Healthcare Technology Trends

Complex System With Various Stakeholders

Source: IBM Care Coordination
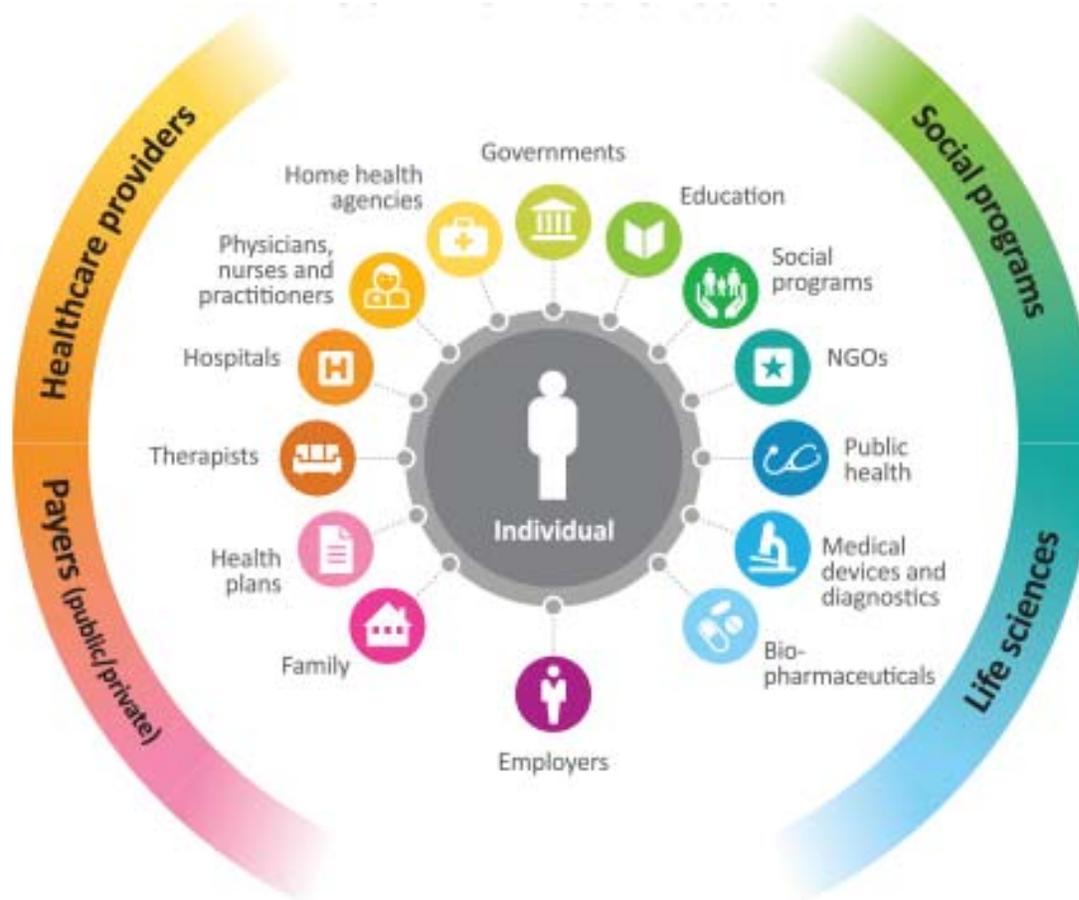
U.S. Healthcare System At A Glance: What Is Driving The Cost Of Healthcare?

Aging Population

- Elderly (65+): 45M and growing
- Elderly living alone: 25M
- Over 30% of healthcare spending
- Medicare: $550B

Chronic Diseases

- 133M Chronically Ill
- $0.75 of every $1.00
- Obesity: 105M
- Hypertension: 124M
- Cardiovascular: 81M
- Asthma: 23M
- OSA: 21M

Hospital Readmissions

- $25B cost
- 840K preventable readmissions
- 19.7% of heart attack patients were readmitted
- 24.7% of heart failure patients were readmitted

Ambulatory Care

- Outpatient Care: $1T+, $500B over benchmark
- 1.3B visits per year, of which 70% were for minor issues
- Poor care coordination: $50B
- Admin. inefficiency: $200B

Medical Mistakes

- Annual cost of measurable medical errors :~$20 billion
- Preventable infections: $4B
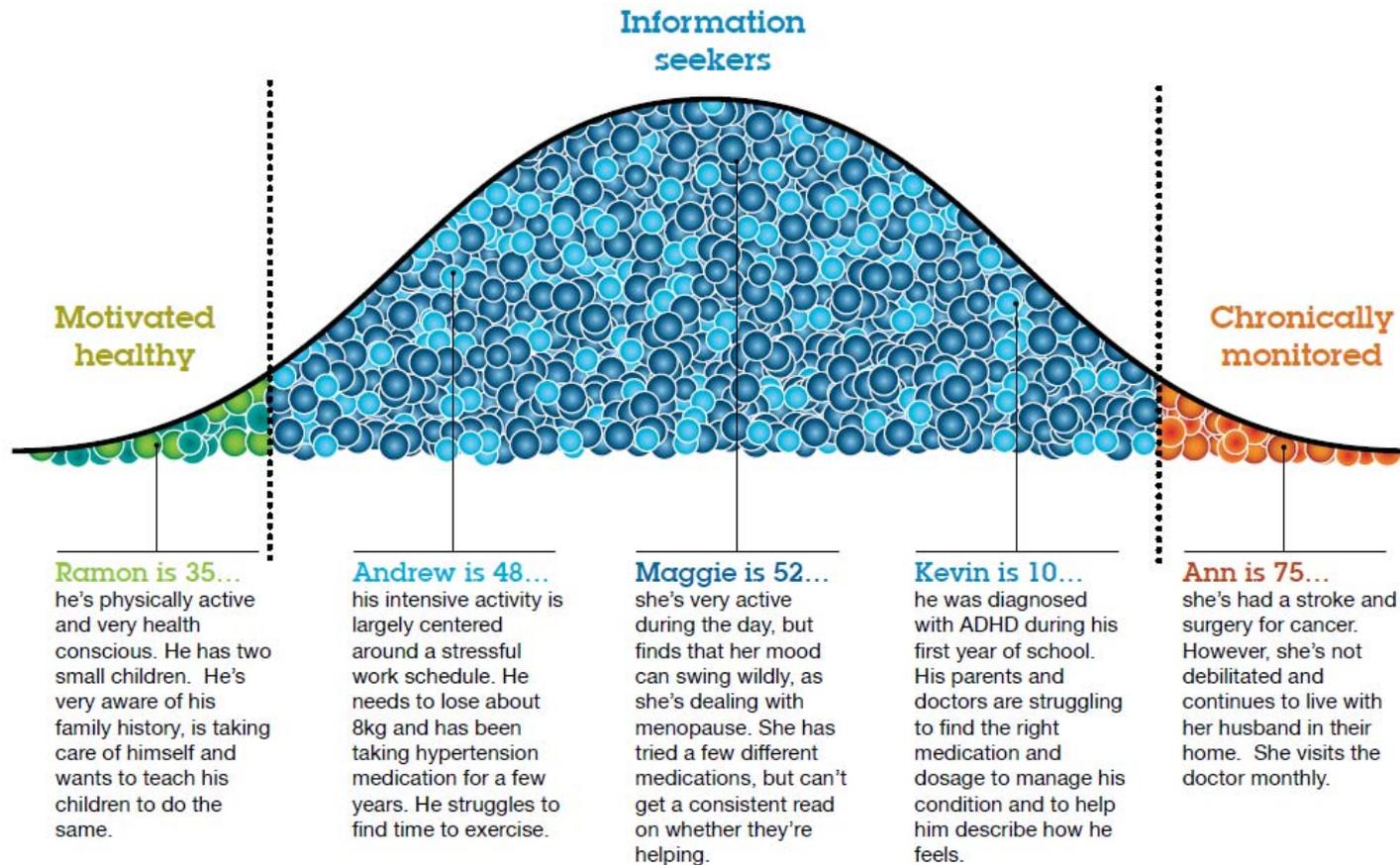- Bedsores, ulcers: $$3.5B
- Implants, grafts, other: $2B

Fraud

- Fraud and abuse: $175B
- FBI estimates that HC Fraud costs $60B/year
- Medicare "improper payments": $48B

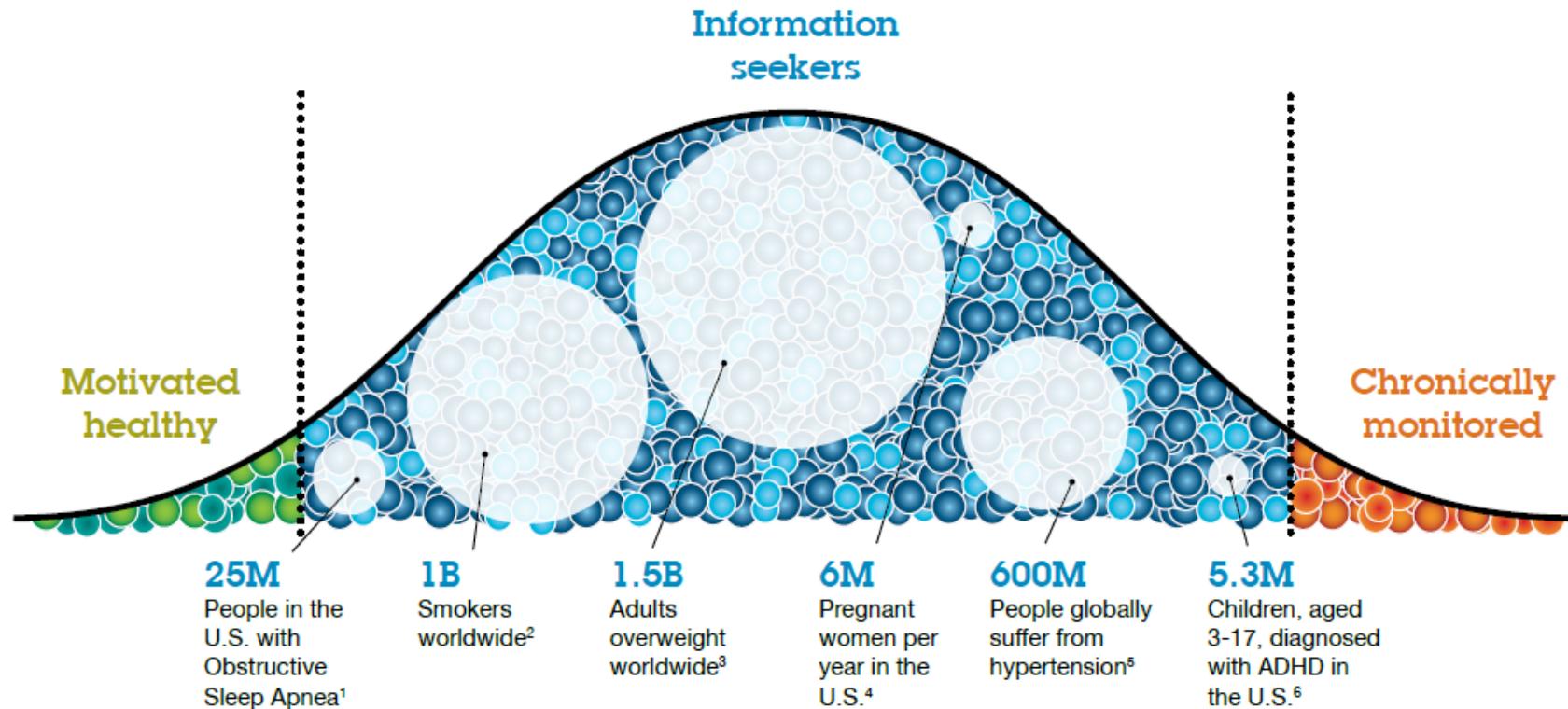# Healthcare Has The Greatest Technology-Driven Improvement Potential
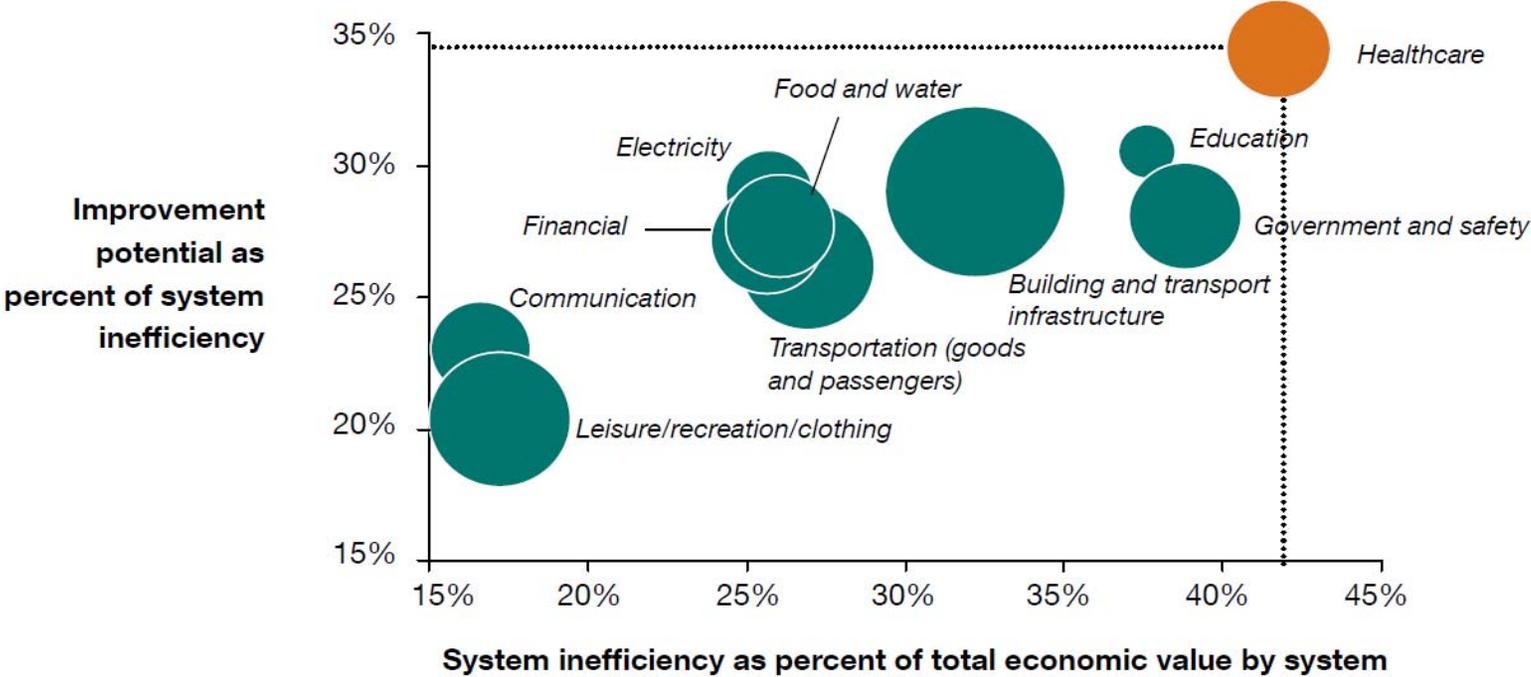
Note: Size of the bubble indicates absolute value of the system (US$ billion).
Sources: "The world's 4 trillion dollar challenge," IBM Institute for Business Value, January 2010.

There Is Untapped Patient Demand For Information And Services

Information seekers

Motivated healthy

Chronically monitored

Ramon is 35...
he's physically active and very health conscious. He has two small children. He's very aware of his family history, is taking care of himself and wants to teach his children to do the same.

Andrew is 48...
his intensive activity is largely centered around a stressful work schedule. He needs to lose about 8kg and has been taking hypertension medication for a few years. He struggles to find time to exercise.

Maggie is 52...
she's very active during the day, but finds that her mood can swing wildly, as she's dealing with menopause. She has tried a few different medications, but can't get a consistent read on whether they're helping.

Kevin is 10...
he was diagnosed with ADHD during his first year of school. His parents and doctors are struggling to find the right medication and dosage to manage his condition and to help him describe how he feels.

Ann is 75...
she's had a stroke and surgery for cancer. However, she's not debilitated and continues to live with her husband in their home. She visits the doctor monthly.

Millions Of Information Hungry Patients Need Assistance In Managing Their Health

Information seekers

Motivated healthy

Chronically monitored

25M
People in the U.S. with Obstructive Sleep Apnea[1]

1B
Smokers worldwide[2]

1.5B
Adults overweight worldwide[3]

6M
Pregnant women per year in the U.S.[4]

600M
People globally suffer from hypertension[5]

5.3M
Children, aged 3-17, diagnosed with ADHD in the U.S.[6]

Healthcare Technology and Related Services Are Poised For Double-Digit Growth

Market

US Healthcare Reform

- U.S. Healthcare spend is $600-700B above benchmark ($2.3 trillion vs. $1.6 trillion based on peer group)
- Healthcare IT remains underinvested (2.5% of HC company OpEx vs. 12.6% in finance)
- Over $40Billion in government stimulus by end of 2019 to accelerate IT adoption

Move to Accountable Care

- Increase in patient population (e.g., over 30 Million uninsured, 70Million retiring baby boomers)
- Decrease in clinician population (e.g., provider consolidation, reducing reimbursements)
- Ongoing epidemic and cost issues associated with chronic diseases (60% of US spend)

Technology

EHR and Mobility Adoption

- Shift from paper based records and processes to electronic
- Physician and clinician need to have access to information in near real time
- Government pressure for meaningful use certification of EHR solutions
- 297M Phones. 111M Smart Phones

Cloud and SaaS Acceptance

- Emergence of SaaS based system providers demonstrating significant cost advantage over traditional client-server architecture
- Explosive growth of medical records, images and the need for data analytics
- Over 70% of in-patient settings are small-medium size hospitals with limited IT budget

24% growth in the HIT market over the next 4 years...

Cloud Computing   Big Data Analytics   Payment Systems

Data Exchanges   Electronic Records   Video   Storage

Gamification   Mobile   Decision Support Tools
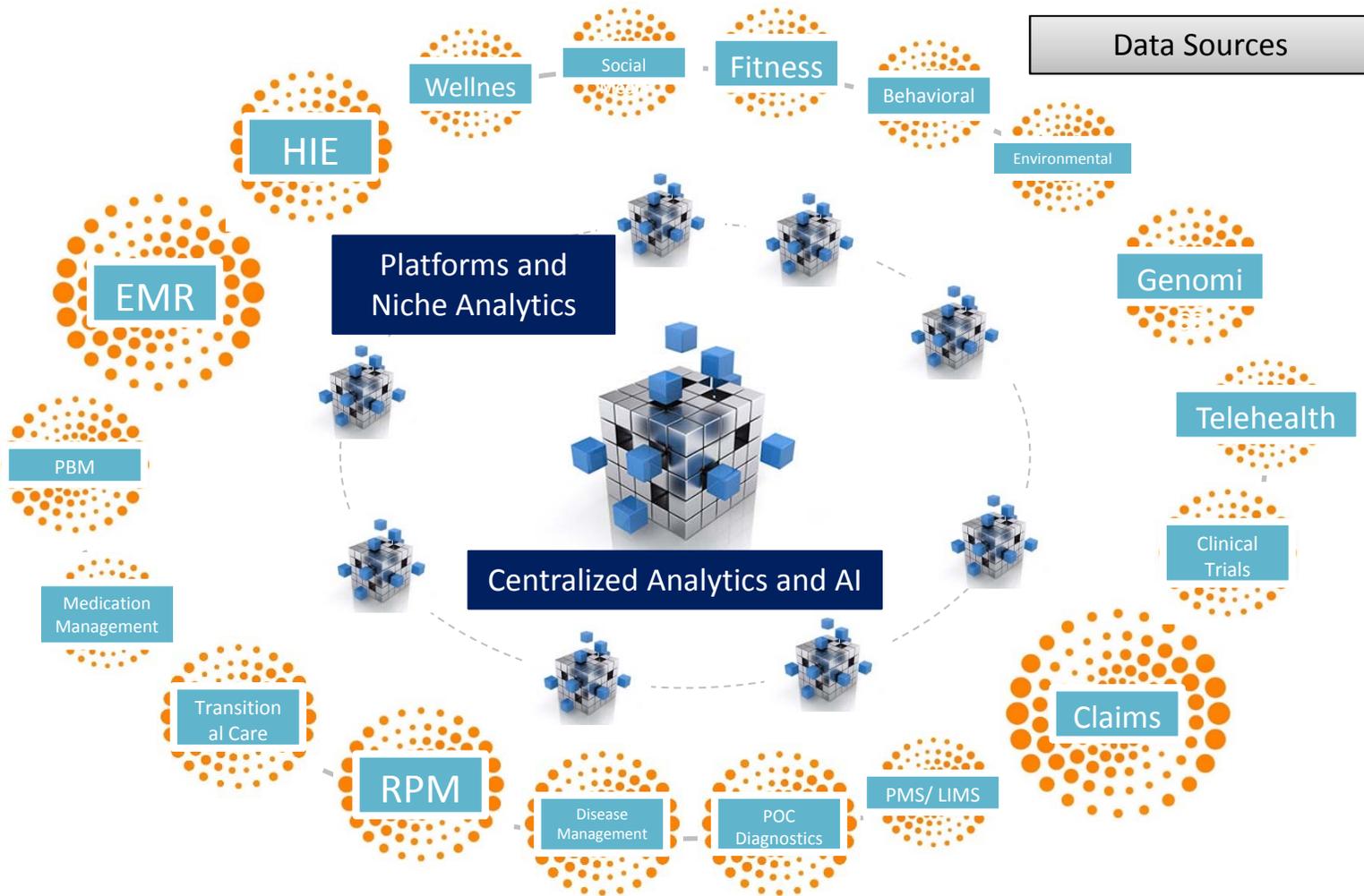
The Promise of Big Data Analytics

Interconnectedness is the single most important trend emerging over the next 20 years. Companies that enable and empower interconnectedness as well as make sense of the data generated by these connections will be best positioned to capitalize on the disruption now running through the $5T global healthcare system.

- Welcome to the Matrix: 32 million points of medical care in the U.S. by 2020.
- Consumers playing a greater role in medical decisions.
- The health care system will have over 258 Trillion interconnections by 2020.
- Data includes: EMR, Claims, Trials, Genomics, Sensors, Mobile Phones, Web
- 3M Connected healthcare devices and growing
- 2X increase in mHealth apps 2009-2011
- 15,000 mobile health applications available on 111M U.S. smart phones and 50M tablets
- 5X increase in mHealth app downloads 2013-2016 to hit 142M (Juniper Research 2011)
- 8X increase in fitness and medical wearable devices (M2M) 2012-2017 to hit 170M devices (ABI research)
- 2X announced investments in mHealth 2010-2011, hitting $500M (MobiHealthnews, 2011)
- Wearable device market is set to grow from $800M this year to $1.5B in 2014

Big Data & Analytics hold potential to resolve current and future confusion in healthcare and create value from terabytes of exponentially growing health information.

Healthcare Sensor & Information Ecosystem

Data Sources

Social

Wellnes

Fitness

Behavioral

HIE

Environmental

Platforms and Niche Analytics

Genomi

EMR

Telehealth

PBM

Clinical Trials

Medication Management

Centralized Analytics and AI

Transition al Care

Claims

RPM

Disease Management

POC Diagnostics

PMS/ LIMS

Solutions And Services Vary Across Stakeholders And Reflect Their Needs

Administrator/ Business Manager	Clinical Team	Patients and Caregivers
Integrated Accounts Receivable Identify problematic payers and save time posting payments	**Electronic Medical Records System** Capture, store, and organize patient health information.	**Patient Health Records System** Allows patients and caregivers monitor patient health information
Billing & Payroll Processing Save time and increase accuracy during invoicing and payroll processing.	**Workflow Management and Analytics** Creates, manages, and dynamically adjusts tasks for care team members.	**Health Risk Assessment Tools** Captures clinical, environmental, and behavioral patient data for analysis
Scheduling & Telephony Increase accuracy and save time by better managing your schedules.	**Coordination and Communication** Web and mobile tools enabling the care team to work together	**Patient Engagement/Behavior Change** Education and incentive mechanisms aimed at long-term behavior change.
Inventory Management & Logistics Increase medical equipment and supplies delivery efficiency.	**Patient Population Analytics** Performs patient stratification by risk and resource allocation.	**Remote Patient Monitoring** Captures qualitative and quantitative patient data; condition specific tools
Client & Caregiver Management Increase services by better building client and caregiver relationships.	**Telemedicine capabilities** Enables clinician-patient interaction using mobile and video technologies.	**Remote Diagnostics and Testing** Check-ups, screening, and diagnostic procedures at the point of care.

Healthcare Stakeholders:
Vision For The Future

Patients

- Patients are more engaged and educated about their health than ever; they are always "plugged in" into their health and fitness ecosystem and are using the following technologies to engage:
  - Mobile health applications
  - Applications in cars, TVs, consoles
  - Social media
  - Consumer health and fitness portable and wearable devices
  - Home testing

Physicians

- Access to healthcare professionals is widespread and universal through the use of video technologies on phones, tablets, TVs, and specialized end-points coupled with connected medical sensors
- Majority of GP/PCP visits are conducted remotely using a secure video client with increased CDS and AI support; Physicians increasingly shift towards various specialties

Providers

- Personalized healthcare with extended use of genomics, DNA modification, proteomics, metabolomics
- Medical offices are using multilingual front office patient check-in solutions
- Physicians and Payers are able to prescribe and monitor mobile health applications to patients/members
- Home automation and smart medical home technologies are commonplace including remote patient monitoring and independent living technologies

Payers

- Health Plans and Healthcare Providers work together to close the information loop on outcomes and expenditures to optimize therapy and prevention techniques
- Payers are increasingly focused on reimbursing and promoting preventative programs and predictive analytics to manage costs and reduce hospitalizations
- Healthcare payments are simplified using technology; middlemen are eliminated
- Health Insurance Exchanges working across state lines

Pharma

- Pharmaceutical companies are shifting to "own a disease" strategy that includes diagnostic, therapy, and monitoring solutions including the use of mobile applications and connected devices
- Companion diagnostics/therapy driven by genomic data
- Clinical trial recruitment and execution is performed through social medial and the use of mobile applications, connected medical devices, and video conferencing

Tech

- Ubiquitous access and transfer of electronic medical records and images on the cloud
- Exponential growth of medical information storage capacity in HIPAA-compliant environment
- Advanced Clinical Decision Support and Artificial Clinical Intelligence driven by big data analysis
- Single communication protocol/standard for all connected devices
- Ultra high bandwidth networks to support health information exchanges