



Centre for Research in Occupational Safety and Health

Background and Research Program Overview

Winter 2017

Representing CROSH today:

- Tammy Eger, Research Chair
- Sandra Dorman, Director
- Wesley Killen, Lab Tech
- Nambogga Sewali, Business Officer
- Graduate Students

From CSSE:



centre for research in
occupational safety and health
at Laurentian University

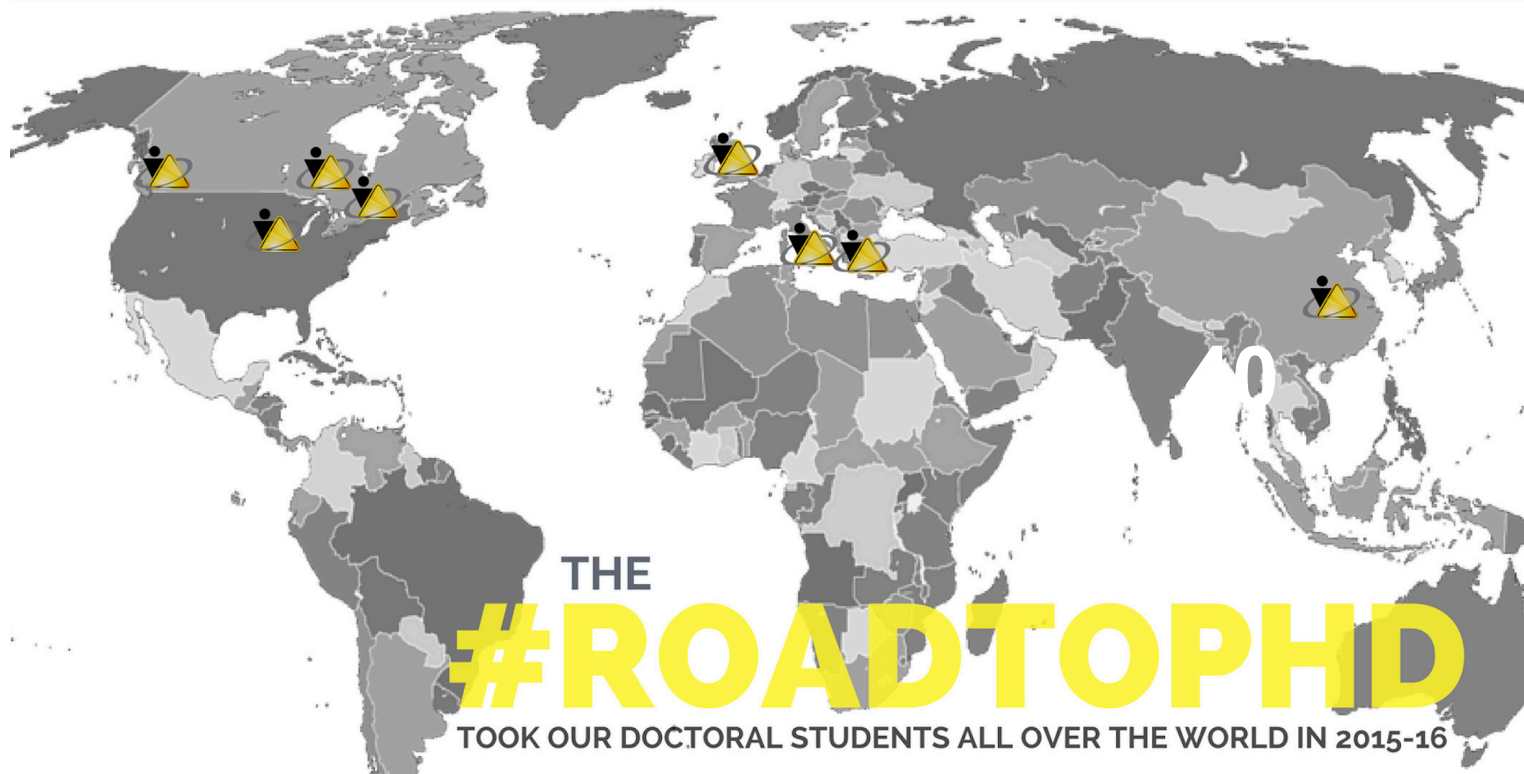
CROSH
CRSST

centre de recherche sur la
santé et sécurité au travail
à l'Université Laurentienne

The Centre for Research
in Occupational Health
and Safety was
established in **2008**

We envision a northern Ontario where workplaces partner to ensure every worker gets home safe and healthy everyday. We will be an agent for innovation and discovery to solve relevant and critical problems facing northern industries so they can eliminate occupational injury and disease from their workplaces.

CROSH trains over **30** graduate students annually



40 faculty members
conduct research
with CROSH

CROSH researchers lead
**PREVENTION
THROUGH
RESEARCH**



Consultations identified the following areas of importance:

- Mental Health
- Fatigue
 - Sleep
- Heat Stress
- MSDs
- Mobile Equipment
 - Line-of-sight
 - Vibration
- Intervention Evaluation
- Safety Culture

CROSH uses a

F2L2F

research approach to:

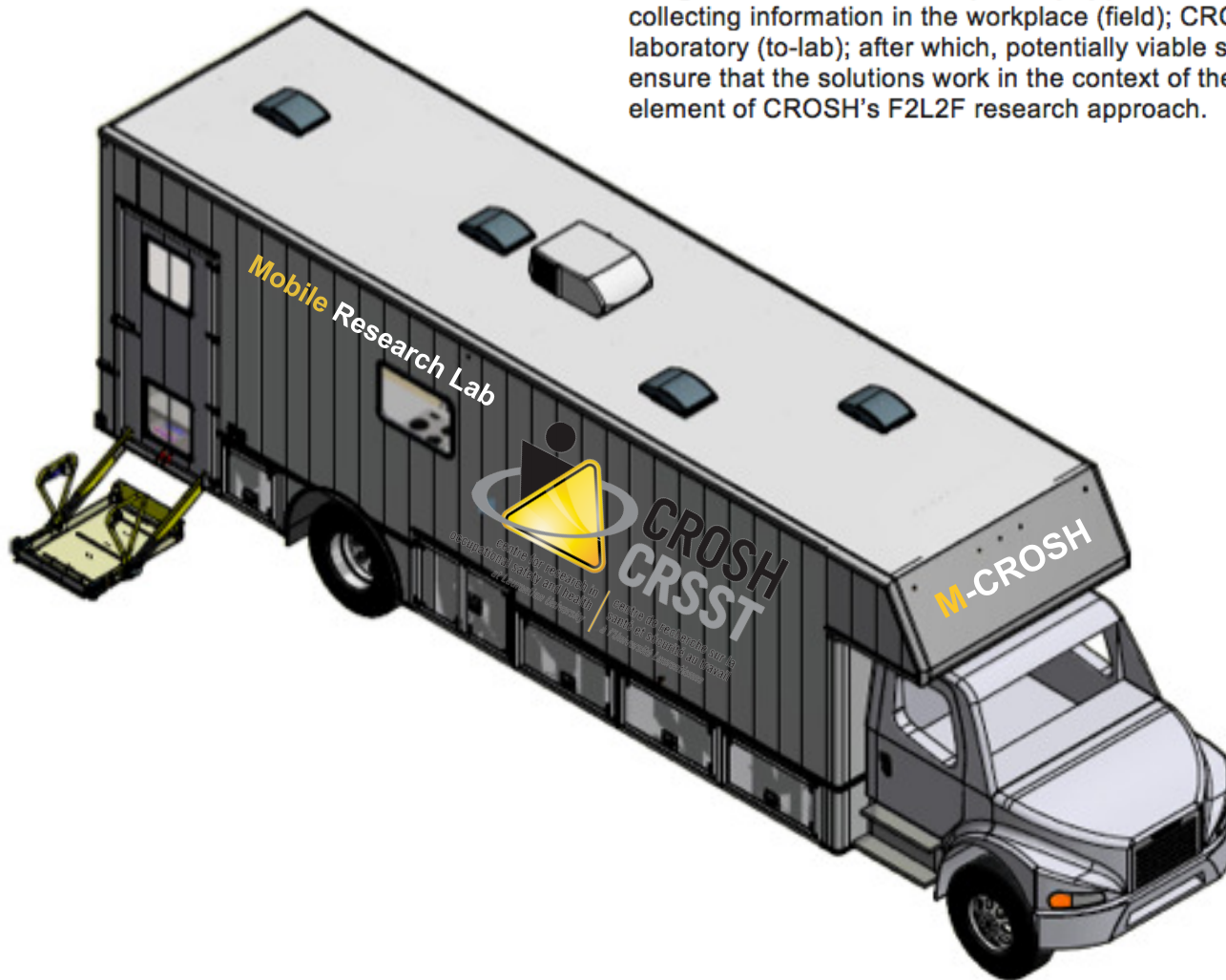
1 Identify and understand the problem in the **FIELD**

2 Drive innovation in the **LAB** to develop and test interventions aimed at prevention

3 Evaluate the intervention back in the **FIELD**

MOBILE-RESEARCH-LAB

Researchers at CROSH identify important occupational health and safety research questions using a **field-to lab-to field (F2L2F) approach**. CROSH understands research problems by collecting information in the workplace (field); CROSH researchers then develop solutions in the laboratory (to-lab); after which, potentially viable solutions are tested in the workplace (to-field) to ensure that the solutions work in the context of the work setting. M-CROSH will be a critical element of CROSH's F2L2F research approach.



**Launch
Spring 2017**

MOBILE-RESEARCH-LAB



Workplace Simulator Lab



Vibration Simulation

Vibration Transmissibility
Musculoskeletal Loading
Vibration Induced Injury
Motion Analysis
PPE Evaluation



Temperature/Humidity Simulation

Fatigue
Heat Stress
Nutrition
Physiological Stressors
Sleep



Virtual Reality Simulation

Eyetracking
Line of sight
Proximity Detection
Cognitive Workload
Human Factors and Equipment
Operation

We will demonstrate vibration measurement, environmental chamber and eye-tracking later today during the tour.



Demonstration and Lab Tour

Led by
Wesley
Killen

Questions & Discussion

Solving today's complex problems and the **NEXT challenge** will require a **multifaceted approach** involving participation of **workers, industry leaders, equipment manufacturers, and researchers.**

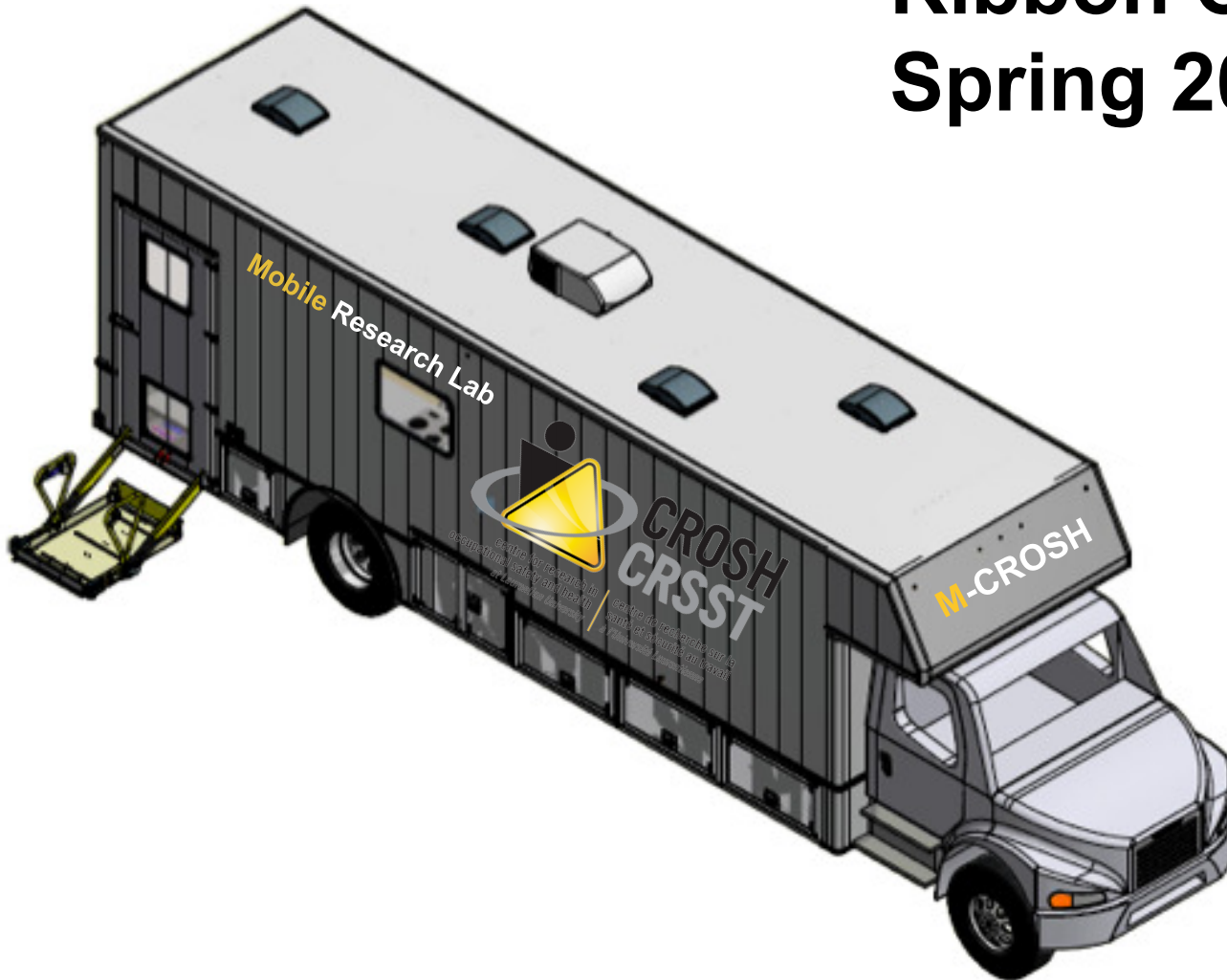
CROSH Advisory Board

An Advisory Board, made up of leaders from industry, labour and OHS-focused organizations, guide CROSH's research efforts by identifying pressing OHS needs, potential partnerships, and funding opportunities.

Leo Gerard (Chair) International President, United Steel Workers	Jody Kuzenko General Manager of Sustainability North Atlantic Base Metals, Vale	Candys Ballanger-Michaud CEO, Workplace Safety North
Jake Noland Canadian Auto Workers Mine/Mill 598 Unifor	William Shaver President & CEO of DMC Mining Services	Bob Barclay Seat: Ontario Ministry of Labour
Nancy Johnson Labour Relations Specialist OHS/Workers' Comp., ON Nurses' Association	Rhonda Watson Vice President, Human Resources Chief HR Officer, Health Sciences North	Trevor Schell Occupational Health Clinics for Ontario Workers (Sudbury Clinic)
Guy Bourgouin President, USW LU 1-2010	Marcia Smith Senior Vice-President Sustainability & External Affairs Teck Resources Limited	Jamie West President, Sudbury and District Labour Council
Michel Jean Seat: Management Pulp and Paper	Ric deMeulles OHS Consultant	Kari Cusack Workers Health & Safety Centre, NE-ON Office

MOBILE-RESEARCH-LAB

**Ribbon Cutting
Spring 2017**



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Overview of CROSH research Projects

Vibration Reduction **F2L2F**

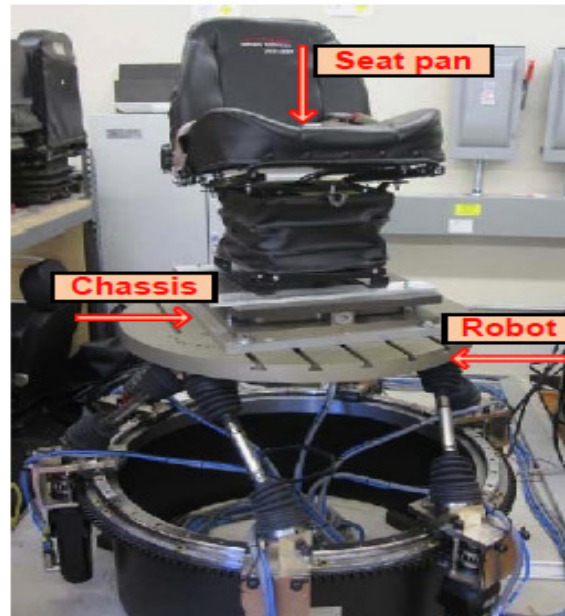
Vibration research led to collaboration with seat manufacturers to identify the “best” seat for underground mining vehicles.

FIELD:



Vibration exposure:
Above recommended
limits; seats implicated.

2LAB:



Simulated field vibration:
Evaluated commercially
available seats.

2FIELD:



Vibration was reduced:
Best seat was selected
for mining use.

Validation and Efficacy of a Simple Tool for WBV Measurement and Exposure Management



To download the free application: <https://itunes.apple.com/ca/app/wbv/id797629017?mt=8>

Vibration Reduction **F2L2F**

Vibration research led to collaboration with boot and insole manufacturers to identify the “best” PPE for reduction of foot-transmitted vibration

FIELD:

Exposure to FTV can result in permanent damage to the feet (impairs circulation and nerve supply)

Vibration-Induced White Feet was confirmed by clinician partners

2LAB:



Lab testing identified mats boots and insoles capable of FTV attenuation

2FIELD:



Field testing confirmed the findings

Vibration Toolkit



EDUCATE



ENGAGE



REINFORCE



EVALUATE



CONTROL

Line of Sight and Mobile Equipment Ergonomics

Line-of-sight (LOS) research led to collaboration with an equipment manufacturer and camera company to improve LOS

FIELD:

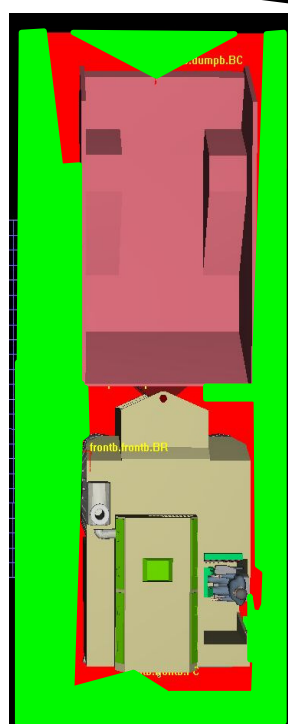
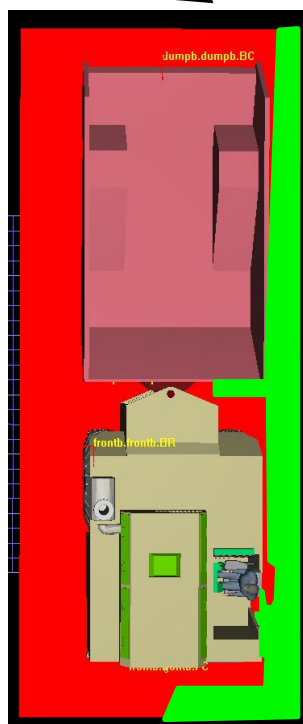
2LAB:

2FIELD:



LOS in the field:
Cab design was
linked with poor
LOS.

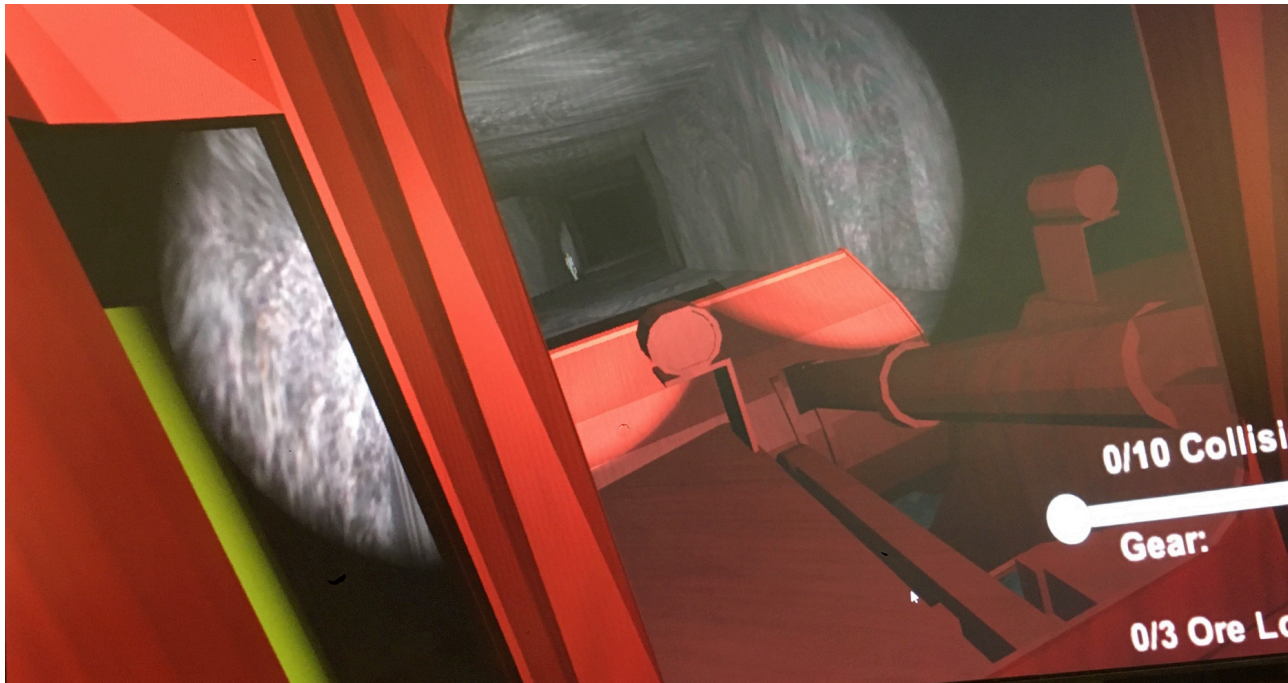
LOS – Operator



**LOS with 4
Cameras installed**



Retrofit: Cameras are now
installed in the field on
some LHDs



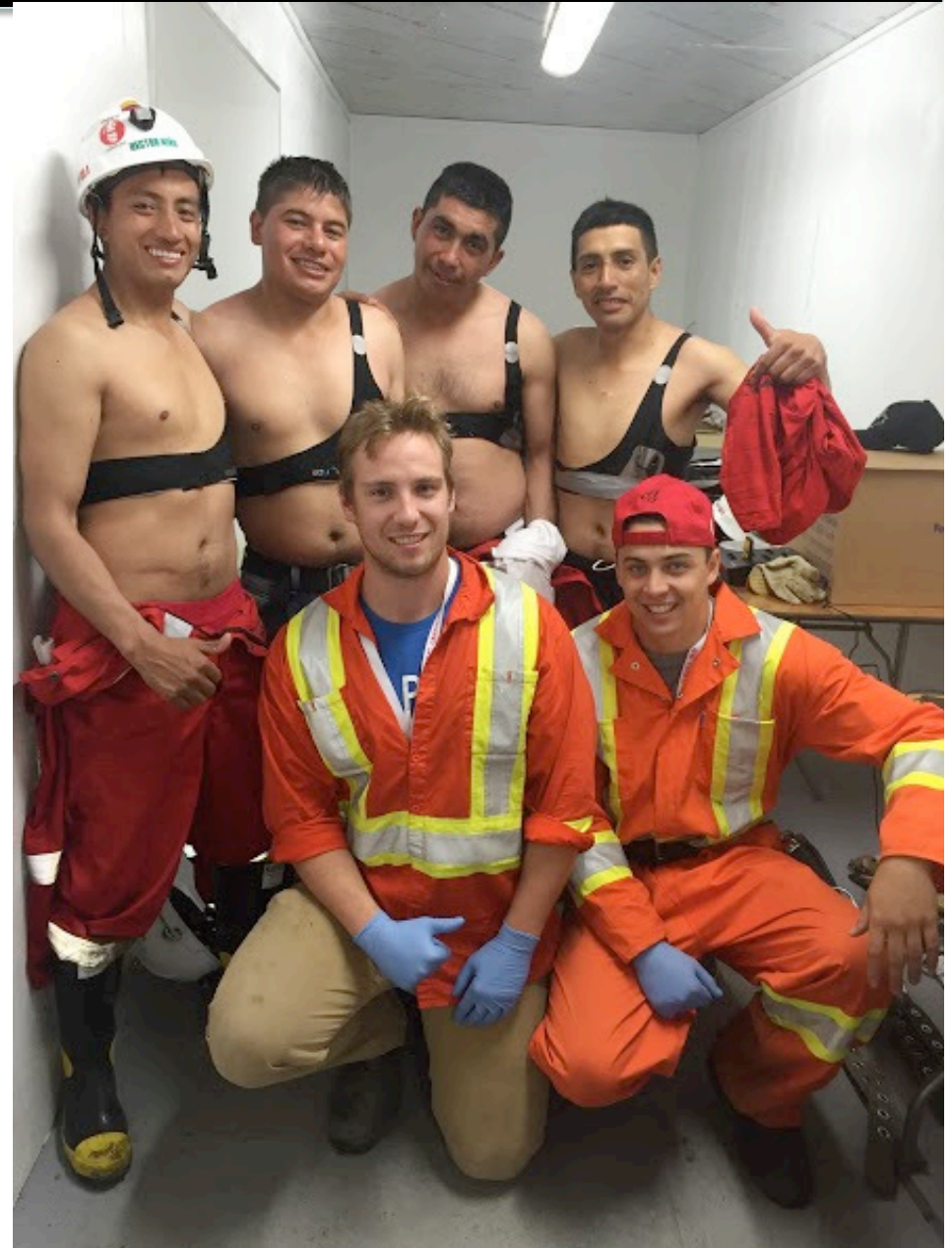
Our research team is developing a “mining game” in VR for LHD operation

- Vibration profile associated with LHD operation
- Oculus rift is used by the participant to view the mining env.
- Next steps will evaluate improvements to situational awareness with different camera and proximity detection interfaces



Equivital was worn by participants to measure in realtime:

- Heart Rate
- Heart Rate Variability
- Skin Temperature
- Core Temperature


















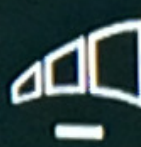













Evaluating task-specific energy expenditure, and heat stress risk in mine rescuers

Data collected

- District, Provincial & International competitions in 2016



Last l	Sessi	Body Po	Moveme	Alarms	Heart Rate	Breathing	Core Temp	Skin Temp	Alerts and Events
< 15s	016-08-2: :59:45 Al				 92	 24	 35.6	 35.5	
< 15s	016-08-2: :59:45 Al				 91	 24	 37.9	 36.4	
< 15s	016-08-2: :00:00 Al				 97	 29	 36.3	 35.7	
< 15s	016-08-2: :59:45 Al				 107	 21	 36.3	 36.7	

Mental Health in Canada

- average number of workdays lost to short-term disability
 - mental health (72)
 - heart disease (37)
 - back pain (37)
 - hypertension (28)
 - diabetes (26)
- disability claims in Canada attributable to mood-anxiety issues
 - 78% of short-term and 67% of long-term claims.



- In 2016 Vale, USW, and CROSH partnered to study mental health in mining
- 3 year study
 - Year 1 surveys and focus groups
 - Year 2 data analysis and intervention development
- **Over 2200 surveys have been collected to date (data analysis is ongoing)**

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