# 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.

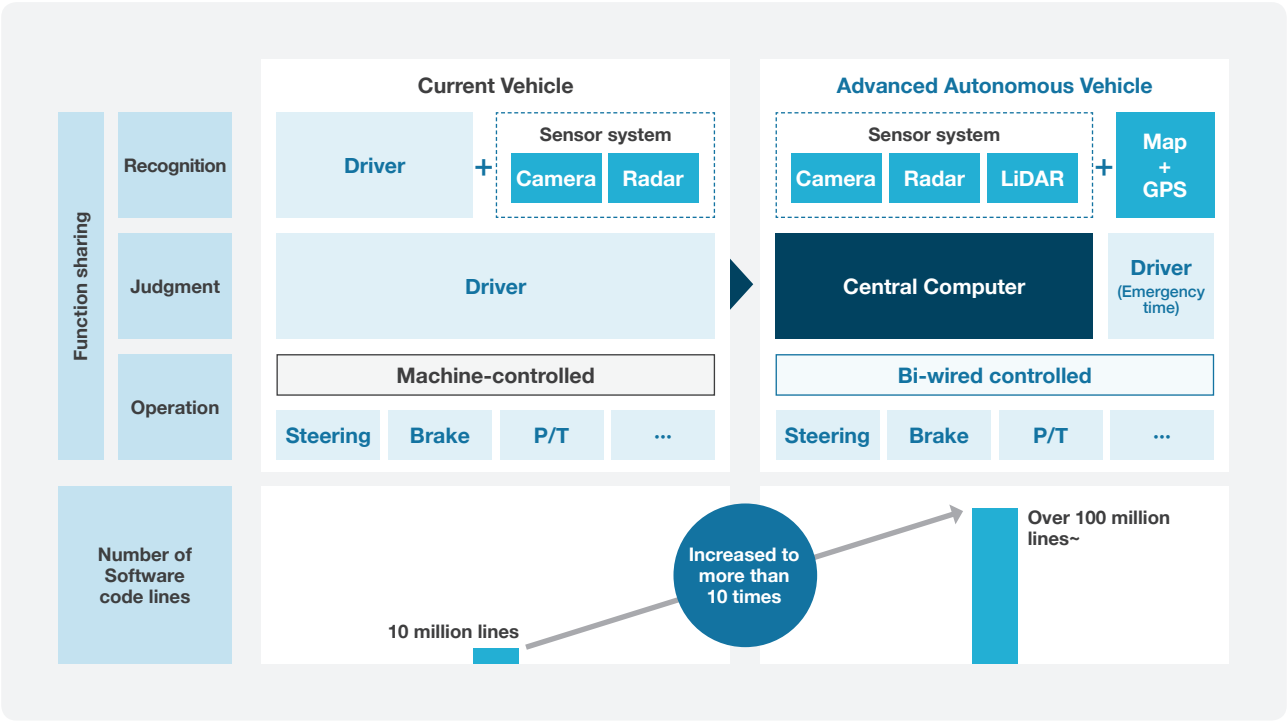
### Development of automobiles go into an uncharted territory to realize advanced autonomous driving

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.

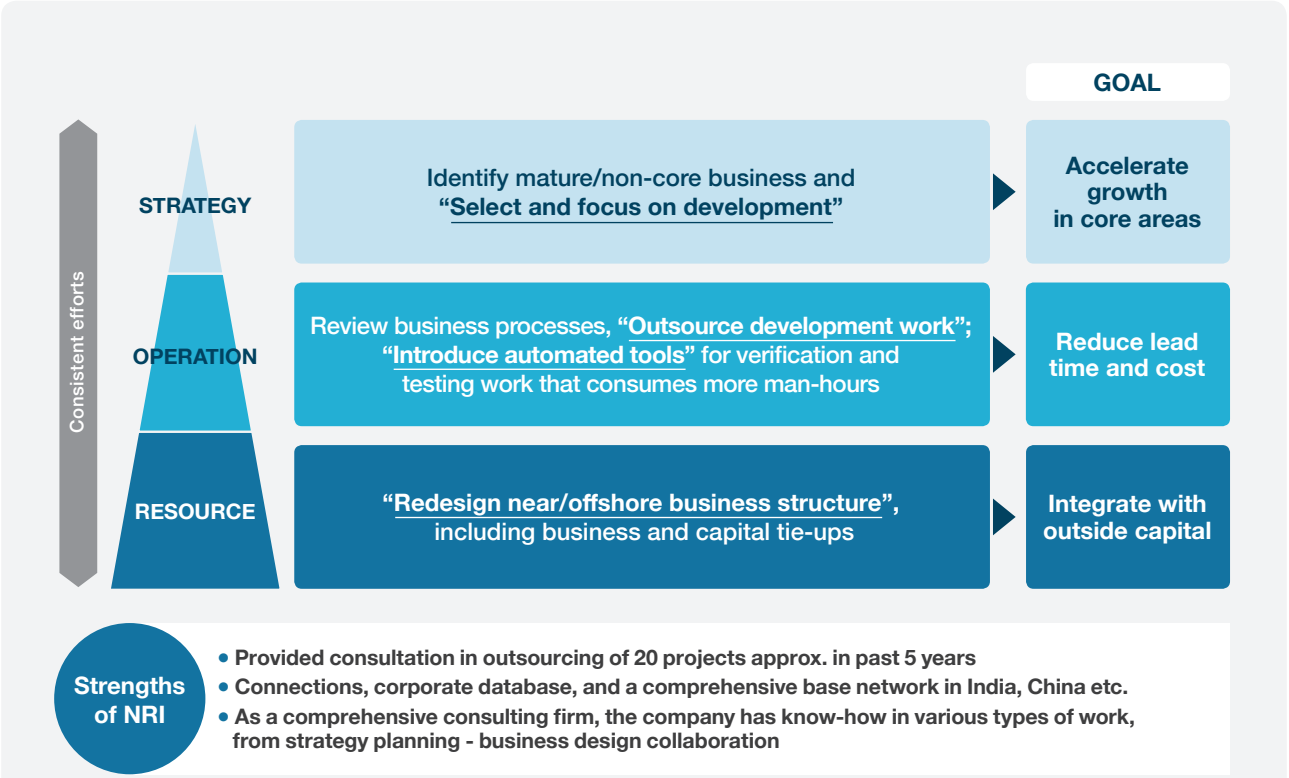
## Drastic strategical changes are required even for the development that was unquestionable before the technological expansion

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"

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