Healthcare Innovation
Incremental and Exponential

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@drnic1
Founder & CEO, Incremental Healthcare

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TELEMEDICINE MARKET

Global market share (2018)
$38.3 BN

CAGR (2019-25):

- Teleconsultation service sector: 18.9%
- Tele-education/ training service segment: 20.8%
- Telehome market sector: 19.6%
- Neurology market segment: 39.8%

Regional Insights

U.S. Market share
2018: $19,524 MN
By 2025: $64.1 BN

CAGR (2019-25)
China: 23.0%
India: 22.4%
Where you can find me

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Agenda

• Introduction
• Health Declines in the Context of Life
• Telehealth
• Innovation Opportunities Today
• Future Potential
• Questions
Consumer Statistics

• 387 Million globally live with diabetes
• 10 million live with Parkinson's
• 14 Million new cancer cases added each year
• 17 Million people will die annually from heart disease
Healthcare consumers are ready to embrace change

- 57% say hospitals as we know them will become obsolete
- 75% are willing to see a doctor via videoconference
- 70% would use pill bottle sensors & other home technology to collect data
- 84% willing to share personal health details to lower overall health costs

Source: Intel Global Innovation Survey, n = 12,000
Undiagnosed Silent Preventable Killers

• Uncontrolled hypertension leading cause of heart disease and stroke
• 1 in 3 U.S. adults (70 Mil) have Hypertension
• 13 million U.S. adults aren’t even aware they have Hypertension
• 84 million people suffer from cardiovascular disease - causing about 2,200 deaths a day, averaging one death every 40 seconds
• 8 million adults have undiagnosed diabetes and 87 million have pre-diabetes
Modifiable Health

60-80% Lifestyle
TeleHealth and TeleMedicine
The Continuum of Telehealth

- Home Monitoring
- Advanced Monitoring Equipment
- Teledermatology
- Sensing Depression and Brain Injury
- Intelligent Assistants and Virtual Interactions
- RoboDoc/Nurse
- Remote Vitals

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Tele Dermatology

- Whole Body Imaging
- AI Identification of Skin Cancer
- MasSpec Pen – Instant Identification of Cancer Cells
Even Assisted Telehealth Intervention
Telehealth Devices

• Predictive Analytics
• 3D Printing
• In Home Monitoring
• Ultrasound
Wearable's and Internet of Things
Wearable's and Internet of Things will surpass smartphones and personal computers by 2018
The Quantified Self

Meet Chris Dancy and His 10 devices he wears or carries and 13 more in his home and car.
Quantified Self

- Ubiquitous, low cost, always on sensors
- Seamless tracking with minimal friction and requiring no behavior change
- Generates interactive easy to understand data and influences behavior
- What Can you Track
  - Activity and Weight
  - Sleep, Mood
  - Cardiac including Heart Rate, Blood Pressure and EKG
  - Bloods including Glucose
  - DNA and Your MicroBiome
- Incentives

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Stress activation detected. Do a breathing exercise?
BIOSENSING WEARABLES LANDSCAPE

Source: Rock Health review of 75+ companies (companies are selected, not comprehensive)
Smartphone Driving Biggest Heart Health Study

http://singularityhub.com/2013/04/03/a-million-smartphones-will-drive-biggest-heart-health-study-in-history
Next Gen Sensors

Continuous Monitoring
Robotics and Automation
RP-VITA robots, iRobot Corp
Robot Support

Mishima City, Japan

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Fully Autonomous Stitching Robot

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Artificial Intelligence
Can We Predict the Future
<table>
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<tr>
<th>Team</th>
<th>Win Probability</th>
<th>Forecasted Outcome</th>
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<tbody>
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<td>Duke</td>
<td>27%</td>
<td>Winner</td>
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<tr>
<td>North Carolina</td>
<td>18%</td>
<td>Runner Up</td>
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<tr>
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<td>14%</td>
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<td>Michigan State</td>
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A Word on Bias

• Reproduce the inherent biases present in the data they are provided with
• Disproportionately creating a ‘feedback loop’ by which the predicted outcome simply becomes a self-fulfilling prophecy
• Models Created with the Bias of the Builders either intentionally or unintentionally
Researchers Create Voice-Analyzing App to Diagnose Concussions

September 29, 2013

By GILLIAN MOHNEY via GOOD MORNING AMERICA, WORLD NEWS

It’s Not Just What You Say, It’s How You Say It

A smartphone app listens for signs of manic and depressive episodes.

By Aimee Swartz
Virtual, Augmented Reality and Gamification
Augmented Reality and Gaming

'Pokémon Go' is so addictive that people are getting way more exercise than they're used to

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Augmented Reality and Gaming

Pokemon Revisited
Virtual Reality and Augmented Reality

• Simple Virtual Presentation and Visualization
  – CT Scans Projected onto Body
  – Teaching and Virtual Experience (Medical Realities, Anatomy, Virtual Surgery)

• 3D Visualization and Augmented Reality
  – EchoPixel
  – Proximie
  – Accuvein
Massive Multiplayer Online Role Playing Games (MMRPOG/MMO)

• $31 Billion Market
• League of Legends – 100 Million
• Heroes in World of Warcraft – 70 Million
• WoW $5 Million in Subscription Fees Every Day
• Steam Concurrent Player Peak – 13 Million
• Gaming is Voluntary and Does not Pay
• WoW Average Player 17-22 Hours per week
• WoW Total of 5.93 Million Years of Player Time
  • Equivalent to the time taken for the Human species to evolve

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Virtual Education and Gaming

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Future Innovations
Genomics and Precision Medicine
Genomics, Sequencing

- Took $3 Billion and 10 years to sequence one genome
- Sequence in days even hours and for <$1,000
- Explosion of data just to sequence the genome
  - Plans to sequence 14M new cancer patients every year which would generate 5.6 Exabytes of information.

- But there’s even more data in -omics
The era of Personal genome analyzers

A PARADIGM SHIFT IN GENOMIC DIAGNOSTICS

ULTRA-LOW COST:
PURE ELECTRONIC DNA SEQUENCING

Genapsys

DNA electronics
Early Impact - Pharmacogenetics

99% of population surveyed in Preemptive Testing of Patients had an Actionable Variant

Final Thoughts

• Healthcare is in Crisis – Technology and Telehealth is central component to solving
• Healthcare Needs to be Wellcare
• New Sensors and data Acquisition of Biometric data occurring at an exponential rate
• For Every 1 Piece of Knowledge we Understand another x50 Questions will Arise
• Genomics and the Biome will revolutionize our Diagnosis and Treatment of Disease
• The Future Lies in Augmentation of Human Capability with Technology

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Questions

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