GrowthEnabler delivers data & intelligence on disruptive technologies & digital innovations from the startup economy, to global brands, business leaders, startups and entrepreneurs, to gain insights, get connected and grow faster through the GrowthEnabler Personalised Intelligence Interface (Pii) platform.

About GrowthEnabler

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Write to us at info@growthenabler.com

Research Methodology

GrowthEnabler’s proprietary research methodology analyses the business impact of disruptive technologies and digital innovations from our index of 500,000+ global tech startups. We capture and assess the impact these technologies have as part of the larger business ecosystem in order to enable executives to take informed business decisions confidently based on facts. (Refer to page 34 to view GrowthEnabler’s proprietary research methodology)

Disclaimer

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This report intends to inform key decision makers, investors and industry influencers on how disruptive technologies and digital innovations in Internet of Things (IoT) will impact the future of their business, industry and sector of interest.
EXECUTIVE SUMMARY

The Internet of Things (IoT) refers to business processes and applications that use sensory information, data and content generated by interconnected and uniquely identifiable embedded computing devices that exist within the Internet infrastructure. These devices can include for example; beacons, RFID sensors, mobile devices and Wi-Fi access points, to name a few.

IoT will be one of the most compelling technology innovations over the next decade. It has the power to transform the way we live, do business and make instant buying decisions by leveraging the benefits of cloud computing, mobility and big-data. The data IoT generates helps to create valuable insights, enabling business leaders to make informed decisions on optimising operations and enhancing customer service standards, especially in industries such as healthcare, retail, automotive and manufacturing amongst others.

IoT: WHY NOW?

IoT has the potential to significantly drive business, technology and economic growth in the UK over the next decade. GrowthEnabler has identified three compelling reasons to investigate IoT and publish this report.

1. More devices than people – the tipping point

By 2017 there will be over 8.4bn IoT connected devices on the planet, superseding the 7.48bn population of world. Mainly attributed to the fast adoption and growth of web-connected physical devices such as driver-less cars, smart bandages, automated farms and interactive billboards. In short, the acceptance, adoption and business applicability of IoT is on the rise.

2. Continued Market Growth

The global IoT market is set to grow from US $157bn in 2016, to US $457.29bn by 20201. This growth will positively impact the UK, where £81bn will be invested in IoT, and 57,000 jobs will be created, across many sectors, including, health & social care, power and transport, by 20202.

3. Immediate Opportunities with UK Startups

GrowthEnabler has identified 21 top disruptive UK IoT Startups that have the potential to fuel UK technology innovation, create jobs, and solve big business problems, as long as they are given the right business opportunities, ample capital investment and the runway to continually build and develop new products. UK IoT startups will emerge and thrive in sectors such as: Infrastructure, Smart Homes, Smart Cities, Smart Cars and Wearable Technology. For instance, D3O, an impact protection & shock absorption technology startup, that grew 400% in four years, and received the Queen’s Award for Enterprise, now supplies leading wearable brands in the sporting and military sectors.

KEY FINDINGS

- IoT serves two distinct user groups - businesses and individuals. IoT is broadly classified into nine segments as follows:
  - Use-cases for businesses: 1) Industrial IoT, 2) Retail, 3) Smart Utilities & Energy, 4) Healthcare and 5) Smart Cities

- Businesses consider investing in IoT to reduce business continuity risk through predictive ‘sensor driven’ analytics that optimise operational performance, reduce costs, and consequently increase profits and customer impact. Other benefits include higher workforce productivity and new product development opportunities.

- End-customers (individuals) increasingly use IoT to save time, money and heighten personal convenience by using smart home automation, and rely on health tracking devices to enhance well-being and lifestyle. Adoption is set to grow as machine sensors in smartphones, wearable devices and other smart devices become more prevalent and affordable.

- Global IoT funding levels reached US $4.5bn in 20163, and is set to grow 5% year on year.

- The key risks to widespread adoption of IoT technology include: lack of optimal encryption of data & network security protocols, insufficient interoperability standards between various types of IoT devices and high costs of implementation, especially in industries including manufacturing and healthcare.

- To mitigate these risks, the IoT ecosystem of manufacturers, distributors, service providers and policy makers must collaborate more on topics such as industry-wide standards, key metrics & protocols, lower-cost hardware, improved connectivity, fast-evolving public policy and innovative business models & strategies.

The implementation track-record of IoT based technologies continues to develop and requires the entire ecosystem, stakeholders, and key players, including policy makers, investors, corporate buyers, innovators, manufacturers and startups, to actively collaborate to maximise the global growth opportunity IoT has to offer. IoT will revolutionise the way people and businesses interact with their surroundings and each other. Billions of inter-connected sensors will share masses of environmental and performance data using minimal energy, creating a hyper-connected world.

Today, consumer-facing IoT products and solutions dominate market attention and investor appeal; however, the growth opportunity presented by Industrial IoT has significant merit for the wider IoT ecosystem too.

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1 Gartner 2 World Bank 3 MarketsandMarkets 4 IoTUK.org.uk 5 CBInsights

“"The Internet of Things has the potential to transform how we live our lives.""

BK Yoon, President & CEO of Samsung Electronics

04
Hailed as the ‘next industrial revolution’, IoT will connect 20 billion devices or ‘things’ to the existing internet infrastructure by 2020. Sophisticated sensors, embedded into everyday objects are already enabling data led decision making for early adopters across industries. IoT has enabled the ‘Connected Home’ to become a reality, and as a consequence minimised human effort with inventions such as smart refrigerators that can pre-order groceries through eCommerce.

Gadgets such as Amazon Echo Dot and Google Nest represent just the first generation of IoT products, with the best of IoT still to come.

In parallel, Industrial IoT is gaining momentum as businesses mesh Big-data and IoT technologies to create major cost and speed efficiencies. IoT enables disparate machines to communicate using data, empowering managers with the capability to predict a fault before it ever occurs. An IoT infrastructure uses wirelessly transmitted data from robots and machine sensors to sense, predict and then alert technicians to conduct preventive maintenance of critical machinery. Operations leaders use IoT to optimise manufacturing processes and reduce risk of incidents. The automotive and transportation industry is already using IoT to increase passenger safety standards by connecting their vehicles with intelligent systems that predict and prevent accidents.

The Internet Revolution has transformed the way humans search, consume and share information by connecting computers all around the world. Similarly, the Internet of Things (IoT) connects physical devices (not just smartphones, laptops & tablets) using sensors and data to augment the way people live, work, entertain, travel, and even how government organisations & businesses interact. A typical IoT platform or application has many layers; that includes, devices and things, data management, security and communication protocols, network communication and computing infrastructure and performance management software.
UK - STARTUP IoT LANDSCAPE

London tops the European Digital City Index\(^1\) 2015 as the most supportive ecosystem for both startups and scaleups. In March 2015, the UK government created IoT UK, a three-year program, with £32m (US $39.7m) of funding, to advance the production and adoption of IoT in the private and public sector. Today, the UK has over 40 million connected IoT devices. This number is expected to grow as investment in IoT rockets to £81bn, creating 67,000 jobs by 2020\(^1\).\

The 3 most popular and important sectors of IoT implementation\(^2\) in the UK are:
- Health & Social Care
- Power
- Transport

1250+ IoT Startup Companies Worldwide

The wealth of information, about your products and your customers’ use of those products, collected through IoT, can help you develop new and much improved offerings and attract more and different customers.”

Maciej Kranz,
VP - Corporate Technology Group at Cisco

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\(^1\) digitalcityindex.eu \(^2\) SAS and the Centre for Economics and Business Research \(^3\) IoT.org.uk
In smart or connected homes, devices including thermostats, smoke detectors, light bulbs, appliances, entertainment systems, and security systems, are linked via Wi-Fi and controlled using smartphone apps. Today, a fully connected home requires multiple IoT products and apps.

A disruptive product category of devices that measure, monitor and analyse daily human activity and vital statistics. Wearables account for a majority of consumer-facing IoT implementations.

Whether self-driven or driver assisted, connected cars are about to become a disruptive service industry of automated fleets. Interconnectivity, mapping services and traffic analysis are the areas that will drive future research in this field.

IoT has connected healthcare systems using smart medical devices that enable preventative care and boost well-being. Beyond fitness tracking wearables, these devices will have countless pathological and therapeutic uses.

Proximity-based advertising, in-store shopping behaviour measurement and intelligent payment solutions are critical areas where IoT is transforming the offline Retail industry to compete with eCommerce.

Worldwide efforts to raise ecological awareness accelerated the implementation of IoT in areas including: smart water management and smart grids, that reduce wastage, improve efficiency, reliability and the economics of energy management.

Industries such as oil and gas are using IoT to optimise oilfield production. Telecom vendors have introduced predictive fault management processes to drive bandwidth provision to the home. Truck manufacturers increased customer satisfaction and introduced new revenue streams with sensor based predictive maintenance.

Healthcare IoT is used for real-time patient monitoring and prevention care using wearable devices. Hospitals use IoT to track the location of medical devices, personnel and patients with the ability to extend preventive care beyond the hospital premises.

Leveraging ubiquitous connectivity, big data and analytics, and funded by smart city initiatives, public utility areas i.e. traffic management, water distribution, waste management, urban security and environmental monitoring are being transformed.
**THE TOP IoT GROWTH INDUSTRIES**

The primary industrial sectors leveraging IoT that will be at the forefront of disruptive value creation in the global business ecosystem.

**Connected Buildings & Smart Homes**

By 2030, a majority of home devices will connect to the internet. 43% of building managers in the US believe that IoT will significantly affect overall building operations within the next three years¹⁶. Particular benefits include: Energy savings, ease of access control, intelligent surveillance and monitoring, improved building operations and support for sustainability efforts.

**Oil & Gas Mining**

By 2020, 5.4 million IoT sensors, devices & systems¹⁷ will be used on oil extraction sites to track and measure environmental, performance and productivity metrics. Particular benefits include: predictive maintenance & monitoring of drilling equipment and the distribution pipeline network, to ensure safe & efficient midstream operations and workflow automation.

**Utilities**

By 2020, Energy providers throughout the world will measure and manage rising energy demand using nearly 1 billion smart meters¹⁸. Particular benefits include: energy savings for cost optimisation, usage-based energy management to minimise energy transmission losses and power outages due to excessive demand.

**Transportation**

By 2020, the automobile and transport sectors, will witness over 220 million connected cars on the road¹⁹. Particular benefits include: better automotive analytics, improved traffic conditions, optimised fuel usage and travel routes. IoT will be a key enabler in the driver-less cars and trucks industry, being pioneered by Tesla, Uber and Otto trucks.

**Healthcare**

Beacons, paired with mobile apps, are being used in stores to monitor customer behaviour and push relevant advertisements to customers. Particular benefits include: greater customer intimacy, more targeted customer offerings and enhanced profitability.

**Agriculture**

646 Million IoT devices are estimated to be used in the agriculture industry, by 2020²⁰. Connected healthcare devices can collect data, automate processes, provide actionable insights including workout routines and much more. Particular benefits include: enhanced medical workflow automation, better analytics for disease management and improved out-patient health monitoring.

**Banking, Financial Services & Insurance (BFSI)**

By 2020, 75 million IoT devices will be shipped²¹ for agricultural uses such as tracking soil temperature, acidity levels, and other metrics to help farmers increase crop yields. Benefits include: real-time monitoring of livestock health, improved irrigation methods, remote soil monitoring, reduced water consumption and streamlining of farming processes.

**Food Services & Logistics**

Future battles will be won or lost using real-time reconnaissance data from sensors connected to military assets on land, air or water. Consequently, spend estimates on drones are expected to reach $58.7 billion by 2020²². Particular benefits include: providing battlefield situational awareness, proactive equipment maintenance, remote training and efficient inventory management.

**Defence**

Tracking sensors placed on parcels and shipping containers will further reduce costs associated with lost or damaged goods and increase the speed of order processing. In addition, robots such as the Amazon Kiva, will help reduce labour costs in warehouses. Particular benefits include: Accurate real-time shipment tracking, monitored & optimised fleet management, and efficient warehouse inventory management.

**Retail**

With 31% of hotels using next-generation door locks, and 33% having room control devices, 16% having connected TVs, and 15% using beacons throughout the hotel²³, IoT has become a symbiotic link between consumers and hotel providers. Particular benefits include: increased personalisation and proactive room replenishment, enabling automatic reordering and improved forecasting and staff management.

**Hospitality**

Municipalities worldwide will increase their spending on IoT systems at a 30% CAGR (Compound Annual Growth Rate), from $30bn in 2014 to $133bn in 2019. Particular benefits include: increased productivity, improved safety, predictive maintenance, reduced asset loss – self diagnosing devices will identify product issues early, from temperature and environmental changes to predicting machine failures.

35% of manufacturers use smart sensors¹³. This number will grow to 53%, by 2020. Particular benefits include: significant increase in capacity utilisation, lower unit costs and improved safety.

**Manufacturing**

By 2030, a majority of home devices will connect to the internet. 43% of building managers in the US believe that IoT will significantly affect overall building operations within the next three years¹⁶. Particular benefits include: Energy savings, ease of access control, intelligent surveillance and monitoring, improved building operations and support for sustainability efforts.

**Infrastructure**

PARTICULAR BENEFITS INCLUDE:

- Increased personalisation and proactive room replenishment, enabling automatic reordering and improved forecasting and staff management.
- Improved productivity, improved safety, predictive maintenance, reduced asset loss – self diagnosing devices will identify product issues early, from temperature and environmental changes to predicting machine failures.
- Significant increase in capacity utilisation, lower unit costs and improved safety.

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MARKET SIZE AND GROWTH FORECAST

The number of IoT connections will increase at a CAGR of 16% from 6 billion in 2015, to 27 billion by 2025. The three countries competing to capture global IoT market share, by 2025 will be the USA (22%) followed by China (19%) and Japan at 6%.

In comparison, the UK IoT market is at a relatively embryonic stage and expected to accelerate as UK investment in IoT increases. Currently, the UK market has captured only 2% of the global IoT market share.

Despite IoT having a significant opportunity to scale and gain mass market adoption, the lack of network security capabilities could hamper momentum. As the number of IoT devices and sensors increase, the importance of data and network security increases too.

The global IoT market will grow from US $157bn in 2016 to US $457bn by 2020, at a CAGR of 28.5%. The global IoT market share will be dominated by three sub-sectors; Smart Cities (26%), Industrial IoT (24%) and Connected Health (20%). Followed by Smart Homes (14%), Connected Cars (7%), Smart Utilities (4%) and Wearables (3%).

Global IoT market growth will depend on these key driving forces:

- Evolving sensor technology at lower cost
- Rise in high speed networking technologies
- High growth of mobile adoption
- Growing adoption and popularity of cloud platforms
- Growing levels of strategic investments to innovate and disrupt/mitigate being disrupted
- Customer demand for improved service and enhanced experience at best cost

It’s not so much about the emergence of new technology, it’s the convergence – the ability to use sensors for everything in the world to basically be a computer, whether it’s your contact lens, your hospital bed or a railway track.

Harriet Green, Chief of IoT at IBM
In 2016, the global IoT industry attracted US $4.46bn² in funding from 690 deals. A large proportion of these deals were from startups in the Industrial IoT space. Looking ahead, the global IoT funding market is expected to grow at a healthy rate of 5% year on year.

[Sources: CBInsights/GrowthEnabler Analysis]

IoT Deal Share by Major Regions

The USA saw the majority of global IoT deals, followed by Canada and the UK. Israel and Germany accounted for 2% of global IoT deals each. It is surprising to note the absence of China and India in this list. Factors include that the USA and Europe possess the most advanced internet infrastructure and innovation focus related to IoT related applications.

IoT Deal Share by Investment Type

In the past four quarters, Global IoT deals have been heavily skewed towards the early stage with seed and Series A funding, accounting for 71% of deals. Mid-stage startup investments made up 22% of the deals, while only 7% were late stage. The UK startup funding ecosystem is at an early stage with 39.29% deals through Series A funding.

UK Trends

In the UK, GrowthEnable has identified 41 IoT startups founded post 2009, that have been sufficiently funded, and have contributed to the ongoing growth of the local IoT startup ecosystem. Nevertheless, IoT is a relatively new investment category in the UK market, where deal sizes have shrunk in 2016 when compared to global trends. In 2016, the total investment in IoT reached $610m across 54 deals as compared to $575m from 49 deals in 2015. London-based IoT startups have led the largest funding rounds generating a considerable $333.5m of investment followed by East England UK-based IoT startups that attracted $52m.

[Sources: IoT.uk/GrowthEnable Analysis]

The top funded UK IoT companies:

- Neul – Network solutions provider for IoT infrastructure
- Telensa – Wireless solutions provider for smart city and smart lighting control applications
- Chargemaster – Manufacturer and operator of electric vehicle charging points in UK
- Resin.io – Provider of a scalable and connected device management platform

Top Investors

Global
- Intel Capital
- Qualcomm Ventures
- Andreessen Horowitz
- Kleiner Perkins Caufield & Byers
- Khosla Ventures

UK
- Cisco Investments
- Wayra
- NDRC
- Winton Technology Ventures
- Voyager Capital
**IoT Investment by Value Chain in UK**

End-customer facing IoT solutions, such as wearables, experience higher levels of innovation and attract more funding when compared with business-led IoT products e.g. security systems.

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**IoT Investment by End User Type in UK**

Many privately funded companies are developing components, solutions, products or services with broad applicability across end user types. Startups focusing on B2B and B2C have been awarded 80% of the overall investment with equal distribution.

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*“Companies have a great deal to gain from the Internet of things. The business leaders who tackle the obstacles to implementing these systems and invest in new capabilities early stand to gain the most from building competitive advantages.”*

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*Michael Chui, Source: Fortune*
Every new technology has to overcome its fair share of hurdles that often inhibit widespread adoption. IoT is no different. Typical challenges in IoT are not just limited to technical or financial issues, such as the cost of sensor devices, or the investment in network and computing infrastructure, but also relate to intrinsic socio-economic factors. As illustrated by an automotive hacking experiment in 2015, two hackers proved the deficiency in current network security standards by remotely hacking into the controls of a jeep on the highway from 10 miles away through the internet and acquired wireless control over the car’s entertainment system, dashboard functions, steering, brakes, transmission amongst others.

The progress of IoT is hindered by the complexities associated with governance, security, interoperability, privacy and standardisation. Moreover, behavioural and organisational factors such as outdated mindsets, budget constraints, cultural change, day-to-day decision pressures, changing business priorities and the business appetite for risk - also play a significant role in the widespread adoption of IoT. There is however a way forward for early adopters. Business and technology leaders who invest in research and intelligence and learn by interacting with key IoT experts, investors and startups can identify and pursue exciting opportunities to drive customer experience, optimise costs and grow profits – while outpacing market competitors.

Security & Data Privacy

Although the number of privacy laws have increased from 20 in the nineties, to more than 100 today, the lack of comprehensive data and network security protocols has left every connected IoT device exposed to cyber-attacks, data-breach threats and identity theft vulnerabilities. As an example, hackers’ used 100,000+ connected consumer devices such as a smart refrigerator to send more than 750,000 malicious emails to businesses and individuals around the world. Inadequate security of IoT devices and networks is the most pressing challenge faced by the IoT industry as it continues to compound the risk of data vulnerability for both businesses and individual consumers. For instance, in healthcare, any connected patient monitoring system or wearable device can present an open invitation for hackers to steal and share private and confidential information.

High Implementation Costs

The global adoption of IoT in a business to business environment is impacted by the high cost of implementation associated with IoT products and solutions. For instance, a manufacturing company with multiple plants, workflows and varying equipment types, seeking to modernise its operational infrastructure, using IoT, will have to consider upgrading legacy infrastructure and systems to achieve a truly standardised and interoperable IoT environment. Policy makers, such as industrial associations and governments have a significant role to play in addressing this issue by drafting key regulations and standards that reduce costs and drive market adoption.

Adaptability & Interoperability

Interoperability is a core enabler of IoT technology. All IoT devices and platforms need to be highly adaptable and open to cater to the widest possible range of applications. For example, if an IoT solution is being implemented in a warehouse to track products, measure inventory and map disparate delivery locations, the biggest challenge will be in making the platform interoperable so that the logistics and warehouse management systems can talk to each other. While progress is being made at standard bodies such as IEEE, Industrial Internet Consortium (IIC) and Open Internet Consortium (OIC), companies in the industrial space are reluctant to bear the cost and business risk associated with replacing existing equipment to accommodate an interoperable IoT world.

Many enterprises are primarily looking for stable yet flexible connectivity stacks that enables them to mix and match sensors, computing infrastructure and analytic platforms based on their needs and business requirement. Consequently, solutions such as the ThingWorx IoT platform is augmenting the existing manufacturing landscape by delivering operational intelligence using sensor driven data collection, identification of key performance indicators (KPIs) and simplification of over-the-cloud predictive analytics.

Compatibility & Longevity Challenges

Technologies including ZigBee, Z-Wave, Wi-Fi, Bluetooth are currently competing to become the dominant transport mechanism between devices and connectivity hubs. This will result in compatibility issues with the lack of standardised M2M protocols and multiplicity of firmware and operating systems among IoT devices. The sheer number of new standards and initiatives can be confusing and is unnecessarily fragmenting the IoT industry. The IoT industry needs to mature in terms of developing a compatible firmware in their implementation and the standardisation of communication technologies.

Relative Immaturity & Lack of Clarity for the Industry

Although IoT has been in the market for some time, the adoption of connected device technologies is yet to reach its prime in verticals such as healthcare, manufacturing and other industrial areas. Factors include the additional time required for integration and cost of change; including, upgrading legacy equipment and re-training staff. At this stage of the IoT revolution, there is still a large degree of uncertainty for organisations when considering the total cost structure and revenue potential of their IoT implementations. This has deferred many from making necessary investments in IoT. The confusion created by ever-changing standards has further stalled adoption. For instance, in Healthcare, current implementations in areas such as: patient monitoring, smart medical devices, intelligent hospital rooms, and health wearables e.g. ECG and blood sugar monitors will be key drivers for future market adoption.

In industries leveraging manufacturing automation and clean technology, business models such as smart grids and energy harvesting have been deploying IoT solutions for several years, however many such projects have stalled at the Proof of Concept (POC) stage because the entire industrial ecosystem requires greater market & business model clarity that needs to be validated by early adopters of IoT.

Another major reason why companies are not as quick to implement IoT is because of the scarcity of relevant skills and expertise, according to the World Industrial Automation Survey. As the industry progresses and standards mature, there will be a growing demand for individuals with relevant IoT qualifications, training and implementation skills.
OPPORTUNITIES

Continuous advancements in semiconductor technology have reduced the size and price of sensors to the point of its extensive application in connected devices. As consumers, businesses, and even governments recognise the benefit of cost-effectively connecting inert devices to the internet with sensors, IoT's impact and opportunities will continue to grow. In the UK alone, research, finance, and engineering could contribute to 25% of the global smart cities market that is expected to be worth $408 billion by 2020.

Healthcare

Research suggests that data-rich analysis of our personal health will become the norm by 2020. Furthermore, IoT implementations in healthcare are already enabling quick, safe and real-time diagnosis and treatment of various illnesses. For example, innovations such as capsule endoscopy, being pioneered in the USA by Given Imaging, involve pill shaped micro-cameras travelling through the human digestive tract, while pinpointing sources of illness to improve treatment outcome.

The opportunity to leverage IoT innovation to improve clinical effectiveness, drive efficiency and enhance the patient experience across the national healthcare ecosystem is truly sizeable. Examples include, innovations such as hand hygiene monitoring systems, remote health monitoring through wearable devices and smart medical apparatus manufacturing. A combination of smart sensors and cloud computing can also be deployed to optimise the flow of patients, staff, equipment and medical supplies hospital wide. Relevant examples from the UK startup landscape include: Njug - Wearables that track physical activity and help in reducing type 2 diabetes

ApoGo - Wearables with high for patient monitoring in hospitals, Walk with Path – Smart footwear for reducing the risk of falling for people with mobility issues and GyroGear – Smart gloves for people suffering from hand tremors.

Agriculture

IoT innovation is being realised in the form of smart farming techniques applied in agriculture, including high-precision crop control, data collection about soil & crop conditions and reduced human intervention in favour of automated farming. With companies such as Agrisolium offering cloud based weather data and risk mitigation solutions for farmers - Smart farming has the potential to address the growing future concerns of the farming industry such as climate change and limited availability of arable land. Similarly, with companies such as IriSense offering integrated hardware and software platforms for crop monitoring, data capture & analytics - precision farming equipment will also deliver high ROI to farmers by empowering them to optimally adjust planting, irrigation, manuring and harvest for each individual part of the field, while also leveraging data collected from remote satellites and ground sensors. Even the health and location of cattle could be monitored and managed using IoT, and revolutionise the livestock industry. Further startups such as Smart Bell, developer of wearables for livestock animals for remote monitoring, Smart Barn, sensor based monitoring and cloud based storage for livestock farmers, Pycno, a developer of sensor systems for precision agriculture, and KisanHub who provide Cloud based integrated software that aggregates public and private data to enable farmers to take informed decisions.

Advertising

With British Airways’ smart billboards that flash when someone passes by, or Diageo’s connected whisky bottles that analyse consumer behaviour, advertisers have just started utilising IoT technology to transform and hyper-personalise advertising to drive relevancy and effective targeting. Companies including Beacontent, LiveBeacon, Proxitee and Linktagger could enable offline retailers to create a more engaging in-store experience for customers using a widespread implementation of hardware sensors (Beacons) that measure and analyse metrics such as high foot traffic areas, popular store sections and products, whilst also targeting consumers with push marketing messages based on their individual purchasing habits. To increase ROI on ad-spend, marketers should consider using disruptive consumer products i.e. smart refrigerators to act as an offline-to-online brand marketing and sales channel, that senses and orders items from nearby retail store(s).

Even if every industry or business sector may substantially vary in the way they leverage IoT, many other sectors including agriculture, power and manufacturing, could start experimenting with small-scale projects that tap into IoT’s innumerable benefits like predictive and prescriptive data analytics. Sectors such as advertising and insurance could also take a cue from the consumer utilities, connected cars and healthcare sectors that are at the forefront of IoT investment.

Manufacturing

The primary opportunities for IoT technology in manufacturing industries include predictive maintenance of machinery based on the sensor data collected and production line monitoring with sensors to optimise equipment utilisation. IoT implementation would also help manufacturers increase business profitability and productivity of both humans and machines, by streamlining production processes and automating plant machinery with RFID chips that store product configuration data, work instructions & work history.

The copious amounts data collected can also be fed into a predictive analytics engine to make the future manufacturing plants more autonomous in terms of predicting and fixing potential disruptive issues. For example, UK based Senseye has developed a predictive analytics engine for sensor data collection and analysis in heavy industries. Similarly, MachineMetrics offers a machine monitoring solution for manufacturing plants to collect and visualise data from machines to improve production performance. Additional startups in the manufacturing industry include: 3Dplex, application development platform for smart manufacturing solutions, Beet Analytics Technology, provider of diagnostic and analytics tools for smarter manufacturing and automation operations and Sensor-Works, a developer of wireless sensor systems for advanced condition monitoring in manufacturing plants.

Energy Analytics

A predictive analytics network monitoring the data collected from sensors embedded in power grids and machinery, can reduce energy transmission and distribution losses to make energy consumption across the world highly efficient and cost-effective. Smart energy management is also made possible by the widespread implementation of IOT technology to create smart grids that price and route power, based on the demand to prevent blackouts. Smart grids coupled with smart meter-based solutions will enable the existing and future industries and businesses to understand and analyse their energy consumption and costs, all the way down to identifying malfunctioning equipment by drawing power at off-peak times and identifying malfunctioning equipment from sensor-collected-data.

Companies like Nixus Solutions offer connected solutions to monitor and reduce energy consumption in buildings, while Aquicore is developing an analytics platform that connects to energy meters that have already been installed enabling organisations to make decisions that improve staff productivity and reduce energy wastage. Further startups disrupting the energy management market include: Labrador, smart meter monitoring and energy usage analytics/management, Limejump, demand response company that enables small scale energy companies to manage their peak load, Pearlstone Energy, energy demand management system for National Grid in UK and also: SMAP Energy, SaaS product to utilize energy consumption data and providing smart meter analytics for energy retailers.

Insurance Tech

Insurance companies can implement IoT solutions to migrate from traditional models of risk assessment, including a user’s credit & claims history, and the size and type of property owned, to a future model that is highly personalised and data-led. By analysing the data from various connected devices including wearables, smart home appliances and connected cars used by the policyholder, insurers can develop unique insights into the policyholder’s personal habits and behavioural preferences to then more effectively assess the insured risk and offer added value.

Even the biggest losses for an insurance company, e.g. from fire damage claims (estimated to typically cost $9bn a year in claims) could be significantly reduced by using IoT based leak detectors and connected fire sensors in buildings to provide early detection and warning alerts of a fire breakout. Multiple insurance companies in the UK are partnering with startups like Just Miles, Oseven, Hubio and Autoemo to introduce Usage Based Insurance (UBI) with the help of ‘Telematics’ (vehicle sensors) that capture and analyse key driving user data and patterns. Similarly, medical insurance claims could be optimised using biometric wearables that track user lifestyle and health.
The research identifies the top disruptive startups in IoT and categorises them into three stages of growth* while assigning them with their GrowthEnabler Personal Intelligence Interface score based on the 5 parameters of business success (explained in our Research Methodology section on page 34).

### EARLY STAGE STARTUPS

<table>
<thead>
<tr>
<th>Startup details</th>
<th>Synopsis</th>
<th>Strengths overview</th>
<th>GrowthEnabler Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Den Automation</td>
<td>Developer of light switches and plug sockets that allow users to wirelessly control (even occupancy based with ambient sensors) and monitor their switches via remote or a mobile app with real time scheduling &amp; monitoring capabilities. Parental controls for limiting usage for devices or user is also possible.</td>
<td>Leadership team - Founding team with CXO level experience with a number of patents filed previously along with number of patents registered for this firm Business traction - Multiple product offerings and patents applied Financial strength - Multiple credible investors involved with the growth</td>
<td>8.58</td>
</tr>
<tr>
<td>Domotz</td>
<td>Provider of home monitoring systems offering real-time, sensor-sourced customer data &amp; analytics for household insurers and users to monitor and access their home and devices from anywhere. It complements all smart home technology by providing extensive device and home information while empowering users with actionable insights for any emergency.</td>
<td>Leadership team - Strong team with vast &amp; diverse CXO level experience Financial strength - Its product Fingbox - a network scanner to secure &amp; troubleshoot home networks - has raised $300k+ on Indiegogo</td>
<td>8.38</td>
</tr>
<tr>
<td>Pycom</td>
<td>Developer of wireless micro-controllers. The company specialises in the manufacturing and development of small wireless multi-bearer micro controllers for IoT deployments. With multi-resilient networks, it has partnered with network providers and supports GSM and Sigfox.</td>
<td>Leadership team - strong and diverse team background Business traction - Overwhelming response to their Kickstarter campaign assuring significant demand in the market for their products</td>
<td>8.31</td>
</tr>
</tbody>
</table>

* The stage of the startup depending on its age of establishment, is subject to change as per the maturity of the technology.
### MID STAGE STARTUPS

<table>
<thead>
<tr>
<th>Company</th>
<th>Founded Year</th>
<th>HQ</th>
<th>Sub Sector</th>
<th>Synopsis</th>
<th>Strengths overview</th>
<th>GrowthEnabler Score</th>
<th>GrowthEnabler</th>
<th>Social media &amp; branding</th>
<th>Financial strength</th>
<th>Business traction</th>
<th>Leadership team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoon</td>
<td>2014</td>
<td>Leeds</td>
<td>Smart Homes &amp; Security</td>
<td>Developer of an infrasound based home security device that combines high definition camera and motion detection technology to sense activity throughout its users’ homes. Comes with a smartphone app to send notifications in case of unusual activity.</td>
<td>Leadership team - Highly experienced founding team with vast &amp; diverse background experience (CXO level)</td>
<td>9.37</td>
<td>9.40</td>
<td>Strong social media and marketing strategy</td>
<td>- Wide array of investors</td>
<td>- One of the top 50 Cisco IoT challenge</td>
<td>- Strong team and sector relevant advisory board and investors</td>
</tr>
<tr>
<td>Kokoon</td>
<td>2013</td>
<td>London</td>
<td>Smart city</td>
<td>Developer of smart premium headphones and mobile apps to help consumers with their natural sleep cycle management. The app allows users to set intelligent alarms for power naps, recovery naps, or a full night’s sleep with detailed analysis of the sleep patterns. Winner of the Wearable Technologies Innovation World Cup.</td>
<td>Leadership team - Founders with sector specific experience - multiple patents registered</td>
<td>9.16</td>
<td>9.16</td>
<td>- Multiple B2B use-cases in logistics and fleet management</td>
<td>- Highly recognised social media and branding</td>
<td>- Secured multiple awards like Startup Sauna Budapest winner and Top 50 Cisco IoT challenge</td>
<td>- Strong team and sector specific (healthcare) experience, premier educational background and investors</td>
</tr>
<tr>
<td>Mystery Vibe</td>
<td>2014</td>
<td>Buckinghamshire</td>
<td>Sexual wellness</td>
<td>In-store analytics provider to retail stores using beacon devices and big data analytics. Provides real-time footfall count, purchasing patterns in the store and demographic profile of the customers.</td>
<td>Leadership team - Founders have sector specific experience</td>
<td>8.18</td>
<td>8.18</td>
<td>- Multiple B2B use-cases in logistics and fleet management</td>
<td>- Strong team background</td>
<td>- Strong team background</td>
<td>- Team with strong sector experience, premier educational background and investors</td>
</tr>
<tr>
<td>Hoxton Analytics</td>
<td>2014</td>
<td>London</td>
<td>Smart city</td>
<td>Connected fleet Management</td>
<td>Developer of a fleet management system that increases driver efficiency and helps in reducing administration cost of fleet maintenance. Enabling data-kid decision making for companies in sectors like insurance, inter-state logistics and automotive servicing with a driving analytics platform.</td>
<td>Leadership team - Strong technical background of founding team’s CTO</td>
<td>7.90</td>
<td>7.90</td>
<td>- Strong social media and branding</td>
<td>- Highly recognised social media and branding</td>
<td>- Strong team and sector specific (healthcare) experience, premier educational background and investors</td>
</tr>
<tr>
<td>Sentimoto</td>
<td>2013</td>
<td>Thame</td>
<td>Wearable tech - Health</td>
<td>Developer of a wearable sensor in the form of a smartwatch to collect long-term physiological and environmental data to identify social withdrawal and altered behavioural patterns in senior citizens. Aims to empower care givers and family members with need based obtrusive remote monitoring and essential information.</td>
<td>Leadership team - Strong team and sector specific (healthcare) experience, premier educational background and investors in healthcare</td>
<td>7.77</td>
<td>7.77</td>
<td>- Strong team background</td>
<td>- Highly recognised social media and branding</td>
<td>- Strong team and sector specific (healthcare) experience, premier educational background and investors</td>
<td></td>
</tr>
<tr>
<td>Device Pilot</td>
<td>2013</td>
<td>Cambridge</td>
<td>Industrial IoT</td>
<td>Platform for detecting, locating, monitoring and managing smart devices connected to the network. Also, offers APIs for easy integration with other back-end business systems.</td>
<td>Leadership team - Team with strong sector experience, premier educational background and investors</td>
<td>7.68</td>
<td>7.68</td>
<td>- Highly recognised social media and branding</td>
<td>- Strong team background with previous CEO experience and number of patents filed by the founding team. Strong board of advisors for company’s growth</td>
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</tr>
</tbody>
</table>

### Market Pulse Report, IoT, UK

**Kokoon**
- **HQ:** Southampton
- **Sub Sector:** Social media & branding
- **Synopsis:** Strong social activity across Facebook & Twitter

**Senseye**
- **HQ:** Southampton
- **Sub Sector:** Industrial IoT
- **Synopsis:** Highly recognised with multiple awards and trusted by VCs

**Hoxton Analytics**
- **HQ:** London
- **Sub Sector:** Smart cities
- **Synopsis:** Highly experienced founding team with ex-CEO members experienced with patent filing

**Sentimoto**
- **HQ:** Thame
- **Sub Sector:** Wearable tech - Health
- **Synopsis:** Currently trusted by a major automotive OEM, helping it to avoid unplanned downtime

**Device Pilot**
- **HQ:** Cambridge
- **Sub Sector:** Industrial IoT
- **Synopsis:** Strong team background with previous CEO experience and number of patents filed by the founding team. Strong board of advisors for company’s growth
**Startup details** | **Synopsis** | **Strengths overview** | **GrowthEnableer Score**
---|---|---|---
**Lime Jump**  
Founded Year: 2014  
HQ: London  
Sub Sector: Smart grid - Energy Efficiency  
[limejump.com](http://limejump.com)  
Provider of an energy management platform for businesses to manage their electricity usage. The company offers software that connects smart meters, smart control devices, weather data, relevant market prices and market mechanisms enabling businesses to regulate and manage their electricity usage and on-site generation. They partner with companies and organisations that own backup or supplementary power generators to take part in National grid’s demand-response programmes.  
Leadership team - Energy sector relevant previous experience and founding member education at top university. Strong & well experienced advisory team  
Financial strength - Backers include; Angel CoFund and Passion Capital

**BleepBleeps**  
BleepBleeps  
Founded Year: 2014  
HQ: London  
Sub Sector: Smart homes  
[bleepbleeps.com](http://bleepbleeps.com)  
Designer and developer of devices that support with parenting. To be specific these small devices claim to enable users to get pregnant, give birth, look after the babies and also raise a child. Its product - Sammy Screamer beeps and sends an alert to a companion smartphone app when it senses movement of a baby. Using Bluetooth 4.0, the device connects with a smartphone within a range of 50m.  
Leadership team - Highly experienced creative director and product design expert in the founding team  
Product & innovation - Multiple well-designed products for parenting

**Concirrus**  
Concirrus  
Founded Year: 2012  
HQ: London  
Sub Sector: Smart cars - Insurance tech  
[concirrus.com](http://concirrus.com)  
Intelligent insurance solutions provider leveraging large volumes of data (from connected sensors) to write off more policies with less risk. Its software tools provide insurers with a dashboard that extracts insights and actions to assess risk in completely new ways and establish new products like connected policies.  
Leadership team - Founding team with vast corporate experience  
Business traction - Very low competition with high B2B potential as it is in the Insurance tech space with the help of connected device technology  
Financial strength - Secured good amount of funding from highly credible investors

**Ncube Home**  
Ncube Home  
Founded Year: 2012  
HQ: London  
Sub Sector: Smart homes  
[ncubehome.co.uk](http://ncubehome.co.uk)  
Provider of home automation systems. Offers a smart home hub and an app to control all the smart devices at home using one platform. Allows users to create rules that can be shared with the family based automation of devices (like IFTTT for smart devices). All the data is stored in the device only.  
Leadership team - Highly experienced founder with previous CXO experience and multiple patents  
Financial stability - Breakeven claimed with Series A stage of funding  
Social media & branding - Received a number of credits and awards in the IoT space

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“Our research also shows that the Industrial Internet will drive growth in productivity by presenting new opportunities for people to upgrade skills and take on new types of jobs that will be created.”

World Economic Forum
IoT is enhancing the way we interact with our physical environment by using powerful sensors and data to enrich our daily lives. Corporations can gain significant competitive advantages by identifying key functional areas in their businesses that seek to drive operational efficiencies, reduce costs, and improve overall performance. This powerful convergence of technology and business will drive new monitoring tools and expedite automation to fast propel the growth of IoT technology.

**Healthcare**

- **Reduced errors** - Automated workflow management and analysis of data collected from health monitoring sensors will help doctors achieve a faster time-to-diagnosis, prescribe suitable medications, just in time, and streamline end-to-end disease management.

- **Efficient Patient Care management** - Real time patient monitoring drastically reduces the need for medical interventions and home visit costs. For instance, devices like Glucovista, a continuous non-invasive glucometer, helps doctors to get real-time data of patient's readings remotely saving them 50 – 60% of their daily visitation.

- **Better allocation of resources** - IoT optimises hospital inventory and resources using smart cabinets that allow automatic monitoring of all medical inventory items and predictive maintenance of medical equipment using performance metrics and controls.

**Energy**

- **Minimise losses** - Energy giants must consider using IoT sensors to minimise transmission and distribution losses by identifying specific performance metrics and indicators in power plants. Similarly, Oil rigs can automate monitoring of all medical inventory items and predictive maintenance of medical equipment using performance metrics and controls.

**Retail**

- **Improving customer experience** - Leaders should leverage IoT technologies to explore new dimensions of customer behaviour with digital identity tracking and cater to evolved taste spaces by driving footfall at their stores with innovative cues like interactive billboards. For example, Offer Moments (www.offermoments.co.uk) uses IoT to connect digital advertising boards to social media in real time. This blends traditional OOH (Out Of Home) media with real-time social media searches to personalise the offer to the person walking past the board.

**Logistics**

- **Precise inventory tracking & storage management** - Companies should investigate geo-tagging and geo-tracking their assets in real time to achieve efficiencies and speed in order to help improve customer satisfaction and revenue margins. For instance, supply chain and logistics companies can reduce asset losses and moreover, save fuel costs through route optimisation. Roambee, a Santa Clara based company, is a shipment monitoring and tracking provider that uses multi-sensor boxes called ‘bees’ to improve operational efficiency.

**Manufacturing**

- **Predictive Maintenance** - Manufacturers use data-backed predictive maintenance solutions that rely on IoT and sensors to generate timely service and performance alerts based on unusual energy usage patterns, capacity threshold controls and other equally relevant parameters to avoid risk of failure, costs, and equipment downtime.

- **Inventory control & supply chain management** - Manufacturing industry leaders can adopt IoT best practices like understanding key performance metrics in their factories and accordingly planning and managing resources (both human & technical) to gain cost and efficiency benefits.

- **Reduce overheads and conserve resources** - Optimising processes like inventory control and supply chain management using IoT applications will enable manufacturers to reduce overheads, conserve resources and increase profits. For example, at one of General Electric’s Durathon battery plants, 10,000+ sensors measure temperature, humidity, air pressure and machine operating data in real time. This opportunity to monitor production and adjust processes in real time has enabled General Electric to forecast $19 trillion in profits & cost savings over the next decade.

- **Resource utilisation** - Real-time energy profiles allow manufacturers to detect off-hours consumption, optimise manufacturing production schedules, identify anomalies, and capitalise on opportunities for savings. Technological and organisational changes result from optimising manufacturing processes and the systems running the plants to create the same (or greater) outputs with more efficient energy use.

### RECOMMENDATIONS

#### Healthcare

1. **Reduced errors** - Automated workflow management and analysis of data collected from health monitoring sensors will help doctors achieve a faster time-to-diagnosis, prescribe suitable medications, just in time, and streamline end-to-end disease management.

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³²Anthony Adshead “Data set to grow 10 fold by 2020 as internet of things takes off” ³³IDC Research Findings
RECOMMENDATIONS FOR INVESTORS

Investors are keen on ensuring they maximise on the significant returns to be made from IoT, especially since IoT is earmarked to be one of the world’s top 5 high-growth technologies by 2020, expected to create a connected ecosystem of 50-90 billion wireless devices. Most recently, Japan’s leading venture investor, SoftBank, invested US $32 billion in cash to acquire ARM (a multinational semiconductor and software company, designing & licensing chip architecture to dozens of global companies like Apple, Samsung and Qualcomm) and expects to produce a trillion IoT chips over the next 20 years. This is exactly where the big advantage is being created.

.1

Due to the many implementations of Industrial IoT, as an enabler of operational efficiency, for industries like automotive, manufacturing and other large scale segments, the future of Industrial IoT certainly looks bright. The Global Industrial IoT Market Research report 2015-2019 divides Industrial IoT into four end-user segments, namely, manufacturing, energy & utilities, automotive & transportation and healthcare, and forecasts a 26.56% CAGR by 2019. Companies like AT&T, Cisco, GE, IBM, Intel are fast building internal IoT capabilities and specialist teams to serve increasing demand stemming from industrial IoT. In addition, investment in building startup engagement programmes and corporate venture arms is also on the rise.

.2

The widespread adoption of IoT technology will necessitate investments that help to create an IoT support ecosystem and complimentary infrastructure capabilities to bolster IoT related business models for device management app creators, cloud-based solution providers, equipment manufacturers, network providers and MRO (maintenance, repair and operations) outfits. Such intense and diverse growth will certainly lead to increased venture capital investment from investors with a long-term vision.

.3

Travel, transportation and industrial manufacturing sectors invest most in IoT. Similarly, in the consumer IoT sector, smart watches and fitness wearables dominate investment and accounted for over 70% of total wearables sales worldwide (2016).

.4

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EXECUTIVE PERSPECTIVE

As part of our Executive Perspective series, we talked to James Mottram, Group CIO, Renewable Energy Systems (RES), who shared his views and practical recommendations on why IoT will drive transformational change, and how Startups can attract and engage senior executives.

Q: How will IoT impact your industry and the RES business by 2020?

A: Renewable energy growth continues at pace and with it the shift towards distributed energy generation, be it through remotely located utility grade solar and wind farms or micro generation at a consumer level. This shift from centralised to decentralised generation creates innumerable end points to monitor and guarantee. Internet of Things (IoT) technology coupled with big data and machine learning will have a big role to play in providing scalable solutions for remote monitoring, maintenance & control that will bring down cost, drive efficiencies and enable mass automation. For me, IoT provides the most optimally scalable solution to enable distributed generation which will transform energy provision.

By 2020, we can expect some of the barriers to wide scale adoption of IoT to disappear, especially in areas like ‘Connected Home’ where lower cost devices and increased interoperability between products will accelerate mass adoption, and empower energy companies to offer a wider range of higher value services to consumers.

Q: How can working with Startups create ‘competitive advantage’ for your business?

A: In the recent years, RES has strategically acquired significant capabilities in engineering, technical and commercial innovation, in addition to partnerships with startups that develop cutting edge solutions and business models. These capabilities together with our organisational culture and market intelligence strengths, is what I believe has accelerated RES to be a global renewables leader and ranked 2nd in the list of Top Utility-Scale Energy Storage Systems Integrators by Navigant Research.

Q: What are the essential elements of a strong ‘business case’ to invest in IoT, in your industry?

A: There are several strong use cases for IoT technology in the renewable energy industry, starting with downtime reduction through predictive maintenance and extending to generation optimisation with advanced analytics. These capabilities also enable energy companies to offer customised price plans adapted for evolving consumption profiles and demands. Apart from the essentials of every successful business case like scalability, security and an acceptable commercial risk profile, what ultimately matters is a compelling ROI.

Q: What are the key attributes of a long-term IoT partnership that every innovator and startup must know?

A: While developing a long-term IoT deal, the most important attributes that we value include: shared vision and values, complimentary capabilities, clear understanding of our business and customers, flexibility of approach, sustainability of solution and measurable ROI.

Q: In your opinion, what are the biggest opportunities awaiting early adopters of IoT in your sector?

A: Early adopters of IoT have many opportunities to seize. For example by leveraging a combination of IoT with big data and machine learning, near-real-time analytics could drive significant enhancements in ‘connected device’ energy usage, price optimisation and improve the overall security of future supply.

Q: What advice would you give fellow executives searching for the next big IoT innovation?

A: In the coming years, IoT and its allied technologies & business models will continue to grow at an accelerated pace propelling both competitive threats and opportunities. Timing and speed of adoption will create competitive differentiation, enabled by accessing smart routes to innovative solutions, including those from the global startup economy.
RESEARCH METHODOLOGY

GrowthEnabler’s proprietary research methodology analyses the business impact of disruptive technologies and digital innovations. We capture and assess these impacts through a hybrid of primary and secondary research, allowing executives to make informed business decisions, based on facts. The GrowthEnabler Personalised Intelligence Interface (Pii) platform delivers data and intelligence from the startup economy, enabling business leaders and tech entrepreneurs to interact, innovate and grow faster.

The GrowthEnabler methodology is divided into two sections; the first section covers Global and UK Market trends and analysis, while the second part talks about top IoT startups in the UK – using the GrowthEnabler startup scoring system.

Step 1: Startups database building

GrowthEnabler conducts extensive primary and secondary data analysis, using proprietary pattern analysis techniques, web algorithms and scoring methodologies to provide relevant market data, trends, industry analysis on sub-sectors, technology areas, applications, industry landscapes and competitors across startup technology segments. GrowthEnabler curates large volumes of data collected from various channels, including, databases, reports, journals, associations, interviews and other sources. Primary insights are gathered using surveys from key business and technology leaders in corporate organisations, investor groups, public sector entities and technology startups. Following this, several market drivers, constraints, opportunities and challenges for specific markets are identified and used as input using regression modelling.

Secondary Research – A team of Machine Learning and NLP experts scan wide range of data sources including startup websites, news, industry reports & investor portfolios to extract secondary data, which is then validated by founder/s, CXOs, product heads or other senior decision makers.

Step 2: Startup evaluation with GrowthEnabler Personal Intelligence Interface

The research identifies the top disruptive startups in IoT and categorises them into three stages of growth*: Early stage (Age <3 years), Mid stage (Age 3 - 5 years) and Late stage (Age 5 - 7 years). Out of the 57 parameters, 30 sub-parameters are classified under 5 core categories that are then used to calculate the GrowthEnabler Startup Score. The categories include:

- Leadership Team – For education, experience & profile relevancy
- Business Traction – For market potential and business model
- Product & Innovation – For the stage of product readiness and end-user value of the innovation
- Financial Strength – For the financial fidelity with revenue & funding
- Social Media & Branding – For the media mentions, awards & social media traction

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- Primary Research – The Primary research data is derived directly from GrowthEnabler Surveys, Interviews and company profile information provided by Startups Registered on the GrowthEnabler Pii platform.
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* The stage of the startup depending on its age of establishment, is subject to change as per the maturity of the technology.

GLOSSARY OF TERMS

APIs – Set of functions and procedures that allow creation of applications which access the features or data of an OS (operating system) or an application

Beacons – Hardware sensors which can track movement in the surroundings, act as a Bluetooth device to transmit data

BFSI – Banking, Financial services and Insurance

CAGR – Compound Annual Growth Rate

Communication infrastructure – Backbone of communication system upon which various broadcasting and telecommunication services are operated

Computing infrastructure – Composite hardware, software and network resources required for the operation and management of an enterprise IT environment

Data-led decision making – Making decisions based on the analysis of data

End-customer – Consumers buying the product / services

Geo-tagging – Adding geographical identification metadata to various media such as photo, video, SMS, website or QR code

Geo-tracking – Identifying a person/item’s current, physical location by obtaining GPS data from their smartphones or other GPS enabled devices

Health tracking – Keeping a check on health vitals through wearable devices

Home automation – Controlling home appliances through a smartphone app

IFTTT – If ‘This’ Then ‘That’ – Rule based operation of devices / applications

Interoperability – The ability of systems to exchange and make use of information

KPI – Key Performance Indicator – Measurable value that demonstrates how effectively a company is achieving key business objectives

M2M protocols – Protocols related to machine to machine communication

Natural Language Processing – Field of computer science, artificial intelligence, and computational linguistics concerned with the interactions between computers and human

Open-source – Software for which the original source code is made freely available and may be redistributed and modified

Predictive maintenance – Maintenance of equipment based on the predictions made by the data analysis

Regression modelling – In statistical modelling, this is a statistical process for estimating the relationships between a dependent variable and one or more independent variables

RFID – Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information

Smart meters – Connected energy meters which can exchange data with apps and other devices

tDCS – Non-invasive, painless brain stimulation treatment that uses direct electrical currents to stimulate specific parts of the brain

Telematics – The branch of information technology that deals with the long-distance transmission of computerised information

Usage Based Insurance – Insurance offering to end consumers based on their day to day activities

Wearables – Connected devices worn by humans / pets to track location and other body vitals