

# EUMETNET-Programme UNIDART-I

## Final Report



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## Executive Summary

The final report consists of two parts. Part I presents the results of UNIDART-I, the first project phase. Part II contains a proposal for the next project phase.

### Part I:

DWD, as the leader of a consortium including KNMI and UK Met Office, is the Responsible Member of the EUMETNET Programme UNIDART-I. The main objective of UNIDART-I was the exploration of the UNIDART (Uniform Data Request Interface) concept. This concept aims at the development of a meteorological Web portal which offers uniform access to all kinds of meteorological data and products. The project team has been asked to do the following tasks during UNIDART-I:

- to define a set of requirements,
- to make a feasibility assessment,
- to estimate the costs for an implementation of the UNIDART concept.

The project team organised a workshop which was held 28 to 30 January 2002 in Langen, Germany. Representatives of EUMETNET member states and other organisations attended the workshop. The attendees discussed the requirements of the UNIDART system and further aspects, which have to be addressed for its implementation, e.g. the definition of a standardised metadata schema.

The list of requirements developed during the workshop was one input for the preparation of the feasibility study. This study explores the suggested Web portal from an organisational, subject-related and technical point of view. A technical concept has been developed which describes the roles of the users, the data providers, and UNIDART as a broker system between users and providers. The feasibility study makes clear that the implementation of the UNIDART system, using currently available standard database and web technologies, is feasible. The study states that the co-ordination of various data formats to produce a common format for metadata, and the provision of data for exchange with UNIDART, will play a central role in the implementation of UNIDART.

The study has been reviewed by two consultancies. Each group of consultants prepared a report where they gave comments and suggestions for improvements. Further, they found it difficult to comment seriously on the time and cost estimations made in the study until the full scope is decided. However, both consulting teams also came to the conclusion that the UNIDART concept is feasible. However, they also notified that there are still some risks. More details about the two reviews can be found in chapter 3 and in the reports themselves.

The budget for UNIDART-I was fixed at 110.750 . Chapter 4 explains how this money was used for the specific project tasks. At present, it is not possible to prepare a detailed balance-sheet because some expenses are not yet calculated. An official final account will be made when all project expenses are definitely known. The personnel costs for the project manager and the programme committee members were higher than planned while the costs for external staff were lower than expected. Thus approximately 28.000 will remain. This amount will be charged against the final rate of each EUMETNET member.

The project experiences lead to some lessons learned. One experience was the good co-operation of the project partners although the communication between the members was largely done only by email. The use of email was satisfactory and is

the preferred form of communication in future project phases. A negative experience was the bad payment behaviour of some EUMETNET members. More than half of the member states did not pay their first contribution rate of 50% within the contractually predetermined time. The project budget existed for a long time only as a “virtual” amount which made it difficult to manage UNIDART-I. It was not possible at the beginning of UNIDART-I to allocate work to external companies because it is a prerequisite for contracts to have financing in advance. The next project phase should only start after at least half of the budget is actually obtained.

## **Part II:**

The study and the two review reports came to the conclusion that the UNIDART concept is sound and feasible. This is the main reason why the three partners of UNIDART-I, DWD, KNMI and UKMO, propose to continue the UNIDART project. The chapters 6 to 8 contain a plan for the next project phase, called UNIDART-II. The main task of UNIDART-II should be the implementation of a prototype. Chapter 6 presents a work plan which consists of four work packages. The first work package comprises the general functions of the project management. A revision of the feasibility study is the task of the second work package. This work should result in the preparation of a technical document which represents a detailed functional specification of the UNIDART system. The real implementation of the prototype is then done in the third work package. All activities necessary for the evaluation and testing of the prototype are accomplished during the fourth work package.

It is estimated that approximately 200 person-days are needed for the realisation of the work plan for UNIDART-II. The man-power is equally divided into two portions. One portion can be accomplished by internal staff while the other portion should be allocated to an external company. The total costs of the second project phase UNIDART-II are fixed at 155.000 . The UNIDART-II Programme should be established for a duration of 10 months. It should have no exact beginning date but it should start when at least half of the budget is available.

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## Part I:

### 1 Introduction

DWD (Deutscher Wetterdienst) presented to the EUMETNET Council at its 11<sup>th</sup> meeting a proposal for the realisation of a meteorological Web portal. The project proposal was called UNIDART (Uniform Data Request Interface). The main goal of the UNIDART project is the development of an information system which will offer uniform access to all kinds of meteorological data and products including climatological data sets. This information system will be designed for the World Wide Web in order to allow its easy use across and outside the meteorological community.

The EUMETNET Council agreed at its 12<sup>th</sup> meeting to start the first phase of UNIDART, called UNIDART-I. The main objective of UNIDART-I was the exploration of the UNIDART concept. It was decided to do the following tasks during UNIDART-I:

- to define a set of requirements,
- to make a feasibility assessment,
- to estimate the costs for an implementation of the UNIDART concept.

DWD, as the leader of a consortium including KNMI (Koninklijk Nederlands Meteorologisch Instituut) and UKMO (United Kingdom Met Office), replied to the tender for UNIDART-I and has been assigned the Responsible Membership for this EUMETNET Programme. The UNIDART-I Programme officially started on 1<sup>st</sup> September 2001. Its duration should not exceed seven months. The project budget was fixed to an amount of 110.750 . The project team consisted of the Programme Manager and two adjoined members, one from KNMI and another from UKMO.

This document contains a summary of the results acquired in the first project phase. More details about the UNIDART requirements can be found in the proceedings of two workshops, the initial UNIDART workshop and the ECSN Workshop on Climate Data Exchange and Data Quality. Specific results of the feasibility assessment are given in the feasibility study (<http://www.dwd.de/UNIDART/Documents/FeasibilityStudyEBP.pdf>) and two independent reports which review this study. The review reports are accessible at

- <http://www.dwd.de/UNIDART/Documents/ReviewReportSERC.pdf> and
- <http://www.dwd.de/UNIDART/Documents/ReviewReportRiverinteractive.pdf>.

This document further contains a proposal for the next project phase. This proposal includes a work plan and a time table. The costs resulting from this proposal are outlined in the last chapter.

### 2 The feasibility study

The major task of the project was the preparation of a feasibility study. This study should explore the concept of an Internet-based information system for exchanging meteorological data and products. Input to the study was a project proposal prepared by DWD, KNMI and UKMO and the results of the initial UNIDART workshop which was held 28 to 30 January 2002 at the Education and Conference Centre (BTZ) of DWD in Langen, Germany. Representatives of EUMETNET member states and other organisations attended the workshop. They discussed the requirements and other aspects of such a meteorological Web portal system. UNIDART was also a topic of the ECSN Workshop on Climate Data Exchange and Data Quality, also held in Langen

12-13 November 2001. This workshop supplied requirements and recommendations for UNIDART which are specifically related to the necessities of the European climatological community. These requirements were also considered in the study.

The German company Ernst Basler + Partner GmbH, which is a co-operation partner of DWD, was charged with the work to prepare the feasibility study. They delivered a document of 44 pages. A summary of this document is given consecutively in this chapter. The interesting reader will find the whole document at the Internet-address <http://www.dwd.de/UNIDART/Documents/FeasibilityStudyEBP.pdf>.

The study compiles the requirements of the suggested meteorological Web portal from an organisational, subject-related and technical point of view. An implementation concept was then developed on the basis of these requirements.

The concept provides for the involvement of users, UNIDART and providers, each of whom perform specific tasks:

- Users perform searches and request data or products as the result of these searches. In order to do this users must first be registered.
- UNIDART takes the requests from users and forwards them to the relevant providers.
- The providers have meteorological data and products and make these available to users.

It was made clear in the study that the implementation of the described information system, using currently available standard database and web technologies, is indeed possible. In addition to the technical aspects there are certain specialist and organisational aspects relating to the data providers which cannot be overlooked. The co-ordination of various data formats to produce a common format for metadata, and the provision of data for exchange with UNIDART, play a central role in the implementation of the project. In order to deal with these, a metadata standard based on ISO 19115 will be defined. Use of this standard will be essential for all providers involved. The WMO Expert Team on Integrated Data Management is also proposing to CBS to develop WMO metadata standards based on ISO19115.

The implementation of the UNIDART information system should increase the availability and utilisation of international meteorological data and products significantly.

### **3 The two review reports**

The UNIDART project team has decided at its kick-off meeting in September 2001 that the feasibility study should be examined by further consultants in order to survey the general concept and to render some expert opinions. This procedure should help to approve and to ameliorate the further project steps.

One consultancy, SERC, was selected by KNMI. Another consultancy, RiverInteractive, was selected by the UK Met Office. Both consultants prepared their reports within two weeks without prior knowledge of UNIDART. They were asked to comment upon a number of questions and criteria which were provided by the project team. The following list summarises these criteria:

- realism and sense-making
- clarity, ambiguities, and inconsistencies

- drawbacks and deficiencies
- sustainability
- recommendations
- feasibility of using new technologies
- similar projects and the use of off-the-shelf software
- alternatives

The two review reports can be found on the UNIDART Web site. This document only contains some general conclusions and remarks made in the two reviews. Both consultancies concluded that the concept of the UNIDART system seems feasible using modern technology. However, they also notified that there are still some risks.

The review prepared by SERC criticises that the feasibility study does not separate functional requirements from technical solutions. Quality requirements, service levels, and limiting conditions are insufficiently specified or missing. Consequently, acceptance tests and feasibility decisions would be difficult. The risks resulting from these deficiencies could be reduced by paying attention to (measurable) non-functional requirements, including business models, by separating requirements from specific solutions, by describing the development and maintenance process in more detail, and by explaining design decisions. SERC concludes that the feasibility study, in its current form, is deemed not yet fit for development or putting out to contract.

The review prepared by Riverinteractive identified all the aspects concerning metadata as critical. They recommend to address a number of areas before a real definition of the functional specification of the project can be completed. Amongst these areas are:

- metadata schema definition.
- distribution of the database.
- possibilities of using components of other projects such as Globus.

Overall, the review from Riverinteractive also endorses that UNIDART seems to be solid, although the project might be more successful in the long term if it brought the actual data delivery mechanisms within its scope, as it is believed that this would naturally bring a tighter coupling of the data and the metadata. The technologies proposed to create UNIDART are an appropriate choice to create a system that would be open, modular, scalable and hopefully long lived. All of the necessary components exist and are in a reasonably mature form as open source software, available at little or no capital cost.

Both consulting teams found it difficult to comment seriously on the time and cost estimations made in the study until the full scope and approaches were decided. Thus, the UNIDART project team decided not to follow the proposal for the next project phase which was given in the feasibility study. The study proposes a future project plan consisting of seven work packages and having an overall duration of 30 months. This document proposes an alternative project plan which only foresees in the next project phase the implementation of a prototype. This alternative project plan is explained in the chapters 6 to 8 in this document. The EUMETNET Council will be asked to accept this plan for the second project phase, called UNIDART-II.

#### **4 Financial Statements**

The overall financial ceiling for UNIDART-I was fixed at 110.750 . In the contract that DWD made with each other EUMETNET Member the method of payment was defined in Article 5. In this Article it is declared that each member has to pay its contribution in

two parts. An invoice covering the first part which amounts to 50% of the total financial contribution was sent to each member in October 2001. Half of the members paid their invoice at the expected time before the end of 2001. In the meantime all members have transferred the first rate to the UNIDART bank account. The latest bank transfer dates from July 2002.

The project budget was used for several items. The objectives of these items have been explained in Article 4 of the UNIDART contract. The following table gives a preliminary overview the total project costs. The amounts of money which have been planned for each item are shown in the credit column. Against these values are the amounts of money which have been actually spent. Personnel costs are distinguished between the Programme manager (PM) and the programme committee (PC).

<b>Item</b>	<b>Credit</b>	<b>Debit</b>
- Personnel costs for the project manager and the programme committee members	14.750	PM: 322 hours * 60 /hour = 19.320 PC: ~ 22.000
- Travel expenditures for the project manager and the programme committee members	8.000	PM: 561 PC: ~ 3.000
- Personnel costs for external staff	75.000	Feasibility study: 19.978 2 review studies: 10.000
- Travel expenditures for 4 key-speakers	8.000	Workshop: 2.365
- Software for the development of Enterprise Information Portals	5.000	for preliminary prototype development: 5.000
- additional costs		~ 500
<b>Total</b>	<b>110.750</b>	<b>~ 82.724</b>

The table needs some explanations. First, we point out that the personnel costs for the project manager (PM) are higher because he did a lot of work which was originally planned to be performed by external staff. Furthermore, the administrative efforts were not considered in the UNIDART-I proposal presented to the EUMETNET Council at its 12<sup>th</sup> meeting. But, it turned out, that these expenditures were not negligible.

Similar to the personnel costs of the project manager the costs for the two committee members (PC) also exceeded the expected limit. The exact values for these costs are currently unknown because a final account from KNMI and UKMO is missing. It takes some additional time because both have their own standard procedure and their own standard internal rates for charging working time.

The costs for the external staff were lower because it has been decided to make contracts at fixed prices for specific work packages rather than buying a quota of 100 person days. Three contracts were signed, one for the preparation of the feasibility study and two for the review of this study.

The initial UNIDART workshop was also much cheaper. This is due to the fact that all invited keynote speakers stayed overnight in the guesthouse of the BTZ. Further, all invited persons accepted to travel on Saturday. This enabled the travel agency of DWD to buy cheaper flight tickets for them.

A lump sum of 500 is assumed to cover the unforeseen costs, e.g. bank wire fees and expenses for catering purposes.



An official final account will be made when all project expenses are available. Then, a closing invoice will be sent to each EUMETNET member. This invoice will charge the second 50% rate against the remaining amount of the project budget. At present, the remaining amount will be approximately 28.000 .

## **5 Lessons learned**

Learning from experiences during a project should be routine. The project team felt that there were some lessons to learn from the UNIDART-I Programme. The team members reported their experiences at the UNIDART-I closing meeting which was held on 24<sup>th</sup> May 2002 in De Bilt, Netherlands.

First, it should be mentioned that the chosen project organisation was a good choice and it worked well. The structure of the project organisation was built of a Programme Manager and two adjoined project members consisting of representatives from the involved EUMETNET members KNMI and UKMO. Most of the communication was done by email and this was satisfactory. The group also felt that the initial UNIDART workshop was another positive experience. The project team considered the workshop as a success.

The Programme Manager expressed his negative experiences concerning the payment behaviour of the EUMETNET members. Only a few members paid their first contribution rate of 50% within the foreseen time of 4 months. The latest payments have been made in July 2002. A project such as UNIDART, which was planned to be essentially accomplished by external staff, is not feasible on such a basis. If the project should be continued further, it has to be guaranteed that all EUMETNET members pay their contribution in advance. Otherwise, the Responsible Member for the Programme has to offer free delivery for the financial impacts resulting from the project. This will not be possible for DWD, because it is not legally allowed. Thus, a further lesson learned is that the financing model of EUMETNET projects is unsuitable in cases where most of the project work will be done through contracts with external companies.

The Programme Manager also learned that the administrative effort needed for managing the project is not negligible. It is significant in this respect that the administrative work was missing in the project plan for UNIDART-I.

In addition it turned out clearly that the project management was not feasible with a person which has been assigned for this work on a 20% basis. Thus, the planned expenses for the project manager were estimated too low. For the further project phases it is therefore recommended that a project manager should be assigned to the project with at least 40% of its work time.

## **Part II:**

### **6 Work Plan Proposal for the next project phase**

For UNIDART-I DWD, KNMI and UKMO installed a project management structure which consisted of a project manager coming from DWD and an advisory committee composed of a staff member from KNMI and UKMO each. External project staff was not employed. However, work was contracted to external companies.

The tasks of the advisory committee were to advise the project manager and to review the working results. The committee members were involved in all important project decision processes. The communication amongst the project team members was mostly done by e-mail. This project management structure has been proved and should be also adopted for the next project phase.

Contrary to the work plan proposed in the feasibility study it is suggested to include a mile stone after the implementation of a prototype. This leads to the conclusion that the next project phase should only contain the prototype implementation and a testing period.

The prototype implementation has several objectives. The prototype should be the starting point for a framework infrastructure in which a number of applications could be fitted. The use of a common metadata standard belongs to the infrastructure aspects. The prototype should serve as a testbed for the proposal for a WMO metadata standard that has been prepared by the WMO-CBS Expert Team on Integrated Data Management. Further, the ECSN requirements for accessing climatological data will be considered as the first application that should fit in this infrastructure. Thus the target group of the UNIDART prototype consists of users from meteorological services and scientific organisations which are interested in climate data. Finally, the prototype should show the usefulness and practicability of the UNIDART system.

The project team suggests to continue the UNIDART project and to start the second project phase, called UNIDART-II. The work plan for UNIDART-II should consist of 4 work packages. Each work package is described in the following sections.

#### **Work package 1: Project Management**

A web site has been established during the first project phase. It is accessible from the Internet server of DWD at <http://www.dwd.de/UNIDART>. All documentation and information about the progress of the project was published on this site. The Web pages have to be brought up to date and maintained. Maintenance was previously done by the project manager. It is proposed that the project manager further maintains this web site and keeps it up-to-date. As part of the management, the Web pages should include the following brief documents:

- Regular reports of progress;
- A Risk Register – a list of possible risks to the project and the envisaged contingencies;
- An issues list – any issues that may need to be addressed by the project team. It will contribute to a final ‘lessons learned’ report after the end of the project phase.

The project management comprises all the administrative and organisational issues. This includes the work concerning the billing of the EUMETNET members and the tasks in order to co-ordinate and to control the overall project work.

One meeting of the project team should take place after the implementation of the prototype and before the testing period will start. The Programme manager will organise this meeting in Offenbach at DWD. The meeting could be used to define a test scenario for the prototype, to discuss open questions and to plan the next project steps.

### **Work package 2: Revision of the feasibility study and preparation of a technical document for realisation**

The feasibility study has been reviewed by two independent consultants. The consultants made a lot of helpful remarks and identified a number of risks. One reviewer concludes that the study is deemed not yet fit neither for development nor putting out to contract. The goal of work package 2 is the preparation of a revised version of the feasibility study which takes into account the notes, suggestions and proposals of the consultants. The revised version should be a preliminary step on the way to preparing a technical document containing a detailed functional specification.

One intention of the UNIDART system is the realisation of a framework infrastructure in which a number of applications could be fitted. The revision should explicitly identify those system components that are infrastructure and those that are application specific.

### **Work package 3: Implementation of a Prototype**

A general system architecture for UNIDART has been described in the feasibility study. This architecture is composed of three main components, a Web server, an application server and an administration unit. One task of this work package is the prototype implementation of these components. In order to get a complete prototype running, we also need some data providers. It is expected that three or four data providers will be involved in the prototype development. DWD will participate as one data provider who will especially offer access to climatological data sets. A search for other data providers will be initiated after the EUMETNET Council has authorised the start of the second project phase.

A second task of this work package is the development of a thin version of the UNIDART agent that has to run at each provider. This development includes a realisation of a metadata standard. We propose to take the proposal for a metadata standard that has been prepared by the WMO-CBS Expert Team on Integrated Data Management.

Finally, all implementation activities have to be documented. Documents should be written which will contain information about functions, installation and use of the prototype.

### **Work package 4: Prototype evaluation and testing**

After the prototype has been realised, it needs to be evaluated and tested. Test cases for the three components of the UNIDART core system as well as for the UNIDART agent should be defined. These cases could be used later for the evaluation of the real system.

Further, a questionnaire should be developed where test users can express their feedback and where they can make suggestions for changes and refinements. The

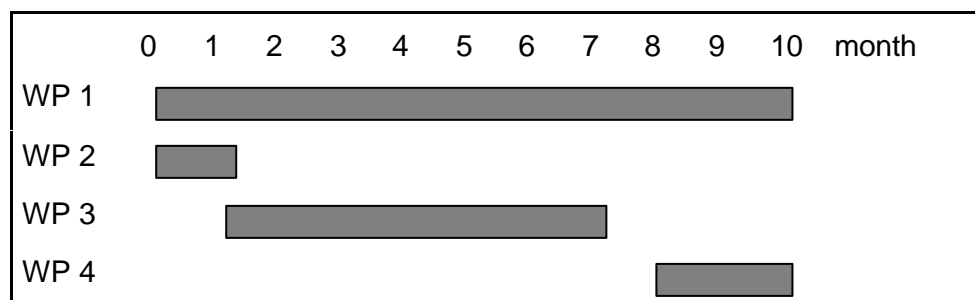
questionnaires will be analysed. The analysis result will then be the basis of a revision of the prototype.

## 7 Time Table

The following table shows the manpower which must be invested for the realisation of the work packages. The manpower is specified in person-days and distinguishes between the quota of the project manager (PM), the quota of the programme committee (PC), and the quota for external staff. In summary the manpower of the project manager is estimated at 60 person-days, the manpower of the programme committee is estimated at 42 person-days, and the manpower for doing work from external staff is estimated at 100 person-days.

Work package	Manpower in person-days		
	PM	PC	External staff
WP 1: Project Management	23		
WP 2: Revision of the feasibility study	5	10	
WP 3: Implementation of a prototype			
Creation of Webserver (Servlets)	5		25
Creation of Application Server (EJB)	5		25
Creation of a provider agent component	5	6	25
Implementation of a metadata standard	5	6	20
Documentation	2		5
WP 4: Prototype evaluation and testing	10	20	
<b>Totals</b>	<b>60</b>	<b>42</b>	<b>100</b>

The following figure shows the time schedule as well as the relationships between the work packages. The reader should notice that there is a time gap of one month between the end of work package 3 and the beginning of work package 4. This time gap serves as a safety buffer for the case when the implementation will take longer than 6 months.



The overall duration of the second project phase, UNIDART-II, should take no longer than 10 months.

## 8 Cost calculation

The following price conditions show the costs needed to perform the previously described work in the next phase of the UNIDART project. A person-day for the project manager and the programme committee members is estimated at 500 €. The costs for the software development which has to be performed for the prototype implementation is based on calculated time requirements of 100 person-days at 900 € per person-day.

<b>Item</b>	<b>Price</b>
- Personnel costs for the project manager and the programme committee members	51.000
- Travel expenditures for the project manager and the programme committee members	4.000
- Software development costs (100 person-days)	90.000
- commissioning costs for required hard- and software	10.000
<b>Total</b>	<b>155.000</b>

Thus, the total costs of the next project phase are estimated at 155.000 €.