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Using Science and Technology for Preparedness and Response to Epidemic Outbreaks
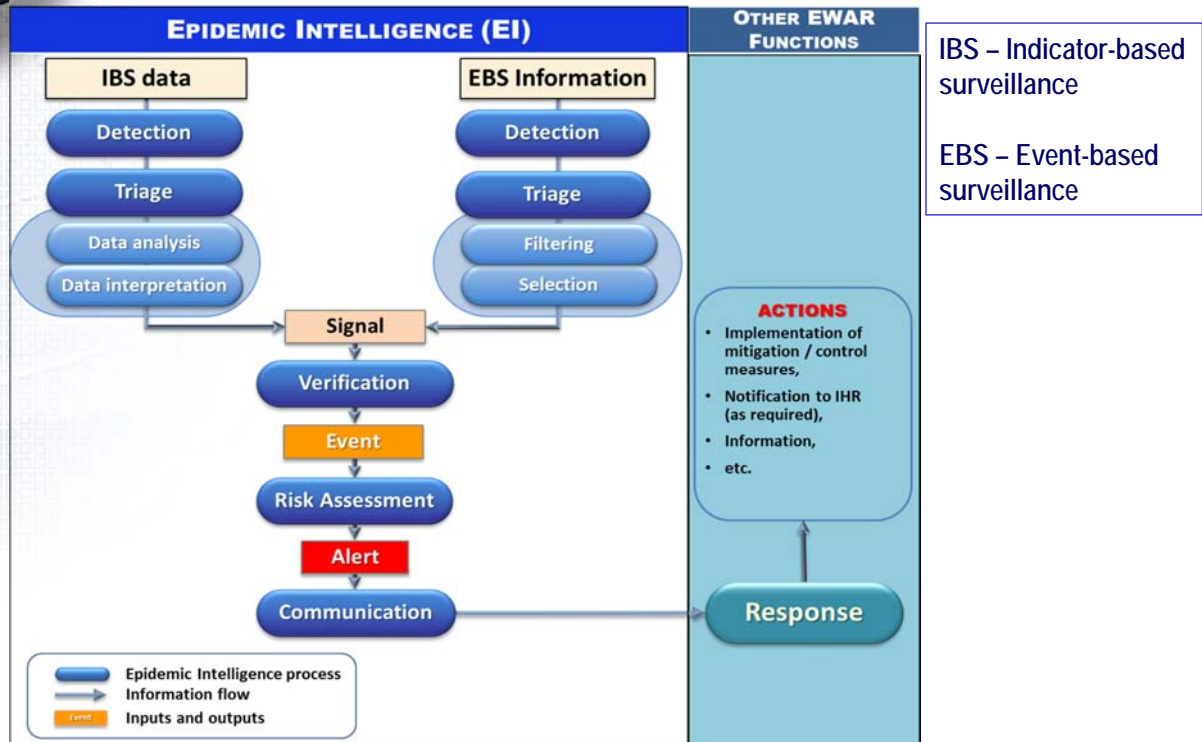
Examples from the West African Ebola Outbreak

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Science and Technology in Preparedness

Event-Based Surveillance – Accessing, Consolidating, and Analyzing Outbreak Information

Early Warning and Response (EWAR)

IBS – Indicator-based surveillance

EBS – Event-based surveillance

Early detection, assessment and response to acute public health events: *Implementation of Early Warning and Response with a focus on Event-Based Surveillance.* WHO 2014

Advantages of Event-based Surveillance

Traditional disease reporting mechanisms (IBS):

- produce credible information but <u>reporting is often delayed</u>; media monitoring systems are gathering information 24/7

- are designed for <u>known diseases</u> and often do not report cases until the etiology is known

- are <u>not well established</u> in all countries

- are <u>limited to the health sector</u>, whereas media reports come from reporters who are highly motivated to report disease events or health threats and have a way to promptly provide the information to the public

Technological advances in the past 15 years have revolutionized the way we access information

Global Disease Detection Worldwide Event-Based Surveillance & Response

- **CDC's Centralized operations for event-based surveillance**

- **Modeled after WHO's Alert and Response Operations in Geneva, and Initiated in 2006 and operational in 2007**

- **Detection and <u>verification</u> of international disease events and threats**

- **Operational support for rapid deployment of CDC assets and field teams**

- **U.S. compliance with International Health Regulations**

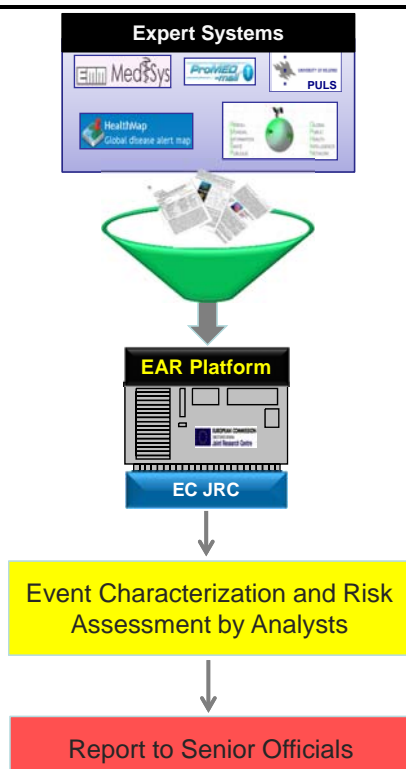- **CDC's liaison with Global Outbreak Alert and Response Network (GOARN)**

GDD Operations Center Team
- Director: PhD Microbiologist/Virologist
- Analysts: Med Epi (3), Vet Epi, PhD Epi
- Emergency Coordinator
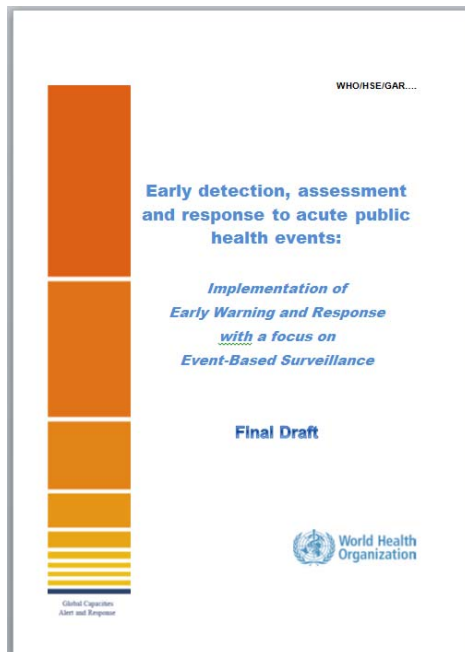

Early Alerting and Reporting Project

Global Health Security Initiative

Expert Systems

EAR Platform

EC JRC

Event Characterization and Risk Assessment by Analysts

Report to Senior Officials

- **Links the existing early threats detection systems to a common web-based platform**

- **Maximum sensitivity while also removing duplicate reports**

- **Rapid access to a list of possible, probable and credible CBRN threats identified from open sources**

- **Relevant evaluation/analysis within a trusted information sharing environment by an international network of subject matter experts**

- **Timely public health notifications and reports about CBRN public health risks for decision makers in participating countries**

- **Efficient and cost–effective approach**

WHO/HSE/GAR....

Early detection, assessment and response to acute public health events:

Implementation of Early Warning and Response with a focus on Event-Based Surveillance

Final Draft

World Health Organization

Global Capacities
Alert and Response

Near-term:

- Expand the scope of threat categories and stakeholders
- Further development/ refinements are planned to allow user-defined filtering of events and to better manage event processing

Long-term:

- Provide portal access to health agencies in other countries

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Science and Technology in Response

The Fighting Ebola Grand Challenge

Grand Challenges – a means to Harness Innovation and bring New Ideas to Market
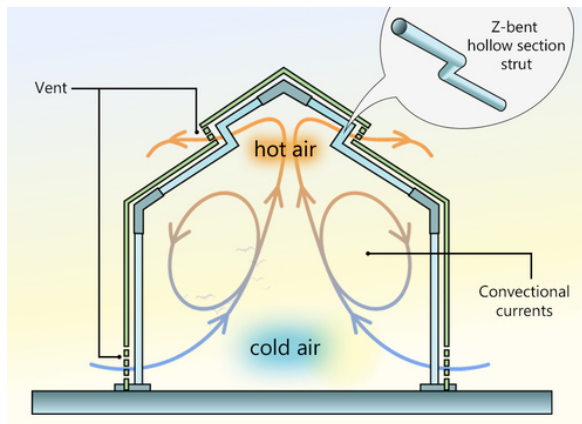
- Identifies Problem and invites Solutions
- Open to Global Audience of Applicants
- Open to Multiple Stakeholders
- Applicants can use in-house R&D or Crowd-sourcing of Input
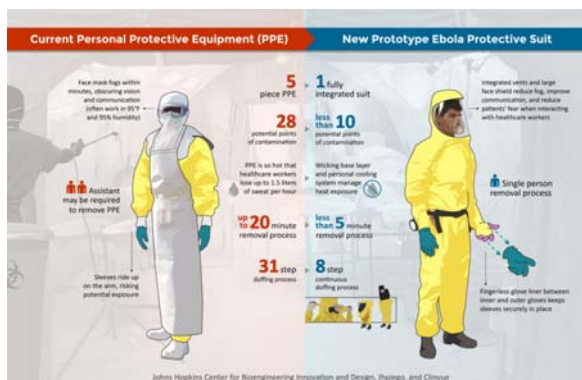
Wearable Patient Sensor

- Blue-tooth Enabled
- Provides Patient data remotely
- Speeds data collection and lowers risk to HCWs

Improved Medical Tent Design

- Reduces Internal Temperatures
- Retains low-cost/quick installation
- Improves Patient and HCW comfort

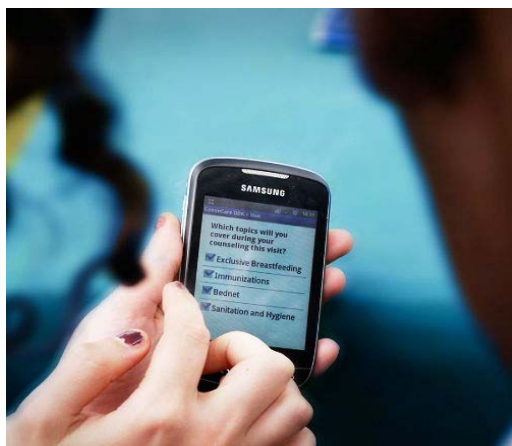# Improved Personal Protective Equipment

- Easier to order
- Easier to Don/Doff
- Cooler and can be worn longer
- Reduced risk of HCW infection

Highlight: A Powdered Bleach Additive

- Improved decontamination
- Lowers risk of infection
- Better adherence to materials
- Temporary color

Mobile Phone Apps

- Multi-function app to include Contact Tracing
- Open-Source development
- Integrates into other IM systems

Conclusion and Challenge

- Infectious Disease Outbreak Risk remains and area of increasing concern
- Some S&T applications are Ready-to-Use; others need time to Develop
- Multiple Stakeholders can make significant contributions
- Challenge is getting Government decision-makers to allocate resources in advance.