

Global Practice Group Automotive

Information

What is GPG-Auto

At NRI, consultants from various NRI offices/regions work together to promote consulting and independent research activities for major industries. These working teams are called “GPG = Global Practice Group”.

Among GPG, the automotive group has the largest history. It operates in 13 countries and regions, with a focus on Japan with professional consultants. In a project, NRI assigns the best consultant based on the customer's needs and provide the best team to support the project.

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h&z (Germany)

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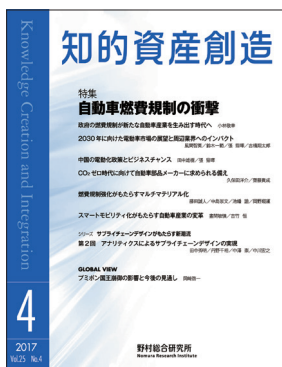
Major project achievements of GPG-Auto

<p>Corporate Strategy</p> <ul style="list-style-type: none"> • Overall vision, medium-term business planning • Business portfolio review • Restructuring group operations • Support for transition to holding company 	<p>Business Reforms</p> <ul style="list-style-type: none"> • Digital/Marketing reformation • Research on new suppliers in LCC⁽²⁾ • Support for improving operational efficiency by outsourcing (BPO⁽³⁾, ESO⁽⁴⁾) • Formulate global R&D structure • Reduction of transit inventory • Improve efficiency by implementing RPA⁽⁵⁾ • Smart factory implementation support
<p>Business Strategy</p> <ul style="list-style-type: none"> • Strategy for shifting service towards manufacturing • Aftermarket penetration • Consumer clinic for introducing new vehicle • PoC⁽¹⁾ support for new business 	<p>M&A Alliance</p> <ul style="list-style-type: none"> • Support research to find new alliances • Synergy study during company merger • Business DD⁽⁶⁾ support • PMI⁽⁷⁾ Execution support • Patnership dissolution support
<p>Tech Strategy</p> <ul style="list-style-type: none"> • Assistance for deciding continuity of development • Modularization strategy support • Technology venture research • Technical strategy planning by analyzing patents/thesis papers • Creating roadmap for training engineers 	

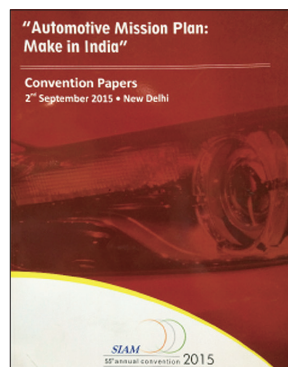
(1) Proof of Concept, (2) Low Cost Country, (3) Business Process Outsourcing, (4) Engineering Service Outsourcing, (5) Robotic Process Automation, (6) Due Diligence, (7) Post Merger Integration

GPG-Auto international presentations

GPG-Auto conduct independent research on hot issues of automobiles from time to time in addition to project implementation every year. Members actively present their own research results at international conferences. We cover a wide range such as interviews, articles, publications, press releases of independent research results, seminar lectures from TV, newspapers and magazines. More than 70 automotive related presentations done in the year 2017.



NRI “Knowledge Creation and Integration” Automobile edition



India SIAM (Automobile Manufacturers Association) Convention Paper

NRI receives certification as a knowledge partner from SIAM. We have made proposals for the development of Indian automobile industry, including contributing discussion to Convention Paper of SIAM General Assembly.



World Autonomous Vehicle Ecosystem Conference, Shanghai

Conference related to autonomous driving and connected car held in Shanghai. NRI participated as a representative of Japan along with the chief of the Ministry of Construction and Transportation, Ambassador of the United Kingdom to China etc. NRI also made recommendations on the concept of autonomous driving society.

Collaboration with major research institutes

GPG-Auto actively collaborate with major research institutes in various countries. We do collaborative research presentations with German VDI/VDE-IT (technology/engineering think tank), China CIAD (China International Association for Urban and Rural Development), DRC (Development Research Center of the State Council). We are also studying the implementation of big data analysis to automotive business in collaboration with AutoNavi Information Technology Co., Ltd. (Alibaba Group) in China where digitization is spreading through the Society at a stretch in the private enterprise.



Debates with China CIAD, DRC



Collaborative research with Germany VDI/VDE-IT



Business tie-up with AutoNavi

Enhancement of software development capabilities with the emergence of automotive intelligence

“Support to outsource development work”

With the emergence of automotive intelligence, large-scale, complex, strategic and effective software development has become imperative.

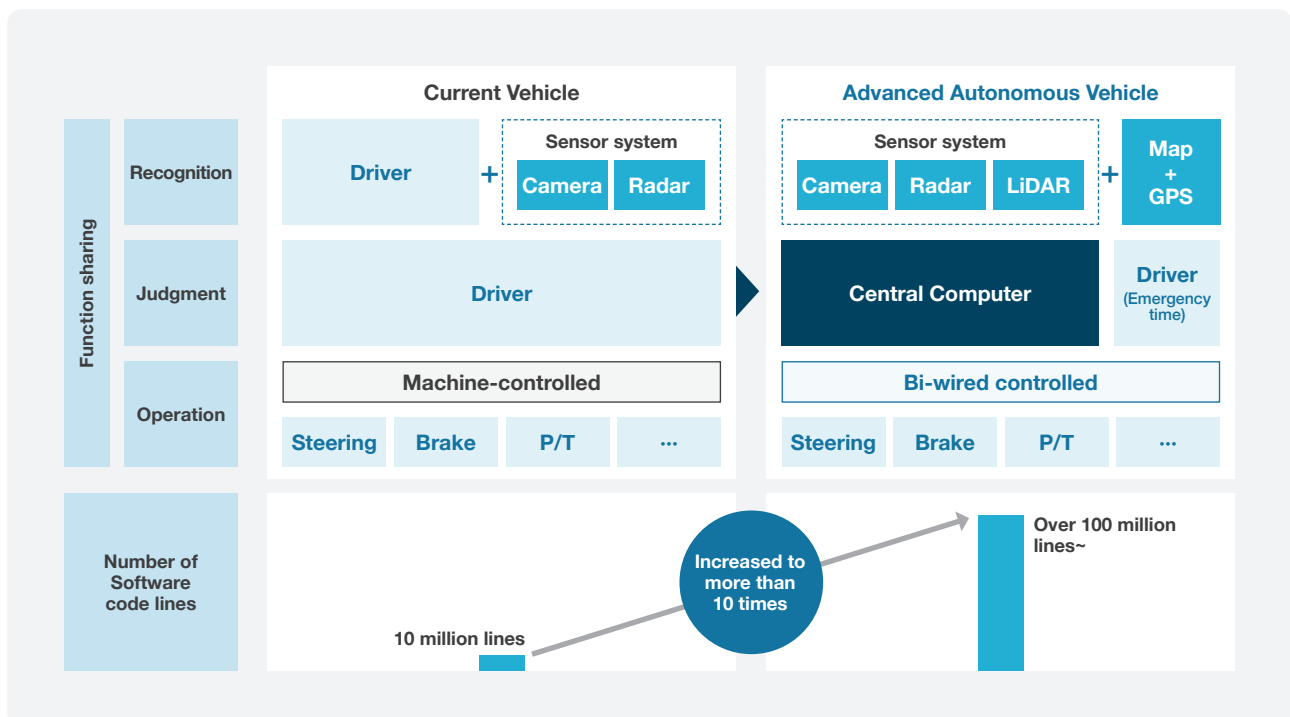
Development of automobiles go into an uncharted territory to realize advanced autonomous driving

In recent years, new cars, such as autonomous driving and connected cars, that have undergone a discontinuous change from conventional cars, are not only gaining attention from the automotive industry, but also in whole society. The leaders of “Automotive Intelligence” are not the traditional automobile manufacturers, rather the so-called Silicon Valley companies, such as Google and Tesla, that have their main business in IT or software. Technologies like AI (Artificial Intelligence), image processing and connectivity are very important for developing new cars. Going forward, the focus on value addition in automobiles is likely to shift from hardware to software. Because of these evolutions, the development of cars has been venturing into an uncharted territory for automobile manufacturers.

Development of large-scale and complex automotive software is on urgent business

In the autonomous driving, the car computer substitutes the function of “Recognition and Judgment”, which has been performed by the driver up to now. It is expected that the scale of in-vehicle computers for this autonomous driving would be 10 times more than the size of automotive software that is currently being sold in the market, and scale of development will increase further. Accordingly, the automobile manufacturers will be required to respond to the challenges, such as (1) Selection and focus of businesses, (2) Development efficiency (standardization/process review) and (3) Development resources optimization (external resource utilization/resource reallocation). Reviewing the current method of development, redefining the direction for business and development, and resource allocation require urgent attention.

■ Software development in accordance with automotive intelligence



NRI can extend support for the formulation of the development strategy, review of business processes, and the utilization of outsourcers.

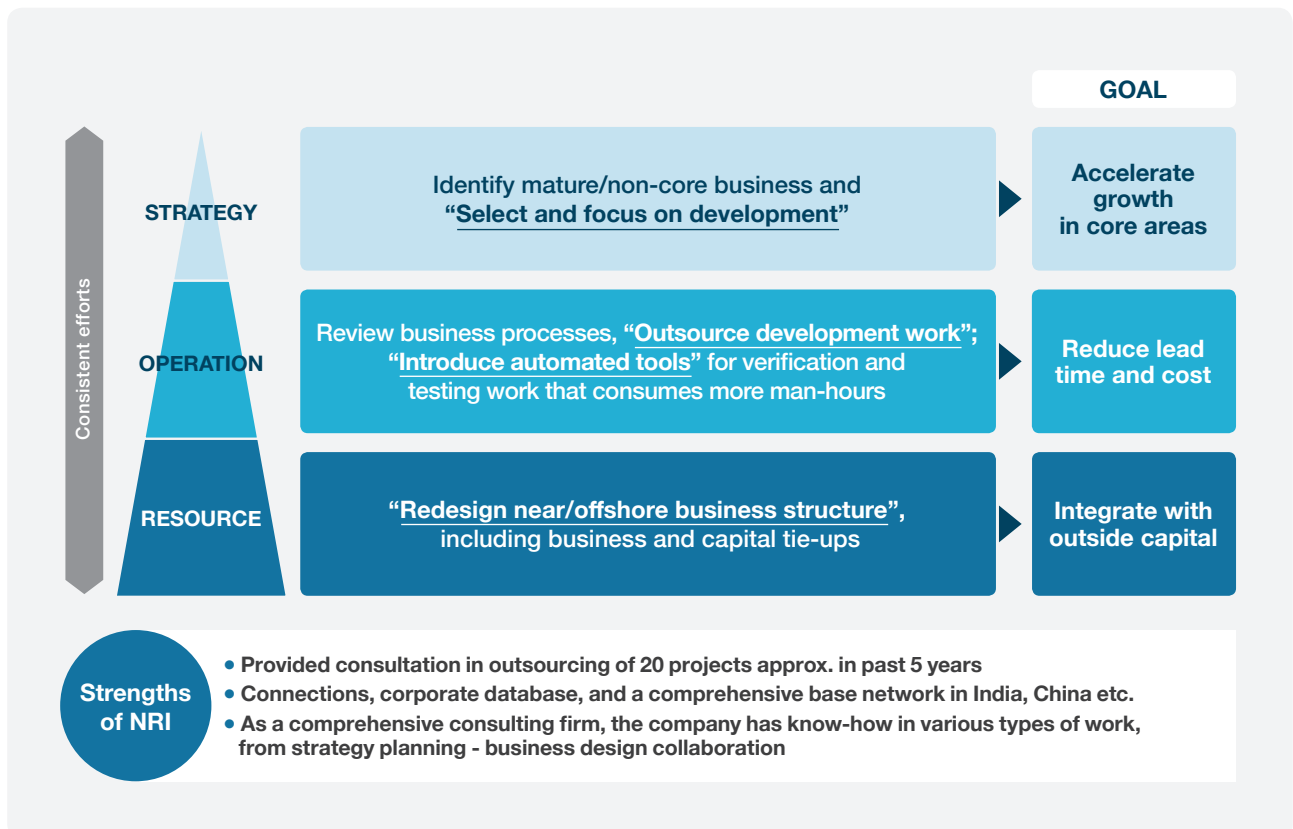
Drastic strategical changes are required even for the development that was unquestionable before the technological expansion

In expanded and complex software development, a resource strategy is required to assess company's focus areas and efficiency, to operate the business (including external resources) in a lean manner. Further, in the autonomous driving that requires coordination between various systems, there is a risk that man-hours pertaining to development and verification will be more due to the complexity of the control architecture. Therefore, it is also important to design an optimized control architecture by introducing model-based development, etc. Moreover, collaboration with the leading startups is also an important issue. It is also required to divide the roles of development taking advantage of each company's special skill and redefine the competitive area as an automobile manufacturer. It is difficult for many companies to implement above with the extension of conventional business. It is time to review the development strategy and system to respond to the technological expansion.

Case: Extensive support such as exploring outsourcing of development to India

Domestic pool of engineering resources is reaching its limit, requiring resources to be ensured on a global scale. Outsourcing development work to offshore locations, such as India which continues to grow was difficult for many Japanese companies, however this option is now widely used as both the parties (i.e. the outsourcer and the contractor) have been able to accumulate know-how. NRI has provided support for the development of products and business units, strategic alliances that are entwined with capital, and the revision of the company's development subsidiaries. It is also important to bridge the language and development culture gap in case of outsourcing development work. Because of support from NRI for initial trial, companies were able to achieve a smooth resource shift. NRI has numerous project achievements in formulating outsourcing strategies, exploring and evaluating offshore outsourcers such as India, and providing support for trial engineering.

Utilization of outsourcing for "Shifting resources to different dimension"



Expanding downstream services for automobile manufacturers “PoC-Proof of Concept”



Automotive aftermarket is about 3.7 times larger than new car sales, OEM and service providers are competing beyond the industry barriers.

The advancement of linked technologies, mainly connected cars, has increased the scale of downstream business

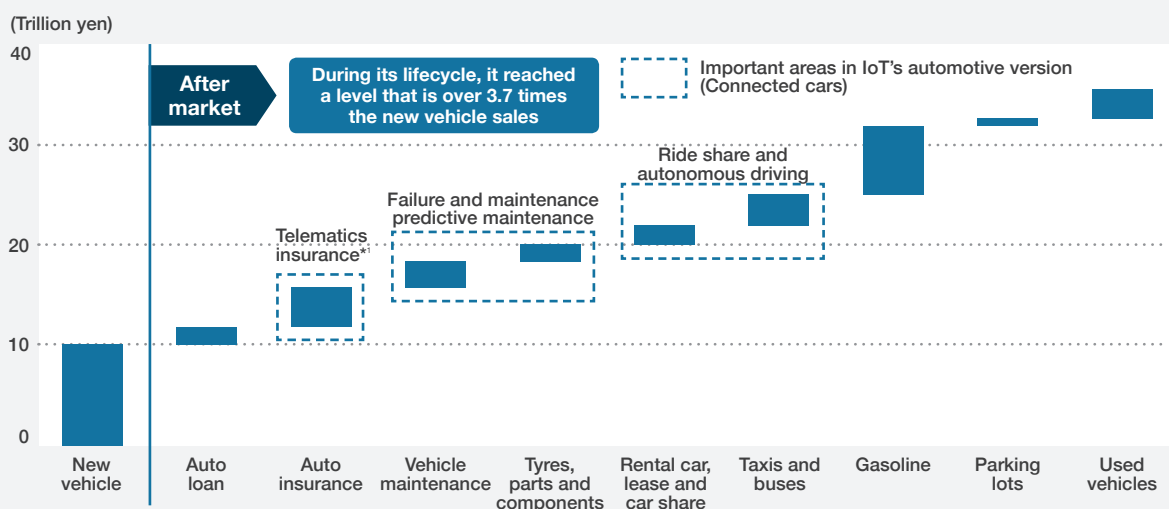
The type and quantity of information that can be collected and transmitted to the car is greatly increasing with the advancement of linked technologies, such as the introduction of connected cars and advanced functions of automotive infotainment system. In addition, with a decline in data communication charges, cloud usage charges and unit price of devices, such as sensors, it has become easy to use large volume of data. As a result of these changes, automobile OEMs are shifting their resources from selling hardware, i.e. traditional vehicle sales to downstream business domain that are strong in software, such as autonomous driving, sharing platform, telematics insurance and real-time prediction of failure in components. NRI estimate that the size of aftermarket will be about 3.7 times of the new car sales.

With a tough competition among OEM and service providers, it is necessary to devise a way to succeed in downstream market

On the other hand, service providers, such as Google, Apple, Uber, Grab, have been proactively involved in the development of autonomous driving or shared platforms in the large-scale downstream business area, and the automobile OEMs and service providers are competing beyond the industry borders.

While the whole industry is accelerating towards establishing a new automotive industry such as autonomous driving and sharing, the existence of service providers with advanced service models and know-how on data utilization poses a threat to OEMs. Although some OEMs have steered up the road of partnership, it is a challenge for OEMs to consider how to take advantage of their own customer assets and data assets to capture downstream areas.

Annual retail market size related to automobiles (Japan)



*1 Automobile insurance wherein data regarding car's mileage and driving mode (sudden start or stop) is collected and analysed, and insurance premium is calculated after evaluating the driving pattern of the driver

Source: New vehicle, Tyres, parts and components, Gasoline, Used vehicles: Business statistics on vehicle maintenance, Ministry of Economy, Trade and Industry (2014); Rental car, lease and car share, Taxis and buses, Parking lots: Survey on trends of auto insurance in Service industry, Ministry of Internal Affairs and Communications (2015); General Insurance Association of Japan (2015) - Auto loan: Market size is equal to the amount of credit extended annually. The amount was calculated by NRI taking 20% of the retail market for new vehicles.

It has become an urgent issue for OEMs to devise a way to compete in the augmenting aftermarket

NRI will support from formulation of the data-driven strategy for automobile OEM through PoC due to harmonize consulting and solutions.

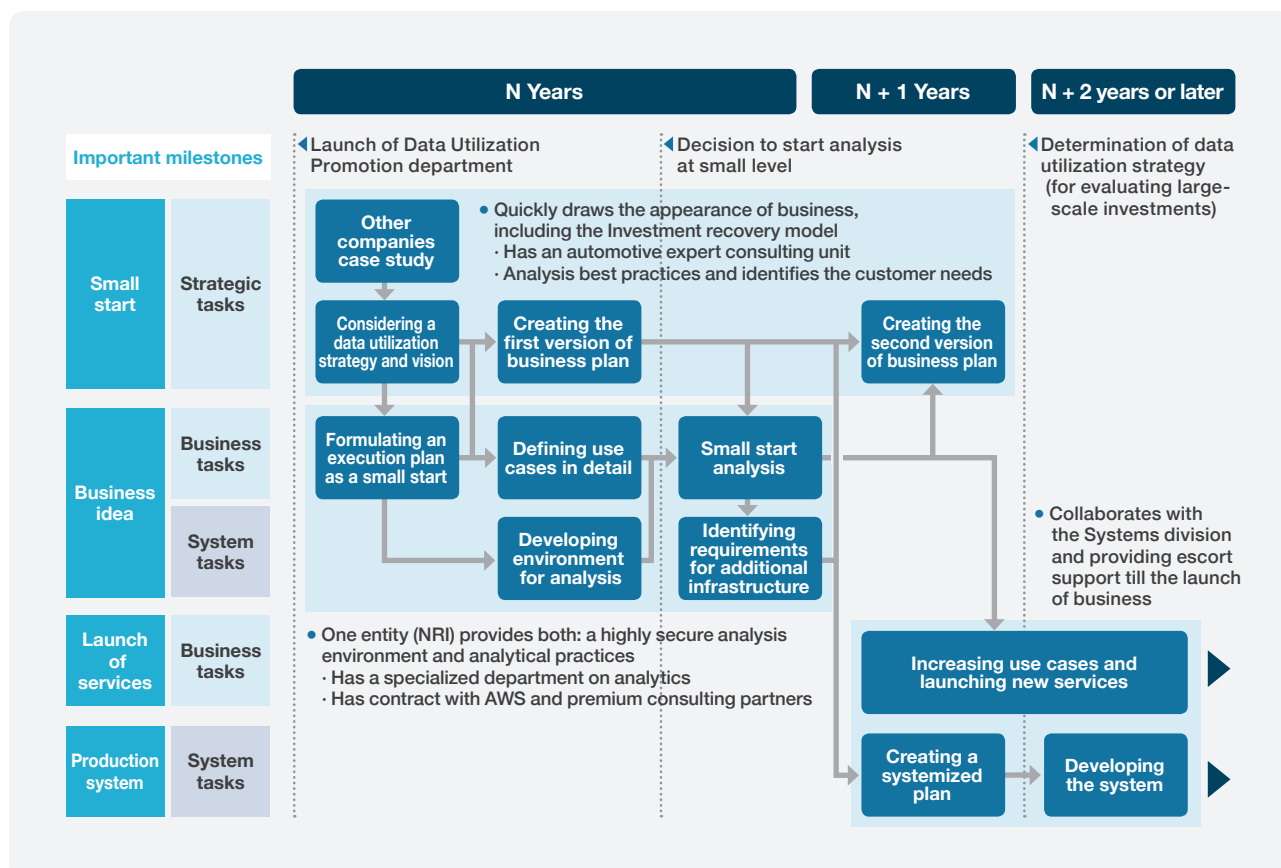
Supports PoC with "Con-solutions" that combines consulting and solutions

When deploying services that utilize data such as car sharing and failure prediction in the downstream, know-how and resources are needed to analyze large amount of data owned by the company or partner companies and summarize it in output that can be used within the company. NRI has a system of "con-solution" in which the consulting department and the system solutions division are monolithic, NRI provide support starting from the study of strategy and vision for OEMs in downstream area, creating use cases in detail based on the analysis done within the company, formulation of small start execution plan for PoC, developing analysis environment, implementing analysis using AI or machine learning, to the study of requirements and estimation of the market scale for formulating a business plan for new services.

Case: Creation of new service menu and environment for data analysis

NRI provided support to a division of an automobile OEM that promotes cross-company data usage. Taking advantage of the global research network, we conducted a case study on the use of advanced data applications, and we jointly formulated a new service menu with a company, while listening to the After-Sales Services division, the Technical Development department and the production site. Further, to implement PoC, NRI built an analysis environment that ensure security on the cloud, based on the Amazon Web Services (AWS) that NRI has a tie-up. As a result, the company was able to prepare a mechanism where external data scientist can be used, without disclosing the highly-confidential data possessed by each division to external parties.

Features of NRI's downstream business development "PoC" service



Ecosystem construction in the AI/IoT era

“Support to explore and evaluate technology ventures”



In the AI/IoT era, it is important to construct an ecosystem with cross industries and venture companies.

Expanding the technological field which automotive industry should deal with

For automotive operation and connected service, the functions required of the car are expanding significantly. In order to implement these functions, importance of technology is increasing in areas where conventional automobile manufacturers do not possess know-how such as AI (artificial intelligence), large-scale software development, big data analysis, high precision digital maps. Such innovative technologies are not only emerging in the In-Car domain (technologies used within a car), but also in the Out-Car domain (technologies used outside the car); hence, automobile manufacturers are required to effort to these technologies.

Collaboration with different industries and ventures is required in area that can't be covered independently

The technical areas that needs to be covered is extremely wide and there is hardly any company that can cover all of them all alone. Moreover, speed is also important to secure a competitive advantage in the AI/IoT era. Therefore, regarding the areas that cannot be covered by the company, it is important to leave the principle of self-sufficiency and quickly collaborate with other companies, including different industries and venture companies. By collaborating with different industries and venture companies the automobile manufacturers not only acquires the technology that the company owns, but also leads to speedy management and the opportunity for high-risk development that it is difficult for the company to handle alone.

Technologies required in automotive operation and connected domain

	In-Car domain	Out-Car domain
Autonomous driving	<ul style="list-style-type: none"> • Development of recognition algorithm using AI • High-performance semiconductor • Advanced sensing technology • Large-scale software development 	<ul style="list-style-type: none"> • Creation and delivery of highly-accurate digital map • Use of dynamic information (V2X*¹ communication)
Connected	<ul style="list-style-type: none"> • In-Car communication module • In-Car cyber security technology • Application and platform development 	<ul style="list-style-type: none"> • OTA*² updates • Big data analysis and utilization • Link with Out-Car information, such as user information • Cyber security technology

*1 V2X: Vehicle to X. This technology enables cars to communicate with their surroundings.

*2 OTA: Over the Air. Technology to update software and information by wireless communication.

Automobile manufacturers are required to deal with a wide range of technologies

NRI quickly explores and evaluates the venture companies that possess the core technologies of AI/IoT to meet customer needs.

Total support, from search to evaluation of venture companies

In the AI/IoT industry, venture companies are likely to grow very quickly. On the other hand, there is a risk that the company gets dissolved or taken over by any other company due to insufficient finance or human resources. Therefore, when selecting a venture company for collaboration, it is necessary to evaluate the target companies from various aspects and make quick decisions.

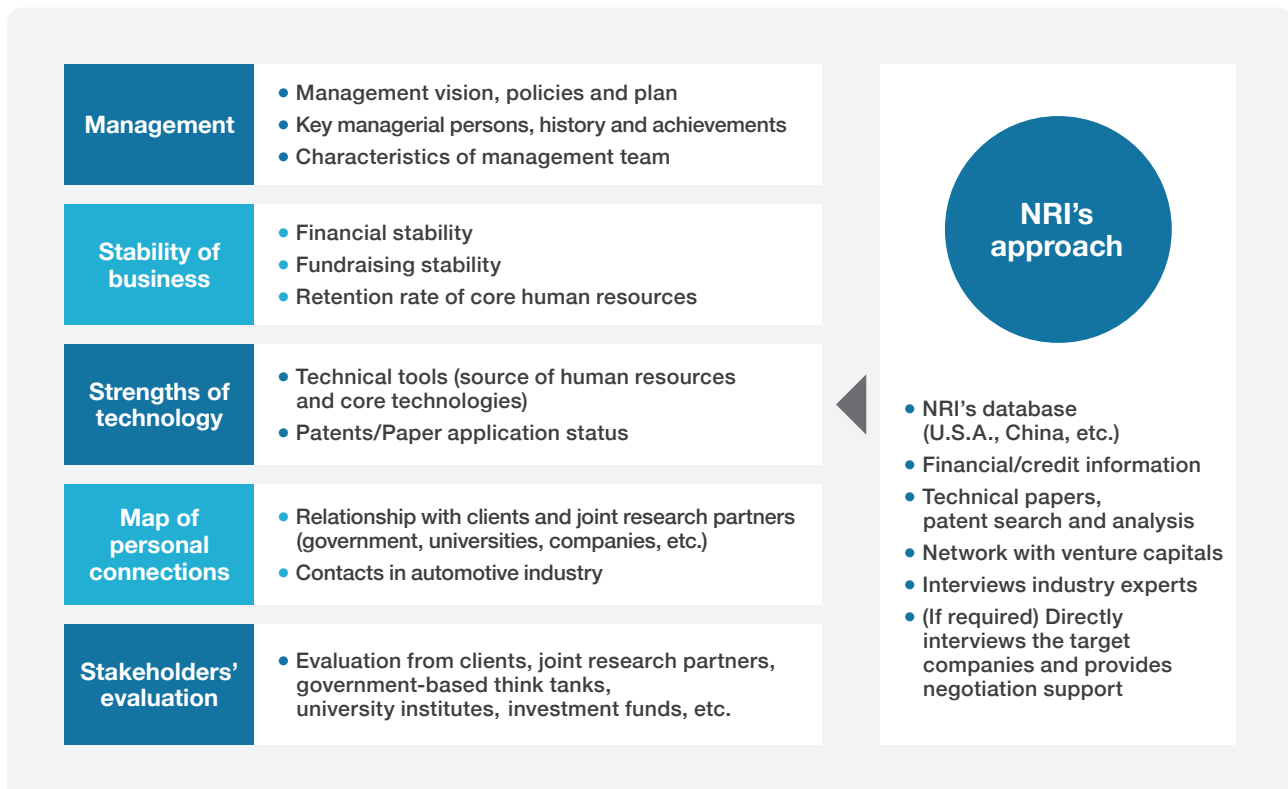
NRI has established a system to monitor venture companies not only in developed countries but also in the emerging countries, and has built a database to understand the industrial structure and companies working on core technologies. Instead of providing a simple list, NRI can flexibly evaluate the company from various perspectives, such as technology strengths, networks maps, and stakeholders' evaluation, to meet the needs of clients.

Case: Support for evaluation of partners with AI/IoT technology

NRI has success stories in several fields, such as automotive industry and machine industry. For example: During evaluation of AI-related companies by automobile manufacturer for collaboration purpose, in addition to collecting public information, such as credit information, we also created a network map of stakeholders of the candidate companies, interviewed stakeholders of venture capital or potential companies, and evaluated them from various aspects. In addition, we also presented the return and risk expected from the collaboration, points to note for inferring risk, and measures to reduce such risk. Although it was a short-term project of about a month NRI completed it very quickly.

Further, for developing an IoT-related strategy for machine manufacturers, NRI promptly supported the search for IoT venture companies in various countries and regions to support negotiation with partners.

■ NRI's Technology Venture Evaluation



Redefining business values in the era of uncertainty

“Creating a steady vision”



The automotive industry is likely to have a turning point once every 100 years in the 2020s era. A “steady vision” is imperative in this era of uncertainty.

Conventional winning pattern cannot be applied in the next era according to changes in environment represented by “CASE”^{*}.

Over 2020s, we will reach an era where advanced technologies, such as electrification and connected cars, can finally be introduced in the market at full scale. Besides having a competitive strategy, the automobile manufacturers have to considerably keep pace with the movements in such technologies. However, when these technologies and products become the mainstream, value addition where especially the Japanese automobile manufacturers have been working on as their specialty, such as engine design or related technology, is likely to relatively decrease. Further, due to the shrinking of new car market because of popularization of sharing and matching, and with the entry of new emerging players that are well versed in ICT, major automobile manufacturers will enter an era where they cannot compete based on the conventional winning pattern.

^{*}CASE: Connected, Autonomous, Shared, Electric

Timing to re-inspection what value the company provides to society

It is extremely difficult to precisely understand the environmental changes. However, if a company chooses to “Wait and not act until the environment becomes predictable”, there is a risk that it may be swayed away by the emerging players entering into the industry. Therefore, the first step is to “move”. However, the important thing here is to have a steady vision that remains the same regardless of any change in the environment. Communicating vision to people inside and outside the company improves the unifying force, fosters an organizational culture where people can think spontaneously, and also establishes a relationship of trust with investors. This can also be taken as a great opportunity for management to re-think “what kind of products and services need to be created” and “how the company will contribute to the society”.

■ Environmental changes and request for management in the 2020s

Along with environmental changes, management issues that should be suppressed with increase

It is important to create a steady vision that serves as the basic policy

- Entry of different industry players (Digital Disruptor)^{*1} with strengths in AI/IoT technology
- Surge of emerging automobile manufacturers

- Environmental problems, resource problems, urban transportation problems and employment problems



- Changes in automobile market as represented by CASE
- Shift to areas where value can be added (from manufacturing to providing services)

- Shift to sustainable investment
- ESG^{*2} expectations

- Shift to software and electrification will raise concerns about shifting of resources and the way company should compete

^{*1} Digital Disruptor: Creative destroyers in the digital era

^{*2} ESG: Environment, Social, Governance; refers to elements that are necessary for sustainable growth of companies

NRI support the formulation of corporate vision that integrates solutions for social problems with the management and business strategy and provides implementation support as well.

Fusion of social problem solution and business strategy/management strategy is important

In order to formulate a "steady vision", it is better to organize the issues faced by the societies worldwide, integrate company's strengths with its business strategy, and then move to the next step of identifying social problems that that company wishes to solve. The importance of this process is that the solutions for social problems are integrated with the business and management strategy. In corporate activities, until now, in most of the cases, CSR and business strategies were classified separately, and the studies and the organizations were considered to be separate entities; however, to realize the integration discussed above, it is necessary to integrate the two and examine the fusion.

NRI has specialized consultants who have expertise of the automotive industry and can support in drafting the business strategy. They work together with the consultants specialized in managing CSR^{*1}/CSV^{*2} to create a steady vision and extend support in drafting the mid-term management plan and IR strategy.

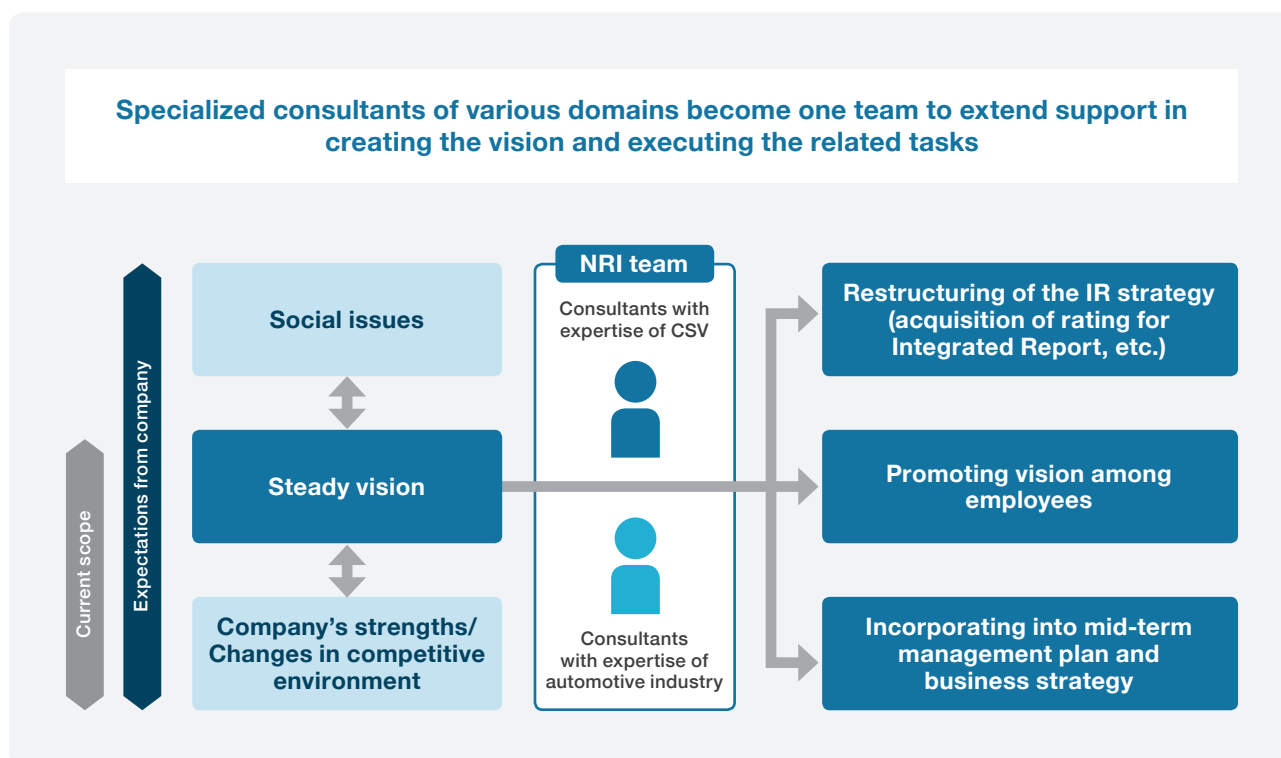
^{*1} CSR: Corporate Social Responsibility
^{*2} CSV: Creating Shared Value

Case: Support for formulation of vision at the time of formulating integrated report and medium-term management plan

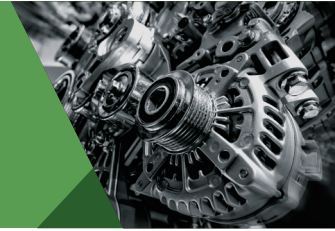
Recently, Integrated Reports have become popular, mainly among the major Japanese companies. Integrated Report is a new tool to interact with the investors wherein the financial reports (e.g., existing Annual Report) are integrated with the non-financial reports (e.g., CSR Report). Nowadays, many global companies have started creating these reports. To respond to such social demands and management's needs, NRI has accumulated the knowledge required to create a vision for Integrated Report and mid-term management plan over a long term.

In order to create the vision, NRI provided various kinds of support, such as setting the aspirations and areas for social contribution, as well as, incorporating them into the business strategy and mid-term management plan, communicating the created vision to people inside and outside the company and implementing activities to promote it.

■ Features of NRI's vision development project



Enhancing Mechatronics for EVs through M&A “Integration of PMI strategy and governance”



When a component manufacturer conduct M&A for the enhancement of Mechatronics for EVs, advanced PMI is required that leads to business development.

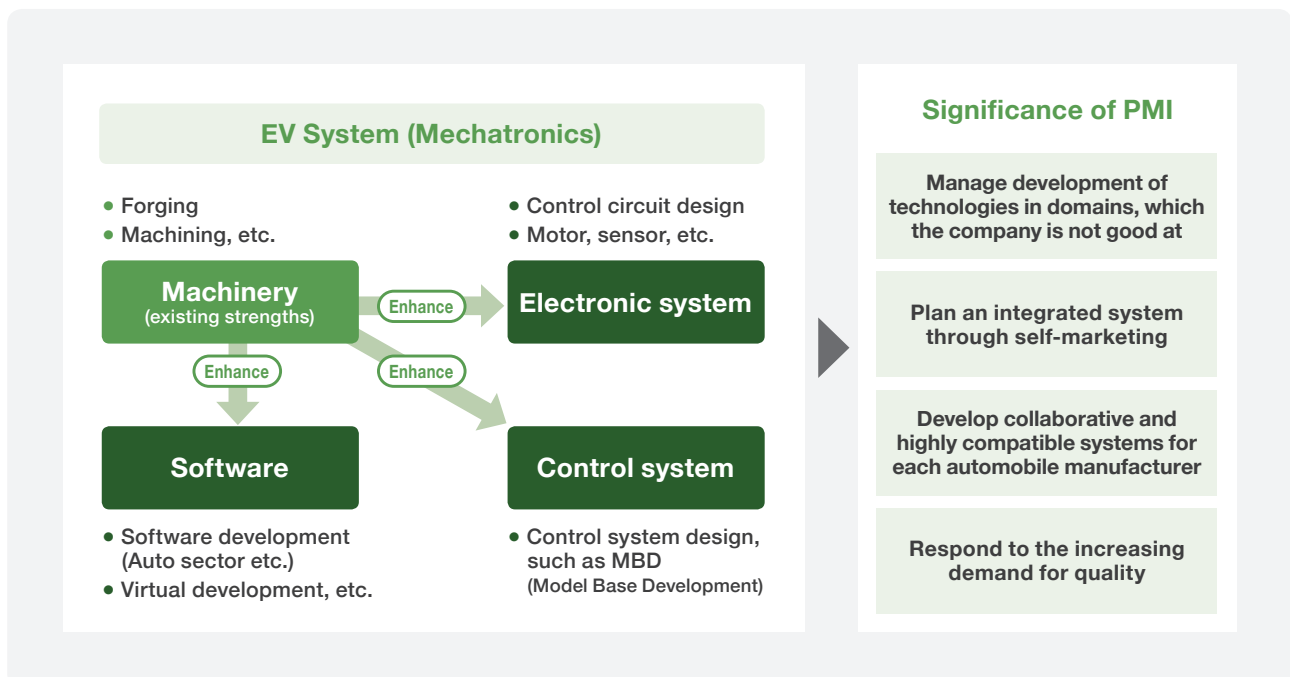
Component manufactures need to strengthen the overall Mechatronics for electrification of cars

With electrification, cars would require 40% lesser components. This will have a devastating impact on especially component manufacturers that deal in mechanical parts of engine and driving system. If the workers do not have anything to do, they will be laid off by the reorganization or culling of corporate restructuring. Component manufacturers are at a position where they cannot underestimate the flow of electrification, rather they need to strengthen their business in that direction. Further, electric cars require lesser components; hence, it is indispensable for the component manufacturers to expand their business domains from components to units and systems in order to maintain or expand their business scale. In order to develop the EV system, they are required to strengthen the control system, Mechatronic and the software domains, as well as improve the capabilities of the Mechatronics as a whole, in addition to the conventional strengths of molding and machining.

Advanced PMI is required for M&A concluded to enhance Mechatronics

Nowadays, companies that cannot cope up with the enhancement of EV system and enter into M&A are increasing. However, it is also true that there are many companies that did not enjoy the synergy effect from acquisition. In the worst case, they suffered impairment loss from the assets allocated at the time of acquisition. Even if acquisition helps one in meeting the technical requirements for EV system, it is not enough. The companies are required to make a system that can be sold based on their own marketing, and have collaborative or compatible systems to meet the different needs of automobile manufacturers. In order to completely prevent the impairment risk, an advanced PMI (Post Merger Integration) is required to reinforce these business models.

■ Significance of PMI in M&A concluded to strengthen Mechatronics



NRI provides comprehensive support from strategic integration to designing governance structure for M&A that requires advanced calibration such as electrification.

Provides support for integrating strategies and governance aspects to achieve sustainable synergy

NRI analyzes that one of the factors for acquisitions failure is due to inadequate integration of strategic and governance aspects. Short-term measures such as cross-selling and joint procurement are not sufficient to achieve sustainable synergy. The long-term strategy of how to develop the system and how to sell it to the customers is strongly demanded. Also, in order to ensure the medium to long term strategy is promoted, it is important to design a governance system including management, evaluation, roles and responsibilities of the acquired company from own company.

NRI has a team specializing in automotive industry and organizational management that provides PMI support focused on strategies and governance.

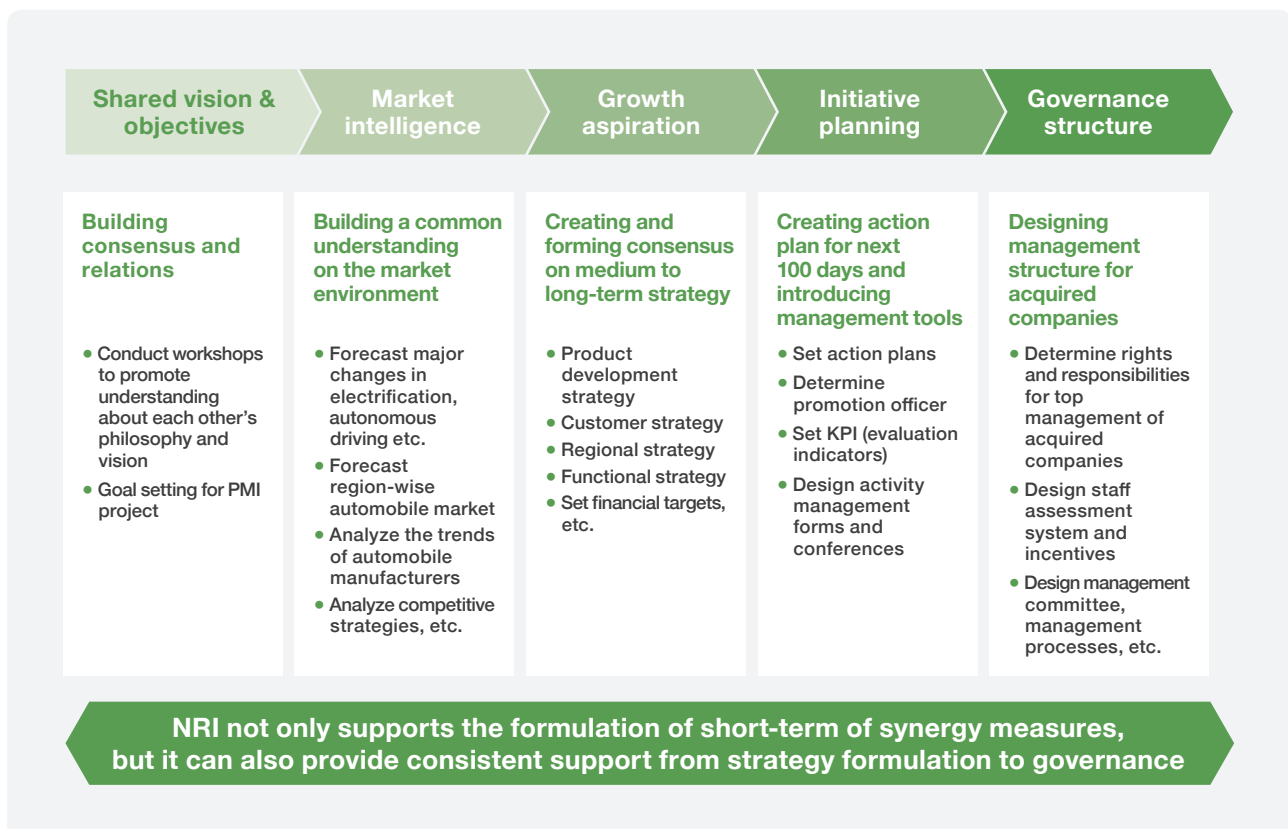
Case: Support for consensus on the medium to long-term strategy for European acquired firms

A machine based automotive component manufacturer was acquired an overseas component manufacturer to expand its overseas customer base and strengthen the development of future EV systems.

Post-acquisition, at the first meeting of the two companies, NRI presented long-term prospects for the market and assisted in building a common understanding of the market environment as a prerequisite for strategic integration. Following this, NRI presented EV system's promising domain based on industry expertise and support the two companies on the medium to long-term strategy agreement.

In the end, to ensure that the strategy is promoted, designed a 100 items initiative list (including activities and targets), set up KPI, and even designed the governance structure including the rights and responsibilities of the staff of acquired companies and reporting line to be followed in headquarters.

■ Features of NRI's PMI service



Developing solutions for materials business “M&A to expand value chain expansion”



The focus of material industry is also shifting from products to services. There is a need to provide solutions combining products and services to directly solve the issues faced by the customer.

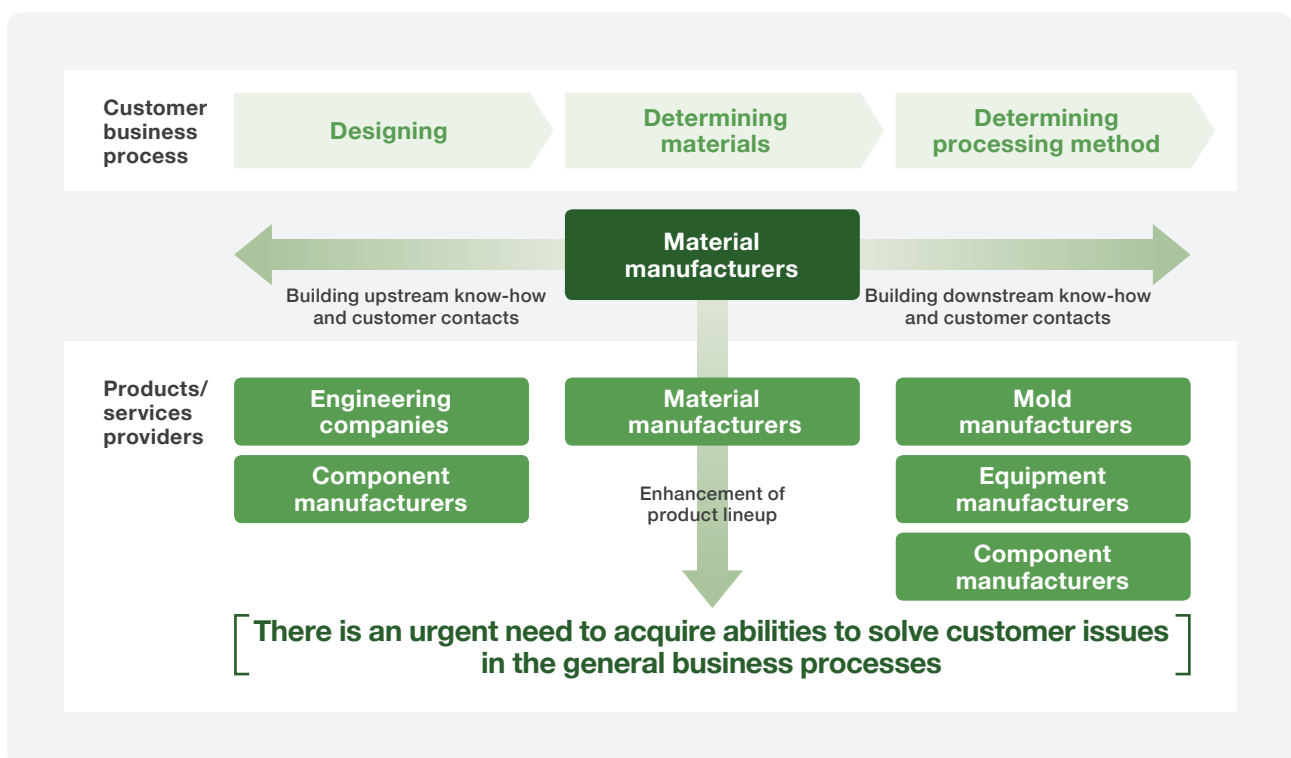
Issues faced by customers are complex and diverse due to the destructive changes in the automotive industry

There is an urgent need to acquire skills to solve issues through material + α, using the resources of other companies

With the changes on regulations of the selling of gasoline vehicles in Europe, the automotive industry is moving towards rapid electrification and low fuel consumption. Further, with emergence of automotive operation technology and digitalization, use of automobile in transportation and living environment, as well as, the process of developing and designing them is undergoing a major change. As a result, skills and know-how required by automobile and component manufacturers are also changing. Besides digitalization, businesses are required to review the component design, materials used and processing methods. Moreover, it is not easy for the automobile and component manufacturers to resolve these issues with limited resources.

The material manufacturers are required to work more actively than ever and propose accurate solutions. On the other hand, in addition to providing company’s material in response to RFQ received from customer, they need to propose the production, processing method, and usage at component level. It is required to support for adding high value and for focusing on core operation according to the joint development with the end client (automobile manufacturer) and improving efficiency/alternative for the process of manufacturing and development. However, in most of the cases, it is outside the scope of material manufacturers; hence, customer values must be improved rapidly using the resources of other companies as well.

■ Acquiring problem solving functions that utilizes functions not materials



NRI can support collaborations/M&A, from strategy building to execution and integration, for developing solutions for material manufacturers.

M&A support with a high strategic significance based on a deep understanding of the automotive industry

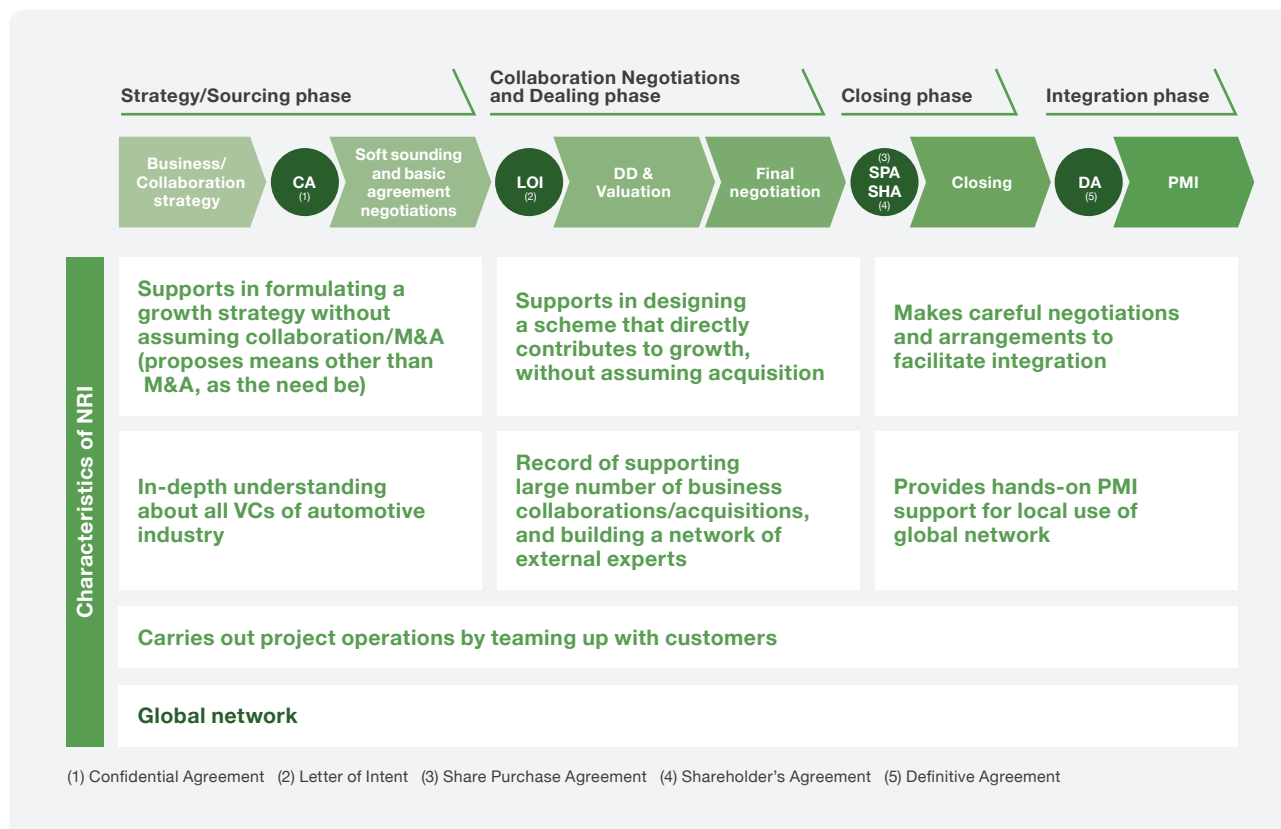
M&A and tie-ups also serves as an effective means to expand the functions for delivering value to the customer. Based on our in-depth knowledge about automotive industry, NRI provides support for collaborations and acquisitions from strategy building to PMI, for improving value addition. In the strategy phase, it helps in formulating a highly effective and feasible strategy based on the knowledge of automobiles, without assuming acquisition. In collaboration negotiations and dealing phase, the consultants having rich experience in M&A smoothly negotiate with the external experts (Investment banks, lawyers and accountants). In the integration phase, M&A experts as well as functional experts (for human resources system, etc.) become a team and provide on-site support for smooth integration, from strategy building to implementation.

Case: Support for high-value addition and global expansion through overseas M&A

NRI supported a Japanese company in an overseas M&A, as an expert in business strategy/M&A. In the strategy phase, we analyzed the needs, industry structure and success factors of various countries, and formulated a growth strategy. Moreover, we validated the results of collaboration by collecting data regarding customers' evaluation (VoC*) about the promising companies for collaboration. In the following phase, NRI supported customers for their negotiation such as anonymous soundings to companies with high possibility of acquisition. Further, we carried out comparison with strategy and business level of target companies and led to conclusion of acquisition. NRI made careful arrangements at advance-level, and for PMI after acquisition, we teamed up with customers and acquired company to ensure smooth operations.

*Voice of Customers

■ Features of M&A/collaboration services of NRI



(1) Confidential Agreement (2) Letter of Intent (3) Share Purchase Agreement (4) Shareholder's Agreement (5) Definitive Agreement

Rebuilding strategies for electrification of cars “Creating a new business model”



Battery business that supports electrification requires enhancement of supply chain and improvement of profitability using a business model that brings cost to the users of batteries.

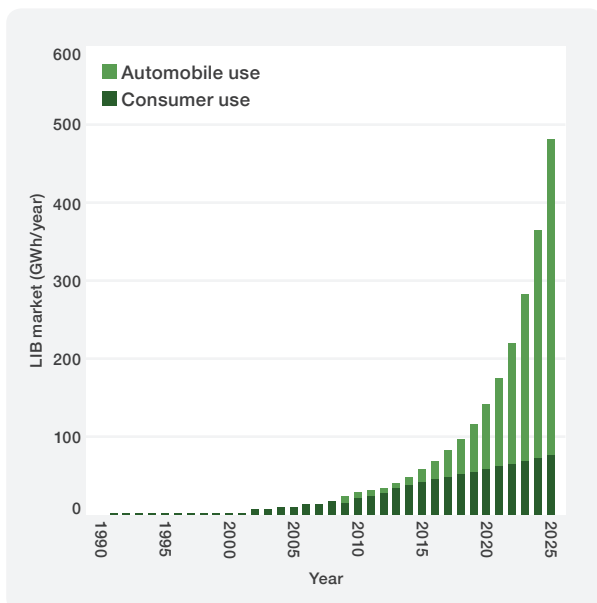
Stringent demand and supply of batteries in the era of rapid electrification

There is a rapid electrification of cars, mainly in Europe and China. The measures adopted to spread electric vehicles are also shifting from assistance type (such as purchase subsidy and tax exemption) to control type (such as ban on sale of internal combustion engine-equipped vehicles and restriction on NEVs). Further, after the Diesel gate scandal, OEMs have started working on the electrification strategy and are announcing aggressive sales targets, which is expected to expand electrification rapidly. On the other hand, the Lithium-ion battery (LIB) industry is bound to point out the possibility that supply may not be able to meet the over rising demand, comparing the rapid expansion of electric vehicles market with the trends of market expansion until now. Elimination of bottlenecks concerning the supply chain, such as securement of resources and capital investment by battery and material manufacturers, and supply of battery equipment, has become a pressing issue.

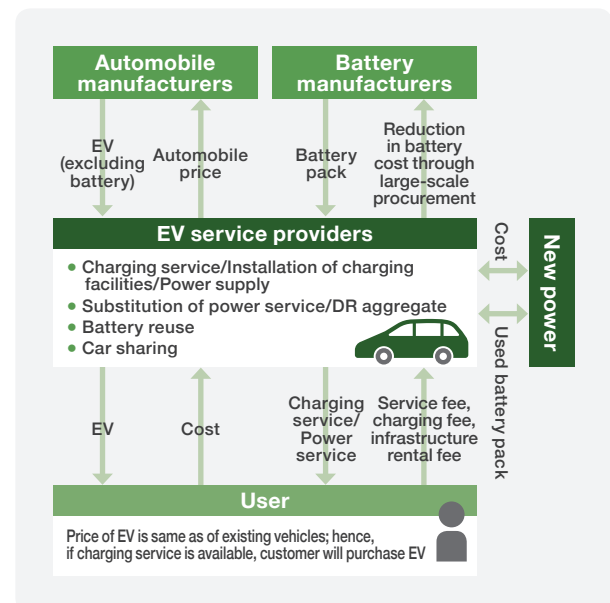
Development of a business model that is indispensable for the spread of EV

If we generally classify the current roles in automotive industry among manufacturers, dealers and fuel companies, EV society will offer low profits to the fuel companies, due to which an ecosystem will not be established. Hence, it is necessary to divide roles appropriately that can help in securing profits. Further, due to high cost of batteries, making EV having the same driving range as the gasoline vehicles makes it very expensive and reduces the demand. Since there is a limit to the cost reduction of batteries through technological development, it is required to make adjustments for substantial cost reduction of batteries through business innovations. Specifically, they can pass on lifecycle cost of battery on the user, by creating a used battery market, promoting reuse of batteries and making adjustments in power systems that are used in-vehicle batteries. Therefore, it is necessary to create a business model that solves these issues and verify and execute such model.

LIB market estimation based on optimistic electrification scenario



Business model for the EV era



Need a business model that solves various problems caused by batteries

Using our industry knowledge, NRI can propose a strategy using client's strengths and provide execution support for the electric car, battery and materials business.

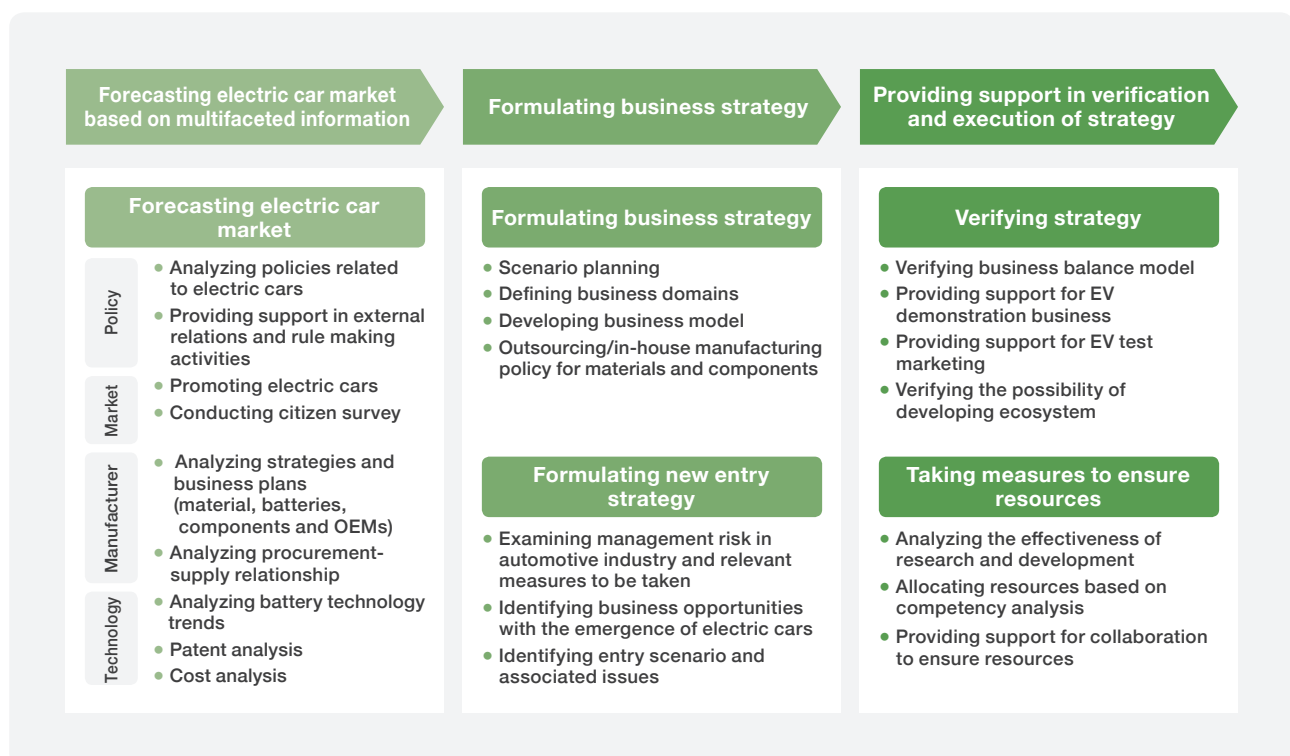
Provides specialized execution support for forecasting, strategy formulation using highly-accurate information and multifaceted analysis

NRI has over 20 years of accumulated data acquired through industry research and has established itself in the field of electrification of cars and batteries. Market forecasts are characterized by multi-faceted analyzes such as policies, users, manufacturers, and technologies. NRI visualizes the future from both supply side and demand side, using our powerful industry network, highly-accurate information and user surveys. Further, in addition to research activities for policy-related trends, we provide support for making rules related to decision-making process and identification of key persons. While making a new entry strategy, it is important to consider differences in industry practices and patents as a risk and include them in the strategy. We have a collaborative system in place with NRI Cyber Patent for implementing patent analysis. After the strategy is drawn, most companies face the issue of resource shortage in the execution phase. Therefore, NRI provides support for reliable execution of strategy through optimization, resource allocation, and outsourcing, to eliminate the shortage of man-hours for development.

Case: Provided support in forecasting electric car market and developing a business model

After the Diesel gate scandal in 2015, various governments proposed the policy to ban the sale of internal combustion engine-equipped vehicles, and OEMs in Europe strengthened the strategy related to electric cars. Regarding the feasibility of shifting to electric cars, NRI quickly presented the crises in lithium-ion battery market and bottlenecks in supply chain, and advocated measures for stable procurement. For this, NRI utilized the knowledge of entire value chain, including materials, batteries, automobiles and power. Following this, when NRI performed incremental cost analysis with an intent to reduce the cost of batteries required to shift to EV and PHEV, it was identified that it is considerably difficult to reach the target cost; hence, companies were suggested to reduce cost by having an effective business model. For developing the business model, NRI suggested to expand the business domains, mainly in Reuse and V2G, based on advanced overseas trends data we obtained through our industry network. Further, we also helped in identifying the core technologies and usage method using clients' strengths.

■ Characteristics of electric cars and battery related services of NRI



Reducing cost further by utilizing emerging nations “Procurement reforms”



It is very crucial to utilize the strengths of local suppliers and actively include emerging nations in the value chain to respond to the growing demand for cost reduction.

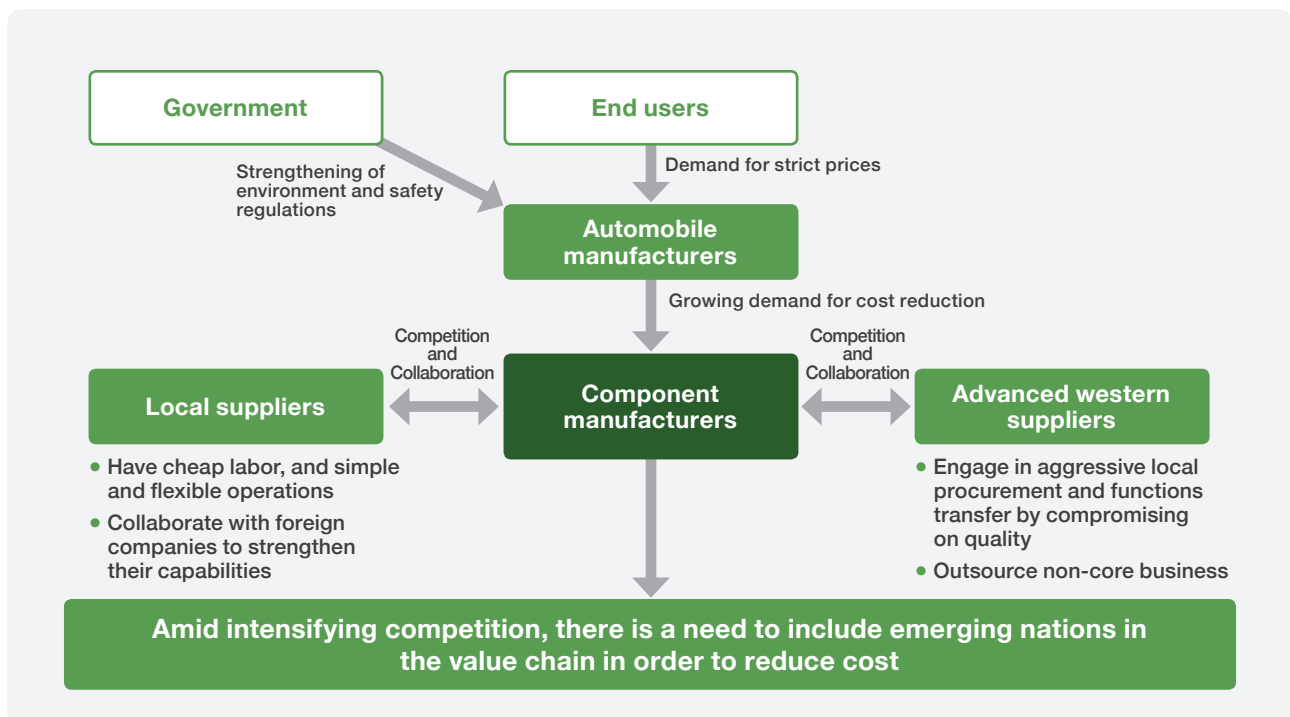
With the growing importance of emerging nations market, demand for cost reduction is becoming very strict

It is necessary to include emerging nations in the value chain by harnessing the potential of local suppliers

While the new car sales are hitting their peak in developed countries, importance of emerging nation markets including China is increasing. Under these circumstances, “cost reduction” is something that automobile and component manufacturers cannot overlook. With rise of middle class and strengthening of environment and safety regulations, emerging nations require “high-performance cars that can be purchased at affordable prices”, and manufacturers are required to offer “low-cost products”. With price demands from end users becoming strict, the demands of automobile manufacturers from component manufacturers for cost reduction is also getting severe. The operations centered on developed countries have reached a stage where any increase in fixed cost cannot be afforded. The component manufacturers must stay determined to reduce the cost by utilizing emerging economies.

The rise of local suppliers is remarkable in emerging nations. Local suppliers aggressively set low prices by employing cheap labor and compromising on quality, which helps in expanding sales to automobile manufacturers. Especially, in India and China, many local material and mold manufacturers have emerged, who utilize the “wide range of industries” to devise creative measures for cost reduction. Further, if we look at after-market components, China and other countries are supplying such components to the entire world and also offers improved quality, due to which, they are used in the genuine components of OEMs. Under such circumstances, advanced Western suppliers are aggressively progressing towards local procurement and functions transfer activities, and are strengthening their operations in China and India. They are strengthening their collaboration with local suppliers in order to reduce cost.

■ Structure of demand for cost reduction and tough competition in emerging nations



NRI provides comprehensive support for procurement reforms, from drafting a procurement strategy to exploring suppliers by utilizing the potential of emerging nations.

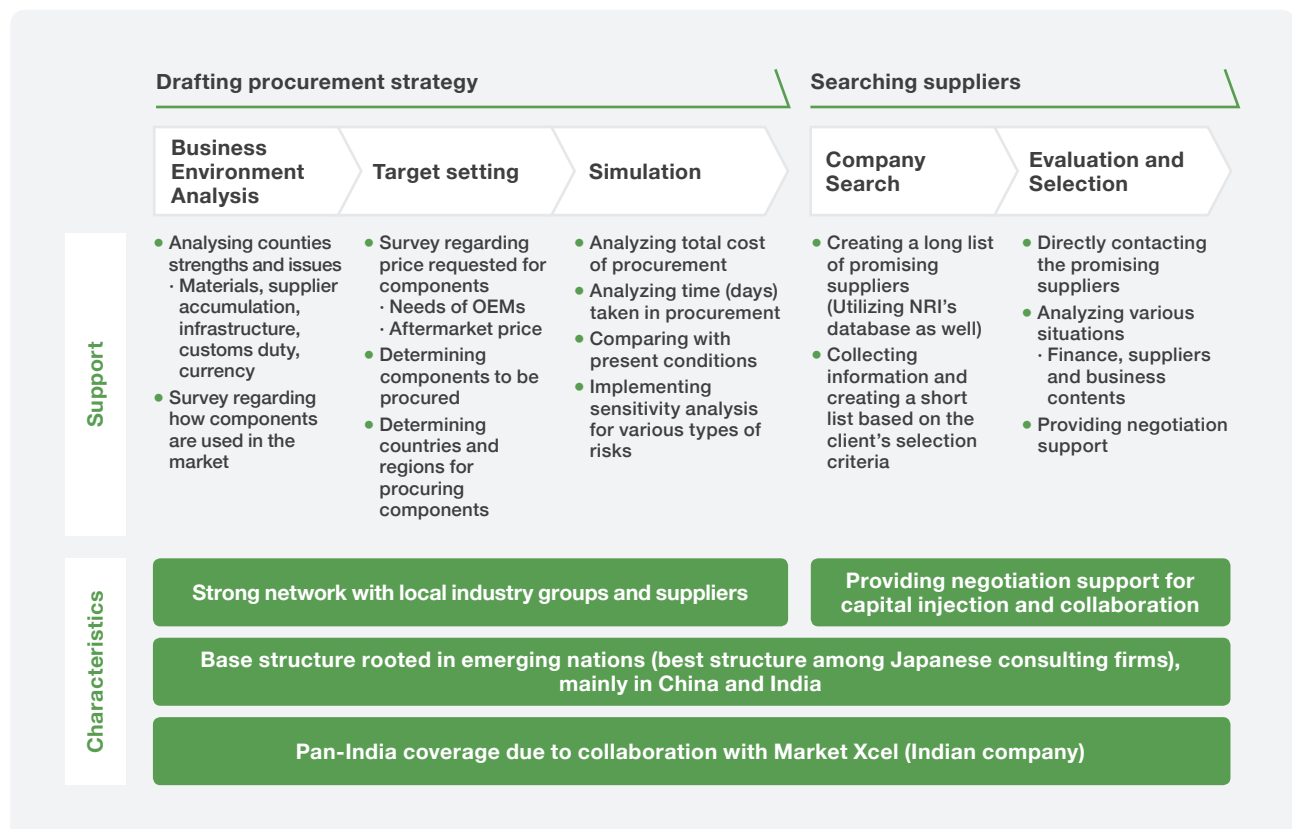
With a base structure deeply rooted in emerging nations, NRI provides support for partnering with local suppliers

NRI has a well-established base structure in Asia where many promising suppliers are present. The overseas bases of NRI constantly build a strong network with local industry groups and suppliers. In order to search, evaluate and select the promising suppliers, NRI provides support to contact the suppliers and negotiate for the clients. Further, not only do we search for promising suppliers but also supports procurement strategy planning in the preliminary stage. In "Business Environment Analysis", we analyze country-wise strengths and issues from a macro viewpoint. Further, we also conduct a concrete market survey to identify the environment where products are used. In addition, we also "set targets" regarding supplier of products, products that are to be procured and procurement price. In the subsequent "simulation", we analyze the awareness about cost benefits and risks associated with a change in supplier.

Case: Support for searching new suppliers for power train components in India and examining collaboration with them

Using our strong industry network in India, NRI provided support to search new suppliers for power train components and examine the possibilities to collaborate with the identified companies. In the Company Search phase, we 1) Clearly defined the skills required from new suppliers, based on the management issues faced by clients, and 2) Created a long list of suppliers in a short period of time, using our database and interviewing local industry groups and leading companies. In order to create a long list, we implemented desktop surveys as well as soft sounding towards promising companies and evaluated them from the perspective of QCDDM to identify the promising companies. In the Evaluation and Selection phase, we connected our client to the local suppliers of the potential region for procurement and provided indirect support for specific negotiations. We also provided support during discussions and negotiations to find any possibility of collaboration.

■ Characteristics of procurement reforms implemented by NRI using emerging nations



Increasing the productivity of white-collar workers “RPA”

Initiatives are required to improve the productivity of white collar workers by delegating the routine tasks to a robot (RPA).

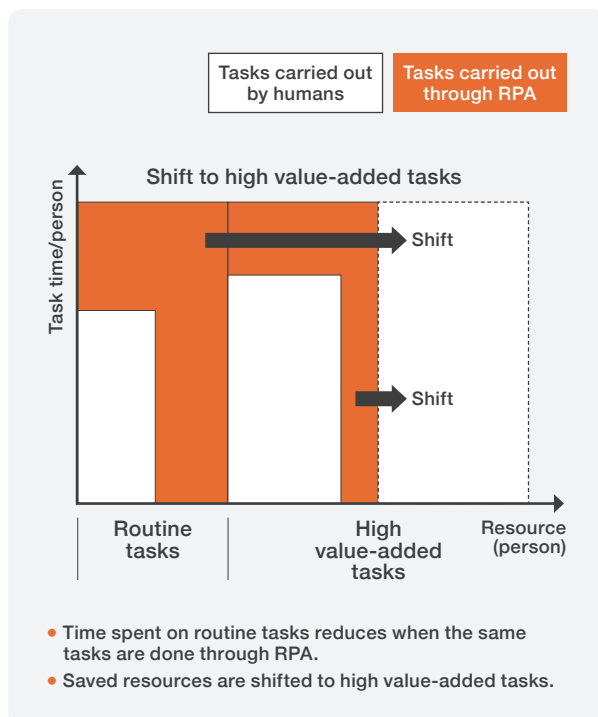
In addition to improving productivity, RPA will also develop services linked with AI in the future

RPA will be introduced in the R&D activities of manufacturing industry

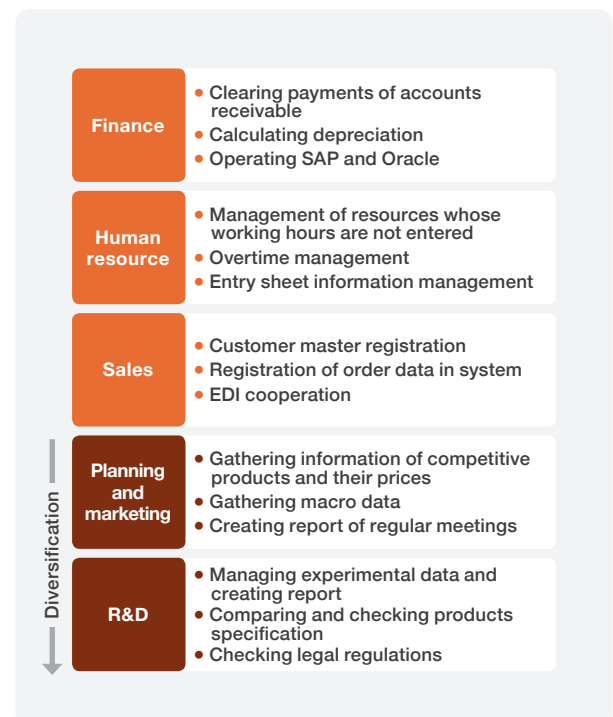
Japan’s working age population is declining and Japanese organizations need to take countermeasures for continuous labor shortage. Following that, Robotic Process Automation (hereinafter, referred to as RPA) that can automate the routine tasks is drawing attention. RPA is a technology to automate routine tasks that require humans to perform on computer screens with a computer robot. Since 2016, financial institutions and service industry in Japan that have many routine tasks to do have been adopting RPA solution. As a result, RPA helped in shortening the time, enhancing the tasks and improving the quality of tasks (reduces mistakes). Going forward, it is expected that this technology can execute higher-level tasks by linking it with the development of AI related technologies.

Since 2017, RPA has been introduced in various industries. The success stories concerning RPA can be witnessed not only in the domains, such as general affairs, human resources, finance, and back office tasks, but also in R&D activities of manufacturing business. In the R&D department, there is always a resource crunch of development engineers. As an instance, it was anticipated that RPA will be introduced in routine tasks such as transcription of experimental data by engineers. Moreover, RPA is becoming more widespread in cases where there is a mismatch between the human resources and the operations being performed, such as routine tasks being performed by management-level workers. Even in the R&D department, there are examples where the routine tasks were automated through RPA and it is expected that through this, the saved resources can be put to higher value-added tasks.

Results of introducing RPA



Diversification of tasks where RPA is introduced



NRI provides integrated solutions, from formulating a plan for RPA implementation to its development and carrying out operations with an aim to bring workstyle and digital reforms.

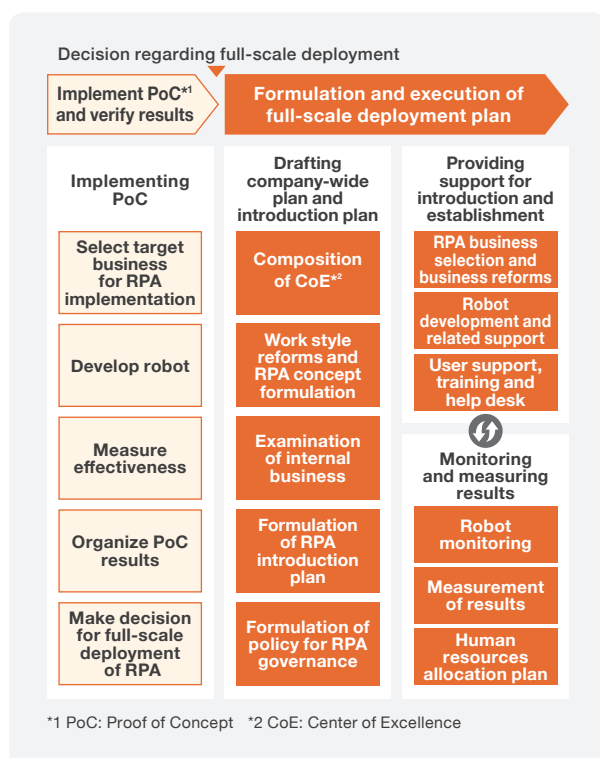
We support creation of an ideal organization that promotes business reforms using RPA as production site initiatives

One of the advantages of RPA is that it is easy to use. Until now, the RPA was introduced by only information system department to develop IT systems, but now it can also be introduced under production site initiatives. RPA can transform a workplace into an ideal organization that enables employees to improve their work efficiency. However, the ease of introducing RPA may backfire as it involves various risks, where RPA developed at the production site can put load on the server, causing the server to slow down, and can increase management cost when different tools are used by different departments. Moreover, there is a risk that RPA may collect or misuse the confidential information of the company. Therefore, for company-wide deployment of RPA, it is necessary to establish its control rules. NRI provides integrated solutions, from formulating a plan for RPA introduction to its development and carrying out operations after considering the risks peculiar to RPA.

Case: Effective to build and operate a centralized system 'CoE' that allows smooth introduction of RPA

In order to implement RPA, in addition to the production site and IT departments, it is essential to cooperate with the operational reform divisions as well. NRI aims at effectively introducing RPA at necessary locations by treating RPA as a tool of business reformation rather than setting the number of robots in KPI. In order to promote RPA utilization and improve operations throughout the company, NRI has been proposing continuous business improvements beyond the introduction of the RPA tool, we have built the center of Excellence (CoE), which is a dedicated group of professionals required for reformation. CoE aims at systematically managing the knowledge of RPA gathered at each production site as explicit knowledge to be accessed in entire organization. It can prepare for risks by centralizing company-specific governance matters. Through this, companies will be able to deploy business improvements and utilize RPA throughout the company using knowledge accumulated in CoE.

RPA introduction process in NRI



Specialized units for business improvement and RPA introduction form CoE



Total value chain design in the digital age "Supply chain update"

An era where each component or customer can be identified. Functions need to be strengthened across complete supply chain.

Following Industry 4.0, corporate management started collaborations with the emergence of new digital technology such as IoT

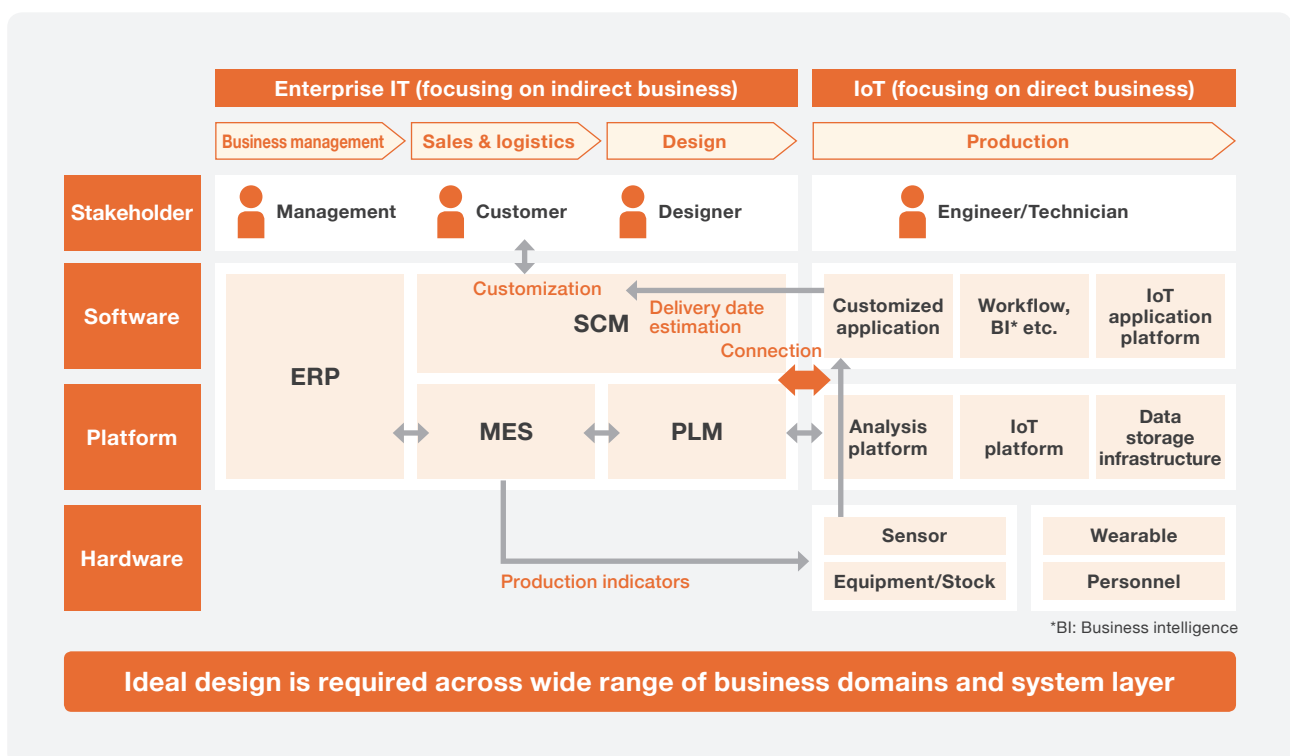
Need to design new business and system for the entire supply chain

With the advent of IoT and Big data processing technology, it is possible to identify each component, manufacturing plant and customer. In Germany, the industry, government and academia are working together to promote "Industry4.0" and use these digital technologies to bring about innovations in the manufacturing sector. As a result, the horizontals of IT competition principles are added to the vertically integrated manufacturing competition principle and if there is no ability to quickly incorporate the "best practices" developed outside company into company's own management or business process, it will make the company less competitive compared to other companies.

Mass customization is an example of close cooperation between management and digital technologies. This is a way to prepare a huge menu of options so that each customer can be satisfied. In order to implement the mass customization, it is necessary to have a flexible "procurement" from a wide range of suppliers, "production" capable of responding to specification changes for each item, "sales" to individual customers using digital channel, smooth "logistics" and a high level "system" that supports all of these. Therefore, it is necessary to a design business and a system across the entire supply chain.

The vision and speed to incorporate the new methods of competition while using company's strength will become one of the competition ability of an organization.

Integration of corporate management and new digital technologies such as IoT



NRI provides comprehensive support for supply chain updates with the help of consultants who have a deep understanding of the automotive industry and IT.

Consultants with deep understanding of automotive industry and IT, support the analyses of IoT utilization

The lack of "Business IT resources/team" that serves as an integral part for studying the collaboration between management and IoT has become a major challenge in many organizations. NRI has years of experience in executing various automotive industry projects and has amassed extensive knowledge of the industry. At the same time, system development division has been engaged in developing and operating IT platform and systems handling large amount of data such as securities and distribution. We support implementation of digital technology at client's company by working together as a team with experienced consultants and IT solution providers. Even in the field of supply chain design, we can propose optimum vendor-free solution, from optimum consulting to proposal of system development using package software such as LLamaSoft.

Case: PMO support to study the use of IoT in factories

NRI implemented the PMO from concept formulation to vendor control for using IoT in factories. First of all, we defined the significance of implementing IoT and formulated the concept of business and system "concept of systemization", we designed the PoC* to evaluate and understand the impact of IoT and supported vendor selection and negotiation. The person in charge of IoT at client company, mainly from Production Engineering Department, the business consultant of NRI, and the system consultant together formed the Business IT Review Team. Following the formulation of concept of systemization, we provided detailed usage scenarios to configure the full-fledged system and extended support to set the system requirements. While using the packages, we also carried out study and offered suggestions to ensure originality of an organization and freedom to select the IT vendors. NRI has experience in designing an IT mid-term plan that serves as connecting point between management strategy and IT plan and designing IT architecture concept to support the strengths of an organization so that system based concept can function effectively.

*PoC: Proof of Concept

Features of NRI's service of providing the support in studying the use of IoT

Steps	Issues identification	Concept designing	Detailed planning	System development	Installation/ application
Managers/ Corporate Planning Department	<ul style="list-style-type: none"> Benchmarking case examples of leading organization Analyzing the present situation of business 	<ul style="list-style-type: none"> Reviewing the policies of digital transformation Formulating an IT mid-term plan strategically 	<ul style="list-style-type: none"> Creating business requirement/ use cases Creating an action plan 	<ul style="list-style-type: none"> Management support for the development of multi-vendor based system 	<ul style="list-style-type: none"> System operation BPO
Logistics Department	<ul style="list-style-type: none"> Supply chain business assessment 	<ul style="list-style-type: none"> Supporting in designing the concept of smart logistics 	<ul style="list-style-type: none"> Extending support for introducing LLamaSoft and its application 		
Sales Department	<ul style="list-style-type: none"> Digital business consulting 	<ul style="list-style-type: none"> Benchmarking case examples of leading organizations 	<ul style="list-style-type: none"> Extending support for introducing digital market solution and its application (NRI digital) 		
Production Department	<ul style="list-style-type: none"> Analyzing the utilization of IoT 	<ul style="list-style-type: none"> Support in designing the concept of smart factory 	<ul style="list-style-type: none"> Vendor management 		
IT Department	<ul style="list-style-type: none"> Various IT assessment 	<ul style="list-style-type: none"> Studying the concept of business IT and designing the overview of platform 	<ul style="list-style-type: none"> Support in reviewing IT security and its application Support in using Data center/Amazon Web Services 		

Next-generation sales reformation using customer data “Digital Marketing”

While the disruptive digital marketing model is being implemented, there is an urgent need to make reforms in the next-generation sales model using analytics.

Disruptive business model of IT platform with massive customer data

Due to the rapid spread of IT services and portable terminals, digital information has a decisive influence on the purchasing behavior of cars, services, accessories, etc.

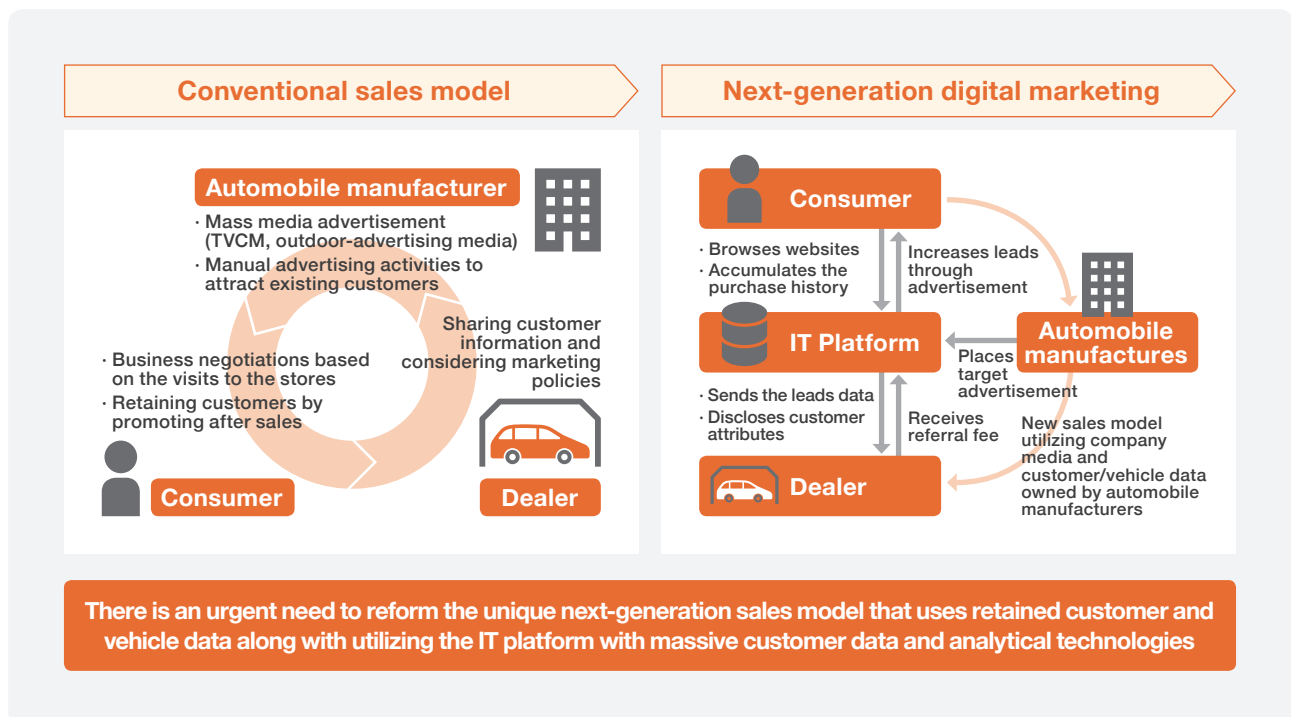
IT platform, a media of providing digital information has been causing a disruptive influence on conventional sales model by analyzing the massive data of purchasing behavior. For example, in China, IT platform anticipates the automobile purchases using the customer data, sends the data of high potential leads to dealers and receives the referral fee; hence, providing a potential solution of distribution and sales structure which were closed for conventional manufacturers and dealers. While using the IT platform, it is necessary to build a unique next-generation sales model by using the customer and vehicles data of manufacturers and dealers.

Necessity of next-generation sales model using the analytics in retained customer data

On one hand, the preferences of customers are getting diversified and uncertain, the business of dealers is expanding and products are getting complicated. Providing a purchasing experience that meets the needs of customer is becoming increasingly complex.

Manufacturers and dealers have been accumulating the massive data of customers in the past. However, most of the data is not used and even if it is used, it is only used for call center response or sending the direct mails. There are many operations that rely on human effort and they are not in the state that can provide an individualized purchasing experience. In order to implement a sales model that responds to diversified preferences, it is very much required to acquire more customer insights using analytics in customer data analytics.

Transformation in the structure of distribution and sales brought by digital marketing



NRI supports the transformation of digital marketing using the analytics.

Supports in transformation, from analyzing data to implementing business reforms

NRI not only has extensive knowledge about automobile distribution and sales industry but also have extensive experience of providing integrated solutions and digital transformation, from management to IT. We also have strengths in making resilient improvement in sales model, such as access to big data by collaborating with AutoNavi Information Technology Co., Ltd. (subsidiary of Alibaba Group) in China.

NRI's data scientists ascertain business domains that utilize data very effectively to analyze the managerial issues, they use most appropriate analytics to respond to the issues and implement suitable analysis to create a connection between the store and the customer. We can also build a business structure from sale of new cars to providing after sales support in collaboration with AutoNavi in China.

In establishing a new business model, we provide support for identifying, correlating and fixing issues, and building a system for full-scale deployment, while implementing PoC (Proof of Concept) repeatedly.

Case: Anticipating "Potential customers" and support to increase the sales of dealers

Using our potential to offer consistent solutions, from identifying managerial issues to analyzing the customer data, we developed a model that anticipates highly potential customers who are likely to replace their cars by analyzing the past 20 years' transaction data of dealers. We extended support to enhance and streamline the sales activities of dealers using this model.

In this case, we identified potential customers who are likely to replace their cars within a certain period of time and incorporated them into the business as an indicator for implementing the proposal activities of sales staff at production site. Anticipation on replacing the cars helped in ranking by probability and, we were able to use them as indicators to prioritize the activities for proposal.

In addition, we also developed a platform that supported timely implementation of marketing strategies by making the potential customer information that was only known by the sales staff at production site available to sales manager and sales headquarters as well.

Transformation in the structure of distribution and sales brought by digital marketing

