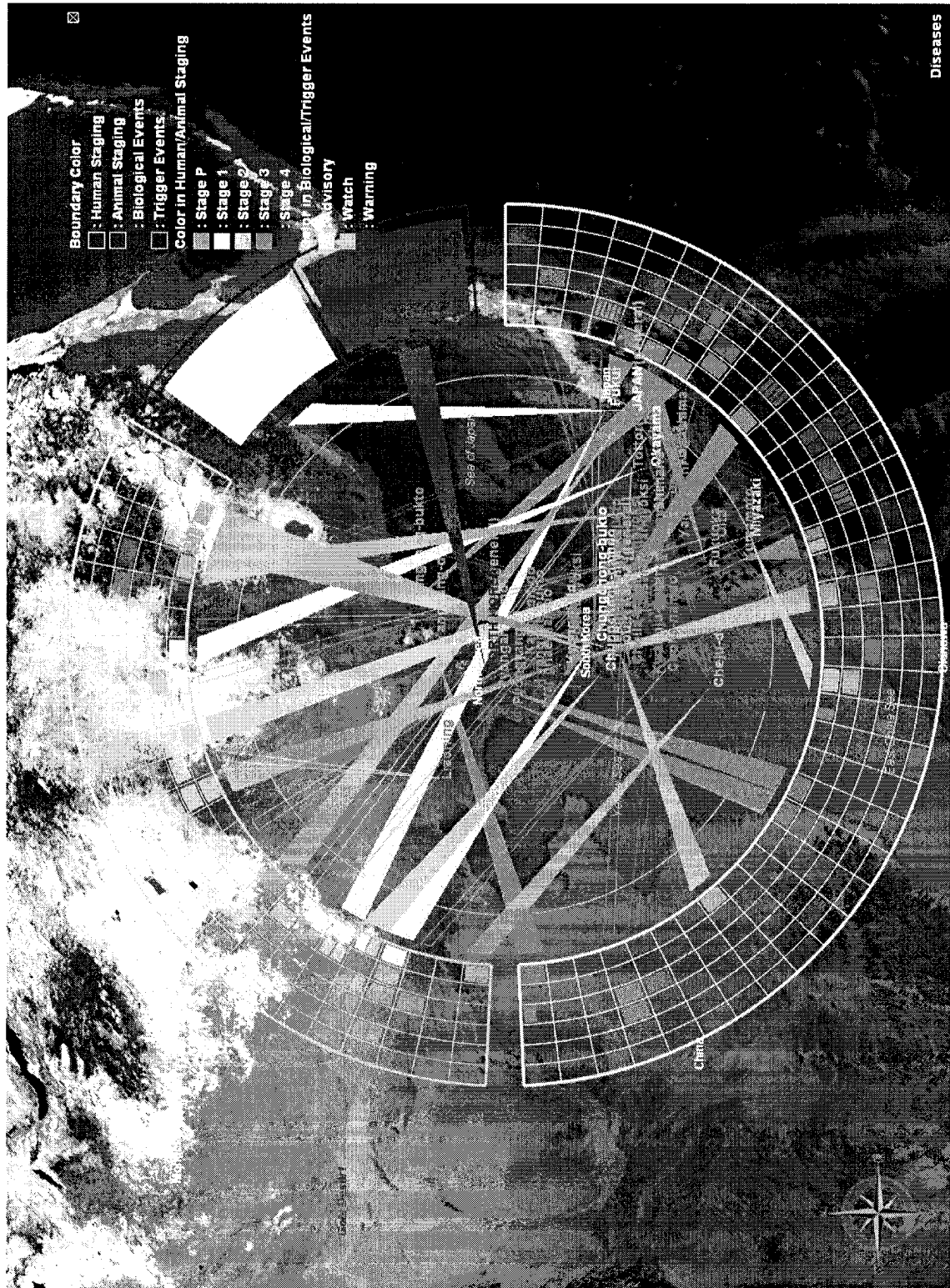
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Argus Common Operating Picture



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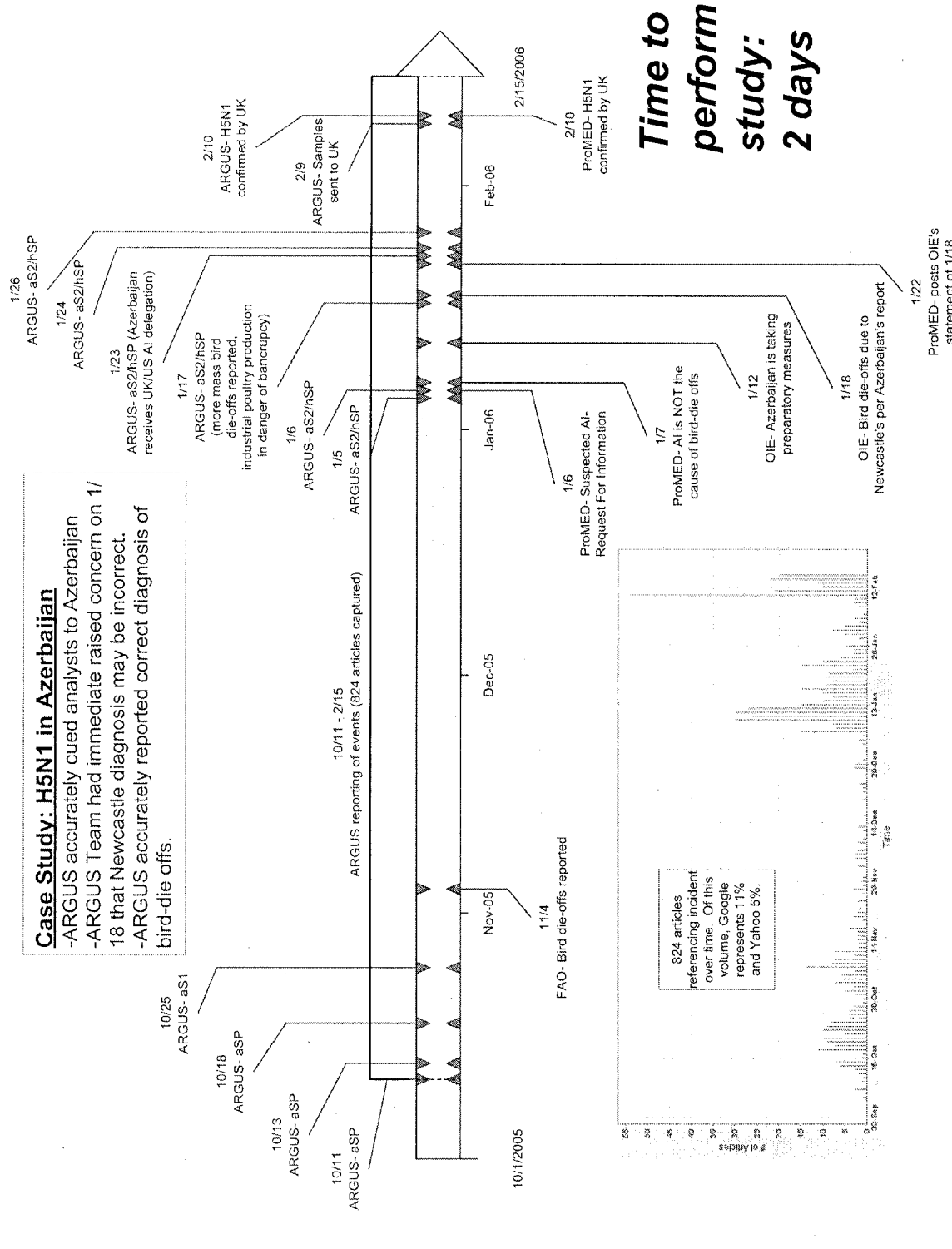
Argus Common Operating Picture



Argus Case Study

Case Study: H5N1 in Azerbaijan

- ARGUS accurately cued analysts to Azerbaijan
- ARGUS Team had immediate raised concern on 1/18 that Newcastle diagnosis may be incorrect.
- ARGUS accurately reported correct diagnosis of bird-die offs.



Time to perform study: 2 days

Summary

- Argus is changing the expectations for bioevent detection.
- The system has been reduced to practice on a global scale. Actively tracking avian influenza and 130 other infectious diseases.
- Reports sent to over 300 accounts (many with multiple users) in approximately 200 organizations.
- The Argus process can have much broader application in event tracking of other issues.

Summary (continued)

- The private sector has been engaged.
- Exploring other real time data sources.
- Completed and transferred the Argus Global Information System (AGIS). AGIS is more robust and stable than its predecessor. Third generation platform (Apollo) was delivered in January, 2008.
- Continuing OFA funding of R&D component to complement and support Argus.
- Exploring real time cueing of U.S. based hospital infrastructure.

Summary (continued)

- Training packages have been created and implemented for federal analysts.
- A PhD program has been established for this new professional discipline.
- A "Community of Interest" has been established with federal, state, and local government analysts ["Biosurveillance Indication and Warning Analysis Community (BIWAC)].
- Peer reviewed papers are being published.

Argus Concept

