Trailing the High Speed Tech Train to the Future

Where innovation and influences from Japan and America have taken tech and where it is going

Executive Summary

This white paper tackles research and expert insights around the following topics:

— Key moments in history for technology in Japan and the United States of America

— The future of tech led by the US and Japan

The purpose of this document is to provide a concise snapshot of the aforementioned topics, taking into consideration various sources that are referenced throughout this document and extracting the most relevant information from those sources.

All extracts, statistics and images in this report are publicly available and referenced.

Turning Points for Tech in Japan and America

Japan and the United States of America (US or USA) have become leaders in modern technology. Pioneering techniques and developing state-of-the-art technology left and right, the two have become superpowers in the industry. In fact, they have topped the list of the most technologically advanced countries in 2022 and have consistently been part of the top 10 in the last five years [1].

News about game-changing technology grabs headlines in Japan and the US every week. This,

combined with the range of applications to which technology is utilized in the country, characterizes how Japan is known by the world today. Similarly, Americans have made their mark in using technology to create breathtaking and novel experiences. But how exactly have they grown into the tech giants they are now? Where do their humble beginnings lie?

Top 20 Most Tecchnologically Advanced Countries - aggregate rankings (10 sources)

Aggregate Rank	Country	Total score	Frequency	Average rank
1	Japan	80	90%	2.1
2	United states	78	100%	3.2
3	South Korea	71	90%	3.1
4	Germany	43	80%	5.6
5	Singapore	40	80%	6.0
6	United Kingdom	32	80%	7.0
7	Sweden	29	70%	6.9
8	Israel	28	60%	6.3
9	China	26	40%	4.5
10	Switzerland	18	40%	6.5

The World Wars

During World War I and II, when the human struggle increased tenfold, and every viable resource was vital to survival, the two nations had to think of every possible way to endure such struggles and sustain themselves by making the most of what they had - may that be food, cavalry, or technology. This brought forth progress in science and technology with magnitudes and speeds unparalleled [2].

On top of efforts to develop technology within the nations, a steady increase in international interactions also allowed Japan and the US to optimize their technologies with learnings and influences from their respective allies.

The wars also paved the way for the institutionalization of scientific research, especially in Japan. During war times, the Japanese government pushed for the expansion of higher education in science and engineering and alongside this, moved to realign international relations of scientific communities that ultimately fast-tracked technological development for its members. Upon joining discussions - such as the 1918 Interallied Conferences of Scientific Academies at the Royal Society and at the Académie des sciences in London and Paris, respectively that led to the creation of the International Research Council (IRC) in 1919 - the country effectively secured their position in one of the premier groups foremost driving scientific and technological advancement [2].

Wartime technologies also left their legacies - especially for inventive Americans who were among the first to adapt these technologies to applications in their homes. The scientific and technological developments of the war had profound and permanent effects on the daily lives of civilians in both countries but manifested more evidently in the US.

After finding commercial potential in several wartime technologies, such devices were optimized and reimagined for new uses that made them mainstays of the American home decades after the war [3]. An excellent illustration of this effect is that the technology of something as mundane and ordinary as today's microwave, found in 90% of American households [4] was derived from the cavity magnetron-radar equipment leveraged for performance advantage in the war. And this is only one example of the war's legacies that found their way into living rooms, hospitals, educational institutions, transport, and eventually space.

America's drive toward space exploration saw huge government investment to address the challenges of reaching and landing on the moon. From that ingenuity, everyday items like wireless headsets, memory foam, and scratch resistant lenses entered the public sector in new commercial applications.

Although there is much more depth and complexity in how these circumstances have impacted technology overall, the points discussed above amply demonstrate the war's influence on academia, government, society, and their systems, paving the way for Japan and the United States to grow into the scientific and technological world powers they have become.

The Advent of Globalization

With globalization culture, knowledge, and development were shared and exchanged exponentially faster than ever before. This created innovation opportunities for Japanese and American techologies.

A recent IMF study shows that globalization has amplified the spread of technology across borders in two ways:

1. Globalization has allowed countries to access to foreign knowledge more easily.

2. Globalization enhances international competition—scaling the rise of emerging market firms and consequently increasing firms' incentives to innovate and adopt foreign technologies.

*Excerpt from: https://www.imf.org/en/Blogs/Articles/2018/04/09/globalization-helps-spread-knowledge-and-technology-across-borders#:~:text=Globalization%20boosts%20technological%20development&text=While%20globalization%20has%20been%20much,easier%20access%20to%20foreign%20knowledge.

Though globalization came at a time when Japan and the US were already among the top countries in terms of technological and digital maturity, research has shown evidence that even these two leaders were able to grow and benefit from each other's innovations. Especially since their reign as top technological countries was challenged by the continuous growth of China and its tech sector. Because of this reemergence of the great-power competition, Japan and the US took it upon themselves to broaden their horizons in tech application [5].

This, together with media becoming increasingly influential in commerce, promoted the popularization of the entertainment applications of technology from Japan and the US. From robotics and gaming to game shows and movie-making effects, the two countries have made an impression and impact through and within technology during this time.

Altogether, globalization was not only a chance for Japan and the US to change the world with their technology but a way for technology and advancement from across the globe to change Japan and the US too.

Climate Change

In an effort to slow down the effects of climate change, leading nations, including the US and Japan, are taking extra steps to mitigate the risks of the said phenomenon through technology.

Even before climate change, Japan often struggled with two major environmental problems: earthquakes and tsunamis. And through time, with much experimentation, they have learned how modern technology can help improve their relationship with the environment in both restorative and preventive ways [6].

The country has learned to maximize technological solutions for its population to deal more easily with their environmental conditions - i.e., with systematic notifications or warnings of impending disasters, flood-control technologies, and more. At the same time, Japan was among the first nations to implement regulations and policies to respond to pressing environmental concerns.

For instance, aiming to reduce air pollution and to address demands for low-emission cars, after a long-term diesel ban was implemented, electric and hybrid vehicles (produced with the assistance of automation) were introduced to the market.

Because of this head start in understanding how technology can solve environmental issues, Japan was faster able to move on to the next steps.

Japan is also one of the top countries where smart technology (now commonly used to promote and practice energy efficiency) is most prevalent .

A shift towards smart devices can be seen in the country. In fact, Japan's smart home market size is set to increase to 18 trillion yen by 2040 from 3.9 trillion in 2020 [7].

Japan ranks 12th in Yale's Environmental Performance Index (EPI) and 20th in RobecoSAM's Country Sustainability Ranking in 2022 [6]

The United States is not far behind in advocating for technology's positive environmental impact. As they move towards sustainability, climate tech and investments toward going green continue to garner interest. These investments are encouraged by proactive steps taken by authorities. Case in point, the Inflation Reduction Act has 369 billion USD in climate provisions [8].

The country has also adapted its technologies to fight climate change. One way is by developing and deploying clean energy technologies.

The United States has a large and diverse clean energy sector, including abundant renewable energy sources such as solar, wind, and hydroelectric power.

By deploying these technologies, the US moves to reduce its greenhouse gas emissions - a major contributor to climate change. In addition, the country has also heavily invested in research and development (R&D) to improve the efficiency and performance of clean energy technologies. Policies have been implemented to further encourage their adoption, and incentives have also been offered.

The country has also dedicated resources to developing and deploying advanced transportation technologies. As transportation is a major contributor to greenhouse gas emissions, significant efforts have been made to reduce these emissions by developing mass commercialized electric and hybrid vehicles and alternative fuels.

In 2021, the electric vehicle (EV) population hit its two-million count milestone and companies have announced over 100 billion USD of investments toward American EV manufacturing. On top of that, the rate of public EV charger installation has close to doubled in 2022 [9].

Clean energy, heavily anchored on alternative renewable energy harvested by adaptive technology, has become the largest source of employment in America's energy sector. More than 3 million Americans have been employed in clean energy jobs since 2021 and have earned wages 1.25 times the national median [9].

The promotion and development of smart spaces are also practiced increasingly in America, not only to create superior user experience but also to combat infrastructure related energy-loss. With Artificial Intelligence (AI)- and Internet of Things (IoT)-powered heating and cooling systems, insulation, and energy-efficient appliances installed throughout these smart places, the US continues to bring forward creative use of technology for the greater cause.

All these recent climate initiatives evince how technology continues to evolve, expand, and reshape itself to help address global issues. And we expect more inspired technological revolutions to take place as we continue to fight climate change.

"Apart from continuing their legacies, Japan and the US share responsibilities to sustainability. Moving forward, we expect to see these nations at the forefront of not only using tech to better build up the global economy but also to elevate human lives in a way that positively affects the world around us."

— Dr. Joshua Walker, President & CEO, Japan Society

The COVID-19 Pandemic

Most recent of all key events, the COVID-19 pandemic significantly changed the trajectory of technological advancement. Apart from highlighting the importance of technological resilience and the need for robust infrastructure and systems that can withstand disruptions and continue to function during times of crisis, it pushed organizations to rethink and reinvent technology once again, this time prepared to brave the frontlines of a plague.

Though technology has long been around in the healthcare sector, we see more ways it can be used outside hospitals and clinics. At airports and public spaces, more thermal cameras are installed to detect individuals with high body temperatures indicative of fever - a symptom of COVID-19. These cameras, which are manufactured by several Japanese companies, including NEC and Panasonic, are able to quickly and accurately screen large numbers of people, making them an effective tool for identifying potential COVID-19 cases and preventing the spread of the virus [10].

Another entry to the list of cross-functional technologies bolstering healthcare in the pandemic, the Fugaku supercomputer, developed by the Japanese company Fujitsu, has been used to support the fight against COVID-19 in several ways [11]. One way is by running simulations of the spread of the virus and the impact of different control measures, such as social distancing and mask-wearing. These simulations can help policymakers, and public health officials understand the potential outcomes of different strategies and make informed decisions about responding to the pandemic.

The Fugaku supercomputer has also been used to analyze and interpret large datasets related to COVID-19, such as genomic data and clinical data, which can help researchers better understand the virus and develop treatments and vaccines.

In addition, the supercomputer has also been used to support the development of AI technologies that can assist with tasks such as medical image analysis and potential COVID-19 case identification. Overall, the Fugaku supercomputer has played a valuable role in the fight against COVID-19 by providing powerful computing resources and capabilities that can support a wide range of research and analysis efforts.

American technology has also played a significant role in the fight against COVID-19. On top of AI and automation used in the research and development phases of vaccines and the rapid test kit, among the country's most notable contributions was Telemedicine.

First used in 1959 by clinicians at the University of Nebraska to transmit information to and from medical students, Telemedicine's use skyrocketed only six decades after, amid widespread isolation protocols. Harnessing the power of telecommunication and IoT technologies, Telemedicine allowed patients to consult health experts and receive care without physically visiting a healthcare facility, reducing the risk of transmission.

Altogether, the COVID-19 pandemic has highlighted the importance of technology in healthcare and in responding to large-scale crises. It has also demonstrated how their use will continue to evolve and expand in the future as we grapple with the challenges posed by COVID-19 and other global health threats.

These key events depict how Japan and the US, much like their technologies, showcased pragmatism, flexibility, intelligence, and commitment to improving human lives. Those values and qualities, more than any one contribution, show the commitment these superpowers have to a lasting impact.
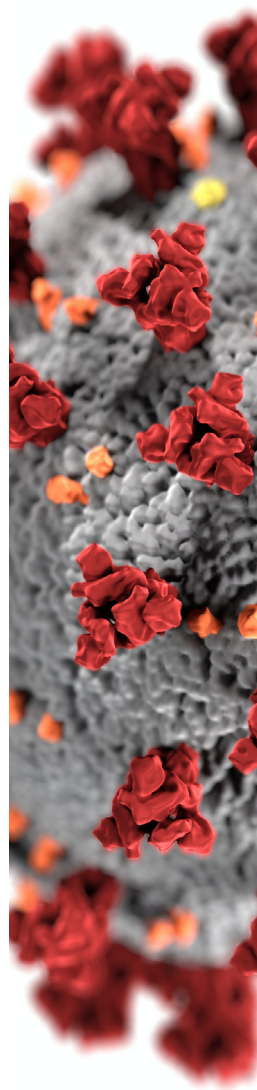
"The US and Japan have this amazing synergy that amplifies their global impact because of their complementary strengths. While Japan is very pragmatic and excellent at learning from other countries' best practices, America is always at the forefront of innovation and pursues opportunities to learn and explore things before others. Such knowledge, applied correctly, is their secret weapon to becoming the global superpowers that they are now".

— Dr. Joshua Walker, President & CEO, Japan Society
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secret weapon to becoming the global superpower

Japanese Innovation

Karaoke - 1971,
Daisuke Inoue

Nintendo - 1889,
Fusajiro Yamuachi

The company we know and love today for their video games started with "Hanafuda" playing cards or flower cards and only started to release electronic games in 1970s)

Shinkansen Bullet Train - 1964

Playstation - 1994, Sony

American Innovation

Mobile phones - 1973,
Dr. Martin Cooper

Cardiac defibrillators - 1930,
William B. Kouwenhoven

Lasers - 1960,
Theodore H. Maiman

ARPANET - 1960s, Internet Protocol
Suite of the National Science
Foundation (U.S. government)

The first working internet prototype

Where are Japan and the US taking tech?

Looking back at the history of Japan and looking forward to global digitalization, the country can be expected to lead advancement in two key technological areas: AI and IoT.

Although it is impossible to predict exactly how Japan will advance artificial intelligence, as the field of AI is constantly evolving, Japan will likely continue to be a leader in AI research and development especially since it is home to several leading companies and research institutions working on a wide range of AI applications and technologies [12].

Japan has made significant contributions to AI R&D in the field of natural language processing in the past and continues to promote efforts in developing advanced algorithms and techniques for handling and understanding human language, which has enabled the development of highly accurate machine translation systems and other language-based AI applications. Additionally, the country has extensive experience with AI applications for image and video recognition. That said, Japan has a considerable advantage in the head start they have in AI exploration.

With competitive application development and IoT integration skills, Japan may lead IoT advancement in the future with novel and seamlessly integrated use cases [13]. As smart technologies with embedded IoT technologies continue to rise in popularity in Japan, it makes great sense for investments to be made towards finding new use cases that these can power. With its greater footing in the field, Japan can earlier revolutionize how we approach healthcare, transportation, or manufacturing or fundamentally, and change how we live and work with IoT.

Monstarlab is among the key players at the forefront of the development of these technologies in Japan. The company has been extensively involved in artificial intelligence and IoT work and has built a number of pioneering technologies. In collaboration with S.RIDE, for example, the company developed a one-tap cab dispatch application that grants users access to a network of 10,000 cabs.

On the Western side of the world, the US is anticipated to transform the quality of digital and blended experiences with its grasp of creative and innovative use of technology and experience design.

AI and IoT are also increasingly used in the US to create better personalized user experiences. This is achieved by collecting data about user preferences, habits, and behaviors and using this information to tailor content and recommendations to their specific interests. This, combined with America's strong innovation culture, superior user research and testing

capabilities, and the country's advanced developments in Augmented and Virtual Realities, gives them an edge in how they are able to build customized, immersive, and pioneering experiences [14].

Monstarlab also plays an active role in the growth of these technologies in the Americas. The company creates optimized experiences with technology for all kinds of spaces and brands; from IoT ecosystems for multiple elevator management for global companies like OTIS to contactless food service programs for brands like Wingstop.

Want to create your own future-proof experiences?
Get in touch with our experts: https://monstar-lab.com/global/contact/

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Key Takeaways

— History and culture both have the power to change the trajectory of technology, but technology is similarly able to change the course of history

— Despite differences in culture and unique technological capabilities, Japan and the United States share a number of common causes of success in the field: adaptability, efficiency, pragmatism, and sheer dedication to elevating the human experience

— With continued research and development as well as innovation efforts, Japan and the US are expected to continue taking the lead in tech, especially in the fields of AI, IoT, and UX

Expert Featured

Joshua W. Walker, PhD

President & CEO, Japan Society

Joshua W. Walker, Ph.D., became President & CEO of Japan Society in December 2019.

Previously, he worked at Eurasia Group, the world's leading political risk analysis firm, where he served as global head of strategic initiatives and Japan in the Office of the President leading the first ever "GZERO" geopolitical summit in Japan. Prior to that, he was CEO and president of the USA Pavilion of the 2017 World Expo in Astana, Kazakhstan; founding dean of the APCO Institute; and senior vice president of global programs at APCO Worldwide, a leading global strategic communications firm based in Washington, D.C. Before joining the private sector, he worked in numerous roles at various U.S. government agencies, including the State Department and the Defense Department.

Dr. Walker is a Senior Fellow at the Center for the Study of the Presidency and Congress, Adjunct Associate Professor of International and Public Affairs at Columbia University, Presidential Leadership Scholar, David Rockefeller Fellow of the Trilateral Commission, Munich Security Conference Young Leader and Nakasone Yasuhiro Award Winner. He was previously a Professor of Leadership and the American Presidency at George Mason University and the Reagan Foundation, Transatlantic Fellow at the German Marshall Fund of the United States, and co-founder of the Yale Journal of International Affairs. He earned a bachelor's degree from the University of Richmond, a master's degree from Yale University, and a doctorate from Princeton University.

Dr. Walker grew up in Japan where his parents still serve as missionaries, came to the United States when he was 18, and is bicultural and bilingual.

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