# Immunization Calculation Engine (ICE)

## an Open Source Clinical Decision Support System for Integration with Health Information Systems

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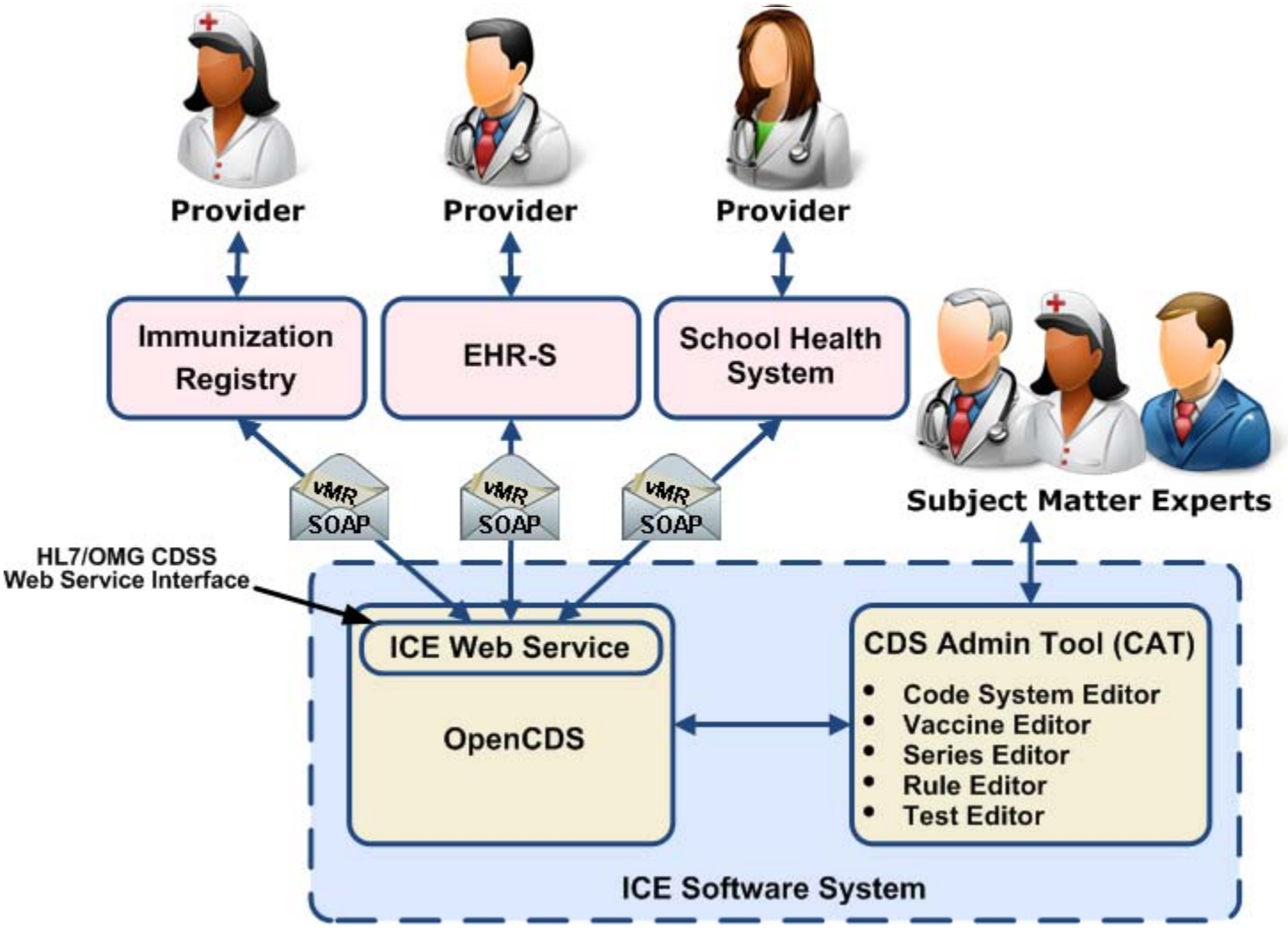
# OpenCDS

- Software platform and toolkit for developers implementing CDS services
- Open source
- Standards-based
- Web Service interface
- Collaborative project, led by Dr. Kensaku Kawamoto at University of Utah

www.opencds.org

# Sample ICE Deployment



# ICE Collaborators

- New York City Citywide Immunization Registry
- HLN Consulting, LLC
- Alabama Department of Public Health
- OpenCDS Team
- Veterans Health Administration
- Pfizer

# ICE Roadmap

- Evaluate Pneumococcal Conjugate and Polysaccharide vaccines as a single vaccine group
- Updates to Polio Schedule
- Updates to Flu schedule
- Support for Meningococcal B (new!)
- Support for HALO factors (health, age, lifestyle, occupation)
- Support Past Due Date

# Deployments of ICE

- National EHR – eClinicalWorks (December 2013)
- National PHR – CareDox (November 2014)
- Denver Public Health (July 2016)
- Veteran's Administration (on VA Test server since July 2016)
- New York City IIS (Scheduled for Summer 2017)
- New Jersey IIS (In the process of scheduling…)

# Learn More About ICE Through…

- ICE Wiki (cdsframework.org)
- HLN's ICE Webpage (www.hln.com/ice)
- Executable software distribution
- Source code
- HLN-hosted test instance
- Software Demonstrations

# Immunization Calculation Engine

An immunization decision support system that:

| **Objective** | **Achievement** |
|---|---|
| Supports routinely administered vaccine groups | • Supports 14 vaccine groups from birth through adulthood |
| Promotes clinical best practices | • Follows ACIP recommendations<br>• Informed by CDC's CDSi project |
| Adapts to changing requirements | • Rule editing GUI tool for non-technical SMEs<br>• Automated testing tool w/ 2,400 test cases |
| Easily integrates with IIS and other health systems | • Standards-based, web service interface<br>• Variety of deployment options |
| Freely available | • Standard open-source license<br>• Downloadable from public website |

# Contact Us for More Information

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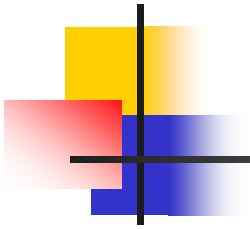


# Software Architecture

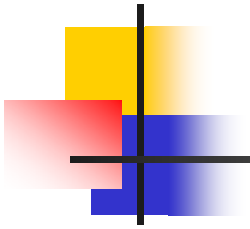
- ICE/OpenCDS
  - Servlet Container (Java EE 6 or 7 compliant)
  - JBoss Drools (rule engine/database)
  - HL7 Decision Support Service "DSS" (web service interface)
  - HL7 Virtual Medical Record "vMR" (data model)
- CAT
  - Application Server (Java EE 6 compliant)
  - JavaServer Faces (GUI)
  - Enterprise JavaBeans (business logic)
  - JDBC compliant database

# Inputs to ICE

- Patient parameters
  - Date of birth
  - Gender
  - Immunization history (vaccine and admin date)
  - Disease immunity
- Situational parameters
  - Immunization schedule identifier
  - Date of evaluation

# Outputs from ICE

- Evaluation of each dose
  - Evaluation = Valid, Invalid, or Accepted
  - Invalid Reason(s), for each Invalid dose
- Recommendation for each vaccine group
  - Recommendation = Recommended, Future recommended, Conditional, or Not recommended
  - Earliest recommended due date
  - Reason



# Easy to Adopt and Integrate With

- Open source (GNU LGPL v3)
- Java-based system runs on a wide variety of sever platforms
- Can be deployed in a variety of ways
- Standards-based Web Service interface
- Public wiki – binary releases, source code, implementation guide, immunization rules