

Identifying API use cases: Healthcare and life sciences industries



Executive summary

Many healthcare and life sciences companies are planning their journey and participation in the API economy. One of the most common questions from companies starting the journey is about the potential use cases within their industry. This paper focuses on several objectives:

- Identifying the common business drivers for API initiatives
- Describing an API identification methodology
- Supplying healthcare- and life sciences-specific examples using the methodology
- Discussing the current state of regulatory requirements and industry standards
- Providing recommendations for starting an API initiative

Determining an API economy strategy and planning a roadmap offer significant benefits, including:

- Consolidating and standardizing common APIs—or simply business services—within an organization
- Lowering cost of operations by having a central repository and index of enterprise business services such as “review claim history”
- Accelerating digital projects and improving time to market with safe, quick access to business services for both internal and external parties
- Identifying a partnership ecosystem—especially outside your own industry—for formulating new value-add products and services to be more competitive

- Defining new business models for monetization purposes such as the mobile marketplace; that is, curating your company’s business capabilities aggregated with your partners’ business capabilities to provide a diverse range of related or complementary services

This paper is intended for business and IT leadership in the healthcare payer, healthcare provider and life sciences industries interested in jump-starting API initiatives by learning about industry use cases.

What is a business API?



Application programming interface (API) is a very old term that has been used to describe technical interfaces for software programs where one software program calls another through its API. Often, these APIs were extremely complicated and not really meant for wide consumption. A few other software programs inside the enterprise might use the API to invoke the program; a partner outside the company might use it as well, but with great difficulty.

This long-standing definition is not what’s getting businesses excited about an API economy. The excitement is instead around what is referred to as a *business API* or *web API* (although sometimes the additional qualifier is left off). These business or web APIs are easy-to-understand interfaces for a recognizable business asset—for example, a customer record, an account, a product catalog, a price, an order and so on.

A business API is a public persona for your enterprise that exposes defined assets, data or services for consumption by a selected audience of developers, either inside or outside your organization. Business APIs are simple for application developers to use, access, understand and invoke. And because a business API extends an enterprise and opens new markets, application developers can easily leverage, publicize and aggregate a company's assets for broad-based consumption.

Common business drivers for API initiatives

Companies that are executing successful API initiatives focus on one or more of four key drivers: speed, reach, Internet of Things (IoT) and domains.

- **Speed (also known as two-speed IT, bimodal IT or multispeed IT):**



This driver focuses on allowing the business and IT organizations to run at different speeds. Traditional IT management of core systems of record can be changed at a certain rate. Trying to force rapid changes into core systems in the enterprise can result in outages or security exposures. Yet the business needs to react very quickly to new opportunities and competitive threats. It needs a higher rate of change than can be delivered by the controlled changes required to the systems of record. Using APIs, you can prepackage core system assets for consumption by the business to create new and innovative systems of engagement. Speed tends to be the first driver of API use in the enterprise.

- **Reach:** To reach new markets and obtain new customers, you can make APIs available to other enterprises, such as partners who can generate additional revenue and new customers for your enterprise. For example, healthcare providers and life sciences companies might make information about their products and services available to specialized journals, WebMD or other resources where potential patients may be searching for information on potential treatments for their specific conditions.



- **Internet of Things or devices:** In many industries,



devices are used in conjunction with APIs to provide new and innovative solutions. This tends to happen in one of three ways:

1. A device sends data via API call, such as a device that monitors patient status in the intensive care unit and calls for action when certain conditions occur.
2. A device is sent a command via API call, such as doctors or other authorized users issuing commands to a device to adjust the level of medication being dispensed.
3. A device sends data through a non-API call using other technology such as MQTT—a high-volume messaging protocol and transport for telemetry devices—because not all data calls require an action. However, APIs can access the data inside the organization and look for or react to particular situations or events. For example, health monitoring devices that collect information from elderly patients will send large amounts of data to the healthcare organization—but only abnormal situations or specific data patterns require action.

- Domains:** Typically, domains refer to interactions across multiple lines of business. They can largely work independently, but benefit from sharing data. APIs allow the data to be shared in a controlled, secured manner. Domains can also be seen as physical locations. Organizations that have multiple locations, which may include cloud and on-premises data centers, sometimes use APIs as a method to secure and control the flow of data between locations. Considerations for regulatory and compliance constraints based on geographical and country specifications become evident.



Organizations often start by focusing on the requirement for speed. After initial success in this area, they address the other drivers. It is not uncommon for businesses to benefit from APIs across all four drivers.

API identification methodology

Who should identify the business APIs? Figure 1 displays several roles in a high-level organizational structure. Note that several people may be in each role, and a single person may be assigned to multiple roles.

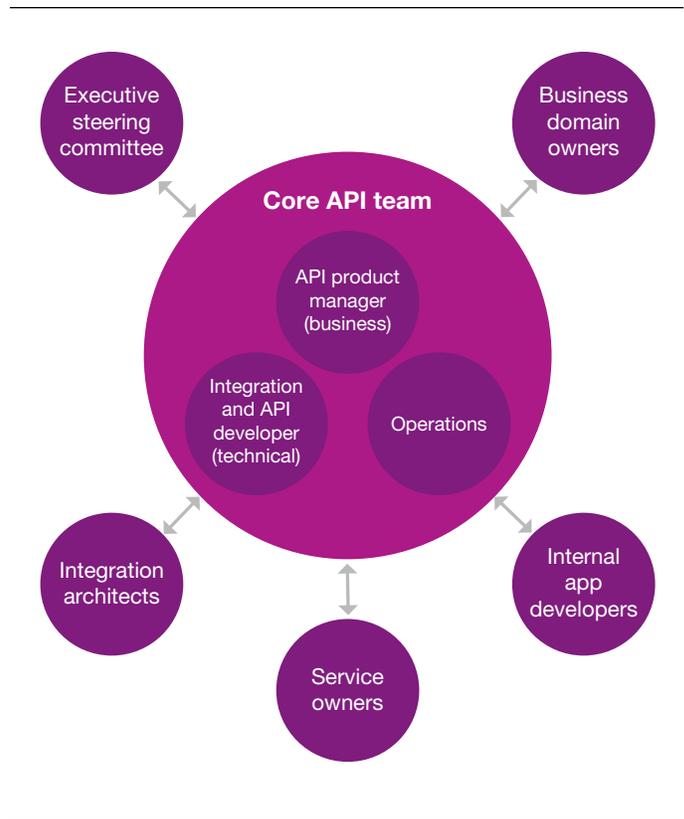


Figure 1. High-level organizational structure for an API development team.

A key role in the structure is the API product manager. The person or people in this role own the success of the APIs and the API initiative. Tasks associated with the API product manager role include:

- Working with the domain owners to identify desired business APIs to bring to market
- Working with the API developer to drive the creation of the API
- Reporting to executives on metrics
- Defining the product characteristics of the API (monetization, rate limits, audience and so on)
- Communication

Identifying good APIs is one of the most critical factors in achieving API initiative (and associated business) success. APIs must be focused on the needs of the API consumer and should be simple. Three questions lead to a good API:

- Who is the audience?
- What do they want?
- Under what terms and conditions are you willing to make the asset available?

Notice that none of these questions ask or refer to the systems of record that will ultimately deliver the response to the API request. Many companies incorrectly define their APIs by looking at what the systems of record do and adding an API in front of them. This approach may simplify the process for the API provider, but it does not meet the needs of the consumer.

When identifying a candidate API, the API product manager needs to understand the API user being targeted (question one). The second question is probably the most important of the three: understanding what the audience is trying to accomplish can result in the best API. If the definition is focused on consumer need, then the interface is more likely to be useful to that audience and also more likely to stand up to change (versioning). The third question is related to the policies you want to have around the API. What security measures are required to allow the API to be used correctly? Are there rate limits that must be enforced?

Once you have answered these three questions, the API product manager and API developer must work together and potentially iterate to define the API. The API developer needs to map the proposed consumer interface for the API to the back-end system of record interfaces—and possibly to many other systems—to provide only the desired result back to the consumer. New business logic may need to be added at a microservice layer in front of the existing systems of record. If the existing systems do not completely address the requirement, the API developer may have to write additional code to add business logic to the existing environment.



“The business of APIs: Best practices” white paper provides additional information on organizational structure and several other important topics.
[Download it here.](#)

Next, consider six categories in which APIs are often used, along with these top questions that can help identify potentially useful APIs in each area.

- **Internal developers (mobile)**

- What data and transactions would your own mobile apps need?
- Does generic data exist that is the same for all app users, such as business locations, rates and so on?
- Is there data specific to existing customers that should be accessible through your app, such as claim status?
- What features of the mobile device—for example, the Global Positioning System (GPS) or the camera—might be useful in conjunction with your APIs?

- **Partners**

- What data and transactions do you share among your current partners?
- Is partner onboarding a long, difficult process?
- Would self-registration of partners be valuable—increasing the number of partners and broadening geographic coverage, for example?

- **Public**

- What apps might others write that could use your data and transactions?
- What information are you currently making available on your website?
- If there was a comparison app for you versus your competitors, would you want to be listed as an option? What data would the app need?

- What other industries or processes might also use your products? Examples include exercise and nutrition.
- Think mashups: What other APIs might make sense with yours? Mapping? Social?

- **Social**

- How do your systems interact with social media? Can you spot trends in social media and raise alerts or take action?
- Can you use social media to gain insight on your brand and your competition?
- Can you do real-time analytics combining current customer status, behavior and history with social interactions?

- **Devices**

- Does your company handle devices such as cars, appliances, sensors or meters?
- What scenarios can apply to the device—for example, needing repair/supplies, needing to send status information, controlling device behavior or enabling interaction between the device and enterprise systems?
- How are you positioned to integrate the next UI technology, such as wearables like smart clothing or augmented-reality glasses?

- **Data and analytics**

- What data do you collect about your clients? Would this data be of value to a larger audience inside the enterprise?
- Can your data identify market segments that would be of interest to an unrelated industry?

Identifying API use cases in the healthcare and life sciences industries



Here is a look at some examples that apply the API identification methodology to the healthcare and life sciences industries.

Internal developers (mobile app development)

General information

General information is information that is not tailored to the specific customer using the app. It may include the company's offerings.

For healthcare payers, this could include:

- Finding a doctor in a plan
- Locating specialists
- Finding hospitals and urgent care facilities in a plan
- Identifying plan coverage limits and deductibles

For healthcare providers, this could include:

- Finding a doctor or specialist
- Reporting wait times
- Providing information on health classes and events
- Checking symptoms
- Searching clinical trial information

For life sciences, this could include:

- Eliminating paper-based processes
- Providing pharmaceutical information
- Providing information on clinical trials
- Accessing industry research

Custom information and transactions

This example offers information and transactions that are tailored to the customer using the app. These APIs require additional security to help identify the user before presenting customized information or to help ensure appropriate access levels. APIs that fit this category span a variety of services.

For healthcare payers, they may include:

- ID cards and coverage eligibility
- Claim submission and status
- Deductible status
- Applications to promote and encourage healthy behaviors
- Applications that extend healthcare beyond the boundaries of traditional medicine, telemedicine and video consultations
- Tools that help guide patients to lower-cost, non-emergency facilities

For healthcare providers, APIs in this category may include:

- Billing and payments
- Making costs transparent
- Scheduling appointments
- Enrolling in a class or event
- Delivering condition-specific information
- Following up to improve patient outcomes

For life sciences, they may include:

- Streamlining processes through patient and provider input and automation of clinical trials
- Providing mobile tools for patients and providers to input data
- Enabling leadership management visibility based on role and task
- Accessing information on a clinical lifecycle
- Enhancing collaboration between teams
- Supporting regulatory compliance with direct access to information or direct reporting of information

Mobile advantages

Customers using the app on a mobile device can benefit from using phone or tablet functions in conjunction with APIs provided by the organization. Healthcare payers could offer customers a doctor or facility location list and use a mapping API to identify the nearest doctor that is in their plan.

Healthcare providers could use GPS functions to map nearby care locations, use phone alerts and alarms as medication reminders, or use a mobile app to show information from connected devices such as scales, glucometers and so on. Life sciences organizations could use a camera and QR code reader to identify and verify patients' medications.

Partnering



APIs can help make it easy for partners to do business with you. Traditional partners can provide resources that place the patient in the center of the interaction to help improve the patient's outcome (Figure 2). Partners such as government agencies traditionally want to share and consume information for the public good as well as oversight. Providing APIs to partners allows them simplified access to your services, so they can more easily offer those services to their own customers. This simplified access may provide "stickiness" that promotes customer loyalty. Companies in the healthcare and life sciences industries frequently enter into partnerships. For example:

- Healthcare payers want to have a large portfolio of healthcare providers. This attracts clients, driving up revenues.
- Healthcare providers want to support several healthcare payers, which allows more patients to choose the provider for their medical care.
- Life sciences companies want to be recommended by providers and covered by payers so they can increase the distribution and use of the pharmaceuticals they sell.

Providing APIs for these participants facilitates the partnering process and increases the number of partners—and the potential revenue. Specific partnership API examples include:

- Healthcare payers can provide APIs that allow healthcare providers to check eligibility for services.
- Pharmaceutical companies can benefit from APIs that reach into healthcare data to determine treatment effectiveness and possible enhancements.
- IBM Watson® APIs can be used in conjunction with healthcare data to help improve diagnosis and treatment options.

APIs can also help streamline collaboration across a team—a common situation for many medical issues and procedures.

For example, a knee replacement requires coordination across a team of doctors and specialists, medications, pre-surgery X-rays or MRIs, referrals to specialists, surgery (with scheduling), post-surgery rehabilitation and so on. APIs can support and enable interactions among the participants, helping to reduce errors and costs. They can also be linked to coverage and payment APIs from the healthcare payer.

As we move to a distributed healthcare model with physicians working together across cities or geographies, APIs can provide doctors and other service providers the necessary access for collaboration. Telemedicine, video consultations and remote patient interactions can all be enabled via APIs.

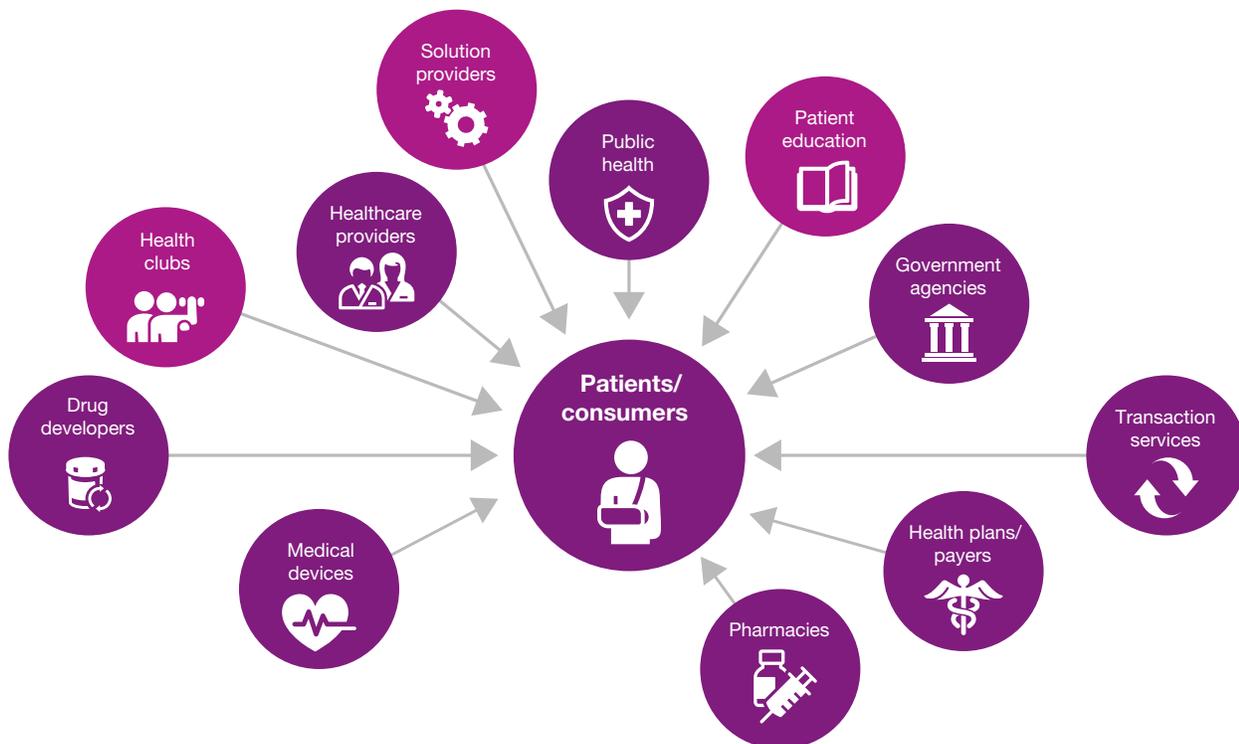


Figure 2. The converged healthcare and life sciences ecosystem places patients and consumers at the center and is built on increased collaboration among providers, payers and consumers.

Partnerships may also exist outside the payer/provider/life sciences ecosystem. Additional partner APIs might exist to employer wellness benefits tools, calendar integration for scheduling and access to the latest medical research.

The IBM Institute for Business Value has published several reports on innovations and changes in the life sciences industry. According to the report [The Evolution of Life Science Ecosystems](#), *“The life sciences industry, like many others, faces broad disruption and challenges on fronts ranging from technology to regulation to product resourcing. Traditionally, innovation has been a key driver of success for life sciences organizations, and it will continue to play a critical role for an industry that seeks to sustain this momentum. So it is not surprising to learn that most life sciences leaders, including those in academia, believe that defining an innovation strategy is critical for their success.”*¹ The report identifies five innovation strategies that differentiate successful academic life sciences institutions:

- Instill a collaborative and open culture
- Apply technology to innovate
- Follow a patient-centric approach
- Prioritize projects and embrace agility
- Measure innovation performance

APIs can support all of these strategies and more. For example, tracking medications through the supply chain, ensuring safe conditions (such as temperature) and managing appropriate handoffs via APIs can help ensure medication is safe and not counterfeit.

Public APIs



Healthcare and life sciences companies can deploy many of the same APIs used internally and with partners as public APIs to drive additional business and help obtain new customers. For example, potential customers may be shopping for the best healthcare plans. By making APIs available for a comparison app, your company has the opportunity to compete for this new business. Of course, you must be very careful with any API that involves customer-specific information due to the privacy concerns and regulations associated with healthcare data.

One of the most exciting aspects of the API economy is extending your reach to other industries that can send business to you. Many healthcare companies are integrating wellness programs into their offerings. APIs can allow wellness programs to provide information on client usage of the program. Exercise, nutrition and smoking cessation are examples of programs that could benefit from the use of healthcare APIs. Wellness apps can integrate with care-tracking APIs for doctor feedback. An app might integrate a symptom checker with a patient’s insurance coverage options and recommend a local doctor in their plan.

Doctors or hospitals could provide APIs describing their services or capabilities and the health plans they accept, which could be combined with patient reviews for a provider comparison app.

In the life sciences industry, some regulations require public access to information on medications and side effects; organizations can make it available through APIs. Healthcare search applications such as WebMD can also access medication information via APIs, and APIs can provide pertinent search results to support research and knowledge sharing.

Many companies have public APIs available. Here are a few examples from ProgrammableWeb:²

- **BlueButton** is a service that allows people in the US to access their own medical records online in order to track their health and check reports for accuracy.
- **RxREVVU** is a medication cost-savings database that offers data sets on prescription medication costs.
- **Kaiser Permanente Interchange** enables internal and external developers to use approved public data from Kaiser Permanente to create individualized healthcare management apps. By using personalized health information, apps can be customized to cater to patient lifestyle, including nutrition and activity, to support total health.
- **TrueVault** is a backend-as-a-service (BaaS) platform designed to provide HIPAA-compliant information storage for healthcare applications. Data stored with TrueVault is secured, but still accessible from anywhere the developer needs it.
- **AdhereTech** makes medication bottles that are enabled with technology to improve prescription medication adherence.
- **iHealth** provides wireless scales, blood pressure monitors and other mobile monitoring devices, along with an app that allows patients to track their own health data. The iHealth API allows third-party applications and services to interact with an iHealth user's data after user authorization.
- **Fitbit** users can authenticate an external website/application to use their Fitbit data, and use the external application to push data to Fitbit.
- **NextBio** is a global discovery platform for life sciences data. Research data from diverse experiments can be imported, integrated with public data and explored within relevant biological and clinical context.
- **EVEX** is a text-mining web service built on PubMed, a database of biomedical and life science references and abstracts featuring more than 23 million records. EVEX extracts over 76 million gene/protein names and more than 40 million biomolecular events. EVEX presents direct and indirect associations between genes and proteins.
- **Pacific Biosciences SMRT Pipe** is a collaborative platform for molecule sequencing within the life sciences industry. It provides information about a proprietary technology for sequencing along with data and analytical software to help process it.
- **BioBase** is used to identify relations that aid in drug and biomarker discovery. It helps researchers identify connections by offering well-structured data, assembled by highly qualified subject-matter experts, that is organized in an accessible and easily searchable manner.
- **PhyloPic** is a phylogenetic taxonomy and a database of reusable silhouette images of plants, animals and other life forms.

Check out IBM Bluemix for your API needs

If you are exploring the API economy and interested in public APIs, IBM offers the **IBM® Bluemix®** platform as a service (PaaS). IBM handles the security, management, operations, scalability and performance for financial institutes that place their APIs on its branded mobile marketplace hosted on the Bluemix cloud platform.

Social



You might already consume social APIs from companies such as Twitter or Facebook, mashing up this information with your own APIs. Acting on specific mentions of your company and trends in social media can provide business benefits that enable you to take advantage of opportunities or head off problems. Among other things, you can combine Twitter feeds that reference your company name with your own analytics to help determine if you must take action to rectify customer satisfaction issues or promote positive comments.

Healthcare companies can also participate in social networking groups. For example, participating in fitness groups or groups focused on specific medical issues (such as types of cancer) can provide value to these groups and direct them to appropriate healthcare offerings. Patient communication to and from

relatives and friends in a controlled group (such as MeWe) can be combined with calendaring, visiting hours and facility location APIs. Interest groups can offer powerful opportunities to support patients and provide recommendations for health services in the area.

As they get access to more information, patients are becoming more involved in their own healthcare and have heightened expectations about their level of care. Social integration is a mechanism for life sciences organizations to support patient involvement and provide resources. APIs on social media networks can market medications to health-oriented communities. Patient searches can trigger opportunities, and organizations can form patient groups for collaboration during the clinical trial process. Plus, life sciences companies can use API access to social media to identify, evaluate and innovate on ideas.

Device integration and wearable devices



Connected devices are common across the healthcare industry. They can be integrated to monitor patients locally or remotely and report current conditions so providers can act quickly if abnormal situations occur. APIs can also help ensure the correct medication and dosage is given to the correct patient on the correct schedule; remote API controls can allow authorized providers to adjust medication-dispensing devices or provide other care to patients without a trip to a facility.

In addition to traditional health monitors, Fitbit devices and similar wearables can encourage healthy behavior, which may reduce medical costs. Wearable device APIs can feed data to the healthcare payer to help ensure the user is meeting wellness program requirements for discounts or reimbursement incentives.

In life sciences, mobile apps allow patients to enter information themselves, which often provides better results than historical data-entry approaches. Collecting patient information directly via a medical monitoring device can show even greater results because it eliminates the chance of human data-entry error. Monitoring devices can use APIs to report readings more regularly and with higher accuracy, and the patient doesn't have to remember to enter the information—a benefit if the patient is not feeling well.

Data and analytics



Combining data from internal and external sources such as customer relationship management (CRM), claims and financial systems, clinical databases, web, mobile and call center channels, social media, and partner systems provides a huge wealth of information that can be accessed via APIs to improve patient care, identify patterns and discover potential opportunities.

Healthcare is a data-driven industry, and the amount of data is constantly growing, with new studies and information becoming available at an incredible rate. It is nearly impossible for doctors to keep up with all of the new information. IBM has been working with companies in the healthcare industry to address this issue through [IBM Watson Health](#). IBM Watson can ingest the new information and act as an assistant to the medical professionals, providing access to the latest information as well as insights gleaned by applying cognitive analytics. As with all IBM Watson solutions, these capabilities are accessed via APIs.

Data APIs can also be used to learn what customers are saying about your products and services, identify preferred interaction channels and appropriate next best actions, predict propensity to engage in health and wellness programs, and uncover opportunities to provide new healthcare products and services.

Industry standards and regulatory requirements

In the US, the healthcare industry is establishing new rules to promote the use of APIs in accessing patient health-related information. The Stage 3 Meaningful Use rule, which will go into effect in 2018, is summarized in the article [A Brief Summary of the CMS Meaningful Use Final Rule](#).

The full rule explains the value of the API to both the API provider and patient:³ *“From the provider perspective, an API could complement a specific provider ‘branded’ patient portal or could also potentially make one unnecessary if patients were able to use software applications designed to interact with an API that could support their ability to view, download, and transmit their health information to a third party.*

“From the patient perspective, an API enabled by a provider will empower the patient to receive information from their provider in the manner that is most valuable to the patient. Patients could collect their health information from multiple providers and potentially incorporate all of their health information into a single portal, application, program, or other software. Such a solution may be offered on a state, local, or regional basis, for instance, through a health information exchange, or through another commercial vendor. In addition, we recognize that a large number of patients consult with and rely on trusted family members and other caregivers to help coordinate care, understand health information, and make decisions. For this reason, we proposed the inclusion of patient-authorized representatives within the measures.”

While allowing for interoperability in the healthcare industry, prior healthcare standards such as HL7 are extremely complex. HL7 is looking to simplify through a standard called Fast Healthcare Interoperability Resources (FHIR). The FHIR API definition is available at <https://www.hl7.org/fhir/http.html>

Healthcare IT interoperability is critical to the patient and providers to ensure correct care is given. To date, organizations have achieved interoperability through sometimes difficult methods. APIs that provide a simpler approach are likely to become more common in future industry integration efforts.

Closing thoughts and recommendations

The healthcare industry is becoming very active in the API economy. Healthcare is a data-intensive business and accessing data quickly across the enterprise, using data in new ways and interfacing with partners rapidly can provide competitive differentiation.

If your organization has not started strategizing and planning for business APIs, the time is now. Do not wait until you know all the answers and have everything in place to get started—the market is moving too fast. Plan stages for the rollout, and then build on what you learn.

If you have already begun your API initiative, look to build on your successes and quickly identify false starts. Also look at additional business drivers and use cases to obtain more value for the business.

As we move into the API economy, there are huge opportunities for new and innovative solutions. IBM has significant knowledge of the healthcare industry and the API economy along with

impressive value from IBM Watson Health, and would like to be your partner on your API journey. Let us share our expertise and experiences to help maximize the value for your enterprise.

To understand more about IBM's thoughts on the API economy, visit the [IBM API Economy website](#). IBM API Connect™ is a comprehensive foundation for creating, running, managing and securing APIs. Learn more about [IBM API Connect](#) and download a [trial version](#) at the API Connect website.

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¹ IBM Institute for Business Value in association with UC San Diego School of Medicine and Rady School of Management, “The evolution of life science ecosystems,” August 2016, ibm.com/services/us/gbs/thoughtleadership/lsacademia

² Examples of public APIs came from keyword searches for “health” and “healthcare” on www.programmableweb.com. This information is not intended as a recommendation of these specific APIs, nor a statement about their capability or quality. ProgrammableWeb acts as a repository where any company can promote its public APIs. Consumers must evaluate the functionality and quality of any API and decide if it meets their needs before deploying.

³ HealthITInteroperability.com, “Health IT Interoperability in Stage 3 Meaningful Use,” August 8, 2016, <http://healthitinteroperability.com/news/health-it-interoperability-in-stage-3-meaningful-use>



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