



***EU-Japan cooperation
on satellite navigation applications and services***
(衛星航法アプリケーションとサービスにおける日欧産業協力)

8 October 2014

TSUTOMU NAKAJIMA

Satellite Positioning Research and Application Center

EU-Japan cooperation
on satellite navigation applications
and services

Topics

Quasi-Zenith
Satellite System
(QZSS)

Multi GNSS Asia
(MGA)

Satellite
Positioning
Research
and Application
Center (SPAC)

- QZSS
Business
Innovation
Council
(Q-BIC)

EU/Japan
Cooperation

- ◆ Quasi-Zenith Satellite System (QZSS)
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System Overview

■ **Functional Capability:**

- GNSS Complementary
- GNSS Augmentation
- Messaging Service

■ **Coverage:** Asia and Pacific region

■ **Signals(QZS-1):**

- L1C/A, L1C, L2C and L5
- L1S (L1-SAIF) on 1575.42 MHz
- L6 (LEX) on 1278.75MHz

■ **First QZSS satellite “MICHIBIKI”**

■ **Four satellites constellation shall be established & the service will start in 2018.**



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Functional Capability 1 **GPS Complementary**

QZSS improves positioning availability time

Navigation signals L1-C/A, L1C, L2C, and L5 sent from high elevation will improve the time percentage of positioning availability.

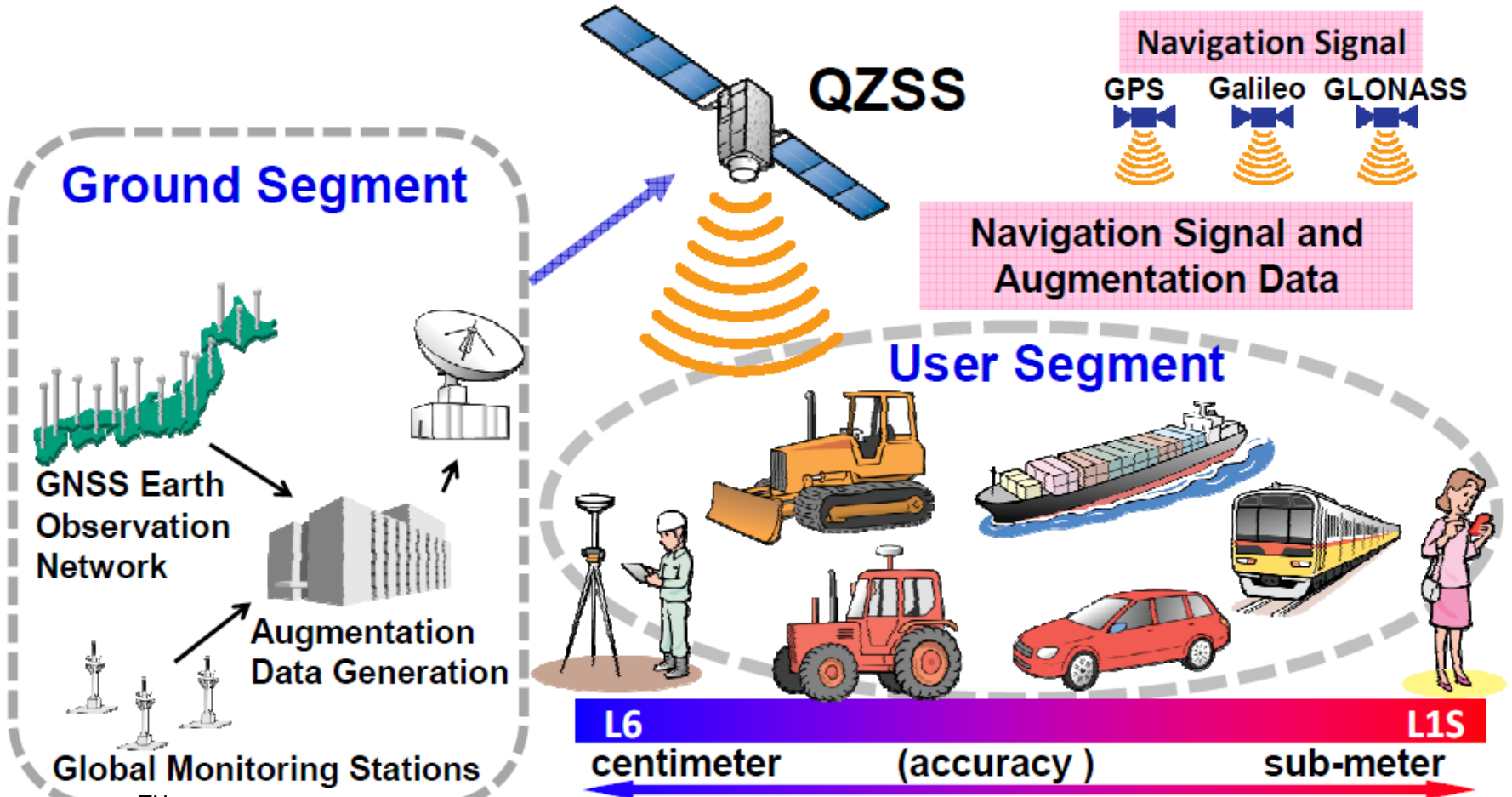


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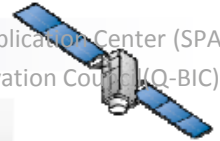


Functional Capability 2 **GPS Augmentation**

QZSS improves positioning accuracy and reliability



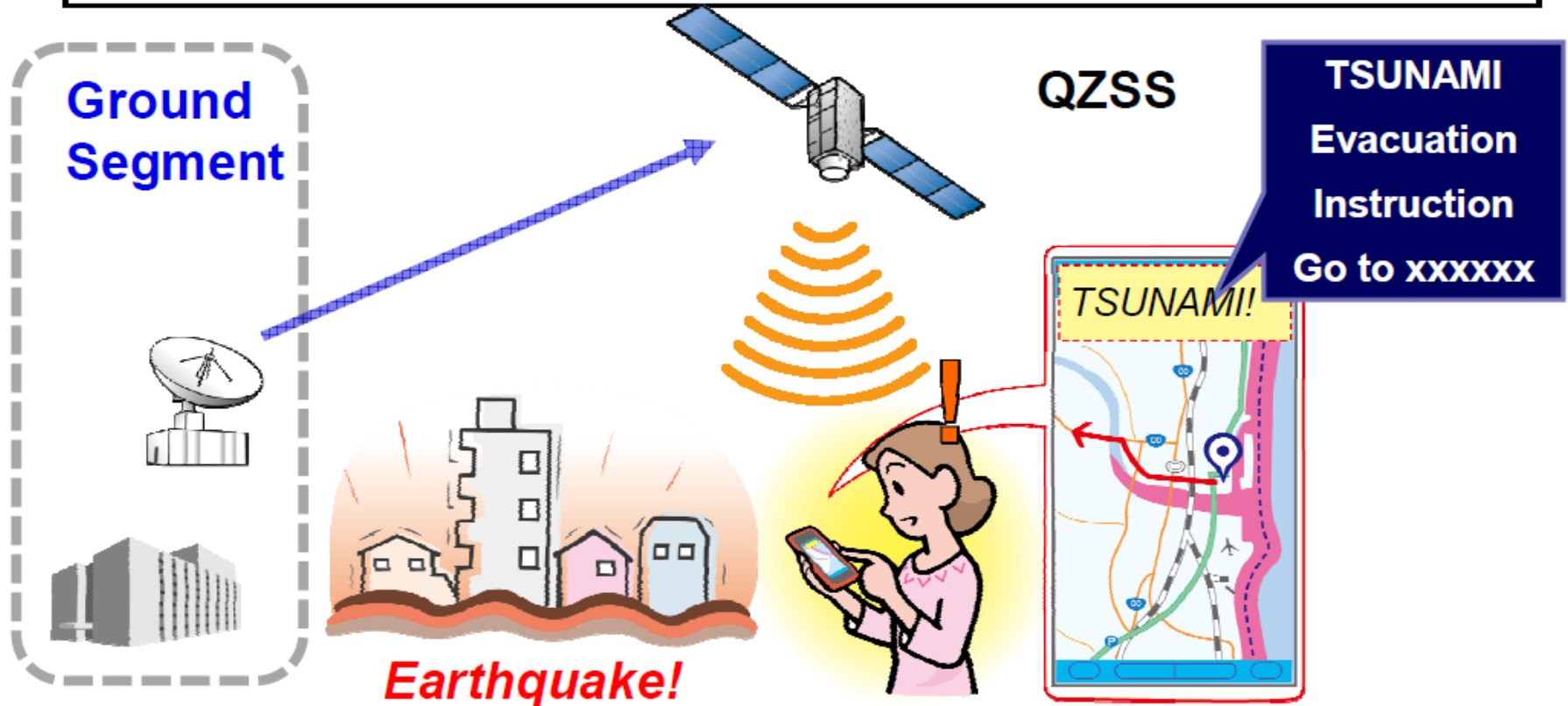
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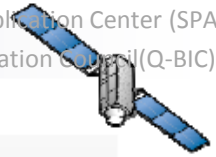
Functional Capability 3 **Messaging Service**

QZSS can send short messages

•QZSS can send short messages such as emergency warnings simultaneously to everyone with a mobile phone.



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Timeline of System Development

(Planned)

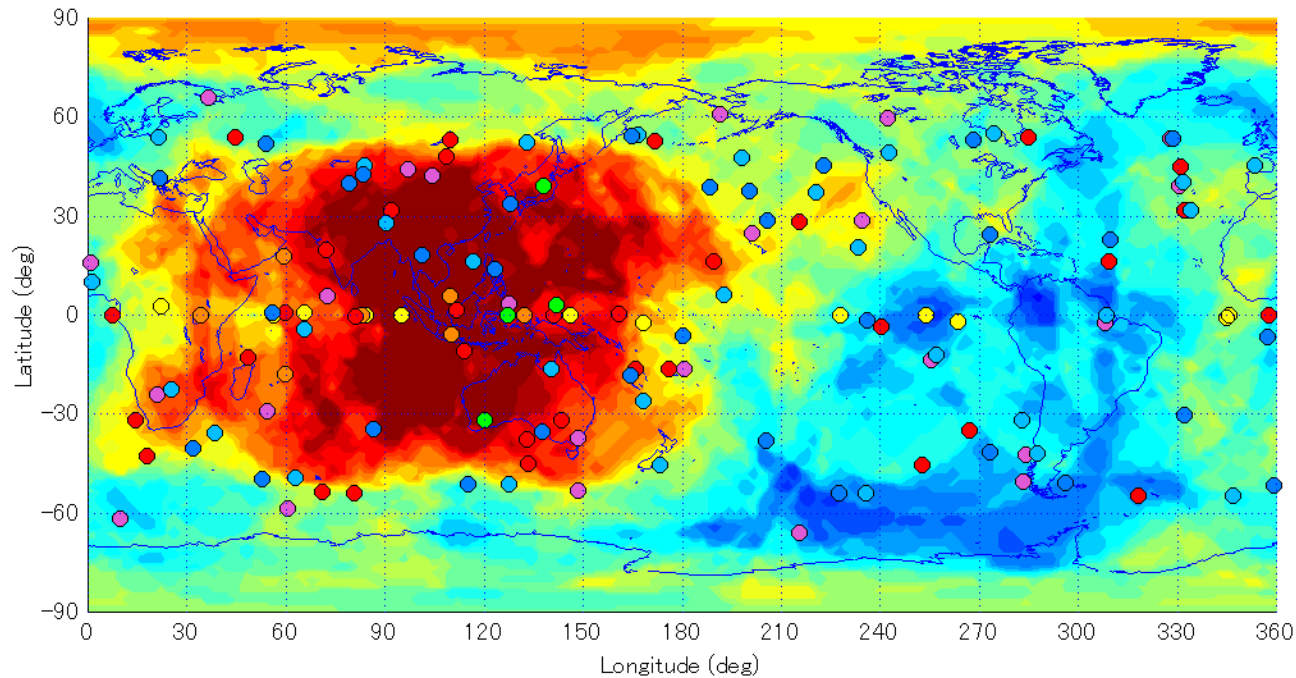
FY	2012	2013	2014	2015	2016	2017	2018	-----	2032
Over All	Development (~6 years)						Operation (15 years)		
Satellite System									
Ground System									

QBIC submitted the first requests to Japanese government and dialogue between government and QBIC has been started.

Asia Oceania Region is showcase of Multi-GNSS Application

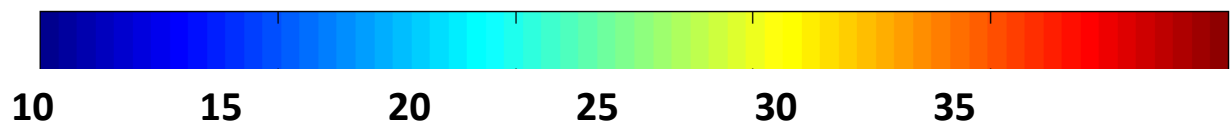
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Visible satellite number (mask angle 30 degrees)



2020:

- GPS(32)+
- Glonass(24)+
- Galileo(30)+
- BeiDou(35)+
- QZSS(4)+
- IRNSS(7)+
- SBAS(13)



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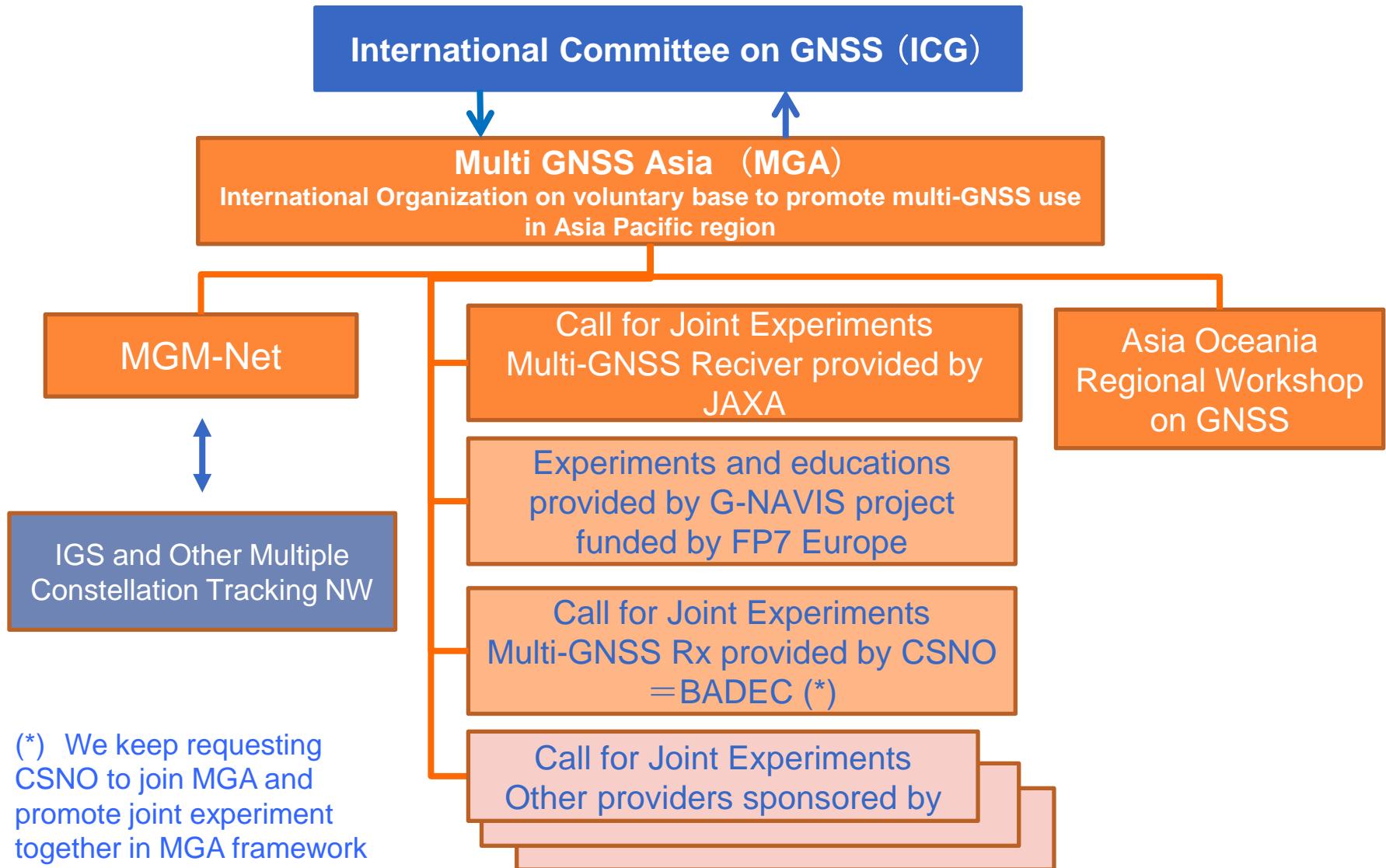
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Work Structure

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(*) We keep requesting CSNO to join MGA and promote joint experiment together in MGA framework

Asia Oceania Multi-GNSS Demonstration Campaign

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Campaign consists of three main activities:

Multi-GNSS Monitoring Network

The diagram illustrates a global network of GNSS satellites and ground stations. Several satellites are shown in orbit, with blue arcs representing their signal paths. Below, a globe shows a network of ground stations connected by red and green lines. A satellite dish and a server rack are also depicted, representing the ground infrastructure.

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, JAN. 2010, @ Bangkok, Thailand

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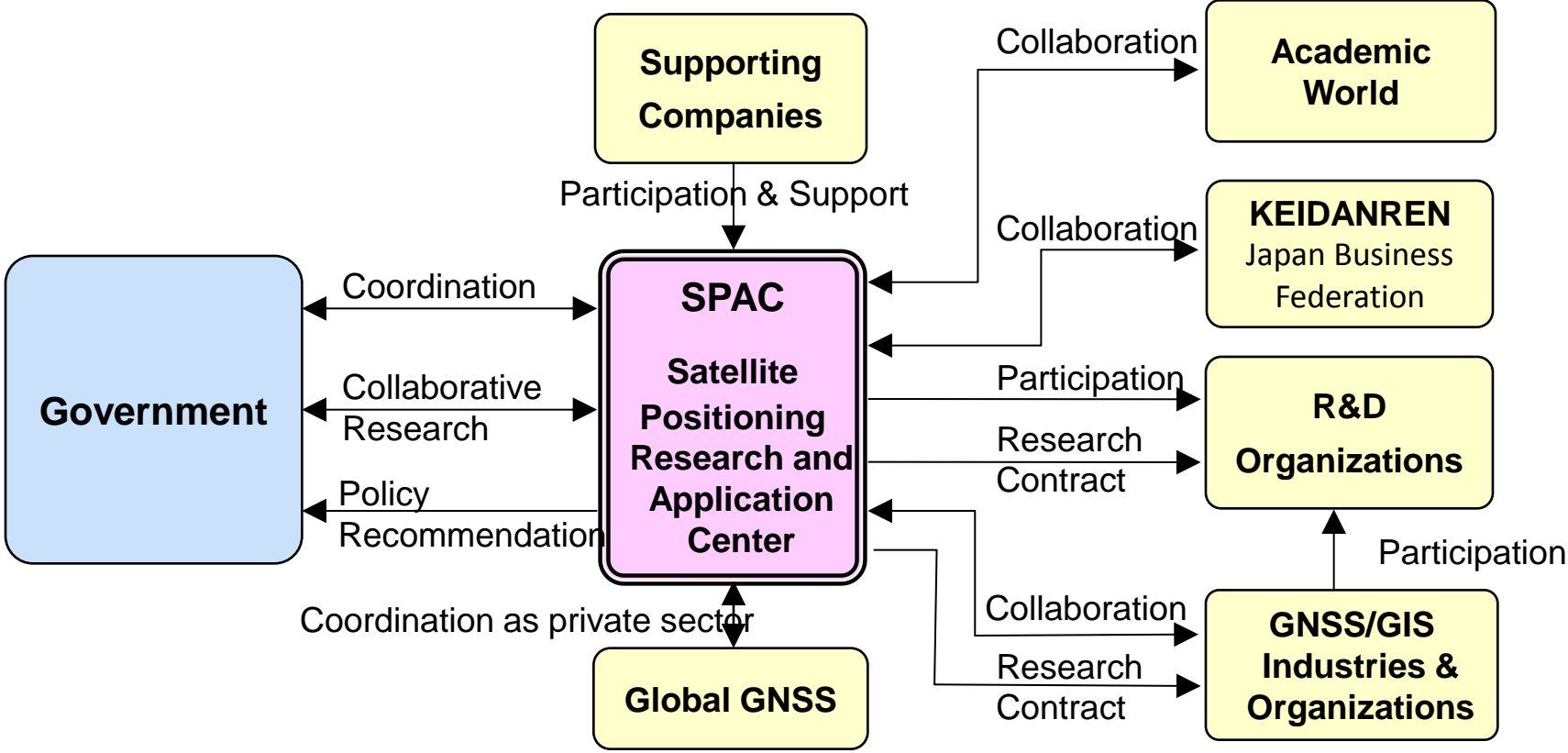
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POSITION

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Satellite Positioning Research and Application Center (SPAC) was established in 5 February 2007 approved by the Ministers associated with QZSS research and development (MEXT, MIC, METI and MLIT) to promote navigation satellite technology application and consequential geo-spatial information utilization (<http://www.eiseisokui.or.jp/en/>)

Missions

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(1)SPAC has been investigating application of regional space-based PNT systems with industrial partners, focusing on high precision services.

- Both L1-SAIF and LEX systems and terminals have been developed and various application demonstrations are on going using “MICHIBIKI” since December, 2010.
- Results have been reflected on the current QZSS service requirements.

(2)Promotion and Information Dissemination

- Forum, Symposium, and Seminar
- Demonstration and Campaign
- Idea competition

(3) International Cooperation

- Asia Oceania Regional Workshop/Secretariat
- ICG Working Group B/Application Sub Group/Co-chair

Application Demonstrations

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As of July, 2014



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Aim and Schedule

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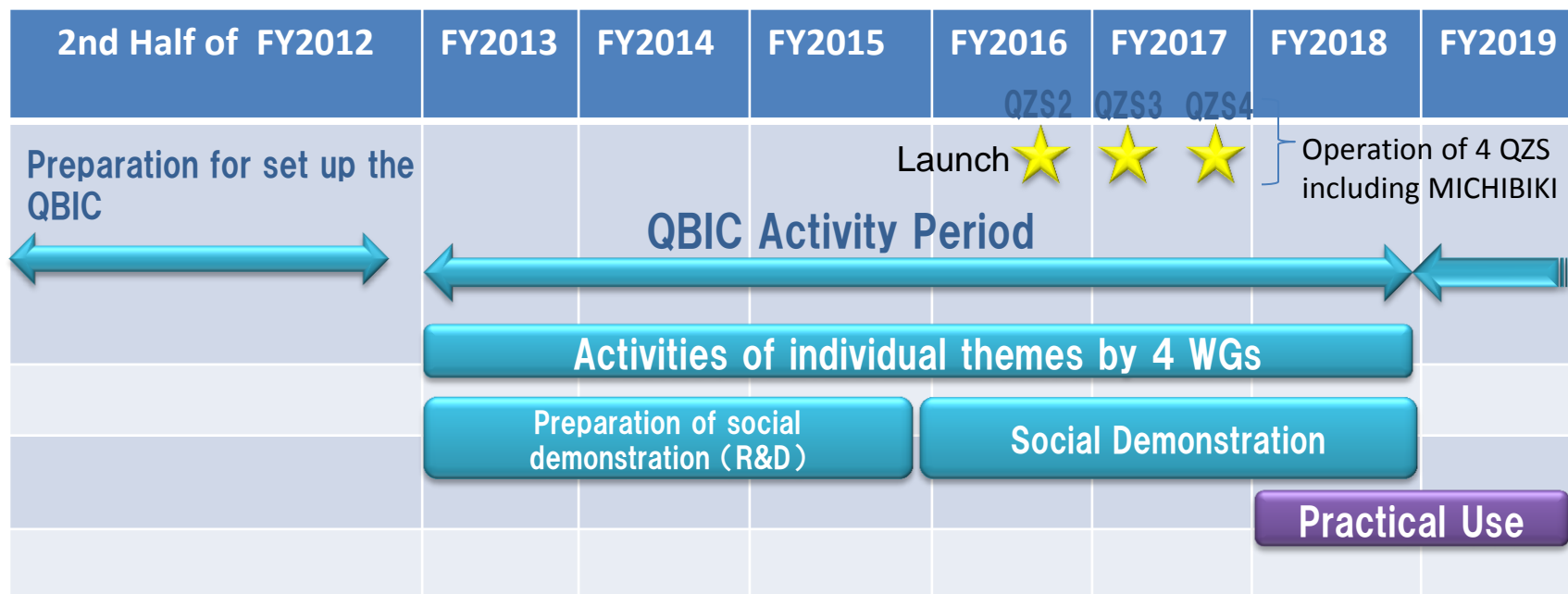
【Aim】

4 QZS is set up for providing coming Geo-Spatial society, while it is necessary to prepare environmental equipment for the QZSS not only in Japan, but also in the Asia Pacific region by late 2010s when the high-accuracy positioning service is going to be available all the time.

Thus, QBIC was established with the aim of discussing cross-sectional problem, summarizing opinions and proposing to the government between private companies for developing their business in Japan and the Asia Pacific region.

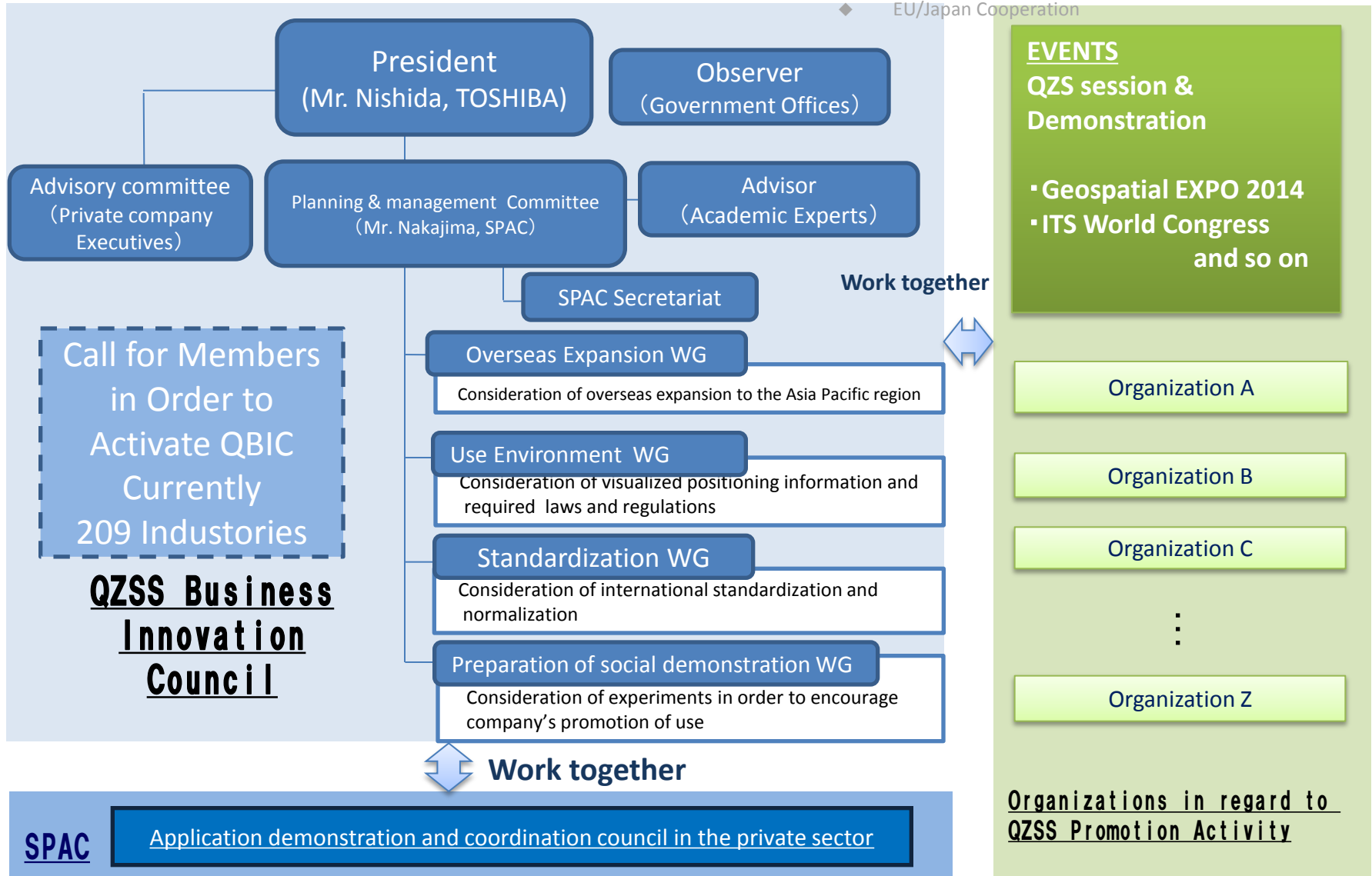
【Schedule】

- QBIC was established in 2013 and will have been operated until 4 QZS is set up in 2018.



Framework

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※ Prospective Observer (Government Offices) : Cabinet Secretariat / Office of National Space Policy, Cabinet Office/ Ministry of Internal Affairs and Communications/ Ministry of Education, Culture, Sports, Science and Technology/ Ministry of Land, Infrastructure, Transport and Tourism / Ministry of Economy, Trade and Industry / Ministry of Agriculture, Forestry and Fisheries/ Geospatial Information Authority of Japan/ Japan Aerospace Exploration Agency/ National Institute of Information and Communications Technology/ Electronic Navigation Research Institute/ National Institute of Advanced Industrial Science and Technology

Challenges to expand application market

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First QZSS 「MICHIBIKI」

Cooperation
Collaboration
Q-BIC



Basic research

Engineering proof
Application demo

Worry Regulation Unknown
Unclear
Deficiency
etc.

Commercialization
Proof in social world

Business Models

Devil Rivers

Valleys of death

Competition Rival Darwinian seas

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Get the assumptions wrong, and nothing else matters

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Survey



Construction
Agriculture



EU/Japan Cooperation
Car



Mobile
phone

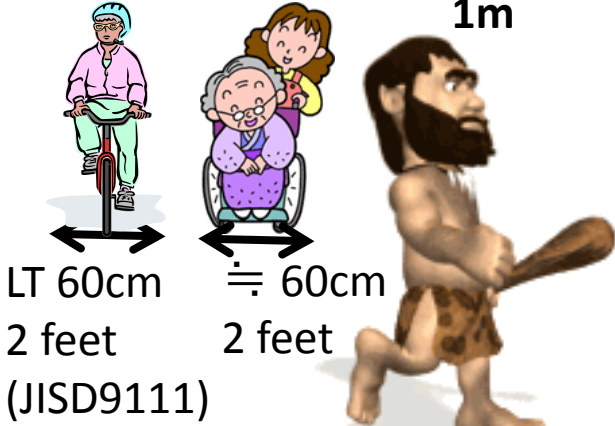


1cm

10cm

1m

10m



2 feet ≐ Step ≐ Shoulder ≐ 3 feet



Potential Areas

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(1) Joint Demonstration Experiments over Asia Pacific Region using MGA Structure

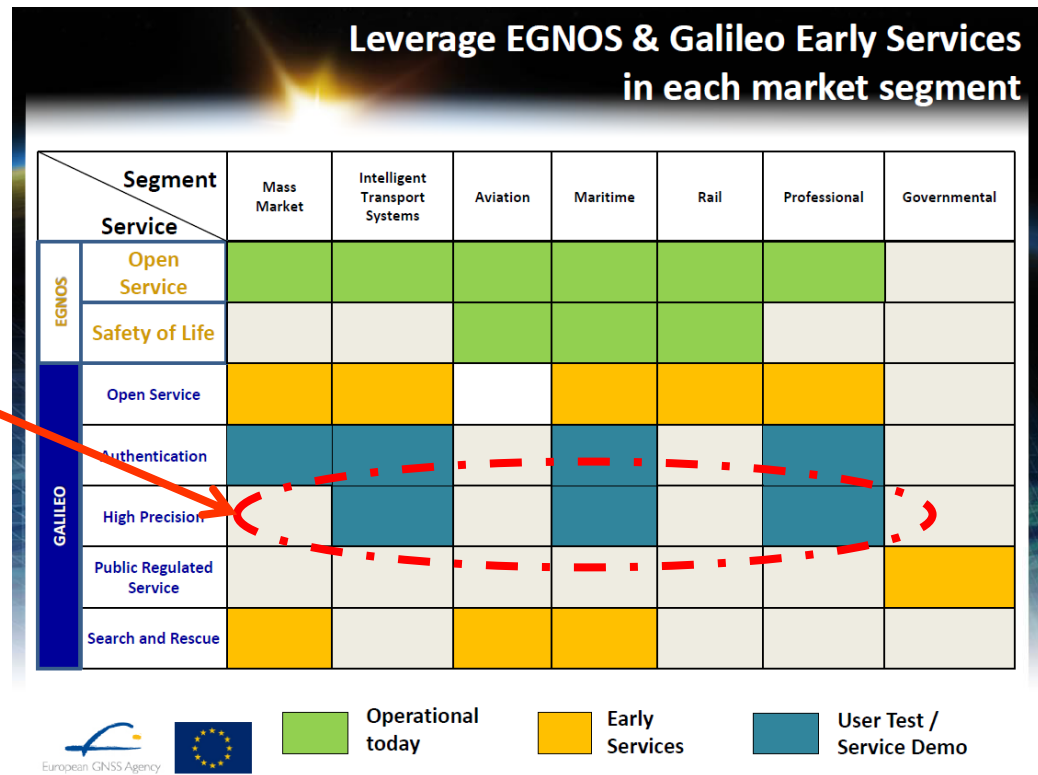
(2) Compact High Precision Terminal Development

(3) High Precision Application Development

- Ex.
- Disaster monitoring/ Prevention
 - LBS
 - ITS
 - IT Agriculture/IT Construction

(4) Seamless Positioning

(5) Asia Pacific Region Market Analysis



ご清聴ありがとうございました