

Humans and Automated Driving Systems

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1. Overview

- Goal of SIP activity and framework

2. Challenges and approaches

- Systems & Humans
- Systems & Other Traffic Participants
- Systems & Society

3. Systems & Humans

- Environment / Situation settings
- System modeling, Scenario analysis

4. Summary

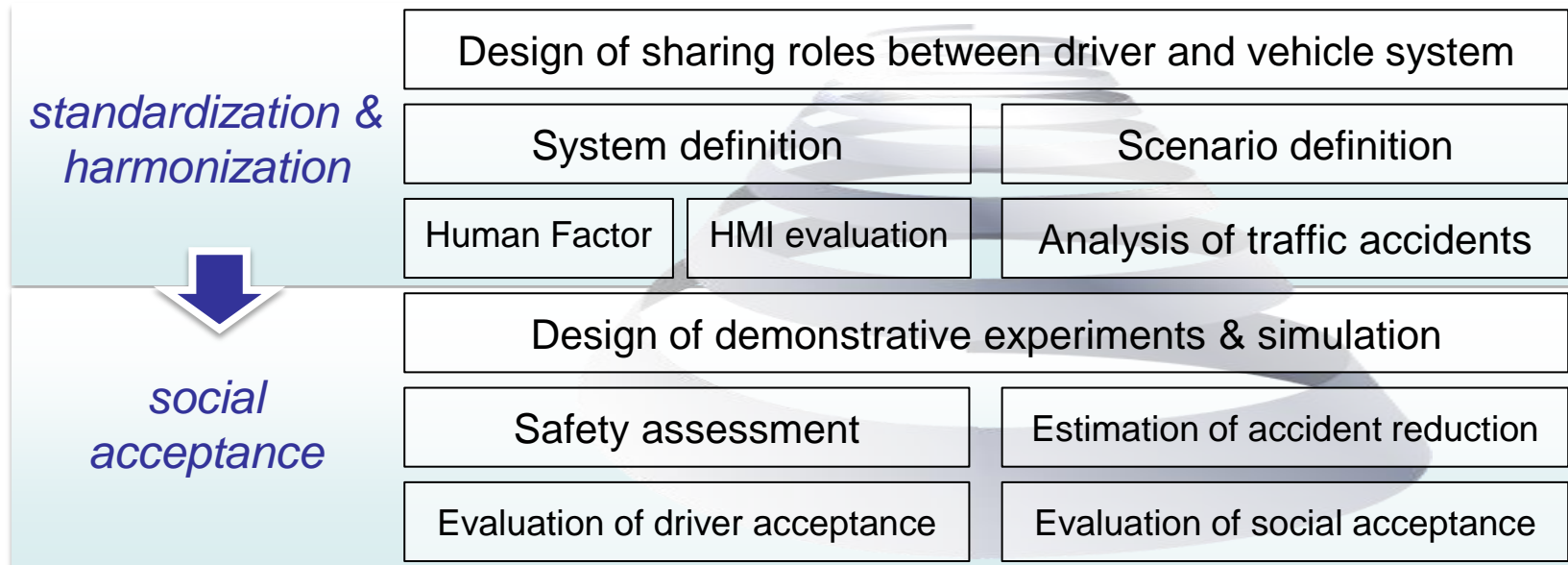


1. Overview

■ Goal of SIP activity

- Contribution to establish standardization and harmonization
- Nourish social acceptance for the realization and promotion

■ Framework



Humans & Systems

■ Approach in 3 phases

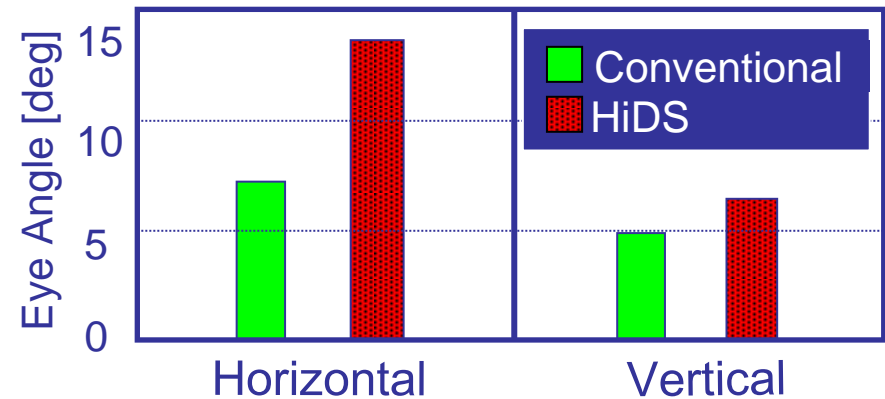
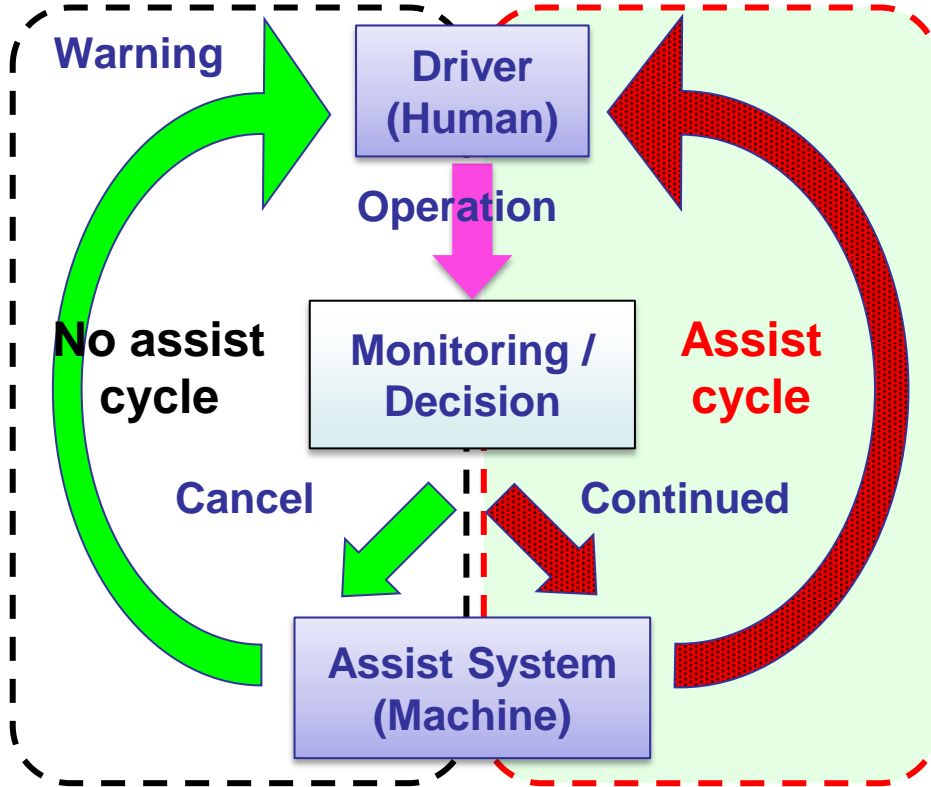
- Authority and responsibility for safety
- Human-in-the-loop / Human-out-of-the-loop *Thought experiments*
- Trading of control between driver and automation
- Human-machine interface and interaction *Demonstrative experiments*
- Negative effects of automation, such as
 - Vigilance decrement
 - Complacency (Over trust)
 - Overreliance
 - Loss of system awareness or situation awareness
 - Mode error / confusion
 - Automation surprises
 - Misuse / Disuse / Abuse
 - Skill degradation

Result evaluation



Humans & Systems – Human Centered Automaton

■ Human Machine Interaction System (HMIS)



Human Centered System in Honda Intelligent Driver Support System (HiDS), Society of Automotive Engineering Japan, March, 2003

➤ Starting point

“Human Centered Automation” can

- Reduced both physical and mental workload
- Keep a driver stays in-the-loop of the system



Humans & Systems

■ Beyond the ADAS

Transition of role and authority

- NHTSA Level 3
- Conditional Automation

Human-out-of-the-loop / -in-the-loop



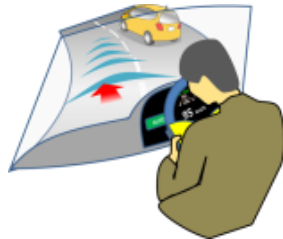
- NHTSA Level 2
- Partial Automation

Human-in-the-loop

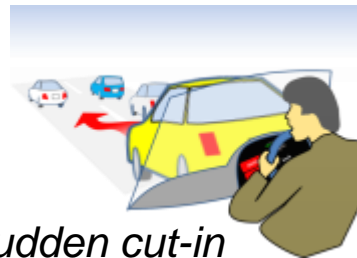
Use case



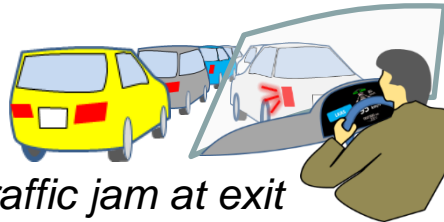
Relaxed



Concentrated



Sudden cut-in

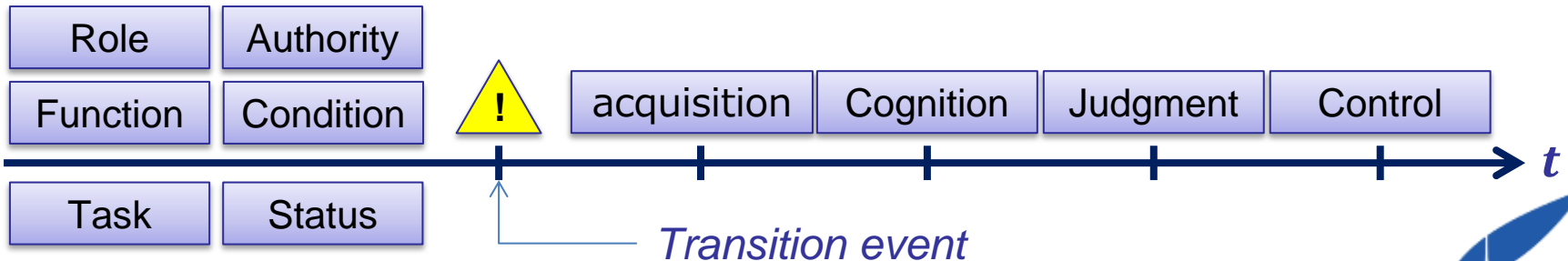


Traffic jam at exit



Resume driving task

Scenario and Interaction



Systems & Other Traffic Participants

■ Human Friendly Interfaces in the mixed traffic



HONDA
The Power of Dreams

Safety for Everyone

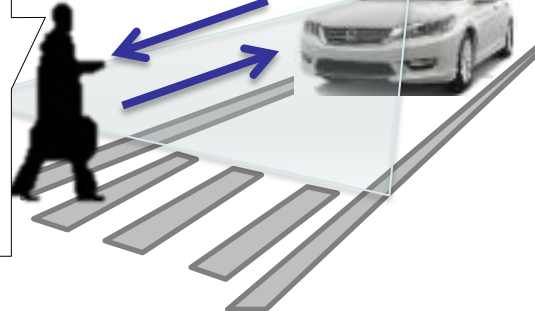


SIP - adus

Mobility Bringing
Everyone a Smile



You first!



- Social acceptance
- Legal issues, ...

Nourishment of social acceptance

OEM / Supplier

- Functions, Benefit
- Definition of the roll of a driver

Customer



- Expectations
- Understanding of the role of a driver

Minimization new risks due to automation

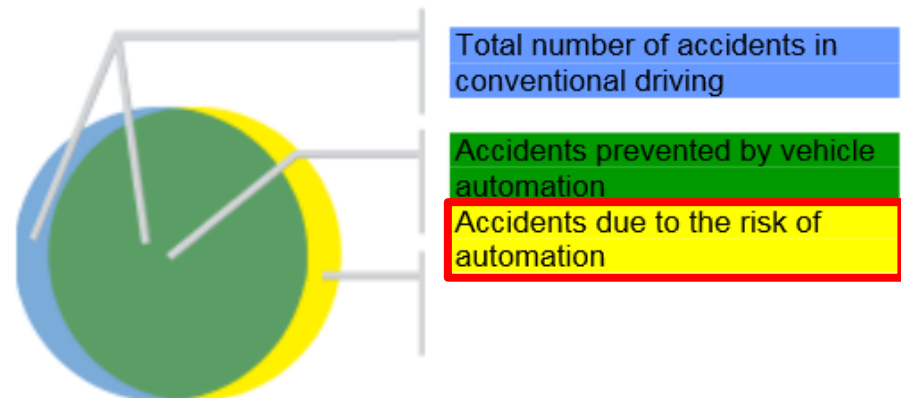


Fig. 4-1: Theoretical potential for accident prevention in vehicle automation (Source: project group)

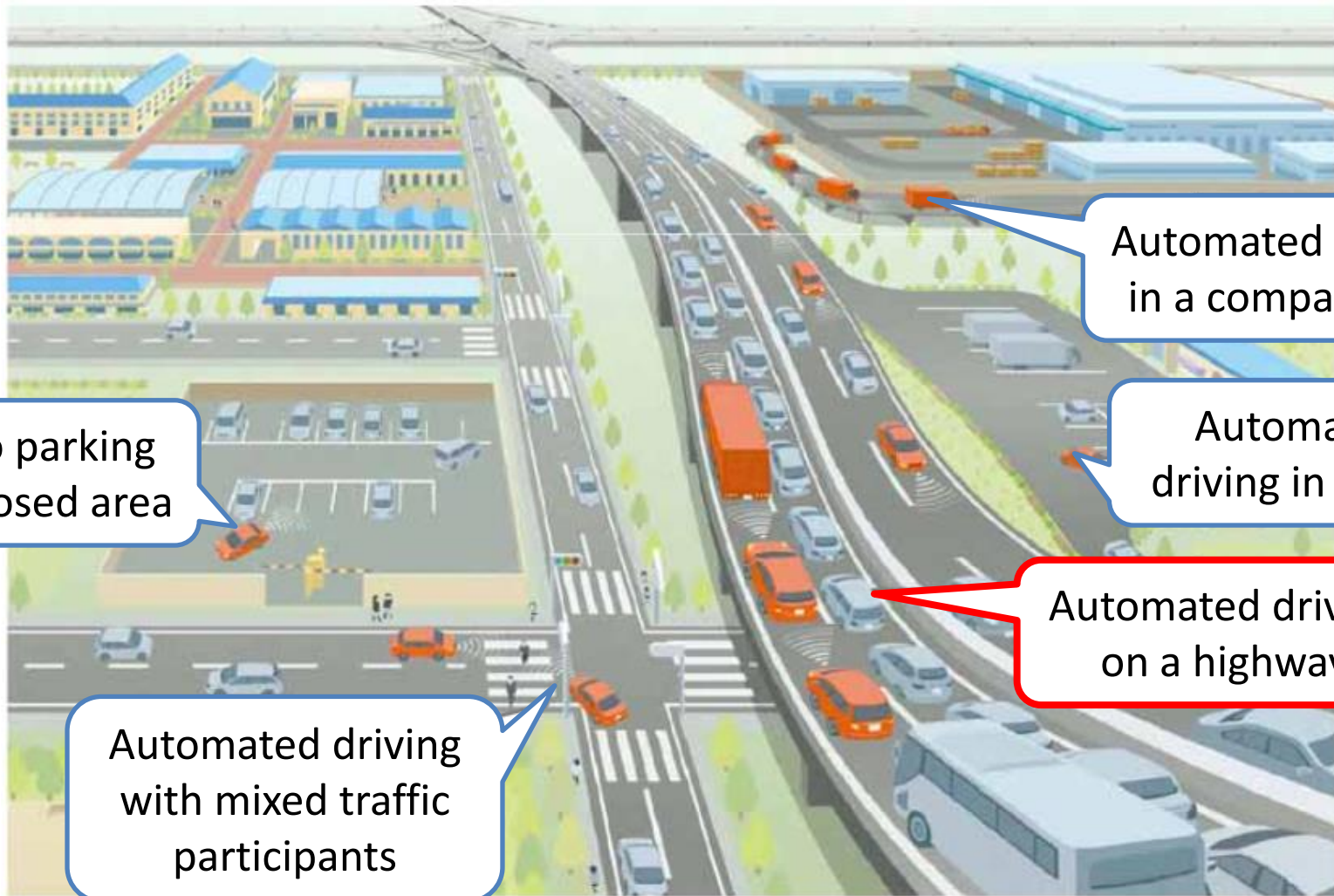
Source: BAST study about the legal consequences of automation (Legal consequences of an increase in vehicle automation)

http://bast.opus.hbz-nrw.de/volltexte/2013/723/pdf/Legal_consequences_of_a_n_increase_in_vehicle_automation.pdf



Systems & Humans

■ 1st : Scenario



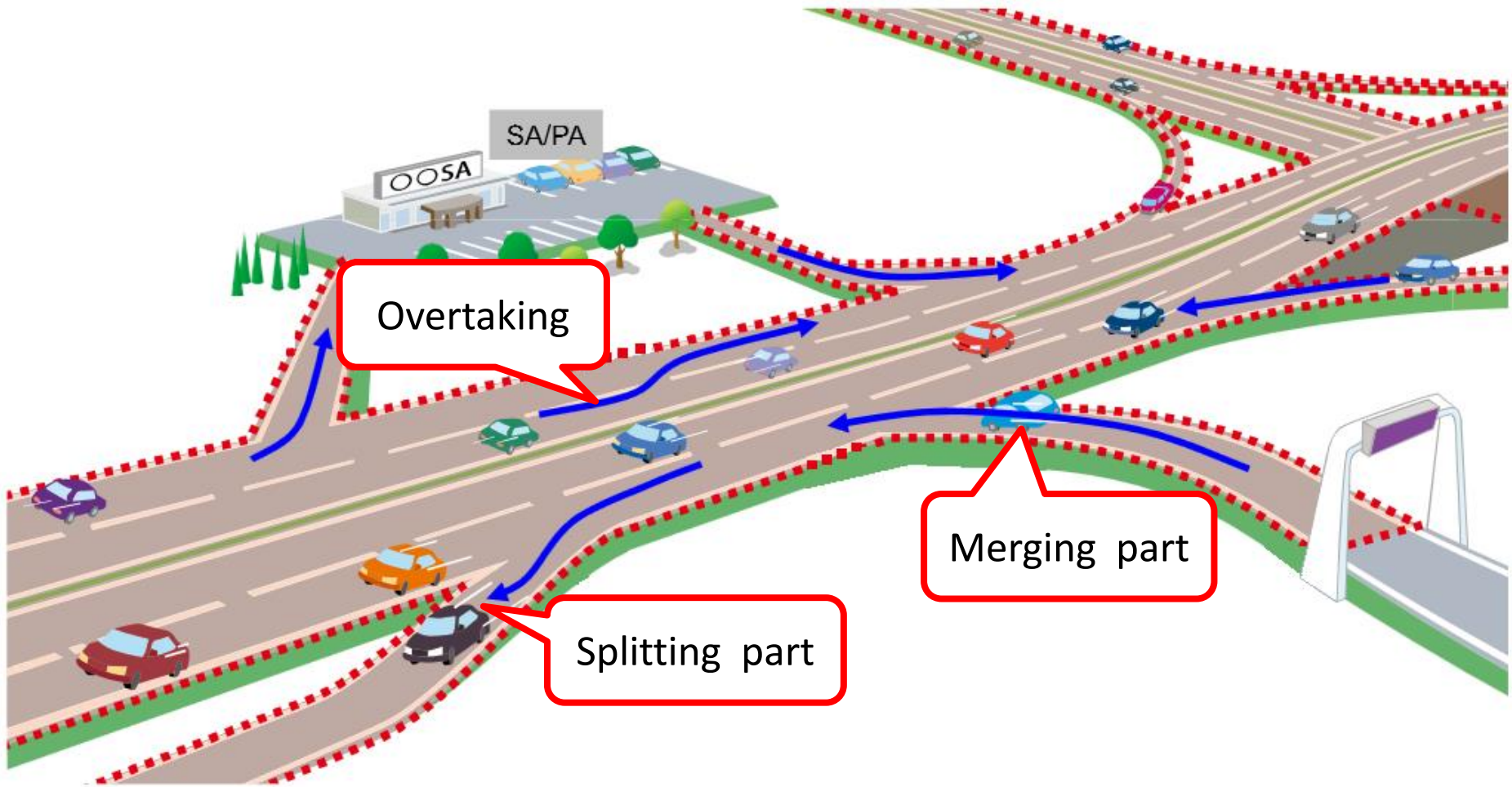
Source: MLIT Autopilot Research Council 6th Report in 28 Oct 2013

<http://www.mlit.go.jp/road/ir/ir-council/autopilot/pdf/06/5.pdf>



Systems & Humans

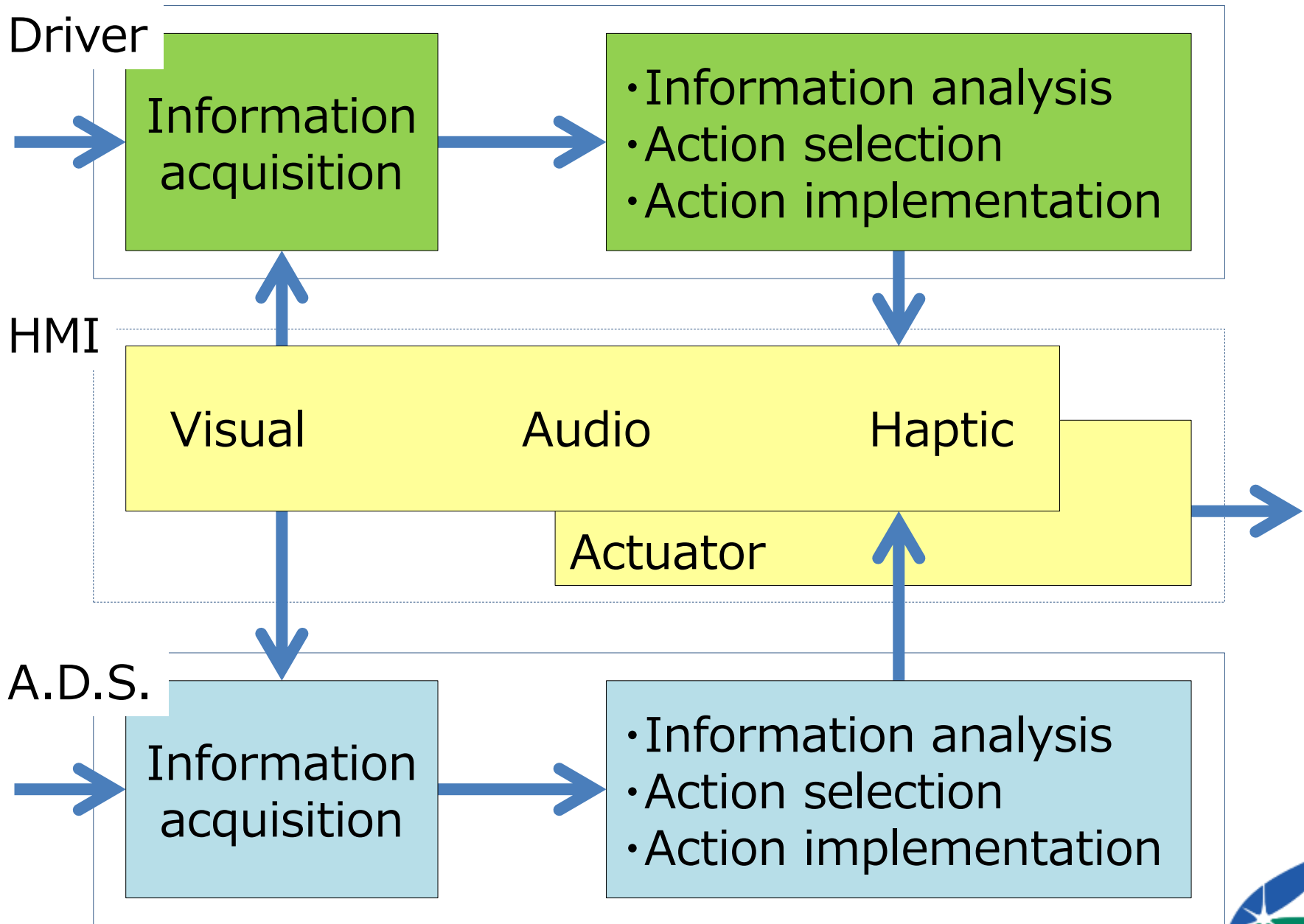
■ 2nd : Situation



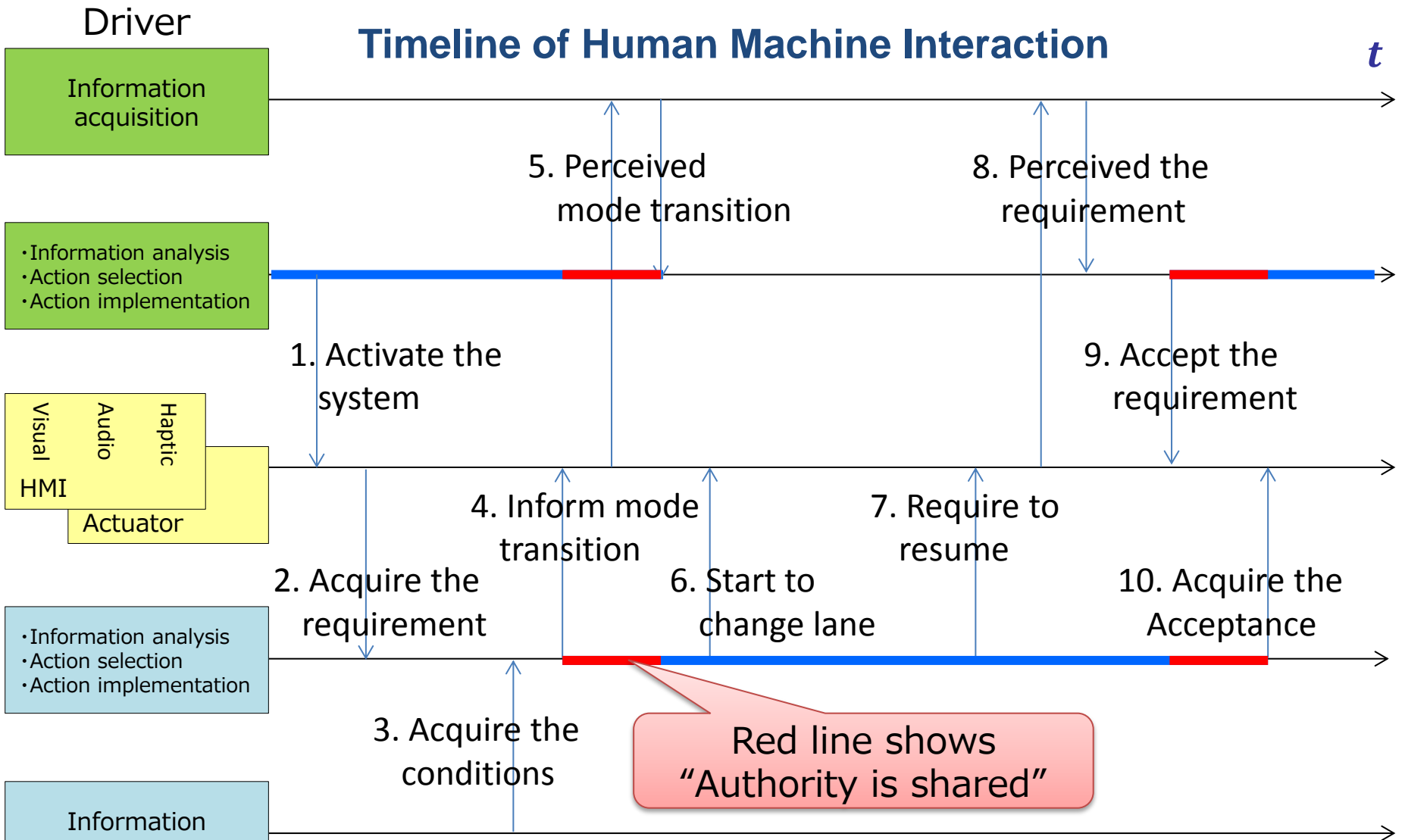
Source: MLIT Autopilot Research Council 6th Report in 28 Oct 2013
<http://www.mlit.go.jp/road/ir/ir-council/autopilot/pdf/06/5.pdf>



3rd : Modeling - “Driver - System Interaction”



4th : Analysis - Example: “Automated Lane Change”



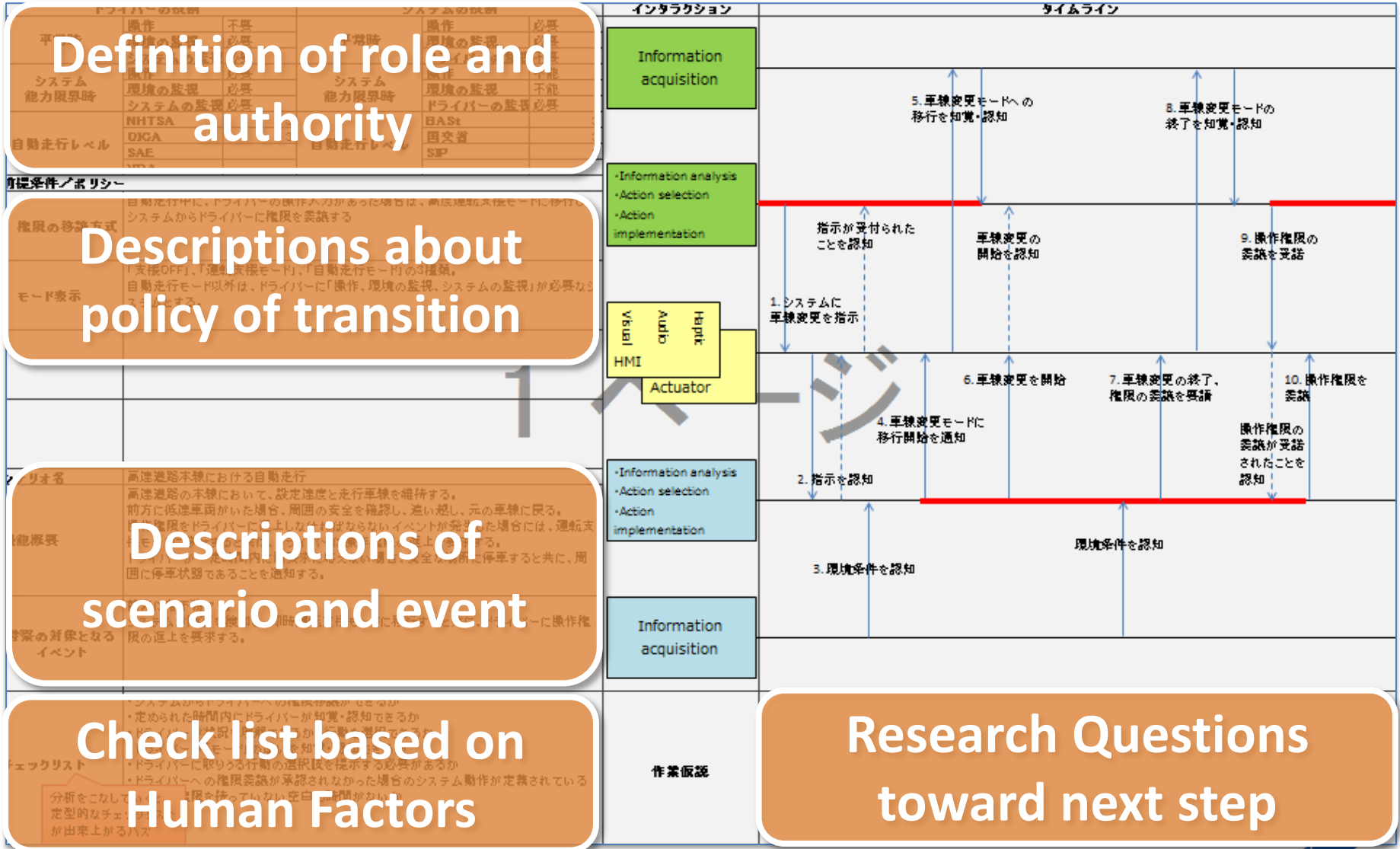
Research Questions:

Should the driver respond acknowledgement to the system?

...

4th : Analysis - Example: “Automated Lane Change”

A complete view of the chart



Collaboration with other themes

Promoting Committee for SIP Automated Driving System Research Project

International cooperation WG

Next Generation Urban Transportation WG

System Implementation WG

- ◆ Dynamic map
- ◆ Data analysis and simulation technology
- ◆ Prediction based on information from ITS
- ◆ Sensing capability enhancement
- ◆ System security
- ◆ **Human Factors**

■ Framework

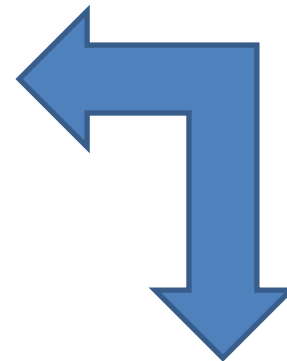
standardization & harmonization



social acceptance

Design of sharing roles between driver and vehicle system		
System definition		Scenario definition
Human Factor	HMI evaluation	Analysis of traffic accidents
Design of demonstrative experiments & simulation		
Safety assessment		Estimation of accident reduction
Evaluation of driver acceptance		Evaluation of social acceptance

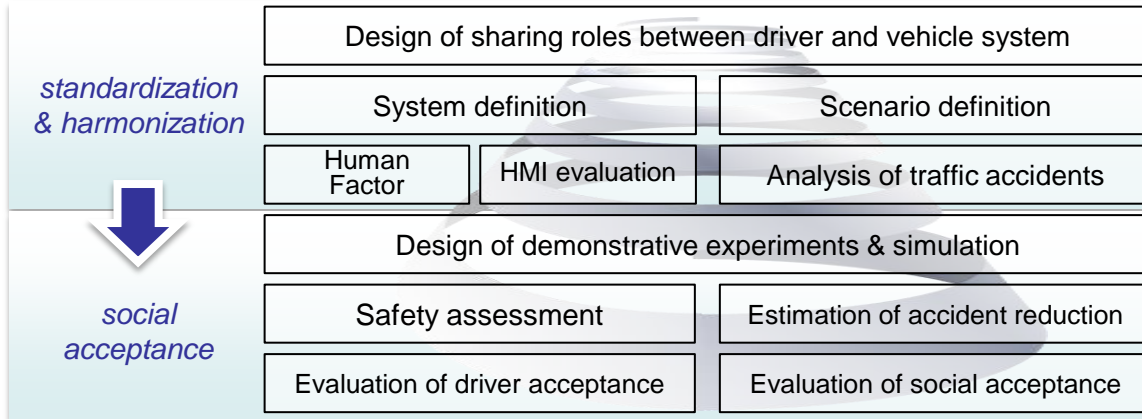
Collaborate with ...



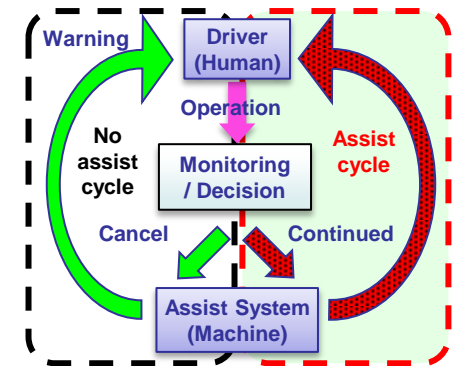
- Environment and Situation
- Scenario / Use Case
- System capability
- ...

4. Summary

■ Activities and Framework



■ Starting point



Human Centered Automation

■ Systems and Humans

Human-out-of-the-loop/-in-the-loop

- NHTSA Level 3
- Conditional Automation



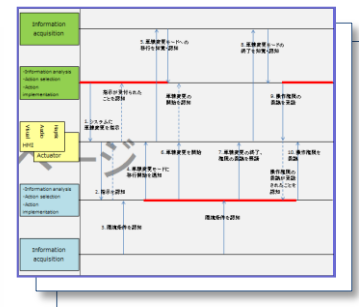
Human-in-the-loop

- NHTSA Level 2
- Partial Automation

■ Scenario / Situation / Use case



■ Modeling and Analysis



Timeline of Human Machine Interaction

↓
Research Questions

Now we have opened our door!



Thank you for your attention.

End

