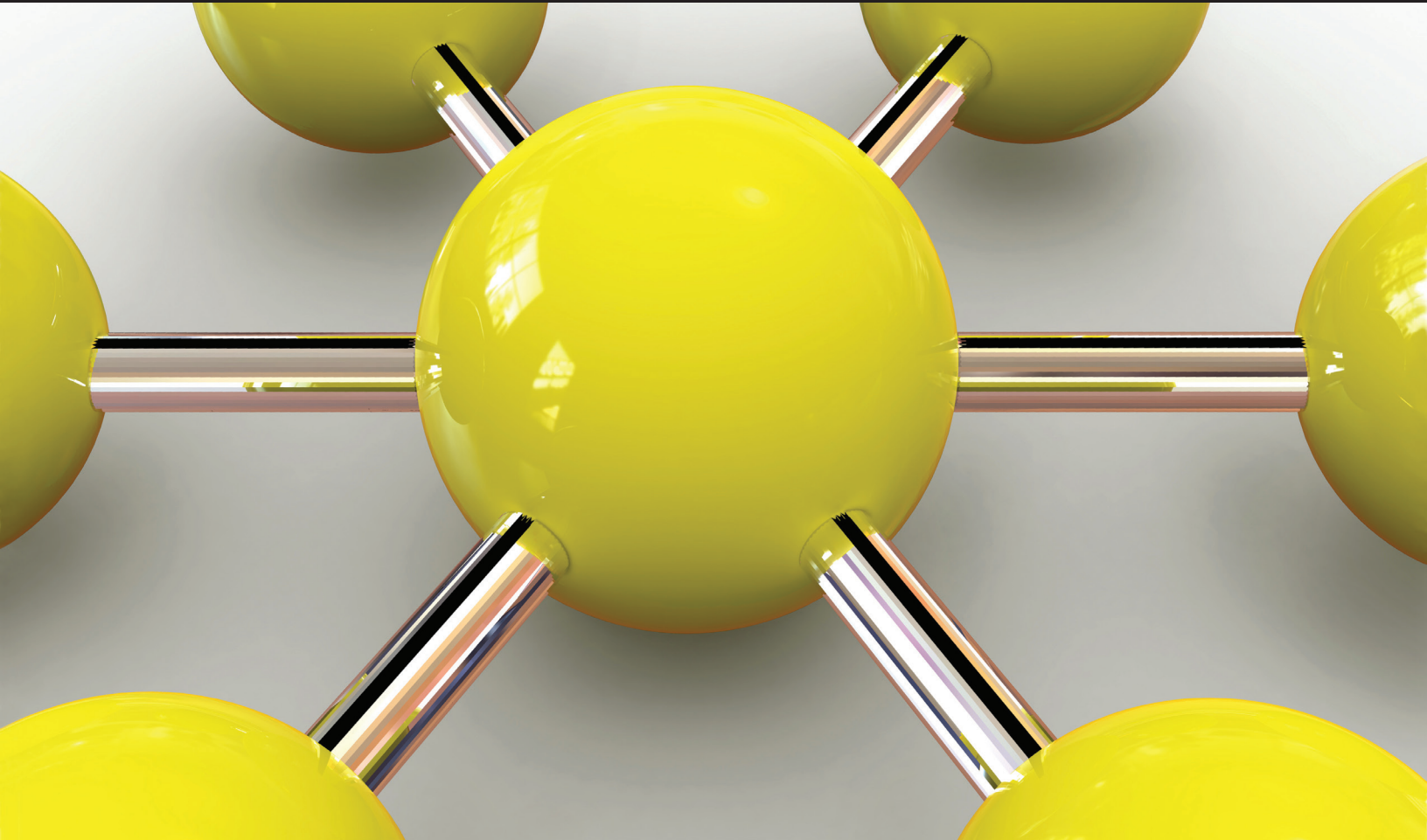# POPULATION HEALTH MANAGEMENT
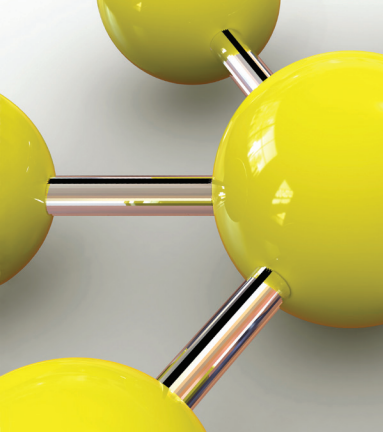
A comprehensive, five-part certificate program
for California hospital leaders

Webinar 4 Issue Brief:

Technology for Population Health Management

August 25, 2015

CALIFORNIA HOSPITAL ASSOCIATION

KaufmanHall

POPULATION HEALTH
MANAGEMENT

Webinar 4 Issue Brief:
Technology for Population Health Management

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Preface

Governance and leadership teams of California's hospitals and health systems must have the knowledge and skills needed to succeed under population health management (PHM). To help ensure success, California Hospital Association, in collaboration with Kaufman, Hall & Associates, LLC, is offering this five-part program titled "Population Health Management." The program provides participants with an understanding of the key components of PHM. Each module features an Issue Brief and webinar for executives and professionals in a wide range of organizations.

This is the fourth Issue Brief and associated webinar. This module addresses the technology needs of PHM, which are significantly different than those of traditional models. Other modules address a framework for the pursuit of PHM, business imperatives, clinical imperatives, and leadership and talent considerations.

For additional information about the program visit www.calhospital.org/population-health-web or contact the CHA Education Department at (916) 552-7637 or education@calhospital.org.

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"With advances made in today's health information technology landscape, hospitals and health systems in California and nationwide can achieve a future in which they consistently get the right information to the right person at the right time to make the right decisions for improved PHM."

Anne McLeod
Senior Vice President, Health Policy and Innovation
California Hospital Association

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Introduction

The first three webinars in this series and their accompanying Issue Briefs provided a framework for population health management (PHM) and described its six business imperatives. These imperatives span delivery system and financing/distribution domains (Figure 1) to include:

• Physician and clinical alignment

• Contracting strategy

• Network optimization

• Operational efficiency

• Enabling infrastructure

• Clinical care management

F I G U R E   1 . *The Population Health Management Framework: Webinars 1-4*
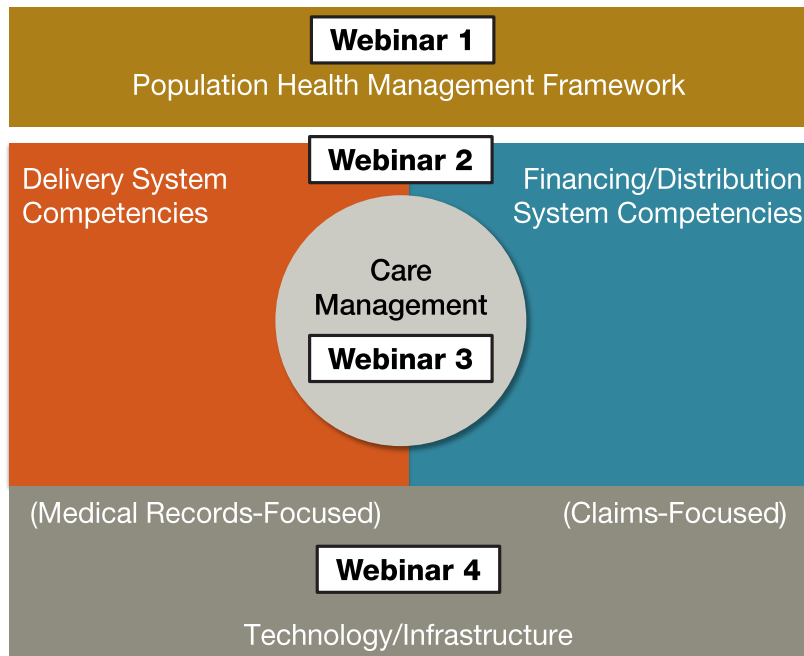
Source: Kaufman, Hall & Associates, LLC

The Webinar 4 Issue Brief addresses technology for PHM. Information technology (IT) — and specifically health information technology (HIT) — provides the platform that "powers" or facilitates the systems and processes involved in the delivery and financing of care. Care management includes both clinical components, such as care transitions and disease management programs described in Webinar 3, and business components, such as network optimization and contracting arrangements described in Webinar 2 (Figure 2).

F I G U R E 2. *The Clinical and Business Components of Care Management*
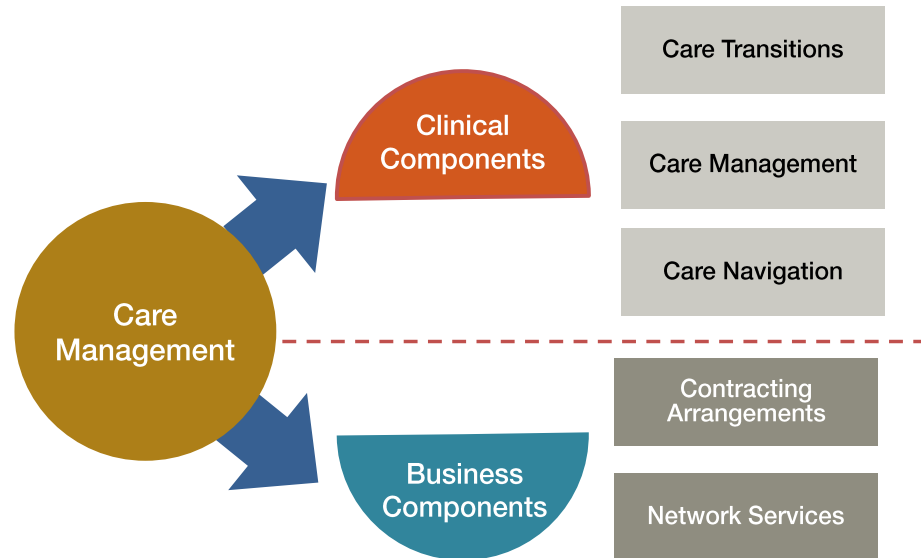
Source: Kaufman, Hall & Associates, LLC

This Issue Brief begins with a discussion of HIT's role in the industry's transformation to a value-based business model for PHM. It takes a close look at the three stages of readiness for future "connected health," the progress made toward this goal by hospitals, health systems and physician practices in California, and the envisioned future for investment in HIT nationwide.

The Issue Brief's focus is HIT strategies for PHM — specifically the technology-enabled components of the care management platform of the future and how organizations will build and maintain this platform. The care management platform includes five building blocks:

- Foundational systems
- Health information exchange (HIE)
- Knowledge management and analytics
- Advanced care management
- Consumer and patient engagement

Details about each level are provided. The Issue Brief also describes the changing and multifaceted vendor marketplace, and concludes with a discussion of how hospitals and health systems in California and nationwide can achieve a future in which they consistently get the right information to the right person at the right time to make the right decision for improved management of a population's health.

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Transformation to High-Value Health Care: The Role of HIT

IT and HIT underpin health care's transformation to achieve high value — defined as improved quality, access and outcomes, at lower costs — thereby enabling accomplishment of the six business imperatives previously mentioned. HIT systems, such as electronic health records (EHRs), clinical decision support systems and revenue cycle IT systems, are providing the means to build new capabilities in real time for predictive and prescriptive analytics, care coordination, and overall clinical and financial management of value-based care.

Rapid technological advances are changing the delivery landscape. Driven by innovation and increased health care consumerism, telehealth and mobile health apps are redefining access to the health care experience and its costs, as described in the Webinar 3 Issue Brief (pages 12-13). Virtual tools also are shifting many care services from traditional bricks-and-mortar inpatient and outpatient facilities to mobile/in-home "anywhere health and anywhere care."

Enabled by HIT, hospitals and health systems are advancing toward high-value, consumer-centric health care delivered in new settings. The speed of transformation varies according to an organization's business strategy, operating model and the stage of readiness in its market (Figure 3). As described in the Webinar 1 Issue Brief (page 13), market stage of PHM readiness and progression can be gauged through analysis of seven characteristics:

- The level of organization among hospitals and physicians

- Employer health care benefits structure

- Enrollment in exchanges and level of insurance product/network sophistication

- Amount of vertical collaboration and new-entrant activity

- Demand for services

- Supply of providers

- Regulatory environment

Enterprise strategy and HIT strategy can be defined in three stages, which are evident in the current market environment in California and nationwide:

- 1.0 — Bricks-and-mortar health care

- 2.0 — Health care in transition

- 3.0 — Digital health and connected care

Representing both enterprise strategy and HIT strategy, the three stages are evolutionary and additive. Activities occurring during 1.0 can continue to be areas of focus as the organization ramps up 2.0 or 3.0 activities. Aspects of each stage build on each other. For example, 2.0 systems, which are able to support clinical care management processes performed by providers in a clinically integrated network, use as a foundational building block the common hospital/physician EHR systems implemented during 1.0, and modified as needed through the years.

"HIT systems, such as electronic health records (EHRs), clinical decision support systems and revenue cycle IT systems, are providing the means to build new capabilities in real time for predictive and prescriptive analytics, care coordination, and overall clinical and financial management of value-based care."

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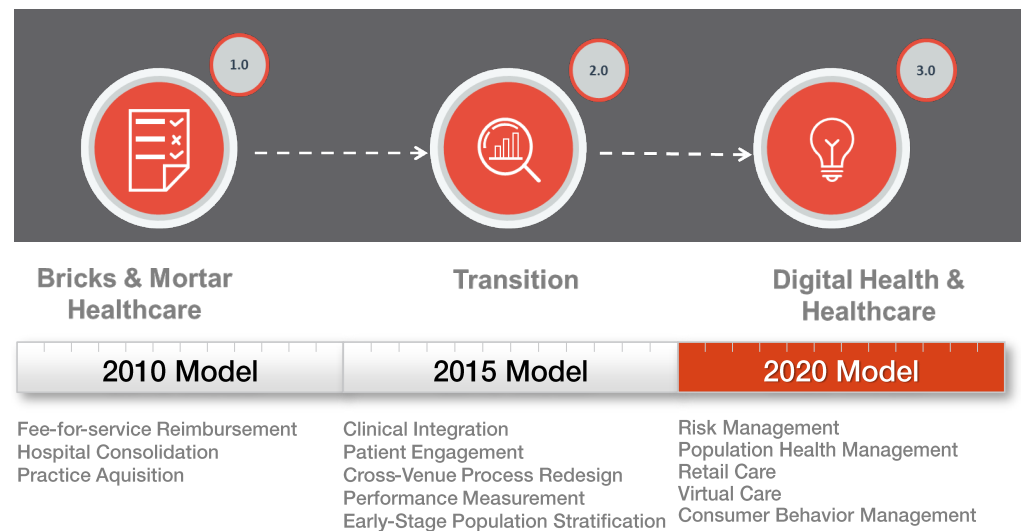
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An organization's ultimate progress is linked to its successful integration of activities occurring in and among each stage of both enterprise strategy and HIT strategy. Markets are evolving at different speeds, and hospitals and health systems in California and other states can go, and are going, through the stages simultaneously.

For example, a health system may find itself trying to operate with a 1.0 HIT strategy (and infrastructure) in a market where it has a 3.0 enterprise strategy, as is appropriate based on the market's advancement toward PHM. The effect could be that the system is not able to quantify the value it brings to payers — i.e., quality, cost and access — and is excluded from rapidly developing regional networks. Or, a progressive health system that has invested heavily in informatics and analytics, which enables it to move quickly from a 2.0 to 3.0 model, may find itself in a traditional 1.0 fee-for-service (FFS) market. The effect could be that the market's traditional FFS payment arrangements do not adequately compensate the system for reduced utilization achieved through effective PHM. The key is alignment of enterprise strategy and HIT strategy based on market evolution.

The journey from 1.0 to 3.0, with development of mature information and technology systems, is often considered to be a 10-year process or even a "generational" one of 20 or more years. During this journey, again, the alignment of enterprise and HIT strategy will be critical. Demand for advanced care management systems will increase with the evolution of market readiness and progress toward value-based payment and population health. Specific capabilities for each stage follow.

F I G U R E 3. *Journey to High-Value Health Care: The Role of HIT*

2010 Model	2015 Model	2020 Model
Fee-for-service Reimbursement	Clinical Integration	Risk Management
Hospital Consolidation	Patient Engagement	Population Health Management
Practice Aquisition	Cross-Venue Process Redesign	Retail Care
	Performance Measurement	Virtual Care
	Early-Stage Population Stratification	Consumer Behavior Management

Enterprise strategy varies by market stage, competitive positioning, history, collaboration among key players, new entrants, organizational competencies, etc.

Source: Maestro Strategies, LLC

"The journey from 1.0 to 3.0, with development of mature information and technology systems, is often considered to be a 10-year process or even a 'generational' one of 20 or more years. During this journey, again, the alignment of enterprise and HIT strategy will be critical."

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1.0 Bricks-and-Mortar Health Care

The first stage, identified as the 2010 Model in Figure 3, should be considered a "business as usual" way of operating in a traditional bricks-and-mortar, facility-based health care system.

Under this model, hospitals and physician practices are the site of a significant amount of care delivery. Physicians are largely in control of the care delivered in hospitals and the way revenue moves through the health system.[1] Public and private payers assume the bulk of the financing and distribution functions, and providers in the local delivery markets operate under contractual FFS arrangements. To build scale and increase efficiency, hospital consolidation is occurring, and hospitals are acquiring physician practices to secure referral sources.

The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 initiated the "meaningful use"[2] of EHRs in hospitals and physician practices nationwide. Initially, these applications mirror and support the traditional FFS, volume-based business model in place in health care since the mid-1960s.

The business-as-usual HIT 1.0 focus is on identification of services to be billed, and claims and contracting management to obtain FFS payment. Key activities include:

- Implementing EHR systems to enable business and clinical aspects of care delivery, first within one hospital and subsequently across system-member hospitals; and

- Preparing to integrate employed and allied physicians in an EHR-enabled ambulatory network

EHRs typically mirror paper records and focus on documenting what occurred between a patient and a clinician. HIT systems mostly are compliance-driven and engage the provider, not the patient. Quality reporting using data generated through the EHR occurs months after the fact. Key characteristics of HIT 1.0 systems are outlined below.

Key Characteristics of HIT 1.0 Systems

- Designed to support clinical care documentation within one entity
- Focus on 1:1 relationship between a patient and a clinician
- Support volume-based billing
- Emphasize compliance and litigation prevention
- Ensure proprietary ownership of HIT "footprint" by vendor
- Mirror the paper record
- Engage the provider, not the patient
- Unconnected to payer risk, claims and disease management

Source: Maestro Strategies, LLC

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2.0 Health Care's Transition or "Pivot"

The second stage, identified as the 2015 Model in Figure 3 (page 5), represents a transition or pivot of the organization's operating model to focus on technology-supported clinical integration and patient-engagement strategies that will enable effective and efficient PHM in the future.

Whereas regulatory compliance may have *pushed* organizations to undertake HIT 1.0 activities, enterprise strategy to support clinically integrated networks, patient-centered medical homes (PCMHs) and advanced PHM now *pulls* the design of HIT 2.0 and 3.0 technologies. In this stage, hospitals and other providers implement information systems to begin enabling rapid and real-time reporting of quality and performance data that are critical to improved clinical and business decision making.

An emergent focus in this stage is on efforts to use technology to identify, stratify and prioritize high and at-risk patient populations whose effective management would improve health outcomes and reduce costs.

As described in the Webinar 3 Issue Brief, risk stratification by health status systematically identifies individual patients covered by specific contracting arrangements in order to coordinate their care based on individual needs and evidence-based guidelines. With HIT support, organizations start to prioritize the 20 percent of the patient population that consumes 80 percent of their health resources. They collect, aggregate and analyze data, such as hospital admissions and readmissions for ambulatory care-sensitive conditions, emergency department and ambulatory visits, and other information.

Technology-supported cross-venue process design also occurs at this stage as the organization rethinks its quality and operating models and looks to build care innovation capabilities. This involves starting to:

- Use technology to engage patients in new ways, such as mobile-friendly appointment scheduling, care monitoring and reminders

- Build out the system of care to consider practical issues, such as how medications are managed across the system's acute and ambulatory settings, or how referrals are managed across care sites in an organization's clinically integrated network

As described in the Webinar 2 Issue Brief (pages 7-12), under new care and financing models, such as bundled arrangements, organizations are expected to meet specific patient experience and outcomes metrics outlined in contracting arrangements. HIT 2.0-stage informatics and analytics help organizations monitor progress toward targeted performance goals.

For example, an orthopedic service line may re-examine overall and specific care processes for patients who have joint replacements covered under bundled payment arrangements. Close review of data relevant to care transitions may reveal opportunities to improve the care process to make it seamless for the patient as he/she moves from the ambulatory visit, through surgery, back home, and to an office- or clinic-based post-operative visit.

"Whereas regulatory compliance may have pushed organizations to undertake HIT 1.0 activities, enterprise strategy to support clinically integrated networks, patient-centered medical homes (PCMHs) and advanced PHM now pulls the design of HIT 2.0 and 3.0 technologies."

HIT 2.0 begins to allow organizations to change the way they work across traditional and nontraditional care sites as providers and consumers access information 24/7/365 for improved decision making and other benefits. Key uses of HIT 2.0 are outlined below.

3.0 Digital Health and Connected Care

In the third stage, identified as the 2020 Model in Figure 3 (page 5), technology reinvents the way health and health care are achieved and managed to meet the Triple Aim goals of PHM — better health and outcomes at lower cost. Far different than the HIT 1.0 world where technology comes in the form of applications that mirror the old way of working, HIT 3.0 weaves digital capabilities into the fabric of the clinical/business/payment model and transforms health care delivery.

The change will be profound. "Our brains are wired to think in a linear fashion, but technology's growth is occurring exponentially," says Peter H. Diamandis, MD, Chair and CEO of the XPRIZE Foundation.[3] "Riding on Moore's Law (which holds that the number of transistors on a dense integrated computing circuit will double every two years), new technologies — including sensors and networks, robotics, 3D printing, synthetic biology, digital medicine, nanomaterials and artificial intelligence — will impact health care this decade in a fundamental way."

The Doctor on Demand app already connects consumers with a physician for a 15-minute video chat for $40. Walgreens offers lab testing at some of its walk-in clinics through a partnership with Theranos, which uses a technique that can deliver results of complex lab tests quickly and economically with just a few drops of blood.[4] In the near future, a consumer wearing a biometric device will measure his/her own blood chemistry, heart rate and other functions. Armed with a smartphone, other mobile device or a cloud-based tool, the individual patient "becomes the CEO of his or her own health."[5]

Digital, connected health will have a bigger impact on how health care is delivered than health reform, meaningful use or any other legislation. A huge wave of innovation based on digital capabilities will drive all stakeholders toward consumer-centric, population health-focused care. Like what occurred in the taxi industry with Uber or in bookselling with Amazon, nontraditional entrants from fields outside of health care will accelerate permanent change in the health care industry.

Key Uses of HIT 2.0

- Effectively manage medications
- Organize clinical problem lists
- Track and manage diseases for individuals and groups of patients
- Communicate and track referrals or consultations
- Document transitions of care
- Manage patient encounters across time
- Provide clinical and business dashboards and care summary information
- Consolidate diagnostic information from a variety of providers
- Engage patients in self-health management activities
- Stratify patients according to risk
- Ensure use of best practice and evidence-based medicine across providers and the continuum of care
- Communicate a multidisciplinary plan of care and ensure accountability

Source: Maestro Strategies, LLC

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"Well-funded nontraditional competitors are looking to take a significant chunk of low-acuity health care business and transform health care into an outpatient- and online-focused model," comments Kenneth Kaufman, Chair of Kaufman, Hall & Associates.[6] Formerly competing only in the retail/pharmaceutical space, Walgreens and CVS Health have expanded into preventive/urgent care and care management services, competing with hospitals and physicians by building a connective platform to link consumers nationwide.

The HIT 3.0 challenge for legacy providers is to ensure that their legacy HIT systems advance to support web and mobile access for administrative and clinical interactions. Areas of focus for hospitals and health systems include retail/virtual care, consumer behavior management and risk management.

"For health care executives, the challenge is to think about their delivery networks and their health care services with a new, multifaceted patient in mind — a patient who may be healthy or sick, who values nurturing but wants independence, who craves information and flexibility, and who will make choices based on perceptions of value that vary depending on each situation," suggests Kaufman.[7]

Many health care organizations are applying analytics tools to group the populations they serve into segments with shared characteristics related to a particular aspect of health care services. For example, segments can reflect degree of interest in virtual care or other factors that influence purchasing decisions. Such segments are critical to understanding the changing nature of a patient — or consumer — in each market, and in translating that understanding into service planning.[8]

To control the cost of care, hospitals and health systems in an HIT 3.0 world must be adept at identifying health care consumers most at risk for costly services, drawing data from all sites of care, insurance claims and perhaps even consumers' everyday lives. Some hospitals, for example, are contracting with data brokers to access information about consumer spending to identify high-risk patients, such as an asthma sufferer purchasing cigarettes.[9]

Technology-enabled care management staff will support high-risk patients in their homes and through schools, employers, public health agencies and religious organizations. Care management can include activities such as helping patients understand a medication regimen, test their blood sugar levels, and address diet or living conditions.

On the business side, hospitals will use sophisticated analytics to identify and assess the sources of risk that must be managed in value-based contracting under a PHM construct, including strategic and operating risk, actuarial or insurance risk, financial/asset and liability risk, and comprehensive risk, as described in the Webinar 2 Issue Brief (page 22).

"Digital, connected health will have a bigger impact on how health care is delivered than health reform, meaningful use or any other legislation. A huge wave of innovation based on digital capabilities will drive all stakeholders toward consumer-centric, population health-focused care."

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The following strategic priorities[10] will drive HIT 3.0 requirements:

• Improving cost management and efficiency

• Increasing clinical integration

• Expanding coordination of care

• Improving quality and safety

• Innovating and effecting change management

• Increasing patient engagement

Listed below are capabilities that must be present with HIT 3.0 to reengineer care delivery.

Progress in California and the Nation

The HITECH Act and its meaningful use requirements drove accelerated adoption of foundational HIT capabilities and tools by hospitals and physician practices serving Medicaid and Medicare populations nationwide. The Act accomplished this by providing incentive payments for meaningful use of interoperable EHRs beginning in 2011, and penalties for non-adoption beginning in 2015.

Rolled out in three stages with specific requirements over a period of time until 2017, the main components of meaningful use are use of a certified EHR:

• In a meaningful manner, such as e-prescribing

• For electronic exchange of health information

• To submit clinical quality and other measures

Medicaid payments to eligible professionals (physicians, nurse practitioners, dentists and others) for adoption add up to approximately $64,000 over six years beginning in 2011. For Medicare, the maximum payments total nearly $44,000 over five years for organizations that were eligible in 2011 and 2012 (and less for those that became eligible in 2013 and/or 2014).[11] Penalties for non-adoption by 2015 are 1 percent of Medicare payments. Penalties increase to 3 percent over three years for physicians, and 1 percent annually to a maximum of 5 percent for hospitals.[12]

Capabilities Available from Value-Driven HIT

• Hardwire standardized care practices and protocols

• Improve point-of-care decision making through clinical decision support and intelligent algorithms

• Stratify patients with specific conditions and track disease status

• Improve access and care management across geographic and time differences

• Integrate data across multiple entities, processes and functions

• Improve communications across care teams and transitions of care

• Measure and analyze performance of care for individuals and populations

• Make Lean and other performance improvement programs sustainable by automating routine work, eliminating waste and reducing cost of care

Source: Maestro Strategies, LLC, and adapted from Davenport, T.H.: Process Innovation — Reengineering Work Through Information Technology. Cambridge, MA: Harvard Business Review Press, 1992.

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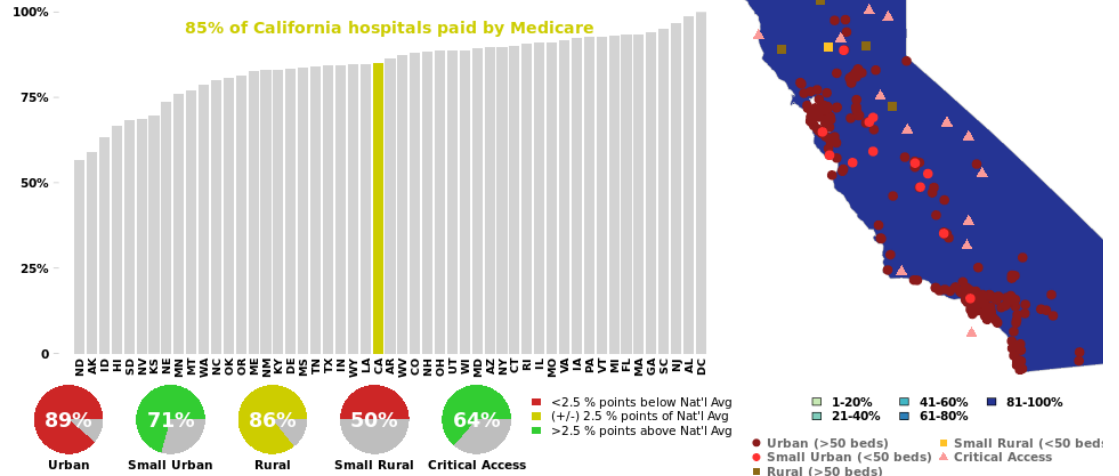Although the incentives did not cover EHR costs, by 2013:[13]

- Hospital adoption of EHRs had increased more than fivefold since 2008 levels

- Nearly 78 percent of office-based physicians had adopted some type of EHR system

- Seventy percent of providers nationwide were using electronic prescribing through an EHR — a tenfold increase since 2008

Data and analytics tools are developing rapidly to meet broad needs for meeting meaningful use requirements, tracking patient populations and managing their health. Advanced health data analytics are expected to continue to grow significantly from a 10 percent adoption rate in 2011 to 50 percent by 2016.[14]

EHR adoption by California hospitals eligible to participate in the Medicare EHR incentive program is in the "middle of the pack" compared with other states, with 85 percent receiving payments for meaningful use in 2014 versus a national average of 86 percent (Figure 4). Adoption varies by location and type of hospital. The adoption rate is 50 percent for small rural hospitals; 64 percent for critical access hospitals; 71 percent for small urban hospitals; 86 percent for rural hospitals; and 89 percent for urban hospitals.

FIGURE 4. *Health IT Dashboards: Hospital Meaningful Use in California*

Percent of California Hospitals Paid by Medicare for Meaningful Use — National Average = 86%
Hospitals Eligible to Participate in Medicare EHR Incentive Program only
Source: CMS EHR Incentive Program data, December 2014 and
CMS Provider of Services data, December 2014.
Note: See www.dashboard.healthit.gov/dashboards/hospitals-medicare-meaningful-use.php for more information

Source: http://dashboard.healthit.gov/dashboards/dashboards.php#Hospital-Meaningful-Use

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EHR adoption is lower for physicians in California than nationwide. The average proportion of U.S. office-based physicians paid by Medicare for meaningful use is 49 percent; in California, that proportion is 48 percent (Figure 5). Again, adoption rates vary by geography, with a high adoption concentration in the Bay area, for example, and less in rural areas.

FIGURE 5. *Office-Based Physicians Paid by Medicare for Meaningful Use in California*

Percent of California Office-based Physicians Paid by Medicare for Meaningful Use
National Average = 49%
Source: CMS EHR Incentive Program data, December 2014, and SK&A Office-based Provider Database, 2013.
Note: See www.dashboard.healthit.gov/dashboards/physicians-medicare-meaningful-use.php for more information

Source: http://dashboard.healthit.gov/dashboards/physicians-medicare-meaningful-use.php
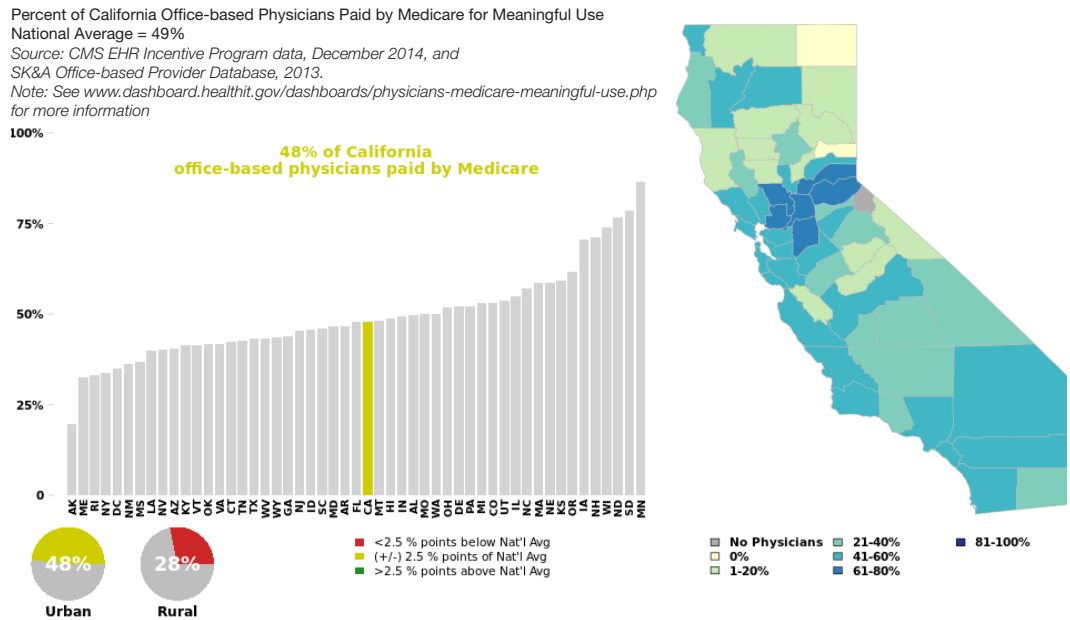
Participation in meaningful use incentives is only one measure of the state's progress. Development and implementation of technology- and value-driven HIT is occurring across California and nationwide. Examples include the following:

- With support from the California HealthCare Foundation, new software allows safety net providers and community health centers to use an iPad to collect registration information from patients and import it into an EHR.[15]

- UC Davis Health System has been developing HIE capabilities to support patient care transitions by leveraging tools in its EHR and building partnerships with other health systems that have the same EHR technology. UC Davis physicians can use the EHR to order tests within the health system and to obtain copies of recent tests performed by other providers.[16] This ensures quicker appointment scheduling for cancer patients, for example, with availability of all relevant clinical information for UC Davis specialists.

- Developed by San Francisco General Hospital and University of California, San Francisco (UCSF) faculty, an electronic system (eReferral) streamlines referrals from primary to specialty care, while also aiding consultations among care providers. As described through the California Improvement Network,[17] "referral requests are submitted electronically and then reviewed by a specialist who can consult with the referring provider until the clinical issue(s) have been resolved. As a result, in some cases the patient will not need to be seen in person by a specialist. This system has improved the timeliness of specialty care, the appropriateness and completeness of referrals and the primary care provider's tracking of referrals."

Additional examples specific to California hospitals appear later in this Issue Brief.

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The most recent annual survey of senior health care executives by *Modern Healthcare* identifies "hot-button issues" and hospital interoperability capabilities.[18] The survey offers a picture of progress to date and future expectations nationwide. High-ranking issues include:

- Achieving ICD-10 readiness

- Adopting/upgrading financial, clinical and analytic systems to ensure readiness for accountable care organizations (ACOs) or PCMHs

- Achieving/maintaining Stage 2 meaningful use

- Building clinical communication infrastructure/links to physicians

- Developing data warehouses

- Adopting/extending ambulatory clinical IT systems

These top issues invite the question of how organizations will fund the development of required capabilities.

HIT Investment Drivers

Market progress, envisioned future and business strategy should drive HIT investment. No one size fits all. Specific systems, tools and approaches will be based on the organization's business objectives, the local/regional market's transition to value-based care and payment, readiness of clinicians and ability of the organization's current foundational systems to move to the next level of sophistication. HIT investment often looks very different depending on the enterprise strategy, organizational competencies and capabilities, and selected partners in a delivery network. National, regional, statewide and hospital-specific examples follow.

A National/International System

A national not-for-profit health system typically must balance corporate strategy and standardization of its HIT platform with local market specifics. Readiness likely is different in each market. The organization's competitive position with care models is highly relevant.

For example, CHRISTUS Health is an international system with more than 60 hospitals and other facilities located in Texas, Louisiana, New Mexico, Arkansas, Georgia, Iowa, Chile and Mexico. Luke Webster, MD, Vice President and Chief Medical Information Officer comments, "Our corporate IT strategy for population health management is dependent on a variety of factors in each market — level of clinical integration, whether ACOs and PCMHs have been established, clinician readiness, state laws, existing technology adoption and other factors. We must balance corporate standardization and the need to "localize' specifics."

> "*Market progress, envisioned future and business strategy should drive HIT investment. No one size fits all. Specific systems, tools and approaches will be based on the organization's business objectives, the local/regional market's transition to value-based care and payment, readiness of clinicians and ability of the organization's current foundational systems to move to the next level of sophistication.*"

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A Regional Partnership

The second example, Vivity, is a regional joint venture partnership between Anthem Blue Cross and seven hospital/physician networks in Los Angeles and Orange counties. Vivity is creating a cobranded narrow network HMO product, initially geared for large-group employers and powered by Anthem Blue Cross' data analytics.

The providers will be working together to keep costs down by using common wellness resources, care management systems and a centralized call center.[19] Sharing of staff is planned to perform services such as discharge follow-up and counseling for chronic care or medication management.[20] Reimbursement of the system partners will be risk-based, meaning payment will depend on how well systems perform in meeting specific quality targets,[21] which Vivity partners will define and monitor through HIT and IT systems.

Interoperability of EHR platforms across Vivity is not in place, but a few of the participating hospital/physician networks have a common EHR system. The Vivity partners are balancing business requirements with alignment of provider technology strategies and plan to do what's most efficient. Implementation of a totally new IT system is not financially viable because Vivity is one product of potentially many with which the providers are aligning.[22]

Technology-enabled, consumer-friendly offerings are a focus, however, and include: Live Health Online, a consultative live video chat with a physician; a 24/7 nurse line; after-hours urgent care; and Mobile Health Consumer, an app offering biometrics, health-risk assessment and information on timely health interventions.

A Statewide Partnership

A statewide partnership in Wisconsin, called Abouthealth, was formed in late 2014 to share IT and other resources for efficiencies that would yield better health care value. The partnership includes eight health systems and insurer Arise Health Plan (Figure 6).[23]

FIGURE 6. *Participants in a Statewide Partnership in Wisconsin*

Source: Maestro Strategies, LLC

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Greg Devine, President and CEO of Abouthealth notes, "Our vision is to use our collective resources wisely by being good stewards of the clinical, administrative, IT, research, patient experience, care management and other shared expertise within our systems."[24] Participants frame their strategic partnership as a new pathway for patients to access the highest quality health care across the state and region. They expect the network to serve as an example for the nation, leveraging the care model advancements of each partner. Strong electronic data collection capabilities will be important to advance value-based PHM initiatives. The partners plan to share quality information, noted Jeff Thompson, MD, CEO of Gundersen Health System and chair of the partnership's board of directors.[25]

The provider partners use the same EHR system, which allows them to leverage the technology and use some of the EHR features more effectively. However, the EHR system was not a prerequisite for joining the partnership.
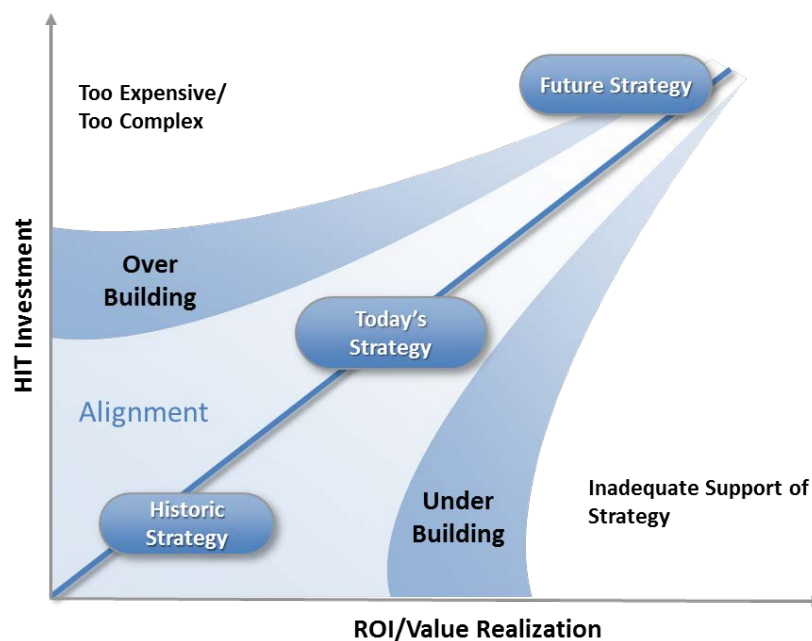
At the Hospital/Health System Level

HIT is the bricks-and-mortar of tomorrow's health care system. The 1.0 version will not be sufficient for future hospital/health system needs related to care coordination and population health strategies. Organizations must invest in much more advanced technology and information tools, or partner to achieve the benefits of such tools. Clinical integration and PHM require "heavy lifting," integrating people, process, information, technology and change.

Potentially reassuring for smaller organizations is that no one enterprise will build this alone. Flexible non-merger models, such as the state and regional examples previously described, will involve some level of partnership among payers, integrated delivery networks, providers, employers and new entrants. These models likely will allow other smaller organizations to participate if they bring high-quality services to the delivery network. Virtual networks using technology as the means for clinical integration will be more prevalent.

An appropriate HIT strategy for the future starts with historic and current capabilities and walks the fine line toward a defined future investment strategy (Figure 7). It neither overinvests in HIT that is too expensive given enterprise objectives, nor provides inadequate support to organizational strategy going forward.

F I G U R E 7 . *HIT Investment Strategy*

Source: Maestro Strategies, LLC

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The extent of an organization's investment in technology infrastructure should be based on the role it assumes in PHM, as described in the Webinar 1 Issue Brief (pages 10-11). A description of three different PHM role-based investment strategies follows.

Population Health Manager

Assuming the most advanced role in a market, the population health manager provides and/or contracts for a full continuum of services across all levels of acuity. The entity is well-positioned to own insurance products and/or manage full provider risks. This level of PHM requires development and operation of the full care management platform, described next, either in partnership with other entities or independently.

The population health manager must provide significant governance, funding and leadership in the design of the HIT-enabled platform. For example, Michigan-based Trinity Health, an 86-hospital Catholic health system, has a new joint venture agreement with Heritage Provider Network, which has a managed care network in California. Named Trinity Health Partners, it is developing a care network comprised of primary care physicians, hospitals, clinics and other providers to manage care for its different patient populations. "What makes Trinity Health Partners different from other population health models is the emphasis on technology," indicates Richard Gilfillan, MD, CEO of Trinity. "We're putting in place a system that is wired and engineered to see the patient wherever they are."[26]

Population Health Comanager

Also in a relatively advanced role, a population health comanager is clinically integrated with other organizations to form a value-based delivery system. Well-positioned to participate in PHM and risk-bearing arrangements, the entity does so in a delegated and/or direct fashion. Providers at this level will need to access all five layers of the care management platform. Their leadership will be engaged in component design, integration and deployment of appropriate HIT to meet functional platform requirements.

Multiproduct, Single Product and Contracting Participants

In these less advanced roles, PHM and HIT strategies vary by hospital/health system and market. Organizations will provide a defined set of services for a defined population covered under public and commercial arrangements. To participate as part of the patient-centered, connected-care platform of the future, their foundational systems, data-sharing agreements and niche-based technology investments will drive their PHM strategies.

For example, in southeast Kern County, Calif., a project is underway to build IT capabilities to support population-wide preventive care initiatives — specifically immunizations. One hundred percent of PCPs are participating with EHRs to enhance quality of care by focusing on diabetic care as a PHM model. In El Dorado County, Calif., a safety net technology project called ACCESS is underway to integrate an HIT access product across all major health care providers to benefit the county's safety net population.[27]

"Clinical integration and PHM require 'heavy lifting,' integrating people, process, information, technology, and change. Potentially reassuring for smaller organizations, no one enterprise will build this alone."

An organization's desired PHM role must be firmly grounded in its strategic-financial condition. Hospital and health system leadership teams in California and nationwide are working hard to determine how to participate in local/regional delivery networks, and the kind of HIT investments and partnerships that are required to make that possible.

Meaningful use is not the "silver bullet" that meets all needs of a high-quality care management platform. HIT strategies must be customized to adapt to a PHM model of care based on organizational, competitive and market specifics. Again, there's no one-size-fits-all approach; the approach used by each organization will be different.
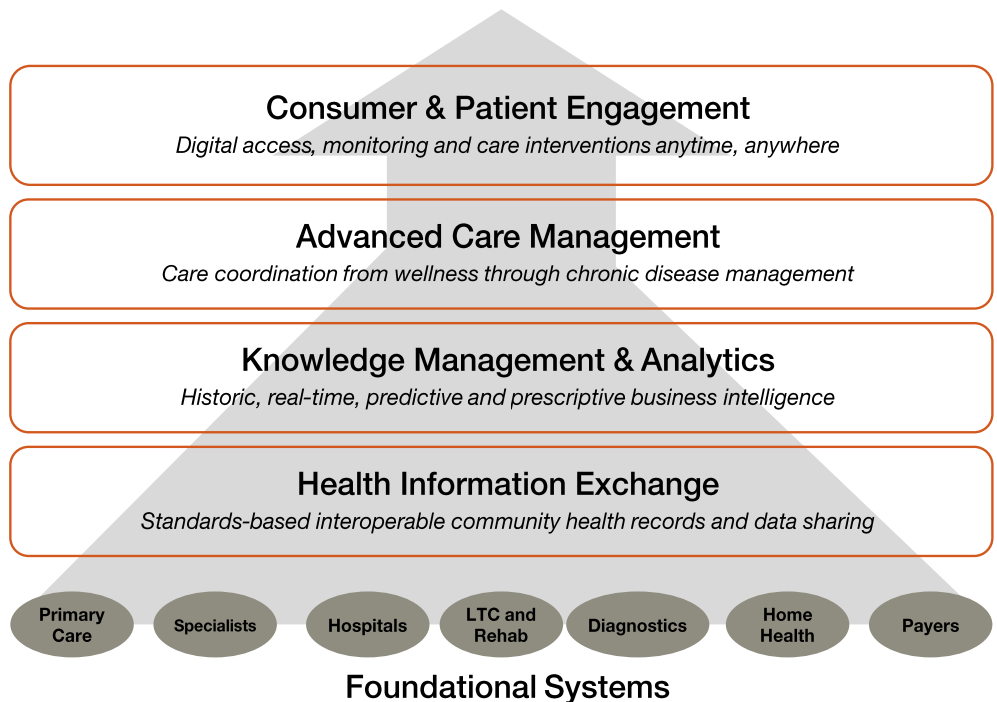
The Care Management Platform

Platform Basics

The five building blocks of a care management platform provide a framework for HIT strategy. These building blocks are not bits and pieces of IT that can be purchased and implemented independently of each other in some given sequence. Rather, they are core competencies that organizations must gain or partner to gain to efficiently and effectively manage population health.

The care management platform's top four levels build upon HIT 1.0 foundational systems, which comprise the first level (Figure 8). These capabilities are additive, reinforcing each other, and typically are in development and used simultaneously to the degree appropriate for an organization. A description of each layer follows.

F I G U R E 8. *The Care Management Platform*

Consumer & Patient Engagement
Digital access, monitoring and care interventions anytime, anywhere

Advanced Care Management
Care coordination from wellness through chronic disease management

Knowledge Management & Analytics
Historic, real-time, predictive and prescriptive business intelligence

Health Information Exchange
Standards-based interoperable community health records and data sharing

Primary Care   Specialists   Hospitals   LTC and Rehab   Diagnostics   Home Health   Payers

Foundational Systems

Source: Maestro Strategies, LLC

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Level 1 — Foundational Systems

Foundational systems used by providers and payers sit at the bottom of the framework. During the past five to seven years, systems used by hospitals and physician organizations were characterized as HIT 1.0. This "micro-view" supported volume-based billing, defending claims and meeting compliance requirements, as previously described.

Foundational systems typically were implemented within fragmented care/stakeholder silos, including primary care physicians, specialists, hospitals, long-term care, rehabilitation, diagnostics, home health, payers and other purchasers. Designed to support clinical care documentation within one entity, they were minimally, if at all, connected to physician networks, and unconnected to overall care coordination and risk-management programs operated by payers.

The pivot to HIT 2.0 begins the path toward a "macro-view," as outlined under the key uses of HIT 2.0 (page 8). HIT 2.0 teaches and informs versus simply documenting. This much-needed pivot:

- Moves from a silo focus to system-of-care focus where data can be shared by hospital systems, continuum-of-care partners and payers
- Supports decision making that is patient-centric and population-focused
- Reinforces population-driven, national standards of practices

The HIT 3.0 future extends the enterprise focus to supporting care coordination across providers in a community and, thereby, to managing the health and health care of specific patient populations.

Level 2 — Health Information Exchange

Key Definitions
Health information exchange is a function or competency that enables standards-based, interoperable patient health records and data sharing in a community, as defined by the participating entities. According to the Office of the National Coordinator (ONC) for Health Information Technology, "An interoperable health IT ecosystem makes the right data available to the right people at the right time across products and organizations in a way that can be relied upon and meaningfully used by recipients."[28]

Not a traditional IT application (for example, data warehousing), HIE is critical to care coordination across settings. True value from HIE occurs when business and interoperability strategies are aligned to create a "central nervous system" for care coordination and management of care transitions. Real-time information flows from site to site and clinician to clinician.

For example, through use of a tool such as a master patient index, a primary care doctor would know that his/her patient went to three city emergency departments in one day, perhaps trying to get a different or "better" answer related to access to pain medications. Communication devices, registries and community health records are other examples of HIE tools.

High-quality data exchange through such tools ensures overall, structural, semantic and process interoperability, powering a delivery network across vendor systems, providers, payers and patient populations.

"Meaningful use is not the 'silver bullet' that meets all needs of a high-quality care management platform. HIT strategies must be customized to adapt to a PHM model of care based on organizational, competitive and market specifics."

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Interoperability is the ability of different information technology systems and software applications to communicate, exchange data and use the information that has been exchanged.[29]

Structural interoperability defines the syntax of the data exchange, ensuring that data exchanged between IT systems can be interpreted at the data-field level.[30] For example, will a patient's diagnosis code be interpreted the same way when data are exchanged between hospitals with different EHR systems?

Semantic interoperability provides the highest level of interoperability, ensuring that two or more systems can use the information that has been exchanged. This level of interoperability supports the electronic exchange of health-related financial data, patient-created wellness data and patient summary information among caregivers and other authorized parties, notes the Health Information and Management Systems Society.[31]

Semantic interoperability is possible with business-related information systems, medical devices, mobile technologies and even disparate EHR systems. One system's use of "heart attack" is recognized to be the same as another system's use of "myocardial infarction" or "MI." Data populate relevant monitoring systems to inform decision making related to treatment of a patient who has experienced a heart attack. Semantic interoperability can contribute to consumer wellness, as well as the quality, safety, cost-effectiveness and access of health care services.

Through *process interoperability*, health information exchange processes interact seamlessly and technology supports business process optimization. For example, process interoperability ensures consistent referral management practices across a network of providers to prevent patient "leakage" to non-network providers. It also ensures integration of data exchange with work processes, management of care transitions and other key practices.

Example tools important for building out interoperability include direct messaging; master patient indexes and record locator services; infrastructure and security applications; and "middleware," such as interface engines.

Approaches to HIE

Business strategy should drive HIE participation and design in specific markets. Participation in multiple HIE networks available in some markets might be appropriate for some hospitals and health systems. Tools or approaches must reflect that business strategy, as well as clinician readiness and the organization's foundational systems.

A number of alternative HIE-building strategies can and should be used singularily or in combination by organizations based on enterprise strategy, market readiness, vendor footprint and role of participating stakeholders. Approaches include selecting and deploying one EHR across all owned, employed and affiliated providers; developing or participating in a private HIE; joining a community or "medical trading" HIE; payer HIEs; and connecting with national HIT infrastructure.

Common EHR. Many organizations have assessed or implemented a strategy involving use of one integrated EHR vendor across system hospitals and employed physician practices. Standardizing EHRs and exchanging data have proven to be challenging across care sites and providers, particularly with physicians in community practice and with post-acute providers on a different EHR platform(s), or that lack a platform altogether. Data exchange with entities using a different EHR may require significant translation of data structure and syntax, and other modifications.

Data exchange on one platform can also be problematic because vendors offer multiple applications or versions where each connect with different providers. For example, one prominent vendor has unique modules that, among others, support:

• Employed physicians who are on the same system as the hospital;

• Affiliated providers who are on the same system but not the same version as the hospital; and

• Providers on a different EHR platform.

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Moving all providers to the same EHR, however, may not be practical. In some markets, affiliated providers use a variety of vendors and versions. For a national health system, the number of different vendor EHRs requiring connectivity could range from 50 to 200.

Private HIEs. Organizations also can create or participate in a private HIE whose tools, capabilities and data are shared with entities that have a business relationship with the organization. Most typically, an entity builds an enterprise exchange for its network and affiliates. For example, a population health manager with a well-developed care delivery network could build — on its own or in partnership with another provider or payer — a private HIE that includes network physicians, post-acute providers and community health centers.

Specialty-based private exchanges also are starting to emerge more frequently. For example:

- Cardiology metrics and data may be shared among cardiologists through professional organizations

- Cancer care information may be shared among researchers, oncologists, radiologists, surgeons and others through various government, professional association and private entities

- Population-specific alliances, such as those designed to improve pediatric care, enable clinicians to share EHR data for improved safety, quality and efficiency of care[32]

These "networks of networks" have varied models of data exchange.

Payer HIEs. Although not as widespread, payers also are starting to support HIEs in a few parts of the country. In certain markets, they play a major role and own companies that offer HIE software to support the care management platforms of health systems and other provider groups.

To control costs and quality, access to claims data is vital for health systems that provide care under value- or risk-based arrangements. As described in the Webinar 2 Issue Brief (page 6), management of attributed patients is one of the biggest challenges nationwide. A high-functioning patient attribution and referral management process to prevent "leakage" of patients to non-network providers depends on knowing where attributed patients receive care. Often only the payer and/or the employer have these data.

Every health system should look at each payer relationship separately and develop a specific strategy for the type of data needed, how that data will be exchanged to better inform clinical and business decision making and how the payer could be involved in development of the organization's care management platform. Payers often can lend their extensive experience with effective disease management and care coordination tools.

Community, State or "Medical Trading Area" HIEs. Public health information exchanges provide another option for an increasing number of hospitals and health systems. For example, in progressive communities, hospital associations and other organizations are building HIEs to enable member hospitals to share patient records. The Illinois Hospital Association, which represents 200 member hospitals, and the Metropolitan Chicago Healthcare Council, a hospital trade group with about 150 members, announced a merger effective January 2016.[33] One key objective of the combined organization is to bring each entity's set of tools to the table to build a regional medical trading area HIE. This HIE will support clinical and business operations in the greater-Chicago area market.
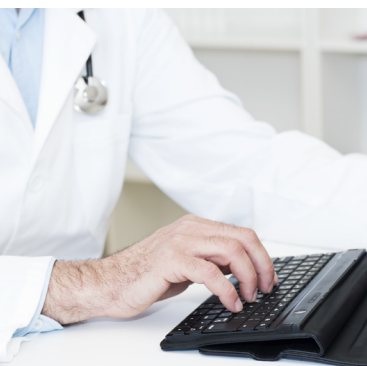
"Standardizing EHRs and exchanging data have proven to be challenging across care sites and providers, particularly with physicians in community practice and with post-acute providers on a different EHR platform(s), or that lack a platform altogether. Data exchange with entities using a different EHR may require significant translation of data structure and syntax, and other modifications."

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The "grandfather" of statewide HIEs is the Delaware Health Information Network (DHIN). DHIN was enacted by the state's legislature in 1997 as a public-private partnership to address the need for timely, reliable and relevant health care information for Delaware residents. Launched in 2007, DHIN is an operational, standardized, real-time, interoperable HIE that connects hospitals, reference laboratories, diagnostic facilities and physician practices across the state.[34] DHIN has 100 percent participation from the state's acute care hospitals, long-term care facilities and skilled-nursing facilities. Nearly 100 percent of physicians and other clinicians are participating.

Members of DHIN have access to:[35]

- A searchable patient clinical history (including medications) available to authorized DHIN users on a "need-to-know" basis
- A web-based portal for providers without an EHR, including auto-print functionality for paper charting
- A direct interface into the EHR with patient record-matching for those providers with DHIN-certified EHRs

DHIN's primary goals are outlined below. Robust tools organize and process more than 9 million results and reports annually for more than 1.2 million unique patients in the community master patient index, which represents 90 percent of Delaware residents.

All 50 states have some form of health information exchange services available to support care.[36]

National HIE. The ONC has provided funding for development of the Nationwide Health Information Network (NwHIN), which provides a set of standards, services and policies that enable the secure exchange of health information over the Internet.[37] NwHIN also offers a set of tools to aid organizations in implementing secure electronic HIE.[38]

Five Core Goals of the Delaware Health Information Network

1. To improve the care received by patients served by Delaware's health care system and to reduce medical errors associated with the often inaccurate and incomplete information available to providers of medical care.

2. To reduce the time required and financial burdens of exchanging health information among health care providers and payers (necessary for patient care) by addressing the currently siloed and unintegrated model of distribution methods and dramatically increasing use of electronic means.

3. To improve communication among health care providers and their patients to provide the right care at the right time based on the best available information.

4. To reduce the number of duplicative tests to afford specialists a more comprehensive view of the patient upon referral from his/her primary physician, and to expedite the reporting of consultant opinions and tests/treatments between specialists and the referring physicians.

5. To improve the efficiency and value of electronic health records (EHR) in the physician office and to assist those physicians without an EHR to better organize and retrieve test results.

Source: Delaware Health Information Network: Delaware Statewide Strategic and Operations Plan for Health Information Exchange. Updated May 2012, p. 7.

The Direct Project, launched as part of NwHIN, was created to specify a simple, secure, scalable, standards-based way for participants to send authenticated, encrypted health information directly to known trusted recipients over the Internet.

The Direct Project has more than 200 participants from more than 60 different organizations. Participants include EHR and personal health record vendors, medical organizations, systems integrators, integrated delivery networks, federal organizations, state and regional health information organizations, organizations that provide HIE capabilities, and health information technology consultants.[39]

A number of state HIEs are ensuring the ability to exchange secure messaging, data and continuity of care document (CCD) transactions. California is one of numerous states participating in Direct Project pilot programs.[40]

Status of HIE Nationally and in California

Given the complexity of HIE, progress on the national front has been fairly slow. Recent data from a 2015 survey[41] on hospitals' and health systems' capabilities to exchange electronic patient information indicate that only 11 percent of respondents are able to routinely exchange electronic patient information with other providers across the country. However, 71 percent are optimistic that they would be able to exchange a core patient data set by the end of 2017.

Twenty-three percent of respondents exchange data with their systems only, 21 percent exchange data regionally, 17 percent exchange data statewide and 6 percent exchange data across state borders (Figure 9). Only 23 percent believe that achieving nationwide interoperability of a core data set will be "high value" for the organization. Forty-nine percent cited moderate value and 28 percent low or no value. This would again seem to indicate that health care is considered to be market-specific or "local."

F I G U R E 9 . *Provider Exchange of Electronic Patient Information 2015*
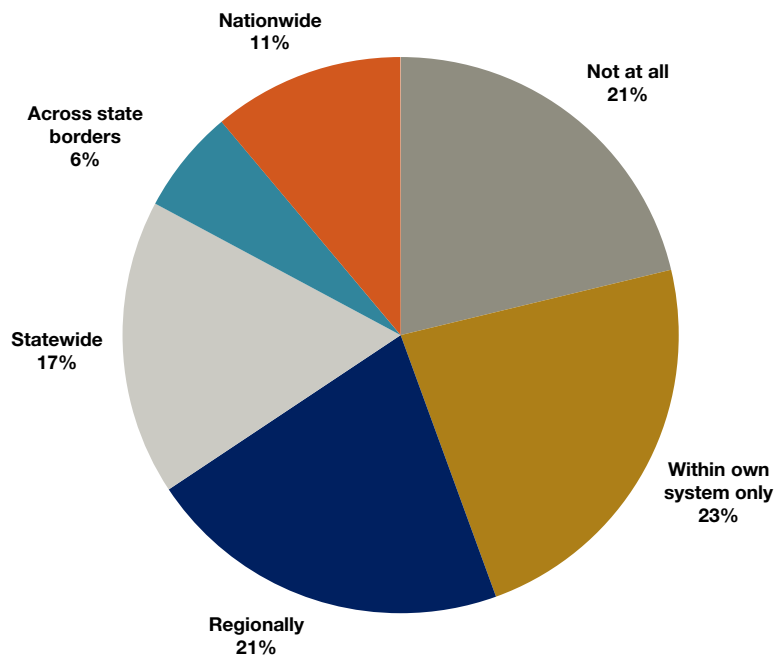
Note: Executive responses to the question: "Does your organization routinely exchange electronic patient information with other health care providers either inside or outside your organization?"

Source: Modern Healthcare Health IT Survey, April 2015

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Development of HIE in California, like in other states, is funded and occurring through numerous organizing entities. The State of California Office of Health Information Integrity (CalOHII) received nearly $39 million in state HIE funding from ONC in 2010. CalOHII's current focus is the coordination of data exchange among state departments that manage patient information.[42]

Another entity is the California Association of Health Information Exchanges (CAHIE). CAHIE is a statewide group of community and enterprise health information organizations working together to advance safe and secure HIE in California. CAHIE's vision is "to provide a California trust framework with pathways that ensure that all providers can connect to and use the nationally-recognized Direct Exchange and other vetted protocols that may emerge."[43] CAHIE assists member organizations with implementation of existing standards, which promotes interoperability throughout the state.

Regional/metropolitan HIEs in California include, among others:

- San Diego Health Connect, with 19 hospitals and other medical facility participants and six others in test mode (http://sdhealthconnect.org)

- HealthShare Bay Area for the San Francisco area, with 17 provider and community organizations (www.healthsharebayarea.org)

- Los Angeles Network for Enhanced Services in Los Angeles County (www.lanesla.org), with hospital, community clinic, health plan, physician group, local government and other stakeholder representation

Payers are active as well. Blue Shield of California and Anthem Blue Cross are jointly developing an independent, not-for-profit organization called California Integrated Data Exchange (Cal INDEX). This HIE collects clinical data from approximately 30 large provider organizations and insurers in California.

Launched in 2014 with data on 9 million patients, Cal INDEX received $80 million in seed money from Anthem Blue Cross and Blue Shield of California to fund the first three years of its operating costs as it integrates provider data. After three years, participating insurers and providers will pay subscription fees.[44]

Cal INDEX will allow physicians, nurses and hospitals throughout the state to share patients' health information.[45] The service will connect claims and EHR data to create comprehensive, longitudinal patient records that participating providers can access through a portal that works with most major EMR systems and displays data, alerts and analytics, along with basic care management tools.[46]

This is by no means a comprehensive view of California's HIE initiatives. HIEs may be small in scope to accommodate information sharing between hospitals and physician offices, or they may be regional, accommodating information sharing among many relevant providers, notes the California Hospital Association.[47]

Level 3 — Knowledge Management and Analytics

The knowledge management and analytics level of the care management platform combines historic and real-time data to inform and enrich predictive and responsive decision making in both business and clinical domains.

Knowledge management and analytics is perhaps the hottest area of hospital and health system spending today, but also perhaps the most misunderstood area in health care. Evolving rapidly, hundreds of vendors occupy this space, which contributes to the confusion that occurs when organizations purchase tools before defining their goals. More comprehensive offerings are starting to emerge to tie together several layers of the care management platform, while including analytics in each.

Business intelligence and analytics tools are designed specifically for risk stratification, network management and value attribution, financial and clinical modeling, and performance management and reporting. Clinical tools will be described in the Advanced Care Management section.

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Risk Stratification

Risk stratification or segmentation, as described in the Webinar 3 Issue Brief (pages 4-9), identifies through use of analytics where patient populations fall on the risk continuum in order to develop effective health care strategies for each population segment. Analytic tools help organizations accomplish the following:

• Define and stratify their patient population(s)

• Determine where patients receive care

• Identify individuals with chronic conditions and those at higher risk for chronic conditions

• Pinpoint gaps in care for high-risk patients and possibly for patients who are not following preventive and wellness recommendations

• Understand the type of care protocols and rule-based workflows that should be developed, implemented and monitored to support the advanced care management platform level

Data sources include clinical information from the health system's EHR and those of affiliated providers, billing and cost accounting data, and outcomes and patient experience information.

Network Management and Value Attribution Functions

A high-performance delivery network covers the care continuum under an optimized contracting strategy with minimal out-of-network utilization by the covered population, while achieving access and quality goals. Knowledge management and analytics support tracking of the organization's performance on a network population level and reporting such data to delivery system partners, payers and other stakeholders. Analytics enable performance assessments by individual provider, network, entity, site or specialty.

Financial and Clinical Modeling

Business intelligence and analytical tools help organizations properly estimate use rates and costs for serving a defined population under a value-based contract, and mitigate the risk of inaccurate projections.

As value-based arrangements reshape utilization, most hospitals and health systems will need to grow their attributed or accessible managed populations to support organizational infrastructure and associated costs. Growth typically requires geographic expansion through strategic partnerships or affiliations with employers, providers or health plans. Financial risk modeling and management with scenario planning tools help move the organization toward the right strategic partnering decision.

Clinical analytics tools use patient data to improve quality and lower the cost of care. Although such tools have been used primarily for retrospective analyses historically, progress is being made with tools that can provide real-time clinical decision support.

Performance Management and Reporting

Knowledge management and analytics go beyond traditional enterprise performance improvement initiatives, which use data warehouses and other tools to analyze performance inside health system walls. Knowledge management and analytics use PHM tools to organize clinical and claims data across delivery systems. The goal is to manage risk and assess quality, access and total cost of care for a patient population throughout the care continuum. Analytics tools are better enabling real-time performance management and reporting.

Responsibility for Knowledge Management and Analytics

Building knowledge management and analytics should be a collaborative effort within hospitals and across their delivery networks, and should include:

- IT expertise, which will build out some of the interfaces and linkages and put in place the needed hardware and software

- Clinical informatics and analytics expertise, which provides insight into medical practice and decision making

- Quality expertise, to develop clinical protocols and apply Lean and performance improvement practices

- Population health expertise, to determine how information will be used to manage risk-based contracts and clinically integrated networks

A collaborative team approach reduces the likelihood of duplicative or overlapping efforts. Inefficiencies occur when one department buys a tool without really understanding how it should integrate with the rest of the systems. Again, business needs and overall strategy should drive purchasing or partnering-to-purchase decisions. The Webinar 5 Issue Brief will cover more of the leadership aspects of this challenge.

Level 4 — Advanced Care Management

The advanced care management level of the care management platform uses tools, technologies and processes to coordinate health and health care. This piece of the platform resembles traditional hospital case management, but on steroids. Rather than involving the care of individual patients, it covers the health and health care of patient populations over time and across settings in a care delivery network.

Effective and efficient coordination of health and health care interventions — from wellness to chronic disease management to end-of-life care — requires the application of clinical intelligence to data in near-real or real time. Information flows both ways. HIE and knowledge management and analytics enable such coordination and monitoring and improvement over time. And care management and coordination tools and protocols, tied to an enterprise-wide decision support and reporting function, facilitate the collection, analysis and interpretation of claims, costs, quality and utilization information.

"Effective and efficient coordination of health and health care interventions — from wellness to chronic disease management to end-of-life care — requires the application of clinical intelligence to data in near-real or real time."

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Advanced Care Management Processes

As described in the Webinar 3 Issue Brief, key care management processes that must be driven or facilitated by HIT include:

- Assessing the health of patient populations

- Identifying groups with specific risks that can/should be mitigated through use of evidence-based standards of care

- Ensuring that providers and care managers can quickly view data on individual patients, specific risks and the standard of care for specific conditions

- Supporting appropriate primary, secondary and tertiary health intervention strategies using HIT-enabled care protocols for wellness, prevention and chronic disease management

- Coordinating transitions of care, effectively supporting the patient as he/she moves from setting to setting, including ambulatory, inpatient, post-acute, rehabilitation and home

- Enabling team-based care, whether provided in person or virtually

These processes are visualized and communicated through use of computers, tablets, mobile phones, or other electronic devices using HIE tools or processes, including health assessments, adherence alerts, disease management, referral management, e-prescribing, secure messaging and many more. While documents summarizing the processes or their results can be printed, the data are not paper-based, but housed electronically in HIT systems.

For example, a disease management coach uses care management tools equipped with information through the HIE. An electronic work list on a mobile or wired device identifies the patients the coach should contact today via telephone or remote monitoring to check heart devices, blood pressures, weights or other clinical vitals. Another list identifies the patients requiring disease-related education via telehealth applications. Other automated tools support the disease management coach as he/she goes through the work day interacting with patients, making decisions regarding care needs, and documenting patients' health status and care. Evidence-based care protocols are hardwired into EHR screens, preventing the coach or other clinicians from ordering or administering medications to which a patient is known to be allergic, or ordering tests that should be questioned or eliminated. All of this helps the coach close care gaps and take care of patients efficiently and effectively in real time.

An HIT-Enabled Team-Based Approach

Team-based care requires significant support from HIE and knowledge management and analytics. Consider the care management needs of the cancer patient who may see up to 20 different clinicians in the treatment of his/her condition. The clinicians' treatment recommendations must be visible to other clinicians. Patient preferences for care, the agreed-upon care plan, its implementation and its results also must be visible. A team-based care management program that is well-understood by team members, including the patient and family, helps to ensure appropriate care and avoidance of care in suboptimal sites. This is critical to the success of hospital PHM initiatives.

"A team-based care management program that is well-understood by team members, including the patient and family, helps to ensure appropriate care and avoidance of care in suboptimal sites."

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Level 5 — Consumer/Patient Engagement

The top layer of the care management platform is consumer and patient engagement. Effective engagement enables an organization to help shape healthy behaviors, ensure the right level of utilization and steer individuals to the best site of care. Engagement is required for both the clinical and business success of managing a population's health. Again, business strategy will drive HIT investment in engagement tools, processes and protocols.

Consumer engagement involves developing a robust strategy that includes many items discussed in the Issue Briefs for webinars 2 and 3:

- Patient education and targeted approaches to improve health
- Holistic personal care plans and partnerships between patients, families, community agencies, employers and retail health providers
- Use of mobile, telehealth/care and digital tools to enable self-care, patient engagement and behavior change
- Integration of devices, monitoring, communications and information technology to support digital care interventions

Example consumer engagement tools and processes include, among many others:

- Unified portals that provide 24/7 access
- Self-service scheduling
- Branded call centers
- Customer relationship management
- Patient self-reported data
- Linguistics services
- Interactive patient education
- Telehealth/telemedicine

Consumer Relationship Development and Management

Consumer relationship strategies will vary by market and by organization, especially given generational differences in the way people consume information. Hospitals will need to develop a multidimensional, coordinated and differentiated experience for various types of consumers at each touch point, which requires extensive research and analysis of target consumer segments. Multichannel health care offerings will be necessary, with consumer access points including web, mobile, telephone and email, in addition to inpatient and ambulatory facilities.[48] Leading consumer-driven organizations will have a diverse complement of services distributed over a broad geography.

The thorough integration of virtual and physical services is important because new-generation consumers expect to use them in an integrated way. They want a seamless digital-physical experience[49] and will access services from organizations that relate to them through mechanisms that are comfortable and convenient for them.

"Consumer-relationship strategies will vary by market and by organization, especially given generational differences in the way people consume information. Multichannel health care offerings will be necessary, with consumer access points including web, mobile, telephone and email, in addition to inpatient and ambulatory facilities."

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Beyond access, organizations will need to strengthen linkages in the customer experience. There is great untapped potential for HIT-enabled relationship management as the mechanism by which health care organizations build and retain "stickiness" with consumers going forward. Health care organizations should consider their social media strategy and how to involve consumers in online consumer-to-consumer communications that build relationships and trust through ratings and other mechanisms.

From One-Way Push to Bidirectional Interaction
Given recent technological advances and the expected speed of future innovation, huge opportunities exist to revolutionize the way hospitals, physicians and other providers interact with patients. The big shift involves switching from just pushing information out to patients to an HIT-driven approach that involves patients in an interactive way.

Tethered portals that are tied to a specific providers' EHR will give way to integrated, secure patient records available to the consumer on handheld devices. More than a decade ago, patients who self-scheduled were proven more likely to keep their appointments;[50] now they can do such scheduling via mobile apps from wherever they are.

Huge capital investment in personal fitness/wellness technologies will drive more transformation in the industry. Virtual health care services, including e-visits over the web and mobile devices, and other applications, are exploding. Various terms, such as telemedicine, telehealth, virtual care or "connected health," are used to describe these services. Once the province of doctor-to-doctor communications about specialized cases or about treating patients with difficult conditions in rural locations, these care delivery models are going mainstream.[51] In so doing, the models are redefining access to health care for consumers worldwide, moving it away from bricks-and-mortar facilities to "anywhere care." And we haven't seen anything yet. The future is almost impossible to imagine.

The Platform Design Process

The big picture involved in building the care management platform includes defining the organization's PHM strategy, identifying and designing new care delivery processes, and determining the information, analytics, and technologies that will support those processes (e.g., work flow management, medication management across care sites). A care management platform must be intentionally designed to reflect new care processes versus "the way we've always done things."

The design process is best accomplished with a clinician leader (e.g., a physician, nurse or pharmacist) who develops strategic informatics teams charged with working with the full array of clinicians to redesign care practice(s). Clinical rather than IT leadership ensures that the design process is strategic in nature, focusing on the practice of clinical care. This issue and other leadership considerations will be addressed in the Webinar 5 Issue Brief.

Offering consumers on-demand access to health care will be challenging, but it is a big opportunity for organizations that can develop the infrastructure to create that experience. The job is to determine how to construct care delivery models that provide direct, timely access and engage consumers.

No one health system will build this alone. They will have partners, which may include health systems, payers, employers, venture capitalists, technology start-ups and other emerging non-traditional entities. Different technologies will help this happen. Hospital partnerships with virtual providers could enable hospital access to needed technology, while still allowing the hospital's own physicians to provide all or most of the services.

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For example, Samsung and UCSF are partnering to accelerate new innovations in preventive health, including commercialization of promising new sensors, algorithms and digital health technologies for preventive health solutions.[52] Mayo Clinic partnered with Apple as it rolled out the iPhone 6 and Apple Watch with which consumers can access indicators of their health status. Apple's HealthKit app lets consumers share these data with their doctors and major medical centers. Pilot projects in such areas as obesity and diabetes are planned.[53]

HIT-Supported Interventions Along the Risk Continuum

To illustrate how HIT tools and processes support an organization's care management platform, provided here are HIT examples used at different levels of patient health risk on the risk continuum. The graphic depicting that continuum, as described in the Webinar 3 Issue Brief, is included here for guidance (Figure 10).

Each layer of the care management platform plays a role in patient activation, which involves:

- Patient willingness and ability to take action to manage his/her own health and health care
- The specific interventions designed by clinicians and other organizational personnel to increase the patient activation level
- Patient willingness and follow-through with clinical recommendations

Evidence around the positive impact of patient engagement is increasing. Chronically ill patients with higher activation levels are more likely than those with lower levels to adhere to treatment, perform regular self-monitoring at home and obtain regular care, such as foot exams for diabetes.[54]

FIGURE 10. *Framework for the Clinical Imperatives of Population Health Management*
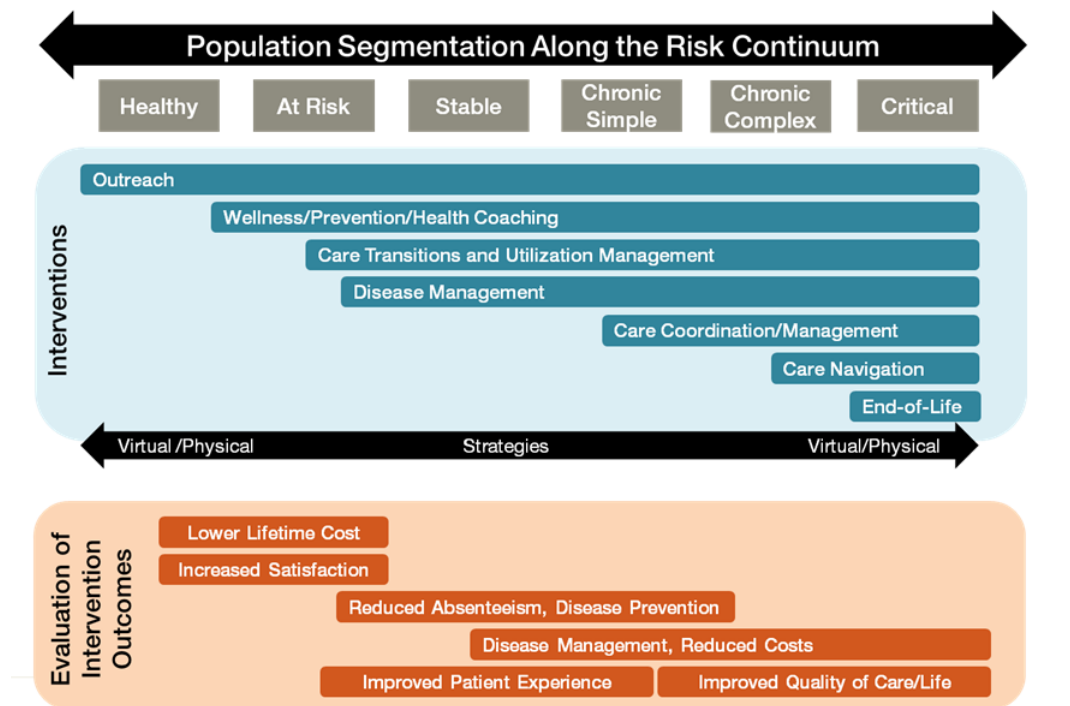
Source: Kaufman, Hall & Associates, LLC

Healthy Patients and the Non-User Population

Wearable health monitoring technologies, mobile and smartphone-enabled devices are increasingly being used by consumers who focus on healthy behaviors. Some providers are using automated stratification tools to identify individuals who have never obtained health care services, such as annual wellness checkups, and cancer screening services, such as mammograms and colonoscopies. Telehealth can provide easy access to physicians and clinical support of routine interventions. Once seen by a physician, a patient portal and keeping a personal health record up to date reinforce a longer-term relationship between the consumer and the primary care provider.

At-Risk and Stable Patients

Technology plays an important role for individuals who are identified as at risk for developing chronic conditions or are stable but have early indicators for chronic disease, such as pre-diabetes or pre-hypertension. HIT helps primary care providers work with their patients and families to build the skills needed to monitor and manage their condition. This includes tools and guidance that enable patients to track progress, seek assistance as needed and perform self-management tasks.

Online health risk assessments, calls, emails, texts and letters are used to invite at-risk or stable individuals to participate in education, health coaching and group initiatives for pre-hypertension or diabetes management.

Patients with Simple or Complex Chronic Conditions

Coordination of care for a patient with a chronic disease, or in many cases multiple coexisting chronic diseases, requires integration and collaboration of primary care providers, an activated patient, and multiple providers and support team members across the care continuum. Patient-centered, connected technologies include:

- EHRs, which collect information for real-time analysis and point-of-care decision making based on defined order sets, clinical decision support and clinical pathways
- HIE, which provides access to patient history and results, notifies primary care providers of patient visits to EDs or admission to acute care facilities, manages referrals and enables care team members to orchestrate services around patient needs
- Analytics tools, which combine clinical, claims and other patient-centric data to facilitate predictive and prescriptive analyses of outcomes and cost
- Workflow and analytics-powered care management tools that support team care planning, medication compliance, scheduled reviews, and tracking and refinement of interventions

Additionally, a growing initiative called "open notes" involves patients and families in review of and participation in their care documentation. This can improve safety and management of chronic conditions. Remote or at-home monitoring provides real-time information between physician visits and alerts care managers when a patient's condition changes.

"Technology plays an important role for individuals who are identified as at risk for developing chronic conditions, or are stable but have early indicators for chronic disease, such as pre-diabetes or pre-hypertension. HIT helps primary care providers work with their patients and families to build the skills needed to monitor and manage their condition."

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Patients at Critical Risk

Access to palliative and end-of-life care services is expected to expand as the U.S. population ages. Many of the tools and technologies described in the previous population segments will be adapted to this environment to support the 24/7 services needed to keep patients in their home, avoid unnecessary hospitalizations, support family caregivers and reduce the burden on family physicians.

Patients and caregivers benefit from electronic communications of Advance Directives and Powers of Attorney, specialized care pathways, pain management protocols and other tools. Initiatives examining the role of telehospice, particularly for rural communities, are under consideration in various parts of the country.

In summary, technology is playing a growing role in patient activation across population segments on the risk continuum.

The Vendor Marketplace

The ultimate design of the care management platform will vary based on how organizations develop and integrate the five platform levels.

First and foremost, before working with HIT and IT vendors, hospitals and health systems must understand what they are trying to accomplish, define a business strategy around those goals, and then build, buy or partner to achieve the technology-enabled care management platform to support that strategy.

The field of players in HIT is developing rapidly and includes traditional HIT vendors, IT vendors, new niche and startup companies, and companies that traditionally have been adjacent players, but are now entering the HIT space (Figure 11).

FIGURE 11. *Understanding the Changing Vendor Marketplace*

Vendor Categories	Description
Traditional HIT for Providers	▪ Integrated EHR and revenue management modules that provide foundational systems ▪ Considerable narrowing of the field of viable companies ▪ Emerging solutions in the PHM space from several traditional vendors ▪ Some providers wait for these vendors to catch up, while others in more mature markets move forward with other partners
IT	▪ Enterprise data warehouses to support enterprise performance improvement and population health analytics, business intelligence, data normalization and data visualization tools ▪ Data analysis and dashboard for health care providers
Niche and Startups	▪ Key categories for venture- and investor-backed software solutions include big data, health care consumer engagement, digital medical devices, interoperability, telemedicine, personalized medicine and PHM ▪ PHM is one of the least mature sectors; however, new care management platforms enable integrated data exchange, analytics, care management workflow and tools, and patient engagement
Adjacent Players	▪ Payers, pharmaceutical companies and life sciences companies with solutions in HIE, data and analytics, care management and patient engagement

Source: Maestro Strategies, LLC

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There are many ways that hospitals and health systems can achieve an effectively functioning care management platform. A significant portion of organizations in California and nationwide have invested heavily in EHRs offered by traditional provider HIT firms. The consideration now for these hospitals is whether to wait for those firms to develop and integrate the systems and applications that will fulfill needs at all levels of the care management platform, or to seek other systems and applications that can be integrated with the EHR.

The situation is a complicated one. Traditional HIT companies built their EHRs in a proprietary manner, making sure their EHRs talked only to each other, not to other vendors' products. New initiatives, such as CommonWell Health Alliance, are encouraging the software industry to work together.[55] Some traditional HIT vendors are innovating rapidly to build applications that help hospitals meet PHM goals. In the past five years, 526 patents were granted to these companies, while only 150 patents total were granted prior to 2009.[56] Still other vendors are opening up their platform for third-party development.

The HIT marketplace is experiencing explosive growth. Venture capital (VC) investment in health care in 2014 was $8.2 billion, up 28 percent from 2013.[57] Companies in California received the highest VC funding of all states with 42 percent of the total. Companies in life sciences hubs in Cambridge and San Diego obtained the most capital — $1.9 billion and $45.2 million respectively. Numerous worldwide investment categories, including big data, consumer engagement, digital medical devices, telemedicine, personalized medicine and analytics to support population health closely align with the needs of a care management platform.

Many new niche and some traditional players are offering cloud or app-based solutions to meet specific platform requirements. Such solutions are intended to be layered onto existing technology. Hospitals can implement some of these without traditional "big-bang deployment," enabling testing first, gaining traction through pilot initiatives and then scaling up organization-wide. Other players are offering platform components and contract with the hospital to tie the systems together. Adjacent players, such as insurance and retail pharmacy companies, are offering solutions in HIE, data and analytics, and patient engagement, among others.

Traditional IT vendors, from Apple and Google to Oracle and IBM, also are entering the health care space, particularly with offerings related to health and fitness.

New and different players will emerge rapidly over the next decade as innovations will be driven by the transformation of health care to a PHM model.

The challenge for hospitals and health systems is to identify the critical HIT-enabled competencies of the care management platform. Proactive pursuit of partnership arrangements, development of HIT leadership and talent, and capital investment will be required.

" Many new niche and some traditional players are offering cloud or app-based solutions to meet specific platform requirements. Such solutions are intended to be layered onto existing technology. "

The Virtuous Cycle for Technology-Enabled PHM

Hospitals and health systems that achieve the goals of PHM through effective use of technology typically will experience what John Fox, CEO of Beaumont Health, calls a "virtuous cycle" (Figure 12).

Says Fox, "The virtuous cycle is created by having the foundational HIT/IT systems in place, applying health informatics skills to help make the systems 'smart,' building analytics capabilities to inform decision making, and partnering with experts trained in quality to drive performance improvement and transform care processes."[58]

FIGURE 12. *The Virtuous Cycle of HIT-Enabled PHM*
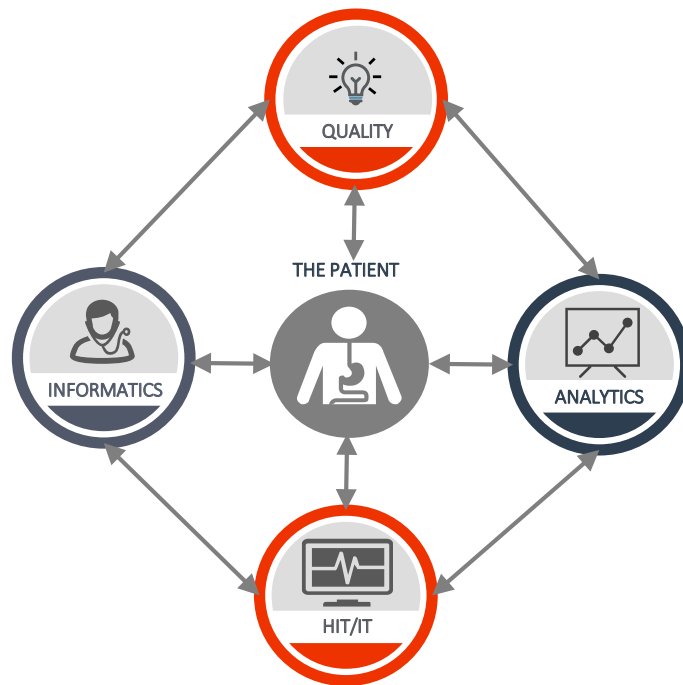
Source: Maestro Strategies, LLC

The result of this synergistic, multidirectional flow of information is improved, patient-centric health and health care. Many health systems recognize the importance of intentional design of new leadership capabilities, organizational competencies and operating models to support this cycle. These organizations are moving forward with integrated initiatives.

High-performing hospitals and health systems of the future will move beyond dependency on legacy information systems to include intelligent HIT tools embedded within care management platforms. These tools and applications will focus on the problems to be solved, and be agile and customizable to the hub, spoke and network of future care delivery. HIT solutions that provide real-time, prescriptive and predictive information for clinical decision making that improves population health will be essential to hospital and health system success going forward.

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Endnotes

1 Grube, M.E., Kaufman, K.: "Inflection 2.0 — The Real Change Begins." *Kaufman Hall Point of View*, August 2013.

2 "Meaningful use" is defined by the use of certified EHR technology in a meaningful manner (for example electronic prescribing) and ensuring that the certified EHR technology is connected in a way that provides for the electronic exchange of health information to improve the quality of care. Source: Centers for Disease Control and Prevention website: "Meaningful Use." www.cdc.gov/ehrmeaningfuluse/introduction.html.

3 Keynote presentation by Dr. Diamandis titled "Disruptive Innovations in Healthcare: The Future Is Better Than You Think," at Kaufman Hall's 2014 Healthcare Leadership Conference. Excerpts appeared in Kaufman Hall Report, Winter 2015, p. 3-4.

4 Kaufman, K.: "Your Hospital Is Your Store." *H&HN Daily*, Oct. 23, 2014.

5 Diamandis, P. at 2014 Healthcare Leadership Conference.

6 Kaufman, K. (October 2014).

7 Kaufman, K.: "Patients as People." *Blog from the Chair*, Kaufman Hall, June 23, 2015.

8 Kaufman, K. (June 2015).

9 Kaufman, K.: "New Ways to Know Your Consumers." *Blog from the Chair*, Kaufman Hall, March 31, 2015.

10 Health Research & Educational Trust, Spencer Stuart: "Building a Leadership Team for the Health Care Organization of the Future." April 2014. www.hpoe.org/Reports-HPOE/leadership-team-future.

11 Centers for Medicare & Medicaid Services: "Medicare and Medicaid EHR Incentive Program Basics." www.cms.gov.

12 www.4medica.com/ARRA.html.

13 Glaser, J.: "Health Care IT Innovation: The Best Is Yet to Come." *H&HN Daily*, Feb. 12, 2015.

14 Glaser, J. (February 2015).

15 CHCF Health Innovation Fund: "Seamless Medical Systems: Supporting Patient Registration, Data Capture, and Education." January 2015. www.chcf.org/projects/2015/seamless.

16 Butcher, L.: "Getting to Interoperability: Learning from Healthcare Pioneers." *Leadership*, Feb. 1, 2015.

17 California Improvement Network: "Webinar — Electronic Referral and Consultation Systems: Improving Primary and Specialty Care Collaboration." May 28, 2014. www.chcf.org/events/2014/cin-webinar-05-28-2014.

18 Conn, J.: "Modern Healthcare Health IT Survey: Health IT Interoperability Remains Elusive." *Modern Healthcare*, April 13, 2015.

19 Vivity website: www.vivityhealth.com.

20 Evans, M.: "Anthem, LA Providers Creating HMO to Compete with Kaiser." *Modern Healthcare*, Sep. 20, 2014.

21 Herman, B.: "New Anthem Network Makes Business Case for HMO-ACO Hybrid." *Modern Healthcare*, Sep. 17, 2014.

22 Ginzinger, B., Priselac, T.: "The Vivity Case Study: How Anthem Converted Adversaries Into Partners." Atlantic Information Services Webinar. Feb. 11, 2015.

23 WPS Health Insurance: "AboutHealth and Arise Health Plan Announce Major Agreement." Press release, June 9, 2015.

24 UW Health: "Seven Wisconsin Health Care Systems Form New Statewide Partnership." Press release, Sept. 30, 2014.

25 Plas, J.V.: "Partners without Mergers: Seven Wisconsin Health Care Organizations Join Forces." *In Business Madison*, November 2014.

26 Herman, B.: "Trinity Health to Expand Risk-Based Care with Heritage Provider Network." *Modern Healthcare*, Jan. 12, 2015.

27 Agency for Healthcare Research and Quality: "Health Information Technology and Health Information Exchange Implementation in Rural and Underserved Areas: Findings from the AHRQ Health IT Portfolio." February 2010. www.himss.org/files/HIMSSorg/content/files/AHRQHITHealthInforural%5B1%5D.pdf.

28 Office of the National Coordinator for Health Information Technology: "Connecting Health and Care for the Nation: A 10-Year Vision to Achieve an Interoperable Health IT Infrastructure." June 2014.

29 HIMSS: "Definition of Interoperability: Approved by the HIMSS Board of Directors April 5, 2013." http://www.himss.org/files/FileDownloads/HIMSS%20Interoperability%20Definition%20FINAL.pdf.

30 HIMSS (April 2013).

31 HIMSS (April 2013).

32 Pediatric Alliance: "Pediatric Alliance and ClinicalConnect — A Secure Health Information Exchange." Press release, Oct. 8, 2013.

33 Schorsch, K.: "Influential Illinois Hospital Associations to Merge." *Crain's Chicago Business*, April 22, 2015.

34 Delaware Health Information Network: Delaware Statewide Strategic and Operations Plan for Health Information Exchange. Updated May 2012.

35 Delaware Health Information Network (May 2012).

36 HealthIT.gov: "State HIE Implementation Status." http://healthit.gov/policy-researchers-implementers/ state-hie-implementation-status.

37 HealthIT.gov: "Nationwide Health Information Network." www.healthit.gov/policy-researchers-implementers/ nationwide-health-information-network-nwhin.

38 HealthIT.gov: "Health Information Network Tools." www.healthit.gov/policy-researchers-implementers/ health-information-network-tools.

39 HealthIT.gov: "The Direct Project." www.healthit.gov/sites/default/files/pdf/fact-sheets/the-direct-project.pdf.

40 HealthIT.gov: "The Direct Project."

41 Conn, J. (April 2015).

42 State of California Office of Health Information Integrity website: www.ohii.ca.gov/calohi/home.htm.

43 California Association of Health Information Exchanges website: www.ca-hie.org.

44 Cal INDEX: "New California Not-for-Profit to Operate Statewide, Next-Generation Health Information Exchange." Press release, Aug. 5, 2014. www.calindex.org/new-california-healthcare-exchange.

45 Cal INDEX: "Statewide Health Data Exchange for California." Fact Sheet. https://www.calindex.org/ wp-content/uploads/2014/08/Cal-INDEX_factsheet.pdf.

46 Brino, A.: "Blues Go Public With Data Exchange." *Healthcare IT News*, Aug. 29, 2014.

47 California Hospital Association: "Health Information Management & Technology." www.calhospital.org/ health-information-management-technology.

48 Grube, M.E., Kaufman, K., Clarin, D., O'Riordan, J.: "Redefining Access to Healthcare Expertise: The Virtual/Telehealth Opportunity." *Kaufman Hall White Paper*, 2015.

49 Rigby, D.K.: "Digital-Physical Mashups." *Harvard Business Review*. September 2014.

50 Versel, N.: "Online Reservations: Letting Patients Make Their Own Appointments." *American Medical News*, March 22, 2004.

51 Grube, M.E., Kaufman, K., Clarin, D., O'Riordan, J. (2015).

52 Bole, K.: "Samsung, UCSF Partner to Accelerate New Innovations in Preventive Health Technology." UCSF Press release, Feb. 21, 2014.

53 Tahir, D.: "Mayo Eyes Apple Collaboration to Expand Consumer Outreach." *Modern Healthcare*, Sept. 8, 2014.

54 Hibbard, J.H., Greene, J.: "What the Evidence Shows about Patient Activation: Better Health Outcomes and Care Experiences; Fewer Data on Costs." *Health Affairs*, 32(2): 207-214, February 2013.

55 CommonWell Health Alliance website: www.commonwellalliance.org.

56 Glaser, J. (February 2015).

57 CB Insights: "The 2014 U.S. Venture Capital Year in Review: Financing and Exit Analysis." January 2015. www.slideshare.net/CBInsights/2014-venture-capital-annual-report-final-cb-insights.

58 Personal communication, 2014.

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