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Health Care, Internet and IT at a Crossroads

Can Economic Stress Drive the Evolution of a New Patient-Centered Medical and IT Networked Paradigm?

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The practice of medicine has not successfully dealt with the explosion of medical knowledge of the last half century. Practice became "siloed" into its numerous specialties in the first half of the 20th century and has remained so ever since. As the amount of knowledge expanded and created many new opportunities for treatment, new opportunities for spending multiplied. Under these conditions, unlike the United States in the 1980s, countries whose leadership did not utterly embrace free market principles have done much better with controlling their medical care costs. Meanwhile, in the past 30 years we have witnessed the unchecked growth of medical knowledge and medical practice fiefdoms fueled by unchecked spending.

One physician, Dr. Lawrence Weed, in the 1950's began work that led to a new understanding of what has since become medicine's massive failure. While medical research qualifies as science, according to Larry Weed, medical practice generally would not even qualify as an art - because it is dependent not on a replicable set of rules but rather on whatever knowledge the independent physician -- someone utterly in charge of his own fiefdom and normally not used to collaborating with others -- might happen to be able to remember.

By the end of the 1970s Weed had developed a powerful paradigm of new ways of using problem oriented medical records and computers to put physicians in touch with medical research relevant to the problems of their patients and do so in a logical and methodical way. It was a groundbreaking achievement that, were it to be left uninhibited, directly undermined the power and prestige of the doctors themselves. No mater how logical, that made its chance of success very problematic.

I met Dr. Larry Weed in the summer of 1978, became extremely impressed with what he had done, and managed to get the *Futurist* magazine, (the publication of the World Future Society) to publish an 11 page summary of Weed's Problem Oriented Medical Information System in its June 1979 issue. I also convinced 60 Minutes to visit him in Burlington Vermont just after Thanksgiving of 1978. When

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the crew asked him to identify a critic of his worldview to be interviewed, he said he thought that they should identify the critic. Rather quickly the issue of how they would present such a complex subject became a stumbling point and 60 Minutes packed up and went home.

I never forgot Dr, Weed's injunctions about keeping one's own medical records. When in March of 2000 the surgeon put screws in my cervical disc, I kept the films and this summer when I needed a second hip replaced at the time of the 30th anniversary of my publication of Larry Weed's worldview, I decided to follow up and see what happened to Larry and his ideas in the meantime.

I have learned a lot. It is very clear that with the work of Dr. Weed we are witnessing the kind of paradigm change described by Thomas Kuhn in his classic *Structure of Scientific Revolutions* (1962). Kuhn speaks of "normal science" practiced according to the dominant paradigm (way of thinking or world view). Then he points out that scientific revolutions occur only when "revolutionaries" develop new paradigms or ways of structuring the basic foundations on which scientific thought rests.

http://en.wikipedia.org/wiki/The_Structure_of_Scientific_Revolutions

Larry's worldview is the equivalent of a scientific revolution in medicine. It is a worldview that after the passage of more than 50 years is reaching maturity -- and one that I hope will result in overthrow of the predominant paradigm of how medicine is practiced. The rise of the Patient Centered Medical Home concept detailed in Chapter Six (p. 46) below is a potential positive step in this direction. Indeed, Larry's practical tools and standards of care make concepts such as "patient-centered" and "medical home" specific, operational and reproducible.

I would maintain that the 30 year period separating the publication of my summary of Dr. Weed's paradigm – the first published outside the medical or computer literature – is a period that has generated a full fledged crisis not because medical research is failing. It is not.

What is failing is medical practice. Larry essentially wanted and still wants to change the way medical records are designed and to merge into diagnosis and treatment the power of computers and information technology to guide and coordinate treatment plans and care. The anomalies burdening medical practice and care are missed diagnosis, misconceived treatments, inadequate feedback to practitioners and misguided education and credentialing -- all of which have created a haphazard system that is difficult for patients to negotiate and one where costs have exploded imposing grievous economic burdens on societies as they try to continue to support the wasteful old ways of practice.

With the hip surgery in the summer of 2009 I saw an opportunity to examine the medical system from the point of view of Larry Weed's critique. I have found out that I had incorrectly assumed it had come to maturity within the PROMIS System at the University of Vermont Medical School when I met him in 1978.

I have since learned that at that time he was concluding that the PROMIS system was an incomplete solution, because while it solved the memory and retrieval problem, it did not solve not the processing problem, that is, the problem of integrating medical knowledge with patient data. As a result, he subsequently developed knowledge coupling software, which constitutes a second major innovation, one equal in significance to the POMR.

Couplers were developed to help solve the gap between medical research and the clinical practice of medicine. The task of the clinical practitioner is "to apply established knowledge as thoroughly and effectively as that knowledge permits to the problems they encounter." Couplers are the

software based means of accomplishing this end. (See text box on page 4 below.) http://www.pkc.com/papers/philosophy.pdf

In doing this examination by means of revisiting my own experience with the medical system, I have what I think is a unique opportunity because I can use that experience to shed light on some of the many failures of medical practice. The timing is right because as everyone knows, the United States is in the middle of the first attempt at health care reform in 15 years. It is a complex and contentious effort focused on insurance and financing issues. In the absence of a viable agenda for reform of medical practice and education, the effort is not going well.

This long essay in six parts and a postscript will shine light on some of the less understood but still critically important issues in that reform effort -- namely the use of information technology and networks in health care.

First -- it will introduce the concept of "e-health" or electronic health as described by Paul Budde in the context of Australia's National Broadband network.

Second -- it will summarize Larry Weed's critique of the current system.

Third -- it will illustrate the hazards of the current health system by using my own health history as an example of the "gotchas" out there ready to bite the unsuspecting patient.

Fourth – it will offer a short outline of Dr Weed's work to correct the current system.

Fifth --it will offer an interview that I conducted on September 3, 2009 with David Southwick, Director of Customer Relations for the Problem Knowledge Coupler Corporation founded by Dr. Weed in 1982.

Sixth -- it will describe the currently emerging concept of Patient Centered Medical Home which is loosely compatible with Larry Weed's worldview and hopefully will become the fulcrum for a paradigm shift that after more that 50 years might enable Larry's "revolutionary science" -- in this case revolutionary medical practice -- to became the new norm or prevailing paradigm for practice.

Postscript -- the text of my 1979 article on Larry Weed.

What Has Happened Since 1979?

Unfortunately we've made little progress, although, as I will point out below, in a few isolated instances Dr. Weed and some people who have worked with him have shown what can be done. But meanwhile the United States and elsewhere is still ruled by medical fiefdoms. Technology has produced possible medical miracles but has made medical care so expensive that no one can pay for it on their own and what care is given is paid for by insurance programs sponsored either by government or by employers or both. These insurance programs have their own entrenched fiefdoms that are interested far more in keeping the cash flowing than in the best health care for the largest number of people. If you can manage to pay for insurance and keep alert you may do okay. If you cannot, you're in deep trouble.

What follows will be a report on my own experience in the decade between the onset of my worsening osteoarthritis in 1999 and this summer of 2009. It will embrace feedback on the current state of the new paradigm for medical practice both from having reinitiated contact with Larry Weed for the first time in 30 years and from discussions with David Southwick, Director of Customer Relations of the Problem-Knowledge Coupler Corporation, a company Dr Weed founded in 1982.

Starting in 1982 PKC has developed software (now web-based) that could be used to implement the diagnostic methodology that Larry Weed began developing more than 50 years ago. I have used it this summer and find it to be quite valuable. I had hoped to be able to interest some physicians at the Rothman Institute in paying attention to it but see now that there is no possibility of such an outcome.

As Dave Southwick has told me, the sales cycle is about 15 years in duration. What he means by this is that only in the last few years has he been receiving some favorable responses from physicians to whom he and Larry presented their ideas in the early 1990s and who have finally become sufficiently frustrated by their experience with the haphazard nature of the current system.

Larry Weed is now 86 years old, still sharp and energetic, with a laser like fixation on his view of the world that, as I learned from about eight hours of phone conversations with him this summer, has expanded in ways that go beyond my initial encounter with him in 1978. While Larry and PKC parted ways in June of 2006, he is still - not surprisingly - very interested in the fate of the organization which remains important to the goal of bringing his revolutionary ideas into reality.

Right now, PKC has approximately 100 Couplers. Keeping these up-to-date requires a full-time staff of about 35 researchers. It is difficult to tell just how many Couplers would have to be built to encompass the full breadth and depth of medical knowledge. In my view this is a worthy goal. Given what is spent and utterly wasted now, the cost of finishing a fully developed prototype of a system by which physicians could use computerized guidance for their clinical diagnosis and development of their treatment plans, the investment of effort to achieve at least one test vehicle for use in government paid healthcare seems eminently worthwhile. Having experienced the hazards of the current system I would very willingly entrust my fate to what I now know to be possible.

However as long as the weak political system in Washington is unable to stand up to the interests of the insurance industry which together with large pharmaceutical companies have co-opted much of modern medicine into some-thing that, all too often, approaches a slush fund with no responsibility, meaningful change is not likely.

Why and for What are Knowledge Couplers Needed in Medicine?

an excerpt from a longer essay by Chris Weed

In medicine as in most other fields one is faced with the ongoing task of bringing a more or less established body of knowledge to bear on problems in unique, although not wholly unfamiliar, situations. Situations may arise that are unfamiliar because they involve events that are truly inconsistent with or unencompassed by established knowledge. But most people outside of fundamental scientific research don't expect such situations to arise very often and do not see it as their task to pursue an understanding of such situations when they do appear. Their task is to apply established knowledge as thoroughly and effectively as that knowledge permits to the problems they encounter. Having done this they can then document and offer for study those cases in which established knowledge has proven singularly unhelpful. What is the magnitude of this task?

A patient's common problem: 40 possible causes and 70 possible findings

A thorough and unhurried study of the medical literature shows that for many common problems there may be 40 or more possible causes. In order to decide which of these causes can be eliminated and how to investigate the remainder, the literature might suggest checking for the occurrence of 70 or more findings in the patient. To help evaluate the presence of various findings and the suggested presence of several causes the literature will provide a variety of ancillary information. To extract all this from the literature or from one's dubiously reliable memory of the literature at the time of action inevitably leads to oversights and logical missteps. The pressures and perceived limitations that arise in real patient care tend strongly to make the provider of care choose a small set of options early on and subsequently to gather a mass of arguments and data to confirm his choice, often at considerable expense. In retrospect it may well turn out that the choice was wrong and that this could have been determined by asking a few crucial questions. Or it may turn out that the choice was basically correct but time and resources were unnecessarily spent on weaving a spurious intellectual "security blanket" in addition to performing the important checks.

The purpose of Problem-Knowledge Couplers

The purpose of the Knowledge Coupler is to provide in an external form a reliable, responsive mechanism for guiding the medical care provider by coupling the uniqueness of the patient's situation to the body of relevant medical knowledge during the initial stages of diagnosis and management, where the completeness of one's planning is most crucial and most difficult to achieve without aid.

Chapter One

"E-health" as Part of a National Broadband Strategy

We can and should talk about the concept of e-health as a part of the national broadband network and indeed something along these lines should be developed. But until the structural complexity and the broken intellectual nature of the current system is better understood and responsibility for outcomes brought in line with payment, money wasted by a Balkanized and siloed system will leave us with huge problems and compared to what could be possible with more rationally founded health care.

Unfortunately there are no easy fixes. However, with the availability of the Internet, the access of the average person to vast amounts of medical information will ensure gradual pressure for improvement on the system. But until there is a broader understanding of what is wrong with the system, one of the key questions as computer networks and information technology are applied to improvements, is - as Larry Weed would say - **whether or not we are merely automating the chaos?**

In this introduction, I will present some conceptual ideas (in this case as articulated by the Australian publisher Paul Budde) regarding what an e-health network might look like.

Some Thoughts from Australia

Australia has adopted a National Fiber based Broadband Network plan. In June 2009 a comprehensive national health plan report was released**. A healthier future for all Australians - Final Report June 2009 is found at**

http://www.nhhrc.org.au./internet/main/publishing.nsf/Content/nhhrc-report

Paul Budde has shared with me some thoughts about how he would frame such a program as a transectoral element of the National Broadband Network effort. The existence of a national broadband network that integrates the delivery of healthcare information can become, in his words, the "catalyst for the standardisation and integration of the various widely dispersed computerised systems that are currently used within the sector."

"However, an equally important element of e-health is that it will give the patient/client a central role in the health system." **[Editor**: I would argue that the existence of a broadband network makes the concept of patient-centered care feasible and that this may well be the point toward which we are all moving. See Chapter Six page 46 below.**]** "At present the patient is simply a subject, with little or no power in the process. The government has already indicated that the control of e-health information ultimately rests with the patient."

This will completely transform the industry, with patients taking far greater control of their own healthcare. Many healthcare issues will no longer be an abstract concept; linking them with patient data will personalise healthcare and enable personal healthcare management. Caregivers can be integrated into the healthcare system to assist the patients in the process.

Once the broad e-health policy is in place a modular implementation will be required. It will be impossible to apply all these different e-health applications at the same time. When the ground rules are in place the implementation should be paced and prioritised."

Paul continues: "Internet-based services such as those from US-based www.pkc.com show what can be done once all the information is seamlessly linked and patients and their care professionals are allowed to work with that information. Their 'couplers' service connects (couples) a range of healthcare-related information and uses the knowledge available in the industry to assist in providing solutions, directions and choices. [**Editor's note** – I introduced Paul to Larry Weed and PKC.]

The current healthcare system is extremely inefficient and, mainly due to a lack of intelligent personalised information. It does not provide the patients with any opportunity to take a leading role in their own healthcare process. This is perhaps one of the reasons that as much as 25% of Internet-related information is directly or indirectly connected with healthcare. People want to be more in control and in desperation they go the Internet. While there is plenty of good information available there, it is also well-known that it is easy to sell desperate people solutions that most likely don't work.This is why it is so important that the national healthcare system and not the Internet becomes the place where people find direction and interaction with their healthcare providers."

When I asked Paul to clarify the source of the percentage of internet usage, he wrote "The 25% is an estimate from ourselves (BuddeComm)." "Without any serious involvement of the national healthcare organizations people use the Internet for their e-health needs and services. Once you do get 'proper' national e-health services from the national healthcare organization, most of that traffic will move from the less trusted general Internet to the more controlled National E-health Service (which of course will still be run as a Web based services but most likely more like a more secure VPN. Does that make sense??"

Finally Paul has written: "Under the latest announcement it is expected that by July 1 2010 the [Australian] government should introduce unique personal identifiers for individuals and for health professionals and organizations."

"It also recommends a "national social marketing strategy" to inform consumers and health professionals about the benefits and safeguards of the e-health approach."

"Payment of all public and private health benefits would depend on using data that could be incorporated into a personal e-health record; and GPs, specialists, pharmacists and other health and aged care providers must be able to transmit key data electronically by January 1 2013."

"The Government should set an open technical standards framework for e-health by 2011-12, and should make "significant" funding available for e-health teaching and training, and encourage increased enrollments in health informatics tertiary courses."

"The commission says ensuring access to the National Broadband Network (or alternative technology, such as satellite) for all Australians will be critical to the uptake of personally-controlled electronic health records as well as to realise potential access to electronic health information and medical advice." "Neil Neuberger (www.tcf.org) estimated in 2007 that in the USA remote monitoring of health conditions would reduce the need for hospitalisation of the elderly by at least 40%.

Global e-health software company iSoft has told an Australian Senate inquiry in August 2009 that using the planned National Broadband Network (NBN) for electronic healthcare alone could pay for the network twice over within its implementation timeframe. Their studies showed that integration of patient information across the healthcare system could save A$8-10 billion a year, a 10% saving on the current investment in healthcare. It predicts healthcare will take up 25% of the NBN's bandwidth.

Chapter 2

Larry Weed's Critique of Knowledge Based Medical Delivery

As I wrote about Larry Weed in the *Futurist* 30 years ago, the beginning of the split in the road to his iconoclastic career can be traced to the 1960s when he noticed the difference in the way physicians and chemists handled their data. Physicians kept it organized by the silo or source from which it came. The chemist or scientist organized the data by problem he or she was looking to solve.

This created a series of intractable problems. With records kept according to source each source became a separate "silo" and linking of silos to each other and to medical knowledge depended on the fallible memory of each physician. Under such circumstances the delivery of uniform, coordinated care, according to any measurable standards across providers become just about impossible.

Larry Weed's short sweet summary of the problem is that **"Medicine is built on a foundation laid by scientific knowledge. Medical practice, however, lacks a corresponding foundation in scientific behavior."** (Source; Larry Weed, Lincoln Weed, Medicine's Missing Foundations for Health Care Reform. p. 1)

A nearly 70,000 word paper -- Medicine in Denial -- begins with the following scathing indictment. [On the web Chapters 1,4 & 7 are found at http://xnet.kp.org/permanentejournal/sum09/medicine-in-denial. Dr Weed kindly sent me the complete June 2008 version.]

"A culture of denial subverts the health care system from [what should be] its foundation. **The foundation—the basis for deciding what care each patient individually needs—is connecting patient data to medical knowledge**. **That foundation, and the processes of care built upon it, require standards for managing clinical information analogous to accounting standards for financial information. If businesses were permitted to operate without accounting standards, the entire economy would be crippled. That is the condition in which the $2 trillion U.S. health care system finds itself—crippled by lack of standards for managing clinical information.** The outcome is a continuing state of denial about the disorder that would be exposed if clinical information were managed with order and transparency."

"Contrary to what the public is asked to believe, physicians are not trained to connect patient data with medical knowledge safely and effectively. Rather than building that foundation for decisions, autonomous physicians traditionally rely on personal knowledge and judgment, in denial of the need for external standards and tools. Medical decision making thus lacks the order, transparency and power that external standards and tools would bring to it. Physicians are left to carry a prohibitive burden. Acting under severe time constraints, they must connect intricate patient data with crucial details from vast and growing medical knowledge,"

". . . medicine lacks [the equivalent of] accounting standards to manage clinical information. Inputs are undefined. The outcome is that physicians are not equipped to fulfill their immense re-

sponsibility safely and effectively. Other caregivers are not equipped to share that responsibility with physicians. Patients are not equipped to work effectively with multiple caregivers, nor to assume the ultimate burden of decision making over their own bodies and minds."

"In short, essential standards of care, information tools and feedback mechanisms are missing from the marketplace. And the underlying medical culture does not even recognize their absence. This does not prevent some caregivers from becoming virtuoso performers in narrow specialties. But that virtuosity is personal, not systemic, and limited, not comprehensive. Missing is a secure system for enforcing care of high quality by all caregivers for all patients." pp. 1-2

Given the prevailing source oriented memory oriented paradigm Larry's exposition is tantamount to saying that the Ptolmaic universe of medical practice held together with band aids and bailing wire in the face of ever more anomalies is wrong. A dominant paradigm never goes down without a fight. Consequently, the medical establishment has long been ready to burn Larry at the stake.

The key phrase in Larry's indictment is "The foundation—the basis for deciding what care each patient individually needs—**is connecting patient data to medical knowledge**." This was the focus of the Problem Oriented Medical Information System about which I wrote in the *Futurist*. It is also the foundation of the Problem Knowledge Coupler Corporation founded by Larry in 1982 to demonstrate how affordable software and a personal computer based system provided to those physicians willing to use it could change medical practice for the better from the point of view of the patient.

From the beginning of July to mid September I have had probably 8 hours of conversations with Dave Southwick, Director of Customer Service for PKC. I have seen first hand how the Patient History Coupler can be filled out to get the baseline data on my condition. I have then run the couplers on lower back pain and hip joint pain. If only I had the information they provided me, I very likely would have made very different decisions about treatment for spinal osteoarthritis in the winter of 1999-2000.

Finally as I am about 10 days from publication as Larry told me would be the case the interview with him by **Lee Jacobs, MD,** the Associate Editor-in-Chief of *The Permanente Journal* is available on line along with the Chapters of Medicine in Denial.

In his Introduction Dr. Jacobs states: This interview is published to complement the editorial in the most recent issue of *The Permanente Journal* (Spring 2009;13[2]:85-7). We believe that in the era of health care reform and quality improvement initiatives, it is important that the medical community take a close look at Dr Weed's total approach decision-making information support defined in this interview."

The ending of the interview is both eloquent and poignant:

A Final Question

LJ: Dr Weed, you have had an amazing career implementing a needed change in how patient data is handled through the POMR. Today, you outlined another major change that needs to be incorporated if the practice of medicine is to be improved. On the basis of your experience as an innovator, and knowing what you know today about medical education and the practice of medicine, are you optimistic such changes will be forthcoming?

LW: Based on what I know about all the vested interests in the present medical educa-

tion system and in the present practice of medicine, I am not optimistic such changes will be forthcoming.

For change to occur, it will take extraordinary leadership with the power to switch all the capital and resources now going into a misguided form of medical education to a National Library of Couplers and a whole new paradigm for medical education and practice as described in Section VIII of the Medicine in Denial paper. A paradigm in which knowledge is in tools instead of heads, in which patients from childhood on are involved in the use of those tools in their own care, and in which there is a new division of labor among clinicians.

If change is to come, it will take courageous leadership from present day Ingelfingers and Hursts. If the medical establishment and the government fail to lead the change, then patients will demand such a change once they understand the deep faults in the present system.

LJ: Do you believe people will heed your warning?

LW: There were many warnings of the disaster coming in the financial system and all were ignored. The present health care system is a medical and financial disaster, and perhaps only the disaster itself will get bad enough to change the status quo. My fear is that the government will spend billions computerizing the present chaos and will remain unaware of the fundamental changes that are so badly needed.

Editor: For the complete interview go to

http://xnet.kp.org/permanentejournal/sum09/Lawrence_Weed.html#

Chapter Three

Risks: A Personal Odyssey -- Ten Years of Navigating the System

I wrote about Larry Weed's worldview 30 years ago. Yet ten years ago, when I really needed to make sound judgments, I failed. Today with the wealth of resources available on the Internet, the environment for making better decisions has certainly improved. The process however is still formidably difficult.

In the 1990s my encounters were fueled by trial and error. In 1991 I experienced numbness in my left hand and this led to a series of tests and a cervical discectomy in July of 1992. X-rays revealed severe osteoarthritis of my cervical and lumbar spine. Naprosyn for a while was a palliative. Meanwhile the Internet boom had made it possible for me to indulge both in travel to Russia and to the Himalaya. I trekked both in the fall of 1998 and 99.

When I returned in 1998 I felt good, but in mid-November of 99, instead of feeling strong and in shape, I felt weak and my lower back was quite painful. And my prescient primary physician Dr. Michael Dash, having done a good physical ordered an x-ray of my right hip. Unfortunately the x-ray showed nothing remarkable. He also ordered a CAT scan of my cervical and lumbar spine. At this point early in 2000 and I made the mistake of returning to the physician who did the 1992 discectomy. It was at the campus of one of the state medical schools. Since the physician had done one successful procedure on my neck eight years earlier, I figured he was still competent. Little did I know.

February 2000 Laminectomy

On February 2, 2000 he performed a lumbar laminectomy at L5 and L6. I just wanted to get my aches repaired so I could return to Russia that spring and the Himalaya in the fall. It was only much later that I recalled, after having observed the plastic models of spines and pictures of spines at the office of my primary physician that I realized that in the office of this orthopedic spinal surgeon there were no such charts or plastic spines that could be used to show the prospective patient what was being done and why. The patient was an object to be operated on – not educated.

I was told that I suffered from spondylosis and stenosis - narrowing of the spinal column with constriction and pressure on the spinal cord and narrowing of the foramina where the nerves for control of the legs and pelvis exited. Amputation of two of the spinal lamina was supposed to relieve compression on the cord and nerve roots. Wonderful – a quick fix. However, I was later told that the muscles supporting the lower back were attached to those lamina and that with the lamina gone and they were apparently tied onto each other but as far as I know not in any way to the spine. To this day any bodily movements using those muscles is very difficult. I have no strength there.

March 2000 Cervical Discectomy

Next on March 24 2000 I had another cervical discectomy. I had asked the surgeon how long the operation would take and he said about three hours. I replied that this seemed strange because I

remember the 1992 procedure which was much more simple took more than three hours. He replied that he had gotten that much more adept since then and that he was much faster and skilled at what he did and told me not to worry.

As far as I can recall, by the time I woke up in the recovery room, he was already into his next surgery. What did happen was that a portable x-ray machine was wheeled around to my gurney and they took an x-ray of my neck. I only saw the films two or three weeks later. Other than that the fact that he had not cut into my pelvis and removed part of the pelvic bone for graft in my neck, and the fact that swallowing was a little difficult I was not aware for a while that anything was amiss. I asked about the missing bandage on my pelvis and he told me that he had used a fibular graft from the bone bank and spared me the pain of digging into my pelvis. At the time, in my ignorance, I was almost grateful.

On the first post operative visit, he looked at the x-rays and asked me not to share them on the Internet. Why? Well the placement of the screws, he said, could have been better. As readers may see from the scan of the x-ray included to the right the fibular draft was on the very

***The Doctors protect their own*. I hold in my hands a letter from the New Jersey State Board of Medical Examiners signed by William Roeder Executive Director. Dated June 19, 2002 it was written 23 months after my initial formal complaint.**

"Dear Mr. Cook, The New Jersey State Board of Medical Examiners has completed its review of your complaint involving Dr. XXXX. After careful review of all the facts, however, the board concluded that, under the governing law and regulations, there was no basis to initiate formal disciplinary action. However, the board has assured itself that his conduct will not recur."

"Unfortunately any detailed exposition of the inquiry is not permitted by statute when formal disciplinary action is not pursued N.J.S.A. 45:9 – 19.3. The statute provides that "if the results of the inquiry or investigation is a finding of no basis for disciplinary action by the Board, the information shall remain confidential… " This information, necessarily includes the content of the deliberative process involved in the evaluation of the confidential materials before the board."

The Board of Medical Examiners appreciates that you brought this matter to their attention. Sincerely, William Roeder Executive Director

anterior edge of the vertebra, the bottom two screws in the plate were not well attached to C7 and the top two screws instead of being anchored in C-5 were squarely in the disc between C4 and C5. But there was nothing to worry about he insisted.

Meanwhile I had a trip to Russia planned for late May where for the first time I was going to take my wife. Trying to get in condition I would lightly jog in my neighborhood for perhaps a mile a day. Around 10 April about 1/2 mile from my house within the space of three or four steps I suddenly experienced sharp pain on the right side of my lower back into my right thigh. I limped home and found thereafter it pretty much impossible to jog more than 20 or 30 yards. The pain of walking, sitting and just about doing anything was considerable and debilitating.

In early May I went back for another checkup, this time with my wife, because I had been Googling on the Internet and found descriptions of the medical literature of fatalities that occurred from the type of operation I have had when screws not anchored in bone came loose and plates moved forward cutting off trachea and esophagus and asphyxiating person within 10 minutes. We asked the doctor about this as a problem

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Todd J. Albert, M.D.

Dr. Todd J. Albert is the President of the Rothman Institute as well as the Richard H. Rothman Professor, Chairman of the Department of Orthopaedics, and Professor of Neurosurgery at Thomas Jefferson University and Hospitals. He also serves as Co-Director of Reconstructive Spine Surgery and the Spine Fellowship Program at Thomas Jefferson University. He specializes in the comprehensive treatment of numerous pathologic conditions affecting the cervical, thoracic, and lumbosacral spines including degenerative disk disease, scoliosis and other deformities, trauma, infections and tumors. He has an interest in minimally invasive surgical techniques and image guided technologies in the management of spinal disorders.

He graduated magna cum laude from Amherst College, received his doctor of medicine degree from the University of Virginia School of Medicine, completed a residency in orthopaedic surgery at Thomas Jefferson University Hospital where he was named outstanding chief resident, and performed a fellowship in spinal surgery at the Minnesota Spine Center. Dr. Albert serves on the boards of several scholarly journals, including, *Spine*, *The Spine Journal*, *The Journal of Spinal Disorders and Techniques*, and medical associations including *American Academy of Orthopaedic Surgery, Cervical Spine Research Society, Scoliosis Research Society, International Society for Study of the Lumbar Spine, North American Spine Society,* and many others. He is Chairman of Network Development for the National Spine Network, a consortium of centers of excellence for spine care throughout the United States.

Dr. Albert has published over 200 scientific articles, authored over 40 book chapters, presented his research both nationally and internationally, and served as chairman at numerous courses. He has published several textbooks on Spinal Surgery, including *Tricks of The Trade: Spine Surgery*, *Surgical Approaches to the Spine*, *Mastercases: Spine Surgery*, *Physical Examination of the Spine* and *Spinal Deformities, The Essentials*.

Dr. Albert sees patients at the Rothman Institute's Center City Philadelphia and King of Prussia, PA locations.

Click Here to Read Physician's Publications and Presentations.

and he said in the presence of my wife - don't worry the flanges of the screws are in bone and I could feel the torque of the screws against the bone as I inserted them. I also complained about the pain in my right lower back and when he looked at my images, said well I could go back in and cut a little here and loosen up a little there I cannot guarantee that you'll feel better and if you don't you may spend the rest of your life in pain management.

I did not know what to do. I was desperate to be rid of the pain and almost ready to gamble. But I had been discussing my problems on a social network system called the Meta-Network http://tmn.com that I had been using for many many years and people there fortunately said: "for God sakes fire your surgeon. We will help you find a new one."

I came very close to scheduling in operation for June 15 but in the parking lot turned around and retrieved my files and x-rays and never returned. An extremely fortunate decision since the pain in the lower back and the thigh had nothing to do with the spine.

To my great fortune a friend

on the Meta Network came up with the name of Dr. Todd Albert of Rothman Institute as the leading spinal surgeon in Philadelphia.

On June 15, 2000 I arrived in Center City Philadelphia at the offices of the Rothman Institute. I told Dr. Albert that I hoped he could do something about the pain in my lower back and that I also suspected that I have problem with my neck that he better look at.

Well this is very interesting he said examining that x-ray and gathering several underlings around screen. He then delivered the bad news. If you want to live you have no choice but to let us "revise" your neck - cute euphemism the word "revision" for botched operation. The plates and screws and likely the bone graft will come loose. And if they do I'm dead? From asphyxiation, he said.

The first opening on his schedule was August 2 about six weeks away. Not surprisingly, I chose it. Meanwhile just before the surgery the August 7th issue of the *New Yorker* magazine arrived. Atul Gawande, Annals of Medicine, "When Good Doctors Go Bad," The New Yorker, August 7, 2000, p. 60 In it Dr Gawande described the case of an orthopedic surgeon in Michigan who decided to increase his income by performing more and more surgeries and reached a point where he did double his income but where he was botching almost every surgery. Gawande comments: "As is often the case, the people who were in the best position to see how dangerous Goodman had become were in the worst position to do anything about it: junior physicians, nurses, ancillary staff." I felt that Gawande's article could have been written about my NJ physician.

On August 2 the surgery lasted more than six hours and I was taken to intensive care having been left intubated with my hands tied to the bed rails. When I woke up about 10 hours after the surgery ended, I found I could not speak and my arms wouldn't go anywhere. I guess I got attention by rattling the bed. They gave me a pencil and pad to write on and explained that I was okay but only the ear nose and throat resident could approve the tube coming out. We will untie your hands but do not touch the area of your neck or mouth or we will tie you up again.

Mercifully within about an hour an ENT came by in the tube came out. I later found out that, given the amount of trauma that the surgery inflicted on my neck, leaving the tube in was considered obligatory because in some patients the tissue would swell so much that the trachea and esophagus would close.

I stayed a second night in intensive care and was discharged home straight from there with a piece of my pelvis to the size of my little finger positioned in place of the missing cervical vertebra. (Note that in the JPEG of the xray above I have used Photoshop to fill in the upper edges of the graft that were not visible from my scan of the x-ray film.) Dr. Albert did a very good job and it nearly seven years later a September 2006 CAT scan with myleogram of my entire spine revealed my neck to be in very good shape.

In the meantime I had found out that because of the New Jersey tort reform law passed under Republican Gov. Christie Whitman I had no recourse whatsoever against the New Jersey surgeon. Why? Because Dr. Albert had corrected the mistakes and I did not "suffer permanent loss of bodily function."

Hospital, Insurer and State Medical Board Reaction - "Tough"

In July, while waiting for the revision, I sent extremely detailed written complaints about the surgeon to the New

My properly repaired neck. A piece of my pelvis the size of my little finger is grafted to C7and C4 replacing 3 discs and the forward parts of C5 and C6.

Jersey Hospital and to Aetna my insurance carrier and to the State Medical Board. In a phone call the vice president of quality assurance at the New Jersey Hospital said that he was terribly sorry that I was dissatisfied with the outcome of my surgery but that they could not guarantee anything. End of discussion. My opinion? *The surgeon kept this man's operating rooms full and the money spigot running and that was paramount.*

The botched surgery cost $30,000. The revision $80,000. Aetna as my health insurer informed me that it saw no reason to decertify the physician and, after two years, I finally received a reply from the State Medical Board which said that the medical board had a discussion with the physician and they were sure that he would not commit such a mistake in future and that having that assurance they would take no action against him. He is still in practice as far as I can tell and, to me, the ironic thing is that not wanting to be on the receiving end of a defamation suit, I have no means of cautioning others who entrust their lives to him.

As the calendar turned to September 2000, while my neck was getting better, my lower back and right thigh were driving me crazy. After a spinal MRI, Dr. Albert proved to me that he was an honest man by saying: "I can see nothing in these images that can account for your pain and I am not going to perform any surgery on you under such conditions." It turned out Dr. Albert was right.

Their Spinal Trained Eyes Were not Much Use in Tracking the Joint Source of the Pain

Meanwhile, in desperation, I went back to my primary physician, Dr Michael Dash, and pleaded that he do something. He sent me for nerve conduction studies of the painful area. The studies reported extensive denervation in the area of the right

hip. Readers should recall that almost 11 months before he had my right hip x-rayed. Now he said, if you are going down to Rothman right after election day in early November, tell them it's very likely the hip joint. He had done the classic exercise of turning the heel of my right foot outward as the leg dangled off the table and asking if it hurt. It did.

At Rothman I told the nurse that my primary thought it was my hip. She immediately did the same exercise. Yes it hurt. She called the doctor. Same exercise. Yes it hurt. Would you like an x-ray of your hip? You bet. Twenty minutes later, examining the film, the grave opinion: well look at that no cartilage left in the hip joint whatsoever. Bone on bone, no wonder it hurts. Before I left that day I had an appointment made for a complete replacement on 6 December by Dr. Peter Sharkey. It went very well and almost 10 years later it feels terrific.

But again as Larry Weed would say their spinal trained eyes had not stopped to consider the joint. For even the best orthopedic surgeons in Philadelphia, hopping from one orthopedic specialty or silo, to the other proved very difficult. Dr. Dash on the other hand a year later proved the value of a good primary diagnostician when, presented with the anthrax infected arm of the NJ postal worker, he prescribed a massive dose of Sipro. In this case Dr. Dash's memory did serve him well. The man's arm reminded him of a picture of anthrax that he had seen in a medical text. There is quite a lot online about Dr Dash's role in this incident. See: http://www.nytimes.com/2001/12/26/us/a-nation-challenged-the-anthrax-trail-tracking-bioterror-s-tangled-course.html?pagewanted=all See also http://www.anthraxvaccine.org/slowscience.html and http://books.google.com/books?id=RBb8ss3GG1MC&pg=PA319&lpg=PA319&dq=michael+dash+anthrax&source=bl&ots=P2uLeqdMip&sig=OSidf9aZXrOJqdmsf0vSskDFAf8&hl=en&ei=8g2tSqqoNpSnlAfB1rHHBg&sa=X&oi=book_result&ct=result&resnum=4#v=onepage&q=michael%20dash%20anthrax&f=false

Swelling in 2006 and Difficult Travel in 2009

By 2006 my legs were tending to swell and when I went to Rothman after a complete spinal study Dr. Albert recommended that I lose weight -- I've lost 40 pounds – in order to help the circulation in my legs -and consider compression stockings. Tests showed vein leakage. He also promised me that we would meet again in the not-too-distant future for a replacement of the left hip. The head of the femur there was already distorted and by the absence of a vein that was discovered in my childhood.

I've been wearing my hip high compression stockings for almost three years. Doing so has brought the swelling under control. With a very sedentary job, moving around when I would travel once or twice a year would be difficult but after a few days my legs would accommodate. In May of this year I went to Russia for just over two weeks and found getting around very difficult with the left hip hurting a great deal. On June 1 2009 one quick look by my primary, Michael Dash sent me back to Rothman with the announcement that it was time to do the hip.

I was going to use Dr. Sharkey a second time but when I found out he no longer operated at Thomas Jefferson Hospital and was instead at a more suburban Hospital on the south west side of Philly and more difficult to get to I switched to a different Rothman surgeon. I have recovered okay.

By this time the procedure was rather more difficult than it had to be. Wanting to get things over with I accepted a July 2nd surgery date and was faced with getting out of the hospital on

July 4th which was functioning with cuts in working staff because of he holiday. At about 6:30 AM on Saturday the fourth when I was due to go home the surgical resident came by and removed the bandage that had been placed over the stapled incision. I noticed that my thigh stung mightily but because I could not see what had happened I was not sure where the source of the sting came from.

The nurses checked things out and said they thought I might have a little leakage from the incision and warned me that the surgeon was very conservative and might want to keep me for observation. I resisted mightily when I found out that they would do nothing other than keep me confined to the room just observe. My feeling was I might as well be home.

I finally got myself discharged and as I was leaving became aware that adhesive from the surgical bandage had lacerated my skin. I asked if I should take any precaution. They said no just soap and water. However on Monday, July 6 when the visiting nurse came for the first time he remarked that the removal of the bandage was very poor. "Did he rip it off?"he asked. I replied No, he went slowly and the visiting nurse said well in a case like yours he should have seen what was happening and gone even slower - loosening the adhesive with some saline solution to avoid ripping the skin. All this produced an exceedingly ugly looking operative area - as can be seen from the photos above.

The stapled incision above left on July 4 and above right on July 5. Ripped skin above the incision and parallel to the incision on the right side.

The incision on July 8 after my visit to Dr Dash. I include these pictures to show the trauma caused by the inept removal of the surgical bandage -- something never acknowledged by the hospital or surgical staff. Fortunately there was no infection.

Meanwhile, even though I presented with poor lower extremity circulation and having worn a hip high 20 x 30 compression socks for three years, no one suggested any protocol for returning compression to my

legs which by midweek began to swell horribly. Poor circulation in the "lower extremities" and worst circulation in the left leg which was the one operated on. Surgery will cause swelling even in a healthy limb.

On June 11th and July 1, at Dr Albert's request, I was seen by the physician whose role it was to examine someone with multiple problems and try to figure out a reasonable course of treatment. In a four page letter to Dr Albert and to my hip surgeon this doctor explained that he had done an "EMG/NCS." For the really curious this is an electro diagnostic study to "diagnose different causes of arm or leg pain, numbness, and/or weakness. They are used when an imaging test such as an MRI does not adequately explain a patient's symptoms or if the doctor suspects the patient has more than one health problem that could be causing the symptoms."
http://www.ohsu.edu/health/page.cfm?id=10147

He stated in the letter "I believe that Mr. Cook has multiple issues. Some of the swelling sensation to the legs may be related to his edema. He also has a mild polyneuropathy. He certainly has severe spinal stenosis and has chronic radiculopathy. In addition he has osteoarthritis of the left hip." *Despite the fact that swelling and edema were specifically mentioned there was no connection drawn to the potential issue that I might be subject to more swelling than normal after surgery.* **As far as my physicians were concerned, instructing me on how and when to return to the use of my compression socks was a non issue.** The Doctors see joints; they see nerves; they see their specialties; and escaping from their silos to think about a plan for the patient with multiple problems was not an issue that they addressed.

On the day of the surgery the surgeon's assistant told me that my two physicians had discussed the previous day's findings, that everything was in order and that I was the third case in line. Scheduled for 11:30. It was after 1 pm when I was wheeled in. While in the holding area, I heard a woman say the name of my surgeon and that she was there for her right hip. I was surprised because I thought I was next in line. I asked whether I was indeed number three. The anesthesiologist laughed and said "heavens no." I asked: How many is he doing today? "Eight," was the reply.

No Post-operative Plan

It was just my luck that not only was my surgeon on vacation but **his assistant was also on vacation**. On July 8th when I called to ask what to do about the swelling. An on-call nurse said "get in the car drive to Philadelphia immediately present yourself at the emergency room because you probably have a blood clot in need to be re-Hospitalized." End of discussion.

Fortunately Dr Dash, my primary saw me. He prescribed an antibiotic and told me to use some polysporin where the bandage had ripped the skin and suggested that I try to return to a compression sock. I did with the right leg but getting anything above that knee on the left leg was out of the question especially because of the torn skin. So for the next two weeks I did very little and stayed in bed as much as possible. The swelling centered mainly in the left foot and in the leg below the knee. But as the picture below shows, the thigh was much enlarged as well. It was very depressing because, when I called up after the assistant got back from her vacation, all she could do was tell me that the swelling might last for months.

Finally on July 26, I put pictures of the hip and a swollen leg and foot on the Web and sent an e-mail plea to the surgeon and his assistant that they take a look and

Twenty four days after surgery - I was told swelling was normal and to be patient for months if need be. Yet with the return of compression to the left leg, the limb was nearly normal within 72 hours.

give advice. The assistant had recommended the use of an ace bandage which seemed to help a small amount. On Monday the 27th I called and I received a return phone call very quickly from the assistant who **chastised me severely for trying to communicate with them via the Internet and electronic mail and explaining that under no circumstances was I allowed to do such a thing.**

She told me the surgeon wanted to see me in his office 40 miles away in three hours. Three hours later, the first words from the surgeon **were do not use e-mail or the Internet to communicate. Do not email us or ask us to look at digital photographs**. He did joint replacement but announced that unfortunately the procedure sometimes was accompanied by swelling and counseled patience. Since the staples had been removed and this scabs from the bandage wound were mostly off, I asked about trying the compression sock on the left leg. Earlier the assistant had told me to think twice about doing it because of the danger of ulceration. But now the surgeon said "if you can get the compression sock on over the ace bandage by all means do so." I replied "how about if I take the ace bandage off and get the compression sock on over the leg?" "Sure try that and come back and see me in two weeks."

On the way home I bought an iron frame that could be used to stretch the sock in such a way that I could insert my swollen foot and leg. The improvement was dramatic. Within two days for the first time since the surgery I could get a shoe on the left foot, within five days I no longer needed the compression sock frame. Yet I had been given the thoroughly depressing diagnosis that only time elevation of the leg would cause the swelling to diminish. And that with some people it took "many months."

Rothman has grown from 20 physicians in 2000 to nearly 60 at the end of 2009. Sadly it reminds me of a factory.

Communication has been extremely difficult.

Rothman now has electronic records. It still uses paper which is scanned and then appears on the staff person's computer screen. The MRI done on June 11, 2009 on July 1 was right there on the physician's desktop screen for him to show and explain. Paper records that I submitted in Voorhees New Jersey on June 15 were also available to him in central Philadelphia on June 30. But what they have done is digitize the paper. As will be seen from the interview in the next "chapter", information from the bitmapped files cannot be easily extracted.

And since this doctor also refuses to use e-mail to communicate with a patient getting information to him has been exceedingly difficult. After finding out that an appointment made on July 1 for September 15th was cancelled without my knowledge I had to drive to my daughters office to send him a fax. I can say that 6 days later I received a call offering me an appointment on the September 10tth which I accepted. Dr Albert had interceded on my behalf and the other physician certainly made a good faith effort to answer the questions I raised in the letter.

Regrettably, no one involved was interested in my photos. I would have hoped that someone would have accepted the ones of the wound. Normally the surgeon would have thought to use them to teach the resident how to properly remove a surgical bandage. But the surgeon refused to hear anything about the problem as I note two paragraphs below.

On September 10 I asked that the photos be made a part of my electronic records. They could have easily done this by moving the jpg attachments into my patient records directory. *But since they refuse to accept email even though they received it —they do have addresses and I had the addresses correct – that was not possible*. I brought a small laptop with me to demonstrate and the files on a clean thumb drive, but I was told that only IT could take a file off a thumb drive and IT was not available***. Conclusion – change of any sort will not come easily to this medical fiefdom and the practice is physician centered rather than patient centered.***

Dr. Sharkey will answer an e-mail as will Dr Albert. I have the highest respect for both men. But, when I went down in mid-August for my six weeks post-operative check up, I was informed by my surgeon and that he felt since I liked Dr. Sharkey better I should work with him on any future problems with joints -- a decision that was fine with me. (He ***had*** read a paper copy of an email that I had asked be scanned into my file.)

Now there was one other surprise on August 15 and that was when I very carefully looked at the x-ray on screen I could see that the two implants that I have were different. The ball of the left hip implant is much larger than the right. I asked about that and was told that this summer's surgeon preferred the implant with the larger ball because he felt that there was less risk of dislocation. I would like to have been told about the two surgeon's different approaches. No such luck.

Some of the surgeons at Rothman are thinking about how to modernize their patient education efforts. I was asked by one such to have a conversation with their marketing director -unfortunately any suggestions I would have probably will go nowhere because they are far too radical. I did have a conversation and was was told by the marketing Director that even when he tried to use e-mail to communicate with the surgeons to discuss ways in which he could help them they seldom responded.

My objective at this point and I'm not sure that it is obtainable is to try to find out the cause of continued weakness in my pelvic area and to get an answer as to whether or not it is related to circulatory problems as well ask whether the circulatory problems are related in any way to the osteoarthritis. These are boundary crossing conditions and ones where the specialists at Rothman have told me that so far they have no answers to.

On September 10th I was told that my arterial circulation was good while veinous was not so good and that they would refer me to a vein specialist in Philadelphia if I wished. They didn't think I'd learn too much and my own reading about polyneuropathy shows that iin about one third of the cases, the cause of the problem cannot be determined. I have therefore not requested a referral.

At one point I dared hope that maybe a few forward thinking physicians at Roth man would experiment with Problem Knowledge Couplers. I see now what a foolish and quixotic thought this was. Still, my condition is definitely approved. *They clearly are superb surgeons. But their communication with patients leaves a lot to be desired. They do try to right wrongs and for that they deserve credit.*

For the September 10th visit the train got me to the Institute headquarters early. I went looking for someone at Jefferson who might take an interest in follow up with the resident who lacerated my thigh when he removed the bandage. I bear the man no ill will. Rather I only hoped they would show him the pictures and instruct him in how to remove a bandage without lacerating the skin.

They told me that I needed to speak to Rothman since the surgeon was responsible for instructing his resident. Now Rothman has a "patient advocate" and they actually followed through and got the man to call me. Where upon he told me that follow up had nothing to do with the surgeon and that it was Jefferson's responsibility since they employed the resident. The advocate also wanted nothing to do with my complaint about how the swelling was handled. I am reading from your clinical notes which say that you spent time sitting at your desk rather than in bed with leg elevated. Of course under those conditions you will have swelling.

It is time to turn now to the development of PKC Corp the company founded by Larry Weed. PKC is developing electronic tools, that involve patients, networks and electronic records. The foundation for eventual paradigm shifting change.

Chapter Four

A Summary of Larry Weed's Indictment of the Current System and His Work to Correct It

By way of introduction to the PKC interview – after reading the already mentioned papers sent me by Dr. Weed, I made the following outline of his world view – one which he was kind enough to comment on.

While medical research is founded on a firm scientific basis. . .

Medical practice founded on the provider's memory and intuition – it is hit and mis with no feedback loops – it may qualify as art but is definitely not science. [**Note** Larry Weed commented that "I do not think it qualifies as art." To talk about the art of medicine you must talk about a system with universally accepted form and rules.]

"The underlying principle is that all complex activities, and the functioning of all complex systems, depend on limits and structure and form. If the pH of the human body changes a few tenths of a point or the body's temperature changes a few degrees, the human being will die. If the musicians in a symphony orchestra go "out of synch" by a single beat, great music is reduced to noise. In that sense, the "art of medicine" is too often missing from medical practice. Until that art of medicine controls inputs by practitioners, we will never reap the enormous benefits that electronic information technology holds in store.' Source is Medicine in Denial p. 37 June 2008 version Chapters 1,4 & 7 are found at http://xnet.kp.org/permanentejournal/sum09/medicine-in-denial

Because practice exits without acceptable standards for record keeping and decision making medicine exists and operates in chaos

It is a fragmented and rushed system where patients are prevented from making the decisions about their own care that would be possible if they had access to relevant information.

Under these conditions, coordination, feedback, learning and problem management plans tailored to the unique differences among patients are impossible. They are impossible because there are no established rules, no uniform standards that can permit the compilation of data to measure outcomes.

Without such a uniform framework, patients cannot manage their own care and take advantage of access to information brought about by computers and the internet.

In short "A trustworthy and transparent intellectual infrastructure for care" does not exist.

Such an infrastructure depends on two tools being available to physicians and patients

The first is a map of the landscape – that is a compilation of medical knowledge that is relevant to patient by being filtered and focused on his problems.

The second is a communication system between patient and care givers for navigating the journey – this communication system must consist of well structured medical records that uniformly map the steps taken by patient and care givers as they cross the medical landscape.

Decision making should begin within a uniform framework of rules standards and knowledge, and be mapped by patient and caregiver according to the nearly infinite variety of journeys that can be taken across the medical landscape of patient differences and needs.

The patient should not be subject to the chaos of haphazard decision making the outcomes of which are gathered into a grand study of what works and what doesn't and that is used to force every other patient into the same procrustean bed regardless of what condition, risk factors and history the patient brings to the table.

There are two problems in managing information:
first - general knowledge must be applied to patient problem specific data.
second - the data generated by patient provider interactions must be systematically organized over time.

To couple general knowledge with specific patient problems. This can be done with the linkage of computer software that given the patients medical history and presenting conditions matches that information against the universe of medical knowledge relevant to the problem and extracts linkages between the two – giving the physician and patient some scientifically verifiable evidence of the soundness of a course of proposed treatment

The coupler system uses a standardized treatment framework to capture the patient history and maintain that over time so that patient and caregivers alike are operating off the same playbooks.

To progress these problems can be dealt with at two levels.

1. reform of the entire system of medical education

2 -use of the problem knowledge coupler system integrated with the computerized problem oriented medical record in the hands of patients and providers designed as a means of dealing with the shortcomings above."

Any meaningful health care reform must first of all remove the profit motive from care. In other words and insurance company or a hospital chain that has as its charter first and foremost to deliver profits to shareholders as a by product of its delivery of or underwriting of health care must be told to look for another structure of operation.

As a concomitant step it must seek to complete a full data base of couplers and test such within a large system such as Kaiser Premanente and or the VA.

Larry Weed commented on this summary. Generally he liked it but he offered a more far reaching second step suggesting that:

'As a concomitant step the country needs to provide a full data base of couplers that are required usage in all medical care facilities where the government is paying for the delivery of care. Through this facility the output of other government organizations like the FDA, the CDC, the Nationals Library of Medicine, the National Institutes of Health, Medicare etc are brought to bear in a rigorous and up-to-date fashion on medical activity in the country - automatically providing corrective feedback and control of all the medical activity on which money is now being spent. All present systems of care will use these facilities to provide care - just as the new highway system of the 1950's coordinated so much economic activity. Present medical schools should become organizations to provide the personnel with the guaranteed hands on skills to operate within the system. The present idea of a "knowing physician" will become an anachronism."

Couplers Conceived By Larry in 1978 and PKC Corp. Formed in 1982

Reading Lee Jacob's interview with Larry Weed on the site of the *Permanente Journal* http://xnet.kp.org/permanentejournal/sum09/Lawrence_Weed.html lead me to realize that that there is a 10 year period in the history of Larry Weeds development of knowledge couplers of which I was unaware. PKC Corp was founded by Larry Weed in 1982.

When in the interview Larry said he had spent more than 30 years developing and implementing "what I have called knowledge couplers," I slowed down and read more carefully. Some paragraphs later I found this quote.

Lee Jacobs: Are there similar demonstrations of the knowledge couplers in practice?

LW: Absolutely. With regard to the introduction and spread of knowledge couplers we must recognize what Kenneth Bartholomew, MD, has accomplished building a working model of his small practice in Faulkton, SD. He has written a classic article in a chapter in my book on the knowledge couplers.[6] This model led to the very important work of Dr Charles Burger, who set up a practice in Bangor, ME, based on knowledge couplers and the POMR. Additionally, Dr Bartholomew has an exciting proposal that would integrate couplers community wide in both ambulatory as well as hospital care settings. If funding is forthcoming, this could provide the nation with a major pilot project demonstrating what we should be doing around the country.

That sent me to footnote 6: . Bartholomew K. In: Weed LL. Knowledge coupling: new premises and new tools for medical care and education (Health Informatics): Chapter 13 The perspective of a practitioner. New York: Springer; 1991

This chapter by Dr. Bartholomew makes for fascinating reading. In the mid 1980s Weed had been invited by a group of Catholic hospitals in Montana and South Dakota to come out and speak about the shape of medicine in the next century. Larry spoke about the POMR and Couplers. He met Dr. Bartholomew who became fascinated with what Larry had developed. So fascinated that he told Larry he wanted to put it in to his own clinical practice and Larry, sensing an opportunity to bring his revolutionary ideas into the real world "asked for assurance that there would be a personal computer in Dr. Bartholomew's office and one in their little 20 bed hospital. They accomplished that and I do not know to this day how much they spent, Knowing Ken Bartholomew, I would not be surprised if he took a lot out his own pocket. He is a very dedicated, goal driven, unselfish person - really quite a guy in many ways. "Given the presence of computers Larry donated his time to make it happen.

Chapter 13 is a glowing testimony by Ken Bartholomew of how these tools changed medical practice in the twenty bed community hospital in Faulkton – a small town that served a South Dakota County that was probably the size of the state of Vermont.

On page 243 of Larry's 1991 book *Knowledge Coupling*, Dr. Bartholomew writes that by "using Dr. Weed's system, we have begun to define terminology; we limit the use of synonyms so that all levels of staff, not only doctors and nurses, can interact in a more effective way. This not only facilitates teaching but it makes it more enjoyable for student and teacher alike. The use of couplers in the teaching process begins to define exactly what parameters to look for a given problem. . . . The use of couplers begins to hone our skills to the problem at hand and that is the essence of learning. It then becomes much easier for a teacher to see where the student needs

more work: time and task become the variables and excellent performance becomes the constant. In teaching we are taught, and this feedback helps our knowledge base grow. For instance although I usually learned from a coupler, I found areas where I have felt that a coupler was deficient. What happens then? At this stage of development I make a printout of the portion that I feel is efficient and then write my reasons on the printout or make a typewritten critique and mail it to Dr. Weed. Acting as editors Dr. Weed and his wife, also a physician, evaluates and documents the added information and, by editing update the coupler. Can you imagine to teaching possibilities around the country if all medical schools used couplers and there were one central library of couplers for the editing and building couplers that could support semi-annual or annual updates and produce new couplers?'

Dr. Bartholomew's success led to adoption by Doctor Charles Berger who is still practicing using Weed's tools in Bangor Maine. According to his website: In 1993, Burger's practice started using electronic medical records, far ahead of other Primary Care practices. Around that same time, Dr. Burger began training staff in Quality Management for all of the staff and began using a sophisticated technology resource called Problem Knowledge Couplers, which help the staff access important medical information and compare it with the patient's own medical history." And in the August 23, 2008 issue of the *Bangor Daily News* Dr. Charles Berger explains how he continues to use weeds problem knowledge coupler software in his evergreen woods clinical practice.

http://www.bangordailynews.com/detail/49407.html

Finally in 1989 in *Physical Therapy*/Volume 69, Number 2/ February 1989, Nancy Zimmy and Carol Tandy explained their adoption of PKC Corp Problem Knowledge Couplers.

I also found an article in the *Proceedings Seventh Annual Symposium of Computer Applications in Medical Care*. 1983 October 26; 831–836.
http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=764783

This short 1983 article by Larry Weed and Richard Hertzberg - Richard had been the lead programmer on the Promis system- describes how less than two years after Larry and Richard founded PKC Corporation in 1982 they had approximately 30 couplers running on a North Star Advantage micro computer with 64 kB of memory and how they had also ported the software to run on the very new IBM personal computer.

The article abstract conveys the most critical information" "A series of computer software tools have been developed which can help to discover clinical problems, and to develop diagnostic and management hypotheses based on relevant information in the medical literature. These tools are: the Problem-Knowledge Coupler, the Coupler Editor, the Knowledge Network, and the computerized Problem-Oriented Medical Record. In this paper the Problem-Knowledge Coupler will be described as it works for a typical office encounter to investigate a patient's presenting complaint, and then as it works for compiling history and physical examination data. The Coupler Editor and the Knowledge Network will be described in terms of their use in building Knowledge Couplers. Finally, the microcomputer version of the Problem-Oriented Medical Record will be illustrated as it is used to organize and record Coupler-based diagnostic and management decisions."

Readers should also look at http://www.boston.com/news/globe/reprints/071402_whenyourdoc/ . This is a 6,000 word piece that is a mini biography of Larry Weed and of PKC Corp.'s history from 1982 to 2002. This article states that: "Disheartened after running PROMIS for more than a decade, in 1982 Weed

retired from the University of Vermont and, with his wife, Laura, a son, Chris, and a friend named Richard Hertzberg, created the PKC Corp. He secluded himself in Burlington with a small team of computer programmers to develop new software." Note also that this valuable *Boston Globe* article begins by interviewing Dr Harold Cross of Beaufort South Carolina who is a third clinical practice user of the computerized POMR and Couplers.

In 1992 PKC was strong enough -- having experienced the clinical adoption described above -- so that a decision was made to expand its activities by hiring Howard Pierce as CEO and establishing a Board of Directors.

http://economicdevelopment.vermont.gov/LinkClick.aspx?fileticket=TTFyEJLdWyw%3D&tabid=371

As is explained in the above cited PDF on p. 14 "Founded in 1982, PKC produces software tools—Couplers—that help patients and medical professionals make better health care decisions. Couplers are developed by the 25 full-time medical researchers to collect relevant information from individuals about specific medical conditions."

And, as explained in http://www.healthtransformation.net/cs/pkc_corporation Problem-Knowledge Coupler Corporation (PKC) is working to create a future in which people are given knowledge tools for making healthcare decisions. Patients and providers will use these tools to evaluate problems more efficiently and reliably than can the unaided mind working under the time constraints of everyday practice. These tools serve as an intellectual loom for weaving together from the predictable limitations and errors of the unaided human mind.

Although there is information about the POMR on the PKC web site from the time of the 1992 expansion, as readers can see from the preceding description of the company and the interview that follows, the focus was primarily on Couplers rather than of the original intent of the POMR and Couplers as an integrated toolset. This shift in emphasis made continued clinical expansion of the use of both POMR and Couplers less likely

In any case, by the time that Dave Southwick who gave me the interview that forms the next chapter was hired by PKC, the company Dave mentions being "established in a stereo-typical Vermont garage" had been a small but on going concern for an entire decade.

Chapter Five

The Problem Knowledge Coupler Corporation

How the Couplers Work, DOD and Electronic Medical Records

An interview with Dave Southwick

Editor's Note: Dave Southwick is Director of Customer Relations at the Problem Knowledge Coupler Corporation. An employee since 1994, his training was as an exercise physiologist. He did his undergraduate work at Syracuse University, a Masters in Sports Medicine at the University of Denver and then went back to Syracuse for a Doctorate of Education in adult education and exercise physiology. After teaching for three years he moved into a preventive medicine clinic to teach exercise training, nutrition and stress management. He then went to work for a company called National Health Enhancement Systems that built health risk appraisal tools that were used in the 1980s by hospitals for marketing to at-risk populations.

COOK Report: How did you come to join PKC?

Southwick: I was product manager for National Health Enhancement Systems which was looking to partner with some other companies in similar line of business in the early 90s. I happened to see one of only two advertisements that PKC has ever published in trade magazines. Since they looked quite interesting, I got in touch with them and discussed the possibility of doing some joint ventures between National Health and PKC and since, I'm originally from this area, it was a chance to come home.

In 1993, as I became more familiar with what PKC was all about, I got keenly interested in what Dr. Weed was trying to accomplish.

COOK Report: So how did the Problem-Knowledge Coupler Corporation (PKC) get started?

Southwick: As I've heard the story over the years from talking with Larry and Howard our CEO, Larry had been working with his son Chris and Richard Hertzberg who is now our lead programmer. They were building the original tools for problem knowledge couplers in a stereotypical Vermont garage setting.

COOK Report: With the increasing maturity of the personal computer, the costs of doing this kind of computerization had begun to come way down. Correct?

Southwick: That's true. Also clinical practices and hospital wards began to acquire their own computers. With the personal computer becoming ubiquitous, what they were trying to do was to build a set of tools to which everyone could have access. They had started to build the core tools for building as well as exposing couplers.

In 1995 when the graphical user interface represented by Windows came out -- of course there already was one on the Macintosh -- they decided okay we are going to build a company around this idea of couplers. Larry met Howard through Howard's wife who is a nurse practitioner and Larry and Howard had been talking along with Jim Tobey about ways in which they, as the initial partners, could put a corporate shell around what Larry was doing. They used the introduction of the Windows world as a kind of marketing tool to kick off a broader ef-

fort for the marketing of couplers.

By 1995 and the debut of Windows we had about 45 couplers which encompassed about 80% of what one would see in a family practice. This was a large enough number of Couplers completed for PKC to be, in their opinion, a viable product.

COOK Report: With your current total of about 100 couplers, what is your estimate of what that encompasses for the typical family practice? Does this reach well into the 90% level of what one would see in that family practice?

How Couplers Are Used

Southwick: With our current number we think we are somewhere in the 85 to 90% range. Getting the percentage higher requires an enormous increase in the number of Couplers because, by that time, you are getting into conditions that are not seen very frequently.

What also happened at the very beginning was that Couplers are designed to do two things. They had a diagnostic side and they were also designed to have internal information that would help the physician address the management of the problem.

You might have someone who comes in with a headache and inside that Coupler would be instructions on how to manage their migraine. What happened was that over time as the literature around the management side became more sophisticated, we would actually take the coupler and cleave it in half. You would then have one coupler for the diagnostic side and a second for the management side Consequently, in some cases we doubled the number of couplers but did not necessarily increase the number of problems we addressed.

COOK Report: How does the patient history fit in? Was it always there? Isn't it something like the foundation on which the couplers function?

Southwick: When you talk to Larry he would say that the medical world was defined by the necessity of getting a baseline of information on every person whom the physician treats. This baseline would consist of a complete health history and basic physical exam.

The health history is certainly the most basic. But in our production of Couplers, it was actually number five and you might say the first four Couplers were built as proof of concept for the tools. The idea was that you would run a health history on everyone. And then, based on the kinds of problems that were identified from that health history, you would define a problem list and would say okay we want to start working up each of these problems. In some cases they were diagnostic and in other instances they

What do COUPLERS do?

They match patient information...

Each Coupler leads users through a series of questions about themselves, their health, and their medical history. The questions collect relevant information about specific medical conditions.

...with an extensive medical database...

PKC's staff of 25 full-time medical researchers combs through the latest medical literature to write Coupler questions and connect them to up-to-date medical information. That's why Couplers are able to produce timely, personalized guidance.

...to provide guidance tailored to individuals.

Couplers do not simply spit out generic medical encyclopedia articles. They match patient information with the latest medical information to produce patient-specific advice, including potential causes, treatments, and management strategies.

Couplers are about you, not the "average patient."

http://www.pkc.com/Couplers.aspx

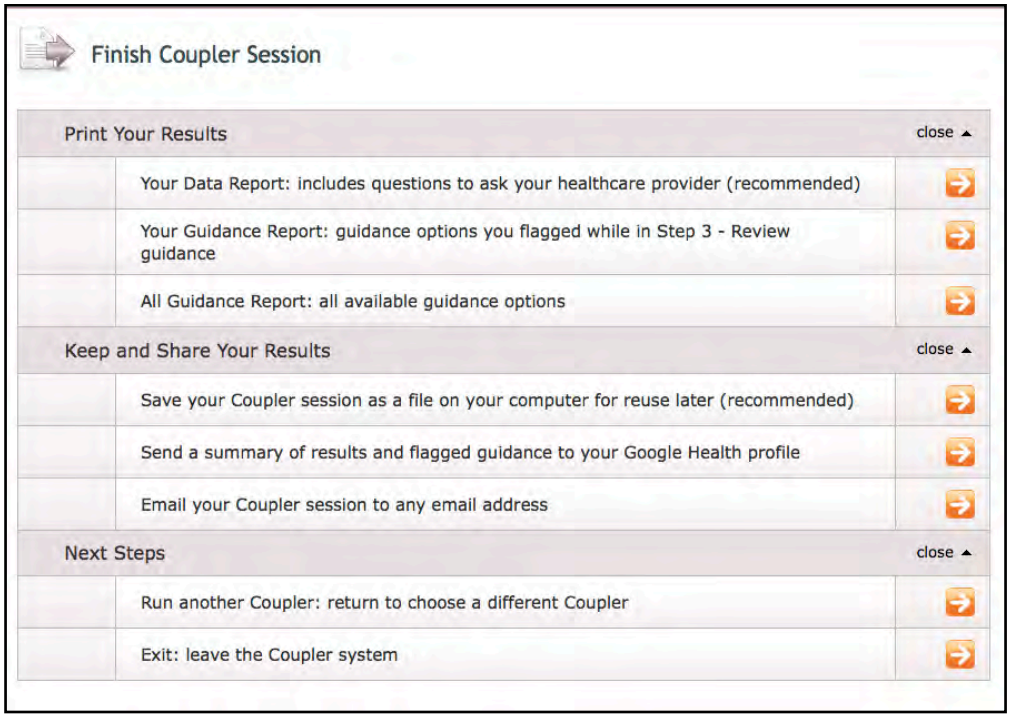
would be management. But this is where the other two types of couplers come into the picture. You would have your health history for the baseline on each patient. The diagnostic couplers are for specific symptom-based problems, and the management couplers for how we use literature to help us drive decisions about treatment.

COOK Report: One thing that I have been wondering about, having done the Health History Coupler for myself as well as the ones about joint pain and back problems is that they both raised some extremely interesting diagnostic possibilities. Do the couplers dip into the person's health history and modify their advice according to what they find? I'm thinking that they should do so. Would you comment?

Southwick: The design of the tools was set up so that each Coupler lives as its own entity but the information that is collected within the Coupler is coded at a very granular level that allows us to move that information between couplers. Captured information in a history coupler for example is stored in the database and let's say that the database belongs to the medical record. When another Coupler is opened, the technology exists in such a way that it can say: what do you know about this patient?

One thing that a coupler likes is information from another Coupler because they talk to each other very well – we use a knowledge net where every entity that is collected is coded at the most basic level. Consequently a headache in one coupler will understand a headache in another coupler. Sometimes context changes the way that headache might appear in a Coupler. But depending on the context of the way in which the data are collected, they may or may not not be the same. But the underlying code knows whether or not the exact same thing is there. We have had a number of different kinds of containers or tools where we could take the findings from the history coupler and have those available in such a way that they could be sucked in as needed.

The tools are not only capable of pulling information in from one coupler to the next, but they are also capable of pulling information in from a third party tool provided the coding is the same.



COOK Report: Could you give me an example?

Linking Couplers with One's Google Health Record

Southwick: Recently we have

been doing some work with Google Health Records and Microsoft Health Vault. One of the things that we have done with the Health History Coupler is to code it in such a way that when someone saves the Health History Coupler into their Google health record, there are individual components of that health history that are stored in the conditions section of the Google health record.

If you have already saved your Health History Coupler into your Google health record, the next time you open that link, the availability to move those findings from the one to the other will be there. There is a command used between Couplers and the Google Health Record and that term is "link." The two tools must be linked in order for them to communicate that way. When you login from Google Health to Couplers or vice versa, it will ask: Do you want to link what you have just done either to your Couplers or to Google Health? Once you make that linkage what you do in one will be appropriately communicated to the other.

Editor's Note: With some instruction from Dave on September 14 I was able to link my basic health assessment coupler completed in mid August to my Google Health Record. The process involved signing into PKC couplers as a google tester and loading the August health profile, going through the review show above and commanding it to link.

After the link command completed, what my Google Health Record looked like is visible on page 28 above. The Live links under my Google mail address - gcook8282 - take me to other parts of my Google Health Record including the photos that Rothman wanted nothing to do with. Other links will enable me to get more information about various conditions or problems. This whole process gives me some sense as to what the online part of a Patient Centered Medical Home might look like. [See Chapter Six below on page 46.]

DOD and AHLTA

The technology that enables one to transfer information from our coupler records to records of others is available with our other partners such as the Department of Defense's AHLTA - Armed Forces Health Longitudinal Technology Application. – See also http://www.health.mil/ahlta/

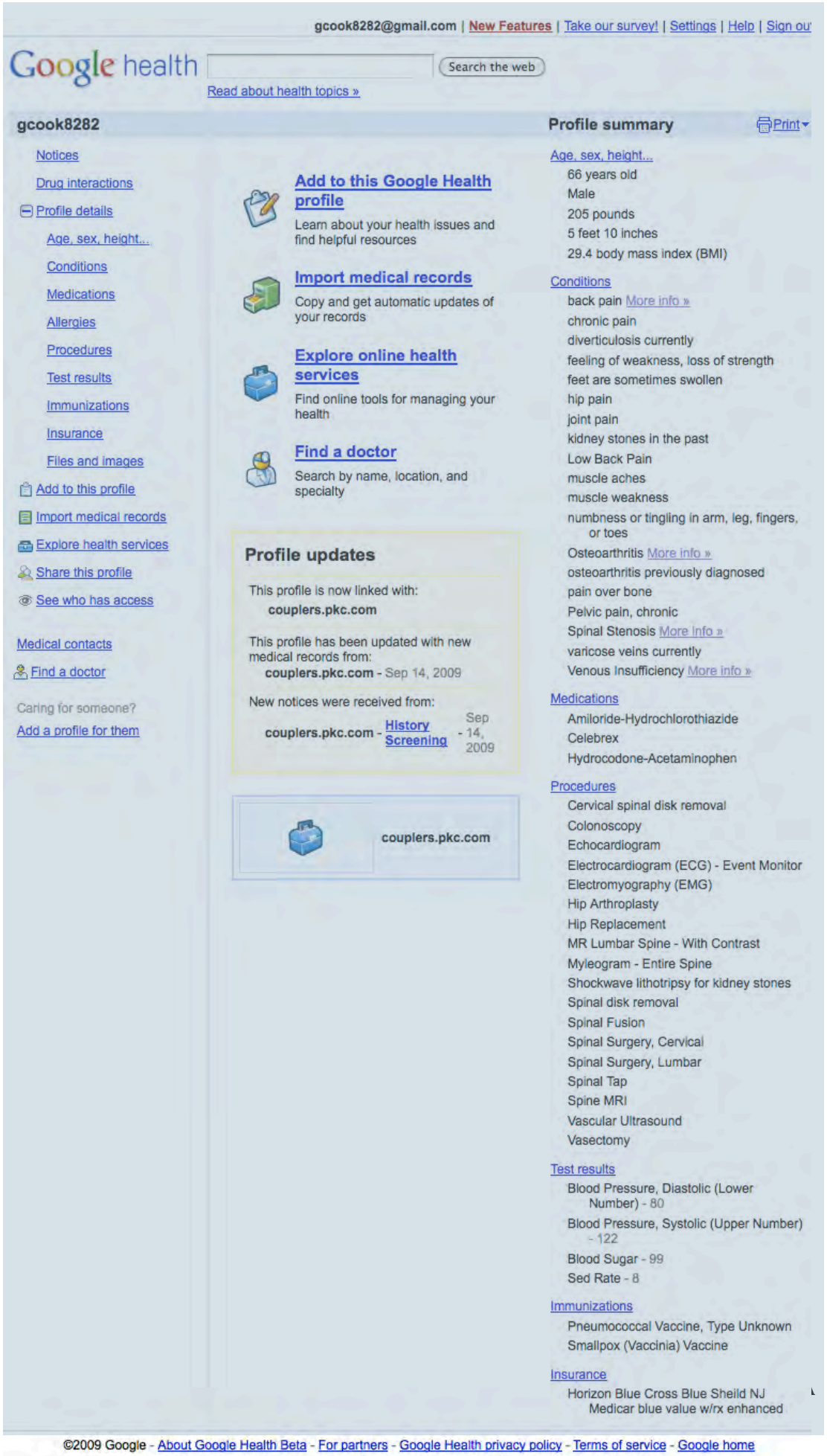
COOK Report: Is part of the Defense Department interest in this a desire to have the service person's medical records available remotely in the theater under conditions of battle?

Southwick: That already exists in some form. There is a theater version of AHLTA that can be taken into the field. It takes what it needs for troops that are going into the field and then it can pump that information back into their AHTLA records when they return

Over the 15 years that we have been involved in work for the Department of Defense, some of that work has been involved with experimenting with the electronic dog tags and in chips that have health records embedded within them. There are a number of different tools that have the potential of carrying health information on the person of the soldier himself.

The first thing that we did with the Department of Defense was immediately following the first Gulf War in 1991 (although work on the CCEP Coupler did not begin until 1995-96). We created something called a Comprehensive Clinical Evaluation Program or CCEP for them. It was a tool that was designed to collect information from soldiers returning from the original Gulf War.

There was this mysterious Persian Gulf Syndrome going around. It was something where no one could quite put



a finger on what caused the problems. Even though the horse was long out of the barn, the decision was made that some kind of information needed to be collected in the hopes that something could be learned. Consequently PKC built a data collection tool for the Department of Defense and the last thing I heard was that there were at least 69,000 troops that have been put through that database. The hope was that there would be some way of looking at that data even though it was post-hoc that it would be possible to get some idea of what was going on. But the mistake that had been made was that there was no baseline data that had been gathered from the troops before they were deployed.

It was almost impossible for anyone to say that something was going on because they just didn't have anything to compare it to. While most people

felt it certainly was the Gulf War that started the problems, there was just no specific evidence that you could point to and used to prove that this was indeed the case.

Nevertheless we tried to gather as much information as possible in keeping with another of Larry's dreams that if we gathered information using our tools as a consistent measure of the information gathered and the way in which it was categorized, the result of such a process would be better outcomes studies.

COOK Report: And I gather from what you are saying that nothing dramatic has been found?

Southwick: That is true you might be able to put together a description of Persian Gulf Illness but what was lacking was a hook to some baseline condition that would enable you to show that this was caused by some experience of the troops in the gulf and not by any conditions they had encountered before. You could put together a list of symptoms for Persian Gulf Illness but there was nothing that enabled you in a definitive scientific way to say that these symptoms were caused by by something encountered in the field, say, depleted uranium for example.

On Going DOD Work

COOK Report: What is the nature of your ongoing work with DOD and Couplers?

Southwick: it's been a very interesting experience because early on we took that Gulf War issue and we went back to the Department of Defense and said "here's what you should really be looking at." We created something that we use internally as a way to communi-

A List of Existing Problem Knowledge Couplers

https://couplers.pkc.com/FindCouplerCompleteList.aspx

Abdominal Pain Diagnosis >

Abnormal Vaginal Bleeding Diagnosis >

Acid Reflux Disease Management >

Acne Management >

Acute Low Back Pain Triage >

Adolescent Wellness Visit: 11 to 17 Years >

Advance Directives: Living Will and Healthcare Proxy >

Angina and Stable Coronary Heart Disease Management >

Asthma Management >

Birth Control Choices >

Blood in the Urine Diagnosis >

Carpal Tunnel Syndrome Management >

Chest Pain Diagnosis >

Cholesterol and Triglycerides Management >

Computer Workstation Ergonomics >

Constipation Diagnosis >

COPD Management >

Cough Diagnosis >

Depression and Anxiety Diagnosis >

Depression and Anxiety Treatment Choices >

Diabetes Management >

Diarrhea Diagnosis >

Dizziness or Vertigo Diagnosis >

Elbow Problem Diagnosis >

Enlarged Prostate (BPH) Management >

Erectile Dysfunction Diagnosis >

Erectile Dysfunction Management >

Failure To Thrive Diagnosis in Children Aged 2 to 5 >

Fainting Diagnosis >

Falling Risk Assessment and Prevention

Headache Diagnosis >

Health History Screening >

Healthy Eating >

Heart Failure Diagnosis >

Heart Failure Management >

High Blood Pressure Diagnosis >

High Blood Pressure Management >

Hip, Groin, or Buttock Problem Diagnosis >

Hives Diagnosis >

International Travel Health >

Itching Diagnosis >

Joint Pain Diagnosis >

Knee Arthritis Management >

Knee Injury Assessment for Patients >

Knee Problem Diagnosis >

Low Back Pain Diagnosis >

Memory Problem or Confusion Diagnosis >

Menopause Management >

Mental Health Screening >

Migraine Management >

Multiple Sclerosis Management >

Musculoskeletal Screening: Strength, Flexibility, Posture >

Nasal Allergies Management >

Older Adult Wellness and Health Review >

Pediatric Back Pain Diagnosis >

Pediatric Chronic Cough Diagnosis >

Pediatric Enlarged Lymph Node Diagnosis >

Pediatric Joint Pain Diagnosis >

Pediatric Overweight Diagnosis >

Pediatric Weight Management >

Periodic Health Evaluation Screening >

Physical Exam Screening >

Preconception Guidance >

Preparing to Have an Operation >

Ringing in the Ear or Other Sound Sensation Diagnosis >

Risk Assessment for Breast Cancer >

Risk Assessment for Colorectal Cancer >

Risk Assessment for Diabetes >

Risk Assessment for Heart Disease >

Runny or Stuffy Nose Diagnosis >

Shortness of Breath Diagnosis >

Shoulder Problem Diagnosis >

Sleep Problem Diagnosis >

Snoring Diagnosis >

Sore Throat or Other Throat Pain Diagnosis >

State Required Newborn Screening Tests >

Swallowing Problem Diagnosis >

Tobacco: How to Quit >

Tremor or Shaking Diagnosis >

Urinary Incontinence Diagnosis >

Vaginal and Vulvar Problem Diagnosis >

Vomiting Diagnosis >

Weight Management >

Well Child Visit: 1 Week to 10 Years >

Wellness and Health Review

cate with the Department of Defense, we call it a "service member life cycle." The idea was that there are points along a timeline of the service members stay with the military at which data should be collected. Everyone should be baseline-studied on the day they join the military. And indeed you could even push it out before that and look for baseline assessments during recruitment. You could establish agreed-upon pre- and post-deployment checkups as well as regular periodic checkups during the service person's career.

COOK Report: Is this happening?

Southwick; Yes we have built a number of tools for them that they do use to do this. Each of the services require that their members have annual evaluations as well as pre-and post-deployment evaluations. In a general sense they are required to do these things and in specific cases Couplers are recommended as a tool. But there are also other PHAs or personal health appraisals that are out there that are being used in addition to ours.

COOK Report: How then might these tools be linked to service members when they transition to Veterans Administration Hospitals?

Southwick: There are linkages beginning to be established through the service member lifecycles. We have two initiatives that we are working on tying up a bunch of these issues. One is a project called CHART which stands for Consolidated Health Assessment Review Tool.

CHART is designed to combine many of the Coupler tools that are out there for evaluating medical screenings into one universal tool. It's taken all the things that they have built and put them into a single Coupler that would now be able to be used across different branches of the services as well as for different types of evaluations.

When a person comes in, it is smart enough to know to ask where he is in this life cycle. If you said, I'm due for my annual evaluation but I'm also getting ready to be deployed to the theater, the system would respond by asking you two sets of questions that are combined to define the two requirements; it would print the results of both of them out for you so that you will have your annual review summary plus your pre-deployment information.

COOK Report: Does it create an electronic record that follows the soldier into the field?

Southwick: No, this is a separate task from the medical record. The idea behind these Couplers is that they are snapshots in time matched to the available medical literature about the problems presented. The information could be pumped in to the record if there was reason to do so but it is designed to serve the troop's needs at a particular point in time. All these tools are fully integrated with AHLTA. If they needed to take it with them into the theater, it would be available there as well.

And we are meeting with the Veterans Administration to look at the integration of the VA screening tools into this same CHART product. Once this is accomplished, you would have a comprehensive product that would take someone all the way through from their initial involvement with the military to discharge and post military care.

Electronic Medical Records -- Communication and Use

COOK Report: Would you take us please into a discussion of the current status of electronic medical record systems and their ability to communicate with each other and use computer networks

to facilitate the delivery of coordinated healthcare?

Southwick: If you go back to the idea of paper-based records, you will see that it was founded on the supposition that all of your medical information should be retrievable from one location at one point in time. When we were a less complex and less mobile society, that paper-based information typically resided in a file folder in the office of one's family physician. If I had to be admitted to a hospital or to see a specialist, information from that folder would be physically transported to the point where it was needed. Now, work on computerization of medical records goes back quite a while. Certainly all the way back to Larry Weed's work with the Promis system in the 1970s. Early attempts were mostly hospital or clinic-based.

COOK Report: But back then the information was just put in the hospital silo or the clinic silo in getting it moved from one silo to another or sent on to the doctor's office or to the patient was an entirely different problem? True?

Southwick: That's correct. Larry used to look at the early situation and speak about it as "merely automating the chaos." A very valid way to look at the situation. Because when you take an important framework like paper-based medical records and try to computerize it, the first thing you should be asking is not how do you get it into the computer but rather on a more fundamental level is the way in which this data is collected the most useful way to handle this information so that it will have value over the longer-term?

Should we copy what we have? Or should we start from scratch and seek a more rational and scientifically defensible way of organizing our medical information? From this point of view the Promis record clearly offered more significant improvement.

So rather than automating the existing chaos of source oriented paper-based records, Larry was brave enough to take on the entire industry by introducing an entirely different way of thinking about how we do this most fundamental function of medical practice.
This was not the philosophy adopted by new EMR companies which almost entirely focused on not doing anything to ruffle the feathers of their prospective customers namely the physicians who after adoption might have to do things very differently from how they did them before. From the psychological point of view the impetus was to make the difference minimal which of course cemented in place the earlier broken ways of dealing with these issues.

What happened therefore was that the early electronic medical record companies kowtowed to whichever physicians they could actually get to communicate with them at that point in time. Something that was okay for that particular set of physicians to whom they been talking. And when they went on to the next set of physicians, they were surprised that what they had done with the first set was not well received because of course the next set had their own non-standard way of record-keeping.

COOK Report: And what about the need to tie all this to issues of billing?

Southwick: I think that office management and billing was much easier to do because it did not directly involve the physicians. Companies that specialized in back-office billing and scheduling have a much easier row to hoe. What is known as the super bill is the triplicate sheet on which the doctor writes down or circles the numerical billing codes that represent what was done during the office visit.. This is the way that the physician has of quickly summarizing what treatment he has deliv-

ered and it has been designed to seamlessly integrate with back-office billing procedures.

Now when you got to the clinical side of things, the early firms hoped that when you got done with the clinical encounter, procedures could be coded in such a way that it would feed the proper instructions to the billing side. Instead they found that when you got to the care side, you could not get consistency in the way in which people were providing care. Without consistency in the way in which care is given, you can hardly get consistency in the way in which it is recorded. And this is where Larry came back and kept saying: "no no, no, you have to standardize how care is given."

Couplers as a Means of Establishing Acceptable Standards of Care

This is where Couplers enter the picture. They are a way of standardizing the questions that are being asked and keeping information generated in an orderly fashion that you could store in a medical record and say that based on these answers to a long list of questions this is where we are headed in our handling of a medical problem.

But one of the first things that electronic medical records did was to automate the chaos and the way in which they did this was to go back to the paper records. A bunch of people had to take all the paper records and scan them in as images into a medical record database. Now that image exists as a bitmap file inside a database and the information on that picture cannot be communicated to anything else using the matching power of the computer to link the information with any other information at all. There is nothing that allows you to connect the dots.

COOK Report: Sadly this is what the Rothman Institute has done as I have made multiple visits there over the summer and observed how they pull my records up on their computer screens.

Southwick: What can I say? Still some medical specialties are progressing better than others. Interesting things are going on in pharmacy and radiology and with digital images when you add these to a computerized system you do have useful means of using accompanying software to take more informative digital tours through the visual data.

The real challenge however is for an electronic medical record to deal with patient history information that may be collected on a paper form? With flat bitmapped files, you have no means of taking any pieces of information that may be captured on them and the enabling that information to communicate electronically with information that may be gathered a week, a month, or several years down the road.

You have however some new things beginning to develop that do have promise. In addition to the clinic based EMR, you now have the PHR or personal health record. This is the record that you and I own. And this is where Google Health and Microsoft health vault come in. These companies have begun to create tools that we can use to make medical records that we can own ourselves.

Just as my ATM account may be viewed as my entre to my larger banking account, a personal health record may be viewed as my entry way into my larger electronic medical record. However, a major problem is that we have not had good ways of moving data from a personal health records to an electronic medical record or even between electronic medical records. Recently, a vehicle to do just this has evolved, it is called the CCR continuity of care record.
http://en.wikipedia.org/wiki/Continuity_of_Care_Record
see also

http://www.ccrstandard.com/ and http://www.neotool.com/blog/2006/10/18/what-is-the-continuity-of-care-record-ccr/

Need to Move Data Between Electronic Systems

As we started to build electronic medical records, there were groups that came along and said that the only consistent way you can move information from one system to another is to have some kind of universal language. But no one could agree on what the universal language should be or if they got started on such a language they found it only worked well in one particular area of medicine. There was a language developed for the pharmaceutical area and another language developed for billing codes (ICD9 or ICD CM) and then there was a language called Snomed that came along that they would attempt to code as many of the terms being used as possible in the hope of having some form of automated translation. http://en.wikipedia.org/wiki/List_of_ICD-9_codes, http://en.wikipedia.org/wiki/SNOMED_CT

For a while, you had a number of tools designed for use as translation vehicles for people who were building up and storing electronic medical information over time. The problem was that you have to map to anything created in your tool into one of these languages or even worse multiples of these languages. And in doing so however you increased your ability to communicate with other tools, provided that those other tools could read one of those languages. That left a lot of holes open because not everything that was collected in one medical record could be transferred to another.

Recently people have begun to suggest a different approach. Namely they say you can add as many of these different translation languages as you want. But meanwhile you must use a standard communications vehicle which is what this continuity of care record is. The CCR is an agreed-upon XML format that says if I am taking information out of a given medical record, I will put what I take out into these different XML template slots and make sure I fill them with as much information as I possibly can provide.

For example I am going to take the concept of headache and put it into the CCR making sure that I have an envelope around it that describes it with all the proper IDs. Then I am going to get into these specific terms taking headache out of a Coupler for example and putting it into the CCR via a text version and then underneath that I am going to put as many codes as I have been able to code this against and I am going to clearly define each of these entities and the coding convention that is being used. And then I'm going to send that out into the ether.

Whoever sees it will use their tools to extract from what I send. All of a sudden they will come to the term headache and they will say this seems interesting. They read it and say oh and they will look underneath it and say all is coded to this ICD-9 code and that SnoMed code. And then they see something called Coupler and they probably don't know what that is. But seeing matches with ICD-9 and SnoMed, which they do read, they pull that material out. But what has happened is that the sender has done his very best to include all the information he can and the receiver has done his best to pull out of everything that he is able to.

COOK Report: So the goal is that, with a generally known number of language or record formats, you gather as many of them as you can into this template and you have an automated XML format that reads whatever records come its way and pulls in every possible match that it finds

into the languages that the templates bear?

Southwick: Yes you can automate the input which is dictated by the CCR group and defined in the way they think about things and therefore the template that is in the middle is widely agreed upon as a good way to exchange medical data from one system to another.

Then I do my very best to put my information in the right places using the right formats and conventions and I send it out. What is quite important is that this new convention did not force people to decide what language to use but it merely became the means to standardize communication by using the languages that were already there. Consequently, we now have the capability where one institution could call another and say what you please send me your CCR on this patient of yours.

Also let's say that you have been hospitalized for three or four days. There is a ton of medical information that is captured about you during that stay and this is especially true when you think of round-the-clock blood pressure and oxygen readings and respiration rates and pulse's and things of that nature.

When you ask them to send the record of your stay to your primary provider, they are not going to send everything. What they do send will be a very much pared down summary so there is an idea for another standard that says merely send me a summary of what happened when the person was in your care or where you could request from another record holder just the lab work on a patient.

COOK Report: So if you are going to use broadband electronic networks in transmitting medical records back and forth, it makes no sense to talk about any of the abilities of the parties involved to use the CCR because it is rather like the DNA or skeletal structure of the whole system of data interchange?

Southwick: Yes it is true that the CCR finally gives a way of moving medical information independent of anyone's knowledge of what is specifically being sent. I can say I'm going to send essentially as many things as I can and do so in the languages in which I've been able to code. And on the receiving end I will say thank you send me the envelopes I will open them up and take out as much stuff as I am able to.

I will give you an example of how this works. In our work with the Google health record there were about 800 separately identifiable PKC entities in our Health History Coupler. To do a prototype we took only 200 of those, choosing the ones that we thought would be most likely to be matched by the records in Google. Now that still leaves about 600 identifiable entities that are not coded. So no matter how much you ask from me you're still only got to get these 200 until we do the rest of the coding which can be done. But in the meantime, when you fill out the health history and in doing so, let's say of the 200 we coded, you use about 50. I send those 50 to Google and Google perhaps may recognize 30. And so what we have done is to effectively move as much information as we possibly can from one source to the other without anyone having to stop and do any one to one mapping of the languages used by the different systems.

The way that CCR's work is that each operator has a responsibility to be able to pump data into a CCR and extract data from them. Before the advent of the CCR we had to try to figure out how to do one-to-one coding with anyone who ever wanted talk to us. That was pretty much an impossible task.

Now all I have to say is "here is my envelope with as much

data in it as I have been able to extract" and you build a tool on your end that will take my envelope and make use of as much of my data as possible. What will be one of the governing factors in determining the success of CCR's is the standard by which creators of medical information develop their tools to take maximum advantage of CCR terminology so that the data they send out is as useful as possible to those who receive it. And if I do a poor job over time I will get a bad and untrustworthy reputation within the rest of the CCR community. If you produce bad CCR's at some point other people will stop talking to you. In other words there is a desirable self policing ethos. What I mean let's assume that instead of sending the known SnoMed and ICD-9 codes for headache I send a code of my own. If I were that sloppy I would not really expect people to continue to talk to me.

Therefore the template is assumed to be good and it is the duty of each health record information provider on each end to use the template responsibly. And this would have a self reinforcing acts because people simply would not exchange or attempt to exchange information with other people whose data was not extractable because it was something other than what the template expected.

COOK Report: The operation of the Internet has this self reinforcing mechanism in many respects. If you want people to advertise good routes to you, you'd better be sure that you do not advertise bad routes to them.

Southwick: And since I know what the CCR template is looking for, I will be encouraged to evolve my tools in that direction. I don't have to do this but I get the sense over time that, if I do do this, I will get more benefit. The brilliance of this from my point of view is that as a company, I need only be responsible to be compatible with the CCR.

To do this with Google prior to the CCR, I would've had to have sat in someone's office and we would've had to have gone through every line of code item by item and attempted to do hundreds of match ups looking for a Google counterpart of everything that was in the Coupler.

COOK Report: So in approaching Google, you both agreed to use the CCR in communicating information from each of your systems to the system of the other.

Southwick: that is correct. All I have to do was dump all of our data that would fit into the CCR and when that arrived at Google all Google had to do was extract all of what we sent them that was compatible with the coding and information gathering of their health record. And while not everything was automatically exchangeable a great deal was.

COOK Report: what would happen if someone like Aneesh Chopra and the White House were to say that any medical care provider hospital and laboratory that wanted to be eligible for federal Medicare reimbursement would have to communicate by using the CCR as their common medical interface technology?

Southwick: I am unsure of the political ramifications of thinking like this because I think the CCR is coming along quite well with out needing a federal push to get it further in place. I am quite happy with the CCR because, for the first time, I have a tool that enables me to very cost effectively share information from my record-keeping systems that I believe will benefit me and the people with whom I have to work. I will have to work very hard to code my data in a way that will be compatible with the CCR, but once I had done the coding I don't need to do it again. Compared to the Tower of Babel that we had before this is a very good situation.

Where Are We Headed?

COOK Report: To conclude then I would like to capture some of your thinking about where all this may be headed. Could I ask you to begin by recounting some of your early experiences in presenting the ideas behind problem knowledge couplers to audiences with Larry Weed back in the mid-1990s when you are just getting started?

Southwick: Sure. When I would travel with Larry and he would make a presentation I often found it more interesting to face the audience and observe their reaction. The audience always divided into three groups but not necessarily into equal thirds. There was one group that absolutely got what he was saying and were really eager at the end to come up and talk with him and shake his hand and offer encouragement. A second group, and it was generally the largest that had no idea what he was saying. The message went over that over their heads and they took the refreshments and left. And then there was a group that he had ticked off to such an extent that they couldn't wait to get at his throat and tear him apart.

I found that the group that was enamored with what he was saying were people to whom I could get back in a little bit. They were leaving business cards and indicating they wanted to learn more. Most interesting to me were those that he had upset. When you went and talked to them and asked them why -- their answer was how dare he stand up there and tell me in fact how to practice -- how to do with my patients what I know better than anyone else. The feeling among these men and women was that they were being insulted by technology.

They are people who have spent a lot of time and money to become credentialed into practice and have come to embrace the feeling of a level of entitlement that says I understand the art and practice of medicine.

COOK Report: They set these people up as gods and they come to think of themselves as God's.

Southwick: Yes. As Larry would say they get their MDiety. Once the ego steps in it makes it very difficult to communicate with them about why or how or what they are doing could possibly be improved upon.

Some of them eventually did come around. The sales cycle at PKC is about 15 years and I say that only some what jokingly because that is about how long it takes many people to calm down enough and get enough further experience to admit that Larry is right. I get calls all the time or letters saying you know I heard Larry talk 14 years ago or I met him 20 years ago and now I am getting it. It happens -- not on a daily basis -- but likely at least once a week. The calls all start on a similar basis: "I heard Larry speak umpteen years ago and I think I'm finally getting it can you send me more information.'

I really don't think it is the cost of the technology that has been a barrier to the successful implementation of technology in healthcare. The more serious barrier is an interruption in the way people are used to doing business as well as a fear that it will lessen the financial rewards that come from the present system.

Putting the knowledge in the tools means that you can start putting those tools in the hands of people that are less educated than current practitioners and achieve similar results.

COOK Report: Absolutely. In 1978 during my initial encounters with Larry, he told me about an experiment that the administration of the medical school gave him permission to conduct. He recruited two young people each of whom had had a year

of college including college chemistry but did not have degrees. One worked as a potter the other in a bicycle repair shop. They paid the students secretaries wages from September through June while they learned patient encounters and diagnosis using the Promis system on the ward of the hospital. They were very carefully audited all the time and paid close attention to licensing laws by not doing hands-on treatment of anyone. The point was they used the knowledge tools to learn. Larry challenged the Dean of the school that at the end of the school year these two kids would be able to take and pass the exams that medical students were given at the end of their second year of medical school Larry turned out to be correct and they did pass but when he wanted to write up the results of the experiment for publication, the Dean forbade it and told him that as far as he was concerned this never happened.

Southwick: Interesting. But to return to our present situation in summing up**, I would say that the opportunities for positive change are to be found in pushing the data gathering more and more into the arms of the patients themselves.**

Probably my all time favorite quote from Larry is that each person has a PhD in their own uniqueness. They know more about themselves than anyone else and to borrow something from what you said – in the absence of Couplers - no one thought to ask them have they been to Tibet lately? Or in other instances about family problems or about whether they might have eaten something unusual the day before? Key events may well not fit into the typical questions asked of a new patient. It is not until you put a broad-based objective survey in front of your new patients and do so uniformly over time that you will likely get the full range of needed baseline information.

We put the knowledge in the tools and the tools continually expose those questions and the patient becomes highly motivated to follow through because given the fragmentary nature of care available to the average person if the patient doesn't follow through no one will.

COOK Report: And with the increase in medical information available on the Internet as well as the Internet becoming a tool for patients to meet people with conditions similar to their own perhaps motivation for change may come from the patient side since medical schools are not likely to change their approaches anytime soon.

Southwick: I have had the experience of dealing with one or two people who are among the very small number of those who have been able to enjoy medical care delivered from this philosophical point of view. If these people move they invariably want to know how to find a physician in their new area who takes this approach. So far the ability to do this is really not there.

As we have learned over the years, it is never the patient – they're always stands somewhere a provider in the way of successful implementation of these new knowledge-based tools. One of my least favorite things that I hear a day-to-day basis when I work with clinicians is "my patients are not bright enough to do this."

COOK Report: Back at the beginning of July when we started talking I had what now seem to be some unwarranted hopes about what might be possible. To my mind right now the situation is rather sad. It seems you have to be someone like Ted Kennedy with unlimited time and unlimited resources to stand up against the establishment and create a game plan that has some hopeful possibility of an optimal outcome.

Appendix: Coupler Text

Readers who are curious should read to get a sense of the guidance. In my opinion this is the best health related material that i have seen on the Internet.

Joint Pain Diagnosis Coupler

TERMS & CONDITIONS OF USE

Please review PKC's Terms and Conditions and indicate your acceptance before continuing. You must accept them in order to use this Coupler.

I accept PKC's Terms and Conditions.

About This Coupler

This Coupler helps determine the cause of adult joint pain that affects more than one joint and that is a prominent or presenting symptom. The pain may be constant or occur in episodes. It may also move from one joint to another. This type of joint pain is characteristic of many infections, genetic conditions, and other diseases. If the joint pain is mostly limited to one joint or began after an injury, use a Coupler for that particular joint. The following Couplers are currently available:

Elbow Problem Diagnosis

Foot or Ankle Problem Diagnosis

Hand or Wrist Problem Diagnosis

Knee Problem Diagnosis

Low Back Pain Diagnosis

Hip, Groin, or Buttock Problem Diagnosis

Shoulder Problem Diagnosis

Using the Coupler

This Coupler contains the question sequences listed below.

1. History. This section can be completed without assistance from a health professional.

People sometimes need help in deciding how to answer some of the questions in this sequence. Such questions should not be skipped. Rather, the responses should be set as uncertain until they can be discussed with a health professional.

2. Medications and Supplements. This section can be completed without assistance from a health professional.

People who are uncertain about their current and past medications should discuss this with a healthcare provider.

3. Physical Exam. A healthcare provider should conduct the physical exam and complete the questions in this section.

4. Laboratory and Imaging. Laboratory and imaging values should be obtained and entered here before reviewing the results, unless the lab finding is labeled "if available."

All question sequences should be completed. Otherwise, the results may be misleading or incomplete.

Causes of Joint Pain Not Included in this Coupler

Many viral, bacterial, and fungal infections can cause joint pain or arthritis. Not all of them are included among the Guidance Options in this Coupler. They will be added, as further information about the nature of joint pain in these infections becomes available. For example, the following viral infections, which have been associated with arthritis or joint pain, though rarely, are not included: Adenovirus, Coxsackieviruses (A9, B2,3,4,6), Cytomegalovirus, Echovirus, Epstein-Barr virus, Herpes simplex virus, Vaccinia virus.

Results of a Coupler Session

Possible diagnoses are listed under one or more of the following headings.

General Causes

These conditions are some of the possible causes of the joint pain suggested by the health history, physical exam, or test results.

Causes That May Require Immediate Attention

These conditions may require immediate evaluation and management. They can progress rapidly and can have serious consequences. In their early stages, these conditions may seem to be unlikely causes of the current problem; however, they may become more evident over a short period of time.

Causes for Which a Single Finding Warrants Evaluation

These conditions are strongly suggested by just one finding from the health history, physical exam, or test results.

Causes for Which Risk Factors Are Especially Important

These conditions are suggested by one or more risk factors.

Causes for Which Critical Risk Factors Are Missing

These conditions are less likely than other possible causes because critical risk factors are not evident.

Joints, Bones, and Muscles

https://couplers.pkc.com/FindCouplerCollectionBrowser.aspx?id=120

Joint and Muscle Pain

Maximize your strength and flexibility. Use a Coupler for a complete assessment of musculoskeletal health or to find the cause of joint or muscle pain.

Knee Injury Assessment for Patients >

If you have recently had a knee injury, you can use this Coupler to get a preliminary idea of which knee structures might be involved. This can provide a base of knowledge for discussing the injury with a health professional and understanding the reasons that further tests may be necessary. (10 min)

Acute Low Back Pain Triage >

Low back pain is common and usually benign. But it can signal a serious medical problem. This Coupler identifies red flags that will alert your doctor that further evaluation is required. If you have no red flags, you can use the Coupler to learn strategies for managing your back pain and returning to normal activities. (5 min)

Low Back Pain Diagnosis >

Whether you have a new back problem or a chronic condition, this Coupler can help you isolate the source of low back pain. (10 min)

Elbow Problem Diagnosis >

This Coupler can help you discover the cause of an elbow problem, whether it's a new condition or a chronic problem. (10 min)

Foot or Ankle Problem Diagnosis >

A foot or ankle problem can slow you down and cause discomfort, whether it's a new condition or chronic problem. This Coupler can help uncover the source of the problem. (10 min)

Hand or Wrist Problem Diagnosis >

This Coupler can help you discover the cause of pain or another problem in your hand, wrist, or fingers, whether it's a new condition or a chronic problem. (10 min)

Hip, Groin, or Buttock Problem Diagnosis >

If you have pain in your hips, buttocks, or groin area, use this Coupler to help identify

the cause. If your pain is primarily in your low back, use the Coupler for Low Back Pain instead. If you have pain in more than one joint, use the Coupler for Joint Pain. (10 min)

Joint Pain Diagnosis >

Joint aches and pains can have many different causes. This Coupler can help you discover the cause of joint pain that affects more than one joint, or that moves from one joint to another. (15 min)

Shoulder Problem Diagnosis >

This Coupler can help you discover the cause of pain or another problem in your shoulder, whether it's a new condition or a chronic problem. (10 min)

Carpal Tunnel Syndrome Management >

If you've been diagnosed with carpal tunnel syndrome, this Coupler will help tailor a treatment plan that's right for you. (5 min)

Knee Arthritis Management >

If you've been diagnosed with knee osteoarthritis, this Coupler can help you design a comprehensive treatment plan. (10 min)

Pediatric Back Pain Diagnosis >

This Coupler can help you discover the cause of back pain in children or adolescents. (10 min)

Pediatric Joint Pain Diagnosis >

This Coupler can help identify the cause of joint pain in your child or adolescent. The Coupler takes into account signs and symptoms, as well as diet, exercise, and risk factors. (15 min)

Musculoskeletal Screening: Strength, Flexibility, Posture >

This Coupler provides a systematic way to identify problems with posture and limitations in strength and flexibility. It also provides an individualized exercise program to address any limitations (10 min)

Knee Problem Diagnosis >

This Coupler can help you discover the cause of a knee problem, whether it's a new condition or a chronic problem. You can use this Coupler whether your knee problem began after an injury or developed spontaneously. (5 min)

Low Back Pain Diagnosis Coupler

About This Coupler

This Coupler helps determine the cause of low back pain in adults.

Using the Coupler

The Coupler contains the question sequences listed below.

1. History. This section can be completed without assistance from a health professional.

People sometimes need help in deciding how to answer some of the questions in this sequence. Such questions should not be skipped. Rather, the responses should be set as uncertain until they can be discussed with a health professional.

2. Medications and Supplements. This section can be completed without assistance from a health professional.

People who are uncertain about their current and past medications should discuss this with a healthcare provider.

3. Physical Exam. A healthcare provider should conduct the physical exam and complete the questions in this section.

4. Laboratory. Laboratory values should be obtained and entered here before reviewing the results, unless the lab finding is labeled "if available."
All question sequences should be completed. Otherwise, the results may be misleading or incomplete.

Results of a Coupler Session

Actions and possible diagnoses are listed under one or more of the following headings.

Tests or Imaging Required for Evaluation

Guidance will be presented under this heading if actions should be taken as part of the diagnostic process.

General Causes

These conditions are some of the possible causes of the low back pain suggested by the health history, physical exam, or test results.

Factors That Suggest a Psychosocial Component of the Back Pain

"Low back pain complicated by psychosocial problems" appears under this heading. If this option is displayed, it should be considered, at least, as a factor contributing to the back pain.

Causes That May Require Immediate Attention

These conditions may require immediate evaluation and management. They can progress rapidly and can have serious consequences. In their early stages, these conditions may seem to be unlikely causes of the current problem. However, they may become more evident over a short period of time.

Causes for Which a Single Finding Warrants Evaluation

These conditions are strongly suggested by just one finding from the health history, physical exam, or test results.

Causes for Which Risk Factors Are Especially Important

These conditions are suggested by one or more risk factors.

Causes for Which There Are Risk Factors But Little or No Evidence

These conditions are less likely than other possible causes because there is no evidence for them in this Coupler session, other than the current low back pain.

Further Steps if Back Pain Persists

In considering the results of the Coupler session and deciding on further steps, it may be useful to keep in mind the following points. Low back pain is very common. Estimates suggest that 80% or more of adults have low back pain at some time during their lives, though only about 1.5% have sciatica (pain that radiates down the thigh or leg). There is some controversy regarding how quickly people recover from a back pain episode. According to some estimates, only about 15% of those who experience back pain have episodes that last more than 2 weeks. But other studies have suggested that 75% of patients have some degree of pain or disability 12 months after an initial episode of low back pain.

Regardless of the duration of a back pain episode, most patients with low back pain cannot be given a precise diagnosis. Although sophisticated imaging studies, such as CT scans, MRIs, and myelograms are available, results of these imaging studies do not always help diagnostically. Although an MRI that does not show a suspected lesion (for example, a herniated disk) can help rule out a particular problem, the presence of such a lesion does not necessarily confirm the

cause of the patient's symptoms. This is because many people who do have evidence of pathological lesions on imaging studies have no back pain symptoms. For example, many people have disk herniations, but experience no pain. Therefore, patients and providers must be cautious when attempting to correlate the patient's symptoms with the results of imaging studies. These facts should help both the patient and provider keep matters in perspective when they are reviewing the results of a Coupler session, especially when no single clear diagnosis emerges.

If a Coupler session does not produce a single clear diagnosis, and if no significant improvements occur within one month, run a second Coupler session to identify any signs and symptoms that developed or became worse over the previous 4-week period. Evolving or additional findings may help identify the cause(s) of a patient's low back pain.

Chapter Six

What May be Possible in the Near Term: The Patient Centered Medical Home Form of Group Practice

The "medical home' form of organizing practice represents an effort coming into focus to take pressures that derive from (1) continued fragmentation of practice as exemplified by my experience with Rothman this summer, (2) a projected shortage of primary care physicians, and (3) patients better informed by knowledge from the internet and develop a new structure of care delivery that would actually have patients USE the internet to communicate with their care givers.

Larry had mentioned this concept of "medical home" in his 2008 paper "Medicine's Missing Foundation for Health Care Reform". " . . with the Internet, patients have become less dependent on experts for information and judgment. . . . . [P]roviders could become better organized to deliver patient-centered care through some form of "medical home." Medical homes would have responsibility for delivering and coordinating care for defined populations. Patients would use information tools but still depend on practitioners for guidance in decision making and for coordination of care. Information tools would reduce but not remove the information asymmetry between patients and practitioners, under this scenario, because the tools could only capture formal, explicit knowledge from medical science, not informal, tacit knowledge from concrete experience in medical practice. [Missing, pp. 30-31]

In his Medicine in Denial he states: "Others argue that the necessary transformation is already underway, as "health information technology" is used to bring "evidence-based medicine" to "patient-centered" care. Yet, neither point of view comprehends the wide gap between what current medical practice delivers and what patient care truly requires. This gap persists regardless of whether health care spending is provider-driven (traditional fee-for-service medicine), payer-driven (managed care) or now "consumer-driven." Until the gap is closed, attempts at cost control and universal coverage will continue to revolve in a circle, without sustainable progress."

"Closing the gap could transform how medicine is personally experienced by caregivers and patients. Supported by a system of order and transparency, caregivers could find their work to be less exhausting and more rewarding, emotionally and intellectually, than what they now undergo. The physician's role could disaggregate into multiple roles, all freed from the impossible burdens of performance that physicians are now expected to bear. The expertise of nurses and other non-physician caregivers could deepen, and their roles could be elevated.' [Medicine in Denial, p.2]

Larry lists three goals

- *Inputs by caregivers must be carefully defined and controlled*. During the last decade, this development has begun to take root. . . . . Decision making itself equally needs definition and control of in-

puts, because each human mind, left to its own devices, is unreliable and not well connected to other participants in the system. . . . . To reform, [Medical education and credentialing] must become focused on instilling in practitioners a core of behavior, not a core of knowledge.

- *A trustworthy and transparent intellectual infrastructure for care must be established*. During the last decade, the Internet has revolutionized access to expanding medical knowledge. But the human mind cannot apply complex knowledge effectively without external aids. *Caregivers and patients trying to navigate the medical landscape need two information tools: a map of the landscape and a communication system for the journey.* The map (tools for coupling medical knowledge with patient-specific data) reveals the landscape so that individuals can find routes that serve their personal needs (unlike "evidence-based" travel directions dictated in advance). The communication system (structured medical records) enables the patient and multiple caregivers to coordinate their actions by recording and planning each step of the journey, informed by feedback from each other and from what happens along the way. With this infrastructure, all caregivers and consumers can apply complex knowledge to detailed data, and readily understand how their efforts interrelate.

- *The central role of the patient/consumer must be recognized*. During the last decade, this recognition has become increasingly evident in two areas: consumer-driven health care and management of chronic illness. But these developments are incomplete. The consumer-driven care movement focuses more on spending than care. In management of chronic illness, many organizations have developed approaches for helping patients manage their own conditions, but these disparate efforts are not unified by common tools and standards applicable in all medical contexts. Common tools and standards exploit basic principles of orderly problem-solving that everyone grasps. With that simplicity and unity, the health system becomes transparent and usable for all.

Transforming medicine in these respects would reorient patient care towards a single purpose: individualized medical problem solving for each unique patient. That orientation differs fundamentally from both payer-driven managed care and traditional, provider-driven medicine. [Medicine in Denial, pp. 4-5]

Editor: The patient centered medical home has been defined over the past two years and, according to my reading of an IBM white paper, it looks as though it is an insurance industry backed version of the health maintenance organization that emerged in 1994 at the time of Clinton heath care reform collapse. The medical home concept seems to be an effort to take the issues I have complained about and reshape care delivery to embrace them **with the exception** of practice via Problem

Oriented Records and Problem Knowledge Couplers. From Larry's point of view a grievous failing – however it must be noted that nothing would prohibit such adoption and that the conditions created by the Patient Centered Medical home environment would be more favorable to adoption than any previous environment.

What is the Patient Centered Medical Home?

According to the National Committee for Quality Assurance: "The Patient Centered Medical Home is a health care setting that facilitates partnerships between individual patients, and their personal physicians, and when appropriate, the patient's family. Care is facilitated by registries, information technology, health information exchange and other means to assure that patients get the indicated care when and where they need and want it in a culturally and linguistically appropriate manner."

"There are nine PPC® standards, including 10 must pass elements, which can result in one of three levels of recognition. Practices seeking PPC®-PCMH™ complete a Web-based data collection tool and provide documentation that validates responses."

http://www.ncqa.org/tabid/631/Default.aspx

A March 2009 IBM white paper contains the most useful and detailed information that I have been able to find on the PCMH concept. I use a succession of excerpted quotes to give readers a flavor. "U.S. healthcare is geared to treating and rewarding acute, episodic interventions. As a result, the emphasis is on reactive care, not on prevention and wellness or care coordination for chronic conditions or serious acute conditions. Poor communication exists among providers, as well as inadequate activation of individuals in ownership for their own health through education and self-management. Providers have also been slow to implement evidence-based medicine in their practice workflows, in part because of the lack of evidence and the tools and support necessary to easily incorporate existing evidence into practice (for example, electronic health records with robust decision support capabilities). The challenges entailed in resolving these issues are daunting. Many believe success will be fully achieved only through a fundamental transformation of healthcare.6." [IBM p. 3
http://www.ibm.com/ibm/ideasfromibm/us/healthcare/20081203/index.shtml

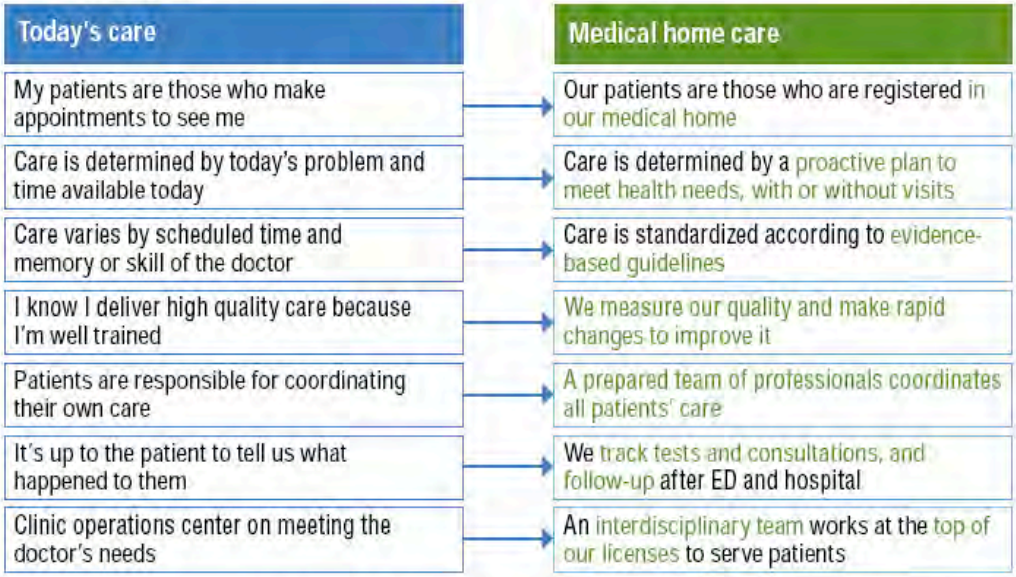
Editor: Four pages later the white paper concludes:

"In summary, we believe the U.S. healthcare system is broken and unsustainable. Primary care, a critical piece of any healthcare system, is "the most broken." The purpose of this study is to analyze the patient-centered medical home, or the "medical home" - an enhanced care model that provides comprehensive and timely care with appropriate reimbursement, emphasizing the central role of primary care. In particular, we explore if and why various stakeholders should consider investment in PCMH initiatives. Based on knowledge gained from current PCMH efforts to date, we also offer considerations on how to effectively define and implement a medical home initiative. Observations and recommendations on this topic are particularly timely to help avoid unfettered expectations about its immediate potential - as the model is in its infancy in the United States.20

The medical home: What is it? What isn't it?

In broad terms, the PCMH provides care that is "accessible, continuous, comprehensive and coordinated and delivered in the context of family and community."21 The American Academy of Pediatrics (AAP) introduced the medical home concept in

FIGURE 2.
The PCMH concept advocates enhanced access to comprehensive, coordinated, evidence-based, interdisciplinary care.



Source: Adapted with permission from F. Daniel Duffy, MD, MACP, Senior Associate Dean for Academics, University of Oklahoma School of Community Medicine.

1967 to improve healthcare for children with special needs. In 2007, the American Academy of Family Physicians, the AAP, the American College of Physicians and the American Osteopathic Association issued principles defining their vision of a PCMH (see sidebar, Principles of PCMH).22 This represents a fundamental change from how healthcare is being delivered today (see Figure 2).

Another key component of the PCMH is the team approach to care. Under this model, the patient is at the center of the healthcare experience, supported by a team of healthcare professionals who are practicing at the "top of their licenses." The physician, nurse, nurse practitioner, patient educator, pharmacist, as well as other caregivers, have new roles to play in a team-based approach to care that incorporates a shared sense of responsibility for the patient's health. Rather than being just a resource for episodic care, the PCP-led care team assumes proactive prevention, wellness, and chronic illness care, becoming the patient's confidant, coordinator and advisor for all aspects of healthcare. Quality and safety are hallmarks of the medical home. Where evidence-based guidelines are available and implemented, **[p.8 of 36]** often with the support of IT tools, PCPs will be able to deliver both more personalized and safer care. It is also about enhanced access, such as flexible scheduling, group visits and use of multiple channels of communication, such as e-mail, phone, or a Web-based portal where patients can manage their personal health record, monitor their own issues or make appointments.

While PCMHs can be foundational to U.S. healthcare transformation, they are not a cure-all. Much needs to be done to support PCMHs in order to implement them and fully realize the benefits. First, PCPs must have better clinical information at the point of service. For example, they need better access to relevant patient information and clinical knowledge to more accurately and completely diagnose problems and deliver effective, evidence-based, personalized healthcare. Information technology help make needed clinical information and knowledge readily available.

Second, broad support and changes are needed from other stakeholders. Consumers must be willing to take more responsibility for their health and healthcare, including changing unhealthy behaviors with appropriate help.26 Care delivered by the

medical home team must be aligned, integrated and coordinated with care delivered by other caregivers, such as specialists, in other venues such as ambulatory surgery centers or hospitals. To encourage clinicians to collaborate and operate effectively, policy or legislative changes will be needed in areas such as insurance coverage, reimbursement (such as payment for inter-specialist communication needed for care coordination), and roles and responsibilities of caregivers. Additionally, changes in education and training for clinicians will be needed to better cover critical topics such as team-based care, use of IT for access to information and communication, quality improvement and how to incorporate evidence into practice in non-hospital settings. Finally, the underlying infrastructure to support the PCMH model, such as IT and other services, will need to be much more robust. " **[p. 9 of 36]**

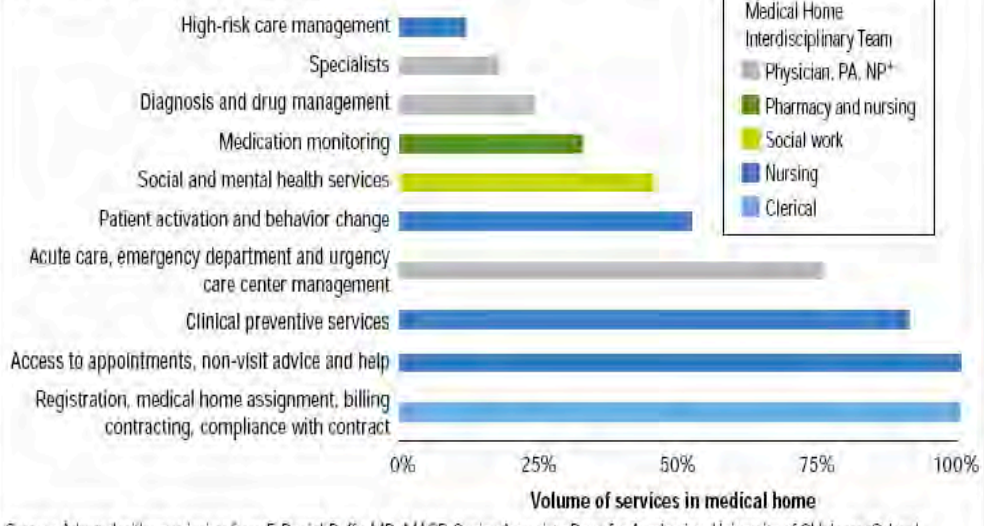
Editor: Note that in calling for the better use of coordination prevention, information technology, changes in training and delivery, the white paper on behalf of PCMH echoes the major critique of the system that we have outlined in the preceding pages.

[p. 11] Why should PCMH be done now? A significant transformation of the U.S. healthcare system appears imminent. The current administration has stated it will press for "comprehensive" healthcare reform legislation in 2009.31 Included in his 2010 budget proposal, President Barack Obama has proposed the largest investment ever in preventive care.32

Other governmental initiatives are also underway. In the Tax Relief and Healthcare Act of 2006 and the Medicare Improvements for Patients and Providers Act of 2008, Congress directed the Centers for Medicare and Medicaid Services (CMS) to "redesign the healthcare delivery system to provide targeted, accessible, continuous and coordinated, family-centered care to high-need populations."33 In January 2010, CMS will launch a three-year demonstration program that will operate in rural, urban and underserved areas in up to eight states.

The American Recovery and Reinvestment Act of 2009 emphasizes health IT and primary care, among other healthcare efforts.34 Healthcare stakeholders have a unique opportunity to either engage in the healthcare transformation initiatives, including those based on the medical home, or risk being left behind.

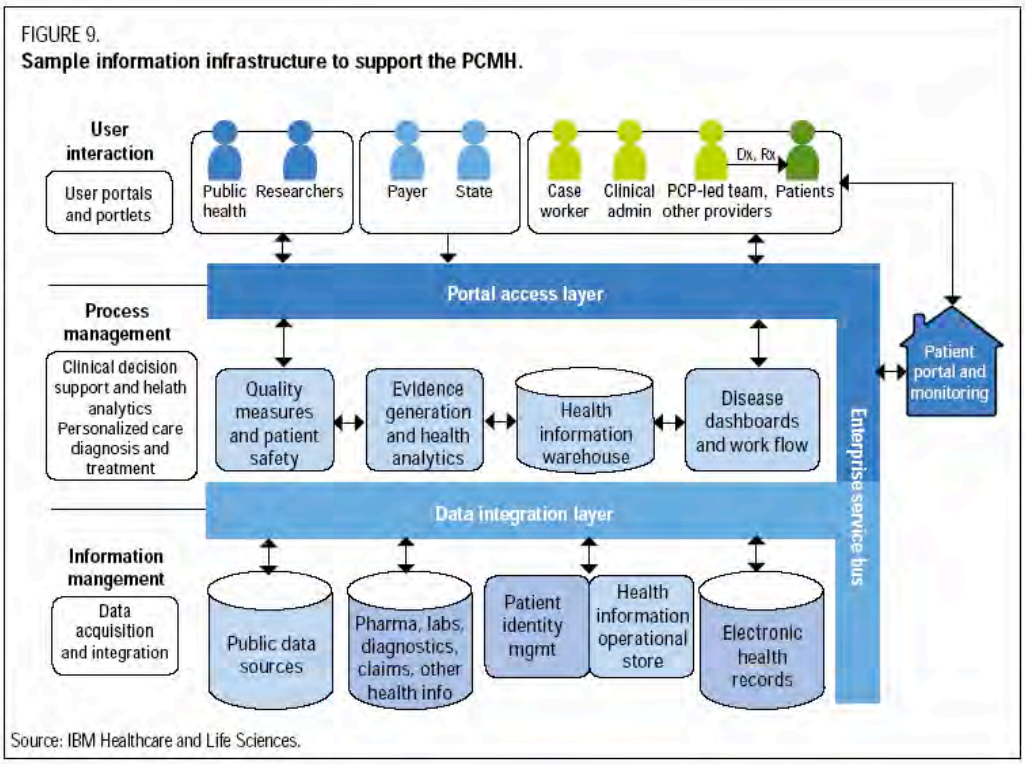
FIGURE 8.
All team members collaboratively contribute at the "top of their licenses," helping the overall practice operate more efficiently and effectively.



Source: Adapted with permission from F. Daniel Duffy, MD, MACP, Senior Associate Dean for Academics, University of Oklahoma School of Community Medicine.
*Note: PA = physician assistant, NP = nurse practitioner.

snip

FIGURE 9.
Sample information infrastructure to support the PCMH.



Source: IBM Healthcare and Life Sciences.

Additionally, there is growing and broad interest in revamping primary care and the medical home model in the United States. PCPs, hospitals, health plans, large employers, consumer groups, patient quality organizations, labor unions and other groups have formed the Patient-Centered Primary Care Collaborative to advance primary care and the medical home model for the 100 million people they represent.45 And many of these organizations have directly invested in individual medical home initiatives. In addition, 44 states and the District of Columbia have passed or introduced at least 330 laws to define or demonstrate the medical home concept.46 Minnesota, for example, has passed legislation requiring all health plans to have medical home offerings by 2011. **[p. 13 of 36.]**

Further, the financial incentives now exist for PCPs to transform their practices. New payment mechanisms are being used to compensate primary care providers for important activities, such as those related to chronic disease management and monitoring, that were not previously reimbursable. Also, the recently enacted American Recovery and Reinvestment Act will pay physicians up to $44,000 and more for meaningful use of an electronic health record (EHR).47

Finally, the technology is now "good enough" to get initiatives started and, done correctly, will likely scale to support larger implementations. For example, disease registries, portals, e-prescribing capabilities and EHRs are robust enough today to get started. In short, with growing support from key stakeholders, examples of success from which to learn, and adequate financial incentives for PCPs to transform practices, the PCMH can and should be done now.

Developments were summarized in a September 4 2009 article syndicated in the McClatchy Newspapers.
http://www.newsobserver.com/2174/story/1675509.html

"What do you do if your baby breaks out in hives after your pediatrician's office closes? Or you want to know if the knee replacement your specialist recommends for your mother is really the best treatment for her? Consider the patient-centered medical home."

"No, a medical home doesn't mean you get a flat-screen TV and a comfy recliner - or even up-to-date magazines - at your doctor's office."

"It means, in the current medical buzz, that you have a relationship with a doctor or clinic that can obtain all of

your medical records, advise you after hours when your baby is sick, or help you weigh the pros and cons of treatments like new knees."

"The "medical home" is coming to a doctor's office near you. The trend is nationwide. Some states, like Idaho, are just getting started, but many providers already have put some elements of medical homes in place."

A KEY TO CHANGE: ELECTRONIC RECORDS

"Several pilot and demonstration projects are under way, or soon will be. A new Idaho task force, the Patient-Centered Medical Home Partners Group, is a coalition of health care providers dedicated to creating medical homes in Idaho."

"The concept is key in many health care reform proposals, including President Barack Obama's. It hinges on providers having comprehensive electronic medical records that other doctors, hospitals or medical practices can access easily. Without that, doctors would be hard-pressed to have all the information they need to track your care."

"The federal government has given medical providers until 2012 to get their electronic acts together or face loss of federal payments."

Finally, Dr Atul Gawande summarizes where we are as of mid September 2009:

http://www.newyorker.com/online/blogs/newsdesk/2009/09/atul-gawande.html?yrail

"Our current health-care system—bloated, Byzantine, and slowly bursting—presents seemingly insurmountable difficulties. It is too big, too complex, too entrenched. What may be most challenging about reforming it is that it cannot be fixed in one fell swoop of radical surgery. The repair is going to be a process, not a one-time event.

The proposals Obama offers, and that Congress is slowly chewing over, would provide a dramatic increase in security for the average American. But they will only begin the journey toward transforming our system to provide safer, better, less wasteful care. We do not yet know with conviction all the steps that will rein in costs while keeping care safe. So, even if these initial reforms pass, we have to be prepared to come back every year or two to take another few hard and fiercely battled steps forward.

In this way, successful reform will have to be more like a series of operations, with x-rays and tests in between to show how we're doing. Embarking on the effort will be among the most severe challenges we take on as country. Outside the settings of war and economic collapse, we've never sustained any policy effort of this scope and duration. It is perfectly possible that our next push will be defeated, or used as an opportunity to dismantle the progress we've already made. But I can see no other choice. We can only forge ahead."

Postscript:
thirty years of missed opportunity -- my article from the June 1979 *Futurist*.

Rx For the Maladies of Health Care: A Medical Revolution in the Making

Physicians have traditionally relied heavily on their memories to treat patients. But as the amount of medical knowledge has exploded, this reliance has proven increasingly untrustworthy. Now a revolutionary new medical system, one based on a different kind of medical record and the power of the computer, offers the chance to bring order and efficiency into medicine.

Although medical miracles receive a lot of attention from the media, most people have probably also heard one of medicine's horror stories from a relative or friend. Lawrence L. Weed, M.D., a physician at the University of Vermont Medical School, is working, in part, to rid medicine of these avoidable tragedies. In doing so, Weed has come to address the broader problems of today's medical system and has evolved an entirely new medical paradigm.

The new system that Weed has developed emphasizes logical and precise thinking within a well-structured framework. The system centers around a new way of keeping medical records—a fact that at first may not appear striking. But when one realizes that the medical record contains the entire structure of medicine—all of its analytical paths, its logic, its goals—it is possible to see why changing the method of keeping records is tantamount to changing the entire system.

Traditional medical records are source-oriented—the doctor's work may be in one section, the nurse's in another section, laboratory and pharmacy reports in other sections, and so on. Early in his career, Weed noted the serious lack of logic and coordination that this system causes. To overcome these problems, he developed what he calls the Problem-Oriented Medical Record (POMR). Under this system, information in the medical records is arranged not according to where it came from but according to how it relates to the patient's problems. A patient's history, diagnosis, treatment plans, and progress notes are all logically organized by how they focus on any one of the patient's particular medical problems.

Under the traditional system, medical students learn to collect information on their patients in piece meal fashion. Synthesizing the relationships among the pieces is then left entirely to their judgments. They are expected to make a quick and correct diagnosis on the basis of surface facts, ordering tests to confirm or disprove their hypothesis. This entire process takes place in a context where, relying on memory alone, it is extremely difficult to calculate what will be the least risky, most effective, and least expensive tests and treatments.

If the prescribed treatment works, the physician has proven his "genius" by guessing right the first time. But if the patient fails to improve, the physician and the patient have become victims of the system. The physician must then reexamine the facts, hypothesize another disease, order more tests, begin more treatments, and so on.

The problem-oriented medical record seeks to change this system. It rewards, not educated guesswork, but structured thinking within a system having well-defined rules and goals. For those physicians who are willing to use it, the POMR offers a way to bring order and logic into our disastrously complex and uncoordinated system of health care.

One of the foremost assets of the POMR is that it meshes so well with computer technologies. In the words of Larry Weed: "Once you have a system with agreed upon rules, structures, and logic, you can let the computers begin to roll. They work very well within logic and structure and can remember so much more than the human brain."

Since 1970, Larry Weed and his colleagues have been

letting the computers roll at the University of Vermont Medical School, where he is a member of the teaching faculty. Weed and a small medical team of about 20 people, using a set of computers in the basement of the university's hospital, have built what they call the Problem-Oriented Medical Information System—PROMIS, for short. The system, which consists of about 30 portable computer terminals that feed into the central memory units, has been operating alternately on two different wards in the teaching hospital for the past eight years.

Weed and his colleagues believe that the combined use of computers and the POMR could begin to solve several of the major problems of modern medicine, including one of the most pressing—the knowledge explosion. The complexities and subtle interrelationships between diseases and the human body have given rise to a medical literature that, at current rates, could fill a large library every five years. The human memory can never store more than the most minute fraction of this knowledge. Computer memory banks, becoming ever smaller in size, can store it all. When a physician needs information, the computer can "send" from an entire library of medical knowledge the exact "page" of information or guidance that the doctor needs. The ability required of the physician is that he follow a logical structure in order to progress from one level of information to the next.

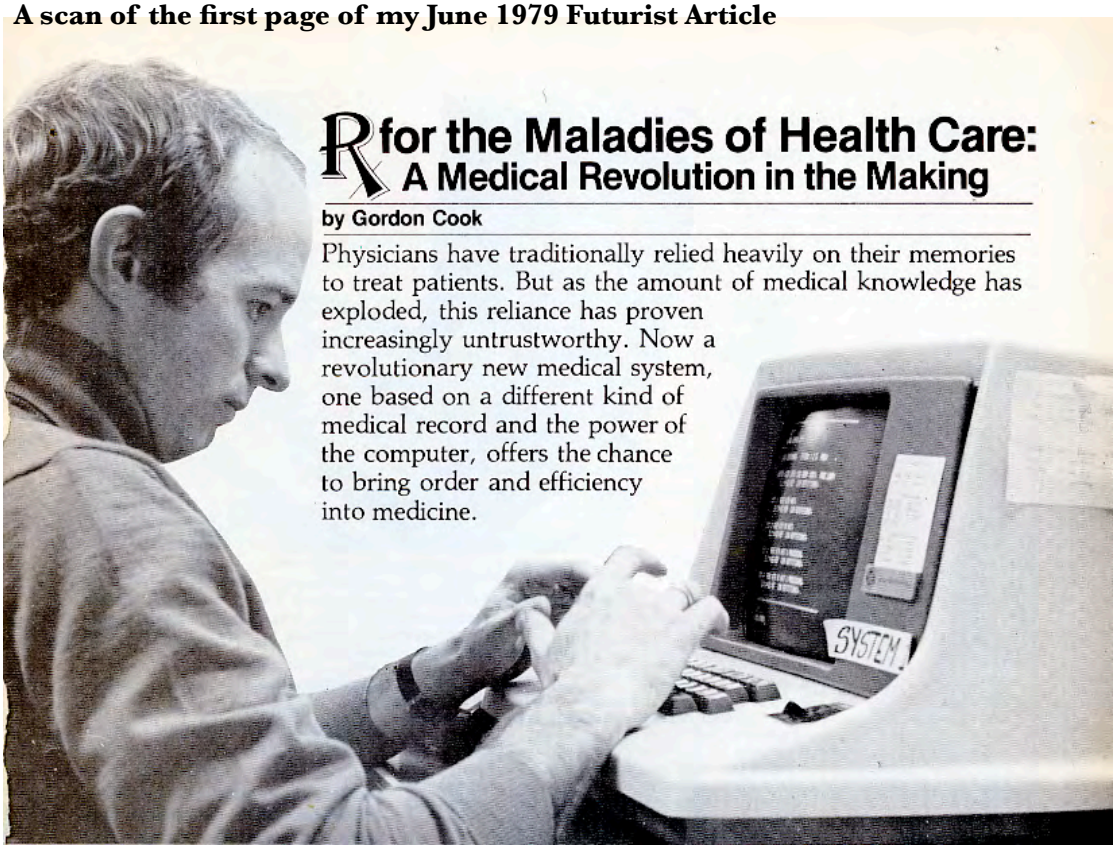
Larry Weed and his team, for the past eight years, have been creating a structure of logic that can accommodate vast amounts of medical knowledge. Four medical librarians work full-time indexing the contents of about 5,000 articles per year from 88 major medical journals. The computer members of Weed's team then input the librarians' work into the computer's memory. Already the PROMIS system contains almost 40,000 interlocking displays of medical knowledge and guidance. Several thousand more are added every year.

The Problem-Oriented Procedure

Physicians who treat their patients using the computerized problem-oriented system follow four procedural steps, each step corresponding to one section of the POMR. First of all, a touch-sensitive computer terminal is wheeled to the patient's bedside and, with assistance from a nurse, the patient begins to touch out on the screen the first of the four parts of his record. This first part of the POMR is the patient's data base, which consists of short answers to 175 or so questions and the results of a complete physical.

Hundreds of different case histories could demonstrate the crucial importance of obtaining an accurate and detailed data

A scan of the first page of my June 1979 Futurist Article



℞ for the Maladies of Health Care:
A Medical Revolution in the Making

by Gordon Cook

Physicians have traditionally relied heavily on their memories to treat patients. But as the amount of medical knowledge has exploded, this reliance has proven increasingly untrustworthy. Now a revolutionary new medical system, one based on a different kind of medical record and the power of the computer, offers the chance to bring order and efficiency into medicine.

base. Weed reports on one such case in his book *Your Health Care and How To Manage It* (Essex Publishing Co., Essex Junction, Vermont, 1978. Available from the PROMS Laboratory, Medical Center Hospital, Mary Fletcher Unit, Burlington, Vermont 05401 for $6.40.):

> *A patient was taken to the operating room for major surgery. Postoperatively the patient responded very poorly for no obvious reason. Only at this point, when the danger was great, and after unnecessary risks had been taken, did the physician begin to ask the proper questions and do a single complete physical examination. Unfortunately, he discovered too late a story of serious disease of the thyroid. He was one of those busy surgeons who claimed if he spent too much time on records, he had no time to care for patients.*

After reviewing a patient's data base, the treating physician elaborates on each of the abnormalities detected in the data base. In discussion with the patient, the doctor seeks to discover *all* of the factors—emotional, social, and economic as well as physiological—that might be affecting the patient's health. By entering the various responses of the patient into the computer, the doctor begins to work down a branching pathway of logical displays that the computer generates. Suppose, for instance, that the

Formulating a New Medical Paradigm: Physicians Who Function as Scientists

Larry Weed traces his current ideas about medicine back to his experiences as a resident at the Yale Medical School in the late 1940s. During this time, he was teaching and doing research in biochemistry while, at the same time, Yale was having him make rounds on the hospital ward for a few months every year.

As Weed made his medical rounds, he found that he could never completely immerse himself in the existing medical paradigm because each morning he had to check on the progress of his graduate students in the biochemistry lab. Had he stayed only on the hospital ward, or only in the biochemistry lab, he feels he would not have started to notice the very important differences in the way the two groups of students approached their tasks.

His graduate biochemistry students, trained to behave as scientists, invariably began their work with a concise statement of the problem under consideration and the desired goal to be achieved. They then kept meticulous records of everything that they did in their experiments.

When Weed went to the hospital ward, however, he found a very different way of doing things. 1n a recent speech, he described what he discovered in a typical conversation with an intern:

> I'd say. "There's not one problem in each of these patients. They have on the average probably five problems apiece. If my biochemistry students keep detailed records on a single problem, you must have records five times as detailed, because this is a very complicated situation." So I'd say, "Let me see the patient's record." Well, the record had no list of problems. It just had orders. "Do this or do that." So I'd say, "What are the problems? What are the problems?" I'd soon find out that no two people on the ward had a clear-cut agreement on what the patient's problem really was. Instead, at the end of the record, after the patient history and lab work-up, they had a series of "impressions·' like "rule out diabetes," or "rule out cancer of the lung."

Weed gradually realized that the physicians who he was helping to educate were acting too little on scientific observations and too much on hunches and intuition.

Weed's experiences at Yale made him realize that medicine was then and still is functioning without well-defined goals and without any system of rules that would enable a physician to reach a goal. Moreover, without precise rules and rigorous record-keeping, it is difficult to tell if a bad outcome is the fault of the physician or the entire medical system. Without an effective way to audit medical outcomes, there is no way to correct either a defective system or bad performance. Medicine, Weed decided, is operating without a feedback loop, and it is increasingly running amuck.

patient complains about abdominal pain. The doctor touches this term, automatically adding it to the patient's record on the screen, and in a quarter of a second a new display—"problem descriptors and associations"—appears. This reminds the doctor to ask about "the severity," "the duration," "relieved by," "made worse by," or "associated with." Suppose tile doctor touches "associated with." These words also become part of the patient's record and a new display reads "symptoms," "problems," "concurrent medications," "social.-environmental problems," "genetic factors," and so on.

Whatever the doctor touches becomes a part of the patient's record and leads to the next layer of questions. The whole process is designed to give the physician explicitly all the information he should get on the problem of abdominal pain. The tool with which he does his work shows him how to do it thoroughly and well.

The second part of the POMR is a list made by the physician of all the patient's problems for which concrete evidence exists. Failure to elicit and state all the problems can sometimes prove disastrous. In Your *Health Care,* Weed offers an example of such a failure:

A superb specialist became totally preoccupied with an excellent piece of vascular surgery on a blood vessel in a patient's leg, and indeed did relieve the patient's current symptom. He kept no complete problem list, and a nodule detected in a prostate on an admission physical examination was never stated as a problem and no plan was formulated.

Two years later, the patient died of carcinoma of the prostate. There is no assurance that earlier detection would have prolonged his life—but it could have.

After the problem list is thoroughly defined, the physician, as if following a road map, uses the computer to branch into displays showing the common and the less common diseases that could account for the patient's problems. These lead to the third part of the POMR procedure: diagnosing the diseases and formulating a treatment plan.

By providing a logical pathway of questions and information, the computer allows the doctor to rule out certain diseases and thereby avoid expensive tests. When the doctor does pinpoint a specific disease, the display provides detailed descriptions and the physical characteristics of the disease. Many displays have terms followed by the word "def." Touch "def" on the screen and a precise definition of the term appears on the screen.

Finally there will always be some instances where even the best thinking can go no further, making a series of tests necessary for a definite diagnosis. In these cases, full information, including the exact cost, on all the options available to the doctor and the patient appears on the screen.

Of course, patients often have several problems, each of which may interact with the others. Treatments given for one problem may make another worse. Here too, the displays are linked so that the physician and patient can explore the various interconnections and make priority judgments. Weed emphasizes that the patient should participate fully in this process, stating his own values, goals, and preferences so that the doctor can draw up the treatment plan that will be most appropriate for the patient's unique problems and circumstances.

The fourth and final stage in treating the patient and creating the patient's electronic POMR is maintaining problem-oriented progress notes, which take their form from the treatment plan. All members of the health-care team—the registered nurse, the radiologist, the physician, etc—contribute to these notes. The patient's vital signs or other problems under observation are entered through the keyboard into the record. The system has been given the capacity to graph this data

Cutting Health Costs

The development of a computerized system of keeping problem-oriented medical records might overcome some objections in the United States to a program of national health insurance.

Opponents of national health insurance argue that such a system has no way to control costs or to guarantee accountability. But a nationwide expansion of the PROMIS Laboratory's computer network might help to solve both of these problems.

Whenever a physician orders a test or treatment for a patient, the computer displays the exact cost of the action—so many dollars and cents per step taken to deal with each problem. The computer then uses this information to generate the patient's bills. Thus, general information about costs is available at the touch of a button, permitting administrators to know precisely what they are paying for and to take actions to avoid unnecessary or excessive costs.

At the same time, people using the computerized system know that their actions can be audited at any future time. They would therefore be accountable for their decisions in a way that today's medical personnel are not. And because the potential for fraud would be greatly reduced, another major objection to national health insurance would fall.

out on flow sheets from day to day or even within a 24-hour period.

Although the POMR yields its maximum advantages when used with computers, problem-oriented records can also be kept manually. Even paper-and-pencil POMRs and flow sheets can ease the problems caused by inadequate and disjointed records:

A physician thought flow sheets carefully kept to follow many variables were unnecessary. He thought he could do it all in his head and have more time just to practice clinical medicine on his patients. He thought the record was one thing, and the care of the patients another. He never really learned that the record is one of the tools we use to care for the patients wisely over time, His misconceptions hurt him not at all, but cost his patient dearly. The physician got lost in all of the figures and intravenous bottles in his head and the patient went into pulmonary edema (massive heart failure) because of too much fluid pumped into his body under the orders of a doctor who thought he did not need carefully constructed records.

Larry Weed has pointed out that one of the strongest assets of the PROMIS system, an asset that could greatly improve the quality of medical care, is that computers are vastly superior to the human memory in keeping track of variables. The computer can identify a potentially harmful drug interaction, it can indicate trends in the patient's vital signs, and it can show the doctor what treatments for one problem might exacerbate another problem.

The computer does this all in a way such that a patient's medical record can be retrieved months or years later. This means that the physician's whole pattern of treatment is available for audit at any future time. If the doctor uses the system conscientiously, he will do his work correctly and will have the record to prove it. He won't forget anything because the computer won't let him forget. Thus medicine has waiting for it a tool that can eliminate malpractice caused by a lapse in memory on the part of an otherwise well-intentioned doctor.

Another advantage of having a single electronic record for each patient is that all members of a healthcare team can see their patients' records. Lapses in the care given by one member of the team can be spotted by another member. For the first time, the complex process of providing modern medical care can be coordinated.

Every physician, nurse, or patient who uses the system has the knowledge of the best minds of modern medicine at his disposal. Instead of groping blindly in the dark, the users of the system stand on the shoulders of their predecessors. Freed from the

impossible task of memorizing a huge body of knowledge, physicians can work more effectively as partners with their patients, learning to make the best possible choices and doing their technical procedures exceedingly well.

A final advantage of both the computerized and the paper-and-pencil POMR is that they offer a chance for a person to take responsibility for his own health. All of us, at one time or another, have difficulty finding any continuity of care among the different physicians who treat us. In his hook Your *Health Care,* Weed maintains that there is only one way to make sure that a person's medical care does not suffer from lapses caused by gaps of information: all patients must have a complete copy of their own medical records, written and structured in terms understandable to them, from which all their doctors can work.

By organizing these records around a patient's problems, the patients can understand their problems and the reasons for the treatment plans that their doctors prescribe. As Weed says, "Once the patient knows that he can have all the information about his problems, it will be like a big ball of twine." If anyone can get it unraveled, by sitting there and pulling at it all day, the patient will. There can be no one better motivated than the patient to get well." If the patient is not motivated, Weed urges doctors to get over the illusion that the patient can be helped.

The attempt to give people control over their own health emphasizes a key aspect of Larry Weed's way of looking at medicine. He believes that medical care should be patient-oriented, not physician-oriented. Doctors who follow the process outlined by the POMR procedure will gain a view of their patients as people, and the best way to solve a patient's problems should grow naturally out of that view. Medicine, with the aid of the computer and a new system of keeping records, could become individualized and personalized by integrating vast knowledge with a patient's unique characteristics.

Medical Costs and the POMR

The cost-effectiveness of problem-oriented medicine could be one of its most appealing aspects. The full money-saving potential of the computerized POMR has not yet been assessed, but a study carried out by the Given Health Care Center, a group practice of physicians that began using the paper-and-pencil POMR in Burlington, Vermont, in 1971, was published in the *Journal of the American Medical Association* in August 1977.

This study, which audited the data on patient care for the years 1971-1976, produced four major findings:

- Although the number of physicians in the practice remained constant during the five years, the number of patients treated by the practice doubled.
- The total hospitalization rate fell 20% and the hospitalization rate for general medical services fell 60%.
- The use and the cost of ambulatory care decreased approximately 20% .
- Expenditures by the practice's patients for health services *fell* 22% in the same time period that the average American's expenditures for those services *rose* 28%.

A major force behind these changes was that physicians using the POMR made much more effective use of their nurses and allied health assistants, giving them responsibility for providing "health care for a growing list of short- and long-term medical problems." The physicians shifted this responsibility by setting up carefully defined rules for their nurses and assistants to follow and then rigorously auditing the outcomes of the work performed. As a result, the nurses came to assume the responsibility for the education and follow-up care of patients with stable long-term health problems, such as diabetes and high blood pressure. By 1976, each nurse was working with about 600 patients.

The problem-oriented philosophy developed by Larry Weed had several other significant effects on the management of the practice. The health assistants were made responsible for collecting a detailed history before the patient first met with the physician. The doctors found that having a "completed defined data base available at the time of the initial examination allowed for long term planning for all

health problems and lessened the need for follow-up visits."

This lessened need for return visits arose from the actions of the patients as well as from those of the doctors. The report notes that "the most profound change in physician attitudes and behavior occurred when they learned that sharing the medical record with the patient increased patient responsibility and participation in his health care and decreased patient dependence on the physician." Because patients were better able to look after themselves, the physicians could soon decrease the number and frequency of the patients' prescheduled return visits.

The study concluded that the observed changes resulted not from changes in the patient population but from ''changes in physician and patient behaviors." Certainly such changes could become a powerful force for improving the future of medicine. The Kaiser Foundation evidently thinks so—in 1978 it gave the Given Health Care Center a $300,000 grant to study further the cost implications of the paper-and-pencil POMR.

Medical Education and the POMR

Today's method of educating physicians focuses totally on their ability to memorize, first, facts and, second, the interrelationships between those facts as established by experiments and past experience. However, the PROMIS Laboratory points out that the scope of medical knowledge and decision-making has grown to the point where it far ex ceeds an individual's intellectual capacity.

Certainly the evidence of failure caused by the traditional method of medical education is often overwhelming. An article in the June 1977 *Journal of the American Medical Association,* for instance, presents the startling findings of a retrospective audit that looked at the use of antibiotics at Duke University Medical Center. When researchers reviewed the charts of 50 randomly selected patients who had received antibiotics in a single week, they found that in 72% of the cases (36 out of 50) physicians had given either an incorrect dosage, or an inappropriate drug, or should not have used an antibiotic at all. Information on how to use the antibiotics was available to the physicians before they ordered the administration of the drugs.

The authors of the study concluded that their results showed the need for a continuing education course in the proper prescription of antibiotics(Larry Weed's comment is concise and to the point:

> It, in the audit example above, Duke University concludes that such bad antibiotic usage is proof that the whole system of education in medical care must be defective and radical changes must occur, then it might be worthwhile. On the other hand, if one merely concludes that we must make more effort along the lines we are already working and then audit again, one begins to wonder how profitable it all is. When one has already selected the best medical students in the country, given them the best house officer training in the country, and put them in one of the best medical centers in the country, and over 50% of them still do not perform properly, one truly wonders.

Weed insists that most of the failures of modern medicine arise directly from our memory-based educational system. By requiring students to master a core of knowledge, medical schools force their students to specialize. But the patient doesn't specialize. A uterus or an eyeball does not come in all by itself to see the doctor. Because the human body is made up of highly complex and interacting systems, the patient may sometimes end up the loser when going for treatment to a specialist. Another of Weed's horror stories makes this point:

> A woman with severe arthritis was followed by a specialist on joints. He had little use for a complete data base and a complete problem list. The patient gained 35 pounds in his clinic and she slowly went into severe heart failure. The cardiovascular decomposition escaped his joint-trained eyes.

Weed's System Could Dominate Medicine in 1990s

Larry Weed believes that the scientific validity and the persuasive logic of the problem-oriented medical record is enough to win converts to his point of view. But anthropologist John Henry Pfifferling, in assessing the reasons for Weed's impact on medicine, also places great emphasis on Weed's charismatic personality and inspiring leadership. Pfifferling has observed that many physicians are so taken with the truths Weed presents that they become crusaders on his behalf.

Weed is a particularly powerful teacher with medical students. One of Weed's students, when interviewed by Pfifferling, voiced the general attitude of his classmates when he said that it was Weed's "charisma, his genius, his humanity, his imagination that is fantastic about the Enthusiasm for the POMR runs highest, Pfifferling says, among students in medical school and younger physicians — those in the profession who are least set in their ways. These younger doctors have turned to Weed's philosophy largely because they share many of the doubts that are troubling the medical profession. Malpractice suits, iatrogenic disease, and widespread dissonance within the formal medical organizations are all pressing problems, according to Pfifferling, and many physicians find the solutions for these and similar problems in the POMR:

> I believe that the POMR system has been adopted so rapidly in so many diverse medical settings because it serves as a practical mechanism for the beginning of a solution to the deep-seated feelings of inadequacy felt by so many within the medical profession. The POMR is, in my opinion, a revitalization movement, a liberating paradigm that crystalizes for its adherents a response to their growing frustration. if more of the same is the answer. Why is it that we keep auditing to prove the impossible to be impossible?

Because of its popularity among younger physicians, Pfifferling believes that problem-oriented medicine will most greatly influence the next generation of physicians. By the 1990s, he concludes, the POMR system may well have come to dominate American medicine.

The power of the computer, coupled with the structure of the POMR, means that, in the future, medical treatment does not have to rely on the physician's memory.

If the practice of medicine need no longer depend on memory, indeed if it *should* no longer depend on memory, then some very important implications for the future of medical education follow. According to Weed, there is no longer any need for the first two years of medical school, which students now spend isolated from the hospital, the wards, and everything having to do with patients while they memorize brutally massive textbooks. Any medical school using the PROMIS system could have its first-year students spending a majority of their time on the ward developing proficient, hands-on skills with the computer.

Changing our outmoded medical curricula need not depend entirely on having the computerized POMR, however. Under Weed's leadership, the members of the PROMIS Laboratory have designed "A New Curriculum for Education in the Medical Sciences." This curriculum, which can be based either on the computerized or the pencil-and paper POMR, begins with an orientation phase, followed by phases that roughly correspond to the four parts of the problem-oriented record: data base, problems, plans, and progress notes.

The philosophical premises underlying the new curriculum show several major differences from those of the traditional system. Two of the most important premises are:

1.Students should no longer memorize a given set of facts and theories; instead, real work and real responsibilities should form the basis of all educational activity right from the beginning.

2.The time spent studying for a medical degree should no longer be the constant while achievement is the variable. Instead, students should have to reach a uniformly

high level of achievement, even though some will take longer than others to learn how to do equally well a given number of tasks.

The single most important change in the PROMIS Laboratory's new curriculum is that, instead of teaching a core of knowledge, medical schools would teach their students a core of behavior, thus producing graduates of uniformly high competence. This does not mean that physicians would have to act as regimented automatons. But it does mean that physicians would have to justify their actions whenever they deviate from that core of behavior.

Under the new curriculum, teachers would evaluate students on the basis of thoroughness, reliability, and analytical sense. For instance, teachers would ask of their students: Were they thorough? Did they get complete data bases? Were they reliable? Was their assessment of information accurate? What is the quality of the analysis in their diagnoses of a patient's problems?

Larry Weed, in teaching his own students, never says, "Now that's right and that's wrong" or "Where did you get that stupid answer?" What he says is, "Defend that for me. Show me how, of all the possible choices in the world, you arrived at that." By never answering a question that he knows they can answer themselves, Weed forces his students to grow stronger and more confident of their ability. His technique is essentially the Socratic method of teaching and learning.

The present medical paradigm assumes that a physician's grades in medical school reflect his grasp of medical knowledge and that the , single licensing exam taken upon graduation ensures his competency. Yet the medical literature is filled with studies that disprove this assumption, indicating that most medical errors are caused by mistakes in the doctor's behavior, not by a physician's lack of knowledge or inability to find information.

Hospital to Convert to PROMIS System

Although many doctors use the problem-oriented medical record, the use of the much more rigorous computerized PROMIS system has not yet spread beyond the hospital at the University of Vermont. This is beginning to change though. Robert J. Ester-hay, M.D., of the Baltimore Cancer Research Center, has recently installed an operational PROMIS terminal at the Center, and over the next six months the Center will become the first hospital in the world to undergo a total conversion to the computerized POMR system.

One of Weed's primary contentions is that it is foolish to equate an individual's performance on an exam at age 23 with that individual's performance at age 43. Yet the present medical system insists on doing just that.

A look at the kinds of medical treatment that dominate our society today quickly reveals that Larry Weed is talking about a new and very different kind of medicine. He is advocating nothing less than a basic change in the paradigm of medicine. Weed envisions a medicine of the future that, in being patient-centered instead of physician-centered, would be as different from today's system as the Copernican universe was from the Ptolemaic.

Under the new medical paradigm that Weed has originated, physicians would go about their jobs in a much different way than doctors do today. John Henry Plifferling, an anthropologist who has recently studied Weed's impact on medicine, says Weed is attempting

> to educate a new physician and other health-care providers who are patient-centered, team-oriented, scrupulously honest, demystified, relating to patients as mutual participants in a contract, capable of using new technologies in conjunction with their patients and never isolated from some kind of feedback that will show them the outcomes of their work. In this new medicine, the physician is far more accountable for his acts than heretofore and his ability to make wise decisions is valued more highly that the mere memorization of facts. In this new medicine, the illness

of the patient is seen in a broader context than in traditional medicine. Included in the context are components of the patient's sociocultural experience and psychological motivation.

The de-emphasis on memorization in the POMR system may also have a profound future effect on who decides to become a physician in the first place. Weed openly acknowledges the revolutionary implications of his work when he writes in *Your Health Care:*

> To the extent that we equate good service with credentials and 'create a situation in which) only a limited number of people can get these credentials ... we increase medical costs. To the extent that "experts" are defined as those who create guidance tools that intelligent noncredentialed people can use, then costs can be lowered. Also, to the extent that we audit performance against well-defined rules and then open up medical practice to anyone who performs well, we may find large numbers of people who are competent and willing to live on far less than physicians' salaries for the services they perform. For those who say that there is something that a human, caring physician gives beyond intellectual guidance, we can only say that this element of care is not something we should be limiting with credentials or fees. 'Caring" at a price is hardly caring. The extent to which we deeply care is not fostered by formal education and credentials, as much as by many other factors in our society.

Larry Weed has thus opened up the restrictions that now limit the practice of medicine by defining a medical paradigm that is far more accessible for far more people than today's medical degree. His implication is that people who have chosen medicine as a career for reasons of wealth and prestige should no longer expect the unquestioning acceptance of American society.

The Future of the POMR

Although the promise of the POMR system still lies largely in the future, Weed's work has already had a major impact on medicine. In 1968, Weed's first major articles on the POMR appeared in the *New England Journal of Medicine.* During the next four years, a vast outpouring of articles pursued the trail he had blazed. In 1972, several major governmental health-care agencies, including the Health Services Administration and the hospitals of the Veterans Administration, began using POMRs. Willis Hurst, M.D., chairman of the department of medicine at the Emory University Medical School and one of America's outstanding cardiologists, became the country's leading advocate of both the POMR and Larry Weed's philosophy. Advocates of problem-oriented dentistry and psychiatry even began to emerge.

Under Hurst's leadership, Emory University held national conferences in 1971 and 1973 to explore the implications of problem—oriented `medicine. Hurst went so far as to rewrite his massive cardiology text, *The Heart,* from the problem-oriented viewpoint

As a result of all this, Weed has become one of the best known personalities in American medicine, with virtually every physician in the country aware of his philosophy and proposed reforms. But the physicians have chosen sides. While a sizable percentage of physicians have become devoted adherents of problem-oriented medicine and users of the POMR, the majority seem determined to ignore Weed's message. Although they admit that Weed's call for improved records and a new relationship between doctor and patient reflects some measure of truth, they appear determined not to hear his broader criticisms of the overall medical system.

Fearing the unknown and wishing to protect their existing powers, the leaders of all traditional human endeavors have resisted those who, in the role of reformer and iconoclast, challenge the premises on which their status depends. Medicine is proving no exception to this rule of human behavior. The implementation of Weed's philosophy and tools changes medicine in ways that challenge physicians in three fundamental areas: mystique, territory, and economic privilege. Many physicians are determined to resist all of these challenges.

In the area of mystique, a system of source-oriented records keeps all other health-care professionals from questioning the reasoning of the physician. Nurses, the pharmacists, the patient, and the other members of the health-care team can never

see the doctor's reasoning in explicit, logical, and comprehensible terms. However, a POMR available to all in electronic form lays bare the physician's reasoning. By observing the development of the POMR, a physician's assistants are likely to discover any faulty reasoning almost immediately. The same "problem" occurs only to a slightly smaller degree with the paper-and-pencil POMR.

The demystification that results from adopting the POMR system usually leads to some important changes in the relationship between physicians and nurses—changes that many physicians resist as infringements on their territory. With the doctor's reasoning laid out in front of them, nurses become very good at spotting problems. Spending eight hours a day on the ward, they can get to know a patient much better than the doctor, who usually sees his patients an average of only 20 minutes a day. Thus when one of the nurses, or a pharmacist, or someone in the radiology lab, detects something out of place in the treatment plan, he can call it to the physician's attention.

Larry Weed can cite case after case of human tragedy caused by uncoordinated medical care. All too often, patients die or suffer irreparable harm because the right hand does not know what the left hand has done and the patient slips through the middle. Under the POMR system, this danger is minimized. As Weed says: "Medicine, for the first time, is delivered by well-coordinated teamwork. Everyone is helping everyone else. Every piece can fall into place."

But, despite the benefits that changing to the POMR can bring, many physicians still find it extremely difficult to have their work subjected to the scrutiny of subordinates, whom they perceive as infringing on their territory. Pfifferling, the anthropologist mentioned above, has described a crisis in the early history of the PROMIS system:

> Nurses were able to audit the care of the patient, since they had access to the same store of information that the physician had. The nurses' questioning of the logic behind diagnostic and therapeutic plans, made so apparent by the computer, was considered by some physicians as highly insolent. The computer was voted out of the ward by a meeting of the senior medical staff. - The new roles and responsibilities that emerged through the "compulsiveness" of the computer were, in my assessment, "territorially" unacceptable to those in power.

It should be added that the nurses, in their own meeting, voted unanimously to keep the computer on the ward. It was nevertheless removed.

It may seem petty to accuse physicians of showmanship based on memory. However, it is a more pervasive trait than most people realize. Pfifferling, for instance, has watched this showmanship in one of its most extreme forms—the ritual of grand rounds at a major American medical center. In these rounds, Pfifferling says, the major professors make a point of memorizing all their notes on the patients they are to discuss. Pages of notes and hours of memorization may be needed to present the interns with a virtuoso performance, to impress upon them that experienced physicians should rely on their memories to treat patients. It is an awe-inspiring "show" that is, as increasing malpractice suits prove, founded on quicksand.

In time, though, the political hindrances to the POMR should weaken, especially as continued development makes Weed's system all the more sensible, appealing, and accessible. In terms of the computerized POMR, for instance, every citizen could soon have a complete POMR in electronic form keyed to his social security number. As a result, a physician anywhere in the U.S., after obtaining the patient's permission and presenting proper identification, could retrieve a uniform, intelligible, and error-free medical record.

This would be possible because the PROMIS terminals run on the technology of cable TV. Like cable television, PROMIS terminals could be connected to the memory banks of the central computers in Vermont. The office of every neighborhood doctor, every group practice, every health clinic, every HMO, and every ward of every hospital could contain a terminal.

With the use of a widespread PROMIS system, the best research minds in the U.S. could continually update and refine the computer's data base. Our best analytic minds, freed from their dependence on memory, could grow more and more proficient at using the terminals to deliver the highest possible quality of care. Moreover, because the system could audit itself, researchers would, for the first time, have detailed information about what kinds of treatment yield the best results. We would truly, in our acts and intentions, be growing wiser

from what we had done.

In the meantime, the goals of the PROMIS Laboratory can only be furthered as the general public, the group with the most to gain, learns more about the system. A major test of -the computerized POMR would greatly encourage this process. The installation of terminals in a few doctor& offices and hospitals in the "real world" would make it possible for experienced physicians to use them on a full-time basis. Such a field test would result in hard data on the quality of care and cost effectiveness of the PRO MIS system—data that is not now available in Burlington, Vermont, where rapidly rotating groups of medical students and interns use the system on a single ward of a teaching hospital. There is a town in South Dakota where the entire medical establishment eagerly wishes to use the PROMIS terminals. Unfortunately, Weed has not yet found the necessary funds to support such a test.

Given the necessary leadership on the part of individuals within government, industry, or foundations, the PROMIS terminals could begin a period of field testing within months. The results of such a test, by demonstrating the sense, the efficiency, and the effectiveness of problem-oriented medical records, could make a widespread PROMIS system politically and financially feasible.

Symposium Discussion August 17 - September 18, 2009

CRTC Protects Bell Canada from ISP Competition

On Aug 17 **Harold Feld**: Anyone familiar with this able to say what's going on and what likely impact? The Canadian Radio-television and Telecommunications Commission has given Bell Canada approval to charge its wholesale ISP customers based on the bandwidth usage of their end users.

In its Telecom Order CRTC 2009-484, the Commission approved the use of GAS, or Gateway Access Service. In fact, two new speeds options were approved on an interim bases by the CRTC, along with mechanisms for usage-based billing rates, and a charge for excessive usage.

The CRTC also approved a request from Bell that will allow the company to charge small ISPs 75 cents for every gigabyte over 300 that their customers use.

Smaller ISPs and resellers of Internet services from Bell's network infrastructure say they will face pressure to use the same bandwidth throttles that Bell uses on its own customers.

The new wholesale pricing structure includes bandwidth limits of 2 GB per month for the lowest-priced wholesale DSL account and charges of as much as $1.75 for each gigabyte above that limit.

http://74.125.113.132/search?q=cache:0-9EIX3JZQkJ:www.mediacastermagazine.com/issues/ISArticle.asp%3Faid%3D1000338088+CRTC+Allows+Bell+Canada+New+Wholesale+Rate+Structure&cd=6&hl=en&ct=clnk&gl=us&client=firefox-a

McCollough: Confusing. Comparing usage and consumption with Capacity is bad. **Pricing based on consumption measured in GB does not at all follow the way costs are actually incurred within the "local" area, for the middle mile or through the backbone. Networks are capacity based, and actual usage does not impose any significant short term marginal costs. Only when total "consumption" begins to get close to the capacity limit (whether within the local network, on the middle mile connection to the backbone or - depending on the provider's particular arrangement for peering or transit - through the Internet) at a given time is there any impact. We may be moving from "TDM" to "IP" but networks are still engineered to handle expected peak loads. When a network consistently approached peak, then the answer is to install more capacity. This is a form of "lumpy" investment or expense.**

The information I've seen is that the heavy users are consuming during both on and off-peak periods. Their off-peak use has virtually no marginal cost impact.

At present prices on the "wireline" side are flat per month, all you can eat for the most part. They are averaged, so presumably the heavy users' "cost" is offset by the low users' cost. Notice how the providers complain about heavy users but never acknowledge that there is presumably this balance?

If the network access providers or regulators want to send "appropriate" price sig-

nals to "heavy users" then they should move to peak load pricing. But then they will also need to send "appropriate" price signals to "light" users by *lowering* prices. I see them wanting to raise prices for heavy users but they never volunteer to make the other adjustment.

Ultimately this is not really about costs. Except (recognizing Fred's concern about middle mile special access costs) in those places where a smaller network has to make a long run over private lines to get to the backbone. There is a cost there that the larger networks don't have to carry, but once again it is capacity-based.

It's about control and attempts by network providers to appropriate positive user and societal externalities to which they have no right or claim.

Cecil: Most IP commercial backbone pricing follows what Scott is saying. You bill on 95th percentile of usage - so you take an entire month, look at usage all month, then slice off the top 5%.

Here's an example from one web host site:

Top 10 Entry	Reading	Comment
100	2,090 Kbps	Ignored (top 5%)
99	1,790 Kbps	Ignored (top 5%)
98	1,200 Kbps	Ignored (top 5%)
97	960 Kbps	Ignored (top 5%)
96	840 Kbps	Ignored (top 5%)
95	825 Kbps	** "95th Percentile"
94	814 Kbps	
93	793 Kbps	
92	712 Kbps	
91	710 Kbps	

Here is a simple example that illustrates what we mean: Over a period of 500 minutes, 100 readings of both incoming and outgoing traffic have been recorded. Assuming the billing period is also 500 minute, then the top 5% of these 100 readings (the top 5, in this case) are ignored, and you are billed at the value of the 95th reading. If the top 10 readings of this set of 100 were: Top 10 Entry Reading Comment 100 2,090 Kbps Ignored (top 5%) 99 1,790 Kbps Ignored (top 5%) 98 1,200 Kbps Ignored (top 5%) 97 960 Kbps Ignored (top 5%) 96 840 Kbps Ignored (top 5%) 95 825 Kbps ** "95th Percentile" 94 814 Kbps 93 793 Kbps 92 712 Kbps 91 710 Kbps

As illustrated here usage exceeded the agreed upon cap - say 1,000 megs - by a substantial margin on several occasions, but there was no charge for this as the 95th percentile was well below 1,000 megs.

http://www.epidirect.com/Bandwidth/Understanding95thPercentile.htm

The Wikipedia entry on this is helpful as well:

http://en.wikipedia.org/wiki/Burstable_billing

This type of billing reflects the burstable nature of traffic as well as the lumpy nature of the real expenses to which Scott refers. The rest, as Scott points out, is shameless fiction.

McCollough: Thanks, Eric. Notice, however, that the terminology is confusing because although it refers to "usage" the exercise does not tote up how many bits traversed a pipe over a month. Instead it looks at how much is passing at a given moment - bandwidth or capacity used in a point in time.

The Wikipedia explanation Eric provides makes this clear - that we are looking at peak, not consumption over a month:

"Burstable billing is a method of measuring bandwidth based on peak utilization. It also allows usage to exceed a specified threshold for brief periods of time without the financial penalty of purchasing a higher Committed Information Rate (CIR, "commitment") from an Internet service provider (ISP)."

Feld: See, nobody at the FCC or in policy land knows this [stuff.] Not because we don't care, but because no one who actually knows this [stuff] bothers to talk about it. Then y'all get pissed at how ignorant the people making policy are.

Would it kill people who actually negotiate these contracts to put this [stuff] in one .. .regulatory filing? Or even a briefing on "here's how ISP pricing works." Policy, like anything else, operates on GIGO.

Cecil: Harold, Good points. A few things for your consideration and a couple of questions:

As to educating regulators, industry-side attorneys, government relations folks, and technical and economic experts put extraordinary effort into educating commission staff, ALJs and Commissioners. Those who participate in these collaboratives would agree that technical / informative sessions tend to be extremely productive. Scott and Chris S., among other members of the communications bar, in conjunction with their respective clients have put together incredibly helpful and informative sessions (and related filings). Not all are perfect, and certainly every piece has its slant, but few regulators are Solomon either. Moreover, the more slanted the piece, the less the exercise accrues to one's credibility; this is typically readily exposed in one of two contexts: (a) cross-examination; or (b) technical sessions on the record where staff and ALJs and Commissioners question technical witnesses (and lawyers, thankfully, are mostly silent).

As productive as these sessions tend to be, however, it seems the recurring problem is in getting from staff up the chain to bureau heads and then to legal advisors and then Commissioners. There seems to be an inverse relationship between rank and presence at these sorts of events. The problem is that galaxies of context and any hope of accurately and completely conveying meaning are lost. This is true both at the state and the federal levels. While there are be rule-based, pragmatic, and/or political reasons for this state of affairs, there seems almost universal dissatisfaction with process and results. Somehow we have to improve the quality and the scope of the conversation. (This goes to Susan's point: "When you understand the underlying technology and the hardware and software bits and pieces, Scott's writeup is pretty darn obvious.")

I'd be interested in yours or anyones' thoughts on any or all of these, including, for example, how those who build and deploy networks could do to improve this.

What methods work with our international brethren? Cities, how do you go about it? Any suggestions?

Broadband Stimulus What Difference?

Savage: I've been reflecting on my comment the other day that the stimulus money for broadband doesn't really matter because it's too small and going to the wrong places. On the one hand I think that is probably true in the sense that I meant it. But Susan and Harold in particular have given me a little pause. To the extent that the money goes mainly to ILECs (large or small) to do more or less what they'd do anyway, that isn't going to change anything. But to the extent

that even small amounts of money goes to things that are a bit outside the box in terms of entities funded or stuff paid for, there might be some demonstration effects that have resonance beyond particular localities.

Which raises the question: what might a municipality, a community group, or any other not-already-in-the-bit-pipes-game entity do with a modicum of stimulus money that would actually amount to something? I darkly suspect that if a non-player were to try to directly get into the face of an existing network provider, we'd end up with political quagmires (not to say incoherent "business" plans) of the sort that seem to have doomed muni WiFi. But surely there are things that are sufficiently orthogonal to just stringing fiber to schools, libraries, or homes - stuff that network operators will say they can do just fine* - that could be done that would be interesting and productive.

What might those be? I'm happy to be a curmudgeon, but I don't want to be forced to curmudgeonism by a failure of imagination.

* If some little town that isn't served by either cable or an ILEC wants to fiber itself because no one else will, that's fine, but I don't see that as interesting or in any way a game-changer. In fact, if you think about it, that sort of thing is a game-affirmer, not necessarily what right-thinking people want to see…

Thoughts?

Feld: The ones I personally know about are:

1) Creative digital inclusion programs that combine community-based programs with infrastructure build out;

2) Creative middle-mile linking 29 counties in the Appalachian region for mixed residential and public safety traffic.

Brian Harris: Some projects I've been helping with:

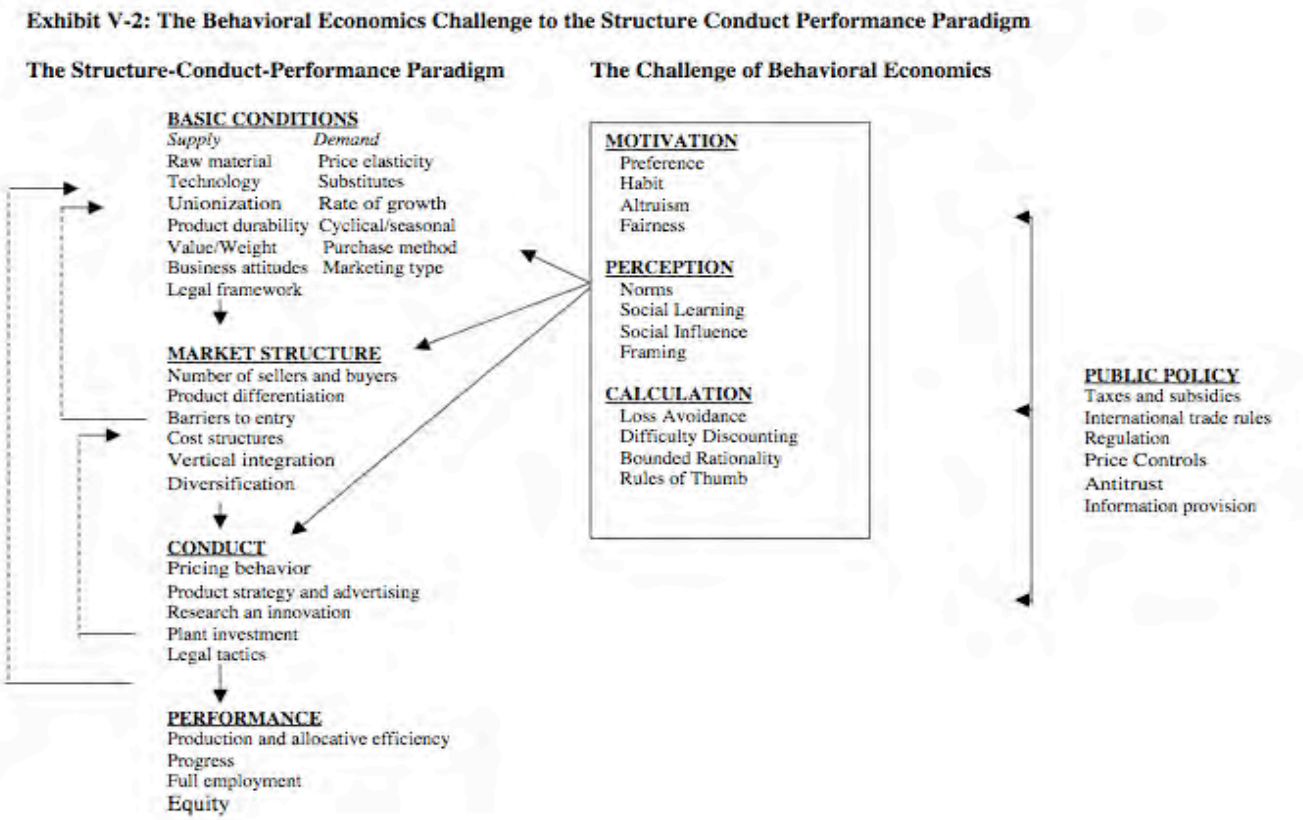
Fiber to the home passing ~3,000 very rural homes. A POP that is open to all service providers. Fixed wireless local loop on a pueblo.

These are loosely affiliated and their goal is as Chris described: "But to the extent that even small amounts of money goes to things that are a bit outside the box in terms of entities funded or stuff paid for, there might be some demonstration effects that have resonance beyond particular localities." What I hope results is that communities who want BB (and most do!) will learn that they can by-pass whatever roadblock is preventing it. They anticipate that absent the huge CAPEX, their OPEX will be met by the take rate. Based on info I've seen, their take rate projections are very conservative.

Cole: I hope one of those funded is mine. We have actually proposed to do "social apps" in fiber communities in 3 different (rural) areas of the country that are already building out FTTH.

Aug 27 **Cooper**: After spending almost 30 years analyzing market failure with the structure conduct performance paradigm, the collapse of market fundamentalism in the financial sector has led me to examine how behavioral economics can strengthen the call for public policy to direct market behavior into socially productive channels. I have decided to describe the observations of behavioral that affect the structure conduct performance paradigm in three categories -- Motivation, perception, and calculation. These line up pretty well with purpose, autonomy, mastery. The attached exhibit summarizes the synthesis. [See next page.]

Cole: I think Mark's chart is a big help to understanding how "behavioral economics" can produce predictions/ analysis that diverges from traditional economics. Thanks to Mark for sharing it, and it



will guide my thinking into the future.

That said, I question what is meant by the statement that motivation, perception, and calculation "line up pretty well with" purpose, autonomy, mastery. I will acknowledge the "overlap" of motivation versus purpose, although Dan Pink really meant that creativity seems to benefit from a "purpose outside ourselves," whereas motivation could be either selfish or altruistic. But perception does not appear to me to have anything to do with what Pink meant by autonomy, nor does calculation have much, if anything to do with mastery.

Pink also distinguishes between a realm where contingent incentives (rewards and punishments) does well -- mechanistic tasks -- and a realm where such incentives are neutral or negative -- creative tasks. So to pick up the Pink insights, Mark's chart would have to be divided in two -- those areas where the economic actor was called on for "mechanistic tasks" and those where "creative tasks" were required.

The fact that I disagree that the Cooper and Pink analyses "line up pretty well " does NOT mean that either is wrong -- I think both make major contributions, at least to my understanding. I would love to read Sara's comments.

Savage: Have you given much thought, yet, to the gritty, pragmatic question of applying behavioral economic insights to regulation? For example (to randomly throw something out), one of the points that Thaler & Sunstein make in *Nudge* is the importance of default choices. Today the FCC initiated an NOI about the wireless industry. I wonder if, retail competition etc. notwithstanding, behavioral economic considerations would justify the FCC in specifying certain default terms in wireless consumer contracts, with various nontrivial requirements imposed on carriers seeking to get a consumer to select a contract term that is different from the default.

Defaults and related issues in telecom history:

1. When consumer premises wire was deregulated, there was an elaborate debate, that I don't even remember how it came out, as to whether consumers would automatically be enrolled in a deregulated inside wire maintenance plan, on the theory that prior to deregulation, maintenance was part of the basic service charge.

2. With all the kerfluffle about dial-a-porn back in the mid-1980s, at Bell Atlantic we effectively solved the problem by ghettoizing dial-a-porn and chat lines to specified NXX (exchange) codes and making those codes inaccessible to any phone except where the subscriber had affirmatively indicated that they wanted to be able to reach them.

3. How to handle customers who did not select a primary presubscribed interexchange carrier as equal access was being implemented after divestiture.

4. Approval or lack thereof for various nonstandard uses of customer CPNI.

Wedeman: However, the nature of default options and whether they benefit people or harm them, is huge. This point was also made by Barry Schwartz of Swarthmore College in his book The Paradox of Choice. I don't necessarily agree with the entire oeuvre, but on this point he completely nailed it.

Christopher, I like these proposals/ideas very much. The thing about BE is that as a nascent field, it is largely confined to academe, with very few actually applying it in their work. You have provided some excellent examples of how BE can inform policy-making, and how leaders can structure programs in such a way that peoples' traditional hesitance to make hard decisions is prevented from doing them harm.

Cole: Chris (et al.):

You still owe us "van Till's law." But as to behavioral economics and regulation, you have already hit on one clear application:

1. Default matters -- opt-in versus opt-out is an absolutely crucial decision.

A second point, somewhat a correlate of the first is:

2. Calculation is a cost -- shifting calculation burden can be equivalent to shifting cost, and reducing calculation burden can be equivalent to saving cost. This, to me, is THE SECRET of "fixed price" rate plans. Consumers will pay an considerable (if not "enormous") premium to have predictable amounts to pay each month.

The T-Mobile ads about shifting rate plans are dead-on -- unless the calculation is matched by a benefit (such as, for the hetro male population at least, a visit from Elizabeth Zeta-Jones), the consumers will avoid doing it.

A third point, related to the first two, is

3. Simple beats complex, over a wide range of issues. It may be the rationale that is simple, rather than the rule itself, but still.... To me, this is part of the attraction of "free market" rationales for

various activities over "behavioral economics" rationales concerning the same subjects. The "free market" rationale is much, much simpler than the "behavioral economics" one.

Wedeman: The default parameter is about far more than just opt-in vs. opt-out: it's also about what happens when a person makes no decision at all? This is where the nature of the default option, and whether it serves the needs of the individual or the provider, becomes a crucial matter of policy.

Savage: But the "Behavioral Economics" rationale, as applied to regulation, can be simply stated as well:

1. Companies selling (regulated) services are cold, careful, calculating cyborgs trying to make the most money possible from consumers with known decision making biases and flaws. 2. Consumers buying (regulated) services are harassed, busy, limited-information-processing-resource people who don't have time for the details. 3. Therefore, over time, in the absence of external constraint (aka regulation) practices will evolve that transfer wealth from consumers to companies with declining corresponding benefits.

The point of the Free Market Myth™ is to say that competition amongst suppliers will so disrupt the operation of forces (1) and (2) that result (3) will not occur. If you believe that, I have a CDS-collateralized TARP-eligible asset - or maybe a bridge in New York - to sell you.

Cooper: The second step after behavioral economics is inserted into the paradigm is to identify the market imperfections that are endemic and consistently lead to market failures. The third step is to extract the implications for antirust and regulation. As described the attached graphic, there are eleven market imperfections that occur with regularity in "free" markets. The supply-side market failures have been the focus of structural economics, while behavioral economics is more related to demand-side issues and more recently the rediscovery of the importance of conduct as a source of market failure in perverse incentives, asymmetric information.

Regulation is the only answer because left to its own devices, the market will fail. The track record of New Deal prudential regulation of the financial sector is the definitive proof. Prior to the new deal financial crises occurred about once every 20 years. For fifty years, from roughly 1936 to 1986 there was not one major financial crisis in the U.S. As the Reagan revolution began to repeal the New Deal regulation, they financial crises returned, with about twice the frequency because financial innovation speeds the development of imperfections. The debate is no longer about whether to regulate; the challenge is to decide exactly what to regulate and how. Setting default values (or minimum standards) is an obvious place to start, but only the beginning.

Savage: Behavioral economics hits the Chicago School where it matters. It shows that people don't in fact make decisions "in their own best interest," which is required for the basic neoclassical model to make prescriptions, i.e., for them to say that the result of an unfettered market is the "best" achievable in some sense. Macro stuff like Keynesianism and Marxism doesn't quite get there, IMHO.

Kushnick: I don't know about schools of economics. Kushnick's law is based on predictable behavior of both the phone companies and the regulators - the idea that free markets exist and they work is pure poppycock. It is based on trajectories of behaviors - and it can be different for different companies within a segment, but..

For example, I can predict the outcome of mergers when SBC did them because

SBC, under Whitacre, was a 'slash-and-burn' capitalist --- What's good for Ed Whitacre was to lie about the outcomes of the mergers then, do as little as possible,

When I say 'slash and burn' -

When SBC bought Pac Bell, who did have some plans to build out CA, Whitacre smiled, then closed everything. When SBC bought SNET, smile the burn, even though SNET was building out some cablecos. When SBC bought Ameritech --- Smile then burn, even though Ameritech was building out some cablecos.

And, when SBC wanted to buy AT&T, --- promise them broadband -"U-Verse"- Always worked before. - then roll out inferior products to be as low cost (and inferior) as possible. No sense of 'what's good for the consumers or state ---

It is also the regulators, that can be predicted, especially the previous FCC under Powell-Martin - their answer to everything was - the market will fix it, we don't need data, we know what's best - arrogance and the underlying preference to prefer the incumbents --- and all answers came through that filter.

And the current FCC? Well, if the previous Democratic FCC under Kinnard is the example --- Smile, Say you care about them, do some things but make sure you don't really rock the boat is what I'm expecting. --- Again, it is about the gestalt of the DC mentality in play.

There is also market power. When you have so much money, you can control the situations. For example, Verizon and AT&T own state legislatures. It's a fact of life. In some states, the outcomes of laws made when these companies are involved will be - they win.

The other side doesn't have the resources, or one other thing - The Focus, tied to resolve. - What I mean is ---

I shoot pool and used to be a hustler. Won a gas station, for example…(did know the guy was in serious debt…) I had a pool table in my house as a kid, practiced for hours. I had a teacher who used to do tournaments. ---there are those that simply hit the balls, good shooters who can get balls in.--- But they are based on luck of the balls going where they will go. A really good player is thinking 3 moves ahead and is planning the shots to line up so that the shots will be simple ---

And, you play defensively as well. You plan on harming the other player's shot, instead of hoping it will simply work out bad for them. Verizon will win because they can target their outcome, spend a great deal to get it, coordinate multiple layers of activities in state and national campaigns, and the other side, et al, are like the bad players --- they can't mount that kind of defense. They don't have the resources, they can only hope luck is on their side… At best, the other side can think strategically, and maximize their impact with small budgets for occasional wins --- or luck out with a judge (luck of the draw sometimes) or even find a judge who they know their behavior or patterns. So, you can predict outcomes based on their behavior as well as the fact that the behaviors of the opponents are also predictable…

There are wild cards, but, almost everything is predictable within a range. --- you just have to understand the inputs of the data and get them right. You might have trouble with the timing - I predicted the Dot.com crash to happen in 1997-98 because I didn't understand that there were seriously flawed capitalists who would do 3-5 rounds of financing, instead of the usual 2 or 3. But, I used to be amused when all of the analysts kept saying - no, this is a totally new paradigm, this is not like the old -'new-media', or that it would defy gravity or the laws of basic business eco-

nomics - like being profitable… However, I had seen multiple waves of new 'the hot next things' - the paperless office, the information superhighway, the flash-in-the-pans like 'portals' or the 'push technologies or… 900 services or

Wedeman: I seem to be consistently catching this conversation at the tail end of the day, when my ability to hold a thought long enough to write it down starts to wilt.

However, I think part of the issue here is that this discussion is entirely focused on macroeconomics, the grand view, the big picture. This is very much at odds with the way behavioral economics approaches the question: what are the 'laws' governing the behavior of people and markets? Please note: o The way individuals behave when acting as individuals is markedly different than how they behave as members of a group, no matter whether said group is composed quilters or commodities traders. o It is not wise to assume that peoples' behavior is context-free. In fact, context is all-important.

o There is too much emphasis here on top-down models. My view is that the search for the 'right' model to describe the grand scheme of things is a bit like the search for the holy grail or the magic bullet. It is about us, and our wish to find coherence in a world where there are many forces of which we are not aware, many of which we are aware but can't control, and just a few over which we believe we have control.

o Note that in Behavioral Economics, there are not various 'schools,' identified with the names of their progenitors (e.g. Keynesian, Marxist, Friedman/The Chicago school, etc.). That is because in behavioral economics (AKA economic psychology), the discipline was built on the basis of research. Hypotheses were developed. They were tested through empirical research. Some were found not to hold water and went away--others were tested and retested before they were integrated into the overall theory. The theory belongs to everyone and no one. It is not a field where one follows a particular doctrine. Remember: theory comes second. The behavior that gave rise to the theory comes first. Behavior is highly situational, and the patterns differ based on one's identity, which is also situational. At the end of the day (literally and figuratively), it's a fractal world, after all.

Savage: Thanks, Sara. Your point about micro v. macro is sort of what I was struggling to say. In one sense it is a negative point: the grand theoretical equilibria (neoclassical theory) or grand sweeps of history (marxism) seem to have turned out to be fantasies. The real world is messy, fractal, etc.

Are CLECs and Open Networks a Good idea?

Sept 4 Bruce Kushnick wrote: (sorry for cross posts. Curious to get everyone,s take on this.)

Been talking to lots or people about the future of the industry and many feel that we should not dwell on reopening the networks and that the ISPs and CLECs are a dead issue ---

Goldstein: ISPs and CLECs need not be a dead issue. Many are still floating around, struggling to operate while under attack from the ILECs and their regulator allies. The survivors are agile and thus more dangerous than the dead ones.

Kushnick: Can the networks be open?

Goldstein: Theoretically, yes. It's just a matter of political will. Most other countries get it. But then other countries have universal health insurance without fear of imaginary death panels.

Kushnick: Will this FCC do it?

Goldstein: Good question. They're not on track, but they have some good people there.

Kushnick: What would it take?

Goldstein: Again, political will. Plus a redirection of effort from the fools' effort of "network neutrality" (health care plan: don't get sick) towards a mechanism that would sustain properly neutral behavior.

Kushnick: Should we bother?

Goldstein: Yes.

Kushnick: As summer wanes, is this the autumn of competition, or winter or can there be a spring?

Goldstein: Good question.

Sheldon Renan: Networks need to disappear, i.e. become transparent and merge into connectivity fields.

More to the point raised by Bruce, the owners and operators of networks need to "get out of the way" of optimizing access and sharing of resources. I don't know how you resolve the business, governance and security model issues that are implicit in moving to what I've been calling "The Field".

I just know that it is critical that we all recognize that this is in all probability the only way to assure sufficient opportunity, safety and sustainability going forward for the many communities and species who share the planet.

My current mantra is: clouds above, fields below - access, safety and services everywhere. The issue is not about the network, or networks. The issue is about optimizing what connectivity can do.

We really have to begin thinking outside the network, to a post-network age, where what the network enables becomes part of the DNA of... everything.

Cooper: "Get out of the way" is not an answer. If you so not have a business, governance or security model, you don't have a network. It won't be built and maintained and it won't function.

Cecil: Get out of the way is not the answer if you are inside the beltway and make your living sustaining the bubble. It is the ANSWER if you are sick and tired of "consumer advocates" and "company types" and "regulators" telling you what you can and cannot do with technology. Sorry, but no thanks. We, the people, don't really need any of you.

Cooper: What you need is a business model, a governance model and a security model.

COOK Report: agreed Mark... ya got one for us?

Cooper: Who is the us and what do they want to accomplish? The government is bankrupt, the Congress is paralyzed and the FCC is in a coma. I spent more time trying to make the unbundling regime work than just about anyone, but its gone and it ain't comin' back; ditto with muni-broadband.

So, which are the most important piece parts of the current terrain that can be tweaked to make things better. Special Access, universal service fund reform, a little more unlicensed spectrum, preserving network neutrality as we now have it?

In the alternative, you can wait for "We the people" outside of Washington to rise up and elect a genuinely progressive government that will revolutionize the communications space.

Renan: What you need is to know first and foremost is where you really need to go.

Then you start by flipping the model... look at what you

want to be able to enable to get there, rather than how to support older models that are ultimately NOT sustainable because ultimately they don't lead to a sustainable future..

And then build awareness and agreement with that vision, that goal and what kind of infrastructure is needed to get there.

And then, you start trying different models for each vector of challenge... technology, security, governance, business.

You responsibly give people and companies and infrastructures time to find new business plans to fit the new realities. You give them a way to do what most business must do anyway, migrate their business "up the stack." Give up the commodity areas to commodity pricing and free.. and find the next level of new value and high value.

But you don't under any circumstances let incumbents continue to be extortionate in establishing and maintaining models and tariffs that are effectively deny life-critical access, services and opportunities to the vast majority -- and that means everywhere. Not just the U.S. and Europe.

The most important reality remains that life and sustainable opportunity for all the communities and species that inhabit from the planet is more urgent and has ultimate priority over the profitability of a few hundred firms and a few hundred thousand middle and senior executives.

Otherwise, no joke, we are headed for a world of frighteningly unintended consequences.

And the most frightening of those circumstances we can metaphorically summarize in two words.

Soylent Green.

We are now at risk of consuming our own future. And the future of all those around us.

And the key component to mitigrating that is radically optimized connectivity and communications. So that everything CAN work together with as little friction and effort as possible.

Cecil: Exactly. We repurpose government. We get government into the business of enabling individuals rather than apportioning the very scarcity battles it inevitably creates and sustains. Those who have ears listen and those who have eyes see; those with courage embrace change; those without try to kill it. They are unaware of a great irony. You cannot kill change without changing. This is why the 1934 Act has swallowed itself - regulators generally never read statutes and generally run as far with them as they can. They don't get overturned that often; it's expensive, time consuming and then there's the presumptions that as a legal matter (and even where review is "de novo" most fed district court judges think like trial judges rather than appellate judges, so they tend to spit the baby rather than apply law) and as a practical matter (my taxes and my client's taxes are paying for the guys on the other side of the case - both the regulator and the incumbent) tends to favor both the legal and political incumbent (aka regulator) and the market incumbent (i.e. the incumbent). (Consumer counsel typically line right up w/ the incumbent; sorry, but it's a fact). But when this goes on for long enough, the law is not even swiss cheese; it's Cheese Whiz(TM) in a handy spray can (keeps for centuries too). The FCC cannot fix it. Congress could, if they had vision and courage, but few have the kind of cash it takes to fund that level of vision and courage.

Thus, the near term is simple. And the final gulp is quite easily executed. The final irony - in this Act - is that it doesn't matter whether that case is won or

lost. It only matters that the litigation is brought as no-law will collide with law. A federal circuit court will choose law. This time they have no choice.

If and when it hits a federal circuit court, finally, we'll be back in the business of enabling technology rather than disabling the very change that is necessary to free up massive innovation. (This is a basic lesson of regulatory litigation; you never bring a single case. You bring at least three. If you are good enough and fast enough, you'll win on one of them ... even if the other sides think you are losing.) This case could be brought in one of six ways, oops, make that 18. Yep, that is possible.

But even bringing the case doesn't matter. The case will bring itself. There's just no stopping the flywheel. Were we detached, neutral, and sensible about this, the FCC would just do what really needs to be done, but they are politicians, not judges, so I expect we will see yet another legal train wreck in slow motion. This time, however, there might not be any room left in the market or the statute to slide through the doorway of complex, heavily lawyered, legal/economic/technological contradiction again. Maybe, but the gears are moving closer and closer with each contortion ...

So, in some respects Sheldon is dreaming; in others he's telling us that we are dreaming ... But I'd rather dream with Sheldon than sleep with DC ...

Cole: I propose one "rhetorical flourish" to this debate.

Mark calls for a "business model." I suggest we need a "social model." Neither the highways NOR the "delivery of electricity" had a BUSINESS model, but both had a SOCIAL model of why we wanted either (a) a set of federal/state/local roads to reach everywhere or (b) a set of generation/transmission/distribution wires to reach everywhere. It was NOT because each individual was willing and able to pay the cost of reaching him or her; it was because "society" had decided that it was better off if "virtually everybody" was touched by a road and electric service. Until and unless "society" (in the US, that means something more than a bare 50% plus one majority) feels that it is better off with "virtually everybody" connected, "business models" will NOT get us connected to "virtually everybody."

Cooper: I wholeheartedly agree. In 1930 85% of urban households had electricity, but only 10% of rural households did. This economic divide was a compelling public policy issue in large measure because 80% of the population resided in rural areas and they were brought into the polity by the radio. I have never seen a breakdown of rural urban telephone statistics for 1930, but I bet it was similar. Atkinson: A useful sanity check. As you correctly note, the social policy was that "virtually everybody" had access to electricity and roads and later to telephones, etc. And that by definition means there are people/houses in this country that do not have electricity or immediate access to a paved road or telephones today. For some it is a matter of personal choice to live in a very remote area and forgo these "benefits" of modern life and for some it is a violation of their religion and for others the cost of electricity, telephone and a paved road is simply prohibitive. Telephone penetration (wired) has never been more than about 95%. Is 95% a reasonable target for society for broadband?

Cole: The big insight (IMHO) of the late, much lamented Mike Bookey was the sense that "we can do this" based on what we did with electricity and roads and (wired) telephone. We do have "virtually universal" service for all three -- from almost remotest Alaska to most urban New York -- there is a road to the plot, and telephone and electricity available to it.

When and if "we" feel the same about broadband, we can (an WILL) see that "broadband" is available to it as well.

Cooper: Personal choice is a [poor] argument against universal service when 98% of households with incomes above $75,000 have telephone service. The fact that 2% do not choose to subscribe should not stand in the way of ensuring that 98% of households at all income levels subscribe to telephone services. With broadband, about 80 percent of households with incomes above $75,000 subscribe to what is currently defined as broadband, but among lower income households only about 30% do. As I said at our universal service workshop, our goal should be to raise broadband penetration to the level of telephone penetration and the first step is to raise the penetration of lower income households, that is where the deprivation of being disconnected occurs. Attached you will find a reanalysis of a recent PEW report on broadband penetration that some of you may have seen. As usual, PEW had the wrong headline and buried the real implications of the data, which demonstrate that being disconnected means being disadvantaged and disenfranchised.

McCollough on September 11: I tend to think the best analogy is to utilities rather than roads, although we can learn from roads too. A mix of public, quasi-public and private entities provide electric, water, wastewater and natural gas utility service, and their treatment does vary somewhat depending on many things. But there are some basics.

Electricity is dabbling in "competition" for point of sale and/or generation, but the results to date are not happy ones. Transmission and distribution is still regulated, using something like rate of return/revenue requirement.

Natural gas has some competition in capture and transmission, but distribution and point of sale is still regulated, using something like rate of return/revenue requirement.

Water and wastewater are still regulated almost top to bottom, and wastewater is typically provided by a public or quasi-public entity. Both are still rate of return or cost-based/revenue requirement for the most part.

But what almost all of these utilities reflect is the idea that the profit should come from the provision of the utility service itself, and most important is that the utility is not allowed to capture the externalities and societal benefits that flow from having them available on a mostly ubiquitous basis.

Consider the societal benefits/externalities that "flow" from having good drinking water and sewer/wastewater utility service available. One immense benefit is that people are healthier from drinking clean water and not being around excrement. Society as a whole is more productive and medical costs are lower. The utilities are not allowed to capture those benefits and they flow to society.

The communications industry is desperately trying to capture for itself the externalities and benefits that come from widespread availability of communications networks and Internet in particular. They want more profit than they would get in an environment where they get back their expenses and secure a good return on and of their investment. They want some of Google's profit (because "Google is using my pipes"), and they are willing to deprive society of these immense benefits through scarcity and rationing until they have their way.

There is a business model for high-speed symmetric network access - the infrastructure necessary to get people on the network. It should be common carrier and it should

be subject to cost-based ratemaking, with the same averaging that is done in gas, water and wastewater. The provider would get a reasonable return on investment and a return of investment. They'd have lower-risk for the investment because the return would be more likely. Society could benefit from the externalities. All the rest of the features, functions and services that run on top of the infrastructure would not need to be subject to economic regulation since they'd be competitive.

Common carrier. Cost-based ratemaking. Reasonable rates, that do not include capture of externalities. A whole bunch of this (not all, but much) is really natural monopoly anyway. Fiber is the essence of a natural monopoly. Unlimited capacity, constrained only by the electronics at each end. Continuously decreasing unit costs. The notion that there should be multiple fibers to every home is ridiculous. It would be the essence of "wasteful competition."

We'd once again have some widow stocks. That would be nice for my someday widow.

IPv6 Transition

Editor:The discussion here runs through September 16th. It did not stop however for another week. As this issue is already overly long I will present that follow up next month. This is a hugely important topic that is going to seriously begin to disrupt the Internet in about another year. Very few people see it coming.

COOK Report: In late August I asked about a New Zealand visit by Vint Cerf to discuss IPv6 conversion.

Keith Davidson responded: It was InternetNZ who sponsored Vint to visit NZ - we ran 3 IPv6 meetings in Auckland, Wellington and Christchurch, with Vint in Auckland and Wellington only. The meetings were well attended, and were primarily aimed at CIO's and CTO's, who were the bulk of the audience. Vint did a great job, as did Tony Hain as our two keynote international speakers. We did a survey of NZ industry just before the meetings, and are in the process of repeating the survey, to see what messages have got through to the CIO / CTO community.

We did the job I think, of raising awareness of the issues around IPv4 depletion, and the growing need to consider how to build IPv6 into network planning.

More detail available at www.ipv6.org.nz - see the link under IPv6 Hui (Hui is an NZ Maori word meaning meeting, conference etc) for these details.

Kamal Shehadi: on September 15: I am beginning a concerted effort - with industry players in Lebanon- to start the transition to IPv6. I was wondering if you had any information/reports/advice on the role of regulators in facilitating this transition. Your advice is highly appreciated.

Rudolf van der Berg: In most countries it's quite hard to require that companies use a particular technology, including in mine, The Netherlands. What is possible is to stimulate and promote. In NL we now have an IPv6 Taskforce that tries to get people enthusiastic.

RIPE NCC is doing a lot to promote IPv6. You might want to have a look at the contents of their Roundtables here. http://www.ripe.net/meetings/roundtable/feb2009/presentations/ Next week there is another roundtable here in Amsterdam

Tom Vest (external consultant, RIPE NCC / Science Group) : Other resources that you may find useful:

http://www.ipv6actnow.org/

-- especially: http://www.ipv6actnow.org/category/all-news/government/

http://www.getipv6.info/index.php/Main_Page

The OECD has also made some efforts along these lines, c.f.:

http://arstechnica.com/old/content/2008/05/oecd-notes-ipv4-depletion-nudges-governments-towards-ipv6.ars

If you have any specific questions, and I'll be very happy to try to find the answers for you.

Fred Goldstein: IPv6 is controversial and there is no universal agreement that it is going to be widely used, or that it is the right answer at all. IP itself developed in a free market that existed at the time in the United States, with the Internet legally considered to be content, not carriage.

Since "Internet" grew up without legal bounds, the word itself is not well defined, so I have suggested this formal definition, which suggests that "Internet" is a business model, not a single specific network:

"A voluntary agreement among network operators to exchange traffic for their mutual benefit."

The Public Switched Telephone Network, in contrast, is a regulated (not voluntary) universal network. This is not a bad thing. simply different. It is not a better or worse model. I see the two as complementary, with PSTN really encompassing more than voice, but the whole regulated "telecom" carrier infrastructure, including fixed and mobile aspects. Internet thus complements PSTN and generally depends upon it to provide protocol-neutral carriage.

Because Internet is voluntary, ICANN is merely a consultative body. Separate private networks with their own address space could (and do) exist. Even private DNS spaces exist, though relying on them could be risky. The point is that they are voluntary content, not carriage.

Therefore the telecom regulator should not try to force an IPv6 transition, though it should not prevent IPv6 networks from developing. Internet protocols should be unregulated, and regulated carriage should allow it to develop freely. This technology can change far faster than regulators can keep pace with it.

A government can use its purchasing power to help the market, though a small country has little market power except to set up, for instance, a national backbone. The US government requires that many of its purchases include dual-stack support for IPv6. However, it sees little use. (A similar requirement for OSI support in procurements, GOSIP, was imposed in the mid-1980s, but that also saw little use.) When this was recently suggested to a state government that is roughly on a similar size to Lebanon, for instance, they dismissed it as impractical and unnecessary.

Shehadi: I fully agree with your comments that this is not an area of business activity that should be regulated by the regulator but to be left to the industry. In this case, we will try to bring together the different parties and leave it to them to decide. The regulator can play the role of facilitator - no more than that.

Savage: Could someone help me to understand why one would NOT convert to IPv6? Serious question. What are the costs to ISPs, providers of web sites, etc., to do the conversion? Assuming that it solves the address exhaust problem, and gives us the

opportunity for a fresh(er) start on the routing problem, what's not to like?

(I know there are costs… I'd just like someone to summarize them if possible…)

Ecclesine: In battery powered meters, there is an energy cost per octet transferred.

https://mentor.ieee.org/802.15/dcn/09/15-09-0312-02-004g-phy-and-mac-proposals-for-low-power-consumption-sun.pdf

If a meter does not have to talk to every grain of sand, why make it support a 128-bit addressing scheme?

Goldstein: Really, seriously, I wouldn't do it.

Bigger headers=more overhead. Routers don't yet do it in the fast path, so performance is slow above incidental levels of usage. This might change in the future but don't bet on when. Insecurity in MAC-based low-order address assignments, when done that way (which was the original idea).

But mostly, IT'S STILL IP, WARTS AND ALL.

It still doesn't address nodes, just points of attachment. So technically it is a layer 2 address, not an internetwork address, even though it was designed to be one. Think "Strowger" rather than "LNP". So a node or network needs BGP and its own AS in order to be multihomed. This worsens the next problem:

MORE address blocks causes MORE BGP overhead as routers need to keep track of more routes. This is the fatal flaw in IP which is leading to its "Y2K" moment, NOT address exhaust. Every time some jamoke in Kazakhstan dual-homes a network in order to get redunancy, every backbone node from Jo'burg to Yellowknife knows about it, and monitors its status in real time. PSTN analogy: Country code, NPA and NXX are all one variable-length field assigned without regard to geography, so the worldwide LERG is 300,000 such entries changing in real time. You may be 12029371235 in Virginia but the house next door, who has a different provider, is 334171855324, and the network needs to know that +3341718 just lost its link to one tandem and network 1202937 now has to route via a different path, now peering in Amsterdam rather than Pennsauken.

Tom Vest: Costs of conversion for end sites:

1. Capex to replace any remaining old hardware that cannot support IPv6. -- Some IPv6 features in some kinds of hardware are still less reliable than their IPv4 counterparts.

2. Training costs to bring IPv6 ops/engineering experience up (or at least closer to) to IPv4 standards.

3. Opportunity cost of (1,2) over and above the cost of doing the same things that one would do with IPv6, albeit with unique public IPv4 (while one can still obtain "new" and/or repurpose currently available IPv4) or private, non-unique IPv4 (ala RFC 1918).

4. Local non-availability of native IPv6 traffic exchange options (compensated or settlement-free) for most prospective IPv6 networkers.

5. Competitive risk of investing heavily in IPv6 "too soon," i.e., before the market has clearly revealed IPv6 to be a viable equivalent (at least) successor to IPv4.

6. Opportunity cost of foregoing the (speculative) prospect of massive appreciation in value of de-facto privatized IPv4 holdings.

For transit providers: all of the above plus

7. Opportunity cost of foregoing the possibility of passively acquiring vastly expanded market power / profitability as IPv4 address lessors.

For facilities-based access providers: all of the above plus

8. Opportunity cost of foregoing the possibility of passively re-acquiring tremendous market power, i.e., by capitalizing on the privatization of viable public IP addressing to "re-internalize" and thereby foreclose the "overlay" aspect of TCP/IP, which has enabled packet-switched services to "bypass" many manifestations of facilities-based/ territorially rooted market power for the last couple of decades.

As Fred's comments reveal, there's also a (smallish I think) contingent of people who find TCP/IP in general, and IPv6 in particular deeply distasteful. If you hate TCP/ IP today, then IPv6 is not likely to make you like it any better.

COOK Report: Tom, this is one of THE most interesting posts i have seen on this subject. Not only do you lay out costs with no benefit accruing to those who incur them but you also suggest that there is benefit to many players in NOT incurring any costs .... that is NOT converting.

OK what will carrier grade NAT look like?

Vest: Several different varieties are in the works. Since the actual behavior of all such systems is determined as much by implementation choices and operational practice as by architecture, what they'll actually "look like" is anybody's guess at this point. I guess we may find out one day soon.

COOK Report: The tailor made walled garden? Is this the supply bottle neck that will enable them to hike prices to their version of an "internet"?

Is the ars technica article right that carrier grade nat will be the death of p2p ? No more skype and bit torrent? five years from now will gov't be worried not about ftth but rather about routable addresses?

Vest: I decline to speculate on particulars at this point. However, if IPv6 dies on the vine, and the introduction of IPv4 address transfers succeeds in increasing the "allocative efficiency" of the IPv4 distribution, then over time I'd expect that to have a significant (damping/truncating) effect on things like the "long tail," "peer production," and any other Internet phenomena that depend on non-monetary exchanges, uncompensated productive activities, etc.

COOK Report: I well remember a 1995 interview with Noel Chiappa lamenting the inadequacy of BGP routing and saying that we needed something better but that getting it would take at least five years....

there isa LOT of economic infrastructure that is at risk..... do governments have a clue?

or cn we divide the work into national intranets and router between them?.

whatever was the group that bought skype thinking?

coming..... the telcos last laugh?

Isn't this issue of huge strategic importance to google?

Vest: It's probably fair to assume that Google is hedged against all possible outcomes. The rest of us, not so much...

That said, there appears to be relatively little concern about these risks -- so maybe I'm worrying too much ... (?)

Vint Cerf: [referring to Gordon's comment on the possible benefit of doing nothing] on the other hand, if your business is either to sell access to Internet or to use Internet to bring services to users, you need address space to do it. NATs are not server or P2P friendly. Despite Fred's noisy assertions, it makes much more business sense to adopt a posture that allows continued growth of

the Internet user base. Google has invested in implementing IPv6 in parallel with IPv4. It has been working towards this objective for almost 2 years in part to avoid engineering in a crisis (a bad practice).

Davidson: I wonder about use of the word "convert", or even the subject of this thread "IPv6 transition" - these words imply moving from IPv4 to IPv6, but the reality is that generally people are adding IPv6 on top of IPv4 (commonly dual stacking).

Tom Vest covers the costs angle reasonably well, but I guess the point missed is that some costs can be minimised by building your IPv6 plans into your overall network strategy, as new kit is being deployed etc.

I note that half the Internets root servers are now resolving DNS lookups in IPv4 and IPv6, and a quick scan through the Asia Pacific regions country codes indicates around half the ccTLD's are also resolving IPv6.

NAT doesn't appear to be the ultimate solution to IPv4 depletion, as NAT doesn't really preserve the end to end principles of the Internet.

So given the overall costs are not immense, and that there is no need to panic in adding IPv6, it seems to me to be quite straight forward to go ahead and do it in an orderly fashion.

If, due to the shortage of IPv4 space, pockets of IPv6 only Internet start to emerge, or if some applications or services are developed for IPv6 only, then you'll be ready for it..

Cerf: I agree with Keith - it is simply a matter of implementing IPv6 in parallel. Eventually, when the last IPv4 addresses have been handed out, those who wish to stay in contact with the full Internet will need to have IPv6 as well as IPv4 available to them. ALGs are hacks that may help but won't be nearly as useful as dual stack in my opinion.

Don Marti: But by that time won't half of "the full Internet" be behind hundreds of flavors of weird firewall/NAT setups? So going IPv6 just connects you to the other IPv6 nerds, so maybe you can "git pull origin" and receive the new versions of your favorite source code a little faster, but that's about it. ISPs become NATSPs, and the NATSPs, the CDNs, and large net companies buy, sell, and trade the IPv4 addresses.

RealAudio, new versions of web browsers, Flash, Silverlight, and BitTorrent all got adopted because the end users were able to get something that they couldn't get with the previous technology, and they went through the pain to get it. Are there companies to which the IPv6 transition is important enough that they're ready to give something to the end users in order to push it? For example, would a VoIP company offer big blocks of free dial-out minutes to the first n customers using bona fide IPv6 clients? Would a media company that doesn't want to get jacked by CDNs set up free IPv6-only streaming of some worthwhile movie or event? Or, since the value of end-to-end goes to all the endpoints, not just the ones that invest in pushing end-to-end, does no one company have the incentive to encourage IPv6 the way Microsoft was willing to sponsor the Olympics to push Silverlight?

Vest: I agree with both Vint and Keith that the immediate and positive outlays to support IPv6 -- both for (intradomain) customers as well as (interdomain) peers -- are likely to be relatively modest for most network operators, esp. after factoring out normal periodic technology refresh costs. I think it's probably fairly clear to all that I also agree -- with extreme prejudice -- that a future of ever-increasing addressing heterogeneity/segmentation (or any other

development path) resulting in increasing variability orun-certainty of inter-domain communications would be extremely unfortunate for everyone in the long-term -- although perhaps very commercially appealing to some in the short term.

Agreeing as I do about the relatively modest positive costs, I am left with the assumption that what I've described as the "strategic uncertainty" and "opportunity costs" are actually the biggest hurdles. Unfortunately, my own sense is that, for the moment, every day that passes leaves the gap between "time until IPv4 non-availability" and "time until IPv6 substitutability" that much wider. If this perception is not off-base, then the resulting trend is likely to continue ratcheting up both the strategic risk/uncertainty for those who might otherwise be happy to lead the transition, as well as the "opportunity cost" (or if you prefer, speculative appeal) of a non-transition for those who might benefit from the status quo ante distribution of usable IP addresses. Other passive/indirect beneficiaries might also include the champions of aspiring successor internetworking protocols (e.g., PNA, IMS, et al.), for whom the closure of TCP/IP might provide a unique window of opportunity to "shine"...

Still hoping I'm wrong about all of this, but markets seem to be pretty indifferent to hopes and fears (my own anyway)...

Savage: By the way, how bad is the problem of what I would call, for want of a better term, address hoarding? If Joe's School of Auto Mechanics and IP Network got a /8 back in 1987, and has 2 active hosts on it, presumably the "right" answer (putting aside the questions of authority, enforcement, etc.) is to tell Joe to give back his /8 and deal with it.

Now, I get that since you assign blocks based on powers of 2, if I really, really need 129 addresses you have to give me 256, and if I really, really need 32,769 addresses, you have to give me 65,536. That obviously imposes some overhead.

But is there a lot of "wasted" address space out there, in the sense of legacy assignments to people who really, really don't need anything close to the amounts they have?

Cerf: The rate of consumption is sufficiently high that recovery of unused or unallocated space would not extend the lifetime of IPv4 by more than a few months. better to put effort into IPv6 deployment in my opinion.

Vest: With respect to cases like your hypothetical /25 ~ /24 example, I know that the IP Resource Analysts that would have handled any such requests since the mid-late 1990s (depending on where you sit) would have allocated the smaller of the two possible address blocks. Lots of address resources that were distributed before CIDR and the RIR system were in place are currently either completely invisible, or only partially visible in the form of smaller address routed blocs. Their public non-visibility does not mean, however, that all such resources are idle -- some (unknown) quantity may be actively used in private networks that are seldom (though not necessarily never) exposed to the rest of the Internet...

In any case, the expectation that we might even come close to 100% efficiency of IP address utilization is not well supported by historical experience. The historical anecdotes preserved in these RFCs are illuminating on this point:

http://www.faqs.org/rfcs/rfc1715.html

http://www.faqs.org/rfcs/rfc3194.html

Executive Summary

IT, Networks and Medical Care

General issues.

This unusually long and detailed article compiled from my summers experience surveys what I believe to be the most up to date and most critical issues of the application of computers and information technology networks to healthcare. I point out that it is a system without a roadmap and without any recognized rules of auditing and accountability and I use my own experience over the last decade with spinal osteoarthritis and degenerative osteoarthritis of my hip joints to point out the risks and medical wastage of navigating within the current system.

The first application of information technology that I ever wrote about was more than 30 years ago with Dr. Larry Weed's Problem Oriented Medical Information System. As I look back I can see now how this was the first instance of what has for me become a career in identifying revolutionary technologies and trying to connect them to a larger marketplace and into broader knowledge. I have been able to reconnect with Dr. Weed and also with the current director of customer relations for the PKC Corporation which Dr. Weed founded in 1982. Before I started I knew only that Larry Weed's revolutionary ideas have not yet been adopted. I found out however that they have gone much further than I realized. I have spent many hours this summer delving into his knowledge coupler concept. I have found that I like it very much and wish him all success. I have also experienced - with a left hip replacement this summer - the current resistance of these very good specialists to becoming patient-centered rather than provider centric. There is a long long way to go. I show this in the chapter devoted to my personal health history.

The most critical issue however is that the predominant direction of the healthcare debate other than the political ideologies upon which it is foundering is to as Larry Weed says speed up the chaos by applying networks and computerized records to diverse systems that cannot communicate with each other that are not logical in the sense of them being auditable across providers and, as Larry's son Chris wrote nearly 20 years ago, is that while the purpose of medical research is to discover new knowledge, the purpose of a medical practitioner is to apply existing knowledge to the problems of the patients who come to this practice. In keeping with his premise, Larry has developed a rigorous system for linking this combination of medical records according to the problem to which they relate rather than to the source from which they come and then to a rigorous computerized database that takes a listing of patient problems and clinical observations and tests and couples it in a rigorous way according to the patient's health history to existing medical knowledge producing guidance for the physician that far exceeds the capability of the human brain.

I close this long investigation with a summary of a new approach that is just beginning to be discussed. It is the concept of the patient centered medical home. IBM has produced quite an outstanding white paper from which I quote. From the research that I've been able to do it seems that this concept may be embraced by insur-

ance companies and come out of this round of health-care reform to replace the health maintenance organization concept that was the product of the last round of reforms in 1994.

This new approach is oriented to the Internet, to web-based interfaces for health records, to active patient involvement and electronic communication with their physicians and with indeed all members of the healthcare team. I find it very very attractive especially considering how it could have made my experience with my second hip replacement this summer much smoother and less fraught with risk.

Although it does not yet use the knowledge coupler concept or problem oriented medical records, in my opinion it does embrace virtually everything else that would come to mean a positive direction for serious changes in healthcare. By this I do not mean insurance. That is a monetary and political issue and well outside my present capability of writing about. And while the *COOK Report* has discussed such concepts as telemedicine, as usual in this case human interface factors are critical. High-speed optical networks do absolutely no good if the patient is willing to use them to transmit visual or other data about his condition while his physicians on the receiving end of the line are unwilling to participate.

This is a fundamental matter of paradigm change in the very structure of Thomas Kuhn's masterpiece of four decades ago *The Structure of Scientific Revolutions.* I am hopeful that given the strains and perturbations of the old system failing to meet so many needs that the new system may begin to make serious progress. Such progress would be a given if medical schools could be encouraged or yes even coerced into changing their four centuries old ways of medical education. Although there are many disparate strands of health care issues, if I can make a contribution with what I have pulled together it would be to bring greater recognition to Dr. Weed's logical and defensible system for rigorously connecting the day-to-day practitioner with medical knowledge in such a way that many fewer mistakes will be made and the inaudible chaos and consequent expense removed from current medical practice.

An Outline of Dr. Weed's Basic Critique

While medical research is founded on a firm scientific basis. . .

Medical practice founded on the provider's memory and intuition – it is hit and mis with no feedback loops – it may qualify as art but is definitely not science.

Because practice exits without acceptable standards for record keeping and decision making medicine exists and operates in chaos

It is a fragmented and rushed system where patients are prevented from making the decisions about their own care that would be possible if they had access to relevant information.

Under these conditions, coordination, feedback, learning and problem management plans tailored to the unique differences among patients are impossible. They are impossible because there are no established rules, no uniform standards that can permit the compilation of data to measure outcomes.

Without such a uniform framework, patients cannot manage their own care and take advantage of access to information brought about by computers and the internet.

In short "A trustworthy and transparent intellectual infrastructure for care" does not exist.

Such an infrastructure depends on two tools being available to physicians and patients

The first is a map of the landscape – that is a compilation of medical knowledge that is relevant to patient by being filtered and focused on his problems.

The second is a communication system between patient and care givers for navigating the journey – this communication system must consist of well structured medical records that uniformly map the steps taken by patient and care givers as they cross the medical landscape.

Decision making should begin within a uniform framework of rules standards and knowledge, and be mapped by patient and caregiver according to the nearly infinite variety of journeys that can be taken across the medical landscape of patient differences and needs.

The patient should not be subject to the chaos of haphazard decision making the outcomes of which are gathered into a grand study of what works and what doesn't and that is used to force every other patient into the same procrustean bed regardless of what condition, risk factors and history the patient brings to the table.

There are two problems in managing information:
first - general knowledge must be applied to patient problem specific data.
second - the data generated by patient provider interactions must be systematically organized over time.

To couple general knowledge with specific patient problems. This can be done with the linkage of computer software that given the patients medical history and presenting conditions matches that information against the universe of medical knowledge relevant to the problem and extracts linkages between the two – giving the physician and patient some scientifically verifiable evidence of the soundness of a course of proposed treatment

The coupler system uses a standardized treatment framework to capture the patient history and maintain that over time so that patient and caregivers alike are operating off the same playbooks.

To progress these problems can be dealt with at two levels.

1. reform of the entire system of medical education
2 -use of the problem knowledge coupler system integrated with the computerized problem oriented medical record in the hands of patients and providers designed as a means of dealing with the shortcomings above."

Symposium Discussion

CRTC and Understanding Network Bandwidth
p. 65

McCollough: The Wikipedia explanation Eric provides makes this clear - that we are looking at peak, not consumption over a month:

"Burstable billing is a method of measuring bandwidth based on peak utilization. It also allows usage to exceed a specified threshold for brief periods of time without the financial penalty of purchasing a higher Committed Information Rate (CIR, "commitment") from an Internet service provider (ISP)."

Feld: See, nobody at the FCC or in policy land knows this [stuff.] Not because we don't care, but because no one who actually knows this [stuff] bothers to talk about it. Then y'all get pissed at how ignorant the people making policy are.

Broadband Stimulus What Difference p. 67

Savage: Have you given much thought, yet, to the gritty, pragmatic question of

applying behavioral economic insights to regulation? For example (to randomly throw something out), one of the points that Thaler & Sunstein make in *Nudge* is the importance of default choices. Today the FCC initiated an NOI about the wireless industry. I wonder if, retail competition etc. notwithstanding, behavioral economic considerations would justify the FCC in specifying certain default terms in wireless consumer contracts, with various non-trivial requirements imposed on carriers seeking to get a consumer to select a contract term that is different from the default. [snip}

Savage: Behavioral economics hits the Chicago School where it matters. It shows that people don't in fact make decisions "in their own best interest," which is required for the basic neoclassical model to make prescriptions, i.e., for them to say that the result of an unfettered market is the "best" achievable in some sense. Macro stuff like Keynesianism and Marxism doesn't quite get there, IMHO.

Kushnick: I don't know about schools of economics. Kushnick's law is based on predictable behavior of both the phone companies and the regulators - the idea that free markets exist and they work is pure poppycock. It is based on trajectories of behaviors - and it can be different for different companies within a segment, but..

Open Networks and CLECS Good Idea? p. 72

Cooper: What you need is a business model, a governance model and a security model.

COOK Report: agreed Mark... ya got one for us?

Cooper: Who is the us and what do they want to accomplish? The government is bankrupt, the Congress is paralyzed and the FCC is in a coma. I spent more time trying to make the unbundling regime work than just about anyone, but its gone and it ain't comin' back; ditto with muni-broadband.

So, which are the most important piece parts of the current terrain that can be tweaked to make things better. Special Access, universal service fund reform, a little more unlicensed spectrum, preserving network neutrality as we now have it?

In the alternative, you can wait for "We the people" outside of Washington to rise up and elect a genuinely progressive government that will revolutionize the communications space.

IPv6 Transition p. 78

van der Berg: RIPE NCC is doing a lot to promote IPv6. You might want to have a look at the contents of their Roundtables here. http://www.ripe.net/meetings/roundtable/feb2009/presentations/ Next week there is another roundtable here in Amsterdam

Tom Vest (external consultant, RIPE NCC / Science Group) : Other resources that you may find useful:

http://www.ipv6actnow.org/

--especially: http://www.ipv6actnow.org/category/all-news/government/

http://www.getipv6.info/index.php/Main_Page

The OECD has also made some efforts along these lines, c.f.:

http://arstechnica.com/old/content/2008/05/oecd-notes-ipv4-depletion-nudges-governments-towards-ipv6.ars

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Postscript 1979 Futurist

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Executive Summary

A Note from the Editor on the November 2009 Format and Presentation

This issue leads off with a lengthy analysis of the variables that are in play in connecting health care reform with IT and networks. It does so from the point of view of the issues pointed out by Larry Weed and by the Editor in an article on Weed some thirty years ago.

Coming in the December 2009 issue - out by October 31st, the interview with Pavan Shakya that tells how he brought one megabit per second wireless internet direct from Kathmandu to Namche Bazaar Nepal. I have an interview scheduled in mid october with Tim Cowen on his construction of a more unified approach to government IT expenditures in the context of open standards and cloud computing. Finally this coming week I hope to do one with Rod Hall, Analyst and JP Morgan on Alcatel Lucent. If both of these get done only one will appear in December.

Text, URLs and Executive Summary: I have attempted to identify especially noteworthy text by means of boldface for REALLY good "stuff" . Also the proper Executive Summary in this issue continues. I hope you find it useful. Feedback welcomed. You will also find live URL links and page links in this issue.. (I am also no longer changing British spellings of things like fibre to the American fiber.) Thanks to Sara Wedeman - see www.becgllc.com for assistance with the masthead logo. Captain Cook now charts direction by looking at a compass rosette.

I am omitting the contributors' page since a cumulative list may now be found at
http://www.cookreport.com/index.php?option=com_content&view=article&id=121&Itemid=74