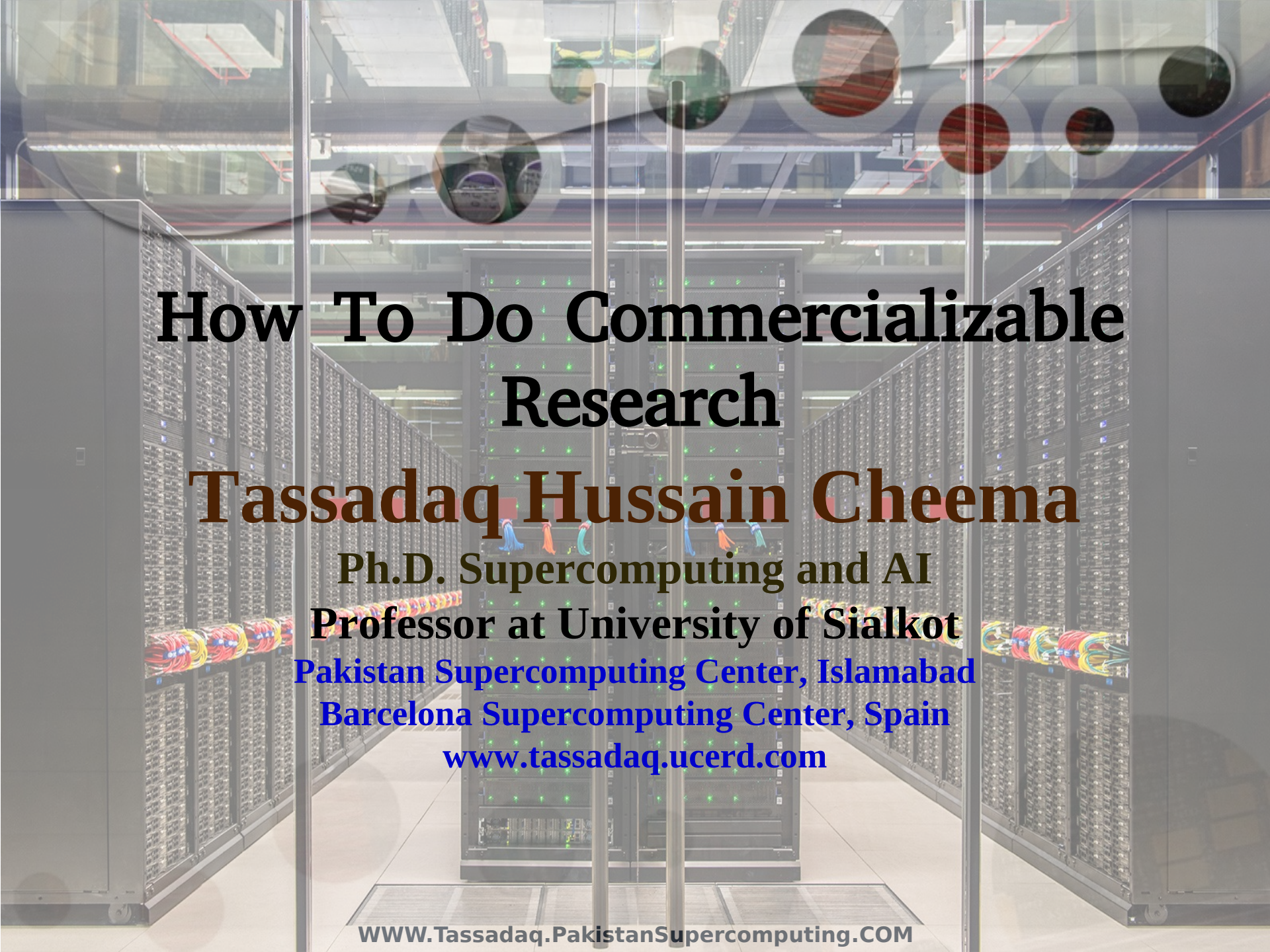

How To Do Commercializable Research

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Ph.D. Supercomputing and AI

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Pakistan Supercomputing Center, Islamabad

Barcelona Supercomputing Center, Spain

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Speaker's Intro

Academia

PhD – UPC BarcelonaTech Spain

Microsoft Cambridge, IBM, Barcelona Supercomputing Center, PLDA Italia

Proven successful record of academic management as Professor and Dean.

Enhanced Quality of academic **outcomes** into **applied and sustainable projects.**

Research

Developed Labs Supercomputing, Distributed Artificial Intelligence, Computer Vision, Software Defined Radio, Parallel programming and Embedded Systems;

80+ publications and **PKR 60+ Million research funding** during the last 5 years.

Introduction

Experience

19+ year's versatile experience in the area of Computing, Artificial Intelligence and IT. Served National and International Academia, Industry and Government

- **Barcelona Science Park Spain**
- **Cambridge Science Park UK**
- **Technopolis Of Sofia-Antipolis, France**

Development and Commercialization

30+ Million of Industrial Funding.

Developed Digital Systems for Industry.
Transform Idea into product.
Innovation and Commercialization for Sustainable economic and industrial development.

Capacity Building: Conducted more than **50 national and international workshops** and **training on Commercializable research, Writing successful grant proposal, and research and innovation.**

Provides Consultancy and Support for Entrepreneurship, Start-ups, Business Innovation and Technology transfer.

Completed Projects

1) Development of Automated Guided Vehicle for Mars mission (case study) 2 Million PKR foreign funding 2021.
2) Indigenous Development of Ventilator as Software Development Team-lead Rs. 12M Funded by Pakistan Science Foundation 2020.
3) Development Of A Scalable Heterogeneous Supercomputer, as PI HEC funding of 16 Millions under TDF-3rd Call 2018/19.
4) Design, Development And Production Of Hardware Based Gel Documentation System For DNA, RNA And Proteins Analysis, as Co-PI HEC funding of 18 Millions under TDF-3rd Call 2018/19.
5) Spanish Ministry Severo Ochoa Mobility Grant to start collaboration with Barcelona Computing Center (2019)
6) Iris based Disease Diagnostic System as PI HEC Funding of 2.52 Million under NRPU 2017/18.

Submitted Projects: (120 Million PKR)

(1) Development of Low Cost Indigenous **Rice Color Sorting Machine**, worth 9.8 Million PKR, PSF

(2) Development of Energy and **Cost Efficient Electric Fan Controller**, worth 7.8 Million PKR, PSF

(3) Computing and **Artificial Intelligence** Platform for **Health Sciences**. Worth 20 Millions PKR, funding source: HEC–LCF status: Shortlisted

(4) **Virtual Reality Platform** for Rehabilitation. Worth 9.5 Millions PKR, Funding Source: HEC-NRPU Status: Shortlisted

(5) Computing Platform for **Data Sciences**, Worth 14 Millions PKR, HEC-TTSF Status: Shortlisted

(6) **Aerodynamics** Testing of Football, Worth 6.5 Millions PKR, PCSIR Status: Submitted

(7) A smart multi-sensor based system for quantization and **dispersion of smog,** Worth 7 Millions PKR, PSF Status: Shortlisted

(8) A Computing Platform for Artificial Intelligence Applications, Worth 10 Millions PKR, PSF Status: Submitted

(9)Smart **Foot Weight Distribution System**, Worth 7.5 Millions PKR, HEC-ISF Status: Submitted

Agenda

- **Identify Impact based Research**
- Research and Development Strategies
- Success Stories

Innovation: Development of **creative** method, process, device or product.

Research: Innovative and systematic work undertaken to increase the stock of **scientific knowledge**.

Technology: Machinery and equipment developed from the application of **scientific knowledge**.

Commercial Application: An application/product/equipment/service that is salable, can generate profit and marketable.

Sustainable Development: National initiative built on local economies, industrial need and unique assets to address their individual **challenges** and provide quantifiable real-world benefits.

SUSTAINABLE DEVELOPMENT GOALS
1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE, JUSTICE AND STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS
SUSTAINABLE DEVELOPMENT GOALS

Current R&D?

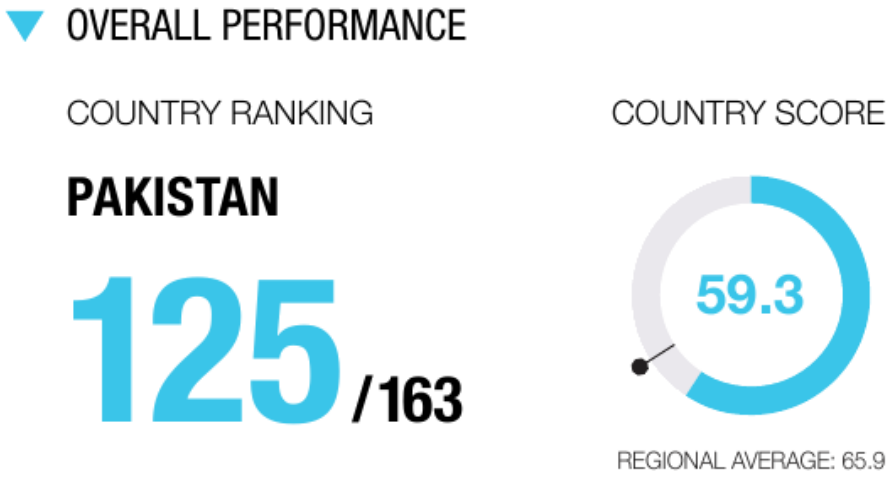
Pakistan has spent around 80 billion on R&D.

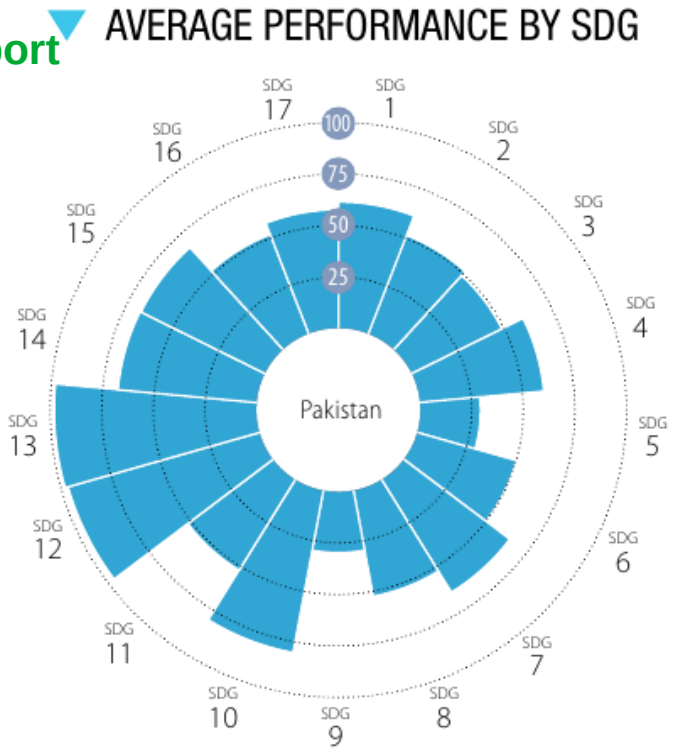
Produced 148,678 Publications (Till 2021 Research Gate)

84040 Researchers R&D (World Data Atlas)

12 Center of Excellence and 42 Research Center (Wikipedia)

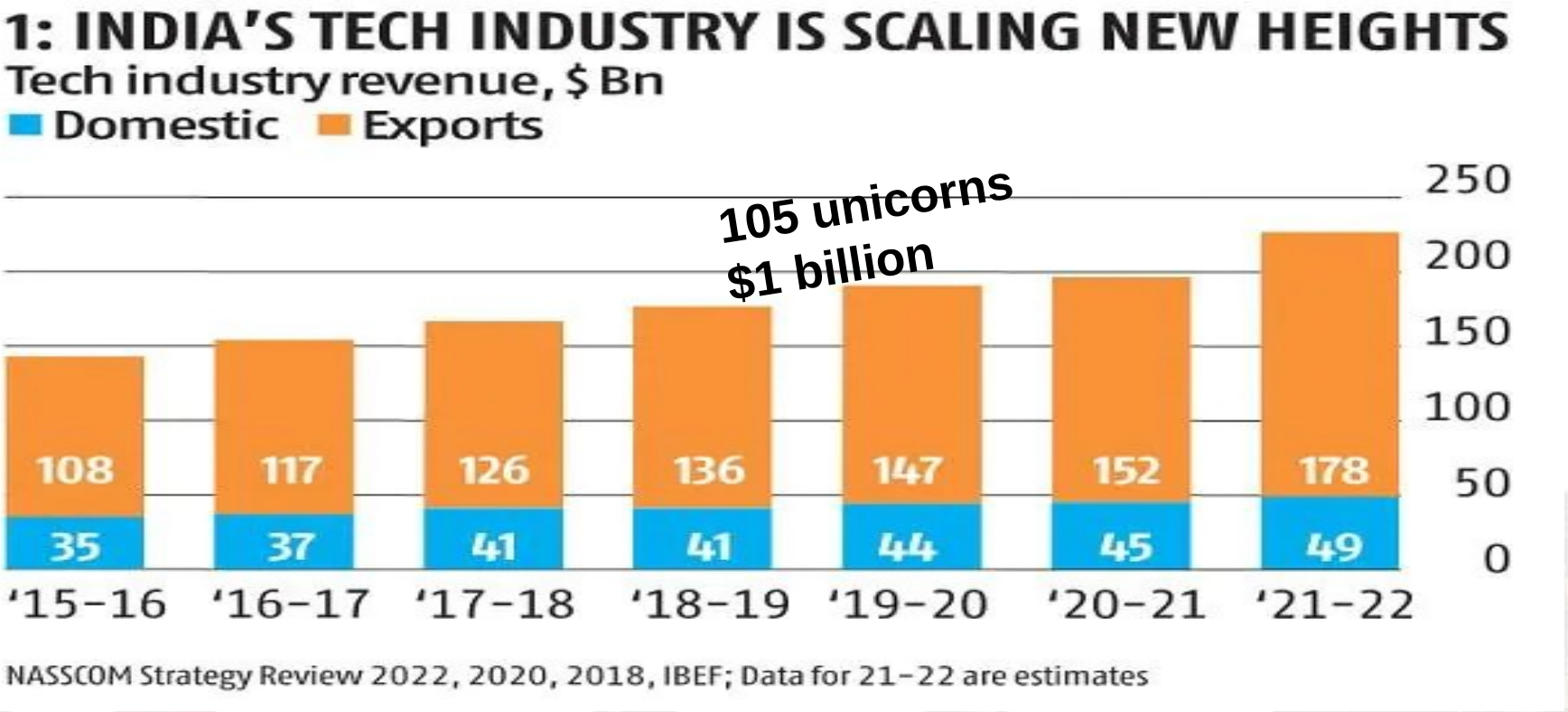
Pakistan Rankings - Sustainable Development Report



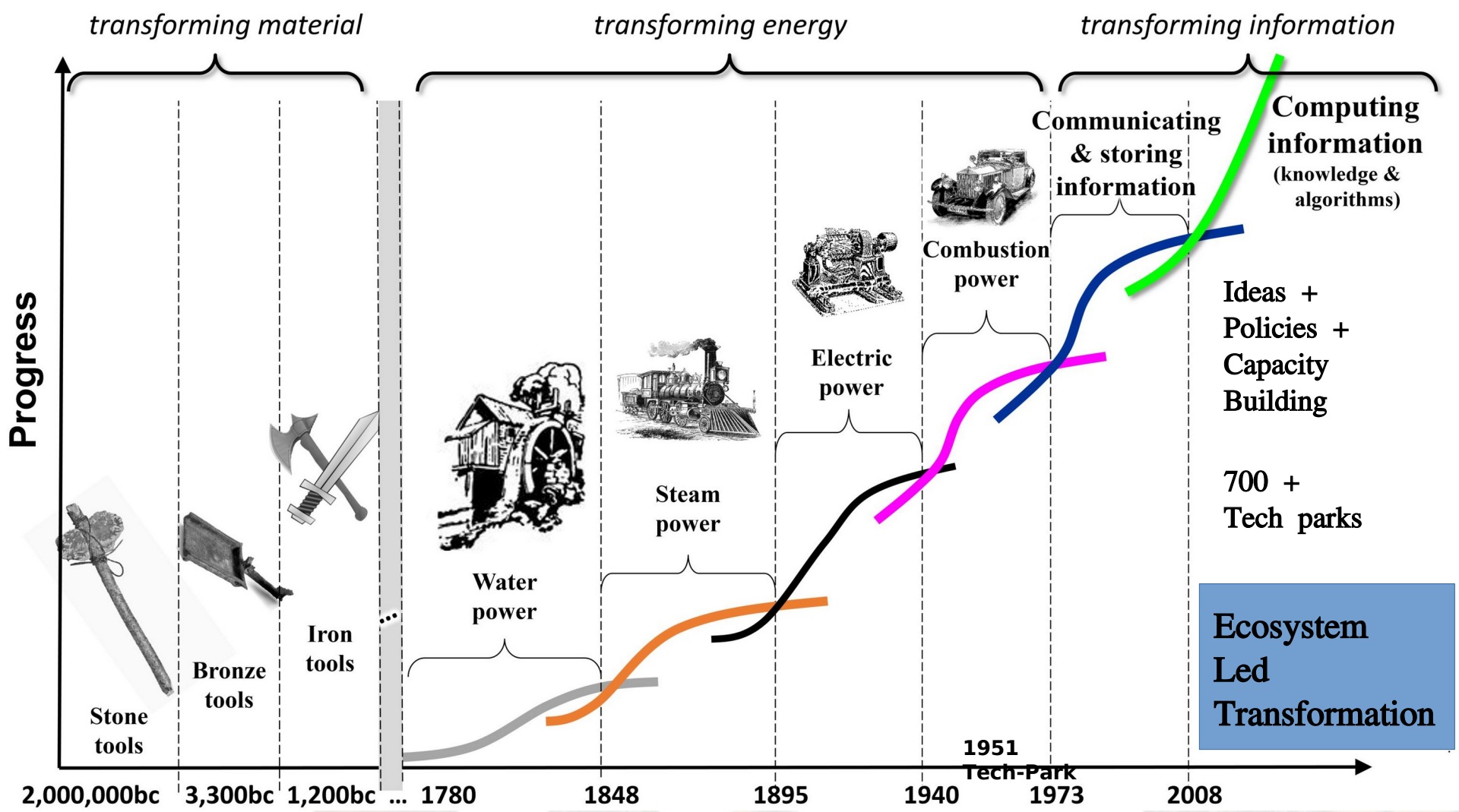


Tech Industry

Pakistan’s Tech Industry 3.5 Billion USD

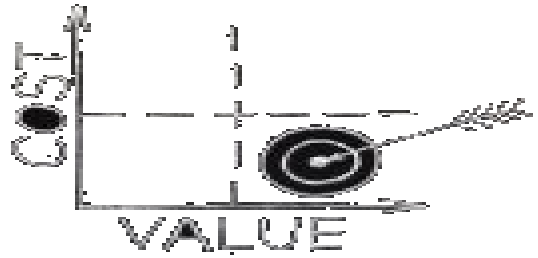


Mankind Progress



1861 MIT birth 1900 Stanford Led Silicon valley

1950: Single focused support office: ORIC / TTOs / KTOs / ILOs / IPOs S&T Park


COST
VALUE

MARKET DISCOVERY
Designing and refining research toward industry challenges & opportunities
Validating the solution's commercialisation potential
MARKET VALIDATION
Defining the technology's value and path to market
IMPACT & SCALE
Launching into the market and managing for impact/scale
Phase A
Phase B
Phase C
Research
Impact

Market Discovery - Challenge: Economic, societal & environmental challenges and opportunities.

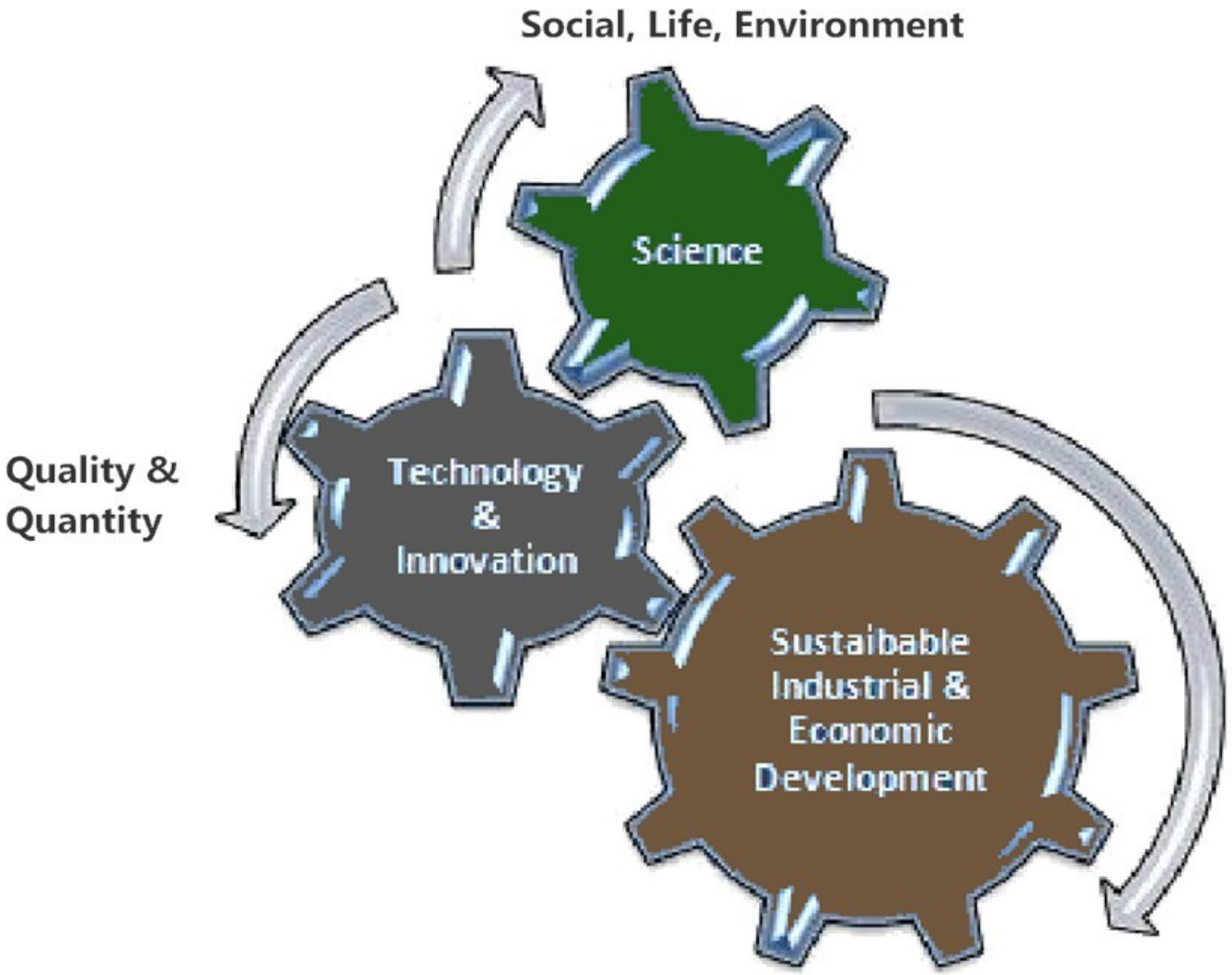
Case Study: Theoretical Model, Mathematical Model, Simulation Model

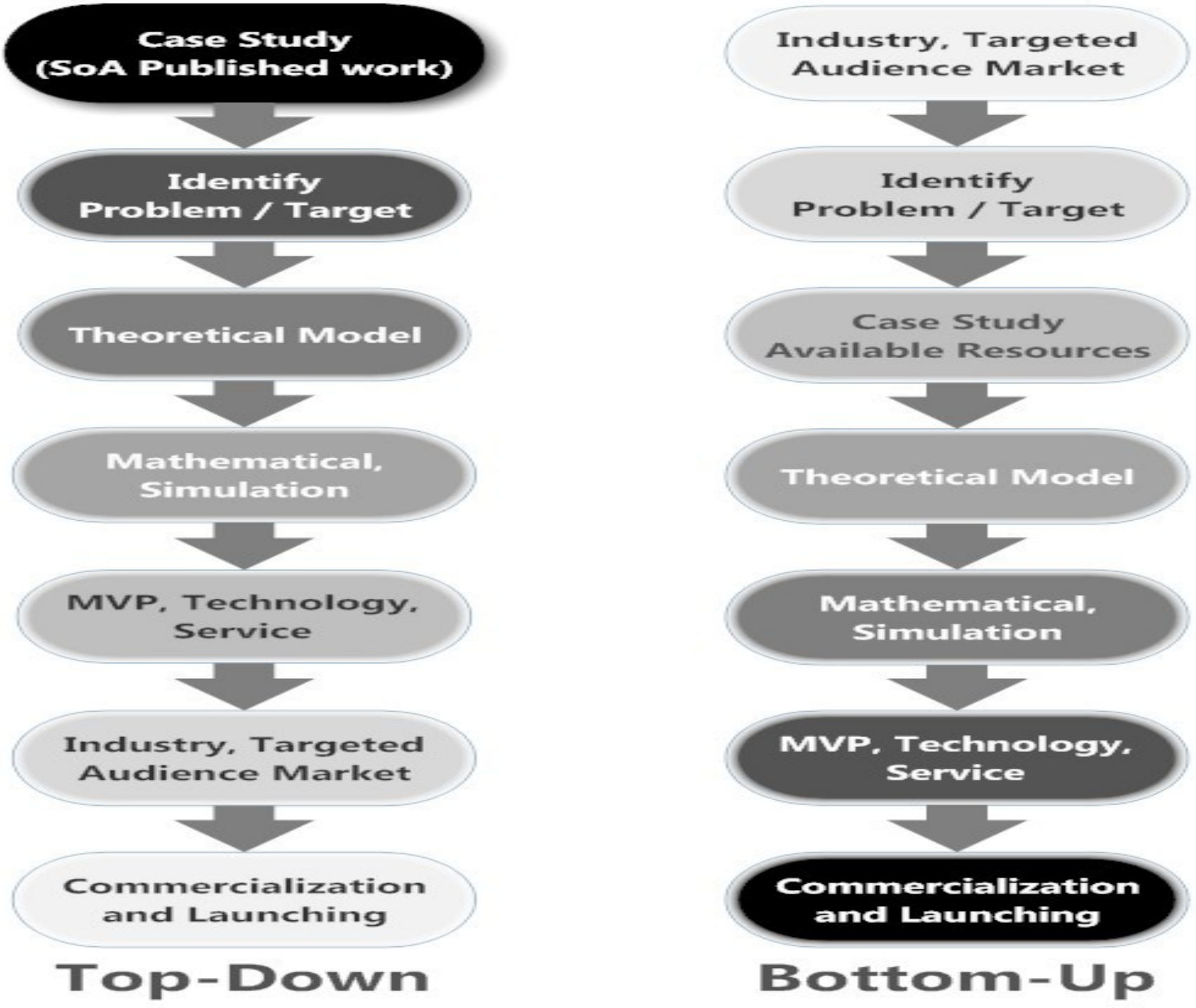
End Users Engagement: Targeted Audience, Understand required features, functionalities and deliverable.

Value Chain: Procurement, Technology Development, Project Team, Cost Analysis. In-bound and Out-Bound Logistics, Marketing and Sales.

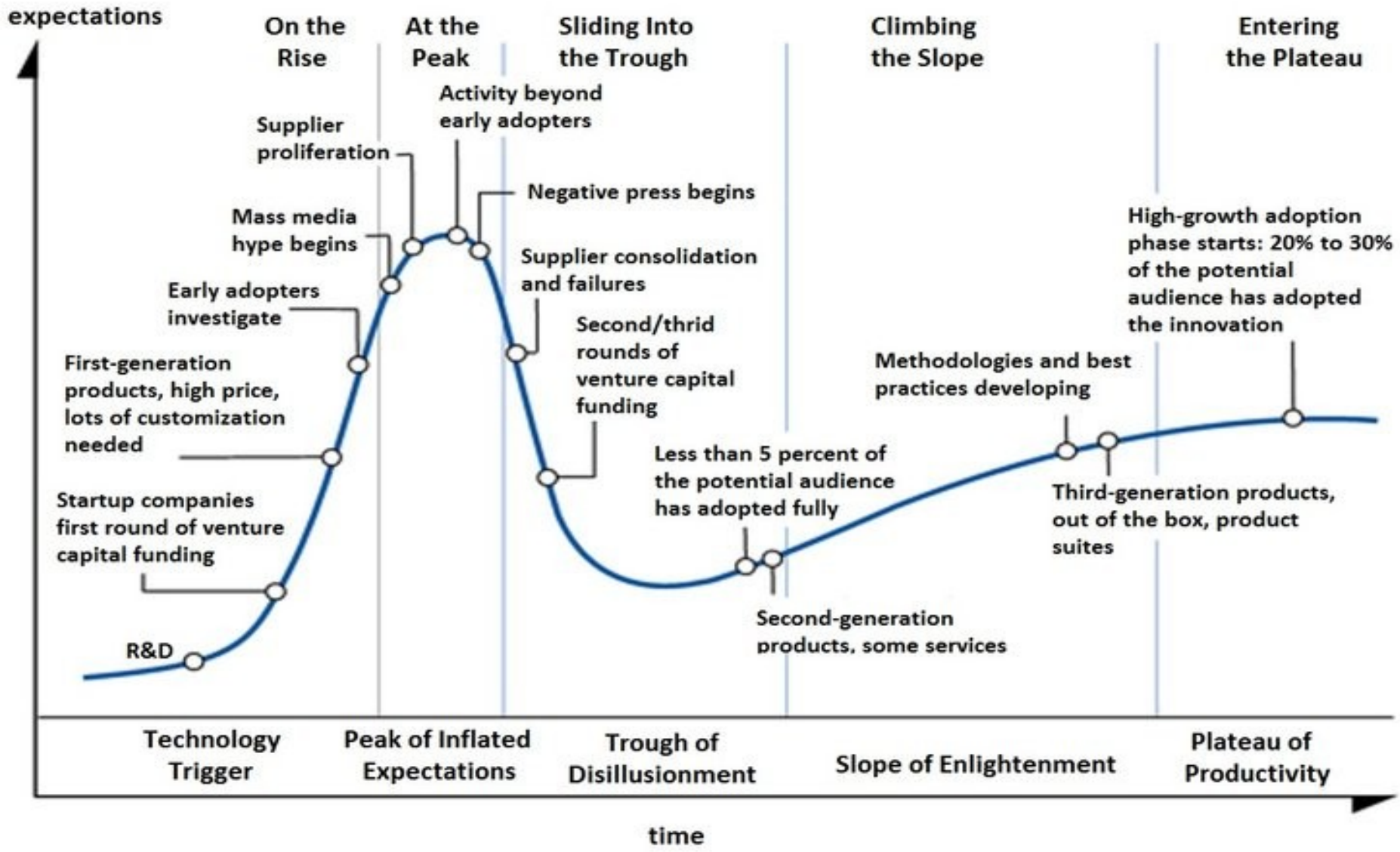
Trade-offs: Competitor Analysis, Ensures risks and potential negative impacts are considered and where possible they are addressed/mitigated in all phases of the project.

Industrial Revolutions and Sustainable Developments




Case Study
(SoA Published work)
Identify
Problem / Target
Theoretical Model
Mathematical,
Simulation
MVP, Technology,
Service
Industry, Targeted
Audience Market
Commercialization
and Launching
Top-Down
Industry, Targeted
Audience Market
Identify
Problem / Target
Case Study
Available Resources
Theoretical Model
Mathematical,
Simulation
MVP, Technology,
Service
Commercialization
and Launching
Bottom-Up

Hype Curve


expectations
On the Rise
At the Peak
Sliding Into the Trough
Climbing the Slope
Entering the Plateau
Activity beyond early adopters
Supplier proliferation
Negative press begins
Mass media hype begins
Supplier consolidation and failures
Early adopters investigate
Second/thrid rounds of venture capital funding
First-generation products, high price, lots of customization needed
Methodologies and best practices developing
High-growth adoption phase starts: 20% to 30% of the potential audience has adopted the innovation
Less than 5 percent of the potential audience has adopted fully
Third-generation products, out of the box, product suites
Startup companies first round of venture capital funding
Second-generation products, some services
R&D
Technology Trigger
Peak of Inflated Expectations
Trough of Disillusionment
Slope of Enlightenment
Plateau of Productivity
time

Focus on Emerging Technologies

IoB

Total Experience (TX)

Hyperautomation

Edge Artificial Intelligence

5G

Cybersecurity Mesh

Distributed Cloud

Augmented Reality and Virtual Reality

Quantum Computing

Blockchain

Conclusion

- **Identify Challenge Having Impact for Research**
- **Integrate Technological Solution (Emerging Tech)**
- **Apply Bottom-Up Approach for Solution**