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Preparing for the Mobility Revolution: International Experience for New Zealand

March 23, 2018

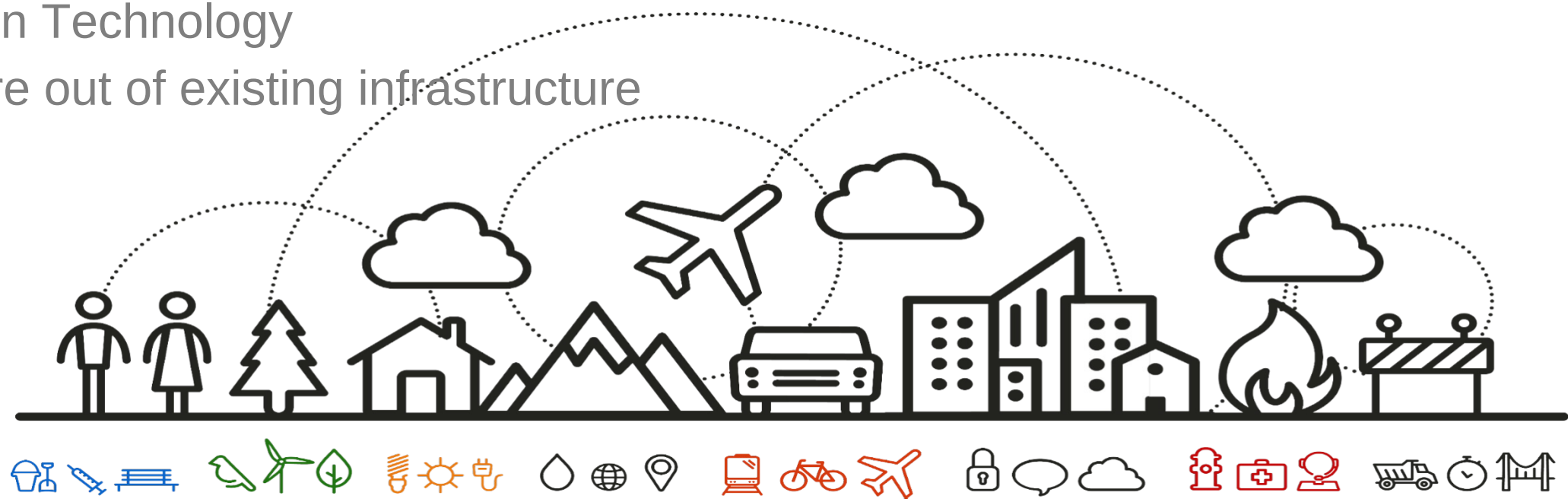
Transportation Today

What a waste ...

Space	Energy	Money	Time	Lives
Average person occupies 1200sf on the highway (the size of a good 1 bedroom apartment). Gross waste of space, leading to congestion.	Average person uses a 3000lb vehicle to move them. Gross waste of energy, leading to pollution and climate change.	Average person uses a vehicle less than 10% of the time per day, but pays for same for ownership as the person who drives for a living. Gross waste of money.	Average person spends hundreds of hours in a car annually doing only one task (or at least they should only be doing one task) ... driving. Gross waste of time.	Last year in North America, more than 40,000 people died in accidents involving motor vehicles. Gross waste of life.

Using Technology to Leverage Existing Infrastructure

- Making Cities Smarter
  - Funding challenges
  - Focus on Technology
  - Get more out of existing infrastructure



Primary Benefits

- **Congestion:** We have a tangible solution for the first time in history.
- **Safety:** We'll ultimately see a 90% reduction in collisions

ICM

ICM Overview

- ICM is the foundation of a Connected Vehicle Network
- ICM is not a built project, it’s an efficiency project
- Congested Corridor with other parallel mode based routes
- Data
- DSS (Decision Support System)
- Data Fusion (Based on preagreed business rules)
- Predictions

ICM Coordination

- Institutional Coordination
- Technical Coordination
- Operational Coordination

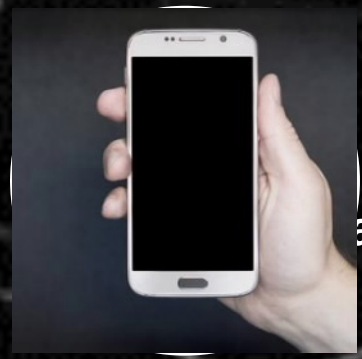
CAV

Transportation Paradigm Shift

Road Network =
Building Block of Cities

Horse & Buggy

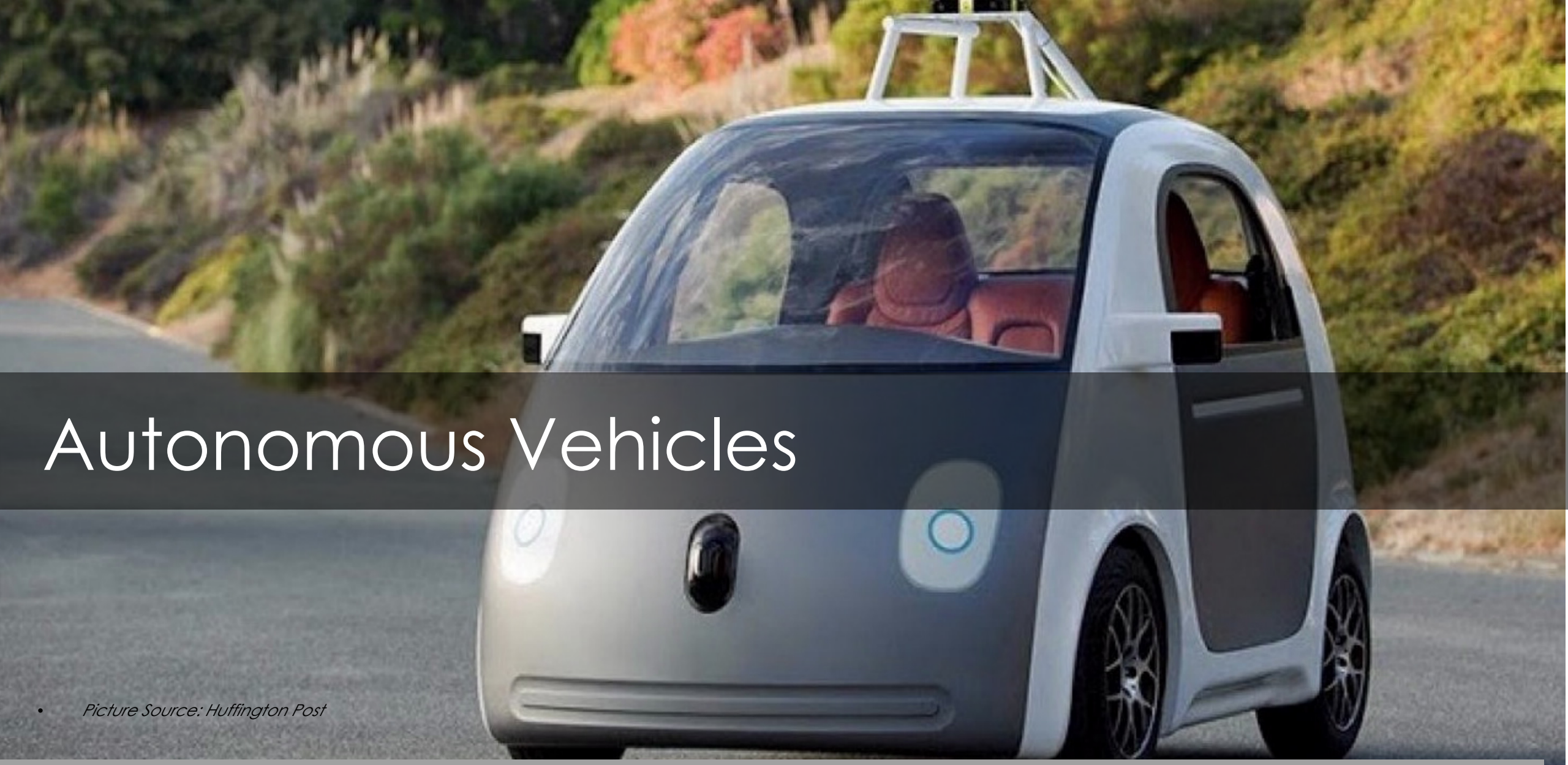
Model T



art

Source: businessreviewusa.com

Autonomous Vehicles



- *Picture Source: Huffington Post*

What do our choices look like?


B
B
B
B
B
B
Heathrow
Heathrow
Heathrow
ULTra
213
207
218
212

Vehicle to Vehicle

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Vehicle to Infrastructure

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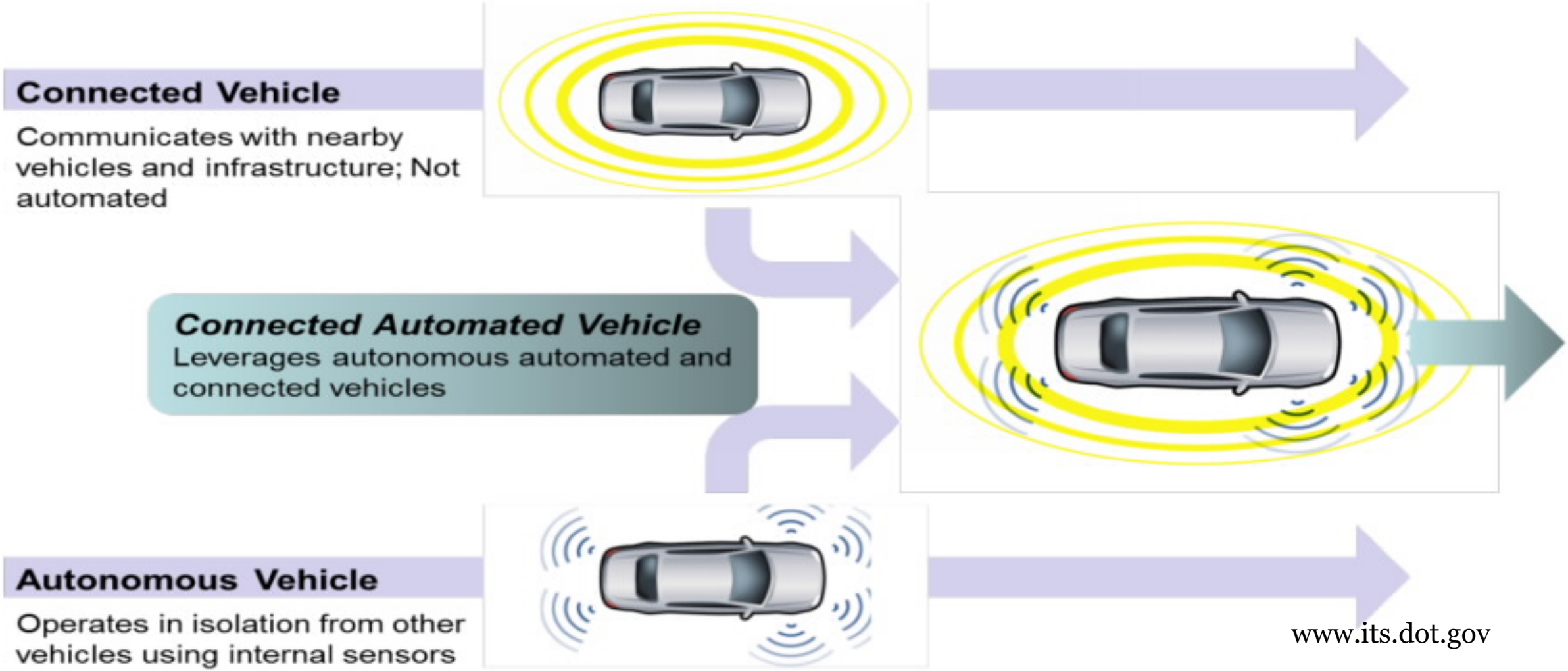
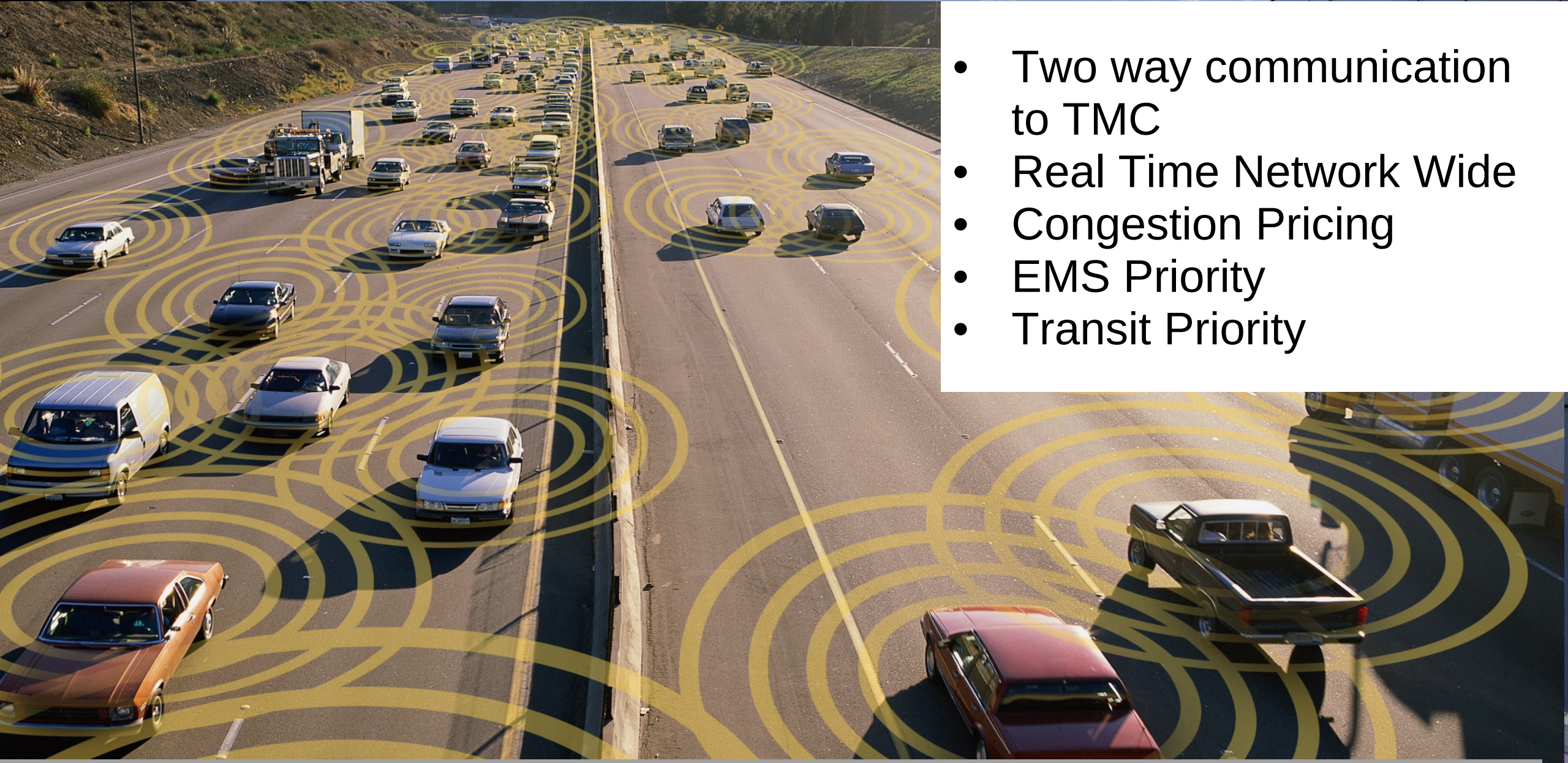
The Evolution of Connected to Automated Vehicles



www.its.dot.gov



- Two way communication to TMC
- Real Time Network Wide
- Congestion Pricing
- EMS Priority
- Transit Priority

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Who will lead? China

- Speed and Support of Government
- Privacy
- Capital Investment
- Size and Pace of Growth
- They may Establish the Standards

Testbeds

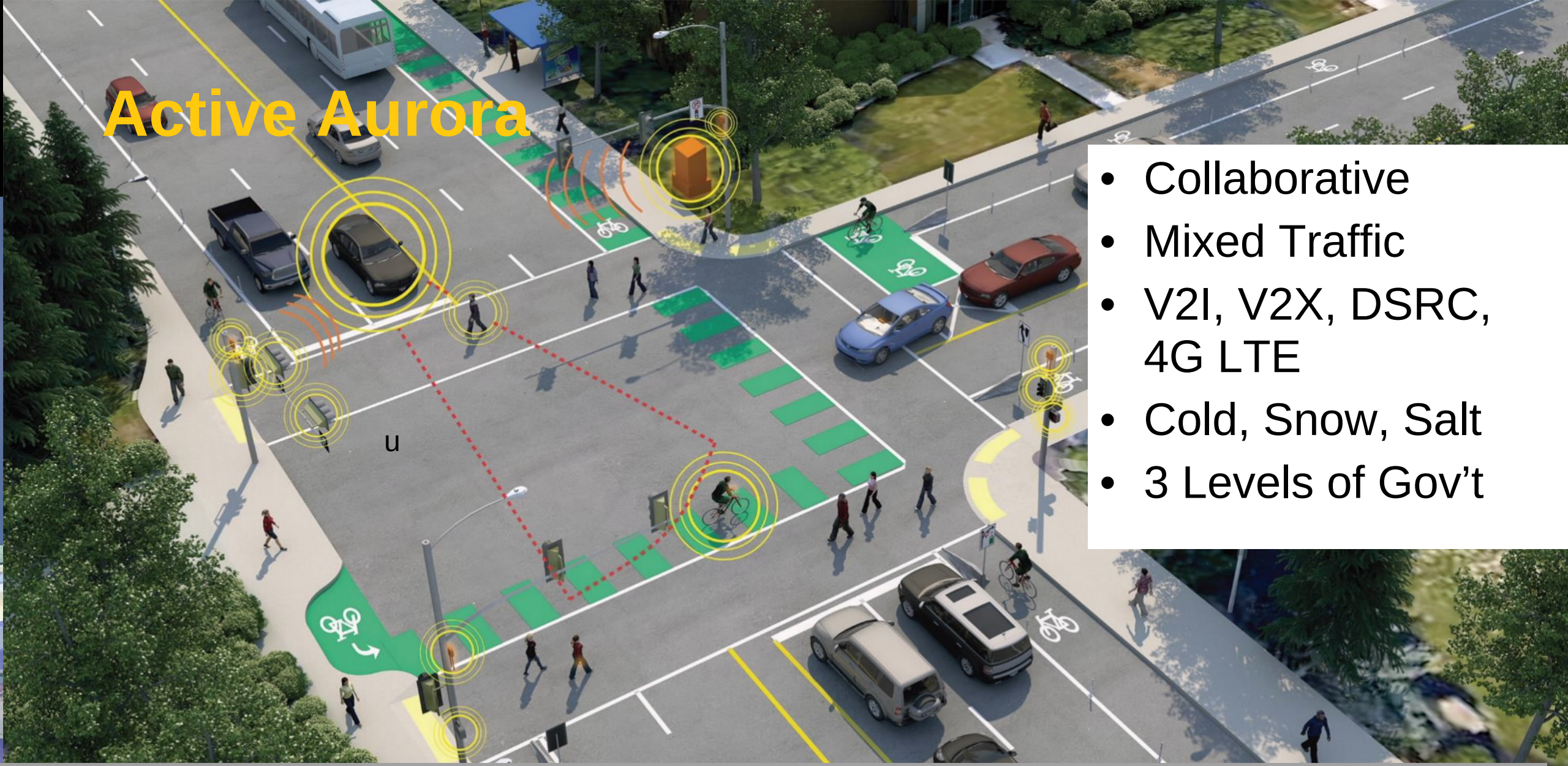
- Cost Effective
- Progress
- Build Acceptance

Stantec Testbed Program:

- Active Aurora, Edmonton,Alberta
  - Largest Testbed in Canada
  - Cold Weather Testing
  - Initial CV focus, now AV also

- GoMentum, Concord, California
  - Largest Secure Testbed in USA
  - Near Silicon Valley
  - AV focus

Active Aurora



- Collaborative
- Mixed Traffic
- V2I, V2X, DSRC, 4G LTE
- Cold, Snow, Salt
- 3 Levels of Gov’t

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DIFFICULTY NAVIGATING IN SNOW

WHAT ARE THE CHALLENGES?

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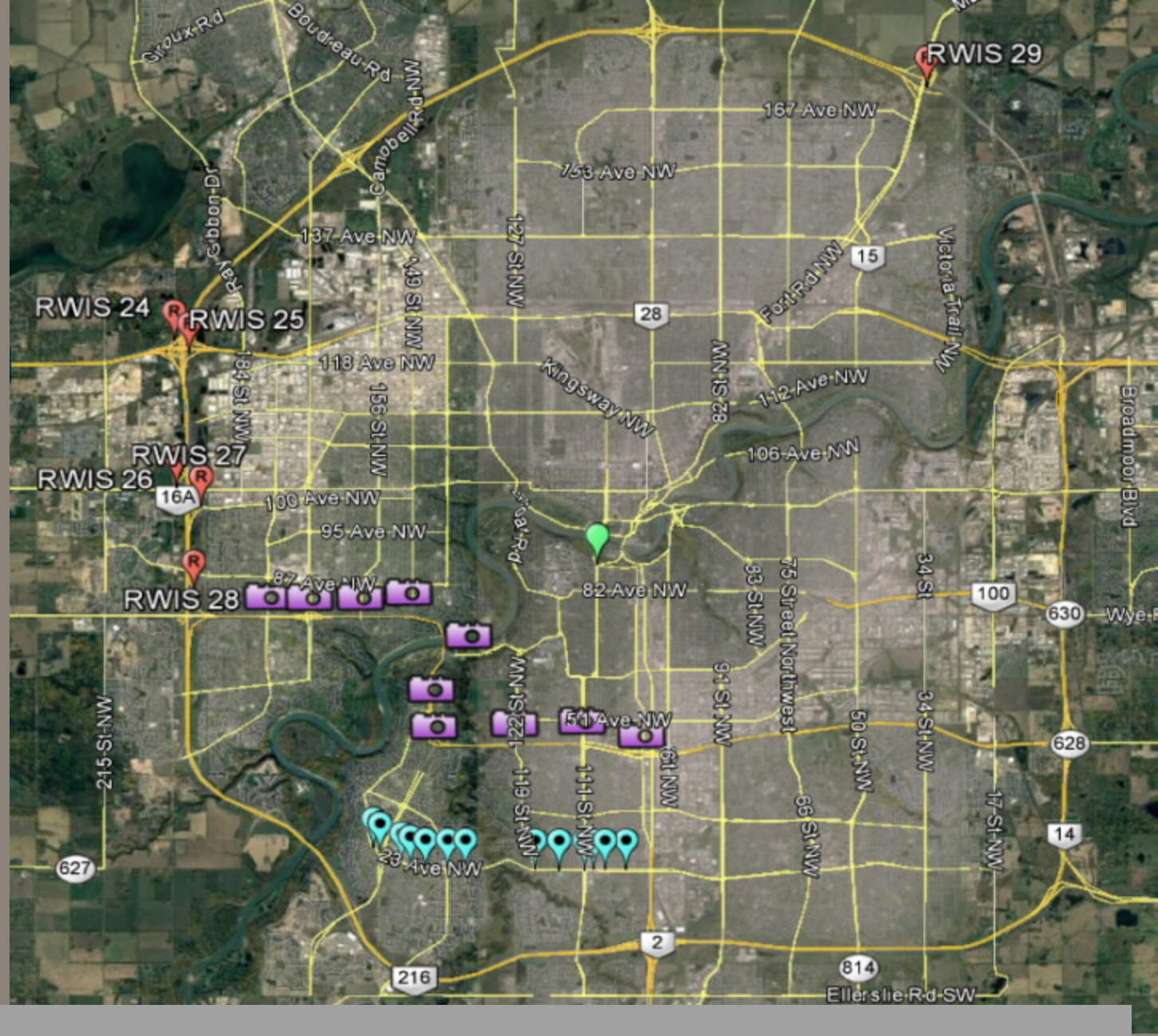
Active Aurora

Currently 42 RSUs:

- Rural Fwy
- Urban Expwy
- Urban Arterial



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GoMentum Station

- Near Silicon Valley
- OEM & High Tech Firms Testing
- Secure – Former Navy Station
- V2V
- Highways, Street Grid, Tunnels, Railways
- First SAV Deployed in USA

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Over 5000 acres, 2100 acres for testing
Point Edith Wildlife Area
Mallard Reservoir
Port Chicago Hwy
Pacifica Ave
Bay Point
Willow Pass Rd
Evora Rd
W Leland Rd
Bates Ave
Imhoff Dr
Olivera Rd
Solano Way
Marsh Dr
Buchanan Field Airport
Pacheco
Concord Ave
Concord
Salvio St
Willow Pass Rd
Farm Bureau Rd
Clayton Rd
Chilpancingo Pkwy
Diamond Blvd
Sunvalley Shopping Center
Contra Costa Blvd
Meadow Ln
Monument Blvd
Cowell Rd
Treat Blvd
Denkinger Rd
Concord Blvd
Bailey Rd
Concord Pavilion
242
680
4

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YIELD

AUTONOMOUS
VEHICLE TESTING
GROUND

BISHOP RANCH

WARNING

YOU ARE ENTERING TEST SITE
FOR AUTONOMOUS VEHICLES
SPEED LIMIT IS 15 MPH

BISHOP RANCH

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Deployments

- Client Expectations
- Flexibility
- 1st US SAV

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First Mile/Last Mile
Paratransit
Low operating $

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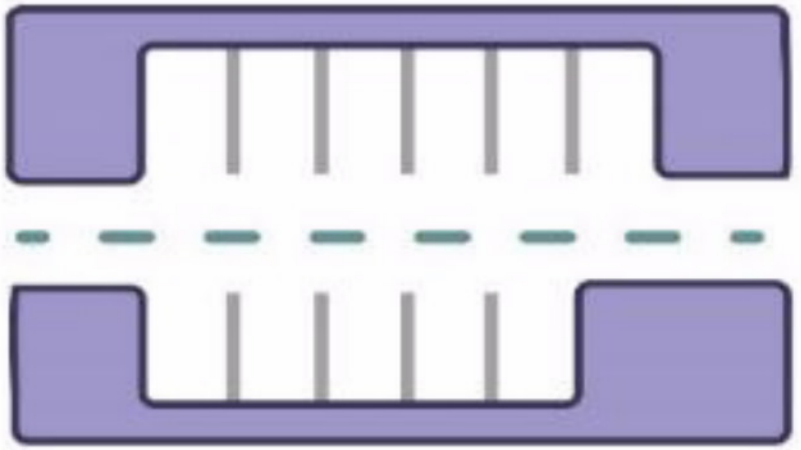
1 SAV can...

Eliminate



11 parking spaces

Every development becomes a TOD

As **SAVs extend Light Rail's reach** beyond a walkable radius…parking requirements drop, **TRAFFIC GENERATION DROPS**, rents…and livability rise

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Stantec Deployments:

- California
- Nevada
- Pennsylvania
- Florida
- Georgia
- Ontario

Other mobility tools and trends?

Car Ownership
Car Share
Shared Mobility

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LRT
BRT
ABRT
MaaS
Ride Share
TNC Partner

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Electric Power Infrastructure

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Security ORNL

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Employment

- Drivers
- Unions

Data

- All AVs generate vast amounts of data
- Much of this data has **value** in the marketplace (think Google).
- Lives depend on keeping certain data **secure.**
- Sensors, cameras, and records challenge **privacy.**

E-commerce Goods Movement
Electric Transports
Abandoned Rail Lines
Parcel Lockers

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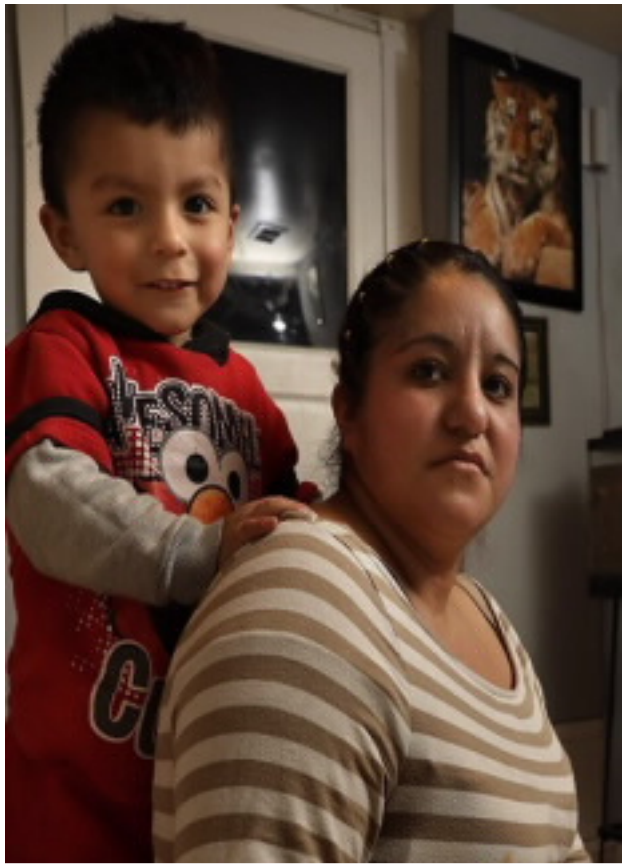
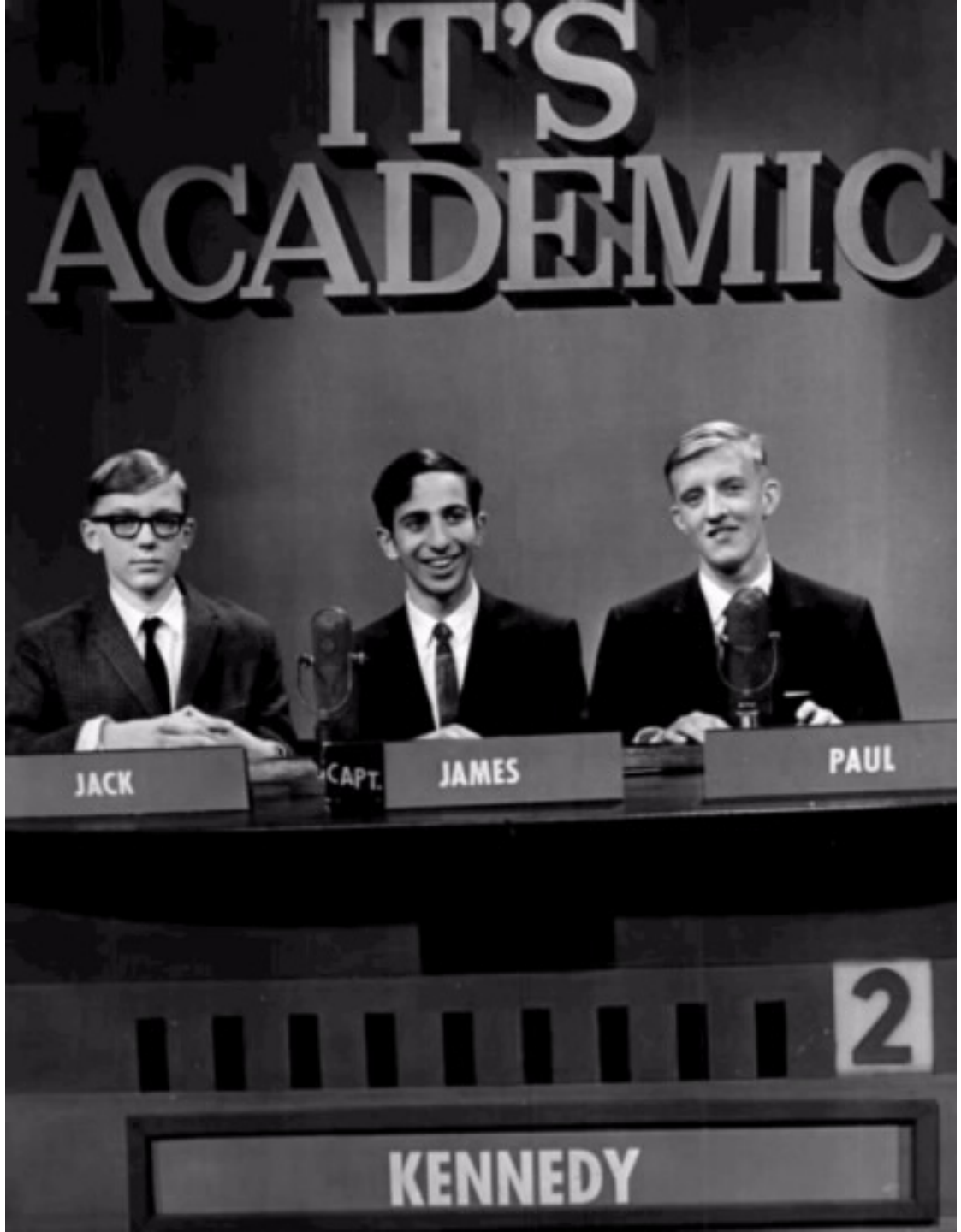
Planning

CONTEXT: Demographics are destiny

America: how we saw ourselves in the 1950s and 60s



America: how we saw ourselves today



New Zealand in the 1950s and 60s

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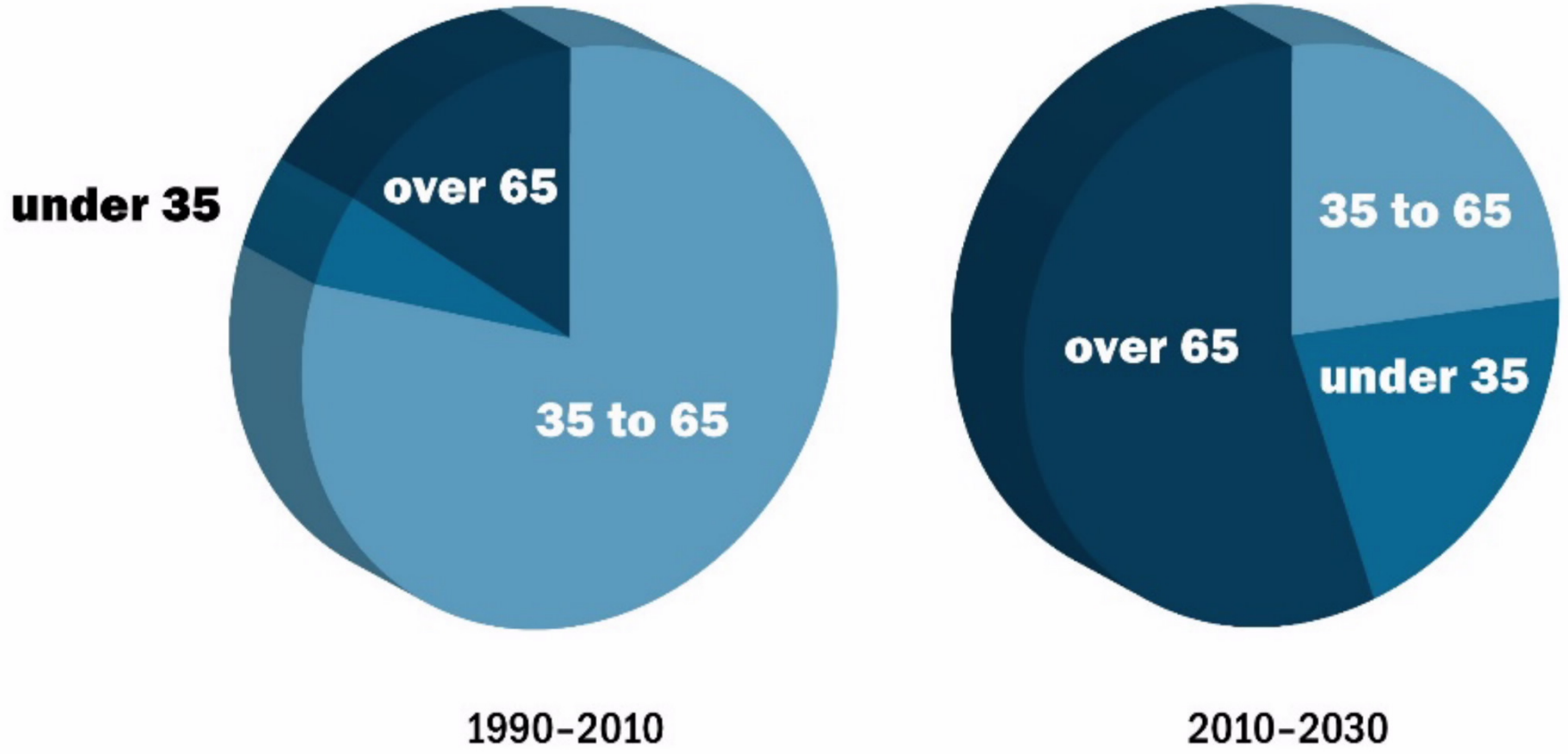
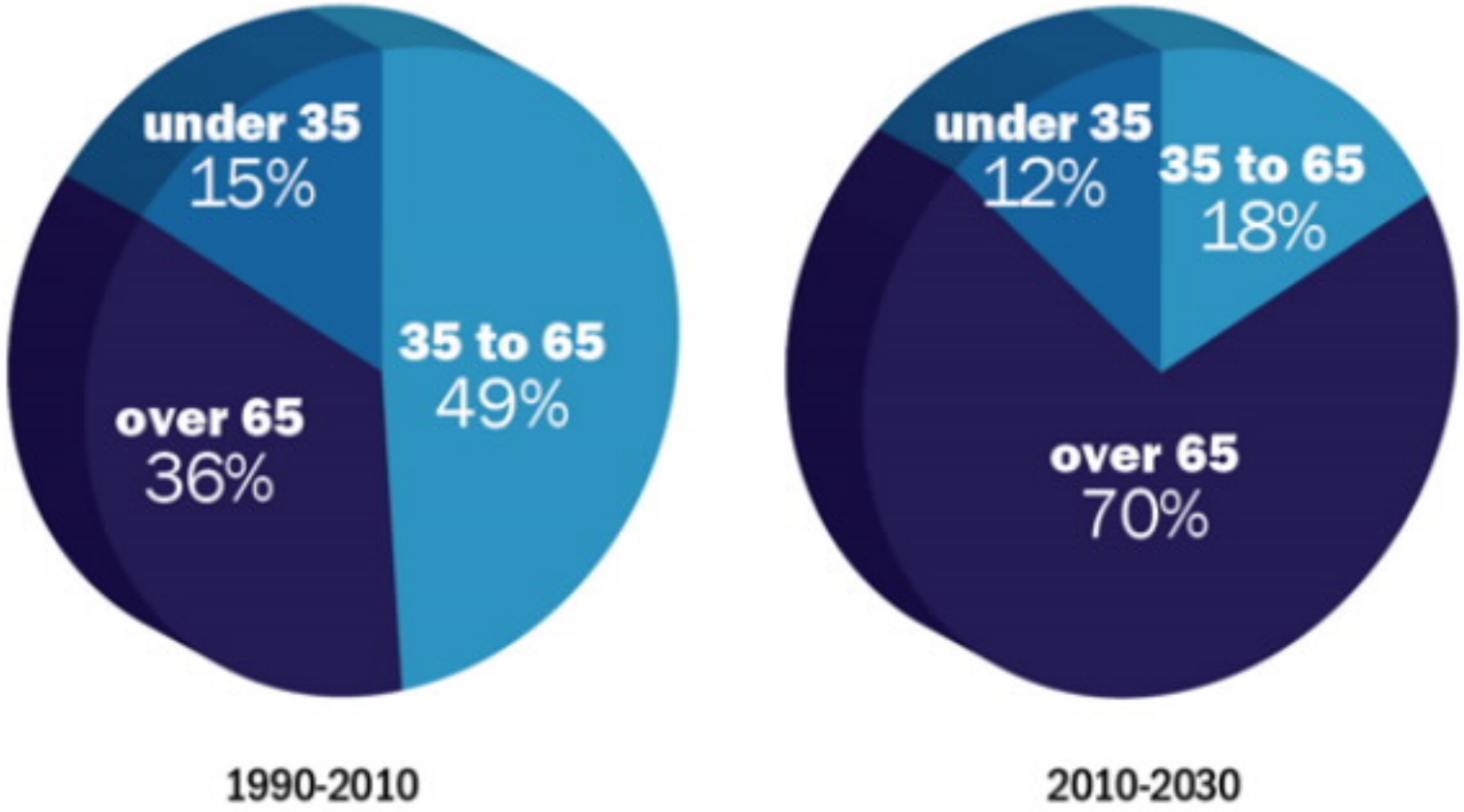
NEW ZEALAND
CRICKET
PAKISTAN
V
NEW ZEALAND
2018 LIVE MATCH
New Zealand today
Live streaming Tv channel list

How we grow has changed dramatically—US is growing older



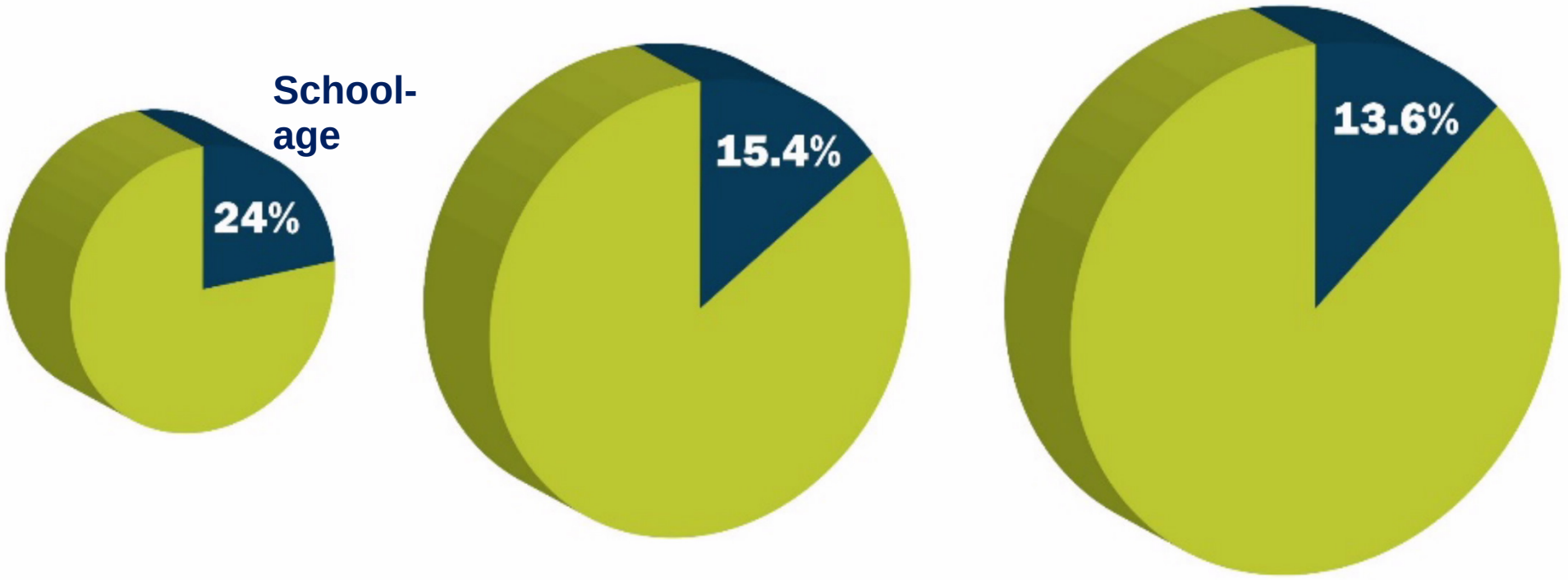
US population growth by age group

How we grow has changed dramatically—NZ is growing older



NZ population growth by age group

How we grow has changed dramatically—School age kids = roughly 2% of US growth since 1970



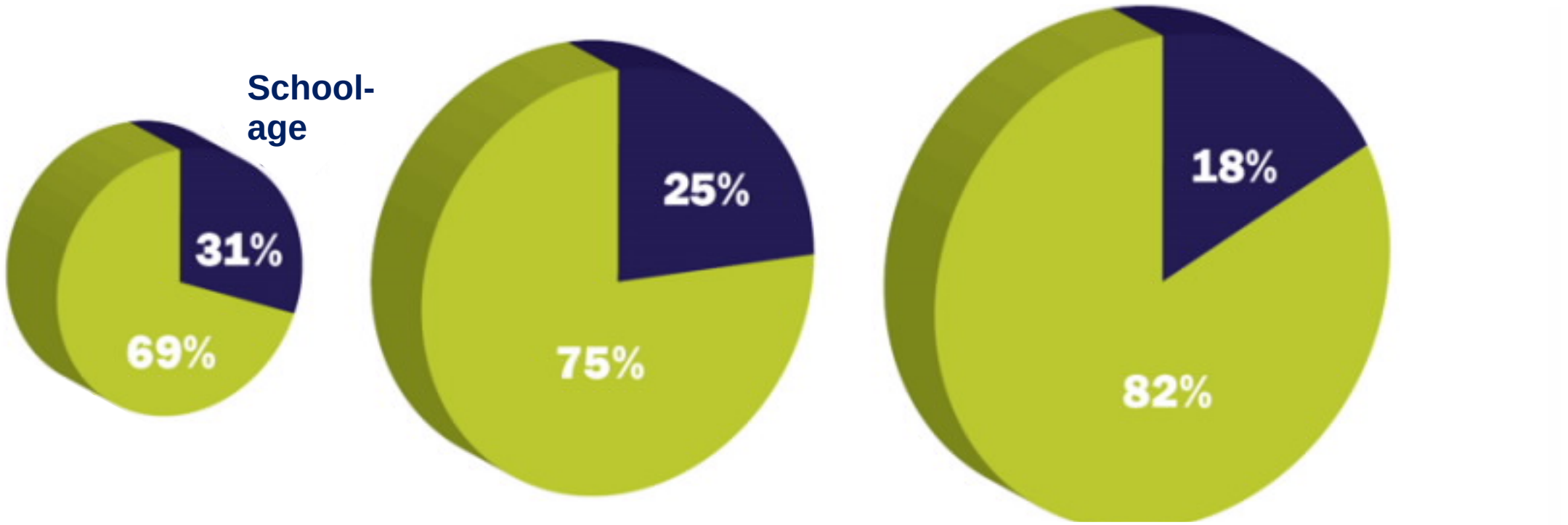
1970
Total pop: 203M

2015
Total pop: 321M

2010
Total pop: 373M

School age kids as share of US population

How we grow has changed dramatically—School age kids = roughly 6% of NZ growth since 1970



1970
Total pop: 2.8M

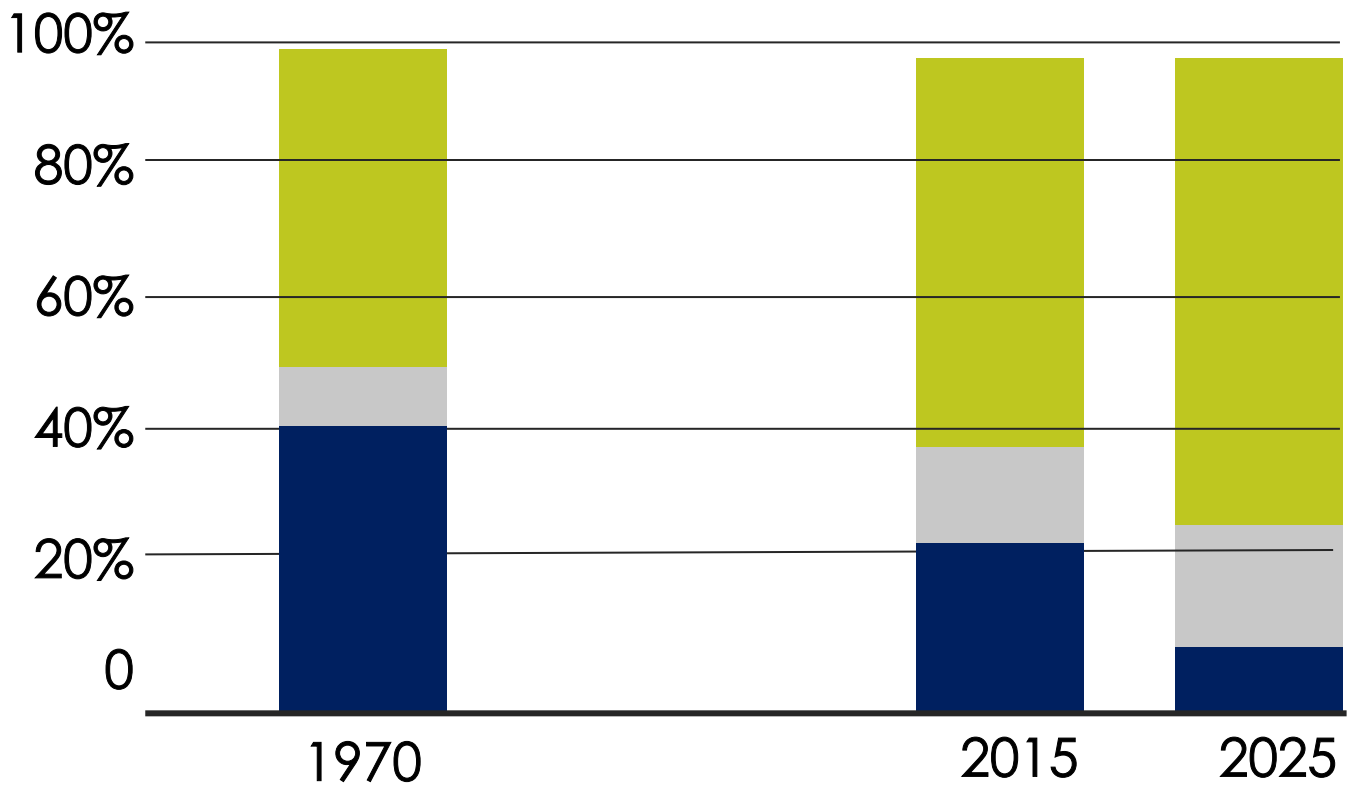
2015
Total pop: 4.4M

2010
Total pop: 5.1M

School age kids as share of US population

WORLD BANK POPULATION ESTIMATES AND PROJECTIONS

Who prefers living in urban places? Singles, couples, and families with one parent



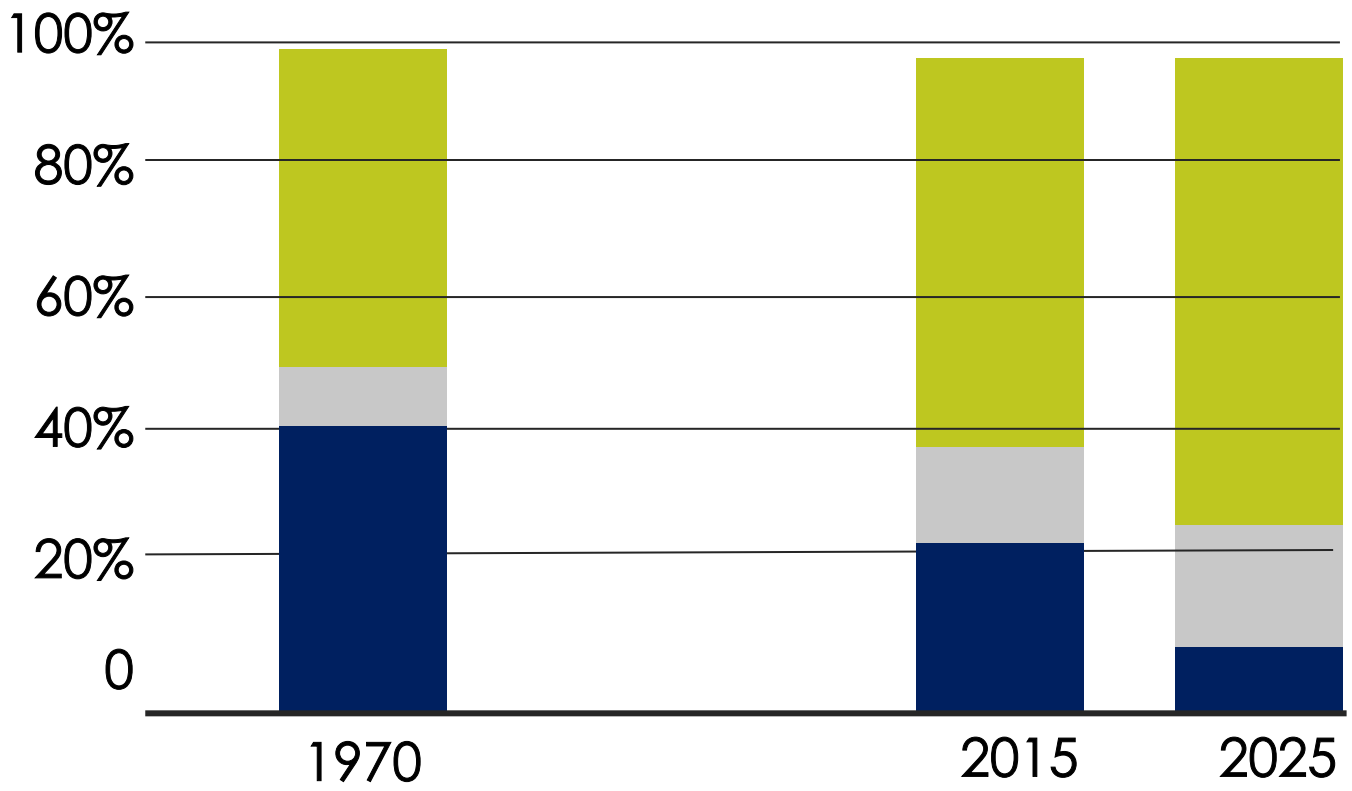
Singles and couples:
most likely to prefer urban places

Families with one adult:
More likely to prefer **urban places**

Families with two parents:
least likely to **urban places** to live

The share of US households most to least likely prefer urban places

Who prefers living in urban places? Singles, couples, and families with one parent



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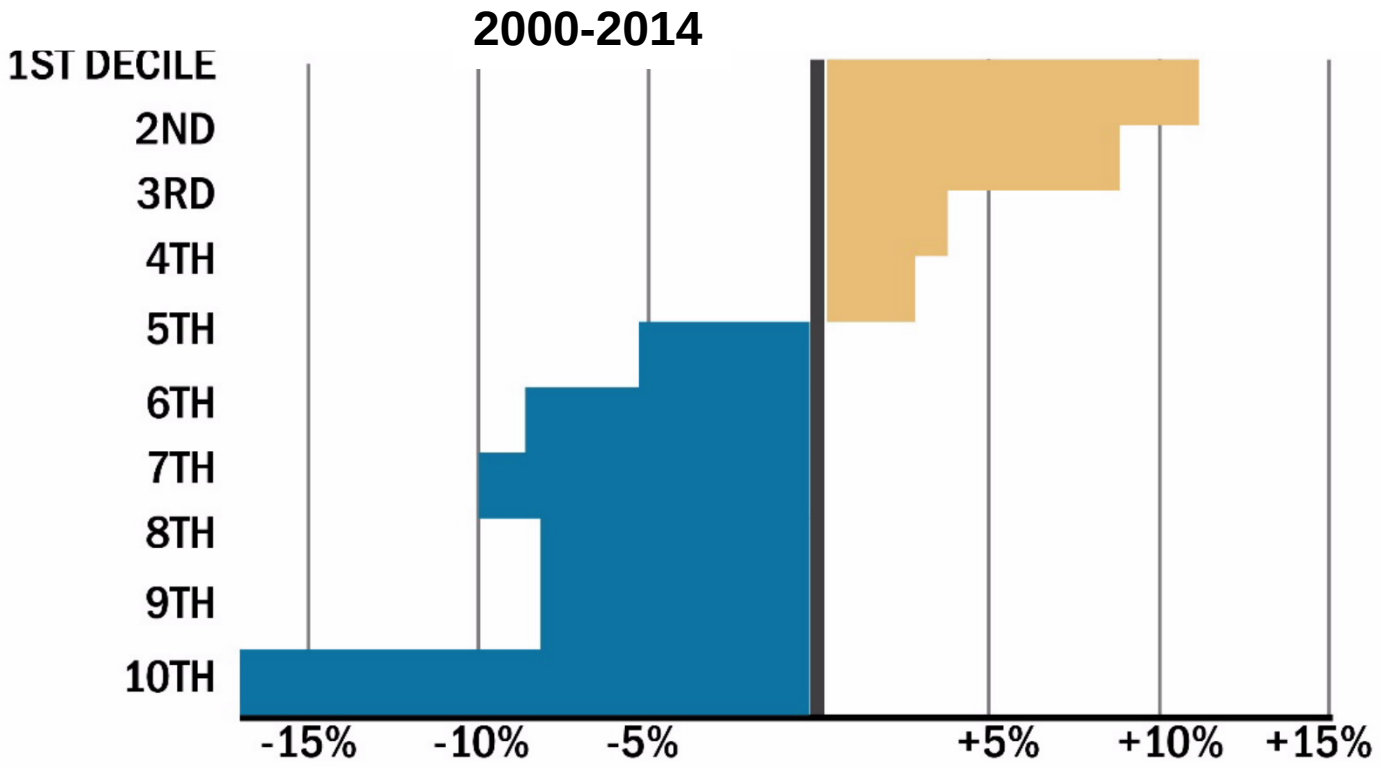
Who prefers living in urban places?
Higher income households

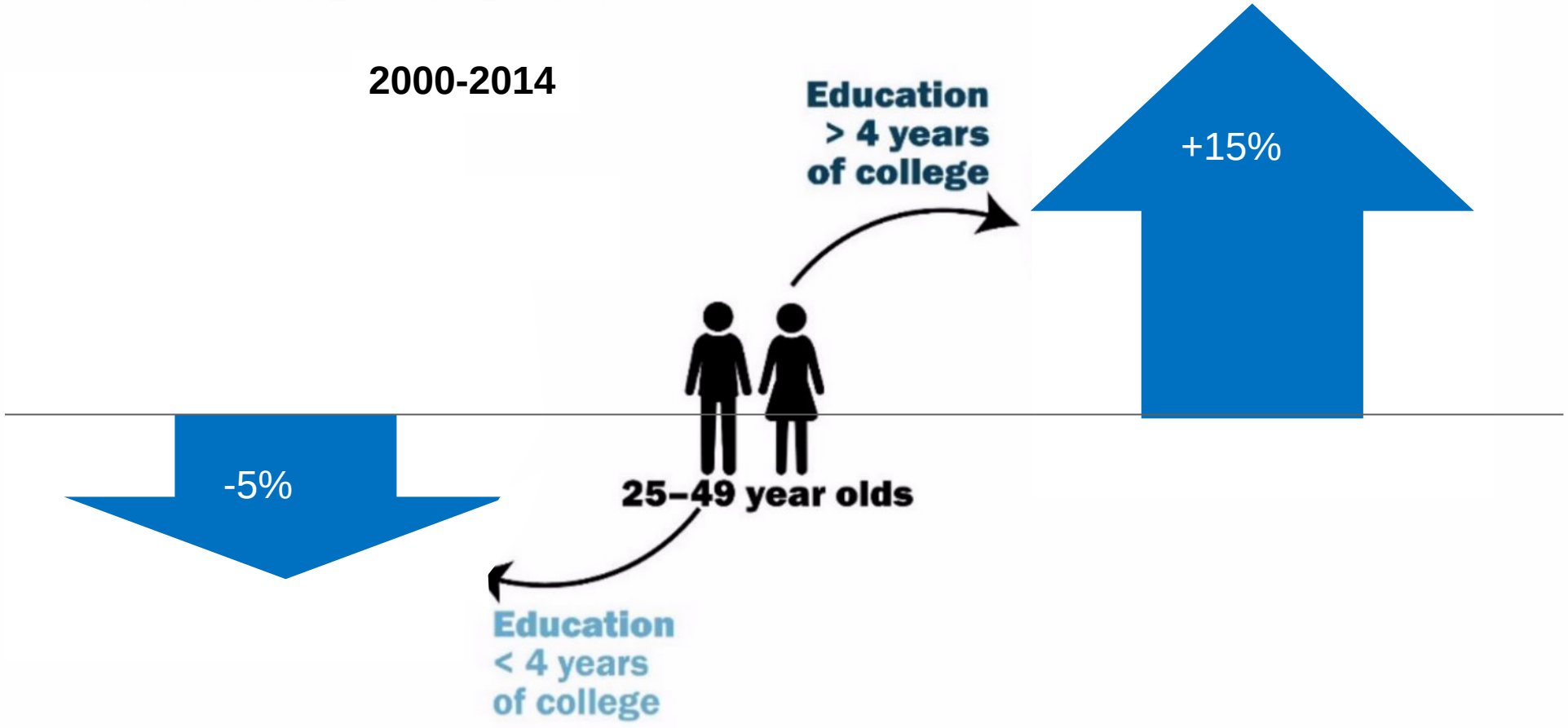


Top 40% of households by income

Bottom 60% of households by income

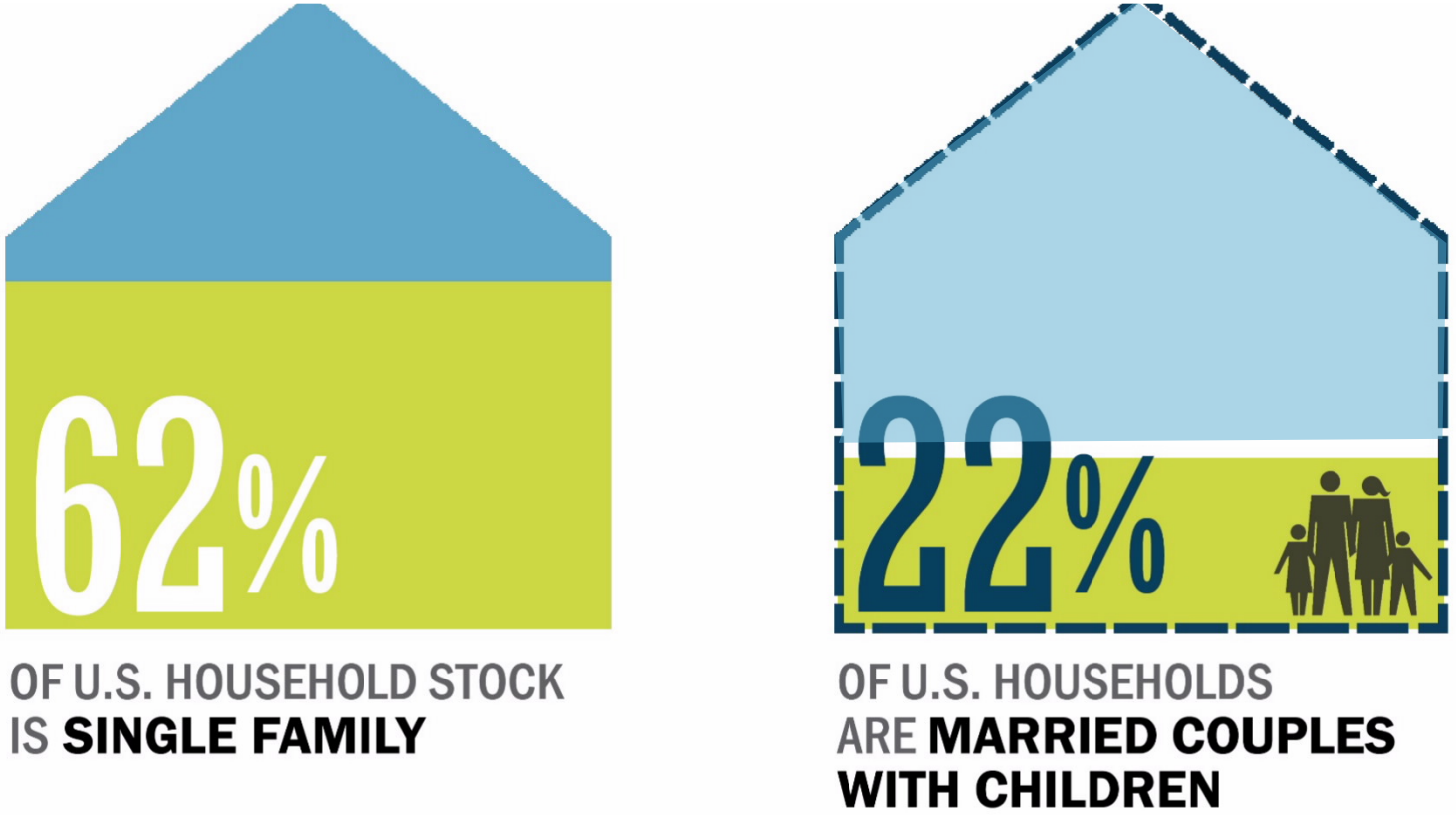
Households moving into and out of urban cores by income

Who prefers living in urban places? Educated millennials



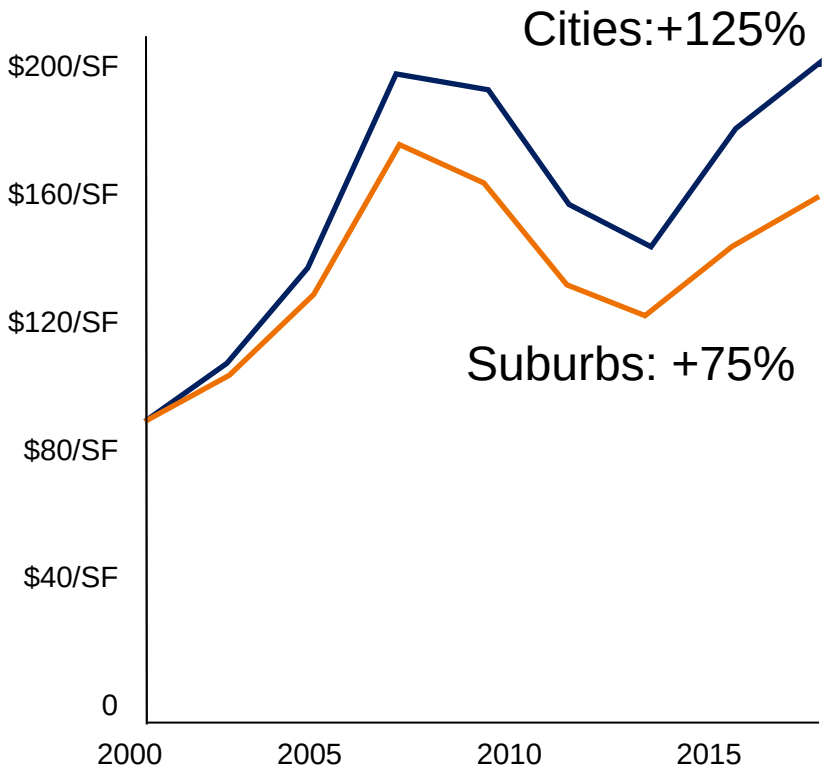
Households moving into and out of urban cores by education

Growing mismatch between US housing supply and demand



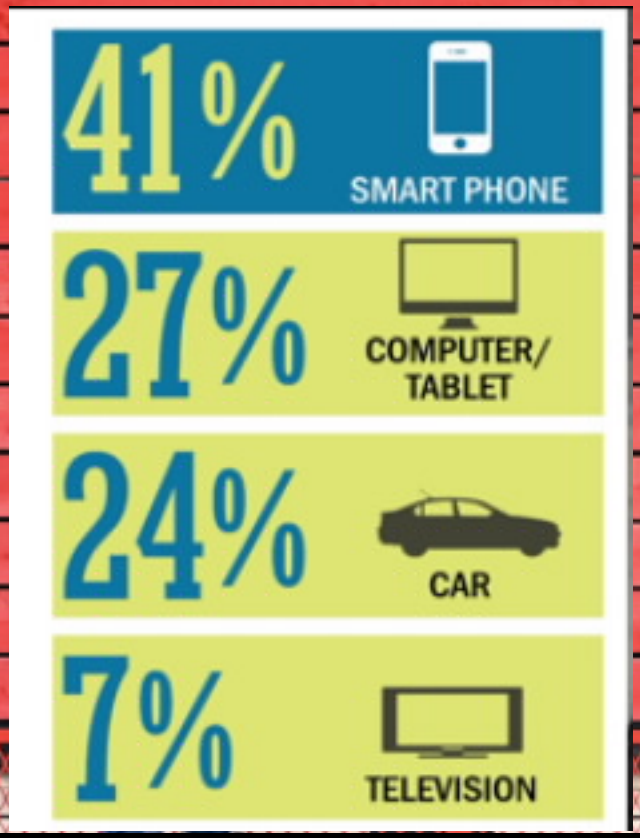
Single-family share of US housing stock vrs married couples with children share of US population

Urban housing values outpacing suburban values



US housing values per SF: cities versus suburbs

Values are changing
Automobiles ceding primacy to newer technologies



Gallup asked millennials what they would miss most…

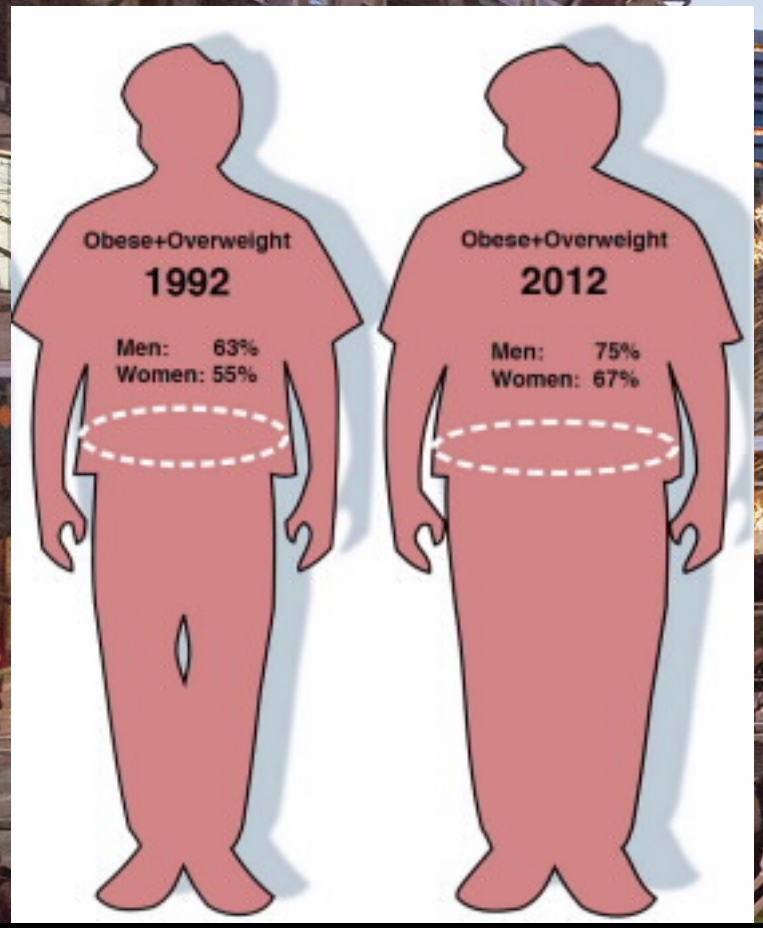
Values are changing
Advertizing tells many stories

Aunt Jemima Waffle Mix, 1960

Values are changing
Advertizing tells many stories

Ikea, 2016

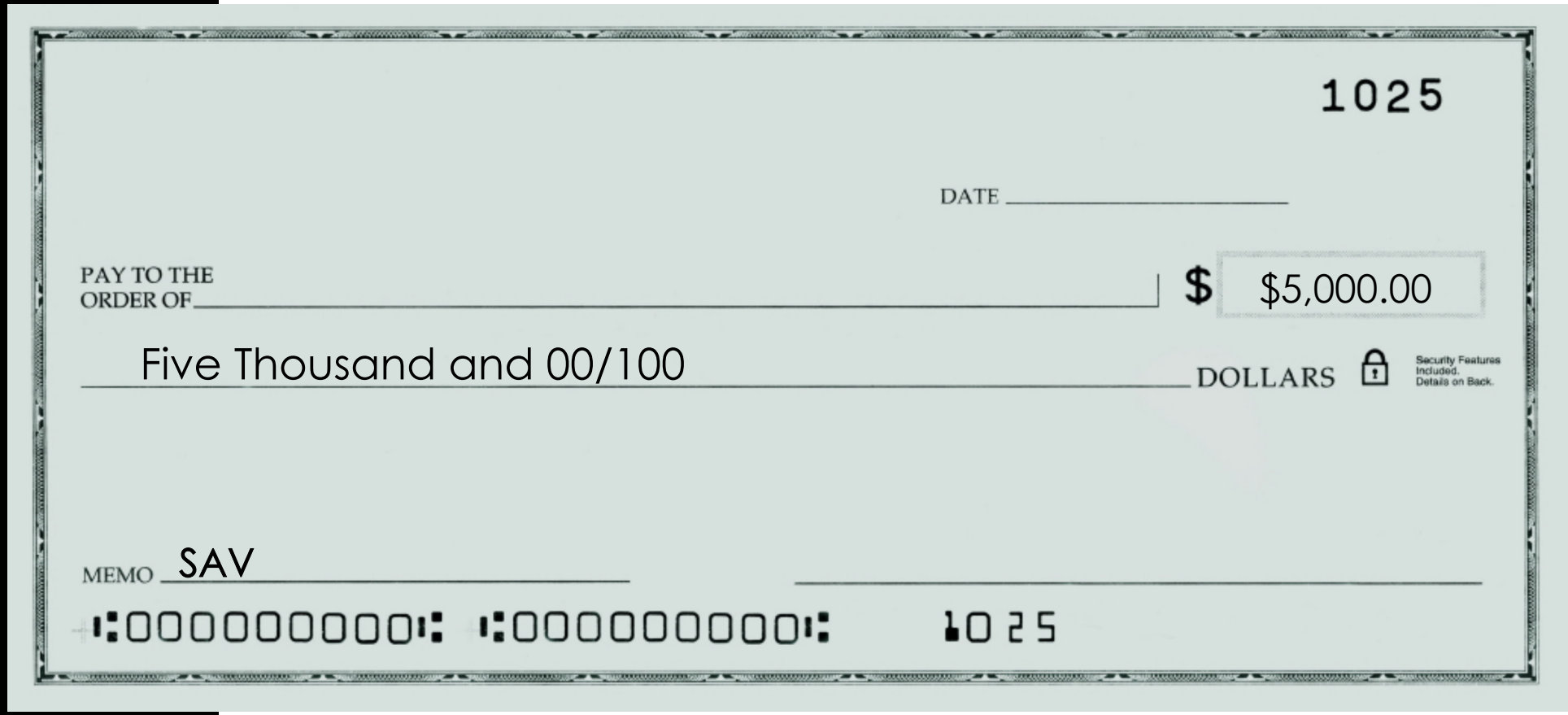
Values are changing
We want our communities to keep us fit



Per cent of Americans who are overweight

Urban subsidy

Shared mobility will save the average household roughly $5,000 per year.

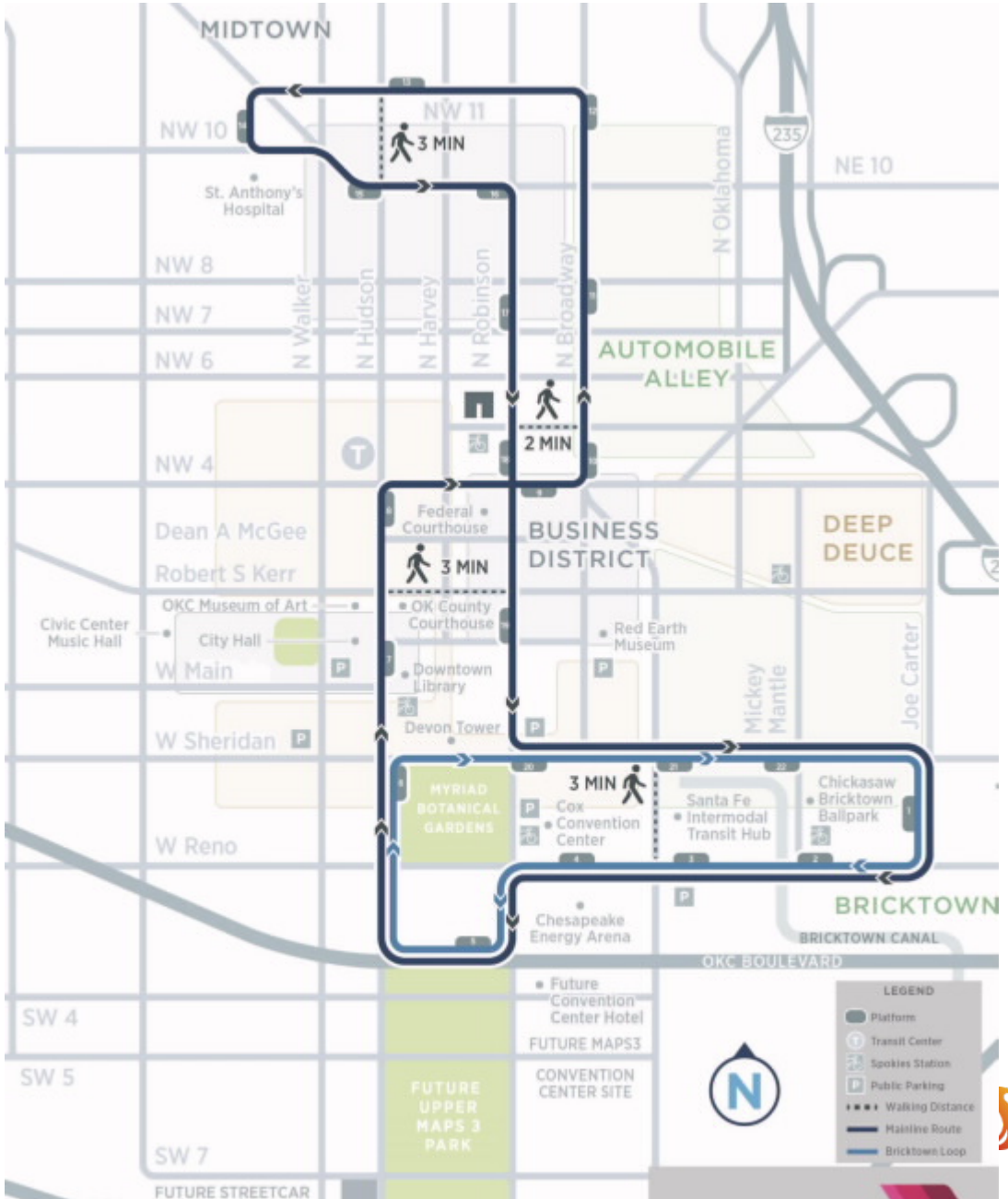


The Amenity Dividend

The 5-minute walkshed grows into the 2-3 mile shared autonomous mobility-shed

The TOD Dividend

As **SAVs extend transit's reach** beyond a walkable radius…**parking requirements and traffic generation drop, rents…and livability rise**



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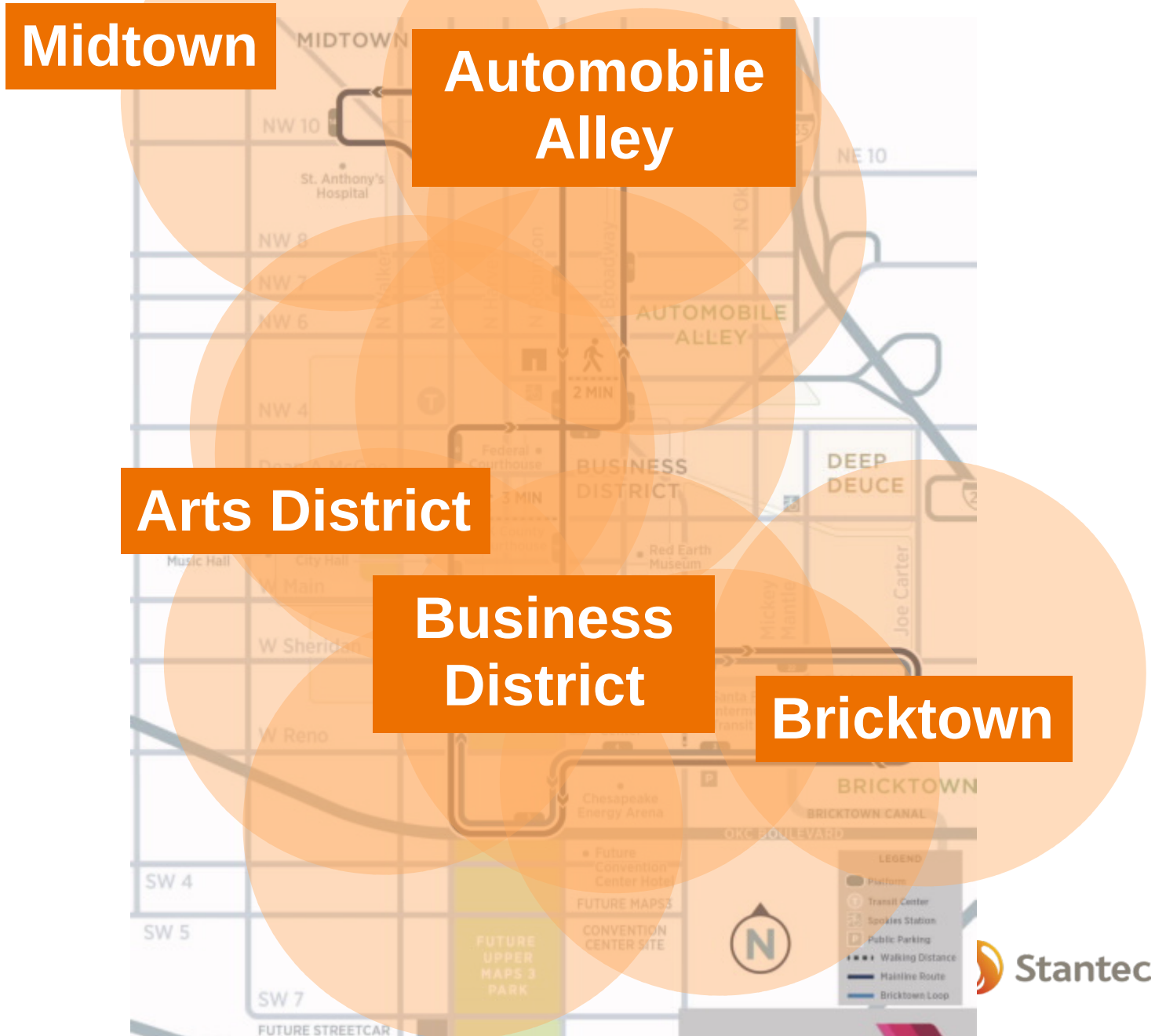

The Amenity Dividend

The 5-minute walkshed grows into the 2-3 mile shared autonomous mobility-shed

The Public Realm Dividend

The Public Realm Dividend

200 People
in 12 SAVs

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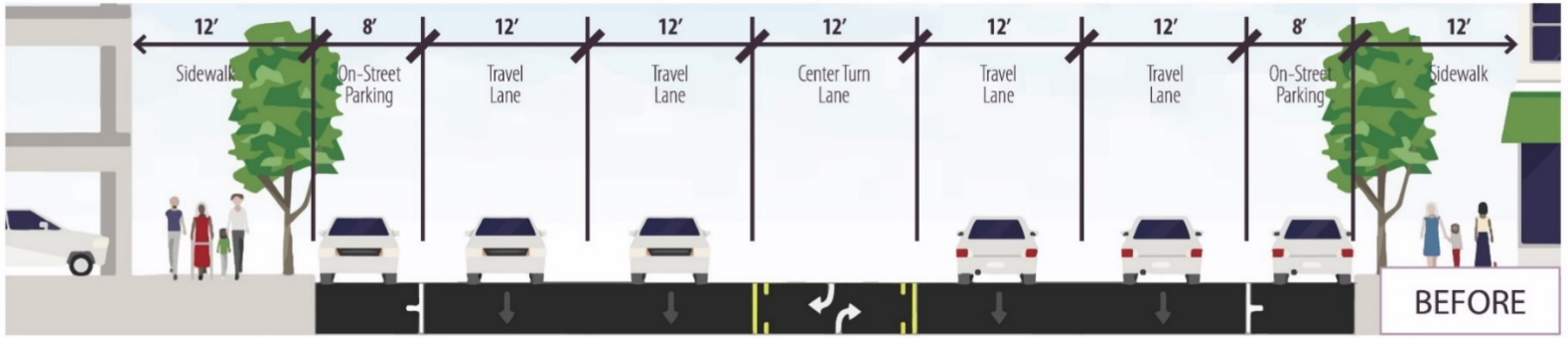
The Public Realm Dividend



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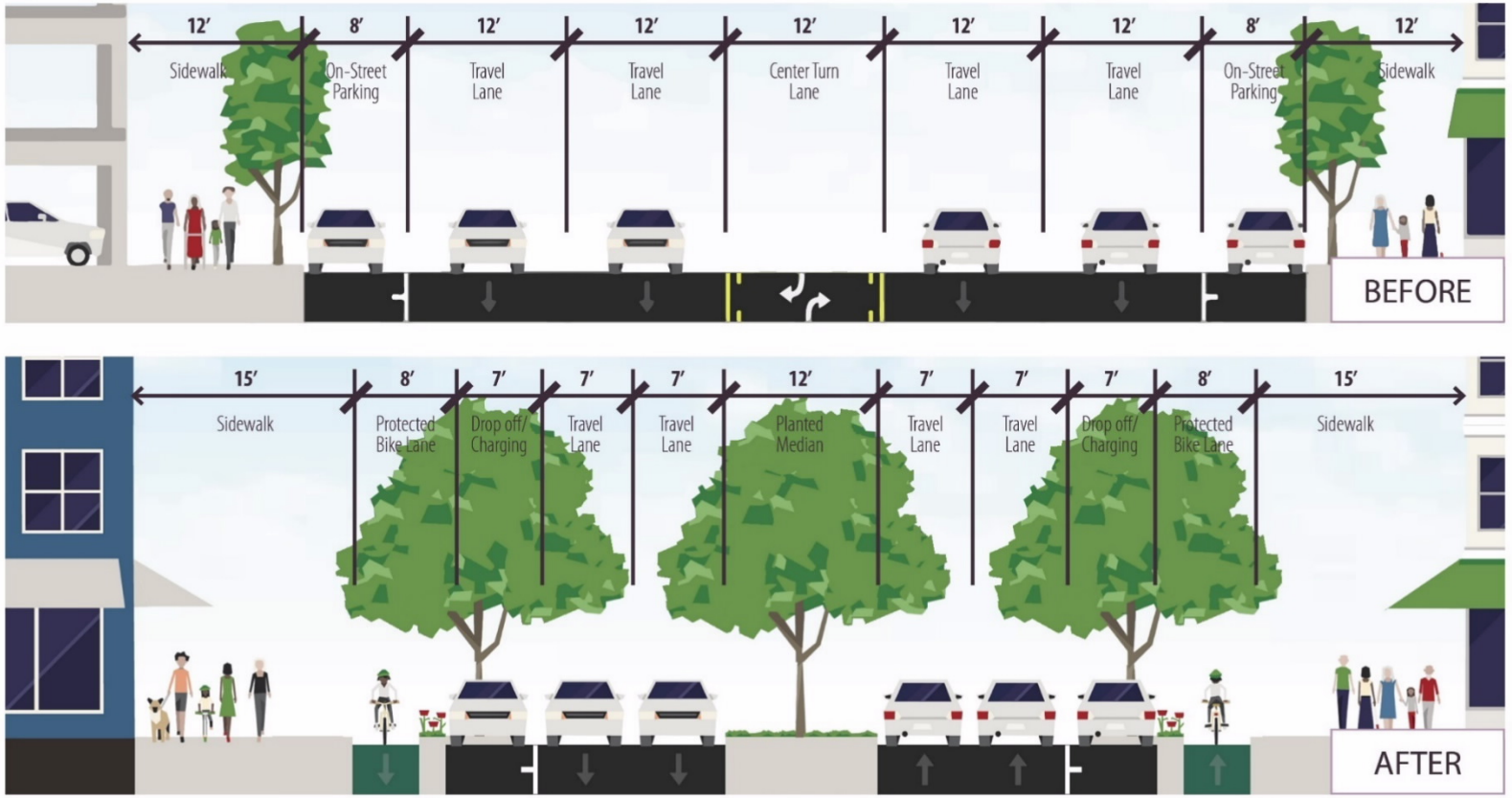

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Parking
Malls
Micro Condos

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Density
TOD
Cyclists
Pedestrians
E-bikes

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Policy

Gas Tax Revenue

- Gas tax revenues will disappear
- Tax time on the road and/or distance traveled, not fuel burned.

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Congestion Pricing vkmh Insurance Framework Now

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Procurement
Partnerships
Public
Engagement

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Sustainability
Resiliency
Health

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Private vs Public vs P3?

Little Control → Total Control

Profit Based → Service Based

It is a balance…

- Cities need to be knowledgeable
- Cities need to protect assets & services

Dubai World Challenge for Self-Driving Transport

Dubai Roads and Transport Authority

To learn more, go to:
http://www.sdchallenge.com/en/

Dubai's Vision: 25% of all trips will be smart and driverless by 2030.

First-/last-mile connection will be the first of three use cases addressed.

The application, evaluation and challenge process will start in 2018 and runs through October 2019.

This multi-year international challenge is designed for industry leaders, start-ups, and students tackling the transport challenges faced by global cities.

Set Policy NOW

Deploy Locally

CV is the key

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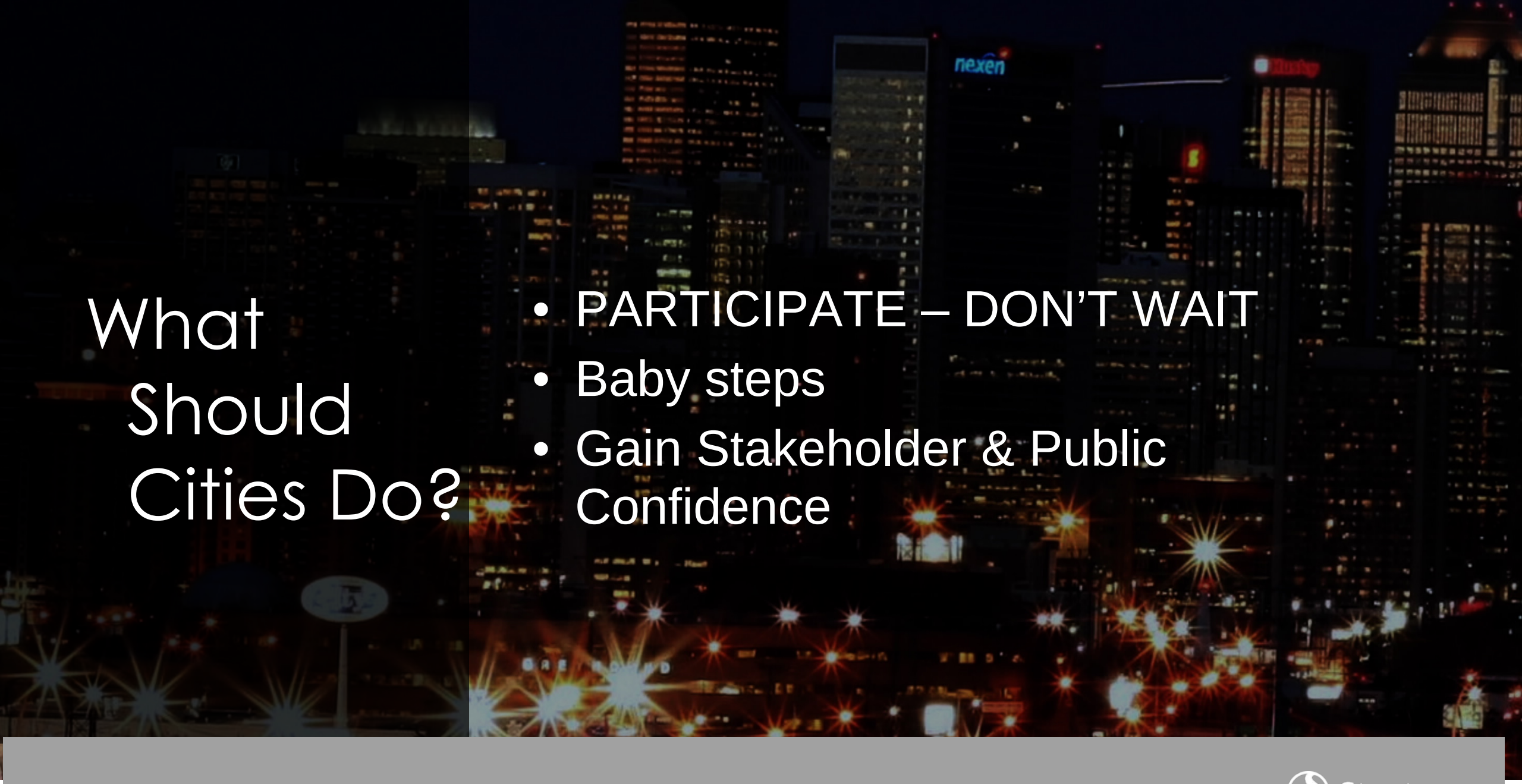

What Should Cities Do?

- PARTICIPATE – DON'T WAIT
- Baby steps
- Gain Stakeholder & Public Confidence

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