Description of the NEDSS Base System
March 28, 2001

I.   Introduction

Purpose of NEDSS Base System Document

This document describes the vision, development, implementation, and uses of the NEDSS Base System as a component of the overall NEDSS initiative. It is intended to provide public health professionals a better understanding of the proposed NEDSS Base System. This document is not intended to define the overall NEDSS effort nor does it provide any detailed technical specifications about NEDSS Base System components. More information on NEDSS can be found at (http://www.cdc.gov/od/hissb/docs.htm).

Background and Overview

The National Electronic Disease Surveillance System (NEDSS) project is a public health initiative to provide a standards-based, integrated approach to disease surveillance and to connect public health surveillance to the burgeoning clinical information systems infrastructure. NEDSS will improve the nation's ability to identify and track emerging infectious diseases (including potential bioterrorism attacks), investigate outbreaks, and monitor disease trends.

To initiate implementation of NEDSS, states have received funds to assess their current systems and develop plans for implementation of NEDSS-compatible systems. Some states are choosing to develop their own systems using specified NEDSS standards, while other states have expressed interest in using all or a portion of a CDC developed system. For those states that choosing to use a CDC-developed option, the NEDSS Base System is a platform upon which many public health surveillance systems, processes, and data can be integrated in a secure environment.

As a primary goal, the first release of the NEDSS Base System will serve to support the electronic processes involved in notifiable disease surveillance and analysis, replacing the functionality currently supported by the National Electronic Telecommunications System for Surveillance (NETSS). The NEDSS Base System is not intended to represent the complete NEDSS solution, but will provide the foundation upon which state and program area needs, data collection, and processing can be built. This foundation will include, for example, the development of modules (e.g. core demographic module, nationally notifiable disease module) that can be used for data entry and management of core demographic and notifiable disease data.

NEDSS Users

The NEDSS Base System, and the modules that interact with it, is intended for use by state health departments for the purposes of communicable disease surveillance. Future modules for the Base System and additional Base System functionality may support content and functionality needed from other programs (e.g. Chronic, Environmental health, etc.). Users may include epidemiologists, laboratorians, data managers, and data entry clerks from various program areas. State and local health departments should plan to develop and institute policies addressing user access and sharing of data between different program areas.

Timeline

Completion of the major components of the NEDSS Base System for pilot testing is targeted for June 2001. In addition, concurrent development of program area modules (PAMs) is planned to provide complementary surveillance functionality shortly after the Base System is ready for production use. This first release of the Base System will represent an integrated system using a Web-based architecture that is intended to integrate with existing state network and Web infrastructures. Experience gained from states implementing components of the NEDSS Base System (e.g. Web-based modules, integrated data repositories, etc.) will help identify desired changes and additional requirements for future releases.

II.   NEDSS Base System Framework

Base System Functionality

The NEDSS Base System will provide users the ability to enter, manage, and view core demographic and nationally notifiable disease data via a Web browser. These basic functions will also be utilized by the NEDSS PAMs. The Base System will allow for several different methods of data entry. In addition to allowing for the entry of completed case reports, the Base System will facilitate the management of open cases under investigation and have basic infrastructure to receive and hold electronic lab results and other electronic clinical reports. Defined tables for all of the data will reside in a state-managed integrated data repository (IDR). Three major Base System functions are described in detail below:

Data Entry Via the Web

The Base System will provide Web screens for the entry, management, and querying of core demographic and nationally notifiable diseases data. The Core Demographic module (CDM) will provide basic functionality for the accumulation and management of core demographic data, including the addition, modification, and deletion of patient demographic data and registry matching for the purposes of identifying patients. The CDM will work with other NEDSS modules to allow for seamless entry of program area and core data. The Nationally Notifiable Disease module (NNDM) will support management of core notifiable disease data and replace the reporting functionality provided by NETSS. Shareable, core data across disease programs will be captured in the CDM and NNDM modules. Shareable data that is specific to a particular disease program (including some of the NETSS extended records) will be managed through PAMs that build on Base System functionality. PAMs are being developed concurrently by categorical programs to collect and manage information relevant to the disease program. Together, these modules will provide the seamless display of demographic, notifiable disease, laboratory, and program area data via a Web browser.

Electronic Interchange of Laboratory Data

The Base System software will include software to support the electronic receipt of laboratory results from CDC labs. This software will also allow for the routing of laboratory data from national laboratories to state health departments as a state selectable option. This will allow states to electronically receive and store laboratory information in defined tables in the IDR. After verifying the completeness of the imported laboratory

findings, this information can be linked with demographic and notifiable disease data to provide an integrated view of a patient's demographics, lab result, and disease history in a timely and efficient manner. Although NEDSS electronic data interchange has focused initially on the receipt of laboratory findings, the methodologies and tools to support this function can also be used for the electronic exchange and reporting of clinical and epidemiologic data.

Storage and Maintenance of Data

A core building block of the NEDSS Base System framework is the IDR – a data store for data from multiple disease programs. To ensure data confidentiality, the IDR will allow for selective access to the data based on users' roles and responsibilities. The IDR will provide state health departments the opportunity to manage, analyze, and share data based on state and locally defined business rules. As states continue collaboration with other external partners (such as clinical providers), the IDR provides a means to have a single point of contact to interchange data with external data sources. As a function of the local extensibility and flexibility of the NEDSS architecture, states can choose to implement separate instances of the IDR if necessary.

For the Base System, the IDR will contain CDC-defined tables to store core demographic, notifiable disease, and some electronic lab and clinical report data. The IDR will support the workflow of state activities involved in case investigation and evaluation by providing views of lab and clinical data to help users determine whether additional follow-up and/or verification is needed before it is designated to a particular disease program (e.g., a positive chlamydia test is captured in the IDR). This record is flagged and viewed via Web screens. Staff members contact labs for additional demographic information before electronically assigning the record to the STD program.

Base System Architecture

The major components of the Base System are shown in Exhibit 1. They include

- ν Web-based modules; screens for data entry and management of demographic and notifiable disease data
- ν A Web application server (SilverStream) to support the functionality of the Web-based modules
- ν An IDR to support management and storage of data across programs (the IDR database is to be supplied by the state)
- ν A messaging software tool (E-Link executable) to support messaging and electronic data interchange between states and the CDC
- ν Security using existing state infrastructure or a CDC-provided, Intranet-oriented authentication and authorization system
- ν Data analysis functionality

The components provided in the NEDSS Base System will be structured to support data entry via Web-based screens, an application server (e.g., SilverStream) to support the functionality of the Web-based screens, and storage of demographic and notifiable disease data in an integrated database (e.g., IDR). To support the communication and analytical needs of states, tools will also be provided for messaging between states and

the CDC (electronic data interchange), data analysis (e.g., SAS), and authentication/security functions.
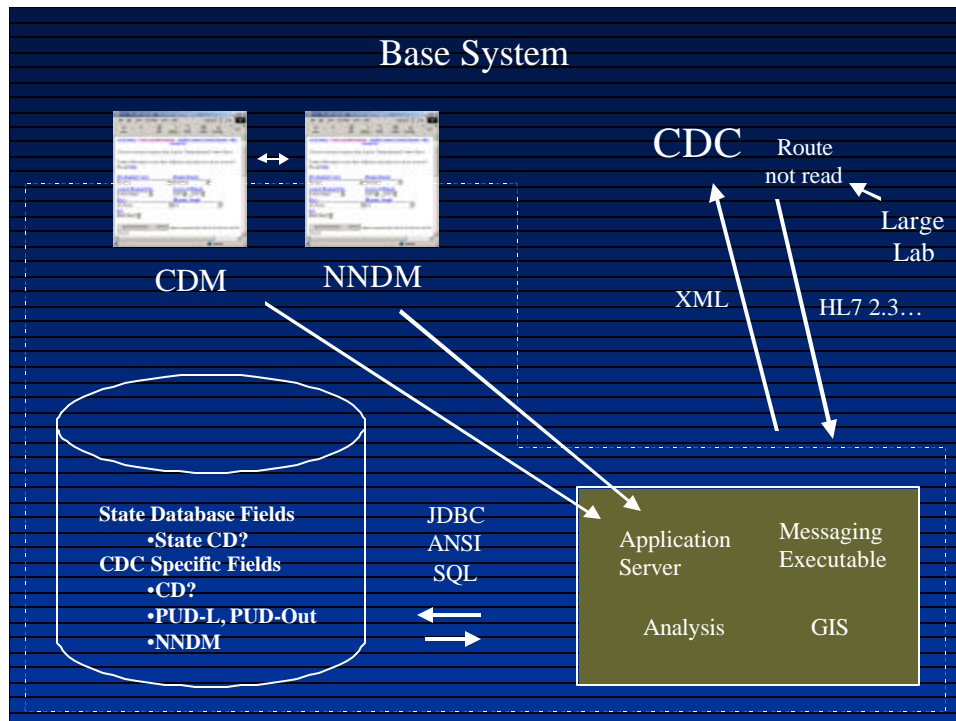

Exhibit 1. NEDSS Base System

III. Development and Implementation of the NEDSS Base System

Development and Implementation

The functional requirements for the NEDSS Base System are being captured and documented based on structured joint application development (JAD) sessions, existing documents from various working groups, and state input. Design requirements for the Base System include the implementation of the Public Health Conceptual Data Model and the NEDSS state architecture and architecture standards (see http://www.cdc.gov/od/hissb/). The CDC has contracted with Computer Sciences Corporation (CSC) to lead development of the Base System components using Capability Maturity Model (CMM) Level 3 development methodologies and tools. IDX Corporation, the principal architects behind the Public Health Conceptual Data Model, have been contracted to provide states technical assistance designing and implementing a NEDSS- compliant IDR. In addition, IDX is collaborating with CSC, CDC, and other state partners to develop a shareable NEDSS Base System logical data model that will be used to construct the Base System's Web-based modules, message specifications, and data repositories at both the states and CDC.

Product Licensing for NEDSS

Licensing of commercial off the shelf (COTS) products for use in NEDSS is currently underway. Agreements have been made with COTS vendors for specific uses of their products. Licensing has been arranged with the SAS Institute for distribution of SAS to state and local partners. These licenses allow for the use of select SAS products for data analysis activities related to NEDSS. An agreement has also been reached for use of the SilverStream Application Server product for support of the CDC-developed Base System applications (e.g., Web-based modules). Finally, the ELink product has been licensed for the messaging of data to and from states and the CDC. This license currently does not cover the development or deployment of messaging of data directly from labs and other providers in the state to the state health department. Additional input is needed from state and local partners to determine further licensing needs for the NEDSS initiative.

Stakeholder Input

Partner input is being solicited from a variety of groups and sources. CDC is continuing to participate in discussions of NEDSS with representatives from state and local health organizations such as ASTO, APHL, CSTE, NAACHO, and NAPHSIS. On April 10-11, 2001, state and local partners are invited to participate in the second NEDSS Stakeholder's Meeting. Working groups have been created that include the 14 states funded for NEDSS development activities to coordinate issues common to multiple states, such as electronic reporting and messaging, data modeling and standards, data analysis and visualization, and security. These working groups provide a forum for states to dialogue and share documentation and requirements via several listservers and an associated electronic Web board. As draft Base System requirements and specifications are available, they will be shared with our state partners and posted to the Web board for comments. The Web board is open to interested NEDSS participants and is accessible via the Internet. To sign up, please contact Jason Hall via e-mail (cjhall@cdc.gov).