OLIVER WYMAN

MRO EUROPE 2018
FORECAST & KEY TRENDS

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Amsterdam

MARSH & McLENNAN COMPANIES

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

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~250 professionals across Europe, North America, and the Middle East

Deep aviation knowledge and capabilities allow the practice to deliver data-driven solutions and provide strategic, operational, and organizational advice

Increased technical aviation expertise in Europe from 2017 acquisition of UK based AVISA Aviation Safety Systems

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We have worked with many of the industry's Fortune 500 companies, including

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- Dominant aerospace and defense firms
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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

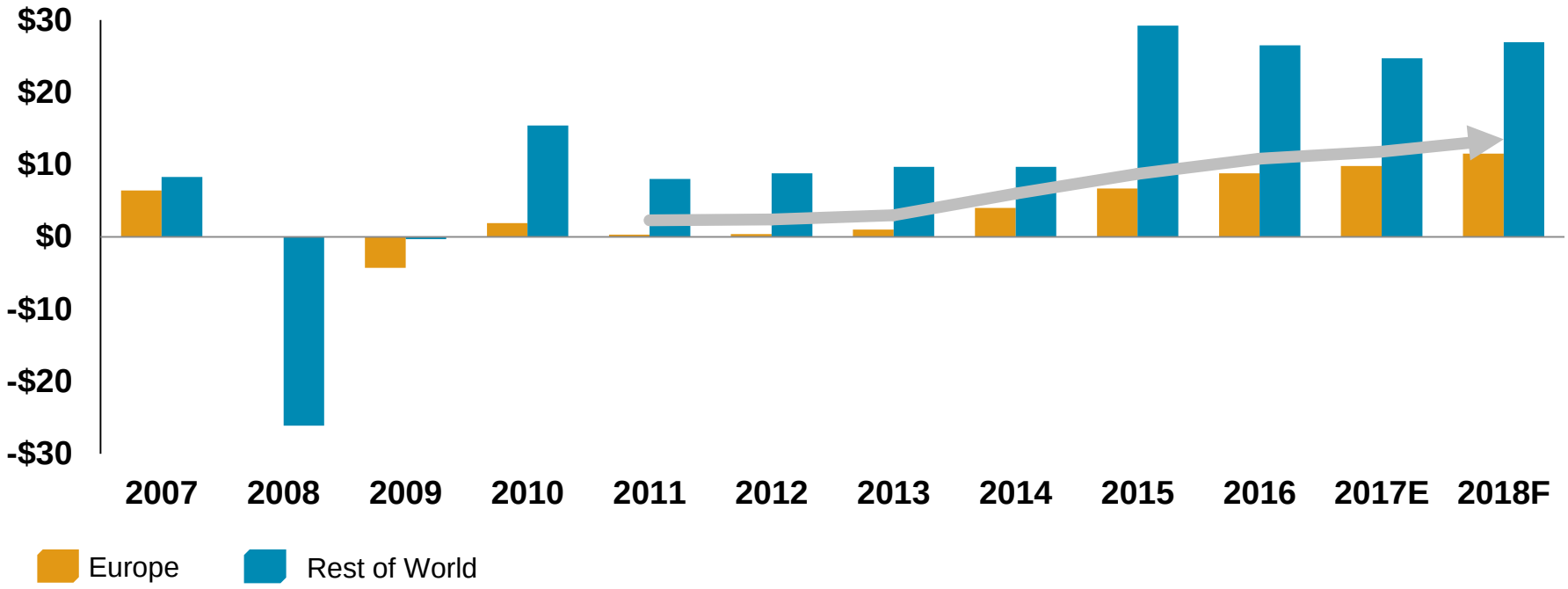
This presentation incorporates Oliver Wyman's 2018–2028 Global Fleet and MRO Market Forecast and 2018 MRO Survey, both of which are available at oliverwyman.com

1 Industry Overview

Global performance remains strong with European operators continuing to deliver strong financial performance

Global Commercial Air Transport Industry Net Profit

By year/US$ BN



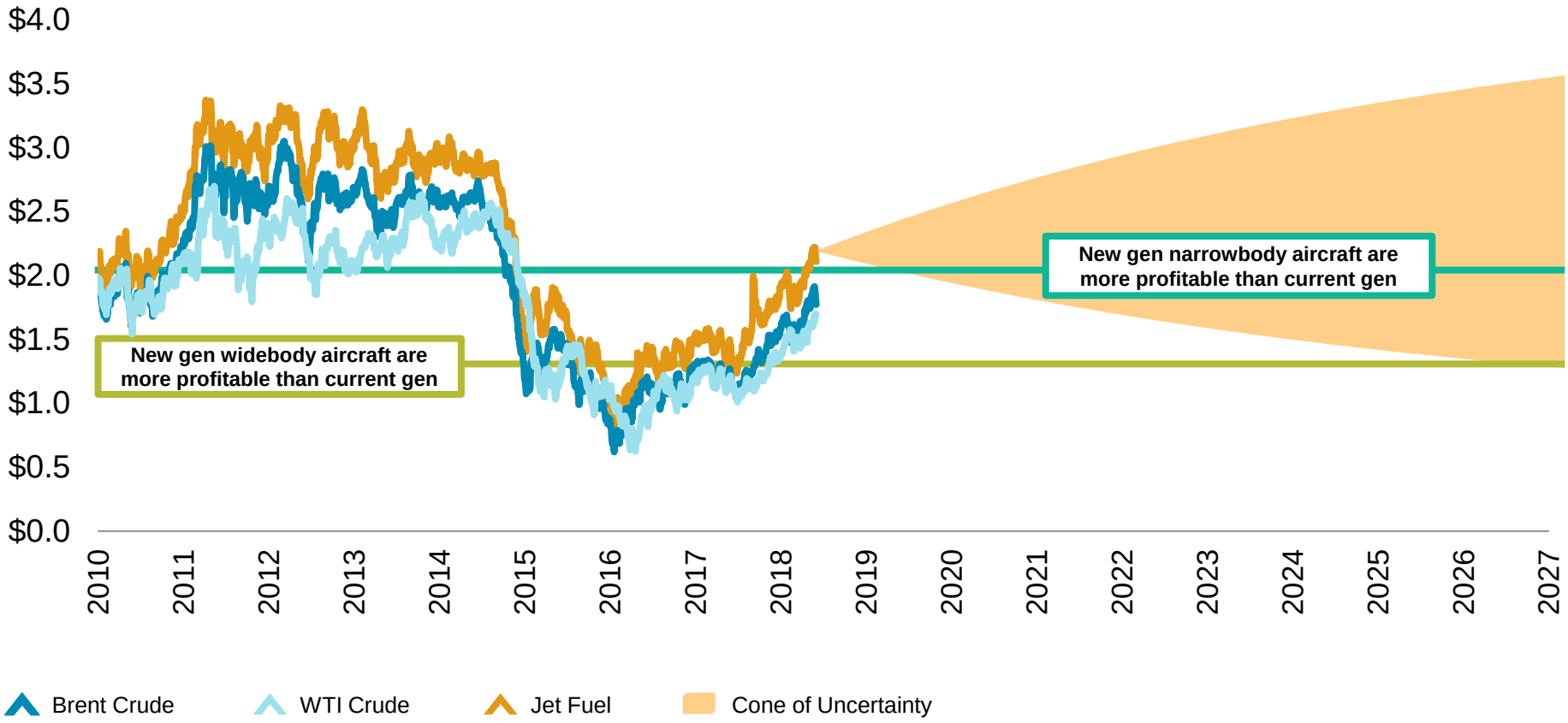
In spite of rising fuel prices and political uncertainty, European operators financial performance continues to improve

Source: Source: IATA

As oil prices rebound, operators will face new cost pressures, particularly with the older generation widebody aircraft

Crude Oil and Jet Fuel Spot Prices per Gallon

By year/US$ BN

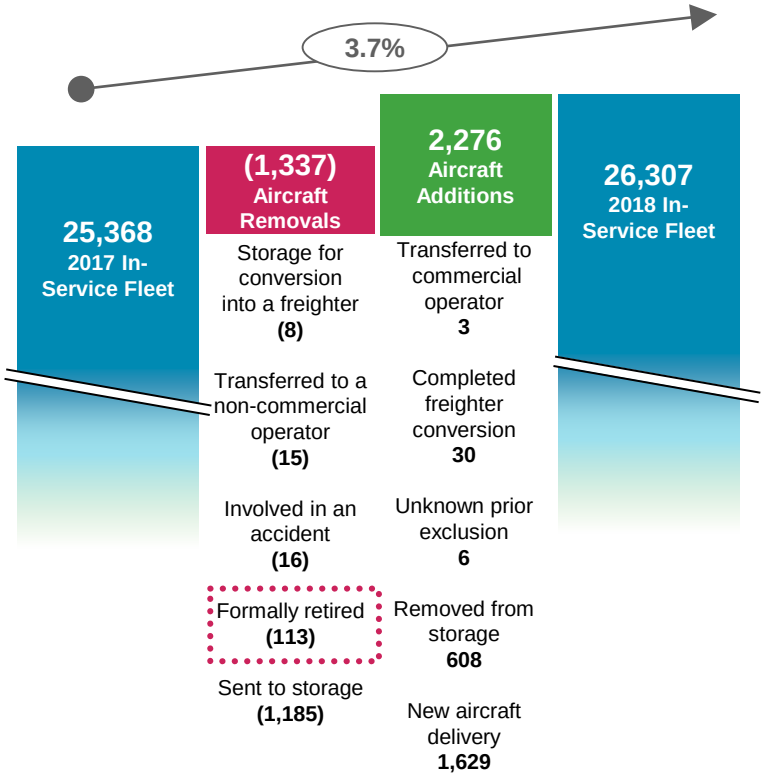


Source: U.S. Energy Information Administration, Oliver Wyman Analysis

Over the past year, status changes to ~3,600 aircraft have led the global active fleet to grow by 940 aircraft, a 3.7% annual growth rate

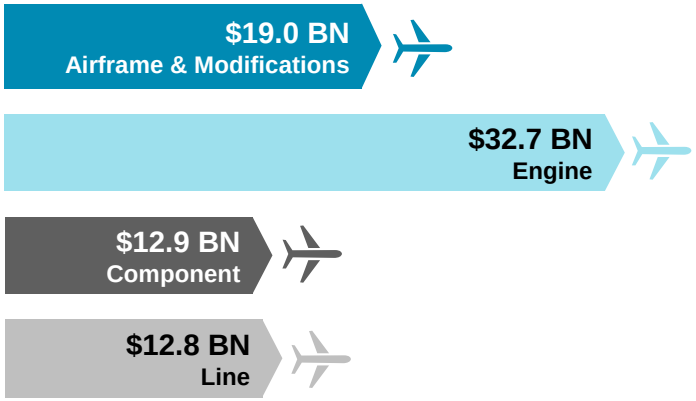
Year Over Year Changes to the Global Commercial Air Transport In-Service Fleet

By Transaction Type



2018 Global Commercial Air Transport MRO Market Forecast

By MRO Segment



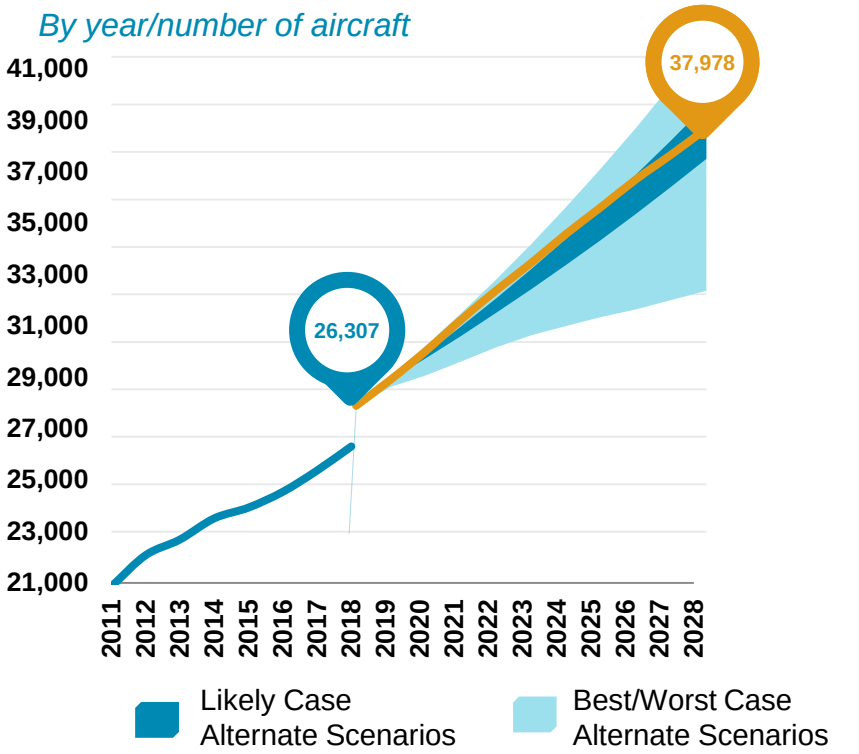
Translating the changing fleet dynamics into MRO, the 2018 market is estimated at $77.4 BN, with engine MRO continuing to be the driver

Source: Oliver Wyman Analysis; Fleet & MRO Forecast 2018-2028

Though the global fleet & MRO market are expected to increase by nearly 50% by 2028, increasing costs (e.g., oil prices) and external market factors (e.g., interest rates) create considerable uncertainty

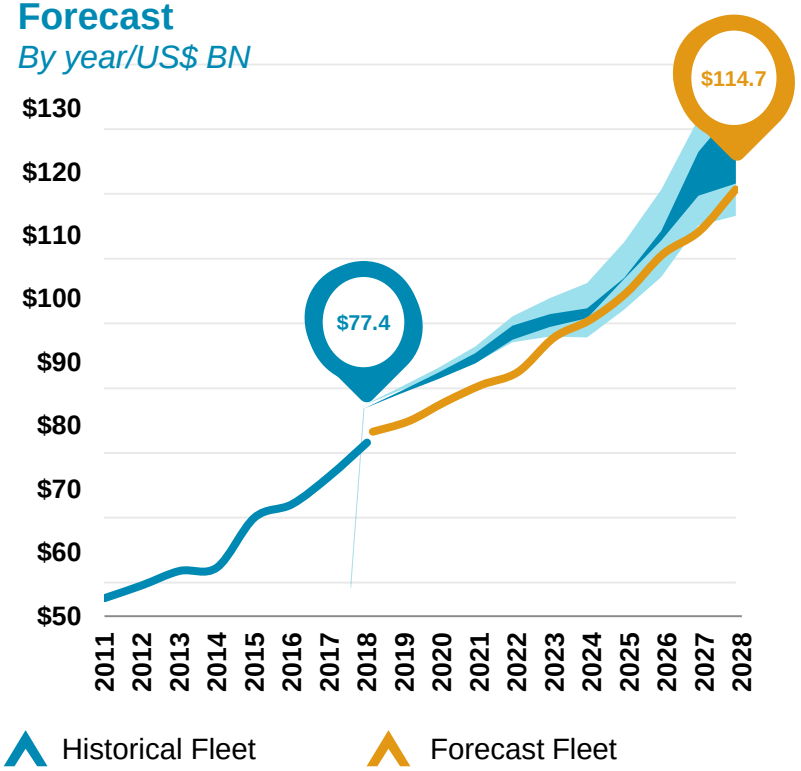
Global Commercial Air Transport Fleet Forecast

By year/number of aircraft



Global Commercial Air Transport MRO Market Forecast

By year/US$ BN



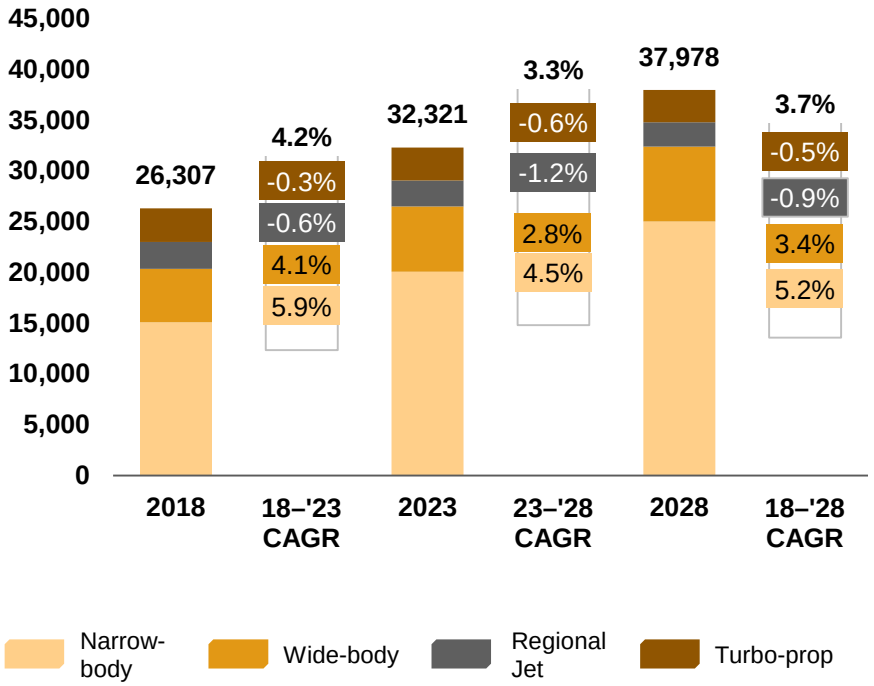
A trade dispute between the US and large trading partners such as China could likely drive the forecasts to the lower bounds and shave several years of growth off the industry's potential

Source: Oliver Wyman Analysis; Fleet & MRO Forecast 2018-2028

The global fleet is forecast to grow 3.7% per annum, while the MRO market is forecast to grow at 4.5%

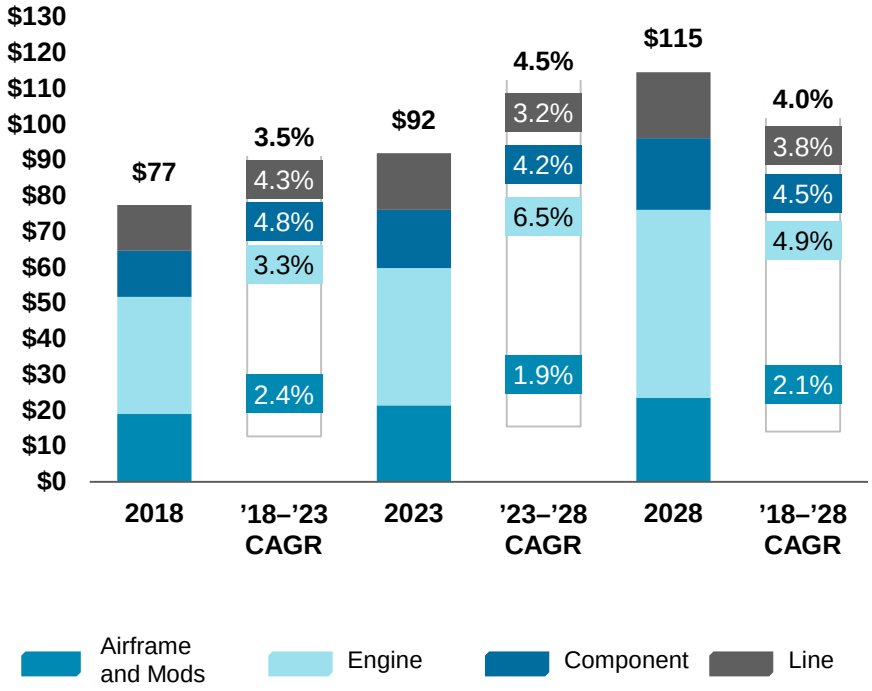
Global Commercial Air Transport Fleet Forecast

By Aircraft Class/number of Aircraft



Global Commercial Air Transport MRO Forecast

By MRO Segment/US$ BN



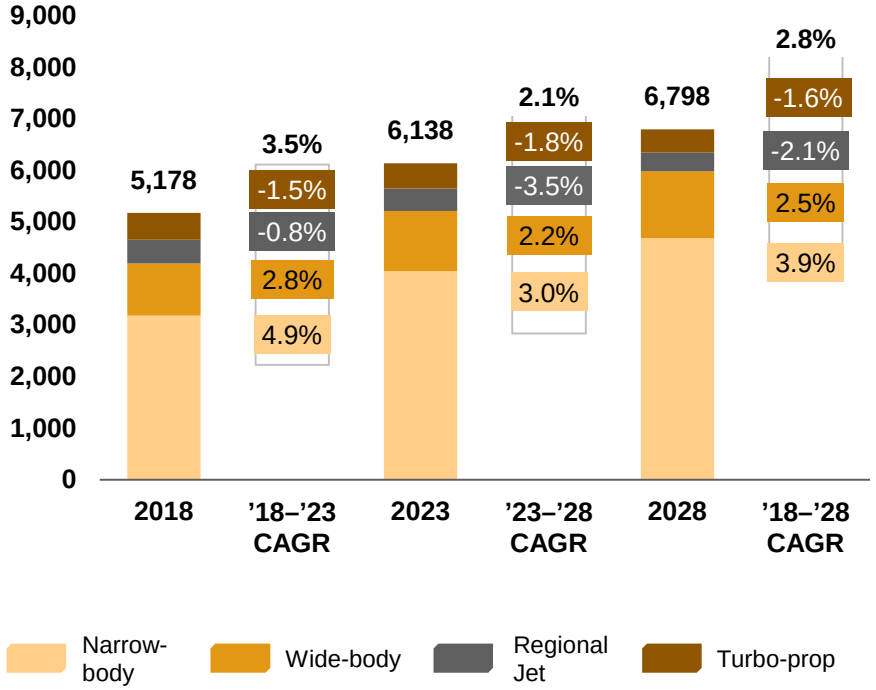
Narrow body aircraft will dominate the global fleet growth, while expensive engine shop visits associated with newer technologies will drive MRO growth

Source: Oliver Wyman Analysis; Fleet & MRO Forecast 2018-2028

Western Europe is expected to show moderate annual fleet growth of 2.8%, reaching a fleet size of nearly 6,800 aircraft by 2028

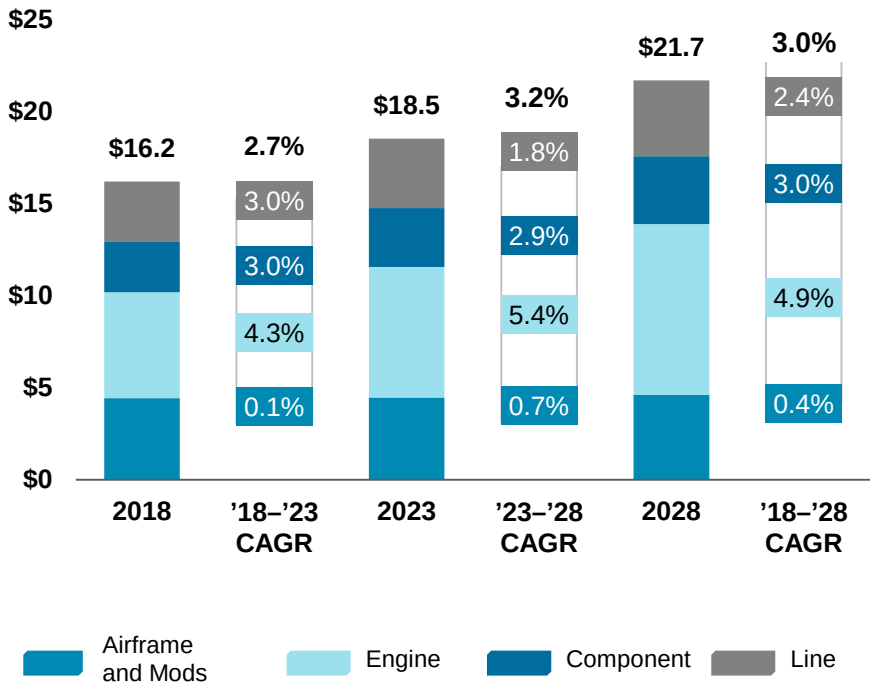
Western Europe Commercial Air Transport Fleet Forecast

By Aircraft Class/number of Aircraft



Western Europe Commercial Air Transport MRO Forecast

By MRO Segment/US$ BN



Western Europe MRO spend is expected to increase 3.0% annually, driven by Engine MRO which will make up over 40% of total spend by 2028

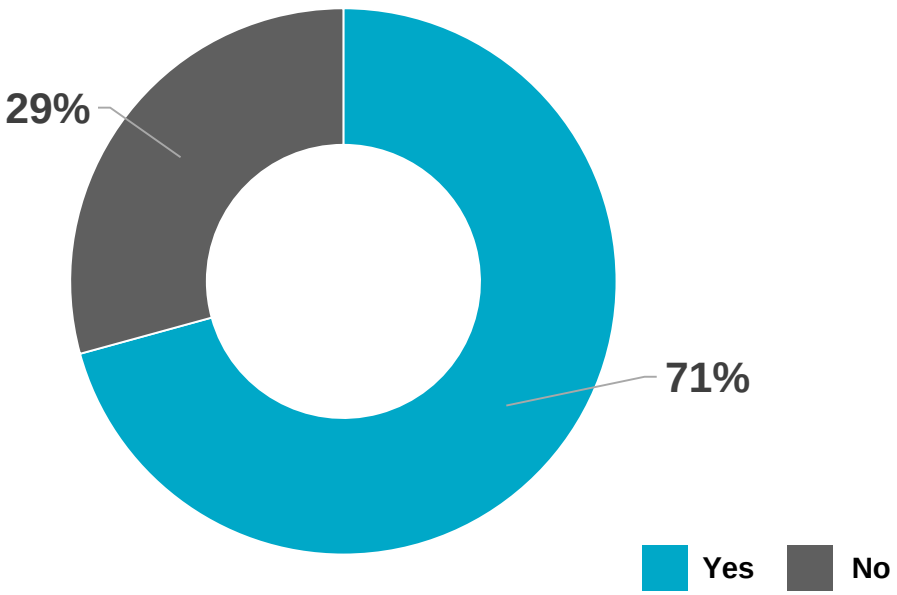
Source: Oliver Wyman Analysis; Fleet & MRO Forecast 2018-2028

2a The industry’s OEM preoccupation

Survey respondents are still overwhelmingly concerned about increasing OEM presence in the aftermarket

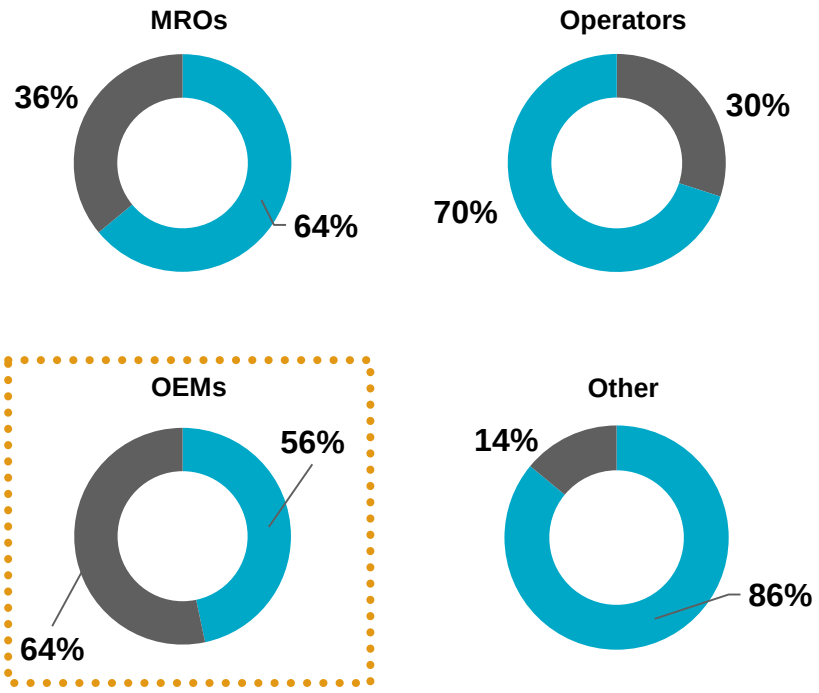
Will OEMs' increasing presence in the aftermarket fundamentally change your market?

Distribution of total responses



Segment deep dive

Distribution of responses for each segment



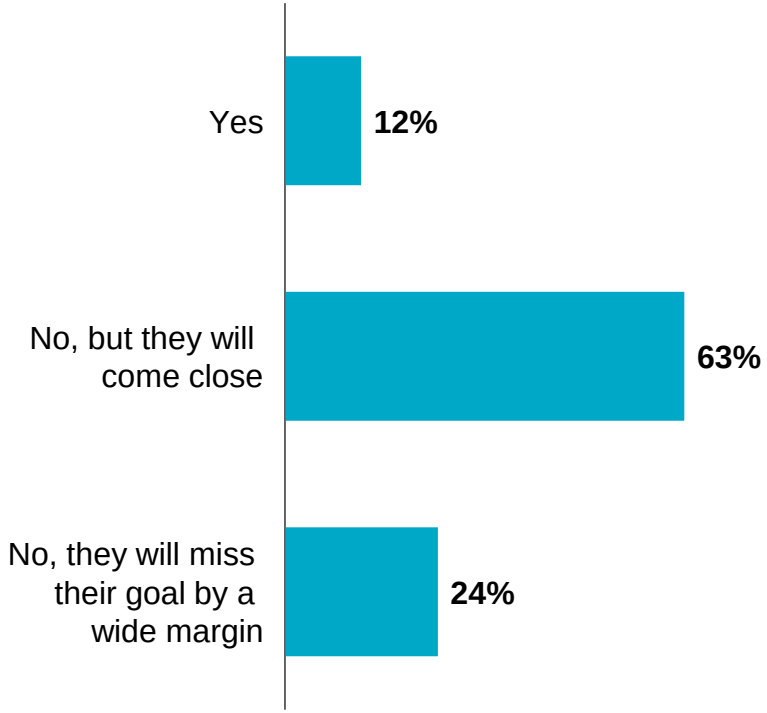
Interestingly, OEMs themselves are less convinced about their impact in fundamentally changing the aftermarket

Source: Oliver Wyman Analysis; MRO Survey 2018

75%+ of this year's survey respondents see OEMs as credible in their ambitions and expect them to gain market share over the next three years

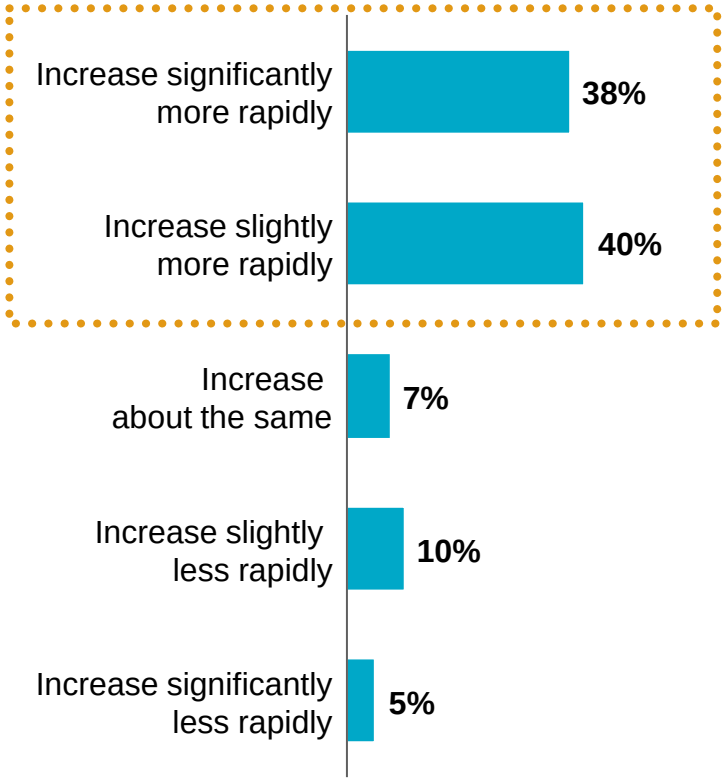
Do you think OEMs' growth targets for their aftermarket business' are achievable?

Distribution of total responses



Compared to the market growth, OEMs' share of the aftermarket over the next 3 years will…

Distribution of total responses

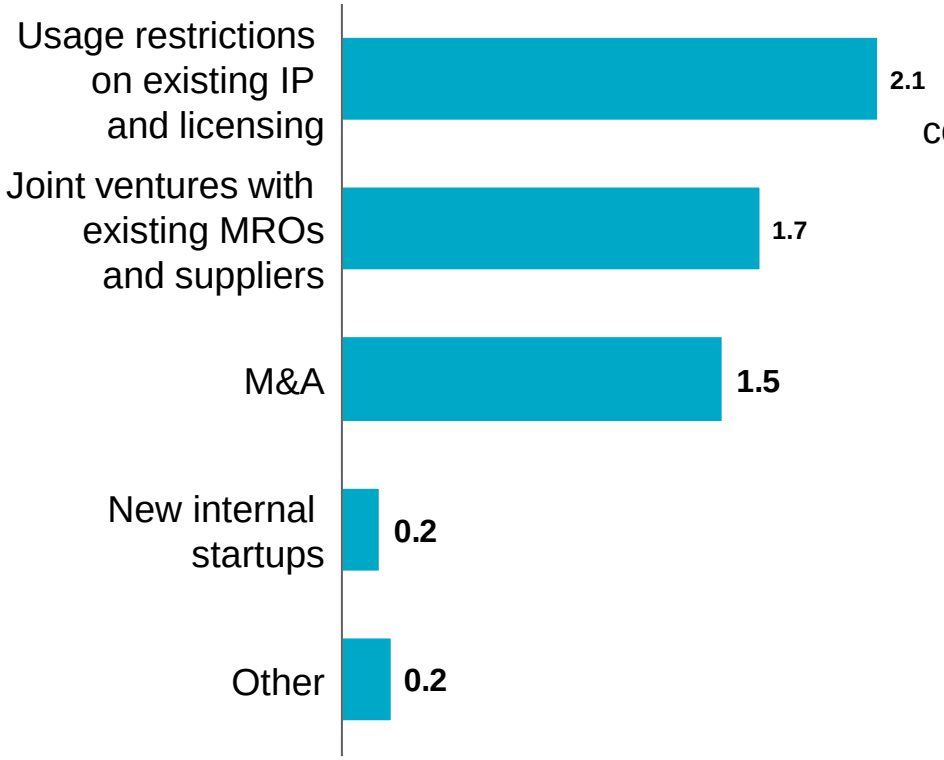


Source: Oliver Wyman Analysis; MRO Survey 2018

OEMs are expected to leverage the strength of their IP positions to increase their share of the aftermarket in the near term

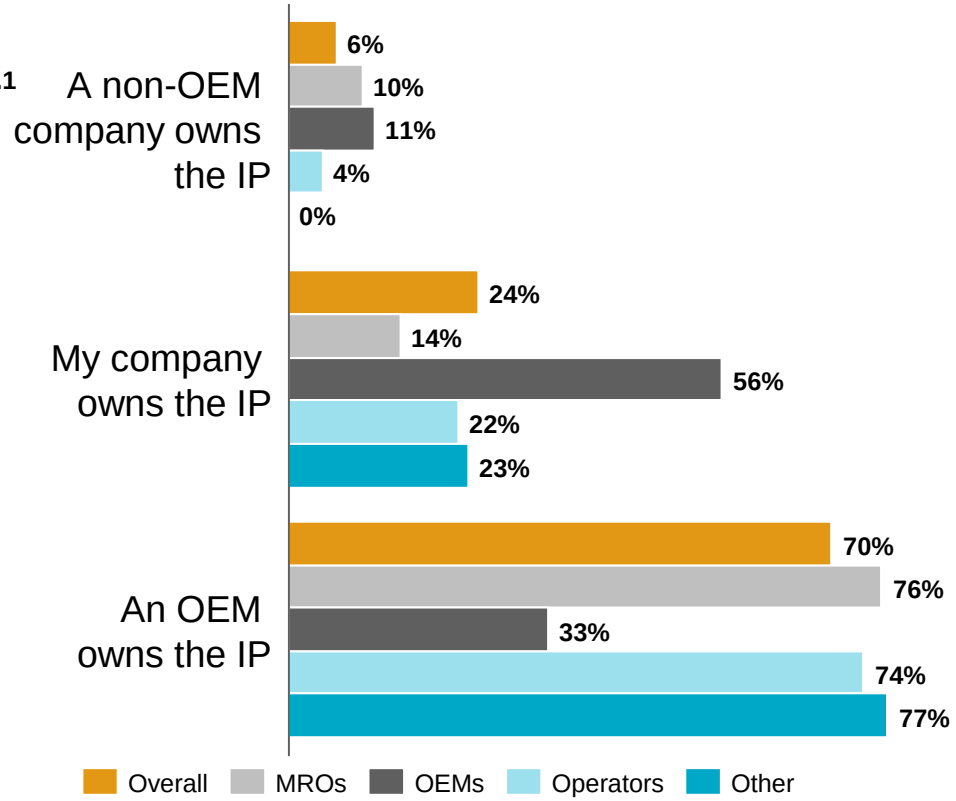
How will OEM grow their presence in the aftermarket?

Weighted average of rankings (highest to lowest ranking, scale of 1–3)



Who is the (majority) owner of the IP your current aftermarket service offering depends on?

Distribution of total responses

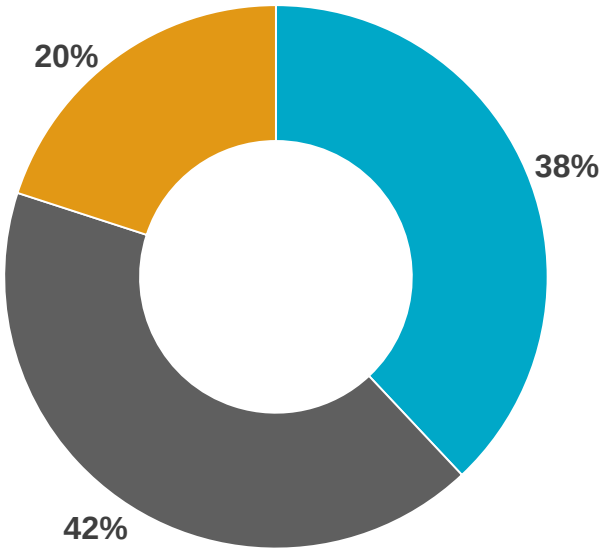


Source: Oliver Wyman Analysis; MRO Survey 2018

And only the OEMs are comfortable with their IP ownership position; third party MROs clearly feel the most vulnerable

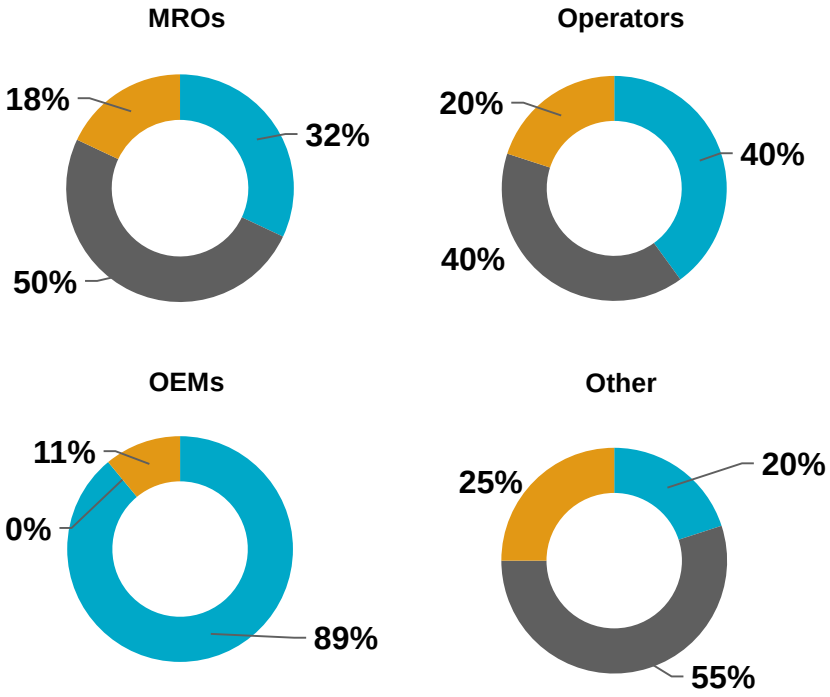
Do you own enough of the IP or OEM authorized licensing to continue to be successful if an OEM restricts use of the IP they own or licenses they provide?

Distribution of responses



Segment deep dive

Distribution of responses for each segment



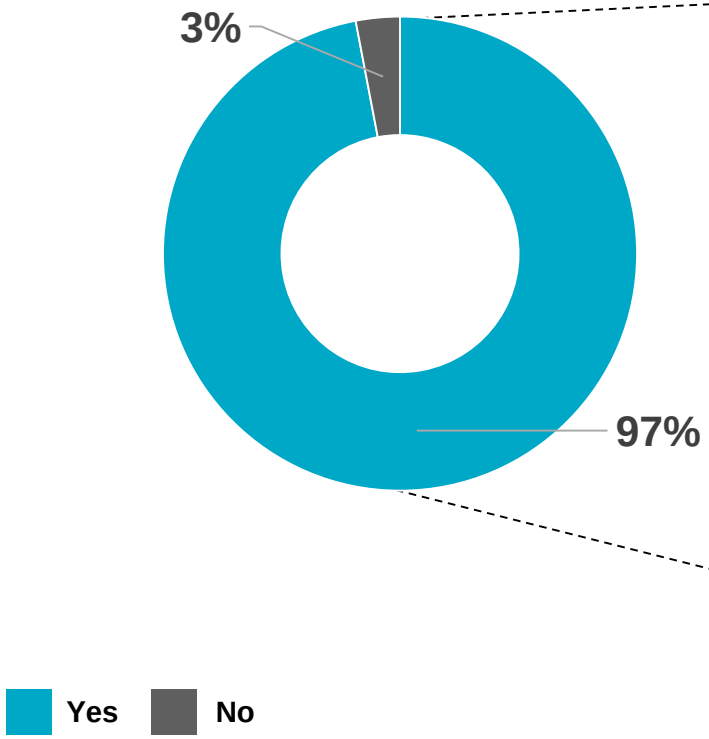
Source: Oliver Wyman Analysis; MRO Survey 2018

2b Dealing with rising costs

Almost all respondents report experiencing increasing material costs; not surprisingly, MROs and operators overwhelmingly attribute their material cost increases to OEM actions

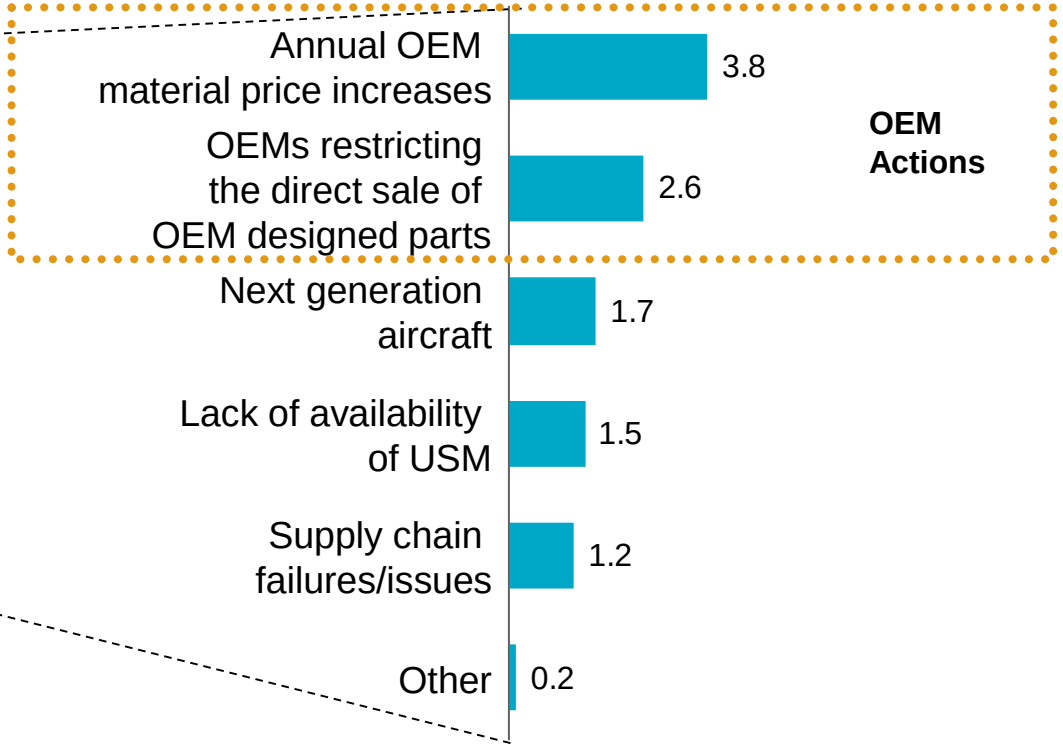
Have you experienced an increase in material costs?

Distribution of responses



Main drivers of material cost increases (for yes responses)

Weighted average of rankings (highest to lowest ranking, scale of 1–5)

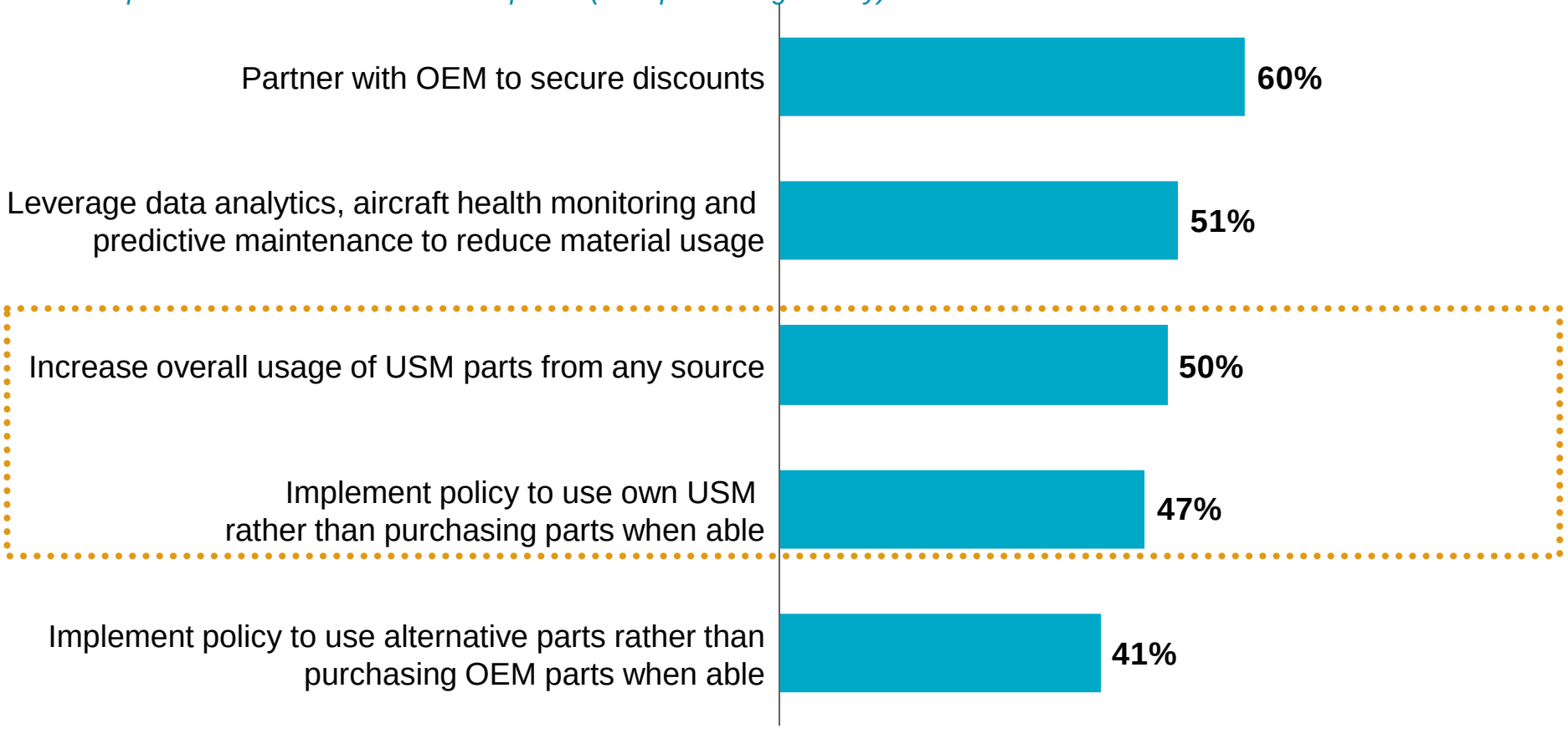


Source: Oliver Wyman Analysis; MRO Survey 2018

Though respondents have no single strategy to combat rising costs, many non-OEM respondents have included leveraging partnerships, USM or technology in their strategic plans

What strategy or strategies have you adopted or are you considering to combat rising material costs?

% of respondents who selected each response (for top 5 strategies only)

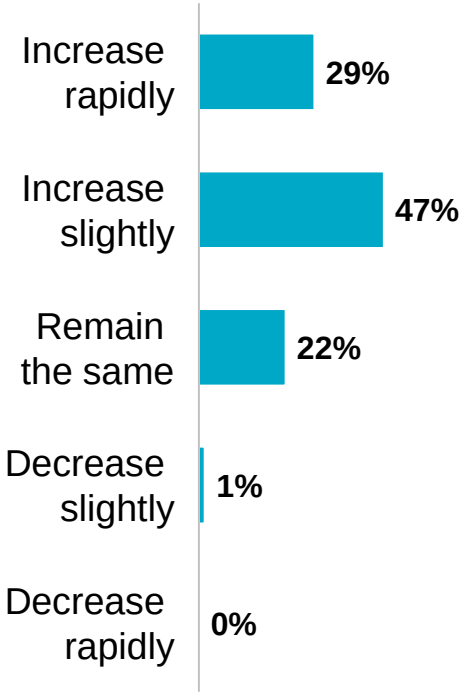


Source: Oliver Wyman Analysis; MRO Survey 2018

An increase in USM from a small base is expected; however, lack of supply and lack of a clear sourcing strategy are big inhibitors

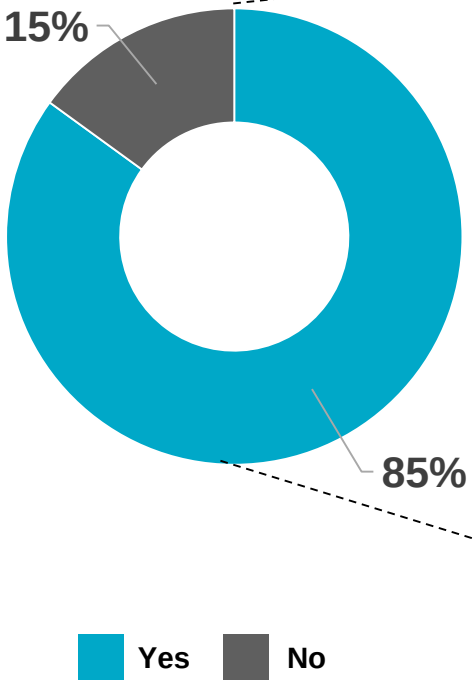
How will your USM change over the next 5 years?

Distribution of total responses



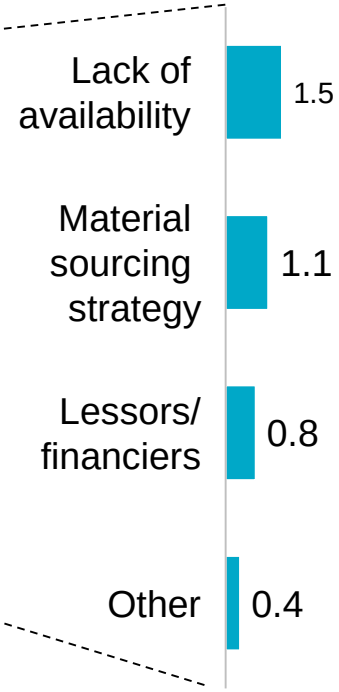
Is your use of USM inhibited?

Distribution of total responses



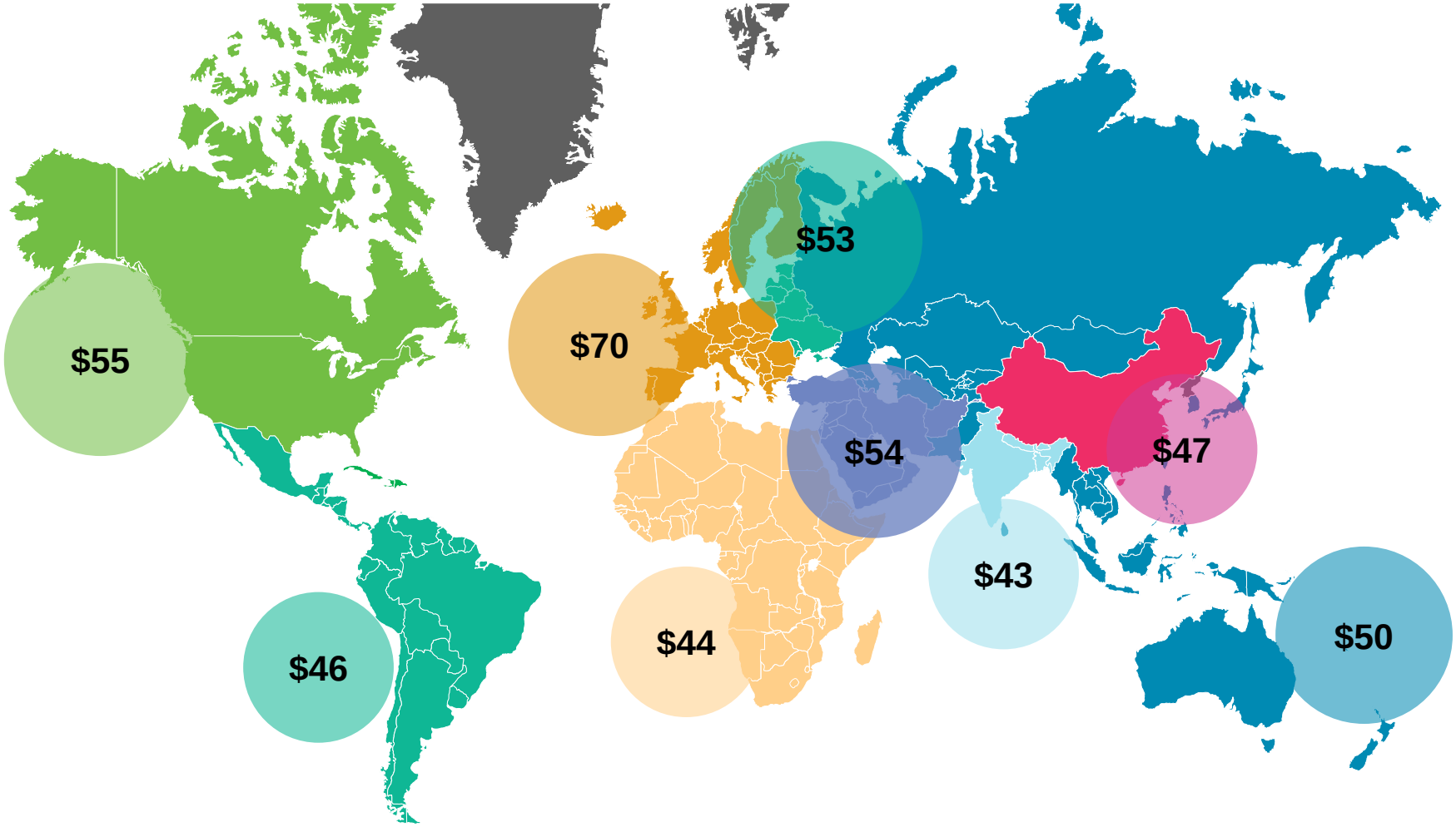
Main factors inhibiting use of USM

Weighted average of rankings (highest to lowest ranking, scale of 1–3) (amongst yes responses)



Source: Oliver Wyman Analysis; MRO Survey 2018

On the labour front, not surprisingly, W Europe is the highest technician pay rate region; E Europe and N America are on par; all other regions are substantially lower[1]



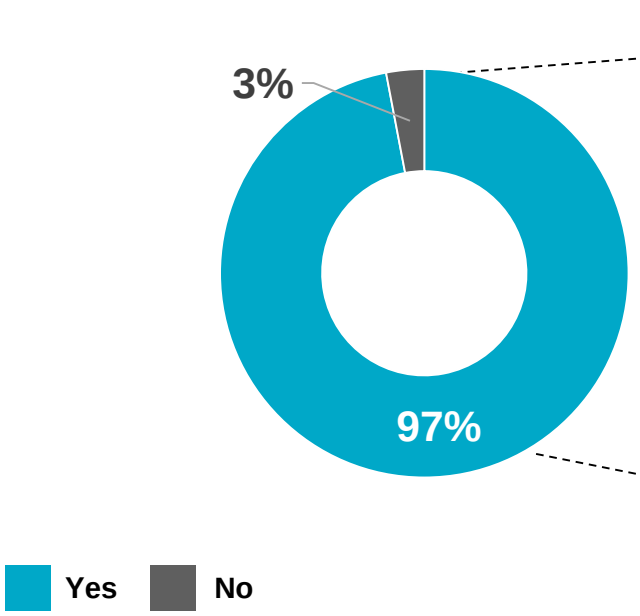
1. Average estimate of current prevailing technician billed airframe rates for heavy airframe maintenance by region (in US$)

Source: Oliver Wyman Analysis; MRO Survey 2018

And globally, respondents overwhelmingly indicate that a lack of labour supply is the primary driver of wage increases by a factor of two

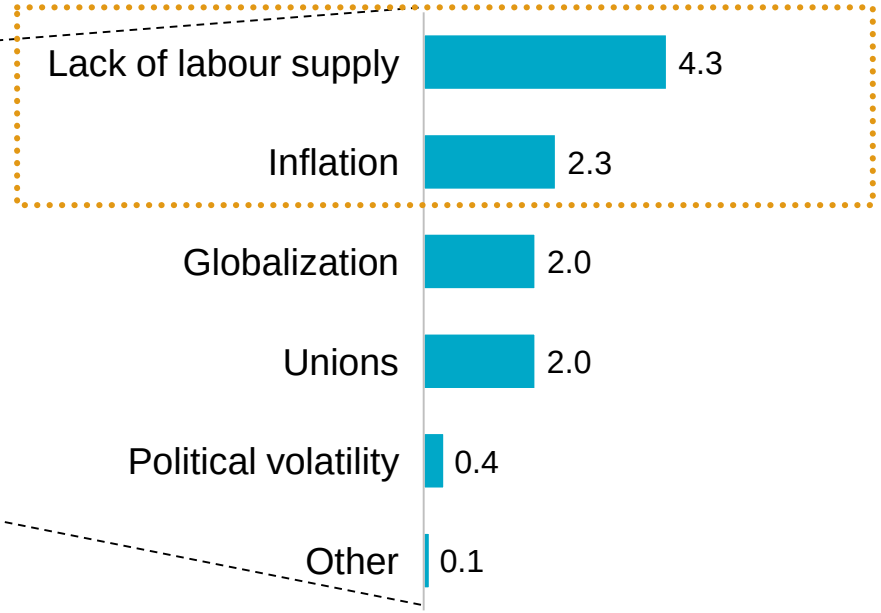
Have you experienced any upward *technician* wage pressure?

Distribution of total responses



Main drivers of technician wage pressure (for yes responses)

Weighted average of rankings (highest to lowest ranking, scale of 1–5)



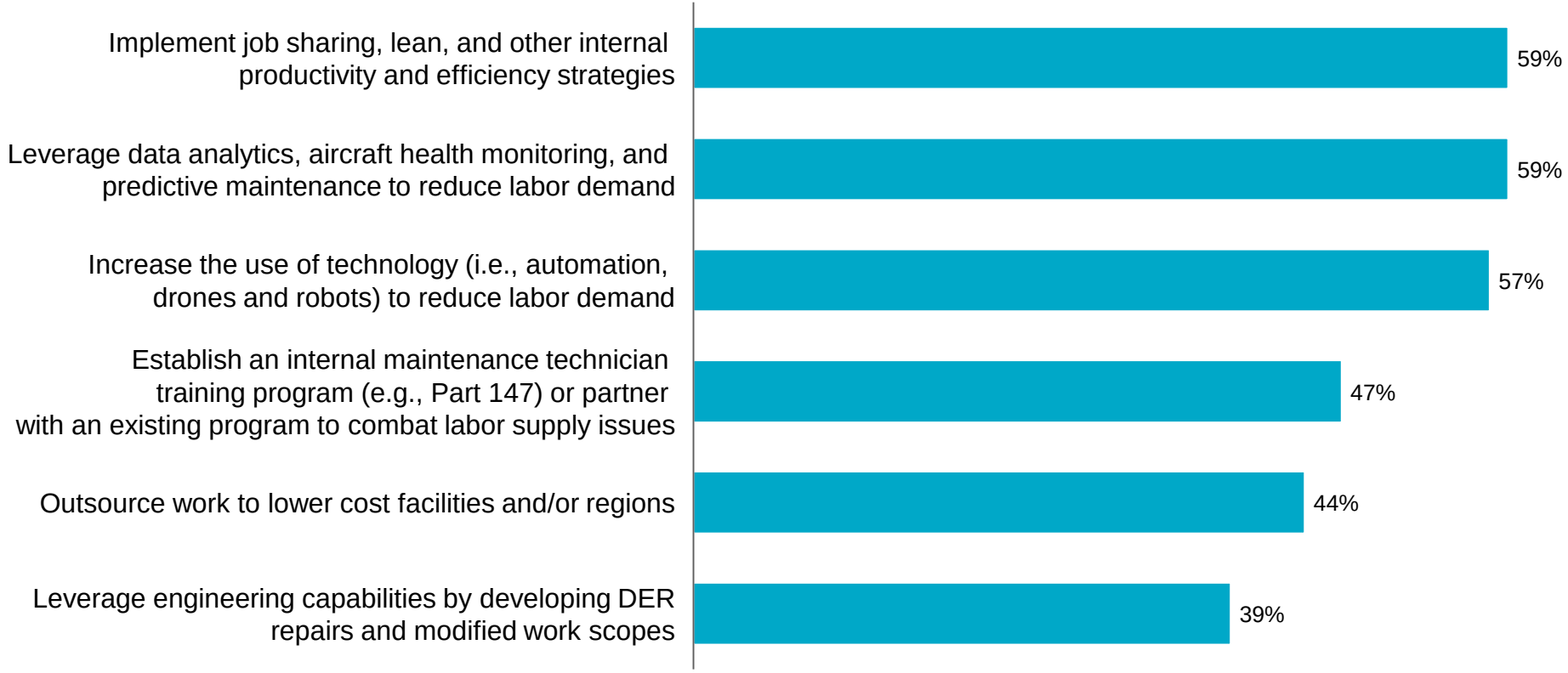
Technician retirements and a lack of new technician creation continue to squeeze both ends of the workforce spectrum – a trend that is unlikely to be resolved soon

Source: Oliver Wyman Analysis; MRO Survey 2018

Approaches to combating rising labour costs differ; operators view outsourcing/right-shoring and data analytics as major levers, whereas, MROs and OEMs are more focused on productivity improvements

What strategy or strategies have you adopted or are you considering to combat rising labour costs?

% of respondents who selected each response

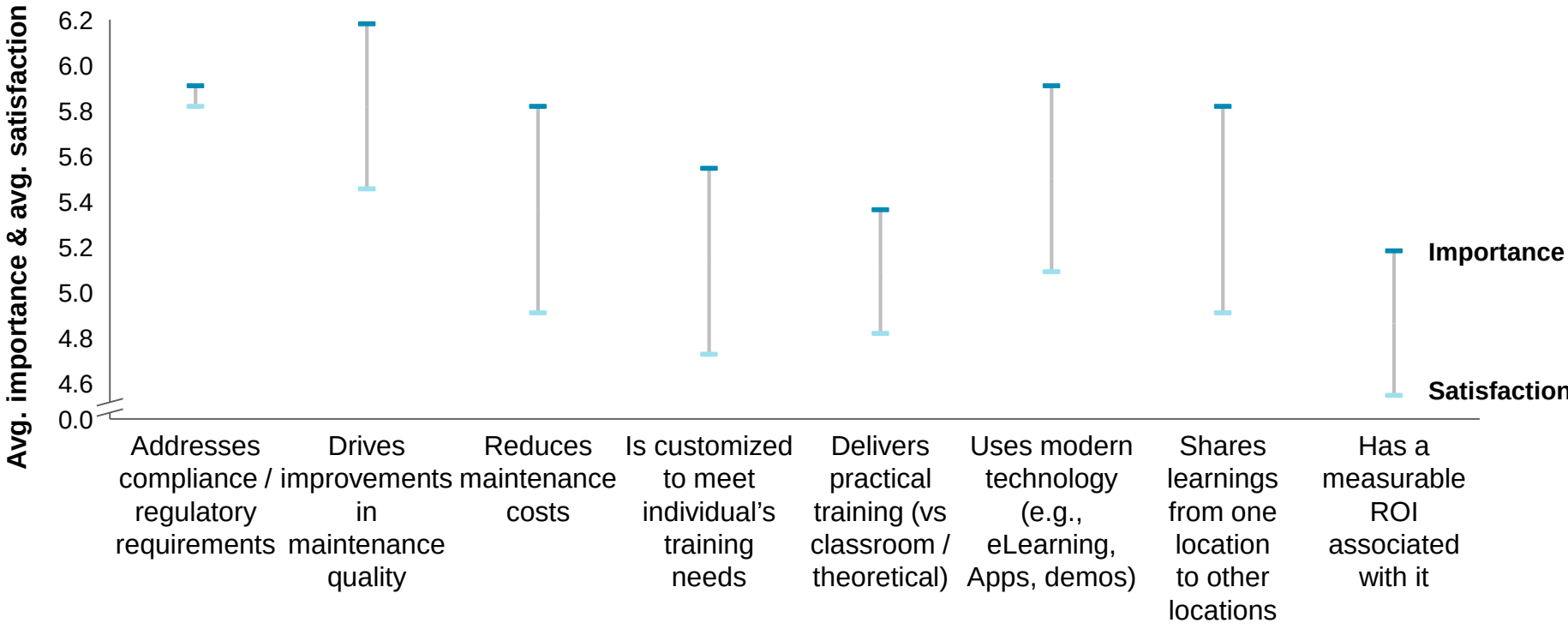


Source: Oliver Wyman Analysis; MRO Survey 2018

Finally, although training programmes are seen as a key to improving labour productivity, there is a large gap between importance and satisfaction across key indicators

Difference between average importance ranking vs. average satisfaction ranking

Rankings on a scale of 0 to 10; rankings of importance and satisfaction made separately



Improved internal training programmes may include aligning to Part 145 & 147 regulations

Source: Oliver Wyman Analysis; MRO Survey 2018

2c Cybersecurity

Every day and across every facet of life, hackers are increasingly bolstering capabilities to launch cyberattacks and disrupt industries

Nature of cyber threats has evolved drastically over just the past decade

Hackers use a variety of means to achieve a number of ends

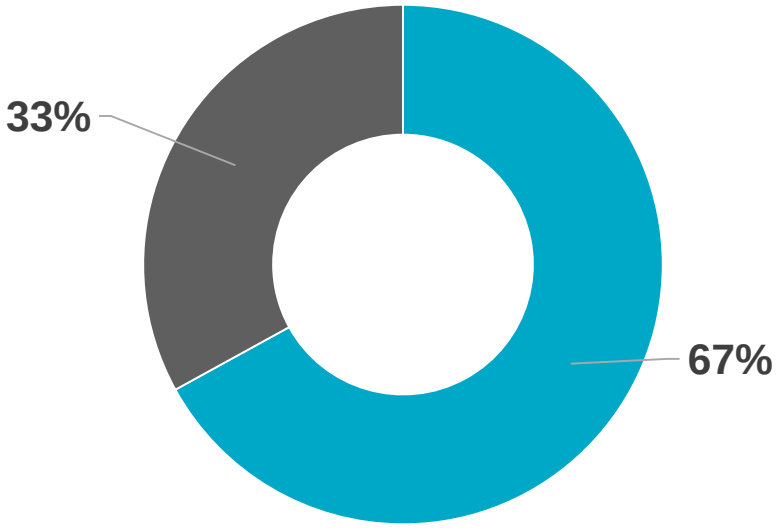
Experts place the number of expert, **professional hackers** at **over 300,000 globally**

Global counter-hacking efforts and actual damages are estimated at **half a trillion US$ annually – a sum that has been** increasing every year

67% of respondents indicate they believe that their companies are prepared, yet less than half had conducted a review of cybersecurity risk in operations and maintenance in 2017

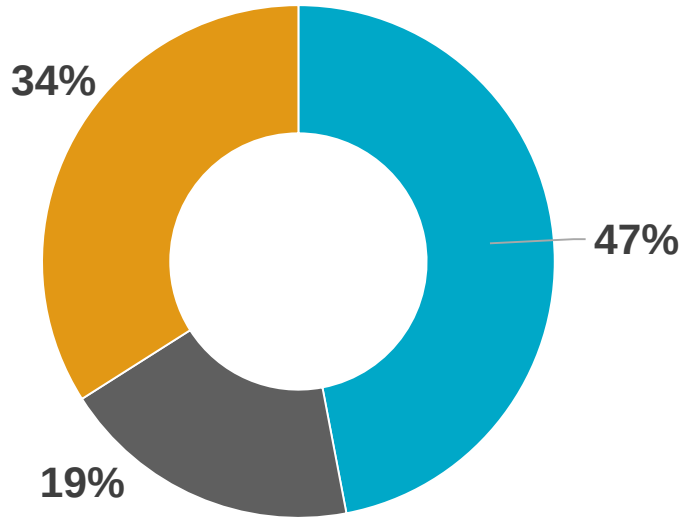
Is your company well prepared to handle cybersecurity threats related to operations and maintenance?

Distribution of total responses



Has your company conducted a review of your cybersecurity risk in operations and maintenance in 2017?

Distribution of total responses



Yes No Unknown

Source: Oliver Wyman Analysis; MRO Survey 2018

A chain is only as strong as its weakest link; stolen credentials have led to multiple significant breaches

Target (2013)

- Hackers used stolen credentials of a Target vendor to penetrate Target's network
- Planted malware and stole **personal data of 70 MM customers** and **information on 40 MM payment cards**
- Cost to Target: **~$300 MM**

Third-party vendor (2014)

- Hackers stole log-on credentials – used to steal data from $56 MM credit and debit cards and $53 MM customer emails
- Cost to vendor: $180 MM+

Global Infrastructure attack (2017)

- Hackers attacked the Ukraine with wiper malware (*NotPetya*)
  - Wiped out data and disrupted operations across industries (banking, transportation, energy)
- Spread to computer systems around the world after computers at the Danish shipping conglomerate Maersk were infected (**cost to Maersk: $300 MM**)
- Led to serious delays in major ports (e.g. Rotterdam, Mumbai, Port of New York and New Jersey); temporary shutdown largest terminal at the port of Los Angeles

The MRO industry has not yet had a major Target or Equifax level cyber-attack – are we next?

Oliver Wyman believes certain factors make the MRO industry a candidate for a major cyber attack

1 

Industry players have access to the networks of world's airlines and OEMs

- Any business in this supply chain becomes target

2 

MRO providers operate across the globe

- MRO companies more vulnerable to regional disparities in security
- Attractive for hackers looking to cause maximum, cross-border disruption

3 

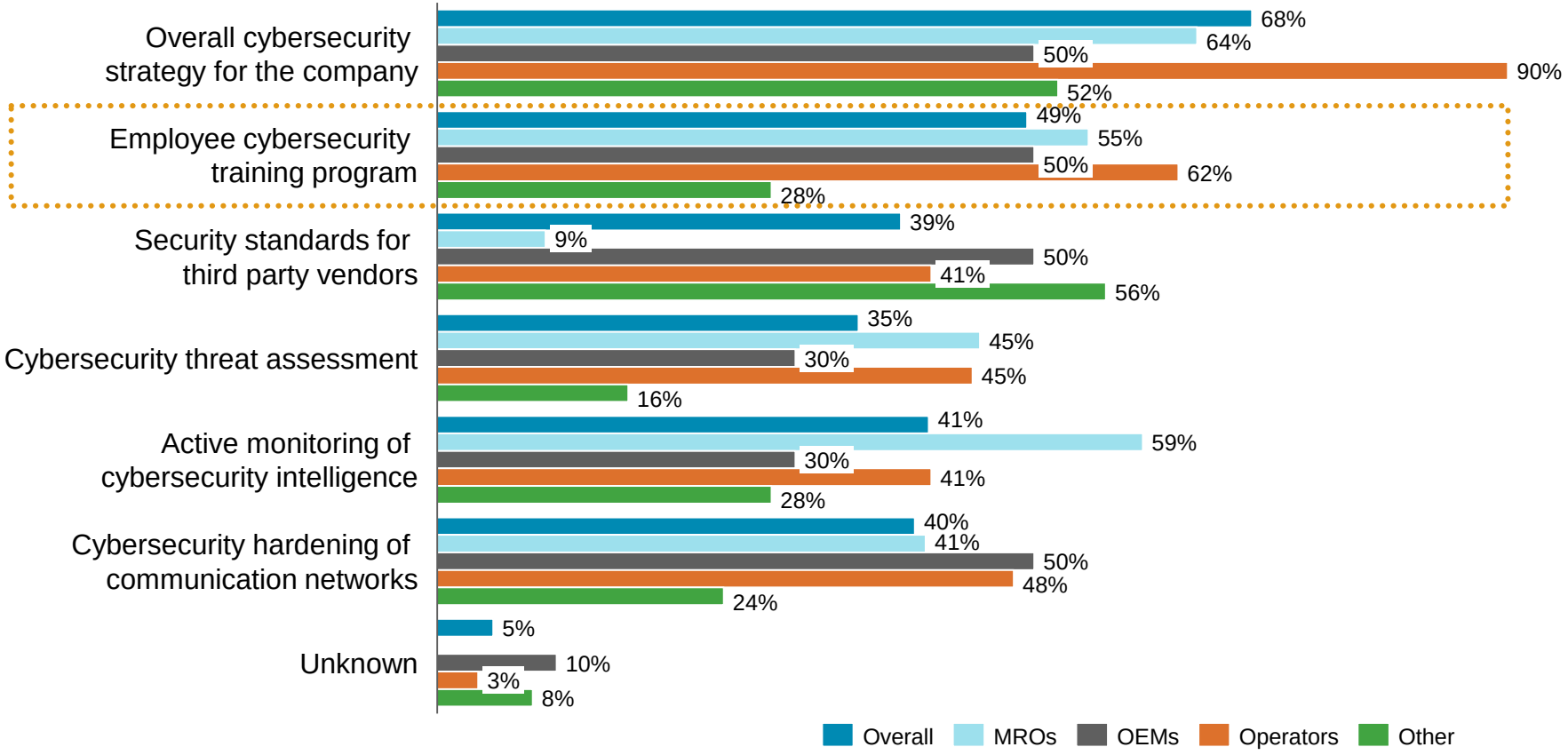
Industry is becoming increasingly digitized

- More interconnectivity, more access points (e.g. Internet of Things), more direct third-party participation
- Difficult to control for all the hands that can come in contact with multitude of processes, systems and data

While the majority of companies show an appropriately elevated level of concern, our survey reveals considerable variability in levels of preparedness, creating potential for weak links in the supply chain

Which cybersecurity safeguards has your company implemented?

% of total respondents who selected each response for each segment



Source: Oliver Wyman Analysis; MRO Survey 2018

To achieve a comprehensive, unified cybersecurity and risk management approach for the industry, MRO providers should consider a comprehensive approach

1  **Evaluate current state cyber security programmes to identify areas of improvement**

2  **Develop a clear framework for mitigating and managing cyber risks**

3  **Fortify information technology systems and create a security-minded culture across companies**

4  **Build and enhance a security minded culture and be fully prepared for when a major cyber incident happens**

While no solution is guaranteed to avert all attacks, developing a shared, holistic approach to cybersecurity risk management may give companies a material advantage

3 Conclusions

Conclusions

The global MRO business is currently valued at $77 BN and is anticipated to reach $115 BN by 2028

At the same time, MROs continue to battle higher material and labour costs

- **There are no easy answers. MROs will need to use a number of countermeasures to become more efficient**

OEMs are expected to continue their push into MRO services and anticipated to hit or come close to meeting their growth ambitions

Cyber threats are mounting and causing increasing disruption across industries

- **The MRO industry has significant work to do to ensure they are well-prepared to mitigate and manage cyber risks**

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