DIGITAL SUPPLY CHAIN – THE NEED OF THE HOUR FOR SUCCESSFUL ERP TRANSFORMATIONS

Abstract

The COVID-19 pandemic has caused disruptions across industries. One key area that has been deeply impacted is semiconductor chip manufacturing. Lockdowns, movement restrictions, and remote working have increased dependence on computing devices, storage, and electronics products. Due to this, the demand for smartphones, computers, and touchless devices that rely completely on semiconductors has grown significantly. With increasing digitalization, the recent chip shortage affected not just the computing and electronics sector, but also automobiles, aviation, and even domestic appliances manufacturers. In light of this experience, there is clearly a need for an optimized, well-managed supply chain for the semiconductor industry. The option of ramping up production capacities to address the shortage, on the other hand, translates to huge investments in capital and time. To build an efficient supply chain, hi-tech organizations need to prepare for an ERP transformation journey in addition to deploying additional levers for a digital supply chain organization.

In this paper, we talk about the ERP transformation journey with automation and an optimized supply chain. We discuss how Stratos along with Infosys Digital Supply Chain helps achieve desired outcomes. As part of our Infosys Cobalt offerings, Stratos is a hi-tech industry platform that brings in the process repository, white spaces, and automation and integration capabilities needed by organizations in this sector.

CONTENTS

Business Challenges and Impact

With the thrust on digitalization in all sectors, the semiconductor industry is facing a huge surge in demand from various industry segments. The demand for digital tools and applications increased post-pandemic resulting in a huge surge in demand. This led to a significant revenue growth rate of 23% for the industry in 2021 alone. From self-driving cars to the latest smartphone on the market, global manufacturing is heavily dependent on the semiconductor industry.

The industry is reliant on a range of materials such as silicon wafers, specialty materials such as tantalum, and inert gases to produce chips. Firms that supply these materials are spread across several different countries. Further complicating the network, chip manufacturing is so sophisticated that only a few processes in the semiconductor manufacturing value chain can be covered by a manufacturer. As a result of such specialization, manufacturers are forced to source semi-finished goods from other suppliers. This widespread network of raw material and parts suppliers has made the supply chain of semiconductor manufacturing highly vulnerable to global volatility and geopolitical tensions.

Figure 1 list major supply chain challenges faced by the semiconductor industry.

Limited visibility
- Value chain includes multiple stakeholders
- Visibility across the chain is a challenge

Cost pressure
- Global competition is putting pressure on margins

Supply chain disruptions
- Vast network of suppliers involved in the value chain across geographies makes the supply chain highly vulnerable to global economic and political disruptions

Demand shock
- Capacity to meet demand is limited by existing manufacturing facilities
- Capacity expansion involves massive capital investments
- Project schedule can span across years

Figure 1 - Critical supply chain issues faced by the semiconductor industry

Industry Requirements to Achieve Efficiency and Scale

For years, the semiconductor industry has successfully utilized traditional supply chain management strategies to ensure that overall operational efficiency levels are maintained. These strategies include a reactive approach to address key challenges that arise from time to time, with professionals employing time-tested and rule-based processes to manage operations. Identifying potential problems in sourcing materials requires significant effort and tackling such issues involves extensive internal and external collaboration.

The current business problems that are constraining the supply chain with considerable business impact are limiting the growth of this sector. The existing approaches are not sufficient to address these problems and enable growth. The situation warrants a forward-looking approach to finding a solution that not only solves current problems but also cushions the industry from future shocks. Figure 2 lists the attributes needed for a future-ready supply chain.

The hi-tech industry needs a supply chain that is

- **Agile and responsive**
- **Collaborative**
- **Provides real-time visibility**
- **Enables autonomous operations control**
- **Optimizes planning**
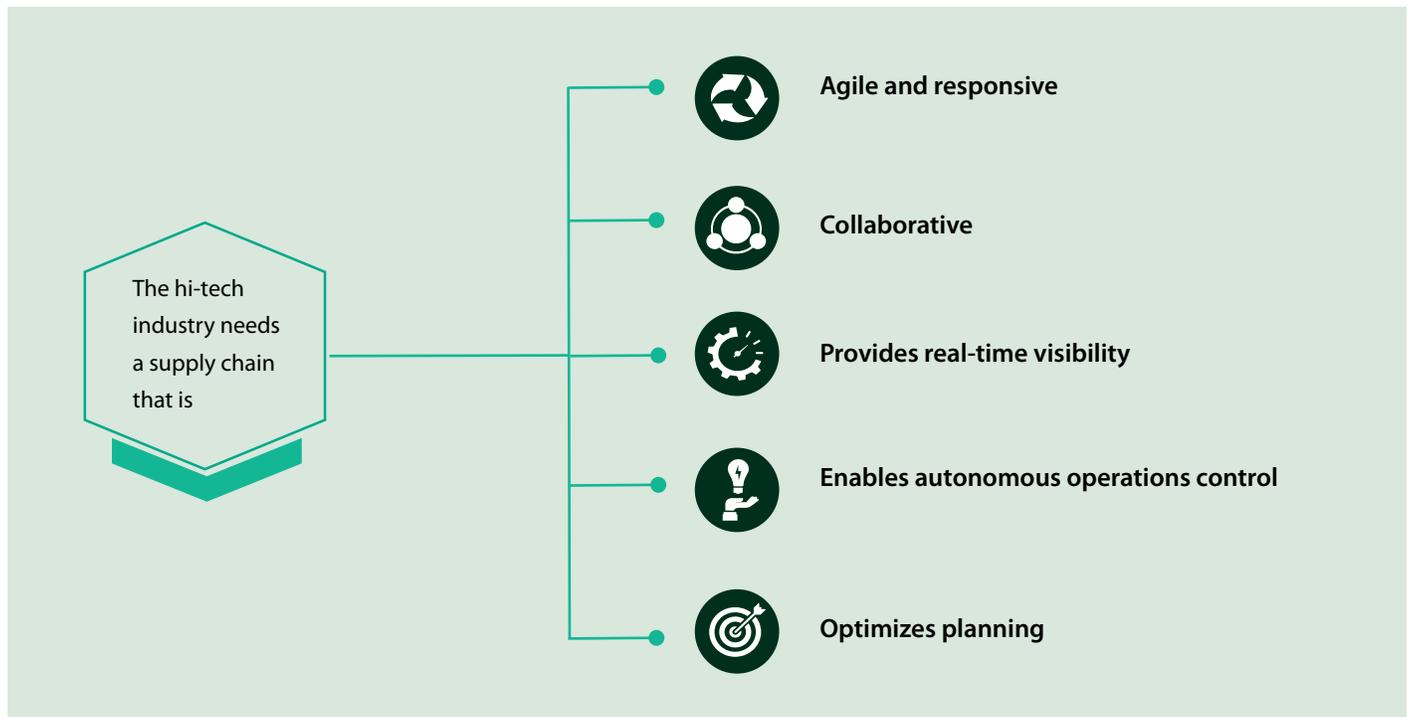
Figure 2 – Desirable features of a future-ready hi-tech supply chain

Role of Technology

The ERP benefits journey of any organization begins with the realization of the benefits that accrue after implementation. It follows multiple stages from foundational systems to moving some applications or functionalities to the cloud to total cloud adoption and finally to a stage of digital expansion. The benefits of all investments increase with each level of transformation of the organization. Figure 3 shows the path for the complete digital transformation of ERP systems in organizations.

Foundation → Edge application on the cloud → Co-existence of legacy app → Complete adoption of cloud → Digital expansion

Figure 3 – Technology progress in the ERP journey of an organization

Stage 1: In the foundation phase, organizations are using either an on-premises ERP system or a legacy application to manage their day-to-day operations. This involves considerable manual activity and tracking outside the system.

Stage 2: At this stage, an organization may run some edge applications on the cloud when specific functionalities such as warehouse management and transportation management are migrated to the cloud. These are integrated with their legacy applications or on-premises ERP systems or are managed outside the system.

Stage 3: Co-existence with legacy systems is the phase where the organization migrates a small piece of a functionality or application integrated with the legacy application to the cloud. This is the first step of the cloud transformation journey for some organizations, but not a mandatory step in the transformation journey. Organizations can opt for full transformation and move directly to Stage 4.

Stage 4: At this stage, the organization opts for a complete cloud adoption solution. This involves a multi-stage process with requirements consolidation and global design where processes are aligned across multiple sites and applications, gaps identified, interfaces built, reports optimized, and data synchronized to define a common framework across the entire organization. This is where we bring in Infosys Stratos – a hi-tech industry platform that facilitates the transformation journey starting from process maps, frameworks, custom-built integrations and reports, and solutions. This platform helps address gaps in Oracle Cloud to build an environment compliant with industry standards. This stage also enables organizations to make use of advanced analytical and automation capabilities, which helps improve compliance, profitability, and decision-making.

Stage 5: The digital expansion phase involves the adoption of AI/ML, IoT, and analytical visualization tools to enable self-curating supply chains. Such supply chains are highly capable of learning, evolving, and taking actions on their own with minimal human intervention, driving agility and effectiveness. Infosys Stratos provides features that enable the adoption of these advanced technologies and tools to improve the digital quotient of the organization. One such advanced technology is Infosys Digital Supply Chain.

Infosys Digital Supply Chain

Infosys Digital Supply Chain can help organizations accelerate their journey towards enabling a self-curating supply chain. Designed to diagnose problems on its own and recommend multiple options to solve the problem, the solution can assist users in complex decision-making situations.
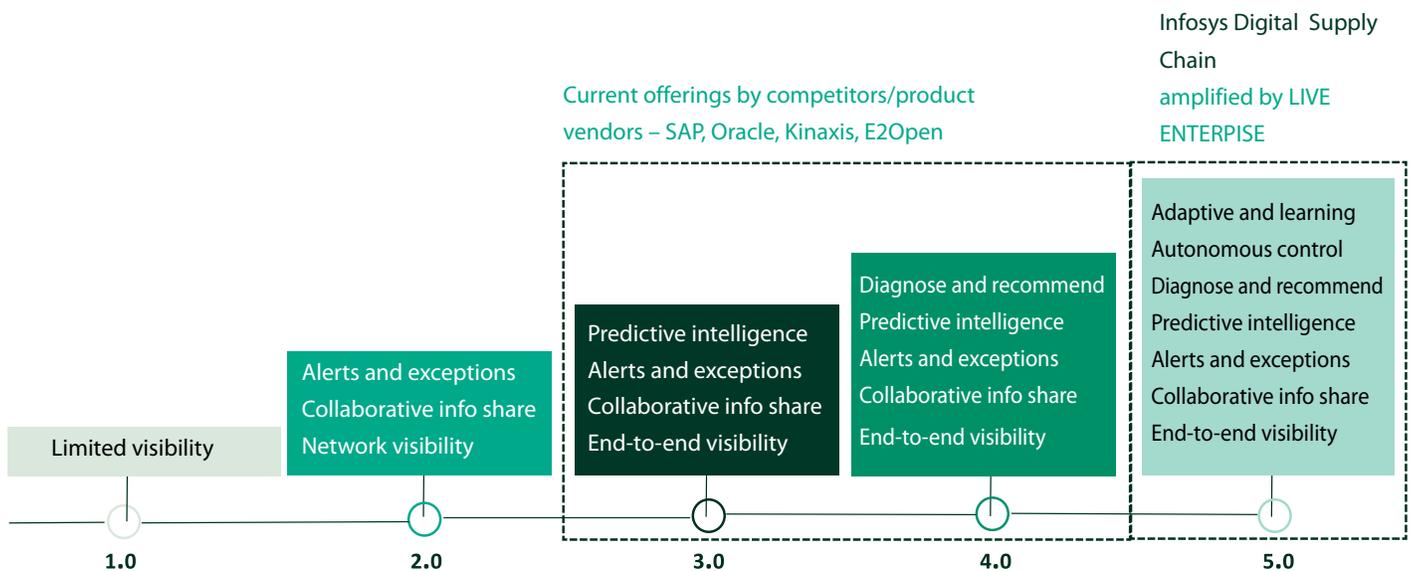
Figure 5 - Digital supply chain maturity stages

Top supply chain products and applications offered by companies such as Kinaxis, Oracle, JDA, Logility, and Adexa provide capabilities only for the third and fourth stages of digital transformation. In contrast, Infosys Digital Supply Chain can help any organization at any stage reach the final or 5th stage. Infosys enables guided scaling up with a scalable and modular approach customized for each organization.

The supply chain of the future must have the capabilities to self-sense (predict potential disruptions), self-analyze (diagnose and recommend options) and self-respond (act on the best option to address the situation at hand). Infosys Digital Supply Chain helps visualize the entire supply chain as one ecosystem rather than multiple isolated nodes within it. End-to-end visibility of the network is provided in real-time by leveraging niche digital technologies that allow information dissemination across the entire ecosystem. This solution is augmented with predictive and prescriptive analytics, and systems can continuously self-learn from past trends, making

increasingly accurate decisions as they progress along the learning curve.

Infosys Digital Supply Chain offers these capabilities through various components of Infosys Live Enterprise. These include a knowledge graph, cognitive capabilities, bots, and persona-based dashboards and provide a host of benefits.

- The knowledge graph helps connect data from disparate systems and sources.

- The digital brain provides multiple options along with predictive capabilities and helps choose the best action.

- The experience configurator provides persona-based dashboards that can be contextualized based on user personas.

Infosys Digital Supply Chain can collaborate with applications offering solutions in any of the supply chain domains ranging from the planning function to returns management. Figure 6 shows the architecture of the application.
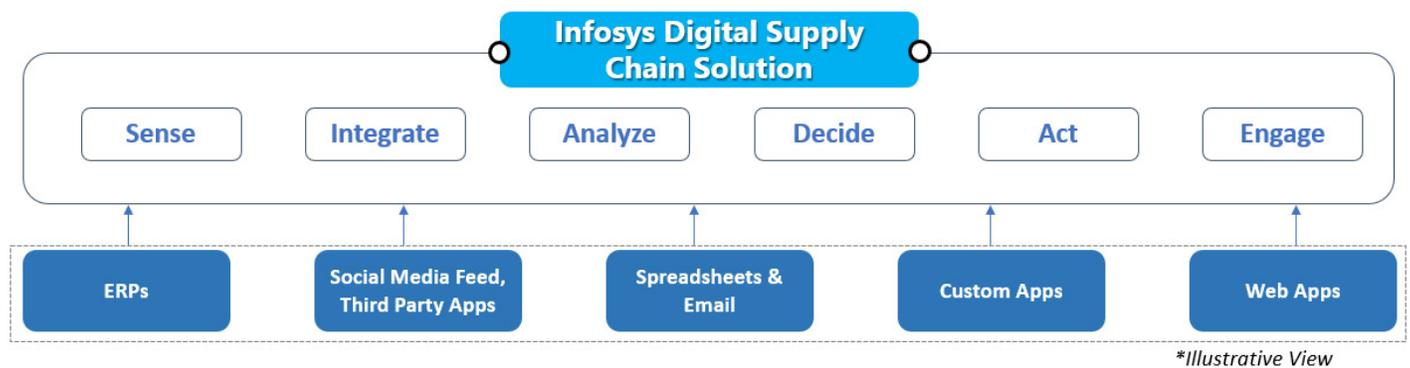
Figure 6 – Architecture of Infosys Digital Supply Chain

Key Features of Infosys Digital Supply Chain

Infosys Digital Supply Chain has provided ways to resolve various scenarios in the supply chain environment.

a. **Predicting machine downtime and recommending ways to mitigate/reduce losses**

The solution involves predicting a disruption at a supply location well in advance by analyzing news and social media feeds. It can also recommend mitigation measures (order-specific) required to minimize the impact of disruption on the existing supply chain operations.

b. **On-time delivery and order delay prediction**

Machine/equipment part failures that lead to disruption in production cost are eliminated by continuous monitoring of assets (with the help of IoT devices) and analyzing the current performance trends. The solution can also aid in the maintenance of optimum spare parts inventory levels.

c. **Inventory management/optimization through real-time monitoring and what-if simulations**

The solution helps global inventory planners to focus on identifying excess and obsolete inventory and also suggests possible ways required to optimize them. The what-if simulator can help the planner optimize the safety stock level (by part/SKU) by simulating the impact of actual parameters (such as lead time and service level) on the safety stock level.

d. **Order backlog management**

The solution provides visibility of backlog sales orders across different sales offices and predicts payment receipts for pending invoices based on historical data. Based on the predicted payment receipts, the system can also assess customer-wise credit limit that can be offered.

Scenario – Prediction of Disruption at Supplier Location and Impact Assessment

The following scenario indicates how the digital supply chain solution predicts disruption at a supplier location by analyzing social media and news feeds and can assess the impact on delivery orders. This example demonstrates how Infosys Digital Supply Chain can help reach stage 5 – the stage of digital expansion – and build an organization with maximum automation.
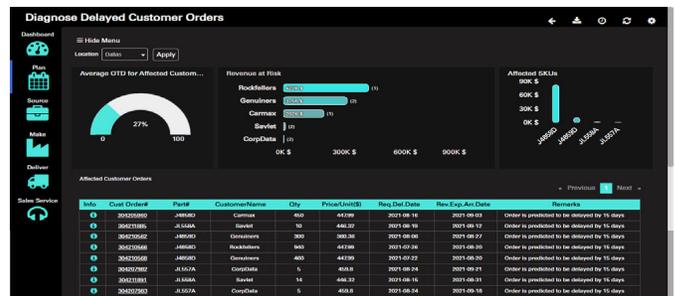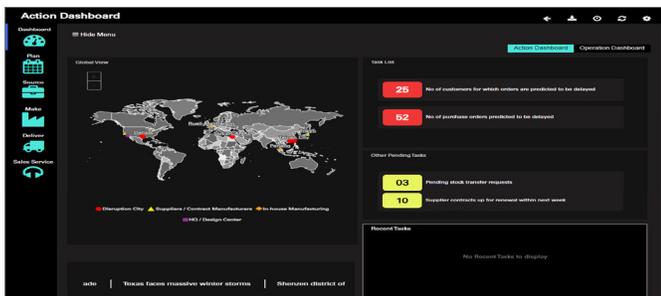
Figure 7 – A few snapshots from the actual use case

The global planner at a corporate office gets an alert for a potential delay in delivery of customer orders due to disruption at supplier location

Planner further drills down to the customer orders in the dashboard and finds out about supply disruption. He looks at the impact analysis tab, potential revenue & OTD loss due to this disruption

Planner selects a customer order and decides to optimize it. He is presented with alternate recommendations to choose from another vendor or reroute the shipment

Planner selects the best recommendation out of the provided options and confirms the selection on the subsequent screen

The solution processes the new information and the planner can see the updated on-time delivery performance indicator in the solution dashboard. The planner can also see major KPIs on the operations dashboard

When the planner confirms the selection, a new purchase order is placed. The solution reroutes/readjusts the shipment plan, adjusts the delivery time and passes on the information to the shipment agent and warehouse supervisor

Driven by a digital brain, the solution provides an option to optimize shipping of the selected alternate recommendation. The solution also highlights the best alternate route along with cost and time impact
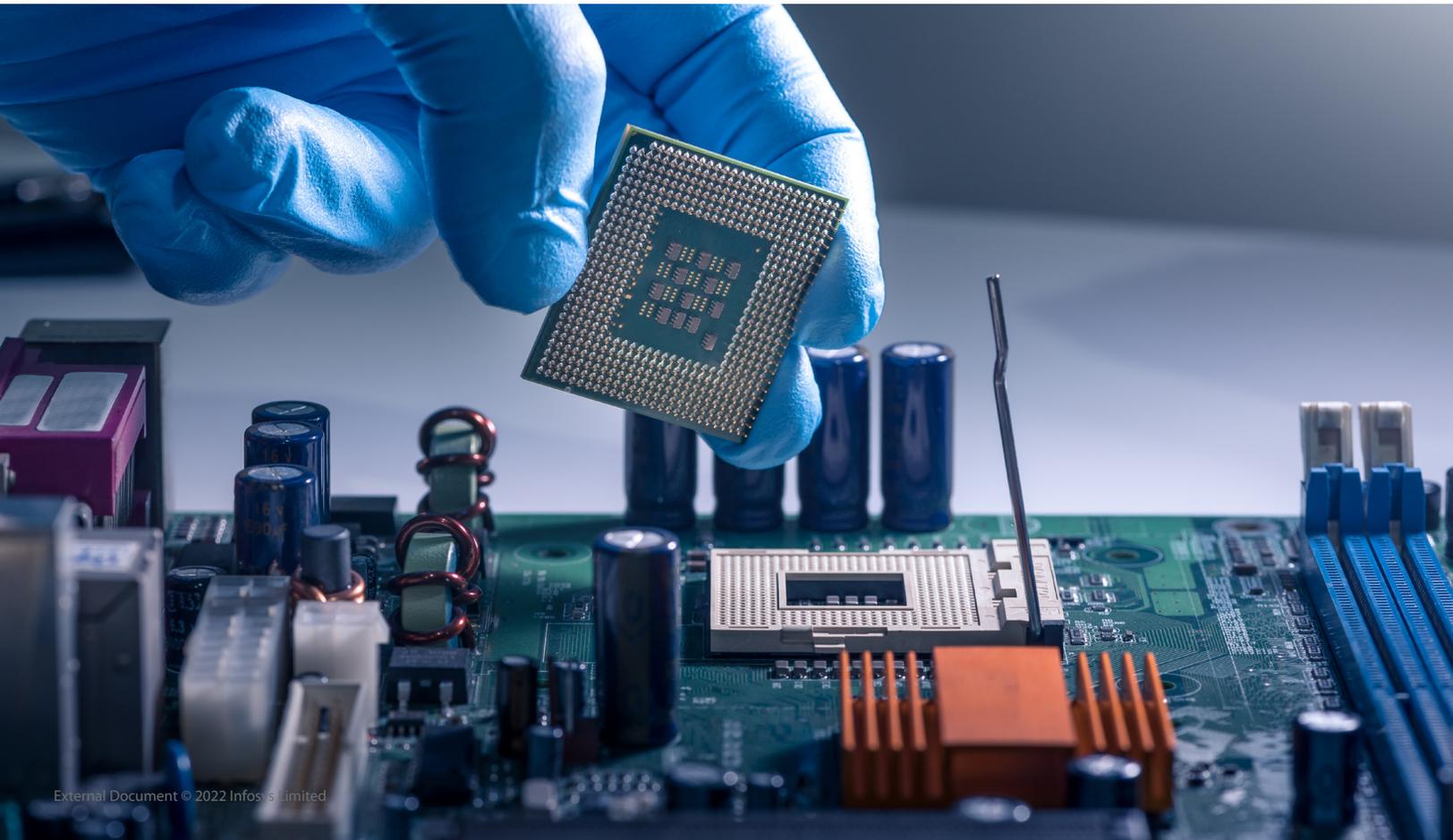
Benefits

Infosys Digital Supply Chain can transform an existing supply chain into one that is agile, responsive, and flexible. Table 1 illustrates how a supply chain gets transformed from siloed to collaborative intelligence by leveraging the capabilities of the Infosys solution.

From		To
Siloed supply chain (Departments/sub-functions working in siloes resulting in delayed response)		**Agile and responsive supply chain** (Integrated and collaborative orchestration across departments/sub-functions)
Limited cognitive capabilities (Few processes are supported with cognitive capabilities)		**Full cognitive capabilities** (Processes or functions are fully supported with cognitive capabilities)
Fragmented visibility (Visibility is available in only a few parts of the value chain)		**End-to-end visibility** (End-to-end visibility across the entire value chain)
Limited real-time information (Limited integration of systems and platforms for data flow)		**Near real-time information** (Integration of systems and platforms enabling near real-time data flow)
Reactive response (Corrective actions are taken once the issue/ disruption surfaces)		**Proactive response** (Preventive steps are taken before an actual issue/ disruption occurs)
Basic insights (Insights supported with limited details or information)		**Insights-driven decision-making** (Insights enable intelligent decision-making)
Manual control (Manual workflows or exception management resulting in non-value-added tasks)		**Autonomous control (self-curating)** (Full autonomous control allows for automated workflow and exception management resulting in high efficiency)

Table 1 – Benefits of Infosys Digital Supply Chain
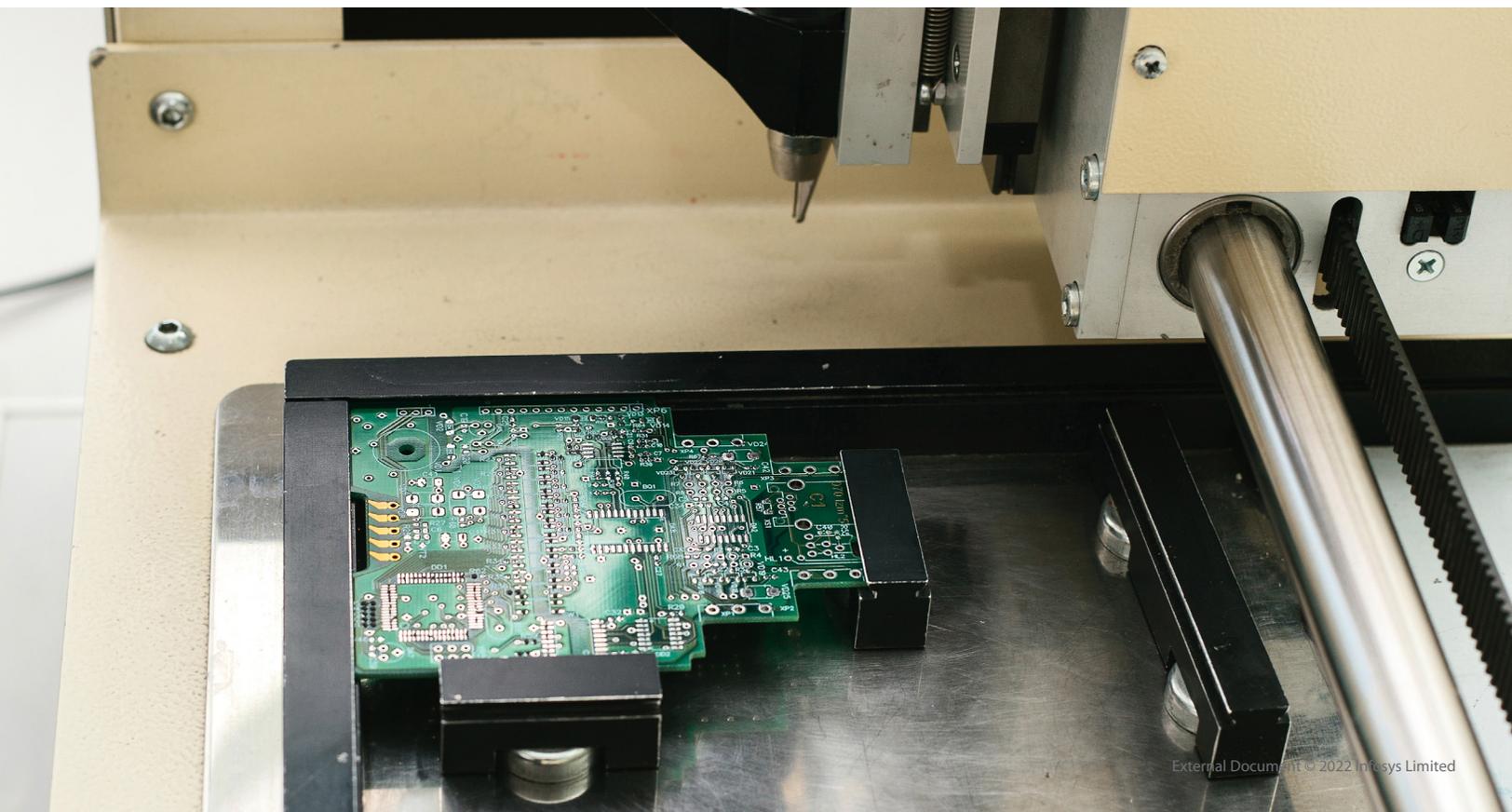
Future Trends

Today, most organizations realize the power of digital technology and have wisely begun to invest in strengthening their digital capabilities. Technology has become one of the strategic levers through which companies can gain a competitive advantage to stand out from the crowd. It is clear that digitalization is the only way for supply chains to become flexible and agile in volatile and disruptive environments. Driven by the need to upgrade digitally, the supply chain software market valued at over $18 billion in 2020 is projected to cross $52 billion by 2030.

Cloud-based solution providers have technologies such as AI, machine learning, social stream scanning, and custom analytical tools built in their platforms that can be integrated with Infosys Digital Supply Chain to deliver a substantial financial advantage. As the market continuously evolves, we have analyzed and captured key trends that will shape the future of the digital supply chain. Figure 7 lists possible areas of impact by digital supply chain trends in the near future.

5G technology, offering higher network speeds, can provide the infrastructure and capability to remotely control devices and monitor goods movement in an instantaneous manner across all nodes of the supply chain. The other key emerging trend is cognitive automation which would provide timely, accurate automated decisions well in advance to occurrence of any global/local supply chain disruption thereby mitigating negative impact on business. Likewise, few other key nextgen technology trends such as Digital twins, Autonomous vehicles, Augmented/Virtual Reality will help in making supply chain more sentient and resilient.
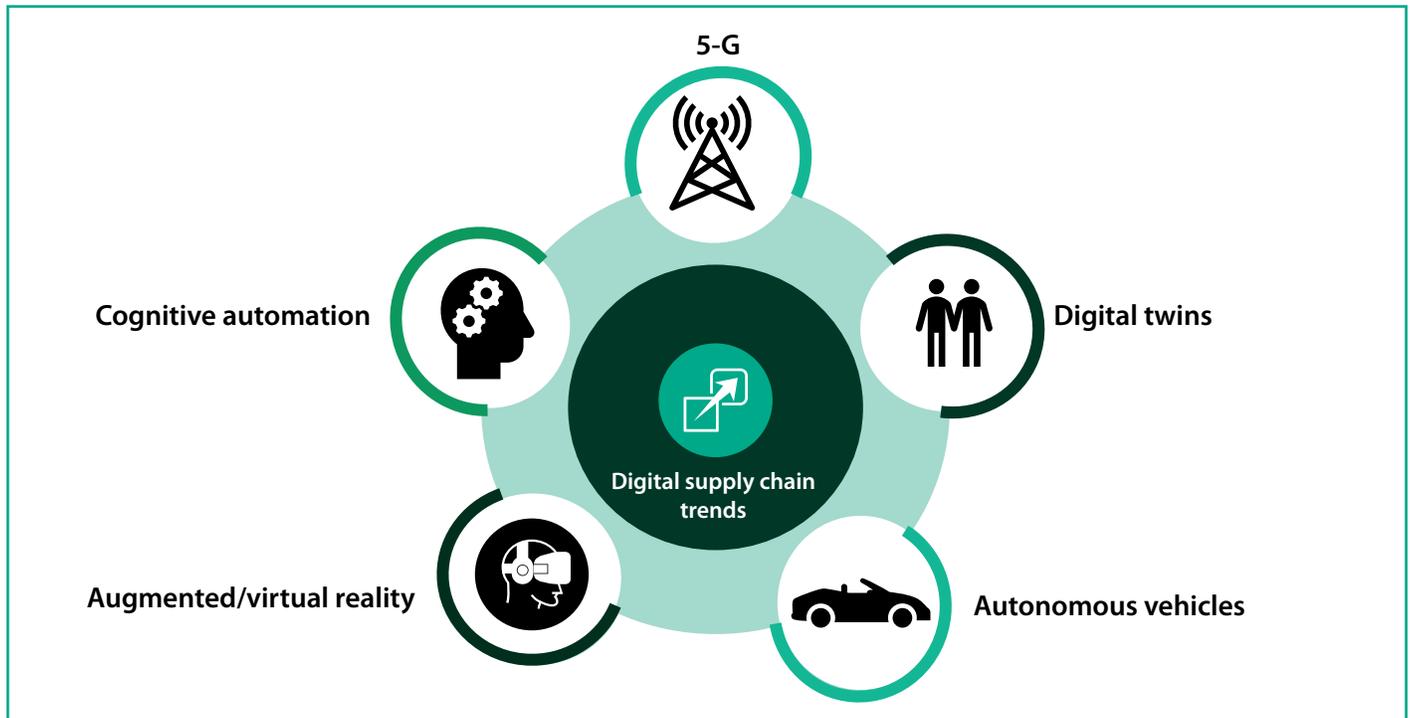
Figure 7 – Key trends in the digital supply chain world
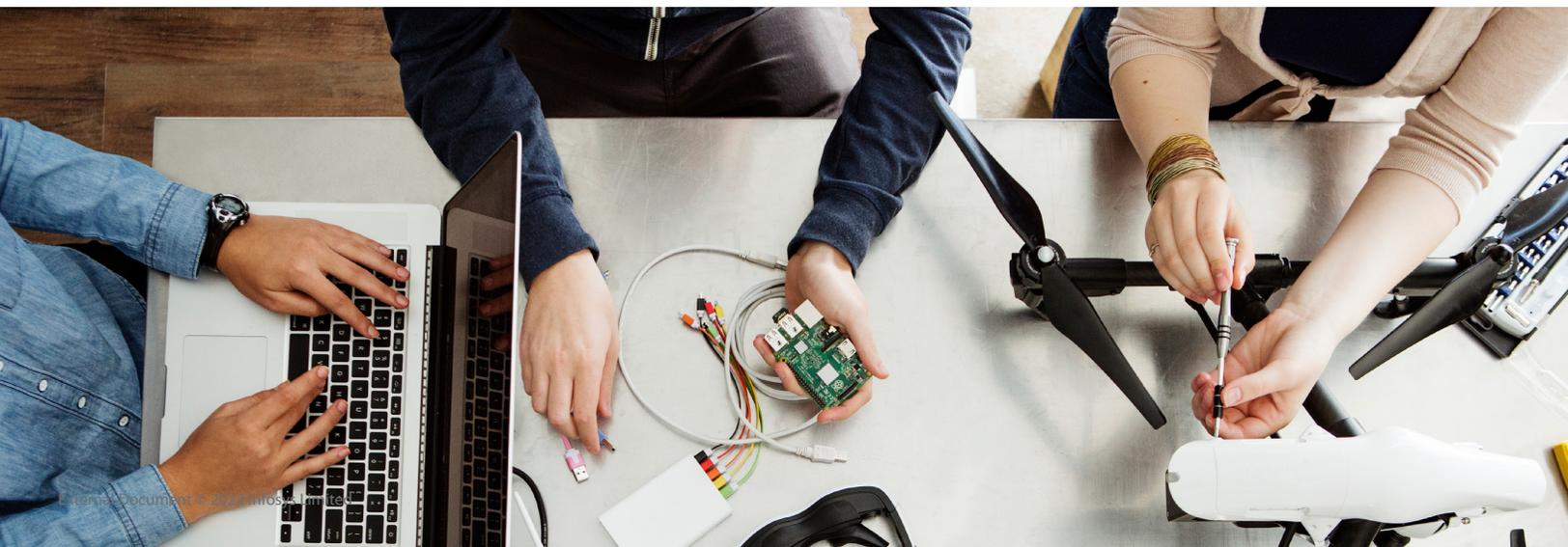
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References

1.   Semiconductor Supply Chain Disruption – Challenges and Solutions | Aranca

2.   A holistic approach to strengthening the semiconductor supply chain (brookings.edu)

3.   Solutions for resilient semiconductor supply chains | Chatham House – International Affairs Think Tank

4.   Strategies to deal with the semiconductor shortage | McKinsey

5.   New Challenges Facing Semiconductors - IEEE IRDS™

6.   How Supply Chain Technology Will Evolve in the Future (gartner.com)

7.   Supply Chain Management Market Size, Share and Global Market Forecast to 2027 | MarketsandMarkets

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