Texas Children's Hospital Forecast Tester: How It Can Improve Your Forecaster

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Objectives

- Understand the current reality and future vision of Immunization Forecasters and testing systems.
- Learn TCH Forecast Tester terminology.
- Observe the TCH Forecast Tester.
- Appreciate how the TCH Forecast Tester can be used to improve forecasting results.

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Current Reality and Future Vision

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Current Reality

- Lack of national standard for Forecasters
- Forecaster Testing
  - Forecasters may not directly support testing
  - Lack of organizational capacity for testing
- Non-standard Integration
  - Forecaster built directly into IIS or EHR
  - Separate system with custom or proprietary access method

Vision for Future

- **Standardization**
  - Forecaster results are consistent across different systems
- **Accurate**
  - Based on most recent ACIP/CDC recommendations
- **Universally and easily accessible**
  - Standard part of continuity of care

TCH Forecast Tester Terminology

- **Expert** – a forecast tester user who can give opinions on correct forecast results
- **Task Group** – a set of experts that work together to create sets of tests
- **Test Panel** – a collection of test cases
- **Test Case** – a single scenario with expected answers
- **Software** – a forecaster that can evaluate a test case and give an answer
- **Expected Results** – exactly what an expert indicates the results for a specific test case should be
- **Actual Results** – exactly what a Forecast returns for a specific test case

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Proposed Solution

- One central system for testing Forecasters
- System with ability to maintain database of:
  - Test cases and expected results from the experts
  - Opinions and notes from experts
  - Actual results from any connected Forecaster
- System with technical ability to:
  - Connect multiple Immunization Forecasters
  - Compare immunization expert guidance/opinions and Actual vs. Expected results within and across different Immunization Forecasters

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How Solution Would Realize Vision

- **Standardization**
  - Verify if actual results match across Immunization Forecasters from different organizations
  - Differences found can point to specific areas that need further clarification
- **Accurate**
  - General consensus from all Forecaster Experts Expected Results
  - Immunization Forecasters can be both tested and utilized as reference Forecasters
- **Universally accessible**
  - Provides opportunity for the development and promotion of a national web service standard for Forecast integration

Current Collaborators

- Texas Children's Hospital
- Indian Health Services (IHS)
- Virginia Department of Health (VDH)
- Massachusetts Immunization Information System (MIIS)
- Scientific Technologies Corporation (STC)
- HLN Consulting, LLC who support the Immunization Calculation Engine (ICE)
- Contra Costa County

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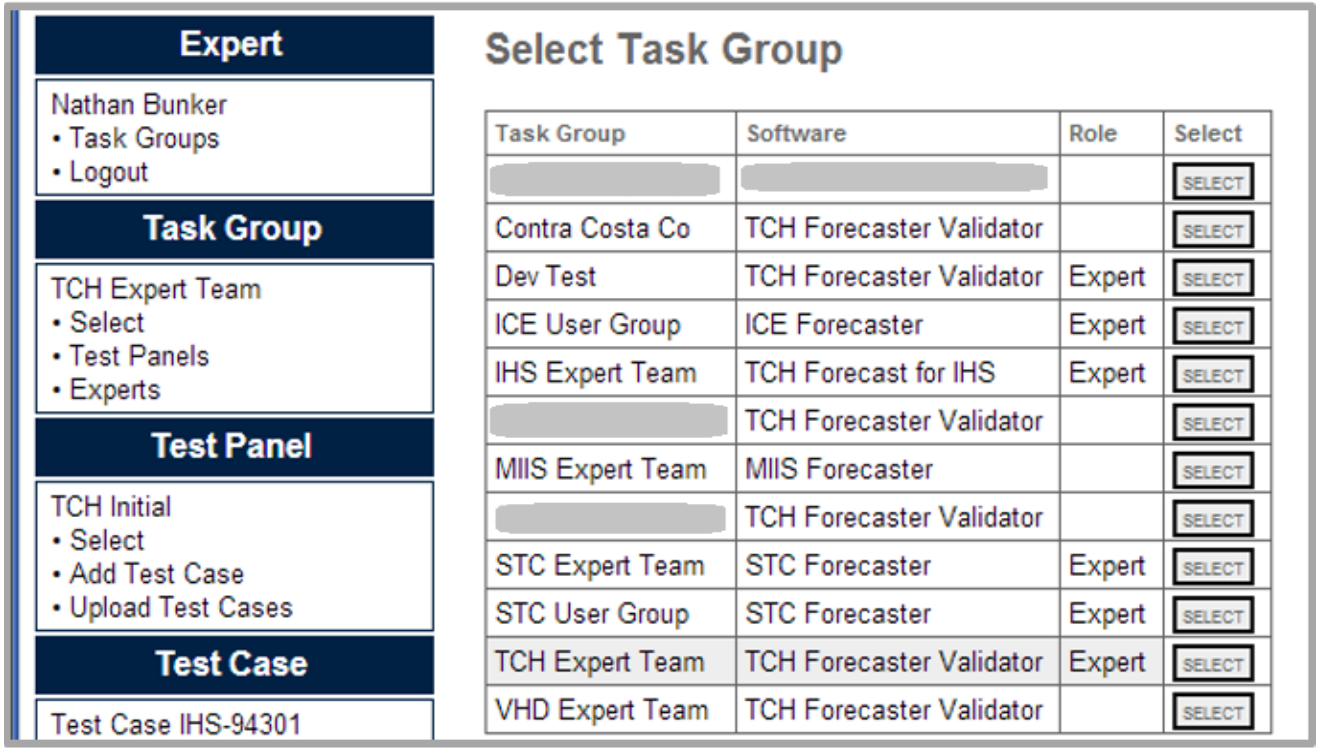
TCH Forecast Tester

Registration and Login

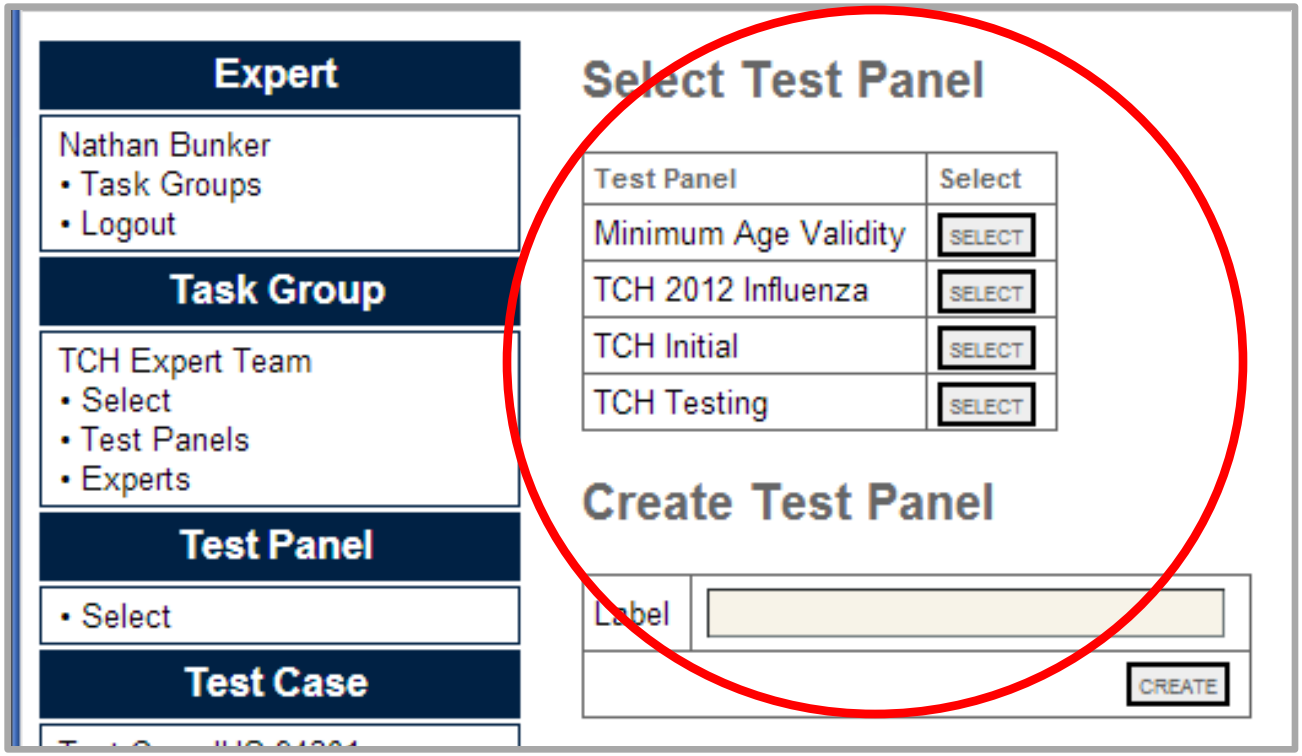
- Click Register to request an account.
- You will be emailed your password for access.
- A current TCH Forecast Tester user must add you as an expert to at least one Task Group.
- Once registration is complete, you can login, add and view test cases.
- Option to reset password.

Task Groups



- All task groups are visible to all users.
- Any task group can be selected by any user.
- All test cases within a task groups are visible to all users.
- Only users assigned to a task group can add test cases.

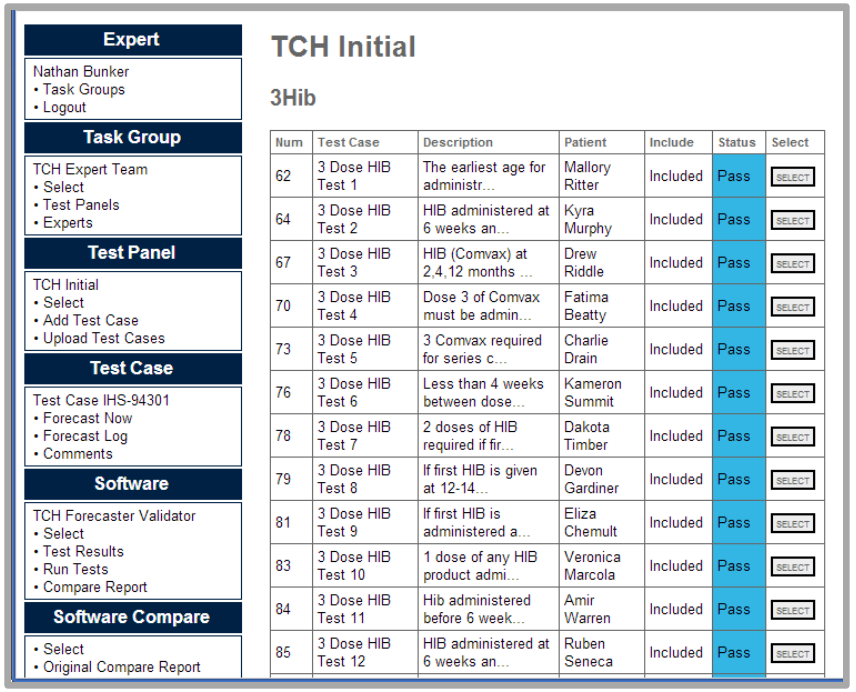
Test Panel



- Test Cases are organized under Test Panels.
- Users assigned to Task Group can create new Test Panels.

Test Panel

- Test Cases are organized under the Test Panel.
- Test Cases are sorted under a section heading.
- The section heading is defined by the Task Group.

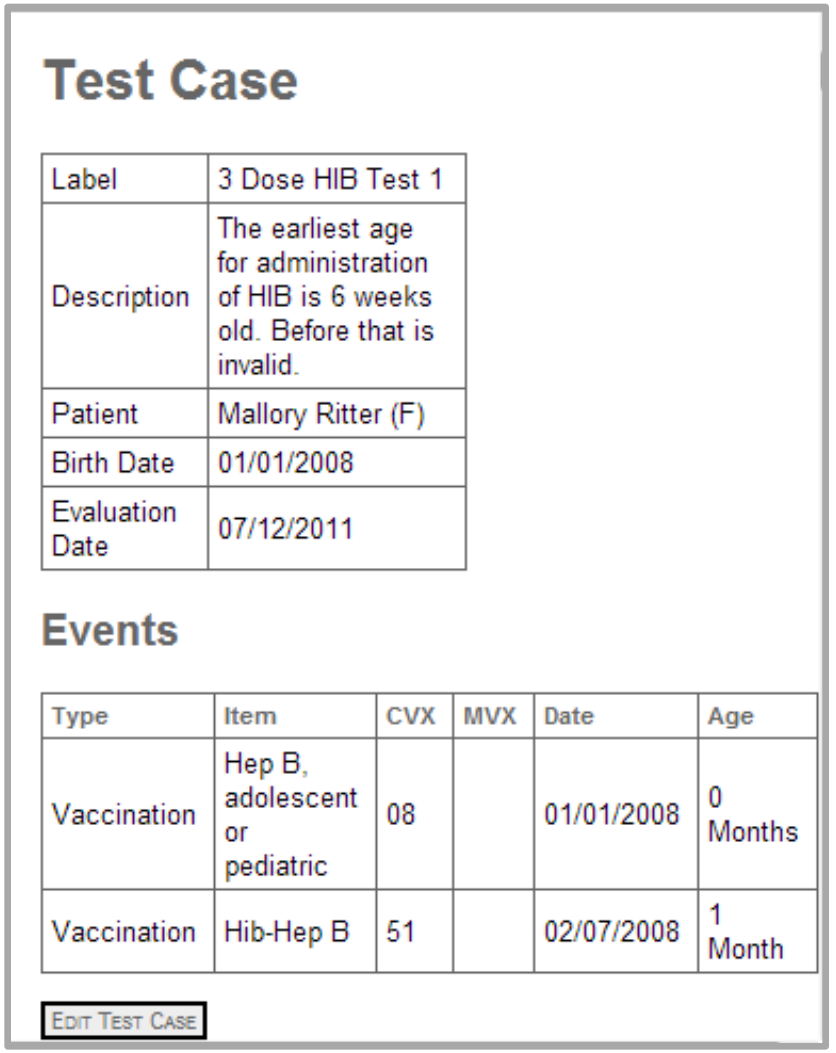


Test Panels Currently Available

- Texas Children's Hospital Test Cases
- Massachusetts Immunization Information System Test Cases
- Clinical Decision Support for Immunizations (CDSi) Test Cases
- Production data replicas

Test Case

- Label and description set by experts
- Name is auto generated
- Birth date and evaluation date are critical
- Events include all immunizations administered



Test Case

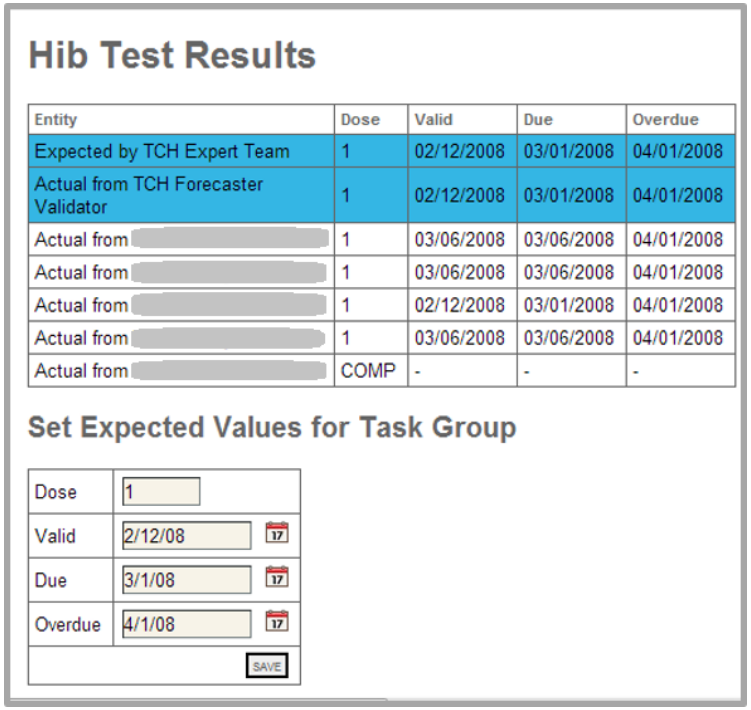
Label	3 Dose HIB Test 1
Description	The earliest age for administration of HIB is 6 weeks old. Before that is invalid.
Patient	Mallory Ritter (F)
Birth Date	01/01/2008
Evaluation Date	07/12/2011

Events

Type	Item	CVX	MVX	Date	Age
Vaccination	Hep B, adolescent or pediatric	08		01/01/2008	0 Months
Vaccination	Hib-Hep B	51		02/07/2008	1 Month

Edit Test Case

Test Case



Hib Test Results

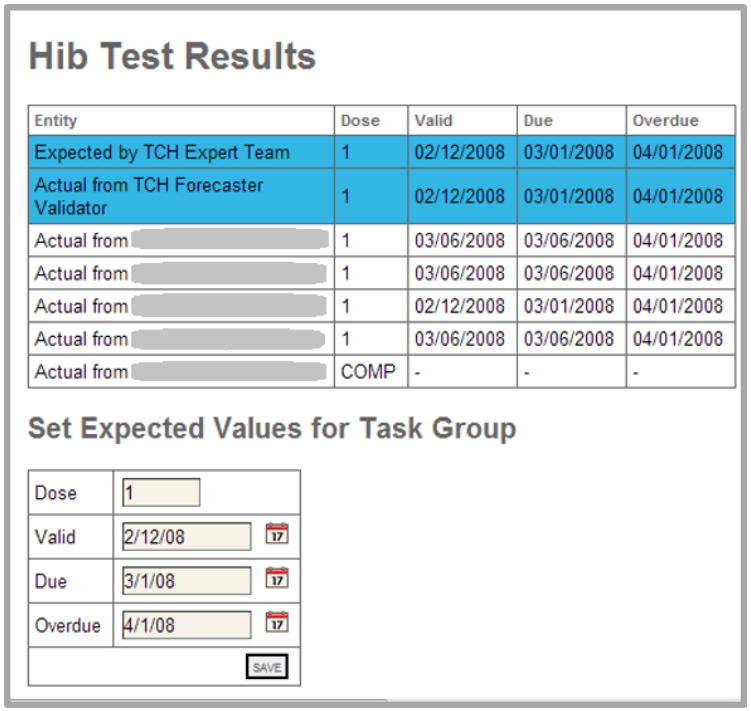
Entity	Dose	Valid	Due	Overdue
Expected by TCH Expert Team	1	02/12/2008	03/01/2008	04/01/2008
Actual from TCH Forecaster Validator	1	02/12/2008	03/01/2008	04/01/2008
Actual from [redacted]	1	03/06/2008	03/06/2008	04/01/2008
Actual from [redacted]	1	03/06/2008	03/06/2008	04/01/2008
Actual from [redacted]	1	02/12/2008	03/01/2008	04/01/2008
Actual from [redacted]	1	03/06/2008	03/06/2008	04/01/2008
Actual from [redacted]	COMP	-	-	-

Set Expected Values for Task Group

Dose	1
Valid	2/12/08
Due	3/1/08
Overdue	4/1/08
	SAVE

- Expected results shown on top
- Actual results shown below
- Any expert can add expected values
- Only Task Group members can set expected results for the Task Group

Test Case Expectations



Hib Test Results

Entity	Dose	Valid	Due	Overdue
Expected by TCH Expert Team	1	02/12/2008	03/01/2008	04/01/2008
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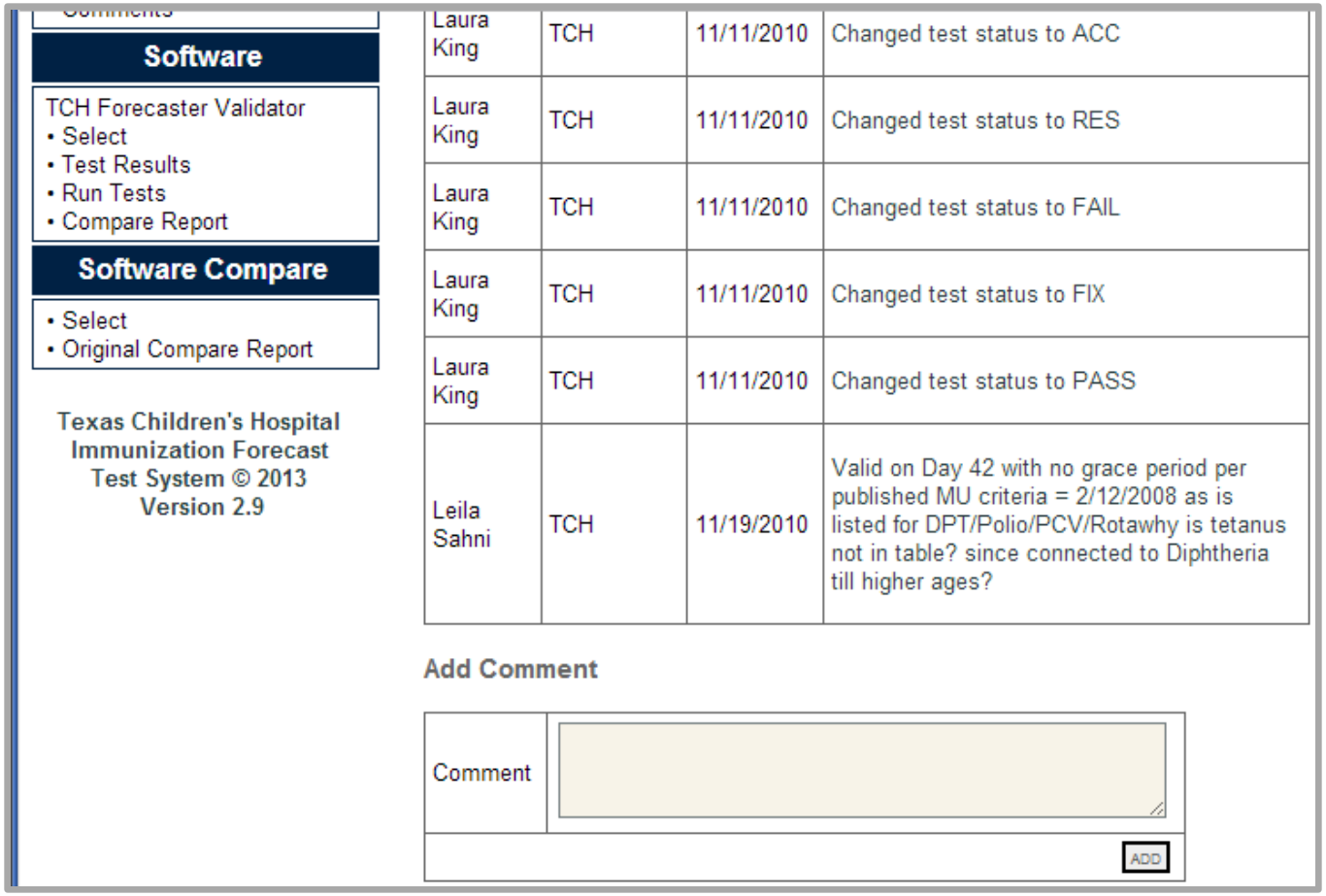
Actual from [redacted]	COMP	-	-	-

Set Expected Values for Task Group

Dose	1
Valid	2/12/08
Due	3/1/08
Overdue	4/1/08
	SAVE

- Expectations for Recommendation:
  - Dose Number
  - Valid Date
  - Due Date
  - Overdue Date
- Expectations for Evaluation:
  - Indirectly tested
  - Future improvement

Expert Comments



- Any Expert can leave a comment
- Comments are universally visible

Software

- Any forecast software application can be selected
- Selecting a different software application changes the Test Case display page to compare expected results against the new target forecaster
- Currently supporting:
  - Texas Children's Hospital Forecaster
  - Massachusetts Immunization Information System Forecaster
  - Scientific Technologies Corporation (STC) Forecaster
  - Immunization Calculation Engine (ICE) Forecaster

Comparing Forecasters

- To run the comparison report the user must select:
  - Test Panel
  - Target forecast software
  - Set of forecast software for comparison
- The results show the Test Cases grouped into these categories:
  1. Same as all others
  2. Same as at least one other
  3. Different than all the others and others don't agree
  4. Different than all others and others have mixed agreement
  5. Different than all others and others agree

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Next Steps

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Increase Number of Test Cases

- Tester currently supports importing test cases in several formats including the CDSi spreadsheet format
- Number of users is increasing and the number of test cases imported are also increasing
- Planning to add support for importing test cases in HL7's VMR XML format
- Willing to consider adding support for importing test cases in other formats, as needed

Increase Number of Systems

- Currently integrated with 4 forecast systems
- Currently testing and verifying 2 of the integrated forecast systems before allowing them to be publicly visible
- In discussions to integrate an additional 4 forecasters
- Anticipate supporting 6-8 forecasters in the next year
- Planning to add support for comparing vaccination evaluations

Improve Forecaster Integration

- Harmonized standard for requesting a forecast
  - Simple HTTP standard for retrieving a forecast result from any forecaster
  - Semantically compatible with all forecasters integrated with tester
  - Could be adopted as community standard
- Interim universal adaptor for Forecasters
  - Currently in development
  - Open source code for providing a common interface for any Forecaster connected to TCH Forecast Tester
  - Core logic shared with TCH Forecast Tester

Create a National Minimum Standard

TCH Forecast Tester can support the creation of a national minimum standard by:

- Facilitating collaboration between experts with the Forecaster community
- Facilitating and assisting in selection of standard CDSi Test Cases and Test Panels as determined by Forecaster community
- Providing resource to run test cases against Forecasters currently in use
- Possibly include certification process that would require agreement with Basic Test Panel

Thank You!

- Dr. Julie Boom and Laura King, RN, MSN
- CDC Immunization Information Systems Support Branch
- Contra Costa County
- HLN Consulting
- Immunization Calculation Engine
- Indian Health Services
- Massachusetts Immunization Information System
- Scientific Technologies Corporation
- Virginia Department of Health

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