Mobile e-Prescribing:
The Killer App for IT Adoption

A BCC: Whitepaper

bcc:
consulting

INTEGRATING THE ART & SCIENCE OF HEALTHCARE

In the Brave New World of medicine,

every physician, practice group, clinic and hospital will be equipped with an electronic medical record (EMR) system. Furthermore, every EMR will be interconnected, creating a vast healthcare information network. Health data will flow freely, efficiently, and securely. Continuity of care records (**CCR**), which are now only a concept, will have long-since become obsolete.

In this digital future, national healthcare information "banks" will form key nexus points within the health network's vast web. Beyond simply maintaining complete, longitudinal health histories on behalf of their members, health banks will compete based on their ability to:

- protect health information;
- mediate complex medical issues;
- resolve information discrepancies; and
- identify demographic, lifestyle, and genetic risks by incorporating decision-support knowledge bases.

Patients will be informed and empowered consumers who play an active role in managing their own care. When this occurs, the nation will emerge stronger and healthier, with lesser relative costs to everyone.

Building the Digital Future

• On January 18, 2005, the **Office of the National Coordinator for Health Information Technology** (ONCHIT) closed the public comment period for responding on the National Health Information Network (NHIN) request for information (RFI).

• The Continuity of Care Record (**CCR**) is a portable XML document for transporting patient-specific health information across multiple physicians, specialties, and locations. CCRs represent an important step in creating an ad-hoc, centralized patient record, however, they have significant limitations.

• Health information banks are not a revolutionary concept. **MedCommons, Inc.**, for example, recently launched its Patient Data Bank solution hoping to secure an early lead in this promising space.

According to Dr. David Brailer, the first National Health IT Coordinator, the beginnings of this Brave New World are at least ten years away. And, by many estimates, even ten years may be overly optimistic. Few would argue then that Congress' decision late last year to pull healthcare IT's funding would help us get there any sooner. Allow us to be among the first to say it will, and to recommend an approach we believe will get us there even sooner.

Hard-Fought Gains

First of all, healthcare IT has been working on the EMR "problem" for more than 20 years. While healthcare IT is often criticized for its inability to realize its electronic goals, such criticism is mostly unwarranted. IT departments in few, if any, other industries have been forced to operate with such scant resources, and at the same time under the burden of such high expectations.

Nevertheless, healthcare IT, with little more than a token gesture of monetary support, has still managed to build a solid framework for the future. For instance, Health Level Seven (**HL7**), the industry's "non-standard standard" messaging protocol, has become nearly ubiquitous throughout the industry. Today, countless hospitals and provider networks rely on HL7 to communicate critical information across disparate systems.

Determined and dedicated parties throughout the industry have also developed key "near-standard" vocabularies, including **SNOMED-CT**, **LOINC**, and **RxNORM**, which are only now being consumed and integrated at the national level under the **UMLS** umbrella. Once complete, health information will have a universal language that is both precise and actionable.

A small group of "early-adopters" has all but carried the massive healthcare industry on its shoulders to get us to where we are today: a point where conversation about a Brave New World is even conceivable, though arguably hazy. If nothing else, healthcare IT has learned to operate leanly, while taking small, yet meaningful steps forward.

Almost Standard

• **HL7**, the industry's widely adopted messaging protocol, reveals a great deal about the challenge of standards: version 2.x, despite a loose and flexible spec, has become the industry's de facto communication standard; version 3.0 (XML-based), on the other hand, while technically more proficient and exact, has been slow to gain broad industry adoption.

• **SNOMED-CT**, **LOINC**, and **RxNorm** are key vocabularies that help codify clinical terminology, laboratory results, and prescription information, respectively. Industry recognized and adopted vocabularies are critical to normalizing health information across different systems. As such, the National Library of Medicine, within the National Institutes of Health, is leading the initiative to consolidate key nomenclatures into the Unified Medical Language System (**UMLS**).

Off Again, On Again

Regardless of how the funding situation ultimately plays out, healthcare IT as a collective industry will continue to move forward. While it is tempting to draw comparisons between President Bush and Dr. Brailer's 10-year plan for healthcare IT and JFK's moon challenge, Congress' withdrawal of $50 million affirms what most already know—"the times they have a' changed." Another national "decade" objective warms the tummy with nostalgic reflections, but for a country that cannot stay focused on a war effort for more than a few weeks, 10 years is about 9.9 years too long.

Perhaps we are being a bit facetious when we declare that healthcare IT is better off without the $50 million promised, or even the $100 to $125 million promised this year. Dr. Brailer and his office can no doubt use the funds to support many important projects. Our point is that in light of the potentially $50 billion undertaking[1], $50 million is not so substantial. In fact, it is the type of newly discovered wealth that can lead to unproductive excesses and distractions.

Take a look at the last year, for example. Several months of EMR flag-waving has done little to alter the industry's ability to implement. At most, the hype and rhetoric has only fostered increased adoption among "early-adopters." In other words, practices, clinics and hospitals that already had the inclination and ability to implement may be purchasing EMRs sooner than they might have otherwise. But will this lower the 10-year hurdle for the great majority? Probably not. In fact, by artificially accelerating the rate of adoption among early-adopters, the increased attention may well be doing a disservice to the natural order of things.

More physicians will likely be exposed to immature systems sooner than their risk-tolerance might otherwise permit. Despite a short-term up-tick in adoption, poor early experiences amongst key advocates threaten to slow broader adoption. At the end of the day, there is a cosmic order to things. Simply stated: you cannot make a flower grow faster by pulling on it. If you want long-term results, focus on long-term drivers.

Addressing Network Dependencies

We have alluded to the "network effect," also know as **Metcalf's Law**, in previous reports. The principle is quite simple—network value increases exponentially with the addition of each new participant. The Internet embodies this principle perfectly, case-in-point. The Brave New World previously described requires universal participation, not just that of the mainstream. In fact, according to Metcalf's Law, technology laggards—ironically—are the most valuable and critical to the long-term success and viability of a universal healthcare information network, hence, the need for government involvement.

In general terms, 20 percent of healthcare providers already know what an EMR is and understand its inherent value. More importantly, these providers also have the wherewithal and desire to implement one in the next 3 years. This segment needs no further inducement. In fact, any effort made to push or encourage them is wasted effort at best, and more likely harmful.

> While it is tempting to draw comparisons between President Bush and Dr. Brailer's 10-year plan for healthcare IT and JFK's moon challenge, Congress' withdrawal of $50 million affirms what most already know—"the times they have a' changed."

Robert Metcalf's Law states that the utility, or "value," of a network increases in proportion to the square of the number of nodes on the network.

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

The next 60 percent of providers do their utmost to ignore healthcare IT jargon (EMR, EHR, PHR, CCR, etc). Nevertheless, they are cognizant of the existence of an Internet, and on occasion have sent an "electronic mail," or two. Believe it or not, providers in this segment will eventually implement an EMR completely of their own volition, well within the 10-year target timeframe. We say this confidently, knowing that the benefits of incorporating technology into these providers' clinical practices will become overwhelmingly self-evident to them given enough time. Return on investment and continuously improving solutions will eventually compel them to take that next step.

Now we come to the ever-important remaining 20 percent of providers, who can only be described as technology-averse. The majority of people in this group—while loathe to admit it openly, think it more likely that they will be electrocuted by a computer than derive an actual benefit from one. This is not to make light of the situation, but really to drive home the point of their distasteful relationship with technology. These are the die-hard providers who will resist reasonable persuasion, who will question the facts and numbers, even as they point so favorably towards making that next step into The Brave New World. Their aversion is strong enough that it will actually outweigh the attractiveness and benefits with which technology will try to tempt them.

Providers in this group will either age out of medicine, or will eventually —and with great reluctance—get on-board with the rest of their colleagues. Those in this last group who eventually "figure it out" will take at least ten years to do so, perhaps even more. Because of the power of the network effect, this last group will in effect hold the entire industry hostage as they resist technological progression.

The Laggards

The Cognizant Majority

The Early Adopters
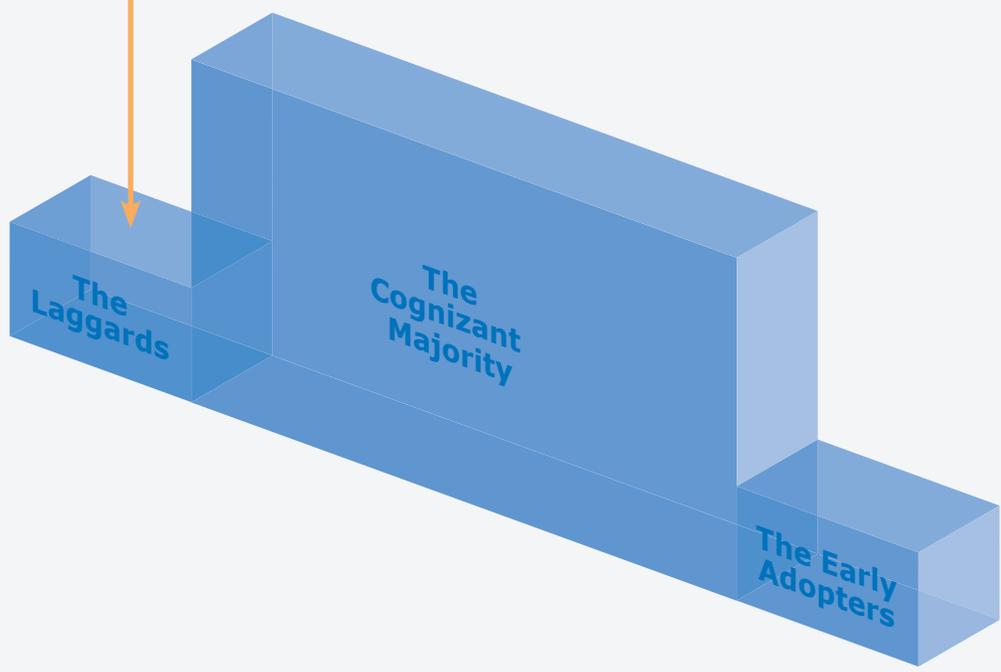
The Role of Incentives

The government has an important role in educating and "incentivizing" this last group of technology laggards. To be fair, not all people in this last group are as naïve or impractical as portrayed. In fact, many may be making very sound, rational business decisions, at least from their point of view. For them, the cost-benefit analysis (or return on investment) may not support investing in technology. In such situations, effort must be taken to double check the numbers.

After all, how many dollars is a life worth? And do we only charge for lives lost (malpractice premiums), and not credit lives saved (stay tuned for more on the evolving pay-for-performance [P4P] movement)? The math can be very tricky. At a minimum, the government has a role in ensuring that network externalities are properly captured and assigned. If the greater system stands to benefit from a provider's participation, then at least some of that value needs to be included in the cost-benefit equation. This is exactly why the government levies fines (negative incentives) against manufacturers who pollute our air, and the implications are no less serious when applied here.

Should there be incentives for technology adoption? Yes, and no. The challenge for the government has always been in applying the rules equitably. The default approach is to do so universally. However, seldom do the two go together. After all, why should the government implement a broad healthcare IT adoption incentive program? We have already explained that 80 percent of the market is going to adopt it on their own, within the target timeframe. Why waste sparse funds incentivizing those who have already sipped the cool-aid?

In the private world, businesses live and die based on how well they can segment their customers and the broader market. Intelligently deployed dollars can do far more than those spent arbitrarily. Likewise, targeted incentives are possible, and will result in the greatest return but they require understanding the customer and the market.

First of all, if our goal is broad EMR adoption within ten years, we can disregard about 80 percent of the market and devote our time and energy to the technology laggards—the so-called "hostage-takers." But how do we identify them? Sure, many are located in rural and underserved areas, but do not be fooled. Just as many, if not more, are lurking on the fringes of academic medicine, and in profitable, private practices and clinics in the heart of suburbia.

The key to segmenting the healthcare market is to recognize and embrace natural selection biases. Ultimately, it is better not to offer a carrot incentive based on adoption of an EMR. As the ultimate goal, we expect everyone to eventually qualify. Furthermore, the EMR is the destination. An additional incentive adds no value. Instead, make a universal offer that is only appealing to target providers—the ones who need encouragement to take initial steps in the right direction. **The solution: incentivize for the adoption of lower order technology.**

> **At a minimum, the government has a role in ensuring that network externalities are properly captured and assigned.**

When Less is More

Lower order technology is not attractive to the majority of physicians, who have already progressed to more advanced technologies; it is a magnitude of order less expensive, and yet critically essential to fostering adoption amongst laggards. By definition, lower order technology is likely to be less complex and yet highly valuable.

Although in many ways counterintuitive, the best approach for the government and Dr. Brailer (the nation's healthcare IT guru) is to support and subsidize less advanced technology. Mobile e-prescribing (mRx) fits the bill perfectly, and will prove to be Dr. Brailer's killer app—the one that drives technology adoption into the furthest regions of ambulatory medicine.

To be very specific, E-prescribing (eRx), or electronic prescribing, is discussed in healthcare IT news almost as often as EMR itself. And, in fact, 'eRx' and 'EMR' are often used interchangeably. However, they are not the same thing at all.

In its broadest definition, eRx is any electronic solution that supports the prescription writing process. This can encompass anything from a stand-alone drug reference (such as **Epocrates**) to an electronic script-writer that creates, verifies, and delivers prescriptions to patient-specified pharmacies. (see eRx segmentation below) While you should expect EMRs to incorporate robust eRx capabilities (full-blown e-prescribing, or close to it), eRx does not require an EMR, and stand-alone eRx solutions can be quite inexpensive and "thin."

> **Mobile e-prescribing (mRx) fits the bill perfectly, and will prove to be Dr. Brailer's killer app—the one that drives technology adoption into the furthest regions of ambulatory medicine.**

e-Prescription Segmentation

'e-Prescription' applications help streamline and improve the process of writing prescriptions. This chart is segmented based on the chief e-prescription functionalities.

	Reference					Script Writing					EDI			Decision Support				
	Dose Calculator	Drug Database	Interaction Checking	Formulary	Clinical Guidelines	Script Generation	Script Printing	Basic Demographics	e-Signature	Script Faxing	RxHub	SureScripts	Other	EMR Support	Decision Support	Pricing	Product	Company Name
		o	o	o	o	o			o		o	o				$$	MedAptus	MedAptus
						•		•	•		•					$$$	NextMed	NextMed
		•	•	•		•	•				•					$	RxNT	RxNT
		•	•	•		•	•		•	•	•	•				$$	RxRite	RxRite
		•	•	•	•	•			•		•	•				$$	PocketScript	ZixCorp
		•	•			•	•	•	•	•	•	•		•		$$$	TouchWorks	Allscripts
						•	•	•		•				•		$$$	Electronic Medical Record	Alta Point Data Systems
						•		•	•	•				•		$$$	Amicore Clinical Management	Amicore
		•	•	•		•	•	•	•	•				•		$$$	Elysium EMR	Axolotl

(Right margin labels: EDI (continued); Decision Sup...)

mRx specifically refers to eRx deployed on mobile devices, and is often associated with a somewhat limited set of eRx features. While we have identified more than **40 companies** that claim to offer mRx capabilities, only a handful offer the type of solution with the potential to change the rate of healthcare IT adoption.

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

Low Hanging Fruit

Before we explain which solutions to watch, it is helpful to understand why electronic prescribing is so important. In addition to measurable, bottom-line efficiencies, the Institute of Medicine's 1999 report "To Err is Human," revealed the extent of other potential "soft" returns that could be gained from better prescribing processes. In particular, the report cites 7,000 lives lost per year due to medication related errors.

The problem is actually quite simple to comprehend. Prescription writing has not fundamentally changed in the last 100 years…while many other things have. For example, according to the Institute for Safe Medication Practices, there are more than 17,000 pharmaceutical brands sold in North America, with approximately 500 new products and indications slated for **FDA** approval each year[2]. Furthermore, 40% of Americans age 40 years and older take more than 5 different medications per week[3]. The complexity of managing potential drug-drug, drug-allergy, drug-food, and drug-disease adverse reactions is staggering.

Assuming a physician has complete, up-to-date drug information (drug name, dosage strengths, contraindications, and directions), and patient medical history (including known allergies and all active medications) he still requires significant assistance traversing the overwhelming number of possible adverse combinations to avoid an adverse drug event (ADE). And all this in a perfect world.

In reality, physicians often do not have access to pertinent drug information at the moment of prescription. While a physician may be familiar with commonly prescribed medications, it would be absolute folly to believe he maintains a running compendium of drug information on the complete list of medications he frequently prescribes, let alone the thousands available to him. Assuming a physician uses the most up-to-date medication information available for every prescription, the body of knowledge surrounding drug use changes so frequently that multiple references are sure to be based on dated information. Integrating up-to-date, easy-to-reference drug data into the prescription process is the lowest level of eRx, and yet one that offers substantial value.

In the absence of an EMR, which is the norm[4], physicians must refer to handwritten paper charts for vital, patient-specific medication information, including history, allergies, and adverse events. There are multiple opportunities for error, ranging from physicians not using the existing information at all (it takes too much time and effort on their part), to misreading notes in the charts.

Even in the ideal case, where physicians have access to an EMR, tremendous network dependencies remain. For instance, because of the fragmentation of care delivery—i.e. most people see multiple, independent physicians each of whom maintains their own unique, independent medical record[3]—the most information any one provider or provider organization has will likely represent an incomplete picture. So, despite an EMR's ability to incorporate up-to-date drug data and process it against patient-specific medical information, the outcome is still dependent upon the accuracy and depth of the provider's knowledge about the patient. **And it is here we begin to truly understand the impact on the greater system caused by non-participants.**

> **While a physician may be familiar with commonly prescribed medications, it would be absolute folly to believe he maintains a running compendium of drug information on the complete list of medications he frequently prescribes, let alone the thousands available to him.**

According to the Institute of Safe Medication Practices, thousands of pages of detailed drug information are released every month across the U.S., and the **FDA** can post as many as 20 safety-related changes a month.[5]

RxHub's MED solution offers inpatient-based physicians the ability to access patient ambulatory prescription information.

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

In the Brave New World, information will flow seamlessly, and all providers regardless of specialty and practice location will share a single, consolidated patient record. In the next few years, this problem may be partially offset by patient-carried Continuity of Care Records and by online, accessible pharmacy benefit management (PBM) prescription data. At present, patients must be very proactive in coordinating information between their disparate providers, and the reality is that most are not.

Finally, assuming a physician has knowledge of his patients' complete medication history, up-to-date drug information, and sufficient information processing power to use the necessary and complex adverse checking algorithms, if he writes the actual prescription by hand, the greatest risk of a medication error still remains—a nurse or pharmacist simply misreading the script. In comparison to the many other challenges, this one would appear trivial to mitigate. It is not. Getting physicians to enter prescriptions into a computer—PDA, laptop, tablet PC or desktop—presents one of the greatest challenges of all as it runs headlong into traditional, entrenched practices. Most physicians scrawl a prescription in seconds, and that is a difficult proposition to beat.

Thus far, we have focused on the difficulties of eliminating Adverse Drug Events. But let's turn our attention now to the measurable, bottom-line returns offered by eRx.

If a physician does not have patient-specific formulary guidance, he may well write a prescription for an off-formulary medication, or for a brand drug instead of a generic. Either choice will result in a more expensive drug both for the patient and the health plan or PBM, unless the pharmacist calls the physician and requests a change—a disruption for both the pharmacist and the physician. According to the Institute for Safe Medication Practices, pharmacists make 150 million calls a year to physicians regarding non-formulary medications, potential drug interactions, incorrect dosages, and illegible handwriting.

> **All else being ideal, if a physician writes the actual prescription by hand, the greatest risk of a medication error still remains—a nurse or pharmacist simply misreading the script.**

What does this all add up to? According to eHealth Initiative's April 2004 report, "Electronic Prescribing: Toward Maximum Value and Rapid Adoption," which references research conducted by the Center for Information Technology Leadership (CITL), nationwide adoption of e-prescribing could save $27 billion a year, primarily as a result of decreased spending on prescription drugs. According to CITL, an additional $2 billion of savings could be realized from the reduction of ADE-related hospitalizations and visits. While $29 billion a year merits significant attention, the figure does not account for the inefficiencies

and rework related to the 150 million pharmacy call-backs previously mentioned. Again, e-prescribing's potential is substantial.

We have established that eRx can save lives and reduce costs. And is that not the point of an EMR? Absolutely, but recall that eRx does not require an EMR. In fact, much of the value of an EMR is contained within the eRx itself. So, what would happen if you could somehow sever eRx from the EMR? You could essentially capture a good part of the value while leaving behind most of the overhead—a **"poor man's EMR,"** if you will. Well, it just so happens that this is possible.

> **It is basically a risk-free route into the electronic age, without the shock of total system and workflow replacement that you can expect with an EMR. It provides much of the value but at a fraction of the cost.**

Beyond the value and savings associated with improving the prescription process, eRx also happens to be a unique, severable part of outpatient clinical workflow. In other words, it is possible to have a completely electronic prescription process within a larger paper-based system. It creates very little, to no, additional overhead, while simultaneously improving the larger paper-process itself. This is extremely important to our target physician base because it enables incremental investment. It is basically a risk-free route into the electronic age, without the shock of total system and workflow replacement that you can expect with an EMR. It provides much of the value but at a fraction of the cost.

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

All eRX Are Not Created Equal

Understand that we are very specific to describe mRx—and not eRx more broadly—as the killer app. When you look at the eRx segmentation, it should be clear that there is a stacking process. eRx builds on itself. While pure-play content companies tend to stick to content, technology companies are rarely satisfied to offer a limited set of functionality. They may start off with a narrow focus, but generally, they tend to stack on new features and functionality. Eventually such companies will claim to have checked off all the boxes required for full blown prescription writing, but they will have done so at the sacrifice of ease-of-use, lean infrastructure and overhead, and low cost. The end result is an EMR. mRx itself suffers from functionality-creep, and as a result, many of the better known mRx companies have grown beyond the scope of the killer app.

The killer app squeezes value from the prescription process, but does not cross the line. It is a stop-gap solution and aspires to nothing greater. This is absolutely critical. When physicians are ready for the greater technology leap, they will jettison the stand-alone mRx in favor of an EMR.

The optimal mRx solution enables a physician to create a script on a mobile device, directly from the physician's schedule or patient census. Access to basic demographic data, which can be obtained from a relatively straight-forward interface with the physician's practice management system (PMS), enables the physician to rapidly tap a script. Furthermore, demographic data should include primary and secondary payer information, which automatically identifies the appropriate formulary, thus eliminating costly off-formulary prescriptions (or disruptive pharmacist call-backs).

Specific drug names should link directly to an integrated drug database, allowing physicians to consult up-to-date clinical content at the stroke of a stylus. Depending on the amount of data in the demographic feed, known allergies may also be automatically bumped against the drug database's list of identified potential drug-allergy reactions. While the PDA-based drug database should support potential drug-drug interaction checking for up to 32 simultaneous medications, this process will not be automated because an electronic active medication list does not exist outside of the scope of an EMR.

Additional tools, including dose calculators and clinical guidelines, would ideally integrate seamlessly into the script-writer to support the physician as-needed. Once the physician creates the script, he should be able to transmit the information to a pharmacist simply and cost effectively. At a minimum, the physician should be able to print the electronically-signed prescription locally using infrared or Bluetooth to prevent the unnecessary and time-consuming cradling of a mobile device. One copy should be delivered to the paper chart, and another either handed to the patient or faxed to the patient's pharmacist. Some script-writing solutions support direct transmission to a fax server, where the prescription is queued and forwarded to the pharmacy. While direct transmission via a fax server is preferable from an efficiency standpoint, it should not sacrifice cost or simplicity.

> **When physicians are ready for the greater technology leap, they will jettison the stand-alone mRx in favor of an EMR.**

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

A Feature Too Far

Finally, we stress the importance of recognizing limitations. Companies hoping to offer the killer mRx app must shun technical perfection and elegance in favor of the optimal cost-to-return ratio solution.
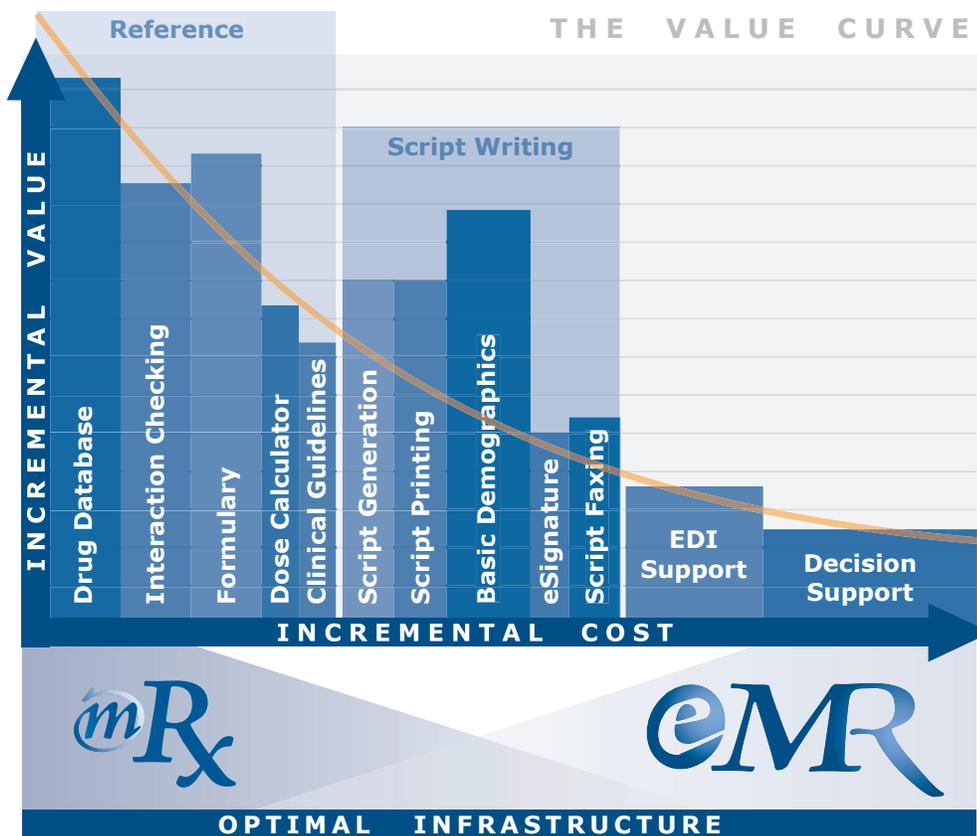
> **mRx solutions must not sacrifice usability or infrastructure simplicity in search of one more feature.**

Consider the work of Surescripts and RxHub—both collaborative efforts by two of the biggest stakeholders in the prescription business—retail pharmacies (SureScripts), and PBMs (RxHub). Both companies have developed extensive communication networks utilizing the National Council for Prescription Drug Programs (NCPDP) SCRIPT standard to promote the rapid adoption of e-prescription. While there are many clear and compelling benefits to the type of networks being developed by Surescripts and RxHub, their value to an mRx offering is somewhat suspect. Multiple mRx solutions support one if not both networks. At least one company, BluefishWireless, provides Surescripts support via NDC Health at no charge to its users, but even then the technology implications require close scrutiny. mRx solutions must not sacrifice usability or infrastructure simplicity in search of one more feature.

Again, the optimal solution recognizes the line, but does not cross it. It is not just about cost, both infrastructure and usability, but it is also about return. Errors compound. By addressing problems where they occur, at the beginning of the process, at the point where the physician first writes the script, the need for more costly downstream solutions is drastically reduced. This is not to suggest that EMRs with full-blown eRx capabilities, including EDI and decision support, should not be the ultimate goal, rather it is to emphasize the diminishing returns associated with costlier solutions.

Despite the fact that Surescripts and RxHub offer competitive solutions, their recent **joint response** to ONCHIT's National Healthcare Information Network (NHIN) RFI, in addition to their collaboration elsewhere—including **CafeRx**—suggests that the two entities are willing to pull resources to secure a key role in an emerging National Healthcare Information Network.

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

Conclusion

Pareto's Principle, better known as the 80-20 rule, has become a trusted and unwaivering law. The final 20 percent of a 100 percent solution requires 80 percent of the time and cost. Before we collectively spend too much time and effort investing in the perfect solution, let's all get on-board with achieving the 80 percent one.

The optimal mRx solution addresses nearly all of the big ticket items, with the exception of patient-integrated active medication lists during interaction checking. As mentioned, though, even with an EMR, the electronic active-meds list represents an incomplete picture. So, for as little as $150 per physician per year (or less) and a PDA, a practice can obtain the majority of the benefits of eRx. Compared to the $10,000 to $100,000 per physician required for an EMR, the value is compelling.

In the final analysis, we stand by the belief that eventually all physicians will transition to a more comprehensive EMR solution. But in the meantime, mRx is the most appealing option out there for those who are limited in either their desire or ability to change. mRx is the best first step towards broad technology adoption and healthcare's Brave New World.

[1] According to a March 2005 National Ambulatory Medical Care Survey, 17% of physician offices have implemented electronic medical records. (http://www.cdc.gov/nchs/pressroom/05news/medicalrecords.htm)

[2] SNOMED estimates that the average American has 11.2 medical records.

[3] "A Call to Action: Eliminate Handwritten Prescriptions within 3 years!" (http://www.ismp.org/msaarticles/whitepaper.html)

[4] According to Price-waterhouseCoopers, research conducted by the Lewin Group suggests that it would cost from $27 to $50 billion to implement EMR nationwide. ("President Bush's Second Term: Prescribing private solutions for the nation's healthcare problems," November 2004).

[5] RxHub Fast Facts (http://www.rxhub.net/patient.html)

Photos: JupiterImages

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

Appendix:
mRx's Big 6—Lessons learned

From 1998 to 2001, PDA-based "e-prescribing" was viewed as the Holy Grail of the mobile healthcare space. Five of the best-known e-prescribing start-ups alone raised more than $170 million in venture capital. Despite the irrational exuberance of investors during that period, there was (and is) tremendous evidence to support e-Prescribing's market potential. In addition to measurable, bottom-line efficiencies, the Institute of Medicine's 1999 report "To Err is Human," revealed the extent of other potential "soft" returns resulting from "e-prescription"—attributing 7,000 deaths a year to medication errors.

Since 2001, four of the six main mRx companies have gone out of business. Interestingly, all 4 have been subsequently purchased for their assets (at bargain basement prices) and have since been brought back to life. The promise of eRx remains alive and strong, though most understand that broad market penetration is not going to happen overnight.

The two companies that survived more or less intact —Epocrates and Allscripts—reveal as much about the market as those who stumbled. Allscripts, the only public company among the original six, has deviated from its initial* mobile e-prescribing focus, and now competes as a pure-play EMR vendor. This shift in business model likely occurred for numerous reasons, but principal among them was the need for a larger market opportunity.

mRx with its seemingly limitless potential to reduce medication errors, improve efficiencies, and generally drive technology adoption, will likely offer only modest rewards to the vendor that gets it right. The reason: mRx is a physician, rather than an enterprise application. To date, generating revenue directly from physicians has proven as difficult as squeezing blood from a stone.

Epocrates, for example, has enjoyed phenomenal success "reaching" clinical users. They, more than any other, have proven that clinicians are willing and able to embrace easy-to-use, value-add technology. Nevertheless, despite their success, they have had an ongoing challenge developing a workable revenue model.   For a company that has raised more than $40 million in venture capital, the $150/year per user offered for the killer mRx app is just not that compelling. Instead, Epocrates will likely continue to tinker with different models for extracting value from their vast clinical network, while being very cautious not to damage the delicate, gossamer-like structure.

Notwithstanding a major government subsidy or public investment in Epocrates, then some other company is going to have to fill the gap. The company that does so will need to be lean, focused and most importantly, disciplined.

*Allscripts has a history of repackaging and selling pharmaceuticals to physicians that predates their entry into the healthcare technology. "Initial" refers to their initial entry into the technology space around the time of their acquisition of ChannelHealth from IDX.

	Parkstone	Healthvision
Founded (Acquired)	**1997** (Oct '01, Jan '03)	**1999**
Location	**Weston, FL**	**Irving, TX**
Funding		
Round 1	**$5M** (Nov '99)	**$20M + $40M** Assets (1999)
Round 2	**$31.5M** (Mar '00)	
Round 3	**$15M** (Aug '00)	
Total	**$59M–$65M**	**$60M**
Original Investors	Oak Investment Partners Partech International Cardinal Health Partners Salix Ventures Aether Systems	VHA Eclipsys General Atlantic Partners
Purchase Price	**$1.1M**	
Key Relationships	Aether Systems Merck-Medco MediSoft InfoCure Johnson & Johnson IBM GSK GSM Cymedix AthenaHealth Healthvision Aventis	**RxHub** **Surescripts** MDconsult ProxyMed VHA WebMD
Solution	**PPARIS***	**MEDS 7.1**
Platform	**PocketPC**	
Pricing	**Free**	**$35–45/month**
Milestones		
Physician Users	**1,500** (Nov '00)	**281** (4,000 contracted)
Employees	**170+** (Nov '00)	**121** (2005)
Events	**July 2001** Chapter 11 **October 2001** PacifiCare acquires assets for $1.15M **January 2003** HEALTHvision acquires ParkStone assets from PacifiCare	

* Physician Prescription and Referral Information Server

	ePhyician	HealthRamp
Founded (Acquired)	**1998** (Mar 2003)	**2002**
Location	**Mountain View, CA**	**New York, NY**
Funding		
Round 1	**$2M** (Jul '98)	**Public**
Round 2	**Unknown** (Apr '99)	
Round 3	**$18M** (Dec '00)	
Total	**Approximately $25M**	**$15.4M (Market Cap 05/05/05)**
Original Investors	Palm Ventures Sierra Ventures Dresdner Kleinwort Capital CVS Pharmacy Benchmark Capital	**AMEX: RCO** (HealthRamp is a wholly-owned subsidiary of Ramp Corp.)
Purchase Price	**$348K**	
Key Relationships	Palm PlanetRx.com Facts & Comparisons Certicom Medsite.com Pharmaceutical Care Network (PCN) Kaiser Permanente MedPlus, Inc.	**RxHub** **SureScripts** ExpressScripts Medco PalmOne 3Com Cingular RxRite
Solution	**ePad**	**CarePoint**
Platform	**Palm**	
Pricing	**$20**/month	**$40**/month
Milestones		
Physician Users	**2,500** (Mar '03)	
Employees	**64** (2001)	**42** (2005)
Events	**March '03:** ePhysician acquired by Medix Resources (now Ramp Corp) from Comdisco Ventures, one of the company's creditors	

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

	iScribe	Caremark Rx
Founded (Acquired)	**1999** (Dec '01)	**1992**
Location	**San Mateo, CA**	**Nashville, TN**
Funding		
Round 1	**$5M** (May '99)	**Public**
Round 2	**$21M** (Mar '00)	
Round 3	**$15M** (Apr '01)	
Total	**$41M**	**$18.7B (Market Cap 05/05/05)**
Original Investors	Galen Partners Domain Asscociates Gleacher Capital Partners Kleiner, Perkins, Caufield & Byers Mayfield Fund Skyline Ventures Earlybird	**NYSE: CMX**
Purchase Price	**Undisclosed**	
Key Relationships	Johnson & Johnson Caremark Rx The TriZetto Group WirelessMD The Doctor's Company Triple I eMedicus	
Solution	**i3000 & i5000**	**e-Prescribing**
Platform	**Windows CE & Palm**	**Palm**
Pricing	**FREE** to sponsored users	
Milestones		
Physician Users	**5,000**	
Employees	**144** (2001)	**11,133** (2005)
Events	**January '02:** iScribe assets acquired by AdvancePCS **March 04:** Caremark Rx acquires AdvancePCS	

	PocketScript	ZixCorp
Founded (Acquired)	1999 (2003)	2000
Location	Mason, OH	Dallas, TX
Funding		
Round 1	$6M (seed)	Public
Round 2		
Round 3		
Total	$6M	$88.9M (Market Cap 05/05/05)
Original Investors		NasdaqNM: ZIXI
Purchase Price	$1.5M	
Key Relationships	Dictaphone ExpressScripts Research In Motion (RIM) MedWired	RxHub Research In Motion (RIM)
Solution	PocketScript	PocketScript
Platform	PocketPC, RIM	
Pricing	FREE if e-Detailing; otherwise $150/month	$50/month
Milestones		
Physician Users	1,000 (2000)	1,500 (2005)
Employees	67 (2000)	252 (2005)
Events	October '02 Medix Resources announces intention to acquire assets of PocketScript

September '03 ZixCorp acquires | |

bcc:
consulting

**Mobile
e-Prescribing:**
The Killer App
for IT Adoption

	Allscripts	ePocrates
Founded (Acquired)	**1998***	**1998**
Location	**Libertyville, IL**	**San Carlos, CA**
Funding	**Funding**	**Funding**
Round 1	**Public**	**$5M** (Sept '99)
Round 2		**$35M** (Aug '00)
Round 3		**Unknown** (Jul '02)
Total	**$502M (Market Cap 05/05/05)**	**$40M+**
Original Investors	**Nasdaq: MDRX**	Sprout Group Bay City Capital Draper Fisher Jurvetson Three Arch Partners InterWest Partners
Purchase Price		
Key Relationships	IDX **RxHub** **Surescripts** Medem Microsoft HP Intel AmerisourceBergen WoltersKluwer Welch Allyn	Sprint Cingular Trio Teknologies palmOne pdaMD.com HP Medsite DrFirst MercuryMD PatientKeeper Handango
Solution	**TouchScript and TouchWorks Rx+**	**ePocrates Rx/RxPro**
Platform	**PocketPC**	**PocketPC & Palm**
Pricing	**$150/month**	**Free/$60 per year**
Milestones	**Milestones**	**Milestones**
Physician Users	**140** physician practices	**420,000** clinicians (2005)
Employees	**348** (2005)	**100+** (2005)
Events		

*1998 is when Allscripts began offering TouchScript mobile prescription solution.