

Outbreak Management System Design Concepts



PUBLIC HEALTH INFORMATION NETWORK

Second Annual Conference
www.cdc.gov/phn

May 26th, 2004



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OMS Design Concepts

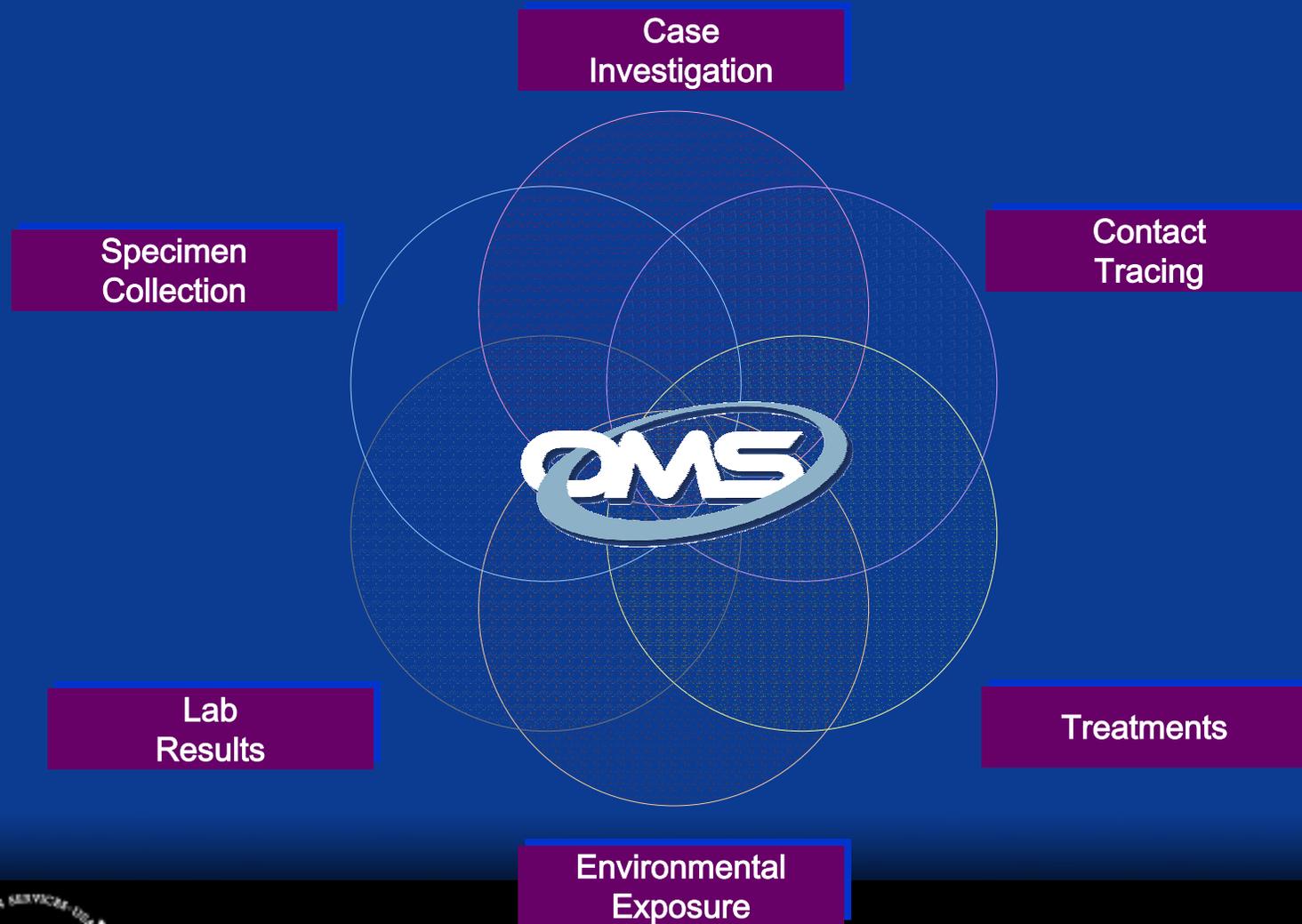
- Major components of outbreak data
 - Entities, actions and relationships
 - New entities and relationships can be create on the fly
- Common functions
 - Demographics, contact tracing, case investigation etc.
 - Common functions implemented as standard screens in system
 - Some new functions could be added by creating supplemental data for a base entity (ie. person)
 - Other functions would be added as application updates



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OMS Design Concepts



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OMS Design Concepts

- Usable interface
 - Navigation driven by context
 - Tree browser for navigation and displaying relationships
 - Drag and drop linkage of entities on tree
 - Tab design to move between functional forms for a given entity
 - Search on multiple criteria
 - Power and quick entry screens
 - Easy navigation to other screens while retaining context of selected entity



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Browse Subjects

- OMS Today
 - Person
 - Organization
 - Search Results 1
 - Search Results 2

Recent Selections

- Person
- ABC Law Firm [11693]
- Allen, Bob [07864]
- New Organization Investigation
- New Person Investigation

Navigation Menu

- << Search Page
- << OMS Toolbar

Outbreak Management System

Welcome to Outbreak Management System

Jurisdiction: Dekalb County, GA

Event Begin Date: Friday, April 30, 2004

Suspected Agent: Monkey Pox



Home | About CDC | Press Room | Funding | A-Z Index | Centers, Institu...

CDC Department of Health and Human Services
Centers for Disease Control and Prevention

Health & Safety Topics

- Birth Defects
- Disabilities
- Diseases & Conditions
- Emergency Preparedness & Response
- Environmental Health
- Genetics and Genomics
- Health Promotion
- Injury & Violence Prevention & Control
- Travelers' Health
- Vaccines & Immunizations
- Workplace Safety & Health

Publications & Products

- Emerging Infectious Diseases Journal

Prevent Skin Cancer

Prevent exposure to the sun's ultraviolet (UV) rays with sun-protection... [more](#)

Genomic

CDC publish on genomic health... [more](#)

Wildfires and Fire Safety

Learn how to prepare for wildfires and protect your family... [more](#)

Trauma Awareness

Learn more about the value of trauma centers and their systems and how they save lives... [more](#)

OMS Links

- Yahoo
- Google
- MapQuest
- Expedia

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Name:
DOB:
Case Status:

** Required fields are denoted by an asterick*

Demographics Investigation Exposure Contacts Relationships

Launch Supplemental Data Save Save and Close Cancel

***Subject ID:**

Name: Legal Telephone: Home
 Nickname:

Address: Primary H... Email: Personal
 Primary Employer: Select/Add
 Occupation:

This is the mailing address.

Date of Birth: 05/11/2004 Reported Age: Gender:
 Is the patient deceased? If yes, date of death: 05/11/2004 If yes, reason for death:
 Race: African American American, Indian, Alaskan Asian Pacific Island, Hawaiian
 Ethnicity:
 Marital Status:
 Social Security No.:
 Driver's License No.: Issuing State:
 Country of Citizenship:
 Issuing Country:
 Country of Birth:
 Speaks English? Primary Language:
 Height: Hair Color: Complexion:



OMS Search

Search for any OMS ID:

<< Return to All Subject Types

More Search Options

Last Name

smith

First Name

Gender

DOB

Deceased

Search Now →



Recent Selections

Adams, John [25713]

person, davis [91368]

Akin, Bob [49313]



Navigation Menu

<< Browse Page

<< OMS Toolbar



Search Results (1)



Smith, Amanda [15845]



Smith, Chuck James [83899]



Smith, John [70192]

OMS Design Concepts

- Add new sets of data fields or “forms” and link to core forms
 - Example: Case investigation
 - Core form with common fields for most case investigations
 - Other data specific to the investigation would be configured using the supplemental data manager
 - Data collection consists of the core form with supplemental data that would be displayed dynamically
 - Enables consistent validated collection of both common fields and those specific to a particular investigation
 - Concepts for new fields can be mapped to standard vocabulary or user defined



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Browse Subjects

- OMS Today
 - Person
 - Jones, Fred [82121]
 - Exposed To
 - Exposed From
 - Relationships
 - Akin, Chuck [73479]
 - Pattison, Tim [61844]
 - New Person Investigation
 - Organization
 - New Organization Investigation

Recent Selections

- New Person Investigation
- Jones, Fred [82121]
- New Organization Investigation
- Jones, Fred [82121]

Navigation Menu

- << Search Page
- << OMS Toolbar

Name: Jones, Fred [82121] **Date of birth:** Not Supplied **Height:** Not Supplied **Hair Color:** Not Supplied
Reported Age: Not Supplied **Admin Gender:** Not Supplied **Complexion:** Not Supplied **Size Build:** Not Supplied
Case Status: Not Supplied

** Required fields are denoted by an asterick*

Demographics Investigation Exposure Contacts Relationships

Launch Supplemental Data

Save Save and Close Cancel

<< Demographics Tab Exposure Contacts Tab >>

*Suspected Agent: Monkey Pox *Jurisdiction: Dekalb County, GA
 CDC Unique ID: State ID: Local ID:

Investigation Information:

Investigation Status: Investigation Start Date: 05/11/2004
 Investigation Priority: Initial Symptom Onset Date: 05/11/2004
 Is there a known epi-link? Health Status:
 Case Status:

Activity Log:

Date of Activity	Activity Type	Initiated By	Point of Contact	Contact Info	Reason	Edit	Delete

Add New Activity

Notes:

Launch Supplemental Data

Save Save and Close Cancel

<< Demographics Tab Exposure Contacts Tab >>

Browse Subjects

- OMS Home Page
- Person
 - Applesc
 - Burki, Y
 - Exp
 - Exp
 - Rel
 - Gilroy, J
 - Holson,
 - Lesterr
 - Littlelor
 - Nguyen
 - Rupert,
 - Wallace
 - Westpo
- Organizatio



Name: Gilroy, James [17635] Date of Birth: Height: Not Supplied Hair Color:
 Reported Age: 25 Years Gender: Male Complexion: Size/Build:

* Required fields are denoted by an asterisk

Supplemental Data

Help ▾

Refresh Sets

Select Set to Enter:

1 of 1

What is the case report date?

What is the diagnosis?

- Syphilis
- HIV
- Chancroid
- Chlamydia
- Gonorrhea
- Herpes
- Human Papillomavirus
- Nongonococcal Urethritis (NGU)

What is the Disease Stage?

What is the Symptom Onset Date?

Who is the Reporting Provider?

What is the MMWR Week and Year?

Close Cancel

[Investigation Tal](#)

Add

ary 25-1110

Male

Recent Sele

- Gilroy, James [1763
- Burki, Yeshwant [18
- Akin, Bob [49313]
- Adams, Susan [911
- Adams, John [2571

Navigation

<< Search Page
 << OMS Toolbar

Speaks English? Primary Language:

Height: Hair Color: Complexion:

Task Bar

-  **Add Set**
-  **Edit Set**
-  **Save Set**
-  **Save Set As**
-  **Create New Version**
-  **Make Default Set**
-  **Add Question**
-  **Edit Question**
-  **Remove Question**

Find Set or Question

Select item to find:

Set Question

Enter Keyword to find:

Find Find Next Clear

Sets

- + Avian Flu
- Contact Daily Communications
 -  Contact Daily Communications : 1
- + Restriction Information
- + STD Reporting
- + Travel Information - Case
- Treatment/Evaluations/Lab
 -  Treatment/Evaluations/Lab : 1
- Work Shift Hours - Case
 -  Work Shift Hours - Case : 1

Set Questions

Editable

- +  Treatment/Evaluations/Lab

All Questions

Questions	Data Type	No. of...	Data Associate...
 What is the case report date?	Date	1	Yes
 What is the diagnosis?	Response Group	1	Yes
 What is the Disease Stage?	Response Group	1	Yes
 What is the MMWR Week and Year?	Text - Small	1	Yes
 What is the Symptom Onset Date?	Date	1	Yes
 Who is the Reporting Provider?	Response Group	1	Yes

Add Question(s) To Selected Set

OMS Design Concepts

- Publishing of standard configurations for specific investigations
 - Publish configuration to web accessible location for remote retrieval
 - Supplemental data fields
 - Vocabulary
 - Reports
 - Queries
 - Distribution of updates to core application
 - Supports standard data collection across all users regardless of deployment scenario
 - Localization of configuration allowed



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OMS Design Concepts

- Data Sharing
 - Synchronization of data between deployed OMS databases
 - File import/export from other systems
 - Several file formats supported
 - Mapping interface enables mapping data to standard and supplemental fields
 - Currently supports appends only
 - Standard messaging
 - Will support selected PHIN message specifications
 - Case report
 - Specimen shipment
 - Test order
 - Test Result



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OMS Design Concepts

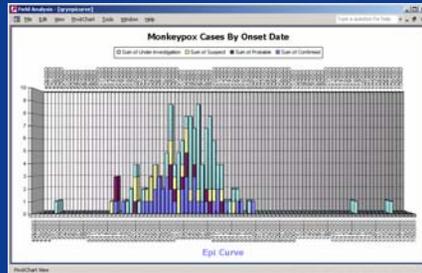
- Analysis
 - Structured data entry provides clean data ready for analysis
 - “Real” data linkages
 - Common data structure provides consistent target for analysis for any investigation
 - Pre-formatted queries and reports
 - Data source for analysis tool of choice
 - EpiInfo
 - SAS
 - GIS
 - MS Access
 - Crystal Reports
 - Others



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Multi-Use Data



Graphs



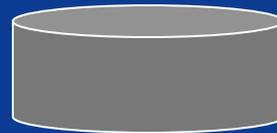
Maps

Ad-hoc query

Reports

Statistics

Data Exchange



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Part II – OMS Technical Approach



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Entities Actions Relationships

- Standard Entities – person, place, specimen, object
- Actions – treatment, case investigation, exposure, travel
- Relationships – person contacts, exposure, person-specimen
- Linkages coded entity to entity or entity to action
- Example: Case – contact relationship
 - Case is entity linked to a set of attributes that represent the case investigation
 - Contact is an entity linked to the one above that has sets of attributes describing it and the contact events
 - If contact becomes case, they get set of attributes for case



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Entities Actions Relationships

- Dynamic typing of entities and linkages
 - Not all entities and relationships can be defined prior to investigation
 - Must be able to create new entities and relationship types
- Example: Shipping invoice for animals during Monkeypox investigation
 - Create new object type of invoice
 - Define attributes for object in supplemental data – number of animals, species etc.
 - Create relationship between two organizations with invoice in common



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Core Functions and Supplemental Data

- Core Functions – demographics, contact tracing, etc.
 - Structured data entry forms
 - Data model derived from Public Health Logical Data Model
 - Consistent form navigation and menus
- Supplemental Data
 - Configured at runtime based on requirements
 - Based on metadata structure
 - Values stored as name/value pair
 - Versioned as collection needs change
 - Configurable business rules for forwarding values to next version
 - Automatic pivot for each data set creating view with entity linker ID for analysis



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Core Functions and Supplemental Data

- System Use
 - Structured forms collect information on specific entities or actions
 - Supplemental data sets are linked in the context of these entities or actions
 - Supplemental data form is launched in the context of the current user task to extend the information for that task
- Configuration propagation to deployed systems
 - Database replication if active
 - Remote update from web accessible service
- Localization
 - Analysis for this capability is not been complete
 - Need to be able to lock down some sets but allow local users to extend with new sets

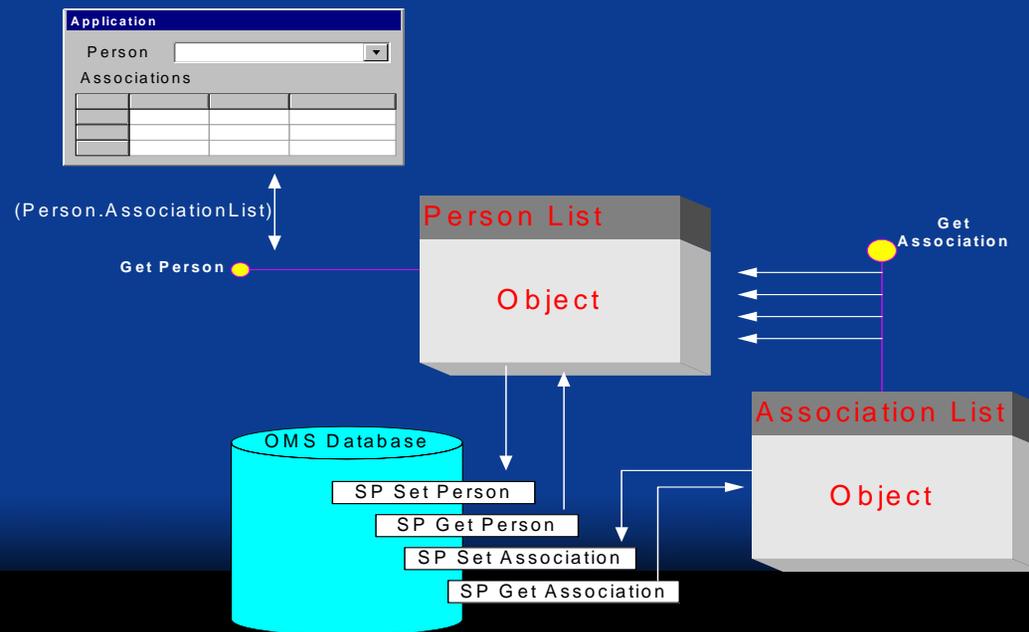


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Architecture

- Visual Basic front-end – artifact of previous iterations but platform change is in the works for later iterations
- MS SQL Server backend
- Middle tier with business logic and data access classes
- Intended as framework for development of additional functional modules



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Deployment Options

- Single machine – MS SQL Server or MSDE database with application front-end
- Multi-tier replication
 - Central publisher to field subscriber
 - Field re-publisher to child subscribers
 - One machine must be designated master for multi-tier merge replication
 - Replication automatically set up through configuration tool
 - Publishers must be MS SQL Server not MSDE
 - MSDE install can be subscriber
- Client server
 - Database must be MS SQL Server



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Configuration Tool

- Separate application in suite
- Request updates from specified update site
- Run scripts and update patches from local files
- Run backups of local database
- Reconstitute application databases
- Three databases created on install
 - FieldDM – application data store
 - FieldDM analysis – analysis store for views and auto-generated pivots of supplemental data
 - Vocabulary – stores all vocabulary for driving the system
- Scripts can be run to update any of the databases
- Enables central configuration with push out to remote systems



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Reporting and Analysis

- Separate application that runs in MS Access
- Provides access to reports and views
- Canned reports and views out of the box
- Users familiar with MS Access can create new queries and store
- Refresh of all supplemental pivots when new fields are added
- FieldDM analysis database



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Import/Export

- Import files from other systems
- Mapping interface for standard and supplemental data
- Requires some data cleansing outside of tool

Import Data Preview

Select table to preview: 'Adams Cty Linelist (C,P,S)'

Select process to run: Animal

Available fields:

	Field Name
1	Household #
2	Attends_SAE school
3	Attends_WH daycare
4	Relation to other cases
5	Vaccinia_vaccine
6	Vaccinia_year
7	Varicella_vaccine
8	Animal_exposures
9	Exposure_setting
10	Exposure_type
11	Animal contact_1st date
12	Animal contact_last date
13	Prairie dog purchase
14	Ill person_exposure
15	Exposure_setting1
16	Exposure_type1
17	Person contact_1st date
18	Person contact_last date

Fields to be linked to parameters:

	Field Name
	Case #
	L name
	State
	Zip
	Occupation
	F name
	Case_status
	Age (yr)
	Sex
	Amish
	Address
	City
	County

Expected parameters:

Name	Data Type
age reported	adVarChar
age reported unit cd	adVarChar
birth gender cd	adVarChar
birth time	adDBTimeStamp
cd	adVarChar
cd desc txt	adVarChar
deceasedDate	adDBTimeStamp
deceasedInd	adVarChar
description	adVarChar
entity-uid	adInteger
firstnm	adVarChar
firstnm sndx	adVarChar
genus	adVarChar
local ID number	adVarChar
pregnant	adVarChar
reason for death	adVarChar
species	adVarChar
tag ID	adVarChar
weight	adVarChar
weight units of measure	adVarChar

Field Data Preview: On Off

	Field Value
1	Daughter of #33, #34
2	Wife of #34, Mother of #32
3	Husband of #33, Father of #32
4	
5	Brother to Natalia
6	
7	Step-brother is Noah McGuire
8	Brother of #34, Uncle of #32

adVarChar

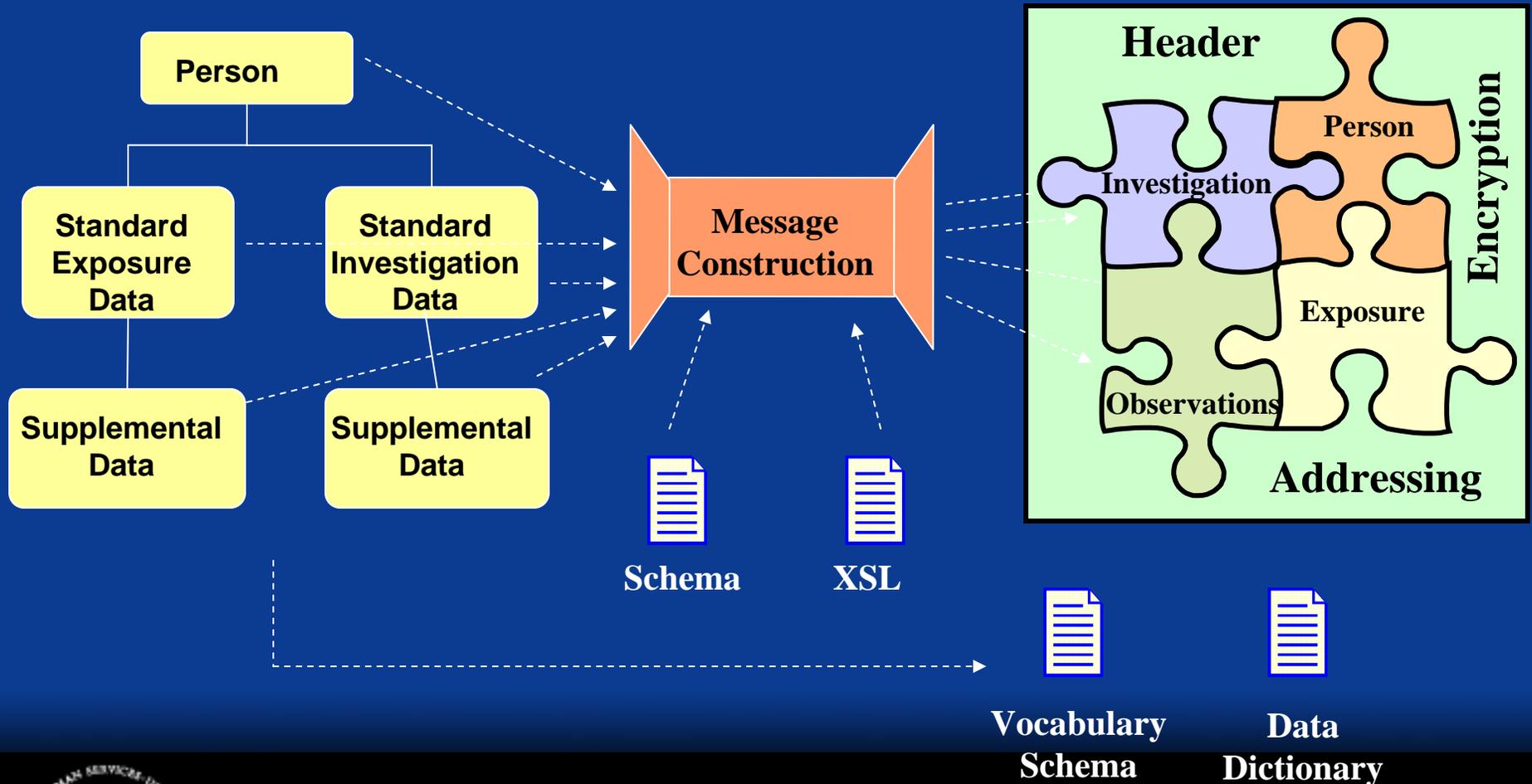
Here will be some tips provided by Kayt...



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Standard Messages



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Information

- Support Helpdesk: 800-532-9929
- Email: OutbreakMS@cdc.gov
- The helpdesk will triage communications to the appropriate individuals.



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