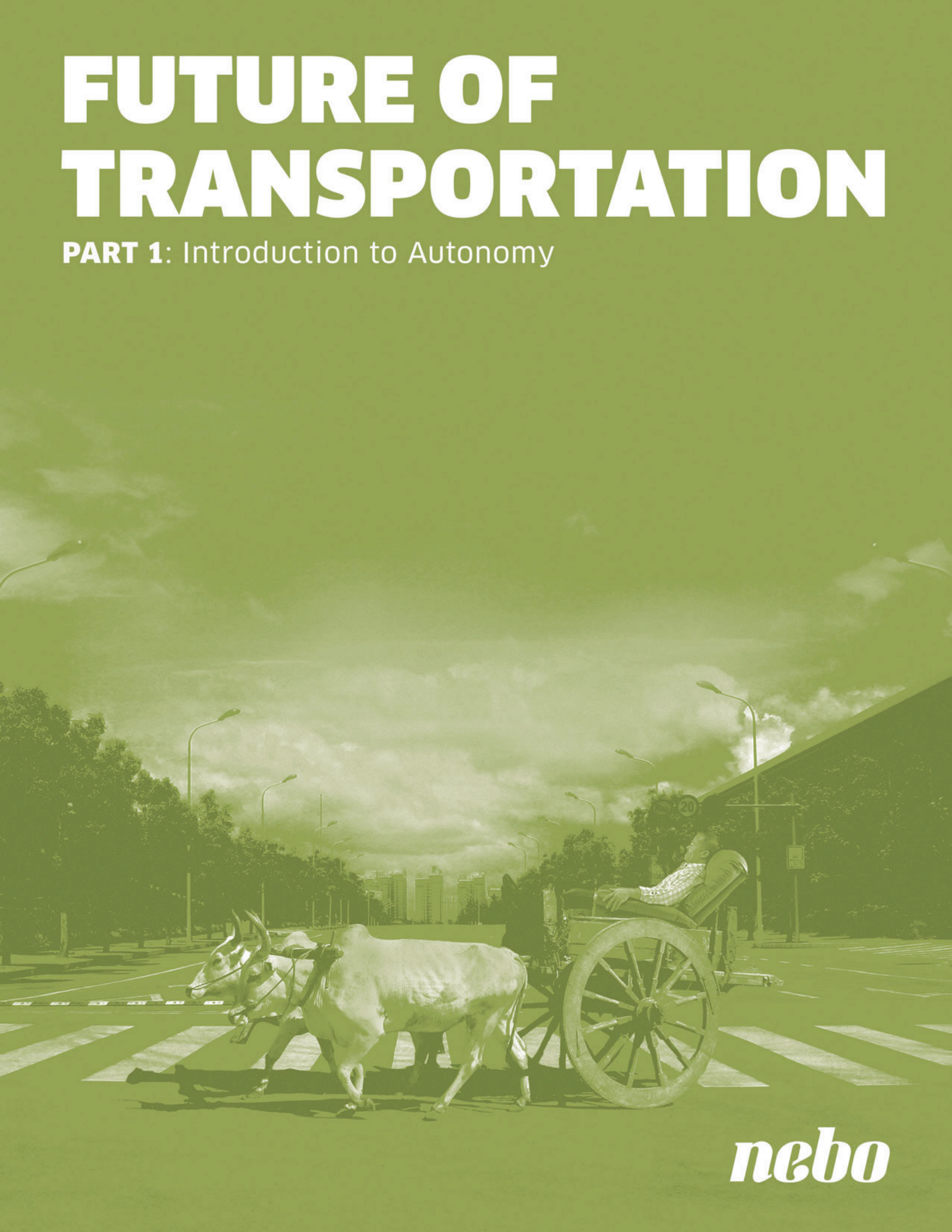


# FUTURE OF TRANSPORTATION

**PART 1:** Introduction to Autonomy



*nebo*

## Section 1.1

# Forward

### Are autonomous vehicles imminent, destined to disrupt society as we know it?

The potential is certainly there. While autonomous vehicles are far from mature, emerging trends are creating the perfect storm for massive disruption. Companies not just in the automotive sector but also across the board – from insurance and government to healthcare and technology – are considering the implications of this developing technology.

While many report that autonomous vehicles are on a path to rapid integration in daily life, what infrastructure needs to improve for this to become a reality? What will the arrival of self-driving cars mean for delivery companies, retailers and the corner market? Will humans be banned from driving completely or just sequestered to a single lane? What new opportunities will time spent in self-driving cars present for marketers and advertisers? Will teenagers invent hacks to mask their location from their parents? Are there security concerns around the personal data collected by connected cars? And who's responsible if there is a car accident?

Furthermore, are people ready for self-driving cars? The general populations' trust in self-driving cars has dropped over the last year, due to discomfort with the loss of control and distrust of putting safety solely in the hands of technology.<sup>1</sup>



If the general population is to welcome this technical advancement with open arms, what necessary policies and infrastructure are needed to ensure consumer protection while also supporting the progress of transportation?

It is inevitable that autonomous vehicles will drive a revolution in urban mobility. What is yet to be determined is on what timeline these changes will occur. While it may be decades before we get a level-five, fully self-driving car that can handle every situation and road that humans can<sup>2</sup>, the following four-part series explores the lesser considered consequences of what our world may look like when – not if – autonomous vehicles hit the streets.

<sup>1</sup> <http://www.wbur.org/bostonomix/2017/05/25/mit-study-self-driving-cars>

<sup>2</sup> <https://scobleizer.blog/2017/11/29/ive-been-thinking-about-self-driving-cars-wrong-its-a-human-problem/>



# The Technology



**The transformation of cars – from mechanical systems of gears and switches to computers with dreams of self-determination – is happening before our eyes.**

While much of the current chatter is about a world of fully autonomous vehicles, there are different levels of self-driving capabilities that must be accomplished before we reach that point. SAE International – the global association committed to being the ultimate knowledge source for mobility – issues the gold standard that guides manufacturers and other entities in the safe design, development, testing and deployment of highly automated vehicles (HAVs).<sup>3</sup>

<sup>3</sup> <https://www.sae.org/news/3544/>

## LEVEL

0

**No Automation**

Involves full-time performance by a driver for all aspects of driving.

## LEVEL

1

**Driver Assistance**

Covers a driver assist system of either steering or acceleration/deceleration using information about the driving environment. Level 1 features, such as automatic emergency braking, adaptive cruise control, automated parking and lane control, already exist in mainstream vehicle models.

## LEVEL

2

**Partial Automation**

Features such as automated steering and speed control for short periods of time.

## LEVEL

3

**Conditional Assistance**

Is still in testing and will require some driver intervention. In the final two stages, Level 4 will be fully self-driving but optionally drive-able by humans, and Level 5 vehicles will be designed to be completely driverless.<sup>4</sup>



<sup>4</sup> <https://www.technologyreview.com/s/609450/autonomous-vehicles-are-you-ready-for-the-new-ride/>

Eventually, all self-driving cars will employ a combination of sensors, cameras, radar, high-performance GPS, Light Detection and Ranging (LIDAR), artificial intelligence (AI) and machine learning to achieve their respective levels of autonomy. Embedding of multiple technologies as redundancies will be essential to building a safe and foolproof autonomous car. The ability to collect, manage and analyze large volumes of sensor data will also be important, which means connectivity to secure and scalable IoT, data management and cloud solutions will be key.<sup>5</sup>

Ford, Mercedes, Apple, Intel, Delphi Automotive and venture capitalists are among the numerous players investing heavily in these underpinning technologies and jockeying for top position in the emerging market. They are taking the potential for future autonomy very seriously, investing an estimated \$80 billion or more in the sector since 2014.<sup>6</sup>

### ***There is debate about whether future autonomous cars will be hybrid or electric.***

many of these companies, the future is both autonomous and electric. General Motors' "Zero emissions. Zero crashes. Zero congestion" message publicly states the company's commitment to prioritizing sustainability through battery-electric propulsion. Others such as Ford are pointing to hybrid-electric technology as the best way forward for self-driving efforts because they have longer ranges and fill up quicker.<sup>7</sup>

Other factors at play include how self-driving cars will be used and how much electrical brain power is needed to manage vision, guidance and mapping technologies and process the growing volume of software coding.<sup>8</sup> Availability of charging stations is another important consideration. Ultimately business opportunity – and not a commitment to the environment – will determine how many driverless cars are powered by electricity.

<sup>5</sup> <https://www.technologyreview.com/s/609450/autonomous-vehicles-are-you-ready-for-the-new-ride/>

<sup>6</sup> <https://www.brookings.edu/research/gauging-investment-in-self-driving-cars/>

<sup>7</sup> <https://www.theverge.com/2017/12/12/16748024/self-driving-electric-hybrid-ev-av-gm-ford>

<sup>8</sup> <https://www.usatoday.com/story/money/cars/2016/09/19/why-most-self-driving-cars-electric/90614734/>



# The Vehicle

When automobiles begin to navigate cities even better than humans, what we define as a “car” will change.



When humans no longer control the wheel, elements like steering wheels, keys, mirrors and brake or accelerator pedals will disappear. In addition to unlocking cars using keyless phone entry, the internal structure of the car will also change, as sitting face-forward to watch out transparent windows for other cars becomes unnecessary. Artificially intelligent canvases of information for passengers.

They could display reviews of nearby restaurants, or recognize and augment surroundings. A car ride could become a history lesson as a passing monument becomes an interactive video, showing the speech given in that very place hundreds of years ago. Windows could be extensions of phones, allowing you to check email and social media, FaceTime friends, or catch up on your current Netflix obsession. Windows might even display location-based advertisements (unless you upgrade to a premium account, of course).

### ***Elements like steering wheels, keys, mirrors and brake or accelerator pedals will disappear.***

The size of cars will vary drastically. Some vehicles will be small, dedicated only to local orders, as driverless cars become a more practical solution to automated delivery than drones. As an alternative to Uber-ing passengers in their free time, unused cars could be filled with deliveries and drive around the city making drop-offs.<sup>9</sup> Such robot couriers are already being tested by the company Starship Technologies, who designed a robocar about the size of an Igloo cooler with the wheels and durability of a rugged, all-terrain vehicle



<sup>9</sup> <http://www.nielsen.com/us/en/insights/news/2017/perspectives-driverless-cars-collide-with-retail.html>

<sup>10</sup> <https://www.washingtonpost.com/news/food/wp/2017/03/09/the-next-time-you-order-food-this-cute-robot-might-roll-up-to-deliver-it>



## Section 3.3

Large multi-person and -purpose vehicles will also emerge as cars become a third space. Coffee shops will no longer be the preferred escape from home and work. **Each car will be a destination unto itself.** Feeling like a workout on the way to meet your friend for brunch? Simply call a gym car – equipped with spin bikes or a personal trainer. Need a break after a long day? Call a sleeping or movie car. Rather than buying cars based on specs like speed and performance, we could choose them for their entertainment, leisure or work amenities.

For some, cars could become an extension of home, or even a home unto themselves. This autonomous future could bring a new literal meaning to “life on the road,” where people traveling for work do so more comfortably and conveniently. Autonomous “van life” could bring a new wave of digital nomads to the road, as well as revolutionize the concept of the family road trip.

Unfortunately for others, this means cars could also become an extension of work, where corporations expect employees to log in while traveling to and from the office. In this world car interiors might more closely resemble cubicles – a WeWork on wheels.



Many people experience sickness in vehicles as passengers, so imagining reading or doing situps in a moving vehicle might seem nauseating. Fortunately, Uber is already at work patenting technology designed to counter motion sickness in future self-driving vehicles.<sup>11</sup> Other companies are also hard at work making this futuristic world possible, some pieces of which could be closer than you think. Ford plans to build fully autonomous, level-four capable vehicles – without a steering wheel or brake or accelerator pedals – for use in ride-hailing or ride-sharing services by 2021.<sup>12</sup>

<sup>11</sup> <https://inews.co.uk/news/technology/uber-patents-tech-to-combat-car-sickness-in-driverless-vehicles/>

<sup>12</sup> <https://corporate.ford.com/innovation/autonomous-2021.html>



## Section 4.1

# The Environment

**If self-driving vehicles are to become reality, roadways must set the stage for revolution. As car designs change, cities will also evolve, in intentional and unintentional ways.**

Although many companies, from Google to Tesla to Uber, are leading the R&D of self-driving cars, very few are developing connected infrastructure to go along with their programs. It's no wonder these companies are striving to develop entirely self-sufficient cars, when local governments can't agree on laws and the U.S. Department of Transportation has estimated it would cost \$109 billion per year in 2020 to simply maintain American roads, highways, and bridges (let alone build connectivity into them).<sup>13</sup>

**But infrastructure technology will be essential to build public trust**, because it acts as a redundancy to embedded autonomous car technology. Currently, GPS isn't accurate enough to tell a vehicle where it should position itself on the road down to the inch. And the cameras that self-driving cars depend upon have difficulty "seeing" pavement markings in rain, fog and snow.<sup>14</sup>



<sup>13</sup> <https://www.fastcodesign.com/90140902/smart-roads-are-coming-do-we-need-them>

<sup>14</sup> <https://multimedia.3m.com/mws/media/13736510/3m-connected-roads-brochure.pdf>

## Section 4.2

So at a basic level, analog traffic lights, street signs and road markings may disappear, or at least transform into digital messages designed to be read by autonomous car cameras, radars and lasers.

***Companies such as 3Ms Connected Roads Division are currently working to own this next generation of technology.***<sup>15</sup>

Urban planners are also considering the impact of driverless cars on the design and use of roadways. With roads and parking spaces taking up so much of the manmade landscape, the advent of autonomous vehicles not only means we'll be able to use them more efficiently, but that it's likely some of the land and space we've paved over won't be needed for vehicle traffic and parking.<sup>16</sup>

**Driverless cars will take up less space on the freeway.** As smart self-driving cars improve city traffic flows with computer guidance and wireless communication, cars will go faster and need less width for every lane. The number of highway lanes could be cut in half.



## The Environment

**Smarter cars also mean smaller parking spaces.**

According to McKinsey & Co, the need for parking space should decline by more than 5.7 billion square meters in 2035.<sup>17</sup> This shrinking is due in part to fewer vehicles on the road in a car-sharing economy, and the fact self-parking cars don't require open-door space for passengers to get out. Parking structures will shrink in size and move to the outskirts of town, where cars will self-park while passengers go about business. .

<sup>15</sup> <https://www.fastcodesign.com/90140902/smart-roads-are-coming-do-we-need-them>

<sup>16</sup> <https://www.curbed.com/2016/5/26/11787632/driverless-cars-will-shrink-our-roads-and-radically-reshape-urban>

<sup>17</sup> <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-ways-autonomous-driving-could-redefine-the-automotive-world>





Alain Kornhauser, a researcher in autonomous vehicles at Princeton University, says that “having parking wedged or close to where people spend time, that’s going to be a thing of the past. If I go to a football game, my car doesn’t need to stay with me. If I’m at the office, it doesn’t need to be there.” In this way, convenient **parking spaces will no longer be necessary for a successful downtown district.** Entrepreneurs who couldn’t afford to buy so much land now don’t have that requirement. This will fuel more small businesses, like shops and restaurants, by lowering the barrier to entry. <sup>18</sup>

All of these unused lanes, floors of parking garages, downtown surface lots, and huge, big-box store parking lots will leave behind a sea of empty asphalt to be repurposed by cities. Cities that act now can shape how these areas are used and have a say in the role autonomous vehicles play in the economy. Cities such as Boston, which recently launched an autonomous vehicle-testing program, are taking control of shaping infrastructure, technology and policy to deliver on the potential promise – and not the potential drawbacks. But for a majority of cities to take this step, city governments will need to evolve beyond their traditional views and roles.

<sup>18</sup> <https://www.curbed.com/2016/2/25/11114222/how-driverless-cars-can-reshape-our-cities>



# Conclusion



Autonomous vehicles have the potential to disrupt much of life as we know it. There's an opportunity to gain first-mover advantage for companies and governments who act now. More importantly, they can shape the role that autonomous vehicles play in society.

Given that advances of companies like Uber and Alphabet are gaining prominence, it would be a mistake to conclude that driverless cars won't be successful in our lifetime. However, chances of success are higher if governments and the general population are involved in their development.

One way autonomous vehicles will thrive and gain wider acceptance is by inviting a more diverse range of the population, such as sociologists and urban planners, into the process of imagining and designing the autonomous future.

Public contribution also brings a myriad of other advantages. These include preventing a few isolated companies from producing a product with potential downsides, such as unconscious bias in programming safety. This also prevents companies from taking advantage of the consumers undivided and unregulated attention, such as turning the vehicle into a moving advertisement inside and out.

In future parts of our series we'll be exploring these lesser talked about topics, such as advertising and retail in the autonomous world, how drivers and robots will share the road, and what negative consequences aren't autonomy developers discussing. Visit us online at [neboagency.com](http://neboagency.com) for this and more.

# About Nebo

Nebo is a human-centered agency built for the digital age. We believe that trust and attention are the most valuable resources in this hyper-connected, omni-channel, multi-device, ad-saturated world. By creating human-centered digital experiences and buyer journey marketing campaigns, we inspire, educate and empower consumers. Our research and strategy teams develop deep, authentic understandings of consumer behavior to earn a place in their hearts and minds. Our creative and copy teams use these insights to help brands tell great stories. Our marketing teams build campaigns that do more than drive awareness, they change consumer behavior.

## Contact

Nebo Agency 1000 Marietta Street NW, Suite 270 Atlanta, Georgia, 30318  
neboagency.com (404) 885-1201

## Project Leads

<b>Bennett Travers</b>	Innovation Lead	<b>Pete Lawton</b>	Creative Director
<b>Jennifer Vickery</b>	Senior Vice President, Strategy	<b>Carlos Muñoz</b>	Designer

**Disclaimer:** This report has been prepared by and is distributed by Nebo Agency. This document is for client information purposes. Any unauthorized disclosure, dissemination, distribution, copying or the taking of any action in reliance on the information herein is prohibited. Reliance on the findings of this report by any other person or party, or use of the report for any other purpose than that which it was prepared, is neither intended nor permitted. Information, estimates and opinions relied upon and furnished to Nebo Agency and contained in this report were obtained from sources considered reliable and believed to be true and correct. However, Nebo Agency can assume no responsibility for accuracy. Opinions and suggestions expressed herein are subject to change without notice. Any opinion and other statement contained in this report does not necessarily represent the opinion or statement of Nebo Agency. This document makes descriptive reference to trademarks that may be owned by others. The use of such trademarks herein is not an assertion of ownership of such trademarks by Nebo Agency and is not intended to represent or imply an endorsement, the existence of an association, or affiliation between Nebo Agency and the lawful owners of such trademarks. This document is not intended to provide specific advice on your circumstances. If you require advice or further details on any matters referred to, please contact your Project Manager.