

法規名稱：(終)(AD.1992.07.24) IMPLEMENTING ARRANGEMENT #5 SYSTEM DEVELOPMENT OF THE OPERATIONAL WORKSTATION TO THE AGREEMENT FOR TECHNICAL COOPERATION IN METEOROLOGY AND FORECAST SYSTEMS DEVELOPMENT BETWEEN THE COORDINATION COUNCIL FOR NORTH AMERICAN AFFAIRS AND THE A

終止日期：民國 82 年 06 月 30 日

ARTICLE I - SCOPE

This Implementing Arrangement describes the cooperative scientific and technical activities to be undertaken by the American Institute in Taiwan (AIT) and its designated representative, the Forecast Systems Laboratory (FSL) of the Environmental Research Laboratories (ERL) of the National Oceanic and Atmospheric Administration (NOAA). It provides for the continuing system development of the Forecast System being developed by the Joint Forecast Systems Project between the Central Weather Bureau (CWB) of Taiwan, the designated representative of the Coordination Council for North American Affairs (CCNAA), and NOAA/FSL.

ARTICLE II -AUTHORIZATION

The activities described in this Implementing Arrangement will be carried out under the general terms and conditions established by the Agreement between AIT and CCNAA for Technical Cooperation in Meteorology and Forecast Systems Development. This Implementing Arrangement is hereby attached to that Agreement and becomes part of the Agreement.

ARTICLE III - SERVICES

The Forecast System is comprised of two primary subsystems: a Central Facility and the Forecaster Workstation Subsystem. It also includes the communication and data interfaces to existing sources of meteorological data and the distribution circuits that disseminate forecasts and warnings to various users.

Emphasis will be placed in this Implementing Arrangement on the development of a RISC-based forecaster workstation. The Central Facility development has been mostly complete and a prototype workstation has been installed and is currently under operational test. In addition to the workstation development, there are tas-

ks addressing training, upgrades to the Central Facility and the prototype workstation, and planning support for the possible introduction of wind profiler observation systems. These activities, described in more detail in the Statement of Work, will include the following:

- Development of the Operational Forecast Workstation - Development of the operational workstation will be the major focus of I. A. #5. Development will proceed in two phases. In the first phase, the basic functionality of the workstation will be implemented and tested, while in the second phase, added meteorological applications will be developed. As a general design concept, a shell-type design approach is planned, where the basic structure or shell of the system is developed in such away that many different capabilities can be added as modules within the shell. With this approach, the system can be more easily modified for other user needs, such as aviation weather forecasting or hydrological forecasting than would otherwise be possible.

One of the most valuable features of the RISC-based X-window system is the relative ease with which software can be ported to other workstations. To insure this capability, interface specifications will be established as part of this agreement which are compatible with the portability objectives.

Recommendations as to suitable hardware equipment will also be provided. If, as expected, several different hardware configurations are suitable, specifications will be provided and the suitable configurations identified. suitable

- CWB Training Program - A training plan was prepared as part of I. A. #3 and implementation of the plan started as part of I. A. #4. The training activities will continue during I. A. #5. Two types of training activities are planned.

In the first, CWB scientific staff will participate in forecast experiments conducted by FSL. Two CWB forecasters participated in FSL forecast experiments during the summer of 1991. This participation was a valuable training experience and wi-

ll be broadened during this period.

The second type of training will involve several CWB scientists in the FSL hydrology program. The development of hydrological forecast software for the FSL workstations is a major ongoing activity within FSL. The effort includes working closely with local government agencies to establish better flash flood warning capabilities. CWB scientists will participate in these activities for periods of several weeks to several months.

- Prototype Workstation Enhancement - Initial use of the prototype forecast system by CWB began in May of 1992. Use of the prototype system will continue until the operational system is fully functional. Evaluation of the prototype system will continue as part of I. A. #5.

Limited development of the prototype workstation will also continue. Certain key new capabilities will be added, including the capability to edit contour displays and the addition of tools providing the capability to draw and edit data on-line.

Additionally, several components of the prototype workstation will be documented. These include the workstation manager interface and the display manager module.

- Central Facility Support & Development Several important additions will be made to the Central Facility. CWB staff at FSL will take the lead in these developments, with FSL providing technical support when required. The following areas of technical support are anticipated:
 - Estimating precipitation amount with the use of radar data
 - Integration of CWB radar data into the Nowcasting System
 - Data base management of CWB radar data
 - Use of satellite data to calculate sea surface temperature
 - Development of procedures to renavigate satellite imagery
 - Incorporate the Empress DBMS into the Central Facility
- Wind Profiler Planning - The use of Doppler wind profiler measurement systems is being considered by both the CWB and the

Civil Aviation Administration. Wind profilers are a new meteorological observation technique that are considered to have great potential in improving forecast capabilities and in the routing and operation of aircraft.

FSL has developed the profiler that has been installed in the 30 profiler network in the United States. The FSL experience suggests that the planning, installation and operation of the profilers, as well as the communication, processing and use of profiler data, is a complex series of tasks. FSL staff will participate in the planning activities during this period. Issues that might likely be addressed could include site selection, frequency interference issues, profiler specifications, and processing requirements.

ARTICLE IV - FINANCIAL PROVISIONS

- A. In accordance with the Agreement, NOAA/FSL is undertaking this work on behalf of AIT for CCNAA. CCNAA will reimburse AIT, and its designated representative NOAA/FSL, for all costs incurred in association with this Implementing Arrangement.
- B. The total cost for activities described in this Implementing Arrangement is mutually agreed to be US \$ 400,000. It is also agreed that fifty percent of the funds will be transferred in advance, with the remaining 50 percent transferred within 30 days of the acceptance Of the final report by CCNAA, and its designated representative, CWB.

ARTICLE V - INTELLECTUAL PROPERTY CONSIDERATIONS

No intellectual property considerations are expected to arise in conjunction with activities described in this Implementing Arrangement. Existing system designs and computer software for the FSL Forecast System are public domain. Reports, specifications, and computer software prepared under the terms of this Implementing Arrangement will also be public domain once they have been approved in final form by NOAA, AIT, CCNAA, and the CWB.

ARTICLE VI - EFFECTIVE DATE, AMENDMENT AND TERMINATION

This Implementing Arrangement is effective on the date of the last signature hereafter. This Implementing Arrangement may be a-

mended and/or terminated in accordance with the terms of the Agreement. The estimated completion date for activities described in this Implementing Arrangement is June 30,1993.

FOR THE AMERICAN INSTITUTE IN TAIWAN

(Signed)

Clarke N, Ellis

Deputy Managing Director

Date: July 22,1992

FOR THE COORDINATION

COUNCIL FOR NORTH AMERICAN

AFFAIRS

(Signed)

Stephen S. F. Chen

Deputy Representative

Date: July 24,1992

Statement of Work-For Implementing
Arrangement #5 System Development of
the Operational Workstation FSL-CWB
Joint Forecast Systems Project

1.0 Background and Objectives

The Agreement between the American Institute in Taiwan (AIT) and the Coordination Council for North American Affairs (CCNAA) provides for technical cooperation between the National Oceanic and Atmospheric Administration's Forecast Systems Laboratory (NOAA/FSL) and the Central Weather Bureau of Taiwan (CWB) in meteorology and forecast systems development.

The new Forecast System that CWB is implementing has two primary subsystems: the Central Facility and the Forecaster Workstation Subsystem. Both the central facility and workstations will be modeled after systems developed at FSL.

A detailed description of the Forecast System planned for CWB was provided in the Project Implementation Plan, prepared as part of Implementing Arrangement #1 (I.A. #1) of this Agreement. I.A. #2 provided CWB with assistance in evaluating system requirements and provided technical input to the functional specifications

of the Central Facility. I.A. #3 provided initial system development of the Central Facility and Workstation Subsystems, as well as the development of the Training Plan. I.k #4 continued development of the prototype workstation and began planning of the operational workstation.

This Statement of work addresses the tasks that will be undertaken by the joint team of CWB and FSL personnel in accordance with the terms of Implementing Arrangement #5.

Emphasis will be placed on the development of the operational workstation during I.A. #5. FSL will also continue to provide both technical assistance and advisory support to CWB in the use and evaluation of the prototype system as part of I.A. #5. In addition, training will be provided to CWB scientists and forecasters.

The tasks will be accomplished by the CWB - FSL Joint Team working at the FSL facility in Boulder, Colorado and at the CWB facility in Taipei, Taiwan, as appropriate. Accordingly, this Statement of Work addresses the tasks that will be undertaken jointly by FSL and CWB under the terms of I.A. #5 and establishes the performance schedule, deliverables, and resource requirements.

2.0 Task Descriptions

In terms of the overall program schedule, five tasks are identified as being critical in the July '92 - June '93 period. These are described below.

Task #1- Development of the Operational Forecast Workstation

The operational forecast workstation will use RISC-based computer technology. Far more powerful processors have been introduced with the RISC processors than were previously available for workstation use. Utilizing UNIX-based X-window software, a workstation can be developed that is far more readily portable to new computers than has been previously possible. This technology will be the basis of the FSL workstation developments in the coming years.

Initial system planning began as part of I.A. #4. Development of

the workstation will be the major focus of I.A. #5. As in the past, workstation development will proceed in two phases. In the first phase, the basic functionality of the workstation will be implemented. This preliminary system will then receive vigorous testing, both in the laboratory and under operational forecast situations. During the second phase, added meteorological applications will be developed, as well as improvements determined from the testing of the initial system.

In the first phase development, all types of meteorological data will be included in the workstation, along with all of the data management, user interface, menu, and display functions. During the second phase, meteorological applications requiring forecast interaction and further computation and manipulation of the data base will be added.

Initial system development indicates that the Motif user interface software can be used to reduce the development effort. Tentatively, the Motif User Interface is planned for use in the operational system.

As a general design concept, a shell-type design approach is planned, where the basic structure or shell of the system is developed in such a way that many different capabilities can be added as modules within the shell. With this approach, the system can be more easily modified for other user needs, such as aviation weather forecasting or hydrological forecasting, than would otherwise be possible.

One of the most valuable features of the RISC-based X-window system is the relative ease with which software can be ported to other workstations. To insure this capability, interface specifications will be established which are compatible with the portability objectives. FSL will prepare such interface specifications as part of this agreement.

Recommendations as to suitable hardware equipment will also be provided. If, as expected, several different hardware configurations are suitable, specifications will be provided and the suitable configurations identified.

Performance Period:

- | | |
|---|---------------------------|
| 1. Prepare Workstation
Design Plan | July 1,1992- Nov.1,1992 |
| 2. Phase 1 Operational
Workstation
Development | July 1,1992- May 1,1993 |
| 3. Prepare interface
specifications and
hardware recommend ations | Jan. 1,1993- April 1,1993 |
| 4. Begin test & evaluation
of initial system | May 1, 1993 |

Resources percent effort
required:

45% CWB-FSL Joint Team

Deliverable:

1. Workstation Design Plan and Development Schedule
2. Initial implementation of operational system
3. System test and evaluation plans
4. Hardware recommendations and interface specifications

Task #2 - CWB Training Program

The integration of the Forecast System into CWB forecast operations will significantly improve forecast capabilities. It will, however, have a major impact on operational activities within CWB. Thus it is important that CWB staff be properly trained in the design, installation, operation, maintenance, and use of the system. A training plan was prepared as part of I.A. #3 and implementation of the training steps identified in the plan will continue during I.A.#5.

The Forecast Systems Laboratory participates in a number of forecast experiments. Some of these emphasize the evaluation of new systems that have been developed, others emphasize new forecast techniques and forecast tools that have been developed. Still others are participation in larger field experiments with specific research objectives.

Two CWB forecasters were able to participate in two such foreca-

st experiments during the summer of 1991. This participation was a very valuable training experience and we intend to broaden this during the 1492-1993 period.

The second type of training planned is the involvement of several CWB scientists in the FSL hydrology program. The development of hydrological forecast application software for the FSL workstations is a major ongoing activity within the laboratory. In addition, FSL is working closely with local government agencies to establish better flash flood warning capabilities. Participation by CWB scientists in these activities are planned for periods of several weeks to several months.

As part of the training activity, FSL scientists will work with their CWB counterparts to establish procedures for preparing weather forecasts on the work-station. While flexibility to adapt analyses to the weather conditions is important, procedures that allow the systematic analyses of likely conditions can be of great value to the forecaster. With this in mind, FSL scientists with more experience with the system and CWB scientists with more specific knowledge of the weather conditions in Taiwan can effectively establish forecast guidelines for use in CWB.

Performance Period: Sept. 1,1992 - April 1,1993

Resources required: percent effort

15% FSL scientific
staff

Deliverables :

1. Participation of CWB scientists in FSL forecast exercises
2. Participation by CWB scientists in FSL hydrology program
3. Establishment of operational forecast procedures on workstation

Task #3 Prototype Workstation Enhancement

Initial use of the prototype forecast system by the Central Weather Bureau began in May of 1992. Use of the prototype system will continue until the operational system is installed and fully functional. Formal evaluation of the prototype system will continue as part of I, A. #5.

Limited development of the prototype workstation will also continue. Certain key new capabilities will be added. These will be the capability to allow editing of contour displays and the addition of tools allowing the capability to draw and edit on-line. These developments will be implemented in such a way to allow easy porting of these new capabilities to the operational workstation.

Additionally, several components of the prototype workstation need to be documented. These include the workstation manager interface and the display manager module.

Performance

Period:	System Test & Evaluation	July 1,1992-Sept. 30,1992
	System Development	Sept. 1,1992-Dec. 15,1992
	System Documentation	Oct. 1,1992-Feb. 1,1993

Resources required: percent effort

15% CWB - FSL Joint Team

Deliverables :

1. Additional software modules
 - Contour editing
 - Data editing
 - Workstation manager interface
2. Upgrade existing prototype workstation software modules as required
3. Document the workstation manager and display manager modules

Task #4- Central Facility Support & Development

Development of the Central Facility System and training of CWB technical staff in its functionality has been a major part of the joint work by CWB and FSL. While emphasis within the project now is directed toward the workstation, several important additions must be made to the Central Facility. FSL involvement will, however, be limited to scientific support of the CWB staff work-

ing on these tasks.

The following areas of technical support are anticipated:

- Estimating precipitation amount with the use of radar data
- Integration of CWB radar data into the Nowcasting Facility
- Data Base Management of CWB radar data
- Use of TIROS and GMS satellite measurements to calculate sea surface temperature
- Development of procedures to renavigate satellite imagery
- Incorporate the Empress DBMS into the Central Facility

Performance Period:

- | | |
|--|------------------------------|
| 1. Radar data support | Aug. 1,1992-
March 1,1992 |
| <ul style="list-style-type: none"> - Precipitation estimates - System integration - Data management | |
| 2. Satellite data support | July 1,1992-
Dec. 30,1992 |
| <ul style="list-style-type: none"> - Sea surface temperature - Satellite navigation | |
| 3. Empress data coordination | Dec 1,1992-
March 1,1993 |

Resources required: percent effort

15%	FSL Scientific Staff
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Deliverables: Recommendations, technical papers, & software modules, as appropriate

Task #5 - Wind Profiler Planning

The use of Doppler wind profiler measurement systems is being considered by both the Central Weather Bureau and the Civil Aviation Administration. Wind profilers are a new meteorological observation technique that are considered to have great potential in improving forecast capabilities and in the routing and operation of aircraft.

The NOAA Laboratories have done much of the basic development activities in bringing the concept of wind profilers to near-operation.

Functions	Milestone
• Complete Test & Eval. of prototype workstation	Oct. 1, 1992
• Complete operational workstation Design Plan	Nov. 1, 1992



- Complete software modifications
to prototype workstation Dec. 15, 1992
- Complete new satellite data
products Dec. 30, 1992
- Complete documentation prototype
workstation Feb. 1, 1993
- Complete new radar data products March 1, 1993
- Complete Empress data
coordination March 1, 1993
- Complete operational
workstation interface specifications
and hardware recommendations April 1, 1993
- Complete training of CWB
Scientists in hydrological
applications April 1, 1993
- Complete Phase 1 Operational
Workstation Development May 1, 1993
- Complete Wind Profiler
Planning Recommendations May 1, 1993

- Schedule by Month-

7/1 8/1 9/1 10/1 11/1 12/1 1/1 2/1 3/1 4/1 5/1

Task 1(Operational Workstation)

- a. (WIS Design) —————>
- b. (W/S Dev.)

-
- c. (Spec.) —————>
 - d. (Test & Eval.) —

Task 2 (Training)

(Forecaster Training)

Task 3 (Prototype Workstation)

- a. (Test & Eval.) —————>
- b. (Software Mod.) —————>
- c. (Documentation) —————>

Task 4 Central Facility)

- a. (Radar) —————>

b. (Satellite) _____>

c. (Data Base) _____>

Task 5 (Profiler)

(Planning) _____>

6/1 6/30

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Joint Management Progress Review, either at Boulder, Colorado or in Taipei will be held 3 or 4 times a year. Reviews in Boulder are tentatively scheduled for October 1992 and April 1993.

4.0 Budget

The following are the estimated costs for the five FSL activities as part of I.A. #5.

	Personnel	Travel	Total
Task #1	\$160K	\$20K	\$180K
Task #2	\$55K	\$5K	\$60K
Task #3	\$55K	\$5K	\$60K
Task #4	\$55K	\$5K	\$60K
Task #5	\$35K	\$5K	\$40K
Totals	\$350K	\$40K	\$400K

As stated in I.A. #5, funds available for the tasks described in this Statement of Work will be US \$400,000. All budget figures are estimates. Actual amounts will be accrued for purposes of fulfilling the financial arrangements described in the Implementing Arrangement, in accordance with the terms of the Agreement. All programs within the Forecast Systems Laboratory use the same budget procedures, whether they are base-funded programs or externally-funded programs. Beginning in FY'91, a facility charge has been applied to all programs to cover management and administrative costs, and the use of the FSL facility and all equipment and data associated with it.

FSL staff time is charged at the employees salary plus the normal NOAA benefit, leave and overhead charges. FSL professional staff are primarily in the government grade scales of GS-11 to GS-14. Contract staff are in equivalent categories.

5.0 CWB Joint Team Assignments at FSL

CWB staff at FSL during I.A. #3 and #4 were able to contribute in a very significant way to the overall development. In addition, they were able to obtain an understanding of the overall system development effort that will be valuable in CWB developments and operations in the future. This has been a very positive part of the cooperative effort between CWB and FSL and we would like to see this continue.

Both Tasks #1 and #3 require CWB staff in residence at FSL. The primary effort of CWB staff at FSL during this period will be directed toward adding functionality to the prototype workstation and beginning development of the operational workstation.

Assignments for the three CWB staff will be as follows:

- System development of the operational workstation
- Development of workstation application products (grid-to-graph & interactive cross-sectional products)
- Workstation

Task 2 (Training), Task 4 (Central Facility), and Task 5 (Profiler) should involve short-term CWB staff visits to FSL. Visits would likely be of 2 to 4 week duration .