

Charrette

The Emergent Construction Technologies Workshop: Wearables and ROI

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Schedule

Exoskeleton Charrette

- 10 minutes: Introduce emergent technologies
- 10 Minutes: Business Planning: write down your EC Ambition Matrix
- 5 Minutes: Introduce the Exoskeleton Technology (E.T. (phone home)) and the Need
- 30 Minutes: Group Meeting: Try on the exoskeleton and then discuss the implications of such a technology for your company.
- 15 Minutes: ROI: Joe Kopko discussion about further implications and ROI
- 5 Minutes: Reporting back: What have you identified as important for adoption in your organization?



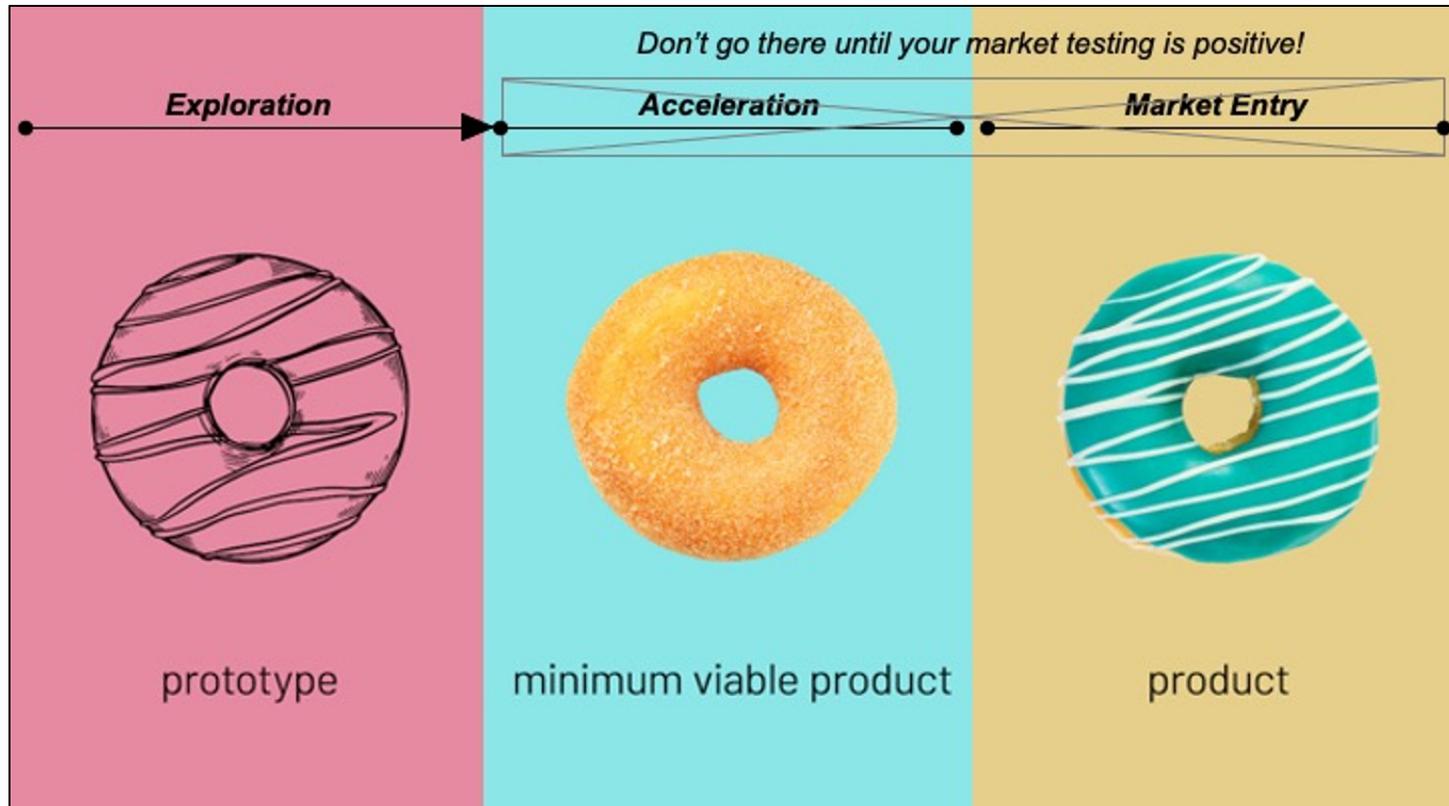
(Re)Viewing Innovation

- For many companies, innovation is a sprawling collection of initiatives, individual and uncoordinated and managed with dissimilar strategies.
- Most organizations, and construction organizations in particular, are not able to utilize disruptive technology. So, finding a diversified portfolio of emergent technologies is important.
- Managers are often aware of innovation happening yet unaware of how to harness it for the benefit of the organization.
- Steady, above-average returns can be achieved only through a well-balanced portfolio. Companies with the strongest innovation track record articulate a clear ambition; strike the right balance of *core*, *adjacent* and *transformational* initiatives across the enterprise; and have put in place the tools and capabilities to manage those various initiatives as parts of an integrated whole.



Diverse Portfolio?

What does the innovation portfolio in your organization look like?



Do you have a portfolio? Do you view it that way?
Finding a diversified portfolio of emergent technology is important.

Source: Simon Ryschka, Ph.D. of REHAU



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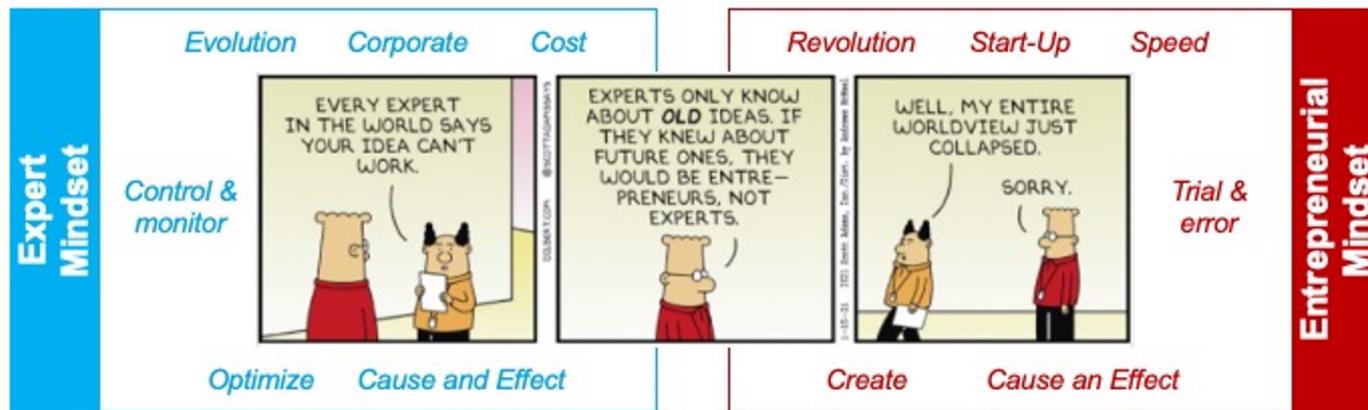
Innovation Portfolio?

What is the right mix of talent or products for innovation in your organization?

Talent



Find the right mix of talent – experts and entrepreneurs



➤ **Both the expert and entrepreneurial mindset are equally important for a balanced innovation portfolio**

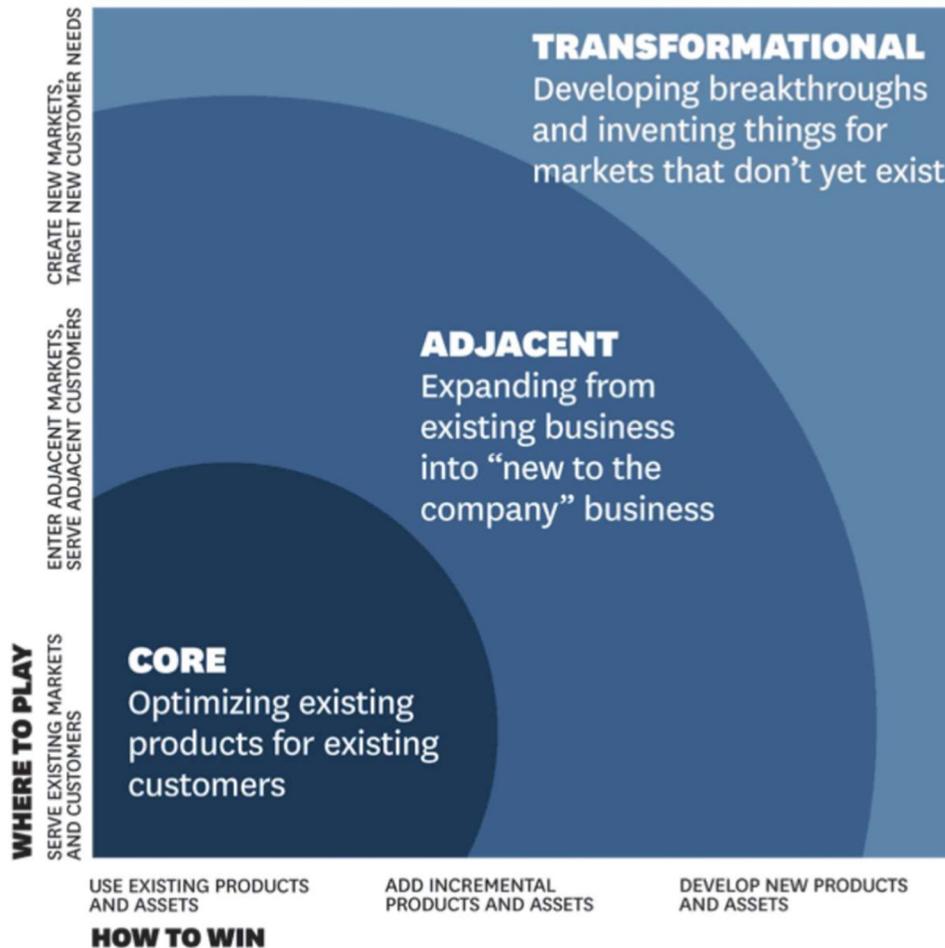
Source: Arthur D Little (2018), Dilbert (2021)

October 05th 2021 / Simon Ryschka, Ph.D. / 27

Do you have it? (most managers are unaware of how to harness innovation for the benefit of the organization)



Innovation Ambition Matrix



Nagji and Tuff (HBR: May 2012):

- Reviewed companies in the industrial, technology and consumer goods sectors to determine whether any particular allocation of resources across CORE, ADJACENT and TRANSFORMATIONAL correlated with better performance of the enterprise.
- On average, companies with innovation activity of 70% in CORE, 20% in ADJACENT and 1- % in TRANSFORMATIONAL performed best.

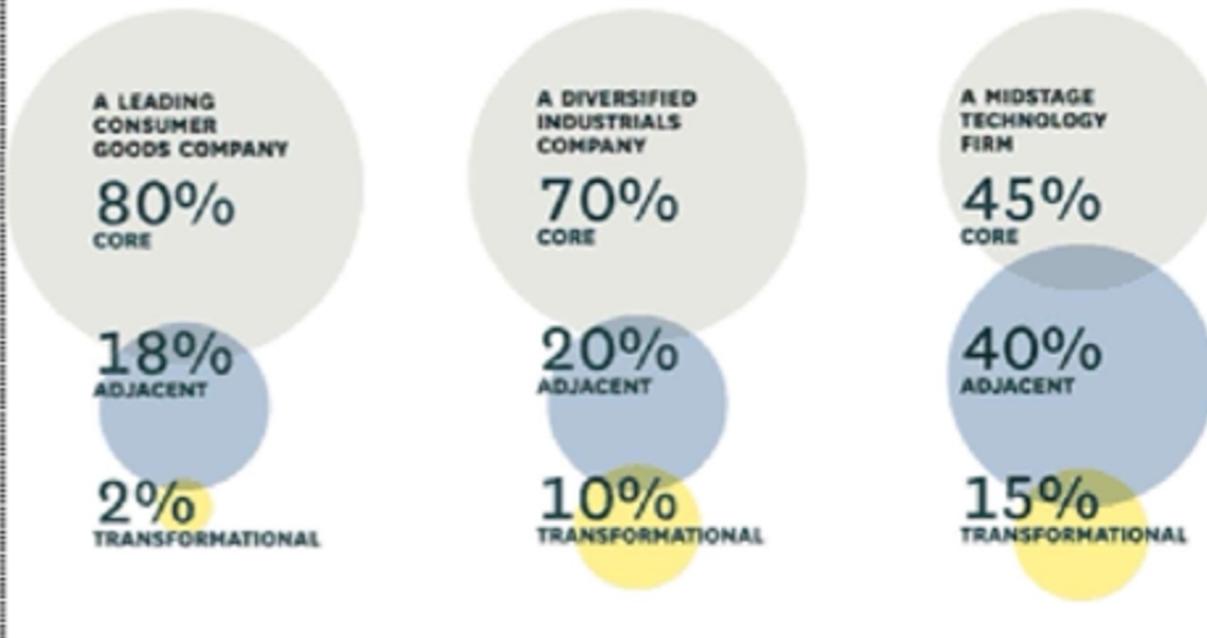


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EC Ambition Matrix?

Different Ambitions, Different Allocations



The Paradox is: TRANSFORMATIONAL technologies typically provide the best return in the longer term, so you need to strike a balance.

What would an EC Ambition Matrix Balance look like?



EC Ambition Matrix?

Ambition Matrix

What technologies are you looking into?	Customer who would you use it and why?	Cost to implement (High, Medium, Low)	Label it

Write on Board:

-Write % and Determine Portfolio

What types of innovative solutions are you using?

Can you label them?

1. Core
2. Adjacent
3. Transformational



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Case Study: Exoskeleton



Exo's continued



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Work- Related Musculoskeletal Disorders

- Work-related musculoskeletal disorders (WMSDs) are a group of painful disorders of muscles, tendons, and nerves (OSHA).
- WMSDs place a large economic and social burden on workers and their communities.
- WMSDs cost the US a total \$45 to \$54 billion annually (compensation cost, lost wages, productivity)
- Skilled labor shortage
- 94.8 MSDs per 10,000 FTE in 2019 (BLS 2019)
- High risk industries: Construction; Transportation and Warehousing; Health Care and Social Assistance; and Manufacturing.

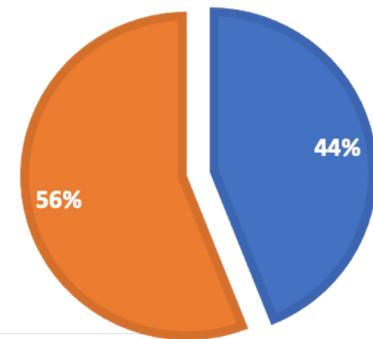


WMSDs in the Construction Industry

- Construction work – Physically demanding and repetitive
- WMSDs make up about 33% of non-fatal injuries and illnesses (Umer, et. al. 2017)
- 1.5 times likely to be affected by MSD compared to other industry sectors
- 12 days away from work (BLS 2019)
- \$5.99 billion in workers compensation annually

AFFECTED MUSCLES

■ Back ■ Knee, shoulder and wrist



Working Overhead



Kneeling



Back Bending Forward



Squatting



Neck Bending



Reaching



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Assess your risk

- Knowing which device to select, which tasks are the greatest risk, and which employees have the greatest need requires assessing your risk and whenever possible measuring it. Data becomes a powerful tool in negotiating with your insurance carrier!



Individual Athlete Data

In order for athlete data to appear in this chart, the sensors must be checked back in and the data files fully processed.

	Date	Name	Average Safety Score	Average Twist Velocity	Average Max Forward Bend	Average Max Tilt Velocity	Average Lift Rate	Pct Low Risk Observations
1	2020-09-10	Rose, Mary	80.2	21.6	73.3	61.6	75.2	88.6%
2	2020-09-11	Franklin, Jerry	79.0	18.2	77.4	61.6	70.3	81.6%
3	2020-09-09	Doe, Jane	78.6	18.6	78.0	61.1	77.8	80.2%
4	2020-09-11	Doe, Jane	78.5	24.7	74.9	64.5	72.3	81.6%
5	2020-09-11	Rose, Mary	78.4	19.0	75.2	64.1	78.5	78.6%
6	2020-09-11	Smith, John	77.2	19.5	78.4	64.4	86.3	77.3%
7	2020-09-10	Doe, Jane	77.2	20.4	76.0	67.4	73.4	75.0%
8	2020-09-09	Rose, Mary	76.6	19.3	81.0	69.8	91.9	80.2%
9	2020-09-08	Rose, Mary	76.5	34.3	77.4	69.3	91.5	78.6%
10	2020-09-06	Doe, Jane	76.3	32.5	79.2	70.2	84.8	77.4%



WMSDs amongst ECs



Electrical Contractor

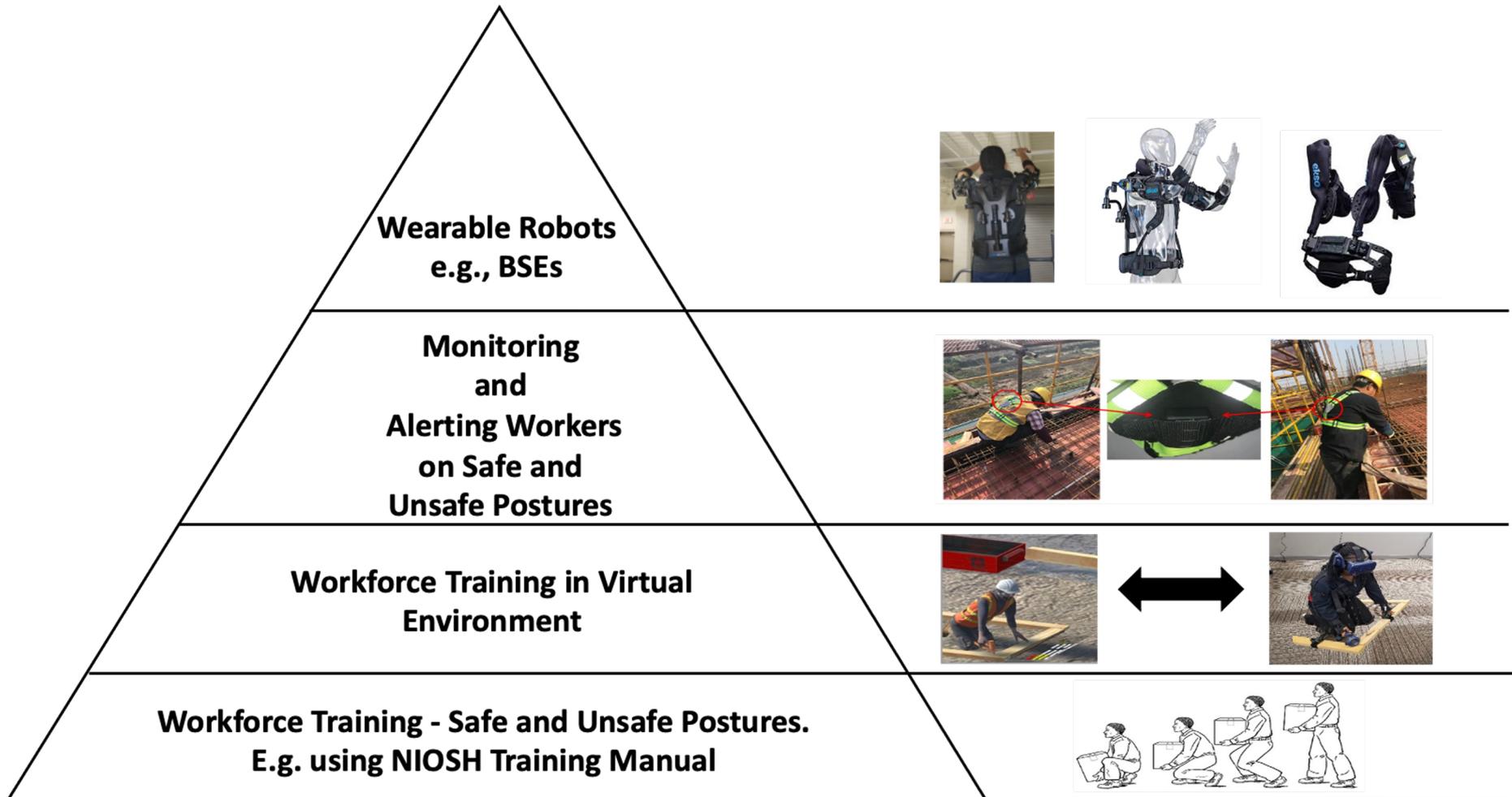
For example, between 1999 and 2002, more than 30 percent of all employee compensation claims from Electrical Contractors were related to ergonomics. This amounted to more than \$10 million in claims in just four years.



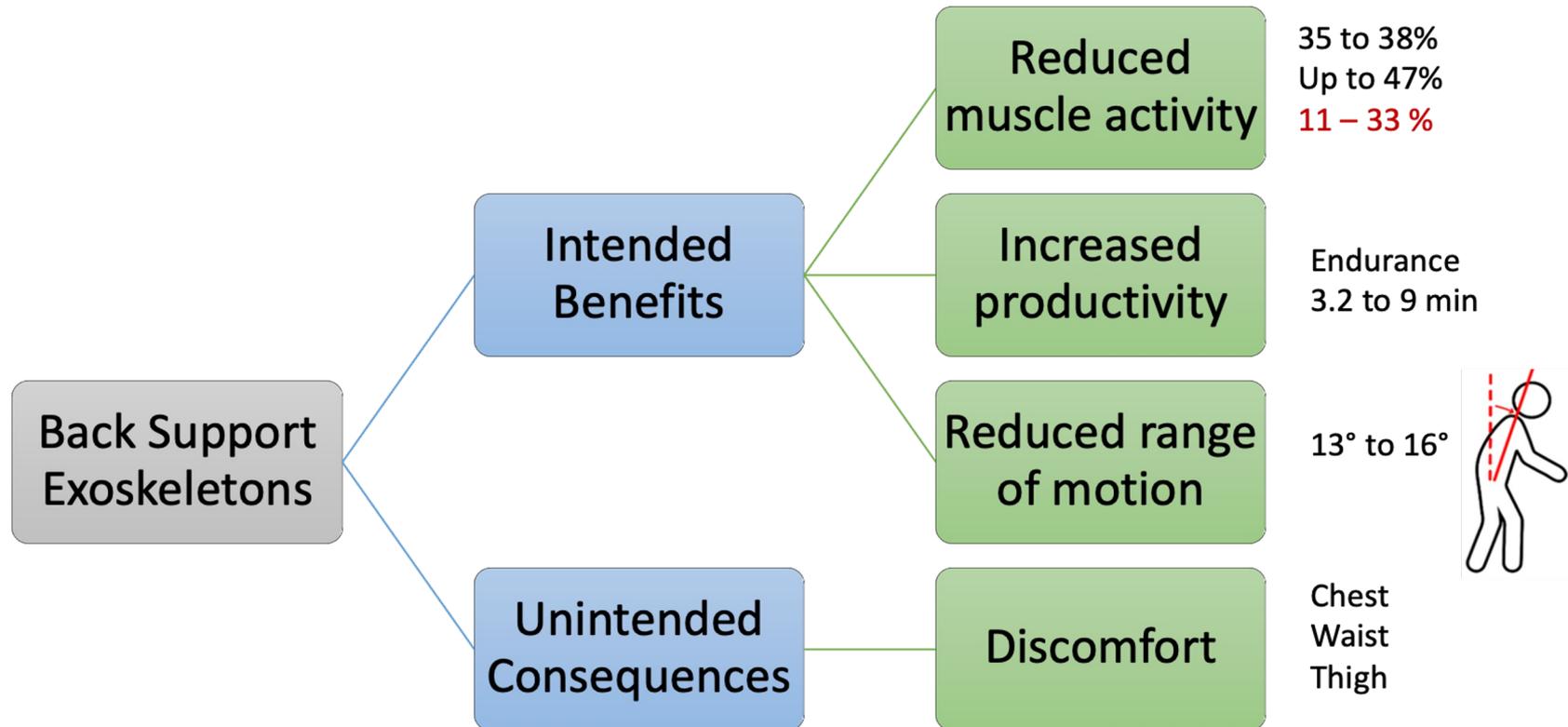
Construction workers aged 35 to 44 years had the highest rates of WMSD claims per 10,000 full-time employees from overexertion, followed by claim rates among construction workers aged 45 to 54 years and those aged 25 to 34 years.

Source: Orthopedics Today

Existing WMSD Solutions



Passive Back Support Exoskeleton



Case Study ROI

ROI Discussion



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Your Thoughts?

General Discussion

