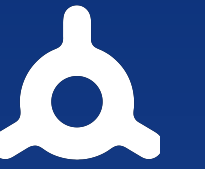
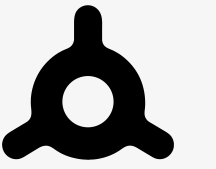


CHAINREACTOR



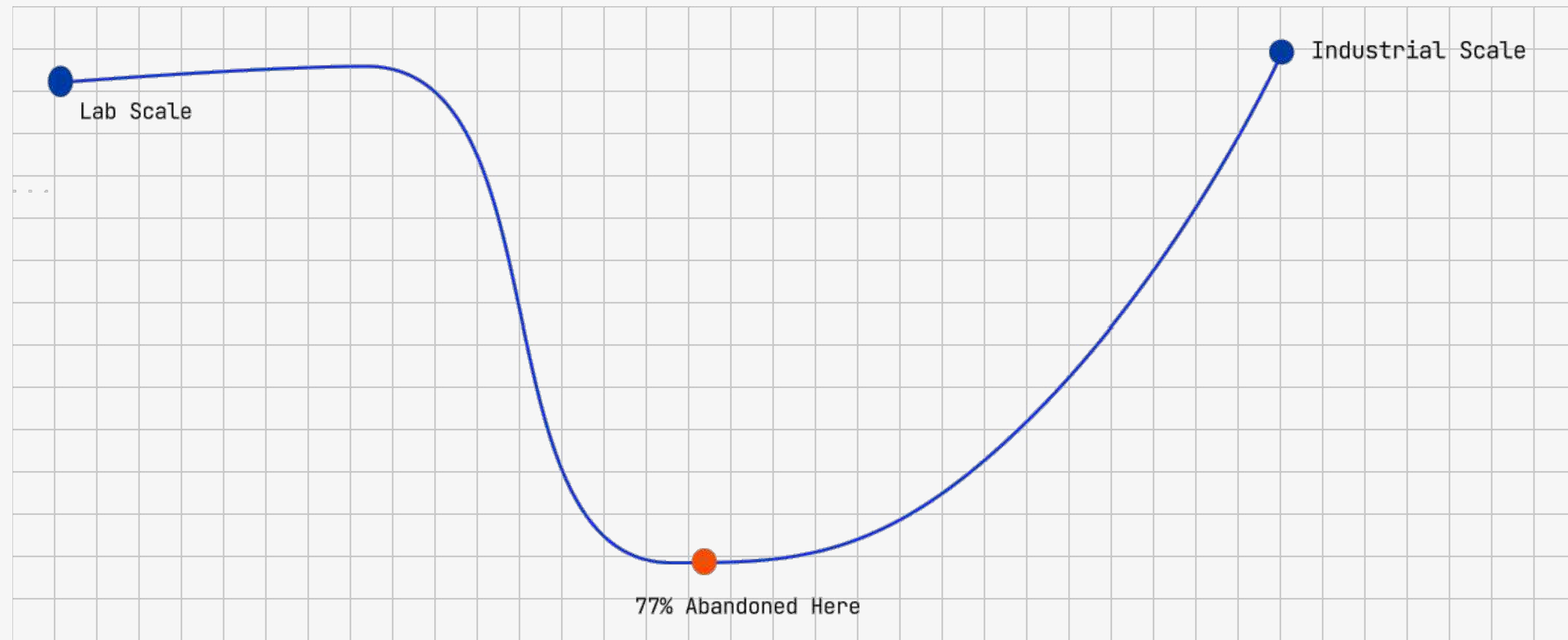
# Biology's first flight simulator

Chainreactor combines physical AI, process engineering, and patented 3D printing to predict the behaviour of cells at scale



# Would you board a plane that had a 77% chance of crashing?

That's the scale-up gamble biomanufacturers have to take. Every batch is a bet against physics



**77%** failure to reach titres

Microbial processes are abandoned between bench and production

**3-10 years** lab-scale timeline

Minor delays or failures substantially increase cost.

**€4BN+** in stranded assets

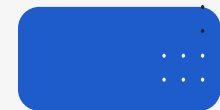
Lost to scale-up failures

# The **physics** inside a 1L and a 30,000L bioreactor is massively different. Predicting the behavior of cells at scale has been...unpredictable



## THE JOURNEY

Moving to a commercial facility requires a **3,000×** increase in volume. At that scale, cells behave very differently.



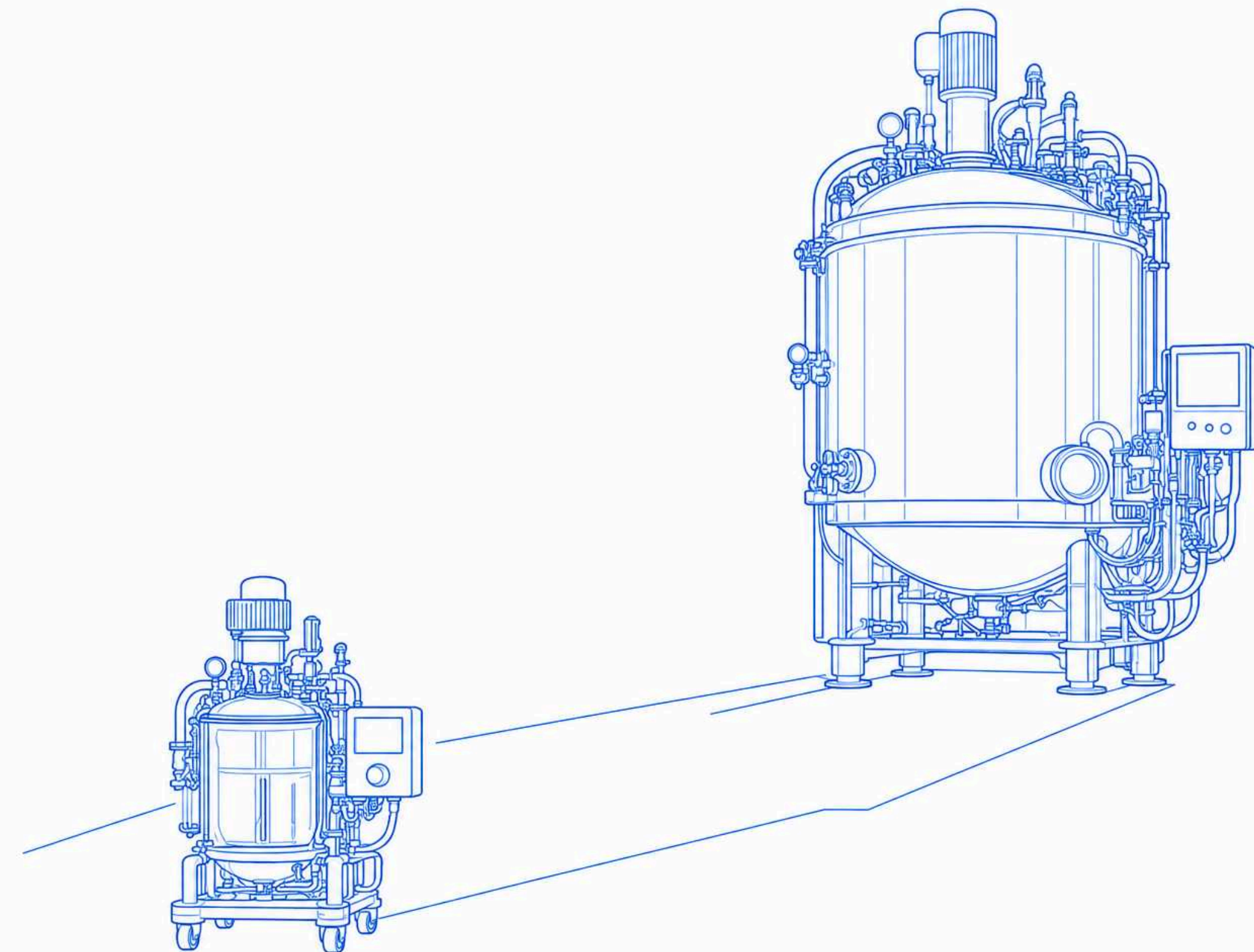
## THE TURBULENCE

A cell's journey in the bioreactor stretches from **5 seconds** in 1L to **200 seconds** at 30,000L.



## THE CRASH

Localised physical stress starves and suffocates cells — yields plummet by **20% to 70%**.



1L

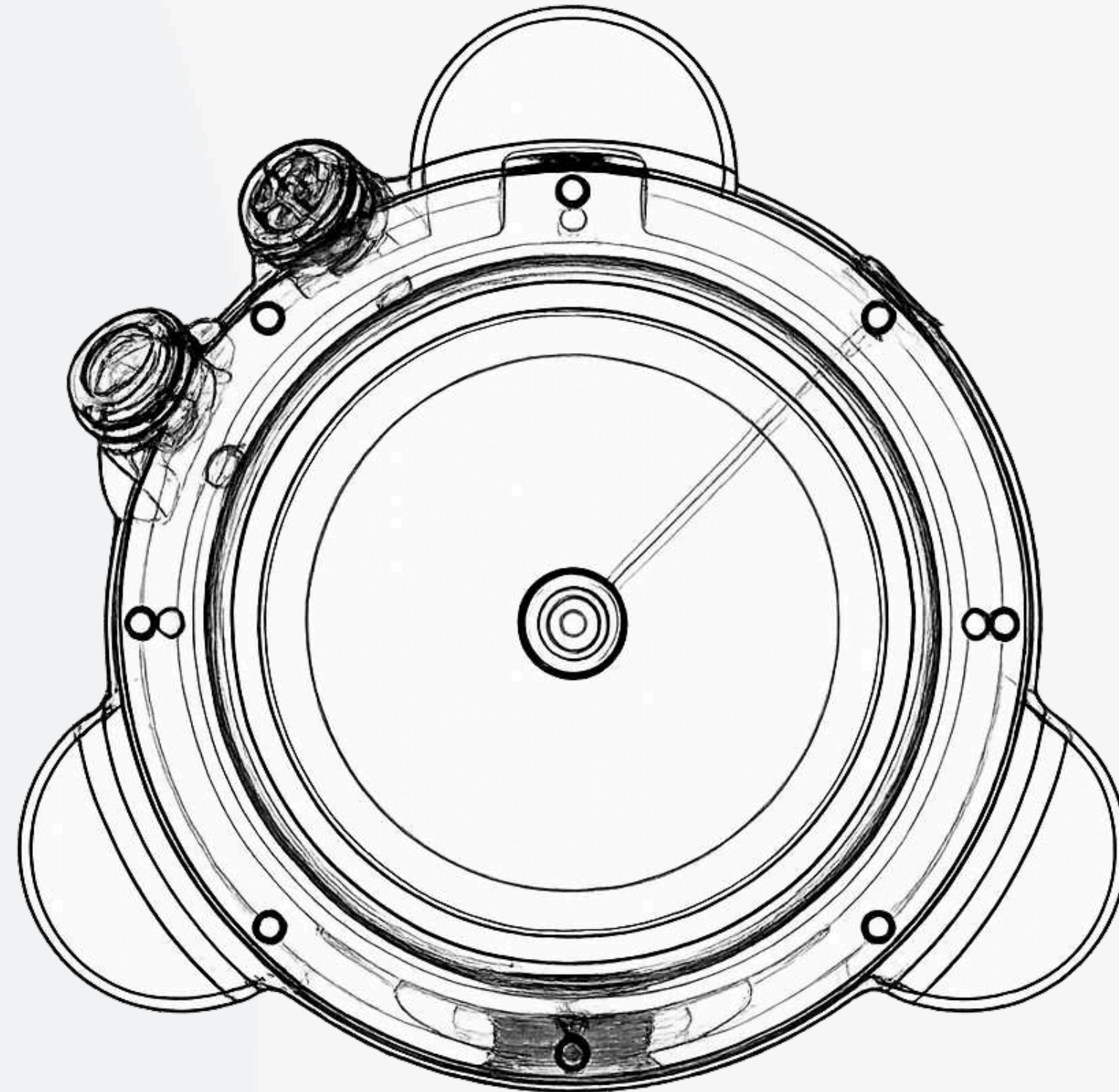
30,000L

# Biology's first scale-up simulator: We simulate the physics of a **30,000L** bioreactor in a **1L** vessel

Large Biological Model

**Designs, controls and optimises**

Large-scale microenvironments at lab-scale



Microenvironment Simulator

**Tests, calibrates, and validates**

Process performance at **1000x** lower cost

Precision 3D-printed bioreactor using proprietary polymer, powered by a Large Biomanufacturing Model (LBM), trained on thousands of experiments and hundreds of thousands of proteins.

# From zero to shipping in less than a year

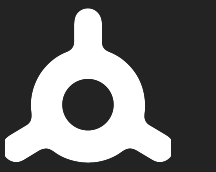
Last 12 months

- **World's largest 3D-printed bioreactor**  
Commercial printing capability
- **AI-native control system**  
Bioprocess control, cloud telemetry
- **2 patent families**  
Sparging control & sterilisable materials
- **V1 LBM architecture live**  
Open-source data + V1 model structure
- **First paying customer**  
+ 4 contracting deals

Next 9 Months

- **In-process validation**  
Cell culture and production runs
- **Dedicated ML + software architecture**  
Data to decisions
- **3 module prototype**  
Microenvironment simulator
- **Proprietary polymer**  
Pressurisable and autoclavable
- **Commercial Expansion**  
New manufacturing space, sales and shipment





# Manufacturing DNA, bioprocess excellence, software innovation and commercial execution



Nate Petre

CEO, Founder

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PhD Imperial : Additive Manufacturing , NHS COVID response: 1,000+ visors/day Distributed manufacturing across 3 continents, NASA-funded bio-composites · 2 patent families.



David Birge-Cotte

CTO

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Electronics & embedded systems, Second-time founder Architect of the sensor stack, control systems & cloud telemetry.



Tania Pereira Chilima

CSO

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Doctorate — decision tools for bioprocess optimisation, Former CTO, Univercells / Scale-X · €136M exit, Six co-authored patents in bioprocess automation.



Mike Stone

CRO

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SaaS enterprise sales Employee #2 at a \$105M IPO Managing key customer accounts.

A **\$4B** market  
with a clear  
path to  
**\$100M ARR**

**20,000+**

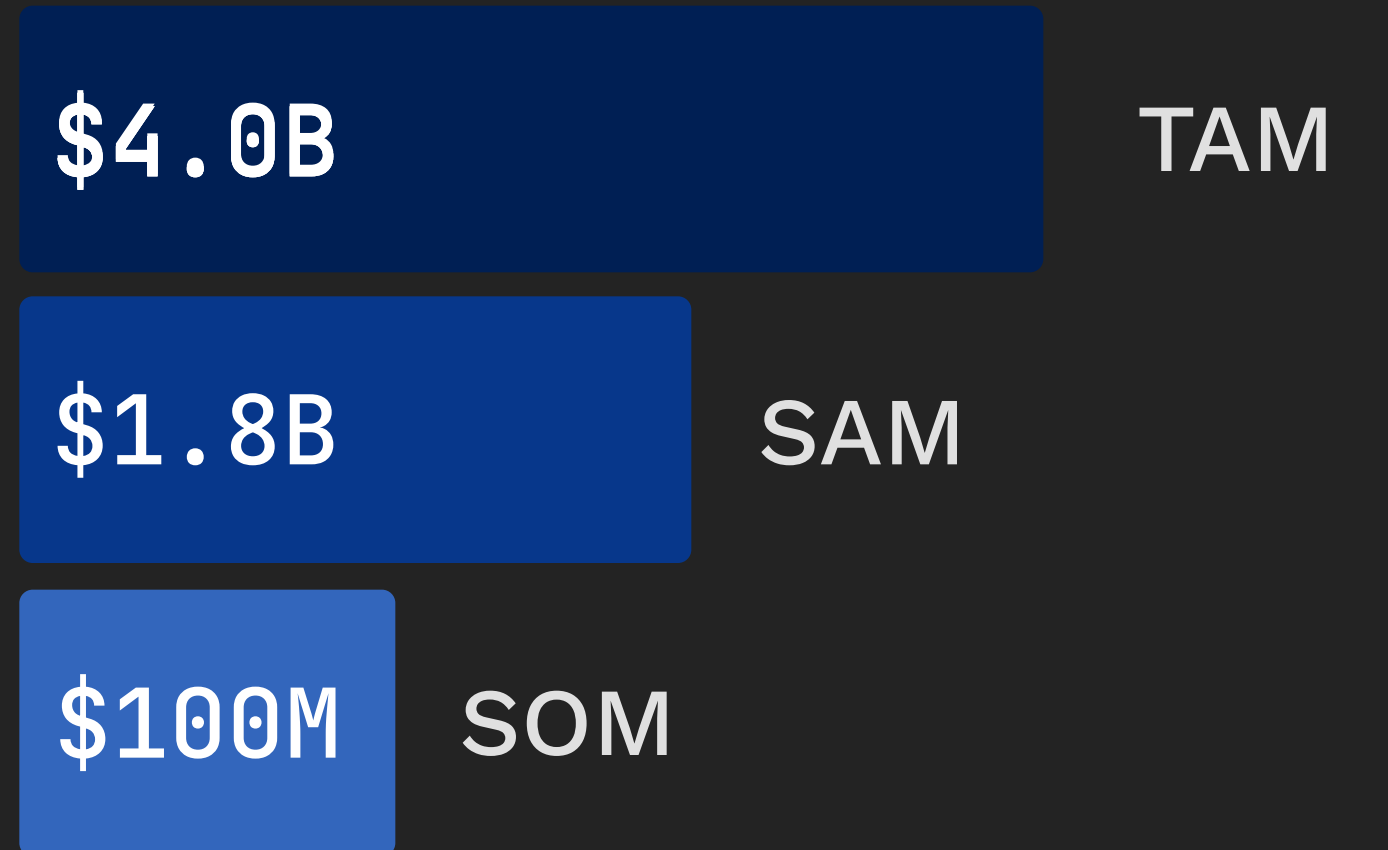
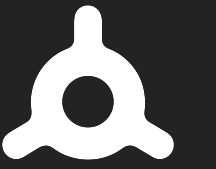
Companies globally developing  
or manufacturing biologics  
using cell culture

**9,000+**

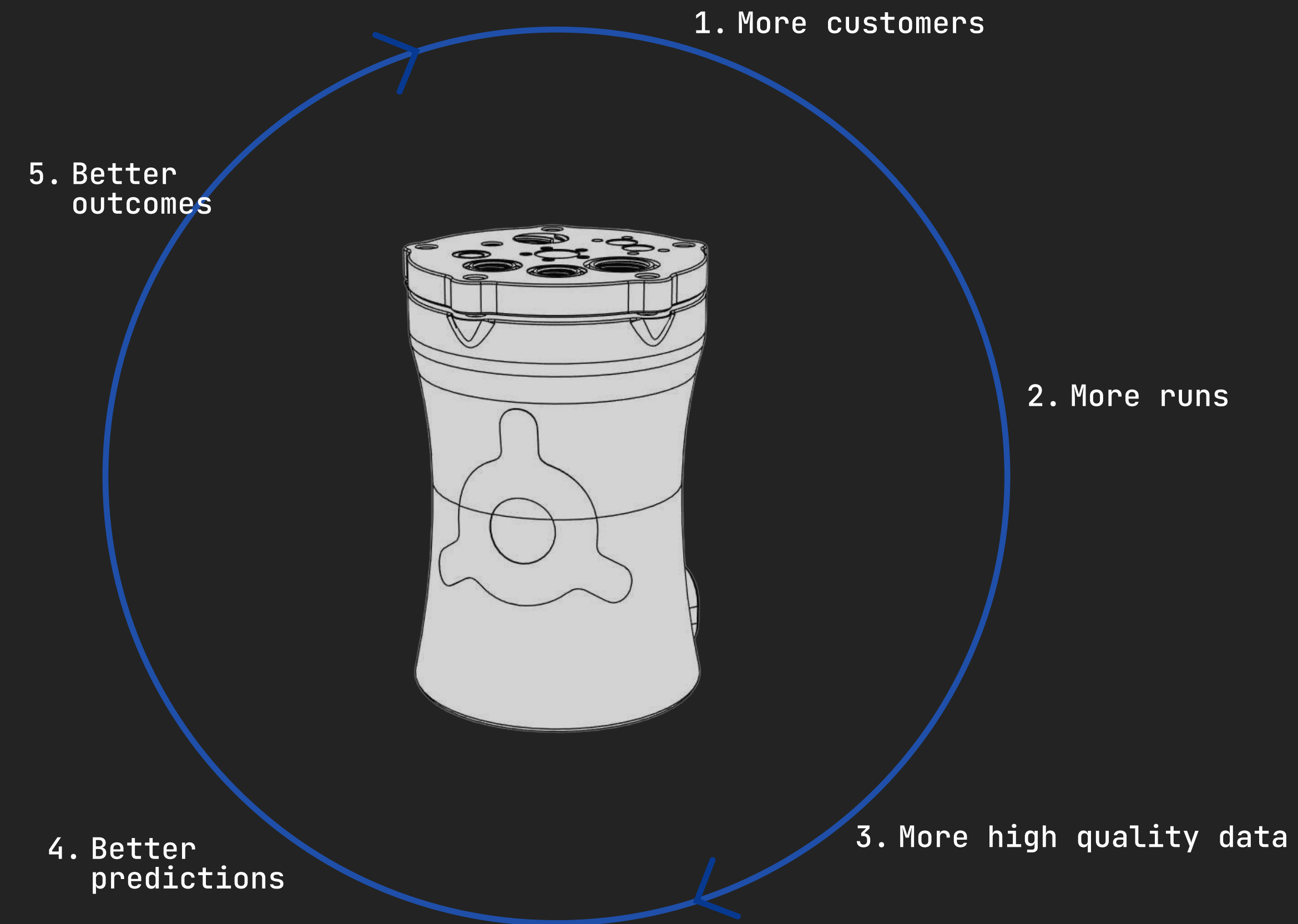
Organisations working on  
microbial and  
mammalian cell culture

**500**

Customers by year 5:  
5% of TAM



## OUR MOAT



# This data flywheel is our moat

Every run means better predictions

### Compounding Data Layer

Every run improves the model.

### Proprietary Polymer

Steel-grade high pressure performance with the speed of 3D printing.

### Team Expertise

A rare interdisciplinary team across additive manufacturing, biology and ML.

### BaaS Model

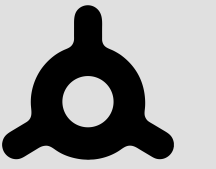
No CAPEX barrier: subscription access lowers adoption friction.

### Patent Families

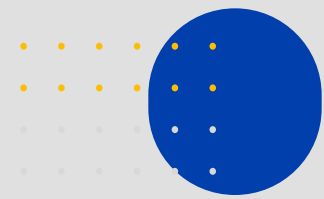
Protected core IP on geometry, sparging and materials.

### First Mover

The first integrated in-silico and physical scale-up programme.



# Hardware lands the customer. Data compounds. Software scales.

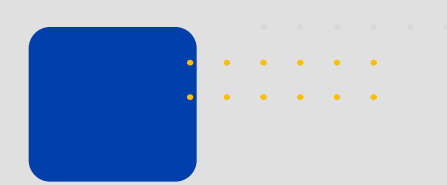


PHASE 1: TODAY

## Hardware as a Service

**€5-7K** / vessel/month

The customer locks in the geometry, the run history, and an LBM personalised to their process.

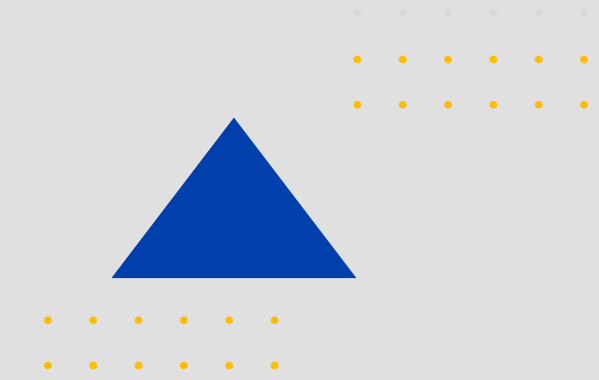


PHASE 2: YEAR 2-3

## LBM Data Licensing

**€100-500k** / program

A predictive scale-up service trained on every customer run, sold even to programs that aren't our hardware customers. This is how the data flywheel is monetised.

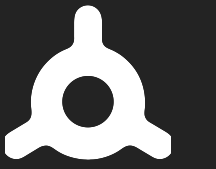


PHASE 3: YEAR 4

## Partner-powered distributed CMO

**€2-5M** / contract - indicative

Chainreactor-operated or CDMO partner-powered: geography and ownership stay flexible. The platform is the asset; the network is the delivery.



# Others own parts, we own the stack

	<b>SIMULATE</b> Bioreactor environment	<b>BUILD</b> Benchtop bioreactors	<b>TEST</b> In-vitro testing	<b>LEARN</b> Capture data each run	<b>PREDICT</b> Cell behaviour at scale
<b>Chainreactor</b> Integrated platform	●	●	●	●	●
<b>Sartorius / Cytiva</b> Hardware vendors		●	●		
<b>Benchling / IDBS</b> ELN / Data platforms				●	
<b>Datahow / Novasign</b> Digital twins	●			●	●
<b>Ansys / openFOAM</b> Simulation tools	●				
<b>Lonza / Samsung biologics</b> Simulation tools		●	●		

# CAPEX free pilot vessel, expand to a multi-vessel program, license the LBM after that

Month 0-3

## Pilot Vessel

€5K/mo subscription ·  
90-day onboarding ·  
~€50K landed

ACV: €60k

Month 4-12

## Multi-vessel deploy

Customer scales programs internally · 3-6 vessels · LBM personalized

ACV: €100 -€360K

Year 2+

## LBM Licensing

Predictive scale-up service add-on, charged per program

+ €100 -€500K

Year 3+

## CMO Referral

Customer's lead program → our facility. Pure expansion

+ €2-€5M / Contract

Year 3 LTV

**€1.2M**

AVG Account

14x CAC

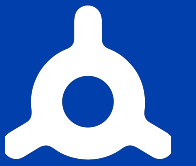
## Why us, why now?

- Sartorius lead time: 26 weeks. Ours: 14 days
- EU sovereignty narrative — onshore vessels are policy-funded
- Tania's network is the EU bioprocess buying committee

## Target Customers

**European precision-fermentation programs, cellular agriculture, biomanufacturing scale ups**

Underserved by US-centric incumbents, capacity-constrained today, and riding an EU green-chemistry & sovereignty tailwind



# Customer demand is already here

Contracting customers in the EU, UK and US, plus an EU grant consortium and a pilot CMO route

## CONTRACTING

### **Recircle / UK**

2 standard reactors,  
6 bespoke chemostats  
(3 bar, solvent compatible)

## CONTRACTED

### **New Dawn Bio / EU**

Paying customer, plant cells in stirred tank reactors. Custom bioreactor development.

## CONTRACTING

### **Marvel Labs / US**

First US deployment

## PARTNERSHIP

### **ITQB Nova University / EU**

Qualifying bioreactors and providing previously unreleased data.

## LOI SIGNED

### **Octarine Bio / EU**

Evaluating as primary CMO. Signed off-take agreement with a fashion brand.

## EU STEP GRANT

### **PRISMA Consortium / EU**

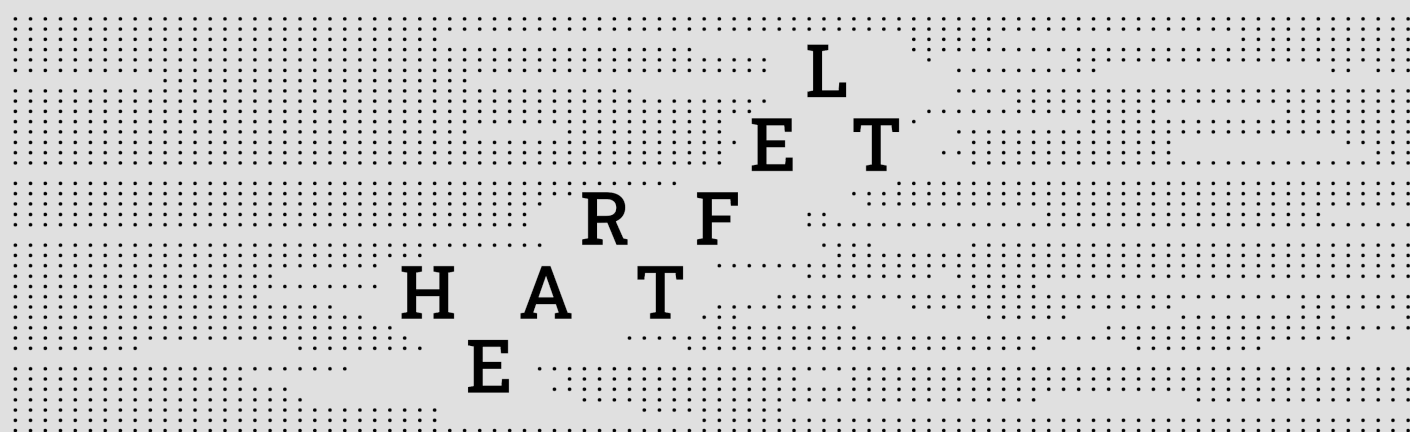
13.2€M Multi-partner grant. 2,000L Yeast based dye project CMO in Portugal. Submitted April 2026.

THE ASK

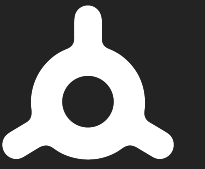
In less than 12 months, we've moved faster than many hardware companies do in 2-5 years

We're raising €750K to accelerate again

€370K Already Raised



< norrsken >



FUNDING TARGET:

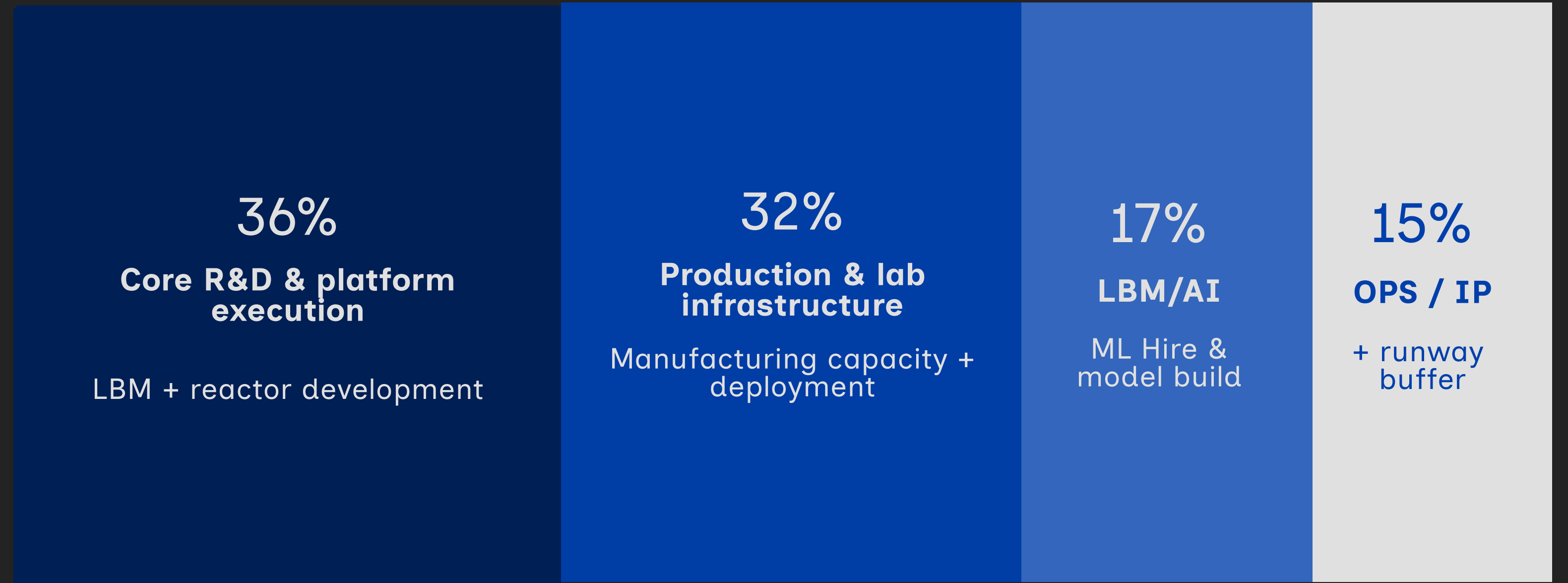
€750K

EQUITY AT €8M POST-MONEY

ACCELERATION TARGET:

€1M

EQUITY AT €8M POST-MONEY





Don't just cross the scale-up valley,  
**fly over it.**

CHAINREACTOR

[nate@chainreactor.bio](mailto:nate@chainreactor.bio) / [chainreactor.bio](https://chainreactor.bio)