CURA

Fatigue Management System :

Technology Overview: Engineering, Design, Analytics, Responsive Learning Program

Presenter:
Matthew Kenyon

CurAegis™ TECHNOLOGIES

Scientific Advisory Board

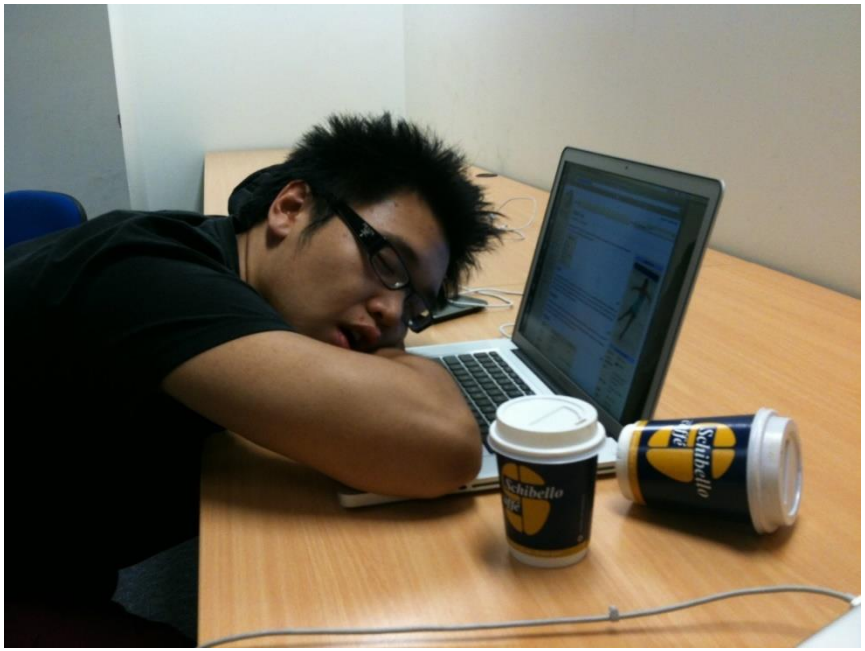
- **Dr. Laura K. Barger**
  - Bringham and Women's Hospital/Harvard Medical School
- **Dr. Richard J. Hanowski**
  - Virginia Tech
- **Dr. Melissa Mallis**
  - Scientist, expert and researcher in Fatigue Management Systems
- **Dr. Jonathan A. Marcus**
  - University of Rochester
- **Dr. Kenneth Wright Jr.**
  - University of Colorado at Boulder
- **Dr. Torbjorn Akerstedt**
  - Stockholm University
- **Dr. Michael Grandner**

System Objectives

- Inform users of their alertness levels throughout the day
- Help users remediate their fatigue problems
- Inform managers of at risk individuals when appropriate

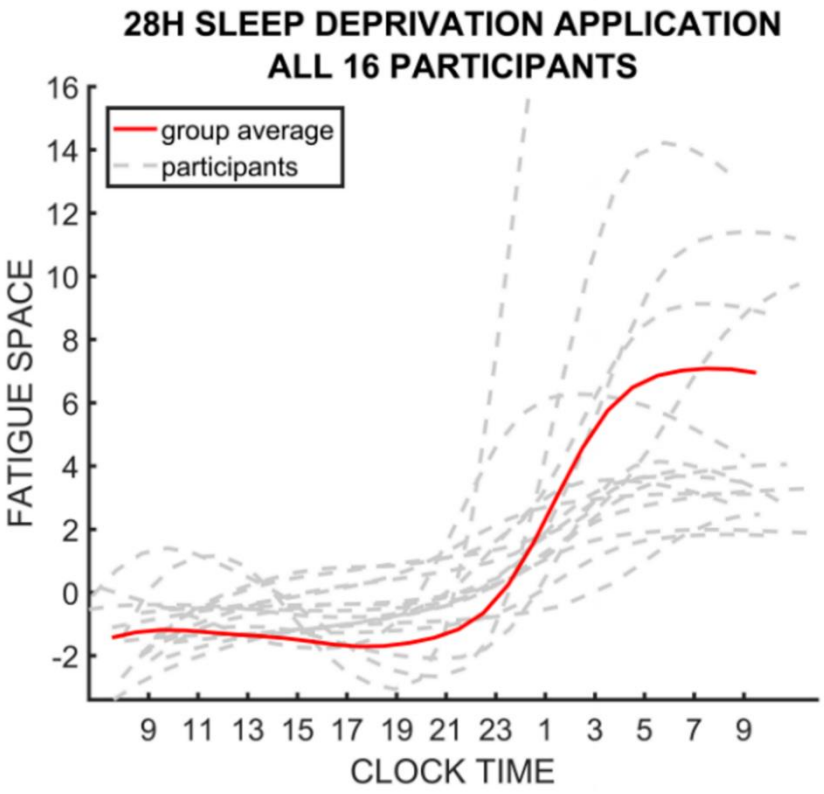
Fatigue at its core

- **Not all fatigue is created equal**
- **Individuals have differing amounts of susceptibility to fatigue**
- **Fatigue is similar to other health issues**

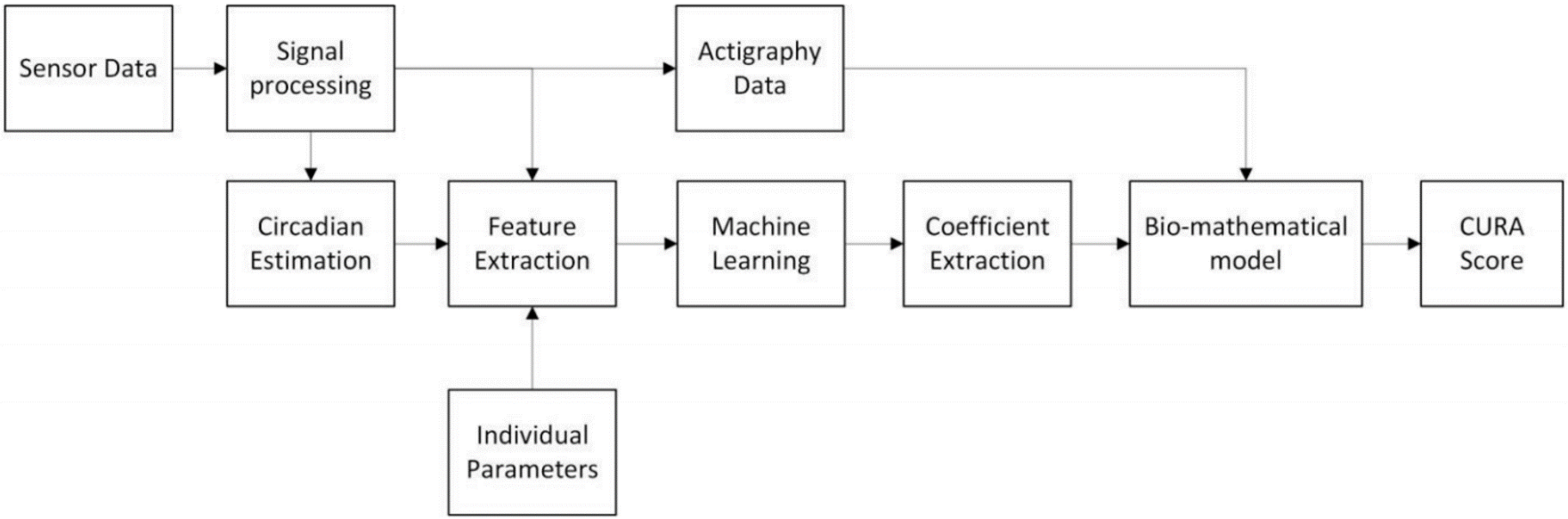


Existing Models

- **Generalized and trained to groups**
- **Circadian oscillators are too generic**
- **Lack of specificity for unique individual variables such as age, gender, weight etc.**



Our Approach



Simply put…

Accurate actigraphy

+

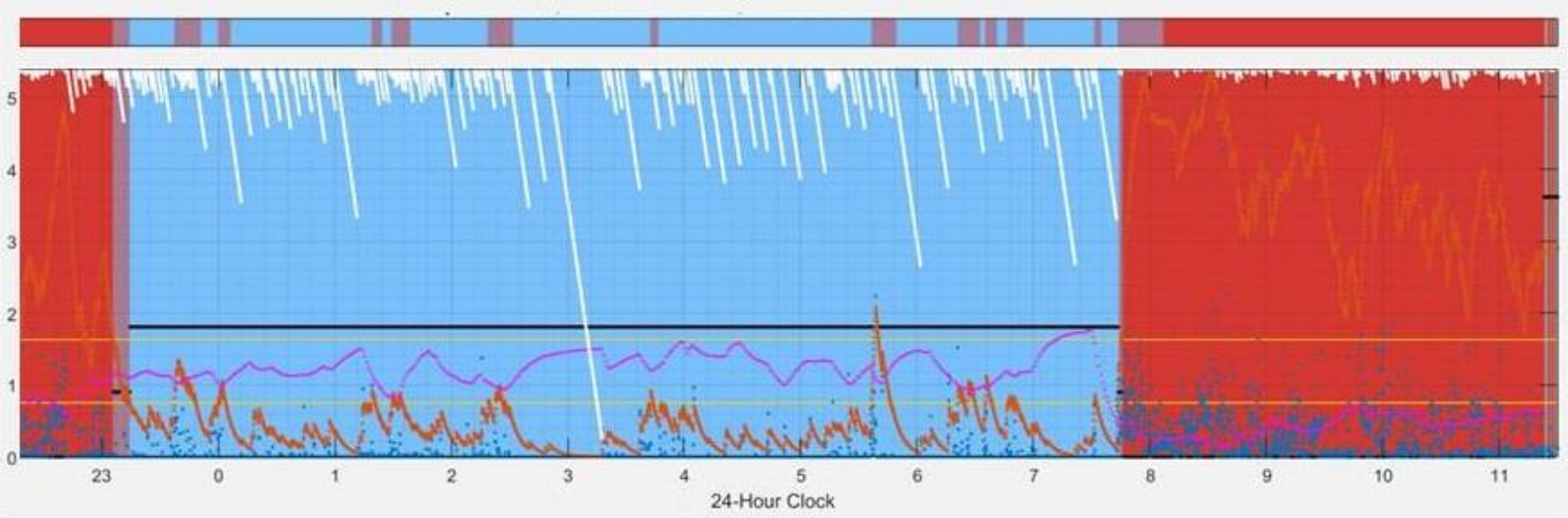
Circadian rhythm estimation

=

Individualized

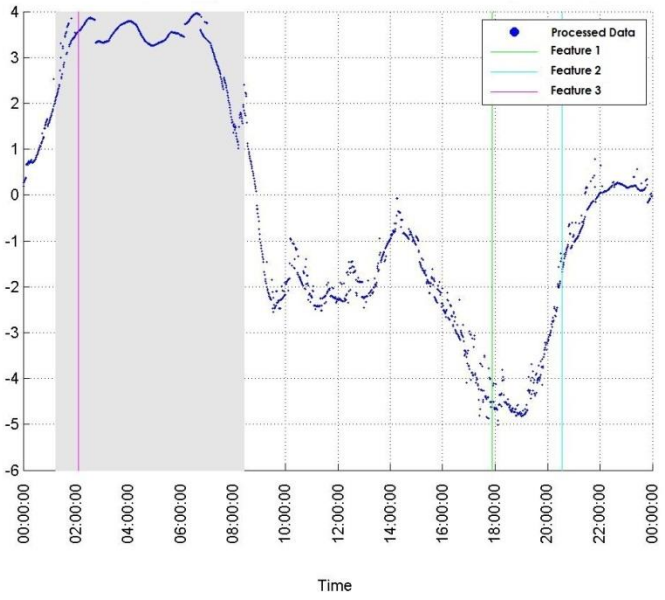
bio-mathematical model

Actigraphy

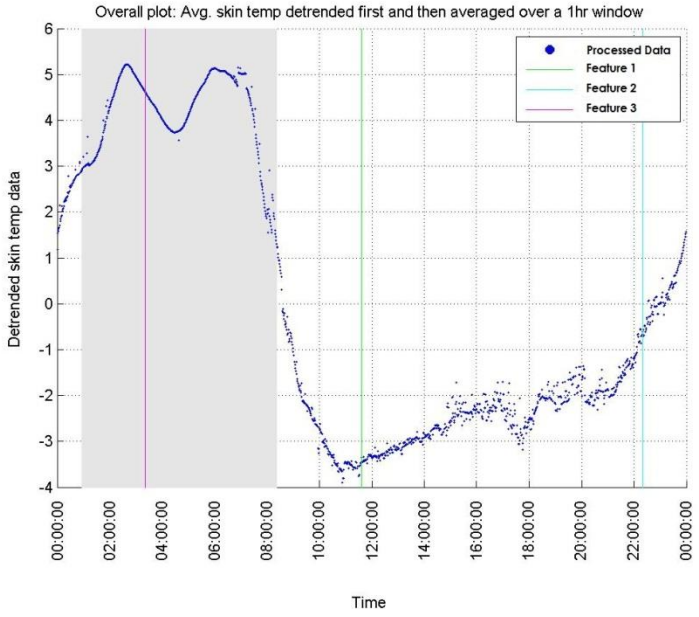


- We developed our own actigraphy algorithm in-house
- All processing is handled on the watch
- Actigraphy results exceeded our expectations when compared to PSG
  - Results will be published in June
- Actigraphy data is available wirelessly

Circadian Results



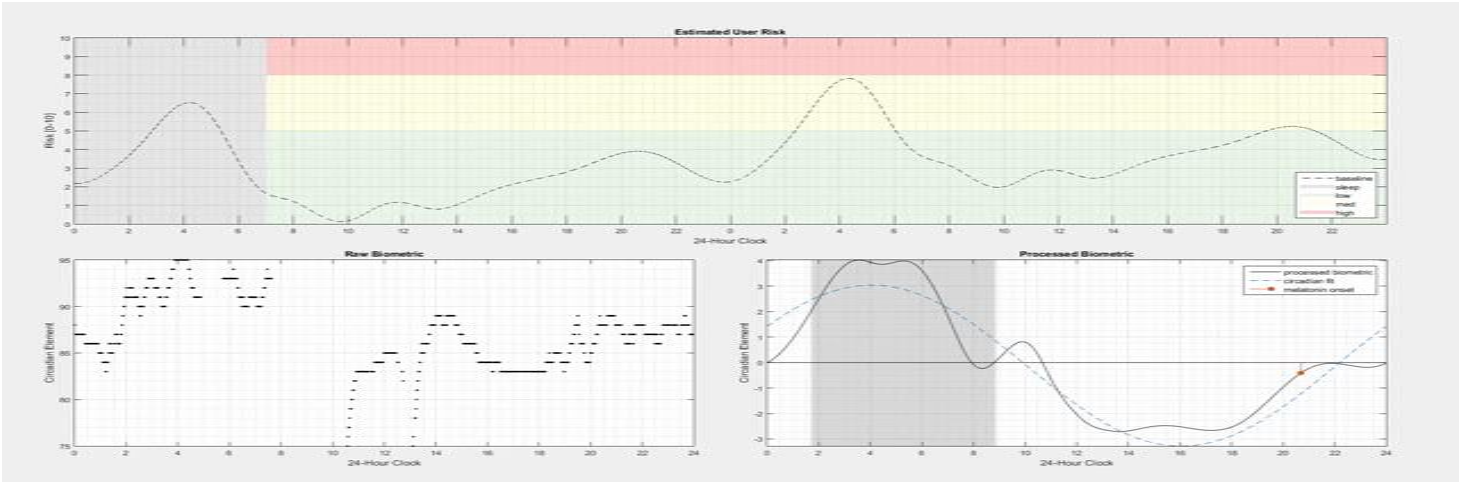
Participant #1



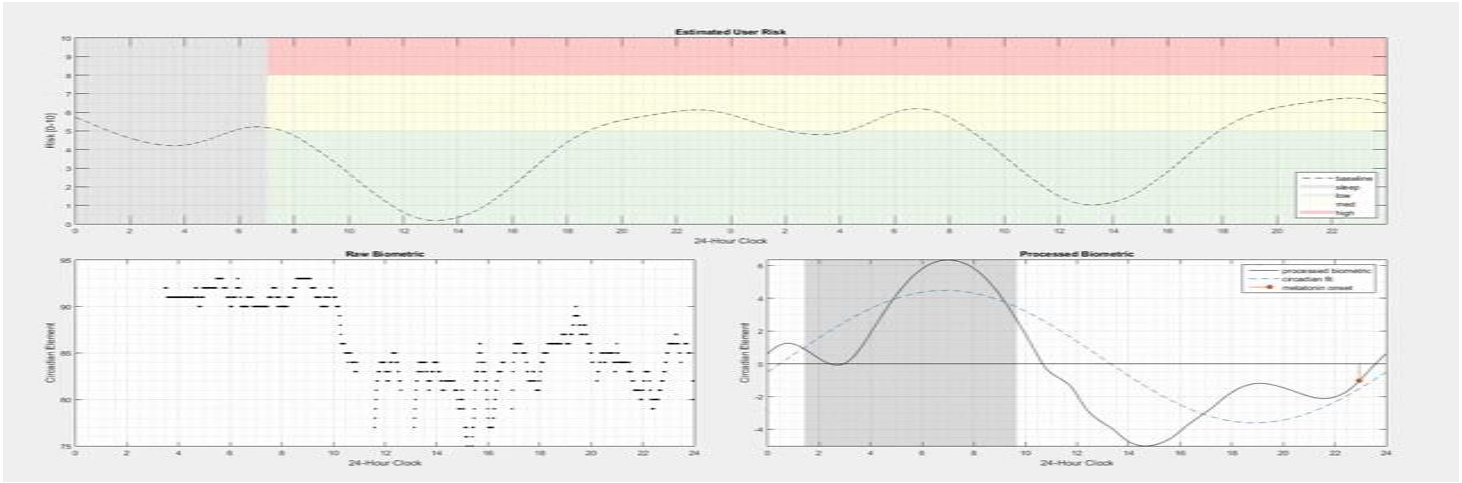
Participant #2

- Data gathered by the watch produces unique circadian estimations
- Note: mid-afternoon lull in participant 1

Alertness Prediction Results

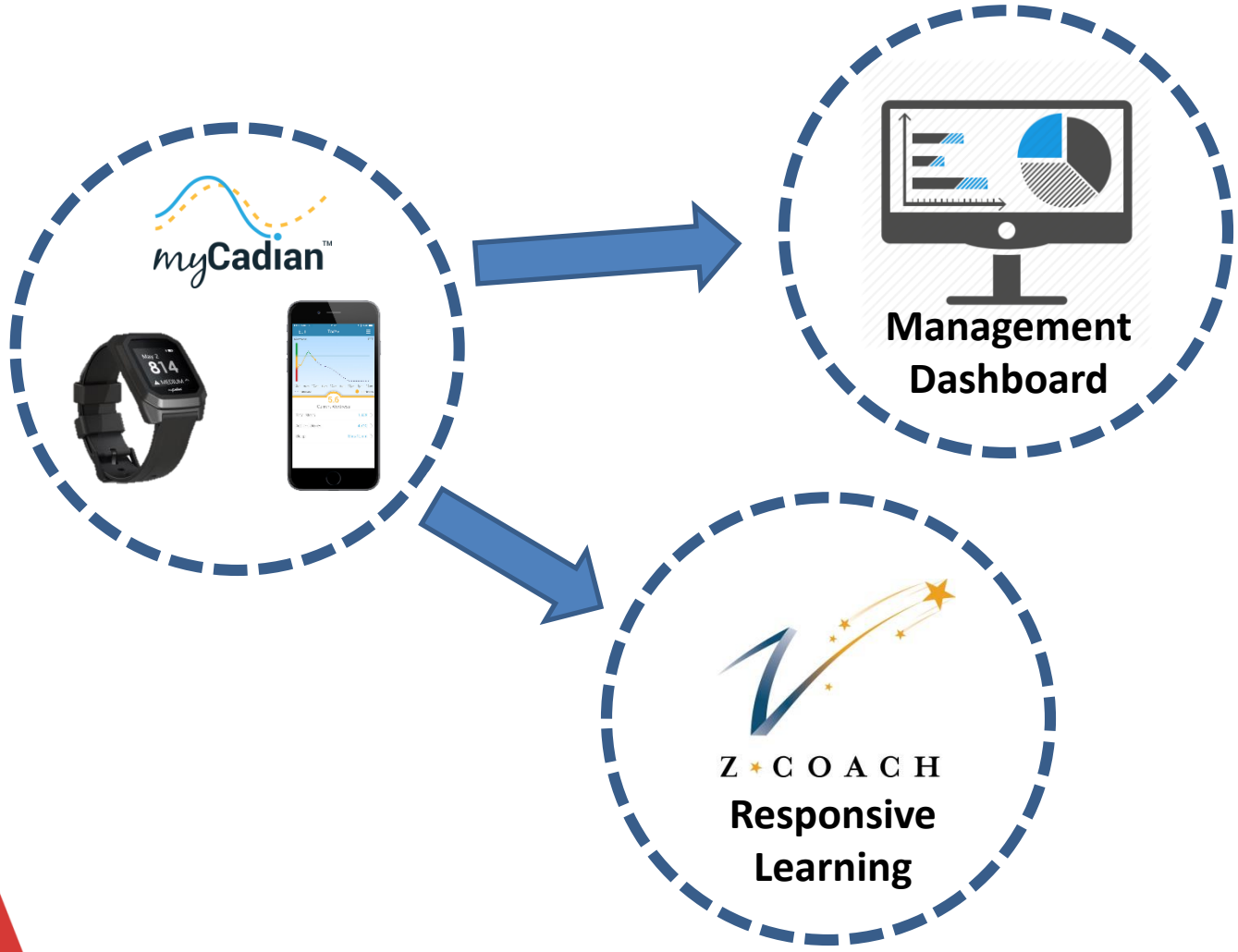


Participant #1



Participant #2

The CURA System



Our Wearable

- **Sensors include:**
  - **Motion sensors**
  - **Skin and Ambient temperature sensors**
  - **Heart Rate Sensor**
  - **SPO2 Sensor**
  - **Ambient light sensor**
- **Bluetooth LE**
- **Touch screen interface**
- **Panic button**

Mobile Application

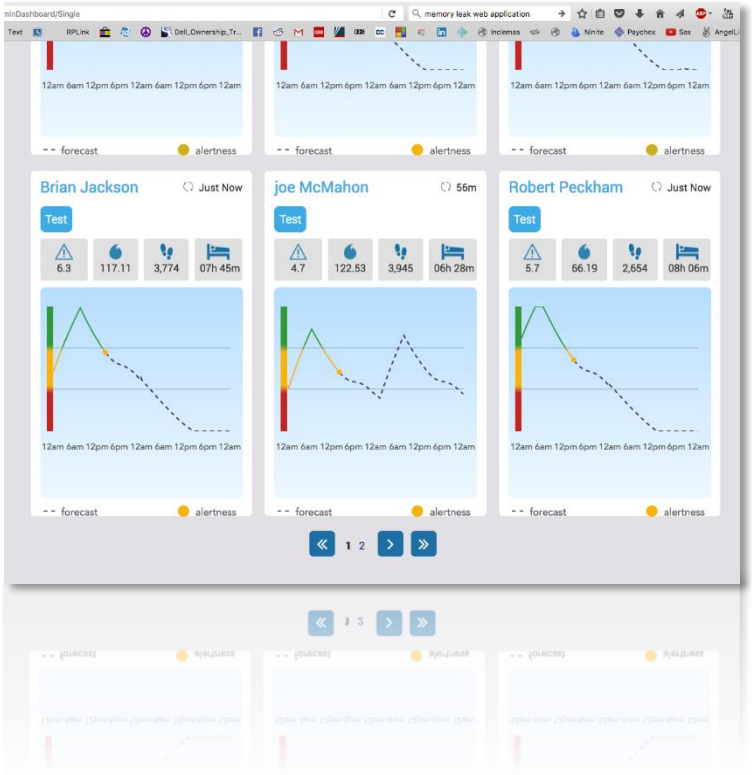
- **Personalized Fatigue risk score**
- **User activity metrics**
- **Sleep details**

Responsive Learning

- System provides feedback through learning modules
- Learning modules can be targeted to user's specific needs
- Learning modules can be queued based upon real feedback from the system
- Objective is behavior change

Manager Dashboard

- **Real time predictions of workforce alertness**
- **Track improvements in workforce sleep health**
- **Pre-emptive actionable information to assist scheduling**
- **Customizable based upon operational environment**



System Summary

- Inform users of their alertness levels throughout the day
- Help users remediate their fatigue problems
- Inform managers of at risk individuals when appropriate
- Partners and Beta testers wanted

Questions?