CEO Summit
Discovery happens here.
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Tech To Serve

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May 16, 2018
Welcome!
Seattle in 1977
Since that time ...
Measuring change ... the 1970s to today

Size: about the same
Speed: about the same
Efficiency (MPG): about the same
Value (cost relative to performance): about the same
Measuring change ... the 1970s to today

1971 Intel 4004
(2,300 transistors)

2015 Intel Xeon
(4,300,000,000 transistors)

Size: area occupied by a transistor reduced by **1,000,000x**
Speed: operations per second increased by **100,000x**
Efficiency (operations per watt): improved by **6,750x**
Value (dollars per instruction): improved by **2,700x**
Measuring change ... the 1970s to today

1970 Ford Mustang

2015 Intel Xeon

What if cars had improved as rapidly as microprocessors?
Measuring change ... the 1970s to today

Size: A car would be smaller than an ant
(About $1/5^{th}$ of an inch long)
Measuring change ... the 1970s to today

Speed: A car would go 6,000,000 miles per hour
(San Francisco to New York in 1.7 seconds)
Efficiency: A car would get 100,000 miles per gallon
(San Francisco to New York on 1/2 cup of fuel)
Measuring change ... the 1970s to today

Cost: A car would cost less than $10
Computer Science has changed also: From smaller/faster/cheaper to tackling societal challenges
In the Paul G. Allen School ...
In the Paul G. Allen School ...
In the Paul G. Allen School ...

Technology Policy and Societal Implications
In the Paul G. Allen School ...
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Medicine & Global Health
From smaller/faster/cheaper to tackling societal challenges: Tech To Serve

CORE CSE
AI, systems, theory, languages, etc.

- Medicine & Global Health
- Energy & Sustainability
- Transportation
- Education
- Scientific Discovery
- Neural Engineering
- Elder Care
- Accessibility
- Technology Policy and Societal Implications
- Security, Privacy, & Safety
- Advancing the Developing World
- Interacting with the Physical World: “The Internet of Things”
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Mobile Phones for Health

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University of Washington

May 16, 2018
Point of Care Diagnostics
Another Paradigm Shift in Health Care
Continuous Capture of Physiological Data
The Modern Smartphone

- Microphone
- Speakers
- Wireless Antenna/Signal
- GSM/LTE/WIFI/BT
- Camera/Flash
- Capacitive touch
- Accelerometer/Gyro
- Microphone
Mobile Health Sensing

Using existing sensors on mobile phones for health sensing
Using Mobile Phones for Diagnostics

- Pulmonary: Spirometry, Cough analysis
- Blood screening: Hemoglobin, Bilirubin
- Cardiovascular: SP0₂, Blood pressure
- Disease Specific: Sleep apnea, Osteoporosis
SpiroSmart: Mobile Phone Spirometer
SpiroSmart: Mobile Phone Spirometer
SpiroCall: Expanding to Any Phone
CoughSense: Tuberculosis Study in South Africa
HemaApp: Measuring Hemoglobin with a Phone
Measuring Hemoglobin with a Phone
BiliCam: Newborn Jaundice
BiliScreen: Pancreatic Cancer
OsteoApp: Screening Osteoporosis
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OsteoApp: Screening Osteoporosis
Challenges and Opportunities

Integration into commodity phones
Trust
Regulatory
Patient – Provider relationship
Training the next generation health professionals
Thanks!