

Lessons learned from Mumbai Metro One

The French experience
of sustainable urban transport



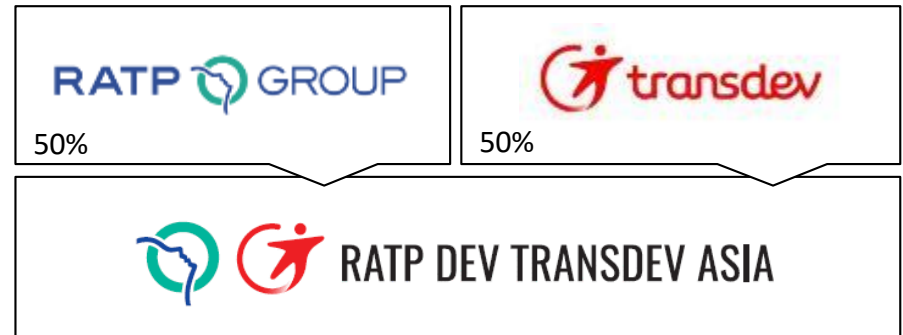
Paul GARDEY DE SOOS – Managing Director of Metro One Operation

1. MUMBAI METRO ONE: INDIAN REFERENCE OF RATP DEV TRANSDEV ASIA



Who we are

- RDTA was created in 2009 and is the exclusive J-V for Asia between the RATP Group (Paris Metro) and Transdev, both among the Top 5 international public transport operators.
- Leveraging on more than 100 years of experience, we operate and maintain landmark systems such as the Seoul Metro Line 9, Mumbai Metro, HK Tramways, Manila LRT1, bus operations in China. We also started the first Chinese modern tram in Shenyang.



Our expertise for Operation and Maintenance

Operation

- ⚙️ The leader in driverless operations
- ⚙️ Worldwide leading tram operator
- ⚙️ Longest and most extensive O&M track record
- ⚙️ Awarded safety management system
- ⚙️ Proprietary CRM tools

Maintenance




- ⚙️ Experience with all major system suppliers
- ⚙️ In-house asset and maintenance management
- ⚙️ Manpower or Service Agreement subcontracting wherever needed
- ⚙️ Data led maintenance (CMMS)








**We work as trusted partner in transferring and localizing expertise,
through tailor-made contractual arrangements**

Our expertise for Skills transfer and Contractual flexibility

Skills transfer

-  Training academies
-  3 greenfield rail projects successfully implemented within the last 5 years
-  Engineering culture with available experts pool

Contractual flexibility

-  Manila LRT: Long-term service agreement
-  Seoul Metro L9: O&M gross-cost
-  Mumbai Metro L1: O&M cost + fee
-  Anqing Bus: Net cost
-  HK Tramways: Full-risk



We work as trusted partner in transferring and localizing expertise, through tailor-made contractual arrangements

Two international public transport operation leaders



The operator of Paris network
developing worldwide through RATP Dev



The most global multimodal
public transport operator

Paris Metro since 1900
RATP founded in 1949
RATP Dev since 2002



RATP Group key figures

€ 5.4 billion in revenue
60,000 employees
3 billion passenger journeys
14 different countries
Operate entire Paris network

- 14 metro lines
- 3 regional trains (RER A, B)

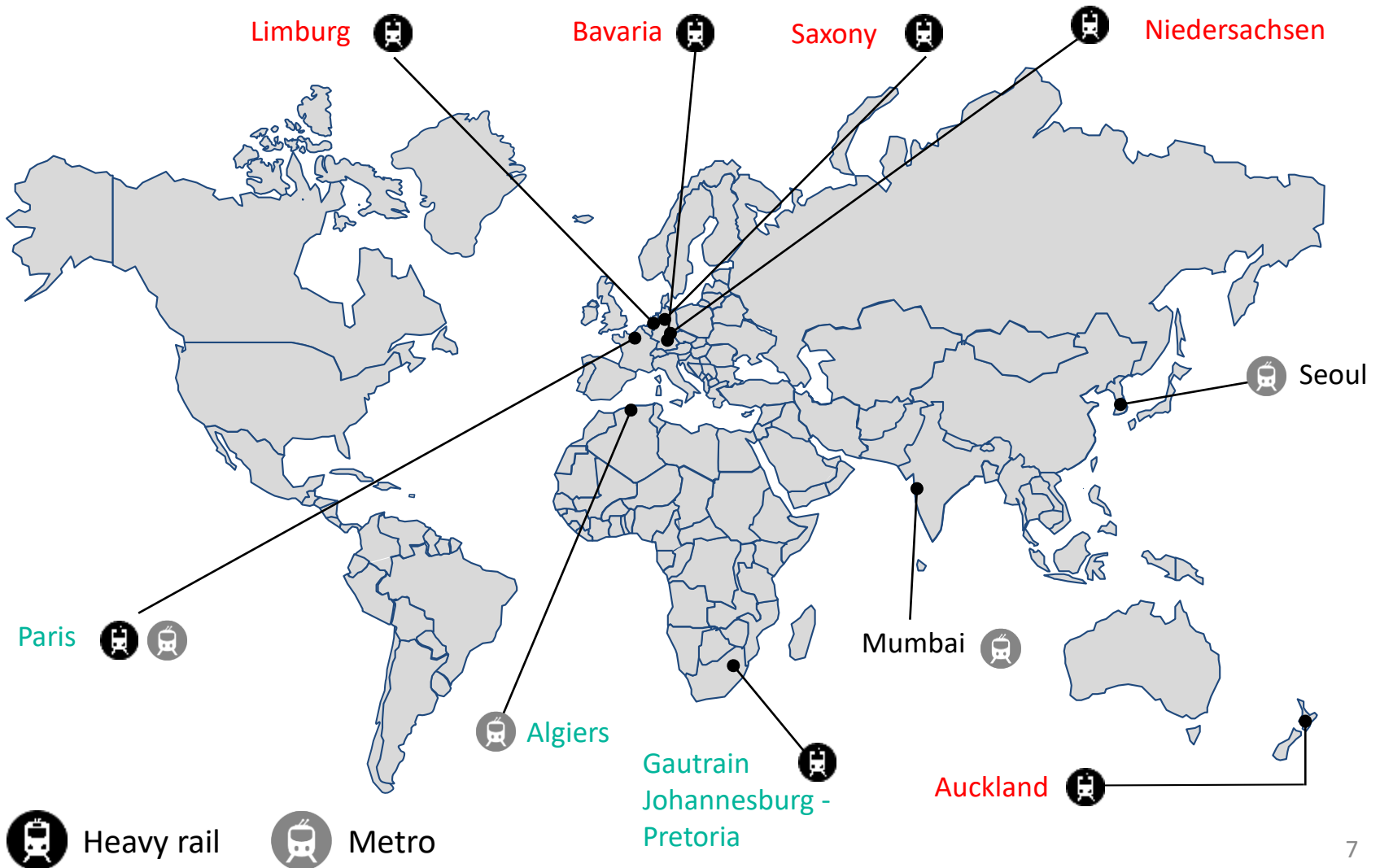
Formerly Veolia Transport
Renamed Transdev in
2013

Transdev key figures

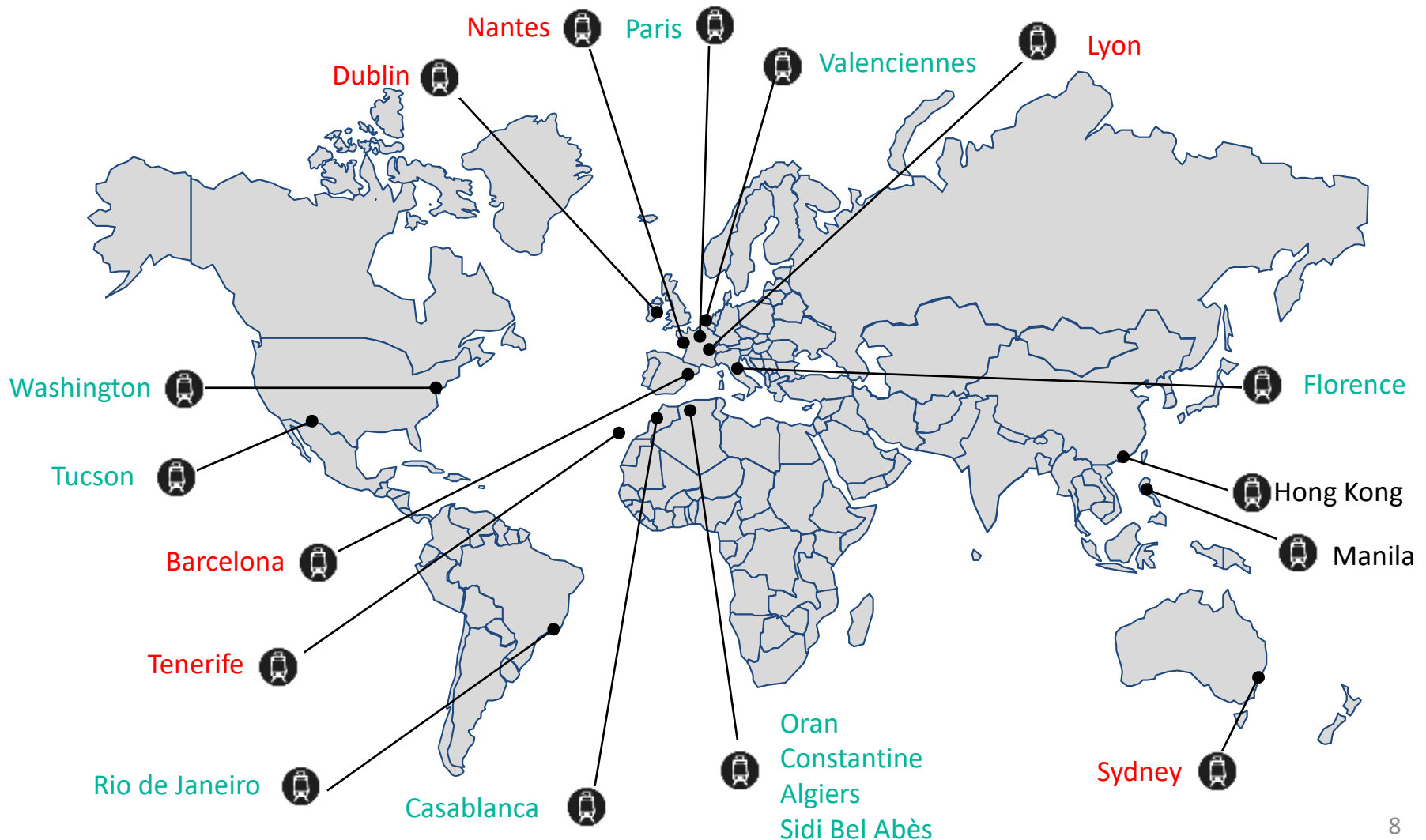
€ 6.7 billion in revenue
83,000 employees
3.3 billion passenger
journeys
19 different countries
All transport modes



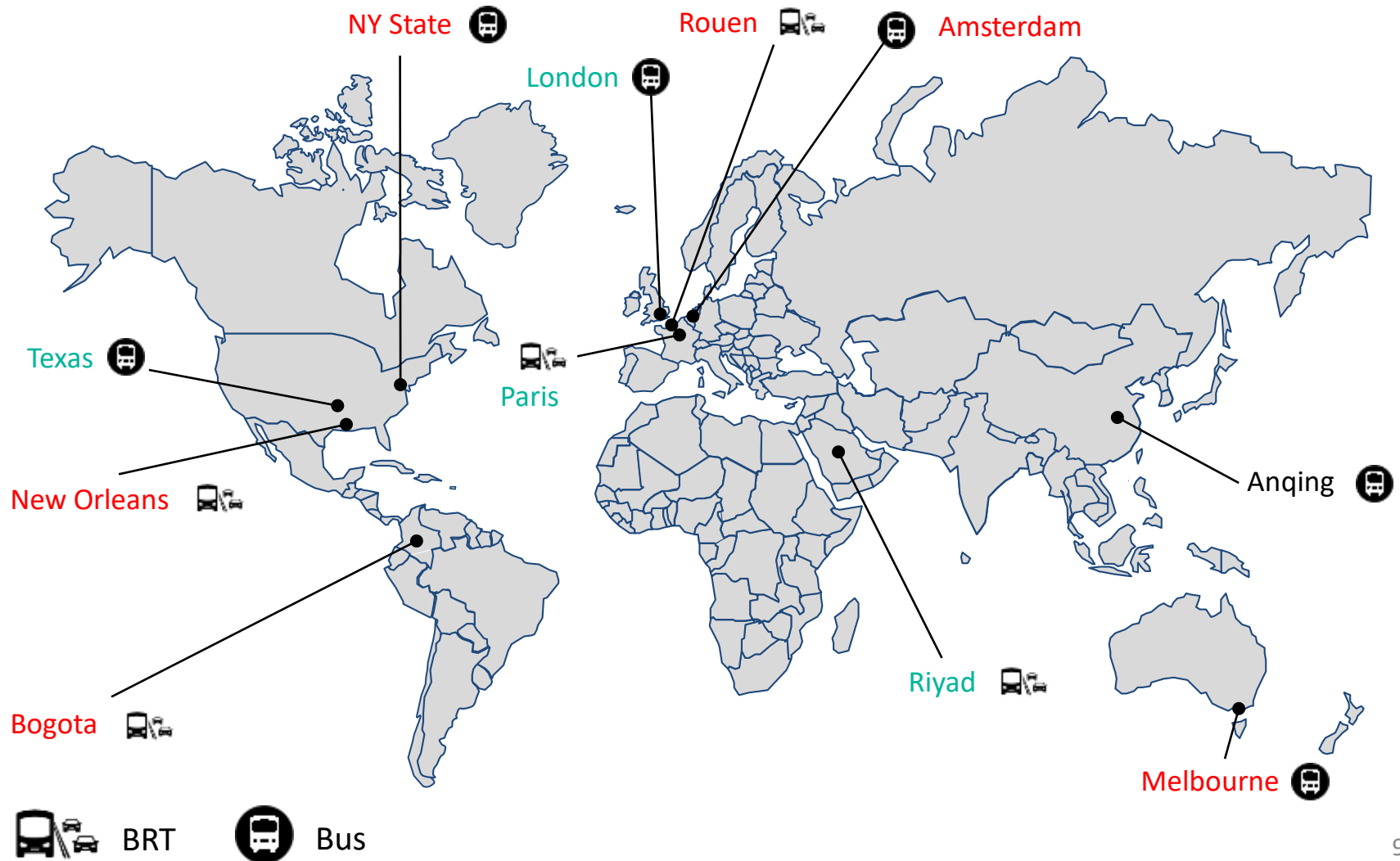
Our MRT best-in-class references from RATP Group and Transdev



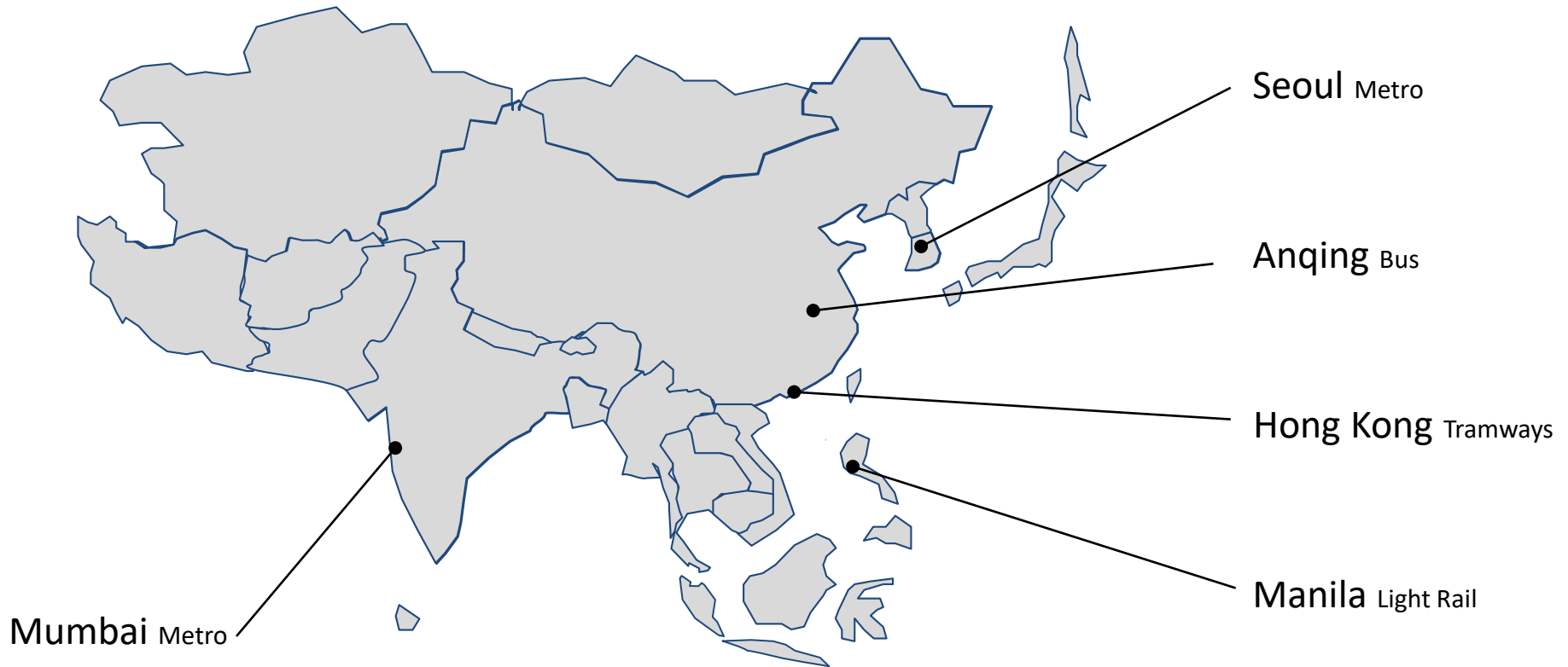
Our LRT best-in-class references from RATP Group and Transdev



Our BRT/BUS best-in-class references from RATP Group and Transdev



RDTA Presence in Asia



Anqing, China

Key achievements

- Dominant bus operator in the market (>90% on fleet and ridership)
- Real time fleet management tool
- A mobile App for a simpler journey
- Green energy bus adoption (50% fleet by 2019)
- Tailor-made public and private shuttle services
- Multiple accolades and awards from the public and authorities.



Key info

- O&M Net Cost
- Duration: 30 years (start 2008)
- Km travelled: 23 million km
- Lines: 38
- Ridership: 57 million pax/year
- Vehicles: 439 buses

Seoul Line 9, South Korea

Key achievements

- Express train: Stable operation of all stop train and express train as 1:1 on a same track (first time in Korea)
- Effective operational manpower: 25 employees per 1km (66 for competitor 'A', 40 for 'B') and 260,000 passengers per 1 employee (160,000 for 'A', 150,000 for 'B')
- Ridership: Achieved high annual average growth rate of transport demand about 12.6% (2009-2016)
- Punctuality: Realized high punctuality of 99.6% by shortening failure recovery time with first intervention
- Train Availability : Consistently achieved over 100%
- Casualty: Only 1 case reported ever since the line's opening (2009)
- International Standard Management System: Certified to 3 sectors - Quality, Environment and Safety



Key info

- O&M - PPP // start: 2009 // duration: 10 years
- System: 27km, 25 stations
- Ridership: 154 million pax/year
- Vehicles: 144 cars (36 trains composed of 4 cars)

Hong Kong, China

Key achievements

- Busiest tram line in the world with about 70 million passengers a year
- Fully integrated asset maintenance and renovation, with 15 new tramcars built “in house” each year
- High passenger satisfaction with 94% satisfaction rate
- Fully commercial business (no subsidy) with the lowest fare in Hong Kong thanks to the development of ancillary revenues
- Iconic system ranked 6 out of 801 attractions in Hong Kong on TripAdvisor, TripAdvisor Certificate of Excellence in 2014, 2015 & 2016



Key info

- Tram Ordinance // start: 1904 – handover to RDTA in 2009
- System: 13km, 118 stations
- Ridership: 70 million pax/year
- Annual km covered: 5.1 MN km
- Fleet: 163 double-deck tramcars
- Daily services: 1,400 departures

Manila LRT1, Philippines

Key achievements

- RATP Dev signed in 2014 a long term Technical Services contract (10+10 years) with LRMC the consortium which was awarded a 30 years concession for the operation and the extension of the Manila LRT1
- 5 full time senior O&M experts train, support and assist the local management for the Operation and Maintenance of the line



Key info

- System upgrade, South extension (11.7km), O&M, TSA // start: 2015 // duration: 10 years + 10 years renewable
- System: 1 line, 19.7 km, 20 stations
- COD: 1984 for Phase 1
- Ridership: 183 million pax/year

Mumbai Line 1, India

Key achievements

- Safety: We brought in international level of safety standards and a safety culture to a country where safety norms are not rigorously implemented.
- Cleanliness: Overall cleanliness has been maintained at a healthy 97%.
- Innovative ticketing and crowd management solution has ensured least waiting time for passengers at ticket counters (less than 120 seconds) and at exit automatic gates (less than 70 seconds)
- Operational excellence: Train punctuality is a commendable 99.9%
- Train Availability : achieved 100% train availability month after month.



Key info

- Cost + Fee // start: 2014 // duration: 5 years
- System: 1 line, 12 km, 12 stations
- Services: 376 departures/day
- Ridership: 110 million pax/year ; 400,000 pax/day

2. HOW WE DELIVER SUSTAINABLE URBAN TRANSPORT AT MUMBAI



O&M Sustainability singularity

Designing & Building a sustainable system
is different to Operating & Maintaining it sustainably.

Because Public Transport is by essence sustainable,
since it reduces the carbon impact and saves people's time,
our O&M sustainability vision is threefold:

1. Safety of the system: a must have
2. Operating and Maintaining the system in a eco-friendly way
3. Helping the assets' owner to make them more sustainable
4. Ensuring for all parties (operator, assets' owner, society)
that the business model is sustainable

1. Safety of the system: a must have

Lessons learned from our O&M's

- OHSAS 18001 certification
- Implementation of groups best practice
 - Open safety culture
 - Operational procedures, such as:
 - Alcohol screening
 - Safety critical communications
 - Inspections of Train Pilot
 - Degraded mode procedures
 - Regular Refresher Training
 - Fire & Operational Drills
 - Report of any near miss



Safety award recognizing the management of our subcontractors

0 severe safety incident
(SPAD, grievous injury, fatality...)

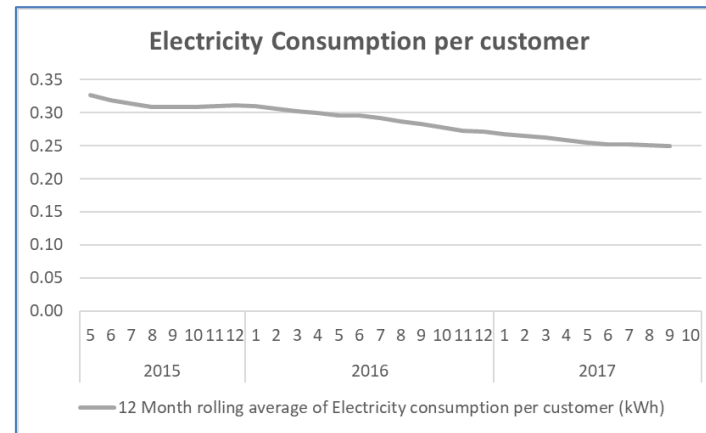
2. Operating & Maintaining the system in a eco-friendly mode

Lessons learned from our O&M's

- As any industrial system, ISO 14001 guides us to reduce our ecological footprint.
- Our subsidiary are accredited or working towards this accreditation by 2020.
- This includes:
 - Environment policy and management process
 - Monitoring of energy and water consumption
 - Measures to reduce energy and water consumption (eco-driving, braking energy recycling, raining water collection)
 - Water Treatment and re-use (watering)
 - Waste sorting and waste reduction
 - Full control of hazardous materials
 - Biodiversity's preservation along the line

Main challenges:

- Balance between trains' speed, escalator on/off or on-board temperature vs environment impact
- Waste sorting & collection
- Noise reduction



3. Helping the assets' owner to make them more sustainable

Whilst we don't own the assets, we strive to identify, suggest and help implementing more sustainable systems.

Best-practices - Solutions existing elsewhere

- Local recruitments
- LED PIDs or Tube lights in station
- Solar panels on the roof
- Paperless organisation
- Waste sorting in stations
- Motion-sensor light switches
- Smart ticketing solutions
- Electric utility vehicle fleet
- Multimodal Transit Hubs



Emerging - Innovative Solutions

- A/C greener alternatives ?
- Improved regenerative braking ?
- Green power supply continuity ?

4. Ensuring for all parties that the business model is sustainable

The Public Transports need to be a success to deliver the expected benefits to the society

- Be ready for the opening
- Excellent customer experience
- Financial equation is protected

How to achieve that ?

1. Agile mobilisation phase
2. Operational excellence from Day 1
3. Learning organisation with the customers
4. Value for money



4.1. Agile mobilisation phase

Reference 1 : Recruitment & skill transfers

Hiring & Recruiting
Process

Bespoke &
top-of-the-art
Documentation



Training Completion

825 staff to be
trained on 50+
training modules

Supplier
Training

“Train the
Trainer”

Transfer of knowledge

- from Seoul L9 for 17 managers (15 to 64 days)
- from CSR Nanjing for 6 managers (14 days)



100% staff + **29,060**
trained before Hours of training
COD

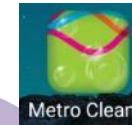
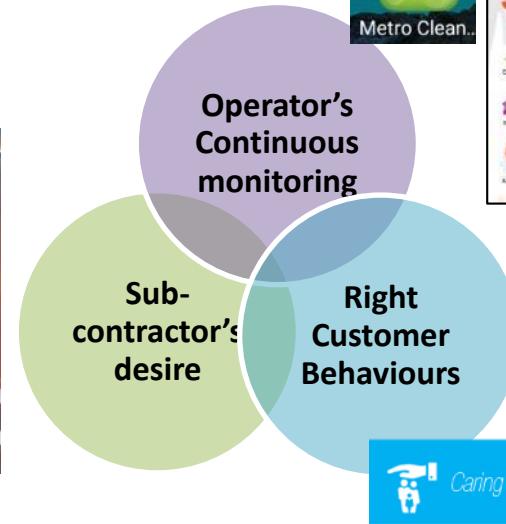
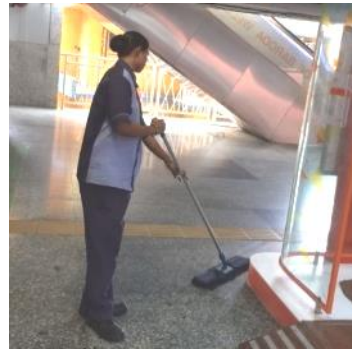
4.2. Operational Excellence from Day 1

Reference 2 : Cleanliness

Of stations

+

Of trains



Train Floor Before Polish
(80l of water)



Train floor after polish
(20l of water)



95% cleanliness at each metro station
Aiming for 97% now



Cleanest public space in Mumbai

4.2. Operational Excellence from Day 1

Reference 3 : Crowd Management



Crowd Management at Ticket Counters

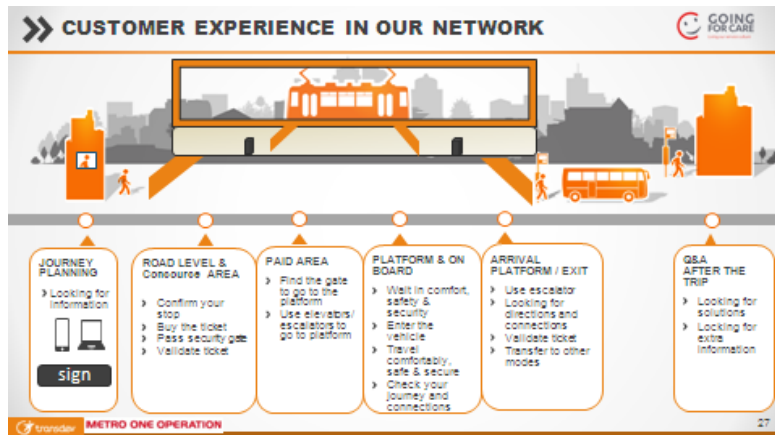


Crowd Management at AFC Gates



4.2. Operational Excellence from Day 1

Reference 4 : Customer Care



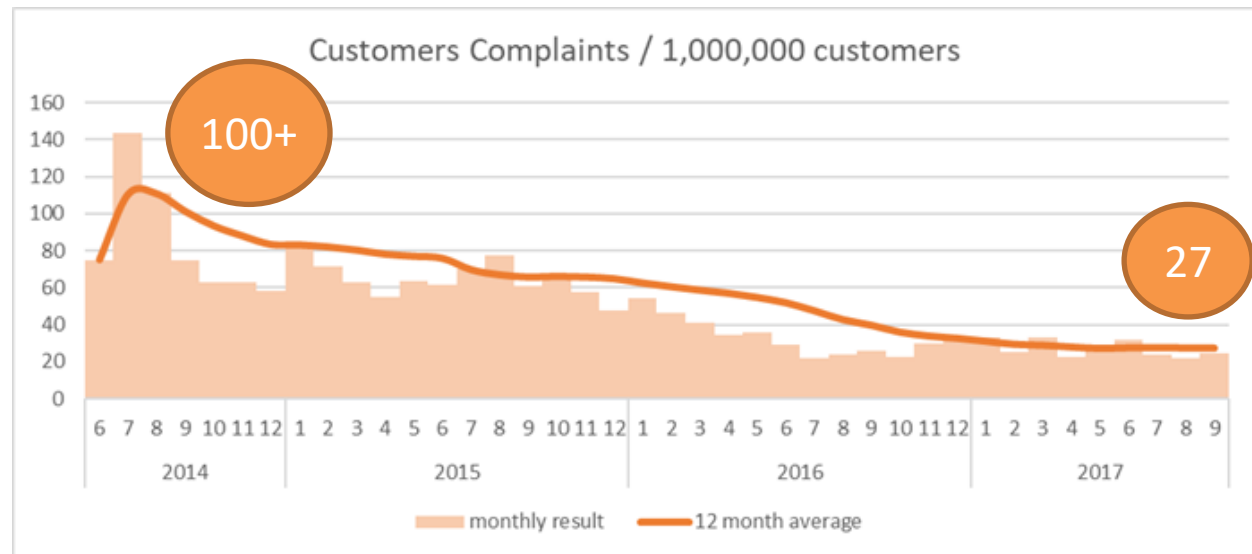
Symmetry of Attention

Measurement Tools



Built around the Customer Journey

All levels of the Transit System



4.3. Learning organisation with the customers

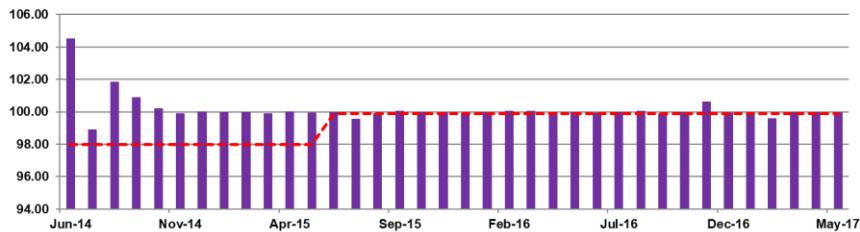
Reference 4 : Continuous Improvement

Performance driven organisation

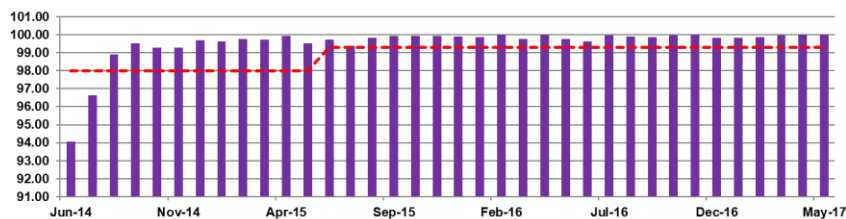
- ✓ The DNA of the company since Day 1
- ✓ Cross-function Performance meeting
- ✓ Complaints are escalated to Director level on a daily basis
- ✓ Looking for best practices or innovative solutions
- ✓ ISO 9001 & OHSAS 18001 certification



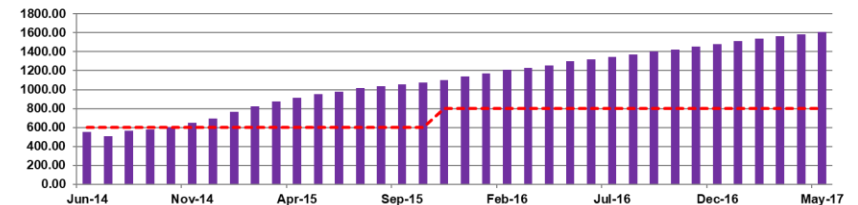
Train Delivery :



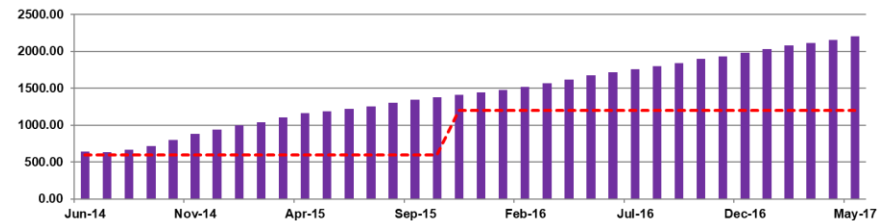
Train Punctuality:



MTBF – Lift :



MTBF – Escalator :

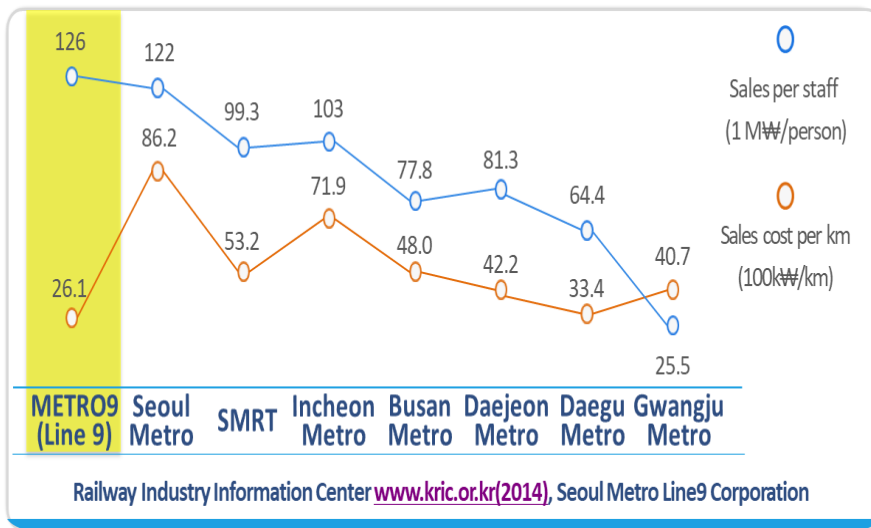


4.4. Value for money

Reference 5 : Cost optimisation

Range of options to optimise O&M costs:

- ✓ Well designed organisation
- ✓ Outsourcing of non-critical activities
- ✓ Multi skill and multi functional teams
- ✓ Training & rostering optimisation
- ✓ New suppliers with tenders
- ✓ Optimisation of Maintenance regime

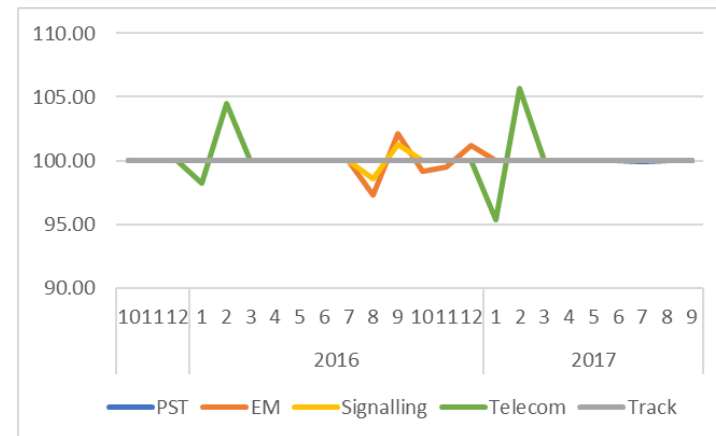


Benchmark of station Operations costs in Korea

Reference 6 : Asset Life Preservation

Asset conditions optimisation:

- ✓ Monitoring of asset conditions
- ✓ Priority to preventive maintenance
- ✓ Obsolescence management
- ✓ Comprehensive reporting
- ✓ Root cause analysis of faults



Thank You



Paul GARDEY DE SOOS – Managing Director of Metro One Operation