The horseless carriage?
Where are we at today?
Where are we at today?
Defining vehicle automation

**Level 1** (one automated function)

**Level 2** (two automated functions working together)

**Level 3** (autonomous driving in some situations)

**Level 4** (autonomous or self-driving cars)
A Range of Issues

• **Technical issues**
  • Inclement weather
  • Complete mapping
  • Pothole depth detection
  • Roadway construction
  • Metal to radar interference
  • Lighting: glare and dark
  • Lingering computer vision issues
  • Cost of the technology

• **Legal issues**
  • Liability
  • Legality and regulation
  • Cyber security
  • Data privacy

• **Societal issues**
  • Cost of the vehicles
  • Trust in the automation
  • Love of driving

And more...
We’ve come a long way

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1960s-70s: AI Golden Age of research and funding
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2012: Google shares Steve Mahan video
2020: Google announces Self-Driving Car Project
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2013: Toyota autonomous concept car

2014: Tesla predicts it will sell first self-driving car

2014: Apple begins car initiative

2014: Google Self-Driving Car Prototype

2015: Delphi car first to cross the US

2015: Nissan and NASA autonomous car partnership

2015: Mercedes-Benz autonomous concept car

2015: Uber announces self-driving car program

2010: Google announces Self-Driving Car Project
Behind autonomous car R&D, we now have...

- Tens of thousands of researchers and engineers
- Unprecedented computational power
- Billions of dollars
- Market demand

The leap path may be possible.
Transportation today

- VMT
- Teens getting licenses
- Transit use
- Bicycling
- Walking
Incremental Path

Highway driving becomes more efficient and more pleasant.
Incremental Path

- Increased highway capacity
- Separated lanes for more efficient self-driving cars
- Platooning
Incremental Path

Highway driving becomes more efficient and more pleasant.

Driving and car ownership become more appealing again.
Incremental Path

Highway driving becomes more efficient and more pleasant.

Driving and car ownership become more appealing again.

Travel behaviors do not substantially change.
If self-driving cars become available and legal, a shared autonomous vehicle service is inevitable.
Leap Path: 3 Big Benefits

Higher fleet turnover

Faster integration of electric vehicles
Leap Path: 3 Big Benefits

Reduced need for parking
Leap Path: 3 Big Benefits

End of car ownership?
The leap path is the more sustainable, more revolutionary path.  
How do we get there?
Thank you! Questions?

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