Mustard

Mustard® Biopharma

Deeptech x Life Science Pitch Deck

EIN: 412405126

Smart ‘dark’ factories for medicines.

The Problem

Global Biopharma Supply Chains Are Inefficient

- The US and Europe imports roughly 65% of the medicines it consumes.
- 30-40% of global pharma manufacturing capacity is lost annually due to inefficiencies associated with current legacy production processes and siloed automation. This causes extended downtime and equipment failures. (McKinsey)
- Process inefficiencies lead to high manufacturing costs making life-saving medicines largely unaffordable for 1 in 3 patients worldwide. (WHO)
- New drug researchers and biotech startups face 12-18 months in lead time and millions of dollars in upfront payment for small trial and commercial batches from pharma contract manufacturers
- The downstream effect of the above is high costs and frequent stockout of existing and new drugs for patients

The Solution

Mustard's Smart, AI-native Biopharma Ecosystem

We are building the world's first Autonomous Pharma Smart 'Dark' Factory which a fully software-defined, AI-native pharmaceutical manufacturing ecosystem that autonomously converts raw materials into finished batches of medicine with minimal human intervention. It is a vertically integrated manufacturing architecture we designed from the ground up to autonomously control machines, orchestrate processes, unify all factory activities into one intelligent software. At the heart of the ecosystem is our proprietary AI-native Factory OS software which controls two physical forms

1. Smart Factory: Our large-scale, renewable-powered hubs running on the proprietary OS for making high-volume biologics & generics at scale.

2. Mini-Factories: Easily deployed, containerized manufacturing pods for low-cost, small-batch, rapid manufacturing demands at point-of-need (e.g. Clinical trial sites, pandemic control centers, research labs and hospitals)

10x faster production time and 30x cheaper than existing biopharma manufacturers in the market

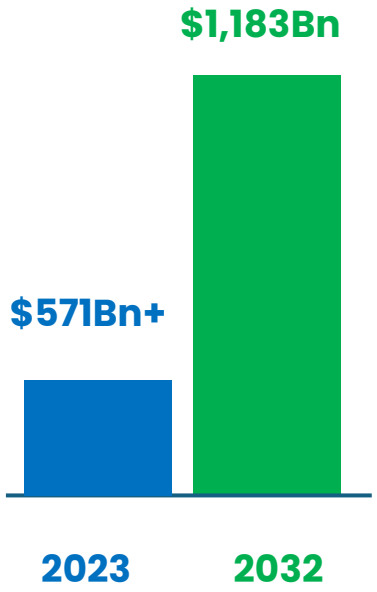
From months to days, we are delivering medicines at the speed of need.

Market Opportunity

A $1.1 Trillion Market Ready for Disruption

Key Data:

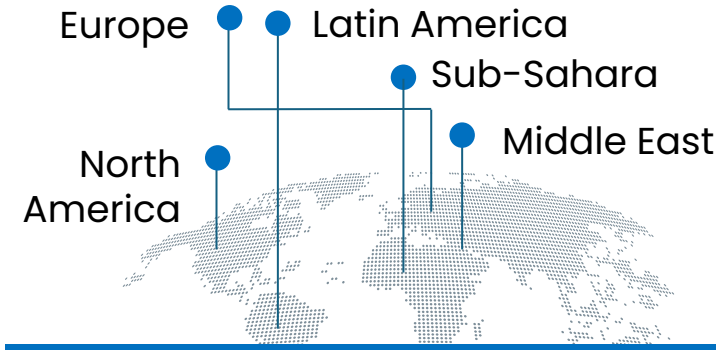
Global Biopharma Market



Addressable market for biosimilars & generics

Outsourced biopharma manufacturing growing at

13% CAGR



Target regions for distributed manufacturing

Why now?

- Growing demand for contract pharma manufacturing as biopharma outsources
- Biotech R&D is booming, but inefficient manufacturing is the bottleneck.
- Advances in AI, ML, HITL automation and digital twins now enable software-defined manufacturing.
- COVID-19 exposed fragility of centralized healthcare supply chains.

Total Addressable Market (TAM):

US$1,155.00bn.

In 2023

Serviceable Addressable Market (SAM):

US$95.00bn.

In 2023

Serviceable Obtainable Market(SOM):

US$30bn.

Business Model

B2B Multi-Stream Revenue Model for Sustainable Growth

Revenue Streams

Commercial Production:
High-output production **of biologics, biosimilars and generic medicines (e.g Anti-cancer drugs, orphan drugs)**

Mini-Factories Leasing for entities that require supply of small batches at point-of-need . (Later Stage)

Manufacturing-as-a-service (MaaS) for contract production of bulk/small volumes

Technology & Product Offerings

A Full-Stack Biopharma Manufacturing Solution

Factory OS unifies and automates all manufacturing modules (ERP, MES, QMS, LIMS, DCS, CMMS, BI, SCM, PAT).

OS algorithm autonomously controls machines for continuous manufacturing.

Smart bioreactors with UV sterilization for rapid turnaround.

Mobile mini-factory pods for point-of-need production of small batches

Renewable energy powered factories for reduced OPEX and ESG-aligned manufacturing

Digital Twin production simulation before live operation

Key Differentiators:

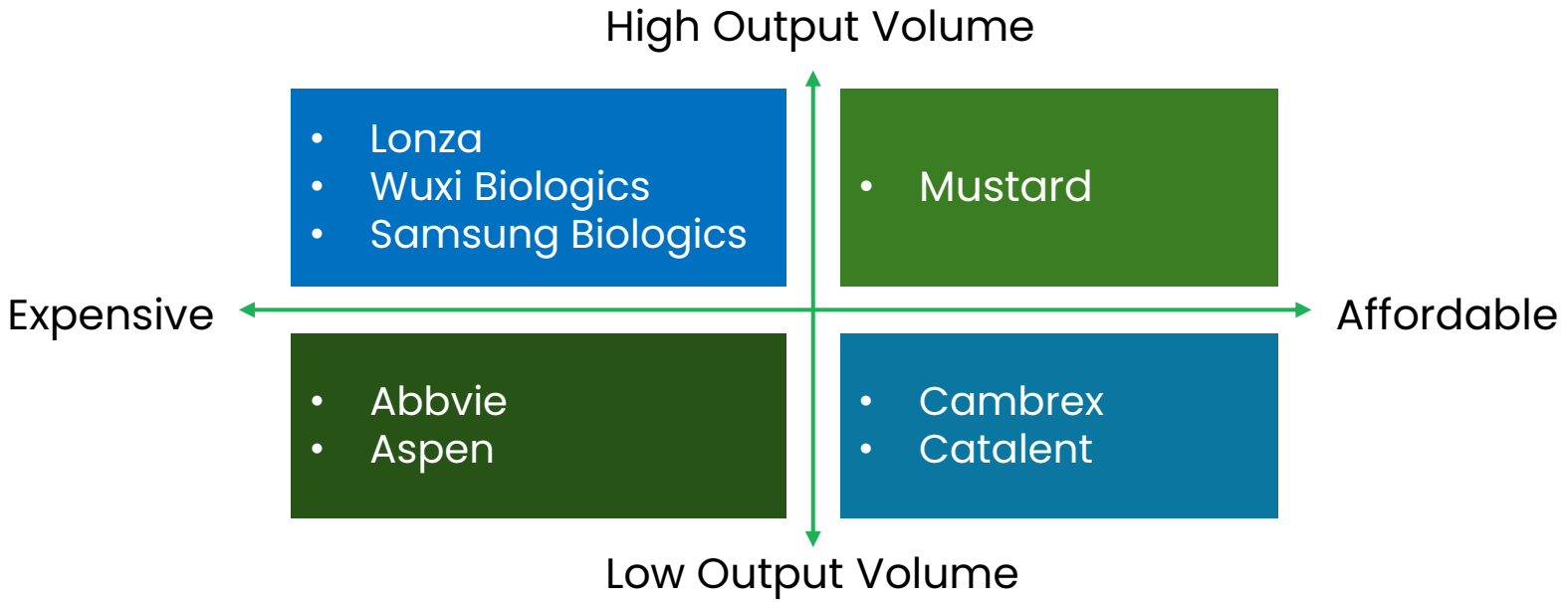
- **Novel HITL Autonomous** operation grossly minimizes human involvement
- **Unified Factory OS** is better than current fragmented factory software stack
- **AI/ML-driven process control** for improved workflow & increased yield.
- **Renewable Energy Dependence** for cost stability & sustainability.
- **Networked Mini-Factories** reducing cold-chain logistics time & costs.

Products & Services

Products:
Biosimilars (Monoclonal antibodies) in form of pre-filled syringes. These medicines are used to treat cancer and other rare diseases. Generic medicines in form of tablets, capsules and parenterals to treat specialized diseases.

Services:
Manufacturing-as-a-Service (Contract manufacturing) and Research-as-a-service (CRO) with Pharma 4.0 integrated processes.

Competitive Landscape & Positioning



Why We Will Win: Lower costs, faster production, frontier technology, AI-driven efficiency & sustainability

Competitor Matrix

Competitors: Legacy pharma manufacturers like Pfizer, Lonza, Wuxi Biologics, Cambrex, Catalent.

Growth Strategy/Go-To-Market

Strategic Market Entry & Expansion Plan

Phases:

1 Strategic market entry

Target: Pharma companies, Biotech startups, clinical trials already in our pipeline

Action:

⇢ Convert $300K LOI pipeline into signed manufacturing contracts within 9 months.

⇢ File provisional patents for proprietary software

⇢ Generate recurring revenue from small batch manufacturing

2 Expansion

Target: Big-pharma surplus demands, emerging markets, health agencies

Action:

⇢ Commercial rollout via Manufacturing-as-a-Service (MaaS) model

⇢ Distributor partnerships for own product brands

⇢ Product line expansion and contract research capacity

3 Market consolidation

Target: Large molecule innovators, CDMOs, government tenders

Action:

⇢ Partner with mid-scale generic manufacturers in low capex regions

⇢ Expand platform to support vaccines and diagnostics

⇢ Deploy pods in 2–3 regions with local partnerships

Traction & Milestones

Strong Early Momentum & Industry Interest

Milestones and Road Map

2 Seeking pre-seed raise of $850k for our pilot factory setup

1 Secured Angel funding to build and test software

Traction:

- ⇨ Signed Letter's of Intent (LOI's) totalling $300k with interested pharma customers
- ⇨ Currently in talks with relevant stakeholders on partnerships regarding Technology transfer and Trade agreements
- ⇨ Built the first version proprietary automation software (MVP)
- ⇨ Tested our software on pharma machines. Early result: 20% improved efficiency and output with autonomous control.
- ⇨ Secured factory space for bench scale and pilot plant

Team & Expertise

Meet the Visionaries Behind Mustard Biopharma

Founder:

Samuel Ojeabulu: A manufacturing scientist (pharm) and an electro-mechanical engineer with interest in software engineering. He has worked in the life science industry and built 12+ factory projects for big pharma clients such as GSK.

Chief Technology Officer:

Ebuka Eze: Experienced full stack software engineer with extensive background in software development with AI/ML specialization. He has two other software engineers working with him at Mustard.

Strategic Advisor:

Professor Anyakora: He is a distinguished figure over 25 years experience across drug development, public health, pharmaceutical market access and extensive manufacturing expertise. He advises on regulatory affairs and strategic partnerships.

Automation Engineer:

Dunsin Adeoye: Our embedded systems engineer. He is an electrical/electronics engineer with experience in IoT systems, machine automation, sensor suites and frontend software engineering.

Join us in building the future of biopharma. Let's talk!

Contact Details

Name: Ojeabulu Samuel

Website: www.mustardbio.com

Address: MIC, Riverside, California

Email: sam@mustardbio.com
ojeabulu.sam@gmail.com