



Position: Intermediate Application Software Architect
Reference #: 8460A
Department: National Resources Canada
Security Clearance: Reliability
Location: Remote
Pay rate is negotiable
Contract Length: 1 year + Four 1 year options
Language: English

Statement Of Work

TITLE

Development of Canada Centre for Mapping and Earth Observation Microservices

SW.2.0 BACKGROUND

The Canada Centre for Mapping and Earth Observation (CCMEO) branch of Natural Resources Canada (NRCan) is Canada's national mapping agency. CCMEO provides geospatial data and services that Canadians rely upon every day. The CCMEO's service provision is based on a monolithic IT architecture, with components designed to meet specific requirements in a rigid fashion. In today's technological landscape, this design is out of date. The CCMEO now requires a modernized IT infrastructure based on principles of agile design to meet the branch's rapidly changing priorities. This project will focus on one component of the CCMEO's IT modernization: microservices.

Microservices represent an IT architectural style based on creating single-function modules with well-defined interfaces and operations. They are deployed independently, allowing them to be easily combined and modified without directly interfering with separate services. By developing microservices to meet its business needs, the CCMEO will gain the agility required to meet its dynamic requirements. The CCMEO envisions its microservices being implemented as a series of Application Programming Interfaces (APIs).

This contract aims to establish a task authorization agreement with a Contractor to deliver microservices to the

CCMEO. Specific requirements for microservices development will be outlined through tasks offered to the Contractor during the life of the contract. It is expected that the range of microservices to be

developed will be broad, ranging from internal scientific research and development processes to components of public-facing APIs that Canadians will use to access CCMEO services.

SW.3.0 OBJECTIVES

This contract will allow the CCMEO to receive microservices that will provide the foundation for the CCMEO's modernized IT infrastructure. The delivered microservices will enable an ecosystem of APIs that will support the CCMEO's diverse activities. It will also provide sufficient knowledge transfer (e.g. documentation, training, presentations, etc.) to enable the CCMEO to implement and modify the microservices without ongoing Contractor support.

SW.4.0 PROJECT REQUIREMENTS

SW.4.1 Tasks, Deliverables, Milestones and Schedule

Specific requirements shall be outlined within individual task authorizations submitted to the Contractor throughout the duration of the contract. Here, the CCMEO outlines the nature of the requirements that may appear within a given task authorization.

1. Architecture

Depending on its needs and financial considerations, the CCMEO has access to several different public, private and hybrid cloud environments. Given this broad offering, the CCMEO seeks to implement a flexible, versatile, reusable and technology agnostic microservices architecture that will allow the use of the different environments in a transparent manner, according to the needs and means of the moment. Currently, the CCMEO is using Amazon Web Services (AWS) and High Performance Computing (HPC) facilities of the Government of Canada (GoC) for intensive calculations tasks, but in the future other cloud environments could be integrated.

Therefore, when requested by the CCMEO, the contractor shall provide architecture design services to enable development of a Microservices Common Framework. This shall consist of:

- Working with CCMEO staff to understand the requirements the desired microservice architecture will need to meet such as:
 - Flexibility: Easily deployable across various cloud environments, HPC and data centers.
 - Reusability: Framework giving the capacity to link microservices into workflows.
 - Usability: Framework for wrapping existing or developing new algorithms and applications into microservices.

- Developing microservice architecture diagrams and any other supporting documentation showing the microservice(s) necessary to meet the requirements, relationships between microservices and internal and external systems, and the technologies that will be used for each microservice component (e.g. Open Geospatial Consortium (OGC) APIs, Docker, Rancher, various programming languages, etc.).

- Authoring written documentation to compliment microservice architecture diagrams. Written documentation shall also enable CCMEO staff to understand architecture characteristics in detail, support subsequent task authorizations, and facilitate implementation and ongoing operation of microservices. Documentation shall be authored in Markdown to enable online management and reuse.

Architecture designs shall consider CCMEO requirements for microservices development (refer to Task 2 below).

2. Microservices Development

The majority of requirements shall consist of contextual and technical design considerations for the development of CCMEO microservices. The CCMEO expects that the following requirements shall apply within each task authorization:

- Open Geospatial Consortium (OGC) APIs – Developed microservices shall be based on OGC API standards specifications to the greatest degree possible (refer to <https://ogcapi.ogc.org/>). In cases where OGC APIs are not appropriate for a given microservice, the Contractor shall provide written guidance indicating why OGC APIs cannot be used, and what alternative(s) should be considered. Any alternative approach provided by the contractor shall be approved by the CCMEO before microservices development begins. The Contractor shall use approved OGC API specifications for published standards, and the most recent specification versions for OGC APIs that are under development. In some cases CCMEO may also request the use of OGC API frameworks that have not yet been formalized (e.g. Data Access and Processing API (DAPA); Application Deployment and Execution Service (ADES)).
- Open Source and Proprietary Solutions – Microservices shall leverage open source solutions wherever possible. For open source programming languages, the CCMEO shall indicate which language is required or preferred for a given task. Examples of common open source languages the CCMEO uses include Python, R, Scala, and JavaScript. The Contractor shall avoid using or recommending any proprietary solution for microservice development unless a proprietary solution is requested by the CCMEO, or if no open-source solution exists for a requirement. If the CCMEO requests interaction with proprietary geospatial software offerings (e.g. PCI Geomatica, ESRI), the CCMEO shall provide interface specifications and carry out required testing. The contractor is not required to possess knowledge of proprietary geospatial software. If the Contractor suggests use of a proprietary solution where the CCMEO has not explicitly requested one, the Contractor shall indicate why the proprietary solution is the only viable way to meet the requirement. Use of proprietary solutions shall not occur unless specifically requested or approved by the CCMEO.
- Government of Canada Directive - All API development shall follow requirements as per Treasury Board Secretariat Directive on Service and Digital - [Appendix B: Mandatory Procedures on Application Programming Interfaces](#).

- Containers - Developed microservices shall be required to operate within containers (e.g. Docker or Singularity within HPC) to enable their use on public (e.g. AWS, Azure, Google Cloud), private, and hybrid cloud environments. The contractor shall also ensure that any container development shall allow for use of container management software (e.g. Rancher).
- Use of Git Repositories – The Contractor shall make use of Git-based repositories (e.g. GitHub, GitLab) for managing source code related to microservices development. All repositories shall be made openly available for CCMEO staff to access.
- Documentation – The Contractor shall be required to author written documentation to describe the developed microservices. Documentation shall be sufficient for CCMEO staff who have no prior experience with the microservice development work to understand the microservice’s purpose, characteristics, how it works, and implement it within internal NRCan systems.
- Ensuring all microservice development is based on technologies, solutions and design that do not require ongoing involvement from the Contractor. Delivered microservices shall be such that the CCMEO can independently implement and operate them with no further involvement of the Contractor.

The CCMEO expects that microservices development will occur through two types of scenarios. The Contractor shall be able to support microservices development through either, or a combination of these scenarios:

- Existing Solution - CCMEO scientists manage many operational applications that are not structured as microservices. In these situations, code exists (e.g. Python, R) to meet a given requirement, but needs to be incorporated into a microservice structure. In this scenario the contractor shall be provided with the existing code and requested to create a microservice from it. The CCMEO may request the Contractor to create a wrapper (e.g. a Python wrapper) to develop a microservice for an existing application.
- No Existing Solution - In this scenario the CCMEO shall provide requirements detailing what a specific microservice will need to accomplish, but existing code will not be available to meet the requirements. In this case, the Contractor shall be required to develop all aspects of the microservice to fulfill the requirements.

3. Knowledge Sharing

All task authorizations shall be undertaken in close collaboration with CCMEO staff to ensure the CCMEO is fully aware of the microservices work that is being undertaken and that the CCMEO can easily leverage the Contractor’s deliverables without requiring further involvement of the Contractor. This shall consist of the following:

- Providing hands-on training to CCMEO staff to enable complete understanding of the developed microservices.
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- Developing training materials to support knowledge sharing within the CCMEO after individual task authorizations are complete.
- Creating content to support the development of communications products the CCMEO will use to describe microservices to diverse audiences (e.g. scientists, executives, internal NRCAN staff, Government of Canada staff, and the general public).

SW.4.2 Reporting Requirements

The Contractor shall meet the following requirements to demonstrate that each task authorization is being completed in a way that is on time, on budget, and of an acceptable quality to NRCAN.

Additional requirements may be defined in individual task authorizations:

- Organize and facilitate at least one preliminary meeting/teleconference to initiate the start of the task. The meeting is to ensure the Contractor is fully aware of project requirements.
- Organize and facilitate weekly teleconferences after completion of the preliminary meeting to discuss progress and updates for the task. Teleconference frequency may be reduced if mutually agreed upon by NRCAN and the Contractor.
- Organize and facilitate additional ad-hoc teleconferences as required to discuss task issues or concerns as they occur.
- Provide draft versions of deliverables (architecture designs, microservices, and knowledge sharing materials) for review and comment by CCMEO staff. Timelines for draft deliverables shall be provided in each task authorization.
- Organize and facilitate knowledge sharing activities (e.g. training sessions) to allow CCMEO staff to fully understand and use microservices developed as part of the task.
- Provide one final meeting/teleconference to allow for final review of task deliverables.
- Written minutes of meeting and teleconference must be made available in such a manner so as to be accessible to NRCAN and other project participants.
- Presentation materials from meetings/teleconferences to be made available to NRCAN and other project participants.
- Provide summaries of task activities, results, and outcomes as requested by NRCAN.

SW.5.0 OTHER TERMS AND CONDITIONS OF THE SOW

SW.5.1 Contractor's Obligations

The contractor shall meet the following obligations. Additional obligations may be defined within task authorizations:

- Provide sufficient computing resources to enable development and testing of microservices. Deliverables shall be designed such that CCMEO staff can implement Contractor solutions with no assistance or involvement from the Contractor.
- Respect NRCan requirements with regards to proprietary information, as needed.
- Ensure that no documents deemed Protected (or higher) are stored or maintained on the contractor's premises outside of the NRCan digital repository/telework environment.
- Participate in teleconferences and attend meetings with project stakeholders, as needed.

SW.5.2 NRCan's Obligations

NRCan shall meet the following obligations. Additional obligations may be defined within task authorizations:

- Provide feedback on or indicate acceptance of project deliverables within a reasonable, predetermined period of time.
- Provide access to relevant documentation and materials relevant to the project.
- Ensure that no document deemed Protected (or higher) be shared with the contractor (hard copy) outside the NRCan network.
- Provide access to the Project Authority or delegate to provide guidance and answer questions as required.
- Provide access to unclassified, publicly available open geospatial data held by the department (e.g. Open Maps Data).
- Provide interface specifications and carry out required testing for any requirements which involve commercial software.

SW.5.3 Location of Work, Work Site and Delivery Point

All work must be performed within the NRCan Citrix Telework environment and then saved in GCDocs or other NRCan approved repository. No documentation/files may be downloaded to contractor's local PC.

When connecting a device to the NRCan network, the contractor must utilize a trusted (non-public) WiFi access point.

Delivery is to take place electronically.

Mandatory Criteria

Criterion ID	Mandatory Criteria	Proposal Page #	Compliant (Yes/No)
M1	The Bidder must provide one (1) IM/IT professional services reference contract that meets the following: a) A minimum total billed value of \$50,000 over a one-year time frame, within the last 5 years. (Canadian, taxes included). b) Have a minimum contract duration of six (6) months. c) Have been undertaken within the five (5) years preceding the issuance date of this RFP. d) Have included the provision of IM/IT resources as follows: a. One (1) Architect resource. b. One (1) or more Programmer/Developer resources. e) Include the following information:		Yes No

	<ul style="list-style-type: none"> a. Brief description of the scope of services provided, including specific reference to how microservices were developed as part of the project. b. Brief description of how knowledge, development, and/or use of OGC APIs and/or services was included in the project. c. Brief description of how open-source software was developed and/or used in the project. d. Brief description of the tasks each IT resource completed as part of the project, including how the resources worked as a team to achieve project outcomes. e. The named client project authority <p>Note: If more than the requested number of reference contracts is provided, Canada will only evaluate the first one (1) in the order in which it is set out in the Bidder's Proposal.</p> <p><i>NRCan reserves the right to contact the named client project authorities to verify the accuracy and veracity of each of the Bidders cited Project Summaries.</i></p>		
M2	<p>The bidder must be a member of the Open Geospatial Consortium (OGC) or must demonstrate the relevance of the OGC to their recent work (i.e. within the last five years), including the use of OGC promulgated standards, services, and/or APIs (for example: project in which the OGC standards were used to develop a geospatial analysis system).</p>		<p>Yes</p> <p>No</p>

Point Rated Criteria

Req. ID	Rated Requirement	Evaluation Criteria Scoring Method	Maximum Points Available	Bidder Score	Proposal Page #	Comments

<p>RC1</p>	<p><u>A.1 – Application/ Softwards Architect</u></p> <p>The bidder should clearly demonstrate that the proposed Architect resource for statement of work requirement 6.0 has knowledge and experience directly related to the project requirements, particularly those related to microservices.</p> <p>For the identified Architect resource, the Bidder should provide the following:</p> <p>a) Name of the Resource b) A curriculum vitae (CV). c) A description of the work for each experience (in years/months) listed in the subsequent column.</p> <p>Reported years/months of experience are to be consecutive, not cumulative. For example, if a resource worked on two projects during one month, this would count as one month of experience.</p> <p>The curriculum vitae (CV) of the proposed Architect resource will only be used to verify these criteria. The CV on its own is not sufficient to demonstrate how this rated requirement is met.</p>	<p>Experience with the development of information technology architectures (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <5 years of relevant experience ● 2 = 5 to <6 years of relevant experience ● 3 = 6 to <7 years of relevant experience ● 4 = 7+ years of relevant experience <p>Experience with the development of cloud and enterprise data centre architectures (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <5 years of relevant experience ● 2 = 5 to <6 years of relevant experience ● 3 = 6 to <7 years of relevant experience ● 4 = 7+ years of relevant experience <p>Experience with the development of cloud and enterprise data centre architectures in the Amazon Web Services (AWS) environment (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <5 years of relevant experience 	<p>32</p>			
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		<ul style="list-style-type: none">● 2 = 5 to <6 years of relevant experience● 3 = 6 to <7 years of relevant experience● 4 = 7+ years of relevant experience <p>Experience with the development of microservice-based information technology architectures (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <5 years of relevant experience● 2 = 5 to <6 years of relevant experience● 3 = 6 to <7 years of relevant experience● 4 = 7+ years of relevant experience <p>Experience with the design of architectures using open-source software. Reference should be made to experience with Python (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <5 years of relevant experience● 2 = 5 to <6 years of relevant experience● 3 = 6 to <7 years of relevant experience● 4 = 7+ years of relevant experience <p>Experience with container technologies (e.g. Docker, Singularity) in the context of architectures (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <5 years of relevant experience● 2 = 5 to <6 years of relevant experience				
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		<ul style="list-style-type: none">• 3 = 6 to <7 years of relevant experience• 4 = 7+ years of relevant experience				
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		<p>Experience with written documentation of architectures for a variety of audiences (e.g. technical experts, high-level users) using online-oriented technologies (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <5 years of relevant experience● 2 = 5 to <6 years of relevant experience● 3 = 6 to <7 years of relevant experience● 4 = 7+ years of relevant experience <p>Experience with the design of architectures in the context of geospatial information technology systems (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <5 years of relevant experience● 2 = 5 to <6 years of relevant experience● 3 = 6 to <7 years of relevant experience● 4 = 7+ years of relevant experience				
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<p>RC2</p>	<p><u>A.7- Programmer/Analyst</u></p> <p>The bidder should clearly demonstrate that the two (2) proposed Programmer/ Developer resources for statement of work requirement 6.0 have knowledge and experience directly related to the project requirements, particularly those related to microservices.</p> <p>The final score will be the average of the two (2) proposed resource experience scores.</p> <p>For the each of the Programmer / Developer resources the Bidder should provide the following:</p> <ul style="list-style-type: none"> a) Name of the Resource b) A curriculum vitae (CV). c) A description of the work for each experience (in 	<p>Experience with software development in the context of microservices (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience demonstrated ● 1 = <6 months of relevant experience ● 2 = 6 months to <1 year of relevant experience ● 3 = 1 to <3 years of relevant experience ● 4 = 3+ years of relevant experience <p>Experience with software development in the context of cloud environments (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <6 months of relevant experience ● 2 = 6 months to <1 year of relevant experience 	<p>39</p>			
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	<p>years/months) listed in the subsequent column.</p> <p>Reported years/months of experience are to be consecutive, not cumulative. For example, if a resource worked on two projects during one month, this would count as one month of experience.</p> <p>The curriculum vitae (CV) of the proposed Programmer/Developer resources will only be used to verify these criteria. The CV on its own is not sufficient to demonstrate how this rated requirement is met.</p>	<ul style="list-style-type: none"> ● 3 = 1 to <3 years of relevant experience ● 4 = 3+ years of relevant experience <p>Experience with software development in the context of the Amazon Web Services (AWS) cloud environment (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <6 months of relevant experience ● 2 = 6 months to <1 year of relevant experience ● 3 = 1 to <3 years of relevant experience ● 4 = 3+ years of relevant experience <p>Experience in development of APIs (4 points):</p> <ul style="list-style-type: none"> ● 0 = No relevant experience ● 1 = <6 months of relevant experience ● 2 = 6 months to <1 year of relevant experience ● 3 = 1 to <3 years of relevant experience ● 4 = 3+ years of relevant experience <p>Number of projects in which the resource has gained knowledge of, developed or used OGC APIs and/or services (3 points):</p> <ul style="list-style-type: none"> ● 0 = No project presented ● 1 = 1 project ● 2 = 2 projects ● 3 = 2+ projects <p>Experience with open-source software development. Reference</p>				
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		<p>should be made to Python development experience (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <6 months of relevant experience				
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		<ul style="list-style-type: none">● 2 = 6 months to <1 year of relevant experience● 3 = 1 to <3 years of relevant experience● 4 = 3+ years of relevant experience <p>Experience with container technologies (e.g. Docker, Singularity) in the context of software development (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <6 months of relevant experience● 2 = 6 months to <1 year of relevant experience● 3 = 1 to <3 years of relevant experience● 4 = 3+ years of relevant experience <p>Experience with the use of Git software development environments (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <6 months of relevant experience● 2 = 6 months to <1 year of relevant experience● 3 = 1 to <3 years of relevant experience● 4 = 3+ years of relevant experience <p>Experience with the development of training materials to support use of APIbased systems (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <6 months of relevant experience● 2 = 6 months to <1 year of relevant experience● 3 = 1 to <3 years of relevant experience				
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		<ul style="list-style-type: none">● 4 = 3+ years of relevant experience				
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		<p>Experience with software development in the context of geospatial information technology systems (4 points):</p> <ul style="list-style-type: none">● 0 = No relevant experience● 1 = <6 months of relevant experience● 2 = 6 months to <1 year of relevant experience● 3 = 1 to <3 years of relevant experience● 4 = 3+ years of relevant experience				
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<p>RC3</p>	<p><u>BIDDER'S EXPERIENCE</u></p> <p>As defined in mandatory requirement M1, the bidder should provide one (1) project with reference to a client who has done business with them in the recent past (within the last 5 years) for microservicesoriented work.</p> <p>In compliance with the M1 criterion, the Bidder should provide one (1) IT professional services reference contract that meets the following:</p> <ul style="list-style-type: none"> a) A minimum total billed value of \$50,000 (Canadian, taxes included). b) Have a minimum contract duration of six (6) months. c) Have been undertaken within the five (5) years preceding the issuance date of this RFP. d) Have included the provision of IM/IT resources as follows: <ul style="list-style-type: none"> a. One (1) Architect resource. b. One (1) or more Programmer/Developer resources. <p>For the project, the bidder should include the following information:</p>	<p>The Project Summaries will be evaluated against the following factors:</p> <p>Contract value (3 points):</p> <ul style="list-style-type: none"> ● 1 = \$50,000 to \$100,000 ● 2 = \$100,000+ to \$250,000 ● 3 = \$250,000+ <p>Contract duration (3 points):</p> <ul style="list-style-type: none"> ● 1 = 6 months ● 2 = 6+ months to <1 year ● 3 = 1+ years <p>Development or use of microservices (2 points):</p> <ul style="list-style-type: none"> ● 0 = microservices not developed or used ● 2 = microservices developed or used <p>Knowledge, development and/or use of OGC APIs and/or services (2 points):</p> <ul style="list-style-type: none"> ● 0 = Knowledge, development or use of OGC APIs or services not included in the reference project ● 2 = Knowledge, development or use of OGC APIs or services included in the reference project 	<p>18</p>			
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	<p>a) Brief description of the scope of services provided, including specific reference to how microservices were developed as part of the project.</p> <p>b) Brief description of how knowledge, development, and/or use of OGC APIs and/or services was included in the project.</p> <p>c) Brief description of how opensource software was developed or used in the project.</p> <p>d) Brief description of the tasks each IT resource completed as part of the project, including how the resources worked as a team to achieve project outcomes.</p>	<p>Resources (2 points):</p> <ul style="list-style-type: none"> ● 0 = No demonstration of how IT resources were involved in the project. ● 1 = Brief description of tasks each IT resource completed during the project. ● 2 = Brief description of tasks each IT resource completed during the project and how the resources worked as a team to achieve project outcomes. <p>Development or Use of open-source software (2 points):</p> <ul style="list-style-type: none"> ● 0 = open-source software not developed or used ● 2 = open-source software developed or used <p>Similarity or relevance of the reference project to NRCan requirements as defined in statement of work tasks (i.e. Architecture, Microservices Development, Knowledge Sharing) (3 points):</p> <ul style="list-style-type: none"> ● 0 = No similarity or relevance ● 1 = Similarity or relevance to 1 statement of work task ● 2 = Similarity or relevance to 2 statement of work tasks ● 3 = Similarity or relevance to all statement of work tasks 				
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<p>RC4</p>	<p>Diversity and Inclusion The Bidders should demonstrate the following corporate activities they have implemented to promote anti-racism and diversity within their organisation: a. The bidder has internally published policies or commitments on anti-racism and inclusiveness b. The bidder has publicly available organisational commitments to a diverse workforce c. The bidder’s employees are mandated to take mandatory training on anti-racism d. The bidder’s employees are mandated to take unconscious bias training</p>	<p>0 pts = the bidder does not address. 1 pts = The bidder has provided information on the existence of the activity but does not provide sufficient detail or supporting documents. 3 pts =The bidder has fully described the activity and provided supporting documents as evidence.</p>	<p>Total of 3 Points</p>			
	<p>e. The bidder has developed internal staffing and/or recruitment strategy(ies) to increase representation of underrepresented groups in their workforce. The bidder should provide details of the following activities.</p> <p>For activities described in a. and b. (Policy and commitments), the bidder should provide copies of policy or commitment documents including their effective date. For activities described in c. and d. (training), the bidder should provide the name of the course and the service provider; if developed internally, a copy of the course outline.</p> <p>For activities described in e. (staffing), the bidder should provide copies of job posting, or other staffing/recruitment documents demonstrating compliance with the rated criteria.</p>					
		<p>TOTAL:</p>	<p>92</p>			
		<p>Minimum Required Passing Score (60%):</p>	<p>56</p>			