

APOLLO HOSPITALS

A Fertile Ground for Digital Twin Methodology in Health Care

Professor Ravi P Mahajan CBE
*Director of Research and Innovation
Apollo Hospitals; India*



Digital Twin in Healthcare



Virtual replica of a patient, process, or system

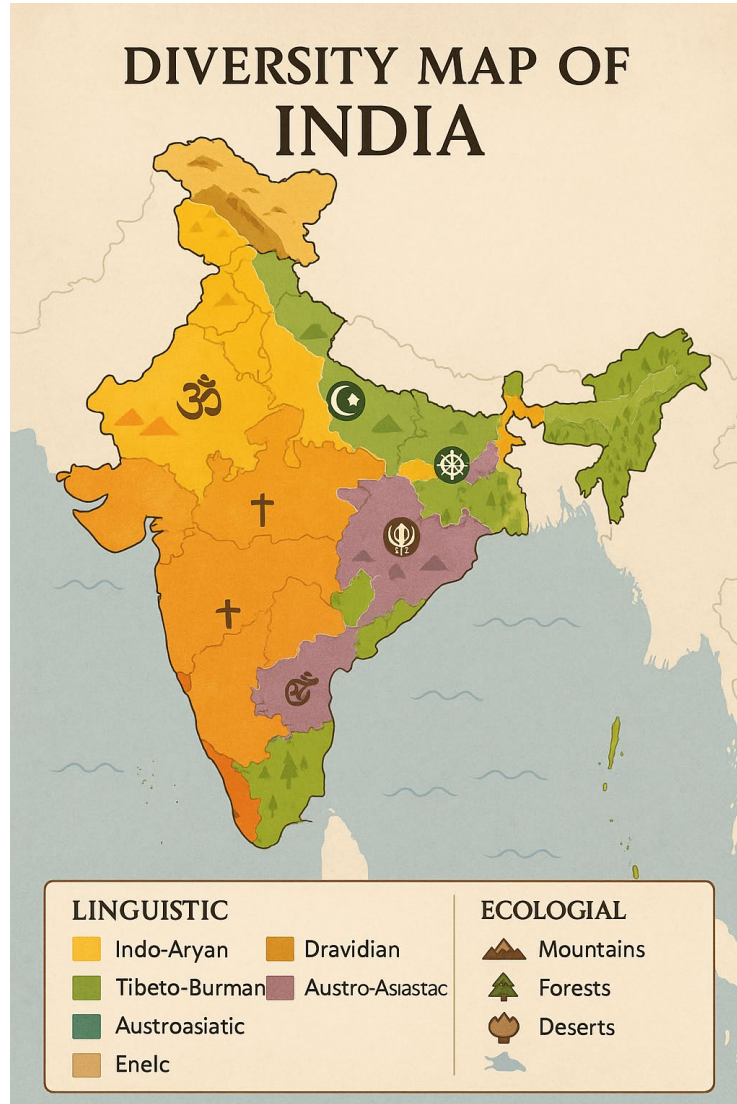


Integrates real-time data, AI, and sensors



Enables simulation, prediction, and optimization

Why India?



Population size and Impact

Genotype and Phenotype Spread

Rising Disease Burden

Healthcare needs to be predictive, proactive, personalized and precise

Why Apollo?; Clinical Breadth

- >70 hospitals
- >500 community clinics
- >5000 pharmacies
- Pioneers in
 - Telehealth
 - Comprehensive Connected Care

Largest integrated healthcare network in Asia

Strong digital backbone (Apollo 24|7, EMR, AI analytics)

Data scale + Model for Development and Validation

Why Apollo?; Digital Infrastructure



Integrated teleconsultation, connected care, pharmacy services and diagnostics, in a unified platform

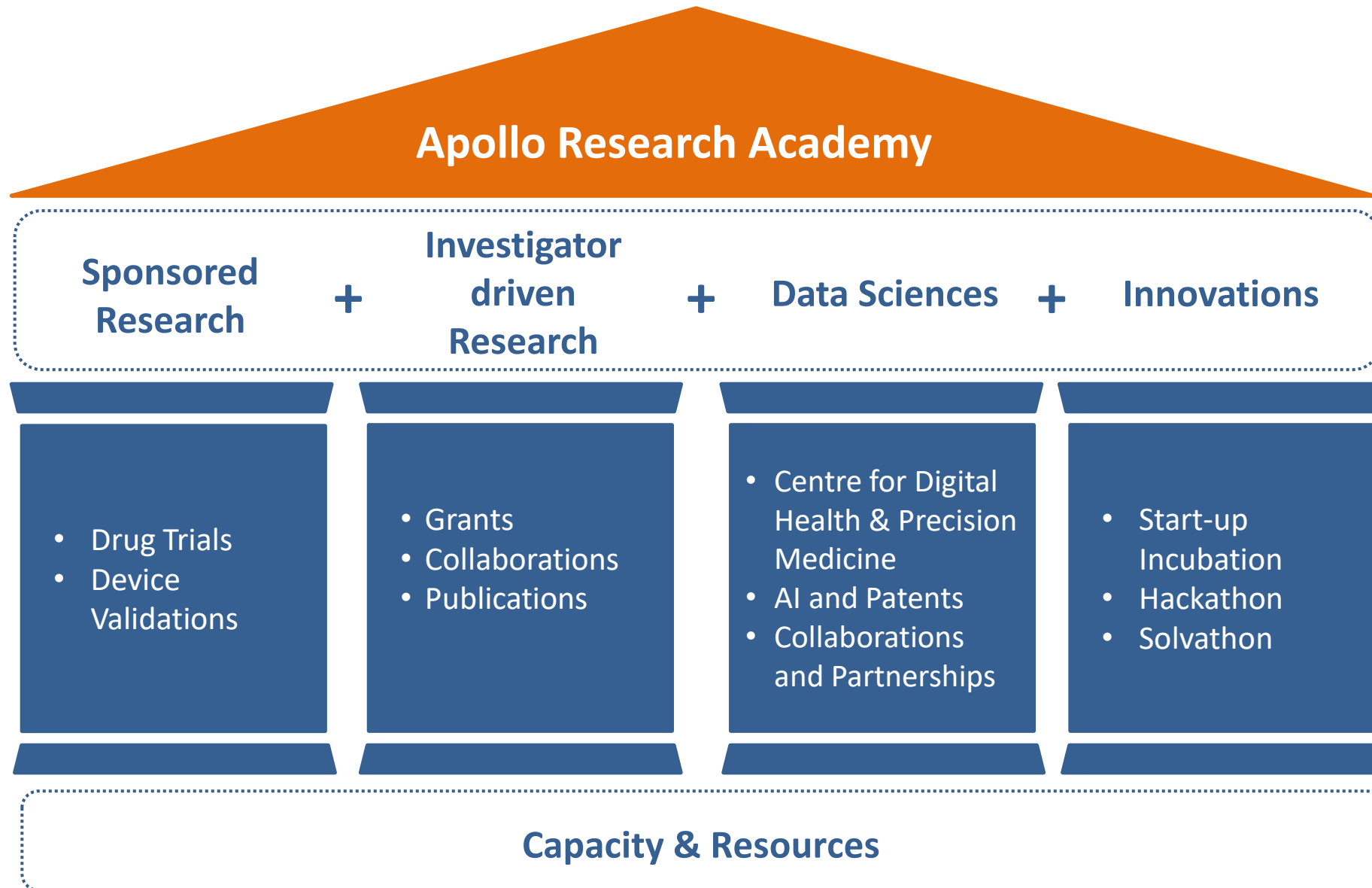


Advanced interoperability of electronic health records across tertiary and speciality hospitals enhances seamless data flow



Large-scale data lakes and AI capabilities

Apollo Research Academy & its 5 Strategic Focus Areas



Capacity, Resources & Culture



Sponsored Research

Experience of **1350+**
clinical studies;
80% multi centric

22 operational
Sites across 9 cities

150 trials on ground
at any given points

24+ years of site
management
experience

200+ GCP certified
active clinicians;

90+ GCP certified
CRCs & professionals

Full AAHRPP
accreditation – gold
standard

Trials across **6** leading
therapeutic areas

NABH accredited,
DCGI registered **Ethics**
Committees

Device validation
studies conducted for
companies from
across the globe

Uniform SOP's across
sites

Trials conducted
across phase I-IV

Founded in 2000 by Apollo Hospitals Group, ARI is India's **first & single largest** Site
Management Service Provider

Centre for Digital Health and Precision Medicine

Apollo – Leicester Joint Collaboration



The Certified Clinical AI Portfolio

Workstream #1 - Clinical Intelligent Engine

Workstream #2 - Risk Scores & Disease Progression Models

1. Cardiovascular Diseases, (AICVD)
2. Pre-Diabetes & Type 2 Diabetes,
3. Liver Fibrosis, (AI-LF)
4. Acute Exacerbation of COPD, (AI COPD)
5. Chronic Kidney Diseases (AI CKD)

Workstream #3 - Image and Signals

1. Chest X-ray Anomaly
2. Chest X-ray Tuberculosis

Workstream #4 - AI Augmented Pathways

1. EARS – Antibiotic Stewardship Program
2. Pre-Anaesthesia AI
3. Adult Early Warning Signs

Workstream #5 - Throughput Optimization

1. Discharge Prediction 24 hours / 48 Hours [With MIT]
2. Gen AI for Discharge Summary

Research Pipeline- Feb 2025

Workstream #2

- Hypertension Pathway
- AI LF Ver 2

Workstream #3 -

- ECG : Heart Failure Pathway
- Mammogram
- Stroke AI

Workstream #4

- NLP Stack on Clinical Pathways
- Early Warning Signs – X Clinical Alerts
- Sepsis with Bloodcounts

Workstream #5

- Virtual Tumor Board
- Google MedGemini Validation

Workstream #6

- First Polygenic Risk Model

Partnerships – Core to Success



UNIVERSITY OF
CAMBRIDGE



MONASH University



Maastricht
University

ACADEMIC

Other universities with whom founding members have collaborations and who are our existing & prospective partners



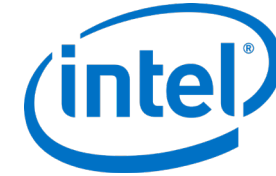
Microsoft
Azure



Google Cloud

INFRASTRUCTURE

Partners who would provide cloud and other API solutions for the Centre



SIEMENS
Healthineers

INDUSTRY

Industrial Partners who are working with the founding members in various research streams

bsi.

WORLD
ECONOMIC
FORUM



Jameel
Clinic

OTHERS

Ongoing or prospective partnerships for ethics research, regulatory or business interests

Strategic Alignment

The integration of Digital Twin methodology aligns perfectly with Apollo's vision of building a digitally enabled, patient-centric, and continuously learning health system.

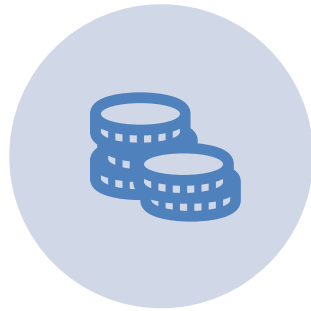
Key Application Domains

Domain	Digital Twin Use Case	Impact
Cardiology	Personalised heart models predict outcomes of interventions.	Reduction in readmissions and optimisation of treatments.
Oncology	Simulating tumour growth and therapy response.	Enables precision oncology and adaptive therapy.
Critical Care	ICU physiological twins for optimising sepsis management and ventilator use.	Facilitates early detection and reduces mortality.
Operations	Simulation of bed management and patient flow.	Improves operational efficiency and reduces waiting times.
Preventive Health	Population-level digital twins based on health checks.	Enables predictive and targeted community interventions.
Education	Immersive training using digital twin technology.	Provides realistic, simulation-based learning experiences.

Strategic Advantages



CLINICAL EXCELLENCE →
PREDICTIVE OUTCOMES



OPERATIONAL EFFICIENCY
→ COST SAVINGS



RESEARCH LEADERSHIP



IP AND PARTNERSHIPS

Call to Action

Healthcare Digital Twin Task Force

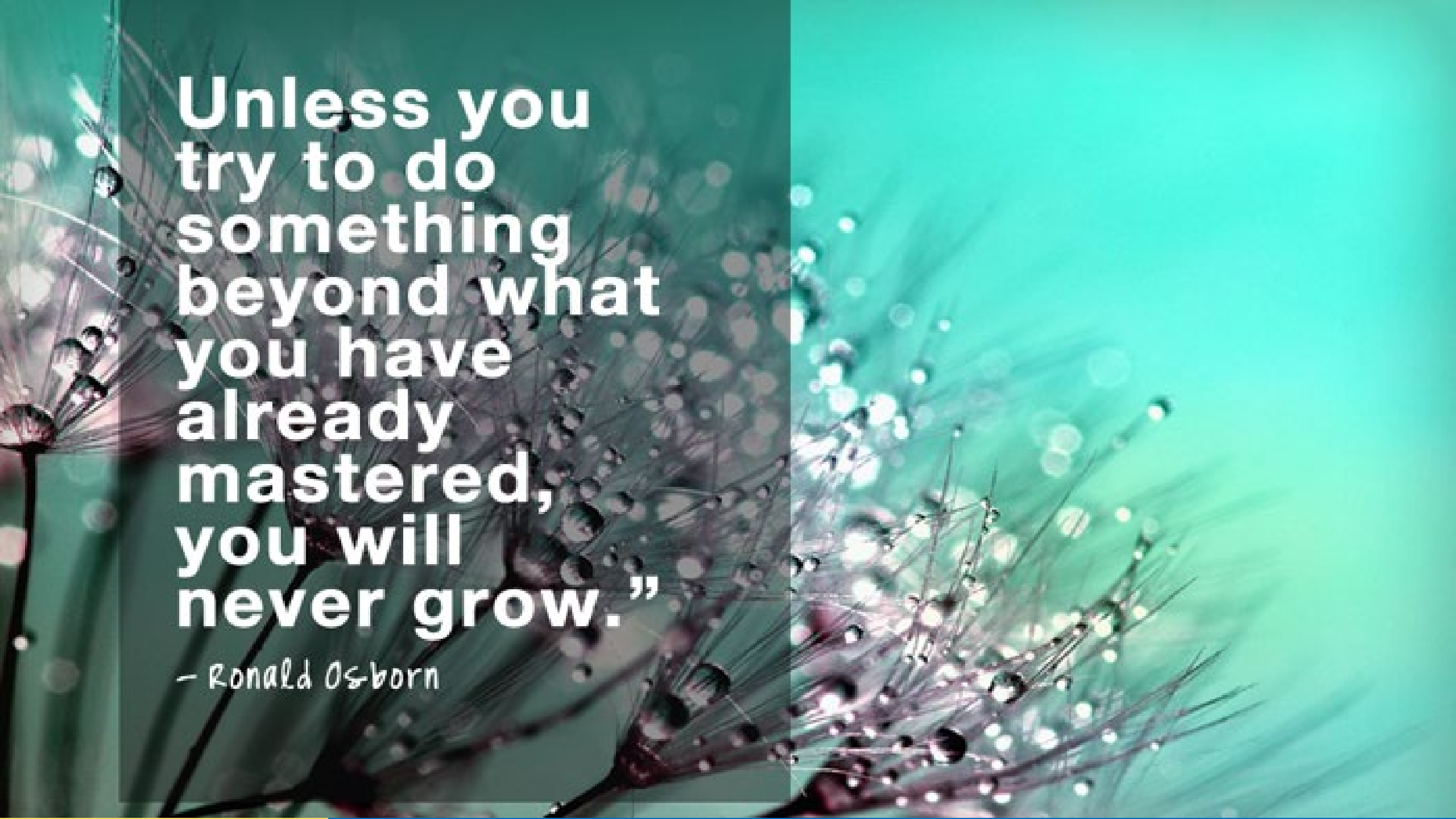
Identify pilot specialties

Build global partnerships

Ethical and Governance Framework

POC developments and studies in pilot specialties

Scale and Integration



Unless you
try to do
something
beyond what
you have
already
mastered,
you will
never grow.”

— Ronald Osborn