Inseer™

Intelligence in Every Movement™

White paper

A new category

The Economics of Human Motion

Introducing Enterprise Human Motion Intelligence (EHMI)

Physical work is the blind spot in enterprise intelligence. EHMI makes it visible, measurable, and comparable across every site, connecting how work is done to decisions about safety, productivity, and performance. This paper sets out the economics, the Six Pillars of a mature program, and how enterprises move from site-by-site assessments to one enterprise-wide program.

> **Wherever Human Motion Affects Enterprise Performance, Inseer Creates The Intelligence.**

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EXECUTIVE SUMMARY

The blind spot in enterprise intelligence

Every multi-site operation runs on human movement: lifting, reaching, packing, assembling. Yet while enterprises measure their equipment, inventory, and capital in detail, the physical demands of work are still assessed one site, one task, and one specialist at a time.

The cost of that gap is large and poorly understood. Overexertion is the leading cause of serious workplace injuries in the United States. Its costs reach far beyond claims, into staffing, overtime, training, and production continuity, and they are scattered across Safety, Operations, HR, and Finance, so no single leader sees them whole.

Inseer introduces **Enterprise Human Motion Intelligence (EHMI)**, a new category that connects how physical work is done to how the enterprise makes decisions about safety, productivity, and performance. This paper explains why the gap exists, what closing it requires, and how one global manufacturer has started.

$13.1B

a year in serious injuries from overexertion, the #1 cause in the U.S.

Liberty Mutual, 2026

$48K

average cost of a medically consulted work injury

National Safety Council, 2024 data

~$1B

paid by U.S. employers almost every week in direct workers' comp costs

OSHA

Who this paper is for

Environmental, Health and Safety
Prioritizing exposure across every site

Operations
Deciding which work to redesign first

Human Resources
Weighing the physical demands of work

Finance
Evaluating workplace investments

Executive Leadership
Connecting physical work to operating priorities

Ergonomics and Engineering
Scaling assessment beyond the specialist

SECTION I

The enterprise-wide cost of physical work

Physical work creates value. Its demands also create cost. Repetitive movement, forceful exertion, awkward postures, and sustained loading are well-established risk factors for work-related musculoskeletal disorders, and they sit at the center of the most expensive injury category in American workplaces.

Overexertion involving outside sources, mostly the lifting, pushing, pulling, and carrying of manual material handling, is the single largest cause of serious workplace injuries, costing U.S. employers $13.07 billion a year in direct workers' compensation costs.[1] Across all causes, the National Safety Council puts the total cost of work injuries at $181.4 billion, or about $48,000 for every medically consulted injury.[2]

1 Liberty Mutual Insurance, 2026 Workplace Safety Index (2023 data). 2 National Safety Council, Injury Facts: Work Injury Costs (2024 data). Full references on page 12.

Those figures capture only what is easiest to count. One strain injury can also touch:

- Workers' comp claim
- Medical costs
- Lost work time
- Overtime to cover shifts
- Reassignment
- Replacement training
- Supervisor time
- Production continuity

Four budgets, four partial views

In a multi-site enterprise, those effects land in different budgets, owned by different leaders.

Safety
understands the exposure.

Operations
absorbs the disruption.

Human Resources
manages the workforce impact.

Finance
sees only part of the resulting cost.

The enterprise therefore faces two connected problems. The first is the physical-work exposure itself. The second is the fragmentation of the information needed to understand its operational and financial consequences. Solving the second problem is how an organization gets dramatically better at solving the first.

SECTION II

The missing intelligence layer in operations

Enterprises expect consistent, comparable information across facilities, functions, and business units. Physical work is a striking exception. Its analysis still depends on local assessment capacity and on specialists who are rarely available at every site.

The problem is not the science. Established methods such as the NIOSH Lifting Equation, the Liberty Mutual Manual Materials Handling Equations, the Revised Strain Index, and the ACGIH Hand Activity TLV provide rigorous ways to evaluate specific work demands. The problem is scale, and it shows up in two ways.

Findings don't compare

Two assessors can score the same task differently, and methods are often applied differently from site to site. What can't be compared can't be prioritized.

Most work is never measured

Most organizations assess only a small share of their jobs, often after a complaint or injury. The work that is never assessed is never improved.

Consider an organization operating multiple fulfillment centers. Each contains numerous lifting, handling, packing, and material movement tasks, shaped by different shifts, equipment, and work methods. Individual assessments can identify real concerns. But enterprise leaders need answers to broader questions.

01 Which types of physical work warrant the greatest attention?

02 Where are similar exposures recurring across facilities?

03 Which interventions should be prioritized?

04 Are changes to work design improving measured exposure?

05 What resources should be allocated, and why?

Isolated assessment reports can't answer those questions. They require an information structure built for consistent measurement, interpretation, comparison, and action. That structure is the missing intelligence layer.

SECTION III

From assessment to enterprise intelligence

The emergence of advanced computer vision technology creates an opportunity to extend the reach of established ergonomic practices. With nothing more than a phone, computer vision and AI can now capture and evaluate real work, with no wearables, markers, or suits required. The result is assessment that's consistent with established methods, delivered at a scale the enterprise has never had before.

Technology alone does not create intelligence, however. A useful enterprise capability connects four functions, the conceptual progression from ergonomic assessment toward Enterprise Human Motion Intelligence.

01
Observation

Capture real tasks, movements, and working conditions, consistently, at every site.

02
Assessment

Apply the appropriate method to identify and characterize each exposure.

03
Enterprise interpretation

Organize findings across comparable tasks, facilities, and operating environments.

04
Decision and learning

Prioritize interventions, verify the change, and improve understanding over time.

The category, defined

Enterprise Human Motion Intelligence connects how physical work is done to how the enterprise makes decisions, turning consistent measurement of human movement into shared priorities, funded improvements, and proven results across every site.

EHMI does not eliminate the need for professional judgment, employee participation, or engineering controls, and it does not claim that every movement can be translated into an injury prediction. Its purpose is narrower and more practical: to make reliable information about physical work useful in enterprise decisions.

SECTION IV

The three-layer economics of human motion

The economic significance of physical work becomes clear when it is viewed in three connected layers. Each builds on the one before it, and each is owned by a different part of the organization.

Layer 1

Workforce exposure

Force, repetition, posture, and duration combine to create musculoskeletal risk. Structured assessment identifies which tasks warrant intervention.

EHS asks: Where does the work need attention?

→

Layer 2

Operational disruption

Injuries, restrictions, and turnover generate overtime, reassignment, retraining, and lost continuity. These effects can't be inferred from an exposure score alone.

Operations and HR ask: What does this mean for the business?

→

Layer 3

Financial impact

Claims, employer-paid medical costs, lost work time, administration, productivity disruption, and the cost of interventions themselves.

Finance asks: Which investments does the evidence support?

Most organizations can see the first layer at a handful of sites and pieces of the third in their claims data. The second layer, where much of the day-to-day business impact lives, is often the least visible of all. Connecting the three is what turns ergonomic findings into enterprise decisions.

A risk score is not a financial return.

A credible economic case requires evidence that an intervention changes relevant conditions, and that those changes produce, or can reasonably be expected to produce, measurable business outcomes. The opportunity is not to calculate a theoretical cost of injury. It is to build a disciplined connection between identified exposure, practical intervention, measured change, and financial consequence.

SECTION V

From exposure to measurable value

Take a real example: a global manufacturer with 55 sites in four regions (customer name anonymized). It needed a consistent way to assess repetitive production tasks across every site. Two approaches were open to it.

Conventional approach

Each facility conducts a limited number of assessments and pursues local improvements.

EHMI-oriented approach

Apply consistent assessment methods, compare similar tasks across facilities, prioritize interventions, and measure whether the changes improve physical-work conditions.

Where the company started

The company chose the second approach. Its starting point was typical: no formal ergonomics program, no standard tools or training, and most sites covered by a single EHS generalist, or by the plant manager at smaller sites.

Start small, then scale what works

Rather than attempt an enterprise rollout all at once, the company began with a proof of concept: two sites per region, with ten assessments assigned to each. Site safety leads completed the assessments themselves after 1 to 1.5 hours of training videos, with the global ergonomics team reviewing their work. Once the results met its criteria, it scaled in two waves.

From proof of concept to enterprise scale

Proof of concept
8 sites
Two per region, early 2025

→

Phase 2 · Q3 2025
10 sites
The largest sites

→

Phase 3 · Q4 2025
36 sites
The remaining smaller sites

SECTION V, CONTINUED

How the company measured success

The company set its success criteria before scaling and judged the proof of concept on three dimensions, which Inseer groups as SHIFT: Safety, Human Impact, and Financial Transformation.

Dimension	What they looked for	What they found
Safety	A consistent risk measure for routine tasks, with before-and-after comparison	One redesign cut a top-priority task's Inseer Composite Rank Score by 55%, from 94 to 42, moving it down the list of tasks to fix first. One site assessed about 20 tasks in its first batch.
Human Impact	Site team adoption and worker response	Sites rated it 4.5 out of 5. Filmed workers saw the safety team proactively improving their jobs.
Financial Transformation	Evidence for capital requests, annual priorities, and leadership visibility	One dashboard by site, region, and business unit, with progress reported to executives monthly.

Sources: customer conference presentation, 2026 (anonymized). SHIFT grouping by Inseer.

54
sites live in one year

From SHIFT to enterprise scale

Eight sites tested it first. Within a year, 54 of 55 sites were live, with site safety leads running their own assessments.

What this case does not yet show

Changes in injury frequency, severity, and cost need a longer observation period and a baseline before they can be claimed. That standard applies to every organization building its own case.

SECTION VI

The Six Pillars of Human Motion Intelligence

Inseer's Six Pillars of Human Motion Intelligence describe what a mature, enterprise-wide program looks like. Where an organization stands on each one is the starting point for building an enterprise program.

01
Consistent Assessment

Apply the same documented, validated methods at every site, with consistent quality control, and define where each method can and cannot be applied.

02
Enterprise Visibility

Give leaders one current view of physical-work risk by site, business unit, and work activity, so Safety, Operations, and Finance work from the same picture.

03
Risk-Based Prioritization

Rank measured exposure across the enterprise so resources go where risk is highest, weighed against operational significance and investment decisions.

04
Program Governance

Treat physical work as an enterprise operating variable, with clear ownership, operating procedures, and accountability at every level.

05
Measured Progress

Start with representative tasks, establish baselines, and report results to leadership with a transparent model that separates assumptions from observed outcomes.

06
Continuous Improvement

Make assessment a repeatable cycle of observation, intervention, and reassessment, where each round's results set the next round's priorities.

> "Inseer has been a vital partner in simplifying and tracking our job task assessments. They made the entire process more efficient, and we look forward to growing our collaboration!"
>
> **Ergonomic Specialist, Hyundai Motor Group Metaplant America**

CONCLUSION

Human motion as enterprise intelligence

The enterprises of the future will not be defined solely by how effectively they manage machines, materials, information, and capital. They will also need to understand the physical work through which their operations function.

Enterprise Human Motion Intelligence is how they will get there. Its first application is workforce risk: identifying and evaluating physical-work exposures so organizations can make better-informed decisions about where and how to intervene.

Its larger role is an enterprise intelligence capability that connects physical work to safety, productivity, and performance, and to the operational and investment decisions that shape them.

Inseer is building that capability the way this paper recommends: with rigorous measurement, responsible implementation, and outcomes customers can verify.

Human motion has always created enterprise value. It is time to make it part of enterprise intelligence.

> "Establishing a new technology category requires more than defining a market opportunity. It requires delivering meaningful results for customers."
>
> **Woody Ritchey, Chief Executive Officer, Inseer**

About the authors

Mitchell Messmore, PhD
Chief R&D Officer, Inseer

An expert in computer vision and human pose estimation, with a PhD in mathematics (3D and 4D geometry). Mitchell leads the design of Inseer's AI models, which turn video into human motion data to predict ergonomic risk and prevent injuries and MSDs.

Carly Mojica
Chief Product Officer, Inseer

Brings expertise in human-centered design and product strategy. Carly leads Inseer's product vision, translating complex AI capabilities into intuitive, scalable solutions that deliver customer and business value.

Fredrick "Fritz" Smith
Chief Commercial & Marketing Officer, Inseer

An enterprise commercialization and growth strategist with deep experience in technology, revenue performance, and EHS&S. A published author, former Vice President of Global Sales at IHS Environmental (now Sphera), and Founder of Topline Catalyst, Fritz leads the commercialization of EHMI, connecting workforce safety and operational performance to measurable enterprise value.

About Inseer

Inseer, based in Iowa City, Iowa, is an AI-powered workplace technology company developing Enterprise Human Motion Intelligence, which turns human motion into actionable insights for safety, productivity, and performance. Its video-based computer vision and AI technology helps organizations analyze physical work, identify risk, prioritize interventions, and verify improvements across every site. Built on ergonomics and proactive injury prevention, Inseer is extending human motion intelligence from single-site assessment to an enterprise capability.

Wherever Human Motion Affects Enterprise Performance, Inseer Creates The Intelligence.

See where you stand today: take the Program Maturity Assessment at **inseer.com**.

References

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2 National Safety Council. Injury Facts: Work Injury Costs (2024 data). injuryfacts.nsc.org

3 Occupational Safety and Health Administration. Business Case for Safety and Health: Costs. osha.gov

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6 National Institute for Occupational Safety and Health (NIOSH). About Ergonomics and Work-Related Musculoskeletal Disorders. cdc.gov/niosh

7 NIOSH. Step 1: Identify Risk Factors.

8 Case study findings from the customer's public conference presentation, 2026. Customer anonymized; SHIFT grouping is Inseer's.