THE FUTURE OF HEALTHCARE TECHNOLOGY
THE FUTURE OF HEALTHCARE TECHNOLOGY

NTT SmartShirt

- Records vitals to enhance athletic performance
- Real time monitoring of vital
- EKG, EMG, Respiratory Rate, Muscle Strength, Reaction time
- Used to rate prospects in NFL combine

Can be adapted to track real time vitals of patients
James Deren is Director of Information Technology (IT) Healthcare Planning for CareTech Solutions. Mr. Deren has more than 36 years of IT experience, including 26+ in the IT healthcare industry.

Jim has presented at a number of national healthcare conferences including The 2016 AHA Rural Health Care Leadership conference, 2012 HIMSS national convention, the AHA Center for Governance Fall Symposium, 2010 HIMSS Virtual conference, 2009 Fall Midwest HIMSS conference and 2009 CHIME conference.

He has earned a B.S. degree in education/computer science from Eastern Michigan University.
LEARNING OBJECTIVES

The session will provide attendees with timely insights on:

• Past, current and future uses of technological tools by healthcare providers

• The drivers behind technology changes with predictions on healthcare trends and initiatives that will best engage multiple generations of consumers

• Ways a healthcare organization can fully leverage technology in order to achieve their business goals

• Strategies that utilize technology to fully engage patients, providers, and staff
WHERE WE WERE
TYPICAL HOSPITAL IT COMPONENTS - 1990

Core Hospital Applications
- Accounts Payable
- Human Resources
- General Ledger
- Insurance Eligibility
- Accounts Receivable
- Quality Assurance
- Medical Records
- Materials Mgt
- ADT/Registration

Organization
- Billing
- Payroll
- Scheduling
- Email
- Medical Management
- Budget

Infrastructure
- High Speed Network
- Network Management
WHERE WE ARE
TYPICAL HOSPITAL IT COMPONENTS - 2016
## HIMSS Analytics EMR Adoption Model

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
<th>2005</th>
<th>2008</th>
<th>Q1 2011</th>
<th>Q4 2013</th>
<th>Q3 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP</td>
<td>0.0%</td>
<td>0.3%</td>
<td>1.0%</td>
<td>2.90%</td>
<td>4.20%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDSS (variance &amp; compliance), full R-PACS</td>
<td>0.0%</td>
<td>0.5%</td>
<td>3.5%</td>
<td>12.40%</td>
<td>27.1%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed loop medication administration</td>
<td>0.0%</td>
<td>2.5%</td>
<td>5.9%</td>
<td>22.00%</td>
<td>35.9%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, CDSS (clinical protocols)</td>
<td>0.8%</td>
<td>2.5%</td>
<td>10.7%</td>
<td>15.50%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
<td>1.7%</td>
<td>35.7%</td>
<td>48.4%</td>
<td>30.30%</td>
<td>16.4%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable</td>
<td>47.5%</td>
<td>31.4%</td>
<td>14.1%</td>
<td>7.60%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries - Lab, Radiology, Pharmacy</td>
<td>20.5%</td>
<td>11.5%</td>
<td>6.7%</td>
<td>3.30%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All three ancillaries not installed</td>
<td>29.4%</td>
<td>15.6%</td>
<td>9.60%</td>
<td>5.50%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Data from HIMSS Analytics™ Database © 2015

n=4000, n=5166, n=5275, n=5458, n=5454

2015 Stage 6-7 31%

2005 Stage 6-7 0%
WHY EMR MATURITY MATTERS

BEST HOSPITALS

- Select 140 top U.S. hospitals
- Categorized by size
- All rank stage 6 or 7 on HIMSS Analytics scale
- KPIs
  - Risk adjusted mortality
  - Risk adjusted complications
  - Patient safety
  - Reduced re-admissions
  - Reduced mortality
  - Reduced LOS
- Operating margin profit
- Patient satisfaction scores

BEST TECHNOLOGY

- HIMSS Analytics Stage 6 and 7
- 29% of U.S. hospitals
- Complete EMR
- Interoperability with all providers
- Data continuity with ED
- Data warehouse with advanced analytics and decision support
- Online physician documentation with structured templates
- Integration with PACS
- Technology plan
THE NEW PATIENT EXPERIENCE
EVOLUTION OF PATIENT ROOM
THE NEW INFRASTRUCTURE
EVOLUTION OF AN IT DATA CENTER
THE NEW PATIENT EXPERIENCE
BLOOD PRESSURE MONITORS
PATIENT INFORMATION
THE PATIENT HEALTH RECORD
FUTURE FOCUS - WHAT IS THE NEW NORMAL?

Continuum of Care

- Prevention
- Diagnosis
- Treatment
- Rehab
- Behavior Change
- Education
- Follow Up
- Environment
- Wellness
- Adverse Event

Settings:
- Home
- Providers
- Hospital
- School
- Long Term Acute Care
- Rehabilitation
- Specialty Care Center
- Work
# Drivers of Healthcare Technology

## Regulatory Requirements
- Payer reform driven by quality vs. quantity
- Transparency of healthcare costs
- Provider collaboration
- Preventative medicine

## New Delivery Models
- Retail health clinics
- Shift from hospital to ambulatory services

## Patient Engagement
- Social media connecting healthcare
- Patient access to their own healthcare data
- Patient education
DRIVERS OF HEALTHCARE TECHNOLOGY

Source: National Healthcare Survey, U.S. Census Bureau

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CRITICAL IT COMPONENTS TO ADDRESS DEMANDS

- More complete electronic health records
- Interoperability & integration of data
- Leveraging data analytics
- Personal / portable consumer access
- Increased IT infrastructure reliability
- IT strategic portfolio management
- IT security safeguards
- End user – customer support and education

Source: Caretech Solutions, Gartner Research, KLAS
INNOVATION BUILDING BLOCKS

Safety Innovation

• Positive patient ID – increases security
• Reduce time to access information
• Touchless facial, fingerprint technology – reduced infection
  • (Supports Ohio 2 factor identification)
• Increased accuracy
• Can work in smaller space
• Reduce infections
  • (Spine fusion robot - used at Miami Valley Hospital)
INNOVATION BUILDING BLOCKS

Quality Innovation

- Remote access to specialists
- Support when needed
- Patient convenience
- Emergency and real-time care
  - (Cleveland Clinic mobile stroke unit)
- Reduce costs & increase convenience

- Create artificial limbs
- Create complex human tissue
- Improved diagnostic capabilities
- Organ replacements
- Better quality, quicker treatment
INNOVATION BUILDING BLOCKS

Continuity Innovation

- Real-time monitoring of vital signs
- Condition specific feedback
- Ability to transmit to PHR
- Awareness and alerts
- Patient convenience
- Timely access to healthcare
- Reduce waiting
- Transparent and reduced costs

(~250 retail clinics in Ohio – 25+ telehealth)
INNOVATION BUILDING BLOCKS

Community Innovation

- Quick access to healthcare information
- Improved knowledge of consumers
- Increased involvement in patients’ own care
- Numerous resources with best practices
- Determine action for best results
- Serve a particular population
- Data to forecast and predict outcomes
- Support pro-active planning
EXPERIENCE THE FUTURE OF:

ENDOSCOPY

Traditional System

- 140 – 170 degree field of vision
- Can miss 25-40% of polyps
- Multiple camera split screen is difficult to view

Advanced Technology

- 5 camera endoscopy system
- 360 degree field of vision
- Complete view of the GI tract
- Advanced spatial awareness
- Better early detection of cancer

www.saneso.com
BUSINESS ANALYTICS MATURITY

- **Improved Decision Making**
  - degree of intelligence
- **Business Analytics Maturity Model**
  - Lucrum Analytics Maturity Model

**Key Components**

- **Standard Reports**
  - What Happened?
- **Ad-Hoc Reports**
  - How often, how many?
- **Query Drilldowns**
  - What Actions are needed?
- **Alerts**
  - Why is this happening?
- **Statistical Analysis**
  - Where exactly is the problem?
- **Forecasting**
  - What will happen next?
- **Predictive Modeling**
  - What is the best that can happen?
- **Optimization**
  - What if these trends continue?

**Benefits**

- **Improved Decision Making**
- **Improved Business Value**
- **Competitive Advantage**

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The rapid growth of global data

Data production is expanding at an astonishing pace. Experts now point to a 4300% increase in annual data generation by 2020. Drivers include the switch from analog to digital technologies and the rapid increase in data generation by individuals and corporations alike.

- Size of Total Data
- Enterprise Created Data
- Enterprise Managed Data

2012: Customers will start storing 1 EB of information.

2009: 0.79 ZB
2010: 2.37 ZB
2015: 7.9 ZB
2020: 35 ZB

What is a zettabyte?

- 1,000,000,000,000 gigabytes
- 1,000,000,000,000 terabytes
- 1,000,000,000,000 petabytes
- 1,000,000,000,000,000 exabytes
- 1,000,000,000,000,000,000 zettabytes

1 terabyte holds the equivalent of roughly 210 single-sided DVDs.

It took roughly 1 petabyte of local storage to render the 3D CGI effects in Avatar.

In 2007, the estimated information content of all human knowledge was 295 exabytes.

Data production will be 44 times greater in 2020 than it was in 2009.

More than 70% of the digital universe is generated by individuals. But enterprises have responsibility for the storage, protection and management of 80% of it.
COGNITIVE COMPUTING – IBM WATSON FOR HEALTHCARE

- Healthcare Cloud Launched by IBM in 2015 that provides a secure, open platform for physicians, researchers, insurers, employers, and patients focused on health and wellness solutions
- Recently dedicated 2000 resources to advance capabilities

HOW IT WORKS….

First Watson learns a new subject
- All related materials are loaded into Watson, such as Word documents, PDFs and web pages
- Question and answer pairs are added to train Watson on the subject
- Watson is automatically updated as new information is published

Then Watson answers a question
- Watson searches millions of documents to find thousands of possible answers
- Collects evidence and uses a scoring algorithm to rate the quality of this evidence
- Ranks all possible answers based on the score of its supporting evidence
IMAGINE A HOSPITAL WITHOUT:

1970s

1980s
CURRENT TECHNOLOGY TO CARE FOR PATIENTS
FUTURE AND EMERGING HEALTHCARE TECHNOLOGIES
ENGAGING PATIENTS & CAREGIVERS
GENERATIONAL IMPACT

Source: Smith & Jones; Healthcare Consumers, the New Reality
ENGAGING PATIENTS & CAREGIVERS
GENERATIONAL IMPACT

Source: Smith & Jones; Healthcare Consumers, the New Reality

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<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SECURITY</strong></td>
<td>Growth linked to electronic records &amp; social media</td>
</tr>
<tr>
<td></td>
<td>Healthcare identity theft worth 100X credit card information</td>
</tr>
<tr>
<td><strong>COST OF TECHNOLOGY</strong></td>
<td>Rural hospitals must meet same EHR requirements as others</td>
</tr>
<tr>
<td></td>
<td>Average capital investment per hospital: $10-70 million; $15-75K per provider</td>
</tr>
<tr>
<td><strong>WORKFLOW &amp; CULTURE</strong></td>
<td>Process change linked to automation is lagging</td>
</tr>
<tr>
<td></td>
<td>Complex technology difficult to implement and learn</td>
</tr>
<tr>
<td><strong>PATIENT BEHAVIOR</strong></td>
<td>Caregivers have limited control on patient behavior</td>
</tr>
<tr>
<td></td>
<td>Increasing unhealthy lifestyle trends of the population</td>
</tr>
<tr>
<td><strong>LOSS OF PERSONALIZATION</strong></td>
<td>Clarity of follow up – may be misunderstood without face to face interaction</td>
</tr>
<tr>
<td></td>
<td>Regulations reduce time caregiver has with patient</td>
</tr>
</tbody>
</table>
"...for the first time, criminal attacks are the number-one cause of healthcare data breaches."

Criminal attacks on healthcare organizations are up 125% compared to 5 years ago. In fact, 45% of healthcare organizations say the root cause of the data breach was a criminal attack, and 12% say it was due to a malicious insider.
## IT TRANSFORMATION

<table>
<thead>
<tr>
<th>Traditional Model</th>
<th>Innovative Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
<td><strong>Infrastructure</strong></td>
</tr>
<tr>
<td>Reactive</td>
<td>Pro-active monitoring</td>
</tr>
<tr>
<td>Limited Availability</td>
<td>24 x 7 Support</td>
</tr>
<tr>
<td><strong>Governance</strong></td>
<td><strong>Governance</strong></td>
</tr>
<tr>
<td>No IT Strategy</td>
<td>IT Linked to Hospital Goals</td>
</tr>
<tr>
<td>Unclear Committee Charters</td>
<td>Define – Measurable Objectives</td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td><strong>Culture</strong></td>
</tr>
<tr>
<td>Hospital Centric</td>
<td>Patient Centric</td>
</tr>
<tr>
<td>Inadequate Information</td>
<td>Information Excellence</td>
</tr>
<tr>
<td><strong>Staffing</strong></td>
<td><strong>Staffing</strong></td>
</tr>
<tr>
<td>Lack Skills and Experience</td>
<td>Expertise When Needed</td>
</tr>
<tr>
<td>No Accountability</td>
<td>Service Levels for Performance</td>
</tr>
<tr>
<td><strong>Applications</strong></td>
<td><strong>Applications</strong></td>
</tr>
<tr>
<td>Financial Based</td>
<td>Full EMR</td>
</tr>
<tr>
<td>Departmental Silos</td>
<td>Community Based Integration</td>
</tr>
<tr>
<td><strong>Processes</strong></td>
<td><strong>Processes</strong></td>
</tr>
<tr>
<td>Redundant</td>
<td>Optimized for Technology</td>
</tr>
<tr>
<td>Not Linked to Technology</td>
<td>Process Improvement</td>
</tr>
</tbody>
</table>

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CONNECTING A HEALTHY FUTURE
TOP 10 HEALTHCARE IT TRENDS FOR 2016

1. PHI Security
2. ICD-10 Compliance
3. HIE / Interoperability
4. Clinical Decision Support Capabilities
5. Patient Portals
6. EHR Adoption (MU)
7. Population Health Management
8. Secure / Unified Messaging
9. Mobile Computing
10. Revenue Cycle Management Automation
Any Questions?