



Digital Transformation

The Internet of Things in Healthcare

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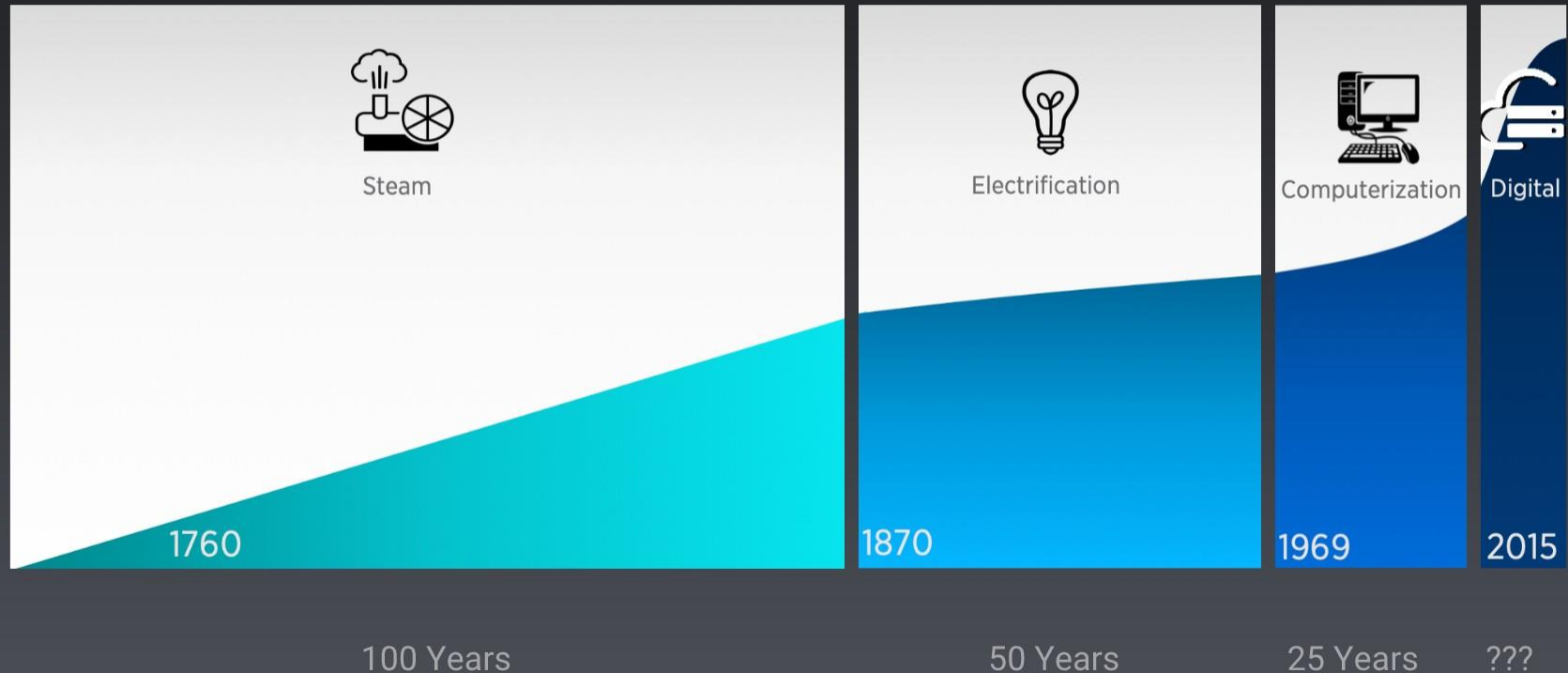
Austin has over 25 years of experience in Information Technology, holding roles in operations, engineering, architecture and consulting. Austin leads Enterprise Transformations for clients in RoundTower's North region spanning KY to NYC

Digital Transformation

A **FUNDAMENTAL** SHIFT
IN THE WAY
COMPANIES DELIVER VALUE
TO THEIR CUSTOMERS

Why Digital? Why Now?

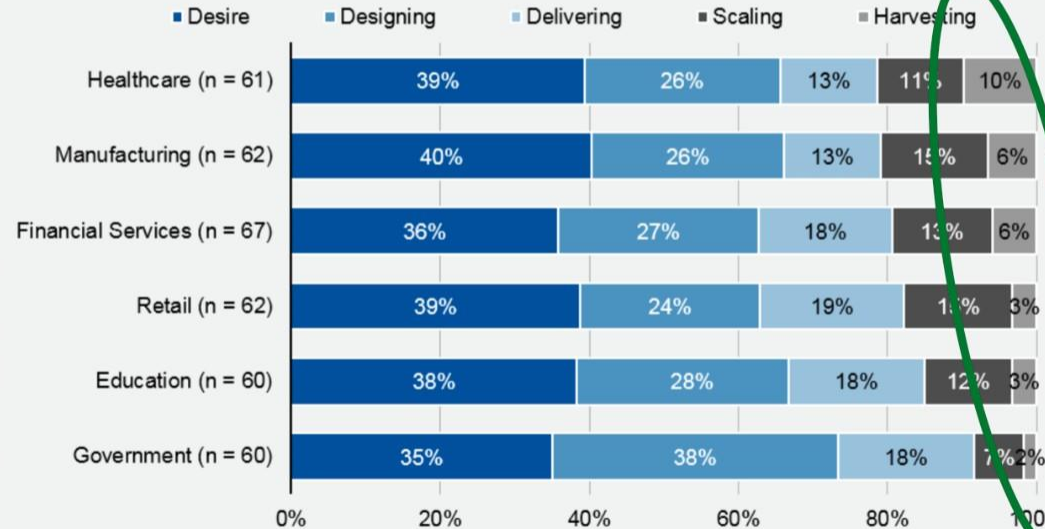
Why Speed and Agility Matter



Who's Transforming? Are We Behind?

Digital Initiative — Progress by Industry

Percentage of Respondents



Base: All respondents, n = 372

Which statement best describes where your organization is on its digital business journey?

ID: 351102

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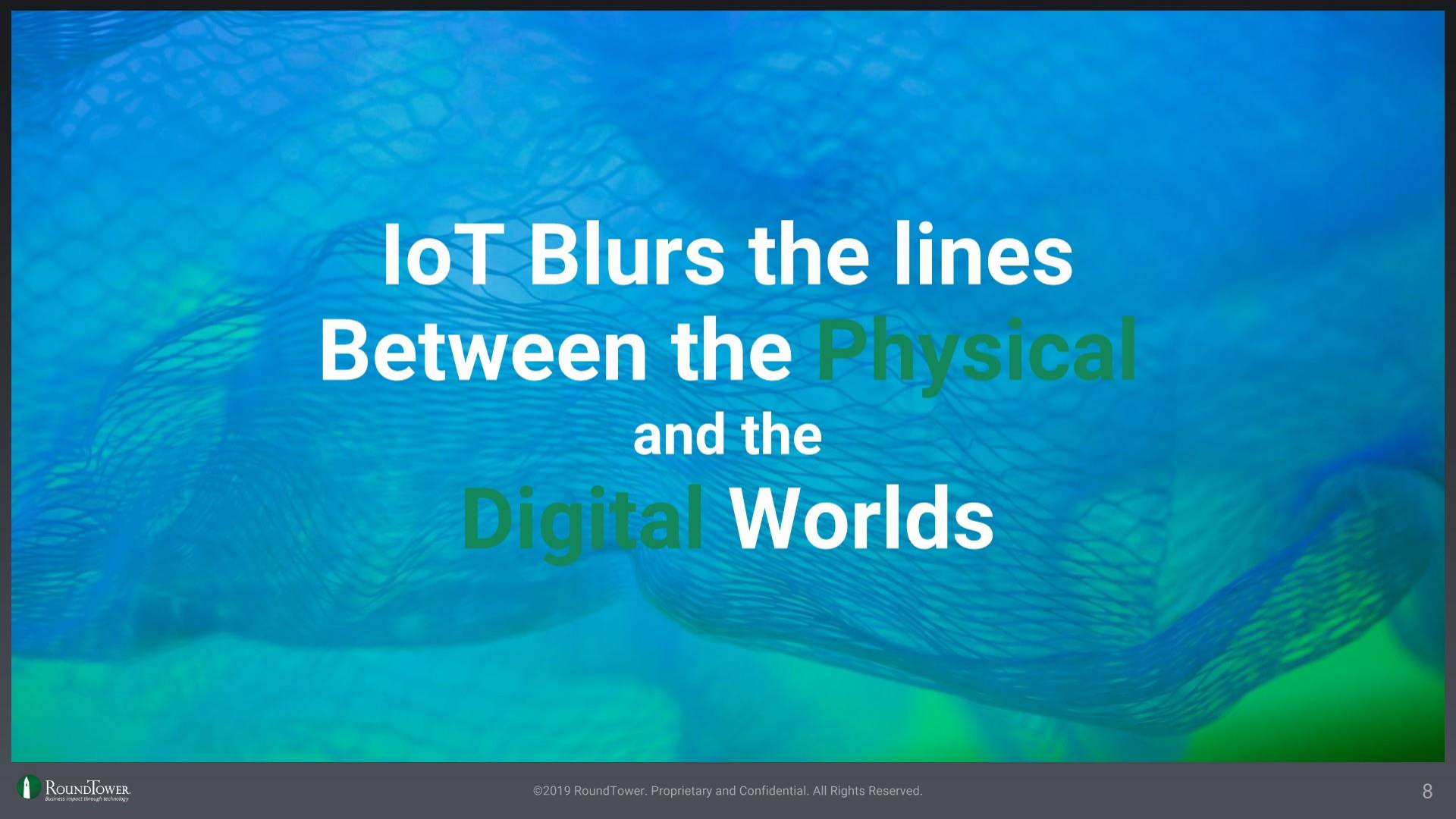
What's Driving Transformation in Healthcare?



What is the Internet of Things (IoT)?



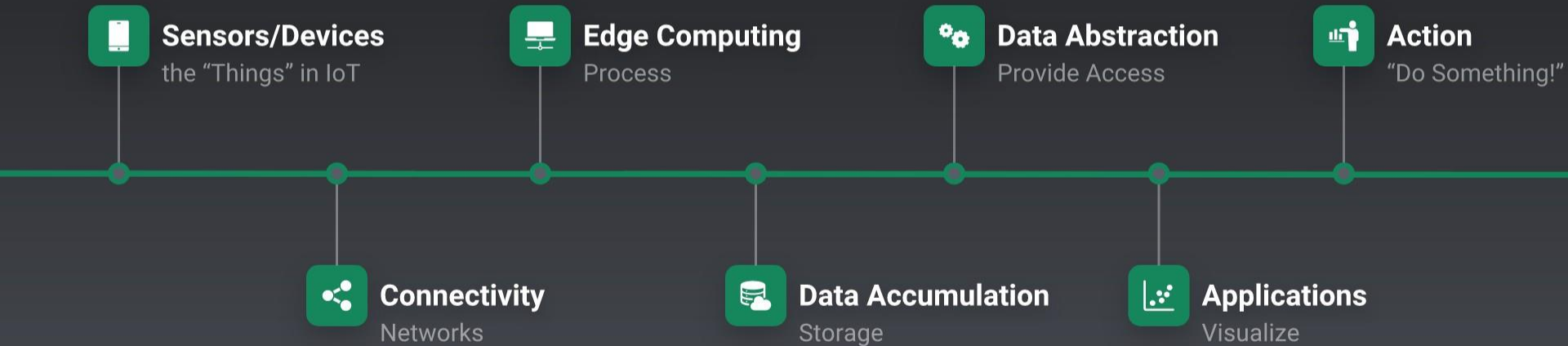
The interconnection of computing devices embedded in **everyday** objects, enabling them to send and receive data.



IoT Blurs the lines Between the **Physical** and the **Digital** Worlds

IoT Conceptual Data Flow

Data Flows from Left to Right



What can be done with IoT?



- The value in IoT is achieved through **analytics and applications**. Sensors receive data from the outside world (i.e. temperature, GPS, motion, video) and send that to a central aggregator (storage). At this point, it's just a bucket of data...
- Using applications, What can be done with this data?
 - Turn on lights when someone enters a room
 - Adjust the temperature when no one is at home
 - Find the closest stretcher to an Operating Room based on location
 - Alert security to an unidentified person in a restricted area

Real World Examples

Retail Example: Kroger

Technology to improve Customer Experience and Reduce Costs



Shelf Edge

Scan-Bag-Go

F.A.S.T.

Life Sciences Example: Merck

Partnered with Amazon for the “Alexa Diabetes Challenge”



Scale with Optical Foot Scanner

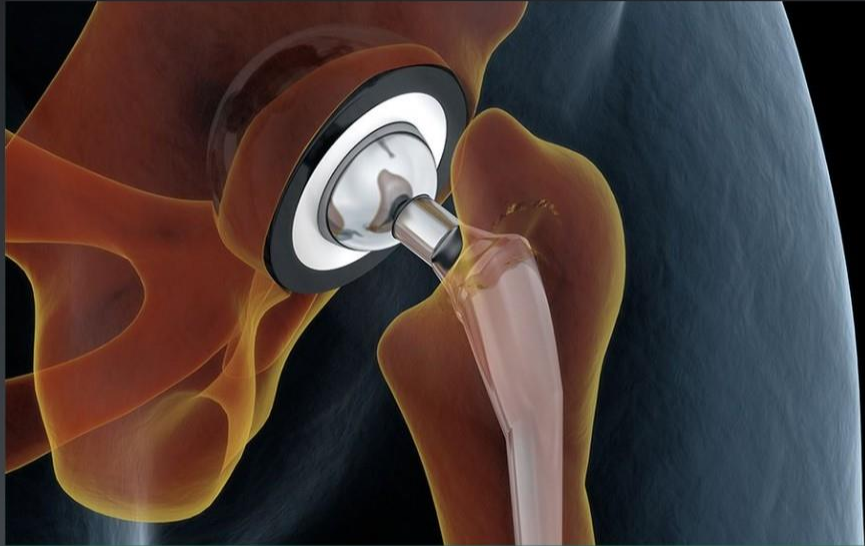


Alexa Voice Integration

<http://www.alexadiabeteschallenge.com/winner-sugarpod-wellpepper/>

Life Sciences Example: Hip Replacement

The IoT-enabled Medical Drill



Bone necrosis is the leading cause of hip replacement complications



Adding IoT and real-time analytics and feedback reduces the likelihood of necrosis

Thank You





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The Internet of Things

A Use Case for Maple Knoll Village

Maple Knoll Communities, Inc.



Andy Craig, MS

VP of Technical Operations

Andy has over 20 years of experience in technology leadership roles. Prior to his entry into healthcare & senior living in 2007, he held technology leadership roles at Fortune 500 companies in the industries of banking, finance, and insurance. A native Cincinnati, he is a Carl H. Lindner Honors-PLUS Scholar and sits on advisory boards for Fortinet, a Fortune 100 Fastest Growing Company, and The University of Cincinnati, a R1 research university.



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Who We Are

Maple Knoll Communities is a non-profit senior care provider impacting the lives of over 3,500 older adults throughout the Greater Cincinnati area and over 30,000 WMKV listeners worldwide.

We have a 170 year history of providing a continuum of services to support seniors in varying levels of care.

We remain dedicated to helping each person achieve, with dignity, the proper balance between independence and assistance.





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VILLAGE

theknolls
OF OXFORD



wmkv
89.3 FM

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OUTREACH SERVICES
FOR SENIORS

mt.view
TERRACE

corblytrace

themeadows

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CHILD CENTER

manorhouse
RESTAURANT

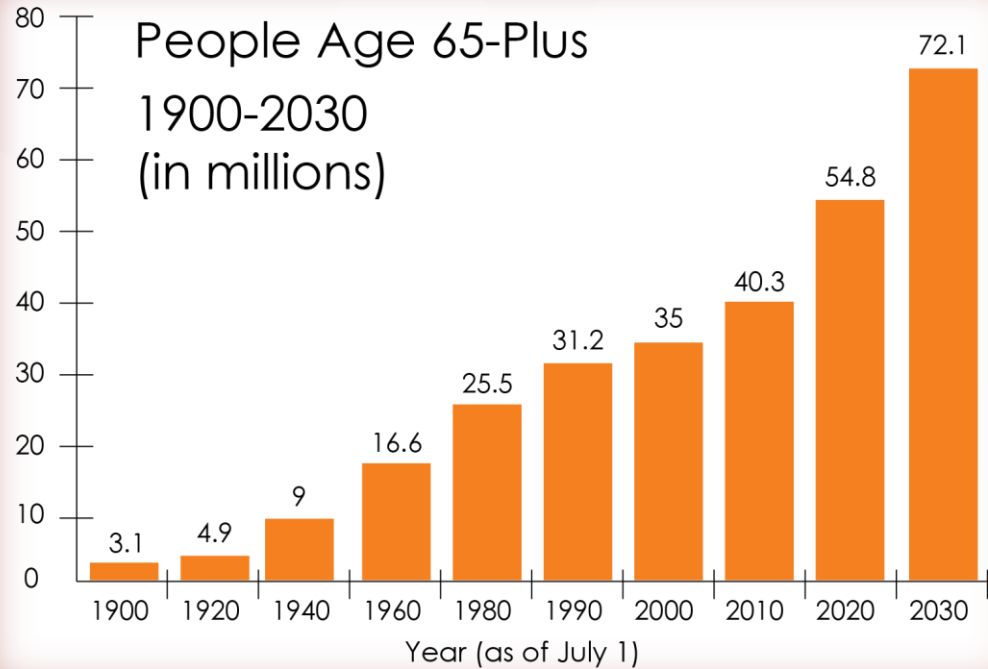
thehemsworth
WELLNESS CENTER

Maple Knoll Village

- Nearly 1,000 older adults reside on our Springdale campus in Independent Living, Assisted Living, and Skilled Nursing
 - 54 acre campus in Springdale
 - 142 Villas
 - 135 Apartments
 - 63 Assisted Living Apartments
 - 145-Bed Skilled Nursing facility and Rehabilitation Center
 - Sprawling gardens and beautiful landscape unmatched in the area
 - Maple Knoll holds a 5-Star rating of quality indicators
 - Our outreach programs and services also continue to serve older adults in the community

The Silver Tsunami

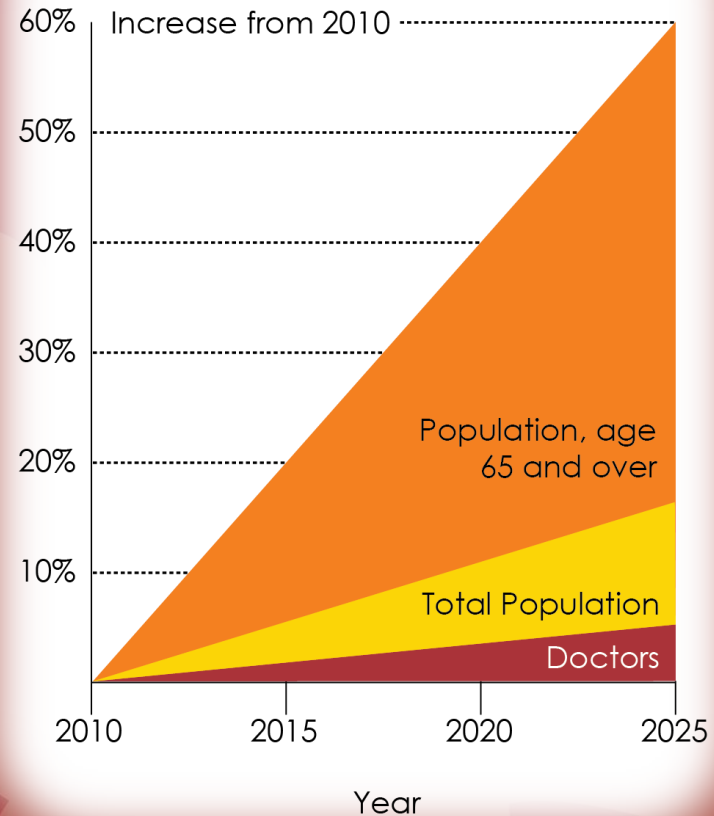
- There are roughly 75 million baby boomers soon to be reaching retirement age
- Over the next two decades 10,000 people per day will turn age 65



Population of Physicians

- The United States will face a shortage of between 40,800 and 104,900 physicians by 2030, according to a new study commissioned by the American Association of Medical Colleges.
- Released March 14, 2017, the study found that the number of new primary care physicians and other medical specialists are not keeping pace with demands of growing and aging population.

Projected growth in population vs. doctors

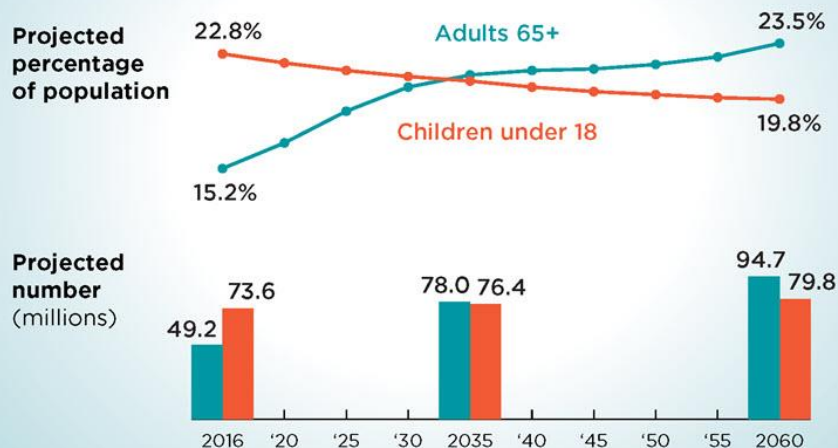




An Aging Nation

Projected Number of Children
and Older Adults

For the First Time in U.S. History Older Adults Are
Projected to Outnumber Children by 2035



Note: 2016 data are estimates not projections.

United States™
Census
Bureau

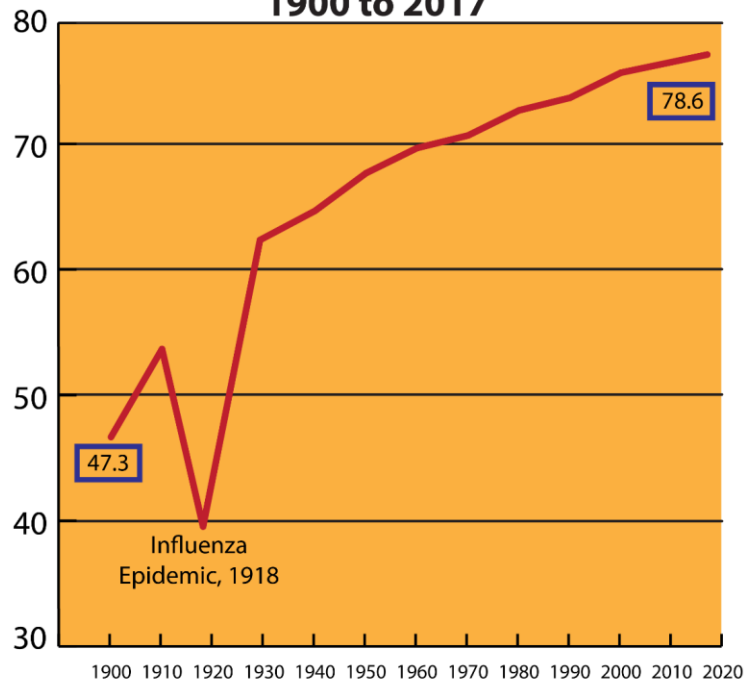
U.S. Department of Commerce
Economics and Statistics Administration
U.S. CENSUS BUREAU
[census.gov](https://www.census.gov)

Source: National Population
Projections, 2017
www.census.gov/programs-surveys/popproj.html

- As the population ages, the ratio of older adults to working-age adults, also known as the old-age dependency ratio, is projected to rise.
- 2020: 3.5 working-age adults per senior citizen
- 2060: 2.5 working-age adults per senior citizen
- 2030:
 - All baby boomers will be older than 65
 - 20% of the population will be of retirement age
 - Transformative decade:
 - Slower overall population growth
 - Population will age considerably
 - Population will become more racially and ethnically diverse
- “The aging of baby boomers means that within just a couple decades, older people are projected to outnumber children for the first time in U.S. history,” - Jonathan Vespa, a demographer with the U.S. Census Bureau.

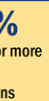
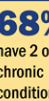
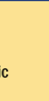
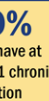
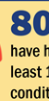
The Healthcare Gap

**U.S. Life Expectancy at Birth
1900 to 2017**

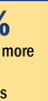
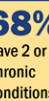


10 Common Chronic Conditions for Adults 65+

Quick Facts



80%
have at least 1 chronic condition



68%
have 2 or more chronic conditions



Hypertension
(High Blood Pressure)
58%



High Cholesterol
47%



Arthritis
31%



Ischemic Heart Disease
(or Coronary Heart Disease)
29%



Diabetes
27%



Chronic Kidney Disease
18%



Heart Failure
14%



Depression
14%



Alzheimer's Disease and Dementia
11%



Chronic Obstructive Pulmonary Disease
11%

Source: Centers for Medicare & Medicaid Services, Chronic Conditions Prevalence State/County Table: All Fee-for-Service Beneficiaries, 2015



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Current State at MKV

- Last decades spent investing in core infrastructure
- Focus on enterprise Wi-Fi to blanket coverage indoors and outside
- Wi-Fi sensors implemented
 - Pendants with location tracking (nearest AP)
 - Motion sensors in IL for daily well being check
 - Other sensors based on needs:
 - Door sensors (entry & refrigerator)
 - Toilet sensors
- Current sensors use their own proprietary reporting platform
- No integration with EMR or other systems

Our Future State





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IoT to Reduce Hospitalizations

“The older you are, the worse the hospital is for you. A lot of the stuff we do in medicine does more harm than good. And sometimes with the care of older people, less is more.”

-Ken Covinsky,

a physician and researcher at the University of California, San Francisco division of geriatrics.

- Older patients become weaker from a hospital stay and are less able to resume daily routines.
- Older patients leave the hospital with a greater level of disability:
 - One Third of those are 70+
 - Half of those are 85+
- Patients return home unable to care for themselves.
 - Helplessness has a profound psychological effect.
 - Needing help with ADLs is a psychological hurdle for seniors.

IoT: Activities of Daily Living



Eating



Bathing



Dressing



Transferring



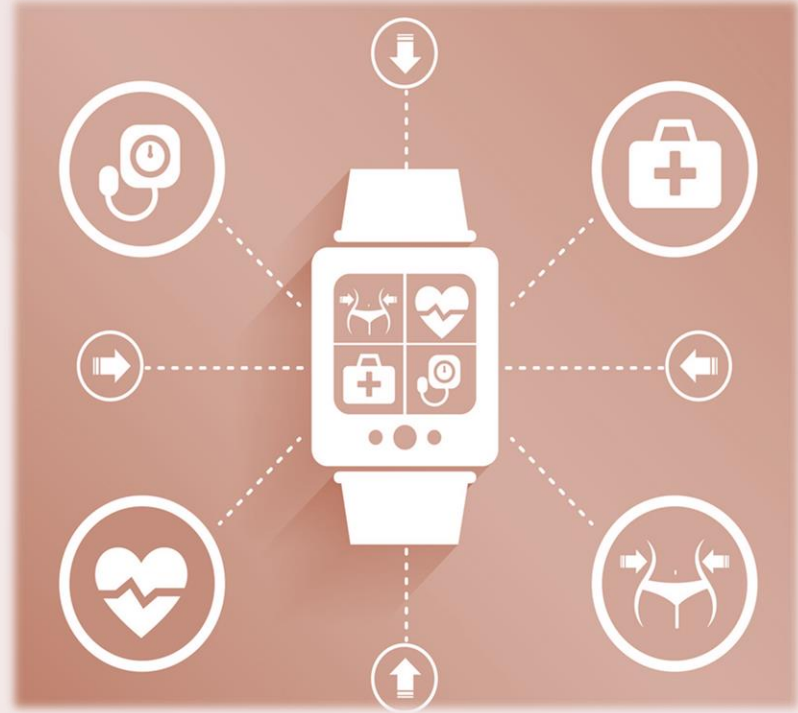
Toileting



Walking or
moving around

IoT: Health & Well Being

- Fall prevention & detection
- Medication reminders
- Vitals
- Blood pressure
- Glucose levels
- Pulse
- Weight
- Cognition
- Wandering



IoT: Automation & AI

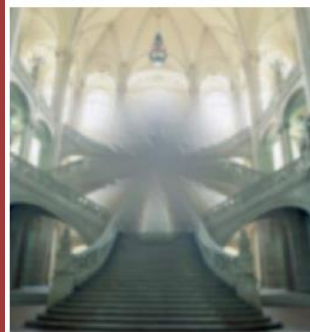
- Smart lighting
- Smart appliances
- Smart controls
- Artificial intelligence
- Fire & security



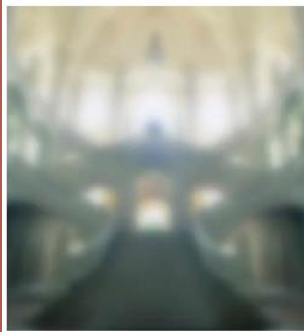
Smart Lighting

As we age, our vision can decline from impairments such as macular degeneration, cataracts, and glaucoma

Research estimates that as much as 40 percent of senior living falls occur in the evening or at night when there is a lack of light



Macular degeneration



Cataracts

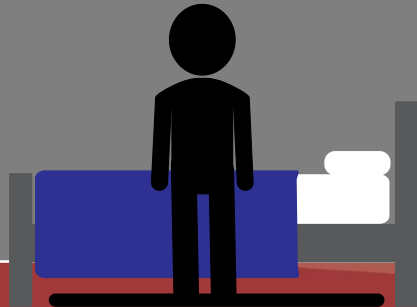
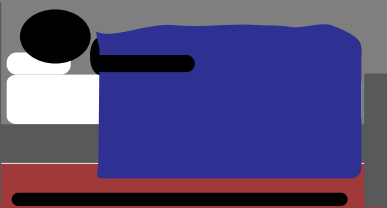


Glaucoma

Smart Lighting

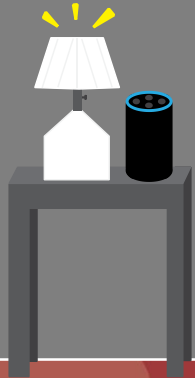
Proper illumination can prevent falls resulting in serious injuries

Sensors allow lights to be turned on as soon as a resident gets out of bed, reducing the risk of a fall and putting the resident at ease



Amazon Alexa can power on and off lights with just a voice

Alexa,
Turn on the
bedroom light



Calling For Help

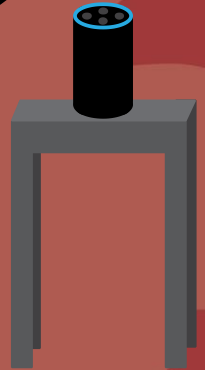
Amazon Alexa provides more options when calling for help

Residents will be able to rely less on their emergency pendant and telephone, and will be able to use their voice to call for help

Alexa,
call
Security!

OK,
Calling
Security

This will result in faster response time and potentially less serious injuries

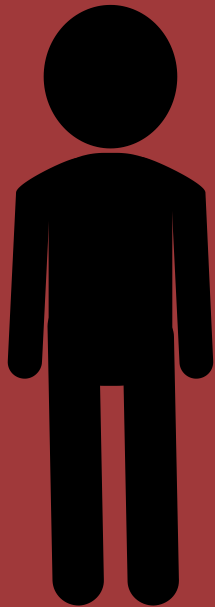


Medication Reminders



As we age, more medications may be needed to keep us healthy

Amazon Alexa can have Skills set to remind residents to take their medications



Here's a reminder,
take your blood pressure
medication

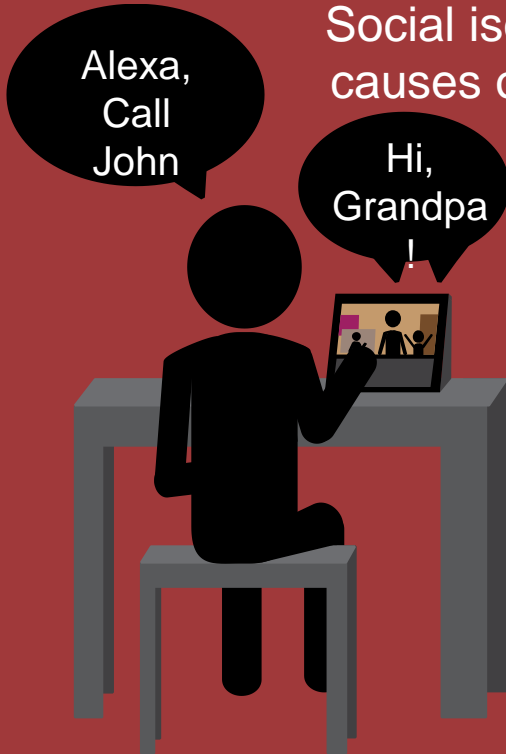
Skills are applications that give
Alexa more abilities

This lowers the risk of serious
consequences resulting from forgetting
to take medications

Social Interactions

Depression affects about 6 million Americans ages 65 and older

Social isolation and a lack of a supportive social network are a couple causes of depression in seniors. Those who are socially isolated are more likely to be pessimistic about their future, have a higher risk of long-term illnesses and are more likely to need long-term care



Devices such as Amazon Echo Show, allow residents to see their friends and family without needing to leave the comfort of their home

Phone calls can also be made by asking Alexa to call your family and friends

Desired Outcomes

- Caregiver Dashboard that aggregates data across sensor platforms
- Reduced ED Admissions & Re-Admissions
- Increased length-of-stay in IL
- Create a model that can be replicated at other facilities

"Limits exist only in the mind..."

Resident Health Overview			
Resident ▾	Room ▾	ADL ▾	Vitals ▾
Bishop, Stanley	A205	!	!
Jones, Janet	B125	OK	!
Perkins, Leslie	C147	!	OK
Bernard, Phyllis	B129	OK	OK
Day, Nicholas	B422	OK	OK
Dwyer, April	C448	OK	OK
Ferguson, Cecilia	A307	OK	OK
Malone, Dwight	C152	OK	OK
Schmidt, James	B223	OK	OK
Scott, Sebastian	A303	OK	OK
Vance, Darryl	B131	OK	OK
Walker, Carl	B230	OK	OK

Caregiver Dashboard: Healthy

Vitals
ADL



Jones, Janet

11140 Springfield Pike
Apt B125
782-4321
MKV IL

Age

87

DOB

4/16/1931

Blood Type

B+

10/12/18

Updated 10/11/18

11:17pm

Steps

Toilet

Food

Sleep

Dr.
Notes

Social
Activity

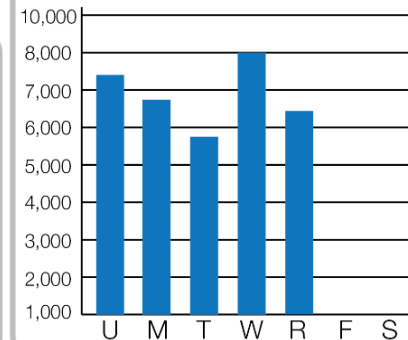
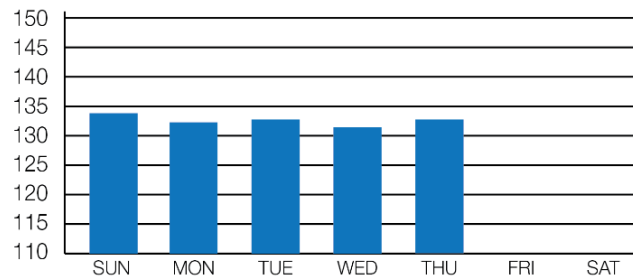
Weight

Blood Pressure

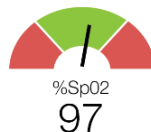
Glucose

Pulse

Temperature



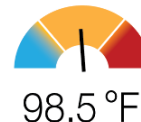
Pulse



Blood Pressure



Temperature



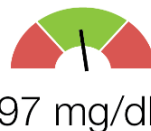
Toileting



Steps



Glucose



Weight

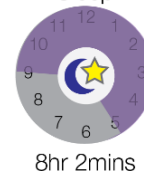


OK

Food Intake



Sleep



Caregiver Dashboard: Intervention Required





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COMMUNITIES

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