

**APTIMA**<sup>®</sup>  
HUMAN-CENTERED ENGINEERING

# Data Visualization for Health Surveillance: Current Concepts and New Horizons

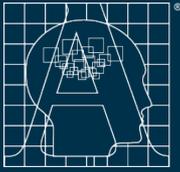
## ISDS Research Committee

23 September 2009

Paul Picciano, Ph.D.  
Sr. Human-Systems Engineer  
Area Lead, Decision Support Systems

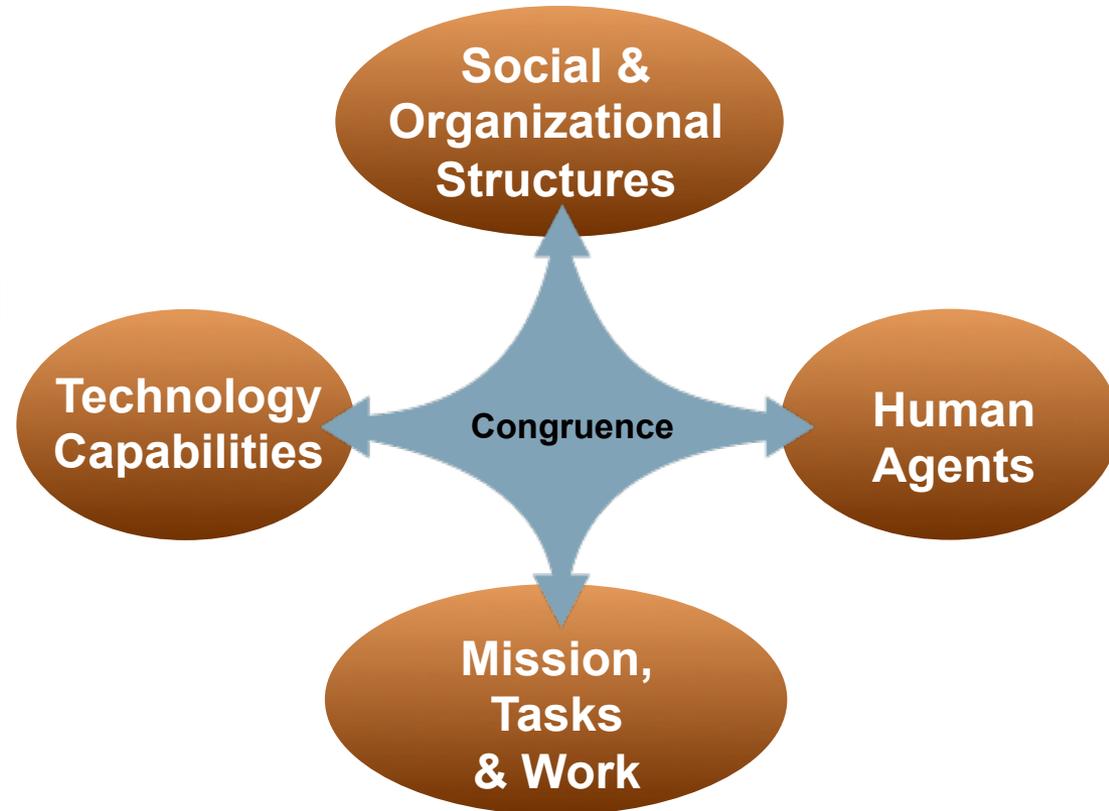
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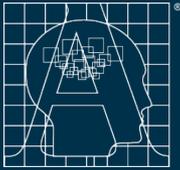




# Human-centered Engineering

- ❖ Human-centered engineering firm
- ❖ Not experts in your field
- ❖ Extensive support from Northrop Grumman
- ❖ Volunteered time from ISDS community members



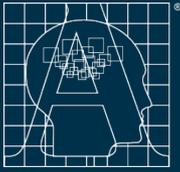


## BioSINE Status

- Early stages of development – conceptual
- Working closely with our subcontractor & volunteers

### ■ BioSINE Objectives

- Developing a free web tool to support visualization/collaboration/security
  - Users create their own secure workspace and manage roles/privileges
- Set out targeting resource-challenged entities with public health responsibilities (e.g., *local units, developing nations*)
  - Lack of IT resources/expertise
  - Non-programmers, stat-program experts
- Create intuitive, efficient platform to analyze and share information
- Create a hub, that could link/incentivize community members



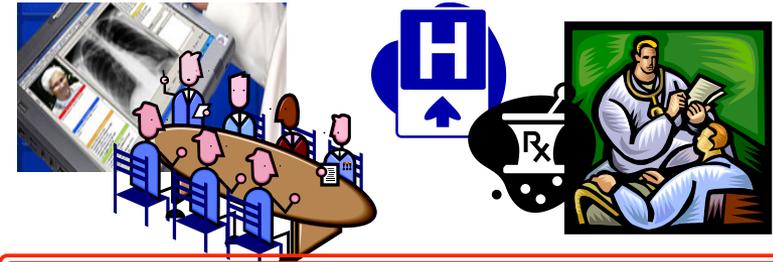
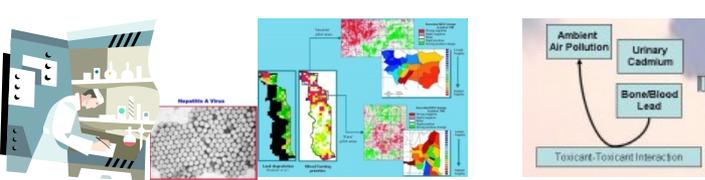
# Conclusion from User Analysis: Context is Critical

- Context determines the kind of data they want and the appropriate level of aggregation/drill-down
  - Stakeholder's role in public health (e.g., public health official, epi, nurse, etc.)
  - Geographic coverage (e.g., local, state, federal, international)
  - Ability to decompose, filter, and aggregate data
  
- Data should be appropriate for the task
  - Traceable, accurate, timely, complete, and valid
  - Flexible, presentable in multiple ways

*“ . . . especially for less experienced analysts, approaches to help them make sense of data for decision making would be useful.”*



# An Approach to Support Multiple Stakeholders



**Biosine**

- Input Data
  - DATA
- Maps
  - DATA Flu Cases in the US
- Charts
  - DATA
- Aggregation
  - DATA

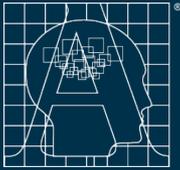
## Primary: Analysts

Provide visualization and collaboration tools to share analyses

The dashboard features a map of the United States with a color-coded overlay for flu cases. On the right, there are two control panels: one for 'Flu Cases' with a color scale from green to red and an 'Allow Animate' checkbox, and another for 'Vaccinated Population' with a color scale from blue to orange and an 'Allow Animate' checkbox. At the bottom, there is a bar chart showing monthly data for 'Flu Cases' from January to December.

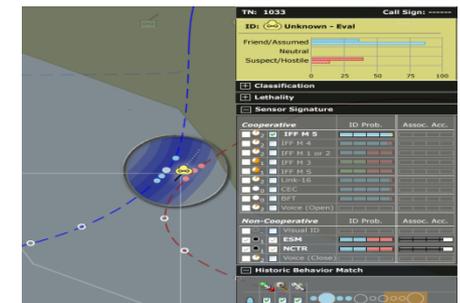
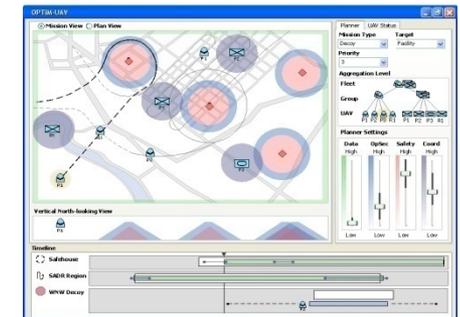
## Secondary: Consumers

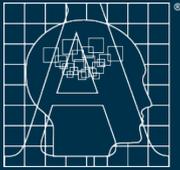
Able to manipulate variables, views, and analyses to target their needs



## 3 Visualization Guidelines

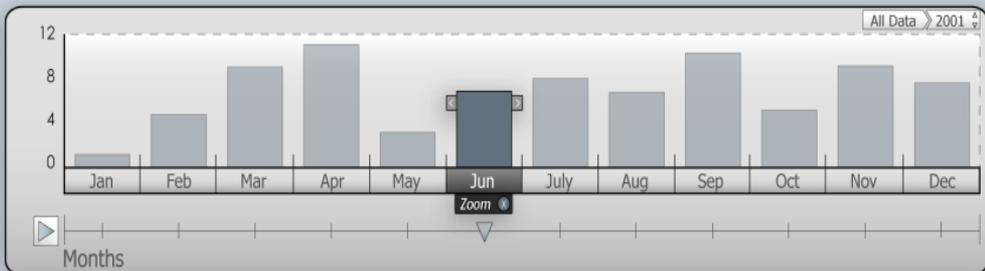
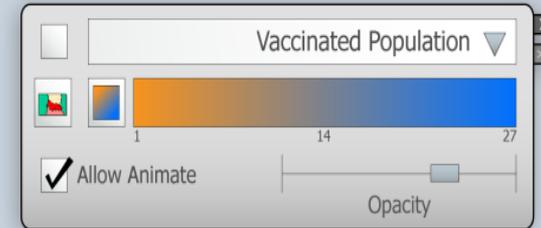
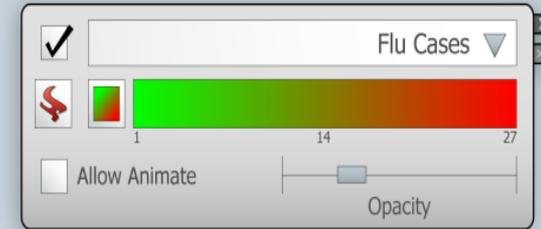
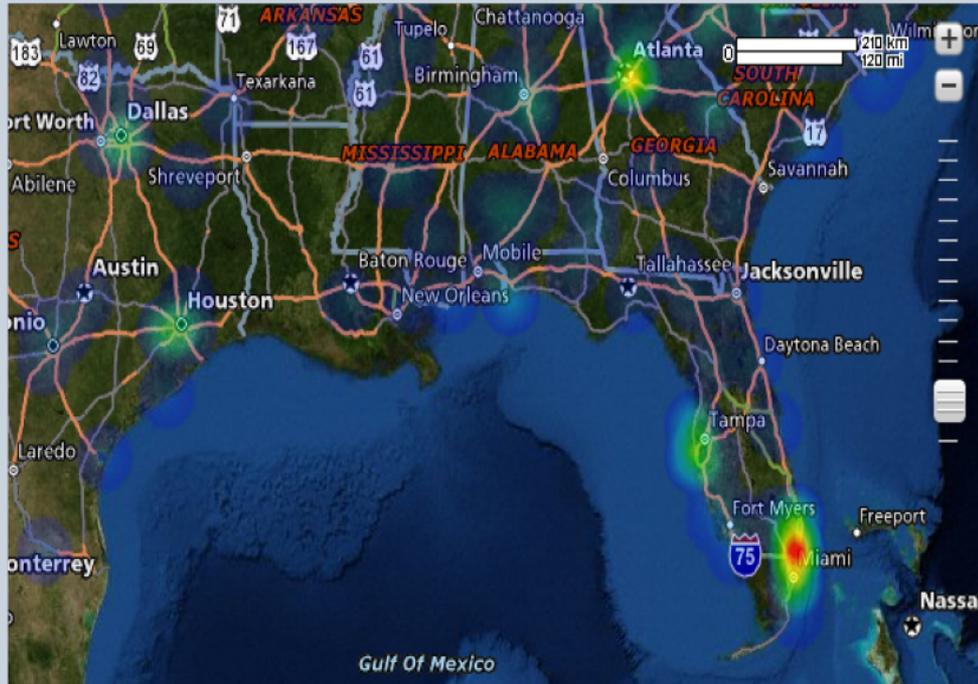
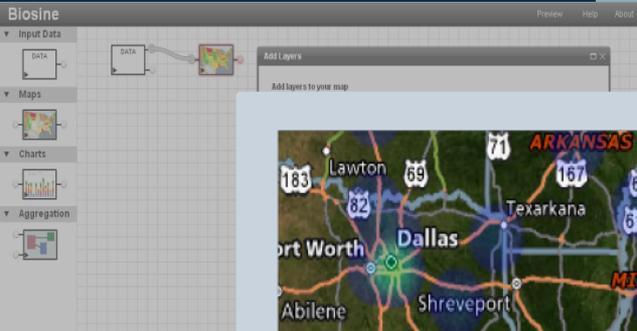
- Provide action at the point of interest
  - Co-locate display and control
  - Reduce extended mappings, breadcrumbs
- Show information at the right level
  - Showing everything all the time = overload
  - Learn what a user needs, and deliver
- Empower users, leverage their expertise
  - Enable “what-if” and tradeoff analysis
  - More engaging experience





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# Feed the Consumers (2<sup>nd</sup> user) ...Buffet Style



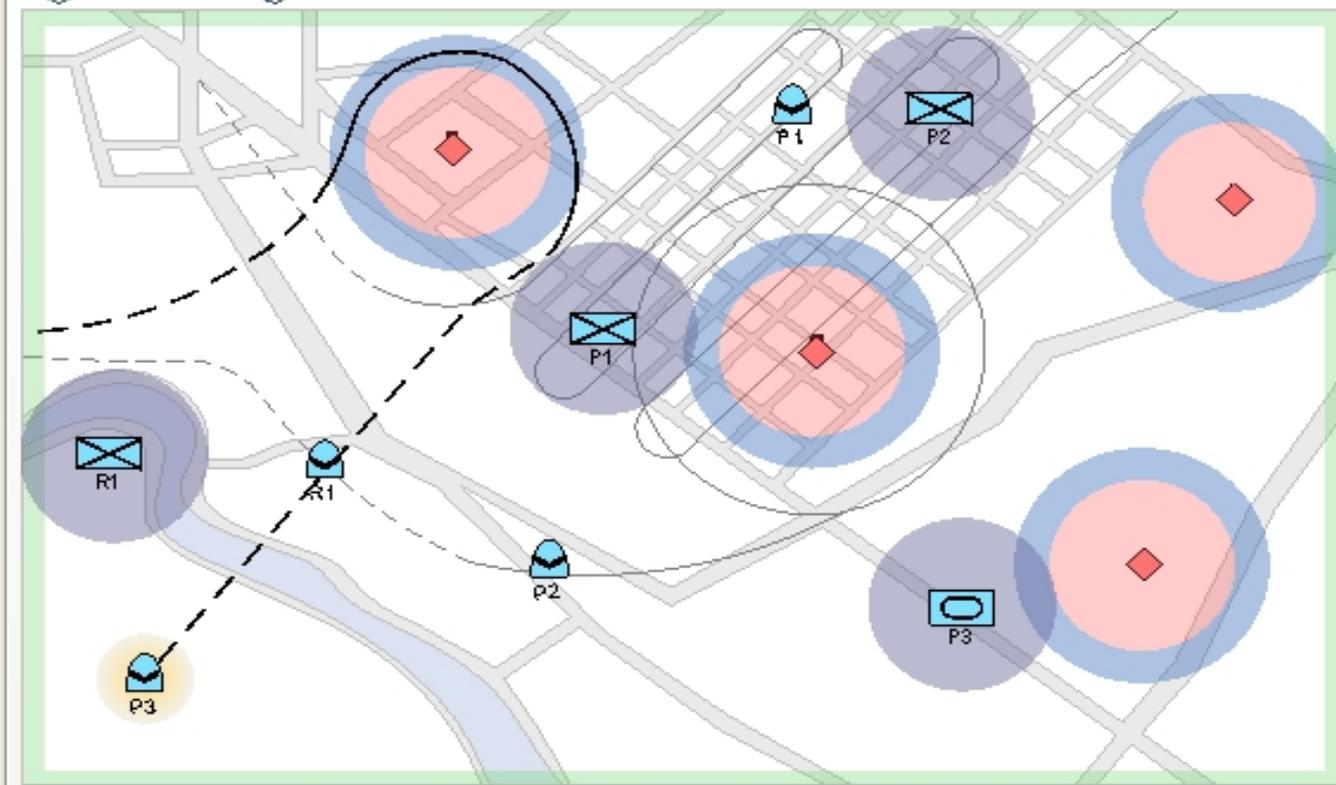
Ibi from Mahoning River, E... displaying

Count

Search... Search None

Ibi	Count
2	19
1	17
3	11

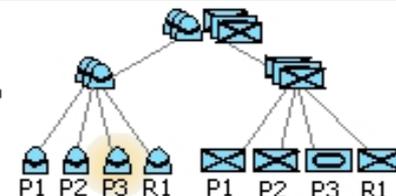
47 Records of 47 Total

Mission View
  Plan View

 Planner
  UAV Status

**Mission Type**

 Decoy
 
**Target**

 Facility
 
**Priority**

 3
 
**Aggregation Level**
**Fleet**
**Group**
**UAV**

**Planner Settings**
**Data**

High



Low

**OpSec**

High



Low

**Safety**

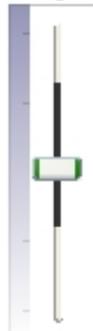
High



Low

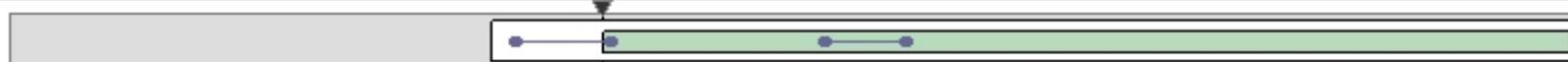
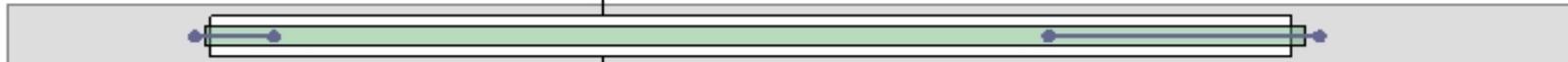
**Coord**

High



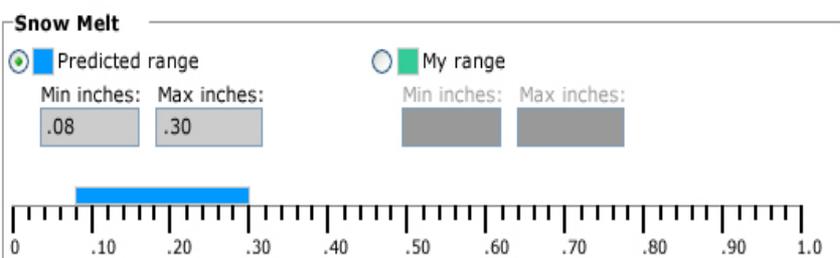
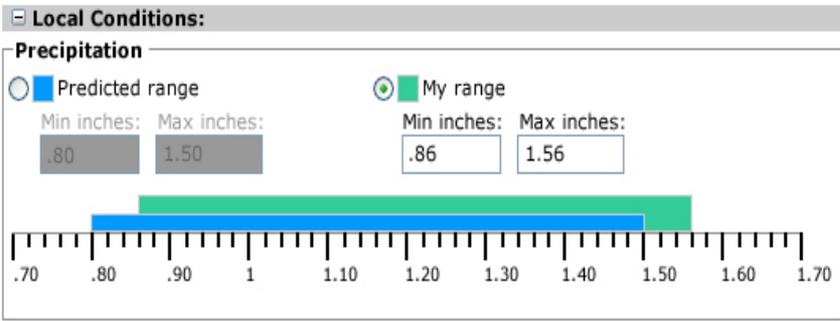
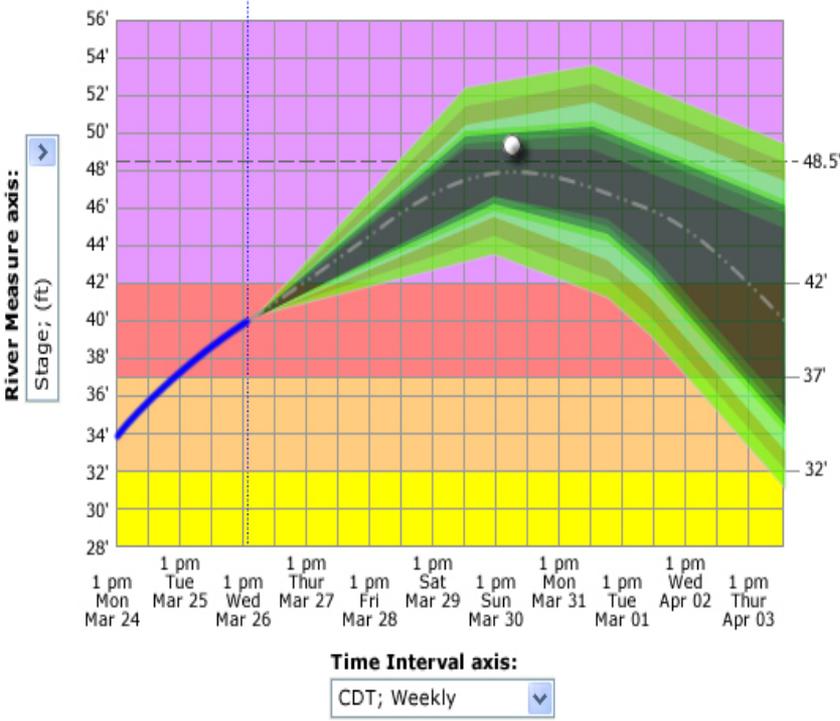
Low

**Vertical North-looking View**

**Timeline**
**Safehouse**

**SADR Region**

**WNW Decoy**


Forecast data shown here are guidance values. Please refer to your local RWIS office for the latest official public river forecasts.

Latest observation: 40.05 ft at 2:33 PM CDT 26-Mar-2008



Time: 19:00

Confidence: low moderate high

**Local Conditions:**

**Precipitation**

Predicted range  My range

Min inches: Max inches: Min inches: Max inches:

.80 1.50 .86 1.56

**Snow Melt**

Predicted range  My range

Min inches: Max inches: Min inches: Max inches:

.08 .30

**Impacted**

- 49'
- 47'
- 42'
- 40'
- 39'

**Non Impacted**

**Damage**

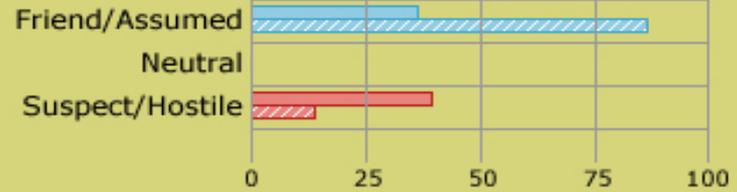
Total Value: 1.4



TN: 1033

Call Sign: -----

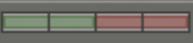
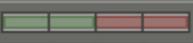
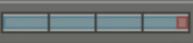
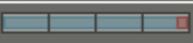
ID:  Unknown - Eval



Classification

Lethality

Sensor Signature

<i>Cooperative</i>		ID Prob.	Assoc. Acc.
<input checked="" type="checkbox"/>  2	<input checked="" type="checkbox"/> IFF M 5		
<input type="checkbox"/>  2	<input type="checkbox"/> IFF M 4		
<input type="checkbox"/>  2	<input type="checkbox"/> IFF M 1 or 2		
<input type="checkbox"/>  1	<input type="checkbox"/> IFF M 3		
<input type="checkbox"/>  1	<input type="checkbox"/> IFF M S		
<input type="checkbox"/>  2	<input type="checkbox"/> Link-16		
<input type="checkbox"/>  0	<input type="checkbox"/> CEC		
<input type="checkbox"/>  0	<input type="checkbox"/> BFT		
<input type="checkbox"/>  2	<input type="checkbox"/> Voice (Open)		

<i>Non-Cooperative</i>		ID Prob.	Assoc. Acc.
<input type="checkbox"/> 	<input type="checkbox"/> Visual ID		
<input checked="" type="checkbox"/>  1	<input checked="" type="checkbox"/> ESM		
<input checked="" type="checkbox"/>  1	<input checked="" type="checkbox"/> NCTR		
<input type="checkbox"/>  2	<input type="checkbox"/> Voice (Close)		

Historic Behavior Match











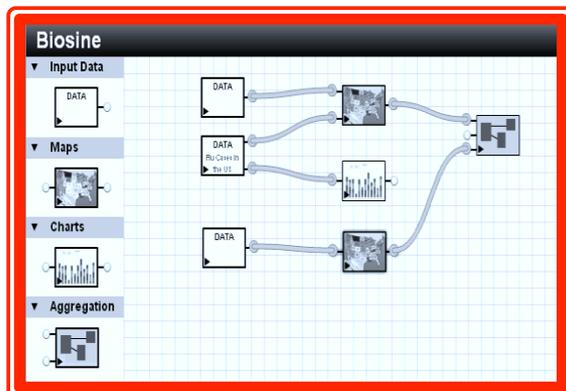
Paul Picciano, PhD  
Sr. Human-Systems Engineer  
Aptima, Inc.

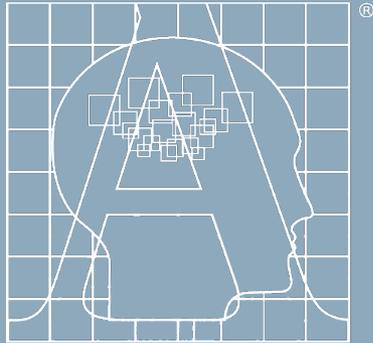
12 Gill Street, Suite 1400  
Woburn, MA 01801

[ppicciano@aptima.com](mailto:ppicciano@aptima.com)

781-496-2407 (office)

781-935-4385 (fax)





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