THE PACIFIC DISASTER CENTER'S TECHNICAL ASSISTANCE TO THE NATIONAL DISASTER WARNING CENTER, THAILAND

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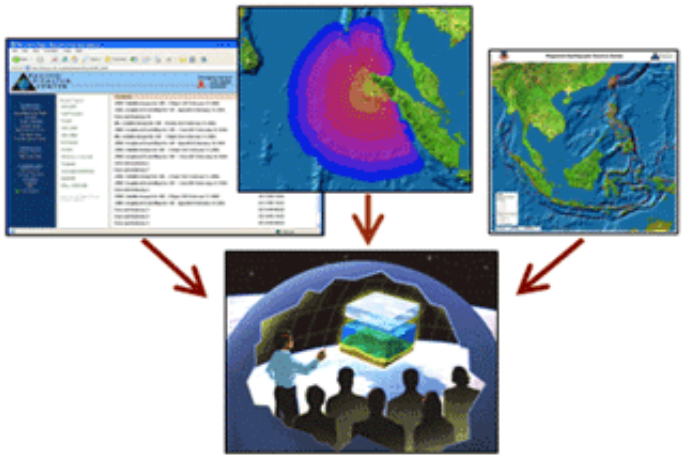
About the Project

The Pacific Disaster Center (PDC) has entered into a contract with National Disaster Warning Center (NDWC), Thailand, to provide Technical Assistance (TA) to the Thai Center towards the enhancement of NDWC's Disaster Management (DM) capabilities, systems, and practices. Under this contract, PDC and its partners will provide NDWC with technical solutions, systems integration, and human resources training to achieve its strategic objective of establishing a scalable and world-class disaster management and emergency communications facility.

PDC's partners in this effort are Lockheed Martin Information Technology, Sun Microsystems, and Environmental Systems Research Institute (ESRI).

The project, funded through a grant by the U.S. Trade and Development Agency (USTDA), will help build Thailand's capacity as part of the U.S. Government's broader support for an Indian Ocean Tsunami Warning System (IOTWS). For its part, the PDC will assist in the development of an all-hazards "decision support" capacity for the NDWC, integrate the decision support system with the NDWC Concept of Operations, and contribute to the disaster management-related best practices and procedures.



Prototype NDWC Decision Support System Delivered

Under this technical assistance grant, the PDC will start to automate national disaster management information flow and emergency response by linking sensor data collection systems, Geographic Information Systems (GIS) mapping, scenario modeling, and emergency notification.

Thailand's NDWC formally became operational in early 2005 with a main focus on the tsunami and earthquake warnings. PDC and its partners will provide technical assistance to enhance these capabilities, augment the underlying infrastructure to support multi-hazard analysis, and extend the disaster warning notification processes. See the Project Profile Fact Sheet.

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Scope of Work

The project's scope of work is to develop an integrated architecture for a disaster warning and decision support platform to support the NDWC's operations. The platform will include a user friendly, web-accessible Geographic Information Systems map viewer, hazard event tracking and collaboration tools, and basic hazard modeling systems that are all needed to support disaster management and decision making.

Under this arrangement, the PDC partner team (the Team) will also address disaster management practices, information and communication technology (ICT) design, and "capacity building" components required for an effective early warning platform and the associated integrated Decision Support systems and processes.

Under this agreement, the Team is not required to address the deployment of hazard monitoring devices and detection units associated with early warning systems, however, the project shall incorporate current and planned systems and practices into the overall integrated architecture, and will work to enhance the disaster warning processes.

Under this project, the PDC and its partners will provide:

- **ICT Gap Analysis Report:** A survey of the NDWC ICT capabilities, along with gap analysis and assessment of these capabilities for disaster warning purposes, and recommend approaches to fill in the gaps.
- **Concept of Operations (CONOPS) *in Relation to the Decision Support System*:** The PDC will review the existing and develop a new CONOPS and describe how it relates to the Decision Support System.
- **Hazard Related Data Inventory:** An inventory of the existing baseline and dynamic hazard data.
- **Proposed Architecture:** Based on the requirements and analysis, the PDC will propose a system architecture.
- **Detailed Cost Estimates:** Cost estimates for the proposed architecture and strategic ICT infrastructure investments.
- **Integrated Decision Support:** The PDC's integrated decision support platform to include GIS-based modeling for risk analysis and hazard tracking for warning capabilities.

- **Business Continuity Plan:** A Business Continuity Plan for the Thai Center and the installed systems.
- **Training:** The PDC shall develop basic training materials and conduct "train-the-trainer" sessions.

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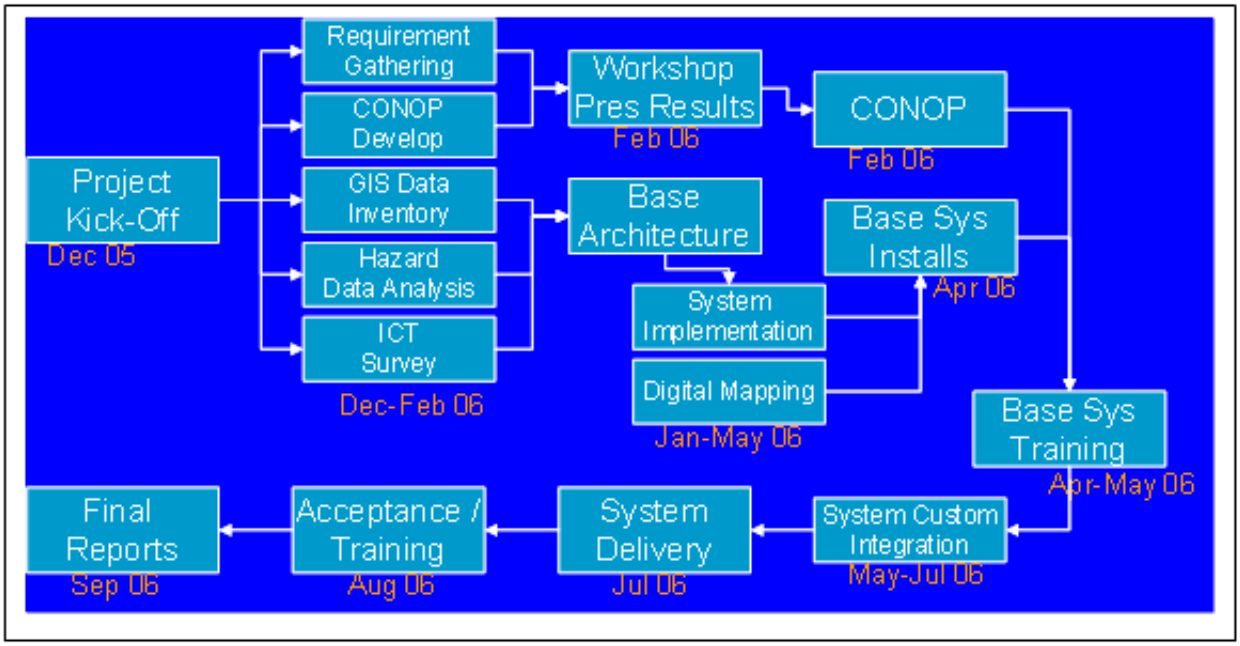
Major Project Milestones and Timeline

The chart below depicts the overall estimated timeline for this project.



Major Project Milestones and Timelines

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Project Update

CONTRACT SIGNED–NOV, 2005

Start of the project activities.

Click here to view further details about PDC's formal contract signing with Thailand's National Disaster Warning Center.

PROJECT INITIATION (KICK-OFF) WORKSHOP–DEC 8, 2005, BANGKOK, THAILAND

The project initiation meeting and workshop took place on Dec 8, 2005 in Bangkok, Thailand. Over 10 national and 5 international stakeholder organizations were represented in this meeting, including a number of Thai Government agencies as well as academic institutions, and IOTWS representatives from USAID, NOAA, USFS, and USFS. See full list of participants.

The meeting was co-chaired by Air Chief Marshal Anubhund Snidwongse, Vice Executive Director, National Disaster Warning Center, Thailand, and Mr. Ray Shirkhodai, Chief Operating Officer, Pacific Disaster Center. PDC Senior Managers Chris Chiesa and Jim Buika also participated with project presentations. Dr. Tavida Kamolvej, PDC Emergency Management Consultant, provided workshop moderation and translation. Stakeholders and representatives from ten different Thai Government agencies, five U.S. Government agencies, the IOTWS Program, and three of the PDC project partners attended the meeting. PDC presented the project scope, objectives, and milestones, and moderated a stakeholder feedback session on planned activities and interagency coordination. An additional interactive session was conducted by PDC to discuss and document related project activities in

Thailand from the represented agencies. See the abbreviated version of the Overview presentation.

To complete the Project's *Phase One: Information Gathering*, PDC is conducting three major activities relating to 1) an Information and Communication Technology Assessment of the NDWC, 2) documentation of the NDWC's existing "Concept of Operations," and 3) a data inventory of key Thai agencies involved in the project. PDC team members Stanley Goosby, Senior Modeling Scientist, Dr. Tavida Kamolvej, Emergency Management Consultant, Todd Bosse, Geographic Information Systems Data Analyst, Uday Kari, Senior Network Engineer & Applications Expert, and Dr. George Buck, Disaster Manager, are leading Phase One field activities in Bangkok.

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CONCEPT OF OPERATIONS (CONOPS) INFORMATION GATHERING–DEC 2005-FEB 2006

A team of the Disaster Management Experts led by the PDC's Chief Scientist, Mr. Goosby and Dr. Tavida Kamolvej spent the month of December in Thailand to collect information on the CONOPS pertaining to this project, including inter-agency communication and process flow. As part of this activity, the team interviewed many of the Thai Government agencies regarding their role and responsibilities in the national disaster management system. The team has compiled the findings into a report to be presented to the stakeholders in Bangkok, Thailand in Feb 2006. This report will serve as a basis for further development of the decision support platform.

DATA INVENTORY–DEC 2005-JAN 2006

PDC's GIS Analyst, Mr. Todd Bosse spent a better part of Dec 2005 in Bangkok, Thailand, conducting interviews with national and international agencies regarding data availability for disaster management purposes. The data inventory and information flow are contributing to the CONOPS as well the decision support architecture.

INFORMATION AND COMMUNICATION TECHNOLOGY SURVEY AND GAP ANALYSIS–FEB 2006

PDC's Sr. Engineer, Mr. Uday Kari traveled to Bangkok, Thailand, to conduct the ICT survey at the NDWC. Mr. Kari completed a similar survey for four ASEAN member countries earlier in 2005. The result of this survey will be analyzed in a report that will further guide the development of the PDC's integration decision support platform.

From January 30, 2006 through February 3, 2006, the Pacific Disaster Center (PDC) conducted an Information and Communication Technology (ICT) Assessment of the existing NDWC systems and other key Thailand data provider organizations' systems, including the Thai Meteorological Department (Seismological Bureau), Royal Irrigation Department and the Royal Thai Navy (Hydrographic Department). The main objective of the ICT assessment is to identify the various disaster warning data feeds and linkages available at the NDWC, analyze the capability of existing hardware/software infrastructure and personnel to fulfill the functionality reflected in improvements proposed by the PDC for NDWC and, finally, in conjunction with NDWC technical staff, formulate a consensus regarding ICT gaps with respect to NDWC operational benchmarks established in the CONOPS. Based on this gap analysis, PDC technical leads will work with NDWC IT Director to develop an acquisition plan for equipment to be installed later in the year as a part of the Technical Assistance project.

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NDWC-PDC CONCEPT OF OPERATIONS (CONOPS) STAKEHOLDER WORKSHOPS–FEB 16 AND 17, 2006, BANGKOK, THAILAND

Two Stakeholder Workshops were hosted by the National Disaster Warning Center, Thailand and Pacific Disaster Center in Bangkok on February 16 and 17 to provide interactive forums for representatives from participating organizations to both understand and comment on the draft Concept of Operations for the National Disaster Warning Center, Thailand. Dr. Plodprasop Suraswadi, Executive Director of the NDWC, opened the February 16 meeting. At both meetings, additional opening comments were read by Admiral Thaweesak Daengchai, Advisor to NDWC. Dr. Cherdsak Virapat, Chief of International Coordination, NDWC, provided Thai protocol and translation. Stanley Goosby and Jim Buika, PDC, provided formal presentations at both Stakeholder Workshops on the Concept of Operations Draft Report.

Each participant received a black and white hard copy of the Draft CONOPS document, ("Version 2.5"). All feedback has been provided by NDWC and stakeholders through an established feedback mechanism including completion of an Organization Feedback Form handout to PDC by the February 24 deadline. As much feedback as possible was collected and documented at both Stakeholder Workshops and will be recorded in CONOPS final report.

Both workshops provided adequate attention to the questions and issues required to develop a multi-hazard warning capability. In particular, flood and landslide were highlighted as a Thai 2006 developmental focus to add to earthquake and tsunami hazards. PDC reminded the stakeholders that the decision support platform would scale to accommodate multiple hazards, including flood, but the current project is focused on tsunami and earthquake hazards and that the current scope does not include building flood capabilities. See the CONOPS Stakeholder Workshop agendas and participants lists.

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NDWC-PDC INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) GAP ANALYSIS STAKEHOLDER WORKSHOPS–APRIL 26-27, 2006, BANGKOK, THAILAND

Two Stakeholder Workshops were hosted by the National Disaster Warning Center, Thailand and Pacific Disaster Center in Bangkok from April 26-27. The purpose of the workshops was to provide interactive forums for representatives from participating organizations to understand, review, and comment on the draft ICT Gap Analysis report and the Data Inventory findings and recommendations. Mr. Ray Shirkhodai and Mr. Stanley Goosby of PDC provided formal presentations at both workshops. The participants were then encouraged to make remarks and offer comments on the ICT Gap Analysis as well as Data Inventory issues in sessions moderated by the PDC.

All feedback was then collected, documented, and reviewed before the completion of the workshops. A record was provided to NDWC officials for consideration. The results and recommendations are to be published by NDWC authorities upon review.

Both workshops provided adequate attention to the questions and issues required to develop a multi-hazard warning capability—and the correlation to the required ICT infrastructure, processes, and data needs. In particular, the group converged on the hardware and software requirements. A number of major steps were also identified to gather the required data. A main issue of concern was the availability and/or development of human resources to adequately support the NDWC's mission. Other main suggestions included:

- Conducting a meeting before the next PDC site visit so that partner agencies can identify what is needed and would facilitate data collection. (NDWC is coordinating a meeting with other government agencies and data providers.)
- Identifying international data sources, especially hazard data providers—e.g., the U.S. Geological Survey (USGS), Intergovernmental Oceanographic Commission (IOC), and World Meteorological Organization (WMO)—that are critical to the mission of the NDWC.
- Identifying local "data partners" to help with the processing of data (some Memoranda of Understanding are already in place).

Other important topics of discussions included:

- Data security (e.g., "how to secure the data"). Mostly this concerned practices, as the "Commercial Off The Shelf" GIS software provides limited security. PDC's solution assumes that whomever can log on will be able to see the data layers.
- Backup systems and processes are needed (this should be addressed during implementation). PDC can help identify essential processes, but NDWC needs to consider these actions/processes in its strategic planning process.
- Metadata documentation is extremely critical to the application. (For example, gaps in road data is critical for evacuation).
- NDWC needs recommendations on the strategic development of human resources. PDC can provide initial (cursory) assistance and recommendations (i.e., on training). However, PDC hopes to identify these areas and work with NDWC on how to proceed. This strategic development requires detailed attention.

See the ICT Gap Analysis Stakeholder Workshop agendas.

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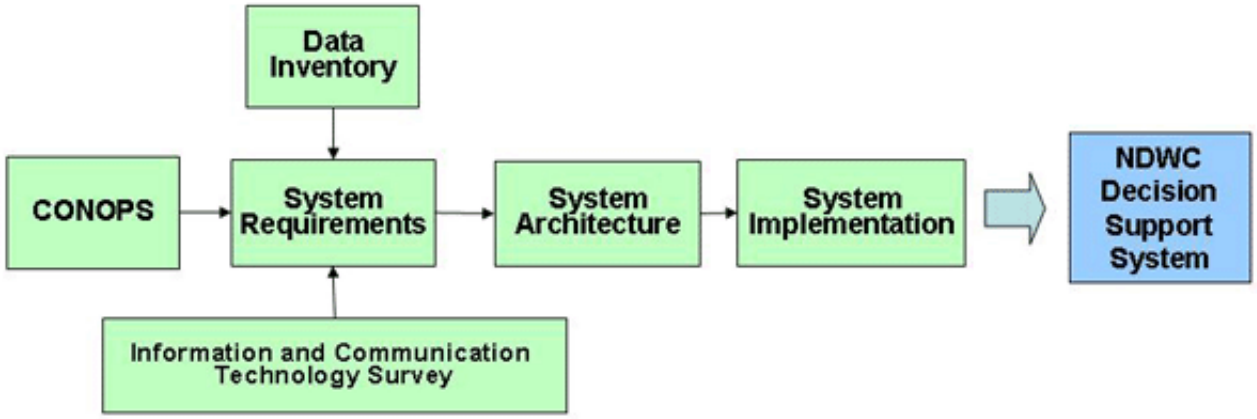
DEVELOPMENT OF SYSTEM REQUIREMENTS

Working in close collaboration with the NDWC Information Management group, and taking into account the findings from the CONOPS, ICT Survey and Gap Analysis, and Data Inventory, PDC developed the system requirements as depicted in this high-level depiction of the principal project components (below). This step includes hardware and software that forms the basis for the decision support platform, as well as custom software application requirements for the early warning processes.



Principal Project Components

CUSTOMIZING THE SOLUTION AND IMPLEMENTATION

Currently, PDC is working to:

a. Process project-specific data;
b. Customize the decision support system architecture according to NDWC-specific requirements; and
c. Implement the end-to-end system for initial testing.

The preliminary solution and the functioning prototype will be ready for deployment (beta delivery) in September 2006.

BUSINESS CONTINUITY PLAN

In December 2006, a draft of the business continuity plan was shared with the NDWC along with the system architecture document. NDWC provided feedback, and then approved and accepted the documents.

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PROJECT COMPLETION, FINAL TRAINING AND REPORTING

In October and November 2006, three servers that had already been tested at PDC were prepared for and delivered to NDWC. The servers were installed and configured at NDWC headquarters by PDC's Senior Network Administrator who also validated the installed system on-site. Separate servers handle the World Wide Web, the system applications and the databases.

In December, PDC's Senior Software Engineer installed a Service Pack upgrade on the working system and conducted three days of system verifications in preparation for staff trainings.

Senior Software Engineer conducted five training courses:

- General Overview of the NDWC/DisasterAWARE system
- Non-GIS Mode Operations
- GIS Mode Operations
- System User Administration
- System Technical Administration

A User Manual and a Technical Administration Manual were provided for the on-site training and for future reference.

With the hardware and software operational and the staff trained, a final workshop was held in December during which the chief NDWC executives and administrators, on behalf of the Royal Thai Government, formally accepted the enhanced early warning system.

The report on the work done to complete and fulfill all phases of the enhancement of NDWC's early warning capabilities, as outlined in the USTDA Technical Assistance Agreement, was reviewed in January 2007 for final delivery in early February.

CEREMONY MARKS PROJECT CLOSING

PDC Executive Director Ray Shirkhodai and Chief Scientist Stanley Goosby attended and spoke at the interagency Project Closing Ceremony on February 9, 2007, at the Pathumwan Princess Hotel, Bangkok. The ceremony marked a formal transition of the Technical Assistance project to the NDWC authorities.

The official closing ceremony for the NDWC-PDC project to enhance Thailand's early warning capabilities was presided over by Dr. Smith Dharmasaroja, chairman of Thailand's National Disaster Warning Administration. Approximately 30 attendees represented Thai stakeholder organizations and the governments of both the United States and the Kingdom of Thailand. The event was attended by Ed Young, Deputy Director, NOAA NWS Pacific Region Headquarters; Jennifer Lewis, International Affairs Representative, NOAA NWS; Rachaneekorn (Jiab) Sriswasdi, Deputy Regional Manager, USTDA; and Mr. Gregory Walters, USTDA Regional Manager for Asia, representing The Honorable Mr. Ralph Boyce, U.S. Ambassador to the Kingdom of Thailand.

Dr. Smith said, in his opening remarks for the half-day ceremony, "I wish to express my gratitude to the United States Trade and Development Agency (USTDA) for providing financial support as a grant to the National Disaster Warning Center (NDWC), Thailand, to improve its early warning capability under the Disaster Warning Integration and Capacity Development. Under this Technical Assistance program, the NDWC has partnered with the Pacific Disaster Center (PDC) in building and enhancing NDWC decision-making and warning-dissemination capacity."

Dr. Smith continued, "Shortly after the tsunami attack, NDWC has reached out for help from experts, even before an official establishment of the national center, PDC was the first organization to provide experts and assistance to help Thailand set up its early warning system."

During the afternoon, officials were given a high-level overview of the capabilities of NDWC as enhanced through the NDWC-PDC partnership under the USTDA Technical Assistance Agreement (TA). All parties judged the TA an unqualified success.

In his closing remarks, Dr. Smith looked to the future and the hope that NDWC would be building on the established relationship with PDC. He said, "I believe that the partnership between NDWC and PDC will certainly step forward into more capacity development plan. Last but not least, I would like to again extend my grateful appreciation to the government of the United States of America, the United States Trade and Development Agency and the Pacific Disaster Center for their contribution and assistance to help the National Disaster Warning Center to operate a more effective and efficient warning system. These collaborations and relationships will certainly continue and step forward into multi-hazard warning capacity to help save more lives of the people of Thailand and the region."

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