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Cluster Science Data System
Detailed Design Review
Scandinavian Data Centre
Executive Summary

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1 Introduction

1.1 Overview

The Scandinavian Data Centre constitutes one national data centre (NDC) out of 7 national data centres in the Cluster Science Data System. The SDC has responsibility for producing EFW data products for the CSDS. Its prime customers are the Scandinavian science community and the other data centres.

The SDC is physically located at the Alfvén Laboratory, Royal Institute of Technology, Stockholm, Sweden. The implementation workload is, however shared between Cluster EFW CoI research groups in Sweden, Norway and Finland as described in section 1.2. The implementation work and operations will be done basically within the frame of normal research department resources.

The limited resources for the software development implies that the design is made in a work-load efficient way, and no major new development is undertaken. Examples of such consequences are:

- Implementation is made on an existing Open-VMS/Alpha system where we have deep system knowledge due to long experience of using VMS systems.
- The Data Base Server contain modules from the ISDAT data base handler which has been developed as a prototype for Cluster detailed data handling over several years prior to the SDC development.
- The SDC depends on the CSDS User Interface as external user interface and for certain data base services.

A major advantage of the SDC development situation is that all development is done in close contact with (or even directly by) the EFW scientists, thus assuring high product quality from the scientific point of view.

1.2 Management

The SDC development is performed in co-operation between the space physics research groups at the Royal Institute of Technology (Alfvén Laboratory), the Swedish Institute of Space Physics (Uppsala Division), The University of Oslo (Physics Department), and the University of Oulu. The responsibility for the implementation lies with the SDC manager (G. Holmgren, IRF-U). In addition there is a SDC Technical Manager (Bengt Harald Nilsson, KTH), and a SDC Scientist (Per-Arne Lindqvist, KTH). These three, together with staff from the UiO and Oulu groups form a Project Group that meet regularly (approximately once per month) for progress reporting and discussion of implementation issues. The project group reports to a governing group consisting of heads of the four research groups. Progress reports are also given to EFW team meetings, and the CSDS project. The head of the Plasma Physics Division of the Alfvén Laboratory, Professor Carl-Gunne Fälthammar, represents the SDC in the CSDS Steering Committee.

1.3 Acronyms

Acronym	Meaning
CoI	Co-investigator
CSDS	Cluster Science Data System
DDR	Detailed Design Review
EFW	Electric Field and Wave Experiment
IRF-U	Institutet för Rymdfysik, Uppsalaavdelningen Swedish Inst. of Space Phys., Uppsala Division
ISDAT	Interactive Science Data Analysis Tool
IWG	Implementation Working Group
KTH	Kungliga Tekniska Högskolan Royal Institute of Technology
NDC	National Data Centre
PI	Principal Investigator
SDC	Scandinavian Data Centre
UiO	University of Oslo

Table 1: Acronyms

1.4 Reference Documents

- [1] Cluster science data system, detailed design for the Scandinavian Data Centre. Technical Report DS-SDC-DD-0001, KTH, February 1995. Draft.
- [2] CSDS Software test plan for the Scandinavian Data Centre. Technical Report DS-SDC-TP-0001, KTH, December 1994.
- [3] CSDS Operator's Manual for the Scandinavian Data Centre. Technical Report DS-SDC-UM-0001, KTH, February 1995. Draft.
- [4] E. Dackborn (editor). CSDS User Interface, IRF-U (ISDAT) detailed design document. Technical Report DS-IRF-DD-001, IRF-U, February 1995. Draft.
- [5] S. Skogvold (editor). CSDS overall interface document. Technical Report DS-EST-ID-0001, ESTEC, September 1994.
- [6] B-H Nilsson, P-A Lindqvist, G Holmgren, and A Lundgren. Cluster Science Data System, Architectural Design for the Scandinavian Data Centre. Technical Report DS-SDC-AD-0001, KTH, October 1994. Issue 1.4.

2 Technical Status

2.1 Detailed Design Document

The Detailed Design Document for the Scandinavian Data Centre is provided as an applicable document in the SDC DDR package [Ref. 1]. All work packages described in section 4 are, however, not described in detail in the document. The reasons are the following:

1. Some functions are performed manually by the operator.
2. Substantial parts of the SDC software rely on the ISDAT software package. The detailed design documentation of the ISDAT system components are found in [Ref. 4] included in the ESRIN DDR package as a part of the CSDS User Interface.

2.2 Software Users Manual

A draft SDC operators manual is provided in the SDC DDR package [Ref. 3]. Software manuals for the ISDAT are provided within the ESRIN package as a part of the CSDS User Interface. An external user manual remains to be written.

2.3 Quality Plans

There are no specific quality plans associated with the SDC software development. Sound coding practices and regular tools will be used as described in an Appendix of the SDC Architectural Design Document [Ref. 6], and in part I of the detailed design document [Ref. 1].

2.4 Tests

Current test plans and test procedures for the SDC are described in the test plan document [Ref. 2] provided in the SDC DDR package.

3 Interface Status

Originally, all SDC external interfaces were described in an SDC interface control document. Recently, the SDC interface description has been transferred to an overall CSDS interface document [Ref. 5] included in the ESTEC DDR package. Since the SDC document has become obsolete, it is not included in the review package.

4 Schedule Status Against Each Work Package

The SDC system is decomposed into:

1. Reception
2. Interactive processing
3. Data base server
4. EFW DB production
5. (SDC) User interface
6. CSDS User Interface
7. Operator's interface

as shown in Figure 1. As mentioned in section 1.1, the SDC software is to large extent based on re-use of already existing software and on development in parallel with other projects. Some of the work packages include very little software but are based on manual procedures that may eventually be transferred into automatized procedures when the actual knowledge of the instrument behaviour is known. Such a planning is possible for the SDC since the data centre development is fully integrated with the scientific planning and analysis and involves the same staff. Bearing this in mind, it is quite natural that not all of the work packages are 100% ready. However, all critical sub-systems have been tested as prototypes to ensure feasibility and compliance with the master schedule. In the following sub-sections, we describe the status of the different work packages in more detail.

4.1 Reception of CD-ROM etc.

This function is essentially manual. The software needed for production of catalogues and quality control has been completed. The software is described in [Ref. 1] and [Ref. 3].

4.2 Interactive processing

This is the software needed for the interactive scientific health check of the EFW instrument. It is expected to evolve with time and is therefore not defined completely. However, enough functionality exist to handle the first data provided that the ISDAT EFW component is in place, see section 4.3. This work package is only described in ISDAT/WEC related documents and are not included in the DDR package.

4.3 Data base server

This work package consists of an ISDAT server identical to the CSDS User Interface ISDAT server but with an EFW instrument module added. For the status of the kernel

Figure 1: SDC system data flow

of the ISDAT server: see the ESRIN package of this review. The EFW module has been implemented and tested for a limited number of parameters and functionality.
Expected readiness: End of February 1995.

4.4 EFW data base production

This work package is the main new development associated with the SDC. It is described in detail in the SDC detailed design document [Ref. 1] provided as an applicable document for this review. The system has been tested to the extent that the processing is working as a prototype with a reduced number of parameters and instrument modes.
Expected readiness: End of February 1995.

4.5 SDC user interface

A menu type of science user interface to the SDC is under development. The size of the software is very small, mostly based on operating system commands, and is not included in the SDC detailed design document.
Expected readiness: End of February 1995.
Preparations for an extension to a graphical interface have been initiated.

4.6 CSDS user interface

This is completely an ESRIN delivery to the data centres. See ESRIN part of the DDR package.

4.7 Operator's interface

This work package provides an operator's shell to control the SDC reception functions and the EFW data base production.
The package is essentially ready.

5 Critical Items

We identify no critical problems of technical nature. As reported at CSDS IWG and steering committee meetings, we still do not have a PI agreement on the access of magnetometer data for integration of $\mathbf{v} \times \mathbf{B}$ computation in the EFW data analysis. We are currently implementing the processing excluding $\mathbf{v} \times \mathbf{B}$ analysis. The result of this will be that the quality of the resulting EFW parameters will be reduced compared to the possible level of quality.