

Country Report from Japan

Implementation of QZSS Update

The 11th PNT Advisory Board Meeting,
May 7-8, 2013 at Washington, DC

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Japan GPS Council

Contents

- Government related Issues
- QZSS award update
- For reference ;
 - Demonstration using “MICHIBIKI”
 - Current Status of MGA (Multi-GNSS Asia)
 - International Human Resources Development

Government Related Issues

Mission of “Office of National Space Policy”

- A role of Interagency Coordination Office
- Operation and management of QZSS
- Outreach activities

Mission of “Space Policy Committee”

- An Advisory Board to the Prime Minister
- Authorization to assess long term policies relating to the space exploration and budget allocation guidelines
- To replace the legacy “Space Exploration Committee”

Basic Plan for Space Policy updated on Jan.25, 2013

(1) Two Basic Policies

- Spreading Space Utilization
- Securing Autonomy

(2) Three Priority Issues

- Contribute to Enhancement of National Security and Disaster Managements
- Foster Strategic Industries for the 21st Century
- Frontier of Space Science

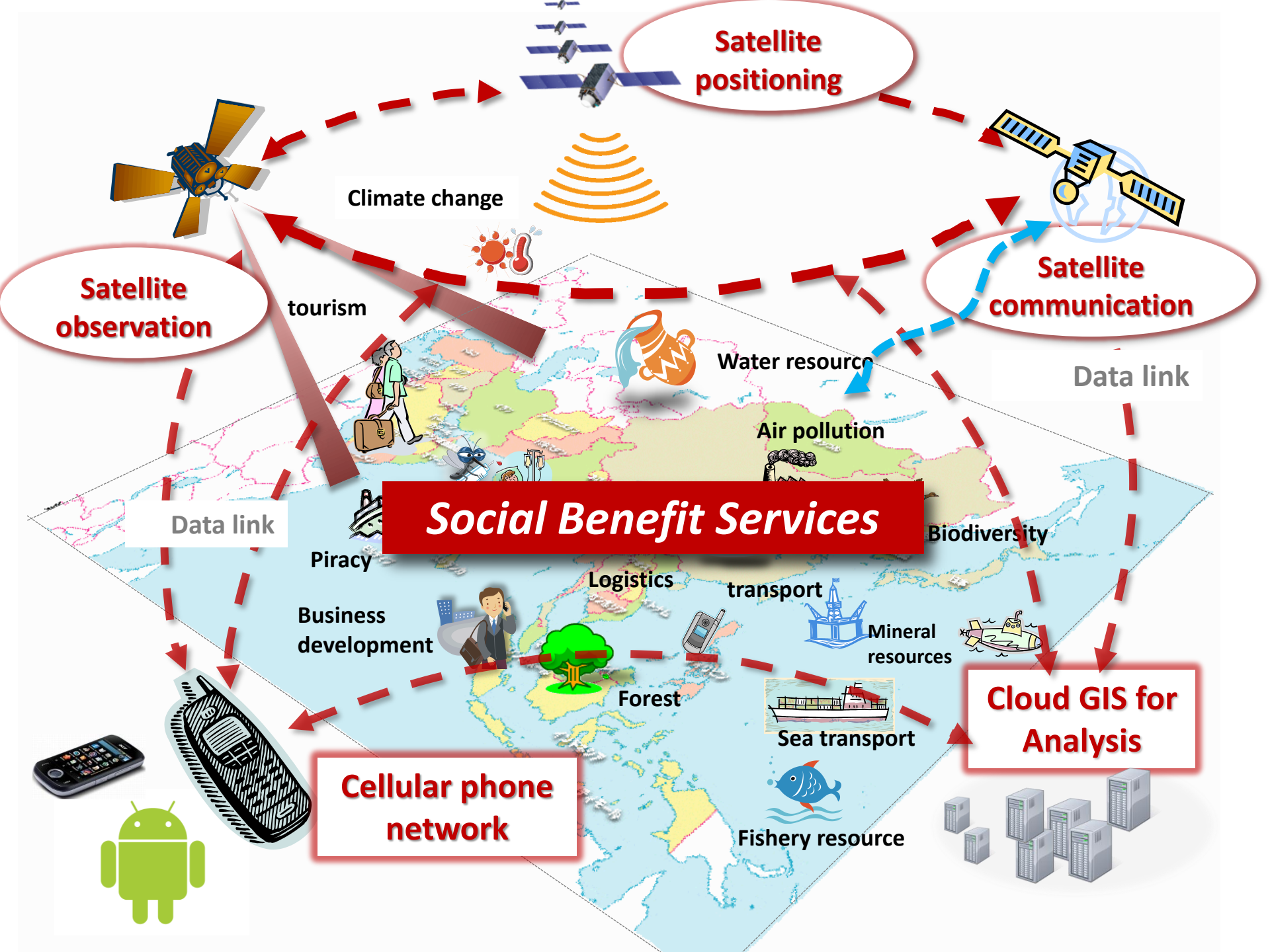
Basic Plan for Space Policy updated on Jan.25, 2013

(3) Four social infrastructure

- Augmented and Implemented Space-based PNT
- Space-based Remote sensing
- Advanced Tele-Communication & Broadcasting Satellite
- Space Transport Capability

(4) Six basic pillars

- Space use for Peaceful Purposes
- Enhancement of Better Quality of Life
- Encouragement of Industrial Competitiveness
- Progress of Social Benefit Services
- Large Contribution to the International Community
- Consideration to the Global Environmental Concerns



Basic Plan for Space Policy updated on Jan.25, 2013

(5) Miscellaneous activities in Space utilization

- Laying foundation of space industries
- Data gathering, research and analysis
- Promotion of diplomacy through collaboration of space use
- Consolidation of national security through space infrastructure
- Appropriate care of the whole space environment

QZSS Satellite (Space Segment) Contract

An entrusted company was awarded for manufacturing 3 satellites etc. on March 29, 2013.

Counterparty: Mitsubishi Electric Corporation

Total amount of contract: ¥50,267,595,000

Contract Period: March. 29, 2013 to March. 31, 2017

QZSS O&M PFI Contract

The Concessionaire “SPC” (Special Purpose Company) was awarded for QZSS Operation & Maintenance on March 29, 2013;

Concessionaire : a consortium “QZSS Service Company Limited”

Representative Company: NEC Corporation

Member: Mitsubishi UFJ Lease & Finance Company Limited

Cooperative Company: Mitsubishi Electric Corporation

Total Amount of Contract: \117,284,273,802

Contract Period: March. 29, 2013 to March. 31, 2033

Back Up

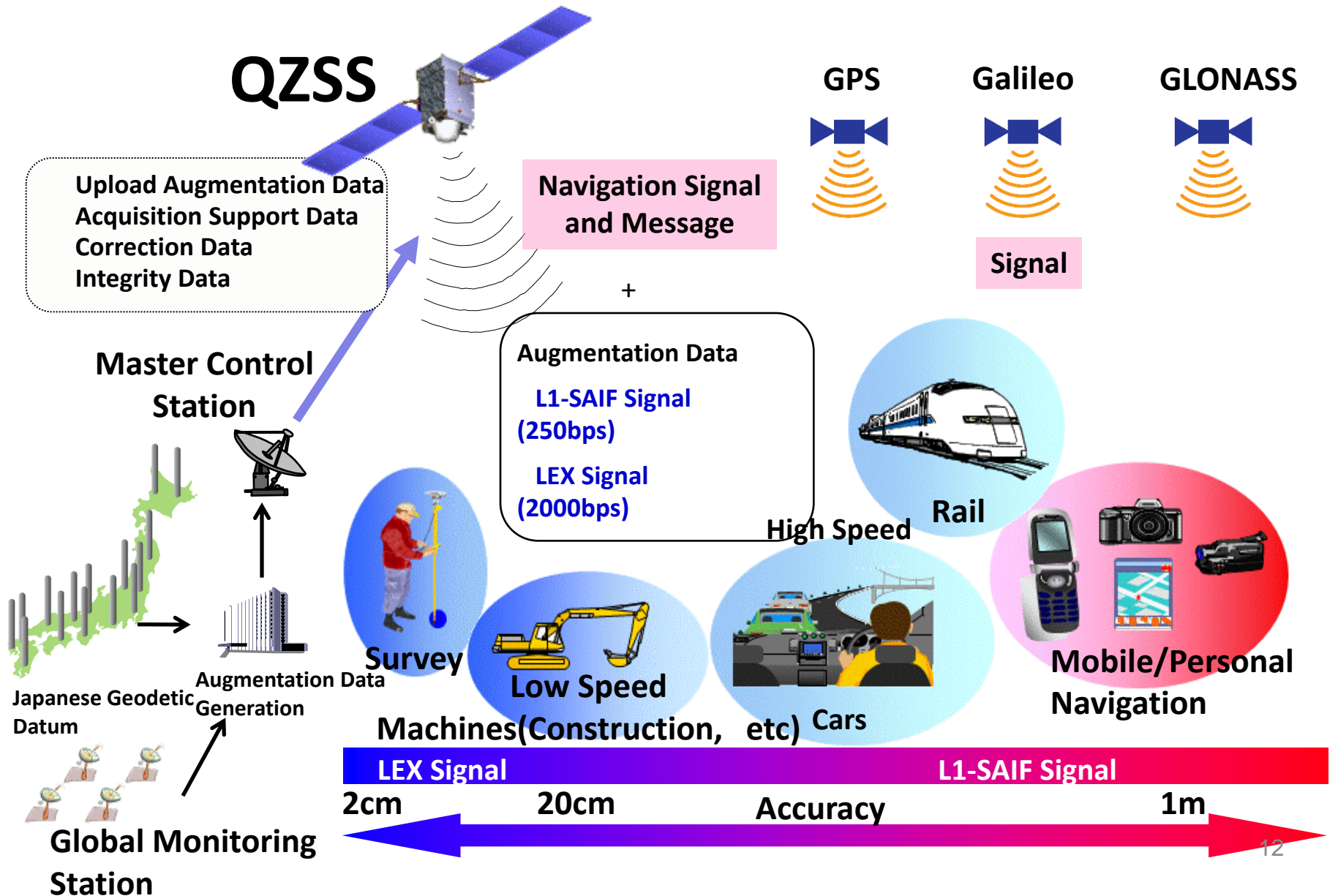
For reference ;

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Application Demonstrations as of December, 2012



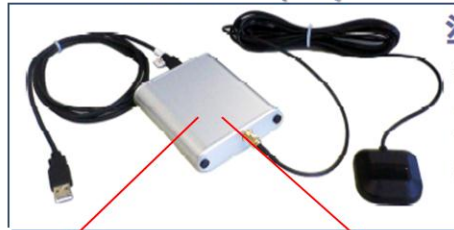
Application of QZSS Augmentation Signal



L1-SAIF Application : Personal Navigation

Verification of a position-fix accuracy improvement

Receiver(Rx)



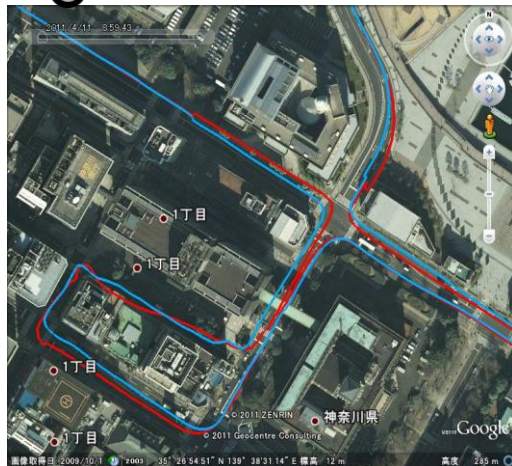
Board

■ with QZS

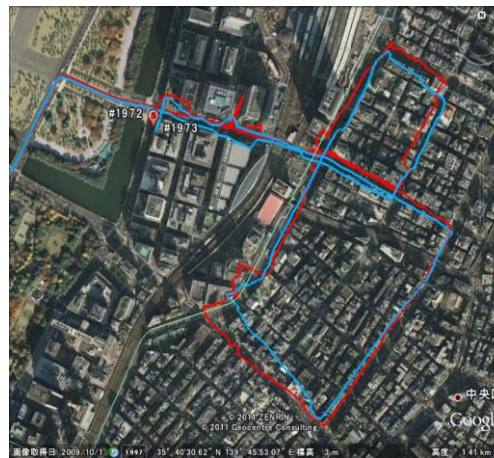
■ other receiver

Summary

- 1) Positioning accuracy(2D-RMS) is improved from 1.6 [m] to 0.8[m] by using L1-SAIF message.
- 2) QZS improved the performance of positioning ability compare to not using QZS.
- 3) QZS has advantage to increase the number of satellites

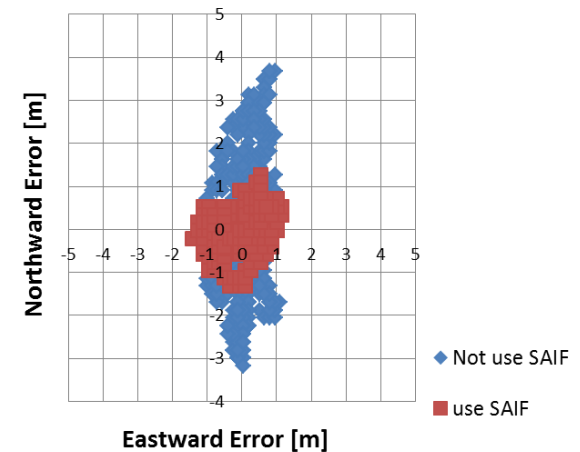


Road test at Yokohama

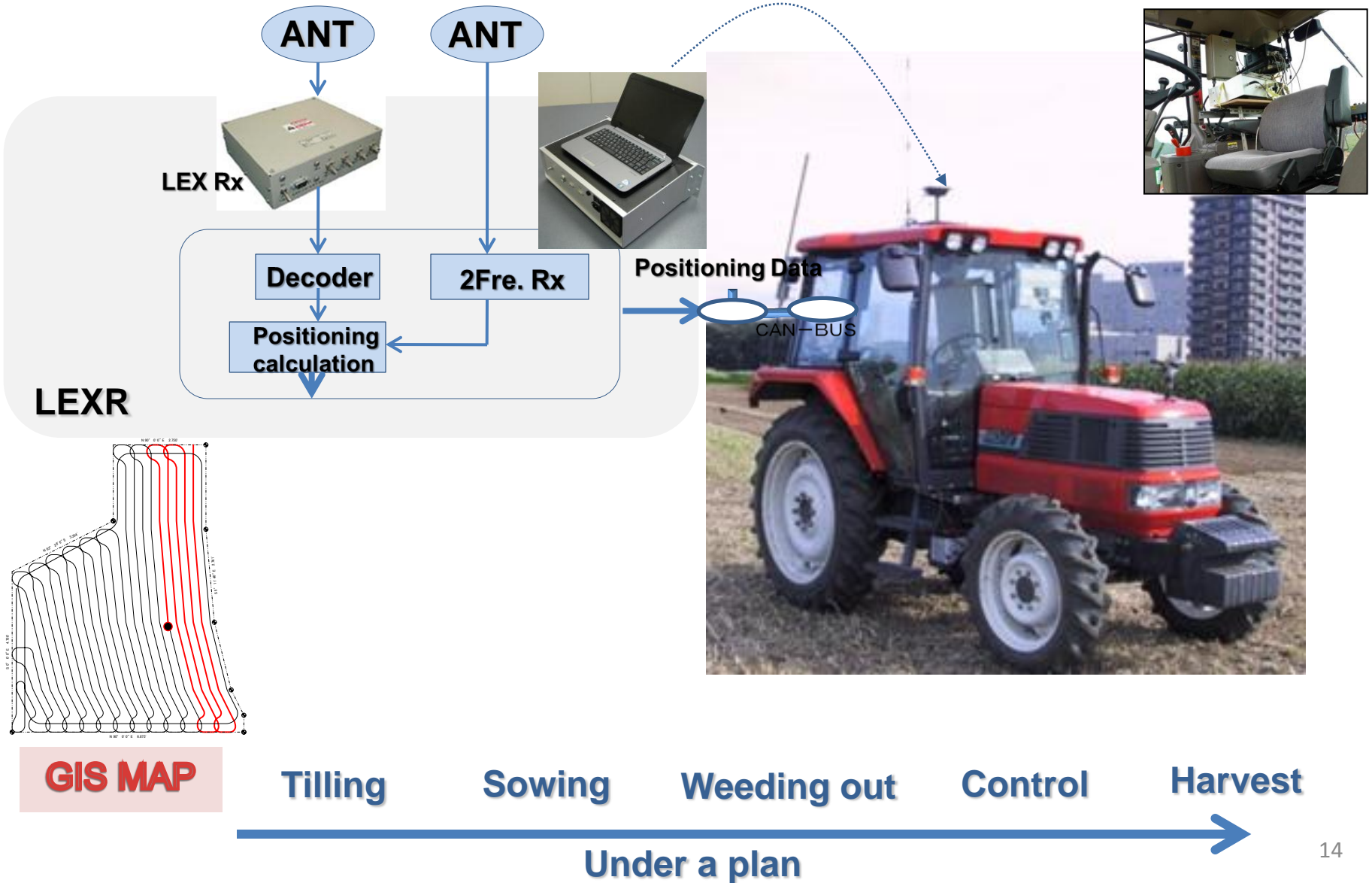


Road test at around Tokyo station

Horizontal Error



LEX Application: IT Aided Automatic Operation



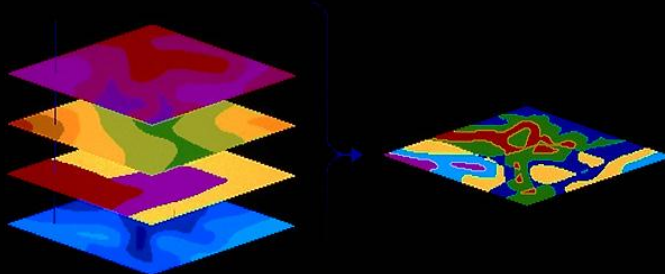
Precision Agriculture

- Precision Agriculture addresses -
 - Production of high-quality foods and feeds at a site-specific (individual) optimized use of resources for production
 - Economical and ecological improvements in agricultural production
- Precise Positioning with Satellites are effective

Site Specific

The Geographical Information System :

A Soil Specific Crop Management Tool



Field Information Layers:

- 1) Soil Survey Map
- 2) Aerial CIR Image of Crop
- 3) Management History
- 4) Aerial CIR Image of Bare Soil

Variable Rate Map

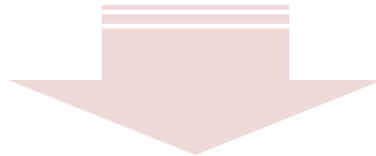
(scale = 1:4,000)

Economical and Ecological Improvements



Mission of IT Automated Driving WG

- Prove QZSS-LEX corrections effect for Autonomous Vehicle Control
 - Evaluate LEX Corrections for Vehicle Control Applications such as Farming and Construction Machines (Slow Dynamic Vehicles)

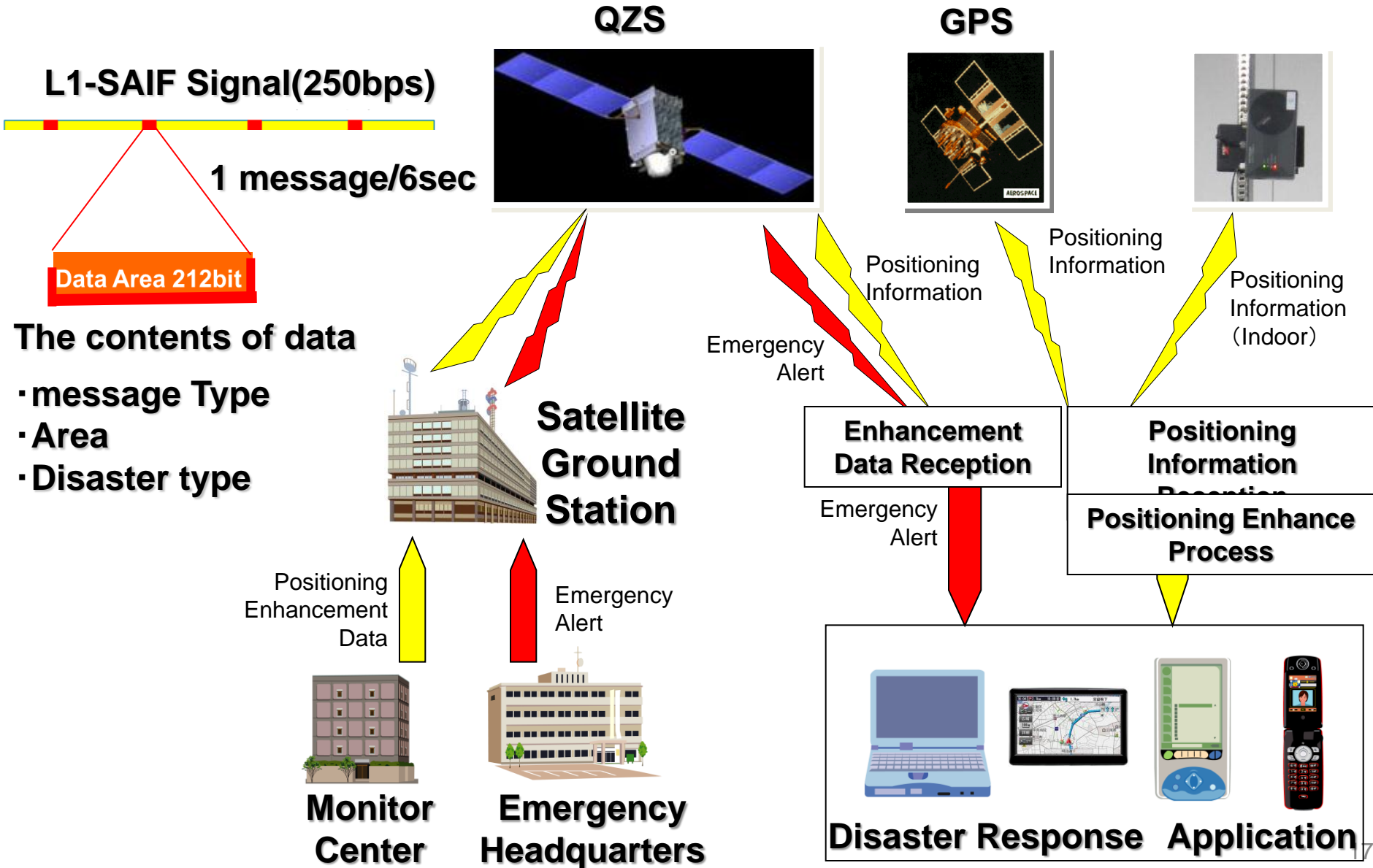


- Evaluation of using QZSS-LEX for vehicle positioning and its precise control
 - Geo Spatial Data Maintenance (Field Maintenance)
 - Un-manned Operation
 - Realize Precision Agriculture using QZSS LEX correction



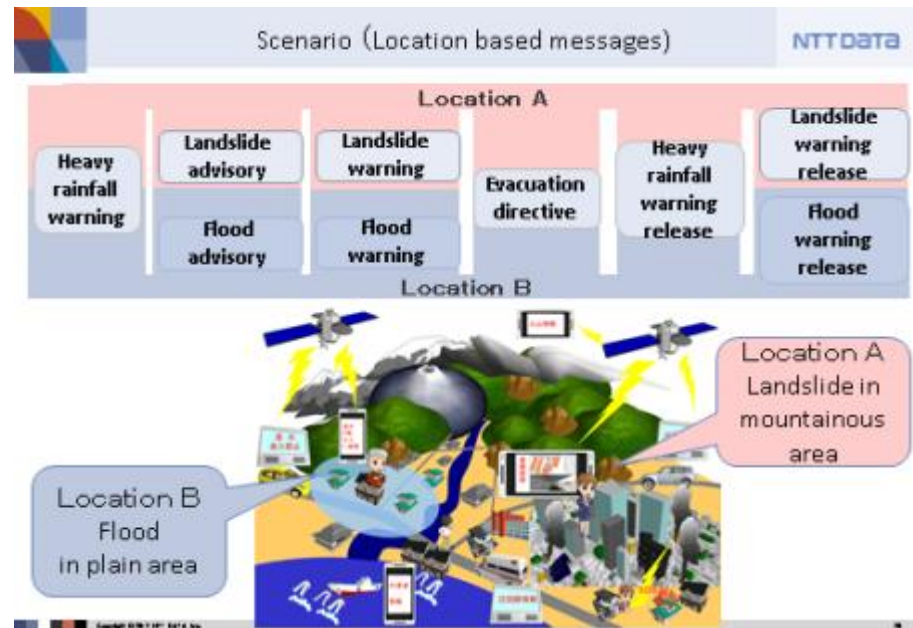
Planting rise Robot
(Courtesy National Agricultural Research Center)

Red Rescue System Configuration

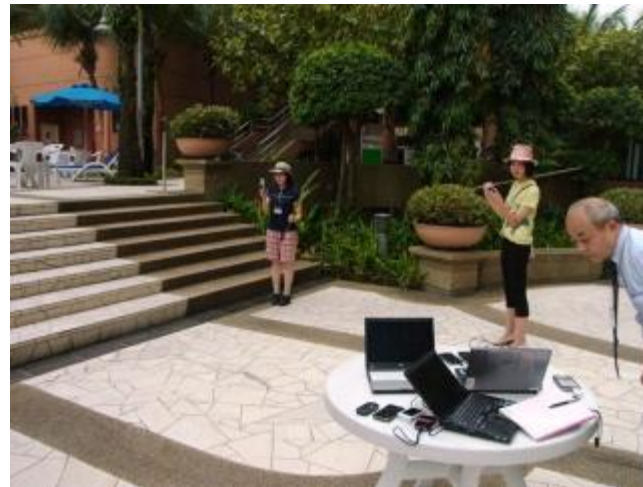


QZSS Emergency Message Demonstration:

Demonstration: People in Malaysia can receive short messages via QZSS, and use emergency information such as early warning and evacuation information based on location.



(c) NTT DATA, Inc.



Asia Oceania Multi-GNSS Demonstration Campaign

- Campaign consists of three main activities:

Establishment of Multi-GNSS Monitoring Network



Application Demonstration

Disaster Mitigation



Precise Positioning



ITS



LBS



Other, ionospheric observation etc

Regional Workshop



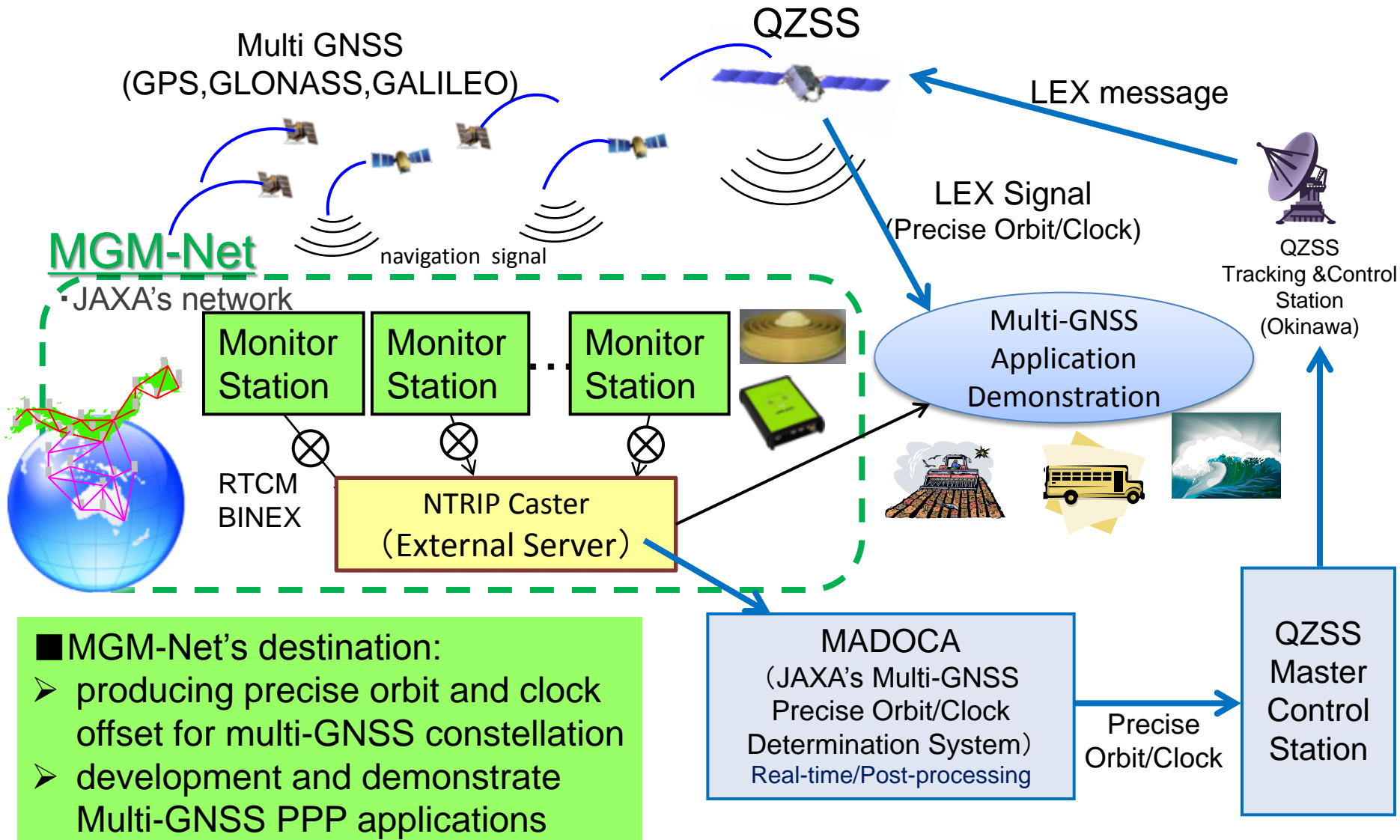
4th Workshop, Dec. 2012 @ Kuala Lumpur, Malaysia:

3rd Workshop, Nov. 2011 @ Jeju, Korea:

2nd Workshop, Nov. 2010 @ Melbourne, Australia

1st Workshop on GNSS, JAN. 2010, @ Bangkok, Thailand

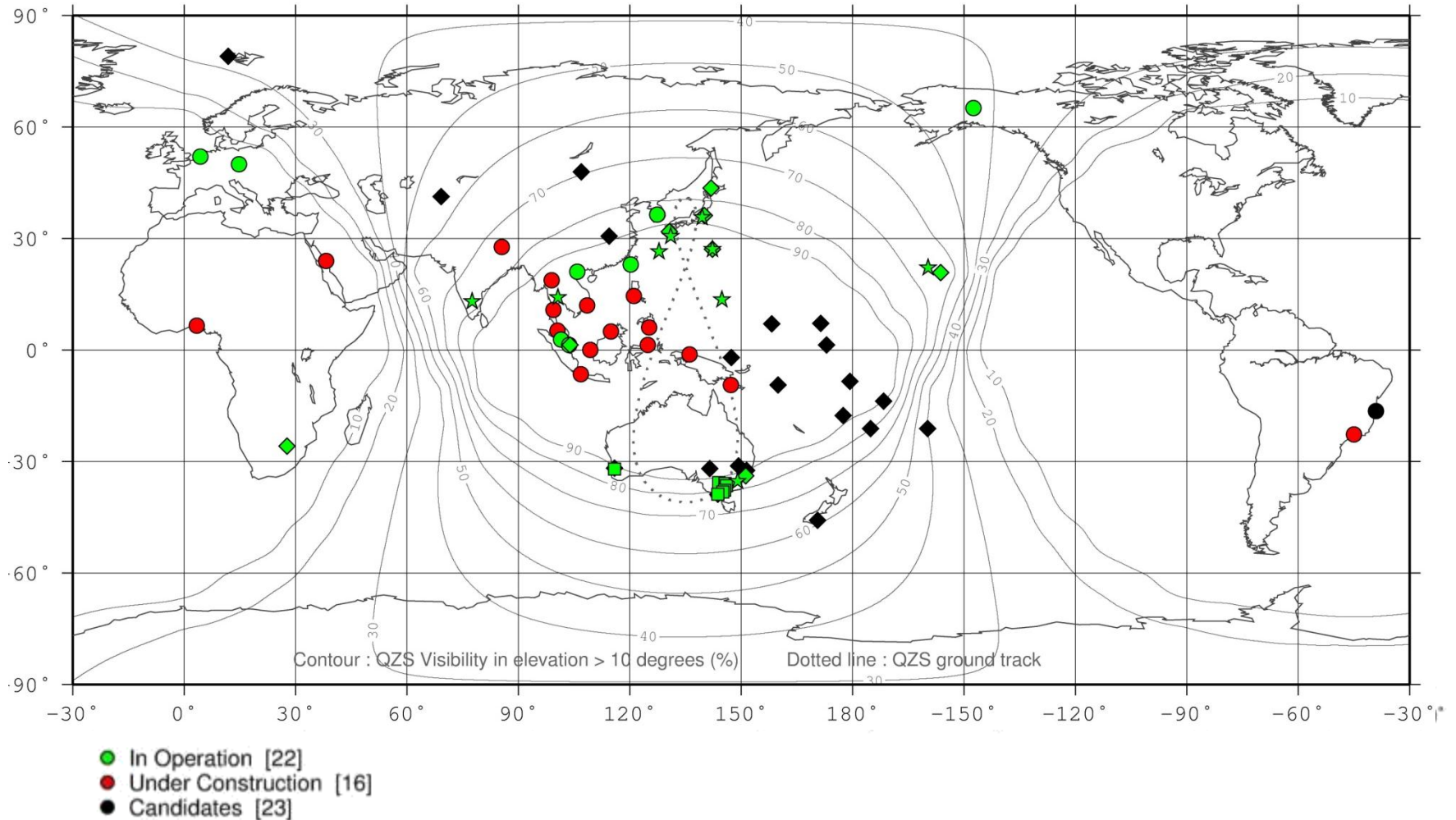
Activities 1 : Establishment of Multi-GNSS Monitoring Network



- MGM-Net's destination:
 - producing precise orbit and clock offset for multi-GNSS constellation
 - development and demonstrate Multi-GNSS PPP applications

LEX: QZSS's experimental signal including some information such as precise orbit /clock for PPP

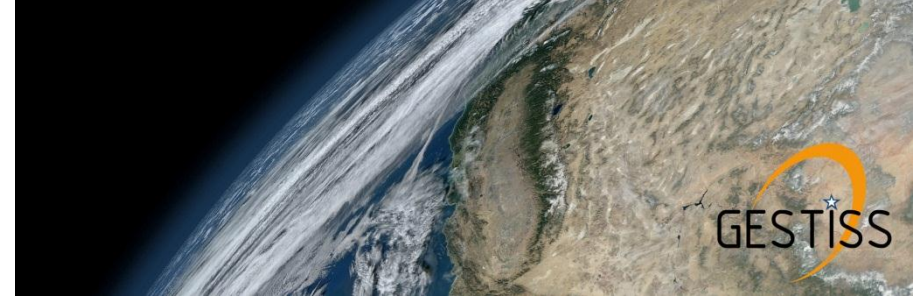
Current Status of MGM-Net



Activities 2: Application Demonstration

◆JAXA's Multi-GNSS Joint Experiments, which selected in 2011, have just started from summer in 2012

	Title, <i>Organization</i> [Application Field]	Country/Region
1	Evaluation of Multi-GNSS for Precision Agriculture in Korea, <i>Chungnam National University</i> [Precise Positioning]	Korea
2	Sustainable Resource Utilization by Precision Farming of Oil Palm Plantation; RTK-Auto Guided Oil Palm Planter; On-the-Go Soil ECa Mapping, <i>University Putra Malaysia</i> [Precise Positioning]	Malaysia
3	Automated rice transplanter guided by using Multi-GNSS including QZSS , Agricultural Research Center , <i>National Agriculture Research Organization</i> [Precise Positioning]	Japan
4	"Joint QZSS/GPS positioning using L1/L5 band signals“, <i>National Cheng Kung University</i> [Disaster Mitigation and Management]	Taiwan
5	"Multi-GNSS Experiment at RMIT University in Melbourne“, <i>RMIT University</i> [Disaster Mitigation and Management]	Australia
6	Evaluation of QZSS-LEX based positioning compared to IGS PPP, positioning for Thailand, <i>Asia Institute of Technology</i> [ITS]	Thailand
7	Exploiting the use of QZSS and GNSS for navigational and high precision applications and their performance assessment (EQUATOR), <i>University of Nottingham Ningbo</i> [Precise Positioning]	China
8	Development of Driver Behavior Measurement Method for Level of Safety Estimation from High Precision and High Resolution Global Positioning System with Quasi-Zenith Satellite System (QZSS), <i>National Electronics & Computer Technology Center</i> [ITS]	Thailand



International Human Resources Development Program for Innovative Social Services with Space Infrastructure

R.Shibasaki, Ph.D, Professor, the University of Tokyo

N.Kubo, Ph.D, Ass. Professor, Tokyo University of

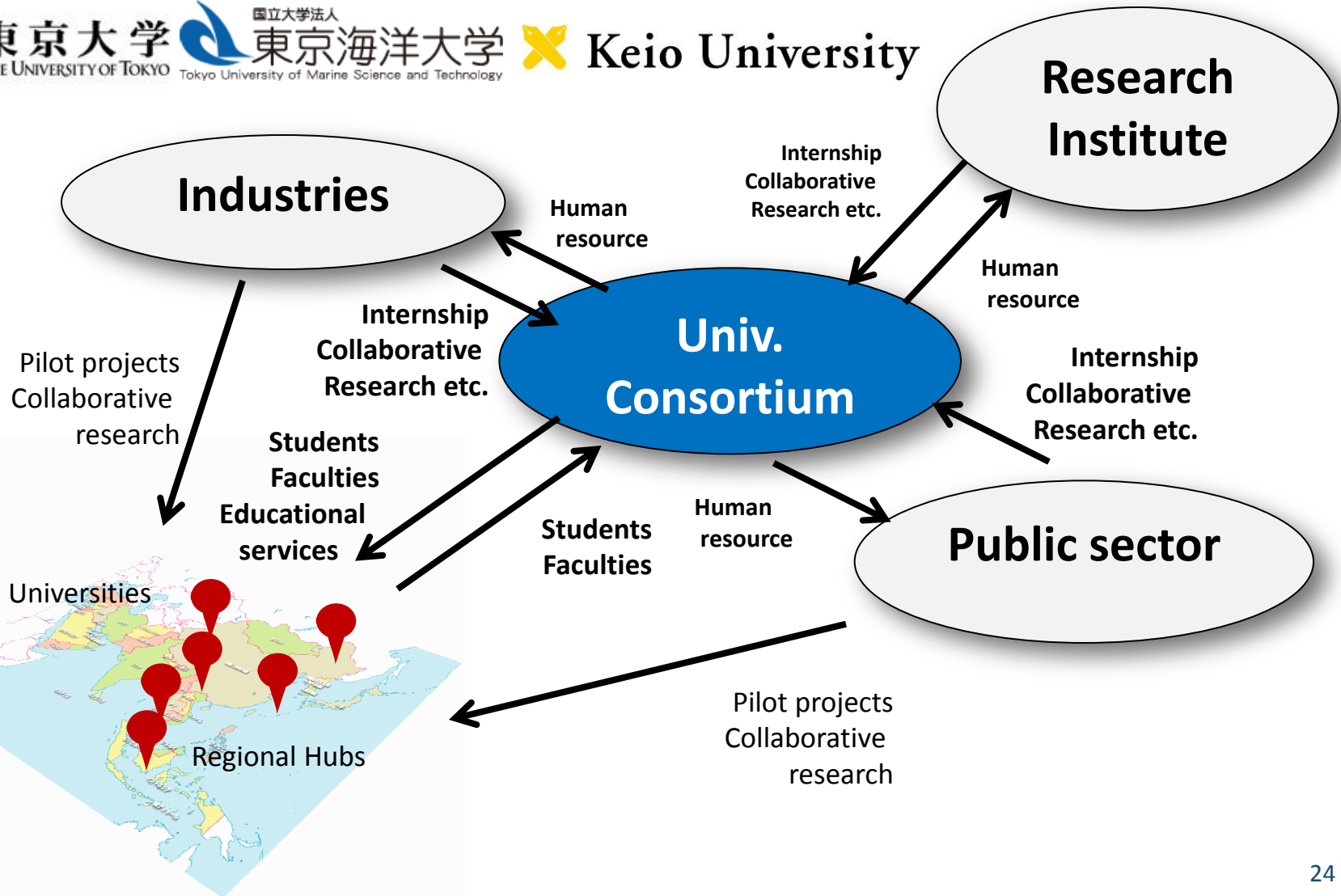
Marine Service and Technology

N.Kohtake, Ph.D., PMP, Ass. Professor, Keio University

T.Ebinuma, Ph.D., the University of Tokyo



Collaboration with Public and Industrial Sectors



カーナビの出荷台数累計

The number of navigation system units in market (JEITA)

VICSユニットの出荷台数累計

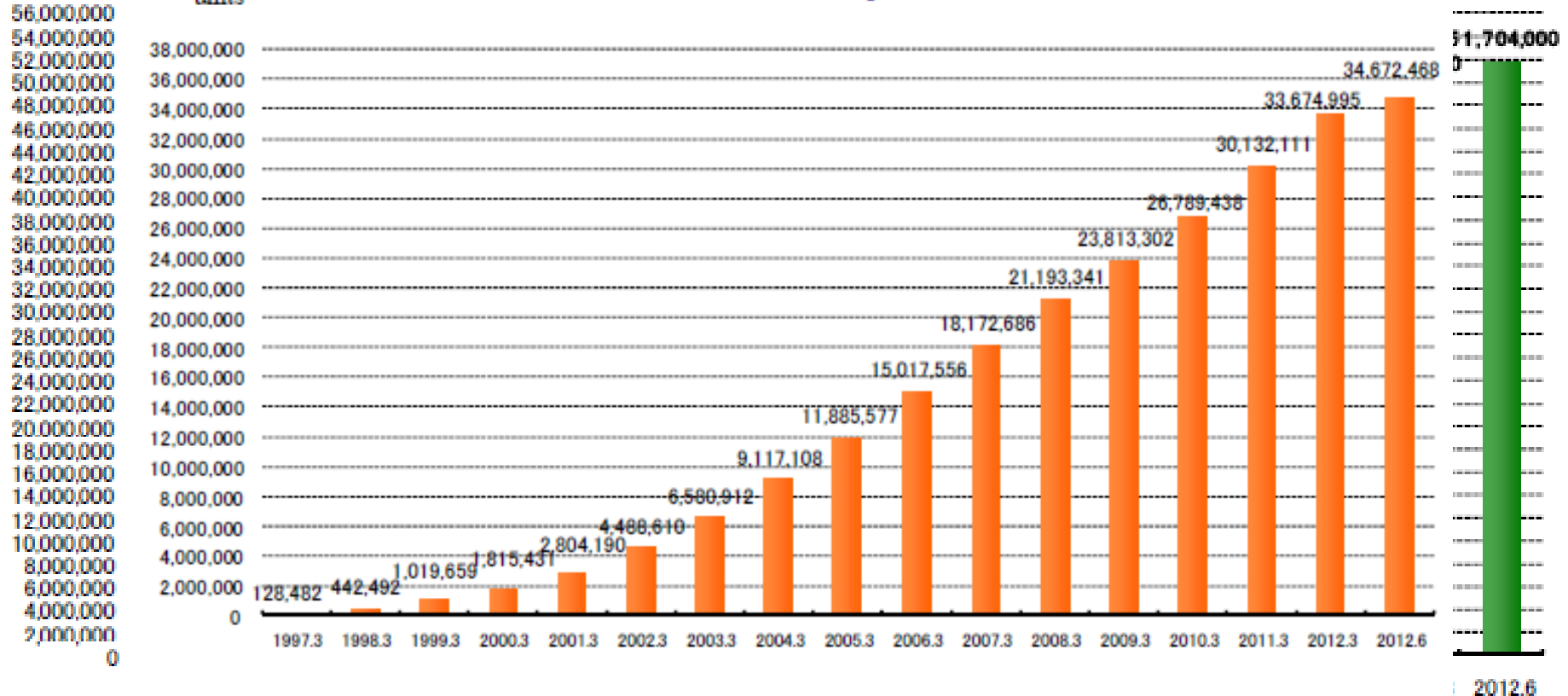
The number of VICS units in market (VICS Center)

2012年6月末現在、VICSユニットの出荷台数は3467万台を突破！

The number of VICS on-board devices sold in Japan has reached 34.6 million units!

units

units



(財)道路交通情報通信システムセンター(VICSセンター)データより国土交通省作成 (2012.8.9)

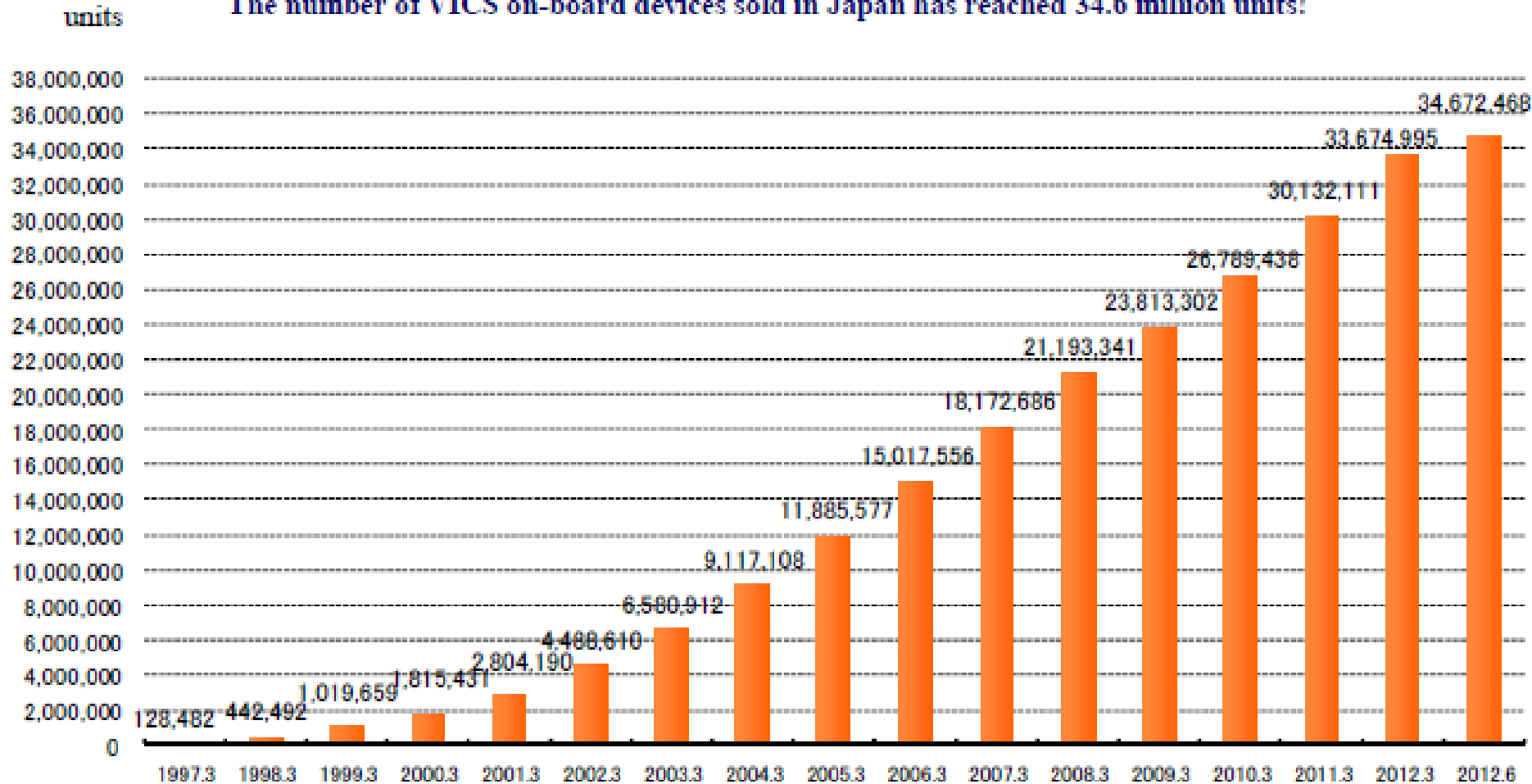
(社)電子情報技術産業協会(JEITA)データより国土交通省作成 (2012.8.9)

VICSユニットの出荷台数累計

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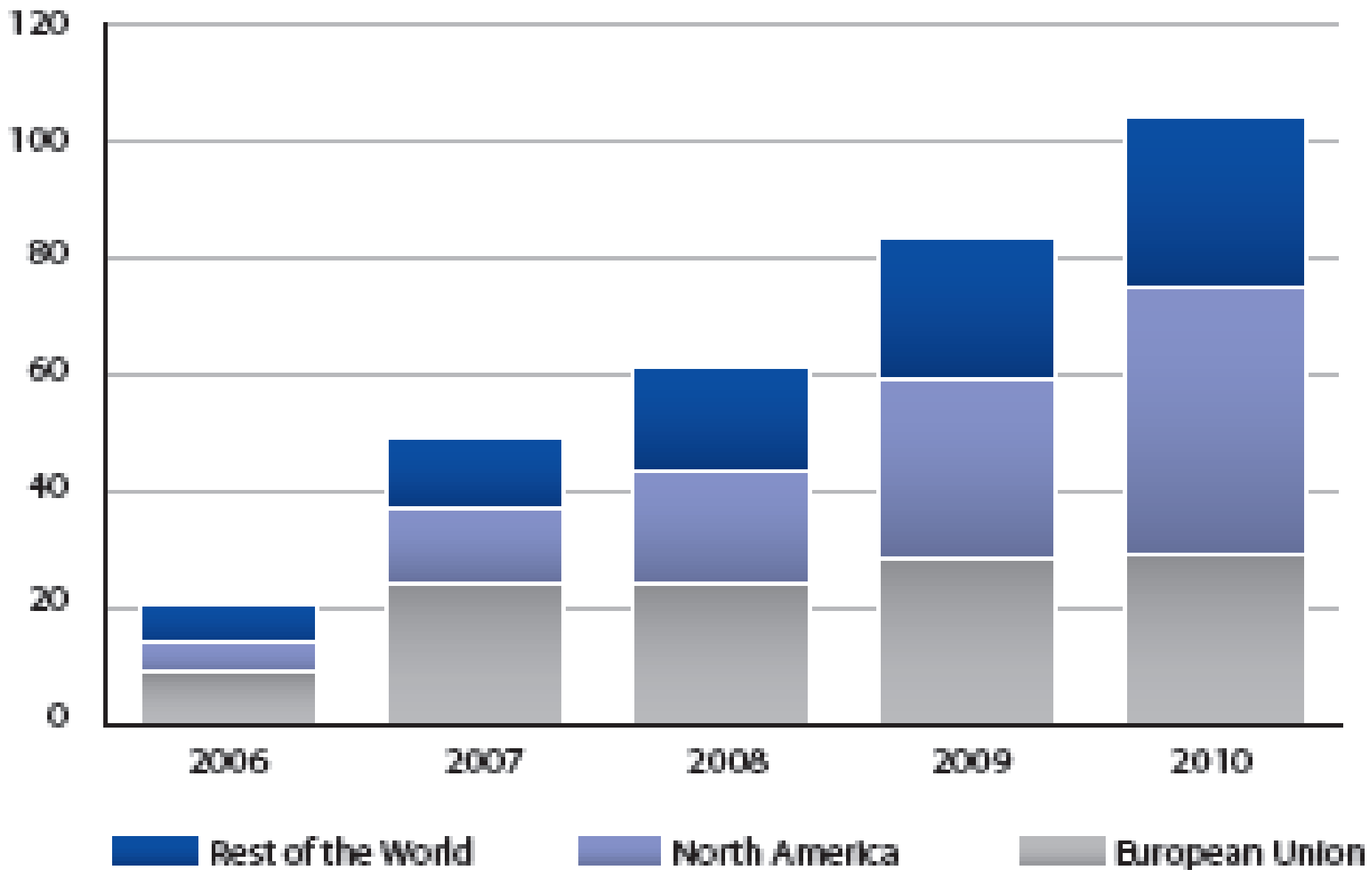


(財)道路交通情報通信システムセンター(VICSセンター)データより国土交通省作成

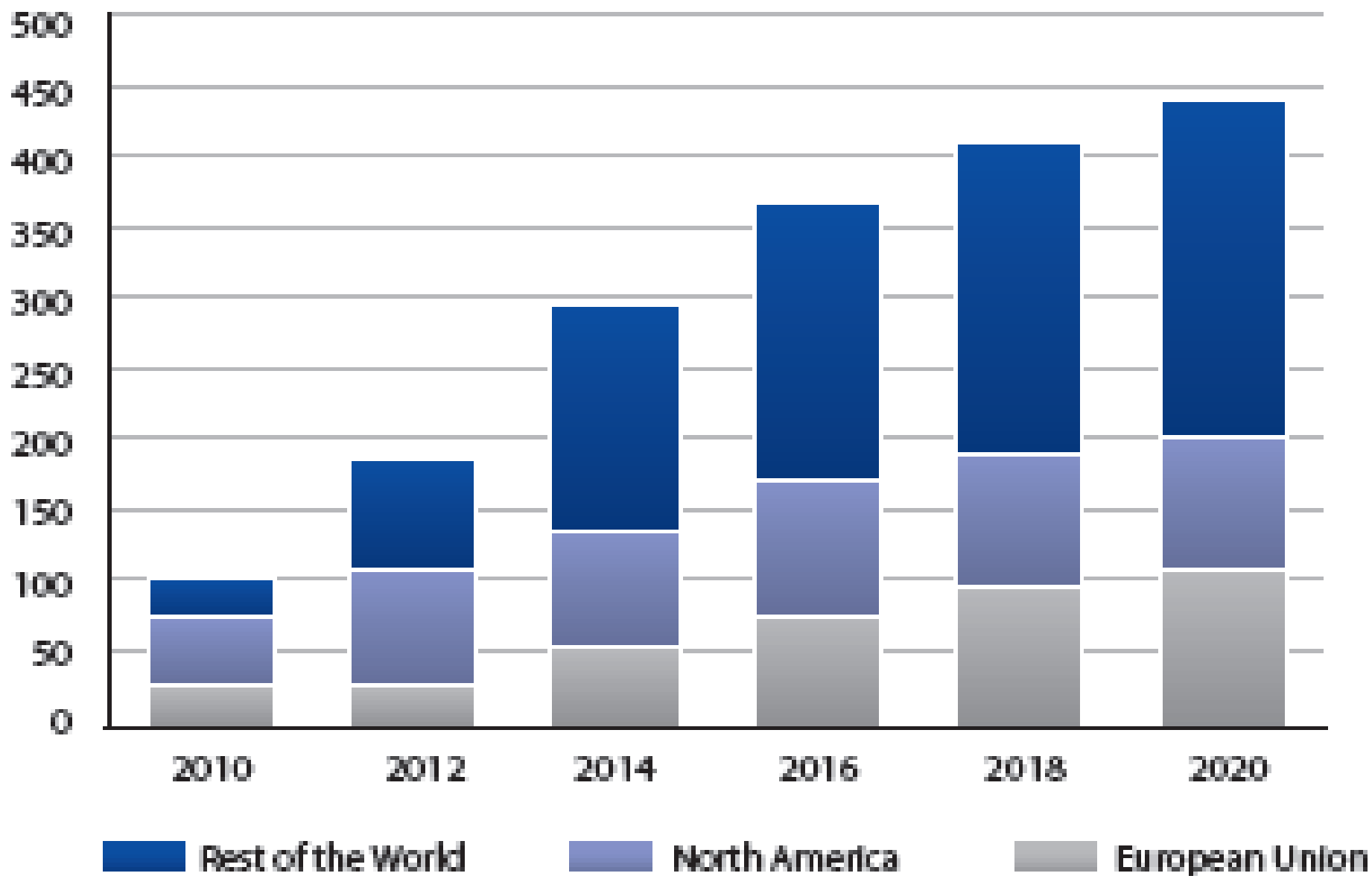
(2012.8.9)

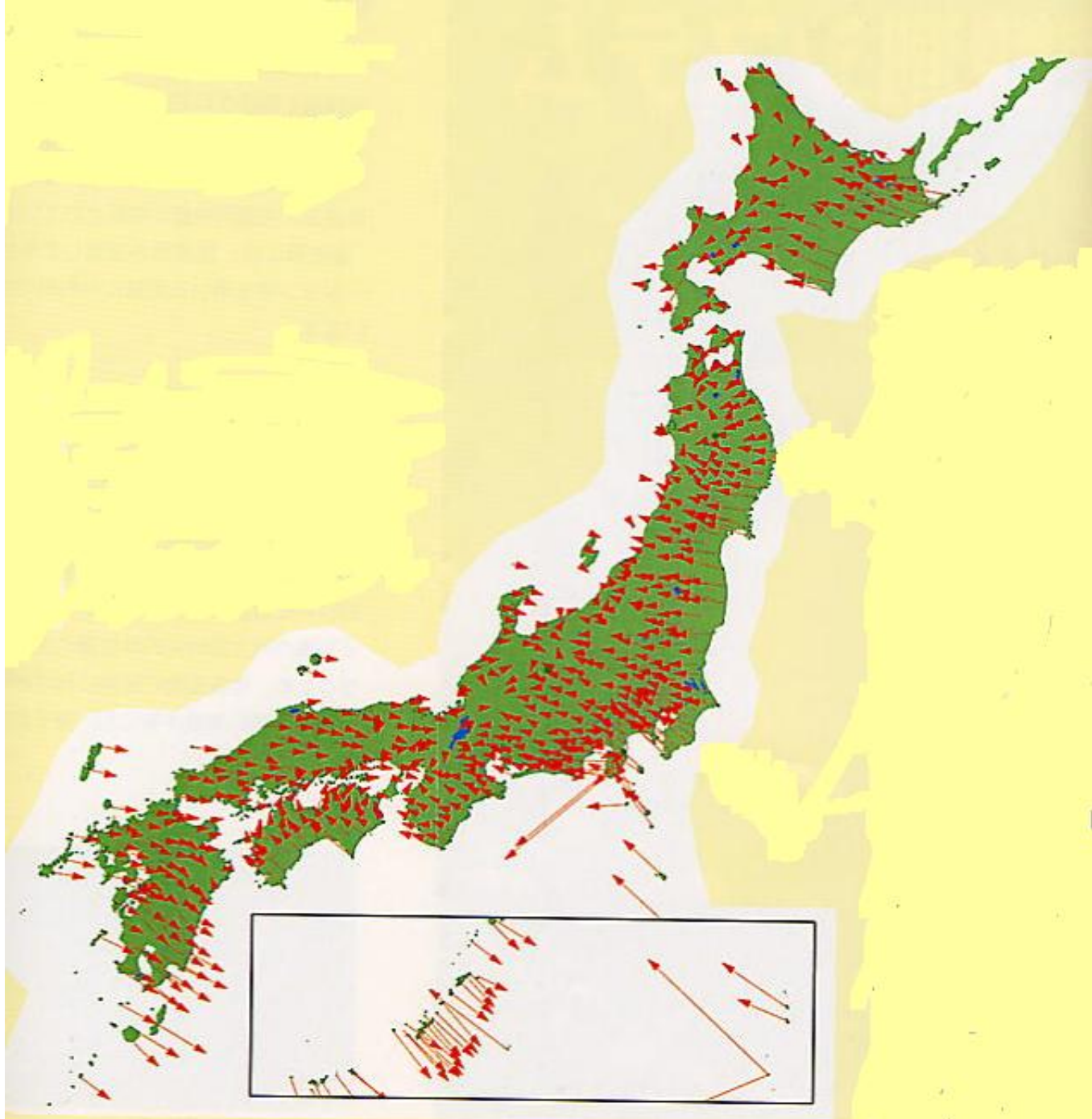
国土交通省

Historical worldwide shipments of GNSS devices in road sector (mln units)



Forecasted worldwide shipments of GNSS devices in road sector (mln units)





基準期間：2011/03/01 21:00 - 2011/03/05 21:00

比較期間：2011/03/11 18:00 - 2011/03/11 21:00

基準期間：2011/03/01 21:00 - 2011/03/05 21:00

比較期間：2011/03/11 18:00 - 2011/03/11 21:00

