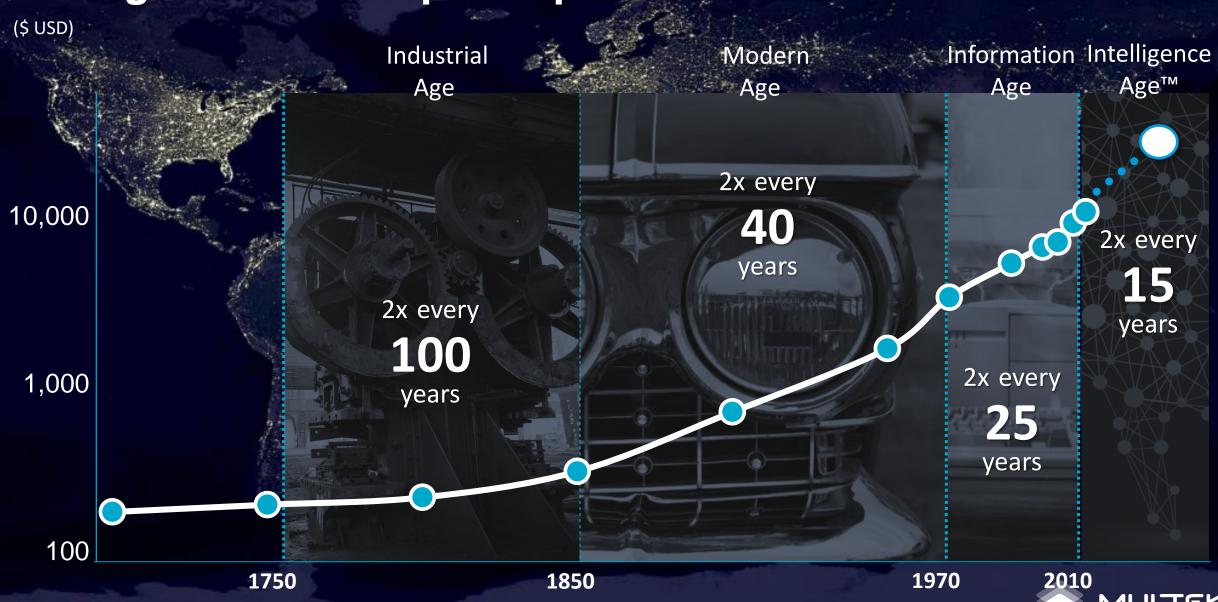


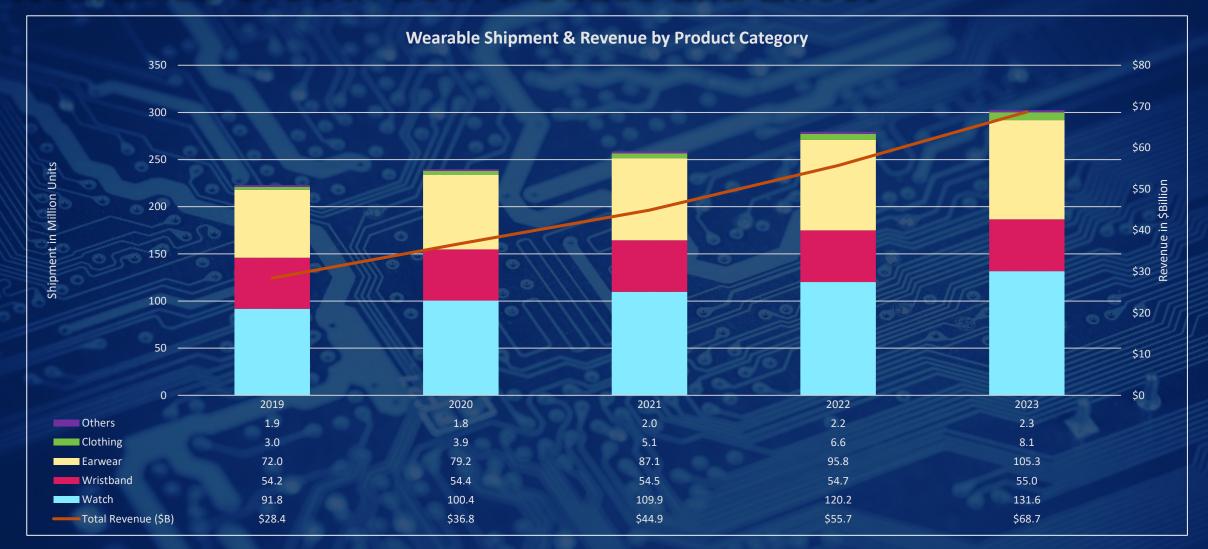
FLEXIBLE INTERCONNECTS:
Building Blocks & Lessons Learned for Wearable Tech

Peter Yu July 9, 2019

# Average World GDP per Capita



### Wearables Growth both a Cause and Effect





## **Defining Wearables based on Proximity**



Smart implants
Artificial limbs
Bionic eye
Smart pills

#### On the Body

Sensor patches
Drug delivery patches
Insulin pump patches
EEG / EMG devices
3D motion sensors
Electronic glasses
Electronic tattoos
Hearing aids

#### Close to the Body

Augmented/Virtual reality headsets
Wearable smartphone accessories
Wearable controller mouses
Wearable emotion monitors
Clothes & shoes
Brain-controlled headsets
Wearable alarm systems
Wearable cameras
Activity trackers
Smart watches
Sleep monitors
GPS trackers



# **Technology Building Blocks Framework**

Security & Computing

Sensors & Actuators

Human Machine Interface

Connectivity









Flexible Technologies & Miniaturization

Battery & Power

Smart Software









### Flexible Technologies



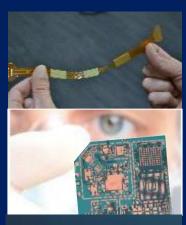
**Industry Trends** 

Technology Advancements

**Solutions** 



- High Speed Interconnects
- Miniaturization
- Thermal Management
- RF Applications
- Modular
- Integration



Flexible Printed Circuit

Rigid Printed Circuit Board



Rigid-Flex



Flexible Printed
Circuit Assembly



### **Wearable Tech – Initial Pain Points**

Failed after ~10000 cycles (10 days for wear)\*





Original Design

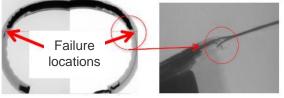
#### **Analysis of Competitor RFPC Fabrication**

- Standard Rigid Flex
- ED Copper, Low elongation cover lay
- We were told it's small factory in China, but no logo

\*Specification requires 1.0M cycles

- Dropping
- Compression
- Twisting
- Flexing

Electrical failure







### **Lessons Learned**

### **CHALLENGES**



- Breakage
- Cost
- Human factors



- Breakage
- Coverage
- Software



Use cases

### **RECOMMENDATIONS**



- Flexible Printed Circuits
- Rigid PCB where possible
- Allergens warning



- Reliability Testing
- Rigid-Flex
- App not an afterthought



• Solve a problem



# **Looking Ahead**



# **THANK YOU**

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