

CHALLENGES AHEAD

OCTOBER 3, 2017

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Oliver Wyman's Aviation, Aerospace & Defense practice is the largest and most capable consulting team dedicated to the industry

OUR EXPERIENCE

- 232 professionals across Europe and North America
- Deep aviation knowledge and capabilities allow the practice to deliver data-driven solutions and provide strategic, operational, and organizational advice

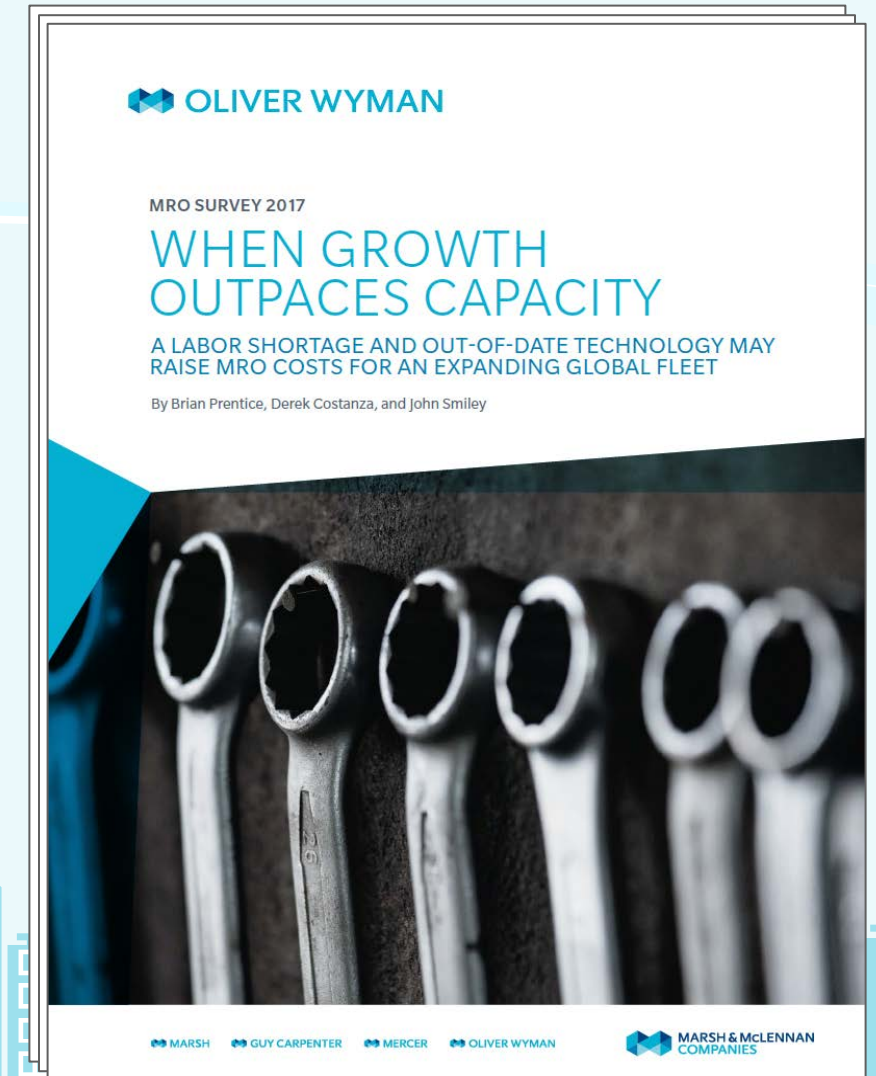
OUR CLIENTS

- We have worked with more than $\frac{3}{4}$ of the industry's Fortune 500 companies, including:
- All major US airlines
 - Leading airlines, MROs, OEMs, and independent parts manufacturers in the Americas, Europe, and Asia
 - Dominant aerospace and defense firms

OUR APPROACH

- Data-driven:** unbiased benchmarking and forecasting tools to establish problems and identify solutions
Innovative: ideas that are forward-thinking
Actionable: results-oriented recommendations
Collaborative: an emphasis on working with our clients, alongside executives, management, and support teams

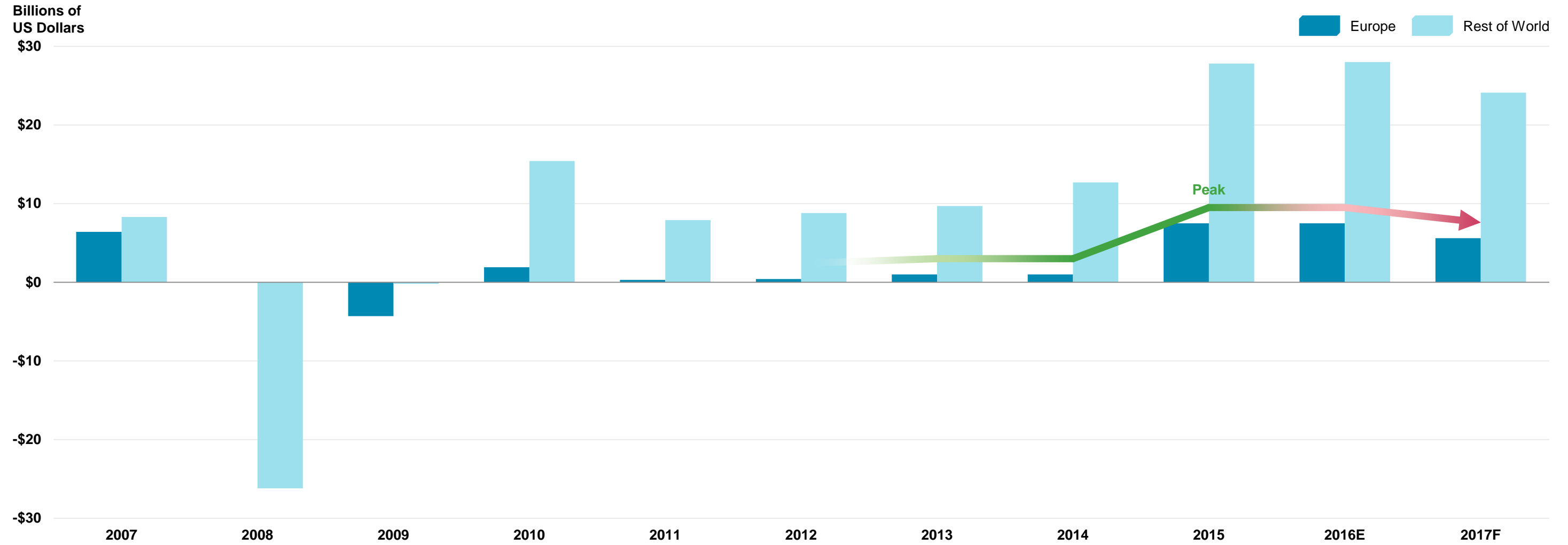
This presentation incorporates
Oliver Wyman's 2017-2027
Global Fleet & MRO Market
Forecast and 2017 MRO
Survey, both of which are
available at oliverwyman.com



1 | Taking Care of Business

In recent years the industry has achieved record profits, with European operators returning to sustained profitability. This looks set to decline moving forward.

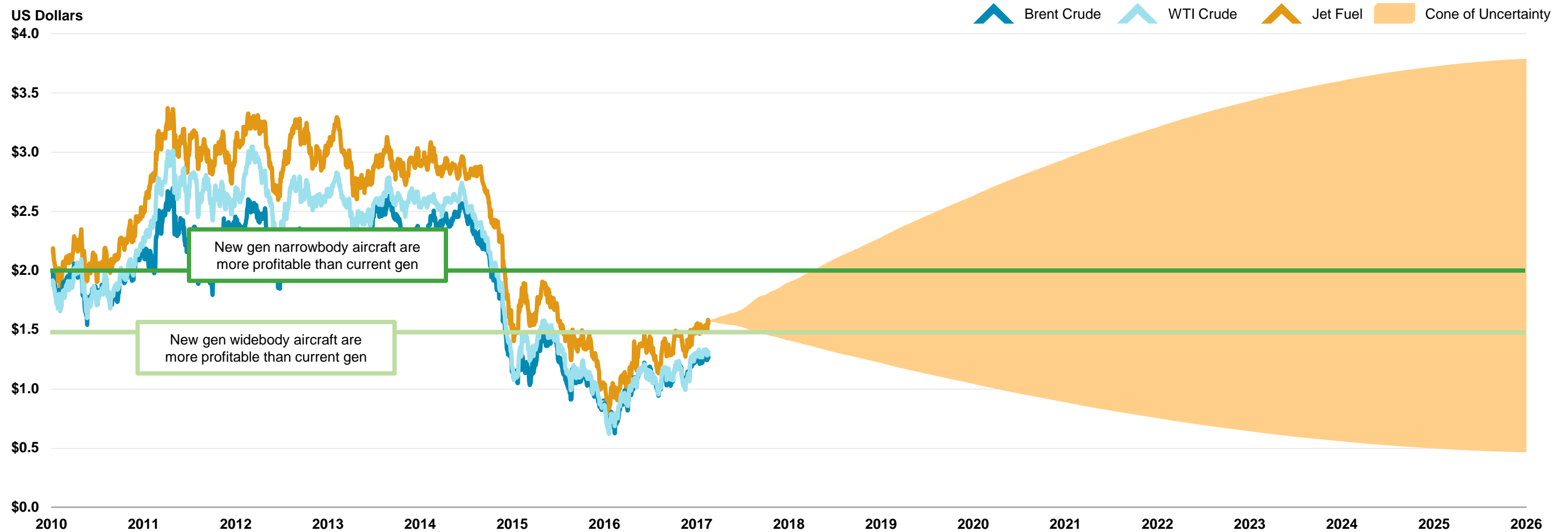
Global Commercial Air Transport Industry Net Profit by Year



A fiercely competitive environment and over capacity drive low yields causing Europe to have the highest breakeven load factors in the world

Three years of record industry profits have allowed operators to invest heavily in the passenger experience and adopt new, more expensive labor contracts, which may be a possible source of turbulence in the near future amid a changing economic landscape as the oil market begins to recover from the glut

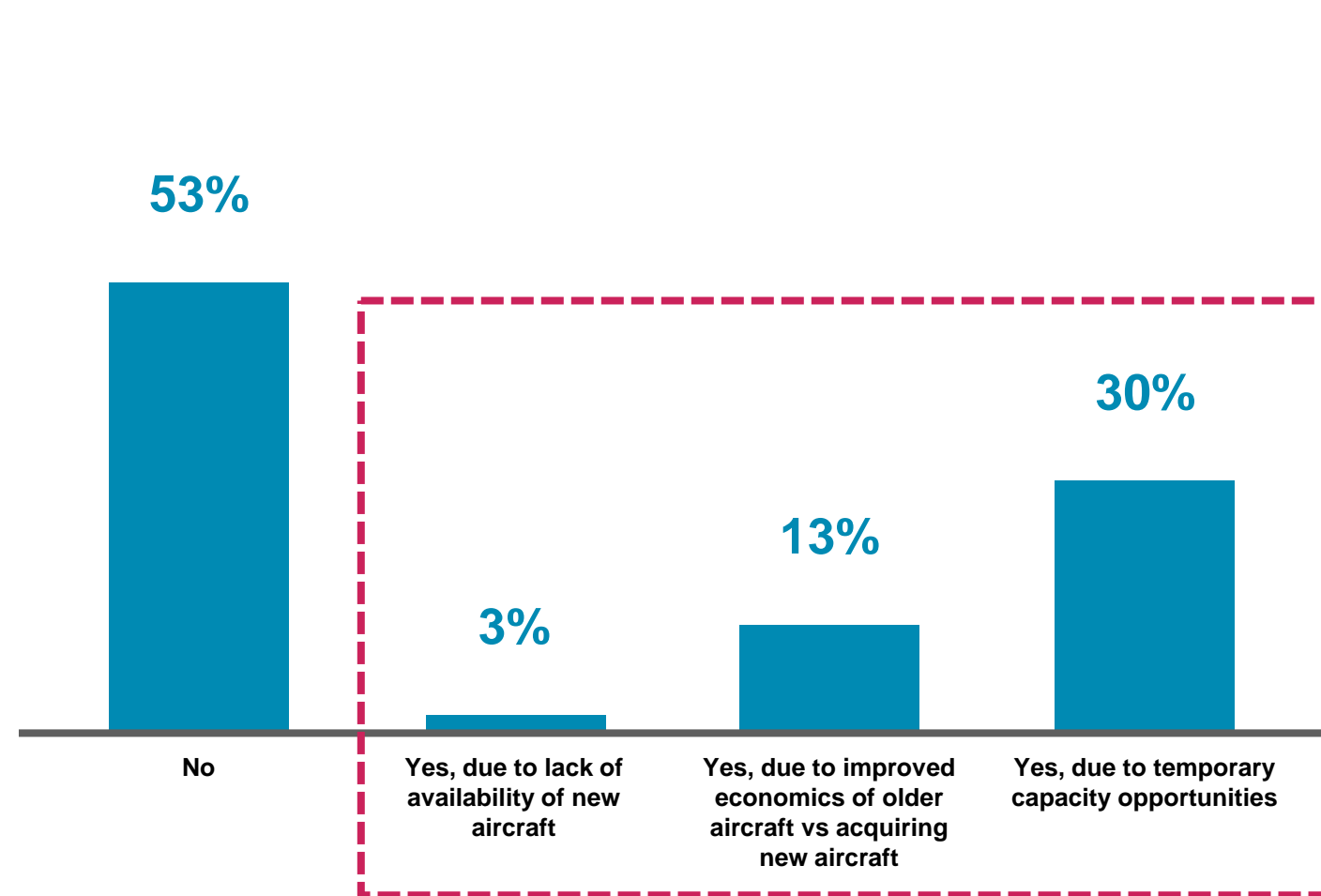
Crude Oil and Jet Fuel Spot Prices per Gallon by Year



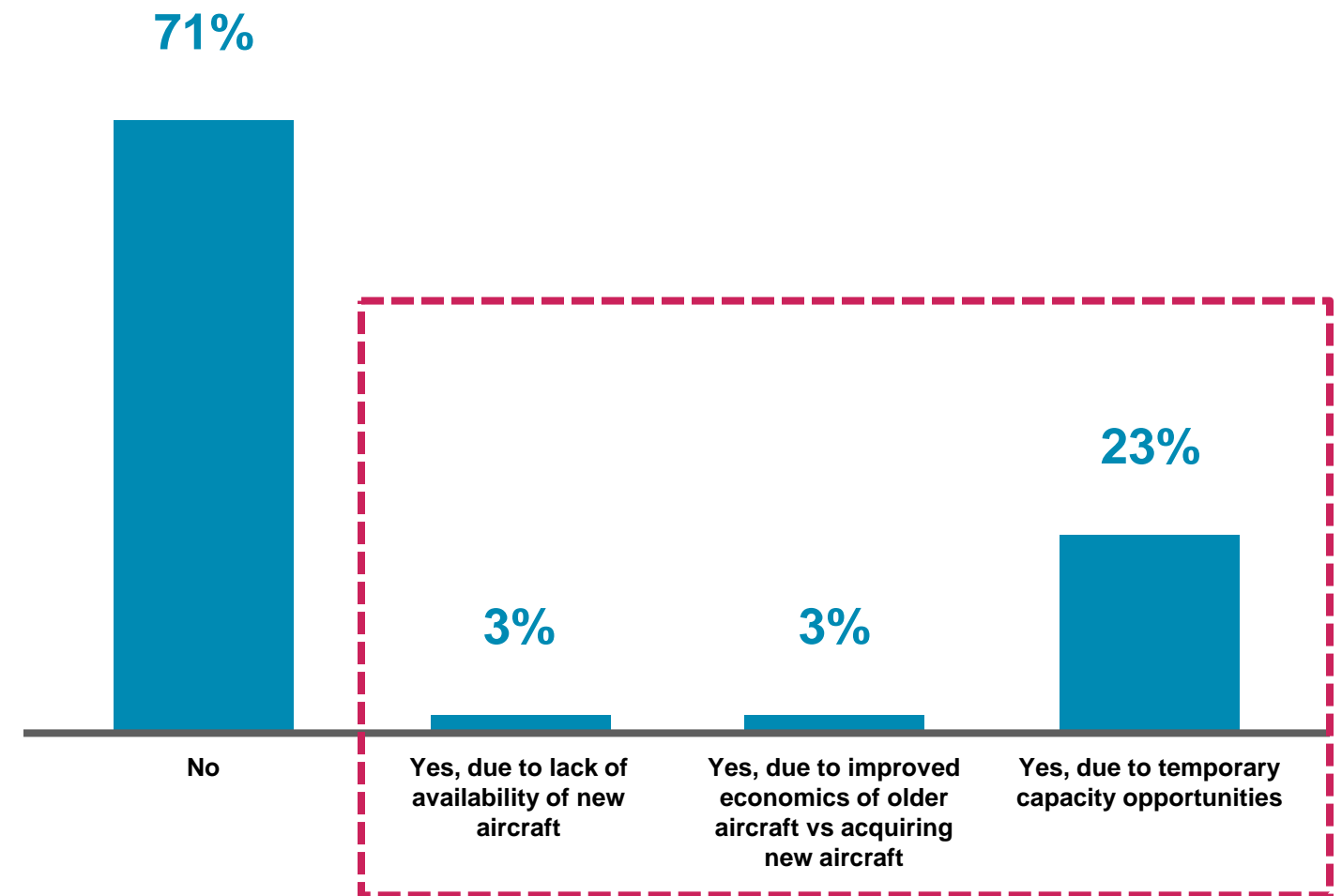
Notwithstanding some operators altering fleet plans over the past year to take advantage of current market conditions, OEM order books remain strong, and new aircraft deliveries are occurring at record rates

Nearly half of aircraft operator respondents in our MRO Survey are delaying retirements and nearly one third of respondents are reactivating aircraft they have pulled from long term storage

Q: Are you delaying aircraft retirements?*

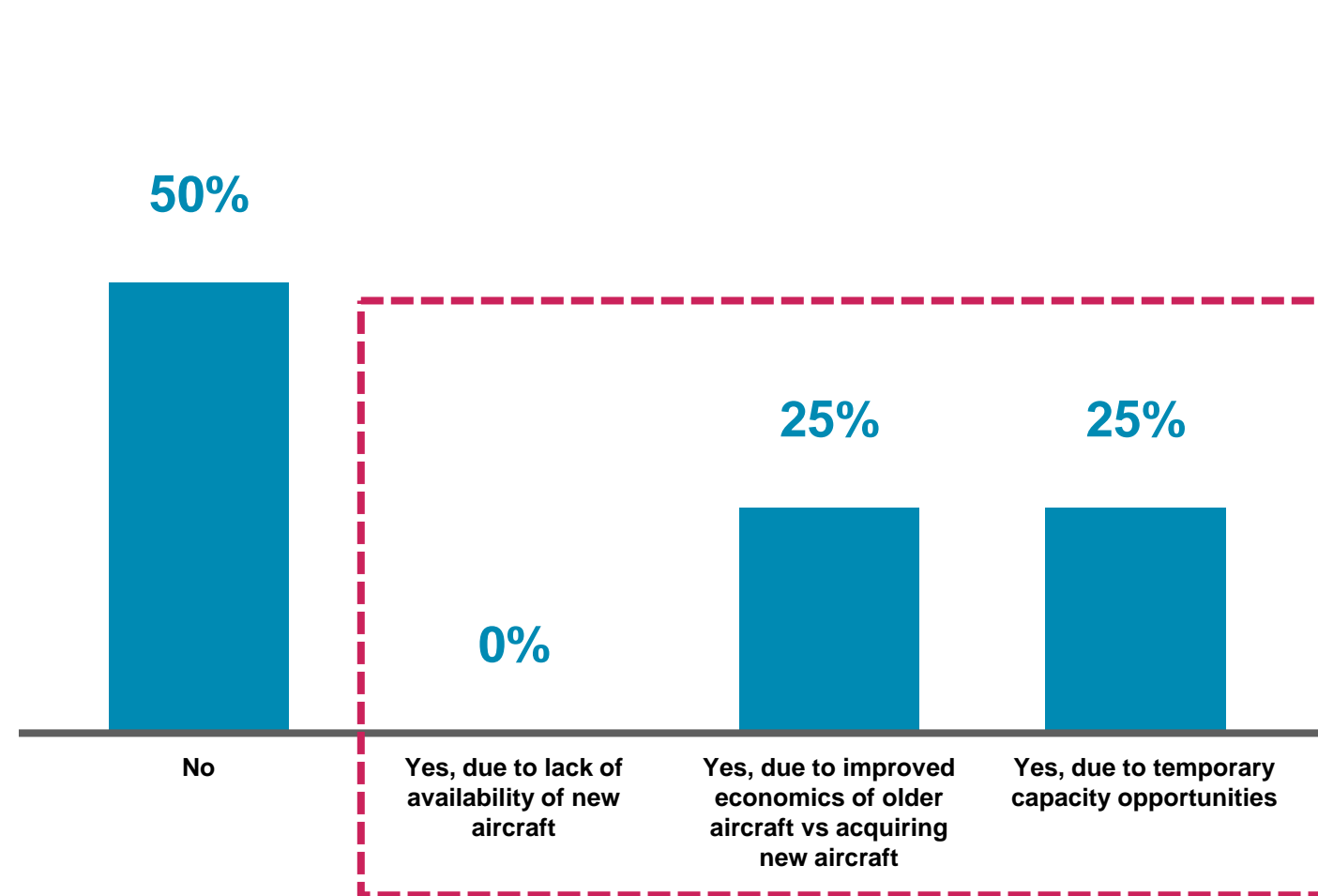


Q: Have you pulled an aircraft out of storage and pressed it into service within the past 12 months? If so, why?*

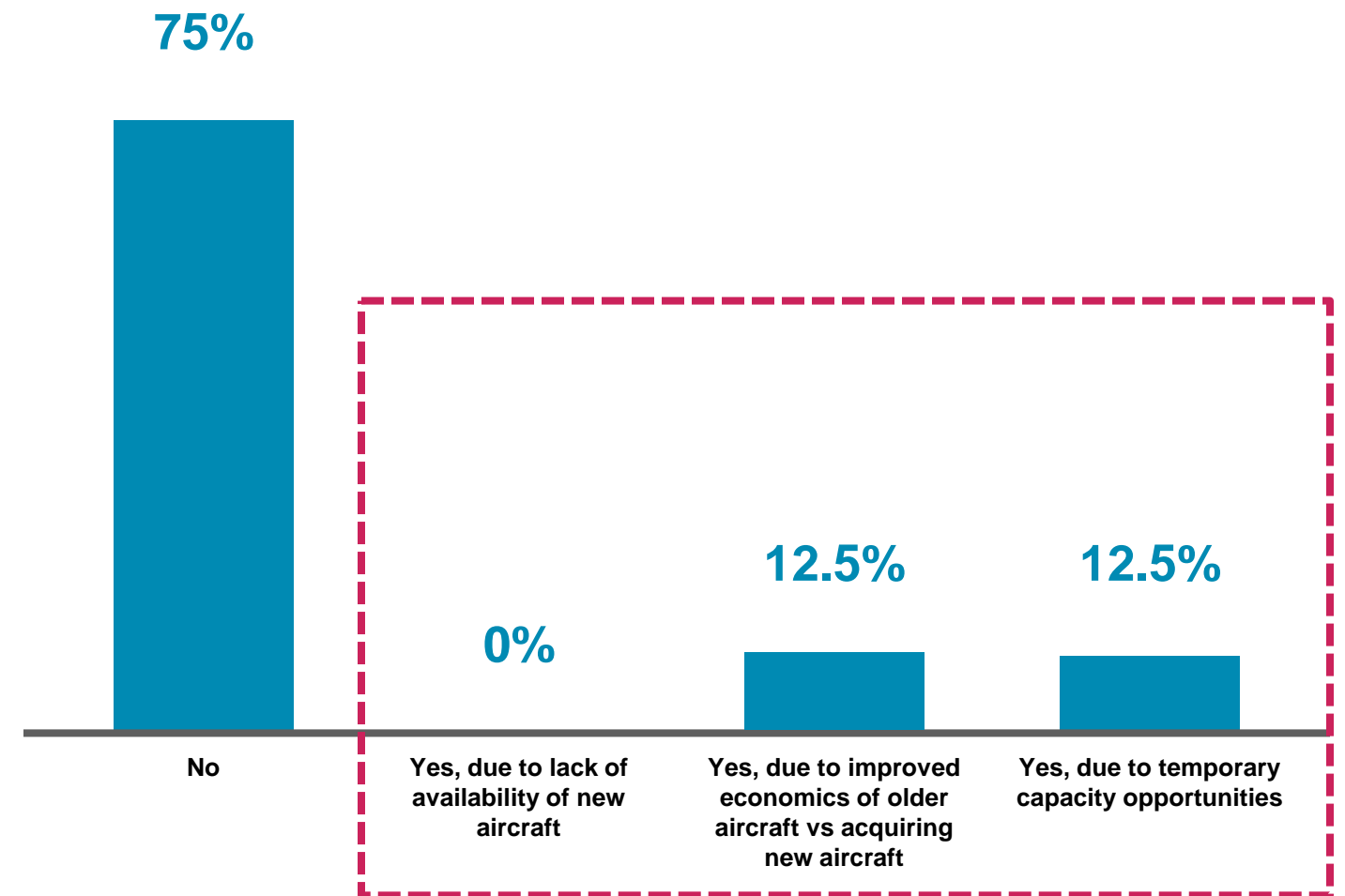


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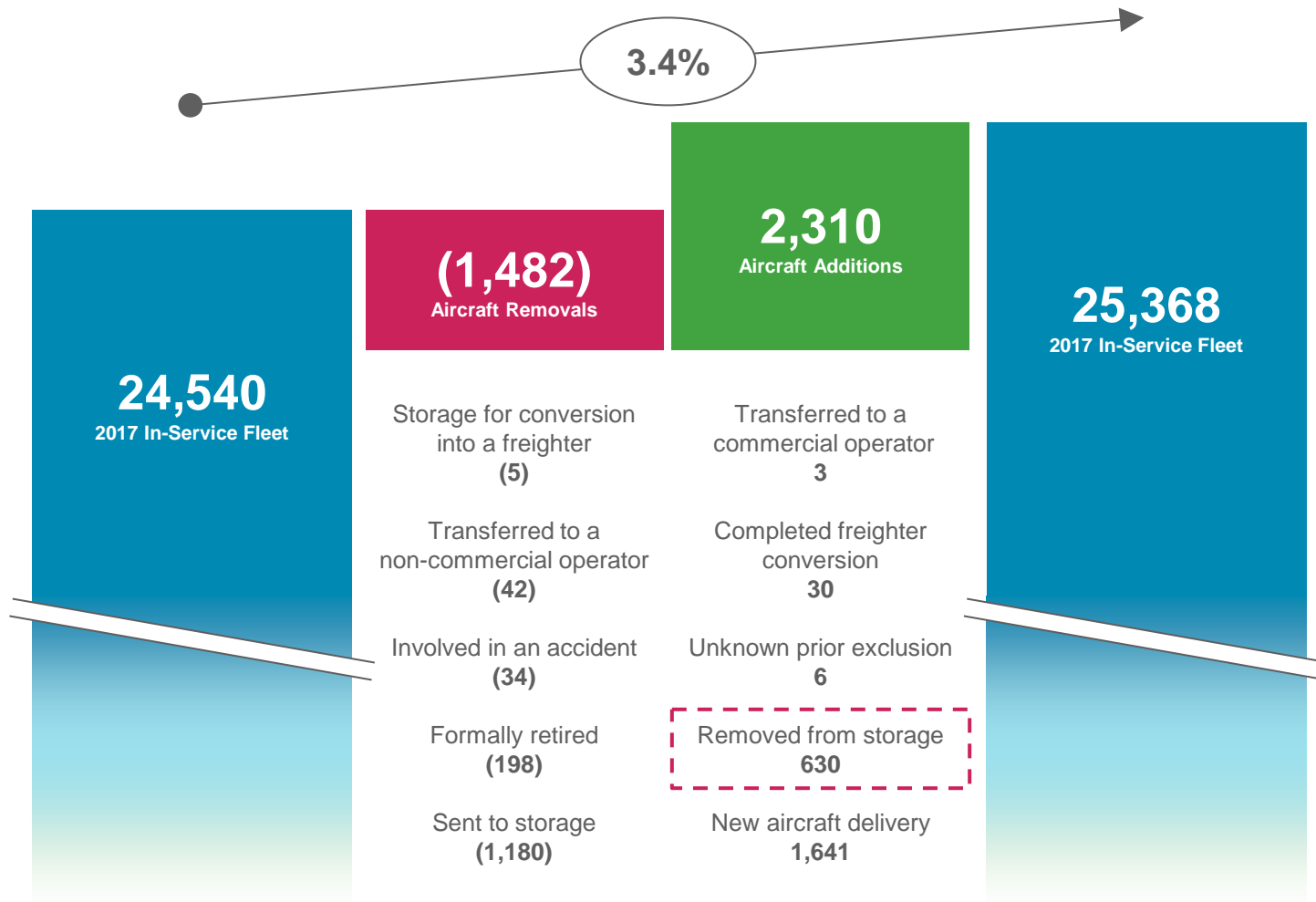
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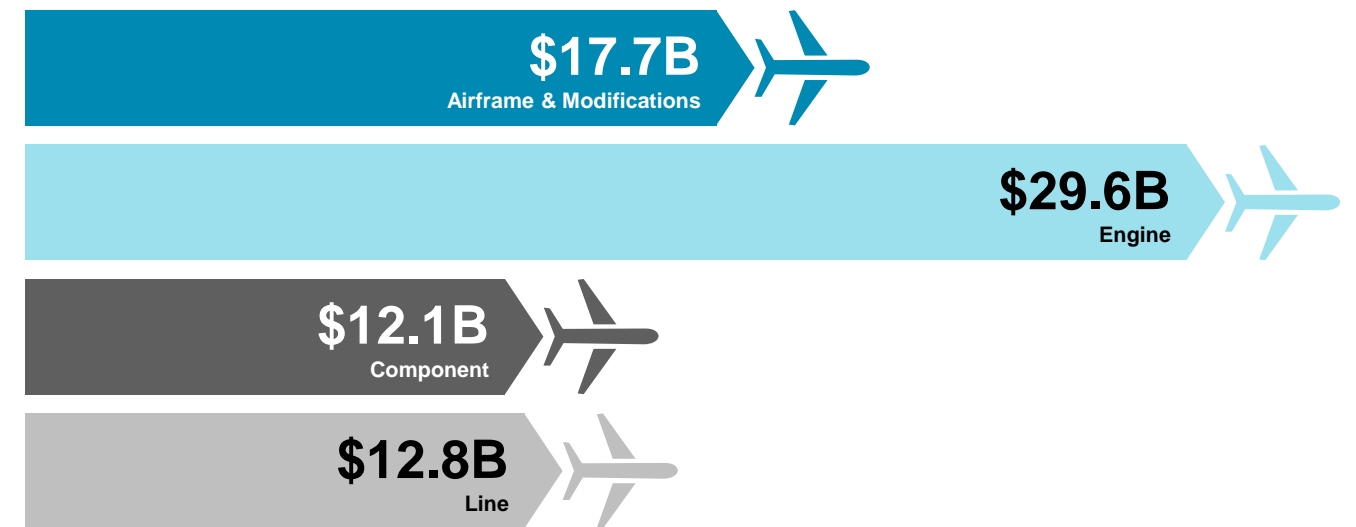
Nearly three quarters of respondents also said they are not deferring new aircraft deliveries, while the remaining respondents by equal measure cited improved operating economics of older aircraft and weakening economic conditions as reasons for deferrals

Over the past year, status changes to 3,792 aircraft have lead the global in-service fleet to experience a net growth of 828 aircraft, representing a 3.4% annual growth rate

Year Over Year Changes to the Global Commercial Air Transport In-Service Fleet by Transaction Type



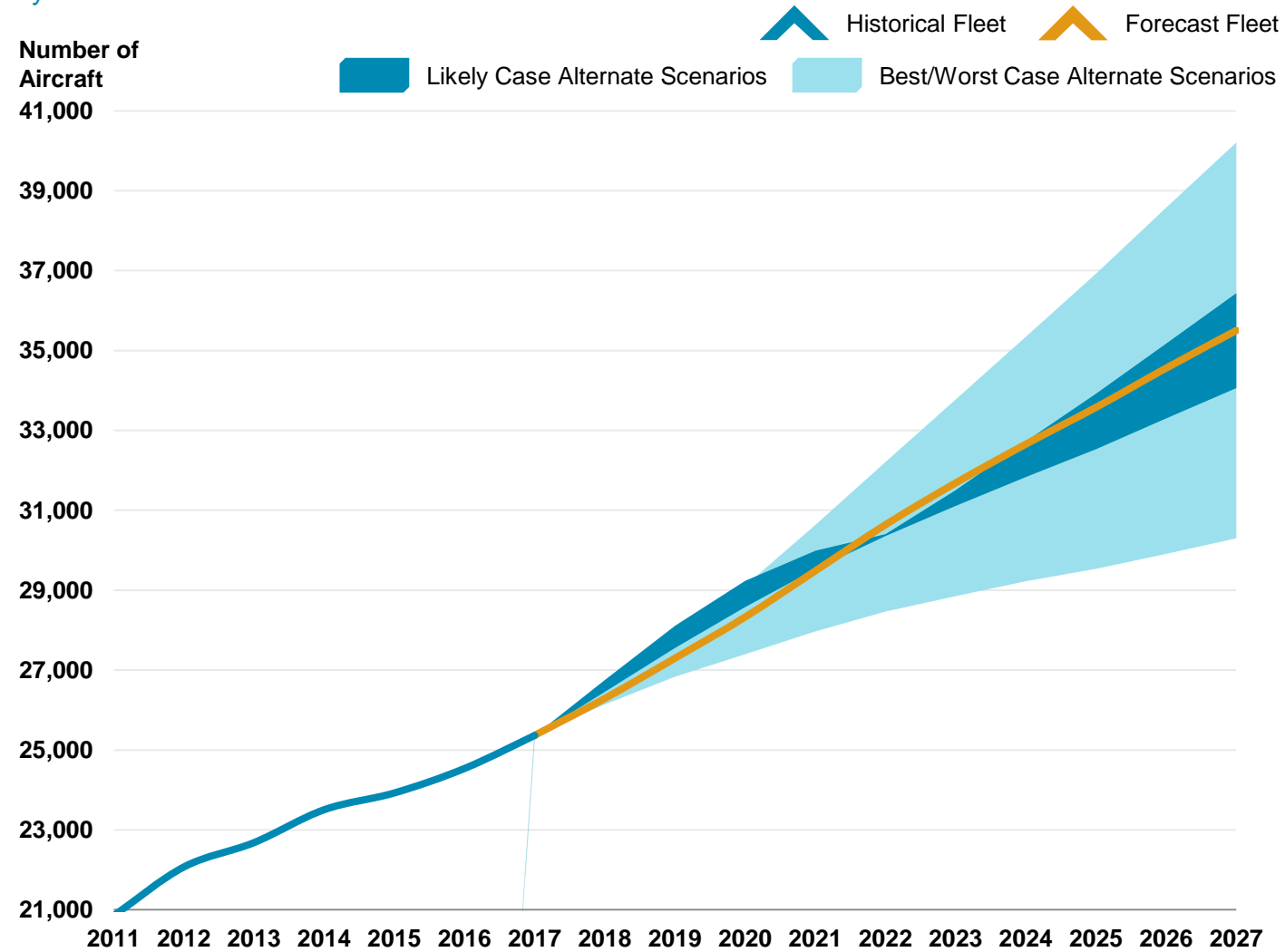
2017 Global Commercial Air Transport MRO Market Forecast by MRO Segment



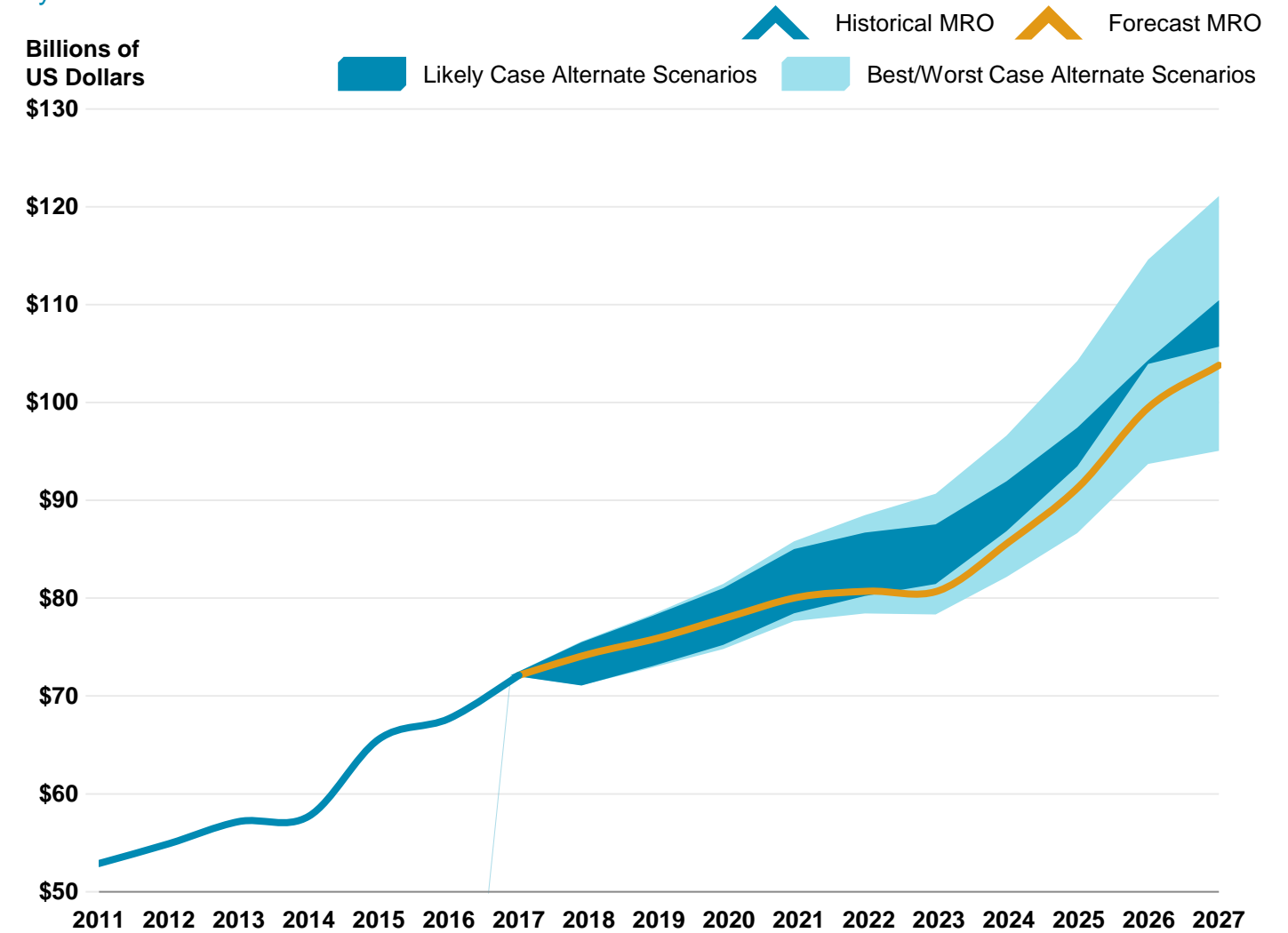
Translating the changing fleet dynamics into MRO, the 2017 market is forecast to be \$72.1B, with engine MRO continuing to be the driver of growth

While the fleet continues to grow at a healthy rate, and the industry is still recording near historic net profits, uncertainties surrounding economic growth, interest rates, and oil could disrupt and hinder growth and stability of the global commercial air transport industry

Global Commercial Air Transport Fleet Forecast by Year



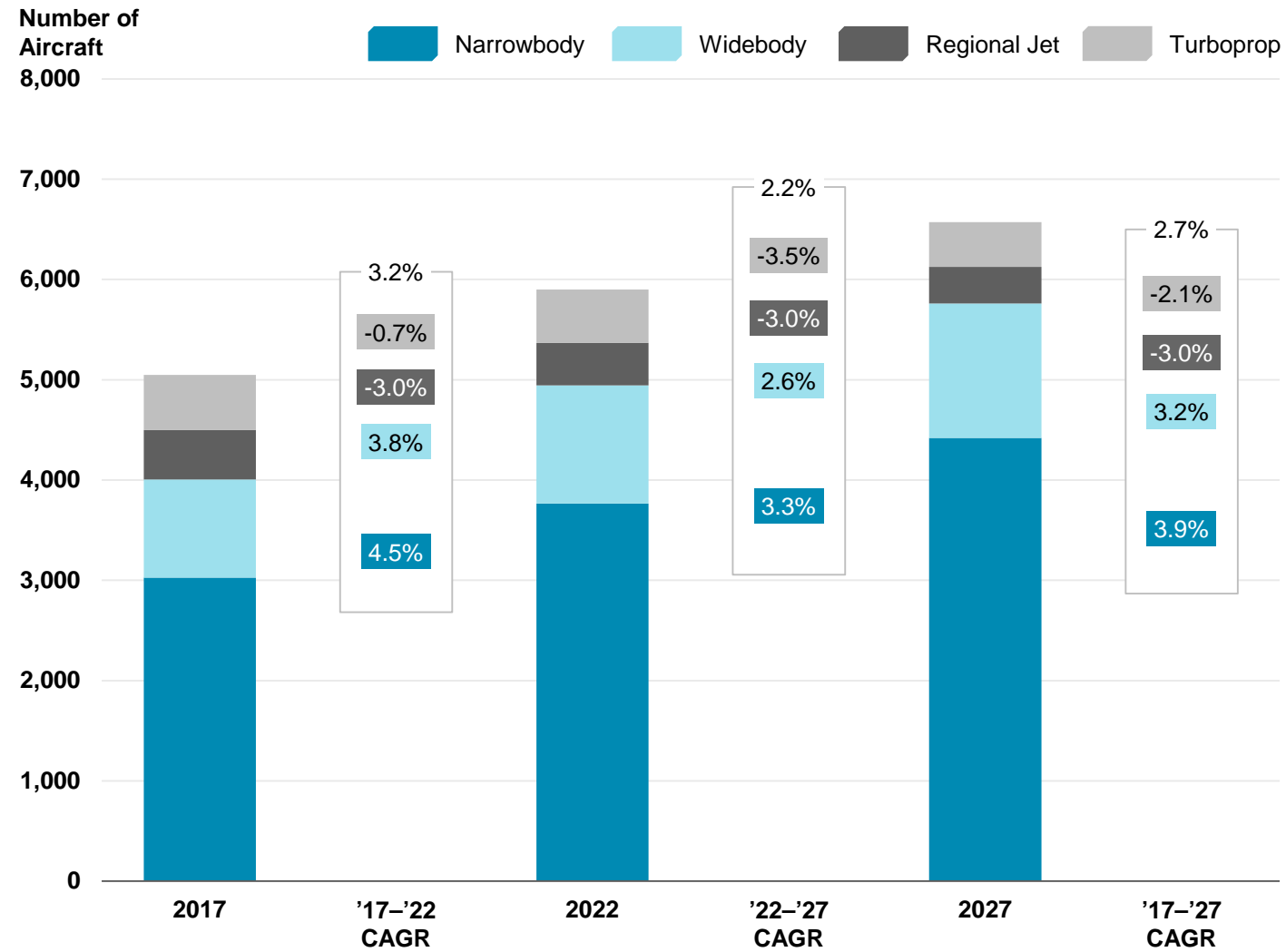
Global Commercial Air Transport MRO Market Forecast by Year



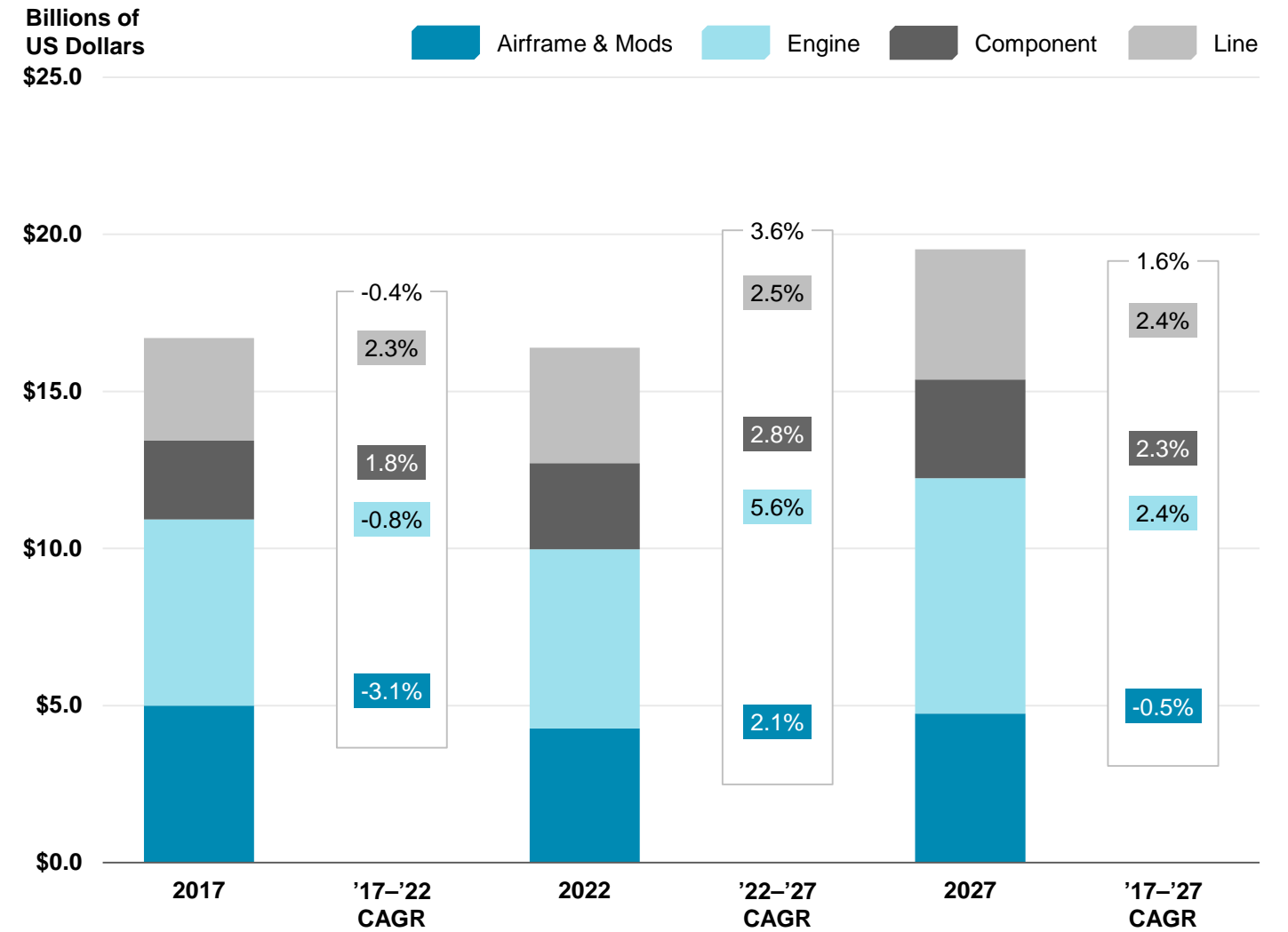
The commercial air transport fleet is forecast to increase by 10,133 aircraft over the next 10 years driving the \$72.1B commercial air transport MRO market to go grow at an average annual rate of 3.7% per year, topping out at \$103.8B in 2027

The mature region of Western Europe is forecast to see a modest fleet growth rate of 2.7%

Western European Commercial Air Transport Fleet Forecast
by Aircraft Class



Western European Commercial Air Transport MRO Forecast
by MRO Segment

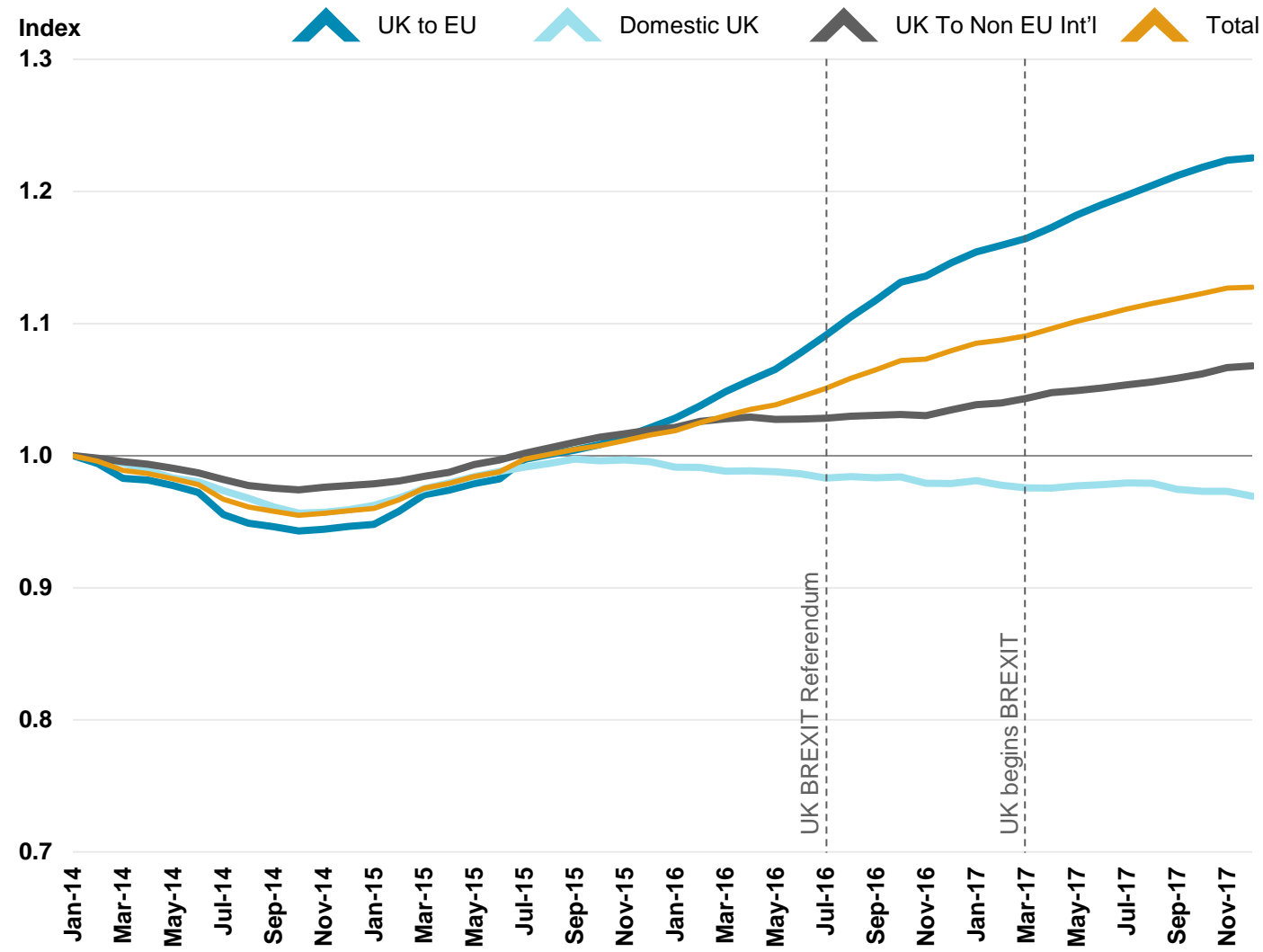


The MRO Market is expected to grow at an even slower pace over the next ten years with an average annual growth rate of just 1.6%

2 | Obvious Challenges

1 Regulatory challenges in Europe

Airline Seats from the United Kingdom
Rolling 12 Month Index = January 2014



BREXIT



Airlines

- Net traffic implications / FX
- EU / UK market access

- ↓ Net negative for UK
- ↓ Higher costs



Regulation

- UK: in or out – what model?
- Target date 20 March 2019 for new regime

- ↓ Very limited appetite for leaving EASA
- ↓ Increased risk if new regime not achieved on time

EU261



Airlines

- Change to ROI equation for:
 - Spares
 - Reliability mods and programs



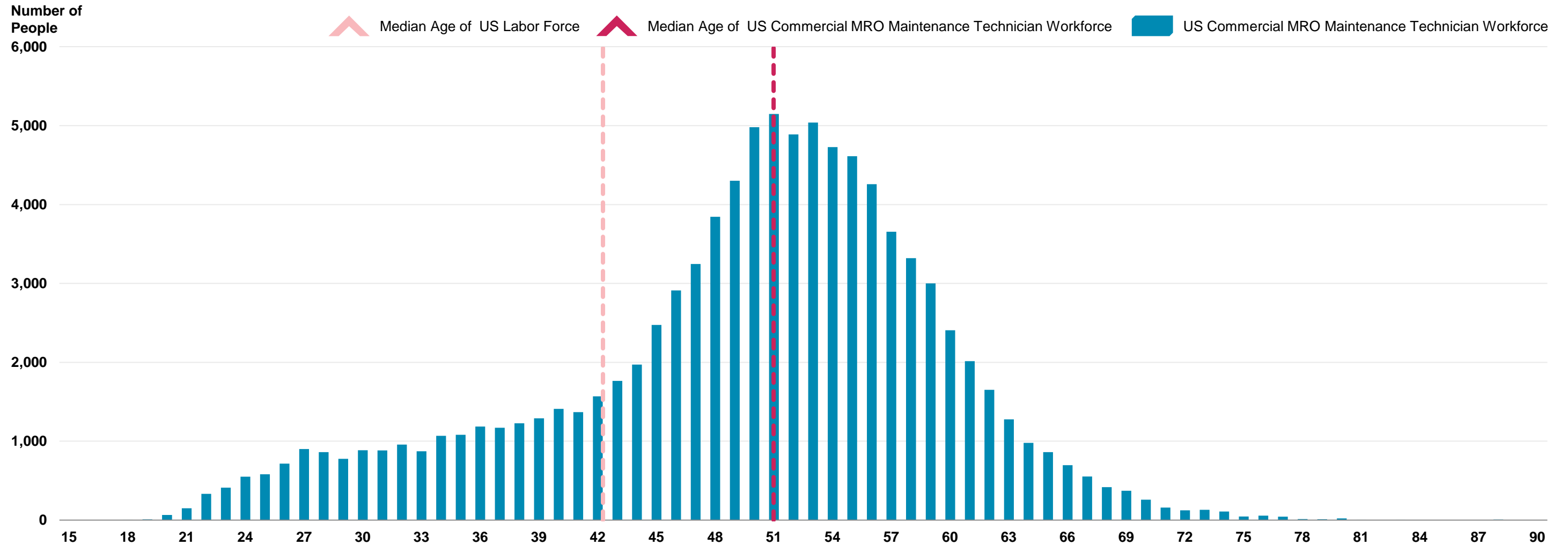
MROs

- Airlines demanding more, but may be willing to pay more?
 - Clean aircraft ex-check
 - Higher mod standards in pool
 - Higher post check reliability
 - Shared risk & liability

2 Skilled Labor Shortage

For example, the US commercial MRO workforce is comprised of approximately 86,000 maintenance technicians with a median age of 51, nearly 9 years older than the median age of the US labor force

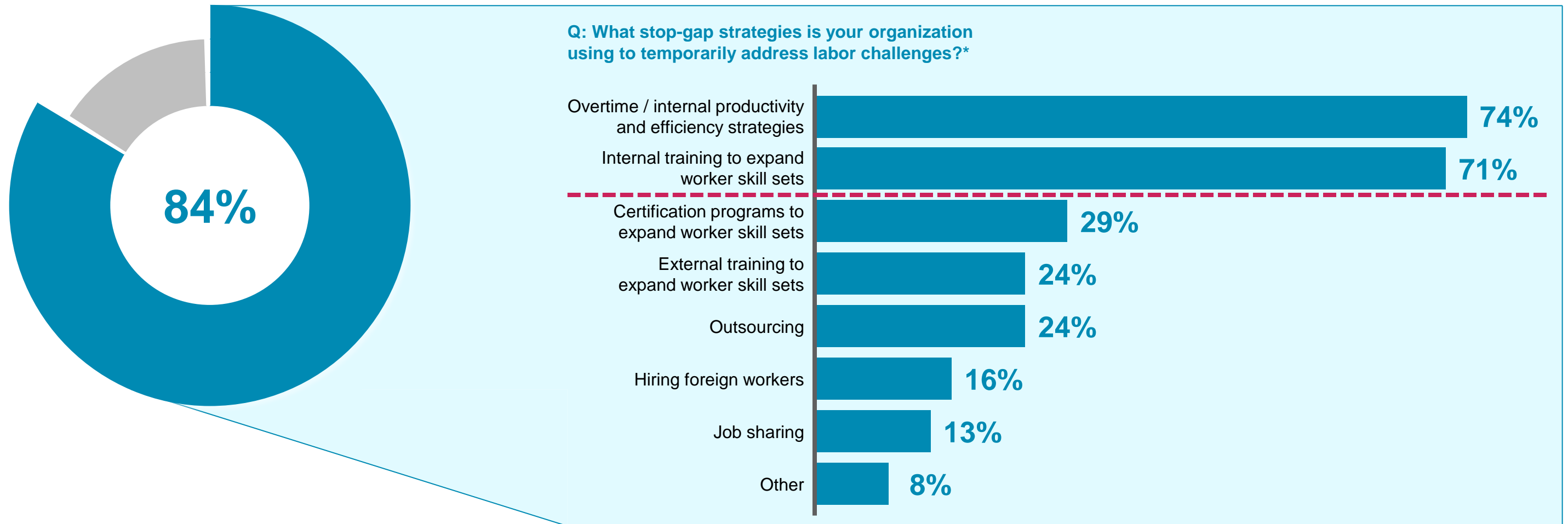
US Commercial MRO Maintenance Technician Workforce
by Age



With a record number of maintenance technicians becoming eligible for retirement, commercial MRO providers throughout the world will face an increasingly difficult challenge over the next 10 years

In fact, the Oliver Wyman 2017 MRO Survey found that 84% of respondents across the globe are already experiencing labor imbalances, choosing to mitigate shortcomings primarily through the use of overtime / internal productivity and efficiency strategies, and internal training to expand skill sets

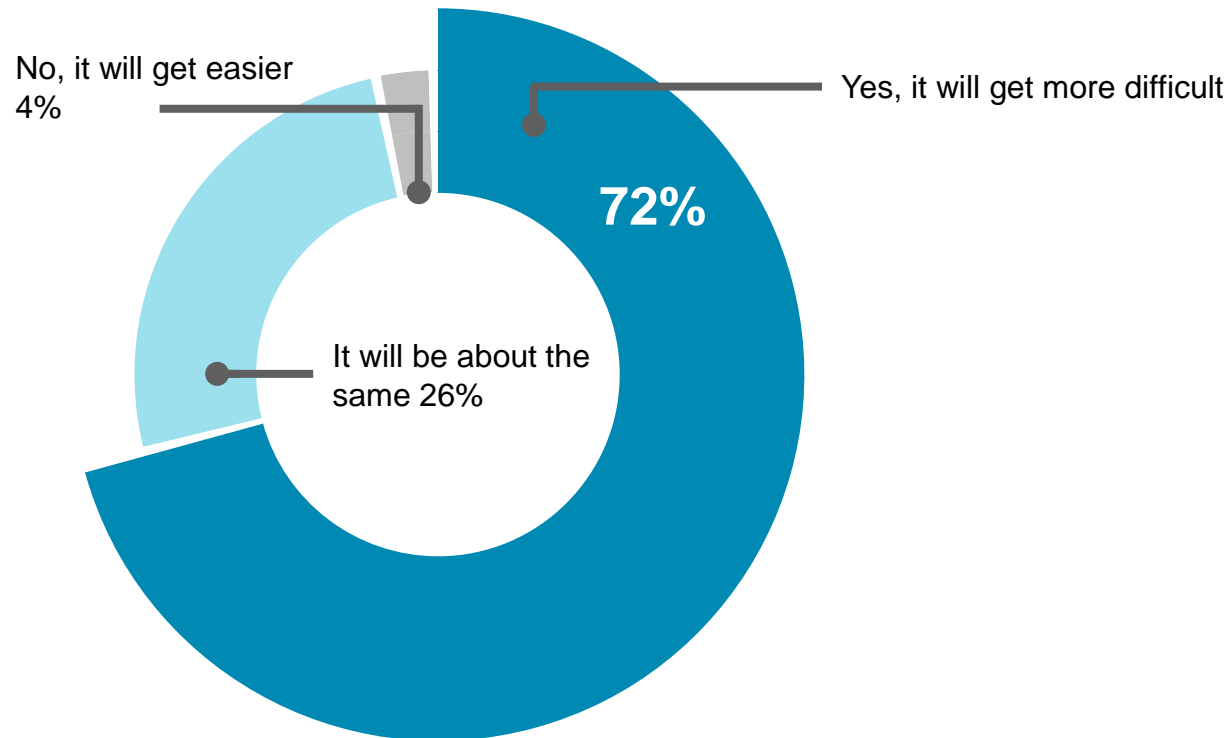
Percent of organizations using stop-gap strategies to temporarily address labor challenges:



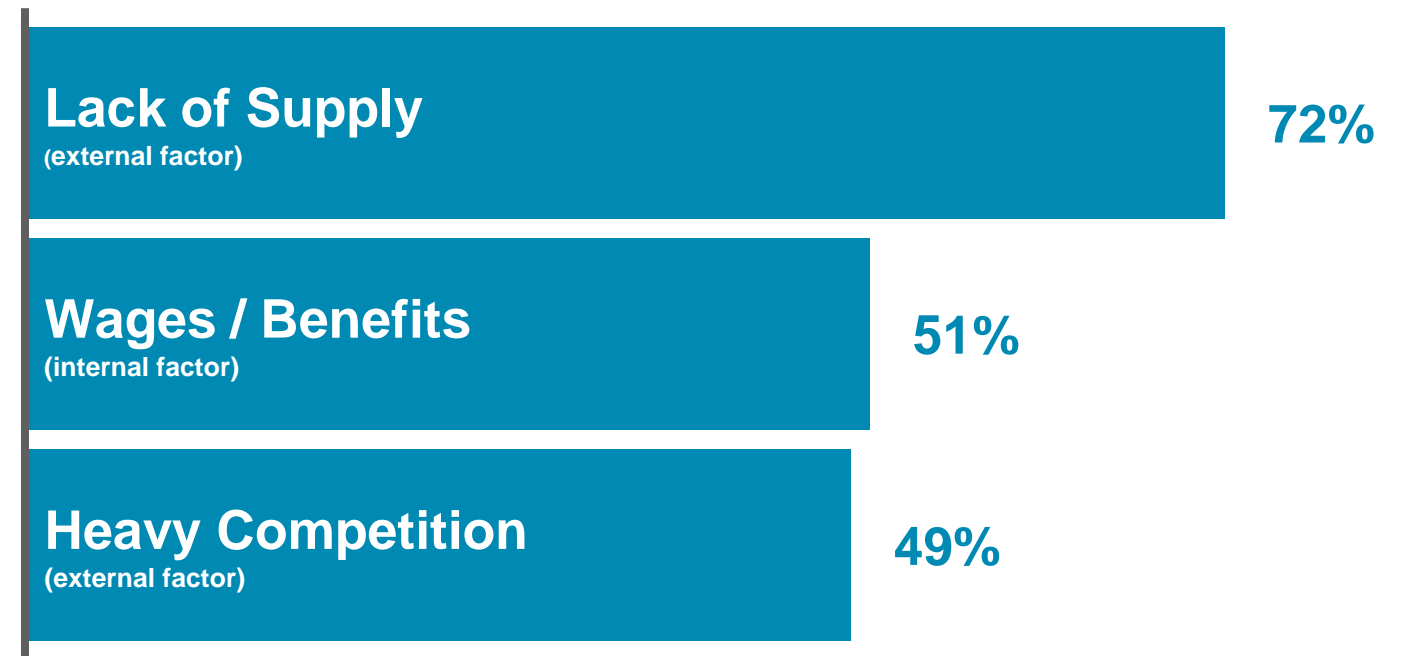
Over the long term, reliance on large amounts of overtime is costly, can reduce overall productivity, and unsustainable

Notwithstanding current labor imbalances, the MRO Survey found that 87% of respondents plan on hiring to increase or maintain headcount over the next three years, and 72% of respondents agree that recruiting will become even more difficult than it is today

Q: Versus today, do you expect recruiting maintenance technicians to get more difficult over the next 3 years?



Q: Are there internal or external factors that are affecting your company's ability to recruit maintenance technicians?



31% Cost of Living at Maintenance Facility Locations | 28% Recruitment Policy / Recruitment Marketing
 15% Low Unemployment Rate | 13% Poor Manpower Planning | 13% Small Size of the Organization
 8% Political / Social / Legal Environment | 3% High Cost of Recruitment | 3% Company Image

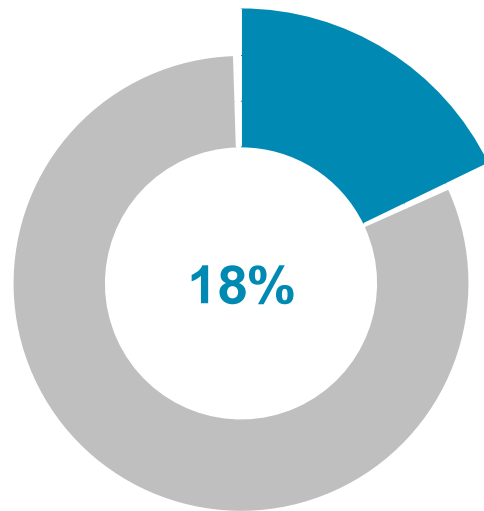
Lack of labor supply, concern about wages / benefits being offered to potential maintenance technician candidates, and heavy competition could hinder plans for growth and indicate tightening in the commercial MRO labor market is underway

3 | Moore Changes Required

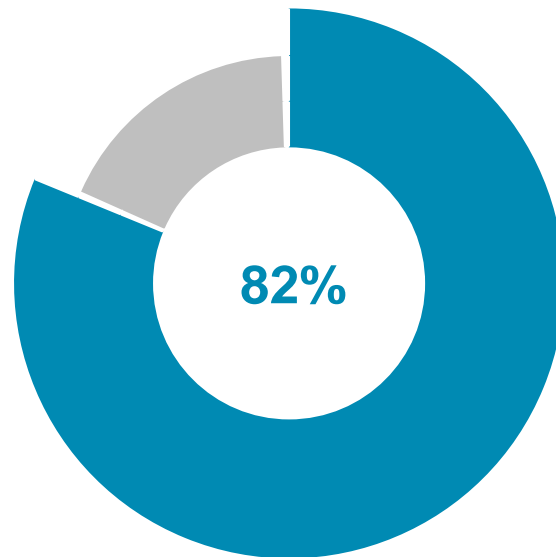
The maintenance technician shortage will make performing maintenance at just the right time, and as efficiently as possible more important than it ever has been

Q: Which of the following game changing technologies for the shop / hangar floor are you planning on implementing within the next 3 years?

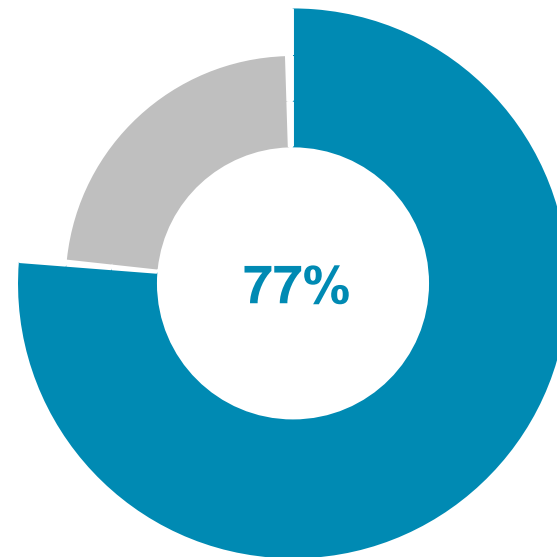
Drone / Robot Supported Maintenance



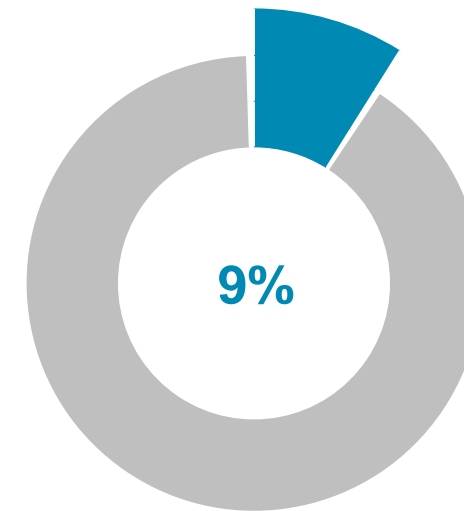
Paperless Shops / Hangars



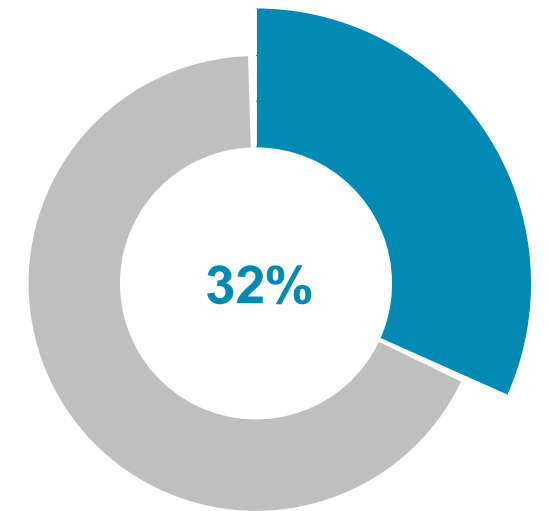
Predictive Maintenance



Smart Sensors (SansEC Sensing)



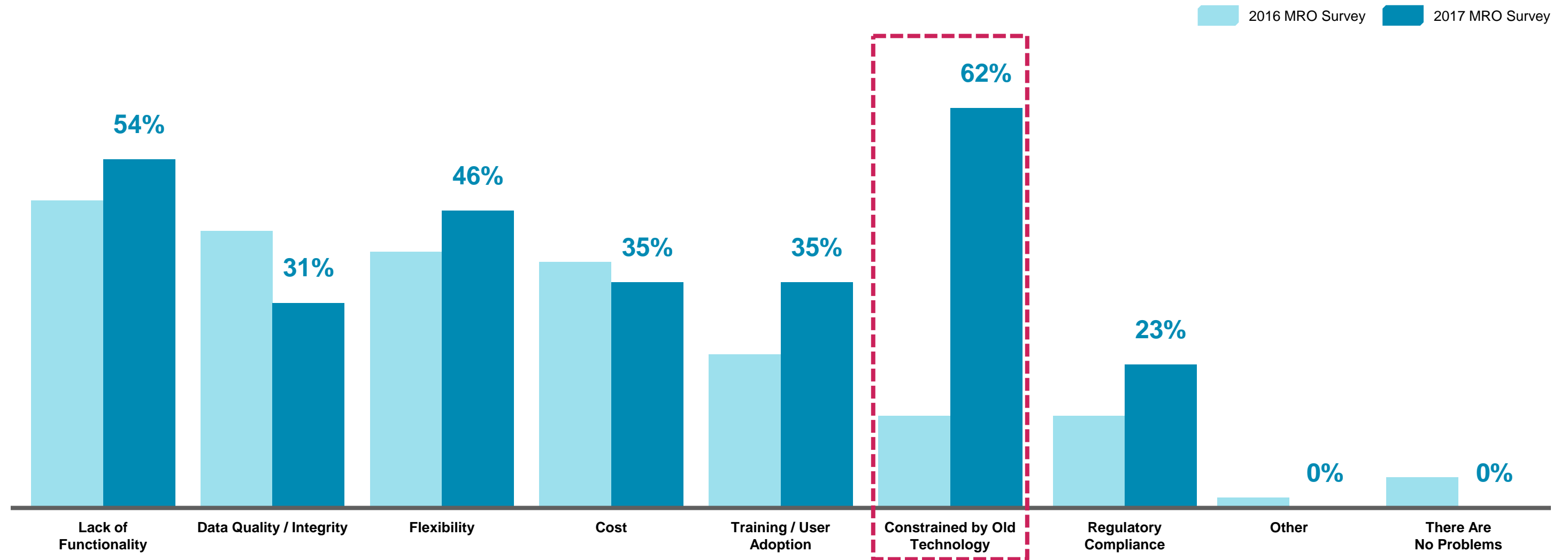
Virtual Maintenance Training



More than three quarters of MRO Survey respondents plan on implementing paperless shops/hangars and predictive maintenance over the next three years – technologies aimed at increasing technician efficiency and productivity and maximizing aircraft availability

While respondents express interest in predictive maintenance, big data, and advanced analytics, there is limited evidence so far as to the benefits, largely due to the industry being plagued with major inefficiencies and a lack of innovation when it comes to information technology

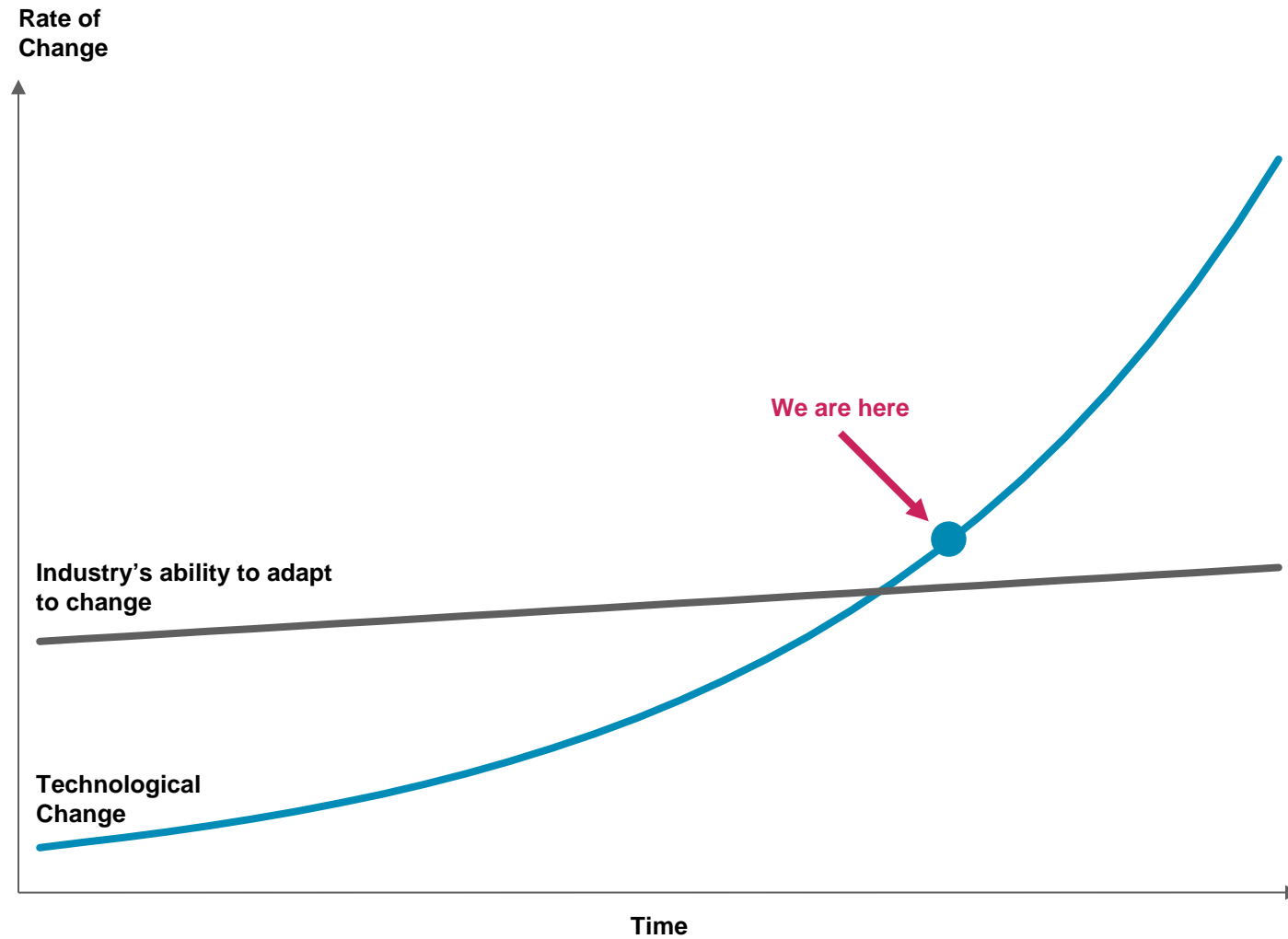
Q: Select the top three (3) problems facing your IT systems today:



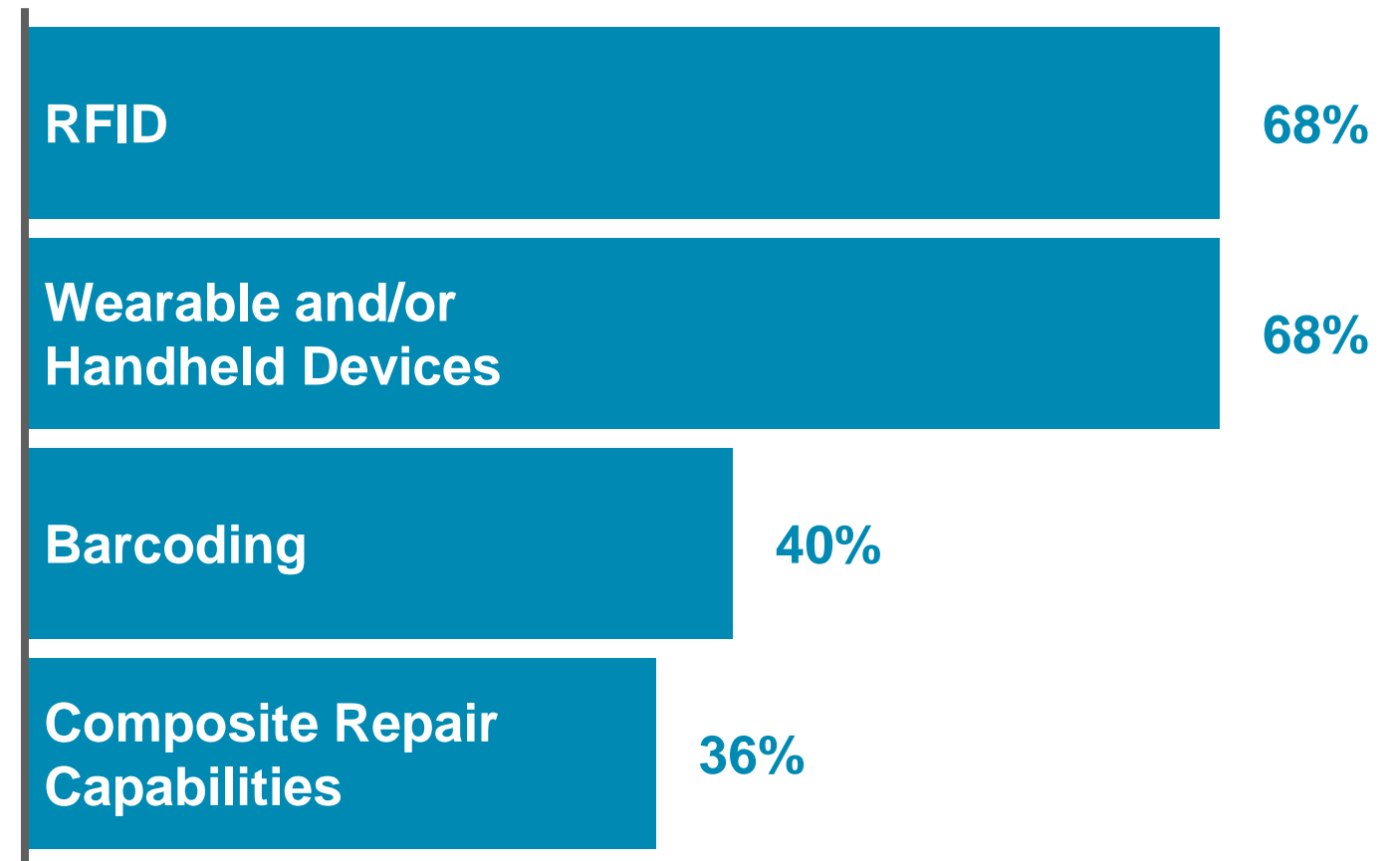
Aircraft designed in 2017 are being maintained by systems designed in 1970 and it's starting to show

Today, the rate of technological change is accelerating so fast that it has risen above the average rate at which our industry can adapt to change, preventing us from fully benefiting from all of the new technology that is coming along

Adaptability to Technological Change
Astro Teller Illustrative Graphic



Q: Indicate which new technologies your company is planning to deploy in the next three (3) years?

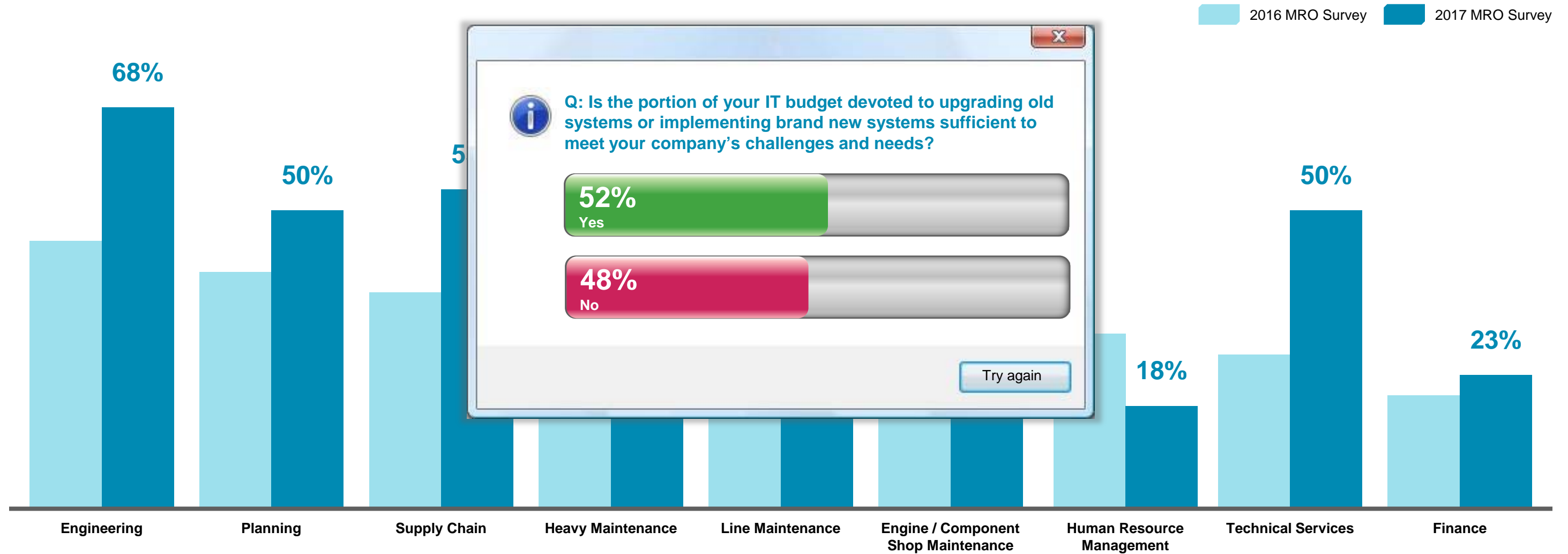


28% New Repair Technology | 24% Additive Manufacturing | 20% Artificial Intelligence (Machine Learning)
20% Robotics | 12% Drone-Supported Maintenance

This is evident by the fact that the new technologies planning on being deployed over the next 3 years are RFID and wearable and/or handheld devices such as tablets – technologies other industries adapted to several years ago

Most have recognized that they are behind the technology curve and plan to make significant changes to their IT systems over the next few years

Q: Indicate which IT systems have a migration or major upgrade planned within the next three (3) years?



Q: Is the portion of your IT budget devoted to upgrading old systems or implementing brand new systems sufficient to meet your company's challenges and needs?

52% Yes

48% No

Try again

An ever aging IT infrastructure, competing for limited resources, needs to be given higher priority because not only is the fleet getting larger, it is becoming more technologically advanced - fast

MAR 20, 2017 @ 10:59 AM 4,281

4 The Lean, Digitally Mean Airline Fleet of the Future Takes Shape



Oliver Wyman on Transportation & Logistics

Exploring transport & travel's transformative ideas & technologies [FULL BIO](#)

Opinions expressed by Forbes Contributors are their own.

POST WRITTEN BY

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Oliver Wyman, Contributor



The Lean, Digitally Mean Airline Fleet Of The Future Takes Shape



The Business Of March Madness



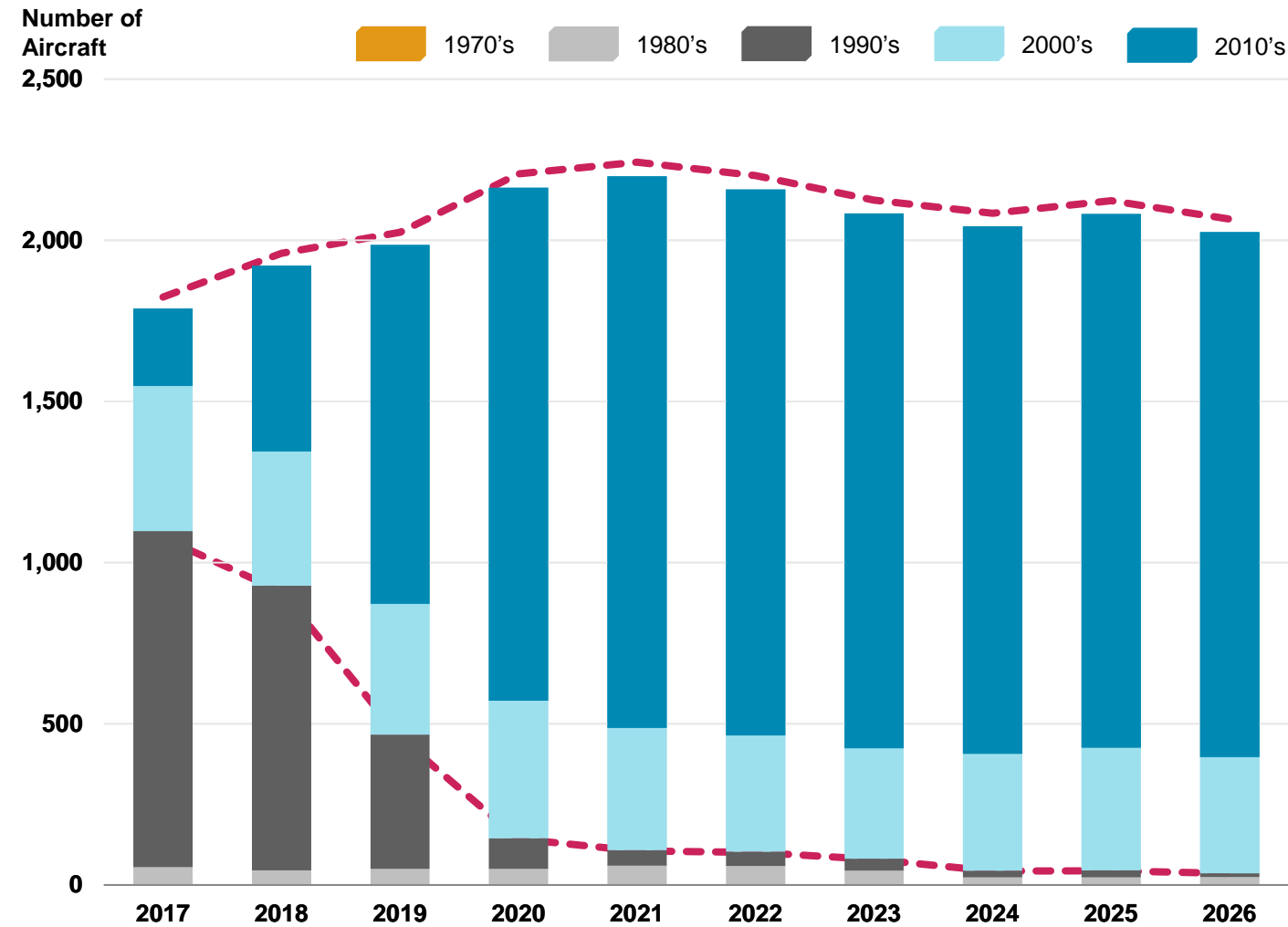
Active on Facebook



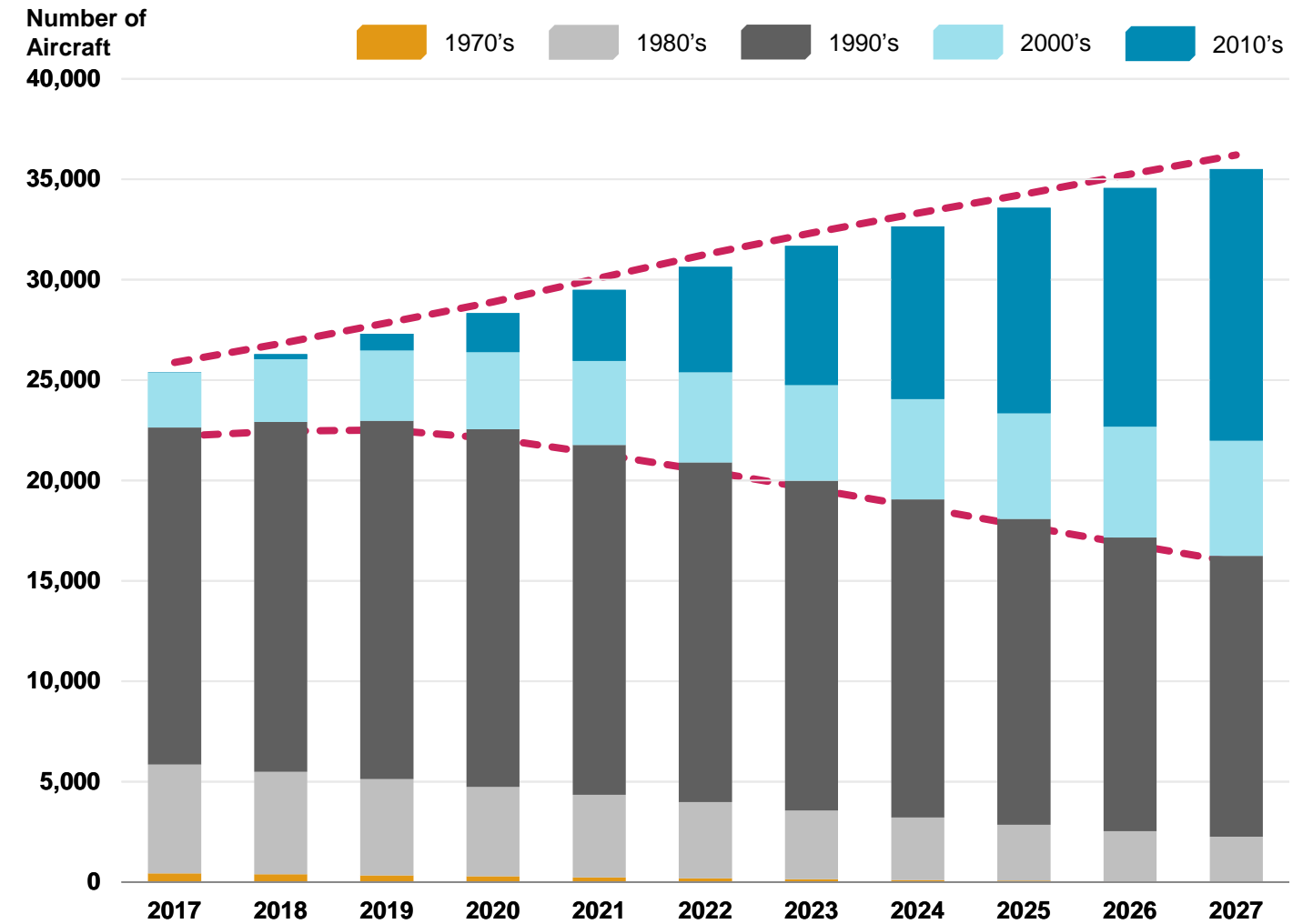
WWE Raw Results: The Winners And Losers Of Superstar Shake-Up, Night 1

As the in-service fleet grows to over 35,000 by 2027, the rapid deployment of aircraft incorporating next generation technology will be the primary agent of change

Global Commercial Air Transport Delivery Forecast
by Aircraft Vintage

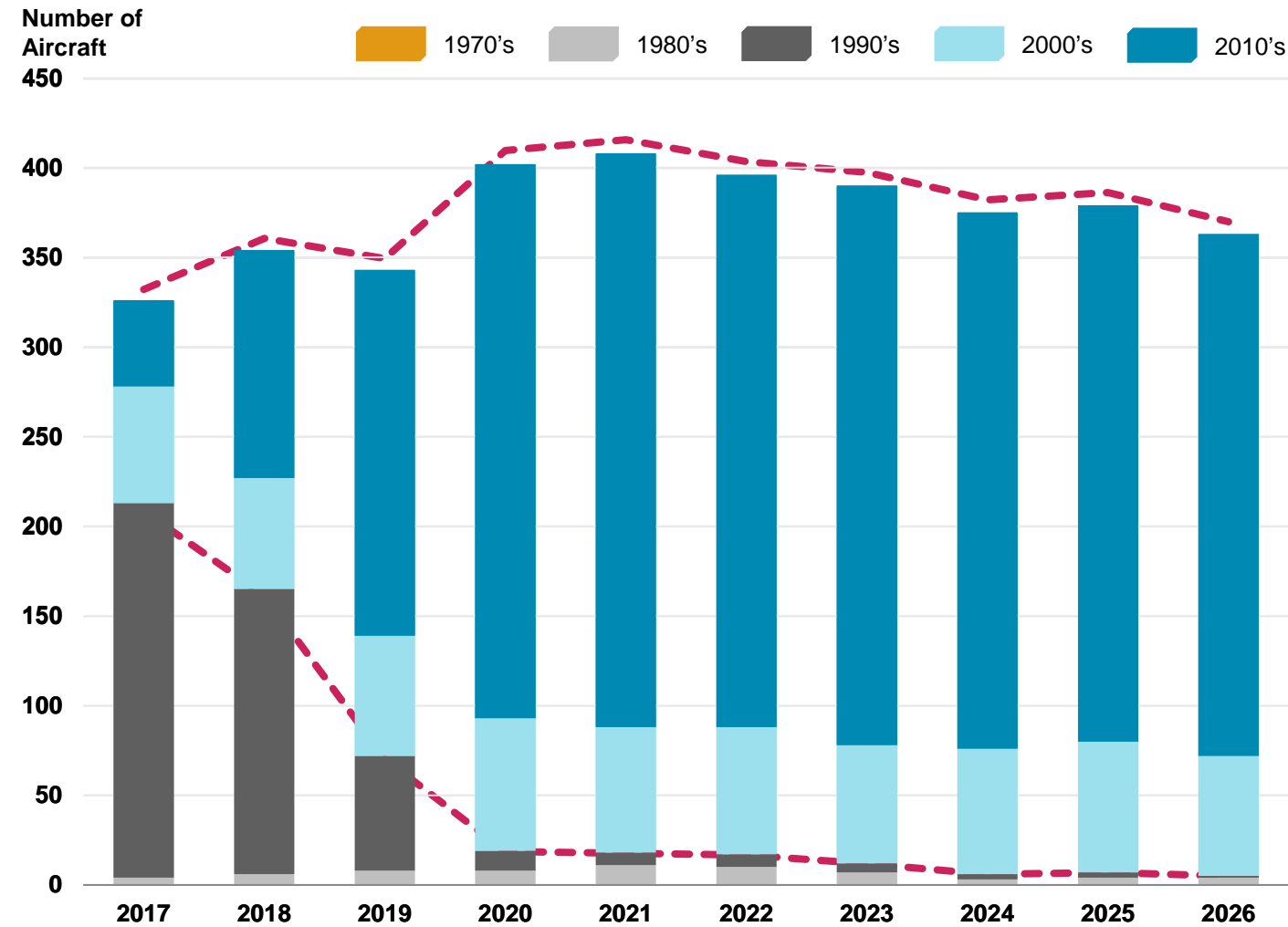


Global Commercial Air Transport Fleet Forecast
by Aircraft Vintage

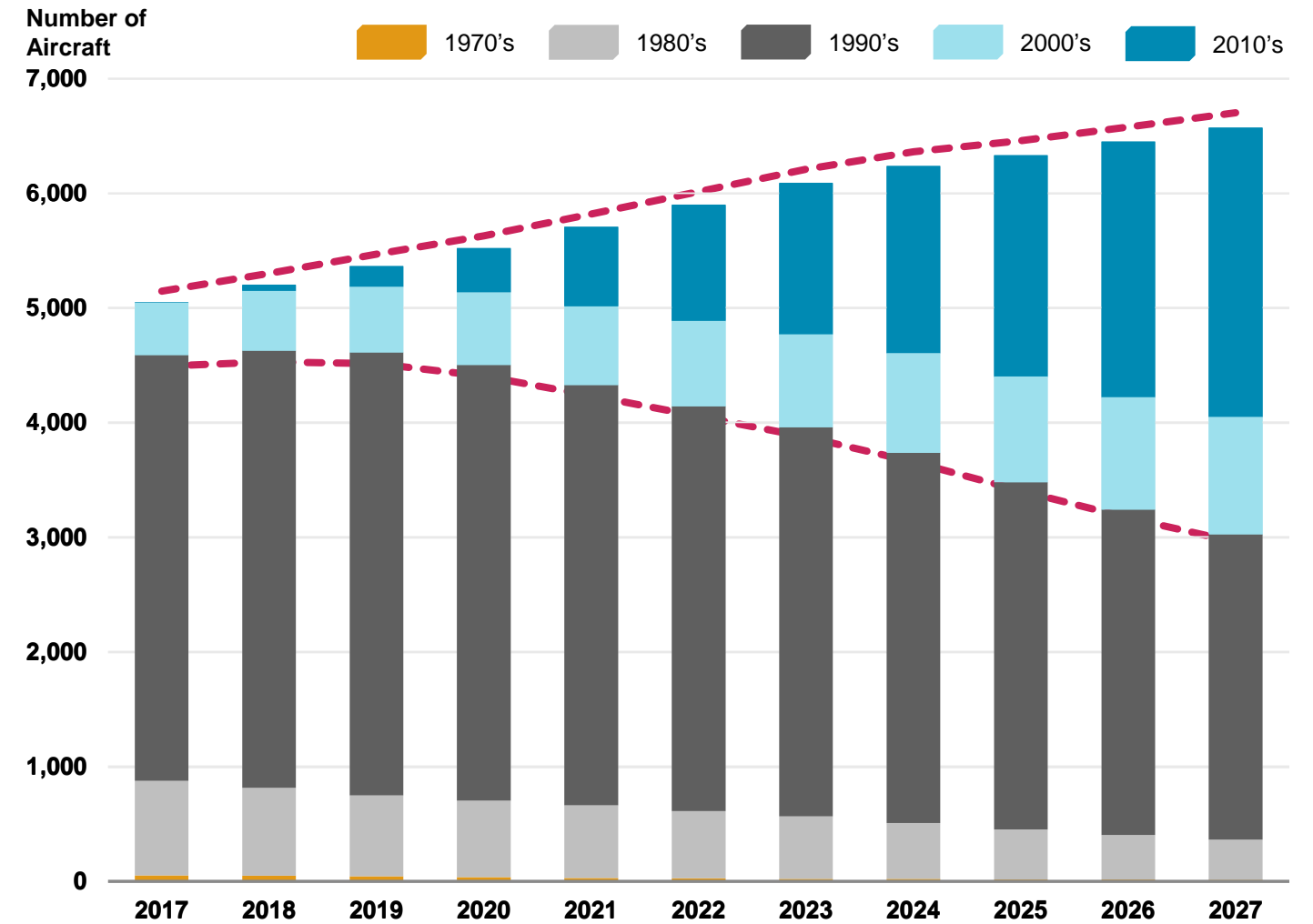


For Western Europe, the story is no different. The rapid deployment of aircraft incorporating next generation technology will be the primary agent of change as the in-service fleet grows from 5,049 to 6,572 by 2027.

Western European Commercial Air Transport Delivery Forecast
by Aircraft Vintage



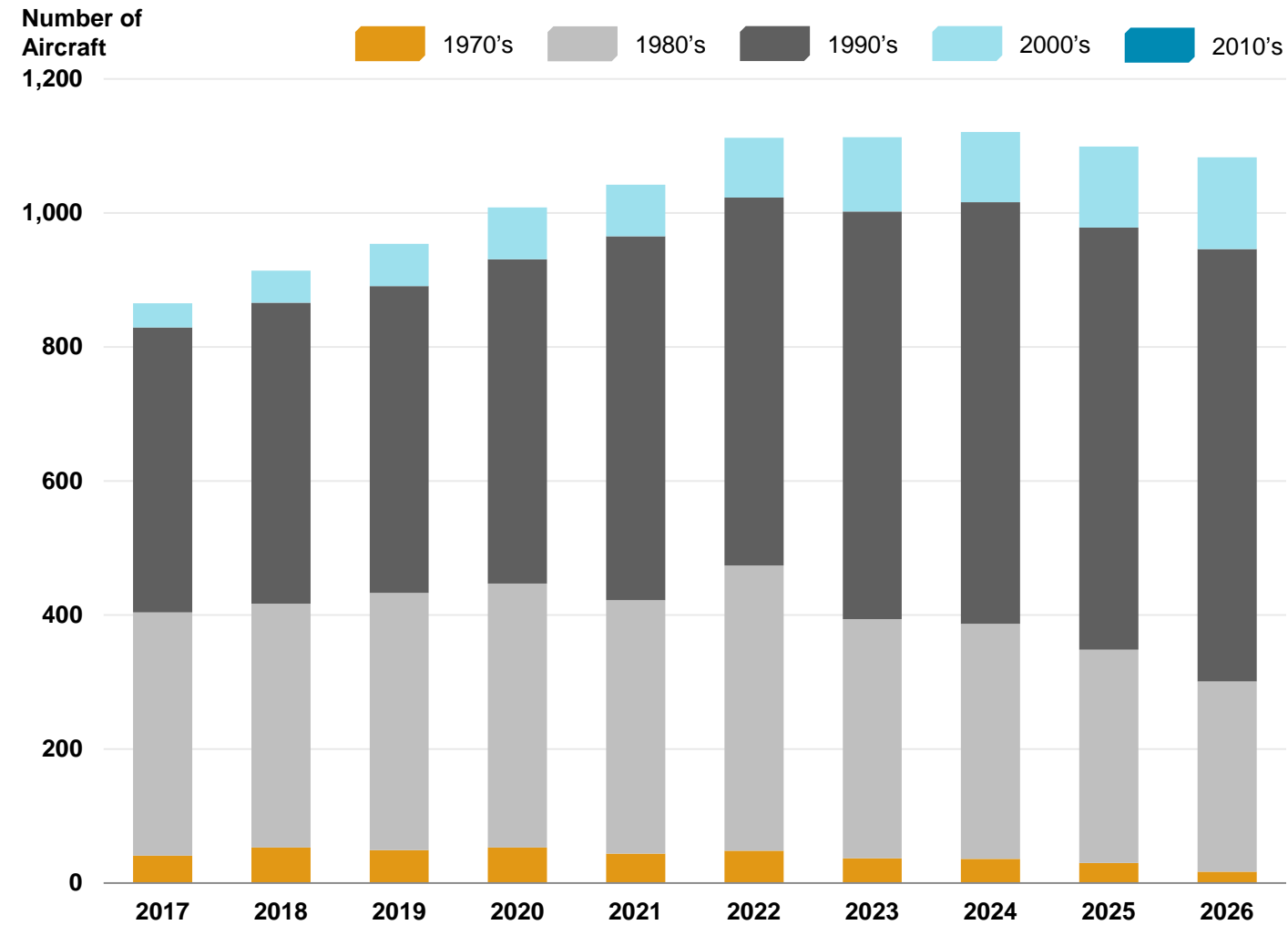
Western European Commercial Air Transport Fleet Forecast
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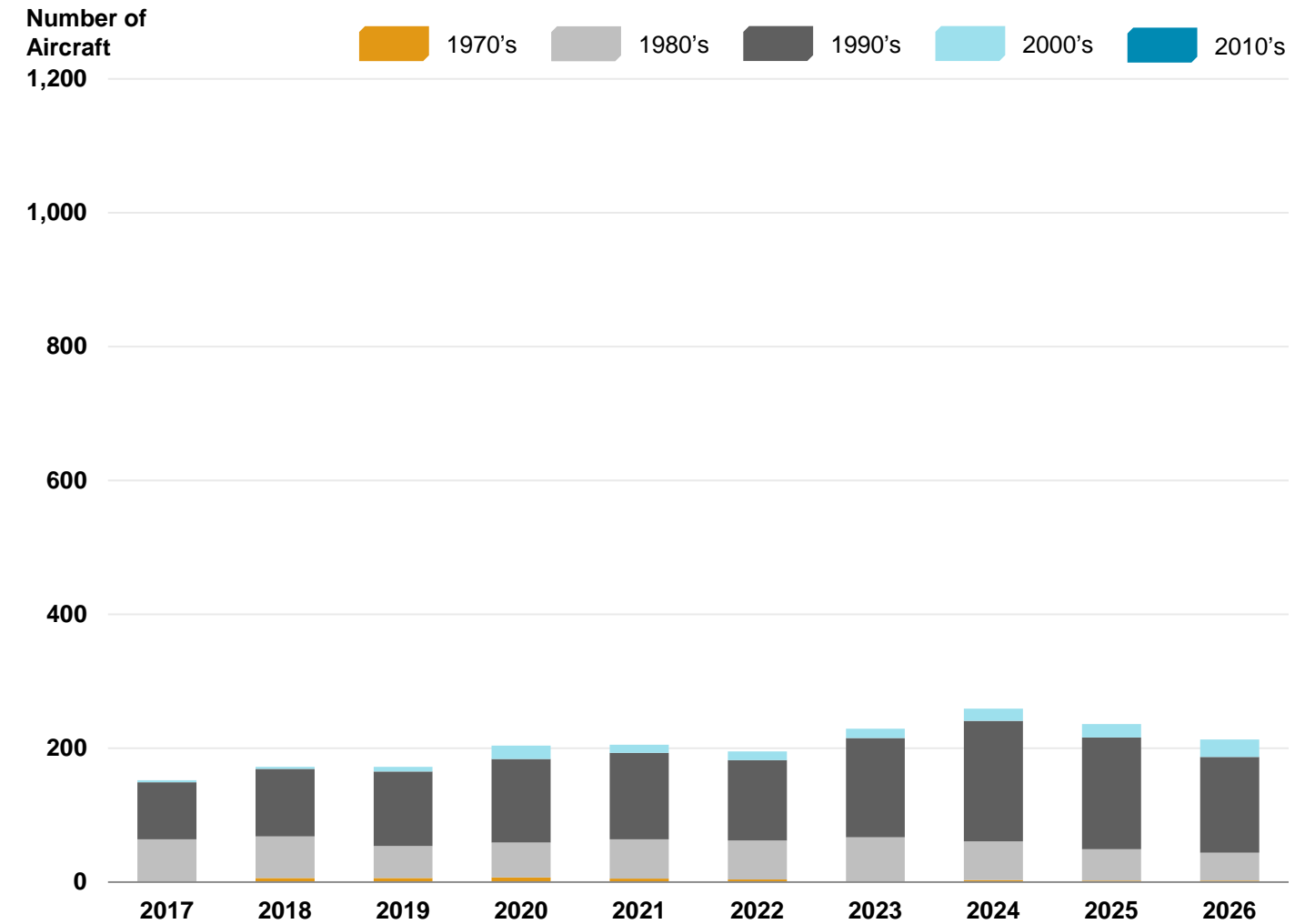
Dealing with the technological shift in the fleet will be an enormous challenge as the new fleets will bring new complexity to the market and further change the skill requirements of the workforce maintaining the fleet

And, even though many have altered fleet plans to take advantage of current market conditions, the number of aircraft removed from the fleet is expected to reach historic levels over the next 10 years

Global Commercial Air Transport Retirement Forecast
by Aircraft Vintage



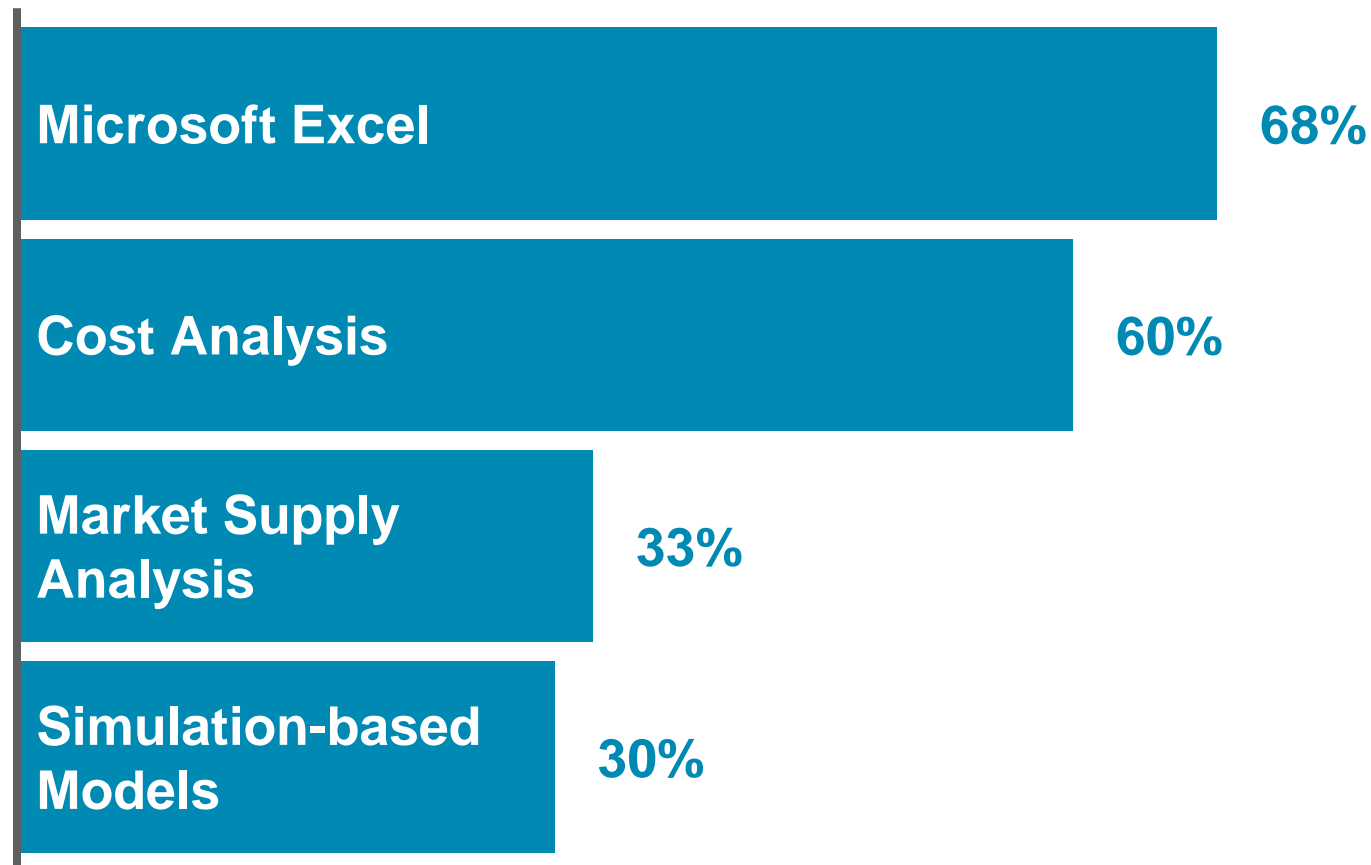
Western Europe Commercial Air Transport Retirement Forecast
by Aircraft Vintage



Western Europe will account for 20% of all aircraft retirements over the next 10 years

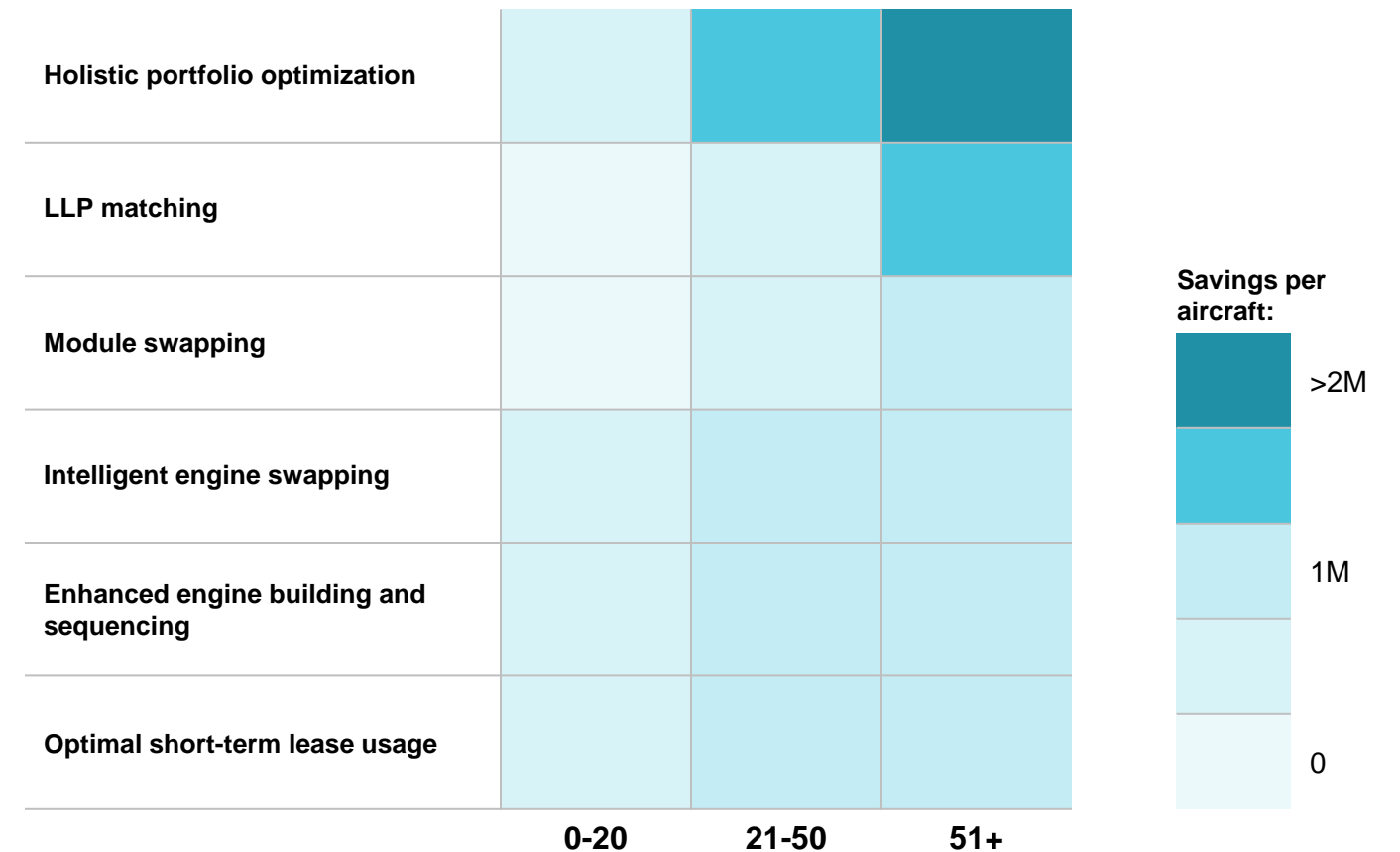
Moreover, the sheer number of retirements over the next 10 years will strain the Excel based processes and methods most use to manage the last six to twelve months of an aircraft's useful life. This approach narrows down the options available to optimize use and can also be a recipe for wasting millions of dollars

Q: What tools do you use to manage the end-of-life?



20% Third-party analysis | 5% Other

End of Life / End of Lease Value Creation



End of life planning needs to move into the digital age – utilizing integrated, holistic modeling approach and big data tools and techniques to fully account of the complexity of aircraft with different requirements

It's time to break free of antiquated thinking, processes, and systems holding us back from fully benefiting from new technologies.

- The industry has passed the peak of this current financial cycle.
- The aging of the mechanic workforce and rash of anticipated retirements could not come at a worse time for the industry.
- An ever aging IT infrastructure, competing for increasingly limited resources, needs to be given higher priority.
- The sheer number of retirements over the next 10 years will strain the processes and methods currently use to manage the end an aircraft's useful life. End of life planning needs to move into the digital age.

Our survey insights come directly from the industry. If you are responsible for maintenance and engineering activities at a carrier, aftermarket activities at an OEM, business operations at an MRO, or a lessor, we want to hear from you!



Our 2018 MRO Survey begins in January

To share your insights with us, send an email to:
MROsurvey@oliverwyman.com

Include a subject line with the phrase **“Count me in”** and you will receive notification when the survey is active

