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INDUSTRY 4.0
A Primer on Startup Driven Industrial Stories

November 2019
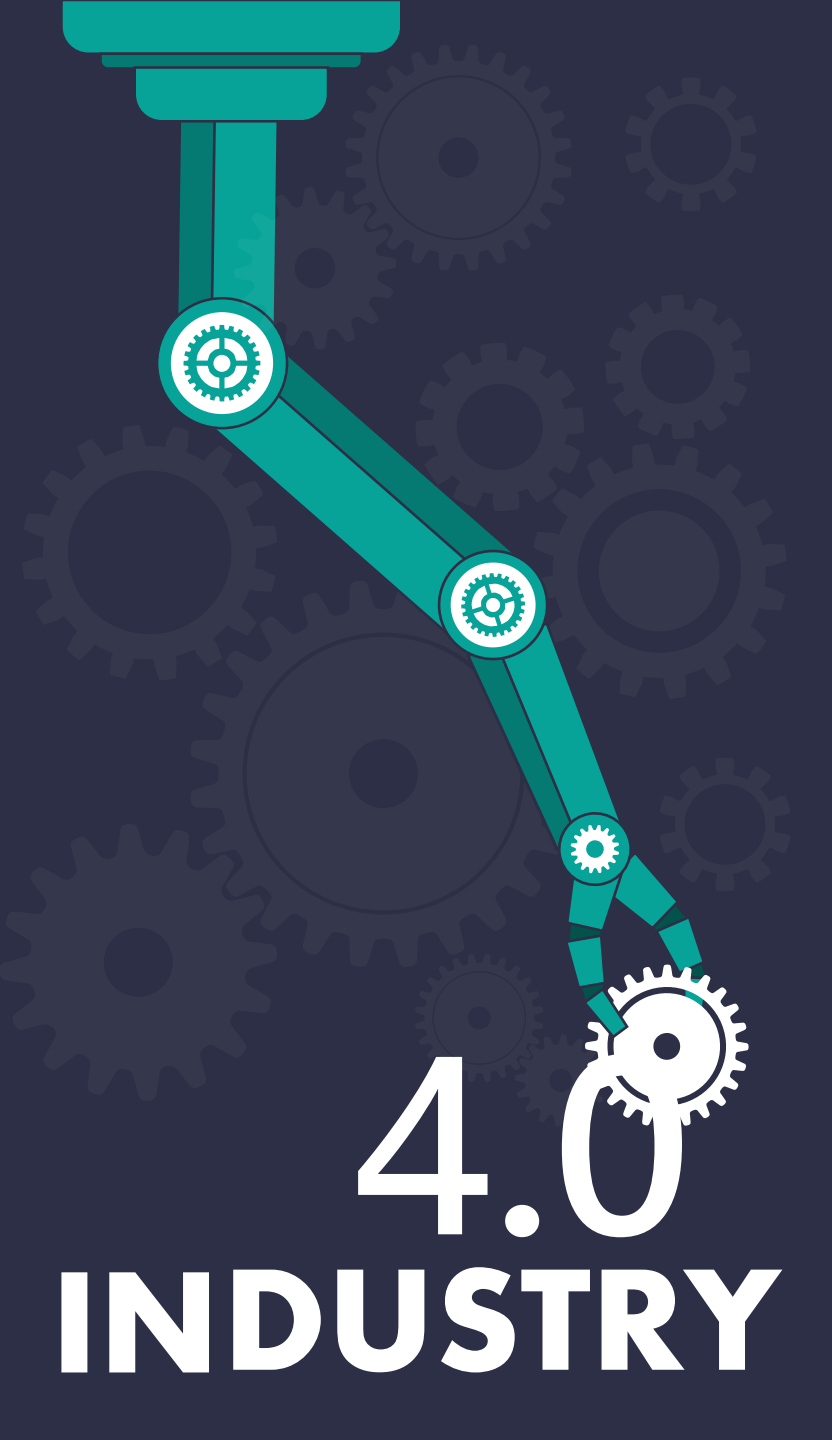
Table of Content

INDUSTRY 4.0

Foreword

The term Industry 4.0 envelops digital technologies and advanced manufacturing techniques to drive interconnectivity, communication and analyse information in real-time, promising a new industrial revolution. In the Indian context, Industry 4.0 brings vast opportunities to leapfrog many stages of development and companies are adopting different elements of the revolution in diverse ways. Hence, the best way for manufacturers and enterprises to bring in new technologies would be through an agile approach solving combinatorial problems. Another key aspect would be how to monetize these new industrial technologies to derive and drive new sources of value creation.

From vision to implementation, this report aims to understand the shift from legacy products to emerging technologies like IoT, Electric Vehicles, 3D Printing and the role of Indian startups in driving innovation on the industrial front. While the report highlights some of the existing and potential use cases, application areas, challenges etc., it also presents a probable approach to Industry 4.0 and the next steps for companies engaged in providing solutions in this domain. Hope you enjoy reading this report, we welcome your feedback and comments.

Debjani Ghosh
President, NASSCOM

Acknowledgement

This report is a result of a comprehensive study on a number of startups which focus on use cases within Industry 4.0.

Industrial AI Consortium has been a key partner for NASSCOM Research in this initiative, having helped collect the initial compilation of the emerging startups in the industrial space. In addition, multiple interviews with the start-up founders and management have added to the level of insights. We wish to sincerely thank all of them for their valuable contributions without which this report would not have been possible.

Titli Chatterjee
Manager, Research

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Executive Summary

Global ER&D spend continues to increase- expected to touch US$2.1 Trillion by 2022

Digital transformation takes a leap toward value creation aligning it to Agile offering

Proliferation of IoT, wearables and connected devices has increased the demand for ER&D

Research indicates that Industry 4.0 could play a pivotal role in boosting the manufacturing sector's share to 25% of the India's GDP by 2022

Shift from engineering services to digital engineering is transforming today's ecosystem

NASSCOM- Flutura compilation of Industry 4.0 startups exhibits emerging industrial stories, encompassing several digitization technologies

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India is ready to catapult into Industry **4.0** spanning a range of emerging technologies

The Fourth Industrial Revolution would be a level-up in the manufacturing and production industry with a technological advancement connecting people, processes and machines

Research indicates Indian industry is already reaping the benefits of Industry 4.0 - companies have posted increase in revenues attributed to technology adoption

Industry 4.0 growth would be driven by products and services such as electric vehicles, smart products, drones, digital twins, automation technologies

Increasing competition is driving an integration between the customer and manufacturer at various stages of product. Agile manufacturing addresses the smart system integration

Industry 4.0 will give an edge to Indian startups that are competing with legacy producers

4.0
INDUSTRY

Sources: Interviews with subject matter experts; NASSCOM analysis

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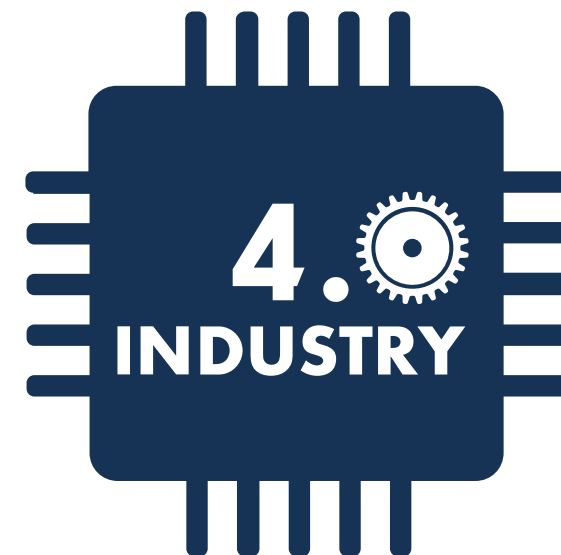
Digital technologies are reshaping the industry landscape by driving the shift from traditional engineering and legacy products to a comprehensive technology radar

There are 50+ drone startups in India today. The Indian drone market is expected to grow at a CAGR of 18% by 2023 and reach US$ 421 Mn. by 2021

18%
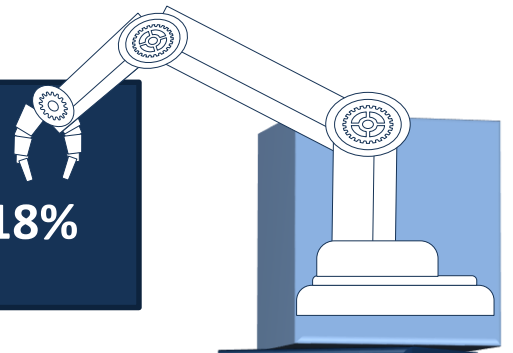
Mapping of landslide affected areas was executed through drones for District Disaster Management Authority of Nongpoh, Meghalaya for the NH-40 connecting Guwahati to Shillong

TATA STEEL

Tata Steel is working with Skylark Drones to deploy drones at their Noamundi iron ore mines in Jharkhand for compliance & volumetric reporting

Indian EV market share for two-wheelers is estimated at **24.1%** in 2022 while passenger cars are estimated at **9.3%**
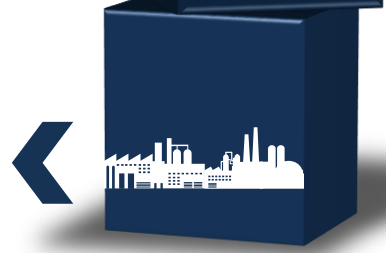
24.1%   **9.3%**

EESL

The Government of India, the Energy Efficiency Services Limited (EESL) and the World Bank signed a $220 Mn. loan agreement and $80 Mn. Guarantee Agreement for the India Energy Scale-Up Program, helping in the deployment of energy saving measures

Coimbatore-based electric vehicle manufacturer, Ampere Vehicles launched two new electric scooters in India V48 and Reo Li-Ion in 2018. It has been focusing on other technology specific to electric scooters and has a wide range of electric three-wheelers

AMPERE ELECTRIC VEHICLES

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Sources: Interviews with subject matter experts; NASSCOM analysis
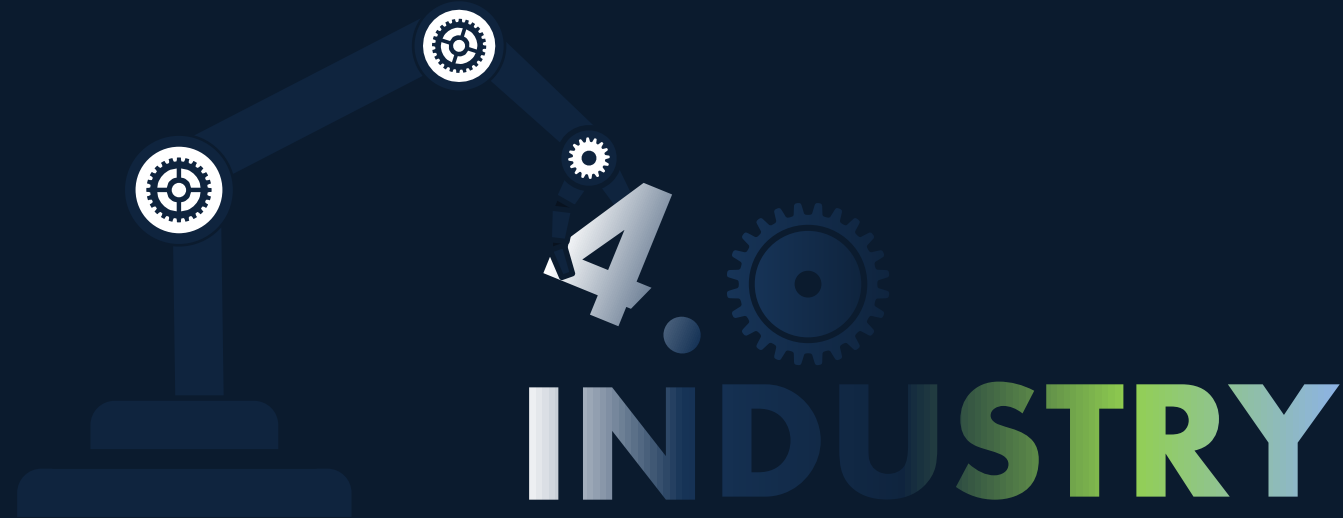
Agile Industry 4.0 – An approach to accelerate the digital journey

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Enterprises are adopting Agile Industry 4.0 to accelerate journey to the digital future

- Newer use cases and products are being explored through emerging technologies.

- An agile approach can make the digitalization process much easier

- Most manufacturers/end users will need a partner to enable finer points of technology

- Addressing small iterative changes with a customer centric focus would be the key in driving Industry 4.0
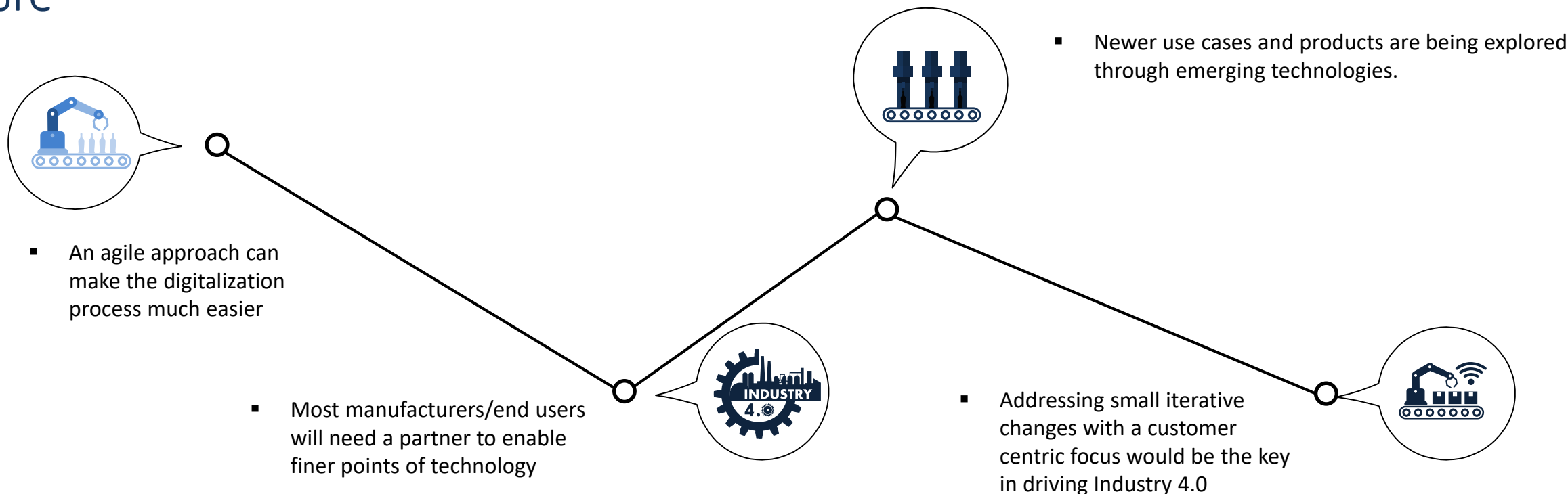
Schneider Electric
Schneider Electric in Le Vaudreuil (France) increased operator efficiency by 25% and decreased cost of maintenance by 30% by setting up Industry of the Future. It deploys itself through numerous technologies and is implemented based on the case-to-basis

BOSCH
Bosch Automotive in Wuxi (China) implemented an agile framework by implementing RFID, sensors to machines and analyzing real-time data. This to eliminate output losses and predict machines interruptions

BAYER
Bayer in Garbagnate (Italy) represent an optimal model of efficiency. The pharma site reduced quality deviations by 80% and increased Overall Equipment Effectiveness (OEE) by 40%.

Sources : NASSCOM analysis

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Value creation in Industry 4.0 can be driven by monetizing data, customer and operational insights

Customer dynamics is the key- Customer driven insights focusing on behavior, preferences and needs is one of the levers of data monetization

Fueling growth through operational insights- One of the primary paths to leverage data is to improve a company's operations, products and services

The evolutionary journey of value creation through datasets – Application of industrial technologies for monetization is slow and cautious

Emergence of the machine economy – Manufacturers would gradually focus on monetizing data through revenue-generating products and services

Tech Reboot

- Digital technologies across industries are transforming practices in the engineering space by being agile and work more openly with external partners

- The upsurge in sensors and the significance of data processing is trending towards massive usage of product data to optimize designs and execute into actionable insights

- Growing emphasis on digital engineering and increasing adoption of advanced technologies is leading to agile development rules, emphasizing on customer centric product design

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Digital technologies enable the democratization of data and allows insights at a wider level

Farmobile - Platform to buy and sell machine and agronomic data through passive uplink connection (PUC). An automatic electronic field record of data is built and stored to sell to equipment manufacturers, agronomists and other relevant parties

Streamr – An open source decentralized platform to buy and sell data, using blockchain smart contracts to facilitate data exchange

DataBroker – Another platform by DataDao to share data among potential buyers like academics, scholars, scientists. One of the use cases was data from shipping containers from the Port of Antwerp – for insurers to buy data around temperature control in a ship and claim its failure when required.
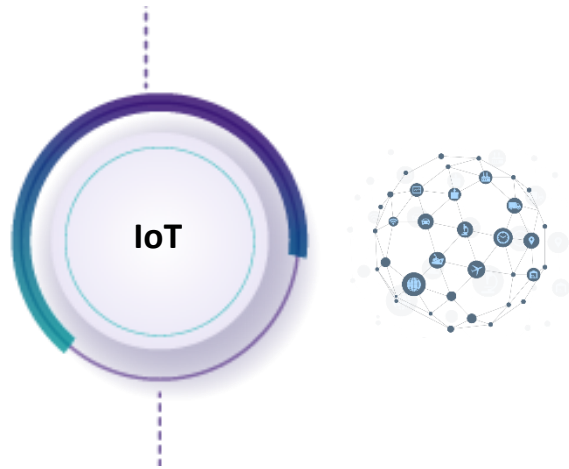
| Enterprise Data

External Data

Social sensor & other data

PESTLE Data | **Data Analytics**
Leverage data Insights to improve processes

Data Product
Offer data as innovative product
Data Services
Set or share Analytics capabilities | **New Revenue streams**

Better products and services

Profit optimization

Controlling competitive landscape |

INSTITUTIONALIZED ASSETS

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Manufacturers need to make data readily accessible and leverage through IT/OT integration

Manufacturing - Manufacturers of smart products and industrial devices can implement remote monitoring and diagnostic solution (RM&D) for data monetization.
Energy & Utilities – Improved outage management & outage restoration

Automotive – The rising concern for climate change is one of the primary drivers in adoption of electric cars

Rapid prototyping – It is making inroads in sectors as diverse as automotive, energy, medicine & aerospace

IoT
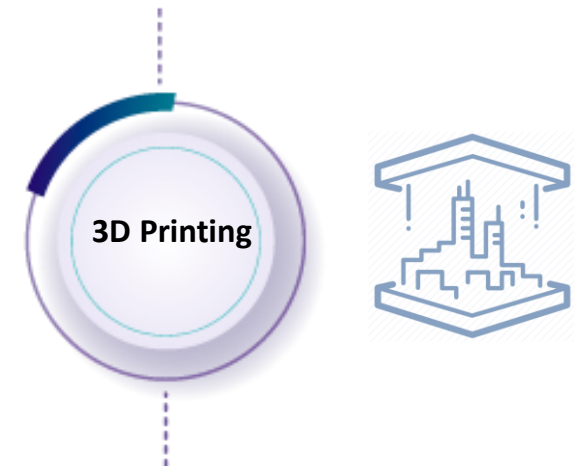
Electric Vehicle

3D Printing

- IoT is helping consumers save on cost and make smart decisions about power usage and reduce billing
- Innovative use of smart data for monetization
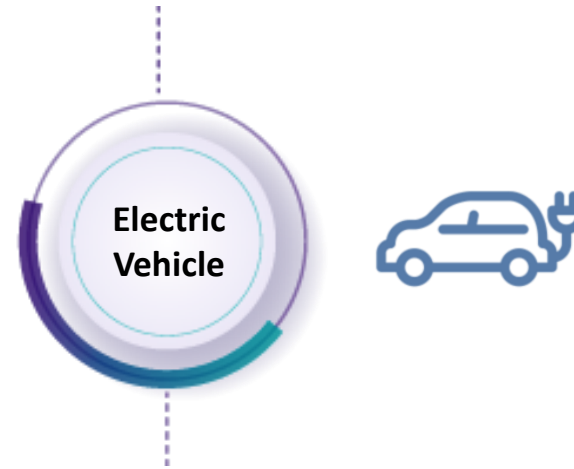
- Monetizing First Notification of Loss (FNO) eases the repair experience i.e. reduced time spent on diagnosis

- Maintenance & Diagnostics – Improving brand reliability, minimize recalls

- Overall Equipment Efficiency using data insights obtained via IT/OT integration

- Service and support through smart glasses

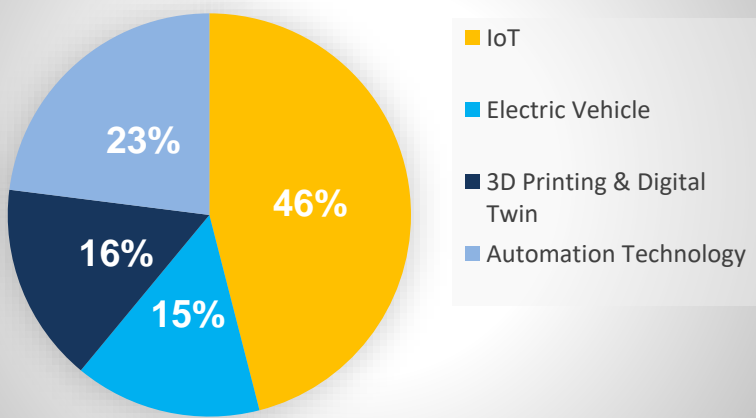Sources: Interviews with subject matter experts; NASSCOM analysis
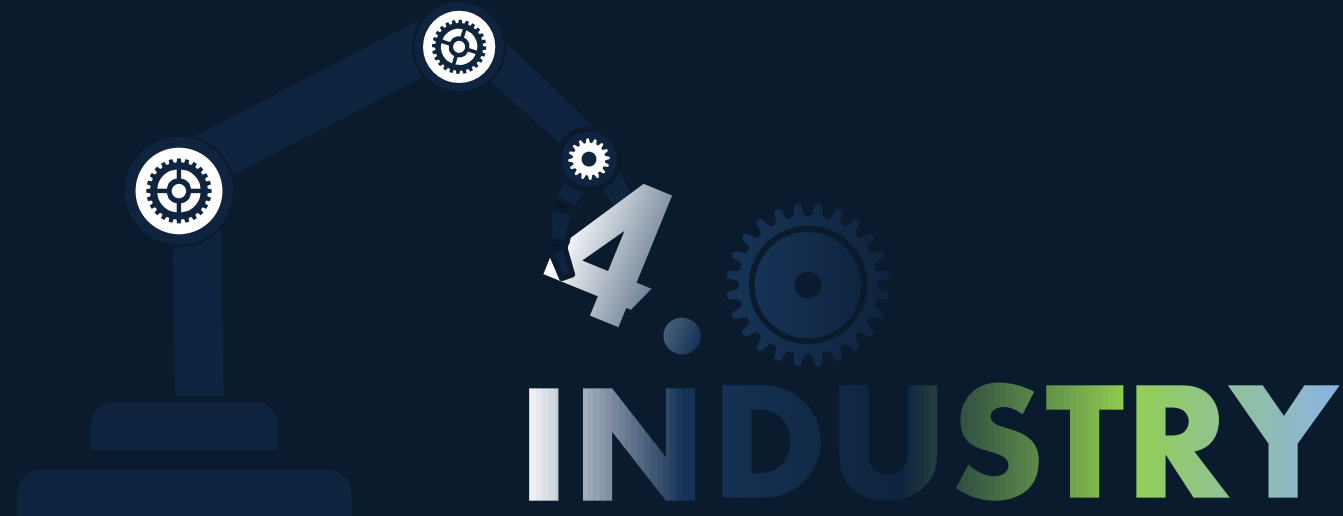
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**NASSCOM - Industrial AI Consortium
Industry 4.0 Emerging Startups Survey**

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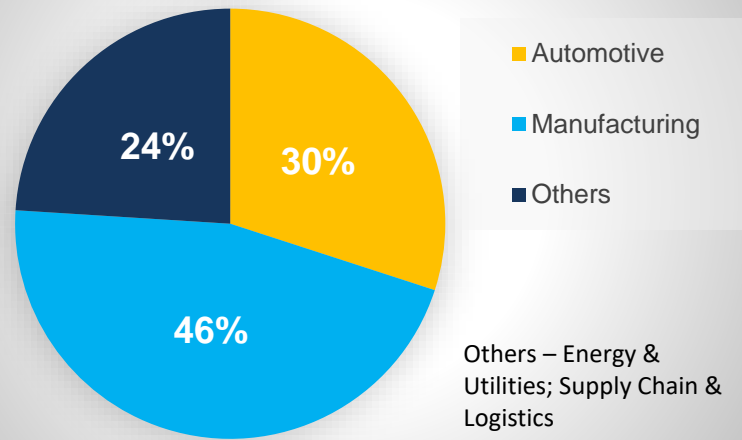# NASSCOM-Flutura Industry 4.0 Emerging Startups Survey Overview

Flutura and NASSCOM invited nominations from start-ups in the industrial space

The shortlisted companies were interviewed to determine solutions, impact, deployment strategy and obstacles in the Industry 4.0 space

Use cases shared by the companies gave additional understanding of the technical capabilities of the companies

Respondent Profile

Emerging Technologies

- IoT
- Electric Vehicle
- 3D Printing & Digital Twin
- Automation Technology

23%
46%
16%
15%

Verticals

- Automotive
- Manufacturing
- Others

24%
30%
46%

Others – Energy & Utilities; Supply Chain & Logistics

Business Models

- Licensed-based cloud
- Subscription & hybrid
- SaaS
- Others

15%
23%
39%
23%

Others – Customer fill-in demand, pilot, productization

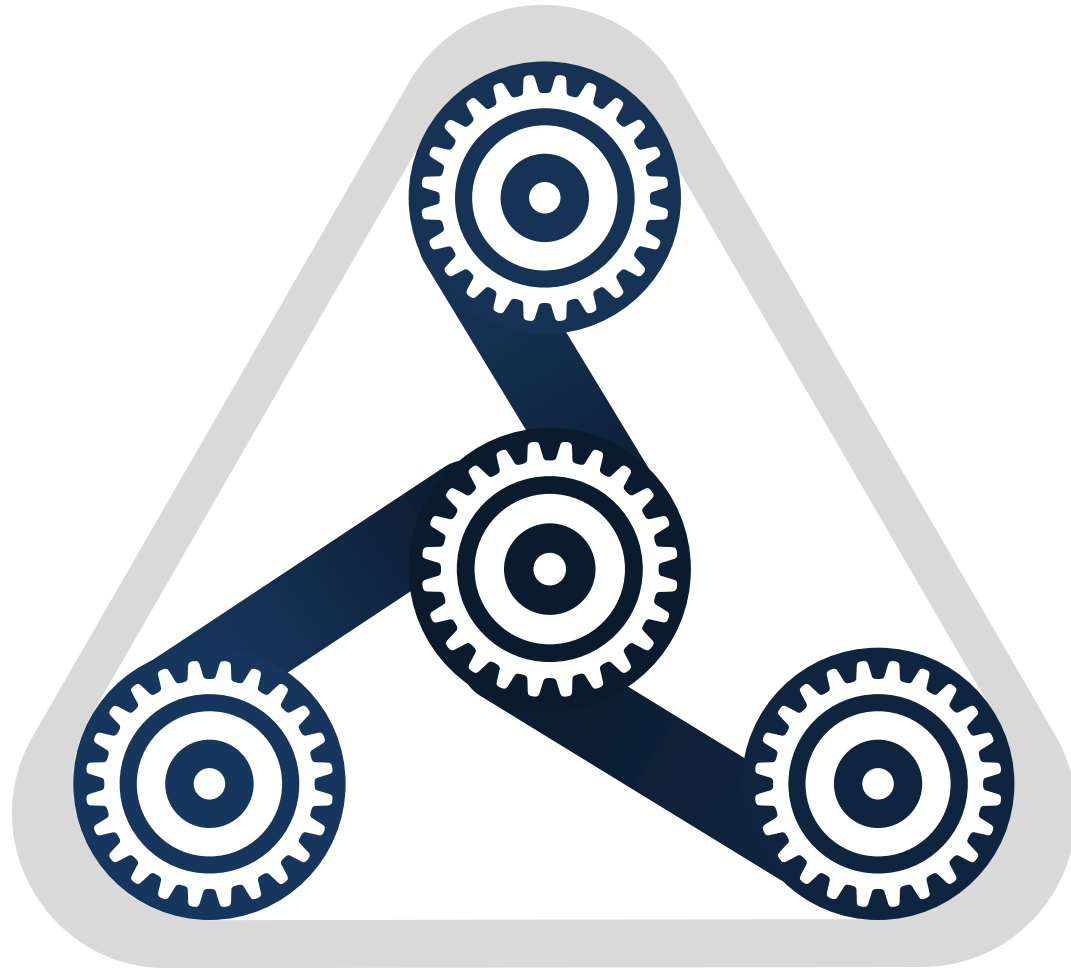Sources: Interviews with subject matter experts; NASSCOM analysis

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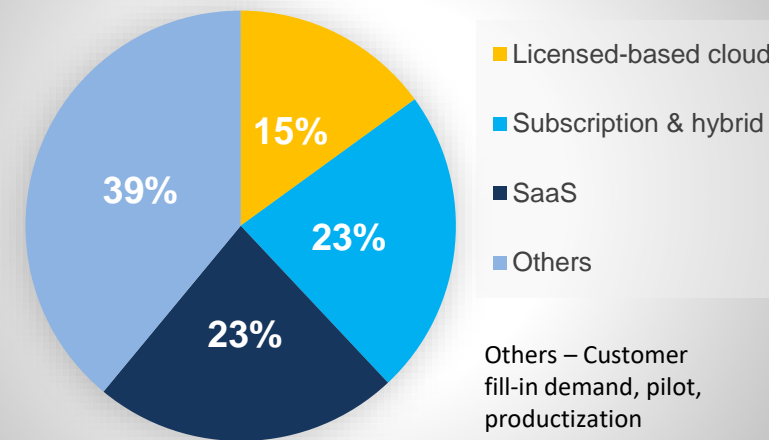
Industry 4.0 Emerging Technology Startups – Key Takeaways

IoT

Key Impact – Granular visibility and real-time detection

Business Model - Predominantly cloud based

Electric Vehicle

Key Impact – Higher efficiency and lower pollution

Business Model - Subscription and Usage

3D Printing

Key Impact – Saves costs through automated fabrication and material combinations

Business Model - Evangelizing the future of composites by achieving scale
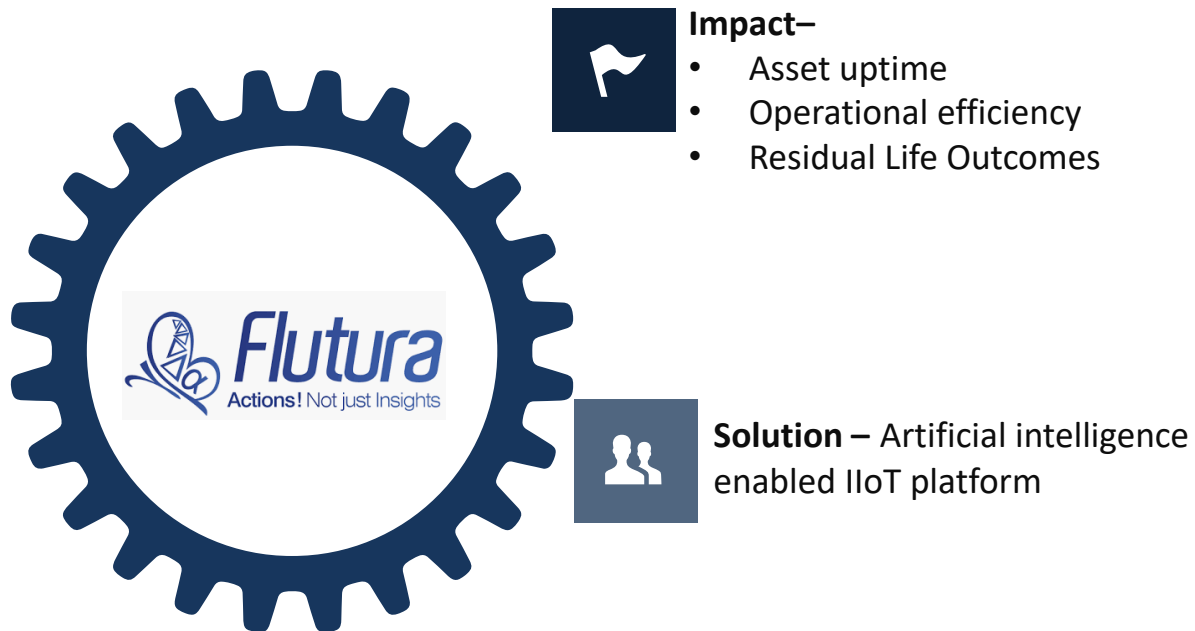
54% of the companies are following an agile framework

30% of the companies are monetizing data through technology

30% of the companies are seeking funding

69% of the companies are seeking mentorship & market access

Sources: Interviews with subject matter experts; NASSCOM analysis

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Flutura offers Artificial Intelligence based industrial platform

Impact–
- Asset uptime
- Operational efficiency
- Residual Life Outcomes

Solution – Artificial intelligence enabled IIoT platform

Key Differentiators –
- Remote assessment, prognostics and edge intelligence in factory systems
- Digital twin implemented across asset management
- Computation and prediction of Residual Useful Life (RUL) from IoT sensors
- Industrial failure prognostic process

Vertical
Oil & Gas, manufacturing, heavy equipment

Customers/Partnerships
TechnipFMC, GTT, Henkel, Hitachi

Business Model
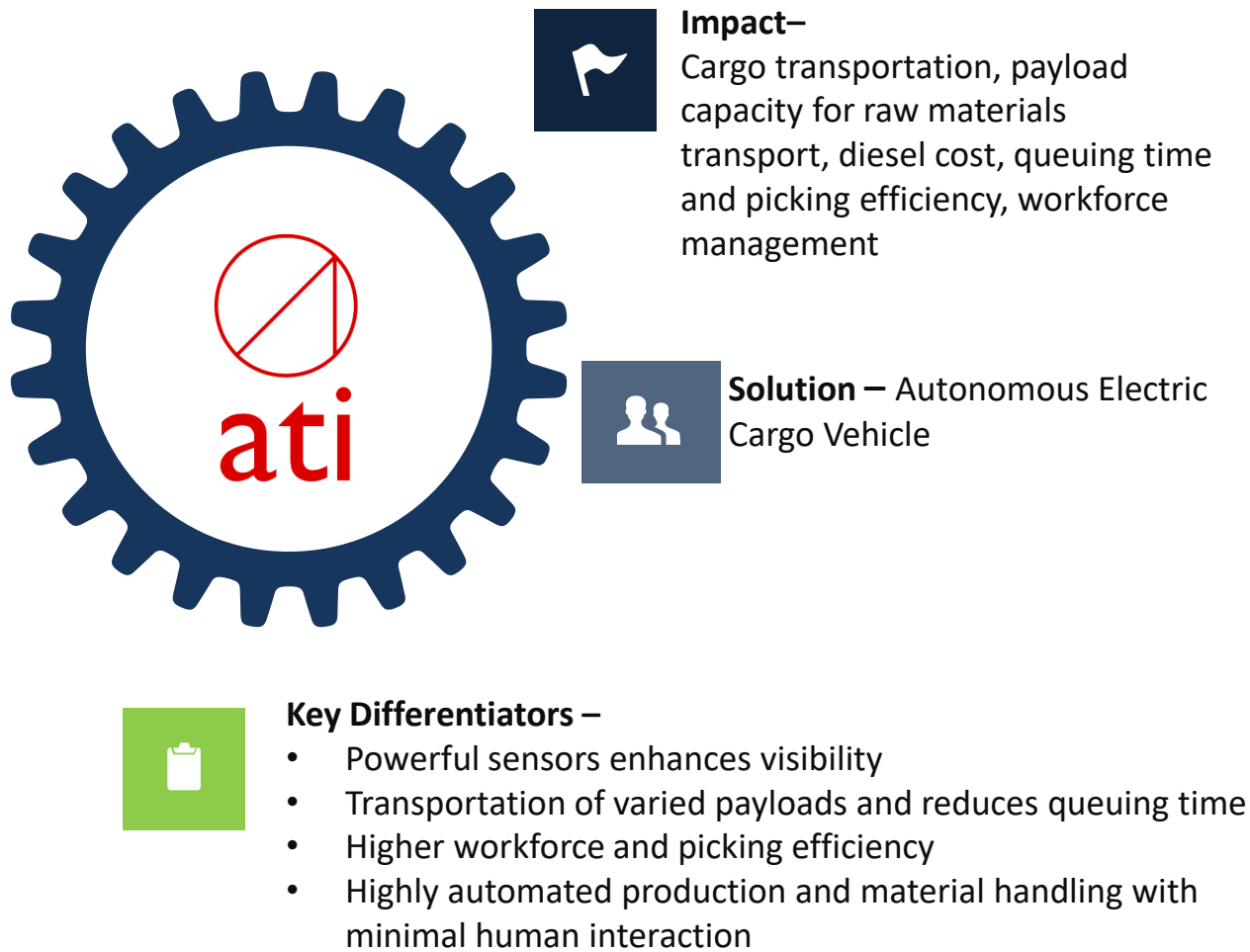Pricing – Per equipment/month

Support Required
Market access

Product: Cerebra

Location
Bengaluru, Tokyo, Texas
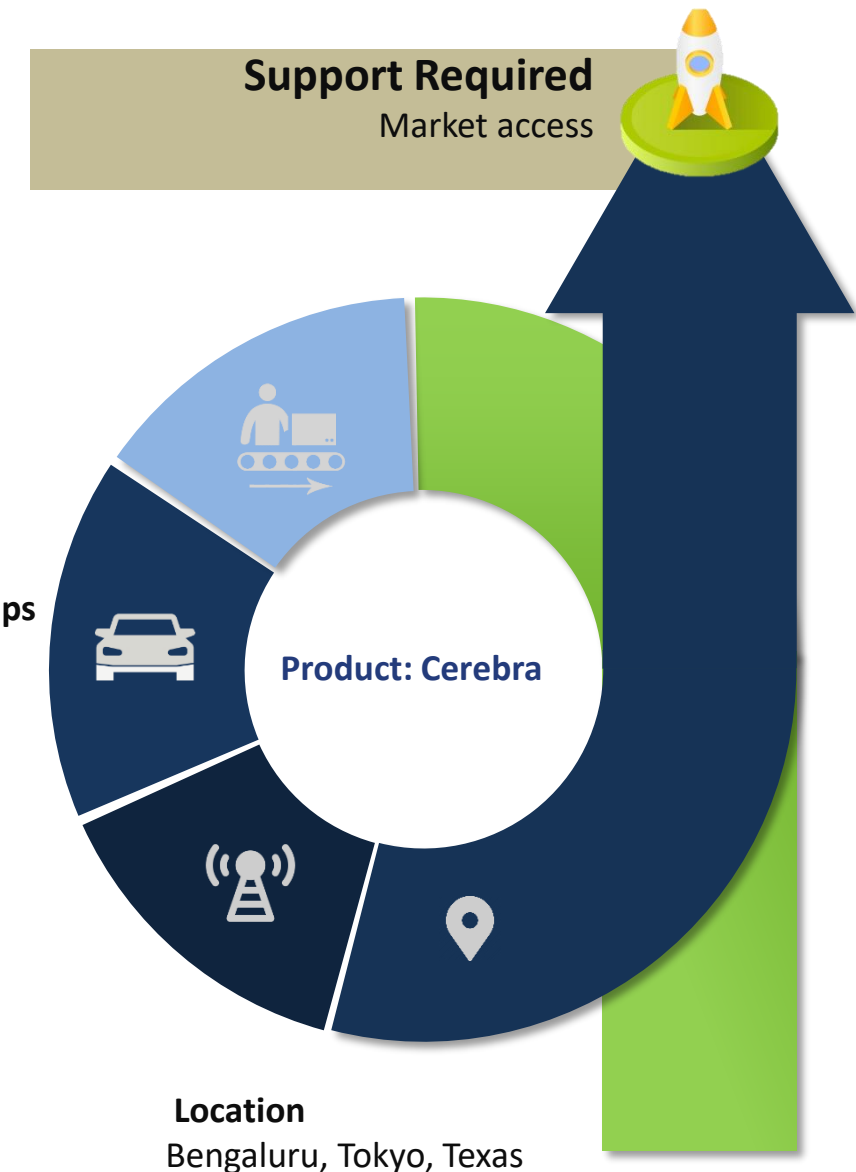
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Impact–
Cargo transportation, payload capacity for raw materials transport, diesel cost, queuing time and picking efficiency, workforce management

Solution – Autonomous Electric Cargo Vehicle

Key Differentiators –
- Powerful sensors enhances visibility
- Transportation of varied payloads and reduces queuing time
- Higher workforce and picking efficiency
- Highly automated production and material handling with minimal human interaction
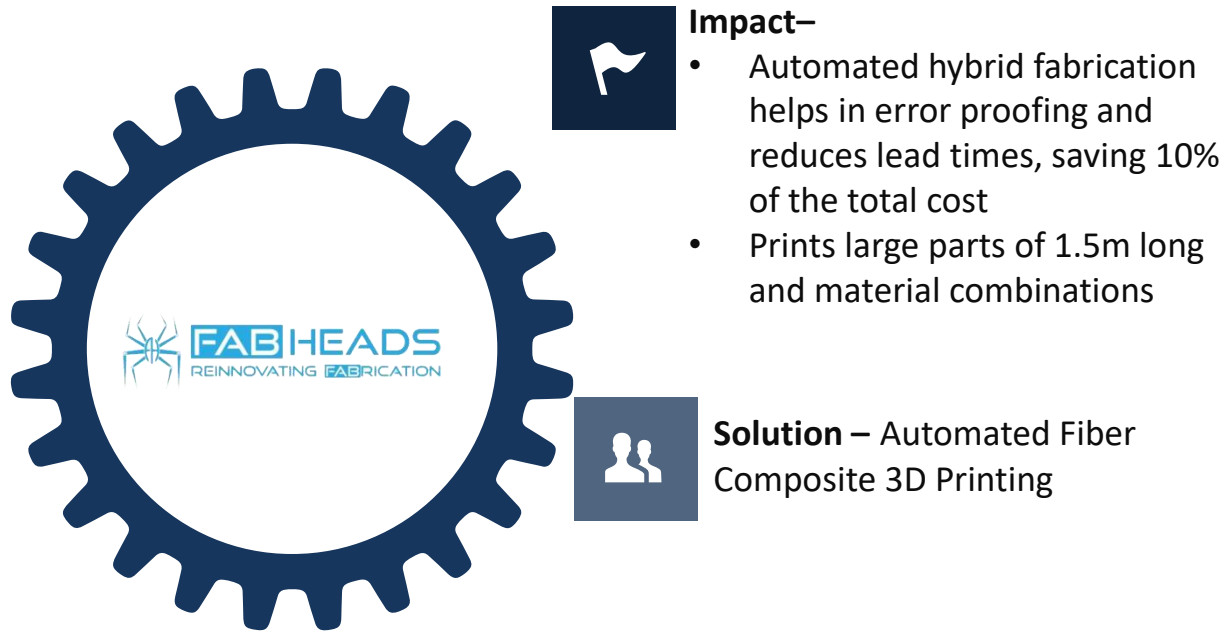
Vertical
Automotive

Customers/Partnerships
E-commerce warehouse, manufacturing facility

Business Model
Customer fill-in-demand, seed funding, subscription model
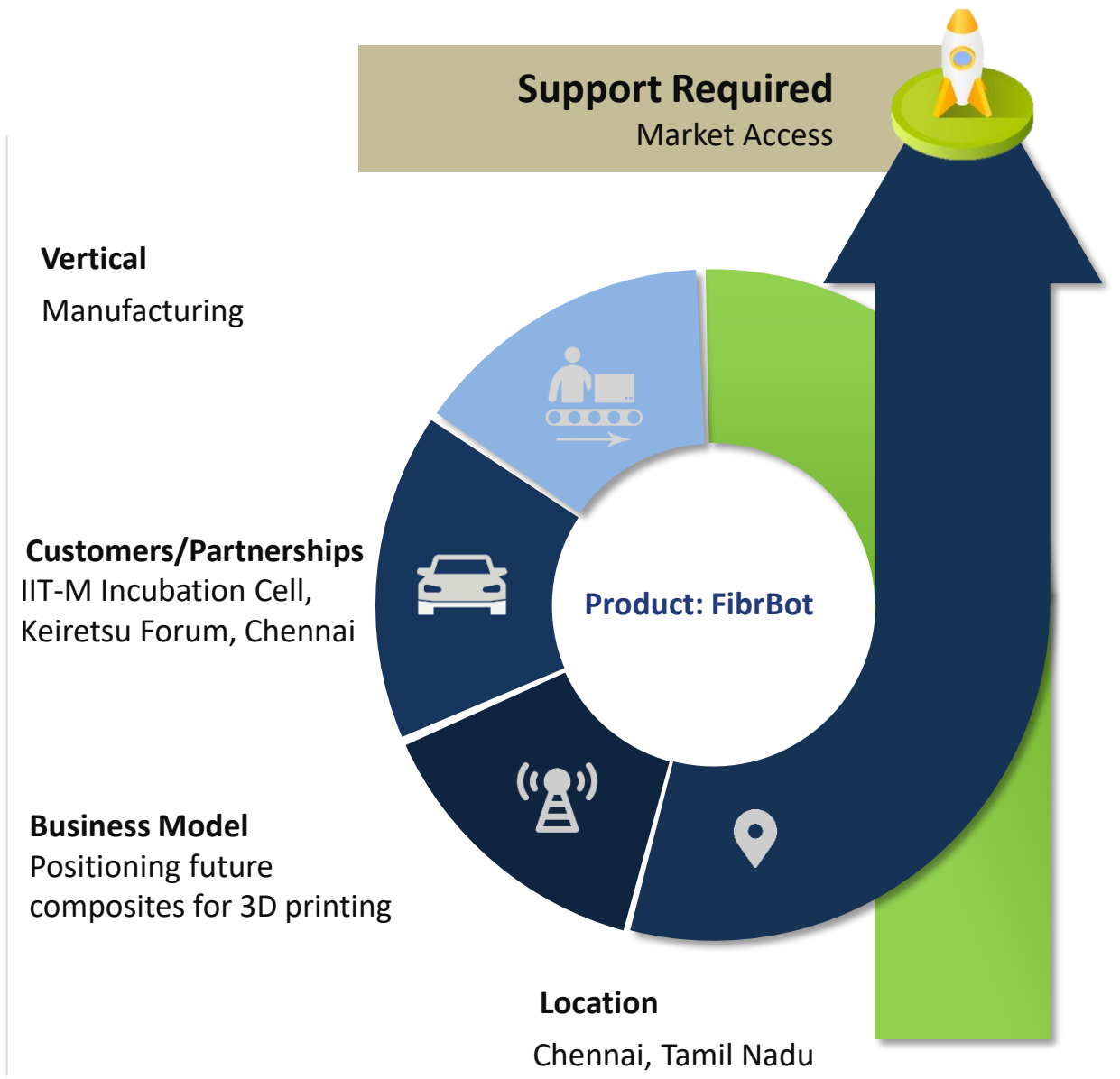
Support Required
Market Access

Product : Sherpa

Location
Bengaluru, Karnataka

Sources: Interviews with subject matter experts; NASSCOM analysis

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Fabheads provides automated fiber composites for 3D printing

Impact–
- Automated hybrid fabrication helps in error proofing and reduces lead times, saving 10% of the total cost
- Prints large parts of 1.5m long and material combinations
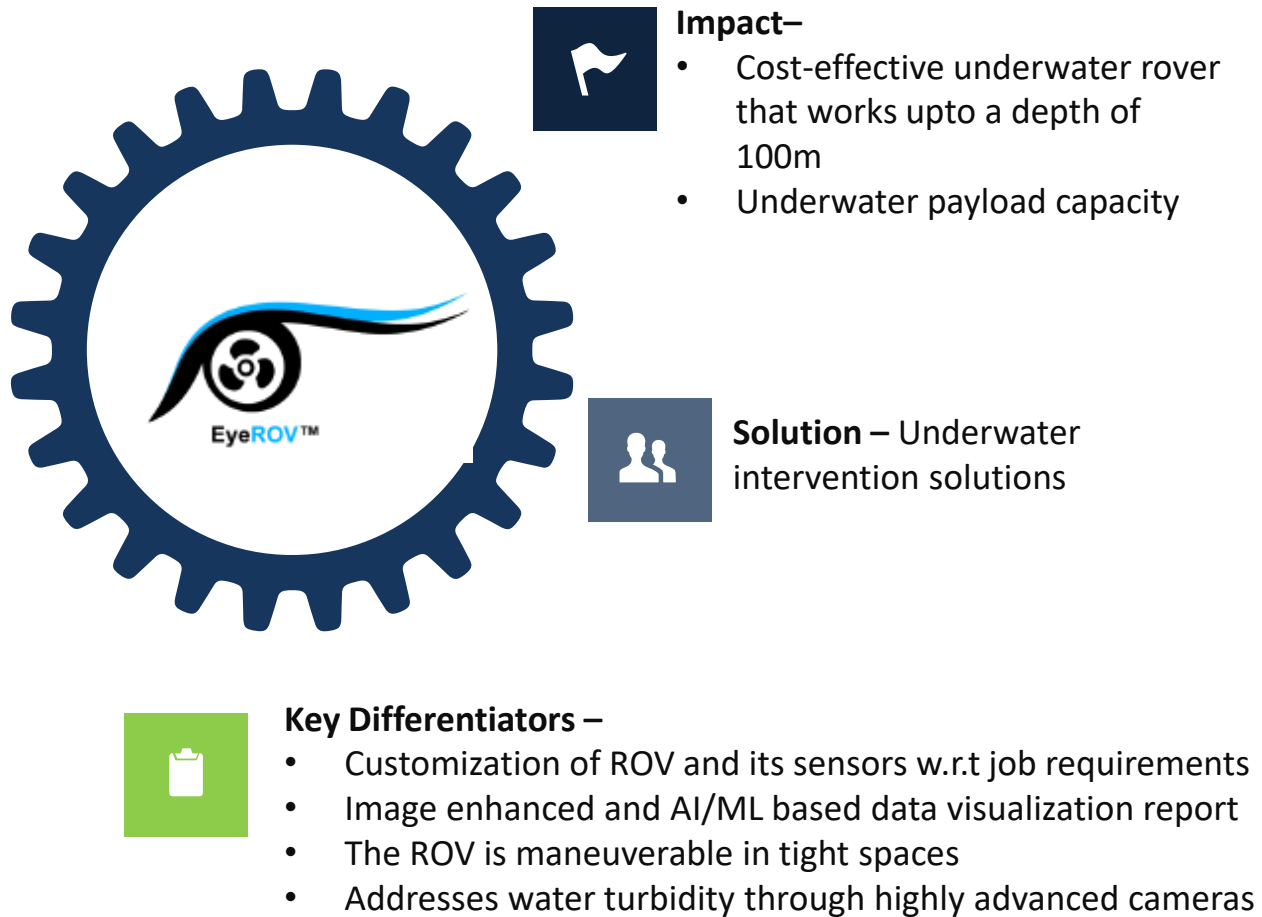
Solution – Automated Fiber Composite 3D Printing

Key Differentiators –
- Customization of different combinations of composite materials for web and skin
- Single stage fabrication resulting in less failures
- Allows designers to fabricate without drafting drawing for both the tool and the component

Vertical
Manufacturing

Customers/Partnerships
IIT-M Incubation Cell, Keiretsu Forum, Chennai

Business Model
Positioning future composites for 3D printing

Support Required
Market Access

Product: FibrBot

Location
Chennai, Tamil Nadu

Sources: Interviews with subject matter experts; NASSCOM analysis

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EyeRov develops underwater drones

Impact–
- Cost-effective underwater rover that works upto a depth of 100m
- Underwater payload capacity

Solution – Underwater intervention solutions

Key Differentiators –
- Customization of ROV and its sensors w.r.t job requirements
- Image enhanced and AI/ML based data visualization report
- The ROV is maneuverable in tight spaces
- Addresses water turbidity through highly advanced cameras

Vertical

Oil & Gas

Customers/ Partnerships

Incubated at Maker Village, Kochi, DRDO

Business Model

B2B

Support Required
Funding; Market Access

Product: Tuna

Location

Ernakulam, Kerala

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Greeniee offers IoT enabled energy solutions

G GREENIEE

Impact–
- Gives a deeper understanding on energy usage
- User- centric that sends alert in real-time to customers on specific usage criterion

Solution – Smart IoT device that helps in understanding energy consumption
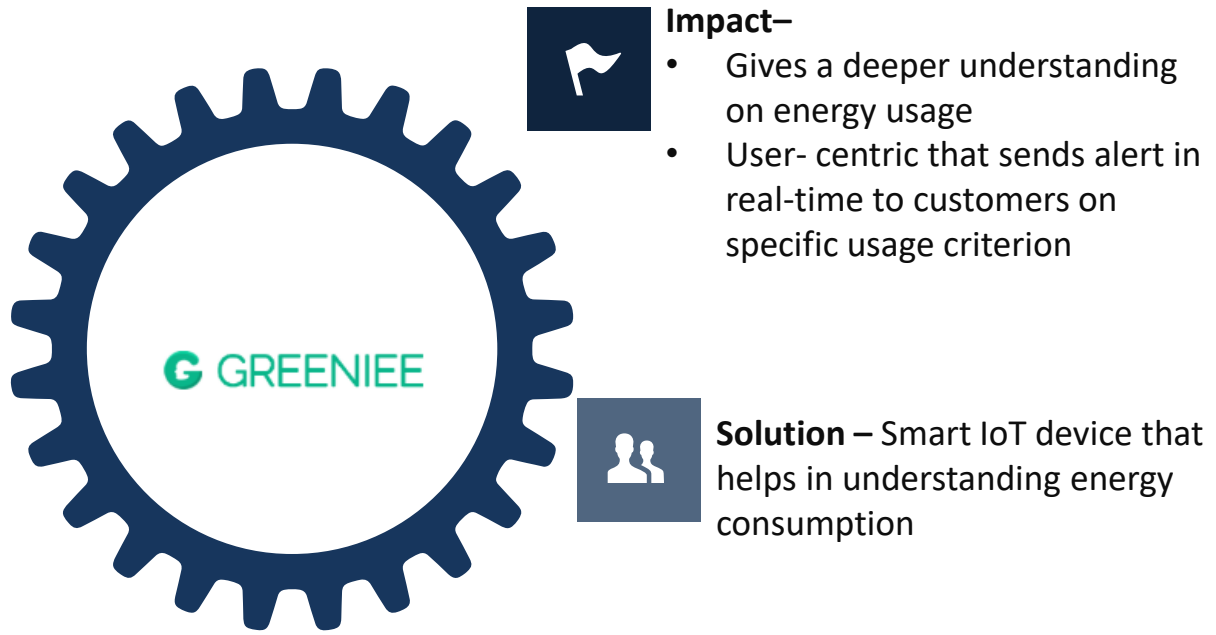
Key Differentiators –
- Retrofit on any existing installation in <30 minutes
- Unlike some of the other products doesn't need a specific gateway
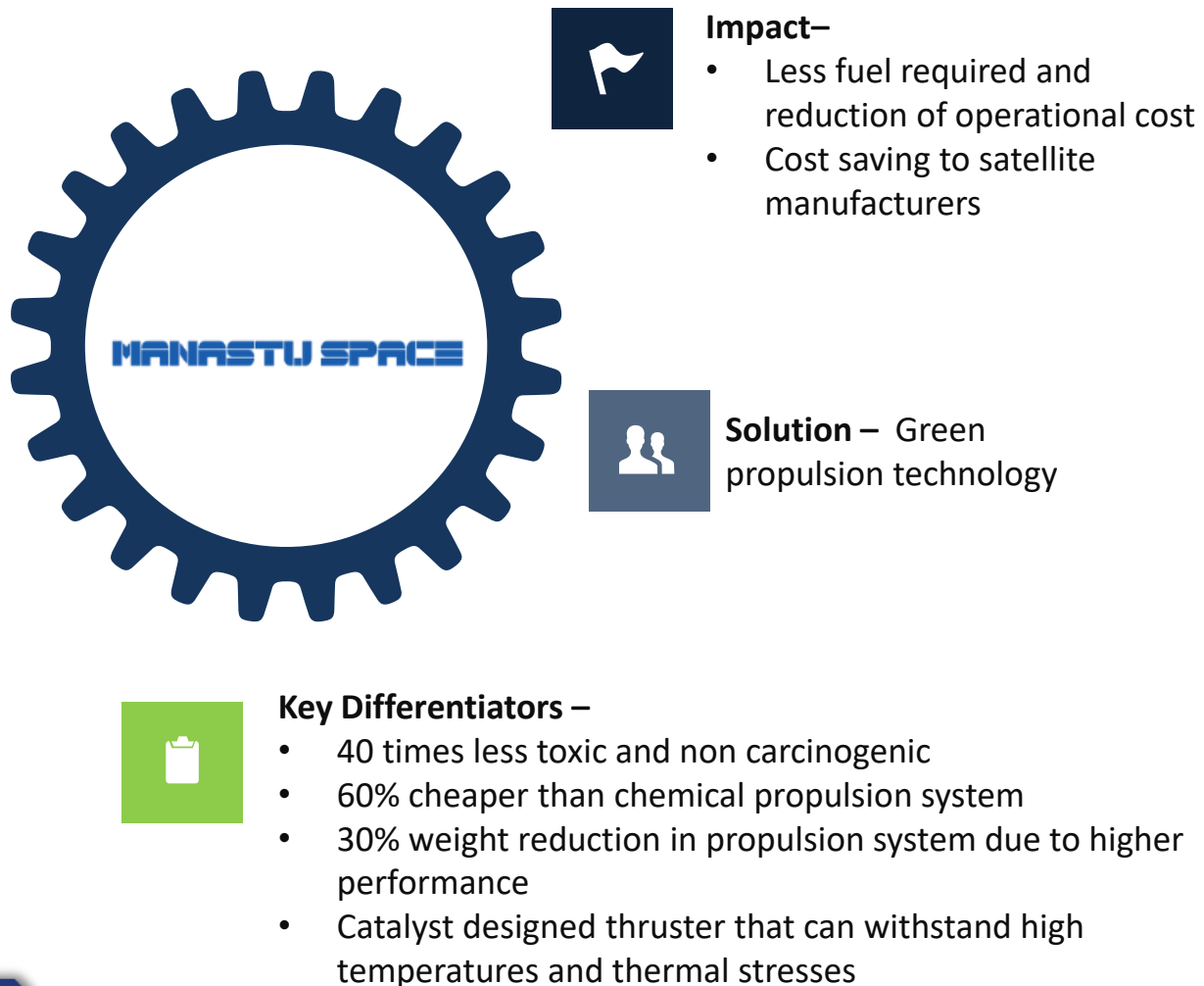- A cloud based solution which is accessible to customers across the globe

Vertical
Retail, healthcare, manufacturing, entertainment

Customers/Partnerships
IT Company, textile manufacturing houses, banks and NBFC organizations

Business Model
B2B

Support Required
Market Access

Product: Greeniee

Location
Kerala Technology Innovation Zone

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Manastu Space builds less toxic propulsion systems

MANASTU SPACE

Impact–
- Less fuel required and reduction of operational cost
- Cost saving to satellite manufacturers

Solution – Green propulsion technology

Key Differentiators –
- 40 times less toxic and non carcinogenic
- 60% cheaper than chemical propulsion system
- 30% weight reduction in propulsion system due to higher performance
- Catalyst designed thruster that can withstand high temperatures and thermal stresses
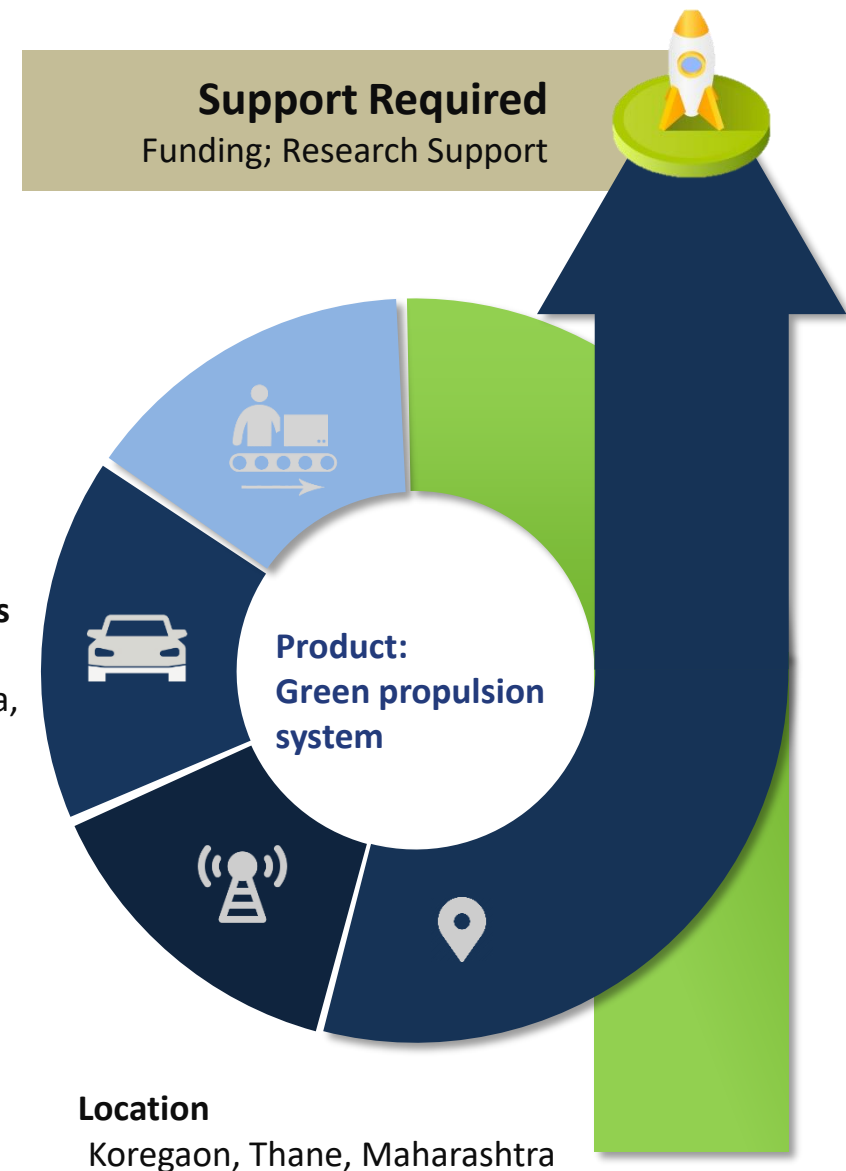
Verticals

Space, satellite, manufacturing
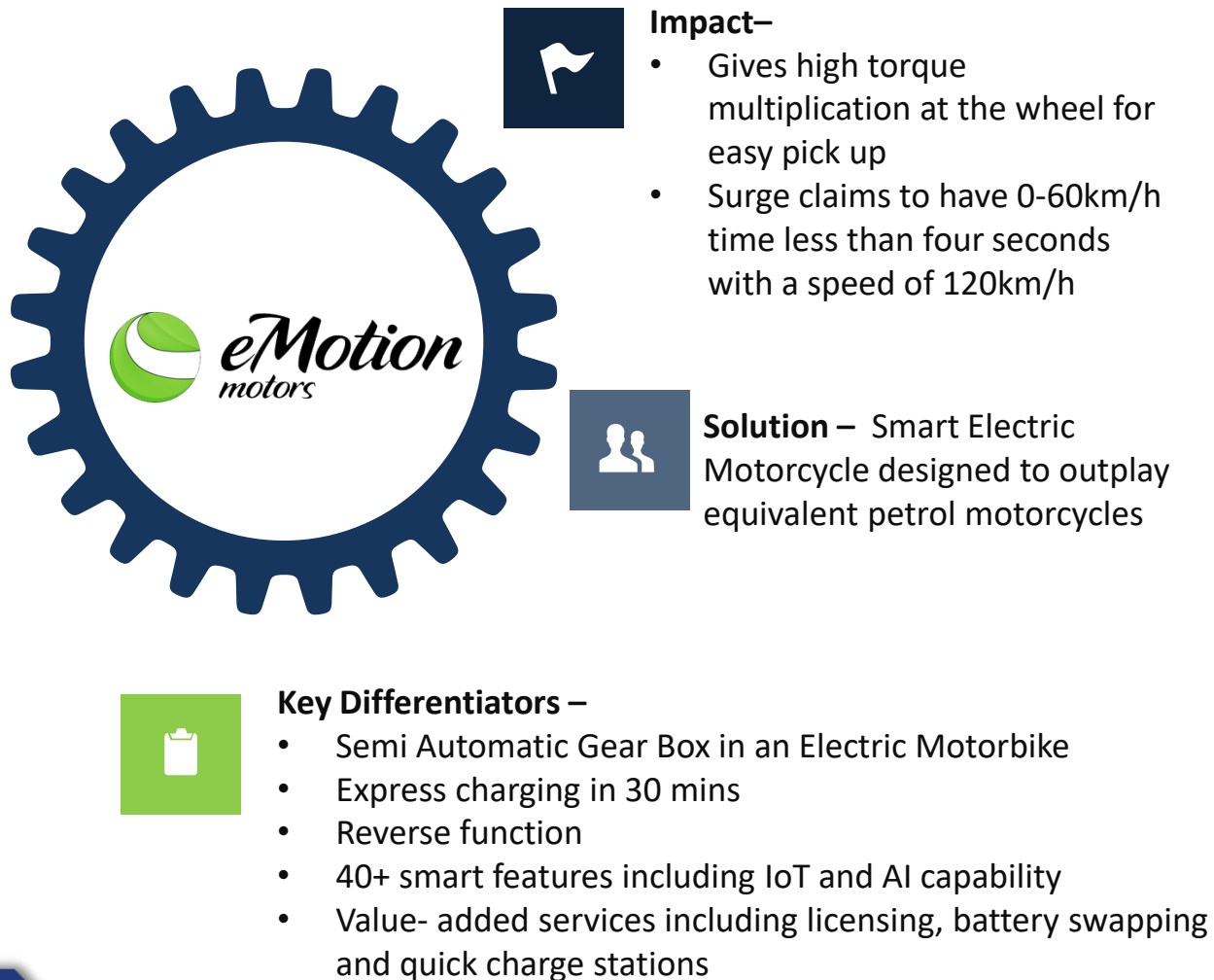
Customers/Partnerships

Lockheed Martin, Tata Trust, DST, Govt. Of India, Shell Incubator Lab

Business Model

Sell cost saving propulsion tech to satellite manufacturers

Support Required

Funding; Research Support

Product: Green propulsion system

Location

Koregaon, Thane, Maharashtra

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eMotion Motors manufactures electric two-wheelers

Impact–
- Gives high torque multiplication at the wheel for easy pick up
- Surge claims to have 0-60km/h time less than four seconds with a speed of 120km/h

Solution – Smart Electric Motorcycle designed to outplay equivalent petrol motorcycles

Key Differentiators –
- Semi Automatic Gear Box in an Electric Motorbike
- Express charging in 30 mins
- Reverse function
- 40+ smart features including IoT and AI capability
- Value- added services including licensing, battery swapping and quick charge stations

Verticals
Automotive

Customers/Partnerships
Pitching stage

Business Model
Dealership, service stations, hybrid model, franchisee

Support Required
Funding

Product: Surge

Location
Othakalmandapami, Tamil Nadu

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DeepSight AI Labs offers smart surveillance solution

DeepSight AILabs

Impact–
Analyzes video in real-time in detecting hazards & incidents and helps customers make informed decisions

Solution – Smart surveillance solution
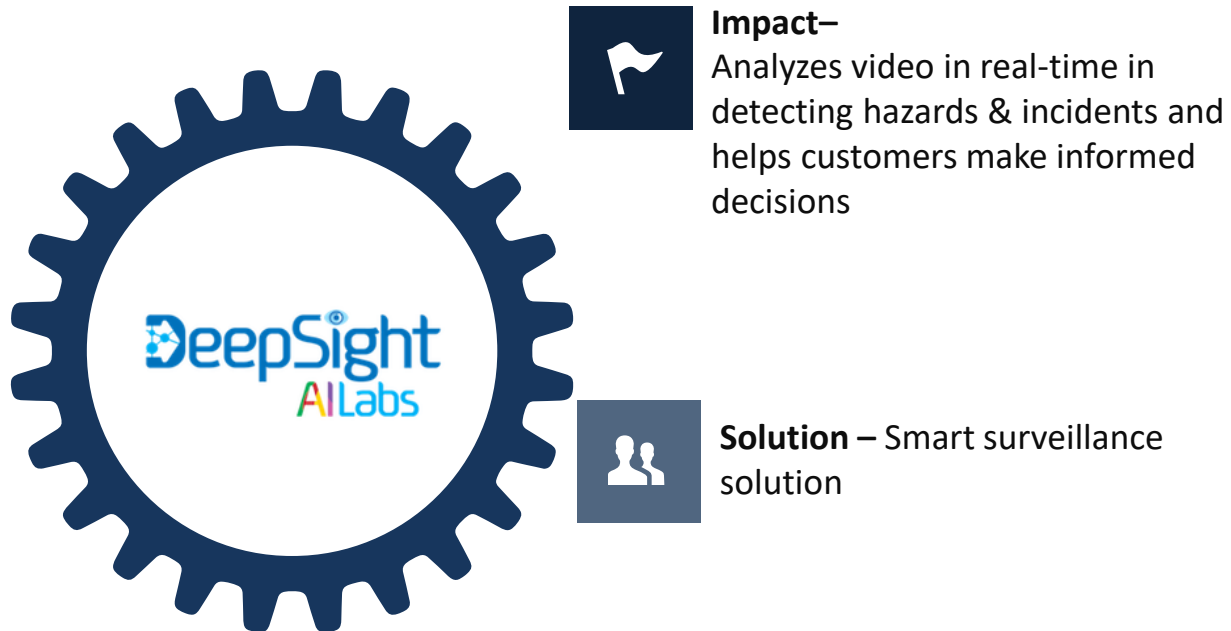
Key Differentiators –
- Cost-effective retrofit solution
- Takes less than an hour to deploy
- Military grade encryption
- Autonomous operation with auto launch feature
- Custom object detection capabilities

Vertical
Retail, healthcare, manufacturing, entertainment

Customers/Partnerships
Intel, Nvidia, Dell, Zeroth.AI

Business Model
On premise, licensing and cloud

Support Required
Market Access

Products: GoDeep SuperSecure

Location
Gurugram, Bengaluru

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Switchon provides intelligent manufacturing solutions through digital twins
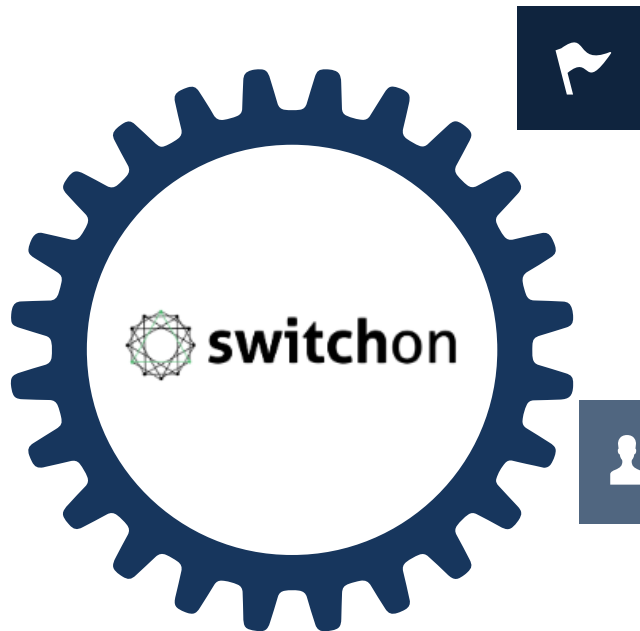
Impact–
- Reduces the turn-around time in the shop floor to increase operational efficiency
- Reduces wastage by predicting equipment failure and automatic diagnosis
- Address data complexity across the process

Solution – AI-based digital twin solution in the manufacturing industry

Key Differentiators –
- Granular productivity analytics
- Algorithms detect part quality defects
- Predicts early signals of failure patterns used for predictive maintenance

Support Required
Partnerships

Verticals
Auto, FMCG

Customers/Partnerships
Wipro, Accenture, pi Ventures

Business Model
SaaS

Product: SwitchOn Digital Twin

Location
Bengaluru, Karnataka

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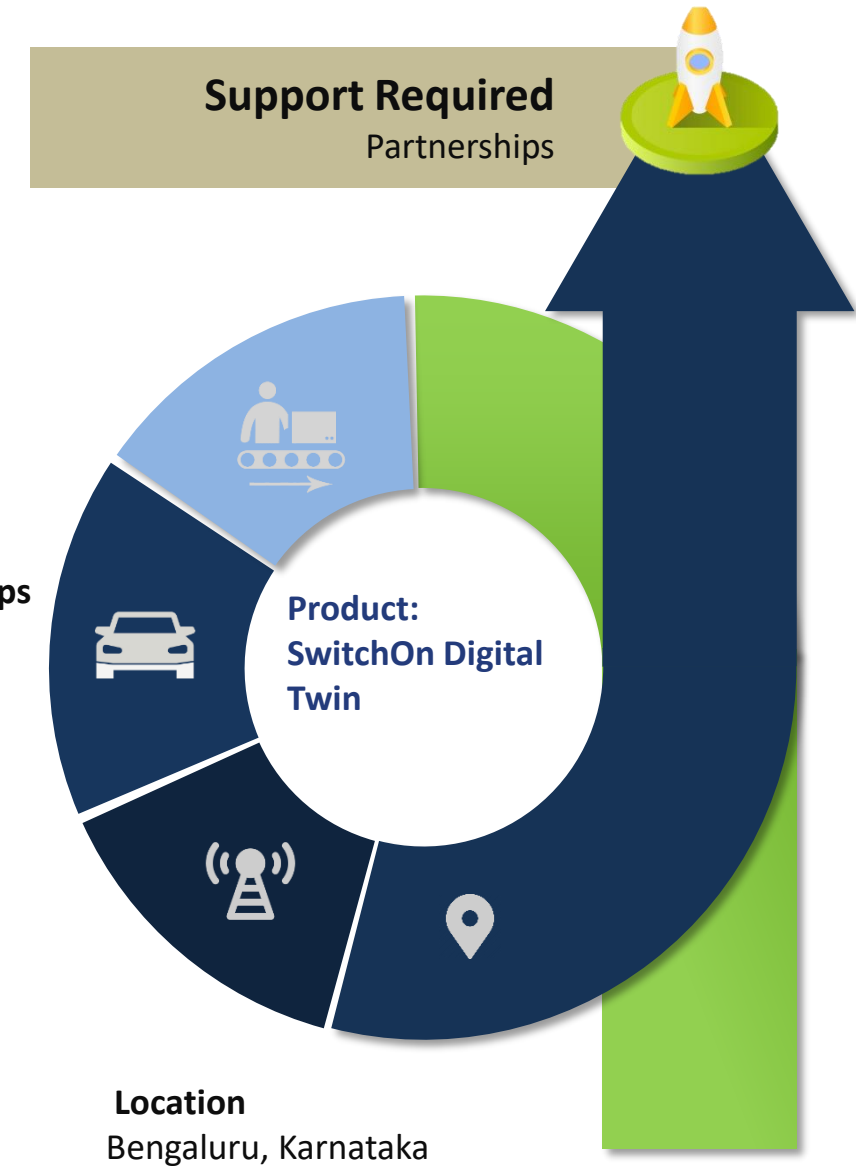
SensiWise provides asset solutions leveraging IoT & Blockchain technology

SensiWise

Impact–
- WiseRadiant Telematics- reduces fuel consumption, maintenance cost & increases vehicle availability
- ColdChain – Track product condition at all stages, agile operations through edge analytics, supports variety of sensors
- Track-and-trace capabilities leveraging IoT & Analytics

Solution – Assets and operations solution

Key Differentiators –
- Granular visibility into supply chain solutions
- Product traceability through integrated Blockchain framework

Support Required
Market Access

Verticals
Logistics & freight food, pharma

Customers/Partnerships
Supply-Chain partners

**Product:
Sensor Node
IoT Platform**

Business Model
Ready-to-deploy; Pay-as-you-Go-SaaS pricing model

Location
Bengaluru, Karnataka

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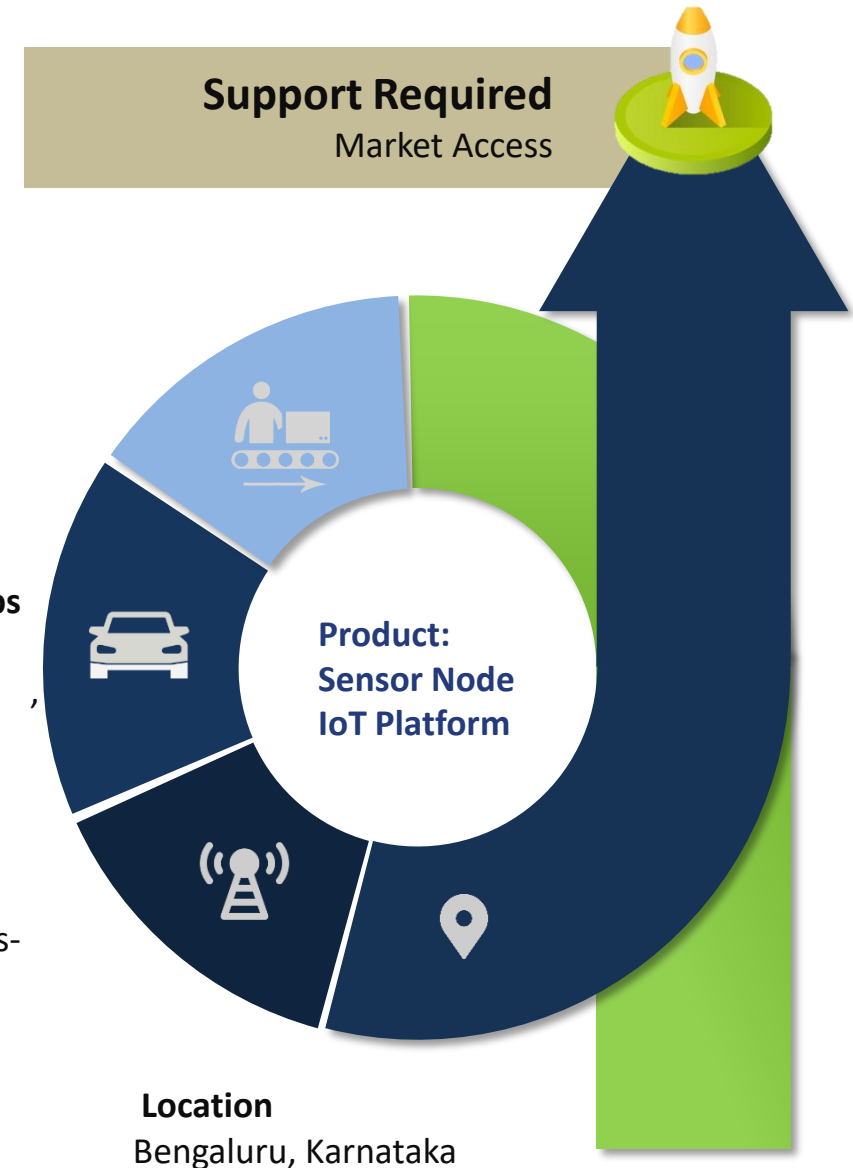
Neewee offers smart manufacturing solutions

Impact–
- Rishee, an IoT based enabler collects, processes and manages data that is ready for decision making insights
- Condition monitoring through data analysis at the edge of the machine
- Bodhee the product has end-to-end capabilities, streamlining the entire manufacturing system

Solution – Predictive and IoT manufacturing solution

Key Differentiators –
- Analytics, knowledge generation and machine learning happens on the edge, enabling real-time insight generation
- Risk prediction across processes through digital twin

Verticals
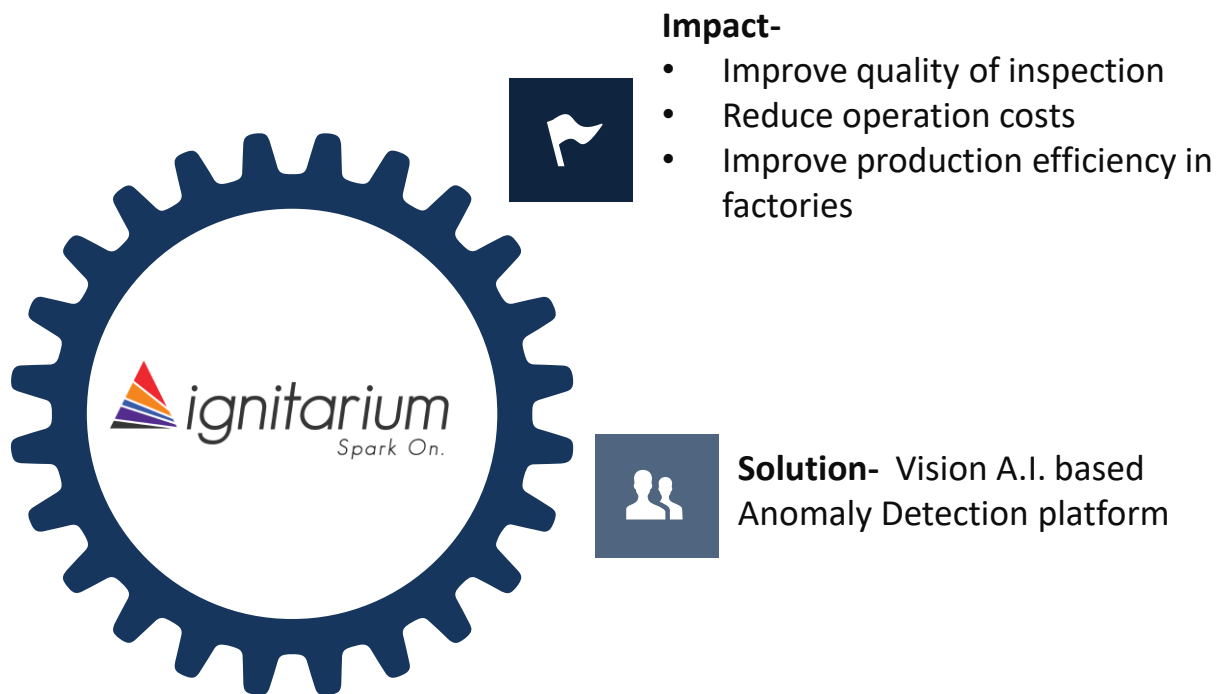Supply Chain, aviation, automobile

Customers/Partnerships
IIFL,EFLIGHT,

Business Model
License-based cloud deployment model, channel partners, memberships

Location
Bengaluru, Karnataka

Support Required
Market Access

Product: Bodhee

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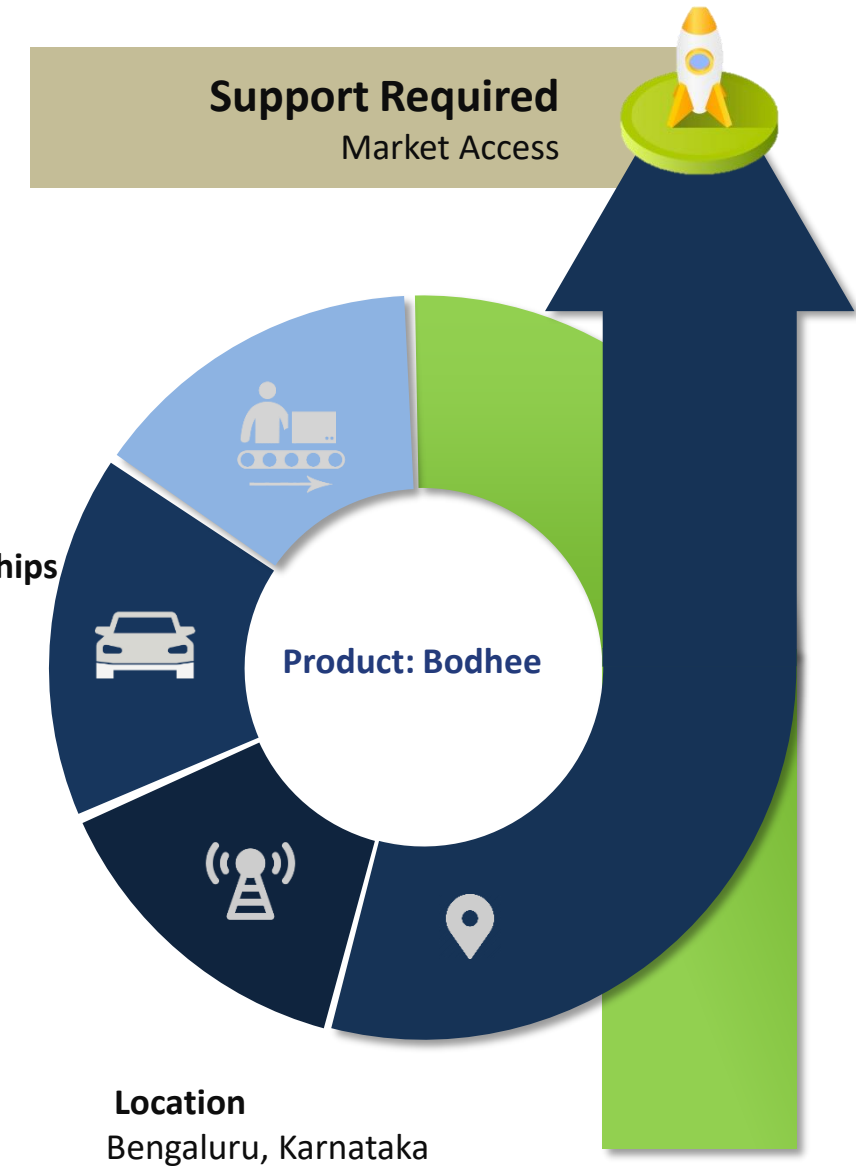
Ignitarium provides Vision A.I. based Anomaly Detection platform

Impact-
- Improve quality of inspection
- Reduce operation costs
- Improve production efficiency in factories

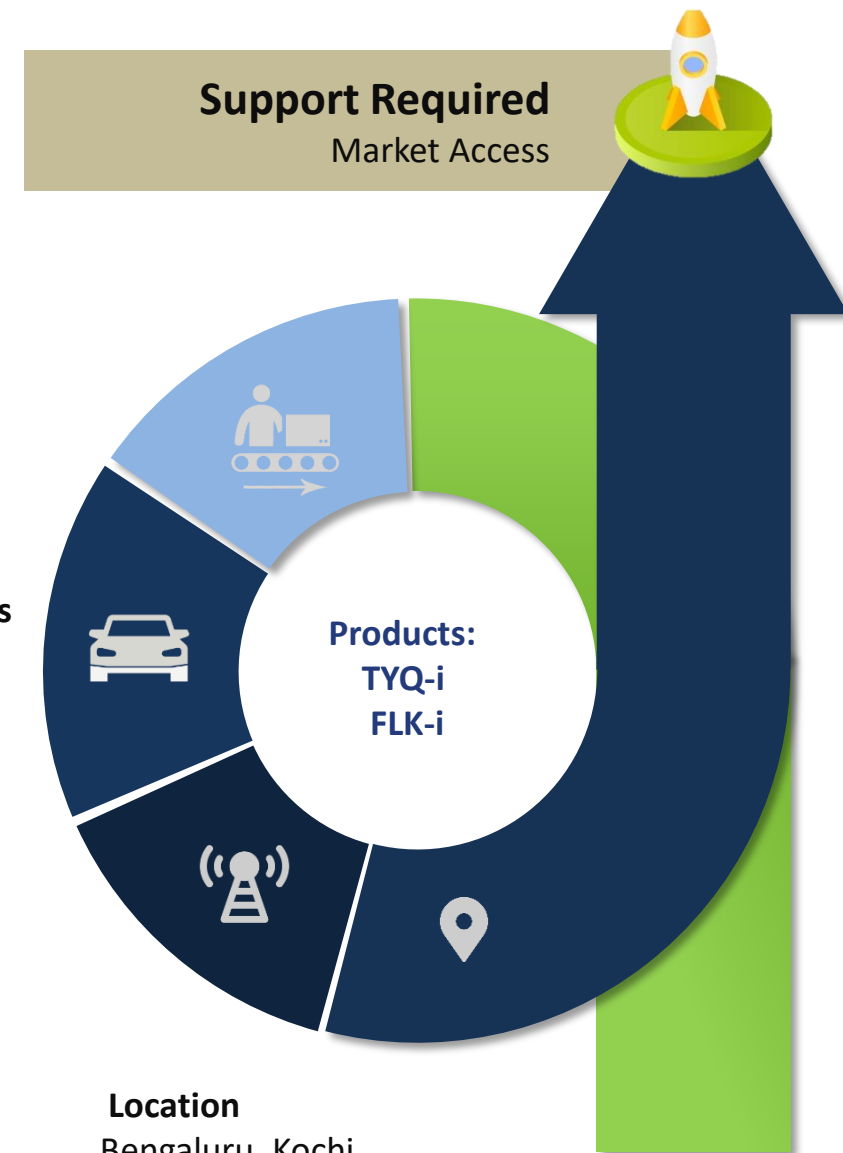**Solution-** Vision A.I. based Anomaly Detection platform

Key Differentiators – AI Based Vision Intelligence Platform
- Scalable A.I.: Multiple hardware platform options – From Edge to Cloud
- Custom algorithms leading to higher accuracy

Verticals
Industry, Civil Infrastructure

Customers/Partnerships
Nvidia, Renesas, Xilinx, Intel Altera, Ericsson

Business Model
B2B, NRE, license, subscriptions

Support Required
Market Access

Products:
TYQ-i
FLK-i

Location
Bengaluru, Kochi

Sources: Interviews with subject matter experts; NASSCOM analysis

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Synapptra provides intelligent energy solutions through digital twins

Synapptra®

Impact–
- Collects and processes data from all sources to devise energy saving strategies and mechanisms
- Actively helps in saving energy and manage spaces for Lighting, Heating, Ventilation, Cooling and Internal Air Quality

Solution – Enterprise SaaS energy saving solution

Key Differentiators –
- Retrofit in any building
- Brings any kind of HVAC under Closed-Loop Control, supported by distributed edge computing at node level

Verticals
Manufacturing, pharma, smart buildings

Customers/Partnerships
Diageo, property management companies,

Business Model
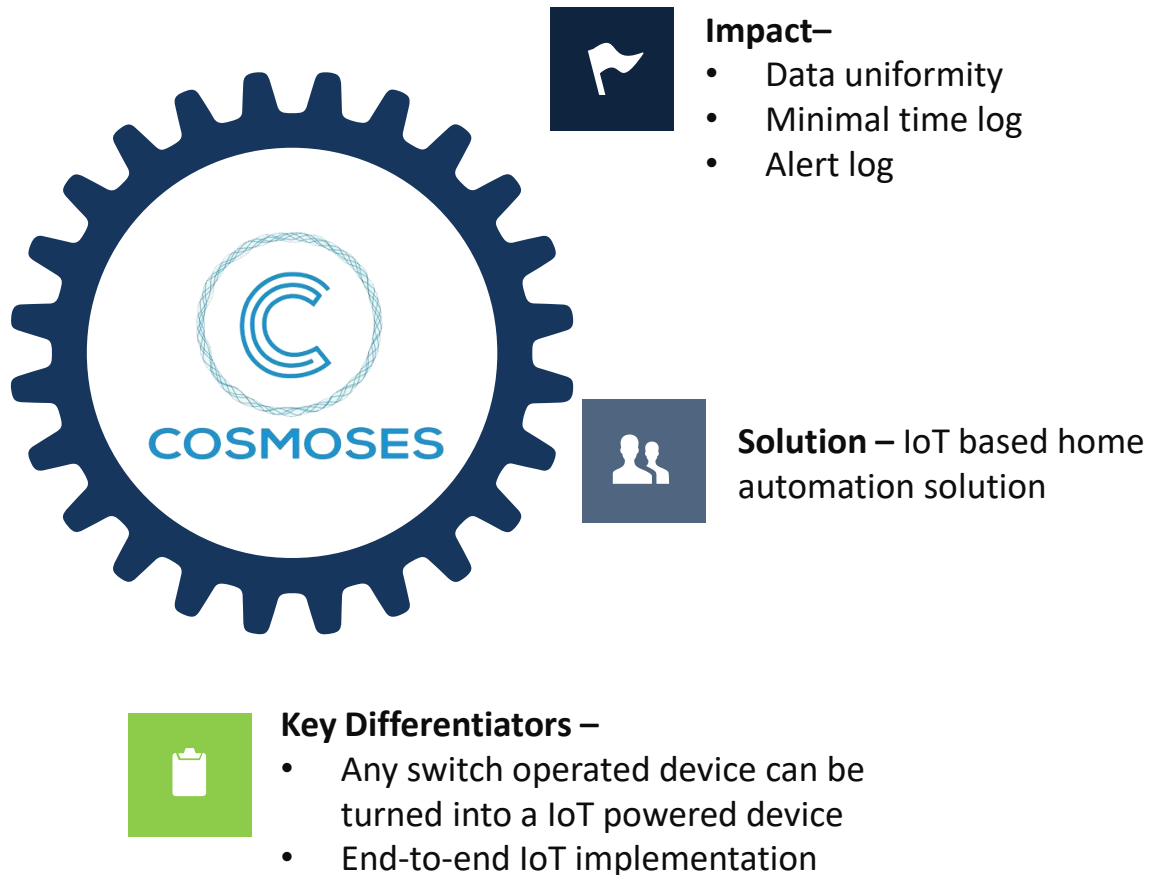Software-as-a-service, distributed edge devices

Support Required
Partnership; Market Access

**Product :
Synapptra Synergy**

Location
Bengaluru, Karnataka

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Cosmoses offers IoT based home automation solutions

Impact–
- Data uniformity
- Minimal time log
- Alert log

Solution – IoT based home automation solution

Key Differentiators –
- Any switch operated device can be turned into a IoT powered device
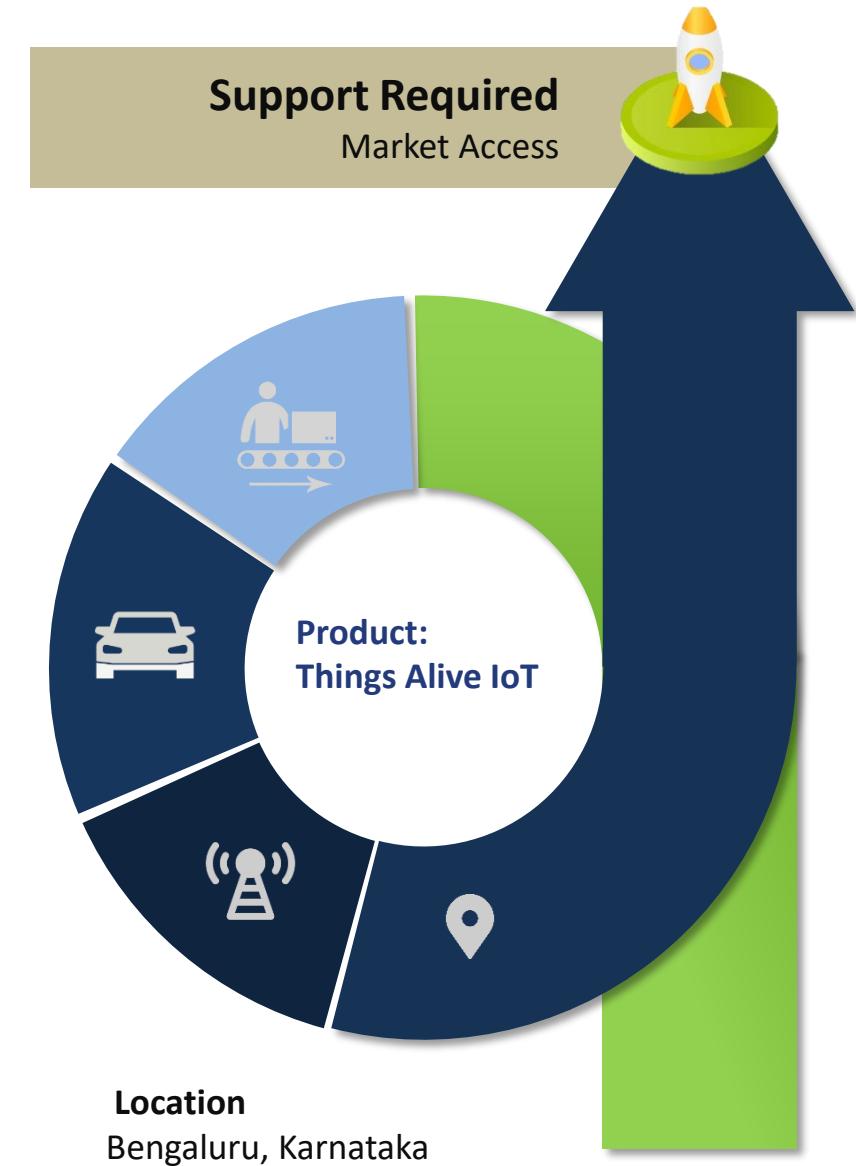- End-to-end IoT implementation

Verticals
Manufacturing, infrastructure, hospitals, automotive

Customers/Partnerships
Pitching Stage

Business Model
B2B, B2C

Support Required
Market Access

**Product:
Things Alive IoT**

Location
Bengaluru, Karnataka

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About NASSCOM

NASSCOM is the industry association for the IT-BPM sector in India. A not-for-profit organization funded by the industry, its objective is to build a growth led and sustainable technology and business services sector in the country. Established in 1988, NASSCOM's membership has grown over the years and currently stands at over 2,800. These companies represent 95 percent of industry revenues and have enabled the association to spearhead initiatives and programs to build the sector in the country and globally. NASSCOM members are active participants in the new global economy and are admired for their innovative business practices, social initiatives, and thrust on emerging opportunities.

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