Health and Identity: No Patient Left Behind?

I spent much of Renaissance Weekend, a retreat dedicated to celebrating the New Year with deliberation, in the company of medical people: doctors and hospital administrators, medical researchers and healthcare company executives. All were personally engaged in health care—caring for the ill, searching for cures, designing systems to manage the process. Yet what struck me most as an outsider was their resignation to the US health-care system’s fundamental problems. Each was doing something good and useful in a particular field or geography, yet they seemed to have given up all hope of reforming the system as a whole. In an equivalent group of IT people, the attitude would have been different: They would have seen all the problems as opportunities. There would have been at least a dozen people with grand schemes to restructure the whole thing, miracle cures for common diseases, interfaces and gateways for incompatible data sources, and new and untried business models guaranteed to realign every misaligned incentive.

Two weeks later, JP Morgan’s health-care conference in San Francisco drew about 7000 analysts and investors, but the focus was on drugs and hospitals rather than replicable improvements in health-care processes. The one such company presenting there that we cover here, ActiveHealth Management, failed to fill its room.

This newsletter is an attempt to bridge that gulf—not with miracle cures or simple solutions, but with a look at one lever about to force open a seam in the tectonic plates of US health care—the personal health record (PHR). We went out and found some of the dreamers and trouble-makers who we believe will make a difference—with their ideas if not with their companies. We admit: The veterans we consulted were skeptical. It’s all been tried before, they said.
But in the end, it’s primarily the unreasonable people outside the establishment who force progress. Without them, we’ll continue with a tragic situation described aptly by Russian prime minister Viktor Chernomyrdin in another context: “We hoped for the best, but things turned out as usual.”

In the US, health care is a huge and costly activity, $1.7 trillion, or about 15 percent of GDP. (You could argue that health destruction takes an even bigger share of GDP, including excess food production and consumption, the tobacco industry, some part of the alcohol industry, along with guns, illegal drugs and perhaps all the advertising that encourages us to overconsume. But let’s move on...)

And it’s not just that the financial costs are so high; it’s that about a third of those costs (by some estimates) are the costs of doing things wrong: unnecessary or duplicated tests, forgotten follow-ups, missed connections between specialists treating the same patient, useless paperwork, scribbled prescriptions leading to clarifying phone calls if not to the wrong medications. Estimates of errors range broadly. One of the most famous is the US Institute of Medicine’s “To Err is Human” report, published in 1999. It estimated that some 44,000 to 98,000 deaths in the US each year in hospitals alone are caused by medical errors.

There is no simple answer to all these problems, pointless as they are. It’s not that many people are getting hugely rich off them. There’s no lobby for stupid medical care, but there is a lobby against changes that would threaten current revenue streams. There is also huge inertia and a minefield of barriers that stall attempts at improvement. The trick is to figure out a way to align financial incentives and revenue streams with a system that achieves its goal – to pay for health rather than just for care.

This will require a different payment system – i.e., payments based on results and prevention of disease (and costly care) rather than inputs. Input-based payments, over time, foster more input – tests, patient visits to a doctor, drugs – whereas results-based payments foster better results and, because suppliers want to make a profit, tend to reduce costly inputs. (The trick is how to handle the reality...
that some conditions simply are expensive. How do you make sure that care-givers don’t avoid patients whose results are hard to improve? In part, by measuring “results” appropriately.)

So, who should pay? And what should they pay for? How to restructure the health-care payment system is beyond our scope here. However, one key to the second of those questions – what to pay for – is information systems that can predict health and measure outcomes; current IT systems are focused on measuring care (and drugs and financial transactions).

On the front end of health-care information systems are personal health records (PHR), which will be both a driver and a result of better health and health information systems overall. The PHR is the patient-centric form of electronic medical records, aggregating all the data about an individual to a single focal point for use in a variety of contexts. EMRs are used by clinicians to record conditions and plan treatments, and multiple, disaggregated EMRs cover any single patient; PHRs are about individual patients, and ideally used by patients as well as by their professional caregivers.

A PHR is not some magic thing in itself. It’s basically a set of data that can inform a variety of applications and functions for individuals, such as a doctor and patient sharing a set of records as they communicate (face-to-face, by phone, e-mail or even a Web conference). A patient could also use PHR tools to schedule appointments, arrange tests and see the results, order medications and perhaps view and pay bills. (A PHR application that could actually explain medical benefits and charges would be a wonderful thing!) More broadly, Juan could maintain health-related records in a PHR, including disease-specific monitoring information – e.g. blood pressure, blood sugar if he’s diabetic, records or reminders about his medications, symptoms and the like. With the proper equipment, users could chart their own progress on any measure: Expectant mother Alice could track her weight and symptoms such as nausea, remind herself to take medications, and store sonograms and other clinical records. Users could also use the PHR as a place to keep queries and receive alerts about, say, new drugs and treatments relevant to their conditions. These are all services that could be built around a PHR; the PHR itself is only a data set, and perhaps a tool to see the data.
Why Personal Health Records?

First, in order to pay for health rather than care, you need standard metrics to define the health of individuals, as well as the likely health of populations. (Then ideally society pays for some base level of health care for those who can’t afford it, and “society or the private sector” – vote for your choice – pays for health care (insurance) for the rest. Out of that, health-care organizations get higher compensation for making – or keeping – people healthier than they otherwise would have been.) That requires enough record-keeping to make initial population-health projections and underwriting/subsidy decisions, to track the health outcomes of individuals (both as individuals and as de-identified data points), and to compensate the organizations that produce the positive outcomes. (That’s already happening under “capitation” schemes that pay for health (care) per head, but so far they are not spreading quickly.)

Second, any doctor or clinician can provide better care if she knows all the relevant data about a patient, including results/recommendations from a background system that can compare the data on an individual to standard protocols for care – treatments for a particular diagnosis, drug combinations to avoid and the like. There is more medical knowledge in general and more details about each patient in particular than any one clinician can handle. Providing just such information, just-in-time and at the point of treatment, is an ideal way for a computer to support – not replace – a human clinician.

Third, some people (including us!) believe that health care will be better and cheaper if individuals are more involved in the process. Without addressing the question of whether they should pay out of their own personal pockets (rather than through taxes, wage deductions and the prices they pay for other things, which include companies’ health-care costs), it’s clear that they can make better judgments – whether about care or about costs – if they have more information about their own situations and the care they are or should be getting. The PHR, identified with a particular individual, is key to getting individuals involved. “Especially,” says David Lansky, PhD, director of health at the Markle Foundation, “it’s essential for someone caring for their own or a loved one’s chronic illness. Managing your diabetes or asthma or blood pressure is a day-to-day thing that you can’t expect the professionals to do for you; you need the information available in real time to do that well, with the doctor as a guide, interpreter and advisor along the way. The PHR is a tool that permits you to manage your own situation and share information back and forth with your professional helpers.”
In short, better epidemiological data, better individual data for automated systems and practitioners alike, and better, more intelligible data for individuals about themselves will be a key mechanism for producing the benefits promised by the transformation of the health-care system from treatment-based to outcomes-based. All these things will happen in the absence of top-down reform, but more slowly and more piecemeal than under realigned incentive systems.

This issue of Release 1.0 focuses on the role of personal health records and the IT infrastructure needed to foster them. In particular, we point to specific examples of the various components, systems and services that need to come together to foster widespread use of personal health records. Even this slice of the broader topic of health care is huge, and we can highlight only a few examples. But we have attempted to choose ones that illuminate the broader problems and opportunities.

**From EMRs to PHRs: Getting at the records through a single lens**

Good news! Electronic medical records already exist. Indeed, many patients have tens or even hundreds of electronic records about them, while other patients “exist” only on paper, or perhaps in some electronic accounting systems. But each EMR has medical information from one only setting (a particular doctor or hospital) in it. A single EMR may know which prescriptions one doctor wrote, but not which ones you had filled at the drugstore, not which ones you actually took, not which ones some other doctor wrote, not which homeopathic remedies you bought, and not how many times you exercised today or how many eggs you ate or cigarettes you smoked. Only the PHR knows all those things, collecting the information (ideally) from all sources: doctors’ notes, drugstores, school clinics, health fairs as well as a person’s own decisions and behavior. It’s an individual’s asset – and to a large extent, an individual’s responsibility. EMRs are only components, though valuable ones, of a PHR.

Moreover, the challenges even around EMRs, let alone PHRs, are many:

- **Often, they don’t exist.** (We lied!) Many medical records are on paper, and may be misfiled or missing. A single paper “chart pull” costs $3 or more in a typical medical office; it’s not something any practice wants to do a lot of for strangers.

- **They don’t follow standard formats**, either technical or in medical vocabulary. Each health-care organization has its own standards, and often each doctor has her own notion of what, say, “severe” might mean. How to
compare a patient’s progress over time using charts and diagnoses from different doctors and institutions!

- They're inaccurate and incomplete, especially when it comes to sensitive information about mental health, addictions or sexually transmitted diseases. Both doctors and patients sometimes purposely obscure the truth, whether for discretion or to enhance “reimbursability.” Worst of all, there’s no way to flag what’s not there – patients who haven’t called for their follow-ups, filled their prescriptions, or taken their tests. Patients can get scared and confused and forget what the doctor said – or they may simply make their own decisions not to do or record something.

- They’re all over the place, hidden in remote locations behind firewalls and different nomenclatures.

- Then there’s the additional challenge that even if a patient’s records can be assembled and integrated, the information is not available or intelligible to a normal individual; i.e., it’s not presented as a personal health record.

Currently, the vast majority of electronic information that flows through most health-care organizations’ IT systems concerns financial transactions; the clinical information is ancillary. The best, most integrated source of data in health care is prescription drug purchases. (Yet it’s amazing how much clinical information can be derived from such records, as illustrated by ActiveHealth Management (see page 24), which basically reverse-engineers clinical information from transaction data.)

Turning all these EMRs into PHRs, however imperfect, is the next challenge. A useful PHR contains enough information to provide “continuity of care”: basic demographic information (including certainty as to the patient’s identity!), plus the aggregation of all EMRs about that patient. It may also include payment and insurance information, plus information from all other sources the patient has authorized and can import data from, including the patient’s own input. Some institutions focus on integrating the patient’s data into a PHR for institutional use, which is a good start, but a patient-accessible PHR may include all these plus the patient’s own input. PHR applications use subsets of this underlying collection of data; getting the data integrated, actionable and visible to the right (and not the wrong) people is what this is all about.
**Records, records, who has the records?**

Just as the data about most patients is scattered and confused, so is the data about the data. There is data about the number of facilities using computerized patient records, but very little – ironically – about the number of patients covered, or the number of patients using records themselves. (Enough about us, say the vendors, let’s talk about our products!) Of course, there are many kinds of records about patients, including office charts (basic information), medical charts (diagnoses, records of procedures, doctors’ notes, images and the like), and of course various billing and administrative records.

We’re most interested here not in how many doctors keep electronic charts (a little more than 10 percent in small private practices, up to about 100 percent in the most advanced medical groups), but in how many patients have electronic medical records about them. That number is probably somewhat less than 100 million, according to best estimates. Among those millions, of course, many patients have tens or even hundreds of charts, from different doctors, hospitals, test labs and other sources. A much fewer number of patients have integrated records, wherein multiple charts are stored together and the data can be compared effectively from source to source; those patients are mostly those who stick to providers within a single unified healthcare group where the doctors are employees and can be persuaded to follow common standards. Notable examples are at Group Health of Puget Sound, Kaiser, Palo Alto Medical Foundation and Geisinger Health Systems. Some vendors of enterprise health-care management software, such as Epic Systems and Cerner Corporation, offer modules that allow the institution or individual doctors to offer a PHR to their patients. (Note for example that most Microsoft employees have access to Epic’s MyChart through their health providers, and they are some of its most enthusiastic users.) However, take-up is low. First, not all institutions offer the service, not all doctors recommend it to their patients, and only about 15 percent of patients take the offer when it is made.

Thus, we estimate there are only about 150,000 to 200,000 patient-centric PHRs, under the control of the patient. CapMed (page 18) is the provider of the largest share of those, of which about 40,000 to 80,000 are in use. A cluster of small vendors compete with CapMed in offering PHR tools to consumers. However, those are mostly “untethered;” that is, they don’t include imported medical data from institutional EMRs. There are some “tethered” PHRs, i.e. ones that include data from a particular set/standard of EMR from a single institution, such as the health groups/vendors mentioned above. And then there is the approach that we believe ultimately will prevail, the “tetherable” PHRs, which are controlled by the patient but that can accept
medical data from and interact with a variety of sources. The tethered ones are the most likely to grow in the short term, however, since they typically come with useful data and institutional support from leading-edge health groups that have themselves integrated a variety of health services (technically and in terms service delivery).

As for consumers, market uptake will be strongest among the more involved and the more technically comfortable patients. Both those populations are increasing as more chronically ill patients take greater part in their own care, and as the US population as a whole gets more technically savvy. Meanwhile, as we describe in this issue, standards for data interoperability are converging, and various suppliers are beginning to contribute their pieces of the solution.

**Integrating the data**

As we mention above, EMRs are generally not compatible with one another. First, they contain different kinds of data with different labels. Various standards are emerging, including a standard “continuity of care” (CCR) record promoted by the American Academy of Family Practice (AFAP) and originally pushed by the Massachusetts Medical Society, which specifies XML labels for various fields.

The second source of incompatibility is the vocabularies used *within* the records. There is none that is particularly better or worse, but they all have adherents and the way forward is automatic translation and backward compatibility rather than revision of existing records. The emerging standards include HL7, mostly used by labs and diagnostic facilities, and Snomed, a more extensive, more academic international vocabulary maintained by the College of American Pathologists.

Another challenge is technical integration – getting various systems to talk with one another. It is fairly easy to e-mail files around or for a practitioner to view a chart through a Web browser. But building interfaces that can routinely transfer or update data intelligently is an implementation challenge – i.e., not rocket science, but a substantial chunk of mundane development that doesn’t appear to save lives even though it’s key to doing so in the long run.

In addition, before any of this can happen, publicly accessible EMR databases will need to have both stronger access/authentication systems and better auditing for after-the-fact monitoring of who may have seen or changed records. (For example: You want to allow an emergency room doctor access to the record of any patient in the country who may randomly show up in her clinic – but you want to be able to
check after the fact whose records she actually looked at if any questions come up.)
Once health-care institutions agree to trade data (with appropriate personal autho-
rizations), they are implicitly also agreeing to trust one another’s systems for authen-
tication and monitoring of users. (See Release 1.0, June 2003, on Identity Management.)

Finally, there’s the legal/policy side. Health-care institutions are paranoid about
breaking HIPAA regulations – and yet huge amounts of clinical and financial data
are routinely shared between large institutions. As in the financial industries, it all
works well at great scale, but it’s hard to get into the system as an individual or as an
individual practitioner trying to get relevant records for a single patient. The systems
are there for payment transactions, but giving or getting specific authorizations is
difficult.

Doctors legitimately worry about the privacy of their patients. The kind of prescrip-
tion data that ActiveHealth is using for clinical purposes is also being used by law
enforcement in the state of Kentucky, for example, to flag individuals who buy “too
many” prescription drugs (in a program called KASPER, for Kentucky All-Schedule
Prescription Electronic Reporting).

The outcome of all this includes the realization of patients’ rights of access to and
control of their own information. That right may be delegated, but we believe people
should know enough to delegate it consciously and specifically. We also believe that
informed, empowered individuals are likely to be happier and healthier and to con-
tribute more and take less from society.

Selling the dog food
Of course, individuals aren’t clamoring for personal health records (a lack-of-
demand challenge being addressed by Health Record Network among others; see
page 27).

The Markle Foundation, as part of its broader Connecting for Health Project, sur-
veyed adults and found both woeful ignorance and complacency. Most people
believe that their doctors already have access to their clinical records online, which is
generally not true. However, they mostly haven’t thought of asking for such access for
themselves. Interestingly, people with chronic conditions – heart disease, diabetes
and the like – are more likely to want access to their records, and the younger they are,
the more likely they are to want that access electronically as opposed to paper.
THE PARTIES: PAYERS AND PROVIDERS

The major players are the government; private-sector payers (employers and health-insurance companies, primarily); private-sector providers (both for-profit and not-for-profit), of drugs, equipment and services; and private-sector vendors of IT (everything from infrastructure to packaged software to consulting, implementation and outsourcing services).

And oh yes, we almost forgot, the patients! They bear some of the costs, and in theory they are the customers. But they rarely know what they are paying for, and they cannot easily assess its value. Most of them think the health-care system is a mess, but that their own providers are above average.

The government pays about half of US formal health-care costs (as opposed to expenses for healthy food or health clubs) – about 17 percent through Medicare (for older people) and 16 percent through Medicaid (for low-income people) plus a similar amount as an employer. The government also plays another role – setting the rules. There’s only so much that private-sector and individual players can do to change the rules – though they can win grants and implement demonstration projects showing how other rules could work better.

Through its reimbursement requirements and the allocation of its huge budget, the government broadly shapes the US health-care system. In addition, through its activities as an employer and health-care provider, most notably the Department of Veterans Affairs health-care system with 170-plus hospitals, the government builds and implements software, trains interns, employs practitioners, and treats millions of patients. Many academics and researchers look to the VA as a potential source of software, though the private-sector people we spoke to are not so enthusiastic, since it’s open-source and unsupported. In the end, the costs of IT have more to do with implementation and support than with software licensing fees.

The payers are growing increasingly uneasy as they see health-care costs continue to rise. (Of course, the real payers are individuals, but they have little clout and generally little understanding of the system.) The payers, however, realize that they can’t simply continue to collect more to cover the rising costs; they need to help figure out how to contain costs – and by more than just disallowing claims or shifting the burden back to the insured. A range of new customer-driven health-care intermediaries are pioneering new payment models, and large health plans such as Kaiser and Group Health Cooperative of Puget Sound are using results-based “capitation” schemes.

The private-sector care providers know that they are inefficient, but they mostly keep doing things the old way and keep getting paid for them. In fact, because of technological developments and legal developments (rising liability), they have to do more: more tests, more procedures, more visits, more drugs. The providers range from individual doctors or small-group practices, to large, multi-unit hospital chains. They also include a variety of clinics, nursing services and fast-care outfits such as Minute Clinic in Target Stores. Some of the larger hospitals and health-care groups are dramatically increasing their effective use of IT in general and clinical records in particular, but they are still in the minority.

The drugmakers, for their part, have lost credibility and trust. Although most of their products do more net good than harm and their revenues continue to rise, they are losing incremental revenues and people who could potentially benefit from their products are losing those benefits, as drugs get taken off the market because they harm high-risk subsets of the population. (Unfortunately, the subset at risk is different for each drug, and it is not necessarily easily determined. We hope to cover biogenetics in a future issue of Release 1.0.)

So far, the patients have played mostly a passive role. But that may be changing too – if they get educated. Ironically, it’s the older, sicker, though less-likely-to-be-online patients who are most interested in access to their own records, online or on paper, and in health-care reform. The good news is that this is a fairly concentrated group... and that they account for a majority of the system’s costs. If they can be pulled into a world of better-managed, less costly care, the rest will take care of itself. (That is, for each population there needs to be a compelling reason to adopt IT. First it was financial analysts using VisiCalc. Then it was young folks using the Net for social purposes. And now it may be sick people, trying to get more control over their own information and access to better, less episodic, more well-being-oriented care.) Note that demand does not express itself only through consumer dollars.

Employers and the health-care providers they use do pay some attention to what consumers want... and they also read magazines, watch television and get a sense of public buzz. Even in a system where consumers may not pay directly, consumers can make their wishes known.
Moreover, despite generally not having thought of electronic access to their medical records before, adults under 65 generally like the idea, Markle found. For example, two in five respondents strongly agreed with the statement, “I’d like to have all my health information in one place – and get to it with a click of the mouse.” Yet half of those expressing strong agreement had never even thought about the concept before.

As Lansky points out, individuals aren’t really asking for PHRs. They do, however, want the functions that PHRs support, including the ability to communicate with their doctors by e-mail, to schedule appointments electronically, to order/refill prescriptions electronically and to see lab results. “They’re not asking for an amorphous ‘record’,” he says. “They want to do things that improve their health.”

According to a July 2004 Harris poll on medical (but not specifically electronic) records, 42 percent of adults keep personal or family health records – i.e. “one place where you keep all your medical records with the results of all your medical tests and details about prescriptions, vaccinations, treatments, known allergies and other health-care information.” And 84 percent of those who do not keep health records nonetheless think it would be a good idea to do so. The Harris press release adds, “At the moment, only a small minority (13 percent) of those with health records keep them electronically but many people – 40 percent of all those who do not have electronic medical records – think it at least somewhat likely that they will do so.”

The demand is there, but it’s not matching any supply because users can’t express what they want and providers aren’t yet offering it in a way accessible to most people. The current PHR products generally aren’t hooked up to data sources, so they’re little more than worksheets where a user can enter her own data. Just as home banking didn’t really take off until users could get at their own accounts online, so will PHRs fail to get broad use until they are populated with clinical data from professional sources.

However, all those things are starting to happen. There’s no one big change, but lots of interacting little changes. We do believe that the market for personal health records can and should be realized. It’s not a question of creating demand for something no one really needs (such as, say, tail fins on a car), but of a capability that can make the world a better, less wasteful place. And, we believe, the market will ultimately work on its own for personal health records, even though the rest of the health-care system will require more explicit government intervention to work at its best.
**What's new? Momentum for change is emerging**

So what has changed? Right now, the government has put its weight – but mostly not its money – behind a National Health Information Network (NHIN). The charge is being led by a man from the private sector appointed last May: David Brailer, MD, PhD, previously CEO (for 10 years) and co-founder of CareScience, a leading provider of care management services and Internet-based solutions on an ASP model, dedicated to reducing medical errors and improving physician and hospital-based performance. Brailer’s charge as Health Information Technology Coordinator (within Health and Human Services) is to execute President Bush’s April 2004 executive order calling for widespread deployment of health information technology within 10 years. However, Brailer’s budget request was recently not funded. . . . Though his plans continue apace, it’s hard to avoid wondering what to make of that message.

Clearly there is bi-partisan support for overhauling the nation’s health-care system – though the support generally evaporates when it comes to specifics. However, all sides agree that a stronger IT infrastructure and interoperable medical records are a key part of any solution. Meanwhile, the private sector is moving ahead on its own but looking to the government to provide momentum, since so much progress depends on the ability to connect across rather than just within institutions.

In November Brailer’s office announced an RFI (request for information, with no promise of related procurement activities) concerning the proposed NHIN: “What should it comprise? Who should fund it? What technology would it require? What rules and what institutions should manage or govern it?” Responses were due January 18.

The RFI is designed to form consensus around a model by which the various parties can spend their own money. Brailer is asking not, “What should the government fund?” but rather, “What kind of system should be built? And what are the incentives that will get it built?” Clearly, many vendors are hoping to find a pot of money somewhere. Equally clearly, the government is saying, “Not here! There’s enough money in the system – and enough potential cost savings – that it should fund itself. But if you can see how to get to the pot, we’ll help you shine a light on the path, and encourage movement with enabling rules if necessary.”

But private efforts are key – to coalescing opinion, to developing standards and to getting things done. The Markle Foundation’s Connecting for Health program has engaged the key stakeholders – physicians, insurers, government agencies, vendors, consumer groups and others – and has developed both technical and policy archi-
tectures for creating a decentralized, networked health-care information infrastructure. Markle set its own agenda in consultation with a steering committee; one of its partners is the eHealth initiative, a membership association comprising many of the same players but focused more narrowly on getting IT into medical care.

Models for Change: Data and Architectures

Ironically – and especially ironically given that the Markle Foundation is involved in studies of both arenas – the issues around health-care data architectures are similar to those in the information-based fight to find and track terrorists: How do you establish a single individual’s identity across multiple, disconnected databases? How can you find things that you don’t even know you are looking for? And how can you protect people’s privacy as you do all this?

The simple answer is to construct a new database and to pour everything into it, giving each individual a unique identifier . . .and thereafter, to keep everything linked through a single network. But aside from all the privacy and single-point-vulnerability issues, that’s simply unlikely to happen. There’s too much data out there already, in too many forms, owned or at least controlled by too many different entities.

Instead, says Markle, a better approach is to leave the data and existing networks in place, and to build indexes that allow the assembly of the information concerning a particular identity as required. Indeed, most of the pilot projects (see HCN, pages 33-35) link existing silos and implicitly consider the EMR to be institutional property. In health care, at least, Markle argues and we agree, the point of control should be at or with the patient, regardless of where the data resides. This is not the most “efficient” approach, but it is the most likely one . . .and it is also one that leaves control in the patients’ and caregivers’ hands, and allows for existing variations to persist – as they would anyway.

What does that mean in practical terms? At least initially, it means that most medical institutions will need to build or consolidate databases of the patients they serve, and that within each patient’s record will be pointers or links to external sources of information about that patient. Later on, as patients gain more control over their own records, each patient may control his own listing of links. In fact, we believe each patient’s records are more likely to be hosted on some third-party website. The big question is who will host this information for the individual.
As with national security, the big policy issue is control of the data. HIPAA attempts to make the distinction between personal data that can be readily shared among providers and payers, and large sets of de-identified data for epidemiological and quality studies. Currently, most individuals sign authorizations that cover far more data and far more parties than they realize. There’s also tension between patients who may want to keep some data confidential even from their doctors, and doctors who don’t want their notes to be seen by patients: Transparency is the enemy of candor.

Mostly, however, the system needs to be more granular than it is, with permissions grantable for more specific purposes, rather than blanket authorizations or prohibitions. This may sound like a giant record-keeping and auditing exercise, but it’s what we have already! Let’s just apply it in the service of patients as well as institutions.

**How can it happen?**

Electronic medical records are likely to show up first at either end of the curve: At the high end are a variety of leading-edge hospital chains, university centers and large research hospitals (led by, among others, Sutter Health in California, Intermountain Healthcare in Utah, Harvard’s CareGroup and Partners HealthCare (both in Boston), Memorial Sloan-Kettering in New York and the Mayo Clinics). They generally have substantial capital budgets and money-raising (endowments or debt) capabilities to fund extensive IT infrastructure, though in many cases it was initially more focused on billing and administration than on patient care and clinical data in EMRs. The challenge for these organizations is to add clinical data and to link all their disparate systems...as well as to encourage their employees and other personnel to use them. (Hospitals that employ their own physicians have an easier time doing this than those who rely on outside doctors they don’t control.) These organizations by and large understand the benefits IT could bring, though they have many pressing projects. Many of them are waiting patiently for standards to emerge – for everything from the formatting of records and the vocabulary they use, to policies governing the collection and use of data.

At the other end of the curve is a long tail of small practices. Most of them have few legacy systems, and at some of them the doctors in charge (often young ones) are comfortable with computers and aware of their benefits. Physician Micro Systems Inc., a “start-up” that has been around since 1983 but is now seeing a spurt in growth, sells primarily to this sector. (See page 20.)
Despite the general and accurate perception that doctors and clinicians are reluctant to computerize, 40 to 50 percent of them are actually using PDAs. Says Kirk Loevner, CEO of medical PDA-software vendor Epocrates: “The adoption of PDAs among clinicians for the most part has been a ‘grassroots’ effort. Rather than having hospital administrators or practice managers mandating use of technology, physicians now are going to their practice administrators trying to drive increased adoption of mobile technology among their practices/institutions. We’ve received quite a few amusing e-mails from practice managers/administrators who can’t believe that physicians are so vocal and enthusiastic about adopting technology. When we’ve gone back to ask our users why they adopted PDAs, the answer is usually pretty simple: ‘PDAs work the way we do – they’re mobile! We’re not sitting at a desk...we’re moving from one exam room to another, from the office to the hospital.’ Rather than relying on physicians to significantly change their workflow, mobile technology is easily adapted into the physicians’ current workflow.” However, these PDAs are mostly still used offline for checking on medications, not for actual prescribing. (There’s no reason they couldn’t get wired, though the pharmacies would also have to tool up to accept electronic orders, securely.)
Introducing the Players: Levers for Change

Below we describe a variety of the players; together, they comprise a market, but no single player really offers a complete solution. CapMed leads the nascent market in the installed base of PHRs, but even its share – some 40,000 to 80,000 PHRs in use – is tiny compared to the potential market. It shows what can – and can’t – be achieved in the current environment. It has numerous smaller competitors, each with its own twist. Physician Micro Systems sells to the little guy, the doctors who make their own decisions about what technology to use – and what to offer to their patients. And finally, while WebMD sells PHR services primarily through employers, it also offers a direct-to-consumer PHR through WebMD.com. But that service lacks the clinical data that the other PHRs get as a function of being offered by providers. Realized demand is light.

Meanwhile, ActiveHealth Management probably manages the single largest collection of health records, though most of the data is financial or transaction-related rather than clinical. It uses administrative and financial data to reverse-engineer conclusions about clinical conditions; its customers are primarily health plans and self-insured employers, but it is building relationships directly with patients through their providers.

Dedicated to solving the problem of minimal consumer demand for PHRs is Health Record Network, a not-for-profit that wants to be primarily a marketing arm for the concept. HRN plans to build software to help meet the demand it hopes to generate, but it would be happy leave the heavy lifting and the value-added services to others.

One capability all these services lack is the ability to manage authorizations and access to data on anything other than a mass level (even though some of them can apply the data to individual cases). You Take Control is developing software to do precisely that, on behalf of the user. And finally, IBM has market clout and tools to help build the necessary infrastructure. Its Health Care Network demonstration project, for example, provided a working network linking ten disparate institutions to share data securely across technical and legal boundaries.

**Yahoo! and Google and MSN: Invited but not confirmed**

Even with the services provided by the above players, we are still left with the question of who has the market presence and the trust to manage PHRs on behalf of individuals. Although they won’t comment, we think the natural online providers
WHAT DOCTORS FEAR

Doctors aren’t stupid, and many of them use computers and even the Internet in their personal lives. So what keeps them from using computers at work to manage EMRs and communicate with patients?

First of all, sheer inertia. They would need to change procedures, train staff and explain things to their patients, as well as to bear the costs of new hardware and software.

Second, they fear that if they started communicating with patients by e-mail, they would be inundated with messages.

Third, they fear that the messages might increase their potential liability – both for what they did say and for what they might omit to say. Suppose a doctor missed a message from a patient or was slow to reply?

Fourth, they fear that patients may be scared or insulted if they have access to doctors’ confidential notes.

And finally, they’re wondering if they are going to get paid for their online activity.

There are answers to these concerns, but they aren’t all simple:

**Inertia** is simply a fact of life – and one that can be overcome only by specific financial incentives. That doesn’t mean government subsidies; it means clear evidence that an IT-supported practice will be more profitable and more enjoyable than the old kind.

**“Patient spam”** isn’t really a problem, experience shows. Everyone we talked to said that doctors who actually worked with patients online found that patients did not in fact deluge them with e-mail. In general, e-mails replace phone calls, and they are more convenient for both parties. Moreover, a patient can consult a single e-mail again and again, and doesn’t need to remember exactly what the doctor says. Nor does she need to save up all her questions to ask at once. Especially for elderly, care-intensive patients for whom memory can be a problem, online access can be a valuable capability. (For the vision-impaired, voice messaging may be more appropriate.) Besides, most doctors do already communicate with patients by phone – and e-mail is actually less disruptive.

**Liability** is a real issue, and applies to almost all uses of IT and the records they generate. On the other hand, online records don’t really make the problems any worse – and they can also provide a record that the doctor did advise the patient to do X. The [Pittsburgh Regional Health Initiative](#), led by former Treasury Secretary and former Alcoa CEO Paul O’Neill, is experimenting with incentives for truth-telling with encouraging results. (i.e. you are punished not for your mistakes, but for covering up your mistakes. You can’t fix things if you don’t acknowledge the problems. Changing this requires a culture shift that will be tough to achieve; covering up mistakes is not peculiar to health care, and our “gotcha” legal system aggravates people’s propensity to hide their failures.)

**Doctor confidentiality:** It’s a fact of life that neither all patients nor all doctors are perfect. And systems won’t capture all data perfectly. Some doctors may keep separate notes – which would be an accommodation to that reality. Meanwhile, most of the systems discussed contemplate policies whereby a patient can challenge but not remove a doctor’s comments, and vice versa. That is, the trend is to more transparency and auditing, rather than to reduce record-keeping.

**Incentives** can be handled through outcomes-based payment structures, someday, perhaps. Such different financial models are a feature of many successful pilot projects. In the meantime, doctors won’t get paid directly for their online activity. But if it’s effective, they’ll be rewarded for its effects. Besides, communication with patients is already part of a physician’s job.

are Google, Yahoo! and MSN. The latter two already have health portals, though with minimal personalization and no facilities (as yet) for access to clinical data. Another community that could provide PHRs but doesn’t is the banking community, which sees health-care data services as a lucrative and growing market ripe for greater efficiencies. Perhaps someday the kinds of tools banks now use to give consumers trusted online access to their accounts will also be commonplace in health care. The Medical Banking Project, an industry think tank, is leading the way.
To be clear, neither Google nor Yahoo! nor MSN will comment on any such plans, but they don’t deny them, either. But all these entities – banks, portals and search engines – are ideally suited to being agents for individuals precisely because they are not in the health-care business. They have no interest in selling them medical services or products of any kind (though they may be interested in selling ads). Likewise, they are not trying to limit benefits or deny coverage to anyone. Their only, limited interest in the users’ health is that they stay alive and active as a registered user.

Of course, this would work only with clear and explicit rules about confidentiality and access, and strict, reliable security. Any of these service companies has the resources to form broad data-sharing partnerships with health institutions (and with proper authorization from the consumers involved). Hence the appeal of banks and large, trusted players such as Yahoo! and Google. Some people may snicker at the notion of one or the other of these institutions being trusted. Those people may keep their own records, or put their faith in their employer or an insurance company if they prefer.

**CapMed: Leader of a small band**

CapMed (for Computer-Assisted Personal MEDical record), a consumer-oriented spinoff of an EMR vendor, was launched in 2000 in the heyday of the Internet bubble. Its basic product was a Quicken-like CD-ROM PHR tool that also provided Web access. Problem was, there wasn’t much on the Web for consumers to download into their PHRs. Unlike many other such companies, CapMed survived the downturn and was recently acquired by Bio-Imaging Technologies, the leading independent provider of medical image management for clinical trials. CapMed’s former CEO and current general manager of Bio-Imaging’s CapMed division, Wendy Angst, led the company through a shift in strategy – from CD-ROMs to more portable USB flash drives – that may just now start to pay off.

CapMed’s current CD-ROM product allows a user to fill in her own health history, store medical images (hence Bio-Imaging’s interest), track and graph lab information, and build her own reminders for anything from daily vitamins to scheduled insulin injections. The interface is simple, with pick lists for most data entry. The tool connects users via the Web to relevant health information tied in context (and legally hedged) to the user’s conditions, treatments, drugs and the like, including a drug-to-drug interaction checker.
So far, CapMed has distributed the CapMed PHR to about 400,000 individuals through several hospitals. The most notable is Christus Health System in Dallas, TX, which distributed it to 250,000 patients as a gift intended to help them manage their own health better. It customized the disk for several of its 17 hospitals, as well as for maternity patients (including lullabies!). When a Christus patient uses the CapMed PHR to go to the Web, she goes to the Christus website, and sees her own information plus further links relevant to her particular condition.

However, take-up has been light: About 22 percent of the recipients went so far as to register the software and get a password; it’s not clear how many are actually using it. But this is only the first of three steps, says Angst.

First, since last summer the company has been offering a USB flash version of the CapMed PHR, which allows patients to keep it as an ever-handly keychain rather than as a fragile, bulkier CD. Reflecting experience and surveys that people with chronic conditions such as diabetes are the most promising (and needy) market, CapMed is adding interfaces to allow patients to hook it up to consumer-style glucose monitors starting with LifeScan, a product from Johnson & Johnson. Interfaces to other kinds of consumer devices (e.g. blood pressure, scales and the like) will be coming soon. And third, Angst is reaching out for marketing and technical partnerships that will add connectivity to clinical data sources and marketing reach to the product. Prospective partners include NextGen HealthCare Information Systems, a mid-market EMR vendor that provides EMR’s to over 700 physician practices across the country; Dr. Notes, which provides an EMR tool for more than 5000 health-care providers; and PMSI (Page 20).

Perhaps the most significant such partnership, focused more on reaching customers than data integration, is a new relationship with MedicAlert Foundation, the non-profit with 4 million members and a well-known brand name. Traditionally, MedicAlert provides medical information and family/doctor contact numbers either online or by phone when a member is hit by a medical emergency. The CapMed MedicAlert HealthKey allows a subset of that data to be available locally to anyone with a USB-equipped PC. One sensible and appealing feature of the HealthKey is that basic emergency-style information – drug allergies, specific conditions, identity information – is available to anyone who has physical possession of the device, such as an emergency room doctor faced with an unconscious stranger, but more sensitive information – however the patient wants to

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**CAPMED INFO**

Headquarters: Newtown, PA  
Founded: May 2000  
Employees: 250  
Funding: recently acquired by publicly traded Bio-Imaging Technologies (NASDAQ: BITI)  
Key metric: distributed more than 400,000 personal health record tools directly to patients; more than 40,000 in use  
URL: [www.capmed.com](http://www.capmed.com)
define it – is accessible only with a password, whether it’s physically on the device or online. The MedicAlert service offers online backup and storage as well as 24/7 support. Other CapMed partners could do the same.

CapMed and MedicAlert are currently promoting the MedicAlert HealthKey to third parties such as health plans, and will be offering it to retail outlets including pharmacies as well as directly to MedicAlert members this spring. MedicAlert membership will include unlimited updates to the personal health record software and to user-selected content stored in the MedicAlert database, along with family notification and access to the MedicAlert 24/7 Emergency Response Center. The retail price will range from $60 to $95 depending on the USB’s capacity and the service level selected by the user.

**Physician Micro Systems Inc.: The market cometh**

Andrew Ury founded Physician Micro Systems Inc. back in 1983, in Seattle. It operates on Sixth Avenue, near where Amazon used to be. Still privately held, in other ways PMSI is the Intuit of the doctors’ world. Its primary product (available in a variety of modules), Practice Partner, manages administration, billing and clinical charts for small medical practices with 1 to 50 professionals. About 1000 of PMSI’s 1400 clients keep clinical as well as business records in digital format; they comprise a healthy chunk of about 10,000 to 15,000 private outpatient practices that manage EMRs in the US, out of more than 100,000 private outpatient practices overall. Ury sees the growth rate in electronic clinical records management jumping this year to about 30 percent; he hopes to keep pace over time at more than 20 percent a year.

PMSI’s EMR tools are strong enough that it also sells them to some customers of WebMD’s Medical Manager and Misys practice management software. PMSI is selling to the doctors themselves, which requires an appreciation of doctors’ uniqueness – both in their own minds, and in actuality. Doctors are a tougher market than the medical secretaries, nurses and office staff who are told by their bosses that they need to use computers on the job. With the wisdom from 18 years selling software for doctors as well as for administrators, Practice Partner offers a variety of ways to enter clinical data, from direct entry (with lots of defaults, templates and macros) to voice recognition.

“The small practices find it easier to innovate and to implement once they decide to do it,” Ury says. Specialists who typically see patients only on a temporary basis – for a single procedure plus pre- and post-care – are less likely to see the point of electronic
records than a family practitioner or internist who sees the same patients again and
again. De facto, the primary care practitioner ends up being the gateway to the
patient’s records, whether by actually holding them or by knowing – more or less –
where they are. In theory at least, he or she knows which specialists the patient has
consulted, what tests have been performed, and so forth. Some of these doctors will
most likely offer PHRs to their patients – or provide data to their patients’ PHRs –
once the technology becomes available, while others will wait a long time. Clearly, the
market requires both demand and products. “We’re just seeing inter-
est in PHRs and forming an alliance with a PHR vendor, but it’s still early,” says Ury.

For a while, PMSI customers in the vanguard were buying OCR sys-
tems to convert records from other doctors into data for their own
system. Now, as other practitioners become more computerized,
ironically, the volume of records is going up and they arrive by e-
mail. Instead of scanning data into an integrated record, doctors
now simply tend to collect new records as standalone files that can’t
be as easily searched or aggregated.

Also increasingly though not yet frequently, doctors are simply gain-
ing access to the necessary records through password-protected websites maintained
by hospitals and clinics, which allow specifically authorized doctors and other pro-
fessionals to look at but generally not to download the records of their patients gen-
erated by referred physicians or other third parties. Lab and radiology data, however,
is more easily transferred, using the HL7 standard.

But starting this year, PMSI will be offering a module for doctors to manage (and
patients to view) the so-called continuity of care record (CCR). Notes Ury, “In 2006,
the CCR record will likely be reconciled with the HL7 clinical-document architec-
ture standard,” which would help to move things along. The challenge, of course, is
that these are IT standards; they don’t mandate a particular vocabulary except for
diagnoses and a few other elements.

Currently, Practice Partner software manages most of the outpatient records of
about 10 million patients – not a bad share of the US population of 300 million –
that constitute a de-facto loosely linked network called the Practice Partners
Research Network, in which PMSI partners share de-identified patient data for qual-
ity and research purposes.
Ury himself is rallying the troops for standardization. Last year he helped to found the EHR Vendors Association (comprising PMSI and 21 competitors) under the umbrella of the Healthcare Information and Management Systems Society (HIMSS). That group is championing the adoption and interoperability of EMRs in the US and helping to provide feedback to various standards organizations.

**WebMD: Back to its future?**
Right now, WebMD is probably best positioned to benefit from any broad public interest in PHRs. The dot-com, consumer-oriented health portal founded by Jim Clark and Jeff Arnold in the mid-90s is now just a small part of the new WebMD Corporation, the $1.3-billion-revenues company that serves primarily providers and payers. But WebMD is a great and recognized name, and its public consumer health portal gets more than 20 million unique users each month.

WebMD is now an assemblage of acquisitions that comprise a microcosm of the health business. Those parts have been integrated both as businesses and IT operations underneath.

WebMD’s Business Services Group provides transaction-processing and “reimbursement-cycle” management services for payers and providers; descended from Envoy (acquired in May 2000), it operates as a back end for more than 1100 commercial health plans in the US.

Second is WebMD Practice Services (formerly Medical Manager, acquired in 2000, from a since-departed team who have just pleaded guilty of inflating their numbers before the acquisition). Practice Services is a leading provider of practice-management software for small-to-medium ambulatory physician practices, a notch higher than the typical PMSI customer. Practice Services has a newly launched EMR tool that integrates with its software and will be able to communicate with PHRs via the emerging CCR standard, enabling physician-to-physician referral of patient information and patient-with-physician sharing of health information.

And finally, there’s WebMD Health, which includes both the consumer WebMD.com portal; Medscape, an online portal for health-care professionals; and private health and benefit management portals for employers and health-plan providers and their customers/employees. It came to WebMD through the acquisition of WellMed in 2002 and includes the technology for a PHR. (WebMD recently announced plans to sell 10 percent of WebMD Health’s equity in an IPO.)
WellMed first offered PHRs to its clients’ enrollees in 1999 as a way for them to store, manage and ultimately share their own health information. Today, the service includes a health risk assessment with medical data such as prescription claim and lab report data from a variety of sources: hospitals, PBMs, reference labs, pharmacies.

Even though Philip Marshall, MD, the VP, product strategy for WebMD Health, can’t cite any data, neither he nor the clients doubt that the PHR and increased personal responsibility for health care is a good thing: “When it comes to compliance [i.e. following doctors’ orders], short-term costs go up, but it’s clear that over time they will go down. In the short run, people may use more drugs or come in for early treatment, but you get the benefits over time.” That is, the insurer spends less. . .and the patient is healthier, too.

WebMD’s larger customers generally self-insure and bear the costs of care themselves, so they have an incentive to offer such capabilities if they think long-term. However, that doesn’t mean that the PHR is broadly used by individuals. Overall, approximately 15 million people potentially have access to a WebMD PHR, says Marshall. But he won’t disclose how many plans and employers actually offer it or how many individuals actually use it. “One challenge is motivating our clients to make clinical data available to drive real decisions by real people about which drugs [to take] and the size of their Health Savings Account contributions.”

Select clients who offer PHRs to their employees include: American Airlines, Dell, Starbucks, PepsiCo, Washington Mutual, Northrop Grumman, EMC Corp, Fidelity and CIGNA. For EMC, for example, WebMD collects medication and other data each two weeks and parses that into the appropriate sections of the EMC employees’ PHRs.

Meanwhile, WebMD has just launched a consumer version of its PHR product called WebMD Health Manager. It costs about $30 per year, vs. considerably less (we assume) through an employer. Unfortunately, it’s limited – since what makes the employer, “sponsored” version so compelling is that it can include a fair amount of clinical data from the various providers linked into WebMD’s system, as well as incorporating all the user’s specific health benefit information. The consumer version, for now, depends on data the consumer enters directly, since WebMD doesn’t usually have a relationship with the providers of clinical data about independent individu-
als...nor do the individuals have a way of authorizing their providers to provide the data electronically. (You Take Control, on page 29, is addressing this problem.)

Over time, Marshall hopes, it will become easier to use the WebMD Health Manager as a way to ensure portability of the users’ health records as they migrate between different plans and employer installations. “Eventually,” he says, “we also see the PHR as a repository of information gathered from a variety of EMR systems used by doctors. “We’re looking at the CCR as an initial standard to make that possible,” he says.

However, that’s only part of the challenge. Currently, WebMD’s relationships with its clients – it’s classified as their “business associate” under HIPAA – makes it fairly easy to collect and manage personal data that it then passes on to patients. To offer similar data to individuals without health plans or employers as an intermediary, it would need to take responsibility for a huge number of confidentiality relationships between those individuals and their various medical service providers. That’s not impossible, but it’s not something WebMD is currently set up to do.

**ActiveHealth Management: Guardian angelic watchdog**

Lonny Reisman begins his pitch at the JP Morgan health-care conference with a telling anecdote: “I couldn’t get into the Westin [conference] hotel, so I stayed at the Ritz-Carlton, where they know what kind of room I like, my favorite newspaper... They know more about me than my doctor does!” The goal of his New York-based company, ActiveHealth Management, is to reverse that balance. In many ways, it’s the opposite of WebMD. A venture-funded start-up, it is virtually unknown to individuals or to nonprofessional investors.

But like WebMD, it’s a “business associate” of a number of health plans and employers, and currently it aggregates data on approximately 8 million individuals. Its initial premise was financial – to improve quality of care and lower costs by ensuring that health care is administered according to established treatment protocols – basically, making sure that care for an individual (as indicated by various financial transactions) matches up with the evidence-based guidelines applicable for that individual. Its customers include a variety of employers, health plans and third-party administrators such as Empire BC/BS, Aetna, Wellpoint, Humana, Marriott and Medicaid HMOs (covering 1.5 million Medicaid patients). Its data sources are much broader, including not just its own customers but also the providers they use, the major PBMs (pharmacy benefits managers) and leading diagnostic labs such as Quest, Labcorp and LabOne. Overall, ActiveHealth integrates 200 different data feeds.
Founder Reisman, a cardiologist, had a clinical practice at New York Hospital in the ‘90s; at the same time, he worked with Mercer Consulting and led a coalition of employers evaluating the leading health-care plans around the US. “That gave me a bully pulpit,” he recalls. “I was concerned that there wasn’t sufficient emphasis on promoting good care, and too much on cost-cutting. There was lots of clinical data to be looked at if anyone had the inclination. If a 50-year-old person had a stroke, they were asking, ‘How quickly did he get out of the hospital and how much did it cost?’ My question was, ‘Why did he have a stroke in the first place, and was he getting the best care?’ If we could cobble together all the clinical data, and then digitize the best standards . . .”

That’s what ActiveHealth does. In essence, it’s a giant expert system. (Such expert systems went underground in the ‘90s when no one could get doctors to replace themselves with machines; it was one of the all-time great marketing mistakes to call them “expert” systems rather than “advisors.”) ActiveHealth has 15 physicians (out of a total of 275 employees) and about 50 consulting specialists who comb the medical literature and professional society ukases for new treatment protocols and recommendations. They turn these into rules that can be run against the relevant transactions. The magic is to convert free text into codifiable elements, says Reisman. The company also uses acquired technology to disambiguate names.

Each time a transaction is performed by one of ActiveHealth’s “business associates,” its CareEngine service sends an electronic report to ActiveHealth. The CareEngine matches that to its records for the patient involved, and then fires off a bunch of relevant rules: Did the drug purchase match a client’s clinical profile? Does the drug in question conflict with any other drug that patient uses? And, says Reisman, “We do more than just assuring a match to the diagnosis cited by doctors. We validate that diagnosis is correct based on data we have, ensure that no contraindications exist relative to therapy being prescribed, and very importantly, look for missing tests and therapeutics based on patient clinical characteristics. More than half the time we suggest more be done. In addition, we run temporal rules to ensure patients are not lost without follow-up. For example, we’ll contact a member and say that no physician visit or drug refill has occurred over some period of time.”

CareEngine can also run new rules across its entire database – such as one to find all patients taking (or who have taken) Vioxx and to alert their care providers.

What happens when a rule finds a violation or a match to an alert? There are rules about that, too. For minor or non-urgent events, the system sends a message (elec-
tronic or paper, depending on the party’s preference) stating that fact. It’s then up to the provider or the payer to take whatever action is appropriate.

But in more urgent cases, AHM also has a call center to call doctors and others in real time. Reisman recounts his favorite story, of a doctor who received a call that his elderly patient had just filled a prescription for quinidine, a dangerous drug for that patient based on the cardiac history shown in ActiveHealth’s data. The doctor was aghast; he had written (or so he thought) a prescription for quinine, against leg cramps. The doctor quickly called the patient and the pharmacist – and gratefully gave Reisman permission to use the story. (Of course, perhaps doctors should start generating their prescriptions electronically, but that’s another story.)

The benefits are clear. . .but that doesn’t mean it was an easy sell, says Reisman. “At first, the health plans were afraid of telling their doctors they had made a mistake. They were reluctant to call a doctor to say, ‘You’re messing up.’ But the doctors thank us. They say, ‘No one could expect us to keep up with all this new medical information, and I can’t know what the other doctors are doing with my patients.’ They love getting that information, because they generally don’t have access to a clinical record across different doctors treating the patient.”

The service has different names, depending on the intermediary. Aetna calls it MedQuery; Empire calls it SARA (for Systematic Analysis Review and Assessment); Wellpoint/Anthem calls it IRIS (for Interactive Realtime Information Sharing). Since 2003, ActiveHealth has also been offering the same sorts of advice, but couched in different terms, to about 2 million consumers. These consumers don’t generally know about or opt in for the service; it’s offered as a default by some employers. They find out about it, mostly, when they get a letter ostensibly from their health plan or their employer. (Someday, that might be an e-mail, but not yet!) “This is from your health plan,” it might say. “Our records show that you meet all the criteria to be taking an ACE inhibitor, but you do not seem to be taking any of the recommended drugs. You might want to talk this over with your physician.”

Most recently, the company is working on a new service where an individual can proactively subscribe to the service. Reisman is excited about that, and about the possibility of adding self-reported patient information about over-the-counter med-
icines, alternative medicines and various other treatments that don’t make it into the kind of transaction information ActiveHealth normally processes. “We’ll need some kind of controlled vocabulary,” he notes. “Then we can analyze that through all the rules we have.”

Pricing runs from 65 cents to $2.50 per person per month for the corporate customers; we imagine it would run about five times that for the consumer version – reasonable for someone with chronic health problems, but probably in the long run best offered as an add-on to some broader service.

**Health Record Network: Market it, and the market will build it**

Brian Baum, CEO of Health Record Network, got interested in health care the hard way: Five years ago his eight-year-old son Trevor was diagnosed with alveolar rhabdomyosarcoma, basically a tumor in the muscle behind his eye. He’s fine now, but he and his parents endured a 14-month course of chemotherapy and radiation therapy, and got an intimate education in the health-care system.

Actually, Baum had also started getting involved in health care professionally as chief marketing officer for CapGemini Ernst & Young; health care was its largest vertical market, generating nearly $1 billion in annual revenues. He watched its customers, mostly providers and payers, investing tens of millions of dollars in IT systems, but often these state-of-the-art systems went unused. “Pharmas were even giving away free PDAs, to encourage ‘e-prescribing’,” he recalls, “but the docs weren’t using them. There were all these companies building health information infrastructures. But they weren’t telling anyone about them in a way that made physicians or patients actually value and use them.”

During that time, Baum formed an informal alliance between CGEY and Duke University’s Fuqua School of Business. Fuqua’s Health Sector Management program is the largest of its kind in the US, led by Dr. Kevin Schulman. The two kept asking themselves “why the health-care industry had not jumped into the information age with all the gusto of every other industry,” Baum recalls. Over time, they concluded that the problem was simple: lack of demand. He recalls that each time he and his son visited the emergency room at Johns Hopkins, they had to fill out a new set of forms. But sick people don’t often question those forms; they just fill them out. “Part of the health-care challenge is to define a tangible solution – a ‘product.’ Once you see the inefficiency firsthand, what can you do about it?”
By the fall of 2003, they decided that if they didn’t do something, they would become nothing more than part of the problem. Baum left CapGemini while Schulman stayed at Duke, but together they set out to launch the Health Record Network to define and market PHR as a product that consumers can understand. With about $500,000 from Duke and a wish for good luck from CapGemini, they set out to shake things up. If HRN is successful, Baum believes, it will be easier for providers to sell their services...which will prompt them to develop those services. The company profiles in this issue, just a sampling of what’s available, certainly confirm that point.

HRN is basically a marketing organization for PHRs with a lightweight service to prove the concept. Market forces will help to knit the underlying technical infrastructures together as consumers start to demand...not interoperability, but the capabilities that interoperability among different data sources (i.e. health-care providers) can support. “Our goal is to have the HRN logo become pervasive: Whenever a consumer shows up at a point of health care - whether an individual doctor’s office, a hospital or a clinic, they will expect to see the HRN name and logo. One nationally recognized umbrella brand – simple and efficient – and some consensus on how it’s implemented. [Authorized] emergency room professionals would know where to go to find anyone’s record.”

Right now HRN is a band of seven, with two pilot projects in prospect – one for the state of Wyoming, and one for Duke. The state of Wyoming wants to create taxpayer (as opposed to consumer) demand for an integrated health information network. The HRN pilot is intended to complement a study sponsored by the Wyoming Healthcare Commission to define the technical requirements necessary to build the back-end network that will link all points of health care in the state.

At Duke, HRN will be working with two groups: Duke’s heart patients, presumably quite interested in their medical conditions, and a group of snowbirds for whom HRN will integrate Duke’s records with those maintained by several Florida hospitals on the same patients – and explain the benefits of doing so.

Beyond the pilot projects, HRN’s immediate goal is to find a number of consumer-oriented companies in whose interest it would be to support the initial development of HRN and to promote the concept – perhaps a pharma company trying to get back
into the public’s good graces or a payer attempting to improve its public image. . .or a high-technology company attempting to jumpstart what everyone – not just IBM (Page 33) – acknowledges as a potentially huge market. Baum is talking with companies such as General Motors, General Electric and Johnson & Johnson.

“While we are looking for our initial sponsors – beyond Duke, we recognize that we must ultimately be sponsor-neutral,” Baum notes. “We want to be like a utility, offering a base service to everyone. And then individual companies can add value around it.” In essence, HRN seeks to be a hybrid system – storing basic consumer-provided information and other actionable information such as lab results and prescription data, and then storing pointers to the more detailed clinical information that exists in EMRs at multiple points in the nation’s healthcare system.

Rallying the troops
In February, the Markle Foundation is convening a meeting for organizations who believe a public communications campaign is necessary to stimulate adoption of EMRs and PHRs. In attendance will be not just HRN but also existing organizations with significant memberships, including the AARP (American Association of Retired Persons), the National Health Council (a coalition of most US-based disease-oriented public interest groups), the government-funded Agency for Healthcare Research and Quality (AHRQ), the American Medical Informatics Association, Research America (a private foundation dedicated to supporting medical research) and the American Health Information Management Association (AHIMA) – the national organization of medical records professionals.

If all of these groups can play nicely together, HRN may not be necessary. On the other hand, the idea has been around for a while, and no one has yet risen to the challenge of really stimulating the market. HRN’s unabashed promotion of the notion of a PHR, with a commercial mentality but with no vested interest of its own, should help. Imagine Oprah promoting this idea: “Write your own book – the book of health! Shouldn’t there be a book just about you that doctors could consult as necessary?” It’s such a simple concept it’s amazing no one has sold it. Until now . . .

You Take Control: Health first, everything else soon
If any of these projects or services start gaining traction with consumers, they will need to figure out how to handle individual patient authorizations, authentication and access concerning medical records – perhaps an even more challenging task than integrating all the data sources. That’s the undertaking of You Take Control Inc.
First some background: You Take Control founder Richard Dick is a key man in the history of EMRs, and an elegant designer who thinks in flow charts. In the ’80s and ‘90s he worked at the National Institutes of Health and then at the National Academy of Sciences’ Institute of Medicine (IOM). He directed the landmark IOM study (1989–91) on electronic patient records that ultimately led to HIPAA. He was also co-editor of “The Computer-Based Patient Record: An Essential Technology for Health Care,” published by National Academy Press in 1991 and 1997.

Five years ago, based on that expertise in the complexities of patient data and its disposition, Dick founded a company called Nex2. It was a significant achievement: perhaps the most-inclusive single medical database in the US in terms of individuals covered (even though it contains only prescription drug-related data for each individual), updating over 200 million Americans’ data every night. The initial – and fundable – business model was to help health and life insurers to make individual underwriting decisions. “We took their underwriting cycle from 90 days down to 10 minutes,” Dick recalls. “The black hole was the medical record. You couldn’t really get at it. But we figured out effectively how to reverse-engineer it, by getting a list of all the medications an individual bought. Every night, the PBMs would upload information about 6 to 10 million new transactions.” More than that, Nex2 started with retroactive data from the same suppliers and a five-year history on the drug transactions of the individuals in its database, which is now maintained continuously. Just like many of the other companies above, Nex2 was a business associate of the insurers. . .and whenever someone applies for insurance (health or life), she authorizes the insurer to check her medical (and other) records. The problem wasn’t the permission; it was getting at the records conveniently and in semi-real time.

However, that wasn’t really what Dick had in mind when he started: “Much to my chagrin, the PBMs restrict access to the data for anything other than insurance purposes.” After some disagreements with his partners, they ended up selling Nex2 to United Healthcare in 2002.

So now Dick is working the other side of the divide, with a vengeance. “This situation with medical records privacy is a time bomb waiting to go off,” he says. “People sign authorizations all the time, but they don’t understand what they mean. At the same time, the industry’s need for that personal health information – for outcomes studies, post-surveillance studies – has grown exponentially. We will radically improve timely access to this information, not only to members of the health-care team but, in both personally identifiable and anonymized forms, to other stakeholders. And if remuneration is being offered for the use of that information, the individ-
ual will receive his or her fair share of it. We consider our solution a win-win-win because the scenario for every party to the transaction hits the trifecta – better, faster, cheaper – without the individual being compromised.”

His new company is called You Take Control, and it has a patent-pending process for managing authorizations and for granular access to any individual’s sensitive personal information, including but not limited to their health records. This premise – that the individual owns the data, and any third party needs to check with the individual explicitly to get at that data (no more of this “business associate” stuff) – is a nice principle, but Dick has gone to the trouble of building a system that implements that principle. Dick sees YTC as “the facilitator of a market in personal information which empowers the individual, the recognized true owner of his or her personal information, to release what, when, to whom, and why they wish – and to profit from the uses to which their information may be put following a negotiation of terms enabled by YTC, all while remaining anonymous, if they wish. And if the individual wants their sensitive personal information locked up tight? No problem.”

YTC holds none of the individual’s health data, and keeps only enough detail to ensure proper identification. YTC provides only the authorization management solution that individuals can use to manage their own data as they deem appropriate.

We saw a demo (backed up by a flow chart!) that shows how complex the challenge really is, with multiple parties communicating, checking back with one another and so forth. . .but it’s no more complex than what thousands of companies do every day. The trick is to build all the interfaces and relationships – not just technical but also legal and commercial – between individuals, data sources and data requesters that will allow these transactions to happen. Dick has a little experience in this area too: He served as Functional Co-Chair for the Object Management Group’s (OMG) Healthcare Domain Task Force.

The technology is currently working, and YTC, funded by angels, is working to find some partners both to fund roll-out of the project and to provide a customer base. Currently, he’s talking mostly to the PBM companies, many of whom he worked with at Nex2. They sell de-identified data back to pharma manufacturers, but they
also have technical access to the identified data that they could pass back to buyers of higher-value data, as directed by YTC members.

The YTC team consists of five people, and Dick has the beginnings of a business model. He posits three levels of membership, with varying levels of access to data and granularity of permissions, among other features. And, as noted, individuals could sell their own data (anonymized or not) and generate revenues shared with the data companies. Meanwhile, a portal partner could generate substantial context-relevant advertising revenues without disclosing users’ identities, and perhaps offer sponsored accounts.

**Medical Banking Project: Data as money**

Outside the formal health-care industry, another source of IT capability entering health care is the banking industry. And with luck, we may see some of the same transition from internally focused apps to consumer-facing online services from health care as we did from banking. Neither sector has really managed integration across silos, but the banking industry is certainly likely to get there first—and to develop capabilities it could also apply in health care, with its 30 billion financial transactions yearly.

The leading exponent of this notion is John Casillas, executive director of the Medical Banking Project. He got started when he ran a medical claims processing business with his brother in Philadelphia. A bank marketing firm called Private Business Inc. approached them with an acquisition offer. “We chuckled and sent them away,” recalls Casillas. “Nine months later we did the deal. We had to cross a mental barrier. But banks have invested in transaction technology for decades; they have the technology and the culture and the workflows.”

Private Business was financing trade receivables, but it didn’t understand health-care receivables or valuations. After the acquisition, Casillas started a publication called Medical Banker to spread the concept more widely. He had noticed a study organized by GE Healthcare that found $200 billion in non-productive medical accounts receivable in 1994; there was a lot of opportunity there. That ultimately led him to form the Medical Banking Project in May 2001 to research the area as a for-profit—but not very!—think tank. Its first study discovered that most banks that wanted in to the business had never even heard of HIPAA. Remediating that is part of the project’s mission.
Since then, the Medical Banking Project has given advice to organizations including the National Committee on Vital and Health Statistics, the Office of Civil Rights, the Centers for Medicare and Medicaid Services and others. LaSalle Bank (ABN Amro), Bank of America and United Healthcare are members of the Project. Other large banks, including JP Morgan/Bank One, Hibernia and PNC Bank, have developed medical banking programs with some input from the Project.

Right now, estimates Casillas, “Banks are probably processing 35 percent of all paper remittances through a lockbox for health-care practices today, which is the first step: A hospital gets tons of mail every day. The bank sets up a PO box for the hospital and gets the payments into the system much more efficiently than the hospital ever could. But now the banks are starting to offer a specialized lockbox service, where they actually recognize the EOBs [explanations of benefits], create an electronic file that complies with HIPAA, and automate the related bookkeeping.” Currently, that’s only about 3 to 5 percent of total remittances – but it’s one of only a few growth areas in banking today. For example, FiServ has told Wall Street that it expects its growth to come from the health-care market. ABN Amro is the lead sponsor of the Project’s next (and third annual) Medical Banking Institute, to be held next month in Nashville.

Casillas’ long-term dream is that any individual’s record be available as easily – and securely – as her bank balance, anywhere, anytime. He also has a notion of an equivalent of a credit card that could provide access to records – especially to third parties in the event of an emergency, similar (except for form factor) to what CapMed offers with MedicAlert: “It would have some limited information directly on it – blood type, allergies, drug contraindications and the like.”

**IBM: IBM and the health ecosystem**

In 2000, IBM designated life sciences as an “Emerging Business Opportunity” and allocated $100 million in incremental investment for the field. That business generated $1.25 billion in revenues for IBM last year.

Early this year, it merged life sciences with its health-care unit and added a third unit, also an EBO, called Information-Based Medicine. Those three units (known collectively as Healthcare & Life Sciences), along with some R&D staff and external business partners, comprise IBM’s new Global Healthcare Initiative, in which it will
invest an incremental $250 million over the next three years. The investment will go towards hiring health-care specialists, solutions development, research and development projects, IBM Business Partner collaborations, a computational biology center, and a deep computing research institute program focused on clinical genomics, employing more than 100 PhDs in total.

“To put that all in context,” says HLS general manager Carol Kovac, “one of our other EBOs is China.” The new IBM even talks of the health-care market as an ecosystem, with partners including hospitals, HMOs, drug companies, medical research institutions, biotech companies and independent software vendors.

IBM’s HCN Project
IBM is working with a number of pilot projects to demonstrate how relevant patient data can be quickly and securely shared amongst health-care stakeholders while maintaining patient privacy. But it also knows that its incremental revenues are likely to come from provable cost savings, rather than from increased budgets, so that’s another important goal of the various pilots.

The most notable is the recent Healthcare Collaborative Network demonstration project led by Markle’s Connecting for Health project from June 2003 to December 2004, with New York Presbyterian, four MedStar hospitals in the Baltimore area, Vanderbilt University Medical Center, and Wishard Memorial in Indianapolis along with the Centers for Medicare and Medicaid Services (CMS), the Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA). The project’s goals were to set up a monitoring network for “adverse health-care events,” to develop cost-effective capabilities for collecting, aggregating, analyzing and reporting clinical information in near-real time, and to establish a common electronic health-care “information highway.”

In November alone, the system handled 4500 messages alerting observers to possible adverse events and providing real-time information on clinical information for biosurveillance. The data standards were HL7 terms for drugs, lab outcomes, diagnoses and procedures.

One well-known issue, for example, is that about 30 percent of Medicare patients who suffer a heart attack do not receive beta-blockers with 24 hours of admission to a hospital, a commonly accepted best practice. During the pilot, CMS observers received alerts as soon as information was captured by hospital information systems, which enabled them to take appropriate action much sooner.
This system, which IBM hopes to deploy elsewhere (and keep alive in Indiana) uses a publish-and-subscribe model; the various participants specify what information they want to provide and receive – a list of patients for whom they are financially responsible, for example, or a set of diagnoses and related therapies (or lack thereof). The hub forwards the relevant information it receives to the appropriate requesting parties, securely. Meanwhile, no clinical data is stored in the hub; it’s simply a sorting and transmission service. It’s an excellent demonstration of how data can indeed be shared across existing systems without new databases or even consolidation of databases. Now if they could only provide patient access to that information…!

**Record, Record on the Wall, Who’s the Healthiest of Them All?**

The market for personal health records is just a glimmer in the eye, but it is a glimmer in many people’s eyes. A variety of projects and institutions are about to achieve critical mass. As the “body-part” profiles above indicate, technology, cross-industry standards, consumer awareness and security/authentication/authorization mechanisms and policies are coming together to create a comprehensive PHR market, just as disparate EMRs need to come together (based on technical standards and legal/business policies) to form a single, comprehensive PHR for each individual. *(SEE RELEASE 1.0, JUNE 2003, ON IDENTITY MANAGEMENT.)*

Although the private sector can do much of the actual work in both design and operation of health-care systems, government plays a key role in setting payment policies – and in collecting taxes and allocating funds to finance care for those who can’t pay or who are faced with out-of-norm (“catastrophic”) medical conditions and costs. However, we hope government applies a light enough touch to allow experimentation both in cost-management schemes and in devising treatments for small populations willing to try unproven remedies (with full disclosure of the risks involved).

For all the organizations described above – and may they all win – the idea will be to provide a useful, user-friendly interface that allows an individual to collect or link to his or her own records over the Web. Policies will determine what users may or may not do: Most likely, users will be able to provide access selectively (to one doctor but not another, to a care provider but not to an employer); they won’t be able to edit individual records, although they may be able to comment on or dispute them. They will also be able to enter their own data – everything from basic information about height and weight, to insurance and other payment information, to health-related
information concerning drugs and therapies, self-monitoring of blood pressure, blood sugar and the like, to exercise or food diaries.

But the PHR will offer functions, not just data – from recording and analyzing to advising and monitoring. Over time, PHRs will be enriched by a wide variety of ancillary services, ranging from aggregating and managing a user’s various health-care payment information to online drug ordering and far more intelligent, domain-specific search and content filtering. All this is easier said than done, but it’s worth doing.

Right now all the issues described above have kept this market from realization, but in the long run it’s huge, and important both to vendors and consumer welfare. Isn’t a person’s body and health as interesting as his or her bank account and finances? The data-management issues and complexity are even more interesting to software vendors.

What about business models? We imagine many consumers would be willing to pay (rather than see ads) in order to use a service that could actually explain and manage all the complexities of current medical billing and reimbursement procedures, as well as of their own bodies and their unique conditions and genetic profiles.

The challenges for the consumer-facing PHR service providers will include maintaining a disinterested position; once a medical data bank starts allying with particular providers, even if only for marketing purposes, it will lose its (perceived) objectivity and much of its allure. Of course some users may not mind, and will prefer a free, sponsored service. It’s their choice.
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For further reading:
US health care spending statistics: http://content.healthaffairs.org/content/vol0/issue2005/images/data/hlthaff.24.1.185/DC1/Smith_Ex3.gif
Continuity of care record: http://www.centerforhit.org/x201.xml
Report from the Center for Information Technology Leadership: http://www.citl.org/research/HIEI.htm
Calendar of High-Tech Events

FEBRUARY 1-2  Web Services on Wall Street - Linz, Austria. New York, NY. The 5th annual event for those interested in Web Services, Java, .NET, XML, and Service Oriented Architectures for Financial Markets. The conference will focus on the core technologies that financial markets players are adopting as they explore new business opportunities. Register on the site, or contact Russell Flagg, 1 (212) 286-0333, flaggmgmt@msn.com, for more information. webserviceson-wallstreet.com

FEBRUARY 13-15  Demo 2005 - Scottsdale, AZ. Last year’s conference was the debut 67 new products and services, from blogging to desktop computing. Register online, and for speaker opportunities contact Karyn Williams, 1 (415) 425-5078, kwilliams@nww.com. www.demo.com/demo/contact

FEBRUARY 13-17  Healthcare Information and Management Systems Society 2005 - Dallas, TX. Barbara Bush, Scott McNealy, John T. Chambers, David Brailer and Scott Adams are set to headline this year’s Healthcare Information and Management Systems Society conference. Register via the site, and direct all questions to the HIMSS registrar by calling 1 (877) 914-4677. conference.himss.org/ASP/education_homepage.asp

FEBRUARY 14-17  LinuxWorld - Boston, MA. LinuxWorld Conference & Expo is the world’s leading gathering place for anyone and everyone interested in Linux and other open source technologies. Come see the latest technology developments in practice, speak with the leading minds in the open source movement, and meet with your peers to discuss how to best leverage the technology for your organization. To register visit the website, or call 1 (888) 823-7586. www.idg.com

FEBRUARY 14-17  3GSM World Congress 05 - Cannes, France. This year the Congress brings together the music, broadcast, gaming & media industries to discuss topical issues such as content strategies, rating, adaptation, delivery & more. Attendees will have the chance to network with 120 CEO’s in the mobile industry, and thousands of others. Register on the website, or contact Hayley Richards, +44 (0) 20 7017 5504, info@3gsmworldcongress.com. www.3gsm-worldcongress.com/2005/congress/default.asp

FEBRUARY 15-18  LEARNTEC 2005 - Karlsruhe, Germany. Now in its 13th year, LEARNTEC is Europe’s largest education technology conference. In addition to educational technology, the conference addresses the use of technology in corporations and human resources fields, with lectures and workshops focusing on innovations in e-Learning, the integration of e-learning in personnel development concepts, new implementation of e-learning strategies in companies, as well as e-learning projects of training providers in Europe and the United States. You can register via the website or by contacting Betsy Bedigian at +01 315 422 3512, betsy@hezel.com. www.learntec.de

Events Esther plans to attend.

Lack of a symbol is no indication of lack of merit. The full, current calendar is available on our website, www.release1-o.com. Please contact Kate Tobin (kate@edventure.com) to let us know about other events we should include.
The Fairmont Scottsdale Princess
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World Wide World: IT ain’t just the Web anymore!

The World Wide World of the Web is now extending beyond IT. We’re expecting IT to solve real-world problems, even as real-world problems affect our use of IT.

Join us in Scottsdale as we explore this year’s theme: “The World Wide World: IT ain’t just the Web anymore!” The IT industry has a useful and even critical role to play in the real world and in real people’s lives, as revealed by the successes and failures of the global IT infrastructure after the tsunami in south Asia. From early warning systems for natural disasters, to communications and logistics after the fact, to more persistent deficiencies in institutional systems, concrete opportunities abound - both to do good and to do good business.

These opportunities are global both in geography and in sector: The IT industry will have an impact in China as well as in health care. IT is helping to solve real-world business challenges (supply-chain management, customer relations, sales and marketing, regulatory compliance) as well as social problems (medicine, security). It is also changing real-world business models, both within and outside of the IT industry. For example, how do the technologies and policies used to track terrorists - matching identities, but also auditing the use of sensitive information and keeping it secure - apply to health care? And what’s different, given that patients should be in control of their own information - while the same does not apply to terrorists!

At the Forum we’ll assess corporate IT initiatives, as companies strive to differentiate themselves with custom software to create strategic advantage. What licensing and sales models work in a wide world where competitive advantage is fleeting and good ideas are rarely protectable? In our increasingly friction-free world, good ideas don’t differentiate you for long. How can content providers and services leverage the proliferation of user-generated content - from blog posts, photos from cell-phone cameras and product ratings, to metadata about the time and attention others pay to that content? How can more traditional companies involve users to add value to their offerings?

Speakers include: Marc Andreessen, Chairman & Co-founder, Opsware; Mitchell Baker, President, Mozilla Foundation; *Jeff Bezos, Chairman, Amazon.com; Peter Brandt, SVP, Business Development, Pfizer Global Pharmaceuticals; *Sergey Brin, President, Technology & Co-founder, Google; Scott Charney, Chief Security Strategist, Microsoft; Carol Diamond, Managing Director, Health, Markle Foundation; Howard Gardner, Professor of Cognition and Education, Harvard Graduate School of Education; Jeff Hawkins, Chairman & Executive Director, Redwood Neuroscience Institute; Dawn Lepore, CEO, Drugstore.com; Robin Li, CEO, Baidu.com; Ann Livermore, EVP, Technology Solutions Group, Hewlett-Packard; Anne Mulcahy, Chairman & CEO, Xerox; Jonathan Schwartz, President & COO, Sun Microsystems; John Thompson, Chairman & CEO, Symantec; *Steve Ward, CEO, Lenovo; *Jerry Yang, Co-founder & Chief Yahoo, Yahoo!

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