

7

PONENCIA MESA 2 PASAJEROS Sala 2	Presentación Empresa de 30 Min.	AECOM Philip Marquis
DEVELOPING MIXED USE HEAVY RAIL SYSTEMS / DESARROLLO DE SISTEMAS FERROVIARIOS PESADOS DE USO MIXTO.		
Miercoles 26/Oct 10:00-10:30Hrs		



**EXPORAIL  
2022**

Octubre 25 y 26, Centro Banamex, Ciudad de México

**CONGRESO EXPORAIL 2022**



# AEECOM



Octubre 25 y 26, Centro Banamex, Ciudad de México

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# Developing Mixed Use Heavy Rail

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Philip Marquis

AECOM

25 / 26 de octubre de 2022

## AECOM by the numbers

**47k**

People

**7**

Continents

**US\$13.2B**

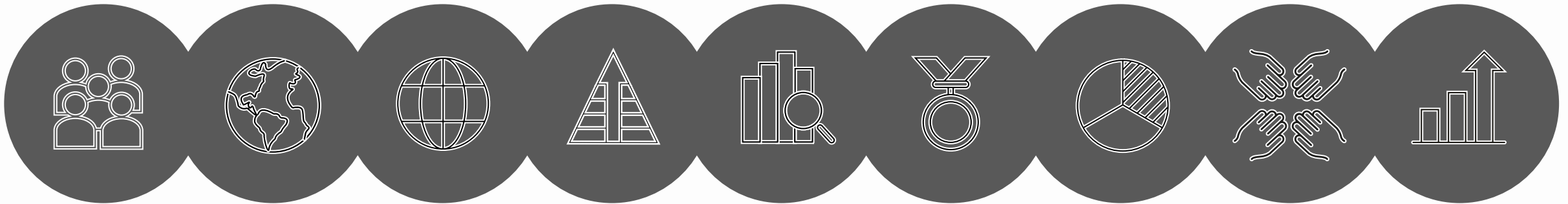
FY 2019 revenue

**US\$7B+**

Market cap\*

**#163**

Fortune 500



Featured on **Fortune's "World's Most Admired Companies"** seven years in a row

**Ranked #1** in Transportation and General Building in **Engineering-News Record's** 2019 "Top 500 Design Firms"

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Received a perfect score for three years in a row on the **Human Rights Campaign Foundation's** Corporate Equality Index

\*As of February 2020



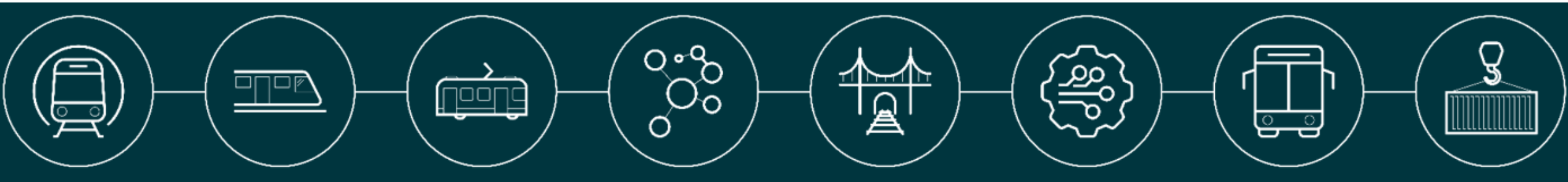
# THERE'S MORE TO US

High Speed

Integrated Transport

Program management and controls

Freight rail



Stations

Metro and light rapid transport

Mass transit and commuter rail

Bus, rapid transit electrification and autonomous transport

# THAN YOU MIGHT THINK



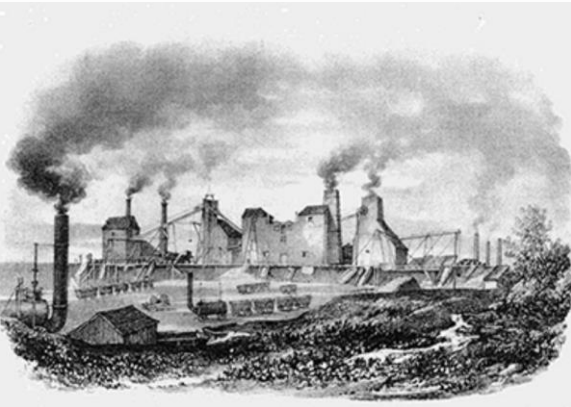
# Introduction

- Brief History
- Resurgence of Passenger Rail
- Ownership Models
- Lessons Learned

# History of Heavy Rail

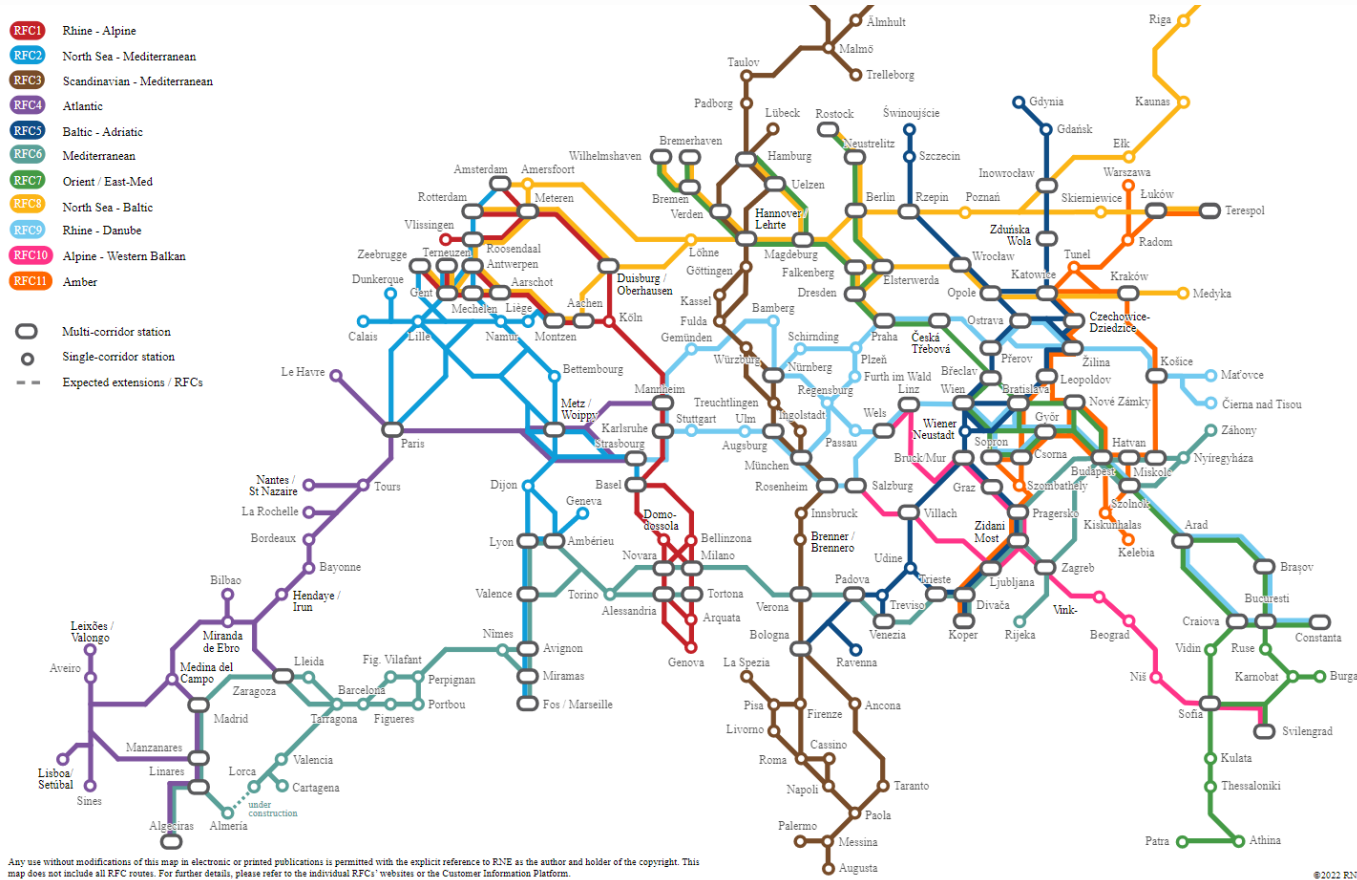
# Brief History

- Railways invented to move coal with less energy
- Soon after it was realized that railways could be designed to move people and goods.
- For over a century railways basically followed this model of mixed use and looking and developing ways to operate with cheaper energy – wood – coal – diesel – overhead electric.





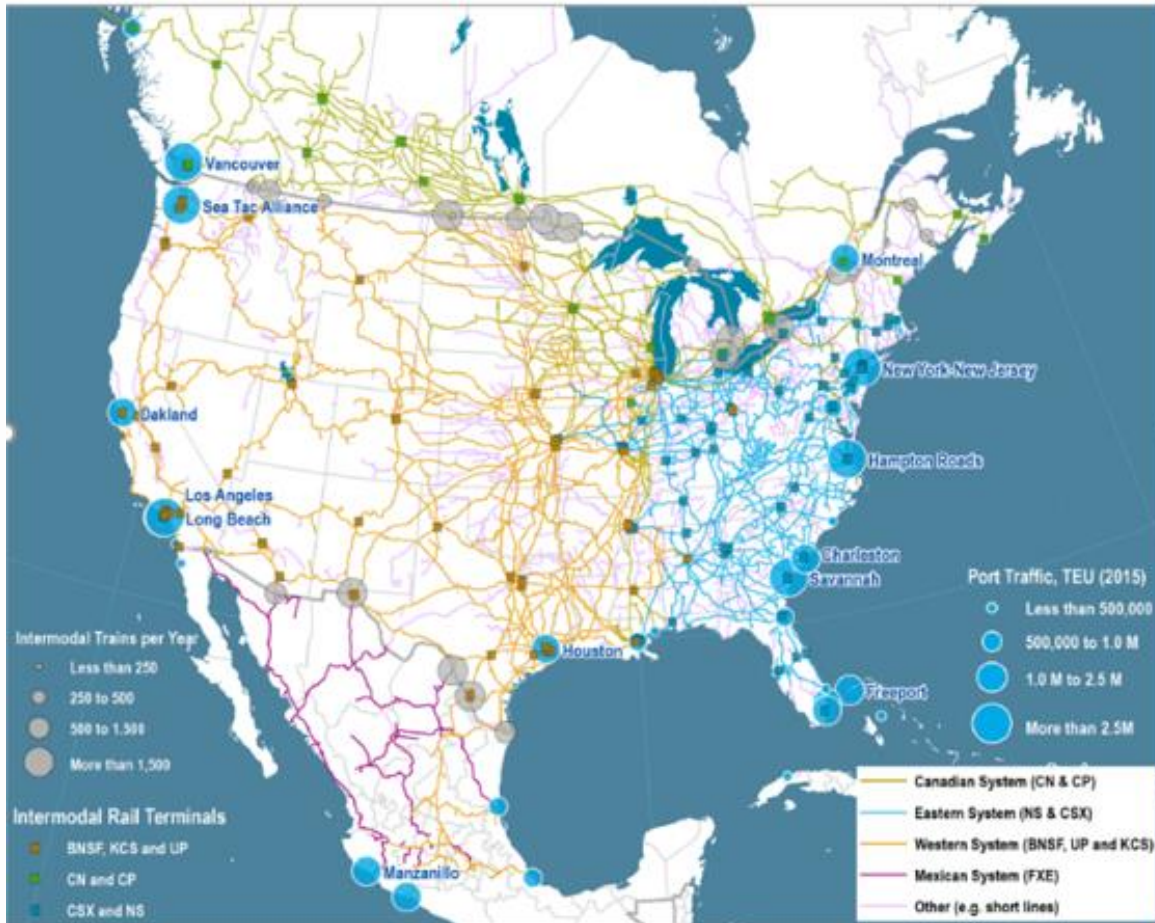
# European Rail Network



## Connecting the Urban Centers Capacity improvements through:

- Lighter Axle Ton Load
- Faster Trains
- Electrification

# North American Rail Network



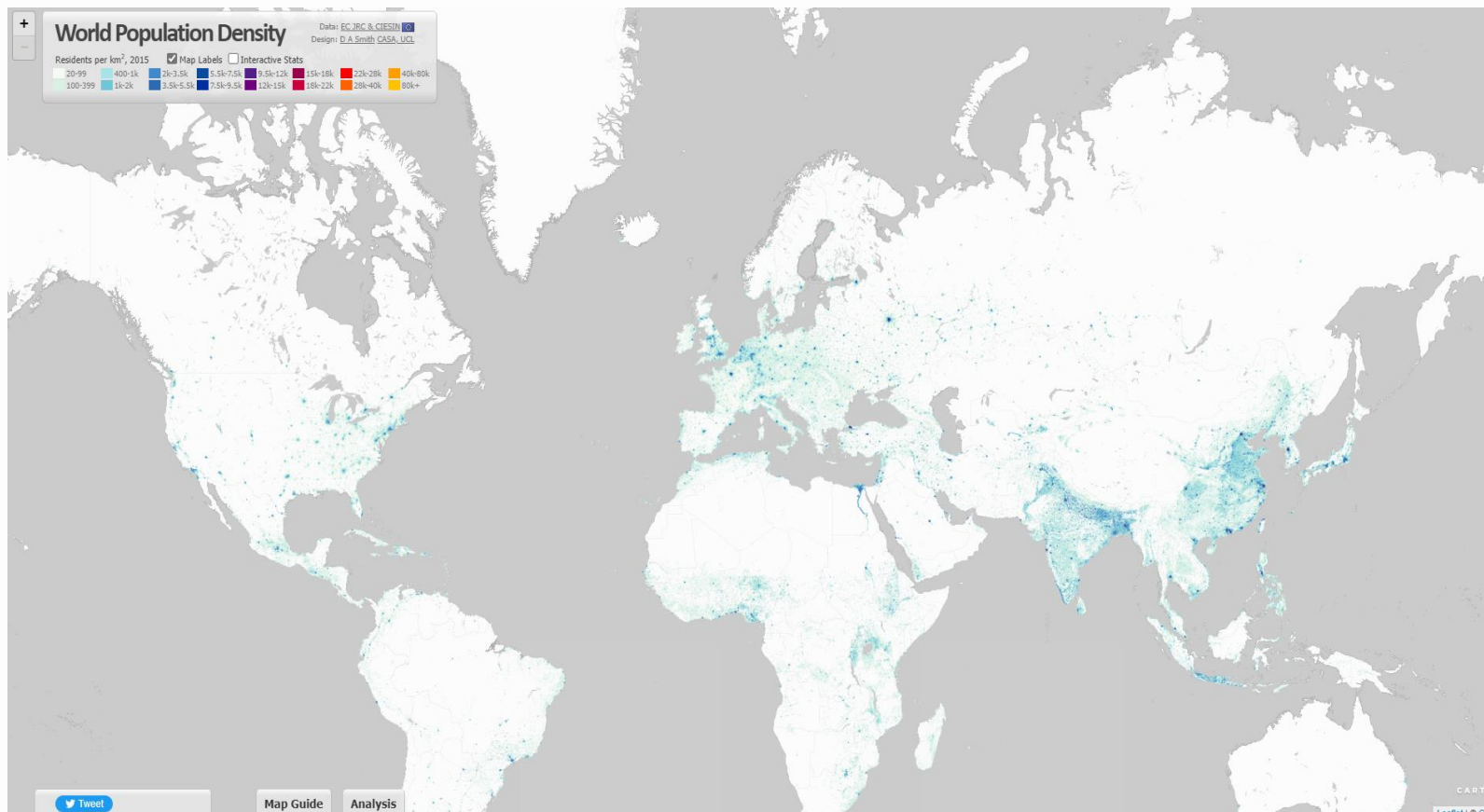
The North American Intermodal Rail System

**Connecting ports and large industrial centers**  
**Capacity increased through:**

- Improved propulsion systems – diesel
- Heavier axle load
- Longer trains

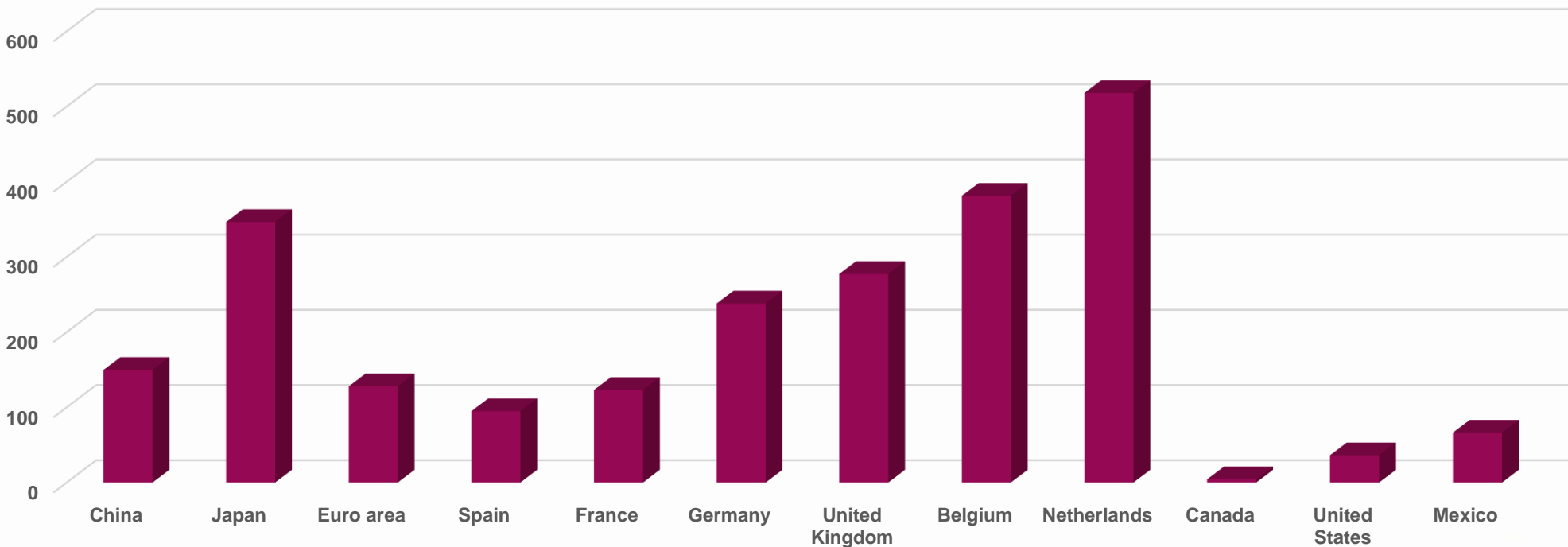


Why is North America lagging behind Europe, China and Japan in the construction of High-Speed Passenger Rail Corridors?



World population densities  
Distances between centers  
Automobile & road infrastructure

**Population Density  
2022**



# Resurgence of Rail

# Why Now? ESG








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**Latest News**



# Rail is 4 Times Efficient Than Trucks



US Rail move roughly 40% of long-distance cargo while only emitting 0.5% of total GHG emissions

U.S. freight railroads, on average, move one ton of freight nearly 500 miles per gallon of fuel

# High Speed Rail: A Catalyst for growth



“According to Project Drawdown, high-speed rail reduces carbon emissions up to 90 percent compared to driving, flying or riding conventional rail, and is the fastest way to travel between two points that are a few hundred miles apart”

By [Marilyn Waite](#) August 24, 2021

“Not the just the cost of oil but the damage of using oil”

Trains emit 60-70% fewer GHG

AAR

AMTRAK NEW JERSEY HIGH SPEED RAIL IMPROVEMENT PROGRAM  
AECOM -

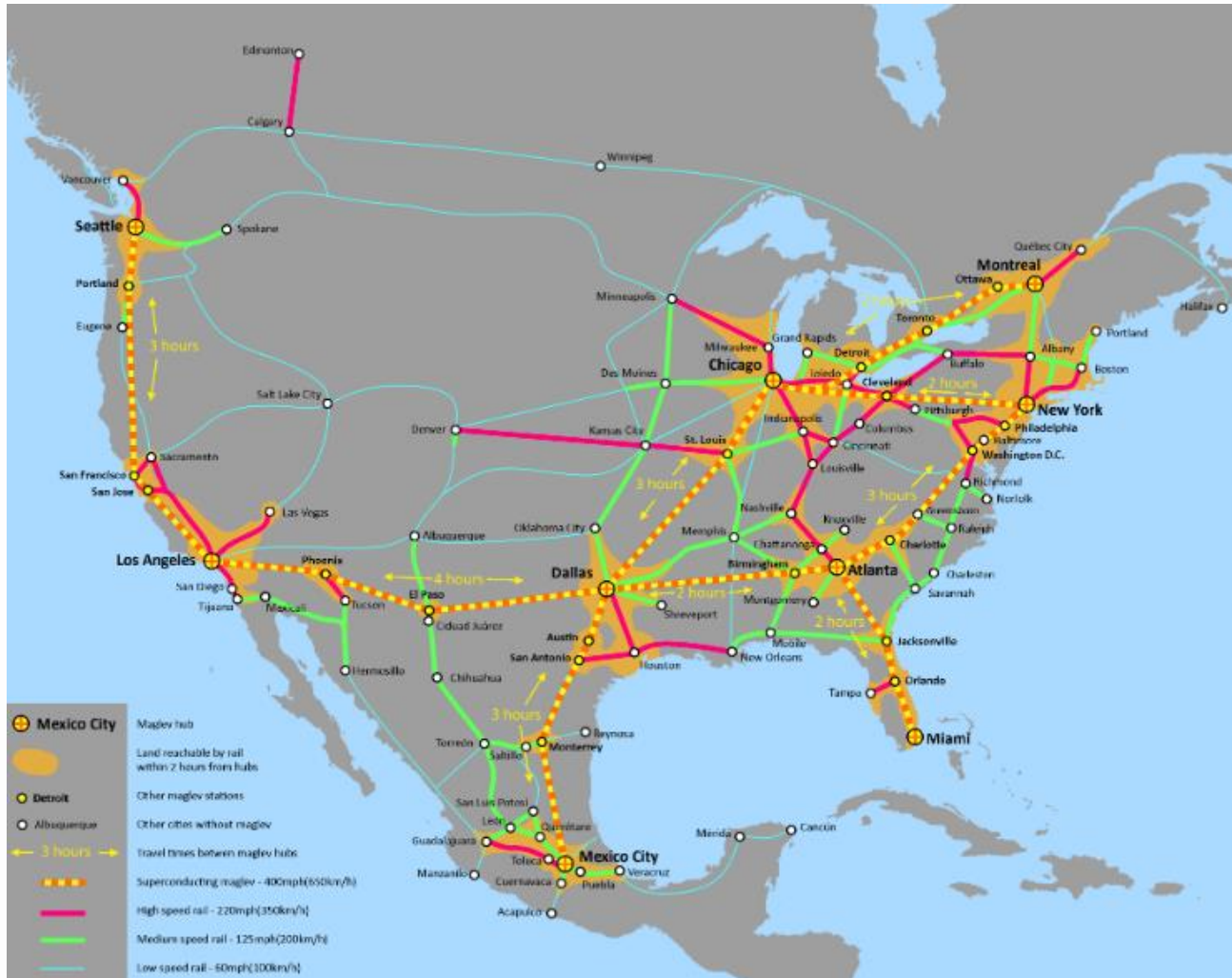
The logo for EXPORAIL 2022 features a stylized graphic of intersecting lines forming a diamond shape, with the text "EXPORAIL" above "2022".



# Today

- North America is a heavy haul freight railway system
- Europe is predominantly a passenger rail system
- China has become a “heavy weight” in High-Speed Rail and continues to develop a mixed freight – passenger system.

# North America



AMTRAK and VIA Rail  
Continue to operate on freight railways.

Planning High-Speed Rail Corridors,  
but elusive due to high costs.

Anticipate various segments will be  
constructed over an extended time frame.

Protection of interoperability is important.

# Europe

- Interoperability between all EU member states is key.
- Governments promoting Freight and Passenger
- Infrastructure is designed for Passenger

## Rail Baltica

Green Field mixed use railway system

Will replace the legacy Russian Gauge Rail with European Standard Gauge rail

Up to 249 km/h passenger trains and freight service.

It will be predominantly a passenger service with cargo trains operating during off-peak periods.

870 Km length

5.8 billion euros



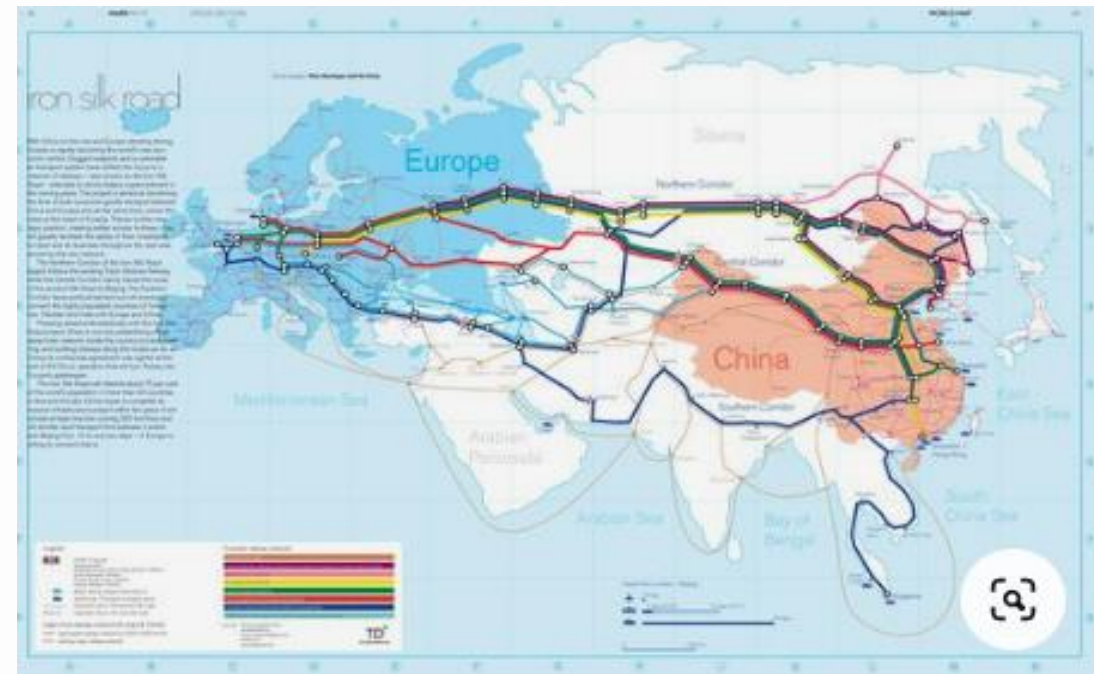
# China



China has been able to overcome challenges faced with “Not in My Back Yard (NIMBYism),

China continues to expand high-speed rail network, plus the original freight/passenger network.

Europe – China connection challenged by Russian gauge.



# India



One of largest rail systems  
 Constructed Dedicated Freight Corridors  
 Planning highspeed passenger corridors.



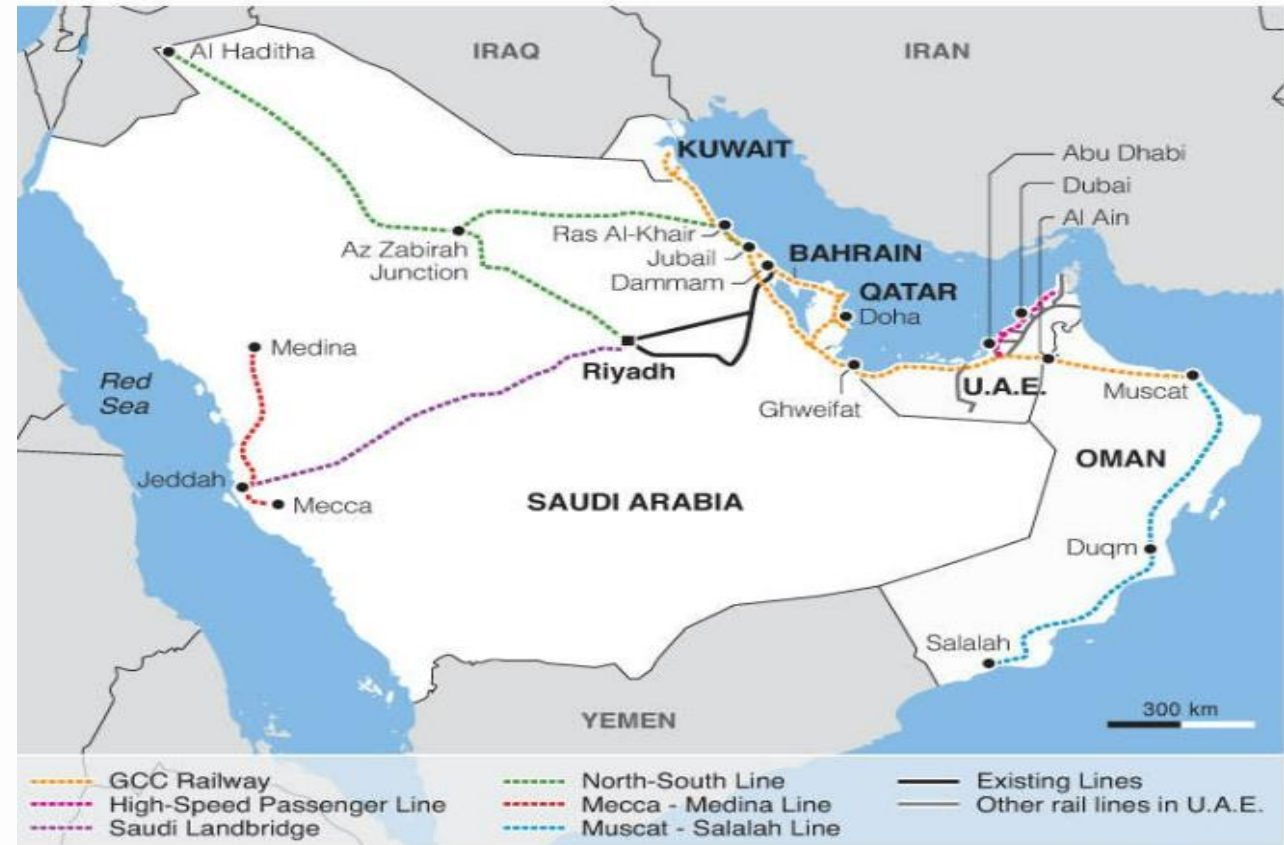
India is working hard to establish a PPP process for railway operations

# GCC Railway Network

- Gulf Cooperative Council
- Building mixed use HSR/Freight rail system

Standard Gauge  
 Passenger Speed – 200 km/h  
 Freight Speed – 120 Km/h  
 North American infrastructure,  
 European Traffic Control

**The Gulf Cooperation Council's Planned Rail Network**



Sources: Reuters, National rail companies

REUTERS



# Mixed-use Railways

## Lessons Learned

# Differing Expectations of the Stakeholders



## Government

In return for financial backing and subsidies:

- Over-simplify expectations
- Do not understand the railway operation.
- Risk of frustration when delivery does not meet expectations.



## Operator

- Follow & deliver on KPIs.
- Expect Government to “backstop” financial risks.
- Strong Financial Returns



## Public

- Sustainable, efficient, uninterrupted passenger rail system which is delivered on time and on budget.



## Shippers

- Best service for least cost.



## Financiers

- Strong operating company with a sound financial and economic outlook.



# Establish Initial Requirements

## \* Need

Demand  
ESG  
Economic enhancement

## \* Requirements

Mixed freight and passenger  
Dedicated Freight Corridors  
Dedicated Passenger Rail

- HSR
- HFR
- Commuter LRT
- Mass Transit

## Current Alternative Rail Operations

### High-speed passenger Rail Networks

Japan 320 Km/h  
China 250-350 km/h  
France 270 km/h  
UK 300 Km/h

### Dedicated Freight Rail Corridors

India  
North America

### Mixed use

North America

- Amtrak
- Via Rail

GCC  
UK  
Europe



# Government to Determine Ownership Structure

- **Vertical Integration vs Separation**
- **Procurement Model**
  - **Publicly Owned**
    - Often political demand to prioritize passenger trains.
    - Heavily subsidized and often underfunded
  - **Private**
    - Leads to a very efficient mode of moving cargo and freight.
    - Driven by financial rewards.
    - Passenger revenues vs. cost of operation.
  - **PPP**
    - Allows for the distribution of risk to the parties most able to manage those risks
    - Addresses the demands of financial lenders
    - Possibly require a sovereign guarantee or subsidy

# Government Team – Qualified Advisors



## Financial

- Does the proposed system make financial sense?
- Value for Money
- Value for People
- Value for the Environment
- Bring to Financial Close



## Technical

- Distinguish aspirational from practical
- Operational Requirements
- Available proven technology
- Manage Stakeholders Expectations
- Prepare for Operation Readiness



## Legal

- Does the country have the requisite regulatory and legal framework for the operation of a railway.
- Are the regulatory laws too restrictive?



## Project Management

- On Time
- On Budget

# A Mixed-Use Railway

**Challenge to develop an optimal passenger and freight railway operation.**

- Infrastructure serving two distinct client needs with two distinct operating characteristic.
- A compromised system - “give and take”.
- Proper Planning reduces risk of future setbacks, lack of capacity and service failure.



# Planning for Technology Advances



- Current propulsion systems are basically diesel or overhead electric
- Diesel phased out in the next 15 to 20 years.
- Efficient energy alternatives to accommodate:
  - High Speed Trains
  - Long Heavy Haul Freight
  - Everything in between
- Current design must be resilient enough to accommodate:
  - Hybrid battery recharging
  - Electricity production
  - Green Hydrogen production
  - New fueling parameters
  - Future infrastructure requirements.

# Planning Life Cycle Cost

**Owner changes to original requirements must be reviewed with key stakeholders.**

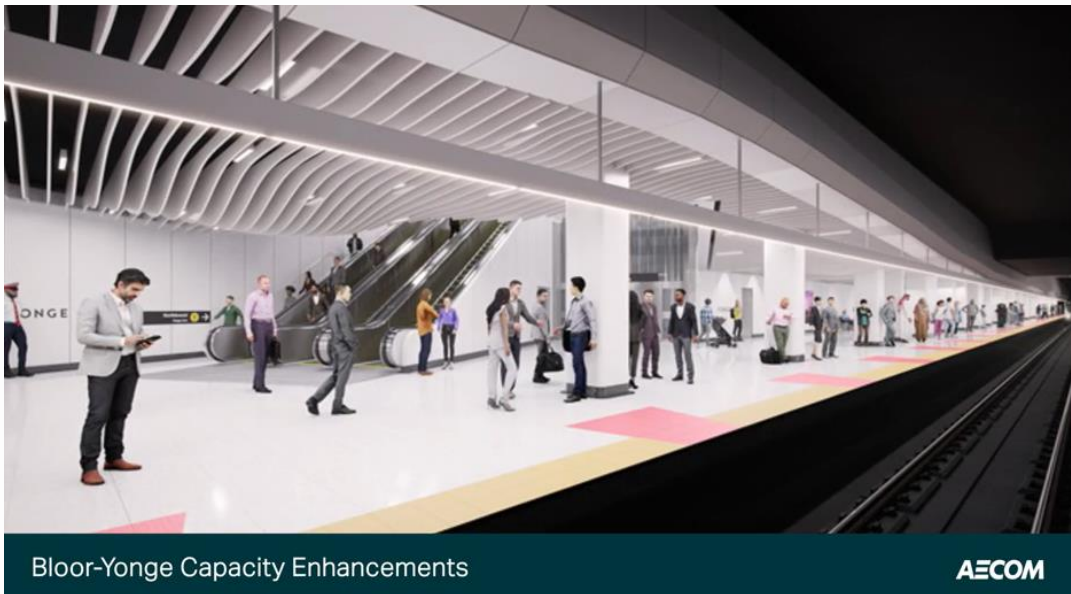
**\* LCC of original and new business case must be compared**

**(not simply added to the project)**



# Planning Capacity Enhancements

Requires a holistic view of entire transportation chain



## Passenger rail

\* Near seamless connections to other modes of transportation:

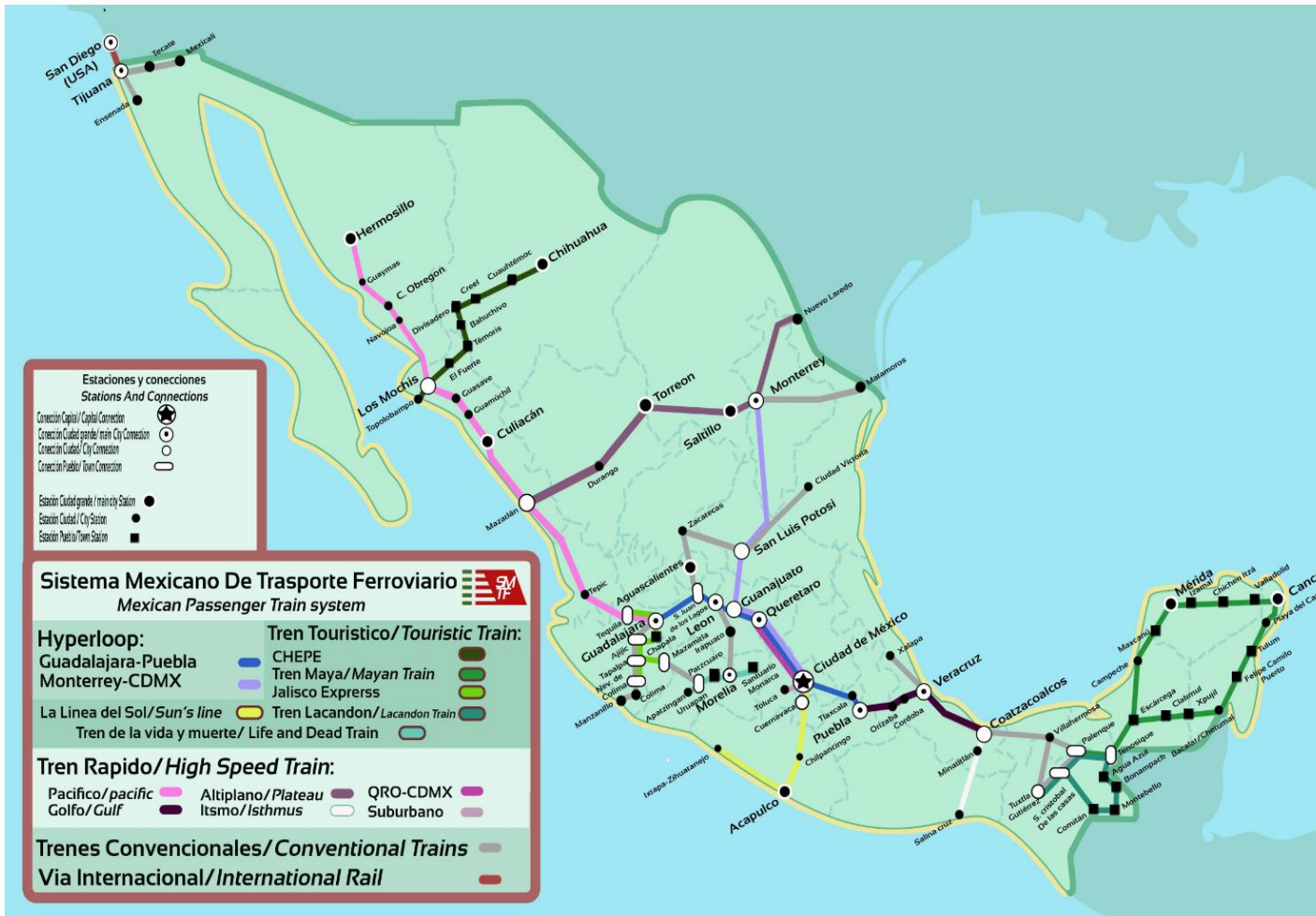
- HSR/HFR,
- Commuter/LRT, Metro,
- Bus and
- Air

## Freight Rail

Near seamless connections to :

- Intermodal terminals,
- Port Design
- Transload centers and
- Other freight railway interchanges.

# Planning Redevelopment of Legacy Networks



## Prevent establishing an “Island”:

- Rolling Stock
- Engineering Standards
- Electrical systems
- Train Control System
  - PTC versus ERTMS
  - Canadian / Mexican railroads.
- Communications systems
  - GSMR/LTE/Satellite



# Scope Creep Avoidance

Once design criteria is established, scope creep must be minimized.

Could lead to inefficiencies of infrastructure and challenge to operations.



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Home > India > In exigencies, dedicated freight corridors to be used to run passenger-carrying trains...

## In exigencies, dedicated freight corridors to be used to run passenger-carrying trains: Rly Board

PTI 19 May, 2022 06:15 pm IST

f t in e w Like 0

New Delhi, May 19 (PTI) The eastern and western dedicated freight corridors, which have been designed for the exclusive movement of goods trains at a high speed, will now be used for passenger trains in times of exigencies, according to an official order of the Railway Board.

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# Interoperability - 1

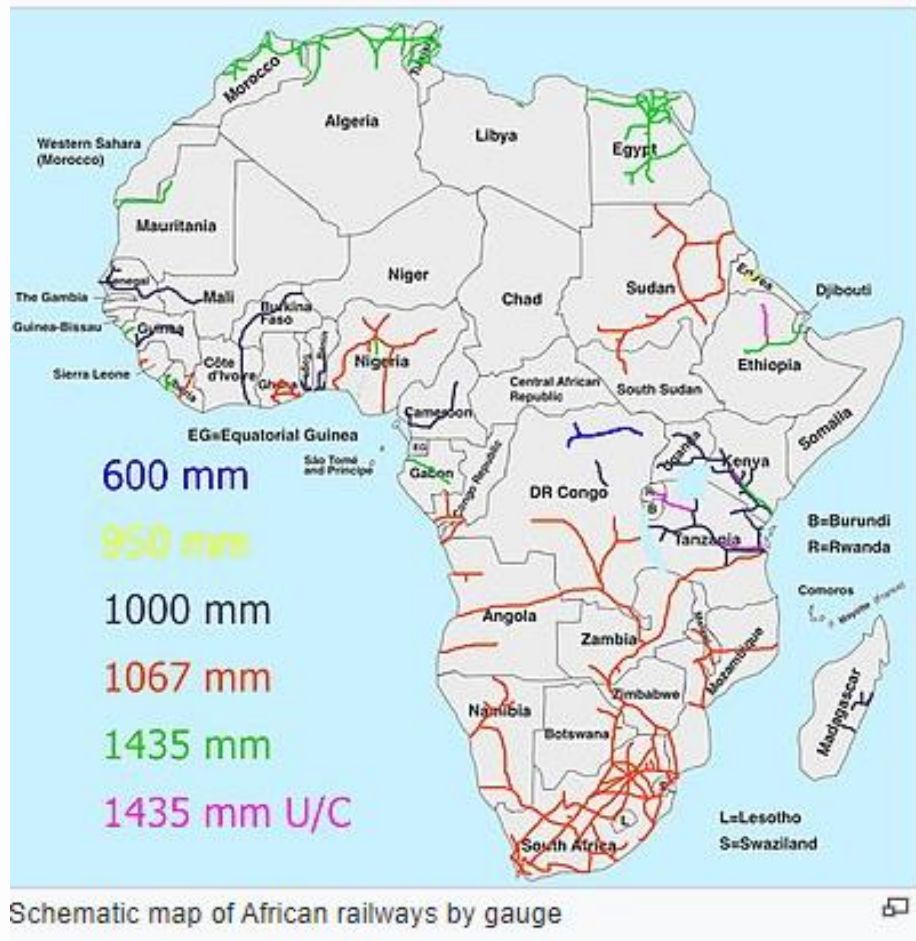
**New Systems or standards may jeopardize interoperability.**

**Avoid developing an “island” which would prevent future connectivity**

**Minimize mixed standards**  
**AREMA/Eurocodes/Chinese**

**Don't be afraid to benchmark against other rail systems**

# Interoperability - 2

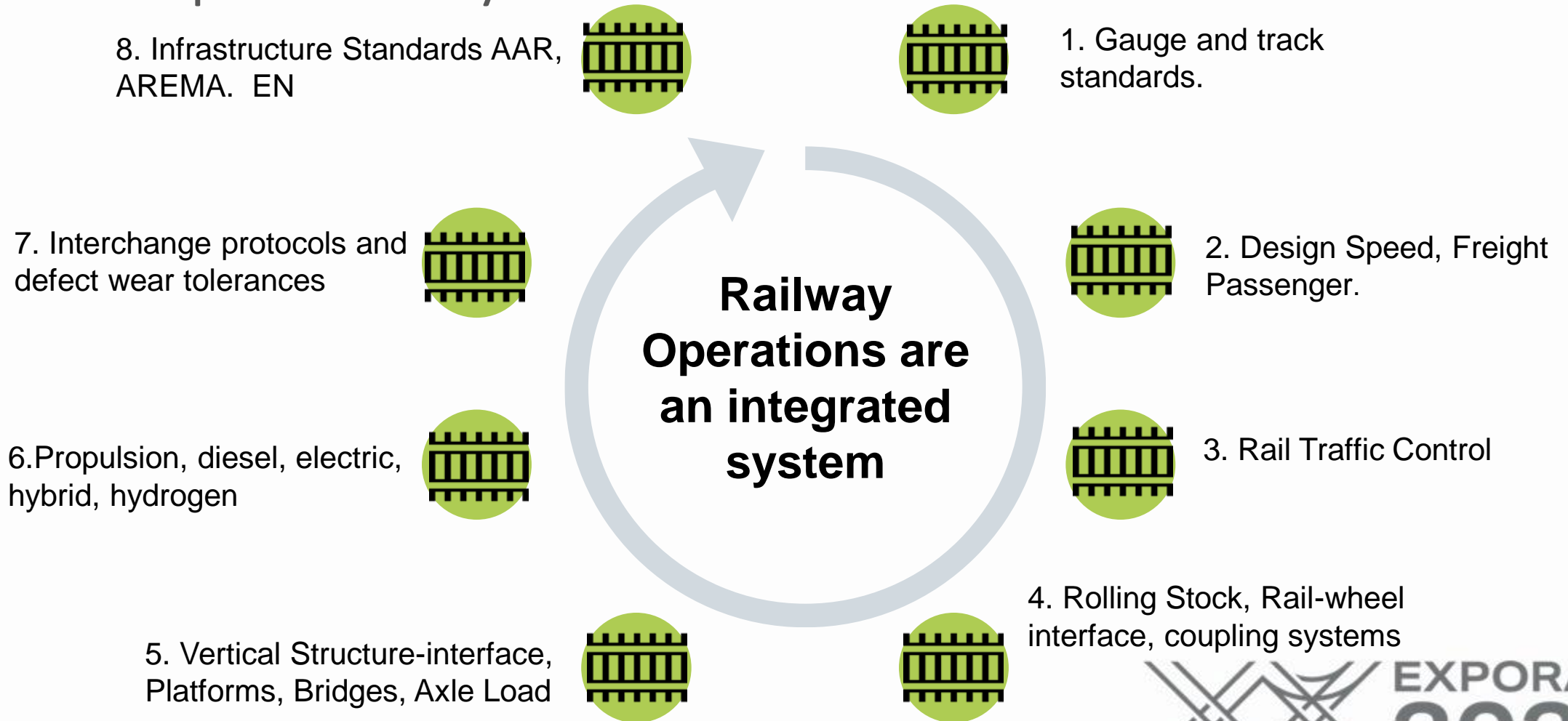


Historically we were concerned about “break of gauge”.

Still important but as technology advances, there are new “break of gauge” issues:

- Train coupling systems
- Rail wheel interface
- Propulsion systems
- Rail Traffic Control Systems
  - \* PTC/ERTMS/Legacy

# Interoperability - 3



# Questions

Thank you / Muchas gracias

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# Ponente

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25 / 26 de octubre de 2022



# Corridor Design Requirements 1

## Passenger vs Freight Capacity and Infrastructure

Safety and interoperability.  
Priority to Passenger or Freight?  
- demand versus political  
Traffic Control Systems, Service Design  
and Train Pathing.  
Requires a strong commitment to  
freight train scheduling.

### Ability to separate freight and passenger trains

Freight trains become more variable when developing train pathing protocols which can and will affect passenger trains.  
Operate a night only option but may affect shipper requirements.  
Build Capacity into network to allow for additional track to prevent/reduce freight passenger conflict

### Speed is affected

Freight trains operate at speeds up to 110 km/h while passenger trains can operate upwards of 200 to 300 Km/h  
  
In mixed use rail systems, in order to attain maximum capacity of the network, passenger train speed will be affected.

# Corridor Design Requirements 2

## Capacity Enhancements are necessary

- Bi-directional track.
- Increased TAL.
- High Speed Turnouts .
- Heavier Rail
- Long passing tracks.
- More frequent crossovers.
- Separation of freight and passenger at areas of high use (build more track).

- Freight Trains in order to be cost effective are heavier and possibly designed up to 15,000 feet.
- Freight Trains will have a weight to power ratio of 0.6 to 1.0 whereas passenger trains can be much higher to allow for faster acceleration and operating speeds.
- Passenger Trains take up more capacity than freight trains.
- Legacy Signal Systems may not support the operation of high-speed passenger rail.