MRCM Maintenance Tool

Requirements Specification

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Approvals

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1. Introduction

1.1 Background

The SNOMED CT Machine Readable Concept Model (MRCM) represents the rules from the SNOMED CT concept model in a form that can be read by a computer and applied to test that concept definitions and expressions comply with these rules. The MRCM may be used for a variety of purposes, including the authoring and validation of SNOMED CT concepts, expressions, expression constraints and queries, Natural Language Processing and binding terminology to information models to support querying and semantic interoperability.

The MRCM Maintenance Tool project will deliver a number of features that will enable authors to create and maintain MRCM rules, test them within the Authoring Platform, generate MRCM reference set files and generate user documentation.

1.2 Purpose

The purpose of this document is to describe the high level functional requirements for the MRCM Maintenance Tool. It also allows user representatives to establish important requirements that will be formally traced through development and testing while leaving less important details to collaborative development.

1.3 Scope

The MRCM Maintenance tool will consist of new components that will be developed and integrated with the existing Authoring Platform and Terminology Server. These functional requirements are written from the perspective of the business user and cover use cases that will be fulfilled using new and existing components. Providers of the new components should therefore bear this in mind when considering the design of specific components. Non functional requirements are not included in this document.

1.4 Structure of this document

The requirements are grouped by functional area. During the development the project steering group will monitor progress and make decisions on scope (either to restrict it to achieve a deadline or conversely to bring forward requirements for later iterations if good progress is being made).

Within each functional area, the requirements are stated in two parts:

1. A high level requirement describing a key element of required functionality;
2. Below that a series of more detailed requirements that elaborate the high level requirement.

Each requirement is stated in plain English and should avoid the use of jargon. Following the narrative of the requirement are categorisations as follows:

1. **Priority** - this allows the business user to indicate how important the requirement is (H,M,L) and helps planning of work for example to complete development of the most

important requirements first to assure delivery of them should time pressures be a factor.

2. **MoSCoW** - This is an additional categorisation to indicate if the requirement is mandatory (Must have), or optional (Should have - strongly advised to have and Could have - useful but the solution will work without it), or conversely to state a requirement to not include something (Won't have - e.g. where it is clear a requirement is not needed).
3. **Complete** - indicates whether a requirement is understood by the customer and the solution provider. All baselined requirements should be complete.
4. **Source** - Useful information about who originated the requirement.

1.5 Audience

User representatives and development representatives will agree on the narrative and categorisation of all the requirements contained in the requirements catalogue. Then the Steering Group will approve this document containing a snapshot of the requirements catalogue at a point in time as a baseline to take forward into development.

1.5 Working artefacts

This document contains snapshots of the following working documents:

1. Requirements Catalogue
2. SNOMED CT Machine Readable Concept Model
3. Process for Maintenance of MRCM Rules
4. Expression Constraint Language - Specification and Guide
5. Template syntax - Specification and Guide
6. Practical Guide to Reference Sets
7. Reference Set Release Files Specification
8. SNOMED CT Editorial Guide
9. Technical Implementation Guide

2. Vision

The MRCM Maintenance Tool will provide new user interface functions that allow authors to create and edit MRCM rules and then test them in in isolation in the Authoring Platform without affecting other authoring projects. Once created and tested the MRCM rules will then be exported as MRCM reference sets which can then be published for general use in the Authoring Platform and as part of the SNOMED CT release.

3. Use Cases

This section briefly summarises the key use cases identified for the MRCM Maintenance Tool.

Maintain MRCM rules

The MRCM authors will use the tool to create, modify and review MRCM rules.

Test and deploy MRCM rules in Authoring Tool

The MRCM authors will test MRCM rules in a separate branch of the Authoring Platform. Officially approved changes will be released to the Authoring Platform to be used by the content team for ongoing editing work.

Version and publish MRCM rules as RF2 files

The technical team will version and publish MRCM rules in files that conform to the MRCM reference set specifications.

Update Editorial Guide

The MRCM output (e.g. RF2 files, textual explanations) will be used to ensure that changes to the MRCM rules are documented in the Editorial Guide.

4. High level functional requirements

The requirements definition makes specific statements about what the solution needs to deliver in order to support the use cases. These requirements are expressed in a logical form that, where possible, does not stipulate a preconceived solution.

Import published MRCM rules

The MRCM Maintenance Tool allows an administrator to import the MRCM reference set files so that published MRCM rules can be reviewed and edited.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Import MRCM reference sets	
CMMT-01	CMMT-01-01	Admin must be able to select a file for import and upload information	M
CMMT-01	CMMT-01-02	Files must be validated during import, errors are indicated, e.g. which file/row contains missing or invalid information	M
CMMT-01	CMMT-01-03	Information from RF2 files must be properly loaded into the tool so that all predefined fields are populated.	M

Display and filter MRCM rules

The MRCM authors should be able to browse, review and filter the MRCM in a user-friendly way. Rather than working directly with the RF2 structure of the reference sets, a simplified form-based interface should be provided. This interface should be comprised of different

sections for domain, attribute, attribute range, and MRCM rule details. When browsing the MRCM, only relevant rules should be displayed. For example, when a domain is selected, only the attributes and ranges that are valid for this domain should be displayed.

As there will be many MRCM rules, additional search functionality should be available so that users can filter rules (e.g. by rule strength or content type). The user should also be able to distinguish between published and unpublished rules. It should be possible to switch between the MRCM that is currently being used in Production authoring and in a MRCM test project of the Authoring Platform.

Additionally, read-only option must be provided so that regular users (e.g. members of the content team, managed service users) can browse the latest MRCM rules.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Display and filter MRCM rules	
CMMT-02	CMMT-02-01	Role based restrictions: Admin (import/export), MRCM author (can edit MRCM, review, promote), regular user (read-only)	M
CMMT-02	CMMT-02-02	Rules are grouped by domain, attribute name and attribute range.	M
CMMT-02	CMMT-02-03	Domains and subdomains are displayed hierarchically	S
CMMT-02	CMMT-02-04	When a domain/subdomain is selected, the valid attribute types are listed, e.g. show all attributes in the "Evaluation procedure" hierarchy	M
CMMT-02	CMMT-02-05	When an attribute is selected, the valid domain(s) in which it can be used are listed, e.g. show all domains that reference the attribute "After"	M
CMMT-02	CMMT-02-06	When an attribute is selected, the associated range(s) are listed, e.g. show ranges for "Associated with"	M
CMMT-02	CMMT-02-07	When an attribute is selected, that attribute and any other attribute(s) valid for any domain(s) that contain the selected attribute are listed, e.g. when selecting "Associated morphology" the valid clinical finding attributes (e.g. finding site, causative agent) would also be displayed (but not highlighted).	M
CMMT-02	CMMT-02-08	Domain rules: When a domain is selected, fields from the MRCM domain reference set (e.g. domainConstraint) are displayed.	M
CMMT-02	CMMT-02-09	Attribute domain rules: When an attribute-domain pair is selected, fields from the MRCM attribute domain reference set (e.g. attributeCardinality) are displayed.	M
CMMT-02	CMMT-02-10	Attribute range rules: When an attribute range is selected, fields from the MRCM attribute range reference set are displayed (e.g. rangeConstraint).	M
CMMT-02	CMMT-02-11	Distinguish between published, modified and unpublished rules, e.g. highlight unpublished components	M
CMMT-02	CMMT-02-12	Display field values that are computed using a formula (e.g. domainTemplateForPrecoordination, domainTemplateForPostcoordination, guideURL) in a user friendly way	M
CMMT-02	CMMT-02-13	When a rule is modified, the previously published version of the rule can be reviewed	M
CMMT-02	CMMT-02-14	User can browse published MRCM	S
CMMT-02	CMMT-02-15	User can browse Authoring Platform MRCM (used by content authors)	M
CMMT-02	CMMT-02-16	User can browse MRCM in Authoring Platform test project (used by MRCM rule authors)	M
CMMT-02	CMMT-02-17	See differences in MRCM rules between Authoring Platform test project (used by MRCM rule authors) and Authoring Platform MRCM (used by content authors)	S
CMMT-02	CMMT-02-18	Search functionality, e.g. enter concept ID or description term to find domains and attributes	M
CMMT-02	CMMT-02-19	Filter on rule strengths, e.g. see all mandatory rules	S
CMMT-02	CMMT-02-20	Filter rule by content type, e.g. precoordinated/postcoordinated rule	S

Edit, test and review MRCM rules

The MRCM author user should be able to select an MRCM rule for editing. It should be possible to generate new rules, modify mutable properties of existing rules, inactivate published, and delete unpublished rules. Form fields should be supported via type-ahead searches restricted to valid values. The authors must also be able to specify human authored notes to support the authoring process that are linked to the relevant MRCM element.

To test the impact of an MRCM rule in an authoring environment, the user must be able to create a task on a test project of the Authoring Platform (see section Authoring Platform update). When the editing of an MRCM rule is completed, the author must be able to submit the MRCM rule for review by the Head of Terminology. Upon acceptance the MRCM rule is formally approved and the rule can be promoted to MRCM MAIN.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Edit, test and review MRCM rules	
CMMT-03	CMMT-03-01	User can create an MRCM task (only one can exist at any one time - to avoid merge complexity) for rule editing (task based workflow with promotion to MRCM MAIN, no project level required)	M
CMMT-03	CMMT-03-02	User must be able to define domain rules	M
CMMT-03	CMMT-03-03	User must be able to define attribute domain rules	M
CMMT-03	CMMT-03-04	User must be able to define attribute range rules	M
CMMT-03	CMMT-03-05	User must be able to delete an unpublished rule	M
CMMT-03	CMMT-03-06	User must be able to inactivate a published rule	M
CMMT-03	CMMT-03-07	User must be able to modify a rule by changing any mutable property, but must not be able to change immutable properties (as defined in http://snomed.org/mrcm)	M
CMMT-03	CMMT-03-08	Form fields should be supported via type-ahead searches restricted to valid values	S
CMMT-03	CMMT-03-09	User must be able to calculate formula-based fields (e.g. DomainTemplateForPrecoordination, domainTemplateForPostcoordination, guideURL) on demand for testing and review	M
CMMT-03	CMMT-03-10	User can enter additional information to support the authoring process, i.e. testing performed, supporting use case, supporting documents, expected release date, briefing notes on reasons for changes with references to other relevant materials. As this is not part of the RF2 files, this information must be linked to the relevant MRCM element.	M
CMMT-03	CMMT-03-11	User must be able to submit MRCM rule(s) for review to Editorial Panel/Head of Terminology	M
CMMT-03	CMMT-03-12	Once a rule has been formally approved, MRCM author must be able to promote this rule to MRCM MAIN	M

Validate MRCM rules

When fields require values in the Expression Constraint Language (ECL) or the Expression Template Language (ETL), the user entry should be validated against these languages to ensure compliance. Syntax errors and conflicting rules should be indicated on data entry.

Several QA checks (e.g. referenced concepts are active) must be performed to ensure the quality and consistency of the MRCM rules.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Validate MRCM rules	
CMMT-04	CMMT-04-01	User entry must be validated on fields that require ECL v1.3 to ensure compliance	M
CMMT-04	CMMT-04-02	User entry must be validated on fields that require ETL v1.0 entry to ensure compliance	M
CMMT-04	CMMT-04-03	Any syntax errors in form fields should be indicated (e.g. attribute cardinality)	S
CMMT-04	CMMT-04-04	Conflicting rules should be indicated, e.g. subtype attribute is conflicting with domain/range of parent	S
CMMT-04	CMMT-04-05	Present list of other rules that are impacted by change, e.g. adding an attribute to a domain can affect other domains, such as those that use refset membership as domain criteria	S
CMMT-04	CMMT-04-06	All referenced concepts in MRCM refsets must be active in the upcoming release in which the rule will be published	M
CMMT-04	CMMT-04-07	Check consistency across different MRCM refsets	S
CMMT-04	CMMT-04-08	QA checks - see details in the "QA checks" work sheet of the requirements catalogue	S
CMMT-04	CMMT-04-09	Check uniqueness of rule, e.g. two rules have the same referencedComponent, contentType and ruleStrength	S

Export MRCM rules and generate RF2 files

MRCM rules are published using 4 different reference sets, which must be generated by the tool. Some fields in the generated reference sets will be computed automatically during the export process. Other fields may have default values that are entered (e.g. module, namespace).

The MRCM rules should be versioned in accordance with the general refset specifications, which use the standard RF2 effectiveTime field.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Export MRCM rules and generate RF2 files	
CMMT-05	CMMT-05-01	Generate MRCM Domain Reference set that corresponds to the MRCM reference set specifications	M
CMMT-05	CMMT-05-02	Generate MRCM Attribute Domain Reference set that corresponds to the MRCM reference set specifications	M
CMMT-05	CMMT-05-03	Generate MRCM Attribute Range Reference set that corresponds to the MRCM reference set specifications is generated	M
CMMT-05	CMMT-05-04	Generate MRCM Module Scope Reference set that corresponds to the MRCM reference set specifications	M
CMMT-05	CMMT-05-05	Define default values for fields that are not specified by authors and populate RF2 files, e.g. moduleId	M
CMMT-05	CMMT-05-06	Version MRCM rules in accordance with general reference set specifications, which use the standard RF2 effectiveTime field	M
CMMT-05	CMMT-05-07	The MRCM information from the tooling is correctly represented in the respective fields of the RF2 files	M

Export MRCM rules and textual explanations to be used in editorial guide

The tool should be able to generate RF2 files and textual explanations of the MRCM rules on demand so that these can be used to update the editorial guide with the latest changes in the concept model.

The export should be performed in a full version and also in a delta that contains only the unpublished changes. As textual explanations are not referenced in the RF2 files, this information has to be linked to the relevant MRCM elements.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Export MRCM rules and textual explanations to be used in editoral guide	
CMMT-06	CMMT-06-01	Export MRCM rules on demand in RF2 format	M
CMMT-06	CMMT-06-02	Export MRCM rule delta (current-minus published) on demand in RF2 format	M
CMMT-06	CMMT-06-03	Export MRCM rule delta (current-minus last interim-export) on demand in RF2 format	C
CMMT-06	CMMT-06-04	Export textual explanations in a format that can be used by WIP editorial guide (e.g. markdown, html). As these human authored notes are not referenced in the RF2 files, this information has to be linked to the relevant MRCM element.	M

Update Authoring platform to support new MRCM specifications

MRCM authors must be able to test the impact of a new MRCM rule in an authoring environment. For this reason, the Authoring Platform must provide a branch that allows testing new MRCM rules without affecting production authoring. This branch must support a separate MRCM that can be deployed on demand from the MRCM tool.

The Authoring Platform must be updated to use the new MRCM reference sets. This requires adding new editor features for attribute cardinality, attribute grouping, rule strength, and content type (all SNOMED CT content vs only newly added SNOMED CT content). In order to

provide enhanced authoring support for proximate primitive and pre-coordinated modeling the Authoring Platform also has to support ETL.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Update Authoring Platform to test MRCM rules and to support new MRCM specifications	
CMMT-07	CMMT-07-01	User must be able to initate the deployment of (unpublished) rules to the MRCM Test project so that it can be tested in an authoring environment or MAIN	M
CMMT-07	CMMT-07-02	Support new feature: Attribute cardinality	M
CMMT-07	CMMT-07-03	Support new feature: Attribute in group cardinality	M
CMMT-07	CMMT-07-04	Support new feature: Rule strength	M
CMMT-07	CMMT-07-05	Support new feature: Grouped or not	M
CMMT-07	CMMT-07-06	Support new feature: Content type	M
CMMT-07	CMMT-07-07	Enhanced author support for MRCM proximate primitive modeling using ETL v1.0 templates	M
CMMT-07	CMMT-07-08	Enhanced author support for MRCM precoordinated authoring using ETL v1.0 templates	M
CMMT-07	CMMT-07-09	Support MRCM datatype properties on concepts to represent ingredient strength, trade name, etc.	C

Support international MRCM for Managed Services

The Authoring Platform is used by national release centres to create their extensions. Updates and modifications made to the Authoring Platform to support the new MRCM reference sets must be compatible with Managed Services. This does not entail the support of local MRCM extensions, but allows the Managed service customers to use the latest international MRCM.

HL Rqt	Requirement Ref	Requirement	MoSCoW
		Support MRCM rules for Managed Services	
CMMT-08	CMMT-08-01	Updates to the Authoring platform must be compatible with Managed Services	M

Glossary of Terms

The following table contains the definition of any terms used within this document.

Term	Definition
Concept Model	A set of rules that determines the permitted sets of relationships between particular types of concepts. The Concept Model specifies the attributes that can be applied to concepts in particular domains and the ranges of permitted values for each of these attributes. There are also additional rules on the cardinality and grouping of particular types of relationships. See the Concept Model Overview section of the Technical Implementation Guide at http://snomed.org/tig
ECL	The Expression Constraint Language is a formal syntax for representing SNOMED CT expression constraints. Expression constraints are computable rules used to define a bounded sets of clinical meanings represented by either precoordinated or postcoordinated expressions. See http://snomed.org/ecl
Editorial Guide	The Editorial Guide describes editorial policies regarding the purpose, scope, boundaries, requirements, concept model, hierarchies, terming, and other

	policies related to the content in SNOMED CT. See https://confluence.ihtsdotools.org/display/WIPEG
ETL	The Expression Template Language is a formal syntax for representing SNOMED CT expressions containing slots. A slot represents a constraint and/or a placeholder for a value that is not known at the time of authoring, but which can be completed at a subsequent time. See http://snomed.org/sts
MRCM	The SNOMED CT Machine Readable Concept Model (MRCM) represents the rules from the SNOMED CT concept model in a form that can be read by a computer and applied to test that concept definitions and expressions comply with these rules.
MRCM reference set	The MRCM reference set specification defines the format used by SNOMED International's MRCM using the SNOMED CT Reference Set mechanism. See http://snomed.org/mrcm
Reference Set	A standard format for maintaining and distributing a set of references to SNOMED CT components and optionally associating referenced components with additional information. See http://snomed.org/refsetpg and the Reference Set Release Files Specification within http://snomed.org/rfs