

CMI
COMPLIANCE MANAGEMENT INTERNATIONAL

Ergonomics Technology

Is it Right for Your Workplace?

Today's Presenter

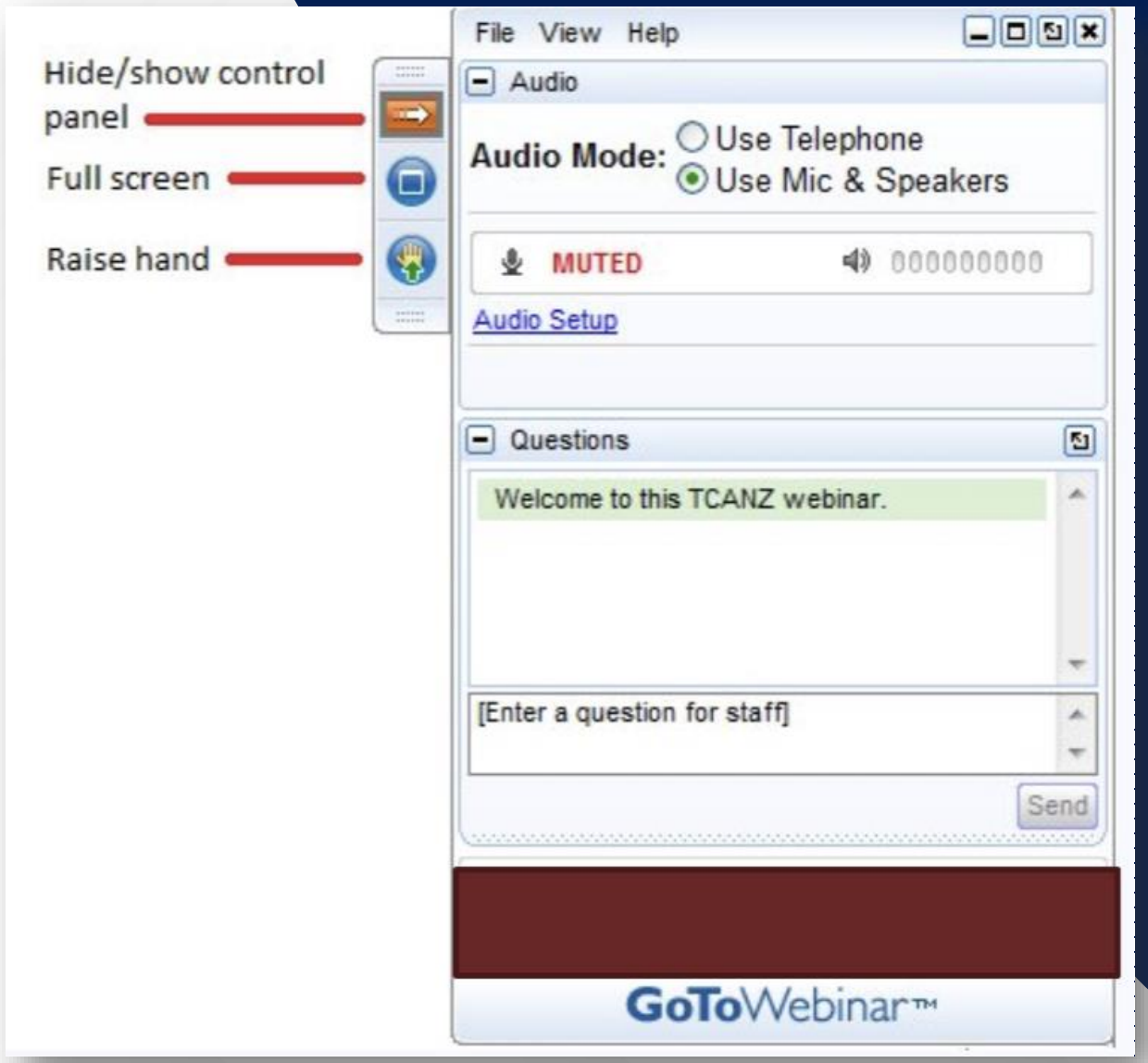


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Senior Ergonomist

Housekeeping

- ✓ This presentation is being recorded and will be shared along with the slides after the session is complete (less than 48 hours).
- ✓ Everyone will be muted to prevent background noise.
- ✓ Use the question button to log your question.

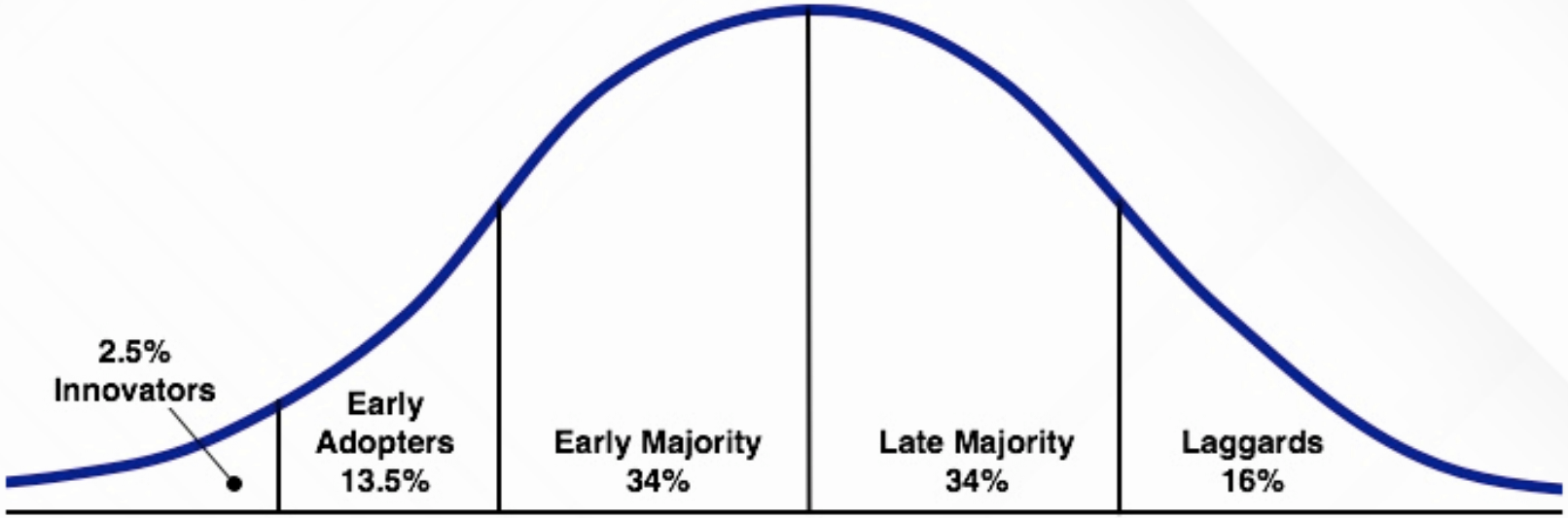


Today's Topics

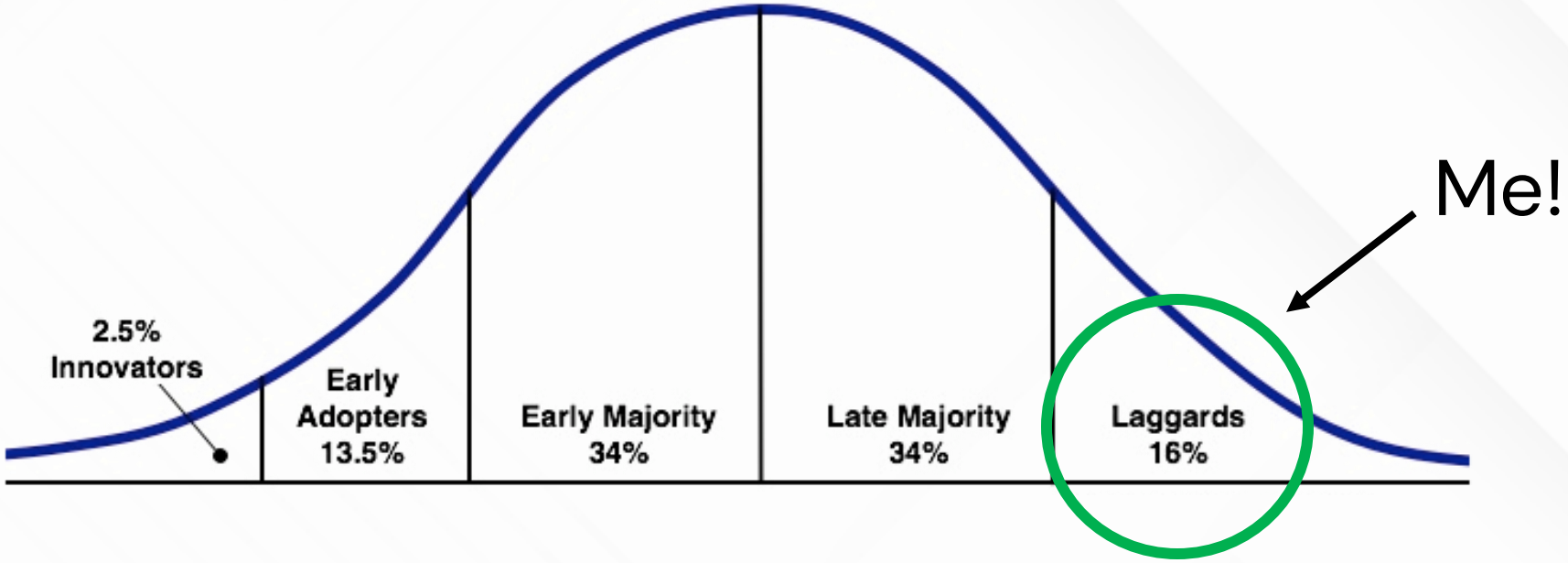


- Technology Adoption Cycle
- Ergonomics: the What, the Why and the How
- Injuries and Risk Factors
- Assessment Methods
- Exoskeletons/Exosuits
- Is New Tech Right for Your Workplace?
- Key Takeaways
- Questions

Technology Adoption Cycle



Technology Adoption Cycle



Ergonomics is about …

… designing (changing) workspaces, processes, equipment and tools so the physical task demands don't exceed employees' capabilities.

Ergonomics adds value by:



How to Use Ergonomics



Without Ergonomics – Bad Things can Happen

3 of the top 10 workplace injuries can be prevented by ergonomics

1 Overexertion involving outside sources

Cost per year: **$13.07B**



Watch for heavy loads
Do workers have access to equipment that reduces the need to lift heavy items?

Moving stuff – lifting, carrying, pushing and pulling

6 Other exertions or bodily reactions

Cost per year: **$3.23B**



Watch for exiting a vehicle
Are ergonomic measures implemented wherever possible?

Awkward postures and movements; static postures

10 Repetitive motions involving microtasks

Cost per year: **$1.59B**



Watch for hand- and shoulder-intensive work
Do engineering controls reduce forceful exertions and enable good postures, and does scheduling allow for breaks?

Packing, unpacking, sorting, picking, stocking, cutting, loading, tool use

Source: 2026 Liberty Mutual Safety Index

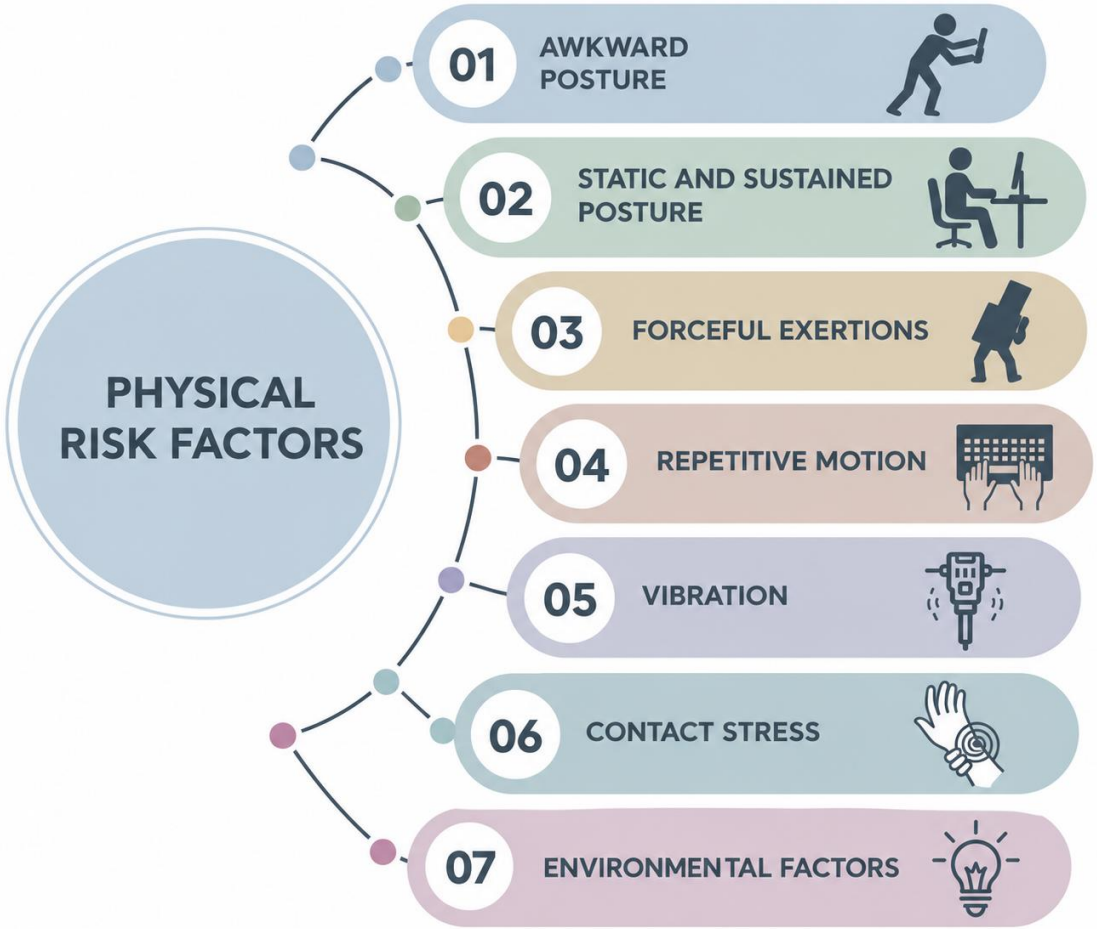
What Causes these Injuries

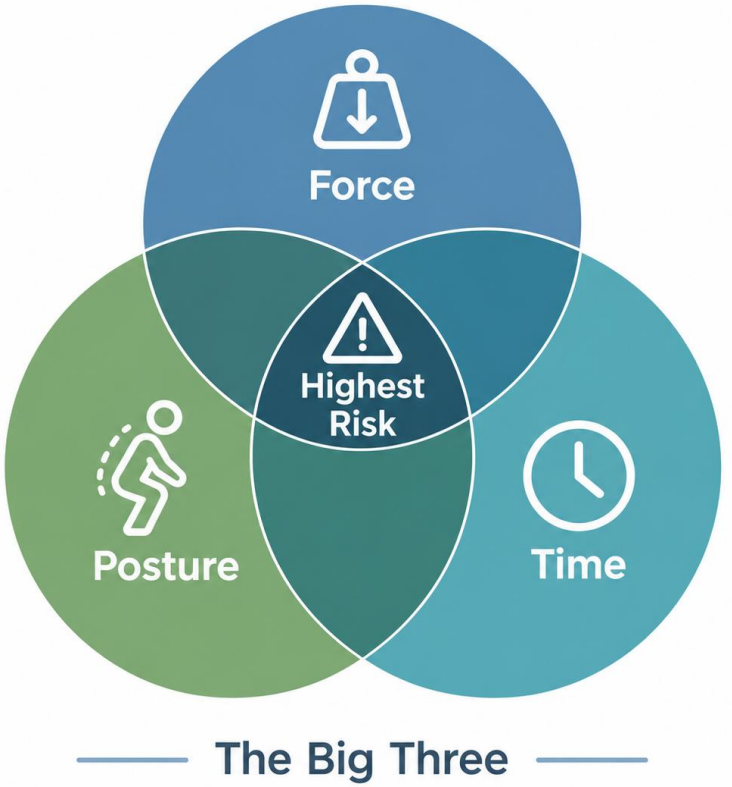


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Work Demands > Workers' Capacities = Risk Factors





So, When do Risk Factors become a Hazard?

Ergonomics assessments can help determine the degree of risk or hazard.

Assessment formats:

- Paper forms
- Excel calculators
- Phone applications
- Wearable sensors
- Computer vision & AI

Hazard Assessment Methods

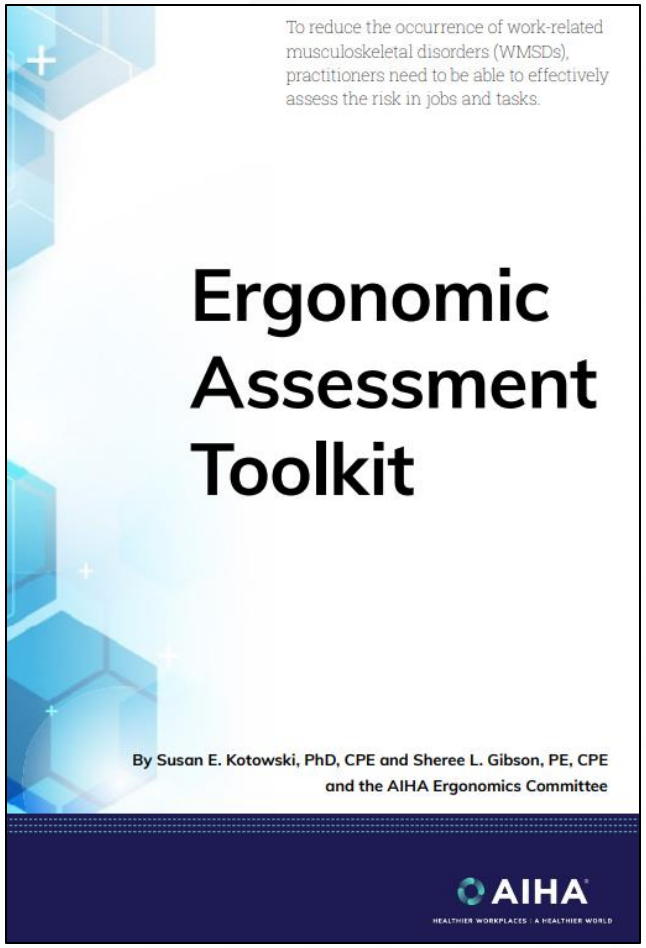
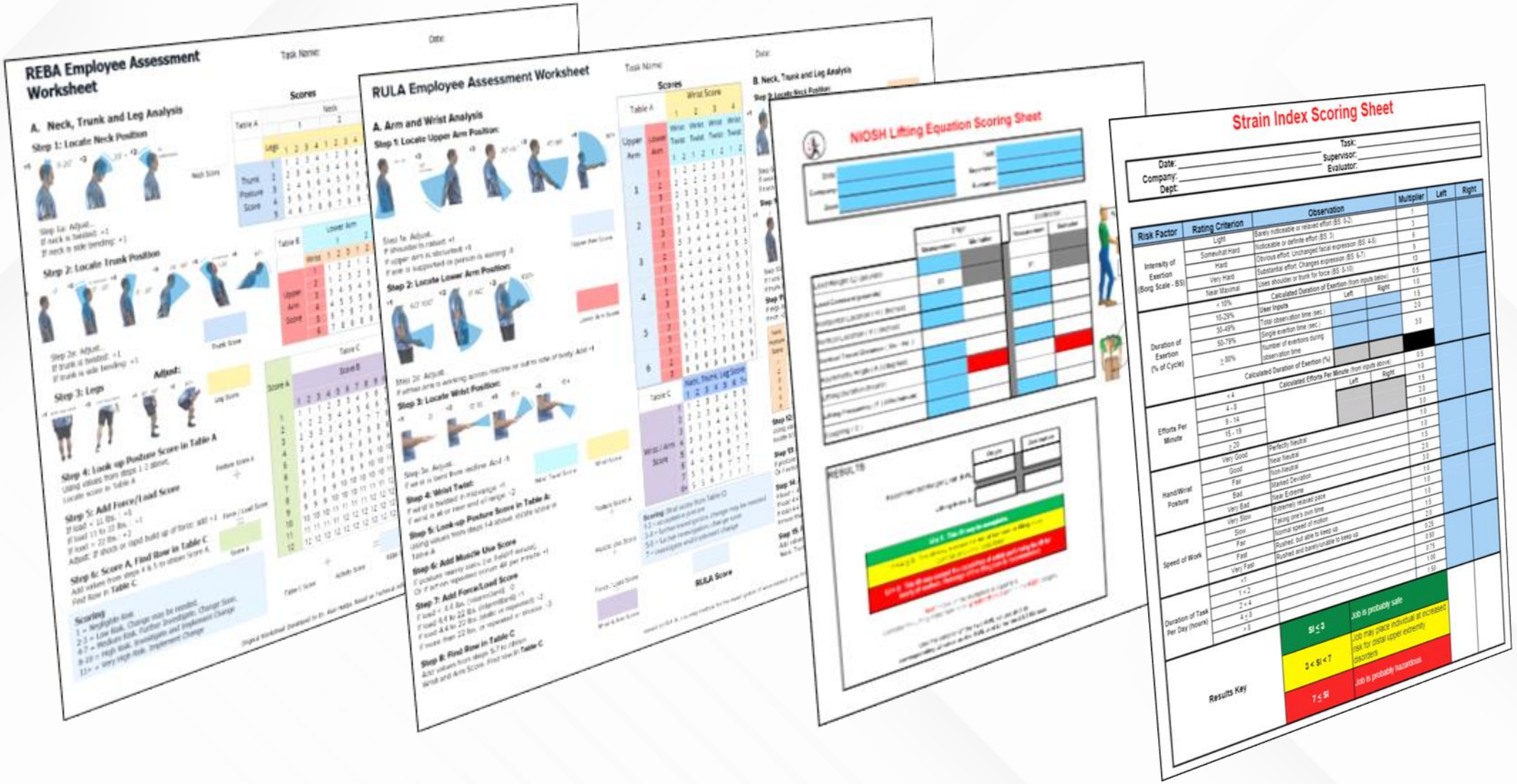


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All are validated and reliable

Hazard Assessments: Paper Forms



Hazard Assessments: Excel Calculators

NIOSH Lifting Equation



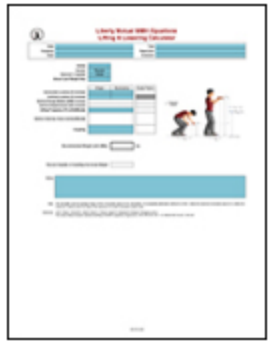
NIOSH LE Calculator English Units (Excel)
NIOSH CLI Scoring Sheet (pdf)

Strain Index



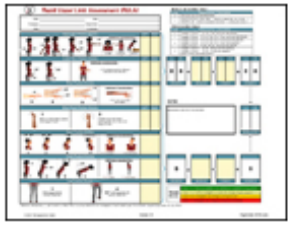
Revised Strain Index Calculator English Units (Excel)

LM MMH Equations



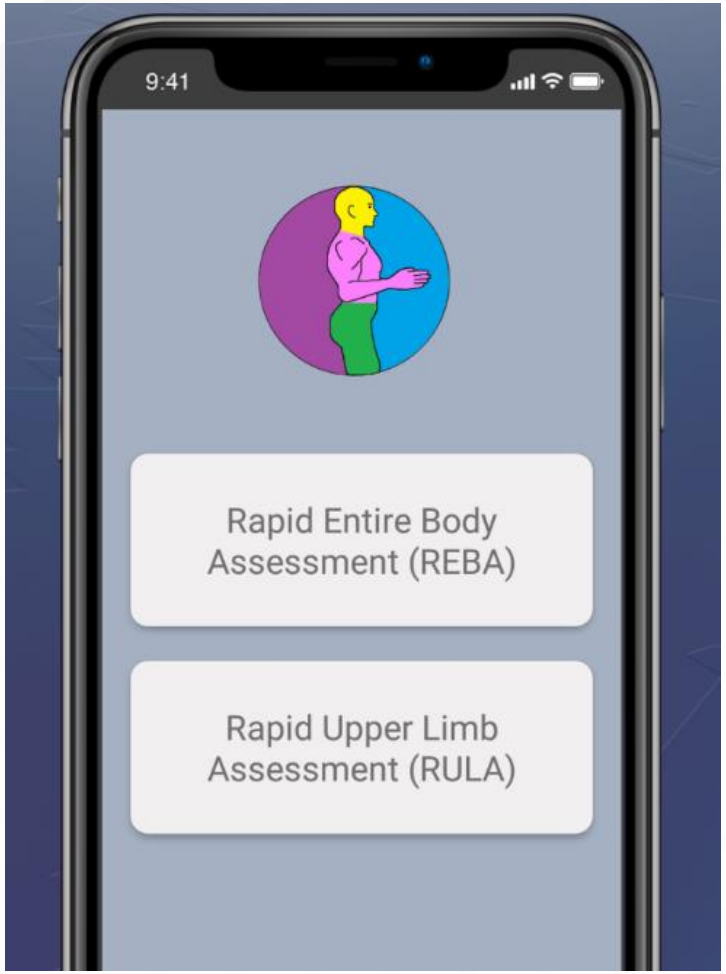
LM MMH Equations Calculator
(Excel)LM MMH Equations Video (how they work)

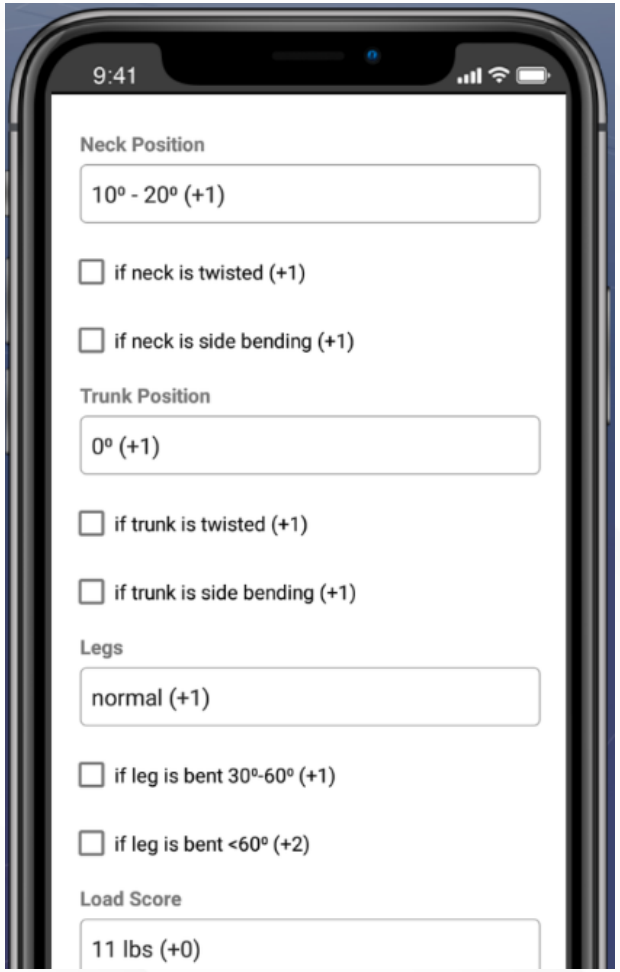
RULA



RULA Quick Reference Tables (pdf)
RULA Smart Calculator (Excel)

Hazard Assessments: Phone Applications





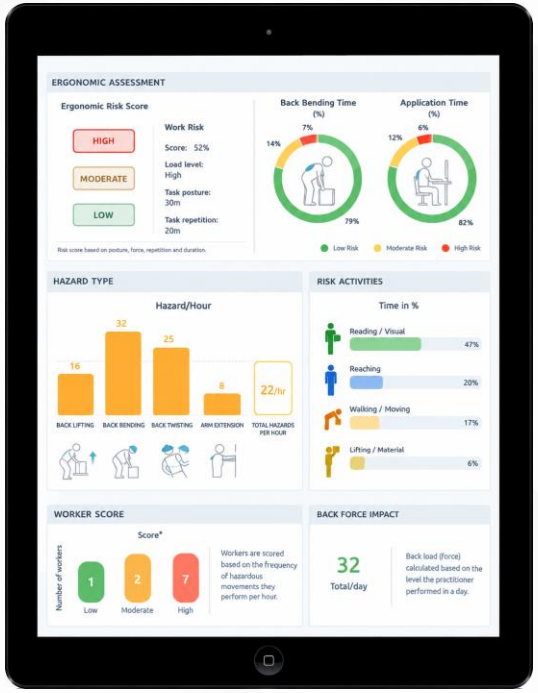
Hazard Assessments: General Considerations

- Best for mono tasks
- Older methods (20-35 years old)
- Observation based
- Many are more postural focused – force is “weighted” less
- Time consuming
- Requires training
- Focus on specific tasks and/or body segments
- Risk scores are not standardized

Hazard Assessments: Emerging Technologies

Wearable Sensors and AI





Wearable Sensors: Potential Benefits

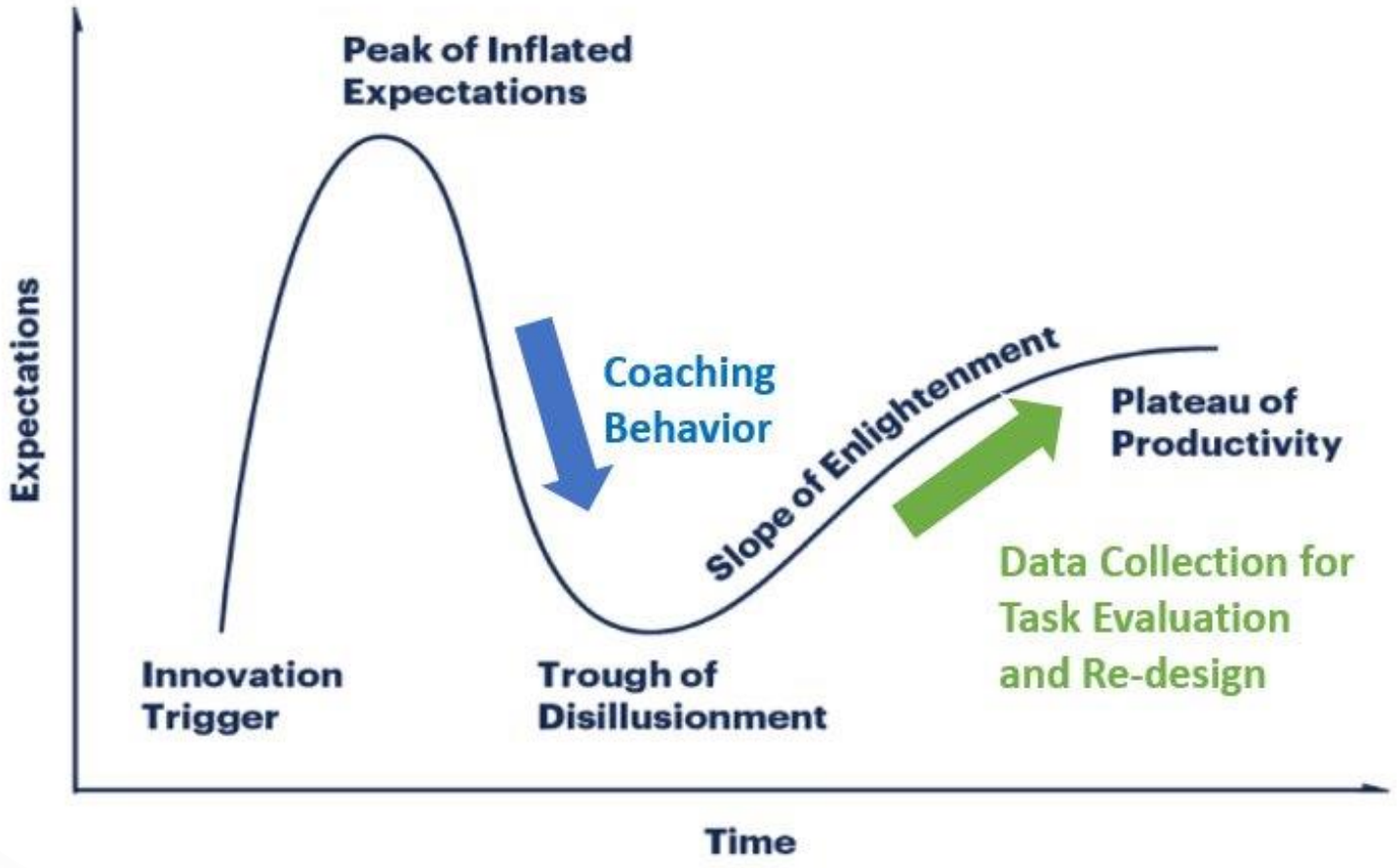
- Quickly collect a lot a data on multiple employees over longer periods of time
- Provides information that can lead to insights into potential opportunities for further evaluation, solutions and actions



Wearable Sensors: Factors to Consider

- Sensors might interfere with task performance
- Sensor accuracy and reliability
- Validity of assessment methods used; still relying on older methods?
- Individual vs. population risk score
- Can capture more risk data – are you ready to prioritize and manage?
- Cost: proprietary software/cloud – who owns the data?
- Employee trust and privacy: surveillance (stress, alienation) – don't use as a "gotcha"!

Wearable and AI Hype Cycle



Hazard Assessments: Emerging Technologies

Computer Vision & AI



Source: Liberty Mutual



Source: VelocityEHS

Computer Vision & AI: Potential Benefits

- Less disruptive and invasive
- Quickly collect and assess a lot of tasks/data
- Interprets and analyzes visual data and manual inputs
- Some use standardized risk scores
- Assess multiple movements
- Story telling and communicating



Computer Vision & AI: Factors to Consider

- Measurement estimation accuracy/reliability
- Not just point and shoot: camera position – single point of view/angles
- Validity of assessment methods used; still relying on older methods?
- Individual vs. population risk score
- Can capture more risk data – are you ready to prioritize and manage?
- Cost: proprietary software/cloud – who owns your data?
- Employee trust and privacy: surveillance (stress, alienation)

Wearable Sensors and CV/AI Still Need Inputs

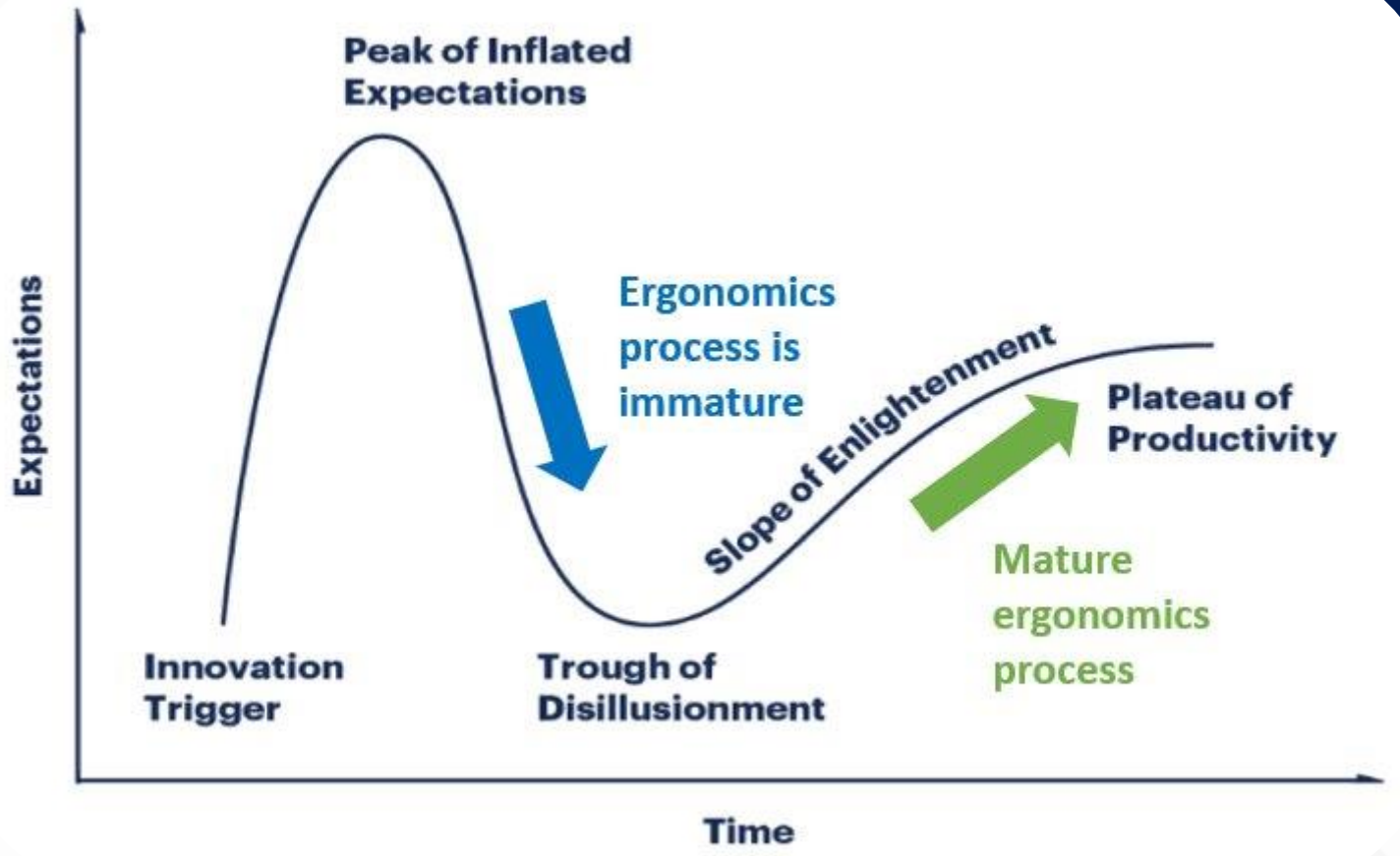
- Weights: manifests, labels, scales
- Distances: tape measures, lasers, wheels
- Forces: push/pull, grip, pinch gauges
- Time (frequency and duration)







Computer Vision & AI Hype Cycle



Fixing Hazards: Exoskeletons & Exosuits

Definition: wearable devices that augments, enables, assists and/or enhances motion, posture or physical activity through interaction with the body.

- Exoskeletons: feature rigid frameworks (e.g., metal, carbon fiber)
- Exosuits: feature soft, flexible and elastic materials

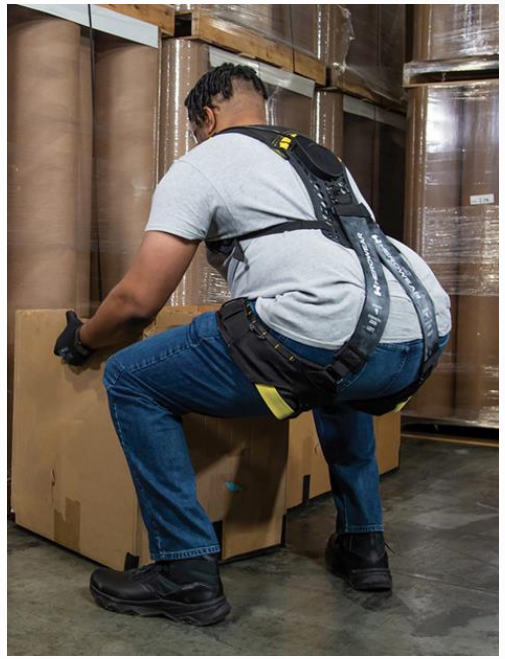
- Passive: rely on mechanical springs, elastic bands to store and release energy
- Active (powered): use electric motors, batteries, pneumatics to assist movement

Fixing Hazards: Exoskeletons & Exosuits

Exoskeletons/exosuits can support specific body segments/movements.



Source: Ekso



Source: HeroWear



Source: Skelex Iron Hand

Exoskeletons & Exosuits: Potential Benefits

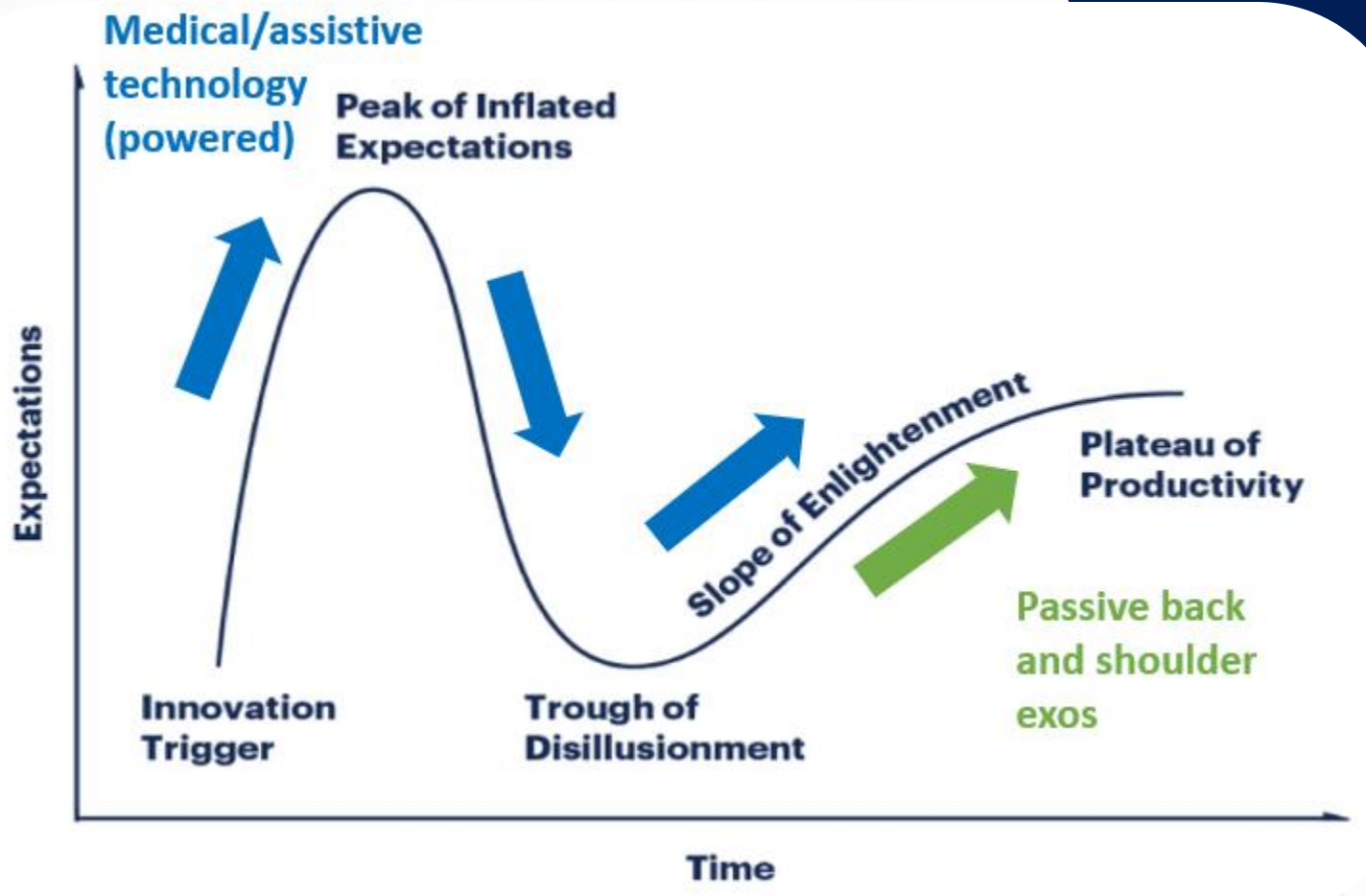
Laboratory, field and case studies:

- Reduces exertion/forces
- Supports static postures
- Reduces discomfort
- Minimizes fatigue
- Increases endurance/increases productivity
- Injury reduction – evidence is emerging

Exoskeletons & Exosuits: Factors to Consider

- Hierarchy of controls – engineering controls first
- What are exoskeletons: PPE, tool, ergonomic aid?
- Task(s) specific – will it interfere with other tasks and PPE?
- Cost (Investment)
- Does it create a potential hazard?
- Time – training, donning, doffing, adjusting; acceptance and use
- Sizes, adjustability and sharing
- Cleaning, maintenance and storage
- Plan to evaluate, select and deploy!

Exoskeletons & Exosuits: Hype Cycle



Where do these Technologies Fit?



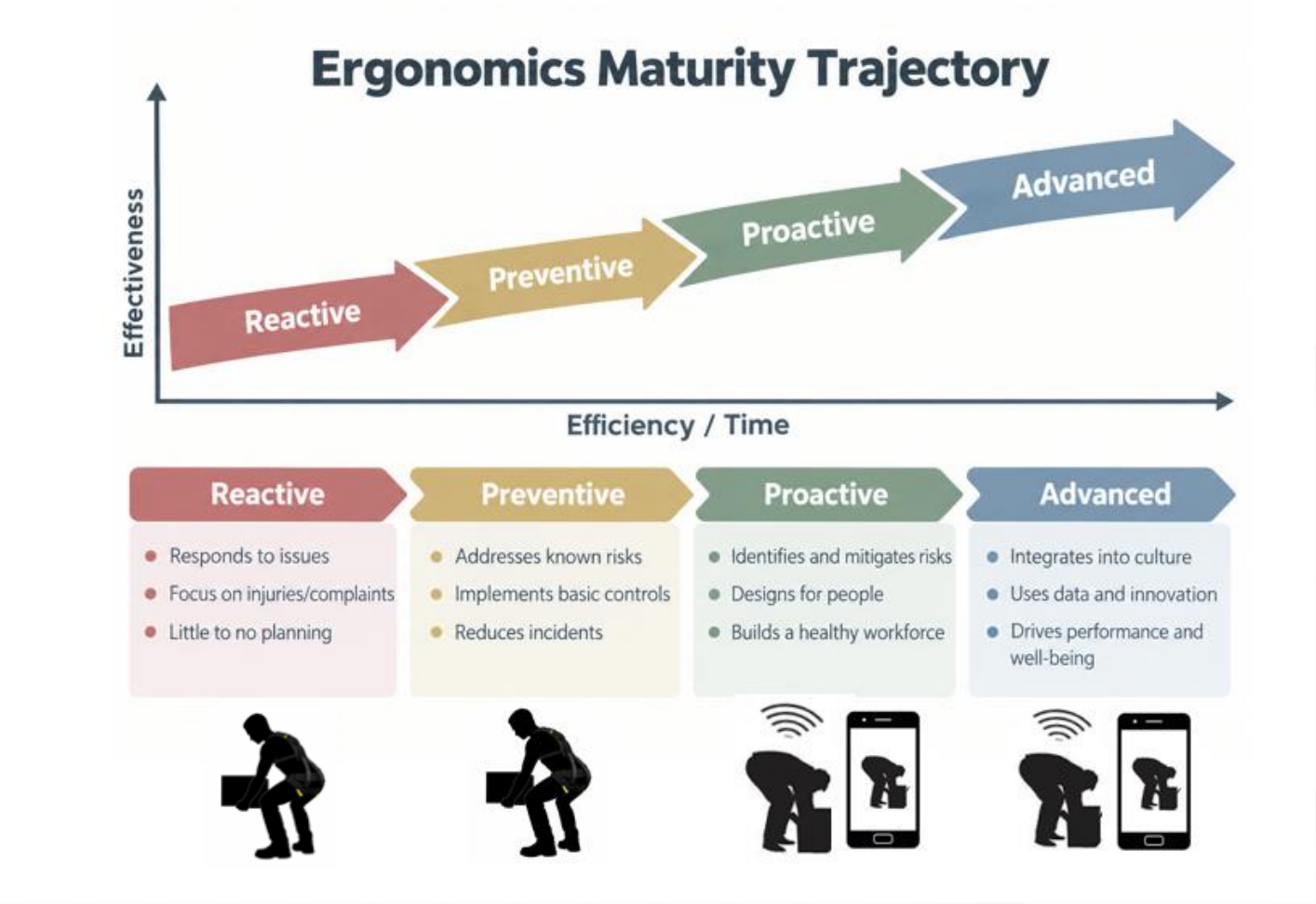
Where do these Technologies Fit?



Where do these Technologies Fit?



Are these Right for your Workplace?



What if your Workplace is not ready?

Use a Participatory Ergonomics approach

Watch the work, and ask employees what tasks:

- Make them sore and tired at the end of the shift, and why?
- Take a lot of physical effort, and why?
- Take too long to do, and why?
- Are frustrating to do, and why?

Then ask them what ideas do they have to improve the tasks?

Key Takeaways

- Benefits are greater than limitations, but be mindful of limitations
- Research, research, research!
- Evaluate where you are at on your ergonomics journey
- Tools, not a process (with a couple of exceptions)
- Select the right tool for your situation
- Technology revels risks; process controls risks
- Success depends on people, process and change management
- Start with a simple process, then integrate new technologies

Workplace Ergonomics Program Field Guide

- After the webinar, look out for your follow-up email. It contains your direct link to download the **Workplace Ergonomics Program Field Guide** , to finding and fixing the tasks that wear on your people, with a 5-step process and a task-by-task controls table.





"We are becoming aware that the major questions regarding technology are not technical but human questions"

Peter F. Drucker, 1967

Questions?

Thank you!

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