In 2nd SIP-adus Workshop on Connected and Automated Driving Systems 2015
Session: Next-Generation Transport (Oct. 28, 2015 11:00-12:30)
@ Tokyo International Exchange Center (TIEC)

Next-Generation "Regional" Transport using Automated Driving Technology and Special Ward for Field Practice

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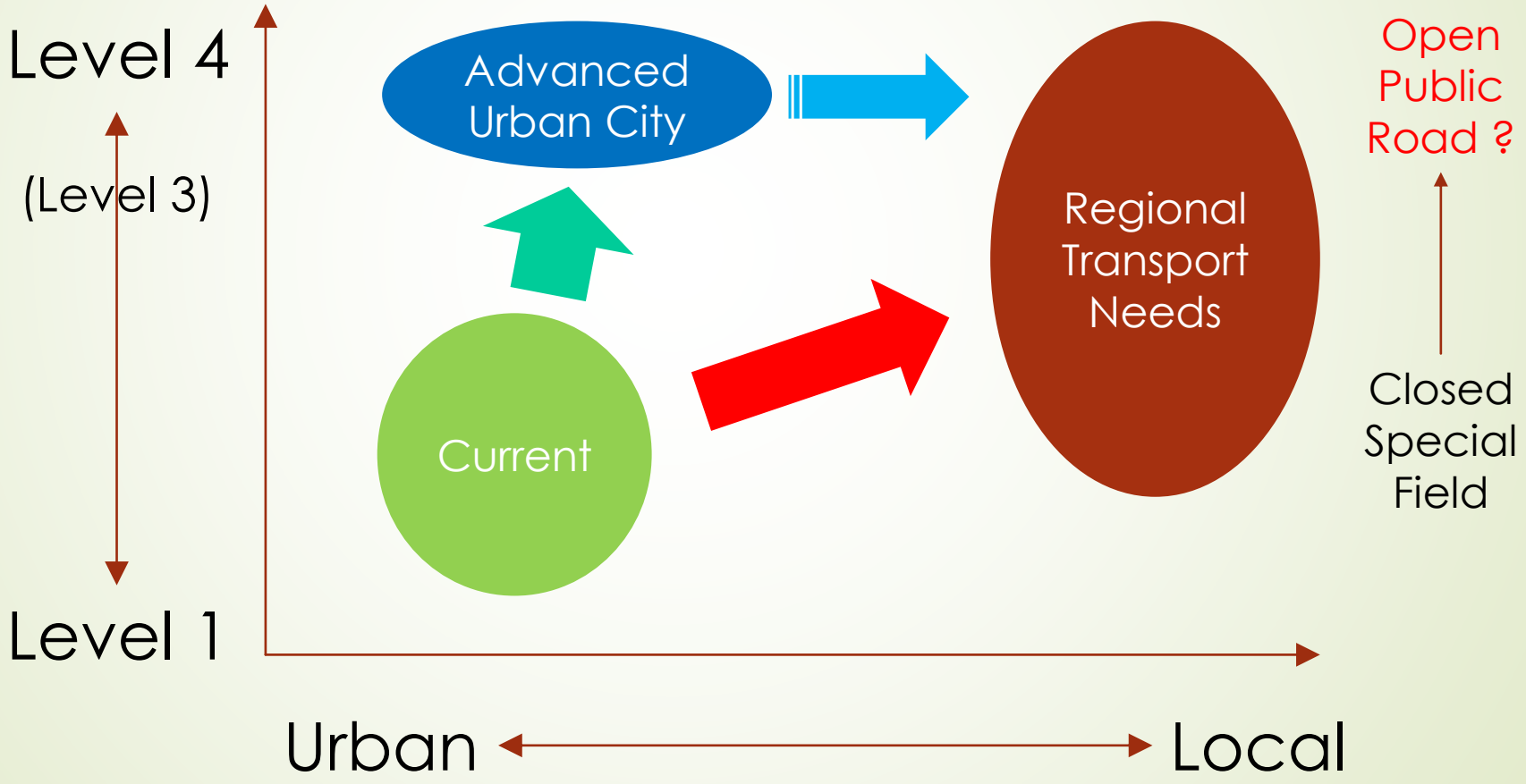
How, and Where to be developed automated driving technologies & systems ?



Tohoku (North-East) Region, Japan

- Distant : “Michinoku” (means “end of road”)
- Sparse ⇒ Smooth & Stress-free
- Highly-Age ⇒ Human-Friendly
- Lot of Nature ⇒ Eco-Friendly

+ Great Disaster … ⇒ Disaster-Resilient

⇒ “advanced problem region”

It must be changed into “advanced problem-solving region”

The Great East Japan Earthquake Disaster on March 11, 2011

[Disaster Investigation by Univ. of Tokyo & Tohoku University]

Next-Generation Advanced Mobility System Research Project in Tohoku University

For Social Contribution

Next-Generation Advanced Mobility System Research Group

Prototype Evaluation Base
for Next-Generation Vehicles

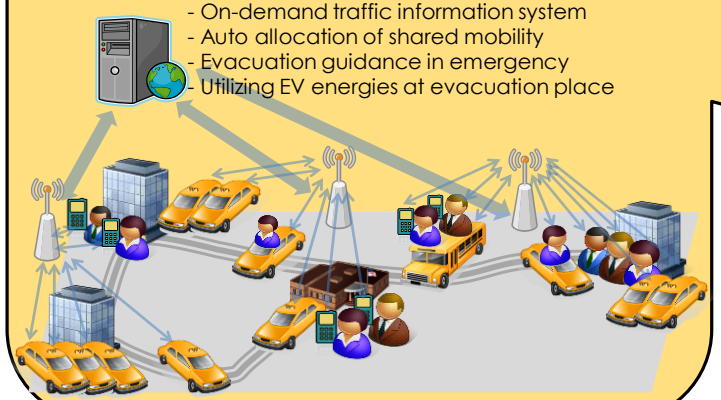
Miyagi Reconstruction Park NICHe TAGAJYO BASE

In the Sony Corporation Sendai Technology Center

- Early operation restarting of the suffered companies
- Creation of new industry and employments by advanced technologies

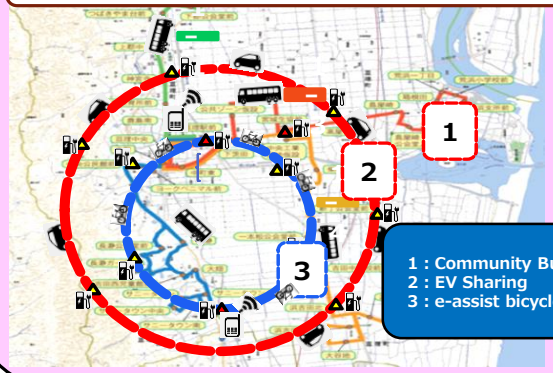
Aobayama Campus Field Experiment

- Visualization of campus bus & EV locations
- On-demand traffic information system
- Auto allocation of shared mobility
- Evacuation guidance in emergency
- Utilizing EV energies at evacuation place



Social Implementation to Tohoku Disaster Area

- Transport System supplementing existing community bus
- Multi-mode mobility with evacuation guidance function



Cross-cutting Integration for Advanced Technology Development

- EV Bus
- Wireless Charging
- In-Wheel Motor
- Head-Up Display
- Omnidirectional Camera

- Micro EV
- Autonomous Vehicle
- Lithium-ion Capacitor EV
- Dual-Mode EV (for emergency)

- Driving Simulator
- Traffic Simulation
- Virtual Space
- Driver Sensing

Region-based Collaboration of Industry-Academia-Government

- Toyota Motor East Japan, Inc.
  Outdoor Un-manned Vehicle
  Next-Generation Distribution
- Kudo Electronics Corporation
  Motor, Power Electronics
- Hikichiseiko Co.,Ltd.
  Wireless Charging Station
- Murakami Co.,Ltd.
  EV Design & Manufacturing

under collaboration with
Ministries, Prefectures, Cities & Towns

Aobayama Campus Smart Mobility Vision (Planning)

Smooth Transfer to Multi-Mode

Subway Tozai Line

Campus Bus

Micro EV Sharing

E-Cycle Sharing

Clean Traffic Mode for Sustainable Society

Development of Smart Station/Port

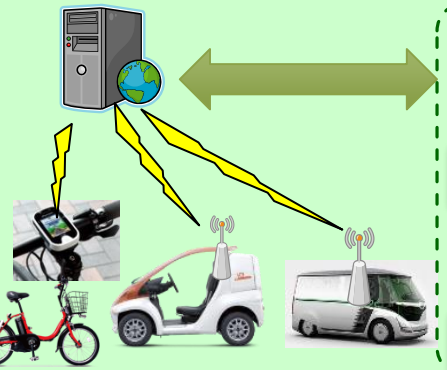
Terminal

EV Station

E-Cycle Port

Smart Station & Charging System

Aobayama Smart Mobility System



On-line

Demand response

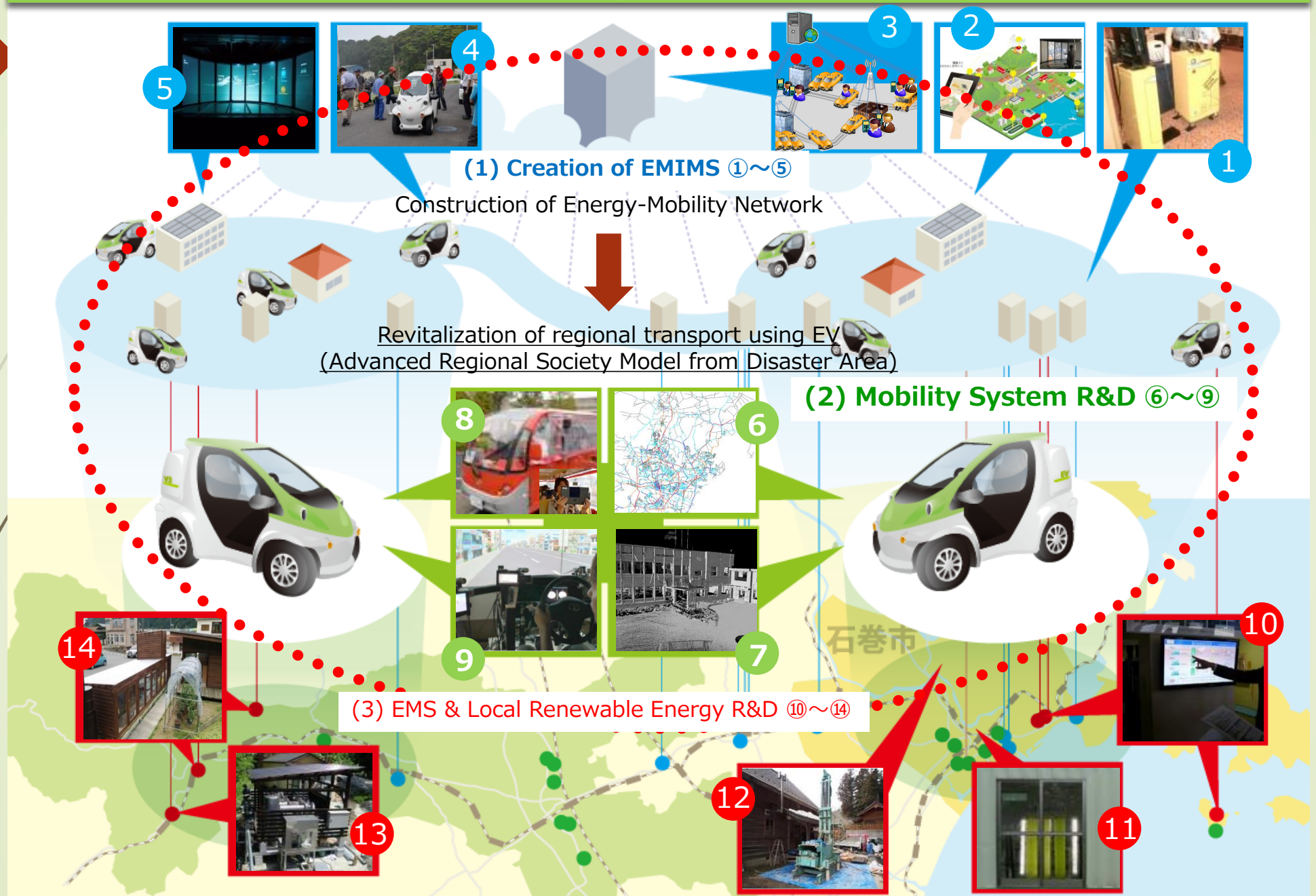
Monitoring & Automated Operation

Next-Generation Smart Campus Model

Smart & Integrated Management

Showcase of Advanced Technologies

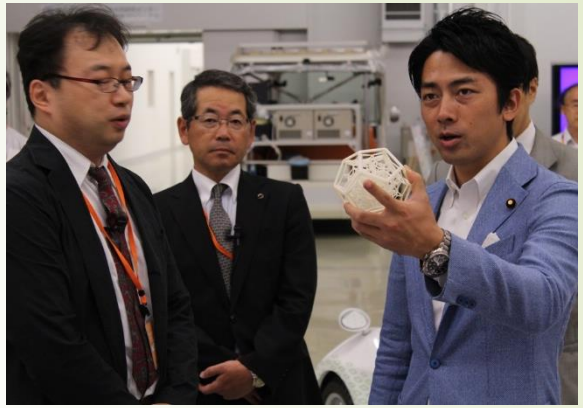
MEXT Tohoku reconstruction Next-Generation Energy R&D Project (2012-2016)
"Creation of Energy-Mobility Integrated Management Systems (EMIMS)"



Inspections inside and outside of the country to Miyagi Reconstruction Park (Tagajo city)

Shinzo Abe, Prime Minister
(Dec. 2013)

T. Nemoto, Minister of Reconstruction Agency
(Sep. 2013)



Shinziro Koizumi, Reconstruction Parliamentary Secretary
(Aug. 2014)

Sadayuki Sakakibara,
Chairman of Keidanren
(Jul. 2014)

Shoichiro Toyota,
President Emeritus of Toyota Motors
(Nov. 2014)

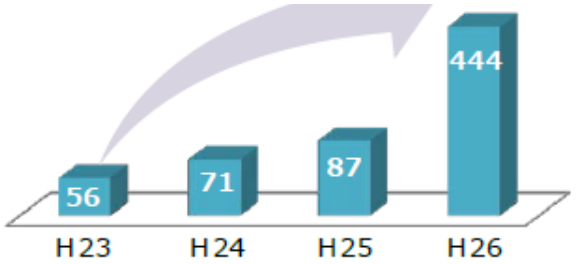
Mali Republic (Africa)
(May, 2014)

Sendai, Miyagi Social Innovation Creation Special Ward

- Reformation Base for Promotion of Woman Activities & Social Business -

< Surroundings of Sendai city >

Increasing women entrepreneurs

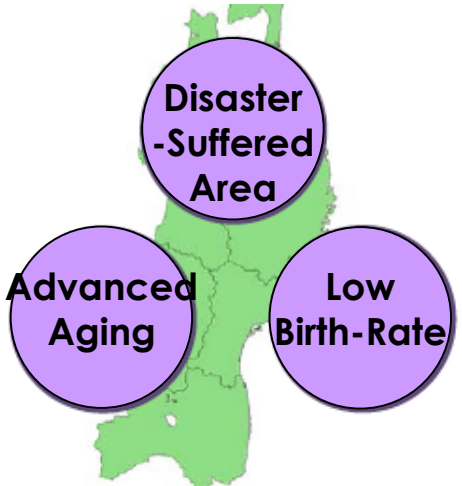


Entrepreneur mind changes greatly after disaster

	To utilize skill	To contribute to society
Before	20.6%	16.5%
After Entrepreneur Candidate	15.2%	23.7%
	8.8%	31.5%

Tohoku region is

"Advanced Problem Area"



Promotion of Social Business

- Shorten NPO startup procedures to a half

etc.

Promotion of Woman Social Participation

- Locally limited nursery examination
- Nursery in urban park

etc.

Field Practice of Advanced Technologies

New Innovation Creation by Field Tests of Automated Driving with Tohoku University

※ This page is translated by Tohoku University from the Cabinet Office's document originally in Japanese.

Advanced Mobility System Practice Field Plan

University Research

Industry

Government

Step.0 Virtual Lab (Simulator)
(Tagajo DS + Traffic simulation)

Step.1 Closed Park
(New Campus)
(Non-public road, not mixed)

Deregulation **Law Reform**

Step.2 Special Ward
(Old Campus)
(Public road, Mixed(partly))

Step.3 Surrounding Areas
(Tohoku Area)
(Remote Islands, Mountainous Areas)

Globally develop from Tohoku Area

Advanced Mobility System Practice Field
(Open Practice Field / Demonstration Field)

For Researcher :

- Hatchery / Nursery / Practice Field
- Utilize Closed Park / Open Road
- Verification of Social Receptivity
- Dissemination to Public
- Advanced Marketing
- R&D considering Practical Needs

For Users & General People :

- Attraction of Advanced Technology, Experience of "Near-Future"
- Improvement of Understanding
- Creation of Near-Future Image
- Participation to Near-Future R&D
- Human Resource Creation

Conventional closed R&D Field

R&D Support

- **Practice Field Operation**
  Real & Virtual Proving Ground
- **Open Lab (PJ Space)**
  widely open to other sectors
- **MICE function (seminars)**
  Public Relations
- **Global Cooperation Hub**
  Tele-Conference, Travel Support, Accommodation

Supporting Dissemination

- **Showcase & Demonstration**
  cooperate w/ top researchers
- **Correspondence to Inspection**
- **Human Resource Development**
- **Experience Lab**

Incubation

- **Support Industry-Academic Collaboration**
- **Industrialization Support**
- **VC**

Vision: Next-Generation Transport Practice Fields in Sendai Special Ward

Advanced Mobility & New Transport Test Field
(Special Ward)

Aobayama st.

Sendai

Arai st.

Arahama District
[Seaside]

Tohoku Univ.
Aobayama Campus
[Hillside]

Subway
Tozai Line
(East&West)

90 min.
(by "Hayabusa")

Tokyo

Sendai Airport

Advanced Technology Field Practice Special Ward :
"Creation of Aobayama Campus Next-Generation Advanced Mobility System Practice Field"
=> Authorized as "Sendai Social Innovation Creation Special Ward" (2015)

○**Outline:**
Field practice of advanced technologies as automated driving or UAV are executed in Aobayama campus.
Utilizing new & existing campus as special ward widely open to active researchers, their realization and deregulation can be quickly proceeded.

Stage 3 (Regional Implementation):
Model Development to Surrounding Area (Island, Remote Area, etc.)

Platooning, Remote Drive

Modeling
Dispatch

Infra Inspection

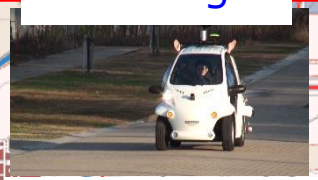
Unmanned Vehicle

Stage 2:
Practical Operation in Existing Campus as Special Ward

Disaster Resilience

UAV(Drone)

Automated Driving

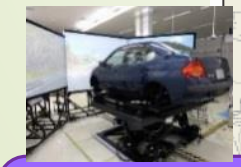


Regional New Mobility

Law Reform
Deregulation

Wireless Charge

Stage 1:
Field Practice in New Campus Area



Stage 0 (Lab):
R&D in Academia or Industry
(Ex. Miyagi Reconstruction Park)

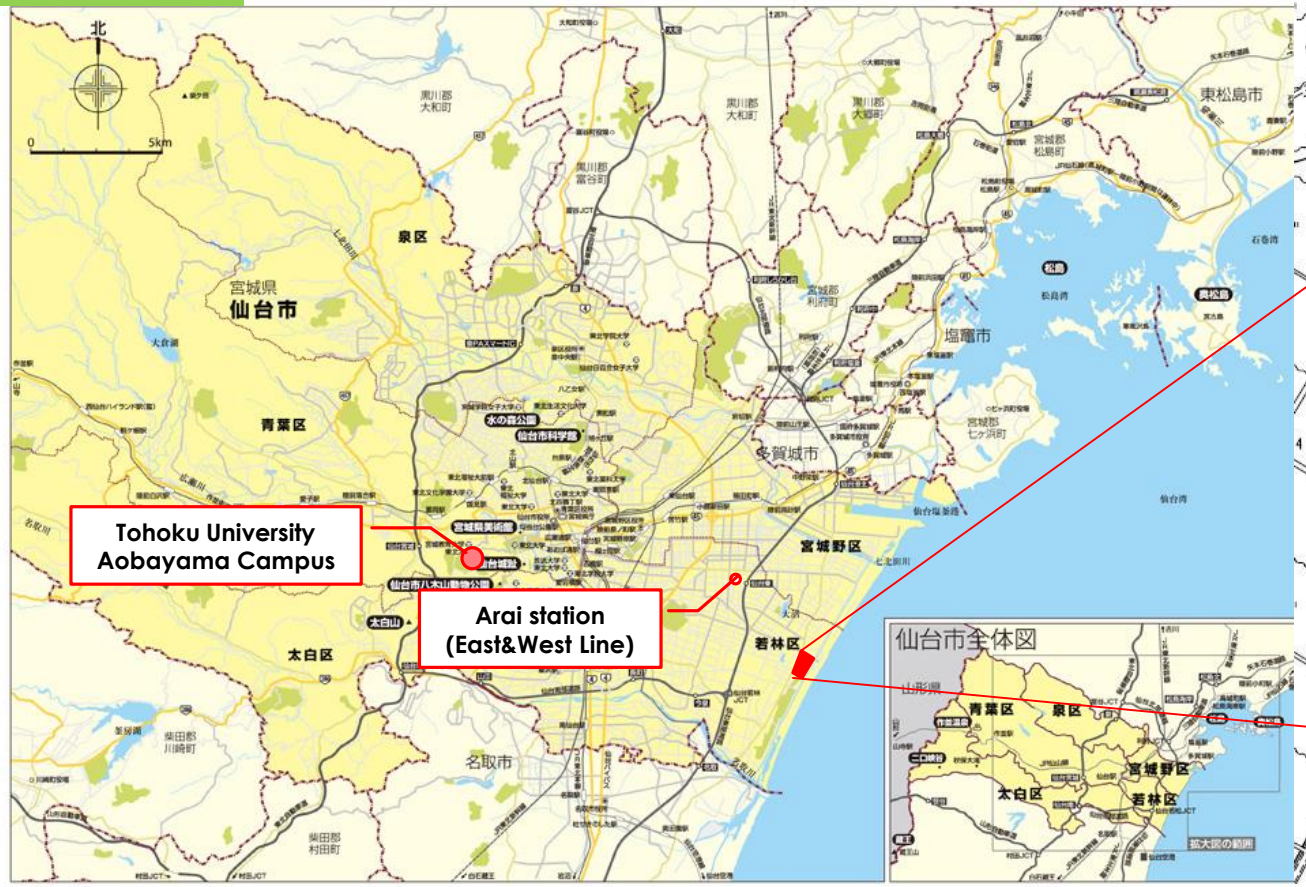
Open to other R&D sectors

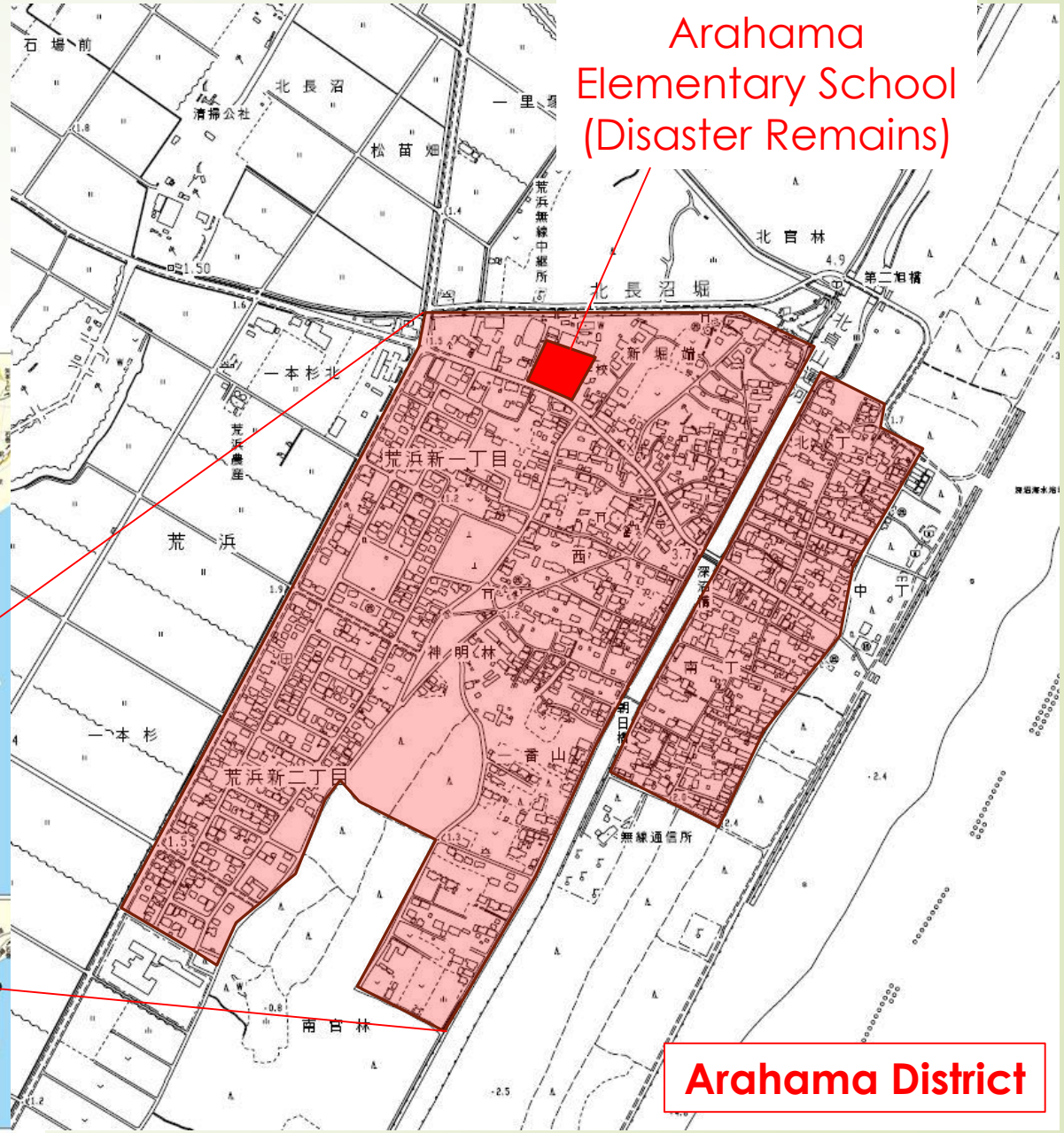
○**Contributions:**
- Quicker realization of technologies
- Active deregulation
- Promotion of field test research
- Attraction of interests
- Dissemination to public
- More attractive campus etc.

Practice Field for Advanced Technologies: "Arahama" District
(Tsunami Disaster Hazardous Area in Sendai)

The residence is restricted in the district.
Now constructing to be a practice field for automated driving, drone, and other advanced technologies.

Sendai City Map





Arahama District : Field Practice in Disaster Damaged Area for Reconstruction

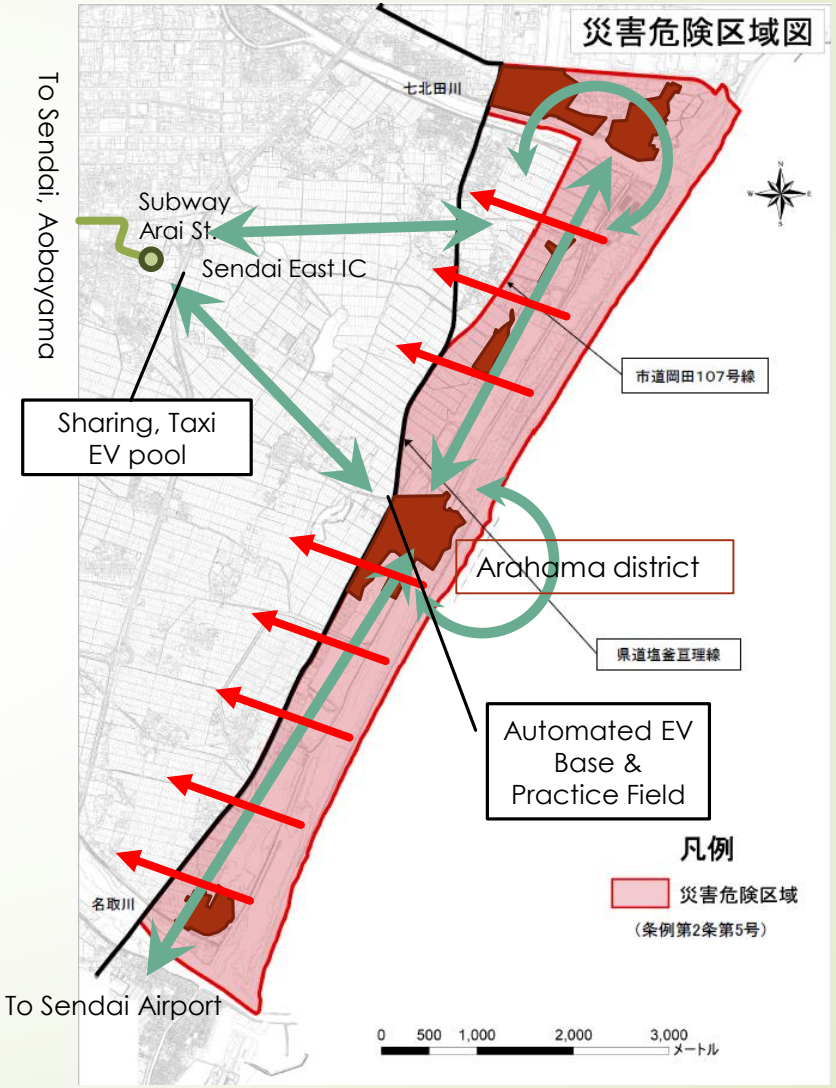
Automated Driving Practice Field Plan

- Reform the coastal disaster-damaged area to a practice field for automated driving to solve problems of regional public transport
- Propose a model of "Last-One-Mile" new mobility system and demonstrate field practice

- Area : Arahama district (disaster-damaged area)

- Future Plan
  - Ordinary : Transport in area and connecting to transport hub
    (Last one mile, Robot taxi, etc.)
    => making workable area in the district
  - In Emergency : Smooth evacuation to higher place

- Unmanned inspection, surveillance for evacuee
  (Utilize autonomous vehicle, drone, etc.)

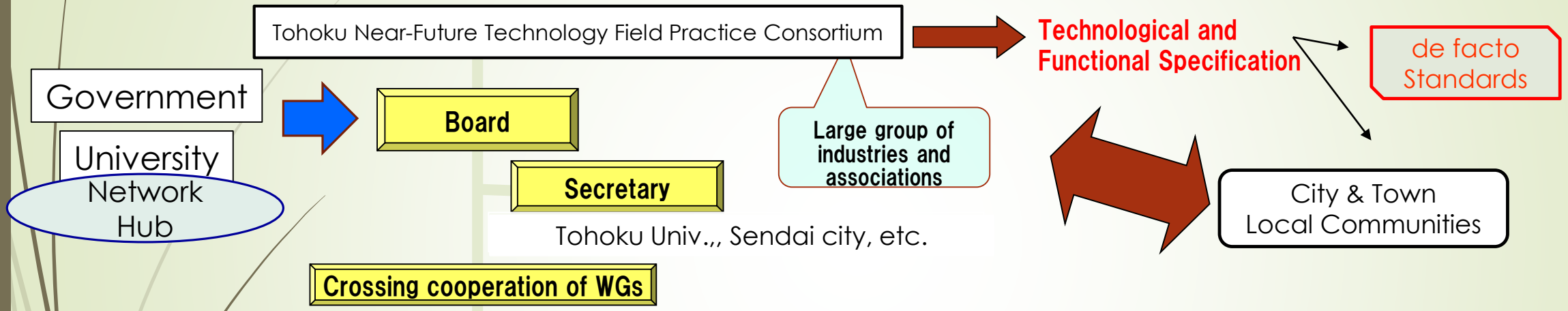


“Car-sharing” to create “community” (in Ishinomaki)

Japan Car-Sharing Association: http://www.japan-csa.org/

“Tohoku Near-Future Technology Field Practice Consortium”

Target: Promote field practice research of near-future technologies as automated driving and UAV, and accelerate social implementation



- Workgroups for Automated Driving, UAV, or other technical fields
- Workgroup for legal and social issues (supporting law reformation and deregulation by national government)

etc.

↓

Now Preparing

To be “Open Practice Field”

- OEM maker
- Supplier
- Venture
- University
- Local Industry
- Local Government
- Local Academia
- NPO
- Local Residents

Level 4 ⇔ Needs for Regional Transport

- Supplier Side (Technological) :
  - Field Experiment for Lv.4 autonomous driving
  - Extraction of the risks on human driving
  - From Simple to Complex
- Demand Side (Social) :
  - Difficulty for Driving by Aged Drivers
  - Decline of Regional Public Transport

⇒ How to solve the needs for regional transport by automated driving technology?

… should be: Last-1-mile transport, Dead-man system

← + Highly Adaptive Driving Assistance (for Driver, Environment)

Thank you for your kind attentions !