

The electronic Health Care Value Network (e-HCVN)
Take It or Receive It
“A Conceptual Model for an Electronic Health Care Value Network”

Authored by

Vincent J. DiGennaro

Digital Strategist

The SDA Group, LLC

In Partnership with

GHN Online

12655 N. Central Expressway

Suite 550

Dallas, TX 75243

214.696.5717

Trend: By 2014, Electronic Patient Record Management (EPRM) and associated transactions, such as Electronic Claims Clearinghouses (ECC) and Computerized Point of Entry (CPOE), will be pervasive, by mandate of Executive Order 13335¹. Compliance with this mandate, unlike the *relatively quick* implementation of the Health Information Portability and Privacy Act (HIPAA)², will be a daunting challenge for even the most information technology-savvy elements of the Health Care Value Network (HCVN)³ (i.e., Providers, Payers, Hospitals, Patient Record Keepers, Clinical/Disease Management Entities, Pharmacies, Labs, Remittance Entities, etc.). Early adopters have already implemented electronic Revenue Cycle Management (RCM), although a significant number of Health Care (HC) claims are still processed manually (up to 40% by some measures).

The Current Situation

Revenue Cycle Management (RCM), defined as the specific processes related to claims submission & payment (eligibility, claims submission & processing, remittance), is at the heart of an integrated electronic Health Care Value Network (e-HCVN), since the majority of all interactions within the HCVN generate claims. Claims also provide a wealth of information on the backend, which facilitate utilization review, improvement of clinical/disease management activities and ultimately produce reductions in HC costs through availability of metadata⁴ that can be analyzed for utilization trends. Access to the information provided within claims data warehouses⁵ have not been feasible before the implementation of HIPAA, which provides common data standards and an associated information architecture⁶ to facilitate data exchange, catalyzing order of magnitude improvements in processes related to lowering overall HC costs through leverage of information technology.

A more immediate, tangible impact of electronic claims processing is a lowering of claims processing costs and cycle time for remittance, creating efficiencies that are passed on throughout the HCVN, facilitating an increase in bottom line profits and, in the case of Not-for-Profit organizations, increasing funds availability for more productive activities.

It is predicted that those HCVN entities that have not implemented electronic RCM by 2006 will be branded as laggards, and become obstacles to implementation of the Electronic Patient Record Management (EPRM) mandate of Executive Order 13335. The financial survival of these technology-adverse laggards will also put them at risk from a simple economics standpoint, as elimination of ineffective process and streamlining of key processes associated with the electronification⁵ of the HCVN occurs over the next 5-10 years.

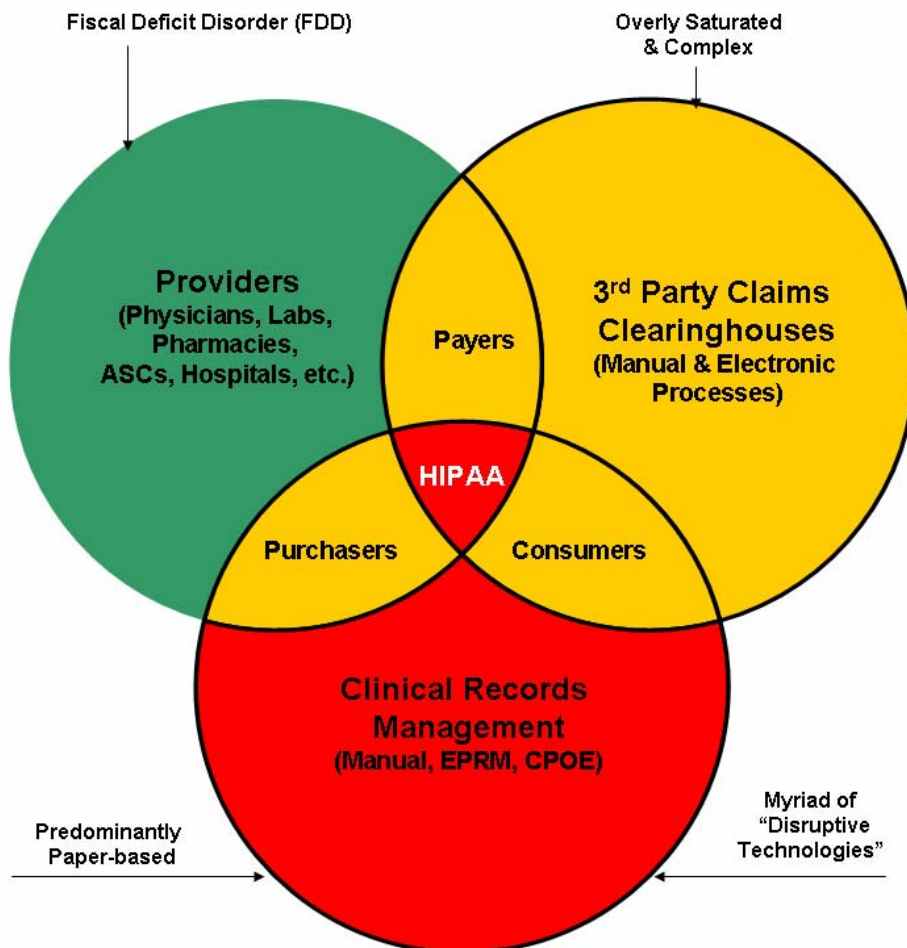
There are, however, significant patient privacy/security obstacles to implementation of Executive Order 13335, the most notable and controversial being the tradeoff between privacy, risk, security and convenience. Electronic patient records can be shared at the speed of technology, not only from one relevant physician to another, but from database to database, among hospitals, payers,

the federal and state governments and a whole new generation of information-based intermediary businesses that will consolidate, package and sell utilization/outcomes information in a manner that would have made George Orwell cringe.

The Department of Health and Human Services (HHS) and Center for Medicare Services (CMS) have already partnered to established voluntary EPRM standards that pave the way for "nationwide implementation of an interoperable health information technology infrastructure".⁶ EPRM will be more convenient for patients who are all too often shuffled between several doctors and are disinclined to keep a copy of their records themselves. A key enabler of an e-HCVN is the federal government push for universal implantation of a "unique health identifier" assigned to every individual, employer, health-care provider and health insurer. This unique identifier is a prerequisite for an interoperable e-HCVN. Its adoption will not come easily as consumer/privacy advocates lobby the Federal government against the ultimate intrusion into a person's privacy—their health record.

Figure 1 summarizes the current conditions of uncertainty, complexity and lack of strong momentum in the direction of an e-HCVN.

Figure 1. Current HC Marketspace
"A Mess at Best like the Wild Wild West"



Taking a Position

HIPPA standards have paved the way for electronic patient records, paperless Revenue Cycle Management (RCM) and a host of information sharing opportunities along the Health Care Value Network (HCVN) that would not have been in even the most aggressive Information Technology (IT) strategies of the major players in the HC industry pre-HIPAA. The universal adoption of HIPPA has set a domino effect in motion. New technologies such as ultra-miniature bar codes being developed by IBM provide a mechanism to provide patient security and privacy, and facilitate a unique health identifier. Middleware⁶ technologies can now be leveraged to share information along the e-HCVN since a common set of data standards are now available. Data Warehouses that have been bantered about in discussions of HC technology innovation are now not only possible, but imperative.

Through the prudent and innovative use of IT, real transformation of the HC business model is now on the visible horizon - and the timing couldn't be more relevant. With the heavy burden on the Medicare system caused by aging in of "forever young" Baby Boomers, combined with health care costs that are increasing at an average 15-20% per annum, the forces of consumerism and simple transaction economies of scale are forcing all constituents in the HCVN to seriously look at IT as a means to create efficiencies in their respective business models.

Technology innovation, combined with HIPPA, Executive Order 13335 and the profit/loss motivation of predominately publicly held payers will catalyze a paperless, electronic HCVN over the next 5-10 years. There are, however, major obstacles to overcome. HC consumers must accept the trade-off between privacy and availability of healthcare as more patient record information is shared electronically. A consortium of government, payers, providers and other e-HCVN constituents will be required to create interoperable healthcare. But the wheels of change have been put into motion, and they don't have the option of going into reverse.

Revenue Cycle Management from eligibility to remittance has already gone electronic and is at the center of an e-HCVN. Electronic claims are stored on databases which can be made interoperable through "middleware" technologies, and provide through a "virtual data warehouse" the core data that can be leveraged to improve clinical/disease management, identify HC trends, conduct utilization review and ultimately drive down healthcare costs once linked to electronic patient records as the electronification of healthcare evolves. Revenue Cycle Management provides the lynch pin via electronic claims processing to link the various elements of the e-HCVN.

Early adopters of Electronic Patient Record Management (EPRM) such as Kaiser Permanente (\$3 Billion investment in EPRM over next several years), the Federal Government (e.g., TriCare/CHAMPUS, VA et al.) are pressuring the commercial sector to transform their "dysfunctional," complex business/technology/applications/information architectures to fully leverage available technologies as enablers of an e-HCVN.

Large (i.e., Fortune 500) companies facing huge healthcare bills for their employees have already begun to build their own data warehouses (e.g., Intel) to monitor payer transactions and identify trends that can be managed to reduce employee benefits costs. This "reverse data warehouse"

phenomenon will pressure payers to manage costs and create radical change to the Utilization Review process, facilitating full implementation of electronic claims processing.

Payers will accelerate the implementation of paperless RCM and the EPRM to improve MCR/MLR (Medical Care/Loss Ratios)⁷ and follow suite behind early adopters such as Kaiser and the Federal HC system. The laggards will find it increasingly difficult to do business in the emerging e-HCVN if they do not have the ability to share information ubiquitously.

There are certain core assumptions for creation of an e-HCVN:

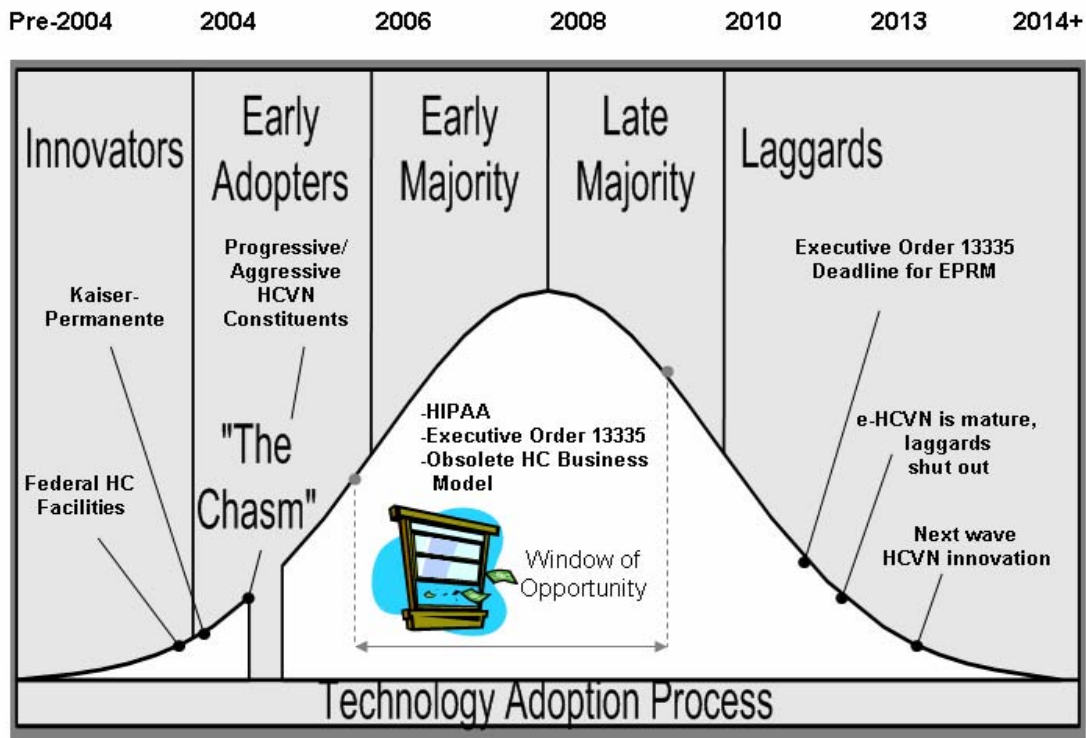
- ✓ HIPPA rules and will continue to pressure the entire HC Value Chain through demand for electronic RCM, EPRM, reporting, etc.
- ✓ Outsourcing of technology wins, outsourcing of people loses (people are expensive, technology is cheap)
- ✓ New entrants (i.e., payers) will rely on HC software providers to provide turn-key solutions so that they can focus on their core competencies of running efficient businesses
- ✓ Provider Groups, Ambulatory Service Clinics (ASCs) and other members of the HCVN will rely on a combination of purchased HC package solutions and the ASP model to retain competitive parity
- ✓ EDI, ECC and ERM will become pervasive
- ✓ CPOE will take hold quickly as “computer-reluctant” Baby Boomer/Silent Generation Physicians retire
- ✓ Transaction economics will drive change
- ✓ Physicians who opt out of the new business model will not be able to compete unless subsidized by government entities
- ✓ The Medicare crisis, consumerism and disruptive technologies (e.g., CPOE devices) will merge to create “The Perfect Storm” scenario that will force the rapid deployment of an e-HCVN
- ✓ Current VOID and future expectation of a “HC Virtual Warehouse (VDW)” to support clinical/disease management, actuarial activities, service pricing and regulatory reporting (Lack of relevant data is a core factor in the rising cost of healthcare)

There are also several key factors which will impact the timing of the rollout of an e-HCVN.

Table 1 summarizes these key factors and attempts to place a subjective, a rough order of magnitude (ROM) probability of occurrence and a relative impact of each factor on implementation of an e-HCVN (high/moderate/low). The purpose of Table 1 is not to provide precise probabilities, but to demonstrate the myriad and heterogeneous mix of regulatory, market, information technology and business transformation factors which must be considered in estimating the time span for substantial (>60%) adoption of an e-HCVN. Based on the factors listed in Table 1, Figure 2 provides a timeline for “universal” adoption of an e-HCVN over the next 3-10 years, based on a conservative interpretation of the factors presented in Table 1.

Table 1. Factors Impacting Rollout and Acceptance of an e-HCVN		
e-HCVN Adoption Factors by Constituent	Probability (%)	Impact (L/M/H)
Payers		
Continued double digit growth in healthcare costs	90	HIGH
HC IT outsourcing	75	HIGH
HC business process outsourcing	75	HIGH
Lower MLR/MCR	50	HIGH
Increased efficiencies in HC business processes	50	HIGH
Enablement of electronic-HC Self Service (e-HCSS) for consumers	75	MODERATE
Actuarial discipline applied to HC (e.g., the BC/BS model for individual plans)	75	MODERATE
Attenuation of payer premium increases	50	HIGH
Fully enabled Electronic Revenue Cycle Management (e-RCM)	75	HIGH
Consumers		
Double digit increase in membership in Consumer Directed Health Plans (CDHP)	75	MODERATE
Continued push form HMO model to PPO, Individual Plans, etc.	90	MODERATE
Increased growth in HC plan membership	60	HIGH
Aging in of Baby Boomers	100	HIGH
Value proposition of CDHP	60	MODERATE
Proactive and widespread use of e-HCSS	40	MODERATE
Universal acceptance of CDHP	40	MODERATE
Pharmaceutical Industry reform	30	LOW
Shift in Consumer Behavior--becoming more proactive in managing their CDHPs	40	HIGH
Information Technology		
Creation of a "clinician-friendly" Computerized Physician Order Entry (CPOE) device	60	HIGH
Unique Patient Identifier	30	HIGH
Accelerated Rollout of Electronic Patient Record Management (EPRM)	60	HIGH
Broad Adoption of Middleware Technology (e.g., XML) to facilitate data sharing	80	HIGH
Universally accepted and enforced data standards (e.g., HIPAA,)	90	HIGH
Ubiquitous e-RCM	90	HIGH
Ability of payers to transform "archaic" core systems	40	HIGH
Universal adoption of smart card technology	50	LOW
Significant HC Market Investment in IT/process transformation to create a universal HC information architecture that is "externalized"	40	HIGH
Technical feasibility of an e-HCVN	70	HIGH
"Virtual data warehouse" for clinical/disease management (i.e., universal access to HC metadata)	50	HIGH
Government		
Continued support/innovation of the Health Reimbursement Account (HRA)	80	MODERATE
Legislation of Unique Patient Identifier (UPI)	40	HIGH
100% HIPAA compliance	90	HIGH
Full Congressional endorsement and accelerated rollout of Executive Order 13335 mandates	75	HIGH
Passage of "Patient's Bill of Rights"	50	MODERATE
Legislate Pharmaceutical Industry Reform	25	LOW
Acceleration of breadth and scope of Medicare Reform	60	MODERATE
Employers		
Investment in IT infrastructure required for interoperability with th e-HCVN	60	HIGH
Increased involvement by employers in "managing" the payers (i.e., Payer Oversight)	75	HIGH
Stabilize employee HC benefit programs	75	MODERATE
Providers		
Acceptance and proactive adoption of EPRM	50	HIGH
Universal acceptance of clinical/disease management activities	50	HIGH
Investment in IT infrastructure required for interoperability with th e-HCVN	50	HIGH
Fully enabled e-RCM		
Litigators		
Control/Capping of frivolous HC lawsuits	40	MODERATE
Hospitals		
Widespread adoption of EPRM	40	HIGH
Investment in IT infrastructure required for interoperability with th e-HCVN	40	HIGH
Fully enabled electronic revenue cycle management (e-RCM)	60	HIGH
Pharmaceutical		
Fully enabled electronic revenue cycle management (e-RCM)	60	HIGH
Business transformation to lower drug costs (i.e., faster rollout of	50	LOW
Investment in IT infrastructure required for interoperability with th e-HCVN	50	HIGH

Figure 2. Market Saturation Timeline of e-HCVN



Benefits of an e-HCVN:

The U.S. Department of Health and Human Services (HHS) has determined the following minimal benefits will accrue through enablement of an e-HCVN, specifically with respect to the critical EPRM component :

Fewer medical errors. People being treated for an illness would not have to face the risk of being harmed by an error. The majority of medical errors would be prevented. Physicians and other authorized clinicians would be able to get up-to-date information on their patients and would have instant access to breaking news in science and research, and to medical guidelines for treatment. They would know which treatments are the most beneficial to their patients at the time they were making their clinical decisions. Overall, clinicians would be able to spend the majority of their time supporting and treating their patients, and not looking for information, waiting for returned phone calls, or facilitating administrative functions to deliver care.

Less variation in care. Consumers would be able to access and compare the quality of clinical services regardless of their geographic location, socioeconomic status, disease condition, or disability. This health care would be culturally sensitive, technologically advanced, and would emphasize timely access to specialists and enhanced clinical decision support so that no consumer or family would experience unnecessary delays in access to care.

Consumer-centered care. Consumers would have ready access to their personal medical information, as well as details on the cost, quality and service ratings of the care they were receiving or seeking. This type of information would maximize consumer choice and involvement in health care and treatment decisions. Consumers would also be able to access their treatment information so that they could make better decisions and take more control over their health status, maintenance and treatments. Patients could specify their treatment preferences and make these preferences readily available to authorized care providers.

Medical information moves with consumers. As they move from clinician to clinician, patients' information would move seamlessly with them. Clinicians would be optimally informed about their patients, and patient care would not be interrupted or compromised. This would reduce the need for duplicate tests and redundant orders, and eliminate clinical guesswork when a new patient receives treatment.

Care is delivered electronically as well as in person. As clinical practice enters into the information technology age, information should be available to clinicians whenever and wherever it is needed. Telemedicine should be used to enhance access to the best specialists when they are needed for a specific disease or treatment.

Medical records are protected from unauthorized access. An information-rich health care system will make information electronically available that can support treating patients, making information accessible for public health and research, and improving care for all. This information has been and will be safeguarded in order to prevent unauthorized access to personal health data and to prevent improper uses and disclosures of individually identifiable information. This information would then be used for quality improvement, health services, scientific and genomic research, bio-surveillance and response, and disaster recovery activities.

Clinicians can spend more time on patient care. Clinicians should be able to focus on care delivery. Care delivery will be enriched by having the most relevant information - including up-to-date medical evidence - at the point of care. Clinicians and consumers will have more time together free of distractions, such as searching for traditional paper records. The reporting that every clinician has to do should be accurate and timely, but also simple and automated. The data needed to conduct research on health care improvement, improve quality and efficiency, and monitor disease outbreaks should be available with little work and distraction to clinicians.

According to the Department of Health and Human Services, the following steps have already occurred en-route to an e-HCVN:

Examples quoted by the HHS include:

- ✓ When arriving at a physician's office, a new patient does not have to enter his or her personal information, allergies, medications, or medical history, since this information is already available.
- ✓ A father, who previously had to carry his chronically ill daughter's medical records and x-rays in a large box when seeing a new consultant, can now keep his daughter's important medical history on a key chain drive that plugs into a USB port on a computer.

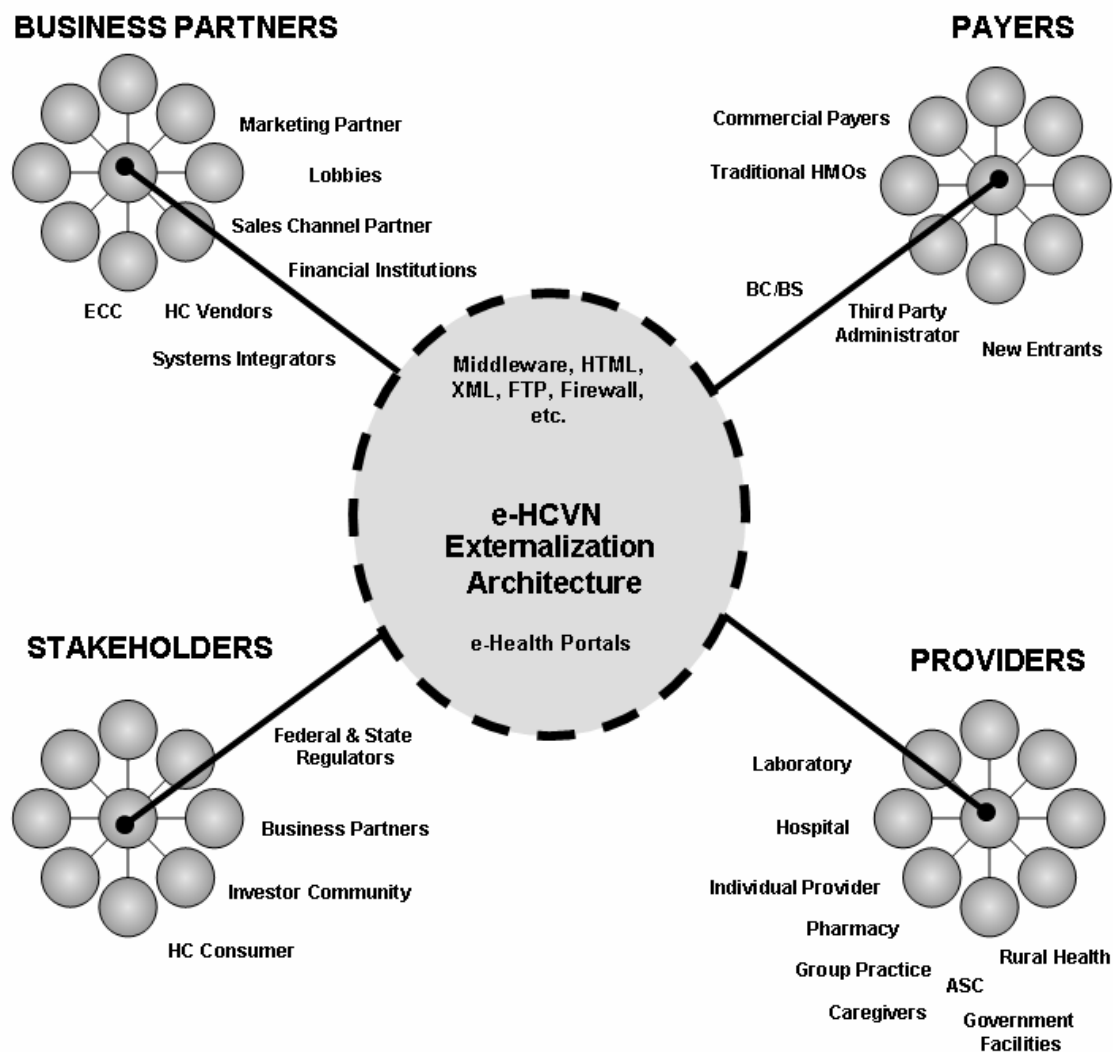
- ✓ Arriving at an emergency room, a senior citizen with chronic illness and memory difficulties authorizes her physicians to access her medical information from a recent hospitalization at another facility, thus avoiding a potentially fatal drug interaction between the planned treatment and the patient's current medications.
- ✓ While at home, a physician receives a call from a worried mother about her infant son and can access, via a secure network, recent lab tests and x-rays online instantly, avoiding a trip to the emergency room.
- ✓ While with a patient, a physician enters a prescription on a computer, where potential allergies and contraindications are shown immediately, and managed care authorization occurs instantly.
- ✓ Clinicians in rural emergency departments routinely send radiology studies to university radiologists and receive telephone consultation regarding these studies within minutes.
- ✓ Because of worsening angina, a senior citizen is being evaluated by her physician, whose decision supports augmenting clinical decision making, and concludes that the patient's life expectancy would be safely extended by angioplasty.
- ✓ At home, a senior citizen consults an online database of physicians to assist in choosing a physician to perform an angioplasty for her angina.
- ✓ An intensive care specialist remotely monitors intensive care units in several different hospitals, providing coverage 24 hours a day, 7 days a week, reducing mortality, length of stay and total cost of the ICU stay.
- ✓ A small number of cases of an unusual, sudden-onset fever and cough are instantly reported to public health officials from area emergency rooms, alerting authorities of a possible disease outbreak.
- ✓ A busy professional with a skin rash uses his health plan's consumer health portal to securely e-mail his clinician, who recommends that the patient schedule an appointment to be evaluated in person.
- ✓ A soldier returning home from Iraq undergoes a standardized health assessment. This information is collected with a personal digital assistant device and sent electronically to a central database, where it will be available for review and ongoing care in the decades to come by DoD and VA medical providers.

Automation of the health care industry through an e-HCVN will improve quality and reduce overall HC costs in the long term, especially since the consumer will be catalyzed to play a more proactive role in his/her wellness. The HC market is motivated by cost reductions achieved through innovations in care delivery and the capability to better manage outcomes.

An e-HCVN Conceptual Model

Figure 3 depicts a Conceptual model for an e-HCVN. In short, an e-HCVN can be defined as the internet-enabled connectivity of the core components of the health care business model—Payers, Providers, Business Partners and Stakeholders. The interoperability of these components is created through “externalization of HIPPA-mandated data and other transaction and metadata via middleware standards such as Microsoft’s .XML standard.

**Figure 3. Electronic HC Value Network (e-HCVN)
Conceptual Model**



RCM as the Driver of an e-HCVN

The rapid and unstoppable shift from paper-based to electronic Revenue Cycle Management was catalyzed by HIPPA as much as by the crystal clear business case to lower transaction costs associated with manual eligibility checks, paper-claims/attachments and “spaghetti-code” interfaces to the banking/remittance component of the RCM value chain. Since RCM has been

first to the plate in the shift from the traditional, paper-based HCVN to an integrated, cost effective, internet-based architecture, it serves as an architectural model for the re-engineering of the remainder of the HCVN. Most importantly, as Figure 4 demonstrates, RCM has critical links into all other components of the HCVN (Practice Management, Eligibility, Hospital Services, etc.). RCM is the “Chart of Accounts” of the HCVN. As with any other major re-engineering/business transformation in an industry vertical (e.g., manufacturing, insurance), the first element to be transformed is the financial component—**RCM**.

Bottom Line: Consumer-driven Healthcare catalyzed by HIPPA, Middleware, the Internet and Consumer expectations will drive creation of an e-HCVN to drive down transaction costs and increase quality of care. Innovators/early adopters such as Federal Government HC facilities and Kaiser-Permanente are the current e-HCVN enablers. Economic/market pressure, government mandate and consumerism will combine with entrepreneurial investment to transform the current, archaic HC business model into an e-HCVN ahead of the Executive Order 13335 mandate. A “Perfect Storm” of HC market instability, risk, uncertainty and rapid introduction of disruptive HC technologies (e.g., CPOE handheld devices) has created a current state similar to that which accompanied the radical and rapid growth of the internet from 1995 through its relative maturity, culminating in the “.com bomb” of 2000.

Footnotes:

¹**Executive Order 13335.** Signed on April 27, 2004 this EO 13335 mandates sweeping reforms to transform the US healthcare system via Information Technology, with specific guidance for electronic patient record (EPRs).

²**Health Information Portability and Privacy Act (HIPAA).** The Health Insurance Portability and Accountability Act of 1996 (HIPAA) was signed into law on August 21, 1996. This law includes important new protections for millions of working Americans and their families who have preexisting medical conditions or might suffer discrimination in health coverage based on a factor that relates to an individual's health. HIPAA's provisions amend Title I of the Employee Retirement Income Security Act of 1974 (ERISA) as well as the Internal Revenue Code and the Public Health Service Act and place requirements on employer-sponsored group health plans, insurance companies and health maintenance organizations (HMOs). HIPAA includes changes that:

- limit exclusions for preexisting conditions;
- prohibit discrimination against employees and dependents based on their health status;
- guarantee renewability and availability of health coverage to certain employers and individuals; and
- protect many workers who lose health coverage by providing better access to individual health insurance coverage.

³**Health Care Value Network (HCVN).** The holistic view of interactions between all major components of the US Healthcare System (Providers, Payers, Hospitals, Government, Consumers, et al.) to provide services to HC consumers.

⁴**Metadata.** Literally, “data about data” or the summarization of data into meaningful information that supports decision making at all levels.

⁵**Data Warehouse.** A data warehouse is a central repository for all or significant parts of the data that an enterprise's various business systems collect. The term was coined by W. H. Inmon. IBM sometimes uses the term "information warehouse."

⁶**Electronification.** The transformation from a paper-based system to a process workflow to an information technology based (i.e., paperless) system and workflow.

⁷**Health Information Technology Infrastructure.** The IT infrastructure which includes business, application, information and technology architectures that provide the infrastructure for an e-HCVN. The Health Information Technology Infrastructure is much like the internet, but focuses on creating interoperability between the major components of the US Healthcare System via information technology adoption.

⁸**MCR/MLR (Medical Care/Loss Ratios).** Medical loss/cost ratio refers to the percentage of dollars actually spent on medical care versus administrative costs or profit by a payer. The higher the ratio, the more money is being spent on actual delivery of care. Components of the medical loss ratio include payments to physicians, IPAs, hospitals, pharmacists and other providers of healthcare. MLR/MCR is a major metric for the Payer community as it is the best indicator of gross revenues vs. gross profit.