Public Health Informatics: Advancing Public Health in an Evolving Landscape

Dr. Leslie Lenert
Director, National Center for Public Health Informatics

APHA President's Session – November 5, 2007

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What is Medical Informatics? Evolving Definitions in an Evolving Landscape

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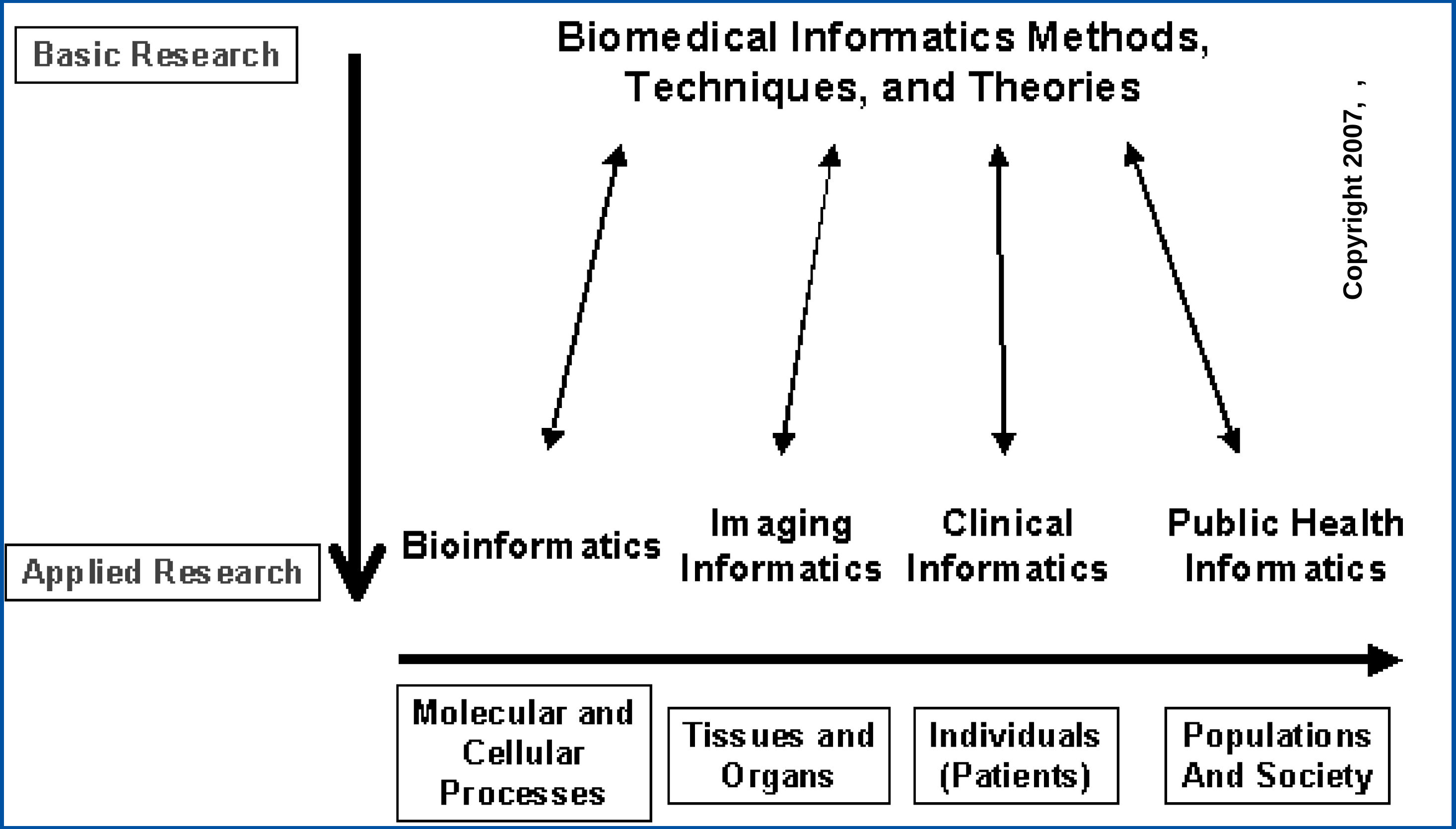
The integrative discipline that arises from the synergistic application of computational, informational, cognitive, organizational, and other sciences whose primary focus is the acquisition, storage, and use of information in the health/biomedical domain."

What is Medical Informatics?



Biomedical Informatics Methods, Techniques, and Theories

Basic Research

Applied Research

Bioinformatics

Imaging Informatics

Clinical Informatics

Public Health Informatics

Molecular and Cellular Processes

Tissues and Organs

Individuals (Patients)

Populations And Society

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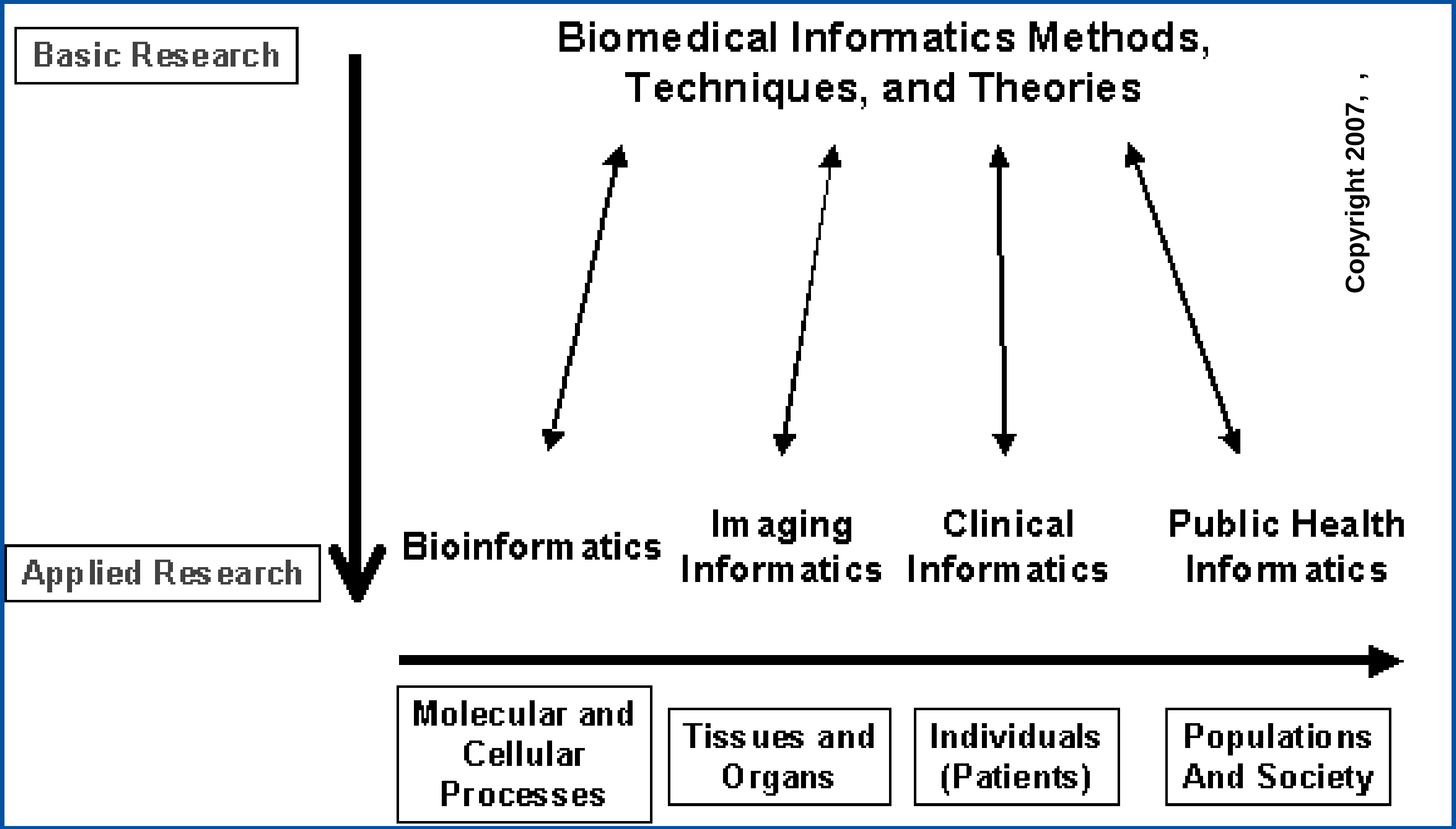
Courtesy of Columbia Biomedical Informatics Program

What is Public Health Informatics?



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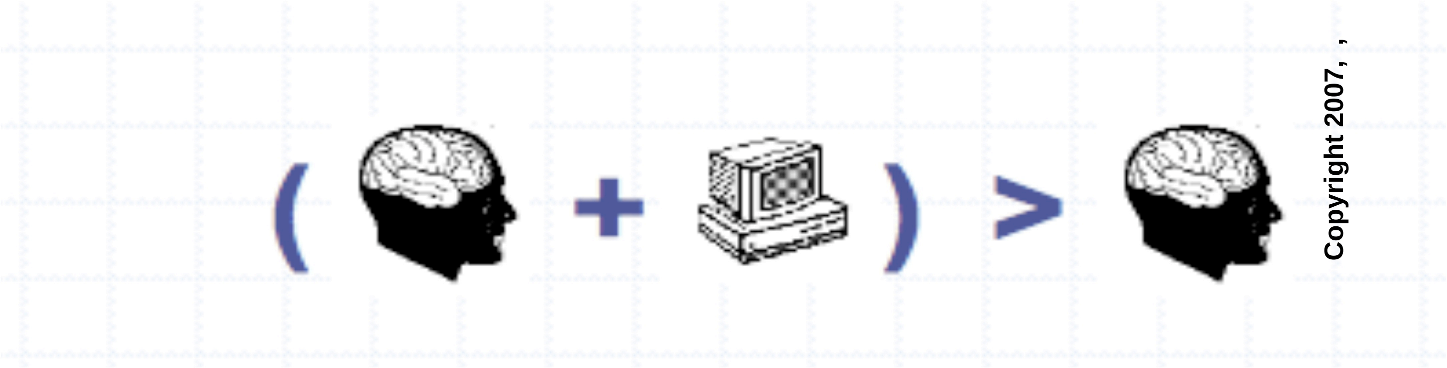
Fundamental Theorem of Medical Informatics (Charles Friedman)



- Informatics is as much about people as it is technology
- In practice, people and technology are in an interactive partnership

Example: Wireless Systems for Disaster Care

Example: Wireless Systems for Disaster Care

VICTIM
VICTIM
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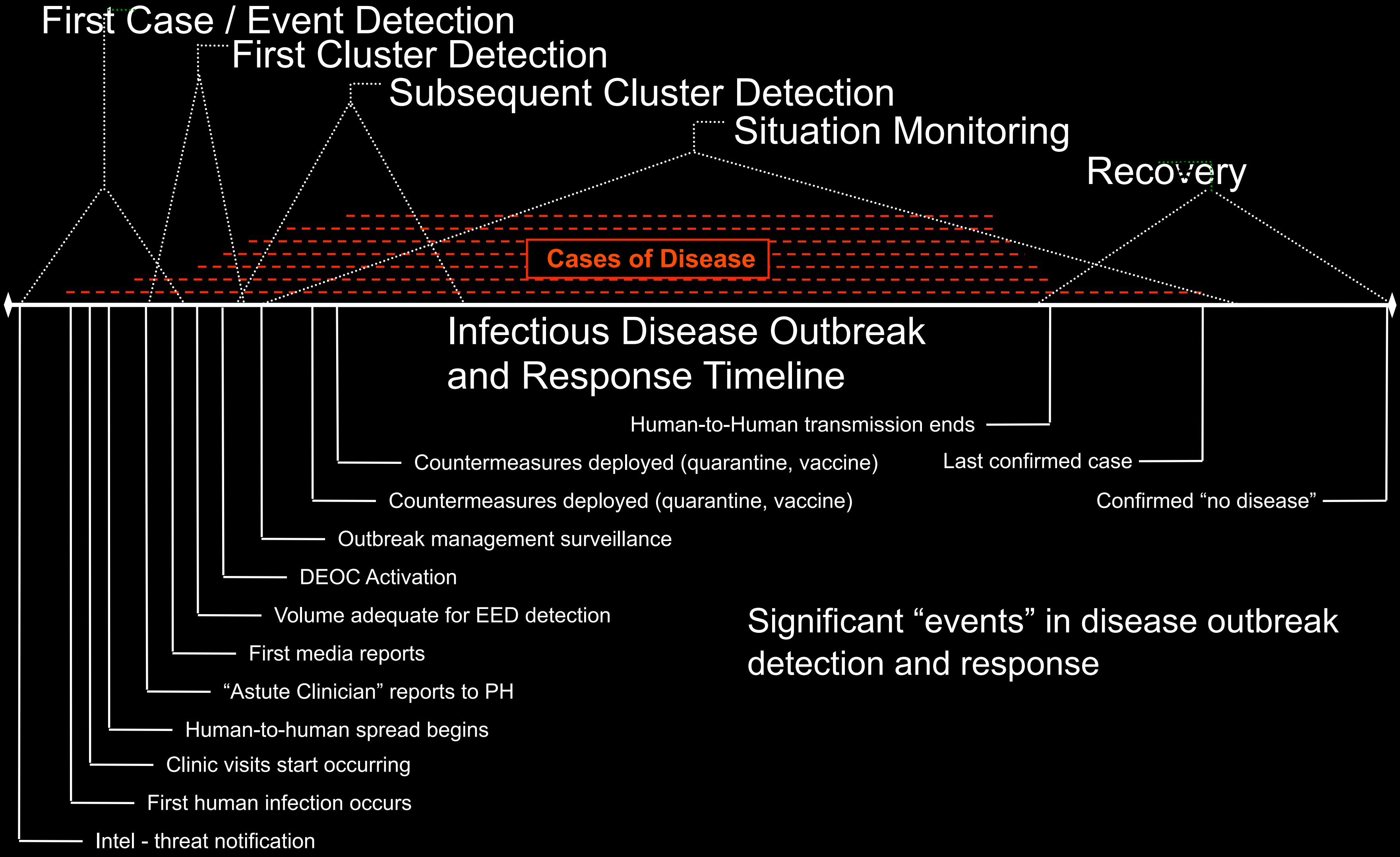
Example: Wireless Systems for Disaster Care

SAN DIEGO FIRE

Science of Medical Informatics as Applied to Public Health

Biosurveillance Example



First Case / Event Detection

First Cluster Detection

Subsequent Cluster Detection

Situation Monitoring

Recovery

Cases of Disease

Infectious Disease Outbreak and Response Timeline

Human-to-Human transmission ends

Countermeasures deployed (quarantine, vaccine)

Last confirmed case

Countermeasures deployed (quarantine, vaccine)

Confirmed "no disease"

Outbreak management surveillance

DEOC Activation

Volume adequate for EED detection

First media reports

"Astute Clinician" reports to PH

Human-to-human spread begins

Clinic visits start occurring

First human infection occurs

Intel - threat notification

Significant "events" in disease outbreak detection and response

Model Formulation: Health Protection Framework

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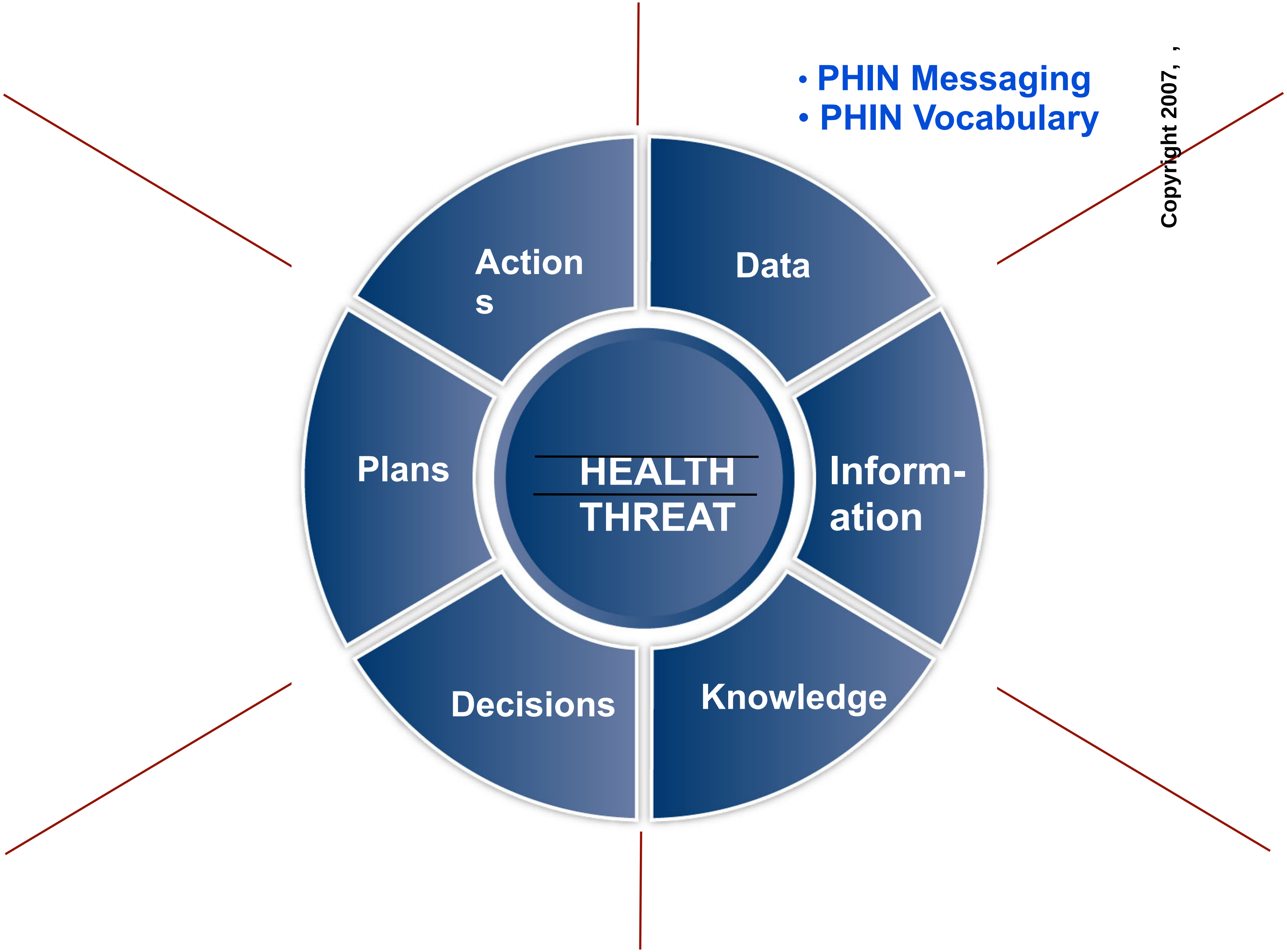
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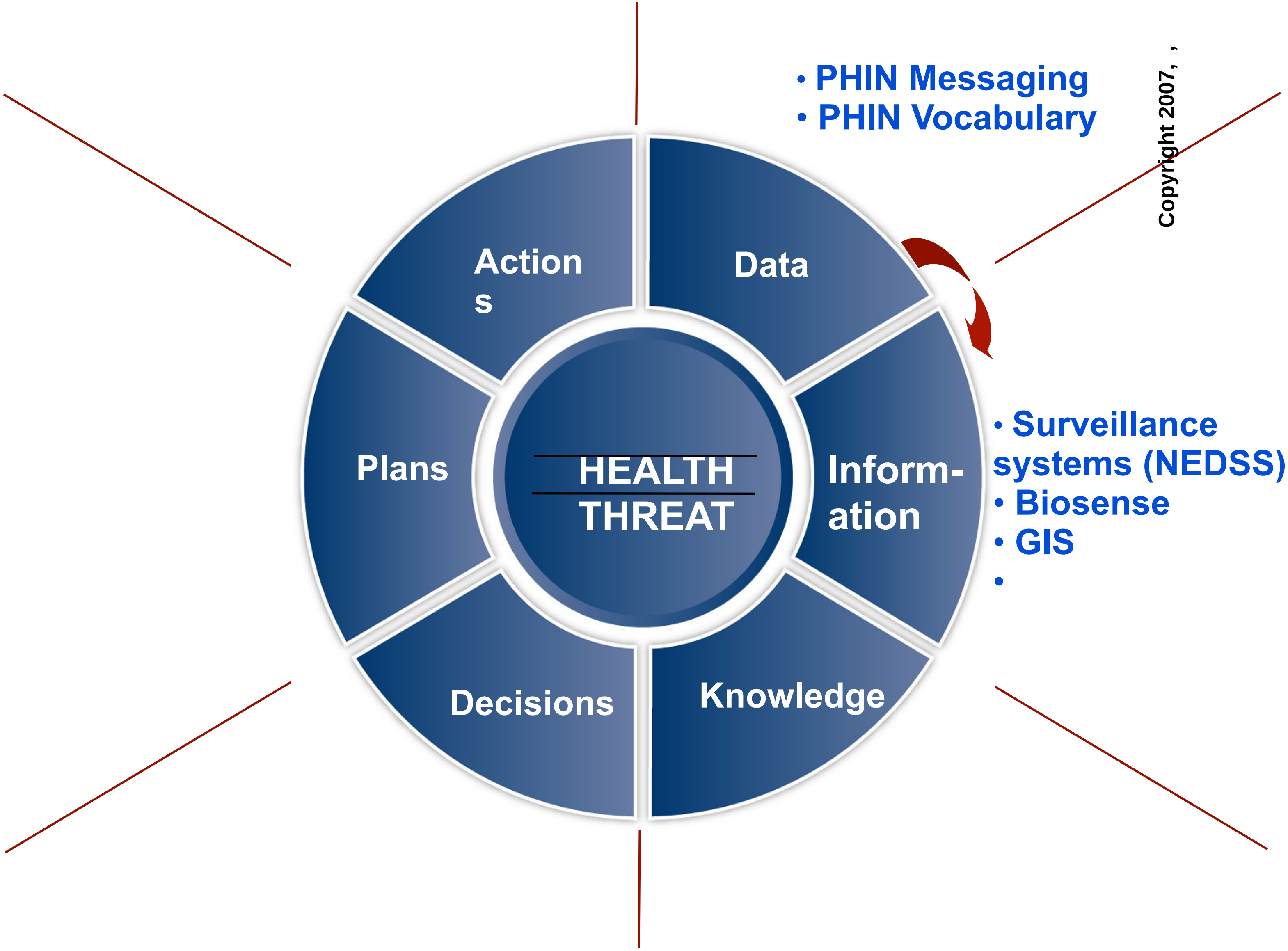
Knowledge

- PHIN Messaging
- PHIN Vocabulary

Model Formulation: Health Protection Framework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- Surveillance systems (NEDSS)
- Biosense
- GIS
-

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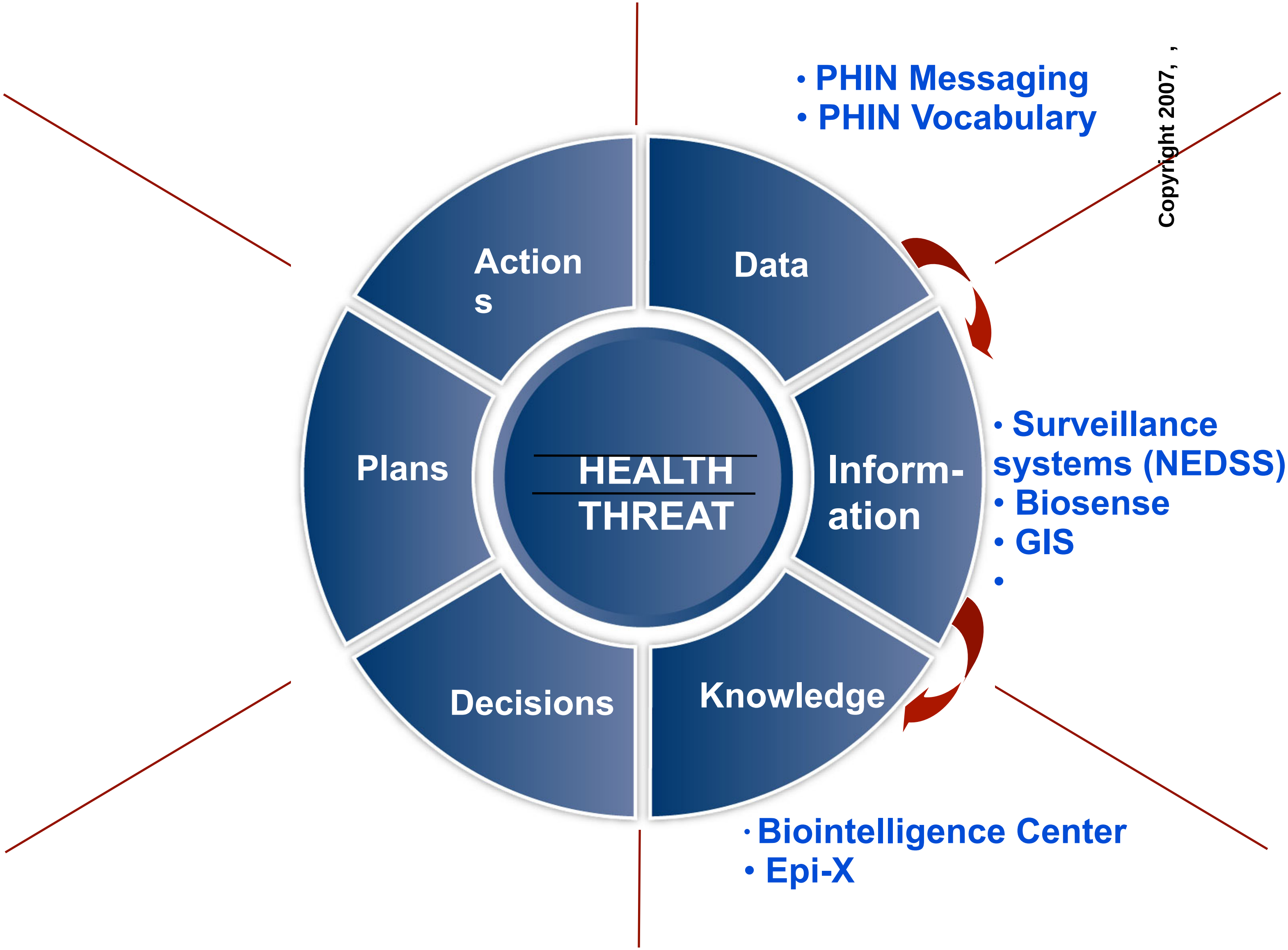

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- Biointelligence Center
- Epi-X

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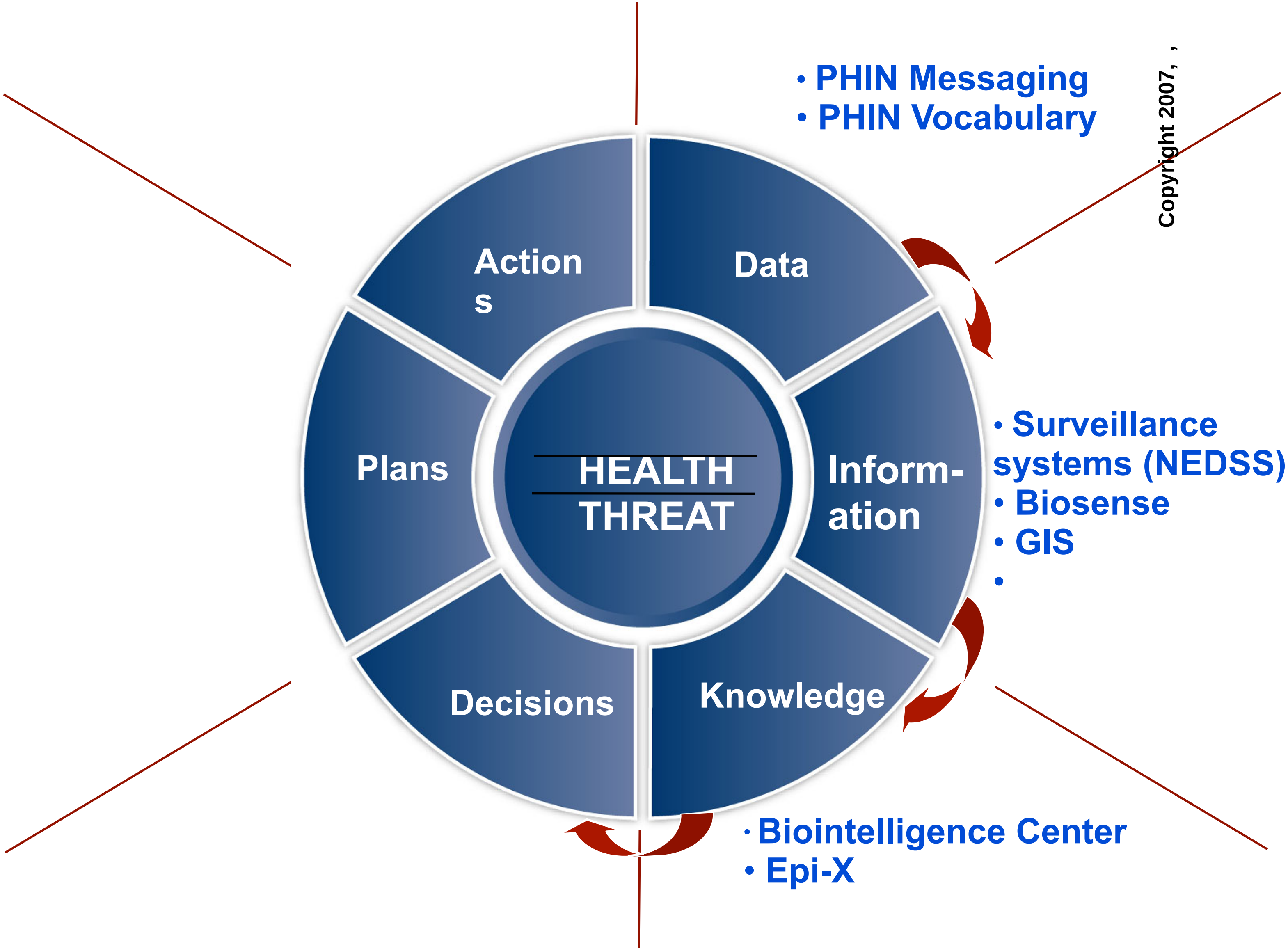

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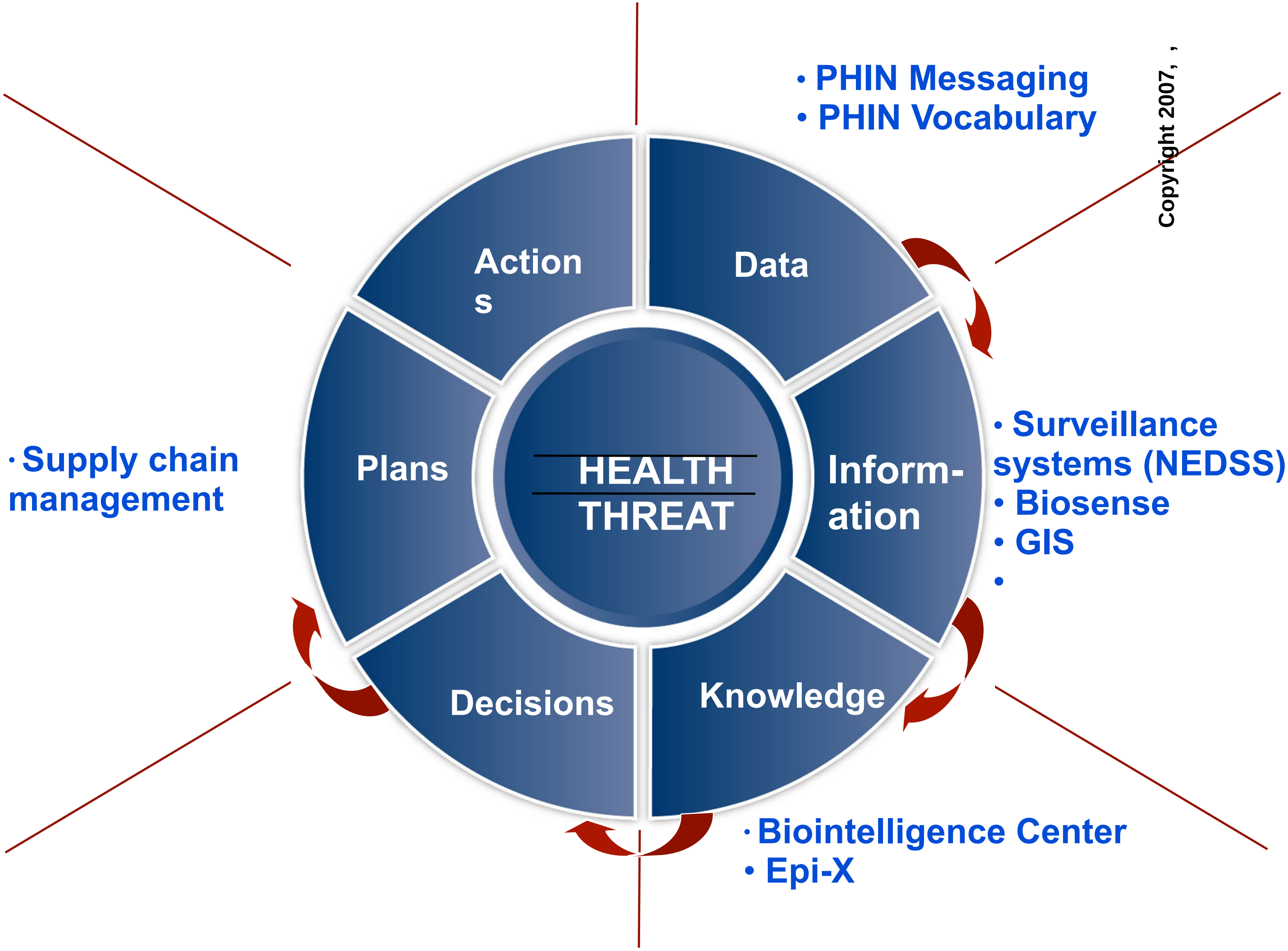
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- Supply chain management

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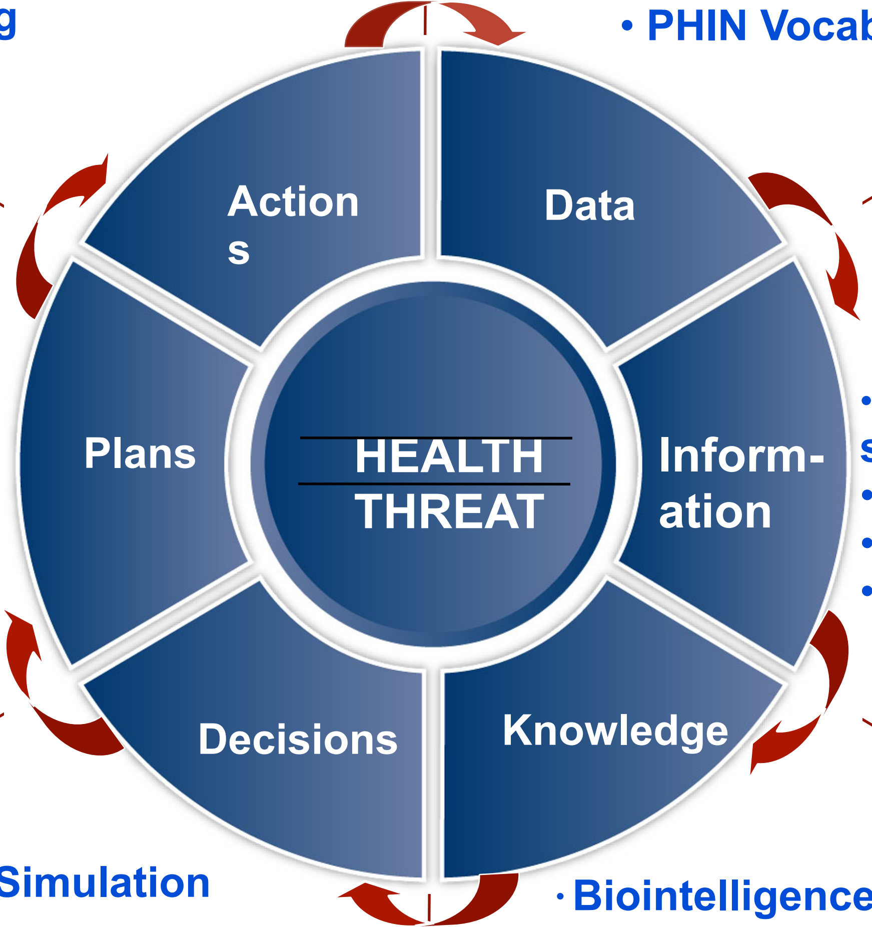
HEALTH THREAT
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- Outbreak Management System
- Countermeasure Tracking

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Health Protection Framework Foundation

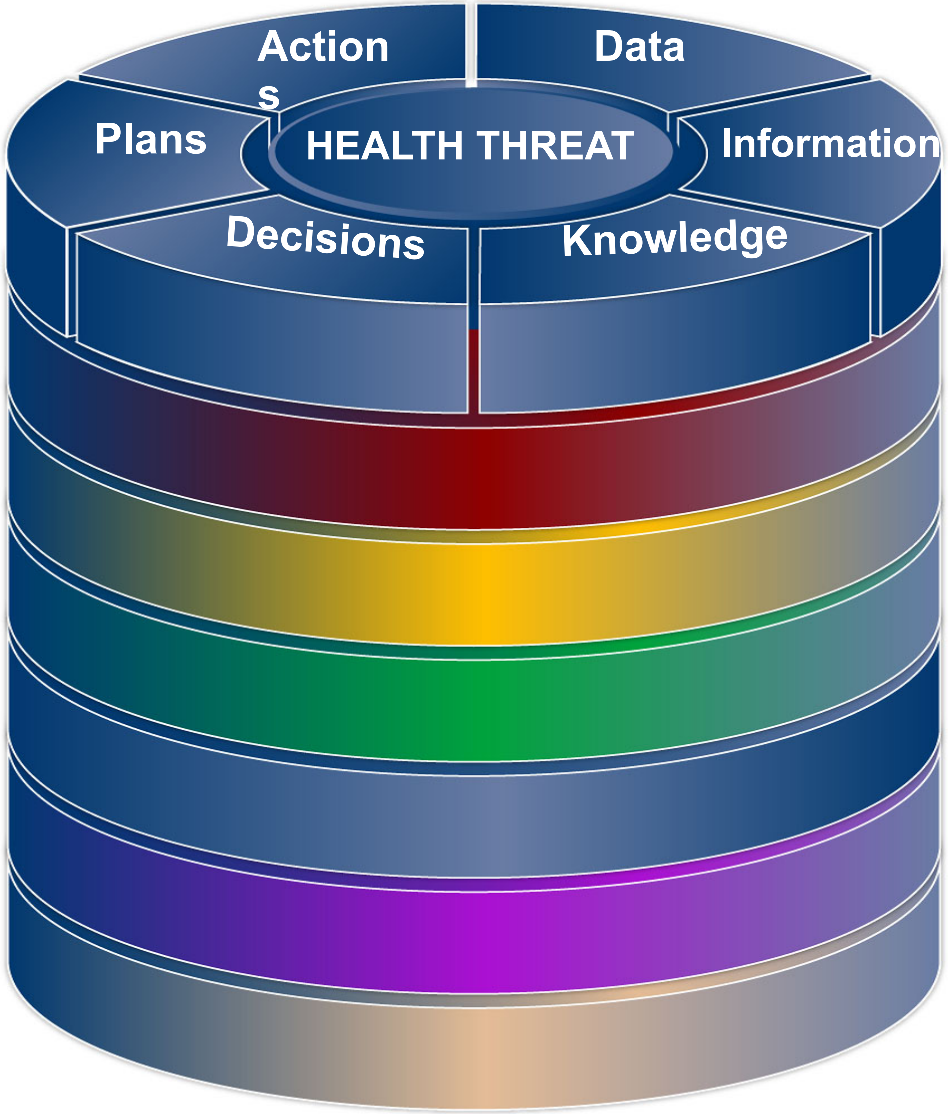

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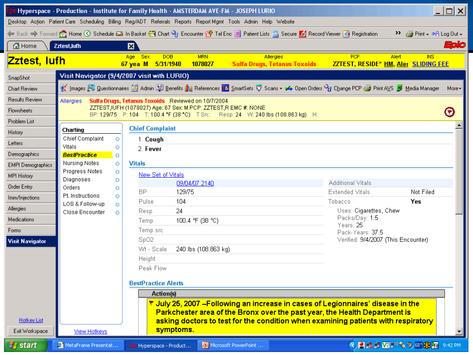
Illustration of Integrated Solution

Practice Alert in EHR prompts changes in physicians' behaviors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Zztest, lufh

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BestPractice Alerts

Action(s)

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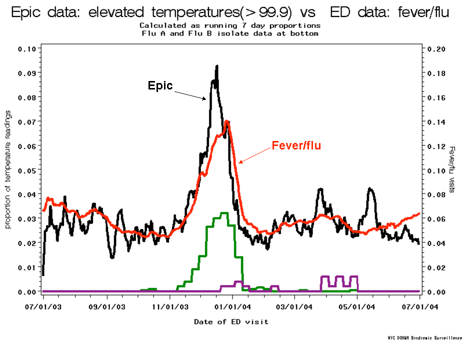
Legionella



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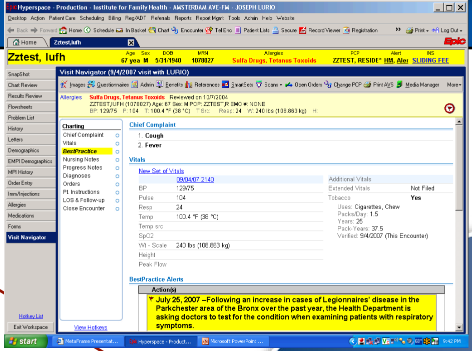
NYC DOHMH Syndromic Surveillance

Illustration of Integrated Solution

Practice Alert in EHR prompts changes in physicians' behaviors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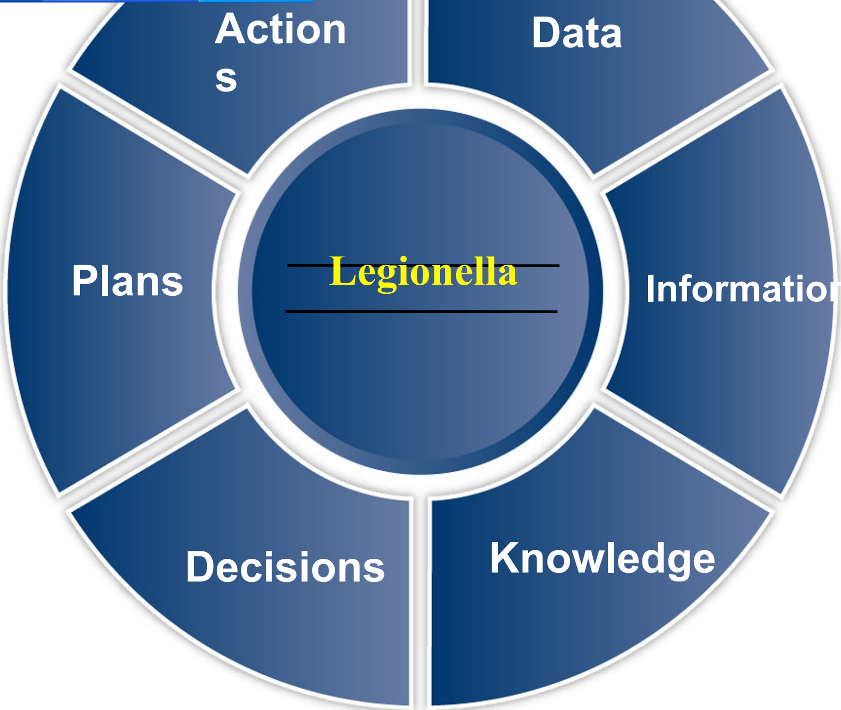
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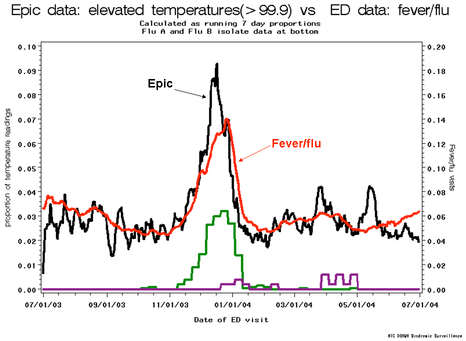
Surveillance system @ NYC Department of Health detect cases of Legionella in Parkchester community in Bronx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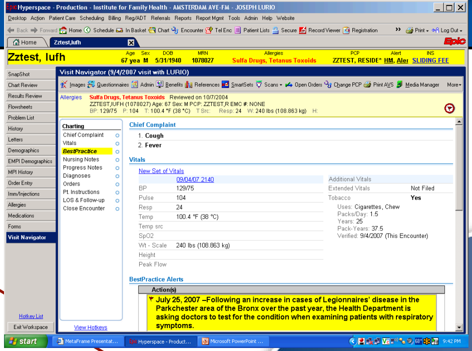

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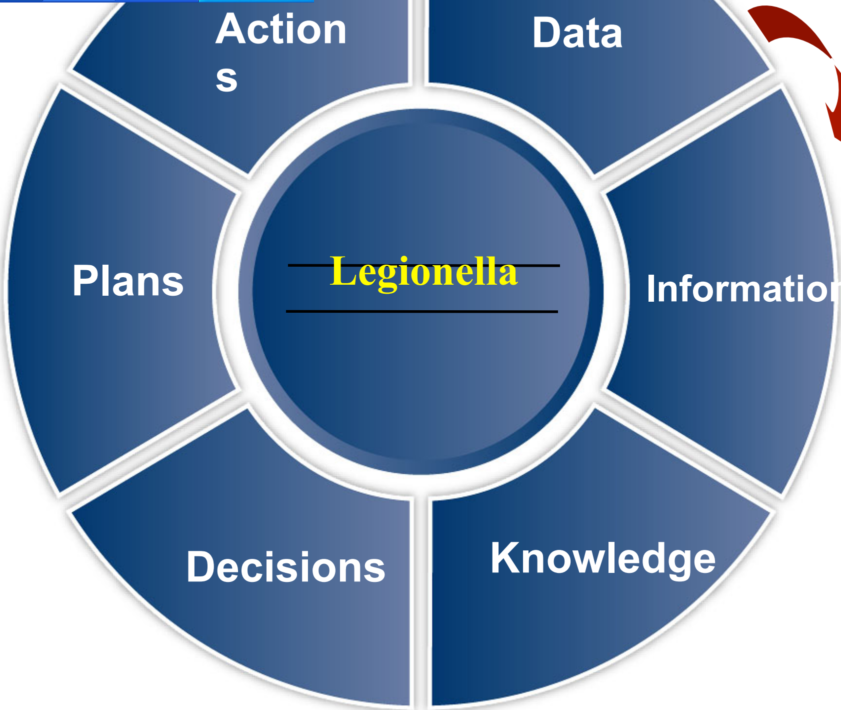

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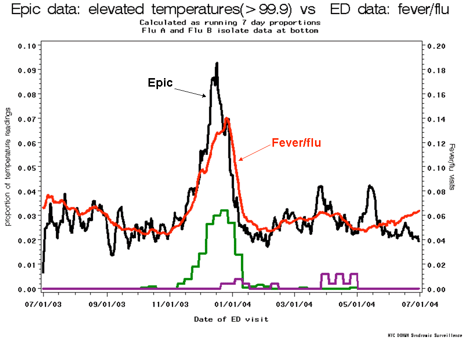

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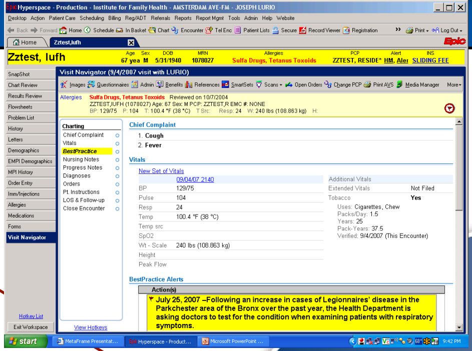
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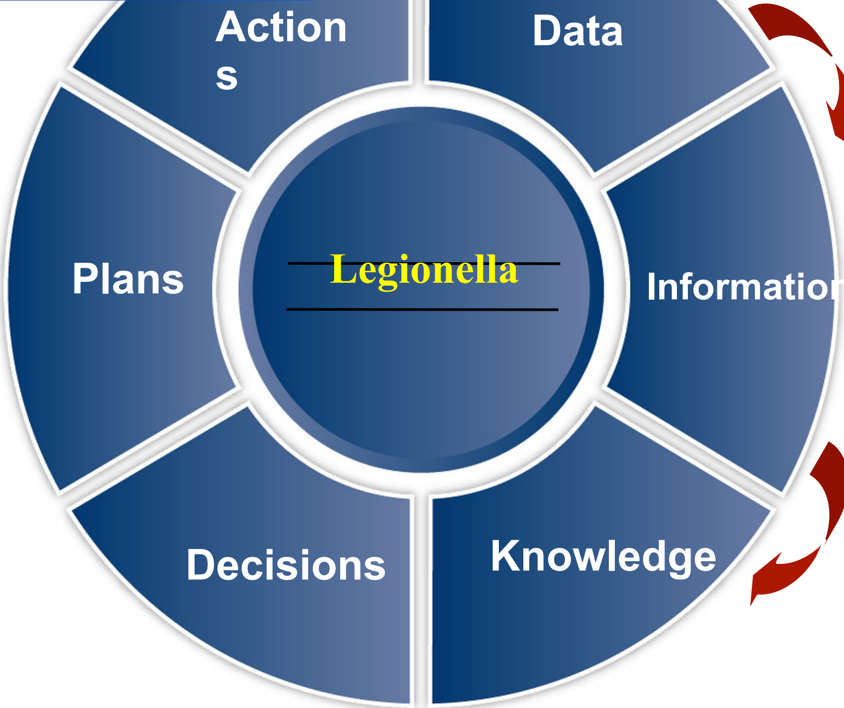
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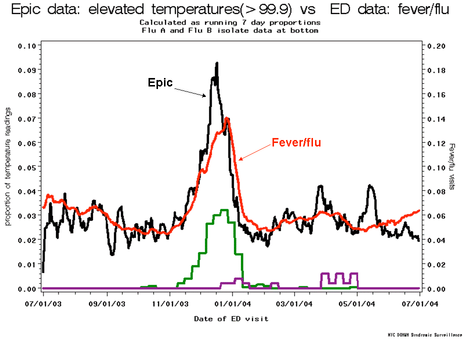

NYCDOH decides there is a Legionella Outbreak

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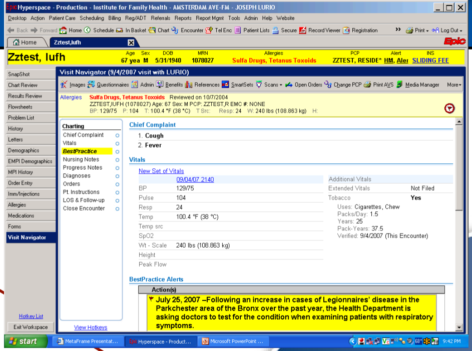

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Zztest, lufh

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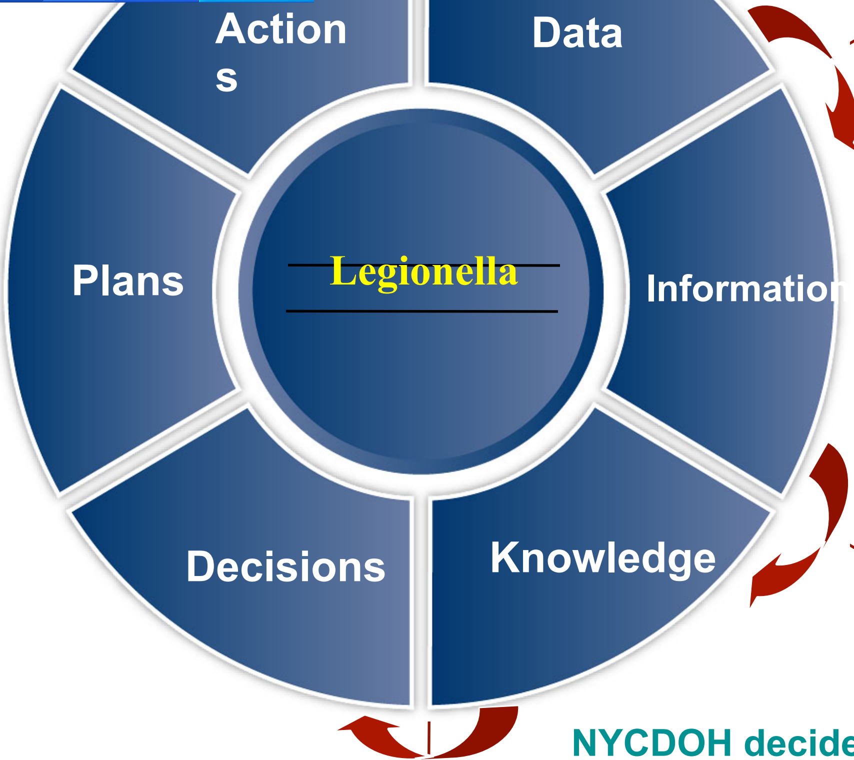
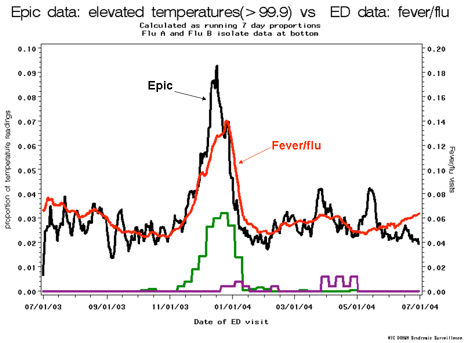


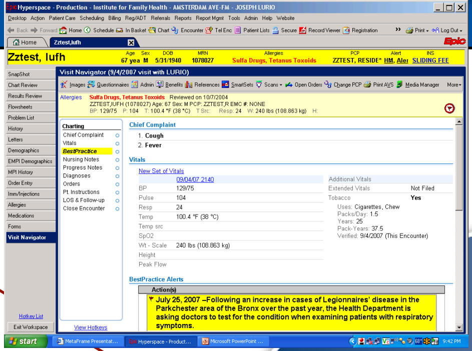
Surveillance system @ NYC Department of Health detect cases of Legionella in Parkchester community in Bronx



NYCDOH decides there is a Legionella Outbreak

Alert is embedded into Electronic Health Records (HER)

Illustration of Integrated Solution


Epic Hyperspace - Production - Institute for Family Health - AMSTERDAM AVE-FM - JOSEPH LURIO
Desktop Action Patient Care Scheduling Billing Reg/ADT Referrals Reports Report Mgmt Tools Admin Help Website
Back Forward Home Schedule In Basket Chart Encounter Tel Enc Patient Lists Secure Record Viewer Registration Print Log Out
Home
Zztest,lufh
Epic
SnapShot
Chart Review
Results Review
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Images Questionnaires Admin Benefits References SmartSets Scans Open Orders Change PCP Print AVS Media Manager More
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Diagnoses
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start
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9:42 PM

Zztest, lufh

Age	Sex	DOB	MRN	Allergies	PCP	Alert	INS
67 yea	M	5/31/1940	1078027	Sulfa Drugs, Tetanus Toxoids	ZZTEST, RESIDE*	HM, Aler	SLIDING FEE

Visit Navigator (9/4/2007 visit with LURIO)

Allergies Sulfa Drugs, Tetanus Toxoids Reviewed on 10/7/2004
ZZTEST,IUFH (1078027) Age: 67 Sex: M PCP: ZZTEST,R EMC #: NONE
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Chief Complaint

1. Cough
2. Fever

Vitals

New Set of Vitals

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Pulse	104
Resp	24
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Temp src	
SpO2	
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Height	
Peak Flow	

Additional Vitals	
Extended Vitals	Not Filed
Tobacco	Yes

Uses: Cigarettes, Chew
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BestPractice Alerts

Action(s)

July 25, 2007 –Following an increase in cases of Legionnaires' disease in the Parkchester area of the Bronx over the past year, the Health Department is asking doctors to test for the condition when examining patients with respiratory symptoms.

Practice Alert in EHR prompts changes in physicians' behaviors

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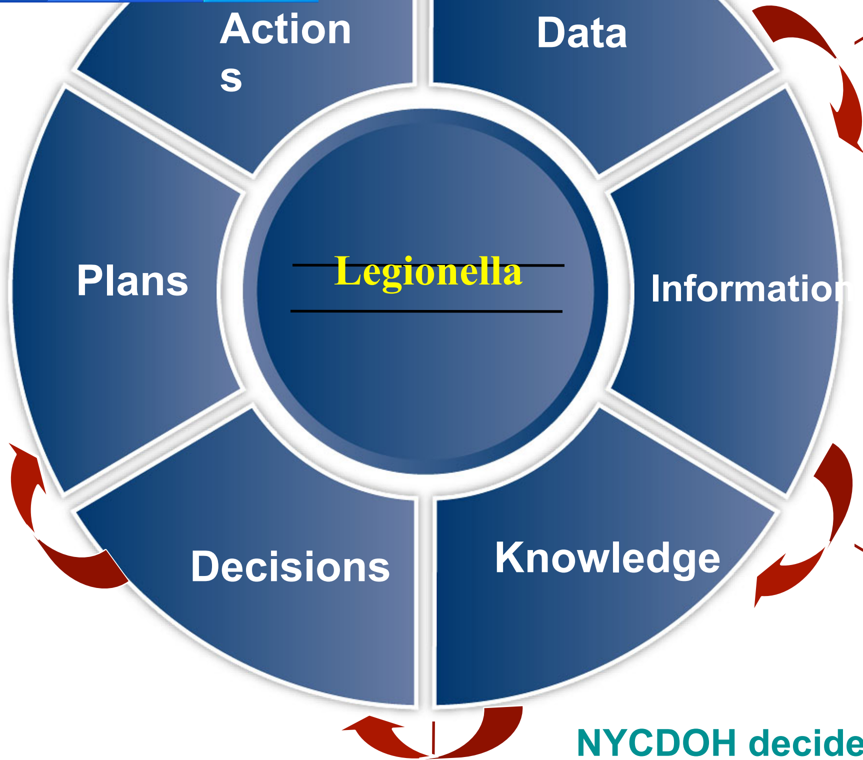
Actions
Data
Information
Knowledge
Decisions
Plans
Legionella

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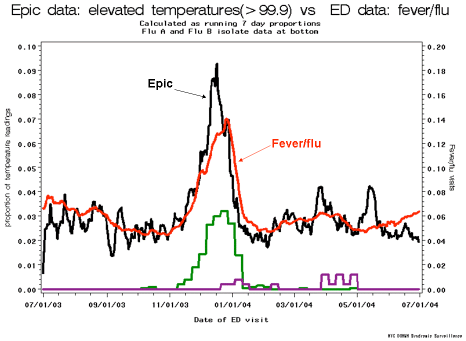
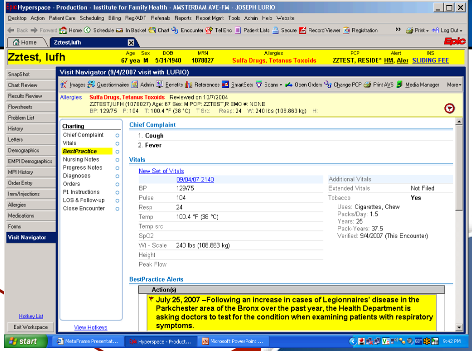

Epic data: elevated temperatures(>99.9) vs ED data: fever/flu
Calculated as running 7 day proportions
Flu A and Flu B isolate data at bottom

NYC DOHMH Syndromic Surveillance

Alert is embedded into Electronic Health Records (HER)

NYCDOH decides there is a Legionella Outbreak

Illustration of Integrated Solution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Index case of Legionella reported

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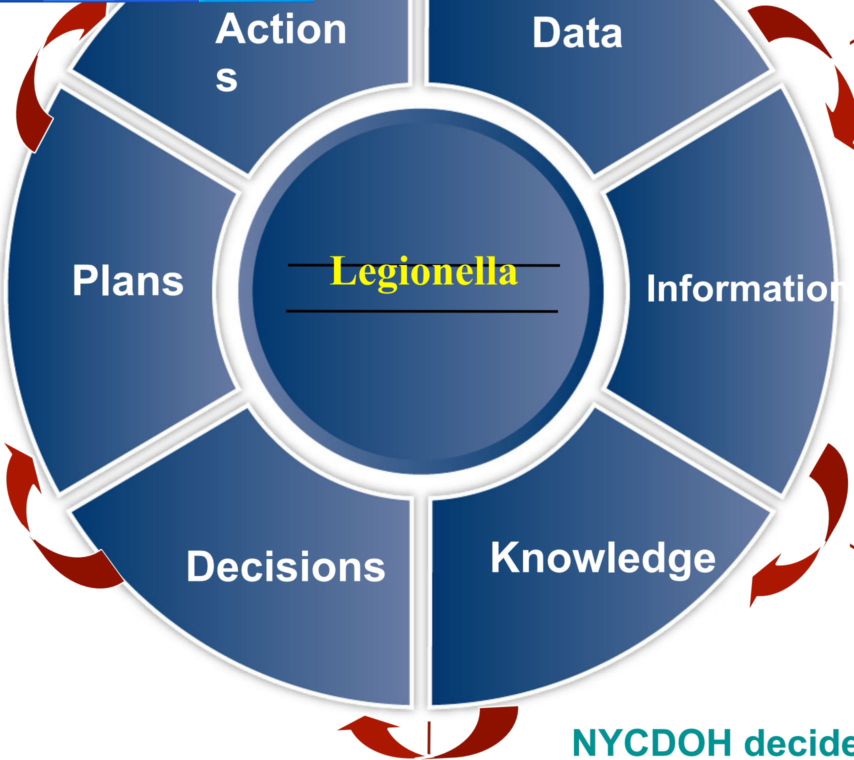
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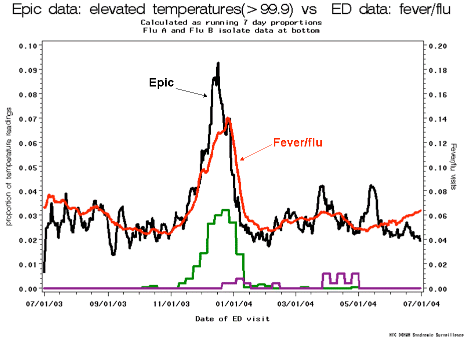
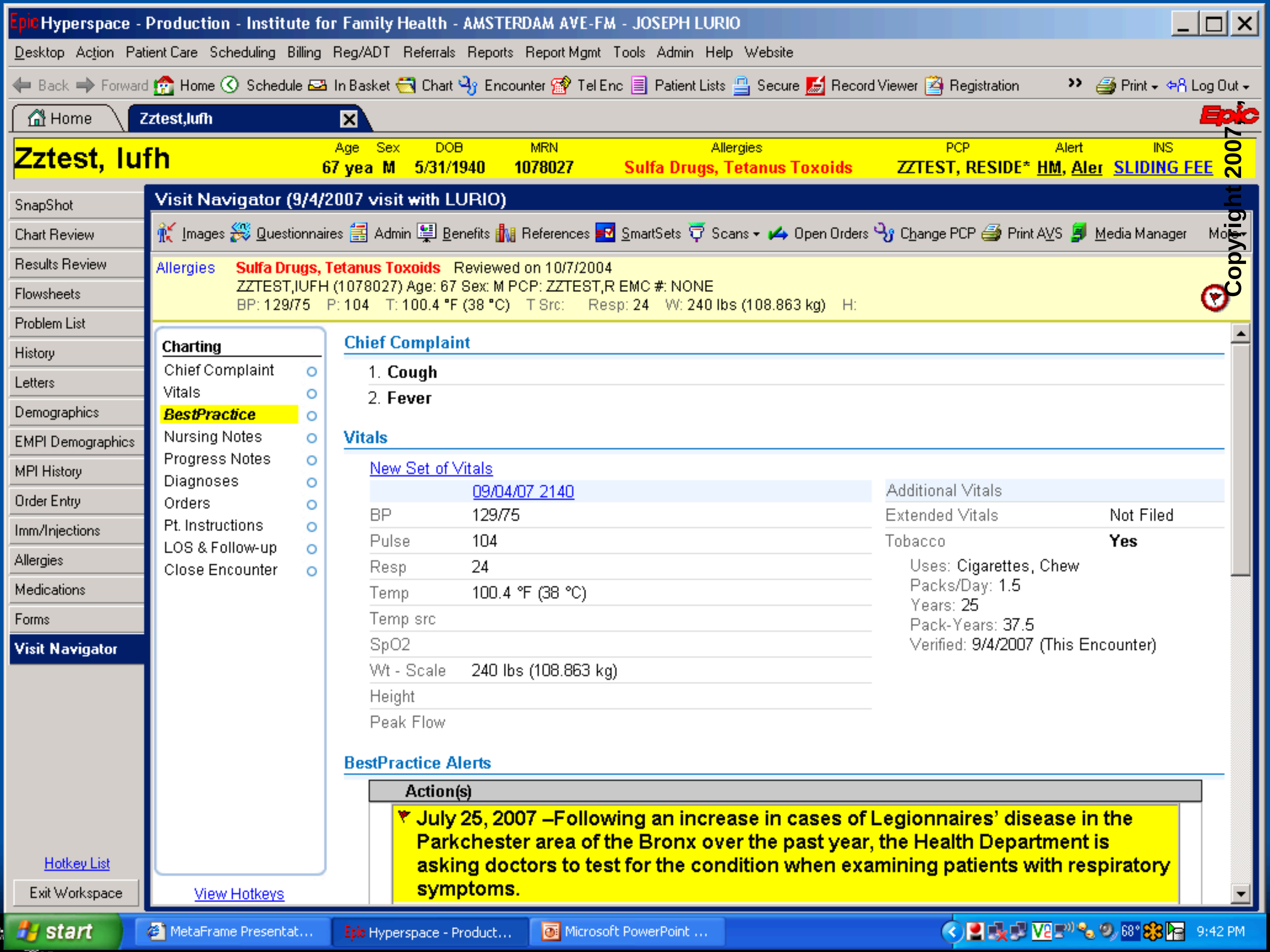


NYCDOH decides there is a Legionella Outbreak

NYCDOH issues alert on Legionella Outbreak

Action: Influencing Health Provider Behavior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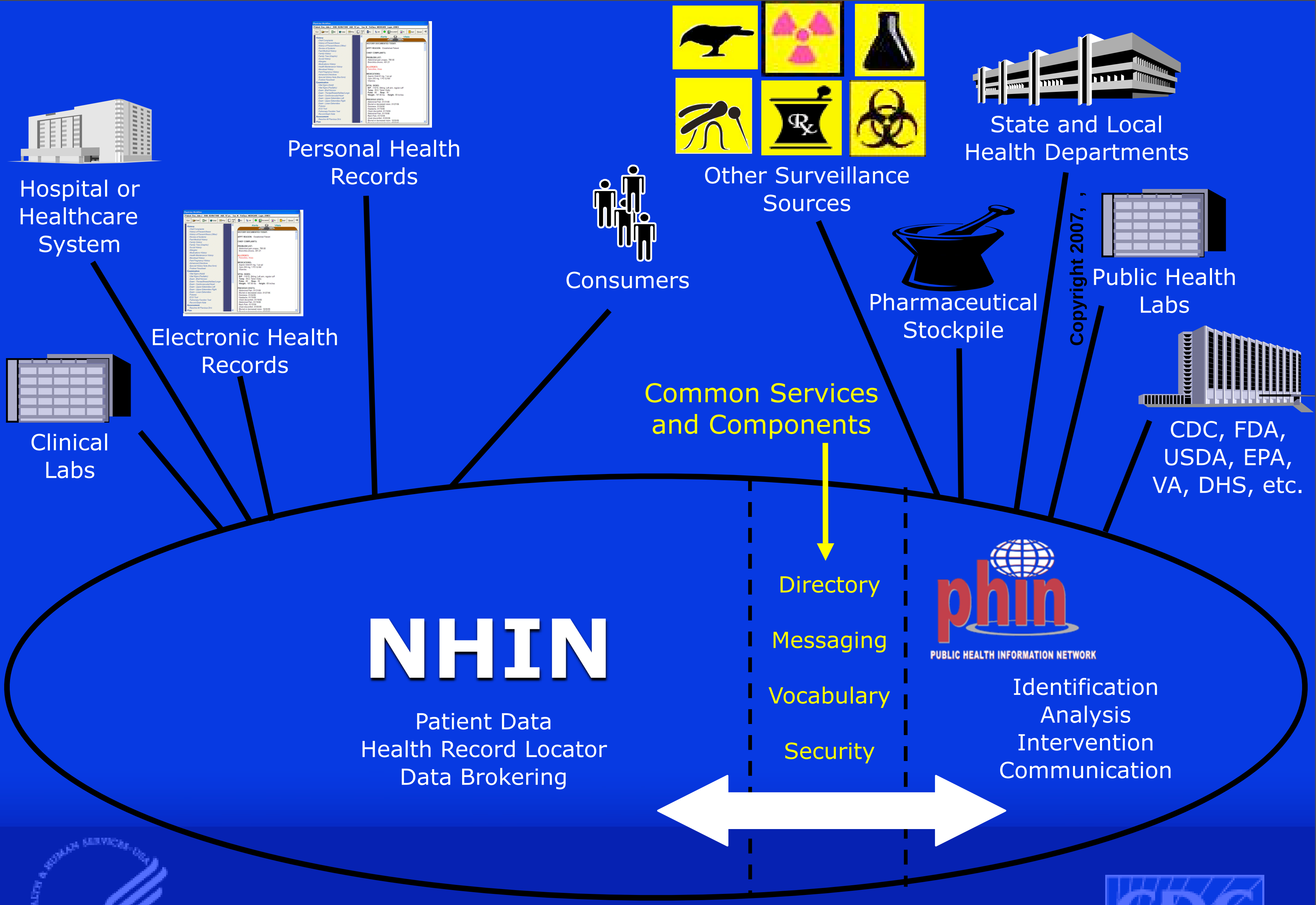


Hospital or Healthcare System

Personal Health Records

Electronic Health Records

Clinical Labs

Consumers

Other Surveillance Sources

State and Local Health Departments

Pharmaceutical Stockpile

Public Health Labs

CDC, FDA, USDA, EPA, VA, DHS, etc.

Common Services and Components

NHIN

Patient Data
Health Record Locator
Data Brokering

Directory

Messaging

Vocabulary

Security

Identification
Analysis
Intervention
Communication

Progress toward a National Health Information Network

q President’s Mandate - 2004

  § By 2014 - Widespread Electronic Health Records (EHRs)

q Office of the National Coordinator for Health Information Technology (ONC)

q American Health Information Community (AHIC)

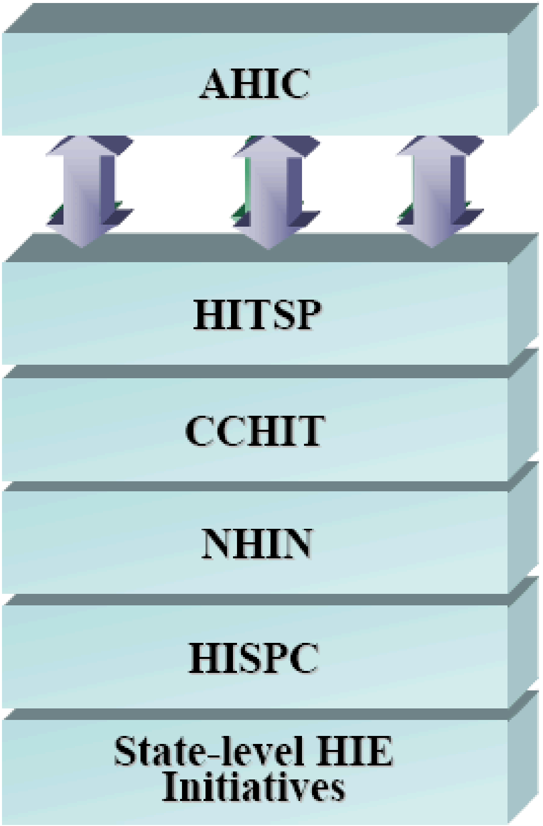
  § Healthcare IT Standards Panel (HITSP)

  § Certification Commission for Healthcare Information Technology (CCHIT)

  § NHIN Prototypes

AHIC – a Public and Private Sector Collaborative

AHIC is the public-private collaborative that sets priorities and oversees and/or endorses HIT standards, certification, the NHIN, and policies on a national level.



AHIC

HITSP

CCHIT

NHIN

HISPC

State-level HIE Initiatives

- **AHIC** - American Health Information Community
- **HITSP** – Health IT Standards Panel
- **CCHIT** – Certification Commission for Health IT
- **NHIN** - Nationwide Health Information Network Prototypes
- **HISPC** – Health Information Security and Privacy Collaboration
- **State-level HIE Initiatives** – State-level Health Information Exchange Initiatives

Legislative Efforts for Health Info Exchanges

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QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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NCPHI Leads CDC's NHIN Efforts

Centers for Disease Control and Prevention

Coordinating Center for Health Information and Service

- National Center for Health Statistics
- **National Center for Public Health Informatics**
- National Center for Health Marketing

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION
DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

National Center for Public Health Informatics

MISSION:

“Protecting public’s health, promoting health equity, and transforming the health system through advancement of the science of biomedical informatics and application of its principles to public health practice.”

VISION:

“Leadership and vision to help create an interoperable public health system.”

Key Programs: BIOSENSE, NEDSS, PHIN, OMS, CRA

National Center for Public Health Informatics: Agenda

- Public Health Integration into the NHIN
  - Collaboration with Office of the Nation Coordinator
  - American Health Information Community Support
    - Participation in Federal Health Information Exchange
    - Public Health Clinical Care Coordination Subcommittee
    - Public health use case development for AHIC
    - Standards development
  - HIE--Public Health integration RFA

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Biosense: Integrating Public Health into the NHIN to Monitor the Nation’s Health

- Past
  - Syndromic surveillance of multiple independent “noisy” data sources allows early identification of events
    - Tracking of counts of interesting but unmerged data streams
    - Chief complaints, ER diagnoses, lab orders, OTC purchases, absenteeism
- Future
  - Case-based surveillance throughout the healthcare system
  - Staged levels of interest
    - Potentially interesting cases (Chief complaints, ER diagnoses, X ray finding, et.)
    - Suspected cases of interest (initial diagnostic criteria met)
    - Confirmed cases of interest
  - Integration with other public health surveillance tools

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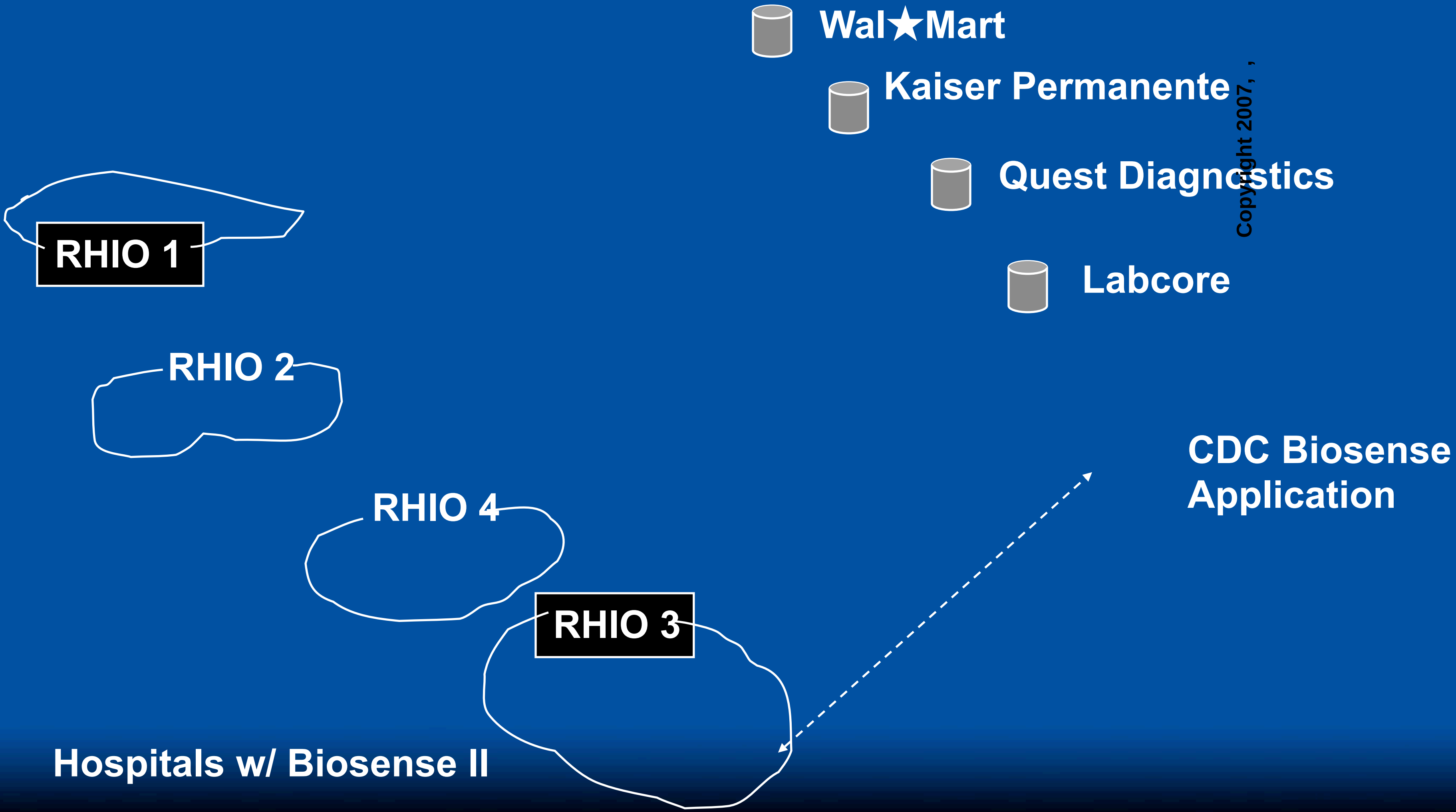
Biosense as the Link to the NHIN



Wal★Mart

Kaiser Permanente

Quest Diagnostics

Labcore

RHIO 1

RHIO 2

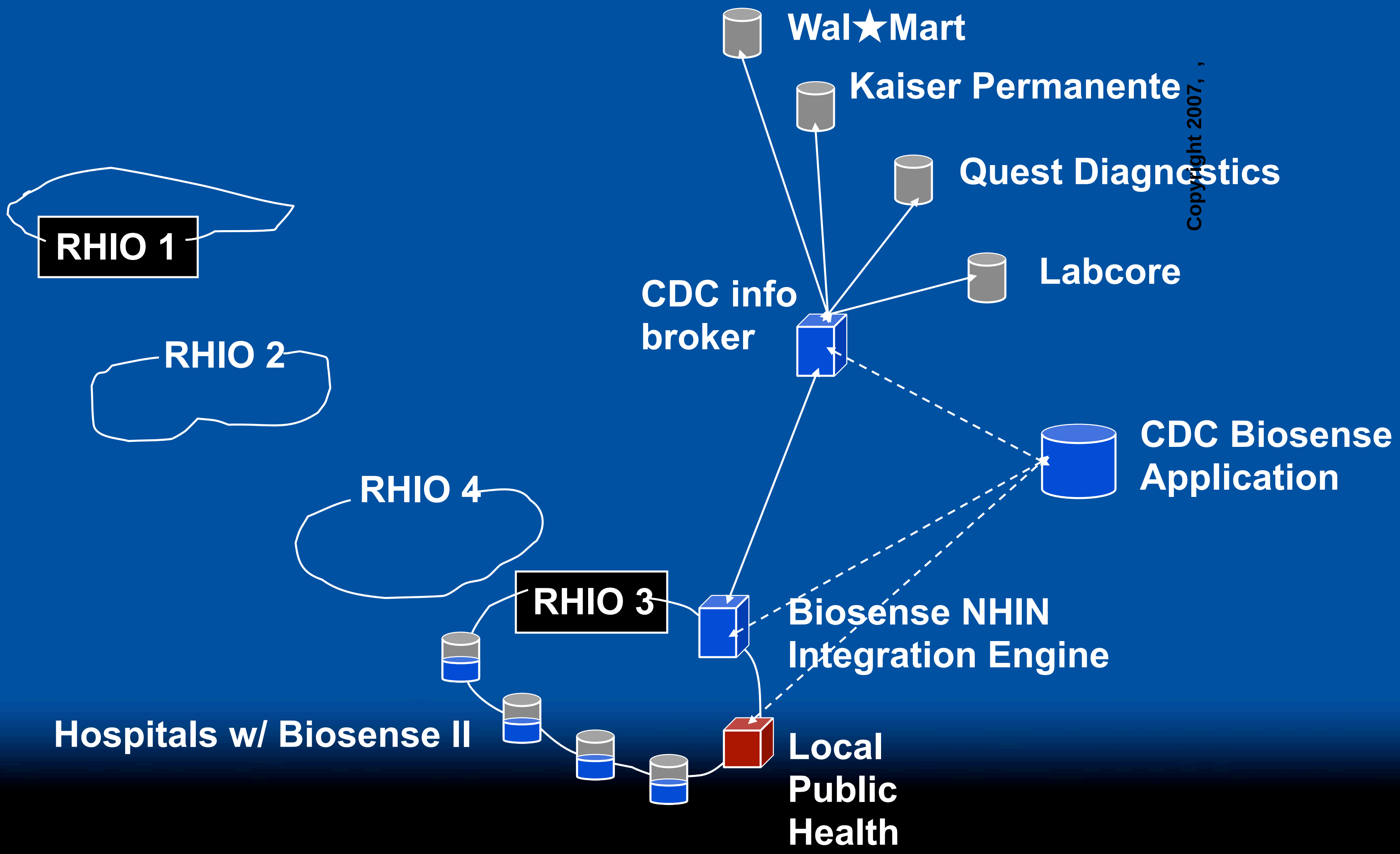
RHIO 4

RHIO 3

CDC Biosense Application

Hospitals w/ Biosense II

Biosense as the Link to the NHIN



Wal★Mart

Kaiser Permanente

Quest Diagnostics

Labcore

CDC info broker

CDC Biosense Application

RHIO 1

RHIO 2

RHIO 4

RHIO 3

Biosense NHIN Integration Engine

Hospitals w/ Biosense II

Local Public Health

Biosense Public Health--HIE Link

- Major investment
  - 5 year 8 -10 million dollar a year program
- Funds health information exchanges required to have public health partners in development teams
  - Uses exchange infrastructure for monitoring task
- Funds
  - Transmission of data from Bioterrorism use case
  - Two-data exchange
  - Transmission to all levels of public health
  - Assessment, tracking and characterization of outbreaks

Other NCPHI Initiatives

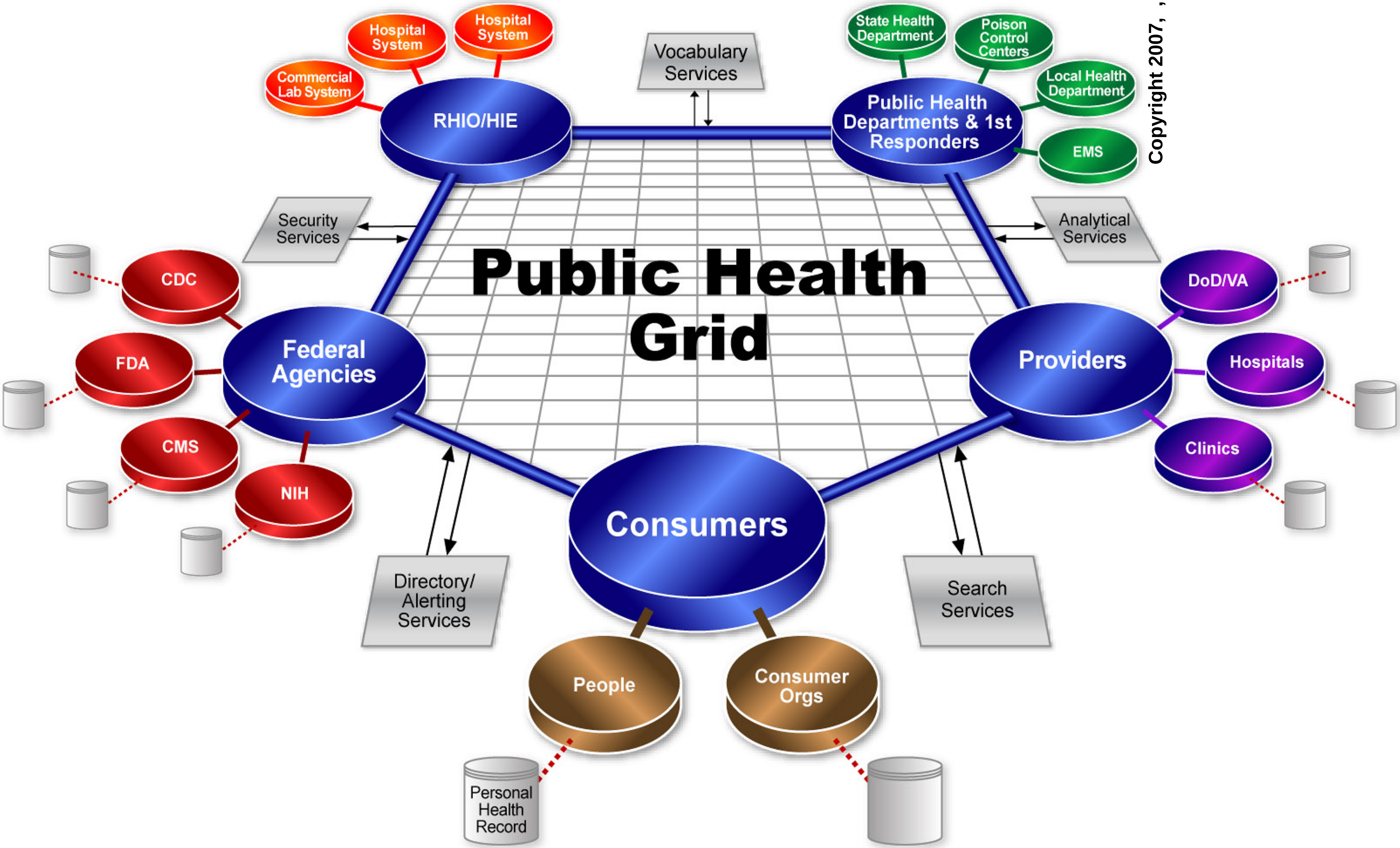
- Workforce Training in Informatics
  - 1000 public health informaticians by 2012
- Communities of Practice and Open Source
  - Changing how the CDC develops software with the public health community
- Centers of Excellence in Public Health Informatics
  - Biosense supported program and others
  - Collaborative research in public health informatics

NCPHI’s Commitment to Innovation

q PHIN Messaging
q Vocabulary Services
q Public Health Ontology
q Decision Support Methodologies for Public Health
q Grid Architectures for Public Health

Goal State

Collaborative, Efficient, Agile


Hospital System
Hospital System
Commercial Lab System
RHIO/HIE
Vocabulary Services
State Health Department
Poison Control Centers
Local Health Department
Public Health Departments & 1st Responders
EMS
Security Services
Analytical Services
CDC
FDA
CMS
NIH
Federal Agencies
Public Health Grid
DoD/VA
Hospitals
Clinics
Providers
Consumers
Directory/ Alerting Services
Search Services
People
Consumer Orgs
Personal Health Record

Summary and Conclusions

If you want to travel fast, travel alone
If you want to travel far, travel together

African Proverb

- **Public Health Informatics**
  - Rapidly evolving field
  - Highly impacts on public health practice
  - NHIN offers new types of opportunities for public healht
  - New strategies for surveillance and intervention
  - Systems that interlock and work together

Questions

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