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METHODOLOGICAL ISSUES

ISSUES RELATING TO REGISTRY SYSTEMS
UNDER ARTICLE 7, PARAGRAPH 4, OF THE KYOTO PROTOCOL

Progress report on the development of
the data exchange standards and transaction log

Note by the secretariat[*]

Summary

The Conference of the Parties (COP), by its decision 24/CP.8, requested the secretariat to submit a report on progress in developing the specifications of the standards for data exchange between registry systems, for consideration by the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its nineteenth session. This note provides information on progress with this work to date. It also provides further information on the development of the transaction log and considers means to reduce the resource requirements necessary for its development and implementation, as well as for its operation and maintenance thereafter.

The SBSTA may wish to consider the information contained in this note and recommend a draft decision for adoption by the COP at its ninth session, noting the progress made in the further development of the data exchange standards and recommending additional actions to establish and maintain registry systems, as appropriate.

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[*]   In an effort to include information on the latest progress in this work, this document has been submitted later than originally planned.

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I. INTRODUCTION

A. Mandate

1.   The Conference of the Parties (COP), by its decision 24/CP.8, recommended that the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP), at its first session, adopt the general design requirements for the technical standards for data exchange (hereinafter referred to as the data exchange standards) between registry systems[1] under the Kyoto Protocol, as contained in the annex to that decision. In doing so, it recognized that the general design requirements form the basis for a complete model of data exchange between registry systems and require the subsequent elaboration of detailed functional and technical specifications, in order to facilitate the implementation of the data exchange standards in all registry systems in a compatible manner.

2.   By the same decision, the COP requested the secretariat, in its development of the transaction log, to undertake work relating to the functional and technical specifications of the data exchange standards during 2003, subject to the availability of resources, with a view to completing the technical specification prior to the ninth session of the COP and completing the implementation and testing of the transaction log by the tenth session of the COP.

3.   The COP also requested the secretariat, in working on these specifications, to closely collaborate with technical experts and submit a report on progress for consideration by the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its nineteenth session.

4.   The COP also requested the SBSTA to report to the COP at its ninth session on progress made in developing the functional and technical specifications of the data exchange standards, and to make any recommendations for additional actions to establish and maintain registry systems, as appropriate.

5.   The SBSTA, at its eighteenth session, requested the secretariat to consider means to reduce the resource requirements necessary to complete the development and implementation of the transaction log in 2004, and to operate and maintain the transaction log thereafter, through, inter alia, collaboration on technical issues with Parties, and to provide information on this issue to the intersessional consultations on registries and the nineteenth session of the SBSTA (FCCC/SBSTA/2003/10, para. 17 (e)).

B. Scope of the note

6.   This note provides information on progress made in the work to develop the functional and technical specifications of the data exchange standards between registry systems. It provides further information on the development of the transaction log and considers means to reduce the resource requirements necessary to complete its development and implementation in 2004 and its operation and maintenance thereafter.

C. Possible action by the SBSTA

7.   The SBSTA may wish to consider the information contained in this note and recommend a draft decision for adoption by the COP at its ninth session, noting the progress made in the further development of the data exchange standards and recommending additional actions to establish and maintain registry systems, as appropriate.

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[1]   National registries, the clean development mechanism registry and the transaction log.

II. BACKGROUND

8.   The COP, by its decision 19/CP.7, recommended that the COP/MOP, at its first session, adopt the modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol. In addition, the COP, by its decision 17/CP.7, adopted modalities and procedures for a clean development mechanism (CDM) as defined in Article 12 of the Kyoto Protocol. These modalities contain provisions for registry systems to ensure the accurate accounting of the issuance, holding, transfer, acquisition, cancellation, retirement and carry-over, as appropriate, of assigned amount units (AAUs), removal units (RMUs), emission reduction units (ERUs) and certified emission reductions (CERs).

9.   These provisions define the following registry systems:

        (a)   National registries, to be established and maintained by Parties included in Annex I to the Convention (Annex I Parties);

        (b)   The CDM registry, to be established and maintained by the CDM Executive Board on behalf of Parties not included in Annex I to the Convention (non-Annex I Parties);

        (c)   The transaction log, to be established and maintained by the secretariat to verify the validity of transactions.

10.   In accordance with these provisions, the structure and data formats of registries are to conform to data exchange standards adopted by the COP/MOP for the purpose of ensuring the accurate, transparent and efficient exchange of data. Such common means of exchanging data between registries, through the transaction log, are to facilitate the transactions that registries need to perform under the mechanisms defined in Articles 6, 12 and 17 of the Kyoto Protocol and the modalities for the accounting of assigned amounts under Article 7, paragraph 4, of the Kyoto Protocol.

11.   The general design requirements, as contained in decision 24/CP.8, form the basis of these data exchange standards. In order to facilitate their implementation in all registry systems in a compatible manner, it is necessary that the general design requirements be elaborated into:

        (a)   Functional specifications, identifying key requirements relating to data exchange that registries and the transaction log under the Kyoto Protocol must fulfil;

        (b)   Technical specifications, containing the full technical detail of how the requirements set out in the functional specifications must be implemented.

III. PROGRESS ON THE DATA EXCHANGE STANDARDS

A. Functional specifications

12.   The work to develop the functional specifications of the data exchange standards has been conducted with the assistance of consultants and in collaboration with technical experts from several Parties who are working on the technical aspects of national registry development.

13.   The functional specifications were derived from decisions 17/CP.7, 19/CP.7 and 24/CP.8 and their annexes. Every attempt has been made to remain consistent with these decisions.

14.   Due to the central role of the transaction log in the exchange of data between registries, the work on the data exchange standards began in the context of preparing a Request for Proposal, through which a contractor was to be selected to complete both the elaboration of the data exchange standards and the development and implementation of the transaction log. The draft functional specifications of the data

exchange standards and the transaction log, for inclusion in the Request for Proposal were prepared and discussed informally in May 2003 with technical experts involved in the development of national registries. Further drafts were prepared and discussed during the pre-sessional consultations on registries immediately before the eighteenth session of the SBSTA (2 June 2003, Bonn, Germany). These consultations were attended by about 50 participants from Parties and organizations.

15.   The need for contributions to the UNFCCC Trust Fund for Supplementary Activities to allow the Request for Proposal to be issued was discussed during the pre-sessional consultations and informal consultations, facilitated by Mr. Murray Ward (New Zealand), at the eighteenth session of the SBSTA. Some Parties expressed concern that it may be difficult to raise sufficient contributions to allow the construction of the transaction log to proceed. It was therefore considered that, subject to the availability of resources, the priority of the work should be the elaboration of the technical specifications of the data exchange standards and the transaction log. On this basis, several Parties pledged contributions to the UNFCCC Trust Fund for Supplementary Activities. It was considered that work on the construction of the transaction log should await further discussions regarding resource requirements, and possible means to meet them, at the pre-sessional consultations prior to the nineteenth session of the SBSTA (Milan, Italy, 28–29 November 2003).

16.   On this basis, the secretariat separated its work on the data exchange standards from its work to develop the transaction log. This has enabled the further elaboration of the functional and technical specifications of the data exchange standards to proceed independently. A revised draft version of the functional specifications was prepared and circulated to technical experts for comment. The current version of the functional specifications, contained in a non-paper considered at the pre-sessional consultations and available at <http://unfccc.int/sessions/workshop/281103/index.html>, has been the basis for the development of the technical specifications of the data exchange standards.

17.   The functional specifications of the data exchange standards define requirements to be met by registries and the transaction log for the following areas:

        (a)   Exchange mechanism, detailing requirements for how to send messages (communications protocols, authentication, encryption and security) and for what messages to send and when to send them (message sequences). The message sequences were distinguished for five transaction processes (issuance of AAUs, RMUs and CERs; conversion of AAUs and RMUs into ERUs; external transfers to other registries; internal transfers for the purposes of cancellation and retirement; and carry-over to the next commitment period) and one reconciliation process (to resolve any inconsistencies in the data sets of registries and the transaction log);

        (b)   Transfer format, detailing requirements for the data to be incorporated in messages (including serial numbers, account numbers and transaction numbers) and how to format them;

        (c)   Data logging, detailing requirements for the data to be recorded in registry systems in order to support audits and the reconciliation process;

        (d)   Operations management requirements, detailing requirements for the validity of data (accuracy, integrity and discrepancy prevention), system performance (efficiency, testing and scheduled downtime), and system safety (user authorization, security and system robustness);

        (e)   Change management, detailing requirements for how to improve the technical specifications of the data exchange standards in response to technological advances, as appropriate.

B. <u>Technical specifications</u>

18.   On the basis of the functional specifications, much work has been completed on the elaboration of the technical specifications of the data exchange standards. As with the functional specifications, this work has been conducted with the assistance of consultants and in collaboration with technical experts from several Parties who are working on the technical aspects of national registry development.

19.   The technical specifications have been derived, indirectly through the functional specifications, from decisions 17/CP.7, 19/CP.7 and 24/CP.8 and their annexes. Every attempt has been made to remain consistent with these decisions and the functional specifications.

20.   The current draft of the technical specifications (draft #3 of version 1.0) is contained in a non-paper available at <http://unfccc.int/sessions/workshop/281103/index.html> and considered at the pre-sessional consultations. This draft has been subject to two rounds of comments and informal discussions with technical experts involved in the development of national registries.

21.   In view of the technical complexity of this work and the limited time to undertake it upon receipt of resources, it has been necessary to concentrate the development effort thus far on areas where clarity on the data exchange standards is of highest priority to developers of national registries. The current draft technical specifications define technical detail to enable the implementation of, inter alia, the following aspects of registries and the transaction log:

          (a)   Secure communications over the Internet through a "virtual private network" between firewalls established at each registry system. Access to a registry system would only be permitted to messages sent by specified Internet Protocol (IP) addresses. Messages would be sent and received using web services and Simple Object Access Protocol (SOAP) and would be formatted using XML (eXtensible Markup Language), which provides for flexible and commonly understood data categories (defined by data tags). All communications would be authenticated using digital certificates, as defined by the transaction log, and encrypted using Secure Socket Layer (SSL) technology;

          (b)   Full transaction and reconciliation sequences, including all messages and the components and functions within the transaction log and registries which are required to support the transmission, receipt and processing of messages. These sequences further define stages and types of status, in order to enable transactions to be checked, and responses that are sent by the transaction log to notify the registry of the successful completion of the transaction;

          (c)   Complete identifiers (serial numbers, account numbers and transaction numbers), XML data tags, and codes for giving meaning to the numerical values in the data exchange standard;

          (d)   XML document formats for messages;

          (e)   Data logging, including the logging of message history data, reconciliation history data and internal activity data, as well as an archive for all messages as they are sent and received;

          (f)   Change management procedures, to ensure the smooth introduction of improved versions of the technical specifications of the data exchange standards in response to technological advances.

22.   The technical specifications have been developed so as not to unnecessarily constrain the design of registry systems. The components and functions specified for implementation in registries are necessary for the accurate, transparent and efficient exchange of data and may be built in the manner most suitable to the registry system. Every attempt has been made to avoid constraints on hardware or software choices. Industry standards have been adopted wherever possible.

23.   Some work remains to be completed on the technical specifications of the data exchange standards, in particular the completion of the XML document formats, the development of common test protocols for registry systems and the elaboration of back-up and recovery guidance. This work is expected to finish in the first part of 2004.

IV. PROGRESS ON THE TRANSACTION LOG

A. Functional specifications

24.   As described above, the work to develop the functional specifications of the transaction log was initially undertaken in conjunction with the functional specifications of the data exchange standards (as a component of the Request for Proposal). This work has therefore been conducted with the assistance of consultants and in collaboration with technical experts from several Parties, in particular through informal discussions in May 2003 with technical experts and during the pre-sessional consultations on registries immediately prior to the eighteenth session of the SBSTA (2 June 2003, Bonn, Germany).

25.   The functional specifications of the transaction log have been derived from decisions 19/CP.7 and 24/CP.8 and are consistent with these decisions. They defines the required functionality to be provided by the transaction log, including its messaging functions, automated checks for discrepancies in proposed transactions, input and output data, data logging, database structure and required interfaces.

26.   The current draft of the functional specifications now requires review in the light of the technical specifications of the data exchange standards being largely complete. Separating these two streams of work required a large amount of development work to be conducted under the data exchange standards that had originally been foreseen under work for the transaction log. The progress made recently on the data exchange standards will need to be reflected in the specifications for the transaction log.

B. Means to reduce resource requirements

27.   Preliminary estimates of the possible resource requirements for the development of the transaction log and the further elaboration of the data exchange standards were presented at the pre-sessional consultations in June 2003. Given the degree of development of the draft functional specifications at that time, it was not possible to provide a clear estimate of resource requirements. Two indicative resource scenarios were provided by the secretariat, depending on the level of performance, reliability, robustness and security to which the transaction log would be developed and implemented.

28.   The more detailed specifications of the data exchange standards, undertaken since June, in particular the specification of components, functions, communications, authentication, security and reconciliation procedures to be implemented by the transaction log, make it now possible to estimate possible resource requirements more closely. On this basis, the secretariat estimates the resources required to design, build, test and roll-out the transaction log at US$ 1,200,000–1,800,000.[2] It should be stressed, however, that such an estimate is highly dependent on assumptions of contracting rates and specific solutions in the design and implementation of the system. This estimate does not include ongoing costs for operation, maintenance and upgrades.

29.   In accordance with the request of SBSTA, at its eighteenth session, the secretariat has explored means to reduce the resource requirements necessary to complete the development and implementation of the transaction log, and to operate and maintain it thereafter, through, inter alia, collaboration on technical issues with Parties. The key options identified by the secretariat are presented in table 1.

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[2]   This concurs with the amount of US$ 1,500,000 specified in the programme budget for the biennium 2004–2005 for the development, implementation and testing of the transaction log.

Table 1: Measures to reduce resource requirements

Means to reduce costs	Pros	Cons	Resource impact
1. In-kind contribution of programming code for a registry	• Some overlap in database structure, internal checks and communications module	• Overlap is limited • Compatibility risks	• Unclear • Could increase costs if there are major compatibility issues
2. In-kind contribution of a communications module	• All registries and the transaction log require compatible communication modules	• Limited compatibility risks	• Reduce resource needs by the costs of the module
3. In-kind contribution of programming code for a transaction log	• Overlap is potentially 100 per cent of the UNFCCC transaction log	• Some Parties may be concerned that the donor Party has influence over the build of the UNFCCC transaction log	• Reduce resource needs by the costs of building the transaction log
4. Offer to host the transaction log	• Costs absorbed by the hosting Party	• Some Parties may be concerned that the hosting Party has influence over the UNFCCC transaction log • Hardware/software incompatibility risks • Does not reduce development costs	• Potentially reduce resource needs by the costs of operation, maintenance and upgrades

30.   The options considered here to reduce the required resources for the transaction log chiefly involve in-kind contributions of programming code. Software development is labour-intensive and its costs typically far outweighs hardware costs. As important, and costly, incompatibility issues are common when combining code from different sources, the risk involved in these options is considerably smaller if the in-kind contribution of a full system is envisaged, such as in option 3 of table 1. Where this is not possible, the in-kind contribution of a complete module, such as in option 2, would normally present less risk.

31.   Under option 3, it may be possible for the donor transaction log to be built in accordance with modular technical specifications that meet the needs of both the donor and recipient transaction log. Taking as an example the transaction log being developed for the European Union (EU) emissions trading scheme, the technical specifications could meet the needs of the more general UNFCCC transaction log and ensure that any EU-specific rules may be clearly isolated, and possibly removed, such that they would not affect the remaining active code used by the transaction log under the Kyoto Protocol. Such technical specifications would nevertheless meet the European requirements.

32.   Option 4 in table 1 involves a contribution of service rather than product. Although it could dramatically reduce costs in the longer term, it would not reduce up-front resource requirements for the development of the transaction log under the Kyoto Protocol.

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