A Multi-purpose Evaluation of an Open Source Immunization Clinical Decision Support (CDS) Tool

Lauren E. Snyder, MPH; Katherine Chichester, BSN, RN;
Dean McEwen, MBA; Moises Maravi, MSc; Kathryn DeYoung, MSPH;
Lourdes Yun, MD; Kelly Gerard, MSHI; Arthur Davidson, MD, MSPH

Denver Public Health

Applied Public Health Informatics Fellowship

AIRA Conference, New Orleans, LA

April 22, 2015

Agenda

- Objective of presentation
  - Overview of evaluation
  - Key Terms
  - Background and need
  - Information about open source tool
- Clinical evaluation
  - Process model
  - Evaluation goals
  - Results
  - Challenges
- Population health evaluation – *in progress*
  - Alignment with Immunization Data workgroup/department activities
  - Evaluation goals/preliminary results
  - Challenges
  - Next steps

Presentation Objectives

- Share process, challenges, and lessons learned from evaluation of open source clinical decision support tool for use with immunization information

- Focus on evaluation methods, not results or tool specifications, as a potentially generalizable approach for CDS assessment in different settings

Key Terms and Acronyms

Open source - denotes software for which the original source code is made freely available and may be redistributed and modified.

Clinical decision support (CDS) - a key functionality of health information technology. When applied effectively, it increases quality of care, enhances health outcomes, helps to avoid errors and adverse events, improves efficiency, reduces costs, and boosts provider and patient satisfaction. (*Centers for Medicare and Medicaid Services*)

Key Terms and Acronyms

Immunization Calculation Engine (ICE) – open source CDS tool

Virtual Medical Record (vMR) – health record data structure that interfaces with ICE (*HL7 standard*)

Clinical Administrative Tool (CAT) – "back end" graphical user interface for ICE; allows users to manipulate rules for vaccine recommendations/ schedules

VaxTrax – Denver Health local/in-house immunization information system

Colorado Immunization Information System (CIIS) – statewide immunization information system

Multi-purpose Evaluation
2 Use Cases: *Up to Date (UTD) Calculations*

Focus	Clinical	Population health
Level of intervention	Patient	Community
Environment	Clinic/hospital	Public health agency
Evaluation goal(s)	• Patient-specific recommendation accuracy • Interoperability with Vax Trax • Flexibility of rules • Reliability of system	• Population-specific UTD accuracy • Interoperability with CIIS • Automation of input and output • Scalability • Historical accuracy

Background and Need

Clinical level:

- In-house, recommend functionality built
  - Costly and not timely to update recommendation
  - Not designed for population/public health analysis

LPH Department level:

- Manual process to calculate UTD rates
  - Labor intensive
  - Created for each vaccine group, as needed
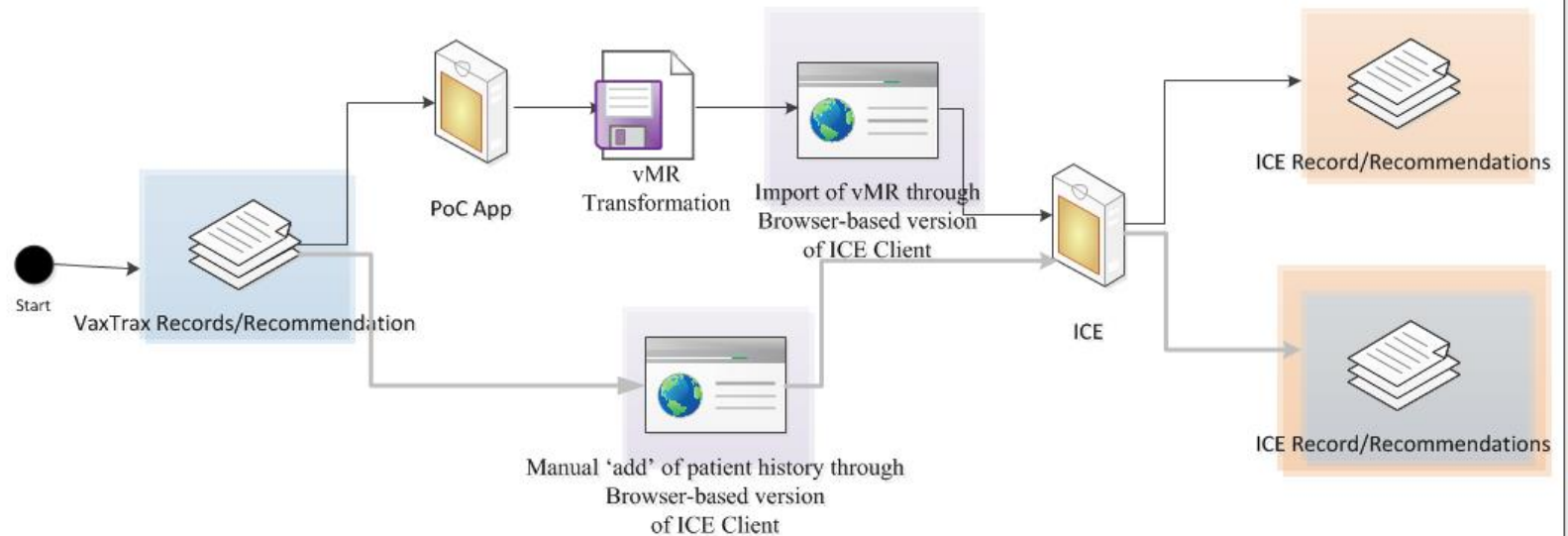
Immunization Calculation Engine

- Tool to support Clinical Decision Support for Immunizations (CDSi)

- Collaboratively developed

- Open source/freely available

- User friendly interface

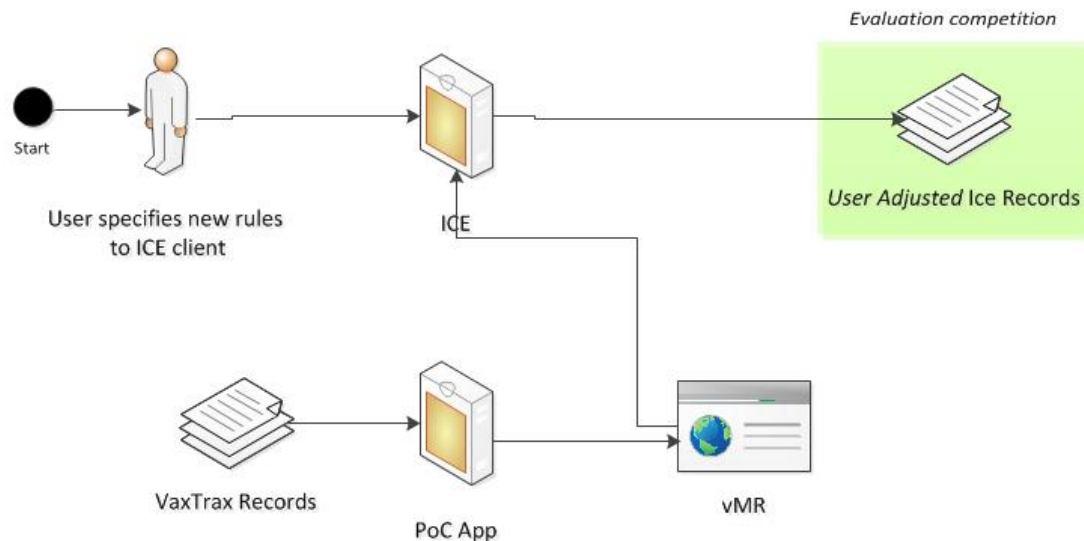- Clinical decision support Administrative Tool (CAT)

References: https://cdsframework.atlassian.net/wiki/display/CDSF/ICE
http://hln.com/ice/

Phase 1: Comparisons – Patient history and Recommendations

Start

VaxTrax Records/Recommendation

PoC App

vMR Transformation

Import of vMR through Browser-based version of ICE Client

Manual 'add' of patient history through Browser-based version of ICE Client

ICE

ICE Record/Recommendations

ICE Record/Recommendations

Note: Colors represent a point of comparison or evaluation

Phase 2: Flexibility Assessment

Start

User specifies new rules to ICE client

ICE

Evaluation competition

User Adjusted Ice Records

VaxTrax Records

PoC App

vMR

© 201

Phase 1: Vaccine History and Recommendation Comparison

Identify or create set of patients

Process through system (ICE)

Compare recommend-ations

Identify or create set of test patients → **Process with tool (ICE)** → **Compare recommendations** → **Manipu late the system**
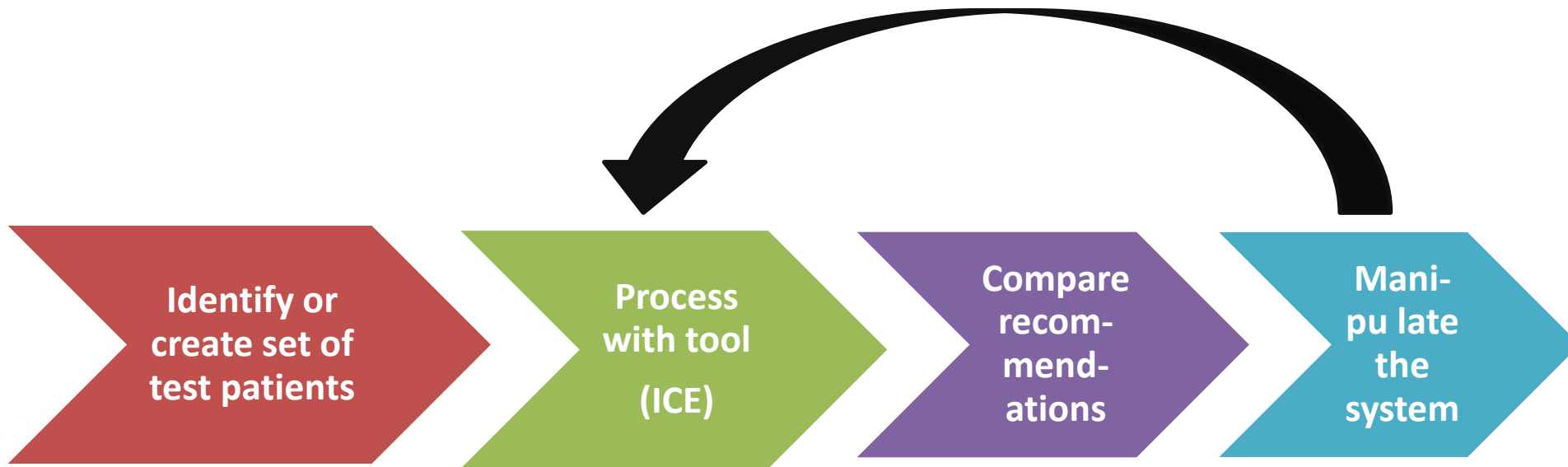
Alignment with Evaluation Goals

Identify or create set of test patients

Process with tool (ICE)

Compare recomme- ndations

Manipu - late the system

Interoperability with Vax Trax

Patient-specific recommendation accuracy

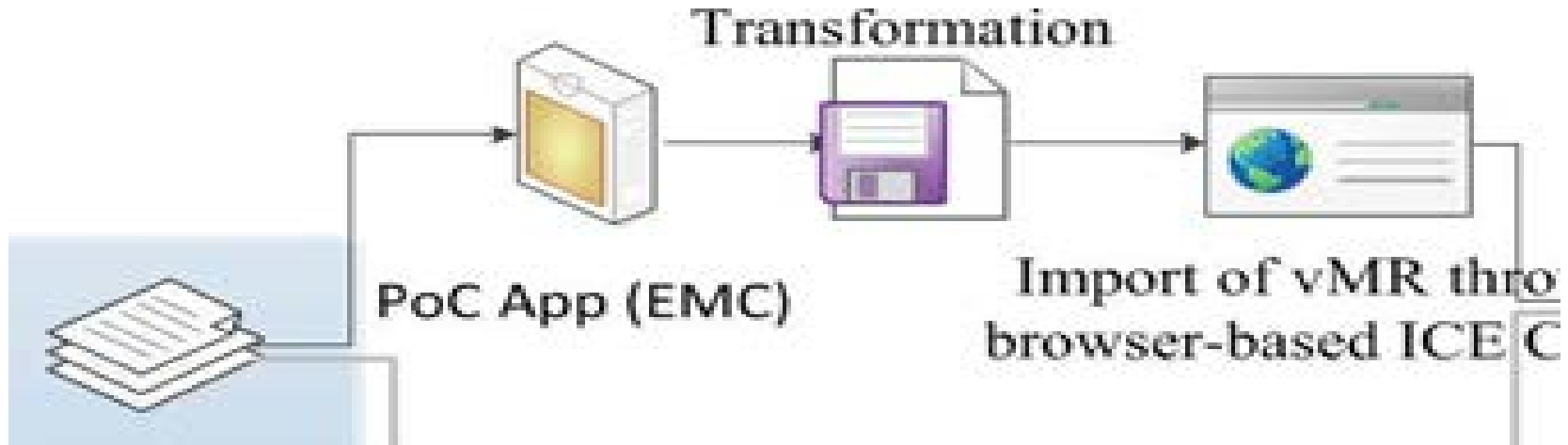Flexibility with rules

Reliability of system
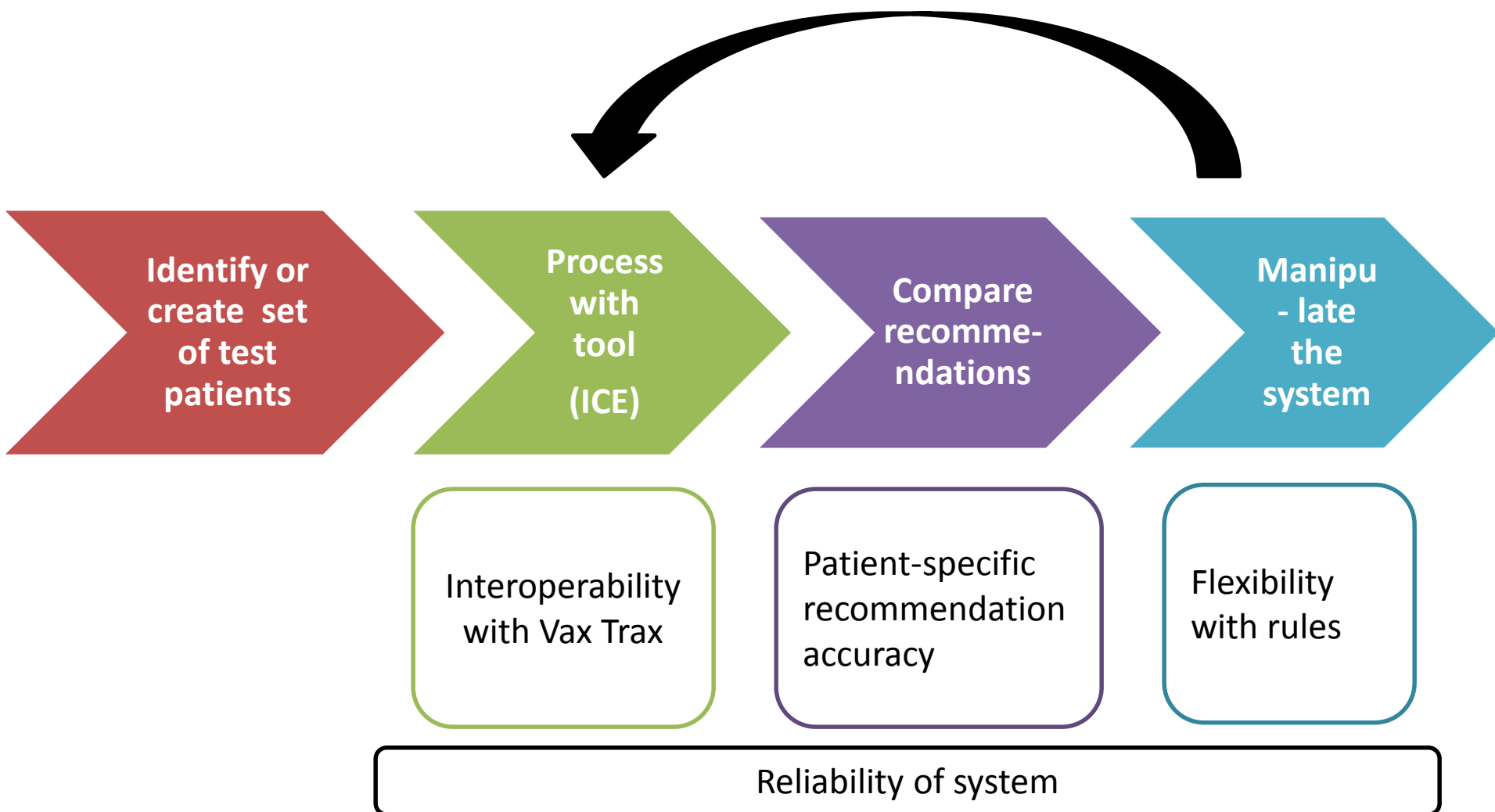
Results

- 40 test cases covered a spectrum of ages, Up To Date statuses, and histories
  - Included both created and identified test patients
- 3 categories of identified issues
  - Influenza season
  - Hep A schedule
  - Support for Zoster
    - First 2 easily and accurately fixed using CAT

- Proof-of-Concept (PoC) app developed for interoperability
  - Lays foundation for future interface

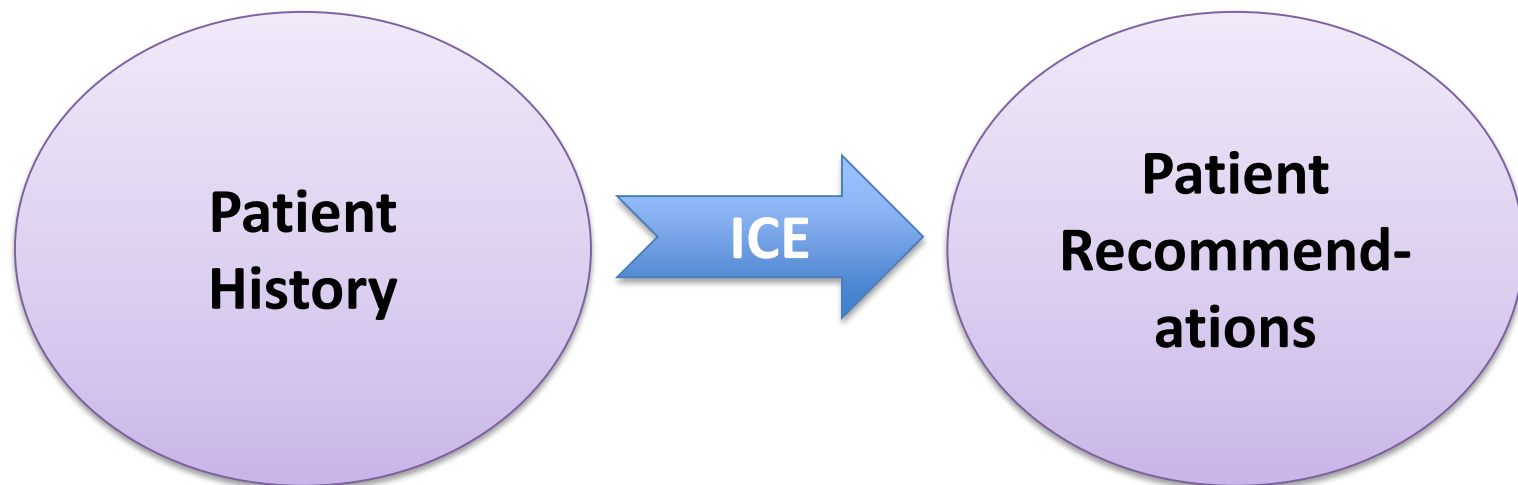| Priority	Not Tested	Testing Results			Notes
	Tested	Failed	Moderate	Successful	
Patient-specific recommendation accuracy				X	
Interoperability with Vax Trax			X		As a PoC, successful
Flexibility with rules				X	
Reliability of system			X		Other instances have shown success

Challenges

- Evaluation date

  – Needs to be the same for comparison purposes

- Interoperability

  – We have developed a Proof-of-Concept application, but need to understand better how ICE and our IIS interface

- Time intensive

  – Currently working record by record
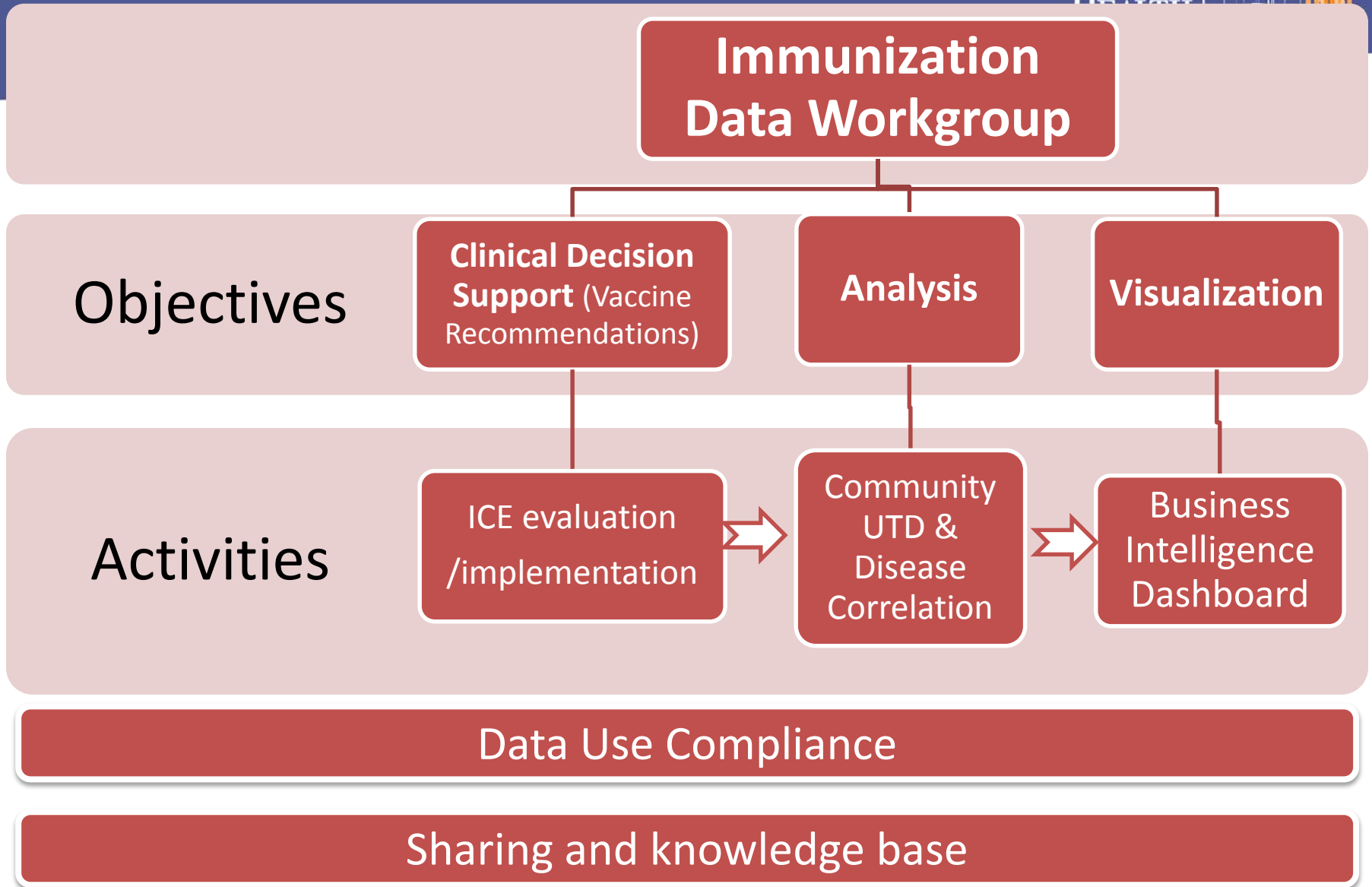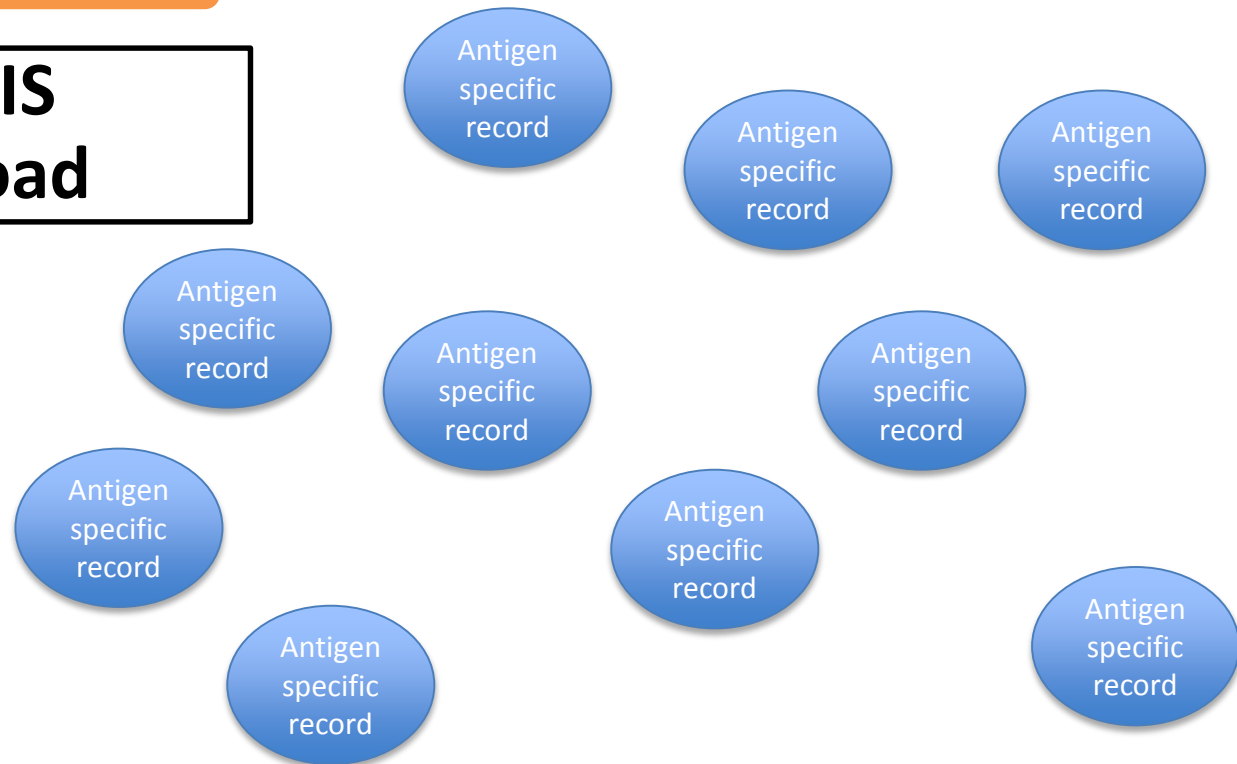
Differences in Implementation

Clinical

Patient History → **ICE** → Patient Recommend-ations

Differences in Implementation

Population health

State IIS Download

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record

Differences in Implementation

Population health

Input / Output - ICE

Patient Record/Status

Antigen specific record

Patient Record/Status

Antigen specific record

Antigen specific record

Antigen specific record

Patient Record/Status

Antigen specific record

Antigen specific record

Antigen specific record

Antigen specific record
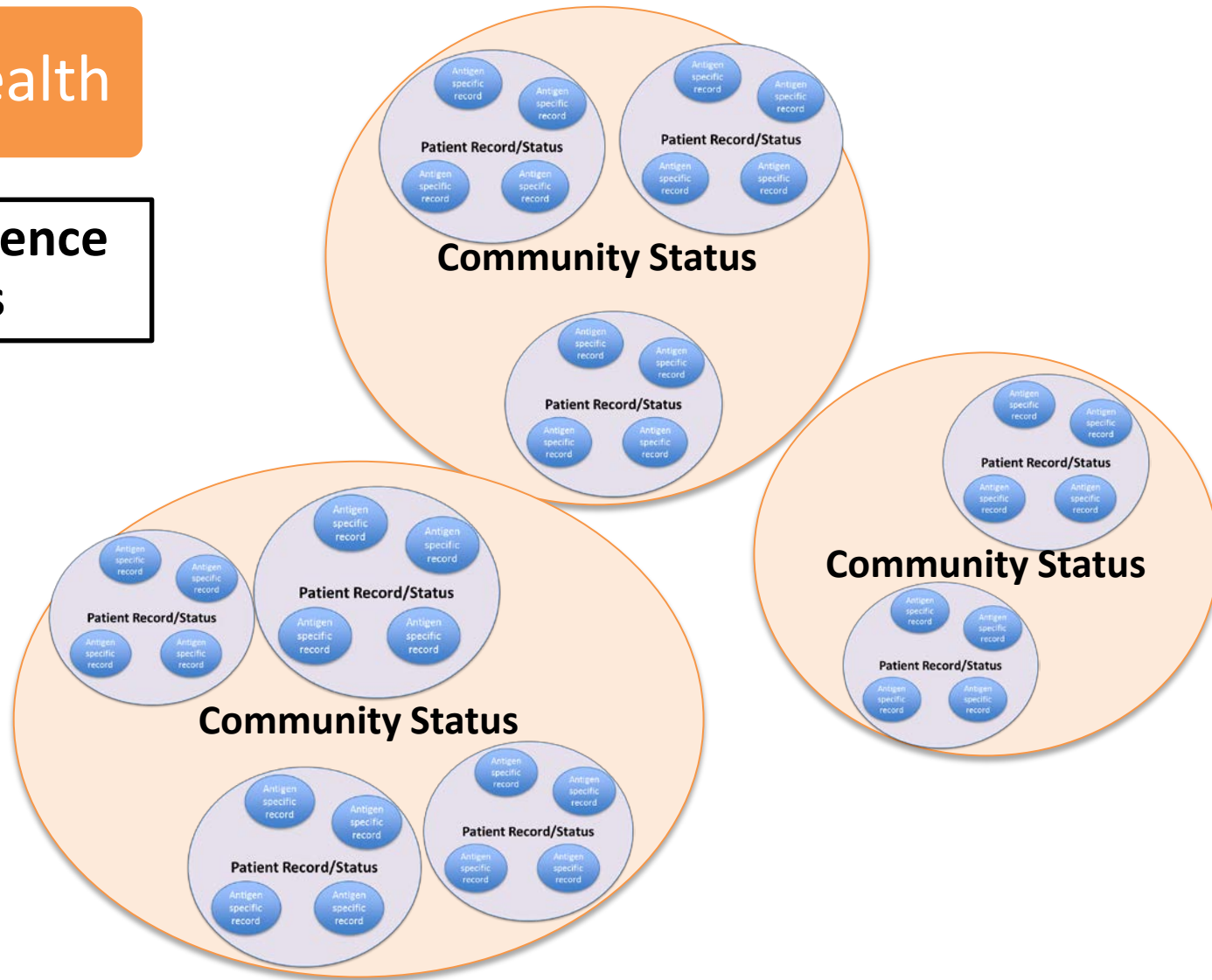
Patient Record/Status

Antigen specific record

Antigen specific record
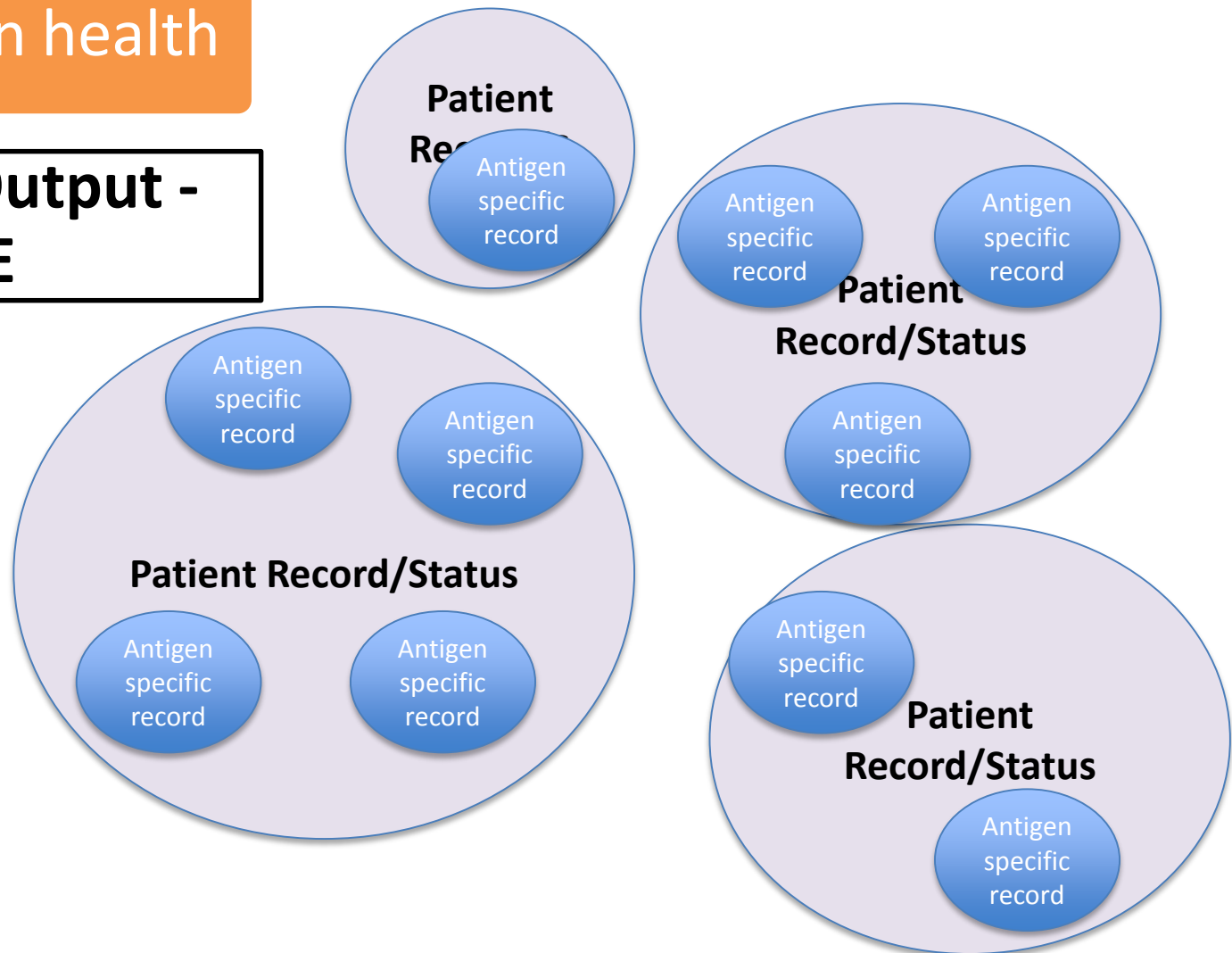
Differences in Implementation

Population health

Business Intelligence Dashboards

Priority	Not Tested	Testing Results			Notes
		Failed	Moderate	Successful	
Population specific UTD accuracy			X		Need to determine Max's ; could tell amount that are due for Vx, but not overdue
Interoperability with CIIS			X		Manual, but possible, at this time
Automation of input and output	X				
Scalability	X				
Historical accuracy	X				

Challenges

- Past due/max of schedule
  - For Up To Date community rates, need to be able to identify who are truly late for a vaccine, rather than who are eligible for one

- Contraindications
  - Not built into out-of-the-box tool, but exploring how this may be included in rules

- Flu seasonality
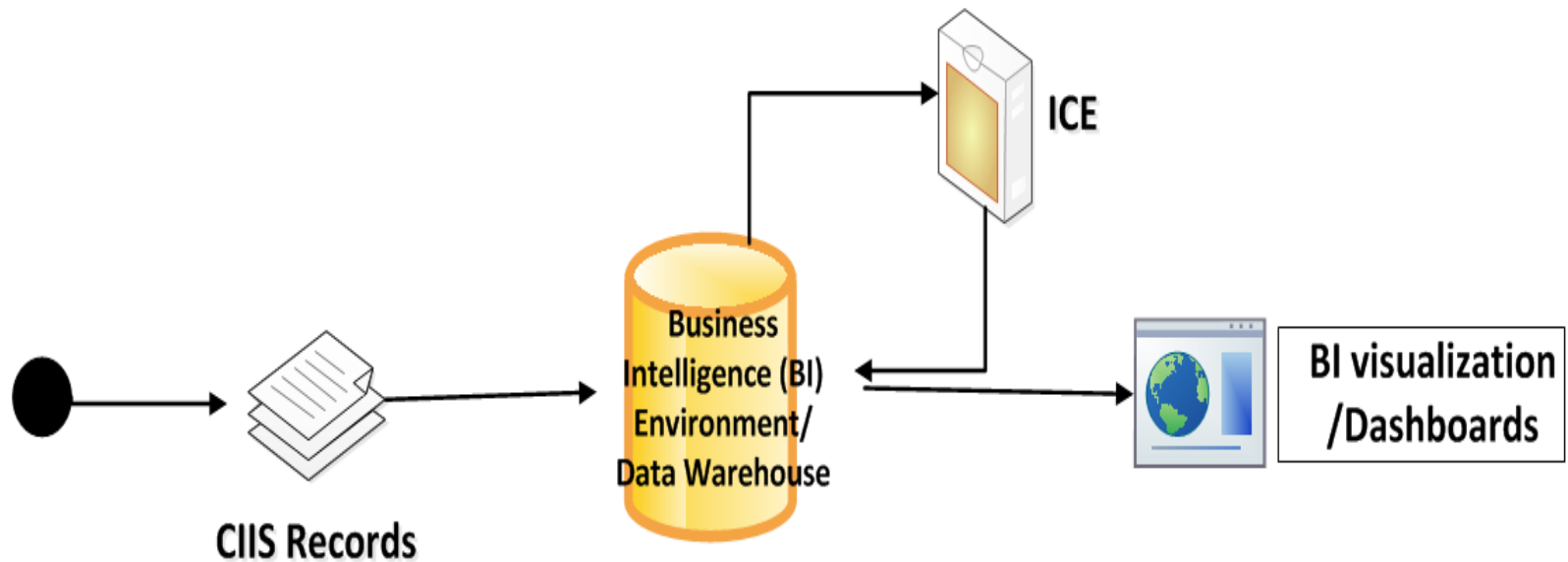 - Historical variability needed for longitudinal analysis

Next Steps

- Scalability
  - How do we run 7 million records every month in a timely way?

- Interoperability
  - How would this tool work 'live' with existing infrastructure?

- Full spectrum of vaccines of interest
  - How do we incorporate Zoster?

Next Steps

- Visualizations

STRENGTHENING HEALTH SYSTEMS THROUGH INTERPROFESSIONAL EDUCATION

A collaboration between the Association of State and Territorial Health Officials, Centers for Disease Control and Prevention, the Council of State and Territorial Epidemiologists, the National Association of County and City Health Officials, and the Public Health Informatics Institute.

Vision Statement: *Illuminate pathways for professionals, organizations, and communities to achieve a collective, transformative, and sustainable impact on population health.*

Thank you!

Lauren E. Snyder, MPH

Applied Public Health Informatics Fellow

Denver Public Health

Lauren.snyder@dhha.org

To learn more about Project SHINE, check out our website:
http://shinefellows.org