Navigating the Future of Health IT

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Digitally Enabled Business Transformation

Blurring the digital and physical worlds
Key Issues

1. What are the key mechanisms for value from digitalization?

2. Which investments will be most important to the transformation of healthcare and health?

3. How should executives be governing IT in the digitalization era??
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Digitalization Cycle of Value

Digital Transformation

Industry Vision

Business Optimization

IT Optimization

IT Renovation

Digital Innovation
The Building Blocks of Digital Business

Leadership Styles

Agile Organization

Culture Change

Technology Platforms

Architectures

Skills

Business Models
Digital Mashes-Up Technologies and Techniques to Play New Roles in Personal and Population Health
In 2020 ...

Cameron — 17
Ava — 15
Their Mom — 47
Their Grandpa — 79
Brady — 12
His Dad — 50
His Grandpa — 82

“They’re playing so well together!”
Future Phenomenon Now

Pokémon GO

Announced in 2015
Est. 20-30 million downloads
May have had peak of about 26 million uses in one day

Praised for being a game that gets people moving
Panned as an accident-causing distraction

https://www.youtube.com/watch?v=SwtDeeXtMZM

Personal Behaviors 36%
National Ecosystem: Singapore Smart Nation

- Ranked first for ease of doing business (World Bank)
- World’s fastest broadband nation (Ookla)
- The top and fastest-changing digital economy (Tufts U.)

Source
http://www.smartnation-forbes.com/

"Forty big banks test blockchain-based bond trading system"

Source
www.reuters.com/article/banking-blockchain-bonds-idUSL8N16A30H
Digitally Enabled Health Transformation

The realization of new outcomes by blurring the digital and physical in societies
Poster in the Newark, NJ Airport, 2014

Note: in mid-1800s it was 47
“Dispatches From the Frontiers of Longevity”
In Reality, "Population Health View"
Determinants of Health

- Personal Behaviors: 40%
- Family History and Genetics: 30%
- Social and Environmental Factors: 20%
- Medical Care: 10%

Source: McGinnis and others, Health Affairs, 2002
Future Phenomenon Now

"23 pairs of chromosomes, one unique you"

"Receive 65+ personalized genetic reports"

"AncestryDNA — The World's Largest Consumer DNA Database"

"Uncover your ethnic mix, discover distant relatives, and find new details about your unique family history"
Digital Health Vision: Queensland, Australia

Increasing pressure on the health system and the Queensland economy

• Increasing population
• Growth in an ageing (sic) population
• Longer life expectancies
• Increasing burden of disease – cardiovascular disease, cancers and diabetes
• The challenge of providing equity of health service provision in regional, rural and remote communities

Source: Queensland Health: 21st Century Healthcare - eHealth Investment Strategy
© State of Queensland (Queensland Health) 2015
Digital Health Vision: Queensland, Australia

Queensland Health’s investment priorities:

- New ICT infrastructure
- Investing statewide in electronic medical records and enabling digital hospitals.
- Business intelligence.
- Systems to support integrated care with primary and community healthcare partners.

Source: Queensland Health: 21st Century Healthcare - eHealth Investment Strategy
© State of Queensland (Queensland Health) 2015
Digital Health Vision: Finland

- Strategic change and a vision for integrated healthcare
- National e-Health architecture
- Extension to social care
- Health registers (longest-running is cancer registry)
- Structured documentation and terminology
- Integrated medical and social services record
- Genomics leadership
- Citizen decision support
Payer/Provider Impact: Best Case, 2027

Personal Behaviors 36%

Family History and Genetics 26%

Pop. Health-Aligned Medical Care 20%

Social and Environmental Factors 18%

Source: Gartner 2017
Key Issues

1. What are the key mechanisms for value from digitalization?

2. Which investments will be most important to the transformation of healthcare and health?

3. How should executives be governing and organizing IT in the digitalization era?
Market Forces Have Created These Business Priorities for Health Systems

- **Scale and Manage Growth**: high growth services/line, geographies, standard practices, economies of scale; future market relevance & dominance

- **Control Cost/Improve Operating Margin**: standardization, economies of scale, automation.

- **Transform Clinical Practice/Quality**: from Individual Physician-based to Evidence-based and Agile: A business priority deeply aligned with a specific technology, the Gen 3 EHR and content/decision support.

- **Business Transformation to a Population Health Management Model**: Accountability through value-based contracting; patient-centric design vs. physician/setting-centricity; team-based delivery/Service, continuum of care perspective. Standardized processes and predictable cost.

- **Patient and Consumer Experience - Engagement, Relationship, Persuasion**: create brand stickiness/loyalty for satisfaction and additional business. Impact the social and personal determinants of health. The “wicked” problem.

Also for some:

- **Solve problems of rural/remote access to equal care.**

- **Support clinical research in new ways.**
Using the Hype Cycle Methodology
Understanding the Hype Cycle progression of new technologies

- What's here that we could be using?
- What's here that we're not using?

Diagram showing expectations over time with phases indicating hype and reality.
Filtering the Noise

Noise Filter ("Coping Strategy")

- Risk of Being Too Early
- Risk of Being Too Late
- Positive Hype
- Negative Hype
- expectations
- time

Innovation Trigger
Peak of Inflated Expectations
Trough of Disillusionment
Slope of Enlightenment
Plat...
What Do The Healthcare Hype Cycles Reveal?
Profiles "Travel in Packs"
The Ten Phases of Health IT Advancement

- Peak of Inflated Expectations
- Trough of Disillusionment
- Innovation Trigger
- Slope of Enlightenment
- Plateau of Productivity

Evidence-Based Medicine: Core Clinicals
The EHR

ERP: HRM SCM FM

Patient Access Revenue Cycle

BOBs: LIS RIS PACS ICU ED

Patient Access Revenue Cycle
The Existence of the EHR is Today’s Biggest Technology Innovation Trigger in Healthcare

Evidence-Based Medicine: Core Clinicals The EHR

Patient Access Revenue Cycle

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Gartner
The Ten Phases of Health IT Advancement

2030: An Ahead-of-Time Health System
- "Post-Modern" Cloud ERP Systems
- Genomics Medicine Knowledge Systems
- 2027: Precision Medicine Solutions
- Consumer Engagement & Digital Marketing Hub
- 2030: Adaptive Virtual Personal Health Services

2020: The Real-time Healthcare System
- CRM/Digital Marketing Patient Engagement Portfolios
- Operational Intelligence Systems
- Population Health Systems, Platforms and Point Solutions
- Evidence-Based Medicine: Core Clinicals The EHR
- Telemedicine and Virtual Care

Innovation Trigger
- Patient Access
- Revenue Cycle
- ERP: HRM SCM FM
- BOBs: LIS RIS PACS ICU ED

Inflated Expectations
Trough of Disillusionment
Plateau of Productivity
Slope of Enlightenment
Gen 3 "EHR" Vendor Megasuites Are The Top Strategic Vendors Through 2020+

- They are a megasuite that includes EHR, patient access and revenue cycle
- For the integrated delivery enterprise + virtual enterprise
- Dominate care-centric workflows, megaprocesses and decision management interfaces with content, adjunct apps and domain knowledge clouds

The core value of the core HIS (with a nod to Dr. Clem McDonald):

- Eliminate the logistical and workflow problems of paper
- Increase the ability to create enterprise standardization and agility
- Reliably and persistently connect the clinician to the computer
- Make the informational "gold" in the HIS and the medical record accessible for clinical, epidemiological, outcomes and management research
Key digital technologies projected to drive important change

In your opinion, which three of these technologies have the most potential to change your organization over the next five years?

- **Top performers (n = 164)**
- **Typical performers (n = 2007)**
- **Trailing performers (n = 160)**
- **Overall total (n = 2,331)**
- **Healthcare providers (n = 64)**

- **Advanced Analytics**: 88%
- **Internet of Things (IoT)**: 79%
- **Digital Security**: 73%
- **Business Algorithms**: 82%
- **Machine Learning**: 53%
- **Virtual Customer Assistants**: 48%
- **Augmented Reality**: 44%
- **Blockchain**: 51%
- **Autonomous Vehicles**: 43%
- **Smart Robots**: 40%
- **Augmented Reality**: 39%
- **Advanced Analytics**: 35%
- **Internet of Things (IoT)**: 34%
- **Digital Security**: 35%
Healthcare Delivery Organization Context of Platforms

- Artificial Intelligence
- Digital Twins
- Digital Mesh
- Advanced Analytics
- Data Science
- Specialty: Imaging, NLP
- Machine Learning
- Deep Learning
- Visualization
Advancing Analytics Compel Health Systems to Treat Data Management as the Enterprise Core Competency

- **Level of Business Impact**
  - Hindsight
  - Insight
  - Foresight
- **Delivered:** Retrospectively, Concurrently, Prospectively

- **Information**
  - Descriptive Analytics
  - Diagnostic Analytics
  - Predictive Analytics
  - Prescriptive Analytics

- **What Happened?**
- **Why Did It Happen?**
- **What Will Happen?**
- **What Should I Do?**

- **Better Decisions**
AI is Clearly a Force Multiplier – Key Trends

New Industrialization
- C-level Visibility
- Explosion in Use Cases
- Algorithm Marketplaces
- Data Science

New Data Sources
- Polystructured Data
- 3V
- IoT

New Processing
- Cloud
- Hadoop/Spark
- Gpus/Fpgas
- In-memory Computing
- Multinode Parallel Computing
- Real-time Analytics
- Data Discovery

New Tools
- Open Source
- Model Factories
- Graph Databases
- Nosql
- Smart Data Discovery
- Data Lakes
- Crowdsoourcing (Microwork)

New Algorithms
- Cognitive and Smart Systems
- Ensemble Models
- Differential Privacy
- Deep Learning
- Reinforcement Learning
- Differential Privacy

New Skills and Thinking
- Skills Trump "Technology"
- Asking Better Questions
- Analytics Culture
- "Data Expeditions"
- Citizen Data Science
- Governance
- Digital Ethics

Data Provider
There Are Many Complexities in Creating Intelligence -- AI

Predictive Analytics → Advanced Analytics Applications

Data Science → part of Advanced Analytics Applications

Artificial Intelligence → Cognitive Computing

Machine Learning → part of Artificial Intelligence

Operations Research → part of Machine Learning

Ensemble Learning → part of Machine Learning

Deep Learning → part of Machine Learning

Big Data → part of Deep Learning

Technologies That Shorten The Time to Insight and Discovery
“Mayo has been pretty clear that we have a big focus on knowledge to delivery, which, as our CEO has described, means that we view knowledge as our most scalable asset – as opposed to brick and mortar facilities. Because of that, we have a focus on how we can support that mission: providing Mayo-vetted knowledge, outside Mayo.”

Cris Ross, CIO
Mayo Clinic
View 2 of Evolving Healthcare IT…

Consumer Lifeflows

Health System Workflows

Core Platforms
Key Issues

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2016 Focus on The Work and The Value
What three words come to mind when you think of the CMIO's job in 2016?

Source: AMDIS-Gartner CMIO Survey, 2016
Two modes of IT, each designed to address different information and technology goals.

**Mode 1**
Sequential: stability and reliability

**Mode 2**
Exploratory: agility and flexibility
Going Bimodal

Q. Does your company/business unit/government or public entity explicitly have two parts in its IT organization or project portfolio — one more safe, predictable and industrialized, the other more innovative, fast and/or collaborative — in other words, a bimodal approach to IT?

Percentage of respondents who use a bimodal approach

Top performers (n = 160)
Typical performers (n = 1,894)
Trailing performers (n = 153)
Healthcare Providers (n = 63)

Average Bimodal Adoption:
38%
43%

Base: Total answering, excludes not sure
Gartner Framework for Defining CMIO Role and Responsibilities – US View (draft)

IT Plan/Portfolio

Consumer Engagement Hub
Precision and Personalized Medicine Portfolio
Intelligent Operations
Population Health Management/ Virtual Enterprise Portfolio
Telemedicine and Virtual Care Platform/Portfolio
Clinical Core Gen 3 EHR, Portals, Analytics

HDO Vision and Executive Ambition

<table>
<thead>
<tr>
<th>Classic FFS/ Activity-Based Model</th>
<th>Value-Based/ Risk Model</th>
<th>Digital/Consumer Business Model</th>
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When Is “Bimodal” Medical Informatics Needed?

At these points, bolder bimodal thinking is required (Working backwards from a new vision)

May split into executive leader or strategic and operations informatics

Office of Digital Healthcare

IT Plan/Portfolio

Consumer-Engagement Hub

Precision and Personalized Medicine Portfolio

Intelligent Operations

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Gen 3 EHR, Portals, Analytics

HDO Vision and Executive Ambition

Classic FFS/ Activity-Based Model

Value-Based/ Risk Model

Digital/Consumer Business Model

Innovator Leader Mainstream

Innovator Leader Mainstream

Innovator Leader Mainstream
Recommendations for All Leaders

- Strengthen IT, information and data governance effectiveness
- Then evolve planning and governance to the flatter, faster model needed for digitalization era
- Concentrate on empowering teams to milk strategic platforms and vendor relationships
- Orchestrate a process for harvesting higher value from existing applications, including the EHR
- Rationalize and standardize the applications portfolio against achievement of cohesion, best-value and best-cost
- Innovate around clinician and consumer engagement