MCSCC: Masuda Cyber Smart City Creative Consortium

一般社団法人
益田サイバースマートシティ創造協議会
MASUDA CyberSmartCity

I. Smart City Background

【Market verification 】

Management of population increase cities by smart civilization

world

population

World of 2040

7.6 billion people → 9.2 billion people **1.2 times**

出所：国連世界人口予測2018年改訂版

【Market verification 】

Resolve human tasks with IoT

2030 Agenda
Sustainable development goals
(SDGs: Sustainable Development Goals)

出所：国際連合広報センターロゴ使用

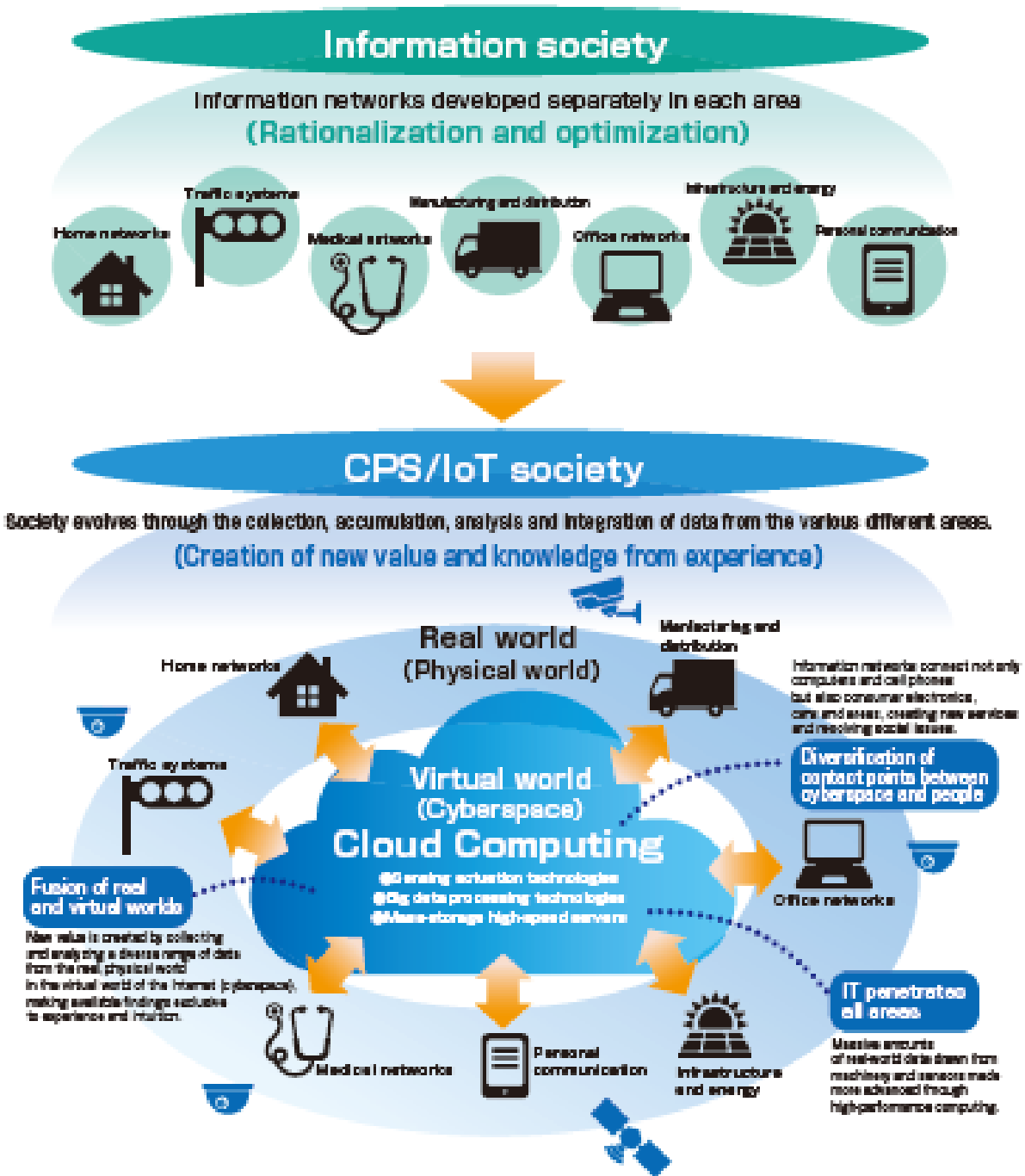
【Market verification 】

CPS (Cyber Physical System) society and SDGs

CPS is a system that gathers various data in the real world (physical space) through sensor networks, etc., analyzes and develops knowledge by using large-scale data processing technology etc. in cyberspace, depending on information and value created there , We are trying to revitalize the industry and solve social problems.

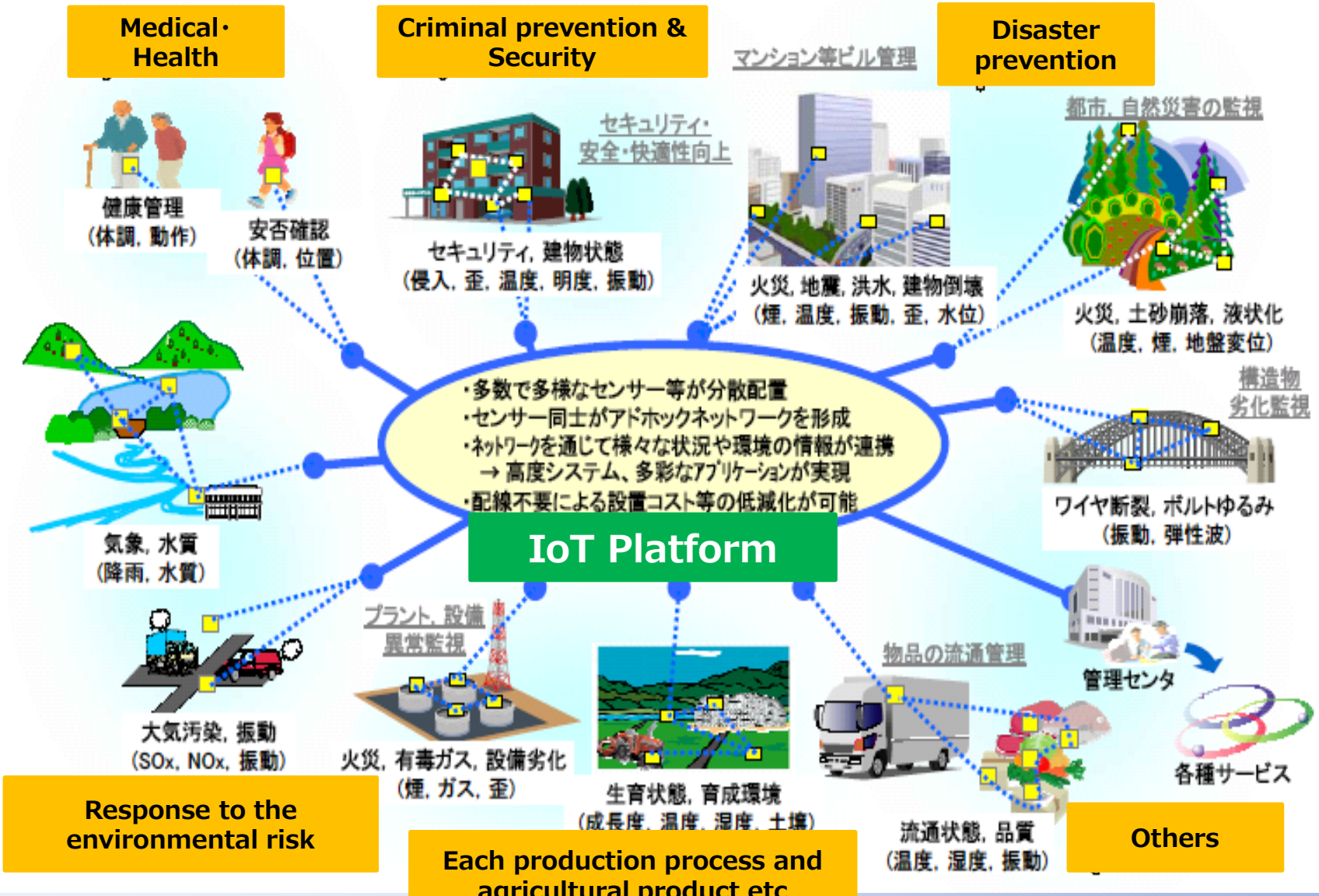
In Masuda Smart City All technologies and service solutions that can be realized are There.

出所：JEITA CPS/IoTサイト https://www.jeita.or.jp/cps/about/,国際連合広報センターロゴ使用


Information society
Information networks developed separately in each area
(Rationalization and optimization)
Home networks
Traffic systems
Medical networks
Manufacturing and distribution
Office networks
Infrastructure and energy
Personal communication
CPS/IoT society
Society evolves through the collection, accumulation, analysis and integration of data from the various different areas.
(Creation of new value and knowledge from experience)
Real world
(Physical world)
Home networks
Manufacturing and distribution
Information networks connect not only computers and cell phones but also consumer electronics, cars and areas, creating new services and resolving social issues.
Traffic systems
Virtual world
(Cyberspace)
Cloud Computing
Diversification of contact points between cyberspace and people
Office networks
Fusion of real and virtual worlds
New value is created by collecting and analyzing a diverse range of data from the real, physical world in the virtual world of the Internet (cyberspace), making available findings exclusive to experience and intuition.
IT penetrates all areas.
Massive amounts of real-world data drawn from machinery and sensors made more advanced through high-performance computing.
Medical networks
Personal communication
Infrastructure and energy

【Market verification 】

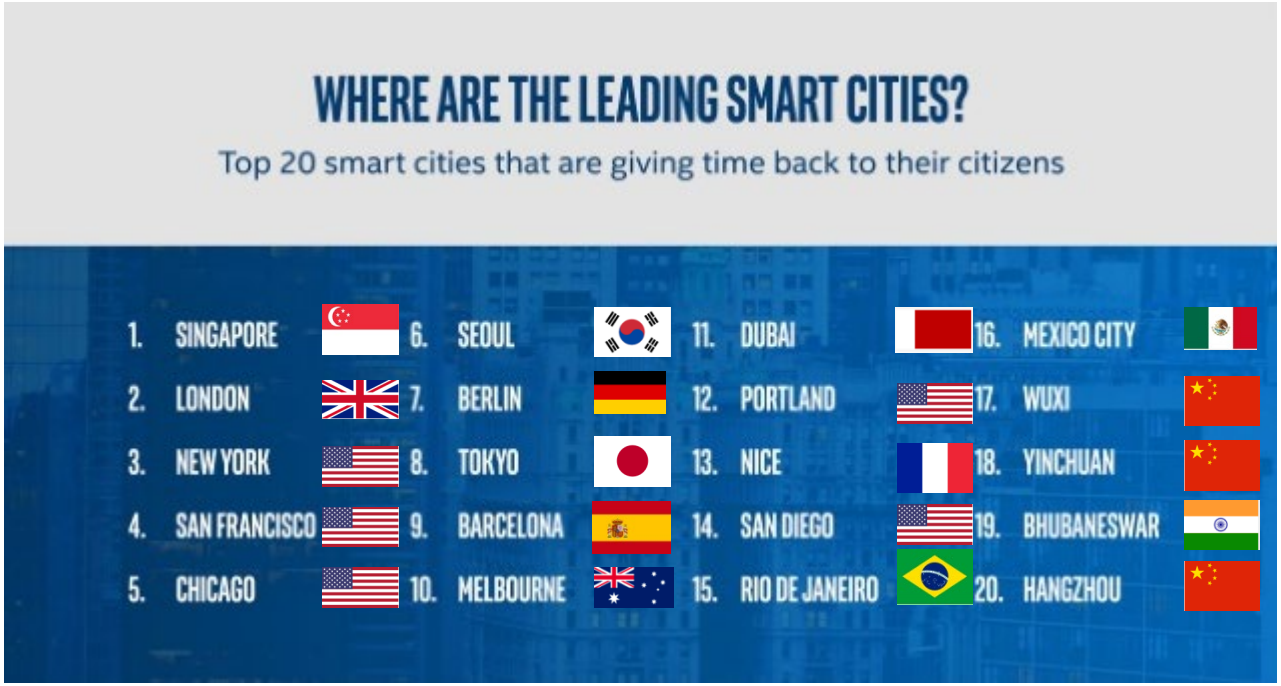
Figure of IoT data utilization of Smart City



出所：ユビキタスセンサーネットワーク技術に関する調査研究会（総務省）

【Market verification 】

What is the future of the world smart city and the future of Japan?



WUXI:無錫　YINCHUAN:銀川(ギンセン)　HANGZHOU:杭州

出所：JUNIPER/intel https://betanews.com/wp-content/uploads/2018/03/intel-smart-cities-infographic-small.jpg

【Market verification 】

World Smart City market size, Smart City is a new industry

World smart city market size *

2018 **2022**

Approximately $ 81 billion → Approximately $ 158 billion

About 18% growth each year

出所：IDC Worldwide Semiannual Smart Cities Spending Guide, 2017H2

II.IoT Project and Case Study

What is Masuda Smart City Creative Consortium?

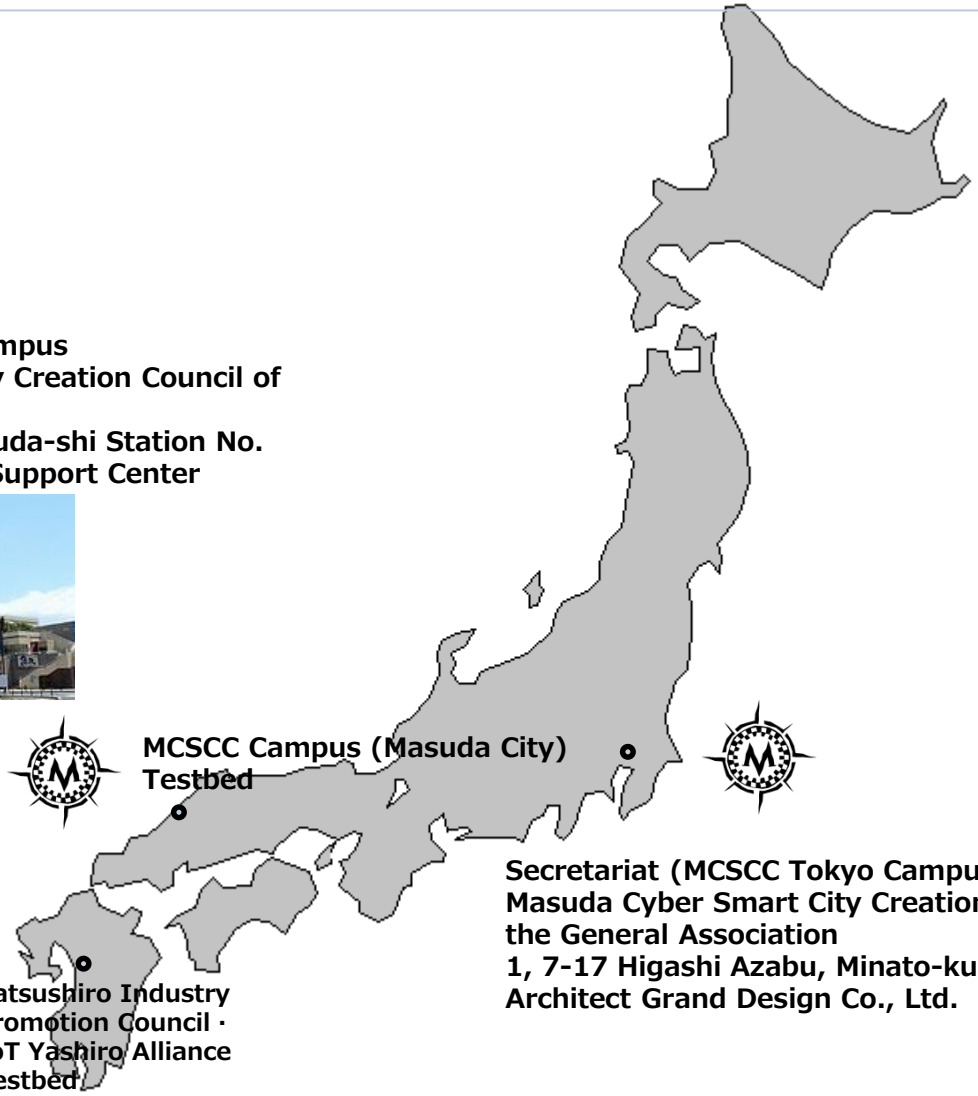
- By developing and verifying MCSCC's smart city standard specifications and IoT related technologies and proposing these to a wide range of high-tech industries, we will develop and disseminate interface-compliant products and related products of smart-city compliant IoT platform promoted by MCSCC in the future The purpose of this project is to contribute to the development of regional creation in Japan by promoting related projects.

- In cooperation with overseas companies and research institutes such as universities and other institutions such as overseas enterprises and universities and others, private-led business model of new city-to-city collaboration to develop global IoT business targeting emerging countries such as Japan and Asia / Africa It is aimed at co-building

- MCSCC's Smart City Project utilizes "Masuda City" in the local city as a testbed place, achieves digital transformation in research and development of the future ecosystem, and develops environment, disaster prevention, medical care, finance, society , Local governments, nations and so on by IoT and aim to realize CPS (Cyber Physical System) society.

MCSCC activity base: Promote inter-city cooperation by IoT

MCSCC Headquarters Campus
Masuda Cyber Smart City Creation Council of the General Association
Shimane prefecture Masuda-shi Station No. 17 No.1 EAGA Industry Support Center



MCSCC Campus (Masuda City) Testbed

Secretariat (MCSCC Tokyo Campus)
Masuda Cyber Smart City Creation Council of the General Association
1, 7-17 Higashi Azabu, Minato-ku, Tokyo
Architect Grand Design Co., Ltd.

IoT八代同盟

Yatsushiro Industry Promotion Council · IoT Yashiro Alliance Testbed

MCSCC promotes global collaboration

Reason why Masuda City, Shimane Prefecture, was selected as the "place" of the test bed

You can see the future of Japan in 2035 in the present Masuda-shi.
Masuda in an aging society is a valuable city that implements a project that honored the future of Japan.

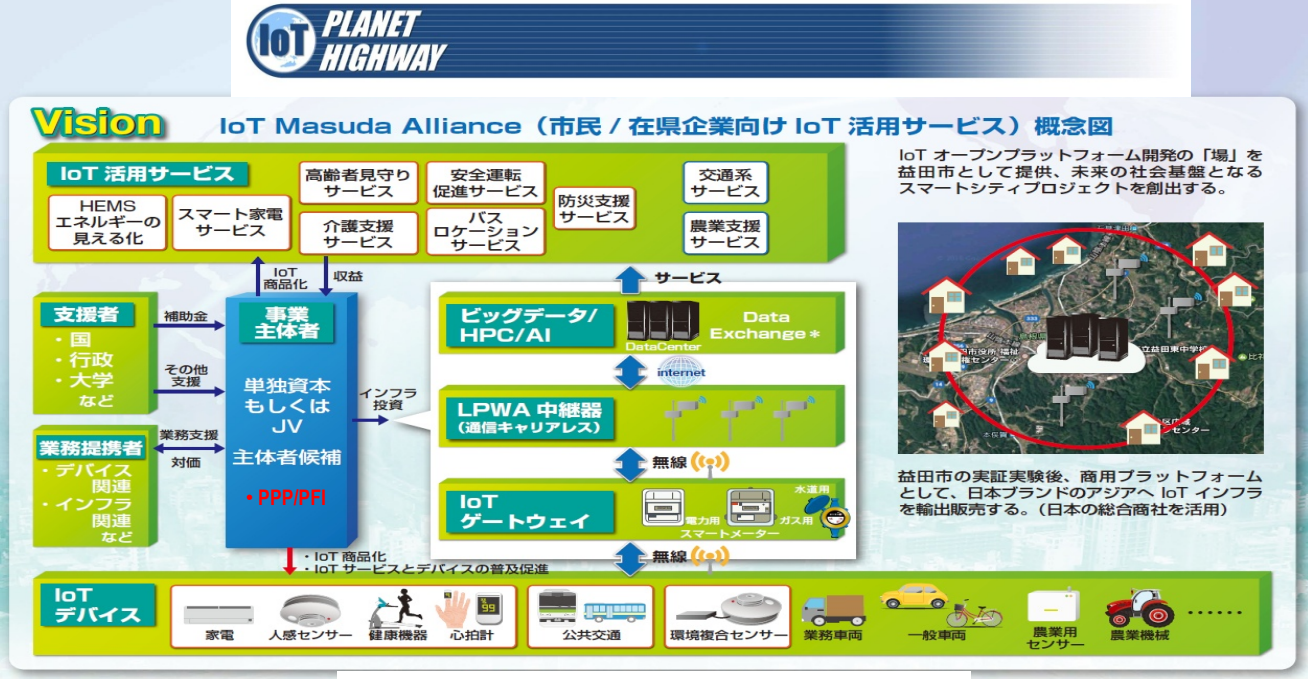
- All the conditions such as geopolitics of Japan, the environment of the country (inter-mountain area), the four seasons, past natural disasters, etc. are in place
- Despite being a compact city with a population size of 50,000 people, the function of the town is comparable to metropolitan cities
- Cities where super aging is progressing (Dementia wanderers are also subjects)
- Many high-blood pressure citizens of the middle age of working population (social issues in important areas)
- The city of Masuda is not well financially and the number of staff of the city is also small (coexistence of private partnership is important)
- There is a clear vision of the policy of the chief "population expansion"
- Establishing the Masuda City model, there is an environment where scaling can be promoted in cooperation with local cities and Republic of Indonesia

Disaster in Japan
・typhoon
・Guerilla Heavy Rain
・River flooding
・Flood disaster
・earthquake
・ High-temperature and humidity

出所：Google Earth引用

Concept of ecosystem ~ Basic concept ~

Power-saving LPWA Plus Optimized for Private Networks * We will create a model foundation for future municipalities management that utilized JV (image for promoting PPP / PFI) as a creation of new industries while utilizing wireless communication standards.



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PPP/PFIの概念図

PPP（Public Private Partnership）

公共施設等の建設、維持管理、運営等を行政と民間が連携して行うことにより、民間の創意工夫等を活用し、財政資金の効率的使用や行政の効率化等を図るもの。

PFI（Private Finance Initiative）

PFI法に基づき、公共施設等の建設、維持管理、運営等を民間の資金、経営能力及び技術的能力を活用して行う手法。

【類型Ⅰ】
公共施設等運営権制度を活用したPFI事業（コンセッション事業）

【類型Ⅱ】
収益施設の併設・活用など事業収入等で費用を回収するPPP/PFI事業
（収益型事業）

【類型Ⅳ】
その他のPPP/PFI事業
（①サービス購入型PFI事業）
（②包括的民間委託）

【類型Ⅲ】
公的不動産の有効活用を図るPPP事業
（公的不動産利活用事業）

出所：左　AGDビジネスコンセプト提案,SME作図(2017-18年インターネプコン出展時使用)
出所：右　内閣府PPP/PFI推進アクションプラン（平成28年5月18日民間資金等活用事業推進会議決定）
* は、FTTH(Fiber To The Home),BLE,WiFi,Mesh network,NB-IoT等

IoT Smart city enabler

- Low power consumption wireless technology →**LPWA**
- Local Business Producer →**MCSCC**
- Data Exchange Open Platform →**FIWARE Platform**

MCSCC's Project ・In (Masuda City and Yatsushiro City)

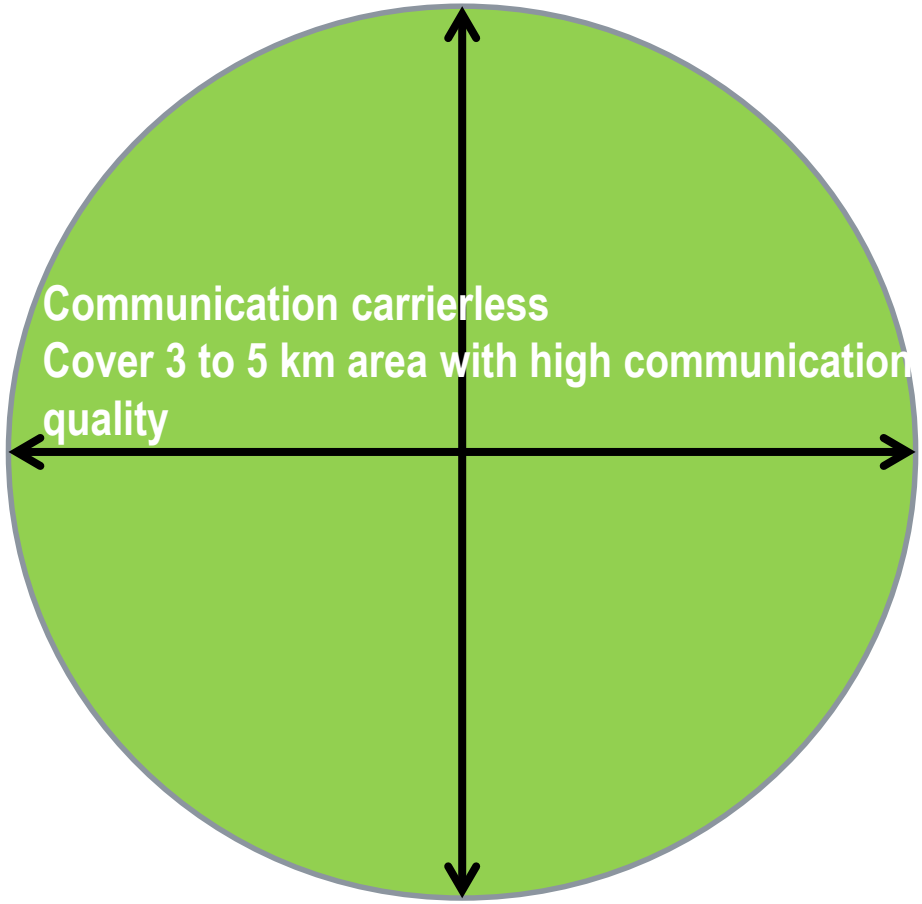
Space (Application to the ground)	**Ultra small satellite "Tasuki" TRICOM - 1 R LoRa 20 mW specification** JAXA・Tokyo University・ADRFD, AGD (ground evaluation by SME with 250 mW output specification in Masuda City)
Disaster prevention phase 1 (River・reservoir・agricultural water)	**Level monitoring system: WSN-IoT AWARD 2011 incentive award** IoT Masuda Alliance ®
Medical health care	**Masuda City Smart・Health Care Promotion Project** Omron Healthcare・Shimane University School of Medicine・Masuda Medical Association・Masuda City・MCSCC
Transport infrastructure	**Road monitoring**
Ministry of Public Management (Adopted case)	**Masuda City data utilization type smart city platform construction project** IoT Masuda Alliance ®
Agriculture (Wildlife harm)	**Electric fence (inter-city cooperation with IoT Yashiro Alliance)**
Public-private data collaboration platform	**FIWARE** Masuda ・MCSCC

Test bed･segment in Masuda City and intercity collaboration

Social Infrastructure	Smart water service
Social Infrastructure	Smart gas (LPG)
What about the future? …	Smart home (pet), school・commuting・regional watching, hospital・elderly care, smart classroom・urban environmental monitoring, smart hotel, food, smart plant・factory, entertainment・sports, marine / aquaculture, smart port, city Next generation disaster prevention radio, disaster prevention, social implementation of EV, municipality's future management model PPP / PFI etc.

Masuda Project	一般社団法人 益田サイバースマートシティ創造協議会 MASUDA CyberSmartCity
Yatsushiro Project	IoT八代同盟 / 一般社団法人 益田サイバースマートシティ創造協議会 MASUDA CyberSmartCity

Utilize LoRa's cyberspace of space communication quality



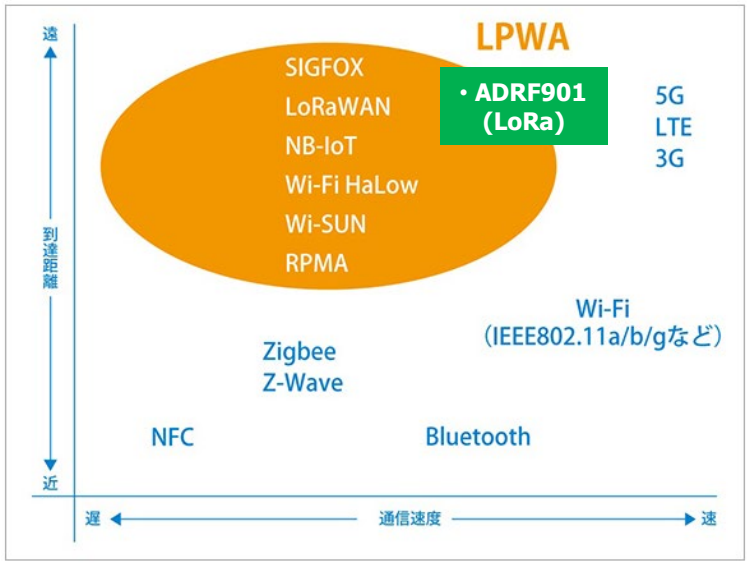
IoT Service
- **LP Gas**
- **Disaster prevention(Flood)**
- **Urban environment**
- **Regional watching**

Low equity with Private LoRa
Mesh in the city
- Long-term recovery model
- Service sharing
- Micro unit

Recommended LPWA technology case introduction
~ ADRF 901 feature ~

It is an optimized power saving LPWA wireless communication standard optimized for the local private network.

- Urban area 5-10 Km (high power 25 km), 5469 bps, 2048 node star type, bidirectional communication
- Wireless multi-hop communication (6 steps)
- Disaster prevention / watching, adapting to energy monitoring / environmental sensing / street control etc.
- Acquired ARIB (TELEC)
- Cipher adopted AES-CCM 128bit
- Private LoRa implements the world's first LPWA protocol stack for radio interference avoidance
- 920 MHz with proven track record in Indonesia



出所：ビジネス＋IT「LPWAの基礎を解説、IoT向け無線通信技術「LoRa」「NB-IoT」「SIGFOX」は何が違うのか」

Working Group Case: Space IoT (Ground Evaluation and Application)

Ground evaluation of Hyper LPWA

Press release
August 23, 2018

JAXA　JAXAについて　プロジェクト　ファン!ファン!JAXA!　サイトコンシェルジュ

プレスリリース

超小型衛星「たすき」（TRICOM-1R）の運用終了について

平成30年8月23日

国立研究開発法人宇宙航空研究開発機構
東京大学大学院工学系研究科

国立研究開発法人宇宙航空研究開発機構（JAXA）のロケットSS-520 5号機によって打上げられた超小型衛星「たすき」（TRICOM-1R）につきまして、平成30年8月22日をもって運用終了しましたのでお知らせします。

本事業は経済産業省 平成27年度宇宙産業技術情報基盤整備研究開発事業（民生品を活用した宇宙機器の軌道上実証）の採択を受けて、JAXA、東京大学の協力、民生品を搭載する民間企業の参画を得て実施されました。

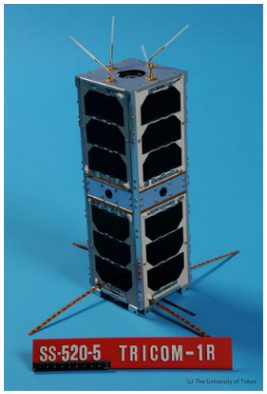
平成30年2月3日の打上げ以降、予定していた運用期間（約30日程度）を超えて、およそ半年に渡って「たすき」の運用を実施いたしました。その間、地球を周回しながら地上端末から送られる微弱な電力無線局（送信出力20mW）による数電波を受信することで地上データを収集（Store）し、衛星が管制圏上空に来た時にコマンドにより地上局にデータを転送（Forward）するStore and Forwardミッションや、搭載したカメラを用いた地球撮像ミッション、また、打上げ・軌道投入後ただちに目標的に地球撮像を実施して、地上との最初の通信で観測データを地上へ送る即時観測ミッション等を成功させました。
なお、「たすき」は地球大気圏に再突入し燃え尽きたものと推定しております。

■申請者 真一　東京大学大学院工学系研究科　民生宇宙工学環境　教授のコメント：
「Big経営のミリサイズのCubeSatが実用的なミッションを実施できることを示し、また低コスト・短期に開発できたことは大きな収穫であり、経済産業省、JAXAはじめ関係各所に感謝申し上げます。この成果を元に、すでにバングン政府と連携して同タイプの衛星を開発し来年打ち上げることが決まっており、それ以外にも海外から引き合いが来ています。またStore and Forward実験は日本だけでなく海外からのアップリンクにも成功しています。この成果を元に、多くの衛中機関と連携してこの衛星を多数製造し、コンステレーションとして運用する計画を持っていますが、その際が今回のプロジェクトで確立できたと考えています。」

■羽生 宏人　SS-520 5号機プロジェクトマネージャのコメント：
「ロケット打上げの延長、衛星運用面においてStore and Forwardミッションの最初の通信実験に立ち合わせていただきました。「たすき」との交信が成功したときの中須賀先生をはじめ衛星チームの皆々が大喜びしていたことが昨日のことのように思い出されます。
今回の成果が超小型衛星の技術を飛躍的に発展させ、私たちにとって宇宙利用がより身近なものになっていくことを祈っております。
本実験にご協力いただきました多くの関係機関の皆様に改めて深く感謝申し上げます。」

超小型衛星「たすき」（TRICOM-1R）について

概要	超小型衛星
寸法	116mm×116mm×346mm（アンテナ部分除く）
重量	約3kg
軌道	近地点180km×遠地点1,500kmの楕円軌道
傾斜角	31度



「たすき」（TRICOM-1R・トリコム-ワン-アール）は、東京大学で開発された超小型衛星ほどよし3&4号機の実績を基にした次期衛星です。経済産業省宇宙産業技術情報基盤整備研究開発事業（民生品を活用した宇宙機器の軌道上実証）に採択されたことをうけて東京大学において開発されました。
地球を周回しながら送信出力20mWというLoRa変調を使った微弱電波を送信する地上端末から送られるデータを収集（Store）し、衛星が管制圏上空に来た時にコマンドにより地上局にデータを転送（Forward）するStore and Forwardミッションや、搭載したカメラを用いた地球撮像ミッション、また、打上げ・軌道投入後ただちに目標的に地球撮像を実施して、地上との最初の通信で観測データを地上へ送る即時観測ミッションを行いました。

出典：http://www.jaxa.jp/press/2018/08/20180823_tricom_j.html

Initial evaluation
April 7, 2017

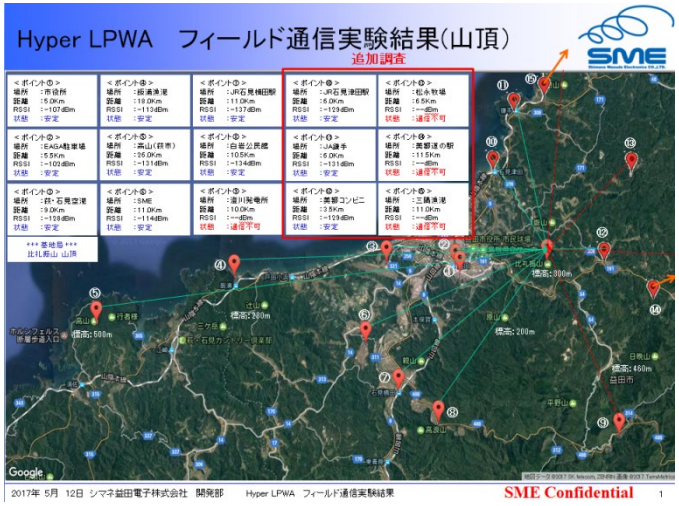
Additional evaluation
May 11, 2017

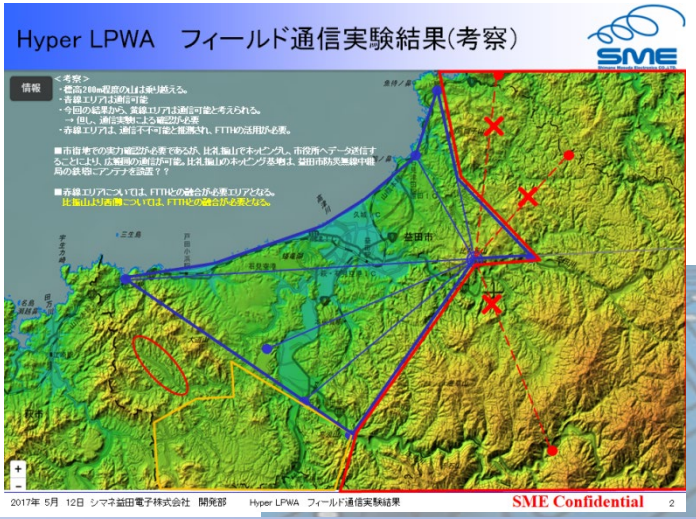
920MHz　250mWモジュール　HPM901

- 920MHz帯簡易無線局　250mW
- LoRa変調
- 伝送速度　46bps～5469bps
- 受信感度　-144dBm～-123dBm
- 技術適合証明取得済（＊1）

HPM901資料

＊1：別途無線局登録が必要です。（登録代行も致します）



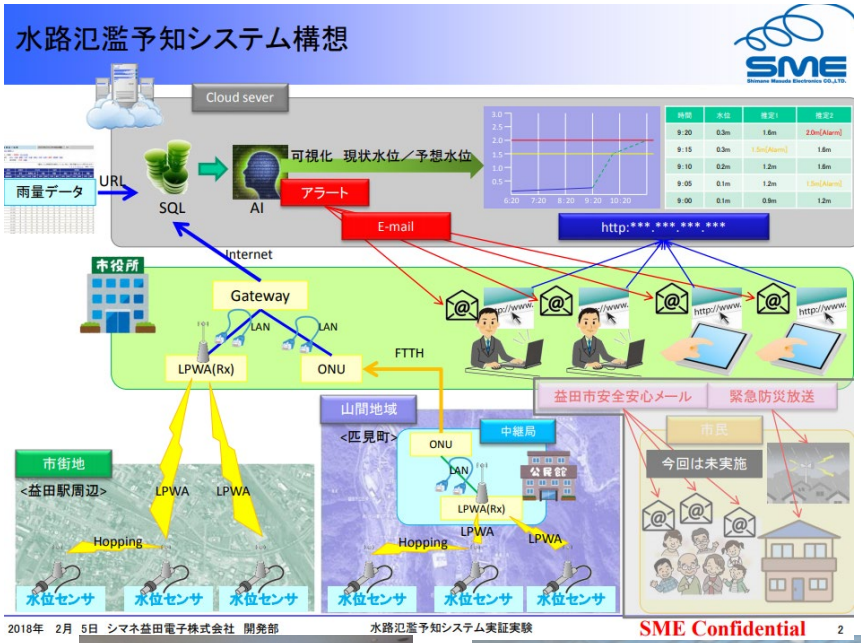


Working group case: disaster prevention IoT

Masuda City Waterway Level Monitoring Project (Phase I PoC)

Omron inspection in 2018 (Masuda city)

July 18, 2017 - Demonstration and operation Masuda City Civil Engineering Section



In no particular order
Project participating companies: AGD (including Keio University), Omron, SME

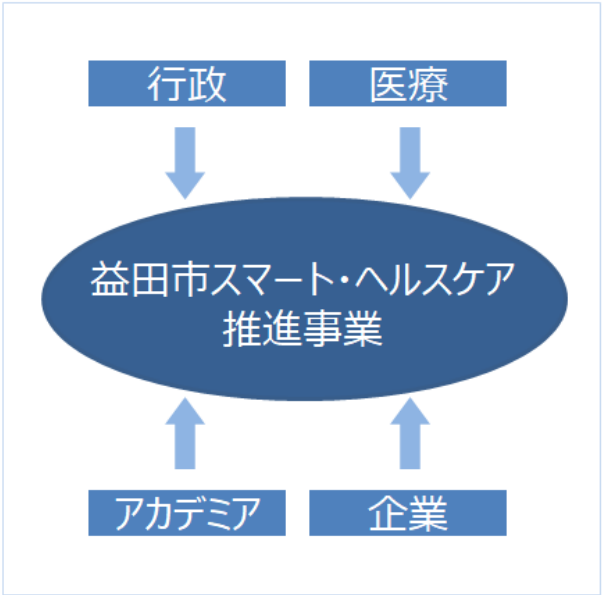
Right figure: May 2018
YRP R & D Promotion Association Awards
Recommended case

Working Group Case: Medical Health Care IoT

Masuda City Smart Health Care Promotion Project (Medical Research)

Kick off・press conference 20th July 2018
(Masuda-shi EAGA 3F)

By promoting "blood pressure management" using IoT
Contribute to the extension of citizen's healthy life expectancy



Titles omitted
【Rear row】From left: Toyosaki (IoT Masuda Alliance Producer / AGD), Hiratani (IoT Masuda Alliance director / SME)
Ueshima (Professor Emeritus of Shiga University of Medicine), Imai (Professor Emeritus, Tohoku University School of Medicine), Saito (Promotion Supervisor of Welfare Environment Division, Masuda City)
Tanaka (Omron Healthcare Executive Officer Managing Executive Officer) Shiga (Professional Officer with Omron Healthcare Technology Development Division General Manager)
【Front row】From left: Matsumoto (Vice Chairman of Masuda Medical Association, Kanzaki (Masuda Medical Association Chairman), Yamamoto (Mayor Masuda)
Kanda (Professor of Environmental Health Medicine, Shimane University School of Medicine), Kano (Medical Association Hospital Director), Nakamoto (Director of Masuda Health Center)

Working Group Case: Transportation IoT

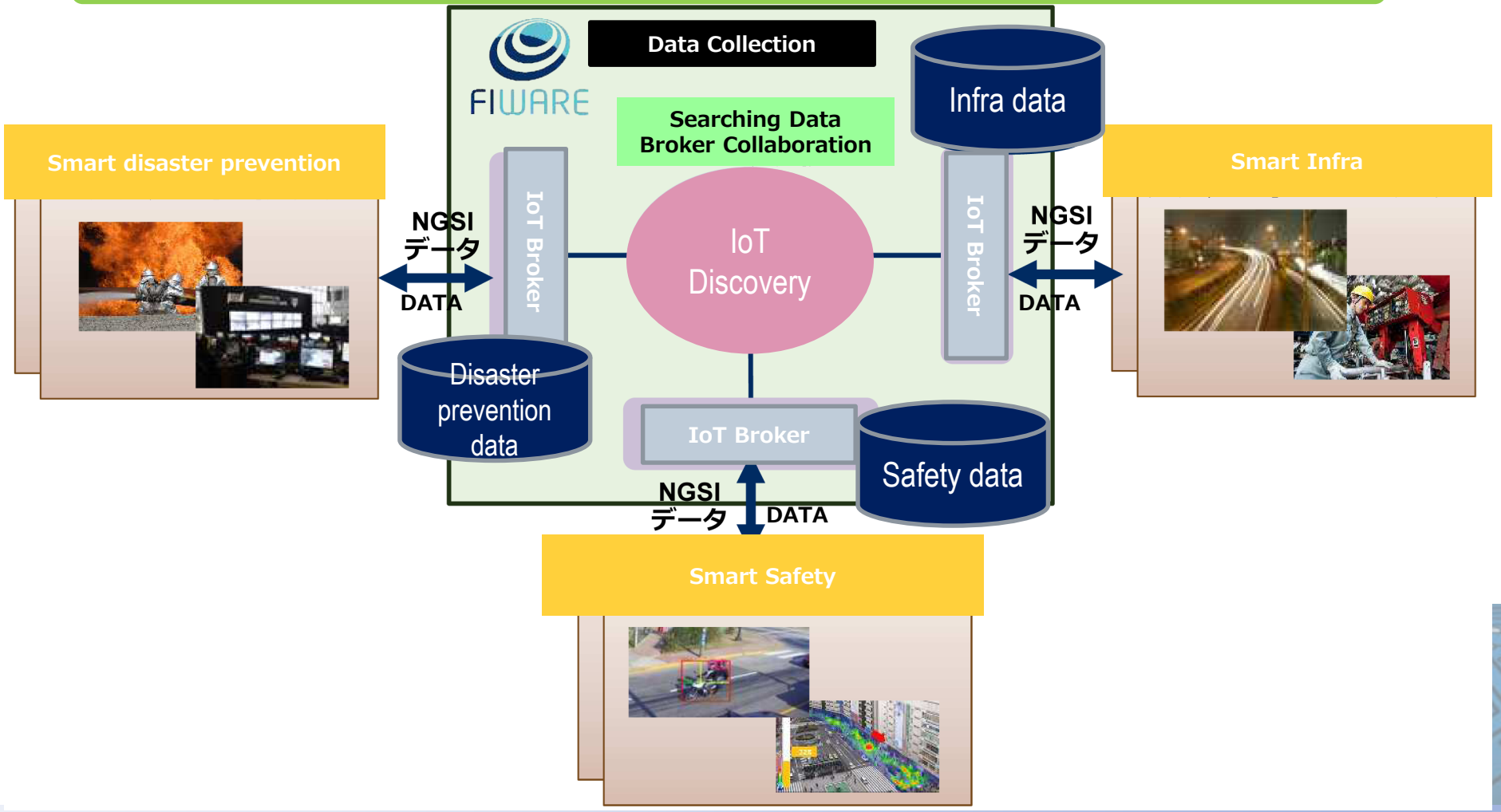
Masuda City Road Monitoring Project (Phase I)

Businessization of Road Sensing by Car
January 2019 -

公用車で、市街地を走り回ってもらうことで、
道路の路面状況データを集め、
路面状態の分析について実験する。

Features of FIWARE Cross domain data collection function

We unified various domain data with FIWARE standard data model (NGSI) and realize cross domain data distribution



Contact information

Inquiries

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【 MCSCC Tokyo Campus 】

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