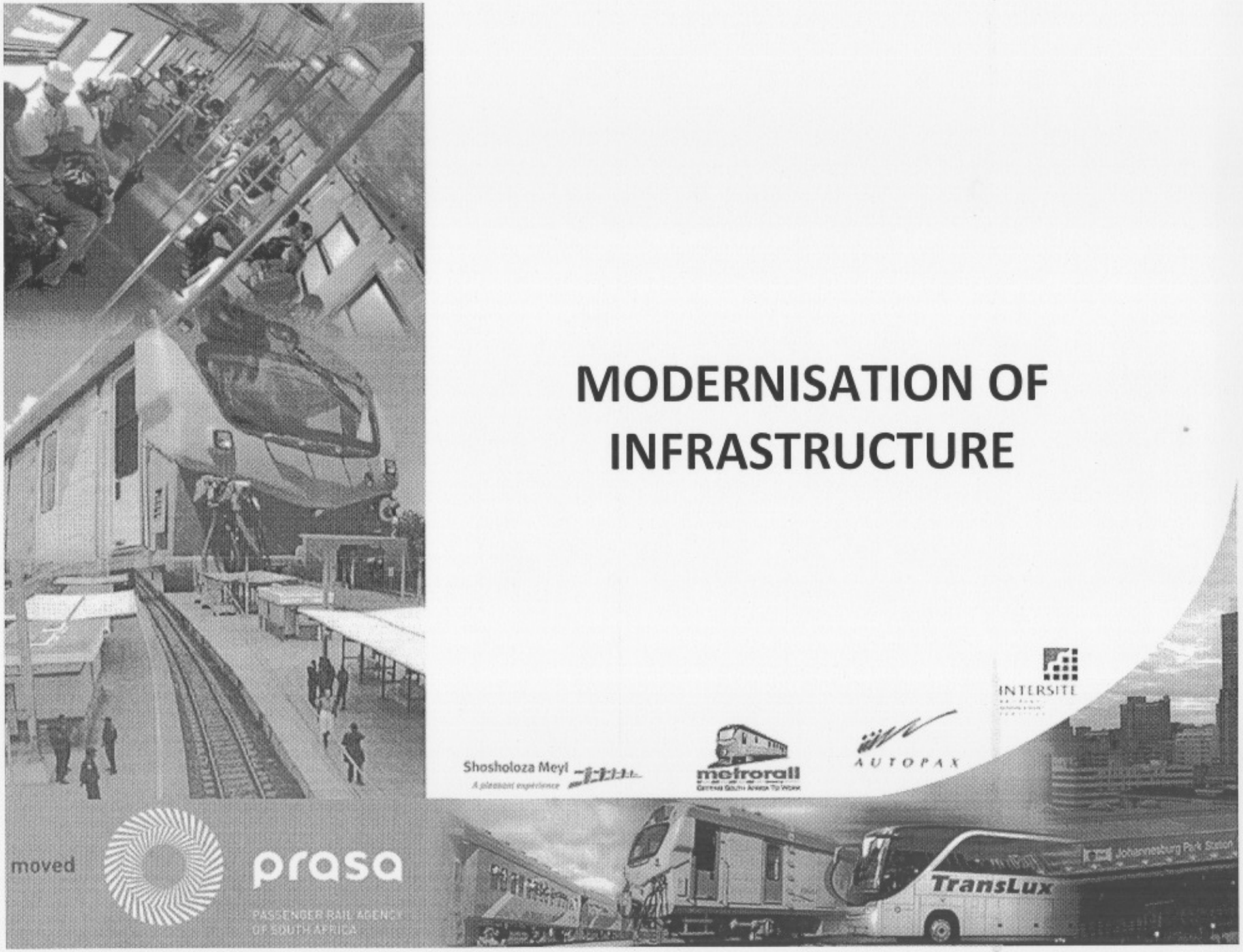
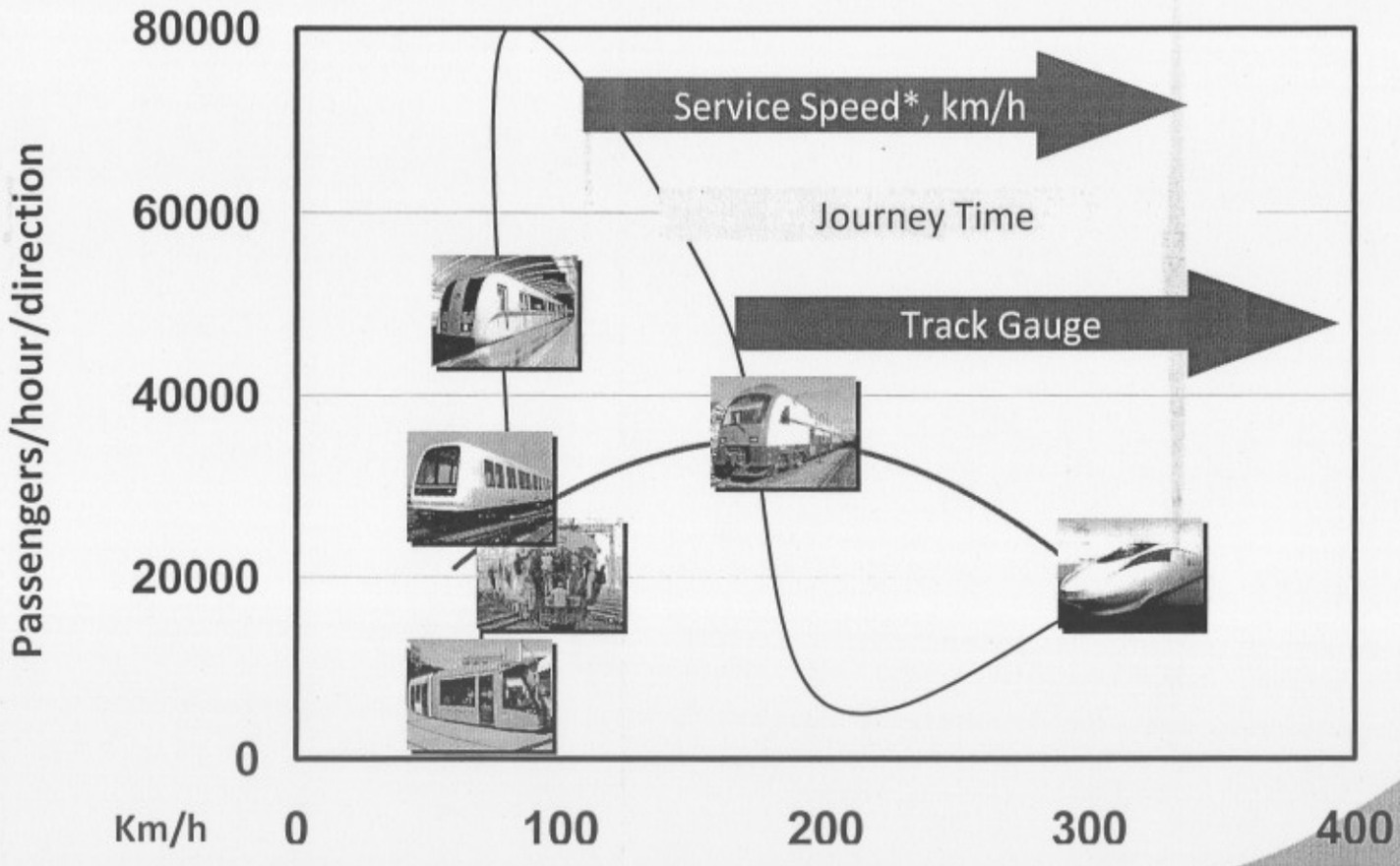
# MODERNISATION OF INFRASTRUCTURE



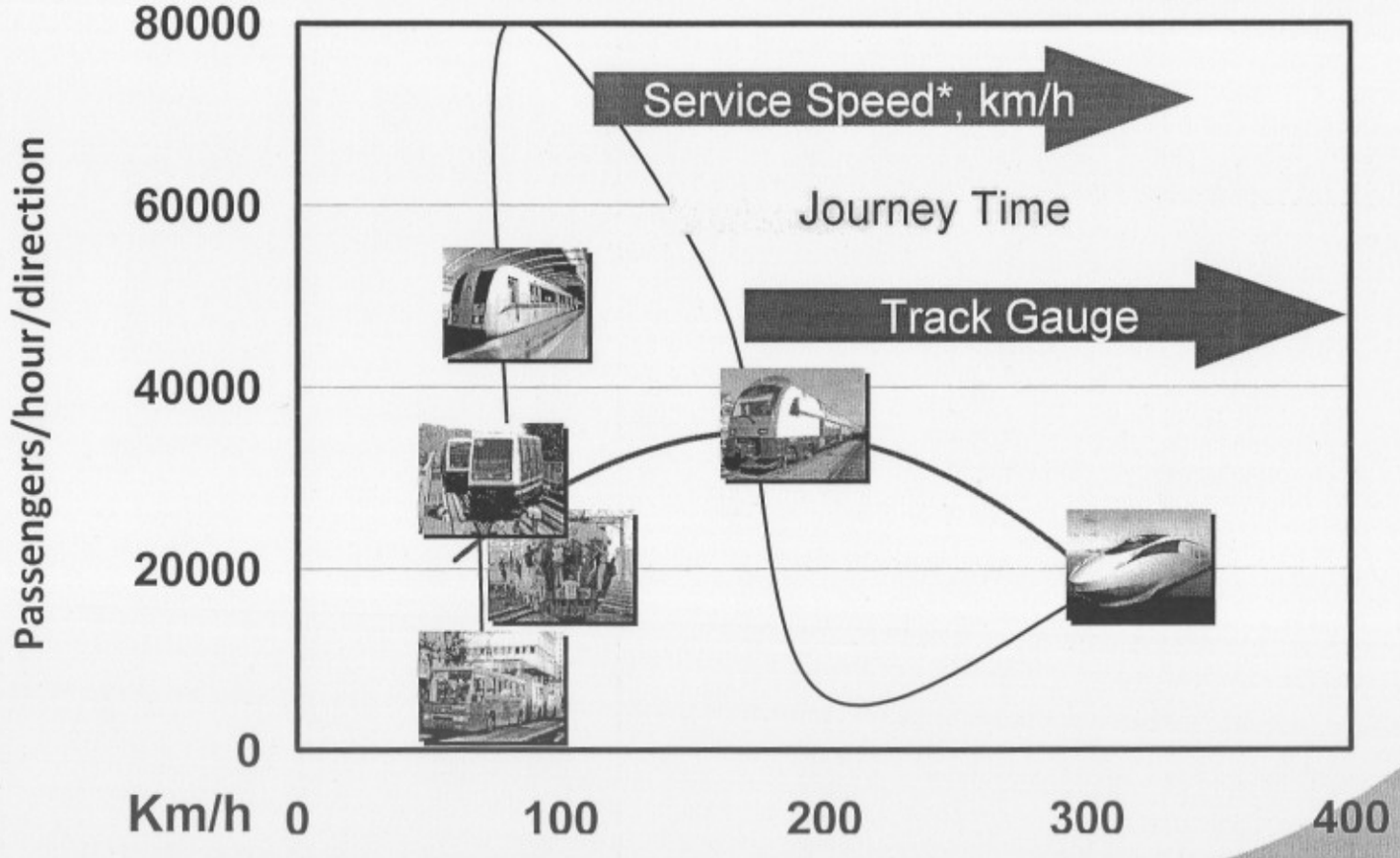
# RAIL APPLICATIONS
# CAPACITY, SPEED AND GAUGE WIDTH






Be moved prasa

# RAIL APPLICATIONS
# CAPACITY, SPEED AND GAUGE WIDTH




*Average speed depends on stopping frequency and infrastructure attributes



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# RE-BRAND PASSENGER RAIL SERVICES: CURRENT POSITIONING

Ultra-high Speed

High Speed

Low Speed

Local Regional Long Haul

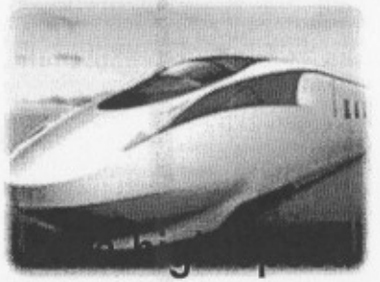
ROUTE DISTANCE

# RE-BRAND PASSENGER RAIL SERVICES: FUTURE POSITIONING

Ultra-high Speed

High Speed

Low Speed





Not a contemporary rail solution

Local Regional Long Haul

ROUTE DISTANCE

# TYPICAL CARRYING CAPACITIES OF URBAN TRANSPORT MODES

| | UNDERGROUND METRO | SURFACE RAIL | PRIORITISED BUS/LRT | URBAN BUS | MINIBUS-TAXI |
|---|---|---|---|---|---|
| Optimal hourly volume | 20 – 40 000 | 20 – 30 000 | 5 – 15 000 | 1 – 2 000 | 500 – 1 000 |
| Units per hour/route | 30 | 15 | 30 - 40 | 15 - 30 | 50 – 100 |
| Peak hour occupancy | 750 – 15 00 | 700 – 2 000 | 150 - 350 | 70 | 10 |

# PLANNING PROJECTS

## (Integrated Public Transport Networks)

- Motherwell Extension.
- King Shaka Airport Link.
- Bara Link.
- Hammanskraal Re-introduction.
- Daveyton Extension.
- Integration Projects with Gautrain.
- Moloto Development Corridor.
- Limpopo Rail Plan.
- Free State – Bloemfontein – Botshabello.

# CAPITAL COST DRIVERS FOR RAIL PROJECTS

**Economic life of rail system = 50 – 60 years**

| | COST PER KM |
|---|---|
| Single rail line<br>*(Excludes bridges, tunnels and heavy earthworks)* | R15m |
| Double rail line<br>*(Excludes bridges, tunnels and heavy earthworks)* | R28m |
| Electrification | R5m |
| Signaling CTC | R9.2m/route km |
| Earthworks - Category A – Difficult terrain | R15m |
| Earthworks - Category B – Fairly flat terrain | R8m |
| **Total**<br>**•Single rail line**<br>**•Elevated (Viaducts)**<br>**•Tunnel** | <br>**R35 – 45m *(Double R60 – R70m per km)***<br>**R70 – R90m per km**<br>**R140 – R180m per km** |

**ROLLING STOCK (TRAINS)**

R120 – R150m per train set *(10 /12 coaches).*

Loading factors:

- Light rail - 500 pax per train
- Metro - 2000 pax per train
- Regional - 1300 pax per train
- High Speed - 900 pax per train

# CHALLENGES AND WAY FORWARD

;est challenge for PRASA in capital investment is to obtain the correct balance
ween sustaining the current system, whilst at the same time starting to build
/ capacity to meet future demands as well as modernise the system through
ration to more contemporary technologies.

Service improvements, capacity management and efficiencies: PRASA Rail.

Maintenance costs too high: Modernisation.

Increased Capital: Operational maintenance.

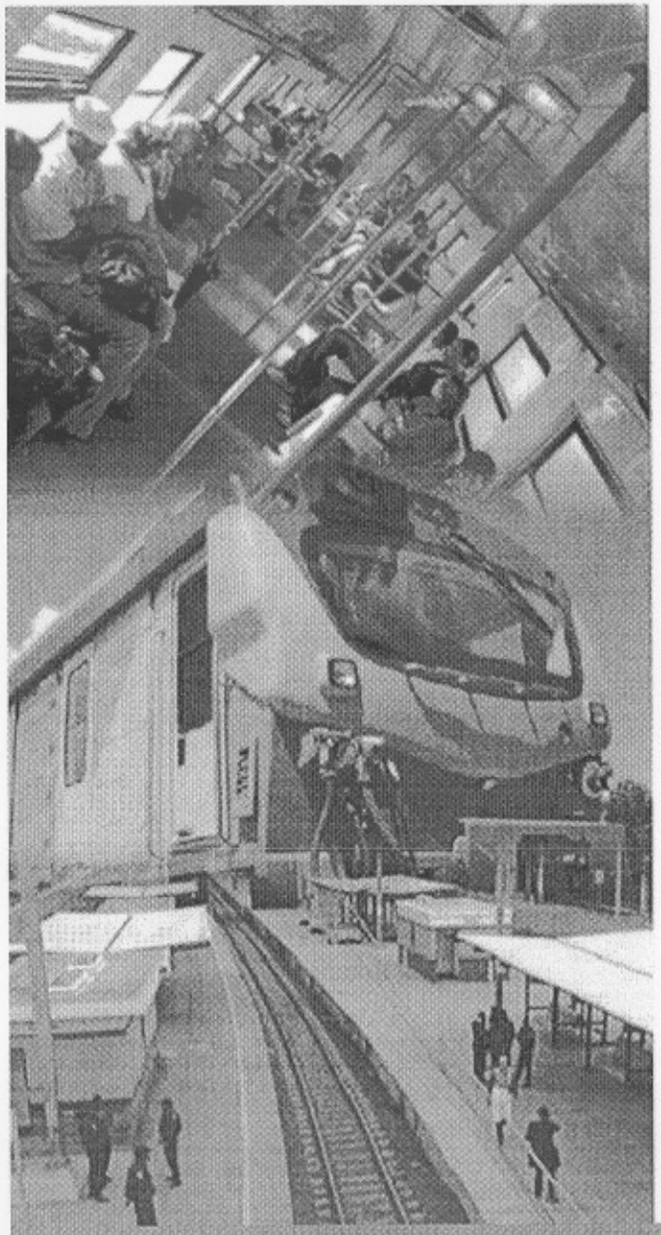
Integrated Planning: TFR. (Integrated Rail Network).

Capacity Management.

PRASA Strategic Demand Network Plan.

Technology and Modernisation Strategies.

- Investment Plans.
- Feasibility Studies and Business Cases.

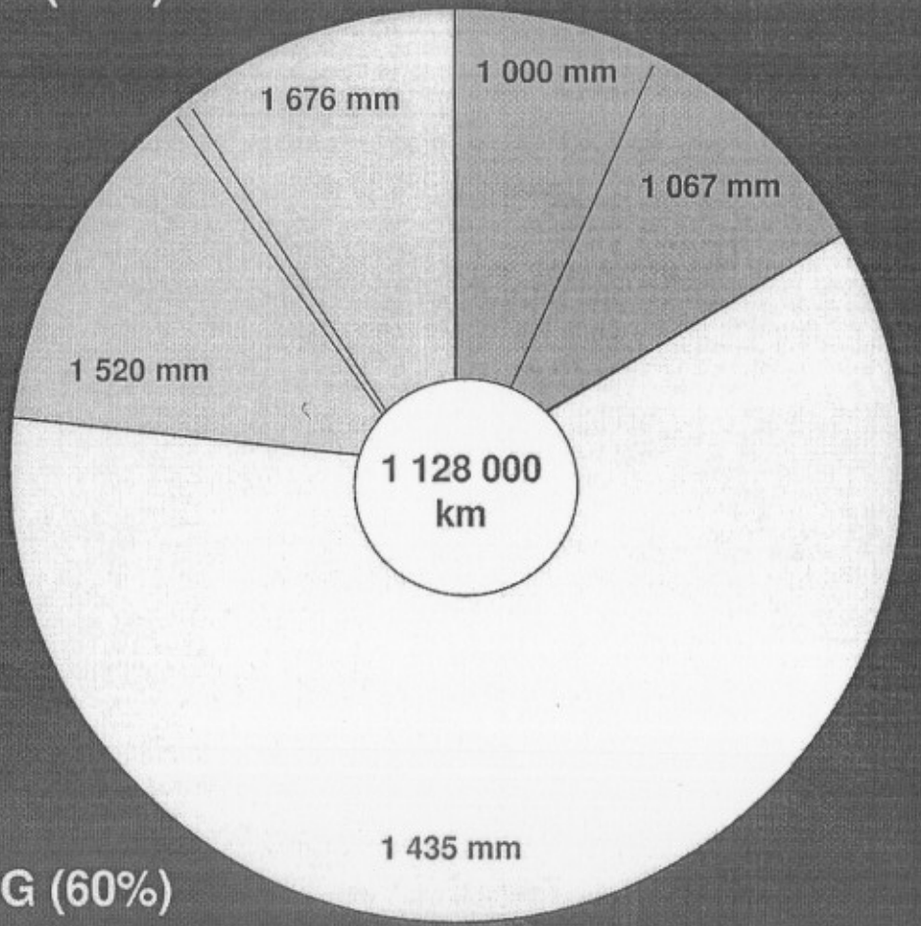


# RAILWAY GAUGE IN PERSPECTIVE

# WORLD RAILWAYS BY GAUGE

265 000 km BG (23%)

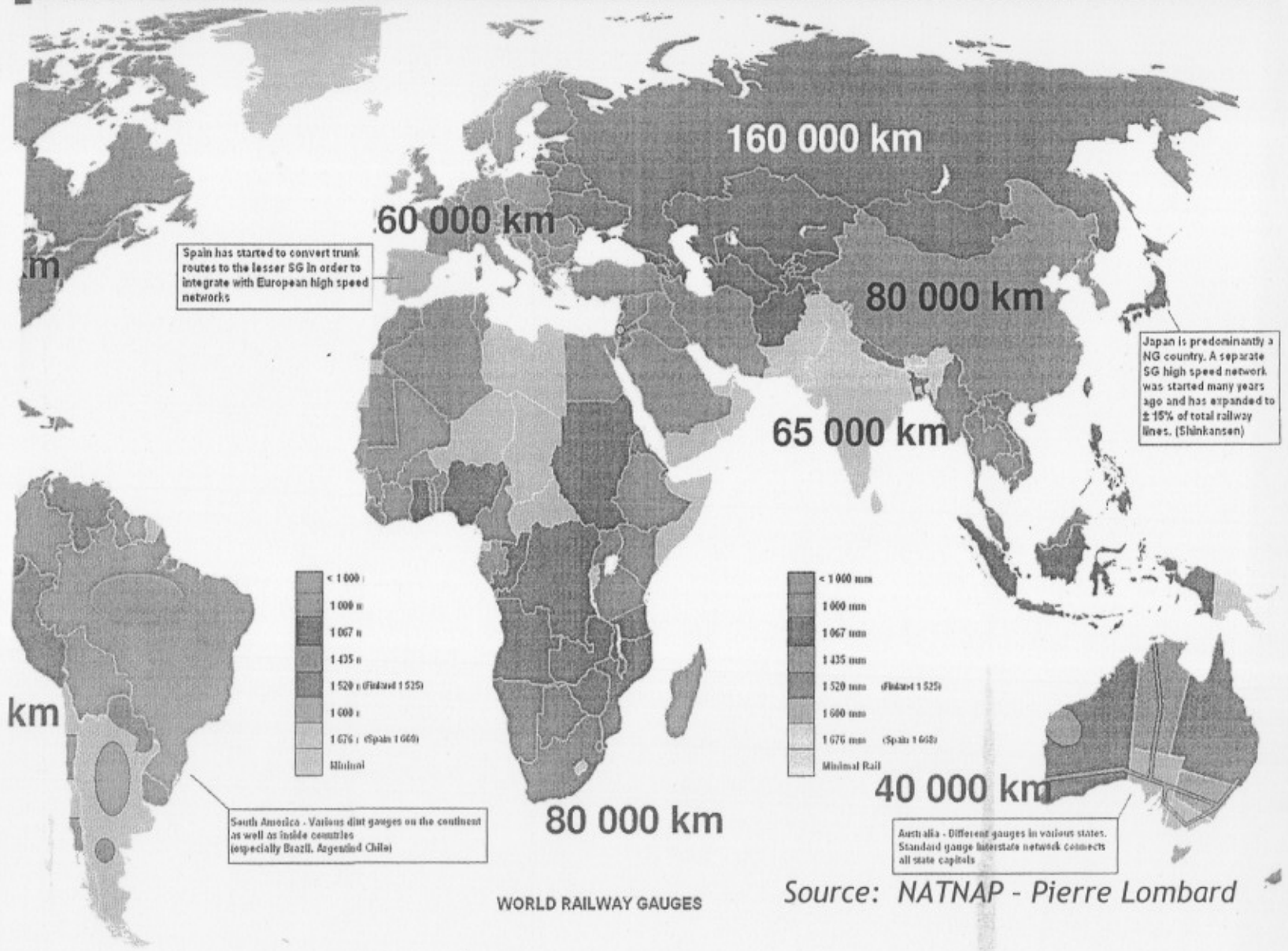
187 000 km NG (14%)




677 000 km SG (60%)

Source: NATNAP - Pierre Lombard

# Railway gauges of the world

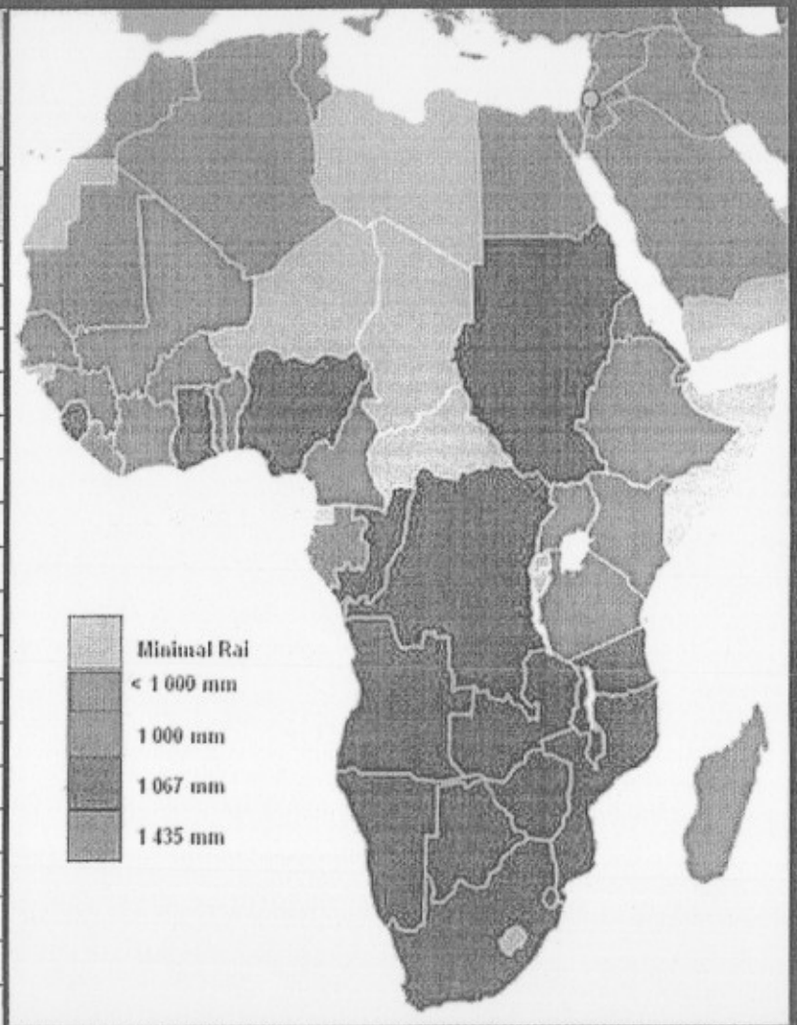



WORLD RAILWAY GAUGES

*Source: NATNAP - Pierre Lombard*

# AFRICA RAILWAYS RANKED BY LENGTH

| Gauge mm | 1 000 | 1 067 | 1 435 | Ranking |
|---|---|---|---|---|
| Country | NG | | SG | |
| | Kilometers | | | |
| **South Africa** | | **22 300** | | 1 |
| Egypt | | | 5 024 | 2 |
| Tanzania | 3 000 | 1 581 | | 3 |
| Sudan | | 4 578 | | 4 |
| Algeria | | 1 085 | 3 138 | 5 |
| Congo, Dem.Rep. | | 3 641 | | 6 |
| Nigeria | | 3 505 | | 7 |
| Angola | | 3 000 | | 8 |
| Mozambique | | 2 974 | | 9 |
| Zimbabwe | | 2 898 | | 10 |
| Namibia | | 2 382 | | 11 |
| Tunisia | 1 762 | | 496 | 12 |
| Zambia | | 2 232 | | 13 |
| Kenya | 1 918 | | | 14 |
| Morocco | | | 1 907 | 15 |
| Cote D'Ivoire & Burkina F | 1 260 | | | 16 |
| Uganda | 1 241 | | | 17 |
| Guinea | 936 | | 236 | 18 |
| Cameroon | 1 016 | | | 19 |
| 11 Others (< 1 000 km ea) | 3 222 | 3 736 | 1 353 | 20 |
| **Totals** | **14 355** | **53 912** | **12 154** | |
| **Percentage** | **18%** | **67%** | **15%** | |




**80 000 km**
**7% of World total**

*Source: NATNAP - Pierre Lombard*

# RDLLING STOCK

coaches upgraded irthe past 3 years.

ı (Upgrades, GO's an(preventative maintenance).

s on maintenance an reliability fori ncreased life span of 10 years.

)'s technology – Averge age = 35 – 40 years.

imum life span 46 yers – ⅓ of fleet beyond 37 years – To be retired

ı.

/ rolling stock acquisi:on program.

acity increase.

Current fleet: 2300 per tıin.

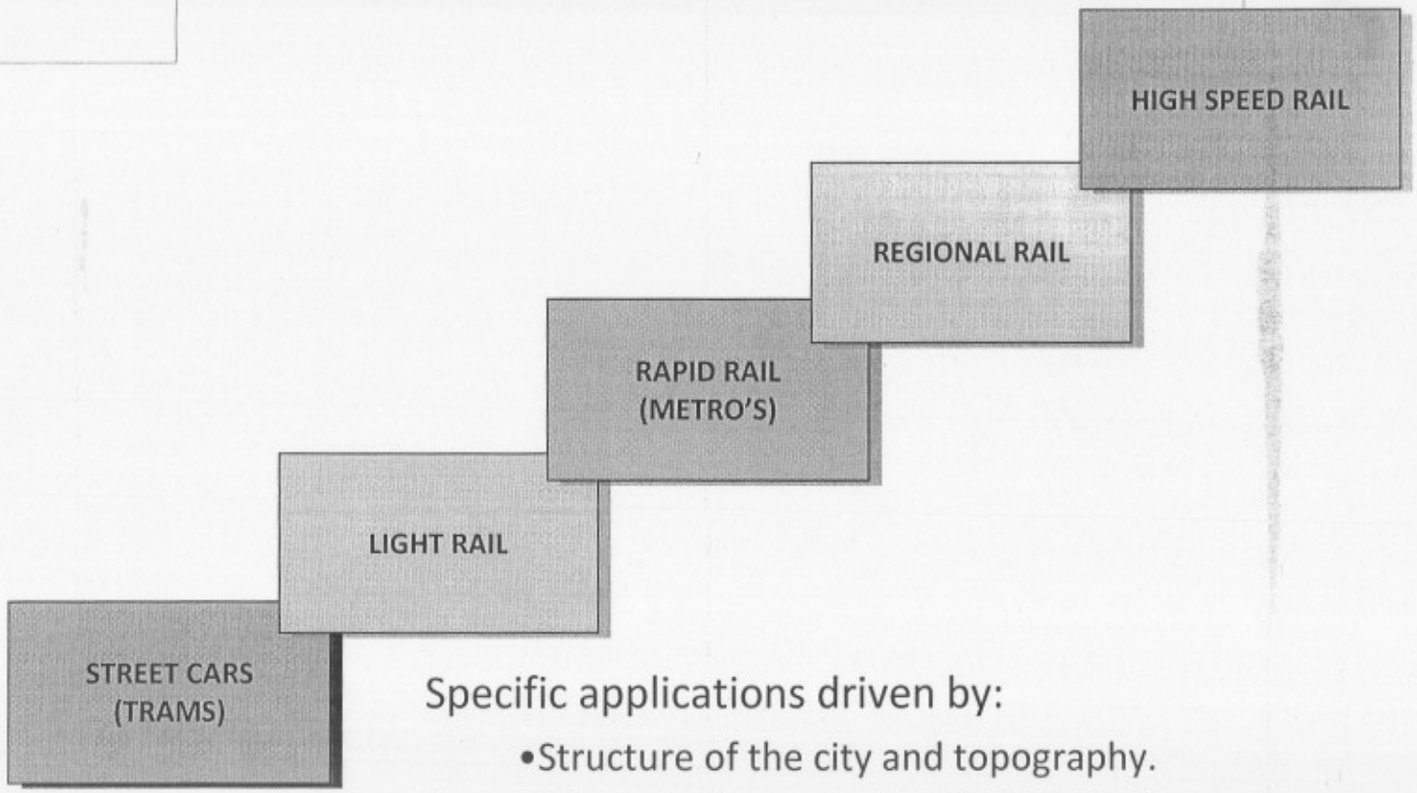
Contemporary fleet: 280 per train.

rasa

# NEED FOR FLEET RECAPITALISATION: CURRENT VS CONTEMPORARY TECHNOLOGY STANDARDS

| CRITERION | | Metrorail 5M/10M | Contemporary EMU |
|---|---|---|---|
| **Mobility** | High acceleration | | |
| | High retardation | | |
| | High speed | | |
| **Security** | Video surveillance | | |
| | Control-to-passenger communication | | |
| | Passenger-to-driver communication | | |
| **Safety** | Automatic train protection | | |
| | Enduring crashworthiness | | |
| **Greening** | Efficient power electronics | | |
| | Regenerative braking | | |
| | High-capacity signaling | | |
| **Convenience** | Level entry | | |
| | Passenger information system | | |
| | Air springs | | |
| | Tight-lock couplers | | |
| | Stepless braking control | | |
| | Stepless traction control | | |
| | Sound insulation | | |
| | Plug doors | | |
| | Heating | | |
| | Ventilation | | |
| | Air conditioning | | |

# INTERNATIONAL RAIL GUIDED APPLICATION HIERACHY




Specific applications driven by:

- Structure of the city and topography.
- Integrated transport and travel requirements.
- Specific market segments.