

# Best Engine

Inaugural Issue  
Vol. 1

Special Feature 1

## Change Culture

—Venturing with Our Clients into the World  
of Application Programming Interfaces

Special Feature 2

## The CTC Managed Security Service

—Responding to Increasingly Sophisticated Security Needs

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Inaugural Issue Vol. 1



Cover photo by  
Masataka Nakano

CTC's Technical Solution  
Center (Kudanshita, Tokyo),  
a comprehensive inspection  
and verification center in a  
multi-vendor environment

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## The Watershed Moment

I spent two weeks in mid-May visiting IT vendors in New York, Boston and the Silicon Valley. This practice of visiting the U.S. twice a year is one of my important duties as the President and CEO of ITOCHU Techno-Solutions Corporation (CTC). For me, it can be a very physically demanding event as I suffer from what I call “vehicular insomnia,” which extends to air travel—I cannot sleep at all on planes.

During this most recent tour of the U.S., I encountered a very significant change. Vendors, which had been keeping in step with each other, were beginning to move in different directions.

Until last year, the key technologies and trends that came up as a topic were pretty much the same wherever I went. Four years ago, it was “converged systems.” Two years later, it was a chorus of “cloud computing.” Next, everyone started talking about “application centric infrastructure” at the same time, and so it went. But things were very different this time. The topics that came up at the companies I visited were rivetingly rich in variety, from talk of OpenStack and security to artificial intelligence and quantum computers.

Information technology is at a watershed. Vendors, which had been running side by side at the forefront of industry trends, were starting to move in their own directions. Newcomers are also appearing on the scene, one after another.

In which direction should we take the next step? What should we do? Those of you at Japanese enterprises must be asking these questions and undoubtedly feeling somewhat lost under such amorphous circumstances. This is a prime opportunity for Slers to show his/her skills.

As a company with multi-vendor partnerships, CTC has spent many years cultivating a breadth of vision and an ability to discern the best. We also have capabilities in full-stack technologies as a comprehensive IT solutions provider that covers the whole range, from consulting, software, hardware, application, operation and maintenance to data centers. We will mobilize our strengths so that we may serve as your signpost, helping you find your way when standing at a fork in the road and leading the way for investment in information technology.

I want to be in top form for my next tour of the U.S. and am currently researching ways to get restful sleep even when flying. I will report on the fruits of this effort and research at another time.

**Satoshi Kikuchi**

President and Chief Executive Officer  
ITOCHU Techno-Solutions Corporation



| Special Feature 1 |

# Change Culture

—Venturing with Our Clients into the World  
of Application Programming Interfaces

**Tomoyuki Higashi**

Deputy General Manager  
Cloud & Security Services Business Division  
ITOCHU Techno-Solutions Corporation



We want to turn the ideas we have now into services as quickly as possible. To meet our clients' desires, we need to go beyond existing frameworks and flexibly change how we approach development, our organizations and ways of thinking. Our engineers, who have spent many years at the forefront of development and infrastructure-building, will use the latest keywords and phrases to “read” the changes that are taking place in IT.

**Tsumoru Kameda**

General Manager  
Cloud Innovation Center  
ITOCHU Techno-Solutions Corporation





## Tomoyuki Higashi

Deputy General Manager  
Cloud & Security Services  
Business Division

Joined CTC in 1989. After being involved in maintenance support operations, was later engaged in the promotion of high-availability systems, storage and middleware technologies. After increasing the sales of private clouds, focused from 2012 on the expansion of services based on the data center, cloud and operation services. Appointed to current position in April 2015.

financial industry. Various companies are offering a cascade of services and smartphone apps that enhance consumer convenience. As a result, a need has arisen to actualize service ideas as quickly as possible. In extreme cases, we are being told that the client wants to take a new function or idea and be able to offer it as a service the following week.

### —How are you responding to such client demands?

**Kameda:** Conventional application development takes the **Waterfall approach** ❶. It is a linear approach that is divided into stages, starting with detailed client requirement definition. Progressing to the next stage only after full completion of a stage enables the development of high-quality applications. However, it is a time-consuming process, and it takes time for a service to be launched. There is a chance that changes will occur in the market or environment during development, and changes might become necessary in the required functions of the application being developed. **Agile software development** ❷ is suitable when greater speed is emphasized—a service can be launched quickly, with user feedback reflected into the service.

More than a dozen years have passed since this term was coined, but it is once again gaining attention. In this approach, there is close communication onsite with the client. A trial model is promptly developed, and it is updated in short-term cycles on the basis of client and market feedback. One could say that it is compatible with the concept of **DevOps** ❸, which links system development and maintenance, with emphasis placed on flexibility to meet new needs and changes to the environment.

**Higashi:** There is, of course, a strong need for swift and flexible response onsite in relation to infrastructures. It goes without saying that the utilization of cloud computing can help make this possible.

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## Technology that Supports Change at Our Clients

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—The relationship between our daily lives and information technology is changing in the face of the coming age in which everything will be connected by IT. As experts in application development and infrastructure-building, how do you see these changes that are taking place close at hand?

**Kameda:** The biggest change that we are sensing is the strong demand from clients to use IT to accelerate their businesses. Clients, particularly those involved in consumer services and products, are now being required to launch new services on a swift and continual basis. This is out of the need to compete against companies that are applying IT to enter markets. For example, companies other than banks—such as insurance companies and telecoms—have entered the

## KEYWORDS

### ❶ Waterfall Software Development

This is a standard approach of application development. It is often cited in comparison with agile software development. Development is carried out progressively in distinct stages, from requirement definition to design, development and testing. It is based on the assumption that specifications will be final and binding. It is referred to as “waterfall” because once a process is completed, development moves forward and there is no going back and repeating that process.

### ❷ Agile Software Development

In this approach, emphasis is placed on dialogue with the client. Development is carried out in a short amount of time in accordance with the priority of the function being actualized. Its development was triggered by the Manifesto for Agile Software Development, which was published in 2001 by experts in prototyping, and iterative and incremental development.

### ❸ DevOps

This word was coined as a clipped compound of “development” and “operations.” In this approach, a system is stably operated while functions are added on. There are some companies that engage in DevOps to update their applications and web-based services several hundred times a day.

In the past, it used to take at least three months, if not more, to prepare an infrastructure for development or a service, including the selection of hardware and operating systems. Today, by using cloud services, such as those offered by Google, Amazon, Microsoft Azure and CTC's [TechnoCUVIC \(4\)](#), it is possible to have an environment set up and development commenced within days or weeks.

However, the essence of the evolution of infrastructures is not simply related to the shortening of lead times. The changes in development methods, such as the implementation of agile software development and DevOps, are making being "programmable" as an infrastructure requirement. The infrastructure provided through cloud services is evolving into something made into a part of the application itself.

Around 2005, when virtualization—the basis of cloud computing—started being used as part of the corporate IT infrastructure, we thought that its major impact would be to provide the ability to consolidate and reduce the myriads of servers being used, thereby enabling a cutting of costs. However, what the evolution of virtualization to cloud computing turned out to be was to bring about a revolution in the way applications were developed and operated—and to change into programmable infrastructures so as to support this. This was the true breakthrough that resulted from virtualization technology.

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## The World of Change Brought about by APIs

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—Clients' environments will probably continue to change even more going forward. However, what kind of changes are happening right now?

**Kameda:** Whether waterfall or agile, "reuse" is one of the ways in which software development can be expedited. In

## Tsumoru Kameda

General Manager  
Cloud Innovation Center

Joined CTC in 2000 after more than a decade of experience in the IT industry. In charge of providing web application development support, promoting service oriented architecture (SOA) and overall in-house standardization of development technology. Worked in the Distribution & Enterprise Group from 2009 before becoming the general manager of the Cloud Innovation Center upon its establishment in 2015.



programming, functions that are frequently used are "packaged" for reuse by other programs and applications. [APIs \(5\)](#) are such "packages." In the past, reuse through APIs remained within the same system.

The change that has occurred over the past two or three years that should be noted is that there is now increased use of an API on a cloud, or a [Web API \(6\)](#). The style is changing. Software is starting to be actualized by combining different Web APIs rather than by coding from scratch the functions that will fulfill requirements. With this, the profile of the developer who wins recognition now includes engineers who have, in addition to competence in programming and project management, familiarity with numerous Web APIs. In other words, engineers who have the ability to combine and coordinate APIs as appropriate in order to fulfill and actualize requirements.

### 4 TechnoCUVIC

A public cloud service (IaaS) launched by CTC in 2008. Since 2014, CTC has also been offering the TechnoCUVIC Virtual Platform in which users can freely design and construct virtual servers. It is a private platform option for virtualization and integration.

### 5 API

Stands for Application Programming Interface. APIs are software and hardware functions and predefined rules and specifications, etc., that can be used from other programs. In the past, APIs generally used hardware via operating systems, such as the Portable Operating System Interface (POSIX) for Unix and variant operating systems, and Windows API.

### 6 Web API

Also known as web services, a generic term for APIs that are publicly available on the Internet. Data is exchanged using Hypertext Transfer Protocol (HTTP), Extensible Markup Language (XML), JavaScript Object Notation (JSON), etc.

Behind the progression of the widespread use of Web APIs was the rapid spread of REST (7) from around 2010. REST is a means for exchanging data that follows the mechanism used when we view web pages. It is highly compatible with the Internet.

Also attracting attention for the preliminary phase of development—in the sense of reaching the consensus of the parties involved and actualizing ideas—is the concept of “design thinking” (8). As used in IT, it refers to a problem-solving method, inclusive of development. In design thinking, user-friendliness is thoroughly pursued, and feedback from users on prototypes is actively incorporated into the item. Many companies are holding events based on the design thinking concept. They include ideathons (9) to identify new services or businesses that the company

should offer, or hackathons (9) that involve engineers and create prototypes. In a hackathon, prototypes are created in a matter of several days at most. So, you could say that these events became possible with the spread of Web APIs, which make it possible to carry out development by simply combining various APIs.

—What’s happening in the field of infrastructure?

**Higashi:** In a nutshell, you could say that the “programmable” element mentioned earlier is evolving. The adoption of OpenStack (10), a cloud operating system, has progressed markedly, and its position is close to that of becoming a future infrastructure technology standard. It is serving as the backbone of SDI (11) through which software



## KEYWORDS

### 7 REST

An acronym for REpresentational State Transfer. REST is a type of Web API. It is a set of principles in which information in a system is transferred only through four basic operations: Create, Read, Update and Delete (CRUD).

### 8 Design Thinking

“Everyone designs who devises course of action aimed at changing existing situations into preferred ones.” Simon, Herbert A. *The Sciences of the Artificial* (3rd ed.) (Japanese edition (Shisutemu no Kagaku) translated by Motokichi Inaba and Hideki Yoshihara. Published 1999 by Personal Media Corp.)

### 9 Ideathon / Hackathon

Words coined by combining “idea” or “hack” with the word “marathon.” They are intensive events carried out on a specified theme for the purpose of generating new ideas or to create prototypes (with the involvement of engineers) within a short period of time.



is used to build and control hardware in an integrated manner. This is accelerating the widespread use of OpenStack.

We also believe that going forward, the use of software container technology will become even more pronounced. A prime example is [Docker](#) (12), a so-called virtual machine that does not require an operating system. Virtualized environments create virtual machines on physical servers for operating multiple operating systems. As seen from an application, the virtual environment is no different from a physical environment. What container technology does is hide even the existence of operating systems from an application. Only the minimal resources and functions required to execute the application are secured. Containers are more lightweight than virtual machines and enable the

swift preparation of environments.

Although OpenStack, SDI and Docker may appear to be different, they all have the same objective—to create a programmable, flexible application environment. API is one of the technologies that makes the programmable infrastructure for applications. It is becoming possible to control CPUs, memories, storage and other IT resources through APIs.

We believe that ultimately, such IT resources will become directly connected to networks, and they will be used by applications only through APIs under the control of cloud operating systems. We think that this kind of world is close at hand.



## 10 OpenStack

Open source software for building a flexible and extensible IaaS infrastructure. It integrates the control of virtual machines and virtual networks, object storage (suitable for the storage of large volumes of data) and other functions. Starting with "Austin," released in October 2010, major versions have been released with code names in ascending alphabetical order.

## 11 SDI

An initialism for Software-Defined Infrastructure, its concept is the dynamic control of infrastructure through software. CTC defines the SDI landscape as being composed of three functional layers: SDI orchestration (carries out across-the-board control and automation), SDI controller (carries out control of SDI devices) and SDI device (provides IT resources).

## 12 Docker

Open source software for a virtual environment in a format sharing the same operating system kernel. Uses less CPU and memory resources because it limits the available area while keeping the OS function unchanged. With Docker, it is easy to migrate from the development environment to the live environment, and it is compatible with DevOps.

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## Undertakings by CTC

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—Development approaches and architectures are constantly changing. What kinds of undertakings is CTC engaged in under these kinds of circumstances?

**Kameda:** To contribute to the swift deployment of services by clients, we offer [CTC Agilemix \(13\)](#), a service that provides coherent support, from the generation of ideas to development and operation, inclusive of DevOps. There is a menu of support services on offer, such as holding a hackathon on client premises with the participation of CTC engineers, developing services based on concrete ideas and implementing their ongoing improvement. We help clients provide new services.

We are also considering the establishment of the Service Design Lab, which would provide consistent support from the hosting of hackathons to development and operation.

**Higashi:** CTC is adopting new technologies that support clients “build” or “use” an infrastructure.

In terms of the support provided to build an infrastructure, there is the [VM Pool \(14\)](#) private cloud solution that we launched in time with the growth of virtualization technology. It has since evolved into what can be called an SDI package. In regards to the utilization of OpenStack, in addition to providing on-premises support to build environments, we also developed [RACK \(15\)](#), which is open source software that makes OpenStack further programmable by applications.

In terms of the support provided for the use of infrastructures, we are promoting the deployment of a new function in the CTC CUVIC series of cloud services. It will be a service that can deal with the various requirements of clients. As for mission-critical systems, for which cloud migration has been considered difficult, we offer [CUVICmc2](#)

[\(16\)](#). It is an IaaS service that is specialized for mission-critical systems and fulfills needed high-level requirements.

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## Challenges to Address

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—What are some of the new challenges brought about by the spread of new technology, and solutions to the challenges?

**Kameda:** Waterfall software development begins with a budget. The system that is developed is one that can be deployed within that budget. In the case of agile software development and DevOps, development takes place in an ongoing basis. For this reason, set budgets are not suitable in many cases. Examples include pay-per-release type of services, which are based on the number of releases, and outsourcing services in DevOps operation that are outsourced on a per-system basis. If seen from the standpoint of working with a client to create a new business, then performance-based contracts, including [profit sharing \(17\)](#), where expansion of the business leads directly to an Sler’s incentive award, may be one option.

**Higashi:** When trying to deploy a new service quickly, there is the possibility that challenges will arise not only in terms of scalability but also in ensuring security. Even if it is a service prototype, it will be exposed to various security threats once that prototype is offered for use. The implementation of frequent updates will also mean that security risks will increase as many times as there are updates.

To deal with such risks in DevOps, we are also starting to see use of the word [DevSecOps \(18\)](#), which emphasizes the need to continually think of security while proceeding with development. CTC, too, offers the CTC-MSS Managed

## KEYWORDS

### 13 CTC Agilemix

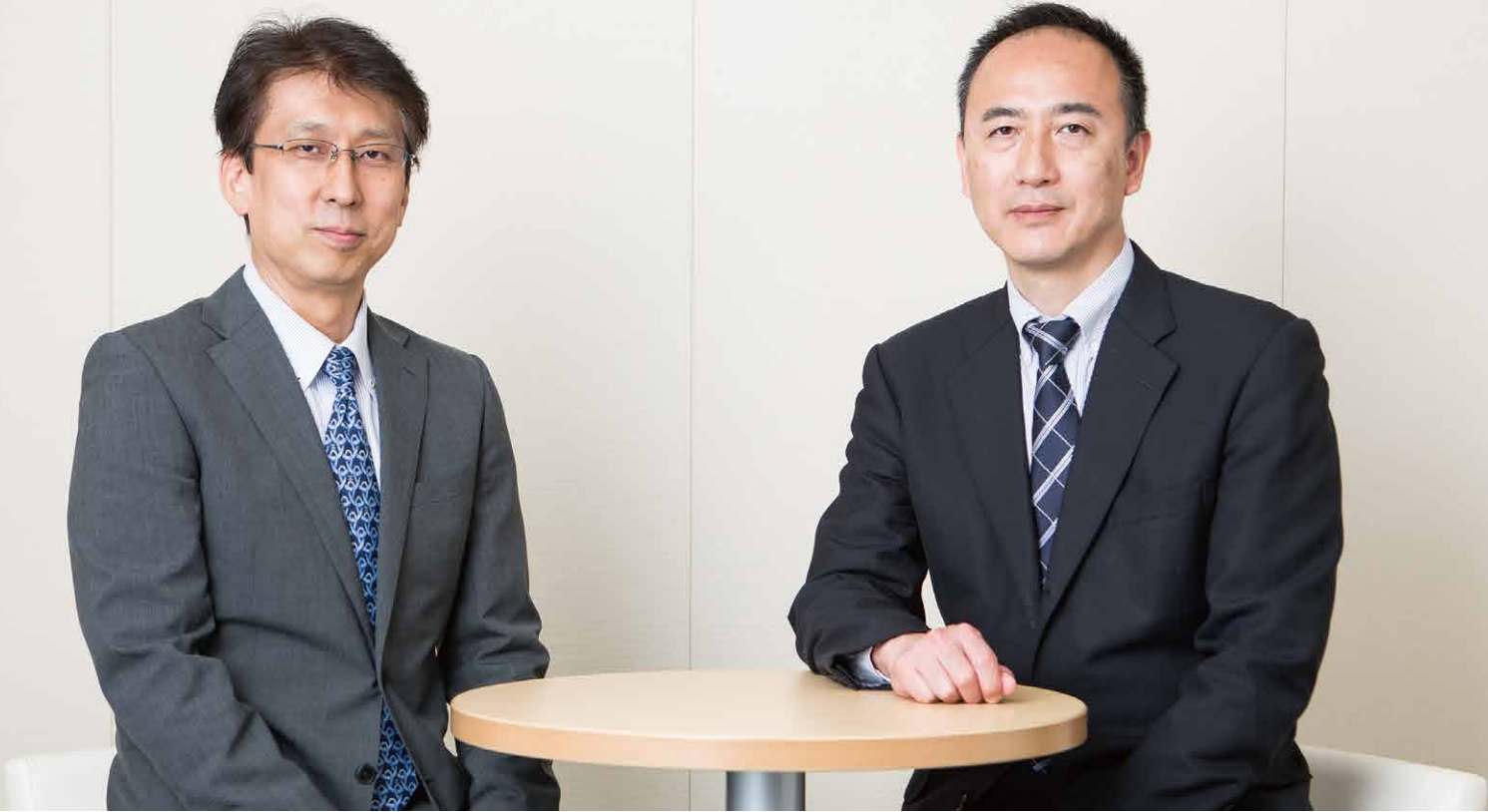
A service unique to CTC, which aims to become an innovation partner to its clients. CTC Agilemix starts out with the co-generation of ideas through hackathons that are carried out on client premises, and it uses the cloud and agile development to support the early deployment of services.

### 14 VM Pool

A CTC private cloud solution launched in 2007. It is a fully-validated multivendor package with a rich track record of adoption. An SDI solution called Next Generation VM Pool is now also available.

### 15 RACK

An acronym that stands for Real Application Centric Kernel. RACK is a platform for operating cloud native applications. Cloud native applications determine the amount of resources they require, and procure and release the resources from the cloud. RACK was adopted by the Japanese Ministry of Economy, Trade and Industry as a software-controlled cloud technology development project.



Security Service, and we will promote DevSecOps along with development and operation.

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### Optimal IT for Clients

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—Finally, please describe what CTC is aiming toward.

**Kameda:** As the speed of our clients' businesses accelerates, Slers like ourselves need to make changes outside of conventional frameworks. To change development approaches and contracts, we must change the culture, including changing organizations and ways of thinking. CTC will venture with its clients into the world of APIs and contribute to the realization of such cultural

change, including that in the IT industry.

**Higashi:** CTC is proceeding with the provision of customer support from three aspects. One is through what we call "Aggressive IT," which combines agile software development and DevOps with ideathons and hackathons as methods for creating new businesses. The second is what we call "Defensive IT," which places emphasis on promoting the efficiency of enterprise systems. The third is "security" for both the Aggressive and Defensive aspects mentioned. We will think with our clients on how they can be aggressive or defensive using IT. CTC wants to go beyond simply being a provider of IT services to clients. Our aim is to be a collaborator and partner to our clients in the creation of businesses that use IT.

### 16 CUVICmc2

A cloud service (IaaS) specializing in enterprise systems, such as SAP solutions. CUVICmc2 simultaneously guarantees performance as well as achieves high security and pay-for-use according to actual amounts used, and contributes to enhancing a company's operational efficiency and reducing its IT costs.

### 17 Profit sharing

In this kind of agreement, rather than deciding, at the beginning, on a set monetary amount as compensation for the deliverable or services provided, future profits are distributed at a fixed percentage. It has the potential of encouraging ongoing service improvements since there will be incentives to do so for both parties to the agreement (i.e. to recover the investment and to increase profits).

### 18 DevSecOps

A word coined by adding a clipped form of the word "security" (sec) to DevOps. Persons in charge of security are added to the teams that are collaborating in development and operation as a way to ensure that the frequent additions of functions will be achieved safely. DevSecOps promotes the creation of templates and automated security tests for each stage.

## OpenStack Achieves a New World View

Challenging what had hitherto been deemed conventional wisdom and changing dated processes enable “Aggressive IT” in the truest sense. Here, we take a look at OpenStack as software for creating what is new conventional wisdom, with a focus on promoting the optimization of human resources.



**Tomoaki Nakajima**

Expert Engineer  
Cloud Innovation Center  
ITOCHU Techno-Solutions Corporation

### The Servitization of IT

Information technology is rapidly becoming a tertiary (service sector) industry. In the past, a major aspect of IT was its use to promote the efficiency of existing operations. In that sense, it had a strong association with the secondary (manufacturing sector) industry. Today, however, now that the utilization of IT for the promotion of efficiency has spread to an extent, there is a demand for what is next—that is, the use of IT as a service. This holds true for areas other than IT as well. The times are changing from an age in which the demands that are shared by as many people as possible are fulfilled through rationalization, standardization and mass production, to an age in which services that emphasize satisfaction levels are provided with a focus on individuals, diversity and the production of appropriate amounts.

### The OpenStack Boom

OpenStack is now on the verge of

becoming the world’s biggest open-source software (OSS) platform. Begun as a project in 2010, OpenStack has since grown to become one of the world’s leading OSS communities.

OpenStack is often compared with server virtualization technology. However, there is a clear difference between the two. Server virtualization is technology that focuses on promotion of the efficiency of “things” (hardware). On the other hand, OpenStack is technology that focuses on promotion of the efficiency of those who are in the position of using the hardware—in other words, the “humans” who carry out the development and operation.

With the servitization of IT in recent years, there is now a demand for “swiftness,” which had not been a requirement in the past. Because “humans” were the causes of bottlenecks in this regard, various technologies were developed to resolve this issue, and OpenStack was

one such technology.

Today, OpenStack is used with a focus on areas such as agile software development and DevOps.

An explanation of the role OpenStack fulfills and its future development follows.

### What’s OpenStack?

OpenStack is software with a focus on “humans” and is therefore designed around related functions with “standardized operation” and “automated decision-making” at the core. OpenStack operates by placing various hypervisor compute nodes and storage and networking resources under its control. OpenStack makes it possible to operate whatever is placed under its control using a standardized method that is mandated by the OSS platform. This means that operators do not need to learn the procedures for operating each individual product and software.

What is more, human intervention was required in the past when

## ■The Difference Between OpenStack and Virtualization Technology



operating an environment. For example, decisions, such as to avoid duplicate network addresses or on where to place a virtual machine, had to be made by humans at various points. What OpenStack does is it enables automated decision-making to be carried out by programs for a large portion of these decisions that need to be made in order to avoid problems from arising.

The two aforementioned core functions significantly streamline the operation required of humans. At the same time, OpenStack promotes automated operation by making coordination with various peripheral tools easy. It enables large-scale autonomous operation that is by far greater than thought possible in the past.

### A New Tool and a New Culture

Because OpenStack functions are focused on “humans,” simply creating an in-house OpenStack environment does not directly equate to the

achievement of enhanced efficiency and greater swiftness. This is because the operations created by humans are built with a company’s corporate culture, which was fostered by that company’s social background and history, as the foundation.

In other words, if you want to use OpenStack and other software to build new systems that create a new conventional wisdom, you will need to do more than simply adopt a new tool—a need to engage in the reform of your company’s corporate culture will also arise. No matter how many new tools with a good reputation are adopted, if they are used with the “old” conventional wisdom as a given, then not only may there be no benefits, the adoption itself may even bring about negative impact. Full attention should be given to this risk.

### Future Possibilities

The latest OpenStack development has expanded the software platform’s functions one step further from the

core functions of servers, storage and networks, into areas such as containers and data analysis. In addition to an increase in the number of companies in Japan that have used OpenStack to develop new-age operation, we are seeing an expansion in the areas of OpenStack utilization in other parts of the world. For example, the application of OpenStack in network function virtualization (NFV), which is used concurrently with software-defined networks (SDN), is progressing among telecommunication carriers. The evolution of the industry as a whole is accelerating.

To follow such evolution and develop new systems, conventional wisdom will need to be questioned and dated processes changed. “Aggressive IT” in the truest sense will be achieved only as a result of such efforts.

# The CTC Managed Security Service

## —Responding to Increasingly Sophisticated Security Needs

With an increase in targeted threats, the security-related needs of clients are becoming increasingly sophisticated. Here, we will take a look at a CTC service that anticipates and manages cyberattacks.



### Dealing with Targeted Threats that Are Ever-more Cunning and Complex

Corporate IT systems are exposed to evolving security threats. There has been an increase in targeted threats that attack specific companies, and are cunning and difficult to detect. Because of this, a system that not only defends against such attacks but also enables the state of damage following an attack to be properly ascertained is needed. In addition to building a system with a high security level, the security level must also be maintained through day-to-day operations that include security monitoring and auditing by experts.

CTC established the CTC Security Operations Center (CTC-SOC) in October 2014 to respond to such needs of clients. CTC-SOC carries out 24/7/365 remote monitoring of the state of clients' security equipment. It also provides the CTC Managed Security Service (CTC-MSS), which undertakes emergency response, equipment setting changes, operation and other tasks in a centralized manner.

### A Mechanism that Assesses Security Threats and Notifies Clients Is Offered

CTC-SOC is based in our in-house data center and is fully prepared against power outages, fires, earthquakes and other disasters. The SOC room, designed in the image of a space ship, is specialized for monitoring operations. Dedicated security analysts, who analyze security events, sit there back to back. An emergency meeting space is created by simply swinging their chairs around in the event that an incident should arise.

The CTC-MSS provided from the room monitors client security equipment—such as unified threat management (UTM) systems (IDS/IPS, URL filtering, anti-malware),

### The Three Strengths of CTC-MSS

#### Multi-Vendor

As security threats diversify, provides wide-ranging support as a multi-vendor, with a focus on products handled by CTC

#### Global (Multilingual Support)

Collaborates with BAE Systems in response to clients who want to carry out centralized management, inclusive of overseas bases

#### Comprehensive Strength as a Group (Centralized Contact Point)

In addition to security products and services, able to work in conjunction with other diverse services, such as maintenance and data centers

anti-targeted-threat solutions (sandbox), Web application firewalls (WAF) and firewalls—24 hours a day, 7 days a week and 365 days a year. At the same time, it collects and analyzes event log files. Although it varies from client to client, the real-time security event data that is received from a client can amount to about 6 million events on some days.

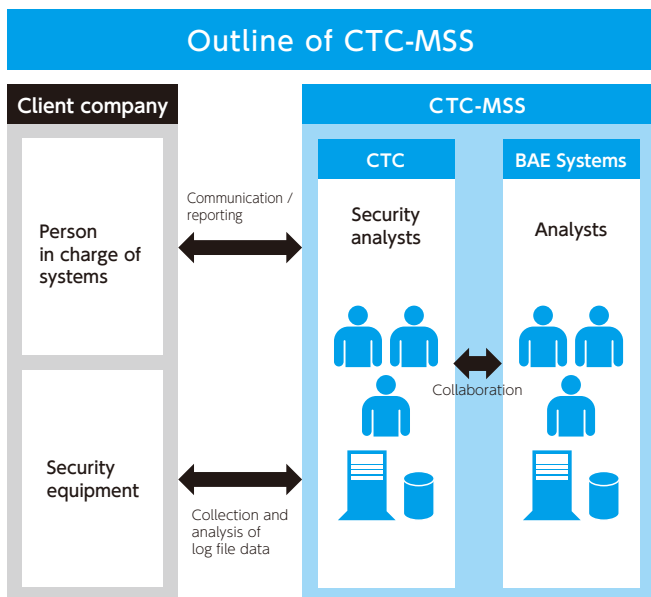
When event log file data is received, high-risk security events are first identified, using a Security Information and Event Management (SIEM) correlation analysis engine, on the basis of information such as source and destination, country and type of attack. A security analyst then analyzes the content, assesses the cyberattack level, and notifies the client.



**In Partnership with BAE Systems,  
Which Possesses World-class Technology and  
Has a Proven Track Record**

BAE Systems, headquartered in the U.K., is a CTC partner in the security business. BAE Systems is one of the world's leading private defense companies. It has a cyber security and intelligence division that has five security operation centers around the world. Based on a track record of cyber-security monitoring for about 6,000 companies, BAE Systems monitors security events around the world.

It is no exaggeration to say that the CTC-SOC serves as a sixth base for BAE Systems. Another aspect of CTC-MSS is that it shares the expertise in security monitoring that BAE Systems has developed over the past ten-odd years, which is leveraged in analyst operations. We are responsive not only to domestic security events but also to those overseas.



**CTC Security Services**

**Security Consulting**

Development of corporate security policies and provision of advisory services

**Security Assessment**

Vulnerability assessment of corporate IT systems

**Training and Drills**

Anti-cyberattack drills and training against targeted email attacks

**Anti-cyberattack Measures**

Network and endpoint detection and blocking solutions

**Security Operation**

Security operation outsourcing for corporate IT systems

**Security Systems Integration**

Design, construction and other integration of various security products that are provided by CTC

**Security Products Support**

Support and maintenance services for the various security products that are provided by CTC

**CTC-MSS (Managed Security Service)**

24/7/365 remote monitoring of clients' corporate security systems, and detection and analysis of threats, such as illegal/unauthorized access, using the CTC-SOC

## Security Measures with an Eye on the Cyber Kill Chain

With an increase in cyberattacks that are difficult to detect, the implementation of suitable, real-time security measures that can foresee what will happen next has become important. Here, we will take a look at the current state of cyberattacks, which are diversifying, as well as the latest security measures being offered by CTC in collaboration with BAE Systems.



**Masato Takimoto**

Manager  
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### Greater Focus On Security Measures Due to the Diversification of Cyberattacks

Interest in security monitoring utilizing a security operation center (SOC) has been mounting ever since the leak of personal information held by the Japan Pension Service came to light. In the Government of Japan's Cybersecurity Strategy (2015), the Japan's National Center of Incident Readiness and Strategy for Cybersecurity (NISC) Cybersecurity Strategic Headquarters described the government's need for security monitoring using an SOC. In December 2015, the Ministry of Economy, Trade and Industry (METI) formulated the Cybersecurity Management Guidelines in order to promote cybersecurity measures under the leadership of corporate managers. The guidelines encourage a periodic inspection of the various logs of equipment set up at a network gateway through the use of a security monitoring service to check on whether any unauthorized transmissions have taken place.

At one time, it was said enough to simply save and store the logs of security equipment and other devices so that matters could later be tracked if

something happened. Periodic log analysis later became necessary from the viewpoint of internal control. Today, with the occurrence of incidents in which important information was leaked by insiders with access authorization, amendment of the Act on the Protection of Personal Information, enforcement of the Act on the Use of Numbers to Identify a Specific Individual in Administrative Procedures (My Number Act), and furthermore, the focusing of public attention on cyberattacks from around the world by hacker groups, there is now an increased demand for real-time log analysis.

While cyberattacks have become sophisticated and difficult to detect, they have also become easy to emulate. We are in an age in which cyberattack tools are relatively easy to obtain on the Internet, and advanced malware for use in targeted attacks can also be purchased for a fee. In the past, security vulnerability data was information that only system administrators and operators needed to know. Today, it is the kind of information that is even published at the top of leading news websites. That

is how much attention is now being focused.

### An Age in Which Even Illegal Hacking Is a Business

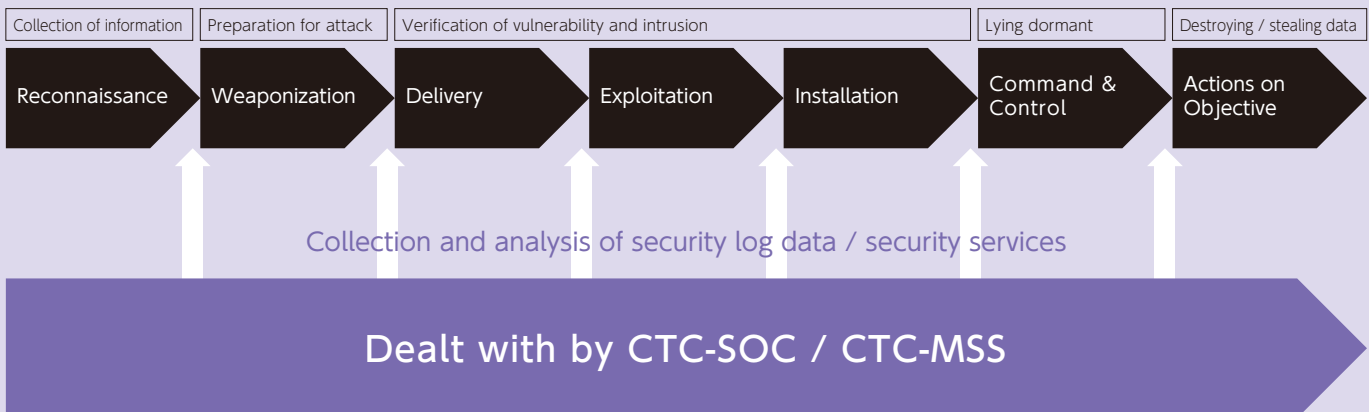
Among the vulnerabilities that were discovered recently, the CVE-2016-3081 vulnerability of the Apache Struts 2 Java Web application framework is well known. We obtained this program for analysis and found that if abused, hackers could easily install a backdoor and exploit information without being noticed. The day after this vulnerability was made public, CTC-SOC detected multiple instances of searches being made using this program to look for vulnerabilities in corporate systems.

Zero-day attacks, in which cyberattacks are made between the time that a vulnerability is announced and a related patch is released, are an ideal for cyber attackers. Tools for such attacks are available online. It including websites that will search for vulnerabilities or those offering exploit codes that are used to take actual advantage of vulnerabilities.

There are even cyber black markets that sell, for tens of thousands of



## ■CTC Deals with the Cyber Kill Chain



dollars, information on system and application software vulnerabilities that have been found by cyber attackers. An illegal market related to cyberattacks is developing in many countries, including those that sell ransomware and other malwares.

### The Wall Between Real Space and Cyberspace Disappearing

When observing cyberattacks at the CTC-SOC, we see that there is regularity in the events taking place in the real world and in the world of the Internet. For example, a Japanese television station showed the wrong captions—which ridiculed South Korea—during a press conference held by the Chief Cabinet Secretary this year. Between that day and the next, the CTC-SOC detected greater than usual reconnaissance activities originating from South Korea. Furthermore, before and after the G7 Ise-Shima Summit, there was, on the whole, more than the usual reconnaissance activities detected. Reconnaissance activities and cyberattacks have a tendency to be implemented on the Internet in reaction to real-world events. To prepare the best possible system toward 2020, the

Japanese government is also considering cybersecurity products and cybersecurity personnel, or the adoption of managed security services as alternative measures.

These days when cyberattacks seem never-ending, countermeasures and monitoring that take the “reconnaissance – weaponization – delivery – exploitation – installation – command & control – and actions on objective” cyber kill chain into consideration have become important.

It is difficult to detect advanced cyberattacks like the cyber kill chain simply by adopting cybersecurity products and checking logs. Cyber attackers conceal themselves and act to avoid detection. Therefore, attacks cannot be discovered through signature matching, which used to be the standard method. New detection and analysis methods, such as analyzing malware behavior through sandbox analysis, need to be considered.

### CTC-SOC and CTC-MSS, Which Nip Security Incidents in the Bud

The CTC-SOC carries out real-time correlation analysis of massive amounts of log files using a security engine that

is packed with the knowledge of BAE Systems and CTC. CTC-SOC analysts are continually giving their full attention to cyberattacks. They work against cyber attackers around the world, predicting what will happen next and using their experience to appropriately intercept sophisticated cyberattacks.

The CTC-SOC and CTC-MSS were launched to respond to the need for all-in-one security, which includes the operational monitoring of clients’ security equipment. CTC-MSS is offered in both English and Japanese. It is a stronghold that assists companies abroad and Japanese companies with overseas bases by providing global security monitoring services with high Japanese quality. Our aim is to not only carry out the detection of cyberattacks and the classification of risks and to report them to clients but also predict, from the CTC-SOC, cyberattacks in advance, quickly detect the possibility of the occurrence of incidents, and control and prevent cyberattacks that can bud into security incidents in the client environment.



## Latest U.S. Trends in AI



### Junka Kaneda

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Surveys advanced technology and IT trends in North America, with a focus on the pharmaceutical and healthcare industries, and refers to Japan, vendors that handle the latest technologies.

Hello. This is Junka Kaneda of ITOCHU Techno-Solutions America. In this issue, I will be introducing the latest information related to artificial intelligence (AI) and the Internet of Things (IoT).

AI is a field for which major growth is anticipated in the future. It is forecasted to become a 5-billion-dollar market by 2020. There are also reports that a total of 6 billion dollars has been invested in more than 1,000 AI-related startups. You can tell how high expectations are from the fact that more than 4 times the 1.5 billion dollars that were invested in the bitcoin virtual currency have gone into the AI field as funds.

AI actually consists of different technologies. Technology called Deep Learning caused a buzz recently because a Go-playing AI developed by Google DeepMind defeated a world-class professional Go player. Natural language processing, sensors for speech and image recognition, and mechanisms for feeding the content of decisions made through algorithms, such as machine learning, back to robots are all indispensable for the realization of AI. Furthermore, in addition to algorithms, how much data can be collected and how speedy the data can be taught to the AI are said to be necessary to enhance the accuracy of AI. The aforementioned Go-playing AI apparently used 1,202 CPUs and 176 GPUs on Google Cloud Platform to memorize the massive amount of Go game records and play tens of millions of Go games against itself. You need to understand that it is only when you have three things—a sophisticated AI architecture, big data infrastructure and high performance computing infrastructure—that the use of AI will progress.

AI algorithms are also evolving day by day. Vicarious Systems, which has its headquarters in Silicon Valley, is carrying out development of an algorithm for

Proteus Digital Health headquarters in Silicon Valley (photo by author)



next-generation AI, which even more precisely emulates the activities of a human brain. Founders of Facebook, Amazon, Yahoo! and Salesforce.com, as well as other prominent investors, are among those investing in the company.

IoT is something that cannot be forgotten from the perspective of big data. More than 50 billion devices are expected to be connected to the Internet in 2020. The utilization of data obtained through such devices is hoped to help enhance the accuracy of AI.

Meanwhile, in the field of healthcare, wearable activity trackers like Fitbit and other “things” are starting to become connected to the Internet. They include contact lenses, pill cases and healthcare equipment. What is more, pharmaceutical items are also starting to be thought of as “things,” and we are starting to see movement such as drugs embedded with sensors. Digital Medicine\*, developed by Proteus Digital Health, is at the commercialization stage and use has begun at some healthcare facilities in the United States and Europe. Incorporating statistical bodily information, such as activity levels, obtained through such “things” into AI would enable more diversified analysis by AI as compared to incorporating fixed amounts of information that have been selected by humans. The hope is that this would result in making health-related advice that is even more accurate possible to obtain.

AI and IoT technology can be applied to fields other than the Go and healthcare mentioned here. We are carrying out surveys on AI and IoT as well as cultivating startups on an ongoing basis and will continue to offer you news from Silicon Valley on the latest trends.

\*A combination of a medicinal tablet embedded with a minuscule ingestible sensor and a wearable sensor patch for detecting its signal. In addition to ingestion of the tablet, Digital Medicine also records bodily information such as heartrate and activity level, which is sent to smartphones and tablets.

# News Pickup

Here is information on solutions and services, selected from CTC news releases, that are in the limelight.

## Cloud Service / IoT

### Joint Support of Corporate IoT Utilization with YASUKAWA INFORMATION SYSTEMS

CTC has joined hands with YASUKAWA INFORMATION SYSTEMS to assist clients in their development of new services utilizing IoT. By combining YASUKAWA INFORMATION SYSTEMS' MM Cloud service (enables the collection, visualization and analysis of data from devices) with the CTC Agilemix service (provides systemized know-how on development in a cloud environment), the early launch of services utilizing IoT and ongoing functional improvements will be realized for the manufacturing and service industries.

## Cloud Service / Electronic Signatures

### Promotion of Paperless Corporate Offices Through an Electronic Signature Service

CTC began handling a DocuSign cloud service that digitizes signature and seal-stamping procedures, including collaboration with other cloud services already being handled by CTC. This service makes affixing signatures and seals possible from anywhere through the use of web browser and smart device apps. Paperlessness will be realized through collaboration with file sharing services. Expenses for shipping documents as well as time can be saved, especially in the case of contracts concluded with overseas companies.

## Systems Operation and Maintenance / Troubleshooting

### A Systems Maintenance Service with Automated Failure Logging Launched

CTC Technology launched Avail-I, a service that realizes efficient systems operation through the automated collection of log data to enable failure isolation in a multivendor environment. Avail-I automates the failure-related tasks of systems administrators. Clients no longer need to identify the equipment where the failure has arisen or contact maintenance services, thereby shortening repair time. Going forward, CTC Technology plans to expand the scope of this service by continuing related development.

## Security / Defense Against Targeted Attacks

### A Security Solution that Protects Terminals from Unknown Cyberattacks

CTC commenced provision of Traps, the Palo Alto Networks product that protects corporate terminals, such as PCs and servers, from unknown cyberattacks. Traps responds to unknown threats by detecting behavior like the destruction of memory regions and library file replacement, which are common to various targeted attacks and zero-day attacks. It takes a Zero Trust architecture approach. It focuses attention on cyber-attacker methodologies and pre-emptively blocks cyberattacks.

## Marketing / One-to-One

### One-to-One Marketing Realized Through Interactive Video

CTC launched eMotion, which is a service that utilizes interactive video to support the streamlining of client operations. This is a service that helps improve customer satisfaction levels as well as streamline operations by linking Pitney Bowes' EngageOne® interactive video solution, which distributes video that is personalized according to viewer tastes, with client systems. Applications include utilization in sales and contact center operations.

## Health Tech / BPO Services

### CTC Services in the Health Tech Area Reinforced Through Launch of a Lifestyle Habit Improvement Service

CTC launched Wellness Workstyle, a solution that provides comprehensive support for health and productivity management. It includes visualization and analysis of the state of employee health, and health management—from follow-up to prevention. This is a new BPO service that not only offers the visualization and analysis of data, such as health checkup results and health guidance, but also utilizes wearable devices for the centralized management of employee lifestyle habits and their state of health. This service, which integrates IT and healthcare, reinforces CTC offerings in the area of health tech.

Please visit the following for further details.

<http://www.ctc-g.co.jp/news/>

Edited by Golf Digest

## Practical Golf Theory for Mental Toughness

(With the cooperation of Team Serizawa Golf Academy)

### Nobuo Serizawa

Born 1959; age 56. A lifetime record of five Japan Golf Tour wins, including the Japan PGA Match-Play Championship (1996). One Japan PGA Senior Tour win marked since becoming eligible. Currently heads Team Serizawa, which he formed with professional golfers Hiroyuki Fujita and Katsumasa Miyamoto. Opened a golf academy at the Daihakone Country Club. Has many fans and followers and is known for his easy-to-understand golf lessons.



# Self-management and an Appropriate Strategy Change Your Golf Game!

Golf is often said to be a game played between the ears. While technique is required to hit a ball accurately, an important factor in the game is how that technique is leveraged. Your game will change significantly depending on how you attack a hole or deal with a bad shot. Nobuo Serizawa, whose disciples include pro golfers Hiroyuki Fujita and Katsumasa Miyamoto, spoke to us about the importance of “strategy” in golf.

#### Assessment of Circumstances and Self-analysis Are the Basics of a Strategy

I am often asked by amateur golfers what they need to do to lower their scores. In my opinion, unless you're an absolute beginner, golf scores are ultimately a matter of strategy. For example, if I'm playing a round of golf in a pro-am tournament and I ask, “What was the thinking behind that shot you just made?”, most amateurs wouldn't have a definitive answer. They would say that they just “sort of” chose to do it. I think very few actually think things clearly through before making a shot. There is no objective assessment of the

situation or any decisions made with an awareness of one's skill-level as a golfer. On the other hand, for every shot that is made, a professional golfer has gone through the process of collecting and analyzing all manners of information and considering all possibilities in order to choose the optimal shot. So, if we were to say that an average golfer only considers one or two things before making a shot, then we could say that a professional golfer has considered 10 or 20 different things. To put it differently, it is because so many things have been considered that there is a higher probability that a shot will be successful, and even if a bad shot was made, it can be compensated for sufficiently in ensuing shots.

#### The Strategy that Is Most Suitable for You Continually Changes

Hearing the word “strategy” might make things seem difficult. But, you know, telling yourself to try to avoid a bunker because you're not a good bunker player is a kind of strategy, too.

Having a single objective—to avoid a bunker—will make you think concretely about many different things, like which golf club to use, the direction to aim the shot, the trajectory you want, and so on. The more you experience thinking in that way before taking a shot, the more precise your strategy will become.

Strategies change in stages in accordance to one's growth and development. So, for example, if there was an amateur player in front of me who says he or she isn't good at making bunker shots, I'd have that person purposely make shots into bunkers. I would have the player overcome what they consider to be their weakness by experiencing lots of bunker shots.

Unlike ordinary shots, it's okay to hit your shot fat when making a bunker shot. In that sense, it's essentially not a difficult shot to make. People who say they're not good at making bunker shots often make their shots worse because of the preconceived notion that bunker shots are difficult. Once they get the hang of it and realize that bunker



shots aren't hard to make, a new option opens up in their strategy whereas before, their only choice was to avoid a bunker. Evolving your strategy in that way leads to getting better at golf.

### Strategy Is Essential for the Realization of Wants

Golf can be called a game of wants. Golfers can't get away from continually "wanting" to do something—to hit a long drive, to plant a shot dead to the pin, to sink a putt, and so on. Add "to win" to the list if we're talking about professional golfers. Then, how can those "wants" be realized with high probability? That is exactly where strategy comes into play.

Ladies pro golfer Yukari Nishiyama, who is a member of Team Serizawa, won her first JLPGA tournament in August last year. I was her caddy in that tournament. I had volunteered to caddy for her because, as far as I could tell, in terms of her golf shots, she had the skills that distinguish pros from amateurs. It was the same for her personality traits. I thought she was a player who could win, and that the reason why she wasn't winning was because the strategies being taken weren't good. In a nutshell, her weakness was that if she made a bad shot, she would get rattled because she couldn't figure out the cause. Losing her cool like that would make her aim for the pin more than was necessary. When I caddied for her, every time she made a bad shot, I explained the circumstances to her and the reason why there was nothing to worry about. This did away with her mental agitation. I think that is what led to the best result possible—the win. Of course, I should mention that of the 54 holes she played in that tournament, there were only around four shots that could really be considered bad shots. The others were within a predictable range, and in that sense allowable.

Not giving yourself much leeway in

terms of what's allowable will place you under pointless pressure. I want amateur players to know that even a pro golfer is lucky if he or she can make a flawless shot a few times in a round of golf. With that said, while we can't avoid making bad shots, it should be remembered that making the same mistake twice is not good. Let's say you find yourself in the same circumstance as when you made a bad shot in the past. If that bad shot was, say, one that could be given a score of 30 out of 100, it might be difficult this time to leap to a score of 100. But, you should be able to improve your shot to a score of 40 or 50 points.

Take something—just one thing—that you want to keep in mind, and make a habit of paying attention to that when making a shot. In the long run, that should help you decrease your mistakes and overcome what you consider to be something you're not good at.

### Professionals Do with Seeming Ease What Is Actually Difficult

In golf, the success or failure of a shot is dependent on how deeply you can think about a single situation and ultimately make an optimal decision.

To me, the best compliment anyone could pay me would be to say, "Serizawa-san, you make shots look so easy." Behind that seemingly "easy" shot is the effort and experience that have accumulated over the years. Making a shot without showing that—doing with seeming ease what is actually difficult—I think that is what a true professional does.

What's important is evaluating your own skills objectively, and, even when mistakes are made, using that to fuel your next step and repeating that to expand the breadth of your strategies. That, to me, is what leads to better scores and improvement of your game of golf.

## Message from Hikari Fujita,

a Female Professional Golfer  
Supported by CTC

Hello, this is Hikari Fujita. We're already into the second half of the season. I'll stay alert and will do my best through to the end.

With the hot summer heat upon us, here are some tips on playing golf during summer. These are the things I keep in mind myself.

The first has to do with apparel. Don't dress sloppily no matter how hot it is, because it will affect your game. Golf wear with tight silhouettes that are in fashion these days might also be tempting to try. But, playing golf wearing comfortable clothes that allow ease of movement will reduce the pressure on you and improve your score. When I take part in product development for Callaway Golf apparel, I propose products that emphasize not only fashionability but also functionality.

And, last but not least, don't forget to take steps to prevent heat exhaustion and heat stroke. I don't perspire very much. I've forgotten to drink plenty of fluids in the past and suffered from heat exhaustion. During this hot season, please make sure to dress appropriately as well as rehydrate. Have a good time playing summer golf!



Hikari Fujita—born 1994. Started playing golf from age 3 with her father as her teacher. Passed the JPLGA pro test in 2013. First win as a pro was the JPLGA Kaga Electronics Rookies Cup. Achieved her long-sought win in a regular tournament in 2015.

# IT Insight



This issue's number is...

# 1891

The Year Virtual Reality Was Born

Virtual reality (VR), like augmented reality (AR), is an area of focused expectations for the rise of a new market. VR utilizes graphics, acoustics and other digital content created by computer to enable a virtual world to be experienced as if it were real. A head-mounted display, which covers the wearer's field of vision, is worn on the head, and headphones are worn over the ears—the gears also serve to limit the information coming in from the real world environment in which the wearer is present. Virtual data is then used to create an illusion of reality. Providing a virtual-world experience as if it were a real-life experience makes it possible for people to go beyond actual time and space.

A familiar example of its use is in video games. The world of conventional video games is contained and played within a square screen, like a television or smartphone display. With virtual reality, the world of the game fills a person's whole field of vision. Playing a VR game becomes an experience that is far closer to a real experience. Other areas in which VR technology is being adopted include virtual space and sites for the live sharing of events and conferences, virtual surgery for gaining experience in performing surgical procedures, and flight simulators for learning how to fly a plane.

VR was one of the centerpieces at CES 2016, one of the world's largest consumer electronics fairs, which was held in January this year in Las Vegas. There were long lines of people every day, waiting to see the exhibits showing the Sony PlayStation® VR, Samsung Gear VR, Oculus Rift, and Taiwanese manufacturer HTC's Vive. With so much attention being focused on virtual reality technology and so many VR products being launched this year, 2016 is sometimes referred to as "the Year of VR."

However, it should be noted that the concept of virtual reality is nothing new. The history of filling a person's field of

vision with replicated reality (virtual space) goes back as far as 1891. That was the year Thomas Edison invented the Kinetoscope. It was a type of motion picture exhibition device in which a film was viewed through a scope on the top part of the device. A head-mounted display was proposed in 1968. A video game utilizing virtual reality was released in the 1990s, but the popularity of VR was limited at the time, and it did not grow big enough to replace video games or films. The VR boom then died down for a time. It was Facebook's purchase of Oculus in 2014 that re-sparked interest in virtual reality.

Oculus developed the virtual reality headset "Rift," which changes the content displayed in line with the movement of the wearer's head. Before the acquisition, Oculus ran a crowdfunding campaign. It raised 2.43 million dollars against the target to raise 250-thousand dollars as development funds. Meanwhile, Google's Cardboard VR actualized a head-mounted VR display at an extremely low price—all that is needed is cardboard and a smartphone, which just about anyone owns these days. As for VR platforms, famous corporations are competing against each other for control. The VR market today is a welter of diverse intentions.

M&A as well as investments activities are also accelerating, and we are seeing a state reminiscent of the VR boom that occurred about a quarter of a century ago. However, the size of the market as well as the quality of products and services have some ways to go. VR can be said to be still in its early days. It is not yet a market that ensures instant success just by making entry. Its success and failure will likely be dependent on whether a company can offer unique products and services that no one else can provide and is not dependent on capital strength. Companies will have to promote their businesses with clear vision to prevent this from ending as a short boom like the first one.

## Masaki Okuda

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ITOCHU Technology Ventures, Inc.

After engaging in system development at a company in the manufacturing industry, carried out research on corporate management and big data while studying for his MBA. Developed an analysis system for corporations that utilized data mining techniques. Joined ITOCHU Technology Ventures in 2014. Is engaged in investments in IT startup companies as well as provision of hands-on support to investee companies.

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