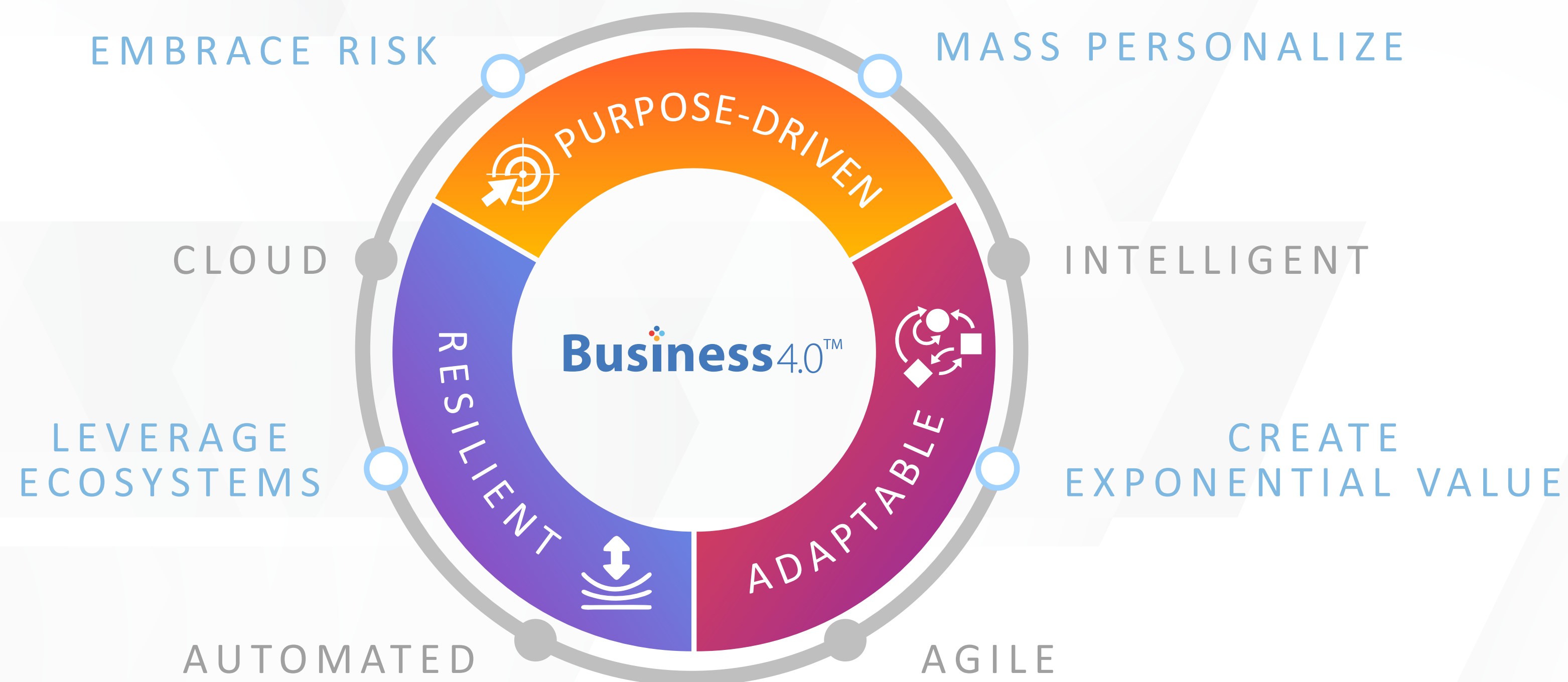# PURPOSE-DRIVEN, RESILIENT & ADAPTABLE

with Business 4.0™

Executive Summary

The technology and services industry has become the backbone for multiple industries to drive an adaptive and resilient response to COVID-19. The technology industry is expected to restore normalcy and ensure secure and predictable outcomes in all networks of business and personal life, which have become entwined like never before. Technology has a huge responsibility to meet, in an agile manner, the infrastructure and operational demands of other industries. While numerous opinions exist about how specific sectors and their definition of a new baseline have changed, digital has evolved exponentially in the past three months.

To stay relevant, every enterprise in each industry vertical and corresponding segment are already attempting to 'SaaSify' their intellectual property at an accelerated pace to enable consumption and maintain and grow customer relationships. In some scenarios, the increasing ability to successfully evolve and drive new ecosystem-based business models will determine whether an enterprise will survive or become irrelevant.
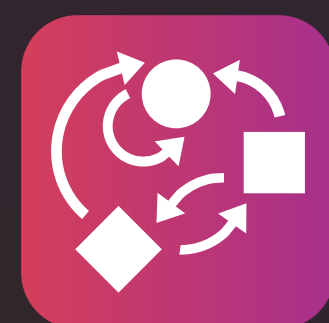
While the technology and services industry is itself impacted by COVID-19, its recovery and growth will depend upon the technology consumption patterns of other industries. This paper examines how technology and services companies will help other sectors sustain themselves in the aftermath of the ongoing pandemic.

PURPOSE-DRIVEN   RESILIENT   ADAPTABLE

The source of innovation for other industries

The technology and services industry—comprising of cloud and software, computer platforms and consumer technology, semiconductor, communications technology, industrial electronics, and professional services firms—has a multi-dimensional go-to-market strategy and is responsible for driving growth, transformation, and cost optimization in other industries.

The pandemic has impacted the technology and services value chain across multiple levels:

- Shifting from product ideation to 'as a service' models will gain traction.

- SaaSifying on-premise software or business models that need to transform in terms of processes, data, API integration, tools, and instrumentation.

- Software development will change from creating services for hardware manufacturers to providing SaaSification offerings.

- The shift to the cloud will be accelerated, a pre-COVID-19 imperative.

- Accelerating the journey of converting consulting, advisory, and professional services into platform-driven business models.

- New e-commerce platforms or marketplaces will evolve.

- Supply chains will become resilient and automated to handle butterfly effects like COVID-19.

- Businesses will focus on collaboration to transform the quality of experience of end users in virtual interactions.

- There will be increasing interface and integration between micro-verticals at every stage.

- A technology backbone that helps enterprises with financing.

- Transforming talent to match skills to address unprecedented unemployment.

- The gig economy and contingent labor will gain precedence.

- Despite having immense data wealth, businesses failed to anticipate the impact of COVID-19, so they must collectively examine what failed and what should have been done differently. Transformation post COVID-19 will see innovation accelerate on various fronts such as mass scale testing in healthcare, advances in drug development, and more.

Putting health and safety first

The life sciences and healthcare industries are at the forefront of battling the pandemic, and technology is core to their efforts (see Figure 1). Healthcare research firms use numerous computational capabilities to run experiments on therapies and for testing. Some healthcare players even use high performance computing workloads for vaccine research, development, and clinical trials. The use of networking and telecommunications have spiked as social distancing during COVID-19 has seen telemedicine services, such as consulting and remote assistance surgery, skyrocket. Further, companies like Google and Apple are using automation to create apps for contact tracing. Technology and services companies play a pivotal role not only in serving as the backbone for healthcare players but also in facilitating partnerships among stakeholders.
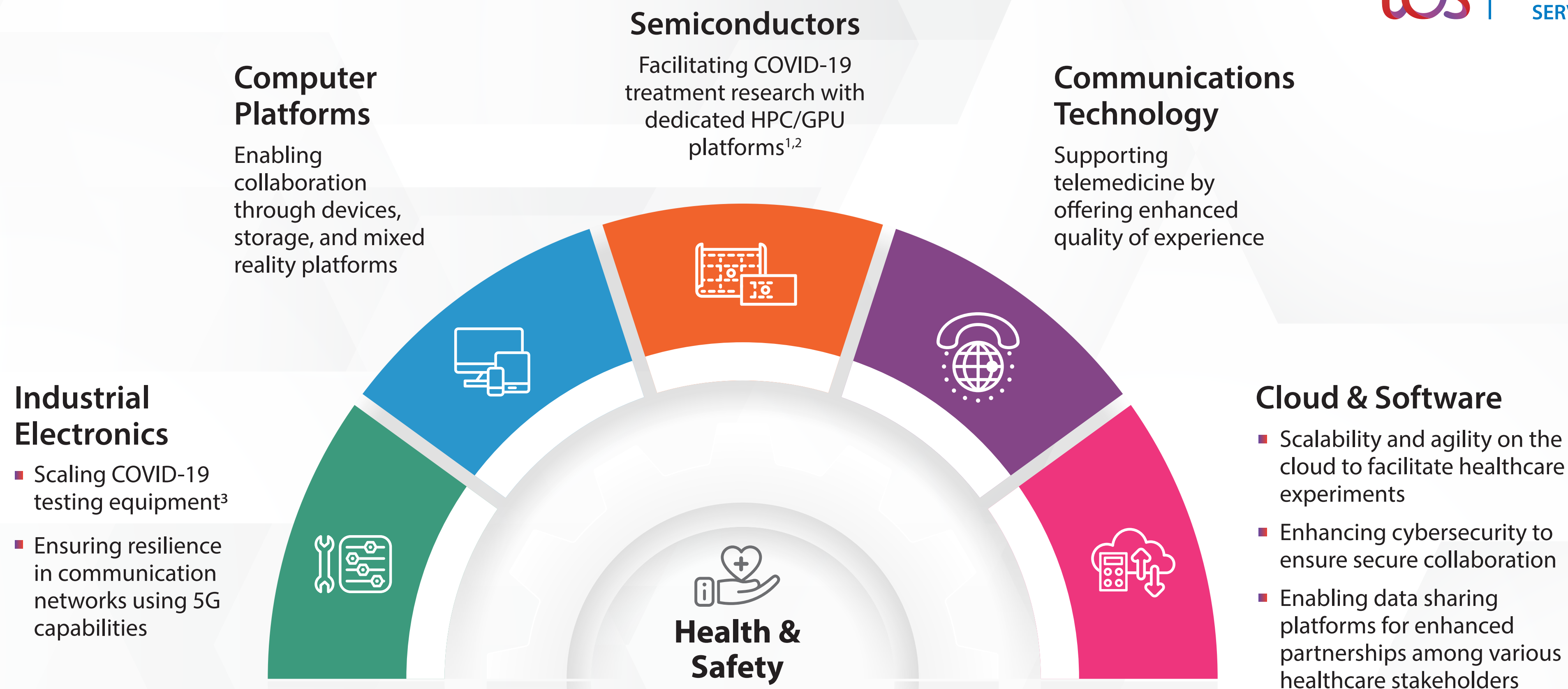
Figure 1. Technology and services - The backbone of the healthcare and life sciences industries

[1]**AMD**; AMD COVID-19 HPC Fund to Deliver Supercomputing Clusters to Researchers Combatting COVID-19; June 1, 2020; *https://www.amd.com/en/press-releases/2020-06-01-amd-covid-19-hpc-fund-to-deliver-supercomputing-clusters-to-researchers*

[2]**Intel**; Intel Commits $50 Million with Pandemic Response Technology Initiative to Combat Coronavirus; April 7, 2020; *https://newsroom.intel.com/news/intel-commits-technology-response-combat-coronavirus/#gs.7b7egy*

[3]**Agilent;** COVID-19 Insights: The need for speed; *https://www.agilent.com/about/COVID-19/en/COVID-19-insights-need-for-speed.html*

Changing communication patterns

The pandemic has brought virtual communication to the fore in business, and the technology and services industry has played a central role in making this happen (see Figure 2).

Experience

Remote intelligent and connected field service

Provide self-service capabilities with guided support through mixed reality

- Collaborate across industries with security and trust
- Scale multi-domain NLP in conversational systems

Product Warranty/Post Sales

B2B/B2C

Ecosystem Collaboration

Enterprise Work Delivery

Enterprise Information

Community Collaboration

Personal Collaboration

- Quality of service guaranteed by CSPs through communications innovation
- Privacy analytics for consumers and automated intelligence for explanations and deviations
- Mixed reality content creation for learning, education, and engagement

Engage beyond controlled audiences with live meetings

Information exchange for transactions

- Engage, ideate, and perform joint design thinking workshops
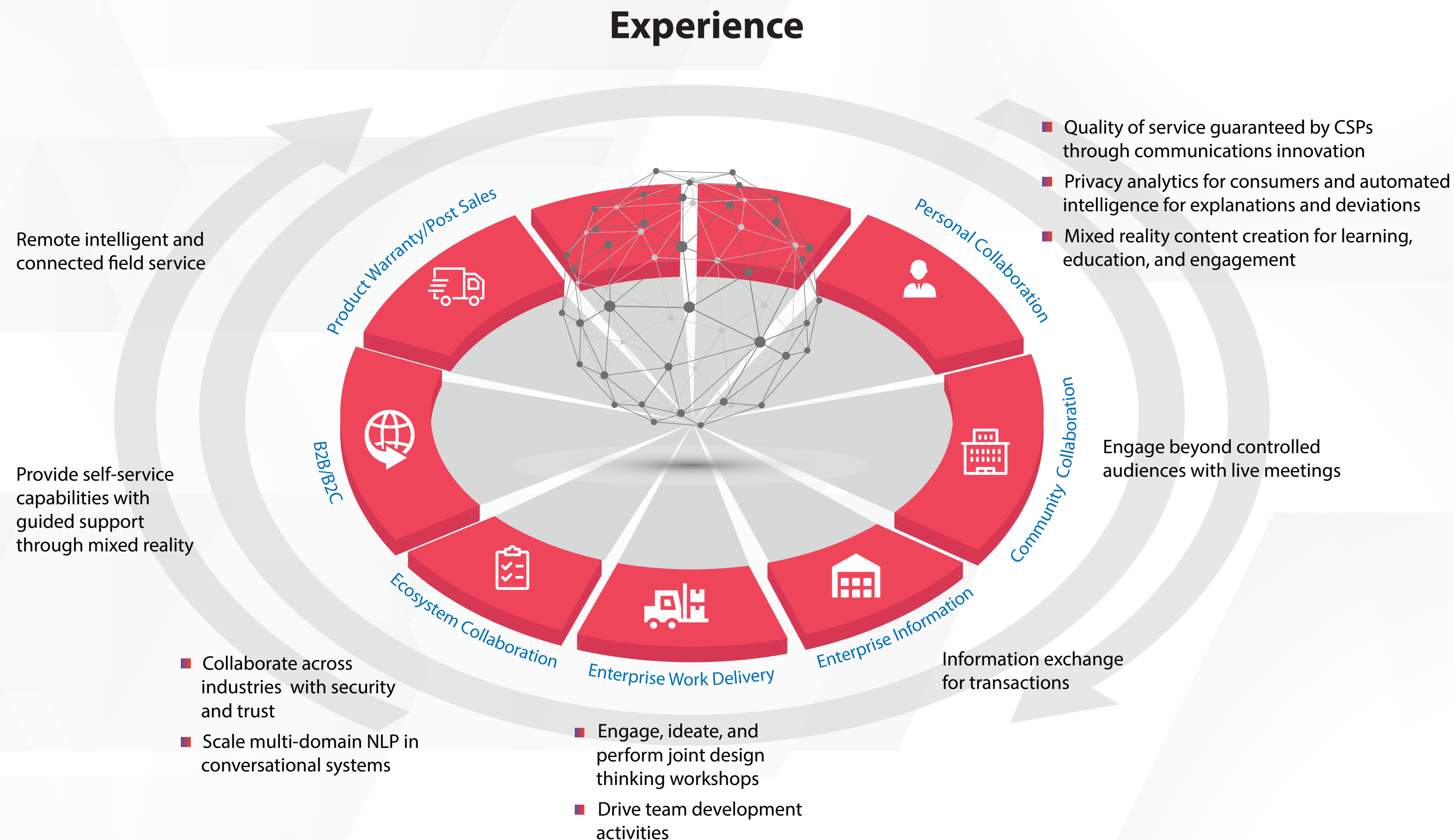- Drive team development activities

Figure 2. Collaboration post COVID-19

The data clearly reflects the massive rise of virtual collaboration tools. Microsoft Teams, Cisco Webex, Zoom, and Facebook have seen an exponential surge in usage volumes led by different freemium and commercial models. Microsoft Teams has scaled from hosting 250 active participants to hosting live events and streaming broadcasts for up to 100,000 attendees[4]. More than 200 million meeting participants were hosted on Teams in a single day in May 2020, generating more than 4.1 billion meeting minutes. Cisco has been running the Webex platform at three times its usual capacity[5]: Over 500 million meeting participants have used the platform, generating 25 billion meeting minutes in April 2020 than in February 2020.

While collaboration tools meet the immediate need to connect, collaborate, and share, their full capabilities have not been fully realized during the pandemic to the extent imagined by technology and services business leaders. This is because a wide disparity exists between virtual collaboration and real-time spontaneous conversations.

[4]**Microsoft**; Microsoft Cloud Strength Drives Third Quarter Results; April 29, 2020;
https://www.microsoft.com/en-us/Investor/earnings/FY-2020-Q3/press-release-webcast
[5]**Cisco**; Third Quarter Fiscal 2020 Quarterly Results; May 13, 2020;
https://s2.q4cdn.com/951347115/files/doc_financials/2020/q3/Q3FY20-Prepared-Remarks.pdf

To enable group virtual collaboration and drive more spontaneity in interactions, enterprises can leverage technology by introducing digital avatars. This capability, made possible through mixed reality technology, will reduce disparities and leapfrog economies with appropriate skilling and talent transformation in a post COVID-19 world. Though mixed reality is available in the market currently, its mainstream adoption is extremely low. This is because mixed reality sets are prohibitively priced, its content is not available, and sustainable pricing for cloud, software, and the communications network to support the experience needs to be further developed.

Workplace transformation deployed and consumed end-to-end at scale is one of the biggest opportunities that is here to stay and will sustain public and private sector commercial innovation across all sectors. To illustrate, in order to sustain 4K video conferencing with high fidelity along with mixed reality, the entire network has to continuously support a minimum of 21 Mbps upload and 30 Mbps download. While download speeds have tremendously increased, one of the biggest challenges has been upload bandwidth capacity, which has led to very uneven experiences in two-way communication.
The experience gap between in-person and virtual conversation will persist until the full spectrum of 5G innovations is realized with guaranteed and inclusive experience for all stakeholders.

Redesigning supply chains in high tech

Because of their global spread, the demand and sourcing locations of high tech supply chains varies tremendously based on components and devices. They also have extremely complex processes of distributing and retailing the products. COVID-19 will push companies to redesign their supply chains at every level. This will make supply chains hyperlocalized, impacting consumer behavior and demand at the micro location level. Besides hyperlocalization, COVID-19 will put high tech companies in proximity to their customers, thus, manufacturing facilities will be set up closer to the places of demand. Aggregated contract manufacturing hubs that develop next generation chips, networks, and consumer electronics will be established onshore or will be sourced from different suppliers. Technologies and new business models already exist today that can decouple supply chains. However, how fast they can be adopted depends on numerous factors including geopolitical events, a firm's overall business strategy,

macroeconomic effects such as inflation, and more. These changes to the supply chain will likely increase the costs of products and services of original equipment manufacturers (OEMs) but they will make processes agile and the supply chain resilient.

A lean and agile ecosystem, commonly referred to as a leagile process, will help companies organize their supply chains in times of drastic change to help meet demand while also minimizing the risk of overstocking or shortage. To be sure, post COVID-19, OEMs catering to high tech companies will demand more options in manufacturing distribution and transportation and will want to collaborate with other technology partners. Therefore, monolithic integrated supply chains will give way to loosely connected but highly secure and seamless networks. These new supply chain networks will not only provide agility but will also ensure that processes are lean and fast.

Besides ensuring agility, enterprises must protect the new supply chain networks from events beyond their control, such as Coronavirus. To do this, firms need to invest in supply chain risk management, visibility, and performance, and refine control tower capabilities to access dependencies. Continuously investing in supply chain will sustain the entire network and avoid negative cascading effects. To drive investments in new technologies and new products, high tech enterprises must develop new supply chain strategies in the post COVID-19 world based on factors like economies of scale already established in existing supply chains. The old approach of replacing supply chains is not feasible vis-à-vis the overall sustenance of end-user affordability of products and services and market competitiveness.

One of the much sought-after technologies for supply chains is digital twin, which will become increasingly mainstream especially in business-to-business sectors. It provides real-time visibility of customers and replicates the services of suppliers, contract manufacturers, and logistics organizations.

Talent management and workplace transformation

COVID-19 has pushed the rates of unemployment and underemployment to unprecedented lows. This has changed work profiles, forcing companies to assess talent gaps vis-à-vis requirements and develop personalized skilling.

Before Coronavirus, enterprises were already embarking on workplace transformation programs, but the pandemic has compelled companies to fast track those programs by using technology like analytics.

In the coming years, industries will undergo numerous disruptions, as illustrated below and in Figure 3:

- **The gig economy:** Individuals will work multiple jobs and laws like the California Assembly Bill 5[6] will change the employer-employee relationship. All enterprises will have a proportion of their overall employee base participating in the gig economy enabled by universal ecosystem platforms (third-party aggregators) or selective ecosystem platforms (consortium, alliance, or joint venture driven) to allow for resiliency and sustainability. The pandemic has disrupted the government-business-consumer model supporting the gig economy, which will see many more policy updates[7].

- **The sharing economy:** Managing liabilities, governance, and ownership of work deliverables in a shared economy and workforce will be focused on quality of experience and the overall work product.

- **Remote learning:** Enterprises will have to upscale the experience of remote learning and overcome the obstacles in certain skill categories dominated by in-person learning management.

- **Future-ready workforce:** To develop the next-generation workforce, organizations must increase the number of internships at the enterprise and global levels and put in place pre-employment learning experiences.

- **Automation:** The Coronavirus pandemic will accelerate the use of machine learning and robotic process automation, which was already being implemented in the pre-COVID-19 era, in information management and customer service.

- **Use of mixed reality in the workforce:** Mixed reality is set to play a greater role in digital learning and talent transformation. Augmented, virtual, and mixed reality devices will become mainstream. They will be subsidized through a tiered model by all business sectors and will replace mobile platforms as the primary medium of communication.

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[6]**California Assembly Bill 5 (AB5)**; Investopedia; February 11, 2020; *https://www.investopedia.com/california-assembly-bill-5-ab5-4773201*

[7]**Gig workers among the hardest hit by coronavirus pandemic**; World Economic Forum; April 21, 2020; Accessed May 27, 2020; *https://www.weforum.org/agenda/2020/04/gig-workers-hardest-hit-coronavirus-pandemic/*
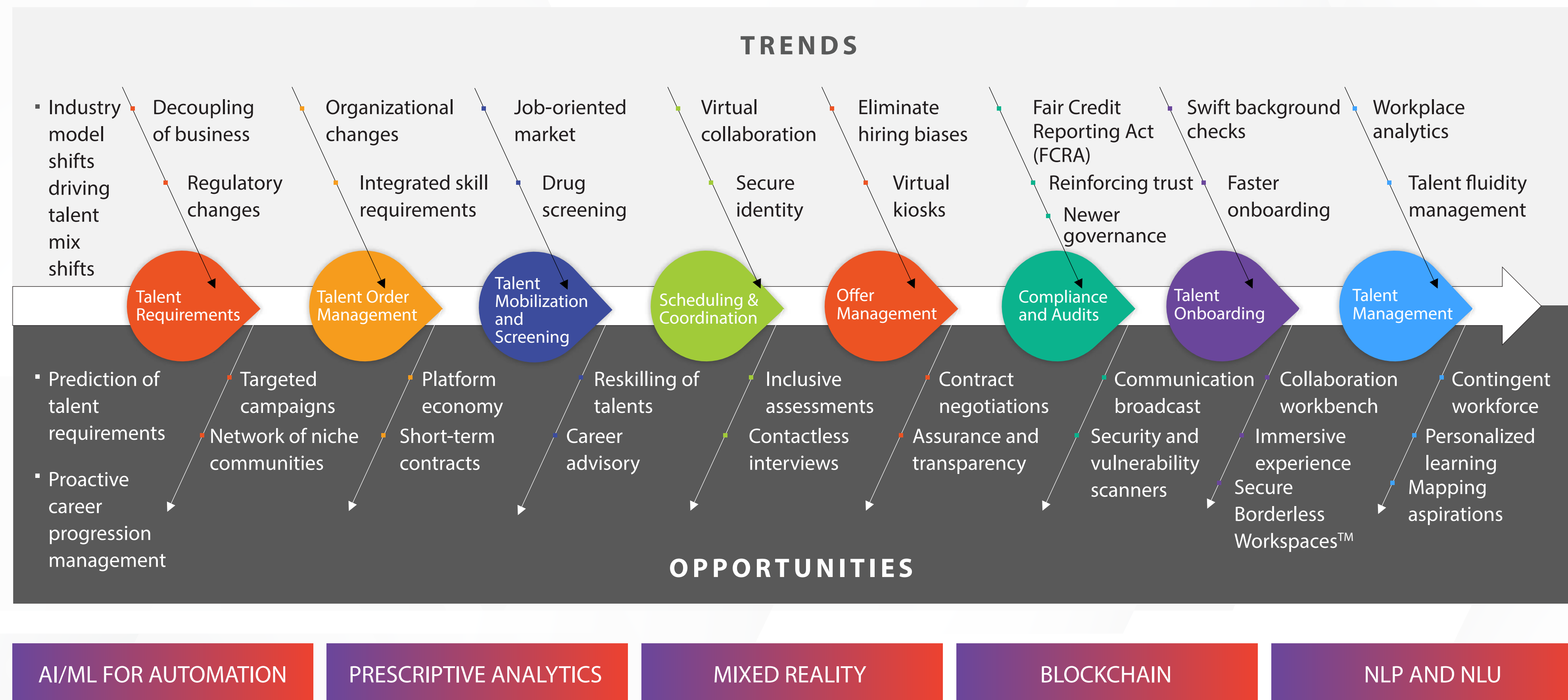
Figure 3. Talent management value chain

■ **Quality of experience in communications:**
As work moves online, enterprises must ensure communications infrastructure is of optimum quality. Work that requires ideating new products and services and design thinking along with collaboration and real-time feedback need more capability than that offered by current virtual collaboration tools, as these are constrained by the form factor of devices.

■ **Employee data repository:**
Conducting background checks of employees during and after Coronavirus poses a challenge for businesses. Firms can address this by setting up a unified database with API-based access, underpinned by blockchain technology[8].

Cybersecurity and privacy after Coronavirus

Today, enterprises have many links in their complex value chains that overlap with one another, as they use similar technology applications and architecture. State sponsored and rogue actors are already exploiting weaknesses in the chain to breach the entire network and cause massive financial disruption and brand loss for enterprises.

The computational speeds and power of organizations across industries has surged thanks to the rise of remote workplaces and the rollout of 5G networks. This has made businesses across sectors vulnerable to cyberattacks. Cyber criminals continue to disrupt the current defense mechanisms through new methods by exploiting vulnerabilities especially in machine-human interactions.

As the number of cyberattacks increases, organizations have to continuously upgrade their cybersecurity mechanisms, especially with regards to unlabeled data. Current cyber defense tools protect only against rogue data that is already identified.
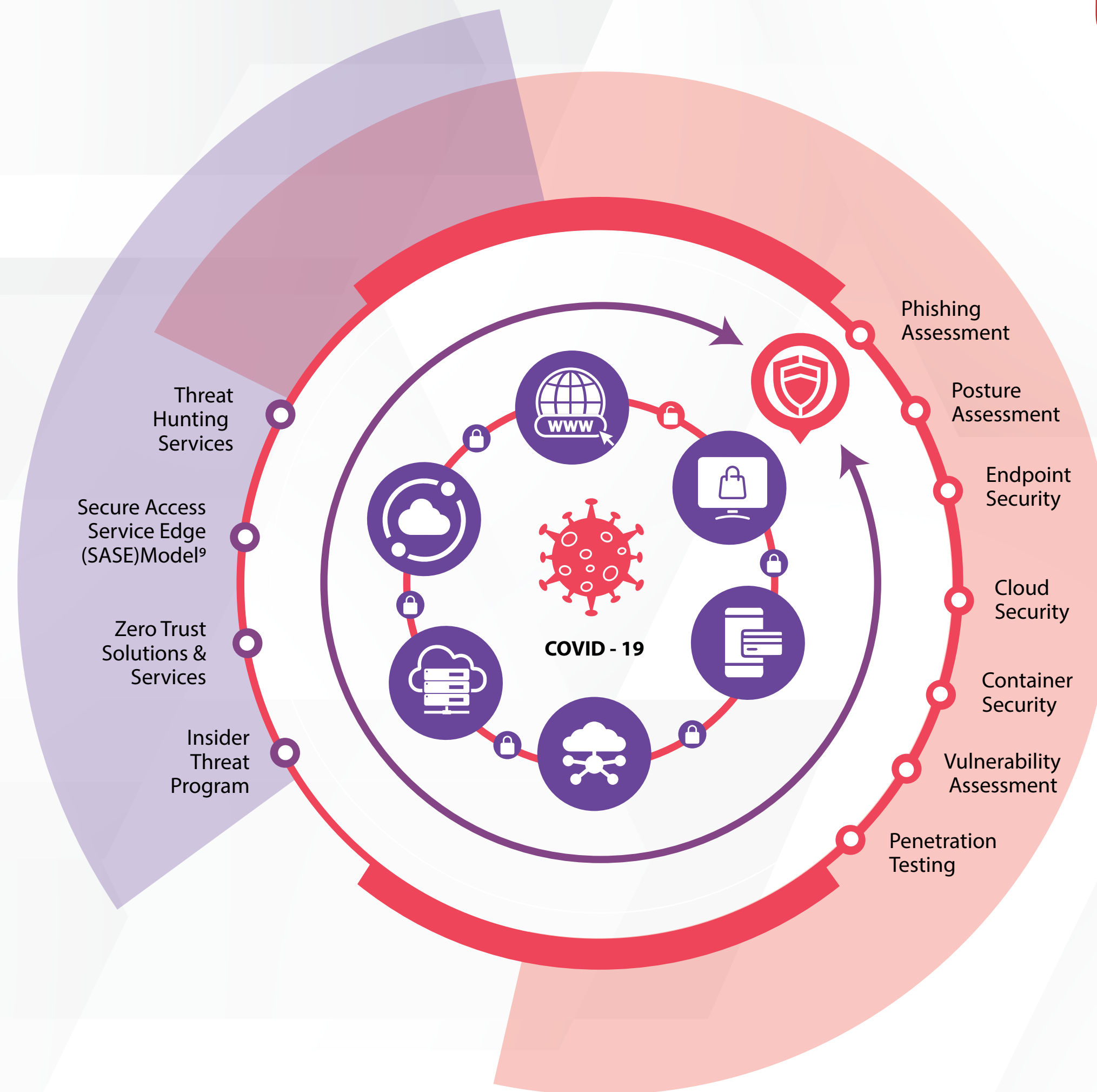
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[8]**Navigate Covid-19 Hiring Obstacles with Automated Background Checks**; The Staffing Stream; May 8, 2020; Accessed May 27, 2020;
http://www.thestaffingstream.com/2020/05/08/navigate-covid-19-hiring-obstacles-with-automated-background-checks/

5G innovations such as network segmentation capabilities can protect enterprises from potential cyberattacks. As illustrated in Figure 4, the technology and services industry can help enterprises develop robust cyber defence mechanisms to prevent cyberattacks.

Organizations have evolved in their digital transformation journeys with SecDevOps as a key building block. The 2020 pandemic has brought to the fore legitimate concerns over individual privacy because of the exponential growth in surveillance. PrivSecDevOps, which is the next step in the evolution of DevOps, will enable enterprises to develop software and services to standardize development patterns with the ability to transparently manage usage with appropriate controls and share privacy linked attributes. Privacy should not be an after-thought but has to shift left before SecDevOps in the world of software engineering for all enterprises and institutions.

Threat Hunting Services

Secure Access Service Edge (SASE)Model[9]

Zero Trust Solutions & Services

Insider Threat Program

COVID - 19

Phishing Assessment

Posture Assessment

Endpoint Security

Cloud Security

Container Security

Vulnerability Assessment

Penetration Testing

Figure 4. Technology and services capabilities for cyberthreat protection

[9]**Gartner**; The Future of Network Security Is in the Cloud; December 23, 2019; *https://blogs.gartner.com/andrew-lerner/2019/12/23/say-hello-sase-secure-access-service-edge/*

Protecting against the financial aftereffects of COVID-19

The financial fallout of Coronavirus has had a catastrophic impact on enterprises and consumers at large. Despite government stimulus and institutional support, the demand for financial support will always be high. During COVID-19 and in the immediate aftermath of the pandemic, chief financial officers and finance organizations have a significant challenge in predicting their businesses and determining the right financial strategies in terms of planning, budgeting, and capital allocation. They also have to make very critical decisions related to employee well-being and stakeholder management.

Cloud and software firms are providing organizations resilience in financial planning by offering different commercial models to launch products in the market and manage infrastructural and software spend in compliance with revenue recognition standards. Software enterprises like Anaplan are offering connected planning solutions to help finance organizations develop financial control tower capabilities like forecasting and reforecasting scenarios for revenue and cost at multiple levels in the product, customer, and location hierarchy.

Changing business models: SaaSification in technology and services

The technology and services industry will witness massive turbulence because of shifting consumer buying patterns in target industries. The traditional models of selling, consuming software in an intellectual property and services-led sales, delivery, and commercial construct will shift rapidly to an everything-as-a-service (XaaS) model. Under SaaSification, enterprises have shifted their static software, business products, and data to a subscription-based model of consumption. While the technology and services industry was already moving towards a XaaS model, the 2020 pandemic has accelerated that journey (see Figure 5). Earlier, SaaSification in certain enterprises, which had established on-premise or resource-augmented consulting business models, was determined based on capital allocation versus immediate returns. The financial incentive did not push companies to accelerate the shift to SaaSification.

As an immediate response to the pandemic, organizations will shift to a complete software-as-a-service (SaaS) model to manage working capital with an optimized operating expense model. Hence, the journey to SaaSification will be driven by the need to survive.

Enterprises have clearly realized that platform-driven businesses have more resilience, are more user friendly, and are continuously available for support amidst chaotic events like the ongoing Coronavirus pandemic. This trend will lead to the following:

- Increased focus on product engineering and adoption of platforms.

- Emergence of use-case scenarios and demand for new platforms.

- Intelligent feedback loop mechanisms with self-improving platforms thanks to automation.
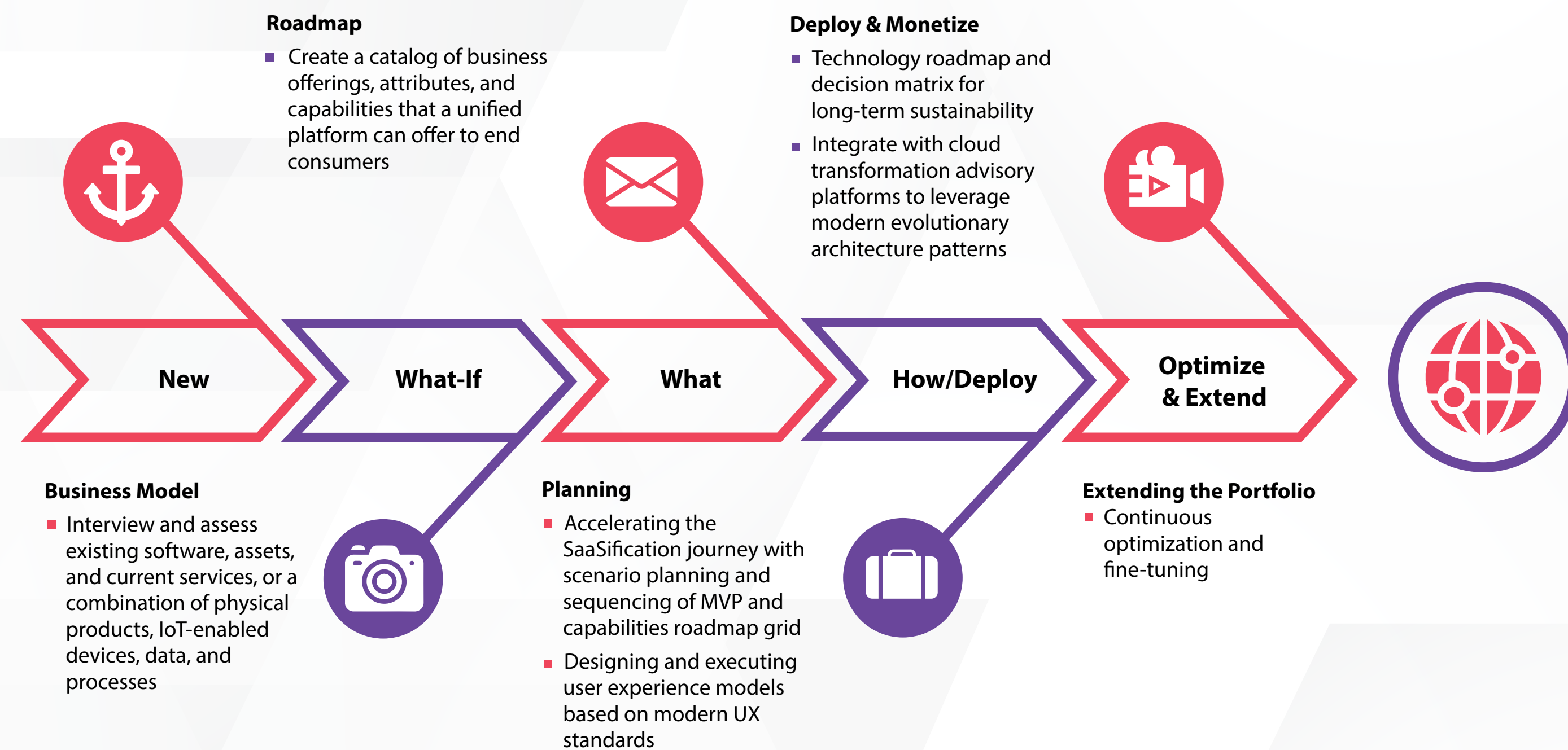
Roadmap
- Create a catalog of business offerings, attributes, and capabilities that a unified platform can offer to end consumers

Deploy & Monetize
- Technology roadmap and decision matrix for long-term sustainability
- Integrate with cloud transformation advisory platforms to leverage modern evolutionary architecture patterns

New → **What-If** → **What** → **How/Deploy** → **Optimize & Extend**

Business Model
- Interview and assess existing software, assets, and current services, or a combination of physical products, IoT-enabled devices, data, and processes

Planning
- Accelerating the SaaSification journey with scenario planning and sequencing of MVP and capabilities roadmap grid
- Designing and executing user experience models based on modern UX standards

Extending the Portfolio
- Continuous optimization and fine-tuning

Figure 5. The SaaSification journey

Accelerating cloud and network transformation

The business imperatives for SaaSification and offering new business models in an agile mindset will drive enterprises to accelerate their cloud, data center, and network transformation journeys.

However, the current internet and communications technology (ICT) infrastructure has not scaled completely to meet the network speeds for multimedia channel engagement. There is wide disparity in the ICT quality of experience across economies and various demographics.

However, the use of cloud-based networking, software defined networking (SDN), network function virtualization (NFV), and 5G innovations will drive next-generation networks and boost network capability. These technologies will also help firms accelerate their digital transformation journey and maintain the new baseline requirements of digital for a post COVID-19 world.

Technology and services in the Business 4.0™ era

Post COVID-19, technology and services will become the de facto means to conduct business and chart new ways of engagement even in people's personal lives. In the Business 4.0 era, as companies grow and transform, directionally they will have to focus on building a resilient, purpose-driven, and adaptable technology and services backbone to drive their strategic priorities for growth and transformation and cost and optimization. There are clear opportunities stemming from the challenges posed by COVID-19, as depicted in Figure 6 below. The technology and services industry will need to scale and drive innovation through ecosystems to meet the demand for solutions for the opportunities witnessed in each core segment.
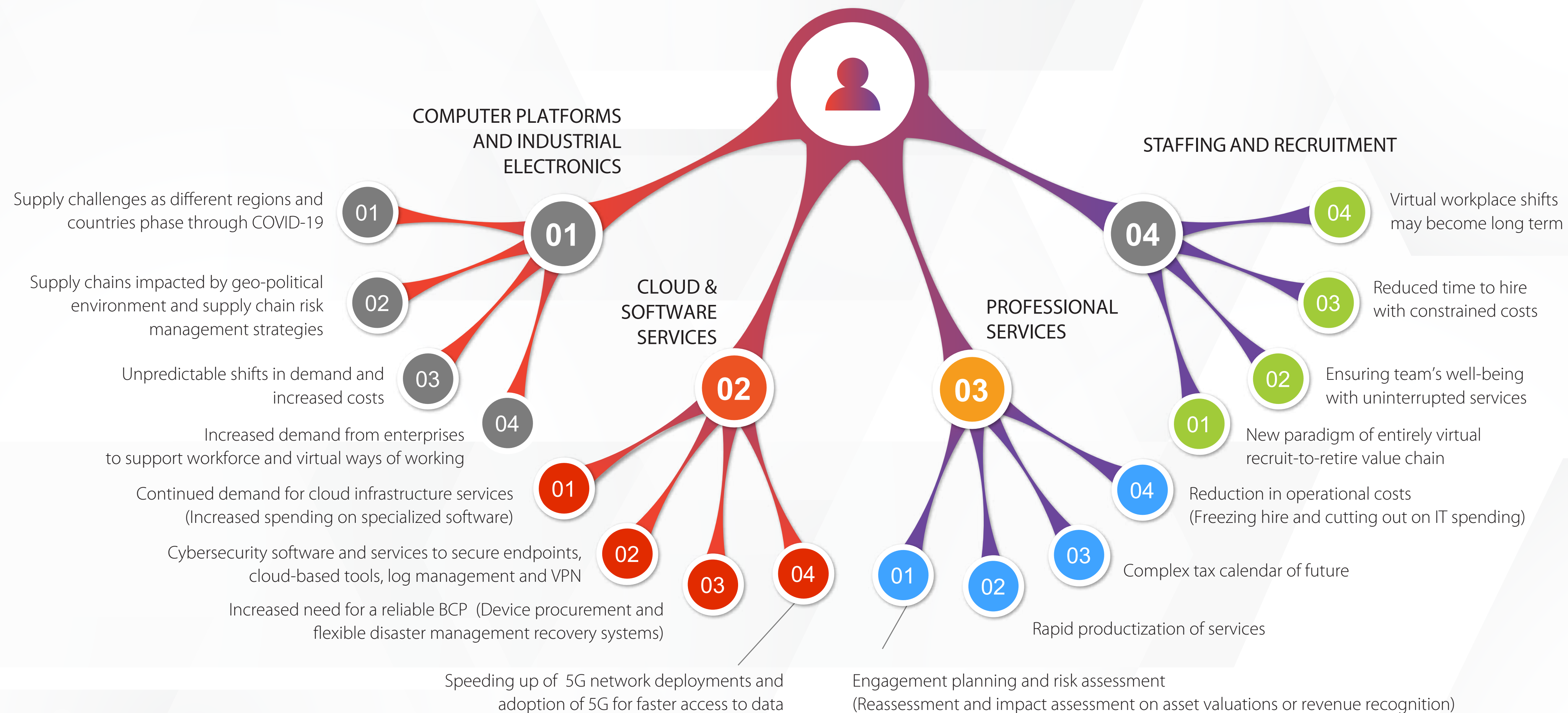
Figure 6. New opportunities in the technology and services value chain

About the **Authors**

Raman Venkatraman is Vice President at Tata Consultancy Services (TCS) and heads the HiTech and Professional Services Business Unit globally. His additional responsibilities include heading the Corporate Alliances and Technology Unit to deliver partner success globally across the entire TCS partner ecosystem. Raman's tenure at TCS spans 27 years, where he has been a part of the executive leadership team in multiple capacities for the last 20 years. He brings with him extensive experience working in multiple geographies and diverse work cultures.

Through his many years with TCS, Raman has led executive ownership to drive large transformational and outsourcing deals with diverse mix in service revenues leveraging the partner ecosystems. He has successfully incubated new solution initiatives with specific focus to build TCS IP on partner platforms. Raman has helped foster and grow strategic partnerships with significant incremental value to the company and its partners. Additional key areas of expertise include interoperable business solutions with a focus on data integration, consumption and visualization on cloud platforms and optimized infrastructure stacks.

Raman has a Master's degree in Electrical Communication Engineering from Indian Institute of Science, Bangalore.

Spandan Mahapatra is the Chief Technology Officer of the HiTech Business Unit at Tata Consultancy Services (TCS). He leads the portfolio which manages the Digital and Enterprise Transformation and Technology domains. He also heads the Business Solutions group within TCS' Alliance and Technology Unit. His team includes a large pool of highly skilled business and technology experts that drive sales, digital solutions development, demand generation for digital business, digital sales, and delivery.

Spandan and his leadership team have been instrumental in establishing one of the largest advanced technology innovation platforms on hybrid cloud at the TCS Innovation Lab in Cincinnati. The platform drives interoperability with over 40 technologies across infrastructure and application solutioning layers.

Spandan is a digital thought leader and advises customers globally on reinventing business models and driving digital reimagination initiatives by using the core capabilities of the Business 4.0™ framework.

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