

# OpenCDS: Enabling Clinical Decision Support at Scale through Open-Source, Standards-Based Software and Resources

Kensaku Kawamoto, MD, PhD; David Shields; and Guilherme Del Fiol, MD, PhD

Department of Biomedical Informatics and Office of the Associate Vice President for Health Sciences IT  
University of Utah, Salt Lake City, UT

## Introduction

- Robust clinical decision support (CDS) is not widely available
- An important reason is the prevalence of non-standard and proprietary approaches to implementing CDS
- OpenCDS ([www.opencds.org](http://www.opencds.org)) is a multi-institutional effort to collaboratively develop open-source, standards-based CDS tools and resources that can be widely adopted to impact health care at scale

## Key Components

### Standard Interface & Data Model

- HL7/OMG Decision Support Service interface
- HL7 Virtual Medical Record data model

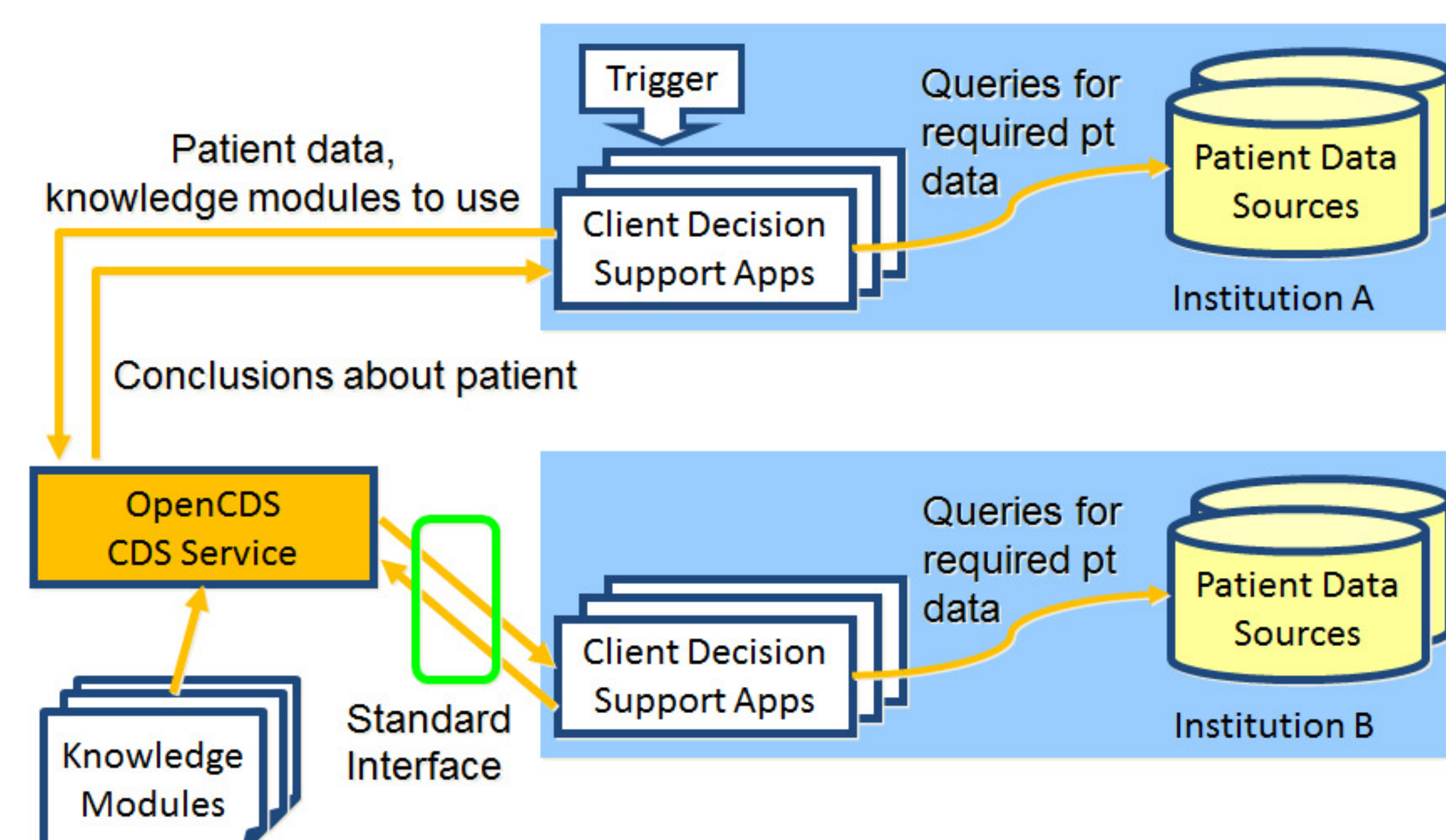
### Knowledge Management Framework and Content

- Enables authoring, testing, and deployment of knowledge modules as a CDS Web service
- Web-based, clinician-friendly knowledge management platform leveraging JBoss Drools
- Apelon DTS terminology support
- Knowledge repository and growing open-source CDS content

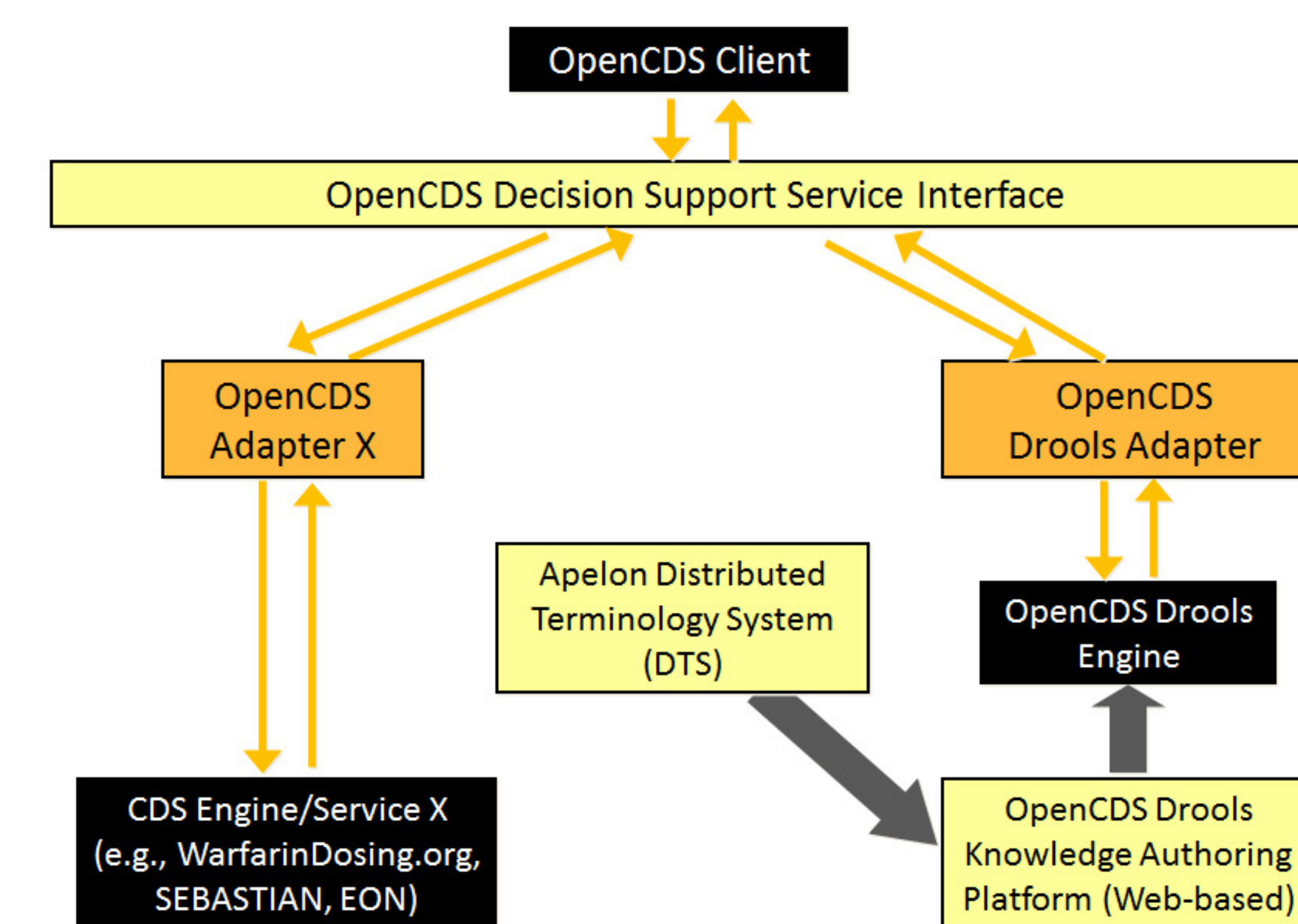
### Adapters for Other CDS Engines

- Enables CDS implemented using alternate approaches to be served up through standard HL7 Decision Support Service interface

## High-Level Interaction Model



## High-Level System Architecture



## Sample Application Areas

### Vaccine Forecasting

- Partners: HLN Consulting, LLC; New York Citywide Immunization Registry; Alabama Department of Public Health
- Implementing open-source, next-generation knowledge authoring, maintenance, testing, and execution environment for vaccine forecasting
- All rules will be made open-source

### Personalized Medicine

- Partners: Intermountain Healthcare, Washington University, IsoDynamic
- Implementing risk assessment algorithms utilizing family health histories
- Enabling service-based access to genetically-guided warfarin dosing algorithms of [www.WarfarinDosing.org](http://www.WarfarinDosing.org)

### Enterprise Quality Reporting & CDS

- Partner: University of Utah Health Care
- In process of leveraging OpenCDS for enterprise quality reporting and population health management

## Current State & Future Directions

- Alpha release available through an Apache 2.0 license via [www.opencds.org](http://www.opencds.org)
- 1.0 preview available to collaborators
- 1.0 release scheduled December 2011

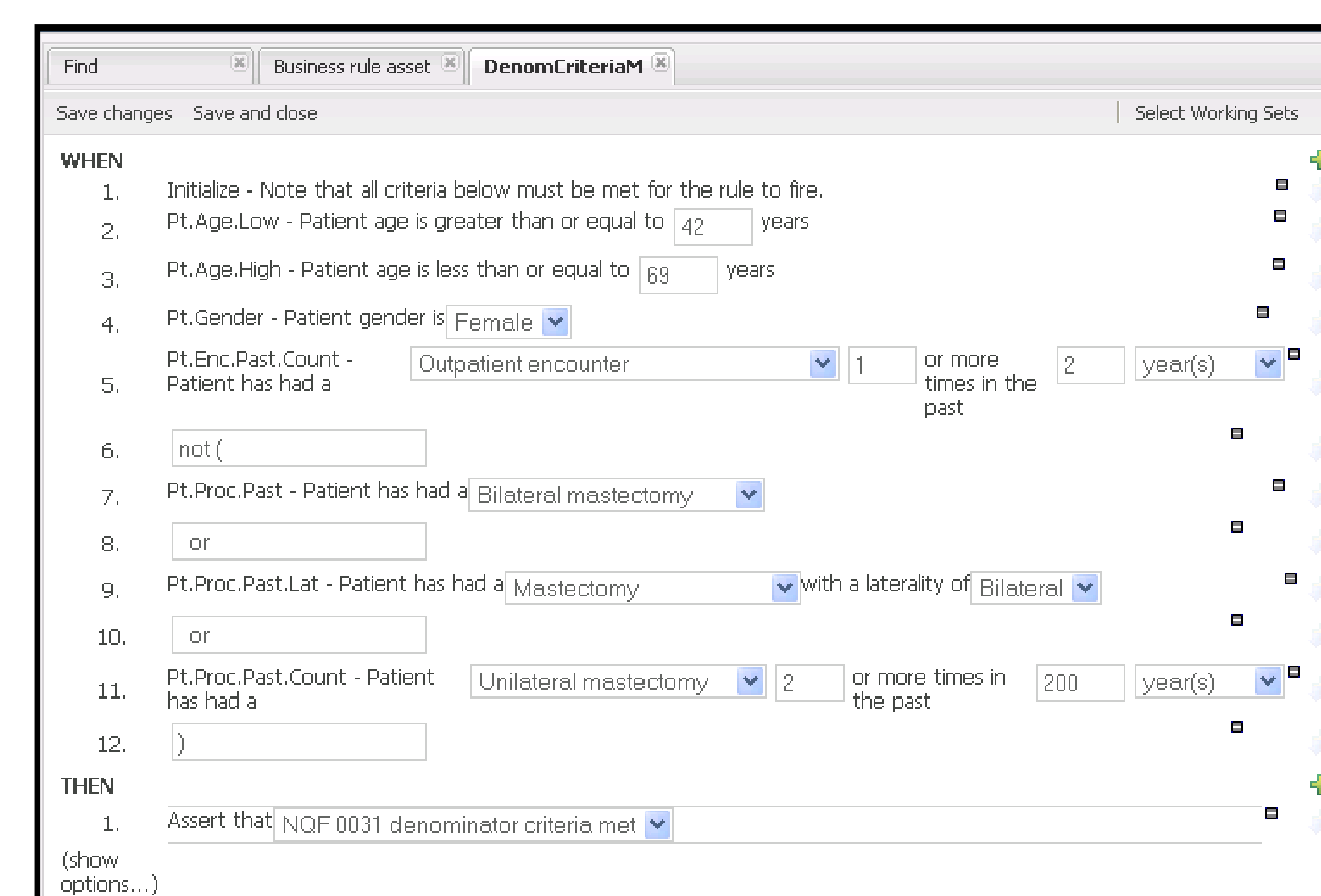
## Acknowledgements

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OpenCDS collaborators ([www.opencds.org](http://www.opencds.org)) → Collaborators)

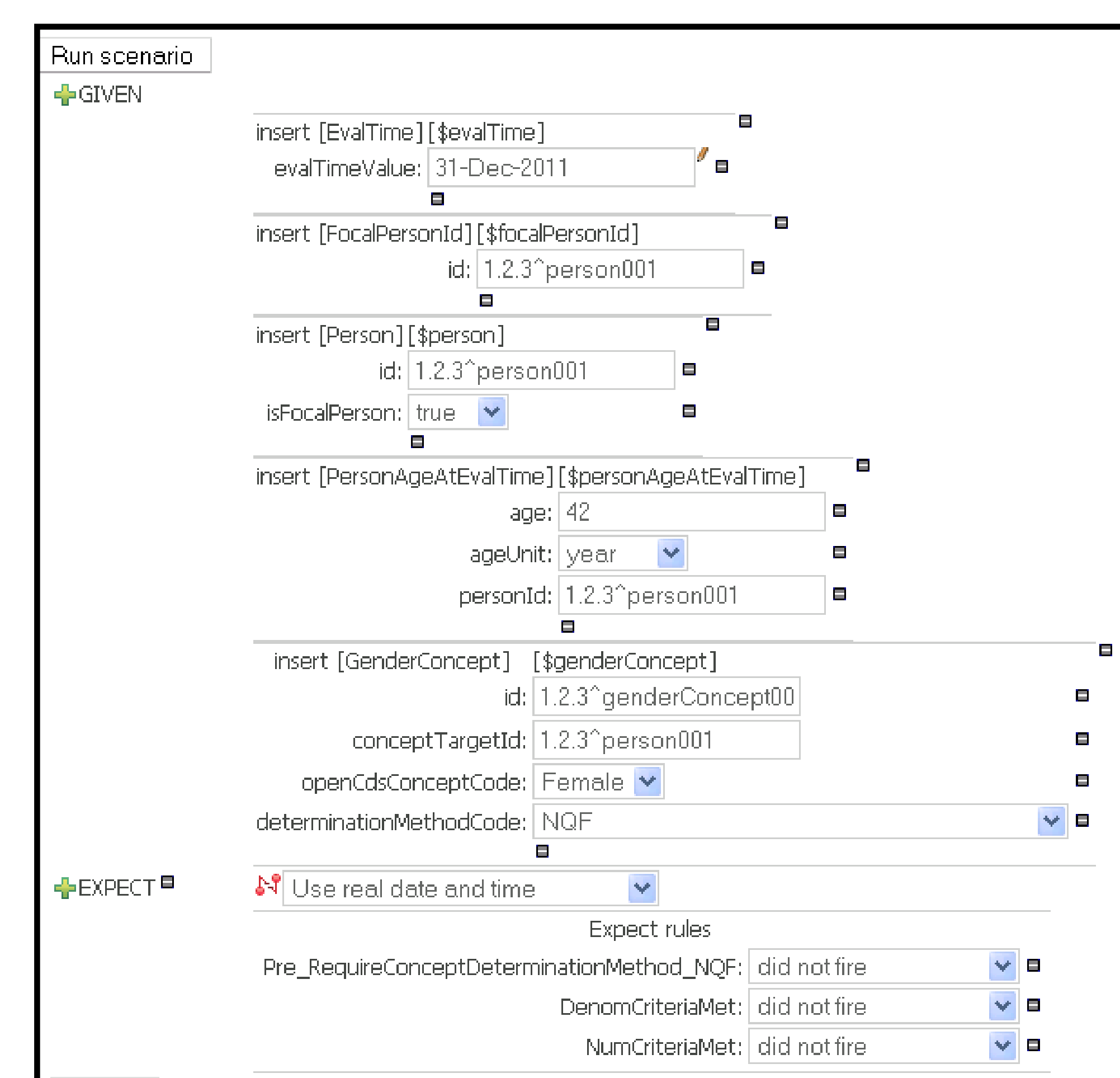
## Contact Information

Kensaku Kawamoto, MD, PhD  
Founder, OpenCDS  
[kensaku.kawamoto@utah.edu](mailto:kensaku.kawamoto@utah.edu)

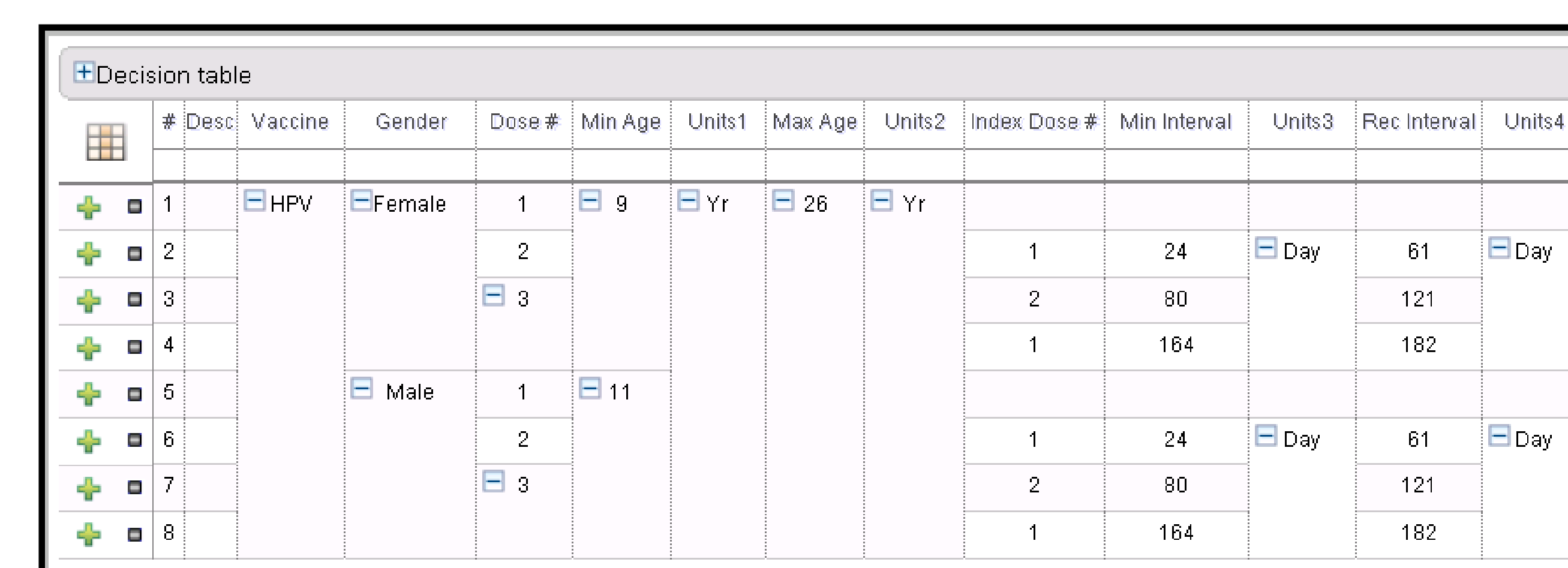
## OpenCDS Screenshots



Implementation of NQF Measure 31 for Meaningful Use (Web-based)

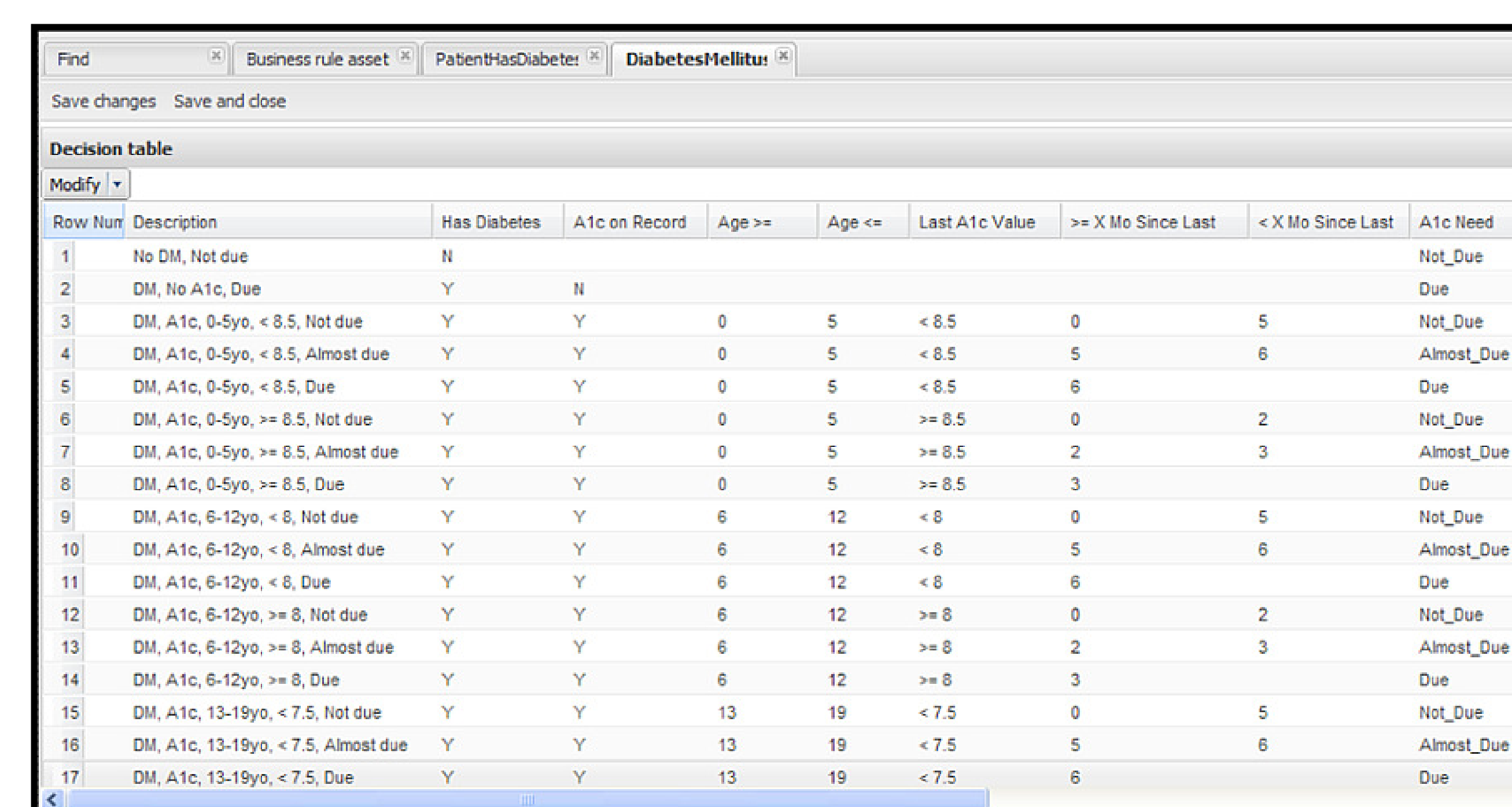


Test Scenario Specification (Web-based)



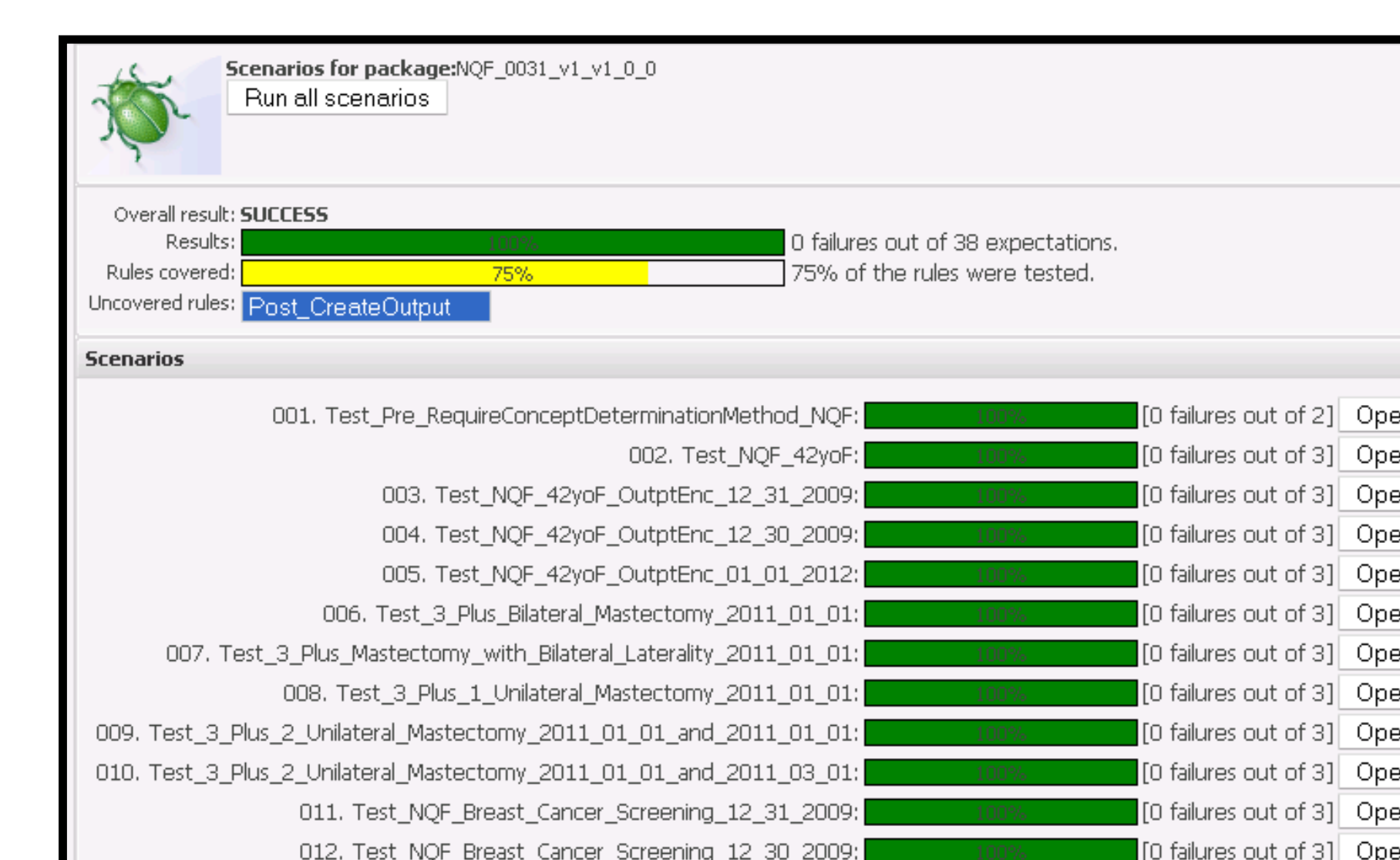
#	Desc	Vaccine	Gender	Dose #	Min Age	Units	Max Age	Units2	Index Dose #	Min Interval	Units3	Rec Interval	Units4
1		HPV	Female	1	9	Yr	26	Yr					
2				2					1	24	Day	61	Day
3				3					2	80		121	
4									1	164		182	
5			Male	1	11								
6				2					1	24	Day	61	Day
7				3					2	80		121	
8									1	164		182	

Implementation of HPV Vaccination Schedule (Web Decision Table)



Row Num	Description	Has Diabetes	A1c on Record	Age >	Age <=	Last A1c Value	>= X Mo Since Last	< X Mo Since Last	A1c Need
1	No DM, Not due	N	N						Not_Due
2	DM, No A1c, Due	Y	N						Due
3	DM, A1c, 0-5yo, < 8.5, Not due	Y	Y	0	5	< 8.5	0	5	Not_Due
4	DM, A1c, 0-5yo, < 8.5, Almost due	Y	Y	0	5	>= 8.5	5	6	Almost_Due
5	DM, A1c, 0-5yo, < 8.5, Due	Y	Y	0	5	>= 8.5	6		Due
6	DM, A1c, 0-5yo, >= 8.5, Not due	Y	Y	0	5	>= 8.5	0	2	Not_Due
7	DM, A1c, 0-5yo, >= 8.5, Almost due	Y	Y	0	5	>= 8.5	2	3	Almost_Due
8	DM, A1c, 0-5yo, >= 8.5, Due	Y	Y	0	5	>= 8.5	3		Due
9	DM, A1c, 6-12yo, < 8, Not due	Y	Y	6	12	< 8	0	5	Not_Due
10	DM, A1c, 6-12yo, < 8, Almost due	Y	Y	6	12	< 8	5	6	Almost_Due
11	DM, A1c, 6-12yo, < 8, Due	Y	Y	6	12	< 8	6		Due
12	DM, A1c, 6-12yo, >= 8, Not due	Y	Y	6	12	>= 8	0	2	Not_Due
13	DM, A1c, 6-12yo, >= 8, Almost due	Y	Y	6	12	>= 8	2	3	Almost_Due
14	DM, A1c, 6-12yo, >= 8, Due	Y	Y	6	12	>= 8	3		Due
15	DM, A1c, 13-19yo, < 7.5, Not due	Y	Y	13	19	< 7.5	0	5	Not_Due
16	DM, A1c, 13-19yo, < 7.5, Almost due	Y	Y	13	19	< 7.5	5	6	Almost_Due
17	DM, A1c, 13-19yo, < 7.5, Due	Y	Y	13	19	< 7.5	6		Due

Diabetes Hemoglobin A1c Management Module (Web Decision Table)



The screenshot shows a web-based interface for batch regression testing. It displays a progress bar and a list of test scenarios with their results. The overall result is 'SUCCESS'. The list includes scenarios like 'Test\_Pre\_RequireConceptDeterminationMethod\_NQF' and 'Test\_NQF\_42vof'.

Batch Regression Testing (Web-based)