



Convergence: Semiconductor, Pharmaceutical and Medical Device Industries

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SIA

SEMICONDUCTOR
INDUSTRY
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Strong global trends in Healthcare



Aging populations

- In ten years (2019), 32% more people in the US will be over 65 years than today. By 2025 1.2 billion people will be over 50 years old, twice as many as in 2006.

Rising healthcare costs

- U.S. healthcare spending more than 18% of GDP, Europe not far behind
- Costs expected to grow from \$2.5 trillion in 2009 to \$4.5 trillion in 2019



Remote and emerging markets

- China healthcare expenditure increased from 3.7% of GDP in 1995 to 5.6% in 2007
- India government proposed in 2008 to increase public expenditure on health care from 1% to 3% of GDP



Personal healthcare

- 33% of medical semiconductor revenue in 2008 went into consumer medical devices



Semiconductors in Healthcare Revolution

Computing revolution



Computing transformed



1980s

Communications revolution



Communications transformed



1990s

Healthcare revolution



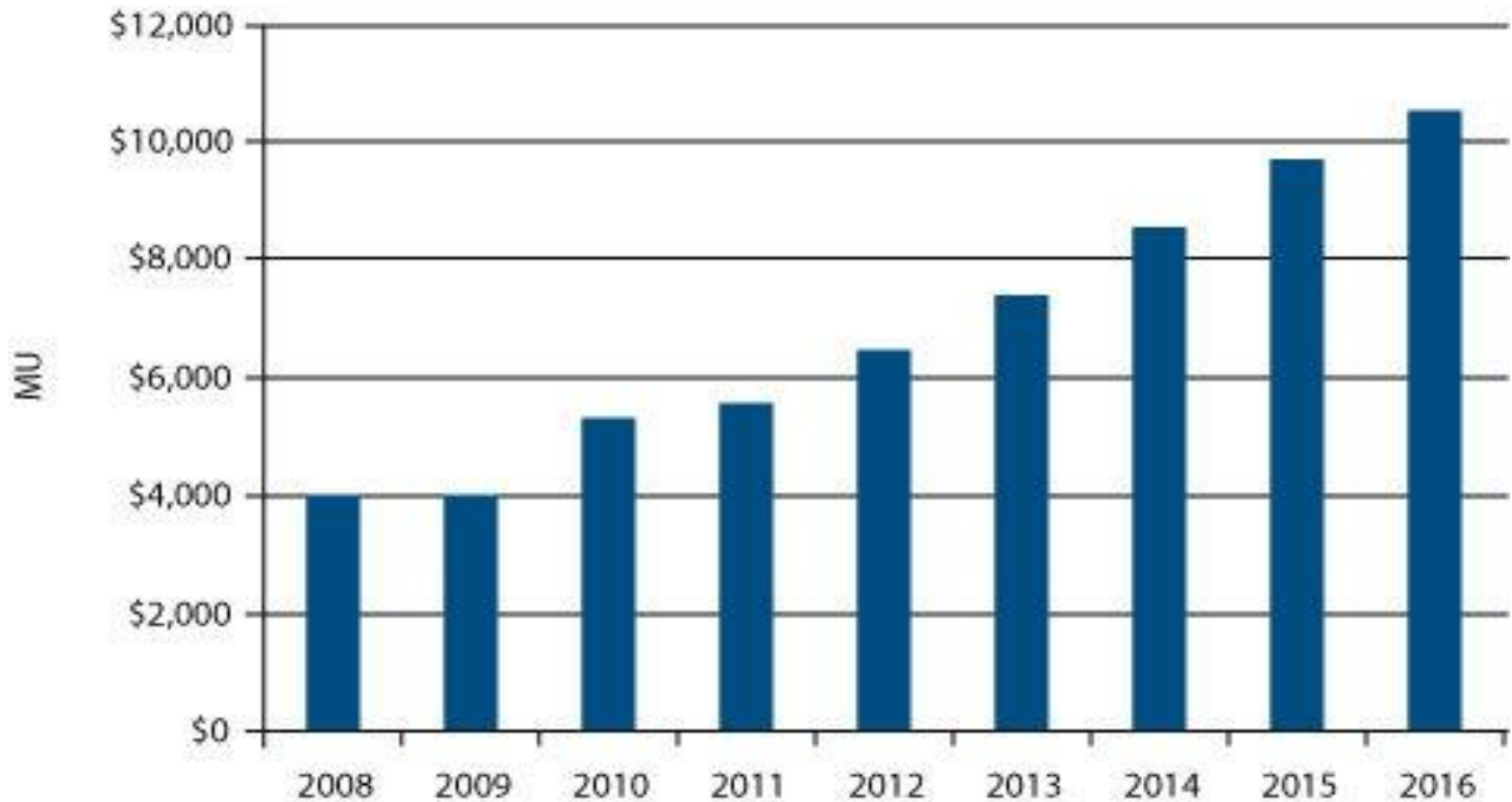
Healthcare transformed



2000 and beyond

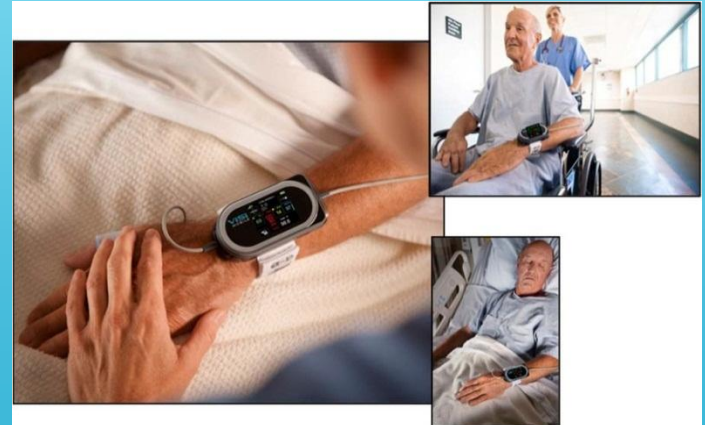
Medical Apps Boost Semiconductor Market

Worldwide medical semiconductor shipment forecast



Source: Databeans

100% monitoring in hospital settings



Images courtesy of Sotera wireless

Bringing ultrasound to the *Point-of-Care*



Mt. Everest



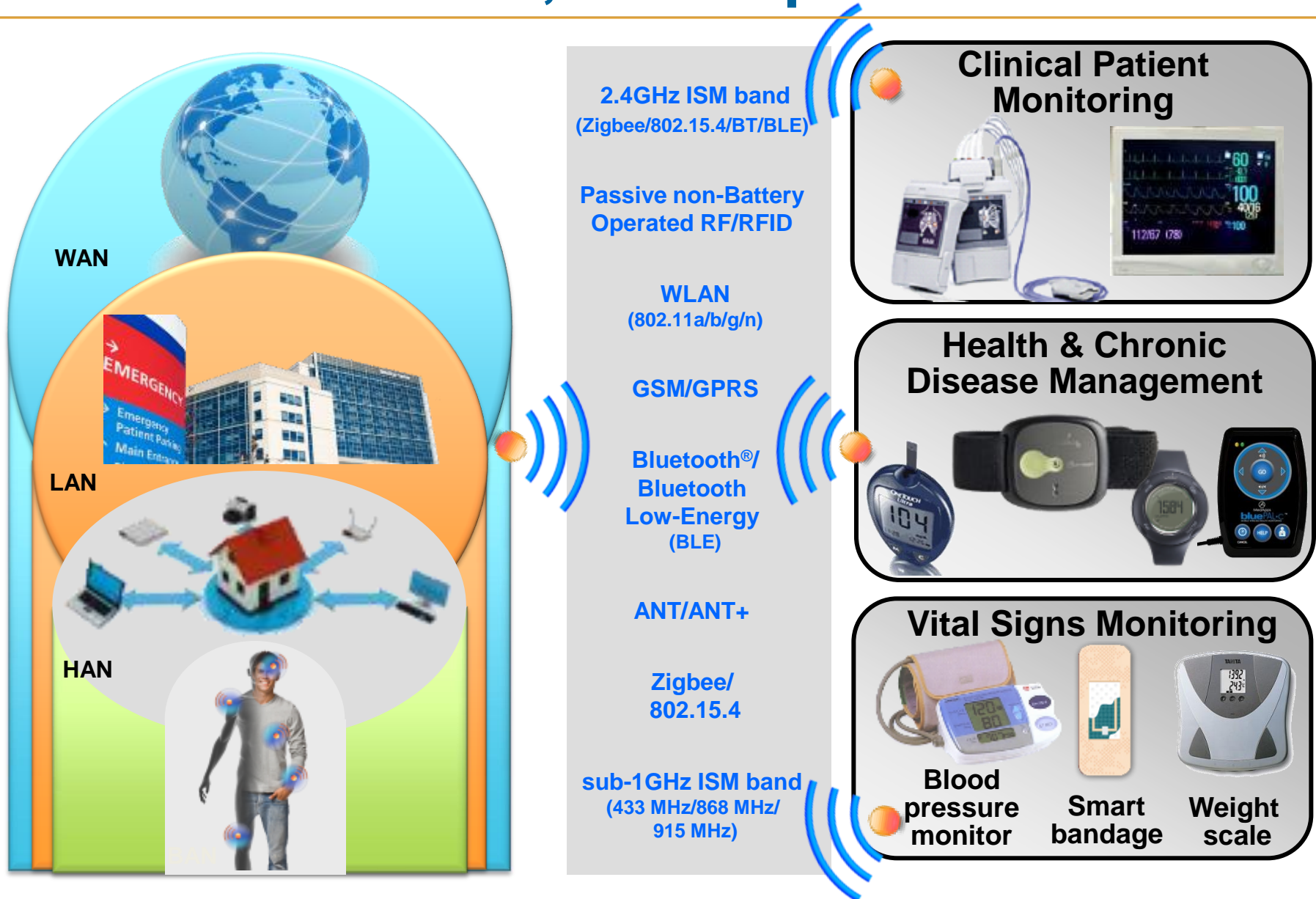
Tsunami



Military

Images courtesy of Sonosite

Connected health, Health portfolio



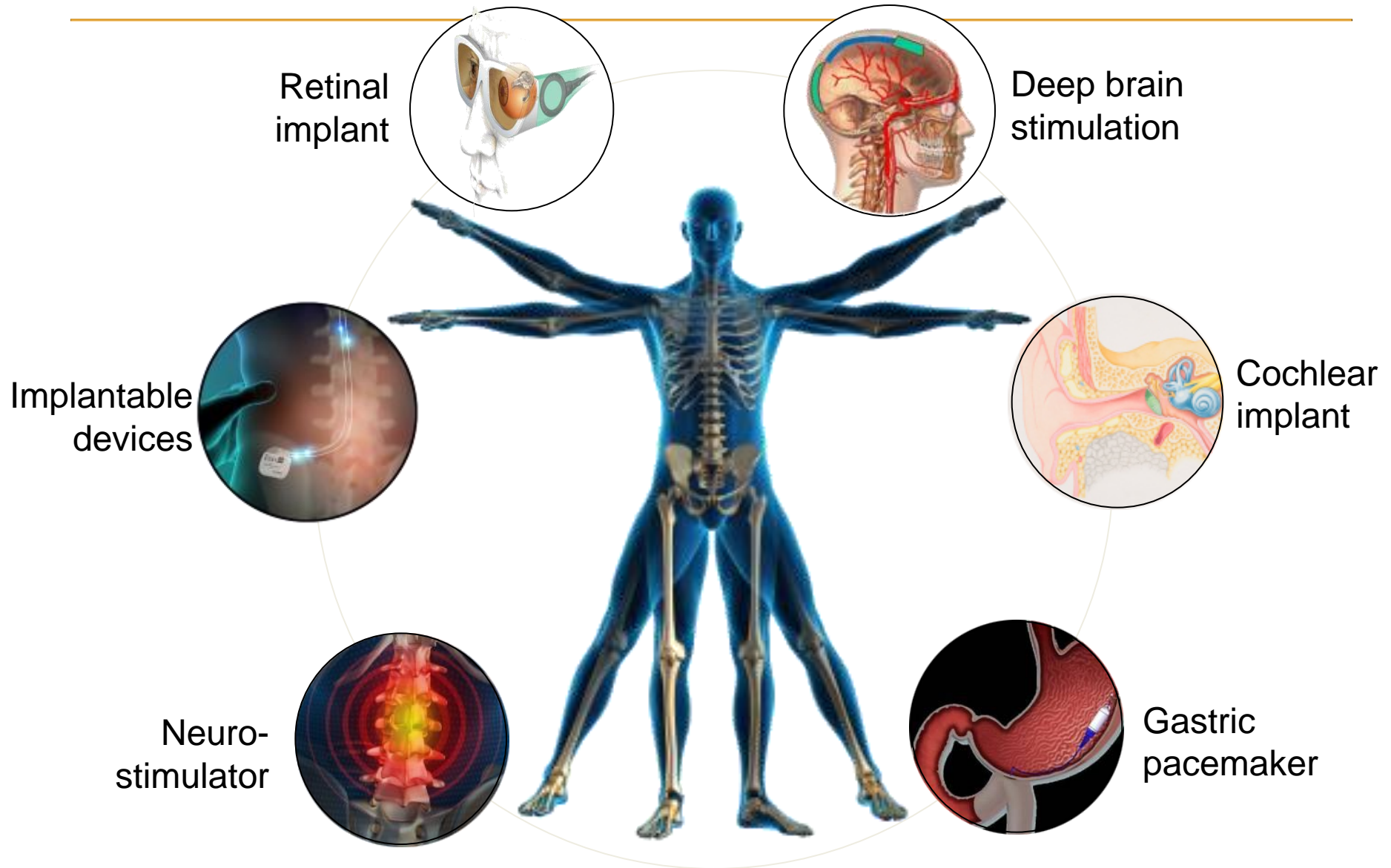
Convenience



Non-invasive blood glucose
monitoring using silicon
bio-sensors

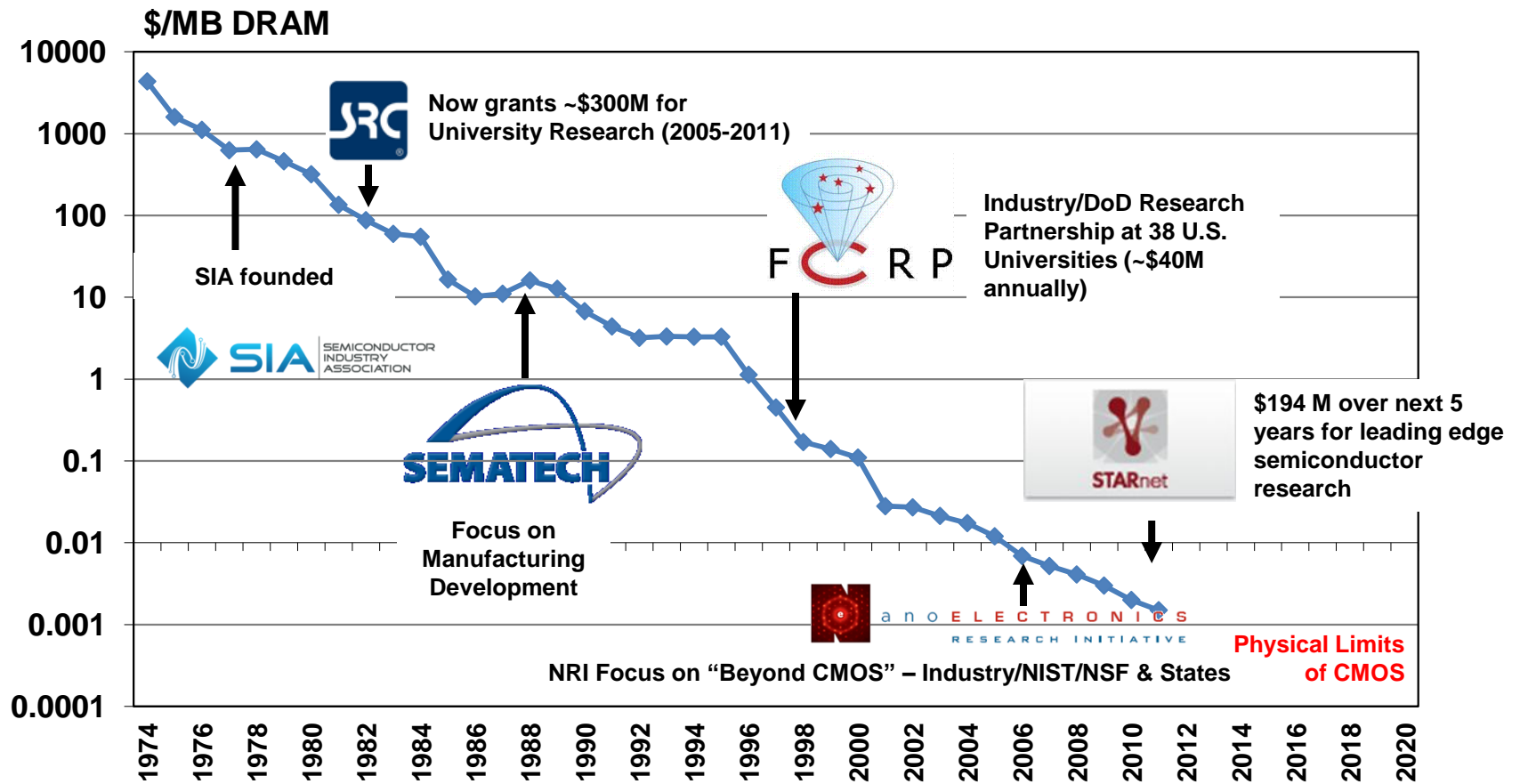
Images courtesy of Diagtronix

Electronics inside the human body



Decades of Industry Collaboration on Research

Industry consortia support for university basic research behind 10 fold drop in costs every six years



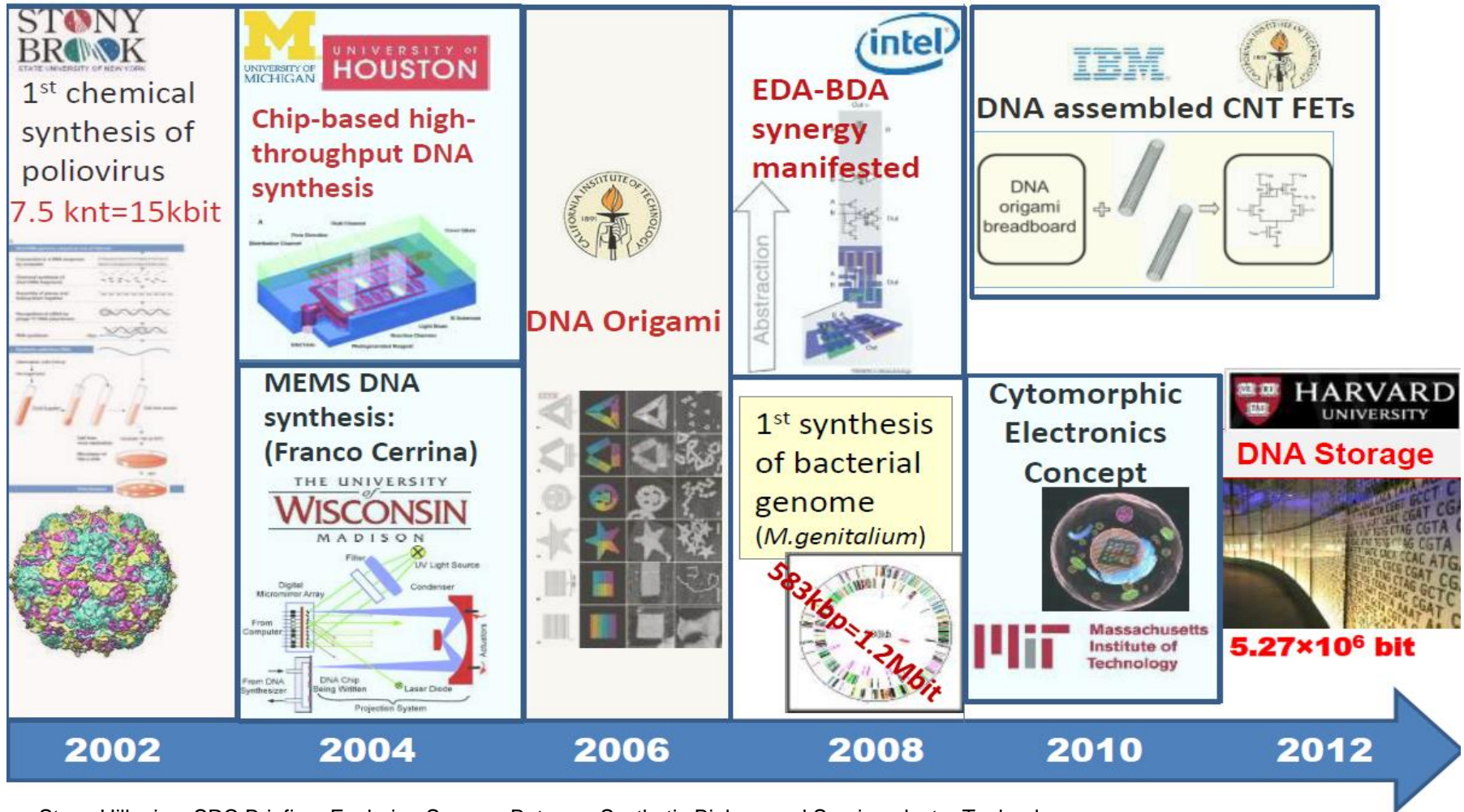
Source: DQ/Micron/WSTS

Semiconductors and Synthetic Biology

SemiSynbio Recent Breakthroughs

Foundation is being laid!

Most happened within last 10 years!

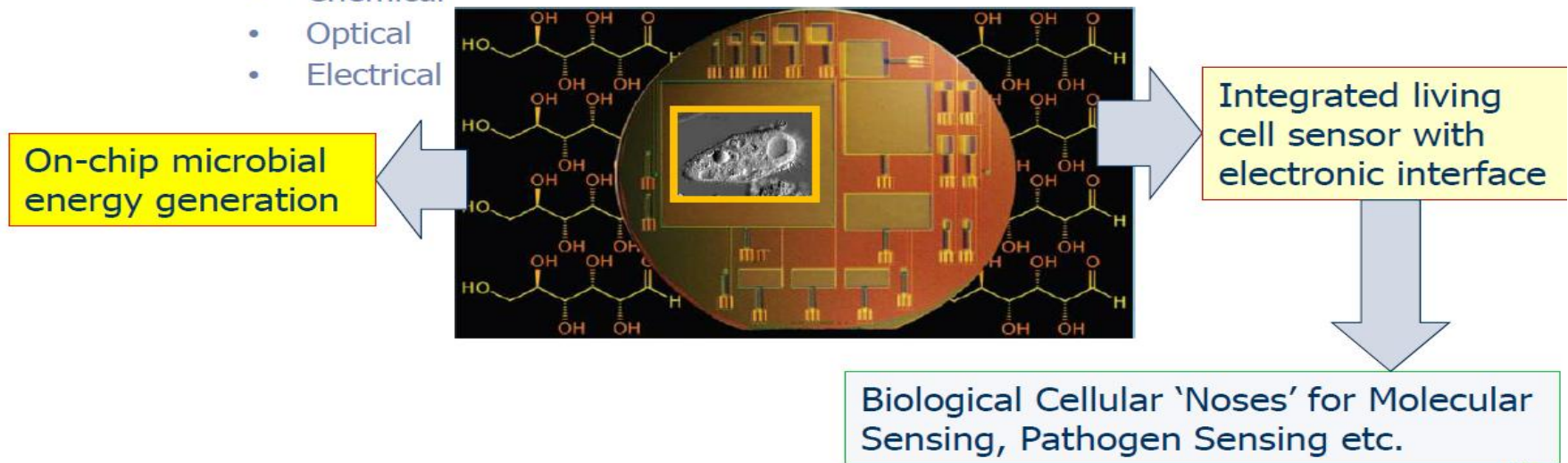


Example: Semiconductor/Biological Circuits



Example II: Hybrid semiconductor/biological circuits

- Using 'cellular material' as intelligent components of electronic circuits
 - Digital, analog and sensing functions
 - Interfaces between biological and semiconductor components using different physical signals
 - Chemical
 - Optical
 - Electrical

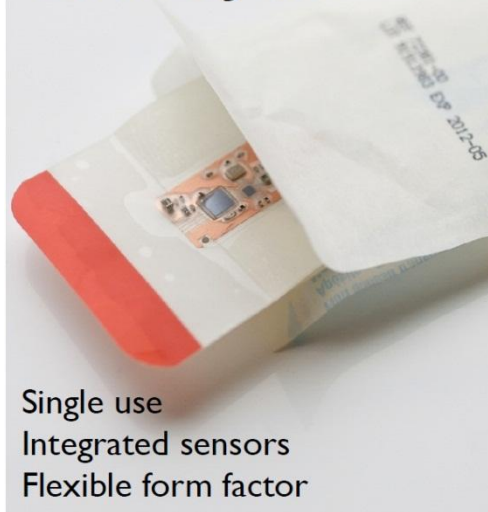


Future Health Challenges



Semiconductors Can Play a Role in the Future of Care

“Tomorrow” A Smart Bandaid for Everyone



Single use
Integrated sensors
Flexible form factor



CHIP WITH **THOUSANDS OF PARALLEL INSPECTION CIRCUITS**



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TIME 4D** ULTRASOUND

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