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Tech Trends 2018 | A life sciences and health care perspective

The API imperative in life sciences and health care
From IT concern to business mandate to drive digital acceleration

For as long as computer science has been in existence, so too have application programming interfaces (APIs). APIs in any form over the last 20 years have helped connect data, applications, and ultimately, business processes across disparate technology systems. However, the role and function of APIs is drastically changing, with APIs becoming an important ingredient in the life sciences and health care industry's overall approach to improved interoperability, data exchange, and digital acceleration.

As the world becomes more digitized, and the business-empowering potential of data grows, APIs have moved out of the shadows and into the limelight. And now that the first step in the digitization of health care—the adoption of electronic health records (EHRs)—is mostly complete, the industry is turning to APIs to help unleash the transformative power of its data through the integration that APIs help provide.

Well, that's the idea in theory. In practice, life sciences and health care organizations have been slower than other industries to

leverage the strategic capabilities enabled by APIs. The hesitation to fully embrace APIs and other emerging interoperability solutions by industry decision makers is understandable given regulatory concerns about data security and privacy, as well as keeping competitive distance. However, in order to compete in today's digital economy, life sciences and health care companies should consider the architectural patterns of the digital natives. Next-generation Internet architecture needs to be integrated reliably to legacy software platforms in order to keep up in a digital world. Intelligence at scale is key and very challenging to execute without API architecture.

Many health care providers and health care vendors are beginning to realize the advantages of using APIs for accessing data and making services available to stakeholders, especially digitally-savvy patients. Patients expect their interactions with health care providers and health plans to use the variety and quality of channels they have become accustomed to using with retailers, banks, and transportation services. But movement toward full

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adoption is slow. One reason for this may be the impact of the time, effort, and investment it took to implement EHRs. Another reason may be because EHRs are only recently commonly available across health systems. Before EHRs, there was no centralized, digitally available patient data that an API could access. Now there is, at least at the individual health system level.

Health plans have similarly been slow to adopt the new generation of APIs. But today members are increasingly eager to see the status of their claims in real time through mobile apps, expecting faster claims analysis and resolution and personalized suggestions for their well-being. Many health plans are increasingly appreciating the value to be found by accessing data locked in legacy systems—but without having to create external copies of the information, rewrite it, or completely replace existing architectures.

As for life sciences companies, most investment and use of APIs are focused on solving immediate operational needs within the confines of existing technology infrastructures. Many life sciences companies are investing heavily in IT to modernize their core platforms, necessary to unlock the value promised by cloud computing and next-generation architectures. As such, few are diving headlong into APIs as an architectural imperative, but are more inclined to opportunistically explore them for project-based, focused integrations.

As the industry evolves toward broader, enterprise-wide value chain capabilities—driven by heightened competition and advanced technologies—the business case for information flow and access within and outside the enterprise is more solid than ever. This justification is making widespread adoption of APIs a strategic imperative—sooner rather than later.

Prospects by sector

What can and should life sciences and health care organizations consider to reap the full benefits of the API imperative? The answers, not surprisingly, vary by sector.
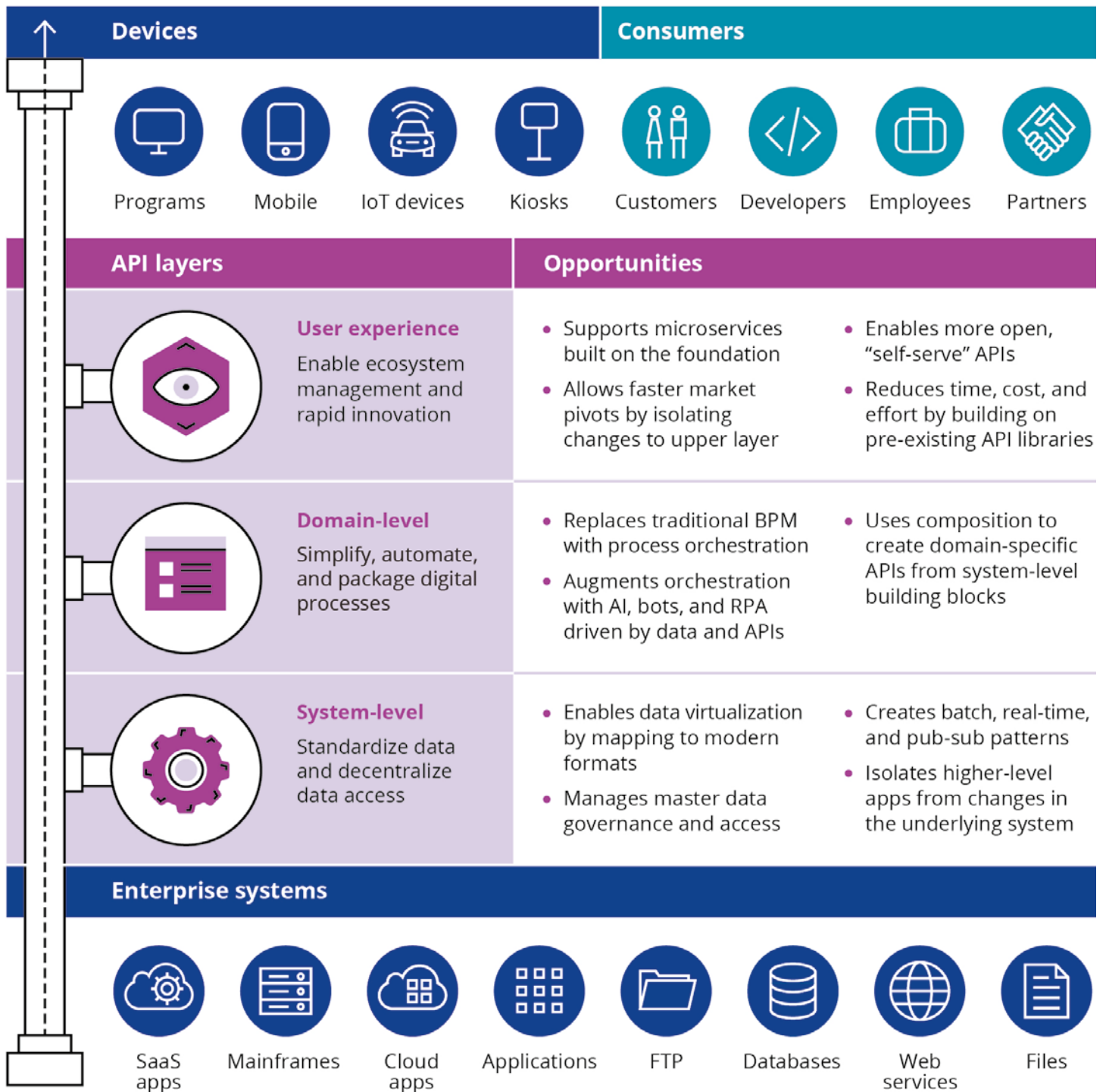
Health Care Providers

Several vital areas could benefit from wider adoption of APIs,

A guide to key terms

- **Application programming interfaces (APIs)**
  An architectural technique that helps improve the way systems and solutions exchange information, invoke business logic, and execute transactions. In the IT world, they are one of the key building blocks supporting interoperability and design modularity, and reducing the need to replicate data throughout the enterprise. The API marketplace is increasingly adopting a Representational State Transfer (REST) model, an architectural pattern that offers performance, scalability, and customization for web-based services.

- **Consolidated-clinical document architecture (C-CDA)**
  Provides a standard for building electronic clinical documents and is widely used for efficient, interorganizational exchange of information, specifically those organizations participating in Health Information Exchanges (HIEs). C-CDA is an extension of the HL7 v3 CDA (XML SOAP) standard published by the Health Level 7 International standards organization (HL7).

- **Fast health care interoperability resources (FHIR)**
  An internet-based, data exchange standard (also by HL7) that allows health care organizations to better integrate workflows, detail clinical decision support, and engage with patients using standard internet protocols and data formats. FHIR frameworks are built from basic units of interoperability and modular components (called "resources") that can be assembled into working systems to try to address clinical and administrative problems. FHIR can be used in mobile applications, cloud communications, EHR-based data sharing, and server communications.

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Figure 1. API logical architecture

Devices				Consumers			
Programs	Mobile	IoT devices	Kiosks	Customers	Developers	Employees	Partners

API layers / **Opportunities**

User experience
Enable ecosystem management and rapid innovation

- Supports microservices built on the foundation
- Allows faster market pivots by isolating changes to upper layer
- Enables more open, "self-serve" APIs
- Reduces time, cost, and effort by building on pre-existing API libraries

Domain-level
Simplify, automate, and package digital processes

- Replaces traditional BPM with process orchestration
- Augments orchestration with AI, bots, and RPA driven by data and APIs
- Uses composition to create domain-specific APIs from system-level building blocks

System-level
Standardize data and decentralize data access

- Enables data virtualization by mapping to modern formats
- Manages master data governance and access
- Creates batch, real-time, and pub-sub patterns
- Isolates higher-level apps from changes in the underlying system

Enterprise systems

SaaS apps	Mainframes	Cloud apps	Applications	FTP	Databases	Web services	Files

Source: Deloitte analysis.

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which can be built on top of existing EHR architecture. The most obvious benefit could be on the cost and quality of patient care. For instance, patient outcomes and reduced readmissions after surgery could be improved through the ability to provide individualized patient monitoring via wearable devices that submit data through an API to their surgeon. Patient vital signs can be continuously measured and monitored, and medication dosages adjusted immediately based on the data collected.

APIs can also enable the aggregation of population data across many connected applications supporting the subsequent analysis needed for clinical research efforts, cohort analysis, and patient

engagement. Technology innovation, too, could be enhanced by APIs enabling access to external developers. Leveraging the crowd and other developers to build new business applications, user interfaces, real-time data access, and more can have a positive impact on clinical decision-making.

Finally, forthcoming meaningful use requirements will require providers to give patients ready, transparent access to their health care information, a standard that APIs can help satisfy. This mandate can help accelerate the adoption of APIs for providing much wider, but nevertheless controlled, access to information.

Health Plans

APIs can create differentiating attributes for health plans that can bolster the user experience, cultivate new members, and streamline back-office operations.

Health plans that share data from authoritative data sources across functions can better serve members across all engagement channels, which may result in faster and more efficient information exchange and improved experiences. Importantly, the efficiencies gained—including the implementation of bots to handle basic requests—can lower call center costs and free up employees to tackle more value-added tasks.

Provider engagement and integration is another focus area for applications of APIs in the health plans space. APIs are being used to enable sharing of critical data between plans and providers, including patient eligibility and benefits, lab tests, diagnoses, medical attachments, ADT (admission, discharge, and transfer,) and other health care information. It is also being used for bi-directional communication between plans and providers for both solicited and unsolicited attachments. FHIR enables providers to send supporting documentation in a patient's file to fill a care-gap without a specific request.

As cost models shift from fee-for-service to shared-risk modalities, plans need to better share and engage with providers at a completely different level than before. APIs can foster that aspect of the transformation, as well.

Life Sciences

While life sciences companies tend to be fast followers when it comes to technology adoption, a few larger companies have moved toward an API imperative and are building or sourcing APIs for every new technology asset.

Some leading companies are experimenting with a broader API focus as part of enterprise-wide efforts to drive down operating costs. As real-world evidence becomes increasingly important in the transition to value-driven health care, some companies are exploring the ways APIs can support data sharing in drug/product development and clinical trials. Patient services is another area where APIs can benefit life sciences companies, especially in disease states like oncology that require close collaboration and

Making inroads: examples of APIs in action

- Physicians at Sloan Kettering gain instant access to the latest information from Elsevier's (an analytics company) research database on oncology symptoms, diagnoses, and treatment options. Collaboration was achieved by opening access to IBM's Watson cognitive-computing technology through APIs.[1]

- Consumers have more health insurance options, and are learning to better navigate the system. APIs afford plans the opportunity to differentiate by offering real-time claims updates and other valued information that can enhance the customer experience—and earn their loyalty.

- Some life sciences companies are beginning to aggressively implement an API strategy. One example: Lilly has created an API that allows developers to request clinical trial data that can be used to create a wide variety of web applications, from simple widgets to full-featured apps.[2]

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information sharing amongst health care providers, specialty pharmacies, patients, and other key stakeholders. APIs can also help ensure that data on the sales of a particular drug or product are collected in the same format for quicker analysis and insight, rather than relying on inefficient, inconsistent data streams and publishing methodologies that can severely hamper the process.

API implementers are establishing the foundational architecture that can allow for opportunistic exploration through API portals, gateways, brokers and other avenues. Once the tangible

benefits of those efforts become visible, both inside and outside the enterprise, more companies would be expected to follow suit.

Risk considerations
Cyber risk should be at the heart of an organization's technology integration, and API initiatives are no different. Whether managing API-specific service description, access, data encryption, or security logging, the controls necessary to control access to data and protect data as it travels between service participants cannot be minimized.

The Health Insurance Portability and Accountability Act (HIPAA) sets forth strict rules for the use of personally identifiable information (PII) and protected health information (PHI). Its penalties are severe. The European Union's new General Data Protection Regulation (GDPR) also requires strict controls on the use of sensitive personal data, and users are still sorting out the implications. So any foray into APIs, or other forms of data collaboration, must be approached with caution. Providers tend to be reluctant to share clinical data through any means, including APIs, because of the potential security risk.

A lack of API-oriented standards and development and security tools to meet the special challenges of the health care space is another concern, especially if unauthorized users have the potential to access patient information. The creation and implementation of C-CDA and FHIR and the addition of internet protocols and formats to traditional health care interoperability development tools are steps toward addressing these concerns.

Well-constructed APIs can bolster an organization's security profile by helping facilitate standardized, dynamic protection against existing or evolving threats already seen in other industries.

At a minimum, from a leading practice perspective, life sciences and health care organizations should consider the following guidelines when sharing data via APIs:

- Follow enterprise data architecture leading practices and specify how data should be shared with stakeholders and consumers while keeping privacy and security in mind.

- Establish governance around sharing data with stakeholders via APIs. The governance body should approve any use of data by internal and external stakeholders and determine any impacts from a privacy and security perspective.

- Evaluate the privacy and security of the data being exchanged and either anonymize or limit it only to data elements that serve the user's needs. Further, data should only be shared with trusted and authorized stakeholders.

- Categorize data into different security levels and assign access to the API data sets based on level. Apply appropriate models for authorizations and reviews to verify compliance with corporate data policies for IP rights protection, fraud detection, and monitoring.

- Leverage an API gateway to maintain, monitor, and secure APIs at scale. The API gateway handles the tasks involved in accepting and processing concurrent API calls, including traffic management, authorization and access control, monitoring, and API version management.

Conclusion

Historically risk-averse, the life sciences and health care industry is in the process of adopting innovative approaches to make more effective use of its data. It has been hampered in that endeavor by poor data quality, capability gaps, and legacy systems that are slow to change.

APIs present a pathway to digital acceleration allowing for interoperability transformation and increased adoption of advanced digital and cognitive technologies. The potential results? More integrated, cost-effective, user-friendly, and results-driven health care than ever before.

For more on the API imperative, visit:
 www.deloitte.com/insights/api-imperative

Endnotes

1 Subramaniam, Bala IyerMohan, The Strategic Value of APIs, Harvard Business Review, 7 Jan. 2015, hbr.org/2015/01/the-strategic-value-of-apis.

2 A Guide to the API, A Guide to the Lilly COI API, aboutapi.lillycoi.com/.

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