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11-1-2013

# Clouds, Crowds, and Traffic: What 10 Emerging Megatrends Mean for the Future of Transportation

Ted Trepanier  
*INRIX, Inc.*

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# Clouds, Crowds & Traffic

## Ten Emerging Megatrends Impacting the Future of Transportation

Ted Trepanier



# INRIX Powers the World's Largest Traffic Intelligence Network



# TEN MEGATRENDS

Reshaping Mobility





# GROWTH OF URBANIZATION

Population of urban areas



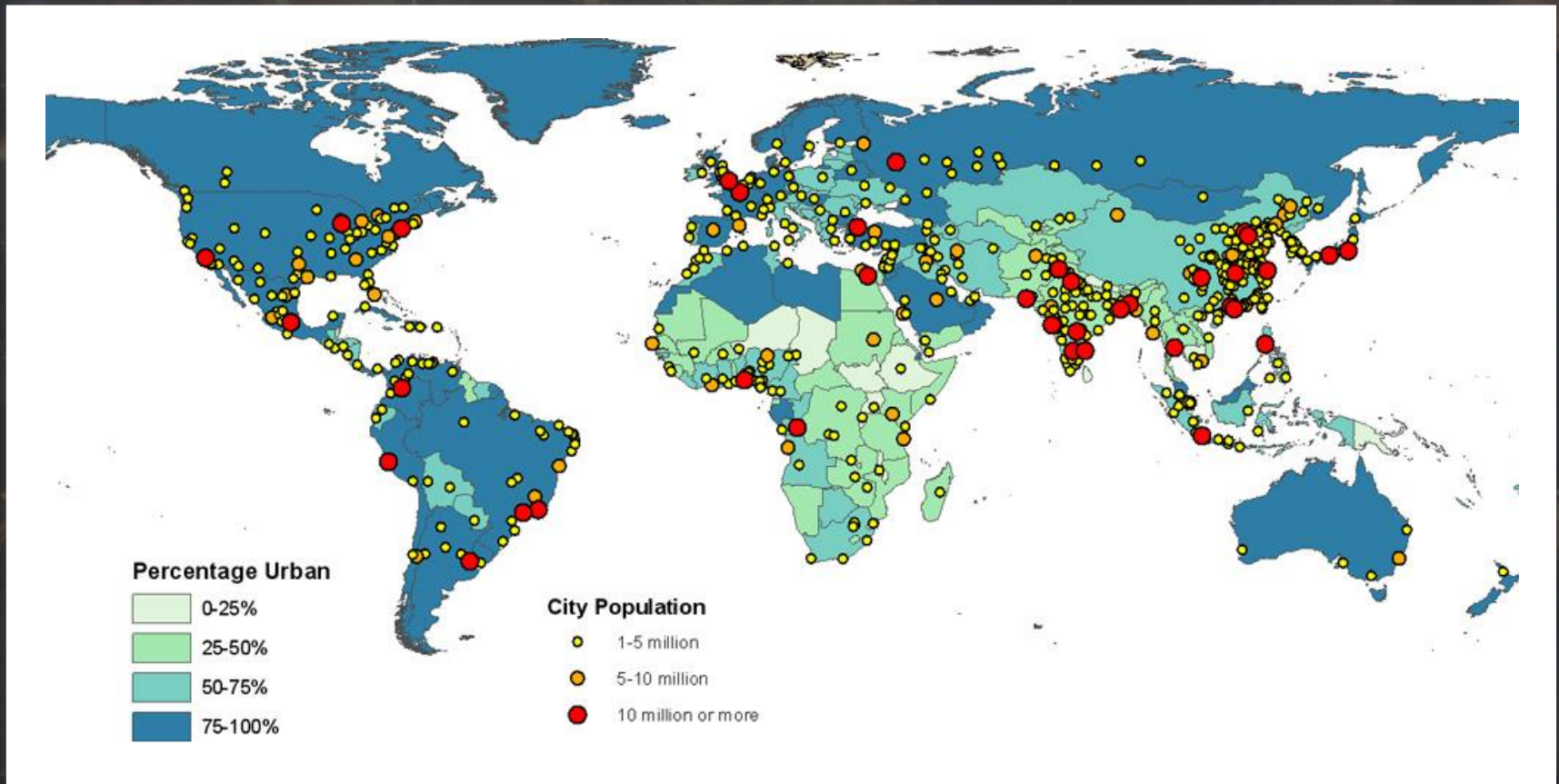


# GROWTH OF URBANIZATION

1980

2011

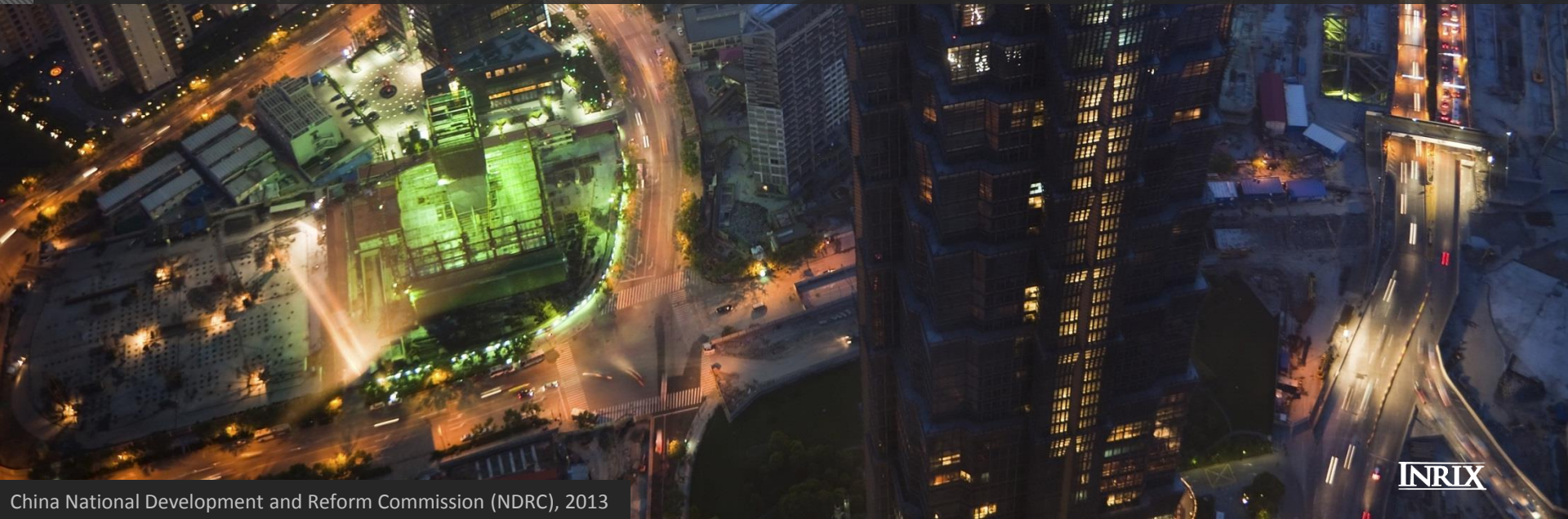
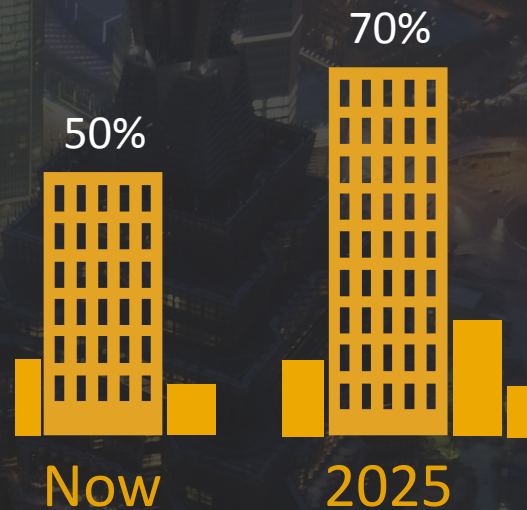
2025





# GROWTH OF URBANIZATION

Percentage of Chinese residents living in urban centers





# COST OF CONGESTION

Annual hours wasted per driver



Los Angeles



Stuttgart



Paris





# COST OF CONGESTION

Economic impact in billions

\$121

United States

€7.8

Germany

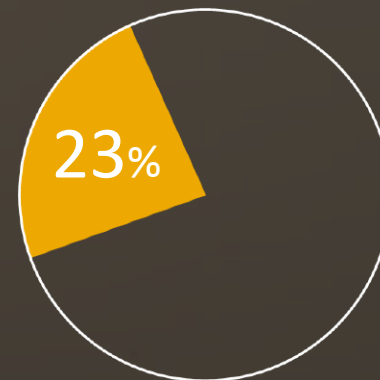
€5.6

France



# POLLUTION

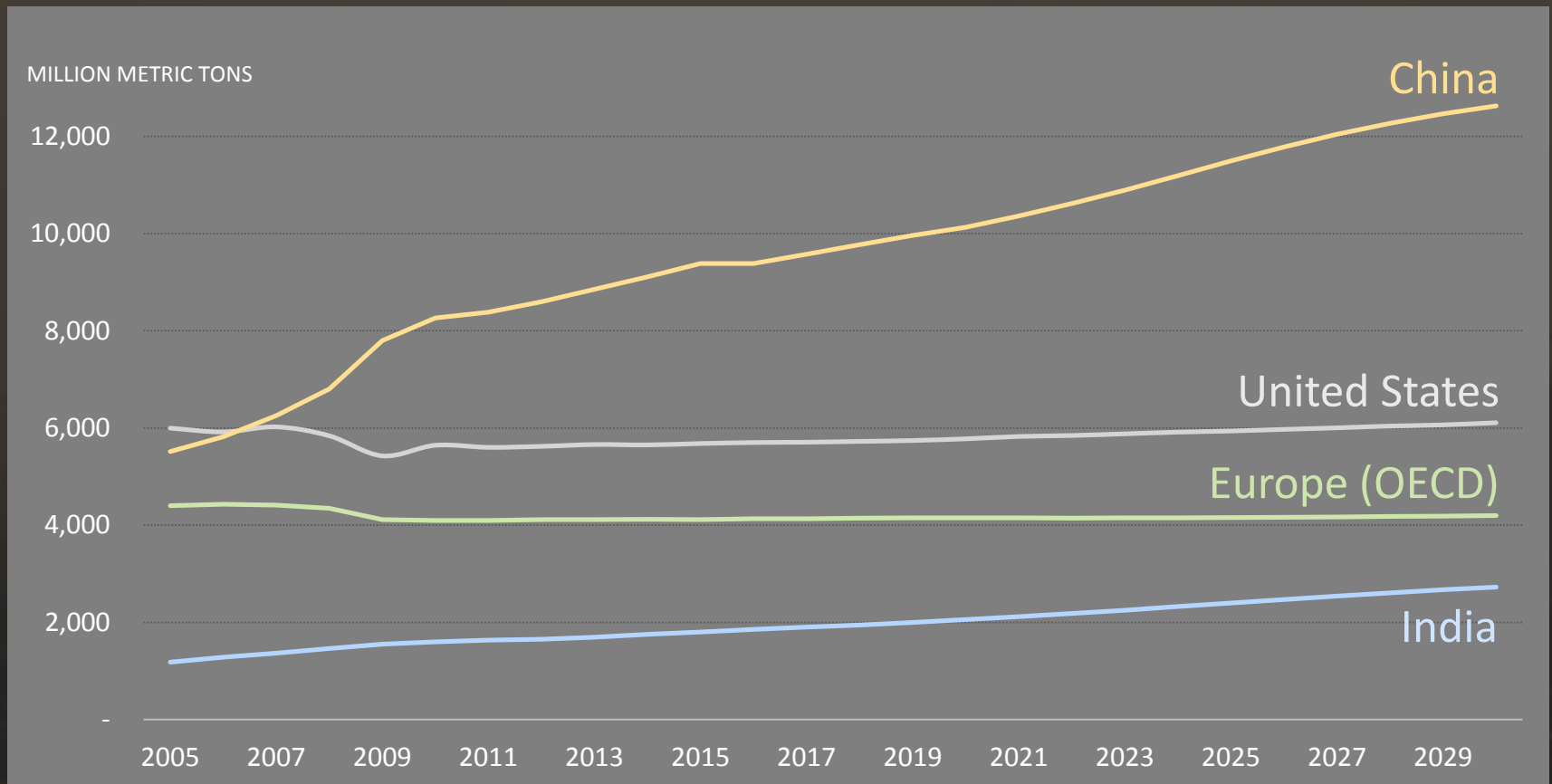
% of carbon emissions  
from vehicles





# POLLUTION

## World CO<sub>2</sub> emissions



# CONNECTED CARS

11%

Now

60%

2017





# URBAN MOBILITY

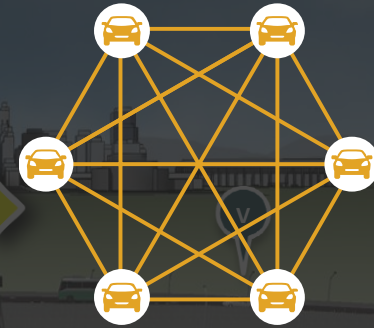
Rise of on-demand transportation





# THE "CROWD"

1.3 billion drivers by 2017



## Flow

- Road sensor
- Traffic camera
- Commercial Vehicle GPS Probe
- Consumer Vehicle GPS Probe
- GPS-Enabled Smartphone Probe
- Cellular Network Probe

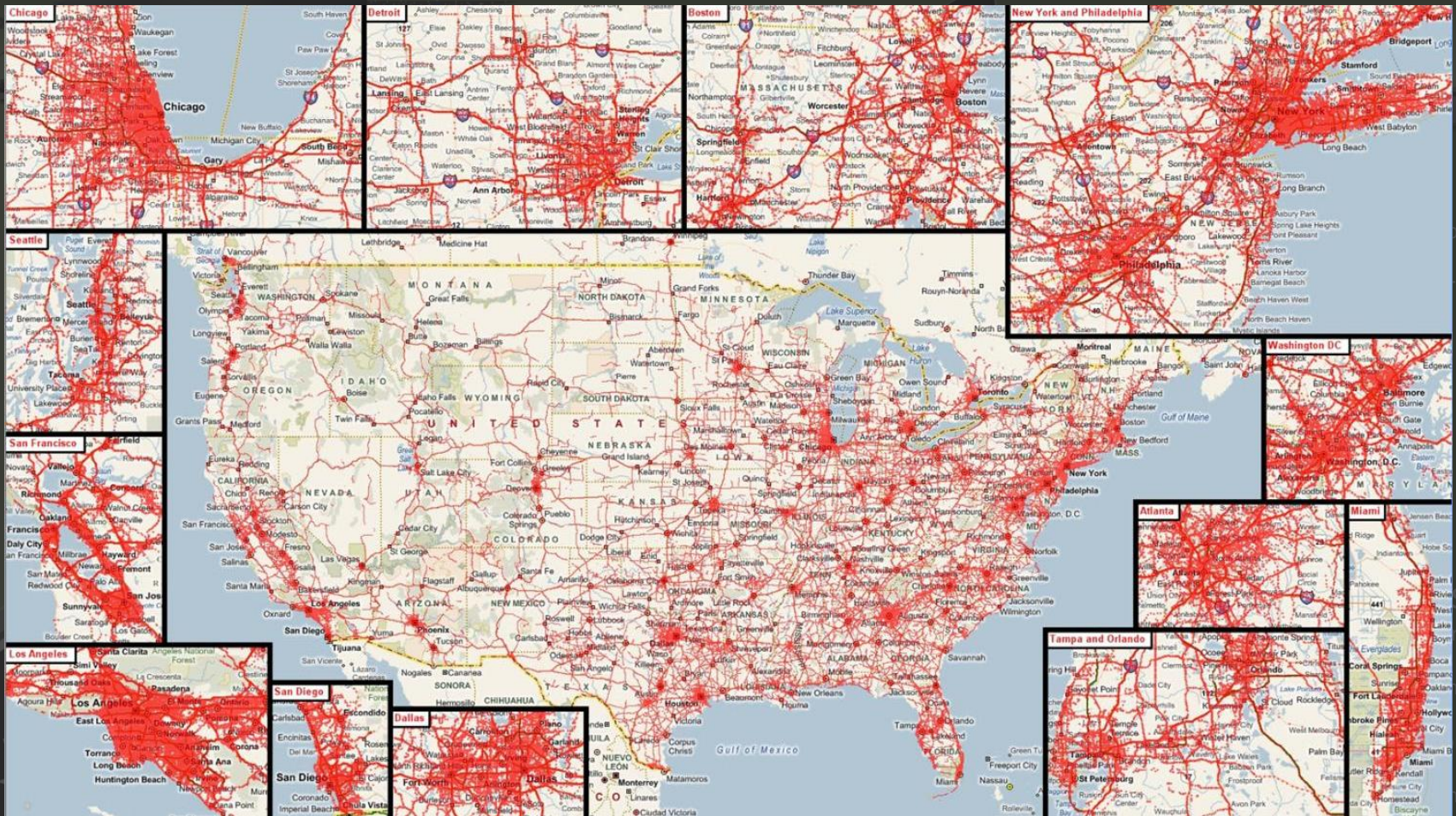
## Incidents

- Driver Generated Report
- Accident
- Construction
- Event



# INRIX Traffic Intelligence Network

## North America, Spring 2010

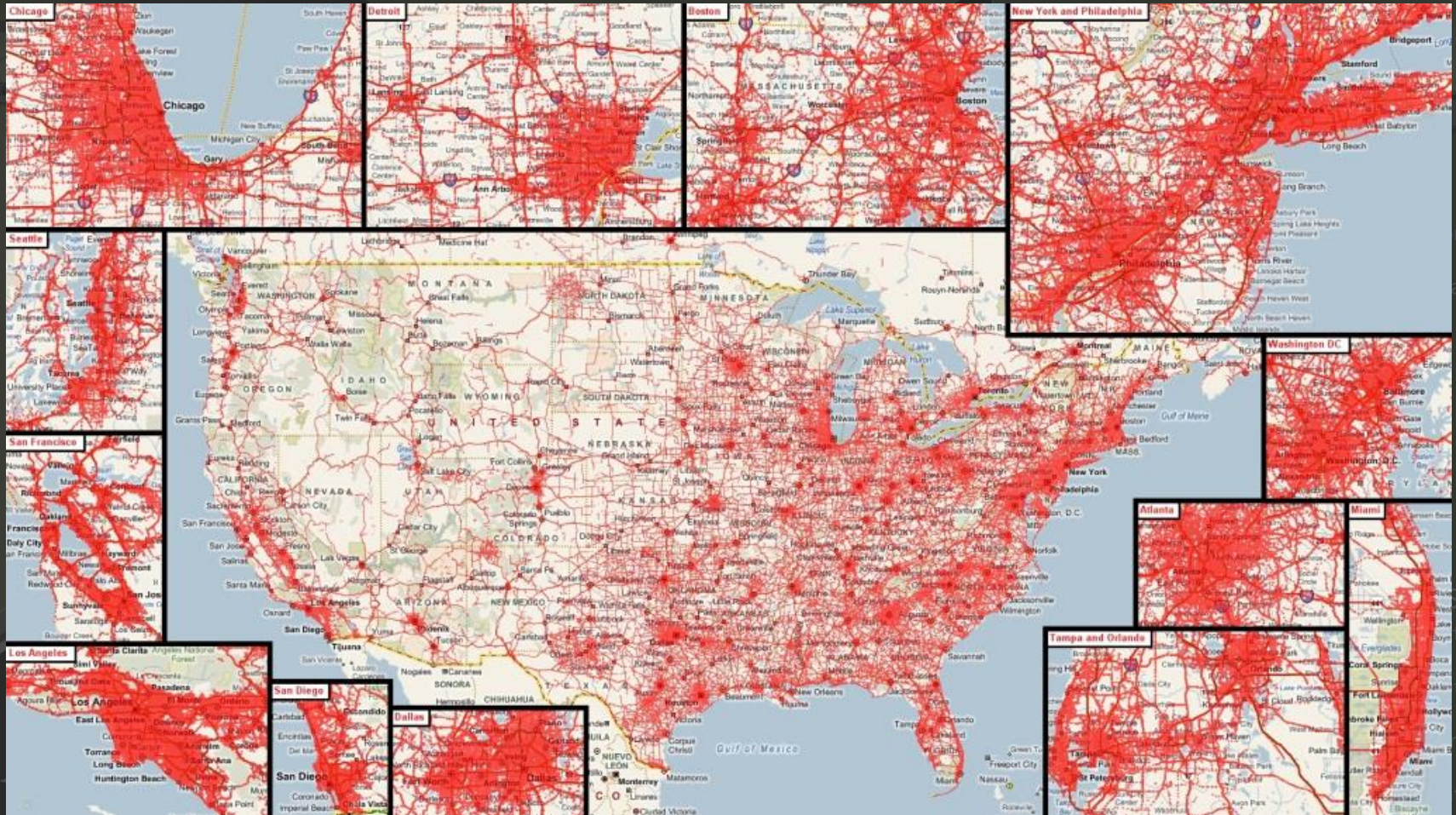


Examples of 15-Minute Real-Time Snapshots



# INRIX Traffic Intelligence Network

## North America, Spring 2013

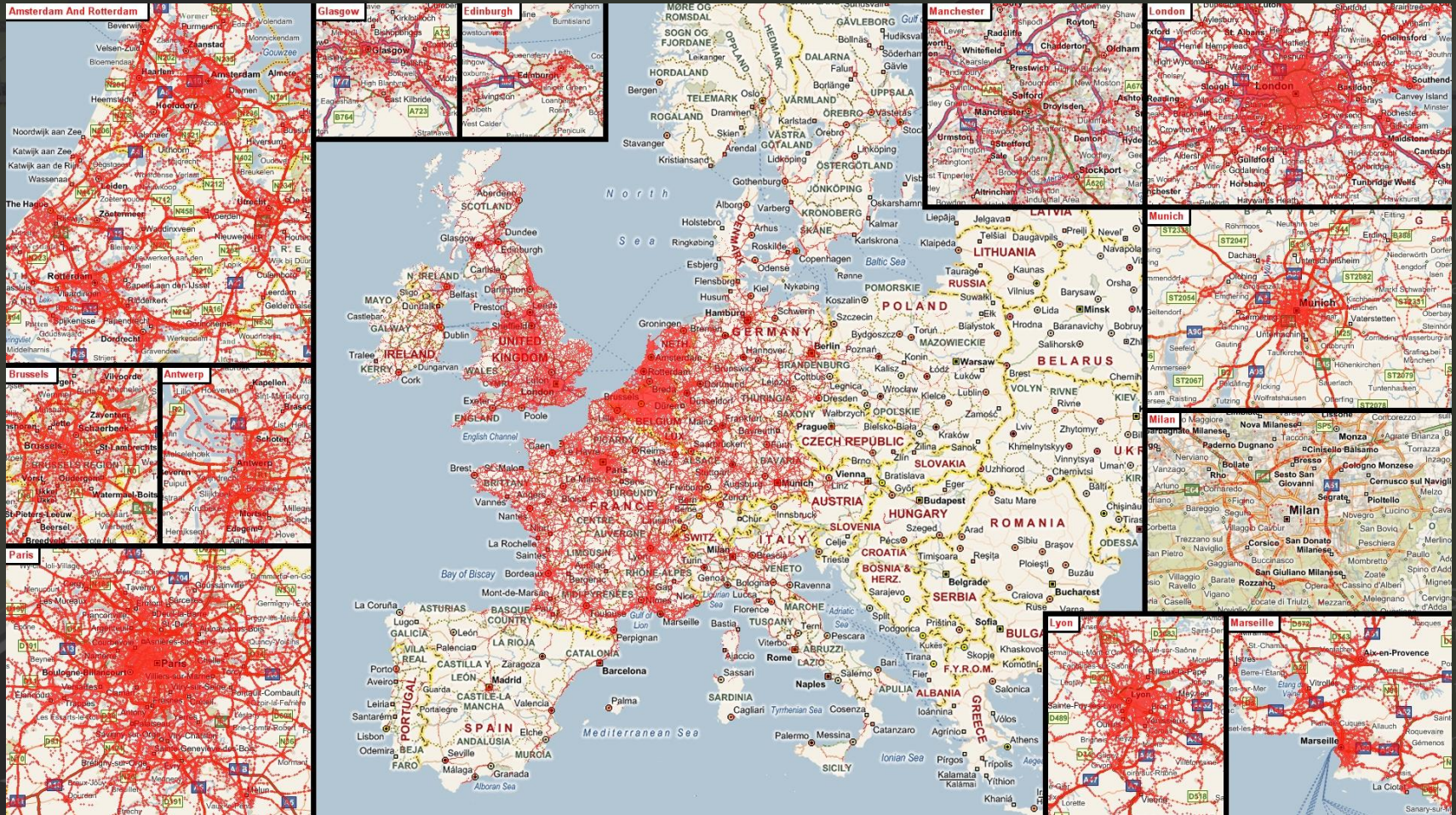


Examples of 15-Minute Real-Time Snapshots



# INRIX Traffic Intelligence Network

Europe, Fall 2010

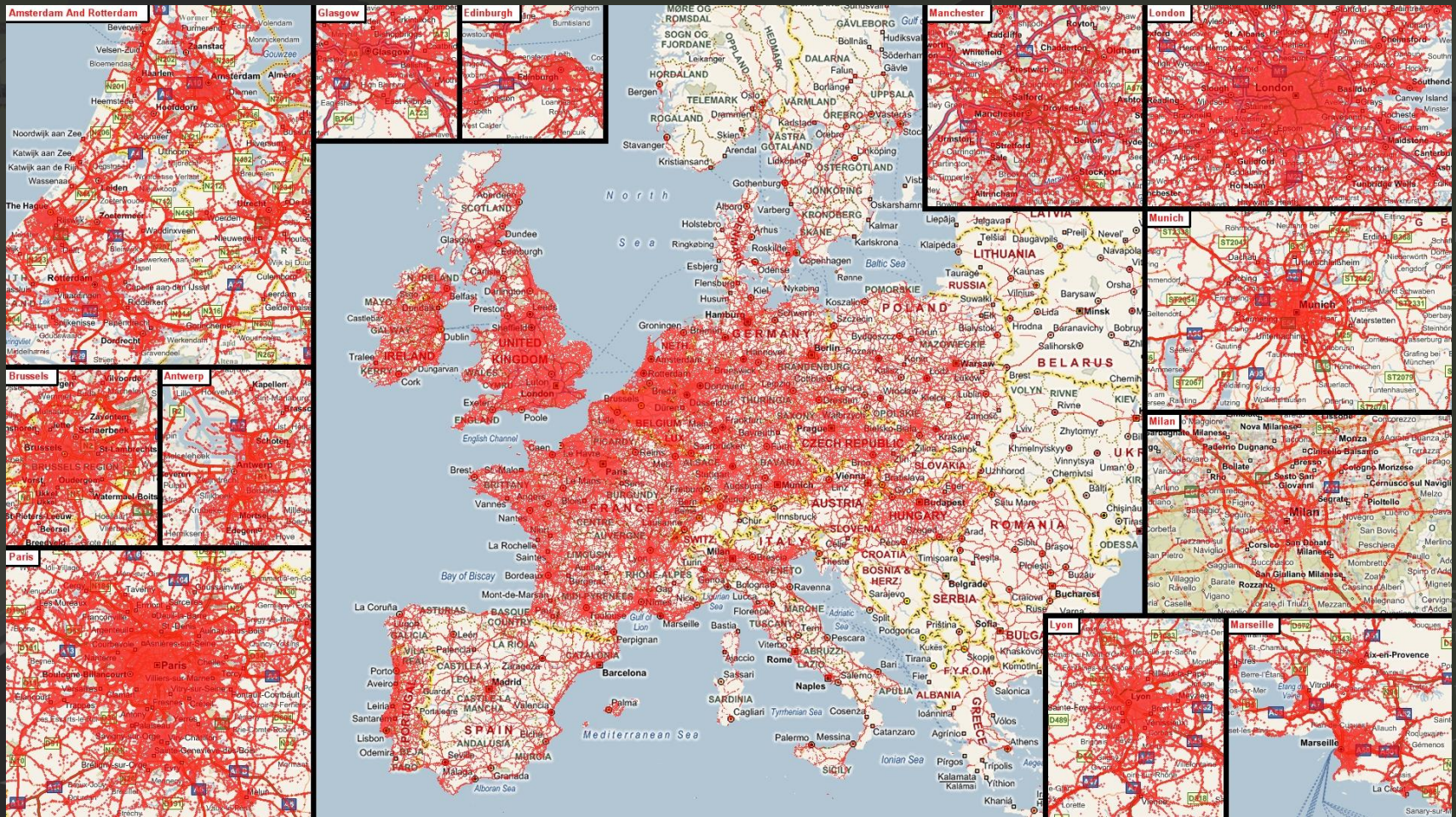


Examples of 15-Minute Real-Time Snapshots



# INRIX Traffic Intelligence Network

## Europe, Spring 2013



Examples of 15-Minute Real-Time Snapshots



# ACTIVE ROAD NETWORK MANAGEMENT

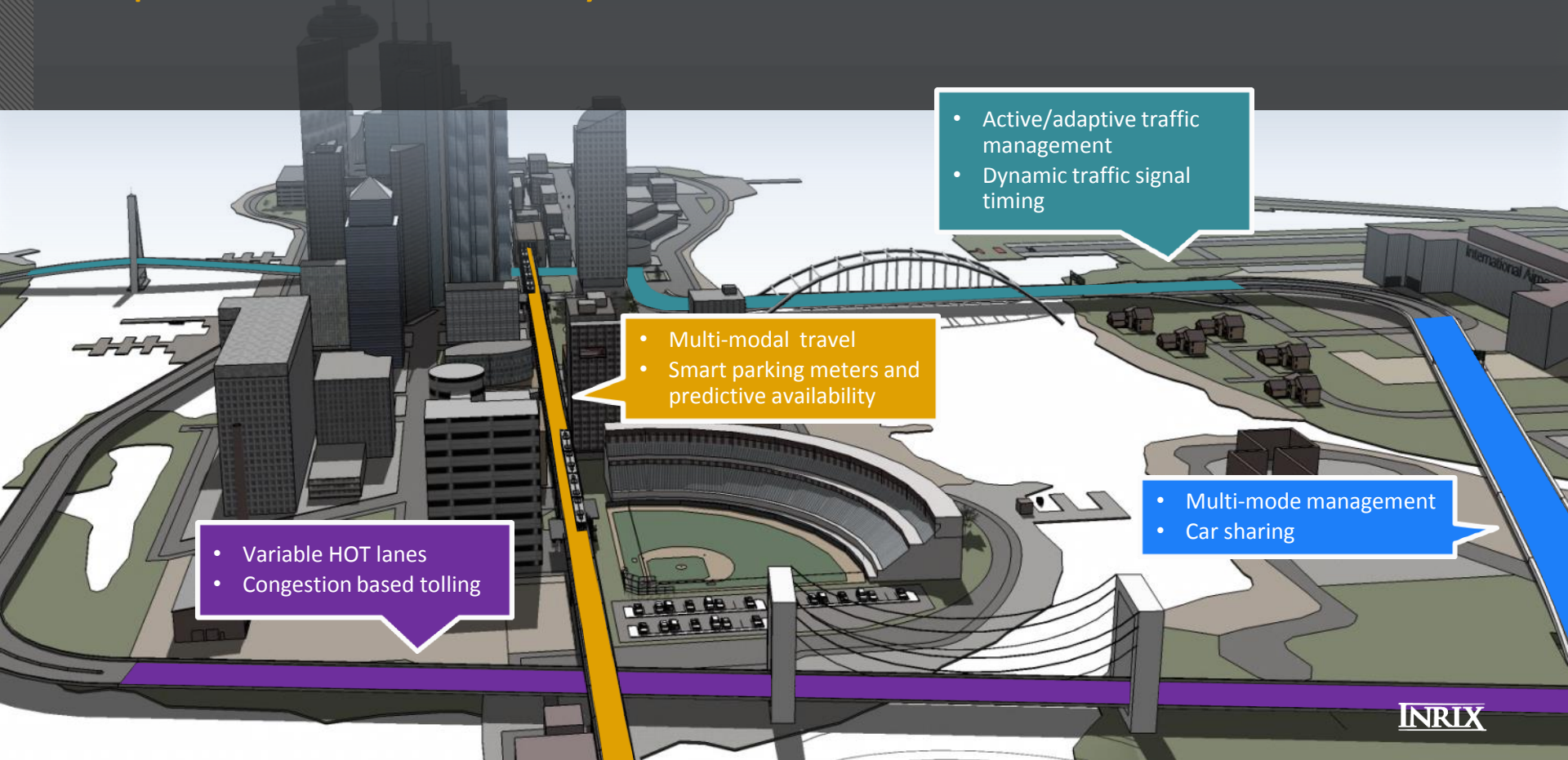
Real-time data and analytics  
for millions of miles



# FUTURE OF TRANSPORTATION

Big Data and ITS technologies will drive improved urban mobility

- ▶ Integrated corridor management
- ▶ Network-wide analysis
- ▶ System performance monitoring



- Active/adaptive traffic management
- Dynamic traffic signal timing

- Multi-modal travel
- Smart parking meters and predictive availability

- Variable HOT lanes
- Congestion based tolling

- Multi-mode management
- Car sharing



# CONNECTED DEVICES

25  
billion

2015

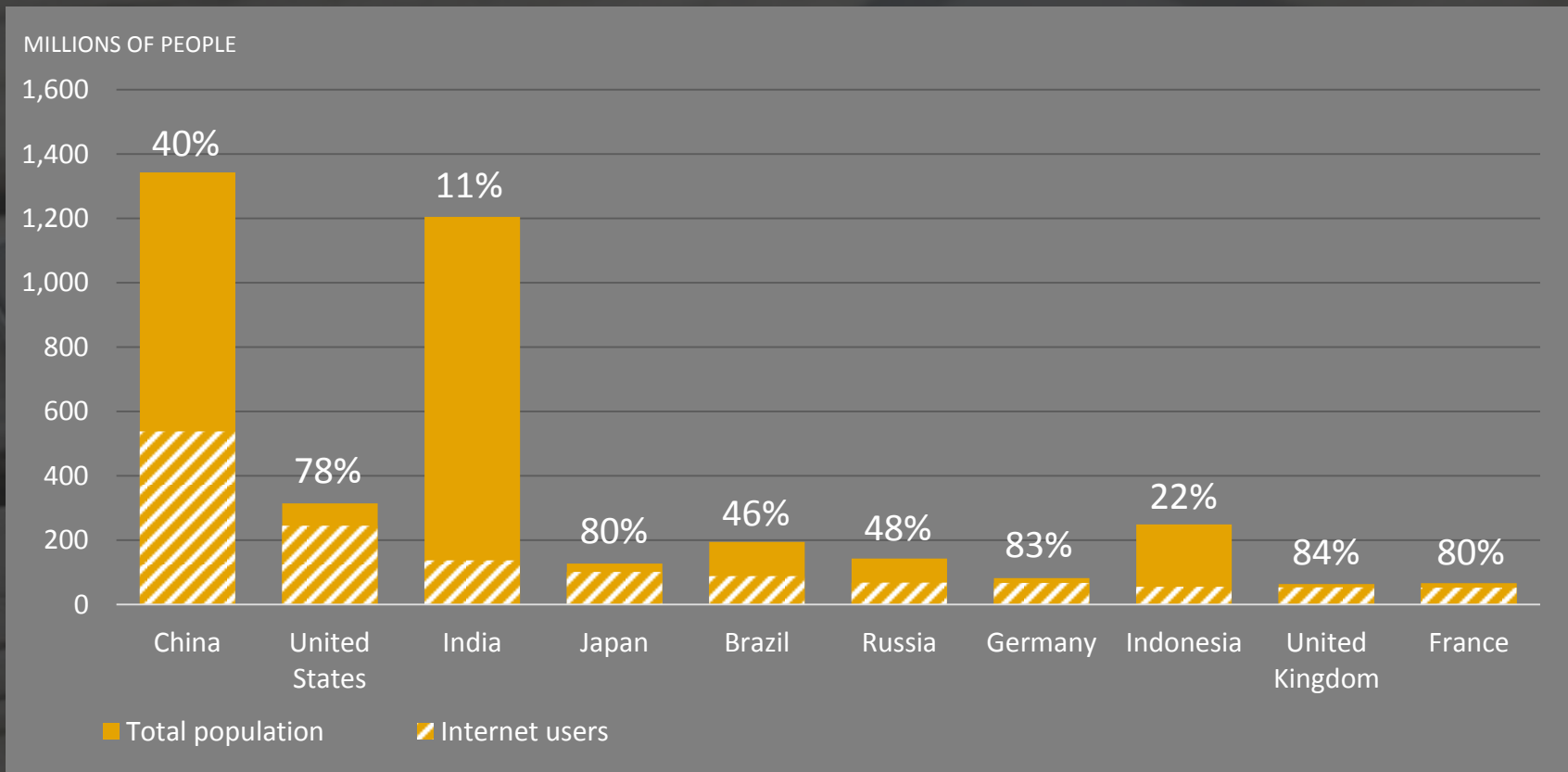
50  
billion

2020



# CONNECTED DEVICES

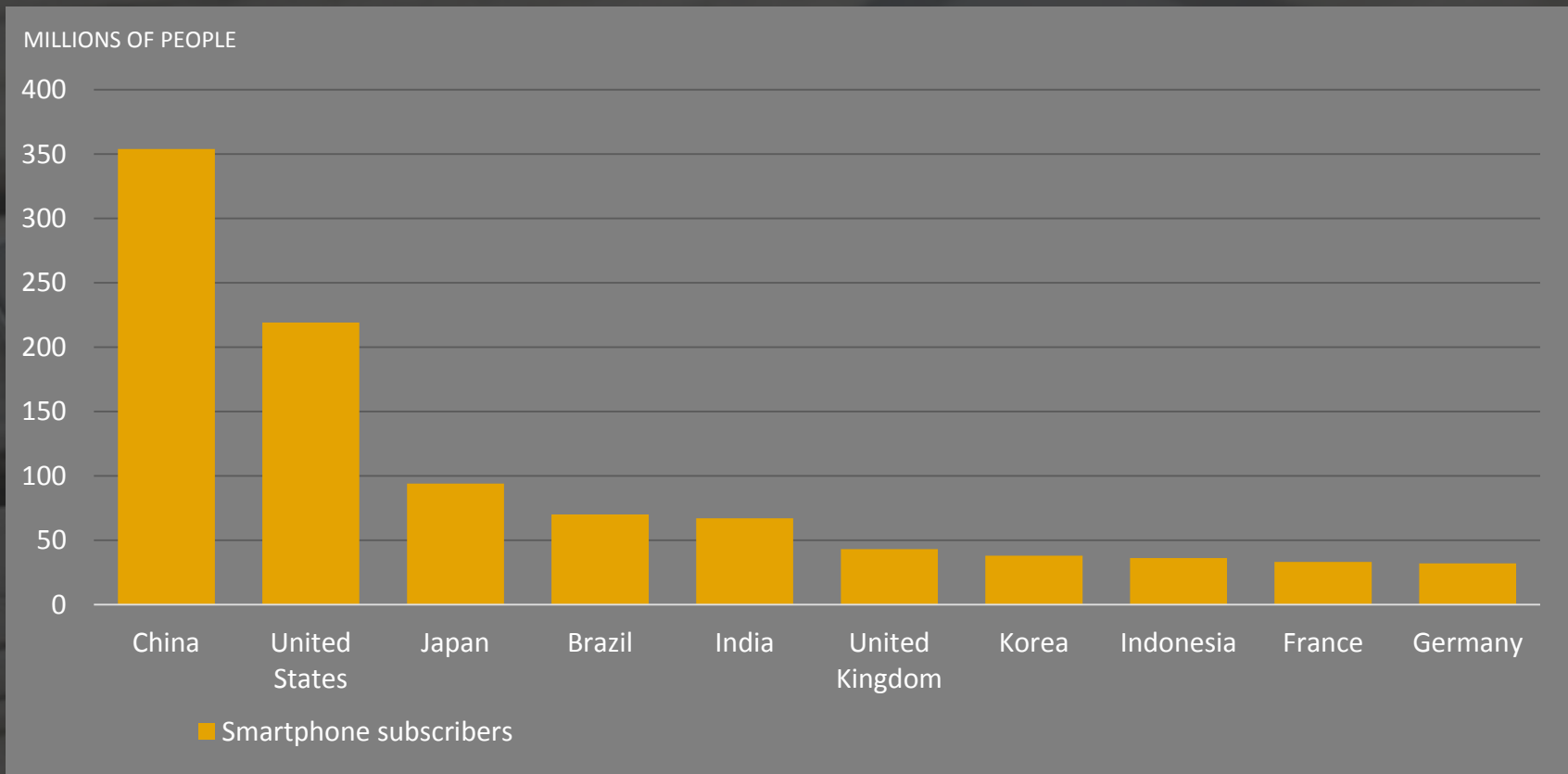
## Penetration of Internet usage by country





# CONNECTED DEVICES

1.5 billion smartphones globally



# PERSONALIZATION

Navigating your world







How long will it take to get to home or work?

Where can I charge my electric vehicle?

Where is the closest available parking?

How efficiently do I drive compared to others in my city?

Where is the cheapest fuel along my route?

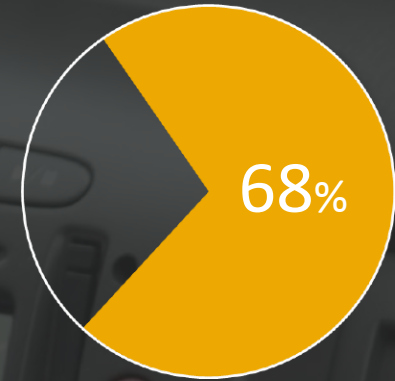
Would it be quicker to park and take the train?

Is the roadway starting to ice up?

What's the best way to avoid this traffic?

# IN-CAR INFOTAINMENT

Adoption by 2019





# THE CONNECTED CAR

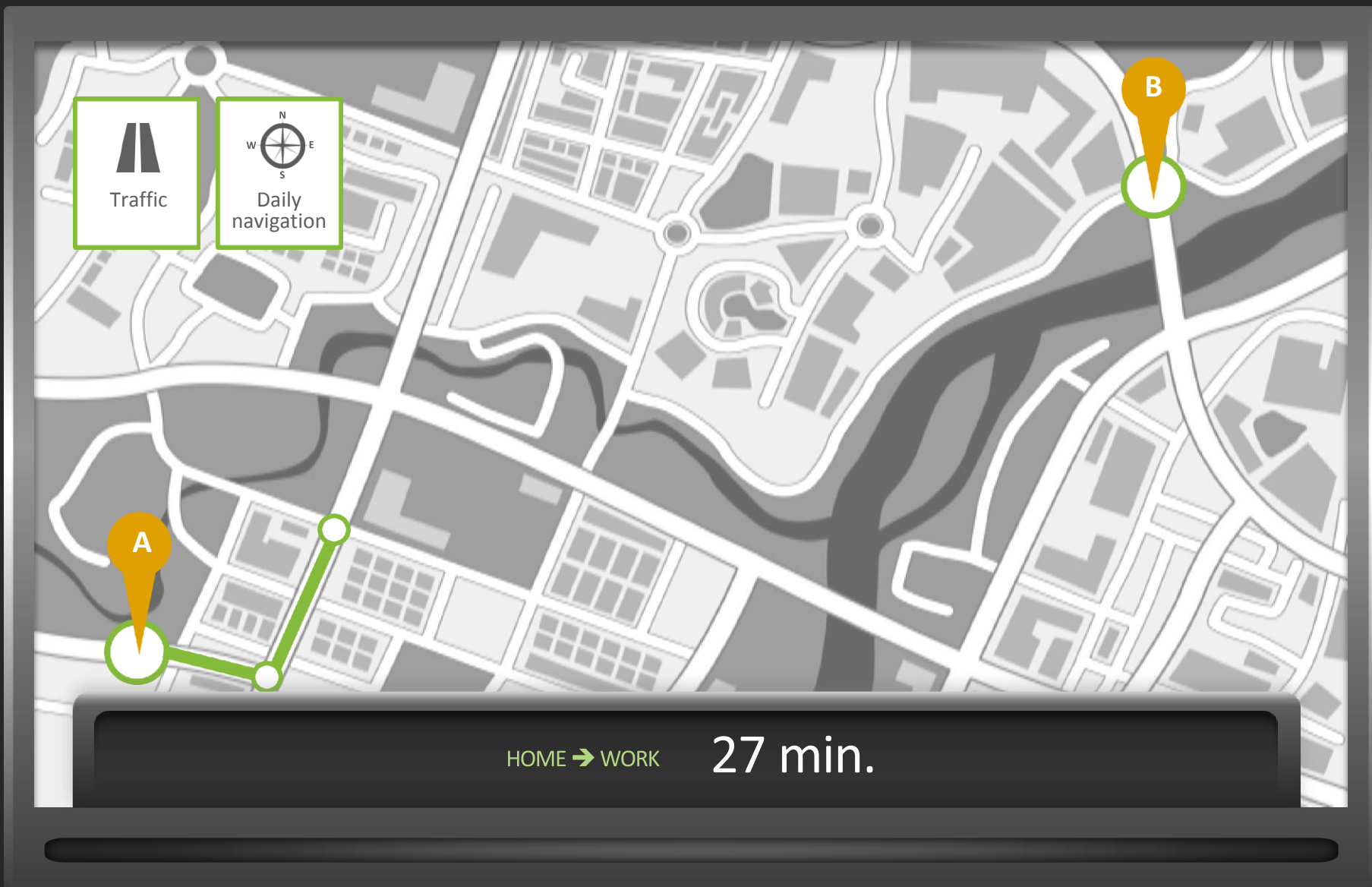


# TRAFFIC





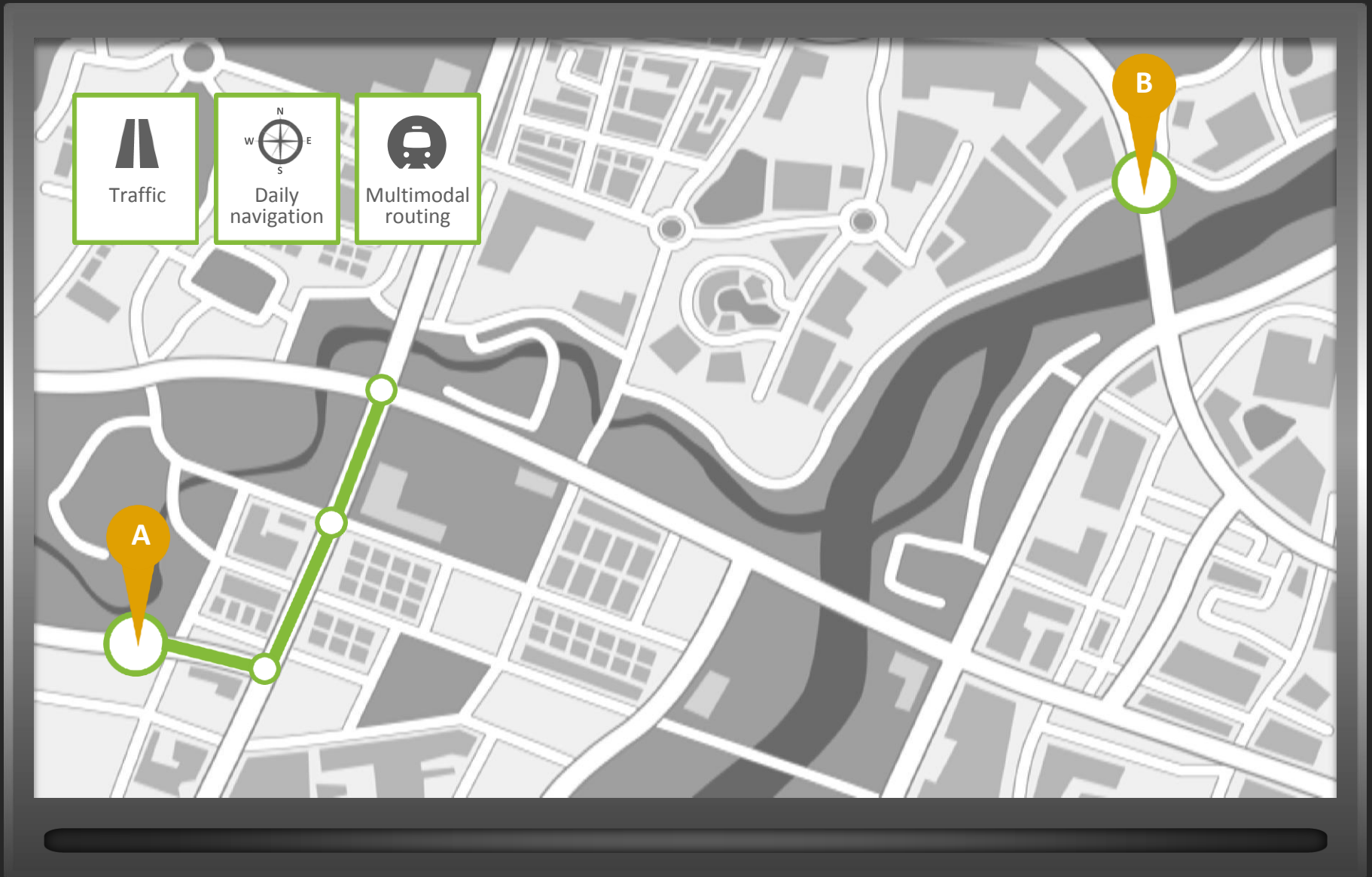
# DAILY NAVIGATION



HOME → WORK

27 min.

# MULTIMODAL ROUTING





# ROAD WEATHER



# LOCAL SEARCH





# FUEL PRICES



Traffic



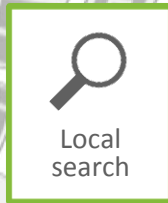
Daily navigation



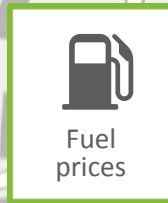
Multimodal routing



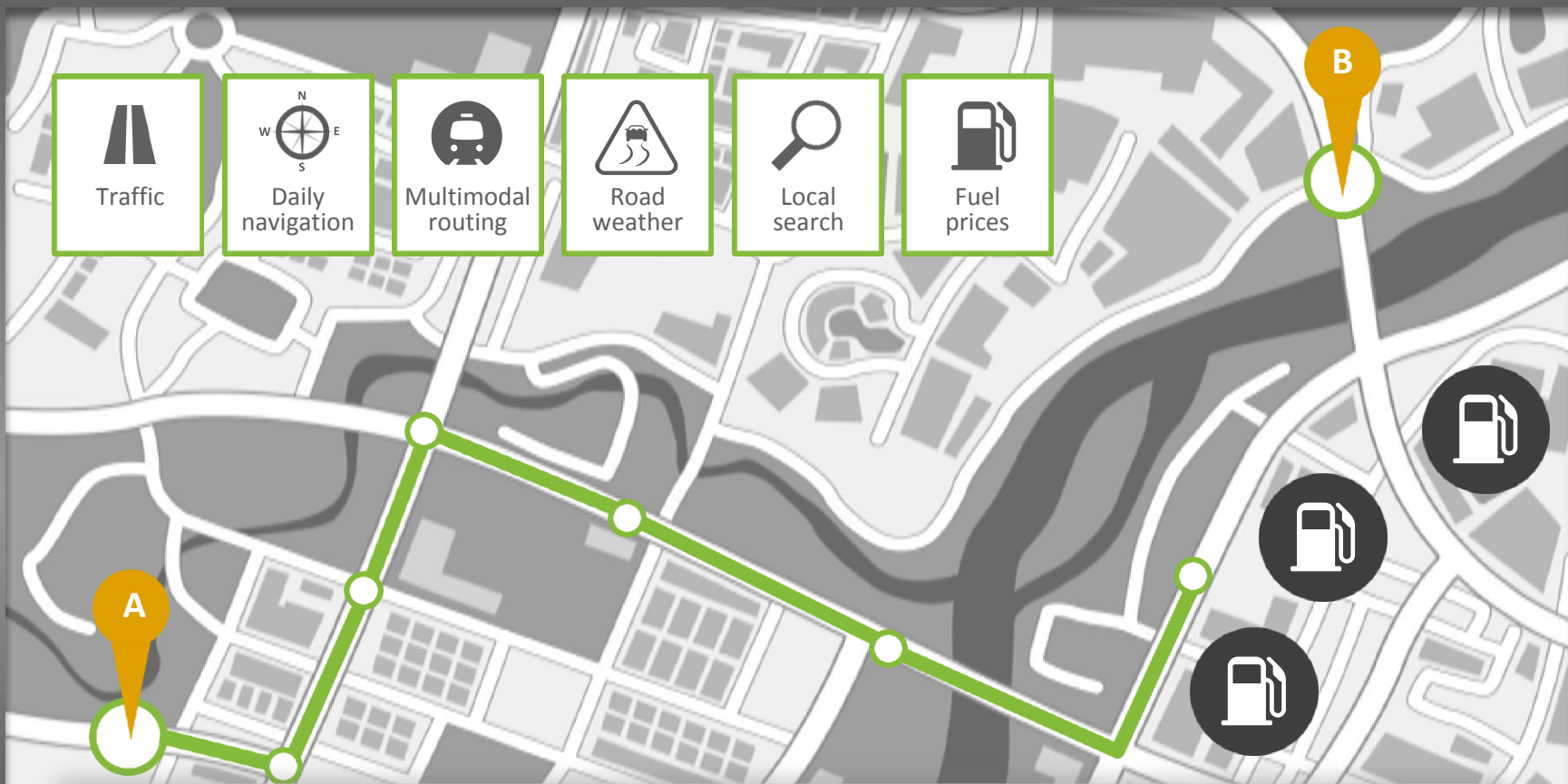
Road weather



Local search



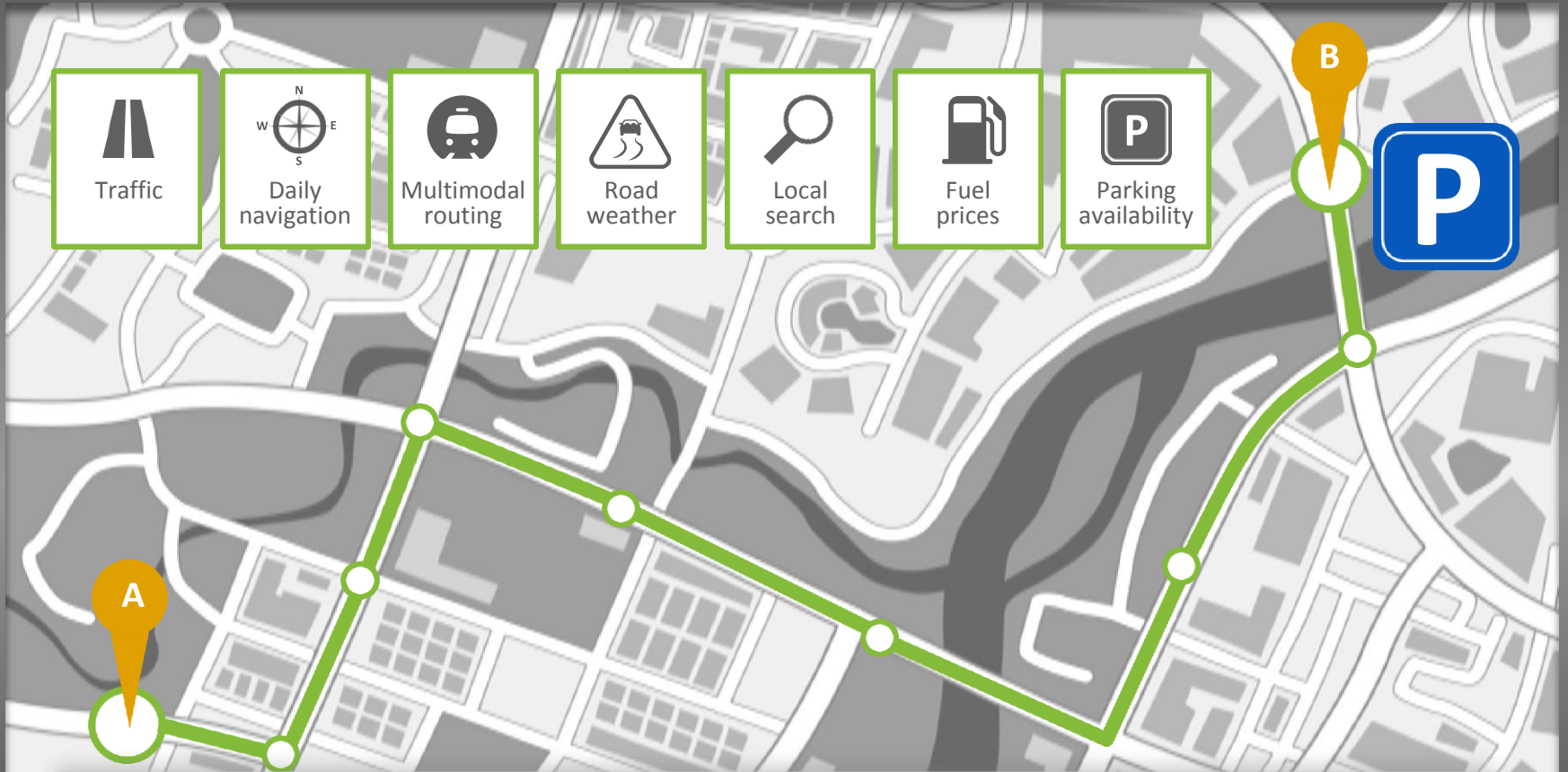
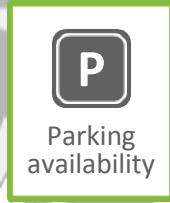
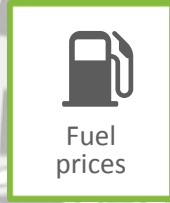
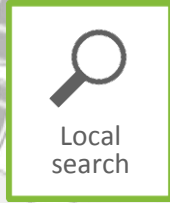
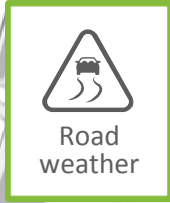
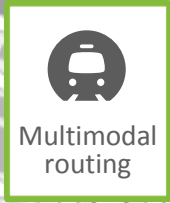
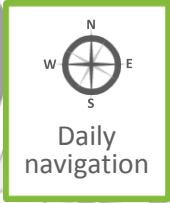
Fuel prices



Regular: \$4.05

Premium: \$4.45

# PARKING AVAILABILITY



23 spaces available

\$10 for first hour



# DRIVING FORWARD

## Ten Megatrends



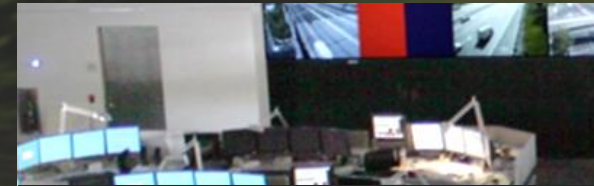
Growth of Urbanization



The "Crowd"



Cost of Congestion



Active Road Network



Pollution



Connected Devices



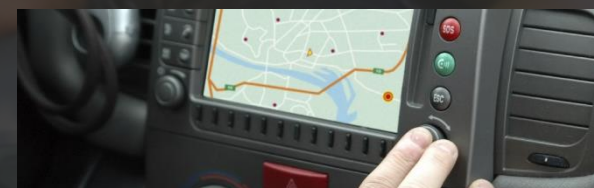
Connected Cars



Personalization



Urban Mobility



In-car Infotainment

# AUTONOMOUS DRIVING

*“We should be able to do 90% of miles driven within 3 years.”*

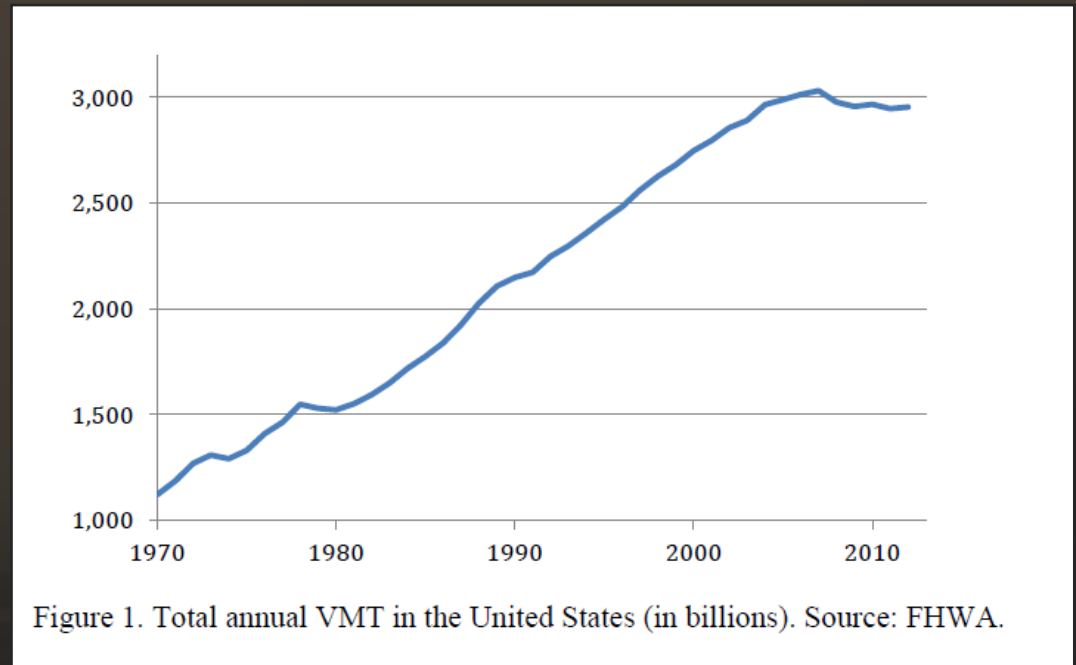
– Elon Musk, Tesla





# Twisted Trends

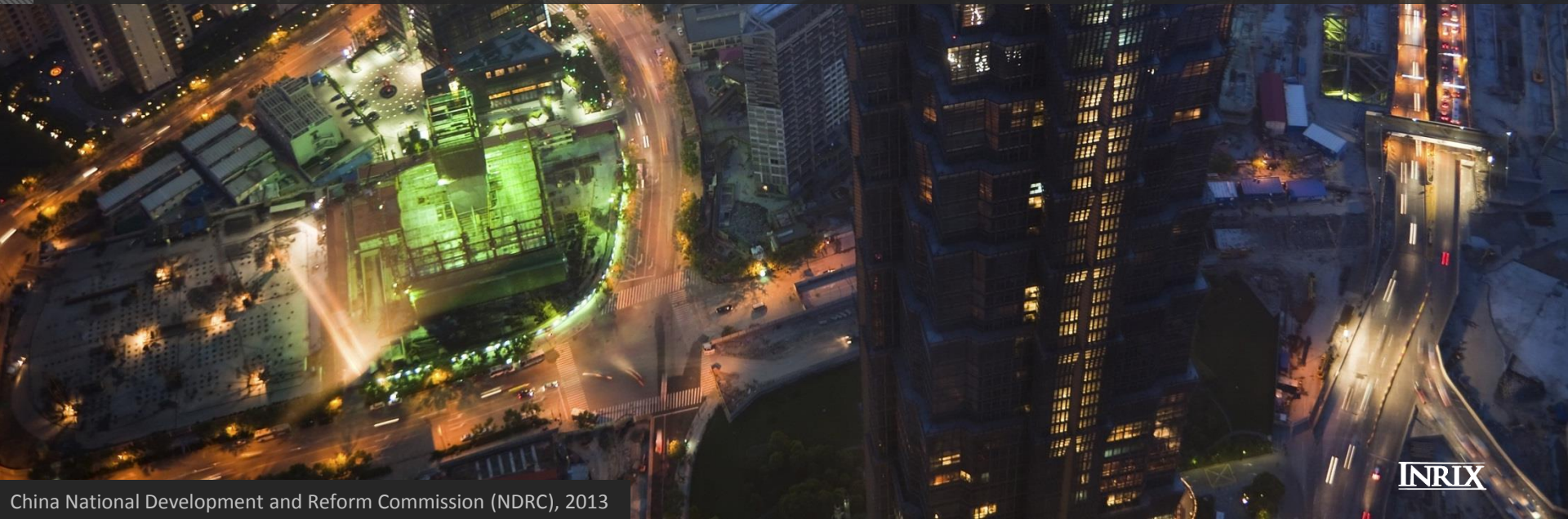
- Woman in the Workforce
- The Baby Boom
- Household Income
- Suburbanization
- Automobile Ownership
- Congestion
- Generational Preferences





# The “Planners Challenge”

It is well understood –  
We cannot build ourselves out of congestion.





# The “Planners Challenge”

It's also been long assumed that VMT will continue to grow.

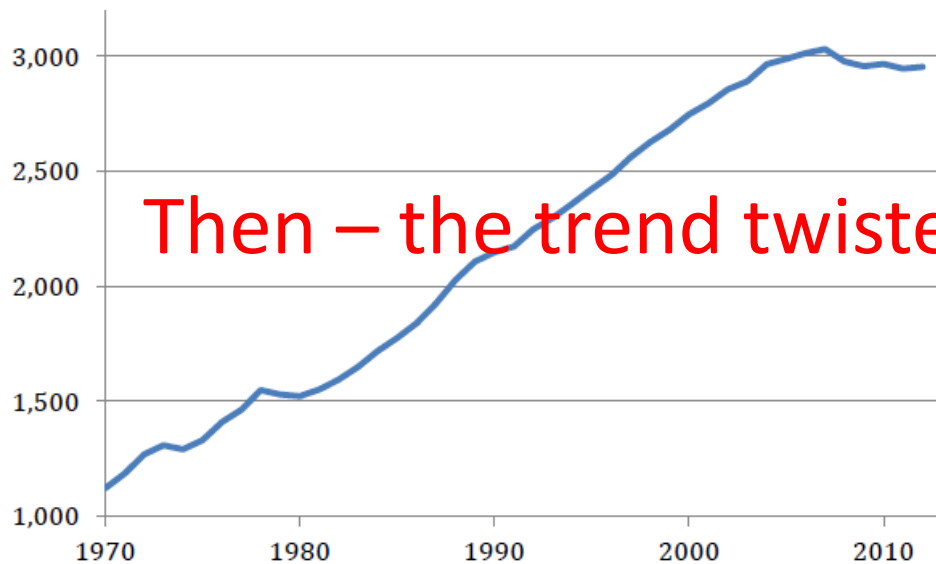


Figure 1. Total annual VMT in the United States (in billions). Source: FHWA.





# The “Planners Challenge”

It is well understood – Maximum Freeway Capacity is near 2000 vphpl

Smart Cars will increase this to???

3000

3500

4000

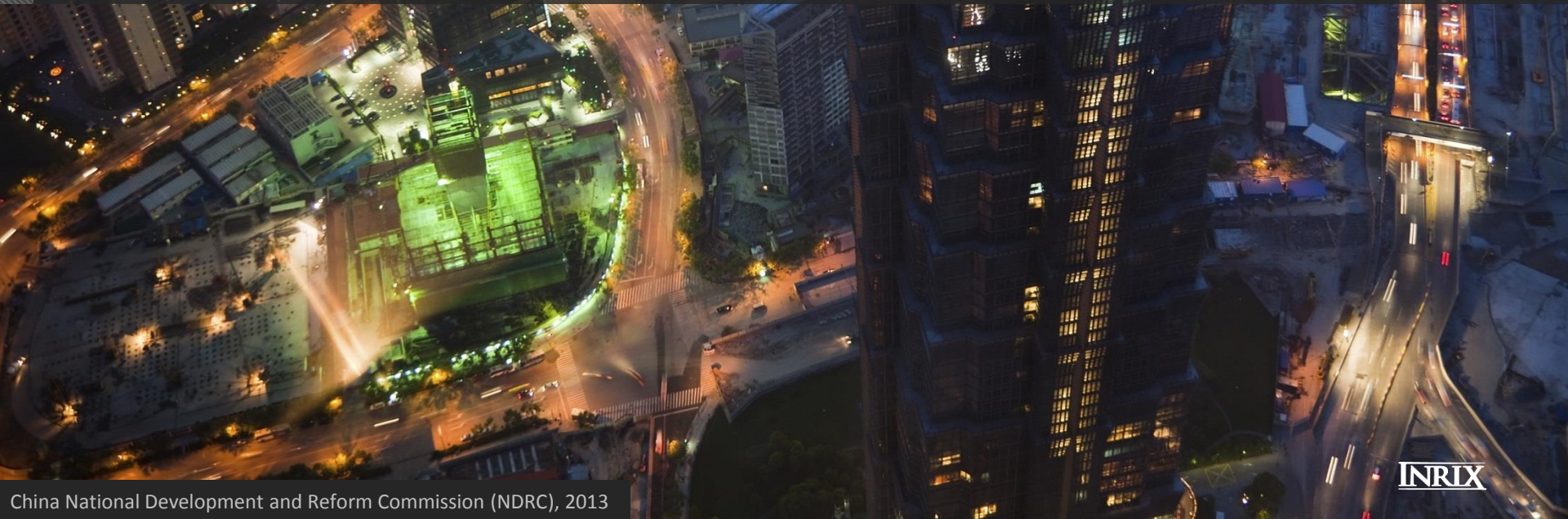
More...





# The “Planners Challenge”

Consider – decreasing demand – added capacity







# The “Planners Challenge”

What does this mean to the assumption?

“We cannot build ourselves out of congestion”





# The “Planners Challenge”

Instead of planning for the  
Next Transportation Package...

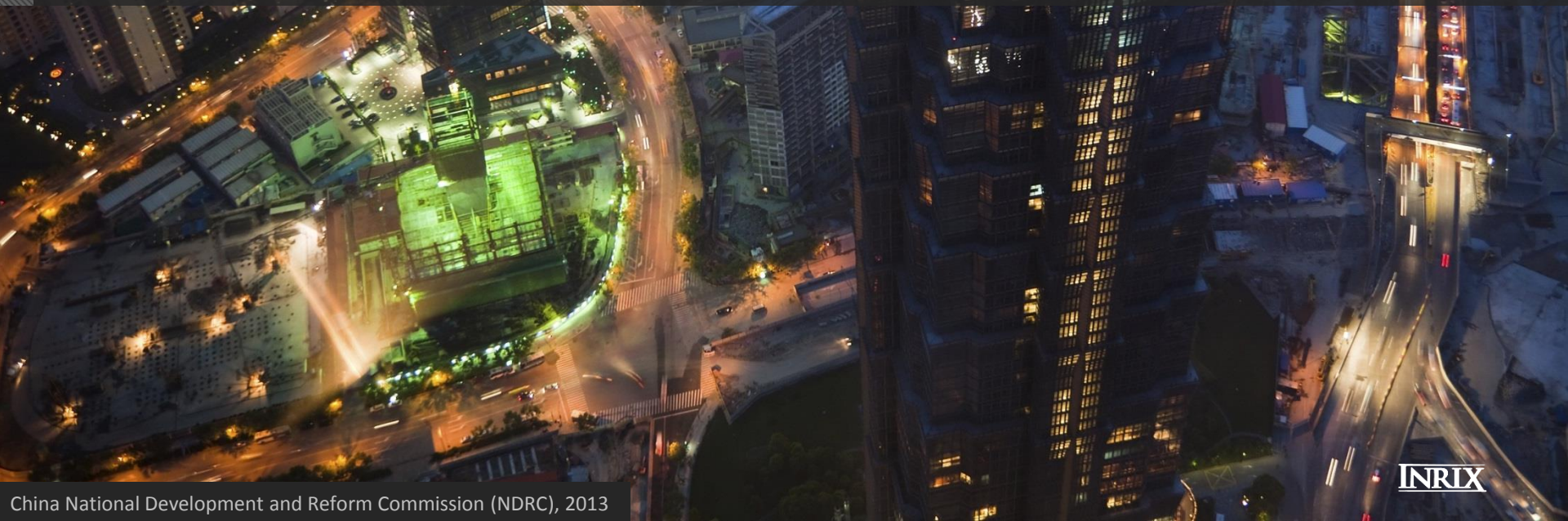




# The “Planners Challenge”

Let’s think about planning for -

## The Last Transportation Package





# Multnomah County Bottlenecks

INRIX Traffic - US

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INRIX Analytic Tools
Bottleneck Ranking

New search

**Bottleneck locations on Oregon Interstates (in Multnomah County) between July 1, 2013 and September 30, 2013 (168 total)**

Export to CSV

Location	Average duration	Average max length (miles)	Occurrences	Impact factor
I-5 N @ WA-14/EXIT 1	4 h 32 m	13.67	150	557,612
I-5 S @ BUTTEVILLE RD/MILEY RD/EXIT 282	4 h 23 m	18.66	53	260,100
I-205 N @ 83RD ST/EXIT 32	2 h 36 m	8.95	182	254,065
I-5 S @ TERWILLIGER BLVD/EXIT 297	2 h 38 m	6.60	194	202,232
I-84 E @ 102ND AVE/EXIT 9	3 h 34 m	5.45	136	158,752
I-5 N @ WA-14/EXIT 1	2 h 6 m	6.41	153	123,611
I-84 W @ I-5	2 h 10 m	3.91	199	101,255
I-84 E @ I-205/EXIT 8	2 h 18 m	4.36	105	63,180
I-205 S @ JOHNSON CREEK BLVD/EXIT 16	2 h 9 m	6.19	68	54,320

**I-5 N @ WA-14/EXIT 1**

**Occurrences**
Table
Export to CSV

In this time spiral each trip around the circle represents a day

The center represent July 1, 2013 and the outer edge represents October 1, 2013.

Maximum queue length < 1






> 10 miles

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Thank You

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