APIs for a Healthcare App Economy: Paths to Market Success

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Preface

This report stems from a series of conversations we had at HIMSS16 on the topic of open application programming interfaces (APIs). Provider organizations seek simpler, more effective ways to develop and integrate HIT applications. Major stakeholders now believe that open APIs represent a new opportunity to build the kind of successful application economy so prevalent in other industries. What is missing so far is a good understanding of how this can be achieved in an already rapidly changing healthcare industry. Open APIs can trigger a restructuring of relationships among HIT vendors, HCOs, and new entrants at least as complex as the transformation being caused by evolving payment models. With few exceptions, existing HIT technologies have not delivered the level of interoperability and services needed to support new models of care and care coordination or satisfy the data needs of the varied constituencies in healthcare.

The purpose of this report is to shed light on the market's readiness to move the industry toward API-based development and integration. Four leading health information technology vendors joined Chilmark Research to sponsor this research: Cerner, InterSystems, Orion Health, and PokitDok. For HCOs, this report provides a snapshot of current thinking about the potential for open APIs, which will enable them to assess their own position and strategies. For vendors, this report is an opportunity to evaluate their product roadmaps from the perspec¬tive of a pressing, and mostly unmet need in the industry.

We are grateful to our sponsors and their desire to support this research. Like Chilmark Research, these companies are committed to educating the industry and laying a path forward for HCOs to realize value from their current and future investments in interoperable software infrastructure.

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> HL7 and messaging architectures are going to fall by the wayside over the next several years as we move toward a more modern architecture based on open APIs.
>
> *Academic medical center*

A critical element of business success across industries has been the surge in use of open application programming interfaces (API) that provide data for applications that did not create or originate the data. APIs are the technical foundation of engaging interfaces and high-value interactions between different applications. Application ecosystems such as Google Play and Apple App Store would not exist without open APIs that enable data access across multiple sources and organizations. Open APIs in healthcare promise a HIPAA-compliant way to enhance a digital portfolio with an ecosystem of third party applications and services.

To understand what it will take to build an API program in healthcare and deliver on this promise, we conducted a broad survey of the healthcare market to solicit ideas and opinions about the opportunities and challenges represented by APIs. These interviews indicate significant enthusiasm for wider availability of APIs to make it easier to develop more accessible systems of record and more responsive and innovative systems of engagement.

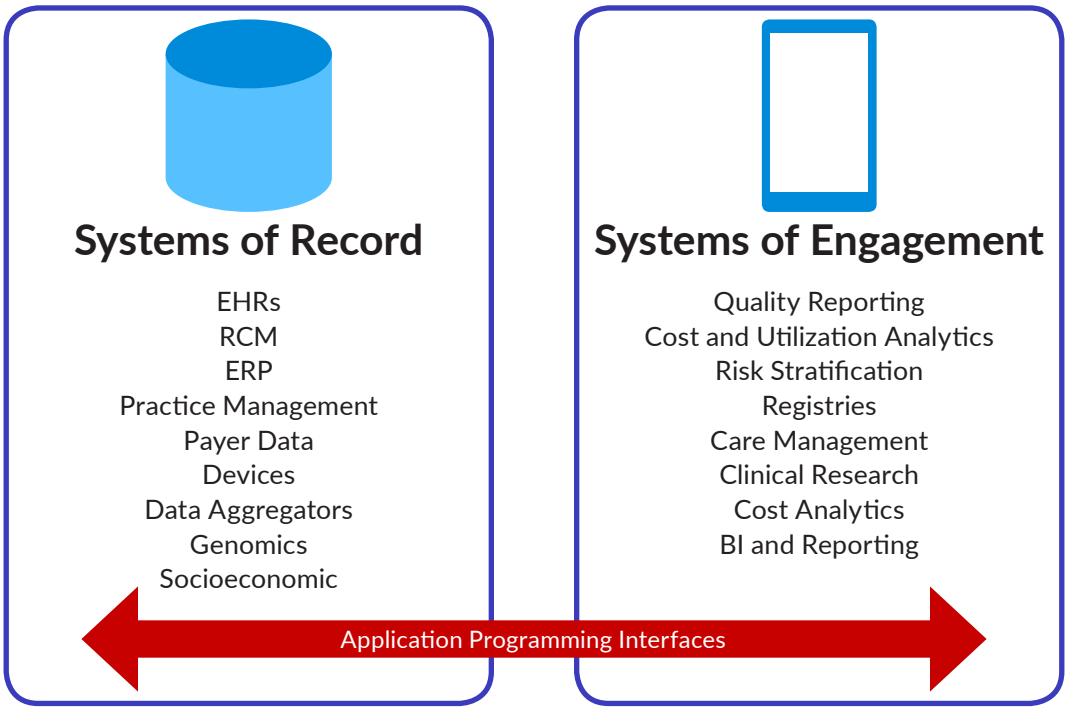


Figure 1: APIs Address Need for Better Systems of Record and Engagement

The API Opportunity in Healthcare

Big Potential – HCO C-suites, IT organizations, and clinical leadership need no convincing about the potential that APIs offer. Most expect API programs to deliver functional enhancements, improvements to user interfaces, and broader dissemination of digital assets across their connected communities.

HCOs Are Building New Care Models – HCOs are actively exploring process changes that can drive better care coordination, higher quality, and healthier patients. Many see APIs as a way to extend and improve applications to support the change needed to implement successful new care models.

Only Large HCOs Can Invest – The largest HCOs are currently expending time and resources on APIs. Other HCOs are waiting for their HIT vendors to show the way.

Smaller HCOs Will Follow – Small HCOs, dealing with the "tyranny of the moment", will wait for tangible results from leaders who demonstrate the utility and efficacy of an API-based infrastructure.

HCOs Want to Spread Expertise – API-based development, together with advanced analytics, can increase the effectiveness of existing applications by enhancing the expertise of individual clinicians.

Data Types	API-based Approaches	Example Companies
Clinical	> REST APIs for HL7 data streams and files > Performs all the translations needed based on customer's expectation of API input/output > Can do any-to-any translation between disparate applications	Redox, Catalyze
Payer	> REST API to claims with JSON response > REST API to plan, formulary, pharmacy network, and price data with JSON response	NavHealth, PokitDok
Other	> REST API to wearables and in-home devices with JSON response	Validic

Table 1: Modern Approaches to Healthcare APIs

The API Challenges

Reimbursement and Regulation Impede Data Sharing – Many see the continued dominance of fee-for-service (FFS) payments and HIPAA as counterproductive to data interoperability.

HCOs and Clinicians are Overwhelmed – Clinical organizations see process change as the way to adapt to the demands of changing payments. They want technology to help but it is not the first tool they reach for.

Lack of Clear Business or Clinical Justification – The wait-and-see stance of most HCOs stems from the demands of keeping existing processes functional and the practical reality that they only want to invest if a clear clinical or business need can be addressed.

Payment Uncertainty – Most people believe that patients will not pay for apps, at least not directly. No one has ruled out the possibility of indirect payment. HCOs will pay only if there is demonstrable value or if an app provides actionable data.

Legacy Issues – Legacy software and skills makes modern Web deployment ideas and technologies difficult to incorporate into existing application and software infrastructure plans.

With respect to this last point, the use of REST APIs with JSON response is not unheard of in healthcare. Numerous vendors are pushing ahead with technology that is mainstream with respect to wider IT. While such companies are not necessarily in a position to move the wider market, they point to the future of HIT software infrastructure.

Discussion of Findings

Healthcare decision-makers are keenly aware that applications can be more responsive to business and clinical needs and improve current care delivery and administrative processes. Clinicians and other healthcare users can't understand why the revolution in consumer applications and in other industries is not happening in healthcare. Virtually everyone uses the term "actionable data" as the defining characteristic of a better future state. This research overviews widely held ideas about how APIs can be harnessed in healthcare to achieve that future state.

Healthcare Segment	Common Beliefs and Attitudes
Large HCOs	> Strong enthusiasm about a healthcare app marketplace > Fully aware of potential of open APIs > Expect their EHR vendor to build an API infrastructure > EHR user interface and functional enhancements > Not investing yet, waiting for vendors > FHIR and SMART-on-FHIR will be valuable and functional
Small HCOs and Individual Clinicians	> Strong enthusiasm about a healthcare app marketplace > Completely dependent on their EHR vendor > APIs are low priority > EHR enhancement is the opportunity
Payers	> Stronger IT bench than HCOs > Want to partner with providers and employers > Want to find way to develop new, better apps that are less costly to create and maintain
Large HIT Vendors	> FHIR is the centerpiece of most vendor's open API strategy > Little sense of urgency > Varied beliefs about role of third parties
Small HIT Vendors	> Very strong belief in open APIs > See FHIR as a way for large vendors to control access to data > Freely offer alternative web-based development ideas > Thinking way beyond the EHR
Data Integrators	> Strong belief in value of proprietary APIs > Skeptical of FHIR > Focused on monetization
Device Manufacturers	> Strong supporters of simplified access to their data > Focused on monetization

Table 2: Summary of Sector Beliefs about APIs and Apps

We interviewed representative stakeholders in healthcare (see Appendix A: Scope, Methodology and Discussion Guide) about the opportunities and challenges presented by open APIs and their potential role in the development of an ecosystem that will make applications more portable, easier to use, and more functional. We talked to large and small HCOs, independent HIT-only ISVs, healthcare data integrators, and payers to get an idea of industry perceptions of what it will take for APIs to set the stage for an app ecosystem that helps transform the industry. (See Appendix B: List of Interviewees).

Overwhelmingly, actual clinical or business need is a primary consideration for providers.

> It's about how you talk about the problems that you're solving versus technology in a way that solves people's real-world operational needs. Ours is an industry that's largely physicians and nurses and others that are delivering care and IT has its wonderful promises that support that care. What they care about is their problems being solved.
>
> *Multi-state IDN*

> We need to change the way that we're delivering the care, and so a lot of our focus is not the technology but the care model, the real care delivery. Technology is going to enable it but I don't want it to anchor the discussion.
>
> *Large IPA*

For HIT companies, APIs represent a different challenge. Custom interfaces are a steady professional services business for many HIT vendors. An API-based ecosystem sets up a revenue model more akin to a software product business with attendant commitments to ongoing maintenance, enhancement, and upward compatibility. More importantly, APIs are not just a better alternative to interfaces. They also represent a more effective way to work with HCOs seeking to implement the clinical and administrative process changes needed for new patient care models and new systemic delivery options.

Opportunities and Pioneer Apps

Clinicians yearn for a light at the end of their EHR data entry tunnel. Many respondents believe that APIs offer one way out. Adding functionality or a better interface to EHRs was the most frequently mentioned opportunity.

> The app should either make the EHR do something better or should make it do something that it's not currently capable of doing. [The] need is going to come from both increased functionality as well as usability and user interface.
>
> *– Hospital System*

"I think the EHR is the center of the world for the vast majority of providers. And we [have to] plug in things. Providers can't go someplace else."

– Large IPA

Key Points:

- EHR improvement is a strong, clear, and urgent need
- Clinicians want actionable data which is the combination of data with expertise
- Better distribution of expertise across the healthcare system is the dominant systemic need

Clinicians want their data in their EHR. For better or worse, the EHR is central to most clinician's activities. Their appetite for and tolerance of separate applications decreases every year. Nearly every respondent talks about the escalating need for integration between different applications – with the EHR at the center.

But respondents see vast opportunities in a variety of different areas:

- Apps that activate and engage patients
- Cross-organization care coordination that borrows interaction features from social network applications
- Apps that let patients compare the cost implications of different treatment and medication options
- Care transition apps for the relatively large number of people involved in care who have no access to an EHR
- Self-service scheduling
- Apps that conceptualize each patient as a sequence of birth-to-death care gaps
- Real-time access to relevant individual data points
- A more functional, searchable longitudinal patient record
- Better use of patient-generated data, including patient-reported outcomes
- Patient-focused peer group communities
- Error detection and prevention
- Utilization management
- Precision medicine

These suggestions point to the unmet need to combine data and insight for the user in the best position to act – actionable data. While there have been herculean efforts – and mixed results – to move data around the healthcare system, the nearly universal expression of interest in actionable data can only be seen as a recognition that existing methods of moving data only accomplish so much. Most respondent's pleas for actionable data point to a need for

software that is smarter about melding the movement of data while doing something constructive with it.

One respondent described this as the need to address the maldistribution of knowledge across the healthcare system. He pointed to increasing incidences of misdiagnoses and the practical impossibility that every clinician know everything they need to know.

> Innovations take an awfully long time to get into the hands of practitioners and become regularly used. We know there are pockets of expertise. What we don't know as much about is the maldistribution of the content of that expertise. That is, 'How much do you know about the problem you're trying to solve or treat or diagnose?' Fundamentally, I think the first-order problem that an [API-based] ecosystem could address would be the cutting-edge stuff. Pharmacogenomics, for example. As a primary care practitioner, it is way beyond my capabilities to understand the tens and hundreds of thousands of new variants that [could better inform] how I diagnose and treat a patient.
>
> *Academic medical center*

Better distribution of knowledge will permit HCOs to compete based on outcomes and patient experience rather than the knowledge set or reputation of a clinician or group of clinicians.

What constitutes evidenced-based knowledge varies, and clinicians have their preferred sources of credible evidence. Whether it is called actionable data or knowledge or expertise enhancement, the point is that apps are increasingly able to deliver it to individual users, with technologies such as predictive analytics and artificial intelligence applied to fairly large data sets. While there is a lot of data sloshing around the healthcare system, these emerging technologies can make that data more effective if the APIs can make data more available.

HCOs are also increasingly focused on ways to be more efficient. They are undertaking programs and measures such as telehealth, the migration of care to lower-acuity settings, and physician substitutes to distribute care resources where they are needed. A more complete distribution of knowledge and expertise can make these efficiency measures far more effective.

Apps for Clinicians or Patients?

Currently, beliefs are mixed about whether clinicians or patients (or both) should be the target user for API-enabled apps. A great many respondents believe that both groups should be the focus of new development. They readily acknowledge that few patient-facing apps deliver

value over more than the short term. They emphasize that there is great potential for apps that can result in more activated, better adhering patients. They also suggest that patient-facing apps could help offload work and possibly expertise from busy clinicians. This group indicates that patient's will be more demanding than clinicians in several ways. Several expressed the idea that apps could help patients better manage chronic conditions. Patients too have high expectations about the user interface and continuity between apps.

Key Points:

- Clinician-facing apps most impactful
- Physicians want their EHRs fixed
- Unclear what patients want, need, or value
- Needs exist among every group of users in healthcare

> Patients will be more demanding because there's a real benefit to them. I mean physicians, they don't care if [data] comes via courier pigeon. As long as data is getting from point A to point B, then great!
>
> *Health information organization*

> It's going to be patient-facing applications. When you look at chronic condition management, when you look at payments, when you think about remote monitoring solutions, it's going to be near impossible for an EHR to do all these things well.
>
> *HIT-only ISV*

> There need to be apps for patients and clinicians but the stuff that's being developed isn't actually meeting the needs of either patients or providers.
>
> *Large IPA*

> It's very unclear what consumers want in terms of digital health.
>
> *Payer*

On the other hand, many respondents strongly suggest that clinician-facing apps offer more promise for a fast, positive contribution to a better healthcare system. One reason is that patients can't be their own doctors, regardless of how much expertise is offloaded to an app. Most who focus on clinicians want to deliver a better end-user experience for clinicians. One respondent talked about the superiority of the well-known SMART-on-FHIR pediatric growth chart and its virtues over identical data delivered in the EHR he uses every day. Another respondent pointed out that iPhone finance apps have uniform navigational and interaction features whereas every SMART-on-FHIR app implements these features differently.

> The healthcare system has a whole lot to be desired and improvements have to come on the provider side.
>
> *HIT-only ISV*

> Clinician need is probably a little higher priority.
>
> *Hospital System*

Physicians in particular believe that clinicians rather than patients should be the focus of development. The well-known issues swirling around EHRs point to significant pent-up demand for API programs.

Who Will Lead?

Key Points:

- Large HIT vendors and large HCOs will control the pace
- Smaller players are pointing the way but can't move the market
- Major EHR vendors can make or break progress for APIs

This question produced a narrow spectrum of responses that point in one direction: Large healthcare players must lead. Most respondents believe it will be the largest HCOs, enabled by their large vendors, which will lead the industry in developing effective API programs. They reason that the numerous small providers across the industry are so dependent on their vendors – generally EHR vendors – that the provider will go without if the vendors do not deliver functionality.

Most believe large HCOs that demonstrate success will establish credibility for the idea of open APIs. Payers are confident they can build successful API programs. However, most respondents believe that EHR vendors have the skills, time, and resources to develop and refine APIs that deliver durability and value for HCOs.

> It's going to be harder for the smaller groups to do that. The sweet spot is going to be those medium to large practice organizations and then the IDNs. And they're also going to be the ones to have the infrastructure to stand up something like this. A small practice is not likely to have the infrastructure.
>
> *Hospital System*

> Vendors are going to have to lead the way.
>
> *Health information organization*

> EHR vendors will have a big role to play. It will not be hospital or practice-driven
>
> *Data Integrator*

> The way it works, there's a story or two that people can deeply latch on to and that usually comes from one of the large organizations.
>
> *Multi-state IDN*

> Technologically, [HCOs are] pretty backward. [EHR vendor name redacted] kept them that way because they liked it. They can dominate their IT teams – like keeping them dumb. In terms of cutting-edge, bleeding-edge technologies, the payers are much further along than the health systems. And we have a lot more data.
>
> *Payer*

This belief is tempered by some vocal minority opinions. Payers want to sponsor API programs in markets where the payer brand is stronger than hospital/health system brands. The potential contribution of vendors not normally associated with HIT could also be important. Some point to partnerships such as Apple-Epic, IBM Watson-Sloan Kettering, or Google's work with pharmaceutical companies and payers as interesting possibilities given the size and prestige of the IT companies involved and their skills and expertise with API-based development and integration.

Provider organizations ratify the top-down theory of technology propagation but don't rule out the possibility that small providers and non-healthcare vendors could contribute – or even lead. In part this belief is based on widespread dissatisfaction with the current state of HIT applications and the track record of innovation from large HCOs and HIT vendors. In general, respondents in close contact with or part of the clinician user community were more inclined to express "blow up the system" sentiments. Some also point out that technology that originates in "Innovation Centers" at large health systems and AMCs is not actually used by those same large players.

Valuable Data Sources

The important conclusion about data sources is that most believe that the appetite for data, in terms of type and quantity, will only increase. But simply providing more and better data is more complex than it sounds. One aspect was aptly expressed by one provider: "It's not as if we are swimming in available data." As another respondent put it: "Getting data is actually a negative, because all it does is inundate [physicians] with information that they can't do anything with because they don't have the resources or the time."

Key Points:

- EHR data is highly prized
- Concern about volume vs. value of data
- All want maximum access to the minimum data required in the context
- Nobody believes that the available data is adequate

This commonly expressed idea – that there is both too much and not enough data – points to the lack of useful data. Many comments deal with this tension between the appetite for data, on the one hand, and the large volume of useless data, on the other.

> It's making the data actionable and not just getting a flood of data. Figuring out how to put it either into my EHR or in front of my clinicians in the right way. That's where we sit today in 2016, moving from the flood of data to actionable data.
>
> *HIT data integrator*

Most of the organizations and individuals believe that a lot of patient data exists, that it is growing rapidly, but that access to it needs major improvement. Almost every interviewee rues the lack of "actionable" data.

By a large margin, respondents believe that EHR data is and will be the most valuable data resource for clinicians, patients, and other users. Physicians, regardless of role in the organization, mention EHR data first and use the term to mean any EHR in any venue that the patient has ever visited. Most then describe other valuable data sources that are new to the healthcare system or currently external to healthcare. The anticipated flood of genomic data is an example of the former. Third-party demographics information is an example of the latter. Some also point to device-originated or patient-reported data as potentially valuable sources.

> Nothing make sense more than the API to connect them to an EHR space. Nothing at all. It's the perfect solution.
>
> *Health information organization*

> I wish I had access to the entire medical record, but I think there's elements to the medical record that are more important frankly than others.
>
> *Specialty Provider*

> I'm looking for utilizing existing EHR data and visually presenting the information to me in a more user-friendly way
>
> *Hospital System*

> Not only the EHR I'm sitting before, but the one that might have been used to care for the patient last week, last month, last year. So we got to get the EHR data right. There will be intersections between those EHR data and other data locally at a healthcare delivery system or clinic or even individual practitioners office.
>
> *Academic medical center*

> The data is all sitting in different receptacles. There's 16 EHR brands in a normal marketplace. And each one of those, within those practices, has a separate instance with its own configuration. We're trying to pull data out of these – not hundreds, but thousands of EHRs.
>
> *Payer*

One interesting observation: Neither independent third-party developers or established HIT vendors will be as close to or familiar with the data as clinical end-users. If developers had deep familiarity with workflows and the data created in face-to-face clinician encounters, then better applications than those developed by someone once removed would result.

Other kinds of data mentioned by respondents include sleep, location of events, nutrition, genomics, activity, weather, and third-party demographics. Payer data is interesting to providers, most of whom note that payers are as locked into EDI transactions as providers are locked into HL7 transactions.

Despite the long list of data and data types of interest, most respondents agree that presenting the smallest quantity of data possible is the ideal. While many insist that access to the complete longitudinal patient record from all EHRs is what is needed, most prefer the absolute minimum subset based on the context. Respondents widely express the idea of maximum data availability and minimum data presentation.

Thoughtful minority opinion on this topic holds that any kind of integration effort or new development should not be tethered to an EHR. A data warehouse or EHR extract can support a range of value-added care coordination applications. These applications need minimal amounts of data – often just patient demographics and information that indicated an encounter occurred, its physical location, and time. Smaller vendors, stymied by a lack of access to EHR data, find this to be a productive approach.

Who Will Pay?

Every interviewee paused before answering this question. No one knows. If there is consensus, it is that consumers will never be willing to pay for apps or for access to a set of APIs and that large HCOs may pay if they perceive that an app or API access provides value or is "actionable."

Key Points:

- Uncertain funding
- Patient or clinician will only pay for value
- Willingness to pay for actionable data

> They're just not at that stage that data is something that they're willing to pay for [referring to device-generated data]. You know, it's like charging for the fuel that's going to power the jetpack I will have one day. Until I have my jetpack I don't want to pay.
>
> *Data Integrator*

> I don't think consumers are going pay for any of this.
>
> *HIT-only ISV*

> It's going to be the larger organizations. Your solo practitioners and smaller groups are going to be a little bit less likely to pay for add-ons. Most of them already resent having to pay for the EHR in the first place.
>
> *Hospital System*

> Who's motivated to pay is part of the challenge. You really need to make the case that there is a return and an ability to achieve [something with these] efforts. The money is going to come from people trying to solve the issues that they're trying to solve and not focus on the APIs.
>
> *IDN*

> It should be built into the payment system somehow. You can play a lot more if you're not living in the fee-for-service world. I don't know how you launch innovation when you're a 100% fee-for-service. That's why larger groups obviously can have a richer conversation [with payers].
>
> *Large IPA*

One respondent talked about a well-known precedent for payment. Nearly every provider in the United States currently pays for e-prescribing through a combination of a genuine desire to achieve efficiencies and a government mandate. Providers see value because it saves them from time-consuming and repetitive interactions with pharmacies and patients.

Many respondents believe that payment is only acceptable if the app enhances revenues or reduces costs. Cost reduction will be an important motivator for HCOs.

> With healthcare providers the dollar absolutely rules everything. So it's most important to start with, 'Can we make them money or save them money?' Most likely the answer is going to be save them money. The most important types of applications are the ones that can cut directly to some of their major expenses.
>
> *Data Integrator*

Patients, too, will seek to reduce their personal share of medical costs. Either way, most respondents think buyers (clinicians or patients) are more willing to pay for a finished app than for access to raw data from an API. Outside of healthcare, developers are able to charge for both models – access to raw data or for finished apps – depending on the app and its user base. While we are convinced that raw data is not monetizable we recognize that there are examples in healthcare where providers pay for raw data (e.g. meds histories, eligibility information, and payment status).

Which APIs?

All HIT vendors focus on providing better interoperability and integration solutions involving APIs. Many have announced plans to support FHIR and SMART on FHIR. Vendor-unique APIs are realistic alternatives. Relatively few HIT vendors have attracted third-party or customer developers willing to build applications that use data through FHIR APIs. Many say that no customer has yet asked them for access to data via FHIR.

Key Points:

- FHIR and SMART on FHIR are inevitable
- FHIR alone will not address all requirements
- Pervasive concerns about the slow pace of FHIR rollout
- Some support for proprietary APIs

Many HIT ISVs approach product development with a more modern set of tools and methodologies. They are more likely to employ REST APIs and JSON data exchange. These technologies are still new for too many large HIT product companies.

> HL7, I know it's a pain in the butt, but it works. You can achieve what you need. And if you throw in IHE profiles, then FHIR brings nothing new to the table.
>
> *Health information organization*

There is resistance to the idea of open APIs. For the most part, this comes from companies with existing business models based on selling healthcare data or companies seeking to monetize existing data stores.

> But the worse thing I can imagine a device manufacturer doing is wasting their time on a specific data format like FHIR when they can act so much faster and provide so much more value if they just trust that, 'Yup, it's going to have to go through some translation and that's just the way it is.'
>
> *Data Integrator*

> APIs can be closed and still be effective, drive efficiencies, and be helpful. There will be more use of closed APIs than open in the sense of having a business relationship.
>
> *Data Integrator*

In general, small HIT developers would prefer to use any API today rather than wait for the large vendors to productize FHIR APIs. They suggest that REST APIs to data extracts would be a good place to start. They admit that the promised uniformity of FHIR simplifies data discovery and addresses many of the problems inherent to existing HL7 and IHE implementations. They would happily use a proprietary API if it delivers consistent data and is well-documented. FHIR promises those characteristics across EHRs – in an unspecified future. For now, small developers see it as an over-engineered content and format exercise, much of which might never get used.

> The faster we can get HL7 to let go and let the market drive [what] the APIs look like, the faster this will evolve.
>
> *HIT-only ISV*

> A simple REST interface to EHR data or lab data or insurance company data would be so much better than a standard. Standards have failed because the standard has to accommodate for everything.
>
> *Specialty Provider*

We know that the largest HIT vendors have conflicted attitudes toward open APIs and third-party applications. All publicly profess a commitment to developing more and better APIs for development and integration purposes centered on the FHIR standard. Relatively few are taking aggressive product actions. Some large vendors openly admit that there are great ideas for innovative applications outside their organizations and actively support third parties. Others insist that they have both the ideas and wherewithal to broadly push innovation. Most large vendors fall somewhere between these two views.

Large providers and their large HCO customers, on the other hand, are confident about the promise and eventual efficacy of FHIR.

> Without a standard [like FHIR] you are going to have to deal with each EHR on its own terms and that can get expensive.
>
> *Hospital system*

> There's nothing right now that I'm aware of outside of FHIR that has any real market-place energy.
>
> *Health information organization*

> The way to do this is to actually make the API as simple as possible – restful, etc. – and then to expect conformance in the source data systems. It's not possible to load all these semantics of the different potential data types and representations and meanings in the FHIR resource specification. Some degree of conformance has to be enforced.
>
> *Academic Medical Center*

> FHIR is an enabler and has simplified some things that were getting really complex
>
> *Data Integrator*

Since the standard is intended to ultimately supplant HL7, it will have to support more use cases. To date, FHIR use cases have been primarily concerned with read access to EHR data sources. HCOs and non-EHR vendors talk often, and urgently, about the need to write data to the EHR.

> We also have to go to [EHR vendor name redacted] and say, 'If we send you this, are you going to be able to store it? Do you have a place to store this information?' As open as they are, that kind of situation requires a conversation directly with the vendor. We have about 15 large customers in common, so we're able to get their attention now. When we only had one, it was a different game.
>
> *Data Integrator*

One respondent notes that HIT vendors and their customers will need time to iterate and refine their APIs. A consumer company such as Google or Instagram benefits from a large volume of API calls that allow it to improve its APIs rapidly. HCOs will not generate comparable usage and will take longer to evolve their APIs to make them market responsive. This fair point indirectly supports the idea that HIT should push forward with FHIR-based APIs. Every vendor could benefit from the collective use of FHIR APIs across the industry.

FHIR is over-hyped in late 2016, but it has been endorsed by the largest EHR vendors, and many large health systems talk and act as if it will be a reality. But we believe that FHIR, as currently conceived, is too narrowly focused. Developers will need access to more than the meaningful use common clinical data set and the small set of use cases under contemplation. APIs for user interfaces and process orchestration can contribute just as much, if not more, than APIs for data access.

The pace of the FHIR rollout has been slow with no acceleration in sight. Every independent HIT vendor expresses frustration about the lack of progress, the complexity of the specification, and the inability to influence its final expression. They are resigned to the fact that large players will establish it as a market force.

To reiterate our belief, API programs, FHIR or otherwise, are the responsibility of HIT vendors. Most developers in less-than-large HCOs and ISVs will need to rely on large vendors to make effective use of FHIR profiles and resources. This point has been made by CMS Acting Administrator Andy Slavitt and is consistent with what we have said for some time: The large HIT vendors, essentially the largest EHR vendors, will have to build and maintain APIs and any supporting infrastructure.

Summary and Recommendations

> We need to be shaken up by some outside thinking. I don't want to tell the Silicon Valley thinkers to go away; I just want to work with them more effectively.
>
> – *Large IPA*

Every healthcare stakeholder wants a diverse and vibrant application marketplace for clinicians, patients, and others. Most believe that open APIs are the linchpin to making it happen. But most recognize that API programs will have to deliver benefits to provider and patient. These benefits – whether financial or health status – will have to be so clear that it becomes irresponsible not to take advantage of APIs. Governance is the thorniest question for most HCOs. So far, we have talked to no one who has answers. Every HCO and connected community will establish its own rules of the road. Even a rudimentary API program can help an HCO begin this process.

Building and operating an API program will be a new undertaking for HIT vendors and HCOs. Vendors such as Allscripts and athenahealth have a head start. It will be impossible to offer an effective way to build better systems of record or engagement without a developer support program built around APIs. Successful examples from outside healthcare are ubiquitous. HIT vendors need to evaluate their current API practices to model their efforts on these best practices, at least initially.

API Program Element	Current HIT Practice	Forward Looking HIT Examples	Cross-Industry Best Practices	Examples
Online presence	> Customer portals > Includes HL7 and IHE documentation > Access restricted to customers only	> Allscripts Developer Program > athenahealth More Disruption Please	> Comprehensive source for API documentation, sample code and SDKs, sandbox, support options and pricing	> Microsoft Developer Network > Amazon Developer Support > Apple Developer
Sandbox	> Customer is responsible whether on-premises or hosted > Developers need representative data with diverse patients and providers > Major EHR vendors have proprietary testing tools > Virtual test environments lacking	> None	> Vendor supplied and maintained > Test environments with data > Virtualized development and testing	> Paypal > Cisco DevNet Salesforce Force.com

API Program Element	Current HIT Practice	Forward Looking HIT Examples	Cross-Industry Best Practices	Examples
SDK	> Proprietary SDKs > Limited access to sample code	> None	> Packaged sample code, classes, APIs, and documentation	> AWS SDK for Java
Live support	> Contract-based > Negotiated customer by customer	> None	> Contract-based > Negotiated customer by customer	> Google Cloud
System of Record APIs	> Lots of HL7, IHE, and proprietary data > Delivers some detailed data from some systems of record > No aggregated data via APIs > Documentation available only to customers	> Cerner FHIR APIs > Epic FHIR APIs	> Delivers data from systems of record > REST simplifies programmer data access > Documentation publicly available online	> Google Elevation API > Bloomberg Open Market Data Initiative > MasterCard Insights Services > AWS Data Pipeline > Expedia Car Search
System of Engagement APIs	> High dissatisfaction with systems of record > SMART on FHIR makes apps more confusing since each looks and acts differently > No standards or consensus > Little attention or discussion about the problem	> None	> Continuity across disparate apps for users > Established interface ideas are well understood among developers	> SAP Developer > Apple Human Interface Guidelines > Android UX Guidelines
Usage Agreements	> One-time interface fees > Incorporated into master contracts	> Validic Service Level Agreement	> Service level agreements > Usage charges	> Google Maps > Amazon RDS

Table 3: Healthcare API Programs Compared to Best Practices

Small HCOs are waiting for large HCO to establish that API programs offer a path to applications that better support their goals. There is also a broad recognition that even large HCOs may not have the resources or the time to invest in building the infrastructure that can unlock the value of open APIs. They need HIT vendors, and particularly the largest EHR vendors, to blaze the trail. The largest HIT vendors can do the industry a service if they can make APIs a bit more plug-and-play and a bit less massive IT project for HCOs.

Recommendations

HCOs

- Start an API program
- Press EHR vendors
- Begin API governance discussions
- Concentrate on EHR UX issues before functional enhancements

HIT Vendors

- Start an API program with FHIR and other APIs
- Rethink interfaces as a product rather than service business

Payers

- Start an API program and begin with paid claims data
- Cultivate stable of ISVs and independent developers

Data Integrators

- Begin to build support since FHIR is not going away.
- Build a value-based – rather than access-based – monetization model

Device Manufacturers

- Partner with EHR vendors and data integrators
- Build a value-based – rather than access-based – monetization model

Appendix A:

Scope, Methodology, and Discussion Guide

To gather the information for this study we conducted telephone interviews with 24 individuals from 15 organizations. The organizations included hospitals and IDNs, an AMC, an IPA, device manufacturers, HIT ISVs, payers, data aggregators, and a health information organization. A brief description of each organization and interviewee is provided in Appendix C. We have withheld the names of the organizations since most agreed to the interview on the condition that their names and the names of their organization not be revealed. The interviews lasted 30-60 minutes with most taking around 45 minutes. Every discussion was based on the following set of questions. Given the qualitative nature of these discussion, not every question was answered but the majority of these topics were touched on in most of the conversations.

Discussion Questions

1. What will be the pioneer API-based applications?
2. Will patients or clinicians drive demand for applications based on open APIs?
3. Who is going to pay for apps?
4. Do you think that large HCOs will be the first place that API-based apps take hold?
5. Which APIs will be important to developing this market?
6. Which existing data sources will be most valuable for API-driven applications?
7. Do HCOs understand when and where to use FHIR?
8. What other technologies – besides APIs – will be important for supporting better interoperability?
9. Can open APIs and an app-based ecosystem accelerate an HCOs response to changing market dynamics?
10. How will APIs help support the successful transition to value-based care and payments?
11. Is an application ecosystem an absolute requirement for a competitive and effective healthcare system?
12. What are the most significant obstacles to adoption from a provider standpoint?
13. How would you rate the priority of having open APIs against other priorities in the HCO?

Appendix B:

List of Interviewees

HIT-only ISV
Chief Medical Officer
Chief Technology Officer
U.S.-based

Large IPA
VP of Innovation (MD)
Northeast U.S.

HIT-only ISV
Founder and CEO
Global

Hospital System
Chief Medical Information Officer (MD)
Midwest U.S.

Multi-state IDN
Chief Innovation Officer (MD)
Southwest U.S.

Data Integrator
VP of Product Management
U.S.-based

Health Information Organization
VP of Operations
Midwest U.S.

Payer
Director of Clinical Innovations
Mid-Atlantic U.S.

Device Manufacturer
VP of Innovation and Integrated Care
Global

Specialty Provider
Chief Technology Officer
U.S.-based

HIT-Only ISV
President and Chief Technology Officer
U.S.-based

HIT-Only ISV
Founder and CEO
U.S.-based

Data Integrator
SVP of Information Systems
U.S.-based

Data Integrator
VP of Product
Global

Academic Medical Center
Chief of Informatics (MD)
Southeast U.S.

Appendix C:

Acronyms Used

Acronym	Explanation
ACO	Accountable Care Organization
AMC	Academic Medical Center
API	Application Programming Interface
BAA	Business Associate Agreement
CMS	Centers for Medicare and Medicaid Services
EDI	Electronic Data Interchange
EHR	Electronic Health Resources
EMR	Electronic Medical Record
FHIR	Fast Healthcare Interoperability Resources
HCO	Healthcare Organization
HIPAA	Health Insurance Portability and Accountability Act
HIT	Healthcare Information Technology
HL7	Health Level 7
IDN	Integrated Delivery Network
IHE	Integrating the Healthcare Enterprise
IPA	Independent Practice Association
ISV	Independent Software Vendor
IT	Information Technology
JSON	JavaScript Object Notation
PCP	Primary Care Practitioner
REST	Representational State Transfer
SDK	Software Development Kit
UI/UX	User interface / User experience

About Chilmark Research

Chilmark Research is a global research and advisory firm whose sole focus is the market for healthcare IT solutions. This focus allows us to provide our clients with the most in-depth and accurate research on the critical technology and adoption trends occurring throughout the healthcare sector. Areas of current research focus include among others: Clinician Network Management, Cloud-computing Models for Healthcare, IT-enabled Accountable Care Organizations, Care Coordination, Adoption of Mobile Technology and Consumer-facing Health & Wellness Applications and Services.

Using a pragmatic, evidence-based research methodology with a strong emphasis on primary research, Chilmark Research structures its research reports to serve the needs of technology adopters, consultants, investors and technology vendors. In addition to reports for the general market, Chilmark Research performs research for clients based on their specific needs. Such research has included competitive analyses, market opportunity assessments, strategic assessment of market and vendors for partnership and/or acquisition.

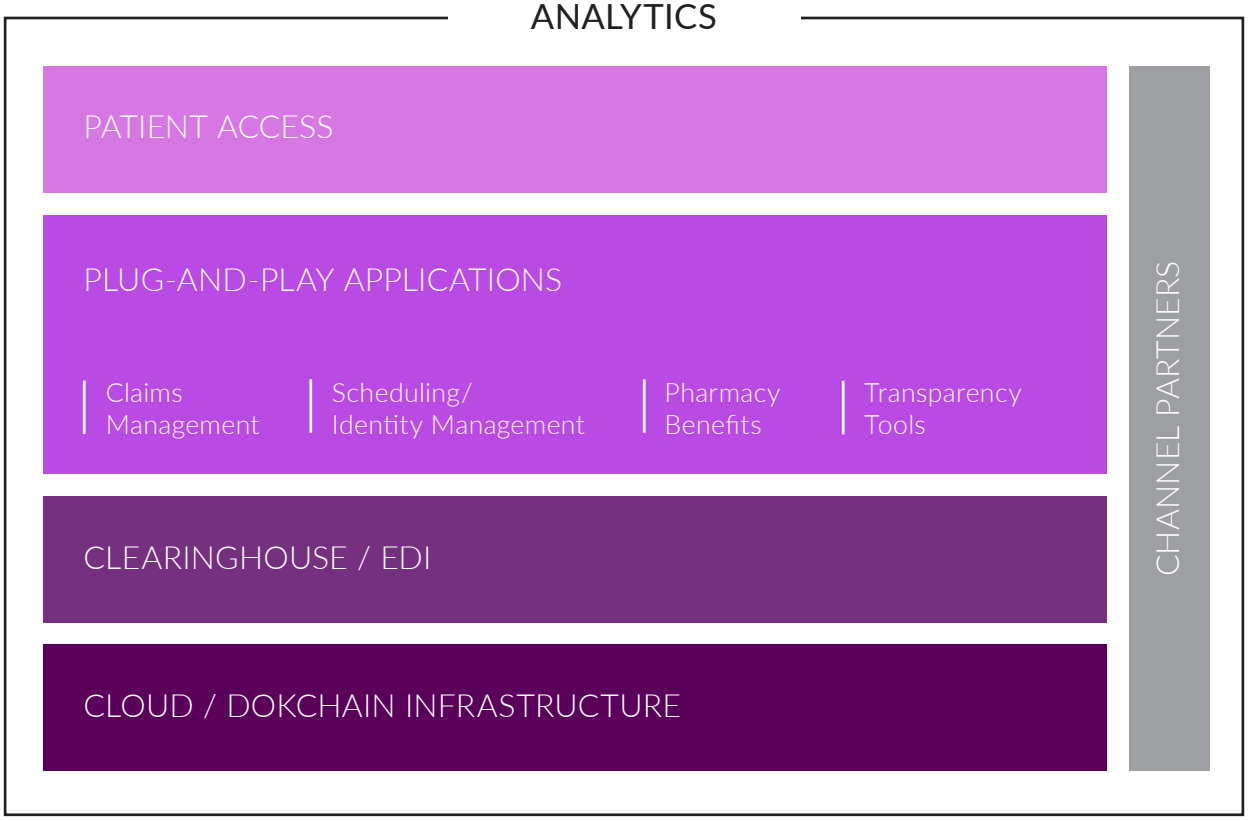
In 2012, Chilmark Research launched its newest service, the Chilmark Advisory Service (CAS). The CAS was created in direct response to clients' request for a continuous feed of research on the most pertinent trends in the adoption and use of healthcare IT. This is an annual subscription that provides not only access to a number of re-search reports throughout the year, but also direct access to Chilmark Research analysts to answer specific client needs. Please contact us directly for further information about CAS.

Chilmark Research is proud of the clients it has had the pleasure to serve including Abbott Labs, Anthem Health, Catholic Healthcare East, Cerner, HCA, Highmark, IBM Watson Health, Kaiser-Permanente, McKesson, McKinsey, Medtronic, Microsoft, and Thomson Reuters to name a few. It is our hope that at some future date we will have the pleasure to serve you as well.

About PokitDok

PokitDok provides a software development platform to free, secure, and unify business data across the entire continuum of care. Its 30 API endpoints facilitate eligibility checks, claims submissions, appointment scheduling, payment optimization, patient identity management, pharmacy benefits, and other business processes. These healthcare transactions that exchange business data can be quickly and easily integrated into any app, website, or service, without requiring that providers or payers rip and replace legacy solutions or IT infrastructure. Health care organizations, digital health companies, and business process outsourcing providers use PokitDok to improve workflows, cut costs, and speed time to market.

The PokitDok Platform



About the Author

Brian Murphy joined Chilmark Research as an industry analyst in August 2012 and brings a wealth of experience to the table. He is an outspoken advocate for true interoperability being the key to unlocking the potential of health IT and has centered the majority of his research efforts with Chilmark around this subject. He also currently heads research for the Analytics domain.

Brian has worked in the IT business for over 25 years, beginning his career in the field-sales organization of IBM. He then joined Yankee Group as an analyst, where he managed an enterprise software service and led research on the dynamics of the database market. Leaving Yankee, Brian joined Eclipsys prior to its acquisition by Allscripts in 2010. At Eclipsys, Brian worked with product managers to refine and harmonize value propositions in light of the organization's broader goals.

Brian is a graduate of both Harvard College and Suffolk Law School. When not thinking about healthcare IT, he is a runner and armchair Boston historian.

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