

**Confidential Morbidity Reporting (CMR) Project**  
**Final Feasibility Study Report**

**By**

**California Department of Health Services**  
**Division of Communicable Disease Control**

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- Appendix A – Acronym List
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## **1.0 EXECUTIVE PROJECT APPROVAL TRANSMITTAL**

The following are the formal signature pages as required for Department of Health Services acceptance of this Feasibility Study Report, and subsequent submittal to the DOF for the proposed information technology project.

These pages are included as separate files in the electronic version of this FSR.

## **2.0 IT PROJECT SUMMARY PACKAGE**

The following is the Information Technology Project Summary Package prepared as required by DOF.

The Project Summary Package is included as a separate file in the electronic version of the FSR.

## 3.0 BUSINESS CASE

### 3.1 Business Program Background

Public health is supported by an array of local, State, and Federal organizations. These partner organizations are further divided into functional units that support clinical, health department, laboratory, disease program, and other operational divisions.<sup>1</sup> California's public health system includes a network of people, information systems, organizations, and public health processes focused on the health of the State's population. The Department of Health Services (DHS) administers the public health system in California at the state-level. Sixty-one local health departments (LHD) – comprising the 58 counties and the cities of Berkeley, Long Beach, and Pasadena – manage the public health system at the local level.

The DHS, through the Division of Communicable Disease Control (DCDC), is responsible for investigating and controlling communicable diseases and conditions in the State. The DCDC works in partnership with local, national, and international health officials, health care providers, and the public to monitor health trends. Through this monitoring process, the State is able to identify and investigate existing and potential health problems, develop and implement prevention strategies, conduct research, provide education and training, and formulate and advise on public health policy.

At the state level, the DCDC's Surveillance and Statistics Section (SSS) staff processes and analyzes in excess of 240,000 disease reports for notifiable conditions<sup>2</sup> each year. The DCDC expects the number of reports to increase by at least 20 percent in the next five years. The monitoring of disease reporting by health care providers and laboratories is crucial for disease surveillance and detection of outbreaks to determine an appropriate public health response. Surveillance is the foundation of DHS's prevention and control programs and is essential to program planning, implementation, and evaluation. Public health surveillance includes the ongoing and systematic collection, analysis, interpretation, and dissemination of data regarding health-related events for use in public health action to reduce morbidity and mortality<sup>3</sup>, and to improve health.<sup>4</sup>

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<sup>1</sup> Centers for Disease Control and Prevention. "Notice of Cooperative Agreement Award, Public Health Information Technology Functions and Specifications." February 8, 2002

<sup>2</sup> A notifiable disease is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of disease.

<sup>3</sup> Morbidity is defined as a disease or the incidence of disease within a population. Mortality is defined as the incidence of death from a disease.

<sup>4</sup> Centers for Disease Control and Prevention. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR 2001;50(No. RR-13).

Effective public health surveillance can:

- Act as an early warning system by detecting microbial, environmental, behavioral, occupational, and other health threats.
- Concentrate resources, focus interventions in areas of greatest need, and facilitate future projections by tracking and monitoring the incidence, patterns, and trends of disease.
- Help assess public health measures by providing accurate health information to policymakers.

At the local level, the LHDs have operational responsibility for front-line public health activities in the State. The LHDs have direct contact with health care providers (physicians, hospitals, and laboratories) that have identified or suspect a disease that meets “public health concern” criteria. The LHDs are responsible for the investigation and control of the disease, condition, or outbreak reported. The LHDs maintain information about cases and outbreaks; local epidemiologists utilize the information to support and direct local public health activities. LHDs periodically report to the State. At the state level, surveillance data are utilized in support of decisions and policy to protect the health of Californians. The state also submits reports to the Centers for Disease Control and Prevention (CDC) for conditions which are nationally notifiable (and also reportable in California) in a standardized format utilizing the CDC's Secure Data Network (SDN).

The cornerstone of public health systems, at all levels, is timely access to high-quality information for protecting and improving public health. More than ever before, information technology (IT) and complex integrated information systems and databases are needed to fulfill the data and information needs of the public health system. Effective resolution of issues relating to connectivity, IT infrastructure capacity, bi-directional data and electronic communications, and public health informatics are vital to the success of administering public health.

The DHS DCDC has been working since early 2004 with state, local, and federal partners to implement a web-based electronic disease reporting system in California to improve the legally required reporting of infectious diseases. Please see section 3.3 for more details about this activity and its relationship to the proposed solution in section 4.0.

### **Program History**

In 1878, Congress authorized the U.S. Marine Hospital Service (the predecessor of the Public Health Service [PHS]) to collect morbidity reports regarding cholera, smallpox, plague, and yellow fever from U.S. consuls overseas. This information was used to implement quarantine measures to prevent the introduction and spread of these diseases into the United States. In 1879, a Congressional appropriation was made for the collection and publication of reports of these notifiable diseases. In 1893, Congress expanded the authority for weekly

reporting and publication of these reports to include data from states and municipal authorities.

To increase the uniformity of the data, Congress enacted a law in 1902 directing the Surgeon General to provide forms for the collection and compilation of data and for the publication of reports at the national level. In 1912, state and territorial health authorities, in conjunction with PHS, recommended immediate telegraphic reporting of 5 infectious diseases and the monthly reporting, by letter, of 10 additional diseases. By 1928, all states, the District of Columbia, and Puerto Rico were participating in national reporting of 29 specified diseases. In 1961, the CDC assumed responsibility for the collection and publication of data concerning nationally notifiable diseases.<sup>5</sup>

Currently, disease reporting is mandated by state legislation or regulation only at the state level. In California, the California Code of Regulations, Title 17, Section 2500 requires physicians to report incidents of specific diseases or conditions to the LHD in the jurisdiction where the patient resides. Section 2505 of Title 17 lists a subset of diseases that must be reported by laboratories to the LHD of the referring physician. The Confidential Morbidity Report (CMR) is the primary form by which health care providers report morbidity to the LHD pursuant to Title 17 Section 2500. Section 2502 of Title 17 specifies that the Local Health Officer is responsible for taking whatever steps deemed necessary for the investigation and control of the disease, condition or outbreak reported. If a disease is one in which the local health officer determines identification of the source of infection is important, and the source of infection is believed to be outside the local jurisdiction, the health officer must notify the DHS Director or the health officer under whose jurisdiction the infection was probably contracted, if known. Section 2502 of Title 17 requires the local health officer to report at least weekly to the DHS Director the number of cases or outbreaks reported pursuant to Section 2500; additionally, this section indicates that some conditions require forwarding the information from the CMR report, or a more extensive case report to the Director. The information from the CMR is typically reported in electronic format while the case reports are typically submitted in paper format.

The SSS staff collects, processes, analyzes, and disseminates data from LHDs around the State on all legally reportable diseases (except AIDS). This information is used to support epidemiological studies and satisfy national reporting requirements. Weekly, the SSS processes the information submitted by the LHDs and forwards disease reports utilizing the appropriate format to the CDC.

### **DHS's Mission, Vision, and Key Issues**

The DHS is committed to successfully administering a broad range of public and clinical health programs that provide health care services to the population of

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<sup>5</sup> [www.cdc.gov/epo/dphsi/nndsshis.htm](http://www.cdc.gov/epo/dphsi/nndsshis.htm)

California. The DHS's mission is "to protect and improve the health of all Californians." In conjunction with its mission, the DHS's vision states that the Department will "... work to:

- Ensure that all Californians have access to high quality health care, experience low levels of preventable diseases and disabilities, and enjoy optimal levels of health and well-being.
- Have a valued and expert work force committed to continually improving the quality of services the DHS provides.
- Be recognized as the authority on patient care, prevention and public health dedicated to public awareness of the DHS programs and services
- Be a technical leader in sound scientific investigation and inquiry, application processes that are easily accessible to all Californians, data analysis and planning, communications and dissemination of data and employee support systems."

In March 2002, the DHS published a five year strategic plan that identified the following key issues that represent significant challenges to overcome and achieve its vision.

- **Optimize State and Local Public Health Capacity.** As the population of California increases in size and diversity, the DHS remains committed to ensuring that its partners have the level of leadership and technical support they require to deliver the highest quality public health, environmental health, and medical care available. The DHS will facilitate the growth of State and local public health capacity by increasing the resources and effectiveness of programs and services and leverage partnership opportunities at the State and local levels.
- **Improve Coverage and Access.** The DHS recognizes that despite several successful initiatives to increase access to health insurance and to increase the types of coverage available, many Californians remain uninsured or underinsured. The DHS will improve coverage and access for Californians that are eligible for low-cost and no-cost quality health insurance.
- **Improve Health Status and Outcomes.** The DHS recognizes its role to set aggressive health goals for the State and monitor progress in meeting both State and national objectives. The DHS will provide the data, analysis, technical assistance and leadership.
- **Foster Integrated Service Delivery.** As the DHS continues to strive to effectively and efficiently serve the people of California, it recognizes the importance of streamlining and coordinating its programs and administrative functions. The DHS continues to simplify and integrate program eligibility processes, improve other administrative functions and information for Californians served by its programs.

- **Develop and Cultivate the DHS Employee Capability to Fulfill the DHS Mission.** Like many other State agencies, the DHS has experienced employee turnover due to retirements and the attraction of the private sector. The DHS will continuously invest in its workforce through active recruitment and attract the highest quality staff. It will also invest in providing comprehensive training programs for employees to insure their leading-edge knowledge and performance.
- **Improve Business Practices.** The DHS is committed to ensuring that the people of California receive the highest quality of service at the least cost by using resources effectively, reducing incidences of fraud, and responding promptly and appropriately to internal and external customer needs. The DHS will create an atmosphere within the Department of providing superior service, mutual respect and continuous process improvement of all aspects of the Department.<sup>6</sup>

### **DCDC Purpose and Mission**

The purpose and mission of the DCDC is “to provide surveillance, investigation, and control of more than 80 communicable diseases and conditions in California.” The DCDC is actively involved in monitoring infectious diseases in the State through straightforward, science-based prevention and control efforts. The DCDC has identified the following seven primary activities to support infectious disease control activities in the State:

1. Improve laboratory capacity and develop more accurate and efficient diagnostic methods for new bacterial, parasitic, viral, and Rickettsial diseases.
2. Expand and enhance infectious disease surveillance, detection, and tracking, including:
  - Automate and improve local and state reporting (through use of the Internet) of infectious diseases to assure timely and accurate assessment.
  - Work with agencies involved in food safety to implement a statewide microbiological monitoring program that will isolate, trace, and eliminate emerging pathogens in foods.
  - Develop electronic laboratory reporting to speed response time to disease outbreaks.
3. Improve the capacity and readiness at both state and local public health levels to assure disease crisis intervention to control outbreaks and prevent the spread of infectious diseases. DCDC experts act as the epidemiological response team for emerging and re-emerging diseases at the regional level.

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<sup>6</sup> California Department of Health Services. “Leadership for a Healthy California: A Strategic Plan for the California Department of Health Services.” March 2002

4. Develop and improve systems, immunization registries and other links with private and public health care providers.
5. Expand partnerships with health plans, other agencies such as the California Department of Food and Agriculture and Department of Corrections, and agriculture-related businesses. These partnerships will improve prevention activities, identify and adopt best practice guidelines, and institute quality control measures to minimize the potential for deadly infectious agents to spread among the population.
6. Use population-based methods and channels to inform, educate and communicate disease prevention information to health care providers, policy makers, and communities at risk of infectious diseases.
7. Thoughtfully and effectively address the disparity in health status and the burdens of infectious disease in California's ethnic, age and gender groups.<sup>7</sup>

### Business Programs

The DCDC is organized into branches, programs, and offices that provide the business and technical resources in areas of disease surveillance and control, and the overall mission and vision of the DHS and DCDC. These organizations are described in Figure 3.1.

**Figure 3.1.**

**DCDC: Branch Descriptions**

No.	Program Name	Purpose
1.	Sexually Transmitted Disease (STD) Control Branch	The STD Control Branch provides statewide leadership, guidance, training and technical assistance for the prevention and control of STDs, and reduction of their complications and adverse outcomes. The Branch provides STD surveillance, investigation, prevention, and control activities throughout California. The Branch also assists and collaborates with LHDs, health care providers, non-governmental organizations, and other partners to develop, translate, and disseminate timely, science-based information and policy to develop and support effective clinical and community prevention programs.
2.	Tuberculosis (TB) Control Branch	The TB Control Branch provides leadership at the local and State levels to control TB in California's diverse communities and institutions. The Branch

<sup>7</sup> Division of Communicable Disease Control. "Communicable Disease Control in California." 2000

No.	Program Name	Purpose
		<p>collects, analyzes, and disseminates information on TB in California so that control strategies can be planned, implemented, and evaluated on an ongoing basis. The Branch also develops plans to distribute fiscal resources in support of TB prevention and control activities; provides technical assistance, training, and advocacy at the Federal, State, and local levels; defines and promotes adherence to minimum standards for TB control; identifies model TB control practices and promotes their replication statewide; fosters collaboration and coordination among public and private organizations concerning TB; and strengthens local TB control programs' capacity to directly provide (or ensure provision of) comprehensive TB services to patients.</p>
3.	Infectious Diseases Branch (IDB)	<p>The IDB protects and promotes the health of Californians through the surveillance, investigation, prevention, and control of communicable diseases of public health importance. These include all infectious diseases not covered by the specific programs of the TB Control Branch, Immunization Branch, Office of AIDS, and the STD Control Branch. The IDB monitors and addresses disease occurrences which impact all LHDs in California, and may affect public health policy on a national and international level.</p> <p>Within IDB is the Bioterrorism Epidemiology Section which is part of a multidisciplinary initiative to strengthen public health infrastructure to detect, identify, investigate, and control illnesses due to biological or chemical terrorist attacks. The team focuses on enhancing state and local health surveillance and epidemiologic response capacity for diseases due to biological agents. If a suspected bioterrorism event occurs, the BT team will also provide epidemiologic assistance and coordination to the LHDs.</p>
4.	Immunization (IZ) Branch	<p>The IZ Branch provides leadership and support to public and private sector efforts to protect California's population against vaccine-preventable diseases. The Branch provides technical guidelines and consultation on immunization practices and standards; assures adequate vaccine distribution to public immunization clinics and healthcare</p>

No.	Program Name	Purpose
		providers; assesses immunization levels of the population; monitors enforcement of school and child care immunization requirements; informs and educates the general public and health care providers about immunizations; and provides direction for vaccine-preventable disease surveillance and outbreak control.
5.	Infant Botulism Treatment and Prevention Program (IBTPP)	The IBTPP provides and improves the treatment of infant botulism, and where possible prevents infant botulism and related diseases. The IBTPP is statutorily established as a fee-supported, Special Fund activity required to produce and distribute Botulism Immune Globulin statewide and nationwide; provide diagnostic and consultative medical services for infant botulism; investigate all cases of infant botulism in California; develop and implement prevention and control measures for infant botulism and related illnesses; and carry out applied research into improving the prevention and treatment of infant botulism.
6.	Microbial Diseases Laboratory (MDL) Branch	The MDL provides reference, diagnostic, and applied research activities needed for method development and related laboratory services essential for the detection, epidemiological investigation, control, and prevention of diseases in humans, food, medical devices, and biologicals caused by bacteria, fungi, and parasites. MDL is the reference microbiology laboratory for all local and county public health laboratories in California. The MDL also acts as the support laboratory for the DCDC to diagnose bacterial, parasitic, and fungal infections.
7.	Viral and Rickettsial Disease Laboratory (VRDL) Branch	The VRDL provides diagnostic, reference laboratory leadership, technical assistance, and training services in the field of viral and Rickettsial diseases. VRDL is the reference laboratory for all local and county public health laboratories, as well as the support laboratory for the DCDC to diagnose viral and Rickettsial diseases.
8.	Office of Informatics and Surveillance (OIS)	The OIS provides enterprise-wide solutions in support of the various DCDC programs, maintains and coordinates the IT infrastructure specific to DCDC, and facilitates integration of business services with the DHS infrastructure through management and oversight.

## Current Business Processes

Providing effective disease surveillance throughout the State requires cooperation between State and local public health stakeholders. While the DCDC administers the State's disease surveillance programs, the LHDs manage the day-to-day surveillance, case management, and public health intervention activities. The LHDs use a variety of systems, and technical sophistication, to process information.

It is important to have consistent reporting across LHDs. Although laboratories follow a similar process for reporting notifiable diseases, the focus of the descriptions in this study, as it relates to morbidity reporting, is with physician reporting since that is the focus of this report. Details on electronic laboratory reporting are in the companion FSR on that topic. The participants in the disease surveillance process are described below. A description of their activities is described in a subsequent section.

### Participants

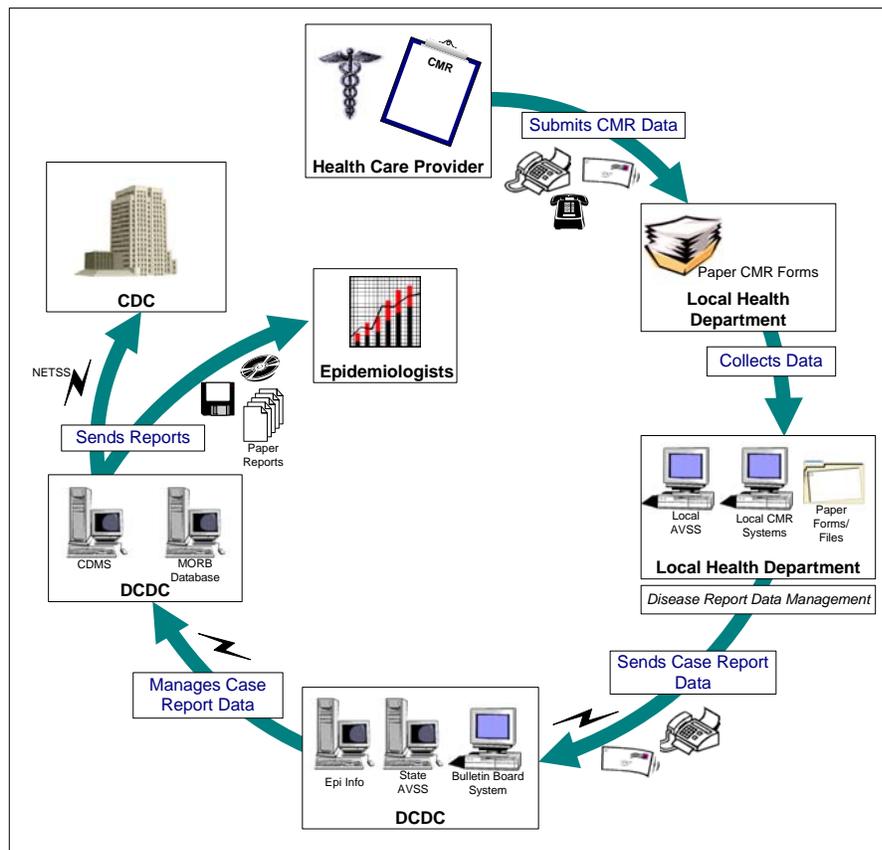
- **Public and private health care providers.** Physicians are the first contact with patients that may need to be treated for diseases that are of a concern to public health. Physicians are responsible for reporting over 80 named conditions, as well as any outbreaks of unusual diseases, within a specified timeframe of identifying the disease. Physicians report these specific conditions to the LHD, based on the residence of the patient, by completing a Confidential Morbidity Report (CMR). The CMR may be submitted to the appropriate LHD by various means including a phone call, facsimile, or mail.
- **Local Health Departments.** While the State disease program offices (such as TB Control Branch and STD Control Branch) are responsible for state-level program management, the LHDs are responsible for the public health activities related to reported cases that are needed to protect the public health of residents within their jurisdiction. Once the LHD receives a CMR for a suspected or confirmed case, it notifies the appropriate public health staff to manage and track the case. In addition, the LHDs report disease case information to the State. The initial source of information is often the CMR.
- **California Department of Health Services, Division of Communicable Disease Control.** There are four branches within the DCDC that use the information from CMRs to support their activities. The four branches include:
  - Infectious Diseases Branch (IDB)
  - Sexually Transmitted Disease Control Branch (STD)
  - Tuberculosis Control Branch (TB)
  - Immunization Branch (IZB)

- **Centers for Disease Control and Prevention.** The CDC is recognized as the lead federal agency for public health in the United States. The CDC provides credible information to enhance health decisions, and promote health through strong partnerships. The CDC serves as the national focus for developing and applying disease prevention and control, environmental health, and health promotion and education activities designed to improve the health of the people of the United States – at home and abroad. California submits information on reportable diseases to the CDC on a weekly basis.

A summary of the reporting process is illustrated in Figure 3.2. A detailed description of the process follows after the summary illustration.

**Figure 3.2**

**Current Disease Reporting Process**



To support the process of disease surveillance, the DCDC relies on various computer systems and desktop databases throughout the organization. The processes and supporting systems are briefly illustrated in Figure 3.3 and described in detail below. While the primary system LHDs use to enter and submit disease information to the state is the Automated Vital Statistics System

(AVSS), there are others (e.g., regional STD systems, standalone local solutions). A detailed description of all the systems used in this process is discussed in Section 3.2.

**Figure 3.3**

**DCDC: Processes and Systems**

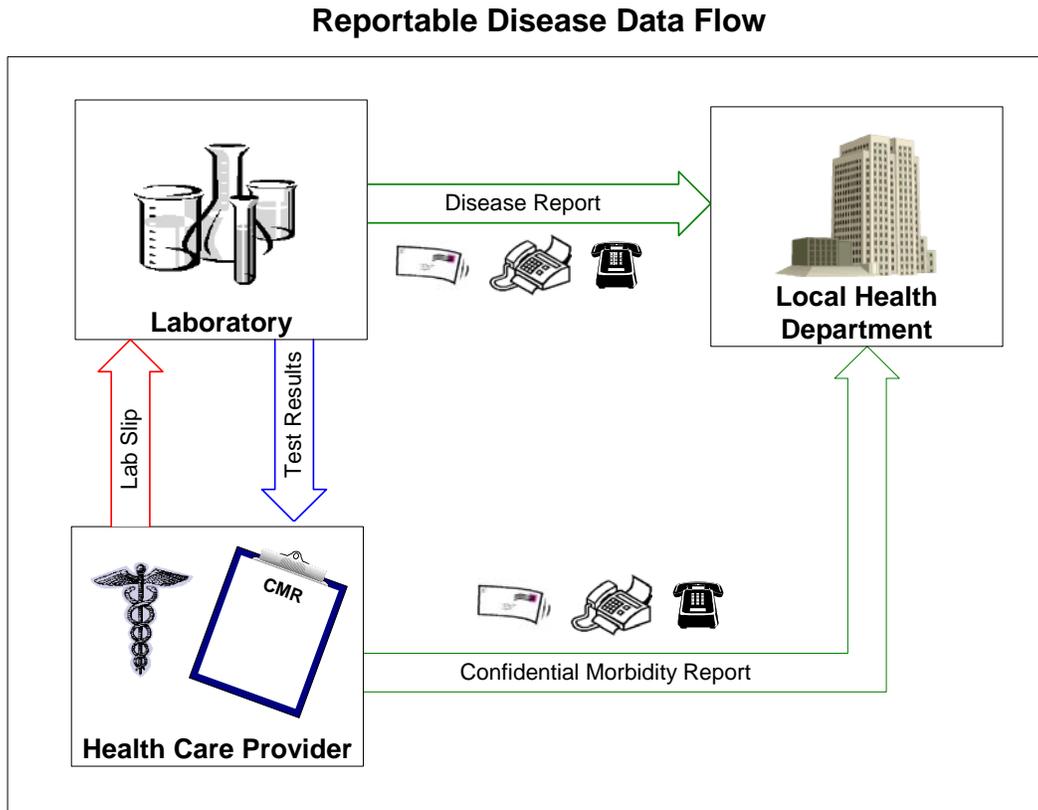
<b>Process</b>	<b>Information Systems</b>
Submit CMR Data	Manual, paper-based processes
Collect Data	AVSS, STD (regional), local systems, paper-based processes
Send Case Report Data	AVSS, Bulletin Board System, paper-based processes
Manage Case Report Data	AVSS, CDMS, MORB Database
Send Reports to the CDC	National Electronic Telecommunications System for Surveillance (NETSS)

**Submit CMR Data**

California has a dual reporting system for communicable diseases. Health care providers are required to report all reportable diseases and conditions. For a subset of these conditions, laboratories are also required to report a case or suspected case of notifiable diseases to public health officials. Figure 3.4 illustrates California's dual reporting system for communicable diseases. California Code of Regulations (CCR), Title 17, §2500, requires health care providers to report over 80 named conditions, as well as any outbreaks of unusual diseases. The providers are mandated to report directly to the LHD in the jurisdiction where the patient resides. The regulations list the reportable communicable diseases as well as the timeframe for reporting (from one hour up to one week) and the means (by phone, facsimile, mail, email) depending on the disease category. Patient consent is not needed for providers to report cases or suspected cases, or to supply additional information requested by State or local public health officials.

To help simplify the reporting process, the State developed a standard form, the CMR, to be used by providers. Appendix B provides a copy of the CMR form and Appendix C presents a list of the reportable diseases and conditions.

Figure 3.4



### Collect Data

LHDs have the responsibility to oversee communicable disease control within their jurisdiction. Notifiable disease reports (i.e., CMRs) may trigger epidemiological and laboratory investigations in an LHD to identify such things as the source of the disease, or appropriate control and prevention measures. LHDs use the disease report information and subsequent investigations to provide the appropriate public health assistance to individuals and their community. For some diseases there is a critical period of time for the LHD to take action. Thus, it is extremely important for the CMR information to be timely and accurate.

To support the disease reporting process, local health officers investigate and confirm that the submitted CMR report meets the case definitions published by the CDC for disease reporting. The CDC publishes case definitions for many diseases. These provide uniform criteria for health department personnel to use when reporting notifiable diseases.

All records, interviews, written reports, and statements produced during an investigation are kept confidential. The LHDs store the disease report and investigation data in a variety of formats. Most LHDs use a combination of paper-based files and information systems to store disease report data. The

LHDs' information systems range from statewide systems, such as AVSS (provided by UC Santa Barbara) to locally-developed information systems (such as simple Access databases) to more complex case management systems. Typically, the LHDs use at least two information systems to accomplish their disease reporting and case management responsibilities. One information system is used for case management (capturing confirmation, investigation and treatment data) and a second system (typically AVSS) is used for reporting data to the State. The CMR data is entered by LHD staff into the case management system and then must be re-entered into the reporting system (AVSS). Recently AVSS has been modified to allow importing data from other systems. At present only one LHD, Ventura County, has taken this approach.

### Send Case Report Data

Once a case of a reportable disease is confirmed, the LHDs reports the information to the DCDC in one of three ways:

- 1) **Using AVSS.**<sup>8</sup> Primarily, LHDs communicate morbidity data to the State using AVSS. While AVSS was designed primarily to automate birth and death certificate production, it has been modified to collect data on the State's reportable communicable diseases. Staff at the LHD receive the CMR for reportable diseases from physicians (except for Human Immunodeficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) disease reports, which have a unique reporting process) and enter confirmed disease reports into AVSS. On a weekly basis, the State installation of AVSS automatically connects, via modem, to each of the local AVSS installations to retrieve new morbidity data.
- 2) **Hardcopy disease reports by mail or facsimile.**<sup>9</sup> Low-incidence or low-population LHDs do not have direct access to AVSS. These LHDs mail or fax the disease case reports to DCDC staff. Staff then enters the disease report data into the State instance of AVSS and disease report data is subsequently entered into the Epi Info system.
- 3) **Alternate electronic methods**<sup>10</sup> A small number of LHDs extract morbidity information from their internal systems to be electronically updated for the State's reporting to the CDC. The files are submitted to the State via an electronic bulletin board system (BBS), transferred via a virtual private network (VPN) or (one county attempting) by sending encrypted files using a Secure FTP server operated by ITSD. In addition one jurisdiction exports data which is uploaded into AVSS for transmission to the state

Figure 3.5 illustrates how LHDs report CMR data to the State.

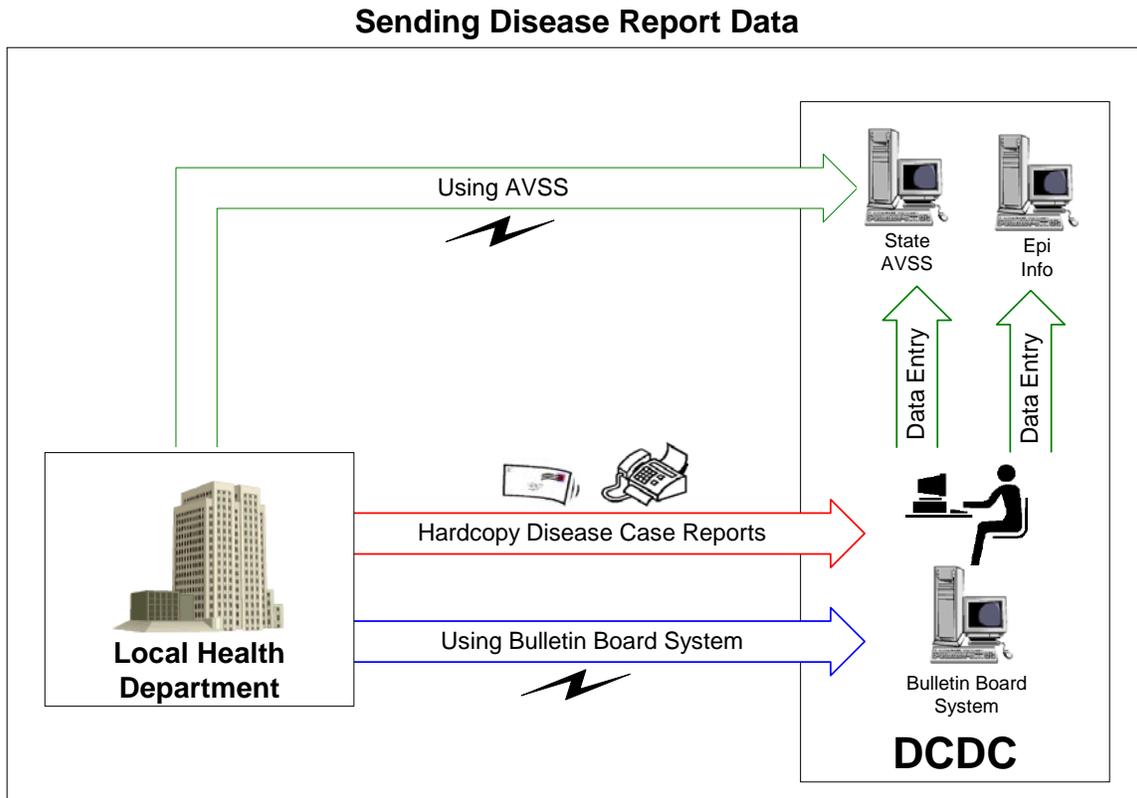
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<sup>8</sup> 43 LHDs use AVSS.

<sup>9</sup> 13 LHDs mail or fax paper CMR forms.

<sup>10</sup> 6 LHDs submit CMR data via alternative electronic methods.

Figure 3. 5



At the State and local level, there are reporting constraints and variances for HIV and AIDS, Tuberculosis (TB), and Sexually Transmitted Diseases (STD). For privacy protection, HIV and AIDS are not reported using the previously described processes. HIV and AIDS data are kept separate from other communicable disease data. The AIDS Office uses the HARS system, developed by the CDC, to capture HIV and AIDS information.

When an LHD confirms a case of TB, the LHDs must complete a four-page report (i.e., Report of Verified Case of Tuberculosis [RVCT]) in addition to the disease reporting process described above. LHDs submit the RVCT directly to the TB Control Branch. LHDs with a high-morbidity of TB in their jurisdictions use the CDC-developed Tuberculosis Information Management System (TIMS) to report to the TB Control Branch. Low-morbidity LHDs mail or fax hard copy forms to the Branch for entry into TIMS.

LHDs submit data on reportable STDs to the State either directly to the STD Control Branch or to SSS. All cases of Syphilis and Chancroid are reported directly to the STD Control Branch.

In addition, many LHDs use locally-developed CMR forms (enhanced versions of the State CMR) to capture STD and TB data from health care providers. These

modified CMR forms capture additional data to assist the LHDs in their investigation and case management activities.

### Manage Case Report Data

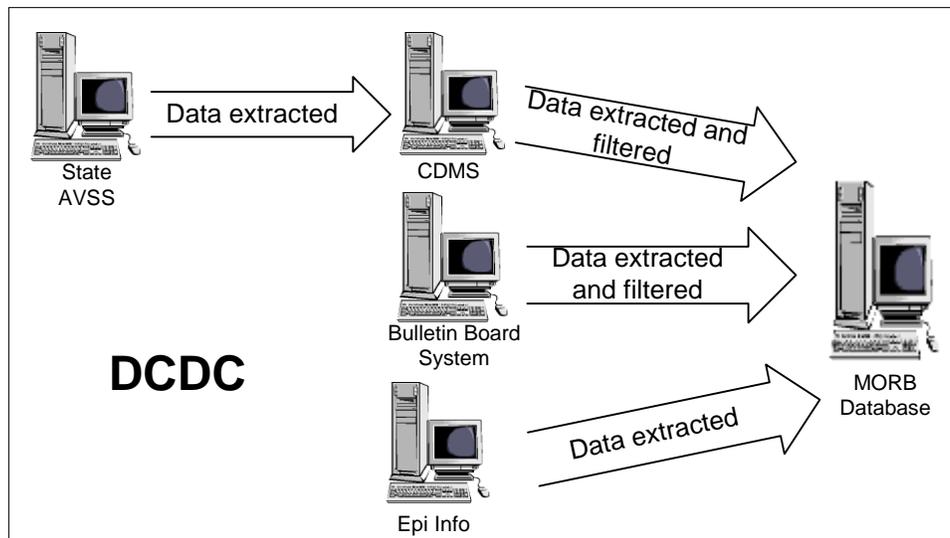
The AVSS system was originally designed to capture information on vital statistics (i.e. birth and death records), and subsequently modified to accept morbidity data. As a result, AVSS does not provide the flexibility and functionality to properly manage disease report data. Consequently, DCDC staff uses two other systems, the Communicable Disease Management System (CDMS) and the MORB Database, to support their activities. CDMS, a cache-based system, comprises two modules: CMR and vaccine-preventable diseases (VPD). The CMR module stores data from AVSS. The VPD module stores extended case management data from case report forms, entered by the Immunization Branch.

DCDC staff has developed a SQL database ("MORB") and SAS programs to transform both CDMS and non-CDMS data sources (such as the files received on the bulletin board system and Epi Info) into a SQL table with a consistent format.

Figure 3.6 illustrates how staff manages CMR data at the State level.

Figure 3. 6

### Managing Disease Report Data



### Send Reports to the CDC

Through NETSS, the CDC receives reports of notifiable diseases from the 50 state health departments, New York City, the District of Columbia, and five U.S. Territories. NETSS provides the CDC with weekly data regarding cases of nationally notifiable diseases. Personal identifiers such as name and address are not transmitted to the CDC in notifiable disease reports. Weekly, the CDC

collates and publishes the data for nationally notifiable diseases in the Morbidity and Mortality Weekly Report (MMWR).

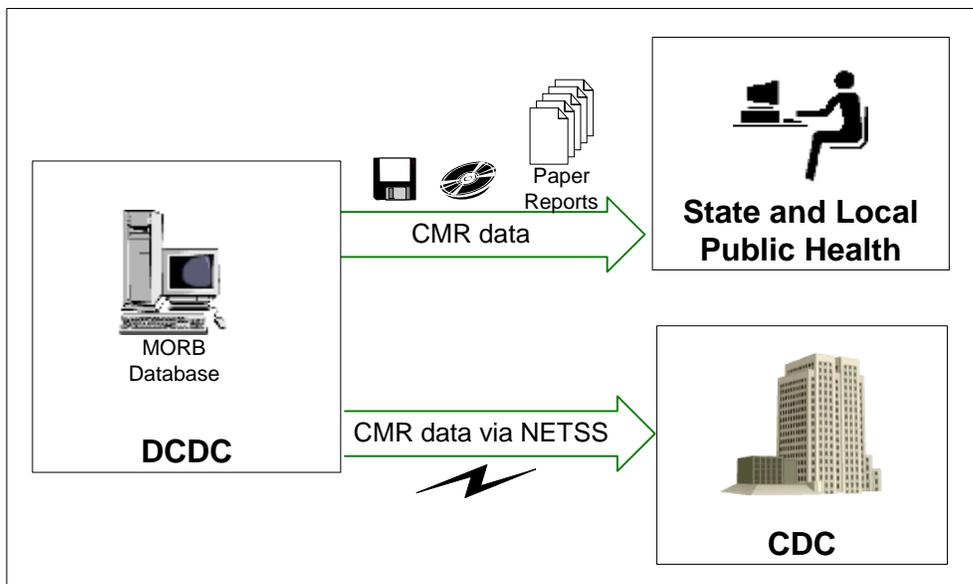
California electronically transmits core surveillance data — date, county, age, sex, and race/ethnicity — and disease-specific epidemiologic information for nationally notifiable diseases to the CDC through NETSS. DCDC compiles a NETSS file by extracting some data from the MORB database and combines this with pre-formatted, extended NETSS files from the CDMS-VPD module and the STD program, which are also data feeds into the MORB database. While NETSS does not require the use of a specific computer software program, the data must be transmitted in American Standard Code for Information Interchange (ASCII) format. This allows the CDC to efficiently integrate data from surveillance systems required to report through NETSS. In California, a weekly connection is made to the CDC's SDN, through a web browser to transfer the NETSS file.

In addition to reporting to the CDC, DCDC provides disease report data to State and local public health staff in various formats. Monthly, the staff publishes communicable disease summaries on the DHS website and also provides data files from the MORB Database to State and local epidemiologists for further analysis.

Figure 3.7 illustrates the process of distributing disease surveillance data to the CDC and other State and local public health staff.

**Figure 3.7**

**Sending Disease Reports**



### 3.2 Business Problems and Opportunities

The mission of the California Department of Health Services (DHS) is to protect and improve the health of all Californians. After September 11, 2001, DHS DCDC recognized that it must immediately confront some new and more serious challenges relating to public health, e.g., bioterrorism. Accordingly, DCDC began an effort to roadmap the strategic problems that it must expect to handle over the next five to ten years. The CalPHIN Strategic Plan was undertaken and required the participation of various DHS organizations, local health departments, other agencies, other departments and providers. The Plan was completed in 2003, it documented the major challenges DCDC must address to protect and improve the health of Californians.

The Strategic Plan emphasized the problem of DCDC's existing surveillance capabilities for disease tracking, epidemiological monitoring, and notification of outbreaks—especially in critical public health situations.

The initial source of information for public health surveillance is primarily the reporting of information from physicians and laboratories. State and local public health officials rely on these reports of notifiable diseases to:

- Determine the extent of the morbidity in the population (at the state and local level)
- Evaluate risks of transmission
- Intervene rapidly when appropriate
- Identify outbreaks and epidemics
- Develop prevention programs, identify core needs, and use scarce prevention resources efficiently
- Provide efficient and effective education and treatment programs
- Evaluate the success of long-term control and intervention efforts
- Facilitate epidemiologic research
- Assist with national and international disease surveillance efforts

Without such data, trends cannot be accurately monitored, or unusual occurrences of diseases might not be detected. Further, the medical community may not be accurately informed of occurrences of communicable diseases, and the effectiveness of intervention activities cannot be easily evaluated. A delay or failure to collect communicable disease information may contribute to serious consequences in the health of populations, such as secondary transmission.. The usefulness of public health surveillance data depends on its uniformity, simplicity, and timeliness.

According to California's *Bioterrorism Surveillance and Epidemiologic Response Plan*, the existing disease reporting processes and systems are neither sensitive,

nor timely enough to allow a rapid response to a bioterrorist event. Current estimates are that, in some jurisdictions, only about 20% of reportable diseases are actually reported. Providers are not fully meeting their legally mandated requirements to notify LHDs of reportable communicable disease occurrences. There are many reasons for this, including: a lack of knowledge, time, or interest in disease reporting, or the cumbersome, paper-based reporting process. Based on an analysis of the current people processes and the critical challenges to the technological infrastructure, DHS has identified the following critical problems to tackle as it prepares for future demands and opportunities in support of its surveillance activities.

- Inefficient Disease Reporting and Inefficient Local Case Management
- Ineffective Methods for Collecting and Aggregating Statewide Information on Communicable Diseases
- Decentralized, Non-Standard and Uncoordinated Outbreak Detection and Alerting
- Autonomous and Disparate Geographical and Graphical Data Analysis Methods

Each of these problems is elaborated in the following paragraphs.

### **3.2.1 Inefficient Disease Reporting and Inefficient Local Case Management**

As mentioned previously, it is estimated that only 20% to 50% of cases of reportable diseases are being reported. Of the data collected, it is often full of omissions and is often incomplete. Because of the labor intensive effort to collect and correct this reportable information, this activity is largely left undone. This is because of several source problems:

- Providers currently must know all reportable conditions and manually initiate action to report the condition to a LHD. This involves the provider to have both the form on hand and to take the action to report the disease. Frequently, providers overlook reportable conditions because most don't have an automated way or reminding then a report is required.
- There currently is no way to validate or check the quality of morbidity data as it is submitted by a provider. Most morbidity reporting is the submission of paper based forms via fax or e-mail. LHD frequently receive morbidity reports with incomplete or contradictory information.
- Providers have limited incentive to submit CMRs. There is no process to ensure that providers submit appropriate disease reports. Providers may not always be able to follow reporting regulations due to the lack of recognition of public health needs, priorities and lack of resources in provider offices, or the perception that there is little or no penalty for noncompliance. Due to the paper-intensive CMR process, providers do

not receive any feedback or epidemiologic knowledge from the LHDs that may be of value to their practice.

- Currently, there is no statewide automated reporting of lab results. Lab results must be submitted manually to a local health jurisdiction.
- Redundant reporting or reporting that “falls through the cracks”. There are instances when a case is required to be reported by the physician, the laboratory that initially receives the specimen, and a State laboratory. The opportunity for double counting of a single case increases due to these multiple reporting requirements. Even worse, when a report is to be submitted by both the physician and laboratory, neither may follow through due to the assumption that the other entity will generate the report and the case doesn’t get reported at all.
- In most local health jurisdictions, there are no automated tools to assist a local health officer with case management and investigation functions such as the case investigation, follow-up of contacts to the case, documentation of findings, or requesting additional information. All this work occurs manually or by using an un-integrated set of tools, most commonly MS-Excel and MS-Word.
- Finally, between local health jurisdictions, there are great disparity and different tools used to analyze epidemiologic data. Because each health jurisdiction collects data differently, each jurisdiction has developed their own methods to analyze and spot trends and outbreaks, including the use of different software and tools. This information is difficult to share between jurisdictions and it is difficult to compare and analyze at the state level.

The current technology is not comprehensive, and in some cases not very efficient or effective. The systems used to collect data for communicable disease surveillance are essentially outdated. The nature of the problem involves:

- **Reliance on complicated legacy systems.** The disease surveillance process requires extensive dependence on legacy systems. The problems include: multiple versions of data, lack of standardized data, and inability for collaboration between the users of the data. The collection of communicable disease data is based on legacy systems difficult to maintain, or heavily modified systems not designed for this type of processing.
- **Lack of standardization.** The existing information systems do not comply with industry-wide technology and data standards. The systems also do not meet the CDC’s NEDSS or PHIN requirements. The implementation of these standards includes a more secure environment.
- **Lack of electronic reporting system.** The current reporting process requires providers to submit CMRs through the mail, facsimile, or phone. The data collection process is not automated and the handling of paper

and multiple data entry is a cumbersome process for local and State public health surveillance staff. In addition the paper-intensive processing does not provide a secure and confidential environment for sensitive public health information.

- **Significant effort required to cleanse and convert current data.** The DHS staff spends significant time filtering and cleansing the disease report data to create meaningful information for analysis and further reporting. The current process is a compromise in data accuracy and validity. Due to the many transformation and edits, much of the original data from the source is lost in State-level systems. In addition, this results in duplicate effort (data entry and manipulation) and the inability to share information among public health entities.

### 3.2.2 Inefficient and Limited Methods for Collecting and Aggregating Statewide Information on Communicable Diseases

At the State level, there is a critical need to incorporate morbidity data from LHDs with their own surveillance systems. This is needed to support more efficient and rapid statewide analytics and alerting, as well as federal reporting. Unfortunately, several shortcomings exist in the present operations that make this very ineffective. The current data collection method is both paper and staff intensive. The nature of the problem involves:

- **Labor-intensive data collection.** The current process includes a significant amount of manual intervention. The process includes providers completing a paper form and sending to the LHD where staff then enters the data into one or more systems. The manual effort creates problems including data entry errors, redundant data collection processes, and mailing costs.
- **Redundant processes.** Redundant data collection and entry processes exist. Many LHDs lose time and money by performing double data entry of the demographic data into several information systems (at least one for reporting and one for case management). This redundancy increases the workload for LHD public health staff.
- **Time-consuming processes.** No matter how the disease reports are transmitted (e.g., facsimile, mail, phone), significant delays are inherent in the time for providers to complete the CMR, send it to the LHDs and, ultimately, enter the DHS reporting process. As new pressures for early detection of disease outbreaks have arisen, most notably for outbreaks arising from bioterrorism, it is critical that public health officials have timely and accurate information to develop appropriate responses.
- **Data interaction between LHDs and the State, and between LHDs, is not dynamic or interactive.** The CMR data flow from the LHDs to the State is unidirectional, and there is no such interaction among LHDs. Once the data is sent to the State, it is difficult for LHDs to query, edit, or

track submitted data or perform regional trend analysis. LHDs only have access to the data in their system. If they have modified the data in their systems, it may be different than what exists in the State system and they are unable to access data in the State-level systems for comparison. As a result, LHDs cannot perform epidemiological reviews of data from the State's database in a timely manner, nor can they access disease report information from other LHDs (including their cases reported elsewhere).

- **Current processes do not adequately protect private health information.** The public health systems have an obligation to protect the confidential health information of individuals that have been identified with specific communicable diseases. Inadequate protection of health information has significant financial, legal, regulatory, and business continuity repercussions, including civil and criminal penalties. Manual, paper based processes may not have the ability to incorporate adequate measures to maintain the confidentiality of private health information.
- **An integrated data repository is lacking to support problem detection, analytic and alerting functions, and to track co-morbidity (multiple infections in individual patients) across disease-specific programs/organizations.** The need for such a repository to support detection, alerting, and analyses is described below. Different communicable disease programs within the State use provider and laboratory reporting as the basis of their surveillance activities. However, each program typically has a separate surveillance system that is focused on the specific needs of the disease (or diseases) they monitor, with no ability to share or link case data (such linkage occurs manually or not at all). The lack of this type of information can increase treatment costs and the risk of inappropriate treatment, and precludes efficient analyses for trends and risks for co-morbidities.

### 3.2.3 Decentralized, Non-Standard and Uncoordinated Outbreak Detection and Alerting

Public health surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding health-related events for use in public health action to reduce morbidity and mortality, and to improve health<sup>11</sup>. As new pressure for early detection of disease outbreaks have arisen, most notably for outbreaks arising from bioterrorism, it is critical that public health officials have timely and accurate information to appropriate responses. Effective public health surveillance can act as an early warning system by detecting microbial, environmental, behavioral, occupational, and other health threats

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<sup>11</sup> Center for Disease Control and Prevention. Updated guidelines for evaluating public health surveillance systems: recommendations from the guidelines working group. MMWR 2001: 50 (No. RR-13).

- **Current outbreak detection is decentralized.** Public health is supported by an array of Federal, State and local organizations. These organizations are further divided into functional units that support clinical, health department, laboratory, disease program, and other operational divisions. Most outbreak detection occurs across these disparate organizations and functional units and lacks a statewide method to coordinate outbreak detection.
- **Current outbreak detection is non-standard.** Each LHD has different methods to assist in the examination of disease data and report anomalies, aberrations and outbreaks. In most LHD, this is a cognitive process occurring by staff reviewing data—there are minimal, if any automated data analysis tools or processes looking for outbreaks.
- **Current outbreak alerting is non-standard.** If an outbreak is detected, each organization currently has different methods to alert the different organizations (Federal, State and Local) and functional units (clinical, health department, laboratory, and disease program). There are primarily manual methods employed to meet the day-to-day business needs and operations of public health alerting, often resulting in missing important assistance from parties that could assist addressing a critical outbreak. Where automated alerting exists (e.g. Health Alert Network), the generation of such alerts from disease detections/reports is a completely manual process.
- **Current outbreak detection is uncoordinated** The complex responsibilities and interactions between Federal, State and local organizations public health partners demand significant coordination of information. In most cases today, this information must all be shared manually. That is a health worker must recognize a situation exists, or recognize an event requires reporting, and then take an action. Currently, there are only manual methods to coordinate responses between organizations.
- **Federal and State rapid disease surveillance needs for emergency preparedness are not being addressed.** A means to meet these needs and guidelines, and improve public health and response for urgent communicable disease problems, is not yet available in California.

### 3.2.4 Missing, Autonomous, or Disparate Geographical and Graphical Data Analysis Methods

Effective public health surveillance can help to concentrate resources, focus interventions in areas of greatest need, and facilitate future projects by tracking and monitoring the incidence, patterns, and trends of diseases. Additionally, it can assess public health measures by providing accurate health information to policy makers.

Health care providers, public health professionals, policymakers, and other public health stakeholders recognize that access to relevant, reliable information will greatly improve their ability to address personal and community health concerns—it can save lives.

- **The state and local health departments often lack the tools and interfaces to enable geographic data presentations, customized graphical presentations and statistical/analytic report tools.** These tools allow public health programs to more efficiently and effectively identify patterns of morbidity to better control and prevent communicable diseases. Geographic information systems (GIS), a key component linking geo-coded information to other data elements (e.g., demographics, disease reports, risk factors) to display clusters of illness and identify “hot spots” or high risk areas, is not widely implemented and not in a standard fashion or on standardized statewide data. The CDC’s term for this category of functional requirements for disease surveillance applications is “analysis, visualization, and reporting” (AVR).
- **Data analysis methods are autonomous.** Currently, health information is maintained in silos in many organizations. State and Local organizations, program, clinics and laboratories. There is no integrated and linked view to this information.
- **Data analysis methods are disparate.** As would be expected, different analytic methods are utilized by each organization and function. Cooperation, information sharing and coordinated/standardized analytic methods are now essential to meet the day-to-day business needs of public health operations as well as bioterrorism and public health preparedness.

### 3.3 Business Objectives

Problem	Objective
1. Inefficient Disease Reporting and Inefficient Local Case Management	1.1 Establish an electronic channel for Providers to submit morbidity reports. 1.2 Induce Providers to submit electronic morbidity reports, by returning value-added disease specific information about their submitted reports. 1.3 Validate incoming electronic morbidity reports at time of entry, to reduce missing and incorrect data 1.4 Provide local health officers tools to assist in the investigation,

- documentation and follow-up on cases
- 1.5 Provide LHDs tools to perform epidemiologic data analysis.
- 2. Ineffective Methods for Collecting and Aggregating Statewide Information on Communicable Diseases
    - 2.1 Shift workload out of LHDs to Providers, by allowing Providers to directly enter morbidity reports
    - 2.2 Reduce the lag-time between when a reportable event is observed and when the data is reported to DHS
    - 2.3 Allow two-way communication of disease information between DHS and LHDs, and between LHDs utilizing PHIN-specified data exchange standards.
    - 2.4 Secure communication of disease information between LHDs and State, and between LHDs.
    - 2.5 Comply with NEDSS and PHIN security specifications.
    - 2.6 Enable bi-directional disease case data exchange with other state surveillance systems, utilizing PHIN-specified data exchange standards.
  - 3. Decentralized, Non-Standard and Uncoordinated Outbreak Detection and Alerting
    - 3.1 Enhance early centralized statewide disease detection
    - 3.2 Standardize methods to detect anomalies, aberrations and outbreaks
    - 3.3 Establish mechanism to alert public health organizations.
  - 4. Autonomous and Disparate Geographical and Graphical Data Analysis Methods
    - 4.1 Establish an integrated view of disease information
    - 4.2 Provide common tools for data analysis and identification of disease patterns, trends, and risks.

### 3.4 Business Functional Requirements

Functional Requirements		
General		
Overall	Objective	
1.	AVSS (legacy system) historical data migration to populate new CMR or episode data store.	2.3
2.	Check for logical date sequence errors during data entry and when importing data	1.3
3.	Allow LHDs with standard internet browser and low bandwidth modem (e.g., 28.8k) to access Disease Surveillance System.	1.1
4.	Provide a single data repository for CMR reports that will be accessible to authorized DHS and Local Health Department (LHD) staff.	1.4
5.	Provide authorized users from LHDs and the State access to data records that they entered. Jurisdictions may elect to make their records visible to other selected LHDs	1.4
6.	A case record must contain enough information to comply with section 2502, Title 17. Ability to retain two sets of case classification/status, one by LHD and one by State. Separately track the case reporting status and case classification	1.4
7.	Ensure complete, accurate, and standardized data entry through enforcement of business rules and edits.	1.3
8.	Maintain CMR and episode/case data indefinitely.	1.5
9.	Provide an easy-to-use mechanism to search for data and information within the database.	3.2
10.	Generate appropriate notifications when problems or systems failures occur.	3.2
11.	Easily maintainable and scalable for additional health care providers and users.	2.1
12.	Support the CDC's PHIN standards. See <a href="http://www.cdc.gov/phin">www.cdc.gov/phin</a> for specifics	2.3
13.	Provide a user-friendly interface that consists of easy-to-navigate menus, pick lists, on-line window and field help, Frequently Asked Questions (FAQs), with visually distinguishing optional and required fields.	1.4
14.	The proposed solution must have an easy-to-use graphical user interface, characterized by "point and click" capabilities. The portion of the application that collects data from external user must operate within a standard web browser. To support high volume data entry the user should be able to enter all information from the key board and/or use mechanisms to minimize mouse use.	1.1
15.	Validate submitted data, translate into appropriate formats, check for inconsistencies or lack of completeness, and load the data into a database.	1.3
16.	Availability of system 24-hours, seven-days-per-week—except for 2 hours per week for application maintenance and 8 hours per month for system maintenance. A total of 16 hours per month for scheduled maintenance.	1.4
Security		
17.	Provide security to limit access to system functions, data, and reports based on role and responsibilities.	1.4
18.	Provide appropriate security levels to ensure that only authorized users can read and/or update data.	1.4
19.	Authenticate HL7 messages and data files to ensure the submitter is authorized to send	2.4

Functional Requirements		
	data to the system.	
20.	Authenticate reporting requests (including downloads) from providers, LHDs, and DHS to ensure access is provided only to individuals approved for access (2-factor authentication).	1.1
21.	Maintain separation of CMR data from other DHS program data to prevent unauthorized access or entry.	2.5
22.	Perform all transactions using an integrated security model that will support the CDC HAN, NEDSS and PHIN requirements as they become available.	2.5
23.	Include a security mechanisms that include data encryption between Web browser and Web-server (SSL).	1.4
24.	Enforce two-factor authentication of users logging onto the system.	1.4
25.	Assign and maintain unique user logon Ids and passwords.	1.4
26.	Capability to use Active Directory Service (ADS) to control authentication as well as application and data level security.	1.4
27.	Voluntarily comply with appropriate HIPAA <sup>12</sup> security and privacy regulations.	2.5
CMR Data Collection (Provider Screen)		
28.	Create a web application to automate the collection of CMR data for diseases identified in CCR, Title 17, Section 2500. Also support optional entry of additional diseases	1.4
29.	Assign unique ID number to each CMR that will remain with CMR throughout life cycle	1.5
30.	Assign a status and date to all incoming electronic documents (e.g., forms) received via the web application.	1.4
31.	Pull-down menus for standard coded attributes such as disease codes	1.3
32.	Provide the ability to generate electronic receipt notifications to health care providers for report submittals.	1.2
33.	Notify submitters of data entry errors.	1.3
34.	Provide ability to add new reportable diseases (as authorized by reporting mandates)	1.4
35.	Provide geo-code on address entered to initially assign responsible LHD; store latitude and longitude with address information.	1.4
36.	For CMRs that belong out of State, enable automatic placement in State portion of Global Area	1.4
37.	Automatically display disease-specific screens and instructions as appropriate	1.4
38.	Provider to receive automatic acknowledgement that LHD received CMR	1.2
39.	Physician self-registration on first time in; (association to already registered facilities); and an 'add' facility feature	1.1
40.	Enable providers to receive summary disease patterns of data	1.2

<sup>12</sup> The Health Insurance Portability and Accountability Act of 1996 (HIPAA) addresses the sharing of confidential medical information. Section §164.512(b) of the HIPAA regulations exempts the reporting of confidential data related to communicable diseases and immunization to local health departments from compliance. Reporting of communicable diseases to the local or state health department are exempt due to the mandates from the State to use the information for surveillance and prevention of communicable diseases.

<b>Functional Requirements</b>		
41.	Add fields to CMR form: 'Patient has been informed of diagnosis', 'daytime address', 'lab accession #' (pointer to a specimen)	1.3
42.	Enable confirmed case acknowledgement	1.2
43.	Prompts for physician to print submitted CMR for their records	1.1
44.	Provider to be prompted to add other geographic variables such as place of work or place of exposure, occupation	1.3
45.	Adapt test, treatment and results area of CMR form to disease being reported	1.1
46.	Enable physician to call up previously submitted CMR and add data (future, when 2-factor authentication is available for clinicians)	1.2
<b>LHD CMR Acceptance and Workflow</b>		
47.	Enable LHDs to view CMRs in other jurisdictions when authorized by those jurisdictions	2.4
48.	Provide ability to collect and archive data that does not warrant a case	1.4
49.	Route CMRs to non-automated LHDs via fax server	1.4
50.	Ability to document multiple person names (AKAs) and multiple addresses	1.4
51.	For each episode, links are maintained to one or more CMR and/or ELR records and to one Person record; link cases to outbreaks	1.4
52.	System should treat acute and chronic reports as separate episodes when appropriate	1.4
53.	Re-route episodes to owning PAMs (Program Area Module; e.g., STD, TB) in jurisdictions that do not manage those types of cases	1.4
<b>Episode Management</b>		
54.	Episode/case information should be auto-populated with data from the CMR or ELR from which the episode record was created	1.4
55.	Generate follow-up investigation forms from episode/case files	1.4
56.	Identify and track episodes; support ability to enter status codes tailored to disease	1.4
57.	Enable prioritization of cases	1.4
58.	Capture client contacts and previous travel history	1.4
59.	Sort episode list by any parameter (e.g., status code, disease (type), program name, PHN assigned) for easier on-line viewing	2.4
60.	Enable LHDs to control reporting of episodes to the State	2.3
61.	Support recording of (progress) notes within each episode	1.4
62.	Provide on-line file of CDC case definitions	1.4
63.	Provide user configurable basic workflow, notifications, and task tracking facilities	1.4
64.	Multiple notes allowed for each episode; each note referenced by creation date-time and by author	1.4
65.	Support attachment of digitized objects (text, images, scanned documents) to	1.4

Functional Requirements		
	episodes	
66.	Enable sharing of selected cases across jurisdictions.	2.3
67.	Capture 'daytime location of patient,' (e.g. work address, school location, zip code)	1.3
68.	Ability to associate and disassociate cases to an outbreak or other situation.	1.5
69.	Provide the disease specific capability or Program Area Modules (PAMs) for STD, TB, IZ, IDB, PIR and Animal Rabies. This must include custom forms, ability to post/distribute reference materials, conduct surveys, and unique logic, such as the syphilis reactor grid.	1.5
Epidemiology		
70.	Tools for visualization of disease incidence patterns statewide; tally number of diseases; present disease rate statistics by jurisdiction	4.1
71.	Measure elapsed time between initial CMR reporting of a case and receipt of a related laboratory report	2.2
72.	Display 'Epi' Curve; graphical display of cases by onset date or by user defined time intervals.	1.5
73.	For data visualization and reporting, include suspect cases prior to potential case confirmation or close (preferably do not wait for closed case status)	1.5
74.	Ability to download raw data into program of individual choice (SAS, SPSS, ESRI Arcview etc.) for data mining and/or geographical display; i.e., enable JDBC or ODBC database connection.	1.5
75.	Provide ability to compare local disease demographic data with statewide case statistics; provide easy user interface for comparing selected jurisdictions (e.g., pivot table or cube/OLAP support)	4.2
76.	Implement a data warehouse and/or datamarts to be used for reporting and analytics; i.e. a redundant data store to avoid performance impacts on operational data store.	4.1
Auditing and Record Retention		
77.	Create and maintain a journal of all CMR and episode data received, processed, and updated. The journal must identify the date, time, and submitter of the data.	1.4
78.	Create a report for auditing purposes that tracks all reports and alerts generated from the data. Information relating to the alert or query will be logged indicating the date and time of the request, who made the request, and the individuals receiving the results.	2.5
79.	All episode and CMR records retained regardless of outcome; Retain closed "not cases", and retain records of inactivated or transferred cases	1.4
Analytics and Reporting		
80.	Provide a user-friendly ad hoc query tool to access the CMR and episode data.	1.4
81.	Enable users to receive summary disease data patterns based on reported episodes	1.5

<b>Functional Requirements</b>		
82.	Provide a report generator to enable advanced users to create custom reports	1.5
83.	Provide the ability for all authorized users to select and run standard, predefined reports.	1.4
84.	Provide the ability for authorized users to generate simple ad hoc reports.	1.4
85.	Support web-enabled reports in both summary and detail format, and the ability to support download of results for subsequent offline analysis.	1.4
86.	Provide the ability for authorized users to export defined datasets and data reports for external data analysis. Included the ability to export information from customized forms, maintaining links to the relevant case/patient information.	1.4
87.	Provide hard copy reports of all system data stores, for example ability to print case history report forms.	1.4
<b>Help Functionality</b>		
88.	Provide an online help function in which users can search for and receive instruction on specific topics related to system functionality.	1.4
89.	Provide online help that displays data field definitions for all user entered data fields.	1.4
90.	Provide online, context sensitive help at the module and function/screen.	1.4
<b>Administration</b>		
91.	A mechanism is required to receive the role of the authenticated user signing in to drive role-based data retrieval. A HAN type of system may be the source of the directory roles.	2.5
92.	Automatic bug trapping; for example user interpretable errors messages, as opposed to internal server errors.	1.3
93.	Ability to merge duplicate person records and unmerge.	1.4
<b>Electronic Data Transfer</b>		
94.	Enable electronic receipt of PHIN compliant messages containing CMR data and case transfers from LHDs. Auto forward CMR and case data to the relevant LHD for case follow up, if the case belongs to an external system or organization.	2.4
95.	Export CMR or more complete episode data and load it into PAM and vice versa	2.3
96.	Expose the person registry for access by authorized external Public Health systems (e.g. separate PAM systems) by providing web services to 1) check for the presence of a person in the registry, and 2) add a new person to the registry.	2.3
97.	Expose the State-wide CMR data store for access by authorized external Public Health systems (e.g. other CMR county systems) by providing web services to query for CMRs in an LHD's queue.	2.4
98.	System integration; This should include interfaces with electronic lab reporting, CalWeb-TB, LHDs with local systems, using PHIN messaging transport layer (PHIN	2.3

Functional Requirements		
	MS) where feasible.	
99.	Provide NETSS/NEDSS or other CDC specified formats for submitting morbidity data to CDC.	2.3

### Technical Requirements

Technical requirements for the proposed system include:

- System Size and Performance Requirements
- Operating Environment
- Data and Security Requirements
- Interface Requirements

Each of these requirements is specified in Figure 3.8..

**Figure 3 2.**

### System Size and Performance Requirements

Component	Minimum Technical Requirement
<b>Workstations – DHS/ LHDs<sup>13</sup></b>	Intel Pentium III 64 MB of RAM 4.3 GB of available hard disk space Two button mouse 32 bit LAN card with 100 Mbps Network Interface Card
<b>Workstations – Health Care Providers</b>	LAN card with 10 Mbps Network Interface Card or 28.8KB modem with Internet connection
<b>Users</b>	Approximately 500 LHD users in the initial roll out of the project 10-15 DHS users 1,000+ external users
<b>Required Up Time</b>	The Web CMR system will be available to users 24x7 except for 16 hours of scheduled maintenance monthly: 2 hours per week, and 8 hours per month.
<b>Required Response Time</b>	For 90 percent of the system transactions: <ul style="list-style-type: none"> <li>• Require no more than 15 seconds to provide initial logon to the application</li> <li>• Require no more than 3 seconds to provide responses to simple database queries, complete on-line updates to the database, and navigate from screen to screen</li> </ul>

<sup>13</sup> DHS and LHD staff currently have access to workstations that meet this minimum configuration.

**Operating Environment**

<b>Component</b>	<b>Minimum Technical Requirement</b>
<b>Client Operating System</b>	Windows 2000 or higher with Web Browser (reasonably current Internet Explorer 5 or greater)
<b>Network Operating System</b>	Linux, UNIX, or Windows 2000 +
<b>Application Server Operating System</b>	UNIX, Windows 2000 for application and databases servers
<b>Application Language</b>	Object oriented language such as Java or a MS.NET development language such as C#, Visual Basic .NET
<b>Data Base Management System (DBMS)</b>	Widely available commerce relational database, Oracle, Microsoft SQL Server 2000, etc.
<b>Transport Protocols</b>	Internet standard TCP/IP protocol

**Data and Security Requirements**

<b>Component</b>	<b>Minimum Technical Requirement</b>
<b>Data Structure</b>	The Web CMR data will be stored in a traditional relational format. Data will be normalized, stored in tables with defined relationships, attributes, and keys that can be mapped to the CDC logical data model (HL7 RIM compliant data model)
<b>Data Integrity</b>	The system will maintain an audit log that tracks changes to key data elements. This log will capture transaction information such as date and user ID. The system will employ edit checks to ensure that users do not make simple data entry errors.
<b>Data Conversion</b>	Data conversion includes data stored in the AVSS, CDMS, ANRABIES.rec, STDMIS, Reactor History, and MORB Database.
<b>Field Level Security</b>	Selected fields may require specific security privileges. This level of security will be controlled by the application.

**Interface Requirements**

<b>Component</b>	<b>Minimum Technical Requirement</b>
<b>User Interface</b>	The proposed solution must have an easy-to-use graphical user interface, characterized by "point and click" capabilities. The portion of the application that collects data from external user must operate within a standard web browser. To support high volume data entry the user should be able to enter all information from the key board and/or use mechanisms to minimize mouse use.
<b>System Interfaces</b>	System must have ability to manually import data from other sources. (e.g., LHDs, health care providers)



## 4.0 BASELINE ANALYSIS

While Section 2.0 discusses the programmatic processes related to CMR reporting, the following section focuses on the technology used to support the business processes.

The following summary provides a high-level description of the existing systems used for CMR reporting and surveillance. Additional detail on each system is provided in the subsequent sections.

- **Objective of System/Process.** To gather morbidity data for reportable disease surveillance. The original purpose of the primary system to collect morbidity data (AVSS) was to automate vital statistics data reporting.
- **System Ability/Backlogs.** Backlogs exist when data from health care providers need to be entered into LHD systems or when LHD surveillance systems, which generate surveillance data to the DCDC, are unable to generate the necessary information.
- **Satisfaction.** Staff are not satisfied with the existing systems. Issues that contribute to this dissatisfaction include the following areas:
  - Multiple databases containing conflicting data
  - Time required to validate data from external sources
  - Manual nature of data collection and reporting process
  - Inability for locals and providers to receive data back from the State
- **Data Input.** Data for disease surveillance reporting is received in several formats. Most of the morbidity data is captured in AVSS. However, a number of LHDs submit data electronically in various formats. In addition, several LHDs submit manual forms to the State which must be manually keyed into AVSS.
- **Data Characteristics.** Data comes from 61 sources (all of the LHDs) and may be completed with inconsistent definitions. The LHDs that submit electronically do not follow any standard formats or definitions. The data in the current surveillance systems do not adhere to CDC standards as presented in the NEDSS and PHIN initiatives.
- **Provisions for Security.** The current environment primarily consists of processes that rely on the receipt and handling of paper copies of the CMR. Health information is highly confidential and compromised by the amount of paper and lack of control to authorize access to the data. Improved security and access rights are required.
- **Equipment requirements of current system.** Most LHDs require a PC for AVSS or automated system to generate files for submission to the State.

- **Internal/External Interfaces.** There are minimal direct interfaces with external data sources. The State’s AVSS can upload disease surveillance data from the AVSS servers at U.C. Santa Barbara. However, LHDs cannot access the State’s AVSS system.
- **System Documentation.** Currently, there is very limited documentation on data collection and cleansing.

**4.1 Current Method**

This section documents the current DHS practices relating to morbidity reporting and management business functions. The information provides a baseline against which the State can measure the potential advantages or disadvantages of the proposed solutions. The information that follows describes the processes at a high level.

**Technology Use within the CMR Reporting Process**

The reporting process begins with the health care provider submitting a CMR, or information required pursuant to Title 17 Section 2500 to the appropriate LHD through a variety of means (mail, fax, or phone call). The LHD collect data from the health care provider and verifies that the disease report meets the criteria for the State to be notified. The LHD then submits a disease case report to the State through a variety of means (AVSS, bulletin board system, paper forms, etc.). The State cleanses and manages the data and then submits case information for nationally notifiable conditions to the CDC. Figure 3.2 provides a graphical representation of the CMR reporting process.

**4.2 Technical Environment**

**4.2.1 Existing Systems**

Figure 4.1 lists the impacted organizations and describes the associated applications used to process CMR and surveillance data.

**Figure 4.1.**

**DCDC Summary of Processes and Systems**

Organizations	Associated Application	Use of Application for CMR Data
1. Infectious Diseases Branch	AVSS CDMS Epi Info (for the Animal Rabies and the Foodborne Disease Outbreak databases) MORB Database	AVSS is used to capture the CMR data from the LHDs. A SAS program extracts data from AVSS. Output data is stored in CDMS. CDMS is used to ease report generation. Data from CDMS is then extracted to the MORB Database. This data is used for reporting and analytical purposes.

Organizations	Associated Application	Use of Application for CMR Data
2. Sexually Transmitted Disease Control Branch	AVSS STD*MIS (based on Epi Info) NETSS	LHDs use AVSS, STD*MIS, and NETSS to report STD cases to the State.
3. Tuberculosis Control Branch	TIMS	The TB Control branch, and LHDs use components of the CDC developed TB Information Management System (TIMS) for case management.
4. Immunization Branch	AVSS CDMS (VPD section)	Several LHDs use AVSS to report vaccine-preventable disease cases to the State. Additional case information is entered into the VPD component of CDMS. IZB also enters all information for cases reported via other mechanisms, based on information provided on the case report forms.
5. LHDs	AVSS Local databases	Many LHDs enter data into a local installation of AVSS. Data is also entered at the local-level into local databases.
6. Health Care Provider	None	There are minimal providers that have systems to electronically generate CMRs to send to LHDs. The majority of providers manually complete the form.

This following section provides a description of the systems relevant to collecting and processing CMR data identified in Figure 4.1. The following information is included for each system:

- Description of the system
- Business functions supported
- Primary users
- Technical architecture
- Interfaces/data exchanges

### Automated Vital Statistics System (AVSS)

Description of System
<p>Beginning in 1980, the AVSS was envisioned to be an integrated computer system for the collection, management, and reporting of public health paper forms, with special emphasis on vital records</p> <p>In cooperation with local, state, and federal health agencies the University of California created the AVSS to automate public health records. AVSS is used to improve the timeliness and accuracy of birth certificates by automating their production at the hospital of birth. In addition, it is used to automate other public health paper records such as death certificates, and has been modified to collect confidential morbidity reports.</p>

<p>UC Santa Barbara developed and implemented AVSS from 1981 to 1995. California uses this system to capture CMR data from LHDs.</p>	
Business Functions	Primary Users
<ul style="list-style-type: none"> <li>Provides a collection of CMR data</li> <li>Captures birth and death certificate data</li> <li>Produces standard reports, allows users to query data base, and provides a report editor</li> <li>Maintains audit trails on all user interactions with records</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance and Statistics Section staff</li> <li>LHD staff</li> <li>(There are multiple other users for non-CMR capabilities such as hospitals for birth and death records and funeral homes for death records)</li> </ul>
Technical Architecture	Interfaces/Data Exchanges
<ul style="list-style-type: none"> <li>Programmed in ANSI M</li> <li>CACHE and MUMPS</li> <li><b>Data Entry:</b> Line-by-line prompting;</li> <li>ASCII protocols for input and output</li> <li>Security: Device and password security, security report, password expiration.</li> </ul>	<ul style="list-style-type: none"> <li>Daily, data is extracted to CDMS</li> </ul>

### Communicable Disease Management System (CDMS)

Description of System	
<p>Atlas Development created CDMS in MUMPS, which as since been converted to Cache. CDMS is split into two modules: CMR and Vaccine-Preventable Disease (VPD). The CMR module stores data from AVSS. The VPD module receives immunization data from the Immunization Branch. Additionally, DCDC epidemiologists use CDMS to build on AVSS' provider-based data to create extended case management data.</p> <p>California uses CDMS to store CMR data and capture additional information for certain VPDs based on the case report forms submitted by the LHDs (for Measles, Haemophilus influenzae, Rubela, Pertussis and Tetanus).</p>	
Business Functions	Primary Users
<ul style="list-style-type: none"> <li>Serves as a repository for AVSS data</li> <li>Provides data used by DHS to generate standard reports</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance and Statistics Section staff</li> </ul>
Technical Architecture	Interfaces/Data Exchanges
<ul style="list-style-type: none"> <li>Cache</li> <li>Windows 2000</li> </ul>	<ul style="list-style-type: none"> <li>Data is input from AVSS</li> <li>Data is extracted to the MORB database.</li> <li>Produces extended NETSS records for the VPDs listed above.</li> </ul>

### Epi Info

Description of System
-----------------------

Epi Info is a public domain software package designed for the global community of public health practitioners and researchers. It provides form and database construction, data entry, and analysis with epidemiologic statistics, maps, and graphs. The primary applications within EpiInfo include:

MakeView - a program for creating forms and questionnaires which automatically creates a database

Enter - a program for using the forms and questionnaires created in MakeView to enter data into the database

Analysis - a program for producing statistical analyses of data, report output and graphs

EpiMap - a program for creating GIS maps and overlaying survey data on to them

Although Epi Info is a CDC trademark, the programs, documentation, and teaching materials are in the public domain and may be freely copied, distributed, and translated.

Business Functions	Primary Users
<ul style="list-style-type: none"> <li>Serves as a repository for summary morbidity data, animal Rabies data and foodborne disease outbreak data (three separate databases)</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance and Statistics Section staff</li> <li>Veterinary Public Health Section Staff</li> </ul>
Technical Architecture	Interfaces/Data Exchanges
<ul style="list-style-type: none"> <li>DOS-based</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>

## MORB Database

Description of System	
<p>The SSS staff developed the MORB database to capture CMR data and facilitate data analysis. The MORB database comprises a SAS master file and an SQL database. SSS staff reformats and selects records from AVSS and non-AVSS sources for inserting, updating or deleting morbidity records into the SQL database. A master data is stored as a SAS file and in a SQL database.</p> <p>California uses the MORB database to develop standard reports.</p>	
Business Functions	Primary Users
<ul style="list-style-type: none"> <li>Serves as a repository for AVSS and non-AVSS morbidity data</li> <li>Provides data used by DHS to generate standard reports</li> </ul>	<ul style="list-style-type: none"> <li>Surveillance and Statistics Section staff</li> </ul>
Technical Architecture	Interfaces/Data Exchanges
<ul style="list-style-type: none"> <li>SQL Server</li> <li>SAS</li> </ul>	<ul style="list-style-type: none"> <li>ODBC of SAS-Translations of raw data sources</li> </ul>

## **4.2.2 Existing Infrastructure Environment**

### **4.2.2.1 Hardware and Software Standards**

The DHS current IT hardware and software standards to which all equipment procurement and software must comply is located at <http://itsd.int.dhs.ca.gov/ei/standards/pdf/DHSHardwareSoftwareStandards.pdf>. Most important is the Network Server Technology Standard in Section 3 describing server performance and configuration requirements.

### **4.2.2.2 Web-based Application Architecture Standards and Processes**

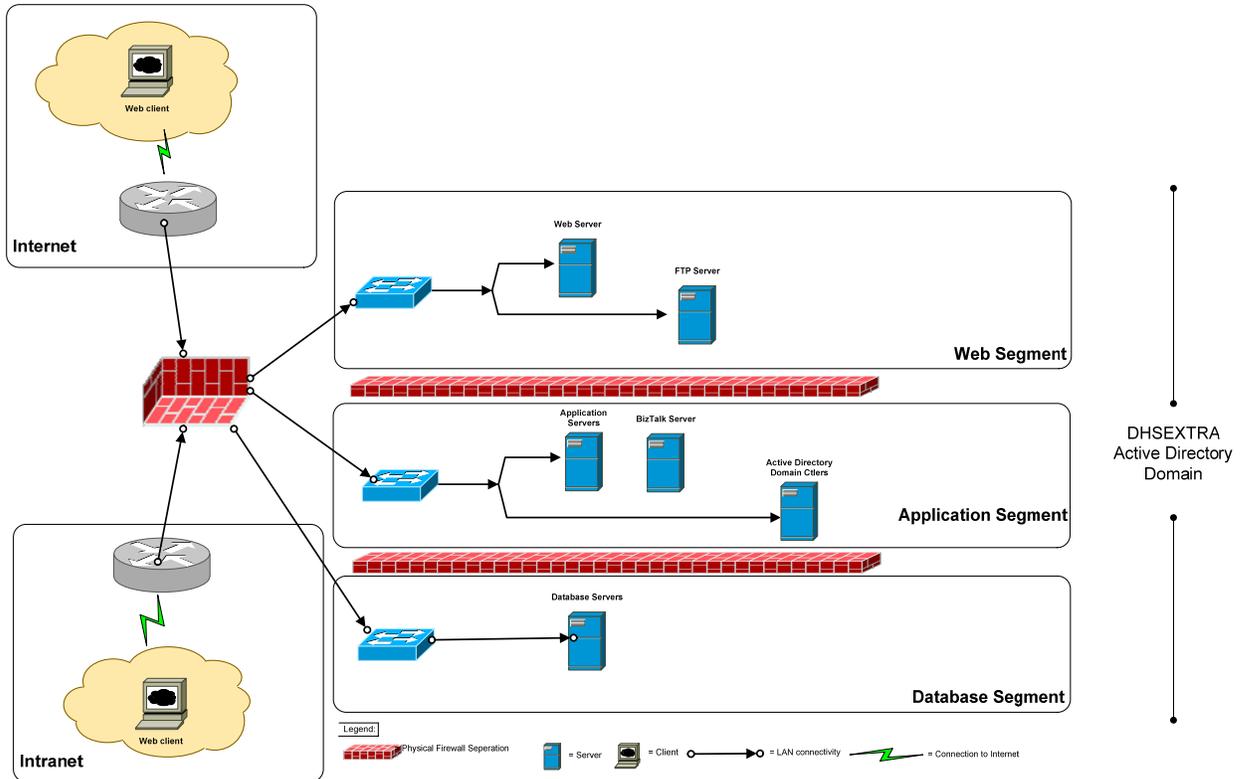
The DHS standard application development architecture contains details about the standard architecture, technologies, database conventions, and required presentation. This document also includes the standard set of support services defined and created by the Information Technology Services Division (ITSD) to support CDHS business functions, and is intended to identify best practices, procedures, and processes allow developers to create applications that are efficient, secure, and maintainable. It may be found at <http://itsd.int.dhs.ca.gov/ei/standards/pdf/Application%20Architecture%20V3.0.pdf>

### **4.2.2.3 Network Infrastructure and Topology**

DHS has designed and implemented a wide area network (WAN) to support the many applications required by the State of California. Within this network there exist three different security models which support the EDP needs of the department. These models, sometimes called zones, are referred to as the Extranet, Intranet and Internet. Each of these zones provides a unique security profile that allows appropriate access and protection to data and applications. Figure 4.2 illustrates the DHS current network topology.

**Figure 4.2**

### **DHS WAN Topology**



1. **Internet Zone** - An area of the network accessible by anyone. The identity of the individuals is usually not required but may be confirmed if needed and communications encrypted if required. The Internet zone is typically used by the general public, connected over the public Internet. This zone is the least secure, and therefore will not contain or allow access to any data not publicly available.
2. **Extranet Zone** - An area of the network used primary by non-DHS staff, whose identity must be specifically identified and authorized to access resources typically considered confidential or proprietary, for example counties, consultants, suppliers. All communication must be encrypted. The Extranet zone is typically used by DHS business partners that may connect over the public Internet or through a direct dial-up connection and requiring an authentication method, such as a password or certificate.
3. **Intranet Zone** - The internal DHS network, accessible only by authorized DHS staff. The Intranet zone is typically used by DHS staff that is directly connected to the internal private network. These users are usually responsible for maintaining the information in each of the three zones and therefore, may require access to information or data contained in each of the zones.



## 5.0 PROPOSED SOLUTION

This section examines a system solution and identifies the alternative that best satisfies the previously defined objectives and functional requirements.

### 5.1 Solution Description

The proposed solution for Web-based submission of CMRs will automate existing manual processes and take steps to address and resolve issues with data integrity. The solution consists of a Web-based application and back-end database that will support CMR reporting and management. The recommendation is to implement the requirements provided in the previous section in a phased approach with a modifiable off-the-shelf application.

Prior to engaging the first phase of the project, a proof-of-concept pilot will be conducted. This step of the project is intended to provide hands-on lessons learned to reduce the management risk of the project during the 4 phase implementation, and also to gain end user feedback regarding specific project approaches. By engaging the LHDs in this effort, it also further builds the relationship between CDHS and the LHDs in preparation for the implementation which follows.

The project is divided into four phases that follow a logical progression, starting with data collection and investigation support at the local level, followed by Statewide data integration into a centralized and comprehensive data repository, enabling Statewide monitoring and alerting. The major functionality to be implemented in each of these phases is as follows:

#### **Phase 1: Local Disease Reporting and Case Management.**

This initial phase is expected to provide to local health departments, State Programs and healthcare providers the base system capability from which the following consecutive phases can build. The expectation is the capability in this phase should be a part of the off the shelf purchase from the application provider and require some unique configuration but minimal modification if any. The successful completion of this phase will provide the foundation for phases 2 – 4.

Phase I capabilities are targeted at the LHDs, and support three primary objectives:

1. Obtaining high quality morbidity data from clinical healthcare providers.
2. Providing tools to assist the local health officer for the investigation and control of the disease condition or outbreak reported.
3. Support LHD epidemiology with analytic tools.

The following capabilities will support these objectives:

- A Web-based CMR form for use by licensed healthcare providers in submitting morbidity reports
- ELR receiving and linkage capabilities
- CMR receiving
- Case investigation
- Reporting morbidity to the State and between LHDs
- Disease specific and program specific forms, configurations, and custom logic capabilities. System architecture should allow for cost effective addition of disease-specific data-driven decision support logic as requested. Examples could include the STD syphilis reactor database or other enhanced surveillance for program areas.

### **Phase 2: Statewide Integrated Data Repository**

At the State level there will be a need to incorporate morbidity data from LHDs with their own surveillance systems. This is needed to support statewide analytics and alerting in the following phases. Leveraging the foundation created in phase one, phase two will require effort on the part of the State and LHDs to establish how the messaging of data can be established to fulfill this objective. There are commercial solutions that will require some amount of configuration and modification. Technical services and expertise will need to be established from all organizations participating in the sharing of this messaging of data. The integration of Electronic Lab Reporting (ELR) is included in this phase. The establishing of a data warehouse is also a part of this phase and will require building the infrastructure for this capability with database and online analytical functions and the ability to extract, transform, and load information at the appropriate user level.

- Messaging interface between systems
- Data warehouse
- ELR integration
- Forwarding of case specific public health information

### **Phase 3: Statewide Outbreak Detection and Alerting**

Phase three will continue to build on the first two phases and add the capability to better identify and respond to disease outbreaks and/or BT events. Current business rules for identifying outbreak parameters and sending alerts will be used and/or updated. This will require the logic for those rules to be configured in the system and an interface with a HAN or another appropriate technology containing an active directory for the sending of alerts to the appropriate LHD and State Program personnel.

- Support analytics for the detection of abnormal patterns and clusters of incidents/cases

- Interface with statewide HAN for automated distribution of alerts based on configurable analytic thresholds

#### **Phase 4: Geographic and Graphical Representations (AVR)**

The capability for phase 4 will be built on top of the capabilities of the previous phases and will complete the work specified in this document. The technology described is to be used by public health analysts, epidemiologists and public health management. The completion of this phase will provide the above personnel the tools and interfaces enabling geographic data presentations (GIS), and customized graphical presentations and reports to more efficiently and effectively isolate morbidity.

- Analysis, visualization, and reporting (AVR) to support statewide and regional public health
- Interface and/or incorporate Geographical Information Systems (GIS) solutions

#### **5.1.1 Solution Description**

The four solution phases introduced above are depicted in a conceptual diagram in Figure 5.1. Each phase is described in more detail following the diagram.

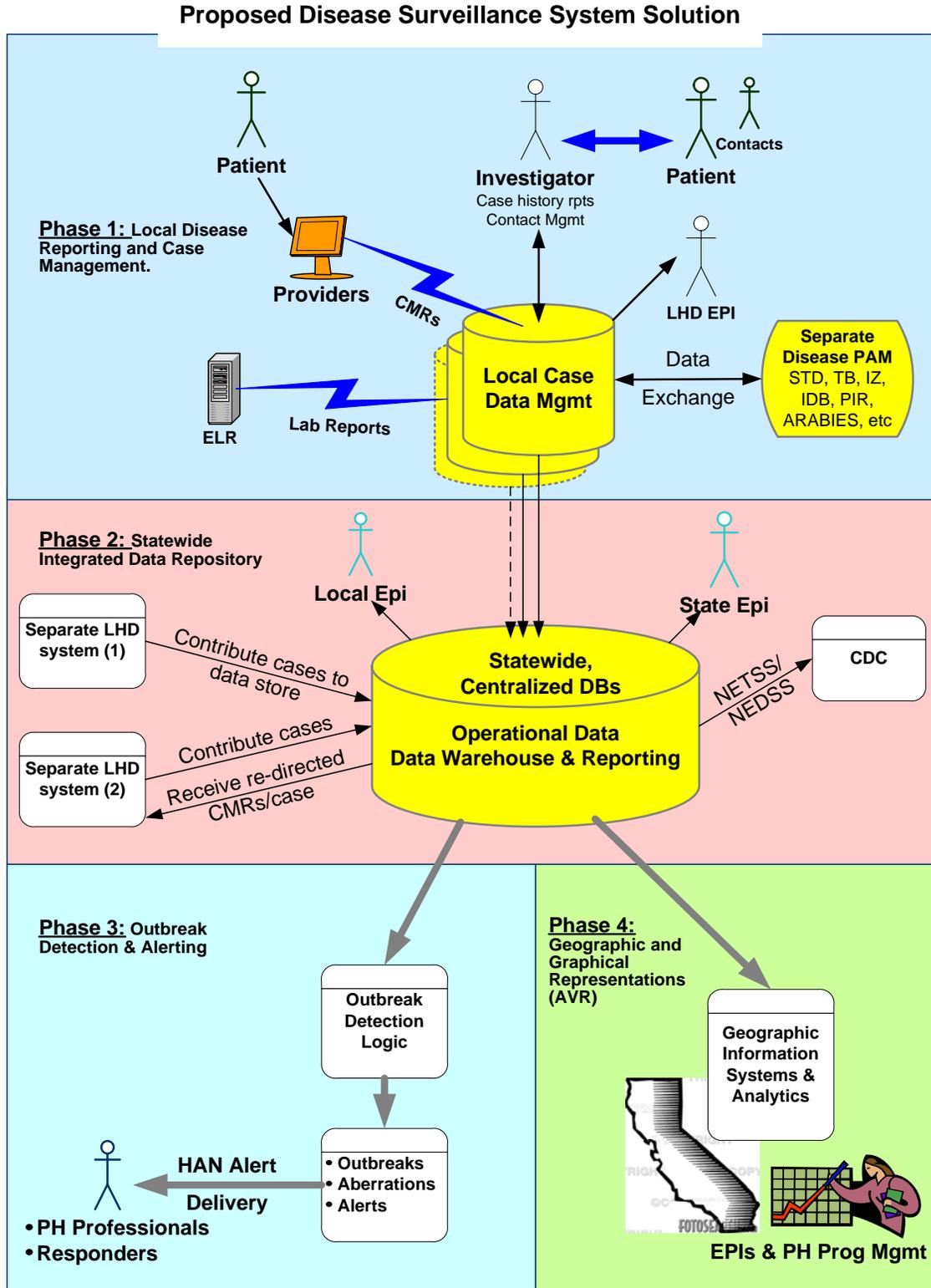


Figure 5.1. Proposed Solution – Phase Description

## **Phase 1 Description**

This module manages all of the data input into the system, and includes extensive editing of data. Data collection is accomplished through three aspects of the disease surveillance systems software application suite:

1. Web form collection (physician input of CMRs using the web portal)
2. receipt of electronic laboratory reports (from separate ELR system)
3. case management data collection
  - patient and contact case data entered by LHD investigators
  - case data exchanged with external program area systems
  - historical legacy case data imported one time to populate the case data management data repository

The architectural placement and number of the case databases is yet to be determined, but will probably be a combination of two scenarios: 1) some local system instances (e.g. LHDs operating and maintaining their local disease surveillance system and case data store), and 2) central system sharing (e.g. LHDs directly utilizing a data partition within the central, shared installation of the State-hosted disease surveillance.) In addition, for scenario number 1, i.e. those LHDs maintaining their own systems, there may be two situations: 1) LHDs maintaining the same software solution as the State (and copying the data to the State-central data store periodically), and 2) LHDs running different application systems (and converting their data to a common format to enable sharing with the State-central data store.)

The exact architectural alternatives and physical database placements will be determined by vendor solutions. The full data exchange capabilities to integrate with LHDs running different applications (the more challenging data exchange scenario) is depicted and discussed as part of Phase 2. Therefore during Phase I, it is not anticipated that it will be possible to have a comprehensive State-wide view of the operational case data residing in one database.

The proposed disease surveillance system application software will be required to accept standard ELR messages such as PHIN-specified HL7 formats. The work of transforming external non-compliant lab reports into this standard format will be assumed to be accomplished externally by the ELR system, which will receive the reports directly from the laboratories. The disease surveillance system will accept incoming lab reports from ELR and provide functionality for associating these lab reports with new or existing cases, to form part of the case data record.

The primary users of the Phase 1 solution are clinical providers (CMR inputs), case investigators (case data inputs), and LHD epidemiologists and program managers (analyzing case data and CMR data within the scope of their own region.)

### Phase 2 Description

Phase 2 implements a statewide comprehensive view of surveillance system by two means:

1. Data warehousing of data from all LHDs into the central data repository
2. Data exchange with external LHD systems

The modules and technologies to achieve these two steps are summarized in Figure 5.2.

The primary users of the Phase 2 solution are epidemiologists at the local and State levels, and program managers at both levels. The proposed security solution includes extensive permissions to limit users to authorized views of data, e.g. according to disease program area and jurisdiction. The proposed technical solution is web-based to enable remote distributed access to the data, i.e. from city, county, and State levels. Note that the functionality proposed in this Phase is primarily data outputs, reports, and analytics, including summarized views. This access can be made available to LHD personnel statewide, regardless of whether their jurisdiction also maintains a separate solution for case data input.

### Phase 3 Description

Phase 3 involves the addition of logic modules for the purpose of exploiting the centralized statewide database to monitor for disease patterns, anomalies, aberrations, and outbreaks. A portion of the work in this phase will involve programmatic definition of specific algorithms and thresholds that define situations worthy of alerts and special attention. The disease surveillance system will hand these alerts over to an integrated Health Alert Network implementation (e.g. CAHAN) for actual distribution of the alerts to users. The alert distribution process will be controlled by protocols already established within that external alerting environment. The Public Health directory will be maintained by the HAN implementation, and will be used in the process of distributing alerts from the disease surveillance application.

The modules and technologies to achieve the objectives of Phase 3 are summarized in Figure 5.2.

The primary users of the Phase 3 functionality are Public Health professionals and responders. Some of these users (e.g. case investigators) may be direct users of the disease surveillance application for other purposes, and may have access rights and skills to run reports and interactive analyses directly in the system, while others may only receive alerts via the HAN environment (e.g. via HAN-initiated e-mail or pager notifications.)

### Phase 4 Description

Phase 4 implements tools and interfaces to enable geographic data presentations (GIS maps), and customized graphical presentations and reports. The CDC’s term for this category of functionality requirements for disease surveillance applications is “analysis, visualization, and reporting” (AVR).

The modules and technologies to achieve the objectives of Phase 4 are summarized in Figure 5.2.

The primary users of the Phase 4 functionality are Public Health analysts at all levels, including epidemiologists and public health management. As in Phase 3, web-based technologies are proposed to support this solution, to enable remote access to the resulting maps, graphics, and analytic reports by authorized users located throughout the State.

### **Surveillance Systems Module Implementation Plan**

Phase #	System Module	Supporting Software and Technology Requirements	Alternative Proposed
1	▪ CMR Web Portal	▪ Disease Surveillance Database Application Suite	▪ MOTS
1	▪ Case Management	▪ Disease Surveillance Database Application Suite	▪ MOTS
2	▪ Data Exchange/Messaging	▪ Message Integration Broker with HL7 Parser/Transformer	▪ MOTS + Build/Config.
2	▪ Data Warehouse	▪ Extract, Transform, Load (ETL) ▪ Database and Online Analytical Processing (OLAP tool)	▪ MOTS + Build/Config.
3	▪ Outbreak and Alert Monitoring	▪ Rules engine and decision support logic (extensions to Disease Surveillance Database Application Suite)	▪ MOTS
3	▪ Alerting interface	▪ Web services communication to Health Alert Network	▪ MOTS + Build/Config.
4	▪ Graphical Information Systems (GIS)	▪ Geo-coding service ▪ GIS mapping and geospatial analytic facilities	▪ MOTS + Build/Config.

- 4
    - Analysis, Visualization, and Reporting
    - Custom report developer tool
    - Statistical and graphical tools
    - MOTS + Build/Config.
- 

***Figure 5.2. Proposed Solution – Module Layout***

### **5.1.2 Software**

During the process to procure development services, systems development vendors will be encouraged to comply with standards defined by the CDHS. The application's operating system software will be Linux, UNIX, or Windows 2000 + or a later version and the database management system will be widely available commerce relational database, Oracle, Microsoft SQL Server 2000, or a later version, complementing with CDHS's current technology infrastructure. The system will operate within the Department's existing network infrastructure.

### **5.1.3 Procurement Approach**

From previous demonstration efforts involving CMR and ELR projects, much of the hardware and operating software specified in the solution will be redirected to this project's effort. For those hardware components remaining, standard CMAS vendors and procurement procedures will be followed. The COTS/MOTS vendor selection will occur through a structured product evaluation process.

### **5.1.4 Development Approach**

The proposed solution is to use a commercial off the shelf application or modifiable off the shelf system, however, the appropriate development methodology will be determined through joint discussions with the State and the systems development vendor. The methodology selected will align with published standards in the Statewide Information Management Manual (SIMM). The development approach must be approved by CDHS, the Web CMR Project Manager, and the Independent Project Oversight Contractor (IPOC).

### **5.1.5 Integration Issues**

The need exists to establish integrations with local health departments with their own systems, integrate the electronic lab reporting system with this system, and the possibility of integrating with other surveillance systems such as TIMS.

### **5.1.6 Testing Plan**

Consistent with best practices, the vendor will be required to develop and submit a Testing Plan. The Web CMR Project Manager and IPOC (if one is selected for the project) must approve this plan. In addition, the vendor will perform unit and system testing before user acceptance testing. User acceptance testing will include health care providers and representatives from the CDHS and LHDs.

### **5.1.7 Technical Interfaces**

The proposed solution may need to interface with large provider organizations

(e.g. Kaiser) in a later phase. Integration requirements are listed above.

### 5.1.8 Resource Requirements

CDHS plans to procure the services of an experienced project manager to manage the project, and contract personnel to implement the new system and provide project oversight. This effort will be augmented by CDHS technical staff that will provide departmental guidance and acquire the skills and expertise in the event maintenance and operation of the system are not outsourced. In addition, CDHS will provide expertise on business processes and policies. Figure 5.3 summarizes the anticipated resource requirements for the State. The selected vendor will need to resource load the project as is deemed appropriate to meet committed upon deliverables and delivery dates.

**Figure 5.3. Anticipated CDHS and Project Resource Requirements**

Contract Staff	FY 1	FY 2	FY 3
IPOC	.5	.5	.5
State Staff			
Project Manager	1	1	1

System Support Tasks	Resource Estimate
<b>Data center operations</b>	
▪ Application administration	App admin
▪ Database administration	DB admin
▪ Security administration	Sys Admin
▪ Server and network infrastructure support	Sys Admin
▪ Web services and internet protocol support	Sys Admin
<b>Application support and advising</b>	
▪ Help desk	Tech support
▪ Application engineering and consulting	App Eng
▪ Change control, standards, and forms coordination	App Mgr
<b>Application software maintenance</b>	
▪ Vendor software releases	vendor (SLA)
▪ Enhanced feature implementation and testing	vendor (TBD)
<b>Business process development</b>	
▪ Program-specific disease plan development	App Eng
▪ Outbreak management procedures and software	App Eng
▪ Alerting policies and protocols	Prog Mgr

### CalPHIN Systems Integration

▪ CAHAN integration	Integ Engr
▪ ELR integration	Integ Engr
▪ Food-borne complaint system integration	Integ Engr
▪ Data exchange infrastructure	
▪ State programs database integration	Integ Engr
▪ Local jurisdiction application integration	Integ Engr

### Training development and delivery

▪ Computer-based training development and deployment	Training Mgr Instruct designer Technical Writer Programmer
▪ Learning Mgmt Software	1 license
▪ Instructor-led advanced/customized training	Trainer

### 5.1.9 Training Plan

End users within the CDHS, LHDs, and health care provider organizations will require differing levels of training in order to use the new system. CDHS and LHD users will need to have functional knowledge of the system for normal daily use. The system will provide on-line help pages to assist other users (e.g., health care providers) with data entry. The application vendor will document system functionality and develop an on-line user's manual for the system. In addition, the vendor will conduct user training for the CDHS and LHD staff. Users external to the CDHS or LHDs may need limited training on the use of the system (e.g., Data Entry, Reporting, Data Submission). It is recommended CDHS maintain training resources identified in the above table to establish customized, relevant training materials and methods that can be administered either in a classroom or organized and implemented via a computer based, self-paced, Web-enabled media.

Training may take place in many forms, including but not limited to:

- On-line Help. For external users of the system, training may be limited to on-line help screens to walk the user through the required entries expected by the system.
- “Train the Trainer.” Training designed for an internal system expert to support Department-wide training needs and provide help desk functionality.

- End User (classroom & computer based-self-paced). Training for all end users on application functionality and capability, in addition to data input, maintenance, search and retrieval, and reporting requirements by practice unit or functional area requirement.
- System Administrator. Training to allow for system maintenance, updating, access, security, configuration, and modification.
- On-going support. Training must be provided after installation to address questions, features, issues, and concerns of the end user base. The vendor will design the initial training to address the needs of both remedial and more sophisticated users but customized, unique training for California specific requirements should be provided by CDHS resources.

#### **5.1.10 On-going Operation and Maintenance**

DCDC staff will provide program-level and basic assistance to external system users. A combination of contracted services and CDHS technical support staff will be available to answer technical questions that arise through the use of on-line interface. Contracted services and CDHS technical support will provide one PY to perform software maintenance; serve as the second-level help desk; and serve as the liaison for the technical hosting of the application.

The Web CMR application software and database infrastructure may be maintained either by an outside vendor through a Maintenance and Operation (M & O) agreement or ITSD. The systems development vendor will be contracted to provide on-site maintenance support for six months after implementation (with an option to renew the maintenance at the CDHS's discretion). Ongoing maintenance of the Web CMR technical infrastructure (e.g., servers, network, etc.) will be performed through the organization selected to host the application.

#### **5.1.11 Information Security**

The proposed database and application software will require users to log in with a user identification and password. The system will grant privileges to the user based upon the user's functional role (e.g., public health nurse, health care provider, supervisor, manager) and will restrict access to unauthorized functions and screens. The hosting organization will maintain a perimeter firewall to protect systems from inappropriate access. Furthermore, appropriate software firewalls will be installed on the system's servers to protect against unauthorized access and provide an additional level of information security.

Use of Public-Key Infrastructure (PKI) technology will enable CDHS to properly secure its health data, while meeting multiple federal security guidelines. A PKI based solution would be identified, designed, tested, and implemented for ultimate use by most public health applications. PKI is a “two-factor” authentication method used by a number of leading health care organizations for e-commerce and HIPAA compliance solutions. It has been demonstrated to be a viable approach for appropriate protection with sensitive health information. Very specific processes and policies will be developed in support of PKI, particularly regarding issuance of digital certificates to individuals, and validating their identity. To allow interoperability with outside entities through the Federal Bridge, federal guidelines on these policies will need to be followed.

#### **5.1.12 Confidentiality and Public Access**

Public health data is highly confidential and subject to Federal and State laws. The solution provides for network and application security enhancements (including PKI, data encryption, and firewalls) that meet industry standards. The system will use Secure Sockets Layer (SSL) 128-bit encryption and server validation via registered certificates.

#### **5.1.13 Impact on End Users**

State and local public health staff will be substantially impacted by the new system. The new system will reduce the time needed to manually enter or collect data, validate and cleanse the data, and generate reporting documents. The new system will also require training for the end user. External users (e.g., health care providers) will require limited training on web forms for data submission. This training will include help screens within the data entry interface.

#### **5.1.14 Impact on Existing Systems**

Once fully implemented, Web CMR may eventually replace several stand-alone systems within DCDC including AVSS, CDMS, and the MORB database. It should be noted this will be a gradual process. These applications are used within DCDC and some LHDs (AVSS may remain in use for other vital statistics functions). The existing systems are maintained by their owners and not a centralized support. The time allocated for system maintenance, which varied by system, resources will be redirected to other tasks or to maintenance of the new system.

#### **5.1.15 Consistency with overall strategies**

In the fall of 2000, the State of California introduced an e-government initiative designed to use the power of technology to bring state government closer to California citizens and businesses. The intention of this effort is to use

information technology to make State government information, services, and programs more accessible by leveraging the power of the Internet. The proposed solution is fully consistent with the State's initiative to create on-line access for government information and services.

The proposed solution directly aligns with the CalPHIN effort's overall goals and strategies documented in the *CalPHIN Strategic Plan*. The Web CMR project supports the following CalPHIN Strategic Goals:

- **Standards:** Develop and implement standards and procedures to support the management of public health information
- **Collaboration:** Develop and manage public health systems collaboratively with partners and key stakeholders to improve public health data sharing and infrastructure development
- **Enabling Technology:** Implement reliable, effective, and efficient information technology solutions to support the public health information infrastructure
- **Security/Confidentiality:** Provide a secure environment for public health information that protects the privacy of Californians
- **Project Success:** Deliver public health projects on time and within budget while successfully achieving objectives

This project will support the CDHS mission to protect and improve the health of all Californians. The implementation of Web CMR is also consistent with CDHS's Strategic Vision to:

- Ensure that all Californians have access to high quality health care, experience low levels of preventable diseases and disabilities, and enjoy optimal levels of health and well-being.
- Have a valued and expert work force committed to continually improving the quality of services the CDHS provides.
- Be recognized as the authority on patient care, prevention and public health dedicated to public awareness of the CDHS programs and services.
- Be a technical leader in sound scientific investigation and inquiry, application processes that are easily accessible to all Californians, data analysis and planning, communication and dissemination of data and employee support systems.
- Be a steward dedicated to improved public access, fiscal integrity, accountability of programs and services.
- Be a national leader and model for how a state health department should implement programs and technology.

Specifically, Web CMR addresses the following CDHS goals, long-term approaches, and objectives as presented in the *Strategic Plan for the California Department of Health Services*:

- Enhance programs, services, and communications with current and emerging technology that can be shared between the State and local levels.
- Seek opportunities to consolidate, coordinate, and integrate programs and services.
- Cooperate with Federal, State and local public health agencies to integrate and consolidate health surveillance, data collection and communication systems.
- Improve health status and outcomes by improving CDHS's data analysis capabilities to identify those populations most at risk.
- Improve the availability of population-based health data by expanding the use of alternative distribution technologies including the Internet.
- Foster integrated, comprehensive, and coordinated services to the public, local health jurisdictions, community-based organizations, and our other partners and customers.
- Ensure easy access to information and referral, integrating funding streams where possible, and streamlining and simplifying partner with the CDHS.
- Increase internal coordination in all areas including data and information.
- Improve organization of existing programs to eliminate duplications and make them more accessible.
- Improve and expand external entities access to the CDHS's health education materials, information and services through web-based technologies.
- Improve business practices by enhancing CDHS's responsiveness to partners and vendors, increasing effective use of resources, and streamlining and improving the quality of support services to the CDHS staff.
- Streamline, integrate, and consolidate business practices.
- Develop and implement information technology and Internet-based systems to support business process and transactions.

The Web CMR aligns with the recommendations provided in the State's Bioterrorism *Surveillance and Epidemiologic Response Plan*. According to the Plan, strategies for strengthening the early detection of bioterrorist events may be grouped into the following categories:

- Increasing awareness of clinicians and laboratorians

- Strengthening the communicable disease reporting system
- Utilizing additional surveillance systems
- Piloting novel detection systems

Implementation of Web CMR supports the strategy to strengthen the communicable disease reporting system. Specifically, the Plan states that early detection of bioterrorist events may be achieved through a spectrum of activities. At one end of the spectrum are detection systems that are more specific but less timely, which include mandatory reporting of diseases and conditions by health care professionals and laboratories. Web CMR enhances this detection system.

Lastly, the proposed solution supports the following NEDSS goals and PHIN requirements from the CDC:

- Emphasize, and adopt national standards for the electronic exchange of information
- Support the development of surveillance systems according to a defined information systems architecture
- Develop direct electronic communications between sources of data (such as health care providers or laboratories) and public health agencies
- Facilitate ready exchange of data, as appropriate, between local and state health departments, among states and between states and the CDC
- Support users – provides information and decision support to the public and public health professionals at all levels
- Dual use – will meet BT preparedness and response needs and will transform routine public health practice
- Engage industry – set direction for private sector participation and develop commercial and clinical opportunities
- A common data language – use of industry standards for comparable data use and exchange

#### **5.1.16 Impact on Current Infrastructure**

The proposed solution may use CDHS's current network infrastructure, depending if the application is hosted through third party services. If the decision is to use existing CDHS resources, there may be an increase in network traffic within CDHS. However, the increase is not expected to be significant enough to increase bandwidth requirements.

#### **5.1.17 Backup and Operational Recovery**

The solution will be subject to the backup and operational recovery practices defined as acceptable and appropriate by the CDHS. At a minimum, this would

include incremental and full system and data backups for the production environment on a backup or retention schedule as defined within the Service Standards and Service Level Objectives section of the IA. In addition, the hosting site will provide operational recovery and disaster recovery services.

### **5.1.18 Public Access**

Health care providers will have access to enter, modify, and certify their own data. There is no interface designed for general public access to the highly-confidential public health data. The system provides a tool for generating reports that, upon approval, could be published to the web for public viewing.

### **5.1.19 Costs and Benefits**

This section discusses the Costs and Benefits of the proposed solution. The costs are further detailed in the EAW section.

#### **5.1.19.1 Costs**

- **One-Time Costs**
  
- **Ongoing Costs**

#### **5.1.19.2 Benefits**

When fully implemented, the selected alternative, will meet all the business objectives identified in the Business Case section.

### **5.1.20 Sources of Funding**

The Centers for Disease Control and Prevention provides funding to California for increasing the use of disease surveillance and early event detection systems, this includes the funding for Confidential Morbidity Reporting system (WebCMR.)

## **5.2 Rationale for Selection**

CDHS selected the proposed solution based on the following merits:

- *Satisfies CDHS's business need and objectives.* This solution satisfies all of the business requirements specified in Section 2.6 of this report.
- *Leverages the Internet to make government information, services, and programs more accessible.* This aligns with the Governor's e-Government initiative to use the power of technology to bring State government closer to California citizens and businesses.

- *Complements CDHS current technical environment.* The products and technologies proposed for this solution are consistent with the web application technology environment established by the ITSD.
- *Reduces the number of redundant processes and data systems.* The solution reduces some of the Department's inefficient data management practices and advances better data management practices, aligning with the CDHS's goals.
- *Accommodates future business needs.* The system architecture and database structure are flexible enough to incorporate new business needs, accommodate changes in CDHS business processes, and capture additional data elements if required.
- *Aligns with CDHS initiatives.* The solution directly aligns with the CDHS's goals as documented in the Strategic Plan for the California Department of Health Services.

## 5.3 Other Alternatives Considered

### 5.3.1 Develop Custom System Application

- Description

Use a competitive bid process with a written Request for Proposals (RFP), distributed to interested bidders. This process involves the use of DGS staff to monitor and oversee the entire process, and would require the hiring of an acquisition specialist to develop the RFP. This entire process, from inception to signing a contract for software development, could take nine months or longer, to complete.

- Costs

The total costs associated with this type of development far exceed the proposed solution due to the additional personnel required to complete the project.

- Advantages

A wide spectrum of responses may emanate from the solicitation of bids. This provides a number of different perspectives from the business community that may not be realized by the Program, and could help in the automation of program business processes.

- Disadvantages

This option is more costly than the proposed alternative, and it will exceed the mandated deadline for implementation due to the protracted time for the acquisition.

### 5.3.2 Transfer Solution

- Description

Select system from another State, and transfer to California. Several other states have PHIN compliant systems that were either built in-house or by a contractor. Because these systems were developed with public funds, these systems are likely open source. Pennsylvania, New York, Massachusetts, and Florida possibly other states have potential systems.

- Costs

This solution is relatively expensive when considering including the on-going maintenance costs. Transferring a solution from another State requires a sizable staff to make modifications specific to California and maintain the system. Each State is responsible for maintenance.

Development Schedule:

Development Cost:

Development Effort:

On-Going average maintenance:

Note: These costs include services costs focused on the system development life cycle and do not included mandatory project oversight or verification and validation services.

- Advantages

Match of Functional Requirements: Because solutions are implementation of Federal PHIN requirements, the basic functionality should match.

High One-Time Development Costs: Because functionality supports other states, California only needs to modify the system, not start from scratch. However, these costs are significantly higher than the preferred alternative.

- Disadvantages

High On-Going Costs: Transfer solution typically require customization and enhancement, they are not designed to be configured to transfer to another installation site. That is, programming is required to make changes, instead of simply changing values in a configuration table.

Relative high risks: This solution requires both people knowledgeable in the transfer solution and knowledgeable in California operations. The system must be customized to work in California's operational environment.

Solution requires extensive DCDC and LHJ and Lab business subject matter experts to answer design questions from development team.

## 6.0 Project Management Plan

The Web CMR Project will be managed under the CDHS Project Management Office (PMO), in the ITSD Project Planning and Management Branch (PPMB). The PPMB will assign a PMO staff member to serve as project director, and will procure a highly qualified project manager to be dedicated full-time to the Web CMR project. The project manager will report to the project director, and will work closely with the DCDC business team and the development vendor to manage project tasks, cost, schedule, quality, and risks.

### 6.1 Project Manager Qualifications

The successful completion of the project will require a highly qualified project manager with experience and training appropriate to the size, complexity and risk level of Web CMR Project.

The PPMB, with participation from the DCDC, will procure a project manager with the following minimum qualifications:

- At least five years experience in information technology (IT) project management.
- Knowledge and experience in managing software development, systems development and data conversion.
- Demonstrated experience in providing project management for an IT project of at least the scope and size of the Web CMR project.
- Knowledge and experience in California state procurement and IT project management practices.

Additional desirable qualifications include the following:

- Project management certification such as:
  - Project Management Professional certification from the Project Management Institute.
  - Degree in Project Management or related discipline from an accredited university.
- Knowledge and experience with health-related data system projects, especially an understanding of disease surveillance strategies and systems.
- Knowledge/experience working with CDHS programs and organization.

### 6.2 Project Management Methodology

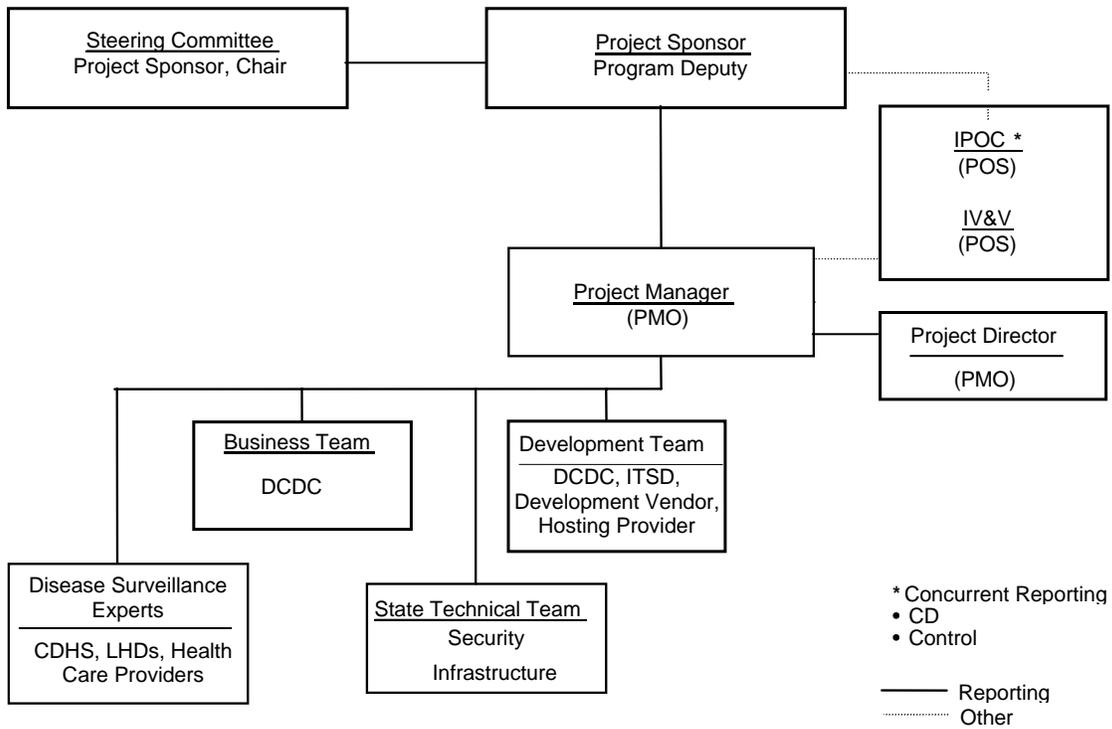
The CDHS Project Management Methodology is based on the guidelines in the California Statewide Information Management Manual (SIMM) Section 200, the

Project Management Body of Knowledge (PMBOK) from the Project Management Institute, and the recommended project management and risk management practices of the DOF Information Technology Project Oversight Framework. Industry best practices and lessons learned from prior CDHS projects are also included.

### 6.3 Project Organization

The organization chart for the Web CMR Project is shown below.

Web CMR Project Organization Chart



## 6.4 Project Priorities

Managing a project requires balancing of three interrelated factors: resources, schedule, and scope. A change in one factor may result in a change in another factor. Project stakeholders should agree on the importance of each of these factors before the project begins by assigning one of the following to each factor:

- Constrained: the factor cannot be changed.
- Accepted: the factor is somewhat flexible to the project circumstances.
- Improved: the factor can be adjusted.

The following presents the trade-off matrix for this project.

Schedule	Scope	Resources
Improved	Accepted	Constrained

## 6.5 Project Plan

This section provides an overview of the following areas:

- Project scope.
- Project assumptions.
- Project phasing.
- Roles and responsibilities.
- Project schedule.
- Project monitoring.
- Project quality.
- Change management.
- Authorization required.

### 6.5.1 Project Scope

The scope of the Web CMR project is to provide a system that accomplishes the business objectives and functional requirements defined in this document.

#### 6.5.1.1 Project Scope

The PMBOK defines project scope as the work that must be done to accomplish the objectives of the project. Project scope management includes the processes to ensure that the project includes all of the work required and only the work required to successfully complete the project. Web CMR project scope will be

defined and managed using a detailed work breakdown structure to be developed and maintained by the project manager. Any changes in project scope will be managed through the change control process.

#### 6.5.1.2 Product Scope

Product scope is defined as the features and functions to be provided by the product of the project. Product scope management ensures that the product includes all of the necessary features and functions, without any unnecessary bells and whistles that could lengthen the project schedule and increase cost. Product scope of the Web CMR system will be defined in system requirements documentation. Any changes to product scope will be managed through the change control process.

#### 6.5.1.3 Business Scope

The business scope of a project can be defined as the processes and systems that form the boundaries for the business areas directly included and impacted by the project. The business processes and respective organizations (i.e., process owners) impacted by the Web CMR project are identified in the following table.

#### ***Business Processes Impacted by Web CMR***

<b>Business Process</b>	<b>Process Owner</b>
Submit CMR Data	Health Care Providers
Collect Data	Local Health Departments
Send Case Report Data	Local Health Departments
Manage Case Report Data	DCDC, Surveillance and Statistics Staff
Send Reports	DCDC, Surveillance and Statistics Staff

The existing CDHS systems impacted by the Web CMR project are identified in the following table.

#### ***CDHS Systems Impacted by Web CMR***

<b>System</b>	<b>Impact</b>
AVSS (CMR component)	Replace with Web CMR
CDMS (CMR component)	Replace with Web CMR
MORB Database	Replace with Web CMR

### 6.5.2 Project Assumptions

The major project assumptions include the following:

- This FSR will receive timely approval from CDHS, HHS, and DOJ.
- Project procurements will not be delayed by the complex and time-consuming state procurement and approval processes.
- All new hardware and software related to Web CMR must be in accordance with the Department's current technology infrastructure.
- CDHS program and information technology staff and representative agencies are available to participate in requirements definition, systems design, and user acceptance testing.
- At least one CDHS information technology staff member will participate on the Web CMR project for knowledge transfer purposes.
- DGS approves the proposed procurement approaches defined in the Information Technology Procurement Plan (ITPP) for this project.
- Full project funding will be provided.
- Federal funding will be provided at a consistent level throughout the project.
- The project will receive demonstrable Department support.
- End users will have participation and buy-in to ensure the solution's success.

### 6.5.3 Project Phases

The project is divided into four phases that follow a logical progression, starting with data collection and investigation support at the local level, followed by Statewide data integration into a centralized and comprehensive data repository, enabling Statewide monitoring and alerting.

#### **Phase 1: Local Disease Reporting and Case Management.**

Phase I capabilities are targeted at the LHDs, and support three primary objectives:

1. Obtaining high quality morbidity data from clinical healthcare providers.
2. Providing tools to assist the local health officer for the investigation and control of the disease condition or outbreak reported.
3. Support LHD epidemiology with analytic tools.

The following capabilities will support these objectives.

- A Web-based CMR form for use by licensed healthcare providers in submitting morbidity reports
- ELR receiving and linkage capabilities.
- CMR receiving

- Case investigation
- Reporting morbidity to the State

**Phase 2: Statewide Integrated Data Repository**

At the State level there will be a need to incorporate morbidity data from LHDs with their own surveillance systems. This is needed to support statewide analytics and alerting.

- Messaging interface between systems.
- Data warehouse
- ELR integration
- Forwarding of case specific public health information

**Phase 3: Statewide Outbreak Detection and Alerting**

- Support analytics for the detection of abnormal patterns and clusters of incidents/cases
- Interface with statewide HAN for automated distribution of alerts based on configurable analytic thresholds

**Phase 4: Geographic and Graphical Representations (AVR)**

- Analysis, visualization, and reporting to support statewide and regional public health
- Interface and/or incorporate Geographical Information Systems (GIS) solutions

**6.5.4 Roles and Responsibilities**

The following chart identifies the major participants in the project and their roles and responsibilities:

Role	Responsibilities	Organization
Project Sponsors	<ul style="list-style-type: none"> <li>▪ Makes key business decisions.</li> <li>▪ Resolves significant issues that the Project Management Team cannot resolve.</li> <li>▪ Determines the final scope of the Web CMR project.</li> <li>▪ Makes the final decision on the vendors retained throughout the Web CMR project.</li> <li>▪ Leads Steering Committee meetings.</li> <li>▪ Communicates project status to CDHS Management and the Budget Committee.</li> </ul>	<ul style="list-style-type: none"> <li>▪ DCDC</li> <li>▪ ITSD</li> <li>▪ CCLHO</li> <li>▪ CCLHDM</li> </ul>

Role	Responsibilities	Organization
Project Manager	<ul style="list-style-type: none"> <li>▪ Coordinates project work efforts.</li> <li>▪ Develops project management-related deliverables.</li> <li>▪ Serves as a liaison between vendors and internal/external stakeholders.</li> <li>▪ Maintains Issues Database and Change Management Database.</li> <li>▪ Maintains project work plan.</li> <li>▪ Reviews all project deliverables.</li> <li>▪ Coordinates monthly Web CMR Project Management Team meetings.</li> <li>▪ Attends Steering Committee meetings.</li> <li>▪ Conducts weekly Project Team Meetings.</li> <li>▪ Develops weekly project status reports.</li> </ul>	Vendor (reports to ITSD/PPMB/PMO)
Contract Manager	<ul style="list-style-type: none"> <li>▪ Participates in the procurement processes to secure Systems Integration services, Project Management services, and Independent Project Oversight services.</li> <li>▪ Reviews and approves all Deliverable Expectation Documents (DEDs) and final deliverables.</li> <li>▪ Reviews and approves invoices.</li> <li>▪ Maintains information on contracted costs vs. actual costs.</li> <li>▪ Attends monthly Web CMR Project Management Team and Steering Committee meetings.</li> <li>▪ Communicates project status to internal and external stakeholders, as needed.</li> <li>▪ Serves as liaison to DGS.</li> </ul>	DCDC
Steering Committee	<ul style="list-style-type: none"> <li>▪ Assists in the identification of business needs.</li> <li>▪ Assists in the coordination of efforts between the Web CMR project and other related CDHS projects.</li> <li>▪ Assist in the definition of business processes and business rules.</li> <li>▪ Participate in interviews and working sessions with the Web CMR project team.</li> <li>▪ Confirms project goals and scope.</li> <li>▪ Provides strategic guidance at key intervals.</li> <li>▪ Communicates project status to respective external stakeholders, as needed.</li> </ul>	<ul style="list-style-type: none"> <li>▪ DCDC</li> <li>▪ Public Health Program Offices</li> <li>▪ LHDs</li> </ul>
Subject Matter Experts (SMEs)	<ul style="list-style-type: none"> <li>▪ Assist in the coordination of efforts between the Web CMR project and other related CDHS projects.</li> <li>▪ Assist in the identification of business needs and analysis of the current operating environment.</li> <li>▪ Assist in the definition of business processes and business rules.</li> <li>▪ Participate in interviews and working sessions with the Web CMR project team.</li> <li>▪ Participates in user acceptance testing of the new system.</li> </ul>	<ul style="list-style-type: none"> <li>▪ DCDC</li> <li>▪ LHDs</li> <li>▪ Private and Public Health Care Providers</li> </ul>

Role	Responsibilities	Organization
Systems Development Team	<ul style="list-style-type: none"> <li>▪ Designs and develops Web CMR, in accordance with the functional requirements and business needs.</li> <li>▪ Conducts prototyping sessions with internal and external stakeholders.</li> <li>▪ Conducts unit and systems integration tests.</li> <li>▪ Conducts system design and development walkthrough sessions.</li> <li>▪ Develops test cases for user acceptance testing. Oversees user acceptance testing.</li> <li>▪ Develops system documentation.</li> <li>▪ Determines technology architecture required for system interfaces.</li> <li>▪ Coordinates with representatives from other systems to which Web CMR will interface.</li> <li>▪ Designs, tests, and documents system interfaces.</li> <li>▪ Develops user manuals, addresses user questions and issues (e.g., help desk), develops training materials, and conducts training sessions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Systems Development Vendor</li> <li>▪ DCDC</li> <li>▪ ITSD</li> <li>▪ Hosting Services</li> </ul>
Data Management Team	<ul style="list-style-type: none"> <li>▪ Defines current and future data elements and data relationships, working with internal and external stakeholders.</li> <li>▪ Designs logical data model and develops data dictionary.</li> <li>▪ Conducts data model walkthroughs.</li> <li>▪ Develops and maintains physical data model.</li> <li>▪ Serves as a resource to the Systems Integration team.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Systems Development Vendor</li> <li>▪ DCDC</li> <li>▪ ITSD</li> </ul>
Independent Project Oversight	<ul style="list-style-type: none"> <li>▪ Serves as an independent expert that provides recommendations in managing all of the activities that are critical to the project's success.</li> <li>▪ Oversees the project to ensure that it is following a structured and defined project management approach.</li> <li>▪ Reviews all draft and final project management deliverables to ensure that they are aligned with defined standards and project needs.</li> <li>▪ Provides monthly assessment and review reports to DOF and CDHS management</li> </ul>	Independent Project Oversight Vendor (Reports to ITSD/POS)

Role	Responsibilities	Organization
Independent Verification and Validation	<ul style="list-style-type: none"> <li>▪ Serves as an independent expert that provides recommendations in performing the technical activities that are critical to the project's success.</li> <li>▪ Oversees the project to ensure that the products of each phase fulfill the requirements levied on them (verification), and that the final product of the project will fulfill the business objectives and functional requirements (validation).</li> <li>▪ Reviews all draft and final technical deliverables to ensure that they are aligned with defined standards and project needs.</li> <li>▪ Provides monthly assessment and review reports to CDHS management</li> </ul>	IV&V Vendor (Reports to ITSD/POS)

Upon completion of the project, the maintenance team will fulfill the following roles and responsibilities.

Role	Responsibilities	Organization
Systems Maintenance Team	<ul style="list-style-type: none"> <li>▪ Serves as liaison between CDHS and hosting services location</li> <li>▪ Maintains Web CMR application. Designs, develops, and implements approved system changes post-implementation.</li> <li>▪ Maintains Web CMR database. Designs, develops, and implements approved system changes post-implementation</li> <li>▪ Addresses user questions and issues (e.g., second level help desk).</li> <li>▪ Maintains Web CMR technology architecture, including servers and external network.</li> <li>▪ Designs changes related to program changes.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ITSD</li> <li>▪ Systems Development Vendor</li> <li>▪ Hosting Services</li> </ul>

### 6.5.5 Project Management Schedule

Task/ Activity	Duration	Milestone/ Decision Point	Estimated Completion
<b>FY 2005 through 2008</b>			
<b>Phase 0: Proof of Concept</b>			
POC Application evaluation by State and Counties	2 months	Select counties and State evaluate POC SW	Mar 2006
Formal Evaluation of Proof of Concept	1 month	Formal evaluation published	Apr 2006
<b>Phase 1: Local Disease Reporting and Case Management</b>			
Develop Software Evaluation Criteria	1 month	Project Sponsor approval of criteria	May 2006

Develop RFP/RFQ	1 month	RFP/RFQ released to vendors	Jun 2006
Vendor Selected	2 months	Signed Contract	Aug 2006
Hardware/Software Installation	2 months	Signed Contract	Oct 2006
Select Pilot LHJ(s)	1 month	Project participation MOUs	Nov 2006
Software Configuration	2 months	Sign-off on Test Completion	Jan 2007
Test/Certify Pilot LHJs	1 month	Pilot LHJs approved as CMR users	Feb 2007
Market system, training, and support to other LHJs	20 months	Incorporation of LHJs into CMR system	Oct 2008
<b>Phase 2: Statewide Integrated Data Repository</b>			
Integration of legacy AVSS data into data warehouse	6 months	Structured incorporation of data	Jun 2007
Integration of ELR message brokering from disparate systems	6 months	Operational MOUs with disparate system LHJs	Apr 2007
Integration of CDMS and MORB reporting processes	16 months	Use of CMR system as LHJs transfer from legacy processes	Oct 2008
<b>Phase 3: Statewide Outbreak Detection and Alerting</b>			
Development of regional and statewide surveillance analysis and detection rules	6 months	Successful testing of surveillance algorithms	Jun 2007
Development of alerting rules and integration with HAN	3 months	Successful testing of exercise alerting using HAN	Sep 2007
<b>Phase 4: Geographic and Graphical Representations (AVR)</b>			
Specification of graphical presentation strategy	3 months	Decision by stakeholders on how to present surveillance information	May 2007
Graphical integration with CMR warehouse, surveillance analytics, and GIS tables	6 months	Successful presentation of disease surveillance geographic results	Nov 2007

Porting of graphical representations to public health partners and stakeholders	3 months	Successful test of presentation web service used by stakeholders	Feb 2008
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## 6.6 Project Monitoring

The Web CMR project manager will maintain the project plan and associated schedule and make it available to all project stakeholders. Team members will report progress, issues, possible risk factors, change requests, etc. to the project manager as they occur, but no less often than monthly.

Development vendor progress will be reported no less often than twice monthly. The contract manager will assess the vendor's performance.

Any problems that might jeopardize the schedule, cost, quality or scope of the project or require additional resources to be added, will be called to the attention of the Project Steering Committee and the Project Sponsor as soon as they are discovered, so remedial actions may be planned.

Project stakeholders will receive monthly status reports of the project's progress, along with other material developed to ensure a successful implementation in the field.

### 6.6.1 Project Oversight

Project oversight involves independent review and analysis to determine if the project is on track to be completed within the estimated schedule and cost, and will provide the functionality required by the sponsoring business entity. Web CMR project oversight will be managed by the ITSD Planning and Oversight Section (POS). The POS will procure highly qualified consultants to perform Independent Project Oversight (IPO) and Independent Verification and Validation (IV&V).

#### 6.6.1.2 IPO

IPO will be conducted in accordance with the DOF IT Project Oversight Framework. The IPO consultant will perform the following functions:

- Perform continuous review and analysis to determine if the project is on track to be completed on cost and schedule.
- Ensure that the project is following a structured and defined project management approach.
- Independently identify and analyze project risks.
- Review project management deliverables to ensure that they are aligned with defined standards and project needs.

- Provides monthly assessment and review reports to DOF and CDHS management
- Provide recommendations in managing all of the activities that are critical to the project's success.

#### 6.6.1.3 IV&V

IV&V will be conducted using the Institute of Electrical and Electronic Engineers (IEEE) Standard 1012-2004, Software Verification and Validation. The IV&V consultant will perform the following functions:

- Perform continuous review and analysis to ensure that the products of each phase fulfill the requirements levied on them (verification), and that the final product of the project will fulfill the business objectives and functional requirements (validation).
- Reviews technical deliverables to ensure that they are aligned with defined standards and project needs.
- Provides monthly assessment and review reports to CDHS management
- Serves as an independent expert that provides recommendations in performing the technical activities that are critical to the project's success.

### 6.7 Project Quality

Quality is defined as the delivery of a work product or deliverable that satisfies the requirements and objectives of the project with minimal errors and defects. In order to minimize the risk of receiving a work product or deliverable of poor quality, a Deliverable Expectations Document (DED) will be completed prior to the start of any major deliverable. Within the DED, the following is identified:

- Deliverable name.
- Description of the deliverable.
- Deliverable outline.
- Planned delivery date.
- Deliverable reviewers.
- Deliverable sign-off sheet.

The project manager and contract manager will review and approve each DED. Walkthroughs will be conducted on all deliverables. The IPOC and IV&V consultants will be provided draft and final versions of applicable deliverables as well as participate in the walkthrough sessions. A deliverable sign-off sheet will be completed by the project manager upon receipt of a completed and approved deliverable. This sign-off sheet must be attached to the vendor invoices in order for the contract manager to process the invoice.

## 6.8 Change Management

Change is an inevitable occurrence on any project. In order to effectively manage change for the Web CMR Project, the Project Manager will develop a Change Management Plan to define the process, procedures and outputs for all change-related project activities. The plan will identify the parties responsible for identifying, resolving, supporting, and making project changes. The implementation of a change management plan ensures that all changes are evaluated for potential scope, cost, and schedule impacts. The process allows decision-makers the opportunity to evaluate changes in a systematic manner. The major goal of this change management strategy is to ensure that only approved changes are made, and those changes are made using standardized methods and procedures.

The change management process will define the processes and procedures for:

- Reporting an identified need for change;
- How the change request will be analyzed and documented;
- How the change will be acted upon for review, approval or denial;
- How approved changes will be executed.

The plan is designed to:

- Allow for needed changes and prevent unnecessary changes.
- Minimize disruption to the project.
- Communicate changes to stakeholders.
- Minimize unanticipated impacts to schedule and/or budget.

The implementation of a change management plan ensures that all changes are evaluated for potential scope, cost, and schedule impacts. The process allows decision-makers the opportunity to evaluate changes in a systematic manner.

## 6.9 Authorization Required

The following external authorization are required for purchase, modifications, and implementation related to the Web CMR project.

Type	Organization
Appropriation of Federal Funds	Legislature
Approval to Spend Federal Funds	DOF and Joint Legislative Budget Committee (JLBC)
Technical Approach	DOF

## 7.0 RISK MANAGEMENT PLAN

This section documents the process and procedures that will be used to manage project risks.

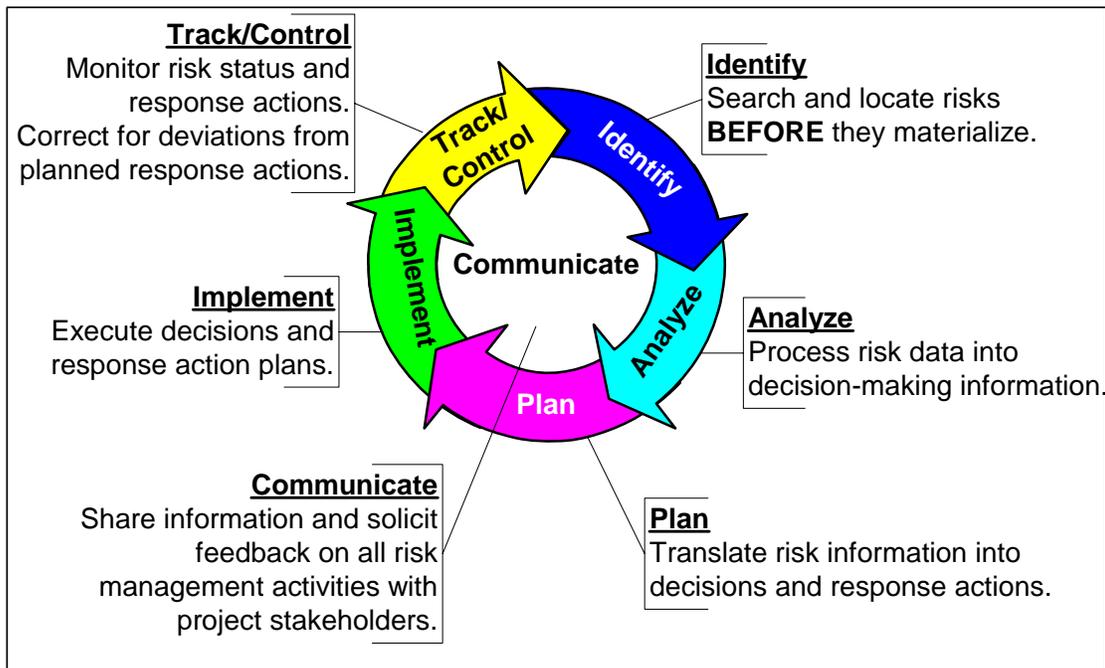
### Introduction

This Risk Management Plan describes the methods that the Web CMR team will use to manage risks throughout the life of the project.

A risk is any potential problem that may interfere with the successful completion of the project. Risks may potentially affect project schedule, cost, and/or quality. Risk management includes the following major components:

- Risk analysis – identifying and prioritizing risks.
- Risk action planning and tracking – developing a plan of action for each identified risk, and tracking progress against the plan.
- Risk escalation – providing appropriate visibility of risks to management.

The continuous cycle of risk management activity is depicted graphically below.



## References Consulted

- Project Management Institute's *Project Management Book of Knowledge* (PMBOK), 2000 Edition, Chapter 11 (Project Risk Management)
- Department of Finance (DOF) *Information Technology Project Oversight Framework*, Section 5 (Risk Management and Escalation Procedures)
- DOF *State Information Management Manual* (SIMM), Section 200.3.11 (Risk Management Plan)

## Goals and Objectives

The goal of this Risk Management Plan is to improve the probability of success of the CMR by providing a roadmap for:

- Ongoing assessment of potential problems; and
- The opportunity to make adjustments to avoid or lessen the impact of those problems before they occur.

The objectives of this Risk Management Plan are the continuous identification, assessment and documentation of:

- The risks faced by the project;
- The estimated probability of each risk;
- The consequences in terms of impact on project schedule, cost, and quality if the risk events should occur;
- The priority of each risk for response action and escalation;
- The owner of each risk;
- The plan of action for responding to each risk; and
- The thresholds and procedures for escalating risks.

## Scope

This Risk Management Plan includes the risk management activities for the duration of the CMR.

## Roles And Responsibilities

The table below identifies the project stakeholders and their related risk management responsibilities.

Title	Role/Responsibilities
Department of Finance (DOF)	Review monthly Independent Project Oversight Reports to assess project risk management practices. Provide feedback and direction as needed.

Title	Role/Responsibilities
Steering Committee	Final approval of Risk Management Plan. Review escalated high and medium severity risks. Provide direction when needed. Determine if risks have become unacceptable for the project to continue.
ITSD/Planning and Oversight Section	Provide general risk management assistance as requested. Review escalated high and medium severity risks. Provide feedback and suggestions as needed.
Project Director	Approve Risk Management Plan. Review escalated high, medium, and low severity risks. Provide direction and feedback as needed.
Risk Manager (CMR Project Manager)	Overall responsibility for risk management. Develop the Risk Management Plan. Determine which risk candidates represent actual risks. Assign Risk Owners. Maintain the Risk Management Forms. Maintain the Risk List. Escalate risks.
Risk Owners (Project team members as assigned)	Assign risk attributes. Determine risk priority. Determine risk response strategy. Develop risk response action plan. Execute risk response actions. Track and report risk status and response activity.
Project Team Members	Identify risk candidates.
Independent Project Oversight Consultant (IPOC)	Provide an ongoing independent review and analysis of project risk management practices. Independently identify and analyze project risks. Develop Independent Project Oversight for submission to management and DOF.

## Risk Analysis

Risk analysis includes the steps necessary to identify and prioritize risks.

### Risk Identification

Risk identification is the process of discovering those risks which could negatively impact project quality, cost, and/or schedule. It would be impossible to identify all possible risks to the project, therefore emphasis is on identifying risks that are at least somewhat likely to occur and that could have a significant impact on the project. All project team members and the IPOC are responsible for identifying potential risks to the project. At a regular periodic basis, all risks will be reviewed by the Project Manager and IPOC. It is also anticipated that monthly project team meetings will include a standing agenda item for raising new risk candidates to the attention of the Risk Manager. Project team members and the IPOC may also communicate risk candidates to the Risk Manager by email, telephone, or ad hoc meetings—however, all project participants will be trained and encouraged to enter risks into the project’s risk management tool Clarity. Project participants will be instructed to communicate potentially serious risk as soon as practical rather than waiting for the next monthly team meeting.

### Sources of Risk

Project risks can come from many and varied sources. Project team members must be vigilant in recognizing and documenting potential risks so that they can be properly evaluated for project impact. Some common risk sources include:

- The technology used on the project;
- The legal and regulatory environment in which the project is executed;
- Relationships between the organizations involved in the project;
- Sufficiency and allocation of project resources;
- Unrealistic or conflicting stakeholder expectations;
- Mandated implementation date.

### Risk Determination

The Risk Manager, with participation as needed by applicable project team members, determines which risk candidates constitute actual risks to the project. A risk is a potential event that would have a negative impact on the success of the project if the event were to occur. The following considerations support the determination of “Is it a risk?”:

- Time frame: A risk is a potential future event. Risk events that have already occurred are not risks, but rather represent problems or issues to be managed outside of the Risk Management process. Events that may occur after the project is completed, but not during the project, are not risks to the project.
- Probability: What is the estimated likelihood of the risk event occurring? If there is little or no probability of the risk event occurring, the risk may not warrant inclusion in the Risk Management process. An event that is certain to occur is not a risk but rather a problem or issue.
- Impact: What is the estimated impact to the project schedule, cost, or quality if the risk event should occur? Risks with little or no impact may not warrant inclusion in the Risk Management process.

Risk candidates that are judged to meet the three criteria described above are included in the project Risk Management process.

## Risk Attributes

Risk attributes are described in the table below. Risk attributes are documented by the Risk Owner, as described in paragraph 3.2 Risk Tracking.

Risk Attribute	Description
Risk Name	A brief sentence or phrase that summarizes the risk.
Risk ID	A unique number used to identify the risk. The Risk ID is assigned sequentially by the system.
Creator	The name and organization of the person who identified the risk.
Creation Date	The date that the risk was recognized as a project risk.
Owner	The project team member responsible for responding to the risk and tracking risk status. The Risk Manager assigns the Risk Owner.
Description	A concise definition of the risk using the sentence structure Concern • Likelihood • Consequence for example, "Mandated unrealistic implementation date • will likely • lead to significant missing functionality in the system implementation".
Risk Symptoms	Elaboration of warning signs or triggers (an early indication that the risk is starting to occur).
Impact Description	Elaboration of the Consequences if the risk is manifested. I.e. the increased costs, delayed schedule, reduced quality, and/or unrealized scope that could occur if the risk occurs.
Impact Date	The expected date the risk might manifest. This is used to calculate the Time Frame.
Target Resolution	The target date for the Risk Owner to implement mitigation, transfer, or contingency plans. This date must be earlier than the Impact Date.

Risk Attribute	Description
Impact	An ordinal value to indicate the severity of consequences. Possible values are: very low, low, medium, high and very high.
Probability	A cardinal value to indicate the likelihood of occurrence: 1%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 80%, 90%, 99%
Calculated Risk	A system calculated value of risk exposure. Calculated by multiplying impact * probability. A higher value indicates a greater exposure. Maximum value is 495.

### Risk Prioritization

Risks are prioritized by severity, with the highest severity risks given the highest priority for response action and escalation. Risk severity is determined by the probability, impact and Timeframe.

#### Probability

Risks are assigned a probability rating based on the estimated likelihood of a risk event occurring.

#### Impact

Risks are assigned an impact rating based on the estimated negative impact on project cost, schedule and/or quality.

Criteria	Impact Rating
One or more of the following: <ul style="list-style-type: none"> <li>- Project cost increase of 16% or more</li> <li>- Project schedule increase of 16% or more</li> <li>- Schedule predicts missing formal public milestone</li> <li>- Failure to meet major performance requirements</li> <li>- Failure to provide major required functionality</li> </ul>	Very High
None of the above Very High criteria, one or more of the following <ul style="list-style-type: none"> <li>- Project cost increase of 11% to 16%</li> <li>- Project schedule increase of 11% to 16%</li> <li>- Schedule predicts missing formal department milestone</li> <li>- Significant discrepancies in desired performance</li> <li>- Significant discrepancies in desired functionality</li> </ul>	High
None of the above High criteria, one or more of the following: <ul style="list-style-type: none"> <li>- Project cost increase of 6% to 10%</li> <li>- Project schedule increase of 6% to 10%</li> <li>- Some discrepancies in desired performance</li> <li>- Some discrepancies in desired functionality</li> </ul>	Medium

Criteria	Impact Rating
None of the above Medium criteria, one or more of the following: - Project cost increase of 3% to 5% - Project schedule increase of 3% to 5% - Minor discrepancies in desired performance - Minor discrepancies in desired functionality	Low
None of the above Low criteria, one or more of the following: - Project cost increase of less than 2% - Project schedule increase of less than 2%	Very Low

### Time Frame

Risks are assigned a Time Frame based upon the Target Resolution date based on the time period within which action must be taken to successfully respond to the risk. Target Resolution is the date all mitigation, contingency and/or transfer activities must be completed. Target Resolution is less than the Impact Date. Impact Date is the date the result will occur and impact the project.

Time Period to Respond to Risk	Time Frame
Very Long	> 18 Months
Long	9 to < 18 Months
Medium	3 to < 9 Months
Short	< 3 Months

### Exposure

Risk exposure is determined from the probability and impact ratings, and is used along with the time frame rating to determine severity. The exposure rating for each risk is the intersection of that risk's impact and probability in the matrix below:

**Risk Exposure Matrix**

		Probability									
		10	20	30	40	50	60	70	80	90	100
Impact	Very Low	10	20	30	40	50	60	70	80	90	100
	Low	20	40	60	80	100	120	140	160	180	200
	Medium	30	60	90	120	150	180	210	240	270	300
	High	40	80	120	160	200	240	280	320	360	400

t	Very High	50	100	150	200	250	300	350	400	450	500
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## Severity

Risk severity is determined from the exposure and time frame ratings, and is used to prioritize the risk. Risks with “High” severity have the highest priority for risk response activity and escalation, followed by “Medium” and then “Low” severity risks. The severity rating for each risk is the intersection of that risk’s exposure and time frame in the matrix on the following table:

### Risk Severity Matrix

		Exposure / Calculated Risk		
T	F	<119	120 to 269	>269
i m e e	Very Long	60	194	231
	Long	120	388	462
	Medium	180	582	693
	Short	240	776	924

## Risk Action Planning and Tracking

The Owner is responsible for planning appropriate risk response action and for tracking the status of the risk and the response activity. The Owner reports any changes in risk status at the monthly project team meeting.

### Risk Action Planning

The Owner, with approval of the Risk Manager, determines the appropriate risk response strategy and actions plan.

### Risk Response Strategy

The Owner, with the approval of the Risk Manager, determines the appropriate risk response strategy from the options below:

- Research – Additional research will be taken prior to determining the appropriate strategy.
- Accept – If the project can continue and be successful with the anticipated impact of the risk, or if there is no practical way to avoid or mitigate the risk, the project may choose to accept the risk and expend no further resources managing it other than tracking the risk status.
- Avoid – Risk avoidance involves taking steps to reduce the probability of the risk.

- Transfer – Transfer the risk to a third party. If the risk occurs, the third party suffers the impact instead of the project. Typically accomplished via insurance.
  - Mitigate – Risk mitigation involves taking steps to reduce the impact of the risk. These steps can include actions to be taken immediately, and/or contingency plans to be implemented if a risk event occurs.
- When appropriate a risk response strategy can include transfer, avoidance and/or mitigation actions.

### Action Planning / Response Strategy

The Owner, with the approval of the Risk Manager, determines the action plan to be taken to implement the selected strategy. Often a simple list of one or more action items, with responsibilities and due dates identified, will be an adequate plan. Some high severity risks may require more elaborate planning. These are recorded in the Response Strategy.

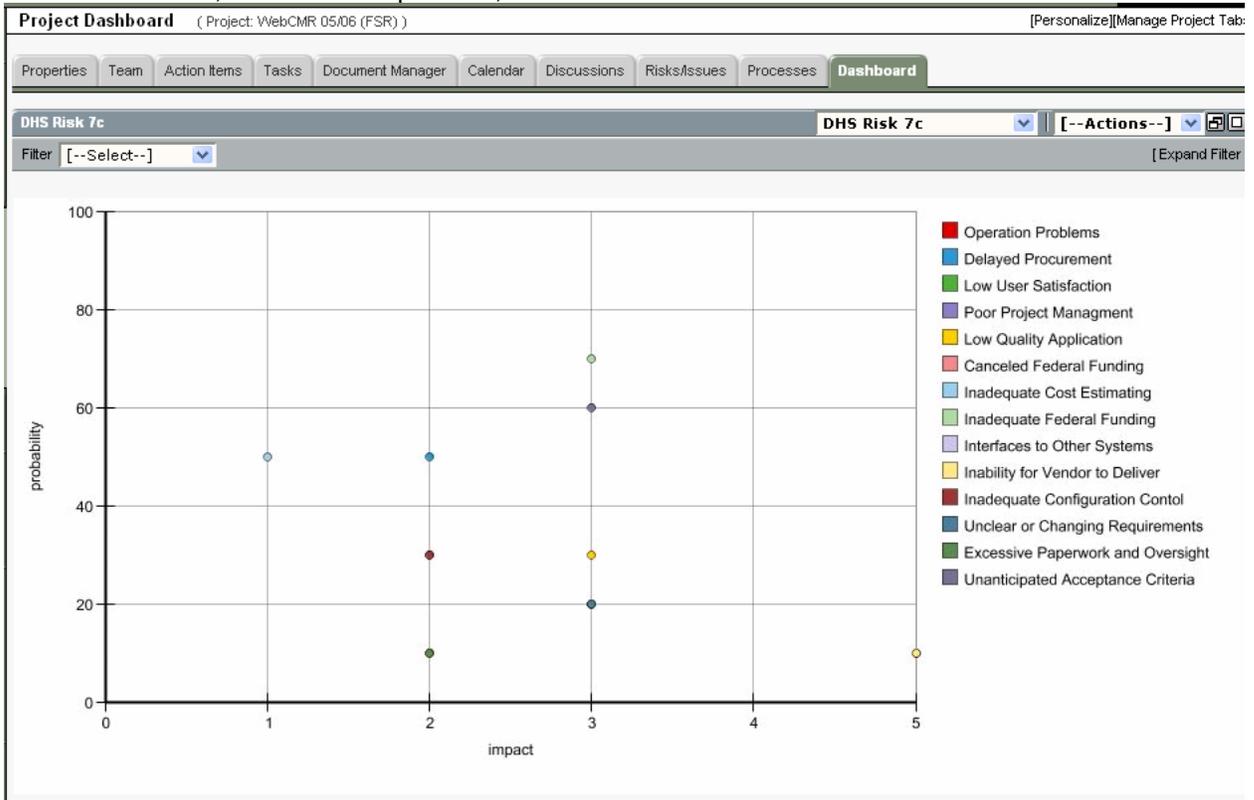
### Risk Tracking

Clarity is used as the system of record for all project risks. This project management repository is available to all project participants. Shown below is an example screen print of the Risk's General Property page. This is used by any project participant to create or edit a risk.

The Risk Manager, or any project participant, may use Clarity to list or summarize the risks via Clarity on a regular basis: A listing of risks, is shown on the following page. It is also included in Appendix A.

Project Risks ( Project: WebCMR 05/06 (FSR) ) <span style="float: right;">[Manage Project Tabs]</span>									
Properties   Team   Action Items   Tasks   Document Manager   Calendar   Discussions   <b>Risks/Issues</b>   Processes   Dashboard									
Risks   Issues   Change Requests									
Risk Filter									[--Actions--] ▾
Filter System Default ▾									[Expand Filter]
New									
<input checked="" type="checkbox"/>	Name	ID	Owner	Probability	Impact	Calculated Risk ▾	Target Resolution Date	Status	Response Type
<input type="checkbox"/>	Inadequate Federal Funding	RSK-0139	Mershon, Steve	⚠	⚠	210	6/6/06	1 Open	Research
<input type="checkbox"/>	Unanticipated Acceptance Criteria	RSK-0151	Mershon, Steve	⚠	⚠	180	6/7/06	1 Open	Research
<input type="checkbox"/>	Delayed Procurement	RSK-0138	Mershon, Steve	⚠	⚠	100	4/6/06	1 Open	Research
<input type="checkbox"/>	Low Quality Application	RSK-0140	Mershon, Steve	⬢	⚠	90	6/6/06	1 Open	Research
<input type="checkbox"/>	Low User Satisfaction	RSK-0142	Mershon, Steve	⬢	⚠	60	6/6/06	1 Open	Research
<input type="checkbox"/>	Unclear or Changing Requirements	RSK-0144	Mershon, Steve	⬢	⚠	60	6/6/06	1 Open	Research
<input type="checkbox"/>	Inadequate Configuration Control	RSK-0148	Mershon, Steve	⬢	⚠	60	6/7/06	1 Open	Research
<input type="checkbox"/>	Interfaces to Other Systems	RSK-0146	Mershon, Steve	⬢	⚠	60	6/6/06	1 Open	Research
<input type="checkbox"/>	Poor Project Management	RSK-0145	Mershon, Steve	⬢	⚠	60	6/6/06	1 Open	Research
<input type="checkbox"/>	Inadequate Cost Estimating	RSK-0143	Mershon, Steve	⚠	⬢	50	6/6/06	1 Open	Research
<input type="checkbox"/>	Inability for Vendor to Deliver	RSK-0149	Mershon, Steve	⬢	⚠	50	6/7/06	1 Open	Research
<input type="checkbox"/>	Canceled Federal Funding	RSK-0150	Mershon, Steve	⬢	⚠	50	6/7/06	1 Open	Research
<input type="checkbox"/>	Excessive Paperwork and Oversight	RSK-0152	Mershon, Steve	⬢	⚠	20	6/7/06	1 Open	Research
<input type="checkbox"/>	Operation Problems	RSK-0153	Mershon, Steve	⬢	⚠	20	6/7/06	1 Open	Research
Total Results: 14									
New									

A dashboard view, with two example risks, is shown below:



Risk Escalation

The Project Manager escalates risks to the Project Director, the Planning and Oversight Section (POS), and the steering committee depending on risk severity, as indicated in the risk escalation matrix below:

		Risk Severity		
		High	Medium	Low
Escalation	DOF	X		
	Steering Committee; POS	X	X	
	Project Director	X	X	X

The method of risk escalation is as follows:

- High, medium, and low severity risks are reported to the Project Director in regular project status reports.
- High and medium severity risks are reported to the Steering Committee during Steering Committee Meetings.
- Printouts of Risk Inventory for high and medium severity risks are included in the monthly Executive Project Status Reports provided to the POS.
- Print-outs of the Risk details for high and medium severity risks are included in the monthly Executive Project Status Reports provided to the POS.
- High severity risks are reported to the Department of Finance by the IPOC in monthly IPO Reports. Alternatively, it is anticipated that the DOF analyst assigned to the project will be a project participant, and therefore be able to view project risks anytime.

Appendix: Risk List

Name	ID	Owner	Probability	Impact	Calculated Risk	Target Resolution Date	Status
<a href="#">Inadequate Federal Funding</a>	RSK-0139	Mershon, Steve	70	High	210	6/6/06	1 Open
<a href="#">Unanticipated Acceptance Criteria</a>	RSK-0151	Mershon, Steve	60	High	180	6/7/06	1 Open
<a href="#">Delayed Procurement</a>	RSK-0138	Mershon, Steve	50	Medium	100	4/6/06	1 Open
<a href="#">Low Quality Application</a>	RSK-0140	Mershon, Steve	30	High	90	6/6/06	1 Open
<a href="#">Low User Satisfaction</a>	RSK-0142	Mershon, Steve	20	High	60	6/6/06	1 Open
<a href="#">Unclear or Changing Requirements</a>	RSK-0144	Mershon, Steve	20	High	60	6/6/06	1 Open
<a href="#">Inadequate Configuration Control</a>	RSK-0148	Mershon, Steve	30	Medium	60	6/7/06	1 Open
<a href="#">Interfaces to Other Systems</a>	RSK-0146	Mershon, Steve	30	Medium	60	6/6/06	1 Open
<a href="#">Poor Project Management</a>	RSK-0145	Mershon, Steve	20	High	60	6/6/06	1 Open
<a href="#">Inadequate Cost Estimating</a>	RSK-0143	Mershon, Steve	50	Low	50	6/6/06	1 Open
<a href="#">Inability for Vendor to Deliver</a>	RSK-0149	Mershon, Steve	10	Very High	50	6/7/06	1 Open
<a href="#">Canceled Federal Funding</a>	RSK-0150	Mershon, Steve	10	Very High	50	6/7/06	1 Open
<a href="#">Excessive Paperwork and Oversight</a>	RSK-0152	Mershon, Steve	10	Medium	20	6/7/06	1 Open
<a href="#">Operation Problems</a>	RSK-0153	Mershon, Steve	10	Medium	20	6/7/06	1 Open

## **8.0 ECONOMIC ANALYSIS WORK SHEETS**

The following pages present the Economic Analysis Work Sheets (EAWS) for the existing and proposed systems

The spreadsheets are included as a separate file in the electronic version of this FSR.

All non-contract staff represents existing positions in CDHS. The following positions are shown:

## **Appendices**

**Appendix A – Acronym List**

**Appendix B - Disease Report List**

**Appendix C – Reportable Disease and Conditions**