



FEATURE

# Psychological barriers to the elevated future of mobility

Are consumers ready to take to the skies?

Robin Lineberger and Aijaz Hussain

PART OF A DELOITTE SERIES ON THE FUTURE OF MOBILITY™

Engineers are making flying-car dreams come true. But for aerial passenger vehicles to become part of the new mobility ecosystem, creators and operators must convince skeptical consumers that airborne drones are both useful and safe.

## Introduction: We were promised flying cars

Would you climb into an air taxi? The question isn't purely speculative: In a previous article, *Elevating the future of mobility*, we discussed how passenger-bearing vertical takeoff and landing vehicles are expected to soon expand transportation into new modes.<sup>1</sup> Creators intend to make urban science fiction a reality, reducing hourlong commutes to minutes in the air, improving productivity, reducing pollution, and improving the overall quality of life by replacing at least some driving in cities around the globe with autonomous aerial passenger vehicles.

Engineers have long worked on solving technological problems: For such aircraft to be viable, they would seemingly need to accommodate two to five passengers, be energy-efficient, and be far quieter than a traditional helicopter. It's a tall order. But ultimately, the biggest barrier to the elevated future of mobility likely isn't technological—it's psychological.

In short, most consumers are skeptical of the idea of travel in these new short-range autonomous airborne vehicles, even after 90 years of onscreen portrayals—beginning with 1927's *Metropolis*—to get them used to the idea.<sup>2</sup> This shouldn't surprise anyone—people have always hesitated to be the first to climb aboard new forms of transportation, whether hot air balloons, steam trains, gas-powered automobiles, prop planes, or self-driving cars. And to consumers, aerial vehicles seem, understandably, more inherently hazardous than earthbound vehicles.

That skepticism is as big a challenge for operators of next-generation aerial passenger vehicles as the technology is for engineers. Without broad popular acceptance of the idea, the elevated future of mobility may never get off the ground, and quadcopter cars could be relegated to entertainment for affluent hobbyists.<sup>3</sup> Shaping consumer attitudes will likely be the joint responsibility of regulators, creators, and operators of these new aerial systems. People will need to feel confident that the vehicles are safe, reliable, and predictable—and that they're actually improving society.

First, it's key to understand consumers' current attitudes toward these vehicles—and what key stakeholders can do to transform consumer perceptions and eventually make taking to the sky a part of commuters' and travelers' daily lives. To measure the dimensions of psychological barriers, Deloitte conducted a global survey this year, asking consumers about their perception of autonomous aerial passenger vehicles, with respect to their safety and perceived utility—two barriers to the acceptance of these vehicles of the future.

## At the core of the elevated ecosystem: Consumers

Regulators, creators, and operators all have critical roles to play to make the *elevated future of mobility* ecosystem commercially viable. (See figure 1.) But the entire ecosystem revolves around the consumer: Unless ordinary people embrace this next-generation mode of transportation—incorporating

FIGURE 1

## The elevated future of mobility ecosystem: Consumers are the key



Source: Deloitte analysis.

airborne options into their daily lives along with more traditional modes—cars will likely stay earth-bound. Passengers would need to feel as though aerial vehicles are, at least sometimes, the best way to get them where they want to go.

Operators' role will be vital in the embryonic stages. Even with much still speculative, the pattern of initial adoption will almost certainly not follow that of the venerable automobile industry, which began by emphasizing an ownership model and introduced operators at a much later stage. In setting up a strictly autonomous system without a private-ownership option—meaning no freelance drivers zipping by above city streets—operators could help aerial passenger vehicles find a market in the early stages by emphasizing affordable access.

### Skeptical about safety

In a recent global survey, Deloitte asked consumers a series of questions about their perception

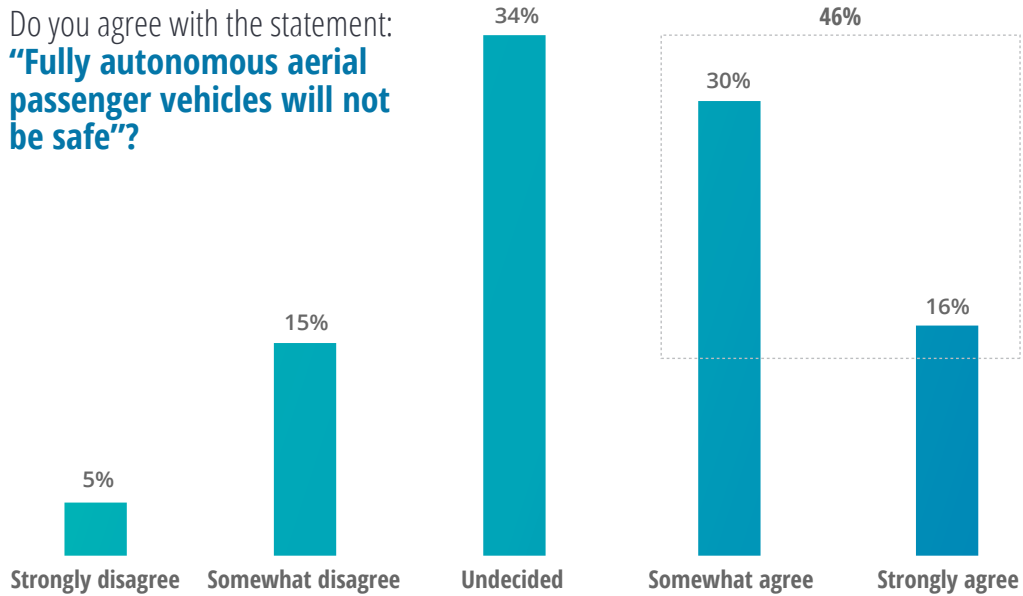
of autonomous aerial passenger vehicles, with respect to these vehicles' safety and perceived utility. The sample size for the survey was 10,300; regions covered include the United States, Canada, United Kingdom, France, China, Japan, and Australia. The results suggest that many consumers, even now, see clear utility in next-generation aerial passenger vehicles but—unsurprisingly at this point—seem to harbor serious concerns about their safety.

Globally, nearly half of the survey respondents view autonomous aerial passenger vehicles as a potentially viable solution to roadway congestion. But initial impressions show how far operators need to go: 80 percent of the total respondents either believe that these vehicles “will not be safe” or are currently uncertain that they will be safe. (See figure 2.)

Responses across national borders were comparatively consistent, though Japanese respondents expressed particularly high safety concerns, with 87 percent of consumers seeing autonomous aerial passenger vehicles as unsafe or remaining

FIGURE 2

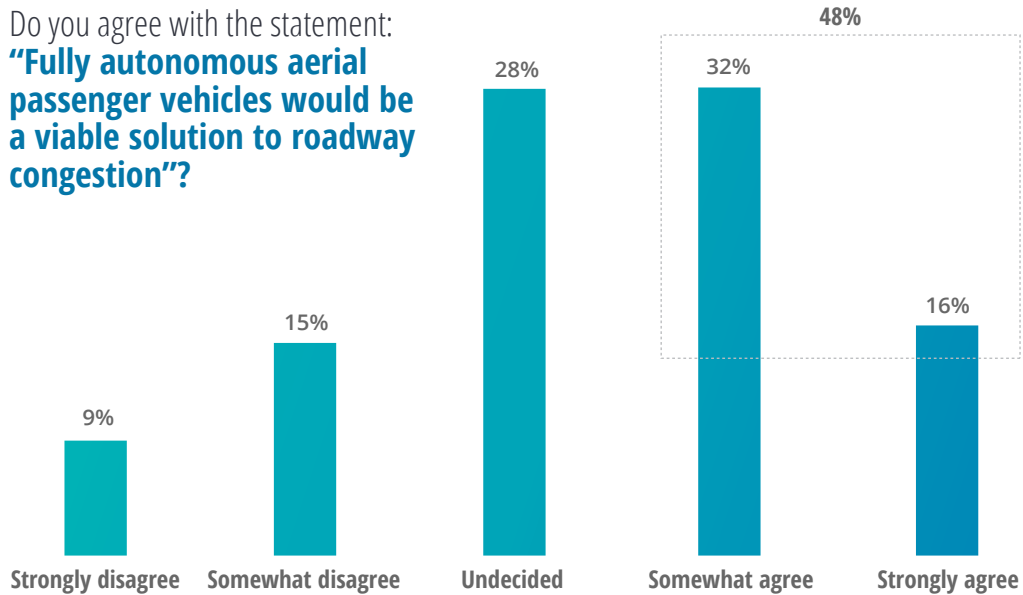
### Nearly half of survey respondents are unconvinced that aerial passenger vehicles will be safe; a fifth are more confident



Source: Deloitte Global Auto Consumer Survey, October 2018.

FIGURE 3

### Nearly half of survey respondents see aerial passenger vehicles as a possible way to solve roadway congestion



Source: Deloitte Global Auto Consumer Survey, October 2018.

undecided, while only 73 percent of Chinese consumers agreed with that assessment. In the United States and United Kingdom, 79 percent and 83 percent, respectively, expressed the same apprehension regarding safety.

Country differences emerged far more clearly on the question of whether people can readily envision such vehicles helping to alleviate roadway congestion: In China, almost three-quarters of respondents expressed enthusiasm, while only 44 percent and 38 percent of US and Japanese respondents agreed.

## Driving future adoption demands changing consumer perceptions

How to boost consumer confidence in the elevated future of mobility? In short, the industry should focus on changing perceptions of the safety and utility of autonomous aerial passenger vehicles. And considering the mental leap necessary for millions of passengers to feel safe climbing into a flying car, the challenge shouldn't be understated: Changing consumer attitudes is expected to require a significant effort by every ecosystem stakeholder—regulators, creators, and operators. There's already plenty of consumer apprehension around the safety of self-driving cars,<sup>4</sup> and once those cars leave the ground and begin competing for airspace with recreational drones, package delivery drones, and larger autonomous aerial cargo vehicles—as well as existing objects and infrastructure—passengers will likely need that much more reassurance that it is safe to take to the skies.

Some steps that stakeholders can consider:

### REGULATORS

- Follow a stringent certification process to ensure that these vehicles are at least as safe as a piloted commercial aircraft.
- Focus on creating a robust traffic management system for autonomous aerial vehicles—and integrating it with existing systems.<sup>5</sup>

### CREATORS

- Equip these vehicles with enhanced safety equipment such as advanced *detect and avoid* sensors<sup>6</sup> as well as safe emergency landing systems to help assure consumers of their safety.
- Demonstrate high levels of reliability and safety margins on all vehicle components.

### OPERATORS

- While developing and introducing services, maintain a zero-tolerance stance on safety, since *any* accident could set back consumer attitudes by months or years.
- As operators will collaborate with manufacturers to increase these vehicles' market reach, they should create more consumer awareness of their safety and utility.

## Conclusion: The importance of social acceptance

This next era of elevated mobility, one in which we might well see autonomous aerial passenger vehicles soaring past high-rise office windows, has a lot to learn from the aviation industry—particularly, how airlines and government agencies built social acceptance of aircraft as a new mode of transportation, back in the early 20th century. To help instill public confidence in an era of barnstorming and daredevils, the American aviation industry lobbied the federal government to create safety regulations, resulting in the 1926 Air Commerce Act.<sup>7</sup>

Today, aviation is one of the safest modes of transportation, with a fatal accident rate of only one per 16 million large commercial passenger flights.<sup>8</sup> Most of those incidents take place during takeoffs and landings, where there is most human intervention, and safety has improved as automatic systems have taken over more of the entire process.<sup>9</sup> Players in the new mobility ecosystem are counting on consumers' eventual comfort with self-driving cars—and perhaps that would help people feel safer when operators introduce autonomous aerial passenger vehicles as an option for commuters or daytrippers.

Less human involvement means fewer overall safety concerns. At least, that's what it *should* mean, as advocates of self-driving cars well know.<sup>10</sup> It will take more than a few reassuring TV ads to convince

millions of passengers to climb into autonomous aerial vehicles. But as public confidence in both air and road travel illustrates, the elevated future of mobility seems within reach.

## Endnotes

1. Robin Lineberger et al., *Elevating the future of mobility*, Deloitte Insights, January 18, 2018.
2. Emerson Rosenthal, "The 9 best flying cars in sci-fi movies," *Vice*, April 22, 2017; Stephen Baxter, "Dude, where's my flying car?," *Financial Times*, February 11, 2017.
3. David Reid, "The world's first flying car you can buy is now taking orders," *CNBC*, March 7, 2018.
4. Keith Naughton, "Fear of robot rides rise following high-profile road deaths," *Bloomberg*, May 22, 2018.
5. Chris Metts et al., *Managing the evolving skies*, Deloitte, 2018.
6. Aerospace America, "Job number 1: Detect and avoid," May 1, 2017.
7. Aviation Online Magazine, "The Air Commerce Act of 1926," accessed October 23, 2018.
8. David Shepardson, "2017 safest year on record for commercial passenger air travel: Groups," *Reuters*, January 2, 2018.
9. Jack Stewart, "Don't freak over Boeing's self-flying plane—robots already run the skies," *Wired*, June 9, 2017.
10. Chris Isadore, "Self-driving cars are already really safe," *CNN*, March 21, 2018.

## About the authors

**ROBIN LINEBERGER** is the global Aerospace and Defense leader of Deloitte Touche Tohmatsu Ltd. and helps develop and execute Deloitte member firms' global strategies to serve the world's largest commercial aircraft manufacturers and defense companies. He actively participates in major industry associations, leads research on business issues affecting the industry, and speaks on industry trends at key industry events. Connect with him on Twitter @robinlineberger and on LinkedIn at [www.linkedin.com/in/robin-lineberger-a7b9894/](http://www.linkedin.com/in/robin-lineberger-a7b9894/).

**AIJAZ HUSSAIN** is a senior manager and leads research for Deloitte US Aerospace and Defense as well as Chemicals and Specialty Materials. He has more than 16 years of experience in research, thoughtware development, market/competitive intelligence, business strategy, and financial analysis. Connect with him on LinkedIn at [www.linkedin.com/in/aijazshaikhussain/](http://www.linkedin.com/in/aijazshaikhussain/).

## Acknowledgments

The authors would like to thank **Siddhant Mehra** for his contributions to this report.

## Contact

**Robin Lineberger**

Global Aerospace & Defense leader

Deloitte Touche Tohmatsu Ltd.

+1 571 882 7100

rlineberger@deloitte.com

The Deloitte US firms provide industry-leading consulting, tax, advisory, and audit services to many of the world's most admired brands, including 80 percent of the Fortune 500. Our people work across more than 20 industry sectors with one purpose: to deliver measurable, lasting results. Deloitte offers a suite of services to help clients tackle Future of Mobility-related challenges, including setting strategic direction, planning operating models, and implementing new operations and capabilities. Our wide array of expertise allows us to become a true partner throughout an organization's comprehensive, multidimensional journey of transformation.

# Deloitte.

## Insights

Sign up for Deloitte Insights updates at [www.deloitte.com/insights](http://www.deloitte.com/insights).



Follow @DeloitteInsight

### **Deloitte Insights contributors**

**Editorial:** Matthew Budman, Blythe Hurley, and Abrar Khan

**Creative:** Molly Woodworth and Anoop K R

**Promotion:** Nikita Garia

**Cover artwork:** Neil Webb

### **About Deloitte Insights**

Deloitte Insights publishes original articles, reports and periodicals that provide insights for businesses, the public sector and NGOs. Our goal is to draw upon research and experience from throughout our professional services organization, and that of coauthors in academia and business, to advance the conversation on a broad spectrum of topics of interest to executives and government leaders.

Deloitte Insights is an imprint of Deloitte Development LLC.

### **About this publication**

This publication contains general information only, and none of Deloitte Touche Tohmatsu Limited, its member firms, or its and their affiliates are, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your finances or your business. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

None of Deloitte Touche Tohmatsu Limited, its member firms, or its and their respective affiliates shall be responsible for any loss whatsoever sustained by any person who relies on this publication.

### **About Deloitte**

Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited, a UK private company limited by guarantee ("DTTL"), its network of member firms, and their related entities. DTTL and each of its member firms are legally separate and independent entities. DTTL (also referred to as "Deloitte Global") does not provide services to clients. In the United States, Deloitte refers to one or more of the US member firms of DTTL, their related entities that operate using the "Deloitte" name in the United States and their respective affiliates. Certain services may not be available to attest clients under the rules and regulations of public accounting. Please see [www.deloitte.com/about](http://www.deloitte.com/about) to learn more about our global network of member firms.