

Fujitsu's Technologies and Solutions Contributing to Development of Sports

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Fujitsu seeks to develop digital sports services in the sports business market with an eye to 2020 and beyond. Digital sports services consist of technologies and solutions to assist the "playing," "watching," and "supporting" of sports and a digital sports marketing platform to stimulate the sports business market. This paper outlines the digital sports services systematized by Fujitsu and discusses the outlook for digital businesses in the post-2020 market.

1. Introduction

Japan is scheduling a series of major international sporting events to take place around 2020. Additionally, faced with the coming of a full-scale aging society, the Japanese government has set a priority on establishing a "sports nation" in which every citizen can lead a culturally enriched life in a mentally and physically fit manner. To this end, the plan is to grow the sports business market by three times (to 15 trillion yen) by 2025.¹⁾

Under these conditions, Fujitsu seeks to provide digital sports services with the aim of creating new digital businesses in the sports business market through the power of technology. "Digital sports services" consist of technologies and solutions to enhance the "playing," "watching," and "supporting" of sports and a digital sports marketing platform to stimulate the sports business market. This issue introduces several papers on digital sports services.

In this paper, we first describe Fujitsu's contributions to sports. We then introduce technologies and solutions that Fujitsu can provide to the sports business market and examples of their use. Finally, we touch upon the future outlook of digital sports services and the shape of sports to come.

2. Fujitsu's contributions to sports

2.1 Changes in sports business market

During the period of Japan's economic boom from

the 1950s to 1970s, people viewed sports as a part of their education (physical education) and as a way to enjoy their leisure time—it was not considered to be a major industry. Modern society, however, is in a transition from an industrial society in which productivity comes first to a post-industrial society in which people wish to enjoy their leisure time and lead a fulfilling life. The way that the general public thinks about sports is also changing. In effect, while traditionally thought to be an activity lacking in productivity, people are now discovering value in sports through diverse ways of interacting with it, namely, through the three elements of playing, watching, and supporting. Today, most people are coming to accept sports as an industry and to recognize it as a market.²⁾

2.2 Features of sports business market

Customers in the sports business market can be viewed as sports associations and club teams that are directly engaged in sports performances as well as operators that sponsor sporting events and owners of sports facilities. In general, running a business requires the procurement and application of capital and the generation of revenue. In a sports business, winning must be added to the above as a new mission. However, in Japan, there are many cases in which winning alone does not lead to greater revenues, so the concept of "popularization" must be added to develop the market. In short, a sports business must fulfill the three missions of "winning," "capital," and "popularization" while

adhering to base "principles" to create a virtuous cycle (Figure 1).³⁾ Sports associations and club teams generally cite the promotion of sports culture, development of a healthy mind and body, international exchanges, regional and social contributions, etc. as principles underlying their activities.

2.3 Fujitsu's contributions to sports business market

In addition to contributing to sports from the viewpoints of winning, capital, and popularization,

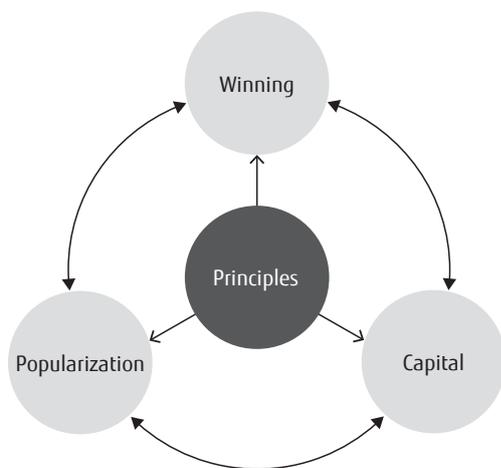


Figure 1
Three missions in a sports business.

Fujitsu will create digital businesses in the sports business market expected to expand in the future.

1) Winning

Fujitsu will provide training systems to improve the skills of individual athletes and solutions to improve team tactics.

2) Capital

Fujitsu will provide support through sponsorship deals. This will include the provision of advanced Fujitsu technologies in addition to monetary support.

3) Popularization

Fujitsu will provide a digital marketing platform to expand the fan base, hospitality services for spectators, and live viewing solutions with a high sense of presence for viewer enjoyment.

3. Fujitsu technologies supporting sports

Fujitsu has structured a digital sports platform to provide digital sports services and contribute to the development of the sports business market through technology (Figure 2). This section introduces the digital technologies supporting this platform and present examples of their use.

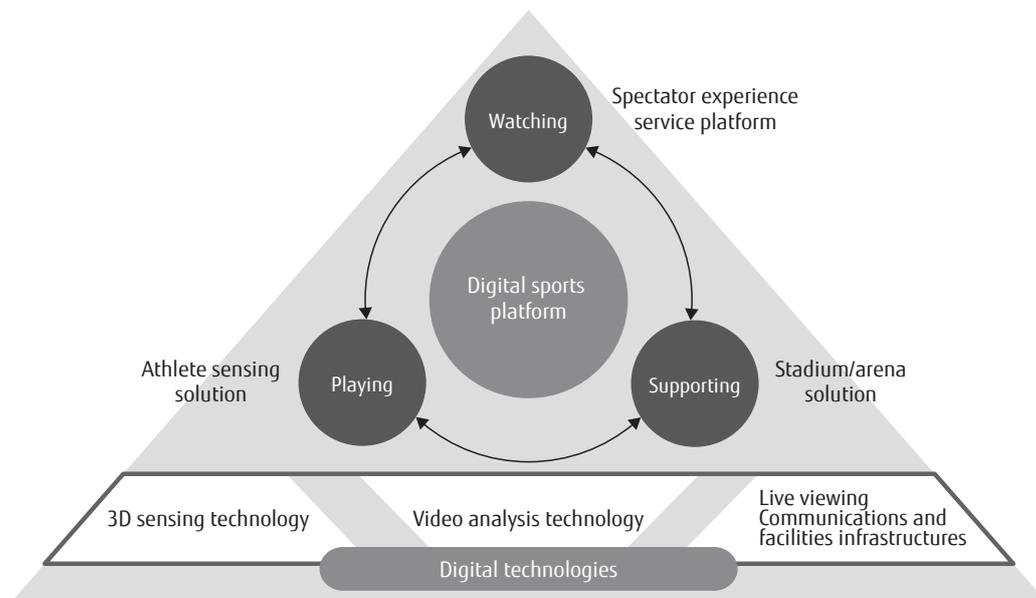


Figure 2
Overview of digital sports platform.

3.1 Technologies supporting digital sports platform

This digital sports platform deals with sports from the three viewpoints of playing, watching, and supporting and systematizes solutions aiding each of these viewpoints.

To begin with, "athlete sensing solution" supports an athlete's "playing" centered around two systems: a high-precision motion tracking system and 3D sensing system. These systems consist of technologies for recognizing objects through images, laser sensors, etc. that can be used in sports to identify and digitize human movement.

Next, "spectator experience service platform" supports the watching of sports centered around free viewpoint video generation technology and live viewing system. These are technologies that can deliver clear video from various angles and audio/vibrations in real time to locations other than the sports venue enabling the spectator to experience an equivalent or even better sense of presence. The aim here is to provide a new sports viewing style that increases the added value of sports content while making sports more entertaining.

A stadium or arena is an area that supports sports by virtue of providing facilities where games or matches can be held. "Stadium/arena solution" supports this function by setting up ICT infrastructure facilities such as network and video display equipment in stadiums or arenas and by rationalizing and efficiently managing and operating services through a total facility management system. This solution also provides enhanced value-added services by linking spectator smartphones to the facilities' Wi-Fi access points, beacons, and digital signages.

The digital technologies making up each solution and the corresponding papers in this issue are listed in **Table 1**.

The paper titled "3D Sensing Technology for Real-Time Quantification of Athletes' Movements" describes technical skill scoring in competitions that have traditionally relied on the human eye. It describes 3D laser sensor and skeleton recognition technology based on machine learning that can improve the accuracy of judging by quantifying an athlete's movements. "Image Analysis Technologies to Realize 'Dream Arenas'" describes motion tracking technology that digitizes players' formations to improve team tactics and free viewpoint video generation technology that enables a spectator to view a scene from any point of view. Finally, "Digital Technology to Support Next-Generation Stadiums/Arenas" describes facilities and communications infrastructures for entertaining many spectators and a live viewing system for providing a realistic experience for viewers not present at the sports venue.

3.2 Digital sports marketing for expanding fan base

One important means of gathering capital for a sports business is to expand the fan base. The following introduces solutions for ensuring that fans who come to watch a sporting event have an enjoyable time.

First, tickets for events can be easily purchased on a website, at a convenience store, etc., and it is also possible to reserve seats. Moreover, as the digitization of tickets continues to progress, it can be expected that high value-added services (seating information, food/beverage orders, etc.) will be expanded. Such services can be achieved through close coupling with the

Table 1
Digital technologies for Fujitsu solutions and corresponding papers.

Element	Solution system	Digital technologies	Paper title
Playing	Athlete sensing solution	3D sensing technology	3D Sensing Technology for Real-Time Quantification of Athletes' Movements
		Motion tracking technology	
Watching	Spectator experience service platform	Free viewpoint video generation technology	Image Analysis Technologies to Realize "Dream Arenas"
		Live viewing system	
Supporting	Stadium/arena solution	Communications/facilities infrastructures	Digital Technology to Support Next-Generation Stadiums/Arenas
		Operation/maintenance solutions	

solutions and platform described above to provide the best service to spectators. In addition, ticket purchasers and fans can be registered as members to enable digital marketing in sports. The paper titled "Digital Marketing That Leverages Sporting Event Ticketing Data" describes services that make use of information on ticket purchasers and reserved seats.

This digital sports platform is not limited to providing the best service to spectators through ICT. It also serves to collect and analyze all sorts of information centered about ticket data to expand the fan base and increase sales.

The solutions and platform described above can demonstrate a maximum effect by organic cross-linking. For example, an athlete's performance information (stats) generated by the athlete sensing solution can be linked to the spectator experience service platform, and that information can be used in a live viewing that uses an arena's large display equipment set up by the stadium/arena solution. As a result, it is possible to provide watching environments where the spectators can easily understand the game situation.

In addition, "Place-based Services Platform That Enhances Satisfaction from Sports Tourism to Daily Life" describes how considering location information tied to ticket purchasers can provide added value through ICT for people visiting a stadium or its surroundings. Furthermore, since making sports as entertaining as possible is essential to popularizing sports, "UX Design Maximizes the Appeal of Sports" describes user experience (UX) design techniques to that end.

3.3 Solutions supporting major events

When it comes to major international sporting events that attract worldwide attention, even a momentary system failure is hardly permissible. A system for a major sporting event, therefore, requires a level of service that can ensure sufficient reliability and quality, but it must be kept in mind that it is still a one-off system that will no longer be used once the event is over. In this regard, Fujitsu possesses abundant know-how from its experiences with large-scale system integration (SI). "System Platform Supporting Major Sporting Events" describes how this know-how is used to set up an ICT platform for the stable and efficient management of major international sporting events.

Additionally, as major international events held

within Japan can be expected to face large-scale cyber attacks from anywhere in the world, "Cybersecurity Solutions for Major International Events" introduces the latest cybersecurity technologies for such events and explains the need for the development and training of security personnel.

3.4 Examples of using ICT in sports

Finally, we introduce examples of using ICT in sports. "ICT-Based Judging Support System for Artistic Gymnastics and Intended New World Created Through 3D Sensing Technology" introduces efforts to improve the accuracy of gymnastics scoring applying the technology presented in the previously mentioned paper "3D Sensing Technology for Real-Time Quantification of Athletes' Movements."

4. Future outlook and Fujitsu's vision of future sports

The technologies introduced above have the potential of being used in markets other than sports.

The 3D sensing system in the athlete sensing solution could be used to create a database of a person's movements, which suggests future applications in the healthcare field. For example, this system could be used to compare a person's movements before and after an injury to aid in determining an appropriate rehabilitation regimen or to extend healthy life expectancy in the elderly through the use of data. Additionally, by being able to faithfully reproduce a person's movements, the system could be applied to traditional performing arts or industrial craftsmanship.

The spectator experience service Platform supports the watching of sports. It can be used to make a sports venue more entertaining to spectators or to deliver high-presence video to remote viewers with the aim of providing a level of entertainment equivalent to an experience in a venue. In fact, Fujitsu would like to expand viewing content beyond sports to concerts, musicals, etc.

Finally, with regard to the stadium/arena solution, there are approximately 20,000 stadiums, arenas, and gymnasiums throughout Japan. Most of these, however, serve as training facilities with low usage fees and utilization rates, which essentially prevents investment. Such facilities, though, could serve as a community hub to trigger local revitalization or be used to develop

business as a facility for accommodating spectators in areas other than sports.

From here on, society must be more welcoming to diversity. New services will be needed to accommodate the growing number of foreign tourists and to achieve a society friendly to disabled persons. These services could not be introduced in this issue, but the following summarizes a few of the technologies that will be used to provide them.

1) Multilingual speech translation system

This is a wearable, ID Card Type Hands-free Speech Translation Device (Figure 3) that detects the direction



Figure 3
ID Card Type Hands-free Speech Translation Device.

of speech and automatically recognizes who is speaking. Using noise suppression technology, it can detect the speech of a person 80 cm away at a noise level of 60 dBA at 95% accuracy. The languages currently supported include English, Chinese, and Korean.

2) LiveTalk

Developed for the hearing impaired, this solution recognizes what a speaker is saying and converts that speech to text. It can improve the speech recognition rate through machine learning and includes a translation function that currently supports 19 languages (Figure 4).

5. Conclusion

This paper outlined Fujitsu's digital sports services. In Japan, there is no doubt that the holding of a series of major international sporting events scheduled around 2020 is a significant factor behind a growing interest in sports. Other countries are uncovering cultural value in sports in a similar manner. It is widely accepted that sports constitutes a common culture extending beyond borders and plays an important role in international exchanges.

Calling a person with sport literacy a "physically educated person" is one aspect of sports as a common world language and a means of facilitating social interaction. Sporting activities can provide a person with

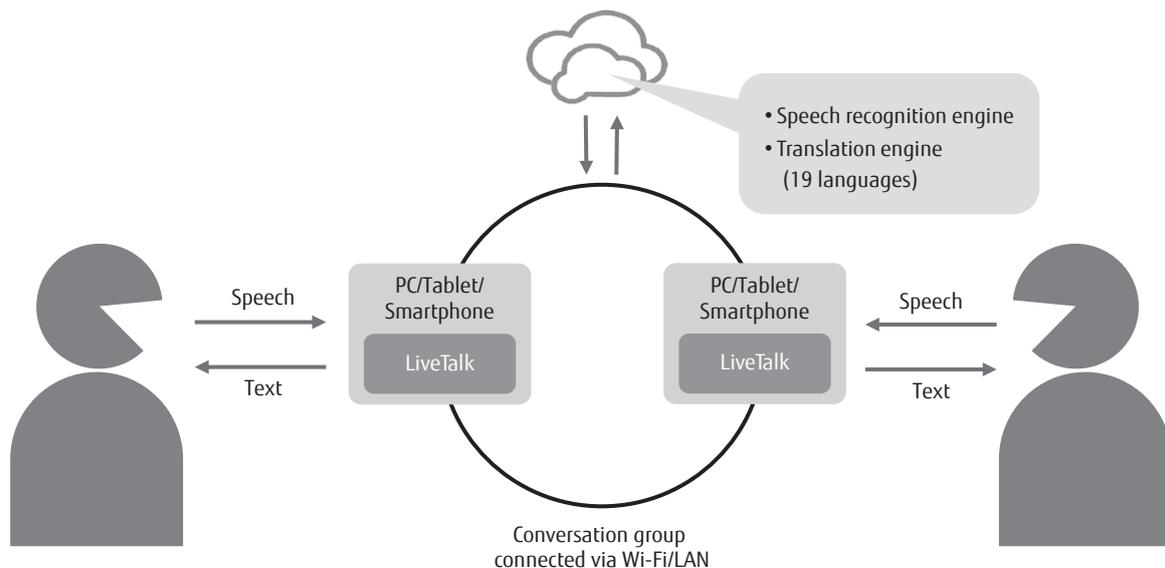


Figure 4
Overview of LiveTalk system.

opportunities to engage with other people and can foster communication skills for living through interaction with a wide range of people in society.

Providing Fujitsu technologies and solutions in this way to extract the potential of sports to the fullest has not been actively promoted until now. Going forward, Fujitsu would like to use sports as a showcase for demonstrating how new services can be provided to solve a wide variety of problems facing society.

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