

MRCM Maintenance Tool

Request for Proposal

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Approvals

Version	Date	Approver	Comments
1.00	20170621	Linda Bird	
1.00	20170621	Yongsheng Gao	
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Future Review Timetable

Review date	Responsible owner	Comments
YYYYMMDD	Person/group responsible	Summary of action

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1. Executive Summary

1.1 Background

The Machine Readable Concept Model (MRCM) is a recently standardised resource for maintaining and validating the consistency of SNOMED CT modelling. The MRCM was designed and adopted during 2016, and from July 2017 the MRCM will be released as part of the SNOMED CT International Edition. The MRCM is currently being maintained in a Google Sheet, with some complex, hand-coded formulae used to generate some fields.

This objective of this Request for Proposal (RFP) is to request proposals from vendors for a solution that integrates into the current SNOMED International tooling environment. A tool is required to facilitate the maintenance of the MRCM including:

- creation and editing of MRCM rules;
- testing MRCM rules using the existing SNOMED International Authoring Platform;
- management of the release of the MRCM for use in both Authoring Platform content validation and validation of SNOMED CT Releases; and
- generation of readable documentation.

The tool is expected to be a web application providing a user interface with some integration with existing SNOMED International Services. The Technical Architecture section of this document details the existing components and expected integrations.

This RFP is published on [22 June 2017](#) and responses are required to be submitted to rfp@snomed.org by [0800 on 17th July 2017](#). SNOMED International expect to inform the successful bidder by [26th July 2017](#) subject to receiving feasible proposals.

Responses to this RFP are not contractually binding.

2. Instructions for replying to the RFP

This document, the information detailed within it and any further detail supplied to responders as part of this process, is provided in confidence, for the sole purpose of this RFP, and may not be disclosed to any third party or used for any other purpose without the express written permission of SNOMED International.

- Direct any questions in relation to this RFP to rfp@snomed.org.
- Submit responses by no later than **0800 on 17th July 2017**.
- We anticipate being able to inform bidders of our decision no later than **26th July 2017** subject to receiving feasible proposals.
- Requirements and Deliverables are outlined in detail in section Section 4.
- Ensure that your response to this RFP contains the information detailed in Section 7. Missing information will affect the assessment or the response detrimentally.

For ease of identification in this document, all non functional requirements required in the proposed solution are labeled so: [NFR-*nn*] and all information required in response to this RFP are labeled so: [RFP-*nn*]. In the associated requirements document, the functional requirements are also individually labeled.

3. Organisation background

SNOMED International is the trading name of IHTSDO, a private company limited by guarantee, incorporated and registered in England and Wales with company number 9915820, whose registered office is at One Kingdom Street, Paddington Central, London W2 6BD, England. It is an international standards body that develops, maintains and promotes effective use of clinical terminology in healthcare information systems. The principal product of this initiative is SNOMED CT, a standard clinical terminology. The organization also encourages, guides, advises and supports key players and stakeholders in SNOMED CT implementation in order to encourage further use.

As set out in its Articles of Association, the objective of IHTSDO is the advancement of the health of humankind, in particular by facilitating better health information management and by that means and otherwise contributing to the improved delivery of care by clinical and social care professions, including through:

- Facilitating the accurate sharing of clinical and related health information, and the semantic interoperability of health records;
- Encouraging global collaboration and cooperation with respect to the ongoing improvement of the consistent use of health terminologies and standards; and
- Providing the foregoing on a globally coordinated basis and taking account of public benefit and commercial considerations of concern to each Member and in each Member Territory.



The following principles guide all the SNOMED International activities:

- The Association will seek to govern itself and conduct all of its activities in accordance with principles of openness, fairness, transparency and accountability to its Members.
- The Association will seek to conduct all of its activities in a prudent, responsible and ethical manner that is conducive to ensuring its long-term viability, the overall value and utility of its activities.
- The Association will seek to work with other parties relevant to achieving its Objects in a spirit of collaboration and will, as appropriate, seek to facilitate interoperability of its terminology products with other relevant standards and products.
- The Association will seek to encourage intellectual contributions to the terminology products from other entities upon terms that permit such other entities to use and distribute their own work for any purpose that is consistent with the Association's Objects.
- The Association will engage with its Members collaboratively, consistently and transparently.

Further information about SNOMED International can be found on our website at www.snomed.org.

4. Requirements

This section provides information about functional requirements which are contained in a separate document and non-functional requirements contained in this document.

Functional Requirements

The solution is required to integrate with SNOMED International's existing Authoring Platform.

The Functional Requirements Specification ([here](#)) contains functional requirements categorised using the MSCoW convention for the entire solution that will consist of the successful bidder's and SNOMED International's components. Bidders are required to provide only the components of the solution indicated in the Application Architecture in Section 5.

Once the successful bidder's components are integrated with SNOMED International's systems, the solution must address all 'MUST' and 'SHOULD' requirements and bidders must provide complete cost breakdown for doing so. In addition, a separate cost should be provided for all requirements labeled 'COULD' and SNOMED International will decide whether or not to include these latter requirements in the procured solution (see section 7.4).

The remainder of this section details non-functional requirements that the solution must meet.

Integration

Please see section Section 5 for supporting information about SNOMED International's existing systems and the components we require to be delivered as part of this solution and the proposed integrations. Bidders are required to produce an outline solution design that is compatible with this architecture but may propose refinements or additions to the integrations to support the solution. [[NFR-01](#)].



Look and feel / User Experience

The solution should closely follow the User Interface conventions established in existing SNOMED International applications [NFR-02]. The successful bidders will be given access to these applications in order to understand these conventions.

Security

The solution must integrate with the existing SNOMED International Identity Management Service (IMS) [NFR-03]. An overview of IMS can be found here:

<https://confluence.ihtsdotools.org/display/REFSET/IHTSDO+Identity+Management+Service>

Details of the IMS API can be found here:

<https://confluence.ihtsdotools.org/display/TOOLS/IMS+Rest+API+Reference>

An example IMS GitHub project can be found here: <https://github.com/IHTSDO/ihtsdo-spring-sso> and provides information on how the solution should integrate into SNOMED International security architecture for authentication and role based access control.

The solution must be resilient to common cyber threats and the successful bidder must document what measures have been taken in the design and construction of the solution to meet this requirement [NFR-04].

Performance

Browsing and editing functions should facilitate responsive interaction such that the user is not kept waiting. The solution will be hosted on SNOMED International's cloud provider and will be integrated with SNOMED International's existing services which will have an impact on end to end performance. However, the successful bidder must ensure their own application components provide a good user experience [NFR-05].

Part of the solution that will be developed by the successful bidder is the MRCM Service which integrates with SNOMED International's Terminology Server. The endpoints provided by this service must be responsive and so the MRCM Service must provide caching where appropriate to ensure the existing Authoring Platform front end application which consumes these endpoints is responsive [NFR-06].

The Authoring Platform Web Frontend is in constant multi-user use so the response time of the authoring assistance endpoints, which will form part of this solution is important. The solution should therefore cache the reference set members required to fulfil these requests on the commonly used branches [NFR-07]. The results of ECL and term concept searches will be executed on existing endpoints to fulfil these requests; responses to these requests should not be cached because the terminology content is constantly changing.

Bidders should provide expected average and maximum response times for a single user and a given server and network specification (at the bidder's discretion and either for all user interactions jointly or broken down per interaction) [RFP-01]. These proposed response times will be considered in determining the successful bidder and will then form one of the mandatory non-functional requirements [NFR-08] that the solution will be expected to meet. Performance testing will form part of the acceptance test of the solution.

Multi User considerations

The MRCM Maintenance Tool application is expected to be lightly used initially. However, the Authoring Platform, which will consume the endpoints provided by the solution is a multi user application in constant use. The solution must be designed and constructed with multi-user use in mind ensuring all interactions are thread safe with appropriate lock management of shared resources [NFR-09].

Logging

The solution components should log key activities for audit and support purposes. The following items should be logged as a minimum:

- Changes to the MRCM reference sets must be logged as INFO [NFR-10]; and
- Caching activity must be logged [NFR-11].

Implementation

The following details the implementation requirements of the provided solution components. Bidders are required to state whether they can comply with these requirements or propose alternative suggestions in the response.

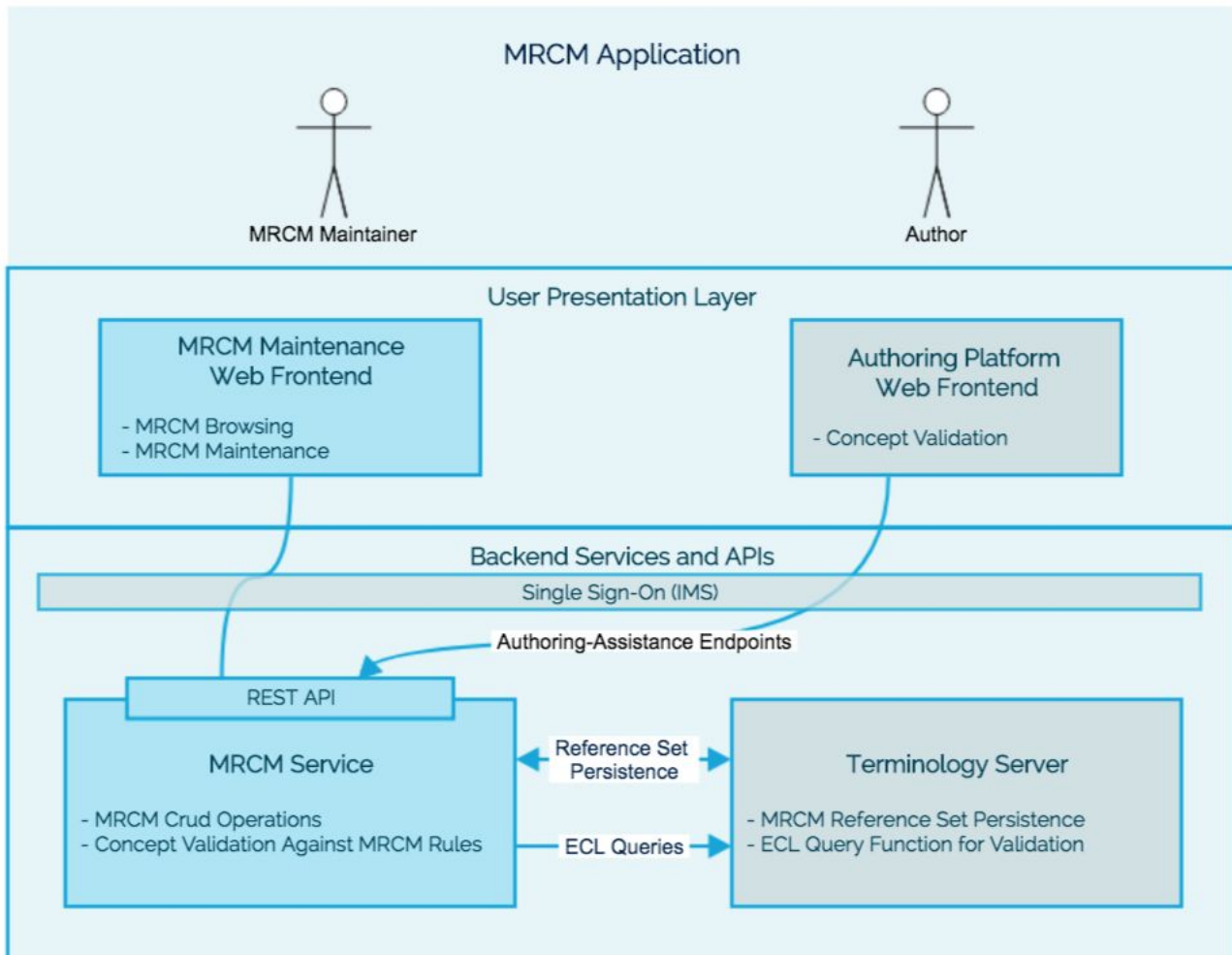
1. The MRCM Service must be written as a standalone Java 8 Spring Boot application packaged as a single jar [NFR-12];
2. Configuration should have defaults so that a minimum set of configuration needs to be set at deployment time using an external application.properties file [NFR-13];
3. The default configuration should have URLs pointing to localhost when checked in and must not contain credentials or deployment URLs [NFR-14];
4. Maven 3 should be used as the build system [NFR-15];
5. EmberJS (preferred) or AngularJS 1.6 should be used to build the front-end [NFR-16];
6. All CSS should be placed in a stylesheet [NFR-17];
7. Bower should be used for package management [NFR-18]; and
8. Grunt is our preferred for application building and the serving of files for local development. Environment specific variables (dev and UAT backend endpoint locations for example) should be provided via an external configuration file rather than contained within Grunt via target environment flags. Deployed FE assets should be both minified and cache busted. [NFR-19];

SNOMED International will wrap the application into a Debian package for implementation on its cloud hosting provider.

In support of the above Bidders are should outline their proposed development technologies as part of the response [RFP-02].

5. Application Architecture

The MRCM Maintenance Tool application will comprise of a frontend web application and a standalone backend service both of which will be developed by the successful bidder and integrated into SNOMED International's existing systems. The overall MRCM Maintenance Tool capability includes these components plus existing components such as SNOMED International's Authoring Platform and Terminology Server to which the successful bidders' components will integrate. These new components are shown shaded blue in the diagram.



MRCM Maintenance Web Frontend

The MRCM maintenance frontend will have screens for browsing and maintaining the MRCM Reference Sets. All domain content will be provided by the backend MRCM Service over a REST interface. The user will be required to log in to the SNOMED International single sign-on using the existing system.



MRCM Service

The backend MRCM Service will have REST endpoints to serve the MRCM Maintenance Web Frontend to support the browsing and maintenance for the MRCM Reference Sets. These endpoints should be designed to make implementation of the frontend application straight-forward and should incorporate any business logic like validation of MRCM rules. The Terminology Server will be used to persist the reference sets and to perform the release and export functions. The service will also integrate with a JIRA workflow via REST and the promotion of the working branch to the MAIN branch within the Terminology Server via REST at the relevant point in the workflow.

There will also be endpoints for the validation of SNOMED CT concepts against the rules on a given branch of the terminology server. See authoring-assistance endpoints within the MRCM Service API Specification.

Branch Management

In the Snomed International authoring platform we use three levels of branching. The MAIN branch is the top level, project branches sit just below that and task branches are under project branches.

MAIN (Main branch)

- | - MRCM (Project branch)
 - | - MRCM-10 (Task branches)
 - | - MRCM-11
 - | - MRCM-12

Editing within the MRCM Maintenance tool should follow the same pattern as when persisting reference set changes to the Terminology Server. Editing of the reference sets will happen under the MRCM project on a single task branch. Those changes will be tested within the authoring platform via the authoring-assistance endpoints which provide type-ahead and validation. If the changes are not accepted the user should be able to make further changes on the task or have the option to discard the task and create a new one. Creating a new task branch under the MRCM project will have the effect of discarding the changes on the previous task because the changes to the reference sets will not have been promoted to project level. The MRCM application must only allow the use of one task at any time. The existence of tasks should probably be hidden from the user.

Once the changes are accepted the application must allow the user to promote the changes. The application must promote the task branch to the MRCM project and then on to the MAIN branch in one user action. There will be no content conflicts during branch rebasing and promotion because changes to the MRCM reference sets will only happen within a single MRCM task and through the MRCM application.

All other projects and tasks within the International Authoring Platform will use the authoring-assistance endpoints under the MAIN branch. This means that once a change is promoted in the MRCM application it will be available to all International Authoring Platform task without the need to rebase.



The Managed Service Authoring Platform will use the appropriate international release branch when using the authoring-assistance endpoints to get a version of the MRCM rules applicable to the upstream version of the International edition they are extending.

Terminology Server API Specification (Existing)

The following API specification provides details of the SNOMED International Terminology Server API that will be consumed by the MRCM Service to facilitate design and costing for this RFP. During development, the successful bidder must refer to the SNOMED International TermServer API documentation current at the time.

Endpoint	HTTP Method	Description
{branch}/members	GET	Parameters: Reference set identifier. Retrieve the list of members of a reference set on the specified branch.
{branch}/members	POST	Create a new MRCM Refset member
{branch}/members/{memberId}	PUT	Update a Refset member
{branch}/members/{memberId}	DELETE	Delete a Refset member
{branch}/concepts	GET	Parameters: ECL query, term search string Return a list of concepts which match the ECL query and term search string on the specified branch.

MRCM Service API Specification (Suggested Design)

The following API specification details a proposed design for the MRCM Service REST endpoints. Bidders should review the API as part of their design and may propose an alternate API.

Endpoint	HTTP Method	Description
mrcm/{branch}/domains	GET	Retrieve a list of MRCM Domains from the specified Terminology Server branch.
mrcm/{branch}/domains	POST	Create a new MRCM Domain on the specified branch.
mrcm/{branch}/domains/{domainId}	PUT	Update the MRCM Domain with the specified identifier on the specified branch.



mrcm/{branch}/domains/{domainId}	DELETE	Delete the MRCM Domain with the specified identifier on the specified branch. This should return a bad request error if the Domain has been released (as identified by the released flag on the terminology server member response).
mrcm/{branch}/domains/{domainId}/attributes	GET	Retrieve a list of MRCM Domain Attributes for the specified Domain identifier on the specified branch.
mrcm/{branch}/domains/{domainId}/attributes	POST	Create a new MRCM Domain Attribute for the specified Domain identifier on the specified branch.
mrcm/{branch}/domains/{domainId}/attributes/{domainAttributeId}	PUT	Update the MRCM Domain Attribute for the specified Domain and Domain Attribute identifiers on the specified branch.
mrcm/{branch}/domains/{domainId}/attributes/{domainAttributeId}	DELETE	Delete the MRCM Domain Attribute for the specified Domain and Domain Attribute identifiers on the specified branch. This should return a bad request error if the Domain Attribute has been released.
mrcm/{branch}/attribute-ranges	GET	Retrieve a list of MRCM Attribute Ranges from the specified branch.
mrcm/{branch}/attribute-ranges	POST	Create a new MRCM Attribute Range on the specified branch.
mrcm/{branch}/attribute-ranges/{rangeId}	PUT	Update the MRCM Attribute Range with the specified identifier on the specified branch.
mrcm/{branch}/attribute-ranges/{rangeId}	DELETE	Delete the MRCM Attribute Range with the specified identifier on the specified branch. This should return a bad request error if the Attribute Range has been released.
mrcm/{branch}/authoring-assistance/domain-attributes	GET	<p>Parameters: List of existing attribute type-value pairs, MRCM branch</p> <p>Retrieve a list of attributes available to the concept represented by the specified existing attribute and values on the specified branch.</p> <p>The {branch} in the endpoint path should be used to fetch concepts.</p> <p>The MRCM branch from the parameters list should be used to fetch the MRCM members to use in fulfilling the request - this will default to "MAIN".</p>
mrcm/{branch}/authoring-assistance/attribute-values/{attributeId}	GET	<p>Parameters: Term search string, MRCM branch</p> <p>Retrieve a list of possible attribute values for the specified attribute identifier and term search string on the specified branch.</p> <p>This is to assist a typeahead UI element.</p>

mrcm/{branch}/authoring-assistance/validate	POST	<p>Parameters: A single concept in JSON format including published flag and a full set of stated relationships. MRCM branch.</p> <p>Validate the stated form against the MRCM rules on the specified branch.</p> <p>The response should include any errors or warnings for the concept relationships.</p>
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Typical values for the branch of the URI would be "MAIN" for the main branch of the current authoring cycle of the International Edition, "MAIN/MRCM/MRCM-2" for a task within the MRCM editing project in the current authoring cycle of the International Edition or "MAIN/2017-07-31" to reference a published version of the MRCM.

6. Deliverables required as part of the solution

The following artifacts must be provided with the delivered solution:

- Application design [[NFR-20](#)];
- Source code and installation packages to allow SNOMED International to install and run the solution on their cloud based infrastructure [[NFR-21](#)];
- User Guide [[NFR-22](#)]; and
- Support documentation detailing the components of the solution, specifications for interfaces provided and consumed, installation and operating instructions [[NFR-23](#)].

7. Information required in response to this RFP

The response to this RFP should include the following minimum information, preferably in the order listed:

1. Commercial Information, Capability and Capacity;
2. Outline Solution Description;
3. Outline Project Delivery Plan;
4. Detailed costs for functional and nonfunctional requirements and a separation of costs for optional requirements (marked 'COULD');
5. Requirements traceability including:
 - a. Response to all functional requirements in the functional requirements specification;
 - b. Response to all nonfunctional requirements detailed in this document, *labeled* [[NFR-XX](#)]; and
6. Approach to Testing.
7. Response to all requests for information in this document labeled [[RFP-XX](#)].

The remaining paragraphs in this section provide further breakdown of the information required in response to this RFP.

7.1 Commercial information, Capability and Capacity

The bidder must provide the following information:

- Company background and key areas of business [RFP-03];
- Financial status [RFP-04];
- Key resources that will be involved in delivery of the solution evidencing sufficient capability and capacity [RFP-05];

7.2 Outline Solution Description

The Bidder must provide the following information:

- Functional description [RFP-06];
- User interface logical description and wireframe mockups [RFP-07];
- Development technologies proposed (e.g. front end and back end development languages and frameworks) [RFP-08].
- Logical architecture for the proposed solution [RFP-09].

7.3 Project Plan

The bidder must provide a project plan with the estimated delivery timescale and key phases in the project including start date, completion of design, completion of development, completion of internal testing and handover of the production ready solution to SNOMED International. The project plan should also clearly and specifically indicate any dependencies on or inputs required from SNOMED International and any other external dependencies [RFP-10].

7.4 Detailed costs

The bidder must provide a total fixed cost for delivery of the solution including the deliverables detailed in Section 6 and a breakdown of the costs by role and mandays [RFP-11]. The bidder should indicate total costs separately for:

- Delivery of all 'MUST' and 'COULD' requirements [RFP-12]; and
- Delivery of all 'COULD' requirements [RFP-13].

SNOMED International will consider whether to include none, some or all 'COULD' requirements in the procured solution.

The bidder must confirm that a warranty period of 12 Months from user acceptance of the solution is included during which time any defects found in the application will be rectified at no additional cost [RFP-14].

7.5 Requirements traceability

The bidder must provide a statement of compliance with all the requirements of the functional requirements specification and the nonfunctional requirements contained in this document. Any requirements that cannot be met or would be partially met or where the bidder believes there is an alternate solution should be listed in the response with details of any non conformance [RFP-15].

7.6 Approach to Testing

The bidder must provide information on their approach to testing and how test content, coverage and test results will be evidenced [RFP-16]. The successful bidder will be expected to conduct all testing apart from User Acceptance Testing.

8. Evaluation Guidance

SNOMED International will evaluate all responses to this RFP received by the due date in a logical and fair manner. The following points indicate what the evaluation team are looking for in the responses. The results of evaluation will be fed back to bidders but limited simply to 'selected' or 'not selected' in order to make best use of resources to focus on taking the selected bid forward. The responses will be checked as follows:

1. Clarity that each and every (functional and nonfunctional) requirement will be delivered or a clear and acceptable explanation for each that can not be delivered as stated with an acceptable alternative solution.
2. A clear description of the solution and how this breaks down into its respective components.
3. All information requested in this RFP is provided in the response.
4. Clear demonstration in the response that the bidder understands SNOMED International's existing solutions, particularly where they will integrate with them and also of how these systems support the collaborative authoring of SNOMED CT.
5. Confidence of the evaluation team in the capability and capacity of the bidder to deliver the solution proposed and to meet the requirements.

7. Disclaimer

SNOMED International reserves the right:

- to amend, clarify, add to or withdraw all or any part of this Request for Proposal at any time during the procurement;
- to vary any timetable or deadlines set out in this RFP;
- not to conclude a contract for some or all of the goods and/or services (as applicable) for which proposals are invited; and
- cancel all or part of the procurement at any stage at any time.

Estimated cost and timeframe to be provided for each deliverable and the contract will be terminated if any deliverable fails to meet the requirements and quality within agreed timeframe.

The bidder accepts and acknowledges that by issuing this RFP, SNOMED International is not bound to accept a proposal or obliged to contract with the bidder at all.



The bidder accepts and acknowledges that they are responsible for any and all costs incurred in their participation in this RFP regardless of a contract award being made.