Matching Your Public Health Analytic Needs with Practical Solutions – A description of the activities of ISDS's Analytic Solutions Committee

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Objectives

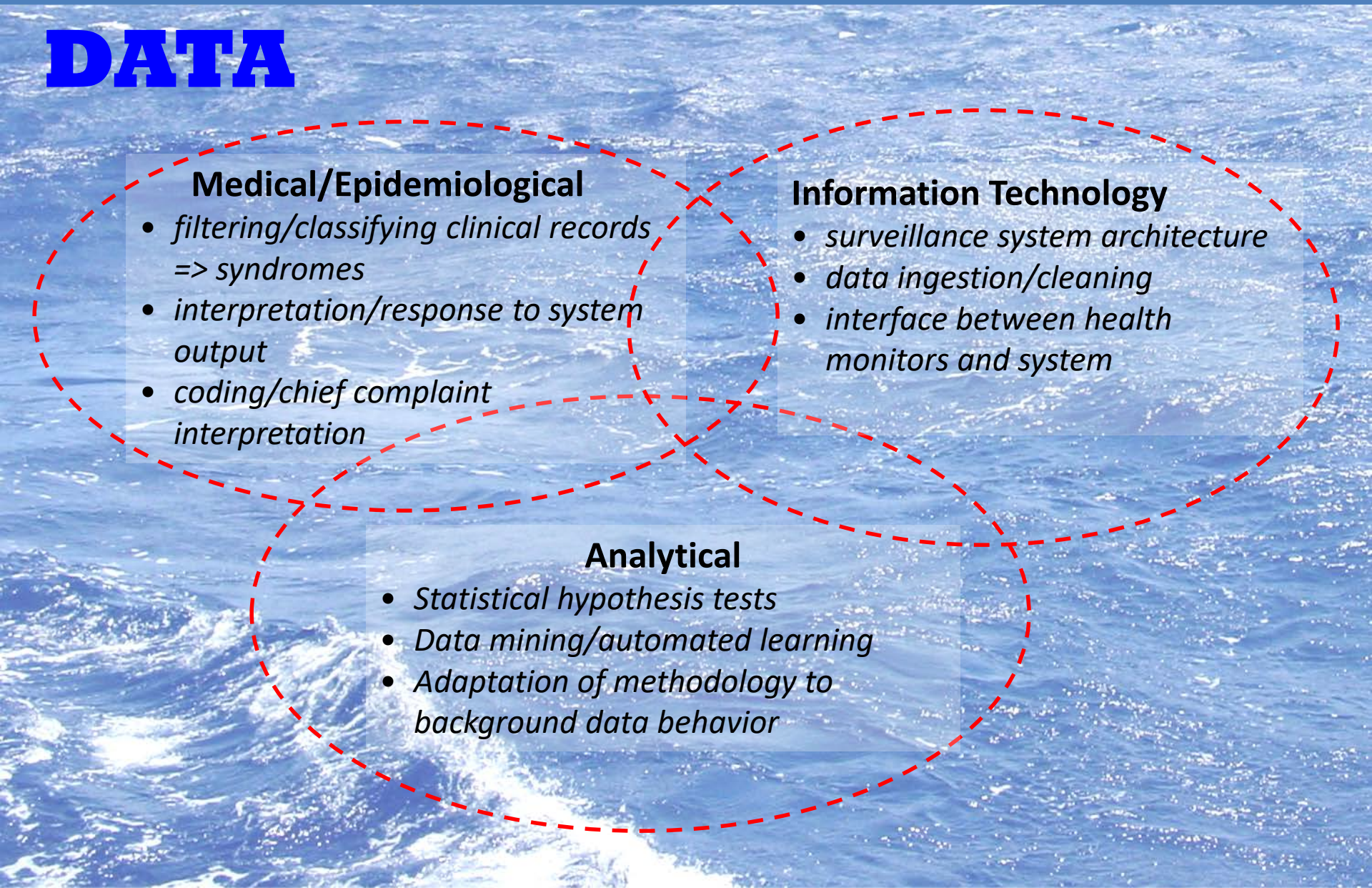
After the webinar, participants will be able to:

- Understand the scope of analytical use cases:
  - local/regional/national
  - chronic/infectious/environmental/behavioral, etc
- Be able to frame their own epidemiological needs as use cases for collaborative development
- Understand the motivation, purpose, and experience of the Analytic Solutions Committee as a resource to the community

Committee Motivation

- Early biosurveillance systems were designed by technology developers, not public health users
- Ongoing mismatch between technical methods in academia and PH surveillance needs
- Methods for early alerting, follow-up investigation, threat characterization need to be tuned to health monitor's purview and needs
- In operational surveillance systems, practical considerations direct funding to IT issues, not algorithms

Interactions in Data Arenas

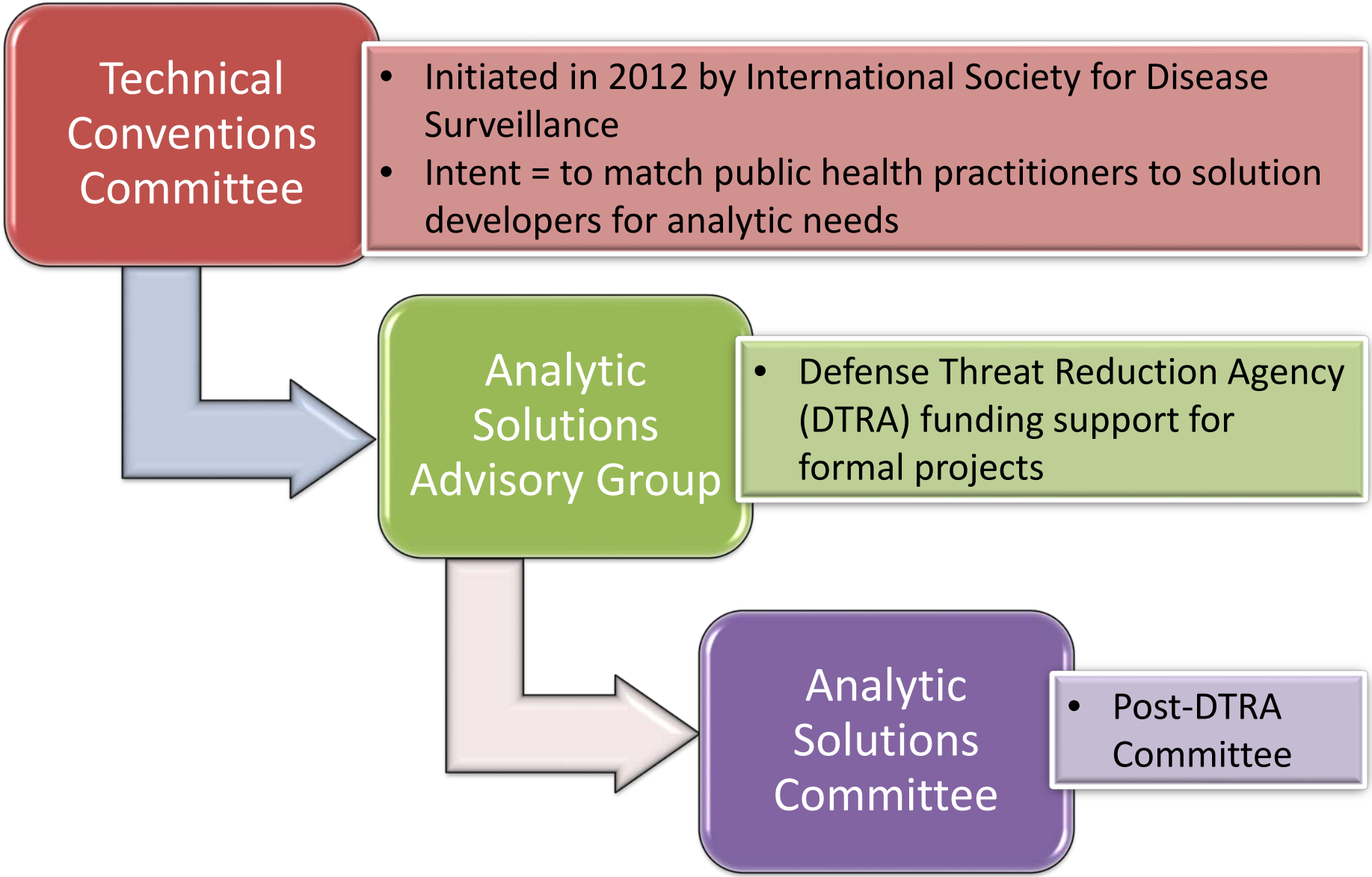


Analogy to Cultural Divide in Oncology, ~1970

S. Mukherjee, *The Emperor of All Maladies*, Scribner, Nov. 2010, p. 367.

- "the conference epitomized the … segregation between cancer therapy and cancer science"
- "Chemotherapy and surgery were discussed in one room…carcinogenesis in another"
- "Few scientists…crossed between the two isolated worlds"
- …"prevailing schizophrenia of the time…"

History of the ASC



Public Health Agency

Biosurveillance Problem/Need

Submit Use Case Template

Data Set?

Analytic Solutions Committee

(Graphic courtesy of Jeff Johnson San Diego Health Dept.; revised 4/13/18, T. Hamby NJDOH)

Potential solutions

Surveillance Community (ISDS)

Research Community: academia, industry, gov't

What is a Use Case?

Practitioner challenge = Obtain analytical tools to extract needed current information about population from data

- Affordable
- Sustainable
- Resource-efficient

Developer challenge = Understand needs for actionable information & public health workflows, develop practical tools for routine application

- Requires available data
- Understanding of how tools will be used
- Necessary explanation/visualization

A Use Case connects these perspectives

Scope of Use Cases

- Exploratory data analysis
- Data quality analysis
- First-stage surveillance: Alerting Algorithms
- Second-stage: Explaining/prioritizing/ investigating Alerts
- Scenario-specific analysis

How use cases can make PH more effective

Surveillance Topics

- Identifying and tracking infectious disease outbreaks
- Chronic disease risk factors, incidence/prevalence
- Animal health and zoonoses
- Occupational and Environmental health
- Behavioral health
  - opioid overdose crisis, suicidal ideation,…

Public health initiative uptake and effectiveness

- Effectiveness assessment of interventions and messaging
- Vaccination promotion
- Hard evidence for rumor control
- Overdose prevention, harm reduction,…

Do you have a use case whose development could strengthen your investigation and response capability?

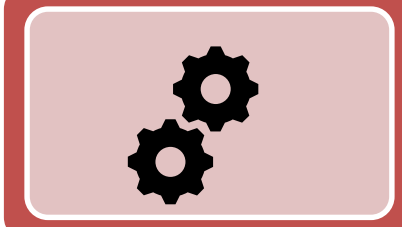
Are you/colleagues working with data regularly?

Could more actionable information for health awareness/response be extracted from your unused data sources or date fields?

Do you need (or would you like) assistance with specific or more advanced analyses of your current or anticipated data?

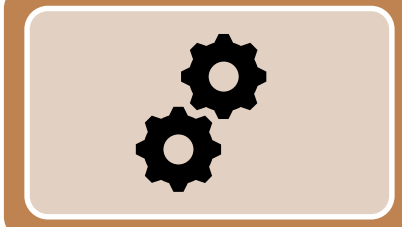
Are there reports you are asked for that require more analysis than you or your staff have time to develop?

Example Consultancies



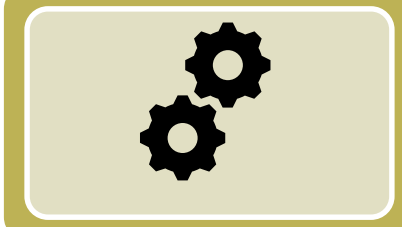
Text-based cluster detection

- E.g. Multiple out-of-state patients infected at a reunion (terms like “restaurant”, “reunion”)

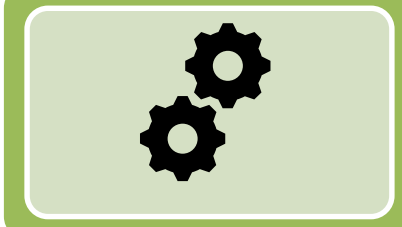


Predictive modeling

- Monitoring risk factors like weather, air pollution



Monitoring enhanced risk of pediatric asthma exacerbation



Monitoring risk of mosquito-borne diseases (even pathogens not yet local)

Use case template

Available at:
http://www.healthsurveillance.org/members/member_engagement/groups.aspx?code=ASC

ISDS
INTERNATIONAL SOCIETY FOR DISEASE SURVEILLANCE

Use Case Template Prepared by:
The Analytic Solutions Committee (ASC)

ISDS Public Health Practice Problem Definition

USE- CASE/PROBLEM TITLE
CONTACT INFORMATION
Submitter name:
Jurisdiction or affiliation:
Phone:
Email:
Co-submitters and affiliations:
PROBLEM DESCRIPTION
Summarize the problem:
SOLUTION REQUIREMENTS (Optional)
Describe the type of solution you are seeking (e.g., anomaly detection, signal validation, data quality characterization):

NC DETECT Cluster Detection
ISDS / DTRA Consultancy
Review of Sample Dataset

June 9, 2015

NCPH
North Carolina Public Health

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Consultancy 1: Use Case

- Records are classified into pre-defined s*yndrome* bins using words in free-text chief complaints
- Syndrome groupings are approximate, inadequate for the range of potential health threats
- They do not make adequate use of available free text in the medical records
  - Clusters based on non-medical text cues cannot be detected
  - e.g. “salad bar”, “restaurant”, “airport”
- Goal: Seek prototype methods for anomaly detection unrestricted by fixed syndromic terms, using evidence from both free-text and categorical medical record data

Consultancy 1: Publication

OJPHI

Cross-Disciplinary Consultancy to Bridge Public Health Technical Needs and Analytic Developers: Asyndromic Surveillance Use Case

Zachary Faigen[1], Lana Deyneka[1], Amy Ising[2], Daniel Neill[3], Mike Conway[4], Geoffrey Fairchild[5], Julia Gunn[6], David Swenson[7], Ian Painter[8], Lauren Johnson[9], Chris Kiley[10], Laura Streichert[9], Howard Burkom[11]

1. North Carolina Department of Health and Human Services
2. University of North Carolina at Chapel Hill, Department of Emergency Medicine
3. Carnegie Mellon University, Event and Pattern Detection Laboratory
4. University of Utah, Department of Biomedical Informatics
5. Los Alamos National Laboratory, Department of Analytics, Intelligence, and Technology
6. Boston Public Health Commission, Department of Communicable Disease Control
7. New Hampshire Department of Health and Human Services, Department of Public Health Services
8. University of Washington School of Public Health, Department of Health Services
9. International Society for Disease Surveillance
10. Defense Threat Reduction Agency, Chemical & Biological Defense Program
11. Johns Hopkins University Applied Physics Laboratory

Abstract

Introduction: We document a funded effort to bridge the gap between constrained scientific challenges of public health surveillance and methodologies from academia and industry. Component

Consultancy 3

The Asthma Problem in Boston

International Society for Disease Surveillance Consultancy
March 30-31, 2016
Boston Public Health Commission

Margaret Reid, RN MPA
Director; Division of Healthy Homes and Community Supports
Boston Public Health Commission

Consultancy 3: Use Case

The problem: Asthma

- Asthma and exacerbation are common
- Multiple triggers
  - Viral Illness (Influenza, RSV)
  - Air quality
  - Pollen
  - Many others
- Current efforts have focused on individual interventions
- Early warning
  - Notify health providers, patients
  - Prevention messages
- Policy considerations

Consultancy 3: Goals

Goals

- Identify a practical model to forecast environmental conditions that are likely to result in asthma exacerbations
- Define system requirements to automate the processing and notification of issues
  - Environmental
  - Technical

Consultancy 3 Publication

OJPHI

Cross-Disciplinary Consultancy to Enhance Predictions of Asthma Exacerbation Risk in Boston

Margaret Reid[1], Julia Gunn[1], Snehal Shah[1,2], Michael Donovan[1], Rosalind Eggo[3], Steven Babin[4], Ivanka Stajner[5], Eric Rogers[5], Katherine B. Ensor[6], Loren Raun[6], Jonathan I. Levy[7], Ian Painter[8], Wanda Phipatanakul[9], Fuyuen Yip[10], Anjali Nath[1], Laura C. Streichert[11], Catherine Tong[11], Howard Burkom[4]

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3. London School of Hygiene & Tropical Medicine

4. Johns Hopkins University Applied Physics Laboratory, Laurel, MD

5. National Oceanographic and Atmospheric Administration, National Weather Service

6. Department of Statistics, Rice University, Houston, TX

7. Boston University School of Public Health, Dept. of Environmental Health, Boston, MA

8. University of Washington School of Public Health, Dept. of Health Services, Seattle, WA

9. Boston Children's Hospital, Harvard Medical School, Boston, MA

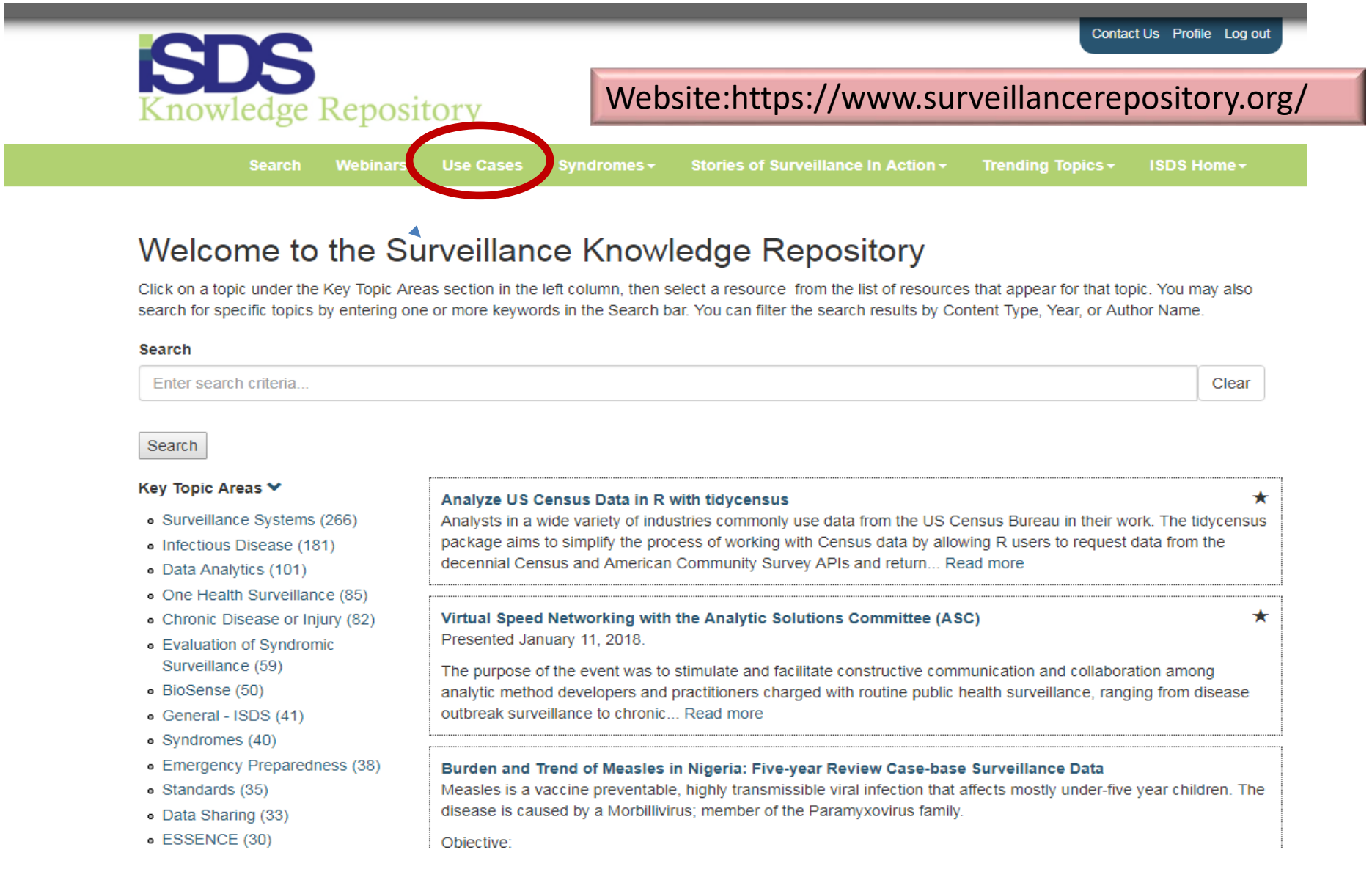
10. Centers for Disease Control and Prevention, National Center for Environmental Health, Division of Environmental Hazards and Health Effects, Atlanta, GA

11. International Society for Disease Surveillance, Boston, MA

Abstract

This paper continues an initiative conducted by the International Society for Disease Surveillance with funding from the Defense Threat Reduction Agency to connect near-term analytical needs of public health practice with technical expertise from the global research community. The goal is to enhance investigation capabilities of day-to-day population health monitors. A prior paper described the formation of consultancies for

RESOURCE: Knowledge Repository



Potential Advantages of ASC collaboration

Accessibility of technical issues facing public health to academic, commercial, government research communities

Strengthen capability to acquire shareable datasets to enable replicable research, thus enable standard methods

- Ability to answer: "Exactly what do you need our data for?"

Globalization of disease surveillance research

- Access to technical issues faced in resource-limited settings
- Ability to transcend boundaries of hardware/software environments

Focus on methods, not systems or funded programs

- Enable technical dialogue outside context of proprietary systems
- Systems, programs could be enriched by independent methods research

Evolution of "biosurveillance" based on grass roots needs

Concluding Thoughts

- Consider areas in your work that could benefit from enhanced, focused analytics such as:
  - Situational awareness: understanding risks and illness burdens on population
  - Outbreak detection and tracking
  - Evaluating public health programs
- Can these be expressed as use cases
  - informal; does not have to be fully developed
  - Sample current ISDS topics of interest: influenza, mental health, opioid overdose
- Ways to collaborate with ASC on use cases
  - Use case-specific webinar?
  - Conference call?
  - Combined ISDS/CSTE subgroups?

Thank you!

Questions?

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Resources:

- International Society for Disease Surveillance : www.healthsurveillance.org
- Analytic Solutions Committee (requires free registration; Society membership not required; includes link to template): http://www.healthsurveillance.org/members/member_engagement/groups.aspx?id=187404