Updates on the Taipei Metro

CoMET 2017 Management Meeting, New York

台北大眾捷運股份有限公司
TAIPEI RAPID TRANSIT CORPORATION

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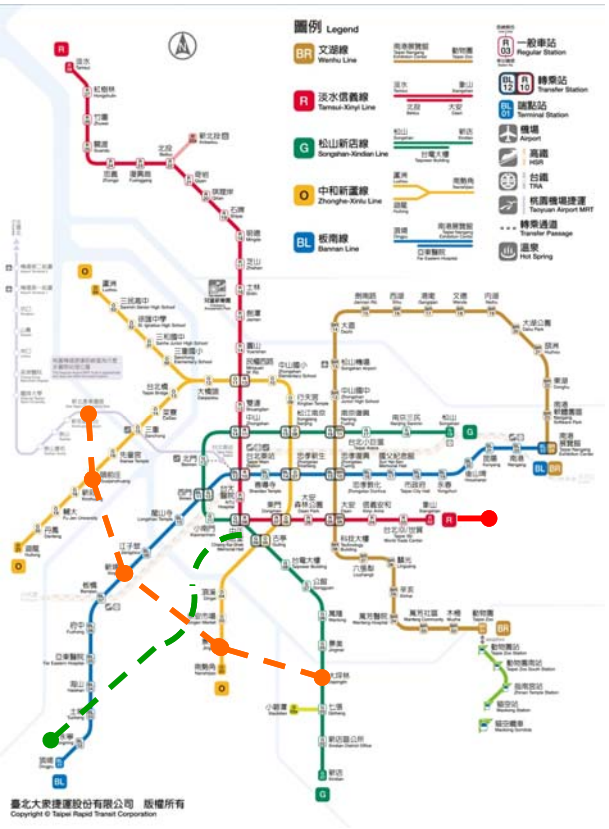
Network Information

Taipei Metro

- 5 Lines
  - BR Wenhu Line
  - R Tamsui-Xinyi Line
  - G Songshan-Xindian Line
  - O Zhonghe-Xinlu Line
  - BL Bannan Line
- 117 Stations
- 131.1 km in operation
- 2 million daily riders
- Total revenue in 2016: 622.9 million USD

Future Network



Circle Line Phase I

- Number of Stations: 14
- Total length: 15.4 km
- Planned launch: 2018

Wanda-Zhonghe-Shulin Line Phase I

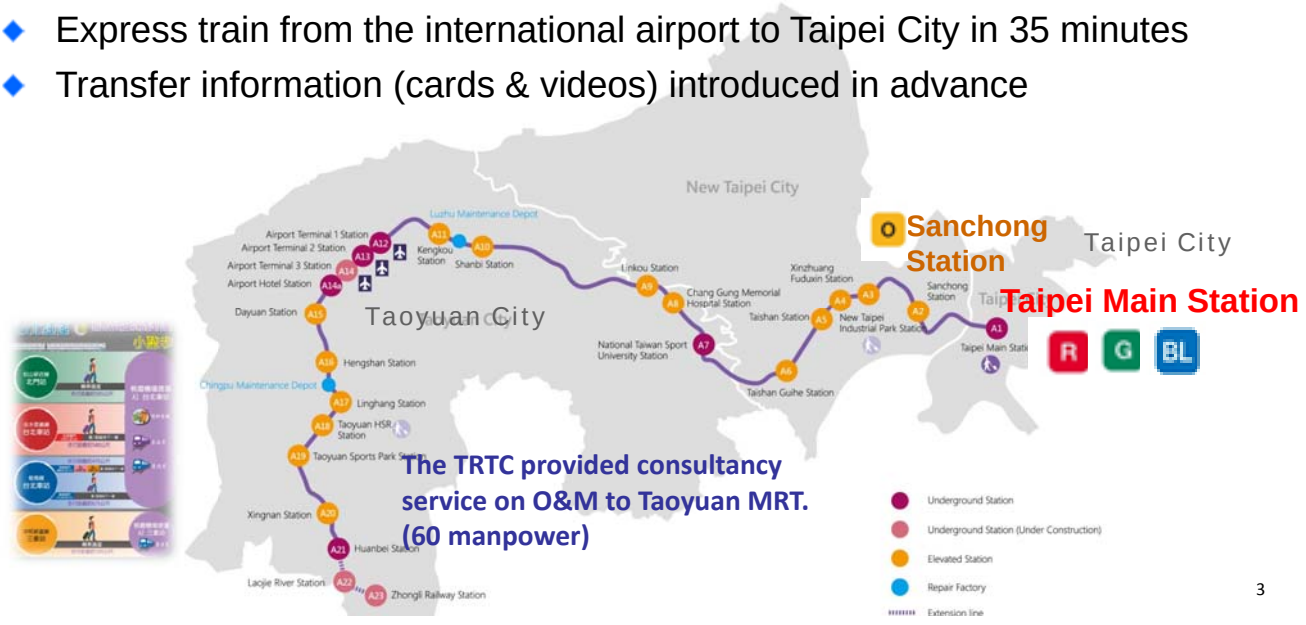
- Number of Stations: 9
- Total length: 8.8 km
- Planned launch: 2018

Xinyi Eastern Extension

- Number of Stations: 1
- Total length: 1.6 km
- Planned launch: 2022

Opening of Taoyuan Airport MRT

- Opened on 2 March, 2017. Operated by the Taoyuan Metro Corporation
- In-town check-in service
- Direct connections to Taipei Main Station and Sanchong Station on the Taipei Metro
- Express train from the international airport to Taipei City in 35 minutes
- Transfer information (cards & videos) introduced in advance



The TRTC provided consultancy service on O&M to Taoyuan MRT. (60 manpower)

Rolling Stock Refurbishment

- **301 fleet - 22 trains**

First Stage
2010-2013

Interior replacements (flooring), on-board communications, air conditioning and propulsion

Second Stage
2016-2017

Replacement of on-board signaling, brakes, auxiliary power, and train supervision information,

- **Extending life expectancy of the rolling stock**
- **Weight reduction, carbody load reduction**

E.g. propulsion equipment 680kg → 330kg

Replacement of Major Escalator Components

- 8 brands in escalator system (OTIS, KONE, GFC, CNIM, YUNGTAY, MITSUBISHI, LIOW CHUAN and JOE TENG).
- Some of the escalator systems (OTIS and CNIM) have been in service since the beginning of the revenue service in 1996, and have now been in operation for more than 20 years.
- Replacing key components of old escalators.

Major escalator components - Inverters

- **Period: 2016 - 2017**
- **Quantity: 409**
- **Extending life expectancy of the escalators**
- **Reducing equipment failure rate**

Innovations in Exploring Business Opportunities in Metro Stations - 1

Opening up Physical Business Spaces in Metro stations

- 21 business spaces created (2,950m²)

- 4 commercial spots added to major and transfer stations

- 4 metro souvenirs booths

- 18 metro fun photo booths

Innovations in Exploring Business Opportunities in Metro Stations - 2

Creative Ads @ Metro stations

Integration of the virtual and the physical

- Advertising walls for virtual stores (using QR codes)
- passengers shop online with their mobile phones
- 13 stations, 52 points

Creative Ads

- Introduction of a variety of creative ads and brand activities in MRT stations (128 points)

AR & high-tech creative ads

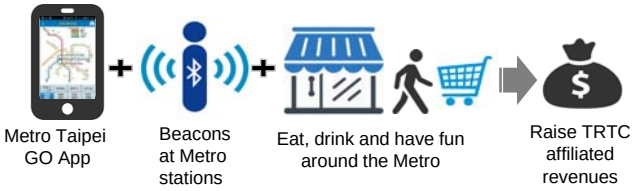
- We encourage agent to use AR virtual reality, MR hybrid reality or 4K video walls and other high-tech creative ads.

Innovations in Exploring Business Opportunities in Metro Stations - 3

Expansion of Mobile Advertising and E-commerce on the Metro App

- **the Metro Taipei GO App as an O2O Platform (Online To Offline).**
  - The app provides commercial space for contractors to launch products or e-coupons, which help raise revenue.

- **In-app mobile ads, push notifications & beacon technology**
  - A total of 1,100 beacons (micro orientation transmitters) were installed at the exits of each station in 2016.
  - Passengers can receive event info and e-coupons on their mobile phones. The service was launched in Feb, 2017.



Logistics collection points

- **Introduction of smart collection points at all 117 MRT stations.**
- **Customers can now pick up their online shopping at any Metro station.**

Benefits and applications of CoMET

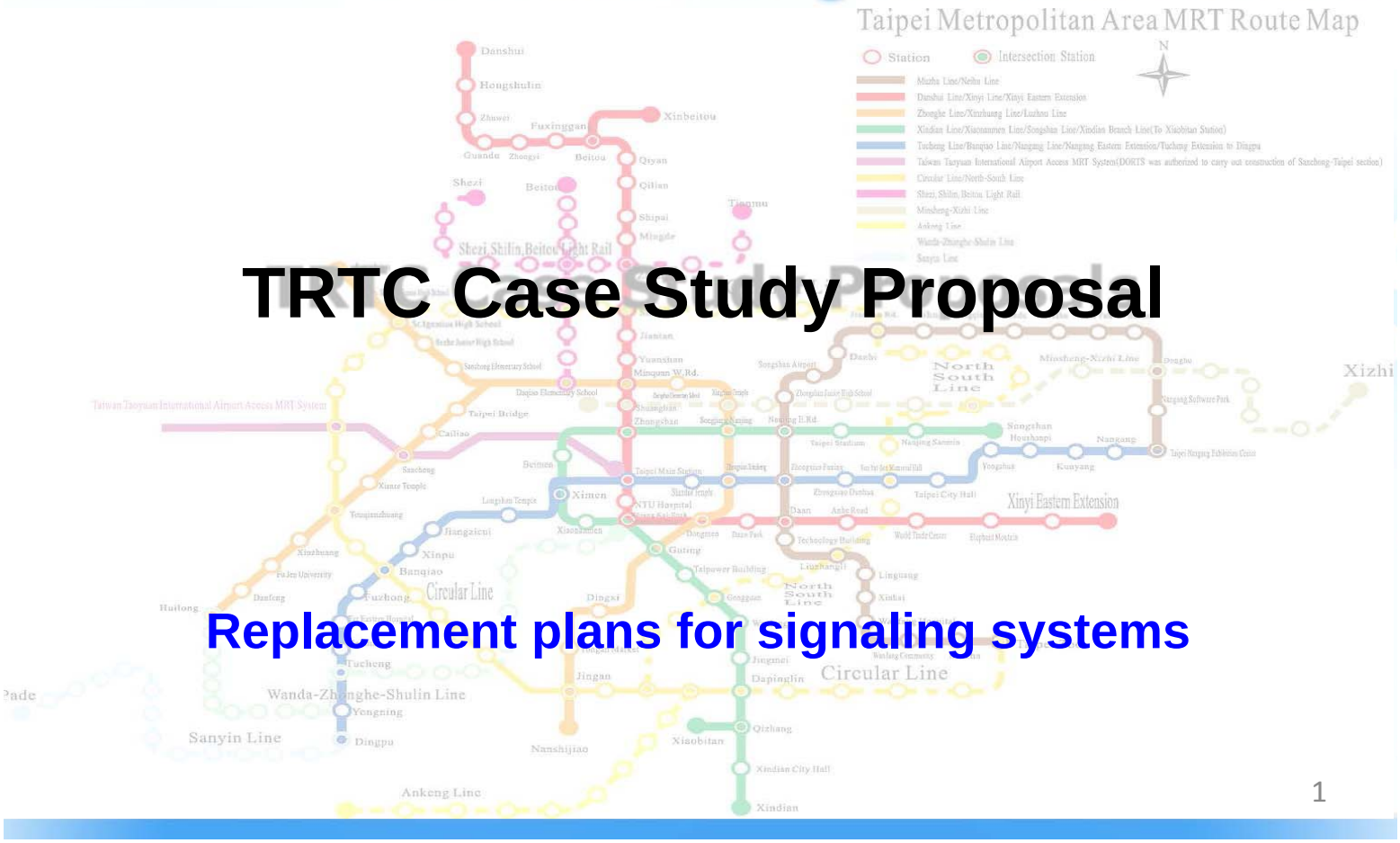
System Reliability Improvement

- A system reliability management framework was launched, based on the KPI " Million Car Kilometers between incidents causing delays of longer than 5 minutes to service, MKBF".
- Reference in setting annual and continuous improvement targets for our system reliability
- The MKBF has risen significantly (4.88 in 2016)

Life Extension of Rolling Stock

- We obtained many best practices from members through the CoMET/Nova case study analysis reports, such as "Rolling Stock Replacement Vs. Refurbishment" Study.
- Life expectancy extended
  - From 30 to 40 years for Wenhu Line trains
  - From 40 to 50 years for the remaining trains


Thank you for your attention!
We cordially invite you to attend the 2017 Annual Meeting in Taipei.
metro Taipei
台北捷運公司



TRTC Case Study Proposal

Replacement plans for signaling systems

Background

- Since the launch of the revenue service in 1996, some of the TRTC's original signaling systems are now approaching their service lives. To prevent issues such as discontinuation of spares and increasing purchasing costs, the TRTC is evaluating possible strategies and implementation plans for the replacement of these signaling systems.

- Considering the high cost and engineering difficulties of replacing signaling systems in operating stations, we would be interested to learn how other metro companies have tackled similar problems.

Objectives

- The TRTC would like to learn about other members' experiences in replacing signaling systems, and how they developed their strategies and implementation plans.

Scope of Work

- Analysis of the life cycles and replacement causes of signaling systems.
- Analytical comparison of the signaling systems' cost-effectiveness before and after replacement.
- Selection strategies for new signaling systems (e.g. Distance-To-Go, CBTC moving block system or others).
- The signal replacement processes as experienced by other metro members.
- Questions

1. What are the life cycles of your signaling systems? How do you evaluate them?
2. What is the replacement frequency of your signaling system? What reasons would prompt a replacement?
3. The detailed migratory process from the old system to the new one.
4. Please answer the following questions on the details of the replacement process:
   - 4.1. Which manufacturer did you use for the signaling system replacement?
   - 4.2. Quantity of system replacement (names and the lengths of lines on which signaling systems were replaced, and number of stations and trains.)
   - 4.3. What was the total replacement cost and the average cost per station?

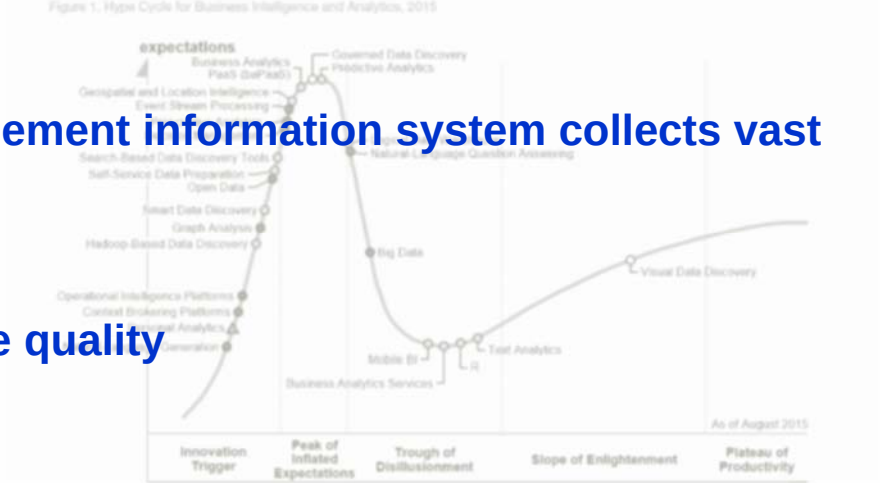
TRTC Case Study Proposal

Applying Big Data Analytics to Maintenance Management Information Systems

Background

- **Gartner Survey**

  - ✓ 48% of companies have invested in big data in 2016, a 3% increase from 2015
  - ✓ However, only 15% of companies have applied the technology to production processes



- **The maintenance management information system collects vast amounts of data**

- **Big data can be used to:**
  - **Improve maintenance quality**
  - **Reduce costs**

Objectives

- **To learn from other members about big data applications**
  - ✓ Development experiences
  - ✓ Development processes
  - ✓ Practical benefits in the maintenance area

Scope of Work & Questions

- **Development experiences and application processes**

1. How does big data improve your system, and what are the main application areas?
2. Have you used big data on your maintenance management information system?
3. What difficulties have you encountered in the process, and how did you overcome them?
4. What are the practical benefits of big data application?