The Santa Barbara County Care Data Exchange: What Happened?

Lack of a compelling "value proposition" for potential investors was the main cause of the Santa Barbara Project's demise.

by Robert H. Miller and Bradley S. Miller

ABSTRACT: The Santa Barbara County Care Data Exchange was once one of the most ambitious and publicized U.S. health information exchange (HIE) efforts. Eight years after its inception, and several months after providing some data, the Santa Barbara Project shut down operations. Despite its developed HIE infrastructure, participants found no compelling value proposition in initial HIE services. Even with fewer technology delays and more community leadership, other regional health information organizations (RHIOs) may also stumble over HIE service-value propositions without some combination of grants, incentives, and mandates that develop initial RHIO infrastructure and services and ensure provision of unprofitable yet socially valuable services. [*Health Affairs* 26, no. 5 (2007): w568–w580 (published online 1 August 2007; 10.1377/hlthaff.26.5.w568)]

T HE SANTA BARBARA COUNTY CARE DATA EXCHANGE was once considered one of the most ambitious and best-publicized health information exchange (HIE) efforts in the United States and a model for emerging regional health information organizations (RHIOs) elsewhere. Yet it shut down operations in December 2006, eight years after its development began. The board of the Santa Barbara Project (as it was commonly called) voted to shut down operations, even though the project had built a basic HIE infrastructure and started to provide data to clinical users. This report provides the history of the Santa Barbara Project, compares its experience with that of two other functioning RHIOs, and suggests some lessons learned.

■ **Information sources.** To gather information for this report, we conducted more than forty interviews of current and former managers and staff in key participating organizations in the project—Santa Barbara County (California) health care organizations, CareScience (now part of Quovadx), and the California HealthCare Foundation (CHCF)—as well as key leaders in two functioning RHIOs (in the Indianapolis and Spokane areas). We analyzed interview transcriptions and detailed

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notes, project progress reports, other project and CHCF documents, and past presentations and articles on the Santa Barbara Project and the other RHIOs. We then used pattern-matching and explanation-building techniques to identify themes emerging from the data.[1]

■ **The setting.** Santa Barbara County, located about eighty miles north of Los Angeles, had a population of 400,000 in 2000. The county has three main cities: Santa Barbara (population 92,000), Santa Maria (population 77,000), and Lompoc (population 41,000), each with adjacent populated areas. The geographically separate cities have relatively self-contained health care systems, with one dominant hospital (system) in each city: the 600-bed Cottage Health System in Santa Barbara City and nearby Goleta, the 125-bed Marian Medical Center (part of the Catholic Healthcare West hospital system) in Santa Maria, and the 60-bed Lompoc District Hospital in Lompoc.

History Of The Santa Barbara Project

The project's history is divided into several periods. An early organizing and planning period was followed by two periods in which technology was the key constraint on progress; thereafter, community organizations' decision making, rather than vendor technology, became the key constraint on progress.

■ **Early evolution (late 1998 through summer 1999).** Key organizations came together when the Santa Barbara Regional Health Authority (SBRHA), a county-sponsored Medicaid health plan, approached the CHCF about health information technology (IT) funding opportunities and David Brailer, chief executive officer of Care Management Science (later CareScience), approached the CHCF about a possible HIE demonstration project. Brailer had previously conducted research on Community Health Information Networks (CHINs), regional HIE organizations with centralized databases whose promise in the early 1990s had faded.[2]

HIE proponents argued that communitywide electronic HIE could improve quality if a health care provider could go to one local Web portal, with one user sign-on, password, and uniform graphical user interface (GUI), to obtain all health care data for a patient across all community health care facilities and providers. HIE could provide more patient data that were more timely, legible, organized, and accessible, which could improve electronic lab and prescription ordering, reminders, lists of patients needing services, and performance reporting. HIE could reduce costs if it could eliminate paper results distribution; reduce duplicate lab tests; and help provide more appropriate primary, specialty, and emergency room care—and thus reduce use of health care services.

In February 1999, the CHCF asked CareScience to study the feasibility of a Santa Barbara County HIE demonstration project. Brailer reported that a communitywide HIE system was feasible: interest and cooperation in the Santa Barbara community were sufficient, an HIE support structure could be built, and sufficient "off-the-shelf" software was available that could integrate health care

information systems with peer-to-peer networking technologies to enable countywide HIE. Product, culture, workflow, and financial barriers were believed to be surmountable.

■ **Organizing and planning (fall 1999 through winter 2000).** In September 1999 the CHCF awarded a $10 million, three-year grant to CareScience and the Santa Barbara participants to create the Community-wide Health Information Demonstration Project, soon called the Santa Barbara County Care Data Exchange. The goal was to create an HIE model replicable in other communities.[3]

The CHCF contracted with CareScience to act as a Program Management Office to lead the effort—it would disburse funds, organize the participants, set up and staff governance structures, certify that vendors complied with standards, contract with vendors to obtain needed software, and more generally provide "products and services that address key barriers to success" for the Santa Barbara Project.[4]

To encourage cooperation, CareScience organized participants into four Care Data Alliances: groupings/clusters of Santa Barbara health care organizations with substantial clinical transactions among themselves. Each alliance had an anchor organization: Sansum Santa Barbara Medical Foundation (a large medical group) and SBRHA (a Medicaid health maintenance organization, or HMO) in Santa Barbara City, Mid-Coast Independent Practice Association (IPA) in Santa Maria, and Lompoc District Hospital in Lompoc. More than half of the $10 million was to go to alliance organizations to develop HIE interfaces between the Santa Barbara Project and the organizations' "legacy" (older) data systems that were not designed for Web use and to help upgrade information systems in Santa Barbara organizations, to enable them to better participate in the project.

The chief governance structure was the Care Data Exchange Council, to comprise high-level health care organization managers meeting monthly. Top technical experts and clinical leaders in a Technical Advisory Committee and Clinical Advisory Committee would advise the council.

■ **Technical concept development and prototyping: (winter 2000 to mid-2003).** Initially, CareScience believed that it could acquire much of the needed technology through purchasing "off-the-shelf" software or by contracting with technology vendors to adapt existing products. CareScience certified whether a vendor's products were compliant with recognized technical standards and able to integrate with legacy information systems. Participating organizations were led to believe that the Santa Barbara Project could be developed rapidly.

By fall 2000, in a crucial reversal of its initial findings, CareScience concluded that "off-the-shelf" software did not exist that would allow HIE to move forward and, in particular, that adapting existing "middleware" could not easily enable legacy health information systems to participate in a network system such as the project's. In an important decision following this CareScience reversal, the CHCF agreed that CareScience should become the software developer and vendor, as

well as the Program Management Office.

By early 2001, CareScience employees, supplemented by experts with specific domain expertise from other organizations, began to develop Santa Barbara's technical concepts. By October 2001, prototyping of key software elements was well under way (see Exhibit 1).

The slow and difficult prototyping proceeded by trial and error, so that changes in any one component typically required changes in other components. Integrating the project's software with the many different legacy systems that were not network capable was an especially formidable challenge. By the end of 2001, CareScience realized that its initial solution—to develop individual data exchange interfaces directly between the Santa Barbara Project and legacy-system databases—required a major architectural change, because the Information Locator Service connections (which identified the location of a patient's data) to source systems were not functioning properly.

The answer was to create a uniform Clinical Data Repository (CDR) for each organization that acted as an intermediary between the Santa Barbara Project and the organization's legacy information systems, continually importing and standardizing data from source systems and sending data to project users. This improved overall system performance, security, stability, and scalability but delayed the project throughout 2002.

CareScience costs mounted as it changed the software architecture. Estimates of CareScience's net investment (separate from CHCF grant funds) were $5–$11 million. Meanwhile, CareScience faced intense investor pressure, because it had been unprofitable since its initial public offering in mid-2000. According to some interviewees, these costs contributed to CareScience's decision in early 2003 to restrict the project's software development efforts to conserve resources, reflecting a deepening split within CareScience. A Brailer-led group argued that learning and

EXHIBIT 1
Santa Barbara County Care Data Exchange Software Components And Their Purposes

Software component	Component purpose
Identity Correlation Service, later called the Master Patient Index (MPI)	Index and store locators to patient demographic and provider identification information
Information Locator Service (ILS)	Identify the location of data for a patient
Certificate Management System	Identify system users
Access Control Services (ACS)	Regulate data access by determining whether providers have authorized access to a patient's data
Graphical user interface	Present screens that data users view
Administrative and monitoring tools	Enable auditing of system use

SOURCE: Authors' own data.

technology developed from a robust Santa Barbara Project could enrich Care-Science's offerings and eventual profitability, whereas the prevailing CareScience wing wanted to meet only the essential requirements of its agreement with the CHCF, in a cost-cutting attempt to achieve profitability. Brailer, the charismatic project champion, left CareScience in July 2003, citing differences with the board over the direction of the company, which Quovadx acquired in September 2003.

■ **Technical revamping (fall 2003 to September 2005).** By the time of the Quovadx acquisition of CareScience, the Santa Barbara Project software had been prototyped but was not sufficiently efficient, effective, or scalable. Quovadx used its integration engine expertise to create more reliable CDR interfaces to legacy systems, create consistent database structures across organizations, harmonize and standardize information, and create data filters to screen out confidential data. Additionally, the graphical user interface was redesigned. CareScience eventually completed remaining software development work in September 2005. By fall 2006, twenty-eight project interfaces to ten types of data in eight data-providing organizations had been built and tested.

■ **Community organization decision making (before and after September 2005).** Since the project's inception, project participants had worked on HIE business issues, including what data should be exchanged and excluded, who was authorized to view data, who was liable if data were improperly exchanged, and who should pay for HIE once grant funding ended. This work and overall local organization participation in the project waxed and waned, depending on its technical progress, participant and CareScience staff turnover, and changes in organizational priorities. In March 2004, local participants created a new locally run 501(c)(3) not-for-profit entity with a new board to assume governance and administrative functions of the Santa Barbara Project; this new legal entity had to undertake the slow process of revising or renewing previous agreements with data providers and users.

As of September 2005, all project entities could technically transmit tested data over the project's network so that vendor-related technology delays were no longer a chief constraint on progress or a reason for community organizations to put off making liability risk and financial investment decisions.

Liability emerged as a key constraint on progress. Three main types of data-use agreements between the Santa Barbara Project 501(c)(3) entity and the vendor, data providers, and data users assigned legal liability in case of lawsuits over data errors. Getting agreement was difficult, because community organizations did not want to be held individually liable for HIE mistakes, the Santa Barbara 501(c)(3) entity argued that it was too small to shoulder liability, and the vendor wanted no liability.

As of fall 2006, only Quovadx and four Santa Barbara organizations had signed Data Provider Agreements, and only two Santa Barbara organizations were supplying data for users. Cottage Health System provided lab, clinical reports, radiology images and reports, and demographic data for hospital patients, while the

SBRHA provided pharmacy claim, eligibility, referral, authorization, and demographic data for Medicaid HMO enrollees; once data filters were in place, Sansum would provide its lab, radiology images, and reports and demographics, while Lompoc would provide lab, radiology reports, and demographics. The Public Health Department, Mid-Coast IPA, Marian Medical Center, and Quest Diagnostics also were technically able to provide data but had not signed agreements.

As the Santa Barbara Project exhausted its grant money, community participants had to resolve "who pays how much" for ongoing operations and development of new services. According to one estimate, the project needed about $500,000 per year to provide basic ongoing HIE services, such as patient data look-up. Project leadership attempted to raise funds from project participants and other organizations, including the CHCF, to pay for Quovadx services, a project executive director, and several staff members.

In fall 2006, users could access some data from two organizations, Quest had not signed a data-provider agreement (after two years of negotiations), and Sansum and Lompoc still had not installed all necessary data filters for sensitive data and so were not supplying data. Meanwhile, the Foundation for eHealth Initiative rescinded its financing for the Santa Barbara Project. Although participants had raised some money, it was not enough, and in December 2006 the project's board voted to close down project operations.

Why Was Progress So Slow In Santa Barbara?

Although there are several proximate causes for the project's slow progress—CHCF grant money, lack of community leadership, vendor limitations, and the duration of the process—the main underlying cause was lack of a compelling value proposition for Santa Barbara organizations.

■ **Foundation grant money and the nature of demonstration projects.** In partially funding the demonstration, the CHCF acted as a social venture capitalist that undertook a project with substantial potential financial risk and with large potential quality and efficiency payoffs. The CHCF believed that some outside entity (itself) should pay for some of the project's development costs, since a successful HIE system prototype would create important externalities (such as more communities subsequently implementing RHIOs sooner) that Santa Barbara participants could never capture to help pay for the development expense.

Like other demonstration project funding agencies, the CHCF inevitably distorted participants' economic incentives and behavior by creating "moral hazard"—whereby below-market prices to buyers or sellers increases consumption, production, and risk taking. In this case, Santa Barbara participants received enough funding for their own information systems projects to want to participate, regardless of their enthusiasm for the project, while CareScience invested more in HIE than it otherwise would have. One interviewee commented that foundation money had "polluted" the process.

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Too little initial risk (that is, moral hazard) helped create too much risk later, slowing progress. When external funds and subsidized prices were ending, both community participants and CareScience found themselves facing more risk than they were ultimately willing or able to bear, given unclear value propositions to participants.

■ **Lack of community leadership.** Although the CHCF and CareScience were the project's key drivers and most eager participants, they assumed that community leadership would grow over time. However, CHCF largesse and CareScience expertise fostered relatively passive community participation, especially without prior "organic" community development of HIE structures, expertise, business cases, and momentum. CareScience had the most decision-making authority, and community participants lacked enough interest or financial "skin in the game" to act as a counterbalance and reality check on CareScience's assumptions and decisions.

■ **Lack of momentum and credibility.** The seemingly endless delays in the project's process dulled interest among community organizations' managers, who had long lists of more pressing priorities. Delays created doubts about the project's credibility, dimmed the vision of what the project could become, and prevented it from evolving by constantly improving and innovating services and thus generating optimism among participants about more robust and valuable services over time.

■ **Vendor limitations.** As Program Management Office, CareScience wrongly believed that (1) it could relatively easily assemble or help develop off-the-shelf technology from vendors, to make the HIE software "work," and then (when that failed), (2) the small firm could undertake a substantial software development effort on a fixed budget in an area abounding in technical and cost unknowns. The Program Management Office acting as vendor compounded the problem, because it reduced independent overall and day-to-day technical oversight of the project.

As it struggled to create the needed software, CareScience consistently overpromised what it could deliver, so that mounting delays increased community participants' disillusionment, as did the vendor's exaggerated claims in national forums about the state of the project's functioning. Meanwhile, substantial CareScience staff turnover disrupted the continuity needed to develop the technology and manage ongoing relationships with project participants.

■ **Lack of a compelling value proposition.** Initial foundation grant- and technology-related delays tended to obscure a chronic, underlying problem in the Santa Barbara Project: lack of compelling value propositions to key stakeholders. Ironically, the same factors that made Santa Barbara so attractive as a demonstration site—the uncomplicated market and lack of acrimonious competition among local organizations—made it harder to establish a favorable value proposition for the pro-

ject's initial service: data viewing. Since Santa Barbara County patient populations often use local health care facilities, one hospital dominates in each city, and one lab dominates in the county, providers could get much data from a few Web portals that organizations increasingly developed. Meanwhile, most data providers had already reaped potential savings from reduced paper-handling costs through physicians' using the data providers' Web portals.

At shutdown, few users used the system, since they could view data from only two organizations that provided them through Web portals. The failure to conclude an agreement with the dominant lab (Quest Diagnostics) was pivotal, because providers had expressed substantial interest in using the project to see all lab results for a patient, regardless of the ordering physician.

In 2006, interviewee managers in community health care organizations bluntly assessed the project's unfavorable near-term value proposition to their organizations. For example, a Cottage Health System interviewee stated that Cottage participated because it was the "right thing to do" for the community and not costly up to that point, not because the Santa Barbara Project had much financial value to the organization; a SBRHA participant made similar statements. Sansum and Mid-Coast IPA representatives also saw little financial value in the project, partly because their physicians already could see much electronic data on patients in their relatively "closed" delivery systems.

To some interviewees, several prime beneficiaries were stakeholders who were not funding the Santa Barbara Project: Solo or small-group practitioners would gain access to electronic data that physicians in larger organizations already could access, health plans might reduce their expenditures—at the expense of providers, since physicians would order fewer duplicative tests or procedures—and patients might benefit from providers' having better patient data.

The lack of a compelling short-term financial value proposition to participants or of a vision of favorable longer-term value propositions elevated the importance of the liability and funding issues, since organizations often will take more risks, and invest more resources, if the financial payoff is great enough.

Perspective: Indiana And Spokane RHIOs

Despite the many announcements about RHIO formation, relatively few RHIOs actually exchange data.[5] Both the Indiana HIE efforts—the most advanced in the United States—and the Spokane-area RHIO help put the Santa Barbara efforts in perspective.

■ **Indiana.** The Indiana Network for Patient Care (INPC) grew out of years of medical informatics research and development at the Regenstrief Institute in Indianapolis. Regenstrief Medical Record System had been used by Wishard Hospital since 1972 and was subsequently used by Clarian Health Partners. After 2002, several other hospital systems, the local county health department, the State Department of Health, Medicare, Medicaid, commercial health plans, and RxHub (a com-

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pany formed to enable communication among prescribers and drug providers) all provided data.[6]

Virtually any central Indiana physician—and more and more physicians across the state—can get access to a patient's INPC data from many data sources, given evidence of a provider-patient relationship and some eligible triggering event, such as recent delivery of a lab results message for the patient. Inpatient use is extensive; a relatively small but growing number of ambulatory physician practices use the system as well. Patient summaries contain "normalized" data, with the INPC reporting data quality problems to organizations providing the data. Other INPC services include biosurveillance and outbreak detection (through real-time capture of hospital emergency department chief complaint information) and biomedical research.[7]

The Indiana Health Information Exchange (IHIE), which includes most major health care organizations in central Indiana, has developed financially sustainable models for some services that the Regenstrief Institute has developed. These services have to have a business rationale, or private value proposition—that is, community organizations are willing to pay for the marginal cost (including for ongoing infrastructure) of providing the services. The IHIE provides clinical report messaging, whereby it provides a physician with electronic reports (for example, lab results or dictation services) for which that physician is the author, orderer, or "copy-to" recipient.

Having achieved a critical mass of data providers, the Regenstrief Institute is developing a new generation of services related to clinical quality initiatives; of these, the IHIE will provide those services for which subscription fees from community organizations can cover marginal costs. Services under development include provider performance reporting across multiple payers (tied to pay-for-performance incentives), point-of-care reminders for patients needing services, and lists of patients needing services.

The usefulness of the Indianapolis system will increase further as more practices implement electronic health records (EHRs), integrate Regenstrief-provided "clean" Health Level 7 (HL7) messages into their EHRs, and provide ambulatory care scheduling and EHR data to the system.

■ **Spokane area.** The Northwest RHIO was created in 2005 as a governance structure for already existing HIE, which was a by-product of years of collaboration among Spokane-area hospitals belonging to two health systems, Empire Health Services and Providence Health Systems. In the late 1990s the hospitals agreed to contract with the jointly owned Inland Northwest Health Services (INHS) to implement and provide support services for one common hospital EHR (Meditech).

Subsequently, INHS provided services to hospitals within a 200-mile radius of Spokane and became an EHR application service provider to some area physician practices.

The common hospital Meditech system and database enabled INHS to provide physicians with viewing access to hospital data for any patient registered for some hospital service. Eventually, the dominant reference lab provider also enabled physicians to view ambulatory care lab results for Providence (but not Empire) patients through the INHS system; meanwhile, the dominant radiology firm provided radiology images and result notes. INHS provides simply formatted "flat files" to some EHR service users, although practices are responsible for correctly importing data into EHRs.

■ **Santa Barbara efforts in context.** Compared especially with Indianapolis, the Santa Barbara Project's HIE efforts were modest. The project aimed initially to provide minimal data-viewing services—mostly of hospital, Medicaid eligibility, and limited outpatient data. Users could access online much of the same data in a handful of portals. Meanwhile, users could not initially access data not already online—such as health plan and Medicare eligibility and encounter data or pharmacy data. Nor could users import data into EHRs, let alone obtain more advanced HIE services increasingly available in Indiana.

Outcomes Of The Santa Barbara Effort

The Santa Barbara Project only partially met its primary goal of becoming a lab for RHIO innovation. Without a fully operational project, participants and staff could not learn by doing and could not incrementally move the RHIO forward, offering increasingly useful data and services. The project's shutdown was especially unfortunate because the project had finally created the infrastructure and agreements to exchange some data and had tested the exchange of more data.

Nevertheless, the Santa Barbara Project produced benefits as a by-product of the demonstration effort. The widely publicized project undoubtedly piqued interest in HIE services, among policymakers and among stakeholders in other communities. Some of the project's software architecture elements have been copied elsewhere, and some of its agreements—such as for data providers and for liability insurers—could become useful models for other communities. Moreover, because the CHCF acquired intellectual property rights over the project's software components that CareScience had uniquely developed, the CHCF can license the software that an open-source developer community could further develop. Finally, project meetings provided a community forum in which executives could discuss community issues.

Lessons Learned And Policy Implications

■ **The pace of RHIO development.** By using software already vetted elsewhere, other communities can avoid many HIE software development delays that plagued

the Santa Barbara effort, and other lessons from current RHIO innovators also will reduce delays. Nevertheless, RHIO staff must still perform the labor-intensive tasks of creating consistent and stable interfaces to numerous databases. Most important, early RHIO experiences suggest that the process of building trust and achieving and constantly revising business agreements among community health care organizations will take much time and effort for years to come.

■ **Different types of value propositions.** The Santa Barbara experience illustrates the differences between private and societal value propositions and among short-, medium-, and long-term value propositions for different HIE services.[8] A societal value proposition includes externalities that private investing organizations cannot fully reap financially, such as improved patient health.

By the end of the Santa Barbara Project, participants focused mostly on the unfavorable short-term private value proposition from providing electronic data-viewing services for physicians. They were not focused on potential medium- and longer-term private/societal value propositions from utilizing data from multiple sources for improved population health services or more effective pay-for-performance incentives, or from providing consumers with electronic data and software services that could begin to turn patients' data ownership and care self-management into more than industry buzzwords.

The Santa Barbara example illustrates the danger that in some communities, unfavorable short-term private value propositions for simpler HIE services may delay more advanced HIE services with greater potential medium- and long-term private/societal payoff.

■ **Role of grant funding in research and development and in determining value propositions.** National funding agencies have awarded grants for HIE in several communities to conduct what is essentially research and development (R&D) designed to benefit RHIOs elsewhere, including piloting of HIE technology, agreements, and services. Among other objectives, the grants help speed HIE development and generate new insights into value propositions for HIE services. Further expanding HIE R&D grant funding to more communities is critical to providing private/public policymakers with important HIE value-proposition information, including (1) value propositions for different stakeholders and services and how they change as RHIOs increase in scale, service scope, and network size; (2) how value propositions change as health care organizations migrate to EHRs; (3) effects of regional market characteristics on value propositions; (4) which services have substantial societal but few private payoffs; and (5) who should pay for initial and ongoing HIE infrastructure, service development, and service provision beyond public funding for R&D efforts.

In Indianapolis, external funding agencies paid for much initial HIE infrastructure and service development, whereas area health care organizations paid fees for RHIO services whose marginal financial benefits exceeded marginal costs (including current infrastructure). Grants enabled the Indianapolis HIE efforts to

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progress farther and faster than would have occurred without such funds. In Spokane, the absence of much grant funding may help explain why the Northwest RHIO provides only basic HIE services, despite very favorable conditions for more services.

Grant-assisted HIE efforts provide some glimpses into future value propositions of HIE services. The Indianapolis experience seems to suggest that once basic RHIO infrastructure is in place, new services are piloted, and the RHIO has many network data providers and users, a RHIO can benefit from economies of scale (for example, adding data updates at low cost) and economies of scope (for example, adding new services at relatively low marginal cost).[9] This increases the likelihood of favorable private value propositions (private parties willing to pay for the ongoing cost of services) that can speed diffusion of the new services. Unfortunately, there is little information on how all of these value propositions change in a world of ambulatory care and inpatient EHRs.

The Santa Barbara experience shows how regional factors can be critically important for determining HIE private value propositions and thus the pace of RHIO development. Expanding grant funding for HIE R&D to more communities can help inform private and public policy decisionmakers about the effect on the value propositions of specific RHIO services of local/regional factors, such as the number of large hospital systems, physician organizations, and payers; past cooperation among participants; extent of existing information system infrastructures; managed care market penetration; and so on.

The Indianapolis experience shows that public funding for HIE R&D can help identify and determine the cost of services that can have much societal but little private value, such as biosurveillance and disease outbreak detection, and can help in answering the "who should pay" question.

■ **Who should pay for RHIO infrastructure and service development?** The most critical issue is who should pay for the investment funds needed to develop RHIO infrastructure and services to a stage at which the RHIO can offer services to participants that will then cover at least part or all of the marginal cost of the service. In some communities, private health care organizations may easily agree on covering most or all of the marginal cost of some services with a favorable private value proposition but disagree on paying for initial HIE infrastructure and service-development costs.

Public funding typically is an option where many potential parties must coordinate investments, benefits are uncertain, and societal and private value propositions diverge, as is the case for RHIO development. Certainly, public funding would be needed to pay for HIE services with a favorable societal but not private

value proposition.

Health care payers could directly contribute to RHIO development by paying for HIE data provision or provider use, for quality performance that HIE services can enhance, and for specific RHIO services, such as provider performance reporting across organizations. Other possible sources of RHIO funding include drug, medical device, or other firms paying for using deidentified patient data. If consumer-focused and self-managed care become increasingly important in HIE services, more RHIO funding may come from such sources as Web advertising.

Finally, the Santa Barbara experience suggests that mandates (from the Centers for Medicare and Medicaid Services or state governments) that shift the burden to regional market participants may eventually be needed to develop HIE infrastructure and services in communities that fail to perceive a positive private value proposition for HIE services, even with grants, incentives, and funds from other sources.

NOTES

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