



NeuroLink

A Brain Computer Interface

for ALS Patients by

Mind Meld

Team MindMeld

- Andrew Black – Team Leader
 - Computer Science, BSMS program
- Matthew Bodofsky – Quality/Process Manager
 - Information Technology, Bachelor's Degree
- Ken Fox, CISSP, CSSLP – Planning, Design
 - Computer Science, Math Minor, Bachelor's Degree
- Eric Loi -- Development Manager
 - Computer Science, Bachelor's Degree

Stakeholders

- Sara Feldman
 - Drexel College of Medicine
 - Philadelphia PA.
- Jeff Salvage
 - Drexel College of Computing and Informatics
 - Philadelphia PA
- EPICS provided funding for Muse & EyeTribe

The Problem -> ALS

- **Amyotrophic Lateral Sclerosis**
 - Lou Gehrig's Disease
 - Motor Neurons in Brain & Spinal cord degenerate
 - Eventual loss of all voluntary Muscle control:
 - Walking, speech, facial muscles
 - Senses still work
 - Always fatal, no cure, limited mitigations
- Need a way to interface with the world
 - Family
 - Care providers (Doctors, Nurses, Therapists, etc)

Existing Solutions & Alternatives

- Existing
 - IntendiX Speller (VEP/P300)
 - Emotive Insight
 - Both are Expensive
- Alternatives
 - Muse by InteraXon (\$300)
 - <http://www.choosemuse.com/>
 - Melon Headband (preproduction)
 - <http://www.thinkmelon.com/>

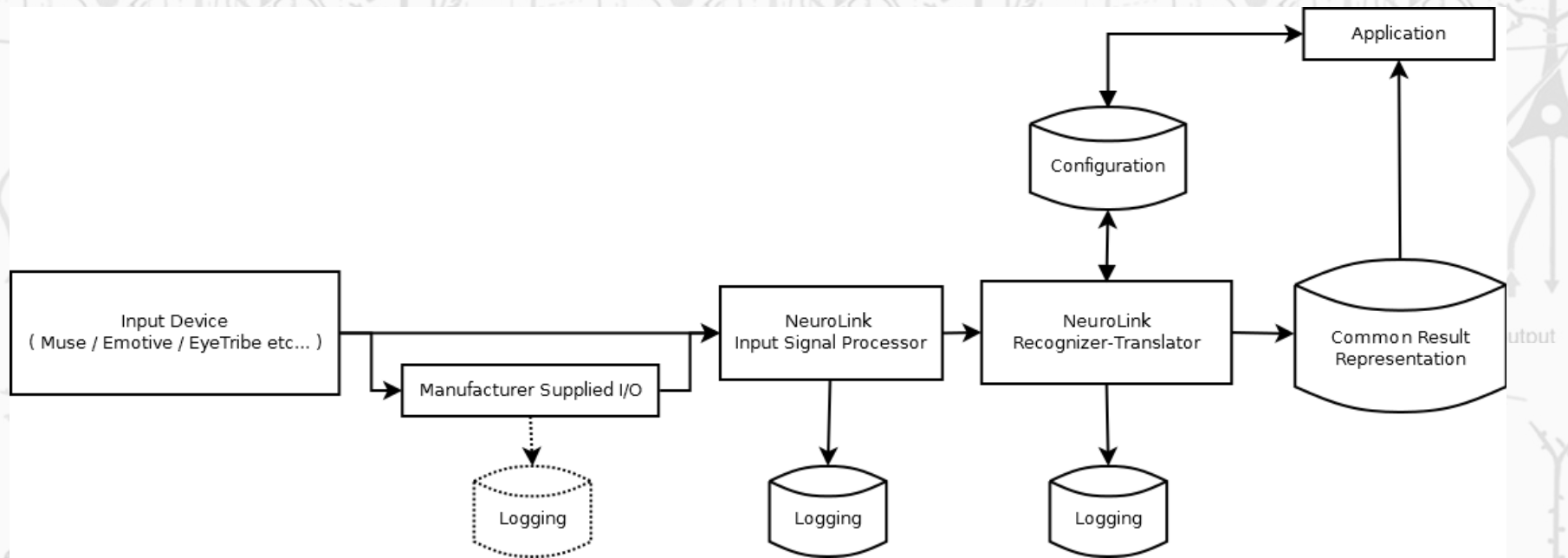
Challenging Brainwaves

- Brainwaves (EEG) measured over 50 years
- Alpha, Beta, Delta, Gamma, Mu, & Theta waves
- It's not easy
 - No mind reading/control yet
 - Every person is different
- Solutions and research suggest using combinations of two or more waves to identify state.

Technology Evaluation Report

- What can it do
- What are its limitations – reliability, accuracy, & durability
- Development tools/utilities
- Vendor Libraries
- Vendor Support
- 3rd Party support (user groups, blogs, etc)

Modular Staged Architecture

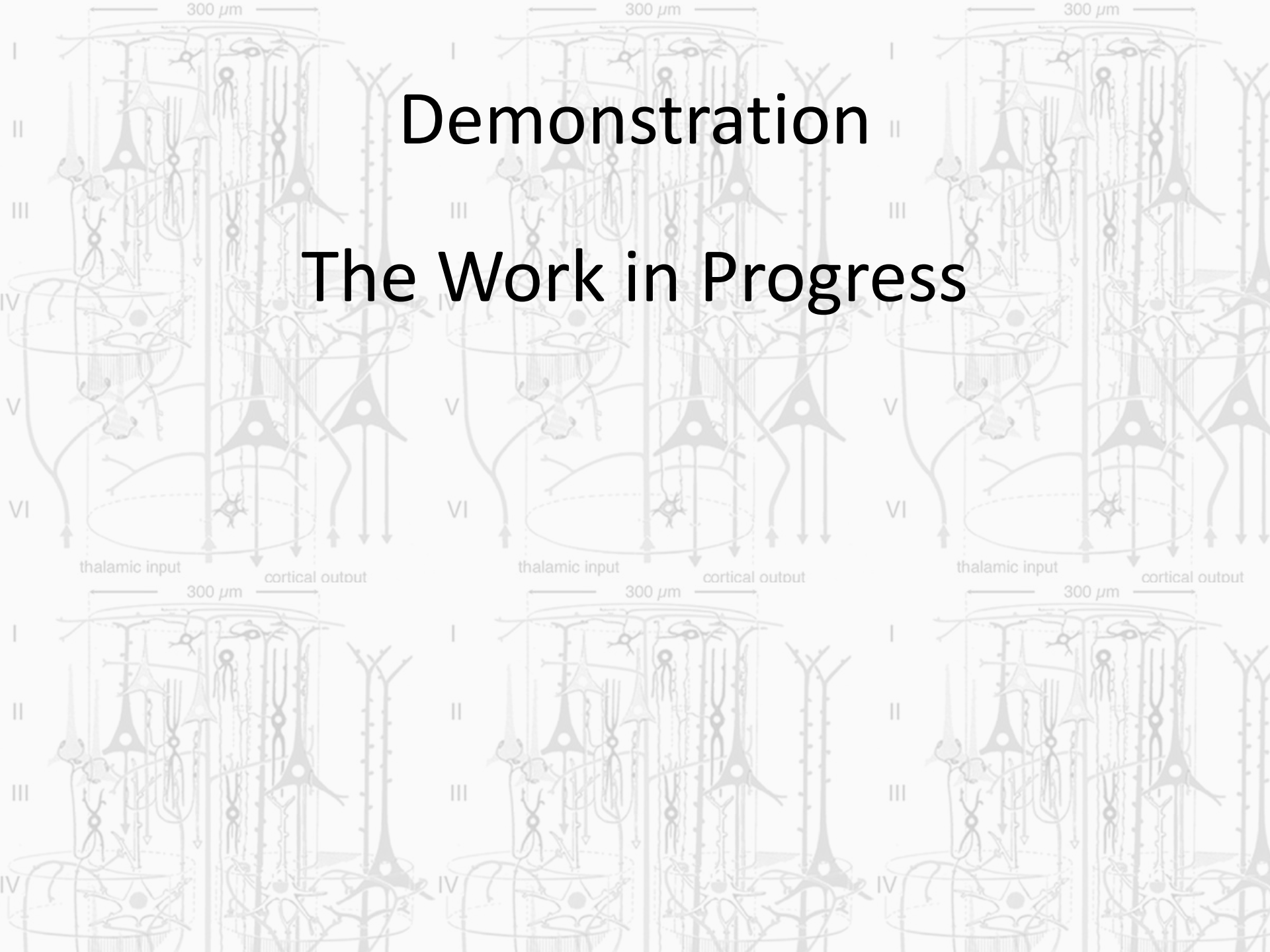


Stages

- Device
- Manufacturer I/O (drivers, utilities, tools, SDK)
- Input Signal Processor (ISP)
- Recognizer-Translator (RT)
- Common Result Representation (CRR)
- Application

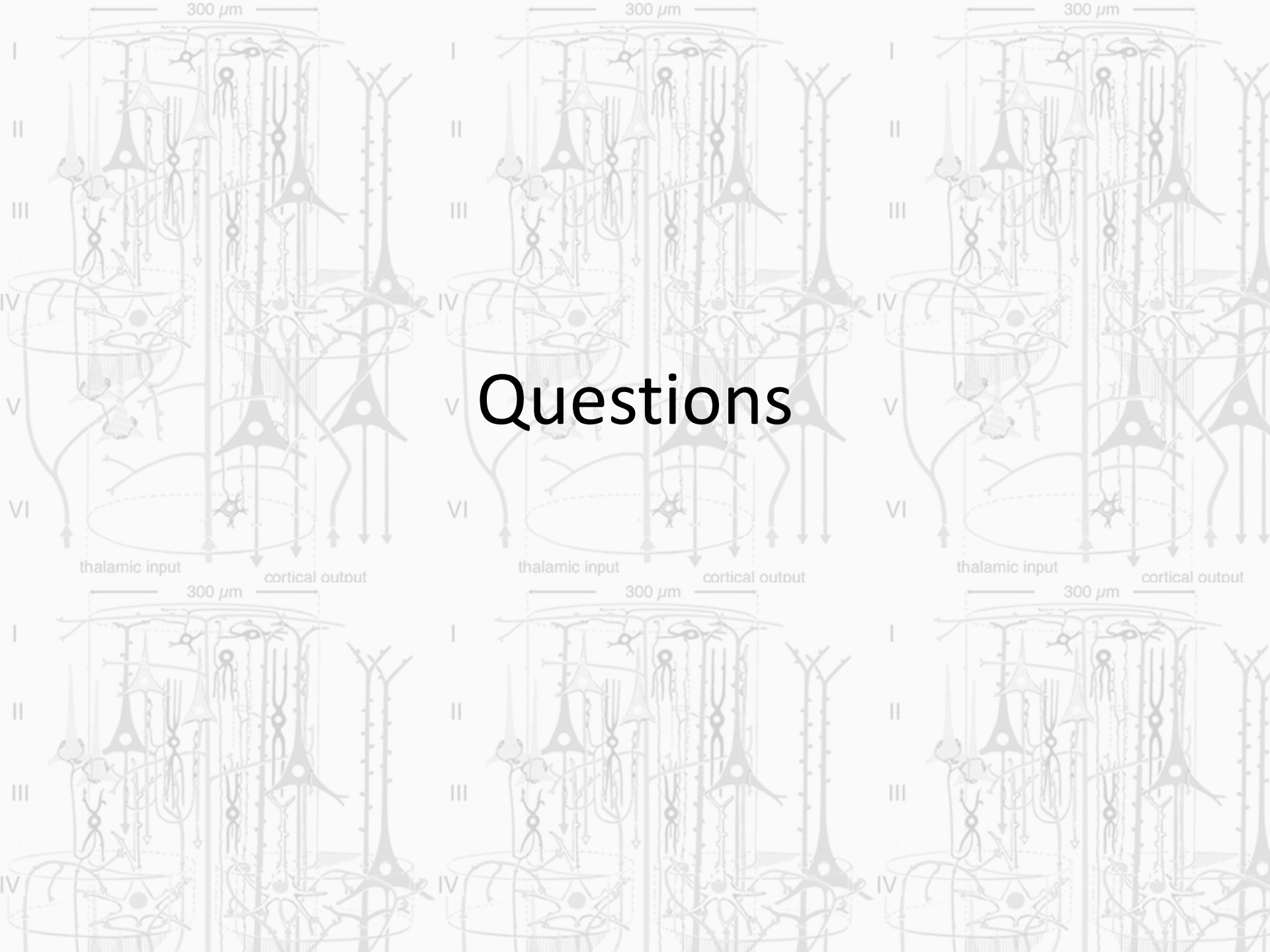
Demonstration

The Work in Progress



Summary

- Help people with Neuro Degenerative Diseases
- Use inexpensive (relatively) technology
- Support multiple input devices
- Support multiple targets (systems/applications)
- Modular/flexible processing supports change
- Developing BCI is non-trivial



Questions



THANK YOU