



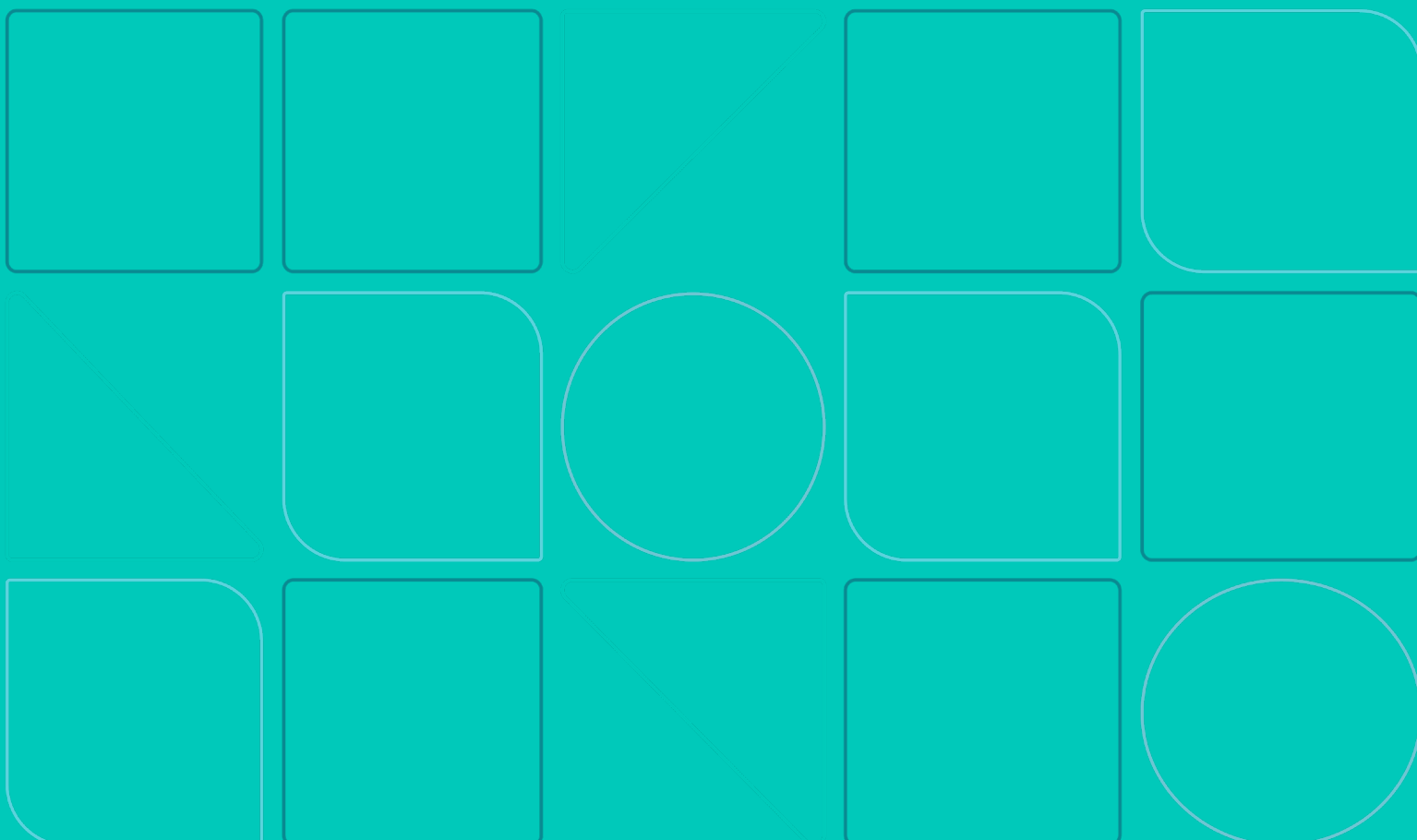
INSIGHTS

Tackling MSD in Industrial Sectors with Emerging Tech



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Foreward

Musculoskeletal disorders (MSDs), conditions that affect the muscles, tendons, ligaments, nerves, bones, or other supporting structures within the body, are one of the most pressing workplace health issues of our time, imposing substantial human and financial costs on organisations worldwide.

Addressing these disorders, which affect millions of workers worldwide and cost the global economy hundreds of billions of dollars a year, is critical to enhancing workplace safety, productivity, and employee wellbeing.

In recent years, technological advancements have opened new pathways for reducing the risk and prevalence of MSDs.

Yet the adoption of these technologies is still at a relatively early stage. But where are we? What technologies are out there? What investments are being made? Is industry starting to adopt them? Is there evidence emerging of benefits?

This report offers a high-level analysis of how technologies targeting MSDs are starting to make inroads in industrial sectors.

Our analysis draws on data from technology companies regarding investment, adoption level, target markets and case studies of reported deployments and benefits.

Evidence from real-world applications is starting to show that organisations adopting these technologies are achieving a measurable reduction in MSD-related injuries and experiencing significant productivity and efficiency gains.

We hope this report also serves as a call to action for organisations to consider increasing innovation and trials of technologies that have the potential to increase health and productivity benefits for their workforce.



Marius Suteu, Managing Director,
Safetytech Accelerator



Executive Summary

- Musculoskeletal disorders (MSDs) present a significant global workplace health issue, with estimates putting the total cost to organisations and economies at 1-2% of GDP. Extrapolating these figures globally suggests that MSDs could in the region of \$1 trillion annually.
- MSDs, which impact muscles, tendons, nerves, and bones, represent one of the most common occupational health problems around the world. They affect a wide range of occupations and industries and are particularly prevalent in physically demanding sectors like manufacturing and construction.
- Recent technological advancements provide new avenues for addressing MSDs, with emerging solutions leveraging AI, robotics, computer vision, and wearables to monitor and mitigate risks.
- This report shares findings from a study of 94 emerging tech companies addressing MSD risk ("MSD Tech") in industrial sectors. It also summarises case studies from technology companies and their clients which report quantifiable benefits from the use of their solutions, including:
 - 45-58% average reductions in MSD risk,
 - Cost reductions of 31-53%,
 - Productivity boost of up to 153% for certain tasks.
- The companies analysed, which comprise "pure-play" ones and those targeting MSDs as one of their use cases, have raised \$895m across 61 different funding rounds since 2020. Those providing solutions involving AI and robots have secured the most funding in that time, indicating that investors recognise the potential and maturity of these technologies.
- The primary MSD Tech markets identified include manufacturing, logistics, and warehousing, where solutions have shown the highest impact and investor interest.
- Businesses investing in these solutions could gain strategic advantages in safety, productivity, and cost savings while enhancing worker well-being and operational resilience. Reported cases include Frito-Lay's use of AI-enabled wearables to reduce postures that result in MSDs by 72% and cut lost work time by 67%, and Hermes Germany's deployment of exoskeletons, reducing lower-back strain by up to 75%.
- However, evidence shows that it can be challenging for organisations to trial and adopt new technologies that can potentially reduce MSDs and their impact. Solutions have different maturity levels, and while evidence of benefits is growing, relatively limited systematic and independent evidence is available regarding their efficacy.
- This report aims to start answering some of the common questions these organisations may have and guide their initial exploration of the technologies available in the market.



MSDs: A Worldwide Business Problem

Data consistently shows that musculoskeletal disorders (MSDs), which include a range of tendinopathies, tunnel (or outlet) syndromes and nerve compressions, hygromas, bone syndromes, vascular syndromes, **meniscus lesions and other non-specific disorders¹**, are one of the most common and costly forms of occupational illness.

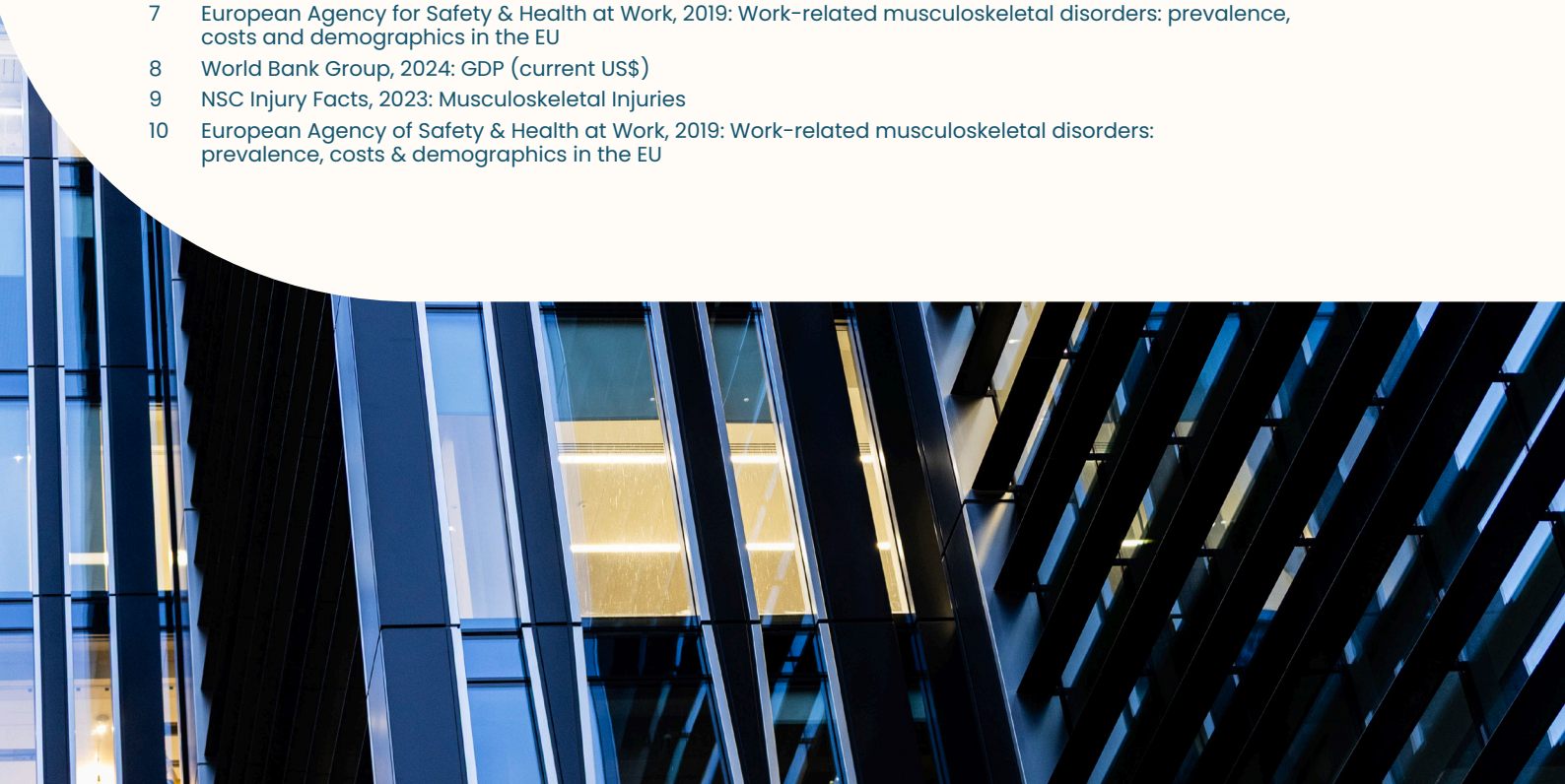
- MSDs are the most common work-related health problem in the European Union (EU)², with three in five EU workers reporting MSD complaints.
- Stephen Bevan, then at Lancaster University, wrote in 2015 that over 40 million EU workers had MSDs caused by their work. MSDs also caused almost 50% of all work absences lasting three days or longer and 60% of permanent work incapacity³.
- In the US, the National Safety Council⁴ has revealed that 30% of unwanted days off work are due to MSDs.
- The latest figures show that 543,000 workers in Great Britain suffered from work-related MSDs in the year to March 2024⁵. This was 15% higher than the year before (473,000 reported cases in 2022/23⁶), and more than any other illness except stress, depression and anxiety.
- While there is no consensus around the total MSD-related cost to the global economy, estimates suggest that it could be enormous.
- A German study, for example, indicates that MSDs accounted for €30.4 billion in loss of gross value added in 2016⁷, some 1.0% of the country's gross domestic product (GDP).



MSDs: A Worldwide Business Problem

- Stephen Bevan goes further still, revealing in 2015 that the direct and indirect costs of MSDs across the EU were estimated at €240 billion each year, up to 2% of the EU's GDP.
- Extrapolating these figures to global GDP levels revealed in World Bank data⁸, **the total economic costs attributable to MSDs could be in the region of \$1 trillion a year.**
- Most work-related MSDs affect the trunk (the central part of the body, excluding the limbs). US data shows that trunk injuries account for 43% of work-related MSDs and often involve the muscles, ligaments, discs, or bones of the spine and back⁹.
- The trunk was also the main location for MSD among EU workers¹⁰, with backache reported in 43% of cases.
- MSDs affecting the shoulders, neck and upper limbs accounted for 36% of US and 41% of EU cases. Issues here include carpal tunnel syndrome, rotator cuff tears, tennis elbow and hand-arm vibration (HAV) syndrome.
- 15% of US workers suffered lower extremity injuries, primarily the knee, and 29% of EU cases involved muscular pains in the lower limbs.

- 1 The European Trade Union Institute, 2018: Musculoskeletal disorders and psychosocial factors at work
- 2 European Agency of Safety & Health at Work, 2019: Work-related musculoskeletal disorders: prevalence, costs & demographics in the EU
- 3 Best Practice & Research Clinical Rheumatology, 2015: Economic impact of musculoskeletal disorders (MSDs) on work in Europe
- 4 National Safety Council, 2022: NSC Teams Up with Safetytech Accelerator to Uncover Technology to Prevent Most Common Workplace Injury
- 5 Health and Safety Executive, 2024: Health and safety at work. Summary statistics for Great Britain 2024
- 6 Health and Safety Executive, 2023: Health and safety at work. Summary statistics for Great Britain 2023
- 7 European Agency for Safety & Health at Work, 2019: Work-related musculoskeletal disorders: prevalence, costs and demographics in the EU
- 8 World Bank Group, 2024: GDP (current US\$)
- 9 NSC Injury Facts, 2023: Musculoskeletal Injuries
- 10 European Agency of Safety & Health at Work, 2019: Work-related musculoskeletal disorders: prevalence, costs & demographics in the EU



MSDs: A Worldwide Business Problem

MSD Risk by Sector

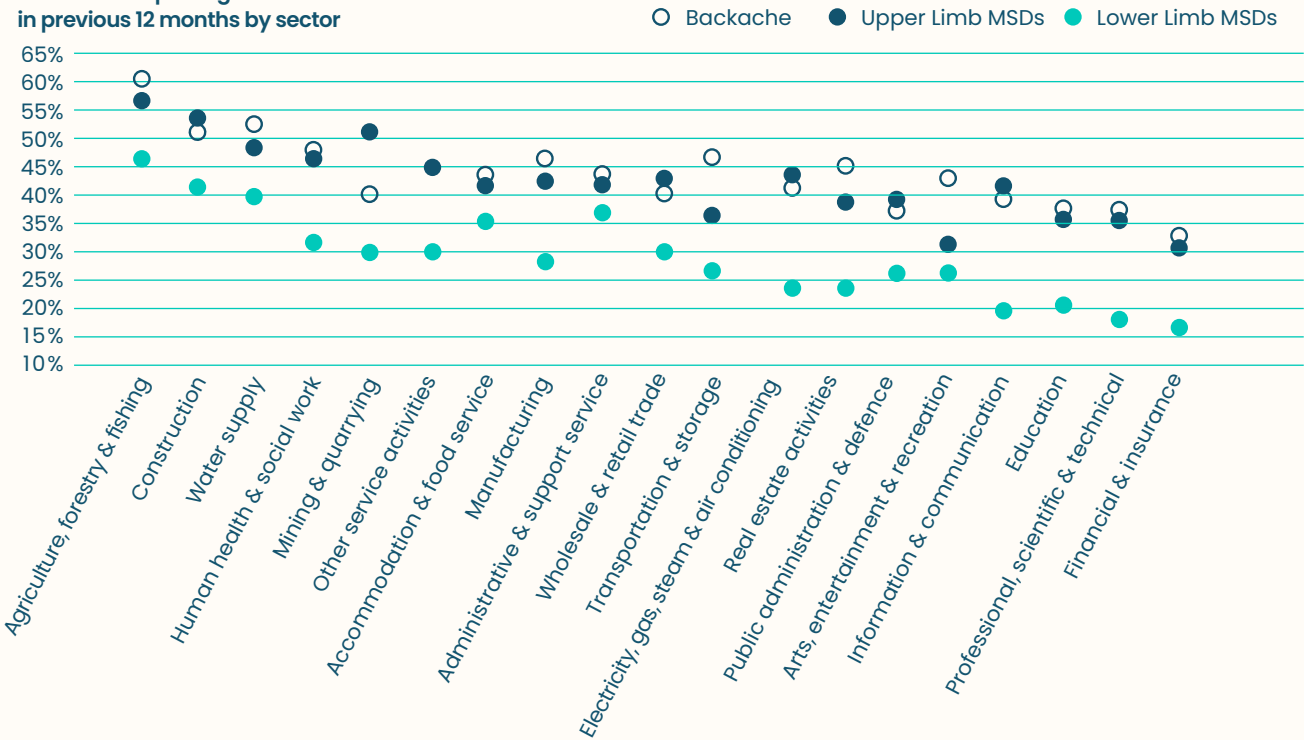
The latest figures (2024) from Great Britain’s Health and Safety Executive reveal the rate of work-related MSDs is higher for skilled trades occupations (2.5%), process, plant and machine operatives (2.2%) and elementary occupations (1.8%) than the average for all occupations (1.2%)¹¹.

EU data shows a high prevalence of MSDs among workers in construction, water supply, agriculture, forestry and fishing sectors. It was also above average among human health and social work workers¹².

However, the economic impact of MSDs does not correlate directly with instances of MSD. German data show that sick leave due to MSDs is more common in occupations exposed to high physical demands, such as manufacturing and construction, but the manufacturing industry experiences, by far and away, the highest economic losses due to MSDs.

German manufacturers missed out on €39.6bn of gross value added to MSDs in 2016, compared to €5.9bn across the construction industry. Even considering the number of people working in each sector, the financial costs of lost production are twice as high in manufacturing than in construction.

EU workers reporting MSDs in previous 12 months by sector

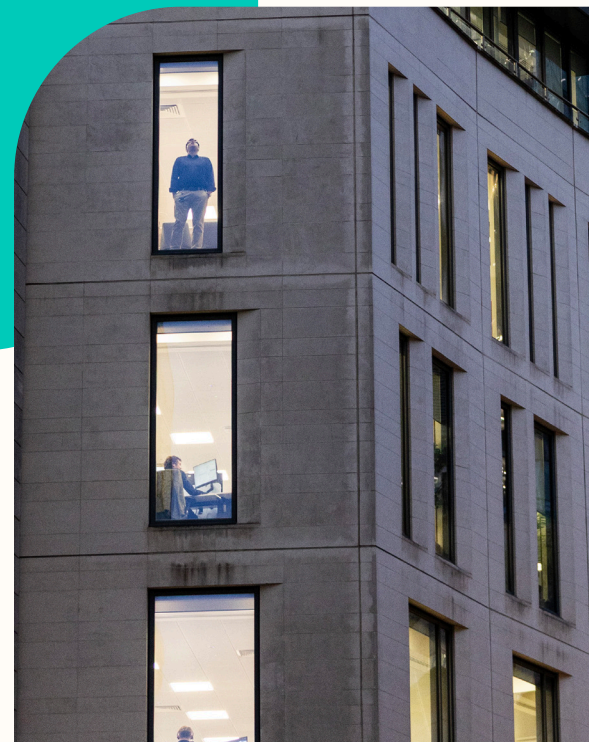


11 Health and Safety Executive, 2024: Work-related musculoskeletal disorders statistics in Great Britain, 2024
12 European Agency of Safety & Health at Work, 2019: Work-related musculoskeletal disorders: prevalence, costs & demographics in the EU

MSDs: A Worldwide Business Problem

What Factors Contribute to MSDs?

- Evidence suggests several factors, which often act in combination, influence workplace MSDs:
- **Repetitive Motion:** Tasks requiring repetitive movements, such as assembly line work, can lead to strain and injury.
- **Awkward Postures:** Working in positions that strain the body, like bending or twisting, increases risk.
- **Heavy Lifting:** Lifting heavy objects can cause back injuries and other MSDs.
- **Prolonged Static Postures:** Staying in one position for extended periods can lead to muscle fatigue and discomfort.
- **Vibration Exposure:** Using vibrating tools or machinery can damage muscles and joints.
- **Work Environment:** Poor lighting, extreme temperatures, and high noise levels can contribute to MSDs by forcing awkward postures or increasing stress.
- **Psychosocial Factors:** High work pressure, lack of support, and job demands can exacerbate physical strain and lead to MSDs.



Technologies Targeting MSD Risks

A growing number of companies are developing solutions that aim to reduce the risk and impact of **MSDs in the workplace with emerging technologies.**

The Analysis

In 2022, Safetytech Accelerator, working in collaboration with The US National Safety Council as part of an initiative funded by Amazon Inc., carried out research on MSD use cases, adoption drivers, and barriers with large industrial firms.

We identified a number of solution providers with the greatest potential to prevent workplace MSDs at scale in safety-critical industries¹³.

More recently, Safetytech Accelerator conducted further research to bring this understanding up to date as well as looking in more depth at a broader range of solutions, their level of adoption, evidence of impact and other aspects across multiple sectors.

MSDs affect a great many industries and occupations and are frequently an issue for office-based employees who maintain poor postures when working at a desk and healthcare workers involved in lifting patients.

However, this analysis is focused on technologies (we shall use the term “MSD Tech” here) with the potential to **reduce MSDs in industrial settings** such as manufacturing plants, construction sites, warehouses and logistics operations.

Starting from a larger pool of candidates, the research focused on 94 tech companies with specific solutions targeting MSD risks in industrial settings. For each, we looked for published evidence demonstrating the potential impact of their solutions, investment and market traction.

¹³ Safetytech Accelerator, 2022: Safetytech Accelerator teams up with NSC to uncover tech to prevent most common workplace injuries



Technologies Targeting MSD Risks

The Cohort

Of the 94 companies in this cohort, the vast majority are companies that target industrial safety and risk (“Industrial Safetytech”)¹⁴.

Of them, 20 would be considered “pure-play”, targeting MSDs as core business. The rest is a mix of technology companies that either started as pure-play and diversified in other areas of safety and risk, or vice versa, where MSD risks became a use case of their wider solution(s).

Most (63) were founded within the last ten years. Almost half (47%) of the companies use AI as part of their solutions, and more than a quarter (28%) use computer vision, a subset of AI that enables computers to interpret visual information.

Data analytics, involving collecting, processing, and analysing data to extract insights for MSD risk reduction, is a fundamental component of solutions for 29% of the companies studied, often in conjunction with AI, and 22% focus on robotics.

For this analysis, robotics does not include exoskeletons, which was a significant enough group of companies (11% of the cohort) to include as a standalone specialism.

Companies with other wearable devices, including those with scanning and sensing capabilities, comprise 16% of the cohort.

Funding & Tech Maturity

As mentioned earlier, while only part of the cohort focuses exclusively on MSD use cases, analysing funding levels provides a useful proxy indication of two key factors when it comes to emerging technology: actual or perceived market demand for that technology solution and its maturity, both in terms of tech and market readiness.

¹⁴ Safetytech Accelerator, 2023: Understanding the UK Safetytech Landscape



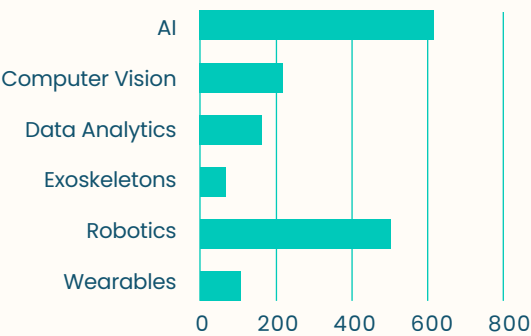
Technologies Targeting MSD Risks

Our analysis shows that the 94 companies in the cohort have raised \$895 million across 61 funding rounds since 2020. Funding peaked in 2022 (at \$321 million), mirroring investment trends in the wider tech market.

Companies with an AI angle attracted the most funding (\$627 million) in that time, followed by those providing robotics (\$502 million).

The chart below shows how funding is allocated by technology. Please note that there will be some double and even triple counting of funding rounds across areas as many companies in the cohort are blending multiple technologies in their solutions.

Funding by technology area
2020-2024 (\$m)

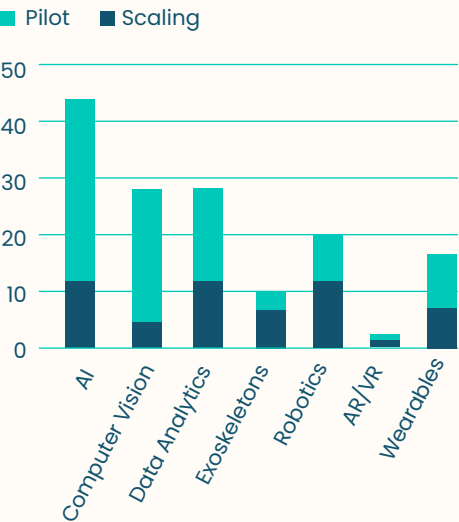


When we look at the stage and levels of funding rounds, we see that certain technologies have already reached a good level of maturity.

41% of companies in the cohort have already begun to roll out their solutions at scale with early adopters and mainstream industrial customers, while 59% are currently piloting their technologies with organisations.

Among the technologies in the cohort, robotics and AI had the most mature solutions now being rolled out at scale, followed closely by data analytics. However, our data reveals that companies in the cohort that scaled and raised large rounds were almost completely non-pure play, with other applications besides MSD risk.

Technology by solution stage



Technologies Targeting MSD Risks

Examples of such companies include:

- Agility Robotics, a creator and manufacturer of robots designed to support productivity, efficiency, and employee wellness in logistics and warehouse environments,
- and Insenseye, which protects more than 100,000 workers at Fortune 500 companies and industrial groups with its computer vision AI platform that spots unsafe acts and working conditions.

These were two of five companies in our cohort that have reached the Series B stage: Agility Robotics raised a \$150m Series B funding round in 2022¹⁵, and Insenseye \$64m at Series B in 2024¹⁶.

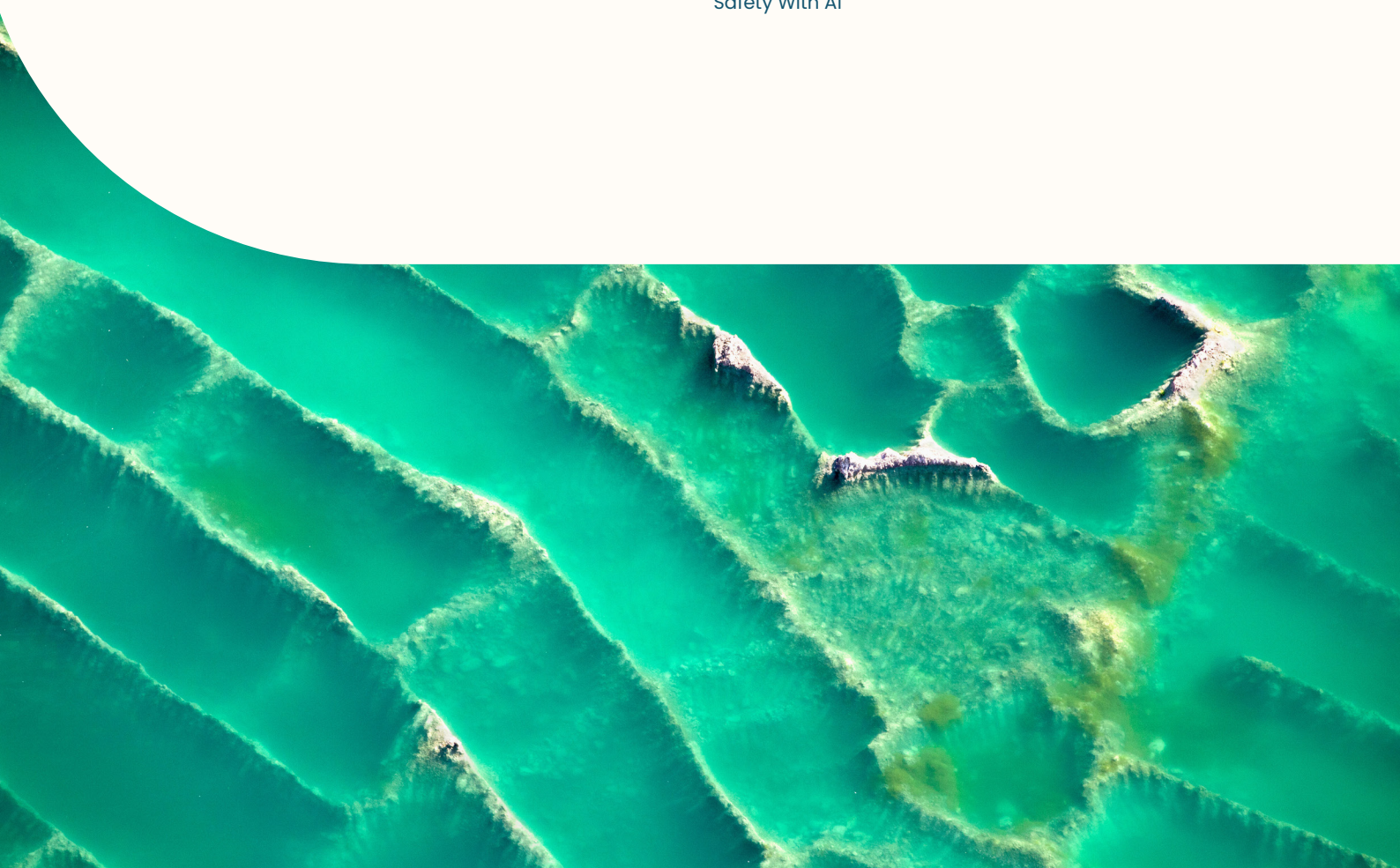
Target Markets

Manufacturing is the primary target market for the MSD Tech offered by companies in our cohort, with exactly half (50%) specifying use cases in this sector for their solutions. Logistics (31%) and warehousing (24%) were also key target markets for MSD Tech.

Cohort companies targeting MSD use cases in these sectors were also most successful in raising investment, securing \$17.3m each, on average, among those targeting logistics, \$14.8m for warehousing and \$12.3m for manufacturing since the start of 2020.

15 Agility Robotics, 2022: Agility Robotics Raises \$150M Series B Led By DCVC and Playground Global

16 BusinessWire, 2024: Intenseye Secures Record-breaking \$64M Series B to Advance Its Mission of Transforming Workplace Safety With AI



Emerging Technologies for Reducing MSDs

| Tech Area | MSD Application | Solution Maturity* | Market Interest** |
|------------------------|---|---|---|
| AI | Can identify risky movements or work patterns in industrial settings by analysing data and behaviour. Flags hazards, such as improper posture or motions that lead to MSDs, and optimises work activities to minimise human effort. | High (13 being deployed at scale) | High (\$627m funding 2020–2024) |
| Computer Vision | Allows machines to interpret and analyse visual data. Identifies poor ergonomics or unsafe behaviours that lead to MSDs. | Medium (5 at scale) | High (\$213m) |
| Data Analytics | Collecting, processing, and analysing data to extract insights. Forecasts potential injury risks and triggers preventive measures. | High (11 at scale) | Medium (\$176m) |
| Exoskeletons | Enhance or support the wearer's physical capabilities. Reduces physical exertion and strain on workers' muscles and joints that contribute to MSDs during tasks. | Medium (7 at scale) | Low (\$64m) |
| Robotics | Using robots to perform repetitive or physically demanding tasks reduces need for humans to engage in activities that lead to MSDs. Alleviates strain, particularly in heavy lifting or repetitive assembly-line work. | High (13 at scale) | High (\$502m) |
| Wearables | Devices that monitor physiological data or physical activity, often worn as part of clothing or accessories. Track movements, posture, and exertion and trigger alerts if thresholds are crossed. | Medium (6 at scale) | Low (\$95m) |

* For this, we have included the number of solutions identified in our cohort as being deployed at scale.

** Here, we use investor interest as a proxy measure for anticipated future customer demand.

Business Benefits: Risk, Productivity & Cost

While most of the companies we analysed have yet to publish figures that quantify the business benefits of their solutions, our analysis reveals a still small but growing body of evidence demonstrating the potential impact of emerging technologies for addressing MSDs.

We identified 92 individual data points of published evidence, primarily from technology company websites, press releases, case studies and research papers, showing a quantified impact based on the use of technology from 31 companies in our cohort.

It is important to note that our findings faithfully reflect the evidence we found but have not been peer-reviewed or independently verified. We recommend that organisations interested in these solutions take additional steps to verify these claims as part of their due diligence prior to any trials or pilot studies in live environments.

For each company, we looked for evidence of a quantifiable impact across the following areas: cost, downtime reduction, human effort, injuries/risk, employee morale/job satisfaction, productivity, quality, return on investment, and sustainability.

Where we found multiple claims of quantified benefits for a company, such as several case studies, we used the average (mean) figure of the quantified benefits identified to calculate the 'typical' impact for that company.

To calculate the 'typical' figure of each technology area, we took the average (mean) across all of the relevant companies for each area of benefit. Where companies offer solutions using multiple technologies, isolating the impact of each specific technology was impossible, so we applied the quantified benefits reported across all relevant technologies.

Larger, more established companies now deploying their technologies at scale were most likely to have quantified the impact of their technologies.

Companies with solutions that used technologies such as AI, data analytics, exoskeletons and computer vision were more likely to have published materials with quantifiable benefits than those using wearables or robotics.



Business Benefits: Risk, Productivity & Cost

Impact of MSD Tech by Area

In the table below, we have highlighted the typical benefits that companies report are possible with their solutions. We have excluded findings where there is insufficient evidence to provide a reliable indication of the typical level of benefit that organisations can achieve with each technology.

Examples of Reported Benefits by Technology

| Technology | Risk | Productivity | Cost | Human Effort | Quality |
|-----------------|-------|--------------|-------|--------------|---------|
| AI | ↓ 57% | ↑ 65% | ↓ 31% | ↓ 18% | ↑ 42% |
| Computer Vision | ↓ 57% | ↑ 41% | ↓ 35% | – | ↑ 41% |
| Data Analytics | ↓ 51% | ↑ 51% | ↓ 29% | – | ↑ 44% |
| Exoskeletons | ↓ 58% | ↑ 10% | – | ↓ 41% | – |
| Robotics | – | ↑ 153% | ↓ 53% | – | – |
| Wearables | ↓ 45% | ↑ 41% | – | – | – |

Business Benefits: Risk, Productivity & Cost

It is important to stress that these numbers should be taken as broad indications of reported benefits.

For instance, the methodology combined evidence from specific but different companies and use cases. Reported productivity figures, in particular, refer to specific tasks or processes the technology addresses, such as lifting.

In addition, the methodology used may have an inherent positive bias, as case studies by technology companies and adopters tend to be published following positive outcomes of pilots or trials.

Manufacturing: Frito-Lay Reduces MSD Risk with Wearables & AI

Snack food manufacturer Frito-Lay, a subsidiary of PepsiCo, implemented AI-enabled wearable technology from New York-based tech company Kinetic as part of an initiative to foster a safer, healthier workplace for its 65,000 employees¹⁷.

This program aims to reduce ergonomic risks — particularly strains and sprains — by monitoring and correcting improper postures in real-time through Kinetic's device. The belt-mounted wearable detects awkward postures that create an increased risk of strain and injury and alerts users with a vibration.

This data-backed approach has driven meaningful behaviour change, increased worker safety engagement, and helped reshape the culture towards proactive safety measures. Results:

- Reduced improper postures by 72%.
- Decreased injury rates by 19%.
- Reduced lost work time to injuries by 67%.
- Expanded use of Kinetic across PepsiCo.

Reducing MSDs & Injury Risk

This report focused on emerging technologies' impact on tackling MSDs. Across all technologies identified, we saw companies reporting average reduction levels of between 45% and 58% in MSD risk.

These figures include examples of reductions in the number of MSDs suffered by workers following the introduction of MSD Tech solutions and reductions in the level of high-risk behaviours and activities that would typically result in MSDs.

The average risk reduction level recorded across five companies using **computer vision** within their MSD use cases was 57%.

Californian startup TuMeke, for example, automatically assesses workers' movements in videos uploaded to its platform, highlighting risky postures and offering recommendations to reduce risk.

Deployment at a Fortune 500 company's distribution centre, where hundreds of workers performed various manual handling tasks, delivered a 68% decrease in recorded MSD injuries within six months¹⁸.

ProTex AI, a company based in Dublin, Ireland, also helps prevent MSDs in the workplace with computer vision, undertaking real-time motion tracking and analysis of CCTV footage to identify areas where changes in posture or movement may reduce risk.

17 Kinetic, 2021: Frito-Lay Uses Wearables to Drive Culture Change

18 Tumeke, 2023: Fortune 500 Distribution Center

Business Benefits: Risk, Productivity & Cost

ProTex AI helped British retailer Marks and Spencer reduce incidents of workers adopting unsafe postures and movements by 80% within weeks of deployment at its warehouse in Castle Donington¹⁹.

Exoskeleton companies, of which there were three in our cohort with quantifiable risk reduction claims, delivered a 58% improvement in MSDs and activities that carry a high risk of injury.

The main benefit of exoskeletons is the reduction in human effort required for lifting and other strenuous tasks. On average, human effort was 41% lower across six exoskeleton providers that published quantifiable improvements in this area.

Using an exoskeleton from HeroWear, a startup based in Nashville, Tennessee, in four US distribution centres resulted in zero reported back strain injuries during 281,000 hours of deployment, during which workers performed more than 50 million lifts. Historic data suggested that 10.5 injuries could be expected from that level of work²⁰.

A study by Verve Motion, a Harvard University spinout dedicated to industrial worker safety, reported that using its exosuits dramatically reduced workplace injuries, ranging from a 60–85% reduction per site.

At one distribution centre, which typically experienced one injury every 14,300 hours, the ongoing use of an exosuit resulted in just one injury every 94,000 hours²¹.

The data we gathered about AI solutions revealed a 57% reduction in MSD risk, on average. Beyond computer vision, which we've already covered, we see AI being used to assess data from wearable technology to reduce MSD risk.

WearHealth, a startup based in Bremen, Germany, uses AI to reduce injury risks by analysing data gathered by a wearable sensor clipped onto workers.

It claims to deliver up to a 78% reduction in the risk of injuries by providing real-time haptic feedback and auditory alerts when workers adopt unsafe postures and movements²².

Boosting Productivity with MSD Tech

The benefits of solutions that reduce MSDs and MSD risk, however, go beyond risk.

This is crucial for adoption at scale because the industrial organisations that could benefit most from adopting safetytech in general – including MSD Tech – need to see a broader range of benefits, particularly financial, to justify a business case for introducing new technologies.

Alongside risk reduction, productivity improvements are the key quantifiable benefit cited by companies providing technologies that reduce MSD risk.

19 Protex AI, 2022: Marks and Spencer reduced incidents by 80% in their first 10 weeks of deployment

20 HeroWear, 2024: Distribution Centers Track Exosuit Users for 281k Hours, Report Zero Back Injuries

21 PR Newswire, 2024: Landmark Study Reveals Wearable Robotics Significantly Boost Safety and Efficiency in Industrial Environments

22 WearHealth, 2024: Reduce injuries and costs with AI and Wearables

Business Benefits: Risk, Productivity & Cost

Logistics: Hermes Implements Exoskeletons to Support Employees

Hermes Germany was the first parcel logistics company in Germany to introduce lightweight back exoskeletons from SUITX by Ottobock for employees handling large, heavy shipments²³.

Used at three major logistics centres — Friedewald, Graben, and Langenhagen — these exoskeletons reduced the physical strain on workers tasked with sorting and lifting heavy items.

SUITX by Ottobock relies on biomechanical systems that temporarily store the body's energy until it is released again in a targeted manner to relieve the strain on the user.

Its producers claim that the lightweight exoskeleton Hermes uses reduces the strain on the lower back by 56–75% and increases endurance by up to 52% after repetitive lifting tasks²⁴.

Results:

- Reduced strain on employees, with effective load reduction of up to 15 kg per lift.
- High employee acceptance due to the device's lightweight (3 kg) and easy use.
- Extended support for dynamic lifting, enhancing comfort and mobility.
- Direct health benefits reported by main users across key logistics centres.

23 SUITX by Ottobock, 2024: Back exoskeletons provide noticeable relief

24 SUITX by Ottobock, 2024: IX Back Air Exoskeleton

Companies in our cohort are more likely to have quantified the productivity benefits of their technology than any factor other than MSD risk reduction.

Perhaps more importantly, our analysis indicates that investors poured more money into companies and technologies that could show strong productivity gains than any other benefit.

The correlation coefficient between investment levels and productivity improvements is 0.7, compared to 0.4 for investment and risk reduction and 0.3 for investment and cost savings/efficiencies.

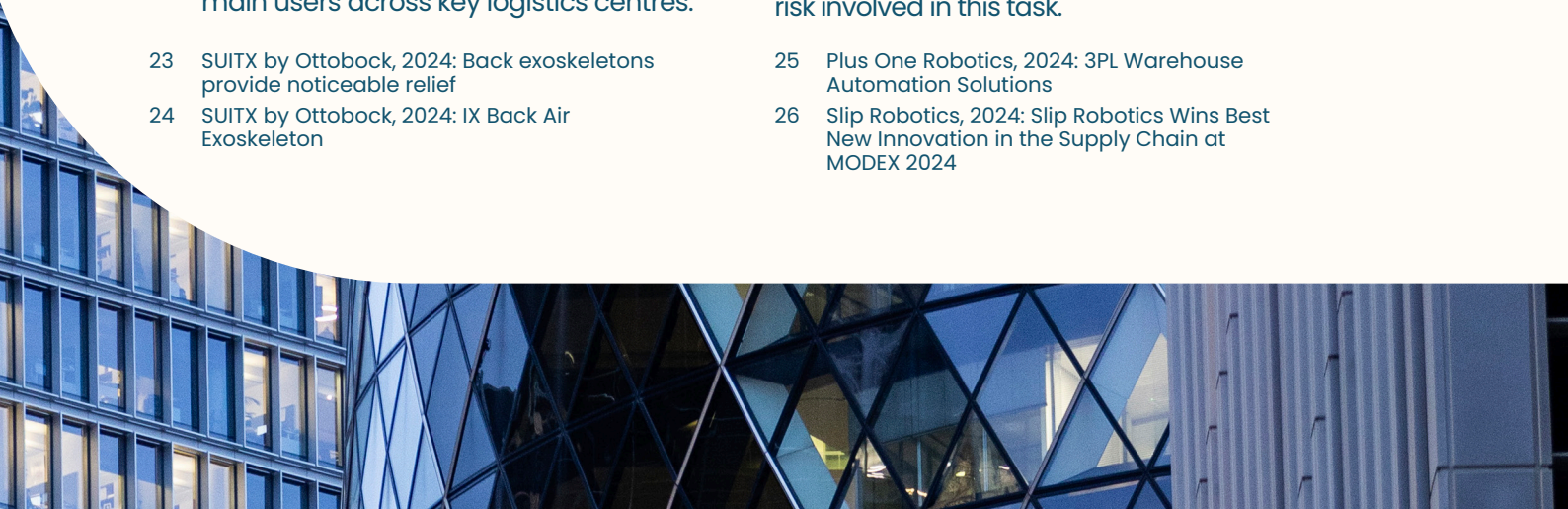
Robotics have existed for a long time with obvious and well-reported productivity gains. Needless to say, as a by-product, most will help reduce MSDs in organisations through risk elimination. However recently some are starting to cater for MSD risk reduction as a core value proposition and we have included a few of them in our cohort.

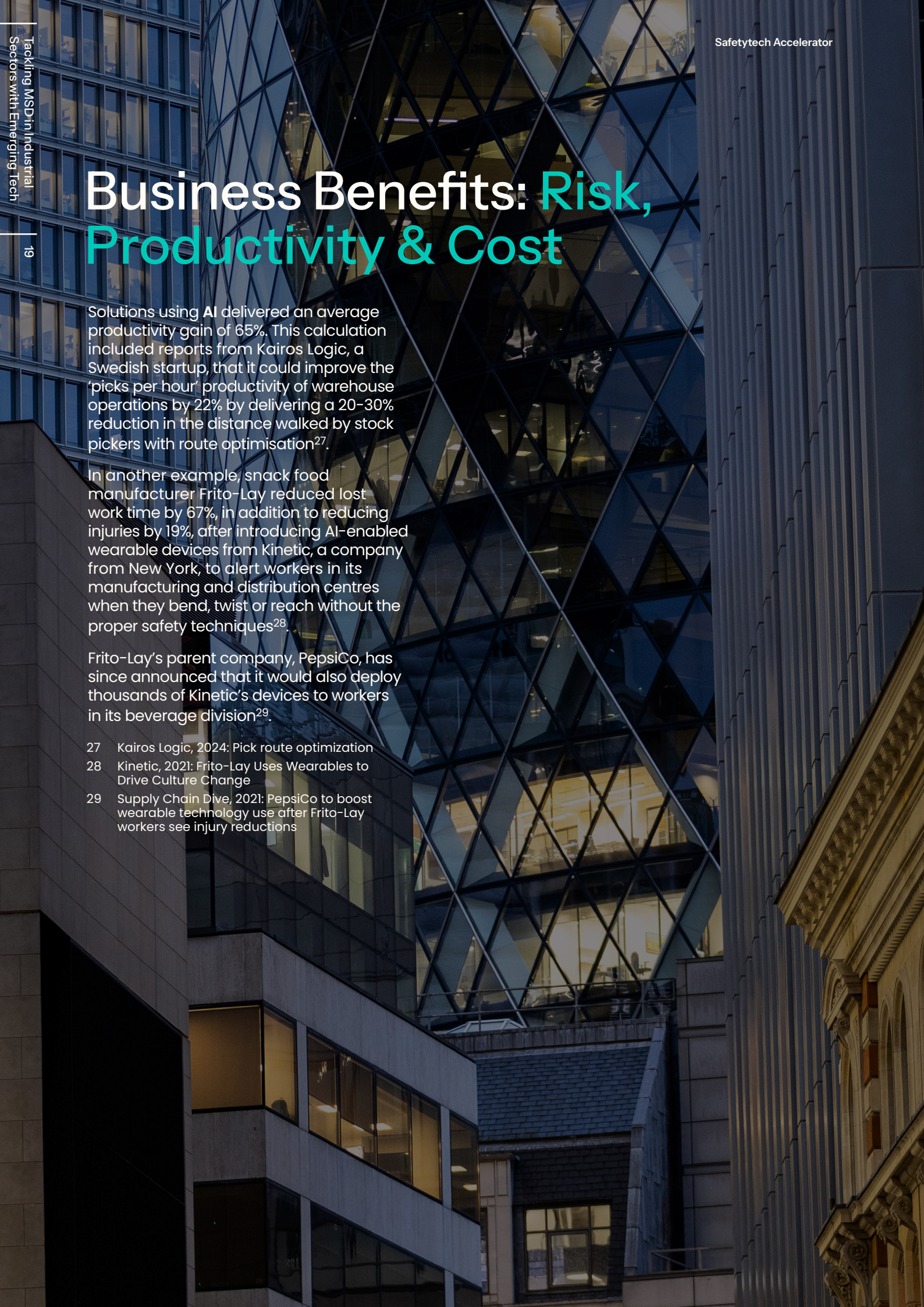
Plus One Robotics, based in San Antonio, Texas, reports improved sorting and picking throughput of at least 30% through warehouse automation²⁵.

At the other end, Slip Robotics, a startup from Atlanta, Georgia, claims to increase dock throughput by as much as 300% with its automated loading robot that largely eliminates the need for workers to load and unload trailers²⁶, in addition to reducing the risk involved in this task.

25 Plus One Robotics, 2024: 3PL Warehouse Automation Solutions

26 Slip Robotics, 2024: Slip Robotics Wins Best New Innovation in the Supply Chain at MODEX 2024





Business Benefits: Risk, Productivity & Cost

Solutions using AI delivered an average productivity gain of 65%. This calculation included reports from Kairos Logic, a Swedish startup, that it could improve the 'picks per hour' productivity of warehouse operations by 22% by delivering a 20–30% reduction in the distance walked by stock pickers with route optimisation²⁷.

In another example, snack food manufacturer Frito-Lay reduced lost work time by 67%, in addition to reducing injuries by 19%, after introducing AI-enabled wearable devices from Kinetic, a company from New York, to alert workers in its manufacturing and distribution centres when they bend, twist or reach without the proper safety techniques²⁸.

Frito-Lay's parent company, PepsiCo, has since announced that it would also deploy thousands of Kinetic's devices to workers in its beverage division²⁹.

27 Kairos Logic, 2024: Pick route optimization

28 Kinetic, 2021: Frito-Lay Uses Wearables to Drive Culture Change

29 Supply Chain Dive, 2021: PepsiCo to boost wearable technology use after Frito-Lay workers see injury reductions

Moving Forward

Addressing MSDs with technological innovation should be considered by leaders in organisations seeking to protect their workforce and enhance operational efficiency.

MSDs not only carry a high cost in terms of healthcare, lost productivity, and absenteeism, but also place an enormous strain on workers and their wellbeing.

Emerging technologies — such as AI, robotics, and exoskeletons — have the potential to mitigate these risks, significantly reducing injury rates while boosting productivity and lowering associated costs.

Still, there are also significant barriers to the adoption of MSD Tech in industrial settings, and many organisations with lots to gain from investing in these solutions are, understandably, cautious about how to proceed.

These include the initial costs, uncertainties around return on investment, human factors and employee buy-in and the reality that relatively few industrial organisations have dedicated budgets for the adoption of technologies that reduce occupational risks.

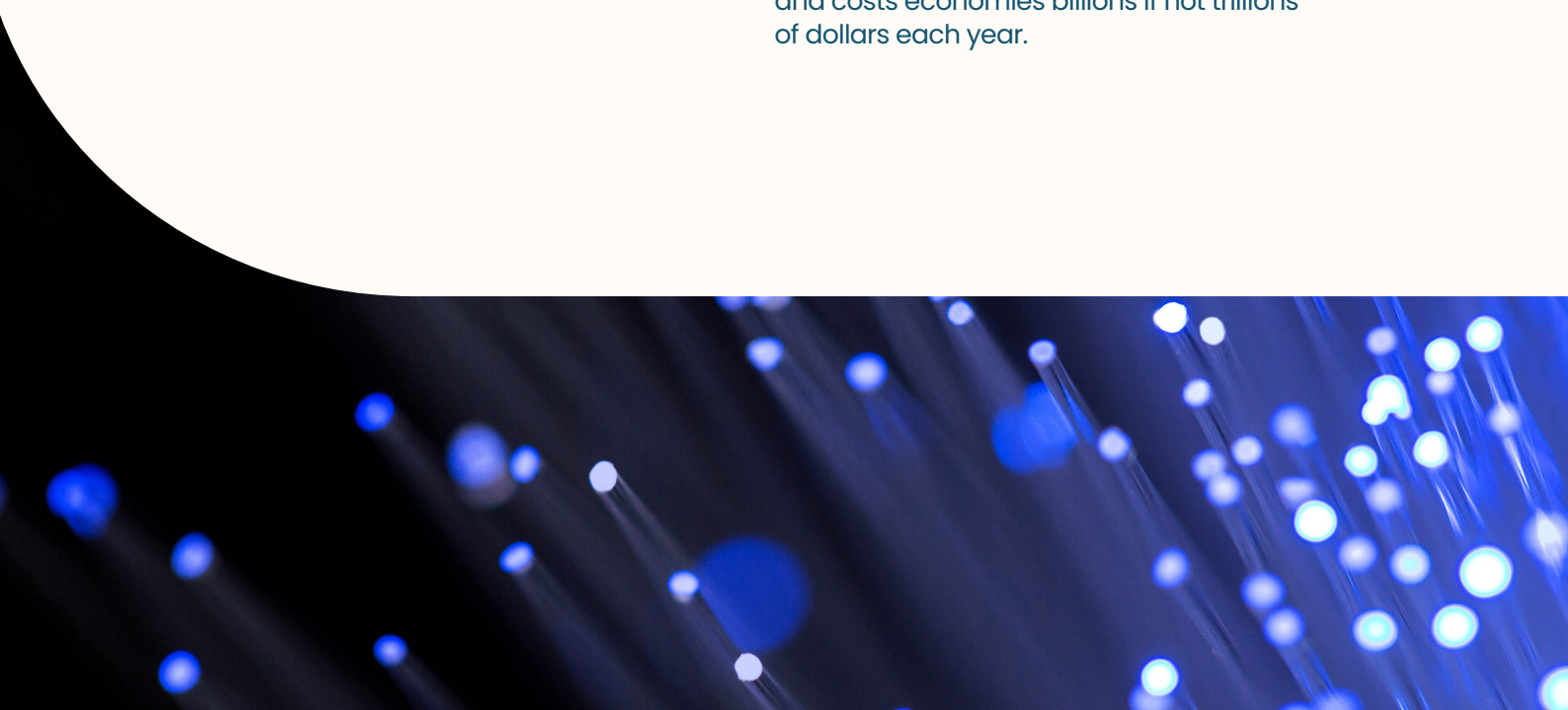
There is still relatively limited historical data to highlight their efficacy, especially at scale and over a long period, as well as insufficient awareness and a lack of standardised safety regulations and guidance for these technologies.

Yet, the evidence of the benefits of technology solutions is growing, and as we have illustrated, investment and adoption have already gathered pace.

This report aims to prompt leaders in organisations exposed to MSD risks to consider experimenting and trialling these technologies.

It is not just an OSH matter; it is a cost and productivity opportunity and a potential source of competitive advantage for retaining a healthy, motivated workforce.

It's also a call for policymakers, regulators and non-governmental organisations to consider how to stimulate more adoption and systemic evidence-gathering for this important issue that blights millions of lives and costs economies billions if not trillions of dollars each year.



About Safetytech Accelerator

Safetytech Accelerator is the world's first fully dedicated technology accelerator focused on advancing innovation in safety-critical industries. Our mission is to make the industrial world safer, more efficient and sustainable through the adoption of cutting-edge technologies.

We partner with corporate and institutional clients in high-risk industries to address their most critical challenges in occupational safety, health, risk, performance, and sustainability.

By providing strategic innovation advice, supporting the identification, and piloting of new solutions, running corporate accelerators and sandboxes, collaborative initiatives, and bespoke innovation programmes, we help them solve complex problems with the world's best technologies.

Safetytech Accelerator was established by Lloyd's Register in 2018 and incorporated as a business in 2021. To date, we have partnered with over 60 industrial organisations with more than three million employees and a combined annual revenue of \$2 trillion.

We have engaged over 600 technology companies and delivered over 70 emerging technology projects and deployments for clients, including Amazon, PepsiCo, Maersk, Shell, National Safety Council, Seaspan Corporation, Health and Safety Executive, and Anglo American.

Visit us at safetytechaccelerator.org





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Safetytech Accelerator is interested in partnering with leading organisations to advance innovation in safety-critical industries and infrastructure.

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