



**Asia-Pacific  
Economic Cooperation**

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# **Telemedicine Development in the Asia-Pacific Region: Network Architecture, Capacity and Feasibility**

**Telecommunications and Information Working Group**

December 2022





**Asia-Pacific  
Economic Cooperation**

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APEC Project: TEL 02 2020A

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## Executive summary

The global challenge of COVID-19 has highlighted the role of information and communication technologies (ICTs) in our collective response to the pandemic. One of the outstanding use cases is telemedicine, which facilitates disease prevention and control via virtual diagnosis and treatment. Telemedicine/telehealth provides clinical/health-related services and information via ICTs over a distance, among which telecommunication network is a key pillar. 5G networks and telemedicine will have the potential to augment an economy's response to a public health emergency.

This project, *TEL 02 2020A – Report and Workshop on Telemedicine in the Asia-Pacific Region: Network Architecture, Capacity, and Feasibility*, was funded by the APEC Support Fund (ASF) Sub-Fund: Digital Innovation and implemented by the APEC Telecommunications and Information Working Group. This project aims to discuss how APEC Economies can better leverage ICTs to assist front-line health professionals and patients with limited access to healthcare services, analyze the feasibility and benefit of telemedicine in the Asia-Pacific region and strengthen the integration of ICTs and healthcare.

As a result of this project, a virtual workshop was held on 30 March 2022. The contributions and inputs from the workshop are incorporated in this report. Government administrators, academic specialists, and medical personnel from 16 APEC member economies (covering nearly 80% of APEC member economies) attended the event and provided insights on promoting telemedicine within the APEC region.

The report includes topics such as telemedicine architecture, the current situation of telemedicine network construction, the application of telemedicine information systems, application scenarios and specific application cases, and telemedicine capacity maturity assessment in the Asia-Pacific region. It also provides implementable recommendations and a collection of use cases in appendices.

The global telemedicine market is growing rapidly from USD 50 billion in 2019 to around USD 460 billion in 2030. Telemedicine provides patients with more healthcare service options. Telemedicine also potentially expands the scope and depth of communication between medical personnel and their peers by enabling academic exchanges and the sharing of cases. Telemedicine can also cut down on unnecessary hospitalizations, rationally allocate hospital resources, and reduce the workload of medical personnel.

Broadband Network Coverage is gradually expanding in the Asia Pacific region. In remote rural areas, a mobile network can be the main way to use telehealth services. Besides network infrastructure construction, government policies are issued to expand the use of telemedicine, especially in the context of COVID-19. Hospitals and related enterprises are actively building telemedicine information systems or platforms to provide healthcare services virtually. COVID-19 boosts public acceptance of telemedicine.

A rapid expansion of telemedicine application scenarios is currently taking place. And four categories of telemedicine scenarios have been identified, that is 1) clinical services, 2) telemonitoring, telecare, and health management, 3) continuous medical education, and 4) data sharing.

A holistic digital health maturity model <sup>1</sup>approach is discussed to inspire more insights and improvements in APEC economies' assessment approaches to telemedicine maturity. However, assessing Digital Health Maturity in the real world remains complicated.

Five recommendations are proposed to promote telemedicine development in the Asia Pacific region.

1. To strengthen the assessment of telemedicine, to formulate and optimize telemedicine strategies, policies, and regulations.
2. To promote multi-party participation and cooperation in telemedicine.
3. To enhance accessibility and affordability of ICT infrastructure.
4. To promote sharing of health data sources while ensuring data privacy and security.
5. To empower telemedicine's development with the help of relevant emerging technologies.

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<sup>1</sup> An approach to assess the maturity of digital health. Please see Chapter 6 and Figure 15



## Acronyms and abbreviations

5G	The 5 <sup>th</sup> generation mobile network
AI	Artificial Intelligence
APEC	Asia-Pacific Economic Cooperation
CCTV	Closed-Circuit Television
DHM	Digital Health Maturity
ECG	Electrocardiogram
EMR	Electronic Medical Records
ICT	Information and Communications Technology
IDC	Internet Data Center
IoT	Internet of Things
ITU	International Telecommunication Union
TCM	Traditional Chinese Medicine
UHC	Universal Healthcare Coverage
WHO	World Health Organization
WPRO	World Health Organization Regional Office for the Western Pacific

## Glossary of terms

<b>Term</b>	<b>Description</b>
Capability	Capability is the physical and/or mental ability to develop, improve and actualize skills and competencies. Capability includes the inherent ability and the availability of resources, mechanisms, and tools that actors can use to enhance their capability.
Maturity	Maturity describes a stage of growth or development.
Capability maturity	Capability maturity refers to the stage of growth of capability.
Digital health (capability) maturity	It is defined as the stage of growth and development of the biopsychosocial ability and the availability of tools that actors can use to enhance their capability of digital health.
Telemedicine	Telemedicine is a modality of healthcare delivery that uses information and communications technologies (ICTs) to exchange medical information virtually over a distance (short or long) for the improvement of health outcomes.

## Acknowledgments

This final report could not have been accomplished without the contributions of experts and representatives who shared their knowledge and experiences in the workshop "Telemedicine in the Asia-Pacific Region: Network Architecture, Capacity, and Feasibility" carried out virtually (Beijing, China) on 30 March 2022.

The representatives of the APEC member economies of Australia, Canada, China, Hong Kong, China, Indonesia, Japan, Republic of Korea, Malaysia, Mexico, New Zealand, Papua New Guinea, Peru, the Philippines, Singapore, Thailand, and the United States participated in this workshop. Experts from the City University of Hong Kong, Yonsei University in the Republic of Korea, Nanyang Technological University in Singapore, the University of Columbia in Canada, Thammasat University in Thailand, Indonesian Hospital Association, University of New South Wales in Australia, University of the Philippines, and the University of Continental in Peru shared and discussed their research results and analysis on telemedicine. Experts from Massey University in New Zealand, Japan International Cooperation Agency, and Monash University (Malaysia Campus) moderated 3 different sessions of the workshop.

Moreover, we want to express our gratitude to the APEC Secretariat, especially to Mr. Kirill Makhrin (Program Director), and Ms. Estella Ho (Program Executive) who strongly promoted the project and gave us valuable advice.

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We take this opportunity to express our deep sense of gratitude.

## 1 Introduction

There is a growing consensus in the global health community that the strategic and innovative use of digital and cutting-edge information and communications technologies (ICTs) will be an essential enabling factor toward ensuring universal health coverage.

The global COVID-19 pandemic is an unprecedented public health crisis. COVID-19 has brought a major challenge to the global economic and social environment and has also expedited the ongoing digital transformation. The current global challenge of the COVID-19 pandemic requires holistic and streamlined approaches utilizing emerging digital technologies with evidence from information analytics, as well as quick responses proportional to the speed and scope of its diffusion.

Telemedicine uses ICTs to overcome barriers of space and time to provide accessible, cost-effective healthcare services and ultimately Universal Healthcare Coverage (UHC). Telemedicine allows long-distance patient and clinician contact, which helps bridge the gaps between emerging healthcare demands and limited access to quality resources due to geography or other factors. That's particularly the case for rural and remote areas with limited mobility, insufficient funding, and understaffed facilities.

APEC brings together 21 member economies in the Asia-Pacific region and encompasses a diverse group of economies and societies, each in different states of telemedicine development. This report will support member economies in the APEC Region to assess the needs and opportunities of telemedicine, understand telemedicine implementation models and technological requirements, and consider the benefit, costs, and risks of implementing telemedicine.

This report is to address the following objectives:

- a)** To generate key evidence and arguments to make a case for expanding the use of telemedicine with an emphasis on economic and social development in the Asia-Pacific region.
- b)** To promote knowledge generation and dissemination on the technical feasibility, use cases, and maturity assessment of telemedicine in the Asia-Pacific region.
- c)** To support APEC Member Economies to better identify their telemedicine development and implement the strategy.

The questions to be explored are:

- a)** What are the benefits and impacts on the economy and society to develop telemedicine in the Asia-Pacific region?
- b)** In what ways has the COVID-19 pandemic accelerated digital health transformations and telemedicine development?
- c)** How could frontier technologies of telemedicine, with a focus on the open architecture and next-generation (5G) telecommunications networks, potentially be utilized in the pursuit of attaining the Universal Health Coverage (SDG 3)?

d) What are the existing best practices and experience sharing during the development and scale-up of telemedicine?

e) How to assess the maturity and readiness of telemedicine development in the Asia-Pacific region for customization of the implementation strategy?

f) What are the implementable recommendations to strengthen the response and capabilities of APEC Economies? Especially in the low socio-economic status to ensure “leaves no one behind”?

The selected six areas of the report are:

- Telemedicine definition and economic and social benefits for expanding telemedicine. (Addressed in Chapter 2)
- Construction of telemedicine network infrastructure in the Asia-Pacific region with a focus on the open architecture and next-generation (5G) telecommunications networks. (Addressed in Chapter 3)
- Construction and application of telemedicine information system in the Asia-Pacific region. (Addressed in Chapter 4)
- Application scenarios and use cases of telemedicine employed by the public and private sectors to improve access and use of telemedicine technologies. (Addressed in Chapter 5)
- Maturity assessment of telemedicine in the Asia-Pacific region. (Addressed in Chapter 6)
- Recommendations on the further development of telemedicine in the Asia-Pacific region. (Addressed in Chapter 7)

## 2 Definition and benefits of telemedicine

### 2.1 What's telemedicine?

Telemedicine is a modality of healthcare delivery that uses information and communications technologies (ICTs) to exchange medical information virtually over a distance (short or long) for the improvement of health outcomes. According to World Health Organization (WHO)<sup>1</sup>, telemedicine generally contains four components: 1) The provision of clinical support, 2) The intention to overcome geographical barriers, connecting users who are not in the same physical location, 3) The usage of various types of ICTs, and 4) The improvement of health outcomes. Telemedicine is an open and constantly evolving science as it incorporates new advancements in technology, responds to and adapts to the changing healthcare needs and the context of societies.

The concept of telemedicine was first proposed by the United States, and the first generation of telemedicine appeared in the early 1960s, focusing on research exploration and local pilot applications. In the late 1980s, modern communication technologies promoted the development of the second generation of telemedicine, and great progress has been made in remote consultation, long-distance transmission of medical images, teleconferencing, and military

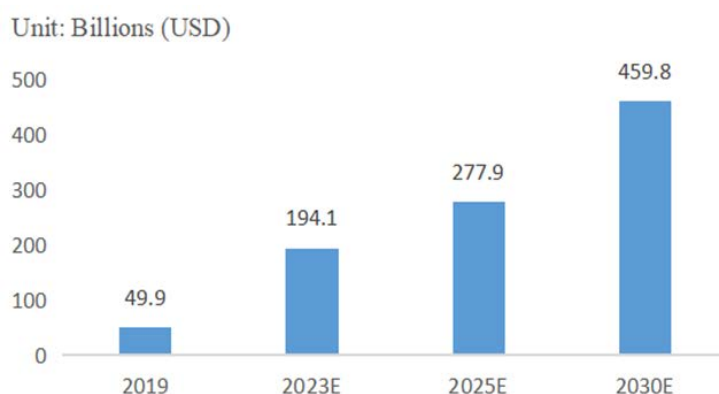
medicine. The most representative at that time was the Georgia State Educational Medical System (CSAMS) established in 1991, covering 2 tertiary medical centers, 9 comprehensive secondary medical centers, and 41 remote sites such as rural hospitals and clinics, implementing remote diagnosis and treatment activities.

Entering the 21st century, new technologies such as mobile communication, the Internet of Things (IoT), cloud computing, big data, and Artificial Intelligence (AI) have promoted the development of the third generation of telemedicine. In recent years, many smart health medical products with remote dynamic monitoring of blood pressure, blood sugar, ECG, etc. have gradually come out, which has promoted the technological development of wearable health monitoring equipment and made telemedicine gradually go out of the door of hospitals and enter communities and families, providing more personalized services for individuals.

## 2.2 Economic benefits of telemedicine

The World Health Organization estimates that there is a global shortage of approximately 4.3 million doctors, nurses, and full-time healthcare workers, especially in remote areas where medical resources are scarce. The development of telemedicine can effectively balance the problem of the unbalanced distribution of medical resources.

The development of information technology has significantly improved the level of medical informatization, making it more convenient for consumers to obtain telemedicine services and realizing steady growth of the market. In 2020, the COVID-19 spread around the world, and the demand for telemedicine increased rapidly. In addition to stimulating user demand, the pandemic has also accelerated research into telemedicine by relevant stakeholders and significantly increased the number of providers in the market. According to data from Statista, the size of the global telemedicine market is projected to grow from USD 50 billion in 2019 to around USD 460 billion in 2030 (Figure 1).

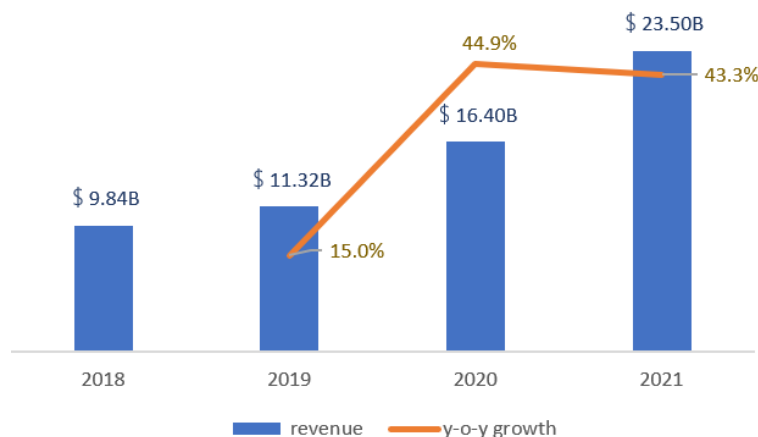


Sources: Statista

Figure 1: Global telemedicine market size (2019-2030)

Among APEC member economies, the United States currently has the largest telemedicine market. The American market grew substantially between 2018-2021. According to Grand View Research, the United States telehealth market increased by 44.9% from 2019 to 2020 (Figure 2). There are increasing government initiatives observed to provide remote healthcare

support to the rural patient population after the pandemic, which is anticipated to drive telemedicine adoption in the United States. However, uncertainty of reimbursement policies also renders projections of the U.S. telemedicine beyond 2022 highly variable. While the developing economies in the APEC region have large populations, the penetration of telemedicine services remains low. As there is still a huge potential in demand for telemedicine, market performance is expected to improve in the future. UBS projects that by 2025, the telemedicine market in China will grow to USD 55 billion.



Sources: Grand View Research

Figure 2 The United States telemedicine market size, 2018-2021

The development of telemedicine will also promote the application of current technology to more scenarios. For example, if telemedicine is integrated with the 5G network, the 5G network is not only a network for mobile communication and Internet access, but also can be applied to the medical field to realize remote consultation, remote surgery, and other purposes. Video terminal equipment that is usually used for company meetings can be applied to remote consultation. At present, smart wearable devices such as smartwatches and bracelets, which are mainly used in daily life, can be used for remote monitoring of patients by doctors and real-time monitoring of patient health data. Robots can also be used to assist doctors in completing patient care, reducing the workload of doctors and nurses.

### 2.3 Social benefits of telemedicine

Telemedicine provides patients with more comfortable and convenient healthcare services. Telemedicine allows preliminary diagnosis of patients from the comfort of their own homes. In addition to saving valuable travel time, this reduces the miscellaneous costs of medical treatment such as transportation expenses, room and board expenses, and work opportunity costs. Statistics show that it typically takes 121 minutes to see a doctor, of which 37 minutes are spent traveling and 84 minutes are spent waiting for a doctor, all for just 20 minutes of face-to-face consultation<sup>2</sup>.

During trials carried out on patients in the ENT, diabetes, physiotherapy (lymphedema), and Altered High Youth Service categories, the New Zealand DHBs saved around USD 9574 in travel costs and USD 5299 in costs incurred from loss of earnings<sup>3</sup>. Around 324,000 grams of carbon emissions were not generated as a result of the reduction in travel<sup>3</sup>. The application of

telemedicine was shown to improve patient access to better healthcare. Patients that would have otherwise needed to seek treatment from a distance are now able to receive diagnosis and treatment from senior experts without leaving their locality, ensuring ease of access to proper healthcare.

Telemedicine also permits the scope and depth of communication between medical personnel and their peers by enabling academic exchanges and the sharing of more cases. Telemedicine allows medical personnel in remote areas to accumulate clinical experience and grasp the latest medical trends and treatment methods in a timely and accurate manner, thereby providing better treatment for patients under the same circumstances. Telemedicine allows the formation of new connections between medical personnel and patients by providing more opportunities for face-to-face communication, helping patients build a stronger sense of trust in their doctors, which is essential for proper treatment.

Telemedicine can also effectively cut down on unnecessary hospitalizations, rationally allocate hospital resources, and reduce the workload of medical personnel. In Canada, a remote home care program in Ontario was effective in reducing hospitalizations of patients with chronic lung disease and congestive heart failure by 60%-80%<sup>4</sup>. In the United States, a telemedicine service that helps doctors at smaller hospitals provide remote neonatal resuscitation services reduced the chance of newborn hospitalization by 29%<sup>Error! Bookmark not defined.</sup>. Realized through remote video technology, multi-party consultation enables the efficient interconnection of high-quality medical resources, while remote ward rounds ensure the safety of medical personnel by reducing the frequency in which they need to enter isolation areas. Telemedicine can improve the service quality of primary hospitals. Relying on the high-quality medical resources of large hospitals or specialized medical centers can prevent misdiagnosis, improve the diagnostic accuracy of primary hospitals, and ensure the early diagnosis of patients.

On a societal level, telemedicine can alleviate the imbalanced distribution of healthcare resources. Telemedicine can overcome geographic limitations, and extend higher quality healthcare resources and advanced technology to remote areas lacking in resources, share healthcare resources, and ensure greater overall access .

### **3 Construction of telemedicine network infrastructure in the Asia-Pacific region**

Telemedicine has the potential to overcome geographic limitations, narrow the differences in healthcare resources between regions, and allocate medical and healthcare resources more efficiently, provided efforts are made to expand digital access and literacy in rural and remote regions. With advancements in information technology and the popularization of the Internet, the telemedicine data transmission model has gradually shifted from the analog stage of the 1960s to the digital stage of today<sup>5</sup>. The transmission channels for telemedicine are constantly expanding<sup>6</sup>, with networks progressively replacing transmission methods such as microwave, closed-circuit television (CCTV), and telephone lines. The rapid adoption of broadband and mobile networks across the world has greatly facilitated the development of telemedicine. Developments in broadband network technology have greatly improved the quality and speed of medical and audiovisual data transmission while reducing costs. The widespread adoption of mobile networks and the Internet have made telemedicine services more convenient than

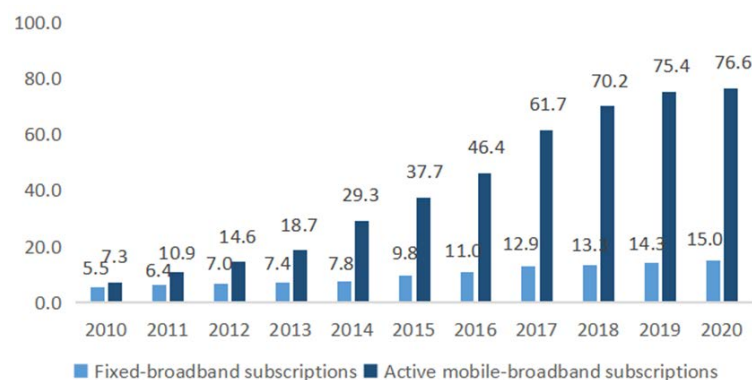


ever.

### 3.1 Broadband network coverage is gradually improving

Characterized by fast transmission speeds and high stability, broadband networks are the key to expanding the coverage of telemedicine services. In recent years, broadband network access in the APEC region has improved significantly, laying the foundation for the implementation of telemedicine services.

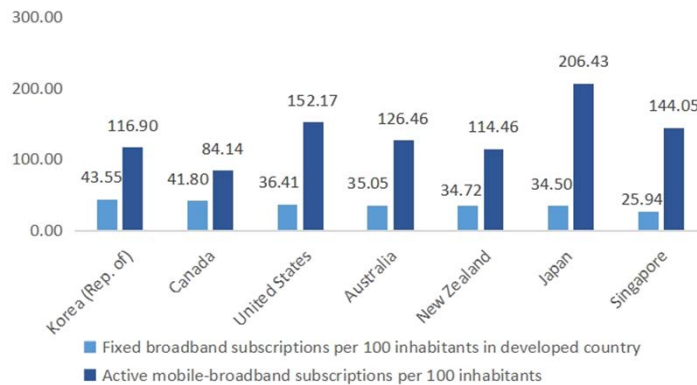
According to data from the International Telecommunication Union (ITU), the amount of fixed broadband subscriptions per 100 inhabitants in Asia-Pacific was 15.0 in 2020, representing an increase from 2010. As can be seen in the figure, there is still much room for improvement in terms of broadband access. The high cost of fixed broadband has always been an obstacle to broadband access in low-income areas<sup>7</sup>. While having comparatively lower construction costs and sufficient data transmission rates, wireless access technologies have become a solution for broadband development in remote areas. Wireless broadband technologies have seen rapid development in recent years, with a focus on construction and deployment in remote and rural areas. The overall level of wireless broadband coverage in the APEC region has improved significantly. In 2020, the number of wireless broadband subscriptions per 100 inhabitants reached 76.6, representing a nearly tenfold increase from 2010 (Figure 3).



Sources: ITU key regional ICT indicator aggregates (Nov 2020)<sup>8</sup>

Figure 3 Broadband subscriptions per 100 inhabitants in the Asia-Pacific region

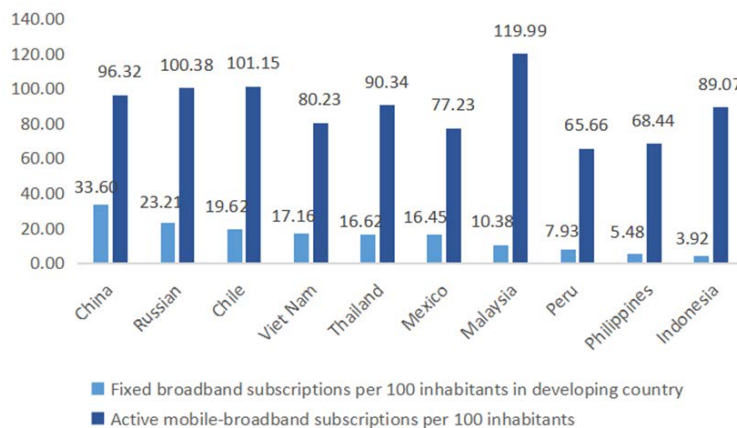
Though overall broadband coverage in the APEC region has improved, there are still significant gaps in the level of broadband access among economies. Broadband network access in developing economies still lags significantly behind developed economies, especially in fixed broadband. According to the latest ITU statistics in 2020, Korea is currently the economy with the highest broadband penetration rate in the APEC region, with a broadband access per 100 inhabitants of 43.55 (Figure 4). In certain developing economies with lower rates of broadband penetration, access levels are in the single digits (Figure 5).



Sources: ITU Fixed Broadband Subscriptions (2000-2020) / Mobile Broadband Subscriptions (2007-2020) <sup>9,10</sup>

Figure 4 Broadband subscriptions per 100 inhabitants in developed economies

In terms of wireless broadband access, there are no significant differences between developing and developed economies. The broadband subscriptions per 100 inhabitants are above 100 in developed economies (Figure 4), and over 60 in developing economies (Figure 5). The level of wireless broadband access in certain developing economies has surpassed that of developed economies. For example, the mobile wireless subscriptions per 100 inhabitants are above 100 in economies such as Russia, Chile, and Malaysia. The subscriptions per 100 inhabitants of economies such as China and Thailand exceed 90. The deployment of enhanced wireless broadband is one method to improving household broadband access in developing economies and narrowing the gap with developed economies.



Sources: ITU Fixed Broadband Subscriptions (2000-2020) / Mobile Broadband Subscriptions (2007-2020) <sup>Error!</sup>  
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Figure 5 Broadband subscriptions per 100 inhabitants in developing economies

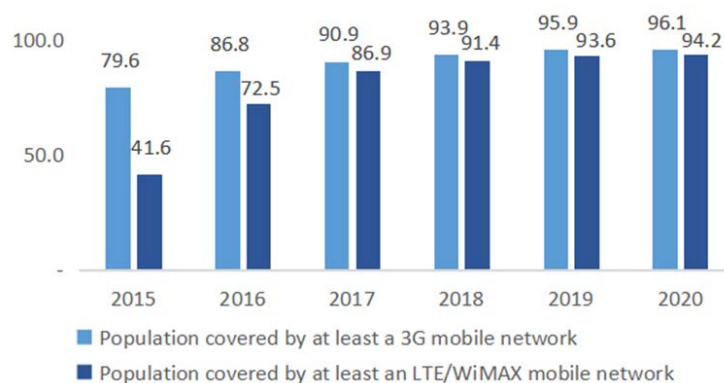
Judging from the level of broadband development within economies, the urban-rural divide is gradually improving. Japan, Korea, and Singapore have taken the lead in achieving full broadband (fixed and wireless) geographic coverage, reaching around 90% around 2010. As the largest developing economy, China has focused on the construction of rural digital infrastructure in recent years, with a current rural broadband (fixed and wireless) geographic coverage of 98%<sup>11</sup>. The United States, Russia, and other economies have also been actively

promoting broadband construction in remote areas. The White House launched a USD 100 billion broadband investment plan in March 2021, to realize 100% fixed broadband coverage by 2030<sup>12</sup>. Russia plans to realize 97% broadband coverage by 2024<sup>13</sup>. The primary goal of telemedicine is to solve the issues of difficult and expensive healthcare caused by shortages of healthcare resources in rural and remote areas. The realization of broadband network coverage is a key foundation for the implementation of such telemedicine services.

### 3.2 Mobile network an important complement to broadband network in telemedicine

Mobile health (mHealth) is a term that refers to medical service models supported by mobile communications, sensor technology, and mobile devices. mHealth will be a key service model in the application of telemedicine. Doctors can use tablet computers to check patient data at any time and prescribe medicine remotely, while patients can use tablet computers and mobile phones to make appointments and inquire about hospital-related data<sup>14</sup>. MHealth is more convenient than telemedicine through fixed broadband, and is widely used in online health consultation, mobile care, and other application scenarios.

The mobile communications networks are a key foundation for the smooth development of mHealth services. There has been rapid construction of mobile communications networks across the APEC region in recent years. As can be seen by the inhabitant coverage of mobile networks, as of 2020, the 3G network penetration in the APEC region reached 96.1 per 100 inhabitants, while LTE/WiMAX mobile network penetration reached 94.2 per 100 inhabitants (Figure 6). The full coverage of the mobile network has created convenient conditions for the widespread use of mobile telemedicine, especially laid the foundation for the development of telemedicine services in rural and remote areas.

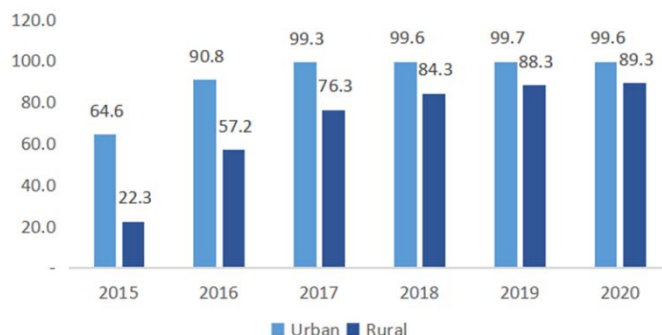


Sources: ITU key regional ICT indicator aggregates (Nov 2020)<sup>Error! Bookmark not defined.</sup>

Figure 6 Mobile network population coverage in the Asia-Pacific Region

According to ITU statistics (Figure 7), the coverage of mobile communication networks in rural areas in Asia-Pacific before 2015 was very limited. In 2015, only 22.3 inhabitants per 100 inhabitants in rural areas in Asia-Pacific were covered by more than 1 type of mobile network, while in urban areas this figure reached 64.6. Since 2015, the mobile network in the Asia-Pacific region has achieved rapid development, especially in rural areas. The level of mobile network

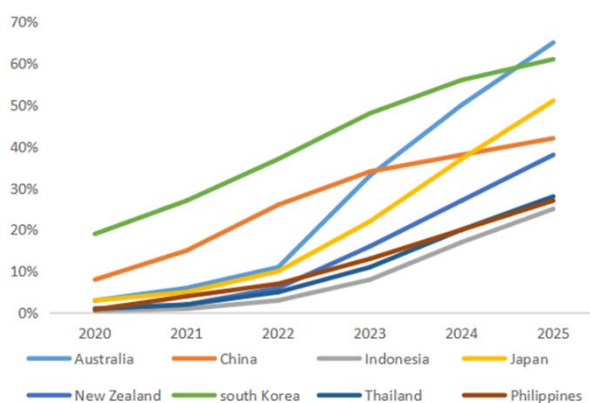
coverage has improved significantly. The gap between rural mobile network development and urban areas is gradually narrowing. In 2020, the mobile network penetration rate in Asia-Pacific urban areas will reach 99.6, and the penetration rate in rural areas will reach 89.3. In addition, mHealth is becoming more and more widely used in various economies. Especially in remote rural areas, mHealth is the main way to use telehealth services. The expansion of mobile communications networks into rural areas is one pillar for the development of mHealth.



Sources: ITU key regional ICT indicator aggregates (Nov 2020)<sup>Error! Bookmark not defined.</sup>

Figure 7 Population covered by at least an LTE/WiMAX mobile network (%)

At present, the APEC region has achieved full regional coverage of 3G mobile networks. In addition, many economies have begun to deploy 5G mobile networks, and some economies have made significant progress. According to Omdia statistics, the penetration rate of 5G users in Korea has reached nearly 30%, and that in China is about 15%. According to Omdia's data (Figure 8), the penetration rate of 5G users in various economies will increase significantly after 2022, indicating that the coverage of 5G networks will be further expanded in the future. Compared with other mobile networks, 5G networks have important features such as faster transmission speed and shorter delay, which enables 5G networks to support some special telemedicine application scenarios, such as telesurgery.



Sources: Omdia

Figure 8 5G penetration in the Asia-Pacific Region (2020-2025)

## 4 Construction and application of telemedicine information system in the Asia-Pacific region

In addition to the basic support provided by the communication network, the information system construction is also an important foundation for the realization of telemedicine. Patients need to make appointments and remote consultations through professional medical platforms. Professional terminal equipment and software systems can help doctors achieve remote care. The telemedicine platform is an important channel for communication between doctors and patients.

#### **4.1 Overall architecture of telemedicine information system in China**

Virtual medical services have become an important part of medical services. "Internet plus medical and health care" has changed from "option" to "necessity" in many medical institutions in China. In China, the domestic health information platform has been completed and put into trial operation<sup>15</sup>. More than 7000 public hospitals above level II (level I and level II) have access to the provincial regional health information platform, and more than 2200 public hospitals at level III have preliminarily realized the exchange and sharing of information within the hospital. 30 provinces have established internet medical service supervision platforms to improve the online supervision ability.

In China's practice, the overall telemedicine information system is composed of two-level telemedicine service and resource supervision centers (China-wide and provincial levels), three-level medical institution (primary level, city and county-level, and provincial levels), a special communication network and a set of application systems, as shown in Figure 9. Here are the roles of each part.

- The two-level telemedicine service and resource supervision centers: coordination and supervision from a macro perspective.
- Three-level medical institution: to implement various medical services, share various medical resources, and ensure service quality and medical safety in business activities.
- A special communication network: interconnection of involved institutions through special line, MPLS VPN, Internet, 3G/4G, satellite and so on.
- Application systems: software and hardware integration solutions for different scenarios.

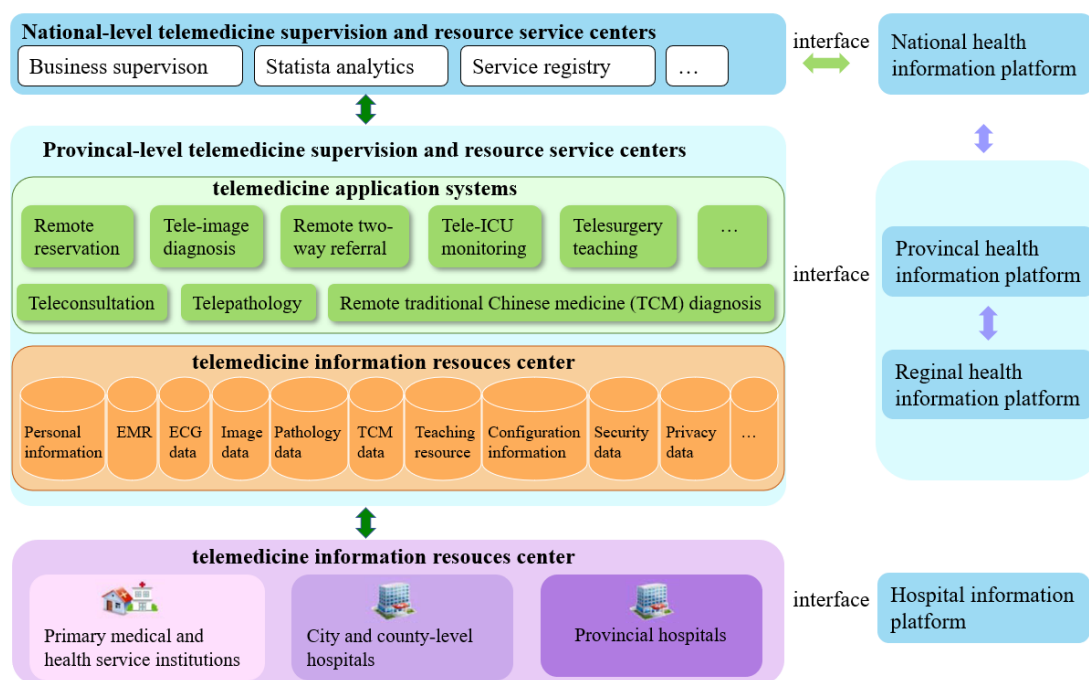
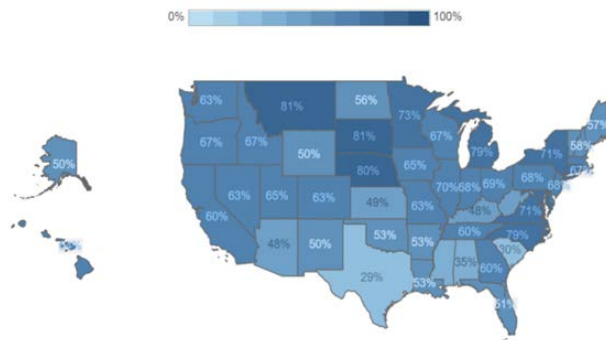


Figure 9 Overall architecture of telemedicine information system deployed in China.

## 4.2 APEC economies actively promote construction and the use of telemedicine platforms

The most conventional model of telemedicine construction in developed economies is patient-oriented and focuses on transforming hospital-based medical services into day-to-day healthcare for the citizenry. The platforms and systems required for telemedicine deployment are typically provided by Internet medical enterprises, which play a key role in the construction of telemedicine in developed economies<sup>16</sup>. For example, in the United States (the most developed APEC economy in terms of healthcare informatization), electronic health record (EHR) systems have seen widespread adoption since 2015<sup>17</sup>. At present, 4063 of 6090 (around 76%) of American hospitals provide telemedicine services<sup>18</sup> (Figure 10). One of the largest telemedicine enterprises in the United States, Amwell, is primarily involved in the construction of telemedicine platforms for medical and insurance institutions. At present, Amwell has served over 2000 hospitals and 150 million medical insurance users<sup>19</sup>. All public healthcare institutions in Singapore, as well as some intermediate and long-term care service providers have begun the application of Smart Health Video Consultation (SHVC), which utilizes video conferencing technology to allow patients to remotely consult with medical teams online<sup>20</sup>. Statistics show that, as of December 2021 45% of people in Canada had been offered some kind of “virtual care” (including phone calls, text messages, emails, and video)<sup>21</sup>.



Sources: American Hospital Association

Figure 10 Adoption of telemedicine in the United States

Japan and Korea have a good foundation for medical informatization, and they are gradually opening up the application of telemedicine. The Korean government allows the use of telemedicine services in the event of a public health emergency. While the Korean government approved the use of telephone-based telemedicine in certain hospitals during the 2015 MERS outbreak, the application of telemedicine has not continued since. The Korean government once again temporarily approved the use of telephone-based telemedicine during the outbreak of the COVID-19 pandemic in 2020<sup>22</sup>. While the Japanese government has temporarily approved the utilization of telemedicine for initial patient consultations and online prescription consultations since April 2020, according to the Ministry of Health, Labour and Welfare (MHLW), the number of medical institutions with telemedicine services was only 16,872 (15% of the economy) as of June 2021<sup>23</sup>.

The application and promotion of telemedicine in developing economies seem to be more active, and the development models vary. Taking China as an example, Chinese medical institutions develop medical alliances. China has made great strides to drive the development of domestic healthcare alliances in four models, namely urban healthcare groups, county-level healthcare alliances, cross-regional specialist alliances, and telemedicine collaboration networks. By the end of 2020, a total of 4028 county-level healthcare groups have been established across the economy, with 76% of pilot counties having deployed some form of information interconnection. Telemedicine collaboration networks now cover all prefecture-level cities and over 1800 counties<sup>24</sup>. Economy-wide healthcare networks, telemedicine cloud service platforms, and video cloud service platforms have been largely established; hospitals above tier 2 are capable of utilizing the Internet or private networks to provide telemedicine services, and full telemedicine coverage has been realized for all state-level poverty-stricken county hospitals<sup>25</sup>. In addition, mobile medical has also been widely used in China. By the end of 2020, the number of Internet-integrated hospitals in China reached 1004, of which 60% were independently built and operated by an existing hospital<sup>26</sup>.

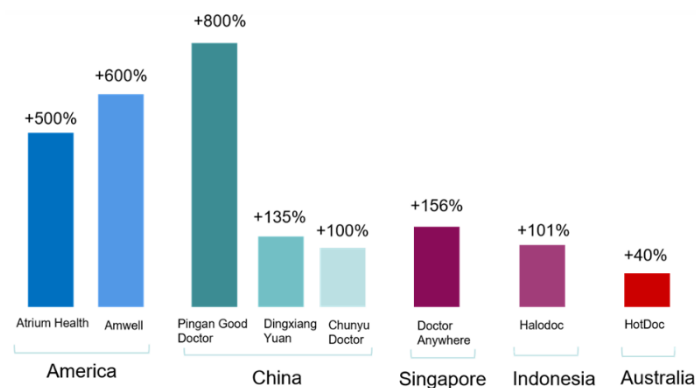
Telemedicine is also spreading rapidly in other developing economies. A 2019 telemedicine survey of 20 District Health Boards (DHBs) in New Zealand found that 19 provided desktop support, while 13 provided virtual meeting room booking systems<sup>27</sup>. A total of 84% of hospitals in Australia have some type of involvement in digital healthcare solutions (including current



applications, pilot projects, and initial interest), of which more than 30% have current applications<sup>28</sup>. As early as 2012, 14 out of 32 Mexican states have realized the popularization of teleconsultation, while 23 states have realized the popularization of distance education.

### 4.3 COVID-19 boosts public acceptance of telemedicine

Since the outbreak of COVID-19 in 2019, people's travel has been greatly restricted. To avoid the risk of infection, patients in need of medical treatment have to switch from offline to Internet-based online medical treatment. The number of patients using telemedicine platforms and applications in the APEC region surged. The United States saw a rapid surge in the use of telemedicine platforms, with Atrium Health experiencing a 500% increase in usage and Amwell's telemedicine service experiencing a 600% increase in Washington state. Growth was even more pronounced in China, where the number of new users for the Ping An Good Doctor telemedicine platform increased by nearly 800% in just 2 months. Platforms such as DXY.cn and Chunyu Doctor also experienced dramatic growth in the same period. Digital health platforms in Singapore, Indonesia, and Australia have also reported surges in activity (Figure 11).



Sources: Bain & Company, L.E.K Consulting<sup>29</sup>

Figure 11 The number of telemedicine users in the APEC region rose sharply in the first months of 2020

The COVID-19 pandemic has boosted public acceptance of telemedicine, and while the pandemic is slowly fading and telemedicine usage numbers are down from their peaks, consumer interest in telemedicine has increased significantly across most economies. Around 40% of American consumers that were surveyed expressed the belief that they would continue to make use of telemedicine services, up from just 11% pre-COVID<sup>30</sup>. A 2020 Canadian Digital Health Survey reports that 54% of Canadians have ever had a virtual visit via video, telephone, or secure messaging/email/text messaging and 90% are satisfied with virtual healthcare services<sup>31</sup>. Though telemedicine adoption in Japan is not widespread, over 50% of respondents expressed interest in making use of telemedicine services, while 86% of respondents who had made use of telemedicine services said they would continue<sup>32</sup>. Public acceptance of telemedicine in Singapore is comparatively low, with only 23% of respondents expressing interest in making use of telemedicine services after the pandemic and 32% of respondents expressing no interest<sup>32</sup>.



With certain economies with low levels of telemedicine acceptance having relaxed restrictions as a measure against COVID-19, acceptance is gradually increasing. The Ministry of Health, Labour and Welfare of Japan has relaxed restrictions to allow telemedicine for initial patients and online instruction on prescription drugs. The Australian Government has broadened GP, allied health, and specialist telemedicine subsidies and provided public health insurance funding, effectively waiving the costs of many video consultations that were previously paid out-of-pocket.

Australia has also launched a service that allowed at-risk groups to purchase prescription drugs from home. The Ministry of Health of Singapore has announced plans to regulate telemedicine and has developed a free online course to guide providers on designing and delivering telemedicine services that prioritize patient safety and welfare, a sign of the government's support for telemedicine adoption on a broad scale<sup>33</sup>.

## **5 Application scenarios and use cases of telemedicine**

A rapid expansion of telemedicine application scenarios is currently taking place. Telemedicine was initially adopted to provide medical assistance where access to care is hard<sup>34</sup> (such as rural areas, space and military situations), and telemedicine was mainly used in chronic disease management<sup>35</sup> and medical emergencies<sup>36</sup>. With digital technologies evolving, telemedicine is used in diverse scenarios much more frequently. The provision of telemedicine services is no longer limited to just phone calls and text messages. Consumers can seek direct medical advice from doctors through text, audio, or video channels such as email, telephone, or Internet platforms. In addition to connecting consumers and hospitals, modern telemedicine solutions can also help connect medical institutions. Hospitals can remotely monitor patient health data through connected devices. Remote education, training and academic exchanges between medical institutions can be realized with telemedicine systems, through which experts can remotely provide on-site doctors with real-time diagnosis and treatment advice and surgical guidance, along with intensive/virtual care to patients in local hospitals. Personal medical data and other healthcare-related information like regional regulatory information can be shared through telemedicine systems. Figure 12 shows the application scenarios of telemedicine.

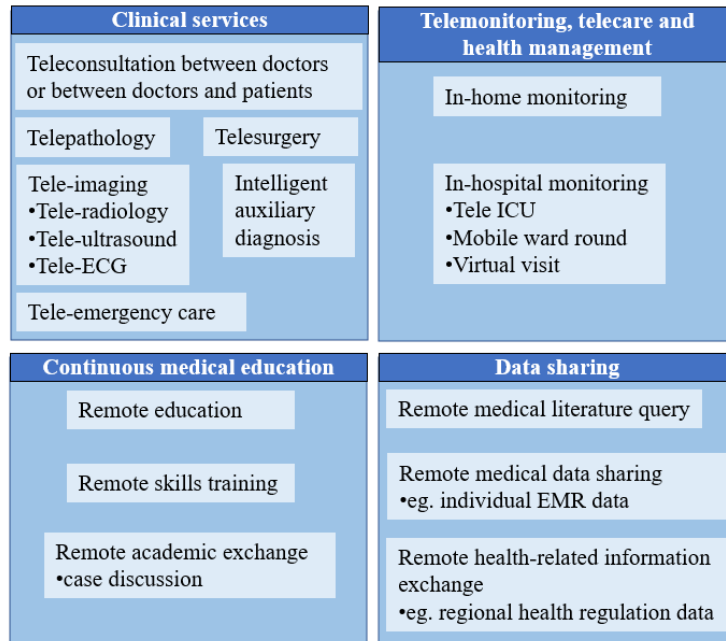
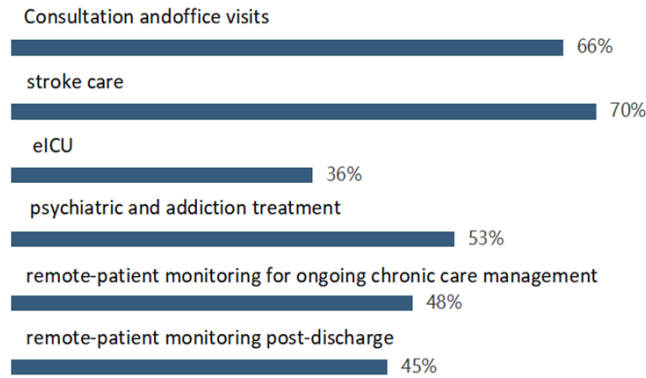


Figure 12 The application scenarios of telemedicine.

After survey and desktop research, we sorted out and provided a collection of 34 telemedicine use cases covering 15 APEC economies. Appendix B shows 26 use cases of telemedicine products and services mainly provided by telemedicine providers, covering 14 APEC economies: Australia; Canada; Chile; China; Hong Kong, China; Indonesia; Japan; Malaysia; Mexico; New Zealand; Singapore; Chinese Taipei; Thailand; United States. Appendix C shows 9 collaborating mechanism cases about multi-participation projects involved with governments, hospitals, the private sector and NGOs, covering 6 APEC economies: Australia; China; Republic of Korea; Malaysia; Thailand; United States.

Most telemedicine services are concentrated on teleconsultation. The application rate of teleconsultation in the United States is 66% (Figure 13), while the application rate of teleconsultation in China exceeds 77% (9). Teleconsultation can serve as an excellent alternative to conventional healthcare systems in the following scenarios:

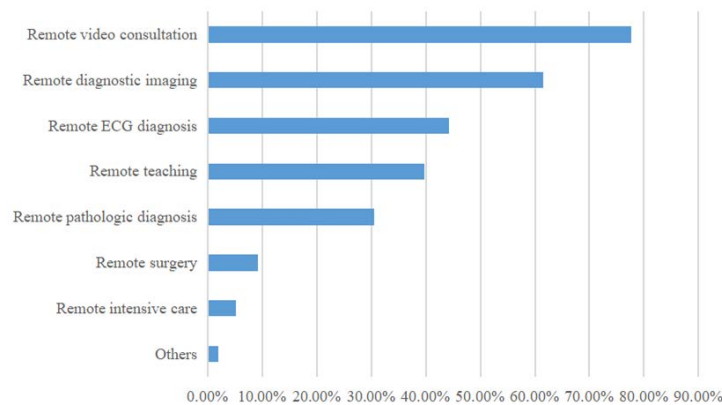
- Diagnosis of common medical issues such as headaches, sore throats, back pain, and digestive problems.
- Consultation on various medical issues related to family therapy.
- Post-treatment examination or follow-up chronic care.
- Holidays, weekends, late nights, or any other scenario in which routine medical care is not available.



Sources: AHA Center for Health Innovation, Market Insights Telehealth Report

Figure 13 Telehealth uses cases in American health systems

With travel greatly restricted during the pandemic, many non-COVID patients have opted to reduce the risk of infection through teleconsultation, which has played a key role during the pandemic.



Sources: CHIMI, 2019-2020 survey on hospital informatization in China

Figure 14 Telehealth use cases in China (2020)

With the continued popularization of 5G networks and the maturity of technologies such as AI in the future, the application scenarios of telemedicine could be further expanded. Application scenarios such as remote diagnosis and surgery have high demands for network transmission speed, latency, and stability. The current level of 5G network construction in the APEC region is not adequate to support widespread adoption. However, while application scenarios such as remote eldercare have been limited by the lack of smart device adoption, there have been successful cases in some economies.

In March 2019, a Chinese hospital successfully implanted a “brain pacemaker” into a patient with Parkinson’s disease in Hainan using its 5G equipped operating room, the first case of remote human surgery in China.

In 2020, a Japanese remote diagnostic imaging company launched a computer-assisted screening system for COVID-19. When the system detects a CT image that it suspects may indicate COVID-19, it immediately alerts a remote doctor, thereby improving diagnostic speed

and reducing the risk of transmission.

## 6 Maturity assessment of telemedicine in the Asia-Pacific region

For APEC economies, it is important to measure, monitor and assess their progress and maturity in digital health (including telemedicine). The monitoring and evaluation of the current status of telemedicine development will result in more targeted and efficient governance, guidance and resource allocation from the government side. Understanding digital health maturity will enable APEC economies to meaningfully mobilize their knowledge, skills and resources to systematically develop, implement, evaluate, scale-up and maintain large-scale implementations of standards-based interoperable digital health systems to support their health priorities and achieve the goal of universal health care (UHC).

Currently, different organizations (Table 1) have developed various digital health assessment tools to help economies/organizations to assess and evaluate their digital health maturity, from a more macro perspective to a more specific one such as data, AI, interoperability, infrastructure, and information systems<sup>37</sup>. The Philippines has adopted the WHO/ITU eHealth Strategy Toolkit and developed its telemedicine strategic framework with multi-sectoral participation. And the universal healthcare law of the Philippines is another framework used in the analysis of the telehealth readiness. China implements annual hospital intelligent service grading evaluation<sup>38</sup>. Indonesia uses the public health index based on the domestic metric survey as metrics for disparities of health and infrastructure. For digitalization, the Central Statistics Bureau (Indonesia) also developed digital survey. However, for maturity of a hospital's capacity to implement a telehealth program, no standard instruments are available in Indonesia.

*Table 1 Digital health assessments tools developed by different organizations*

Number	Digital health assessments tools
1	• Broadband Commission
2	• Global Digital Health Index
3	• Global Observatory of eHealth
4	• IS4H Maturity Assessment tool
5	• Measure Evaluation HIS Framework
6	• University of Chicago Data Framework
7	• University of Oxford Cybersecurity Capacity Maturity Model
8	• USAID Digital Health Investment Review Tool
9	• WHO/ITU eHealth Strategy Toolkit
10	• World Bank Group Digital Health Assessment Toolkit

The literature review highlighted that a more holistic approach is needed to integrate the current maturity assessment models, which are either specialized or generalized<sup>39</sup>. Here, we provide a holistic digital health maturity model approach<sup>40</sup> (Figure 15) which is from emeritus professor

Teng Liaw in the workshop and hope to inspire more insights and improvements of APEC economies' assessment approaches of telemedicine maturity. This matrix presents the same four digital health essential foundations identified by the World Health Organization Regional Office for the Western Pacific (WHO WPRO)<sup>41</sup> plus a quality improvement, measurement, monitoring & evaluation (QIMME) foundation, along with the five stages of the digital health maturity model applicable to each foundation: basic, controlled, standardized, optimized and innovative. In addition, USA Department of Health and Human Services think that quality of care should be considered as a separate but necessary element of telemedicine.

Essential digital health foundations	Five Digital Health Maturity Stages				
<b>ICT &amp; IoT infrastructure</b> <i>e.g. power supply, mobile network, internet bandwidth, penetration, affordability, reliability, ICT supply chain</i>	<b>1 BASIC</b>  ✓ Unstable environment ✓ Ad-hoc and chaotic ✓ Disjointed & uncoordinated processes  ✓ Knowledge & data not shared  <b>UNPREDICTABLE</b>	<b>2 CONTROLLED</b>  ✓ Getting control ✓ Reactive ✓ Coordinated but inconsistent ✓ Processes manageable & getting predictable  ✓ Knowledge & data sharing is ad hoc  <b>REACTIVE &amp; PROBLEM DRIVEN</b>	<b>3 STANDARDISED</b>  ✓ Standardised & interoperable digital data & tools ✓ Centralised & consistent processes ✓ Proactive & Predictable  ✓ Organisation level knowledge & data sharing  <b>REQUEST DRIVEN</b>	<b>4 OPTIMISED</b>  ✓ Continuous improvement ✓ Efficiency ✓ Consolidated 'lean' processes ✓ Accountable  ✓ Cross organisation knowledge sharing & collaboration  <b>SERVICE DRIVEN</b>	<b>5 INNOVATIVE</b>  ✓ Catalyst for innovation ✓ Pioneers new dynamic process ✓ Drives innovation  ✓ Enterprise-wide knowledge sharing & collaboration  <b>VALUE DRIVEN</b>
<b>Essential tools</b> <i>e.g. common registries, unique ID, HIS/eMR/eHR,, social media, mHealth, telehealth</i>					
<b>Readiness for information sharing</b> <i>e.g. architecture, standards, interoperable, hardware, software &amp; protocols, security, privacy</i>					
<b>Enablers of adoption</b> <i>e.g. policy, strategy, legislation, regulation, governance, human resource, financing, capacity building, engagement</i>					
<b>Quality improvement, measurement, monitoring &amp; evaluation (QIMME)</b>					

Source: Liaw ST et al. (Eds) *Digital Health Maturity: innovation & quality improvement*

Figure 15 Digital Health Maturity Model presented in the workshop

The complications should also be acknowledged when one tries to assess Digital Health Maturity (DHM) in the real world. Digital and telehealth maturity varies between organizations within and between economies. In the above Digital Health Maturity Model, while all preceding stages of the DHM must be achieved before starting on the next, the reality is that it often is not. The reasons for this non-linearity are usually contextual and social rather than technically logical. It just means that the benefits of digital health are not optimally realized. For example, if the standardized stage is not achieved, the interoperability and information exchange will be inefficient and inaccurate, with safety issues.

## 7 Discussions and recommendations

Telemedicine is generally less progressed in upper-middle, lower-middle, and low-income countries than in high-income countries. A series of factors (Figure 16) impact the implementation and development of telemedicine. Policy, technology, finance, human resources, culture, infrastructure and data are all factors enabling the environment to promote capacity building for the sustainable development of telemedicine. Here are some recommendations to address the findings of these key factors.

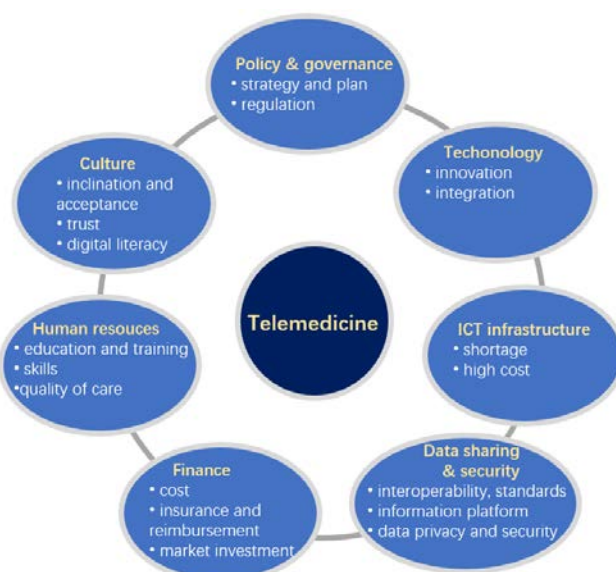


Figure 16 Factors impacting the implementation of telemedicine.

**1. Strengthen the assessment of telemedicine, and formulate and optimize telemedicine strategies, policies and regulations.** Many economies loosened restrictions on telemedicine under the pressure of the COVID-19 pandemics, such as allowing telemedicine direct to patient, relaxing restrictions around provider licensing, online prescribing and written consent, and expanding insurance coverage and reimbursement for telemedicine services. WHO survey results showed the need for rigorous evaluation to inform policy and strategy<sup>42</sup>. With frequent outbreaks of infectious diseases, technical advancements and changes in people’s health needs, governments should recognize the importance and urgency of deploying telemedicine, assess telemedicine status in their economies and formulate more comprehensive telemedicine policies to efficiently respond to public health crisis and achieve better health outcomes.

**2. Promote multi-party participation and cooperation in telemedicine.** Multi-stakeholder engagement counts a great deal in the successful design and implementation of telemedicine and digital health. Expertise from the government, the public, the private and the academia sectors and perspectives from health and non-health disciplines (e.g. ICT and social sciences) should be included. A public-private partnership for telemedicine could be established for the reform of health insurance system, the formulation of clinical guidelines, and human resources training to optimize telemedicine.

**3. Enhance accessibility and affordability of ICT infrastructure.** ICT infrastructure is fundamental to ensure the capacities of key stakeholders to formulate, implement and monitor telemedicine programs and achieve long-term sustainability of telemedicine projects. Underdeveloped infrastructure is a common problem for telemedicine development particularly in developing economies. And in many economies, there is still room for improvement in the coverage, cost and quality of Internet services. The domestic plan for ICT infrastructure should be iteratively upgraded with advanced technologies like 5G, fiber optic fixed broadband, and possibly Internet Data Centers (IDC).

**4. Bridge digital gap and promote equitable outcomes through better digital access and literacy.** There is an urgent need for policies that facilitate lower cost and more affordable ICT

services to older people, rural communities, and other special populations to help bridge increasingly apparent digital gaps. Governments could reduce telecommunication fees with exclusive preferential initiatives or plans suitable for different populations or areas. Special adaptations in digital health devices and services should also be encouraged. For example, realizing that the existing ICT technologies, facilities and services are often not comprehensible for older people, governments could tailor policies to achieve simplification and usability, such as large fonts, high-contrast icons, friendly user profile, simplified registration, etc. Governments could also support or coordinate to gather efforts from private sectors and NGOs to provide educational trainings on digital literacy.

**5. Promote sharing of health data sources and ensure data privacy and security.** Sharing health data for the purpose of public interest should be encouraged with the patient's consent, when undertaken in a manner that is built on trust and privacy protection. The development and international coordination of technical standards or norms should emphasize interoperability<sup>2</sup>. In addition, there are concerns regarding legal issues such as those associated with ensuring patient confidentiality. Governments are encouraged to establish legal policies about patients' data privacy and security.

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<sup>2</sup> WHO defined "interoperability" as the ability of different applications to access, exchange, integrate and cooperatively use data in a coordinated manner through the use of shared application interfaces and standards, within and across organizational, regional and national boundaries, to provide timely and seamless portability of information and optimize health outcomes. (<https://apps.who.int/iris/handle/10665/344249>)



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## Appendix A: Key search terms in the literature review

Telemedicine	“telemedicine”, “telehealth”, “online health service/consultation”, “online diagnosis and treatment”, “telecare”, “telenursing”, “remote care”, “virtual care”, “teleconsultation”, “internet hospital”, “virtual hospital”, “virtual health”, “virtual visits”, “e-visits”, “remote access to health services”
Digital health	“mhealth”, “ehealth”, “digital health”, “intelligent health/medical”, “smart health/medical”
Healthcare	“health”, “care”, “healthcare”, “medical”, “well-being”, “wellness”, “chronic”
Technologies	“wearables”, “video conferencing”, “internet”, “store-and-forward imaging”, “streaming media”, “terrestrial and wireless communications”, “multimedia”, “Internet of things”, “robotics”, “5G”, “artificial intelligence”, “big data”, “cloud computing”, “deep learning”
Technical components	“app”, “application”, “practice”, “use case”, “product”, “service”, “solution”, “device”, “platform”, “system”, “architecture”
Member States	“Australia”, “Brunei Darussalam”, “Canada”, “Chile”, “People’s Republic of China” or “China”, “Hong Kong, China”, “Indonesia”, “Japan”, “Republic of Korea”, “Malaysia”, “Mexico”, “New Zealand”, “Peru”, “Papua New Guinea”, “Russia”, “Singapore”, “Chinese Taipei”, “Thailand”, “The Philippines”, “The United States”, “Viet Nam”
Regional attributes	“APEC”, “Asia Pacific”, “APAC”, “Asia”, “Pacific”, “Pacific Islands”, “Southeast Asia”, “ASEAN”, “Western Pacific”, “developing countries”, “low-and-middle-income countries”, “low-literate”, “low-skilled”

## Appendix B: Selected use cases of telemedicine application

<b>Case 1</b>	<b>Royal Perth Hospital eICU Construction, <a href="#">Link</a></b>
<b>Timestamp</b>	May 15, 2018
<b>Implementing economy</b>	Australia
<b>Keywords</b>	Emory Healthcare, Royal Perth Hospital, eICU
<b>Abstract</b>	Building on the success of a telemedicine pilot conducted in Sydney, Atlanta's Emory Healthcare is now launching an eICU partnership with Royal Perth Hospital on Australia's west coast.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	ICU patients
<b>Application scenarios</b>	remote intensive care
<b>Technologies</b>	eICU
<b>Technical Architecture</b>	Philips eICU technology enables real-time remote patient monitoring, including the application of algorithms that can predict deterioration in patient health.
<b>Project Impacts</b>	According to a 15-month analysis, the telemedicine platform helped increase hospitals discharges by nearly 5%, reduce discharges from long-term care facilities or nursing homes by nearly 7%, reduce the 60-day readmission rate by around 2%, and save USD 4.6 million in healthcare costs over the 15 months (with an average Medicare spend spending 1500 per patient).
<b>Takeaways</b>	eICU solutions represent the future of global intensive care. Through a partnership with the Informatics Center, the project expands healthcare delivery beyond the bedside, breaking through the barriers of space and time.
<b>More info</b>	Studies have shown a sharp drop-off in clinical outcomes for patients treated off-hours, compared to those treated during the day. Conversely, studies have shown that eICU programs improve patient survival rates by some 26 percent over traditional ICU programs, with a 20 percent faster discharge rate.

<b>Case 2</b>	<b>Screening of OSA in Diabetics by Diabetes Queensland,</b> <a href="#">Link</a>
<b>Timestamp</b>	July 31, 2020
<b>Implementing economy</b>	Australia
<b>Keywords</b>	ResApp, Diabetes Queensland, SleepCheck
<b>Abstract with</b>	ResApp will work with Diabetes Queensland to raise awareness of these risks and promote its SleepCheck application as a screening tool for people with diabetes that may be suffering from OSA.
<b>Providers</b>	Coviu
<b>Targeted users</b>	Diabetes Queensland
<b>Application scenarios</b>	the diagnosis and management of respiratory disease
<b>Technologies</b>	a screening test for obstructive sleep apnoea (OSA)
<b>Technical Architecture</b>	Coviu provides a cloud-based video conferencing platform and CSIRO smart home sensors.
<b>Project Impacts</b>	The project addresses the issue of restricted home visits to patients during the COVID-19 pandemic, especially regarding the elderly.
<b>Takeaways</b>	Faced with the global COVID-19 pandemic and the social distancing and containment aimed at curbing the spread of the virus, the Australian government has temporarily eased restrictions on telemedicine services funded by the Medicare Benefits Schedule. Coviu serves as a digital counterpart of conventional medical clinics, providing a safe and easy-to-use system for doctors to connect with their patients.
<b>More info</b>	SleepCheck is ResApp's easy-to-use, direct-to-consumer mobile medical application that uses accurate algorithms to assess a person's risk of OSA by analyzing breathing and snoring sounds during sleep.

<b>Case 3</b>	<b>Australian e-Health Research Centre Remote Monitoring and Management in Crises Such as Pandemics and Natural Disasters, <a href="#">Link</a></b>
<b>Timestamp</b>	Sept 28, 2020
<b>Implementing economy</b>	Australia
<b>Keywords</b>	Telehealth, AEHRC, COVID-19
<b>Abstract</b>	Coviu – a telehealth spinout of CSIRO’s Data61 – could form part of this future vision for healthcare. Coviu reflects a digital copy of traditional medical clinics, providing a secure, easy-to-use system for clinicians to connect with their patients.
<b>Providers</b>	ResApp Health Limited
<b>Targeted users</b>	all Australians
<b>Application scenarios</b>	healthcare
<b>Technologies</b>	Cloud-based video conferencing platforms
<b>Technical Architecture</b>	The SleepCheck mobile health app precise algorithms to evaluate a person’s risk of developing OSA by analyzing breathing and snoring sounds during sleep.
<b>Project Impacts</b>	The technology provides diabetics with the only clinical-level and regulatory-approved app that can be used from the comfort of their own homes. The app ensures that patients are put on an immediate path to treatment that may improve their quality of life and reduce the risk of adverse health outcomes.
<b>Takeaways</b>	ResApp is working with Diabetes Queensland to raise awareness of relevant health risks and promote the SleepCheck app as a screening tool for diabetics that may have OSA.
<b>More info</b>	With COVID-19 placing restrictions on home visits, in particular with older people, AEHRC and service providers are exploring how this technology could support remote monitoring and management in crises, such as pandemics and natural disasters.

<b>Case 4</b>	<b>Renfrew County and District Health Unit Launches a Population Health Management Pilot, <a href="#">Link</a></b>
<b>Timestamp</b>	Jul 28, 2016
<b>Implementing economy</b>	Canada
<b>Keywords</b>	Philips, Renfrew, Population Health Management
<b>Abstract</b>	Philips and the County of Renfrew Paramedic Services announced a 12-month pilot that will equip the County of Renfrew Paramedic services with the Philips Tailored Ambulatory Care Program.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	the County of Renfrew Paramedic Services
<b>Application scenarios</b>	outpatient care
<b>Technologies</b>	eCareCompanion
<b>Technical Architecture</b>	Philips provided Renfrew Care Services with a tailored outpatient services plan and the eCareCompanion tablet app to allow the automated upload of patient vitals from a Bluetooth-connected monitoring tool. Each patient is equipped with a wearable device capable of fall prediction through the Philips Lifeline AutoAlert service.
<b>Project Impacts</b>	The app presents required patient data in a meaningful and easy-to-use format. This data is closely monitored by Renfrew community care workers to identify where early intervention is most required.
<b>Takeaways</b>	This latest pilot enables Renfrew community care workers to proactively treat high-risk patients from the comfort of their own homes. Treating patients before their health deteriorates further helps prevent emergency room visits and readmissions. Telemedicine provides home care patients with increased comfort and access to nursing professionals when needed most.
<b>More info</b>	eCareCompanion, is a consumer-grade tablet application that allows the patient to have their vital results automatically uploaded by way of Bluetooth-connected measurement tools.



<b>Case 5</b>	<b>Enable Healthcare Inc. Remote Patient Monitoring Gateway Hub Construction, <a href="#">Link</a></b>
<b>Timestamp</b>	May 6, 2020
<b>Implementing economy</b>	Canada
<b>Keywords</b>	LiveCare, Link+, RPM Gateway
<b>Abstract</b>	LiveCare and Enable HealthCare Inc. announced today that they have reached a cooperation agreement making the LiveCare Link+ Home RPM Gateway the preferred provider of RPM services for Enable HealthCare’s patients.
<b>Providers</b>	LiveCare
<b>Targeted users</b>	Enable HealthCare’s patients
<b>Application scenarios</b>	Home Remote Patient Monitoring
<b>Technologies</b>	Link+ serves
<b>Technical Architecture</b>	LiveCare Link+ serves as a patient home RPM gateway by connecting all home medical devices to a centralized platform when patients cannot access their provider.
<b>Project Impacts</b>	The Link+ RPM gateway remotely captures and shares diagnostic data to ensure that elderly, disabled, and other high-risk patients connected to the Link+ network do not need to travel to the doctor’s office or local hospital for non-urgent care, protecting them from COVID-19 exposure and other high-risk environments.
<b>Takeaways</b>	When many patients were unable to access their healthcare providers during the COVID-19 pandemic, Link+ was instrumental in connecting all home medical devices to one centralized platform. This project was another milestone in efforts to improve personal health and forge stronger relationships between patients and their healthcare providers during the COVID-19 pandemic.
<b>More info</b>	Because medical information and diagnostics can be captured and shared remotely by the Link+ RMP Gateway, the elderly, disabled, and other high-risk patients connected to the Link+ avoid traveling to their physician’s office or local hospital for non-emergency care.

<b>Case 6</b>	<b>Humber River Hospital (Toronto) Pioneers AI Algorithms in Equipment, <a href="#">Link</a></b>
<b>Timestamp</b>	Sept 1, 2020
<b>Implementing economy</b>	Canada
<b>Keywords</b>	Health Canada Licenses, Artificial Intelligence Algorithms, On-Device, X-ray Review
<b>Abstract</b>	GE Healthcare today announced Health Canada’s license of Critical Care Suite, an industry-first collection of artificial intelligence (AI) algorithms embedded on a mobile X-ray device. Built-in collaboration with Humber River Hospital in Toronto, using GE Healthcare’s Edison platform.
<b>Providers</b>	GE Healthcare
<b>Targeted users</b>	radiologists
<b>Application scenarios</b>	Critical Care Suite
<b>Technologies</b>	artificial intelligence (AI)
<b>Technical Architecture</b>	The extensive catalog of healthcare-oriented developer services available on the GE Healthcare Edison platform allows GE developers and select strategic partners to rapidly design, develop, manage, secure, and distribute advanced applications, services, and AI algorithms.
<b>Project Impacts</b>	GE Healthcare algorithms ensure that AI results can be generated within seconds of image acquisition, independent of connection or transmission speeds. These results are immediately made available to technologists through mobile X-ray equipment and sent to radiologists for review on the PACS. The project also runs automatic quality checks on equipment, integrating them into technical workflows and enabling the rejection and reprocessing of images before submission to the PACS.
<b>Takeaways</b>	This project represents the first collection of AI algorithms in mobile X-ray equipment. With successful applications in Canada, these intensive care kits can be implemented in other economies to benefit doctors and patients.
<b>More info</b>	_____

<b>Case 7</b>	<b>Intelligent Network for Point-of-Care Ultrasound, <a href="#">Link</a></b>
<b>Timestamp</b>	Mar 9, 2020
<b>Implementing economy</b>	Canada
<b>Keywords</b>	Intelligent Network, Ultrasound, visual feedback
<b>Abstract</b>	This is driving the efforts of the Intelligent Network for Point-of-Care Ultrasound consortium, led by Providence Health Care in partnership with Change Healthcare, Clarius Mobile Health, the University of British Columbia and the Rural Coordination Centre of BC.
<b>Providers</b>	Clarius
<b>Targeted users</b>	patients in rural, remote and urban areas
<b>Application scenarios</b>	point-of-care diagnostics
<b>Technologies</b>	Ultrasound
<b>Technical Architecture</b>	Clarius offers an ultrasonic Intelligent Network, a bedside tool that combines machine learning, handheld ultrasound devices and cloud-based platforms to create integrated intelligent point-of-care ultrasound networks.
<b>Project Impacts</b>	Smart networks provide visual feedback to family doctors and reduce the need for professional training. The visual feedback will provide enhanced assistance to doctors making diagnostic decisions no matter where they are. The connected system will also load images centrally, making remote second opinions an easy option.
<b>Takeaways</b>	By providing faster and more accurate diagnoses for patients in rural, remote and urban areas, the program also saves money for health care systems and patients in smaller communities and could effectively improve healthcare services and outcomes for Canadians.
<b>More info</b>	The project is initially targeting physicians who treat heart and pregnancy patients in rural communities.

<b>Case 8</b>	<b>Tyto Care delivers primary care to the under-served community of San Bernardo in rural Chile, <a href="#">Link</a></b>
<b>Timestamp</b>	Jan 14, 2021
<b>Implementing economy</b>	Chile
<b>Keywords</b>	Tyto Care, vital care, San Bernardo
<b>Abstract</b>	The Covid-19 pandemic has exposed vast gaps in people's experiences of healthcare depending on where they live. Recently, telehealth company Tyto Care began delivering primary care to the under-served community of San Bernardo in rural Chile.
<b>Providers</b>	Tyto Care
<b>Targeted users</b>	the under-served community of San
<b>Application scenarios</b>	primary care
<b>Technologies</b>	the handheld remote examination device
<b>Technical Architecture</b>	Tyto Care's handheld remote examination device works with AI-driven software to examine the heart, lungs, throat, skin, ears, and body temperature, with earbuds for enhanced audio. Tyto can be used for diagnosing acute conditions like colds, flu, ear infections, bronchitis, and sore throats, as well as monitoring patients with chronic conditions such as high blood pressure, asthma, COPD, and diabetes. The camera built into the device can photograph skin conditions, rashes, and bites and forward these images to a specialist. Data is stored on a mobile device for later reference, or can be forwarded instantly to a clinician for consultation.
<b>Project Impacts</b>	With Tyto, the medical teams will visit 100 percent of the list once a month, spending only about 30 percent of the total budget. As there are not enough doctors, and expenses are too high to pay people to visit a poor municipality, the medical teams will use trained nurses to bring the patients to the doctors, virtually.
<b>Takeaways</b>	Batikoff predicts that, based on the success of the program, they will see an expansion to other Chilean villages. Its usage was massively boosted as a result of the pandemic, can deliver doctor consultations remotely, eliminating the need to travel long distances for a face-to-face appointment.
<b>More info</b>	Vitaltec, a healthcare provider who represents and distributes Tyto Care products in Chile, helped deliver the care programme.

<b>Case 9</b>	<b>Shengjing Hospital — Practical Advancements in Smart Computer-Assisted Ventilator Weaning Systems, <a href="#">Link</a></b>
<b>Timestamp</b>	Mar 23, 2021
<b>Implementing economy</b>	China
<b>Keywords</b>	Shengjing hospital, Neusoft HIFLY, computer-assisted ventilator weaning system
<b>Abstract</b>	Shengjing Hospital Affiliated with China Medical University and Neusoft HIFLY launched the computer-assisted ventilator weaning system for critically ill patients, successfully jointly developed this system, and carried out a practical application recently.
<b>Providers</b>	Neusoft HIFLY
<b>Targeted users</b>	critically ill patients
<b>Application scenarios</b>	clinical application of ventilator
<b>Technologies</b>	data analysis
<b>Technical Architecture</b>	The Neusoft HIFLY computer-assisted diagnosis and treatment system integrates data collected from a variety of medical equipment with the real-time monitoring and analysis of critically ill patients. The system supports automated data collection through Internet of Things (IoT) technology and provides diagnosis and treatment suggestions based on multi-parameter indicators.
<b>Project Impacts</b>	The computer-assisted ventilator weaning system greatly reduces the occurrence of ventilator-associated lung injury and pneumonia, reduces the reintubation and fatality rate, relieves patient pain during the weaning process, provides patients with more time, and reduces the labor pressure on medical workers.
<b>Takeaways</b>	The use of ventilator weaning systems has served as an important watershed in the diagnosis and treatment of severe COVID-19 cases. As clinical data shows that long-term ventilator usage can result in irreversible lung damage, the question of when to wean a patient off ventilator usage is a critical one. The application of smart computer-assisted ventilator weaning systems is of great significance to the diagnosis and treatment of COVID-19 in critical conditions.
<b>More info</b>	The background of the project is that Intel proposed the "Technology Anti-epidemic" project in May 2020 to collect scientific and technological innovation solutions against the new crown pneumonia from the world.

<b>Case 10</b>	<b>West China Hospital 5G Remote Consultation Upgrade,</b> <a href="#">Link</a>
<b>Timestamp</b>	Feb 24, 2020
<b>Implementing economy</b>	China
<b>Keywords</b>	China Telecom, 5G, remote CT
<b>Abstract</b>	The Radiology Department of West China Hospital of Sichuan University used the 5G dual-gigabit remote CT scan assistant to conduct remote CT scans for three patients with new coronary pneumonia in Ganzi Prefecture, Sichuan Province, providing strong support for the diagnosis and treatment of patients' conditions.
<b>Providers</b>	China Telecom
<b>Targeted users</b>	COVID-19 patients
<b>Application scenarios</b>	remote consultation
<b>Technologies</b>	5G cloud-network integration technology
<b>Technical Architecture</b>	China Telecom provided West China Hospital with 5G cloud-network integration technology for its remote consultation system upgrade, while Siemens Healthineers provided advanced medical equipment such as CT scan aids.
<b>Project Impacts</b>	Through the effective utilization of expert resources, West China Hospital is now able to provide diagnosis and treatment services to patients in remote areas, enhancing treatment and pandemic prevention efforts while greatly improving the efficiency of medical resource utilization.
<b>Takeaways</b>	This project represents the first case of COVID-19 examination through remote CT, symbolizing a transformation of telemedicine from consultation to practice, and further optimizing the distribution of medical resources. China Telecom Sichuan partnered with Siemens Healthineers to provide 5G dual-gigabit ethernet and remote technical support for the remote CT solution. This technology is expected to be popularized and applied to follow-up pandemic responses, and is of great significance to remote areas.
<b>More info</b>	Different from the previous remote consultation system, this system uses a dedicated control terminal and camera to obtain various data of remote CT equipment and patient images, and transmits it to the expert terminal of West China Hospital in real-time through telecommunications 5G. All images and data obtained from the scan can be seen on the screen, and the remote CT equipment can be remotely controlled in real-time.

<b>Case 11</b>	<b>Hospital Authority Telehealth, <a href="#">Link</a></b>
<b>Timestamp</b>	April 1, 2020
<b>Implementing economy</b>	Hong Kong, China
<b>Keywords</b>	Hospital Authority, HA Go, CMS, Smart Hospital, Telehealth
<b>Abstract</b>	Hospital Authority (HA) has developed extensive digital health capabilities in the world-renowned electronic medical records system “Clinical Management System” (CMS) and integrated patient app “HA Go”. HA Telehealth is a suite of services HA has deployed to provide personalized care through CMS and HA Go. Tele-rehabilitation facilitates patients to do different types of prescribed rehabilitation exercises and activities at home and report outcome through HA Go. Tele-information enables clinicians to prescribe instructions or information from CMS for patients on HA Go. Tele-consultation supports consultations to be conducted using teleconference capabilities integrated in both CMS and HA Go. All these initiatives have been well received by the public.
<b>Providers</b>	Hospital Authority, Hong Kong
<b>Targeted users</b>	All members of the public in Hong Kong
<b>Application scenarios</b>	Care beyond hospital / clinic walls
<b>Technologies</b>	CMS, HA Go (mobile), AI, Teleconference, IoT, etc.
<b>Technical Architecture</b>	CMS is a centralized digital health platform that enables care delivery across 43 hospitals and 120+ clinics with the support of smart IoT & AI technologies. Patients with HA Go mobile app are connected for telehealth information and services.
<b>Project Impacts</b>	During COVID-19, HA Telehealth has enhanced patient experience, improved accessibility and reduced infection risk.
<b>Takeaways</b>	Telehealth is greatly enhanced with deep integration with the electronic medical records system, and support for enhanced clinical workflow and the end to end patient journey.
<b>More info</b>	HA Telehealth will be further developed to cover many more aspects of care as a key part of the long term health strategy in Hong Kong.

<b>Case 12</b>	<b>The Ministry of Communication and Information Technology Partners With Halodoc to Provide Telemedicine Services Through the PeduliLindungi App, <a href="#">Link</a></b>
<b>Timestamp</b>	Jun 24, 2020
<b>Implementing economy</b>	Indonesia
<b>Keywords</b>	Halodoc, PeduliLindungi, COVID-19
<b>Abstract</b>	Halodoc provides telemedicine services in PeduliLindungi, an application initiated by the Ministry of Communication and Information Technology (Kominfo) and related parties to track the spread of COVID-19 in various regions in Indonesia.
<b>Providers</b>	Halodoc
<b>Targeted users</b>	Indonesian
<b>Application scenarios</b>	test for COVID-19
<b>Technologies</b>	tracking, and fencing capabilities
<b>Technical Architecture</b>	Halodoc provides telemedicine services through the PeduliLindungi app, which features track, trace, and geofencing functionality.
<b>Project Impacts</b>	The app provides relevant authorities with the ability to track the movements of users that have been exposed to COVID-19 in the past 14 days, and connects to various cellular carriers. The track and trace results of the app can provide warnings to users within a 2-5m radius of people diagnosed with PDP or ODP to immediately implement COVID-19 protocols through the doctor consultation service.
<b>Takeaways</b>	The provision of Halodoc telemedicine services through the PeduliLindungi app is the first step toward developing a more comprehensive ecosystem in Indonesia to deal with COVID-19. Telemedicine helps reduce the amount of community healthcare visits during emergencies. Through this partnership, more and more Indonesians have been able to use telemedicine technology to contribute to breaking the chain of infection of COVID-19.
<b>More info</b>	The results of tracking and tracing this application can provide a warning to the number of the users within 2-5 meters of a person diagnosed with PDP and ODP to immediately implement the COVID-19 health protocol through a doctor's consultation service.



<b>Case 13</b>	<b>Ministry of Communication and Information Technology — Alodokter Private Doctor Remote Consultation and ISOMAN Package Prescription Services, <a href="#">Link</a></b>
<b>Timestamp</b>	Jul 5, 2021
<b>Implementing economy</b>	Indonesia
<b>Key words (No more than 5)</b>	remote consultation, ISOMAN gratis, Alodokter
<b>Abstract (No more than 200 words)</b>	Kementerian Kesehatan RI bekerja sama dengan Alodokter dalam program Telemedicine dan pemberian paket obat ISOMAN gratis. Program tersebut bertujuan membantu mempermudah pasien COVID-19 menjalani isolasi mandiri di rumah.
<b>Providers</b>	Alodokter
<b>Targeted users</b>	Indonesian
<b>Application scenarios</b>	home isolation
<b>Technologies</b>	remote consultation
<b>Technical Architecture</b>	Alodokter provides teleconsultation and e-prescription services for ISOMAN packages to the Ministry of Health.
<b>Project Impacts</b>	The project has helped COVID-19 patients receive the proper care without visiting the hospital, and provided psychological support and medical guidance to allow patients to think more calmly and positively while going through self-isolation.
<b>Takeaways</b>	It is difficult for COVID-19 patients to get through self-isolation and receive independent treatment procedures. Poor access to health services and limited interaction with family and relatives during self-isolation often hurts physical and mental health. This project makes it easier for COVID-19 patients to self-isolate at home.
<b>More info</b>	Ada beberapa jenis obat yang disediakan oleh Kementerian Kesehatan. Obat-obatan tersebut terbagi menjadi dua paket, yaitu paket A dan paket B.

<b>Case 14</b>	<b>8K Endoscopic Gallbladder Removal Surgery at Kyorin University Hospital, <a href="#">Link</a></b>
<b>Timestamp</b>	Nov 10, 2014
<b>Implementing economy</b>	Japan
<b>Keywords</b>	8K Imaging Systems, 8K endoscopic surgery
<b>Abstract</b>	An 8K endoscope was used in the gallbladder removal surgery performed by the Affiliated Hospital of Xinglin University School of Medicine for two patients with gallstones.
<b>Providers</b>	Sharp
<b>Targeted users</b>	hospital patients
<b>Application scenarios</b>	remote consultation
<b>Technologies</b>	8k
<b>Technical Architecture</b>	Sharp provides 8K endoscopy through a newly developed compact 8K camera.
<b>Project Impacts</b>	With 16x more pixels than conventional equipment, the 8K laparoscope allows surgeons to see things invisible to the naked eye, such as narrow blood vessels and sutures one-tenth the width of human hair. By providing high-definition images without obstructing the operation, the project gives surgeons more freedom of movement.
<b>Takeaways</b>	8K endoscopy is expected to open up new possibilities for complex surgeries, including the anastomosis of thin nerves and blood vessels and more reliable surgical resection of various cancerous tissues. The advantages of 8K endoscopy over conventional 2K imaging technology are likely to lead to major changes to medical procedures shortly.
<b>More info</b>	It can be seen that the 8K image enables fine blood vessels to be distinguished with vivid images that represent a major performance improvement compared with 2K.

<b>Case 15</b>	<b>Showa University Pioneers an Electronic Intensive Care Unit (eICU) Project, <a href="#">Link</a></b>
<b>Timestamp</b>	Jul 3, 2018
<b>Implementing economy</b>	Japan
<b>Keywords</b>	Philips, Showa University ,eICU program
<b>Abstract</b>	Royal Philips and Japan-based Showa University announced the launch of Japan’s first telemedicine intensive care (eICU) program at Showa University Hospital and Showa Koto Toyosu Hospital, designed to help improve the outcomes of high-risk patients and advance the globalization of critical care.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	critically ill patients
<b>Application scenarios</b>	critical care
<b>Technologies</b>	patient monitoring and audio-visual technology
<b>Technical Architecture</b>	The eICU solution provided by Philips enables near real-time remote patient monitoring and early intervention through advanced audiovisual technology. The project’s smart algorithms help predict deterioration in health conditions and enable remote specialists to communicate with on-site caregivers via a live video connection.
<b>Project Impacts</b>	The project has increased ICU case count by 21% without any additional beds or costs, reduced ICU mortality by 20% in eICU monitoring areas, saved roughly USD 1500 per patient in care costs within the first 60 days of ICU admission, and reduced the length of ICU stays by 30%.
<b>Takeaways</b>	Representing the future of global intensive care, eICU solutions change the way bedside care is delivered and provide a centralized remote patient support center that consolidates and standardizes care, reduces transfers, maximizes bed utilization, and guarantees peace of mind for bedside caregivers. In this manner, costs can be controlled while improving revenue, patient flow, and capacity management across the system.
<b>More info</b>	The Philips eICU program is part of connected, patient-centered care and analytics suite that supports advanced care delivery models, both in the hospital and in the home.

<b>Case 16</b>	<b>Home Blood Pressure Monitoring for High-Risk Patients,</b> <a href="#">Link</a>
<b>Timestamp</b>	Jul 15, 2020
<b>Implementing economy</b>	Japan
<b>Keywords</b>	OMRON Healthcare, Mount Sinai Health System , VitalSight
<b>Abstract</b>	OMRON Healthcare, the global leader in personal heart health and wellness technology, and Mount Sinai Health System, New York City’s largest academic medical system, have teamed together to offer patients the new VitalSight™ home blood pressure monitoring solution.
<b>Providers</b>	Omron
<b>Targeted users</b>	patients with hypertension
<b>Application scenarios</b>	home blood pressure monitoring
<b>Technologies</b>	data monitoring
<b>Technical Architecture</b>	Omron provides VitalSight, a home blood pressure monitoring solution that features digital blood pressure monitors, scales and digital medication trackers, and a data center.
<b>Project Impacts</b>	The project empowers patients with the ability to actively engage with their healthcare, while expanding the reach of doctors with a continuous stream of real-time patient data to ensure timely and low-cost interventions.
<b>Takeaways</b>	VitalSight is the latest addition to Omron Healthcare’s comprehensive line of home blood pressure monitors designed to prevent heart attacks and strokes. As part of a recent telemedicine initiative, the VitalSight suite complements the Mount Sinai Health System’s commitment to remote patient monitoring, especially for COVID-19 patients recovering at home.
<b>More info</b>	VitalSight is the newest addition to the comprehensive line of OMRON Healthcare home blood pressure monitors designed to advance the company’s mission of Going for Zero™ — the elimination of heart attack and stroke.

<b>Case 17</b>	<b>Thomson Hospital Launches the Thomson Hospital Online Telemedicine Service, <a href="#">Link</a></b>
<b>Timestamp</b>	Jun 25, 2020
<b>Implementing economy</b>	Malaysia
<b>Keywords</b>	Teleconsultation,e-prescription,e-pharmacy
<b>Abstract (No more than 200 words)</b>	THOMSON Hospital Kota Damansara (THKD) has launched its telehealth service called Thomson Hospital Online, ushering in a new healthcare experience for its customers.
<b>Providers</b>	Doctor on Call
<b>Targeted users</b>	patient
<b>Application scenarios</b>	remote healthcare
<b>Technologies</b>	remote consultation
<b>Technical Architecture</b>	Providing online video medical consultation platform integration with hospital systems, the project covers teleconsultation, e-prescription, and e-pharmacy services to ensure the seamless outpatient process of THKD.
<b>Project Impacts</b>	Patients can visit select healthcare providers, book an appointment at their convenience, consult a doctor through a secure platform, obtain a prescription or medical certificate, and have medication delivered to their doorstep.
<b>Takeaways</b>	Modern healthcare faces a variety of challenges beyond pandemic control and social distancing. These include access to specialist care, appointment flexibility, efficiency, reduction in wait times, and long-standing problems in costs. The project paves the way to resolving some of these issues.
<b>More info</b>	_____

<b>Case 18</b>	<b>New Zealand Virtual Care Solutions, <a href="#">Link</a></b>
<b>Timestamp</b>	Sept 29, 2021
<b>Implementing economy</b>	New Zealand
<b>Keywords</b>	Philips, Teladoc Health, virtual care solutions
<b>Abstract</b>	US-based healthcare IT firms Royal Philips and Teladoc Health have joined hands to deliver virtual care solutions in Australia and New Zealand.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	patients
<b>Application scenarios</b>	virtual care
<b>Technologies</b>	remote patient monitoring
<b>Technical Architecture</b>	Philips provides enterprise virtual care solutions that utilize monitoring, machine learning, and advanced analytic programming to transform disparate data into actionable insights to support clinical decision-making. Teladoc Health provides virtual care platforms and solutions (including point-of-care devices/solutions) that integrate with existing systems and workflows.
<b>Project Impacts</b>	The project can reduce patient hospital stays by 30%, increase discharge speed by 15%, reduce patient mortality by 26%, enable hospitals to expand their coverage to more points of care, and affect health and satisfaction outcomes.
<b>Takeaways</b>	The New Zealand health system is dealing with a backlog of overwhelmed emergency departments, ICU capacity, and elective surgeries, resulting in long patient wait times. The project enhances doctor experiences and patient health outcomes while reducing the overall cost of care.
<b>More info</b>	_____

<b>Case 19</b>	<b>An App-Based Telemedicine Program for Primary Care and Specialist Video Consultations During the COVID-19 Pandemic in Mexico, <a href="#">Link</a></b>
<b>Timestamp</b>	Jan 6, 2022
<b>Implementing economy</b>	Mexico
<b>Keywords</b>	Primary Care, Specialist Video Consultations, COVID-19
<b>Abstract</b>	The coronavirus disease 2019 (COVID-19) pandemic has disrupted the health care system in various ways, one of which is the implementation of telemedicine as a part of the daily clinical practice for many physicians. Sofia is a Mexican health care and technology startup that implemented an app-based telemedicine program during this pandemic in Mexico.
<b>Providers</b>	Sofía
<b>Targeted users</b>	patients
<b>Application scenarios</b>	remote consultation
<b>Technologies</b>	on-demand video consultations
<b>Technical Architecture</b>	Sofía implemented its video consultation service in Mexico City and the metropolitan area, offering free-of-charge mobile-based consultation services by physicians specialized in internal medicine, with expertise in providing medical care by video consultation. The service was extended to the entire economy, and pediatric consultations were added.
<b>Project Impacts</b>	A total of 2,585 video consultations were provided through the Sofia mobile application in the period from March 23 to September 4, 2020, and were available for anyone >18 years in Mexico. Patient satisfaction after video consultation services was >80%.
<b>Takeaways</b>	Telemedicine has been proven to be a useful, safe, and effective tool to improve patients' overall health. This effect has been boosted by the COVID-19 pandemic. The use of mobile applications, such as Sofia, is a versatile and convenient tool to manage health care remotely, especially in a younger population. The use of an app-based telemedicine program can encourage patients to seek help to improve their health and well-being due to many factors, including the elimination of commuting time to the physician's office, on-demand health care assistance, and many others, leading to high levels of patient satisfaction.
<b>More info</b>	Sofía developed an app (also named Sofia) that allows teleconsultations, exchange of medical prescriptions, and requesting follow-up consultations. The video consulting service launched in March 2020 with nine internal medicine specialists providing medical attention daily.

<b>Case 20</b>	<b>Singapore is trying to monitor rapid testing for COVID-19 through remote consultations, <a href="#">Link</a></b>
<b>Timestamp</b>	Nov 18, 2022
<b>Implementing economy</b>	Singapore
<b>Keywords</b>	COVID-19, video consultation, Doctor Anywhere
<b>Abstract</b>	The government has teamed up with local telehealth startup Doctor Anywhere to offer rapid test supervision via 30-minute video consultations. Doctor Anywhere just launched tele-ART, a supervised self-swab test service.
<b>Providers</b>	Doctor Anywhere
<b>Targeted users</b>	Singaporean
<b>Application scenarios</b>	COVID-19 antigen rapid test
<b>Technologies</b>	self-swab test service
<b>Technical Architecture</b>	Doctor Anywhere launches Remote ART, a supervised self-swab testing service. Provides rapid COVID-19 antigen testing and assessment, video counseling and surveillance services.
<b>Project Impacts</b>	Remote ART will provide Singaporeans with regular, supervised self-swab testing. It can meet travelers' health needs in the face of a pandemic.
<b>Takeaways</b>	This supervised testing service will facilitate travellers coming to Singapore for COVID-19 testing as well as those departing. At the same time, the Ministry of Health was assisted in effectively responding to the challenges of the outbreak in Singapore by informing the testing licensing requirements and safeguards for monitoring testing through video. It is the culmination of the deep medical expertise and experience of Singapore's largest home-grown private healthcare provider.
<b>More info</b>	Doctor Anywhere aims to capture about 30% of the demand for supervised self-swab tests.



<b>Case 21</b>	<b>Remote ventilator simulation in the intensive care unit of Singapore Central Hospital, <a href="#">Link</a></b>
<b>Timestamp</b>	Apr 6, 2021
<b>Implementing economy</b>	Singapore
<b>Keywords</b>	ALPHA, SGH, Alpha Ventilator
<b>Abstract</b>	Advanced MedTech Holdings announced the results of a simulation study conducted by Singapore General Hospital (SGH) in November 2020 showing that Alpha ventilators may offer efficiencies to hospitals during a pandemic.
<b>Providers</b>	Advanced MedTech Holdings
<b>Targeted users</b>	hospital patient
<b>Application scenarios</b>	ICU
<b>Technologies</b>	Alpha Ventilator
<b>Technical Architecture</b>	Available Alpha Ventilator (touch-screen based portable ventilator), Alpha ventilator is connected to a 3G analog model connected to an adjustable advanced lung model.
<b>Project Impacts</b>	The Alpha ventilator has the potential to help medical teams eliminate the time-consuming process of wearing personal protective equipment (PPE) by facilitating remote adjustment of the ventilator; reducing the use of PPE and protecting medical resources; and expanding the capacity of the medical team by allowing non-specialist physicians to adjust ventilator settings under the supervision of intensive care units.
<b>Takeaways</b>	Alpha ventilators will serve as a link between telemedicine providers and healthcare teams to determine the best model of care, fine-tune workflows and address challenges. Studies have shown that by establishing a range of activities to maximize the use of telemedicine ventilators, benefits can be gained from remote monitoring and adjustment of ventilators Settings, including daily screening of all patients breathing and switching between mechanical ventilation modes based on patient needs. During the pandemic, Alpha can help hospitals in COVID-19 hotspots provide telemedicine services; And long-term home remote ventilation support when patients return home.
<b>More info</b>	—

<b>Case 22</b>	<b>Hospital in Chinese Taipei Implements Pandemic Prevention &amp; Control, <a href="#">Link</a></b>
<b>Timestamp</b>	May 29, 2021
<b>Implementing economy</b>	Chinese Taipei
<b>Keywords</b>	Guider Technology, health bracelet, oximeter
<b>Abstract</b>	The entire system has been deployed by Guider in NTUH and integrated with the Taibo oximeter through the wristband and app to effectively monitor the health status of individuals in hotel quarantine or self-isolation at home, with data monitoring carried out by family members.
<b>Providers</b>	Guider Technology
<b>Targeted users</b>	patients
<b>Application scenarios</b>	home isolation
<b>Technologies</b>	data monitoring
<b>Technical Architecture</b>	Guider Technology provides a wristband and app that supports integration with commercially available medical devices (including a full range of Taidoc Fora medical devices such as oximeters, forehead thermometers, blood glucose meters, blood pressure monitors, and weight and body fat meters).
<b>Project Impacts</b>	The entire system has been deployed in NTUH and integrated with the Taibo oximeter through the wristband and app to effectively monitor the health status of individuals in hotel quarantine or self-isolation at home, with data monitoring carried out by family members. The app supports unified data management and warning functions, and can create instant video calls with multiple people.
<b>Takeaways</b>	As the pandemic situation continues to worsen, medical capacity in Chinese Taipei is reaching its limit, forcing many who have tested positive for COVID-19 to wait in hotel quarantine or self-isolation for a hospital bed to open up. Many patients have also suddenly died as a result of the sudden decrease in blood oxygen or even heart problems. This partnership has contributed to the reduction of infections and deaths across the economy.
<b>More info</b>	_____

<b>Case 23</b>	<b>5G Healthcare at Siriraj Hospital, <a href="#">Link</a></b>
<b>Timestamp</b>	Mar 4, 2021
<b>Implementing economy</b>	Thailand
<b>Keywords</b>	5G, Siriraj Hospital, Huawei
<b>Abstract</b>	With the assistance of telecom operators and Huawei, Sierra Hospital opened a 5G network and deployed an automated auxiliary diagnosis solution in just three days.
<b>Providers</b>	Huawei
<b>Targeted users</b>	hospital patient
<b>Application scenarios</b>	telemedicine
<b>Technologies</b>	5G
<b>Technical Architecture</b>	Huawei provides 5G network, cloud computing, and automation technologies for the deployment of automated computer-assisted diagnosis solutions.
<b>Project Impacts</b>	The project helps doctors perform high-precision analysis of CT quantification of infection cases. When compared with conventional WiFi solutions, CT upload efficiency was increased by 3-4 times, while the response times of medical systems, patient monitoring, data collection and analysis, remote collaboration, and resource allocation has been greatly improved. As a result, case diagnosis times have been reduced from 12 to 2 minutes, significantly improving the efficiency of COVID-19 detection and reducing the workload of medical personnel.
<b>Takeaways</b>	This project is the first application of 5G technology in the Thai medical industry. In December 2020, Siriraj Hospital won the “Most Innovative 5G Trial in APAC” award issued by Informa in recognition of its successful application of 5G technology in the fight against COVID-19. Siriraj Hospital has pioneered a successful application for 5G smart healthcare, providing a reference for the development of 5G in the healthcare industry and unlocking new value.
<b>More info</b>	Siriraj Hospital is also using 5G in the teaching field.

<b>Case 24</b>	<b>New York Presbyterian Telemedicine Solution, <a href="#">Link</a></b>
<b>Timestamp</b>	Feb 1, 2019
<b>Implementing economy</b>	United States
<b>Key words</b>	eCareCoordinator, eCareCompanion, Philips
<b>Abstract</b>	Philips said physicians affiliated with New York-Presbyterian's Weill Cornell Medicine will use Philips eCareCoordinator and eCareCompanion remote patient monitoring software solutions for patients who are under their care.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	hospital patient
<b>Application scenarios</b>	home care
<b>Technologies</b>	remote monitoring
<b>Technical Architecture</b>	Philips provides the eCareCoordinator telemedicine software platform, which empowers doctors with the ability to remotely monitor patient vitals and send them brief surveys about their health. The eCareCompanion platform allows patients to share health data such as blood pressure, weight, blood oxygen levels, and blood sugar levels with their healthcare providers daily through tablet computers and connected medical devices.
<b>Project Impacts</b>	The project improves the ability of doctors to remotely monitor patient health indicators and conduct more timely consultations when required. The project is designed to shorten hospital stays, decrease the amount of preventable readmissions, and reduce the frequency of expensive emergency room visits.
<b>Takeaways</b>	Remote patient monitoring is playing an increased role in the digital health landscape, driven by aging populations in smaller communities, efforts to better manage chronic diseases, and continue to provide high-quality care during the pandemic. Virtual care and advanced telemedicine solutions are key to providing doctors and patients with the resources needed to deliver quality home care, thereby improving outcomes and reducing costs.
<b>More info</b>	_____

<b>Case 25</b>	<b>Telemedicine Construction by the American Telemedicine Association, <a href="#">Link</a></b>
<b>Timestamp</b>	Jun 18, 2020
<b>Implementing economy</b>	United States
<b>Keywords</b>	Philips, ATA, eCareCoordinator
<b>Abstract</b>	Royal Philips, a global leader in health technology, today announced it has once again joined forces with the American Telemedicine Association (ATA) to help further the adoption of telehealth across the industry.
<b>Providers</b>	Koninklijke Philips NV
<b>Targeted users</b>	American
<b>Application scenarios</b>	home care
<b>Technologies</b>	remote critical care
<b>Technical Architecture</b>	Philips provides Tele-ICU software (eCare Manager) featuring AI-assisted decision-making support algorithms that enable intensive care doctors to virtually coordinate with on-site clinical staff to provide hospital-to-home care for COVID-19 patients. The project also includes the adoption of real-time patient monitoring during transit, along with mobile IoT devices deployed in home environments.
<b>Project Impacts</b>	This partnership helps encourage the strong growth and rapid adoption of telemedicine, along with the acceleration of policy measures to tackle the COVID-19 pandemic.
<b>Takeaways</b>	In encouraging the rapid expansion of telemedicine applications (including virtual care, remote patient monitoring, data analysis, and medical record sharing), COVID-19 has brought digital technologies to the forefront, as evidenced by the expansion of virtual connected care through a partnership between the American Telemedicine Association and Philips.
<b>More info</b>	The COVID-19 pandemic has increased the share of Americans participating in telehealth from 11% in 2019 to 46% today.

<b>Case 26</b>	<b>MedChi Remote Patient Monitoring &amp; Telemedicine Services, <a href="#">Link</a></b>
<b>Timestamp</b>	Jun 18, 2020
<b>Implementing economy</b>	United States
<b>Keywords</b>	a remote patient monitoring platform, the Health Harmony app
<b>Abstract</b>	PRA and MedChi announced today that Care Innovations, a PRA Health Sciences company, was selected by MedChi to be a preferred provider of remote patient monitoring, and telehealth.
<b>Providers</b>	Care Innovations
<b>Targeted users</b>	American
<b>Application scenarios</b>	home care
<b>Technologies</b>	remote monitoring
<b>Technical Architecture</b>	Care Innovation provides technologies for doctors and patients, including a remote patient monitoring platform, the Health Harmony app, a nurse-led coordination center, and connected devices such as blood pressure monitors, pulse oximeters, and blood glucose meters.
<b>Project Impacts</b>	The project provides doctors with an innovative way to monitor patient health in near real-time without travel or time constraints. PRA digital health solutions provide infrastructure, technology, and payer reimbursement programs to support doctor requirements and patient healthcare demands.
<b>Takeaways</b>	Remote patient monitoring is a key component of healthcare that helps improve patient outcomes and satisfaction. Through the automatic and remote capture of medical information, RPM provides comprehensive, patient-oriented care, especially for elderly and high-risk patients. In the current pandemic situation, RPM can help prevent COVID-19 exposure and reduce emergency room visits and hospitalizations by evaluating patient health data from the comfort of their own home.
<b>More info</b>	_____

## Appendix C: Selected best practices of collaboration mechanism

<b>Case 1</b>	<b>The NSW Government Develops a Tool to Reduce the Risk of Data Re-Identification, <a href="#">Link</a></b>
<b>Timestamp</b>	Jan 28, 2021
<b>Implementing economy</b>	Australia
<b>Keywords</b>	NSW government, re-identification risk, PIF
<b>Abstract</b>	CSIRO's Data61 and the New South Wales government have teamed up to develop a tool that allows important datasets to be shared with the public while ensuring sensitive personal information remains protected.
<b>Lead Agency</b>	New South Wales government
<b>Facilitators</b>	CSIRO
<b>Targeted users</b>	Australian
<b>Application scenarios</b>	Lowers re-identification risk of datasets
<b>Collaboration mechanism</b>	CSIRO's Data61 and the New South Wales government have teamed up to develop a tool.
<b>Technical Architecture</b>	CSIRO Data61 provides personal information factor (PIF) tools that use sophisticated data analysis algorithms to identify sensitive information in datasets.
<b>Project Impacts</b>	The PIF tool helps the NSW government minimize the risk of re-identification of COVID-19 case datasets before releasing to the public.
<b>Takeaways</b>	The NSW government has been using an earlier version of the tool to analyze, secure, and publish datasets tracking the spread of COVID-19 in the state since March 2020. The technology also plays a key role in the examination of other datasets (such as domestic violence during COVID-19 lockdowns and public transit utilization) before public release.
<b>More info</b>	The evolving approach to a PIF takes a tailored approach to each dataset by considering various attack scenarios used to de-identify information. The tool then assigns a PIF score to each set.

<b>Case 2</b>	<b>First 5G-Oriented Remote Ultrasound Surgery at Shanghai International Medical Center, <a href="#">Link</a></b>
<b>Timestamp</b>	Oct 4, 2019
<b>Implementing economy</b>	China
<b>Key words</b>	5G, AIoT, RaaS
<b>Abstract</b>	Nokia Shanghai Bell uses TeamViewer, a leading global secure remote connection platform, to provide 5G focused ultrasound telesurgery services for hospitals.
<b>Lead Agency</b>	Shanghai International Medical Center
<b>Facilitators</b>	Nokia Shanghai Bell, China Unicom, Fustech
<b>Targeted users</b>	hospital patient
<b>Application scenarios</b>	Ultrasound Telesurgery
<b>Collaboration mechanism</b>	Nokia Shanghai Bell and China Unicom have partnered to provide networking solutions, end-to-end 5G network equipment, and related terminals. Fustech provides RaaS.
<b>Technical Architecture</b>	China Unicom has carried out the deployment of 5G digital distribution and MEC edge computing equipment. Nokia Shanghai Bell and China Unicom have partnered to provide networking solutions, end-to-end 5G network equipment, and related terminals. Fustech provides a 5G + AIoT cloud-edge-end integrated remote treatment system platform, along with Robot as a Service (RaaS) for hospital customers.
<b>Project Impacts</b>	The project involved a FUS surgery on a patient, which successfully thermally ablated five uterine fibroids with a maximum size of 4.8 cm. In addition to receiving smooth expert treatment, the patient was spared the pain of having to travel around.
<b>Takeaways</b>	The 5G-oriented ultrasound surgery was the first of its kind in the world, marking the imminent birth of a commercial remote 5G surgery project. Focused ultrasound (FUS) equipment are highly digitized device with innate advantages when paired with 5G. This non-invasive treatment method has multiple advantages, including the lack of need for incision and anesthesia, along with the protection of the patient's organs.
<b>More info</b>	Focused ultrasound therapy is a non-invasive treatment technology, which has the characteristics of no surgery, no bleeding, no anesthesia, and preservation of the patient's organs, and the risk of surgery is relatively low.



<b>Case 3</b>	<b>People’s Liberation Army General Hospital Launches a 5G+ Smart Healthcare Project, <a href="#">Link</a></b>
<b>Timestamp</b>	Nov 22, 2019
<b>Implementing economy</b>	China
<b>Keywords</b>	5G, smart medical care
<b>Abstract (No more than 200 words)</b>	As a technical partner of the PLA General Hospital, Hongyun Medical and Huawei jointly showed the audience the overall solution of 5G + smart medical care, as well as the rich practical achievements of the PLA General Hospital in 5G remote surgery, 5G remote clinic, and 5G remote ultrasound.
<b>Lead Agency</b>	People’s Liberation Army General Hospital
<b>Facilitators</b>	Huawei ,Butel
<b>Targeted users</b>	hospital patient
<b>Application scenarios</b>	telesurgery
<b>Collaboration mechanism</b>	People’s Liberation Army General Hospital integrates Huawei's 5G network and equipment as well as Butel's Internet telemedicine technology into all department systems.
<b>Technical Architecture</b>	Huawei provides 5G communication technology, while Butel provides overall telemedicine solutions that utilize information systems such as the Internet, cloud computing, cloud node transmission, and audiovisual codec technologies.
<b>Project Impacts</b>	The 5G+ smart medical solution gives full play to the respective technical advantages of Butel and Huawei to meet the practical needs of various departments of People’s Liberation Army General Hospital. The solution has already seen successful applications such as the world’s first remote-controlled human brain surgery in a 5G network environment, the world’s first 5G remote robot total hip replacement surgery, and the opening and operation of a full-coverage remote 5G clinic on the southernmost island of China.
<b>Takeaways</b>	5G+ smart medical care is the future of industrial development and the market competitiveness of healthcare institutions. Through this solution, People’s Liberation Army General Hospital comprehensively utilizes cutting-edge technologies such as 5G networks, HD audio and video transmission, cloud image transmission, and remote simulation and controls to realize inter-regional, high-reliability, high-definition, and ultra-low-latency doctor-patient communication, “face-to-face” physical examination, and diagnosis and treatment.
<b>More info</b>	——

<b>Case 4</b>	<b>A Korean Hospital Shortens Image Read Times, <a href="#">Link</a></b>
<b>Timestamp</b>	_____
<b>Implementing economy</b>	Republic of Korea
<b>Key words (No more than 5)</b>	S Hospital, RemoteView
<b>Abstract (No more than 200 words)</b>	For rapid diagnosis and treatment, S Hospital introduced the RemoteView remote control solution, which can remotely confirm the high-resolution images of the imaging department directly in the doctor's consultation room.
<b>Lead Agency</b>	S Hospital
<b>Facilitators</b>	RemoteView
<b>Targeted users</b>	patient
<b>Application scenarios</b>	medical consultation
<b>Collaboration mechanism</b>	S Hospital's medical imaging equipment is integrated with RemoteView medical imaging data analysis technology.
<b>Technical Architecture</b>	To enhance the speed of diagnosis and treatment, a Korean hospital deployed the RemoteView solution, which is capable of remotely confirming high-resolution images directly from the doctor's consultation room.
<b>Project Impacts</b>	RemoteView can be used to remotely connect to image data through remote screen sharing on any computer, significantly reducing the time ICU patients need to wait for examination results. Patients with hypertension and diabetes must monitor their blood pressure and blood sugar levels frequently to maintain their health. RemoteView allows doctors to provide timely services to patients based on indicators confirmed in real-time, and supports system health management.
<b>Takeaways</b>	The model Korean hospital conducts prospective and progressive clinical/basic research that involves a large amount of medical personnel, providing support for the latest medical knowledge and technology. The hospital has deployed the RemoteView solution, which is capable of directly and remotely confirming high-resolution images from the consultation room, to lead the revolution in diagnostic imaging.
<b>More info</b>	_____

<b>Case 5</b>	<b>Ministry of Health COVID-19 Rapid Testing, <a href="#">Link</a></b>
<b>Timestamp</b>	Jul 26, 2021
<b>Implementing economy</b>	Malaysia
<b>Key words (No more than 5)</b>	DOC2US, AI System, COVID-19 Rapid Test
<b>Abstract (No more than 200 words)</b>	DOC2US has launched its proprietary Rapid Test Kit Intelligent System (RTKis) which will test, record, manage, and report COVID-19 cases for corporates and the public.
<b>Lead Agency</b>	Ministry of Health
<b>Facilitators</b>	DOC2US
<b>Targeted users</b>	Malaysian
<b>Application scenarios</b>	Malaysian
<b>Collaboration mechanism</b>	The AI technology of DOC2US synchronizes the identified detection data to SIMKA.
<b>Technical Architecture</b>	DOC2US provides Rapid Test Kit Intelligent System (RTKis) and machine learning image classification engine to test, record, manage, and report COVID-19 cases for enterprise and public applications.
<b>Project Impacts</b>	After users perform self-testing, they can typically submit their results to the RTKis, which uses AI for validation. Positive results are uploaded to the SIMKA, which is synchronized with MySejahtera.
<b>Takeaways</b>	The system provides a cost-effective, reliable, and convenient method to comply with the guidelines set by the Ministry of International Trade and Industry for sectors of the economy that are allowed to operate under Phase II of the Malaysia Recovery Plan.
<b>More info</b>	DOC2US is a Ministry of Health-approved telemedicine provider that distributes digitally signed e-prescription services in Malaysia.

<b>Case 6</b>	<b>Bumrungrad Telemedicine Program, <a href="#">Link</a></b>
<b>Timestamp</b>	Feb 26 2020
<b>Implementing economy</b>	Thailand
<b>Keywords</b>	Bumrungrad Hospital, Doctor Raksa, virtual consultations
<b>Abstract</b>	Organizations such as Bumrungrad Hospital and Bangkok Dusit Medical Services (BDMS) are putting dozens of their doctors on call for telemedicine appointments for Thais and patients coming from overseas as a way to cut down on medical costs and attract new patients.
<b>Lead Agency</b>	Bumrungrad
<b>Facilitators</b>	Doctor Raksa
<b>Targeted users</b>	patient
<b>Application scenarios</b>	telemedicine
<b>Collaboration mechanism</b>	Doctor Raksa's mobile app provides a commerce platform for doctors and medicine in hospitals
<b>Technical Architecture</b>	The project provides the Doctor Raksa app and virtual consultations, allowing patients to access their electronic health records. Any consultations given through the app are automatically updated in the hospital's system.
<b>Project Impacts</b>	The project has helped Thais in rural areas with no nearby hospitals easily access healthcare experts. Users in Bangkok can avoid heavy traffic and obtain essential prescriptions without leaving the comfort of their homes.
<b>Takeaways</b>	These types of cross-border online doctor exchanges operate in a legal gray area as doctors are technically only permitted to practice medicine in their economy. The Doctor Raksa has allowed anyone in any economy to access healthcare services, no matter who they are.
<b>More info</b>	_____

<b>Case 7</b>	<b>Department of Medical Services Digital Healthcare System Construction, <a href="#">Link</a></b>
<b>Timestamp</b>	Nov 8, 2021
<b>Implementing economy</b>	Thailand
<b>Keywords</b>	DMS, Huawei, 5G
<b>Abstract</b>	Global tech giant Huawei signed a 2-year memorandum of understanding with Thailand's Department of Medical Services (DMS) at a signing ceremony presided over by Thailand's Minister of Public Health Anutin.
<b>Lead Agency</b>	DMS
<b>Facilitators</b>	Huawei
<b>Targeted users</b>	patient
<b>Application scenarios</b>	telemedicine
<b>Collaboration mechanism</b>	DMS' ICT equipment and expertise merge with Huawei's 5G technology.
<b>Technical Architecture</b>	Huawei has launched smart services that leverage integrated digital technologies such as 5G, AI, big data, and cloud computing to help the DMS improve medical services in Thailand.
<b>Project Impacts</b>	The project has unlocked a wealth of new services, such as telemedicine, patient visit management, and patient information collection based on big data. Integration of advanced ICT devices, the expertise of the DMS, and 5G technologies help create opportunities to benefit more Thais and provide them with equal access to high-quality and rapid healthcare.
<b>Takeaways</b>	This partnership represents a milestone in the introduction of world-class technology to Thailand's healthcare system, which is of great significance for raising the overall level of the industry and improving the quality of life of urban and rural residents.
<b>More info</b>	Huawei will cooperate with DMS's National Cancer Institute and Rajavithai Hospital.

<b>Case 8</b>	<b>University Of Miami Pediatric Mobile Clinic Construction, <a href="#">Link</a></b>
<b>Timestamp</b>	Dec 21, 2018
<b>Implementing economy</b>	United States
<b>Keywords</b>	AMD, University Of Miami, Mobile Clinic
<b>Abstract</b>	In Miami-Dade County, the University of Miami Pediatric Mobile Clinic relies on AMD's telemedicine technology to help them greatly improve access to treatment in areas that need it most.
<b>Lead Agency</b>	University Of Miami
<b>Facilitators</b>	AMD
<b>Targeted users</b>	pediatric patients
<b>Application scenarios</b>	primary care
<b>Collaboration mechanism</b>	By bringing the remote specialists to the University Of Miami mobile unit via AMD's telemedicine technology.
<b>Technical Architecture</b>	AMD provides portable teleclinic and integrated telemedicine technology. The mobile TeleClinic system utilizes specialized medical equipment, real-time data aggregation software, and video conferencing to provide convenience for UMMPC staff.
<b>Project Impacts</b>	With the introduction of remote experts to the University of Miami medical system through AMD telemedicine technology, compliance rates have risen significantly from 30% to 90%. More importantly, patients have benefited from all-inclusive care.
<b>Takeaways</b>	By leveraging AMD's mobile portable teleclinics and integrated telemedicine technology, UMMPC has expanded to reach of its primary care to 15 specialized services. The University of Miami Mobile Clinic enables communities to have the same cutting-edge services that a traditional hospital or medical practice has providing more convenient access to specialized health care for uninsured patients in the community.
<b>More info</b>	With the help of AMD's Portable TeleClinic, UMPMC can treat nearly 3,000 children each year.

<b>Case 9</b>	<b>Oregon Health &amp; Science University Virtual ICU, <a href="#">Link</a></b>
<b>Timestamp</b>	Dec 16, 2020
<b>Implementing economy</b>	United States
<b>Keywords</b>	Oregon Health, Science University, Virtual ICU
<b>Abstract</b>	GE Healthcare announced a multi-year agreement with Oregon Health & Science University, Oregon’s only academic health center, that will allow OHSU to oversee and help provide care to ICU patients across eight hospital sites via a “Virtual ICU”, using the GE Healthcare Mural Virtual Care Solution.
<b>Lead Agency</b>	Oregon Health & Science University (OHSU)
<b>Facilitators</b>	GE Healthcare
<b>Targeted users</b>	ICU patients
<b>Application scenarios</b>	critical care shortage
<b>Collaboration mechanism</b>	GE Healthcare’s Mural Virtual Care solution seamlessly integrates and embeds into the workflow of the University.
<b>Technical Architecture</b>	In response to shortages in critical care, OHSU and GE Healthcare have partnered to develop a customized healthcare workflow solution to support the OHSU VICU. The GE Healthcare platform (Mural Virtual Care Solution) integrates data from multiple systems and devices through edge infrastructure or cloud deployments, which devices to digitize the hospital’s best practices and clinical protocols, and provide a comprehensive, real-time view of patient status that is scalable across a selected care area, hospital, or entire health system.
<b>Project Impacts</b>	The project has improved community hospital care, enabling Oregon patients to receive the healthcare they need closer to home while reducing unnecessary transfers and optimizing the ICU capacity of the region.
<b>Takeaways</b>	The flexible platform supports the provision of data from devices and systems from a variety of manufacturers, beyond the capabilities of conventional remote ICUs. The solution empowers specialists with the ability to reach multiple ICU patients in a centralized location, and expands the virtual care scenarios of healthcare systems as their demands evolve.
<b>More info</b>	Mural will also support the OHSU goal of enhancing the quality of care throughout the system by providing analytics on clinical information, such as minutiae ventilation data and metrics on clinical and operational best practices, including pain, delirium and agitation management.