

NERAD PROJECT METHODOLOGY DOCUMENTATION SERIES .

WORKING PAPER No. M3

NERAD Agricultural Development Information and  
Coordination System (NERADICS): A Project Description

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## PREFACE

This document has been printed and distributed by the Northeast Rainfed Agricultural Development Information and Coordination System (NERADICS) of the NERAD Project. The purpose of NERADICS is to develop, at the Northeast Regional Office of Agriculture, a system to manage Project-generated data and information in order to support the testing, transfer and dissemination of technologies, methodologies and approaches appropriate for integrated agricultural research and development in Northeast Thailand.

Technical working papers are produced with the objective of communicating project-generated information to the relevant research and development agencies in order to receive comments and feedback and to help to ensure that the lessons learned within NERAD are made available to all interested individuals and organizations.

Working papers are produced on a number of topics and are grouped into three series according to their subject matter:

### Problem Definition Series

Situation papers on the problems or constraints currently facing rainfed agriculture and farm families in Northeast Thailand.

### Methodology Description Series

Descriptions and methods of use of proven methodologies and techniques for the planning, analysis and evaluation of research and extension activities for rainfed agriculture.

### Technology Documentation Series

Documentation of technologies considered appropriate for rainfed agricultural development in Northeast Thailand

All papers in these series are listed in the Appendix of this report and are available on request from the Project Director. The papers are updated at appropriate intervals and NERAD invites comments and discussion from readers on any topic covered in the reports.

<u>CONTENTS</u>	<u>PAGE NO.</u>
1.0 BACKGROUND AND OVERVIEW .....	1
2.0 OBJECTIVES AND SCOPE .....	3
3.0 TARGETS	
3.1 System Development Targets .....	5
3.2 Support Information Output Targets .....	6
3.3 Technical Workshop and Seminar .....	6
Information Output Targets	
4.0 ORGANIZATIONAL SETTING .....	7
5.0 IMPLEMENTATION PROCESS .....	10
6.0 PROTOTYPE SYSTEM DESIGN	
6.1 The NERAD Approach .....	12
6.2 Information Coordination Pyramid .....	13
6.3 NERADICS Conceptual Model .....	14
6.4 Information Management Performance .....	15
Objectives of the System	
6.5 System Elements .....	15
- Information Demand: Workshops	
- Data Supply and Sources	
- Data Transformation, Administration	
and Communication	
6.6 Information System Structure .....	19
and Functions (Logical Model)	
6.7 Information Sub-Systems Objectives .....	21
7.0 NERADICS IN THE POST-NERAD 6th PLAN .....	22
PERIOD (1989 - 1991)	

APPENDIX

NERADICS Working Paper Series

## NORTHEAST RAINFED AGRICULTURAL DEVELOPMENT PROJECT INFORMATION AND COORDINATION SYSTEM (NERADICS)

### 1.0 BACKGROUND AND OVERVIEW

The Northeast Rainfed Agricultural Development Project (NERAD) has completed 6 years of its planned 7.5 year implementation period and a cohesive model has emerged as a set of approaches, processes, methods, procedures, and technologies which together form a comprehensive replicable approach to integrated agricultural development in Northeast Thailand. Concurrently, in October 1986, the Sixth National Five Year Social and Economic Development Plan commenced implementation and will continue from fiscal year 1987 through fiscal year 1991 with continued emphasis on rural development and poverty alleviation, improved efficiency and quality of production and marketing, and more systematic full-cycle development administration using information systems for decision support. In mid 1987, the Royal Thai Government began mobilizing attention and resources in response to a royal concern for the hardship of the Kingdom's citizens in the Northeast region, which supports one third of the total population. The "Greening of the Northeast" campaign intends to mobilize resources to the Northeast for the next five years and is resulting in increased levels of development inputs by the RTG and foreign donors/lenders.

The NERAD Project began generating a large quantity and broad range of data and information when pre-project design surveys and studies began in the late 1970's. This includes baseline socio-economic surveys, land use mapping, agro-ecosystem analysis handbooks, physical resource development surveys, rapid rural appraisal reports, economic and marketing studies, research trials data, development project results, technical and economic analyses, mini-evaluations, promising technology documentation, consultants' reports, and working papers. However, due to the ambitious objectives of the Project and the intensive effort required to manage integrated implementation of the complex of activities by 9 agencies, most of the Project resources were focused on coordinating the implementation of operations.

The Project developed ad hoc information systems to meet operational needs as the program model was emerging. Project technical information functions were predominantly producer-driven, rather than user-driven, resulting in reports which were ends in themselves. Source data was rarely processed into different information formats to meet the needs of multiple users from different disciplines. The result was a situation characterized by data overload and information shortage, while data and information producers complained that their outputs were not being used by the recipients of their reports.

Technology documentation activities were deemed a high priority for improvement in mid FY 86, which resulted in the publication of two preliminary reports on technologies and processes with high potential for successful application in the region. Since then, data resource management and the production and communication of information have been included as priorities, to support emerging project needs as the technology integration strategy of the Consolidation Phase leads on to

the methodology/technology Transfer and Dissemination Phase of the Project life cycle. The critical link in this progression is the development of mechanisms to consolidate information and knowledge gained from the Project experience.

The existing data/information environment is now beginning to organize around concepts outlined in this paper; the most significant developments to date which will serve as the basis for developing a working prototype of NERADICS include the following:

Agro-Ecosystem Analysis was conducted in December 1986 on a gross scale for the entire region at the district level (with the assistance of KKU) and the core team refined the methodology and conducted training for Provincial Subject Matter Specialists (SMS) from 8 MOAC Departments and Tambon Extension Agents in August 1987, to analyze the four NERAD provinces at the Tambon level.

The Cropping Trials Database System program for NERAD's cropping system trial results is now operational and data for this year's trials are currently being entered. The program is written to run under dBASE III, and will be used to analyze and summarize results from on-farm and multi-location trials, for use in the triage process at this year's annual technical workshop in February. Data for 1988 will be entered/reported using Thai language to test the program's appropriateness for use by the relevant line agencies of the MOAC, most importantly FSRI, DOA and DOAE.

The Technology Triage Methodology for screening technologies and prioritizing research and extension activities was further refined in February 1987, and is considered to be of primary importance for use in the NERADICS expert review workshops and in setting guidelines to support planning decisions. The NERAD "Cropping System Technology Development Process" has been formally accepted by the Agricultural Development Coordination Committee as the model to be used in implementation of the Memorandum of Understanding between the Departments of Agriculture and Agricultural Extension.

Promising Technology Documentation has been prepared in executive summary form for 21 technologies, and will be compiled in a more extensive form for review and reproduction. Documentation of promising technologies and processes developed by the Project covers: background, principles and justification, methods of application, results, use to date, potential applicability and expected benefits, pre-requisite conditions for use, and further development needed. This information will be used as input for sustainability analysis during the workshops, and for developing a database of technologies and their developmental status, and requisite conditions for and constraints to their appropriate application and adoption. The database and documentation will be linked to agro-ecosystem analysis to support diagnosis and description of recommendation domains for targeting research and extension.

A series of 8 Technical Workshops and Seminars will be held between March 1988 and February 1989 to summarize current conditions and problems, technologies/processes tested, recommendations, and future

information needs. These subject-specific workshops will drive the development of prototypes for collecting, organizing and analyzing data, and producing information according to the requirements of each workshop.

The NERADICS Working Paper Series now includes 19 documents produced since 1986 for distribution to relevant research and development professionals to disseminate lessons learned and stimulate feedback and comments from interested individuals. The series has already proven to be an effective way of inducing adoption of NERAD developed technologies and processes by other projects and donors.

During this consolidation phase, the management of Project data resources has become a key area for concentrated improvement and development in order to ensure generation of the necessary input information for major transfer and dissemination workshops/seminars planned to facilitate the transition from NERAD to regular or special RTG projects, programs and plans. Additionally, since it is the intention of NERAD to emphasize its coordination role through the NERADICS approach in the future, it is necessary to develop prototypes of information management models, mechanisms, processes and procedures during the remaining year of the Project.

The NERAD multi-agency farming systems research and extension approach requires development of problem/technology information systems which facilitate the extraction of information concerning key factors affecting agricultural ecosystems properties, production problems and technological solutions. Useful reports with various contents and formats need to be produced from common or shared source data, for communication to users who are researchers, extension workers, and farmers.

After preliminary analysis of needs, it was agreed that key constraints to development of a working prototype of NERADICS include: personnel/time allocation, system analysis and design, applications software, computer hardware, training support, document reproduction and publication equipment, and communications facilities. USAID approved the NERADICS proposal in May 1987, and then worked with the Project management team and representatives of DTEC and Ministry of Finance in developing the NERAD General Implementation Plan for the remaining life of project. In November 1987, the implementation plan was approved; Grant funds were committed through FY 88, and loan funds through February 28, 1989 which is the Project Assistance Completion Date. In December 1987, the TA Team developed a general methodology for the workshop component, which appears in NERADICS methodology description series working paper M8.

As of January 1988, it appears that major opportunities exist to build upon the base formed by the agro-ecosystem analysis, cropping trials data system, triage methodology, technology/process documentation and working paper series, and the workshop component currently receiving high priority in Project management. Long-term and short-term technical assistance contractors will allocate more of their time to system development, permanent personnel will be re-allocated to concentrate on NERADICS, minimal procurement of hardware (3

microcomputers) will provide adequate Thai language data processing capacity, and existing personnel in the key Project agencies will be developed through learning by doing. When these constraints to data resource management are overcome, the usefulness of data/information produced during the 7.5 year Project life will be greatly enhanced. The NERAD Project also occupies a unique strategic position to facilitate the development of a limited prototype system which can serve as the basis for future development of a comprehensive information system for coordination and implementation of agricultural development in the Northeast and other regions of Thailand.

## 2.0 OBJECTIVES AND SCOPE

### LONG-TERM GOAL:

To establish at NEROA, an information system which supports coordinated mobilization of resources for problem-based, integrated technology research and development.

### OBJECTIVES: (through 2/89)

- To organize and document the lessons learned, methodologies and technologies developed by the NERAD Project.
  
- To develop prototypes of data and information resource management methods appropriate for the future role of NEROA.

NERAD Project management has learned that successful integration of technology research, development, transfer, and dissemination, requires inter-disciplinary and inter-agency coordination of data and information flows for: target site description and diagnosis, problem/solution analysis, guideline setting, R&D project design, planning, implementation, expert review, monitoring, and evaluation. Successful transfer and dissemination of the promising processes, methodologies, and technologies depends on the existence of an adequately functioning information management system. This system will be dedicated to providing necessary data, information, and documentation for subject-specific workshops and ultimate use by policy makers, planners, researchers, extensionists, and farmers. High priority is assigned to the development of prototype methods for systematic collection, compilation, cross-indexing, and cataloging of the significant quantities and range of data, information, and technology documentation generated by the NERAD Project.

Permanent officials of NEROA, together with Project technical assistance contractors and short-term consultants, will collaborate in development of workshop support systems, operating systems and procedures, database structures, agro-ecosystem analysis flow charts/programs, and applications software. All of these are required to ensure effective transfer and dissemination, and for long-term sustainability of the system functions and services for use by MOAC agencies in the region after completion of the assistance Project. NERAD-ICS follows the NERAD approach of developing and adapting workable prototypes for transfer, dissemination, further adaptation, replication and institutionalization by the RTG.

## SCOPE:

The NERAD Project Information Coordination System will limit its scope to the data and information generated by the NERAD Project and additional secondary data necessary for effectively and efficiently implementing technical analysis and transfer/dissemination workshops. The system operations coordination center is located at NEROA. Field areas covered are shown below.

Province	District	Tambon
1. Chaiyaphum	1. Jatturat 2. Phu Kloow	1. Lahan 2. Kwangchon 3. Thadthong
2. Nakhon Phanom	3. Ban Phaeng 4. Na Wa	4. Na Ngua 5. Na Thom
3. Roi-Et	5. Muang * 6. Muang Suang	6. Nongkaew * 7. Khu Muang * 8. Kok Kung * 9. Muang Suang * 10. Nong Hin * 11. Nong Phu 12. Na Muang
4. Sisaket	7. Selaphum 8. Utumphonphisai	13. Tao 14. Taket
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Totals: 4 Provinces	8 Districts	14 Tambons

\* Pre-Replication Trial Area Sites

## 3.0 TARGETS

3.1 System Development Targets include:

a. Analysis, Design and Planning

Requirement analysis completed, development/production schedules set and design/plan specifications prepared for the 5 sub-systems:

- Agricultural Resource Information System (ARIS)
- Area Analysis Information System (AAIS)
- Technology Analysis Information System (TAIS)
- Management Information System (MIS)
- Data/Information Administration System (DIAS)

b. Implementation

Computer hardware and software installed and documented; permanent officials operating the systems producing required information.

Sub-system operating procedures and software developed, documented, installed, and implemented; officials operating applications software.

Project data and information organized, catalogued, packaged and integrated with implementation of strategic transfer and dissemination workshops/seminars.

c. Operation and Maintenance

Data collection, analysis and transformation, and communication mechanisms developed and functioning as an information support network for transfer and dissemination of results of integrated research and development in 14 representative Tambons in 8 districts of 4 provinces (Project target area);

Operating costs and hardware maintenance costs are funded by RTG budget funds beginning in FY 89.

3.2 Support Information Output Targets include:

- a. Data dictionary  
(Producer: NEROA Public Information & Training Section, Special Operations Group)
- b. Information directory and access system  
(Producer: NEROA Public Information & Training Section)
- c. Cross-indexed resource inventory  
(Producer: NEROA Planning Coordination Group)
- d. Annotated bibliography of project documents;  
(Producer: NEROA Operations Group, Public Information & Training Section)
- e. Project progress reports and output indicator status reports  
(Producer: NERAD TA Team, NEROA Operations Group)

3.3 Technical Workshop and Seminar Information Output Targets

- a. Handbooks on the use of key analytical, planning and evaluation methodologies and techniques appropriate for rainfed agricultural development.  
(Producer: NEROA Planning Coordination Group, Special Operations Group, Public Information & Training Section)

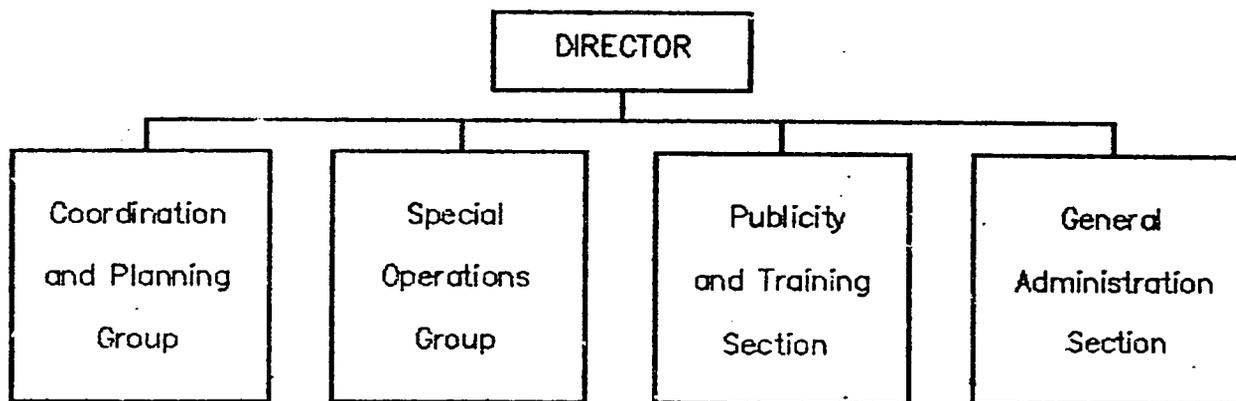
- b. Clear definition and documentation of the major problems facing rainfed farmers in Project sites representative of Northeast Thailand.  
(Producer: NEROA Planning Coordination Group, Special Operations Group, Public Information & Training Section)
- c. Identification of technologies available for solving the problems identified in 22' above, including documentation on the specific causal problems that they address, their recommendation domains and guidelines for application of the technologies.  
(Producer: NEROA Planning Coordination Group, Operations Group, Public Information & Training Section)
- d. A list of key research questions by subject area, that warrant high priority attention on a regional basis.  
(Producer: NEROA Planning Coordination Group, Special Operations Group, Public Information & Training Section)
- e. A list of key extension and development guidelines, by subject area, of high priority for the region.  
(Producer: NEROA Planning Coordination Group, Special Operations Group, Public Information & Training Section)
- f. A definition of the key information and data needs at the regional level required for the further development of NERADICS to support coordination of on-going research and development programs of MOAC in the region.  
(Producer: NEROA Planning Coordination Group, Special Operations Group, Public Information & Training Section)

#### 4.0 ORGANIZATIONAL SETTING

NEROA will be the agency responsible for system development and management, with assistance provided by Khon Kaen University in system development. Active cooperation from MOAC departments is essential to the development and meaningful use of the system, with the Office of Agricultural Economics (OAE), Department of Agriculture (DOA), and Department of Agricultural Extension (DOAE) including the Northeast Regional Office Of Agricultural Extension (NEROAE) being the core agencies. Additionally, all MOAC departments will be involved through conducting and/or participating in the workshops, according to respective subject areas. For the long-term, mechanisms and procedures will be explored for linking with the microcomputer-based economic analysis unit at the Research Division of OAE, while DOA and DOAE will benefit from the system as a pilot and test-bed for developing information communication mechanisms which could support implementation the MOU. The NERAD Farming Systems Workgroup and provincial/district work groups are being utilized to coordinate participation and collaboration of MOAC agencies.

Since NEROA is the site of the system, the institutional home environment is determined by the structure, functions, duties, responsibilities and projects of the recently re-organized NEROA as follows.

## NEROA STRUCTURE AND UNIT FUNCTIONS



– Project  
Coordination

– Planning

– Project  
Implementation

– Management  
& Development

– Technical &  
Laboratory

– Dissemination  
& Public Relations

– Training

– Information

– Administration

– Finance &  
Accounting

– Equipment &  
Supply Mgt.

## DUTIES AND RESPONSIBILITIES OF NEROA

- Represent MOAC at the Regional Level
- Coordinate, Plan, and Conduct Operations to Foster Integrated and Full Cycle Agricultural Development
- Accelerate, Monitor, and Evaluate Integrated and Full Cycle Agricultural Development
- Implement Pilot Projects Through Research, Testing and Demonstration
- Act on Specific and Urgent Subjects According to MOAC Policy to Solve Local Problems and Reduce Gaps in Agricultural Development
- Implement Special Assignments, i.e. Royal Projects, Foreign Assistance Projects, and Other Specific Tasks
- Act as Regional Agricultural Information Center
- Provide Technical Support, Transfer Technology Through Training and Public Relations

## PROJECTS IMPLEMENTED BY NEROA

1. Northeast Rainfed Agricultural Development Project (NERAD: USAID)
2. Northeast Crop Development Project (NECDP: EEC)
3. Agricultural Diversification Project in Northeast Thailand (IFAD)
4. Dryland Poor Soil Development Project in Northeast Thailand
5. Northeast Mobile Service Center for Farmers
6. Project for Study and Development of Increased Papaya Production
7. Project to Develop Farmers' Livelihood by Constructing Rubber Dams
8. Royal Project to Develop and Improve Native Chickens (Kranuan District, Khon Kaen)
9. Royal Project for Processed Food Under the Royal Project to Promote Security (Tao Ngoi Sub-District, Sakhon Nakhon, and Lahansai District, Buriram)
10. Development and Self-Defense Volunteer Village Project
11. Agricultural Development Project in Forestry Village Development Project (Dong Lan Forest, Si Chomphu District, and Phu Mani Sub-District, Khon Kaen)

12. Public Relations for Farmers' Lives Project
13. Project to Arrange Botanical Garden from Thai Literature and Buddhist History in Northeast Thailand
14. Support of Greening of Northeast Project and Farmers' New Life Plan

Development of the NERADICS Agricultural Resource Information System will provide the basis for information network linkages between agencies & organizations, specialists, and projects/programs. Professional and technical linkages in the region will be developed including those between personnel of MOAC, Khon Kaen University, bilateral and multi-lateral assistance agencies, private sector specialists, etc. Computers will be used to support a bilingual database directory and mailmerge applications for eventual networking of experts. This will gradually develop by combining existing data records of recipients of the NERAD Project TA Term Quarterly reports and recipients of the Northeast Development Workers Group monthly mailing, with profiles of experts obtained through the workshop process. Planners, researchers and extensionists will be brought together to coordinate and integrate the application of shared knowledge and experience in guiding the search for solutions to complex problems.

Systematic organization and development of the knowledge base for agricultural development (derived from Project experience in the representative target areas) will support formulation of programs and major projects to be implemented during the present Five Year Plan such as the "Northeast Green Revolution" and "New Life Plan." It will also support integrated sub-project design, planning, implementation, monitoring and evaluation.

## 5.0 IMPLEMENTATION PROCESS

A mini-workshop will be held internally at NEROA on January 22, 1988 to clarify organizational roles and responsibilities in regard to NERADICS and consider establishment of a NERADICS coordinating work group for implementation during the remaining life of Project. A permanent official of NEROA will be appointed System Coordinator for each of the information Sub-Systems, to coordinate system development, operations and information production. On January 25, 1988, a Farming Systems Work Group mini-workshop will be held to clarify NERADICS concepts and to develop a preliminary plan for implementation of the technical workshop component, including agency roles and responsibilities, workshop specific task forces, participants and resource persons, general data/information needs, and scheduling. In February, the NEROA computer hardware procurement proposal will be finalized and submitted to the Bureau of the Budget for approval. The annual Farming Systems Technical Workshop will be conducted in March and the triage process will be further refined during the workshop. Also in March, initial planning and preparation will begin for the methodology workshop to be held in April. Hardware should be installed

in late April to early May. After that, the NEROA work group will coordinate with individual task forces to prepare for and conduct each workshop. Concurrently with planning and preparations for the workshops, NEROA staff will begin developing prototypes of the 5 information sub-systems to collect and compile minimum data required according to needs of the workshops. A priority analysis for development of sub-systems and information management applications will be conducted using criteria such as the following:

- a. Feasibility of timely production of output reports;
- b. Value of information for key workshops/seminars and decisions;
- c. Resources required/available for application development, operations, information production and system maintenance;
- d. Effectiveness in meeting information needs for multiple users;
- e. Functional dependency and sequential development requirements;
- f. Importance to overall system structural development;
- g. Immediate impact and benefits of improvement relative to overall system development and objectives;
- h. Difficulty of implementation:
  - accessibility, availability, and accuracy of input data;
  - transaction volume;
  - frequency of implementation;
  - mode of processing;
  - complexity;

After determination of priorities for development and implementation of sub-systems and applications programs, an overall system prototype development plan and schedule will be prepared, with due consideration for the need for sequential or simultaneous development of some sub-systems and their need to be designed for integration with the emerging overall system as soon as they can be implemented. Basic data collected by surveys, rapid appraisals and for agro-ecosystem analysis, will be used to construct a generic resource database and access system for use in problem analysis. Agro-ecosystem analysis flowcharts, technology sustainability analysis diagrams, the cropping trials data system, technology triage process, and technology documentation are the basis for a problem/cause/solution database system to support joint analysis, planning, targeting, and review of the coordinated adaptive research and extension process.

Regarding strategy for the development of the overall system, it should be understood that an integrated information management system is not synonymous with a "totally integrated information system." It means that functional sub-systems are not developed and implemented in isolation, but only after consideration of their relationship with the total system. Thus, within the context of the NERAD Project, the NERADICS development/production strategy has the following major characteristics: goal-directed (transfer & dissemination), output-driven, top-down design and bottom-up implementation, middle management-oriented (regional and provincial), integrated, uses common data flows, has a heavy analysis-design-planning element, uses phased development of prototype sub-systems, feeds packaged input to workshops for production of guidelines, and relies on multi-purpose data bases and microcomputer-based distributed data processing.

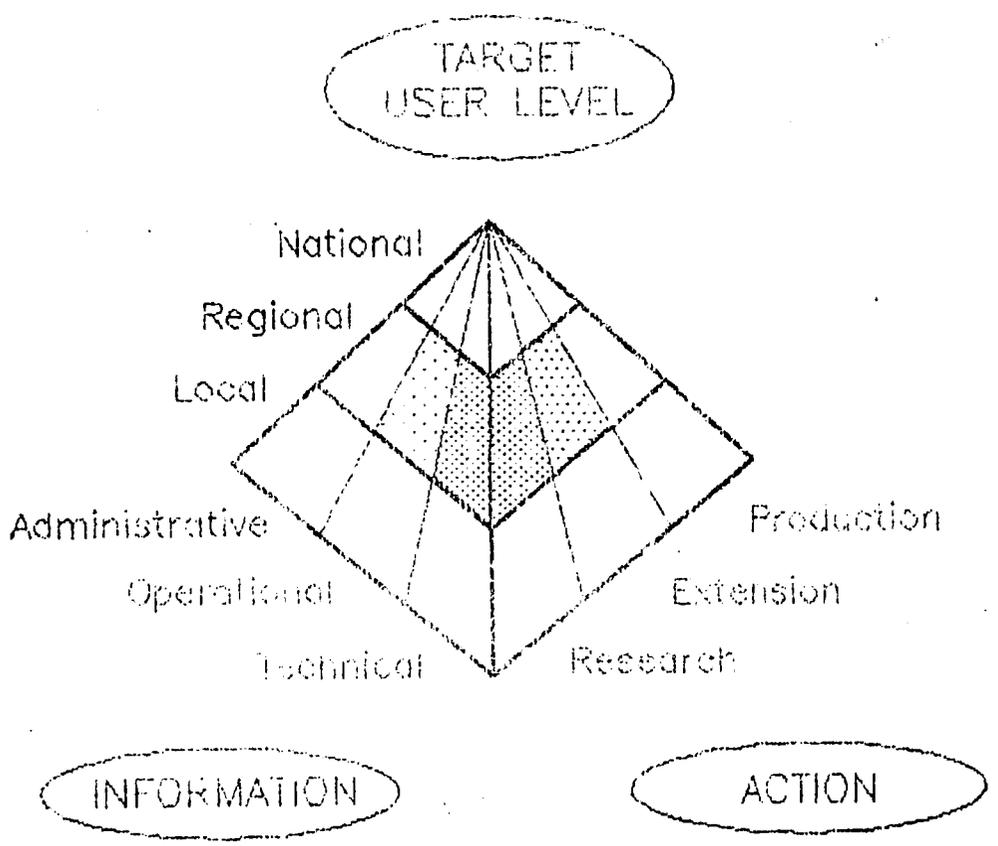
## THE NERAD APPROACH

### Key Characteristics

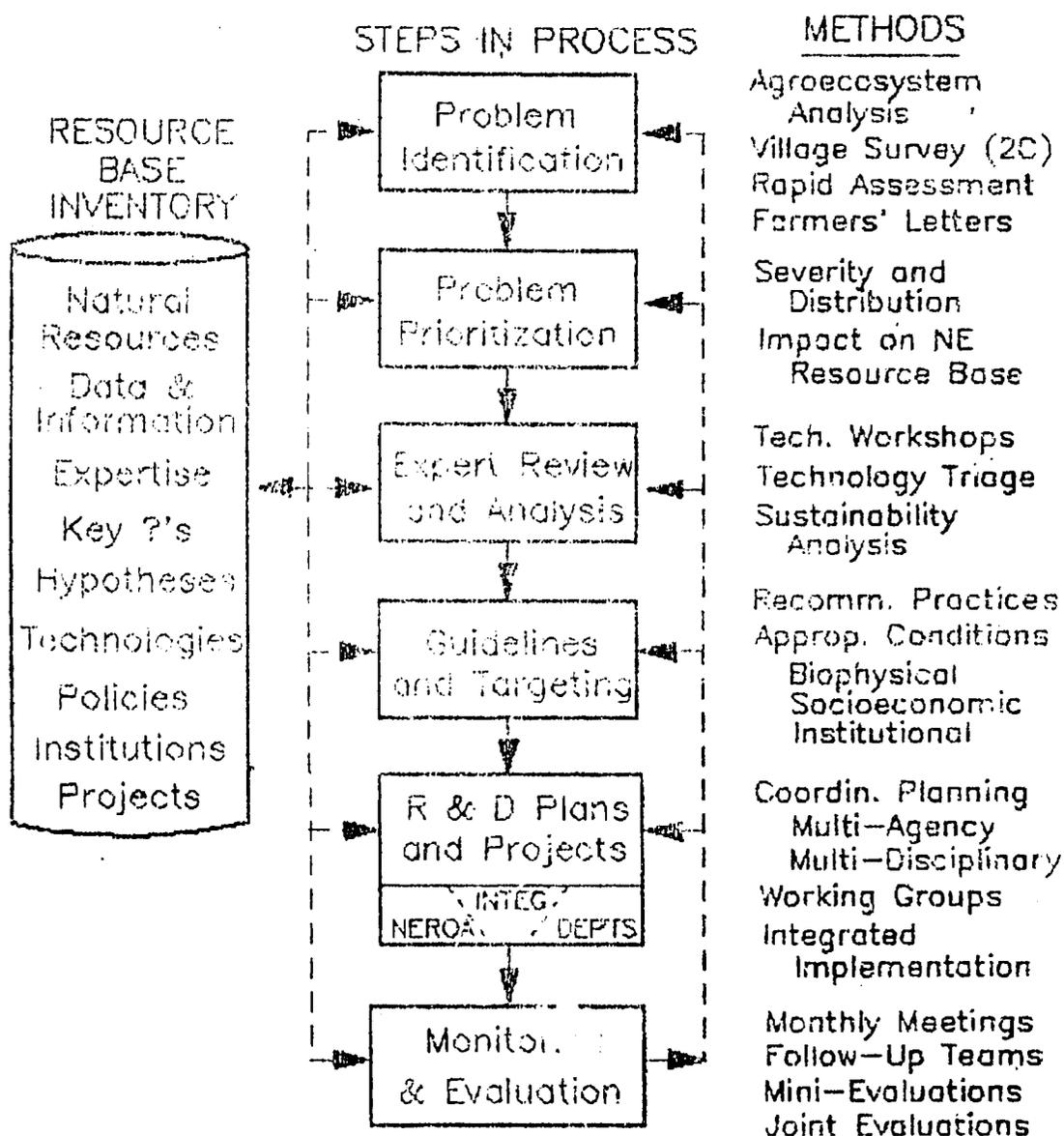
- Vertical & Horizontal Coordination
- Multi-Disciplinary Working Groups
- Multi-Agency Design & Planning
- Research & Extension Linkages
- Coordinated Implementation of Operations
- Joint Review & Assessment of Technologies
- Methodology & Technology Documentation
- Transfer, Dissemination, Spin-Off

6.2 NERADICS INFORMATION PYRAMID

Showing Relative Emphasis



## NERADICS: Conceptual Model



#### 6.4 Information Management System Performance Objectives:

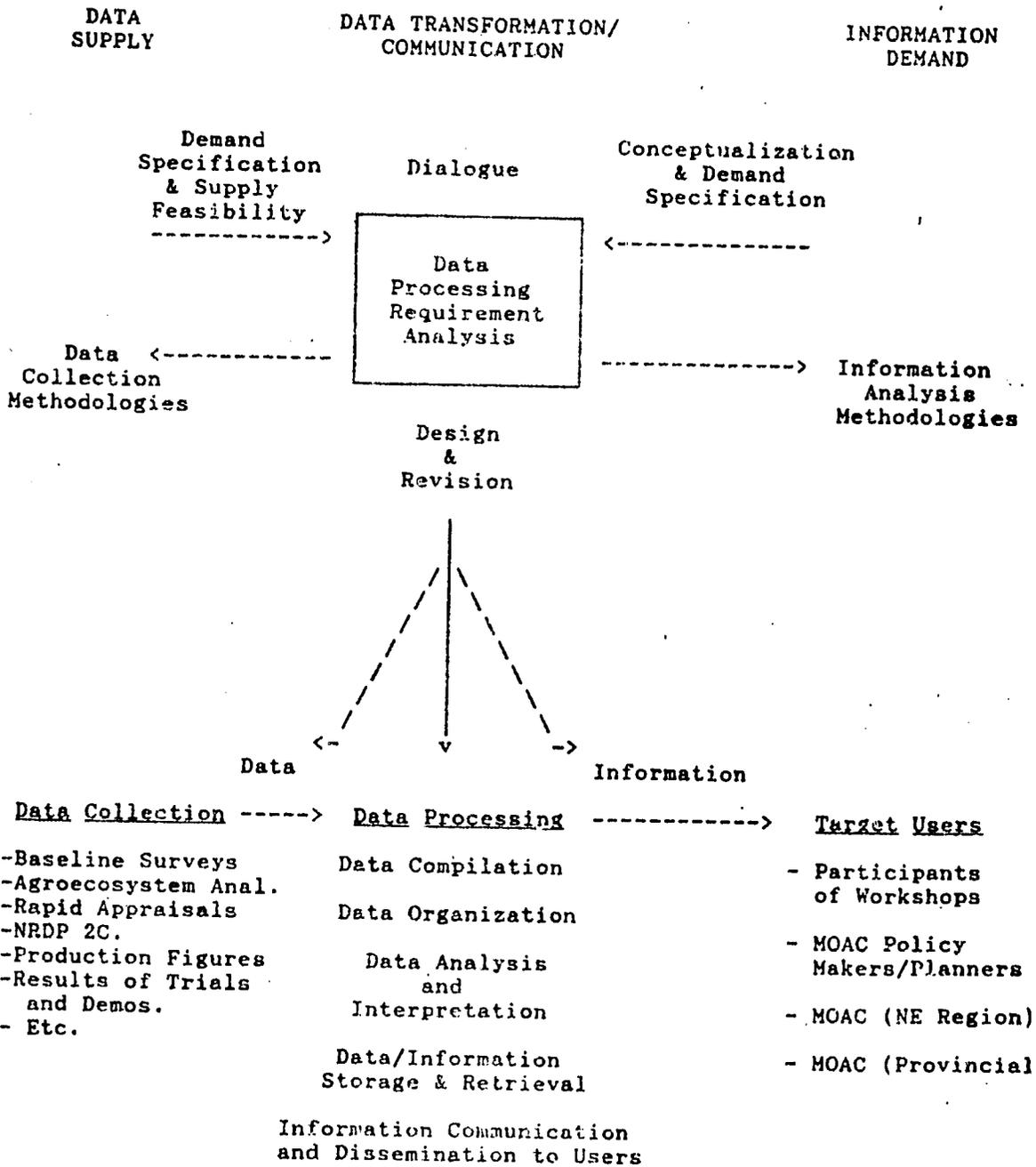
In aggregate, NERADICS is intended to function as a continuous adaptive learning process for optimizing the sustainable productive utilization of available resources, in accordance with changes in area-specific natural, production, marketing, social environmental, and institutional conditions. NERADICS is a Human-Based multi-disciplinary expert system, which will use computers as tools to assist in networking knowledge, and to increase effectiveness and efficiency of data processing and packaging as required by the technical workshop/seminar component. The general prototype system performance objectives are as follows:

- To determine information/data requirements, and provide useful and timely information required for expert review & triage workshops, and for dissemination seminars.  
(Information DEMAND Element)
- To utilize data sources and methods of collecting, organizing, processing, and analyzing data that optimize the trade-offs between reasonable standards of accuracy, timeliness, and coverage, and the financial and human costs incurred;  
(Information SUPPLY Element)
- To establish a dialogue between users and producers/suppliers of information to analyze demand specifications and supply feasibility, and to evaluate appropriateness of packaging.  
(Data TRANSFORMATION Element)

#### 6.5 System Elements

For purposes of NERADICS, data refers to primary, undigested facts, which may be subjected to a wide variety of analyses depending on the needs of users. Data becomes information when it is digested, analyzed, packaged and disseminated in the manner and time frame required by the workshop process. The value (benefit) of information can only be determined by its usefulness for review and triage workshop participants, and for R&D decision-makers/users. Final use is highly dependent upon appropriate packaging, and timely production and communication. (See Figure 1 below)

Figure 1. NERADICS Data/Information System Elements



a. INFORMATION DEMAND: Technical Workshops

The need for information for workshops is the source of demand for data collection and analysis. Major users of information generated or collected by the Project include: MOAC Policy/Plan Makers, NERAD National Committee, USAID, DTEC, MOF, BOB, MOAC (NE Region), and MOAC (Provincial).

Various users (decision-makers) require both aggregated and disaggregated information. The system will concentrate primarily on linking with and supporting users from MOAC departments in Bangkok, at the regional level, and at the provincial level. In order avoid the common phenomenon of data glut, information generation will be limited to the minimum information set required. This will be determined during sub-system design and information production output scheduling by analyzing key workshop/seminar events. Matrices will be prepared showing workshops and information, information/data, and data/sources. These matrices, together with workshop/seminar schedules will be used to prioritize applications program development and output reports generated.

A description of the workshop component including objectives, implementation steps, outputs, and schedule is found in NERADICS Methodology Description Series Working Paper M8.

b. DATA SUPPLY AND SOURCES:

Data collection will focus on the minimum data set required for information to meet demands of the primary users described above. Types of data to be collected and sources include:

- Benchmark Data, which is only collected every five to ten years, such as: natural physical resources, infrastructure facilities, human resources (demographic census and employment patterns), and socio-cultural (income and expenditures, health/nutrition status). Pre-implementation baseline surveys were conducted for NERAD Tambons and exist in a printed form; NRDP village level survey data also is available for the 14 Project tambons.
- Farmer/Producer Behavior Data. Presently farmer interest is used for screening technology trials in the triage indicators and will be compiled and organized; Available Rapid Rural Appraisal reports, adoption studies, mini-evaluations and impact studies will also be used.
- Current Supply Data, regarding production, area, yields, etc. DOAE/OAE presently collect this on a regular basis;
- Problem Conditions in the Target Area. Sources include NRDP and other surveys and studies, rapid appraisals, workgroup reports;

- Production Potential. Determined through agro-ecosystem analysis; exists in printed form for district level data;
- Subsistence Consumption Needs. From agro-ecosystem analysis and NRDP surveys;
- Market Demand and Price Data. From on-going Project activities of CPD and OAE regular programs;
- Available and Proven Technologies/Processes. From published reports, studies and mini-evaluations;
- Agronomic and Technical Data From Project Research Trials. From published reports;
- Economic Analysis Data on Improved Technologies and Processes. From OAE publications under the Project;
- Policies and Guidelines. From Project and MOAC documents;
- Project, MOAC and Other Resources Available. From official publications and site visits.

In addition to primary data which has been generated by the Project, NEROA will collect data specifically for the workshops and support information. Existing secondary data and information will be collected from other sources as needed to fill gaps in the data sets. These sources may include some of the following:

- MOAC Departments and Agencies
- Ministry of Interior Agencies
- Ministry of Commerce Agencies
- National Rural Development Program
- Universities and Other Educational Institutions
- Bank of Agriculture and Agricultural Cooperatives
- Private Sector Entities and Cooperatives
- Special Studies and Reports
- Historical Records

It will be necessary to survey the existing data/information available and determine the best methods for collection by considering trade-offs in speed, accuracy, and cost; and realistic estimates of the level of cooperation of secondary data sources will need to be made by evaluating methods used after each workshop.

#### c. DATA TRANSFORMATION, ADMINISTRATION, COMMUNICATION:

- Data Transformation

Sub-system design will include preparation of matrices showing reports/information, information/data, and data/sources. This is commonly referred to as reverse engineering, meaning that

analysis starts with definition of the desired outputs, and then proceeds to determine the required processing (data analysis/transformation) and inputs required to produce the outputs. This approach will ensure that time and resources are neither wasted in collecting and entering unnecessary data, nor in developing applications which do not meet real needs on a timely basis.

#### - Data Administration

Since much of the data will be secondary data obtained from other agencies or already collected, a systematic inventory of sources will be conducted as soon as analysis of reports/information/data input needs is completed for each workshop and sub-system. Sub-system prototype design will address such issues as systems for efficient access, transfer and exchange of data, precise definition of variables and units of measure, coding and indexing systems for storage and retrieval, quality control, validation, classification, physical mechanisms for systematic storage and retrieval, and methods of analysis.

Multiple database files will be structured for linkage as required by applications, but the databases will be independent from the programs which will access their data for analysis and reports. A database dictionary will be developed to standardize the names and map the locations of entities and fields of data elements and their aliases. Access will be controlled by use of a simple "banking" system approach with user accounts and password protection to maintain the integrity of the databases. The host-country contract Data Administration Assistant will work with a civil servant statistician from the NEROA Planning Coordination Group in the development of the data/information administration system.

Use packaging, and information communication (transfer, use, feedback) procedures will be determined early in sub-system analysis by starting the system requirements analyses with setting of report formats needed by workshop users. Three microcomputers and a library of hard copy documents will form the core of the system. Compatibility of Thai language data will be controlled by using the official code of the Thai Industrial Standards Institute, and by following hardware standards for PC technology which is compatible with IBM microcomputers.

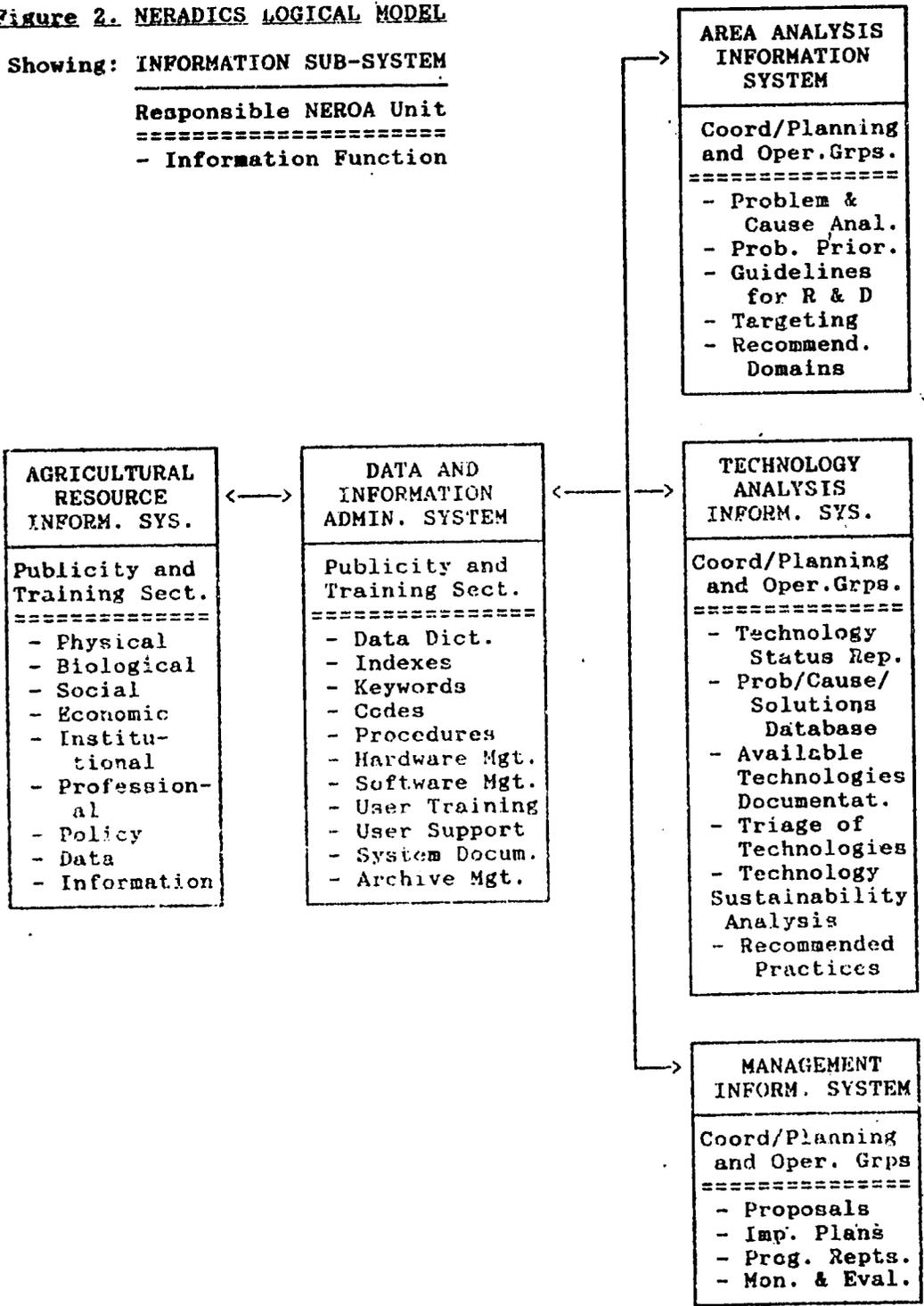
#### 3.6 System Structure

The general system structure consists of an Agricultural Resource Information System which contains data and information accessed by the Agroecosystem Analysis, Technology Analysis, and Management Information Sub-systems by passing through a user interface system maintained by the Data/Information Administration Sub-system. The logical model of system architecture appears in Figure 2. below.

**Figure 2. NERADICS LOGICAL MODEL**

Showing: **INFORMATION SUB-SYSTEM**

Responsible NEROA Unit  
 =====  
 - Information Function



## 6.7 Sub-Systems Objectives

### RESOURCE INFORMATION SUB-SYSTEM

To develop and maintain a database directory of biophysical, technical, and institutional resources related to agricultural development in the target area to serve the AAIS, TAIS, and in preparation for workshops/seminars.

### AREA ANALYSIS INFORMATION SUB-SYSTEM

To coordinate diagnosis, compilation and classification of problem conditions and constraints arising from natural physical conditions, from production and marketing conditions, and from social environmental conditions in the target area;

To prepare and maintain a priority analysis of problems, key causal factors in their origination, and their relation to MOAC policy and 5 Yr. Plan programs for the target area;

To provide baseline information for designing and planning research and development activities; and to provide recommendations for analogous area transfer of proven processes, techniques, and technologies from the target area to the NE;

### TECHNOLOGY ANALYSIS INFORMATION SUB-SYSTEM

To acquire information derived from research and development operations; to develop and maintain a database composed of proven farming systems technologies and processes, and requirements and constraints to application/adoption; and to prepare status reports and documentation of promising technologies for review by experts and communication to decision makers in the public and private sectors through dissemination workshops/seminars;

To organize and provide information for expert reviews and analyses of results of past and present research and development activities using the target area as case studies for prescription of guidelines and recommendations for actions to solve prioritized problems through research and development actions;

### MANAGEMENT INFORMATION SUB-SYSTEM

To provide information necessary to coordinate integration of components in implementation of integrated full-cycle research and development operations.

To provide information management support for implementation of integrated projects, to produce proposals, implementation plans, progress/status reports, monitoring & evaluation reports.

### DATA/INFORMATION ADMINISTRATION SUB-SYSTEM

To establish and maintain Project data/information organization procedures, including a data dictionary, security measures, directory/access systems, and production schedules.

## 7.0 NERADICS IN THE POST-NERAD 6th PLAN PERIOD (1989 - 1991)

NERAD Project assistance terminates in February 1989, while the current 6th Five Year National Social and Economic Development Plan continues for another 31 months, through September 1991. The major strategic action related to the future role of NERADICS is the formulation of the 7th Five Year Plan, which will begin approximately 2 years prior to commencement of implementation, or 7 months after the final NERAD assisted seminar for policy makers and planners from MOAC.

In the post-NERAD period, the expert review and triage process will continue to be the engine of NERADICS; technical workshops and seminars will be the basis for continued full development and operation of the system. A more fully developed version of the NERADICS prototype would feedforward results of technology and methodology research and development activities, for planning and implementation of the 7th Five Year Plan. The relationship between newly established Provincial MOAC Representatives and NEROA, would be strengthened by systematizing information flows. Coordination with the Office of the Permanent Secretary would be facilitated, primarily by developing monitoring linkages with regional offices, which are responsible for generating information for use by MOAC Inspectors.

Outputs and effects of NERADICS will be limited by the availability of resources for conducting workshops and for subsidizing participation of top quality experts, some of whom need to be obtained from off-shore locations. Other constraints to full system development and operation will probably include data administration procedures, system analysis and design, applications development, computer/information skills, additional workstations, data storage devices, desktop publishing and graphics output accessories, and data communication equipment for external linkage and networking.

## APPENDIX

The following NERADICS Working Papers are available on request from the Project Director:

### NERADICS Problem Definition Series

- P1 Effects of Paddy-bund-planted Eucalyptus Trees on the Performance of Paddy Field Crops. Craig, I.A. and Wasunan, S., 1987. (English)
- P2 Overview of Rainfed Agriculture in Northeast Thailand. Craig, I.A. and Pisano, U., 1987. (English)
- P3 The Upper Paddies in Northeast Thailand: The Current Situation and Implications for Development. Craig, I.A., and Baker, G.P., 1985. (English)
- P4 Current Pest Management Problems Facing Farmers in Northeast Thailand: Key Research and Development Priorities. Katanyakul, W., Amarisut, W., Keerati-Kusikorn, M. and Craig, I.A., 1987. (English)
- P5 Problems and Opportunities for Farming System Based Annual Crop Development in Northeast Thailand. Craig, I.A., 1987. (English)

### NERADICS Methodology Documentation Series

- M1 A Cropping Systems Technology Development Process: the NERAD Model. Craig, I.A., Sukapong, C. and Suratikul, S., 1986. (Thai and English)
- M2 Triago: a Methodology for Screening Agricultural Technologies and Prioritizing Research and Extension Activities. Craig, I.A. and Sukapong, C., 1987. (Thai and English)
- M3 NERAD Project Agricultural Development Information and Coordination System (NERADICS): A Project Description. Hopkins, J., 1987. (English)
- M4 The Rapid Assessment Technique (RAT): a Procedure for Identifying Farmer Problems and Development Opportunities. Alton, C. and Craig, I.A., 1987. (Thai and English)
- M5 Key Characteristics of the NERAD Full-cycle, Integrated Development Models. Songlin, R., 1987. (Thai)
- M6 The NERAD Logical Framework: a Project Design Summary for Planning, Monitoring and Evaluation. NERAD, 1987. (English)

- M7 Crop Protection and IPM for Rainfed Cropping Systems in Northeast Thailand. Amaritsut, W., Prasertsri, V. and Craig, I.A., 1987. (English)
- M8 General Methodology for the Technical Seminar/Workshop Component of NERADICS. Hopkins, J. and Craig, I.A., 1987. (Thai and English)

NERADICS Technology Documentation Series

- T0 Executive Summary: NERAD Promising Technologies. Thamabood, S. (Editor), 1986. (Thai)
- T1 Direct Sown Rice: a Cropping Systems Technology for the Upper Paddies in Northeast Thailand. Craig, I.A., Whattanabhuti, W., Sukapong, C. and Netpichit, W., 1986. (Thai and English)
- T2 Cooperative Buying Groups in Thailand: Results of a Social Experiment. Meyer, A.L. and Infanger, C.L., 1987. (English)
- T3 Modified Shallow Wells: a Farmer Developed Technology for Northeast Thailand. Craig, I.A., Phensupha, N. and Fogland, J.L., 1986. (English)
- T4 Pre-rice Green Manuring: a Technology for Soil Improvement Under Rainfed Conditions in Northeast Thailand. Craig, I.A., 1987. (English)
- T5 Papaya Ringspot Virus: Cross Protection for an Important Subsistence Crop in Northeast Thailand. Gonsalves, D. and Prasertsri, V. (English)