The Internet of Everything and Healthcare

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June 26, 2014

TORONTO 2015
Pan Am/Parapan Am

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Internet of Everything

The Only Constant is Change

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Internet of Everything
Stats & Facts

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Today's Students Are Preparing for

Jobs That Don't Yet Exist

Source: Forbes

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1000 Internet Devices in 1984

50,000,000,000 in 2020

Source: Telefonica I&D 2011

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2012 created more information than the past 5000 years combined

Source: Telefonica I&D 2011

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Amount of new technical information

doubles every 2 years

Source: from Did You Know by Fisch, McLood and Brenman

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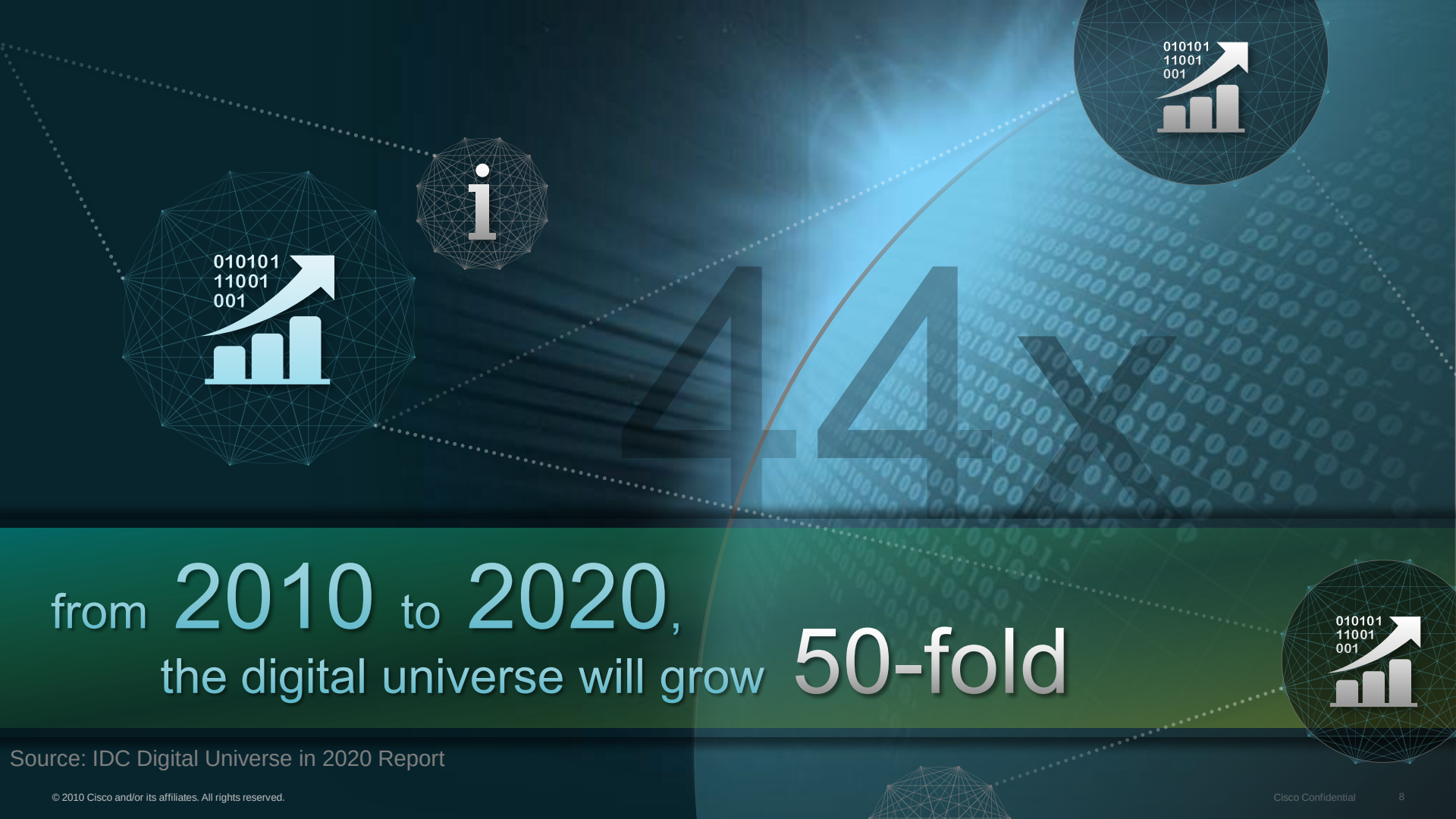

Source: IDC Digital Universe in 2020 Report

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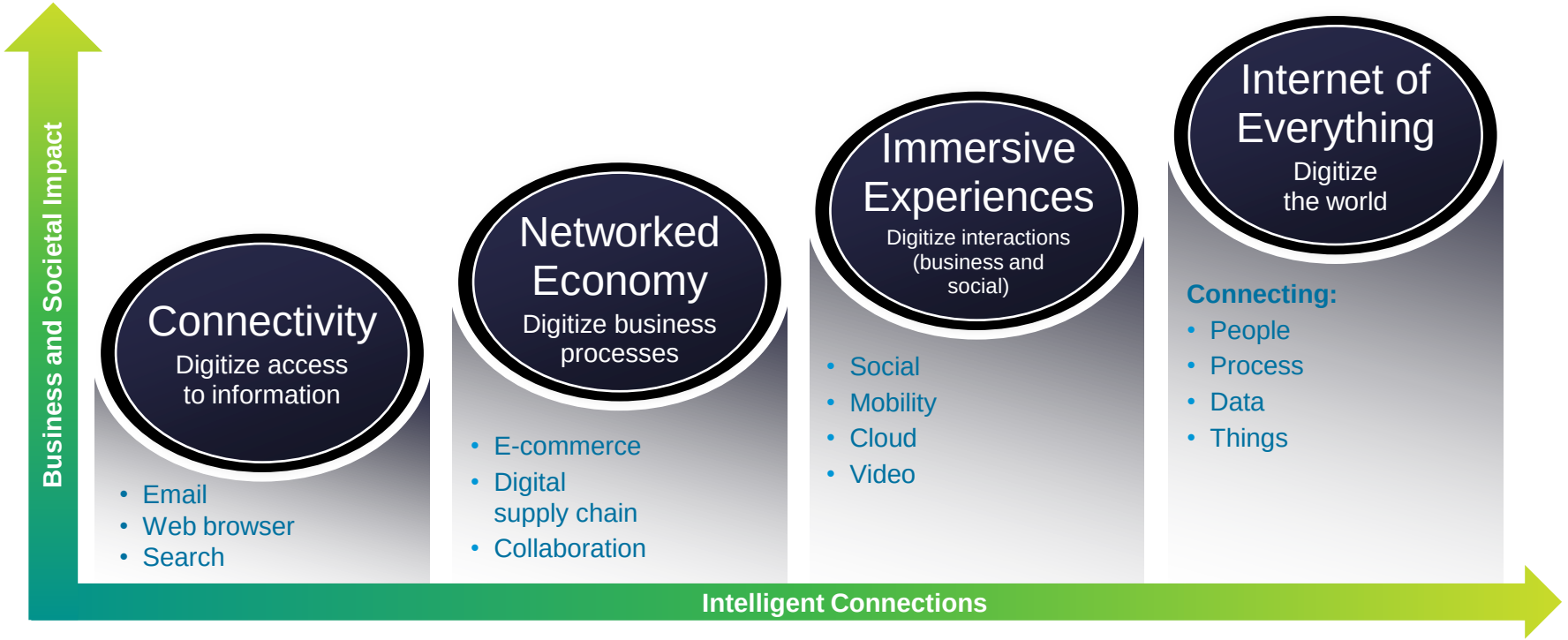
The Internet Continues To Evolve



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We're Moving from the 'Era of the Internet' to the Internet of Everything

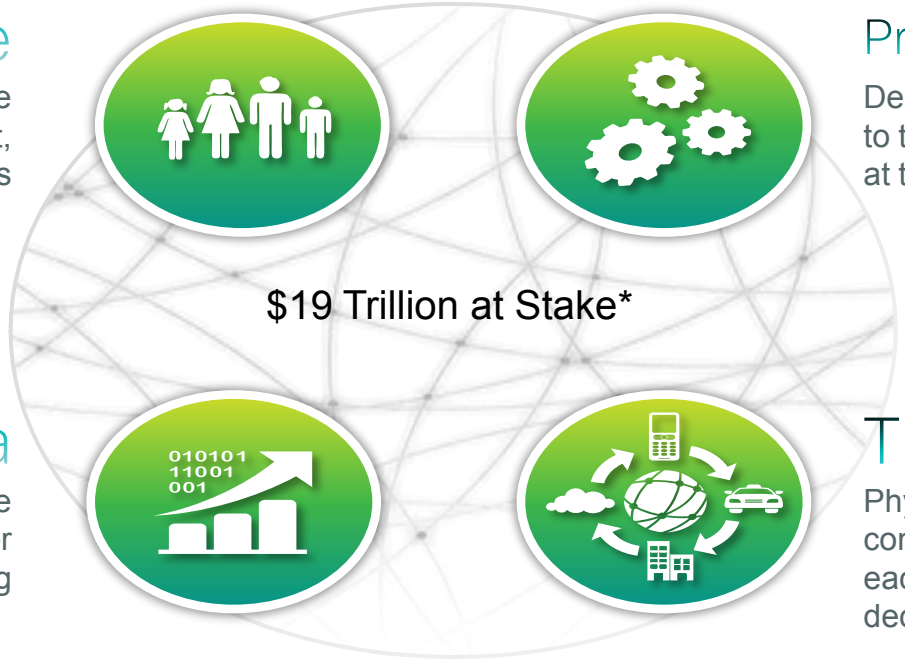
Networked Connections of People, Process, Data, Things

People

Connecting people in more relevant, valuable ways

Process

Delivering the right information to the right person (or machine) at the right time



Data

Turning data into more useful information for decision making

Things

Physical devices and objects connected to the Internet and each other for intelligent decision making

*Estimate is based on bottom-up analysis of 61 use cases, including 21 for private sector and 40 in public sector, 2013-2022

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IoE Real World Applications

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IoE Applications

Predictive Maintenance

Energy Saving Smart Grid

Intelligent Buildings

Enable New Knowledge

Improve Food /Water supply & quality

Smart City Smart Home

High-Confidence Transport & Asset Tracking

Improve Efficiency & Productivity

Enhanced Safety & Security

Healthcare E-health

Utilities: BC Hydro uses Smart Metering to Increase Grid Efficiency

First live production IPv6 Internet of Things on the Grid in the world. The Multi Service Grid network sets the stage for advanced grid applications, better control and monitoring and significant cost savings.

People » Machine » People

New smart meters are installed along with meter communications network and automated data collection system

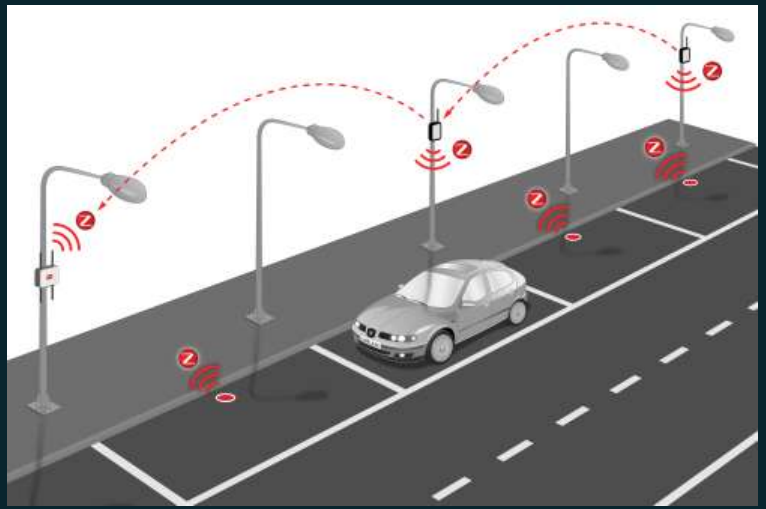
New distribution grid meters are installed, with analytics software to identify electricity loss through theft and diversion

Introduce in-home devices and launch new conservation website for customers

Enable an intelligent, self-healing grid that can accommodate two-way flow of electricity

Innovation through Mobility and Presence

Real-Time Parking Information For Residents & Visitors



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Insurance: Usage-Based Insurance Monitors Driving for Promise of Lower Rates

Desjardin, Allstate, Esurance, Progressive, State Farm, offer customers insurance rates based on driving behavior

Machine › Machine › People

People may drive safer when monitored and with incentive for lower cost insurance

New pricing processes developed to adjust and bill behavioral rates

Time, speed, acceleration, and braking data analyzed to determine rate

In-car sensors gather and process information to determine driving behaviors

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Smart Farming: Connected Bees

Scientists in Tasmania attach 2.5mm sensors to honey bees to advance knowledge of colony collapse disorder that is decimating global bee populations

Bees ➤ Machine ➤ People

Colony collapse disorder threatens Global bee populations critical to key fruit crops

Sensors glued to backs of bees track flight patterns of honey bees

Tracking data will enable deeper understanding into workings of bee colonies

Advance our understanding to work to avoid further impact to fruit orchards reliant on bees

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Smart Farming: Connected Cows

SAIT's Applied Research and Innovation Services is field testing a unique project designed to track livestock with UHF RFID tags.

Cows ➤ Machine ➤ People

Deployed at several feed lots and ranches, tags track cattle more efficiently with less stress to animals

Tags track date, time, breed and the GPS location

Tracking enables more effective herd management, health and location monitoring

Enable an industry-wide data base of stock including location, health history, producer and processor traceability

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Cisco’s Role in Transforming Canada

IoE: Healthcare Opportunities

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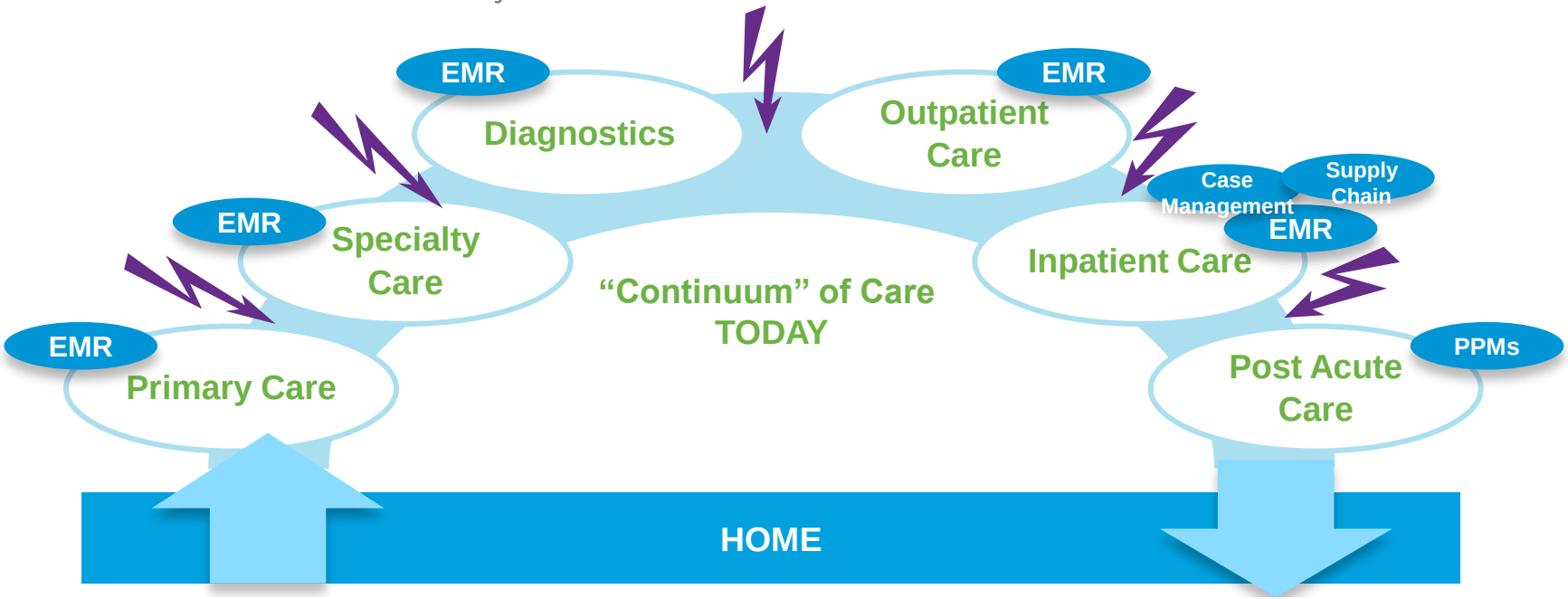
Based on an Architectural Approach

Where Are We In Healthcare Today?

Current State of the Industry



- Navigating from "silo" to "silo" is difficult
- Information is compartmentalized because "systems" are
- Continuity relies on patient compliance and doctor/office staff vigilance

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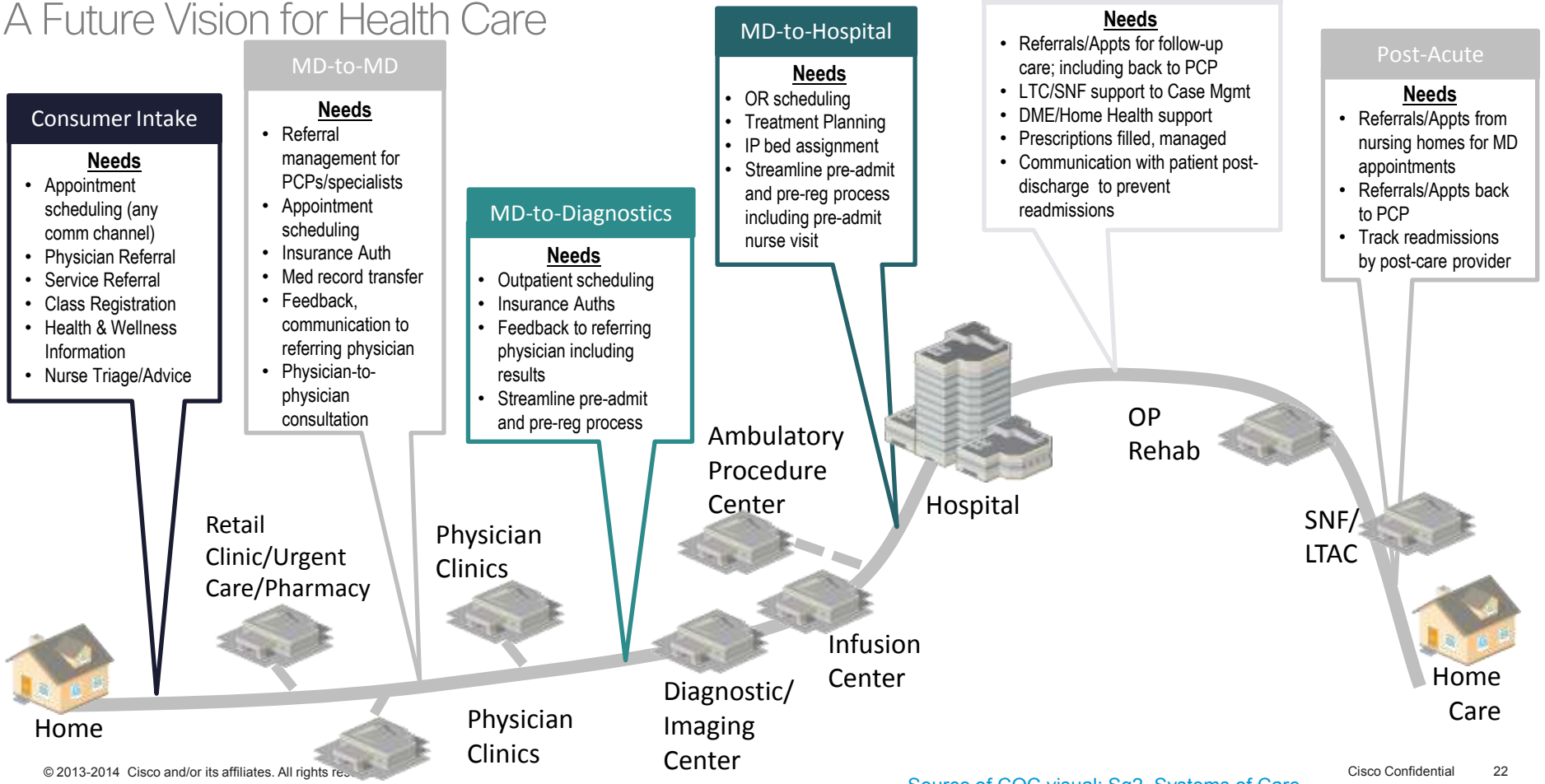
Where Do We Want To Be?

A Future Vision for Health Care



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Source of COC visual: Sg2, Systems of Care

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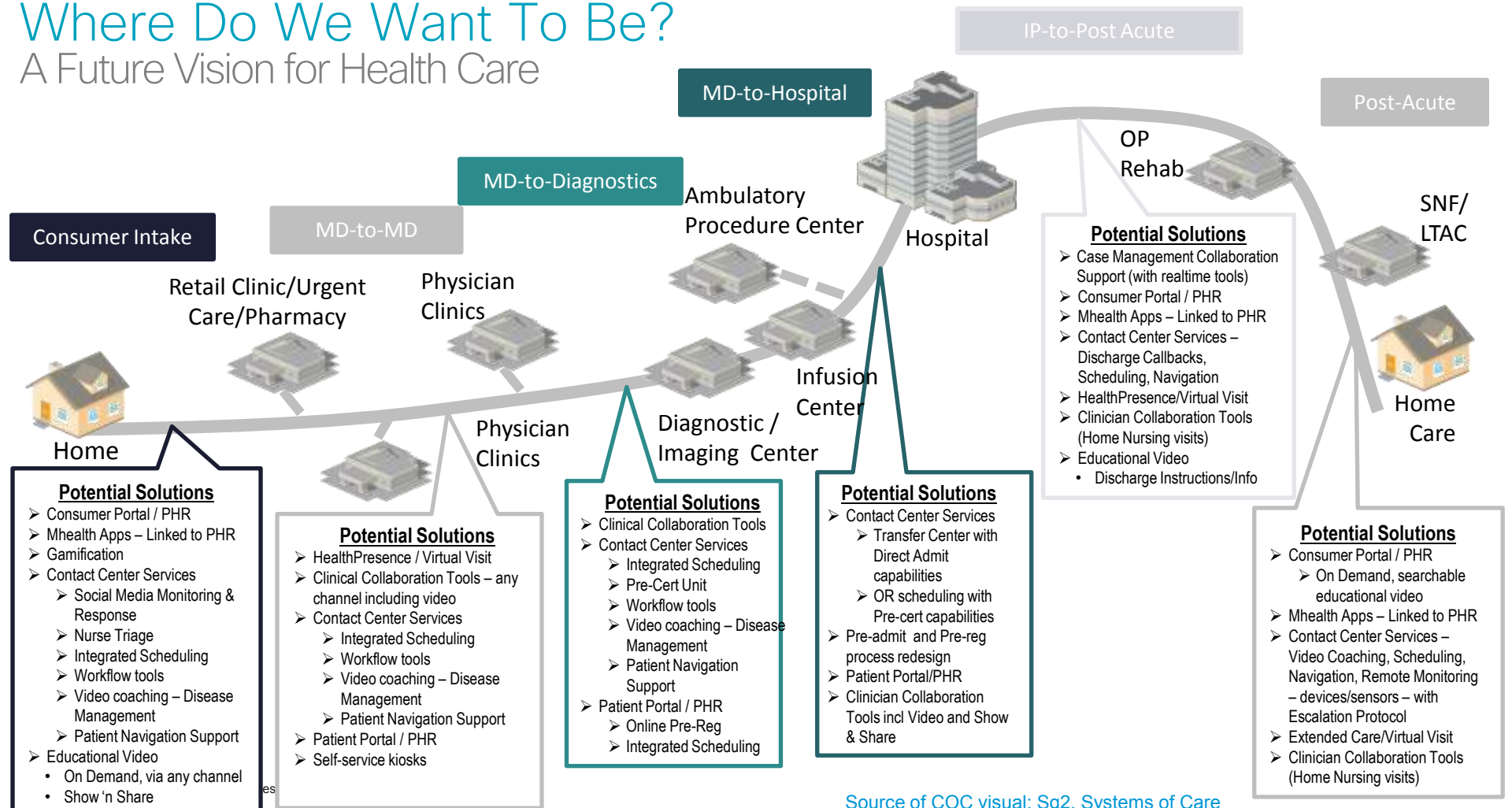

Source of COC visual: Sg2, Systems of Care

New and Better Connections for Healthcare

Connections

M2M

- Medications
- Equipment
- Consumables
- Health databases
- Patient statistics
- Computer vision
- RFID

M2P

- Patient reports
- Bluetooth Low Energy beacons
- Wearable monitors
- Home health monitoring
- Virtual Reality
- Augmented Reality
- Patient Education
- Patient portals

P2P

- Immersive streaming video
- Doctor collaboration tools
- Mobility chat clients
- Contact center services

Impacts

Accurate Medication Dispensing

Hospital Procurement & Supply Chain

Automatic Patient Location Tracking

Authenticated Medications

Better Treatment Protocol

Efficient Admissions & Correct Discharge

Accurate, Immersive Surgery Simulations

Patient Awareness

On-Demand Hospital Staff

Collaborative Surgeries

Native Language Interaction

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Healthcare: Proteus Pill – No More Skipping Our Medicine

FDA-approved ingestible sand-sized chip integrated into pills uses body fluids to activate and send signal to smartphone alerting doctors that medicine has been taken

Machine → People

- People ingest pills that send alerts to doctors
- Doctors change processes to communicate with patients about medicine intake
- Signal from chip sent to patch, then to smartphone; doctors email patients with feedback
- Sand-sized chip powered by body fluids produces voltage read by wireless skin patch

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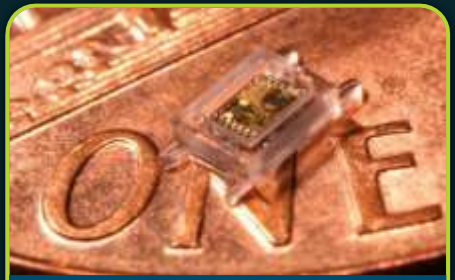
Devices You Can Hardly See….Smart Dust



Computer (1x1x1mm)

- Ultra low-power processor
- Pressure sensor
- Memory
- Thin-film battery
- Solar cell
- Wireless radio with antenna

Camera (1x1x1mm)

- Size of a grain of salt
- 250x250 resolution
- Disposable
- Medical and security applications

MEMS sensor (0.05 x 005 mm)

- MEMS: Micro-electro-mechanical systems
- Represents 4th generation sensor

Sources: Cisco IBSG; University of Michigan; Fraunhofer,; Wikipedia

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"Electronics are boxy and rigid, humans are curvy and soft. That's a mechanical mismatch problem."

Regina Dugan – Motorola/Google

New Internet Inhabitants….Wearables

"Wearables could provide the backbone for the next evolution of big data analytics from unstructured data (that isn't packaged neatly into databases) to uncaptured data (that isn't collected at all)"
Source: Credit Suisse

Pebble + Glass + iWatch + Gear + FitBit + Fuelband = 64M units shipped by 2017

"Sales of wearable technology jumped almost 300 percent in 2012 as we bought 8.3 million"
Source: Venturebeat

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Mobility Changes Everything! We want access…

any time, in any location, and on any device

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Cisco Mobile Concierge: Prescription Ready Notification with Personalized Promotions

In-Store Concierge

Mobile Concierge Applets

- Find item
- Customer Service (VoWLAN)
- Come Help Me! (location-based – Phase 3)
- Shopping List
- Price/Inventory Check
- Pharmacy
- Recipes (video clips)
- My Promos (coupons)
- Shopping Buddies (IM)
- POS and Home delivery

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Sheridan College Deploys Visual Wait Times App

Tech and arts grads combine to create mobile app that shows real-time queues to improve service levels

Machine → People

People want to know expected wait times

Analytics in Video Surveillance auto detect number of people in queue

Privacy protected through use of hand drawn graphics

Increased visibility and choice leads to improved customer satisfaction

Interactive Patient & Guest Experience

Lobby Systems

Kiosks and Signage at Entry and Public Areas

Waiting Rooms and Exam Rooms

Information, health education, and collaboration

Patient Room

Entertainment, education, collaboration, and interaction

Mobile Guides

Personalized information delivered to devices

Internet

Patient Portal

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Be Challenged: Rethinking Care Rooms with IoE

Patient

- Receive and view Wellness Education
- Receive Medication Consultation and Education on-screen
- View Live TV
- View Care Team Information
- Control the room environment
- Remote Video Consultations
- View Personal Health Records
- Visit with Family through video
- Simplify Discharge Process

Clinician

- Conduct Remote Consultations
- Discuss Personal Health Records
- Observe Patient Remotely
- Prescribe Wellness Education
- Monitor the room environmental
- Deliver Remote Rounds
- Deliver Strong Transitions of Care
- Consult on Medication Reconciliation
- Provide on-going discharge assistance

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Healthcare: Centralized Virtual Patient Monitoring

Clear Lake Regional Medical Use of IP video surveillance to improve care in high risk patients

People › Machine › People

- Patient sitters traditionally deployed room-side to monitor at-risk patients
- Deploy IP video surveillance nurses monitor up to 17 patients at a time.
- Ability to monitor 925 additional patients, Video analytics can provide further enhancements
- Operational savings and improved patient care

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Connected Healthcare / Patient Monitoring: $106B of Value at Stake

Continuous monitoring of health conditions in a less, expensive home setting; all care aspects consolidated and coordinated

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Cisco Extended Care: Patient Engagement

Access, Interaction, Education

Access to Care Team
Live Video Interactions

Personal Wellness
Trends, Ratings

Context Specific Patient Education

Messaging with Patients (Reminders, Alerts, Informational Material)

- Anywhere Access
- One click Connect
- Secure Messaging
- Patient Empowerment
- Educational Video Library
- Weighted Questionnaires

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Healthcare: Video Collaboration Transforms Healthcare in Northern BC

Cisco solution helps Vancouver-based physician treat patients in Takla Landing over satellite broadband.

People › Machine › People

- High-quality video collaboration solution that connects clinicians and patients in the remote community
- Diagnostic peripheral devices were added to send real-time information about a patient's condition to a Doctor
- Used for a broad spectrum of cases, including regular check-up appointments, follow-ups, and education
- Pilot program helped reduce travel and improve patient outcomes

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Virtual Visit / Telehealth – Look out for Pervasive Video

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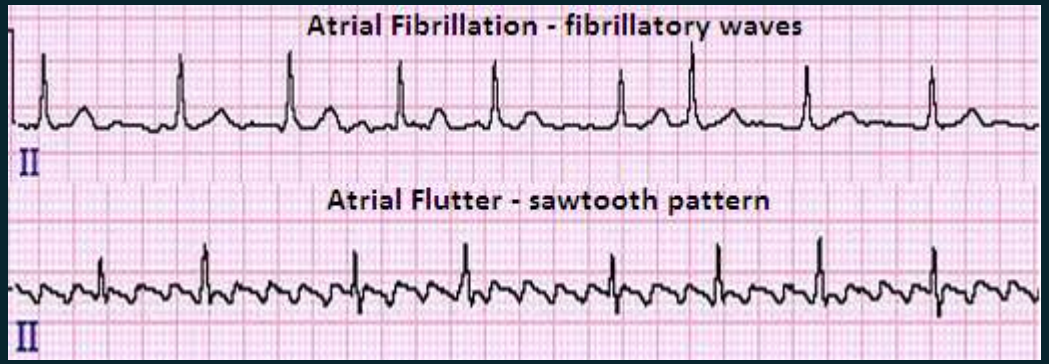
Connected North

TRANSFORMING LIVES THROUGH TECHNOLOGY

Connected North is a ground-breaking virtual program that uses Cisco's internet networking and collaboration solutions to enhance education in remote, underserved communities across Canada's north.

Tele-psychiatry….

But Sometimes We Need to Live on the Edge



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99% of the world is not connected: Amazing things can happen when you connect the unconnected

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What Will it Take?

Creation of a New Industry

Visionary Leadership

Global Open Standards

Smart Regulation

Public Private Partnerships

New Ecosystem

collaboration

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The Internet of Everything

Are you Ready?

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