

From Wearable Sensors to Smart Implants – Toward Pervasive and Personalized Healthcare

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Pervasive Healthcare

- What is it?

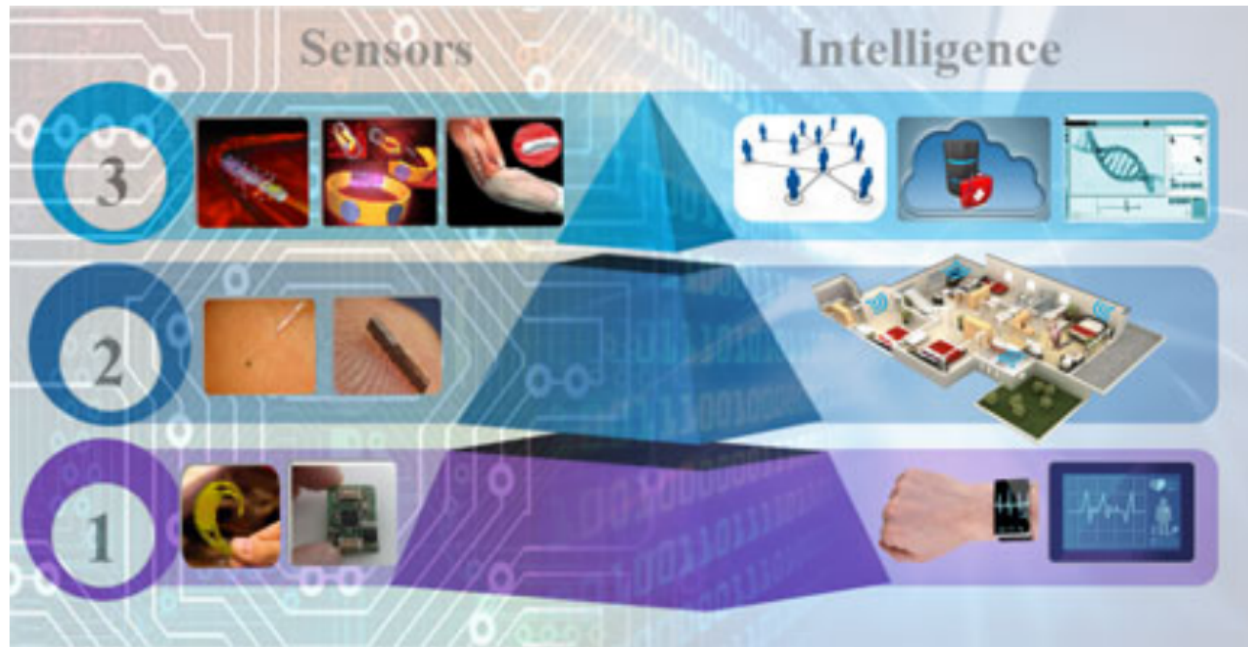
Pervasive and Personalized Healthcare

- What is it?
- Why do we need it?

Also Known as

- Ubiquitous Healthcare
 - Mobile healthcare

Pervasive Health Application



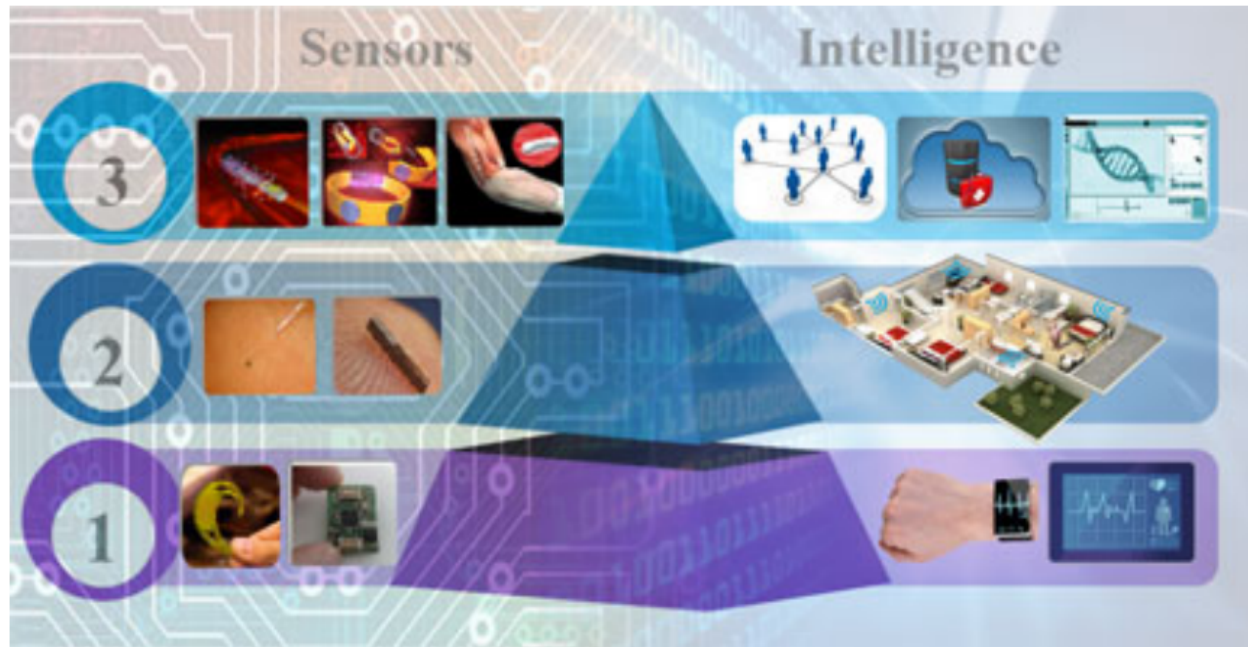
- 1st Generation

Pervasive Health Application



- 2nd Generation
- 1st Generation

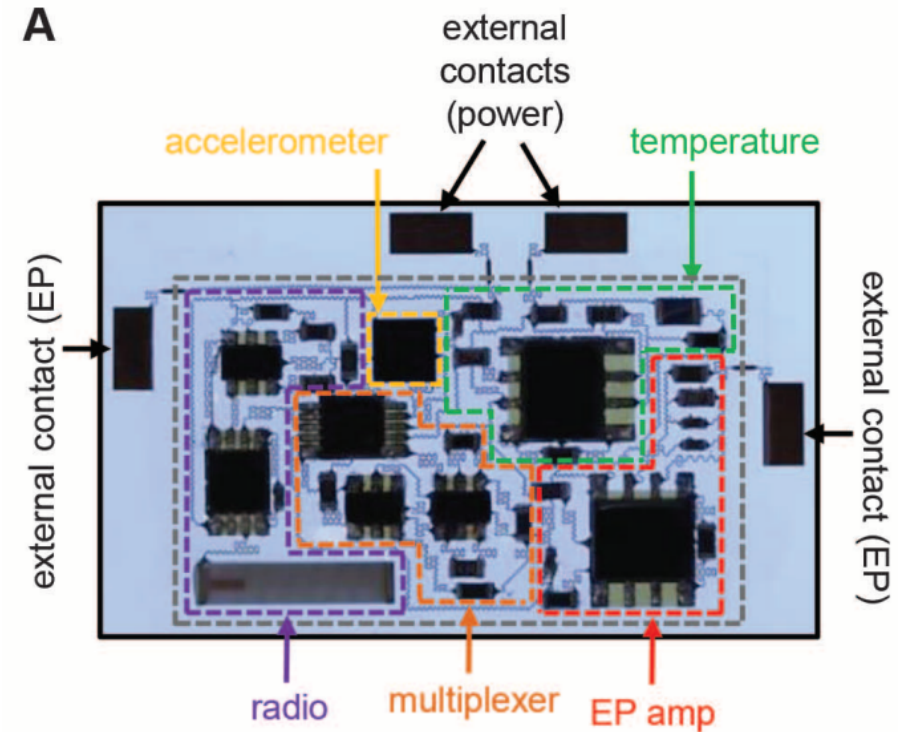
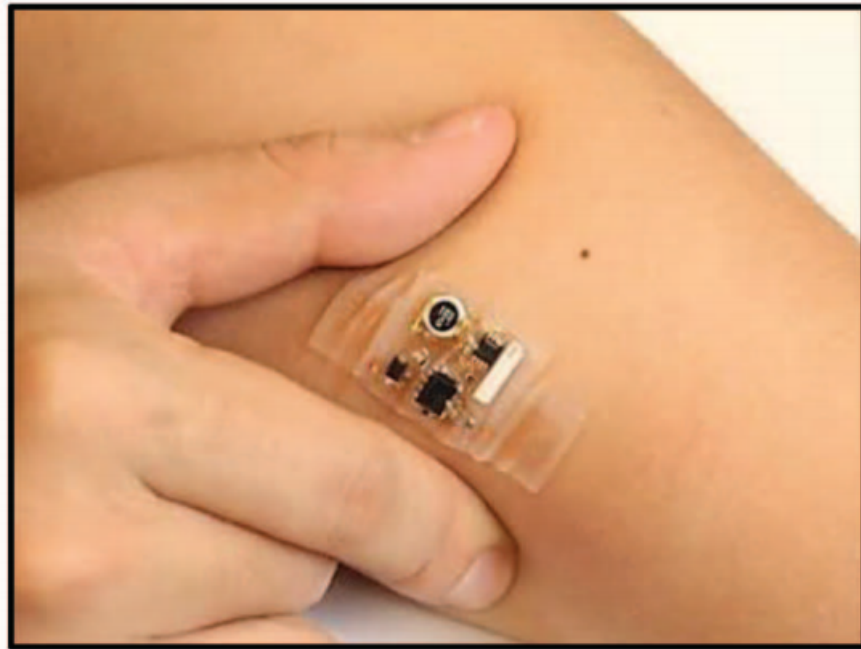
Pervasive Health Application



- 3rd Generation
- 2nd Generation
- 1st Generation

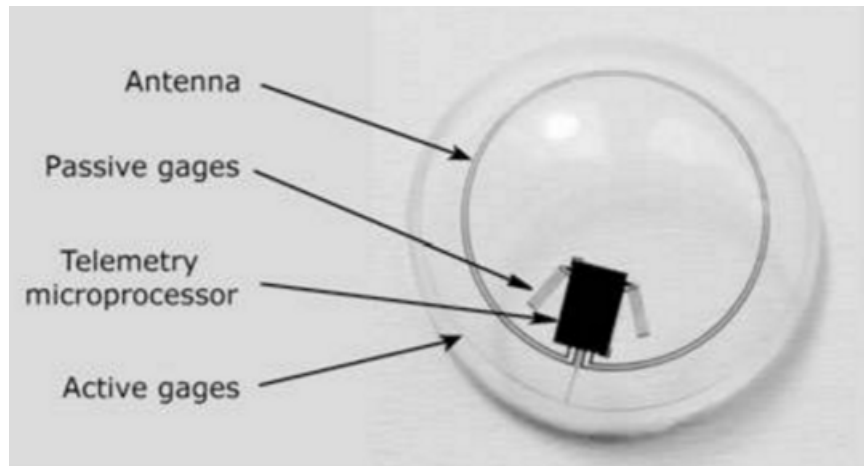
Sensors

Wearable Sensors – Wrist/arm

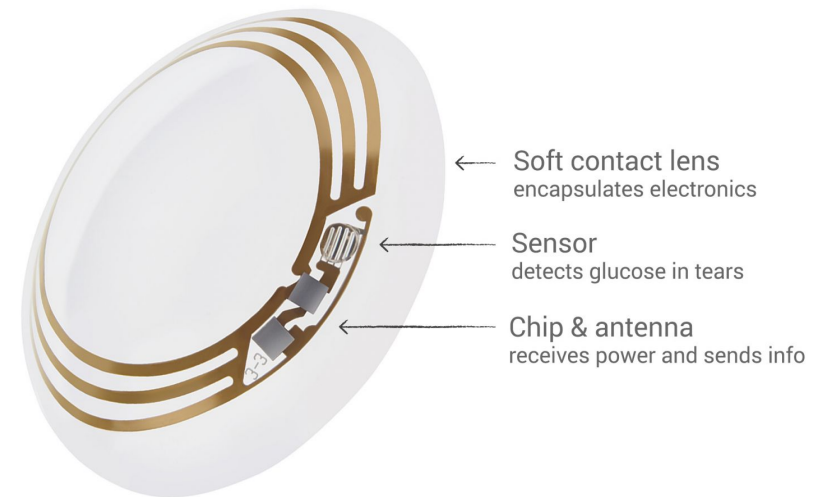


Xu et al, 2014

Wearable Sensors - Eye



Leonardi *et al*, 2009



Google Lens

Wearable Sensors - Head



Checklight



NeuroPro

Wearable Sensors – Chest and Torso

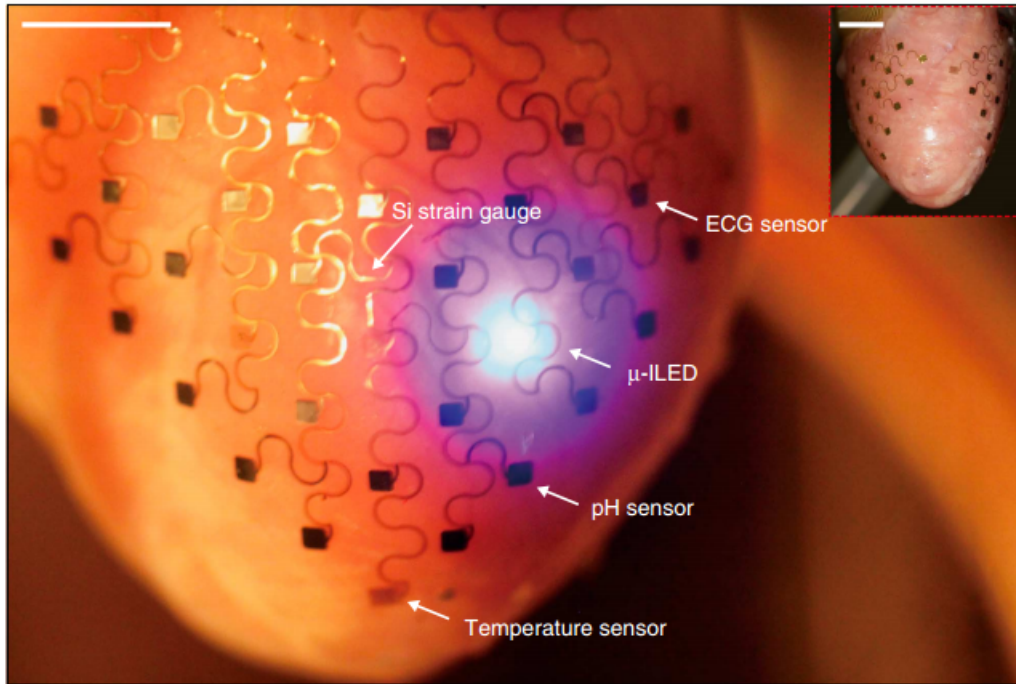


Dexcom

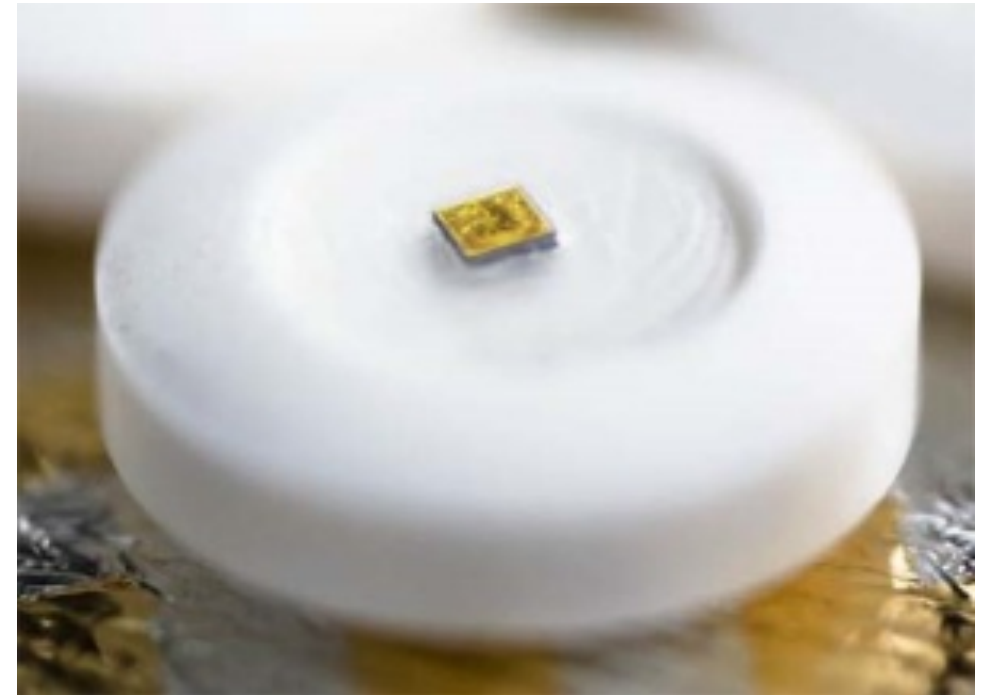


CardioMems

Implantable and Ingestible Sensors



Xu et al, 2014



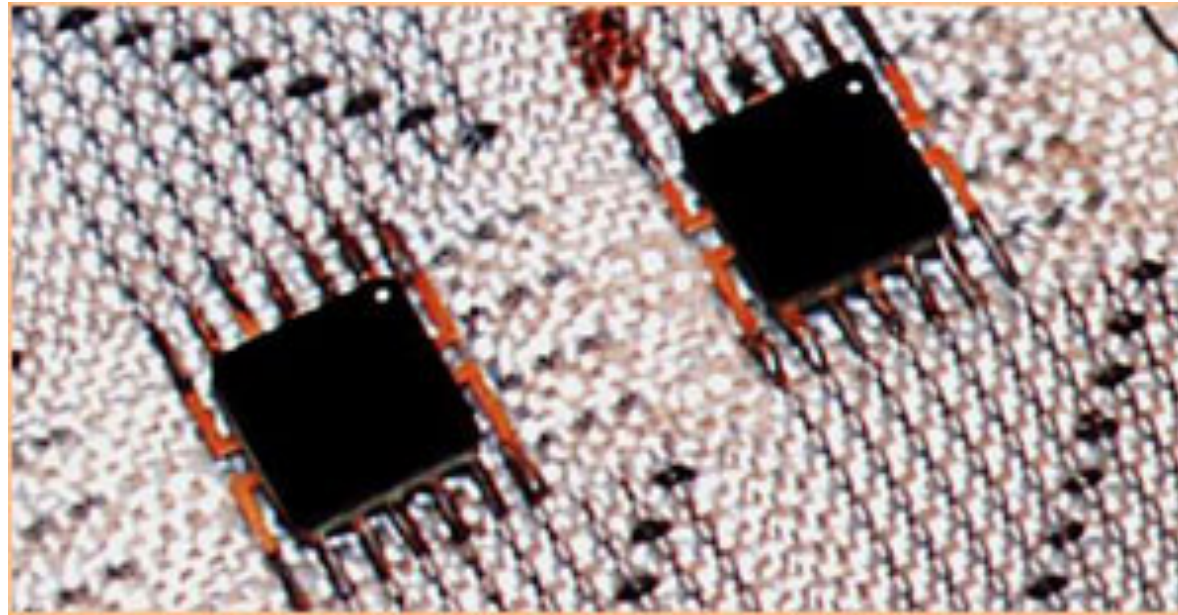
Proteus

Wearable Ambient Sensors

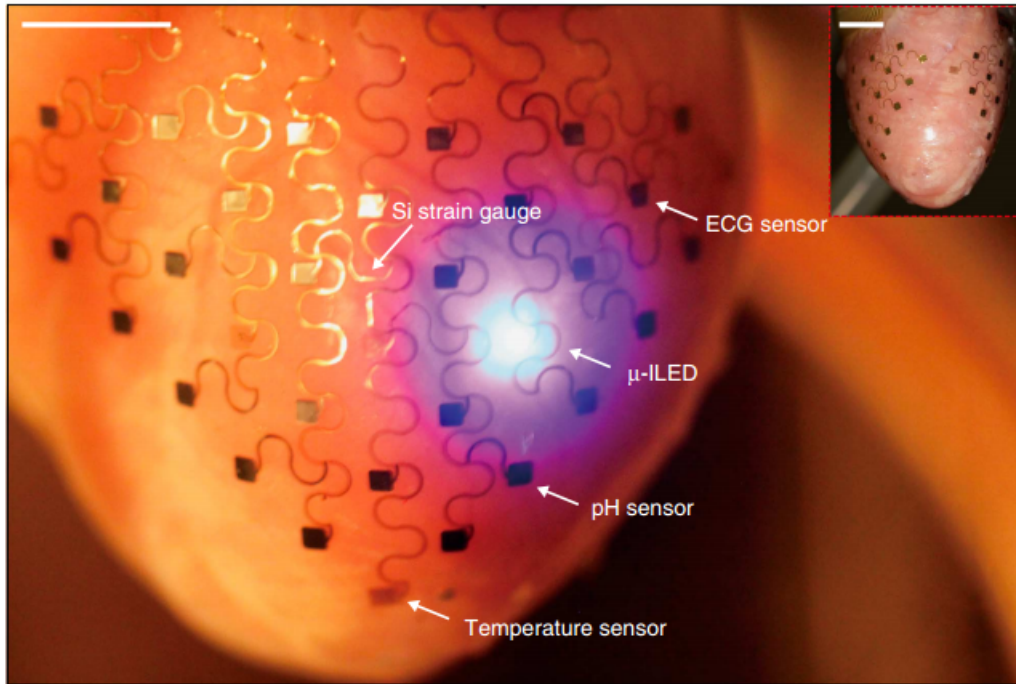


Sensordrone

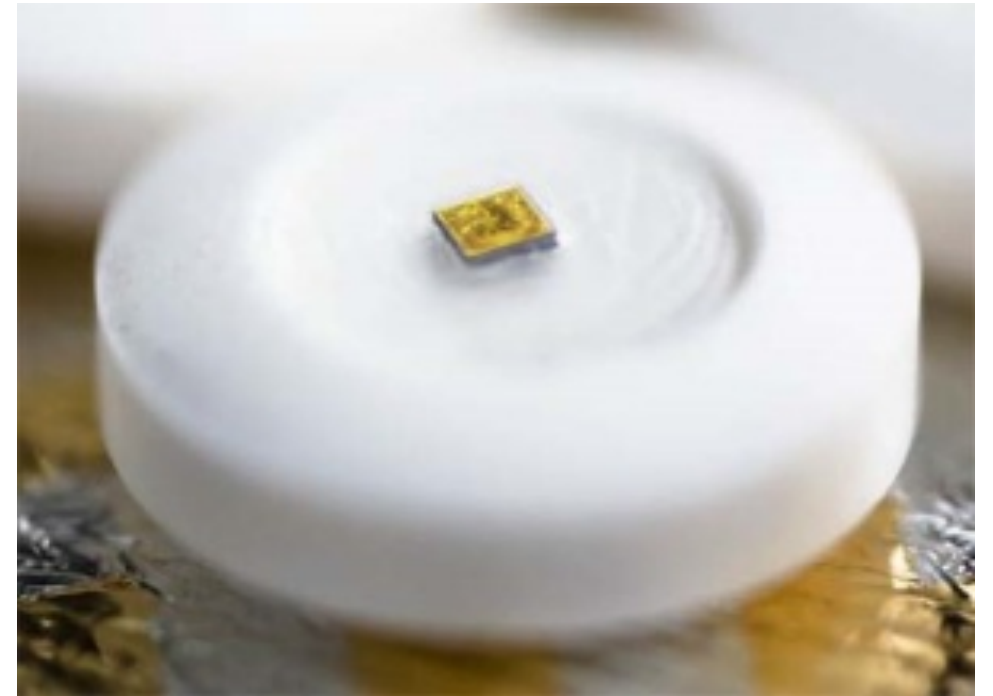
Smart Textile



Implantable and Ingestible Sensors



Xu et al, 2014



Proteus

Major Challenges

Challenges – Heterogeneous Data

- Sensors Data
- Family Histories
- Clinical research databases
- Social network

Challenges – On Node Processing

- Continuous data
- Ultra low power operations
 - Lightweight processing

Challenges - Data Volume

Application Generation

1st Generation

2nd Generation

3rd Generation

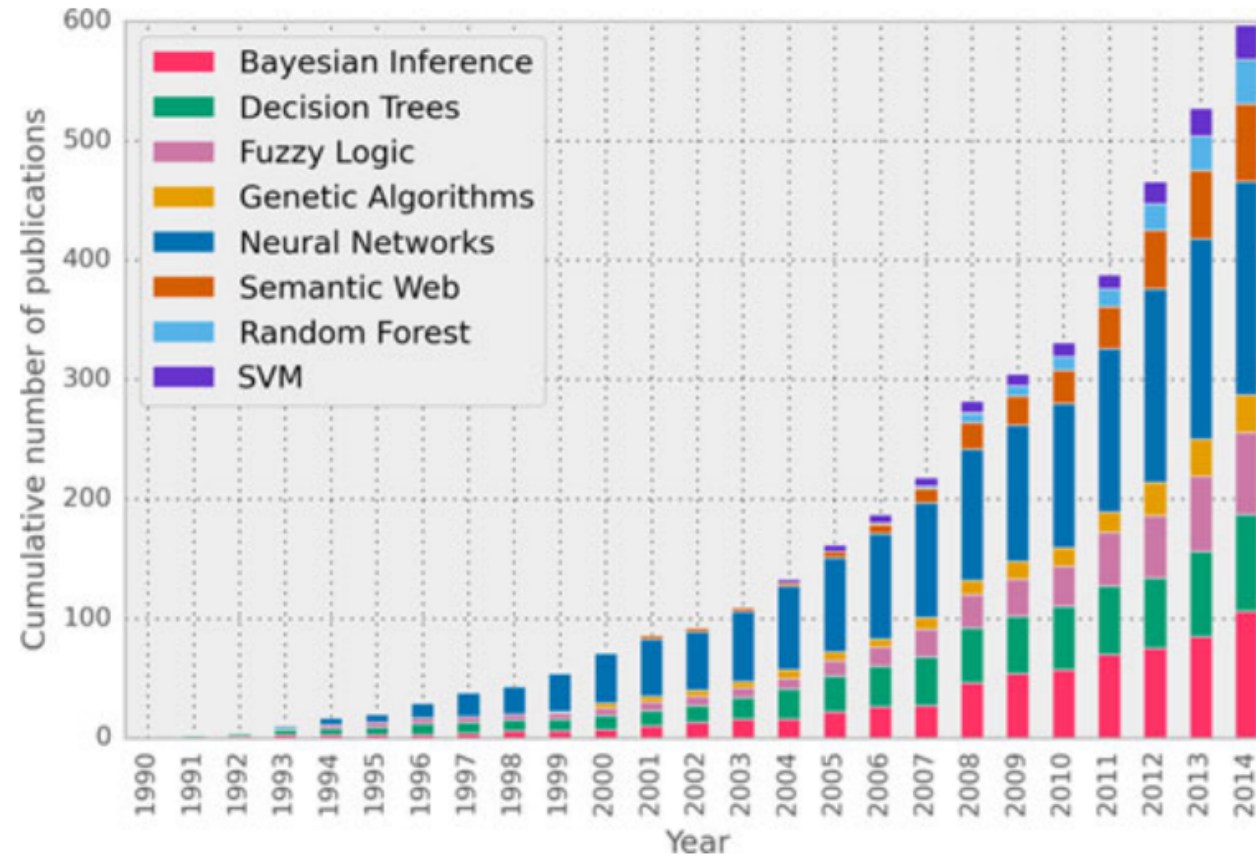
Data Volume

Few MB – Several hundred MB

Several hundred MB to Few GB

Several Hundreds GB to Several TB

Challenges – Analysis



Pervasive Healthcare - Future

- Integrated care
- Continuous Sensing
- Prevention based treatment
- Managing global epidemic

Thank you

