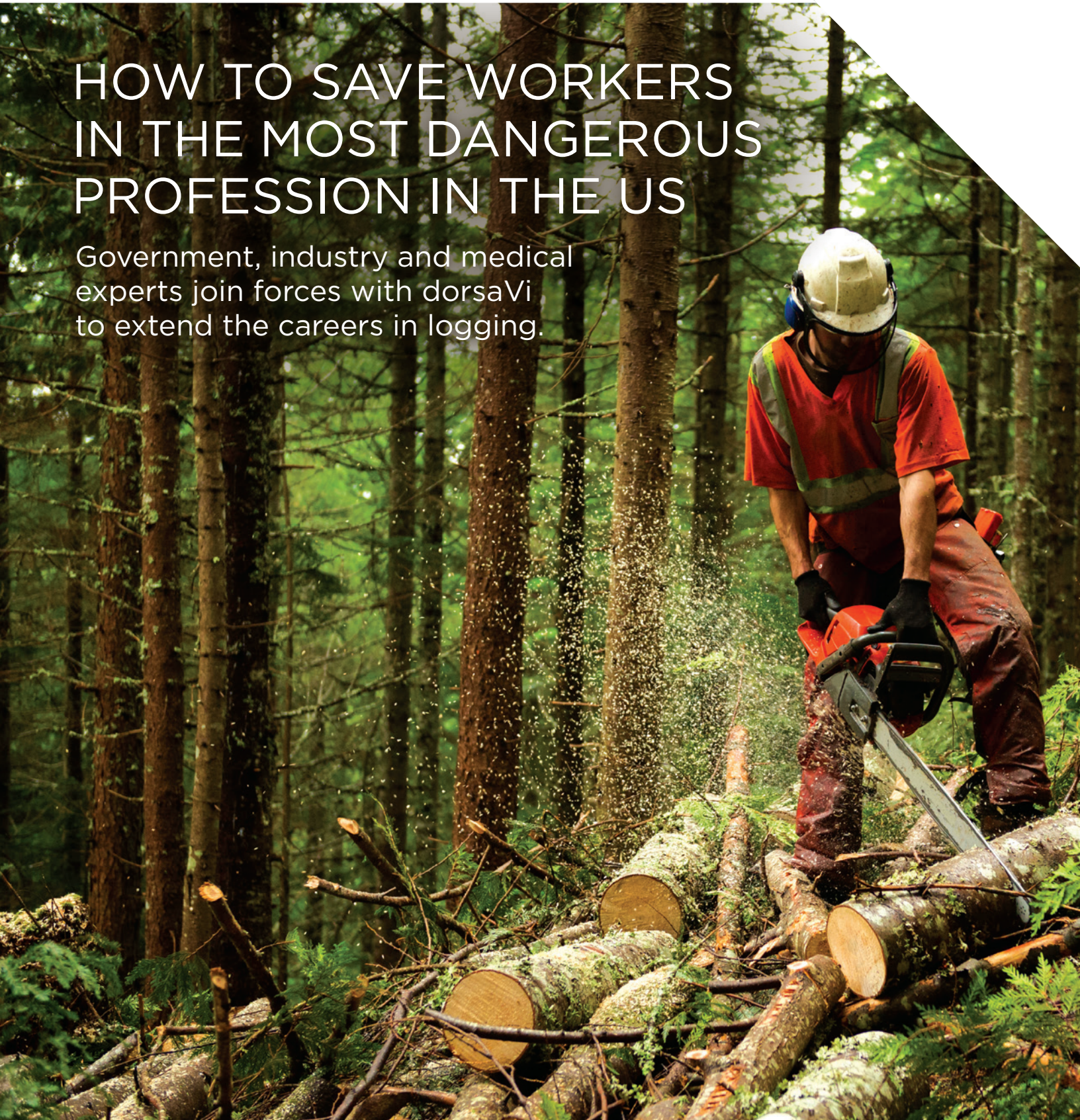




## ViSafe COMPARATIVE ASSESSMENT CASE STUDY

# HOW TO SAVE WORKERS IN THE MOST DANGEROUS PROFESSION IN THE US

Government, industry and medical  
experts join forces with dorsaVi  
to extend the careers in logging.







## **BACKGROUND: The biggest risk in the United States' most dangerous job**

Remote and steep mountain sides, falling trees, heavy machinery and vehicles, accidental chain shot whizzing through the air at the speed of a bullet, metal wires swinging overhead and laying on the ground, full exposure to the elements, helicopters with heavy loads crisscrossing the sky above... The everyday reality of logging crews is so action-packed, they have inspired several TV series, like *Ax Men*, *Swamp Loggers*, *American Loggers* and *Heli-Loggers*.

With a rate of workplace fatalities 30 times higher than the national average, logging is the most dangerous profession in the U.S., including the military. This is reflected in the costs of insurance; loggers in Washington State pay premiums that range between \$6.51 and \$26.94 per hour. But for all the dangers of traumatic or lethal injury, there is something that is not so much a risk as a given outcome. Almost 100% of all long-term loggers sustain such severe musculoskeletal disorders (MSDs) that they result in a career change before the age of 50. By a wide margin, MSDs represent the largest percentage of compensable occupational claims in the logging industry.

## **THE AMERICAN LOGGER: A life of non-stop multisport**

Across their various roles, logging crews test their bodies in almost every way imaginable. They climb, crawl, run and jump. They drag unwieldy equipment over rugged terrain. They maintain the same posture for extended periods,

only to then suddenly spring into action. They keep their necks craned, looking up at the treetops or down at the dashboard controls or focusing on the chainsaw in their hands. They trek up steep hillsides with full backpacks. It's a laundry list of physical challenges, like a Ninja Warrior obstacle course for industrial workers.

Loggers are subjected to the full spectrum of impacts: heavy loads, endurance demands, explosive movements, full-body vibration, compromising postures and repetitive motions as well as prolonged sedentary chores followed by sudden and intense muscle activity, often while in a state of physical and mental fatigue.

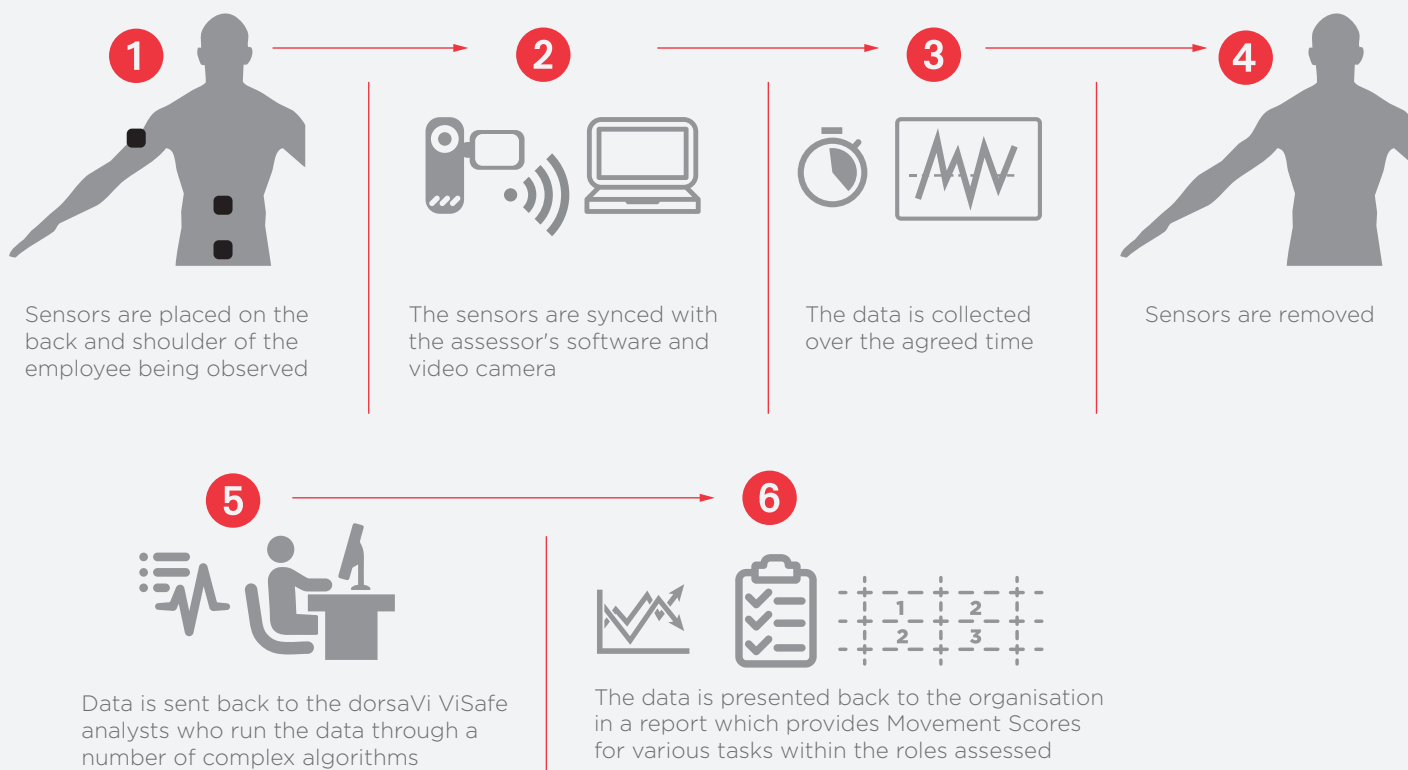
Of course, for the foreseeable future, logging will remain a tough job; the real question is how to make all this physical activity build, rather than break, the body. But how do you analyze and improve movement patterns when you're as far as you can possibly get from a biomechanics lab?

## ViSafe: The crystal ball of ergonomics

dorsaVi's workplace solution ViSafe employs unobtrusive wearable wireless sensors that capture a range of data as the employee goes about their workday as usual. Precise objective data is synced with a field assessor's software and matched to video footage captured simultaneously.

This includes range of movement, repeated movements, sustained movement, whole-body vibration and muscle activity. The medical-grade FDA cleared wireless wearable technology is suitable for field use, enabling in-depth assessments in any kind of environment.

### How it works



## 15-MONTH STUDY: Learning in the field

A collaborative group consisting of industry leader Chilton Logging, medical consultancy firm Work Right NW and dorsaVi were selected as part of a grant submission process by Washington State Department of Labor & Industries for a Safety and Health Investment Projects (SHIP) grant. The objective was to improve worker safety and reduce compensation costs for musculoskeletal disorders.

Lead by Dr. Nic Patee, Founder and President of Work Right NW, the research group included three physical therapists from the same company and experienced industry experts from Chilton Logging as well as a

team of data analysts from dorsaVi. The study subjects were 17 loggers at Chilton Logging, who volunteered for the project.

Dr. Patee had himself worked as a logger during college breaks, and his experience proved invaluable in designing the study. Covering three key logging roles – Equipment Operator, Rigging Man and Timber Cutter – it started by establishing baseline assessments of core tasks.

The loggers were fitted with adhesive wireless ViSafe sensors that map movements, muscle activity and

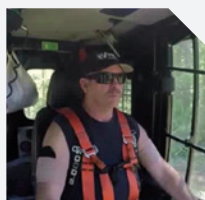
vibration. The loggers then went about their workday as usual, the unobtrusive sensors continuously sending data in real-time at more than 200 frames per second to a dorsaVi field technician, who also recorded video of the task performed.

Beginning with the baseline study findings, the gathered data was combined with video footage to create risk

profiles for each task. All findings were discussed at quarterly meetings, where different approaches were proposed, rejected or confirmed as superior. The study lasted for 15 months, gradually developing increasingly precise guidelines. In total, some 128 individual tasks were assessed, and 28 comparative analyses were conducted in order to develop a set of best-practice recommendations for the three key roles.

## FINDINGS: Objectivity is king

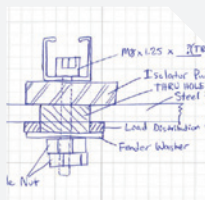
The study produced interesting results. Relatively minor changes to routines or equipment had significant impact of risk profiles.



Using a proper 5-point harness **reduced the total back and shoulder risk by 50%**



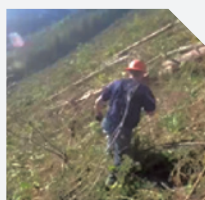
Using Hindu-eye rather than spliced-eye wire **reduced lower back strain by 25%**



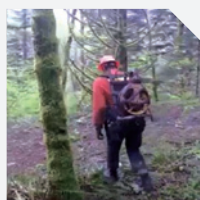
Dampening seat-mounting bolts **reduced total daily vibration**



Using a standard mountain-climbing harness to pull equipment **reduced shoulder and lower back risk values by 75% and 40% respectively**



Pulling chokers over the shoulder rather than the traditional method **reduced back risk by 40%**



Using a bullpack to carry equipment **reduced low back risk values by 60%**

All of the above changes have the potential to significantly affect the incidence of a range of MSDs in the two key roles of Equipment Operator and Rigging Man. The Timber Cutter role proved more challenging, however, with further research required before proper recommendations can be made. Furthermore, trials with an exoskeleton proved another point: what appears to be a good idea on paper is not always so in practice. The concept of an exoskeleton naturally comes pre-packaged with notions of increased strength and stability. In several regards, this also held true in testing. But for certain tasks, the objective data showed that using an exoskeleton actually increased body impacts.

**BOTTOM LINE:** minute details often make all the difference. *These details can only be identified through capturing real time data in the field.* When it comes to workplace ergonomics, objectivity is clearly king.

## OUTCOME: Training the trainer

With the study findings already having generated significant interest at a number of industry conferences and meetings, the full study report is now freely

available at the Washington State Department website. A complete train-the-trainer program in best practices is also ready for delivery on a case-by-case basis.

**For more information on training, please contact the SHIP department.**



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[info@dorsavi.com](mailto:info@dorsavi.com) | [www.dorsavi.com](http://www.dorsavi.com)

AU: 1800 367 728

UK: +44 20 7520 1370

US: 800-961-0772

**Melbourne | London | New York**

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