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project__Orpheus  
// the PC moment  
// for bio-labs■
```

1. Problem → Solution

Modern biotech is 21st century science + 20th century tools:

- | slow
- | error-prone
- └ expensive

5% 

Bio-innovation is a fraction of its TRUE potential.

1. Problem → Solution

Time is ripe for a paradigm shift:

[from] rooms filled with expensive equipment (≈MAINFRAMES)

↓↓

[to] compact, affordable, programmable, modular desktop
devices that run entire lab workflows like software (≈PCs)

2. Technology

Extendable base station plus swappable cartridges:

- |— BASE (reusable)
 - |— compute: microcontroller; all routing via software
 - |— actuation: electrowetting grid moving droplets
 - |— sensing: embedded on the stream
- |— CARTRIDGE (disposable)
- |— SOFTWARE

2. Technology

Extendable base station plus swappable cartridges:

- |— BASE (reusable)
- |— CARTRIDGE (disposable)
 - |— wet path layer: defines sterile droplet area
 - |— ports/blisters: loading samples and reagents
 - |— optional inserts: magnet capture zone etc
- |— SOFTWARE

2. Technology

Extendable base station plus swappable cartridges:

- |
- └ BASE (reusable)
- |
- └ CARTRIDGE (disposable)
- |
- └ SOFTWARE
 - └ parser: protocol JSON → actuator commands
 - └ LLM layer: natural language → protocol JSON
 - └ telemetry incl. sensor data, timestamps, etc.

3. Markets

Beachhead: research labs that cannot afford robots

- university/institute cores
- biotech startups

◦ 15,000–40,000 academic labs and early biotechs

◦ 5,000–15,000 EUR/year average revenue per client

≈ 100–300 MEUR/year global beachhead (SAM)

3. Markets

Broader: global life sciences tools sector

- from mid-biotech and clinical labs, to big pharma
- setting new standard for modular automation

◦ 10-20 BEUR/year life sciences tools and consumables

◦ 20-40% addressable share for modular automation

≈ 2-8 BEUR/year global potential (TAM)

4. Business model

- ▶ Hardware: one-time sales + extensions
 - └ developer kits for early adopters
 - └ community-driven expansion modules
- ▶ Consumables: recurring, high-margin (razor blade model)
 - └ (semi)disposable cartridges
 - └ compatible reagent kits (vendor co-branded)
- ▶ Software & cloud: recurring SaaS
 - └ OS, updates, monitoring, fleet learning
 - └ enterprise support later (Red Hat model)

5. IP strategy

Patents: protect core innovations

- system-level integration (MF + manifold + sensing)
- method claims (e.g. automated SPRI)

Trade secrets: keep know-how private

- cartridge fabrication/coating
- ML models trained on fleet telemetry

Open-source: catalyze community-led growth

- OS protocol language
- software library (e.g. visualization, simulation)
- hardware interface / API specs
- basic dev boards and demo cartridges

6. Roadmap



7. Core team

We are creating a collective of builders; nerds; misfits;
Supported by Biocatalyst Foundation's ecosystem networks.

(α = α)

Andrii Shekhirev
Biocatalyst Foundation co-founder, 10+ years building startups. Set up a chemistry lab in his room as a kid.

(° ± ~)

Eduards Teodors Mincis
Senior Lab Assistant @ LU
Institute of Biotechnology.
3 yrs in iGEM. Bred plastic-eating larvae as a kid.

project_Orpheus

creating a global and open-source
hardware + software standard that
enables fleet learning on a scale
never imagined before in biology.

95%



Think of the value to be unlocked with a global network of PC-like biolabs!