THIRD HORIZON
STRATEGIES

Building a Digital Foundation for the Growth and Rapid Change of the Health System:

Secure and Smart Orchestration for an Evolving Connected Care Model

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EXECUTIVE SUMMARY

Health care IT executives expect that the rate and volume of integration and communication between different institutions, clinicians, and mobile or remote technology devices will vastly accelerate over the next five years. This acceleration—driven by a range of regulatory, economic, and market catalysts—puts more pressure on the IT industry to ensure performance, security, and speed to integration amongst and between these various nodes. The information and infrastructure dimensions are increasingly tied together. New managed services entities can support provider integration activities, compress the IT costs associated with more connections, and safeguard organizations.

The COVID-19 pandemic has given significant energy to the entire digital landscape. Recognizing the need to ensure that patients could continue to access care, President Donald Trump temporarily expanded Medicare telehealth coverage to allow providers to offer 80 services virtually and be paid the same amount as in-person visits.[1] In turn, delivery systems made—and continue to make—rapid and unprecedented changes to the way they interact with patients. According to a report from the U.S. Department of Health and Human Services (HHS), the percentage of fee-for-service Medicare services accessed via telehealth jumped from 0.1 percent in February to almost 44 percent in April. The report states that, "The stable and sustained use of telehealth after in-person primary care visits started to resume in mid-April suggests there may be continued demand for telehealth in Medicare, even after the pandemic ends."[2] McKinsey & Co. estimates that about 20 percent of all office, outpatient, and home health expenses across Medicare, Medicaid, and commercially insured populations could be converted to virtual care, amounting to $250 billion in telehealth spending in 2020.[3]

Despite widespread economic challenges, digital health companies have seen record-setting investments. So far this year, digital health companies have raised a total of $5.4 billion. A total of 214 deals were made, averaging $25.1 million—well above the previous record of $21.5 million set in 2018.[4] On June 25, 2020 the Centers for Medicare & Medicaid Services (CMS) announced the intent to make the telehealth flexibilities for home health providers during the COVID-19 pandemic permanent.[5] We believe the structural shifts catalyzed by the pandemic will change the shape of the digital infrastructure adoption curve, thereby increasing the rate of change over the coming years.

The purpose of this paper is to explore potential solutions to the challenges posed by integrating disparate technology platforms and ensuring security and connectivity needs are met amid the burgeoning ecosystem of connected devices. These devices are proliferating across all points of care, from hospitals to clinics to doctors' offices and eventually the home.

CORE RESEARCH AREA OF INTEREST

There is a strong belief that the convergence of several different trends will cause the volume of inter-network and inter-device connections to undergo an explosion over the coming five years. These trends include:

- A rapid evolution in Internet of Medical Things (IoMT) technology with sophisticated sensors, data-recording functions, and wider-spectrum transmission capabilities
- The ongoing consolidation of the delivery system catalyzed by the dual need to generate greatly-scaled efficiencies and extend the spectrum of clinical services under control by a single entity
- Alternative modes of payment that comparatively incentivize higher-functioning and efficient delivery platforms, such as accountable care entities, bundles, etc.
- A growing science of care models and therapies that are malleable to a person's individual needs and whose precision is sharpened through the use of data
- A myriad of historically unprecedented network access points created by the burgeoning use of cloud, edge, and Software as a Service (SaaS) computing systems comingled with horizontal connectivity
- A post-COVID-19 environment that demands improved technology-enabled infrastructure to scale system capacity and lower the total cost of care, especially as an influx of new Medicaid beneficiaries enter the program because of the macro economic environment

The increased volume of connections is predicted to impede a network's abilities to operate at optimal levels, thereby potentially causing higher failure rates and more situations involving compromised security, privacy, efficiency, and performance (with performance meaning application availability and user experience). In order to mitigate these adverse events, the IT industrial complex must begin laying the groundwork now.

Our research seeks to address five key questions and assumptions related to this thesis:

1. What is the actual expected rate of network and device interconnectivity over the next five years, and what assumptions are driving aggregate forecasts?
2. Is there a direct correlation between a greater number of connected devices and inherent network insecurity or instability, absent newer technology, or platform management functions?
3. To what degree is the health care system prepared for these changes, including technical support entities that can facilitate managed services, the development of standards to ensure ubiquitous expectations for hardware and software connected across networks, and having IT professionals who are equipped to lead the significant change acting at the intersection of exponentially greater data and insights with different payment and delivery models?
4. Is there evidence that the system is broadly ill-prepared, and what are the key considerations for industry stakeholders and IT professionals across the board?
5. Does the industry anticipate that the emerging digital environment will drive a faster rise in home health participation?

METHODOLOGY

We leveraged a mixture of public and proprietary information sources to address and analyze the aforementioned questions and inform key trends we believe portend core aspects of our thesis. We interviewed 10 leading health IT professionals serving different operational, functional, and geographic delivery system domains across the country to gauge the collective sentiments regarding the future in the context of our thesis.

Interviewees were profiled as those who are actively leading (or have recently led) the enterprise function of a health system's IT operation. Further, we deliberately sought to engage with a range of IT leaders from different health system backgrounds, ranging from a safety net hospital system to a larger, multistate/market Integrated Delivery Network (IDN). Interviews were conducted over a 45-minute period by researchers from Third Horizon Strategies. The questions posited were focused on the preceding core thesis questions and were used to provide a standardized query to the interviewees. Interviewees were not remunerated for their participation.

OBSERVATIONS

A myriad of different and converging environmental dynamics will markedly increase the rate of disparate technology interfaces.

While there is insufficient research to identify a specific correlation between a number and variation of connected devices on a network with underlying performance shifts, there is a shared point of view that a material increase in connectivity volume will raise security, privacy, and efficiency risks. The primary reasons for this lie in the ever-expanding web of connections between organizations and entities that require a native technology and communications platform to interface with an ever-increasing number of digitally-aware, care-giving nodes across the health care ecosystem. In this section, we will explore five key observations revealed through our research. Each observation is followed by a discussion regarding its specific technical implications.

"When wired becomes wireless, access methods go from proprietary radio signals to public Internet signals, and all of that confusion and challenge occurs inside the walls of the hospital. Just for all the reasons in the world, I think there's a lot of demand for new solutions, but it's just hard...hard to break in."

- A president of a health care analytics company

I: The plethora of niche technology solutions will continue to increase, substantiating the need for standardization.

There is currently an array of protocols and architecture across a wide spectrum of devices, manufactured by hundreds of companies, that ostensibly fulfill different clinical, administrative, or communication functions. As the arc of American health care bends in the direction of increased precision-based activities, the volume of niche technology solutions and/or platforms will exponentially increase before discrete sectors consolidate. This variation reflects an age-old problem in hoping for some level of device standardization or ubiquity to minimize the technology and administrative burden, over a range of different interfaces, modalities, and functions. The telemedicine market consists of hundreds of different vendors with different value propositions. Categorically, these solutions represent:

- Direct-to-patient video interactions where a physician engages directly with a patient through a secure connection, posits clinical inquiries, and logs key clinical information into an Electronic Medical Record (EMR) system that in turn may need to interact with other systems
- E-consult platforms that facilitate connectivity between clinicians with different clinical specialties, aiming to extend unique knowledge to underserved, remote, or unequipped settings
- Artificial intelligence systems that are cloud based and process imaging, diagnostic, or other observational data to draw certain conclusions
- Remote monitoring technologies equipped with various types of sensors, regularly recording key information and feeding a stream of data to a core system
- Network management platforms that support medical professionals in referring or transferring patients to alternative care settings and facilitate a closed-loop information or reporting process

Each solution encompasses dozens of other applications that have highly specified functions to improve the care or management of patients.

Technical Implications

In the current environment, a growing number of providers are seeking solutions and standardized infrastructures that can cultivate the most sustainable IT strategy with a focus on security. Open Application Programming Interfaces (APIs), open platforms, and orchestration addressing providers' needs are the way to achieve homogeneity where policies and governance structures can be executed.

II. Infrastructure variability must be accounted for during the Merger and Acquisition (M&A) due diligence process in order to ensure the robustness of secure access for medical devices and systems.

The micro-level connectivity of the aforementioned solutions underlies a structural shift in the way different entities or organizations elect to interact in streamlining integration that would support improved coordination across different physical entities. One way such integration may manifest is through traditional M&A activities, where one entity acquires another and frequently imposes systemic interoperability and compatibility constraints. M&A trends are occurring increasingly in both horizontal and vertical contexts, accelerating the integration of different technology, data management systems, and tools difficult to fully assimilate within a 12-month period. According to Kaufman Hall's M&A Quarterly Report, while the number of hospital and health system transactions decreased by approximately 50 percent between Q1 and Q2 (2020) – 29 vs. 14 – it was not a significant reduction year-over-year. Additionally, two "transformational transactions" announced by Steward Health Care and Advocate Aurora Health caused the average size of seller by revenue to increase to over $800 million, almost double the historic high recoded by the firm.[6] However, the more complicated and emergent form of integration is constituted by disparate facilities or entities that are not commonly owned, but participate in a joint arrangement to coordinate resources to improve the care for patients or reduce the overall expenditures for providing such care by improving the overall efficiency of the system. There is a wide range of entities integrating in this way throughout the country, primarily driven by experimental demonstration programs promulgated by the Center for Medicare and Medicaid Innovation, such as Accountable Care Organizations and bundled payments.

> *"I think you will find that some systems have acquired and shut down several rural hospitals. And part of it is that they just cannot justify the operating cost. If you are getting—some of these hospitals are 20 or 25 beds—two patients a day, are you going to run a full communications infrastructure into that node? It is just never going to sustain itself. Based on that alone, much less all the care and staffing."*
>
> - A former CIO of a not-for-profit health care system

> *"The question (when discussing integrated EMRs after acquisitions) is always of funding. How much will it cost? Is there value? In our case, I think I would say that we lucked out because some of our EMRs were really old and there was no choice but to either upgrade or make significant investments as needed regardless of what our strategy had been. So that gave us an opening to then say that we need to extend our EMR."*
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> - A CIO of a non-profit health system

Beyond specific M&A rationale, the objectives of increasing revenues, gaining economies of scale, and driving operating efficiencies and financial returns are predicated upon the assumption that an orchestrated, secure, and robust technology infrastructure is in place. The infrastructure variability in the "last mile" of ambulatory and home-care delivery challenges that assumption.

Technical implications

Integration of disparate systems demands addressing brittle infrastructure and bolstering weak links. Infrastructure variability is a determining factor in the deployment of emerging technologies that incorporate artificial intelligence and machine learning into health care delivery. It also ensures that acquired care providers can be onboarded in a timely manner and that the entire health system continues to evolve.

III. Significant barriers are likely to slow the rate of secure interconnectivity and system performance.

The IT executives interviewed universally expressed a concern regarding the system's capacity to adequately manage the anticipated influx of connections driven by the aforementioned forces. Several reasons were enumerated, including:

- The financial resources required to underwrite the cost of IT professionals who manage the work of integration is insufficient. There is also an insufficient number of hands applied to the work and a range of technical acumen addressing the requirements of connecting different systems to keep up with the current (in certain cases) and anticipated demand.
- The variation and dynamism of different operating systems and interfaces will require specialized technical skills to keep pace with systems.

> *"You bring two organizations together and the first thing everyone wants to do is exchange information but what we find is that the security programs of the organizations coming together were not at the same level of maturity. So we had to synergize security programs so they could exchange information. Challenge of different security controls, different vendors to implement those controls, that becomes a challenge."*
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> - A CIO of a non-profit health care system

- The management and oversight of the increasingly byzantine volume of inter-device and/or cloud connectivity will necessitate improved central systems capable of providing a standardized view of the overall network's performance, security, and orchestration against organizational objectives.
- The connectivity required in remote or underserved areas will demand low-cost, performance-centric systems capable of providing reliable end-to-end communication.
- The legal, technical, and operational resources required to immediately identify, triage, and redress communication lapses that could compromise sensitive organizational or patient information will increase at a rate proportional to the number of connections (and any underlying risks that such connections and management fail to meet key standards).

Technical implications

The Food & Drug Administration (FDA) has outlined that medical device manufacturers are responsible for the security of all devices and the validation of all software design changes in the event that a Health Care Delivery Organization (HDO) requests an adjustment. Many HDOs have contracts with various manufacturers. As an increasing number of devices enter the network, contract maintenance and enforcement will become untenable and drive the prominence of network-based solutions rather than device-based solutions. Ideas like Secure Access Service Edge (SASE) frameworks, which are gaining traction in other industries, will become an increasingly important framework for CIOs to consider when looking at heterogeneous points of care delivery.

IV. As with other parts of the health system required to demonstrate improved efficiency, there will be an emergence of a managed services construct that will increasingly standardize and professionalize the facilitation of IT system integration.

While interviewees shared a range of different opinions regarding the magnitude and scale of the duress placed on IT systems resulting from scaled technology integration, a general consensus regarding an ill-prepared system was evident: There will be an increasing need for and utility of central management platforms capable of supporting integration activities at scale and in real-time while subsequently providing lower-cost surveillance and management functions.

Such entities are not expected to wholly supplant existing IT teams, but rather to streamline key IT activities to ensure faster speed to integration, greater fidelity to security and privacy, and increased emphasis on communication performance to optimize the use of technology-based resources in service of a rapidly changing landscape.

"I would say, largely speaking, we are guided by two principles. One is more data drives more cures. The second is the idea that patient data needs to stay private and needs to be directed by the patient. As with all things, in terms of security, it is a balancing act between privacy, security, and necessary data sharing."

- A CIO of a large academic medical center

Technical Implications

Care settings are evolving from a simple Electronic Health Record (EHR) serving administrative needs IoMT ecosystems delivering care in real-time. A combination of SaaS and data center-driven solutions is now going to coexist with possible edge intelligence devices to be highly responsive to patient needs. This heterogeneous technology environment will place a localized optimization challenge at the doorstep of health system IT departments, typically specializing in large hospital IT. Resulting IT management complexity is correlated to the size of health systems—the bigger the health system, the more complex. The installation, maintenance, and orchestration of multiple, varied points of care settings, like many other verticals, is simply overwhelming for IT departments from at least three angles:

- Need for personnel with rapidly changing skillsets
- Cost of maintaining sufficient IT support for expanding footprint
- Need to identify, deploy, and orchestrate effective new technologies

System integrators often provide blueprints for idealized solutions. However, a managed service provider, as a practitioner, can help realize and sustain those solutions, in addition to helping design them, so technology investments deliver their full value.

V. The COVID-19 pandemic instigated an unprecedented expansion of commercial and regulatory activity that will continue to significantly shift health care delivery.

The resulting COVID-19 changes to our social construct have caused an increase in patient demand for services and experiences that are credible, seamless, accessible, and error-free. According to a recent study, 64 percent of individuals surveyed believe they are more likely to use telehealth services since the COVID-19 crisis started, and 69 percent would like their provider to offer more virtual visits as an alternative option to office visits after the crisis ends.[7]

The massive data gathered by this explosion of devices and connections to support sound and safe clinical determinations through the application of genomics (genetic testing and editing), biological solutions, and unique therapies raises the threshold for connectivity performance. Finally, the integration of social and behavioral science that constitute a holistic view of a patient and are causally related to 60 percent of a patient's overall health (or life expectancy) will demand historically incompatible systems and workforces to interact with the same interoperable precision that professionals are coming to demand of the health system itself.

The regulatory environment will continue imposing requirements for reporting, technology adoption, patient safety and privacy, and improved efficiency at scale. Dispassionate economic interests will create spending ceilings that motivate the profit-seeking interests of organizations to improve efficiency and lower costs in an attempt to achieve break-even or shareholder-required margins. Impending electoral events at the state or federal level may install a dominant political ideology that would advance structural changes in statute. Finally, the looming global recession (or depression) will shift reimbursement patterns for all entities in the health care system, significantly increasing the urgency to improve performance.

IT executives were generally unable to specify circumstances where the post-integration process resulted in substantive or material diminishment of the underlying performance of technology-based systems. More generally, the pain point was the speed at which

such integration could be accomplished, and the resources required to connect systems under regulatory and market expectations.

Certain barriers have historically imposed operational challenges to this integration, particularly in the domain of connecting IoMT devices to a central EMR or population health management platform or connecting these platforms directly. However, it is rarely the defect of sufficient technology or integration activities that impose challenges, but rather the proprietary nature of underlying technologies that may render such interoperability complex, litigious, and/or costly. Such challenges may limit or altogether impede connected technology systems from achieving the core objectives of their base integration.

Recent statutory and regulatory activity has sought to ameliorate these issues through advancing requirements for API to be built into and accessible by EMR and population health management systems (Medicare Access and CHIP Reauthorization Act) and through the prohibition of information sharing (21st Century Cures Act) regulated by the Office of the National Coordinator for Health Information Technology. For its part, the CMS has pursued a litany of changes to requirements imposed on providers in sharing information through the Health Button 2.0 or MyHealthEData initiatives; motivating commercial forces, providers, and managed care organizations to rapidly work with technology companies to streamline accessibility to critical claims and clinical information.

The conditions created by these regulatory shifts should not be overstated, as they are likely to overcome the challenges faced by systems seeking to integrate in order to more easily surpass the historically-imposed operational, legal, and financial challenges.

Technical Implications

One major technological shift in care delivery is the rise in telehealth utilization in all its modalities—patient/caregiver and caregiver/caregiver from all points of care in episodic and non-episodic situations. This requires technical agility at these points of care and the backends that support them. Topological (network) and Quality of Service agility will be required to scale up and down across many locations depending on varying demands at these locations. Managed service providers, with their ability to surge and later contract resources and available technical expertise, will play a greater role in managing these agility-driven needs. .

CONCLUSION

COVID-19 has upended health care delivery in the U.S. and spurred the adoption of technology-based solutions and platforms. While experts recognize that there is some uncertainly regarding to extent to which care will remain virtual beyond the pandemic, they agree that health systems need to have an executive accountable for building a sustainable telehealth program.[8] In addition to the Trump administration's efforts to codify telehealth flexibilities extended during the pandemic, numerous lawmakers have drafted legislation aimed at expanding telehealth coverage or studying how connected health is being used during the pandemic. During the week of July 20th alone, Congress introduced four new bills – HR 7760, HR 7695, S 4230, and S 4216 – aimed at expanding telehealth coverage or studying how connected health is being used during the pandemic. On a state level, Idaho Governor Brad Little signed an executive order in June to permanently loosen the telehealth access rules that had been temporarily waived because of COVID-19.[9] On the commercial front, a recent survey found that more than half of large employers will offer more virtual care options, and more than 90 percent said they will offer telemental health services in 2021.[10]

This steep adoption of connected devices and telehealth will make health care providers take inventory of their existing technological services, find innovative solutions to address deficiencies, and meet consumers' evolving needs. Simultaneously, they will need to ensure that their system can support an increased number of fast and secure connections to thrive in a more digitally-driven environment. IT organizations, in the new emerging scenario, can either be enablers or impediments with outdated skills and network topologies.

CIOs can empower this transition by augmenting skills at both the operational and design level. Likewise, managed service providers can enable IT organizations to stay focused on information and be assured of an infrastructure that is secure, intelligent,and keeps data

flowing seamlessly. Health systems' dynamic growth will continue to require agility, simplicity, augmentation support, and workflow distribution functions. Those who adapt to this heterogeneity sooner will have a better chance at reaping a bigger share of the gains and in the process set an example for the rest.

The pace of change will only be accelerated as health care providers and systems take inventory of their existing technological services, find innovative solutions to address deficiencies, and meet consumers' evolving needs. Simultaneously, they will need to ensure that their system can support an increased number of fast and secure connections. Investments in data interoperability and infrastructure are critical to health systems expanding successfully. As providers look for ways to remain competitive in a rapidly changing environment, new managed services entities capable of supporting provider integration activities will be an important component of success.

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