



Sciamachy Data Centre
(NL-SCIA-DC)

Software Project Management Plan

Version 1.1

(NL-SCIA-DC-SPMP-1.1)

Abstract

This Software Project Management Plan (SPMP) describes the planning, organisation and staffing in the Design & Realisation phase (WP3000) of the "*Netherlands' SCIAMACHY Data Centre*" project. In the NL-SCIA-DC project the 'lite' version of the ESA PSS-05-0 *Software Engineering Standards* **[pss-05-lite]** is used as guideline for the software engineering life cycle

The NL-SCIA-DC-SPMP contains:

- a project overview
- a description of the activities, methods and tools used in WP3000.
- an enumeration of the deliverables of WP3000

The SPMP does not cover the activities of the WP5000 work packages described in the **[project proposal].** The SPMP should be read by the software managers, team leaders, senior company managers and initiators (BCRS/SRON) involved with this project.

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1. Introduction

1.1 Project overview

The *Netherlands' SCIAMACHY Data Centre* project is part of the design and implementation phase of the NEONET programme. NEONET is an initiative of the Dutch government to integrate the use Earth Observation information and products in Dutch society. On behalf of several government ministries BCRS/SRON are the initiators of the NEONET programme and this project.

The primary goal of the *Netherlands' SCIAMACHY Data Centre* project is to provide data services and processing facilities to Dutch users of SCIAMACHY data beyond those offered by the ENVISAT ground segment and German D-PAC. The NL-SCIA-DC will be developed in close co-operation with end users and will make use of past experience on the data handling of GOME data. NL-SCIA-DC will ingest, store, process and distribute both consolidated and near real time SCIAMACHY data provided by D-PAC and the ESA ground segment at Kiruna.

The *Netherlands' SCIAMACHY Data Centre* project consists of 5 work packages (c.f. **[project proposal]**). WP1000 is a general work package that covers all project management activities. Work package WP2000 is concerned with obtaining user requirements for the NL-SCIA-DC. WP3000 *Design and Realisation* involves the development of the systems that together comprise the NL-SCIA-DC. WP4000 *Implementation* is the work package where the final version of the NL-SCIA-DC of WP3000 will be transfered to an operational environment. This involves among others organisational changes to set up user support and system operations and maintenance. WP5000 is the work package for making operational SCIAMACHY related data products and algorithms that have been developed in separate research projects.

1.2 Project deliverables

The project deliverables are per work package :

WP2100

- The User Requirements Document (NL-SCIA-DC-URD) version 1.0
- The Software Project Management Plan (NL-SCIA-DC-SPMP) version 1.0 for WP3000.

WP2200
- Updates of the NL-SCIA-DC-URD

WP3000
- The Software Specification Document (NL-SCIA-DC-SSD)
- The Detailed Design Document (NL-SCIA-DC-DDD)
- The WP3000 end rapport (NL-SCIA-DC-WPR3)
- The Software Project Management Plan for WP4000
- A logical (functional) model of the NL-SCIA-DC
- A physical model of the NL-SCIA-DC (version 3.0, see section 5.3)
- An NL-SCIA-DC Web-site

WP4000
- The WP4000 end rapport (NL-SCIA-DC-WPR4)
- The implemented NL-SCIA-DC version 3.0
- A User Support help desk

1.3 Evolution of the SPMP

The Software Project Management Plan (SPMP) describes the planning of the project in detail. It is an evolutionary document that is updated in each workpackage of the project The updated SPMP is a milestone of every work package.

1.4 Definitions, acronyms and abbreviations

AD	Architectural Design
CF	Core Facilities
DD	Detailed Design
OM	Operations and Maintenance
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Cartography
SR	Software Requirements
SPMP	Software Project Management Plan
SQAP	Software Quality Assurance Plan
SSD	Software Specification Document
SVVP	Software Validation and Verification Plan
SR	Software Requirements
TBD	To Be Defined
TR	Transition phase
UR	User Requirements

1.5 References

[project proposal]	*Netherlands' Sciamachy Data Centre* , NEONET Ontwerp- en Implementatiefase, BCRS-Programme Bureau / SRON 97
[pss05-lite]	*Guide to applying the ESA software engineering standards to small software projects*, ESA Board for Software Standardisation and Control, BSSC(96) Issue 1, May 1996
[urd]	*Sciamachy Data Centre User Requirements document*, M. Krol & H. v.d. Woerd, NL-SCIA-DC-URD
[scmp]	*Sciamachy Data Centre Configuration Management Plan*, W.J. Som de Cerff, J. van de Vegte, NL-SCIA-DC-SCMP
[svvp]	*Sciamachy Data Centre Validation and Verification Plan*, W.J. Som de Cerff, J. van de Vegte, NL-SCIA-DC-SVVP
[Bridging]	*Bridging EOSDIS and Sciamachy*, NEONET Ontwerp- en Implementatiefase, BCRS-Programme Bureau / SRON 1997
[Phase E]	*Dutch Contribution to Sciamachy Phase E*, 01/04/98, draft 5, version 1.0, J. Carpay, NIVR

2. Project Organisation

2.1 Organisational roles and responsibilities

The organisational structure is depicted in fig.2.1.

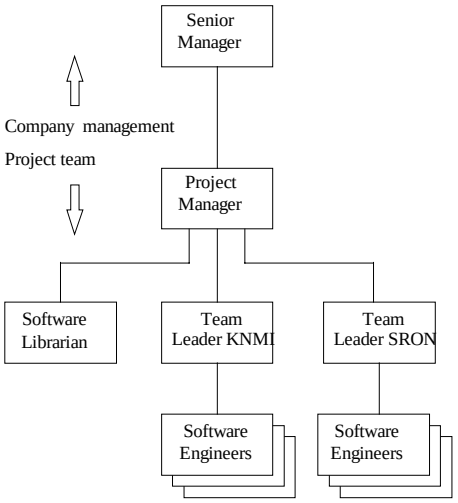

Fig.2. 1 Organisational structure of the project

The *roles* and their responsibilities within the project are

The project manager
Handles communications with external groups and organisations. Informs and reports to the NEONET steering group about the status of the project.

The team leader
Makes plans and decisions on technical matters within the project. Is responsible for the production of the SPMP and for archiving project documentation.

The Software engineers
Design, test and implement software systems. Are responsible for the production of the Software Specification and Design Documents (SSD,DDD) and setting up a validation and verification test plan.

Software Librarian
Takes care of the version management of software source code. This role is combined with that of the teamleader.

2.2 Organisational boundaries and interfaces

The relationship and interfacing between the project and external groups and organisations that form the immediate project environment are stated below. However no Interface Control Document (ICD) has been drawn up to formalise communications.

BCRS/SRON:
The subsidising organisation for this project and the NEONET programme. A steering group meeting will be held every 2 months to discuss progress, problems and issues put forward by the end user advisory group. Prior to each meeting a progress rapport will be made and publicised on the Web at *http://www.neonet.nl/nsg.*

End User Advisory Group:
No formal interface exists. However, members of this group participate in the steering group meetings and the progress meetings of this project (see below).

WP5000 Project members:
More specific, the project members implementing the SCIAMACHY science products for the NL-SCIA-DC. They are among the anticipated end users of the data centres. A progress meeting will be held every 2 months. These meetings will be used to discuss progress in project activities, data policy matters etc. Also in their role as end users they are invited to give feedback on ongoing developments. Prior to every meeting the agenda and relevant documents will be distributed (by e-mail) to participants. A progress report will be made up to formalise decisions that are taken, to record on policy matters, open issues, problems etc.

Fokker Space:

A commercial Aerospace company, supplier of the data storage format software for the NL-SCIA-DC. This software is the deliverable of the 'Bridging Sciamachy and EOSDIS' project **[bridging].** Tis project is also part of the NEONET programme. Work meetings will be held with regular intervals to communicate requirements put forward by the NL-SCIA-DC and to discuss technical matters. In addition the NL-SCIA-DC project team will review the milestones of the above mentioned project.

Core facilities:
A supplier project within the NEONET programme. The project is carried out by a consortium involving NLR, ICT and Origin. The core facilities will supply the required network and Web technology needed to connect the distributed databases within the NL_SCIA-DC and make them searchable and inter-operable. Interfacing occures in workshops on technology issues and bilateral meetings on implementation matters. These take place in irregular intervals.

DLR/Bonn:
Supplier of consolidated SCIAMACHY data. For interfacing see Phase E document of NIVR **[Phase E].**

3. Managerial Process

This chapter is specific to this version of the SPMP since it is the first SPMP of the project. In future versions this chapter may be left out. This chapter covers important managerial considerations pertaining to this stage in the project.

3.1 Management objectives and priorities

The management of this project is committed to deliver the milestones on time, with costs covered by the project budget and utilising the available and necessary resources as they are mentioned in the **[project proposal]**. The project management will give priority to a user-oriented approach in the development of the NL-SCIA-DC providing sufficient opportunity for feedback from the end users.

In WP3000 the objective lies in producing a functional and physical model for the NL-SCIA-DC that is verifiably traceable to the user requirements as they are specified in the NL-SCIA-DC-URD.

3.2 Assumptions, dependencies and constraints

This SPMP has been drawn up with specific assumptions , dependencies an constraints in mind. They are, in no particular order or category :

- The user requirements will be incomplete after the UR phase
- The project depends on the technology input from the Core Facilities to make the NL-SCIA-DC transparently searchable to end users
- The project will use storage format software from Fokker Space only when it is not constrained by intellectual property rights or commercial interest.

3.3 Risk management

From the previous section it is apparent that a certain risk is involved concerning some of the dependencies.

- The planned technology for the transparent connection of distributed archives is based on the Catalogue Inter-operability Protocol (CIP) which is being developed by CEO. The reason for choosing CIP is because of its functionality, it offers standardisation, it will be supported by the NEONET-CF and documented properly. At the moment of writing of this SPMP however this technology is not mature and only a demonstrator of this technology exists. An operational implementation will be available early 1999. A further risk is the lack of control that the NEONET-CF have over the progress and direction of the development of CIP.

- The technology contribution required for the advanced communication between end user Web clients and the NL-SCIA-DC centres around XML. For NEONET and the NL-SCIA-DC XML is provided and supported by the NEONET-CF. The NL-SCIA-DC will use XML only when it is accepted as a standard for communication over the World Wide Web. XML is not an accepted standard yet and is only supported by very few Web-application. There is no guarantee XML will be a standard when the NL-SCIA-DC is due to be operational. And as with CIP, the NEONET-CF have no control over developments concerning XML.

- At the moment of writing it is not clear what the software deliverable of Fokker Space actually is. What *is* clear is that terms of delivery concerning the formatting software must not constrain its intended application in the NL_SCIA_DC. The NL-SCIA-DC is a facility for the benefit of the atmospheric chemistry community at large and its functioning cannot be hindered by commercial interests of an individual company. The formatting software of Fokker Space will only be used if this requirement is met. To achieve this it may be necessary to sign some form of 'non-disclosure' agreement with Fokker Space to protect their commercial interest.

3.3.1 Contingency planning

At this moment our estimate is that the mentioned risk factors will be overcome. In the unfortunate case that for one or more of them this is not so, the following contingency plans will be adopted:

- If CIP is not a viable option the problem of connecting distributed resources will be solved with existing Web technology. This is technically feasible albeit less advanced.

- If XML is not a viable option again existing Web technology will be used (HTML,CGI).

- If the formatting software of Fokker Space will not be used the project team will have to develop the software themselves. This requires extra time and resources.

4. Technical Process

4.1 Project inputs

The input for WP3000 is

- The user requirements document **[urd]**
- This document, the NL-SCIA-DC-SPMP

4.2 Process model

The project has a phased approach. The user requirements (UR) phase is used for consultation of the end users(WP2100). This results in a set of user requirements that form the basis for the design of a functional and a physical model for the NL-SCIA-DC (WP3000). Subsequently this model will be implemented and made operational (WP4000). This sequence of phases is called a *waterfall cycle* (fig.4.1). The development life cycle approach in WP3000 is phased as well but is also determined by the following:

- From the user consultations that have taken place in the UR phase and the detail of user requirements so far it has become apparent that actual experience of users interacting with the data centre is needed to further refine and complete the user requirements. Apart from this new requirements may emerge. That is why an additional work package is defined, WP2200 Monitoring of User Requirements.

- At the moment there are uncertainties about the environment in which the NL-SCIA-DC has to operate. Data content, data handling prior to ingestion into the NL-SCIA-DC etc. may be liable to change.

- A prerequisite for making the data centre possible in the first place is that it relies on network technology. Not all of these technologies have reached the state of maturity necessary to allow them to be used in the development of the NL-SCIA-DC. Moreover, even if these technologies become mature, certain (user, technical, ...) requirements may be more difficult to meet than others.

For these reasons it has been decided to apply an *evolutionary* life cycle approach for the development of the NL-SCIA-DC (fig.4.2). The evolutionary approach consists of multiple

waterfall cycles with an overlap in development (UR,SR/AD,DD), transition, operations and maintenance (TR,OM). In WP3000 the developed versions of the NL-SCIA-DC will be made pre-operational in the transition phase (TR) and feed-back from users will be incorporated in the operations and maintenance phase (OM). In a pre-operational state the services provided by the NL-SCIA-DC are “as is” , and without user support. The final version of the NL-SCIA-DC will be made operational in the implementation phase (WP4000) as is described in the [project proposal].

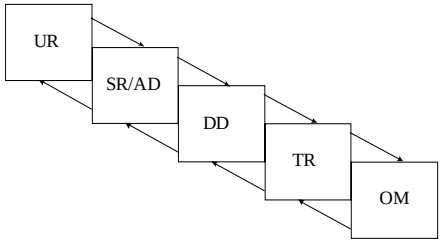

Fig.4.1 Waterfall cycle

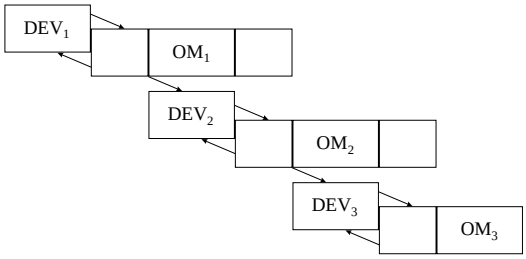

Fig.4.2 Evolutionary life cycle

4.3 Methods, tools and techniques

The design methods and techniques used in WP3000 to develop the NL_SCIA_DC are a mix of several well known methods in software engineering.

For the system parts that are concerned with user interaction, i.e. human computer interfaces (HCIs), an *object oriented* technique is applied (OMT) using a *bottom up* approach. The HCIs are implemented in Java.

For database design a structured analysis method is used. A CASE-tool will be used for the production of Entity-Relation Diagrams (ERD), flow charts etc. Databases will be designed according to the ODBC standard.

For the configuration management of documents and source code the PVCS version control system will be used.

Milestone reports will be produced electronically and/or as paper document. For electronic documents the use of a word processor is prescribed. Recommended is the use of MS-Word 97. Exchanged documents have to be either in MS-Word format or in PDF. The content milestone documents will be based on the templates of appendix C of **[pss05-lite]**.

The coding standard for software produced in this and subsequent phases have to be ANSI compliant if a pertaining standard exists

Web software will adhere to the most current version of standards as XML HTML, HTTP, JAVA.

4.4 Project support functions

Support functions for this project are *software configuration management* and *software verification and validation*. There is no *quality assurance* support function. Such a function would require too much effort given the available resources.

Software configuration management will be applied on all paper/electronic documents and source code that are produced in the project life cycle. This covers amongst others :

- Project management reports (NL-SCIA-DC-SPMP, ..)
- Technical documents
- Progress reports
- HTML/XML pages

- ESA/SCIAMACHY data description and data policy documents
- Phase-milestones (NL-SCIA-DC-URD, …).

These and other configuration items (CI) are part of the project documentation and shall be stored in the project manager's office located at KNMI, room A2.23. The software configuration management is described in detail in the Software Configuration Management Plan **[scmp]** .

The verification and validation of software requires that software is checked against its specifications. The objective of this effort is to reduce software errors to an acceptable level. Verification and validation also requires that software products comply with standards, guidelines, user requirements, functional and system requirements. A detailed description of this support function is given in the Software Verification and Validation Plan **[svvp]** . Part of this plan is carrying out an acceptance test that requires the active involvement of the end users.

5. Work packages

This section describes the decomposition of the WP3000 work package into more detailed work packages.

5.1 Work packages

WP01	***Project management***
	General management
Responsible organisation	KNMI
Major activities	External communications, progress reporting, activity planning, risk analysis
Work package manager	S. Barlag / J. de Vries
Start	September 1st 1998
End	December 31st 1999
Work package inputs	NL-SCIA-DC-SPMP
Work package outputs	NL-SCIA-DC-SPMP (updated for WP4000)
	Configuration management + Validation management
Responsible organisation	KNMI
Major activities	Version control of paper/electronic documents and source code Guiding the validation process and acceptance test
Work package manager	J. de Vries
Start	September 1st 1998
End	July 1st 1999
Work package inputs	NL-SCIA-DC-SCMP
Work package outputs	NL-SCIA-DC-SCMP (updated for WP4000)

WP02	***Design & Realisation***
	Human Computer Interfaces
Responsible organisation	KNMI
Major activities	Functional / architectural design and realisation of the NL-SCIA-DC user interfacing system
Work package manager	W. Som de Cerff / J. v.d. Vegte
Start	September 1st 1998
End	July 1st 1999
Work package inputs	NL-SCIA-DC-SPMP, NL-SCIA-DC-URD
Work package outputs	Logical model HCIs, meta-data attribute set, software implementation for HCIs
	Meta-data database
Responsible organisation	KNMI
Major activities	Functional / architectural design and realisation of the meta-data database
Work package manager	W. Som de Cerff / J. v.d. Vegte
Start	Januari 1st 1999
End	March 1st 1999
Work package inputs	NL-SCIA-DC-SPMP, NL-SCIA-DC-SCMP
Work package outputs	• Pre-operational meta-data database for GOME & SCIAMACHY • NL-SCIA-DC-SSD • NL-SCIA-DC-DDD
	Data Handling
Responsible organisation	KNMI
Major activities	Functional / architectural design and realisation of a data handling system
Work package manager	W. Som de Cerff / J. v.d. Vegte
Start	March 1st 1998
End	June 1st 1999
Work package inputs	NL-SCIA-DC-SPMP, NL-SCIA-DC-SCMP
Activities	Modelling of the data ingest function
	Design of meta data extraction function
Work package outputs	NL-SCIA-DC-SSD, NL-SCIA-DC-DDD
	Data Storage
Responsible organisation	KNMI
Major activities	Functional/architectural design and realisation of a data storage/archiving system , i.e • definition of the record structure for SCIAMACHY data of different levels • database access facilities • storage hardware selection
Work package manager	W. Som de Cerff / J. v.d. Vegte
Start event	April 1st 1998
End event	July 1st 1999
Work package inputs	NL-SCIA-DC-SPMP, NL-SCIA-DC-SCMP
Work package outputs	Logical model for the SCIAMACHY database, data storage hardware.

	Data processors
Responsible organisation	SRON
Major activities	Design and realisation of data processors, i.e. • a generic processing environment for GOME and SCIAMACHY data • an interface for the level 1b to 1c Applicator • meta-data extraction/handling based on the HeaD project • level 1c SCIA data to HDF conversion
Work package manager	R. van Hees/H. Schrijver
Start event	December 1st 1998
End event	August 1st 1999
Work package inputs	NL-SCIA-DC-SPMP, NL-SCIA-DC-SCMP
Work package outputs	Logical and physical model of the data processing environment NL-SCIA-DC-SSD, NL-SCIA-DC-DD
	Verification and validation
Responsible organisation	KNMI
Major activities	Setting up a verification and validation test plan
Work package manager	W. Som de Cerff / J. v.d. Vegte
Start	September 1st 1998
End	January 1st 2000
Work package inputs	NL-SCIA-DC-SVVP, NL-SCIA-DC-URD
Work package outputs	NL-SCIA-DC-SSD, NL-SCIA-DC-DD

5.2 Dependencies

In the Design & Realisation work package (WP02), the work on *Human Computer Interfaces* will be carried out first since it must deliver the meta-data attributes relevant for the communication with end users. The work on *Meta-data Database Design* depends on a stable set of meta-data attributes and will be started after the item *Human Computer Interfaces* has finished.

Verification and Validation activities as described in **[svvp]** are carried out after the delivery of a new version of the NL-SCIA-DC as described in section 5.3.

5.3 Schedule

The schedule for WP3000 is presented in the form of a time table for the delivery of planned versions of the NL_SCIA_DC. These versions of the NL_SCIA_DC are the milestones of WP3000 along with the output of the work packages mentioned in section 5.1.

Delivery Date	*Version*	*Features*
March 1st 1999	1.0	• selection/browsing of GOME data on a limited data set • downloading of GOME data on a limited data set
May 1st 1999	1.1	• processing of GOME data (on a limited data set)
July 1st 1999	1.2	• SCIAMACHY meta-data extraction • SCIAMACHY data archiving • User interface extended for SCIAMACHY
October 1st 1999	2.0	• selection/browsing of SCIAMACHY data • processing of SCIAMACHY data • Conversion tools (HDF) • SCIAMACHY Information web-site
January 1st 2000	3.0	• Delivery/downloading of SCIAMACHY data

The final version 3.0 of the NL-SCIA-DC will adhere to all the requirements in the then latest version of the User Requirements Document.