Challenge to Cross Industry Open Collaboration

18 December 2020
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1 Introduction
Introduction

Okinawa Open Laboratory (OOL)

Vision: Social Innovation x Digital Technologies
Approaches: Open Technologies x Open Collaboration
Experiences: Technology Verification x Use Case Studies in Okinawa

OOL Contributes to Innovation for Society, Business and Personal Life in the New Normal Era through its Open Approaches and Rich Experiences Looking ahead to Beyond 5G
2 Transit and Tourism Open Data
Issues for Tourists

- Difficult to find the route data for travelling by public transportation like bus or monorail

- Poor information appeared on the well used web service like Google Maps
To Use Rental Car

Shuttle bus waiting queue for rental car office at the airport
To Use Taxi

Taxi waiting queue at the cruise ferry terminal
Create an Open Data Platform

Open the OTTOP web site in August 2019

Okinawa Transit and Tourism Open data Platform

Publish and maintain the open data like
- Timetables
- Location of bus stops, stations, ports
- Route data

for
- Buses
- Monorail
- Ferries

in Okinawa

Data from 53 operators are published among 55 operators in Okinawa
After Publishing Open Data

Reach to the destination via buses and ferries.

Route data can be searched in Google Maps including ferries.
Gathering Tourist Spots Data

OOL has gotten approval from all of cities, towns and villages in Okinawa (total 41 municipalities) to publish tourist spots data on the OTTOP gathered from local tourism associations which are published on the local websites respectively.

Some of the gathered data can be gotten through APIs like:
- A list of tourist spots
- Their detail data
- Reachable spots within a certain time period

These data will be added and expanded by discussing related parties and local associations.

APIs on the OTTOP

By using APIs, tourist spots and their detail data can be gotten and used by applications for tourist services like reachable spots within a certain time range.
To facilitate the usage of OTTOP, a Hackathon had held in December 2019 with 31 participants including young engineers and students.

Following applications have developed in this hackathon:

- Utilize free time for tourists
- My timetables
- Bus navigation for events
- Vacant parking space navigation
- Bus collection
- Smart bus navigation
Realtime Data Gathering

Realtime bus location data gathering feature will be added to OTTOP in FY2020 for the bus routes mainly used by tourists.

1. GPS data gathering
2. Get the real-time bus location
3. OTTOP (OpenTourism Open Platform)
4. Feed to Google Maps
5. Convert into GTFS-RT format
6. Open to the public usage as an open data
Tourists travelling data are planned to be gathered in FY2020 to find out issues and to consider the future enhancement of data utilization.

- Request for tourists to install a tour guidance application
- Get approval to acquire location and personal attribute data
- Gather personal attribute and GPS data through the application

- Lent a smartphone or tablet for rental car users
- Get approval to acquire location and personal attribute data
- Gather personal attribute and GPS data for rental car users
OTTOP Summary

Provide convenient services to end users by open collaboration between cross industries

End users

Route guidance service by Google, Baidu, Yahoo!, Jordan, etc.

Various applications by local IT companies and service providers

Transport Open Data

Okinawa Transit and Tourism Open data Platform

Tourism Open Data

Transportation companies

Tourism associations

Visitors Bureau

Support

Support

Support

Okinawa Government

Provides GUI for companies and organizations to maintain open data by themselves
3 Data Utilization Use Cases
Collaborating with NEC
Planned in FY2021
Case 1: Count the Number of People (Real Time)

- Count the number of people at tour spots/shops by sensors and send data to the Smart IoT system, thus tourists can see the congestion status in real time.
- Public transportation operators can facilitate the usage of public transportation and can avoid opportunity loss by dynamic allocation of cars and busses according to the congestion status.

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1. Count the Number of people
2. Facilitate to use public transportation
3. Dynamic allocation of cars and buses
4. Screen forward

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1. 観光客は混雑状況をポータル等より確認し観光施設を利用する事が可能（時間効率向上・三密回避）
2. センサー情報により人数カウントを行い正確な混雑状況をSmart IoT側に格納。
3. 事業者は混雑状況をSmart IoTのリアルタイムデータ（混雑状況）よりピンポイントの場所への配車・増便が可能。（機会損失の削減）
   ※リアルタイムデータは、FIWAREポータルよりSmart IoTへフォワードされる想定。
4. 混雑の場所より観光客を乗車させる事が可能。（公共交通機関利用促進）
Public transportation operators can create more efficient and suitable routes and timetables by analyzing the accumulated data such as number of people at each place, date and time.
Case 3: Utilize QR Code (Countermeasure for COVID-19)

By scanning the QR code in public transportation and registering a feedback to the Smart IoT system, tourists can get infection information by email if the infection happens near the QR code.

Public transportation operators can also get the infection information including date, time and which cars, then the operators can take actions for the infection.

Tourists

By scanning the QR code in public transportation and registering a feedback to the Smart IoT system, tourists can get infection information by email if the infection happens near the QR code.

Public transportation operators can also get the infection information including date, time and which cars, then the operators can take actions for the infection.

1. 観光客が公共交通機関に設置されたQRコード経由で自分のメールアドレスを含むフィードバックを登録。
2. Smart IoTよりTACO連携により感染情報を観光客および公共交通事業者へリアルタイムでメール配信。感染情報データはFIWARE側にも蓄積データとして積み。
3. 感染情報により次の対策が可能。
   ✓ 公共交通事業者：従業員のPCR検査・該当車両洗浄をタイムリーに感染対策可能。（従業員の不安払拭）
   ✓ 観光客：タイムリーな感染対策可能（公共交通機関利用への不安払拭、安全安心）

*TACO (Traveler’s Access Center Okinawa) has been established in Naha Airport to support travelers for preventing infectious diseases*
QR Code Implementation Image for Feedback
Case 4 : Utilize QR Code (Coupon/Mile Distribution)

By scanning the QR code in public transportation and registering a feedback to the Smart IoT system, tourists can get coupons/miles to discount the public transportation and tour spots/shops.

Public transportation operators can improve routes and timetables and enhance services based on the feedback information.

1. By scanning the QR code in public transportation, tourists can get coupons/miles to discount the public transportation and tour spots/shops.
2. Public transportation operators can improve routes and timetables and enhance services based on the feedback information.
3. Analyze the feedback information together with tourist attributes and travelling data.
4. Enhance customer satisfaction and repeat ratio.
4 End to End Network Slice Evaluation
MEF 3.0 PoC in 2019

- Exhibited PoC “5G xHaul Sharing as Slices with LSO Orchestration” in MEF19
- Demonstrated network slicing and multi orchestrator/controller integration on multi operator inter-connection environment
- Won “Network Slicing Implementation Award 2019”
MEF PoC 2020

E2E Dedicated Overlay Services

1. Real-time AI/ML-based recognition
2. High-precision jitter-less remote motion control
3. xHaul mobile transport
4. Unlimited video streaming

E2E dedicated slice control and management using LSO

Underlay Services

Physical Infrastructure

MNO/Enterprise 5G

Transport (Metro) service provider

Transport (Core) service provider
5 5G and IoT Projects
Towards Next Generation Smart City
- Utilize the advanced technologies for urban development for citizens' life and government services, etc.

- Make efficient for entire city

- Data exchange between various industries

**Concept of Smart City**

![Smart City Diagram](image)
1. Platform needs to manage various kind of data and needs to develop services

2. Network needs to handle the huge data and real time events
1. Platform needs to manage various kind of data and needs to develop services

   Evaluate the integration of data utilization platform FIWARE and FaaS (Function as a Service) feature for easy service development

2. Network needs to handle the huge data and real time events

   Utilize 5G Multi Access Edge Computing (MEC)
   - Locate the computing resource physically near place to the device or base station
   - Process the data or events at the MEC for those unnecessary to send to the cloud
Develop the **Meteoroid** to integrate the FIWARE and FaaS feature

- Meteoroid provides the event driven application execution environment in the FIWARE eco system utilizing FaaS (Apache OpenWhisk)

Evaluate a use case utilizing the Meteoroid integrating with 5G project network

- Use case: Digital signage control depends on the personal attribute
Use Case Evaluation

Use case

- Assume the entrance of stadium or airport
- Display the advertisement depends on the visitor’s attribute (age)
- Collect the visitor’s attribute by Field Analyst and notify to the FIWARE in every 3 sec.
- Control the signage depends on the attribute and count the number of visitors once a day
- Collected and counted data are stored into FIWARE in the cloud
- Advertisement data are gotten from object storage
6 Wrap up
Wrap up

Key factors to succeed the open collaboration (from our experience)

- Target oriented approach
- Zero base thinking to consider the collaboration partners
- Sufficient communications
- Scheme, formation or system to keep sustainability
Thank you!!