



Doing more
with automotive
manufacturing IT.

*Automotive manufacturing requires
precision and flexibility.
The IT solutions we developed
to meet these needs have applications
that extend far beyond
the automobile industry.*



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Doing more with automotive manufacturing IT.

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that extend far beyond the automobile industry.



Representative Director,
President and Chief Executive Officer

北沢宏明
Hiroaki KITAZAWA

The environment surrounding us is undergoing rapid changes.
Further advances in IT are required to quickly adapt to these changes
and build a safer, more comfortable world.
DX and digitalization represent pressing needs
for the Toyota Group as we look to establish new work styles
and implement full-scale development and demonstration
of next-generation mobility services.
As the core IT company of the Toyota Group,
in addition to fulfilling our required roles, we will contribute
to innovation by connecting information with the latest technologies
and by leveraging our technological capabilities and productivity.

Going forward, technology will continue to evolve around AI,
and we will therefore continue working
to develop highly capable human resources.
We will also accelerate our efforts toward achieving SDGs
and becoming carbon neutral, goals shared
by the international community, and we aim to become
a trusted IT company that benefits the world.
We look forward to your continued support and patronage.

IT, toward a comfortable future through mobility.

Toyota Systems supports platforms
for ever-better car making and
new mobility services with IT.

Car Creation

Improve productivity
and competitiveness

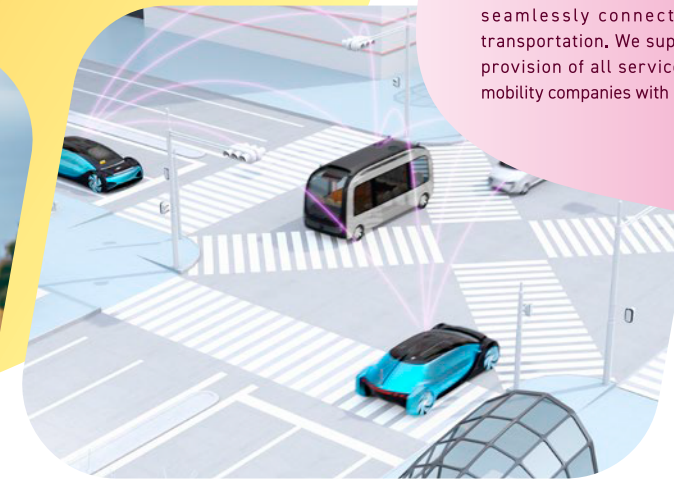
More than 5 million people are involved in making 10 million cars annually. Shipment value is worth 60 trillion yen, accounting for 20% of the total manufacturing industry. We support with IT the development and production of automobiles, which play a leading role in the Japanese economy.



MaaS

Optimizing mobility with IT

"Mobility as a Service". Traffic is optimized by IT seamlessly connected to various types of transportation. We support the development and provision of all services related to transport of mobility companies with IT technology.



CASE

Revolution in the concept of cars

"Connected, Autonomous, Shared, Electric". Supporting the future of mobility using IT technology, with the key ideas of developing new contacts and solving social issues.



Community Development

Realization of a connected city

"Woven City" connects cars and towns, and connects society as a whole. Through the cycles of technology and service development, demonstration, etc., IT technology supports new value and business creation.



We provide optimal IT solutions with the customer's perspective and outstanding technical capabilities.

PLAN



— Co-creation from the planning stage —

Research management issues locally and formulate policies and plans together with customers. Working together from the beginning.

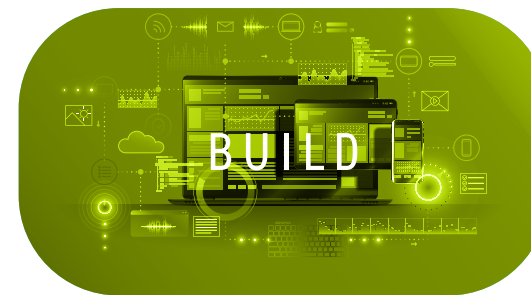
PROPOSAL



— The most polished optimal proposals —

Using our experience and know-how, we propose optimal IT solutions from the customer's point of view to handle requests and solve problems.

BUILD



— Tremendous productivity,
best technical capabilities —

We concentrate high technology inside and outside the company to provide safe, secure, and cost effective solutions.

COMMUNICATION



— Always striving for something better —

Through daily activities and communication, we provide total support to handle our customers' requests and solve their problems.

The Latest Case Studies

Strategy and Business Planning Group

R&D of advanced technology as an “IT think tank” working on technical proposals and improving technical capabilities.

- 1 The world's first in-vehicle battery degradation diagnostic technology for battery reuse and better service.
- 2 Detecting deterioration in cognitive function based on driving behavior to aid elderly drivers.

Engineering Field

Support Toyota's car manufacturing with the best IT services and technology to build the future of manufacturing.

- 1 Estimating paint quality with machine learning prior to application. Bringing new colors to the world quickly with a world-first technology.
- 2 Realizing further improvements in productivity through next-generation manufacturing that utilizes XR.
- 3 CAE, which normally required an entire day, has been reduced to a few seconds with our proprietary machine learning technology.
- 4 Launching new global diagnostic software to adjust to the latest changes in vehicle technology and the continuous changes in the automotive industry.
- 5 Pioneer the Toyota Group's Future with creative CG.
- 6 Building better systems with customers. Developing lean systems using the agile methodology.

Corporate and Finance Field

Integrate with Toyota's Corporate and Finance to achieve business innovation through IT.

- 1 Systems embodying the Toyota DNA and support for transformation in the DX era.
- 2 Supporting the transformation of dealerships and rental/leasing businesses through promotion of DX for an ideal future.
- 3 From developing TOYOTA Wallet to improving it, we created a user-friendly payment application.

Infrastructure Field

Supporting DX by providing IT infrastructure —the core of the All Toyota businesses— on a global level.

- 1 Providing an original common platform that supports All Toyota businesses.
- 2 Security initiatives to accelerate DX as an enabler rather than not as a blocker.
- 3 Developing AI-powered virtual assistants that contribute to Work Style Innovation.
- 4 Building next-generation networks that ensure security and connectivity in addition to improving convenience.
- 5 Converting inquiries into knowledge and sharing that knowledge to quickly solve OA-related problems.

Corporate Administration Group

We support quick and accurate decision-making by management, and we provide an environment in which employees on site and in offices can demonstrate high performance and work with peace of mind.

- 1 Expected value
- 2 Company-wide priority measures to achieve the medium-term plan
- 3 Functions and missions

The Latest Case Studies

Strategy and Business Planning Group

R&D of advanced technology as an “IT think tank” working on technical proposals and improving technical capabilities.

1 The world's first in-vehicle battery degradation diagnostic technology for battery reuse and better service.



With the popularization of hybrid and electric vehicles, it is increasingly more important to reuse batteries. Generally, it takes a full day to accurately diagnose whether a battery can be reused. A technology is needed that can perform a quick and simple advance diagnosis in order to minimize to the extent possible the diagnosis of batteries that are no longer usable so that diagnosis is only performed on batteries that are found to be reusable. Toyota Systems has developed the world's first simple diagnostic technology that analyzes voltage fluctuations and achieves a 90% accuracy in three minutes. There is no other technology compatible with both nickel-metal hydride batteries and lithium-ion batteries that can specifically diagnose the degree of deterioration in nickel metal hydride batteries, which account for almost 100% of the used market. Currently, we are working on a cooperative system with companies overseas to expand our business globally. In addition, we have established a technology that can diagnose the deterioration of an entire car without removing the battery, and are aiming to have it used at dealerships.

2 Detecting deterioration in cognitive function based on driving behavior to aid elderly drivers.

In Japan, where the aging of society is progressing faster than anywhere else, we are working on the development and demonstration of driver assistance technologies specifically for elderly drivers. With driver-assistance technologies for autonomous driving and pedestrian detection, we focus on cognition as we work with the elderly. Driving involves a large amount of repetitive behavior. Machine learning is used to identify cognitive and driving impairments by analyzing the data stored in the car, such as from brakes and the drive recorder. We hope that by reminding the driver and their family about driving and encouraging them to visit the hospital, they will be able to continue driving safely or return their driver's license after understanding why. This could also help solve the shortage of professional drivers, such as for taxis, trucks, and buses. We will continue to develop better technologies while continuing to meet with transportation companies, local governments, and doctors.



The Latest Case Studies

Engineering Field

Support Toyota's car manufacturing with the best IT services and technology to build the future of manufacturing.

1 Estimating paint quality with machine learning prior to application. Bringing new colors to the world quickly with a world-first technology.



Color is a very important factor that contributes significantly to the first impression of a car. However, until now it was considered difficult to grasp the quality of the application of paint—its stability, safety, durability, and so on—until after it was applied. We have developed a world-first technology to estimate paint quality based on combinations of materials and other factors through machine learning by collecting data from every process, from design to manufacturing. We have succeeded in significantly shortening development periods. In addition to using remaining data in the development process, we also repeated exchanges at production sites, conducted additional experiments, and gained further knowledge. This was done to gradually improve the accuracy of the technology. This system is closely involved with actual manufacturing. In the future, we plan to expand into other material fields such as rust prevention and resin.

2 Realizing further improvements in productivity through next-generation manufacturing that utilizes XR.

We provide AR, VR, MR, and other technologies to meet the needs of the development and manufacturing divisions of each Toyota Group company. 3D models enable the verification of prototype vehicles and new equipment before production. Taking AR as an example, simply by holding up a smartphone or tablet in an actual factory, full-scale equipment data can be displayed, making it possible to check in advance whether it will interfere with surrounding equipment or walkways. This helps eliminate rework, shortens the time needed, and reduces costs. This is used in a wide range of applications. We have an app that lets someone annotate the other party's space during a video call, as well as an app that indicates steps and tips to assist with work. In order to further improve productivity, we are aiming to advance the use of XR by combining it with machine learning in the future.



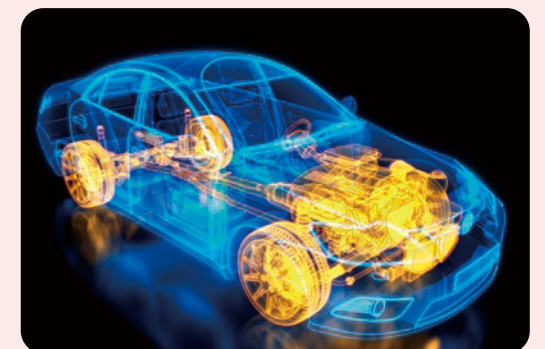
3 CAE, which normally required an entire day, has been reduced to a few seconds with our proprietary machine learning technology.



Performance analysis of aerodynamics, collisions, durability, etc. using large-scale CAE conducted in the vehicle development process. This is an essential processes, but even a supercomputer requires an entire day. We have developed a technology that uses machine learning to predict aerodynamic forces in a very short time—less than 30 seconds—based on the large amount of data that has been accumulated by Toyota Motor Corporation. By degenerating three-dimensional shapes unsuitable for machine learning into a unique format, we have achieved predictions with a level of accuracy that is practical under certain conditions. Used as a pre-validation for CAE, it can significantly shorten design, calculation, and analysis cycles. As only CAD data and so on needs to be entered, this technology can be used at the design and planning stages to reduce rework. We can predict fluids with the same mechanism, but we will continue to improve this technology so that it can be applied to other phenomena.

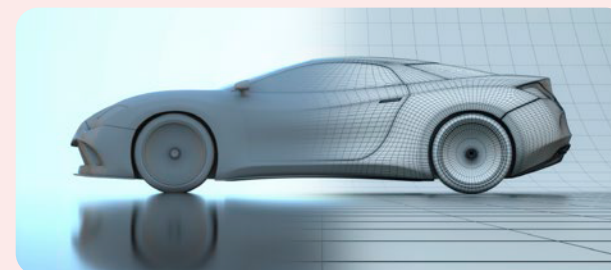
4 Launching new global diagnostic software to adjust to the latest changes in vehicle technology and the continuous changes in the automotive industry.

Diagnostics software is the essential application for dealerships to communicate with ECUs on vehicles, diagnose electrical systems, customize personal settings and initial setup after ECUs/parts replacement. We have renewed the software structure of the application to respond quickly to further changes and enhancements. This renewal makes user operation time short, diagnosis certain, security strong and also enables quick software updates. We can develop the software quickly for new car models or requirements without increasing development cost. Since the software is used by car dealers all over the world, the requirements are adjusted with overseas TOYOTA distributors, and the software is designed to reflect the unique needs of each region. We will continue to support DX in after-sales service and vehicle development with open APIs.



5 Pioneer the Toyota Group's Future with creative CG.

In the world of video content and manufacturing, the use of CG is more advanced than ever. We have cultivated the technology to create beautiful and accurate content, such as high-definition images, video, VR, AR, and configurators through CG production of cars. Going forward, we will apply this technology to various fields to provide unprecedented user experiences in a wide range of fields, such as the automotive industry, entertainment, person-to-person communication. Our future possibilities are endless.



6 Building better systems with customers. Developing lean systems using the agile methodology.

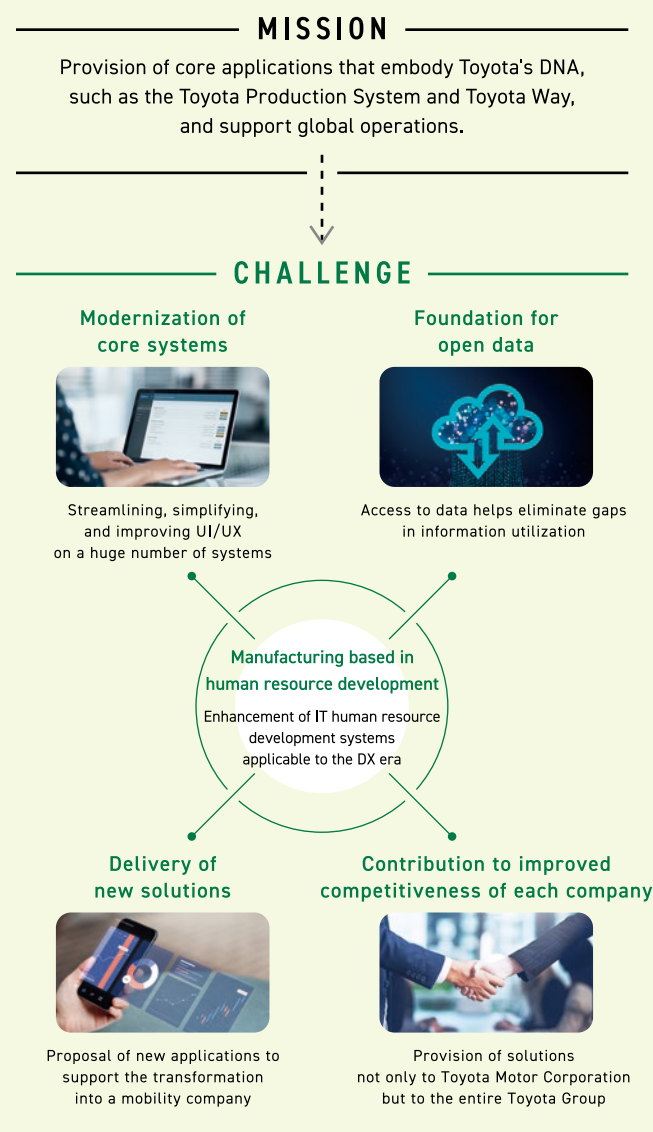
In this age of rapid change, development methods must also change. In the past, it took two or three years to build a system after discussing a customer's needs. And during that span of time, the world around us would change. By the time the system was completed, the customer's needs had already changed. In order to make our systems more practical and more resistant to change, in recent years we have been using agile development. With agile development, changes can be incorporated into customer requests by having them participate in the development as a member of a team of five or six people. By utilizing low-code tools and so on, we can quickly develop something tangible. And having customers and developers in the same room allows for active discussions, proposals, confirmations, and selections, which in turn enable quick decisions on the spot. This fosters a mindset where developers think for themselves and only develop effective features. Scrum methodology, the main agile development method, originated in the Toyota Production System. We will utilize agile development, make improvements, and work to achieve lean system development.

Corporate and Finance Field

Integrate with Toyota's Corporate and Finance to achieve business innovation through IT.

1 Systems embodying the Toyota DNA and support for transformation in the DX era.

Manufacturing based on the Toyota Production System is carried out around the world. The Corporate and Manufacturing IT Group develops and maintains core global applications that support this. We have embodied Toyota's DNA in our systems because we understand not only the Toyota Production System but also the Toyota Way—such as improvements, cost management, and human resource development—and business processes. With the advent of DX, there is a need today for IT environments that can cope with these major changes. Referred to as the cliff of 2025, there are also quite a few old systems in Toyota Motor Corporation that need to be modernized. We must also contribute to user convenience by streamlining and simplifying bloated and complex systems. Depending on the circumstances and requirements of Toyota Motor Corporation, systems will be updated or the legacy version will be utilized. In order to make effective use of data, it is essential to eliminate gaps in information utilization within the company. Previously, information was kept in a closed environment for security reasons. We are working to provide tools that can create added value from accumulated data by providing an environment where everyone can access the data while ensuring safety. We are also taking on the challenge of proposing systems that will support the transformation from an automaker to a mobility company, and systems that will enhance the competitiveness of Group companies and create added value through collaboration. The foundation for achieving these goals is human resource development. In addition to our extensive upskilling program, we are currently training with a focus on understanding Toyota Motor Corporation's operations and agile development using the cloud. We will continue to support Toyota Motor Corporation's manufacturing by not only improving our technology but also by proposing optimal technologies to customers.



2 Supporting the transformation of dealerships and rental/leasing businesses through promotion of DX for an ideal future.

As Toyota Motor Corporation shifts toward becoming a mobility company, dealerships and rental and leasing businesses—points of contact with customers—will also need to change.

〈Current〉 Characteristics of the system and work currently provided



Toyota Systems has therefore built a sales support system that enables sales representatives at dealerships to make optimal proposals to customers (such as when to purchase a car and what type of car to buy), and has also built systems for predicting component deterioration and diagnosing failures so that customers can drive safely and with peace of mind even after their purchase. In order to further improve the value that dealerships provide to customers, we visit dealerships in person to promote business understanding. At the same time, we are constantly taking on the challenge of utilizing the latest digital technologies in agile development.

〈Going forward〉 Future mission and direction

Going forward, we will continue to provide optimal mobility utilization (buying, renting, and car sharing) based on information on customers' living environments (family structure and residential area) and hobbies and preferences. We are also moving forward with the concept of creating a system in which various services in the real world can connect to mobility as autonomous driving advances. We will contribute to the promotion of DX so that mobility becomes more comfortable and meaningful for our customers.

3 From developing TOYOTA Wallet to improving it, we created a user-friendly payment application.

Toyota Wallet is a payment application from Toyota Motor Corporation. Toyota Finance Corporation and Toyota Systems are involved in the planning and development of this system. Unlike many payment services, the idea is to connect users and services and make them more convenient by linking them with various payment methods and enabling the use of mobility services and linked services such as food and drink with a single app and ID. The app also creates a new point of contact between Toyota and its users outside of dealerships. By utilizing data to create better services, we enable users to choose the contract and payment method, the content of business negotiations. Registering dealerships will enable them to be

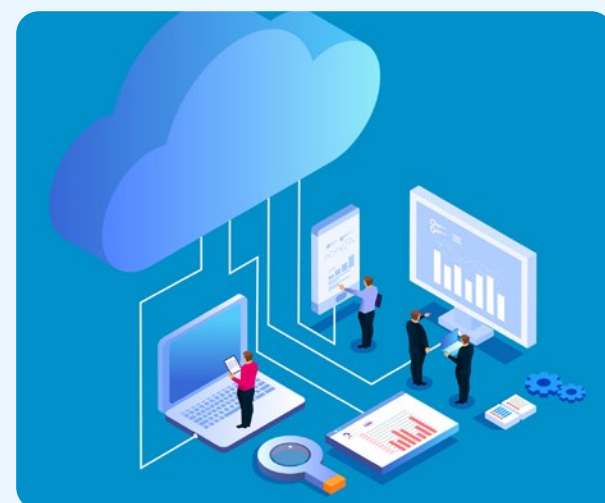
used as a means of communication, which will lead to greater convenience for Toyota Motor Corporation customers. We have been working together with Toyota Motor Corporation and Toyota Finance Corporation since the start of the project, and we continue to work together with other companies. We place particular emphasis on speed and communication. In order to respond to changes in the market, the three companies regularly exchange opinions from the same perspective and continuously improve specifications. Going forward, we will continue to look at the benefits and usability for our users and make improvements to apps in order to make them even more valuable to Toyota Motor Corporation.



The Latest Case Studies

Infrastructure Field

Supporting DX by providing IT infrastructure
—the core of the All Toyota businesses—
on a global level.



1 Providing an original common platform that supports All Toyota businesses.

We are building an original common platform on a private cloud server that runs All Toyota core systems and business applications. This enables us to deliver high quality IT infrastructure quickly and inexpensively. Privately managed environments require a significant amount of time and investment for a company to deploy and build servers. And while public clouds can be used flexibly, they must be engineered to ensure the same security and continuity as private environments. Because we are working together with Toyota Motor Corporation to advance our business, we are able to provide users with optimal proposals. In the future, we will work to make the platform more efficient by combining both private and public environments.

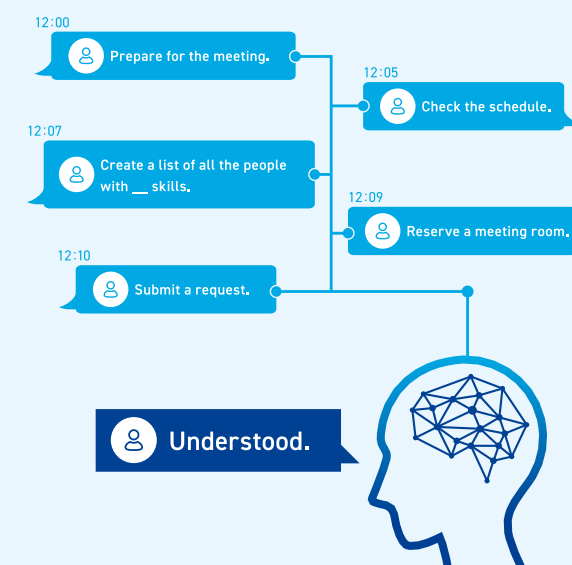
2 Security initiatives to accelerate DX as an enabler rather than not as a blocker.

The business environment has changed dramatically due to the work style innovation and the DX promotion, and the innovation is used the cloud is accelerating rapidly. On the other hand, with increase of the Cloud use, many cloud-specific incidents such as the information leakage due to misconfigurations to be set have occurred around the world. Being unwilling or unable to use the cloud for avoiding the incidents, it is not be able to cope with this change. Effective and efficient security measures are major success factor in DX accelerating. As concrete initiatives, establish approval processes for cloud use, create individual guidelines, and conduct reviews. We have established a system for maintaining an optimal environment by constantly diagnosing compliance with guidelines and checking for inappropriate points, even after the system introduction. Not a limitation, we would continue being as a security task-force to support the correct and safe use definitely, and would promote the security enhancement for the All Toyota and the Automotive industries.



3 Developing AI-powered virtual assistants that contribute to Work Style Innovation.

We are working to use AI to develop virtual assistants that help achieve overwhelming productivity. The goal is for these to become virtual assistants for each employee. We want AI to take care of all the complicated, messy tasks on behalf of people, and we want employees to focus on what they're doing. The project began with that in mind. The FAQ chatbot is currently installed on the company's portal site to assist in the early resolution of questions about how to use the company's systems and various applications. In order for it to become a more useful assistant in the future, we are working to improve it every day with cooperation from different departments. We will contribute to Work Style Innovation by adding functions such as scheduling, automating meeting setup, and searching for experts inside the company.



4 Building next-generation networks that ensure security and connectivity in addition to improving convenience.



In response to changes in the business environment, such as Work Style Innovation, cloud utilization, and group collaboration, we are working to create new networks using the highly convenient Internet. In the past, no matter where the connection took place, it would go through the company's network, which caused inconvenience such as audio interruptions in conference calls and poor cloud server response. Therefore, we have introduced three solutions—remote access, cloud proxy, and SD-WAN—as we aim to build an environment that ensures security and connectivity. We will start by introducing the network from the core companies of the Toyota Group, then expand to the entire All Toyota, including dealerships, and eventually the wider automobile industry. Going forward, we will continue to consider network design.

5 Converting inquiries into knowledge and sharing that knowledge to quickly solve OA-related problems.

OA-related inquiries are frequent in our day-to-day business. Because the Toyota Group often uses common environments, we developed FAQs as shared knowledge to improve the self-resolution rate of chatbots and reduce the response time of support staff. In actual operation, we will classify contact response logs from each company that provides support as (1) common inquiries and answers, (2) common inquiries but different answers, (3) unique to each company, and add (1) and (2) as shared knowledge every month. In addition, we are also promoting the establishment of contact centers for companies that do not provide support. We plan to expand these activities to the entire Toyota Group and make proposals with a view to standardizing the OA environment for greater efficiency.

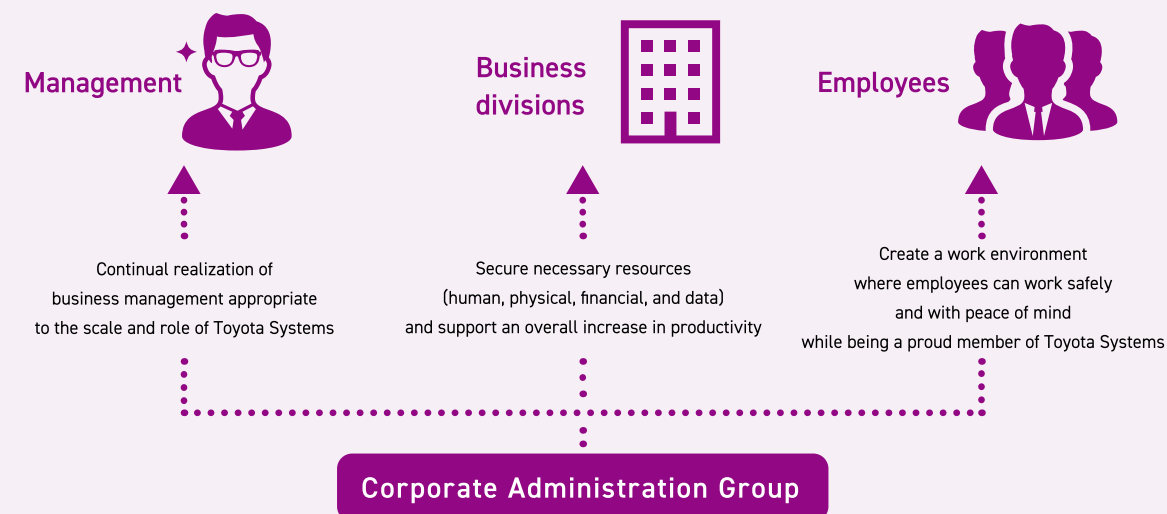


Corporate Administration Group

We support quick and accurate decision-making by management, and we provide an environment in which employees on site and in offices can demonstrate high performance and work with peace of mind.

1

Expected value = We define management, business divisions, and employees as customers, and make efforts to achieve the expected values for each.



2

Company-wide priority measures to achieve the medium-term plan



3

Functions and missions

Accounting functions



While fulfilling the role of the accountant by accurately recording (book-keeping) the company's activities (related to money), accounting will act as a compass for management.

Based on highly accurate earnings information (actual results and forecasts), and based on the setting and follow-up of management indicators and KPIs, we discuss with management about what direction the company should take. In addition to providing accounting literacy education that helps raise awareness of the accuracy of earnings information and asset management, we are promoting initiatives involving relevant departments within the company, such as the standardization and improvement of earnings management processes and risk management for new business development.

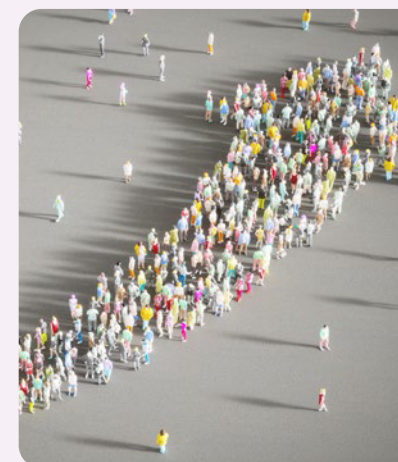
Human resource functions

We contribute to the development and formulation of strong human assets and organizations that can survive in a rapidly changing business/IT environment, picture their own future vision, and realize it together with their colleagues.

The assets of an IT company are its people. To say that employees are the lifeblood of the company is no exaggeration. We will continue to support employees from both a work (providing challenges) and a life (peace of mind) perspective. The mission of our human resources function is to create an environment in which all employees can work with peace of mind and a sense of excitement, and feel joy and pride in working at Toyota Systems. For the happiness of employees and the growth of the company, we consider and implement various human resources measures on a daily basis, such as recruitment, training and development, assignment and organization, labor, treatment, welfare, health measures, and work-life balance support.



General affairs function



Through strategic public relations activities, the company has improved its name recognition and corporate image, and has contributed to expanding its business performance, securing talented human resources, and improving employee satisfaction.

In order to realize new ways of working, we aim to create offices that employees want to go to and offices that enable efficient work when building new bases or renovating existing bases. We have optimally placed facilities in designed spaces, such as booths that facilitate concentration on the individual level and spaces that encourage communication. We are also working to create workplaces where employees can work with peace of mind through activities to eliminate occupational and traffic accidents and to promote compliance. As part of our social contribution activities, we hold computer classes at welfare facilities, donate PCs that can be reused, clean up beaches, hold food drives, and hold other activities that employees and their families can participate in. Toyota Systems' efforts to solve social issues are introduced in the SDGs TS report.

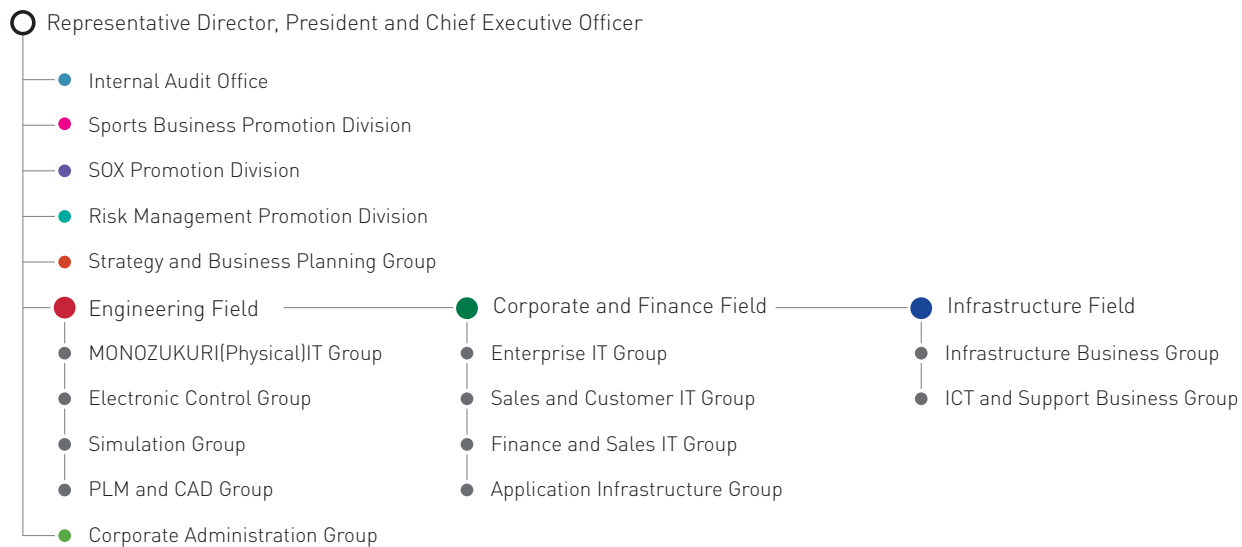
Procurement functions

Building and strengthening partnerships to deliver high performance.

While sharing Toyota Systems' business policies and plans with our partners, we are strengthening our integrated activities and contributing to system development and service delivery by improving quality, reducing costs, and complying with deadlines. We are also working with business divisions to review operations, utilize systems, and improve them so that we can steadily and efficiently implement the steps from order receipt to order to delivery.



Management		Group General Manager	
Representative Director, President and Chief Executive Officer	Hiroaki Kitazawa	Internal Control Officer	Shinichi Kawashima
Director	Masahiro Hosokawa	Strategy and Business Planning Group	Tomohiro Amano
Director	Seiji Sakai	MONOZUKURI (Physical) IT Group	Takayuki Suzuki
Director	Hisashi Kano	Electronic Control Group	Shinichi Ohashi
Director	Kazuya Enya	Simulation Group	Hiromichi Yokoyama
Director (part-time)	Toshiyuki Hibi	PLM and CAD Group	Hiroshi Matsumoto
Audit & Supervisory Board Member	Yasuhiro Itoh	Enterprise IT Group	Masafumi Ito
Audit & Supervisory Board Member (part-time)	Kazuyoshi Tanaka	Sales and Customer IT Group	Wataru Asari
		Finance and Sales IT Group	Katsuhiko Terauchi
		Application Infrastructure Group	Kenji Aoki
		Infrastructure Business Group	Hirotsugu Yoshimi
		ICT and Support Business Group	Motoki Maeda
		Corporate Administration Group	Kazuya Enya



1	Nagoya Headquarters	JP TOWER NAGOYA 32F, 1-1-1 Meieki, Nakamura-ku, Nagoya-shi 450-6332
2	Tokyo Headquarters	Shinagawa HEART 14F, 1-8-23 Konan, Minato-ku, Tokyo 108-0075
3	Sakae Office	Toyota Home Sakae Building 7F, 1-23-22 Izumi, Higashi-ku, Nagoya-shi 461-0001
4	Midland Office	Midland Square 20F, 4-7-1, Meieki, Nakamura-ku, Nagoya-shi, 450-6220
5	Meieki Office	Meieki Dia Meitetsu Building 8F, 1-1-17 Meieki, Nishi-ku, Nagoya-shi 451-0045
6	Takaoka Office	Dai-ichi Fuji Building 8F, 35-16 Daikancho, Higashi-ku, Nagoya-shi 461-0002
7	Toyota Office	Gaza Building 5F, 1-140 Kitamachi, Toyota-shi 471-0027
8	Osaka Sales Office	Hankyu Terminal Building 16F, 1-1-4 Shibata, Kita-ku, Osaka-shi 530-0012
9	Kyushu Sales Office	Daisan Hakata Kaisei Building 10F, 1-3-6 Hakataeki Minami, Hakata-ku, Fukuoka-shi 812-0016
10	Tohoku Sales Office	JR SENDAI EAST GATE BLDG. 2F, 1-1-1 Tsutsujigaoka, Miyagino-ku, Sendai-shi 983-0852

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1	Germany Belgium United Kingdom	Toyota Tsusho Systems EUROPE GmbH
2	Singapore	TOYOTA TSUSHO SYSTEMS SINGAPORE PTE. LTD.
3	Thailand	TOYOTA TSUSHO SYSTEMS (THAILAND)Co.,Ltd.
4	India	TOYOTA TSUSHO SYSTEMS INDIA Pvt.Ltd.
5	Indonesia	PT TOYOTA TSUSHO SYSTEMS INDONESIA
6	China	TOYOTA TSUSHO SYSTEMS CHINA
7	USA	TOYOTA TSUSHO SYSTEMS US, Inc.

