ECMWF Copernicus Procurement

Invitation to Tender



Copernicus Climate Change Service

Volume II

Quality Assurance for the Climate Data Store

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1 Introduction

ECMWF as the Entrusted Entity for the Copernicus Climate Change Service (C3S) invites tenders for implementation of the Evaluation and Quality Control (EQC) function for the C3S Climate Data Store (CDS). The successful tenderer shall be responsible for evaluation of the quality and the provision of quality assurance information to users of the CDS, including its technical infrastructure, data catalogue, and toolbox. The work to be done will rely on outputs from several existing C3S contracts, as indicated in Section 2. The scope of activities and detailed requirements for this tender are described in Section 3 of this document.

The purpose of the EQC function in C3S is to provide quality assurance information for all C3S products and services, and to ensure that users have the information they need in order to use the products and services for their own purposes. The EQC function also keeps track of user requirements, and informs ECMWF about gaps, limitations and shortcomings in products and service delivery. C3S users include scientists, consultants, planners and policy makers, the media and the general public.

The aim of this tender (C3S_512) is to verify that the C3S Climate Data Store is fit for purpose, and to ensure that it remains so. Fitness for purpose in this case means, for example, that

- the CDS offers high-quality data and products that are relevant to users;
- all data and products are well documented and available in a searchable catalogue;
- all descriptive metadata are correct and complete;
- the catalogue is properly organised and indexed;
- providers of data and products have adequate quality control measures in place;
- providers make data and products available using agreed standard data formats and protocols;
- information on data quality and applicability is collected from a variety of sources;
- all such information is presented to the user in a clear and unambiguous way;
- the CDS toolbox offers the functionalities that users need;
- the tools implement scientifically sound algorithms and best practices;
- all output from toolbox applications is reproducible;
- a data provenance tracking mechanism for toolbox applications has been implemented;
- graphical representations of data and products (graphs and charts) are consistent and provide the necessary information (e.g. on uncertainty);
- the CDS meets agreed key performance indicators regarding speed, usability, etc.

A separate invitation to tender will be issued for implementation of the EQC function for the C3S Sectoral Information System (SIS). That tender (C3S_513) will address fitness for purpose of SIS workflows and applications that make use of the CDS, as well as various C3S-sponsored use cases addressing the needs of C3S users in various sectors and professional capacities. The scope of the C3S_513 tender will also include management of the C3S User Requirement Data Base (URDB), which will record all user requirements for C3S, including user requirements for the CDS as identified by this (C3S_512) tender.

2 Background

The purpose of this section is to clarify the context of this tender and to briefly describe the relevant outcomes of current EQC activities initiated by C3S. Specific technical requirements for the additional work to be carried out under this tender are described in Section 3 of this document.

2.1 The C3S Climate Data Store

The backbone of the C3S is a cloud-based Climate Data Store (CDS) that provides users with a single

point of access to quality-assured data on climate. The datasets may be physically located at various data centres around the world, or they may be distributed in the cloud, but this will be transparent to users of the CDS. All data will be open and free, and can be used by anyone for any purpose. To facilitate the transformation of data into tailored information products, the CDS features a toolbox for creating workflows and applications on-line. All CDS data and tools will be accessible from the C3S website as well as via open Application Programming Interfaces (APIs). The first public release of the CDS will take place during the Q1 of 2018.

Figure 1 shows a conceptual representation of the CDS. A recent ECMWF Newsletter article (available at <u>this link</u>) describes the main elements of the CDS infrastructure and details on its functionality and design.

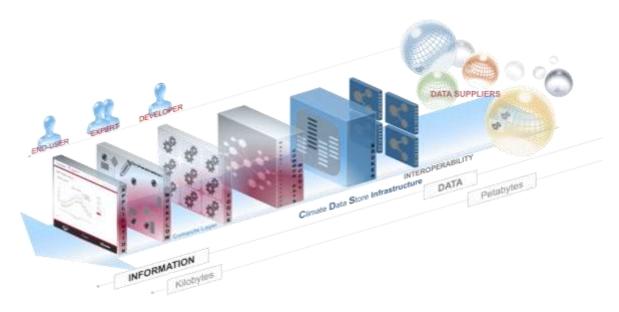


Figure 1: The Climate Data Store infrastructure and toolbox

CDS DATA CATALOGUE. The CDS provides access to climate datasets via a searchable catalogue. Categories of data include: Climate Data Records (CDRs) and Interim Climate Data Records (ICDRs), quality-controlled archives of in-situ climate observations, reprocessed satellite data records, data from climate reanalyses, seasonal forecast data, output from climate model simulations, and a variety of derived climate impact indicators. Multiple datasets will be available in each category, e.g. for the majority of GCOS Essential Climate Variables (ECVs), on global or regional domains, with varying spatial resolutions and temporal coverage, from different data providers, based on different methodologies, etc.

Establishing the criteria for inclusion of datasets in the CDS catalogue is one of the roles of the EQC function. Criteria must be based on user requirements, on scientific quality, on the maturity and traceability of the underlying science and production methods, on quality of documentation and reliability of access. The first release of the CDS will provide access to approximately 20-40 distinct datasets. The total number of datasets to be served by the end of 2020 will likely be between 250 and 400. When data suppliers are under contract with ECMWF, the production and updating of datasets is subject to strong requirements on quality assurance, documentation and user support, use of standard data formats and data transfer protocols, etc. In other cases, ECMWF will have limited (or no) control over the production of a dataset or its continued availability.

CDS TOOLBOX. The CDS Toolbox provides users with the ability to create interactive web applications tailored to their needs using CDS datasets. The Toolbox contains a variety of software tools for combining CDS datasets and performing basic operations on the data, including functions for interpolation and regridding, simple statistical calculations, visualisation, text manipulation, etc. The Toolbox is designed to be extendable. The Toolbox uses a Common Data Model to represent different types of datasets available in the CDS catalogue. This allows data and tools to be combined into workflows that can be executed on-line. An Application Editor is available to parametrise workflows using widgets to create interactive web applications on the CDS. The Toolbox includes a mechanism for tracking the provenance of information products created in workflows and applications.

2.2 Current EQC activities

Three contracts were issued in Q3 of 2016 to prepare some elements of the EQC function for the CDS. Key deliverables and timelines for these contracts are summarised in Table 1. Each contract addresses a specific category of data products, and explores for each category the user requirements and possible solutions for addressing them. A fourth contract was issued in Q4 of 2017 to deliver quality assessments for ECV products during the operational phase of C3S starting in 2018. Several outcomes from these contracts are relevant to the present tender and will play a role in the requirements described in Section 3 of this document. These outcomes are briefly described in the following paragraphs.

QUALITY ASSURANCE TEMPLATES FOR CLIMATE DATA. A template for presenting information about product definition, quality and usability has been developed under the C3S_51 Lot 2 contract. The template (outlined in Figure 2) has been designed to accommodate quality assurance information specifically for ECV products derived from satellite observations. The information in the template is intended to be displayed as web content linked to the corresponding CDS catalogue data record. All relevant information is organised in five main categories. The template also contains a set of quality assurance status indicators (the icons in the top panel) that can be used to show at a glance the level of completeness of the information provided. Sample forms for provision of detailed content in each of the five categories have also been designed. To demonstrate the approach, quality assurance templates and forms will be completed for a selected set of ECV data products, including some that are derived from in situ observations. An updated template definition and first set of demonstrations will be available by February 2018.

	Title	Start	End	Key deliverables
C3S_51 Lot 2	Quality Assurance for ECV Products Derived rom Observations	01/10/16	31/12/18	 User requirements for climate data Inventories of existing climate datasets Scientific assessments and gap analysis fo
C3S_51 Lot 3	Quality Assurance for Multi-Model Seasonal Forecast Products	01/07/16	30/09/18	 a selection of datasets Recommendations for further development of the CDS
C3S_51 Lot 4	Quality Assurance for Multi-Model Climate Projections	01/08/16	31/10/18	Recommendations for further development of the EQC function
C3S_511	Quality Assessment of ECV Products	01/11/17	30/06/21	 Quality assessments for individual ECV products (approx. 100 datasets) Multi-product assessments for each ECV (approx. 39 ECVs) Thematic assessments for sets of related ECVs (approx. 6 themes)

Table 1: Relevant C3S contracts for EQC implementation and their key deliverables

This template-based approach to quality assurance developed by the C3S_51 Lot 2 contract can be used as a framework for EQC of other types of data products, e.g. products derived from reanalyses, seasonal forecasts, climate model simulations, etc. Similar templates showing similar categories of information can be developed for any of these, although the precise specification of content in each category will surely vary. To explore this idea, proposals for additional template specifications will be provided by the C3S_51 Lot 3 contract for quality assurance of seasonal forecast products, and by the C3S_51 Lot 4 contract for quality assurance of multi-model climate projections. Proposals and recommendations for implementation will be delivered by February 2018.

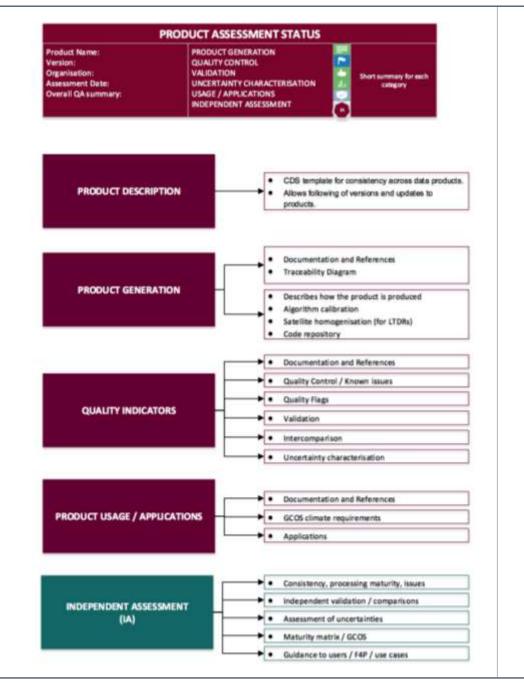


Figure 2: A quality assurance template for ECV products derived from satellite observations

CONTENT MANAGEMENT SYSTEM FOR QUALITY ASSURANCE TEMPLATES. Gathering, checking and updating the information needed to populate the quality assurance templates with accurate and useful content is a complex process that involves multiple parties, including data providers, CDS data managers, and other EQC actors who carry out data quality checks on behalf of C3S. Clear protocols, roles and responsibilities must be defined to manage this process, which accompanies the life cycle of the data product. Essential information about the product and a pre-defined level of data quality control must be in place before a data product can be published in the CDS data catalogue. Results from independent assessments and user feedback must be added as they become available, and product information may need to be updated to remain consistent with the actual content of the dataset, which may change over time.

In order to support such a process, a dedicated Content Management System for quality assurance templates is being developed under the C3S_51 Lot 2 contract. The system will support content generation by multiple parties and will feature the tools needed to publish quality assurance templates on the CDS. The system will be designed to accommodate multiple types of quality assurance templates for different categories of data products. A first version, capable of handling quality assurance for ECV products derived from observations, will be available by February 2018.

3.1 Single-product assessments

The purpose of a single-product assessment is to support management of the CDS catalogue by providing information on the quality of a single ECV product in a form that is meaningful to users of the CDS.

Each single-product assessment shall include:

- Descriptive metadata for the product as needed for the catalogue;
- · A recommendation on inclusion, conditional inclusion, or exclusion of the product;
- Any actions needed to implement the recommendation;
- Detailed justification for the recommendation.

In case of a positive recommendation, the assessment shall include a Product Quality Brief containing:

- High-level qualitative user guidance on strengths, weaknesses and limitations of the product;
- Quantitative results on product uncertainties, including those generated by the dataset providers
 as part of their production process (e. g. using ensembles), as well as comparisons with other
 products and independent observations where possible.

The Product Quality Brief is intended for C3S users and will be made available via the CDS. A standard format for the Product Quality Brief shall be agreed with C3S prior to contract signature.

Single-product assessments shall:

- Address scientific quality of the products with reference to GCOS target requirements (GCOS IP 2016, Annex A) and its annual updates and refinements (GCOS IP 2016, Action G10);
- · Address availability, access and usability of the products;
- Address the maturity of products and production systems;
- Make use of product documentation, peer-reviewed journal articles and other publicly available studies and reports;
- · Include results of any additional analysis undertaken by the contractor;
- · If applicable, summarise usage information and user feedback on the product;
- Ensure consistency with the EQC framework and standards developed by the C3S_51 Lot 2 contract on behalf of C3S.

The successful Tenderer shall be responsible for ensuring that single-product assessments remain up to date; i.e. the information contained in them reflect any changes or upgrades in the product itself.

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C35_511 Volume II: QA of ECV Products

Figure 3: Requirements for quality assessment of individual ECV products, taken from C3S_511 Volume II

INDEPENDENT QUALITY ASSESSMENTS. The main purpose of the C3S_511 contract (see Table 1) is to provide quality assessments for the majority of ECV products in the CDS catalogue. The assessments are to be carried out independently of the suppliers of the data products. The requirements for these assessments are described in Section 3.1 of Volume II of the ITT C3S_511, which is shown in Figure 3 above. Note that the scope of C3S_511 is limited to ECV products (CDRs and ICDRs) derived from observations and from reanalysis data. Assessment of other CDS data products such as seasonal forecasts, climate projections, in situ data collections, etc. will be under the purview of this tender (C3S_512).

3 Technical Requirements

ECMWF intends to award a single multi-annual framework contract (maximum 36 months) for management and implementation of the Evaluation and Quality Control (EQC) function for the C3S Climate Data Store (CDS), including its technical infrastructure, the catalogue of data products, and the toolbox.

The successful tenderer shall:

- Take overall responsibility for assessing fitness-for-purpose of the CDS and for providing quality assurance information to CDS users, using proven methods, metrics and techniques;
- Take full advantage of relevant outcomes of existing EQC activities contracted by C3S, as described in Section 2 and further detailed in the subsections below;
- Engage with C3S users to collect and clarify user requirements, to test CDS usability and user satisfaction, to collect user feedback, etc.;
- Provide inputs to the C3S User Requirements Data Base (URDB) maintained by the C3S_513 contractor;
- Develop and maintain an up-to-date User Requirements Analysis Document (URAD) with consolidated user requirements for the CDS, including assessments of impact and feasibility, based on information in the C3S URDB;
- Make use of any applicable international standards and best practices related to quality assurance and quality control where possible;
- Make use of relevant work performed by international scientific bodies and initiatives, including the Global Climate Observing System (GCOS), the Intergovernmental Panel on Climate Change (IPCC), the World Climate Research Programme (WCRP) and the CEOS/CGMS Working Group on Climate;
- Interact regularly with the CDS data providers, with the CDS development and data management teams at ECMWF, and with other ECMWF contractors charged with implementing specific aspects of the EQC function (see Table 1 in Section 2) in order to ensure that agreed protocols and processes are in place, and adhered to, to enable timely and accurate updating of content in the quality assurance templates;
- Report regularly to ECMWF on the outcomes of these activities.

The following subsections list additional technical requirements for areas of work related to quality of CDS data, tools and overall service provision.

3.1 Fitness of CDS data

The objectives for this area of work are:

- to continuously test and assess fitness for purpose of all CDS data products;
- to set minimum requirements for including new products in the CDS catalogue;

- to provide quality assurance information and guidance to users of the products;
- to inform ECMWF on user requirements, gaps, shortcomings and limitations, as well as opportunities for improvement.

3.1.1 Requirements

The requirements listed in this section refer to the approach based on quality assurance templates (QAT) as described in Section 2.

The successful tenderer shall:

- Develop and maintain a QAT for each of the datasets in the CDS data catalogue;
- Generalise and refine the QATs as needed, taking note of the work undertaken by the C3S_51 Lots 3 and 4 contracts;
- Establish rules and procedures for content management of the QATs, including baseline criteria to allow initial publication of a dataset in the CDS catalogue;
- Ensure that all QAT content is accurate, traceable, verifiable, up-to-date, and fully consistent with the actual content of the dataset, which may change over time;
- Ensure that the QAT content includes 'must-know' information about the use and applicability of the dataset, including its limitations and uncertainties;
- Update the QAT with new information as it becomes available, e.g. based on new use cases, user feedback, scientific reports, or targeted scientific assessments such as performed under the C3S_511 contract;
- Ensure that each QAT is fully integrated with the CDS and can be displayed as web content alongside the descriptive metadata of the corresponding dataset, i.e. as an annex to the CDS catalogue dataset record;
- For all QATs, maximise the consistency of approach, terminology, visualizations and user experience;
- Continuously engage with users to identify user requirements for CDS content quality and completeness, to measure user satisfaction and to develop recommendations for improvements and expansion of the CDS datasets and products.

3.1.2 Tasks and deliverables

Task 1.1: Framework development

Deliverables shall include:

- A consistent set of QAT designs for all dataset categories supported by the CDS. An outline of the designs shall be included in the proposal. Detailed designs shall be delivered within 3 months after contract signature.
- Protocols and workflows for initiating, developing and updating QATs, including definitions of minimum requirements and procedures for publication of new datasets in the CDS catalogue. Initial specifications shall be delivered within 3 months after contract signature.
- Definition of shared vocabularies and common practices to ensure consistency of QATs across the CDS. Initial specifications shall be delivered within 3 months after contract signature.
- A report on relevant international standards and best practices related to quality control and/or quality assessment of scientific data, including an assessment of their applicability in the context of this tender. An outline of this report shall be included in the proposal; the report shall be completed within 6 months after contract signature.
- A Content Management System for managing collaborative development of QAT content. An initial version shall be delivered within 6 months after contract signature.

- Periodic updates of all framework deliverables as needed.

Task 1.2: EQC of CDS datasets

Deliverables shall include:

- A QAT for each dataset in the CDS catalogue. By the end of 2018, a QAT that meets the minimum requirements defined in Task 1.1 shall be available to CDS users, for each dataset in the catalogue. All QATs shall be updated as needed to meet all requirements listed in Section 3.1.1.
- Quarterly reports to ECMWF on overall quality of the CDS datasets and content, quality shortcomings, and recommendations.

Task 1.3: User requirements

Deliverables shall include:

- Biannual reports on user engagement activities.
- Regular contributions of user requirements for CDS data to the URDB.
- Biannual updates of the User Requirements Analysis Document.
- Biannual recommendations on evolution of the CDS data catalogue.

3.2 Fitness of CDS Toolbox

The objectives for this area of work are:

- to continuously test and assess fitness for purpose of the CDS Toolbox;
- to set minimum requirements for including new tools in the CDS Toolbox;
- to provide quality assurance information and guidance to users of the CDS Toolbox;
- to inform ECMWF on user requirements, gaps, shortcomings and limitations, as well as opportunities for improvement of the CDS Toolbox.

In this context, the term "CDS Toolbox" denotes, in addition to the tools themselves, any other key elements required to use the tools such as the Common Data Model, the Application Editor, the implementation of a mechanism for provenance tracking, and all associated documentation intended for users.

3.2.1 Requirements

The successful tenderer shall:

- Develop a suitable quality assurance framework for the CDS Toolbox, addressing functionality, usability, adherence to standards and best practices, and any other quality aspects relevant to users;
- Develop suitable quality criteria and assessment methods for different categories of tools, e.g. visualisation, interpolation, downscaling, statistical analysis, and for different components of the CDS Toolbox such as the Common Data Model and Application Editor;
- Define a set of minimum requirements for quality assurance of all aspects of the CDS Toolbox;
- Devise effective means and mechanisms for presenting CDS users with information about the quality of the CDS Toolbox and how to use it most effectively for building applications that make use of climate data;
- Engage with users to clarify user requirements, to test and assess the quality and fitness-forpurpose of the CDS Toolbox, to measure user satisfaction and to develop recommendations for improvements and expansion of the CDS Toolbox.

3.2.2 Tasks and deliverables

Task 2.1: Framework development

Deliverables shall include:

- Definition of a quality assurance framework for the CDS Toolbox and all its components. An outline for such a framework, including an implementation plan, shall be included in the proposal. Reference shall be made to any applicable international standards and best practices related to quality control and quality assessment of software tools for scientific computation and visualisation. A report containing a detailed description of the framework and implementation plan shall be delivered within 6 months after contract signature.
- Protocols and workflows for initiating, developing and updating quality assurance information and user guidance, including definitions of minimum requirements and procedures for inclusion of new tools in the CDS Toolbox. Initial specifications shall be delivered within 6 months after contract signature.
- Definition of shared vocabularies and common practices to ensure consistency of quality assurance information and user guidance for all elements of the CDS Toolbox. Initial specifications shall be delivered within 6 months after contract signature.
- Periodic updates of all framework deliverables as needed.

Task 2.2: EQC of CDS Toolbox

Deliverables shall include:

- Outcomes of Toolbox tests and assessments, presented in a form suitable for publication on the CDS, and easily accessible to new users of the Toolbox.
- User guidance on quality and applicability for all elements of the CDS Toolbox. By the end of 2018, a first version of such user guidance shall be made available to users via the CDS. Toolbox user guidance shall be updated as needed to meet all requirements listed in Section 3.2.1.

Task 2.3: User requirements

Deliverables shall include:

- Biannual reports on user engagement activities.
- Regular contributions of user requirements for CDS Toolbox to the URDB.
- Biannual updates of the User Requirements Analysis Document.
- Biannual recommendations on evolution of the CDS Toolbox.

3.3 Fitness of overall service

The objective for this area of work is to measure and report on quality of service provided by the CDS infrastructure, and to inform ECMWF on user requirements, gaps, shortcomings and limitations, and opportunities for improvement of the CDS infrastructure.

3.3.1 Requirements

The successful tenderer shall:

- Introduce a set of key performance indicators (KPIs) measuring technical quality of service, such as system availability, response time, capacity, speed, effectiveness of search, usability, INSPIRE compliance, etc., using proven methods, metrics and techniques;
- Ensure that the set of KPIs span a wide range of system performance aspects and user perspectives, e.g. related to user type (background, objectives, etc.) and access method (web,

API);

- Ensure that each KPI is defined in such a way that can be interpreted consistently over time (i.e. unaffected by specific hardware configurations or changes in technology);
- Continuously test, probe and measure CDS system performance;
- Engage with users to clarify user requirements, test and assess CDS quality of service, measure user satisfaction and develop recommendations for improvements and expansion of the CDS Infrastructure.

3.3.2 Tasks and deliverables

Task 3.1: Framework development

Deliverables shall include:

- Definition of KPIs on service quality. A comprehensive set of KPIs shall be included in the proposal, and finalised within 3 months after contract signature.

Task 3.2: EQC of CDS Infrastructure

Deliverables shall include:

- Quarterly reports on service quality KPIs. The KPIs shall be accessible to ECMWF via a webbased dashboard application.

Task 3.3: User requirements

Deliverables shall include:

- Biannual reports on user engagement activities.
- Regular contributions of user requirements for CDS infrastructure to the URDB.
- Biannual updates of the User Requirements Analysis Document.
- Biannual recommendations on evolution of the CDS Infrastructure.

4 Other Requirements

4.1 Schedule

A detailed time plan and schedule shall be included in the tender response. The proposed time plan and schedule shall address the main tasks, inputs, outputs, intermediate review steps, milestones, deliverables and dates. Regular progress meetings will be held with ECMWF during the contract to assess project status, risks and actions.

ECMWF has to prepare annual Implementation Plans, which must be approved by the European Commission before they can enter into force. The implementation plans will take full stock of service reviews, performed thoroughly on an annual basis, as well as of the continuously evolving user requirements and corresponding service specifications. The successful tenderer shall therefore provide each year for ECMWF approval an updated detailed plan of proposed activities including Deliverables and Milestones, using the Work Package table template in Volume IIIB, which will form part of this Implementation Plan. The successful tenderer has to report on a quarterly and annual basis (for more details please see Volume V Framework Agreement for this ITT).

4.2 Meetings

ECMWF will organise annual meetings to bring together all C3S service providers. The successful tenderer is expected to attend these meetings. The successful tenderer is required to attend monthly

teleconference meetings to discuss C3S service provision, service evolution and other topics that cut across different aspects of C3S.

In addition, the successful tenderer is required to organise and lead regular coordination meetings with all other EQC actors under contract with ECMWF (see Table 1 in Section 2.2), including the successful tenderer of C3S_513. These EQC coordination meetings shall take place at least once every 6 months.

The cost of attending these meetings shall be covered by each successful tenderer and shall be included in the tendered price. The cost of organising and attending any additional meetings required to carry out the contracted activities shall also be covered by the successful tenderer and shall be included in the tendered price.

5 Tender Format

General guidelines for the tender are described in Volume IIIB. Specific requirements to prepare the proposal for this particular tender are described in the next sub-sections.

5.1 Page Limits

As a guideline, it is expected that individual sections of the tenderer's response do not exceed the page limits listed below. These are advisory limits and should be followed wherever possible, to avoid excessive or wordy responses.

Section	Page Limit
Executive Summary	2
Track Record	2 (for general) and 2 (per entity)
Quality of resources to be	2 (excluding Table 1 in Volume IIIB and CVs with a maximum
Deployed	length of 2 pages each)
Technical Solution Proposed	30 (Table 2 in Volume IIIB, the section on references, publications,
	patents and any pre-existing IPR is excluded from the page limit
	and has no page limit)
Management and	10 (excluding Table 3, Table 5 and Table 6 in Volume IIIB) + 2 per
Implementation	each Work package description (Table 4 in Volume IIIB)
Pricing Table	No limitation

Table 2: Page limits

5.2 Specific additional instructions for the tenderer's response

The following is a guide to the minimum content expected to be included in each section, additional to the content described in the general guidelines of Volume IIIB. This is not an exhaustive description and additional information may be necessary depending on the Tenderer's response.

5.2.1 Executive Summary

The tenderer shall provide an executive summary of the proposal, describing the objectives, team and service level.

5.2.2 Track Record

The tenderer shall demonstrate for itself and for any proposed subcontractors that they have experience with relevant projects in the public or private sector at national or international level. ECMWF may ask for evidence of performance in the form of certificates issued or countersigned by the competent authority.

5.2.3 Quality of Resources to be Deployed

The tenderer shall propose a team providing the skills required for providing operational services that meet the technical requirements set out in Section 3. The team shall include a Service Manager with at least 5 years of experience in management of large-scale projects. The tenderer shall describe the experience of the Service Manager and of the technical project team in performing activities related to the various aspects of this tender.

5.2.4 Technical Solution Proposed

The tenderer shall give a short background to the proposed solution to demonstrate understanding of that solution and of the C3S context. This section shall also include information on any other third party suppliers that are used as part of the technical solution, and a statement of compliance for each requirement formulated throughout this document, describing how the proposed solution maps to the requirements.

5.2.5 Management and Implementation

The tenderer shall provide a detailed implementation plan of proposed activities for the duration of the framework agreement. Deliverables should be consistent with the technical requirements specified in Section 3. The number of milestones is not restricted, but they should be designed as markers of demonstrable progress in service development and/or quality of service delivery. Adjustments to the proposed implementation plan can be made on an annual basis depending on needs for service evolution, changed user requirements, or other requirements as agreed between the European Commission and ECMWF.

As part of the general project management description the tenderer shall consider the following elements (this is not an exhaustive list):

- Reporting shall be provided in accordance with the Framework Agreement Clause 2.3.
- An implementation plan for the year N+1 shall be provided in February of the year N for ECMWF approval.
- Monthly teleconferences with ECMWF and a proposal for involvement of ECMWF in major project reviews shall be provided as part of the management plan.
- A proposed payment plan shall be provided as part of the proposal. The payment plan shall be based on quarterly payments for routine services work packages and shall be based on milestones completion and associated deliverables for development related activities.
- The following management aspects shall be described: quality assurance and control, communication management (ECMWF, stakeholders, internal communication), conflict resolution, subcontractor management, personal data management.
- A list of sub-contractors describing their contribution and key personnel, legal names and addresses shall be provided. The tenderer shall describe how the Framework Agreement, in particular Clause 2.9, has been flowed down to all their sub-contractors.