



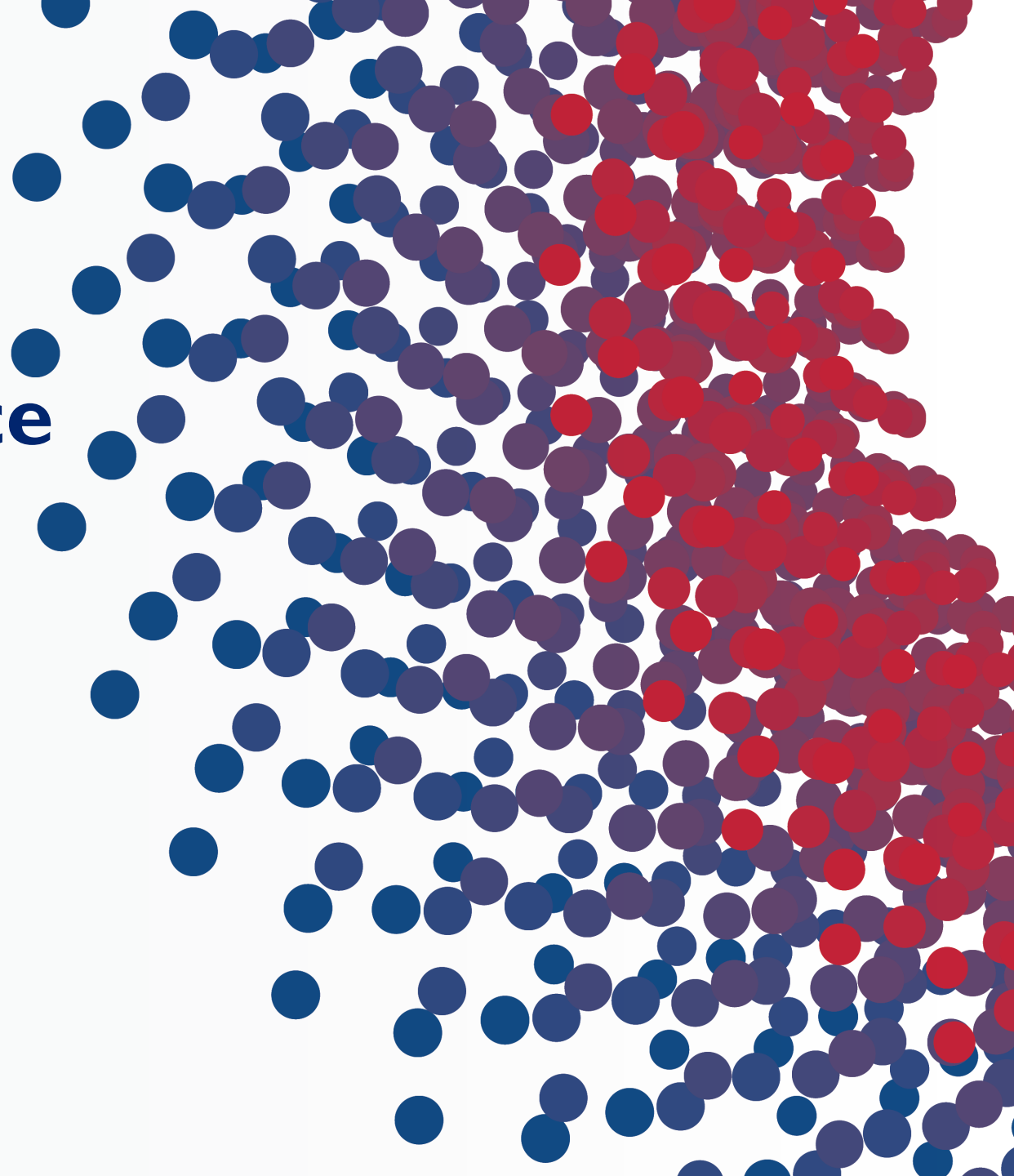
AI & Clinical Neuroscience

Brian Litt, MD

**Professor Neurology, Neurosurgery
And Bioengineering**

Disclosures:

- **Co-Founder:** Hyperfine, Identifeye, Detect, Protein Evolution
- **Advisor:** Panaxiom, Beacon Neuro, Butterfly IQ
- **Penn Licensed IP:** NeuroPace (divested), MC10





8:00 Computer Referral: Predicted new onset seizure/ cancer/ other....

- EMR, genetics, biomarkers
- *Prevention, Treatment, Trajectory?*

9:00 Refractory To Medical Therapy: for surgery

- Compare to “Collective Experience”

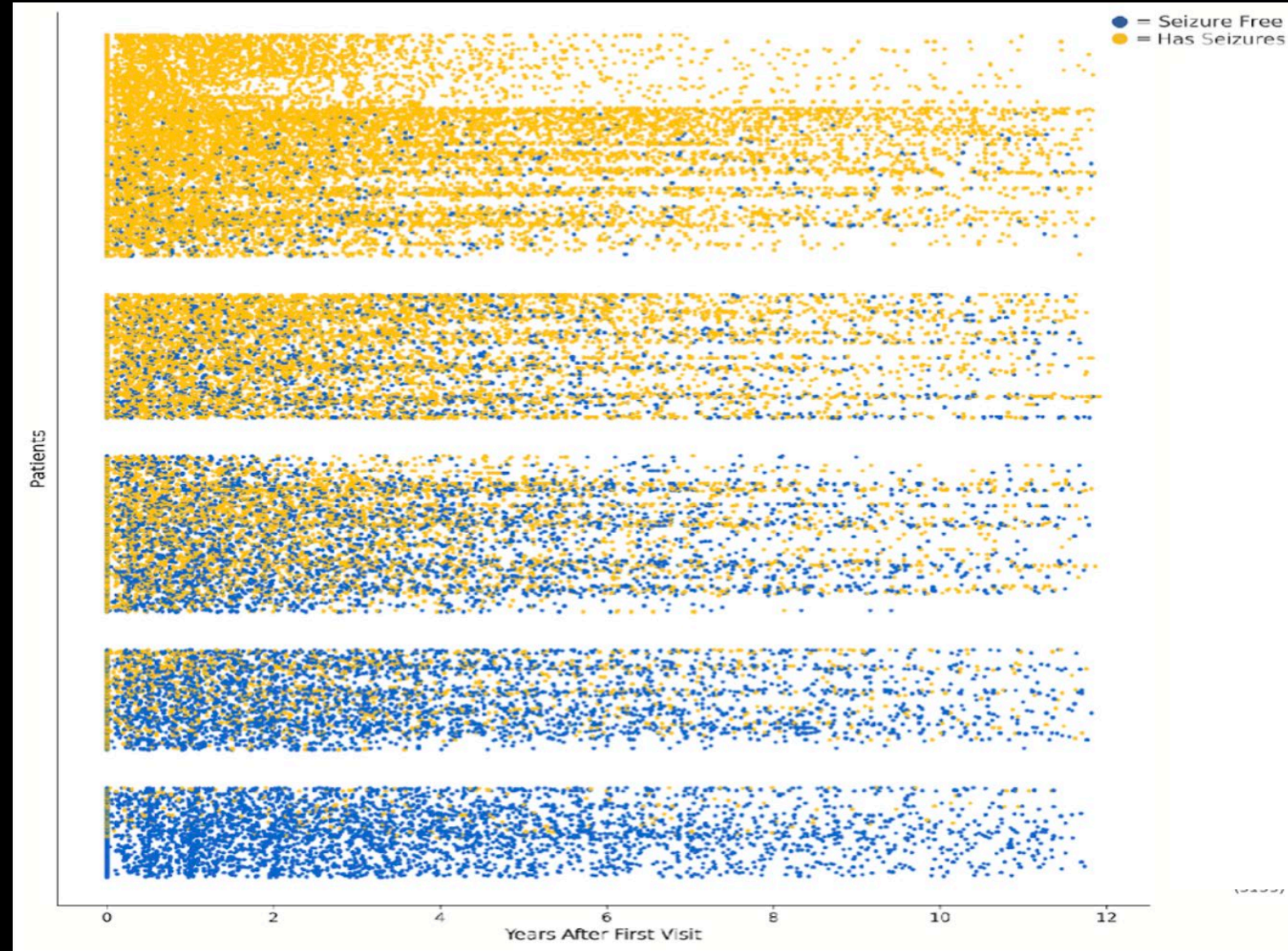
10:00 Refractory disease: “management” device + interface

- Learning, teaching, palliate

11:00 Upload data, retrain models (“scientific payload”)

- Add new knowledge

Seizures over 12 years (5,000 patients)



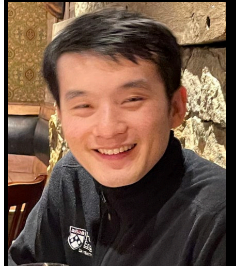
Inputs

- Raw Multi-modal data
- EMR
- Objective > Experts
- Genomics

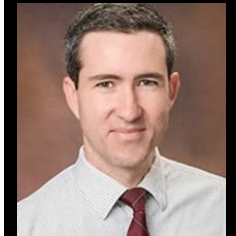
?Generative Disease Models

Xie et al., JAMIA, 2022

Xie et al., Epilepsia 2023



Kevin Xie



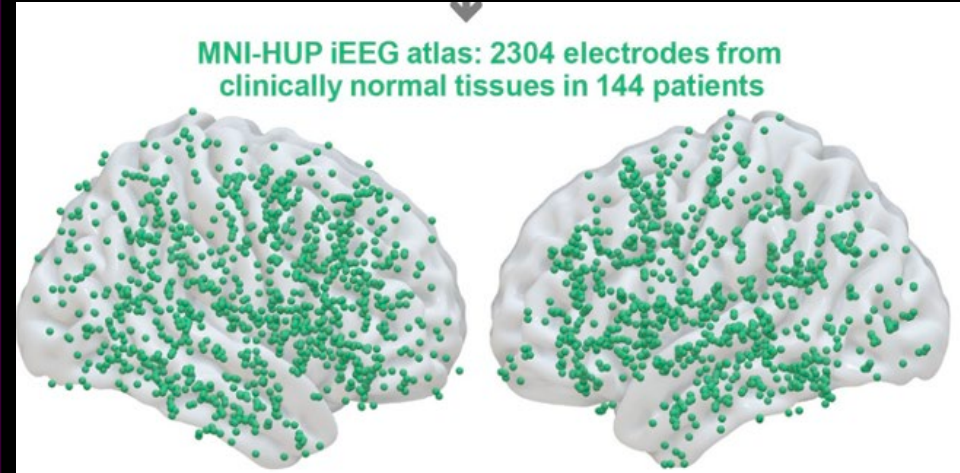
Colin Ellis



Dan Roth

Aggregated Patients

MNI-HUP iEEG atlas: 2304 electrodes from clinically normal tissues in 144 patients

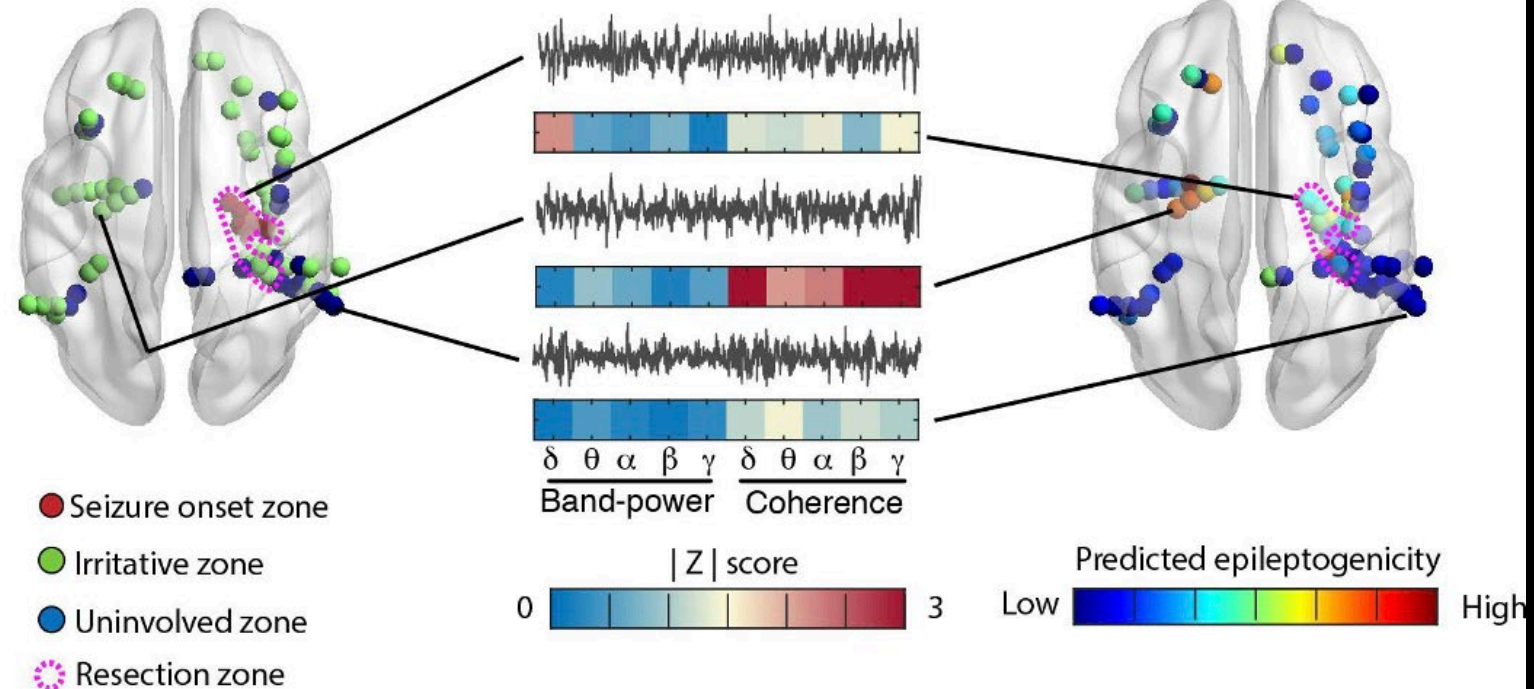


Need New Data!

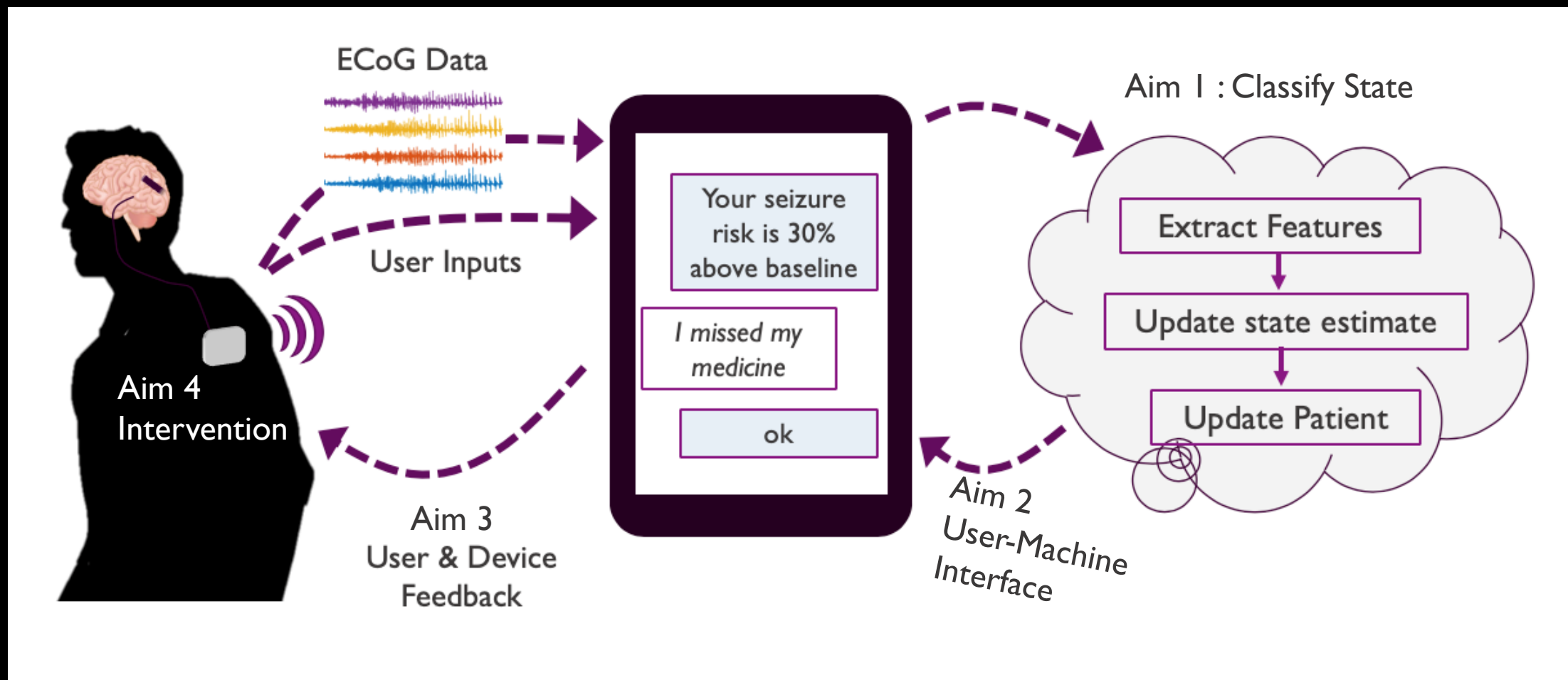
Bernabei, Sinha et al, Brain 2022

Compare New Patient

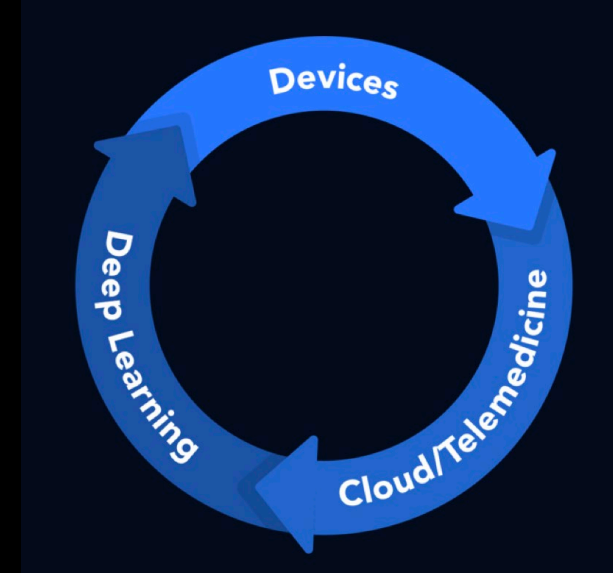
c) Poor outcome
Engel 2A



Pt #3: Management: Devices that Learn and Communicate



- Unmet Needs: **Access to experts, Quality**
- Tech: **Data, platforms, devices, Cloud, AI, wireless, EHR, NLP/ ML**
- Expanding Knowledge: **pharmaco-genomics, models, mechanisms**
- Digital Culture - platforms
- Cost: **Total Value Care**
- ? ARPA-H ?



Rothberg's Virtuous Circle

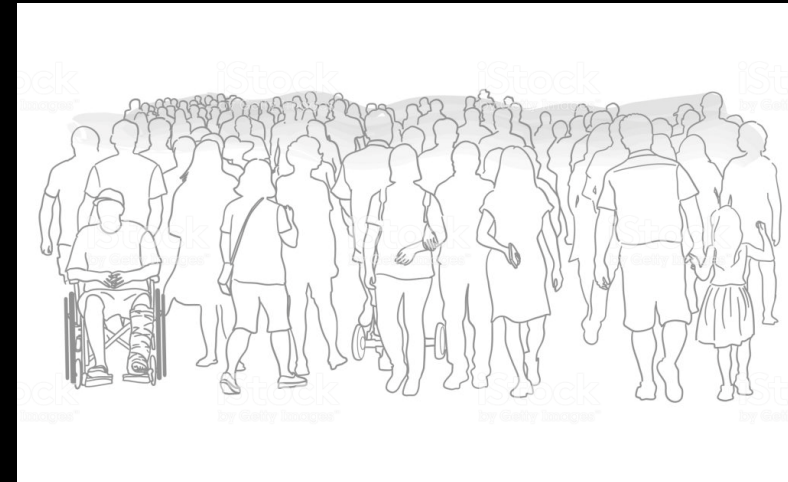


- Siloed & Proprietary Data
- Security/ Privacy/ Piracy
- Lack of Medical Data "Ecosystem"
- AI "risks" – Asimov's 3 laws
- Competition/ Incentives
- "For profit" vs. public good

Starting a Roadmap – Initial Thoughts



- Privacy: modernize laws, pirates
- Tech: legislate standards, sharing
- Align Incentives: Academia (S-index), industry (FDA), insurers (CMS)
- Carrots & Sticks
- Quality measures, review



Scientific "Payload" in each patient

Novel Approaches – incremental steps



- ❖ Blockchain EMR ownership
- ❖ Public-Private Partnerships
- ❖ Data Platforms/ Brokerage - FAIR
- ❖ Acting on the knowledge...



