Reportable Conditions Knowledge Management System (RCKMS): A Survival Tool for the New Frontier

Council of State and Territorial Epidemiologists

A jurisdiction's-eye view of RCKMS

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“R-C-K-M-S ?”

Reportable Conditions Knowledge Management System

An authoritative, real-time portal to enhance disease surveillance, by providing comprehensive information to reporters and others about the “who, what, where, when, why, and how” of reporting to public health.

Reporting: current challenges

- No easy access to reporting requirements
  - No single place to find reporting requirements
  - No single means of getting updates to reporting requirements
  - Reporting requirements scattered across various websites and places, in various formats

Reporting: current challenges

- Nature of reporting requirements
  - Complex
  - Changing
  - Vary among jurisdictions
- Not easy to automate
  - Requirements not in machine-processable format

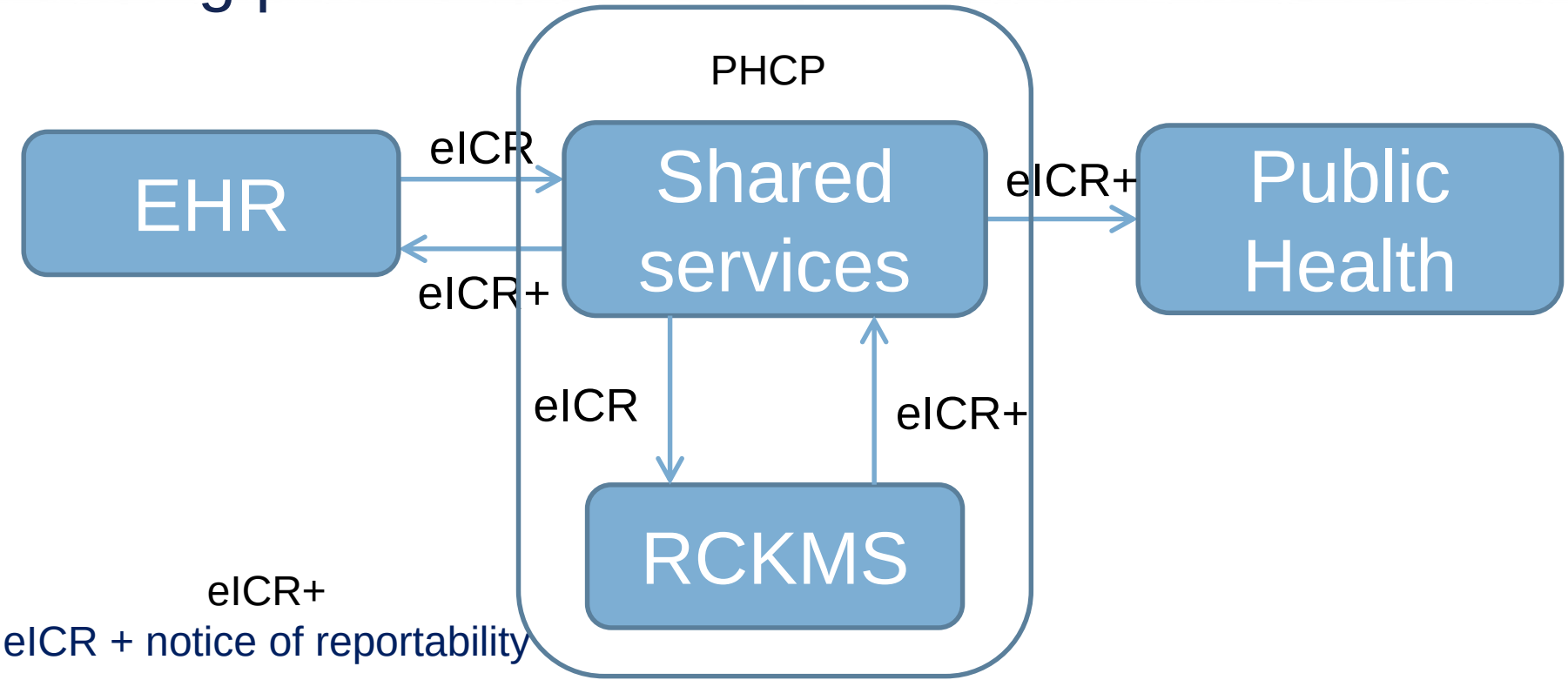
RCKMS: benefits

- Easier access to reporting specifications
  - Single portal, real time information
    - Reporters can automatically receive updates
  - Single authoring interface for jurisdictions to manage requirements
  - Base content: pre-populated set of requirements
- Easier automation of reporting
  - Machine-processable reporting specifications provided

It's been a long time coming

- PHSkb: A knowledgebase to support notifiable disease surveillance (2005)
- Notifiable Conditions Knowledgebase (NCKB)
- CDC/CSTE Case Reporting Standardization WG
- CSTE/CDC State Reportable Conditions Assessment
- CSTE/CDC/APHL ELR Task Force (2010-2011)
  - Reportable Conditions Mapping Tables (RCMT)
  - Priority Recommendations
    - Reportable Conditions Knowledge Base (RCKB) project
- RCKMS – Initial Work (2012)
  - Specification Collection, Default Criteria and Health eDecisions Pilot

RCKMS and eCR: the big picture



eICR+
eICR + notice of reportability

RCKMS and eCR: alternate visions?

RCKMS and ELR

RCKMS Pilot

- Fall 2014 – Fall 2015
- Partners:
  - CDC
  - HLN (Decision support implementer)
  - Intermountain Healthcare (Provider)
  - 4 funded jurisdictions (Houston, IL, Southern Nevada, VA)
  - 5 unfunded/previously participating jurisdictions (NY, NYC, UT, CO, WA, DE)

RCKMS Pilot Deliverables

- Content Development
  - Machine-processable reporting specifications for four conditions:
    - Pertussis, blood lead, chlamydia, TB
  - Trigger codes for use within RCKMS pilot
  - Scalable processes for content development

RCKMS Pilot Deliverables

- Technical Development
  - Development and testing of authoring interface
  - Implementation of machine-processable reporting specifications
    - Hard coded-- not automated rules generation
  - Development of Public Health Decision Support (PHDS) service
  - Implementation of trigger codes within Intermountain EHR
  - Triggering of vMR sent from EHR to RCKMS
  - Determination of reportability by RCKMS
  - Return of draft Notice of Reportability

RCKMS Phase II

- Fall 2015-June 2016
- Continuation of pilot work
  - Production-ready version of the RCKMS tool
  - Default content for a subset of reportable conditions
- Partners:
  - CSTE (for content development)
  - CDC
  - HLN (decision support implementer)
  - APHL (integration services)
  - Consultants & SMEs

RCKMS Phase II Deliverables

- Content Development
  - Creation of machine-processable reporting specifications for a subset of reportable conditions
    - RCKMS Content Development Team of consultants to draft specifications
    - Review within RCKMS Content Development Team
    - Vet with Position Statement authors as needed
    - Vet with CSTE Content Vetting Workgroup
  - Creation of Reportable Conditions Trigger Codes (RCTC)

Community engagement

- Conversations about RCKMS
  - CSTE committee calls
  - CSTE annual conferences
    - Workshops, breakout sessions and roundtables
  - Other venues
    - CDC and ONC national calls, ASTHO, NACCHO
  - RCKMS workgroups
    - Defining requirements for tools and vetting content

RCKMS: the good news

Communicate with reporters

requirements for lab reporting AND case reporting

in both

human-readable form AND machine-processable form

in one place in a single format

based on standards (terminology, rules)

RCKMS: the challenges

- Effective use requires understanding
- Decision support systems relatively new to public health
- Express rules as logic
  - Position statements tables VI-B and VII-B
- Understand construction of value sets
  - Use of standard terminologies
    - LOINC, SNOMED, ICD
    - RxNorm

RCKMS: the challenges

- Effective use requires mastery of new tools: RCKMS authoring software
- Understanding and using base content
- Building business processes
  - Authoring
  - Review and authorization
  - Publishing

RCKMS: the challenges

- Supplying content: the first time
- Expressing jurisdictional reporting requirements in new ways
  - Collecting the information
  - Identifying the gaps
  - Closing the gaps
  - Modifying base content

RCKMS: the challenges

- Supplying content: the work is never done
- The world keeps changing
  - Conditions and diseases change
  - Populations change
  - Science changes
  - Politics change
  - Resources change
  - Jurisdictional rules change

RCKMS: the challenges

- Will RCKMS be the one true way?
  - Jurisdictional websites, documents, posters…
- What happens when the answer is different?
  - What is a reporter legally required to do?
- “Intentional discrepancies”
  - Can they exist?
  - Should they exist?

RCKMS: the challenges

- “Intentional discrepancies”
- What RCKMS will do (initially)
  - Criteria:
    - Demographic
    - Laboratory
    - Diagnosis/problem
- What RCKMS will do (eventually)…

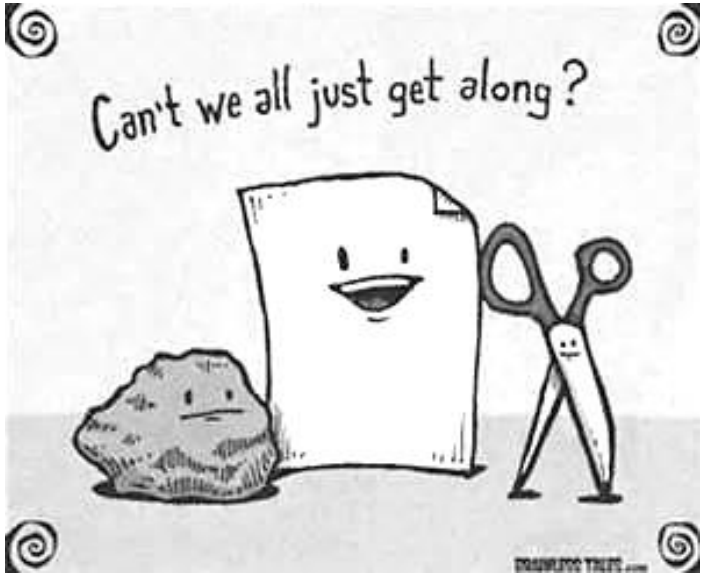
RCKMS: the challenges

- Variations on the big picture
- Some jurisdictions may
  - Legally be unable to have reports coming through a national platform
  - Not want to have reports coming through a national platform
  - Legally be unable to participate in RCKMS
  - Not want to participate in RCKMS

RCKMS: the challenges

What role will RCKMS play in the reporting process for YOUR jurisdiction?

RCKMS: the challenges



Reducing variation

Why does variation exist?

How far are we willing to go to minimize it?

RCKMS: the challenges

- **Some** reasons variation in reporting requirements exists
  - Differences in local incidence/prevalence of conditions
  - Differences in available resources
  - Different political interests/mandates
  - Different decisions about appropriate public health action (and, therefore, need for surveillance)
  - Different need for/desire for denominators
    - Reporting “negatives”

Is less variation better?

RCKMS: the challenges

- Implications of variation
- Some kinds of variation are harder for computers to deal with
- Easy
  - Blood lead level > 10 ug/dl vs. > 5 ug/dl
- Harder
  - Herpes simplex, genital (initial infection only)
  - Influenza, novel or unsubtypable strain

RCKMS: the challenges

- Dealing with variation
  - Accommodating variation
    - Jurisdiction-specific rules in RCKMS
    - Jurisdictional permissiveness/filtering
  - “Fixing” variation
    - Coming to consensus
    - Experience in content vetting sessions

The bottom line

From the perspective of a jurisdictional public health agency

realizing that promise will require change

Change is gonna come

- In knowledge
- In practice
- In policies
- In law/rule (maybe)

- How much is desirable?
- How much is necessary?
- How much is possible?

It ain't easy….

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WACs > Title 246 > Chapter 246-101

Chapter 246-101 WAC

NOTIFIABLE CONDITIONS

Complete Chapter

WAC Sections

246-101-001 Provisions of general applicability.
246-101-005 Purpose of notifiable conditions reporting.
246-101-010 Definitions within the notifiable conditions regulations.
246-101-015 Provisional condition notification.
246-101-101 Notifiable conditions and the health care provider.
246-101-105 Duties of the health care provider.
246-101-110 Means of notification.
246-101-115 Content of notifications.
246-101-120 Handling of case reports and medical information.
246-101-201 Notifiable conditions and laboratories.

The bottom line

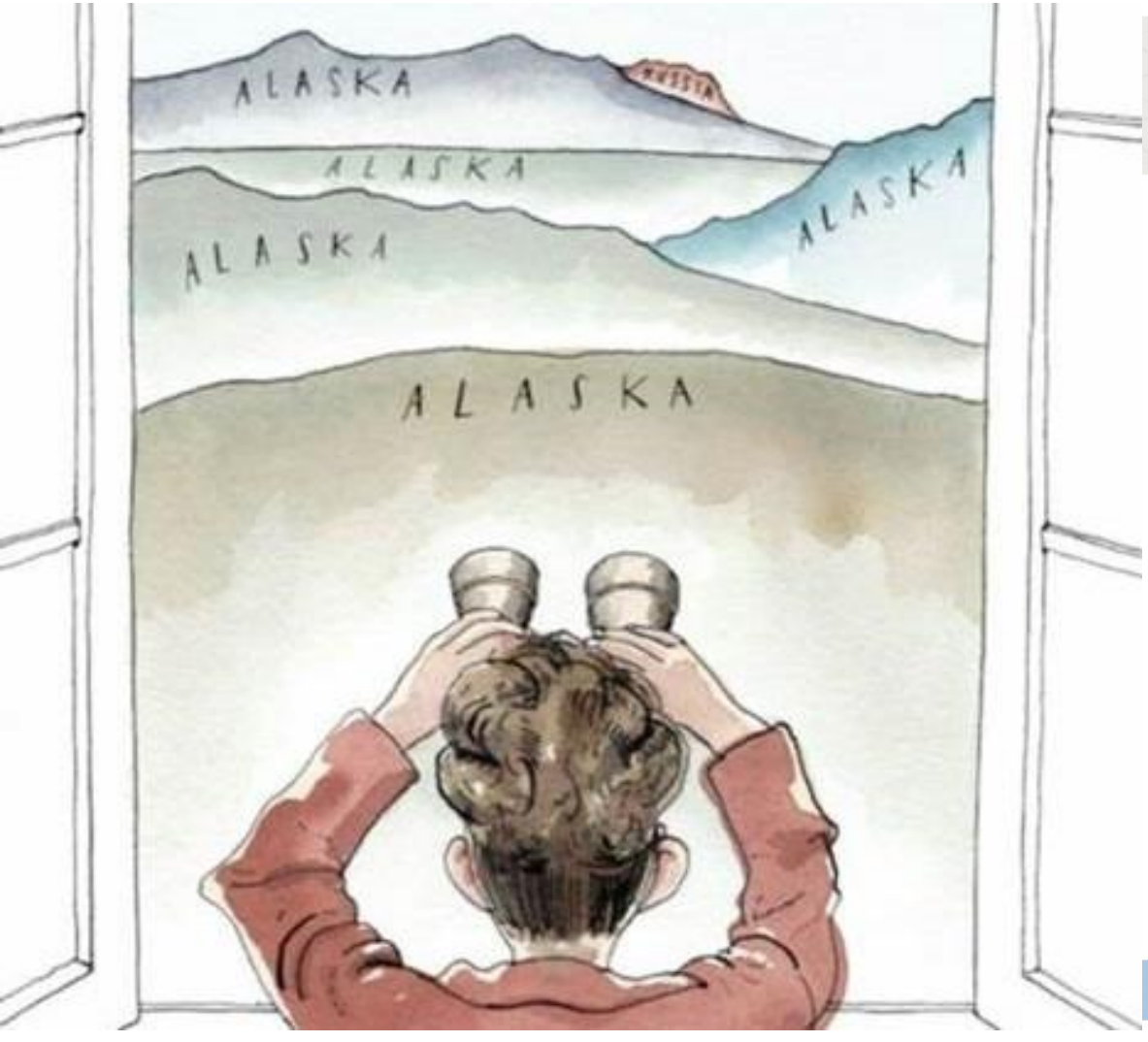
CSTE believes

RCKMS benefits outweigh
the challenges its use will present

CSTE is working
to help jurisdictions make effective use of this new tool

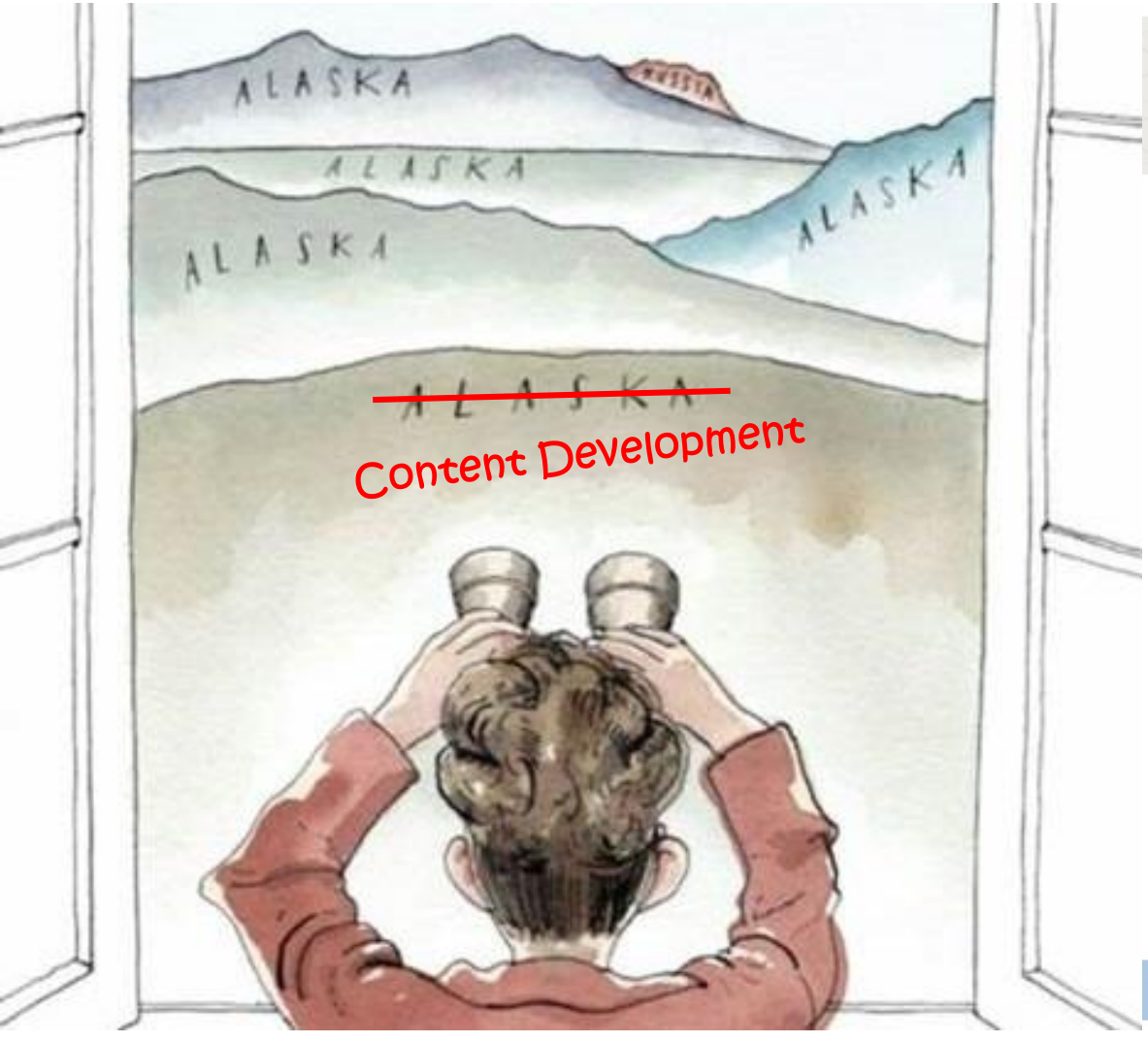
Thank you!

RCKMS - Knowledge



CSTE

RCKMS - So close you can see it from your house…



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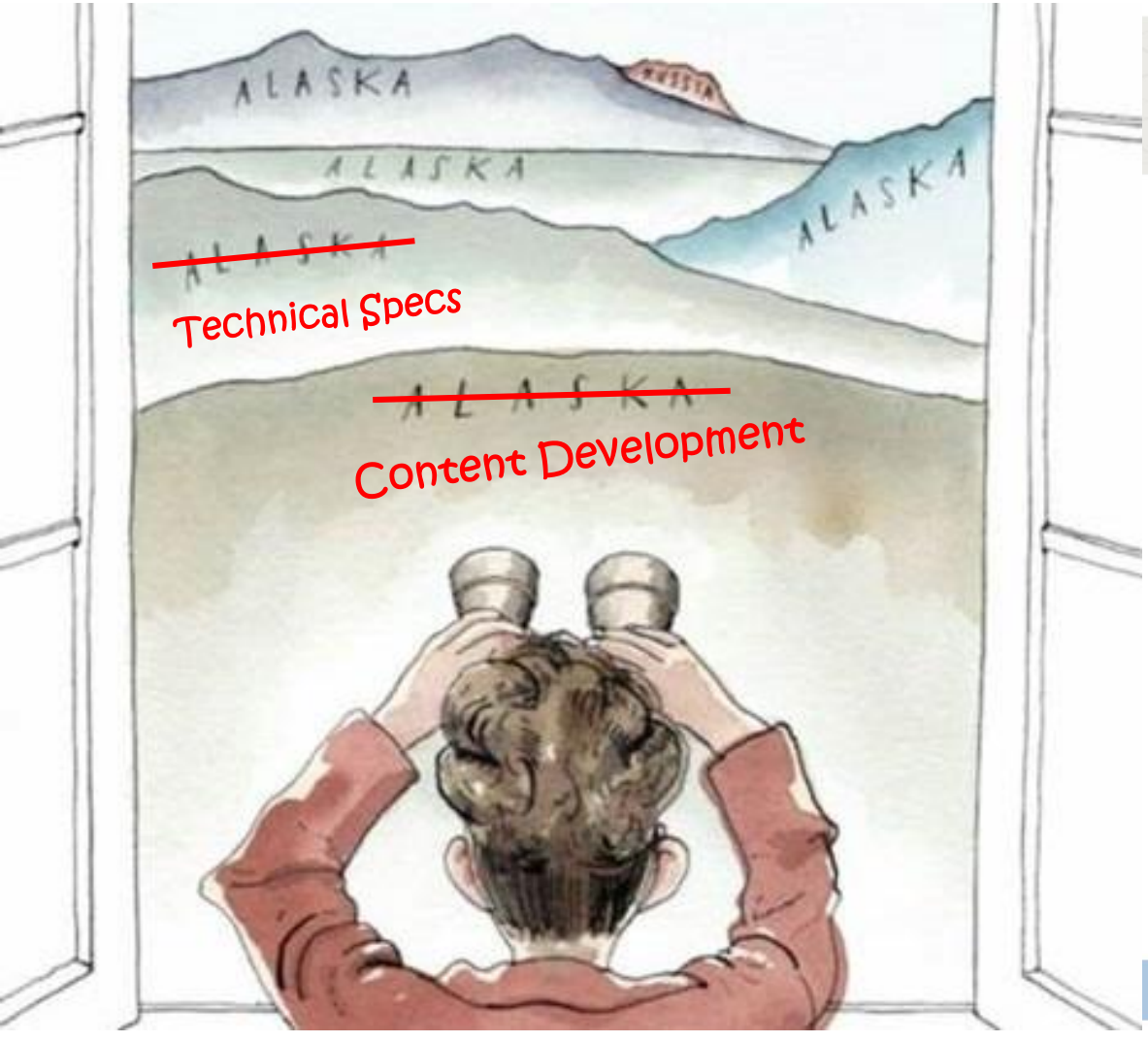

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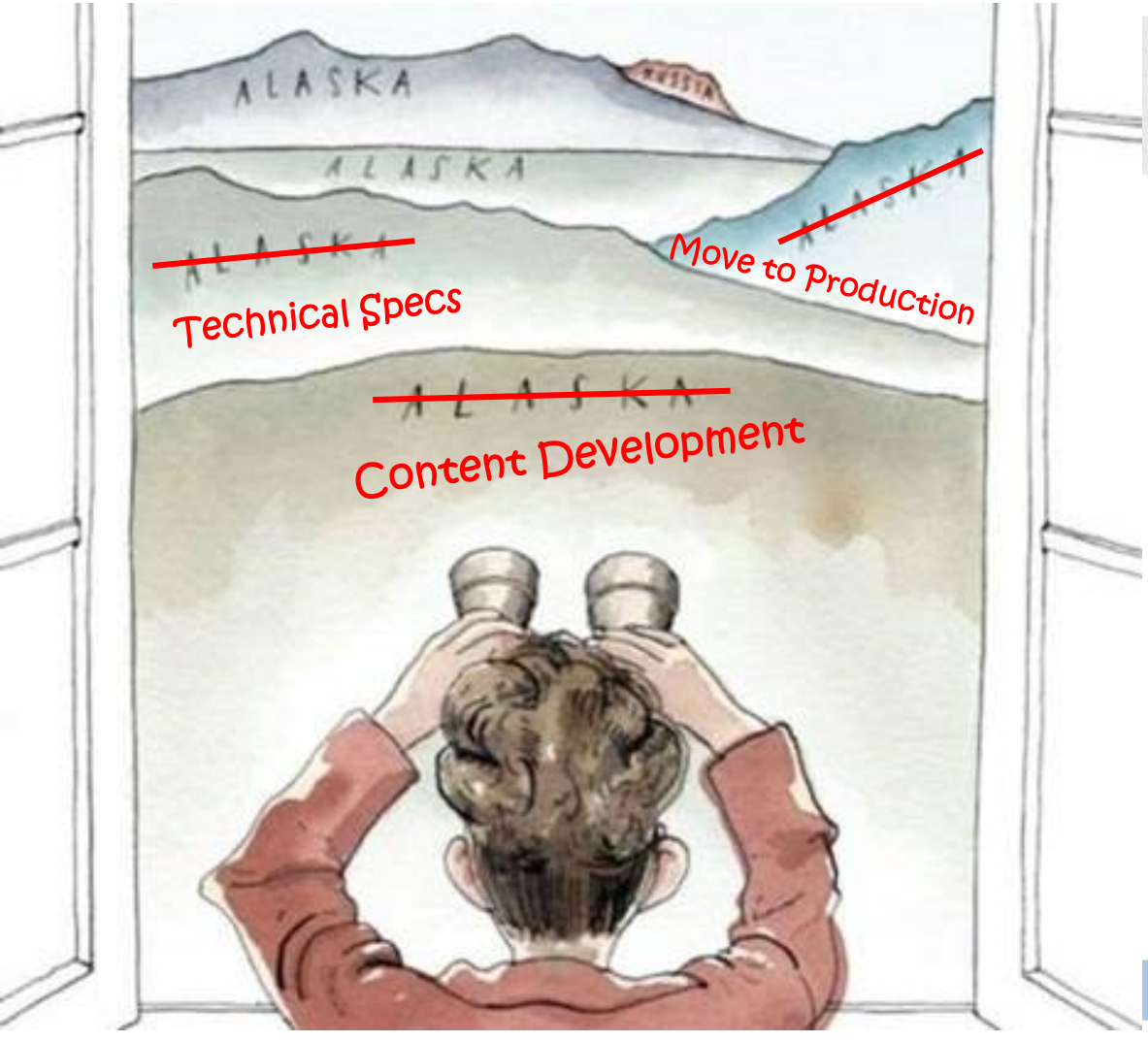

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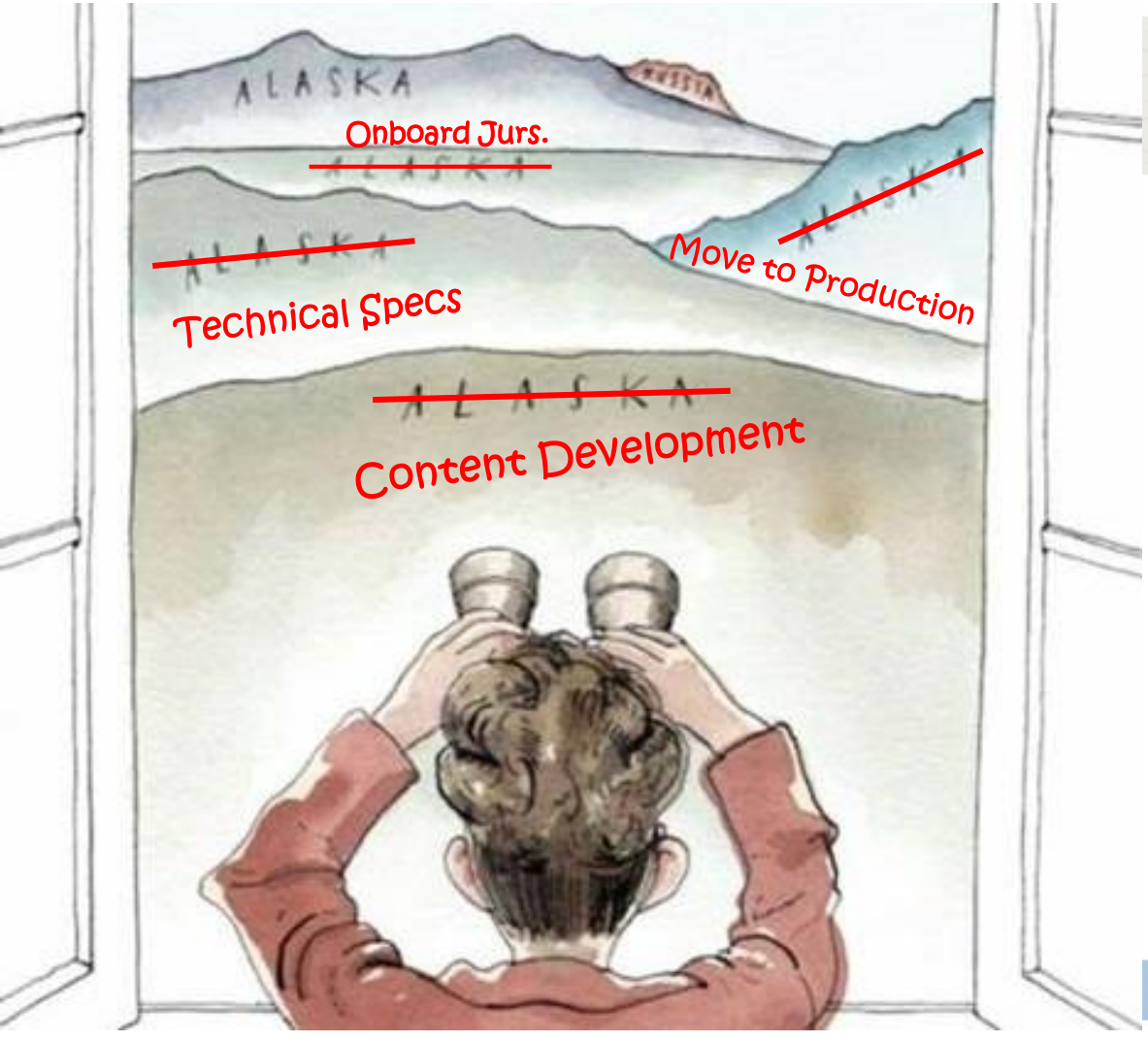

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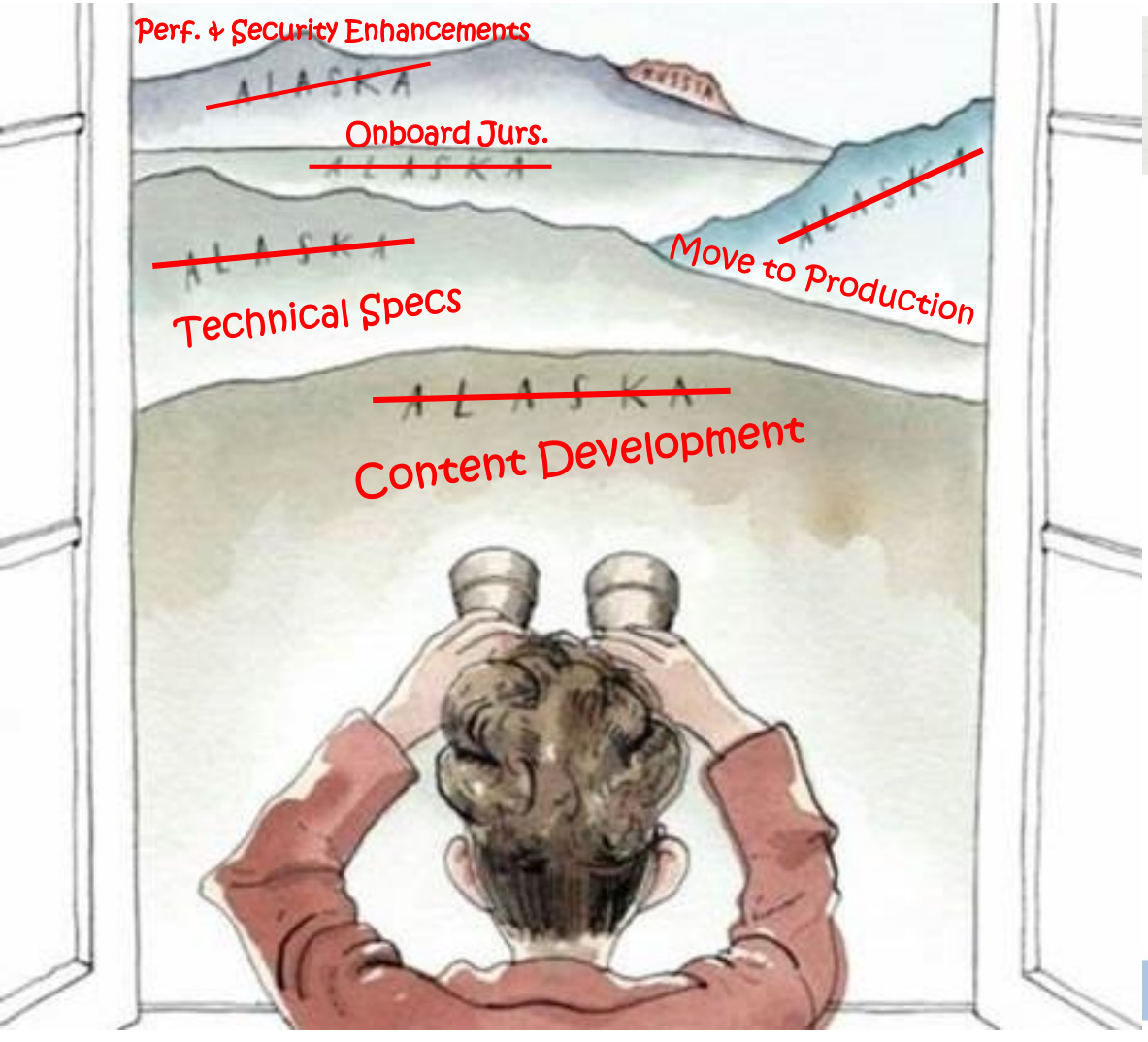

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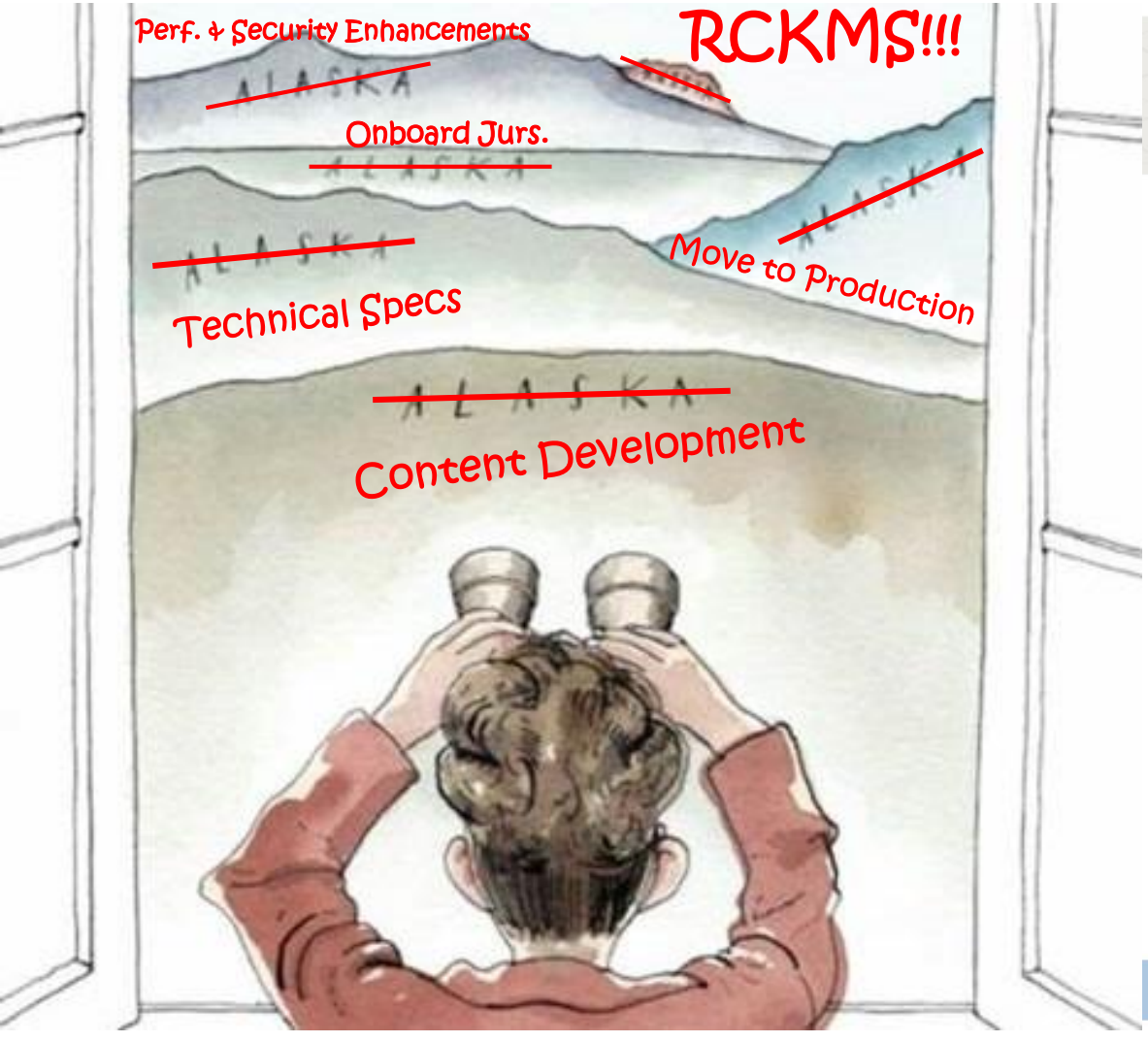
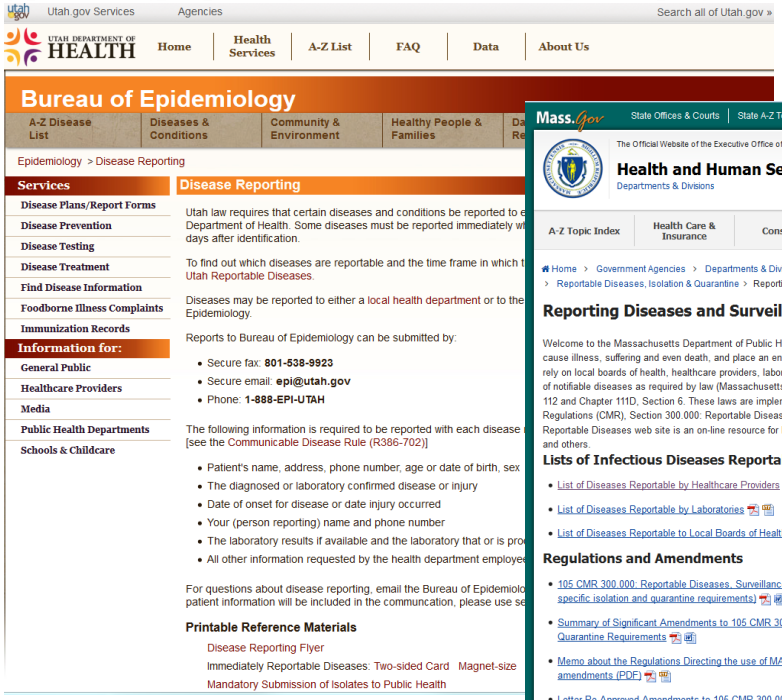


CSTE

RCKMS - So close you can see it from your ~~house~~ jurisdiction…

Reporting Specifications of Today



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Bureau of Epidemiology

A-Z Disease List | Diseases & Conditions | Community & Environment | Healthy People & Families

Epidemiology > Disease Reporting

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Information for:

- General Public
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- Media
- Public Health Departments
- Schools & Childcare

Disease Reporting

Utah law requires that certain diseases and conditions be reported to e
Department of Health. Some diseases must be reported immediately wi
days after identification.

To find out which diseases are reportable and the time frame in which t
Utah Reportable Diseases.

Diseases may be reported to either a local health department or to the
Epidemiology.

Reports to Bureau of Epidemiology can be submitted by:

- Secure fax: **801-538-9923**
- Secure email: **epi@utah.gov**
- Phone: **1-888-EPI-UTAH**

The following information is required to be reported with each disease
[see the Communicable Disease Rule (R386-702)]

- Patient's name, address, phone number, age or date of birth, sex
- The diagnosed or laboratory confirmed disease or injury
- Date of onset for disease or date injury occurred
- Your (person reporting) name and phone number
- The laboratory results if available and the laboratory that or is pro
- All other information requested by the health department employee

For questions about disease reporting, email the Bureau of Epidemiolo
patient information will be included in the communcation, please use se

Printable Reference Materials

Disease Reporting Flyer

Immediately Reportable Diseases: Two-sided Card Magnet-size

Mandatory Submission of Isolates to Public Health

Mass.gov | State Offices & Courts | State A-Z Topics | State Forms | No Active Alerts | Skip to main content

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› Reportable Diseases, Isolation & Quarantine › Reporting Diseases and Surveillance Information

Reporting Diseases and Surveillance Information

Welcome to the Massachusetts Department of Public Health (MDPH) Reportable Diseases web site. Infectious diseases cause illness, suffering and even death, and place an enormous financial burden on society. State public health officials rely on local boards of health, healthcare providers, laboratories and other public health personnel to report the occurrence of notifiable diseases as required by law (Massachusetts General Laws, Chapter 111, sections 3, 6, 7, 109, 110, 111 and 112 and Chapter 111D, Section 6. These laws are implemented by regulation under Chapter 105, Code of Massachusetts Regulations (CMR), Section 300.000: Reportable Diseases, Surveillance, and Isolation & Quarantine Requirements.) The Reportable Diseases web site is an on-line resource for local health departments, clinical providers, hospitals, laboratories and others.

Lists of Infectious Diseases Reportable by Law

- List of Diseases Reportable by Healthcare Providers
- List of Diseases Reportable by Laboratories
- List of Diseases Reportable to Local Boards of Health

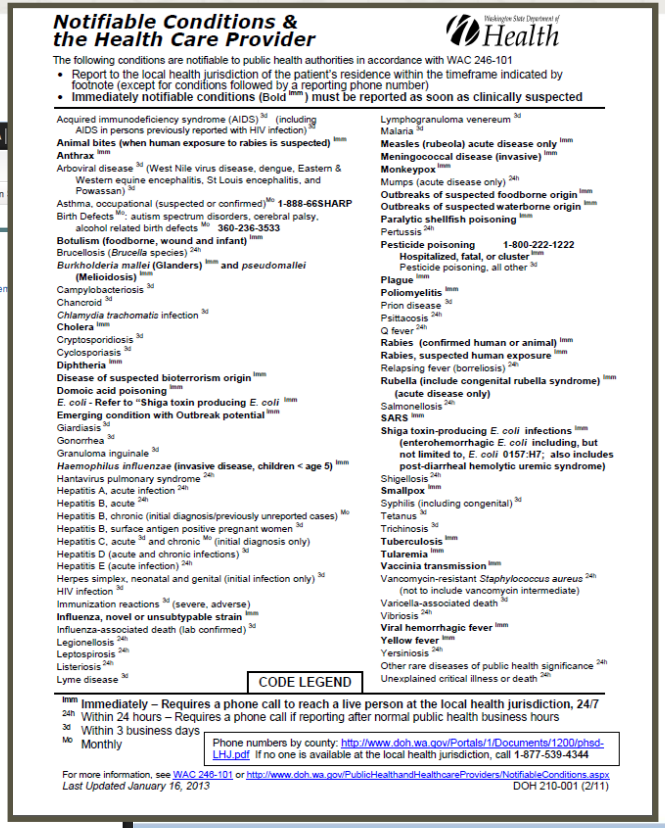
Regulations and Amendments

- 105 CMR 300.000: Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements (includes disease-specific isolation and quarantine requirements)
- Summary of Significant Amendments to 105 CMR 300.000: Reportable Diseases, Surveillance and Isolation and Quarantine Requirements
- Memo about the Regulations Directing the use of MAVEN by Local Boards of Health, includes summary of amendments (PDF)
- Letter Re-Approved Amendments to 105 CMR 300.000 to Enhance HIV/AIDS Surveillance in Mass.

Guide to Surveillance, Reporting and Control

- Guide to Surveillance, Reporting and Control: A Massachusetts-specific manual to guide local boards of health through surveillance and control of reportable infectious diseases. Contains basic epidemiological information as well as isolation and quarantine requirements for each reportable disease. (2006)

Documents Pertaining to Privacy and Confidentiality Concerns



Notifiable Conditions & the Health Care Provider

Washington State Department of Health

The following conditions are notifiable to public health authorities in accordance with WAC 246-101

- Report to the local health jurisdiction of the patient's residence within the timeframe indicated by footnote (except for conditions followed by a reporting phone number)
- **Immediately notifiable conditions (Bold [Imm]) must be reported as soon as clinically suspected**

Acquired immunodeficiency syndrome (AIDS) [3d] (including AIDS in persons previously reported with HIV infection) [3d]
Animal bites (when human exposure to rabies is suspected) [Imm]
Anthrax [Imm]
Arboviral disease [3d] (West Nile virus disease, dengue, Eastern & Western equine encephalitis, St Louis encephalitis, and Powassan) [3d]
Asthma, occupational (suspected or confirmed) [Mo] **1-888-66SHARP**
Birth Defects [Mo]: autism spectrum disorders, cerebral palsy, alcohol related birth defects [Mo] **360-236-3533**
Botulism (foodborne, wound and infant) [Imm]
Brucellosis (*Brucella* species) [24h]
***Burkholderia mallei* (Glanders)** [Imm] **and *pseudomallei* (Melioidosis)** [Imm]
Campylobacteriosis [3d]
Chancroid [3d]
Chlamydia trachomatis infection [3d]
Cholera [Imm]
Cryptosporidiosis [3d]
Cyclosporiasis [3d]
Diphtheria [Imm]
Disease of suspected bioterrorism origin [Imm]
Domoic acid poisoning [Imm]
E. coli* - Refer to "Shiga toxin producing *E. coli [Imm]
Emerging condition with Outbreak potential [Imm]
Giardiasis [3d]
Gonorrhea [3d]
Granuloma inguinale [3d]
***Haemophilus influenzae* (invasive disease, children < age 5)** [Imm]
Hantavirus pulmonary syndrome [24h]
Hepatitis A, acute infection [24h]
Hepatitis B, acute [24h]
Hepatitis B, chronic (initial diagnosis/previously unreported cases) [Mo]
Hepatitis B, surface antigen positive pregnant women [3d]
Hepatitis C, acute [3d] and chronic [Mo] (initial diagnosis only)
Hepatitis D (acute and chronic infections) [3d]
Hepatitis E (acute infection) [24h]
Herpes simplex, neonatal and genital (initial infection only) [3d]
HIV infection [3d]
Immunization reactions [3d] (severe, adverse)
Influenza, novel or unsubtypable strain [Imm]
Influenza-associated death (lab confirmed) [3d]
Legionellosis [24h]
Leptospirosis [24h]
Listeriosis [24h]
Lyme disease [3d]
Lymphogranuloma venereum [3d]
Malaria [3d]
Measles (rubeola) acute disease only [Imm]
Meningococcal disease (invasive) [Imm]
Monkeypox [Imm]
Mumps (acute disease only) [24h]
Outbreaks of suspected foodborne origin [Imm]
Outbreaks of suspected waterborne origin [Imm]
Paralytic shellfish poisoning [Imm]
Pertussis [24h]
Pesticide poisoning 1-800-222-1222
Hospitalized, fatal, or cluster [Imm]
Pesticide poisoning, all other [3d]
Plague [Imm]
Poliomyelitis [Imm]
Prion disease [3d]
Psittacosis [24h]
Q fever [24h]
Rabies (confirmed human or animal) [Imm]
Rabies, suspected human exposure [Imm]
Relapsing fever (borreliosis) [24h]
Rubella (include congenital rubella syndrome) [Imm] **(acute disease only)**
Salmonellosis [24h]
SARS [Imm]
Shiga toxin-producing *E. coli* infections [Imm] **(enterohemorrhagic *E. coli* including, but not limited to, *E. coli* 0157:H7; also includes post-diarrheal hemolytic uremic syndrome)**
Shigellosis [24h]
Smallpox [Imm]
Syphilis (including congenital) [3d]
Tetanus [3d]
Trichinosis [3d]
Tuberculosis [Imm]
Tularemia [Imm]
Vaccinia transmission [Imm]
Vancomycin-resistant *Staphylococcus aureus* [24h] (not to include vancomycin intermediate)
Varicella-associated death [3d]
Vibriosis [24h]
Viral hemorrhagic fever [Imm]
Yellow fever [Imm]
Yersiniosis [24h]
Other rare diseases of public health significance [24h]
Unexplained critical illness or death [24h]

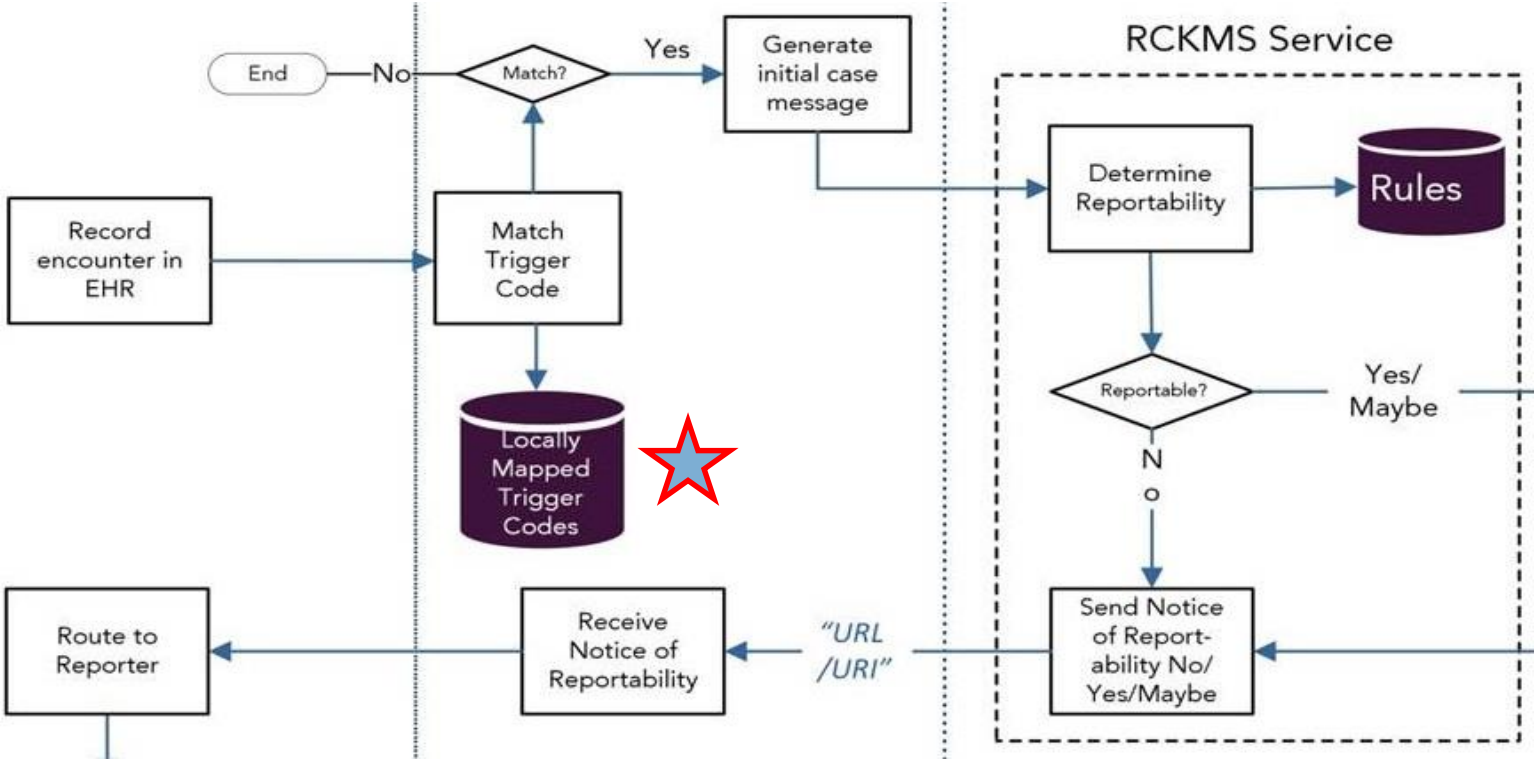
CODE LEGEND

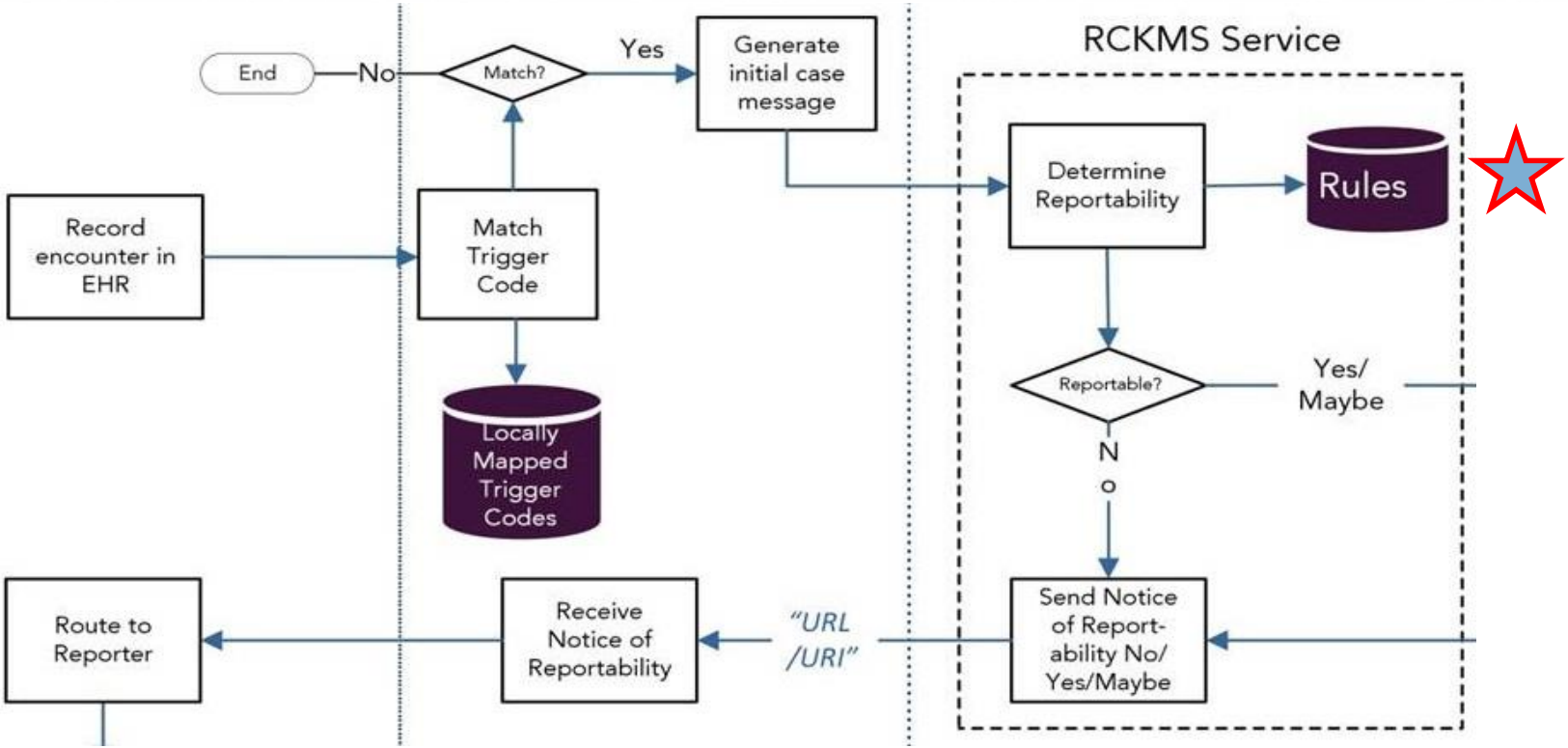
[Imm] **Immediately – Requires a phone call to reach a live person at the local health jurisdiction, 24/7**
[24h] Within 24 hours – Requires a phone call if reporting after normal public health business hours
[3d] Within 3 business days
[Mo] Monthly

Phone numbers by county: http://www.doh.wa.gov/Portals/1/Documents/1200/phsd-LHJ.pdf If no one is available at the local health jurisdiction, call 1-877-539-4344

For more information, see WAC 246-101 or http://www.doh.wa.gov/PublicHealthandHealthcareProviders/NotifiableConditions.aspx

Last Updated January 16, 2013 DOH 210-001 (2/11)


RCKMS Service
End
No
Match?
Yes
Generate initial case message
Record encounter in EHR
Match Trigger Code
Determine Reportability
Rules
Locally Mapped Trigger Codes
Reportable?
Yes/ Maybe
No
Route to Reporter
Receive Notice of Reportability
"URL /URI"
Send Notice of Report-ability No/ Yes/Maybe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"URL /URI"
Receive Notice of Reportability
Route to Reporter

Status Update: Content Vetting WG (1st Round)

Category	Dates Vetted	# of Conditions Vetted*
Sexually Transmitted Diseases	Summer 2016	0 / 5
Bloodborne Diseases	Nov – Dec 2015	4/4
Enterics	Dec 2015 – Jan 2016	13/13
Vaccine-Preventable Conditions	Feb – March 2016	18/18
Respiratory Conditions (Infectious)	February 2016, June 2016?	3/5
Neurologic and Toxin-Mediated Conditions	March 2016	1/1
Zoonotic and Vectorborne Diseases	March - April 2016 June 2016?	20/20
Toxic Effects of Non-Medicinal Substances	5/12, 5/19	4 / 4
Systemic Conditions	5/26	4 / 4
	Total	67/74

*Note: Some conditions may be re-vetted to get additional feedback

So how did we develop content?

- Agile approach for project management
- Creating the machine-processable specifications:
  - Draft specifications – Content Development Team
  - Review the preliminary specifications – Content Development Team
  - Initial vetting of the content – Position Statement Authors
  - Final vetting of the content – Content Vetting Workgroup

Content Vetting Workgroup

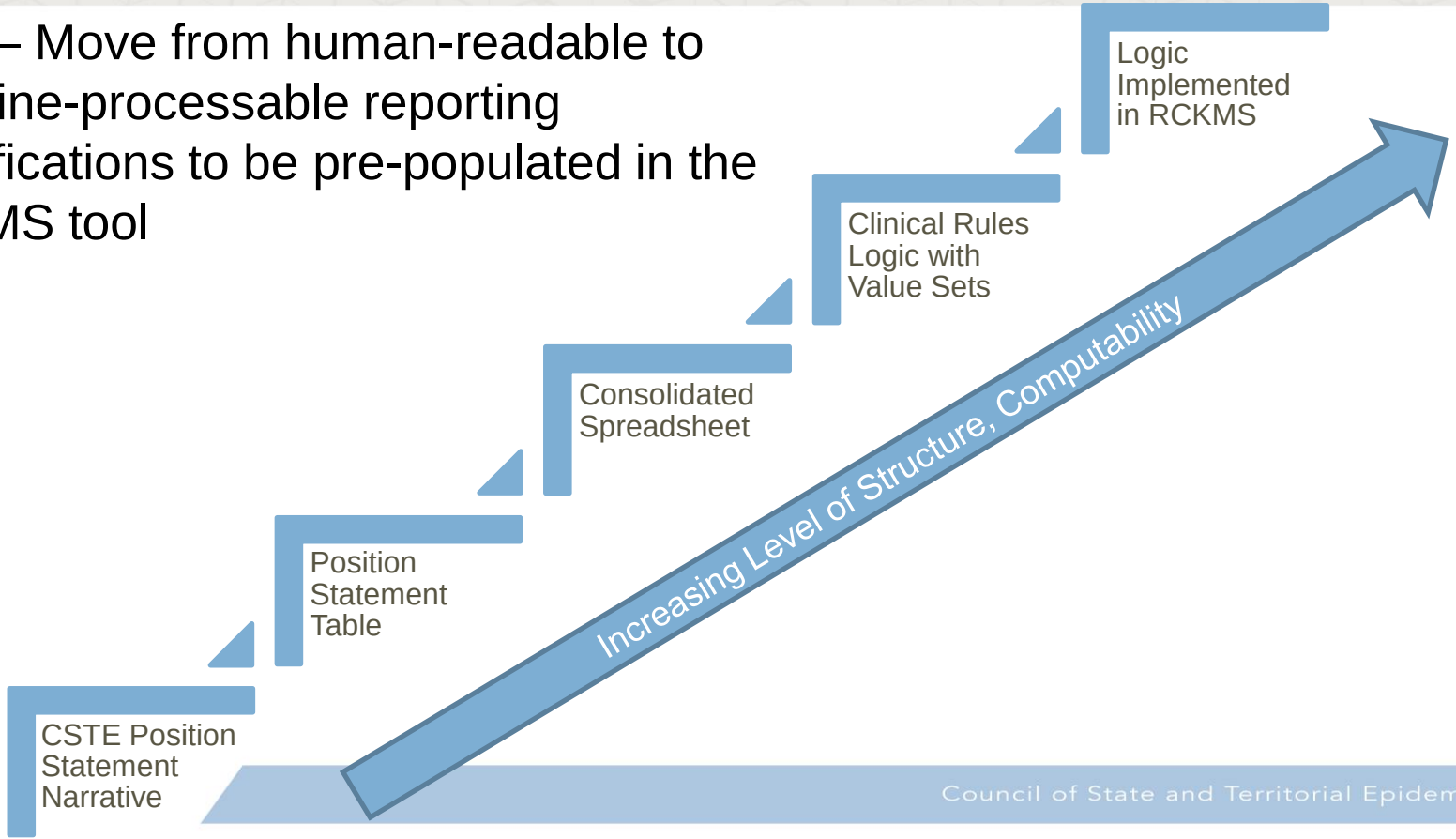
- Goal: Vet the proposed content (trigger codes and reporting specifications) for notifiable conditions
- Focus on ensuring criteria meet the needs of (most) jurisdictions
- Focus on reviewing the drafted content:
  - Clinical diagnoses
  - Laboratory observations/results
  - Resources or links related to a reportable conditions
  - Demonstration of standardized clinical and lab vocabulary associated with a reportable condition (ICD, CPT, LOINC, SNOMED, and other codes)

RCKMS Content Development Team

Agile Approach to Project Management

- *Content Product Owners* – Janet Hui (CSTE), Laura Conn (CDC)
- *Scrum Master* – Shu McGarvey
- *Content Drafting*
  - Knowledge Engineer/Epi SME: Catherine Staes
  - Informatics Business Analysts: Denisha Abrams, Julie Lipstein
  - Clinical Lab SME: Sarita Sadhwani
  - Lab Vocab SME: Jerry Sabele, APHL
  - Clinical Epi Vocab SME: Mary Hamilton, Heather Patrick (NG)
- *Content Vetting*
  - **CSTE Content Vetting WG**

Goal – Move from human-readable to machine-processable reporting specifications to be pre-populated in the RCKMS tool



VI. Criteria for case identification

A. Narrative description of criteria for case ascertainment of a specific condition.

Report any illness to public health authorities that meets any of the following criteria:

Clinical evidence: A person who is acutely ill with jaundice. Associated symptoms might include: fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, or abdominal pain.

AND/OR

Laboratory evidence:

- A person who has tested positive for IgM antibody to hepatitis B core antigen (IgM anti-HBc positive), *or*
- A person who has tested positive for hepatitis B surface antigen (HBsAg positive), *or*
- A person with elevated serum aminotransferase (ALT or AST)[1] who has tested positive for IgM antibody to hepatitis B core antigen (IgM anti-HBc positive) or for hepatitis B surface antigen (HBsAg positive).

Clinical data: A person whose healthcare record contains a diagnosis of acute hepatitis B.

Administrative data: A person whose death certificate lists acute hepatitis B as a cause of death or a significant condition contributing to death.

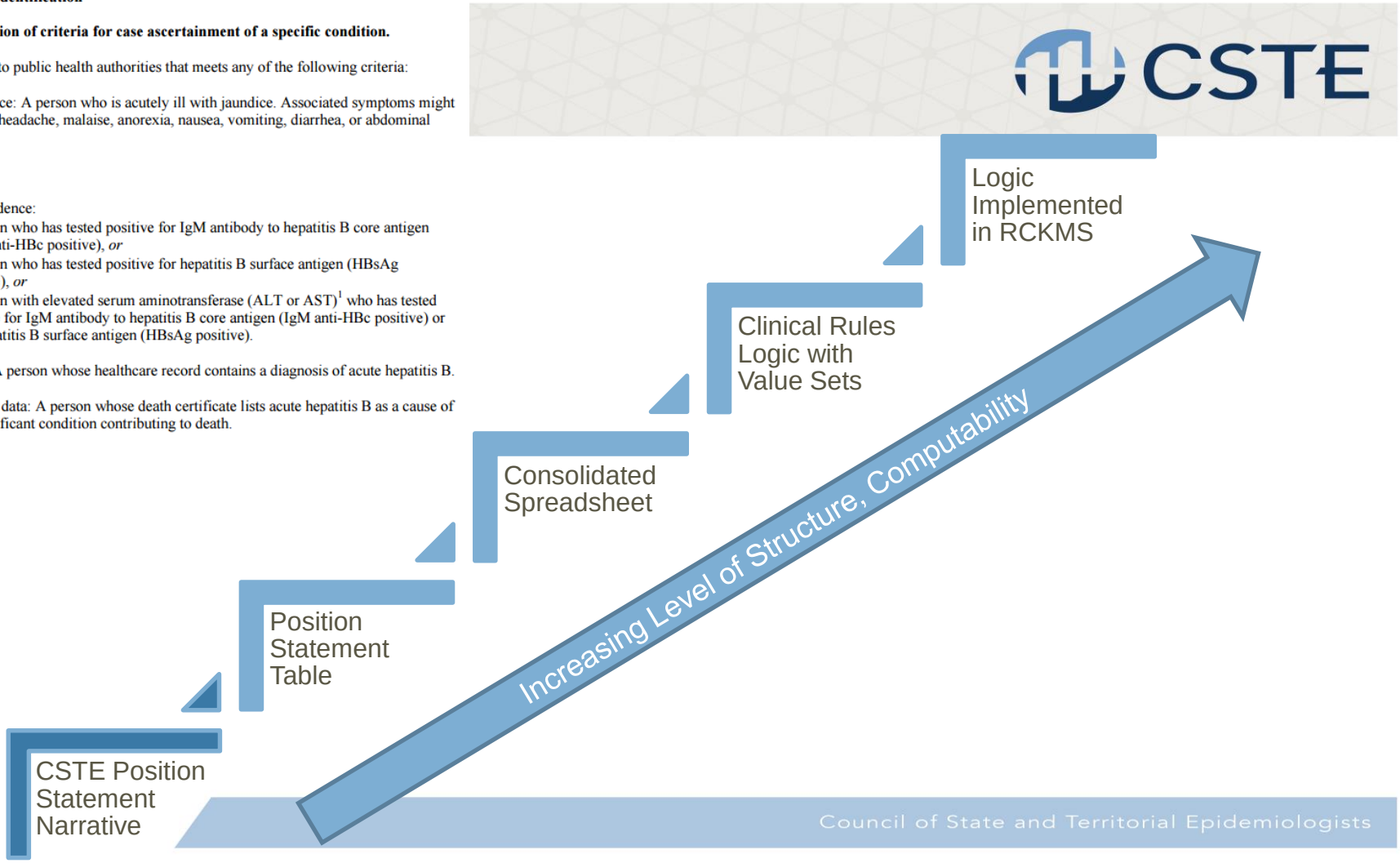
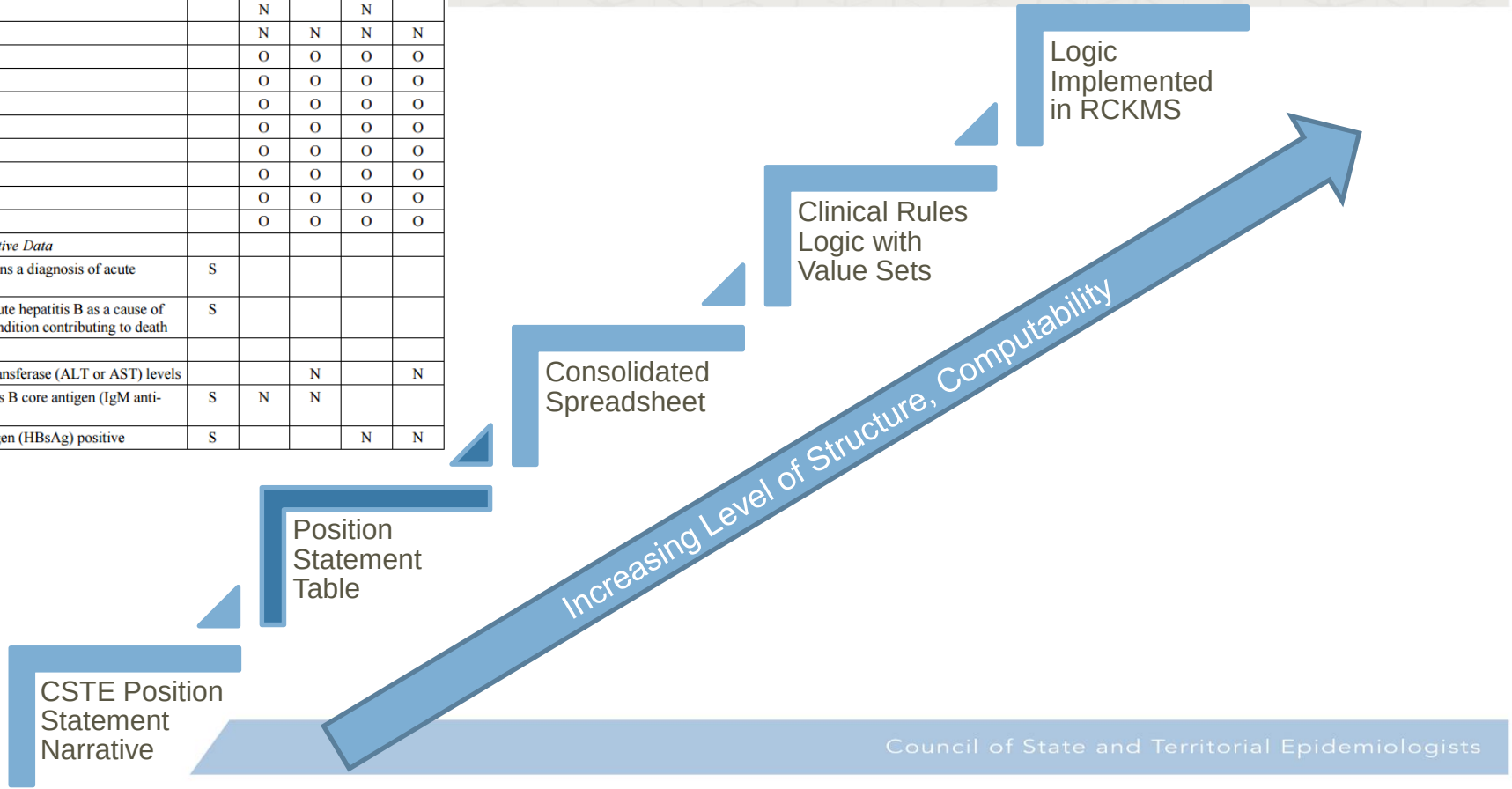
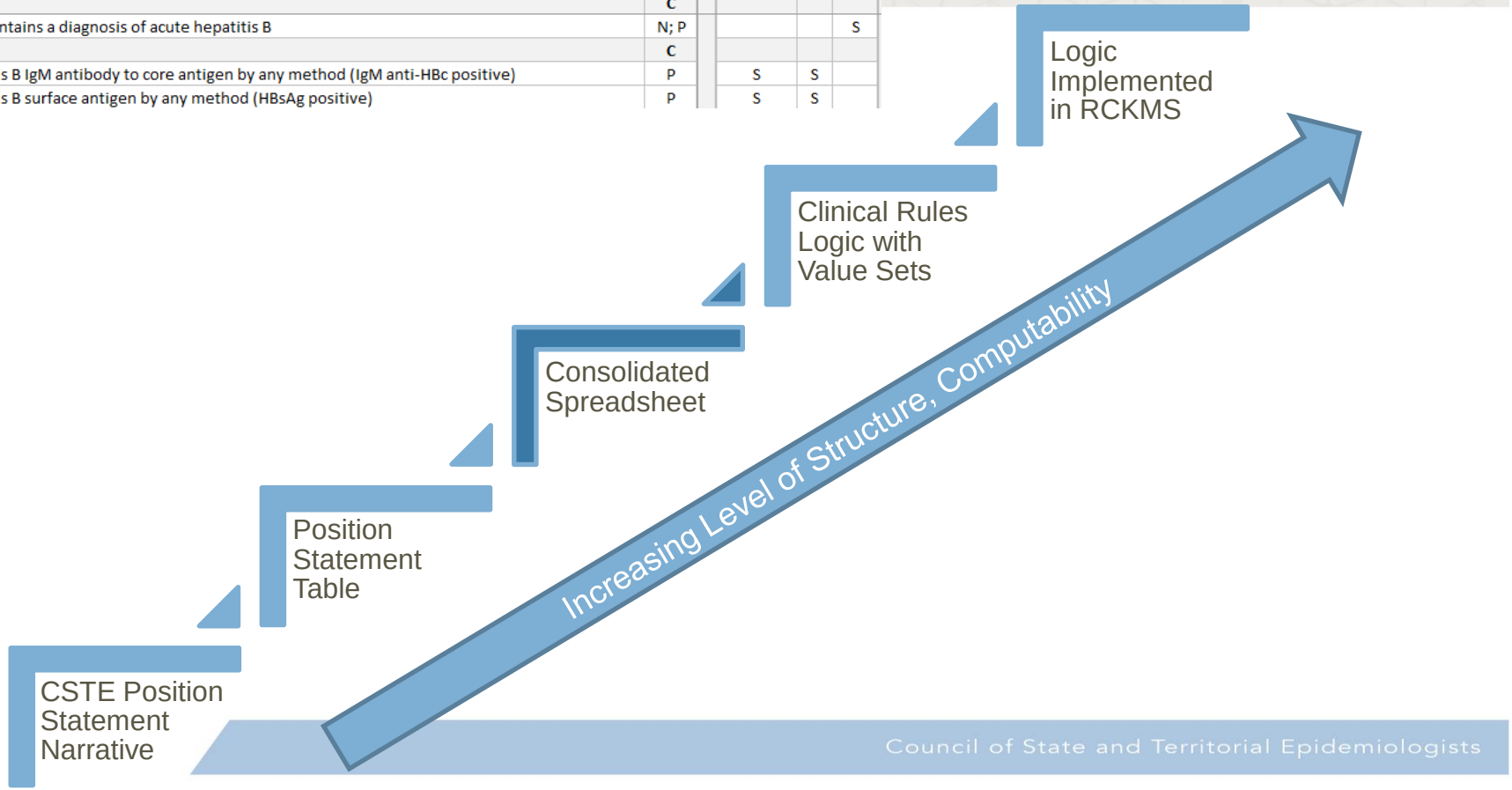


Table VI-B. Table of criteria to determine whether a case should be reported to public health authorities. Requirements for reporting are established under State and Territorial laws and/or regulations and may differ from jurisdiction to jurisdiction. These criteria are suggested as a standard approach to identifying cases of this condition for purposes of reporting, but reporting should follow State and Territorial law/regulation if any conflicts occur between these criteria and those laws/regulations.

Criterion	Reporting				
Clinical Evidence					
Jaundice		N		N	
Acute onset		N	N	N	N
Fever		O	O	O	O
Headache		O	O	O	O
Malaise		O	O	O	O
Anorexia		O	O	O	O
Nausea		O	O	O	O
Vomiting		O	O	O	O
Diarrhea		O	O	O	O
Abdominal Pain		O	O	O	O
Clinical and Administrative Data					
Healthcare record contains a diagnosis of acute hepatitis B	S				
Death certificate lists acute hepatitis B as a cause of death or a significant condition contributing to death	S				
Laboratory Evidence					
Elevated serum aminotransferase (ALT or AST) levels			N		N
IgM antibody to hepatitis B core antigen (IgM anti-HBc) positive	S	N	N		
Hepatitis B surface antigen (HBsAg) positive	S			N	N

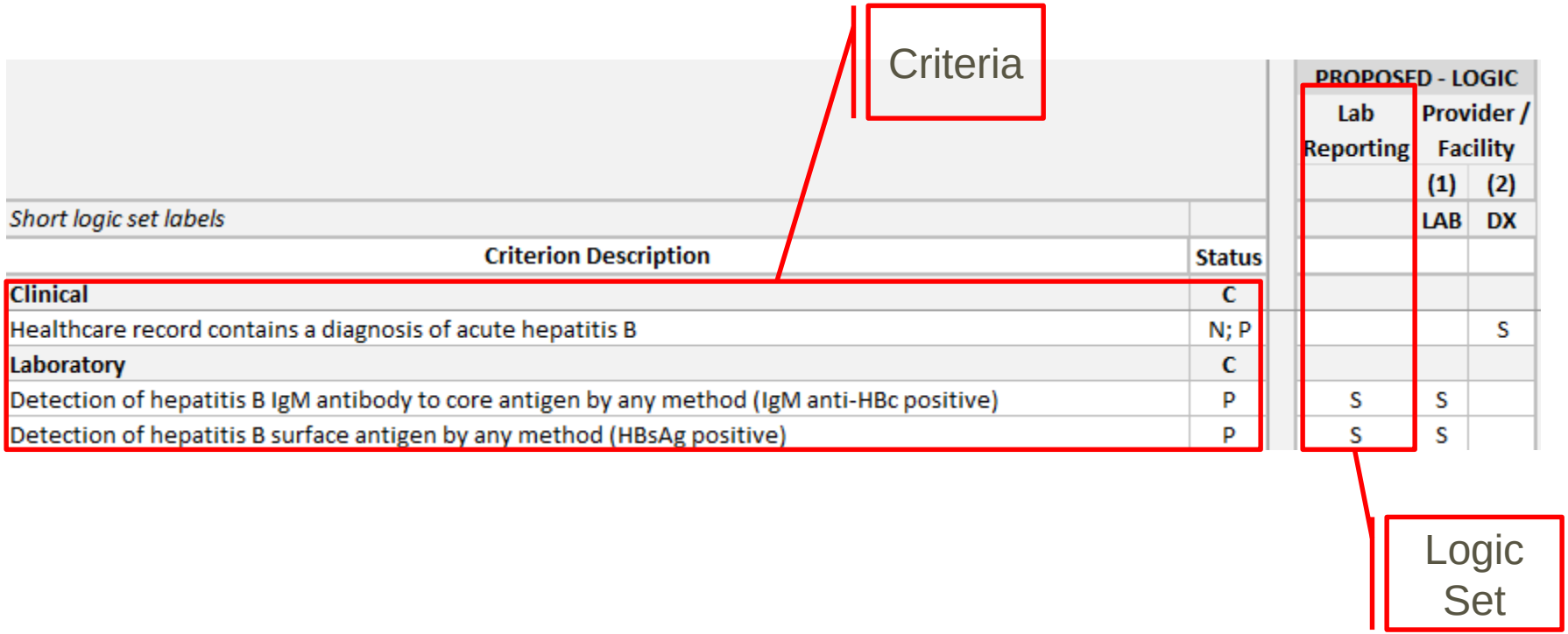


		PROPOSED - LOGIC		
		Lab Reporting	Provider / Facility (1)	(2)
Short logic set labels			LAB	DX
Criterion Description	**Status**			
Clinical	C			
Healthcare record contains a diagnosis of acute hepatitis B	N; P			S
Laboratory	C			
Detection of hepatitis B IgM antibody to core antigen by any method (IgM anti-HBc positive)	P	S	S	
Detection of hepatitis B surface antigen by any method (HBsAg positive)	P	S	S	



Criteria

		PROPOSED - LOGIC		
		Lab Reporting	Provider / Facility	
			(1)	(2)
Short logic set labels			LAB	DX
Criterion Description	**Status**			
Clinical	**C**			
Healthcare record contains a diagnosis of acute hepatitis B	N; P			S
Laboratory	**C**			
Detection of hepatitis B IgM antibody to core antigen by any method (IgM anti-HBc positive)	P	S	S	
Detection of hepatitis B surface antigen by any method (HBsAg positive)	P	S	S	


Criteria
PROPOSED - LOGIC
Lab Reporting
Provider / Facility
(1)
(2)
Short logic set labels
LAB
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Criterion Description
Status
Clinical
C
Healthcare record contains a diagnosis of acute hepatitis B
N; P
S
Laboratory
C
Detection of hepatitis B IgM antibody to core antigen by any method (IgM anti-HBc positive)
P
S
S
Detection of hepatitis B surface antigen by any method (HBsAg positive)
P
S
S
Logic Set

WG Working Spreadsheet

			PROPOSED - LOGIC SET						NATIONAL (CSTE)	
			Lab Reporting	Provider / Facility Reporting				Vital Records		
				(1)	(2)	(3)	(4)			
Short logic set labels				LAB	CLIN +DEM	CLIN+DEM +LAB	CLIN+ ENC		(PED)	(HOS)
Criterion Description	Status									
Clinical	C									
Documentation of death	P				N	N				
Death of a person < 18 years of age	N (P)								N	
Diagnosis or active problem of respiratory illness or a mention of respiratory illness as a cause of death or a significant condition contributing to death	P									
Fever > ### degrees F documented within # days prior to death date	P									
Illness clinically compatible with influenza infection	N (P)								N	
Cause of death not related to influenza	N (P)								A	
Recovery from febrile, respiratory illness prior to illness leading to death	N (P)								A	
Diagnosis or active problem of influenza or a mention of influenza as a cause of death or a significant condition contributing to death	P				N	A				
Laboratory	C									
Positive influenza diagnostic test	N (H)									N
Isolation of Influenza A or B virus by culture methods in a respiratory specimen	P					O	O			
Influenza virus isolation from respiratory specimens	N (P)								O	
Detection of Influenza A or B nucleic acid by any method in a clinical specimen (i.e. includes PCR and rapid molecular assay tests)	P						O			
Detection of Influenza A or B antigen by any method in a clinical specimen	P					O				
Reverse-transcriptase polymerase chain reaction (RT-PCR) from respiratory specimens positive for influenza virus	N (P)								O	
Positive rapid influenza diagnostic testing of respiratory specimens	N (P)								O	
Microscopic observation of Influenza antigen by immunohistochemical (IHC) staining methods in any clinical specimen	P					O				
Positive immunohistochemical (IHC) staining for influenza viral antigens in respiratory tract tissue from autopsy specimens	N (P)								O	
Microscopic observation of Influenza antibody by immunofluorescent staining methods in any clinical specimen	P					O				
Immunofluorescent antibody staining (direct or indirect) of respiratory specimens positive for influenza virus	N (P)								O	
Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera	P					O				
Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera	N (P)								O	
Demographic	C									
< 18 years of age	P				N	N		N		
Epidemiologic	C									
Encounter	C									
Hospitalized within 3 days prior to 14 days following specimen collection date for positive influenza laboratory test	P						N			
Hospital admission date 14 days or less after a positive influenza test	N (H)									O
Hospital admission date 3 days or less before a positive influenza test	N (H)									O
Vital Records	C									
Death certificate lists influenza as a cause of death or a significant condition contributing to death	P							N		

jhui:
N(P) represents national criteria taken from Influenza Peds PS

jhui:
This logic set represents influenza associated hospitalizations

jhui:
N(H) represents national criteria taken from Influenza Hos PS

Condition Specific Questions:

1. Do the S's, N's, O's accurately reflect reporting requirements for influenza-associated pediatric mortality, and influenza-associated hospitalizations?

Clinical Criteria:

2. The RCKMS team operationalized the national criteria in Rows 11, 12, 13 as Rows 9+10. Is this acceptable? Clarification found below:
   - -Row 11: Illness clinical compatible not available in EHR; captured under Row 10
   - -Row 12: The PS asks for [absence of] "cause of death not related to influenza." The group of codes for illness NOT related to influenza is huge, so we've operationalized this as Row 10.
   - -Row 13: The PS indicates [absence of] "recovery from febrile, respiratory illness prior to illness leading to death" as a criteria; captured using Rows 9 and 10 together.

Lab Criteria:

3. Is this what we want to trigger a report sent to PH?
   - Column F/G: Would PH ever want a positive lab test alone to trigger a report to be sent to PH? A positive lab test + demographic info? Currently, reporting criteria requires clinical symptoms and demographic information to be present, for a positive lab test to be sent to PH. (Row 17, 19, 20, 23, 25, 27)
   - Column I: To confirm, would PH want documentation of death (row 7) + diagnosis of influenza (Row 14) + <18 years of age to trigger a report to be sent to PH?
   - Column J: This logic set represents reporting criteria for influenza-associated hospitalizations.

4. For any "isolation of" tests, do you want preliminary results, as well as final/corrected results? (Row 17)

5. Do you want to hear about any and all positive results, regardless of method and specimen type? (Row 17, 19, 20, 23, 25, 27)
   Recommendation: go through each lab criteria in rows 17, 19, 20, 23, 25, 27, ask if they want to restrict method/specimen for default
   - Jursidictional options are available if only a few jursidictions want to restrict

6. Are these labs being performed by your reporters? (Particularly Row 23, 25, 17)
   - Sarita suggested labs in Rows 23, 25, 17 may only be used for research purposes

Note that symptom and epidemiologic criteria is not currently representable in a machine processable form.

Example Discussion Questions

Condition Specific Questions:

1. Do the S's, N's, O's accurately reflect reporting requirements for influenza-associated pediatric mortality, and influenza-associated hospitalizations?

Clinical Criteria:

2. The RCKMS team operationalized the national criteria in Rows 11, 12, 13 as Rows 9+10. Is this acceptable**?** Clarification found below:

-Row 11: Illness clinical compatible not available in EHR; captured under Row 10

-Row 12: The PS asks for [absence of] "cause of death not related to influenza." The group of codes for illness NOT related to influenza is huge, so we've operationalized this as Row 10.

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Lab Criteria:

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5. Do you want to hear about any and all positive results, regardless of method and specimen type? (Row 17, 19, 20, 23, 25, 27)
6. Are these labs being performed by your reporters? (Particularly Row 23, 25, 17)

Recording Feedback

7	Proposed Logic	2/9/16	Janet	3. Is this what we want to trigger a report sent to PH? - Column F/G: Would PH ever want a positive lab test alone to trigger a report to be sent to PH? A positive lab test + demographic info? Currently, reporting criteria requires clinical symptoms and demographic information to be present, for a positive lab test to be sent to PH. (Row 17, 19, 20, 23, 25, 27) - Column I: To confirm, would PH want documentation of death (row 7) + diagnosis of influenza (Row 14) + <18 years of age to trigger a report to be sent to PH? - Column L: This logic set represents reporting criteria for influenza-	2/11/16	Janet	- Addition of new logic set for influenza associated pediatric mortality (Column I); approved by MD, NY, MA, OR - Vital records generally do not list influenza as cause of death - For four fold rise: Most jusrisdictions would want a single titer to trigger a report sent, not necessarily a four-fold rise; TX would not want, MA would not follow up, but because of low case count, can accept; may need jursidictional options - for isolation tests, want all influenza virus	Decision: Addition of new logic set for CLIN+LAB Decision: Change criteria name for isolation tests to "Isolation of influenza virus"
8	Criteria	2/9/16	Janet	4. For any "isolation of" tests, do you want preliminary results, as well as final/corrected results? (Row 17)	2/11/16	Janet	- AL: All	
9	Criteria	2/9/16	Janet	5. Do you want to hear about any and all positive results, regardless of method and specimen type? (Row 17, 19, 20, 23, 25	2/11/16	Janet	- MD: Yes	

General Info | Revised Peds (1) | Revised Hos (1) | CDC_Feedback | WG_Feedback | Specifications | LOINC.Reference | Pivot Table | Log

Dispositioned comments captured in Log, with indication of decisions made

Spreadsheet – Revised Tabs

		PROPOSED - LOGIC SET				OPTIONAL - LOGIC SETS				NATIONAL (CSTE)	
		Lab Reporting	Provider / Facility Reporting		Vital Records	Lab Reporting	Provider / Facility Reporting		Vital Records		
			(1)	(2)	(3)		(1)	(2)	(3)		
The patient record being evaluated contains evidence of:			LAB	CLIN +DEM	CLIN+ LAB		LAB	CLIN +DEM	CLIN+LAB	(PED)	(HOS)
Criterion Description	**Status**										
Clinical	C										
Documentation of death	P			N	N						
Death of a person < 18 years of age	N									N	
Diagnosis or active problem of respiratory illness or a mention of respiratory illness as a cause of death or a significant condition contributing to death	P										
Illness clinically compatible with influenza infection	N									N	
Cause of death not related to influenza	N									A	
Recovery from febrile, respiratory illness prior to illness leading to death	N									A	
Influenza (i.e., as a Diagnosis or active Problem or mentioned in text as a cause of death or a significant condition contributing to death)	P			N							
Laboratory	C										
Positive influenza diagnostic test	N										N
Isolation of Influenza virus by culture methods in a respiratory specimen	P				O						
Influenza virus isolation from respiratory specimens	N									O	
Detection of Influenza A or B nucleic acid by any method in a clinical specimen (i.e. includes PCR and rapid molecular assay tests)	P				O						
Detection of Influenza A or B antigen by any method in a clinical specimen	P				O						
Reverse-transcriptase polymerase chain reaction (RT-PCR) from respiratory specimens positive for influenza virus	N									O	
Positive rapid influenza diagnostic testing of respiratory specimens	N									O	
Microscopic observation of Influenza antigen by immunohistochemical (IHC) staining methods in any clinical specimen	P				O						
Positive immunohistochemical (IHC) staining for influenza viral antigens in respiratory tract tissue from autopsy specimens	N									O	
Microscopic observation of Influenza antibody by immunofluorescent staining methods in any clinical specimen	P				O						
Immunofluorescent antibody staining (direct or indirect) of respiratory specimens positive for influenza virus	N									O	
Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera	P				?O						
Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera	N									O	
Detection of Influenza hemagglutination inhibition (HI) antibody by any method in a clinical specimen	P								Option		
Demographic	C										
< 18 years of age	P			N	N	N					
Epidemiologic	C										
Encounter	C										
Vital Records	C										

General Info | **Revised Peds (1)** | Revised Hos (1) | CDC_Feedback | WG_Feedback | Specifications | LOINC.Reference | Pivot Table | Log

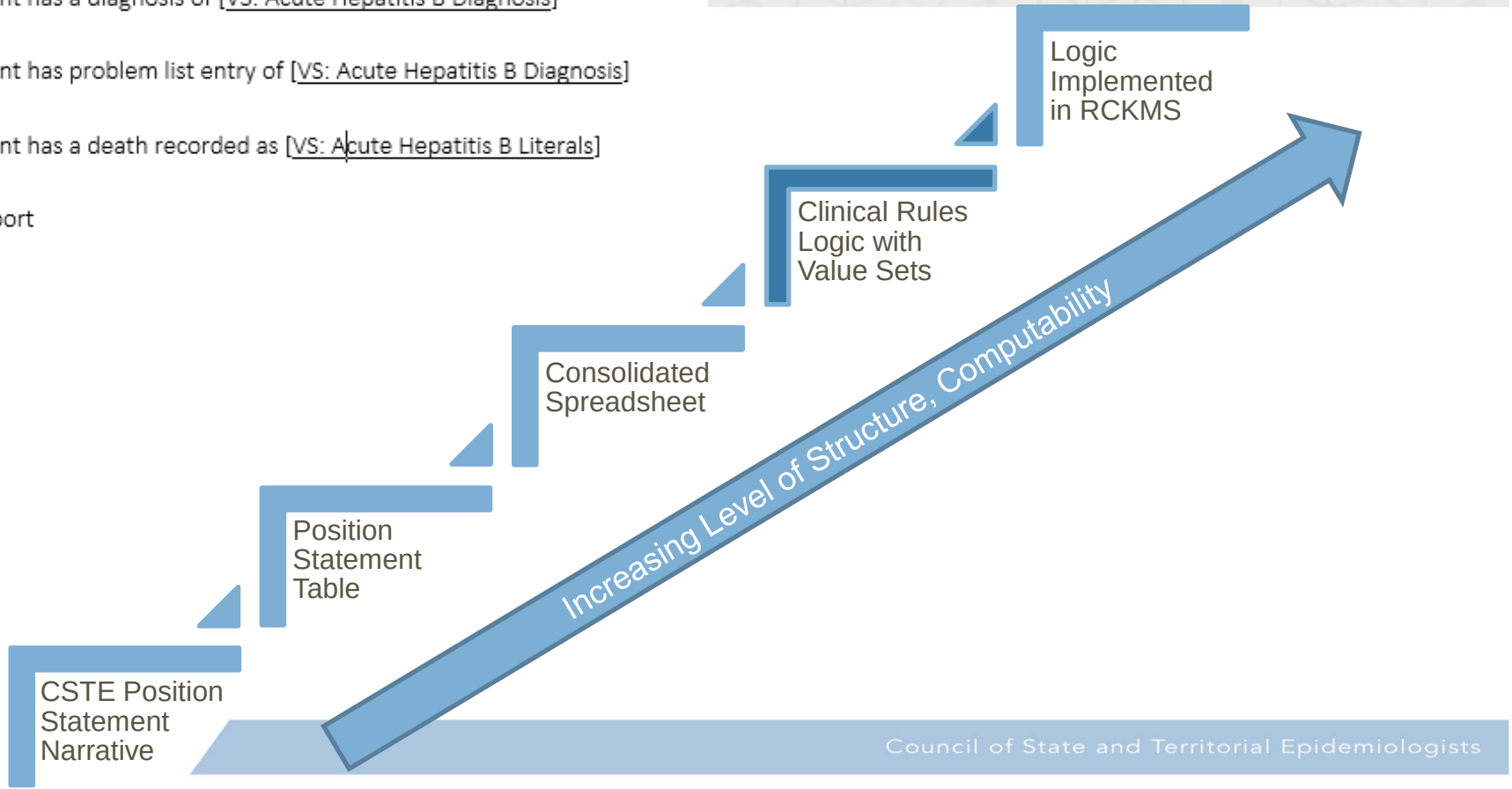
Spreadsheets updated based on feedback, saved as Revised tabs; Revisions also noted in Log Tab

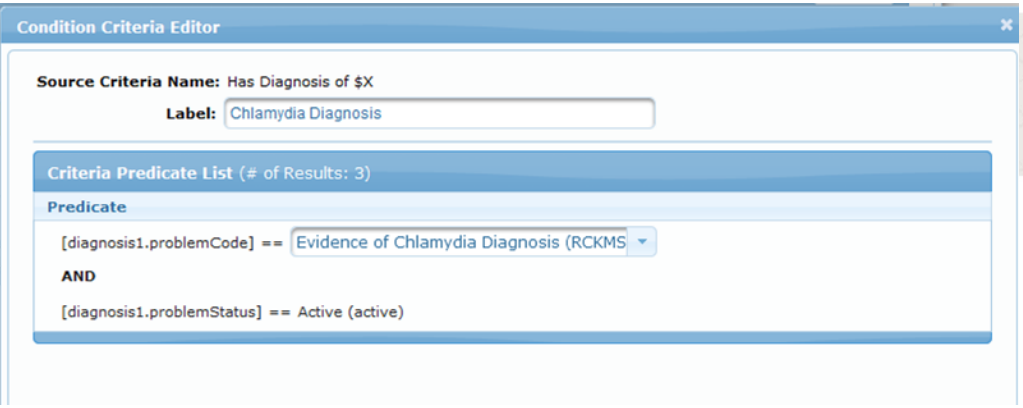
1. Healthcare record contains a diagnosis of acute hepatitis B:

IF

- Patient has a diagnosis of [VS: Acute Hepatitis B Diagnosis]
  OR
- Patient has problem list entry of [VS: Acute Hepatitis B Diagnosis]
  OR
- Patient has a death recorded as [VS: Acute Hepatitis B Literals]

THEN report





CSTE

Logic Implemented in RCKMS

Clinical Rules Logic with Value Sets

Consolidated Spreadsheet

Position Statement Table

CSTE Position Statement Narrative

Increasing Level of Structure, Computability

*Please note – all screenshots used in this presentation are in **mock-up, design,** or **draft** stages.

Challenges to moving to machine-processable rules

- Many requirements are easily converted (ICD, LOINC, SNOMED, etc.); however…
- Some reporting requirements are much harder
  - Non-coded variables, such as epidemiology criteria (“Contact with a laboratory-confirmed pertussis case.”)
  - Symptoms may or may not be coded (“cough” or “apnea”)
  - Post-coordinated terms that may be qualifiers or abnormal flags (“paroxysmal” may be an abnormal flag or a qualifier for cough)

Once we have logic implemented in RCKMS…

…you can either Adopt or Adapt

- Jurisdictions can either *adopt* the content for the notifiable condition, OR
- *Adapt* the content to meet their jurisdiction's needs ("Applying Localizations")

Follow Up Questions

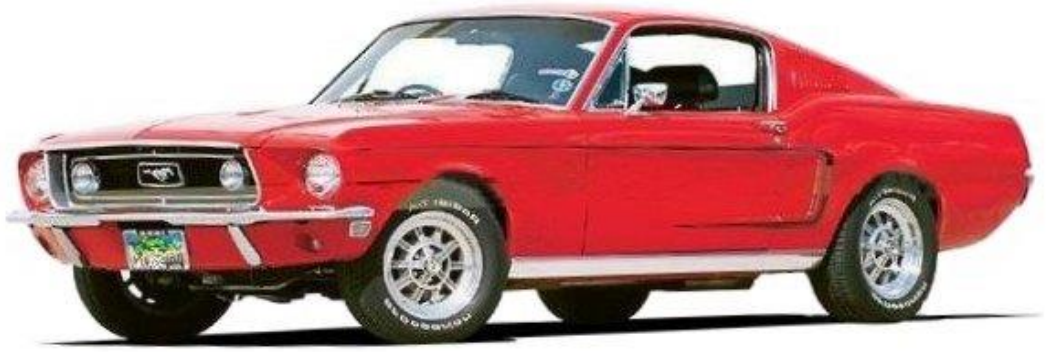
Will jurisdictions have access to the final spreadsheet, value sets, etc.?
- Yes – all deliverables will be available by end of project period; working on distributing them out earlier

“My jurisdiction has [CONDITION] reportable; will this condition be available within RCKMS?”
- Yes – out of scope for this year, but will be addressed next phase

When will the RCKMS tool be ready for jurisdictions to use? For reporters to use?

RCKMS is envisioned to be part of the electronic case reporting infrastructure which is intended to be ready for providers/jurisdictions to use by 2018 (according to Meaningful Use timeline)

Not just a faster horse…



RCKMS - Technology

The Thinking Behind RCKMS Software

Build a software suite based on an open source software, best practices, and standards-based principles, incorporating the following components:

1. General-purpose Public Health Decision Support Service (PH-DSS) for processing ongoing, real-time requests that can determine whether or not a case report should be sent to Public Health based on the medical record information supplied to the service. (The DSS bases these decisions on the executable reporting specifications created in the Authoring Tool)
2. Easy-to-use Authoring Tool to assist jurisdictions in conceptualizing, creating, maintaining and deploying machine-executable reporting specifications (for each desired condition) to the DSS service. Authoring tool should be generalizable so it can evolve with authoring requirements *and* runtime environments
3. Integrated with the Public Health Community Platform (PHCP), or option to run on its own

RCKMS Public Health Decision Support Service

- PH-DSS built atop the OpenCDS
  - Freely available Clinical Decision Support (CDS) software: “multi-institutional, collaborative effort to develop scalable, CDS tools and resources”
  - Facilitate widespread availability of advanced CDS capabilities through collaborative development of standards-based DSS infrastructure and tooling
  - Open Source
  - Active collaboration by RCKMS team
- Lower barriers to adoption; foster interoperability between public health and other clinical systems
  - HL7 Decision Support Service Standard for standard functionality and interfaces
  - HL7 Virtual Medical Record (vMR) for consistent modeling of the rules
  - HL7 Clinical Quality Language (CQL) and Drools as executable representation of rules
  - Evolve to future models and payloads (e.g. FHIR) if needed

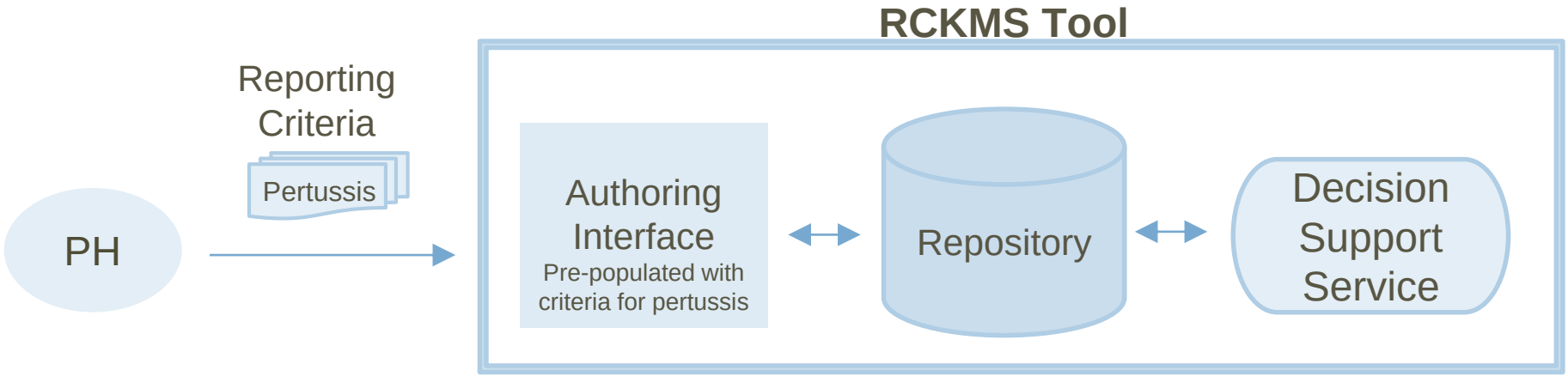
Characteristics of the RCKMS PH-DSS

- Web Service architecture
- Scalable by volume of requests and by number of jurisdictions/conditions
- Conducive for future enhancements
  - Accessibility to Authoring Tool data
  - Support of different payloads
- Evaluates patient data (input) on a request-by-request basis
  - Determines (or requestor may specify) which jurisdictions are relevant based on patient's address, where the patient received care, and/or servicing laboratory
  - Executes the relevant reporting specifications for those jurisdictions
- Outputs
  - Notice of Reportability (NoR) for *each* jurisdiction
  - Specifies list of conditions reportable to the jurisdiction: for each condition, where to report, and timeframe to submit case report

RCKMS Authoring Tool

- Built atop the CDS Administration Tool ("CAT")
  - Open source framework and application for managing CDS logic and deployments
  - Terminology/concept management, authoring & deployment of rules, and automated test case creation
  - Includes a web (UI) front end
- Simplifies authoring of reporting specifications
  - Two user views: RCKMS Administrator view, Jurisdiction view
  - Reporting specifications data entry simplified via grid format
  - Generated rules in a standards-based output
  - Ability to generate a "human-readable" view of any reporting specification

How the Authoring Tool works



1. Jurisdiction enters reporting criteria into authoring interface (website)
   - RCKMS tool comes pre-populated with **default reporting criteria** that users can choose to use, or customize to meet their jurisdictional needs
2. Information entered → stored in repository → Linked to decision support service
3. Jurisdiction can test whether criteria entered correctly by using test manager

Preconfigured Defaults for Each Condition ("out-of-the-box")

- Users may adopt reporting specifications "as is", or modify them
  - Users may simply accept the default rules for each condition if they wish
  - To modify defaults, select preconfigured "Criteria" to add or remove
  - If additional criteria desired, contact RCKMS team
- If Value Sets change, Authoring Tool and PH-DSS automatically accounts for changes
- If guidelines/logic change, RCKMS team updates Authoring Tool with *new* default rule logic and publishes new default rules; jurisdiction incorporate into local version

Default Reporting Specification (Chlamydia)

Manage Default Logic Sets — + Add Logic Set

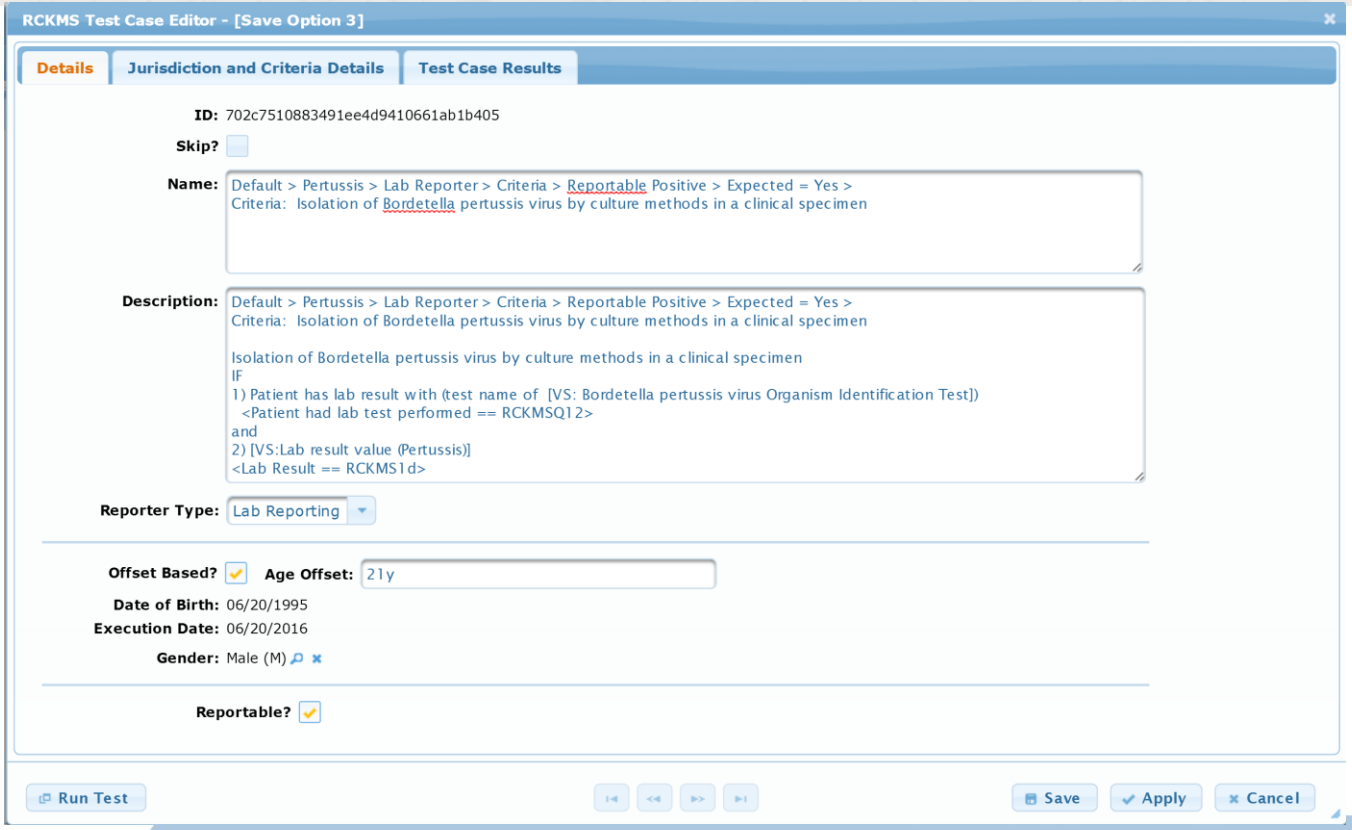
Logic Set Properties	Lab Reporting Logic Sets	Provider/Facility Reporting Logic Sets	
	Lab1	Dx	Lab
Reporting Timeframe	1 day(s)	1 day(s)	3 day(s)
Define Default Reporting Specifications			
Clinical			
Chlamydia (i.e., as a Diagnosis or active Problem or mentioned in text as a cause of death or a significant condition contributing to death)		Sufficient	
Death Record			
No criteria of this type			
Demographic			
No criteria of this type			
Epidemiologic			
No criteria of this type			
Laboratory			
All result values for laboratory tests specific for detecting chlamydia species organisms, nucleic acid, or antigen by any method in a clinical specimen (i.e., 'negative' and 'positive' results)			
All result values for laboratory tests specific for detecting chlamydia trachomatis organisms, nucleic acid, or antigen by any method in a clinical specimen (i.e., 'negative' and 'positive' results)			
Isolation of C. trachomatis by culture methods in a clinical specimen	Sufficient		Sufficient
Detection of C. trachomatis antigen by any method in a clinical specimen	Sufficient		Sufficient
Detection of C. trachomatis nucleic acid by any method in a clinical specimen	Sufficient		Sufficient

Save Apply Cancel

RCKMS Test Cases

- Test reporting specification logic under varying conditions to ensure correct operation
- Automated testing: run all tests at once or individually
- Accepts eICR file imports or manually entered tests
- User enters:
  - Test (sample) patient data inputs
  - Expected outputs:
    - Reportable: Yes/No
    - List of Criteria met
- Outputs:
  - Test pass/fail
  - Conditions that are reportable
  - List of Criteria met

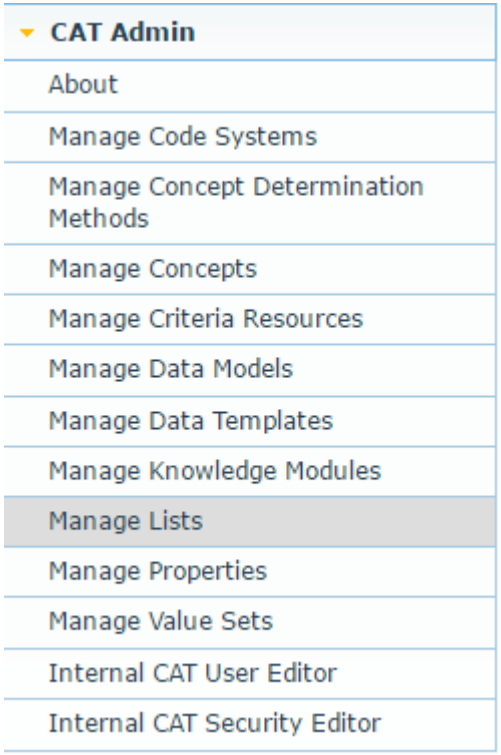
Test Case Editor



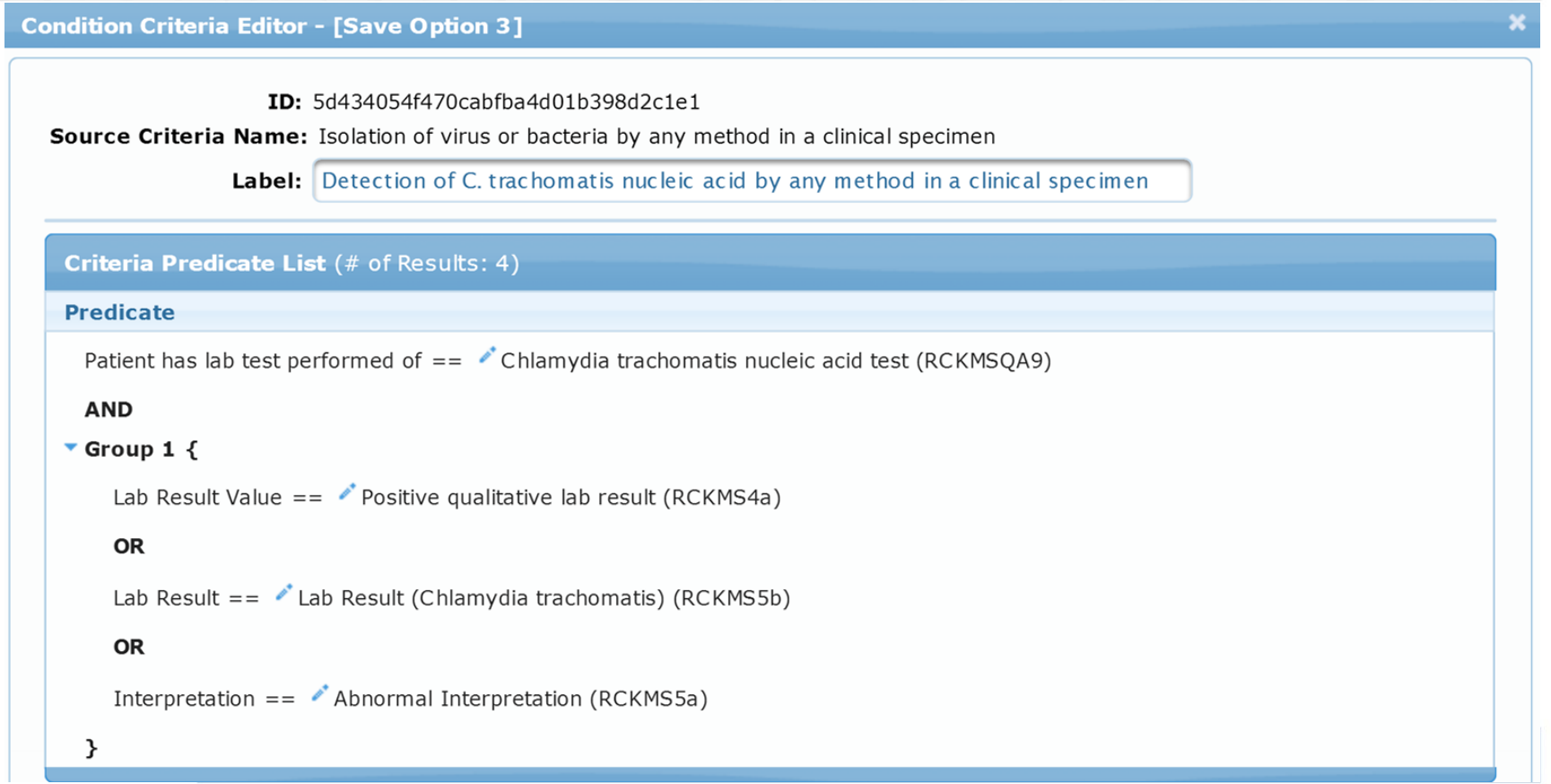
Deployment of Reporting Specification to PH-DSS

- Scheduled or On-Demand
- Deployed via REST service invocation to OpenCDS
- Concepts and Mappings deployed to PH-DSS (value sets, individual code system codes, and concepts)
- Intermediate representation of the rules as HL7 CQL Expression Logical Model (ELM) format (XML)
  - Standards-based, technology-agnostic, sharable representation
  - Facilitates additional verification of the rules, race condition checks
- Final executable representation of rules as Drools

RCKMS Administrator-Only Configuration Functions



RCKMS Administrator-Only Criteria Authoring



Questions?

Next Steps - Laura

Questions?