The business case for blockchain in health care — part I

Evaluating emerging technology: a solution framework and the potential business value

When considering the business case for blockchain in health care, history proves to be an accurate guide. The questions raised about the business case there are consistent with those asked of other emerging technologies. Interestingly, the questions are not only consistent across industries but also stand the test of time. Whether it is the emergence of computerized patient records, as electronic health records were first called, or the new kid on the blockchain, emerging technologies meet with healthy skepticism, if not downright dismissal.

▶ What are the use cases?

▶ What are the associated benefits and costs?

▶ What are the regulatory and compliance issues?

▶ Is it secure?

▶ Will it see widespread adoption?

Emerging technology innovators, usually through persistence and shared vision, find those early adopters who will test, break and refine the technology until it truly becomes mainstream. No business wants to be in the "late adopter" category at which point they will be at a competitive disadvantage or worse yet, be **that** company, the one that dismissed the technology that totally disrupted their industry and eventually led to their demise.

While the emerging technology itself is questioned, it is about much more than the technology. Successful organizations build and leverage successful emerging technology business cases because of strong leadership who know their organization's mission, business needs, pain points and the market landscape and who have a deep knowledge of their end users. This combination allows organizations to take advantage of emerging technologies at the optimal time for them and flex to the market landscape and demands. Leading organizations ask the tough questions of themselves, of their commitment to lead, of the business case and of the technology. In this way they advance their legacy solutions and mission instead of being disrupted by outsiders. Great companies have a solution set of people, knowledge and methods coupled with technology assets such as products, data and tools.

So, while conversations around the C-suite and board table might favor whether a given technology is worth investing in, time is better spent looking at an organization's solution set. If organizations do not have, or cannot augment, the people, the knowledge or the methods to support capitalizing on an emerging technology, they must wait. They can only be "early majority" adopters as opposed to innovation leaders. Health care is an especially risk-averse environment with constrained labor and capital resources. What must organizations (that are risk-averse, slower to adapt and less agile) do to benefit from the vast promise of emerging technologies? How can they learn from others and, at the same time, meet unique organizational goals, constraints and circumstances? They have the option to wait to see if enough organizations that look like them have realized a positive impact from their solutions. Their alignment will be on similar pain points or desired key performance indicators. However,

this alignment only goes so far. An organization still needs to emulate those leading organizations' methods, capitalize on knowledge sharing, and secure implementation and maintenance support.

So where can, or should, blockchain fit in a health care organization's solution set? What are the solution set requirements, knowledge, methods, people, data and tools for determining this? And if a good fit is found, what are some of the associated costs, key success metrics and the ultimate business case? This article, the first in a series, will address the requisite leadership and emerging technology evaluation solution framework along with potential blockchain business values. These all contribute to the ultimate business case. Subsequent papers will address the costs of blockchain systems and take the reader through a case study.

A prerequisite for emerging technology evaluations is strong leadership aligned with a clearly articulated mission. The leaders must also provide the people and capital support for a thorough analysis of the organization's unique business needs. This is independent of any technology. Organizations are not looking to use technology for technology's sake. They are looking to solve deep pain points or advance their core business to better serve their end users. They want to advance their mission with technology, not be disrupted by it. They are willing to do the up-front investment to thoroughly complete the business case analysis to assure an emerging technology will indeed advance their mission.

Organizational prerequisites
Leadership
Clear mission
Support: capital investment
Stakeholder alignment
Market landscape
End-user focus

With this leadership support, the organization must next evaluate whether it has the full emerging technology solution set of people, knowledge, methods, and complementary technology assets, products and data to fully evaluate and stress test the fit of an emerging technology. While the organization may have strong internal resources, it is essential to stress test viewpoints against external resources such as industry groups, analyst reports, academia and standard development organizations.

Emerging technology evaluation — a solution framework	
	People: leadership, champions, mission- and values-driven, end-user input, human-centered designers, operations, training, support
	Knowledge: industry experience, technology experience, regulations and compliance specific to industry and the emerging technology, market landscape
	Methods: business analysis for process and workflow, costs and potential savings, change management, human-centered design, technical analysis
	Technology assets — products and data: trusted data, currently owned technology, potential new technologies, cybersecurity

The match to current or rapidly changing market landscape or the ability for end-user capture and retention are also important for the success of a given technology. After all, the value of a fax machine is dependent on how many other organizations also have them. Likewise, with blockchain, the greater the number of participants using a blockchain application, the greater potential for a realized business

value. However, blockchain ecosystems themselves, if not well-designed, may beholden an organization to specific business process and costs. Closed networks (or private blockchains) may require significant numbers of users to buy in to the network or create cumbersome governance structures. Both undo one of blockchain's greatest characteristics, that of decentralization. In contrast, a public blockchain ecosystem can be designed for greater ease of participation, flexibility in process design and lower costs to operate. Those emerging technologies aligned with standards development organizations are also more likely to add current and future scalability. An organization can turn to industry groups and academia to assure a holistic market landscape view.

Market landscape
Industry groups
Analysts reports
Academia
Government regulatory bodies
Standard development organizations

Whether there is a larger "ecosystem play" is dependent on the specific ecosystem and the mutual benefits of healthy "coopetition." The larger ecosystem players can also determine whether there are mutual benefits from streamlining complex business processes or improved transparency between organizations. Blockchain uniquely establishes participant trust, data integrity, transparency, security and full transaction auditability. This is particularly true for health care supply chains or data exchanges. Blockchain allows for targeted transparency in an ecosystem. No one organization must expose its data to every other player in an ecosystem, such as is seen in large health information exchanges or one in which all participants use a common supply chain system. Instead, authorization and access rules are embedded into a blockchain protocol with paired public and private key cryptography assuring that only the intended businesses see mutually relevant information.

The market landscape and ecosystem view are ultimately about the end users. There may be multiple end users in an ecosystem. Too often, an emerging technology gets a slow start, fails or causes unintended burnout with use because the technology architects or implementers failed to appropriately engage with those ultimate end users. Additionally, a system may be perfectly designed for one group of end users while creating cumbersome experiences for other groups. For example, electronic health records in the United States are designed to maximize billing requirements rather than drive clinical outcomes. Legions of clinical end users of these systems are bemoaning feelings of "burnout." The technology detracted from those end users' goals of providing the high-quality care, instead of enabling it. The most successful MP3 player was not the first one in the market. It was the one with the best user interface. Ideally, a new technology delights the end user in some fashion. It either introduces a new capability or it significantly decreases the effort to accomplish a current capability. Either way, the end user's capabilities evolve. Therefore, human-centered design must not only drive emerging technology architecture and implementation but continue to be at the forefront of ongoing technology evaluations and modifications lest it solve for one capability but detract from another. A well-considered human-centered design will also positively impact the implementation, training, support and ongoing maintenance efforts.

End-user focus
Interviews
User groups
Human-centric design

Thus far in the framework, much of the people, knowledge and methods discussed are agnostic of a specific technology. However, these factors all drive the design and the selection decisions made with respect to emerging technologies. These forerunners position an organization to weigh the additional costs of a variety of technologies against potential benefits.

Human enterprise design: Always ask, "What are the human implications of this decision?" Empathy is the driving principle when designing solutions in a human enterprise, ensuring technology is like well-designed furniture — ubiquitous, essential, unobtrusive, intuitive and supportive. It not only automates mundane, repetitive tasks, but acts as a tool to unlock greater creativity and collaboration. It enables and empowers change and innovation, and is agile.[1]

Business analysis: primary

blockchain business case drivers in health care

While there are many business case models for health care, most fall into one of three primary buckets:

▶   Operational efficiencies

▶   Rapid growth, scale and new business capabilities

▶   Regulatory compliance

These drivers are not mutually exclusive either. They tend to be complementary in their key performance metrics. For each use case consideration, determine the *current* costs to achieve business aims, desired increased revenues, improved efficiencies or new capabilities as well as the costs *not* to adapt to changing market landscapes (e.g., loss of revenue, personnel or customer attrition, penalties, fines). Those costs may be both quantitative and qualitative.

Benefit analysis: determine if benefits such as increased visibility and trust, near-real-time insights and an immutable record of transactions alleviate current business challenges or create new business opportunities.

Blockchain can deliver network effects to drive mutual value: the more users, the greater the benefits, security and realized operational efficiencies. Many health care organizations are ecosystems unto themselves and are rapidly expanding through mergers and acquisitions. An organization may have multiple internal locations with disparate systems, as well as unique or ingrained business processes. Yet organizational leaders need to make decisions based on data from these multiplicities. Ripping and replacing existing systems or trying to design for a one-size-fits-all system can be costly, time-consuming and fraught with inflexible processes. Blockchain allows customizable business processes and data calculations with the ability to pull data from disparate systems and create a "records to record" back to those same systems. Introducing blockchain does not require a significant change management component to train and familiarize end users on how the new system interacts with existing and more familiar systems.

Examples of assets in health care: data access rights, authorization to functions, supplies (biologics, pharmacologics, machines, surgical instruments, etc.), credentials, payments

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[1] "Embrace the human enterprise," *EY website*, www.ey.com/en_us/technology/embrace-the-human-enterprise, 6 December 2019.

This minimizes one of the biggest barriers in implementing any technology, which is the amount of change required for the intended benefit. Instead, blockchain automates much of the export, import and reconciliation work currently done manually and offers cross-ecosystem transparency. Blockchain gives leadership trusted, combined data from multiple systems for analysis and decision-making. Complementary technologies such as data analytics, machine learning and artificial intelligence require this pure data. Having this type of data reduces human biases to inform decisions. An example would be multiple hospitals or clinics within a health system, each needing to order supplies. A blockchain system can assure they are ordering from the correct supplier to maximize savings and in keeping with supplier inventory and pricing incentives.

In this way, blockchain enables rapid, trusted incorporation of new entities and systems and can improve operational efficiencies. Blockchain allows for agile operating models and systems instead of today's legacy structure-driven operating systems and models hindered by either over-standardization or conversely, a lack of standardization. The merged entities are then organized around issues, not processes, and value agility over hierarchy. The merger enhances relationships and fluid teams to encourage creative thinking and knowledge sharing. In this approach, blockchain adapts to the needs and enhances the abilities of end users rather than constricting them. Blockchain is implemented with a technology at speed ethos. This means that new functionality required by mergers and acquisitions or changing user requirements can be met more promptly than within legacy environments or implementing entirely new systems.

Health care regulatory compliance is essential, time-consuming and expensive if not properly implemented. The costs of noncompliance are not just financial. It can be damaging to public relations as well. Successful health care systems pride themselves on being high-trust, high-touch entities. The trust between the systems and those they serve is invaluable. Uncertainty on how to comply with and track certain data sharing regulations is often cited as a barrier to health care data interoperability. For example, the Centers for Medicare & Medicaid Services (CMS) has pending regulations to draw attention to lack of information sharing otherwise required by regulation with a final ruling expected this year.

A health care organization is caught between maintaining data privacy and security and releasing data in a timely manner if appropriately prompted to do so. Health care systems will need to prove they have appropriately gathered consent from a positively identified requester and complied with data requests in a timely manner. A component of blockchain platforms called smart contracts can assure participants meet required specified data sharing agreement privacy and security standards and certifications and create an immutable ledger of data consents, requests and authorizations, and data transmissions.

It is important to clearly define the business quantitative and qualitative value for all use cases across all primary business drivers. The qualitative values apply to people, data and business-to-business interactions. An organization may draw input from human resources, internal user groups and business development executives. Examples are outlined below and will be specific to the use cases contained within the business drivers. This detail will be the basis for potential value against the cost to apply a technology to affect those metrics.

Quantitative value

I. Operational efficiencies
   a. Number of assets tracked
   b. Number of processes automated
   c. Hours saved from manual entry and reconciliation
   d. Decreased dispute resolution time
   e. Speed to payment and cash on hand
II. Grow and scale
   a. Time to onboarding
   b. Hours saved from manual reporting and reconciliation
   c. Capital optimization — cash on hand
III. Regulatory compliance
   a. Number of automated audit trails
   b. Number of regulation requirements automated
   c. Avoidance of fines or public relations issues
   d. Hours saved from manual reporting
      i. Current capabilities
      ii. Allow to operate at the top of their license

Qualitative value

I. People
   a. Well-being of end users (personnel or customers)
      i. Evolved capabilities
      ii. Improved efficiency in increased job satisfaction
      iii. Equalization and for access to knowledge and to spread and encourage ideas
      iv. Change management minimization
   b. Increased end-user and personnel retention
      i. Ability to attract talent
      ii. Customer loyalty and repeat business
II. Business
   a. Trusted business-to-business interaction, ethical
   b. Cohesive business processes or interactions within or between organizations
   c. Decreased litigation
III. Data
   a. Transparency
   b. Trust
   c. Immutable record and audit trail
   d. Secure

Summary

Organizations that have, or can augment, their critical solution set elements are in the best position to evaluate emerging technologies and determine whether they have the surrounding solution set to align and advance mission-critical priorities for their end users. Blockchain especially advances operational efficiency, allows for rapid growth and expansion, and assures auditable regulatory compliance. Yet, the ability for a business to have new capabilities is the ultimate reason for leading organizations to explore blockchain. Subsequent papers in this series will examine what drives the cost to build, optimize and maintain blockchain technologies and provide a case study.

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