

# Fujitsu Labs of America Platform for Data Driven Health Care

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- The vision from HQ:

*“Connect all people, things and phenomenon with networks. Add advanced analysis and knowledge processing to real world data obtained by various sensing technologies.”*

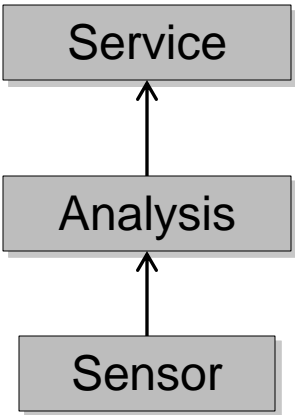
- How do we think about the changes this vision suggests?
- How do we reduce it to practice for health & wellness?

# Some current sensor based health offerings



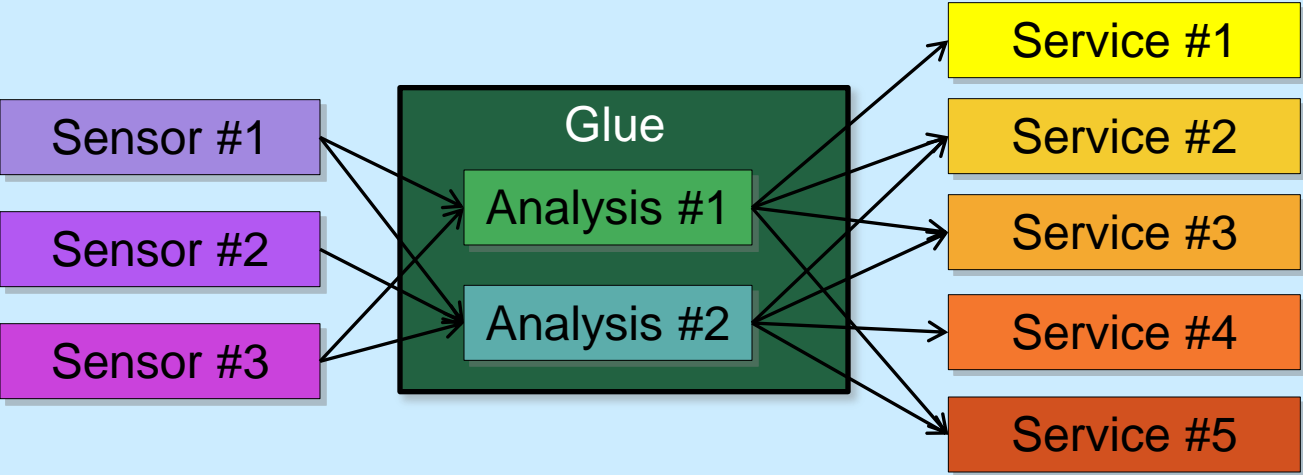
# Sensor based health: Service and vendor evolution

2011 to ~2013



- Offerings generally vertically integrated
- Single vendor at all stages.
- Simple mapping of sensor to service

~2013 on



- Vertical integration breaks down in evolved markets
- Systems become componentized
- Sensors and/or analysis can come from many vendors
- Complex mapping between components & services
- Need for generalized components and 'glue'

# Stress tracking: Combining data streams

- Goal is to accurately calculate stress
- Pulse data (from PPG) and corresponding activity data (from accelerometer) as input



## Hardware:

- 5 miniUSB ports for sensors
- WiFi / BT / low power <1GHz RF
- ARM Cortex A8
- 256 MB SDRAM / 256 FLASH / microSD
- 70mm X 36mm
- ~20WHr Battery

## Software:

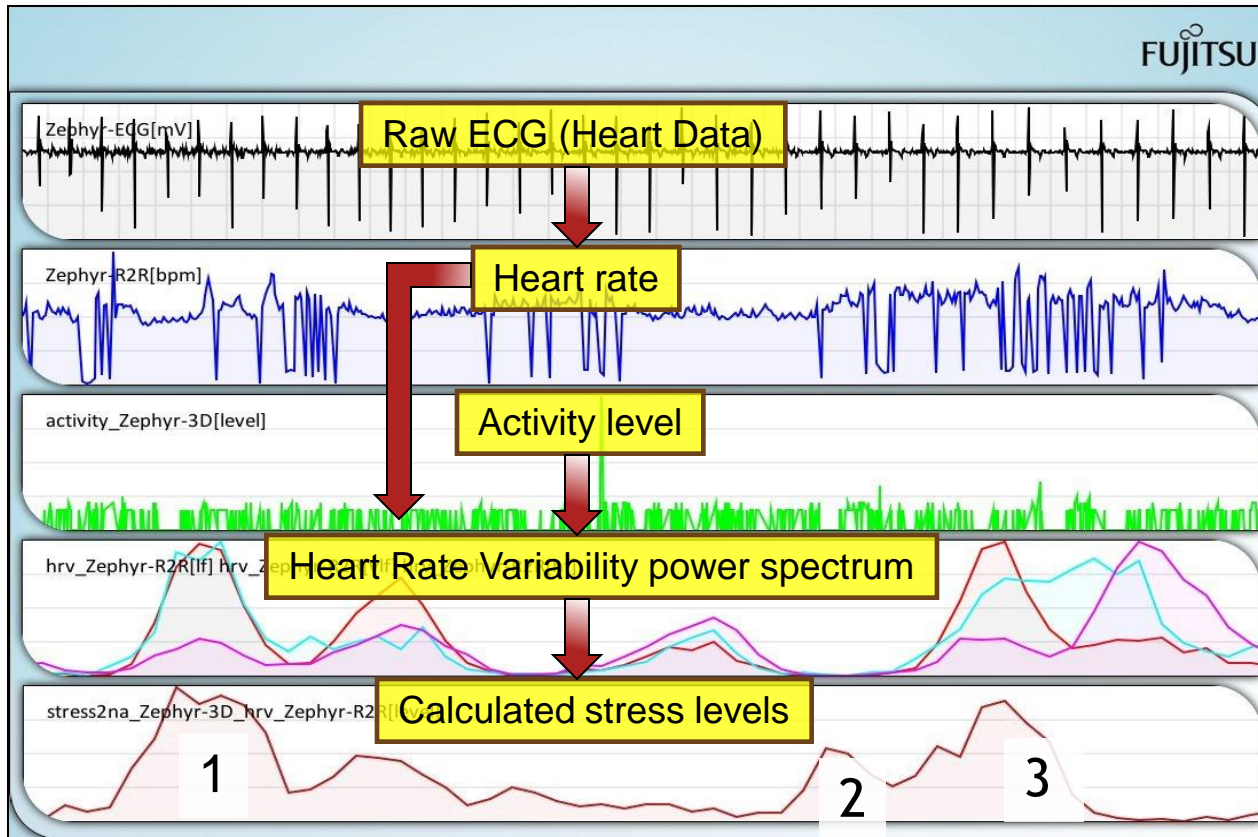
- Linux 2.6
- Stores & processes data locally
- Sensor stream synchronization
- Apache web server
- Custom visualization tools



## Notes:

- Can track, combine and synchronize data streams
- Does data analysis locally
- In time device will fold into mobile phone (like everything else)

# Tracking stress – with a modular architecture



Each layer of processing acts as a 'meta-sensor' that feeds into the next.

Heart rate and activity are used to compute HRV (Heart Rate Variability)

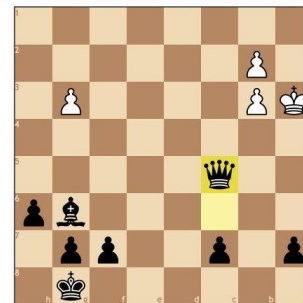
HRV is used to calculate stress.



1 Waiting for opponent



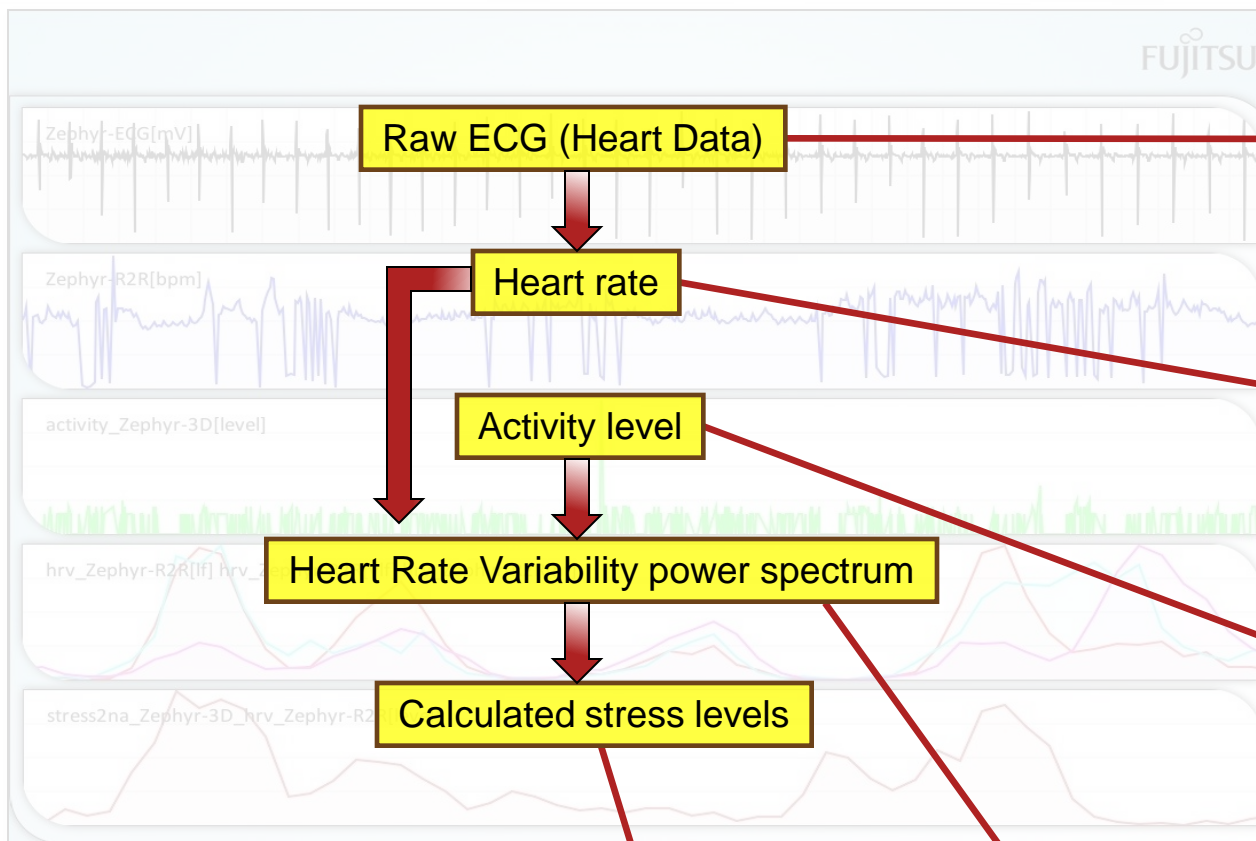
2 Considering 'trick' move



3 Opponent error, game resolved

Stress levels seem to correlate well with the flow of the 'speed chess' game.

# Platform => Modular components



Can use any heart sensor

- Chest strap
- Ear clip
- Ring PPG

Can be input for:

- Fitness tracking
- Better ambulatory BP trigger
- 'Cuffless' BP
- Apnea alert

Can be input for:

- Pedometer
- Sleep tracking
- Sensor filtering
- Trigger ambulatory BP
- Diabetes management
- Fall detection


Can be input for:

- Diabetes management
- Hypertension management
- Sleep problem diagnosis

Can be input for:

- Meditation tracking
- Drowsiness detection
- Infection prediction





**FUJITSU**

shaping tomorrow with you