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## **2015 Defense Health Information Technology Symposium**

# **Improving ESSENCE Risk and Cost through Joint Research**



***"Medically Ready Force...Ready Medical Force"***

# DHA Vision



**“A joint, integrated, premier system of health, supporting those who serve in the defense of our country.”**



***“Medically Ready Force...Ready Medical Force”***

# Learning Objectives

- Understand the problem statement the Defense Health Agency aimed to address
- Discuss how the Pacific Joint Information Technology Center (JITC) was leveraged for its pre-acquisition research, testing and evaluation services
- Identify enhancements to the DoD Electronic Surveillance System for Early Notification of Community-based Epidemics (ESSENCE) based on research efforts
- Identify the value and benefits of the Agile research and development process to capture and document the end-users input to the requirements process, and final graphical user interface presented for IT solutions

# Agenda

- Health IT Research at the Defense Health Agency
- What is the Pacific Joint Information Technology Center (JITC)
- Purpose and Need of Pre-Milestone B Health IT Research
- Snapshot of Health IT Research at the Pacific JITC
- Research Spotlight: ESSENCE
  - What is ESSENCE; Research Problem Statement
  - Technical Approach, Outcomes and Benefits
- Leveraging Pacific JITC for Research Outcomes
  - Streamlining Acquisition; Leveraging an Agile Approach
  - Working with Pacific JITC
- Reengineering our Approach to Data-Driven Health IT Research

# Health IT Research at the Defense Health Agency



## Addressing the Technology Landscape

### Advanced Technology Development

- Driven by functional gaps and strategic priorities
- Map to the Joint Requirements Oversight Council (JROC) approved Concept of Operations [Health Service Delivery (HSD), Health System Support (HSS), Force Health Protection (FHP)]

Meeting today's needs

### Health IT Innovation

- Driven by ideas that seem disruptive and/or transformational
- Map to HIT Innovation buckets approved by the Assistance Secretary of Defense (Health Affairs) [Cognitive Analytics, Mobile Wars, Cloud Computing, Digital Engagement]

Meeting tomorrow's needs

## TECHNOLOGY LANDSCAPE

One Year

Three

Five

Seven

Nine

Eleven

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# What is the Pacific Joint Information Technology Center (JITC)?

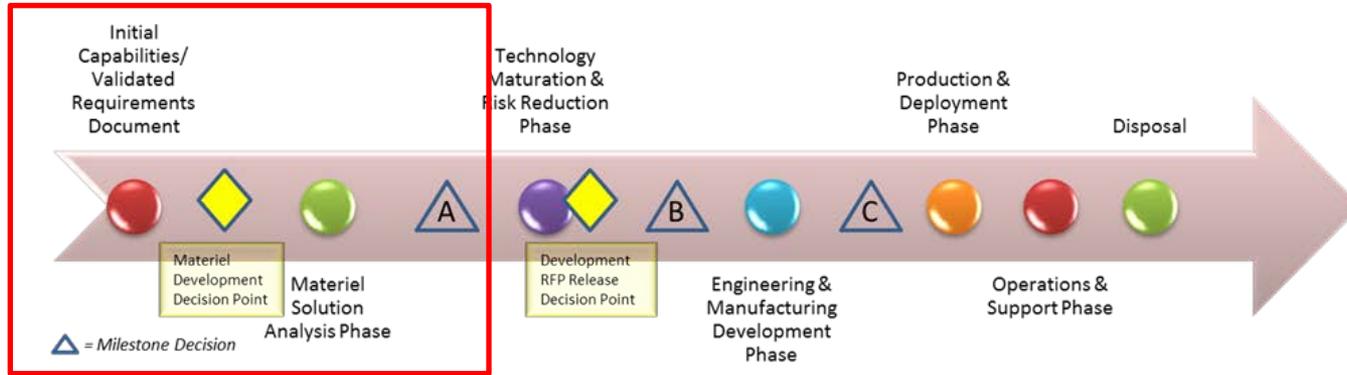


The Pacific Joint Information Technology Center (JITC) is the Military Health System's only center for **joint concept technology development, prototyping and piloting** of Information Management / Information Technology products and services to support **Department of Defense medical readiness requirements and IT modernization needs** across the medical continuum of care.

## Benefits of Leveraging Pacific JITC

- **Risk Reduction:** Early piloting to identify the best, most cost effective IT solutions
- **Speed to Market:** Rapid prototyping, piloting, accelerated integration and proven interoperability
- **DoD-VA Interoperability:** Pacific JITC Biotechnology Hui supports DoD-VA Health Information Systems interoperability and dual use technologies
- **Agile Computing:** Pacific JITC Integrated Test and Evaluation Center is the first DoD-VA integrated lab where critical systems are virtualized

# Purpose and Need of Pre-Milestone B HIT Research



- Performed **before the Technology Maturation and Risk Reduction Phase**
- Objective is to buy down technical risk and **develop a sufficient understanding of a solution** in order to make sound business decisions before initiating a formal acquisition program
- Develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate manufacturing processes, and refine requirements

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# Snapshot of Health IT Research at the Pacific JITC (2010 – 2015)



## Governance Review

- Linked Problem List for Web Based Health Information Exchange Applications
- Disability Evaluation System Information Technology Modernization
- VistA Metadata Standardization



## Pending Award

- Legacy Program and Data Migration/Integration (TAPS v.2)
- Innovation Ecosystem
- Theater Blood – Mobile
- Integrated Public/Private/Personal Cloud Management



## Active Projects

- Theater Gap Analysis
- Optimal Vision Care Prototype
- DMLES Regionalization
- Medical Informatics Fusion Decision Support



## Completed Projects

- Unified Theater Service Platform
- Theater Warfighter Blood Application
- iEHR Business Process Optimization
- Theater Mobile Blood Management
- **Next generation ESSENCE**
- And many more.....

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# Pacific JITC Research Spotlight: **ESSENCE**

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# What is ESSENCE?

The Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) is a web-based disease surveillance information system developed to **alert Health Authorities of infectious disease outbreaks** including possible bioterrorism attacks.

ESSENCE uses a variety of data sources to understand the “big picture”:

- Health encounters like outpatient visits
- Pharmacy transactions
- Laboratory orders
- Radiology orders
- Chief complaints/symptoms

# ESSENCE: Operational Scope

- Surveys **entire direct care Military Health population**, excluding deployed forces
- **500+ Military Treatment Facilities** and 100+ regional sites
- **~90,000 outpatient visits and pharmacy transactions** (analyzed per day)
- **~2 million outpatient files** (received per day)
- Updates outpatient data 6 times (every 24 hours on average)
- **200-600 thousand pharmacy records** (received per day)
- Updates pharmacy data every 24 hours
- **100-300 thousand lab and radiology orders** (received per day)
- Demographics data updated monthly



# ESSENCE Research: Problem Statement

- **PURPOSE:** Armed Forces Health Surveillance Center sponsored a proof of concept in partnership with JHU-APL to **improve the specificity of disease outbreak detection using a Bayesian Network methodology**
  - Previous methods that used algorithms to detect outbreaks exclusively based on disease counts compared to a historical baseline resulted in numerous alarms
  - They were not successful in identifying true outbreaks and health events needing intervention
  - **Automated correlation to trigger an alert when multiple sources are correlated**



## Concept Used: Population-based Bayesian Networks

- Method of combining information from the monitored population
  - Algorithm results from **multiple data streams** of varying relevance (not raw data)
  - More than a rule set: an analytic umbrella that can also include **report based results**, incomplete data updates and other multivariate methods

# Executing ESSENCE Research at the Pacific JITC



**Design/Prototype next-generation ESSENCE capability** encompassing the integration of the John Hopkins University's Applied Physics Laboratory (JHU-APL) fusion detection algorithm with the production version of ESSENCE and a Business Intelligence dashboard supporting the new algorithmic capabilities.

## Technical Approach:

- Establish and configure a temporary ESSENCE lab environment
- Establish System Requirements and Concept of Operations
- Present Preliminary Design
- Implement prototype
- Address Subject Matter Experts' change requests following validation

The aim of executing the requirements discovery/definition and system design is to shorten market delivery time of these capabilities to the field by an estimated nine months

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# ESSENCE Research: Outcomes



## Instead of:

- How to model data effects of public health threats in multiple data streams?
- How evidence sources are correlated?
- Which data signals correspond to authentic events and false alarms?

## We ask:

- How to analytically combine raw data from different sources?
- How would an experienced health monitor make investigation decisions given the luxury of examining all data sources everyday?

**RESULTS:** Proof of concept was completed using the JHU-APL version of ESSENCE, and demonstrated promising results in **greatly reducing the “false alarms” and improving the confidence in the alerts that ESSENCE produces**

Secondary intent of the research executed was to shorten the time to market in delivering these new salient enhancements to DoD ESSENCE

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# Benefits to the Warfighter

- Improved Situational Awareness and Management of Community Diseases **leads to Improved Medical Readiness**
- Improved Family Health Outcomes = **Improved Mission Focus/ Warfighter peace of mind**
- Improved bandwidth of the Public Health Professional will lead to **expanded surveillance opportunities** on other issues of public health interest (i.e. - Heat/ Cold Stress Injuries)



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# Streamlining Acquisition: A Project Manager's Pragmatic View



## Traditional Acquisition

- Awaits Programmed RDT&E via the POM
- Usually involves March/April contract start depending on when CY appropriations are received
- Spends the first 9-12 months of the “Development Contract” establishing a Preliminary Design

## Acquisition through the Pacific JITC

- **Funds can be approved via DHA Governance in advance** of when appropriations are programmed via the POM
- **Development can begin as soon as the Pacific JITC contract(s) are awarded**
- Establishing preliminary design early allows the Program Manager to **move immediately into detailed design and development** once POM appropriations are received
- Early design establishment = **early risk identification and potential risk reduction**

**9-12 Months** = Time to Market Improvement using the Pacific JITC

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# Leveraging the Pacific JITC for Joint Health IT Research

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# Working with Pacific JITC's Integrated Test and Evaluation Center



- Engagement Criteria
  - Government contract requires development within the ITEC
  - Projects approved and funded (RDT&E) by the Joint Program Committee-1 (JPC-1)
    - <https://info.health.mil/hit/portfolio/invest/gov/ISPDEV/SitePages/Home.aspx>
  - ADP/IT-II clearance for access to PHI/PII on the ITEC's NIPRNet
- Engagement Process
  - Request Engagement Packet from [support@pacificjitcitech.com](mailto:support@pacificjitcitech.com)
  - Complete Engagement Packet and define requirements
  - Requirements reviewed by ITEC and submitted to government for approval
  - All requests must be approved by the Pacific JITC Director prior to resource allocation
  - Once approved, the ITEC will work with customer to provide access to ITEC systems

# Pacific JITC IDIQ Contract Vehicle Overview



## Indefinite Delivery / Indefinite Quantity (IDIQ) Contract Vehicle

- \$300M multiple-award contract vehicle
- Seven (7) pre-selected prime vendors and over 65 subcontractors
- No color of money restrictions
- Open to DHA and other federal entities
- Specific requirements defined through individual task orders
- Computing resource (Pacific JITC Integrated Test and Evaluation Center) available at no-cost

## Specific task areas include:

- CONOPS Studies & Analyses
- Proof of Concept
- Concept Modeling and Simulation Development
- Test and Evaluation
- Technology Insertion
- Integration & Transition
- Installation
- Technical Data Management
- Training
- Operational Exercise

# An Agile Approach to Concept Development

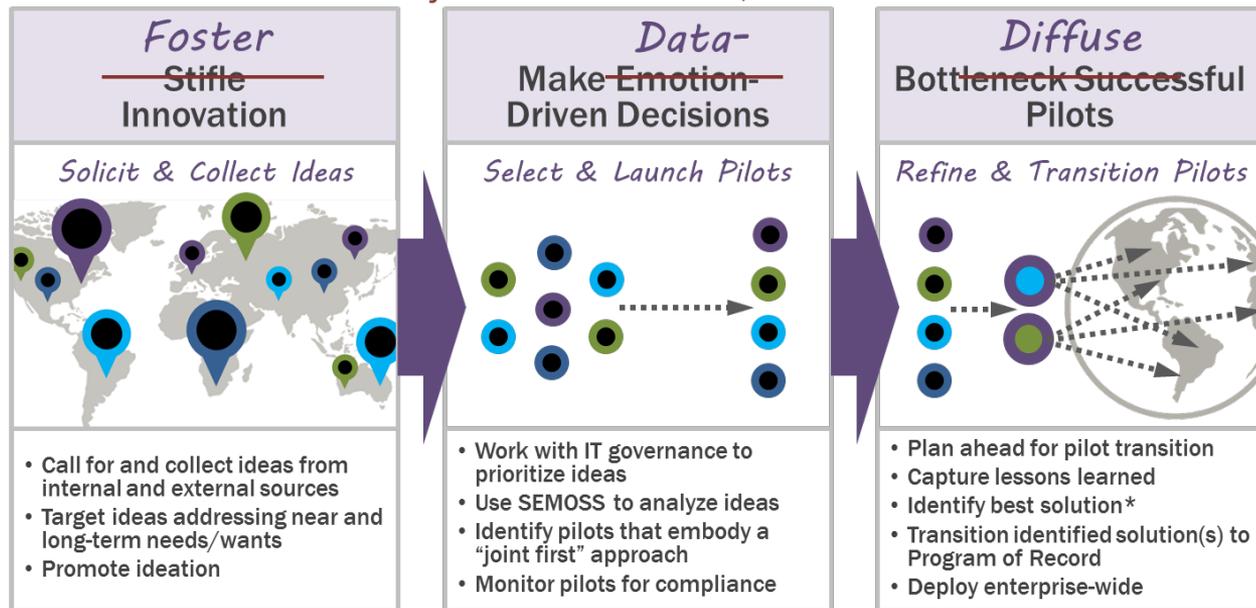
- Iterative Research and Prototyping activities
- **Active stakeholder participation working CLOSELY with assigned SMEs**
- Short sprint cycles enable responsiveness to SME input
- **SMEs consulted to develop a set of requirements...**  
basis for first prototype build...but...
- **Iterative prototyping and user evaluation quickly trump “shall statements”** from first prototype on...  
this leads to better **build quality**



# Reengineering our approach to Data-Driven Health IT Research

In the end, the IATDD's goal is to work with stakeholders to reengineer our approach to HIT research, to better address needs and utilize available research funds.

## The New Way Forward for Joint, Health IT Research



\*solution is being used to refer to knowledge, work products, concepts, tools, architectures, etc.

# Questions?

Learn more at:

[www.health.mil/PJITC](http://www.health.mil/PJITC)

or

search health.mil for “Essence”

**Visit DHITS Exhibit Booth #317**



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# Contact Information

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**Please complete your evaluations**