"Yes, Virginia, there is a Santa Claus!": Use of a Business Intelligence Shared Services Framework to Improve STD Program Planning and Epidemiologic Awareness

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Introduction

Local health departments (LHD) require timely surveillance data to appropriately plan and respond to core STD surveillance needs. However, funding specifically targeted towards STD data management and improved data dissemination practices and tools is scarce.

Staff from the Health Informatics & Integrated Surveillance Systems (HIISS) unit created a Strategic Aberration Monitoring (SAM) application in the early 2000's to better understand and respond to statewide STD reporting trends. Although appropriate for in-house use, SAM lacked sufficient infrastructure to enable statewide distribution to LHDs, and Data Access Pages are no longer included in MSOffice 2007.

The Commonwealth of Virginia initiated a Business Intelligence (BI) software contract in 2007 to improve state agency capacity for analysis, visualization and reporting (AVR), including development of a Shared Services Framework to leverage BI initiatives (Figure 1). HIISS staff participated in BI planning with the Commonwealth's Enterprise Applications Division (EAD) and subsequently began a collaborative pilot project to assess usage for improved STD data management infrastructure.

Figure 1: Business Intelligence Network Infrastructure for Shared Services by State Agencies, as deployed by the Enterprise Applications Division—Virginia Information Technologies Agency

Objectives

• Development of a low-cost analysis, visualization and reporting (AVR) infrastructure, for the provision of enhanced surveillance and data dissemination capacity, including:
- Recreation of SAM's 5-year moving average algorithm for gonorrhea and chlamydia case reporting, including the map interface, flagging properties and graphical depiction of trends
- Recreation of SAM's histogram "drag and drop" data format, including export functionality
- Creation of access control mechanisms and long term sustainability
• Engage Virginia's three STD Surveillance Network (SSuN) jurisdictions in a pilot project to assess functionality and practicality for a new tool, known as Strategic Monitoring, Assessment and Response to Epidemiology (**smartEPI**).

Figure 2a: SAM 5-year Moving Average Replacement

Figure 2: smartEPI Proof of Concept Dashboard

Figure 2b: Statistical Report Functionality

Figure 2d: Dynamic Data Functionality

Figure 2c: Interactive GIS via Web-Services Interface

Methods

HIISS and EAD staff collaborated to design a proof of concept (Figure 2) to replace SAM, including 5-year moving average functionality, LogiXML™ mapping capabilities (Figure 2a), statistical reporting (Figure 2b), ArcGIServer importation via web services (Figure 2c) and dynamic data use capabilities (Figure 2d). HIISS data administration staff attended the initial 5-day LogiXML™ training, sponsored by EAD and purchased a developer license from the state contract. STD*MIS data was replicated in a SQL Server environment using an extract, transform, and load (ETL) process and SQL Server Analysis Services (SSAS) cubes were created to serve as the data sources for the development of the BI tool (**smartEPI**). VDH IT network issues were addressed for bi-directionality between VDH and EAD servers via a secure network portal. As such, persons using **smartEPI** will access the application via the EAD production server, however, the data will reside on a VDH server. ESRI and LogiXML have addressed web-services integration of ArcGIServer, such that a **smartEPI** dashboard panel will allow for web-services accessibility.

Results

smartEPI is a promising project worthy of additional staff time investment as a means of improving STD/HIV data dissemination.
. The ability to reproduce SAM aberrant trend algorithms was successful.
. Development of panel mock-ups have been completed by HIISS staff who attended the initial LogiXML™ training.
. Transformation of STD*MIS data into SQL tables was time-consuming and required in-depth knowledge of STD*MIS system parameters and data flow.
. Establishment of the secure network portal between VDH and EAD servers was arduous. However, once established, the portal has remained stable and 100% operational.
. HIISS connections to both the EAD test and production servers work well. No apparent slow down in data processing occurs with data residing on a VDH server.

VDH costs associated with the **smartEPI** proof of concept have been minimal ($12,600) . An assessment of total costs incurred, to date, including "in-kind" contributions from EAD has resulted in an approximate savings of $83,500 for the Virginia Department of Health.

Table 1: Cost Assessment for smartEPI Pilot Development

	Cost	Count	# Hours	VDH Cost	VDH Savings
LogiXML Training (HIISS staff)‡	$1,500	1	40		1,500
LogiXML Software Package (state contract)*	$60,000	1	NA		60,000
LogiXML Annual Software Support*	$5,000	1	NA		5,000
Logi Info Developer Software (for HIISS)	$1,000	1	NA	1,000	
HIISS Staff Development Time†	~$40/hour	NA	290	11,600	
EAD Staff Prototype Development Time^	$80/hour	NA	40		3,200
EAD SQL Server Database Work	$80/hour	NA	80		6,400
Shared Services Framework Server/Hardware Maintenance‡	20,000	NA	NA		20,000
TOTAL				12,600	96,100

‡ Initial training for six state employees (including one from HIISS) sponsored by Enterprise Applications Division (EAD)
* Virginia's state contract pricing for the total bundle of services and annual maintenance; use of Shared Services Framework for pilot project requires no upfront VDH expense
† EAD staff "in-kind" development includes IT network, requirements gathering and software development
^ Health Informatics & Integrated Surveillance Systems (HIISS) staff development includes software and SQL cube development, and data transformation
‡ Northrop Grumman manages Commonwealth of Virginia IT infrastructure; server costs are based on monthly fees to be paid by EAD through the Shared Services Framework

Conclusions

Effective leveraging of state resources (fiscal and personnel) can result in mutually beneficial agency outcomes and improve public health data dissemination efforts. Virginia's surveillance staff participation in data working groups (e.g. business intelligence) are providing additional collaborative and knowledge-transfer opportunities, which are critical during fiscally-challenging times.

smartEPI pilot development has been an extremely cost-effective project, thanks largely to the Shared Services Framework and Virginia's statewide BI Initiative. Without a low-cost BI tool and availability of a Commonwealth-wide shared services model, Virginia would not be making positive strides towards improved data dissemination capacity.

During the remainder of 2010, the **smartEPI** pilot development will be completed, including creation of: 1) report definitions for dashboard panels; 2) reports, tables and graphs, and interactive data functionality; 3) a geodatabase in ArcGIServer for STDs and a web services connection with the LogiXML™ servers; 4) secure roll-based user access based on staff domain accounts; and 5) pilot roll-out to the three SSuN jurisdictions (Richmond city, Chesterfield county and Henrico county).

Phases II and III of **smartEPI** will include evaluation of the initial pilot sites, roll-out to additional LHD jurisdictions, and inclusion of additional STD/HIV data sources and graphics related to performance management and strategic planning objectives.

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