**Measure Calculation Tool**

Business Requirements Document (BRD)

Version 1

# Version and Approvals

**UTORS**

|  |
| --- |
| **Version History** |
| **Version #** | **Date** | **Revised By** | **Reason for change** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

This document has been approved as the official Business Requirements Document for Measure Calculation tool, and accurately reflects the current understanding of business requirements. Following approval of this document, requirement changes will be governed by the project’s change management process, including impact analysis, appropriate reviews and approvals.

|  |
| --- |
| **Document Approvals** |
| **Approver Name** | **Project Role** | **Signature/Electronic Approval** | **Date** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Table of Contents**

[Project Details 1](#_Toc343520616)

[Overview 1](#_Toc343520617)

[Document Resources 1](#_Toc343520618)

[Glossary of Terms 1](#_Toc343520619)

[Project Overview 1](#_Toc343520620)

[4.1 Project Overview and Background 1](#_Toc343520621)

[4.2 Project Dependencies 2](#_Toc343520622)

[4.3 Stakeholders 2](#_Toc343520623)

[Key Assumptions and Constraints 2](#_Toc343520624)

[5.1 Key Assumptions and Constraints 2](#_Toc343520625)

[Use Cases 2](#_Toc343520626)

[Use Case Diagram 2](#_Toc343520627)

[Use Case Narrative 3](#_Toc343520628)

[Business Requirements 5](#_Toc343520629)

[Appendixes 7](#_Toc343520630)

[Appendix A – Business Process Flows 7](#_Toc343520631)

[Appendix B – Business Rules Catalog 10](#_Toc343520632)

[Appendix C- Models 10](#_Toc343520633)

[Traceability Matrix 10](#_Toc343520634)

[Use Case Narrative Instructions 10](#_Toc343520635)

Project Details

|  |  |
| --- | --- |
| **Project Name** | Measure Calculation Tool (MCT) |
| **Project Type** | ***Phase 1*** |
| **Project Start Date** | 10/3/2022 |
| **Project End Date** | 3/09/2023 |
| **Project Sponsor** | CMS |
| **Primary Driver** | ***DQM transition*** |
| **Secondary Driver** |  |
| **Division** | 2 |
| **Project Manager/Dept** | Kerry McDowell |

Overview

This document defines the high-level requirements of the Measure Calculation Tool. It will be used as the basis for the following activities:

* Designing a prototype
* Building features
* Developing test plans, test scripts, and test cases
* Determining project completion
* Assessing project success

Document Resources

| **Name** | **Business Unit** | **Role** |
| --- | --- | --- |
| <Identify all stakeholders and resources involved in gathering requirements> |  |  |
| CMS |  | host |
|  |  | Receiver |
| Smile Digital Health |  | Developer |
|  |  |  |

Glossary of Terms

| **Term/Acronym** | **Definition** |
| --- | --- |
| <Identify any terms and acronyms used within this document> |  |
| MCT | Measure Calculation Tool |
| Docker image |  |
| HQR | Hospital Quality Reporting Program |
| FHIR | Fast Healthcare Interoperability Resource |
| eCQM | Electronic Clinical Quality Measure |
| dQM | Digital Quality Measure |
| QRDA | Quality Reporting Document Architecture |
| CCN | CMS Certification number |

Project Overview

## 4.1 Project Overview and Background

<**This information can be taken from the Project Charter**. This is a brief description of what the project is about. It includes the current situation, the problem, and the objectives. This section serves as the vision statement for the requirements. Each requirement should bring the project closer to the vision.>

*Situation*

The Promoting Interoperability Program Eligible incentivizes eligible hospitals and providers to demonstrate meaningful use of certified HIT to improve quality, safety, efficiency, and equity of the American health care system. Hospitals participating in the inpatient hospital quality reporting program (IHQR) are encouraged to voluntarily submit 4, electronic clinical quality measures (eCQM) for 3 of 4 quarters.

*Problem*

However, the process of electronically sharing population-level data is labor-intensive and cumbersome, hampered by a lack of standardization of data models and fields. In order to calculate eCQMs today, providers must map their EHR propriety data models to the Quality Data Model and upload their results as a Quality Reporting Document Architecture Category I formatted file onto the Hospital Quality Reporting portal, as well as participate in post submission audits.

In order to reduce the burden of data collection and improve interoperability, CMS aims to transition away from traditional electronic clinical quality measurement (eCQM) to Fast Healthcare Interoperability Resources (FHIR)– specified measures, that leverage certified health information technology or digital quality measurement (dQMs)

As per the 21st Century Cures Act Final Rule, developers of certified health information technology (HIT) must ensure their technology supports a variety of use cases, including the calculation of quality measure**. Technology certified by the Office of National Coordinator ONC must support “standardized API for patient and population services.”** Certified HIT will

1) support Fast Healthcare Interoperability Resources (FHIR) Release 4.0.2,

2) responds to request for data elements mandated in the USCD v1

3) enables access to patient-level data across a patient population.

dQMs will allow eligible providers and hospitals to seamlessly exchange patient and population level data for the calculation and reporting of quality measure scores, using a measure calculation tool (MCT).

An MCT is an open-source, end-to-end software platform, designed to interface with eligible hospital and clinicians FHIR API, gather data requirements for measure calculation from a knowledge repository, request and validate data from a provider API, calculate measure score(s) using clinical query language, and produce electronic report(s). CMS has contracted Yale-CORE to orchestrate the development of an early MCT prototype and demonstrate its ability to calculate a measure score for single-FHIR specified measures.

*Objective*

To develop a prototype of the MCT engine that will be able to demonstrate key features of the enterprise level MCT platform. These features will be defined and enumerated as user stories, all features not selected for development and testing for prototype will remain in the backlog.

## 4.2 Project Dependencies

<List any related known projects that relate in whole or in part or has a dependency on this project.>

## It will be able to calculate a Measure of Interoperability, currently in development

* It will be able to submit data as individual FHIR resources to a DEQM complaint receiving system
* If the MCT knowledge repository is not internal, it will connect to ECQI resource API for measure specification
* Measure developers must convert and validate their measures to FHIR model

## 4.3 Stakeholders

The following comprises the internal and external stakeholders whose requirements are represented by this document:

|  | **Stakeholders** |
| --- | --- |
| 1. | Bridget Calvert |
| 2. | Joel Andress |
| 3. | ISG – Tom Lantz and Anne Weinstein |
| 4. | HQR – Michellene Roberts- adhoc |

Key Assumptions and Constraints

## 5.1 Key Assumptions and Constraints

|  |  |
| --- | --- |
| **#** | **Assumptions** |
|  | List any assumptions the requirements are based on |
| 1 | Calculate a single hospital-level-process measure |
| 2 | Have a User interface similar to Hospital Quality Reporting webpage |
|  | MCT Host is agnostic |
| 4 | It will connect to US core Compliant FHIR Server for mock reporting system |
| 5 | It will connect to server with DEQM receiver capabilities as a mock receiving system |
| 6 | It will use smart on FHIR or O Auth for authorization |
| 7 | The prototype will use synthetic data |
| 8 | The knowledge repository source- github ecqm-content-r4-2021 or EQRI |
| 9 | It will connect to external knowledge repository (measure specification support) |
| 10 | It will connect to an external terminology service |
| 10 | TBD: use bulk FHIR |
|  | Hospitals with multiple locations operating under a single CCN will submit reports for all locations |
| 11 | Hospitals user can select measures for reporting (see 1st assumption) |
| 12 | TBD: connect to Compliant FHIR server that has aggregated patient data |
| 13 | TBD: measure calculation occurs on data in transit |
| 14 | Debatable? MCT does not store data it exchanges data |
| 15 | The prototype engine will not be able to calculate risk adjustment that requires pooling of all data  |
| 16 | Debatable? The MCT act retrospectively not in Realtime (CORE) |
| **#** | **Constraints** |
|  | List any constraints the requirements are based on |
| 1 | It is open source |
|  |  |
|  |  |
|  |  |
|  |  |

Use Cases

< The primary purpose of the Use Case is to capture the required system behavior from the perspective of the end-user in achieving one or more desired goals. A Use Case contains a description of the flow of events describing the interaction between actors and the system. The use case may also be represented visually in UML in order to show relationships with other the use cases and actors>.

We have identified nine FHIR-specified, hospital-level, process measures, actively being voluntarily reported as eCQMs by eligible hospitals within the Hospital Inpatient Quality Reporting Program. Of theses, five measures have been uploaded into a public github library for widespread testing with synthetic data (*see table below*). Discharge on Antithrombotic, Discharge on Statin, and Use of Venous Thromboembolism Prophylaxis in the ICU setting are the most widely tested at Connectathons,

## Use Case Diagram

##

## Use Case Narrative

<Each Use Case should be documented using this template. Refer to the Appendix for Use Case Narrative instructions>

|  |  |
| --- | --- |
| Use Case ID: |  |
| Use Case Name: |  |
| Created By: |  | Last Updated By: |  |
| Date Created: |  | Date Last Updated: |  |

|  |  |
| --- | --- |
| Actors: | Hospital (EHR FHIR Endpoint)Measure Calculation ToolKnowledge RepositoryTerminology ServiceReceiving SystemReporting Client |
| Description: | This use case describes the way a hospital will submit a FHIR specified hospital level quality measure for all 3 out of the four voluntary reporting periods for CY 2023. The user accesses the portal with their HARP account, selects all facility affiliates, selects the program (IQR) and the measure (TBD) and checks the measure requirements, and agrees to begin (**PUSH**) the data |
| Preconditions: | The EHR FHIR Endpoint has been validated (with the Validation Use Case)All relevant patient data is available via the EHR FHIR EndpointAll facility information is registered and available via Organization/Location resources (TBD: need to identify where this will come from)All attributed patient ids are available via a Group resource (TBD: need to identify source for that as well)The measure content is available via the KR interface (can be mocked as a pre-packaged bundle)The terminology content is available via the TS interface (can be mocked as a pre-packaged bundle) |
| Postconditions: | The relevant patient data from all sites is stored in the “receiving system”The MeasureReport calculation produces the expected results from the input dataThe MeasureReport is submitted to the “receiving system” |
| Normal Course: | A user initiates the process via the Reporting Client, selecting the facilities, measure, and reporting period.For each measure, the measure calculation tool gathers data requirements and terminology to determine FHIR queries to be executedFor each facility, the measure calculation tool uses the facilities FHIR endpoint to evaluate the FHIR queries and gather all relevant dataFor all relevant data, the measure calculation tool validates the data conforms to expected profilesFor all relevant data, the measure calculation tool submits that data to the Receiving SystemThe Measure Calculation Tool evaluates the measure using the Receiving System as the data sourceThe Reporting Client displays the result of the Measure Calculation to the userThe user confirms the results and agrees to submitThe Measure Calculation Tool posts the resulting MeasureReport to the Receiving System |
| Alternative Courses: | N/A |
| Exceptions: | If the data doesn’t meet reporting requirements, the measure cannot be submittedIf the data doesn’t conform to appropriate profiles, steps need to be taken to address, report violations as part of the response and require a resubmit |
| Includes: | N/A |
| Priority: | High |
| Frequency of Use: | Measure will be calculated quarterly |
| Business Rules |  |
| Special Requirements: |  |
| Assumptions: |  |
| Notes and Issues: |  |
| Use Case Graphic |

***Example of a completed use case:***

|  |  |
| --- | --- |
| Use Case ID: | 1 |
| Use Case Name: |  |
| Created By: | Dan Sward | Last Updated By: |  |
| Date Created: | 4/19/09 | Date Last Updated: |  |

|  |  |
| --- | --- |
| Actors: | User |
| Description: | This use case describes the main way this interactive campus map will be used – as a web browser accessed application. The user accesses the appropriate URL and interacts with the functionality made available. |
| Preconditions: | Web browser opened, and interactive campus map URL accessed. |
| Postconditions: | User navigates from interactive campus map web site. |
| Normal Course: | 1. Open browser
2. Navigate to campus map URL
3. Interact with the campus map using available functionality
 |
| Alternative Courses: | None |
| Exceptions: | None |
| Includes: |  |
| Priority: | High |
| Frequency of Use: | Once per visit. |
| Business Rules | TBD… |
| Special Requirements: | * 24/7 access
* Response times comparable to common web mapping solutions (e.g. Google Maps)
* U of M accessibility requirements
* U of M eCommunications requirements
 |
| Assumptions: |  |
| Notes and Issues: |  |
| Use Case Graphic |  |

 Business Requirements

The following sections document the various business requirements of this project. Please use the existing template to document

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Requirement Type | ID – Prefix ?? | ID – Number | Function – Feature - Requirement | Use Case Reference | Required | **??** | **??** | **??** | Comments |
|  | Business User Requirements |
|  | f | 0001 |  |  |  |  |  |  |  |
|  | f | 0002 |  |  |  |  |  |  |  |
|  | f | 0003 |  |  |  |  |  |  |  |
|  | f | 0004 |  |  |  |  |  |  |  |
|  | F | 0005 |  |  |  |  |  |  |  |
|  | F | 0007 |  |  |  |  |  |  |  |
|  | f | 0007 |  |  |  |  |  |  |  |
|  | f | 0008 |  |  |  |  |  |  |  |
|  | Reporting, Data Requirements |
|  | f | 0001 |  |  |  |  |  |  |  |
|  | f | 0002 |  |  |  |  |  |  |  |
|  | f | 0003 |  |  |  |  |  |  |  |
|  | f | 0004 |  |  |  |  |  |  |  |
|  | F | 0005 |  |  |  |  |  |  |  |
|  | F | 0007 |  |  |  |  |  |  |  |
|  | f | 0007 |  |  |  |  |  |  |  |
|  | f | 0008 |  |  |  |  |  |  |  |
|  | Security, Access Control, and Compliance Requirements (Includes roles, user access needs) |
|  | f | 0001 |  |  |  |  |  |  |  |
|  | f | 0002 |  |  |  |  |  |  |  |
|  | f | 0003 |  |  |  |  |  |  |  |
|  | f | 0004 |  |  |  |  |  |  |  |
|  | F | 0005 |  |  |  |  |  |  |  |
|  | F | 0007 |  |  |  |  |  |  |  |
|  | f | 0007 |  |  |  |  |  |  |  |
|  | f | 0008 |  |  |  |  |  |  |  |
|  | Service Level Requirements (Includes Service Level, Scalability, and Performance) |
|  | f | 0001 |  |  |  |  |  |  |  |
|  | f | 0002 |  |  |  |  |  |  |  |
|  | f | 0003 |  |  |  |  |  |  |  |
|  | f | 0004 |  |  |  |  |  |  |  |
|  | F | 0005 |  |  |  |  |  |  |  |
|  | F | 0007 |  |  |  |  |  |  |  |
|  | f | 0007 |  |  |  |  |  |  |  |
|  | f | 0008 |  |  |  |  |  |  |  |
|  | Support and Maintenance Requirements |
|  | f | 0001 |  |  |  |  |  |  |  |
|  | f | 0002 |  |  |  |  |  |  |  |
|  | f | 0003 |  |  |  |  |  |  |  |
|  | f | 0004 |  |  |  |  |  |  |  |
|  | F | 0005 |  |  |  |  |  |  |  |
|  | F | 0007 |  |  |  |  |  |  |  |
|  | f | 0007 |  |  |  |  |  |  |  |
|  | **f** | **0008** |  |  |  |  |  |  |  |

Appendixes

## Appendix A – Business Process Flows

<Describe the current existing process workflow using flow diagrams (i.e. Visio Flowcharts) and/or a detailed narrative.>



### *As Is Diagrams*

<Insert As Is Diagrams here (if applicable)>

*To Be Diagrams*

<Insert To Be Diagrams here (if applicable)>



## Appendix B – Business Rules Catalog

<Instructions: Use the following template for each business rule. >

|  |  |
| --- | --- |
| Business Rule Name: | <The name should give you a good idea about the topic of the business rule.> |
| Identifier | <Defines unique identifier.> *EXAMPLE: BR1* |
| Description | <Defines the rule in detail.> *EXAMPLE: “All employee labor is tracked, reported and billed in 15 minute increments.”* |
| Example | <(Optional) An example of the rule> |
| Source | <Source of the rule. E.g. stakeholder> |
| Related Rules | <List of related rules, to support traceability> |

## Appendix C- Models

<Insert models here>

## Traceability Matrix

<Insert traceability matrix here>

## Use Case Narrative Instructions

<Instructions for completing the Use Case Narrative are included here. Remove these instructions from the completed Business Requirements Document>.

| **Use Case Field Name** | **Definition** |
| --- | --- |
| Use Case ID | Give each use case a unique numeric identifier, in hierarchical form: X.Y. Related use cases can be grouped in the hierarchy. Functional requirements can be traced back to a labeled Use Case. |
| Use Case Name | State a concise, results-oriented name for the use case. These reflect the tasks the user needs to be able to accomplish using the system. Include an action verb and a noun. Some examples:* View part number information.
* Manually mark hypertext source and establish link to target.
* Place an order for a CD with the updated software version
 |
| Created By | Include the name of the person who initially documented this Use Case. |
| Date Created | Enter the date on which the use case was initially documented |
| Date Last Updated | Enter the date on which the use case was most recently updated |
| Last Updated By | Include the name of the person who performed the most recent update to the use case description. |
| Actor | Enter the person or other entity external to the software system being specified who interacts with the system and performs use cases to accomplish tasks. Different actors often correspond to different user classes, or roles, identified from the customer community that will use the product. Name the actor(s) that will be performing this Use Case. |
| Description | Provide a brief description of the reason for and outcome of this use case, or a high-level description of the sequence of actions and the outcome of executing the Use Case. |
| Preconditions | List any activities that must take place, or any conditions that must be true, before the Use Case can be started. Number each precondition. Examples:* User’s identity has been authenticated.
* User’s computer has sufficient free memory available to launch task
 |
| Post conditions | Describe the state of the system at the conclusion of the use case execution. Number each post condition. Examples:* Document contains only valid SGML tags.
* Price of item in database has been updated with new value
 |
| Normal Course | Provide a detailed description of the user actions and system responses that will take place during execution of the use case under normal, expected conditions. This dialog sequence will ultimately lead to accomplishing the goal stated in the use case name and description. This description may be written as an answer to the hypothetical question, “How do I <accomplish the task stated in the use case name>?” This is best done as a numbered list of actions performed by the actor, alternating with responses provided by the system. |
| Alternative Courses | Document other, legitimate usage scenarios that can take place within this use case separately in this section. State the alternative course, and describe any differences in the sequence of steps that take place. Number each alternative course using the Use Case ID as a prefix, followed by “AC” to indicate “Alternative Course”. Example: X.Y.AC.1 |
| Exceptions | Describe any anticipated error conditions that could occur during execution of the use case, and define how the system is to respond to those conditions. Also, describe how the system is to respond if the use case execution fails for some unanticipated reason. Number each exception using the Use Case ID as a prefix, followed by “EX” to indicate “Exception”. Example: X.Y.EX.1 |
| Includes | List any other use cases that are included (“called”) by this use case. Common functionality that appears in multiple use cases can be split out into a separate use case that is included by the ones that need that common functionality. |
| Priority | Indicate the relative priority of implementing the functionality required to allow this use case to be executed. The priority scheme used must be the same as that used in the software requirements specification. |
| Frequency of Use | Estimate the number of times this Use Case will be performed by the actors per some appropriate unit of time. |
| Business Rules | List any business rules that influence this Use Case. |
| Special Requirements | Identify any additional requirements, such as nonfunctional requirements, for the use case that may need to be addressed during design or implementation. These may include performance requirements or other quality attributes. |
| Assumptions | List any assumptions that were made in the analysis that led to accepting this use case into the product description and writing the use case description. |
| Notes and Issues | List any additional comments about this use case or any remaining open issues or TBDs (To Be Determined) that must be resolved. Identify who will resolve each issue, the due date, and what the resolution ultimately is. |