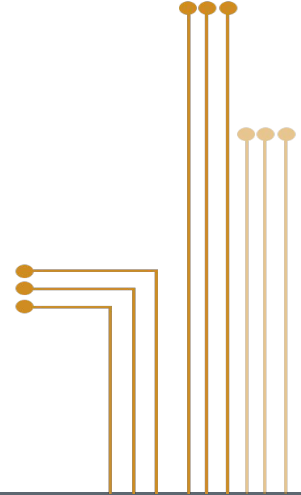
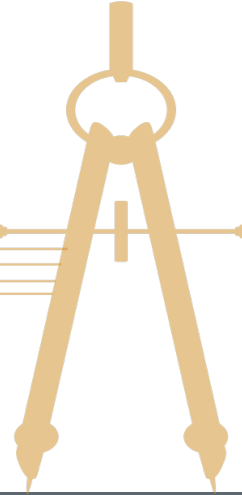




Pantas and Ting

Sutardja Center
for Entrepreneurship & Technology

Berkeley Engineering



Smart Clothing Market Analysis

Alex Hanuska, Bharath Chandramohan, Laura Bellamy,
Pauline Burke, Rajiv Ramanathan, Vijay Balakrishnan

This work was created in an open classroom environment as part of a program within the Sutardja Center for Entrepreneurship & Technology and led by Prof. Ikhlaq Sidhu at UC Berkeley. There should be no proprietary information contained in this paper. No information contained in this paper is intended to affect or influence public relations with any firm affiliated with any of the authors. The views represented are those of the authors alone and do not reflect those of the University of California Berkeley.

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UNIVERSITY OF CALIFORNIA

Market Analysis Key Insights

The **power of smart clothing** can be best realized when companies engage both consumers for **personal data insights** and **big data analysis** for commercial application.





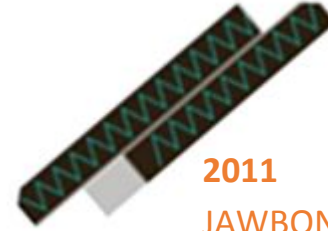
1975
PULSAR
CALCULATOR
WATCH



1987
DIGITAL
HEARING
AID



2006
NIKE
IPOD KIT



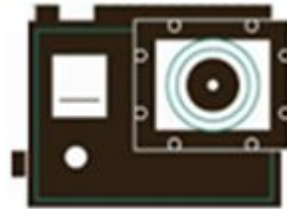
2011
JAWBONE



2014
APPLE
WATCH



1979
SONY
WALKMAN



2004
GOPRO CAMERA



2008
FITBIT

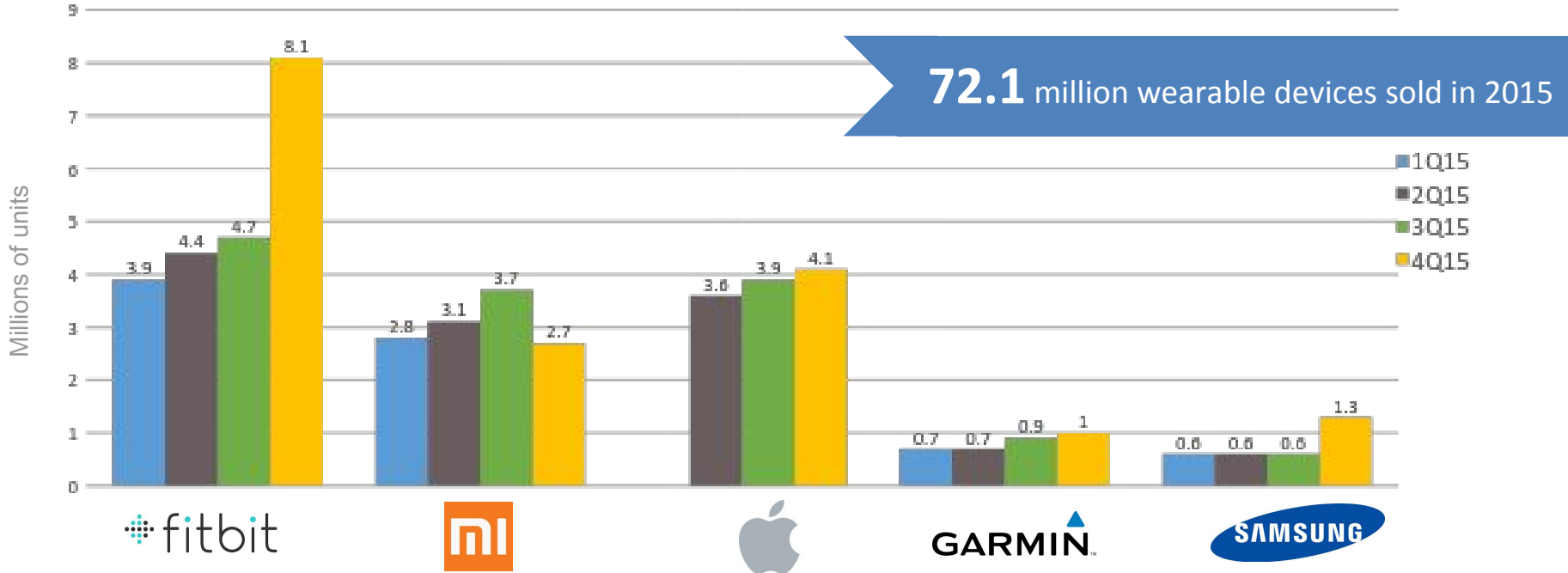


2013
GOOGLE
GLASS



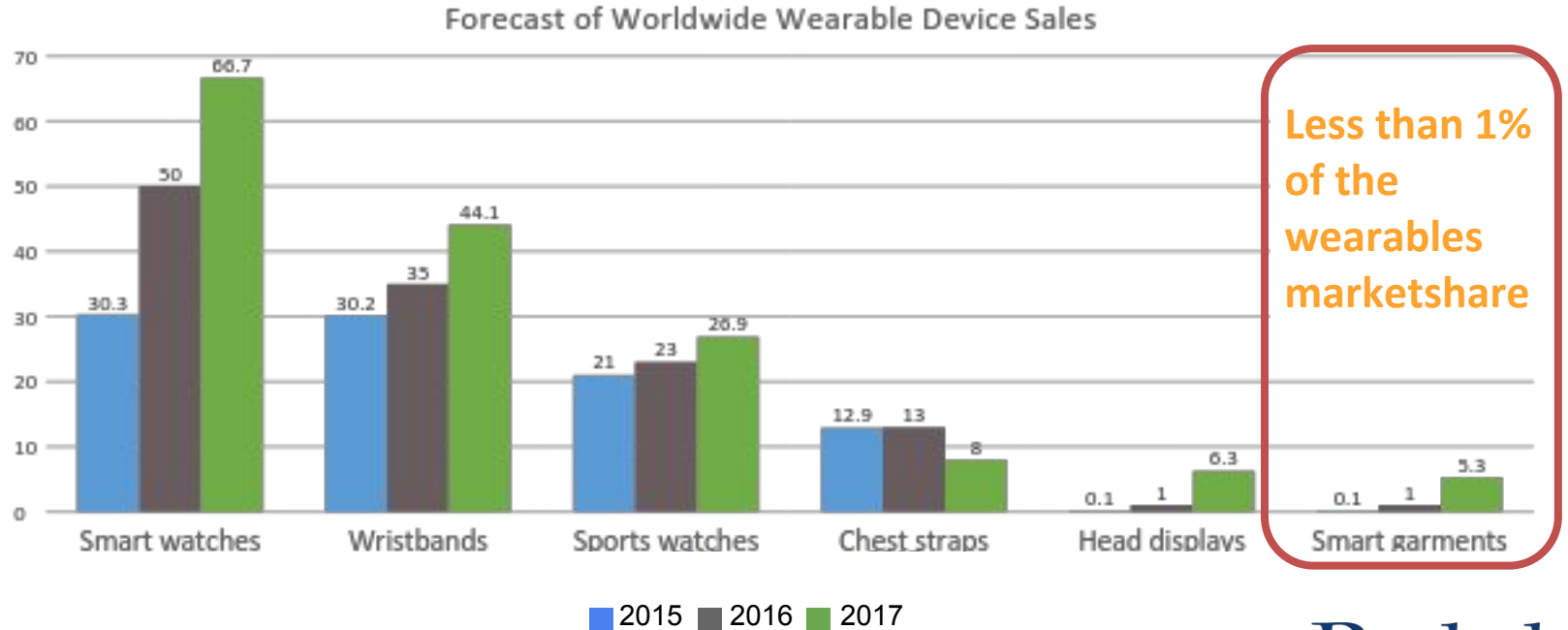
Current Wearables Market Dominated by Fitness Trackers

Worldwide Wearable Device Shipment from Top 5 Manufacturers



Wearables are Growing, but Smart Garment Adoption is Slow

14X more wearables will be sold in 2018 than in 2013

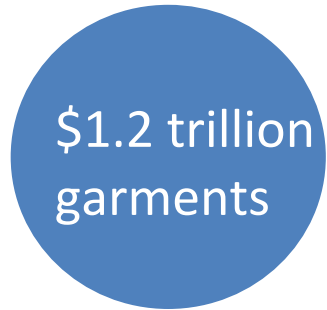


Smart Clothing could be the Next Wearable Market Leader

Clothes will always outsell phones.

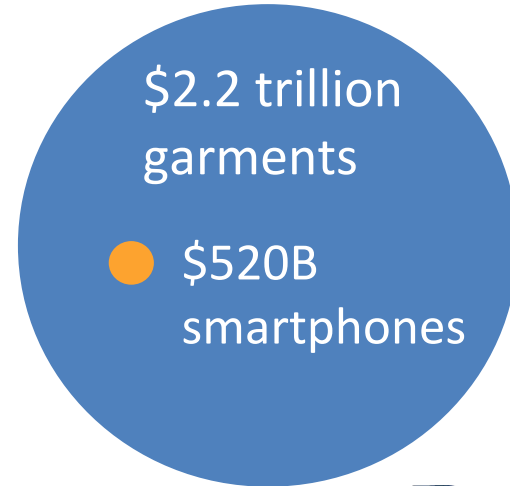
Dr. Michael Burrows, DuPont

2015 Global Market Size

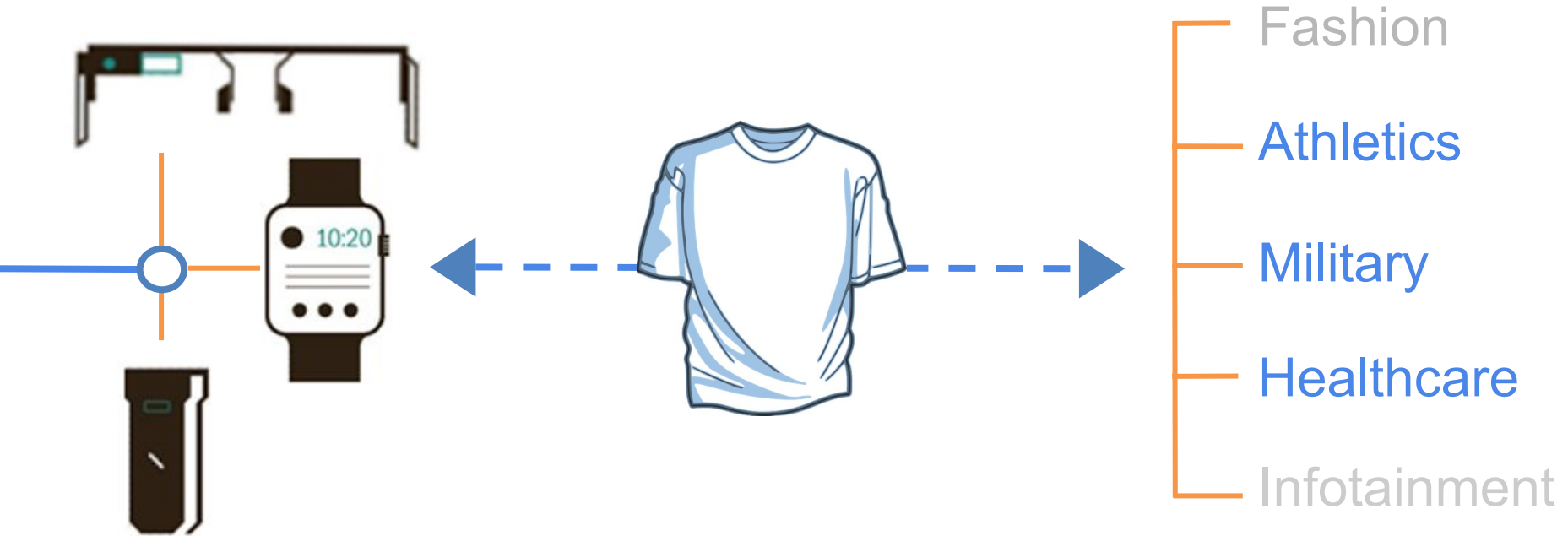


● \$399B
smartphones

Predicted 2019 Global Market Size



How can Smart Clothing Move from Today to Tomorrow?





Pro teams could save
\$20B of revenue loss by
using predictive data to
prevent injuries.

SAN FRANCISCO
BUSINESS TIMES

Mar 18, 2015, 6:26am PDT

Golden State Warriors practice in this startup's high tech fitness gear



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Application for Athletic Smart Clothing



PERSONAL

- Injury prevention
- Athlete peak performance optimization
- Oxygen monitoring
- Dehydration
- Cramping
- Collision measurement

BIG DATA ANALYSIS

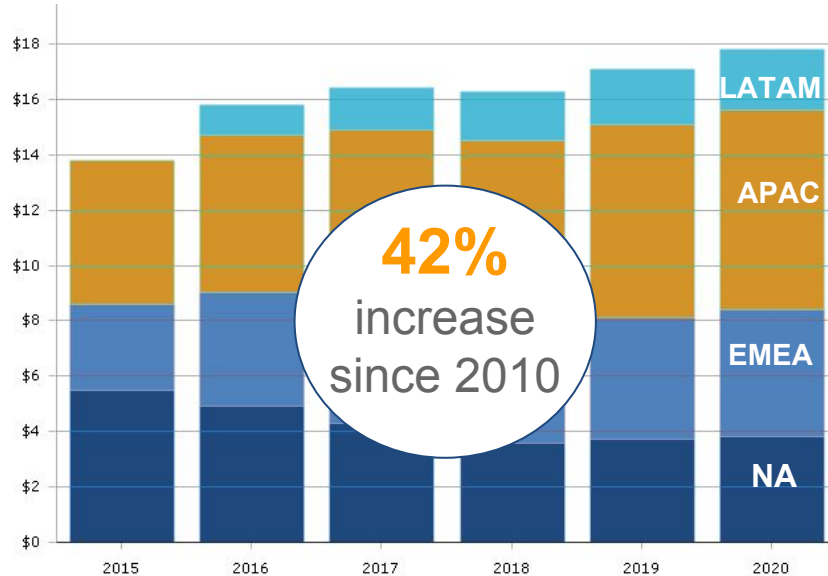


TEAM

- Team metrics: comparison applications
- Predictive injury analysis
- Predictive performance analysis

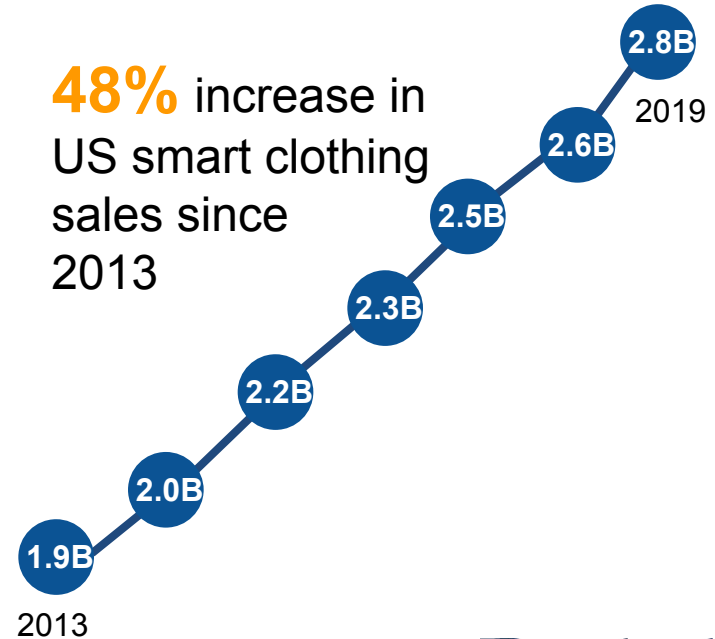
Market Size for Athletic Smart Clothing


Global Athletic Clothing Revenue in \$B



U.S. Smart Clothing Revenue

48% increase in
US smart clothing
sales since
2013





Biometric data and remote diagnostic ability could save thousands of lives of U.S. troops per year and **\$170B** of long-term care savings.

Application for Military/Industrial Smart Clothing



PERSONAL

- Health monitoring
- Ballistic protection
- Wound detection
- CBRNE agent detection
- Power generation
- Assisting uniform

BIG DATA ANALYSIS



TROOPS

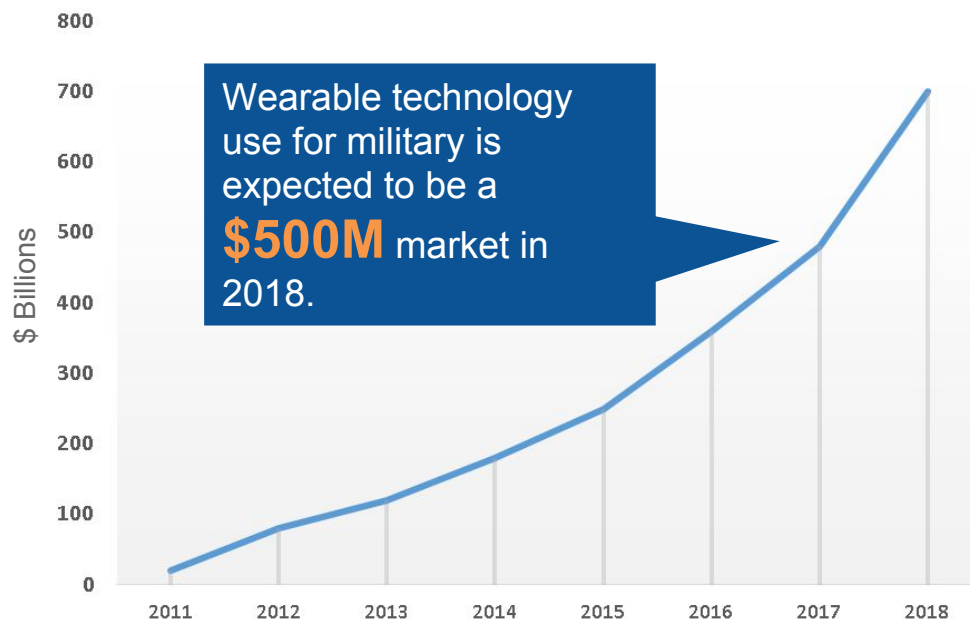
- CBRNE agent detection
- Communication & networking capabilities
- Battlefield awareness

Market Size for Military/Industrial Smart Clothing

Spending on military textiles and clothing in the US is expected to be **\$1.6 billion** in 2015.

The Global Smart Textiles Market for Military will grow at a CAGR of **10.4%** during 2014-2019.

Projected Military Spending on Wearables



Sources: Transparency Market Research Advanced Textile Source
Global Industry Analysts TechNavio

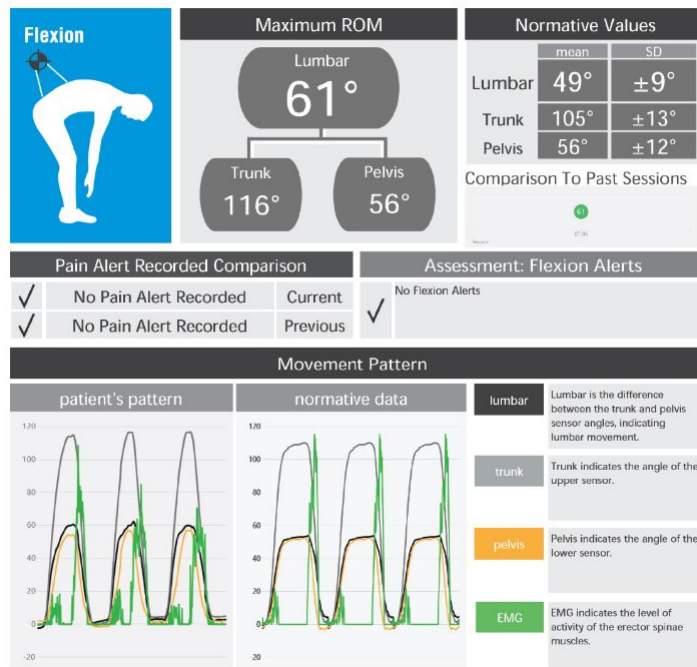


Insights from big data analysis could save **\$1.7B** year through injury avoidance.

Smart Clothing for the Healthcare Worker



Sample of ViMove™ Low Back Instant Analytics



Application for Healthcare Smart Clothing



PERSONAL

- Real-time posture
- Situational alerts
- Customized training
- Imminent Injury alert

BIG DATA ANALYSIS



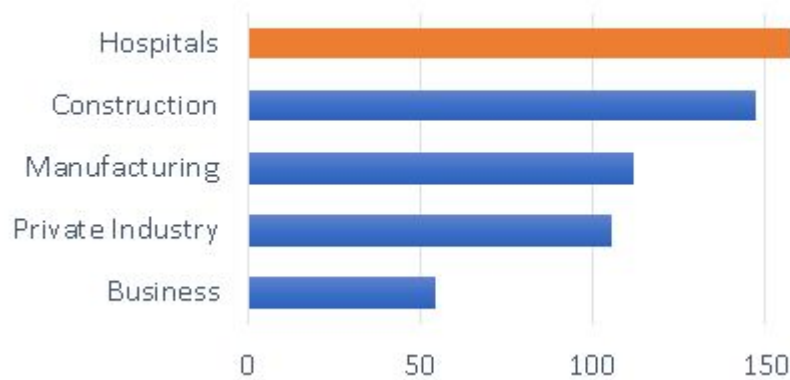
STAFF

- Alerts: Call for additional help
- Situational analytics
- Hospital-wide training recommendation
- Cost analysis of improved facilities

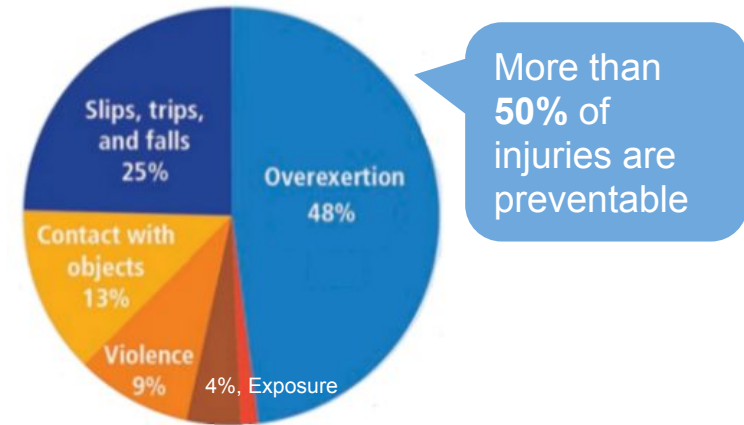
Smart Clothing for Healthcare Worker

Use Case: Smart clothing could prevent injuries for healthcare workers, where the business cost of an injury averages **\$22,440**.

Workplace Injuries per 10,000 employees



Causes of Missed Work for Hospital Workers



Market Size for Healthcare Smart Clothing

Total Addressable Cost

- 4 Million Nursing Staff (US only)
- 2 Million Nurses (EU)

\$1.7B

SINGLE INCIDENT COST

MEDICAL
\$12K

INDEMNITY
\$10K

LOST TIME
\$22K

REPLACEMENT
\$27K



Wearable Technology Vendor Landscape and Market Applications

Healthcare & Medical

- **Smart clothing**
- Biometric monitors
- Chemical monitors
- Hearing aids
- Drug monitors



Industrial & Military

- **Smart clothing**
- Wrist displays
- Heads-up displays
- Exoskeleton



Fitness & Wellness

- **Smart clothing**
- Activity monitors
- Wrist displays
- Heads-up displays

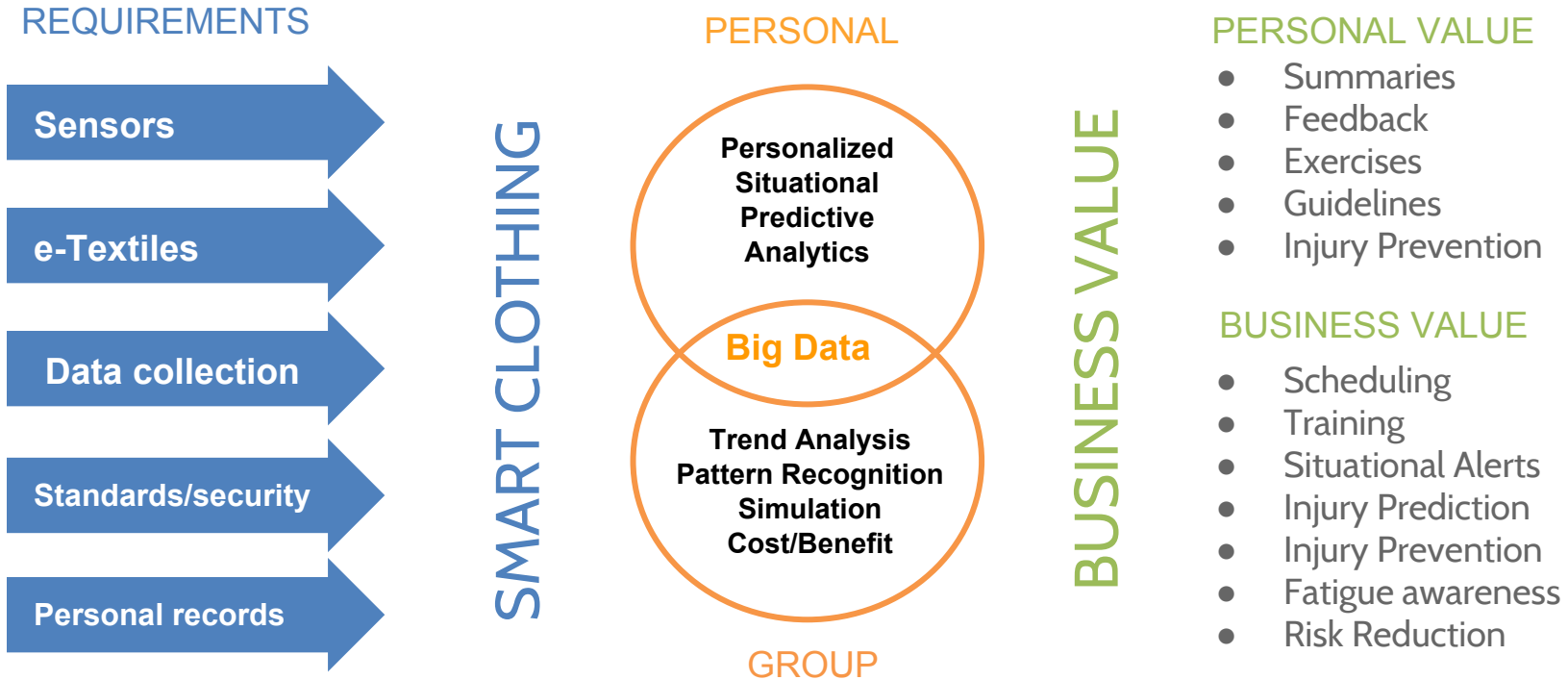


Infotainment

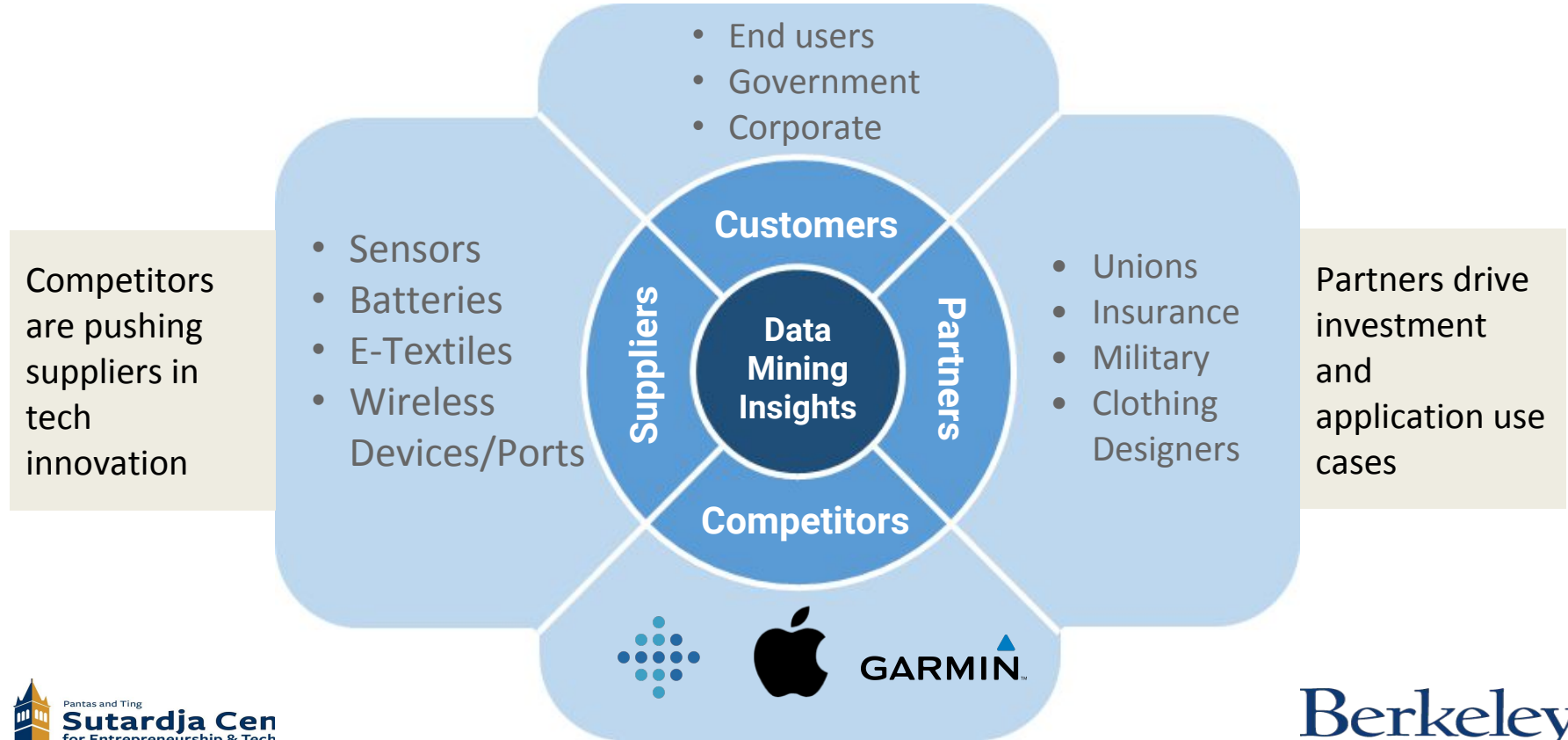
- Smart glasses
- Wrist displays
- Heads-up displays
- Headsets



Value Chain for Big Data in Smart Clothing



Smart Clothing Ecosystem



Barriers to Smart Clothing Adoption and Growth

Cultural Challenges

Expense: 14% say that wearable tech is too expensive

Privacy: 52% say that privacy is the biggest concern for wearables

Style: 53% say that want wearable tech to be more stylish

Utility: 51% say wearables lack compelling use cases



Technical Challenges

Portability: Sensor size, energy source, and chargeability

Sensors: Recognizing user action and environment data

Connectivity: Uploading data

Privacy: Securing data

Standards: Normalizing data

Analysis: Mining data for insights

Predictions for Smart Clothing Market Success

- Big data is needed to move from personal to commercial use cases
- Commercial application is needed to improve the value proposition
- Companies will start to enter the big data platform market

