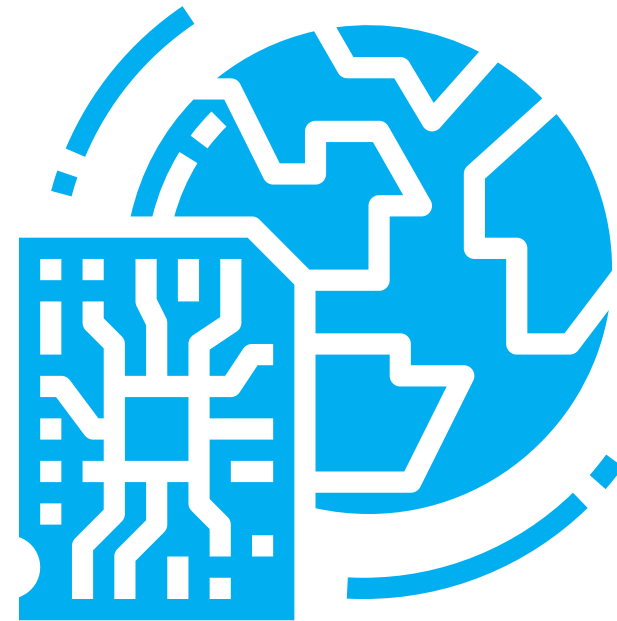


Media Tech Intelligence Briefing:

Global Chip Shortage

June 2021



Introduction

Sourcing components

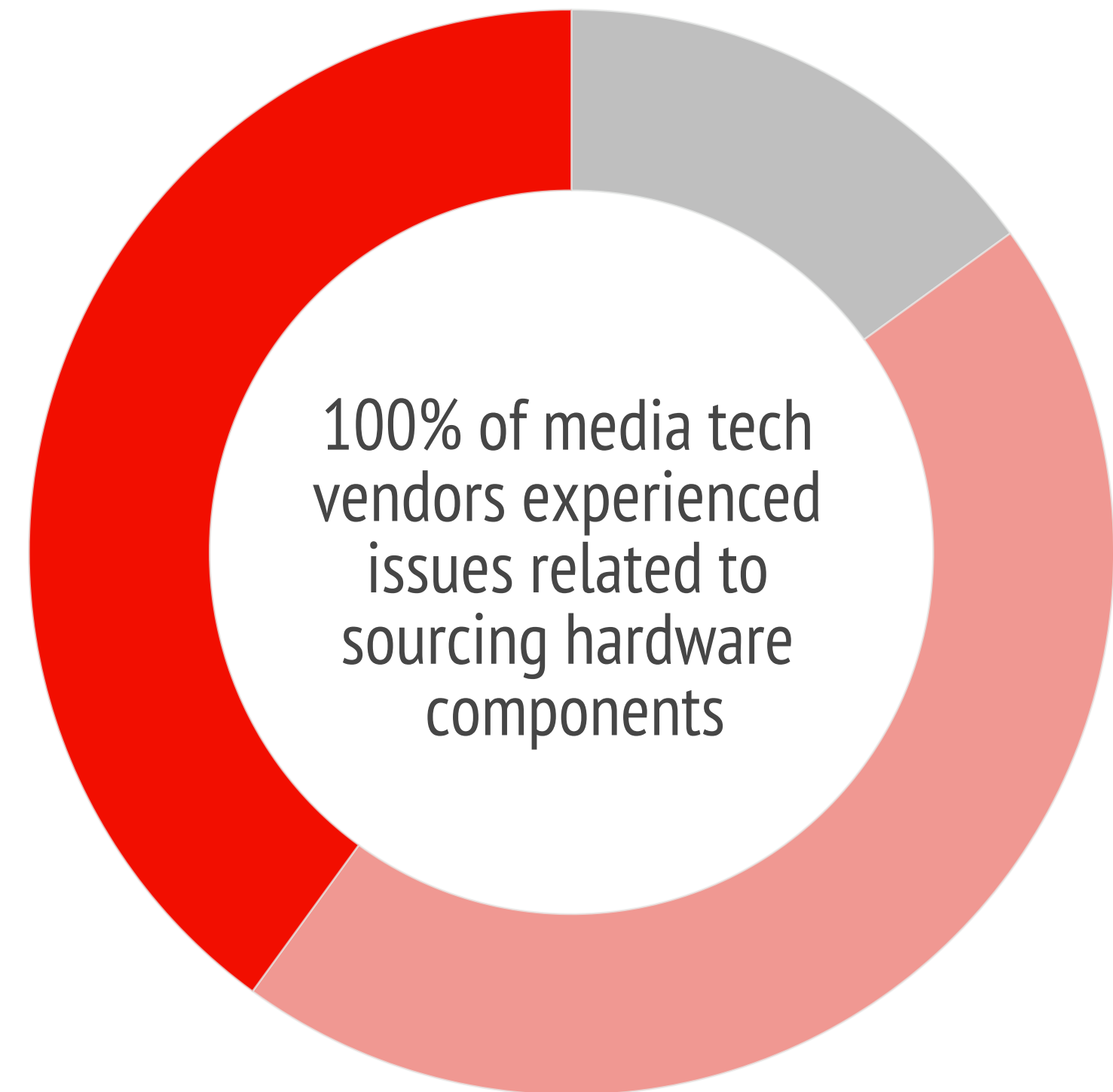
In Q1 2021, factors such as increasing demand for consumer electronics contributed to causing a global shortage in the supply of components. This is part of a megatrend seeing COVID-19 producing distortions in the dynamics of supply and demand in different markets, which, according to analysts, may ultimately lead to inflationary pressures. In the case of consumer electronics, the move to remote working and the concurrent disruptions in global supply chains caused by COVID-19 may have produced an imbalance between demand and supply. Other areas such as labor markets are experiencing a similar trend - i.e., demand outstripping supply - due to factors such as unprecedented fiscal spending by governments. IABM conducted a poll on component shortages in April 2021 to measure the impact of this megatrend on the media technology industry. The poll's findings show that this is a serious issue for most media technology suppliers, and it is a global problem. Anecdotal research carried out by IABM highlighted that this is not a temporary situation but rather a structural shock that may have prolonged effects. PC manufacturers such as Dell, HP, and Lenovo highlighted this situation in their recent investor calls, pointing to record demand for consumer electronics as the main driver for this and warning about price increases as well as shipping delays due to component shortages.

Source: IABM

The disrupted supply chain

Sourcing components

The Covid-19 pandemic caused disruptions in the hardware supply chain, particularly in chips, also known as semiconductors, impacting industries from automotive to gaming to broadcast and media. In the recent IABM survey, 85% of the media technology vendors that rely on hardware components said that their businesses were experiencing moderate to severe issues related to sourcing hardware components for manufacturing media technology products. The other 15% experienced mild issues.



● Mild issues ● Moderate issues ● Severe issues

Source: IABM

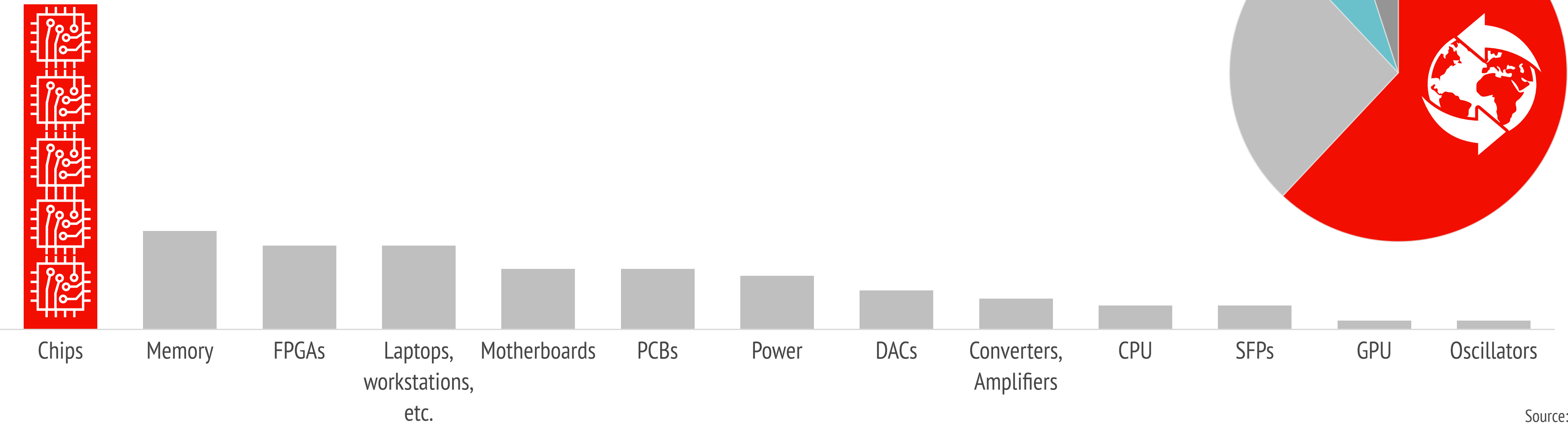
Supply chain disruption

Global chip shortage

The shortage of chips is the most common issue experienced by 43% of the surveyed media tech vendors. Others mentioned components like memory, motherboards, CPU, and GPU, which also contain semiconductors. 62% of the respondents think it is an international issue.

The result of text analysis with overlapping categories

Q. What are you experiencing a shortage of?



Source: IABM

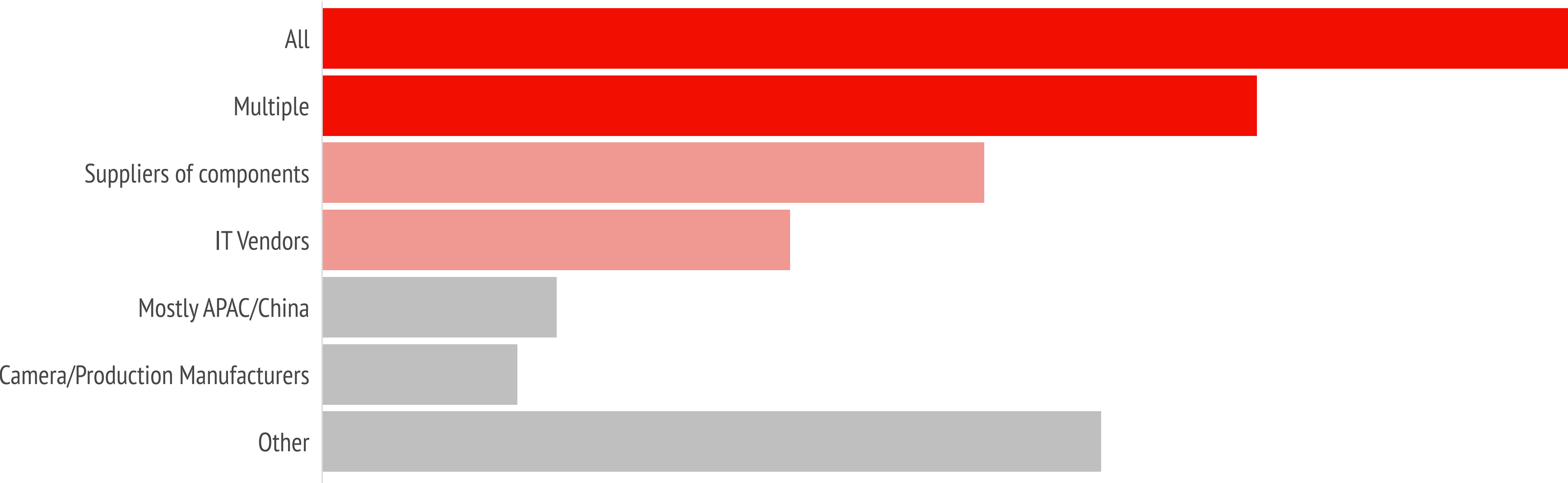
Supply chain disruption

Global chip shortage

45% of media tech vendors that rely on hardware said that all or several of their suppliers of components and/or IT vendors were affected by this chip shortage.

The result of text analysis with overlapping categories

Q. Which suppliers have been affected?



Source: IABM

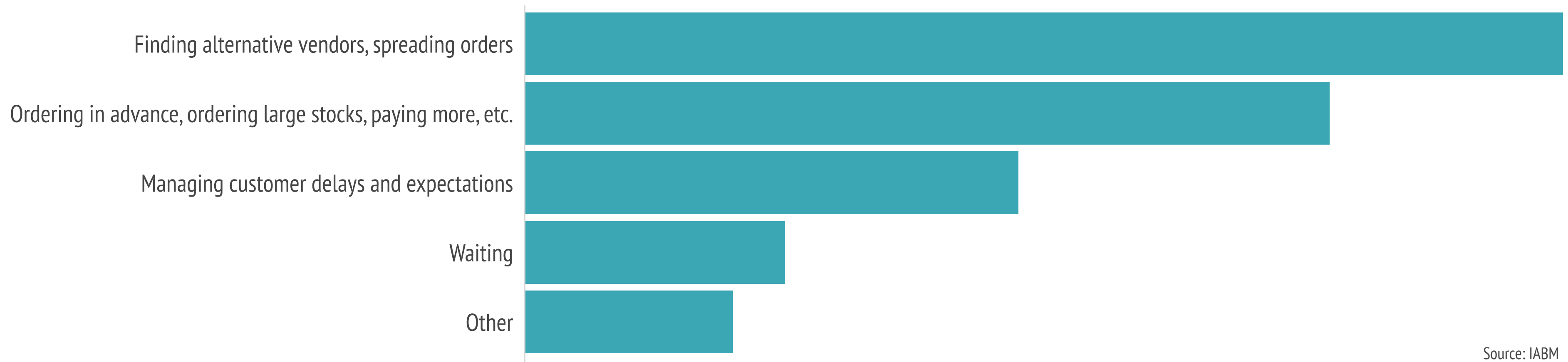
Supply chain disruption

Global chip shortage

In response to the shortages, around 40% of the media tech vendors said that they were looking for alternative vendors or redesigning their products, and almost the same number of respondents said they were extending order lead times, ordering in advance, paying more, etc. As an example of this, by April 2021, lead times for semiconductors from Broadcom Inc. had extended to 22.2 weeks, up from 12.2 weeks in February 2020.

The result of text analysis with overlapping categories

Q. What are you doing about it?



Source: IABM

Drivers of semiconductor shortages

Historical background

Historically, chip shortage has occurred for a variety of reasons, including regulatory or technical factors, like transitioning to new production methods, as well as natural disasters. This highlights the volatility of the semiconductor industry itself and other industries, like media tech, that rely on it. One of the most severe chip shortages occurred after the 1986 agreement between American and Japanese chip manufacturers that restricted semiconductor exports from Japan to the US – these were mainly “dynamic random-access memory” (DRAM) chips, used in consumer electronics equipment, including video cassette recorders.



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Although the shortage reflects several forces within the electronics industry, the one receiving the most attention is the agreement signed by the Governments of the United States and Japan in the summer of 1986. The agreement was intended to end supposedly unfair trade practices by Japanese manufacturers and help revive chip-making in the United States. But instead, some say, it has hurt computer chip users and provided a windfall profit for Japanese chip companies.”

The New York Times, 12 March 1988

Sources: IABM, The New York Times

Drivers of semiconductor shortages

Historical background

An example of the transition to newer production methods was the shortage of smart card chips in 1999, as well as chip shortage during the rationing of other types of chips in 2004. In 2011, a Japanese earthquake disrupted the chip supply chain, which complicated the sourcing of electronic components such as NAND memory and displays. The ongoing global chip shortage is the result of the increased demand for consumer electronics driven by work from home mandates, as well as by the unsustainable semiconductor market structure where many US companies depend on a few Asian suppliers of silicon wafers, accompanied by some chip plants being destroyed by fire. In October 2019, the Asahi Kasei Microsystems (AKM) semiconductor plant in Nobeoka, Japan, that supplies high-end integrated circuit components to most of the Japanese camera industry, including camera vendors such as Canon and Sony, was destroyed by fire. On 19 March, the Renesas Electronics chip plant in the north of Tokyo, Japan, also suffered a fire. It was planned to restore the factory by the end of May but had to postpone till mid-June.



Regulatory decisions

Transition to new technology

Natural disasters

Unsustainable market structure - reliance on a few silicon wafers manufacturers

Chip plants destroyed by fire

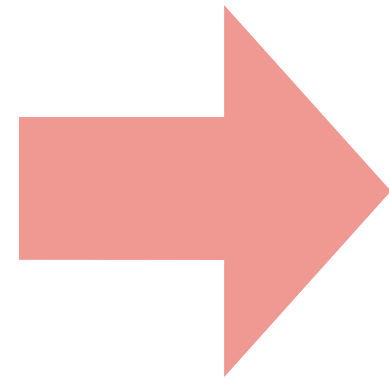
Other factors

Source: IABM

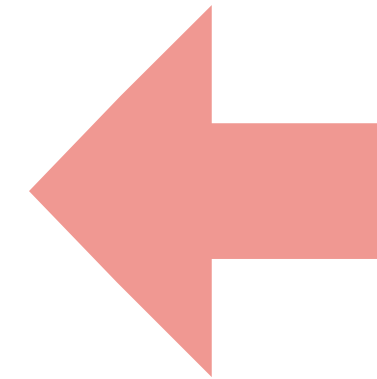
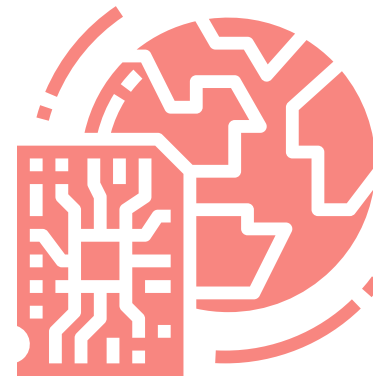
Drivers of semiconductor shortages

Factors that contributed to the 2020-2021 global chip shortage

The demand for chips has soared



**2020-2021
GLOBAL CHIP
SHORTAGE**



While the supply chain has been disrupted

Due to the increased demand for consumer electronics



Due to businesses moving to cloud infrastructure



Due to the transition to remote working



Due to most fabless companies relying on a few foundry companies



Due to geographical imbalance vulnerable to the pandemic



Due to Taiwan drought



Due to the US-China trade war

Source: IABM

The demand side of chip shortage

The Covid-19 effect on consumer demand

The increased demand for consumer electronics caused by the Covid-19 pandemic led to a spike in demand for chips that the supply chain was not able to fulfill due to the reasons described later in this briefing. The disruption of the semiconductor supply chain affected more than 169 industries worldwide, including broadcast and media technology companies. Factors such as the transition to remote working and the massive spike in the Esports industry led to a 13% increase in global demand for PCs. The International Data Corporation predicts a 12.5% growth of the semiconductor market in 2021. To meet that demand, the Chip Industry Association says it will require a \$3 trillion investment. With the adoption of technologies such as 5G, AI, IoT, and remote working, an increasing amount of chips will be required.



12.5%

Semiconductor market growth in 2021



\$3T

Investment in the industry
required globally over the next
three decades

Sources: IABM, International data corporation

The supply side of chip shortage

Market structure

A number of factors have contributed to the fact that chip manufacturers were not able to meet the high demand for chips, including the US-China trade war and Taiwan drought. There is also a major long-lasting factor of geographical imbalance of design and manufacturing capabilities of chip production. The share of global chip production done in the U.S. has declined from 37% in 1990 to 12% today, while its share of chip sales is four times larger – 47%. This means that most US companies rely on outsourcing components from countries with lower manufacturing costs, often headquartered in East Asia.

There are three main types of chip manufacturers – these are:

Foundry

Foundry companies operate for the purpose of fabricating chip designs of other companies

IDM

Integrated Device Manufacturers design, manufacture, and sell integrated circuit products

Fabless

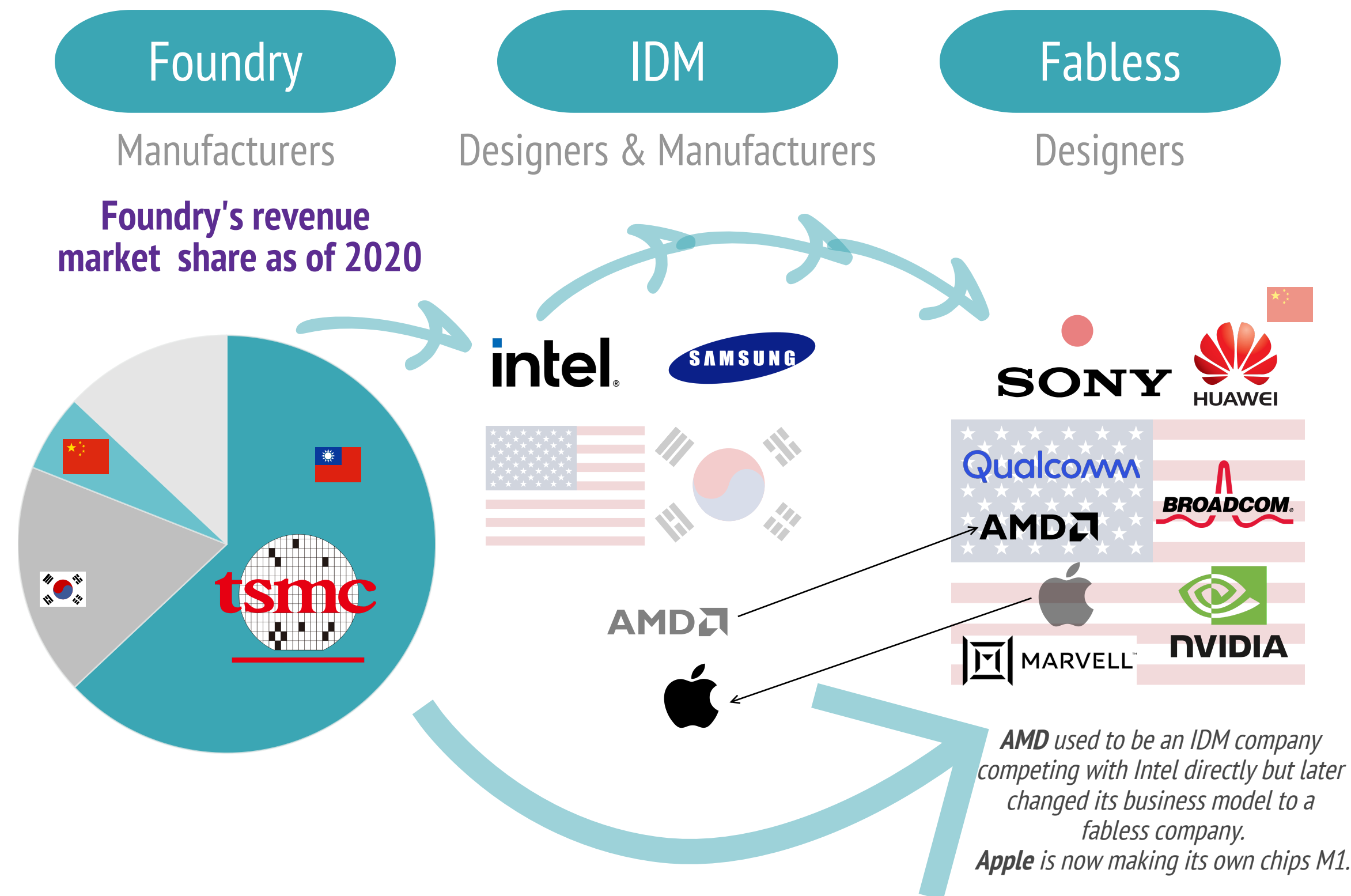
Fabless companies focus on design and sell the hardware & chips but do not manufacture the silicon wafers

Source: IABM

The supply side of chip shortage

Market structure

Nearly 70% of fabless companies' global revenue comes from the US, while almost 90% of global foundry revenue comes from East Asia, in particular Taiwan. The US fabless companies include such names as Apple, Qualcomm, Broadcom, AMD, and NVIDIA, among others. All these companies rely on the world's largest contract chipmaker, Taiwan Semiconductor Manufacturing Co Ltd (TSMC), which was not able to satisfy the increased demand, partly due to the Taiwan drought. Even Intel, with its own production facilities, partly outsources from TSMC.



Sources: IABM, Trendforce

The supply side of chip shortage

Taiwan drought

Semiconductor chip production consumes lots of water. Total water consumption from TSMC accounts for 3.4% of total industrial water usage worldwide, and it increased by 70% between 2015 to 2019. TSMC and other semiconductor manufacturers have been depending on water trucks to maintain production during the Taiwan drought, which limited their production capabilities. To meet the demand, TSMC has planned a \$100 billion investment in its production over the next three years. Japan also invests in semiconductor R&D. In partnership with 20 Japanese chip-making companies, TSMC is to build a new production facility near Tokyo, with Japan's government to fund half the total cost of a \$343 million investment in the new plant.



Source: IABM

The supply side of chip shortage

Changing market structure

In order to increase margins and reduce the risk related to dependency on external chip suppliers, in November 2020, Apple announced that it was breaking its 15-years long partnership for chip supply with Intel. This marks a significant shift for the semiconductor industry. The three new Mac computers are powered by Apple's M1 proprietary silicon chips instead of Intel processors. In reply to this, Intel has stepped into the foundry business. In March 2021, Intel's new CEO, Pat Gelsinger, revamped the company's business model into a contract manufacturing business called "Intel Foundry Services." Intel plans to spend \$20 billion to build two new factories in Arizona. The increased capacity will allow bigger volumes of both its own manufacturing as an IDM company and contract manufacturing as a foundry IFS. However, Intel cannot yet rely only on its own production capabilities. In 2023 Intel plans to release products with CPU cores that are fabricated with an unspecified process node from TSMC and will address both the client and data center markets.



Sources: IABM, Apple Inc., Intel

Future outlook

The global chip shortage is here to stay for most of 2021

Most experts predict the global chip shortage will last till the end of 2021 or close to that. At the beginning of the year, IHS Markit forecasted that the impact would last through the third quarter of 2021, while Cisco has said the shortage of computer chips is set to last for most of this year. One of the largest chip contract manufacturers, a Singapore-based Flex, came with an even worse forecast, predicting the chip shortage will last until at least mid-2022. With the adoption of technologies such as 5G, AI, IoT, and remote working, an increasing amount of chips will be required. For example, Microsoft announced in 2018 its intention to invest \$5bn in IoT. In order to reduce the risk of future chip shortages, the chip market should develop more sustainable and resilient to risk business relations; companies like Apple and Intel have already made their moves to reduce risk.



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With such strong demand, the expectation is mid to late-2022, depending on the commodity. Some are expecting [shortages to continue] into 2023

Lynn Torrel, Flex's chief procurement and supply chain officer

Sources: IABM, Financial Times