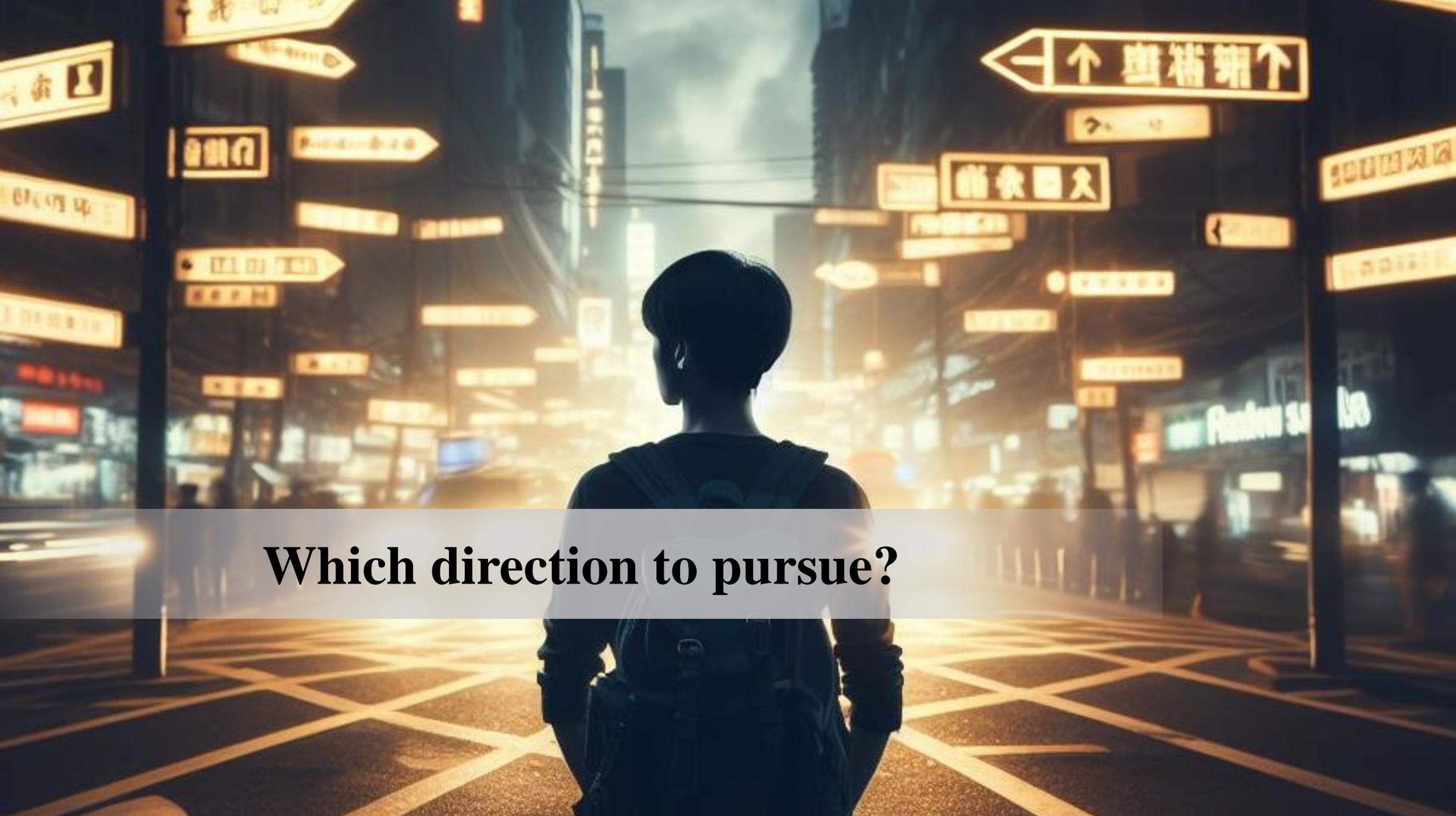


Research philosophy and group culture development

Hui Fang

Group retreat, 2/7/2024

Disclaimer: all images, if not provided with citations, are generated by AI



Which direction to pursue?

Find the sweet spot between bottom-up innovation and top-down problem solving

- **Innovation:** real technological breakthrough most often comes out of fundamental innovation from the bottom.
- **Significance:** literally anything we create in the materials and device field is novel, but you need to ask - who cares?
 - ❖ Caveat: you need to know the field too; don't do redundant work.
- **Optimization:** our group values both aspects (bottom-up and top-down thinking) strongly. But there are no objective sweet spots, so find your own passion and propose your own agenda.



How do you find the right ideas?



Fail fast, succeed faster

- **Embracing failure:** as experimentalists, if you don't fail, you are not trying. Manage risks.
- **Parallelism:** if you can try things in parallel, don't do them sequentially. Shape your idea. Occupy a no-man's land quickly.
 - ❖ Again you need to know your field.
- **Critical thinking:** don't do random stuff. Design your experiments carefully; be research question driven (spell them out explicitly). Pay attention to analysis and all details. Get your physics right.

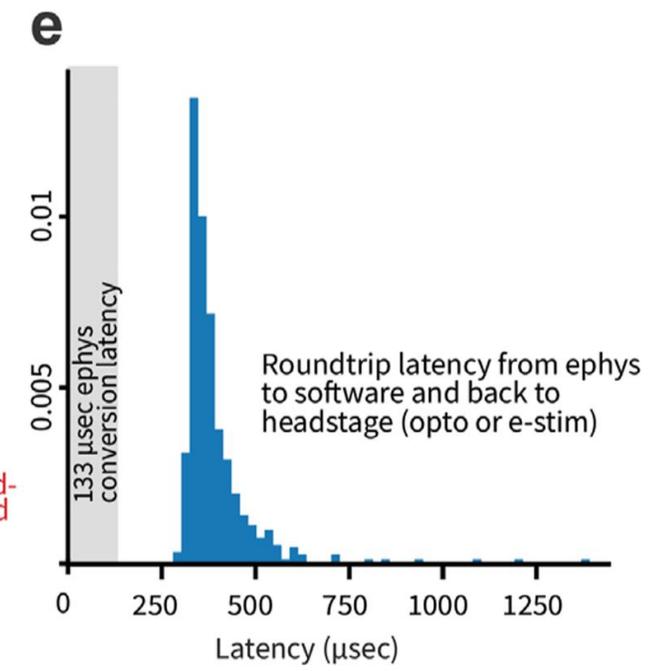
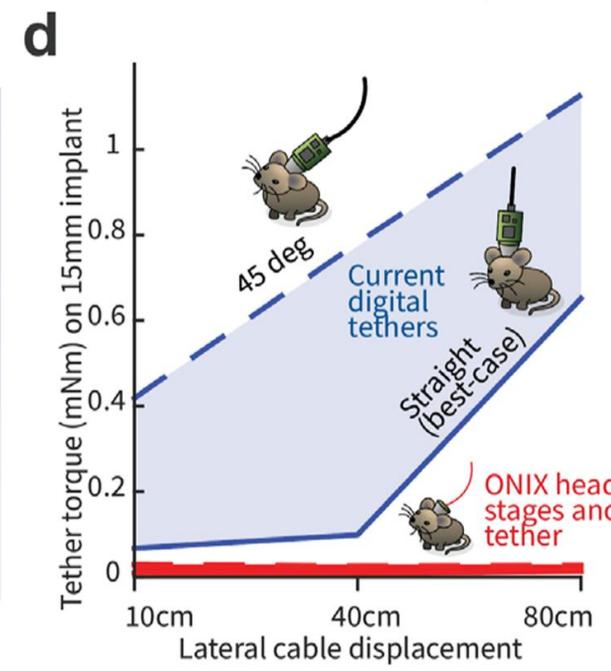
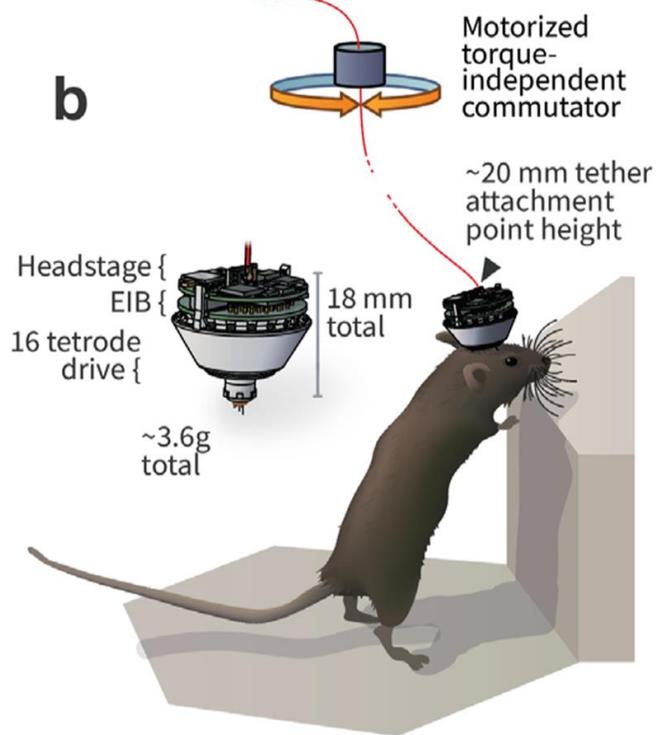
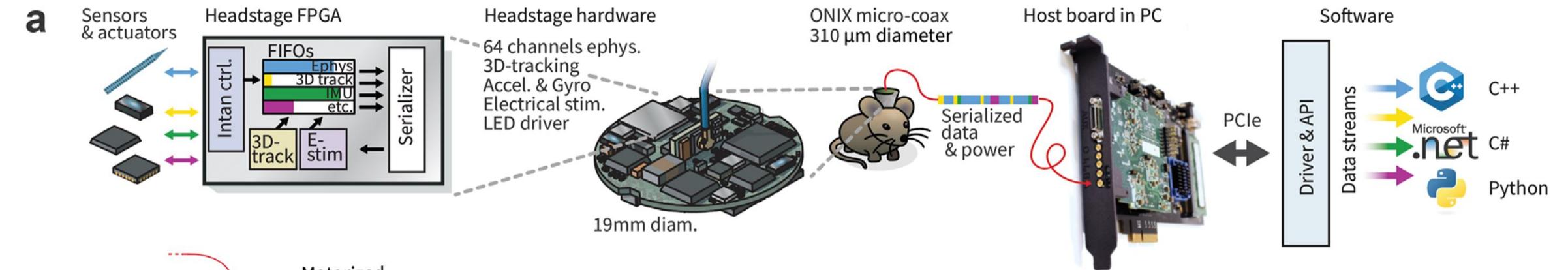


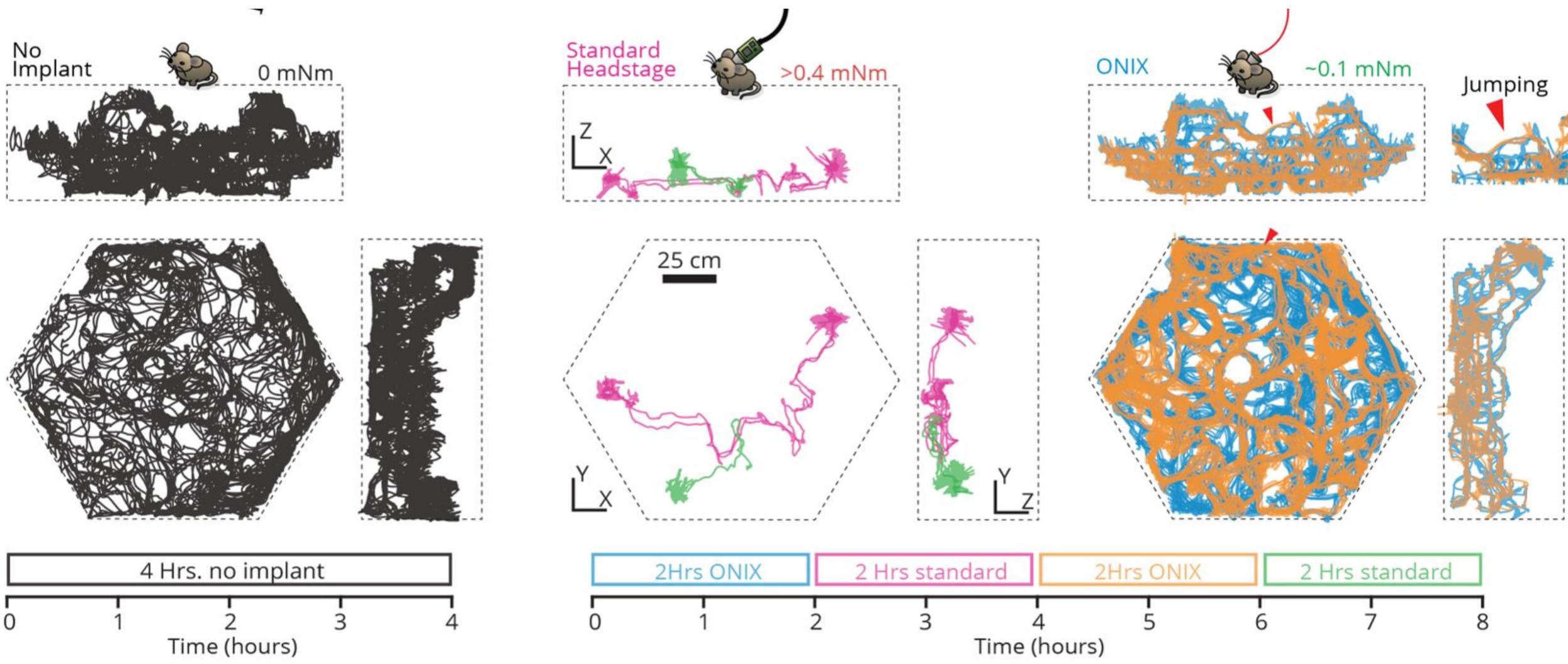
How do you demonstrate your ideas?

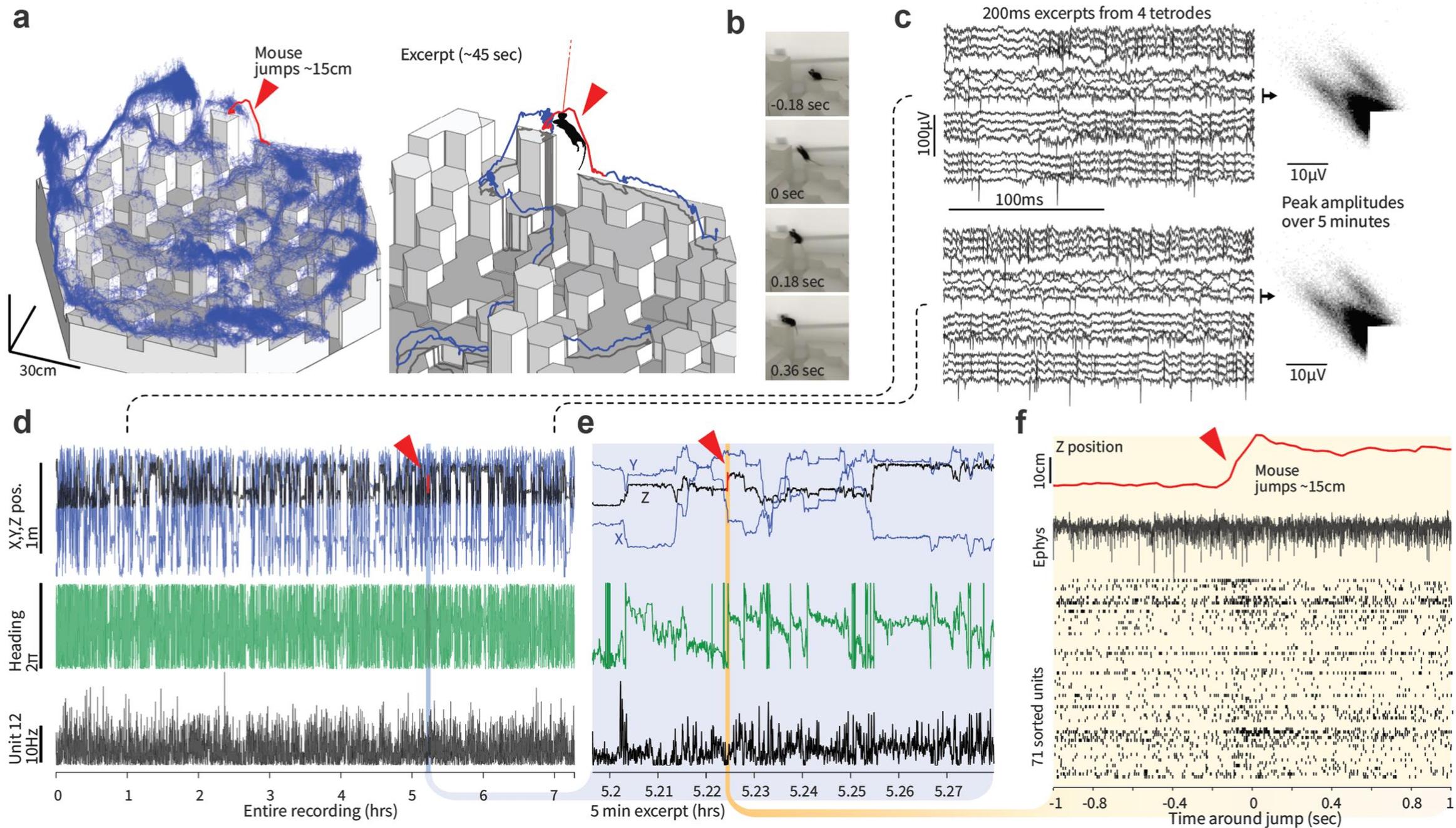
Demonstrate the broader impact of your idea. With data, not just words

- **Impact demonstration:** good ideas are everywhere; you need to demonstrate them using the exact problem that you are ‘selling’ them for. Be data driven.

Suppose you have an idea to reduce the diameter of the tether on animal's head for recording, how might you demonstrate that it's useful?







Demonstrate the broader impact of your idea. With data, not just words

- **Impact demonstration:** good ideas are everywhere; it's best to demonstrate them using the exact problem that you are 'selling' them for. Be data driven.
- **Persistency:** very good ideas are rare; exploit your (very good) ideas in the deepest and broadest way you can.
- **Story-telling:** however, do not belittle words. In fact, learn how to tell your stories (*e.g.*, from Steve Jobs) and practice it on daily basis.

A scenic mountain landscape at sunset or sunrise. A winding asphalt road curves through a valley, flanked by golden-brown grass and shrubs. A single, dark, conical tree stands prominently on a ridge overlooking the road. In the background, a large, rugged mountain peak rises against a bright, hazy sky. The overall atmosphere is warm and serene.

How to stay energetic?

Enjoy the process of climbing too

- **“Real artists ship”**: maintain a good pace for publication.
- **Broadening your skillsets**: get out of your comfort zone; think about mastering at least two or three skillsets. Be in the driver’s seat. Learn from the best (and be grateful to your mentors).
- **Embracing collaboration**: invite others to contribute to your vision. Be mindful and explore synergies. Build up teams. Make friends.
- **Mentoring younger generations**: think about legacy. bring out the best in people.
- **Celebrating milestones**: celebrate successes often, with others and for others.

2023 Group Mentoring Award



2023 Group Service Award

