# Real-Time and Automatic Internet Advertisement Delivery Service through AI Analysis and Data Integration

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**Internet advertisements (ads) have benefits not provided by conventional ads; not only do they allow measurement of ad deliver results but they also make this data available for subsequent ads. However, the lack of human resources and departments with ICT expertise, which is required to effectively utilize Internet ads, is an issue at many companies. Outside Japan, ICT vendors provide one-stop services that cover the entire process, from target analysis and purchase of ad space to ad delivery and data analysis following delivery. Against this background, Fujitsu aimed to realize a one-stop service for Internet ad delivery making use of AI technology and human resources such as data scientists, and implemented such a service in house. Then making use of the knowledge and know-how acquired through this implementation, Fujitsu developed a system for automatically delivering Internet ads in real time and has begun offering it as the FUJITSU Intelligent Data Service AD Drive Programmatic Marketing Service (hereafter, AD Drive). This paper describes Fujitsu's process of in-house implementation of its prototype Internet ad delivery service and outlines the resulting, commercially offered, AD Drive service.**

## 1. Introduction

Internet ads refers to all advertisements posted on websites, e-mails, social media and mobile applications. It is difficult to record by whom and when ads in traditional media such as television, newspapers, and magazines are seen, but this is not the case for Internet ads, making it easy to measure their effectiveness. Measuring this effectiveness has the merit of allowing visualization of potential customers and clarification of cost effectiveness.

With the explosive spread of smartphones, the Internet advertising market has been growing at an annual rate of 10% or more. The size of this market exceeded 1.5 trillion yen in 2017,[1)] taking over newspapers, magazines, and radio, and it is nearing the approximately 2 trillion yen size of the television advertising market. For this reason, Internet advertising is an indispensable part of digital marketing.

Internet ads can be enhanced by delivering them to the appropriate users via the appropriate media. To this end, ICT expertise, including aspects such as the storage and analysis of large amounts of data including mission-critical data of enterprise, is required, but several issues such as the following exist.

1) Information systems departments often lack human resources that understand Internet advertising.
2) Ad delivery is handled by advertising agencies and data analysis is handled by ICT vendors, making coordination slow.

To remedy these issues, Fujitsu implemented in house a service for Internet ad delivery using AI and mission-critical data, and has begun offering this service as the FUJITSU Intelligent Data Service AD Drive Programmatic Marketing Service (hereafter, AD Drive).

This paper describes the process of Fujitsu's in-house implementation of its Internet ad delivery service and outlines the resulting AD Drive service.

## 2. Current status of Internet advertising and existing issues

Coordination between the marketing department and the information systems department is required when companies put out Internet ads. This is because it is essential for the marketing department to utilize the mission-critical data accumulated by the information systems department to maximize advertising

effectiveness. In practice, however, such coordination hardly occurs, and as a result companies fail to achieve effective ad delivery. This is because their information systems department lack human resources with Internet ad delivery expertise and are insufficiently aware of the importance of coordination with the marketing department.

Further, there are few Internet ad delivery service providers offering one-stop solutions ranging from the storage of large amounts of data including mission-critical data to data analysis and ad delivery according to client requirements. Timely data analysis is particularly important because it is necessary to adjust the delivery settings according to the results, such as the click rate[note 1)] and the conversion rate[note 2)] for programmatic advertising.[note 3)] However, in many cases ad delivery is handled by an advertising agency while data analysis is the responsibility of the ICT vendor, resulting in slow service provision.

Outside Japan, ICT vendors and consulting firms often undertake Internet ad delivery themselves. In doing so, they offer a one-stop solution that encompasses target customer analysis, acquisition of advertising space appropriate to the target customer, and delivery. Based on this strength, such players are more successful in winning orders. In fact, outside Japan, the first four top spots in terms of Internet advertising handling volume are held by ICT vendors and consulting firms, and the highest ranked advertising agency comes in only in fifth place.[2)]

## 3. Fujitsu's approach

To solve the issues mentioned in the previous section, Fujitsu developed a system and framework enabling one-stop, real-time, and automatic service provision by coordinating Internet ad delivery, AI technology, and mission-critical data. Specifically, we integrated data acquired through marketing activities and customers' data accumulated in the mission-critical system in real time, and based on that, implemented Internet ad delivery in house on an iterative basis.

As a result, our ad delivery demonstration experiment achieved a conversion rate 2.5 times that of the conventional method. Combining the know-how acquired from this in-house demonstration experiment and Fujitsu's expertise in advertising media and ad placement, we began offering our Internet ad delivery service as AD Drive in April 2018.

## 4. Fujitsu's history of Internet advertising-related activities

Fujitsu has had its own advertising media for some time and has gained experience delivering ads for clients through these media. Specifically, our advertising media include the media business of "@nifty," an Internet service provider that we launched in 1999. Next, in 2009, we launched "My Cloud," a portal site for users of Fujitsu's FMV brand of PCs, and in 2010, we began to operate "Rakuraku Community," a portal site for seniors using Fujitsu's brand of mobile phones.

The unique users[note 4)] who frequent these websites can number as many as 1.9 million per month, generating between approximately 30 million to 77 million page views (PV)[note 5)] each month. Fujitsu has been selling ads space on these portal sites to businesses.

On the other hand, as a client, Fujitsu also began promotion activities to raise awareness of its FMV brand of consumer PCs, its ARROWS series of smartphones, and its Raku-Raku brand of smartphones targeted at the elderly, among other things. Moreover, we carried out promotion activities to bring users to "WEB MART," Fujitsu's official direct sales site for FMV PCs, which was launched in 2000. In doing this, we gauged the effectiveness of our advertising and implemented ad delivery operations with a view to putting what we had learned to use in our next ad delivery project. Through such activities, we have been accumulating ad

note 1) The proportion of times that an ad generates user clicks compared with the number of views of that ad.

note 2) Percentage of the visitors to a website who take a desired action such as making a purchase (conversion).

note 3) Advertising that can be finely targeted according to the purpose, including selective delivery on mobile app, social media, and other channels. Internet advertising can be roughly divided into reserved advertising, which consists in purchasing advertising space in media and posting banners and other advertising items there, and programmatic advertising.

note 4) Number of users who visit a website.

note 5) Number of times users view a website page.

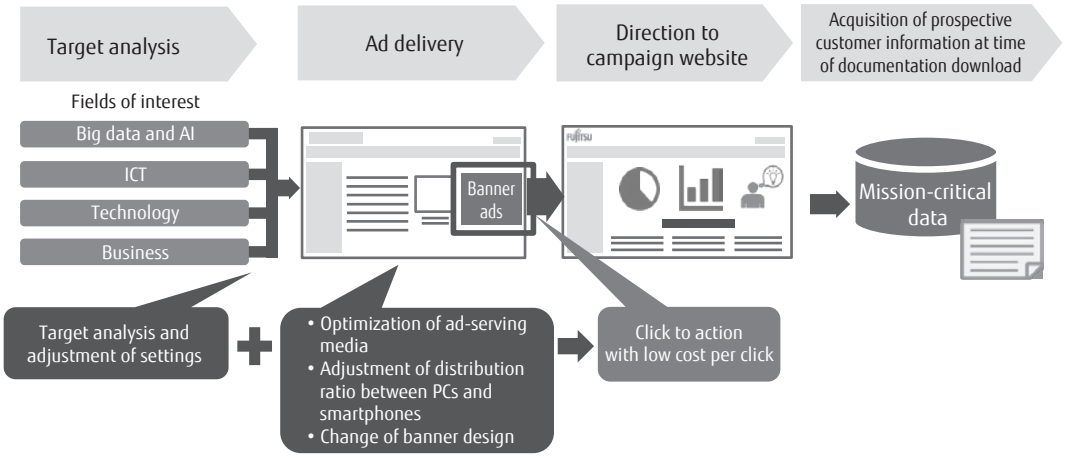


**Figure 1**
**First-round in-house implementation: Prospective customer information acquisition project.**

placement know-how.

This accumulation of experience and know-how from the two aspects of operating advertising media and putting out ads as a client, as described above, is similar to the work done by advertising agencies. Thus it occurred to us that, through the use of Fujitsu's ICT know-how and its human resources such as data scientist, we could make Internet ad delivery more efficient. Specifically, Fujitsu has technology and know-how both as an ICT vendor and as a solution provider. We can also draw upon our experience running advanced services such as big data, cloud (FUJITSU Cloud Service), and AI (Human Centric AI Zinral), as well as an abundance of human resources including the system engineers (SEs) and data scientists who work on these services.

## 5. In-house pre-launch trial of AD Drive service

This section describes Fujitsu's in-house pre-launch trial of the AD Drive service.

### 5.1 First-round in-house implementation: prospective customer information acquisition

In fiscal 2016, Fujitsu began activities toward acquiring prospective customer information by using its internal ICT infrastructure, know-how, and resources. In the first half of fiscal 2017, we launched a prospective customer information acquisition project. This was a project to use ad delivery to direct users to a campaign site and have them provide prospective customer information in exchange for downloading materials from the website (**Figure 1**).

In this project, we aimed to reduce the cost per click, [note 6)] that is, to determine how inexpensively user traffic can be directed to the website. Since Fujitsu has ad placement know-how as a client, we thought that we could reduce the cost per click through the following measures.

- Target analysis and adjustment of ad delivery settings
- Adjustment of advertising media
- Adjustment of distribution ratio between PCs and smartphones
- A/B testing[note 7)] of banner designs, analysis of the results, and banner modifications

As a result, we were able to reduce the cost per click at the beginning of the campaign, but the effect of these measures quickly reached a limit.

### 5.2 Things learned from first round of in-house implementation

From the results of the first-round in-house implementation described above, we learned the following four things.

note 6) The cost per click on an ad that takes the user to a website, resulting in one access.

note 7) Testing of two variants to determine which variant is more effective.

1) Necessity of staff increases for campaign continuation

As the campaign goes on, various data are accumulated, and it is necessary to adjust the target and optimize ad delivery accordingly. However, this means more work per employee involved, and increasing the number of employees involved is unavoidable for the continuation of operation. This in turn is a negative factor for cost reduction.

2) Difficulty of dynamic improvement of measures

It is difficult to continuously produce results by applying the same campaign content for a long time, and substantial improvement of measures is required at some point. However, as the persons in charge of ad delivery are busy with day-to-day operations and delivery adjustments, they seldom have time to work on improving measures. Therefore, arrangements must be made to allocate the resources of the persons in charge to enable them to take some time away from daily operations to work on improving measures.

3) Analysis of enormous amount of customer data

Analysis of customer data for targeting purposes involves an amount of data that grows enormous as the campaign progresses, and much labor and time is required for the analysis of all this data. As a result, it becomes difficult to implement policies in real time according to user trends.

In our first-round in-house implementation, the number of visitors to the website exceeded one million persons per month. As external data such as website access history was added to improve analysis accuracy, the amount of data per visitor reached 100,000 columns. As a result, the total amount of data reached some 1,000,000 rows × 100,000 columns, far exceeding the limits of manual analysis.

4) KGI more important than KPI

The first-round in-house implementation did not reach the stage of downloading of materials, and thus the acquisition of prospective customer information, which was the original goal of the campaign. We were distracted by the key performance indicator (KPI) of reduction of cost per click, which made us somewhat lose sight of the key goal indicator (KGI) of acquiring prospective customer information.

## 5.3 Second-round in-house implementation: Mechanism automation

Based on the things learned described in the previous section, we conducted a second round of in-house implementation from the second half of fiscal 2017 (**Figure 2**). The goal of this second round was the coordination, real-time operation, and automation of the Internet ad delivery-related mechanisms. Specifically, the following items were worked on.

- Coordination with FUJITSU Digital Marketing Platform CX360 (hereafter, CX360)[note 8)]
- Integration and utilization of website access history data and customer data in the mission-critical system
- Customer data analysis by AI and data scientists

Through the implementation of the above, in a first stage, the customer data accumulated in the mission-critical system, the website access history, and the user attributes data (audience data) were to be integrated and the data were to be sophisticatedly analyzed using AI technology (Zinrai). Next, a series of tasks for extracting users with a high conversion rate would be automated. As a result, it would become possible to automatically execute the PDCA (plan-do-check-act) cycle by repeatedly analyzing the accuracy of ad delivery and the new data accumulated every day.

## 5.4 Result of second round of in-house implementation: Achievement of KGI

In this second-round in-house implementation, emphasis was placed on the KGI, and how much prospective customer information could be acquired within a certain budget was taken as the criterion of evaluation. The method of implementation was the same as the first-round in-house implementation described in Section 5.1.

As a result, approximately 2.5 times more prospective customers were acquired compared with the traditional manual ad delivery method. By executing steps 1) through 3) described in the previous section, we were able to create a system for integrating the

note 8) A digital marketing system covering everything from a platform for sharing and utilizing a wide variety of data across the organization, to human support by solutions and marketing experts.

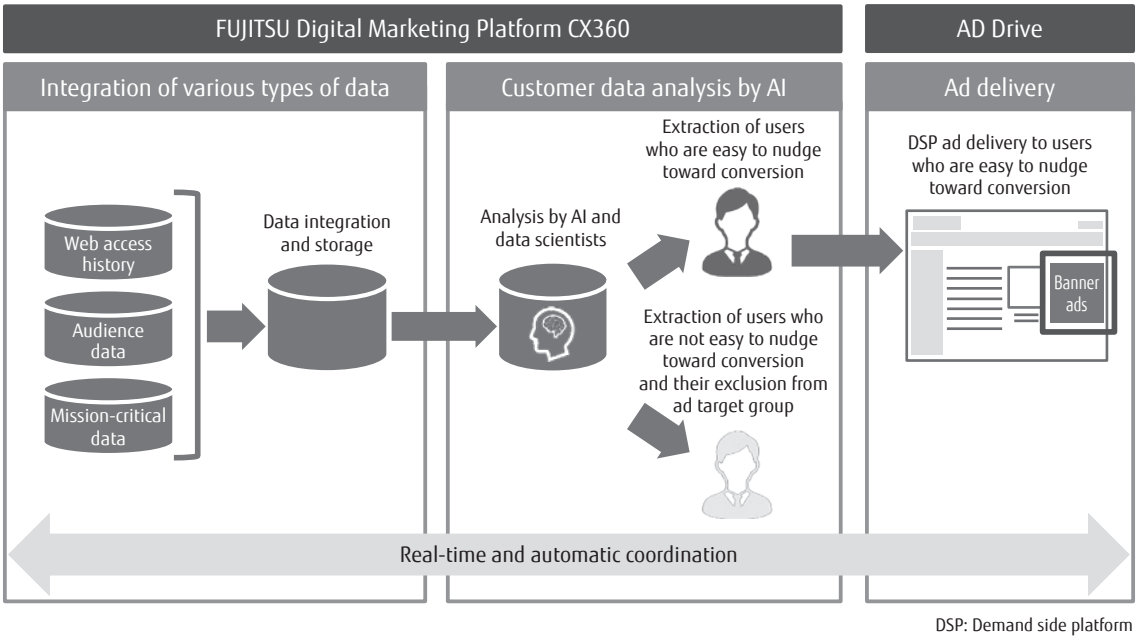


**Figure 2**
**Second-round in-house implementation: Automation of Internet ad delivery mechanism.**

various data of the mission-critical system and performing target analysis using AI technology, and this led to the good result.

Next, we will concretely describe the integration of the data in the mission-critical system and target analysis using AI technology.

1) Integration of the various data necessary for ad delivery

Aiming for more granular targeting, we integrated both offline and online data. Offline data includes seminar visitor information, information obtained from persons in charge of business negotiations, etc., and online data includes e-mail newsletter subscriber information, website access history, etc.

2) Improvement of customer data through analysis using AI technology

In the second-round in-house implementation, we estimated prospective customers using the Marketing AI Container of CX360 as follows. The Marketing AI Container is an analysis infrastructure for big data that accelerates the utilization of AI technology (Zinrai) in the field of marketing.

1) For the delivery of ads,[note 9)] high-cost-effectiveness customers are modeled and lists of the customers to whom ads are to be delivered are created.
2) The bottom 40% of the customer list is excluded from the delivery list. This is because the bottom layer has low loyalty and even if ads were delivered, their effectiveness is predicted to be low.
3) A delivery list consisting of the middle 30% of the customer list generated by the Marketing AI Container is created. An enormous amount of customer data contained in 1,000,000 rows × 100,000 columns can be processed with high precision in a short time with Fujitsu's proprietary AI technology, and it can be analyzed in real time.

## 6. AD Drive Programmatic Marketing Service born from in-house implementation

Fujitsu create AD Drive by using the know-how it gained through its approximately two-year in-house implementation project started in 2016, and began offering it in April 2018.

AD Drive incorporates knowledge gained through

note 9) Analysis using AI is used for delivery of retargeting ads. Retargeting advertising is a mechanism for sending ads to persons who visited the company's website to get them to visit again.

in-house implementation, from the integration of website access history and mission-critical data, to target analysis utilizing the Marketing AI Container, and even the operation of ad delivery. Through this, Fujitsu has become able to offer a one-stop service for Internet ad delivery of the kind being deployed by ICT vendors and consulting firms outside Japan, thereby allowing effective ad delivery via Internet advertising media in Japan.

The main features of AD Drive are listed below.

1) Integration and analysis of offline data and online data

In coordination with CX360, customer data (offline data) accumulated in the company's mission-critical system and behavior data (online data) of users visiting the website are integrated in real time. Then, by making the Marketing AI Container, which is a component of CX360, machine learn those data, target analysis can be performed.

2) Improvement of advertising effectiveness through use of analysis results

The cost benefit can be enhanced by delivery of ads to users who visit similar websites based on the behavior data of users with high conversion rates on websites extracted by the Marketing AI Container.

3) Ad delivery to a wide range of Internet advertising media in Japan

In determining ad delivery targets, we collaborate with partners who are active in the Internet ad delivery business. Fujitsu collaborates with partners in various industries related to Internet ad placement to perform tasks that traditionally were outsourced by companies, such as ad space purchasing and customer targeting, allowing ads to be delivered across a wide range of advertising media in Japan.

4) Support for consistent Internet promotion

From the formulation of targeting strategies to delivery result reporting and the proposal of improvements, we offer comprehensive support for Internet promotion by companies. Further, as mentioned earlier, since KGIs can be easily grasped by AD Drive, measures can be implemented while sharing KGIs with companies.

AD Drive was developed by combining the technologies, know-how, and resources of Fujitsu's marketing department and various business divisions. When coordinated with CX360, AD Drive can respond to many different needs, from broad deployment of digital marketing to ad delivery as promotion.

In the future, we plan to expand this service to solve the issues of companies in the area of Internet ad delivery.

## 7. Conclusion

This paper described the process of Fujitsu's in-house implementation of its Internet ad delivery service and outlined the resulting AD Drive service.

Fujitsu has accumulated many ICTs and human resources, including big data analysis and AI. The in-house implementation project demonstrated that by combining these assets, it is possible to achieve highly effective Internet ad delivery similar to that of ICT vendors and consulting firms outside Japan, and this led to the creation of the AD Drive service.

As the marketing environment undergoes dramatic changes with the spread of smartphones and other technologies, corporate interest in digital marketing, including customer relation management (CRM) and marketing automation (MA) is rising. Armed with a solid track record of system integration and system solutions, Fujitsu will provide a wide range of services utilizing cutting-edge technologies such as AI for Internet ad delivery and other digital marketing fields.

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