

Good  
Morning



PDMA



UN's Sustainable Development Goals



Data & Funnels



O<sub>2</sub> Cube Case Study



PDMA Special Interest Group

# Why am I Here Today?

*Hypothesis: PDMA's community of product innovators and managers have the immense opportunity to leverage innovation to improve the lives of billions of people by focusing our skills and energy on the underserved regions of the world.*

# PDMA & Our Community



PRODUCT DEVELOPMENT &  
MANAGEMENT PRACTITIONERS,  
ACADEMICS and SERVICE PROVIDERS



WE SERVE NATIONS, ORGANIZATIONS  
AND INDIVIDUALS

Connecting Innovators Worldwide



# PDMA Community – Industries



Product Development & Management Concepts and Best Practices are **UNIVERSAL**. They transcend industry, product or service.

# PDMA Community – Geographies



Our Global Footprint

PDMA INTERNATIONAL



**United States**  
Headquarters

Europe  
Asia Pacific  
Americas  
Africa

Members in 47 countries



# PDMA Offerings

## CERTIFICATION & PROFESSIONAL DEVELOPMENT

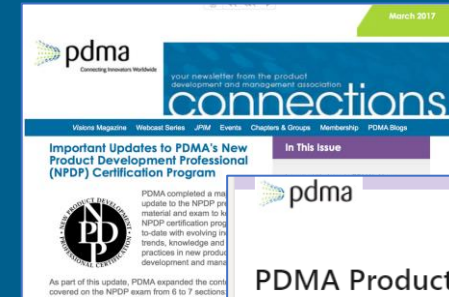


## BOOKS, JOURNALS & CUTTING EDGE RESEARCH



PDMA Best Practices Survey

## NEWSLETTERS & SOCIAL MEDIA COMMUNITIES



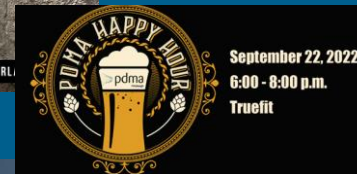
## ONLINE WEBCASTS, WORKSHOPS & KHUB

**PDMA Webcast**  
 Thursday, May 16, 2019 | 12 PM CT / 1 PM ET  
 Incorporating Clinical & Consumer Discovery during Medical Device Product Development  
 Sharon Baer, Advanced Innovation, Sleep and Respiratory Care Division

Save My Spot!



## GLOBAL, REGIONAL & LOCAL EVENTS



JPIM Research Forum

## PROFESSIONAL RECOGNITION



*Crawford Fellow Award*

*Allan Anderson Ambassador Award*

# United Nations Sustainable Development Goals



# The State of the World (in numbers)



**689 Million**  
EXTREME POVERTY<sup>[1]</sup>



**780 Million**  
GO TO BED HUNGRY<sup>[4]</sup>



**773 Million**  
ILLITERACY IN  
ADULTS<sup>[3]</sup>



**2.2 Billion**  
NO SAFELY MANAGED DRINKING  
WATER<sup>[5]</sup>



**1.1 Billion**  
NO ACCESS TO  
ELECTRICITY<sup>[6]</sup>



# The State of the World (in images)

Poverty



Hunger



Illiteracy



Clean Water



No Electricity

# How Much Money is Spent in These Areas? (U.S.)



**\$328B on  
Startups [6]**



**\$20.7B On  
Food [10]**



**\$67.6B by Higher  
Education [7]**

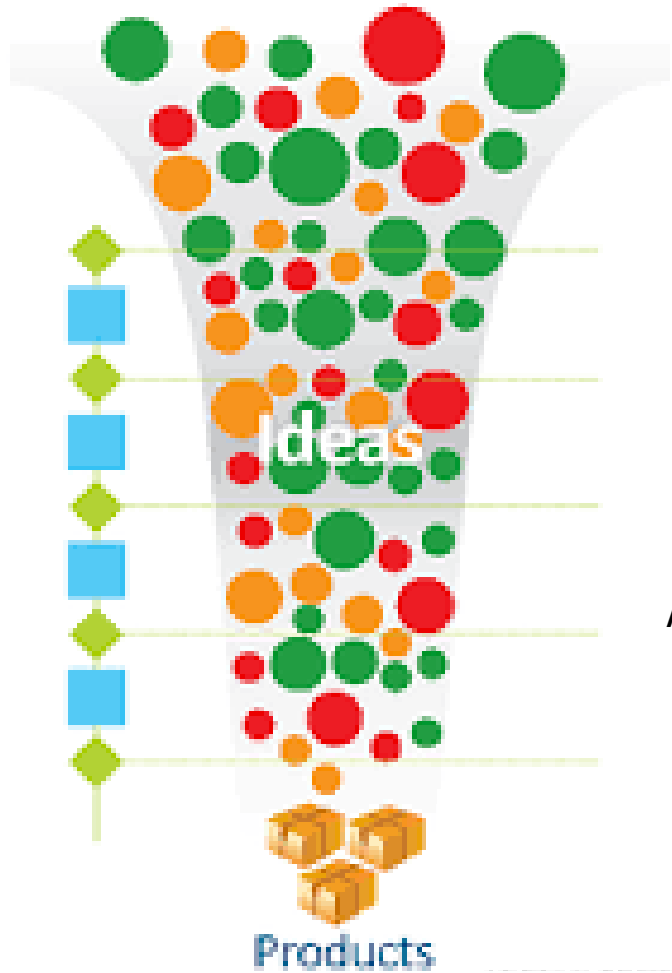


**\$50B On  
Clean Water [9]**



**\$8.8B on Grid  
Power [8]**

# The Innovation Funnel



*It's my belief that R&D focused on higher income consumers must be translated through innovation into viable, valuable products and services for low-to-middle-income countries (LMIC's).*

# The Neglect Funnel





# LEANMED

A CASE STUDY

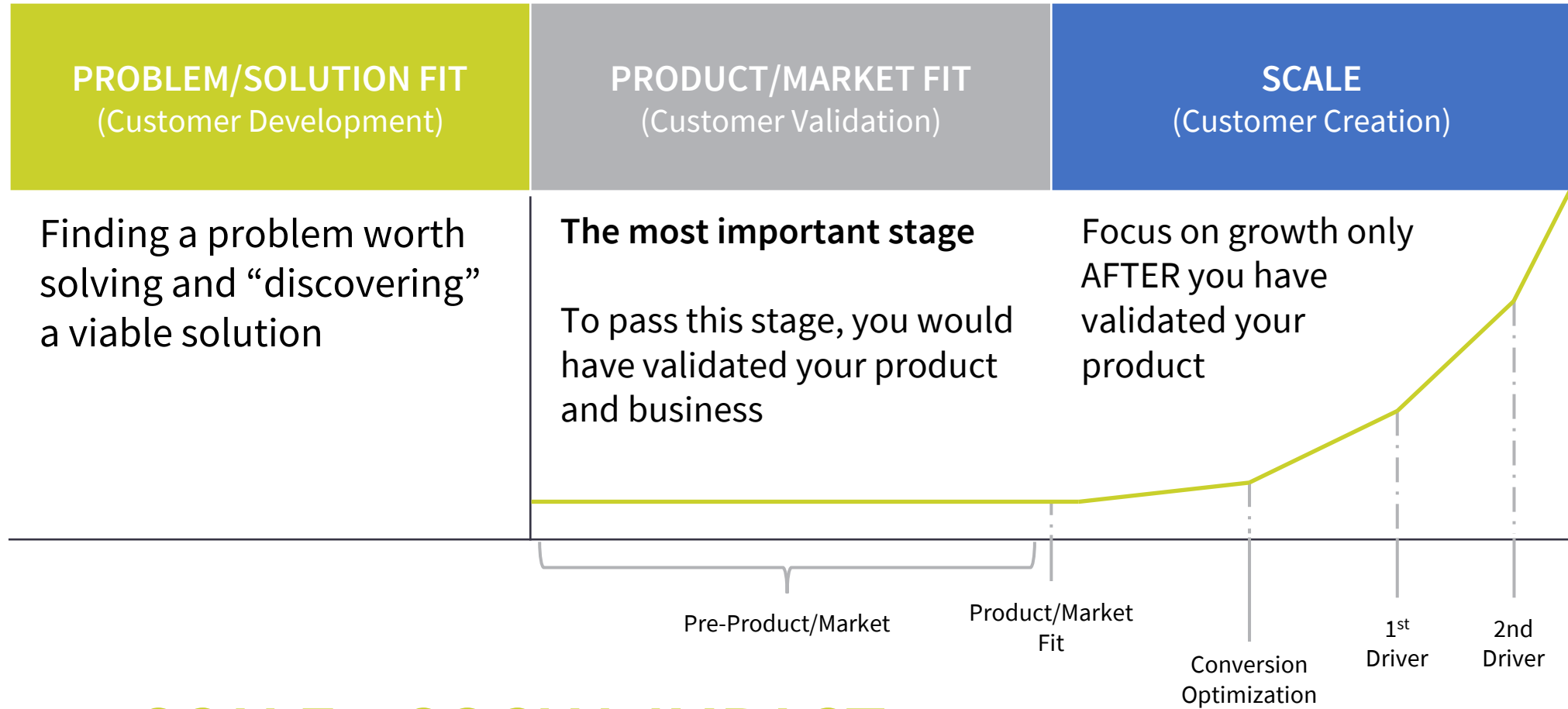
Leveraging Lean Startup methodology  
in Product Innovation



# Key Elements of Lean Startup

1. The Three Stages
2. The Business Model Canvas
3. Build/Measure/Learn
4. Minimum Viable Product

# The Three Stages of a Startup



**SCALE = SOCIAL IMPACT**



## Problem:

Pediatric pneumonia is the #1 killer of children in developing nations, averaging 800,000 deaths per year

Rural hospitals lack reliable electricity to produce life saving medical oxygen.

# Solution: Bring Oxygen to the People

The *O2 Cube* is a solar-powered, cloud connected production system that brings *life-saving oxygen* to the over *one billion* people that live without it today.





# Five Years of Product/Market Fit

2018

Winner of the University of Pittsburgh 2018 Blast Furnace competition

Developed functional O<sub>2</sub> Cube prototype at Duquesne



2020

Duquesne University New Venture Competition Finalist

Acceptance into life sciences incubator, LifeX Labs



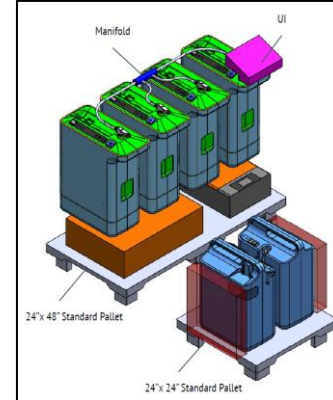
2022

Wefunder crowdfunding campaign started. \$85K raise.



2022 – O<sub>2</sub> Cube Pilot Operational in Nigeria

First Commercial 10 LPM O<sub>2</sub> Cube Designed



Idea Foundry Incubator Malawi Pulse Oximetry Project



2019

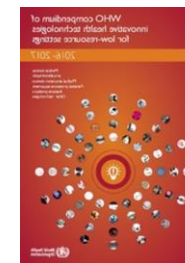


Finalist in PinCh Competition. \$50K award

Licensed UltraFill oxygen filling station from Philips



O<sub>2</sub> Cube included in 2021 WHO Compendium of Innovative Health Technologies for Low-Resource Settings

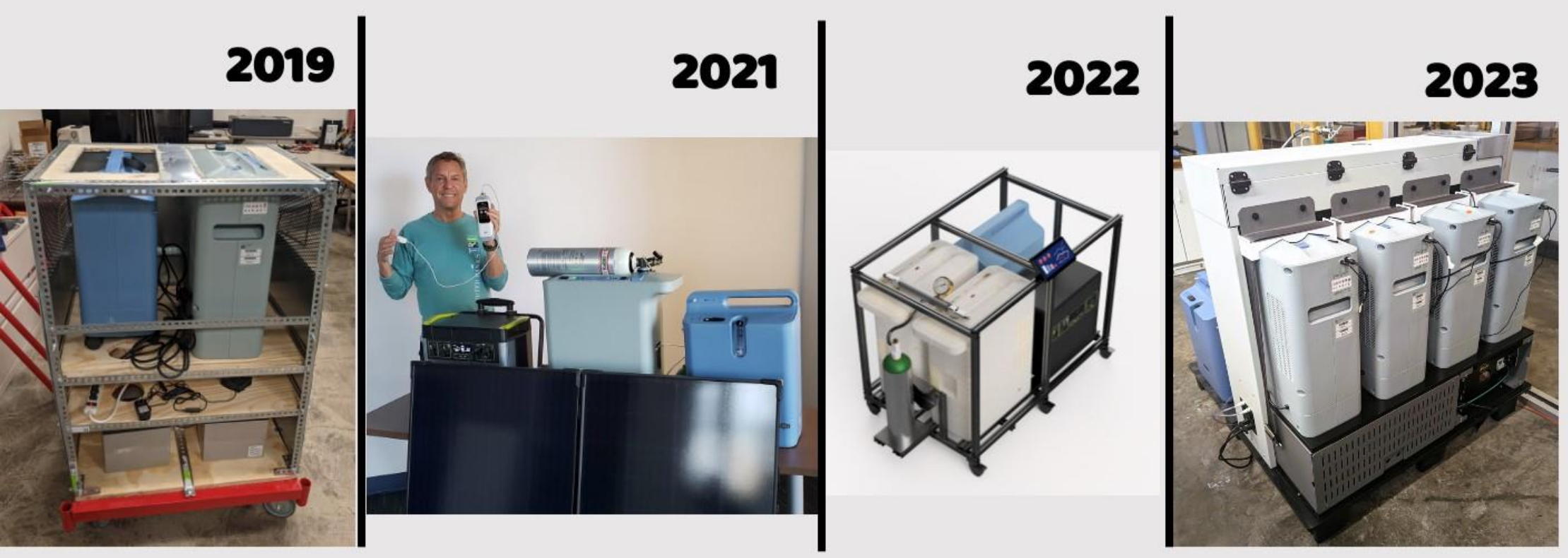


2021

**Commercial O<sub>2</sub> Cubes Ship to Uganda and Nigeria!**

2023

# The O2 Cube – Concept to Commercialization



# O<sub>2</sub> Cube Scale-up

3 Stages: Questions?



**Philips Sourced UltraFills**

Installed Base of 5,000 O<sub>2</sub> Cubes

- 200 New UltraFills
- Procure, Assembly & Test performed in Pittsburgh
- 50 Units
- In-country Sourcing of Solar Panels & Lithium Batteries

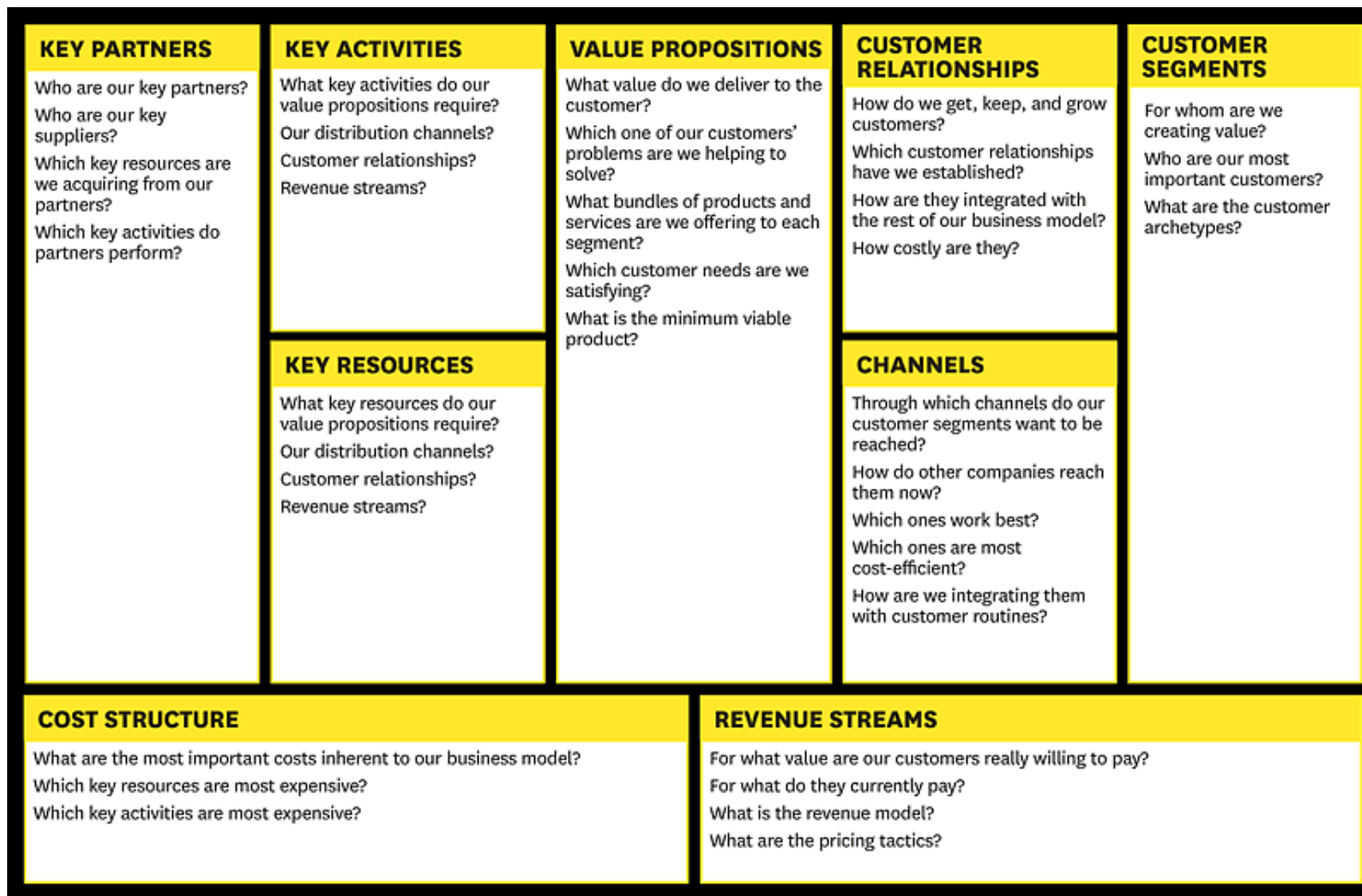
**African Sourcing & Manufacturing**

- Manufacturing Partner In Place
- Quality Management System active
- Complete local sourcing except compressor

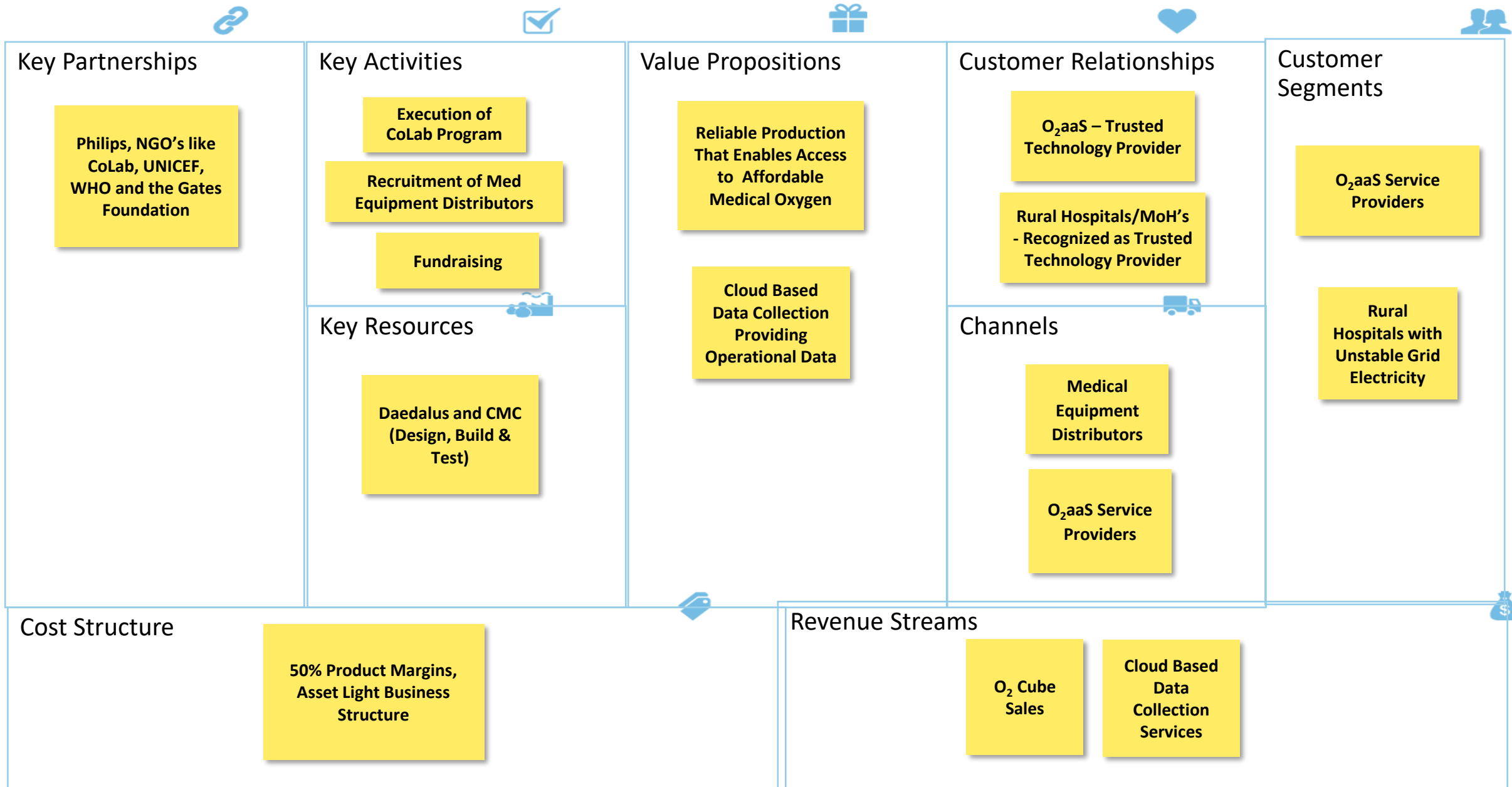
- Full Local Manufacturing
- BOM Cost Reduction
- Full Local Sourcing

**Mfg. Expansion to South Asia and LATAM**

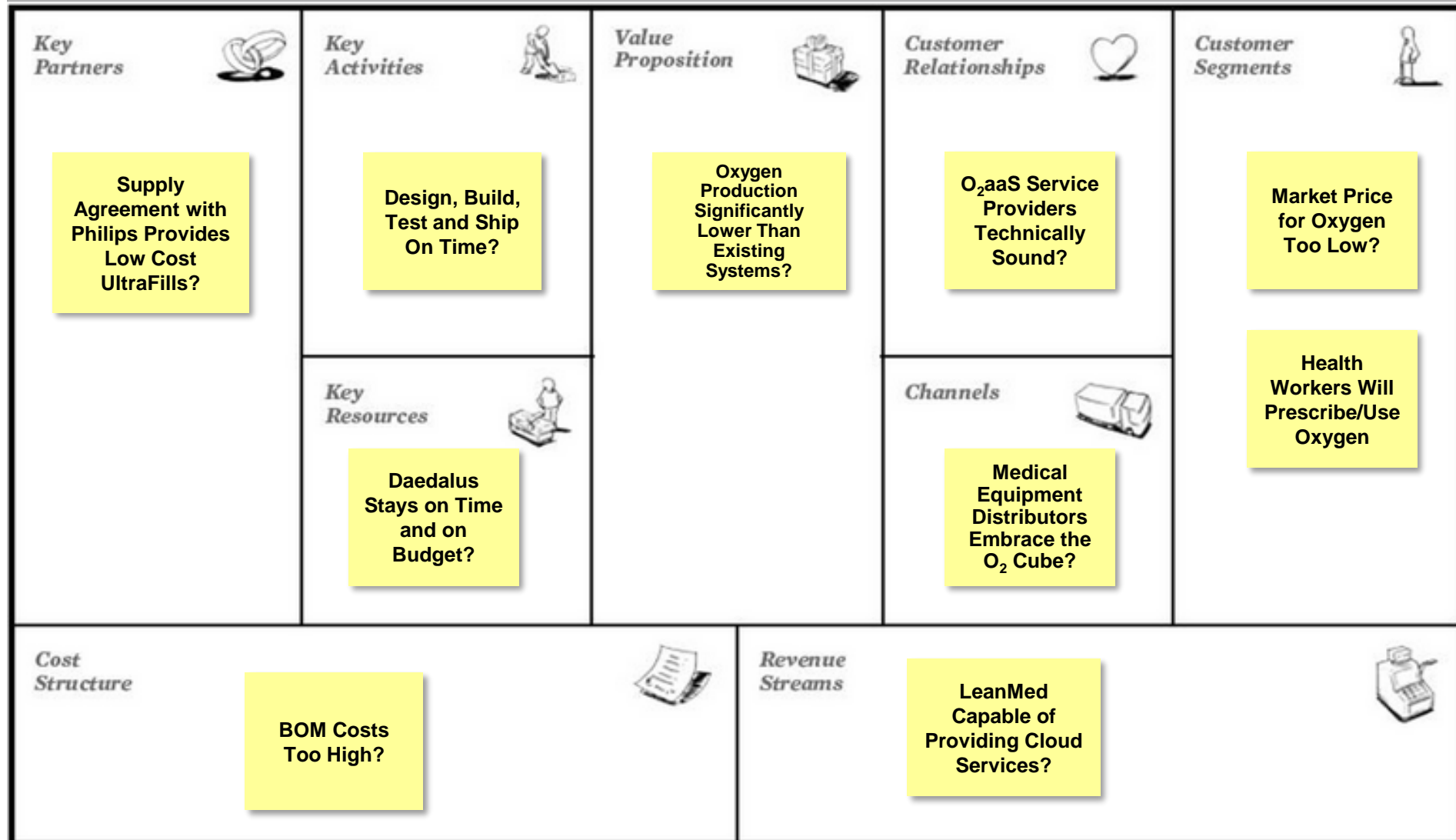
# The Business Model Canvas



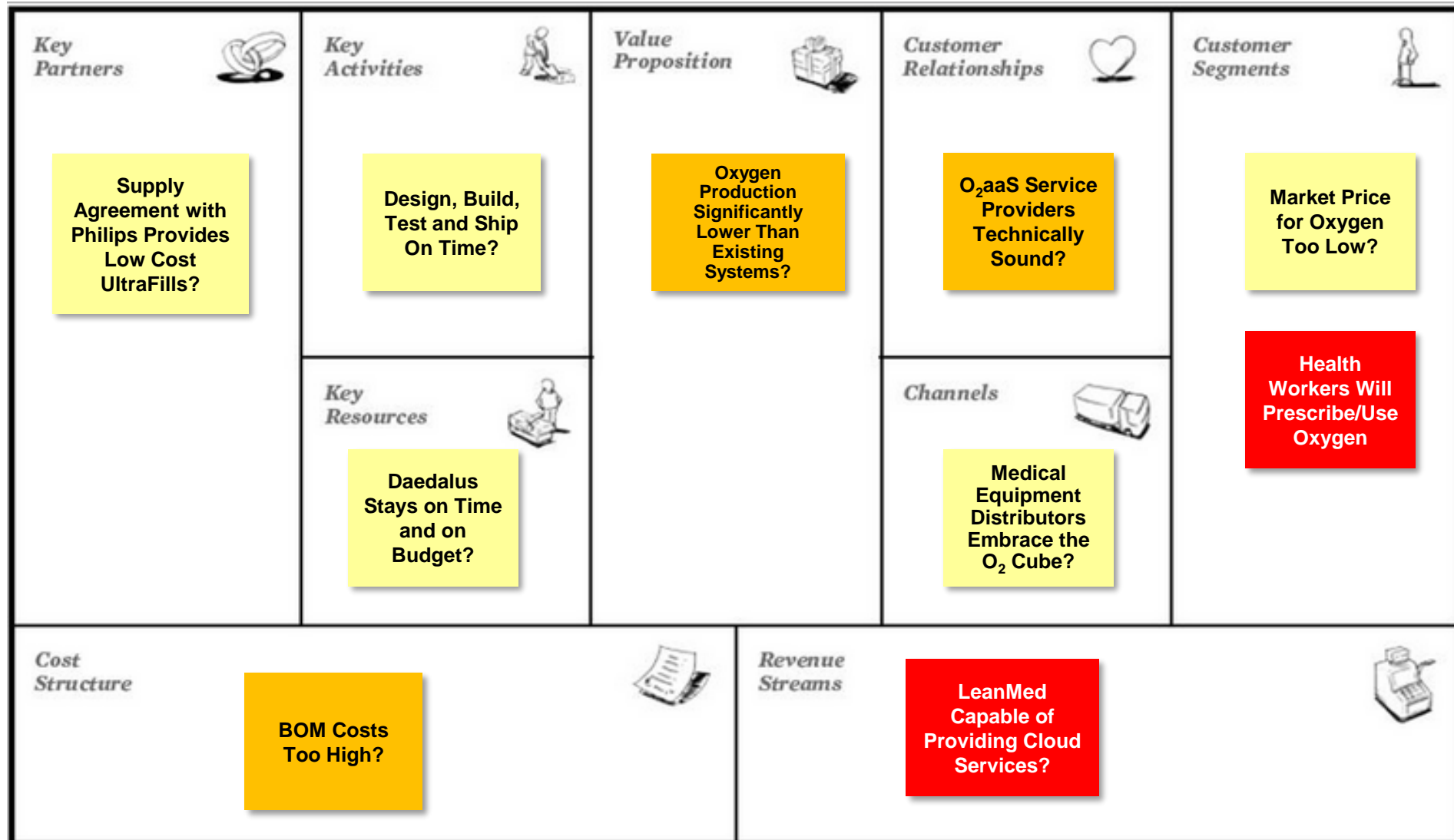
# Lean Med Business Model Canvas



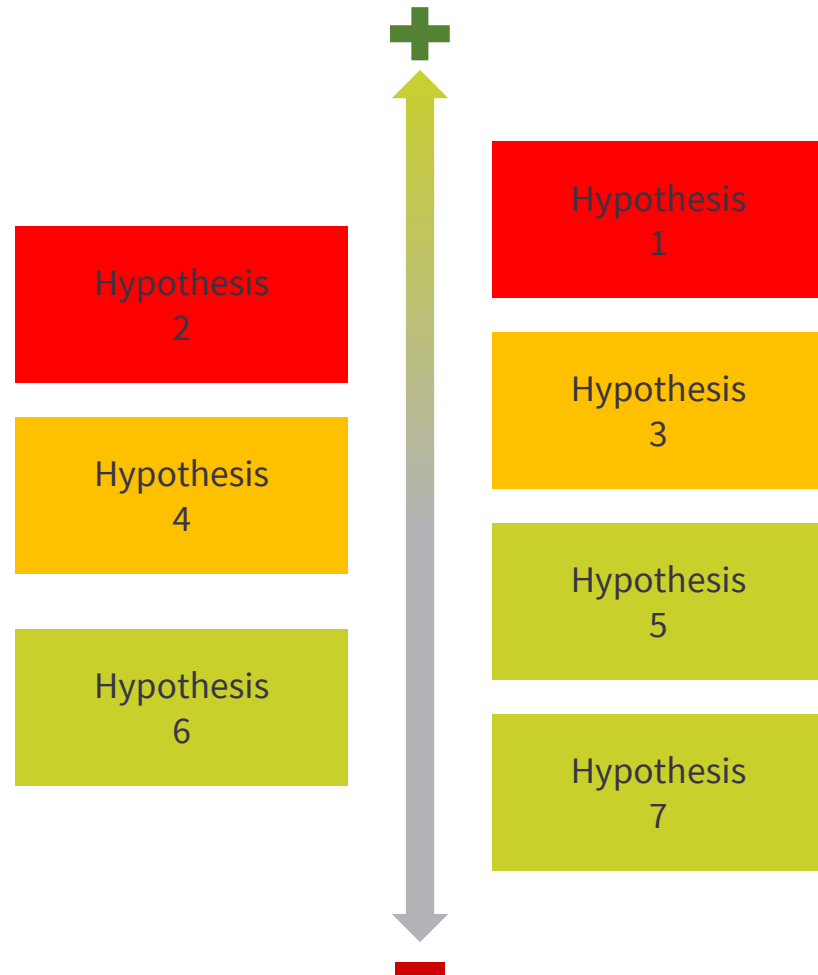
# Identify Key Hypotheses



# Where is the Risk?



# Prioritize Hypotheses



1. Break down the critical assumptions
2. Use an FMEA like approach
3. Estimate Probability and Impact
4. Rank them



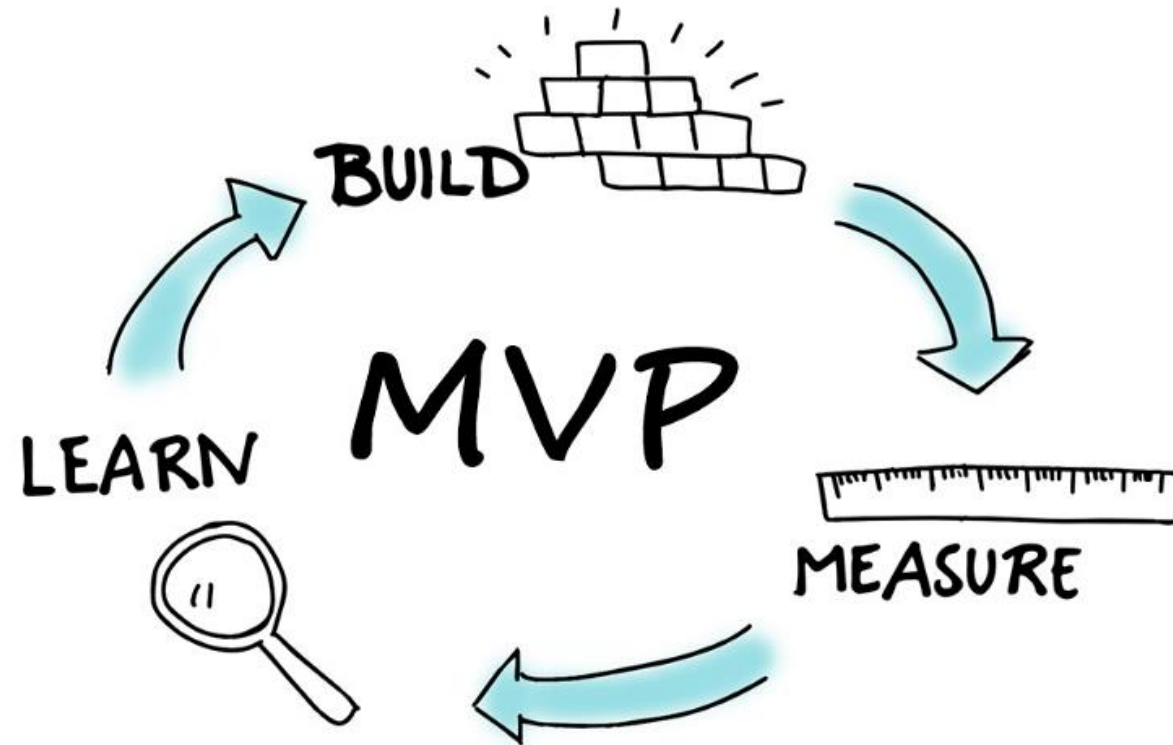
# Design an Experiment and Measure Results

- 1. We Believe:**  
Medical staff will use oxygen cylinders effectively
- 2. To Verify:**  
Execute the Nigerian Fast Track program
- 3. And Measure:**  
Satisfaction score and system usage
- 4. It Will Require:**  
8 or higher satisfaction rating and 80% utilization
- 5. We Are Right if**  
Scores and utilization exceeds targets



BMC  
Questions?

# Minimum Viable Product



*A minimum viable product (MVP) is a version of a product with just enough features to be usable by early customers who can then provide feedback for future product development*

# Fast Track as MVP

## What is it?

A pilot program initiated to better understand the demand for oxygen and learn how versatile the O<sub>2</sub> Cube is by implementing variations of the product in multiple locations with different needs.

## How will it work?

The **Fast Track O<sub>2</sub> Cube** is the minimal viable product version of the O<sub>2</sub> Cube that uses already FDA-approved components donated by various organizations including Philips, Goal Zero, and Masimo.

The world can't wait  
– so neither will we

**Fast Track  
O<sub>2</sub> Cube**



Operational in  
Nigeria. 26 Bed  
Pediatric Ward

**Goal Zero  
Yeti 3000x**

**Philips  
UltraFill**



**Philips  
EverFlo**



**Masimo  
Rad-G Pulse  
Oximeter**



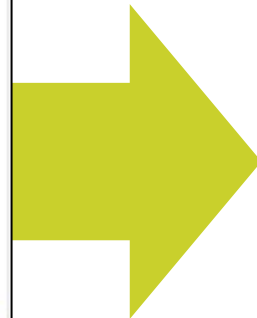
# Fast Track O<sub>2</sub> Cube



26 Bed Pediatric Ward Ota, Nigeria

# One Pilot Program Using an MVP

# O<sub>2</sub> Cubes Deployed at Scale



800,000 Deaths per Year Due to Pediatric Pneumonia

Multiple Clinical Studies Show a 33% Reduction in Mortality Rate When Oxygen Treatment is Available

$800,000 / 3 = 266,000$  Lives Saved Every Year

In Addition, An Enormous Reduction in Medical Complications and Hospital Stays

# In Summary

- PDMA's community of product managers and developers have an **ENORMOUS OPPORTUNITY** to make the world a better place to live, work and play. Let's use our innovation resources and skills to improve healthcare, eliminate poverty and protect the environment.
- Product and service **INNOVATION IS REQUIRED** to invent the technologies that will allow us to achieve the challenging price-performance objectives and operational requirements for new products to work properly under specific constraints found in low to middle income countries (LMIC's)
- The LeanMed journey is demonstrating the impact that comes when new product development becomes **MISSION DRIVEN INNOVATION.**

Thank you!



The logo for o2cube, featuring a stylized 'o' with a '2' inside it, followed by the word 'cube' in a lowercase, sans-serif font. A trademark symbol (TM) is located to the upper right of the word 'cube'.

every breath counts

# References

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6. [6] <https://www.cnbc.com/2022/01/13/vcs-invested-more-money-than-ever-into-start-ups-last-year.html>
7. [7] <https://www.foodengineeringmag.com/articles/98793-public-budgets-for-foundational-research-decline>
8. [8] <https://nces.nsf.gov/pubs/nsf22312>
9. [9] <https://www.who.int/news/item/13-04-2017-radical-increase-in-water-and-sanitation-investment-required-to-meet-development-targets>
10. [10] <https://www.iea.org/reports/world-energy-investment-2020/rd-and-technology-innovation>