

Disruption Drivers

Key Characteristics of a Digital Health System

HIMSS

NORTH CAROLINA *Chapter*

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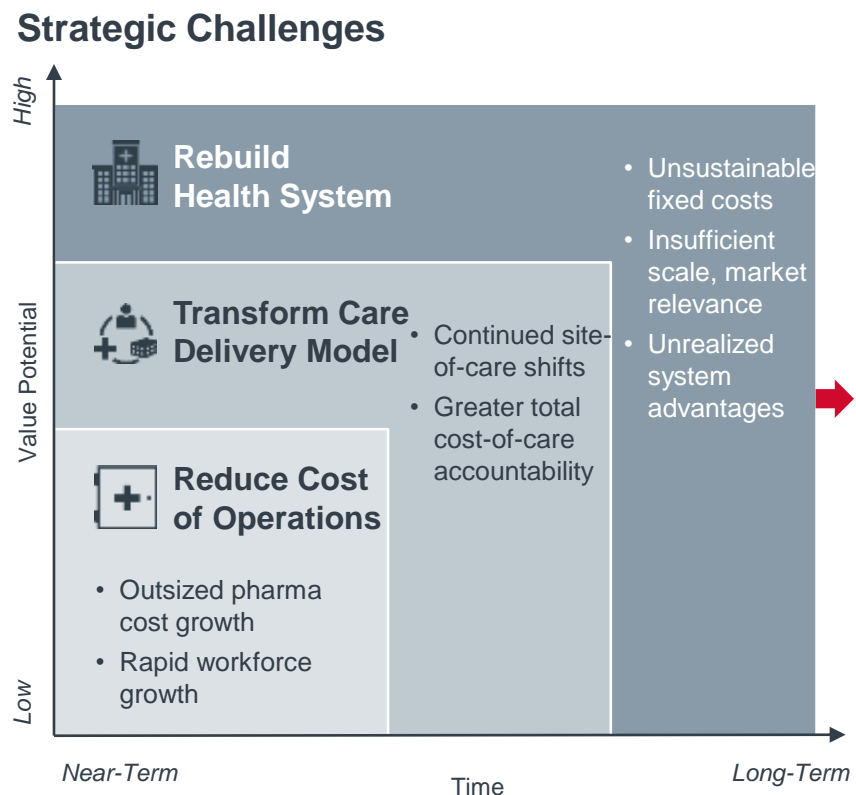
May 3, 2018
Charlotte, NC

Roadmap

- **Digital Health Systems, Transformation, Disruption, and Innovation**
- Digital Health System Maturity Model
- Imperatives and Next Steps

Radical Transformation Central to Future Success

Digital Enablement and Innovation Essential to Transformation

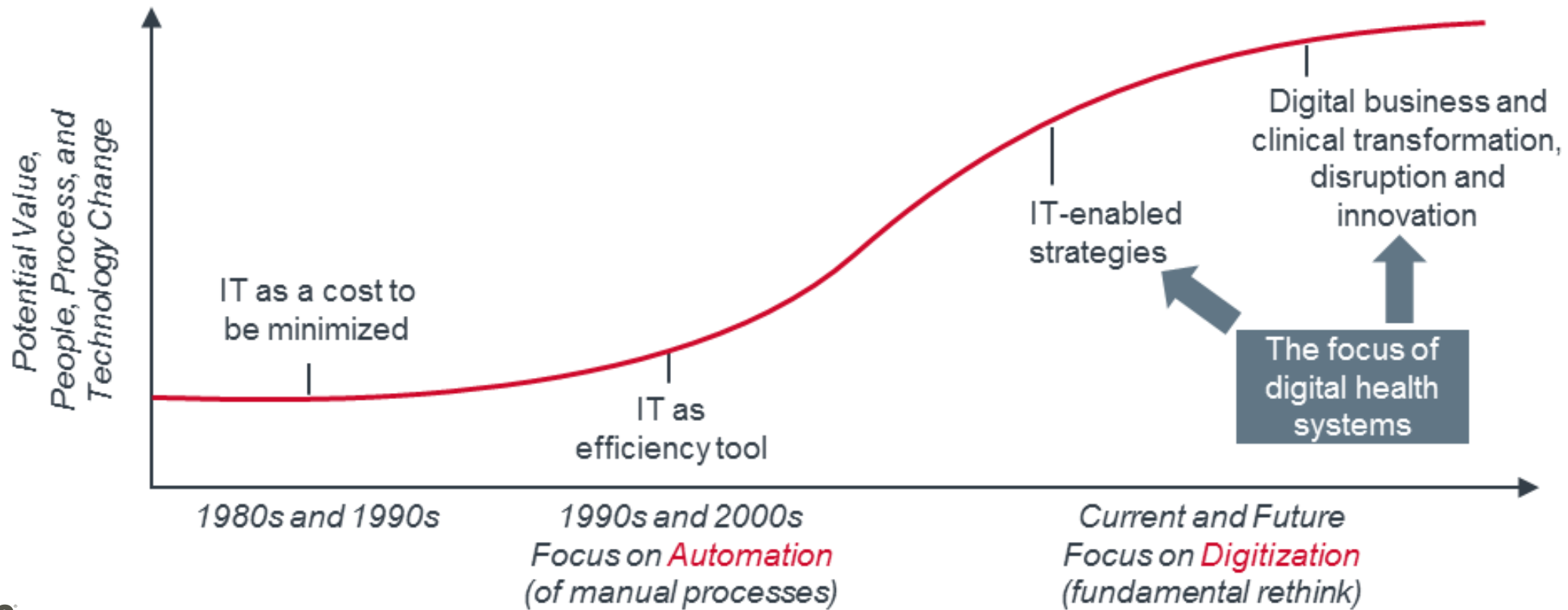


Strategic Imperatives

1. Identify opportunities to inflect pharma spending
2. Eliminate unwarranted care variation
3. Rightsize and reconfigure the clinical workforce
4. Expand to new sites of care
5. Reevaluate risk strategy, transition path
6. Reallocate services across the system
7. Eliminate excess capacity
8. Capitalize on internal advantages of scale
9. Embrace radical growth strategies


Digital Health Systems: Automation to Digitization

Organizational Strategies and Digital Strategies Converge




What Is the Relationship?


Transformation

 Transformation typically implies **major change** and is required to address major industry or competitive opportunities or threats


Digital Disruption

 Digital disruption uses digital capabilities to (unexpectedly) **change the rules of competition** and poses a significant threat to incumbents

Innovation

 Innovation, which typically implies **doing something new and different**, is one way to transform or respond to external disruption

Digital Health Systems

 Digital health systems **set the foundation** for and reap the rewards from strategy enablement and innovation

“Sustaining” Innovations



Physician practice acquisition



Freestanding emergency departments



Partnerships for pricing leverage

“Disruptive” Innovations



Retail, urgent care footprint



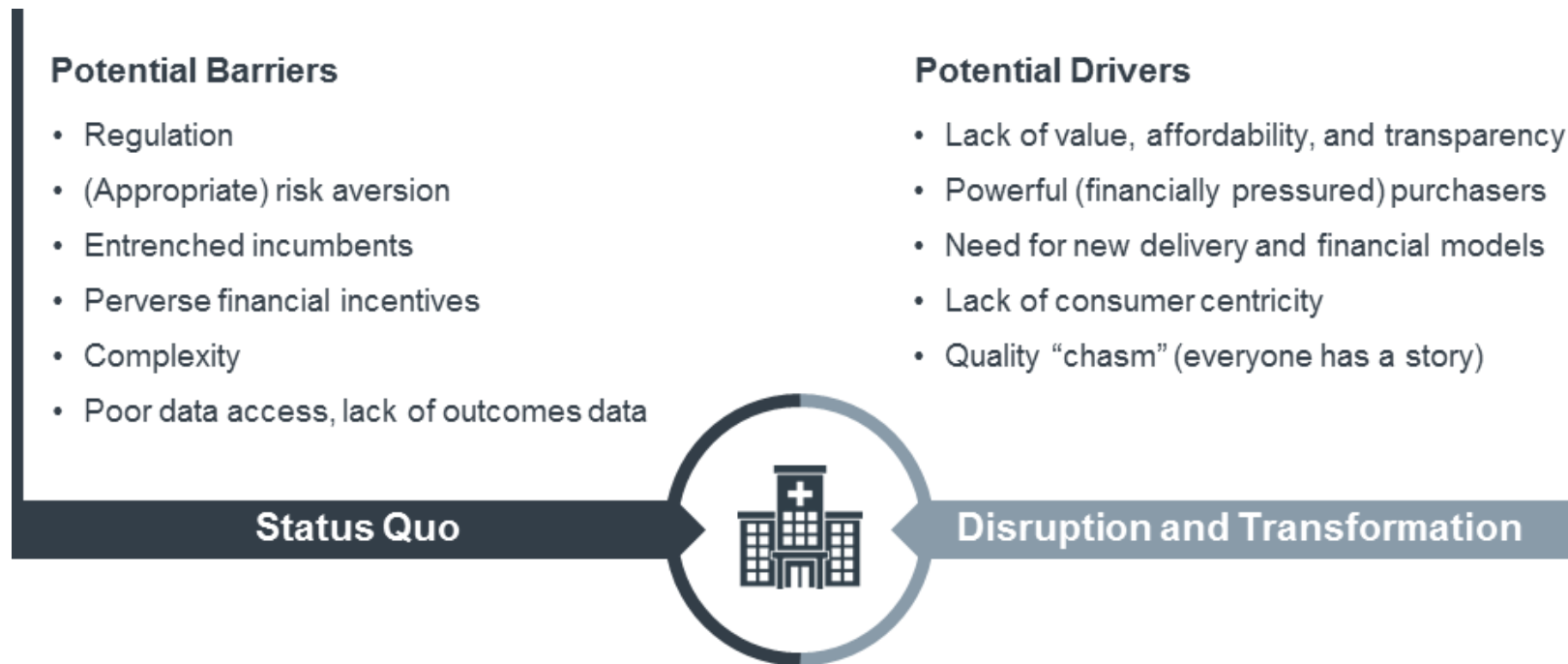
Telemedicine, remote diagnosis and treatment



Provider-sponsored health plan

Health Care Immune to or Ripe for Disruption?

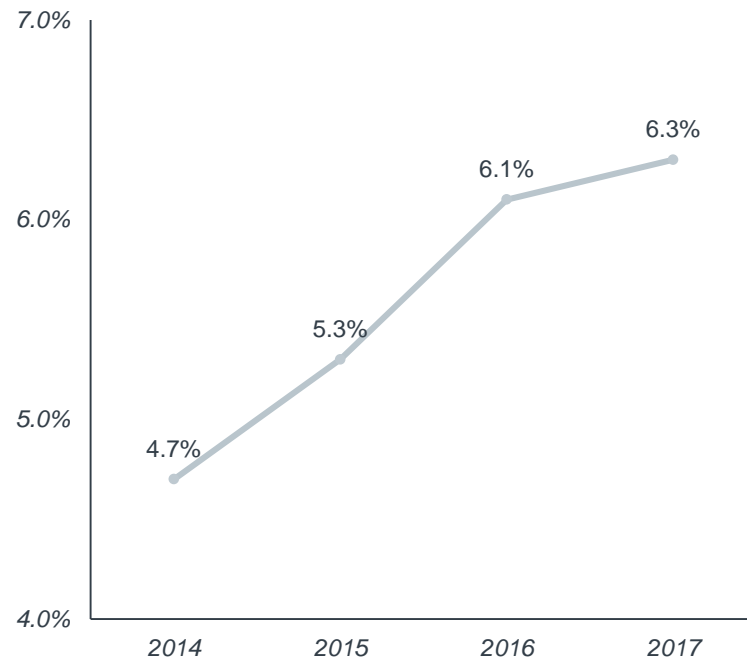
Competing Forces and Perspectives



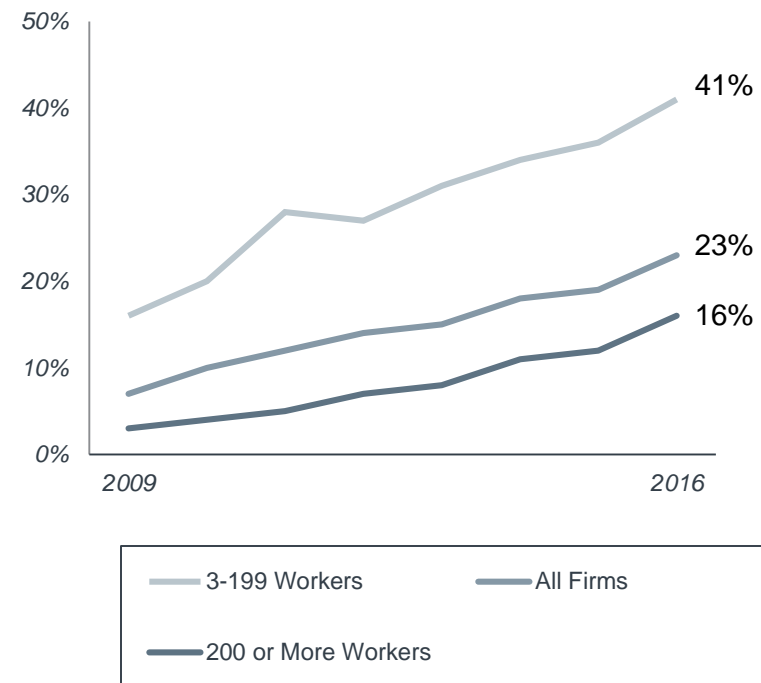
It may be easier to disrupt from the outside than to help incumbents disrupt or for incumbents to self-disrupt.

Affordability a Problem for Purchasers

Average Annual Growth Rate Among Private Business's Health Expenditures
FY 2014-2017



Percentage of Workers by Annual Deductible of \$2,000 or More
By Firm Size, 2009-2016



Three Concurrent Major Changes for Health IT

Transformation, Exponential Technologies, New Role for IT



Fee-for-service incentives to value and affordability



Acute conditions plus prevention, precision, chronic conditions



Encounters and episodes plus longitudinal care management, whole person orientation



Passive patients to active participants

Future, New Role for IT



Security?
Privacy?
Interoperability?
Usability?
Governance?
Dystopia?

Computer power and capacity

3D printing

Networks and sensors (IoT)

Virtual and augmented reality

Artificial intelligence

Material sciences

Robotics and drones

Synthetic biology



Digital transformation is not about technology. It's about redefining an organization's value proposition and, ultimately, a redesigning of the organization."

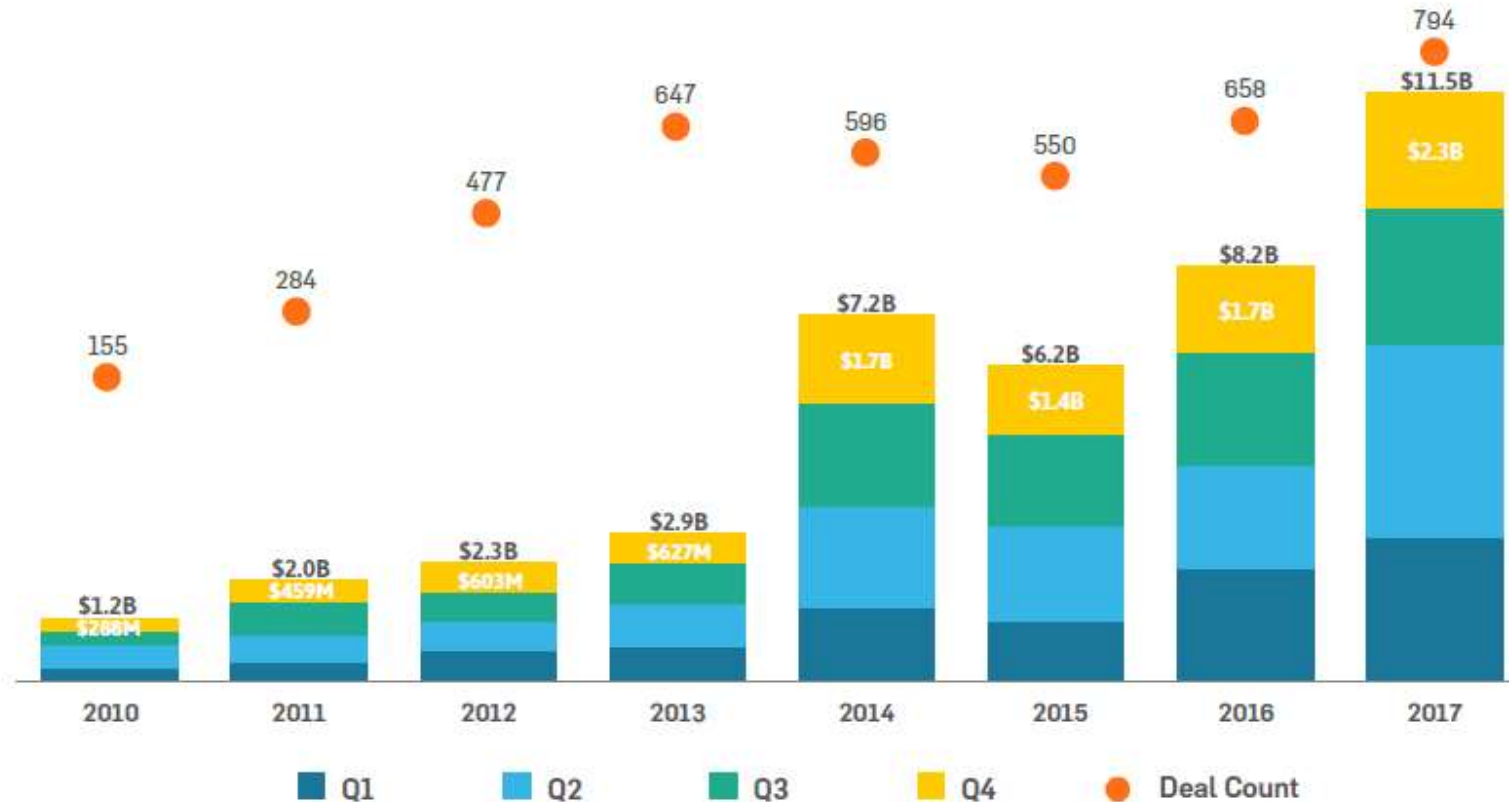
*Dr. Jeanne Ross, Director
MIT Sloan Center for IS Research*

Sources: Moore J, "Microsoft Digital Transformation: CIOs to See Industry, Partner Focus," TechTarget, July 2017, <http://searchcio.techtarget.com/opinion/Microsoft-digital-transformation-CIOs-to-see-industry-partner-focus>; Health Care IT Advisor research and analysis.

Digital Health Funding Continues at a Record Pace

More Dollars, Bigger Deals

Digital Health Funding Snapshot: 2010–2017



Digital Health Market Continues to Mature

Consumers, Workflow, Analytics, Wellness, Personalized Health

Market Maturity by Investment Activity—2017

	Seed	Series A	Series B	Series C	Series D	Series E-H
Patient/Consumer Experience	35	38	17	6	4	0
Workflow	26	32	11	4	0	0
Wellness	13	17	9	4	1	0
Medical Devices	12	9	12	9	4	2
Population health	6	15	9	4	1	1
Big Data / Analytics	6	17	9	1	1	0
Personalized Health	7	12	9	4	3	2
Research	9	6	6	5	2	1
Education / Training	4	3	1	1	0	0
Clinical Decision Support	2	6	4	3	2	0
EHR	2	1	1	0	0	1
E-Commerce	1	3	5	0	1	0

More Funding Activity

Less Funding Activity

HCOs¹ Partnering with Venture Capitalists



(Techstars-Cedars Accelerator)



(Ascension Ventures)



(Center for Personalized Health)



(Summation Health Ventures)



(Providence Ventures)



(Partners HealthCare Innovation)



(“Run, Run, Jump”
Innovation Program)



(Kaiser Permanente Ventures)

“We have the data in usable, annotated forms, and the ability to validate apps that claim to make a difference in the system.”

*Dr. Michael Blum, Director,
Center for Digital Health
Innovation, UCSF*

PSJH¹, UPMC,² and Others Launch Xealth

Xealth Spinout from Providence's Digital Innovation Group



Case in Brief: Xealth

- IT vendor based in Seattle, WA
- Started in 2016, incubated within Providence's Digital Innovation program
- Offers a cloud-based technology that allows physicians and clinicians to **prescribe clinically-relevant digital services**: patient education articles/videos, apps, programs, devices
- **80% email open rates, 40% patient completion rates; 80% IT cost reduction in digital vendor EHR integration**: Epic now, Cerner in development
- PSJH **monitors** patient data from over 20,000 patients via CPAP³ device integration

xealth™



Integrate

Onboard and launch new solutions



Prescribe

Prescribe from existing workflow



Monitor

Access data and usage across solutions



Analyze

Determine best match digital solution for each patient

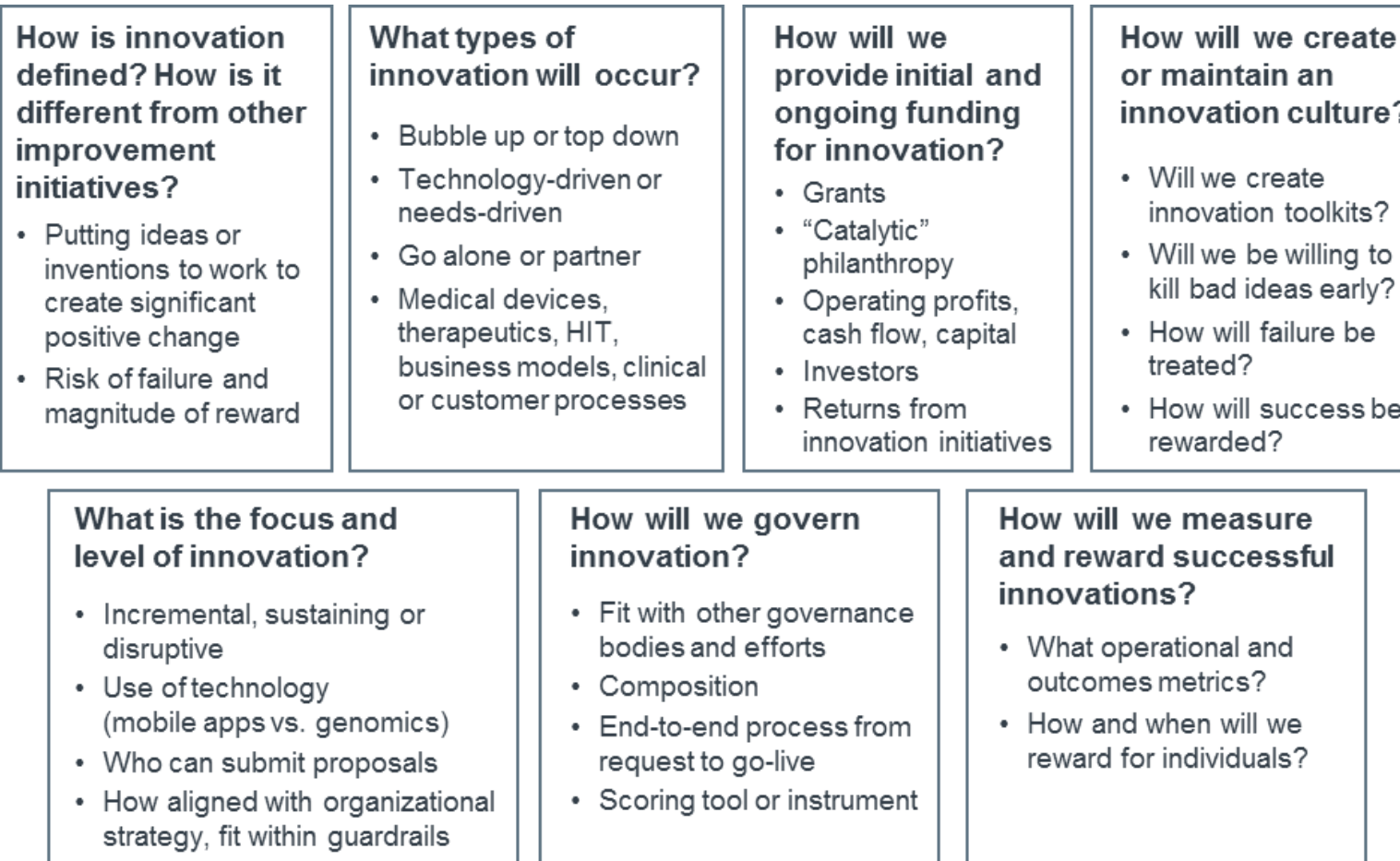
Examples of Innovation

	Incremental “Innovation”	Sustaining Innovation	Disruptive Innovation
Superior Access	<ul style="list-style-type: none"> • Better hospital signage • Optimized facility scheduling 	<ul style="list-style-type: none"> • Wayfinding mobile app • Optimized centralized scheduling 	<ul style="list-style-type: none"> • Virtual visits, e-visits • Navigation services / virtual assistants • Digitized patient journeys
Reliable Care Delivery	<ul style="list-style-type: none"> • Minor EMR enhancements • Order sets • Hospital-based clinical decision support 	<ul style="list-style-type: none"> • EMR optimization • Care standardization • Longitudinal care plans 	<ul style="list-style-type: none"> • Integrated virtual care • Smartphone diagnoses • Precision medicine • CRISPR¹
Leaner Cost Structure	<ul style="list-style-type: none"> • Process efficiencies • Supply chain standardization 	<ul style="list-style-type: none"> • Reallocating acute care services across system • Rightsizing excess inpatient capacity 	<ul style="list-style-type: none"> • Hospital at home • Integrated retail clinics
Platforms for Customer Loyalty	<ul style="list-style-type: none"> • Focus on patient satisfaction • Improve traditional quality metrics and reporting 	<ul style="list-style-type: none"> • Acute care patient portal • Quality metrics meaningful to consumers / purchasers 	<ul style="list-style-type: none"> • Care management mobile apps • Affordable prices • Pricing transparency • Comprehensible billing • High-performance delivery networks

1) CRISPR = Clustered Regularly Interspaced Short Palindromic Repeats.

IT-Powered Innovation Questions

Discipline, Results Orientation, Willingness to Fail



Key Takeaways

1 We are witnessing three major concurrent changes

- Health care is transforming.
- New enabling technologies are available and some are improving exponentially. Sometimes you will need to “skate to where the puck will be” with exponential technologies.
- The focus of IT is expanding beyond automation to digitization, transformation, and innovation.

2 The digital health market is growing and maturing

3 Digital health systems are foundational to strategy enablement and innovation to respond to disruption and innovation.

4 We need to digitize processes and digitize information about the patient.



“Typically with any technology, version 1.0 is speeding up or making efficient the current way of doing things, and version 2.0 is changing the way things are done (e.g., business models). Unfortunately, you have to go through 1.0 to get to 2.0.”

*Aaron Martin, Chief Digital Officer
Providence St. Joseph Health*

Roadmap

- Digital Health Systems, Transformation, Disruption, and Innovation
- **Digital Health System Maturity Model**
- Imperatives and Next Steps

Digital Health System Maturity Model

Focus, Governance, Strategy

	IT Efficiencies	IT-Enabled Strategies	Digital Transformation
Focus for and Value from Deploying IT	Automation for localized ROI, ¹ quality improvement	Business / IT alignment , strategy enablement, scale, operational excellence and improvement	Digitization, sustaining, or disruptive innovations that scale and change the basis for competition
Governance, Funding, and Prioritization	“Scratch each other’s backs,” huge backlogs of prioritized and approved requests (the “Yes Machine”), haves and have-nots	Enterprise focus, agile governance, funding for innovation proof-of-concepts, “strategic” funding	VC ² -like innovation funding (possibly with separate but coordinated governance)
Organizational and IT Strategic Planning	IT plan loosely aligned with business strategy, more a prioritized list of initiatives	Tightly aligned or concurrent business / IT planning	Focus on addressing key business problems or opportunities

“Driving innovation at scale means going digital—having customers engage and transact online with us.”

*Aaron Martin, Chief Digital Officer
Providence St. Joseph Health*



Imagine if Amazon tried to scale using call centers rather than transacting with customers online.

Digital Health System Maturity Model (Cont.)

Leadership and Skills

	IT Efficiencies	IT-Enabled Strategies	Digital Transformation
Non-IT Leadership in IT-Related Matters	Functional and departmental leaders	C-level executives	CEO, perhaps supported by a Chief Digital Officer
Non-IT CxO Skills, Focus	Operations, financial, functional	Enterprise, strategic, T-shaped business and clinical skills, IT-literate	Practical, engaged visionary, key end-to-end journeys, support for agile co-development
CIO Skills	Infrastructure technologies, project management, applications	Business/clinical acumen, digitization (fundamental rethink), data, T-shaped IT skills	Practical IT-powered innovation
IT-Related Skills	Stovepiped technical	Consultative, “soft skills,” business understanding, integration, interoperability	Knowledge of key business problems, exponential technologies, and how to deploy

“If the CEO doesn’t own innovation, it will die—it’s not even a fair fight.”

Aaron Martin, Chief Digital Officer
Providence St. Joseph Health

Digital Health System Maturity Model (Cont.)

Infrastructure, Data, Security, Systems, and Technologies

	IT Efficiencies	IT-Enabled Strategies	Digital Transformation
IT Infrastructure and Operations	Localized (by facility or department), reliability, stability	Reduce “keep the lights on” expenses, centralization , standardization , reliability, scalability	Two-speed IT , agile , virtualization, cloud, analytics platform, mobility platform, interoperability, innovation services
Systems and Technologies	Point solutions for transactions and analytics, proven (best-of-breed) technologies	Enterprise systems of record, systems of insight, enterprise technologies	Systems of engagement and exponential technologies
Data and Analytics	Localized, point solutions	Enterprise perspective, data-informed operational and management decisions, basic advanced analytics	Data-informed strategic decisions, innovation, automated operational decisions, AI and ML ¹
Key Vendor Relationships	Tactical	Strategic	Joint investments, shared risk and reward
Security and Risk Management	Local, ad hoc	Centralized, standardized	Built in, risk-based

“We divide our IT function into run/build and exploit/innovate.”

*Jim Noga, CIO
Partners HealthCare*

Common Themes Around Innovation



CEO-led; CxOs-
supported



Use of agile by cross-
functional innovation
teams



Proof-of-concepts
approach for rapid learning
and decision making



Recognition that
digitization is
required for (standardized)
rapid scaling



Help fund innovation
by controlling “keeping
the lights on” costs



Some IT resources dedicated
to innovation both in the
innovation function
(if there is one) and for core
IT functions or systems

Some Organizations “Going Big” on Innovation

PSJH: Going Digital to Enable Innovation at Scale

Five Key Components



A Unified Mission

- The goal is to democratize health care and make it accessible to everyone on their terms. PSJH's Digital and Innovation team is focused on **discovering important digital innovations, demonstrating they work, and bringing them to scale across the organization.**



The Right People and Team

- The **right mix** of business/clinical and technical; health care and consumer industry expertise



Innovating at the Ends of the Industry Value Chain

- Innovating on what delivers **value directly to consumers / patients and providers**



Innovating on What Won't Change

- The ultimate aim of health care is **achieving the quadruple aim**—improving the health of populations, improving patient and provider experience, and reducing health care spending. Innovation at scale is one way to work toward this aim.




Going Digital with Our Customers

- **Driving innovation at scale means going digital**—having customers engage and transact online with us.


Some Innovations Are Less Grandiose

Modern Technology for an Old Problem: Team-Based Communication

 **Started with a Long-Standing Business/Clinical Problem: Team-Based Communication**

 **Used 21st Century but Proven Technology**

 **Built Around the Patient**

 **Utilized Design Thinking**

- Fits with clinician's workflow
- Focuses on usability
- Integrates into the EMR



Case in Brief: UCSF Medical Center

- Health system based in San Francisco, CA
- Built a team-based communication app called CareWeb Messenger that operates as a **hybrid of Facebook and Twitter** technology; IP has been licensed for commercial use
- App is built around a patient and connected to the EHR, so the app knows who on the team is taking care of the patient
- Solution creates a **wall of communication whenever there are important conversations happening between team players** (e.g., doctors, care planners, discharge coordinators)

Innovations May Be High-Tech...

Health Nucleus “Digitizes the Patient” to Provide Personal Health Insights



High-Definition Brain and Body MRI¹

Advanced imaging scan can detect signals of some early-stage cancers, cardiovascular disease, neurodegeneration, and neurovascular disease.



Whole Genome Sequence Analysis

Provides insights into your genomic risks for many health conditions and personalized information about medications to which you may respond to as well as others you should avoid.



CT² Scan

Measures calcified plaque in the walls of your arteries of your heart to provide insights into your risk for coronary artery disease.



Cardiac Rhythm Monitoring

A wireless patch that continuously monitors your heart's rhythm over a two-week period through all your normal activities.



Core Laboratory Blood Testing

Measures key risk-markers for cardiovascular and metabolic diseases, as well as tests of organ function.



“Health Nucleus combines cutting-edge technologies to provide you and your physician with personal health insights for early detection, disease prevention and empowering you for a life better lived.”

...Or Innovation May Be Relatively Low Tech

Children's Health Dallas Working in and with the Community



Work with School Programs

- Integrate primary care with school nurses
- Provide inhalers with sensors connected to a smart phone app to prevent unnecessary emergency department visits



“Family Health On Call”

- Experienced providers come to your location, providing convenient care for the whole family
- 8 a.m. to 8 p.m. daily
- Request a visit via a mobile app



“Adopted” 100 Families

- Focus is on wellness and prevention
- Connect families with obese children to community resources
- Address root causes of allergies
- Consider SDOH¹ data in predictive analytics



“We’re focusing on a few of the most common, chronic and often resource-intensive conditions, seeking to enhance care and improve wellness for these patient populations. This approach will enable us to continue serving the community well into the next 100 years.”

*Pamela Arora, Senior VP, CIO
Children's Health*

doc.ai Provides AI-Powered Patient Conversations

Products

- **Robo-Hematology:** Answers any question on over 400 blood biomarkers
- **Robo-Genomics:** A conversational agent designed to improve comprehension of genetic data and provide users with decision support
- **Robo-Anatomics:** Uses state-of-the-art deep neural network and optimization techniques to analyze “selfies” to predict a variety of anatomic features including height, weight, and gender for frictionless data collection

Levels of Conversational AI



Chatbots that frequently follow pre-determined scripts (e.g., *Siri*)



Virtual Agents that can contextualize conversations (e.g., *Ask Verizon*)



Unsupervised Agents with Memories (e.g., *doc.ai*)



Personalized Assistants (e.g., *J.A.R.V.I.S.*)

“The ultimate goal with doc.ai, is to create a world full of knowledge about health care, where people have the ability to learn and take care of each other.”

SmartBridge “Democratizes” Access to Cancer Care

Services

- For **\$29**, patients receive a same-day, personalized and validated second opinion, researched and written by an oncologist.
- For **\$49**, the patient can have a next-day call with an oncologist hand-picked specifically for his or her case.
- For **\$299**, SmartBridge Health will gather and review a patient's medical records, diagnosis and treatment plan, give recommendations based on treatment options and clinical trials in the patient's area, and follow up with his or her oncologist to explain its opinions.

SmartBridge Exists Solely Online



SmartBridge has a **library of validated cancer diagnoses and templates**, which can be used by experts for their second-opinion reports.



When the **AI system compiles the report**, the oncologist will review it and see if he or she agrees with it.



If the doctor has a different opinion, he or she can **override the AI report** and tailor the written treatment plan.

Roadmap

- Digital Health Systems, Transformation, Disruption, and Innovation
- Digital Health System Maturity Model
- **Imperatives and Next Steps**

Imperatives



Develop a **Common Vision** Across the C-Suite



Build a Full **CEO-CIO** Partnership



Move IT from the “Backroom to the Boardroom”



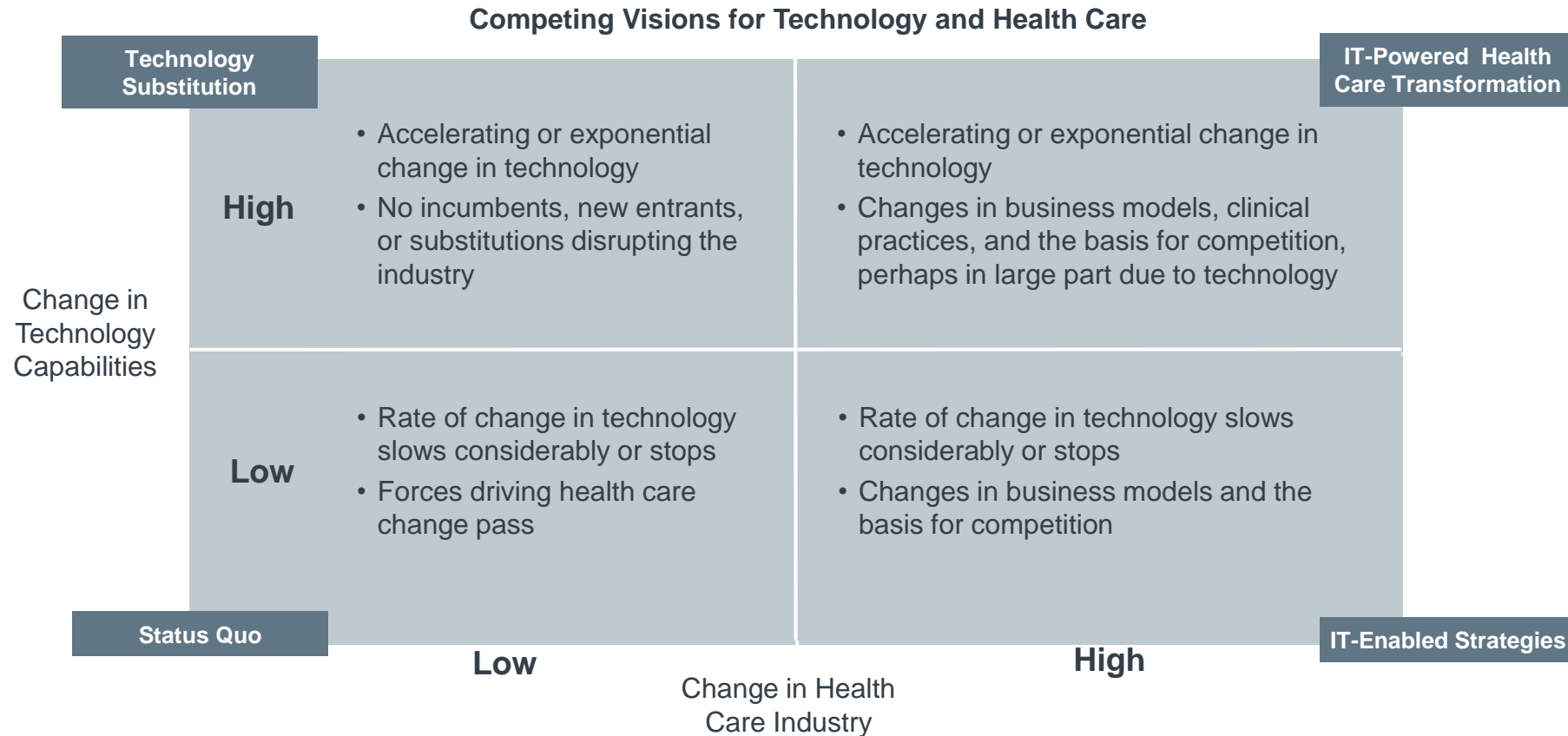
Utilize IT **Benchmarks**, Where Available



Communicate and Focus on the “**IT Value Equation**”

Develop a Common Vision Across the C-Suite

The Future of IT and of Health Care?



Build a Full CEO-CIO Partnership

A Clear Need for Collaboration



CIO, “IT-Powered Innovators”

- Align with and appropriately shape a clearly defined enterprise vision and strategy
- Support IT-enabled process transformation and organizational change management
- Manage demand and match it with the supply of IT-related resources
- Obtain funding for IT-related operations and infrastructure
- Track emerging and enabling technologies; help identify opportunities for innovation

Key Areas of Interdependence

Vision and Strategy

Organizational Change

Demand

Funding

Innovation



CEO and Other Non-IT Leaders

- Clearly define the IT-enabled enterprise vision and strategy and help implement the enterprise strategy for IT
- Lead IT-enabled process transformation and organizational change management; clearly define roles, accountabilities, and rationale for transformation
- Help prioritize demand; have justified confidence that the IT function and IT infrastructure are managed well
- Understand different funding approaches for different types of investments
- Help create an environment for appropriate IT-powered incremental, sustaining, and possibly even disruptive innovation

Move IT from the “Backroom to the Boardroom”

Make IT a “Team Sport”

IT is not essential to implementing and executing our organizational strategy



We need IT-enabled strategies and IT-powered innovation and business models

These are IT projects



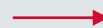
These are IT-enabled business and clinical initiatives

These are IT’s systems



IT runs your systems— “business-driven, IT-powered”

It’s the CIO’s job to get value from IT-related investments



IT value is the job of the non-IT leaders, supported and enabled by the CIO

We need to stop spending on IT so we can move on to other things



Actively manage “keeping the lights on” spending, focus on optimization and innovation

We’re doing across-the-board cuts, including IT



Assess impacts cost cuts would have on service levels, new initiatives, or costs in other areas

Our business is health care, not IT



Our business is IT-powered health care

Utilize IT Benchmarks, Where Available

“Apples-to-Apples” IT Benchmarks Are Difficult to Establish

Challenges



Organizations may define and classify IT-related costs differently:

- Do you include HIM and BioMed as IT-related costs?
- What costs for departmental systems are included?



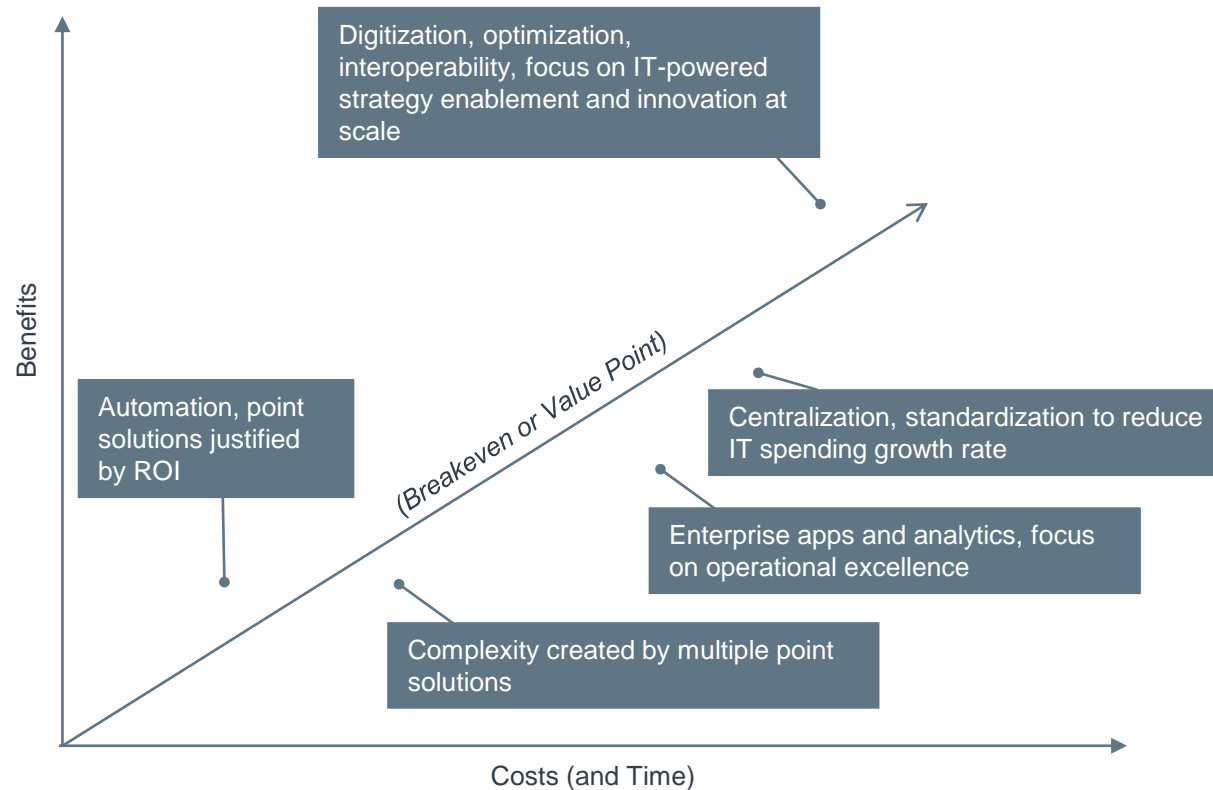
Organizations may differ in sourcing strategy (e.g., hosted on premises, a public cloud, or by an outsourcer) or application portfolio (e.g., Epic hospitals versus MEDITECH hospitals)



Organizations could differ in size, complexity, strategy, stage of strategy implementation, or even how successfully the applications and technologies are being used

Communicate and Focus on the “IT Value Equation”

Ongoing Efforts by Non-IT and IT Leaders Required to Get “IT Value”

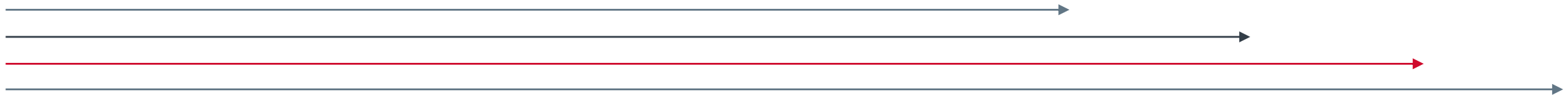


“History has repeatedly shown that arguing against technology is a losing proposition.”

Dr. Michael Blum, Director, Center for Digital Health Innovation, UCSF

Key Takeaways

- 1 Yes, digital transformation, disruption and innovation are actually happening in health care.
- 2 CEOs must lead innovation. “If the CEO doesn’t own innovation, it will die—it’s not even a fair fight.”
- 3 The “designated digital transformer” (e.g., CIO or Chief Digital Officer or Chief Innovation Officer) must lead, educate, and balance practicality with “rethinking impossibilities.”
- 4 The innovation mindset and agile, cross-functional, customer-focused teams (e.g. an “outside-in approach) must become part of the culture.
- 5 Ensure adequate resources, prioritization, and coordination for changes required to the core systems by innovation initiatives.
- 6 CIOs need to run a “tight IT ship” while building the digital platform to enable strategy and scalable innovations. You can’t utilize all your resources just “keeping the lights on.”
- 7 Use the Digital Health Systems Maturity Model to help assess and to plan your journey.





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