

The Outlook for the Shift to Industrial Autonomy

A survey on the shift to industrial autonomy

- ➔ The contents of this report are based on the findings from the “Global End-user Survey on the Outlook for Industrial Autonomy,” conducted on behalf of Yokogawa by Omdia between June and July 2020 with over 500 decision-makers from the process industries.
- ➔ The purpose of the survey was to validate assumptions and quantify insights with 17 questions on topics ranging from investment in autonomy and the levels of autonomy through to the technologies being used and the impact of COVID-19.

7 key process industries were represented in the findings



Upstream oil and gas



Midstream oil and gas



Chemicals/ Petrochemicals



Conventional power generation



Refining



Renewables

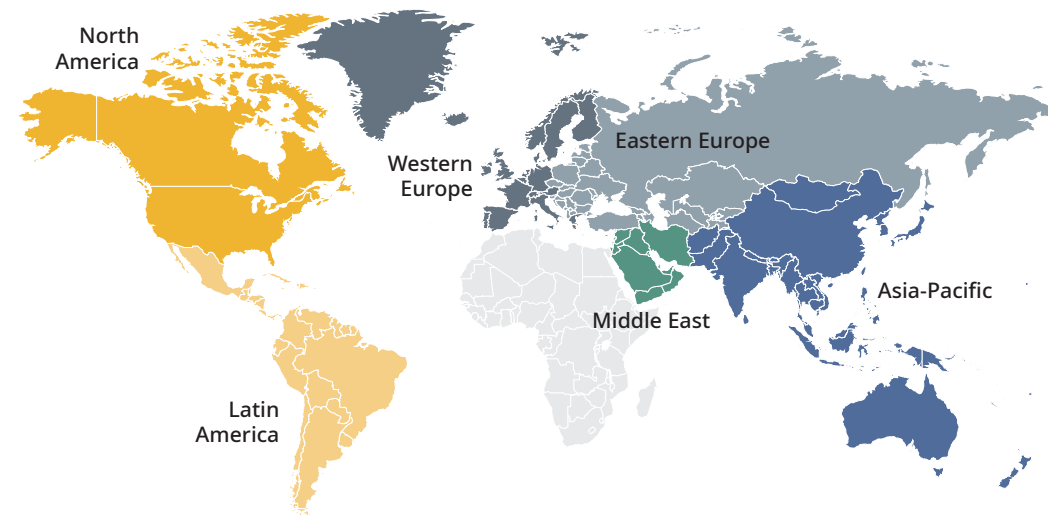


Life sciences

Defined levels of industrial automation and autonomy

- 5 Autonomous operations:** Operations are completely autonomous, with the integration of process operations, supply chains, etc.
- 4 Autonomous orchestration:** Facilities operate autonomously and operations are synchronized to optimize manufacturing and safety under ideal conditions.
- 3 Semi-autonomous:** A combination of autonomous and automated assets, with human orchestration
- 2 Automated:** Humans are responsible for safe operations, assisted by traditional automation systems and limited autonomous functions
- 1 Semi-automated:** Humans and automation systems share the workload, with humans responsible for safe operations
- 0 Manual:** Humans control the facility at all times

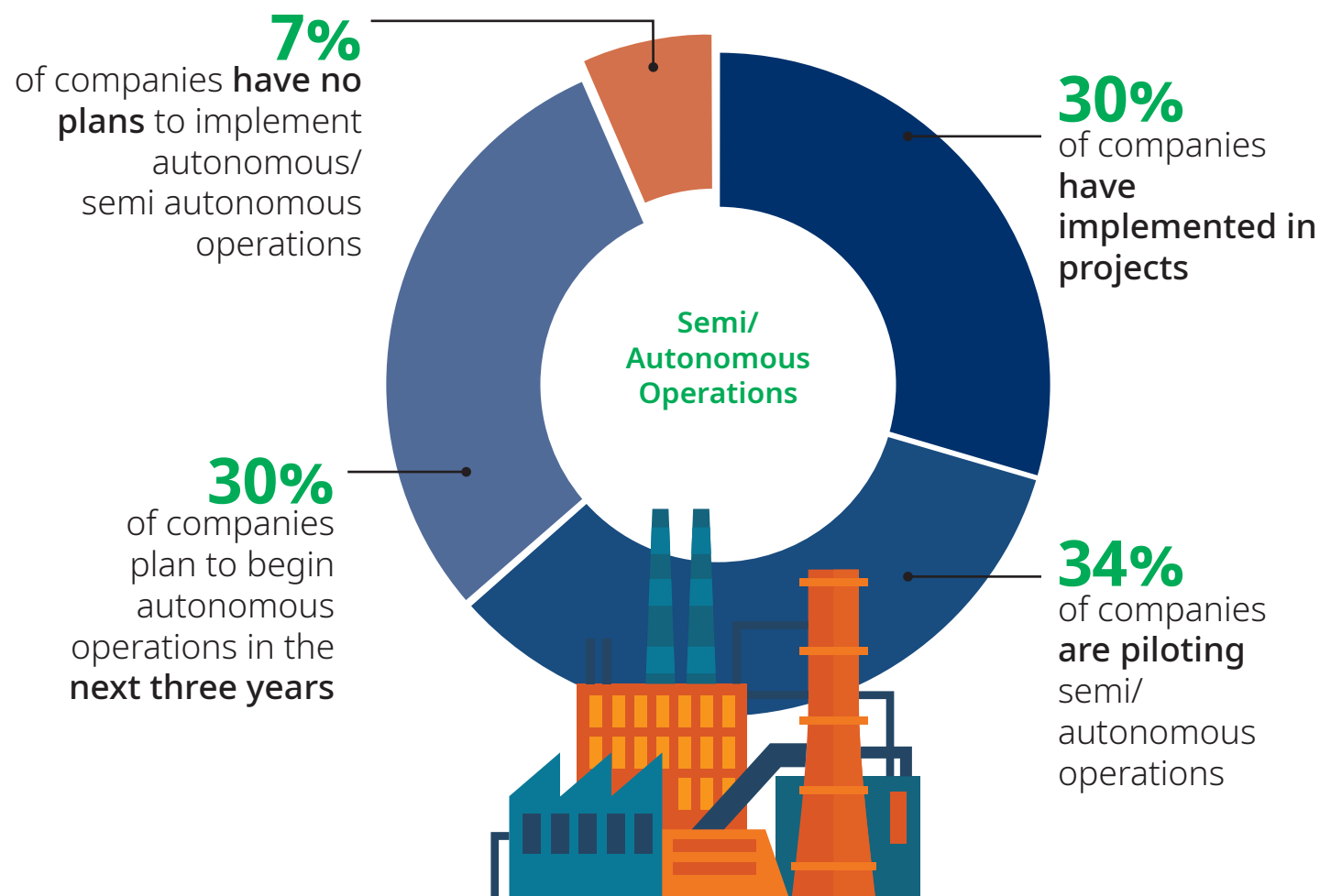
6 key regions were assessed



Is everyone investing in industrial autonomy?

- ➔ As the process industries move from automation to autonomy, both operational technology (OT) and IT professionals are looking at ways to increase productivity through autonomous operations.
- ➔ More than half of respondents said their companies are either slightly or significantly increasing their investments in industrial autonomy over the next 3 years.

Are you ready to invest?

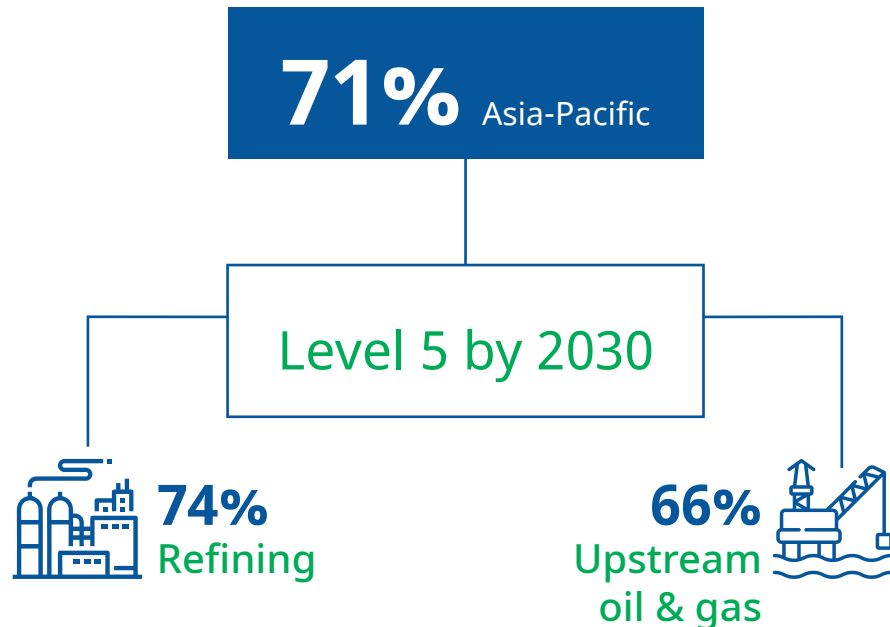


89% of companies have plans to increase the level of autonomy in their operations.

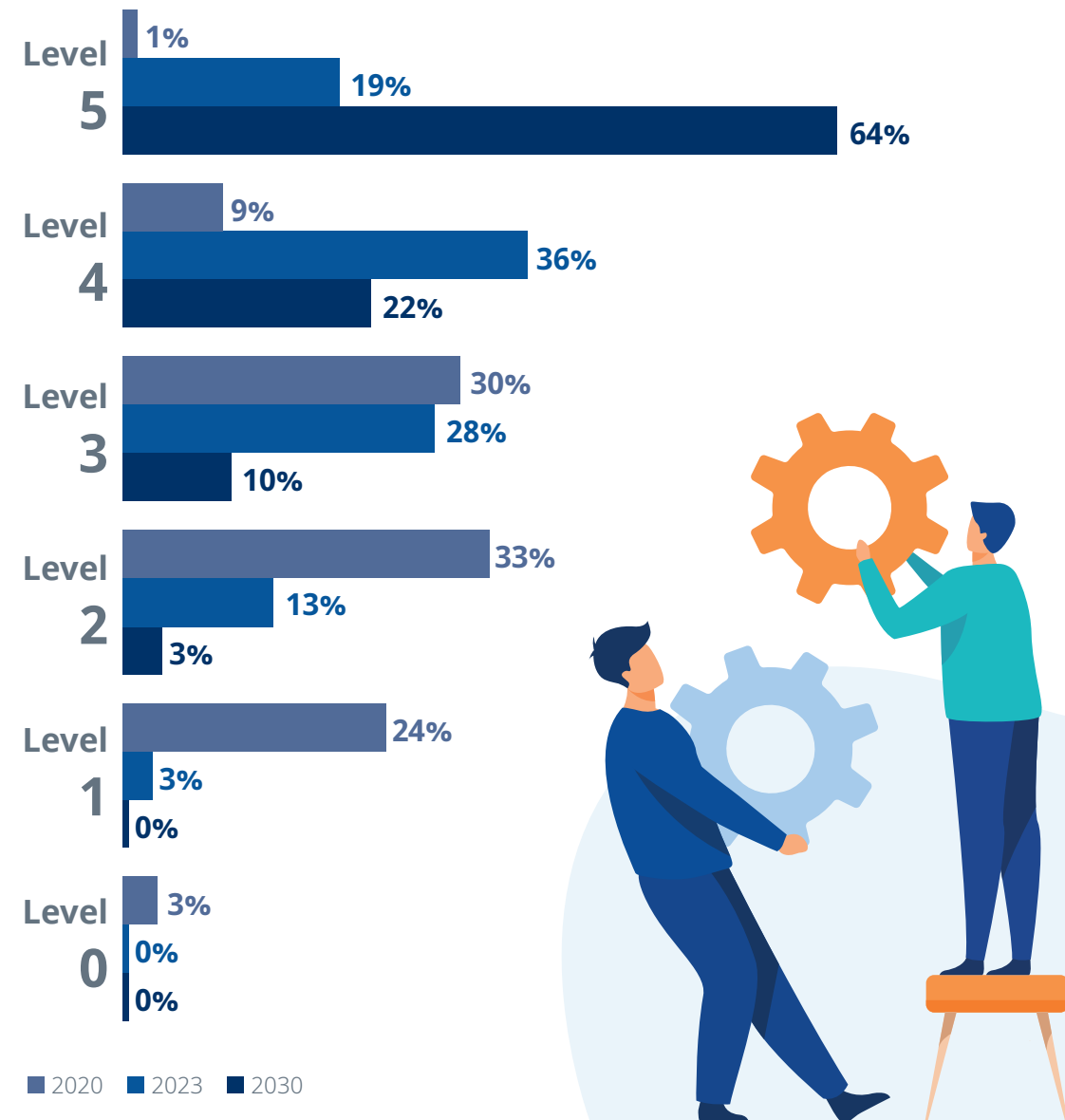
79% of companies have implemented or are piloting remote operations.

The shift to level 5, fully autonomous operations

- ➔ As companies start to see the benefits of industrial autonomy on a small scale, they are looking to significantly ramp up their level of autonomy over the next 3-10 years.
- ➔ Although semi-automated or automated operations have been the norm for the past few decades, the findings show a relatively rapid shift to semi-autonomous operations (level 3) by 2023 and fully autonomous operations (level 5) by 2030.
- ➔ Improving worker health and safety and greater technology requirements within operations are driving the shift to level 5.

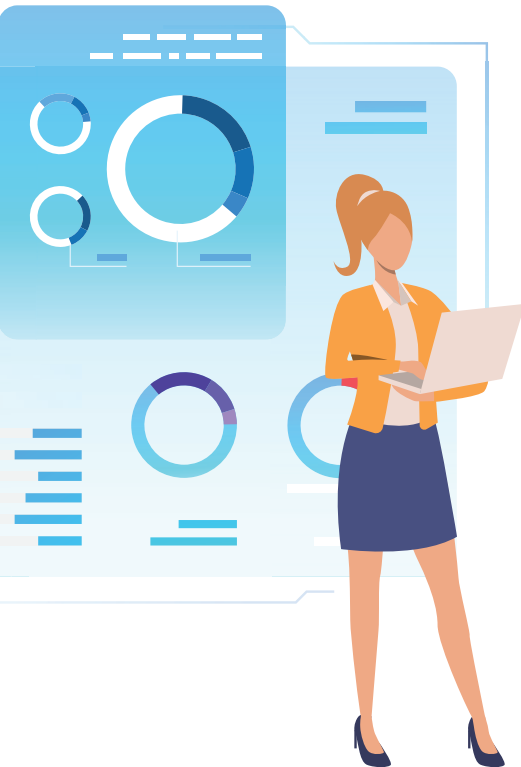


Levels of autonomy reached by end-users



The business objectives that industrial autonomy is targeting

- ➔ Now more than ever, getting value for money from your digital transformation project is vital.
- ➔ From reducing downtime to improved quality management and regulatory compliance, companies have a number of business objectives they are targeting when they push for greater autonomy through digital transformation initiatives.



48% of respondents said their companies put productivity as a key target

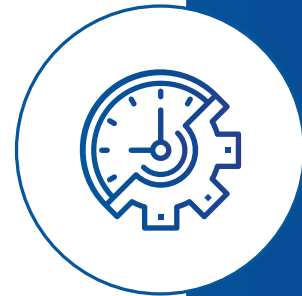


40% named operations efficiency as one of their key objectives



Only **22%** said optimizing staffing levels is one of their top four priorities

Improve productivity



Optimize operations efficiency



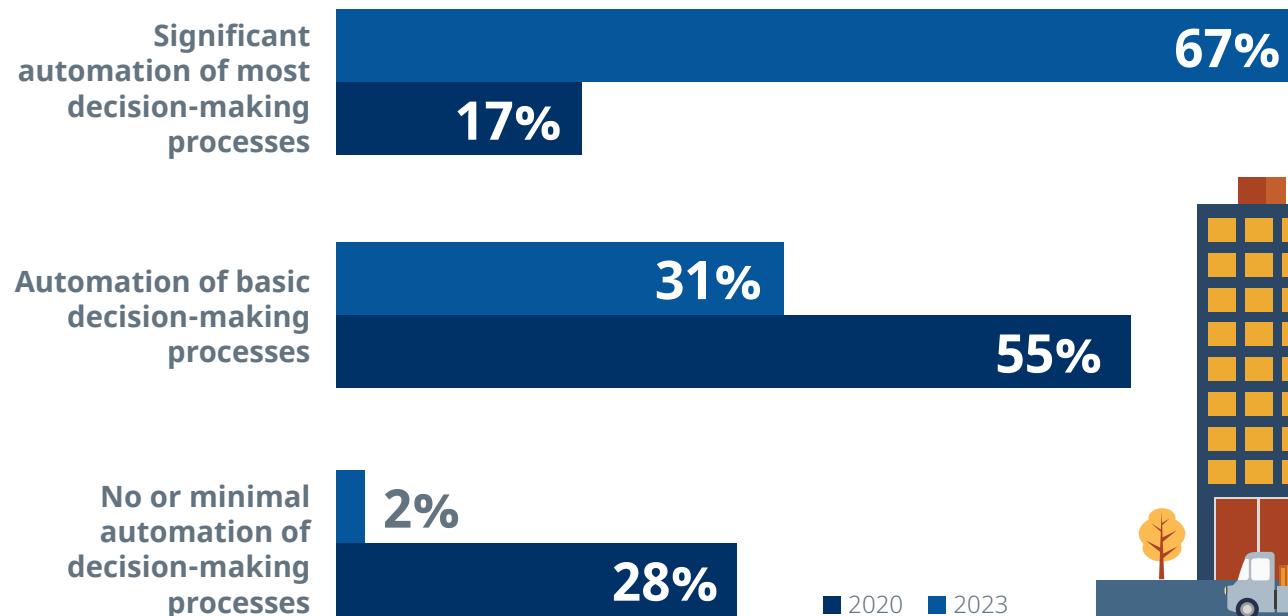
Improve worker safety



The key business objectives

Both physical and decision-making tasks are becoming autonomous





➔ Automation is the link to autonomy. Whilst a greater proportion of respondents stated they had more significant automation of physical tasks in 2020, it is the automation of decision-making tasks that is set to boom over the next 3 years. Developing technologies such as AI and Digital Twins will see companies move from the automation of basic decision-making tasks to the significant automation of most physical and decision-making tasks.

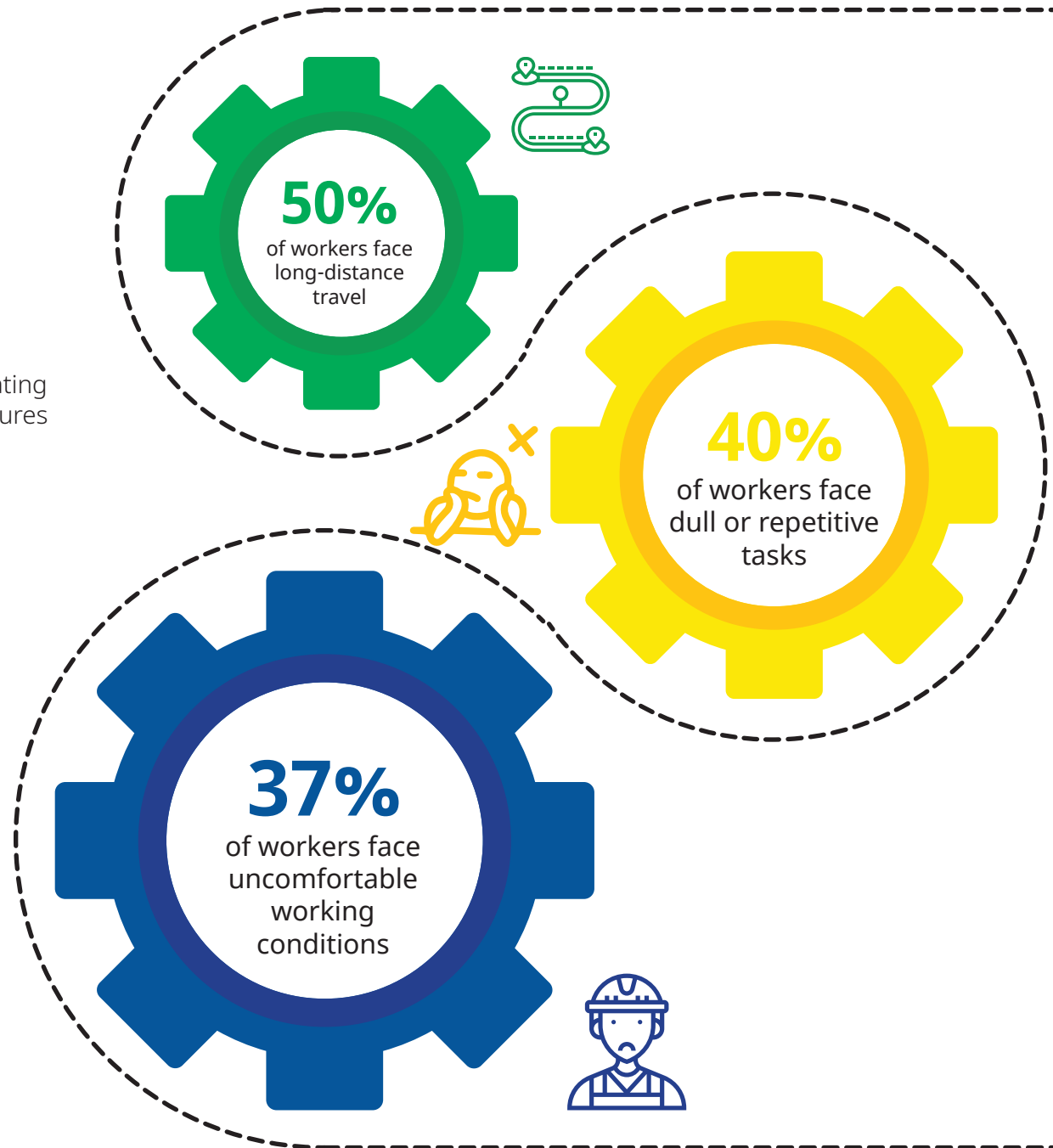


Challenging working conditions are pushing the move to unattended systems

- Moving to unattended systems can significantly reduce operating costs as having workers present brings safety risks and measures must be taken to mitigate that risk.
- Over the next 3 years, fully manned tasks will largely remain unchanged, but it is the move from minimally manned to unattended that will see the biggest change.

The proportion of respondents reporting the application as unattended

	2020	2023
 Process monitoring	14%	26%
 Quality control	9%	19%
 Asset monitoring	11%	21%
 Process operations	11%	25%



New technologies are tackling the issue of an aging workforce

- ➔ New technologies are being utilized to help bridge the gap to the next generation of engineers. The management of applications through autonomous operations can offset the shortage of skilled labor brought on by the retirement of highly experienced personnel, a key challenge for the process industries.
- ➔ A host of relatively new technologies are seeing increased investment, from digital twins that allow 'What if' scenarios to be tested virtually to AI software that can make decisions without human involvement.



42% or respondents stated they will be making significant investment in AI



40% are looking to make significant investments in intelligent sensors and devices



29% are planning to make significant investments in quantum computing

Technology investment priorities for the next 3 years

Top priority



Cyber security



Cloud, analytics, big data



AI



Intelligent sensors & devices

Mid priority



Wireless & 5G



Industrial fixed robots



Blockchain

Low priority



Vision systems



AR/VR/MR

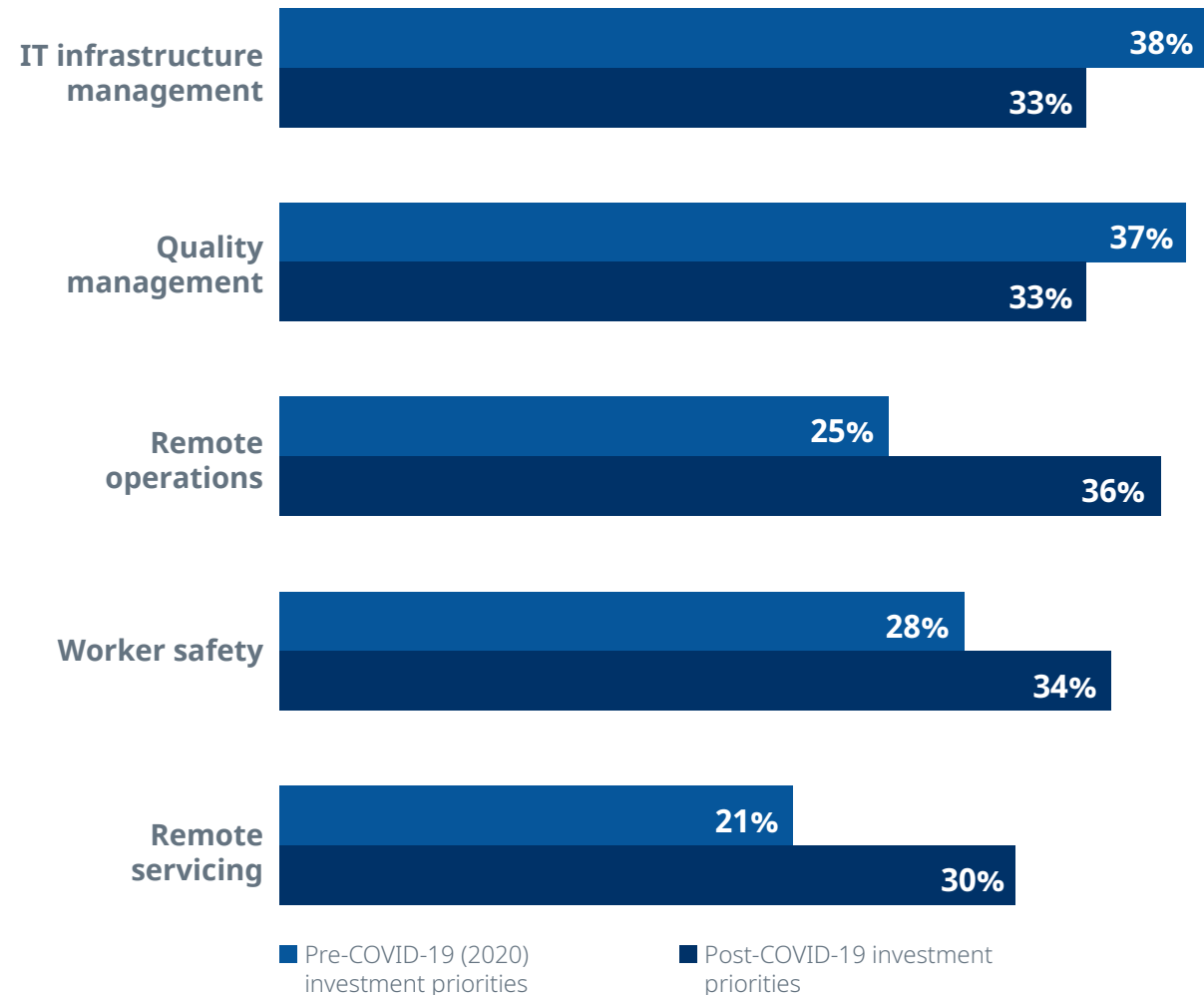


Drones

Applications that are seeing investment are those that support greater autonomy

- ➔ IT infrastructure and quality management are the key applications that are seeing investment in 2020.
- ➔ Greater IT investment is tied to investments in the cloud, AI, and cybersecurity. OT and IT professionals are using technology as an enabler of autonomous operations within applications that would previously have been fully manned.
- ➔ As a direct result of COVID-19, more companies are looking to invest in applications such as worker safety, remote servicing, and remote operations.
- ➔ Companies are taking workers out of hazardous working environments and future-proofing against the risk of pandemics.

Priority applications for investment in industrial autonomy



COVID-19 is driving investment in IA in the long term

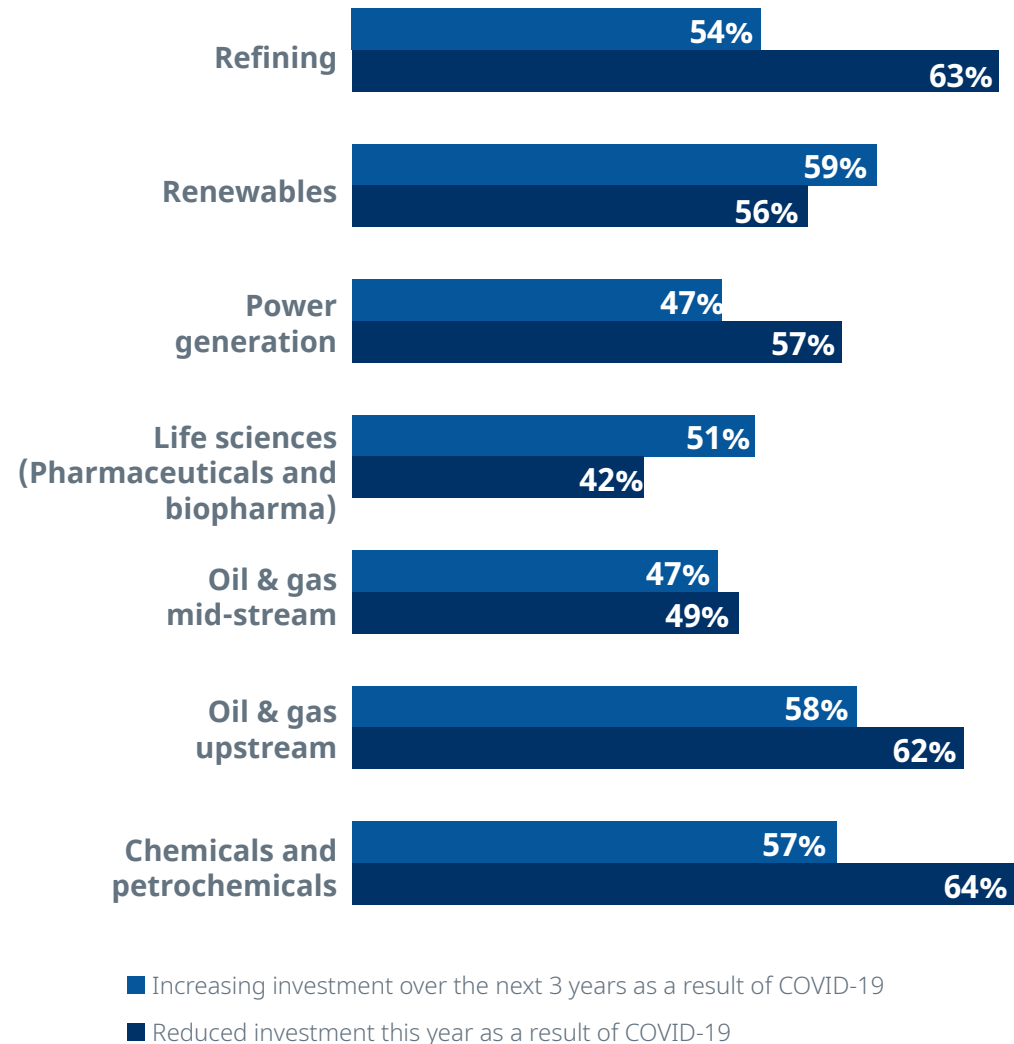
- Following an initial decline in industrial autonomy investment as COVID-19 takes its toll on the process industries, investment in this field is expected to bounce back in the 2020-23 timeframe.
- Upstream, midstream, and refining are seeing the toughest investment climate this year as the result of a dramatic drop in consumption/demand. They are however set to see the greatest investment in industrial autonomy over the next 3 years as COVID-19 provides the rationale for remote operations.

54% of respondents see increasing investment in industrial autonomy because of COVID-19 over the next 3 years



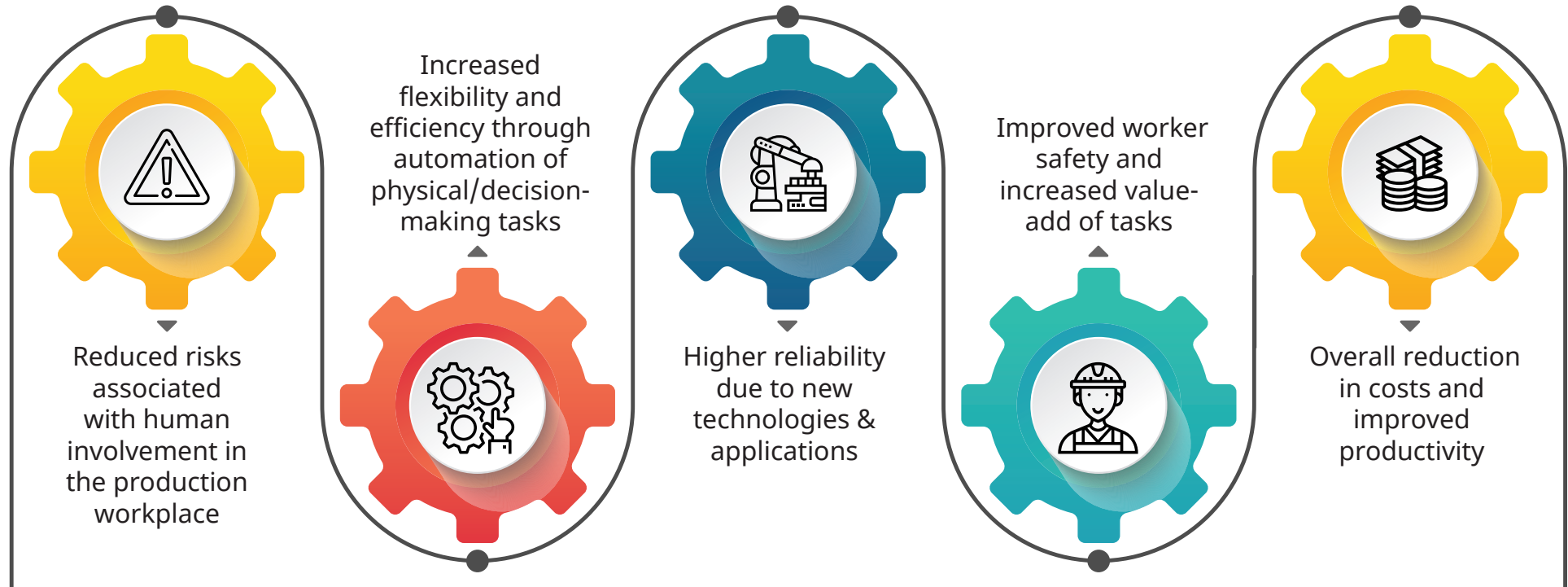
55% of respondents see a decline in investment in industrial autonomy this year

Industrial autonomy: From challenge to opportunity



The road to greater productivity

Key Outcomes



- ➞ Companies have been looking to autonomy as a means for addressing business challenges, and COVID-19 has provided the impetus for them to accelerate their shift to autonomous operations.
- ➞ New technologies are being deployed to deal with an aging workforce and ever greater complexity in operations.
- ➞ The need for a partner who knows the challenges you face and can set you on the right path for your journey from industrial automation to industrial autonomy (IA2IA) has never been more important.





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