



HIRAOKA LAB.

[Design Methodology of Human-Centered Systems]



Vehicle Dynamic Control and Strategy of Automated Driving

Human-Machine Systems

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One of the most representative human-machine systems in daily life is a driver-vehicle system. To achieve a safer, more comfortable, and more efficient traffic environment, we have to optimize the whole system including driver-vehicle-road in addition to improving vehicle performance. Consequently, my current research goal is to **establish a design methodology of the driver-vehicle system to improve QOM (Quality Of Moving)**.

Vehicle Dynamic Control

- **Control System Design Robust to Disturbances and Modeling Errors**
 - Automatic Path Tracking Control for Four-Wheel Steering Vehicle
 - Active Four-Wheel Steering Control
 - Active Pitch Control by Driving/Braking Force Distribution

HMS (Human-Machine System)

• Advanced Driver-Assistance System (ADAS)

- Eco-Driving Support System
- Safe Driving Evaluation System
- Wakefulness-Keeping Support System
- Smooth Driving Assist System
- Expressway Driving Game

• Analysis of Interaction between Driver and AD (Automated Driving)/ADAS

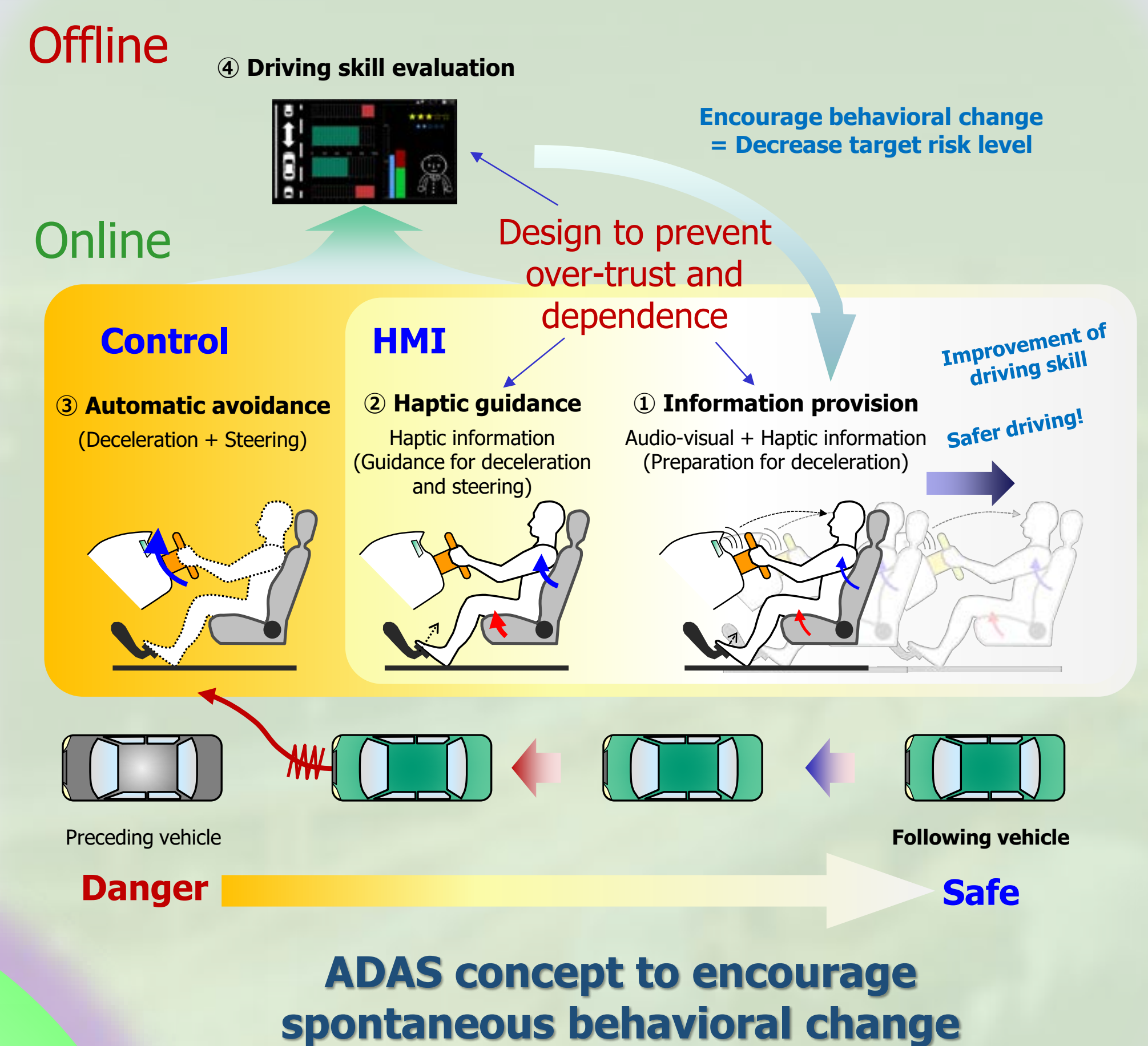
- Modeling of Trust Generation Mechanism for AD/ADAS
- Impact of Trust in AD/ADAS on Driving Behavior
- Countermeasures to prevent over-trust in AD/ADAS

• Haptic Shared Control

- Direct HSC (D-HSC)
- Indirect HSC (I-HSC)

• Collision Risk Indices

- Deceleration for Collision Avoidance (DCA)
- Lateral Acceleration for Collision (LACA)



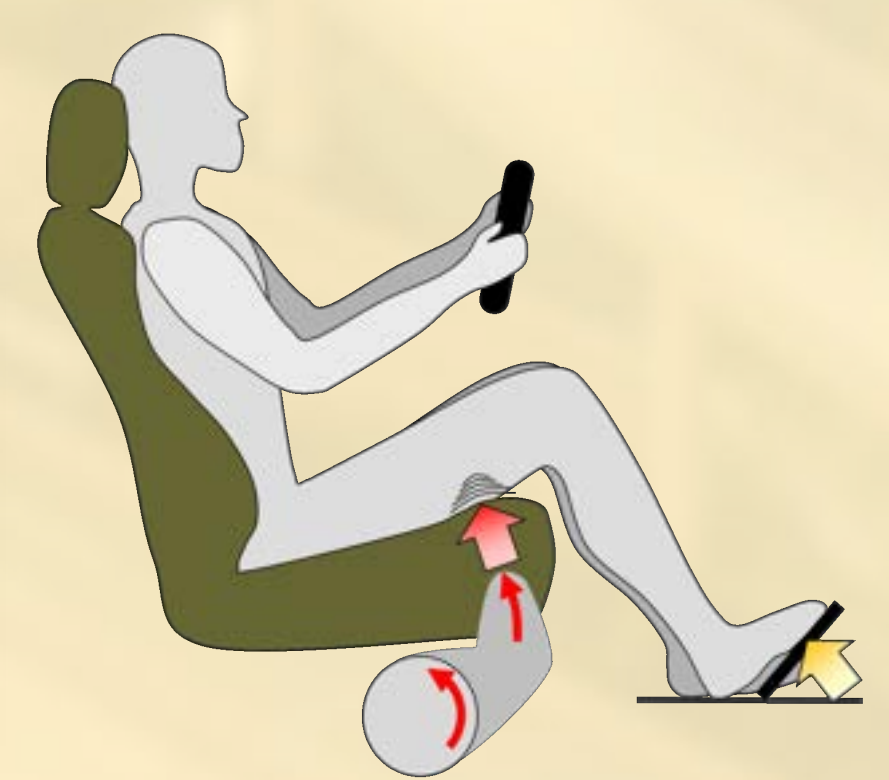
Green

Safe

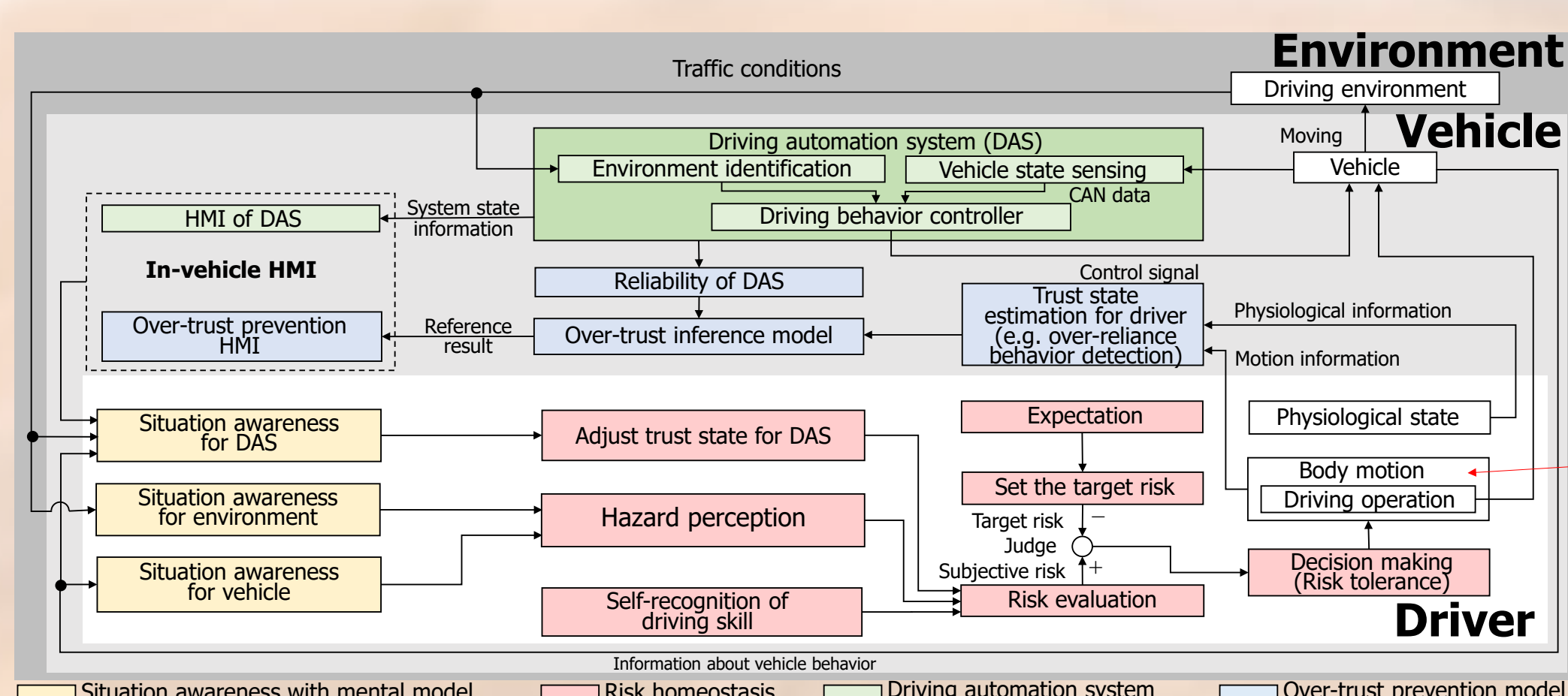
Aim for high level integration

Smart Drive
for better **QOM**
(Quality Of Moving)

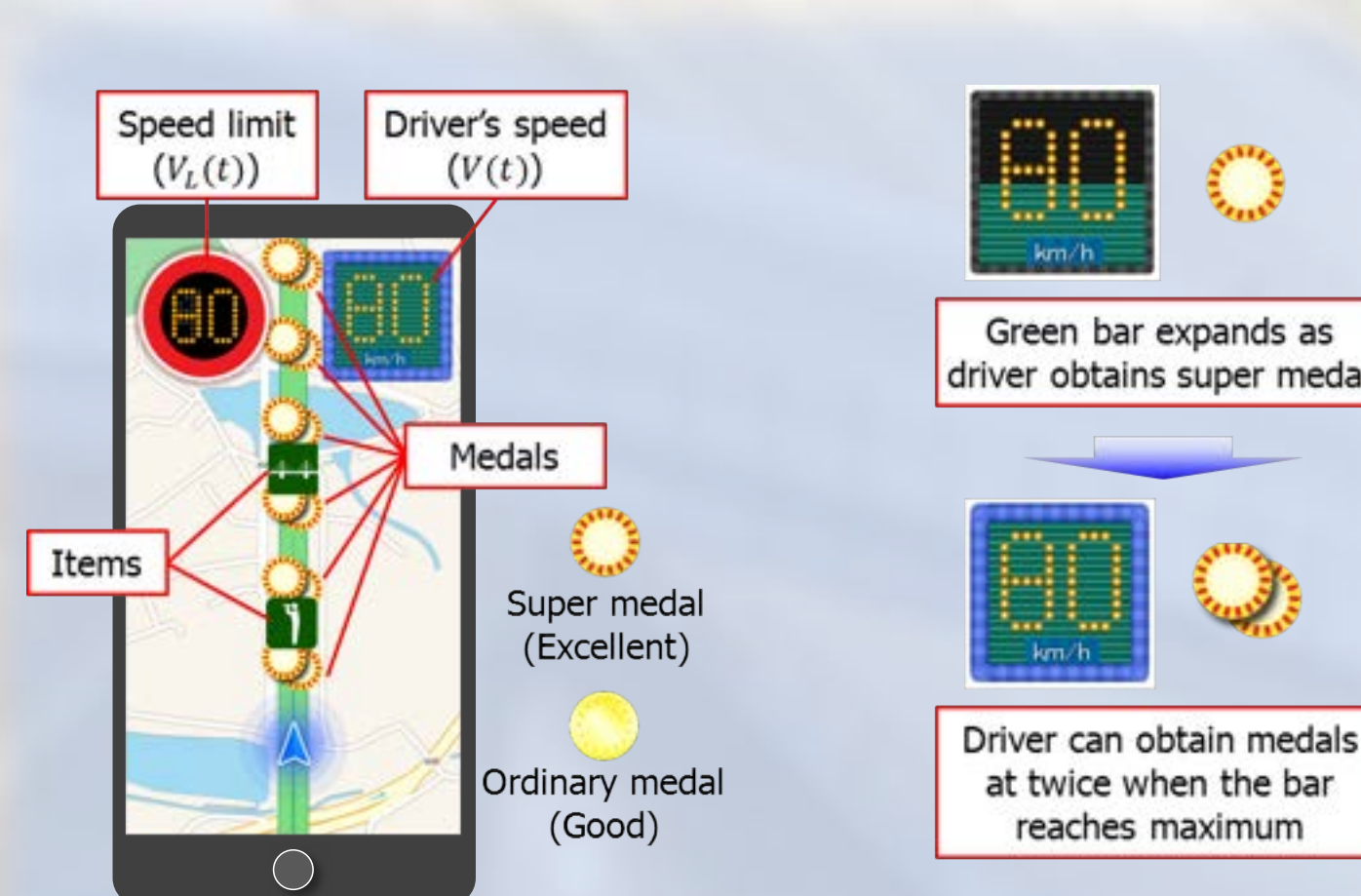
Smooth flow



Haptic Seat (example of I-HSC)
Upper: to encourage deceleration
Lower: to encourage collision avoidance steering



Trust generation mechanism model for AD/ADAS



Expressway Driving Game

Background Photo was Designed by fanjianhua / Freepik

