California Health Information Exchange
Strategic and Operational Plan

October 2012
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Preface

California is at a very exciting point in the execution of health information exchange (HIE) program planning and implementation.

Since the initial California HIE Strategic and Operational Plan was developed, in 2009, significant education has raised awareness about the important influences HIE will have on healthcare reform, cost management and quality of care for California’s residents. Both ongoing state and federal healthcare reform discussions have clarified the core role health information technology will play in care related transactions, including those for direct care, payment, quality, public health and patient engagement purposes. The world of health information technology and exchange is ever-changing and growing, making it impossible for a stationary document to fully capture the fluidity of the planning and implementation process. This document, however, outlines a vision for California’s role in the evolution of healthcare, and a roadmap to better health for California residents.

California’s focus on utilizing health information technology and exchange in pursuit of improved health and well-being for all Californians has expanded through state government planning and supporting structures. This was recently underscored by the development of “Let’s Get Healthy California,” a program outlining California’s 10-year plan for population management of high-risk and high cost chronic diseases. Making health information more readily available for authorized healthcare providers as well as patients can help make significant impact on the overall health of the population. Providers can better coordinate care, and patients become more engaged and empowered through information access, and may seek more active participation in the management of their own health status. The recently created position of Chief Medical Informatics Officer in the Department of Healthcare Services also highlights California’s commitment to a data driven, analytical approach to monitoring and quality improvement in Medi-Cal efforts.

The following plan is submitted at a time when California’s programmatic work specific to HIE is “in transition.” As work has transferred from California’s initial Partner, Cal eConnect, to the newly established Partner, California Health eQuality (CHeQ). The new partner was established through the Institute for Population Health Improvement (IPHI), part of the University of California Davis Health System under the direction of Distinguished Professor and Director, Kenneth Kizer, MD, MPH.

California’s inaugural efforts of governance — as evidenced by the state governance entity (SGE), Cal eConnect (CeC) — with a statutorily defined 20+ member Board of Directors proved to be too constraining and cumbersome a model to support a start-up organization tasked with aggressive implementation and planning for such a large geographical environment as California. This realization, and the subsequent termination by CeC of its SGE subgrantee
status arrangement, has provided an opportunity to reenergize and refine programmatic work while focusing on future modeling and sustainability.

We’ve learned many valuable lessons since the initial Operational and Strategic Plans were drafted in 2009. Since that time the most significant areas of change have been in governance (Section 1.1), sustainability (Section 3.0), and Privacy and Security Framework (Section 5.0). In direct response to public input, the June 2012 Statewide Strategic and Operational Plan has been amended to include a new section (Section 1.8.5.2) on the 61 local public health jurisdictions in California. Central to all California’s efforts is the focus on “the consumer” of healthcare services – our patients. These changes, and the lessons we’ve learned, are reflected in this updated document, which is submitted for your review and approval.

It is important for the reader to understand the use of specific terms throughout this document. Specifically:

- **California Health and Human Services Agency** will be defined as Agency, the state entity in receipt of federal funding to facilitate HIE under the American Recovery and Reinvestment Act.
- “**Former Partner**” will refer to Cal eConnect
- “**Current Partner**” will reference California Health eQuality, a program under The Institute for Population Health Improvement, UC Davis Health System
- **Health information exchange organization (HIO)** is commonly used in this document to define the entity with **governance structure and oversight** in health information exchange.
- **Health information service partner (HISP)** as used in California refers to any service partner engaged by a Health Information Exchange Organization to facilitate exchange. Note: This is a use that differs from the definition in common use by our federal partners where it is specific to NwHIN Direct facilitation.

California’s statewide efforts in HIE are truly “a work in progress” and will remain that way for the foreseeable future. This is to be expected as HIE is a tool to support providers and hospitals pursuing truly meaningful use of health information technology that will significantly impact patient care. State government is in a position to both manage and oversee population health efforts in California, and to provide leadership in creating a healthcare system that is effective, efficient and financially viable. However, it is only through collaboration and cooperation with public and private stakeholders, state and local departments, providers, patients – all Californians – that the state will achieve its goals for a healthy California, as detailed in this document.
Executive Summary

Much dialogue, debate, consensus, and the “agreement to disagree” have taken place across the country regarding Health Information Technology (HIT). Stimulated by funding through The American Recovery and Reinvestment Act (ARRA) and its Health Information Technology for Economic and Clinical Health (HITECH) Act, this discussion centers on a central question: How do we best apply HIT and Health Information Exchange (HIE) technology across broad healthcare challenges?

Nowhere have the conversations been more robust than in California.

California is geographically a large diverse state, with densely populated urban areas like Los Angeles, San Francisco and wide-open spaces such as Monterey and the Central Coast, and everything in between. This huge range of diversity also creates a complicated and divided technology landscape. In this way, California is truly a microcosm of the entire United States, reflecting the diverse technology challenges we face nationwide.

Our state’s diversity is most apparent when implementing and applying technology. On the one hand, California is nationally recognized for technology leadership in the Silicon Valley, a highly advanced entrepreneurial spirit, and a technological vision renowned as “leading edge.” California is home to the most sophisticated health care institutions in the world; these providers have invested billions of dollars in health IT to support improvements in efficiency and quality, both within their individual organizations and in their patient populations. Additionally, emerging health information exchange organizations (HIOs) are on the forefront of interoperability, endeavoring to support community health care and improve care for the underserved. State government has made significant investments in its systems including Medi-Cal and various state registries that can be leveraged to create value in healthcare settings.

On the other hand, many of California’s rural areas¹ don’t have access to broadband. The result: A growing “digital divide.”

What has created this divide? We can look to California’s geographic landscape for answers. Eighty percent of California landmass is designated as rural. ² As recently as 2008, 57% of households in rural areas remained without

¹ US Census Bureau, Definition of Urban and Rural, October 1995. Rural: all territory, population, and housing units that are located outside of urban areas and urban clusters. Urban areas and clusters are determined by population density and size.
broadband access\textsuperscript{3}. Thirteen percent of California’s 37 million residents (5.1 million) live in these rural areas\textsuperscript{4} and are cared for by providers whose patient load is over twice that of their counterparts in non-rural areas (935 to 460 per doctor, respectively).\textsuperscript{5}

This “care divide” is exacerbated by the shortage of physicians in rural areas nationally: only one in four doctors practice in these areas.\textsuperscript{6}

California is dedicated to bridging this divide. In spite of the differences in geography, technology access, and adoption, a private-public-government commitment to the advancement of technological solutions exists. The goal is to eliminate barriers, increase safety and quality, and reduce cost while actively engaging patients in the care process. When it comes to statewide comprehensive health care reform efforts, health information available electronically through HIE continues to figure prominently in ongoing planning.

Our state has a documented commitment to eHealth. For example, the “Let’s Get Healthy California” initiative, an Executive Order signed by Governor Edmund G. Brown on May 3, 2012, will focus on “develop(ment of) a 10-year plan for improving the health of Californians, controlling health care costs, promoting personal responsibility for individual health and advancing health equity by establishing baselines for key health indications” through “the talent, resources, experience and innovations of California’s….technology and healthcare industries, universities and others”.

Movement toward this goal began in March 2007 with Governor Arnold Schwarzenegger’s Executive Order S-06-07, which called for the advancement of statewide health IT adoption to increase quality, strengthen transparency, and promote accountability in the health care sector. The order called for “100 percent electronic health data exchange” within ten years, and it identified key actions for the state to pursue, including providing state leadership, leveraging state purchasing power, developing a quality reporting mechanism through the Office of the Patient Advocate, and strengthening the ability of the Office of

\textsuperscript{2} Sam Willburn, Department of HealthCare Services, State Affairs Update, The California State Rural Health Association 9th Annual Rural Health Conference, Sacramento, CA , November 19, 2009.


\textsuperscript{4} USDA: Economic Research Service, State Fact Sheets, December 9, 2009

\textsuperscript{5} California Health Interview Survey, Diabetes and Health Disease search; rural/urban comparison, 2007

Statewide Health Planning and Development to collect, integrate, and distribute data.

Many positive changes have already begun: A newly created position within Medi-Cal leadership, the first Chief Medical Information Officer, will be staffed by the former interim Deputy Secretary, HIE, and will focus on applying data in Medi-Cal’s rich repository of information to these efforts. The Officer will coordinate information provided through administrative data and quality reporting to provide analytics for decision making and educational efforts focused on reduction and prevention of chronic disease management.

California Health and Human Services (Agency) is the ARRA-funded HIE grantee, under the direction of the Deputy Secretary, HIE and in new HIE cooperative partnership agreement with California Health eQuality (CHeQ). Together, these groups and individuals will work in concert to continue leveraging federal dollars with statewide partners, funding, and planning opportunities for advancing HIE in California.

The collective efforts of Federal, State, and stakeholders, including patients, will create a model environment for HIE, improving both the physical and fiscal health of our state. To this end, we’ve simplified the Vision and Goals of California’s e-Health landscape:

**California’s Vision**

Improve the health and well-being of all Californians.

**California’s e-Goals**

- *Enhance* individual and population health outcomes through results-oriented programs.
- *Ensure* secure data access that protects patient privacy and data integrity.
  - *Engage* patients and families as partners in care.
1. OVERALL HIE STRATEGY
1. OVERALL HIE STRATEGY

1.1 Oversight and Governance

California’s Health Information Exchange (HIE) strategy has engaged a diverse number of stakeholders who are all driven by the same passion — improving the health and well-being of our citizens.

The HITECH Act includes state grants to promote health information technology and health information exchange. Through the state HIE Cooperative Agreement Program, grants have been awarded to States to develop and advance mechanisms for information sharing across the health care system. California Health and Human Services Agency (“Agency”) is the grantee for California, and has not appointed a State Designated Entity (SDE). Agency is expected to develop a strategic plan and use their authority and resources to:

- Develop and implement up-to-date privacy and security requirements for HIE.
- Develop technical services to enable interoperability within and across states.
- Coordinate with Medicaid, and state and local public health programs to enable information exchange and support monitoring of provider participation in HIE.
- Remove barriers that may hinder effective HIE, particularly those related to interoperability across pharmacies, laboratories, hospitals, clinician offices, health plans, and other health information exchange partners.
- Ensure an effective model for HIE governance and accountability is in place.
- Convene health care stakeholders to build trust in and support for a statewide approach to HIE.

The diagram below shows the relationship between the state, the statewide HIE subgrantee, CHeQ, the Privacy and Security Workgroups, and stakeholders:
1.1.1 CALIFORNIA E-HEALTH COORDINATING COMMITTEE

A critical piece of the California’s eHealth landscape is the eHealth Coordinating Committee, which is convened by Agency to facilitate collaboration and partnership among all entities that are working to implement health information exchange within the state. Representation includes government, ARRA/HITECH grantees, and major California organizations and associations. The eHealth Coordinating Committee is a state policy entity that focuses on health information technology and health information exchange for all of California’s citizens.

Where will the funding for this come from? The Department of Healthcare Services (DHCS), using Planning Advanced Planning Document (P-APD) funding, has entered into a contract to cover 50% of the cost to facilitate the work of the eHealth Coordinating Committee and establish the framework for aligning the work of CHeQ and the Regional Extension Centers (RECs) with the Medi-Cal EHR Incentive Program. The remainder of the costs are covered by Agency, using funding from the state HIE grant funds. Agency will coordinate multiple and diverse HITECH and eHealth initiatives to support the efforts of California’s Medi-Cal providers and hospitals to become meaningful users of EHRs. The goals of the California eHealth Coordinating Committee are:

- To create a common eHealth coordinating entity in California that makes operational policy recommendations to those organizations participating in eHealth activities.
- To identify services that may be leveraged by participants, and propose plans to fund and coordinate their delivery.
• To identify barriers to success for the various partners and propose solutions, providing direct assistance where possible and desired.
• To identify appropriate metrics for tracking EHR/HIE adoption and use statewide.
• To garner support, consensus, and buy-in from California stakeholders.

Entities represented in the California eHealth Coordinating Committee are:

**Government:**
- California Health & Human Services Agency
- Office of Health Information Integrity (OHII)
- Department of Health Care Services/Medi-Cal (DHCS)
- California Department of Public Health (CDPH)
- California Senate Health Committee
- California State Assembly Committee on Health
- California State Treasurer
- California Business, Transportation and Housing Agency
- California Technology Agency
- CMS, Region IX (Ex Officio)

**ARRA/HITECH Grantees:**
- HIE Cooperative Agreement Partner Regional Extension Centers (Cal HIPSO, COREC, HITEC-LA)
- California Rural Indian Health Board
- California Telehealth Network
- Western Regional HIT Consortium
- California eHealth Workforce Alliance
- Beacon Grantee UC San Diego

**Statewide Organizations/Associations:**
- California Academy of Family Physicians
- California Association of Health Plans
- California Association of Physician Groups
- California Association of Public Hospitals & Health Systems
- California Critical Access Hospital Network
- California Hospital Association
- California Medical Association
- California Primary Care Association
- California State Rural Health Association
- California Conference of Local Health Officers
- United Health Group
- Consumer Representatives (TBD)
Agency and all California eHealth partners are committed to engaging and informing as many Californians as possible. The partners’ policy of “No Wrong Door” has led to a public eHealth web portal (www.ehealth.ca.gov) whose structure and format allows all partners to post and publish news, funding opportunities, educational, and other calendar events to one location, enhancing visibility and providing a one-stop location for Californian’s information needs. This web portal complements and links to the State Level Registry (SLR).

1.1.2 THE AGENCY HIE POLICY AND COORDINATION COMMITTEE

The Agency HIE Policy and Coordination Committee (PCC) was established in October 2009, under the authority of the Secretary of the California Health and Human Services Agency, and reports to the Agency Deputy Secretary for HIE, who also serves as the California HIT Coordinator.

With the primary focus on improving patient outcomes, the purpose of the PCC is to address the policy needs of all Agency Departments and Offices required in order for them to: 1) collaborate on the health information exchange (HIE); 2) incorporate Agency and State eHealth initiatives in response to the ARRA; and to 3) provide a collaborative foundation for future Agency-wide efforts and cross-departmental cooperation in support of HIE and HIT.

The PCC founding goals included:

1. Identify common business processes and requirements, including health information policies and procedures and core data elements, which could be shared among departments to facilitate the efficient provision and sharing of health information. Develop three Agency-wide use cases that provide a framework to describe essential business processes that must be supported by HIE in Agency.

2. Develop a plan for building HIE capacity at the Agency enterprise level in order to securely share commonly required data when programmatically and legally appropriate.

3. Enable departments to better leverage and plan resources to take advantage of opportunities to improve program outcomes as a result of HIE.

4. Provide a committee process that can include other departments, agencies, and communities external to Agency.

5. Provide input to State eHealth planning and implementation processes and the California HIE Operational Plan.
6. Maximize opportunities for obtaining and utilizing shared Agency program and/or departmental funding, including possible Federal matching funds, in support of developing Agency-wide HIE capacity.

**Members of the CHHS HIE Policy and Coordination Committee**

The members of the CHHS HIE Policy and Coordination Committee include the Directors and Information Officers (or their designees) of all CHHS Agency Departments and Offices, including the California:

1. Department of Alcohol and Drug Programs (ADP)
2. Department of Aging (CDA)
3. Department of Community Services and Development (CSD)
4. Department of Child Support Services (DCSS)
5. Department of Developmental Services (DDS)
6. Department of Health Care Services (DHCS)
7. Department of Mental Health (DMH)
8. Department of Manager Health Care (DMHC)
9. Department of Rehabilitation (DOR)
10. Department of Public Health (CDPH)
11. Department of Social Services (CDSS)
12. Emergency Medical Services Authority (EMSA)
13. Managed Risk Medical Insurance Board (MRMIB)
14. Office of Health Information Integrity (OHII)
15. Office of Patient Advocate
16. Office of Statewide Health Planning and Development (OSHPD)
17. Office of Systems Integration (OSI)

The Deputy Director for HIT, California Technology Agency (CTA), is also an active member of the PCC.

The PCC developed the Roadmap to Health Information Exchange within California Health and Human Services Agency in October, 2010. A key recommendation was that the PCC develop an Agency HIE Plan, including the development of three Agency-wide HIE use cases. These use cases have been drafted. The Agency HIE Plan, 2012-2014, was completed on March 30, 2012 and is before the California Health and Human Services Agency Secretary.

**1.1.3 MEDI-CAL EHR INCENTIVE PROGRAM ADVISORY BOARD**

Established by DHCS, the Medi-Cal EHR Incentive Program Advisory Board consists of stakeholders specific to the Medi-Cal EHR Incentive Program. Monthly meetings of the Advisory Board (Table 1) serve to present and vet
policy issues as well as solicit feedback for inclusion in the State Medi-Cal Health Plan (SMHP) and development/enhancement of the State Level Registry (SLR). Dialogue relative to these issues extends beyond the meetings, into day-to-day discussions with stakeholders impacted by the issues. The Office of Health Information Technology (OHIT) staff and subject matter experts from various DHCS divisions participate at the Advisory Board meetings and workgroups as determined by program needs.

### TABLE 1: THE ADVISORY BOARD STAKEHOLDERS

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Advocacy</th>
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<tbody>
<tr>
<td>California Association of Physician Groups</td>
<td>Physicians</td>
</tr>
<tr>
<td>California State Rural Hospital Association</td>
<td>Rural Hospitals and Clinics</td>
</tr>
<tr>
<td>California Association of Public Hospitals</td>
<td>Public Hospitals</td>
</tr>
<tr>
<td>California HealthCare Foundation</td>
<td>Public Health</td>
</tr>
<tr>
<td>California Medical Association</td>
<td>Physicians</td>
</tr>
<tr>
<td>California Primary Care Association</td>
<td>FQHCs, RHCs and Patients</td>
</tr>
<tr>
<td>California Hospital Association</td>
<td>Hospitals</td>
</tr>
<tr>
<td>California Children’s Hospital Association</td>
<td>Children’s Hospitals</td>
</tr>
<tr>
<td>California Rural Indian Health Board</td>
<td>Indian Health Services</td>
</tr>
<tr>
<td>COREC</td>
<td>REC</td>
</tr>
<tr>
<td>LA Care</td>
<td>REC</td>
</tr>
<tr>
<td>CalHIPSO</td>
<td>REC</td>
</tr>
<tr>
<td>Community Health Clinic Ole Napa</td>
<td>Local Underserved Population</td>
</tr>
<tr>
<td>Redwood Community Health Coalition</td>
<td>Regional Patient Advocacy</td>
</tr>
<tr>
<td>Consumers Union</td>
<td>Patient Advocacy</td>
</tr>
<tr>
<td>Harbor-UCLA Medical Center</td>
<td>Acute Care Facilities</td>
</tr>
<tr>
<td>Inland Empire Health Plan</td>
<td>Regional Health Plan</td>
</tr>
<tr>
<td>Kaiser Permanente HealthConnect</td>
<td>Statewide Health Plan</td>
</tr>
<tr>
<td>Long Beach Network for Health</td>
<td>Regional HIE</td>
</tr>
<tr>
<td>Mercy Medical Group</td>
<td>Regional Healthcare Provider</td>
</tr>
<tr>
<td>Santa Clara Valley Health and Hospital System</td>
<td>Regional Healthcare Provider</td>
</tr>
<tr>
<td>Western Health Information Network</td>
<td>Regional HIE</td>
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</tbody>
</table>

The Medi-Cal EHR Incentive Program Advisory Board meets monthly, as does the eHealth Coordinating Committee. Independently, DHCS OHIT, CHeQ (and formerly CeC), the eHealth Coordinating Committee and Regional Extension Centers have communication/outreach committees to target their specific stakeholder groups with appropriate messaging and communication modes. The group seeks to launch a statewide campaign to raise awareness of the Medi-Cal EHR Incentive Program among providers and to promote the value of HIT among consumers as a means of expanding our individual education and outreach efforts. **Empowering providers and consumers through the**
dissemination of information is a key part of our HIT strategy. This joint effort is funded through contributions made by each of the respective partners, including DHCS.

1.2 Business Operations

California is building on current regional HIE capacities to achieve statewide interoperability. Using the terminology outlined in a February 2011 ONC State HIE Strategic and Operational Plan Emerging Models Detailed Report\(^7\) that categorized initial state strategic and operational plans, California has adopted a mixture of:

- a Capacity-Builder model (“bolstering of sub-state exchanges through financial and technical support, tied to performance goals”)
- an Orchestrator model (“thin-layer state-level network to connect existing sub-state exchanges”) and (to a lesser extent)
- an Elevator model ( “rapid facilitation of directed exchange capabilities to support Stage 1 meaningful use”)

This mixed model is characterized by a thin-layer state-level network, which facilitates HIE transactions across existing sub-state exchanges, forming a network-of-networks. California plans to deploy state-level shared services as appropriate to support regional HIOs, which provide services to end-users. The state and CHeQ employ policies and funding programs, respectively, to establish or extend regional HIE capacities to cover existing whitespace. For more information please refer to Section 1.8, Environmental Scan.

California operates a hybrid information model implementing HIE architecture to support exchange among public and enterprise HIOs and other health information trading partners. State-level services help to support the trusted exchange of correct information. We’ll provide additional detail in Section 1.5, HIE Architecture and Standards.

1.3 Finance

Cost Estimates and Staffing Plans

As discussed previously, Agency is collaborating with the University of California, Davis, Institute for Population Health Improvement (IPHI) to oversee the Statewide HIE Cooperative Agreement Grant programs. Detailed cost estimates for implementation of programs were developed prior to execution of the contract in late September 2012. Agency will submit revisions to this section of the Strategic and Operational Plan in the May 2013 annual update that will include a detailed schedule of tasks and sub-tasks that need to be completed over the next 15 months in order to enable statewide HIE along with resources, dependencies, and specific timeframes.
Control & Reporting

California has allocated a portion of the funding received through the State Health Information Exchange Cooperative Agreement Program to set up an administrative grant management infrastructure. This unit oversees the implementation of financial and procurement policies and procedures of the State as well as sub grantees. This ensures the uniform application of OMB circulars, and ensures 1512 reporting requirements are met. Additionally, this unit conducts periodic assessments of sub grantees to ensure all federal and state requirements are being met and assist with corrections, if needed. Hence, there is a single point of contact to oversee grant management activities and reporting to ONC.

1.4 Collaboration with Medi-Cal

Agency has positioned itself to maximize the opportunities of the ONC-funded Statewide HIE Cooperative Grant Program and the CMS-funded Medi-Cal EHR Incentive Program. This strategy (Figure 2) is spelled out in this HIE Strategic and Operational Plan (SOP). The SOP, in combination with the State Medicaid HIT Plan (SMHP), tells the story of how California is going to reach the Triple Aim of better care, better health, and lower costs. Agency understands that the success and sustainability of its programs, designed to support providers in achieving Meaningful Use through 2014, is foundational to the development and implementation of programs to get Medicaid providers to Meaningful Use through 2021.
The CMIO along with OHIT works closely with the Office of the Deputy Secretary, Health Information Exchange (also serving as the HIT Coordinator) in the Agency to coordinate the Medi-Cal EHR Incentive Program with wider health information exchange efforts throughout California and the nation.

The role of the State HIT Coordinator in coordination with Medi-Cal is clearly described in the Office of the National Coordinator (ONC) Priority Information Notice (ONC-HIE-PIN-001). The PIN requires the following five activities:

1. The state’s governance structure provides for representation of the Medi-Cal program.
   - The Chief of the Office of Health Information Technology (OHIT) serves on the statewide eHealth Coordinating Committee as well as
on the Agency HIE Policy and Coordination Committee for all Agency departments.

2. The HIT Coordinator assists with provider outreach and communications with the Medi-Cal program.

- OHIT and Affiliated Computer Services, Inc. (ACS), the fiscal intermediary (FI) for the Medi-Cal program, staff are active members of the Education and Outreach Workgroup of the eHealth Coordinating Committee. ACS is responsible for functionality to deliver the CMS Medicaid EHR Incentive Program through the provisions as an optional contractual service under the (FI) contract.
- OHIT, ACS, and the RECs conduct bi-weekly webinars to address issues with provider and hospital registration at the State Level Registry (SLR).

3. The HIT Coordinator in concert with the Medi-Cal program identifies common business or health care priority outcomes.

- The HIT Coordinator and OHIT work together with the ONC grantees to meet the ONC Challenge State goals for 2012.
- The Agency HIE Policy and Coordination Committee identify common goals and objectives across all Agency departments. To date, the committee has identified three distinct cases with common HIT/E solutions.

4. The HIT Coordinator, in collaboration with Medi-Cal, work together through its various committees to leverage, participate in, and support the Beacon Community, Regional Extension Centers, and the ONC-funded workforce projects in California.

- The HIT Coordinator is developing a strategy with the Medi-Cal program to extend technical assistance for EHR adoption to providers and hospitals outside of the federal grant for the REC’s scope of work (e.g. specialists and large integrated health systems).

5. The HIT Coordinator aligns efforts with Medi-Cal to meet Medicaid requirements for Meaningful Use.

- The HIT Coordinator works closely with the Medi-Cal program to update the State HIE Operational and Strategic Plans with the State Medicaid HIT Plan to ensure a single, coordinated “roadmap” for California to reach its goals for better health, higher quality, and lower costs.
- The HIT Coordinator has been developing and implementing strategies to meet the ONC Challenge Goal to deliver incentive
payments to 10,000 Medi-Cal eligible providers for attesting to adoption, implementation or upgrade (AIU) of certified EHR technology by the end of June 2012 and meaningful use attestation by 8,000 providers December 2012

The PIN further defines activities that are highly encouraged for the coordination of the State HIE Cooperative grantee with the Medi-Cal program. These activities include the following:

- Conducting joint needs assessments and environmental scans to include a broad understanding of EHR and HIE adoption by California’s hospital and providers segments; including those not eligible for the CMS incentive programs.
- Conducting joint assessment and alignment of privacy policies at the statewide level and in the Medi-Cal program.
- Determining which specific shared services and technical services will be offered or used by Medi-Cal to allow electronic reporting of meaningful use and clinical quality measures to the state and Medicare.
- Determining which operational responsibilities the Medi-Cal program will have, if any, to build capacity for public health reporting.
- Identifying opportunities to use Medicaid HIT incentives to encourage provider participation in HIE.
-Collaborating in activities to encourage the participation of additional provider types that are ineligible for incentives (e.g. pharmacies and labs).

In collaboration with Medi-Cal, public health, labs and local HIEs, CeC convened a Laboratory Services Task Group to develop a strategy for adoption of standards and development of services to support electronic lab data exchange. Specific attention was given to:

- Working with the state to develop a roadmap for enabling lab exchange with Medi-Cal, public health and other state funded providers and entities
- Conducting a survey of messaging and transport standards (and LOINC) currently utilized among providers and labs
- Supporting labs and local HIEs in filling identified gaps
- Ensuring that future grant program priorities include efforts that foster utilization and innovation in lab services

Following its work, the Laboratory Services Task Group reported its recommendations, which included promoting consistent messaging standards and specifications and determining a strategy to provide lab result routing services (push) among other potential services.
These strategies, together with the functionality created through the development of CeC’s core services, intend to enable entities (e.g. state and county labs) to exchange data such as lab results through directed exchange or query/look-up. Medi-Cal will leverage these CeC core services to enable the electronic exchange of laboratory, eRx, and other data among stakeholders across the state enterprise.

The state will leverage the state HIE grant funds, in-kind support from California Department of Public Health, the Implementation Advanced Planning Document (I-APD) and other resources to implement a lab solution that benefits Medi-Cal providers and other stakeholders. Additional core activities include working with the RECs to establish lab reporting requirements between the EHR vendors and the providers adopting their technology; investigation of policy options that may include standard requirements that labs and providers must adhere to for electronically reporting lab results; and exploring contractual provisions with the Medi-Cal managed care entities that address the use of electronic lab reporting tools.

1.5 Technology/HIE Architecture and Standards

The strategy for statewide HIE for California follows a neutral connectivity model: an approach in which regional community and enterprise exchanges, registries and other health information resources, and consumers connect to individual information sources as needed, supported and coordinated by a set of services that all resources share. Under this model, any organization that meets a minimum set of policies and procedures that establish a trusted exchange environment and any system that meets a minimum set of consensus technical standards can connect and exchange information.

The neutral connectivity model has the most flexibility to adapt to California’s complex healthcare ecosystem. Several regional community health information exchange organizations already exist, many large institutions have significant geographic distribution across California and have created “enterprise exchanges” to meet their needs, service providers are offering specialized health information functionality such as directed exchange following the Direct Project specifications, and public health resources are becoming electronically enabled and interoperable. Within this environment, current and future participants in exchange have varied business requirements and needs for information exchange that can be best met through a flexible technical environment.

Importantly, the neutral connectivity model pushes operations and deployment away from centralized technical services adopted by many smaller states with simpler environments, and instead emphasizes local autonomy to create and operate the services best meeting the needs of the local users, with
overarching governance and coordination at the state level. For the future, it also enables new shared services to be more innovative, more responsive to market needs, and more rapidly deployed, since any entity is capable of being a service provider.

### 1.5.1 ARCHITECTURAL APPROACH

The technical architecture designed to implement the neutral connectivity model is defined in California by a set of principles:

1. **Local Autonomy** – The decision to disclose information is a local decision, governed by Federal and State regulations and local policies and permissions. The technical mechanism for exchange must include enough information to allow the disclosing individual or organization to make an informed decision about whether to participate in the information exchange.

2. **Local Accountability** – The individual or organization disclosing information is accountable for the accuracy and truth of the information provided, and the decision to disclose it as embodied by the Local Autonomy principle.

3. **Use National Standards** – The technical standards for exchange should adopt standards and specifications required by Meaningful Use, reuse common standards that have become part of national or State initiatives, and specify new standards only when no standard has been specified or specified standards do not meet State needs or conflict with other principles.

4. **Promote HIE** – Promote architectures and standards that are simple to implement while protecting patient privacy, enabling interoperability, promoting sustainability, and accomplishing State goals for HIE.

The adoption and application of these principles is used to drive policy, procedural, and architecture design decisions for the State HIE program. Their application has led to a number of characteristics, patterns, and processes associated with the technical architecture as follows:

- The technical architecture is both flexible and adaptable to meet current requirements and future needs.

- The process for defining the statewide technical architecture is open and inclusive, and emphasizes the precise identification of the needs of the community (patients, providers, payers, vendors, government, etc.), the identification of priorities, and a clear statement of the value proposition for HIE and individual exchange services.

- Special priority is given to identify and enable those services required by the ONC State HIE Cooperative Agreement Program, prioritized in
Program Information Notices, and of greatest value to California users: namely electronic reporting of lab and other results, care summary exchange to support transitions of care and care coordination, and exchange with public health focusing first on reporting of immunizations and reportable conditions, as defined by state and local law.

- Special consideration is given to identify and enable those services demanded by stakeholders as enhancing quality care delivery and efficiency. These are the services that are most likely to be sustainable.

- The architecture builds upon open national and nationwide standards, including NwHIN (now Healthway eHealth Exchange) specifications and the standards and specifications supported by the Standards & Interoperability (S&I) Framework initiative, thereby leveraging the reference implementations and open-source initiatives supported by ONC and enabling high-value exchange with Federal agencies.

- The architecture adopts, whenever possible, the technical standards requirements of Meaningful Use criteria and the EHR certification requirements of ONC-Authorized Testing and Certification Bodies, thereby leveraging the significant market pressures of the Meaningful Use initiative to lower interface costs.

- The architecture is based on service-oriented design principles whenever possible to maximize flexibility and adaptability in an environment of rapid standards development and functionality change.

- The approach is vendor and technology neutral, using open protocols and standards.

- The policies, procedures, and technologies support a trusted exchange environment without limiting communities, enterprises, and other stakeholders in meeting their individual functional requirements in a way that is sustainable at the organizational level.

The technical architecture is based on a peer-to-peer services topology, with no technical constraints on connections between systems disclosing and receiving health information (i.e., health information exchange organizations, health information service providers, registries, personal health records, etc.). This is the most flexible connectivity pattern, enabling any user authorized to receive health information to connect to the service authoritative for the information as needed. Centralized State services are created to create and enable a trusted exchange environment and add efficiencies, where needed. Unlike some other large states, California is not adopting a strict coordinated services model. There is no requirement to use any shared, centralized State service to conduct exchange, and health information need not pass through any State system. Should future needs dictate, a more constrained connection
topologies (for example, a hierarchical connectivity topology that forces all service consumers to connect through a specified set of network services) can be imposed through policy without changing the technical architecture. The state HIE Partner, CHeQ, brings together California’s state and private technical leaders to identify details of the architecture, select among multiple nationwide standards, and constrain selected standards to produce implementation guides through an open and transparent process that does the following:

- Develops collaboration with strong technical representation from stakeholders, including vendors, so that the technical architecture is consensus-based and practical.

- Develops use cases that span multiple systems as well as multiple organizations to link the architecture to the delivery of value in the healthcare environment. Patient-centric use cases are developed to ensure that implementation maintains a focus on patient involvement and inclusion.

- Selects architecture details and standards based on an understanding of business processes that must be supported. Use cases provide at least one mechanism to identify required business processes. An architecture based on business processes maximizes the functionality and sustainability of technical services.

- Prioritizes implementation activities to correspond to Meaningful Use objectives to maximize ARRA funding opportunities.

- Develops the policy guidance for the minimum necessary architecture to enable practical implementations. Wherever possible, policy and procedures are developed in advance of architecture or standards decisions.

- Ensures access to Medi-Cal data and other state health IT resources by collaborating with Agency to create interfaces to these assets that are interoperable through the statewide technical services.

- Identifies and prioritizes candidate shared services, and informs implementation.

- Works with other states that are engaging in similar efforts and incorporate applicable best practices.

1.5.2 OVERVIEW OF THE STATEWIDE ARCHITECTURE

The architecture for statewide HIE in California comprises:

1) exchange entities, the providers and consumers of health information, in the form of:
a) community and enterprise health information exchange organizations
b) Direct HISPs and other health information service providers
c) healthcare delivery organizations supported by interoperable EHRs
d) ancillary service providers, including labs, imaging clinics, etc
e) public health registries, Medi-Cal, and other state and local agencies,
f) DoD, VA, CMS, SSA, CDC, and other federal agencies, and
g) any other organization with an IT system that exchanges health information

2) a shared trust environment, including
   a) a set of consensus policies and procedures that govern exchange
   b) trust services that facilitate multi-party exchange without the need for point-to-point trust relationships
   c) directory services that facilitate discovery of individuals, systems, services, and organizations with which to exchange information, and
   d) identity management services, initially to establish individual provider and organizational identity, but later to address patient identity as well; and

2) a shared set of consensus specifications for exchange, including
   a) national and nationwide standards, and
   b) conventions, guides, and profiles on how the standards are used to meet use case needs.

The principal actors within the model are “exchange entities”: the providers and consumers of health information. These entities expose technical services that exchange information using a set of consensus standards and specifications for information sharing bound and governed by the policies and procedures of the trust environment.

Exchange entities may be:
- **Community or enterprise HIOs**, responsible for last-mile connectivity to their users and stakeholders, and providing a high level of exchange to address the local nature of healthcare delivery. The features of these HIOs may differ to meet local market demands and support varying business processes. Large healthcare delivery organizations often share some of the same characteristics of an enterprise HIO, even if based on a single technology and vendor platform, and therefore conceptually fall in the broad category of enterprise HIOs. Most exchange entities will fall under this category.

- **Service providers** or business entities that provide the technical services for health information exchange without the governance processes that are usually the realm of an HIO. Directed exchange services via the Direct Project specifications are often available through so-called health information service providers (HISPs), which fall into this category. California is beginning to see the emergence of service providers that provide most of the traditional exchange services of HIE, beyond directed exchange, as a business offering without governance. These service providers enable the rapid start-up of HIOs without the need to capitalize and create new technical infrastructures. The architecture supports these service providers as well.

- **Ancillary service providers**, such as pharmacies receiving electronic prescriptions, testing laboratories receiving electronic lab orders and/or providing electronic lab results, imaging clinics receiving electronic radiology orders and/or providing electronic images or radiology notes, etc. Many of these ancillary service providers may be included in exchange through a community or enterprise HIO. However, the architecture does not preclude them from the role of an exchange entity – a position that may be appropriate for large lab systems, public health labs, or pharmacy benefit management systems.

- **Local, state, or federal government agencies** and their systems. This category includes local public health departments, regional or state public health registries, and the Centers for Medicare & Medicaid Services (CMS) as prioritized by ONC’s Program Information Notices and Meaningful Use. Initially, the systems operated by these organizations are consumers of health information – receiving immunization reports, electronic lab results for reportable conditions, other public health surveillance information, clinical quality metrics, etc. Ultimately this category will also include bi-directional interfaces to public health (to support, for example, queries for immunization histories) as well as bi-directional exchange with Medi-Cal systems, Veterans Affairs and the Department of Defense medical systems, and other federal agencies as stakeholder priorities require.
Ultimately, exchange entities are any IT system authorized to provide or receive health information with another entity according to consensus exchange standards and conforming to the trust environment established by trust services, governance policies, and operational procedures.

1.5.2.1 TRUST ENVIRONMENT

California has identified individual and organizational provider identity management as a critical condition for trusted exchange of health information. Through the Direct Project and the S&I Framework, ONC began exploring standards for “provider directories” and mechanisms to utilize and discover digital certificates in a public-key infrastructure (PKI) identity model.

In California, the trust environment for exchange is defined by:

- a set of policies for establishing and recognizing organizational and individual identities,
- operational procedures for how to provision, manage, monitor, and revoke identities, and
- technical services to support discovery of communication services and verify identity.

Policies and requirements for operational procedures constitute governance for statewide HIE in California, and establish acceptable behavior of organizations that exchange health information. The technology component of the trust environment comprises “Directory and Trust Services,” and forms a keystone of our overall exchange strategy and architecture.

Directory Services establish a mechanism to identify technical services of exchange partners, such as the direct address of a rural primary care provider to which a hospital system might send a discharge summary, or the web service for an HIO to query for a care summary upon admission. Directory Services will build upon the standards work of the Direct Project, the S&I Framework, the EHR | HIE Interoperability Workgroup (a multi-state and multi-vendor collaboration to establish interoperability standards for statewide HIE), and the HIMSS Integrating the Healthcare Enterprise (IHE) initiative. The California landscape, the principles driving the statewide HIE architecture, and the neutral connectivity model suggest a decentralized, federated approach to Directory Services that is not part of current standards initiatives, and will be piloted in California.

Trust Services establish the identity of exchange entities (Direct HISPs, HIOs, hospital systems, clinics, registries, labs, etc.) and individuals (providers and other care givers, etc.). Technical services to enable trust will be based on policies and operating procedures for identity management, formulated through consensus with stakeholders in California. Like Directory Services, trust services will build upon the standards work of the Direct Project and S&I Framework. However, a model for multi-party trust has not been part of these initiatives to date. California will pilot a technical approach to creating a Trust Community – a collection of organizations that conform to a defined set of
functional and behavioral requirements and therefore agree to share protected health information – through collective digital certificate management. The HIE landscape in California comprises a number of operating and emerging exchange organizations, including traditional community HIOs as well as enterprise HIOs that serve integrated hospital or other delivery organizations. During 2012, we have observed the initial emergence of health information service providers operating in the state as well. As a result, each of these organizations manages individual identities per their various policies and operational procedures, and many operate directory services for their users. Rather than replace the working local solutions and take on full identity management for every potential provider and system in the State, we are creating a federated approach to Directory and Trust Services in which individual organizations continue to manage identities of their participants, and the State creates and manages a trusted third-party service – much like a notary public – that attests to the proper adherence to consensus procedural requirements.

We will base our approach on the standards and specifications developed in the Direct Project and S&I Framework initiatives, expanded by the EHR | HIE Interoperability Workgroup of which California is a member, extending these standards through an open and transparent process to produce a federated solution in collaboration with other states and IHE. It is California’s hope that the result may be used by other states that desire federated management of Directory Services, Trust Services, or both.

Initially, Directory and Trust Services will be implemented to support directed exchange using Direct Project specifications. They are coupled tightly with our strategy to support Meaningful Use and the exchange of care summaries, and our initial pilot of interstate exchange. However, Directory and Trust Services have a critical role for the more generalized trusted exchange of health information as well. Therefore, California will generalize the Trust Services environment to manage more than just the identities of Direct HISPs and Direct participants, and the federated Directory Services to more than just Direct addresses. Directory and Trust Services will be used to manage organizational and individual identities and discover services for query/response exchange, public health registries, and other services as well.

Importantly, the policies, operational procedures, and technical services that define Directory and Trust Services will be coordinated with other states to create an environment that not only supports inter-entity (e.g., inter-HIO) exchange, but also interstate exchange. The Western States Consortium, of which California is a core member, will inform the policies and procedures for managing and communicating provider identity for ensure it supports interstate exchange.

1.5.2.2 GATEWAYS TO GOVERNMENT SERVICES
Like many states, the current landscape for state government services in California is fragmented. More unique to California is an environment where many of the state services are not centralized at the state level, but may be housed regionally or seated at the county level. Some systems, such as the California Cancer Registry, are centralized for statewide use. However, in other areas the result is a fragmented set of stove-piped systems and services with differing information technology capabilities. California plans to consolidate many of these systems in the coming years. For example, 10 separate regional immunization registries exist based on four different technology platforms. California will move toward consolidating these regional registries into a single statewide registry. However, other systems, such as local health departments and systems that receive reportable conditions will likely remain separate.

The technical architecture supports separate public health and other government systems and individual exchange entities. However, to ease interface development and reduce costs, California will consolidate some state government systems logically through “gateways” to information repositories. The result is that the exchange entity for immunization registries appears logically to be a single information consumer for the entire state. The gateway receives, queues, and routes information submitted by a provider to the appropriate registry. The gateway hides the implementation of legacy public health and other government systems in line with service-oriented architectural patterns.

1.5.2.3 VALUE-ADDED SERVICES

California envisions a role for other, value-added services that may become part of the overall statewide exchange environment. Value-added services are not strategically part of “shared services” in the current technical architecture. Instead, the neutral connectivity model establishes value-added services as any other exchange entity that exposes technical services, provides and/or consumes health information, and conforms to the trust environment operational and technical requirements.

1.5.3 TECHNICAL STANDARDS

The architecture for a system is defined as its structure, comprising software (or service) elements, the externally visible properties of those elements, and the relationship among them. While Figure 1 provides an illustration of the elements comprising the statewide architecture for HIE, the properties of and relationships among those elements are defined by interfaces and the technical standards they implement. Therefore, technical standards are a critical component of the statewide HIE architecture. California applies a set of critical principals to the selection and promotion of any exchange standard:

1) Align with national standards required by Meaningful Use and EHR certification whenever possible.
2) Look forward to adopt proposed stage 2 Meaningful Use certification standards where practical and available from vendors.
3) Adopt ONC implementation guidance from the S&I Framework and other initiatives whenever it fills gaps in meaningful use standards.
4) Align with NwHIN (now Healthway eHealth Exchange) and Direct Project specifications as appropriate between exchange entities.
5) Reduce optionality in implementation guides whenever possible to create a uniform, statewide approach that reduces implementation cost.

The following sections outline how the California architecture applies these principals to the selection and promotion of standards, specifications, and implementation guides.

1.5.4 INTER-HIO AND INTERSTATE EXCHANGE

California stakeholders have identified a business need for both directed exchange and query/response-based exchange between HIOs. California promotes the use of Direct Project specifications for directed exchange, and Healthway eHealth Exchange specifications for patient discovery (derived from the Cross-Community Patient Discovery (XCPD) profile from IHE) and document discovery and retrieval (derived from the Cross-Community Access (XCA) profile from IHE). This approach allows California to leverage market pressure on vendors created by these ONC initiatives, and allows stakeholders to adopt reference and other open-source implementations and reuse functionality for both intra- and interstate exchange.

California will monitor evolving Direct Project specifications and efforts of Direct certification and accreditation initiatives and adjust our implementation guidance as needed. We will likewise monitor efforts to refactor eHealth Exchange specifications under the new Healthway leadership to adopt lighter-weight REpresentational State Transfer (RESTful) web service models and likewise adjust guidance for our stakeholders.

Through collaboration with neighboring states, California is leading development of policies, procedures, and technologies that enable interstate exchange. The same trust environment developed for intra-state sharing of information among HIOs is being leveraged for interstate exchange with HIOs and service providers across state lines. California is using the same technical standards for the Direct Project and eHealth Exchange to enable interstate exchange.

Use of eHealth Exchange specifications does not make an organization a participant in the eHealth Exchange – it simply leverages the common consensus standards and conventions of directed and query/response exchange and their common implementations. California is also promoting that organizations onboard onto eHealth Exchange so that they may also exchange information with the federal agencies and large enterprise HIOs that require full
onboarding. The policies and procedures, as well as the technologies, that implement the trust environment in California are and should remain consistent with those of eHealth Exchange to every extent possible to enable organizations to leverage the same procedures and technologies for inter-HIO exchange and exchange on eHealth Exchange.

1.5.5 DIRECTORY AND TRUST SERVICES

Through the Direct Project and the S&I Framework, ONC began exploring standards for directory services using a number of potential technologies, including Lightweight Directory Access Protocol (LDAP), Healthcare Provider Directory (HPD) and its extension by the EHR|HIE Interoperability Workgroup (HPDPlus), the domain name service (DNS), and public-key infrastructure (PKI).

California will build on the work of ONC and the S&I Framework for Directory Services, extending HPDPlus to define a standardized query mechanism (a critical component of interoperability that is not part of the HPD standard) and support federation – both important requirements for the exchange environment in California.

For organizational identity management, California will build upon the work of ONC and the Direct Project to utilize X.509 digital certificates and DNS- and LDAP-based certificate discovery. California will establish a California Trust Community by creating a “Trust Bundle” of PKI trust anchors, and thus creating a collection of exchange entities that can exchange information freely based on adherence to the policies and procedures of the trust environment. This Trust Bundle approach to trust anchor management will be piloted for interstate exchange as well, but creating a Trust Community and Trust Bundle for the Western States Consortium, in turn signifying adherence to Consortium governance requirements.

Most states have agreed that PKI and the issuance of digital certificates to individuals do not present an affordable option for individual identity management. California will continue to investigate other options, such as those using Security Assertion Markup Language (SAML) assertions of individual identity, including Cross-Enterprise User Assertion (XUA), to select an approach and standard for validating individual identities.

1.5.6 ANCILLARY SERVICES

Whenever possible, California adopts Meaningful Use criteria requirements and EHR certification standards for use by all exchange entities. California looks forward to implementation of the Meaningful Use stage 2 certification criteria as preferred standards to be promoted at this time. In order to support Meaningful Use, promoted standards include the use of:
• National Council for the Prescription Drug Programs (NCPDP) Prescriber/Pharmacist Interface SCRIPT standard, Implementation Guide version 10.6 for e-prescribing, or SCRIPT 8.1 for those vendors that do not yet support Script 10.6;
• HL7 Version 2.x for incorporating clinical laboratory test results into certified EHRs, moving to the HL7 Version 2.5.1 Implementation Guide: S&I Framework Lab Results Interface, Release 1-US Realm as it becomes supported by vendors; and
• HL7 Version 2.5.1 Implementation Guide: Electronic Laboratory Reporting to Public Health, Release 1 (US Realm), for submission of electronic reportable laboratory results to public health agencies.

Where Meaningful Use or EHR certification identifies optionality, California selects a preferred standard, implementation guide, and/or terminology for all implementation projects that it funds. Preferred standards are identified through an open, consensus process that includes vendors. This reduction in optionality also reduces implementation costs by eliminating custom interfaces and the need to maintain multiple standards.

See the following section on HIE Ready for more information about consensus standards and specifications for ancillary services.

1.5.7 GATEWAY SERVICES

Whenever possible, California adopts Meaningful Use criteria requirements and EHR certification standards for use in gateways to local and state government systems. California looks forward to implementation of the Meaningful Use stage 2 certification criteria as preferred standards to be promoted at this time. In order to support meaningful use, promoted standards include the use of:
• HL7 2.5.1, Implementation Guide for Immunization Messaging Release 1.0 and HL7 Standard Code Set CVX – Vaccines Administered, July 30, 2009 version for immunizations; and
• HL7 Version 2.5.1 Implementation Guide: Electronic Laboratory Reporting to Public Health, Release 1 (US Realm), for submission of electronic reportable laboratory results to public health agencies.

Where meaningful use or EHR certification identifies optionality, California selects a preferred standard, implementation guide, and/or terminology for interfaces exposed by its gateways. Preferred standards are identified through an open, consensus process that includes vendors. This reduction in optionality also reduces implementation costs by eliminating custom interfaces and the need to maintain multiple standards.

See the following section on HIE Ready for more information about consensus standards and specifications for ancillary services.
1.5.8 EHR-HIE INTERFACE AND INTEROPERABILITY INITIATIVE

While California fully supports emerging standards for exchange, an opportunity exists to leverage current HL7 standards using interface and interoperability features already built into most EHR software. California launched an EHR-HIE interface and interoperability initiative, called HIE Ready, that has created a specification for basic interoperability based on meaningful use requirements and the capabilities available in production vendor systems today. It is the intent that HIE Ready should be delivered as a single, orderable part of any EHR or other IT system implementation. California is using market pressure to ask EHR vendors, HIE vendors, HIOs, hospital systems, and ancillary systems vendors to adopt HIE Ready and make it available to all providers. The result will be a more robust, more integrated healthcare landscape, all drawing on current software capabilities and requiring no investment of new development dollars.

California will publish those vendors and organizations that have adopted HIE ready, providing full transparency into what vendors provide and at what cost. The resulting “Buyer’s Guide” will help educate the provider marketplace on what is available and what to purchase. It will also reduce interface costs by reducing variability and custom interface development.

HIE Ready requires vendors and interoperable organizations to provide an interface as an “orderable kit”, i.e., a standard part number to be ordered, one that is priced and can be quoted and sold. It puts responsibility for interface development squarely upon HIE vendors, service providers, or HIOs to establish secure connectivity, test and map individual interfaces, and provide level-1 interface support. The based interface specification includes:

- Basic admission, discharge, or transfer demographic information on patients as HL7 2.5.1 messages,
- Structured lab results, radiology reports, chart notes, observations, and other reports as HL7 2.5.1 messages,
- Lab and radiology orders as HL7 2.5.1 messages,
- Referrals and appointments as HL7 messages,
- Care summaries as CCD documents using eHealth Exchange or Direct specifications, and
- Immunization reports and lab results for reportable conductions as HL7 2.5.1 messages.

For structured lab results, immunization reports, and care summary exchange, the requirements are consistent with the requirements for ONC-ATCB certification for CMS' Stage 1 and Stage 2 Meaningful Use incentive program, but further constrain Meaningful Use standards to reduce interface customization and costs.
1.6 Risk Assessment

Managing risk is an important element of successfully building health information exchange (HIE) capacity to support Meaningful Use. Agency has identified known and potential risks. The following table lists these risks, their probability, potential severity, and the strategies to mitigate them.
<table>
<thead>
<tr>
<th>ITEM</th>
<th>RISK/ ISSUE</th>
<th>PROBABILITY</th>
<th>SEVERITY (IMPACT)</th>
<th>MITIGATION PLANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Breach of protected data, violation of privacy standards, unauthorized disclosure of PHI</td>
<td>low</td>
<td>moderate</td>
<td>Mitigated by the State’s efforts to monitor and enforce compliance with relevant security and privacy laws. Resources for reporting of violations will continue to be provided and updated on State websites and webinars. In addition, future HIE standards will specify no reading or storage of PHI during transport.</td>
</tr>
<tr>
<td>2</td>
<td>Failure to pass state legislation that harmonizes state and federal differences in the privacy and security of health information.</td>
<td>moderate</td>
<td>high</td>
<td>Mitigated by State plan to identify and address privacy and security issues in need of harmonization with input from statewide privacy and security steering teams. The steering teams recommend privacy and security policies for the electronic exchange of health information. The CalOHII (Office of Health Information Integrity) will provide analysis and policy support for ongoing legislative proposals.</td>
</tr>
<tr>
<td>3</td>
<td>Lack of coordination, planning and integration of network infrastructure between health related State agencies</td>
<td>low</td>
<td>moderate</td>
<td>Mitigated by regular inter-agency HIE coordination meetings to assist health related agencies in planning enterprise architecture standards and interfaces.</td>
</tr>
<tr>
<td>4</td>
<td>No information exchange taking place in isolated regions of the state</td>
<td>low</td>
<td>moderate</td>
<td>Mitigated by HISP vendors providing Direct messaging to assist providers in isolated geographical regions. HIE grant programs will be continued for HIOs to potentially expand HIE services into underserved areas.</td>
</tr>
<tr>
<td>5</td>
<td>Inadequate funding, bandwidth, and technical expertise for rural hospitals and clinics</td>
<td>high</td>
<td>moderate</td>
<td>Mitigated by RECS (Regional Extensions Centers), LECS (Local Extensions Centers), and CTN (CA Telehealth Network) providing technical assistance and resources to enable providers and service providers in sparsely populated areas to explore connectivity and exchange options. RECS will receive additional funding to support clinics and Rural Access Hospitals.</td>
</tr>
<tr>
<td>6</td>
<td>Lack of resolution on pharmacy standards impeding progress on interoperability</td>
<td>moderate</td>
<td>high</td>
<td>Mitigated by Agency coordinating efforts to address the eRx messaging and standards issues that if resolved would accelerate and encourage widespread adoption of eRx.</td>
</tr>
<tr>
<td>7</td>
<td>Changing standards are not supported by vendors</td>
<td>high</td>
<td>moderate</td>
<td>Mitigated by vendor participation in standards discussions, educating stakeholders on upcoming changes, a statewide technology strategy that can migrate with standards updates and application of market pressure to vendors to support a common set of standards across the state.</td>
</tr>
</tbody>
</table>
### 1.7 Legal/Policy

For decades, California has been at the forefront in protecting the privacy of our citizens. In 1972, California passed a constitutional amendment to include the right to privacy, which can be enforced against private as well as public entities:

> All people are by nature free and independent and have inalienable rights. Among these are enjoying and defending life and liberty, acquiring, possessing, and protecting property, and pursuing and obtaining safety, happiness, and privacy.

Over time, our state laws have been influenced by many fair information practices; we’ve enacted many laws to ensure individual access, ability to make corrections, openness and transparency, individual choice, collection, use and disclosure limitations, data quality and integrity, safeguards and accountability.

Because of California’s many laws and regulations regarding maintaining the confidentiality of medical information, they are sometimes difficult to harmonize with other state laws and HIPAA. Confusion can arise in many situations, such as when the rules apply to one type of entity but not another, the rules may be unique to a type of funding source, or our stakeholders have agreed that the current laws are not adequate for HIE.

Here are a few examples of the kinds of rules and regulations that must be harmonized:

- Health and Safety Code section 123111 requires licensed health care providers to provide individuals access to their medical information.

- Civil Code section 56.07 requires any entity that compiles or maintains medical information for any reason, to provide the patient with a copy of any medical profile, summary, or information maintained by the corporation or entity with respect to the patient, at no charge.
• Health and Safety Code section 1364.5(c) requires health plans to provide notice to patients about how they may obtain access to medical information created by and in the possession of the Health Plan or its contractor.

• The Health Care Providers’ Bill of Rights forbids health plan contracts with providers to permit access to patient information in violation of state and federal laws. However, there is no explicit requirements applicable to healthcare service plans to provide patient access.

**Rules of the Road**

The development of “rules of the road” for HIE is especially difficult in light of the various rules that apply to the entities who are the most likely health information exchange partners. There is a need to simplify the rules. Simplifying the rules doesn’t translate into reducing privacy rights, but involves a better understanding of who can share what information with whom and under what circumstances.

The difficulty in facilitating HIE is well known in California. Many lessons were learned from the demise of the Santa Barbara Project in 2006. *The Retrospective: Lessons Learned from the Santa Barbara Project and Their Implications for HIE* ([http://content.healthaffairs.org/content/26/5/w589.full](http://content.healthaffairs.org/content/26/5/w589.full)), shares these insights. One of the main lessons, write the authors, is addressing privacy and liability issues early:

> Privacy and liability issues need to be addressed up front. RHIOs should start with local policies as a base (for example, those established by the local hospital), understand federal and state regulations, and engage relevant stakeholders, including consumers, from the onset. Involving consumers in the process of developing these policies will have another valuable consequence: both input and buy-in from a powerful customer base.

**1.7.1 FAIR INFORMATION PRACTICES**

The California Privacy and Security Advisory Board (CalPSAB) was appointed in 2006 to represent consumers and a wide variety of healthcare stakeholders. The Board was charged with overseeing and coordinating a statewide collaborative process to identify privacy and security standards and policies necessary for the safe exchange of electronic health information in California.

One of the first tasks accomplished by CalPSAB was developing the California Health Information Exchange Practices Principles. The

---

7 Health and Safety Code section 1375.7.
Principles, developed over a two-year period, were based upon a variety of successful principles for privacy and security of individual information. The principles included:

- Connecting for Health – Markle (9 Principles)
- Consumer Union Guiding Principles
- Health Privacy Working Group (11 Principles)
- E-Health Initiative connecting Communities Common Principles
- OECD Fair Information Practice (8 Principles)
- Japan Personal Information Protection Act (5 Principles)
- APEC (9 Principles)
- EU (9 Principles)

To ensure transparency and public participation, the Principles were posted on the CalOHII website in early 2009 for 30 days from February 26, 2008 until March 28, 2008 for public comments. The principles were also emailed to over 400 interested parties on the CalPSAB contact list. Comments were received on the Principles from: Analex, Incorporated, OSHPD, CalRHIO, California Health Information Association, WellPoint, CDVA, and Catholic Health Care West, and approximately 1250 individuals.

The Board received comments, provided responses to those comments, and made one change to the Principles, which were then submitted to the Secretary of the Health and Human Services Agency. The Secretary approved the Principles, and they were posted on CalOHII’s website as recommended guidelines for privacy and security principles for electronic health information exchange in California. Subsequently, these Principles were incorporated into the demonstration regulations.

Before these principles were adopted by California Secretary of Health and Human Services, the Office of the National Coordinator (ONC) released a Privacy and Security Framework, consisting of the national principles. According to ONC, these principles:

- Were designed to complement and work with existing federal, state, territorial, local, and tribal laws and regulations.
- Should not be construed or interpreted as supplanting or altering any applicable laws or regulations.
- Should evolve in concert with technological advances that allow for greater protections.

Comparing California Principles and Federal Principles

In comparing the California Principles with the HHS Framework, generally California Principles are more specific than the Federal Principles, while incorporating its broader concepts.
California Principles has one missing component, which is specific to patient rights to HIE consent. At the time the California Principles were developed, CalPSAB chose not to address patient HIE consent until its work was completed on this issue. That work was completed in December 2010, after unanimous approval of a policy recommendation for opt-in consent. The California principles have not been updated to reflect that recommendation; however, the demonstration regulations do reflect the opt-in preference with opportunities to test alternatives.

The HHS framework is more specific than California’s principle in addressing the Security Safeguards. However, the demonstration regulations for security incorporate all the concepts addressed in the federal framework for security safeguards.

1.7.2 STAKEHOLDER ENGAGEMENT IN OPEN AND TRANSPARENT PROCESSES

Many teams have evolved to work toward harmonizing privacy laws. Building on the close collaboration between CalOHII and the wide spectrum of stakeholders, Agency established the Privacy Steering Team, the Security Steering Team, and the task groups formed by these steering teams. These steering teams and task groups have embarked on discussions for harmonizing California and federal privacy and security law, specifically how to address the ambiguity and lack of harmonization in state and federal laws regarding applicable rules for collection, use, and disclosure of health information.

As part of its ongoing transparency process, advance notice of these meetings is posted on public web sites, which also provides telephone and webinar access to the public. Final work products are also publically posted and public comments are solicited.

As discussed more fully in Section 5, the privacy and security framework details the various legal frameworks available: statutory, regulatory, contractual and best practices that are being coordinated by Agency. There are five separate efforts:

1. **Work toward** Law Harmonization to simplify the integration of HIPAA and state laws.

2. **Create** Demonstration Projects to test policies and rules to better inform the State and health care stakeholders while the HIE infrastructure is being defined over the next several years.

3. **Develop** contractual language, policies, and procedures, consistent with state and federal laws and best practices, to ensure a trusted environment for HIE.

4. **Provide** a Risk Assessment Tool to enable small providers to conduct their own risk assessments.
Facilitate patient and provider engagement and education.

1.8 Environmental Scan

1.8.1 EHR ADOPTION IN CALIFORNIA

California’s health care practitioners have been found to be approximately on par with the balance of the national practitioners with regarding EHR adoption, according to preliminary landscape assessments. Data from 2005 indicated that only 14% of practitioners had implemented EHRs. Subsequent studies have indicated that for some functions, such as electronic receipt of laboratory results or electronic receipt of emergency room notes, California providers may have attained 80% compliance.

Providers in large, integrated health systems, such as Kaiser Permanente, have achieved much higher rates of EHR adoption than those in smaller or solo practices. However, the data on EHR adoption by individual providers is limited, somewhat out-of-date, and requires additional assessment. No recent data is available specific to the use of EHRs by Medi-Cal providers. For this reason, the Department of Health Care Services is funding an annual survey of physicians through the Medical Board of California in conjunction with researchers at the University of California to monitor the adoption of EHRs throughout California, including the Medi-Cal providers.

The information on California’s hospitals is somewhat more recent and optimistic than that for individual practitioners. Data from 2006/2007 indicated that 55% of California’s hospitals have fully or partially implemented EHRs. Surveys in 2010 indicate that 87% of children’s hospitals and 33% of critical access hospitals have implemented EHRs. However, the functionality of hospital EHRs is highly variable, often proprietary, and it is difficult to draw any accurate conclusions regarding meeting Meaningful Use, although it will undoubtedly be a lesser effort than that of practitioners. Preliminary assessment data from surveys of large medical groups and independent practice associations (IPAs) indicate higher rates of adoption of EHRs than for small group practices. This is undoubtedly due to the infrastructure support that these larger groups tend to provide their members. The data from hospitals and other health system entities is highly varied and not comparable.

1.8.1.1 EHR ADOPTION BY PHYSICIANS

Researchers at UCSF conducted a survey of physicians with MD degrees in 2011. A questionnaire was sent to 10,353 physicians whose license renewals were due to the California Medical Board between June 1 and July 31, 2011. The questionnaire included questions that assessed whether a physician
had an EHR at his/her main practice location, as well as questions that measured 8 of the 15 core objectives and 4 of the 10 menu objectives that CMS has set forth for meaningful use of EHRs. The analysis was limited to the 7,931 of the 10,353 physicians in the sample who reported that they practiced in California and provided at least one hour of patient care per week; 5,384 of these 7,931 (68%) completed the supplemental survey.

**Major Findings**

**Prevalence of Electronic Health Records**

- 71% of respondents reported having any sort of EHR at their main practice location.
- Only 30% of respondents reported having an EHR at their main practice location that can achieve all 12 of the Meaningful Use objectives measured.
- Rates at which functions required to meet CMS’s Meaningful Use objectives were available varied, ranging from a low of 40% of total respondents for providing patients with access to their own electronic records (64% of respondents with EHRs) to a high of 60% for clinical notes and lists of patients’ medication allergies (95% of respondents with EHRs).
- Respondents were more likely to report using functions that gave them information they could use in their encounters with individual patients than functions associated with assessing quality of care or exchanging information electronically with patients or other providers.

**Satisfaction with Electronic Health Records**

- 35% of respondents with EHRs are very satisfied with them, 38% are somewhat satisfied, 13% are somewhat dissatisfied, and 14% are very dissatisfied.
- Respondents who indicated that their EHRs could meet the 12 Meaningful Use objectives measured were more likely to be satisfied with their EHRs.

**Factors Associated with Use of Electronic Health Records at Main Practice Location**

- Practice type is the strongest predictor of EHR availability. Physicians who practice in large organizations, including Kaiser Permanente, are much more likely to have an EHR at their main practice location than physicians in solo practice, small partnerships, or community/public clinics.
- Kaiser Permanente physicians are also more likely to have an EHR that can meet the 12 Meaningful Use objectives measured.
- Physicians under age 46 years are more likely to have EHRs at their main practice location than physicians age 46 years or older, largely because they are more likely to practice in large organizations. Hospital-
based physicians are more likely to have EHRs than office-based physicians.
- Urban physicians are more likely to have EHRs than rural physicians.
- Specialty is not a strong predictor of having an EHR. Primary care physicians are only slightly more likely to have EHRs than specialist physicians.

Physicians’ Plans Regarding EHR Incentive Payments
- 37% of physicians plan to apply for either Medi-Cal or Medicare incentive payments for meaningful use of EHRs.
- Some physicians do not appear to be well-informed about the eligibility criteria for Medi-Cal incentive payments.
- Over half of physicians who appear eligible for Medi-Cal incentive payments do not believe they are eligible, do not plan to apply, or need further information about the program.

Findings for Respondents Who Appear Eligible for Medi-Cal EHR Incentive Payments
- An estimated 21,545 of physicians with active California licenses (17%) appear eligible for Medi-Cal EHR incentive payments based on information they provided regarding their payer mix, practice setting, and practice type.
- Respondents who appear eligible for Medi-Cal EHR incentive payments are much more likely to practice in community/public clinics than all respondents (33% vs. 6%) and are less likely to practice in Kaiser Permanente’s medical group (9% vs. 15%) or to be in solo practices (9% vs. 17%).
- Primary care physicians are more likely to be eligible for Medi-Cal EHR incentive payments than specialists, most likely because hospital-based physicians, who are predominantly specialists, are not eligible for these payments.
- Physicians who appear to be eligible for Medi-Cal incentive payments are somewhat less likely to report having any sort of EHR (68% vs. 72%) or an EHR that can meet the 12 Meaningful Use objectives measured (30% vs. 33%) than physicians who appear to be ineligible.
- Similar to total responders, eligible physicians who practiced at Kaiser Permanente or in other large organizations were much more likely to have an EHR than physicians in solo practice, small partnerships, or community/public clinics.

The findings from this survey suggest that EHRs are widely available in California physicians’ practices, but that many of these EHRs do not have the functions needed to meet CMS’s objectives for Meaningful Use of EHRs. Although 71% of physicians responding to the survey have some sort of EHR, only 30% have EHRs that, as currently configured, can meet all 12 of the MU objectives measured in the study. Rates of EHR availability are lowest among...
physicians who are in solo practice, small partnerships, and community/public clinics. Office-based physicians are less likely to have EHRs than hospital-based physicians and rural physicians are less likely to have them than urban physicians.

The survey results also suggest that the Medi-Cal EHR incentive payments are well-targeted to increase meaningful use of EHRs. The majority of respondents who appear eligible for Medi-Cal incentive payments (70%) do not currently have EHRs that can meet all 12 of the Meaningful Use objectives measured in the survey. Thirty percent do not have any sort of EHR.

1.8.1.2 EHR ADOPTION BY NON-PHYSICIANS

Current data on non-physician practitioner use of EHRs (including Medi-Cal providers) is limited. In 2010, the California HealthCare Foundation published a survey of dental practices in California that only attained a 3.7% response rate. This survey found that 23% of respondents reported having a fully functional dental EHR. Among Denti-Cal dentists, 37% reported being likely to participate in ARRA incentive programs, with an additional 27% somewhat likely.

Much more information is needed to help fill the gap of knowledge about EHR use by non-physician providers. To this end, DHCS has contracted with researchers at UCSF to modify the survey they have developed for the Medical Board of California for use with nurse practitioners and certified nurse midwives. This was administered in September-December 2011 through direct mailing to a random sample of 5000 providers. Results will be available in Summer 2012.

1.8.1.3 EHR ADOPTION BY HOSPITALS

A 2010 study by Lewin Group and McKinsey & Company found that 242 of 435 (55%) of the hospitals in California will be potentially eligible for Medi-Cal incentive payments, based on Medi-Cal discharge volumes and other eligibility factors.

Figure 3: Eight of these are children’s hospitals; the remaining 234 are general acute care facilities. Statewide, these eligible hospitals will account for more than 93% of all Medi-Cal discharges and 72% of all acute care hospital bed days.
EHR Adoption and Use

In 2011 UCSF researchers conducted an analysis of the Information Technology Supplement of the 2010 AHA Annual Survey for Agency. In California, the sampling frame was 419 hospitals, 205 of which responded (48.9% response rate). The researchers also utilized 2009-2010 financial data for California hospitals submitted to the Office of Statewide Health Planning (OSHPD). For this study, the variables used from this source were descriptive variables about the hospitals, not variables about their EHR adoption, meaningful use, or health information exchange capabilities. The hospitals in the AHA and OSHPD data sources were matched using their respective CCNs. The final sampling frame included 342 California acute care non-federal hospitals.
The 12 Meaningful Use core measures listed in Table 3 were used to assess the extent of MU objectives attained in each hospital. In order to achieve "meaningful use," a hospital needs to have the capabilities of all 12 core measures. For this report, a Meaningful Use Core Measures Index (0-12 possible points) was created by summing each hospital’s score for each meaningful use core measure (0 or 1 point). For the remainder of this report, the meaningful use core measures index score will be referred to as the “MU score.”

**TABLE 3: MEANINGFUL USE CORE AND MENU OBJECTIVES**

<table>
<thead>
<tr>
<th>Core Measures</th>
<th>Menu Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Record key demographics</td>
<td>• Laboratory reports</td>
</tr>
<tr>
<td>• Report HQA and PQRI quality measures</td>
<td>• Perform medication reconciliation</td>
</tr>
<tr>
<td>• Maintain up-to-date problem list</td>
<td>• Record advanced directives</td>
</tr>
<tr>
<td>• Maintain active medication list</td>
<td>• Summary care record for relevant transitions in care</td>
</tr>
<tr>
<td>• Record vital signs</td>
<td>• List of patients by specific conditions</td>
</tr>
<tr>
<td>• Record smoking status</td>
<td>• Drug formulary checks</td>
</tr>
<tr>
<td>• Maintain comprehensive list of allergies</td>
<td>• Patient-specific education resources</td>
</tr>
<tr>
<td>• Use CPOE for medications</td>
<td>• Capability to electronically submit immunization data</td>
</tr>
<tr>
<td>• Implement at least 1 of 6 clinical decision rules</td>
<td>• Capability to electronically submit laboratory results to public health agencies</td>
</tr>
<tr>
<td>• Implement drug-drug and drug-allergy interaction checks</td>
<td>• Capability to electronically submit syndromic surveillance data to public health agencies</td>
</tr>
<tr>
<td>• Give patients electronic copy of health info</td>
<td></td>
</tr>
<tr>
<td>• Discharge summaries</td>
<td></td>
</tr>
<tr>
<td>• Capability to electronically exchange key clinical information among providers of care and patient authorized entities</td>
<td></td>
</tr>
<tr>
<td>• Protect electronic health information in EHR through appropriate technical capabilities</td>
<td></td>
</tr>
</tbody>
</table>

*NOTE:* "Not included in the 2009 AHA Annual Survey IT Supplement.

**SOURCE:** Eligible Hospital and CAH Meaningful Use Table of Contents; Core and Menu Set Objectives.

To assess the extent of HIE capabilities adopted in each hospital, a HIE question from the AHA Annual Survey Information Technology Supplement was used. The question reads: “Does your hospital electronically exchange any of the following patient data with any of the providers listed below? (Check all that apply.)” The four types of providers listed were: 'with hospitals inside of your..."
system,' ‘with hospitals outside of your system,' ‘with ambulatory providers inside of your system,' and ‘with ambulatory providers outside of your system.' The five types of patient data to be shared with any of the four provider types were: patient demographics, clinical care record, laboratory results, medication history, and radiology reports.

Table 4 displays descriptive data on the 182 acute care non-federal California hospitals that responded to the AHA Annual Survey IT Supplement. The majorities of hospitals are non-profit and treat both adults and children.

**TABLE 4: DISTRIBUTION OF ACUTE CARE, NON-FEDERAL HOSPITALS; N=182 HOSPITALS**

<table>
<thead>
<tr>
<th>Ownership</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Profit</td>
<td>63.2%</td>
<td>115</td>
</tr>
<tr>
<td>Investor</td>
<td>15.9%</td>
<td>29</td>
</tr>
<tr>
<td>District</td>
<td>15.9%</td>
<td>29</td>
</tr>
<tr>
<td>City/Country</td>
<td>4.9%</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Hospital</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small/Rural</td>
<td>19.8%</td>
<td>36</td>
</tr>
<tr>
<td>Teaching</td>
<td>8.2%</td>
<td>15</td>
</tr>
<tr>
<td>Neither</td>
<td>72.0%</td>
<td>131</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type of Care</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>96.2%</td>
<td>175</td>
</tr>
<tr>
<td>Children's</td>
<td>2.7%</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size (licensed beds):</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-99 beds</td>
<td>18.1%</td>
<td>33</td>
</tr>
<tr>
<td>100-199 beds</td>
<td>25.3%</td>
<td>46</td>
</tr>
<tr>
<td>200-399 beds</td>
<td>33.0%</td>
<td>60</td>
</tr>
<tr>
<td>400+ beds</td>
<td>23.6%</td>
<td>43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size (acute care beds):</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-99 beds</td>
<td>26.9%</td>
<td>49</td>
</tr>
<tr>
<td>100-199 beds</td>
<td>24.7%</td>
<td>45</td>
</tr>
<tr>
<td>200-399 beds</td>
<td>35.7%</td>
<td>65</td>
</tr>
<tr>
<td>400+ beds</td>
<td>12.6%</td>
<td>23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kaiser:</th>
<th>% of Hospitals</th>
<th>Number of Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>5.5%</td>
<td>10</td>
</tr>
<tr>
<td>No</td>
<td>94.5%</td>
<td>172</td>
</tr>
</tbody>
</table>

**SOURCE:** 2011 UCSF California Hospital EHR Linked Data File.

FIGURE 4 displays the distribution of ratios of Medi-Cal discharges to total discharges among California hospitals. The mean percentage of Medi-Cal discharges was 24%. For 17.6% of hospitals, Medi-Cal discharges comprised less than 10% of total discharges.
Meaningful Use

Table 5 shows the percent and number of California hospitals that met each specific meaningful use core or menu measure objective. Over 85% of hospitals were able to record key demographics and view laboratory reports (items in green). Less than half of hospitals met the four core meaningful use objectives (items in red): these included maintaining up-to-date problem lists and using computerized provider order entry for medications.

NOTE: Mean=24.0%, SD=17.0%.
SOURCE: 2011 UCSF California Hospital EHR Linked Data File.
### Table 5: Percent of Hospitals That Have Implemented Meaningful Use Measures; N=182 Hospitals

<table>
<thead>
<tr>
<th>Meaningful Use Measures</th>
<th>% of Hospitals</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record key demographics</td>
<td>88.5%</td>
<td>161</td>
</tr>
<tr>
<td>Maintain comprehensive list of allergies</td>
<td>74.2%</td>
<td>135</td>
</tr>
<tr>
<td>Record smoking status</td>
<td>74.2%</td>
<td>135</td>
</tr>
<tr>
<td>Discharge Summaries</td>
<td>73.1%</td>
<td>133</td>
</tr>
<tr>
<td>Maintain active medication list</td>
<td>69.8%</td>
<td>127</td>
</tr>
<tr>
<td>Implement at least 1 of 6 clinical decision rules</td>
<td>69.2%</td>
<td>126</td>
</tr>
<tr>
<td>Record vital signs</td>
<td>64.8%</td>
<td>118</td>
</tr>
<tr>
<td>Implement drug-drug and drug-allergy checks</td>
<td>63.2%</td>
<td>115</td>
</tr>
<tr>
<td>Maintain up-to-date problem list</td>
<td>45.6%</td>
<td>83</td>
</tr>
<tr>
<td>Use CPOE for medications</td>
<td>36.3%</td>
<td>66</td>
</tr>
<tr>
<td>Give patients electronic copy of health information</td>
<td>35.7%</td>
<td>65</td>
</tr>
<tr>
<td>Report HQA and PQRI quality measures</td>
<td>21.4%</td>
<td>39</td>
</tr>
<tr>
<td>Menu Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory Reports</td>
<td>89.6%</td>
<td>163</td>
</tr>
<tr>
<td>Perform medication reconciliation</td>
<td>57.1%</td>
<td>104</td>
</tr>
<tr>
<td>Summary care record for relevant transitions in care</td>
<td>55.5%</td>
<td>101</td>
</tr>
<tr>
<td>Record advanced directives</td>
<td>53.8%</td>
<td>98</td>
</tr>
</tbody>
</table>

**Source:** 2011 UCSF California Hospital EHR Linked Data File.

**Out of a Possible 12 Points, the Mean Score Was 7.2 and the Median Score Was 8 for California Hospitals.**

Figure 5 displays the relationship between the MU score and the extent to which the hospitals serve Medi-Cal patients. Except for hospitals with the lowest MU scores, there was a negative relationship between MU score and Medi-Cal discharges as a % of total discharges.
FIGURE 5: ASSOCIATION BETWEEN MU SCORE AND MEDIAN RATIO OF MEDICAL/TOTAL DISCHARGES; N=182 HOSPITALS

NOTE: ANOVA test of significance of the difference between means: p=0.052.
SOURCE: 2011 UCSF California Hospital EHR Linked Data File.
Figure 6 below displays the relationship between MU score and hospital ownership. Most hospitals fell into the categories of non-profit, and the mean MU score for this category was 7.9 out of a possible 12. The mean MU Score for hospitals owned by a city or county was similar (7.7), while the mean MU Score for investor-owned hospitals and district hospitals were lower (6.0 and 5.4, respectively). The analysis revealed a strong direct relationship between higher MU score and larger hospital size.

**FIGURE 6: MEAN MU SCORE BY HOSPITAL SIZE; N=182 HOSPITALS**

<table>
<thead>
<tr>
<th>MU Score (possible 12 points)</th>
<th>Median: Licensed Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3 (N=33)</td>
<td>114.0</td>
</tr>
<tr>
<td>4 - 6 (N=37)</td>
<td>186.0</td>
</tr>
<tr>
<td>7 - 8 (N=37)</td>
<td>204.0</td>
</tr>
<tr>
<td>9 (N=28)</td>
<td>327.5</td>
</tr>
<tr>
<td>10 - 12 (N=47)</td>
<td>327.0</td>
</tr>
</tbody>
</table>

*NOTE:* ANOVA test of significance of the difference between means: p=0.002.

*SOURCE:* 2011 UCSF California Hospital EHR Linked Data File.

Forty-seven California hospitals scored between 10 and 12 points on the meaningful use core measures index. These 47 high-scoring hospitals were responsible for 35% of all California discharges, and 30% of Medi-Cal discharges. Among respondents, these hospitals included:

- All 10 Kaiser hospitals;
- 4 of the 5 children’s hospitals;
- 8 of the 15 teaching hospitals;
- 3 of the 36 small/rural hospitals;
- The median number of licensed beds was 327, and the median ratio of Medi-Cal discharges to total discharges was 17.8%.

Seventy California hospitals scored between 0-6 points on the meaningful use core measures index. These 70 low-scoring hospitals were responsible for
29% of all California discharges, and 32% of Medi-Cal discharges. Among respondents, these hospitals included:
- 2 of the 15 teaching hospitals;
- 23 of the 36 small/rural hospital;
- The median number of licensed beds was 157 (less than half of the high scoring hospitals), while the median ratio of Medi-Cal discharges to total discharges was 22.9% (somewhat higher than the high scoring hospitals).

“Unlikely to Implement”: Spotlight on Computerized Physician Order Entry for Medications

Table 6 shows the percent of hospitals that had achieved each meaningful use core or menu measure, compared to the percent of hospitals that responded that they were unlikely to implement (see description of this response category below) that measure. More than one-quarter of California hospitals indicated that they were unlikely to use Computerized Physician Order Entry (CPOE) for medications: as CPOE is challenging to implement and use, this represents a major obstacle to achieving widespread meaningful use for California hospitals.

<table>
<thead>
<tr>
<th>Meaningful Use Measures</th>
<th>% Hospitals Implemented</th>
<th>% Hospitals Unlikely to Implement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Report HQA and PQRI quality measures</td>
<td>21.4</td>
<td>n/a</td>
</tr>
<tr>
<td>Give patients electronic copy of health info</td>
<td>35.7</td>
<td>n/a</td>
</tr>
<tr>
<td>Use CPOE-Medications</td>
<td>36.3</td>
<td>26.4</td>
</tr>
<tr>
<td>Maintain up-to-date problem list</td>
<td>45.6</td>
<td>19.8</td>
</tr>
<tr>
<td>Implement drug-drug and drug-allergy checks</td>
<td>63.2</td>
<td>14.8</td>
</tr>
<tr>
<td>Record vital signs</td>
<td>64.8</td>
<td>13.7</td>
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<tr>
<td>Record smoking status</td>
<td>74.2</td>
<td>11.5</td>
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<tr>
<td>Discharge summaries</td>
<td>73.1</td>
<td>10.4</td>
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<tr>
<td>Maintain active medication list</td>
<td>69.8</td>
<td>10.4</td>
</tr>
<tr>
<td>Maintain comprehensive list of allergies</td>
<td>74.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Implement at least 1 of 6 clinical decision rules</td>
<td>69.2</td>
<td>9.9</td>
</tr>
<tr>
<td>Record key demographics</td>
<td>88.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Menu Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform medication reconciliation</td>
<td>57.1</td>
<td>n/a</td>
</tr>
<tr>
<td>Record advanced directives</td>
<td>53.8</td>
<td>23.1</td>
</tr>
<tr>
<td>Summary care record for relevant transitions in care</td>
<td>55.5</td>
<td>20.3</td>
</tr>
<tr>
<td>Laboratory reports</td>
<td>89.6</td>
<td>6.0</td>
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</tbody>
</table>
**NOTE**: The measures italicized and with "n/a" under "% Hospitals Unlikely to Implement" did not have answer choices in the AHA Annual Survey Information Technology Supplement that could be interpreted as "unlikely to implement."

**SOURCE**: 2011 UCSF California Hospital EHR Linked Data File.

Figure 7 displays the extent of implementation of computerized physician order entry (CPOE) for medications, among hospitals with less than 10 percent Medi-Cal discharges (not eligible for Medicaid EHR incentives) or greater than or equal to 10 percent Medi-Cal discharges (eligible for Medicaid EHR incentives). Hospitals not eligible for EHR incentives (left hand side pie chart) were far more likely to have implemented CPOE (blue color), and were less unlikely to implement CPOE (tan color), compared to hospitals not eligible for EHR incentives (right hand side pie chart).

**FIGURE 7: EXTENT OF IMPLEMENTATION OF CPOE FOR MEDICATION ACCORDING TO PERCENT MEDI-CAL DISCHARGES; N=182 HOSPITALS**

<table>
<thead>
<tr>
<th>&lt; 10% Medi-Cal Discharges</th>
<th>≥ 10% Medi-Cal Discharges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented</td>
<td>Implemented</td>
</tr>
<tr>
<td>0.0%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Likely to Implement</td>
<td>Likely to Implement</td>
</tr>
<tr>
<td>0.4%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Unlikely to implement</td>
<td>Unlikely to implement</td>
</tr>
<tr>
<td>0.7%</td>
<td>37.3%</td>
</tr>
</tbody>
</table>

**NOTE**: Chi-square test of significance of the difference between counts: p=0.007.

**SOURCE**: 2011 UCSF California Hospital EHR Linked Data File.

Key findings for the N=182 hospitals include:
- 37% of hospitals are in an area with a regional HIE entity (for example, the Orange County or LA regional HIE entities);
- 18% of hospitals participate in regional HIE entity;
- 39% of hospitals do NOT participate in a regional HIE entity but have electronic framework to do so; and
- 42% of hospitals do NOT participate in a regional HIE entity and do NOT have electronic framework to do so.

Table 7 displays the percent of hospitals that are exchanging data with affiliated and unaffiliated hospitals and providers. Overall, the most progress was made in exchanging data with ambulatory care providers and hospitals within a health care system, with less progress made in exchanging data with ambulatory care
providers outside the system, and very little progress in exchanging data with unaffiliated hospitals.

**TABLE 7: IMPLEMENTATION OF HEALTH INFORMATION EXCHANGE MEASURES; N=182 HOSPITALS**

<table>
<thead>
<tr>
<th>HIE Measures (Types of Data)</th>
<th>Affiliated Entities/Providers</th>
<th>Unaffiliated Entities/Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With ambulatory care providers inside system</td>
<td>With hospitals inside system</td>
</tr>
<tr>
<td>Patient demographics</td>
<td>56.8%</td>
<td>48.6%</td>
</tr>
<tr>
<td>Laboratory results</td>
<td>56.8%</td>
<td>47.0%</td>
</tr>
<tr>
<td>Radiology reports</td>
<td>57.4%</td>
<td>45.9%</td>
</tr>
<tr>
<td>Clinical care record (clinical hist, exam)</td>
<td>40.4%</td>
<td>40.4%</td>
</tr>
<tr>
<td>Medication history</td>
<td>40.4%</td>
<td>39.9%</td>
</tr>
<tr>
<td>At least 1 type of data</td>
<td>62.3%</td>
<td>52.5%</td>
</tr>
<tr>
<td>All 5 types of data</td>
<td>21.3%</td>
<td>37.7%</td>
</tr>
</tbody>
</table>

**SOURCE:** 2011 UCSF California Hospital EHR Linked Data File.

**Relationship between Meaningful Use and Health Information Exchange**

**Figure 8** displays the association between progress toward meaningful use (MU Score) and health information exchange for California hospitals. All types of HIE were more prevalent among hospitals with higher MU Scores, compared to hospitals with lower MU Scores.
FIGURE 8: HEALTH INFORMATION EXCHANGES MEASURES IMPLEMENTATION ACCORDING TO MU SCORE; N=182 HOSPITALS

NOTES: ANOVA test of significance of the difference between means: Internal Provider HIE (p<0.001); Internal Hospital HIE (p<0.001); External Provider HIE (p=0.461); and External Hospital HIE (p=0.009).
SOURCE: 2011 UCSF California Hospital EHR Linked Data File.

Summary of Findings and Policy Implications
- Overall, achieving EHR meaningful use objectives varies a great deal among hospitals
- Greater prevalence of Medi-Cal patients is associated with lower EHR meaningful use scores
- Hospitals that are smaller, rural, or investor owned tended to have lower MU scores
- Implementing CPOE presents the most difficult challenge in achieving EHR meaningful use: about ¼ of hospitals appear to be unlikely to achieve meaningful use in the foreseeable future
- Data exchange is modest with affiliated providers and hospitals within a system, is less with unaffiliated providers, and is least with unaffiliated hospitals. The extent of data exchange is correlated with the level of MU scores.
- The AHA dataset was a relatively good source of data for the purpose of determining progress towards achieving EHR meaningful use. Given the variation in response rate by type of hospital, OHIT may want to consider supplementing data collection efforts in future years.
1.8.1.4 EHR ADOPTION BY VETERAN ADMINISTRATION HOSPITALS

Veterans Administration hospitals were excluded from the analysis of the 2010 AHA Survey. However, it is well known that they are leading the charge when it comes to EHR implementation: All VA hospitals in California use the highly successful Vista EHR system. The Veterans Administration San Diego Medical Center (VASDMC) recently launched an electronic medical data exchange and instant access program with Kaiser Permanente. This is exciting because it represents the first time a federal agency and a private healthcare organization have linked their computerized patient-records systems. In addition, the Naval Medical Center and VASDMC have established Virtual Lifetime Electronic Records (VLER) to share data. The VASDMC is a member of the Beacon Community collaborative led by the University of California, San Diego.

CALIFORNIA CRITICAL ACCESS HOSPITALS (CAHs)

California’s Critical Access Hospitals (CAHs) serve rural Medicare patients on cost-based reimbursement for Medicare services and traditional fee-for-service for private payers and Medi-Cal. What constitutes a CAH? A CAH must provide 24-hour services, must be a minimum of 35 miles away from another hospital (15 miles in the case of mountainous terrain or in areas with only secondary roads available), must not exceed an average length-of-stay of 96 hours in the hospital business unit, and have a maximum of 25 beds, including “swing” beds that can transition from acute to skilled nursing.

How technologically ready are California’s CAHs? In March 2010, the Rural Health Information Technology Consortium received a grant from California Health and Human Services (Agency) to develop tools and perform pilot studies. Their goal was to assess the technology readiness of five Critical Access Hospitals (CAH) in California to achieve the Meaningful Use measures proposed by the Centers for Medicare and Medicaid Services (CMS).

After the pilot was successfully completed, the consortium organized under the California State Rural Health Association (CSRHA). In June 2010, they received a grant from United Health Group to complete assessments on the remaining 25 CAHs and one pending CAH.

Survey Process

The technology assessment consisted of interviewing CAH staff and reviewing their internal documents and reports. Web-based survey questionnaires were emailed to executive, finance, nursing, laboratory, radiology, pharmacy, and IT managers at each facility. Questionnaire responses were reviewed and a site visit allowed follow-up interviews with each manager to understand the hospital’s readiness or plans for demonstrating Meaningful Use. Following the site visit, a draft technology assessment was circulated to the CAH staff for review and correction. Further staff comments were then incorporated in the
report. All reports were reviewed by the project director and summarized for stakeholder comment. Financial analysis of each CAH was also completed, including indicators of financial performance, estimating incentive payments and cost-reimbursement for HIT deployment, outpatient laboratory profitability, Medicare patient populations and Medi-Cal share of acute inpatient days.

FIGURE 9: CRITICAL ACCESS CARE HOSPITALS

Results
According to the survey, 10 of 31 CAHs have implemented EHRs, with another six in the process of implementation. The most common barrier cited by CAH chief executive officers (CEOs) to achieving Meaningful Use was funding. Most CAHs struggle financially, with only 13 of the 31 CAHs reporting a profit according to the most recent financial audit information. However, CSRHA
projects that most CAHs will receive reimbursement adequate to achieve Meaningful Use.

The estimated total of incentive payments for California’s CAHs will be $73 million, compared to total anticipated AIU costs of $55 million. However, these costs do not take into account ongoing operational costs, including HIE and increased information technology staffing costs. According to CSRHA, many rural hospitals, particularly those not affiliated with larger parent organizations, will need technical assistance in order to make the right decisions to achieve and sustain Meaningful Use. **Figure 9** shows the location of California’s CAHs and their potential status in achieving Meaningful Use.

### 1.8.1.5 EHR ADOPTION BY CHILDREN’S HOSPITALS

California is home to eight children’s hospitals. Under the Medi-Cal EHR Incentive Program, they will all qualify for incentives regardless of Medi-Cal discharge volume. Based on 2008 data, the children’s hospitals are expected to receive an estimated $45 million in incentive payments.

Successful health information exchange is a priority for the majority of children’s hospitals. The primary barrier to adopting new EHR technology is reported to be inadequate funding.

**Strategy and Next Steps**

In a survey of the eight hospitals conducted by DHCS and the California Children’s Hospital Association, six hospitals indicated that they will participate in the hospital incentive program. One hospital, Loma Linda, will apply in conjunction with their main hospital. Another, Oakland Children’s, is not sure about participation.

Of the six hospitals who will be participating:

- All six hospitals currently have an operating EHR.
- One hospital believes that it can meet the current Meaningful Use criteria.

### 1.8.1.6 EHR ADOPTION BY COMMUNITY CLINICS

In September 2010, the California Primary Care Association (CPCA) sought to determine how many clinics have fully implemented EHRs. They surveyed 181 clinic and health center corporations in California about health information technology related issues. One hundred and twenty-seven corporations responded, a 70% response rate. Seventy-five percent of the respondents were FQHCs or FQHC look-alike clinics.

**Results**
This survey found that 21% of clinic corporations have fully implemented EHRs, 19% have partially implemented EHRs and 60% do not have an EHR. Eighty-three percent of the clinics intend to work with its providers to participate in the Medi-Cal EHR Incentive Program, with 73% intending to do so in the first year. Sixty percent of clinics reported a need for additional staff for EHR support in the next two years.

The survey also revealed information about technology products. Two EHR products dominate the marketplace for community clinics and health centers: eClinicalWorks (25%) and NextGen (25%). Sixty percent of organizations that have not yet implemented intend to purchase NextGen, while 24% plan to purchase eClinicalWorks.

Out of 127 respondents, the survey revealed how many are using each of the following types of interfaces:

1) Lab: 73
2) E-prescribing: 25
3) Radiology: 12

When asked what type of information would be most beneficial to exchange, 66% of respondents ranked eReferral and scheduling for specialty care as the most important. Following, in order of importance, was immunization registry, labs, patient summary, and lastly e-prescribing.

Funding
Fifty-two of California’s FQHCs have successfully obtained funding from the HRSA Capital Improvement Project grants for health information technology and/or electronic health records. Additionally, there are 13 Health Center Controlled Network grantees in California with nearly $24 million in dedicated funding for health information technology. (Table 8)
### TABLE 8: HEALTH CENTER CONTROLLED NETWORK GRANTEES

<table>
<thead>
<tr>
<th>Grantee</th>
<th>Grant Number</th>
<th>Program Director</th>
<th>Financial Assistance</th>
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<tbody>
<tr>
<td>ALLIANCE FOR RURAL COMMUNITY HEALTH</td>
<td>H2LIT16580</td>
<td>Cathy Frey</td>
<td>$506,859.00</td>
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<td></td>
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<td>Cathy Frey</td>
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<tr>
<td>ALTA MED HEALTH SERVICES CORPORATION</td>
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<td>Castulo de la Rocha</td>
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<td>ASSN OF ASIAN/PACIFIC COMM HLTH ORGANIZATIONS</td>
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<td>Rosy Weir</td>
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<td>CLINICA SIERRA VISTA</td>
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<td>Stephen W Schilling</td>
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<td>Roberto S Juarez</td>
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<td>COMMUNITY ACCESS HCCN, LLC</td>
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<td>COMMUNITY HEALTH CENTER NETWORK</td>
<td>H2LCS18136</td>
<td>Ralph Silber</td>
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<td>GOLDEN VALLEY HEALTH CENTER</td>
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<td>Michael O Sullivan</td>
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<td>REDWOOD COMMUNITY HEALTH NETWORK - REDWOOD COMMUNITY HEALTH COALITION</td>
<td>H2LCS18142</td>
<td>Nancy O Oswald</td>
<td>$2,079,598.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>707-792-7900 x216</td>
<td></td>
</tr>
</tbody>
</table>

The Role of 1204a Clinics
Over 200 of non-FQHC clinics in California are licensed as 1204a clinics under state law. These clinics must be non-profit entities that charge patients based on ability to pay, using a sliding fee scale. If the patient can’t pay, the clinics can’t charge the patient directly for services rendered or for medications, appliances, or apparatuses furnished. These clinics constitute an important component of the state's safety net for the most vulnerable of our population. However, a large number of providers in these clinics may not qualify for Medi-Cal EHR Incentive Program payments due to the inability to count uninsured and other needy patient encounters toward their patient volumes.
EHR ADOPTION BY LARGE MEDICAL GROUPS AND INDEPENDENT PRACTICE ASSOCIATIONS

There is a relatively low adoption rate for medical groups and IPAs in California. The National Study of Physician Organizations, reporting 2007 data, found only 32% of medical groups and 6% of IPAs made an EHR available for progress notes, and even fewer for lists of patient medications (see Table 9). However, looking at electronic access to clinical data, medical groups and IPAs had much better utilization rates, especially for laboratory test results (59%), though less so for a record of prescriptions filled (13%). Twenty-nine percent of organizations reported that providers exchanged e-mail with patients and only 3% allowed patients online access to their EHRs.

Commercial HMO contracts

In 2009, the Integrated Healthcare Association (IHA) surveyed 193 medical groups and IPAs in California with at least one commercial HMO contract, requesting that the organization indicate their Electronic Medical Record status. Here are the responses: 28.1% “Fully Operational;” 33.3% “Implementation Underway;” 20.8% “Implementation Planned;” and 15.1% “No Implementation Planned.” Only 2.7% did not respond. (The same question was asked of all 28 reporting units for Kaiser Permanente, and they all responded “fully operational.”)

| TABLE 9: IT CAPABILITIES AND EHRs IN LARGE MEDICAL GROUPS AND IPAS IN CALIFORNIA |
|---------------------------------------------|-------------|-------------|
| N=71                                        | N=113       |
| Electronic documentation                   |            |
| Progress notes                             | 32%         | 6%          |
| List of patient medications                | 25%         | 8%          |
| Electronic access to clinical data         |            |
| Laboratory test results                    | 69%         | 52%         |
| Radiology test results                     | 63%         | 39%         |
| Specialist referral notes                  | 37%         | 9%          |
| Emergency dept. notes                      | 42%         | 19%         |
| Hospital discharge notes                   | 55%         | 33%         |
| Record of prescriptions filled             | 18%         | 10%         |
| Clinical decision support                  |            |
| Alerts for potential drug interactions     | 24%         | 5%          |
| Alerts for abnormal tests                  | 20%         | 10%         |
| Prompts at time of visit                   | 21%         | 10%         |
| Physician order entry                      |            |
| Physician electronic prescribing           | 32%         | 17%         |
| Electronic registry for chronic illness    |            |
| Diabetes                                   | 62%         | 51%         |
| Asthma                                     | 39%         | 48%         |
| Chronic heart failure                      | 44%         | 41%         |
| Depression                                 | 23%         | 19%         |
| Electronic connectivity for patients       |            |
| Physicians use e-mail with patients        | 39%         | 23%         |
| Patients can access part of EMR online     | 4%          | 3%          |

Quality measurement

EMR used to measure quality 19% 39%

NOTE: National Study of Physician Practices (NSPO2), March 2006–March 2007, including practices with 20 or more physicians.
Pay for Performance
IHA also includes HIT criteria in their pay-for-performance program, and have audited data for measurement years 2003-2009 on several aspects of HIT adoption. In 2009, 62.7% reported having computerized registries; 26.9% electronic prescribing; 53.4% electronic lab results; and 47.2% electronic messaging. Also, 51.8% were able to access clinical notes of other practitioners; 50.3% provided physician reminders for preventive and chronic care; and 31.6% could order lab tests electronically. These numbers do not include Kaiser Permanente.

Managed Care Contracts
In 2010, Cattaneo & Stroud conducted a survey of the California medical groups (excluding Kaiser Permanente) accepting managed care contracts and having at least six primary care providers. The 155 groups responding reported 18% of primary care providers use EHRs. A relatively high percent of respondents (33%) reported not knowing the rate of EHR use by their providers. The reported rate of use of EHRs by specialists was only 8%. The reported rates of group support for e-prescribing, local HIE, and electronic lab reporting were 57%, 37%, and 41%, respectively.

Although there is current knowledge of EHR use by groups and associations, it is not complete or consistent across settings. For this reason, DHCS has contracted with researchers at UCSF to design a unified survey to be conducted in 2012 and repeated periodically in the future.

1.8.1.8 EHR ADOPTION BY INDIAN HEALTH CLINICS
There are 64 small and independent Tribal Health Programs in rural and isolated communities in the state, which are hard to reach and have high provider turnover. Most do not currently use EHRs. Some, however, use the Indian Health Services’ Resource and Patient Management System (RPMS), which is an electronic health information technology solution. This system is used to manage clinical, business practices and administrative information in order to meet stringent Indian Health Services (IHS) reporting requirements, including the Government Performance and Requirements Act (GPRA) reporting.

A network of primary care clinics throughout the state is funded by IHS to provide care to American Indians and other underserved populations as identified in the clinic charter/mission. These clinics can participate in Medi-Cal as a Tribal Health Provider (THP) funded under the authority of Public Law (PL) 93-638, 25 USC 450 et seq., FQHC, Rural Health Clinic (RHC), or Community Health Center, if they meet all of the federal and state statutory requirements for each provider type.
The History of FQHC and THP

In 1998, DHCS implemented a Memorandum of Agreement (MOA) between the federal IHS and the Health Care Financing Administration (HCFA). HCFA was later renamed the Centers for Medicare & Medicaid Services (CMS). Funded under PL 93-638, the MOA established a new provider type and reimbursement rate for services provided to Medi-Cal recipients at tribal health clinics and also established the THP provider type. Clinics subsequently had the option to change their provider type. Although they did not change operations, most of the tribal health clinics changed their provider status from FQHC to THP at that time to take advantage of the new reimbursement system. As of March 2010, there were 16 FQHCs and 48 THP Indian health clinic providers enrolled in the Medi-Cal program.

THP clinics are operated by tribes and tribal organizations as primary care clinics in California under the authority of PL 93-638 and funded by the IHS to continue to provide a significant level of health care services at no cost to individual American Indians. These services meet the description of services provided to needy patients established in 42 CFR 495.306; the THP clinics have requested to be considered as FQHCs for the purposes of the Medi-Cal EHR Incentive Program. In compliance with CMS’ recently published FAQ on this issue, DHCS will treat the THP clinics as equivalent to FQHCs for this purpose.

1.8.2 HEALTH INFORMATION EXCHANGE LANDSCAPE

INTRODUCTION

Early in California’s quest to make patients’ health records available when and where they are needed for medical decisions, stakeholders voiced a strong preference for a decentralized approach to Health Information Exchange (HIE). Because health care is local, the prevailing sentiment was that each community should be supported in developing systems and governance that best meet its particular needs. At the same time, stakeholders endorsed leveraging national and state policies, standards, and capabilities for exchange within and between HIE initiatives.

In the past several years, two types of health information organizations (HIOs) have emerged across the state. One type is supported by a number of unaffiliated health care organizations within a particular community. The other is supported by a single hospital, health system, or integrated delivery network (IDN). For the purposes of this report, we refer to these as community HIOs and enterprise HIOs, respectively. HIOs play a foundational role in the emerging HIE landscape, providing governance and services enabling the

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8 The March 2010 California HIE Strategic and Operational Plans submitted to ONC may be downloaded here:
http://ehealth.ca.gov/MakingHIEHappen/CaliforniaHealthPlans.aspx
exchange of patient health information across unaffiliated community partners and within large enterprises.

As part of its ongoing monitoring of Health Information Exchange (HIE) in California, Cal eConnect commissioned a review of the current status and future plans of both types of HIOs in the state by Top Tier Consulting. This review assesses various elements of both models and describes their approaches and progress. The findings are meant to inform HIE strategic planning and goal-setting in California, both regionally and statewide.

Thirteen community HIOs and 14 enterprise HIOs from throughout California participated in this study. The charts below show their self-projected status at the time of data collection (February/March 2012) using the eHealth Initiative’s schema of HIE development.

**FIGURE 10: PROJECTED HIO DEVELOPMENT LEVEL FOR END OF 2012**

<table>
<thead>
<tr>
<th>Community HIOs (n=13)</th>
<th>Enterprise HIOs (n=14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning, 23% (3)</td>
<td>Planning, 36% (5)</td>
</tr>
<tr>
<td>Sustaining, 8% (1)</td>
<td>Sustaining, 14% (2)</td>
</tr>
<tr>
<td>Operating, 39% (5)</td>
<td>Operating, 43% (6)</td>
</tr>
<tr>
<td>Piloting, 15% (2)</td>
<td>Piloting, 7% (1)</td>
</tr>
<tr>
<td>Organizing, 15% (2)</td>
<td></td>
</tr>
</tbody>
</table>

**Key Findings**

HIOs have significant opportunities to contribute to healthcare transformation in California. The following key findings based on data collected in February and March 2012 elaborate on many of the dynamics and issues at play in the emerging HIO environment.

*Ambitious Community HIOs Forming in major Medical Trading Areas*

---

9 A Medical Trading Area is defined as a largely self-organized geographic market area in which a delineated population receives most of its medical services. MTA identification takes into account where patients seek medical care as well as where their health professionals refer them for specialized medical care. In this regard, MTA analysis focuses on the geographic origins of patients (i.e. counties, towns, zip codes, etc.) seeking medical services and the
Community HIOs garnering the most support are adopting service areas with clear lines of patient flow and trust between known participants, typically in Medical Trading Areas (MTAs) shaped by geographic, demographic, organizational, and market factors. There is little enthusiasm for a statewide exchange duplicative of these efforts.

Large, ambitious community exchanges are forming along county or multi-county lines in most urban areas in California. These include:

- Inland Empire HIE (IEHIE) in Riverside and San Bernardino counties
- HealthShare Bay Area in San Francisco, Contra Costa, and Alameda Counties
- LANES in Los Angeles County
- OCPRHIO in Orange County
- San Diego Beacon Community in San Diego and Imperial Counties

Regional Approach Among Enterprise HIOs

Most large health systems are also taking a regional approach, developing robust HIE capacity within their regional units as a first priority. Examples of this approach include the development of HIE capacity at Dignity Health and Sutter Health, which is largely occurring within their regional units, and Kaiser Permanente’s exchange infrastructure in southern and northern California. Smaller systems are typically geographically-focused in a specific region following the contours of their service area, such as SHARP in San Diego or Huntington Hospital in LA County.

Many Factors Have Slowed Connectivity

Progress establishing live data exchange with participants has been slow for many HIOs in operation. The process of engaging participants, negotiating agreements and contracts, and building the necessary infrastructure and interfaces with participating organizations has proven difficult, time-consuming, and costly. Data trading partners need to have a mutual interest in sharing health information, usually around patients or populations in common, and must trust other organizations’ capacity to serve as effective exchange partners. In addition, competing initiatives such as Meaningful Use have slowed HIE adoption,\(^{10}\) as provider organizations are struggling to

\(^{10}\) This may change in the near future: recently proposed Stage 2 Meaningful Use objectives requiring participating providers to exchange information across unaffiliated organizations and different EHR technologies, and consistent standards required of certified EHR vendors, will encourage the convergence of EHR and HIE adoption. In a recent presentation, the first priority identified by ONC for Stage 2 EHR standards and certification criteria is “enhancing standards-based exchange.” Steve Posnack, Director, Federal Policy Division, ONC, “2014 Edition, Standards and Certification Criteria, Final Rule.” 08/24/12 presentation hosted by the National eHealth Collaborative.
deal with the competing demands of all the initiatives they face. At the time of data collection (February/March 2012), there was limited information exchange across organizations in most regions of the state, with many HIE initiatives in the development or implementation stages.

Enterprise HIOs have made progress in connecting internally using their EHRs and are now focusing on finding the best way to connect providers to support emerging care models such as Accountable Care Organizations, Patient Centered Medical Homes, and improved coordination of care more generally. Health reform initiatives have increased pressure on organizations to implement solutions that provide support for virtual integration of patient information and care.

Potential for HIO-to-HIO Exchange

An important component of California’s strategy for statewide interoperability is the adoption of mechanisms for robust HIO-to-HIO exchange, both between and among community and enterprise HIOs. Community HIOs seek to involve enterprise HIOs with facilities in their service areas in their efforts. They also have plans to connect to other community HIOs, but progress has been slow as each organization is primarily focused on connecting with their own participants at this stage. Moreover, agreed-upon standards and governance at the state and national level are under development.

While enterprise HIOs are also primarily focused on internal exchange, some of them are forging alliances with community initiatives to take advantage of economies of scale. Links are occurring when there is clear benefit to the enterprise’s patients and members, especially when there is significant patient flow to or from other organizations. Most enterprise HIOs express a desire to engage with other HIOs when relevant and safe.

HIO to HIO Trust Remains Primary Challenge

An effective trust environment for exchange requires a clear understanding of applicable laws and regulations, governance mechanisms for exchange across unaffiliated organizations, and consistency of data sharing agreements. Important aspects of each of these elements is missing in California, significantly hindering the progress of HIOs in bringing on new participants.

Organizations express general concern about reliability of data and the legal framework within which data is currently exchanged. Researchers found near unanimity among HIOs regarding the need for state-level leadership and legislation to address privacy, security, and consent requirements, breach liability protection, and related issues. Respondents also suggest that the state implement a structure that has regulatory influence and authority, in addition to subject-matter and program expertise. Such
progress is a precondition for many providers to trust data from unknown external sources.

HIOs recognize that a transparent legal framework would not only ensure consistency of language and intent, it would also defray some of the costs of negotiation. Respondents look to the state HIE Cooperative Agreement Program to provide resources on the legal environment and appropriate data sharing agreements.

**Sustainability Issues Difficult**

Most community HIOs have yet to establish a clear path to sustainability beyond grant funding. Only a small number of community HIOs in California have reached a truly sustainable threshold – such as Santa Cruz HIE and Inland Empire HIE – through broad participation and a revenue model in which “everybody pays” for data exchange. Other HIOs are adopting versions of this model.

Significantly reducing the cost structure of community HIOs is partially out of the control of individual HIOs and requires state and public-private leadership. For example, standardizing data-sharing agreements within a statewide governance framework could dramatically reduce HIO legal fees; likewise, standardizing the HIE specifications incorporated into EHR products could significantly rationalize the pricing of interfaces to the benefit of HIOs.

**Lack of Standardization an Obstacle**

HIO leaders say there are too many technical standards that are similar but not the same, making exchange across organizations difficult and complicated to enable. Uncertainty about the effectiveness and evolution of specific data standards, and about what is mandatory and what is optional, limits adoption.

HIOs are also concerned with the lack of standard clinical terms among their participants. This limits the ability of organizations to accept data from unaffiliated organizations and forces HIOs to revert to the lowest common denominators in terms of data content.

**Predominant Transaction Types**

The most common exchange types on HIOs’ 2012 roadmap or live at the time of data collection (February/March 2012) were laboratory and radiology results delivery, patient care summary exchange, and discharge summaries (ADT messages). Exchange transactions are primarily transmitted through HL7-based electronic exchange or secure messaging.

**Community and Enterprise HIOs Differ in Focus, Priorities, and Structure**
Enterprise HIOs are formed to support their organization’s providers, staff, and patients. As large health systems and provider groups establish more complex dependencies on their core electronic health records, some are relying on their EHR for exchange. This is particularly true in organizations that use EHRs from Epic, NextGen, and eClinical Works, which support exchange with other affiliated organizations and environments that use the same technology. Although this is not a ubiquitous approach, it causes confusion among provider organizations about the need to adopt more robust HIE solutions.

Community HIOs, in the main, are focused on results delivery and enabling information to be efficiently exchanged across multiple unaffiliated partners in specific service areas, with governance provided by boards with representation from participating organizations.

*In summary*, the current HIE environment in California is characterized by a set of locally based initiatives focused on supporting the requirements of local organizations and stakeholders. Varying degrees of progress have been made, but it is clear that stakeholders are engaged and making investments in exchange technology, processes, and partnerships.

**Methodology**

The methodology behind this assessment was developed in conjunction with Top Tier Consulting. Qualitative and quantitative data were gathered between February and March 2012 from selected enterprise and community HIOs that are actively planning or engaging in clinical data exchange. A structured online survey and interview questionnaire tool were developed to guide interviewers and interviewees.

Participating organizations included 13 active community HIOs, 14 of the leading enterprise HIOs, and representatives from county and state public health organizations.

The participating community HIOs represent a nearly complete set of active efforts at the time of data collection. At least one other effort was at the early planning stages at the time (Connect Healthcare, which has been added to several maps and tables). The participating enterprise HIOs include the most prominent efforts in the state.

A complete list of participating organizations is provided in tables below:

**TABLE 10: PARTICIPATING COMMUNITY HIOs**

<table>
<thead>
<tr>
<th>Community HIOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAReHIN</td>
</tr>
<tr>
<td>EKCITA</td>
</tr>
</tbody>
</table>
HealthShare Bay Area
Inland Empire HIE (IEHIE)
LANES (Los Angeles Network for Enhanced Services)
NCHIN (North Coast Health Information Network)
OCPRHIO (Orange County Partnership Regional Health Organization)
RAIN (a Central Coast telemedicine organization)
Redwood MedNet
Santa Cruz HIE
San Diego Beacon Community
Shasta Health Collaborative
Tulare Kings Foundation for Medical Care

<table>
<thead>
<tr>
<th>TABLE 11: PARTICIPATING ENTERPRISE HIOs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enterprise HIOs</strong></td>
</tr>
<tr>
<td>Dignity Health</td>
</tr>
<tr>
<td>Healthcare Partners</td>
</tr>
<tr>
<td>Hill Physicians</td>
</tr>
<tr>
<td>Hoag</td>
</tr>
<tr>
<td>Huntington Hospital</td>
</tr>
<tr>
<td>John Muir Health</td>
</tr>
<tr>
<td>Kaiser Permanente</td>
</tr>
<tr>
<td>Marin Health Network</td>
</tr>
<tr>
<td>MemorialCare Health System</td>
</tr>
<tr>
<td>San Mateo Medical Center</td>
</tr>
<tr>
<td>Sharp HealthCare</td>
</tr>
<tr>
<td>St. Joseph Health</td>
</tr>
<tr>
<td>Sutter Health</td>
</tr>
<tr>
<td>UC Davis Health System</td>
</tr>
</tbody>
</table>

The data collection process involved completing an on-line survey followed by either a telephone or in-person interview with leaders at each organization, and follow-up discussions to clarify information provided or to gather additional data. Information was also gathered from organizations’ websites and from other verified publically available materials, as well as reports submitted to Cal eConnect.
The review considered each participating HIO’s strategies and efforts in the following areas:\textsuperscript{11}

- HIO structure, management, and governance
- Participants, stakeholders, and service areas
- Legal/regulatory enablers and barriers to exchange
- Use of technology and exchange standards
- Financing and sustainability
- Types of information being exchanged
- Plans for growth and expansion

Findings and Analysis

Governance

A robust governance framework is fundamental to the trust fabric of an HIO and a prerequisite for effective data stewardship.

\textit{Enterprise HIOs}

Enterprise initiatives tend to be governed within the confines of existing board, operating committees, and budget processes at both the regional and corporate level. Private organizations are subject to HIPAA and HITECH and the provisions for inappropriate access to personal health information apply equally to EHRs and other information exchanges.

\textit{Community HIOs}

Most community HIOs have 501(c)(3) or other non-profit/foundation designation, with Boards of Directors typically representing a combination of physicians, hospital or delivery systems, public health, and other care-based organizations. Some include a member of the community at large to represent consumers.

Control of data is a point of contention among some community HIO board participants. Issues of competition and trust have led some to restructure, delay launch, or dissolve entirely. One solution, a governance model enabling tiered participation and control, is being tested in the Inland Empire. A "Leadership Council" has voting rights and preferential sequencing for implementation, in exchange for a higher annual fee. The "membership" tier allows participation and service on operating and advisory committees.

\textsuperscript{11} Note: Gaps in some of the data for some organizations reflect areas where no action was noted or the question was not relevant to the organization.
Organizational Structure

Enterprise HIOs

Large enterprise HIOs tend to be organized and managed at the regional level, which enables them to delegate responsibility, test new approaches region by region, and pursue more lightweight solutions for interoperability enterprise-wide.

Implementing and integrating EHRs has stressed the capacity of IT departments and has led to increased staffing, technology, and cost. While organizations have made significant investments to source, implement, and support enterprise interoperability, many are reallocating already employed staff to HIE projects. IT departments are bearing most of the load of this strategy.

The competitive response to Health Reform initiatives, such as Accountable Care Organizations (ACO), Patient-Centered Medical Homes (PCMH), and Pay for Performance (P4P) programs, has led to organizations building new structures and areas of expertise. These initiatives are important competitive drivers as more effective care coordination becomes the prominent focus among payers and regulators. As a result, organizations feel pressure to implement solutions that provide support for virtual integration of patient information and care. Only by these means can provider organizations generate the scale of savings needed to maintain revenues from Medi-Cal, CMS, and health plans. Many organizations are taking a wait-and-see approach to establishing robust internal as well as external exchange activity, due in part to lack of clarity in policies, standards, and regulations. Most enterprise HIOs are funded based on delivering specific savings, improvements in quality, and other benefits to the institution.

Community HIOs

The study found that most community HIOs are under-resourced with limited budgets for adding dedicated operational staff. While limited funding and instability have restricted hiring full-time, employed staff, many organizations fill gaps through in-kind or shared resources to bring on the expertise they need in an affordable manner. Of the 76 staff reported by community HIOs, more than half (41) are either contractors or in-kind resources.

Significantly, the HITECH-funded workforce development program is not being utilized by any of the interviewed organizations. These resources tend to accept lower pay to establish themselves in a new industry and could serve to increase organizational bandwidth at a lower cost than either contract or direct hire staff. The need for increased supervision and/or training appears to be a limiting factor.
Geographic Factors and Coverage

The findings of this assessment suggest that Medical Trading Areas (MTAs) constitute the logical geographic unit for HIOs. Enterprise HIOs choose specific geographies to support patients and providers in their own closed system, constituting internal MTAs with a high level of patient flow and organizational coherence, often contiguous with regional units. Community HIO service areas are also gravitating to MTAs defined by geographic, population, and related factors. Their service areas are significantly influenced by county lines driven by participation from county health systems, Medicaid Managed Care Plans, and other stakeholders operating in specific county geographies.

The study found potential for effective regional exchange of healthcare information in California, especially in MTAs with a high urban concentration. The tables in this section and the map below depict the overlap and proximity between both community and enterprise HIOs, highlighting the need for interoperability between these efforts. (The following section on Trading Partners will explore the extent to which they are linking to one another.)
Enterprise HIOs

Although improvements in quality and efficiency of care are primary drivers of enterprise HIO development, other factors specific to the organization influence the types of exchange capabilities and coverage areas chosen. ACOs are driving much of the strategy currently.
Enterprise HIOs tend to be concerned with providing the most appropriate data to clinicians delivering care in a medical trading area (MTA) or organizational region, including participant hospitals, employed and affiliated physicians/specialists, inpatient and outpatient labs, radiology and surgery centers, and other owned or contractually associated points of care. For tightly integrated health systems or capitated, delegated arrangements, this is a fairly straight-forward process. However, for multi-state, multi-region enterprises with multiple technologies, integration becomes complicated and expensive. Patients and providers most closely affiliated with the enterprise tend to dominate the focus. Closely affiliated providers tend to be on a more common set of technology solutions and by focusing on them, enterprise HIOs can most efficiently attain critical mass, with a rapid impact on large numbers of patients. However, this approach can result in fragmented or incomplete information as patients seek care outside this group of connected providers, which erodes confidence in the data, reduces the value of the exchange, and further raises concerns about liability for treatment errors.

Community HIOs

By the end of 2012, 44 out of 58 counties in California will have a community HIO in the planning or operating stages, based on HIOs’ projections. These counties encompass most of the urban areas in the state, as well as some rural and semi-rural areas that have specific needs, strong local support, or a current arrangement, such as telemedicine, with the local provider community. Unlike most enterprise HIOs, community initiatives tend to align along county lines as a result of affiliations with county health departments and Medicaid Managed Care Plans.

Four of the larger HIOs expected to begin implementation in 2012 stand out, covering major urban areas in San Francisco, Alameda, Contra Costa, Los Angeles, Orange, San Diego, Riverside, and San Bernardino counties.

County focus does not necessarily mean broad participation within specific counties. An HIO working with one or more facilities in a specific county is considered active in that county. Visually, as represented in the maps in the Appendix B, this may significantly over-represent their actual penetration within any given county.

The potential for competition and consolidation among community HIOs is increasing. The tables in this section and associated maps in the appendix depict increasing proximity between many community HIOs, with projected overlapping service areas in multiple regions in the state by 2013. This will lead to growing competition among HIOs for participants and increased choice for consumers of HIO services, but also instability and consolidation in some regions.

Fifteen counties have no planned or established community HIO activity. As expected, they are the most rural areas of the state or in areas with a highly
fragmented delivery system: Siskiyou, Lassen, Shasta, Tehama, Colusa, Yolo, Placer, El Dorado, Calaveras, Tuolumne, Mono, Santa Clara, San Benito and Monterey. Surprisingly, Sacramento also has no planned community HIE effort underway at this time.

Some HIOs have expansion plans to initiate activity in Shasta, Tehama, Colusa, Yolo, Sierra, Calaveras, and Tuolumne counties in 2013, which could bring the total number of counties with one or more community HIO to 51 of 58 by year-end.

The sheer numbers of independent practices, small rural clinics and hospitals, and the many types of EHRs in place make progress slow in rural and remote parts of the state. Further, many providers have no funds for EHR implementation or lack the broadband service to use one. The costs of outreach, negotiating data sharing agreements, and building and implementing custom interfaces are also significant obstacles.

About 20 percent of the state population and the majority of critical access hospitals are in areas with no identified HIO activity. Because these areas tend to lack resources for technology adoption, adjacent community HIOs are considering serving them.

Analysis of Geographic Coverage

For purposes of simplifying the analysis of geographic coverage, the state is divided into eight regions, each of which has significant attributes related to geography, population density, care delivery structure, and penetration by community and enterprise HIOs participating in this survey (Table 12).

**TABLE 12: EIGHT REGION COVERAGE ATTRIBUTES**

<table>
<thead>
<tr>
<th>Region</th>
<th>Community and Enterprise Coverage</th>
<th>Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern California – South/Inland</td>
<td>Inland Empire, SD Beacon Dignity, Loma Linda, Scripps, Sharp, Kaiser Permanente, UC San Diego</td>
<td>• Many large IDNs&lt;br&gt;• Two community exchanges live in Q1 2012, with broad expected participation and support&lt;br&gt;• Focus on local interoperability, specific community pilots and emergency services</td>
</tr>
<tr>
<td>Southern California - Central</td>
<td>LANES, OCPRHIO, Hoag, Kaiser Memorial Care, Monarch, St. Joseph, Huntington Hospital</td>
<td>• Many mid-large IDNs&lt;br&gt;• Focus on covering local medical trading areas&lt;br&gt;• Two community initiatives could involve over 70%+ of providers and hospitals in the</td>
</tr>
<tr>
<td>Area</td>
<td>Entities</td>
<td>Observations</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Central Coast                | RAIN, Santa Cruz HiE, Dignity, Kaiser, Memorial Care, Tenet                                    | - Two community exchanges operating currently  
  - Focus on expansion (Santa Cruz) and leveraging telemedicine services (RAIN) for broader exchange  
  - Fragmented provider networks  
  - Major hospital system (Tenet) not impactfully engaged with local exchanges in Santa Barbara, San Luis Obispo counties |
| Central Valley               | EKCITA, Tulare/Kings FMC, IEHIE Dignity, Sutter, Kaiser                                       | - One experienced community effort (EKCITA) could evolve to include most of the Central Valley’s safety net  
  - Three dominant IDNs in area  
  - Much overlap in service area across both enterprise and community exchanges  
  - Consolidations of some established and planned initiatives expected |
| Bay Area – Central and North | HealthShare Bay Area, Connect Healthcare Hill, Kaiser Permanente, John Muir, Sutter           | - Dominant IDN (Sutter), coupled with John Muir and Hill include 75%+ of non-Kaiser healthcare activity in Bay Area  
  - Community exchange (HSBA) encompassing above IDNs appears organized and well-funded for launch in 2012/13 |
| Sacramento Valley Sierras    | CAReHIN, Connect Healthcare, Shasta Health Collaborative, Dignity, Kaiser, Sutter, UC Davis    | - Dominant IDN-based enterprise exchanges evolving  
  - Community initiatives are in early stages, focused on critical access hospitals and local safety net |
| North - Coastal/Agricultural | NCHIN, Redwood MedNet Dignity, St. Joseph, Sutter                                              | - Fragmented and widely dispersed provider networks  
  - Two established results- |
Tables 13 and 14 show patient population targets for the end of 2012 and 2013, as reported by respondents in February/March 2012.

Numbers should be treated with caution given that some initiatives overlap, resulting in higher total reported counts. Moreover, these are aspirational numbers for some organizations; just because a patient is in an HIO’s index does not mean care-givers are actively exchanging data on that patient. Nonetheless, these numbers provide a point of comparison with one another.

<table>
<thead>
<tr>
<th>Community HIOs</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAReHIN</td>
<td>173,000</td>
<td>173,000</td>
</tr>
<tr>
<td>EKCITA</td>
<td>200,000</td>
<td>800,000</td>
</tr>
<tr>
<td>HealthShare Bay Area</td>
<td>1,000,000</td>
<td>1,500,000</td>
</tr>
<tr>
<td>IEHIE</td>
<td>1,000,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>LANES</td>
<td>6,000,000</td>
<td>7,000,000</td>
</tr>
<tr>
<td>NCHIN</td>
<td>130,000</td>
<td>160,000</td>
</tr>
<tr>
<td>OCPRHIO</td>
<td>500,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>RAIN Central Coast</td>
<td>150,000</td>
<td>300,000</td>
</tr>
<tr>
<td>Redwood MedNet</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>Santa Cruz HIE</td>
<td>270,000</td>
<td>680,000</td>
</tr>
<tr>
<td>SD Beacon</td>
<td>10,000</td>
<td>80,000</td>
</tr>
<tr>
<td>Shasta Health Collaborative</td>
<td>0</td>
<td>52,000</td>
</tr>
</tbody>
</table>

delivery oriented community HIOs
- Multiple IDN operated hospitals/clinics in overlapping areas
- Difficult to connect
- Minimal funding resources

North – Inland/Border
CAReHIN, Redwood MedNet
Dignity

- Single dominant IDN in area
- Fragmented and widely dispersed provider networks
- Minimal funding resources
<table>
<thead>
<tr>
<th>Enterprise HIOs</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dignity Health</td>
<td>3,700,000</td>
<td>3,800,000</td>
</tr>
<tr>
<td>Healthcare Partners IPA</td>
<td>500,000</td>
<td>500,000</td>
</tr>
<tr>
<td>Hill Physicians</td>
<td>300,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Hoag Health System</td>
<td>270,000</td>
<td>270,000</td>
</tr>
<tr>
<td>Huntington Hospital</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>John Muir Health</td>
<td>525,000</td>
<td>525,000</td>
</tr>
<tr>
<td>Kaiser Permanente</td>
<td>6,600,000</td>
<td>6,600,000</td>
</tr>
<tr>
<td>Marin Health Network</td>
<td>0</td>
<td>250,000</td>
</tr>
<tr>
<td>Memorial Care Health System</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>San Mateo Medical Center</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>Sharp HealthCare</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>St. Joseph Health System</td>
<td>140,000</td>
<td>140,000</td>
</tr>
<tr>
<td>Sutter Health</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td>UC Davis Medical Center</td>
<td>Not reported</td>
<td>Not reported</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>12 Million</strong></td>
<td><strong>13 Million</strong></td>
</tr>
</tbody>
</table>

**TABLE 14: POPULATION TARGETS FOR ENTERPRISE HIOs**

**Trading Partners and Participants**

The need for trust between data trading partners is a critical reason that exchange geographies currently follow regional MTAs. Parties exchanging data need to be able to trust the data they receive. Provider organizations within a community treating the same patients, with a history of collaboration and even competition, often have enough of a comfort level with each other to enter into a shared HIE effort. In contrast, governance mechanisms to extend trust across larger geographic areas are not readily apparent to most organizations. As a result, trust is not scalable in the current environment. This dynamic can be present within large multi-region enterprises as well, though to a lesser degree.
While enterprise HIOs continue to focus their attention mainly on internal connectivity of EHRs between affiliated providers, hospitals, and labs, community HIOs are engaging with a broader set of partners in the following types of patterns:

- Connecting safety-net hospitals and clinics to communities of providers
- Connecting rural hospitals and clinics to a diffuse provider community
- Connecting co-existing, independent integrated systems together

Community HIO participants include health plans, hospitals, long term care/rehabilitation facilities, community clinics, Federally Qualified Health Clinics (FQHCs), county health departments, lab and radiology centers, registries, primary care physicians (PCPs), specialists, other clinicians, and other HIO/HISPs.

Below are aggregated responses about the number and types of data exchange partners from study respondents submitted in February/March of 2012.

**TABLE 15: PROJECTED HIE TRADING PARTNERS**

<table>
<thead>
<tr>
<th>Enterprise HIOs (n=14) Estimated Number of Trading Partners per Year</th>
<th>Health Plans</th>
<th>Hospitals</th>
<th>Physician Practices</th>
<th>Physicians</th>
<th>FQHCs</th>
<th>Comm'ty Clinics</th>
<th>Public Health</th>
<th>Rehab/LTC</th>
<th>Labs/Rad</th>
<th>Other HIEs/HISPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>3</td>
<td>154</td>
<td>175</td>
<td>23912</td>
<td>0</td>
<td>1</td>
<td>30</td>
<td>9</td>
<td>305</td>
<td>7</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
<td>170</td>
<td>255</td>
<td>29638</td>
<td>0</td>
<td>6</td>
<td>35</td>
<td>13</td>
<td>502</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Community HIOs (n=13) Estimated Number of Trading Partners per Year</th>
<th>Health Plans</th>
<th>Hospitals</th>
<th>Physician Practices</th>
<th>Physicians</th>
<th>FQHCs</th>
<th>Comm'ty Clinics</th>
<th>Public Health</th>
<th>Rehab/LTC</th>
<th>Labs/Rad</th>
<th>Other HIEs/HISPs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>11</td>
<td>69</td>
<td>117</td>
<td>4996</td>
<td>69</td>
<td>85</td>
<td>22</td>
<td>10</td>
<td>87</td>
<td>17</td>
</tr>
<tr>
<td>2013</td>
<td>14</td>
<td>101</td>
<td>146</td>
<td>9158</td>
<td>91</td>
<td>100</td>
<td>34</td>
<td>20</td>
<td>96</td>
<td>33</td>
</tr>
</tbody>
</table>

Three items stand out here:

- More hospitals, providers, and labs are connecting via enterprise HIOs
- As expected, community HIOs include many FQHCs and community clinics while they are largely absent from enterprise HIOs
- Somewhat surprisingly, community HIOs are also engaging a larger number of health plans. Many of them are Medicaid managed care plans.

Once again, these numbers should be treated with caution given their aspirational nature for some of the organizations participating in the study. At the same time, some respondents did not provide any data for several fields, skewing some numbers down from their actual levels.

*HIO-to-HIO Exchange*
Statewide interoperability hinges on the adoption of mechanisms for robust HIO-to-HIO exchange, both between and across enterprise and community HIOs.

Where enterprises share a common EHR vendor, many will look to connect EHR-to-EHR using vendor hubs. Nevertheless, some enterprise organizations are forging alliances with community HIOs as a way to take advantage of economies of scale connecting to unaffiliated services such as local, regional and national laboratory and radiology services, emergency departments, clinics, registries and public health organizations in their medical trading area. Table 16 shows planned and potential enterprise-to-community HIO affiliations among organizations participating in this study.

**TABLE 16: ENTERPRISE TO COMMUNITY HIO AFFILIATION**

<table>
<thead>
<tr>
<th>Enterprise to Community HIO Affiliation</th>
<th>Planned Affiliations - Community HIOs</th>
<th>Possible Affiliations with Community HIOs (Same or adjacent geography)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dignity Health</td>
<td>NwHIN-on boarded HIOs</td>
<td>HSBA, EKCITA, Shasta, Redwood MedNet</td>
</tr>
<tr>
<td>Healthcare Partners</td>
<td>None</td>
<td>LANES, OCPHIO, IEHIE, RAIN</td>
</tr>
<tr>
<td>Hill Physicians</td>
<td>HSBA</td>
<td>EKCITA, Santa Cruz</td>
</tr>
<tr>
<td>Hoag</td>
<td>None</td>
<td>OCPHIO, LANES, IEHIE, SD Beacon</td>
</tr>
<tr>
<td>Huntington Hospital</td>
<td>None</td>
<td>LANES, RAIN</td>
</tr>
<tr>
<td>John Muir Health</td>
<td>HSBA</td>
<td>EKCITA</td>
</tr>
<tr>
<td>Kaiser Permanente</td>
<td>NwHIN on-boarded HIOs</td>
<td>Various</td>
</tr>
<tr>
<td>Marin Health Network</td>
<td>None</td>
<td>HSBA, Redwood MedNet</td>
</tr>
<tr>
<td>Memorial Care Health System</td>
<td>OCPHIO</td>
<td>SD Beacon, IEHIE</td>
</tr>
<tr>
<td>San Mateo Medical Center</td>
<td>None</td>
<td>HSBA, Santa Cruz HIE</td>
</tr>
<tr>
<td>Sharp HealthCare</td>
<td>SD Beacon</td>
<td>IEHIE, OCPHIO</td>
</tr>
<tr>
<td>St. Joseph Health</td>
<td>OCPHIO, NCHIN,</td>
<td>LANES, IEHIE, SD Beacon, CARhIN</td>
</tr>
</tbody>
</table>
Interviews revealed that smaller enterprises will begin to look at community HIOs as their only way to connect outside their infrastructures. This could help drive HIE adoption by smaller general hospitals, rural hospitals, and LTC/SNF facilities.

Community HIOs have plans to connect to other community HIOs as well, but progress has been slow as each organization is primarily focused on connecting with their own participants at this stage. Planned and potential affiliations are summarized in Table 17 below.

**TABLE 17: COMMUNITY TO COMMUNITY HIE AFFILIATION**

<table>
<thead>
<tr>
<th>Community to Community HIE Affiliation</th>
<th>Planned Affiliations</th>
<th>Affiliations to Consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAReHIN</td>
<td>OCHIN, UC Davis</td>
<td>Redwood MedNet</td>
</tr>
<tr>
<td>EKCITA (E. Kern County)</td>
<td>Tulare/Kings, IEHIE</td>
<td>RAIN</td>
</tr>
<tr>
<td>HealthShare Bay Area</td>
<td>None</td>
<td>Santa Cruz HIE</td>
</tr>
<tr>
<td>IEHIE</td>
<td>EKCITA</td>
<td>SD Beacon, OCPRHIO</td>
</tr>
<tr>
<td>LANES</td>
<td>None</td>
<td>OCPRHIO</td>
</tr>
<tr>
<td>NCHIN</td>
<td>Redwood MedNet</td>
<td>HSBA</td>
</tr>
<tr>
<td>OCPRHIO</td>
<td>None</td>
<td>LAMES, IEHIE, SD Beacon</td>
</tr>
<tr>
<td>RAIN Central Coast</td>
<td>None</td>
<td>RWMN</td>
</tr>
<tr>
<td>Redwood MedNet</td>
<td>NCHIN</td>
<td>HSBA, RAIN, CAReHIN, Shasta H.C.</td>
</tr>
<tr>
<td>Santa Cruz HIE/Physicians Medical Group SC</td>
<td>None</td>
<td>HSBA, EKCITA, RAIN</td>
</tr>
<tr>
<td>SD Beacon</td>
<td>Veterans Admin</td>
<td>IEHIE, OCPRHIO, EKCITA</td>
</tr>
<tr>
<td>Shasta Health Collaborative</td>
<td>Veterans Admin</td>
<td>Redwood MedNet</td>
</tr>
<tr>
<td>Tulare Kings FMC</td>
<td>IEHIE</td>
<td>EKCITA</td>
</tr>
</tbody>
</table>
Legal Framework

The legal framework for HIE causes the greatest concern among HIOs and prospective trading partners. Questions about liability and accuracy and how to deal with interstate exchange are common. How to reconcile differences between California and federal law is also a major point of confusion.

As Table 18 shows, of the responding community and enterprise HIOs, fewer than half have legal data sharing agreements in place as of February/March 2012, and a small number of those are standardized. Organizations, particularly enterprise HIOs, are relying on Business Associate Agreements defined under HIPAA and the HITECH Act of 2009.

<table>
<thead>
<tr>
<th>Question</th>
<th>Community HIEs</th>
<th>Enterprise HIEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your HIE have legal data sharing agreements in place?</td>
<td>5 Yes 6 No</td>
<td>5 Yes 6 No</td>
</tr>
<tr>
<td>Does your HIE have a standard agreement template?</td>
<td>4 Yes 7 No</td>
<td>1 Yes 10 No</td>
</tr>
</tbody>
</table>

For now, agreements appear to be negotiable between HIOs and new entrants to the exchange, thereby creating the impression that each agreement is customizable to individual participants. HIOs realize that the cost of establishing, maintaining, and negotiating agreements with individual stakeholders is expensive and duplicative.

The study found broad agreement that California HIOs would benefit from a central source of expertise, knowledge, and content to help focus agreements in a standard way. Many respondents stated that Cal eConnect should be the source of truth with regard to governance, legal frameworks, and issues surrounding privacy and security and patient consent. They are looking for a standard agreement template that ensures consistency of approach and purpose across all HIOs, and that eliminates loosely combining agreements from a variety of sources. Respondents also request that Cal eConnect provide guidance on how to evaluate partners to an agreement and exchange.
Technology

Findings suggest significant variance in the scope and approach to delivering information exchange. Many community HIOs begin by offering a web portal to access data in centralized or distributed HIO-managed repositories, and develop interfaces to deliver data into participants’ EHR systems in later phases. Others focus on results delivery from the start by developing interfaces directly to participants’ EHR systems, and others offer both a portal and results delivery. There is also significant variation in the types of transactions supported by different HIOs, which will be identified in more detail below.

Table 19 provides a general overview of the various planned and live technology solutions selected by community HIOs.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Vendor</th>
<th>Functionality</th>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAReHIN</td>
<td>Mirth</td>
<td>CONNECT/Interface Local data repository</td>
<td>Hybrid</td>
</tr>
<tr>
<td>EKCITA</td>
<td>Browsers of Pentaho</td>
<td>MPI/Longitudinal Health Record (CCD) Population Health</td>
<td>Hybrid</td>
</tr>
<tr>
<td>HealthShare Bay Area</td>
<td>TBD</td>
<td>MPI, CDR, RLS, Prov.Dir. (TBD)</td>
<td>TBD</td>
</tr>
<tr>
<td>IEHIE</td>
<td>Orion Health</td>
<td>Integrator/Clinical Portal/Aggregator/CDR/Prov Dir./Image viewer Secure messaging</td>
<td>Hybrid</td>
</tr>
<tr>
<td>LANES</td>
<td>Mirth IBM Initiate</td>
<td>CONNECT Interface MPI</td>
<td>TBD</td>
</tr>
<tr>
<td>NCHIN</td>
<td>Mirth IRIS</td>
<td>CONNECT Interface Referral engine</td>
<td>Federated</td>
</tr>
<tr>
<td>OCPRHIO</td>
<td>Mirth</td>
<td>MPI/RLS Aggregator, Results viewer</td>
<td>TBD</td>
</tr>
<tr>
<td>RAIN Central Coast</td>
<td>Mirth</td>
<td>CONNECT/Interface/Data Aggregator Secure messaging</td>
<td>Federated</td>
</tr>
<tr>
<td>Redwood MedNet</td>
<td>Mirth</td>
<td>CONNECT/Interface Match/MPI-CDR</td>
<td>Hybrid</td>
</tr>
</tbody>
</table>
*HIE systems range from centralized data repositories to federated arrangements with all patient data remaining on local participant systems. Most systems fall in the middle of this spectrum using a “hybrid” structure, with data stored centrally on proxy servers but with each participant organization controlling access to their data on these servers.

ASP and SaaS models are the dominant approach to service provision for community HIOs likely because these approaches provide lower ongoing costs and support a subscription revenue model.

Community HIOs have taken one of three main approaches to configuring their technology:

- Single strategic solution providing main HIE components. Examples include Browsersoft, Optum Insight, and Orion. Organizations rely on the vendor to ensure all priority capabilities are being supported including the need to build interfaces with other source and target systems.

- Selecting best of breed technologies to meet the key planned requirements. Building solutions in this way requires identifying core technologies and tends to support environments where there is a need for strong integration between disparate systems. Mirth is frequently cited as a core technology provider for interfacing/integration technology. IBM’s Initiate is cited as the most common EMPI technology.

- Relying on an EHR-based approach supporting exchange within a close community of organizations using the same EHR. Two examples are Epic users and eClinical Works users.

Delivery methods vary among solutions from a simple viewer or portal, a viewer with ability to consume selected data into an EHR, delivery of interfaced, cross-walked and/or structured data, and full interoperability with standardized and harmonized data.

Many community HIOs recognize the need for integration and interface support, with half either already using or planning to use an integration/interface engine. With the cost of custom interfaces seen as one of the major barriers to HIE
expansion, integration capabilities are essential and provide flexibility to support different messaging standards that may be required as HIOs develop.

The ability to uniquely and accurately identify patients is seen as a fundamental requirement for individual health care organizations and for organizations involved in HIE. Five of the 14 community HIOs (36%) cited use of Enterprise Master Patient Index (EMPI) technologies, while others said they have the technology embedded in other systems such as their EHR or HIE engine. Identifying the correct provider is also critical; five community HIOs said they had plans for a provider directory or were already using one.

**Enterprise HIOs**

Enterprise HIOs either build on their EHR’s exchange capabilities or procuring an HIE engine to drive their exchange.

Six of the enterprise HIOs (43%) are working with HIE engines. The main technologies are Optum Insight, dbMotion, Medicity, MobileMD, Interhealth, and RelayHealth. The other six enterprise HIOs are using their EHRs to facilitate exchange using an EHR Hub or Hub/HIE equivalent. These include NextGen and Epic. Sites using Epic are confident that they will be able to use Epic’s Care Everywhere as a means of exchanging data with other Epic sites. NextGen users will use the NextGen HIE as their exchange hub.

Integration technologies used by enterprise HIOs include Cloverleaf, Mirth, Apixio, Relay Health, Sybase, Biztalk, Forward Advantage, Atlas, and dbMotion. Some have separate MPI technologies such as Initiate and Optum Insight. **Table 20** below describes the technologies used or selected by enterprise HIOs.

**TABLE 20**: ENTERPRISE HIOs TECHNOLOGY SOLUTIONS

<table>
<thead>
<tr>
<th>Organization</th>
<th>Vendor</th>
<th>Functionality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dignity Health</td>
<td>Cerner, Mobile MD</td>
<td>EMR</td>
</tr>
<tr>
<td></td>
<td>MedSeek, Axway</td>
<td>Internal HIE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Patient portal</td>
</tr>
<tr>
<td>Healthcare Partners IPA</td>
<td>NextGen</td>
<td>EMR</td>
</tr>
<tr>
<td></td>
<td>Local</td>
<td>Clinical data repository</td>
</tr>
<tr>
<td>Hill Physicians</td>
<td>NextGen</td>
<td>EMR</td>
</tr>
<tr>
<td></td>
<td>Relay Health</td>
<td>MPI Interface (external)</td>
</tr>
<tr>
<td>Hoag Health System</td>
<td>Allscripts, Medicity</td>
<td>EMR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Novogrid (drop box/exchange)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proaccess (Longitudinal Health Record)</td>
</tr>
<tr>
<td>Hospital</td>
<td>Technology</td>
<td>Integration</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Huntington Hospital</td>
<td>Meditech dbMotion Initiate</td>
<td>EMR Integration, Virtual Health Record portal, Physician portal, CCR/CCD repository MPI</td>
</tr>
<tr>
<td>John Muir Health</td>
<td>Relay Health/ Cloverleaf</td>
<td>MPI/Integration</td>
</tr>
<tr>
<td>Kaiser Permanente</td>
<td>EPIC</td>
<td>EHR Care Everywhere</td>
</tr>
<tr>
<td>Marin Health Network</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Memorial Care Health System</td>
<td>EPIC NextGen Initiate</td>
<td>EHR EHR MPI</td>
</tr>
<tr>
<td>San Mateo Medical Center</td>
<td>Siemens eClinicalWorks Apixio</td>
<td>EHR Interface portal</td>
</tr>
<tr>
<td>Sharp HealthCare</td>
<td>dbMotion Initiate</td>
<td>EHR MPI</td>
</tr>
<tr>
<td>St. Joseph Health System</td>
<td>Meditech Forward Advantage Initiate Atlas Sybase</td>
<td>CCD exchange Data Express/Interface MPI Labworks interface Biztalk - Meditech/other integration</td>
</tr>
<tr>
<td>Sutter Health</td>
<td>EPIC Initiate RelayHealth</td>
<td>EHR MPI Interface (external)</td>
</tr>
<tr>
<td>UC Davis Health System</td>
<td>EPIC</td>
<td>EHR Interconnect interface</td>
</tr>
</tbody>
</table>

**Transaction Types and Meaningful Use**

Table 21 shows the counts of community and enterprise HIOs providing or planning to provide specific transactions, beginning with transaction types prioritized by ONC in Program Information Notices (PINs) to State HIE Cooperative Agreement awardees.
The most common exchange types either live or on HIOs’ 2012 roadmap at the time of data collection (February/March 2012) were lab and radiology results delivery, patient care summary exchange, and discharge summaries (ADT messages). Interestingly, there is a large increase in the number of both community and enterprise HIOs planning to offer patient-access Personal...
Health Records from 2012 to 2013, a development which would qualitatively change the nature of HIO engagement with patients.

The most significant divergence between community and enterprise HIOs emerges with public health reporting, with community HIOs planning to enable immunization and syndromic surveillance reporting to public health, and integration with disease registries, at a much higher rate.

**Data Standards**

Findings show a lack of consistency in the use of standards to support data exchange. This may be driven by a number of factors including choice of technology to support data exchange and the underlying technical platform implemented, the inability of applications to support specific standards, a historical preference for a specific standard (such as the support for using the CCR over the CCD or CDA standard), or reluctance to use a standard because of its fragility and the occasional need to use non-standard means to import or export data.

While a number of HIOs cited use of HL7, they did not specify the versions being used. In addition, HIOs raised issues about how internal data exchange may use different standards than external data exchange.

Of great concern is the inability of EHRs to receive data being sent from other systems, as well as a perceived unwillingness of vendors to cooperate in resolving the problem. Overcoming semantic interoperability was seen as critical to enabling the connection of disparate technologies and varied implementations of the same vendor solution.

HIOs expressed concerns about the fragility of CCD as a standard and the inability of EHRs to consume the CCD accurately, uniformly, and securely. Four community and four enterprise HIOs expressed commitment to the Continuity of Care Document (CCD) as their standard. One enterprise HIO referenced the Continuity of Care Record (CCR) as a current standard with a future expectation to commit to the Clinical Document Architecture (CDA). A small but important number of enterprise HIOs, in voicing concerns about the mandated standards, cited a preference to manage their data as discrete and structured data rather than in forms specified in document-based standards. It is their belief that this will enable more robust and trustworthy exchange than some of the emerging nationwide standards promoted by ONC.

Addressing the best way to rationalize standards is imperative if California is to have a proper roadmap toward exchanging health information across the state. HIOs would benefit from a source of authoritative advice and guidance on standards and expertise in building interfaces and integrations; Cal eConnect is cited as the logical source.
Guidance from a central, authoritative source appears needed on a wide range of topics including the importance of transitions of care data and how and when this should be exchanged, how the IHE guideline fits with other standards, the most appropriate standards for exchanging lab results, and reconciling different versions of HL7.

The more concern stakeholders have about the validity of a standard, the more they are likely to find work-arounds for that standard’s limitations. This has the potential to destabilize the trust fabric within which data is exchanged. A means of validating and incorporating changes to standards needs to be established so that exchanges can incorporate and learn from best practices.

**Interoperability Issues**

Many factors impact interoperability. Trust among trading partners and data quality concerns as described above certainly affect interoperability. Currently, the proliferation of electronic systems requires development of many interfaces to exchange data. Every time a change is made to a system, corresponding changes need to be made to the interfaces, adding significant time and expense. Further, systems that predate the introduction of data standards and are still critical to an organization’s ability to provide health care will need unique approaches to be integrated into local and regional exchanges.

A number of respondents cite the difference in clinical terminologies between systems and organizations as the biggest barrier to successful information exchange. A few HIOs have adopted technology that supports semantic harmonization and the use of a robust ontology to underpin clinical concepts and consistent terminology, but they are concerned about the ability to handle the import from and export to exchanges that are not similarly equipped.

As a precursor to more robust integration, some HIOs are enabling exchange through portal technology on a query-only basis. The exchange of data by query can create the possibility of too much data being made available unless appropriate filters are applied to ensure relevance, accuracy, and appropriateness. This can be a major issue when consuming data into third party EHRs. Some exchanges have adopted a strategy around a centralized repository that will allow more effective data harmonization and standardization, but requires agreement among stakeholders.

Although there was limited inter-HIO exchange at the time of research, organizations that anticipate such exchange envision using NwHIN Exchange specifications to facilitate it. But many also feel they need guidance on how NwHIN should be used at both the local, regional, and state level to facilitate exchange, suggesting Cal eConnect as the resource for assistance.

Respondents also suggested that Cal eConnect consider establishing a team to address more cost-effective development of interfaces and integration on behalf of stakeholders and to advise on how data can be mapped, understood,
and harmonized in local organizations. As community HIOs develop interfaces to disparate EHRs and HIE technologies, one way to exponentially increase connections and exchange would be to make interfaces public domain (especially among organizations granted ONC State HIE Cooperative Agreement funds) and share them among other initiatives to reduce duplication of development efforts.

**Financial Strategies and Sustainability**

Long-term financial sustainability for HIE is a major objective for the ONC, the state, and organizations across California. Enterprise and community HIOs face different opportunities and challenges in the emerging market for HIE services.

**Enterprise HIOs**

Large enterprises are primarily funding their exchange initiatives with operating budget and capital investment funds. The expectation for sustainability is based on improved quality and efficiency, operational efficiency gains, reduction of errors leading to unpaid care, and enhanced revenue from pay for performance programs. Additional benefits include improved relationships with affiliated providers, as well as increased patient retention. Enterprise HIOs are being driven by initiatives such as Accountable Care Organizations (ACOs), Patient Centered Medical Homes, and Pay for Performance, all of which require better access to data. Enterprise initiatives are considering the benefits of collaborating with other HIE efforts that operate in their medical trading areas to take advantage of connections with unaffiliated providers, labs and other participants in community exchange.

**Community HIOs**

Most community HIOs are still not fully operational, and remain uncertain about the revenue models best suited for their organizations over time. In fact, many community HIOs are heavily reliant on grant funds as their primary revenue source, and their long-term ability to keep costs below revenues remains unknown. Quantifying the return on investment for participation in HIE also remains difficult, hampering HIOs’ recruitment of new members. Payers, aside from Medicaid Managed Care Plans, represent a critical missing revenue stream for most community HIOs given that they benefit substantially from improvements in care quality and efficiency.

Beyond grant funds, the most used revenue model is the participation model, which includes a sliding scale of fees for implementation, interface, basic HIE services and menu-based services.
TABLE 22: COMMUNITY HIO EXPECTED FUNDING SOURCES THROUGH 2013

<table>
<thead>
<tr>
<th>Revenue Type(s)</th>
<th>#</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>None budgeted</td>
<td>1</td>
<td>Shasta Health Collaborative (MSO)</td>
</tr>
<tr>
<td>Grants Only</td>
<td>4</td>
<td>CAReHIN, OCPRHIO, SD Beacon, Tulare/Kings</td>
</tr>
<tr>
<td>Grants + Fees</td>
<td>4</td>
<td>EKCITA, HSBA, LANES, Redwood MedNet</td>
</tr>
<tr>
<td>Fee only</td>
<td>2</td>
<td>IEHIE, Santa Cruz</td>
</tr>
<tr>
<td>Other Support</td>
<td>2</td>
<td>NCHIN, RAIN</td>
</tr>
</tbody>
</table>

Of the 13 community HIOs, eight have no specific revenue model determined or approved; one has the model determined, but the exchange is not currently exchanging data; four have operational revenue models, one of which is based on telemedicine data exchange and one on MCO development only. Regardless, the clear majority of HIOs project shifting to some form of a fee-based revenue model by 2014, as seen in the table below.

TABLE 23: COMMUNITY HIO EXPECTED FEE REVENUE THROUGH 2013

<table>
<thead>
<tr>
<th>Expected Fee Revenue</th>
<th>#</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>4</td>
<td>IEHIE, Redwood MedNet, RAIN, Santa Cruz</td>
</tr>
<tr>
<td>2012</td>
<td>6</td>
<td>EKCITA, HSBA</td>
</tr>
<tr>
<td>2013</td>
<td>7</td>
<td>LANES</td>
</tr>
<tr>
<td>2014</td>
<td>11</td>
<td>CAReHIN, NCHIN, OCPRHIO, SD Beacon</td>
</tr>
</tbody>
</table>

Some HIOs have had success in moving implementations forward by having participating organizations make an initial investment for startup operating costs. The benefit is that the earlier the actual HIO can go live the sooner maintenance/subscription fees can be billed. These initiatives often provide discounted or waived subscription fees in years one and/or two of operation in exchange for the investment. These investments have been used by one organization to obtain better pricing for software licenses and interfaces. Another approach is the use of SaaS or ASP solutions in order to enable implementation sooner and mitigate some specific risks related to security and disaster recovery.

Other HIOs, mostly those focused on the underserved or White Space, provide participation incentives or discount fees such as a “one free interface,” typically using grant funds to cover the development costs. Regardless, a sliding fee scale is used based on the type and size of the stakeholder organization and whether it is a public or private entity. Fees typically are tiered at specific
threshold levels based on number of beds or number of physicians in an office or IPA, etc.

IEHIE and HealthShare Bay Area are using tiered revenue models based on tiered governance. The IEHIE model, for instance, provides for a “Leadership Council” that carries voting rights and preferential implementation sequencing in exchange for a substantially higher annual fee. Membership fees make up the second tier, which encompass the “Advisory” and “Operating” committees. Finally, all participants using services pay subscription, maintenance, transaction, training and other value-based fees, where applicable.

Some HIOs are charging other fees for value-added services such as consulting and technology hosting in addition to standard subscription, maintenance, and implementation fees. A few organizations plan to provide analytics services for a fee in the future, as well. Others plan to negotiate revenue sharing arrangements with participants based on exchange-related improvements achieved in various pay-for-performance programs.

Some of the more established community HIOs are beginning to franchise their technology by serving as HIE Service Providers to other HIOs in adjacent geographies, shared medical trading areas, or directly to enterprise organizations themselves (to develop and manage their internal enterprise HIE). This could lead to increased adoption and potentially consolidation of initiatives, and represents the sort of evolution in the market for HIE services that we should expect to emerge in this creative, dynamic environment.

1.8.3 E-PRESCRIBING

Increased electronic processing of prescriptions is driven by prescriber and pharmacy adoption of e-prescribing. In order for e-prescribing to be a success, practices and pharmacies need to be prepared.

Table 24 displays data on e-prescribing adoption in California from 2007 to 2010. Surescripts statistics are used as the main source of data for each year in the table; the second column for 2010 combines data from Surescripts, Kaiser Permanente, and Veterans Affairs, and provides a more accurate representation of the full extent of e-prescribing adoption in California.

California denominators used to calculate the 2010 measures are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office-based physicians:</td>
<td>Approximately 78,000</td>
</tr>
<tr>
<td>Patients:</td>
<td>Approximately 38 million</td>
</tr>
<tr>
<td>Pharmacies:</td>
<td>Approximately 5,465</td>
</tr>
</tbody>
</table>
TABLE 24: E-PRESCRIBING ADOPTION IN CALIFORNIA

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ADOPTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Physicians Electronically Routing Prescriptions</td>
<td>3%</td>
<td>6%</td>
<td>13%</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
</tr>
<tr>
<td>% of Patients with Available Prescription Benefit Information</td>
<td>37%</td>
<td>40%</td>
<td>47%</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>72%</td>
</tr>
<tr>
<td>% of Patients with Available Prescription Histories</td>
<td>N/A</td>
<td>40%</td>
<td>47%</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>72%</td>
</tr>
<tr>
<td>% of Total Community Pharmacies Activated for e-prescribing</td>
<td>72%</td>
<td>74%</td>
<td>86%</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>90%</td>
</tr>
<tr>
<td>% of Independent Pharmacies Activated for e-prescribing</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75%</td>
</tr>
</tbody>
</table>

*Data from Surescripts, Kaiser Permanente, and the Department of Veterans Affairs

Adoption among Prescribers
Currently, there is an estimated 26,000 electronic prescribers in California enabled through the Surescripts network. In 2010, approximately 18,000 were enabled through Surescripts; 23% of those physicians routed prescriptions electronically (Table 24). According to aggregated data from Surescripts, Kaiser Permanente, and the Veterans Affairs, the total percentage of physicians e-prescribing at the end of the 2010 was slightly higher at 25%.
Adoption among Pharmacies

Community Pharmacies
According to Surescripts, community pharmacies include all pharmacies self-reporting a pharmacy class of "chain," "franchise," or "independent," and a dispenser type of "retail," "HMO pharmacy," "mail order," "clinic pharmacy," "specialty pharmacy," or "unknown." In 2009, 86% of California’s 5,241 community pharmacies were connected for e-prescribing. This percentage dropped to 81% in 2010, which is either due to a greater decrease in connected pharmacies or a greater increase in total community pharmacies in California compared to the previous year.

Chain Pharmacies
California is home to 3,402 chain pharmacies.\textsuperscript{12} A chain pharmacy is defined as being part of a chain of four or more pharmacies operating in a retail setting

other than in supermarkets or mass merchandise stores. Chain pharmacies have more robust technical support for addressing e-prescribing barriers compared to independent pharmacies. According to Surescripts, Siskiyou and Trinity Counties have 60-70% connected community pharmacies. Alpine County does not have any pharmacies enabled through Surescripts. The remaining counties in California have 70% or more of their community pharmacies connected. With the exception of Alpine County, prescribers have access to at least one connected community pharmacy in every county in California.

**Independent Pharmacies**

There are 1,817 independent pharmacies in California, which are defined as pharmacies that operate in retail settings and are owned by a company with three or fewer pharmacies. Modoc, Lassen, and Mono Counties are among the counties with the highest percentage (90% -100%) of connected community pharmacies, but have the lowest percentage (50%-60%) of connected independent pharmacies (Figure 13). Since pharmacies are generally not incentivized to adopt e-prescribing processes, the lack of pharmacy adoption among independent pharmacies is likely due to the workflow changes and financial barriers associated with implementation. This could have potential implications on the ability for prescribers to send electronic prescriptions to these non-connected pharmacies.

Adoption gaps have been identified for counties with less than 70% connected independent pharmacies, which includes Modoc, Lassen, Siskiyou, Trinity, Tehama, Glenn, Napa, Solano, Sacramento, El Dorado, Amador, San Joaquin, Alpine, Mono, Merced, Madera, Santa Barbara and Kings counties.

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FIGURE 12: PERCENTAGE OF TOTAL E-PRESCRIBING PHARMACIES BY COUNTY IN CALIFORNIA
FIGURE 13: PERCENTAGE OF CONNECTED INDEPENDENT PHARMACIES BY COUNTY IN CALIFORNIA
E-prescribing Utilization

Physician adoption of e-prescribing does not guarantee that individual physicians will routinely use the technology, according to a national study from the Center for Studying Health System Change (HSC).14

Table 25 shows utilization statistics for physicians and pharmacies in California enabled through the Surescripts network. Unlike adoption statistics above, we were unable to obtain additional 2010 data from Kaiser Permanente or Veterans Affairs.

**TABLE 25: E-PRESCRIBING UTILIZATION**

<table>
<thead>
<tr>
<th>METRICS</th>
<th>YE2007 Surescripts</th>
<th>YE2008 Surescripts</th>
<th>YE2009 Surescripts</th>
<th>YE2010 Surescripts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UTILIZATION</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total eligible prescriptions Routed Electronically</td>
<td>1.44%</td>
<td>3.28%</td>
<td>9%</td>
<td>16%</td>
</tr>
<tr>
<td>% of Patient Visits with a Prescription Benefit Request</td>
<td>2.10%</td>
<td>2.93%</td>
<td>12%</td>
<td>18%</td>
</tr>
<tr>
<td>% of Patient Visits with a Medication History Response</td>
<td>0.50%</td>
<td>1.37%</td>
<td>1.72%</td>
<td>10%</td>
</tr>
</tbody>
</table>

*Data from Surescripts

Electronic Routing of Eligible Prescriptions among Physicians

While the majority of community pharmacies are activated or connected for e-prescribing in California, only 16% of eligible prescriptions are routed electronically by 25% of physicians.

The electronic routing of eligible prescriptions does not include controlled substances, which were not eligible for e-prescribing under 2009 Drug Enforcement Administration (DEA) regulations. While year-to-year increases in the percentage of total eligible prescriptions routed electronically in California are high, these figures remain low and are below national percentages.

The overall percent of eligible prescriptions being routed electronically is lower in California than nationally. However, those who are e-prescribing are doing it

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at a similar rate compared to national averages. In August 2011, 71% of e-prescribers in California sent more than 20 prescriptions that month, which is comparable to the national percentage (Figure 14).

**FIGURE 14: E-PRESCRIBERS USING AN EHR BY VOLUME OF E-PRESCRIPTIONS**

![Pie chart showing e-prescribers sending 20 or more prescriptions and fewer than 20 prescriptions in August 2011](image)

- E-prescribers sending 20 or more e-prescriptions in August 2011: 29.3%
- E-prescribers sending fewer than 20 e-prescriptions in August 2011: 70.7%
- Nationwide: 29.1%
- 70.9%

* Data from Surescripts

**Electronic Routing of New Prescriptions vs. Renewal Requests**

Over two million new prescriptions were routed electronically. This is compared to approximately 900,000 renewal requests in California, which was comparable to the national percentage. Several studies reveal that the electronic renewal process is a major challenge in e-prescribing. Unlike new prescriptions, renewal requests involve bidirectional communication between the prescriber and pharmacist. In order to complete the electronic renewal request process, the pharmacist must identify and locate the original prescriber and obtain the renewed prescription. **Figure 15** shows the proportion of incoming orders that are new electronic prescriptions versus electronic renewal requests in August 2011.
In the future, Agency plans on gather data on electronic renewal requests versus total prescription requests (electronic, phone, fax, etc.) or electronic renewal responses versus electronic renewal requests.

**Benefit Information and Medication History among Physicians**

While most patients have prescription benefit information and medication histories available from their health plans, the utilization of this information at the point-of-care is low. Only 18% of patient visits to e-prescribers involved a prescription benefit request and only 10% involved a medication history response. This number increased to 18% in 2010 from 2.1% in 2007.

This data, which did not include Kaiser Permanente and Veterans Affairs, was low compared to the 30% of requests on a national level. The percentage of patient visits with medication history responses was even lower on an annual basis. Among the prescription benefit requests made, responses were even lower compared to the percentage of requests made. These low numbers may be attributed to the lack of availability of this information and knowledge among prescribers that the feature exists in their stand-alone e-prescribing system or EHR.

**E-prescribing Utilization among Community Pharmacies**

Although the high percentage of e-prescribing enabled community pharmacies continues to increase on an annual basis, not all of them are actively e-
prescribing. The percentage of active community pharmacies, which means they receive electronic prescriptions, is below the national percentage of active pharmacies.

The percentage of community pharmacies connected increased from 75.7% in 2008 to 90.1% in 2011. These percentages were high and comparable to those at a national level (Figure 16). Although the percentages of active community pharmacies were consistently lower than those of connected community pharmacies, the gap is closing.

**FIGURE 16: PERCENT OF COMMUNITY PHARMACIES ENABLED TO E-PRESCRIBE AND ACTIVELY E-PRESCRIBING ON THE SURESRIPTS NETWORK**

* Data from Surescripts
** Note: Denominator of pharmacies is provided to Surescripts by the National Council for Prescription Drug Programs and includes all pharmacies self-reporting a pharmacy class of "chain," "franchise," or "independent," and a dispenser type of "retail," "HMO pharmacy," "mail order," "clinic pharmacy," "specialty pharmacy," or "unknown."

**Percentage of Covered Lives by County**

What are the county level percentages of covered lives in California? Data from 2010 provided by Surescripts, Kaiser Permanente, and Veterans Affairs (Figure
reveals the counties with the highest and lowest percentages of lives covered.

**FIGURE 17: COUNTY LEVEL POPULATION AND ADOPTION OF E-PRESCRIBING IN JUNE 2010**

Sacramento, San Jose, Tulare, San Bernardino, and Riverside Counties were among those with high percentages (approx. 70% - 100%) of covered lives. Regions in northern California, including Del Norte, Modoc, and Humboldt Counties, had low percentages of covered lives, approximately less than 50%. It is important to note that the percentage of patients with benefit information may be low in counties with a low percentage of covered lives.

Forty-five out of fifty-eight counties in California have less than 70% of patients covered by a third-party payer. Therefore, a significant number of patients don’t have prescription benefit information and medication histories available at the point-of-care.

**Medi-Cal Providers and Pharmacies**

It’s been challenging to obtain e-prescribing data specific to Medi-Cal. Though the ONC has worked with Surescripts to obtain e-prescribing connectivity and
utilization data for California's providers and pharmacies, the data cannot be easily linked to Medi-Cal claims data. To correct this, OHIT and Agency have requested that the ONC work with Surescripts to provide an NPI field in the standard dataset to states in order to link the Surescripts data to Medi-Cal data. Several other states have made a similar request.

Some data does exist. By matching Surescripts subscribers against Medi-Cal provider files with an algorithm using name, address, phone number and other factors, DHCS has determined that in 2010 approximately 9.3% of Medi-Cal providers were connected for e-prescribing. This is somewhat lower than the 11.3% of all providers in California reported by Surescripts in 2009. (Surescripts data does not include Kaiser Permanente and the Veterans Administration, two large healthcare delivery systems that are fully electronic.)

Medi-Cal providers connected to Surescripts represent only 5% of Medi-Cal's prescription claims volume for 2010. At least two variables may affect the validity of this data: 1) the estimated accuracy rate of provider information is 80% at best relative to pharmacy claims; and 2) not all of the prescriptions from the providers will be sent electronically. Also, it should be noted that being Surescripts certified does not ensure actual use.

The following table shows e-prescribing utilization and the Medi-Cal patient to provider ratios in the state by region:

**TABLE 26: E-PRESCRIBING UTILIZATION AND PATIENT/PROVIDER RATIOS**

<table>
<thead>
<tr>
<th>Region</th>
<th>Population</th>
<th>% of e-Prescribing Providers</th>
<th>Medi-Cal Population</th>
<th>% of e-Prescribing Medi-Cal Providers</th>
<th>Medi-Cal Patient: Provider Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northern Sierra¹</td>
<td>485,836</td>
<td>24.5%</td>
<td>44,883</td>
<td>23%</td>
<td>50</td>
</tr>
<tr>
<td>Sacramento</td>
<td>1,422,789</td>
<td>43.2%</td>
<td>64,355</td>
<td>17%</td>
<td>18</td>
</tr>
<tr>
<td>San Francisco</td>
<td>810,078</td>
<td>8.1%</td>
<td>45,859</td>
<td>18%</td>
<td>63</td>
</tr>
<tr>
<td>Silicon Valley²</td>
<td>2,541,407</td>
<td>16.1%</td>
<td>59,616</td>
<td>13%</td>
<td>22</td>
</tr>
<tr>
<td>Central Valley³</td>
<td>1,281,545</td>
<td>13.3%</td>
<td>57,089</td>
<td>7%</td>
<td>56</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>10,385,372</td>
<td>8.3%</td>
<td>502,716</td>
<td>7%</td>
<td>50</td>
</tr>
<tr>
<td>Inland Empire⁴</td>
<td>4,215,536</td>
<td>10.2%</td>
<td>142,568</td>
<td>6%</td>
<td>106</td>
</tr>
<tr>
<td>Orange</td>
<td>3,152,642</td>
<td>18.3%</td>
<td>52,340</td>
<td>10%</td>
<td>17</td>
</tr>
<tr>
<td>San Diego</td>
<td>3,138,382</td>
<td>21.8%</td>
<td>89,932</td>
<td>17%</td>
<td>24</td>
</tr>
</tbody>
</table>

¹Northern Sierra: Siskiyou, Modoc, Shasta, Trinity, Lassen, Tehama, Plumas, Sierra, Nevada Counties
²Silicon Valley: San Mateo and Santa Clara Counties
³Central Valley: Kern and Tulare Counties
⁴Inland Empire: Riverside and San Bernardino Counties
Currently, the Medi-Cal patient-to-provider ratio is very high in certain regions of California, mainly the Inland Empire, San Francisco County, the Central Valley, Los Angeles County, and the Northern Sierra. These counties make up 62% of the Medi-Cal population. With the exception of the Northern Sierra region, these areas also have the lowest percentage of e-prescribing providers in all of California.

In 2006, the L.A. Care Health Plan implemented a pilot project among Medi-Cal providers in Los Angeles County. With the project in place, over 60,000 prescriptions were sent electronically during the one-year trial period. Interestingly, safety net providers had higher adoption and implementation rates than small or solo practice providers. The current data indicates that activities to promote the adoption of e-prescribing in Los Angeles County should continue through the Medi-Cal EHR Incentive Program efforts.

**Participating Medi-Cal Pharmacies and e-Prescribing Connectivity**

Medi-Cal pharmacies, particularly independent pharmacies, have a low rate of connectivity (Figure 18). The Silicon Valley has the fewest number of connected pharmacies overall, including the largest number of independent pharmacies that are not connected to receive e-prescriptions. Orange County and Los Angeles ranked right behind the Silicon Valley in terms of having the fewest number of connected pharmacies and the highest number of independent pharmacies not connected to receive e-prescriptions. A focus on getting these independent pharmacies connected will be vital for the successful transmission of e-prescriptions.

**FIGURE 18: E-PRESCRIBING CONNECTIVITY OF MEDI-CAL PHARMACIES**

*Above data represents the 25 highest Medi-Cal volume pharmacies in each of the nine regions*
Roughly 50% of Medi-Cal's participating pharmacies are independents as opposed to chain pharmacies. While 97% of retail pharmacies affiliated with large chains are connected to Surescripts, only 62% of independent pharmacies are connected. The relatively low rate of connection of independent pharmacies to e-prescribing is an area of particular concern for DHCS because of the relatively high number of Medi-Cal beneficiaries served by these pharmacies. Understanding their needs will be a priority for DHCS.

**Barriers to E-prescribing Connectivity and Utilization**

In June and July 2012, the Agency conducted a survey of 100 independent pharmacies with the highest volume of Medi-Cal claims to study the perceived barriers and benefits of e-prescribing implementation and utilization. This report looked at the perceived barriers faced by independent pharmacies and assessed their need for assistance in implementing and actively using e-prescribing. The survey further explored what the state could do, in the opinion of independent pharmacy managers, to help diminish the perceived barriers. The survey process allowed for open discussion for independent pharmacies to voice the barriers and concerns faced during implementation and utilization. The rate of response to the survey is below:

**E-prescribing Implementation in High Medi-Cal Volume Independent Pharmacies**

<table>
<thead>
<tr>
<th>Total Response Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of contacted pharmacies</td>
</tr>
<tr>
<td>Completed Surveys</td>
</tr>
<tr>
<td>Incomplete Surveys</td>
</tr>
<tr>
<td>No response/Disconnected</td>
</tr>
</tbody>
</table>

The survey revealed the top barriers to e-prescribing implementation and utilization involved costs and lack of technical assistance. Many pharmacists did not feel technologically prepared to take on the processes of continual electronic communication and to tackle the technical dilemmas presented during the workday. Independent pharmacies require more training and technical assistance than the initial training provided by software vendors. The problems faced on a daily-basis were a hindrance to implementation and continual utilization of e-prescribing technology. Below are the highest rated perceived barriers to e-prescribing implementation from all survey responses:

**Top 5 Barriers to Implementation and Utilization of e-Prescribing**

1. Costs to implement the new system
2. Costs to upgrade system
3. Cost of transaction fees
4. E-prescribing network costs
5. Lack of technical expertise
The results obtained by this survey demonstrate that the major hurdles barring independent pharmacies from adopting ePrescribing are financial and technical in nature. The Agency and CHeQ will use these findings to guide the development of future e-prescribing support programs for independent pharmacies, which will address both financial and technical concerns.

1.8.4 ELECTRONIC LABORATORY REPORTING

Under the Final Rule for the EHR Incentive Program, EHs and EPs will be required to incorporate more than 40% of lab test results into their EHRs as structured data. In addition, hospitals will be required to provide electronic submission of reportable lab results to public health agencies. These requirements represent some of the biggest challenges for ambulatory providers and hospitals to attaining meaningful use.

2012 Lab Survey

From April-June 2012, the California Health and Human Services Agency (CHHS) partnered with Cal eConnect to survey all hospital and independent laboratories in California to gain a better understanding of laboratory capacity for electronic transmittal of lab results to health care providers in the state.

The purpose of this assessment was twofold:

1) Establish a more robust understanding of California’s hospital and independent laboratories’ capacity for electronic transmittal of structured lab results to health care providers and to provide a benchmark for which to measure progress and improvement moving forward.

2) Satisfy ONC’s directive as outlined in the State HIE Cooperative Agreement Program Information Notice, ONC-PIN-HIE-002, instructing states to track the progress of their health information exchange-enabling efforts in key program priority areas related to Meaningful Use. Tracking progress includes setting annual goals and reporting annually on progress for specific measures. Enabling providers to receive structured lab results is one of the ONC priority areas outlined in both ONC-HIE-PIN 001 and ONC-HIE-PIN-002. Specific electronic lab results measures outlined by ONC to track annually include:

- Percent of hospital and independent labs sending electronic lab results to providers in a structured format
- Percent of hospital and independent labs sending electronic lab results to providers using LOINC (Logical Observation Identifiers Names and Codes) terminology standards
CHHS aims to ensure that every health care provider in the state has an option to receive clinical laboratory results electronically, in a structured format.

Methodology

The lab survey report presents data obtained from a sample of hospital and independent laboratories in California that voluntarily chose to complete the 2012 California laboratory survey. Laboratory contact information was obtained through the CMS CLIA Online Survey, Certification and Reporting (OSCAR) database. The Clinical Laboratory Improvement Amendments (CLIA) laboratory demographics file is populated with data queried from the CMS CLIA OSCAR database and updated on a weekly basis. The OSCAR database provides a listing of all clinical laboratory locations by state and includes contact information (addresses and telephone numbers) for each lab. Information on all hospital and independent labs in California was downloaded on March 28, 2012, organized and merged with additional contact information from CDPH that included email addresses for a portion of eligible laboratories.

Our total sample consisted of 1,220 California labs; 692 hospital labs and 528 independent labs. The section on response rates below further describes the number of completed surveys included in this analysis.

Data Collection

Through a competitive bid process Granite Solutions, Inc. was engaged to administer the 2012 California laboratory survey which was based on survey questions provided by ONC (see appendix for survey instrument). Data was collected between May 18, 2012 and June 14, 2012 and an attempt was made to contact each of the 1,220 labs on the sample list. Surveys were sent to specific individuals based on telephone contact. Depending on the lab contact’s preference, surveys were sent either via online survey tool, fax, or e-mail PDF.

Response Rate

Granite Solutions, Inc. successfully sent surveys to 815 lab directors or 67% of the overall sample. These surveys were sent to 421 hospital labs and 394 independent labs.

- 193/421 (46%) hospital labs returned completed surveys
- 126/394 (32%) independent labs returned completed surveys

In total, 319/815 or 39% of labs that received a survey returned a completed survey. Considering all 1,220 labs obtained through the OSCAR database, Granite Solutions, Inc. was able to obtain an overall response rate of 26% (319/1,220) in the short time frame provided to collect data.
Limitations

It is important to note the following:

- Data in this report are self-reported and cannot be verified.
- The tight timeframe of less than one month provided to contact and collect data from 1,220 labs most likely impacted and reduced the overall response rate.
- Primary survey questions did not ask about electronic capabilities of labs overall, instead the questions were more narrow and focused specifically on the ability of labs to send lab results electronically to providers outside of their organizations during the calendar year 2011. This narrow wording prohibits us from understanding the full spectrum of electronic capabilities for each organization.
- Labs that service a specific group or network of physicians (such as Kaiser) did not feel the survey was relevant to them since they do not send electronic results to ambulatory providers outside their organizations. Similarly, hospital labs performing inpatient laboratory work felt the survey did not apply to them and declined.
- Several labs working under a CLIA waiver did not feel it necessary to respond since as defined by CLIA, they are only performing “simple laboratory examinations and procedures that have an insignificant risk of an erroneous result.”

Descriptive Characteristics of Survey Respondents

Before considering the results of the survey, it is important to have an understanding of some of the characteristics of the laboratories that chose to complete the survey. This section provides descriptive information of the types of lab that responded to the survey, their location in the state and their size as determined by the number of billable tests processed annually.

Type of Lab

Approximately two-thirds of the 319 labs that completed the survey are hospital labs (61%) and a little more than one-third are independent labs (39%).
Hospital labs mainly identify as being affiliated or owned by a hospital or health system (164/193, 86%), with a small percentage (29, 14%) identifying as University/Academic Centers or County owned facilities. Most independent labs identify as privately owned commercial labs (100/126, 79%), while a minority (26, 21%) describe their entities as reference or specialty labs.

Size of Lab

**Almost half (48%) of the labs in this analysis are very low volume labs that processed fewer than 100,000 billable lab tests in 2011.** Of the remaining 52% of labs that completed the survey, 16% or 51 are very large labs that processed 1 million+ lab tests in 2011, while the remaining 36% of labs processed anywhere from 100,000 to under a million tests from ambulatory providers in 2011.
Location of Lab

Survey results capture information from labs in 46 of California’s 58 counties or 79% of counties statewide. As indicated in the table below, almost two-thirds of labs that completed a survey (63%) are located in Southern California with less representation from labs in central or northern California counties.

Labs by Region (n=317)

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern CA</td>
<td>200</td>
<td>63%</td>
</tr>
<tr>
<td>Northern CA</td>
<td>85</td>
<td>27%</td>
</tr>
<tr>
<td>Central CA</td>
<td>32</td>
<td>10%</td>
</tr>
</tbody>
</table>
In addition, as displayed on the map below, it’s important to note that most labs that chose to complete a survey are located in urban areas around the state - 30% in Los Angeles, 15% in the Bay Area, 11% in Orange County and 8% in San Diego.

Results

Electronic Capabilities

Thirty-three percent (105) of surveyed labs report transmitting electronic lab results in a structured format to ambulatory providers outside their organization in 2011.
Electronic lab results were generally sent to a provider’s web portal for viewing and/or download, rather than delivered directly to an EHR.

- Web portals - Altogether, 89 or 86% of surveyed labs estimate that 75%+ of final electronic lab results were sent to provider web portals for either download or view (slightly more labs sent results to a web portal for viewing (53%) vs. download (34%)) in 2011.

- EHRs - Only 17 or 16.5% of surveyed labs estimate that 75%+ of final electronic lab results were delivered to EHRs. Almost half (45 or 44%), estimate that under 25% of final lab results were delivered to EHRs in 2011.

### Number of labs sending final lab results to Electronic Health Records (EHRs) and web portals, by percent of lab results (n=103)

<table>
<thead>
<tr>
<th></th>
<th>0%</th>
<th>1-24%</th>
<th>25-74%</th>
<th>75-99%</th>
<th>100%</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic delivery to EHR</td>
<td>17</td>
<td>45</td>
<td>18</td>
<td>9</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Available for download from web portal</td>
<td>24</td>
<td>16</td>
<td>10</td>
<td>14</td>
<td>21</td>
<td>9</td>
</tr>
<tr>
<td>Available for viewing on web portal</td>
<td>16</td>
<td>15</td>
<td>12</td>
<td>29</td>
<td>25</td>
<td>6</td>
</tr>
</tbody>
</table>

### By Region

While the sample of laboratories was largest in Southern California and urban areas, location does not seem to determine current electronic
capabilities of labs. As indicated in the table below, about the same percentage of labs surveyed in each region report sending electronic lab results in a structured format to ambulatory providers outside their organization in 2011. Statewide and by region, about one-third of labs surveyed sent results to providers electronically in 2011.

Percent of labs sending results electronically in a structured format to ambulatory providers outside their organization in 2011, by Region (n=317)

<table>
<thead>
<tr>
<th>Region</th>
<th># sending electronically</th>
<th># surveyed in Location</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southern CA</td>
<td>63</td>
<td>200</td>
<td>32%</td>
</tr>
<tr>
<td>Northern CA</td>
<td>29</td>
<td>85</td>
<td>34%</td>
</tr>
<tr>
<td>Central CA</td>
<td>13</td>
<td>32</td>
<td>41%</td>
</tr>
<tr>
<td>Total Statewide</td>
<td>105</td>
<td>317</td>
<td>33%</td>
</tr>
</tbody>
</table>
**By Lab Type**

There is minimal variation in the percentage of hospital labs versus independent labs that report sending electronic lab results in a structured format to ambulatory providers outside their organizations in 2011. As indicated in the side-by-side tables below, about one-third of hospital labs (34%) and one-third of independent labs (32%) that completed the survey report sending electronic lab results to providers outside their organizations in 2011.

<table>
<thead>
<tr>
<th>Percent of Hospital labs sending electronic lab results in a structured format to ambulatory providers outside their organization in 2011 (n=193)</th>
<th>Percent of Independent labs sending electronic lab results in a structured format to ambulatory providers outside their organization in 2011 (n=126)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td>62% (120)</td>
<td>34% (65)</td>
</tr>
</tbody>
</table>

**By Volume**

The data indicate evidence of an association between lab size and electronic capability of a laboratory to send results in a structured format to ambulatory providers outside a laboratory’s organization. As shown in the table below, the larger the lab, the more likely they are to send results electronically in a structured format to ambulatory providers outside their organizations in 2011. Sixty-five percent of labs that estimate 1,000,000+ billable tests from ambulatory providers in 2011 report sending results electronically in 2011 compared to only 17% of labs that estimate less than 100,000 billable tests.

**Percent of labs sending results electronically in a structured format to ambulatory providers outside their organization in 2011, by volume of tests received by ambulatory providers in 2011**

<table>
<thead>
<tr>
<th>Volume of Tests</th>
<th># labs sending electronically (n=102)</th>
<th>Total # surveyed (n=312)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,000,000+ billable tests</td>
<td>33</td>
<td>51</td>
<td>65%</td>
</tr>
<tr>
<td>500,000 - 999,999 billable tests</td>
<td>20</td>
<td>40</td>
<td>50%</td>
</tr>
<tr>
<td>100,000 - 499,999 billable tests</td>
<td>24</td>
<td>71</td>
<td>34%</td>
</tr>
<tr>
<td>&gt;100,000 billable tests</td>
<td>25</td>
<td>150</td>
<td>17%</td>
</tr>
</tbody>
</table>
Standards

LOINC

Only a small fraction of labs are using LOINC standards. Of the 105 labs that reported sending electronic lab results in a structured format to ambulatory providers outside their organization in 2011, only 31% or 33 labs sent a proportion of those test results using LOINC standards. About half (54 or 51%) did not follow LOINC standards for any results sent to providers and 18 (17%) did not know whether LOINC standards were used.

Number of labs sending test results to ambulatory providers outside their organization in 2011 using LOINC standards, by percent of results (n=105)

<table>
<thead>
<tr>
<th>0%</th>
<th>1-24%</th>
<th>25-49%</th>
<th>50-74%</th>
<th>75-99%</th>
<th>100%</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>16</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>10</td>
<td>18</td>
</tr>
</tbody>
</table>

LRI Guide

A handful of hospital labs and the largest independent labs surveyed have implemented the LRI guide. Only 3% or 11 labs surveyed report having implemented the LRI guide (implementation guide developed by the ONC’s Standards and Interoperability Framework lab results interface initiative) for lab result content and format. Almost all (82%, 9 of 11) were hospital labs, while the remaining two were independent labs. Interestingly, four of these labs report that they did not send results electronically to providers outside their organizations in 2011. Of the seven labs that did send results electronically in 2011, two are the largest independent labs that processed 1M+ billable tests from ambulatory providers and the remaining five are hospital labs associated with Dignity Health, Cedars-Sinai and Henry Mayo hospital.

HL7 Message Standards

As part of the survey, laboratories were asked to report on the HL7 (Health Level 7) message standards they use to send lab results to ambulatory care providers. As discussed in more detail below, labs report using up to six different versions of HL7 message standards as well as two other non-HL7 standards to send lab results to ambulatory care providers.

Responses by HL7 versions reported:

HL7 2.3.1 – 63/319, 20% of the labs that completed the survey report currently using HL7 2.3.1 to send lab results to ambulatory care providers. Of those 63 labs, 41 or 65% report sending lab results in a structured format to ambulatory providers outside their organization in 2011.
HL7 2.5.1 – 24/319, 7.5% of the labs that completed the survey report currently using HL7 2.5.1 to send lab results to ambulatory care providers. Of those 24 labs, 19 or 79% report sending lab results in a structured format to ambulatory providers outside their organization in 2011.

Other HL7 versions – 18/319, 6% of labs report currently using other HL7 versions to send lab results to ambulatory care providers. Those include:
- HL7 2.4.1 – 5 labs report using
- HL7 2.3 – 1 lab reports using
- HL7 2.2 – 3 labs report using
- HL7 2.1 – 1 lab reports using

In addition, a few other labs also mention using ASTM and ELINCs standards at their facilities.

When asked about barriers to sending structured lab results in HL7 2.5.1 format using LOINC, laboratories indicated the following as their top four issues:
1. Lack of funding (33%)
2. Lack of clear business need (20%)
3. Lack of customers accepting electronic results (19.5%)
4. Lack of network connectivity (18%)

While both independent and hospital labs reported lack of funding as the biggest barrier, the lack of a clear business need was more prevalent for independent labs as compared to hospital labs. Additionally, more hospital labs than independent labs noted network connectivity as a main barrier.

Access to an HIE
About 10% of labs surveyed are connected to an HIE. The final question laboratories were asked to complete on the survey relates to their knowledge of and access to a health information exchange (HIE). As indicated in the table below, 17% or 54 labs that completed the survey knew their labs had access to an HIE. Of those 54, about two-thirds (35, 65%) report being connected to an HIE, while the remaining 19 or 35% reported having access to an HIE, but not being connected at the time of the survey. As the table also indicates, the vast majority (83% or 263) of respondents report either not having access to an HIE or that they don’t know. This demonstrates a need for outreach and education to labs about HIEs in their areas and how to connect with them.

### Access to a Health Information Exchange (HIE) (n=317)

<table>
<thead>
<tr>
<th></th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, lab is connected</td>
<td>35</td>
<td>11%</td>
</tr>
<tr>
<td>Yes, but lab not connected</td>
<td>19</td>
<td>6%</td>
</tr>
<tr>
<td>No</td>
<td>161</td>
<td>51%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>102</td>
<td>32%</td>
</tr>
</tbody>
</table>
More hospital labs are aware of and connected to health information exchanges as compared to independent labs (23% vs. 7%). This may be attributed to the cost and time associated with developing and implementing interfaces to connect a lab to an HIE. Hospital systems are more likely to subsidize the cost to connect affiliated or owned laboratories, where independent labs may need to pay all of their own expenses. As discussed above, lack of funding is the biggest barrier survey respondents noted to being able to send lab results in HL7 2.5.1 format using LOINC.

Survey Summary and Discussion

As part of the HIE Cooperative Agreement, California is working to ensure that providers around the state have options available to them to receive structured lab results in an electronic format. Data from this survey reveal that as of the end of 2011, one-third (33%) of surveyed hospital and independent labs around the state report having transmitted structured lab results to ambulatory providers outside their organization. These results give us an important view into available options for providers to fulfill one of their key Stage 1 Meaningful Use exchange requirements. Based on these findings, CHHS has set a goal to increase this percentage from 33% to 50% by the end of 2012.

To facilitate reaching this goal, the state has pursued and is pursuing the following strategies:

1) Regional HIE initiatives funded by the State HIE Cooperative Agreement Program enable providers to receive electronic lab results, including $3.1 million in funding to five Expansion Grant awardees, and several Infrastructure Awards to HIOs currently in the contracting process with IPHI.

2) A new Interface Support funding opportunity enables the implementation of lab and other interfaces between HIOs, providers, labs, and other partners.
3) In the summer of 2012, Cal eConnect launched a program to provide technical assistance and financial support directly to labs to implement technology solutions and workflows to send results electronically to providers in a structured format. However, in spite of widespread publicity, labs in California did not respond to this opportunity in significant numbers. As a result, IPHI will focus on the strategies listed above and other programs enabling Meaningful Use.

Another important finding relates to the lack of standard lab result codes used when transmitting data. Few labs report using LOINC standardized codes when transmitting structured lab results to providers, which can make exchange across organizations more difficult and complicated. Labs also report using multiple versions of HL7 message standards as well as other non-HL7 standards to send lab results to ambulatory care providers. This highlights the current lack of standardized lab terms used by California labs and the importance of adopting common lab standards so that more providers can be enabled to accept structured lab results.

Next Steps
We will continue to monitor and measure progress of California’s hospital and independent laboratories’ capacity for electronic transmittal of structured lab results to health care providers. Using lessons learned from this survey effort, we hope to obtain a higher response rate and more equal representation from labs in all parts of the state.

According to the Office of the National Coordinator for Health Information Technology (ONC), enabling providers to received structured lab results is “one of the basic exchange building blocks to supporting care improvements for patients including better treatment, diagnosis and improved chronic care.” California continues to work towards enabling this building block for all providers in the state.

1.8.5 PUBLIC HEALTH REPORTING AND SURVEILLANCE

1.8.5.1 STATE LABORATORY AND DISEASE REPORTING

DHCS received P-APD administrative funding to support the work of the California Department of Public Health (CDPH) in partnership with CHeQ and other stakeholders in completing the development of an implementation guide that will support meaningful use submission of laboratory results from EHRs to public health. Because of budgetary issues, work on this began in March 2011. This implementation guide builds on assessments that began with other funding sources and will help align reporting standards and implementation specifications to minimize the work required of hospitals and public health departments across California and support Medi-Cal eligible providers (EPs) and eligible hospitals (EHs) in their achievement of meaningful use.
DHCS is partnering with CDPH to leverage existing state and local infrastructure that currently supports laboratory reporting in developing capacity that will support meaningful use requirements. Current systems and infrastructure, while having capacity to receive electronic data, were established prior to requirements to send and receive using HL7 standards as specified by ONC. Public health systems are conducting planning and system modification activities to adapt to these new federal standards for data transmission however there are significant resource gaps that limit the speed at which these activities can occur. A brief description of public health systems and their interfaces with meaningful use requirements are described below.

- The CDPH Center for Infectious Diseases Division of Communicable Disease Control has launched the California Reportable Disease Information Exchange (CalREDIE). CalREDIE is designed to improve the efficiency of surveillance activities and the early detection of public health events through the collection of more accurate and timely. Although the state focus on the ELR component has been on laboratory reporting to public health, CalREDIE will also be able to receive HL7 messages from EHRs in support of meaningful use. CalREDIE is being incrementally rolled out to provide real time disease surveillance capacity at the local and state public health levels in the following phases:
  - Local Health Departments: As of December 1, 2011 CalREDIE has brought 40 local public health departments into the system and is working to phase all LHDs interested in participating by 2013. (Note: Currently the counties of Los Angeles, Alameda, San Francisco, and San Diego have their own electronic disease surveillance systems, and have been resistant to transitioning to the use of CalREDIE. During 2012, CDPH will be working to develop a plan for encouraging these jurisdictions to use CalREDIE or otherwise electronically transfer data between CalREDIE and their systems.) LHDs in all by 2013. LHDs are able to directly type enter all submitted confidential morbidity reports from providers and reportable disease reports from laboratories into web-based CalREDIE which allows LHDs to maintain one centralized location for disease reports. This initial entry by locals into CalREDIE will simultaneously serve both local and state disease reporting data requirements.
  - Medical Providers: Providers have begun using an online web-based CalREDIE portal to type in details of mandated confidential morbidity reports [80 reportable diseases and conditions cited under Title 17 of the California Code of Regulations (Sections 2500, 2593, 2641.5-2643.20 and 2800-2812)] with the goal to have providers from all
jurisdictions participating in CalREDIE with access during 2014, pending resources to support this work. In the future, the goal will be to have electronic confidential morbidity reports be sent automatically from the providers’ EHR technology into the CalREDIE system.

- Laboratories: CalREDIE is in the initial stages of being capable of directly receiving the electronic submission of lab results for reportable diseases via the Electronic Lab Reporting (ELR) module. When fully implemented, the ELR component of CalREDIE will provide for electronic disease data submissions [over 60 reportable diseases under Title 17 CCR Section 2505], using HL7 standards, from approximately 2,200 commercial labs (hospitals, reference, public health, etc.) and 15,000 licensed physician-operated labs. State legislation (AB 2658) requires labs to electronically transmit lab reports to the State of California. Development and piloting of the ELR component is planned for 2011 and it is currently anticipated that this functionality will be fully functional in 2012.

- The Childhood Lead Poisoning Prevention Branch, through its web-based surveillance system (RASSCLE II), currently receives over 800,000 blood lead tests per year from over 250 laboratories via HL7 files. This program is participating in ongoing discussions with departmental programs regarding meaningful use and current electronic blood lead reporting from eligible providers and laboratories.

- The Cancer Surveillance and Research Branch manages the California Cancer Registry, which collects information about all cancers diagnosed in California) Statewide, population-based cancer reporting is required with the 1985 enactment of sections 103875, 103885, and 100330 of the California Health and Safety Code. The program uses laboratory reports as source data information when compiling complete cancer data abstracts. Currently, the California Cancer Registry has enrolled 82 pathology labs, which transmit directly to registry systems in an HL7 format. This program plans to expand electronic reporting of cancer pathology and to adapt the Public Health Lab Workgroup laboratory specification guidelines into their existing system.

In addition to receiving laboratory results, public health also receives specimens and generates results. Public health programs that provide results are described below. These programs will partner with DHCS and other eHealth stakeholders to leverage the CPOE meaningful use requirement.
- The California Laboratory Information Management System (CalLIMS) implements a common data structure and user interface across the CDPH Center for Infectious Disease, Division of Communicable Disease Control, Microbial Diseases Laboratory (MDL) Branch and the Viral and Rickettsial Disease Laboratory (VRDL) Branch and other CDPH laboratories in order to centralize tracking of patient records and laboratory specimens. This system has the capacity to send HL7 messages to the CalREDIE system although there have not been resources to implement this functionality to date.

- The Genetic Disease Screening Program (GDSP) which includes the Prenatal Screening Program and Newborn Screening Program screens newborns and pregnant women for genetic and congenital disorders in a cost-effective and clinically effective manner. The screening programs provide testing, follow-up and early diagnosis of disorders to prevent adverse outcomes or minimize the clinical effects. The GDSP is working towards the electronic submission of screening results to hospitals and clinicians as well as the receipt of clinical provider order entries for newborn and prenatal screenings.

- The Lab Field Services (LFS) provides oversight for clinical and public health laboratory operations and for the licensed and certified scientists and other testing personnel who perform testing in clinical laboratories. To assist department-wide and statewide efforts to meet meaningful use requirements, LFS is working to disseminate information regarding these federal regulations to California laboratories and to collaborate with interagency efforts to administer lab assessments.

In addition to the above described activities at the state level, CDPH and DHCS are partnering with local public health labs to assess infrastructure needs to support meaningful use. Over the past several years there have been independent efforts led by the California Association of Public Health Laboratory Directors to assess and begin to address infrastructure needs necessary to exchange data with providers. This project, Cal-X, has been funded by Homeland Security, Cal EMA and other sources. Based on their assessments, most county labs do not have robust laboratory information management systems and many still use paper-based processes. Currently approximately a dozen local public health laboratories do have capacity to exchange laboratory results through Cal-X to providers in a collaborative, shared, secure, and cost-effective manner. Initial transaction sets supported by Cal-X include laboratory results (Title17), medical surge, mass evacuation/shelter, and catastrophic disaster situational awareness.
IMMUNIZATION REGISTRIES

Over the last 15 years, California has incrementally developed a collaborative, decentralized system of eight regional and two county web-based immunization registries collectively known as the California Immunization Registry (CAIR). See figure below.

CAIR provides secure, electronic exchange of immunization records to support the elimination of vaccine-preventable diseases. Within each region, CAIR allows users to see patient demographic data, immunization history, immunization forecasting, contraindications, overdue immunizations and other functions. CAIR provides users with copies of standard immunization record cards, usage reports, appointment reminders and inventory management. However, there is no capacity for the registries to exchange appropriate information (e.g. when a person moves from one regional registry to another) or to search across multiple registries at this time, thus limiting these benefits to both providers and patients on a region-to-region basis and more generally, statewide. At the present time, there is no interoperability between CAIR and Public Health Surveillance reporting databases.

The majority of exchange between immunization registries and EHRs involves the transfer of updated immunization data, for which prompt, rather than immediate or real-time, exchange is usually sufficient. Approximately 150 organizations with at least 20 EHR systems have secure, current or pending data exchange with CAIR, primarily through data exports in a standardized flat file format. Seven of the ten registry systems utilize the same registry software, ‘CAIR’ software. This software is not HL7 compliant and therefore cannot accept data qualifying providers for meaningful use. However, the other regional registry software systems can exchange information via HL7. So for the purpose of reporting the immunization
meaningful use measure, the hospital or provider would need to submit information to the immunization registry in their jurisdiction.

The state’s strategy for notifying providers and hospitals of which public health measure to pursue has been to: 1) assess state and local health departments for readiness to accept, validate, test and store the immunization, syndromic surveillance or lab result data in the specified standard set by ONC; 2) develop a website for hospitals and providers to access and retrieve information on MU readiness in their jurisdictions (http://www.cdph.ca.gov/data/informatics/Pages/eHealth.aspx); 3) update the website with new standards, FAQs, other objectives and CQMs that have public health impact; and 4) provide informational updates in the statewide Stakeholder webinars and outreach presentations.

DHCS is supporting the development of statewide immunization registry capacity to receive HL7 messages in support of meaningful use through a previously approved P-APD-funded assessment. Due to the late passage of a state budget in October 2010 and the elimination of $18 million of state general funding for the entire Immunization Program in the budget, DHCS has requested a no-cost extension through the I-APD to conduct this project.

1.8.5.2 LOCAL PUBLIC HEALTH JURISDICTIONS

In California, responsibility for most public health is at the local level. The sixty-one local public health jurisdictions are the primary authority for public health reporting and provision of public health services. The sixty-one jurisdictions are comprised of the fifty-eight counties in California and the cities of Berkeley, Long Beach and Pasadena. The Health Officers of these jurisdictions are recognized as the California Conference of Local Health Officers (CCLHO):

The California Conference of Local Health Officers (CCLHO) is an organization of the 61 legally appointed city and county physician Health Officers in California established in 1947 by statute (California Health and Safety Code Sections 100290, 100295, 100925 and 100950) to advise the Department of Health Services (now Department of Public Health), other departments, boards, commissions, and officials of federal, state and local agencies, the Legislature and other organizations on all matters affecting health.

The organization and function of local health departments (LHDs) vary across the State. While all of them perform surveillance activities and investigate reported diseases and outbreaks, their surveillance intensity and investigation capacity vary considerably. Many LHDs are also responsible for environmental health, some oversee emergency medical services, and many engage in chronic disease surveillance and prevention efforts. Over half of the State’s
LHDs operate local public health laboratories, and many of them operate primary care clinics and/or public hospitals.

Title 17 of the California Code of Regulations establishes requirements for reporting of selected communicable diseases and other conditions to LHDs; it also establishes the requirement for hospitals and certain other facilities to report most types of cancers to regional cancer registries. In addition, State law provides for both the State and local jurisdictions to operate immunization registries. Beyond these statewide reporting requirements, local jurisdictions are authorized to make additional diseases and conditions reportable. As a result, public health reporting requirements vary across local jurisdictions and are generally more extensive at the local level than at the state level.

LHDs work with all healthcare organizations, including individual practitioners, small practices and large healthcare systems, HIOs (regional, public and private) as well as Department of Defense, Veteran Administration, tribal, international and private sector organizations to meet their population and public health needs. This enables LHDs to establish robust relationships with their partners for exchange of information that is important to public health. It also provides LHDs the opportunity to engage EHs, CAHs and EPs with respect the public health Meaningful Use requirements.

The Meaningful Use public health objectives encourage electronic transmission of key data to public health agencies, including immunization data, reportable laboratory data and syndrome surveillance data. While these data are intrinsically important to LHDs in themselves, they represent substantial portions of a broader public health data and IT infrastructure. The LHDs in California are at substantially different places in their development and implementation of a comprehensive, public health IT infrastructure. Some have very limited capabilities while others have well developed systems. With respect to the Meaningful Use public health objectives, some LHDs operate systems that can receive and utilize electronic transmissions of data for one or more of the objectives. A limited number of LHDs, including San Diego, Santa Cruz, Riverside and San Bernardino, have engaged in relationships with HIEs to develop “gateways” for data transmission for their hospitals, providers and laboratories. This strategy offers an opportunity for LHDs, and ultimately appropriate State agencies, to obtain public health data while minimizing the impact on reporting entities.

In an effort to address Meaningful Use public health objectives as well as to develop more comprehensive public health IT systems, LHDs will utilize a number of IT solutions and strategies. These include the following:

- Implementing local syndrome surveillance systems that meet International Society for Disease Surveillance (ISDS) standards
- Implementing ISDS standards-compliant commercial syndrome surveillance systems
• Utilizing CDC’s BioSense 2.0 for syndrome surveillance
• Utilizing the CAIR regional registries for immunization data
• Implementing local immunization registries that communicate with the CAIR regional registries
• Utilizing the CDPH’s CalREDIE system to meet a portion of the electronic laboratory reporting objective under Meaningful Use and as a component of a comprehensive public health IT infrastructure
• Implementing local systems for electronic laboratory reporting, for some or all of the reportable laboratory results required in the jurisdiction
• Implementing local systems for cancer data reporting by EPs, preferably with the capacity to communicate with regional cancer registries
• Implementing local systems for special registry data reporting by EPs
• Implementing local provider data “gateways”

1.8.6 BROADBAND INTERNET ACCESS

In January 2008, the California Broadband Taskforce concluded that ubiquitous broadband services are “…an integral part of improving the overall health of Californians and driving down the cost of care.” California has moved forward with this vision through a successful Federal Communications Commission (FCC) grant award of $22.1 million through the Rural Health Care Pilot Program - with the goal of significantly increasing access to acute, primary and preventive health care in rural California. This funding is building the California Telehealth Network (CTN- www.caltelehealth.org) a high-speed broadband network that will allow for the expansion of an eHealth network with an emphasis on rural and underserved populations. This network will connect over 850 sites statewide. It is expected that the network may expand to over 2,000 sites through other funding opportunities, such as those provided by the American Recovery and Reinvestment Act of 2009 (ARRA). California’s $3.6 million in matching funds is provided by California Emerging Technology Fund.

In addition to the CTN, California has another broadband network, the Corporation for Education Network Initiatives in California (CENIC), which provides broadband infrastructure to educational and research communities. Many of these facilities could be involved in the provision of clinical education programs.

In September 2010, the University of California, Davis and the CTN were awarded a $13.8 million Broadband Technology Opportunities Program (BTOP) Grant. This grant supports the adoption of broadband and technology enabled healthcare throughout the state by delivering multi-faceted training through partnerships with libraries, community colleges, health organizations and public safety sites. The project also intends to establish a best practice Model eHealth Community to demonstrate and facilitate the transition to technology enabled
health delivery. It is funded by the federal government ($9.1 million) with a match of $4.7 million from California partners, namely the National Coalition for Health Integration, the California HealthCare Foundation and United HealthCare. This comprehensive training partnership is an innovative collaboration between academia, community-based educators, instructional design experts and tribal representatives. On-site and on-line courses will be developed or adapted to support the following curricula: Change Management, Broadband Adoption, CTN Broadband Orientation, EHR/HIE adoption, Telehealth Certificate Program, Consumer Health Informatics, and Clinician Health Informatics. Curricula will be leveraged for consumer education through public libraries, community colleges and local extension centers.

These networks are a product of California’s longstanding commitment and investment in broadband and Telehealth. California is a national leader in the development of technology-supported health care, having passed the California Telemedicine Act in 1996. The California Legislature, Governor and voters have demonstrated their commitment to eHealth through the passage of bond funding, legislation and executive orders that support the continued expansion of broadband and eHealth applications.

California also has an HRSA designated Telehealth Resource Center (TRC) that provides program guides, best practices, technical assistance, and other supporting services to newly developing Telehealth programs funded by HRSA. The California Telemedicine and eHealth Center (CTEC) is one of only six designated TRCs throughout the country. CTEC has developed a comprehensive set of written program development materials, video education and training, best practice guides, policy guides, Telehealth training programs and technical assistance.

**TABLE 27: BROADBAND ACCESS FUNDING**

<table>
<thead>
<tr>
<th>Program</th>
<th>Federal Funding</th>
<th>CA Match</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCC Rural Health Care Pilot Program</td>
<td>$22.1M</td>
<td>$3.6M</td>
<td>$25.7M</td>
</tr>
<tr>
<td>Broadband Technology Opportunities Program Grant</td>
<td>$9.1M</td>
<td>$4.7M</td>
<td>$13.8M</td>
</tr>
<tr>
<td><strong>Total Broadband Funding</strong></td>
<td></td>
<td></td>
<td><strong>$39.5M</strong></td>
</tr>
</tbody>
</table>

**1.8.7 VULNERABLE POPULATIONS**

The electronic exchange of health information carries the potential to greatly improve health outcomes and reduce costs of care for all Californians; this may be particularly true for populations within the state that experience enhanced vulnerability at points of transition in their healthcare. These groups include patients lacking stable housing, those with diminished ability to monitor and
maintain their own healthcare, those who experience financial, cultural or physical barriers to accessing the healthcare system, as well as others. The enhanced coordination of care made possible by HIE, electronic health records, and other implementations of health information technology (HIT), has the potential to make a great impact in the care of these vulnerable populations.

The Agency has chosen to focus on two representative vulnerable populations; children in foster care and the elderly population. Both of these groups exhibit vulnerability in health outcomes due to gaps in available health information as they transition from one healthcare provider or location to another. It is our hope that through public and private collaborations, we can improve coordination of care and health outcomes for these populations, while demonstrating the possibilities that new technologies and information exchange represent for other vulnerable populations and all Californians.

**Children in Foster Care in California**

There are approximately 62,000 children in foster care in California. As is the case nationally, these children tend to have more complex health care needs than other children and account for a disproportionate share of Medi-Cal expenditures. Nearly half of all children living in foster care in California suffer from chronic illnesses, and children in foster care are three to six times more likely than those in the general population to have significant psychological or behavioral problems. Yet children in foster care receive less than optimal care for a number of structural reasons.

On average, children placed in foster care in California experience two to three changes in foster placements each year. Placement changes are often accompanied by changes in health providers. The existing system for sharing information about a child in foster care is, to a large extent, based on the passing of duplicate paper forms among caseworkers, public health nurses, foster parents, and health providers. Often providers do not receive forms, or receive forms that are missing crucial information about the child. Inadequate medical records for children in foster care contribute to poor quality health care that, in some instances, can be life-threatening. This can include duplication of immunizations, over-prescription of psychotropic medications, misdiagnoses, and subsequent medical errors and omissions based on faulty paperwork. According to Children’s Action Network, “doctors often have no reliable birth or immunization records, don’t know who has previously treated the child, and have no facts about current and past diagnoses, treatments, or prescriptions.”

Electronic exchange of key information for this highly mobile, high-needs population of children can result in greater coordination of care between providers and caretakers. This can increase efficiency, reduce program costs at the state and local levels and significantly improve outcomes for youth in foster care. Early findings from related efforts indicate that the information management and coordination of care enabled by a system of electronic
information-sharing can result in improved preventive care, decreased hospital stays, improved clinical conditions, and decreased cost of care. After implementation of electronic information exchange in Milwaukee, Wisconsin, the number of youth in residential programs declined from 364 to 140 per day, psychiatric hospitalizations declined by 80%, and the cost of care per child dropped from $5,000 per month to less than $3,300. Children in foster care also experienced a variety of improvements in clinical conditions.

Agency recognizes the great potential to improve coordination across the many programs and services available to children in foster care through the use of EHRs and electronic data-sharing and has been working with stakeholders to develop interventions and pilot projects. The long-term goal is provide access to information to foster parents, caseworkers, health providers (physical, mental, and dental), public health nurses, educators, attorneys, judges, and older youth in foster care. The California information technology architecture involved may include the statewide health information exchange (HIE) infrastructure, the Medicaid Management Information System (MMIS), and the State Automated Child Welfare Information System (SACWIS), as well as local systems that vary by county. The long-term goal is to provide access to appropriate information about a child in the appropriate circumstances to facilitate communication among providers so they can more effectively coordinate and deliver care to children, afford foster parents and older youth in foster care access to information, and provide youth in foster care with a record of conditions and services received. Due to the unique situation of foster children and the number of entities requiring access to their health information, confidentiality, security and consent issues will be a priority during the planning and implementation process, particularly for older children.

Transitions of Care in the Elderly

The elderly population is another vulnerable group that would benefit from having personal health records (PHR). By 2050, an estimated 25% of Californians will be 60 or older. While approximately 628,000 Californians are 85 or older today, by 2050 an estimated 2.9 million will be in this group. This substantial increase has many implications for individuals, families, communities, and government in providing health care for this population. Providing elderly patients with personal health records would help them manage their chronic conditions and engage their formal and informal caregivers. The families and caregivers of these patients may also be better equipped to provide care and support by having accurate and comprehensive health information retrieved through patients’ PHRs.

In addition, physicians, specialists, and other health care providers can ensure continuity of care through the use of electronic PHRs by retrieving critical health data at the point of care. Communication problems and other errors occur as patients receive care from multiple providers, especially at the time of discharge from hospitals. Failure to communicate critical information related to a patient’s
medical care, chronic conditions, medications, and the importance of follow-up care often result in avoidable readmissions and decline of patients' health. A personal health record would allow patients to reduce their own chance of readmission and achieve better health through the capacity to self-manage their chronic conditions, maintain an accurate medication list, and engage their caregivers.

Comprehensive information on the current availability and functionality of PHRs is limited. The Agency is now working to assess the current landscape of PHR vendors, functional capabilities, and PHR adoption in California. In addition, the Agency plans to engage consumers and patients, particularly the elderly, in assessing their needs regarding PHR accessibility and functionality. The findings from these assessments will guide future planning of adoption of PHR technology, which will enable elderly patients to self-manage their health and improve their transitions of care.

1.9 Strategy to Meet Meaningful Use

California is committed to helping eligible providers meet the HIE requirements of Meaningful Use. The PIN 001 identifies three immediate priorities for state HIE programs to ensure that these providers have at least one option available. They include:

- e-prescribing
- receipt of structured lab results
- sharing patient care summaries across unaffiliated organizations.

In addition, ONC has added the support of public health criteria and reporting of clinical quality metrics as priorities. All five priorities are represented in the Final Rule for Stage 1 Meaningful Use criteria.

These criteria will be supported through a number of activities that broadly fit within five major categories:

1) **Establishing Consensus Exchange Specifications.** These will support all of the Meaningful Use criteria by adopting standards to fill gaps in those specified in the Final Rule for Stage 1 and in the EHR certification criteria, as well as working with EHR vendors to ease integration with HIE.

2) **Grant-making to support HIE.** Grants and financial support to HIOs, providers, and others to enable achievement of prioritized Meaningful Use exchange objectives. These are described at the end of this section.

3) **Providing Technical Assistance.** This will enable independent pharmacies to receive electronic prescriptions, local labs to provide structured electronic lab results, and health departments and registries to receive electronic
updates, as well as review usability and provide education for e-prescribing users.

4) **Developing Statewide Services.** Targeted at providing options for providers where insufficient HIO- or commercially-supported solutions exist, these will enable standards-based electronic exchange with federal and state agencies.

5) **Conducting Demonstrations and Pilots.** These will explore and demonstrate the utility of emerging approaches to health information exchange, as well as test specifications to ensure they meet the intended needs.

Agency will support Meaningful Use and Health Information Exchange by implementing projects and programs to move the following priorities in 2012:

### 1.9.1 ELECTRONIC PRESCRIBING (E-PRESCRIBING)

The e-prescribing initiatives for California have been identified and vetted through the collaborative efforts of the California e-Prescribing Consortium (Cal eRx) beginning in 2009, followed by the Cal eConnect e-Prescribing Advisory Group. Though there have been several transitions along the way, the group has made tremendous progress, and have implemented, or are on the verge of implementing, some very exciting projects that will make great strides in e-prescribing adoption and utilization in California.

Transition of funds and projects from Cal eConnect to IPHI has been finalized; we anticipate that many of the advisory group’s projects will be continued and completed either with Cooperative Grant funds or outside funding. The CHHS Pharmacy Residents will be taking on the administrative work for the e-prescribing advisory and task groups. The groups will continue to meet on a regular basis and will maintain task groups for those projects with ongoing activity.

Whereas the ONC requires Agency to report on the percent of pharmacies participating in e-prescribing, **California’s strategies are focused primarily on utilization** or the use of e-prescribing in a meaningful way. While 90% of California’s pharmacies are connected to Surescripts for e-prescribing, only 25% of eligible prescriptions are currently being transmitted electronically (Surescripts, 2011 National Report). This leaves a large gap between what is being done in practice and the 40% required by Stage 1 Meaningful Use.

#### 1.9.1.1 Partners in E: Promoting Safer Use of Electronic Health Records for Better Care

*Partners in E* is an innovative program of curricular development and outreach that aims to better integrate the discipline of safety science into a health information technology (health IT)—enabled world. This program is modeled
after two successful teaching programs developed by the UCSF Department of Clinical Pharmacy on both state and national levels: a Medicare Part D training program, Partners in D (http://www.partnersind.com) and a comprehensive tobacco cessation training program, Rx for Change: Clinician-Assisted Tobacco Cessation (http://rxforchange.ucsf.edu). These programs have proven results and extensive literature supporting their success. Further, these programs are sustainable with the training programs continuing well beyond the duration of funding. Partners in E will use a similar process for evaluation, education and outreach, with a focus on the following objectives:

1. Educate and deploy a pharmacy student workforce with the attitudes, knowledge, and skills required to identify and resolve barriers to e-prescribing in community pharmacies, a critical component of health IT adoption in California.
2. Create a cross-disciplinary learning environment for health IT among health professionals that is focused on shared learning, maximizing transparency and minimizes the burden of Electronic Health Record (EHR) adoption to providers.
3. Evaluate the current state of health IT on patient safety and identify strategies to minimize the risk of its implementation and use.

The first goal of the Partners in E program is to educate and deploy a pharmacy student workforce with the attitudes, knowledge, and skills required to identify and resolve barriers to e-prescribing in community pharmacies. This is a critical component of health IT adoption in California. To expedite rapid adoption of e-prescribing, the Partners in E program also will establish two Pharmacy Technical Assistance Centers (Rx-TACs) to provide technical support for community pharmacies in the northern and southern regions of California. Further, the Partners in E program will use an established train-the-trainer program model to disseminate the health IT curriculum that can be taught in a standardized and consistent format across schools of pharmacy in California.

Partners in E launched its initial anchor course, Introduction to Pharmacy Informatics, in the Fall 2012 quarter at UCSF, School of Pharmacy. Seventy students, including one nursing student, enrolled and participated in the pre-course survey which evaluated the students in both attitude towards and knowledge of health information exchange. The results of the survey (see Appendix C) indicate that there is much work to be done in developing the necessary workforce to promote meaningful use of e-prescribing. An experiential course to match pharmacy students with independent pharmacies not participating in e-prescribing in the San Francisco Bay Area will begin enrollment for the Winter and Spring quarters of 2013. In parallel to the UCSF experiential program, Partners in E will begin incorporating its anchor course into the curriculum of other California schools of pharmacy in January 2013.
This will result in a rapid dissemination of course content and deployment of pharmacy student technical assistance to pharmacies throughout the state.

You can read more about Partners in E and how it relates to HIE sustainability in Section 3 of this document.

**Timeline for Partners in E activities:**

<table>
<thead>
<tr>
<th>Activity Description</th>
<th>Estimated Start Date</th>
<th>Estimated Finish Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop partnerships and complete subcontracts with UC Extension</td>
<td>6/29/2012</td>
<td>10/30/2012</td>
</tr>
<tr>
<td>Develop the curriculum materials for the Health Information Technology for Pharmacists course at UCSF</td>
<td>6/29/2012</td>
<td>12/31/2012</td>
</tr>
<tr>
<td>Develop evaluation plan, including creating and piloting evaluation tools</td>
<td>6/29/2012</td>
<td>12/31/2012</td>
</tr>
<tr>
<td>Establish community pharmacy partnerships within the Silicon Valley region</td>
<td>6/29/2012</td>
<td>12/31/2012</td>
</tr>
<tr>
<td>Develop Partners in E internal website</td>
<td>6/29/2012</td>
<td>3/31/2013</td>
</tr>
<tr>
<td>Pilot the Health Information Technology for Pharmacists course at UCSF</td>
<td>1/1/2013</td>
<td>5/31/2013</td>
</tr>
<tr>
<td>Develop training materials and update community pharmacy outreach toolkit for the Health Information Technology for Pharmacists course</td>
<td>1/1/2013</td>
<td>7/31/2013</td>
</tr>
<tr>
<td>Hire staff; set up infrastructure for Southern California Rx-REC</td>
<td>1/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Establish statewide community pharmacy partnerships</td>
<td>1/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Continue to update and revise the Health Information Technology for Pharmacists course materials, including the community pharmacy outreach toolkit, as needed</td>
<td>1/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Evaluate pharmacy staff experiences with student outreach at community pharmacies</td>
<td>1/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Conduct training sessions to other schools of pharmacy in California for the Health Information Technology for Pharmacists course</td>
<td>5/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Students from other schools of pharmacy in California initiate the Health Information Technology for Pharmacists course</td>
<td>9/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Students from other schools of pharmacy conduct community pharmacy outreach</td>
<td>10/1/2013</td>
<td>12/31/2013</td>
</tr>
<tr>
<td>Present Partners in E results at state and national meetings</td>
<td>10/1/2013</td>
<td>12/31/2013</td>
</tr>
</tbody>
</table>
1.9.1.2 PHARMACY GRANT PROGRAM

As discussed in Section 1.7, the independent pharmacy survey conducted in June 2012 showed that the independent pharmacies who are not participating in e-prescribing are equally interested in funding for connectivity and technical assistance. The former Pharmacy Grant Program (as described in the June 2012 SOP) is being revised to incorporate the funding for connectivity with the technical assistance in Partners in E. The amount of funding and the number of recipients is currently being determined based on available funding.

1.9.2 STRUCTURED LAB RESULTS EXCHANGE

The strategy for enabling labs to exchange structured lab results, including state and county labs, continues to focus on the integration capability of existing, developing, and expanding HIOs. Many existing national and local labs currently deliver structured lab results via HIO integration using recognized HL7 messaging standards. However, many local independent or hospital labs do not have the IT resources to electronically submit lab results to providers.

Lab reporting will be enabled through a two-pronged approach:

- Lowering the cost of integration of EHRs, labs, and existing and emerging HIOs by promoting a constrained set of consensus standards for EHR receipt of structured lab results.
- Supporting the development of interfaces for lab data exchange with providers and HIOs

Promoted standards will align with, and therefore leverage, national standards and proposed standards for Stage 2 Meaningful Use EHR certification criteria. Interface development support will accelerate the flow of structured lab results from labs directly to providers and to providers via HIOs in alignment with Meaningful Use requirements.

Specifically, CHeQ, in collaboration with Agency, will:

1) Establish and promote uniform consensus standards for lab results exchange.
2) Support HIOs, providers, and labs through grant programs enabling the implementation of interfaces for structured lab data exchange.

Table 28 lists milestones for implementing the strategy to structured lab results exchange.
TABLE 28: STRUCTURED LAB RESULTS EXCHANGE TIMELINE

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Estimated Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish a consensus implementation guide for exchange of electronic lab results between labs and EHRs.</td>
<td>Q2 2012</td>
</tr>
<tr>
<td>Demonstrate lab results exchange using consensus standards at California Connects, a vendor and HIO exhibition of standardized exchange in California.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Initiate an interface development support program for HIOs and providers to integrate independent and hospital labs.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Continue funding five regional HIOs enabling structured lab results delivery through the HIE Expansion Grant program.</td>
<td>Q1 2013</td>
</tr>
<tr>
<td>Distribute funds to HIOs, providers, and labs through interface support program.</td>
<td>Q2 2013</td>
</tr>
</tbody>
</table>

1.9.3 CARE SUMMARY EXCHANGE

Providers in California exist within a varied landscape of business requirements and capabilities for health information exchange. The California strategy for care summary exchange acknowledges the varied landscape we find within the State, and is designed to work with the varied needs rather than deliver a single, one-size-fits-all solution. That strategy has three primary components:

1) Support a rich exchange environment, including exchange of care summaries, for providers within HIOs.

2) Encourage exchange of care summaries between unaffiliated providers across HIOs or other service providers, and between states using NwHIN Exchange and NwHIN Direct specifications.

3) Develop a lightweight option for providers that do not have access to an HIO or do not wish to join one.

Each of these components are described in more detail in the following sections, followed by an integrated timeline and list of milestones for operationalizing the strategy.

1.9.3.1 CARE SUMMARY EXCHANGE WITHIN AN HIO
For many providers and provider organizations, becoming a participant in an HIO is an acknowledgement that they share a common set of business needs, privacy requirements, and preferred workflows that are served by the technologies and functions provided by the HIO. That is true whether the HIO is a regional, public, not-for-profit organization created to govern exchange for a diverse collection of stakeholders, a service provider enabling exchange through technical services to its individual participants, or a large, closed health organization creating enterprise HIE services to connect its constituents and their systems.

The fact that HIOs exist with differing features and workflows illustrates regional variation and the aggregation of providers with common needs. These existing HIOs already provide a rich set of exchange capabilities that have been adopted by their users and integrated into their daily activities. In some cases, the primary service is the efficient delivery of health information: electronic lab results, referral or discharge notes, prescriptions, etc.

In many cases, the services include a repository of health information that can be accessed to retrieve information, often implemented as a federation of repositories linked by a record locator and data aggregator. In most cases, the services include the exchange of care summaries on demand, perhaps as part of an integrated longitudinal community record as well as a standardized CCD.

California’s HIE strategy should not interrupt ongoing exchange of care summaries within public or enterprise HIOs by imposing any specific technology or approach. Instead, we encourage HIOs to develop the capabilities to exchange care summaries that are in line with the business needs and workflow requirements of their constituent members – their customers – and support these efforts through expansion and infrastructure grants. Where possible and desired by eligible providers and hospitals, the input and output for these services are the CCD documents required for certified EHRs to meet meaningful use requirements.

To support intra-HIO exchange of care summaries, California will:

1) Support care summary exchange within public and enterprise HIOs via grants to establish new and expanded services in line with PIN 001 and PIN 002 priorities.

2) Enable the continued use of existing query-based retrieval of care summary information, but encourage CCD exchange as required by meaningful use and the new transitions-of-care specification through participation in state and national demonstrations, market pressure on vendors, and requirements in our grant program.
1.9.3.2 CARE SUMMARY EXCHANGE WITH UNAFFILIATED PROVIDERS

While California supports the exchange of health information among affiliated providers within a public or enterprise HIO, the exchange of care summaries among unaffiliated providers present the larger challenge requiring statewide — and nationwide — coordination. To address these challenges, California will encourage adoption of NwHIN Exchange and NwHIN Direct standards, and will develop a lightweight option for providers that currently do not have access to an HIO or do not wish to join one. This will involve development and adoption of HISPs, and will rely on directory trust services, as well as lessons learned from an interstate exchange pilot.

1.9.3.3 USE OF NATIONWIDE HEALTH INFORMATION NETWORK SPECIFICATIONS

An analysis of business requirements and provider needs suggests that query/response based exchange, while presenting a greater technical barrier to entry, is an equally important requirement for sustainable health information exchange. Providers have identified business requirements that include the need to exchange care summaries using both directed exchange and the query/response model.

Therefore, California promotes exchange of care summaries through query/response exchange as well as directed exchange in order to meet provider business requirements and provide a sustainable model for health information exchange.

The work of the Direct Project has provided a simple yet effective technical mechanism for directed exchange, with a set of specifications and a reference implementation that can be utilized by HIOs or service providers. Likewise, the Nationwide Health Information Network (NwHIN) has created a robust set of specifications for patient discovery and query/response document retrieval that has been implemented in CONNECT.

To leverage market pressures created by Meaningful Use and other federal programs, and to take advantage of the Direct Project and CONNECT initiatives, we have elected to use NwHIN Direct specifications for directed exchange and NwHIN Exchange specifications for patient discovery and query/response exchange between HIOs and service providers. California is encouraging HIOs to adopt one or both of these mechanisms to facilitate inter-HIO exchange, making it a requirement of future infrastructure grants. The grants program is being extended in 2012 and 2013 to include enterprise HIOs, with the requirement that they enable exchange outside of their constituent organizations using NwHIN Direct and/or NwHIN Exchange specifications, as appropriate to their internal architectures and business processes.
California demonstrated the utility of combined directed exchange via NwHIN Direct and query/response exchange via NwHIN Exchange for transitions-of-care summary documents at the Interoperability Showcase as part of the HIMSS 2012 Annual Conference and Exhibition. This demonstration illustrated the strategic architecture for statewide exchange in California, and the strategy for care summary exchange with unaffiliated providers between HIOs. California is beginning to see a shift from an environment of HIOs that always offer both governance and technical services to an alternative structure that includes governance as the sole responsibility of the HIO, and technical services provided by a separate service provider.

Direct is in fact largely modeled on a service-provider approach – thus the Direct HISP. To a limited extent, we are beginning to see service providers that not only provide Direct services, but that also provide traditional results delivery via HL7 standards and query/response capabilities normally expected of traditional HIOs. Our strategy is to include Direct HISPs, these emerging HIE service providers, as well as traditional HIOs as organizations that exchange via NwHIN Direct and NwHIN Exchange specifications. Like enterprise HIOs, the grants program in 2012 and 2013 will be extended to service providers where supported by a prime HIO that provides governance.

To support inter-HIO exchange of care summaries, California will:

1) Continue to fund expansion of existing HIOs to implement Direct for directed exchange of care summaries through 2012 and 2013, with a focus on enabling patient summary exchange during transitions of care.

2) Fund the expansion of existing HIOs to implement NwHIN Exchange for query/response exchange of care summaries through 2012 and 2013, again with a focus on enabling patient summary exchange during transitions of care.

3) Expand the infrastructure grants program to include enterprise HIOs that agree to extend exchange outside of their enterprise, and to service providers allied with an HIO that provides governance.

4) Participate in national demonstrations and pilot programs sponsored by ONC and the State through 2012 and 2013, to demonstrate the utility of the combined use of NwHIN Direct and NwHIN Exchange mechanisms for meeting the meaningful use criterion and establishing sustainable exchange services.

5) Monitor the market demand and adoption of Direct exchange and Direct HISP services.
1.9.3.4 DIRECTORY AND TRUST SERVICES

ONC and the State of California have identified individual and organizational provider identity management as a critical component of trusted health information exchange. Through the Direct Project and the S&I Framework, ONC began exploring standards for "provider directories" using a number of potential technologies, including LDAP, HPD, DNS, and PKI.

Directory and trust services are a keystone of California’s overall exchange strategy that establishes mechanisms to (1) locate unaffiliated exchange partners and (2) establish their identity, not only as part of our strategy for exchanging care summaries, but for more generalized trusted exchange of health information as well. The diverse California landscape is such that a single, centralized repository of all provider information is neither affordable nor maintainable. **Therefore, California envisions a federated approach to identity management, in which directory services are rooted at a statewide authority, and organizations that traditionally manage provider information continue to do so by maintaining their own local provider directories.** A set of policies, operational procedures, and technical standards link the separate directories into a trusted whole.

California has recently launched its initiative to define a federated approach to directory and trust services that leverages national standards whenever possible, aligns with the exchange environment in California, and can be reused by other states and to support interstate exchange. This initiative will identify:

- The policies and operating procedures for directory and trust services, concentrating on business processes that must be supported, policy considerations, and procedures associated with operating trusted services.

- The technical architecture, interfaces, and implementation guidance that support those business processes, policies, and procedures, and define directory and trust services.

In order to participate in statewide trust, California will require participating HIOs and service providers to adopt the policies and procedures for identity management, and conform to a set of consensus technical standards for interfaces to their provider directories to create federation.

Therefore, to further support inter-HIO exchange of care summaries, California will:

6) Establish a set of pilot specifications for federated directory and trust services to establish and maintain individual and organizational provider identity, based on the provider directory and certificate management
guidance of the Direct Project and S&I Framework to every extent possible.

7) Pilot an implementation of the federated directory and trust services in 2012.

8) Operationalize the federated directory and trust services in 2013 based on lessons learned during the pilot.

9) Encourage HIOs and service providers in California to participate in directory and trust services as a requirement of the infrastructure grant program through 2012 and 2013, and using market pressures on vendors to support an open implementation standard.

Directory and trust services are an important part of a larger model agreement program that will provide HIOs and service providers with a model for policies for exchange of health information. Participation in directory and trust services is an important component of these model agreements for inter-HIO exchange, as the services established a shared basis for trusted exchange.

1.9.3.5 INTERSTATE EXCHANGE

**California is a core member of the Western States Consortium, which is working to establish the policies and procedures for managing and communicating provider identity for interstate exchange.** Participation in the Western States Consortium is strategically important to California to ensure that its strategy and plan for directory and trust services aligns with the requirements for interstate exchange.

The use case adopted by ONC for the Western States Consortium is limited to the directed exchange, using NwHIN Direct, of health information between providers for treatment purposes. The demonstration planned for the end of 2012 will be limited to this narrow use case as well. However, California and Oregon, the lead states in the Western States Consortium, have agreed to consider other use cases, including query/response exchange, exchange between other stakeholders, and other exchange purposes as we outline the policies and procedures that govern interstate exchange. California will apply these considerations to our own directory and trust services.

To further support inter-HIO exchange of care summaries, California will:

10) Extend the pilot for directory and trust services to include a demonstration with the Western States Consortium for interstate exchange using Direct by the end of 2012.
11) Apply the lessons learned in this demonstration as we move directory and trust services to production.

1.9.3.6 PROVIDER OPTIONS FOR CARE SUMMARY EXCHANGE

California’s strategy for unaffiliated providers is dependent upon every provider having access to an HIO or service provider. Despite numerous successful HIOs, many geographies still exist within California that have no HIO presence, and many providers do not see value in becoming a member of an HIO.

To offer options to these providers, California will establish a “HISP marketplace,” a qualified list of HISP vendors providing Direct services that meet a set of consensus requirements for directed exchange of care summaries (and other health information) in California. Other states have adopted a similar approach, and lessons learned from these initiatives will be applied to our approach in California.

The activities of the Direct Trust and other groups are working to establish a set of criteria by which Direct HISPs may be accredited and trusted. We will leverage the activities of these groups as well, avoiding a special set of requirements for HISP vendors in California to the extent possible. An important requirement, however, will be to participate fully in the directory and trust services key to the trust environment in California and our approach to interstate exchange.

California will continue to promote Direct services within HIOs in California as well. It is possible – perhaps likely – that HIOs will offer Direct services not only to their regional constituents, but also to providers outside of their direct geography as a business advantage to support sustainability. Therefore, HIOs may participate in the HISP marketplace.

In order to establish options for providers, California will:

1) Create a list of qualified HISP providers by Q3 2012.

2) Continue to fund expansion of existing HIOs to implement Direct for directed exchange of care summaries through 2012 and 2013, with a focus on enabling patient summary exchange during transitions of care.

3) Link each HISP, whether HIO or independent vendor implementation, to directory and trust services beginning in 2012.

4) Monitor the market demand and adoption of Direct exchange and Direct HISP services.
1.9.3.7 TIMELINE AND MILESTONES

Table 29 lists the consolidated milestones for implementing the strategy to support care summary exchange.

### TABLE 29: SUPPORT CARE SUMMARY TIMELINE

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish a list of qualified vendors to establish HISP marketplace.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Demonstrate care summary exchange at California Connects, a vendor and HIO exhibition of standardized exchange in California.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Establish architecture and interface specifications for federated directory and trust services.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Establish policies and procedures for directory and trust services.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Establish policies and procedures for interstate exchange through Western States Consortium.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Establish pilot implementation of directory and trust services.</td>
<td>Q4 2012</td>
</tr>
<tr>
<td>Demonstrate interstate exchange using Direct and directory and trust services through Western States Consortium.</td>
<td>Q4 2012</td>
</tr>
<tr>
<td>Demonstrate care summary exchange using federated directory and trust services and directed and query/response exchange at 2013 Interoperability Showcase.</td>
<td>Q1 2013</td>
</tr>
<tr>
<td>Deploy production directory and trust services.</td>
<td>Q2 2013</td>
</tr>
<tr>
<td>Support at least one additional Direct implementation within a California HIO.</td>
<td>Q3 2013</td>
</tr>
<tr>
<td>Link all HISP providers and HIOs to production directory and trust services.</td>
<td>Q2 2013</td>
</tr>
</tbody>
</table>

1.9.4 IMMUNIZATION REGISTRIES

California has incrementally developed a collaborative system of regional and county immunization registries, collectively known as the California Immunization Registry (CAIR), as described on page 121. Within each region, CAIR allows users to see patient demographic data, immunization history, immunization forecasting, contraindications, overdue immunizations, and other functions. The majority of exchange between immunization registries and EHRs involves the transfer of updated immunization data. For this kind of information, prompt, rather than real-time, exchange is sufficient.

Agency has established as a consensus standard the specification identified in Stage 1 Meaningful Use EHR certification criteria for submitting immunization records. The State strategy is to utilize community and enterprise HIOs to
aggregate immunization records from EHRs among their data sharing partners, submitting them using a single public health gateway service which interfaces to CAIR and/or individual regional and county registries. Providers that do not have access to an HIO may connect to the gateway directly. This single gateway will provide a uniform interface that insulates individual EHR or HIE implementations from developing immunization registry capabilities, and properly routes among differing registry jurisdictions.

While initially focused on providing a capability for immunization registries, this project will provide a general approach to accessing other public health resources, such as reportable disease registries and surveillance systems.

**TABLE 30: IMMUNIZATION PROJECT TIMELINE**

<table>
<thead>
<tr>
<th>Milestone Name</th>
<th>Expected Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish architecture and publish technical implementation guide for reporting immunizations to regional registries.</td>
<td>Q2 2012</td>
</tr>
<tr>
<td>Establish and publish methodology for virtual queue of EPs/ EH's that passed testing and are waiting for production reporting of immunizations.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Begin implementation of immunization gateway.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Begin pilot testing of immunization gateway.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Enter production, accepting immunizations conforming to meaningful use standards, in all jurisdictions and counties.</td>
<td>Q4 2012</td>
</tr>
</tbody>
</table>

**1.9.5 BUILD CAPACITY OF PUBLIC HEALTH SYSTEMS**

California organizes public health reporting around 61 local health departments. Most do not currently have the capability for receiving electronic lab results. The strategy for building the capacity for public health reporting has two primary activities:

1) Extend the immunization gateway concept to provide a single reporting mechanism for all providers and labs.

2) Provide technical assistance to local health departments to enable them to consume electronic lab results submitted to the gateway.

Like immunization reporting, submission of electronic lab results will adopt the standards called out in Stage 1 Meaningful Use certification criteria, and establish a single gateway service for all submissions utilizing community and enterprise HIOs as aggregators where they exist. This approach simplifies the
reporting requirements for providers, and eases compliance with meaningful use requirements.

The gateway will take receipt of electronic lab results from providers. To enable receipt by local health departments, the State will initiate a technical assistance program to enable existing public health systems to receive electronic lab reports routed from the gateway. The intent is to continue to use standards required by Stage 1 Meaningful Use certification criteria so as not to create a California-specific standard.

**TABLE 31: PUBLIC HEALTH PROJECT TIMELINE**

<table>
<thead>
<tr>
<th>Milestone Name</th>
<th>Expected Completion Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Establish architecture for reporting lab results for reportable conditions that extends the immunization gateway and can be used in all counties and jurisdictions.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Develop draft implementation guide for public health reporting.</td>
<td>Q3 2012</td>
</tr>
<tr>
<td>Begin implementation of public health reporting gateway.</td>
<td>Q4 2012</td>
</tr>
<tr>
<td>Begin pilot testing of public health gateway.</td>
<td>Q1 2013</td>
</tr>
<tr>
<td>Enter production, accepting lab results conforming to meaningful use standards, in all jurisdictions and counties.</td>
<td>Q1 2013</td>
</tr>
<tr>
<td>Establish a technical assistance program for local health departments.</td>
<td>Q4 2012</td>
</tr>
<tr>
<td>Initiate a technical assistance program for local health departments.</td>
<td>Q4 2012</td>
</tr>
<tr>
<td>Enable receipt of electronic lab results in all local health departments.</td>
<td>Q3 2013</td>
</tr>
</tbody>
</table>

**1.9.6 ENABLE E-REPORTING OF MU AND CQM TO MEDICARE AND MEDI-CAL**

Both CHeQ and the new CMIO will be instrumental in development of required Medi-Cal and Medicare reporting. We will comply with future requirements as they are defined.
1.9.7 HIE FUNDING PROGRAMS

The HIE funding program aims to stimulate robust HIE in California for provider achievement of Meaningful Use exchange objectives, coordinated care to improve health outcomes, and efficient reporting to state and federal agencies. Funding is targeted toward HIE initiatives, provider organizations, pharmacies, and laboratories.

Expansion Funding Program

The HIE Expansion Funding Program supports community-based organizations to increase robust exchange between unaffiliated health care entities within regional medical service areas in California. By supporting HIE organizations in the implementation of key milestones (e.g., developing and testing interfaces, obtaining signed participation agreements, performing outreach to providers), the goal is to increase the adoption and use of HIE services, improve care delivery and coordination, and enable providers to meet Meaningful Use exchange objectives.

Five HIE organizations -- LANES, OCPRHIO, EKCITA, Redwood MedNet, and NCHIN -- were awarded a total of $3.1 million dollars for 18-month projects lasting from June 2011 through November 2012. Expansion Awardees and other community HIOs support the following PIN priorities in California:
TABLE 32: PIN PRIORITIES FOR EXPANSION Awardees

<table>
<thead>
<tr>
<th>Transaction Type</th>
<th>Total # of Community-based HIOs offering (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2012</td>
</tr>
<tr>
<td>PIN Priority Areas:</td>
<td></td>
</tr>
<tr>
<td>Lab Results Delivery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Patient Care Summaries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Immunizations (Public Health)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td>ePrescribing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Syndromic Surveillance (Public Health)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

New Funding Programs

CHeQ, in collaboration with Agency, will offer four new funding opportunities directed toward HIE initiatives and providers represented in Table 29 below. A call for letters of intent was released in May 2012 and proposals were reviewed over the summer. Each of these new programs will require awardees to address ONC PIN priorities.
### TABLE 33: NEW FUNDING PROGRAMS

<table>
<thead>
<tr>
<th>Grant Name</th>
<th>Planning</th>
<th>Infrastructure</th>
<th>Innovation</th>
<th>Interface Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Funds Available*</td>
<td>$200,000</td>
<td>$2.5 million</td>
<td>$500,000</td>
<td>$1 million</td>
</tr>
<tr>
<td>Award Amounts</td>
<td>$25,000, plus technical assistance from CeC-engaged consultant</td>
<td>Up to $500,000</td>
<td>Up to $250,000</td>
<td>Up to $10,000 per interface; awards up to $200,000</td>
</tr>
<tr>
<td>Purpose</td>
<td>Community planning and governance development for data exchange within 12 months</td>
<td>Implementation of HIE infrastructure for initiatives with high population impact and/or broad geographic scope</td>
<td>Innovative projects with potential to produce breakthrough results and to scale statewide</td>
<td>Support and technical assistance for interfaces between HIOs**, provider EHRs, pharmacies, labs, and public health systems</td>
</tr>
<tr>
<td>Length of Projects</td>
<td>Up to 6 months (plus additional 6-month reporting period)</td>
<td>1-6 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eligible Prime Applicants</td>
<td>HIOs, HIE initiatives, provider organizations, local government; not restricted to nonprofit organizations; vendors may not serve as prime applicants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exchange Goals</td>
<td>Exchange across unaffiliated organizations and, whenever possible, distinct electronic health record (EHR) systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Priority-Area Requirements***</td>
<td>Plan for exchange in 3 out of 4 priority areas</td>
<td>Exchange in 2 out of 4 priority areas</td>
<td>Exchange in 1 out of 4 priority areas</td>
<td>Exchange in 1 out of 4 priority areas</td>
</tr>
<tr>
<td>Partner Commitment</td>
<td>Binding letters of commitment to participate in planning process</td>
<td>Signed participation agreements or Business Associate Agreements (BAAs) for data exchange</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching-Fund Requirement</td>
<td>50% of CeC award (cash only)</td>
<td>50% of CeC award (cash only)</td>
<td>25% of CeC award (cash only)</td>
<td>TBD</td>
</tr>
</tbody>
</table>

*Funding is contingent upon continued availability of federal HIE Cooperative Agreement funds.

**This includes interfaces between separate health information exchange organizations (HIOs), not just between HIOs and the other types of entities listed here.

***Applicants must familiarize themselves with the ONC Program Information Notices (PINs: ONC-HIE-PIN-001, ONC-HIE-PIN-002, ONC-HIE-PIN-003) released to state HIE Cooperative Agreement Program award recipients.
Four planning awardees have been announced and contracting discussions are underway with potential awardees in other categories.

The ONC exchange priorities detailed in PINs 001 and 002 are summarized below:

1. **E-prescribing**
2. Enabling providers to receive **structured lab results**
3. Facilitating transitions of care by sharing **patient care summaries** across unaffiliated organizations or making similar data available through other means
4. Building the capacity of **public health systems** to accept electronic reporting of immunizations, notifiable diseases, and syndromic surveillance from providers

CHeQ will work closely with grantees to integrate their activities targeting ONC PIN priorities with allied efforts in each of these areas.
2. TRACKING PROGRESS
2. TRACKING PROGRESS

Agency acknowledges that demonstrating progress and the tangible results of implementation efforts is critical to encouraging participation in HIE, maintaining provider/user buy-in and trust, and establishing the long-term sustainability of health information exchange. Both state and national stakeholders seek to understand how the HIE Cooperative Agreement funds are enabling exchange and supporting providers meet Meaningful Use in California.

Agency is monitoring and tracking key Meaningful Use HIE capabilities in the state. Table 34 provides the measures and targets for key measures outlined by the ONC for reporting progress.

TABLE 34: TRACKING PROGRAM PROGRESS

<table>
<thead>
<tr>
<th>Program Priority</th>
<th>Status as of December 2011</th>
<th>Target for December 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. % of pharmacies participating in e-prescribing</td>
<td>89.5%</td>
<td>94%</td>
</tr>
<tr>
<td>2. % of labs sending electronic lab results to providers in a structured format</td>
<td>34% (June 2012)</td>
<td>50%</td>
</tr>
<tr>
<td>3. % of labs sending electronic results to providers using LOINC</td>
<td>13% (June 2012)</td>
<td>30%</td>
</tr>
<tr>
<td>4. % of hospitals sharing electronic care summaries with unaffiliated hospitals and providers</td>
<td>23.6%</td>
<td>45%</td>
</tr>
<tr>
<td>5. % of ambulatory providers electronically sharing care summaries with other providers</td>
<td>43.5%</td>
<td>60%</td>
</tr>
<tr>
<td>6. Public Health agencies receiving ELR data produced by EHRs or other electronic sources. Data are received using HL7, 2.5.1 LOINC and SNOMED. Yes/No or %</td>
<td>2%</td>
<td>50%</td>
</tr>
<tr>
<td>7. Immunization registries receiving electronic immunization data produced by EHRs. Data are received in HL7 2.3.1 or 2.5.1 formats using CVX code.</td>
<td>15%</td>
<td>100%</td>
</tr>
<tr>
<td>8. Public Health agencies receiving electronic syndromic surveillance hospital data produced by EHRs in HL7 2/3/1 or 2.5.1 formats (using CDC reference guide).</td>
<td>7%</td>
<td>15%</td>
</tr>
<tr>
<td>9. Public Health agencies receiving electronic syndromic surveillance ambulatory data produced by EHRs in HL7 2.3.1 or 2.5.1.</td>
<td>7%</td>
<td>15%</td>
</tr>
</tbody>
</table>
3. HIE SUSTAINABILITY PLAN
3. HIE SUSTAINABILITY PLAN

3.1 Overview

As discussed in the Executive Summary of this document, the technological landscape of California is very complex. With very different models of HIE throughout the state, and a very diverse geography and population, California has experienced both many challenges and many successes. **Much time and thought has been given toward how to make California’s HIE efforts sustainable for the foreseeable future, thus improving the health and well-being of its citizens for many years to come.**

3.1.1 STATE INFLUENCE AT THE “PAYER” LEVEL

California is focused on sustaining information-sharing efforts at multiple levels of influence. **It is critical to sustainability that providers unable to make investments in HIE infrastructure are not left behind as private health systems with financial means develop enterprise HIE connecting their provider network.** However, this circumstance is a potential reality without targeted investments in communities supported by providers serving the publically insured and safety-net populations.

*Private Health Plans*

Private or enterprise HIEs are being developed currently by many mid-size to large health systems. These investments are being made, and will be sustained, as a cost of doing business. Referring physicians increasingly demand that diagnostic test results are delivered electronically to their office electronic health record (EHR) systems. Clinical care summaries must soon follow in order to achieve Meaningful Use and collect EHR incentive payments. Anticipated payment reform initiatives also require HIE capabilities for more effective coordination across care settings, which in turn supports emerging business models in healthcare. Private health systems will continue to build out enterprise HIEs to meet these growing business needs and recruit community physicians to participate as affiliated data trading partners.

*Public Providers*

Public hospitals, community health centers, and other providers that primarily serve publically insured and safety-net populations operate on much thinner or even negative margins when compared to providers serving patients under private health plans. However, safety-net providers face the same demands for diagnostic test results flowing into EHRs and clinical care summaries shared electronically among participants in coordinated care models. As a result, many communities have chosen to organize public or community-based health information organizations (HIOs), pooling limited resources to develop and manage shared HIE capabilities necessary to address the healthcare needs of local populations.
Incorporating HIE into Public Health Plans and Managed Care

A number of emerging public HIOs in California include public health plans and Medicaid managed care plans as primary participants and supporters of local HIE initiatives. The success of these initiatives suggests an approach to sustainability of public HIOs and supports the goal of keeping pace with private HIEs connecting private health systems.

While many HIE start-up costs will be covered under the HIE Cooperative Agreement grant and 90/10 Administrative funds, **long-term sustainability is the key to achieving the benefits of HIE to patient care.** As Medi-Cal beneficiaries are transitioning to managed-care plans across California, we have an opportunity to incorporate health IT adoption and health information exchange requirements into these plans. Managed care plans are early representations of anticipated payment reform models, including integrated care for dual eligibles, which demonstrate an increasing demand for HIE and can clearly serve as HIE sustainability partners for public HIOs in regional communities.

California identifies similar opportunities for public payors to influence the HIE sustainability across the state. Like Medi-Cal plans, Children's Health Insurance Programs at the state and county level share the need for those covered to have their health information available at the point of care. This would obviously include a strong need for children’s immunization records to be readily accessible in electronic format. Nearly one million children are covered by these public health plans.

In addition to the previous programs, other opportunities also exist. **The California Public Employees Retirement System (CalPERS) is the third largest purchaser of health care in the nation, covering more than 1.3 million people.** The California Correctional Health Care Services is responsible for another 170,000 lives incarcerated in state prisons. In each of these cases, as in the case of Medi-Cal programs, there is the opportunity for the HIT Coordinator to work with state of California leadership to deliberately incorporate health IT adoption and health information exchange requirements into these plans, consistent with other state and federal healthcare reform initiatives.

### 3.1.2 ALIGNMENT WITH THE MEDI-CAL EHR INCENTIVE PROGRAM

According to CMS’s Ten Guiding Principles for 90%, HIE activities should be directly related to the Medicaid EHR Incentive Program. The State Medicaid Director’s (SMD) letter from June, 2010, says that HIE promotion activities must:
• Have costs that are divided equitably across other payers base on fair share principles and are appropriately allocated
• Leverage efficiencies with the ONC HIE funding
• Be developmental and time-limited in nature.

The Medi-Cal EHR Incentive Program is aligning its benchmarks, approaches, and performance goals with the ONC funded Cooperative Agreement Grant Program. Agency anticipates that ONC and CMS will jointly evaluate the state’s HIE sustainability model.

DHCS collaborates in full partnership with Agency (and serves on multiple internal and external Agency stakeholders’ HIE committees) to define an HIE model that will include the following characteristics:

• Plays a significant role in the electronic reporting of Meaningful Use and clinical quality measure data from Medi-Cal providers to the state and CMS;
• Is directly focused on enabling providers to meet meaningful use requirements, such as pharmacy, lab and clinical summary exchange;
• Provides immediate value to providers through affordable services that help them meet meaningful use requirements and coordinate and improve patient care;
• Is governed by state-level policies, accreditation processes and exchange standards that are aligned with federal policy; and
• Is actively engaged with state government.

California’s plan to promote and support health information exchange will leverage the HITECH 90% FFP as part of an overall financial plan that incorporates multiple funding sources to develop and maintain HIEs between hospitals, health systems and individual practices.

This will likely include various federal and state funding sources, as well as contributions by commercial payers, large employers, integrated delivery networks, and associate entities such as laboratories and registries.

Entering into public/private partnerships to develop HIE infrastructure makes sense as the efficiencies and quality improvements associated with HIE build. In addition, the governance and risks associated with developing HIE infrastructure, such as seeking provider buy-in, should not be borne predominantly by a single payer. HIE strategies need to be developed with broad stakeholder involvement with the Medi-Cal program to ensure that the marketplace is balanced to support both public and private health systems’ business cases.
While engaging the state’s health plan stakeholders, the state can remind payers that the Medical Loss Ratio final rule published on December 7, 2011, makes references to health information technology expenses that a private insurance may include in the share of the premium that it must devote to health care services and quality improvement activities (QIA). Under § 158.150(a), health insurance issuers are required to submit an annual report to the Secretary documenting their expenditures for activities that improve health care quality.

What defines a QIA? In order for an activity to be considered a QIA, it must be designed, among other things, to improve health quality and increase the likelihood of desired health outcomes in ways that are capable of being objectively measured and of producing verifiable results and achievements. In addition, the activity must be primarily designed to:

- improve health outcomes
- prevent hospital readmissions
- improve patient safety
- implement, promote and increase wellness and health activities.

By taking a collaborative and informed approach with the Medi-Cal EHR Incentive Program, federal and state investments will be carefully and measurably directed to develop and support HIE. Whether HIE is employed as part of Meaningful Use of EHRs, for enhancing care coordination and medical home strategies, or as enablers of new provider payment models, HIE is an essential tool for improving individual and population health and reducing unnecessary costs.

### 3.2 Conditions for Sustainability of Health Information Exchange

**Trust Environment for HIE**

Uncertainty regarding legal and policy issues is holding many organizations back from participating in robust health information exchange (HIE) with unaffiliated entities in California. Ongoing confusion over the variable interpretation of state and federal law and associated concerns over liability arising out of data sharing are at the heart of this dynamic. Please refer to Section 5 to read more about how California is tackling these privacy and security issues.

**According to a recent assessment performed for CeC, there is general acknowledgement of the need to underpin all stakeholder relationships where Individually Identifiable Health Information (IIHI) is being exchanged with an appropriate legal framework.** However, the availability and application of trusted legal agreements in support of health information exchange is limited. Please refer to Section 5.3 for a detailed explanation of how California is working toward ensuring a trust environment for HIE.
3.2.1 ADVANCE CARE COORDINATION MODELS AND PAYMENT REFORM INITIATIVES

California is continuing to advance changes and transformations in the delivery of health care that will have the opportunity to leverage and support health information exchange. Recognizing the importance of policy to drive improvements that will require transformations, California is participating in a number of programs that are driving changes.

Examples of these programs include components of the Medicaid 1115 Waiver such as the Delivery System Reform Incentive Pool (DSRIP) Program, and the transitioning the Seniors and Persons with Disabilities (SPD) population into Medi-Cal Managed Care. Another example is a pilot program to integrate care for dual eligible individuals. While these programs were initiated to support care transformation, California also believes that these programs highlight the need for coordination of care and thus potential need for health information exchange. Moving forward, California will explore potential levers with programs such as these to identify policies that will support increased demand for health information exchange and will streamline reporting requirements to local, state and federal governmental entities.

Here are a few of these programs:

- **Advance Patient Safety in California’s Public Hospitals.** The Delivery System Reform Incentive Pool (DSRIP) Program is an important component of the 1115(a) Medicaid Demonstration program, “Bridge to Reform.” A significant portion of the DSRIP Program is devoted to patient safety. Details of this work can be found at: [http://www.dhcs.ca.gov/provgovpart/Pages/DSRIP1.aspx](http://www.dhcs.ca.gov/provgovpart/Pages/DSRIP1.aspx). Two areas of focus for all 17 public hospital systems are: (1) improved detection and management of sepsis (serious, life-threatening blood infections); and (2) central line-associated bloodstream infection prevention. In addition, each public hospital system will be implementing other quality improvement initiatives that are relevant to the individual institutions. Each quality improvement focus will: (1) specify a measurable impact on population health; (2) have a strong evidence base; and (3) have the potential to reduce morbidity, mortality, or both in the public hospital population.

- **Improve Care Coordination for the Seniors and Persons with Disabilities Population.** The 1115 Waiver allows DHCS to achieve care coordination, better manage chronic conditions, and improve health outcomes by transitioning the Seniors and Persons with Disabilities (SPD) population into Medi-Cal Managed Care. Beginning June 2011, DHCS began enrolling the SPD population into managed care in 16 counties. The Governor’s 2012-13 proposed budget proposes to expand Medi-Cal managed care statewide starting in June 2013. The proposal...
combines strong beneficiary protections with centralized responsibility for the broader continuum of care. This combination will promote accountability and coordination, align financial incentives and improve care continuity across medical services, long-term services, and behavioral health services.

- **Integrate Care for Dual Eligible Individuals.** DHCS is developing a pilot program to test innovative payment and person-centered delivery models that integrate the full range of acute, behavioral health, and long-term supports and services for members that are dually eligible for Medicare and Medi-Cal. DHCS will pursue newly available federal funding to support this work through the federal Coordinated Health Care Office. The pilot goals are to: 1) coordinate Medicare and Medi-Cal benefits across care settings; 2) maximize the ability of dually eligible individuals to remain in their homes and communities with appropriate services and supports in lieu of institutional care; and 3) minimize or eliminate cost-shifting between Medicare and Medicaid. DHCS aims to achieve significant efficiencies and improved care for members that are dually eligible.

### 3.2.2 FOSTER SYSTEMIC CHANGES TO SUPPORT HIE

Now more than ever, it’s necessary to support patient-centered care, self-management and effective use of health care resources. Overall, electronic PHRs, together with health information exchange solutions, may be essential for improved quality of care and the nationwide health information network. Importantly, patients seem to be ready to use PHRs to help them manage their personal health information.

The improvements in quality when using a PHR include safety, timeliness, effectiveness, efficiency, equity, and patient centeredness of health care. The concept of a PHR, however, should not be limited to an information repository, but should stimulate actions that support personal health. A PHR has the potential to improve patient-provider relationships, discussions, and shared decision-making. Personal health records can supplement and improve patient and family access to information for health and wellness. The comprehensive nature of PHRs empowers patients to understand their health and the care they receive — while facilitating the communication between the patient and the care team.

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15 PF Brennan, S. D. (2010). Project HealthDesign: Rethinking the power and potential of personal health records. 43.

**Vulnerable Populations**
California has identified key programs aimed at fostering systemic changes that are necessary to support health information exchange in two vulnerable populations: foster children and seniors with disabilities requiring home health care.

**California’s goal:** To improve the quality and continuity of care for California’s foster children and long-term care patients using personal health record (PHR) technology to enable connectivity and information sharing across multiple care systems, provider types, and state and local health agencies.

**Our progress so far toward this goal:**
- Determined the specific size, scope and need for PHR deployment in two vulnerable populations: foster care and long-term care (See ONC Bold Audacious Goal at [http://ehealth.ca.gov/MakingHI EHappen/CaliforniaseHealthPlans.aspx](http://ehealth.ca.gov/MakingHI EHappen/CaliforniaseHealthPlans.aspx))
- Collaborated across state departments and private sector projects to determine state IT infrastructure requirements for information exchange via PHR technology.
- Identified key privacy issues that need to be addressed.

Ongoing projects involving these two populations exist, which are expanding to include the use of personal health records (PHRs). While evidence regarding the benefits of PHRs is still limited, studies have shown that disease-specific HIT applications help engage patients in their healthcare and improve the delivery of traditional clinical interventions.  


**Foster Care**
In the pediatric population of foster children, PHRs can provide pediatricians with vital information on events occurring at home and in school, as well as connect immunization and newborn screening registries with all relevant stakeholders (patients, providers and regional health information organizations). **A goal is to create a PHR as soon as a child enters the foster care system that will include records since birth, and will be used for the rest of life.** In addition, PHR for foster children can be expanded to include a safe place to store other important documents that these children need, such as their birth certificate. The PHR should be able to function as both a repository of health history and a system to ensure proper preventive services are completed, such as immunizations. In addition to benefits to the child, a PHR also has the potential to benefit society, supporting efforts such as immunization registries, bio-surveillance, and public health monitoring.\(^{20}\)

**Health IT Education**

We believe Health IT education is a key component of HIE sustainability. However, California is currently lacking in health professional training programs; we are working to change this. Clinician education and training can be encouraged through a number of avenues, including professional education and postgraduate clinical training experiences. Introducing concepts of health IT safety early in professional clinical training allows clinicians to learn how to use and practice delivery of care safely and effectively with an existing technology.

Almost all health IT technologies are configured differently. Therefore, it’s also important to become trained in a local context, such as a hospital, clinic, or pharmacy setting. **We believe that specific and comprehensive programs that focus more on inter-professional use of health IT are needed, and that health professional curriculum that provides inter-professional, standardized and consistent health IT training will improve successful adoption and use of health IT and lead to improvements in patient safety.**

Providers, institutions, and pharmacies need help now to improve increased adoption and effective use of EHRs and HIE. These stakeholders cannot wait for the training to catch up to their current needs. As a result, a combination of academic training for health professional students and on-site technical support for existing providers and pharmacies will be necessary to improve the effective use of health IT.

There are several barriers to effective use of health IT:

- Systems and providers must adopt it.

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\(^{20}\)NM Lytle, J. S. (n.d.). *Uncovering Interests and Concerns About Personal Health Record Use By Individuals with Disabilities: Results of a Preliminary Survey.* Retrieved September 16, 2011, from American Association of People with Disabilities:
• Users must be appropriately trained to use health IT, and barriers to effective use need to be identified and resolved based on system-specific needs.

• Health IT may introduce new safety concerns not previously encountered which will need to be addressed.

Although adoption of health IT is a critical first step to promote improved patient safety, it is widely understood that merely installing health IT in health care organizations will not result in improved care. The design, implementation and use of health IT will affect its safe performance. Safer implementation and use of health IT is a complex, dynamic process that requires a shared responsibility between vendors, health care organizations and the public sector. We need for an organized, trained workforce to support enhanced adoption and improved use of health IT and HIE.

Maximizing the Safety of Technology-based Healthcare

In this time of rapid adoption of Health IT, how can private and public organizations maximize the safety of technology-based health care? The Office of the National Coordinator for Health Information Technology (ONC), asked the Institutes of Medicine (IOM) to establish a committee to find out. In response, the IOM established the Committee on Patient Safety and Health Information Technology, which released a report on November 8, 2011. The report, entitled Health IT and Patient Safety: Building Safer Systems for Better Care, identified the lack of data as a major barrier in quantifying the harm that might result from health IT. It cited several reasons health IT–related safety data are lacking, including the absence of quantitative and qualitative measurements of errors and the absence of a central repository (or linkages among decentralized repositories) to collect, analyze, and act on information related to safety of this technology.

Partners in E: Promoting Safer Use of Electronic Health Records (EHRs) for Better Care

As introduced in Section 1.8, Partners in E is an innovative program that is important to the success of HIE sustainability in California. This program is modeled after two successful teaching programs developed by the UCSF Department of Clinical Pharmacy on both state and national levels. These programs have proven results and extensive literature supports their success. Further, they are sustainable with the training programs continuing well beyond the duration of funding.

Partners in E will use a similar process for evaluation, education, and outreach; here we’ll describe in more details the goals we introduced earlier in this document.

Goal 1: Educate and deploy a pharmacy student workforce with the attitudes, knowledge, and skills required to identify and resolve barriers to e-prescribing
in community pharmacies, a critical component of health IT adoption in California. This goal is to be accomplished by supporting successful health IT adoption in community pharmacies.

Establish a Pharmacy Technical Assistance Center (Rx-TAC) at California Schools of Pharmacy:
Working in consultation with California’s Regional Extension Centers (CalHIPSO, HITEC-LA and COREC), local pharmacy associations, provider groups and other stakeholders, California schools of pharmacy will develop Pharmacy Technical Assistance Centers (Rx-TACs). The goal of these newly established organizations will be to provide onsite technical support for pharmacies identified in geographic regions having large Medi-Cal populations that need and desire assistance to facilitate their adoption of e-prescribing. To meet this need, we will create and implement an innovative education and outreach program designed to train and deploy student pharmacists, under faculty supervision, to provide technical assistance to independent pharmacies enrolled in the Medi-Cal program. Serving as e-prescribing and medication safety advocates, these pharmacy students will work with pharmacists and their staff to: (1) identify and resolve technological, logistical, workflow and other barriers that preclude pharmacies from adopting e-prescribing; (2) identify medication safety errors resulting from e-prescribing; and (3) identify common problem areas across commonly used systems to facilitate more rapid scalability of the program.

Selection of the first Pharmacy Technical Assistance Center (Rx-TAC):
Based on the success of previous programs (Partners in D and Rx for Change), UCSF will be the first to pilot and then establish a program of outreach, resources and curricula to disseminate to other California Schools of Pharmacy. This Rx-TAC will work with CalHIPSO in Oakland to support community practices in Northern California, especially the Silicon Valley. Staff will be hired to support this new entity including a health IT pharmacist expert, a research analyst and an administrative assistant. These personnel will oversee the outreach activities of the Rx-TAC. Another California school of pharmacy will be selected to support the Southern California region working collaboratively with the Southern California REC’s (HITEC-LA, and COREC).

Initially, the training program will be developed, implemented, and evaluated at UCSF. The foundational training module will be an elective course entitled, “Health Information Technology for Pharmacists.” Open to UCSF pharmacy students, this course will have two components: (1) a didactic component, which will consist of classroom lectures and case-based laboratory work at the UCSF Pharmacists’ Informatics Center; and (2) an experiential component, consisting of student outreach activities at community pharmacies requesting help in accelerating e-prescribing adoption.

Lecture content will be supplemented with interactive case studies and role playing sessions designed to: (1) improve students’ knowledge about and
attitudes toward health IT, e-prescribing, and medication safety; (2) enhance students' confidence about providing technical assistance to pharmacists and their staff; (3) improve student's ability to engage vendors, providers and other stakeholders when resolving e-prescribing barriers; and (4) improve students' ability to identify medication errors resulting from e-prescribing.

Community outreach will occur weekly with adopted community pharmacy sites. Pharmacy students will be the primary group deployed to provide the on-site technical support for the community pharmacists and staff. Each week, pharmacies participating in the outreach will be required to complete a problem list and input into an issues database. This problem list will include (in priority order) the key issues the staff faced in filling e-prescriptions that week. A brief description of the problem, steps taken to resolve the problem, and stakeholders contacted (physician, software vendor, EHR vendor, etc.) will be included. The students will use this worksheet as the basis for the technical support for the community pharmacy. Unresolved problems and high priority items will be addressed by the student first. If the student cannot resolve the problem for the community pharmacy on that day, he or she will provide the support off-site with supervision provided by the health IT pharmacist overseeing the UCSF outreach program (at the Pharmacy TAC). When the problems are resolved, they will be coded, collected, and stored in a central database. Follow-up and resolution of the problems will be discussed on-site with all pharmacy staff to maximize transparency and minimize duplication of work.

In addition to the weekly meetings with the pharmacies, the student will also meet with the health IT expert to report on the progress of the program and to ensure appropriate oversight, accurate data collection, and timely resolution of issues.

Dissemination to other California Schools of Pharmacy
Once implemented and evaluated, all materials from the Health Information for Pharmacists course (lecture content, laboratory-based exercises, and experiential training modules) will be disseminated to eligible pharmacy schools across California for adaptation to their own health IT-learning environments. All outreach activities will be coordinated with Regional Extension Centers (RECs), pharmacy professional associations, and CHeQ to ensure the successful adoption and use of health IT in pharmacies across California.

While all schools will have the opportunity to receive the training materials for the Health IT for Pharmacists course, not all schools will be selected to provide on-site outreach support as a Rx-TAC. Schools may be selected to participate in the on-site outreach program only if they have a geographic proximity to a high need area (e.g., Los Angeles and Orange Counties) and provide specific deliverables demonstrating a commitment to the program. These deliverables include:
1. Full integration and adoption of curriculum by the school (e.g., as an official elective or required course);
2. Development of an outreach plan and policies and procedures for deployment of students as on-site outreach support for community pharmacies;
3. Identification of a dedicated faculty person committed to participating in teaching the Health IT for Pharmacists course and overseeing its outreach component;
4. Accurate and complete data collection on participating students’, pharmacists’, and pharmacy staff’s knowledge, attitudes, skill mastery as it relates to health IT and e-prescribing;
5. Contribution to the data repository on health IT patient safety (see Goal 3 below);

**Goal 2:** Create a cross-disciplinary learning environment for health IT among health professionals that is focused on shared learning, maximizing transparency and minimizes the burden of Electronic Health Record (EHR) adoption to providers. This goal is to be accomplished by developing and disseminating and interdisciplinary health IT curriculum throughout California.

A number of leading health professional organizations, including the American Society of Health-System Pharmacists, the American Medical Informatics Association and the American Nursing Association, have emphasized the need for informatics-trained clinicians.\(^{14-16}\) In 2003, the IOM convened a multidisciplinary panel of healthcare professional leaders to identify strategies for reforming clinician education. IOM identified five core competencies for all health professionals, one of which was using the tools and techniques of informatics.\(^{17}\)

Nationwide, there is a lack of formal informatics training provided to health professional students, but there is consensus among health professional students regarding the need for proper informatics training.\(^{18-20}\) In schools that do provide such education, instruction is typically taught within individual schools. Such siloed training does not permit health professional students to learn about the barriers and opportunities that health IT presents across disciplines. To redress this significant gap in clinician training, we propose to develop and disseminate a novel interdisciplinary health IT curriculum throughout California.

In our proposed model, collaboration and shared learning among medical, nursing and pharmacy schools will enhance interdisciplinary collaboration and improve the scalability of health IT. Inter-professional training programs will create a cross-disciplinary learning environment for health IT as part of their curriculum. UCSF will collaborate with the University of California, Davis, Schools of Medicine and Nursing to develop a health IT inter-professional training curriculum. This curriculum will be used at train-the-trainer sessions to support the implementation of health IT in selected pharmacy, medical and
nursing programs in California. This curriculum will help train a clinician workforce equipped with the attitudes, knowledge, and skills necessary to accept health IT in their work environments.

**Goal 3:** Evaluate the current state of health IT on patient safety and identify strategies to minimize the risk of its implementation and use. To be accomplished through the development of a statewide health IT incident reporting system to identify health IT related errors and strategies utilized to resolve and prevent future errors from occurring.

There is not enough research available on the unforeseen adverse events caused by new health IT. The November 8, 2011 IOM report made clear that improved documentation of these incidents with an understanding of the root cause, circumstances, and environment associated with adverse events related to health IT are critical to ensure improved patient safety. A central repository that will analyze and disseminate potential and actual adverse events seen with health IT and e-prescribing will help stakeholders and policy makers understand barriers and safety concerns with the new technology. The database should be used to document, monitor and advocate the use of safe practices, including measures specifically related to the design, implementation, usability, and safe use of health IT by all users, including patients. The frequency and variation of these prescription errors can alert both pharmacy and provider staff to pursue the cause and document changes necessary to prevent future errors.

*Partners in E* will develop, maintain and evaluate such a database. Students and other users will document adverse events into a central repository which will be aggregated and evaluated regularly by UCSF and participating schools. These adverse events will be disseminated to stakeholders and policymakers in peer-reviewed publications.

### 3.2.3 California’s Health Information Technology and Exchange Fund

Because of its complex nature, the transformation of California health information infrastructure will extend far beyond the initial four years of California’s current State Cooperative Agreement with the Office of the National Coordinator.

Recognizing that sustaining the health information exchange effort is of critical importance, California added section 130255 to the Health and Safety Code (H&SC) in 2010, which created the Health Information Technology and Exchange Fund. The new Fund is a special state fund whose purpose is to hold any public and private funds awarded, contributed, and earned to be dedicated toward the continued support for programs and activities that continue to advance California’s health information exchange efforts. This creates a
potential permanent funding source for HIE programs and activities once the federal grant is ended.

In addition to establishing a special HIE account, H&SC 130255 also acknowledges Agency’s continued leadership for California HIE efforts. Specifically, H&SC 130255 allows Agency to convene an advisory panel on the issue of sustainability of HIE, and utilize the Health Information Technology and Exchange Fund to hold any funds raised through public private partnership efforts. (Please go to Appendix A to read H&SC 130255).

3.3 Business Sustainability of Services Directly Offered or Enabled

Cooperative Agreement funds enable HIE in California medical communities through a sub-grant program and through a number of additional state-level programs and services. As described in the Environmental Scan section of this Strategic and Operational Plan, key characteristics of community HIE initiatives in California include:

- Exchange across unaffiliated partners
- Geographic footprints shaped by medical trading areas and counties
- Participants include advanced hospital/health systems, safety-net providers, county health departments, independent provider practices, medical groups, Medicaid managed care plans, laboratories, pharmacies, and others
- A mix of exchange models, but most support some form of query-based exchange
- A mix of operational and pre-operational efforts throughout state (by the end of 2013, over 75% of counties will have community-based HIEs in the planning or operational stages)

A recent assessment by CeC produced the following findings on revenue models being implemented by these community HIEs:

- **Participation model most prevalent.** Beyond grant funds, the most used revenue model is the participation model, which includes a sliding scale of fees for implementation, interface, basic HIE services and menu based services.
- **Some models enable earlier fee generation.** Some HIEs have had success in moving implementations forward by having stakeholder organizations make an initial investment in the entity for startup operating costs. The benefit is that the earlier an HIE can go live, the

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sooner maintenance/subscription fees can be billed. These initiatives often provide discounted or waived subscription fees in years one and/or two of operation in exchange for such an initial investment. These investments have been used by one organization to obtain better pricing for software licenses and/or interfaces. Another approach gaining increasing interest is the use of software-as-a-service (SAAS) or ASP solutions to enable implementation sooner and mitigate specific risks related to security and disaster recovery.

- **Implementation, subscription and maintenance fees are common among operating organizations.** As previously mentioned, some obtain these fees up front and defer billing for up to two years, while others collect fees as soon as the development work begins. Still others, mostly those focused on the underserved or White Space, provide participation incentives or discount to these fees such as a “one free interface,” typically using grant funds to cover the development costs. Regardless, those using these revenue models have enacted the use of a sliding fee scale, based on the type and size of the stakeholder organization and whether they are a public or private entity. These fees typically are tiered at specific threshold levels based on # of beds, # of MD’s in an office or IPA, etc.

- **Other revenue models are planned or operational.** In addition to the fees mentioned above, some HIEs are charging fees in addition to their standard subscription, maintenance and implementation fees. These fees are for value-added services such as consulting and technology hosting. A few organizations plan to provide analytics services for a fee in the future, as well. Others plan to negotiate revenue sharing arrangements with participants based on exchange related improvements achieved in various pay-for-performance programs.

- **Franchising or affiliation fees are being considered.** Some of the more established Community HIEs are considering franchising their technology by providing HISP services to other HIEs in adjacent geographies or shared medical trading area or stakeholders. This could lead to increased adoption and potentially consolidation of initiatives, as well as increased revenue and stability for the organizations offering these services.

- **One new model in California.** Inland Empire HIE (IEHIE) is using a multi-tiered revenue model based on a tiered governance structure. The model provides for a “Leadership Council” that carries voting rights and preferential implementation sequencing in exchange for a substantially higher annual fee. Membership fees make up the second tier, which encompass the “Advisory” and “Operating” committees. Finally, all
participants using services pay subscription, maintenance, transaction, training and other value-based fees, where applicable.

**Most community/regional HIEs in California face the “…tension between offering services that are self-sustaining and serving communities and providers with the fewest resources”** noted in ONC PIN 002, and sustainability remains a significant challenge for many of them. Of the thirteen community HIEs interviewed in this assessment, eight have no specific revenue model determined or approved; one has the model determined, but the exchange is not currently operational; four have operational revenue models, one of which is a model based on telemedicine data exchange only.

Aside from the involvement of Medi-Cal managed care plans, a missing revenue stream is that of the payers, who benefit significantly from the improvements in care quality and efficiency. Planned state-led efforts to engage payers in HIE across California will positively impact the sustainability equation for community HIEs.

Financial support received through sub-grant programs offer grantees capital to implement HIE systems serving significant populations of providers and patients in the state. This funding gives them the chance to cross the tipping point to sustainability after which fees can support ongoing operations. For example, one grantee reported that their sustainability tipping point is 12 hospitals and 1,000 provider participants, generating $500,000-$700,000 in annual revenue to support operations. Cooperative Agreement grant funding is enabling them to reach the half-way point to these numbers in 2012, and with current growth at over 200% per year, they hope to close the remaining gap shortly.

Cooperative Agreement funding is also galvanizing significant matching funds from community HIE stakeholders, solidifying their long-term commitment. The Los Angeles Network for Enhanced Services (LANES), for example, has received matching fund investments totaling $1 million from LA County and LA Care (the local Medicaid Managed Care Plan). With over six million lives to be entered into the LANES Master Patient Index during the grant period, these organizations are committed to LANES’ long-term success to meet their data exchange needs.

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22 Cal eConnect’s sub-grant program supported five regional HIE efforts that received Expansion Grants in 2011, with awards totaling $3.1m. They are located in Los Angeles, Orange County, the Central Valley, and the North Coast. As described in the Environmental Scan section (pp. XY), recently launched programs for Planning, Infrastructure, Interface, and Innovation grants will support a broader set of organizations with Cooperative Agreement funds and technical assistance.
Additional state-level programs and services enabled by the Cooperative Agreement are strengthening the value proposition community HIEs can make to current and potential participants. These include:

- **EHR/HIE interoperability specifications.** With vendor collaboration, produced and testing an “orderable kit” of HIE interface requirements for California purchasers of EHRs (RECs, their clients, etc.) to reduce the cost and complexity of implementing HIE interfaces.
- **Gateways to state agencies.** Meaningful Use-compliant public health reporting, including provider immunization reporting via community HIEs to meet current gaps in state infrastructure.
- **HIO-HIO exchange.** Implementations of exchange between HIIOs using national standards to demonstrate statewide exchange capabilities via regional HIE initiatives, and exchange between community and enterprise HIEs.
- **Provider identity and trust services** to locate unaffiliated exchange partners and validate their identity, including requirements supporting federal transport mechanisms (Direct).
- **Data exchange policies and model agreements** to establish a trust environment for exchange in California, reducing legal fees for community HIEs and encouraging participation in HIE through mitigating perceived risks.
- **Promotion of common technical standards/specifications** to lower the technical barriers to exchange across disparate systems, including between enterprise and community.
- **Accreditation of Health Information Service Providers (HISPs)** enabling exchange via Direct; community HIEs may apply for HISP accreditation and expand their customer base through offering Direct
- **Interstate exchange** via the protocols developed and tested by the Western States’ Consortium.
- A statewide **HIE Community of Practice** and issue-focused task-groups.

These programs and services provide community HIEs with tools and resources to enhance the value and reduce the cost of their offerings. By leveraging these opportunities, many will succeed in the dynamic emerging market for HIE services in California as they balance a strong commitment to all providers, including those serving the safety net, with the imperative to sustain their operations over time.
4. PROGRAM EVALUATION
4. PROGRAM EVALUATION

California has undertaken a rigorous evaluation strategy when it comes to health technology. In this section, we outline the aims of the evaluation, the evaluation framework (background and context for California’s goals, approaches and strategies), and evaluation methods.

4.1 Evaluation Aims

This formative evaluation aims to address the four evaluation topics listed in PIN-002, “4. Program Evaluation”. Therefore our main research questions are:

a. What are the approaches and strategies that the state and the California Health eQuality Program (CHeQ) used to facilitate and expand health information exchange (HIE) in program and state-specified priority areas?

b. What are the conditions that support and hinder implementation of those strategies?

c. What is the HIE performance in each of the key program priority areas?

d. How did key approaches and strategies contribute to progress in these areas, and what were lessons learned?

Two other questions overlap with the above:

e. What is the sustainability of the community (regional, public) health information organizations (HIOs) in California?

f. What HIE challenges are likely to remain after the grant period ends, especially those that affect meeting Stage 2 electronic health record (EHR) meaningful use objectives? How will these challenges be addressed?

For all questions, the team will pay special attention to:

a. The key program priority areas:
   - Laboratories participating in electronic structured lab results delivery
   - Pharmacies participating in e-prescribing
   - Providers exchanging patient summary of care records

b. “Safety-net” providers, especially community health centers, county public hospitals and clinics, and independent practice associations (and their member practices) focusing mostly on Medi-Cal-insured and uninsured patients.

Note: This evaluation plan refers to the “evaluation team”, which consists of staff from the University of California, San Francisco (UCSF), the state’s primary contractor (CHeQ), and the California Office of Health Information Integrity (Cal OHII), in the California Health & Human Services Agency (CHHS).
Cal OHII is contracting with UCSF for the evaluation and with CHeQ for a wide range of activities.

4.2 Evaluation Framework

**Context:** *State aims.* Over time, the state and its state governance entity/contractors have had several key aims:

- Improve the trust environment for HIE
- Accelerate HIE—and especially development of HIOs
- Implement strategies for supporting EHR meaningful use through HIE
- Monitor HIE progress
- Communicate with and educate stakeholders

The state and its governance entity/contractors have developed detailed work plans comprising specific tasks designed to accomplish each of these aims. These aims are consistent with those for facilitating and expanding HIE in ONC program priority areas.

*The state’s model for HIE efforts.* Using the terminology outlined in a February 2011 ONC report that categorized initial state strategic and operational plans, California has adopted a mixture of the:

- **Capacity-Builder model** (“bolstering of sub-state exchanges through financial and technical support, tied to performance goals”)
- **Orchestrator model** (“thin-layer state-level network to connect existing sub-state exchanges”) and (to a lesser extent)
- **Elevator model** (“rapid facilitation of directed exchange capabilities to support Stage 1 meaningful use”)

Compelling reasons for adopting this mixture of HIE models—and not the more straightforward Public Utility model—include:

- The lack of development of statewide HIE infrastructure and community HIOs pre-American Recovery and Reinvestment Act of 2009 (ARRA)
- California’s large population and geographic size which includes multiple, distinctly different market areas
- Many large, well-financed California provider organizations, most of which are developing private HIE capabilities

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23 CITE 2011 study
The need to use this combination of HIE models creates many challenges for the state and its contractors, since they must attempt to influence HIE actions of numerous private market participants in different markets—rather than more directly control HIE actions, which is more possible in a Public Utility model. In part, these substantial challenges contributed first to a change in the leadership of the state governance entity (Cal eConnect) in late summer 2011 and then the dissolution of that entity in summer 2012. Currently, the state (the grantee) is engaging a contractor through an interagency agreement (Institute for Population Health Improvement (IPHI), CHeQ Program) to work with the state to carry out the state’s HIE activities.

**Community HIOs and private HIEs.** Supporting the development of community HIOs has been a prime focus of state HIE efforts. These community HIOs act as HIE nodes that likely will become the pillars of cross-entity HIE in the state. Emerging HIOs that potentially can serve the five largest market areas (and three quarters of the state’s population) include: Inland Empire Health Information Exchange (IEHIE), Orange County Partnership for Regional Health Information Organization (OCPRHIO), San Diego Beacon Community (San Diego), Los Angeles Network for Enhanced Services (LANES), and Health Share Bay Area (HSBA). Another 3 functioning and 4–7 emerging HIOs serve or may serve smaller urban or rural markets.

Overall, community HIO development is relatively immature in California while still varying among HIOs. Only three to five large regional HIOs had started to build infrastructure to exchange some data among some market participants, and only one was doing so as of September 2012—and only for a limited number of patients and providers.

Meanwhile, most large California health care systems (such as Dignity, Sutter, Sharp, Kaiser), large hospitals, and medical groups have focused on expanding private HIE capabilities, which both can compete with community HIOs for limited management attention and resources for HIE, and can complement and bolster community HIOs by acting as enterprise-level HIE nodes, providing HIOs with low-cost gateways connecting them to numerous system-affiliated providers. While some private HIE efforts are far more advanced than community HIO efforts, many are not advanced.  

**Conceptual Model.** Given this California context—especially the state’s model of influencing private market participant HIE efforts—we use elements of Rogers’ Diffusion of Innovation model[25] to provide a conceptual framework for

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addressing the key evaluation questions and therefore for understanding and evaluating the effectiveness of the state’s overall HIE approaches and efforts. This model includes participants at three levels: statewide, community HIO, and community HIO health care organization (non-) participants (partners).

As Capacity-Builder and Orchestrator, the state is trying to accelerate the diffusion of HIE innovation, primarily (although not exclusively) by improving market participant perceptions of the “relative advantage” of engaging in more HIE generally and more community HIO activity specifically—i.e., the state is attempting to improve participant private HIE benefits and especially community HIO partner benefits while reducing their costs, thereby increasing demand for and supply of private HIE and especially community HIO services. For example:

- Improving the trust environment for HIE can increase health care organization participation in a community HIO by decreasing participant liability fears (and expected costs) while increasing expected benefits (including revenues. For example, a common, state-approved trust document for organizations participating in community HIOs could reduce organizations’/practices’ fears about competitors using the HIO to “steal” patients (a cost), while this and other clear “rules of the road” could reduce an organization’s risk of incurring substantial liability from HIE thereby increasing the relative advantage to organizations of being an active community HIO partner.

- Using HIE acceleration grant awards to help finance community HIO infrastructure lowers an organization’s cost of participating in a community HIO, while grant awards for interfaces for connecting HIOs with solo/small providers lowers those providers’ technical and cost barriers to participation.

- Implementing strategies to help achieve EHR meaningful use through HIE increases HIE’s financial payoff to market participants, and thereby improving their perception of HIE’s relative advantage; for example, developing and promoting tightly specified common standards for interfaces that lower vendor costs to create interfaces, and while obtaining agreements to publicize vendors’ interface prices enhances competition among vendors can lower costs to practices, and increase their HIE and likelihood of receiving EHR meaningful use payments.

The evaluation’s focus on relative advantage and business case will provide crucial information on the likely sustainability of community HIO efforts, a key state focus.
Processes

The state and its contractors are carrying out a series of tasks that can help accomplish each of the state’s aims. The evaluation will describe: the state’s/CHeQ’s aims and activities, conditions that support and hinder implementation of the strategies (facilitators and barriers), HIE outcomes, how well the state’s approaches and strategies helped improve those outcomes, the potential sustainability of community HIOs, and challenges likely to remain after the Cooperative Agreement Program award ends.

The evaluation team is using key research processes similar to those promoted by the Centers for Disease Control. For example, evaluation team participants have:

- Engaged a wide range of stakeholders and are continually receiving stakeholder input into revising questions
- Described the program, including in presentations to stakeholders
- Focused evaluation design on a quantitative and qualitative evaluation of activities at the three levels (state, HIO, health care organization)
- Begun to collect credible evidence from surveys at the three levels, using measures described below
- Begun to analyze, synthesize, and interpret findings, and make judgments about their implications for public policy
- Shared initial findings with state policy-makers and will develop a robust dissemination strategy as they generate more findings.

Outcomes

The state aims to accelerate HIE activities throughout the state, and specifically in program priority areas. This formative evaluation addresses the evaluation aims and questions described in the initial section above. Its two primary intended outcomes are to:

1. Help the state and CHeQ to improve the effectiveness of their activities, including by providing timely:
   - Landscape information on HIE progress, barriers/facilitators, and prospects in different market areas

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26 Cothren, R. Presentation to the Cal eConnect Technical Advisory Group, April 18, 2012.


• Feedback and analysis on the effectiveness of the state’s/CHeQ’s activities
• Suggested options for changing state/CHeQ activities to improve their effectiveness

2. Contribute to the national evaluation on the Awards’ effects on HIE progress while meeting ONC’s PIN-002 evaluation requirements.

4.3 Evaluation Methods

4.3.1 STUDY DESIGN

This formative evaluation adopts a mixed methods approach (quantitative and qualitative) using mostly longitudinal data from various sources, focusing on program strategies and their effect on 12 California HIOs’ and key HIO (non-) participants’ HIE performance. It will compare and contrast performance among HIOs—at grant baseline, and at 3, 6, and 12 months. The evaluation will especially focus on program priority areas. For more advanced HIOs, we also will attempt to examine the effects of state/CHeQ-funded HIOs on health care organization participants, using a pre-post design.

NOTE: We will obtain and compare much relevant quantitative data, and will use a pre-post research design whenever possible. However, given the California context, several factors create major challenges to obtaining some needed quantitative data, using comparison/control groups, and conducting statistical analyses of quantitative data:

• The number of HIO cases is small, and most are current or former state/CHeQ grantees (and hence cannot act as comparisons)
• Given the varying and (on average) early state of community HIO development, measures relevant for one HIO may be irrelevant for others, limiting possible comparisons. The evaluation team can obtain:
  o Measures of HIO-specific infrastructure development and organization participation across all cases
  o Measures of organization/provider utilization of HIO services (although some HIOs are uncertain about the quantitative data they can produce)
  o Measures of financial effects on selected HIO partners. It cannot obtain measures on patient outcomes.
• The state/CHeQ has more difficulty obtaining quantitative data given its de-centralized Capacity-Builder/Orchestrator/Elevator model, than it would with a Public Utility HIE model. The state must rely on a
small number of grantees and a much large number of non-grantees to provide data, rather than on a statewide HIO. Moreover, the data that HIO grantees report to CHeQ is still under negotiation, and must be approved by their boards in some cases, while non-grantees are providing data completely voluntarily.

- The large size of California, with its multiple markets and many health care organizations, makes comprehensive quantitative surveys cost-prohibitive; moreover, the relatively extensive amount of private HIE development and the diffuse nature of some of the state’s/CHeQ’s interventions (given the model the state has had to adopt), creates challenges for attributing to those interventions specific quantitative effects.

### 4.3.2 STUDY POPULATION

The primary study populations are the 12 HIOs, and key (non-) participating health care organizations in each HIO. We will focus most on HIOs that are CHeQ grantees and therefore must provide data as a condition of their grant, and on key (non-) participants that are considered important for an HIO’s sustainability. Types of health care organizations (not) participating in HIOs include:

- Large health care systems, most with private HIEs (e.g., hospitals, medical groups, independent practice associations and their management service organizations)
- Other care providers, most without private HIEs (e.g., solo/small practices, community health centers, public hospitals, county clinics)
- Ancillary service providers (e.g., pharmacies, laboratories, and radiology firms)
- Public health departments and registries
- Medi-Cal and other state agencies
- Private health plans

While the likely importance of an organization to a HIO’s success is the primary inclusion criteria, we will ensure inclusion of key safety-net providers. Most analyses will focus on HIOs and their members, although some will focus on laboratories, public health departments, and immunization registries, including those that are not HIO members. Since a high percent of pharmacies are already participating in e-prescribing, we also will focus on provider e-prescribing utilization.
4.3.3 DATA SOURCES AND DATA COLLECTION METHODS

- **Quantitative annual national survey of hospital EHR and HIE use** (i.e., data ONC will provide annually to the state). Outcome measures include percent of hospitals exchanging data with affiliated and with unaffiliated hospitals and physicians.

- **California-wide surveys.** CHeQ and the state will field annual surveys to assess progress for six of the nine ONC-proposed measures. The evaluation team will include questions about the effect of state/CHeQ activity on participants, and will conduct selected qualitative interviews where findings are unclear.

- **CHeQ grantee reports to CHeQ (baseline, 3, 6, and 12 months).** CHeQ grantees will primarily produce quantitative data. While report data elements are still under negotiation, likely measures include:
  - HIO governance, staffing, revenues, costs
  - Technology model and capabilities – e.g., directed exchange (Direct and otherwise), query-based exchange (provider portal and ability to import data into specific EHR products or not), exchange using Nationwide Health Information Network (NwHIN) protocols; patient portal, approach to provider identify management across HIOs and private HIEs; e-prescribing, structured lab results reporting, and patient summary of care capabilities
  - Exchange partners – e.g. which health care entities are participating, their EHR capabilities, number of providers and patients, number of providers eligible for EHR meaningful use payments, patient insurance status (especially Medi-Cal/uninsured or not), executed legal agreements with the HIO, and payments for HIO services
  - State of implementation – e.g. number of partners contributing data to master patient index (MPI) and record locator service (RLS), data elements made available by each partner, number of patients in the MPI/RLS, and number of providers in provider directory (by partner), which partners are live (i.e., providers are actually using HIO data) and timetable for other partners
  - Utilization of HIE data (total and by partner) – e.g. number of consented patients; number of patients and number of providers with at least one transaction/query per month/year; distribution of transactions/queries per month or year, by patient and by provider

- **Annual semi-structured interviews of HIO and HIO member key informants.** Conducting detailed, semi-structured interviews will produce extensive HIO- and HIO member-level qualitative interview
data and some quantitative data that will complement grantee reports. They also will produce much qualitative/quantitative data on key HIO non-participants. Given the conceptual model, interview questions will focus most on perceived business case and sustainability for private HIE and community HIO activity, including perceived barriers/facilitators, and CHeQ’s direct and indirect effects on HIE efforts. The team will obtain interview data from state-level key informants and, for each HIO, from two to ten HIO staff, HIO partner and non-participant key informants, for a total of 78 interviews. The survey instruments have already been well-tested with California participants.

- **Special case study quantitative and qualitative data.** Where an HIO grantee is exchanging data among providers, the evaluation team will identify selected HIO partner cases of different types (e.g., a hospital within a system, a stand-alone hospital, an independent practice association) that might participate in quantitative/qualitative case studies of the effectiveness of award-supported HIO activities and other state/CHeQ activities, including on the organization’s patient care cost and quality.

### 4.3.4 ANALYTIC METHODS

**Quantitative analysis.** The evaluation team will use simple tables, charts and (where data volume and quality permits) univariate statistics or multivariate regression analyses, especially to determine the effectiveness of the state’s/CHeQ’s activities.

**Qualitative/quantitative analysis.** The qualitative analysis will use all data, qualitative and quantitative, and the conceptual model outlined above to provide more of the “whys” of especially HIO grantee progress (or lack thereof), including the effect of CHeQ’s activities. The team will record and transcribe all interviews, refine already created key concept categories (e.g., types of barriers and facilitators), succinctly summarize interviews into tables using those concept categories, and create and analyze tables with highly summarized data, comparing information across HIOs, and across the participants within each HIO. Using the conceptual model and data tables, the team will use explanation-building and pattern-matching qualitative data analysis techniques\(^\text{29}\), identifying common themes and differences among HIOs and

\(^{29}\)Yin RK. Case Study Research, Design and Methods, 3rd edition. Sage 2003
types of stakeholders; the Principal Investigator has successfully used these techniques elsewhere.\textsuperscript{30}

**Products and Dissemination**

The evaluation team will provide regular presentations of findings to CHeQ staff plus an annual report.

In the annual evaluation results reports to be submitted to ONC in the 2013 SOP update, and 30 days after the end of the Program, the team will submit

- Updates or changes to evaluation plan (if any).
- Progress on the evaluation: the team will describe data collection efforts underway, any issues encountered while conducting the evaluation, results and interpretation of those results summarized as briefs (3-5 pages) or as manuscripts submitted to peer-reviewed publications, and implications of the evaluation findings for program implementation and strategy.

\textsuperscript{30} For example, see

5. PRIVACY AND SECURITY FRAMEWORK
California’s success in implementing HIE hinges on our ability to follow a rigorous privacy and security framework. Following the fair informational practices developed by California’s stakeholders, **California is looking to further its development of privacy and security in the various legal frameworks available: statutory, regulatory, contractual, and best practices.** To this end, Agency is coordinating five separate efforts. These are listed below, and described in detail throughout this section. See Appendix B, Templates for Guiding Statewide Privacy and Security Frameworks.

1. **Law Harmonization** to simplify the integration of HIPAA and state laws.

2. **Demonstration Projects** to test policies and rules to better inform the State and health care stakeholders while the HIE infrastructure is being defined over the next several years.

3. **Development of contractual language**, policies and procedures, consistent with state and federal laws and best practices, to ensure a trusted environment for HIE.

4. **A Risk Assessment Tool** to enable small providers to conduct their own risk assessments.

5. **Facilitating** patient and provider engagement and education.

A timeline, strategy and action plan is forthcoming in an update of this Strategic and Operational Plan that will address gaps in recipient privacy and security policies and practices between the law and current business practice.

### 5.1 Advisory Groups

Beginning in the second half of 2011, the Privacy Steering Team and the Security Steering Team focused on efforts to synchronize state law with federal rules pertaining to privacy policies and security standards. The objective was to provide CalOHII with input to legislative activity that would harmonize applicable law for the exchange of health information within California and between California and other states.

In October 2011, stakeholders of both the Privacy and the Security Steering Teams unanimously voted to have HIPAA as the base rule for California and to keep California Medical Information Act statutes where there is no equivalent of the law in HIPAA or HITECH. **The two steering teams are neither recommending nor drafting new law, but they are identifying areas where future law harmonization work and drafting new law is needed.** The stakeholders also agreed that the harmonization of the law should be done in a comprehensive manner to be meaningful and operationally feasible.
In 2012, the steering teams focused their work on developing comprehensive legislative recommendations to CalOHII for the exchange of health information. The Steering Team’s approach was to systematically review and propose recommendations regarding the harmonization of the terms employed either by HIPAA, CMIA, or both. The intention was to begin the process of making definitive identification of where Californians’ benefit from greater protections of privacy under law when compared with HIPAA alone.

In the summer of 2012, CalOHII lead a public comment activity to gather broad stakeholder input to the recommendations of the Steering team. The public comments received indicated that there is recognition that the proposed work of harmonizing applicable law in California is likely to improve the privacy preserving strengths of California law compared to HIPAA, but that a significant amount of additional communication and exposition was necessary to ensure stakeholder support for Steering team’s recommendations. Many stakeholders recognized the risks and the administrative cost associated with the incongruities between applicable state and federal law indicating their general support for the Steering team’s intentions but commenters consistently noted the need for further clarification and constraints regarding the Steering team’s recommendation. Still other commenters felt that the recommendations may be appropriate but due to the lack of exposition on the recommendations stakeholders were unable to make informed decisions about the appropriateness of the recommendations.

The Steering Teams are in the process of organizing into a single steering team and developing a new work plan to guide the activities of the new steering team to be formed. As a part of this reorganization effort updated processes will be implemented to help ensure that any recommendations made by the new steering team will be accompanied by the rational of the members in order to support stakeholder understanding of the proposed changes. The intention would be to provide the community with the background and rational of the new steering team so that Stakeholders will be in a better position to judge the merits of the recommendations.

5.2 Demonstration Projects

Demonstration projects are allowing California to test privacy and security policy that will increase the trust of HIE participants by evaluating privacy preserving safeguards of health information that use innovative technology and sound business practices.

On September 23, 2010, Governor Schwarzenegger approved Assembly Bill 278, Health Information Exchange: Demonstration Projects, which authorizes CalOHII to establish and administer demonstration projects for the electronic exchange of health information. The purpose of these demonstration projects is to evaluate potential solutions to facilitate health information
exchange that promotes quality of care, respects the privacy and security of health information, and enhances the trust of the stakeholders.

The bill authorizes CalOHII to approve up to four demonstration projects annually in order to address barriers to HIE implementation, test potential security and privacy policies, and identify differences between state and federal laws. The demonstration projects to date have been focused on enabling exchange of electronic health information, while increasing privacy protections, by testing the following:

1. Privacy and security policies and practices
2. New technologies
3. Implementation issues encountered by small health care practitioners

The bill also charges CalOHII with adopting regulations to ensure all demonstration project participants follow a set of rules that frame the project and support objectives. Regulations have been vetted twice among California health care industry stakeholders and finalized and filed in December 2011 with the Secretary of State for use by the demonstration project participants.

Currently three demonstration projects are approved by CalOHII: San Diego Beacon eHealth Community Inland Empire Health Information Exchange and Santa Cruz Health Information Exchange. These three projects will test privacy and security policies as set by the regulations and the demonstration project objectives. San Diego Beacon eHealth Community is currently testing opt in consent with multi-consent models scheduled in the future. Inland Empire HIE is testing opt out consent and Santa Cruz HIE is testing opt-out consent with an emergency exception. These demonstration projects will be complete by the end of 2013. California will not be mandating a single statewide consent policy; however, the data collected from the demonstration projects will be evaluated and used to make recommendations regarding consent guidance for California.

CalOHII’s demonstration project effort began in February 2012 and all three demos are projected to conclude at the end of 2013. Upon completion of the demonstration projects, CalOHII will review each projects evaluation and document the lessons learned and will submit a report to the legislature 6 months after all demonstration projects are complete.

### 5.3 Ensuring a Trust Environment for HIE

California stakeholders recognize the need for an overall governance structure that encompasses the legal framework for data exchange including standardized terms for contractual agreements between those who create health information and the service providers that they use to securely exchange health information appropriately. The current cost of establishing, negotiating, and maintaining agreements with an increasing number of data exchange
service providers is viewed as being duplicative and expensive. This is felt acutely among smaller exchanges, for which the legal fees may be disproportionately high and the participants who must evaluate the myriad differences between being presented to them by service offerers.

This is a cause for great concern. To remove these and other disincentives to exchange, Agency and its partners have begun a set of integrated activities to establish a trust environment for private and secure HIE in California, consistent with current law and best practices. The following activities will facilitate development of a trusted environment:

- California Model Participants Agreements
- Development of an inter-state trust community as a participant in the Western States Consortium pilot

**Model Agreements**

CalOHII released the first Modular Model Participant Agreement (MMPA) in October, 2012 as a tool to accelerate HIE adoption in California. Development of the MMPA was an open collaboration between partners, privacy advocates, organizations that provide HIE services, and the consumers of these HIE’s offerings (potential adopters). The objective of this task force was to develop Release 1 of a modular participants agreement that could be used to help reduce the cost barrier associated with the development of individual contract language for organizations seeking to provide electronic health information exchange services and to provide a reference tool for those entities that would sign-on to use their services (adopters). Release 1 of this model addresses a continuum of contracting situations and relationships, enabling users to create contracts specific to their offerings that are based on common terms and conditions. The MMPA is a model describing the agreement(s) between a health information organization (“HIO”) and the parties who provide data and obtain data through the HIO (“Data Providers” and “Data Recipients,” respectively and collectively, “Participants”).

HIOs may use the MMPA as the basis for their agreements with their Participants (“Participants’ Agreements”), or for emerging HIOs to facilitate the development of the HIO’s model as a part of the HIO’s organizational and/or governance process. The MMPA is based on a number of assumptions that are described in the document’s footnotes, which offer explanation and commentary to assist understanding and use of the document. The MMPA is not expected to be the single solution for all HIOs, however, the adoption of health information exchange can be made more efficient if HIOs normalize their contracting processes by adopting common or similar contracting strategies and terminology - the MMPA can be a helpful resource for that effort. The MMPA offers a number of alternative provisions addressing many subjects, and invites individual HIOs to adopt their own changes and provisions to meet their own circumstances, objectives and other requirements.
The primary objective in preparing this first release of the Model is to suggest a common baseline reference tool for HIOs and participants to structure and facilitate their work to develop Participants’ Agreements that address their unique goals and circumstances. The Model addresses the fact that there are a number of paradigms within which health information exchange is offered by HIOs in California today. The Model seeks to provide a common structure and language for Participants’ Agreements that address these various paradigms, and offers a degree of consistency across the contractual terms that must vary based on the paradigms’ differences. Release 1 of the Model describes five specific paradigms that follow a progression of access (and subsequent differences in terms and conditions). The first paradigm is of an HIO that acts as a conduit only, and simply facilitates the participant’s exchange of PHI for which only the sender and the receiver of specific information have access to that information, and retain responsibility for assuring its privacy. At the other end of the continuum the fifth paradigm in the model describes an HIO service that incorporates data aggregation to create a more complete picture of an individual’s health across creators of PHI while constraining access to authorized users (for example by creating a longitudinal health record from multiple sources presented to a Provider who has a relationship with the patient in question).

The MMPA was released for public comment on October 1, 2012 and can be found at http://ohii.ca.gov/calohi/MMPA.aspx.

**Western States Consortium**

In light of the barriers related to interstate exchange and the importance that data exchange, across state lines, has in realizing the greatest benefits that HIE has to offer, CalOHII continues to act in a leadership role of the Western States Consortium. This Consortium is an initiative that began in 2011 and has received approval and funding support from the ONC’s State Health Policy Consortium Grant program in November 2011. The Western States Consortium includes Oregon, California, Nevada, New Mexico, Arizona, Utah, Hawaii, and Alaska and is being followed by a number of others.

The Consortium’s goal is to develop a common set of policies and technology solutions to ensure trust and security across common trust community that spans state boundaries. This will be accomplished by focusing on the policies and procedures of the trust community culminating in the pilot of two mechanisms:

1. A trust bundle administered by the states that creates a means to recognize the digital certificates of HISPs that have been vetted by authorized parties of the community; and
2. A mechanism for the federation of provider directories across states and communities. Combined, these solutions will ensure that all participants
can find, know, and trust the identity, credentials, contractual terms, and technical security of those with whom they are exchanging their patients' health data.

A demonstration pilot using direct messaging and Governance policies and procedures developed by the Consortium is slated to take place between Oregon and California in late 2012. The project culminates in a set of recommendations and lessons learned on how to improve the work of the Consortium, expand it, and offer best practices to be considered by other states considering adoption of similar frameworks.

5.4 HIPAA Security Compliance Tool

In 2011, CalOHII and its Security Steering Team embarked on designing and drafting a HIPAA security compliance tool. This tool was for the use of small, medium, and rural health care providers and entities engaged in health information exchange that may have not performed an adequate security risk assessment or implemented appropriate security measures. The purpose is for these providers to do a self-assessment of their compliance with the federal security standards as they relate to the exchange of health information. This HIPAA security tool will also aid the providers to see if they meet the Meaningful Use Stage I and II security requirements of health information exchange.

The HIPAA security tool was tested during the month of May 2012 by CalOHII stakeholders, and was released for public use on the CalOHII website in June 2012. It can be found at http://www.ohii.ca.gov/calohi/.

5.5 Education and Engagement

In a collaborative effort with its stakeholders in 2011, CalOHII developed material and content to educate patients and providers about issues related to privacy and the electronic exchange of health information. As of spring 2012, this content is now available to the public through a new webpage on the CalOHII website, “Privacy 360.” The website and its content are geared toward educating patients and providers about their rights, role, and responsibilities regarding electronic exchange of information. Another goal of the website is to help patients trust the electronic exchange of health information, electronic health records as used by their health care providers, and to be actively engaged in their own health care.

In collaboration with UC Hastings College of the Law, San Francisco, CalOHII developed the California Health Information Law Identification (CHILI) search tool. CHILI is an interactive web based tool that will identify and organize provisions of the Constitution of the State of California and all codified State statutes (or subdivisions thereof) that relate to the privacy or security of health
information, e.g., every provision of State law that has one or any combination of the following specific purposes: regulating the collection of health information, regulating the use of health information, regulating the disclosure of health information, regulating the privacy of health information, regulating the security of health information, regulating the storage or retention of health information, or, the statute otherwise affects the regulation of health information in a "direct, clear, and substantial way."

The CHILI reference tool is an interactive tool available to search by keyword, HIPAA regulation number or California statute number and will enable the user to quickly identify the provisions of California law that regulate the use of health information or health records, as well as correlating the California provisions that resonate with the privacy and security requirements of the federal HIPAA provisions. The CHILI search can be found at http://www.ohii.ca.gov/chili/.

**Conclusion**

California is committed to forging a rational approach to establishing a Trust Environment that preserves the privacy of individuals while realizing the benefits of the appropriate exchange of health information. Every Californian stands to benefit from a robust exchange ability within the state and beyond. To realize a trust environment that endures the rapid changes to the technical capabilities to exchange health information Agency’s strategy has been to take a many pronged iterative approach to establishing the foundation for a trusted exchange environment that is future ready.

Working with our Advisory groups we are meticulously evaluating current state law striving to improve the ability of all stakeholders to understand what is permitted today and looking for appropriate means to take advantage of the capabilities of the future. Working with HIOs and the entities that consume their offerings we are iteratively developing a model for terms and conditions that protect all parties involved. Working with our partners and the existing HIEs in California we are developing tools to facilitate exchange that provide a framework for Directory and Trust services that ultimately synergizes with our interstate efforts to realize channels that respect the unique differences between California and our neighboring states.

Working with stakeholders from within the state, our neighbors and the ONC CalOHII is advancing the states HIE capabilities.
6. PROJECT MANAGEMENT PLAN
6. PROJECT MANAGEMENT PLAN

6.1 Staffing Plan

The organizational chart that follows, Figure 24, shows the allocation of personnel and administrative roles spread across the various departments within CalOHII, (California Office of Health Information Integrity) the Agency department responsible for supporting the implementation of HIE and related programs in California. The CalOHII departments are:

- Senior Administration
- Programs
- Privacy & Security
- Administration
- Legal

Since 2010, Agency has persisted in coordinating statewide HIE activities in spite of significant staffing and budget constraints. Most of the positions described on the organizational chart that follows have been filled with qualified employees as of May 2012. Being fully staffed should make a significant difference in the state’s ability to provide the leadership and support needed in implementing HIE in California.
6.2 Major Activities for the Coming Year

Below is a timeline showing some the critical milestones and events identified in the state's plan, from June 2012 to May 2013.
7. FINAL THOUGHTS
In conclusion, California will continue to aggressively support and pursue HIE as a statewide effort. We have long recognized the value of HIE to our residents and to the sustaining of safe, quality and affordable care for our population.

The regionalization of HIE efforts in California has allowed for development of differing models of exchange; but there continue to be white spaces and thus there remains room for technical expansion.

Agency will continue to partner wherever opportunities to expand HIE exist – with federal, other state, regional and local partners as well. We know that our Medicaid system is the largest single payer in the state with approximately 7 million enrollees and that California’s plans to expand enrollment will bring another 2 million in the near future. The ability to apply the benefits of HIE and the resulting data driven decision management makes HIE critical to the continued care of this population segment.

Agency and its newly named Partner, CHeQ, will focus vision and efforts on:

- Medi-Cal,
- foster children, whether enrolled in Medi-Cal or not,
- decision across the care continuum – with a particular focus on long-term care applications,
- providers and hospitals seeking to attain meaningful use incentives
- with the overarching aim of increasing preventive care by engaging consumers in their own care planning and monitoring.

It is through these efforts that we believe we can best reach our newly stated vision and goals:

**California’s Vision**

Improve the health and well-being of all Californians.

**California’s e-Goals**

- **Enhance** individual and population health outcomes through results-oriented programs.
- **Ensure** secure data access that protects patient privacy and data integrity.
  - **Engage** patients and families as partners in care.
APPENDICES
Appendix A: Health and Safety Code 130255

(a) In the event that the California Health and Human Services Agency applies for and receives federal funds made available through the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5) for health information technology and exchange, as outlined in subdivision (a) of Section 130251, the California Health Information Technology and Exchange Fund is hereby created in the State Treasury.

(b) All moneys in the California Health Information Technology and Exchange Fund shall be available, upon appropriation by the Legislature, for purposes related to health information technology and exchange.

(c) The California Health Information Technology and Exchange Fund shall consist of, but is not limited to, federal funds made available through ARRA for health information technology and exchange. Notwithstanding Section 16305.7 of the Government Code, any interest and dividends earned on deposits in the fund shall be retained in the fund for purposes of this division.

(d) It is the intent of the Legislature that the activities associated with health information exchange be funded solely through the following:
   (1) Federal funds.
   (2) Private contributions identified by the state, the state-designated entity, or any relevant advisory panel convened by the California Health and Human Services Agency.
   (3) Funds generated by the self-sustaining funding mechanism to be established by the California Health and Human Services Agency or one of its departments, or the state-designated entity.
### HIE ARCHITECTURAL MODEL: GUIDED STATEWIDE PRIVACY AND SECURITY FRAMEWORKS

<table>
<thead>
<tr>
<th>Domain</th>
<th>Description of approach and where domain is addressed in policies and practices</th>
<th>Description of how stakeholders and the public are made aware of the approach, policies, and practices</th>
<th>Description of gap area and process and timeline for addressing*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required to address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Openness and Transparency</td>
<td>Fair Information and Transparency Principles approved by CalPSAB; signed by CHHS Secretary in 2009; incorporated into the regulations of the demonstration projects for the electronic exchange of health information.</td>
<td>Webinars/conference calls open to the public Postings to CalOHII website</td>
<td>N/A</td>
</tr>
<tr>
<td>Collection, Use and Disclosure Limitation</td>
<td>CalOHII Privacy and Security Steering Teams addressing through law harmonization.</td>
<td>Webinars/conference calls open to the public Postings to CalOHII website Public forum</td>
<td>2013 - 2014</td>
</tr>
<tr>
<td>Safeguards</td>
<td>CalOHII Privacy and Security Steering Teams addressing through law harmonization.</td>
<td>Webinars/conference calls open to the public Postings to CalOHII website</td>
<td>2013 - 2014</td>
</tr>
<tr>
<td>Accountability</td>
<td>Fair Information and Transparency Principles approved by CalPSAB; signed by CHHS Secretary in 2009; incorporated into the regulations of the demonstration projects for the electronic exchange of health information. CalOHII Privacy and Security Steering Teams addressing through law harmonization.</td>
<td>Webinars/conference calls open to the public Postings to CalOHII website</td>
<td>N/A</td>
</tr>
<tr>
<td>Optional to address</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Note</strong></td>
<td>If needed, use additional documents to describe and insert reference here.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pre-Course Survey Results

Total completed surveys = 70

Demographic Questions

Mean Age ± SD (years): 25.7 ± 3.1  
Gender: 41 female (59%), 29 male (41%)

<table>
<thead>
<tr>
<th>School</th>
<th>1st Year Student</th>
<th>2nd Year Student</th>
<th>3rd Year Student</th>
<th>4th Year Student or Higher</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacy</td>
<td>10</td>
<td>41</td>
<td>13</td>
<td>5</td>
<td>69</td>
</tr>
<tr>
<td>Medicine</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nursing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Prior Experience

1. Please describe any coursework or on-the-job training you have had in pharmacy informatics and/or health information technology:

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td>Work experience (paid or volunteer)</td>
<td></td>
<td>27</td>
</tr>
<tr>
<td>Prior instruction through my coursework at UCSF (please specify the course):</td>
<td>10</td>
<td>14%</td>
</tr>
<tr>
<td>Prior instruction through my coursework at a school/program other than UCSF</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

2. Do you have experience using pharmacy practice management systems to manage data concerning the treatment of patients, dispensing of prescriptions, control of inventory, billing of claims, compliance with laws and regulations, and/or communications with other health care professionals? Examples of pharmacy practice management system vendors include Speed Script, McKesson Pharmacy Systems, OPUS-ISM, QS/1, and Cerner Etreby.

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>29</td>
<td>41%</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>59%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>
3. Do you have experience using electronic medical record systems to create digital records of patients' history and treatment? Examples of electronic medical record system vendors include Allscripts, Valant, eClinical Works, and Epic Systems.

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>23</td>
<td>33%</td>
</tr>
<tr>
<td>No</td>
<td>47</td>
<td>67%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

4. Do you have experience using software and/or systems (like Surescripts) that allow prescriptions to be sent electronically from providers to a pharmacy?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>21</td>
<td>30%</td>
</tr>
<tr>
<td>No</td>
<td>49</td>
<td>70%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Attitudinal Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neither Agree nor Disagree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health information technology benefits the pharmacy profession.</td>
<td>55</td>
<td>14</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Health information technology enables pharmacists to work more efficiently.</td>
<td>55</td>
<td>13</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Health information technology enables pharmacists to provide safer care to their patients.</td>
<td>50</td>
<td>16</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Other pharmacy students in my program think learning about health information technology is important.</td>
<td>29</td>
<td>28</td>
<td>12</td>
<td>1</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Pharmacists can influence policy decisions about the use of health information technology.</td>
<td>33</td>
<td>28</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Pharmacists can be a main driver of health information technology advancement.</td>
<td>38</td>
<td>23</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>I have the necessary knowledge and skills to be an expert in health information technology.</td>
<td>23</td>
<td>12</td>
<td>15</td>
<td>13</td>
<td>7</td>
<td>70</td>
</tr>
<tr>
<td>I intend to seek out further training to improve my knowledge and skills related to health information technology.</td>
<td>42</td>
<td>23</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>I intend to use health information technology to improve patient safety.</td>
<td>43</td>
<td>25</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>I intend to educate pharmacists and/or pharmacy students about health information technology.</td>
<td>36</td>
<td>23</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>70</td>
</tr>
</tbody>
</table>
### Knowledge Questions

1. What is Health Language 7 (HL-7)?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The national standard for electronic patient education information</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>B. A messaging/interface standard</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>C. The primary programming code for most Computerized Provider Order Entry (CPOE) systems</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>D. None of the above</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>59</td>
<td>84%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

2. Which best describes transactional (operational) data versus analytical data stored in a data warehouse?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Transactional data are easier to summarize for operation reports.</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>B. Transactional data are easier to query.</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>C. Transactional data need to be extracted and then loaded into a data warehouse for database functionality.</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>D. Both A and B are true.</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>61</td>
<td>87%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

3. Which of the following is a utilization challenge of electronic prescribing?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Incomplete standards for drug terminology and codified instructions can result in errors translating data between systems.</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>B. Decreased access to clinical guidance including drug safety alerts, adherence reminders and alerts can result in possible gaps in care for patients with chronic disease.</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>C. Decreased access to complete patient prescription history can lead to unsafe prescribing of medications.</td>
<td>10</td>
<td>14%</td>
</tr>
<tr>
<td>D. Starting in 2013, new regulations from the Drug Enforcement Agency (DEA) mandate providers to prescribe controlled substances using only electronic prescriptions.</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>43</td>
<td>61%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>
4. What do you think is the most accurate definition of the term "pharmacy informatics"?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The systematic process for delivering well-referenced, critically evaluated information in pharmacy practice.</td>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>B. The scientific field that utilizes a systems approach to medication-related data and information - including its acquisition, storage, analysis, and dissemination - in the delivery of optimal medication-related patient care and health outcomes.</td>
<td>26</td>
<td>37%</td>
</tr>
<tr>
<td>C. The use of electronic information and communication technology to provide and support comprehensive pharmacy services when distance separates the participants.</td>
<td>9</td>
<td>13%</td>
</tr>
<tr>
<td>D. The transmission, using electronic media, of prescription or prescription-related information between a prescriber, dispenser, pharmacy benefit manager, or health plan, either directly or through an intermediary, including an e-prescribing network.</td>
<td>17</td>
<td>24%</td>
</tr>
<tr>
<td>E. I don't know.</td>
<td>16</td>
<td>23%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

5. Which health professional is NOT considered an "eligible professional" in either the Medicare OR Medicaid Electronic Health Record (EHR) Incentive Programs, and is therefore not able to receive incentive payments through these programs?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Nurse practitioner</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>B. Pharmacist</td>
<td>13</td>
<td>19%</td>
</tr>
<tr>
<td>C. Chiropractor</td>
<td>14</td>
<td>20%</td>
</tr>
<tr>
<td>D. Dentist</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>42</td>
<td>60%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

6. Medication errors that reach the patient in the acute care setting typically occur at which stage in the medication distribution process?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Ordering</td>
<td>5</td>
<td>7%</td>
</tr>
<tr>
<td>B. Transcription</td>
<td>34</td>
<td>49%</td>
</tr>
<tr>
<td>C. Dispensing</td>
<td>11</td>
<td>16%</td>
</tr>
<tr>
<td>D. Administration</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>19</td>
<td>27%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>
7. Which of the following is a true statement about “smart pumps”?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Smart pumps are used primarily by pharmacists to safely compound injectable medications.</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>B. Smart pumps require as many as 30 separate button pushes by nurses or other clinicians.</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>C. Smart pumps are used primarily in the home care setting to administer injectable medications.</td>
<td>5</td>
<td>7%</td>
</tr>
<tr>
<td>D. Smart pumps use a drug library to administer injectable medications.</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>58</td>
<td>83%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>

8. Which of the following is a true statement about drug-drug interaction checking in a Computerized Provider Order Entry (CPOE) system?

<table>
<thead>
<tr>
<th>Answer</th>
<th>Response</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Drug-drug interaction checking is a form of clinical decision support.</td>
<td>6</td>
<td>9%</td>
</tr>
<tr>
<td>B. Drug-drug interaction checking can lead to reports of alert-fatigue by end users.</td>
<td>4</td>
<td>6%</td>
</tr>
<tr>
<td>C. The severity of a drug-drug interaction is often determined by the editorial policy of a Knowledge Base Content provider.</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>D. All of the above statements are true.</td>
<td>26</td>
<td>37%</td>
</tr>
<tr>
<td>E. I don't know</td>
<td>32</td>
<td>46%</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>100%</td>
</tr>
</tbody>
</table>
### Text responses to “What knowledge and skills do you expect to gain as a result of taking this course?”

- laws and regulations governing electronic health records, commonly used electronic support systems in healthcare, future directions that the field of bioinformatics is heading in
- Any that they can offer
- I hope to learn a little bit about the variety of systems available.
- Learning softwares & technologies to improve the workflow of pharmacy profession.
- Learning about how bioinformatics/informatics helps improve prescription errors
- What are the informative tools that will be employed in the pharmacies that we need to know and be able to use?
- Future careers for pharmacists in health informatics.
- What pharmacy informatics is, the jobs available for pharmacy informatics, the training this field entails
- To gain a basic understanding of the topic and to be able to use this in my profession
- Answers to all the previous questions as a minimum.
- A more in depth understanding of pharmacy informatics.
- The ability to understand the benefits and consequences of utilizing electronic systems in the healthcare setting. The ability to more easily navigate electronic systems on rotations or in work situations.
- I don’t know
- Ability to answer the questions I picked as I don’t know.
- An understanding of the various programs that exist, a which is the best if there is one
- Anything related to Partners in E
- understanding what types of programs or technology services are available to facilitate pharmacy practice and how to utilize such technology
- I would like to be informed about the latest technology associated with the pharmacy profession.
- Understand pharmacy informatics challenges and job opportunities
- I hope to gain important information on how to use electronic information to be a very effective pharmacist
- General information
- Be more knowledgeable about health electronic records
- how to maximize bioinformatics
- more information about electronic health prescribing and utilizing EHR for smoother transitions between different services of care. also how different EMR systems can be used between different pharmacies and MD offices
- Pharmacy informatics and technological advancements to enhance my career and profession
- Learning different pharmacy information systems in use today and the future.
- Better understand pharmacy informatics
- better able to utilize informatics resources to be more competent in the pharmacy work setting
- I expect to gain knowledge of how e-prescribing is utilized and can help efficiently and safely share medical information. I also expect to gain the skills necessary to teach others how to utilize e-prescribing
- I wish to gain a basic foundation on these topics that I can utilize in my career.
- how to learn, use, and implement systems
- The role of the pharmacist in the new world of CPOE. How to problem solve physician/provider issues with CPOE. What is expected of the next generation of pharmacists
in regards to technology

- Better understanding of the state of e-prescribing.
- More information on how to improve pharmacy care at the work place.
- I wish to gain knowledge and skills in Health informatics which I can apply in my future workplace
- how to use different health information systems
- The knowledge and skills involved in the future of pharmacy.
- I hope to learn about skills to help me work effectively and knowledge to maneuver around the new pharmacy technologies system in hospital or community pharmacy
- To learn about different health information systems, how they can assist healthcare providers, such as pharmacist, deliver safe and efficient patient care
- Not sure
- How to use informatics and educate others about it as well.
- How to navigate new systems
- How to better utilize existing technology
- terminology
- electronic heath record, pharmacy drug databases
- Operation and management of electronic medical tools
- foundation in pharmacy informatics to continue more advanced training
- Understand more about the electronic health system used in a pharmacy and be able to manage it efficiently
- The answers to all previous questions!
- exposure to health care informatics and what is available, what is in the pipeline, and regulatory issues surrounding the topic.
- Familiarity and understanding with current pharmacy informatics and where the future of informatics is heading.
- General understanding of systems that I will be exposed to during rotations
- To learn the ins and outs of E-prescribing and the process of implementing the software.
- A better understanding of the philosophy behind systems I've seen while interning
- General understanding of the electronic world of pharmacy.
- Hands on informatics software
- Learn more about the impact and the utilization of electronic healthcare information and how that will impact the future of the pharmacy profession.
- Understand more about pharmacy informatics, its importance, future directions, and more on how to use it and what existing systems are out there
- Better perspective as far as healthcare's current innovations and future direction.
- Learning how to use tools of pharmacy informatics