Team NeuroDynamics Example

**Multi-subject Simultaneous EEG Acquisition**

- Findings: *Modeling the Nuerodynamic complexity of submarine navigation teams (assessed synchronization of 6 individuals)*
- Human Factors: *Cognitive Neurophysiologic Synchronies*

**The Neuroscience of Leadership Project at ESADE Business School – Barcelona**

- Video News Story: *The Neuroscience of Leadership Project* (YouTube; 5 min)
- Media Coverage: *Fortune Magazine - Tapping Brainwaves to Measure Business Sense - June 2015*
- Findings: *Emergent Leadership and Team Engagement - Findings from The Neuroscience of Leadership Project* - David Waldman (Arizona State University) and ABM demonstrate the B-Alert Cognitive State Metrics accurately predicting emergent leaders within groups. The paper was awarded the Best Paper Proceedings for the 2013 Academy of Management Meeting -- #1 in the Financial Times 45.
- Video Presentation: *Early Findings Presentation at ESADE Business Forum* (YouTube)
- Media Coverage: *Are You A Leader? Brainwaves Can Tell* - Discovery News
- ABM Webpage: *Team NeuroDynamics*

### Accelerated Learning

**Marksmanship, Archery, and Golf**

- Media Coverage: *Discovery Science’s Through the Wormhole with Morgan Freeman* (YouTube; 6 min)
- TEDx Talk: *A Window on the Brain: Chris Berka at TEDxSanDiego* - Chris Berka, CEO and Co-Founder of Advanced Brain Monitoring, provides insight into the company vision and recent findings enabled within DARPA's Accelerated Learning Program
- Cover Story: *Zen and the Art of Genius - New Scientist Magazine*
- Findings: *Characterizing the Psychophysiological Profile of Expert and Novice Marksmen*
- Findings: *Assessment of Rifle Marksmanship Skill Using Sensor-Based Measures*
- Findings: *Identifying psychophysiological indices of expert vs. novice performance in deadly force judgment and decision making*
- Follow-on Findings: *Modeling temporal sequences of cognitive state changes based on a combination of EEG-engagement, EEG-workload, and heart rate metrics*
- ABM Webpage: *Accelerated Learning*

### Optimizing Surgeon Training

- Video Summary: *Cognitive Skills Assessment During Robot Assisted Surgery - Summary*
- Peer-review Publication: *BJUI - Cognitive Skills Assessment During Robot-Assisted Surgery - Separating Wheat from Chaff*
- Findings Poster: *Characterizing the Expertise and Proficiency of Surgeons Using EEG-based Metrics*
- Contact: Dr. Khashid Guru, Roswell Park Cancer Institute - ABM will be happy to introduce you to learn about his experience with B-Alert and first hand account of developing his methods.
- ABM Webpage: *Accelerated Learning*

### Major League Baseball Batters

- Video: *Wall Street Journal - Using Science to Scout Hitters*
- News Story: *SB Nation - Take Me Out to the Brain Game*
- ABM Webpage: *Accelerated Learning*
Law Enforcement Officers

- Publication: Identifying Psychophysiological Indices of Expert vs. Novice Performance in Deadly Force Judgment and Decision Making - Frontiers in Neuroscience
- Video: Deadly Force Decision Making - DARPA supported study at Washington State University (collaboration with ABM)
- Video: TEDx Talk - "Tired Cops, Justice and Injustice" - Bryan Vila - Washington State University
- Principal Investigator: Dr. Bryan Vila - Research Gate Profile
- ABM Webpage: Accelerated Learning

Brain Computer Interface

Neurorehabilitation

- Video News Story: BBC Horizons profiles DARPA's Closed Loop Project (YouTube HD; 6 min)
- Publication: An Adaptive Brain Actuated System for Augmenting Rehabilitation - Frontiers in Neuroscience
- Findings Poster: Changes in Cortical Activation During BCI Use in Chronic Spinal Cord Injury
- ABM Webpage: Brain-Computer Interfaces

Cortically Coupled Computer Vision

- Video News Story: BBC Horizons profiles Neuromatters (YouTube HD; 5 min)
- Publication: In a Blink of an Eye and a Switch of a Transistor: Cortically Coupled Computer Vision - Proceedings of the IEEE
- Principal Investigator: Columbia University - Professor Paul Sadja
- ABM Webpage: Brain-Computer Interfaces

Consumer Neuroscience

Recent Media Coverage

- Introduction: Coursera - Introduction to Neuromarketing - Check out the 2 min intro video featuring B-Alert X10
- Presentation: Dr. Thomas Ramsoy @ South X Southwest 2015 - The Cognitive Workload Metric serves as a measure for understanding how modern media communications are received by consumers
- ABM Webpage: Consumer Neuroscience

EEG Biomarkers

Neurodegenerative Diseases

- Keynote Engagement: Abbreviated (90 seconds) I Full-Length (20 minutes) - Biogen's Dr. Ajay Verma highlights partnership with Advanced Brain Monitoring at StrataRX
- Findings Poster: GTC Biomarkers - Development of EEG Biomarkers for Alzheimer's Disease - Presented at GTC Biomarkers 2014
- Podcast: CureTalk Radio - Wearable EEG in Clinical Trials: Now & Beyond - Featuring ABM CEO & Co-Founder Chris Berka with Biogen's Dr. Ajay Verma (63 minutes)
- Press Release: Development of EEG Biomarkers for Alzheimer's Disease
- ABM Webpage: EEG Biomarkers

Psychiatric Indication – PTSD

- DARPA Findings Release: DCAPS Information Pamphlet - PTSD (Shilling, 2013)
- Conf Poster: Detection & Computations Analysis of Psychological Signals (DCAPS) - DARPA I2O Demo Day
- ABM Webpage: EEG Biomarkers
**EEG-based Metrics**

**Predicting Fatigue Errors**

- **UCSD Findings** *(Login Required)*

**EEG @ 15,000 Ft.**

- **EEG at 15,000 Feet** - This is a link to a power-point introduction on the study assessing the physiological impacts of live flight vs. simulated aviator training. Also included is a recent findings report as prepared by the research team at STISim.

**Details on the development and accuracy**

- **Cognitive State Metrics**
  - Development of The B-Alert Cognitive State Metrics *(Engagement Classifications)* - BioPsy 2011
  - Real-Time Analysis of EEG Indexes of Alertness, Cognition, and Memory Acquired With a Wireless EEG Headset
  - EEG-derived Estimators of Present and Future Cognitive Performance *(Frontiers 2011)*

- **Cognitive Workload Metric**
  - Development of The Cognitive Workload Metric - ASEM 2007
  - Correlation between Expected Workload and EEG Indices

- **Info-graphics:**
  - Cognitive State and Cognitive Workload Metric Overview Slides

**Findings enabled by the Metrics from independent researchers:**

- **Cognitive Skills Assessment During Robot-Assisted Surgery - Separating Wheat From Chaff**
- **EEG Estimates of Engagement and Cognitive Workload Predict Math Problem Solving (Galan et al, 2012)**
- **Cognitive State Assessment - Examination of EEG-Based Measures on a Stroop Task (Sciarini et al, 2014)** - US Naval Postgraduate School
- **Correlation between Expected Workload and EEG Indices of Cognitive Workload and Task Engagement** - Augmented Cognition *(Login Required)*
- Modeling temporal sequences of cognitive state changes based on a combination of EEG-engagement, EEG-workload, and heart rate metrics
- **EEG Estimates of Engagement and Cognitive Workload Predict Math Problem Solving (Galan et al, 2012)**

**Multi-subject Simultaneous EEG Acquisition**

- Findings: Modeling the Neuodynamic complexity of submarine navigation teams (assessed synchronization of 6 individuals)
- **Human Factors:** Cognitive Neurophysiologic Synchronies

**Validation of the Cognitive Workload Metric**

- **Journal of Urology** - Cognitive Skills Assessment During Robot-Assisted Surgery - Separating Wheat From Chaff
- Augmented Cognition - Correlation between Expected Workload and EEG Indices of Cognitive Workload and Task Engagement *(Login Required)*
- **Research led by Naval Post Graduate School** - Cognitive State Assessment - Examination of EEG-Based Measures on a Stroop Task *(Sciarini et al, 2014)*
- Look closely at Figure 3.2 - Attached - Objective Measures of Situational Awareness Using Neurophysiology Technology
- Modeling temporal sequences of cognitive state changes based on a combination of EEG-engagement, EEG-workload, and heart rate metrics
- **EEG Estimates of Engagement and Cognitive Workload Predict Math Problem Solving (Galan et al, 2012)**