# MEGA TRENDS WORKSHOP

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### FROST & SULLIVAN TODAY'S FACILITATORS



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The Growth Pipeline™ Company

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New Trends Growth Opportunities Arising due to Reshaping of Industries Caused by COVID-19

Analysis of critical forces shaping growth opportunities

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The Growth Pipeline™ Company Powering clients to a future shaped by growth

### WHY IS IT INCREASINGLY DIFFICULT TO GROW? THE STRATEGIC IMPERATIVE 8<sup>TM</sup>: FACTORS CREATING PRESSURE ON GROWTH



# THE IMPACT OF THE TOP THREE STRATEGIC IMPERATIVES ON INDUSTRIES POST COVID-19



### **ECONOMIC IMPACT OF COVID-19**

#### SCENARIO-BASED IMPACT ON GDP GROWTH, GLOBAL, 2019-2021



With no solid development of vaccines within the end of 2020, a second outbreak occurs triggering a return to lockdowns, world economic faces even severe downturns leading to de-Globalization and geo political imbalance.

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Recovery

### **POST-CORONA WORLD – GROWTH IMPERATIVES**

#### Post-COVID Growth Opportunity Matrix, Global, 2019-2030



### **CONNECTED WORLD: OVERVIEW**

THERE WILL BE OVER 7 CONNECTED DEVICES PER HUMAN BY 2025 AND A DENSE, COMPLEX MESH OF 72.8 BILLION DEVICES AROUND THE WORLD, CONNECTIVITY WILL ACT AS A KEY ENABLER FOR THE SEAMLESS INTEGRATION OF AN ARRAY OF SOLUTIONS.



### **CONNECTED WORK: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



Unified communications

Consumerization of IT

(Workplace wearables)

Digital personal assistants

as a service

Real estate:

Telecommuting



POST-COVID OUTLOOK



**Old Projections- Pre COVID** 

**Cloud Web/Video Meetings** 

Market, Global, 2019–2025

#### **Case in Point**

#### Who: Microsoft Teams

**Technology:** Cloud Video Conferencing Services, UCaaS, Virtual events **Key Innovations:** Custom applications to support the COVID-19 crisis management, such as the **Crisis Management PowerApp**.

**Benefit:** Fast-paced product enhancements enable Microsoft to more effectively compete and appeal to a larger audience, Microsoft developed a scalable framework to share best practices with clients to provide partner solutions during COVID crisis

#### **New Projections- Post COVID\***

Cloud Web/Video Meetings Market, Global, 2019–2025





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### **Growth Drivers for Connected Work**

#### Connected Work: Growth Drivers, Global, 2020–2030

	Remote Work	Scenario1	Scenario2	Scenario3
	Approximately 87% of companies rely on their employees using personal devices to access business applications; this saves employees 58 minutes each day, allowing for a 34% increase in productivity.	М	н	н
*	Telecommuting by employees has grown by 115% in 10 years. In 2016, 43% of US workers worked remotely at least occasionally. Maturing technologies enable the delivery of more feature-rich, secure and reliable hosted/cloud voice and UCaaS solutions.	Μ	Μ	н
	Virtual Collaboration	Scenario1	Scenario2	Scenario3
	Upgrades to communications and collaboration solutions increasingly become a part of the broader digital transformation and cloud migration strategies. Telepresence and advanced conference technologies are set to become business imperatives.	Μ	Μ	М
	Need for business continuity during times of crisis and fulfilling the needs of evolving business models that demand increased flexibility of work and travel needs – as businesses move to virtual workplaces, the data gathered will ease operations and streamline communications across various verticals.	L	Μ	М
	Hybrid Workplaces	Scenario1	Scenario2	Scenario3
	Tech businesses and start-ups are looking for a quick way to scale employees without having to hire expensive, full-time staff.	L	м	М
	Microwork will become an essential income supplement. Gen Z entering the workforce will drive the demand for increased flexibility at work; this population cohort also prefers multitasking and online work over traditional 9-5 jobs.	L	L	L

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **Growth Restraints for Connected Work**

#### Connected Work: Growth Restraints, Global, 2020–2030

	Remote Work	Scenario1	Scenario2	Scenario3
	Many existing premises-based systems continue to deliver essential functionality at a declining cost due to asset depreciation and limited need for additional investments.	Μ	М	М
-	Most hosted IP telephony and UCaaS solutions are still silos supporting limited integration with other premises-based or cloud solutions or business workflows.	L	Μ	М
	Virtual Collaboration	Scenario1	Scenario2	Scenario3
	Some businesses refrain from moving their communications to the cloud due to control, reliability, security, or industry compliance concerns.	Μ	М	М
	Despite proliferation of hosted offerings, businesses cannot always find a trusted provider delivering services that meet all requirements (features, cost, performance, etc) in their geographic area.	L	Μ	М
11	Hybrid Workplaces	Scenario1	Scenario2	Scenario3
2	As AI-based systems and chatbots are progressing into the workplace and carrying out human-centric tasks, there will be a major social unrest around the fear of AI completely taking over certain jobs through automation.	L	М	М
	Most micro-workers are underpaid and are not qualified for benefits such as healthcare and Medicare, leading to poor working condition with extended work hours.	L	Μ	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **CONNECTED LIVING: STRATEGIC OPPORTUNITIES**





**POST-COVID** 

**OPPORTUNITIES** 

**Strategic Outlook** 

POST-COVID OUTLOOK

# SMART HOME

Smart Homes

Home automation

Home energy

Home security

#### Old Projections- Pre COVID

#### Total Smart and Connected Home Outlook, 2019-2025



#### **Revenue forecast**

#### **Case in Point**

### Total Smart and Connected

**New Projections- Post COVID\*** 

Home Outlook, 2019-2025



### **₽**

Who: Nest Hello Doorbell

Technology: High power infra red LEDs, IR cut filter, microphone

**Key Innovation:** 24/7 live streaming, HDR imaging, and night vision to give you a clear view, day or night

**Benefit:** The smart bells enabled with connected home capabilities and internet connectivity will take center stage during the pandemic as contactless technologies gain popularity.

### **Growth Drivers for Connected Living**

#### Connected Living: Growth Drivers, Global, 2020–2030

Smart Home	Scenario1	Scenario2	Scenario3
Safety, home owner comfort, and energy and cost savings are the top benefits perceived by non-users, which will drive demand.	н	Н	Н
<b>Integration possibilities with Tier-I hubs,</b> the emerging requirements of social distancing, and self- hygiene to drive the demand for home sensors that would further lead to participation by home builders.	Μ	н	н
Virtual Entertainment	Scenario1	Scenario2	Scenario3
Growth in the virtual entertainment market is expected to increase with the launch of commercial VR headsets with diverse capabilities and new applications in immersive technology.	м	М	М
Advancement in high computational power devices and the growing adoption of high-speed, low- latency 5G network will boost demand for the virtual entertainment market.	L	Μ	Μ
Virtual Learning	Scenario1	Scenario2	Scenario3
The emergence of low-cost initiatives, increased internet penetration, government initiatives, and a large fraction of young population are driving the imperatives for virtual learning across the world.	L	М	М
The new module of self-paced learning is driven by the integration of innovative immersive platforms which are meant to revolutionize the learning market.	L	L	L

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

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### **Growth Restraints for Connected Living**

#### Connected Living: Growth Restraints, Global, 2020–2030

	Smart Home	Scenario1	Scenario2	Scenario3
	Though many people prefer programming all their smart technologies with one remote control, they may need to use different apps separately for each device, <b>limiting the inter-device communication.</b>	Μ	М	Μ
•••	Smart homes would be capable of easily <b>enslaving their owners</b> , tracking their every motion and sound, or even predicting their behavior.	L	Μ	Μ
	Virtual Entertainment	Scenario1	Scenario2	Scenario3
	High cost of hardware and the need for high processing power and storage are some of the factors that are limiting the growth of the virtual tourism market	М	М	М
	Apart from the technological barriers, there will be a need for a drastic shift in consumer behavioral habits when it comes to virtual tourism; complete replacement of physical experiences with virtual will happen over the long term.	L	Μ	М
	Virtual Learning	Scenario1	Scenario2	Scenario3
	Lack of peer-to- peer interaction is one of the most significant restraining factors that could limit the eLearning platform .	L	Μ	М
	Lack of financing and dedicated government support towards building proper digital infrastructure for virtual learning platforms in government schools are a major reason for the slow commercial adoption.	L	L	L

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **SMART CITIES: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



POST-COVID OPPORTUNITIES



POST-COVID OUTLOOK



**Crowd analytics** 

Public Healthcare

Mobility and Tracking

Safety and security

### **Old Projections- Pre COVID**

## Smart Cities Spending on Technology, Global, 2019 and 2025



#### Total Spending (\$ billion)

#### **Case in Point**

#### Who: Taoglas

Technology: AI, data analytics, video analytics, Wi-Fi

**Key Innovations:** The CROWD Insights solution from Taoglas can be used on the existing Wi-Fi infrastructure or hotspots and doesn't require any new hardware. Helps in monitoring crowd data both indoor as well as outdoors.

**Benefit:** Municipalities and other public /private entities using this solution easily manage and predict the people movement in public places and also deploy efficient scare public resources .

#### **New Projections- Post COVID\***

Smart Cities Spending on Technology, Global, 2019 and 2025





### **Growth Drivers for Smart Cities**

#### Smart Cities: Growth Drivers, Global, 2020–2030

	Crowd Analytics	Scenario1	Scenario2	Scenario3
	More investment in analytical tools and solutions by enterprises to gain knowledge about the real perspective of consumers and study their spending patterns to gain a competitive advantage in the market.	Н	М	L
•	Growing security threats, rising demand for intelligent video systems, and increasing demand for organized crowd distribution planning in smart cities will lead to a huge adoption of crowd analytics solutions.	Μ	Μ	Н
	Open Data Dashboard	Scenario1	Scenario2	Scenario3
	More traditional city administrations and public entities will shift towards real-time data to monitor the socio-economic situation of cities as well as citizens; this will lead to an increase in development of single dashboards with summarized data in one place.	Μ	Н	Н
AT	Growing health hazards and the rise in infectious diseases will lead to increased collaboration between healthcare entities and city governments to develop health data dashboards to monitor the health parameters of citizens.	Μ	Н	Н
1	Digital City Services	Scenario1	Scenario2	Scenario3
	Increasing use of digital healthcare services through digital platforms, surge in online education from the primary to university level, increase in online administrative services like renewal of passports, tax filings, and licensing services.	Μ	Н	Н
	Government policies encouraging multi-stakeholder partnerships (between city administrations, tech companies, social organizations) to offer various public services through innovative technologies like robots, drones, digital assistants, and chatbots.	Μ	Н	Н

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

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### **Growth Restraints for Smart Cities**

#### Smart Cities: Growth Restraints, Global, 2020–2030

	Crowd Analytics	Scenario1	Scenario2	Scenario3
	Lack of robust data security infrastructure specially in developing countries; dearth of proper data protection measures or policy implementations by government or city administration to secure sensitive public data.	Μ	Н	Н
•	Lack of investment to cover the high initial establishment cost of crowd analytics; most of the government spending on ICT is insufficient to endure the infrastructural as well as implementation cost of crowd analytics.	Μ	н	н
	Open Data Dashboard	Scenario1	Scenario2	Scenario3
	Inadequate data transparency or bad data quality could lead to incorrect analysis, which could impact the decision-making process for both policy makers and city administrations, refraining them from using open data dashboards.	М	Н	н
X	Open data dashboard lacks a user support system that could help in the case of data breach or inappropriate data analysis.	Μ	Μ	Μ
1	Digital City Services	Scenario1	Scenario2	Scenario3
	Lack of robust security system – with the rise in cyber attacks, it is necessary that digitalized services have a strong and secure system to survive such threats. This puts extra cost burden on city administrations while implementing digital services.	Н	Н	Н
	Digital Divide: Some sections of the society lack access to internet and are deprived from utilizing digital services.	Μ	Н	Н

Impact: H High M Medium L Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

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Source: Frost & Sullivan

### **GLOBAL SUPPLY CHAIN OVERVIEW**

PROCESS AUTOMATION IN SUPPLY CHAINS – PART OF THE INDUSTRY 4.0 – WILL PLAY A SIGNIFICANT ROLE IN HELPING COMPANIES TO KEEP OR EVEN REDUCE OVERALL LOGISTICS OPERATIONAL COSTS, AND EVENTUALLY MAINTAIN A MINIMAL OPERATIONAL FLOW EVEN IN TIMES OF CRISIS.



### **"LIGHTS-OUT" OPERATIONS: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



#### POST-COVID OPPORTUNITIES



POST-COVID OUTLOOK

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Digital Twins

Asset Condition

Predictive and

**Prescriptive Analytics** 

Monitoring

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#### S Old Projections- Pre COVID

#### Digital Twin Market, Global, 2019 and 2025



#### Revenue forecast(Billion)

### New Projections- Post COVID\*

### Digital Twin Market, Global, 2019 and 2025



#### **Case in Point**

#### Who: GE

objectives.

#### **Technology:** Edge Analytics Engine, GE Digital Twin Model **Key Innovations:** The digital twin runs on an industrial platform – Predix – which is designed to ingest massive volumes of machine sensor data, to

execute analytic models and to manage industrial data at scale.

Benefit: GE's digital twin model integrates analytic models for

health and performance with customer defined KPIs and business

components of the given asset which enables remote monitoring asset

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Image Source: Freepik; Frost & Sullivan

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### Growth Drivers for "Lights-Out" Operations

#### Light-Out Operations: Growth Drivers, Global, 2020–2030

	Remote Asset Monitoring	Scenario1	Scenario2	Scenario3
	COVID-19 has driven increasing awareness about the benefits of remote asset monitoring as firms invested in the same have been able to operate during the lockdown by analyzing data to take informed decisions on plant site and equipment.	Н	Н	н
•	Increasing safety standards and regulations in industrial and transportation sectors drive the adoption of asset monitoring solutions. Outsourcing asset monitoring activities creates alternative revenue streams for hardware equipment providers.	н	н	н
	Digital Twins	Scenario1	Scenario2	Scenario3
	Increased adoption has been noted in the manufacturing and the heavy industries sectors, primarily for product development, optimizing asset performance, improving process efficiency, and minimizing time and cost. Digital twins are also increasingly finding applications in healthcare, construction, and smart cities.	Μ	м	м
X	Digital twins enable simulation of physical assets and workspace, which allows planning and performance improvements. Digital twins provide the ability to detect variances and predict failures, enabling preventive maintenance of the machinery.	L	Μ	Μ
1	B2B/C eCommerce	Scenario1	Scenario2	Scenario3
	Customers will expect retailers to take extra efforts to deliver highly customized products and solutions through the contactless mode. Customer experience will be the focal point as physical stores will be used as a channel for customers to touch, feel, and try products before making an online purchase.	L	м	м
	A digital reality will enable customers to augment or virtualize their desired products and narrow down their purchasing decisions. Digitization at every step will enhance customers' overall experience throughout the shopping process, including product selection, trials, information seeking, personalization, and payment process.	L	L	L

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### Growth Restraints for "Lights-Out" Operations

#### Light-Out Operations: Growth Restraints, Global, 2020–2030

	Remote Asset Monitoring	Scenario1	Scenario2	Scenario3
	Lack of interoperability or standards to implement Industrial IoT/Industry 4.0 platforms restrict market growth. Implementation of Industrial IoT and digitalization which requires collaboration with multiple stakeholders may suffer teething problems.	Μ	М	Μ
•	End-user skepticism due to lack of understanding or awareness about the cost-benefit ratio and return on investment (ROI) restricts growth and leads to a lack of customer awareness about technological advances and latest developments.	L	Μ	Μ
	Digital Twins	Scenario1	Scenario2	Scenario3
	The expansion of the sensor networks connected to computing systems is exponentially increasing the attack surfaces that cyber criminals can target. The concerns pertinent to cybersecurity are hindering large-scale implementation of IoT and digital twins.	Μ	Н	Н
	Successful implementation and operation of digital twins demand high-speed communication networks without service disruptions. Latency in communication networks, if any, leaves a negative impact on the lead time for digital twins.	L	L	М
1	B2B/C eCommerce	Scenario1	Scenario2	Scenario3
	Huge initial capital expenditure would be required for digitization of retail stores. Providing such capital outlay for digitization could be a difficult proposition for medium- and small-sized retailers.	L	М	н
	Retail businesses that do not undertake business model transformation required to enable a contactless shopping experience for users will face lower revenue.	L	L	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **GEO POLITICAL BALANCE : STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



Creation of Centralized

**Economic Polarization** 

**Global Resource Reserves** 

Building Nation-wide Risk Assessment Mechanism



POST-COVID OUTLOOK

### **Old Projections- Pre COVID**





**New Projections- Post COVID\*** 

#### Case in Point

### **₽**

#### Who: Japan

**Stimulus:** \$2.2billion is earmarked for Japanese companies moving their manufacturing operations out of China. Of this amount, \$2 billion is for companies moving back to Japan while the rest \$0.2 billion is set aside for companies shifting their production to other countries

*Strategic Basis:* China shuttered factories in February 2020 during the pandemic, thereby shutting the supply of necessary components for Japanese manufacturers. Japan, therefore, wants the production of high-added-value products to move back to the country

### Growth Drivers for Geopolitical Balance

#### Geopolitical Balance: Growth Drivers, Global, 2020–2030

	Political Polarization	Scenario1	Scenario2	Scenario3
	Increasing perception, especially by the United States, that the spread of COVID-19 was a result of mishandling of the outbreak during the initial phase by both WHO and China, due to the lack of information sharing required to understand the severity of the outbreak	Μ	М	М
	Backed by more than 120 countries, a resolution was passed for seeking a probe into WHO's response to the COVID-19 pandemic. Independent calls of inquiry into the origin of COVID-19 could also gain global support.	Μ	М	Μ
	Economic Polarization	Scenario1	Scenario2	Scenario3
	Dependence on the globalized supply chain drives economic polarization as countries increasingly commence steps to make themselves independent to global supply chain shocks. Japan has set apart \$2.2 billion to enable its companies to shift production out of China.	Μ	М	М
	The United States continues to increase its rhetoric of pulling out US manufacturing companies from China. In support of the same, nations like India have offered land to companies moving their production out of China.	Μ	М	М
1	Climate Change	Scenario1	Scenario2	Scenario3
R	Deforestation and the resulting loss of wildlife habitat driving climate change plays a key role in the spread of zoonotic diseases (according to estimates, 75% of new infectious diseases are zoonotic).	м	н	н
	Global warming driven by climate change could result in altering climatic conditions, leading to the mutation of deadly viruses and resulting in the spread of infectious diseases.	Μ	М	Н

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **Growth Restraints for Geopolitical Balance**

#### Geopolitical Balance: Growth Restraints, Global, 2020–2030

	Political Polarization	Scenario1	Scenario2	Scenario3
	Political polarization could lead to rifts between nations resulting in barriers to trade. Australia, which led the resolution to probe WHO's response faced an 80% rise in tariff on its export of barley to China, and also a ban on certain segments of beef exported to the country.	Μ	м	М
	Increasing acrimonious accusations and responses between the United States and China on COVID-19 could shift the world order to a new cold war era.	L	Μ	Μ
	Economic Polarization	Scenario1	Scenario2	Scenario3
	Deeply entrenched global supply chains are not easy to shift in a short time. Any shift in the supply chain without proper planning could result in disruptions to production. Setting up manufacturing facilities and hiring labor is a time-taking process with difficulties in execution.	Μ	Н	Н
	Economic retaliation by China as a result of such supply chain shifts could create new trade tariff wars, especially with countries moving their manufacturing base out of China.	L	L	М
1	Climate Change	Scenario1	Scenario2	Scenario3
	April 2020 saw the highest carbon dioxide concentration at a global level, as recorded by US National Oceanic and Atmospheric Association, underscoring the need to reduce greenhouse gas emissions.	L	М	Н
	Inspite of the risks associated with deforestation and its linkage to infectious diseases, Amazon rainforests continued to see an acceleration in the levels of deforestation as compared to last year, combined with the fact that Brazil is facing a rapid transmission of COVID-19.	L	L	М

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **SUPPLYCHAIN OPTIMIZATION: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



POST-COVID OPPORTUNITIES



POST-COVID OUTLOOK

**On-demand delivery** 

#### Delivery Drones and Delivery Bots

- Web based procurement
- On demand spot-market
- Packing Management

### Old Projections- Pre COVID

#### Total Drone Delivery Market Outlook, 2019-2025



#### Revenue forecast(Billion)

#### **Case in Point**

#### Who: Zipline

Technology: Vision sensor, ultrasonic, infrared, LiDAR

Key Innovations: Fully autonomous emergency medical supplies,

**Benefit:** Significantly reduce costs and time take to distribute drugs to remote areas, partnering with pharmaceutical companies to expand their geographic reach to deliver drugs in remote areas.

### New Projections- Post COVID\*

#### Total Drone Delivery Market Outlook, 2019-2025



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### Growth Drivers for Supply Chain Optimization

#### Supply Chain Optimization: Growth Drivers, Global, 2020–2030

	Autonomous Fleet	Scenario1	Scenario2	Scenario3
	AI will help reduce the number of accidents, enable efficient traffic flow, and support greater mobility. AI approaches can provide full scalability to store and manage large volumes of data, enabling vehicle- to-vehicle and vehicle-to-infrastructure services.	Μ	н	Н
•	Focus on data monetization and the availability of cloud-enabled infrastructure will fuel future innovation in AI applications, including autonomous fleets.	Μ	Μ	Н
	On-demand Delivery	Scenario1	Scenario2	Scenario3
	Drones and bots could be preferred for various driving forces such as quick delivery, improved time management, energy conservation, and safer delivery systems, coupled with higher levels of efficiency.	м	н	н
	On-demand delivery solutions can help in lowering labor and operational costs and also eliminating the issue of driver shortages.	L	L	Μ
1	Demand Planning	Scenario1	Scenario2	Scenario3
	Demand planning through control towers can help companies with end-to-end visibility and control, real-time tracking, Omni channel access, and providing notifications and alerts on the go.	Μ	н	н
	Demand planning can help automate forecast management processes via web-based software to provide for forecast visibility, auto-replenishment alerts, comparing actual demand to in-transit inventory, store-on-hand data, etc.	L	Μ	Μ

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Carpal; Frost & Sullivan

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### Growth Restraints for Supply Chain Optimization

#### Supply Chain Optimization: Growth Restraints, Global, 2020–2030

	Autonomous Fleet	Scenario1	Scenario2	Scenario3
	Other drawbacks include the technology itself and the legal issues around insurance and legal liability for accidents.	Μ	н	Н
	Autonomous fleet have additional factors that are restraining growth including data privacy and breach issues and loss of jobs amongst drivers.	Μ	Μ	Н
	On-demand Delivery	Scenario1	Scenario2	Scenario3
	One of the key limitations of drones includes shorter flight time and being highly prone to change in climatic conditions.	М	м	М
	Despite their numerous benefits, drones and bots are limited by legislative uncertainties, as well as safety and privacy concerns .	Μ	Μ	Μ
1	Demand Planning	Scenario1	Scenario2	Scenario3
	The adoption of process automation, Big Data analytics, and network orchestration is constrained by the heavy investments required by corporates to bring them into play, coupled with the loss of flexibility.	L	М	М
	In the wake of control towers, most organizations are struggling with issues such as multiple information sources and a lack of integration across systems.	L	Μ	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Rosen & HR Law; Frost & Sullivan

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### **HEALTH AND WELLNESS OVERVIEW**

DIGITAL HEALTHCARE DATA HAS BEEN EXPLODING AND WILL BE FURTHER RISE DUE TO COVID-19. IT TAKES 24 MONTHS FOR THE HEALTHCARE DATA TO DOUBLE WITH 150+ EXABYTES OF DATA AVAILABLE TODAY WHILE GLOBAL WEARABLE'S SPENDING IS EXPECTED TO INCREASE BY 27% YOY BY THE END OF 2020.



### **HUMAN AUGMENTATION: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



#### **POST-COVID OPPORTUNITIES**



**POST-COVID OUTLOOK** 



**Behavioral Analytics** 

**Proactive Evolution** 

**Behavioral Evolution** 

Human-Machine

**Evolution** 

### **Old Projections- Pre COVID**

**Behavioral Analytics Market**, Global, 2019 and 2025

ear	2019-2025	13%

#### Growth rate (%)

#### **Case in Point**

#### Who: Viisights

Technology: AI, Sensorization, Advanced Analytics **Key Innovations:** Use of artificial-intelligence driven video analytics solutions instead of discrete images to recognize human behavior. The technology provides full public privacy as it only recognizes the behavioral patterns and not faces or other personal details **Benefit:** The data will be useful in predicting probable outbreak areas as well as can help authorities, enterprises and medical centers track and implement restrictions on public movement vital to combat the spread of corona virus.

Year

2019-2025

Growth rate (%)

**New Projections- Post COVID\*** 

**Behavioral Analytics Market,** 

Global, 2019 and 2025

21%

### **Growth Drivers for Human Augmentation**

#### Human Augmentation: Growth Drivers, Global, 2020–2030

	Transhumanism	Scenario1	Scenario2	Scenario3
•	More investment in intuitive interfaces such as NLP will enable a reduction in an individual's time spent on daily "work", taking care of reminders, ordering, and transport, as well as a reduction in activities such as website visits by answering questions directly.	Μ	М	М
	New skills training in workplaces as well as educational organizations via VR simulations, personalized AI education modules, and brain stimulation devices that activate learning regions of the brain will help in choosing optimal career path suiting the trainee's skills.	L	М	Μ
	Social Welfare	Scenario1	Scenario2	Scenario3
	Governments developing policies and strategies to introduce social contracts like basic income for all and universal health coverage.	м	н	н
	Increased adoption of technologies like VR and BMI will help individuals, communities, and even governments in understanding the dilemma of refugees, and victims of social conflicts.	Μ	М	н
	Behavioral Analytics	Scenario1	Scenario2	Scenario3
	Companies using nudge tactics to encourage positive behavioral change and improve decision making, without significant financial investment.	м	Н	н
	More adoption of NLP devices and interactive digital assistants, combined with Big Data and AI, will extract meaning from unstructured datasets in order to analyze customers' preferences, and relationships across diverse user groups to enable extreme levels of personalization.	L	М	М

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact.

#### Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **Growth Restraints for Human Augmentation**

#### Human Augmentation: Growth Restraints, Global, 2020–2030

	Transhumanism	Scenario1	Scenario2	Scenario3
•	Super-abled and genetically stratified humans lead to physical hierarchies: extreme scrutiny and risk of unknown consequences will keep this possibility low for the foreseeable future.	Μ	М	Μ
	Hacking of body parts for control or espionage: Will follow IOT cybersecurity trends, but lag slightly; likely to be monitored by community watch groups in the short term because of limited use.	Μ	Μ	Μ
	Social Welfare	Scenario1	Scenario2	Scenario3
	Inadequate government policies and strategies addressing social discriminations like income inequality, deskilled workers as computers take over decision guidance and tasks, and job loss due to automation and technology advancement.	Μ	Н	н
	Identity crisis: Lack of effective refugee resettlement programs across the globe have led to an increase in illegal migrants. Illegal migrants lack citizenship status and so are deprived of the basic rights.	Μ	Μ	Μ
1	Behavioral Analytics	Scenario1	Scenario2	Scenario3
R	Abuse of personal data collected by companies or insurance agencies: government regulations will vary globally, typically in response to the abuse. Blurred boundaries of abuse will perpetuate testing of boundaries.	Μ	Н	Н
	Loss of implant sensation and functionality: Currently, a concern for body hackers, but likely to diminish as the technology advances and sees higher uptake.	Μ	Μ	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **DIGITAL HEALTH: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**







POST-COVID OUTLOOK

Telehealth

- Virtual Visits
- RPM (Remote patient monitoring)
- mHealth
- PERS (Personal emergency response systems)

### S Old Projections- Pre COVID

#### Telehealth Market, Global, 2019 and 2025



### Telehealth Market , Global, 2019 and 2025

**New Projections- Post COVID\*** 



#### **Case in Point**

#### Who: HGE Health

**Technology:** Sensors attach to inhalers and monitoring medication usage

**Key Innovations:** Focus initially on patients with Chronic Obstructive Pulmonary Disease and those at risk from Covid-19

**Benefit:** Bluetooth enabled communication system to manage medication usage to help them assess, manage and treat high risk respiratory patients.

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### **Growth Drivers for Digital Health**

#### Digital Health: Growth Drivers, Global, 2020–2030

	Telehealth	Scenario1	Scenario2	Scenario3
•-	Virtual visits can be scheduled quickly, and many more patients can be seen in a day. Some patients may be virtually treated and tracked with RPM.	н	Н	Н
	Highly contagious patients can be triaged and handed off to a specialized first responder team. Important patient-generated health data can be gathered and analyzed.	н	н	н
	Novel Diagnostics	Scenario1	Scenario2	Scenario3
	Innovation in rapid POC diagnostic tests to detect complex infectious diseases – for example, chip- based PCR technique to decipher avian influenza mutants.	м	М	М
	Technologies such as microfluidics, use of smartphones for digital data communication, CLIA-waived POCT molecular diagnostic platforms, and techniques to identify host biomarkers will be the driving forces for increasing adoption among end users.	L	Μ	М
	Robotic Care	Scenario1	Scenario2	Scenario3
	Adoption of assistant care bots is directly proportional to the evolution of AI capabilities. Computer vision, motion control and object avoidance, and high cognitive abilities will result in intelligent robots changing the current perception of end-consumers.	L	Μ	М
	Lower number of doctors and personal assistants will drive the demand for robot assistants, which will increase productivity and relieve stress on human assistants.	L	L	L

**Impact: H** High **M** Medium **L** Low Note: Drivers are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### Growth Restraints for Digital Health

#### Digital Health: Growth Restraints, Global, 2020–2030

	Telehealth	Scenario1	Scenario2	Scenario3
•	The decision when to limit the use of Telehealth and insist on a face-to-face consult is always a clinical one. Patients may not be comfortable without seeing the doctor face-to-face at least for the first time.	М	м	м
	Regulatory concerns on professional liability or frauds along with risks due to hardware or devices failures leading to incorrect diagnosis or prescription; as with any internet-enabled device or service, there is a risk of a data breach which may put sensitive patient information at risk of exposure.	L	Μ	Μ
	Novel Diagnostics	Scenario1	Scenario2	Scenario3
	Handling of patient samples is extremely crucial to get accurate POCT results. Mistakes in sample handling prior to testing account for 32% to 75% of laboratory errors, which can cost between \$200 and \$2,000 per incident.	Μ	Н	Н
	The requirement of confirmatory testing creates a situation for laboratory processing. Reimbursement cuts by Medicare and Medicaid will impact revenue streams of POCT vendors.	L	L	М
1	Robotic Care	Scenario1	Scenario2	Scenario3
	Huge initial capital expenditure is needed for the integration of robotic solutions. There is also this question of who takes responsibility if there is an accident.	L	м	н
	Perception issues as consumers may still not be that comfortable with machines; lack of personal human touch, especially for robots expected to be used in the personal space.	L	L	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

are ranked in order of impact.

Source: Frost & Sullivan

### **TECHNOLOGY ADVANCEMENTS: STRATEGIC OPPORTUNITIES**

#### **Strategic Outlook**



POST-COVID OPPORTUNITIES



POST-COVID OUTLOOK

**Cyber Security** 

#### Biometrics

- Al-based Cybersecurity
- Quantum based cyber security
- Blockchain-based
   Cybersecurity

### **Old Projections- Pre COVID**

#### Total cyber security Market Outlook, 2019-2023



#### **Revenue forecast(Billion)**

#### **Case in Point**

#### Who: Kount

**Technology:** Real-Time Identity Trust Network, AI-powered Identity Trust Global Network

**Key Innovations:** Kount's strategy is to use the email age as a reliable identity trust signal for identifying and stopping automated fraudulent activity.

**Benefit:** Kount's AI-powered Identity Trust Global Network consists of fraud and trust signals from over half a billion email addresses.

# Total cyber security Market Outlook, 2019-2023 2025 \$270 2019 \$150 7.2% CAGR

**New Projections- Post COVID\*** 

Revenue forecast(Billion)



### Growth Drivers for Technology Advancements

#### Technology Advancements: Growth Drivers, Global, 2020–2030

	Cybersecurity	Scenario1	Scenario2	Scenario3
•	Digital transformation of economies and societies will bring increased security threats and device vulnerabilities, thus fueling significantly investments in state-of-the-art cybersecurity technologies solutions that prevent the epidemics of cyber-crime and cyber-terror.	Μ	н	н
	Cyber attacks will be among the top 10 global risks of highest concern by 2030. Cyber attackers will target new unprotected threat surfaces created with the adoption of remote working. Network, data, and endpoint security will be the three leading use cases of AI in cybersecurity.	Μ	Μ	Н
	Robotics	Scenario1	Scenario2	Scenario3
	Addressing the shortage of skilled labor and increased manufacturing costs, most manufacturing companies are looking at automation to keep operational costs low.	м	м	м
	Uncertainties in global supply chains and risks of supply chain losses will lead to many global manufacturers to increase in-house manufacturing through automation rather than outsourcing to other countries.	L	Μ	Μ
	Al	Scenario1	Scenario2	Scenario3
	Al tools can also be used to develop virtual novel molecules that bind to virus proteins to block their replication process. Using this approach, the drug discovery process can not only be accelerated, but the cost associated with the development of new drugs can be significantly reduced.	L	м	м
	Al-powered systems can track and predict the outbreak and the spread of COVID-19 from the disease epicenter to other parts of the world. The local government can use this critical information to initiate containment measures to minimize the risk of spreading the contagion and potentially save countless lives.	L	L	L

Impact: H High M Medium L Low

#### Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Note: Drivers are ranked in order of impact.

Source: World Economic Forum; Nesaus; Frost & Sullivan

K4FD-MT

### **Growth Restraints for Technology Advancements**

#### Technology Advancements: Growth Restraints, Global, 2020–2030

	Cybersecurity	Scenario1	Scenario2	Scenario3
•	Lack of system interoperability of IT systems within an organization poses major challenges to AI in the cybersecurity market, leading to insider cyber threats	н	Н	н
	Shortage of highly skilled cybersecurity and AI professionals is creating a major skills gaps in the industry	Н	н	Н
	Robotics	Scenario1	Scenario2	Scenario3
	The lack of demand for metals and machines due to restrictions in construction, automotive, shipbuilding, and many more industries has severely affected the industrial robotics sector.	н	М	М
	Despite the proliferation of hosted offerings, businesses cannot always find a trusted provider delivering services that meet all requirements (features, cost, performance, etc) in their geographic area.	L	Μ	Μ
	Al	Scenario1	Scenario2	Scenario3
	Corporate data that once resided primarily on workstations in IT-managed facilities protected by firewalls, network security, and integrated system and endpoint security is now being accessed on laptops—or potentially even personal devices—with fewer security measures available to secure it.	L	Μ	Μ
	A lack of onsite IT professionals in this time of isolation and social distancing will require new ways of protecting corporate data.	L	Μ	Μ

**Impact: H** High **M** Medium **L** Low Note: Restraints are ranked in order of impact. Scenario 1: Optimistic Scenario, Scenario 2: Baseline, Scenario 3: Prolonged Scenario

Source: Frost & Sullivan

### **KEY TAKEAWAYS: CRITICAL SUCCESS FACTORS**



#### **Automation/ Robotics**

Shifts to focus on cost optimization and prevention of further production losses is accelerating the Adoption of professional service and industrial robots across various industries.

#### **IoT & Sensorization**

Rising installation of IoT technologies has provided an imperative for the use of Digital Twins in industries such as retail, automotive, healthcare, manufacturing, energy and smart cities.



#### **Security & Privacy**

As workplaces become more decentralized and distributed organizations should prioritize on cyber security, updating BCPs and focusing on updating risk assessment should be conducted on critical business processes.

#### **Business Model innovation**

Companies can adopt agile business models that will adopt to new remote working models, technology will play a critical role in sifting from on-site to virtual workplace which is mobile and more flexible.



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