# EEG Signal Data Sharing & Real Time Processing Consideration

NARISA CHU, PH.D.
CE SOCIETY REPRESENTATIVE
NARISA.CHU@IEEE.ORG

@ IEEE BRAIN INITIATIVE
COLUMBIA UNIVERSITY, NEW YORK
DECEMBER 14, 2015

# CEA R6 SC4 WG3 on EEG* Data Interoperability

- September 16, 2015 - CEA R6 SC4 WG3 kick-started "Interoperability Standards Series for Consumer EEG Data," with specification numbers assigned:
  - 2057 - Local Transmission – Lab Streaming Layer (LSL)
  - 2058 - Event Description – Hierarchical Event Descriptor (HED)
  - 2059 - User State Description
  - 2060 - File Storage – Extended Data Format (XDF)
  - 2061 - Group-Level Meta-data Encapsulation – EEG Study Schema (ESS)
- Open Source Standards: LSL, HED, XDF and ESS have been proposed.

* Electroencephalography

# Sample BCI Products Entering the Market

**eMotiv**

- EPOC (2014)

- Insight (2015)


**Interaxon**

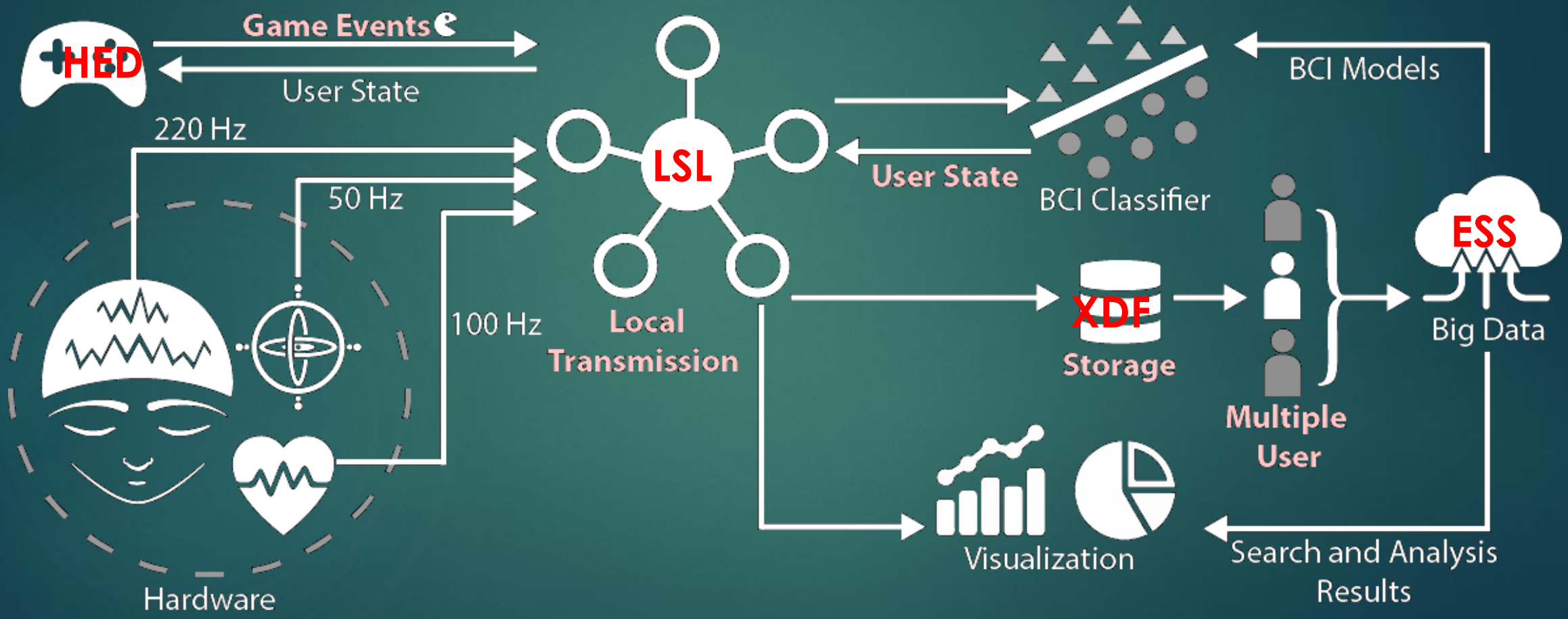
- Muse (2014)

**NeuroSky**

- MindWave Mobile (2012)

# Proposed Standards Series






Source: Nima Bigdely-Shamlo, Syntrogi, et al.

# Summary



- Brain data collection, storage, retrieval and application should be harmonized at the onset of EEG signal capture, through standardization.
- Shared Usage of EEG Data has to address challenges, e.g.:
  - Noises caused by:
    - Brain and Scalp
    - Channels
    - Infrared
    - Bluetooth
    - Wifi
    - Internet delays
  - "Agreeable" user brain states across applications – sick vs. well conditions…
  - Legitimate pattern matching for applications beyond rehab, into consumer marketing and communications – in recognition of emergence of consumer products!