Creating standards for commercialisation

Emil Hewage, Co-Founder & CEO

Workshop 3: Standards for Neurotechnologies and Brain-Machine Interfacing

TU Graz, 16th September, 2019
BIOS | Creating standards for commercialisation

• Neurotechnology - need for platform technologies

• Our journey at BIOS

• Standards are Key enablers for future neurotechnology companies

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NEURAL IS THE NEXT FRONTIER

SPINE - 1000 MB/S
ORGAN - 4 MB/S
LIMB - <1 MB/S
<... FOR LIFELONG HEALTH ...>

REDUCED PAIN
REDUCED COST
INCREASED EMPOWERMENT & BETTER HEALTH
BIOS | New generation of neural technologies

Blood pressure control with selective vagal nerve stimulation and minimal side effects.


Plachta DT¹, Gierthmuehlen M, Cota O, Espinosa N, Boeser F, Herrera TC, Stieglitz T, Zentner J.

Vagus nerve stimulation inhibits cytokine production and attenuates disease severity in rheumatoid arthritis


PNAS July 19, 2016 113 (29) 8284-8289; published ahead of print July 5, 2016
https://doi.org/10.1073/pnas.1605035113

Experimental nerve-stimulation therapy partially revives man in long-term vegetative state—but experts urge caution

By Michael Price  |  Sep. 25, 2017, 12:00 PM
OUR APPROACH: DELIVERY FOR ECOSYSTEM ADOPTION

- Business Model
- Economic Scalability
- Clinical Compatibility
- Regulatory Approval
- Scientific Rigour
- Technical Advancement

COMMERCIAL

TECHNICAL
1. A stable & high-fidelity neural connection

2. Discovery of neural biomarkers for multiple diseases

3. An ability to deliver this to people & clinics in a safe & cost effective way

Visualization of BIOS neural biomarker set IT2-S1, presented at NIPS 2017
BIOS | Where we started

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“USB PORT FOR THE BODY”

PLUG & PLAY

OPEN STANDARD
BIOS | Key facts

Founded: 2014
Team size: 35+
BIOS | UK talent advantage: high concentration of neuro talent

PREVIOUS COMPANIES:

28 Full-Time
13 Part Time
6k+ Clinical Procedures*
10+ First of kind Medical Devices*
300+ Peer-reviewed papers*

*denotes combined achievements prior to joining BIOS

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OPEN STANDARD EDGE-AI DRIVEN NEURAL INTERFACES
DISCOVER & DEPLOY NEW TREATMENTS USING ADVANCED RESEARCH IMPLANTS & ML
OUTCOME MEASURES
POWER CLINICAL & PATIENT OPERATING SYSTEMS
BIOS | The data challenge: new approaches to discovery

- LONG TERM & LARGE SCALE NEURAL DISCOVERY
- DISTRIBUTED, ML ENABLED, NEURAL DATA STUDIES
- BENCHMARKED METHODS, LEVERAGING NEURAL BIOMARKERS
- EARLY CLINICAL IMPACT
- OPEN TRANSLATION PLATFORMS

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Neural Biomarkers for Respiration

- Identify activity of vagus nerve modulating respiration

- Neural Biomarker-like encoding via ML:
  - Output independent of time shifts and highly tolerant to time scaling
  - Prioritisation of poignant signal features

- Subject-to-subject repeatability

- Robust to implantation procedure

- Invariant to electrode types
BIOS | Enabling faster delivery of clinical applications
BIOS | Facilitating standards for the neurotech ecosystem
ECOSYSTEM GOAL: FAST ITERATION
WHILE MITIGATING A NEW FORM OF
REGULATORY & PAYOR RISK
WILL UNLOCK NEW GROWTH

GO TO MARKET “VALLEY OF DEATH”

+$50 \text{B}$

Neurotech Growth Opportunity

+ 20 more
BIOS | Creating standards for commercialisation

Neurotechnology - need for platform technologies

Standards are Key enablers for:
• future neurotechnology companies
• Better, more accessible products
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