

Mobile Positioning Data Pilot Project for Official Statistics in Oman

NCSI

Presentation Objectives

Give an overview of the project, objectives and status

Provide possibility to learn from Oman case in terms of

- Administrative aspects of accessing the data
- Technological solutions of accessing the data

Present with the obstacles and risks involved in the project

Give overview of the lessons learned and future plans

About the Project

To provide a proof-of-concept for deciding if and how to implement Mobile Big Data as a part of official statistical system

The project concentrates on data access, methodology, and processing of the data collected by two largest Mobile Network Operators (MNOs) in Oman

Focus areas for statistical indicators are

- population,
- tourism and
- mobility

Stakeholders and Roles in project

Steering Committee (NCSI) – Oversight of the project

Telecommunication Regulatory Authority (TRA) – Approval of MNOs to provide data

Information Technology Authority (ITA) – Technical hosting of the government cloud (G-Cloud)

The Research Council of Oman (TRC)

Sultan Qaboos University (SQU) – Scientific and academic view on the project

Local Working Group (NCSI, TRA, ITA, TRC, SQU)

OmanTel, Ooredoo – MNOs

Positium, Nortal Oman – executers of the project

Project Time Plan

		Month	1	2	3	4	5	6	7	8	9-14	15-20	21-32
Phase I	Preparation tasks		█										
	Kick-off meeting		█										
	Consultations for accessing the data		█	█									
	Hosting setup (HW/SW)		█	█									
	Initial Transmission of the Data from MNOs			█									
	Assessing the Quality of the Initial Raw Data, Cleaning, Formatting and Preparation of the Data			█									
	Data Acquisition Report (D1)			█									
Phase II	Acquiring reference data				█								
	Adaptation of methodology				█	█	█						
	Mid-term meeting					█							
	Methodology Report (D2)					█	█						
Phase III	Aggregation of the data								█				
	API								█				
	Interactive applications								█	█			
	Dissemination Materials								█	█			
	Roadmap for implementation of continuous data updates								█	█			
	Training								█	█			
	Pilot Project Final Report (D3)								█	█			
	Project delivery meeting								█	█			
Project management		█	█	█	█	█	█	█	█	█			
Hosting		█	█	█	█	█	█	█	█	█	█	█	
Managed operations										█	█	█	

Expected Outcomes of the Pilot Project

Data Acquisition Report (D1)

Methodology Report using GSBPM v5.0 (D2)

Pilot Project Final Report (D3)

Data, Databases in 3 tiers and API (D4)

6 lightweight interactive applications (D5)

Dissemination materials incl. maps, animations, presentation materials, project web page (D6)

Telecommunication mobile service players in Oman

Service Providers:

Omantel

Ooredoo

Retailers: TeO, Awasar, Friendi, Renna, Zajel Communications LLC

Governmental Bodies:

The Telecommunications Regulatory Authority (TRA)

Ministry of Transport & Communication

Information Technology Authority (ITA)

Ministry of Legal Affairs

National Centre for Statistics and Information (NCSI)

International Organisations:

The International Telecommunication Union (ITU)

The ITU's Arab Regional Office

World Trade Organization (WTO)

Arab Network of Telecom & ICT Regulators

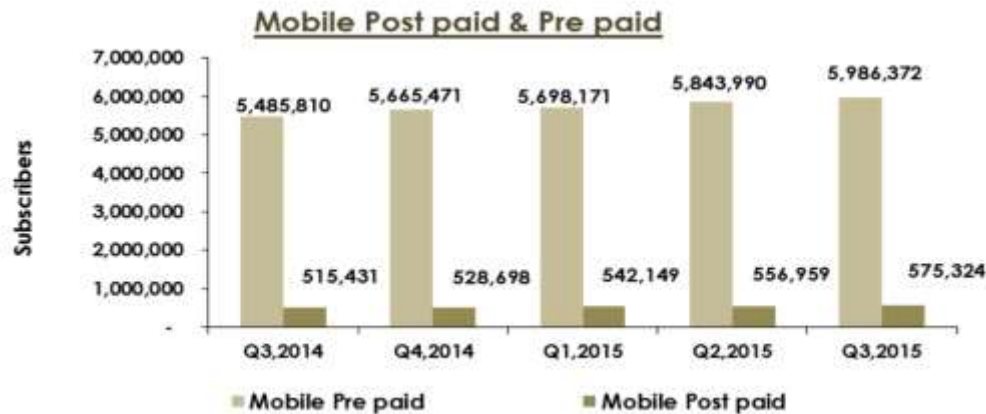
Oman Mobile Subscribers

6.5 million subscribers (6M pre-paid and 0.5M post-paid)

Penetration for mobile service is 154%

3.1 million mobile broadband users (penetration 74%)

Service providers: Oman Mobile (45%), Ooredoo (41%), Friendi, Renna, Teo



* all stats on 2015 3rd quarter by TRA

Data access

Required data

Call Detail Records (CDR, call activities) or Data Detail Records (DDR, internet data) stored in the data warehouse of the MNO representing the network activities:

- Inbound roaming data
- Domestic data
- Outbound roaming data

CDR and DDR data are described by:

- User identifier (discussion over IMSI vs MSISDN)
- Time of activity (e.g. when the call was made)
- Location of activity as Cell (e.g. antenna ID, where the call was made)

Cell reference data (geographical representation of cell information)

Socio-demographics :

- Nationality
- Age
- Gender

Legislative issues

Mobile Phone Location Data is sensitive and protected by law¹

Article (30)

The freedom of correspondence by post, telegraph, telephone conversations, and other means of communication is protected and its confidentiality is guaranteed. It is not permissible to monitor, search, disclose the confidentiality of, delay, or confiscate the same, except in cases specified by the Law and in accordance with the procedures stated therein.¹

Article (5):

It is not permissible to monitor telecommunications means or its content or inspect it or reveal its confidentiality or delay it or confiscate it or intercept it or take advantage of it without a prior order from the concerned court, unless there is a breach of public order or morals or infringement of the rights of others, without prejudice to the aforementioned law of Penal Procedures.²

MNO's are willing to give their data for public good, but it must be approved by TRA (written approval by TRA is required²)

NCSI has the right and necessary powers to collect and store data for generating official statistics³

Article (3)

The Centre, in order to achieve its objectives has the necessary powers to exercise its competences, in particular the following:

4. The collection and storage the official statistics generated by the centre and other government agencies, in addition to the information prepared by the private sector with the aim of analysing and publishing it.

¹The Basic Statute of the Sultanate of Oman

²Telecommunications Regulatory Act & Amendments

³Royal Decree No. 40/ 2014 Issuing the System of The National Centre for Statistics and Information

Data Security

There must be strict control over who can access the data

No data could leave Oman (TRA request)

Data has to be made "non-personal". Any direct identifier to a person like phone number or IMSI should be hashed or tokenised before moving outside of MNO's

Hashing algorithm has to be secure enough for collision resistance

Data processing could not take place on operator premises as it is necessary to remove duplicate SIM occurrences over MNO's

MNO's do not want to expose their business secrets to each other and

TRA is responsible for keeping *10 Repeated 9: To set the conditions for ensuring the security of beneficiaries' private data and ensure its confidentiality and privacy.*²

Hashing example

pos_time	pos_cell	msisdn	usr_origin
2016-07-18 04:57:36	7EF	95368806	EE
2016-07-09 19:03:36	E5E	95368806	EE
2016-07-20 05:14:00	13AC	95300000	OM
2016-07-23 07:52:00	288	95300000	OM
2016-07-14 05:28:48	857	95300000	OM
2016-07-06 02:43:36	197D	95300000	OM
2016-07-07 16:14:00	A31	95300000	OM
2016-07-02 11:05:36	1002	95300000	OM



pos_time	pos_cell	hashed_msisdn	usr_origin
2016-07-18 04:57:36	7EF	4554696726141310000	EE
2016-07-09 19:03:36	E5E	4554696726141310000	EE
2016-07-20 05:14:00	13AC	15565698112818500000	OM
2016-07-23 07:52:00	288	15565698112818500000	OM
2016-07-14 05:28:48	857	15565698112818500000	OM
2016-07-06 02:43:36	197D	15565698112818500000	OM
2016-07-07 16:14:00	A31	15565698112818500000	OM
2016-07-02 11:05:36	1002	15565698112818500000	OM

Data Security



This is why, the system that processes the data, will be hosted in secure government cloud (G-Cloud):

- G-Cloud is supervised and managed by ITA
- The data owner will be NCSI
- Each access to the G-Cloud has to be authorized by ITA or data owner

Data transfer is still not solved as only one operator is connected to Oman Government Network

Data Security policy must be formed and signed by all parties

Data Availability

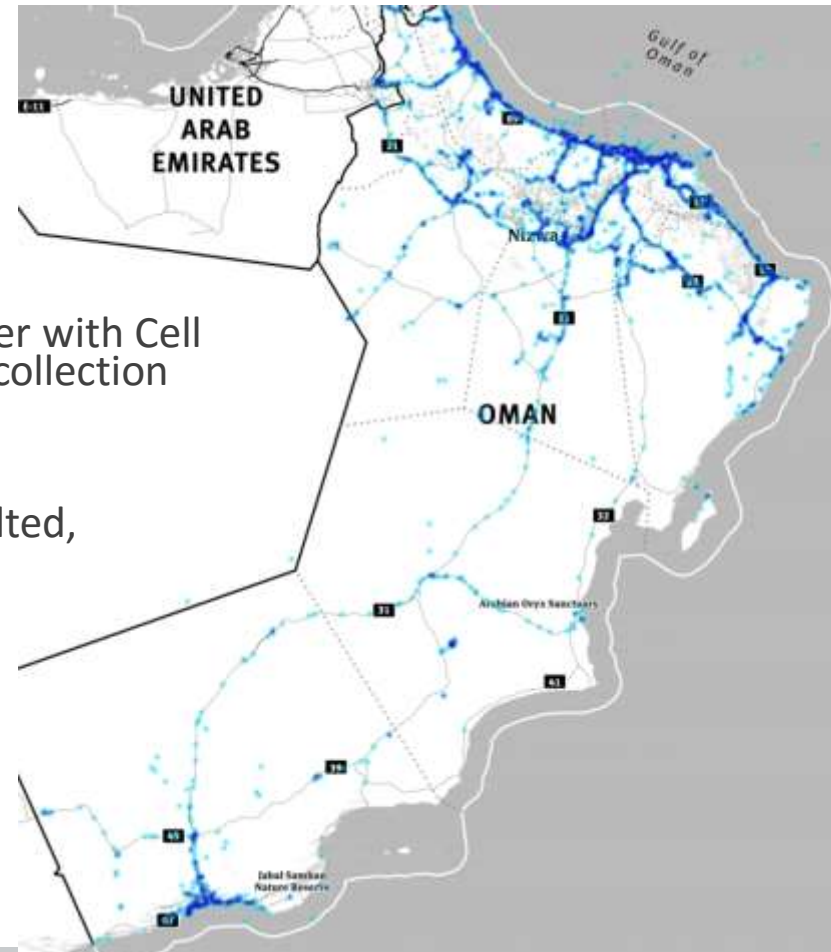
MNO's have different hardware setup and system configurations

There must be several meetings with MNO people to find out the best possibility to extract mobile positioning data

For example one MNO stores CDR data together with Cell information and the another one is not. Data collection method has to be changed now.

Cell information is stored in very different forms at different MNO's and it must be consulted, which one is most suitable for mobile positioning project.

Data coverage might be an issue for statistics generation methodology as there are big differences between rural and urban area coverage





Project status

Current Status of the project

Currently ongoing: Phase I

Access to the data behind the approval from TRA

Technical preparations are ready (G-Cloud)

Several meetings with stakeholders and MNOs

Consultation with MNOs on technical questions ongoing, aim to use period of 2 years of data

One of the MNOs has not available historical location data, working on having a solution for that

Expected Benefits of the Project

The benefits of the Mobile Big Data are seen in

- faster processing and production of statistical indicators,
- supplementary and new indicators in previously unavailable magnitude,
- improved temporal and spatial coverage and accuracy,
- smaller or no burden on the respondents,
- cost-efficiency,
- applicability in a wide range of domains inviting new public and private user to benefit

Example of Benefits

NCSI is organizing every year a tourism survey of Salalah visitors during the Khareef Season. The cost of this single survey could be replaced with faster (data is already digital) and higher quality (larger sample) data using mobile positioning data

Oman does not have origin-destination statistics for transportation sector. Starting to use this data, will improve the quality on decisions of large infrastructure project running in Oman

Lessons Learned

It takes time to talk to all involved parties and explain all details of the aims of the project and how it is carried out.

CDR data must be made non-personal and access to even this data must be well protected.

The location where the data processing is taking place is crucial:

- MNOs have business secrets within the data and they want to make sure that only statistical office could access the data and nobody else (especially not other MNOs)
- Privacy advocates want to make sure the data is safe from privacy breach and ideally they do not want to move it at all.

Future and Other Domains

Expected implementation – data updated regularly and indicators produces on regular basis (quarterly, monthly)

Involving new users (OmanAir, Municipalities, Private sector) and new data usage possibilities

How big data will save money for official statistics and improve decision making on the policy levels (faster decisions, better and more complex data for analysis, monitoring of changes, etc.)

Thank You!

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