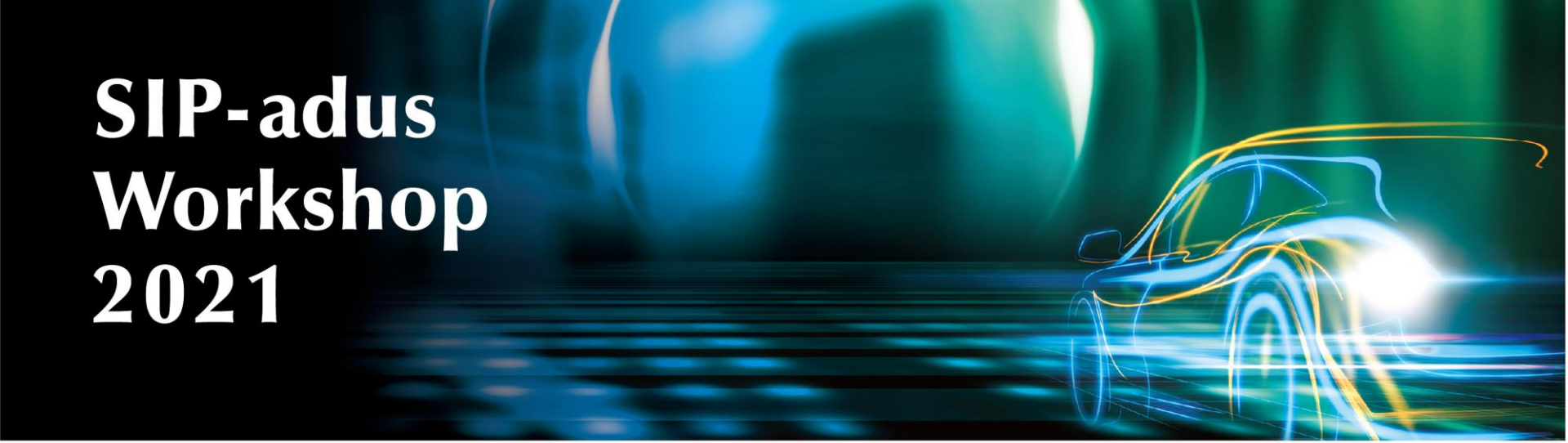


National Research Project on Automated Driving to Realize Society 5.0
- SIP-adus in Japan -

FUKUSHIMA Chie
Director for SIP-adus
Cabinet Office, Government of Japan

SIP Cabinet Office

Society 5.0

Data convergence

high degree of convergence between cyberspace (virtual space) and physical space (real space)

Economic advancement + **Solution of social problems**

provision of products and services that are needed to the people that need them at the time they are needed

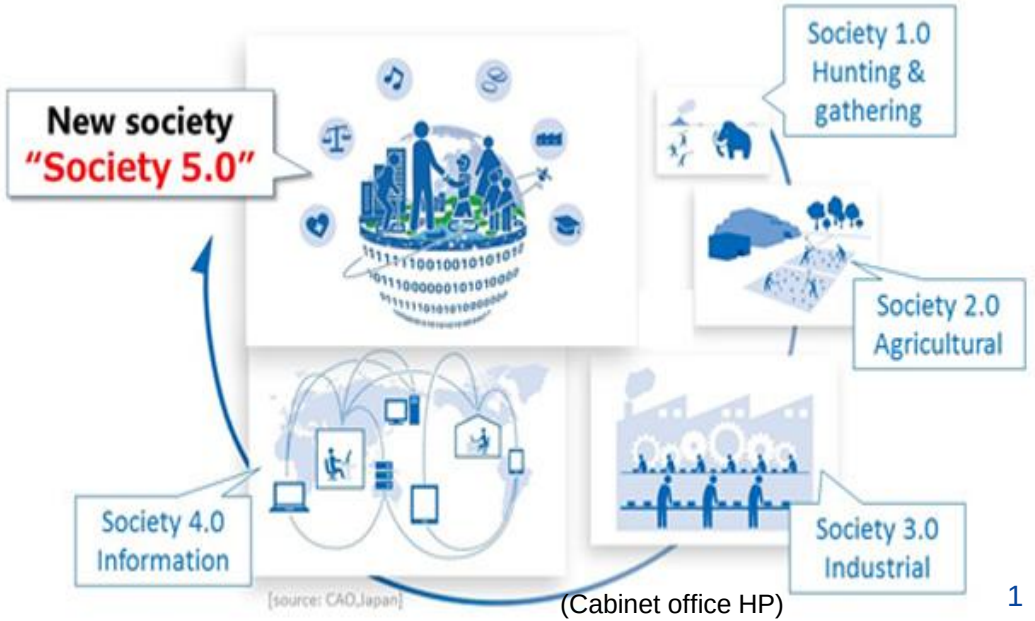
human-centered society in which anyone can enjoy a high quality of life full of vigor

SIP Strategic Innovation Promotion Program

SIP 2nd FY2018～FY2022

12 themes on going (SIP-adus is one of them)

adus ; Automated driving for universal services



(Cabinet office HP)

Outline of SIP

- **Intensive R&D program**
  - ✓ promote 5-year R&D (FY2018 - FY2022)
  - ✓ from fundamental research to social implementation and commercialization
- **Promote cross-sector collaboration**
  - ✓ enhancing cross-ministerial cooperation
  - ✓ promote industry-academia-government collaboration
- **Leadership and total Budget**
  - ✓ CSTI appointed Program Directors and allocates the budget for each research theme.

2nd phase of SIP (FY2018-2022) - 12 Programs

Big-data and AI-enabled Cyberspace Technologies

Intelligent Knowledge Processing Infrastructure Integrating Cyber and Physical Domains

Cyber Physical Security for IoT Society

Automated Driving for Universal Services

“Materials Integration” for Revolutionary Design System of Structural Materials

Photonics and Quantum Technology for Society5.0

Technologies for smart bio-industry and agriculture

Energy system for an IoE society

Enhancement of National Resilience Against Natural Disasters

Innovative AI Hospital System

Smart Logistics Services

Development of Innovative Technologies for Exploration of Deep-sea Resources

Promoting structure of SIP-adus

HQ coordination

Digital Agency ⟷ **Cabinet Office**

PD

Steering Committee
Chair: Program Director (Seigo Kuzumaki)
Secretariat: Cabinet Office
Members: Sub-PDs (Tateo Arimoto, Youichi Sugimoto, Ryota Shirato)
NPA, Digital Agency, MIC, METI, MLIT, industry and academia, etc.

- Discussion and progress management of strategies by experts from industry, academia, and government
- Launch of **IP Committee**
- **Task forces of experts** launched as necessary

System Implementation WG

- TF on Transport Information Infrastructure
- TF on V2X Communication for Cooperative Driving Automation

Business Promotion WG

- TF on FOTs in Tokyo waterfront area

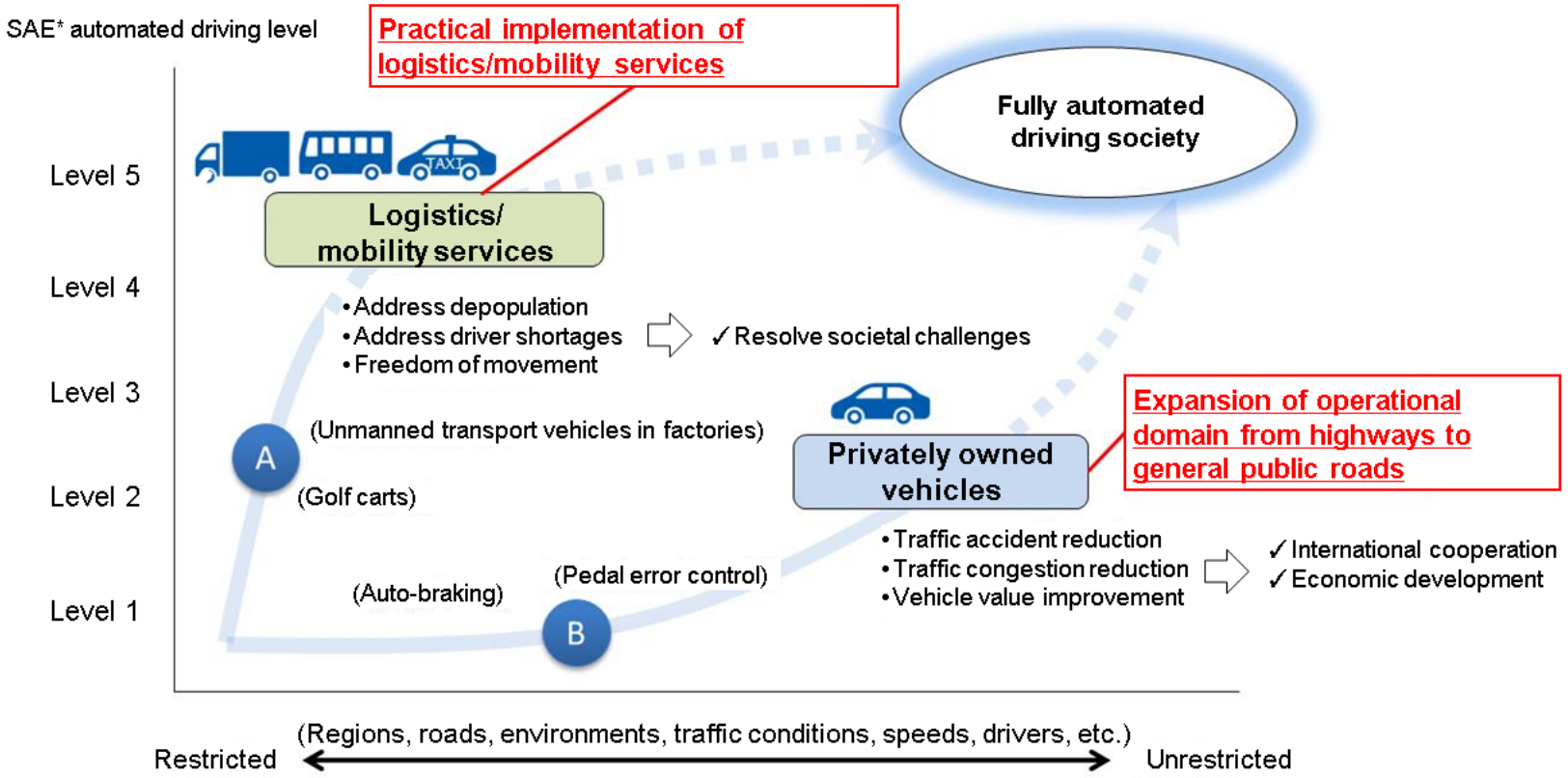
International Cooperation WG

- National Police Agency (NPA)
- Ministry of Internal Affairs and Communications (MIC)
- Ministry of Economy, Trade and Industry (METI)
- Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
- Ministry of Education, Culture, Sports, Science and Technology
- Other related ministries and agencies

NEDO

Research bodies

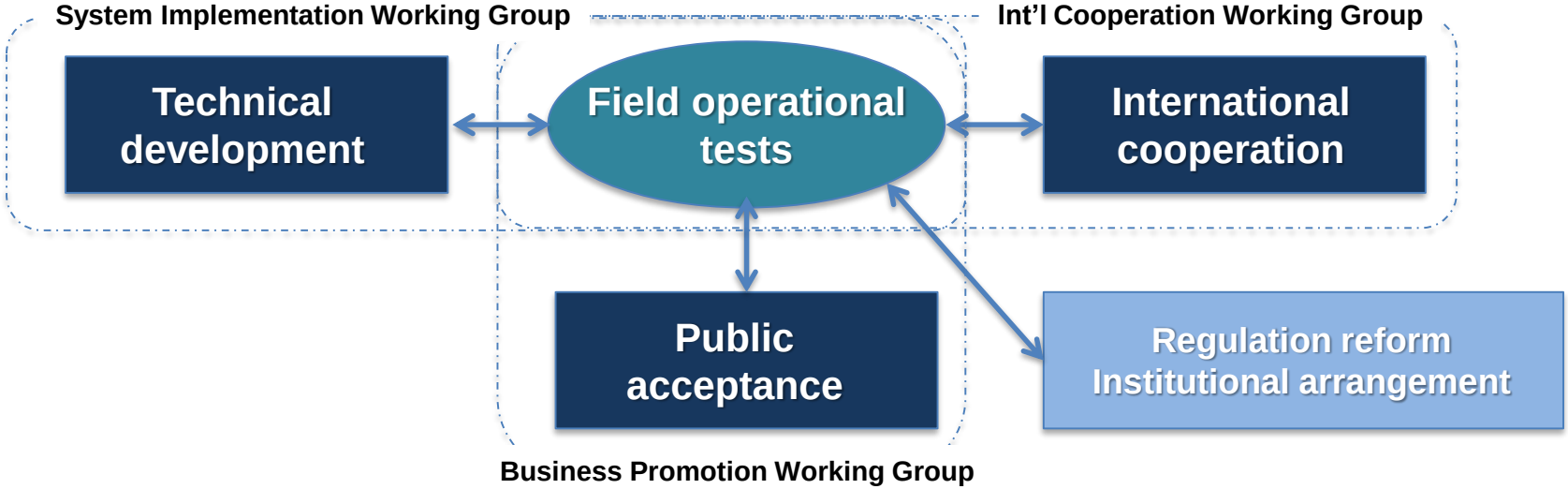
Overview of 2nd phase of SIP-adus



*SAE (Society of Automotive Engineers): Standardization body in the U.S.

Focus themes

【4 pillars】



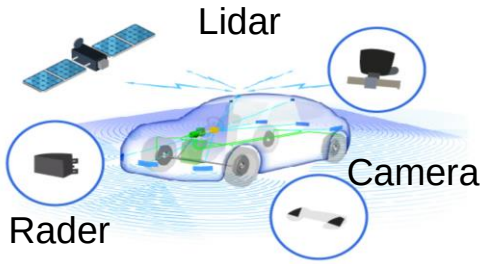
【Priority themes】

（Ⅰ） Traffic environment information (Dynamic map)
（Ⅱ） Traffic environment data portal
（Ⅲ） Virtual validation platform for ADS safety assurance
（Ⅳ） Evaluation methodology of Intrusion detection system

Dynamic map

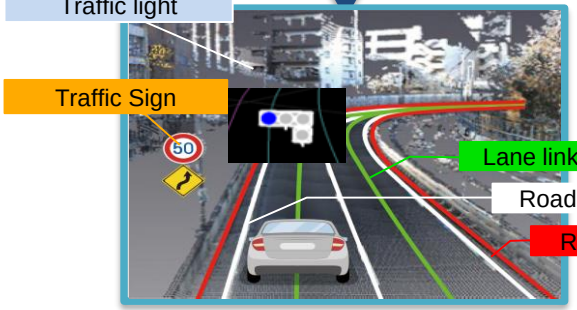
Structure of ADS

In-vehicle sensor information



Dynamic map

- **Dynamic Data**
  Movement of Vehicles, Status of Pedestrians, Traffic Signals etc.
- **Semi-dynamic Data**
  Accidents, Traffic Jams, Detailed Weather etc.
- **Semi-static Data**
  Traffic Regulation, Road Construction, Weather etc.
- **Static Data**
  High-precision 3D Map
  Road, Lane, 3D Shapes of Structures etc.



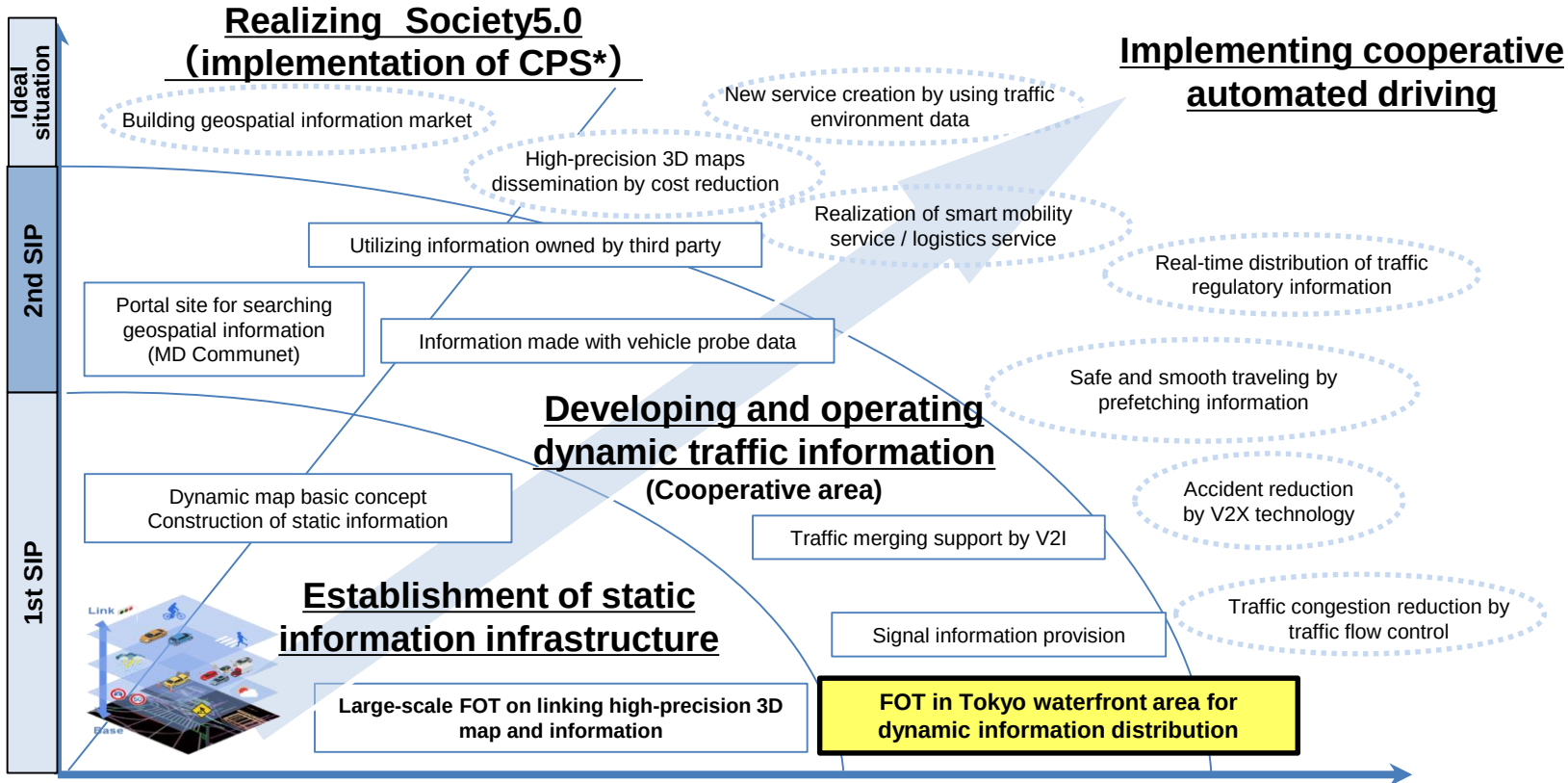
Traffic environment info.

- Localization
- Pass planning
- Advanced driver-assistance systems

Technology development in cooperative areas

Realization of Society 5.0

Building the traffic environment info. framework

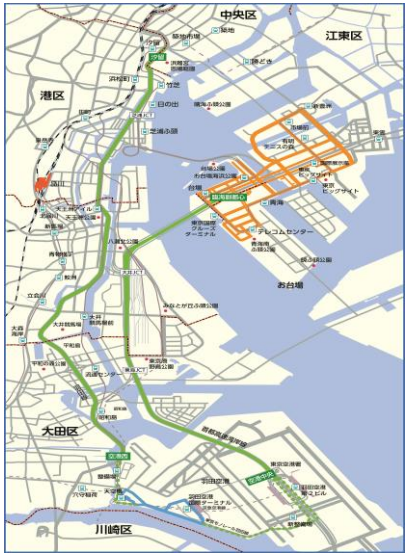


*CPS：Cyber Physical System

【Scenario for private car】

FOTs in Tokyo waterfront area

- Promoting standardization in an internationally open experimental environment under public roads and mixed traffic
- Promoting R&D by drawing out private investment through a matching fund format with industry-academia-government collaboration



(a)Tokyo Waterfront City area

- Signal display and change timing information via ITS infrastructure
- High-precision 3D map linked with signal info. etc

(b)Haneda Airport area

- Signal display and change timing information via ITS infrastructure
- Magnetic marker
- Bus stop, designated lane for bus service

(c)Metropolitan Expressway

- Merging assistance at main lanes of expressway
- ETC gate open/close info.
- Lane level traffic flow regulation info. Etc.

◆ From this November, FOT will be expanded to provide **dynamic traffic information from a wide area** of infrastructure via **V2N** with the aim of further expanding the operational design domain (ODD) of ADV and mobility / logistics services.

Participants of FOT in Tokyo waterfront area

- 22 institutions including domestic and foreign automobile manufacturers, auto parts suppliers, universities, start-ups and others

※As of November 2021

Alphabetical order. A total of 22 institutions

Safety assurance

- Developing a simulation platform that replaces real vehicle evaluations with sensor modelling that is highly consistent with real phenomena, in order to perform reproducible safety evaluations of automated driving in various traffic environments.

Real experimental test

Public Road

Proving Ground

Camera

Radar

LiDAR

Virtual test

DIVP

SILS／MILS
（Software in the Loop／Model in the Loop）

Connect

Connect

HILS
（Hardware in the Loop）

VILS
（Vehicle in the Loop）

Highly consistent sensor modeling

SIP

Simulation evaluation of Tokyo waterfront area

- **Build Odaiba Virtual-PG environment**
  - ✓ **Modeling of FOTs in Tokyo waterfront area**
  - ✓ Model building of traffic participants
    （3D model） pedestrian/bicycle/vehicle etc.
  - ✓ **Reproduction of weather conditions**
    （sunlight, rain, nighttime）

- **Evaluate tool usability and simulation results**
  - ✓ Evaluation of scenario setting tool including traffic participants
  - ✓ Comparative evaluation of sensor detection data and simulation

Main themes of international cooperation

- Dynamic Map
- Connected Vehicles
- Human Factors
- Cybersecurity
- Safety Assurance
- Impact Assessment
- Service and Business Implementation

Japan-Germany research cooperation

Start from September 2019

Human Factors

Impact Assessment

JPN-GER Cooperation

Safety Assurance

Start from October 2020

Cybersecurity

Start from November 2020

Japan-EU research cooperation

SIP

Human Factors

Safety Assurance

Impact Assessment

Cybersecurity

HADRIAN

HEADSTART

SHOW AUTOMATED URBAN MOBILITY