

◆ Intelligence Technology

Intelligence to provide new value for cars

▽ Intelligence in Cars – Providing new value to vehicles

We will **sequentially expand the update of advanced safety technologies, multimedia, and other functions to all vehicles** in line with the evolution of the times. With a next-generation voice recognition system, Arene will accelerate the shift to car intelligence, such as quick response and flexible suggestions that make the driver feel as if they are talking to a human being.

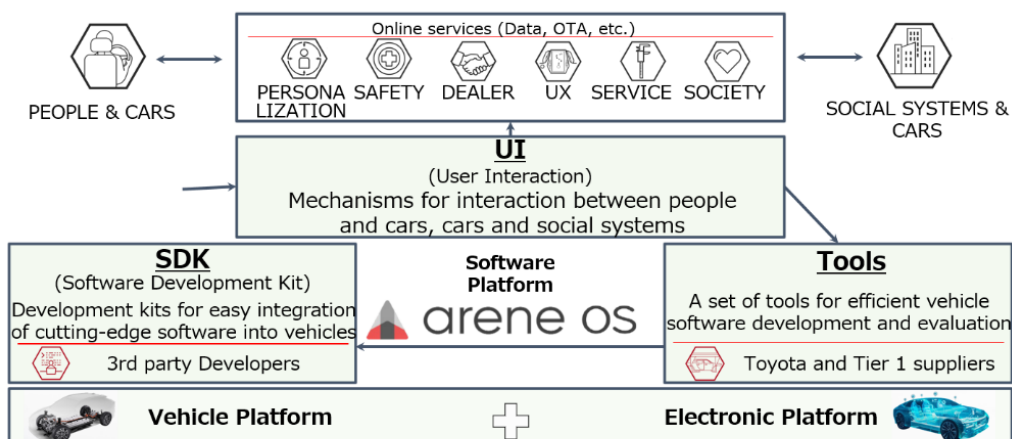
With the evolution of the vehicle's operating system, **the next-generation battery EV will also enable customization of the "driving feel," with a focus on acceleration, turning, and stopping.** In addition, by further refining the vehicle's fundamental characteristics, we will realize more Fun to Drive vehicles in terms of both hardware and software.

1. Arene OS

Arene OS is a **state-of-the-art software platform, accelerating the intelligence of cars and providing new value to customers** with the following three pillars as below:

- 1) **TOOLS:** A set of tools **for efficient development/evaluation of car software**
- 2) **Software Development Kit (SDK):** Development kit for **easy integration of state-of-the-art software into vehicles**
- 3) **User Interaction(UI):** **Mechanisms for interaction between people and cars, and between cars and society**

Arene OS Software platform to accelerate car intelligence



2. Next-generation Voice Recognition

- The most advanced AI technology enables a comfortable cabin experience for customers with fast, high-performance response times and suggestions tailored to their situations and preferences, as if they were talking to an operator.
- Arene OS operates more than 200 vehicle functions to accelerate vehicle intelligence
- Scheduled to be installed in the next global volume production model



3. AI-Supported "Stylish Design"

- A tool that aims to **limitlessly expand the power of design ideas** through **collaboration between humans (designers) and AI (systems)**, while at the same time **drastically improving the speed of design development**.
- An AI system generates images that take aerodynamic and other engineering constraints into account to support the creation of designs that combine aerodynamic performance and design.

4. Manual BEVs

- BEV hardware and software that can be updated in a way that only a carmaker can provide.
- **Drive control and clutch functions provide the fun of driving a manual transmission car even with a BEV.**



5. Cars that can be modified on-demand for various driving feel

- **Driving feel, engine sound, etc. can be changed** by updating BEV software
- **Pursuing unlimited possibilities with a single BEV**, such as nostalgic cars you used to drive, sports type cars for driving, or cars you want to drive in the future.



6. Lexus RZ with Steer-by-Wire

- A system that controls steering and tires with electric signals. Provides a new driving experience by significantly reducing the amount of steering operation. For example, the vehicle can be maneuvered without turning the circular steering wheel as much as before.
- No mechanical linkage and greater flexibility in steering arrangement, allowing for expansion to new mobility applications.



Intelligence that Connects with Society and Contributes to Solving Social Issues

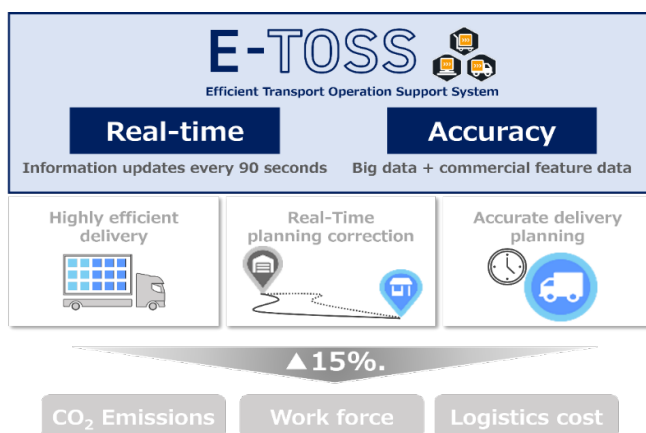
▽ Contribute to solving social issues by making services and society more intelligent

Cars will be connected to infrastructure and towns to provide new services. For example, we will promote social implementation of logistics systems that utilize real-time traffic information to improve transportation efficiency and systems for optimal energy management. **Woven City, positioned as a test course for mobility, will conduct various demonstrations that connect people, vehicles, and society.** For example, we will implement connected services in the logistics area publicly, improve the issues identified there again in Woven City, and implement them again. By advancing this cycle, we will also accelerate the intelligence of society.

In enriching people's lives through mobility, safety is a top priority. We are **developing autonomous driving technology by utilizing our long-accumulated safety knowledge and large amounts of data.** For example, in automatic parking, the system not only traces a prerecorded route, but also handles irregular situations when there are obstacles. We are also **developing an autonomous e-Palette.** We will continue to advance intelligence and **aim for "zero traffic accidents," "freedom of movement for all," and "provision of new value in mobility.**

1. Highly Efficient Transportation Operation Support System (E-TOSS)

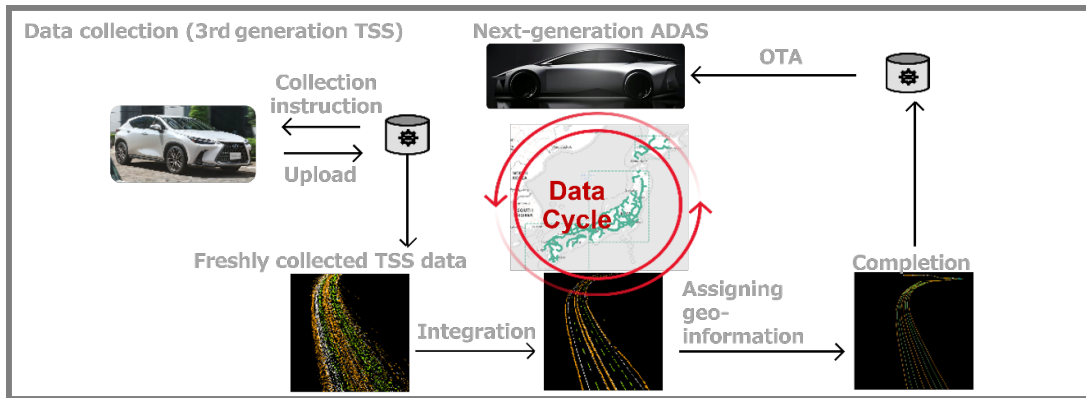
- **Achieves a real-time transportation and delivery system** by utilizing vehicle data and connected technology
- Provides **accurate transportation and delivery planning that contributes to reductions in (1) CO2 emissions, (2) manpower, and (3) logistics costs by about 15%***.



※ Calculated based on the results of the reduction of total travel distance based on the verification experiment at the distribution center of the cooperating company.

2. Automatic Map Generation (Geo)

- Dramatically improve the resolution of road gradient information by utilizing Toyota's vast amount of vehicle data and increase the frequency of 3D map updates from 6 months to the same day.
- Enables more comfortable, safer, and more fuel/electricity efficient driving.



3. New next-generation automatic parking function

- Provides "smart parking" in various locations based on registered parking patterns, while the system responds to irregular situations such as obstacles using autonomous driving technology.

4. e-Palette

- Two types are available for diverse applications: one without a driver's seat (automatic operation) and one with a driver's seat (manual operation is also possible). **Various services can be offered by using the spacious interior space (mobile convenience store specifications in this case).**
- The car is equipped with an autonomous driving system under development by Toyota Motor Corporation, Woven by Toyota, and DENSO. Aiming to contribute to Mobility for ALL with autonomous driving that only a carmaker can provide, based on intelligence from a large amount of data and safety knowledge accumulated over many years.

