



wildland fire canada 2010

OUT OF THE BOX AND INTO THE FIRE:
How Product Innovation is Possible by Design

Thomas Garvey, PhD

Director, School of Industrial Design, Carleton University

Thanks to conference and program chairs: Rob McAlpine / Mike Wotton

Introduction

Research and **product development projects**

Interest in developing deeper understanding of **unique challenges of fire management** – extension of past experience

“This is the inaugural conference in what we envision becoming a biennial event”

“The unique program will provide a balance between presentations from forest fire managers and the scientific community. “

“Our goal is to provide a venue ... to exchange best practices with other fire managers and ... scientists ... as well as other scientists from a number of disciplines.”

OUT OF THE BOX AND INTO THE FIRE:
How Product Innovation is Possible by Design

t h i n k i n g



OUT OF THE BOX AND **INTO THE FIRE:**
How Product Innovation is Possible by Design



A F F



A or F

OUT OF THE BOX AND INTO THE FIRE:
How Product Innovation is Possible **by Design**

How can someone without experience **learn to innovate through design?**

What are some of the **key attributes of the process?**

What **is industrial design?**

It's easy being a firefighter.



Overview of Industrial Design

1957 Establishment of ICSID

International Council of Societies of Industrial Design

1971 Working Definition

Industrial design is a creative activity whose aim is to **determine the formal qualities of objects produced by industry.**

These formal qualities **include the external features** but are **principally those structural and functional relationships that convert a system to a coherent unity** both from the point of view of the producer and **the user.**

TWENTY CENTS

OCTOBER 31, 1949

TIME

THE WEEKLY NEWSMAGAZINE



DESIGNER RAYMOND LOEWY
He streamlined the auto carts.





How does one train people to design anything and everything?
How does a profession develop around innovation?

You need a **general process that is widely applicable.**
You increasingly need **teams of the right people.**

Interdisciplinarity has taken a new lead

You need to be **open-minded enough to share** the territory and you need to be **confident enough to take risk**.

Domain Knowledge of Industrial Design

History of design and product analysis

Math and physics

Mass production techniques

Anthropometrics and ergonomics

Business and marketing aspects

Fundamental psychology

Aspects of use and operation

Task analysis

User of the product, service or environment

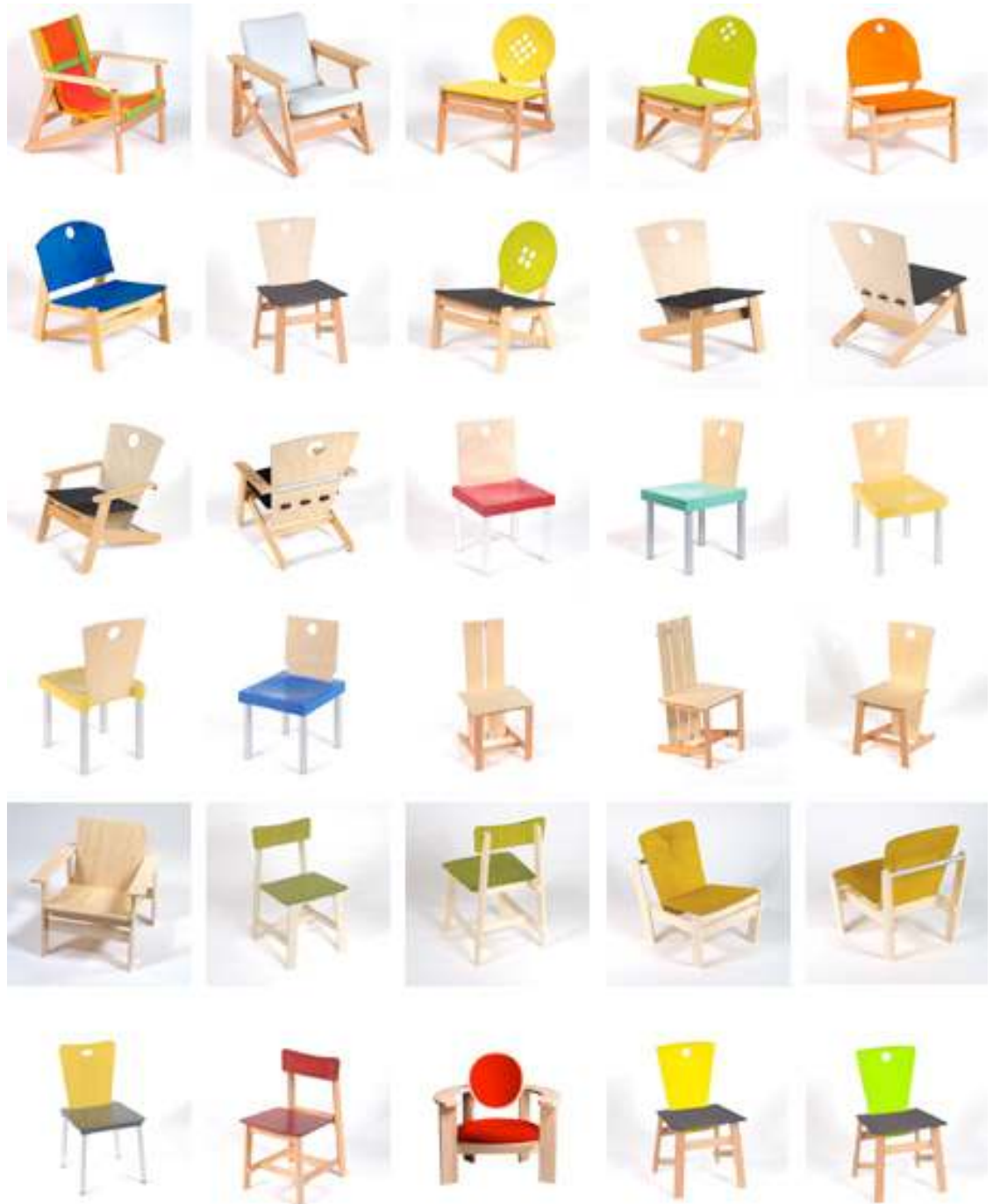
Understanding of desired **experience**

People don't want toasters. **They want toast.**



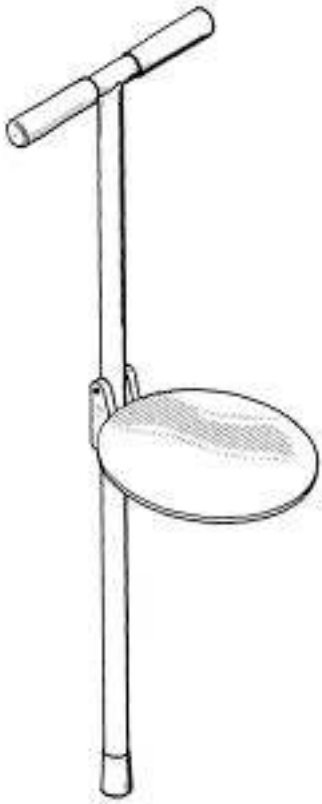


'Virgin Mary grilled cheese' sells for \$28,000 (E-Bay 2004)



chair

product

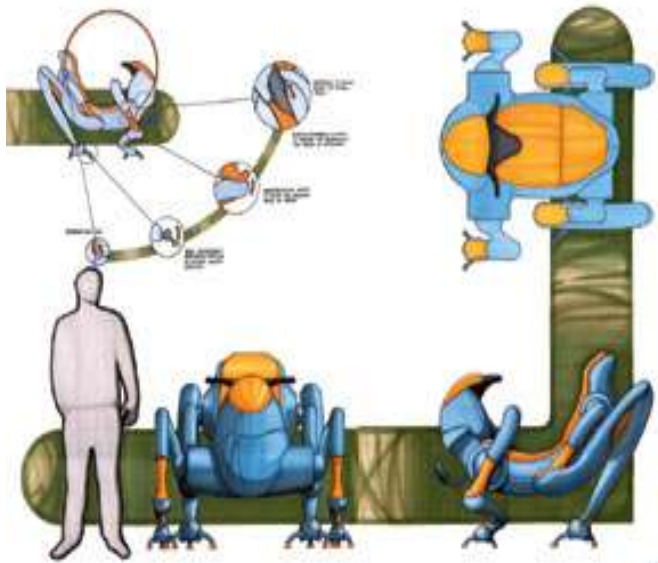


seating device

action or function







Carleton University School of Industrial Design

Exists within Faculty of Engineering and Design

Premiere design school in Canada; one of the best in N. America and internationally

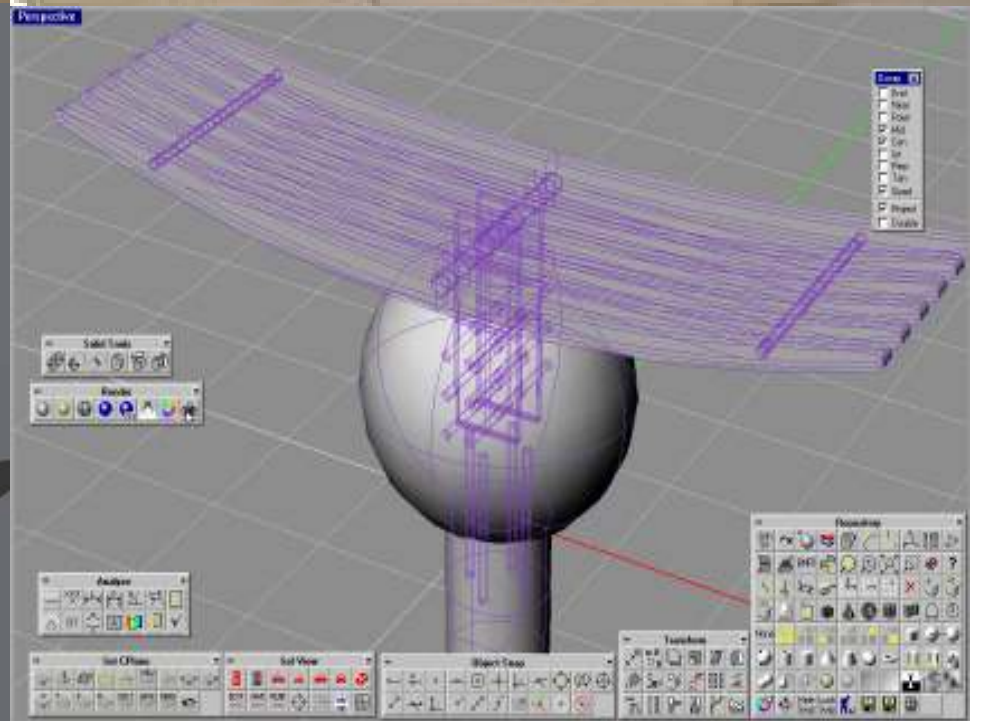
(500 applicants, 250 portfolios, 38 admitted annually)

Celebrated 35th Anniversary in 2008

700+ graduates; 150 students in program at any time

4 year intense program leading to major thesis project and B.I.D









Overview of Major Project

Runs full academic year from September to April

Phased project carried out in groups of 4-8 under a project advisor

Research >

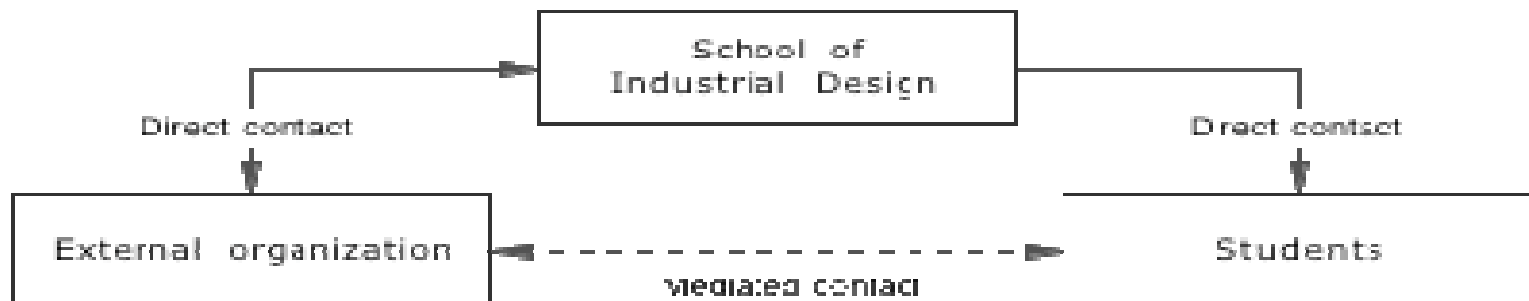
Concept development >

Preliminary design and ergonomic testing >

Design development (iteration) CAD modeling, prototyping >

Final design and documentation

External advisors play a key role



Design Collaborations with Industry Partners

Value for the student

Experience in near-real-life work scenarios

Job opportunities

Increase in portfolio credibility

Inspiring opportunities (enhancement of student self-value)

Value for the external organization

Young fresh ideas

Employee rejuvenation

Insight into the program of study – input into the program

Exposure to top students – extended job interview

Project opportunities not restricted by budget (R+D without the overhead)

Value for all parties

Upon graduation, students are one step closer to understanding the professional environment they are expected to enter and function effectively in.

Overview of Recent IDES 4300 Major Projects

EMS Bicycle Paramedic Project (2001-02)

Tactical EMS (TEMS) (2002-03)

Ottawa EMS Paramedics (2003-04)

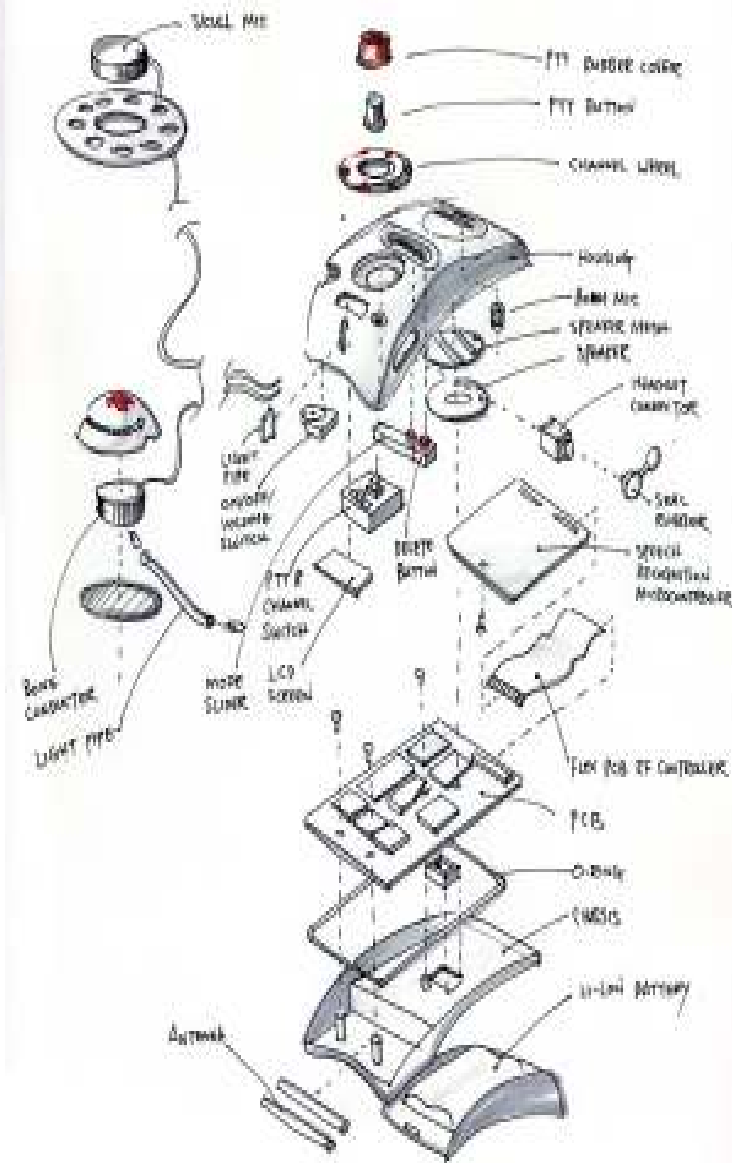
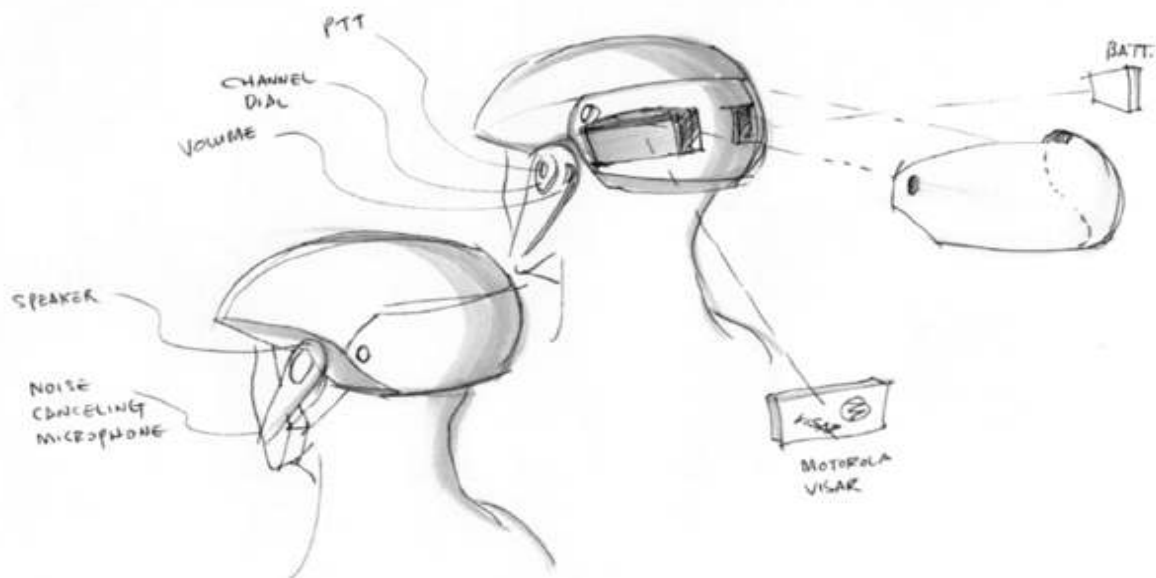
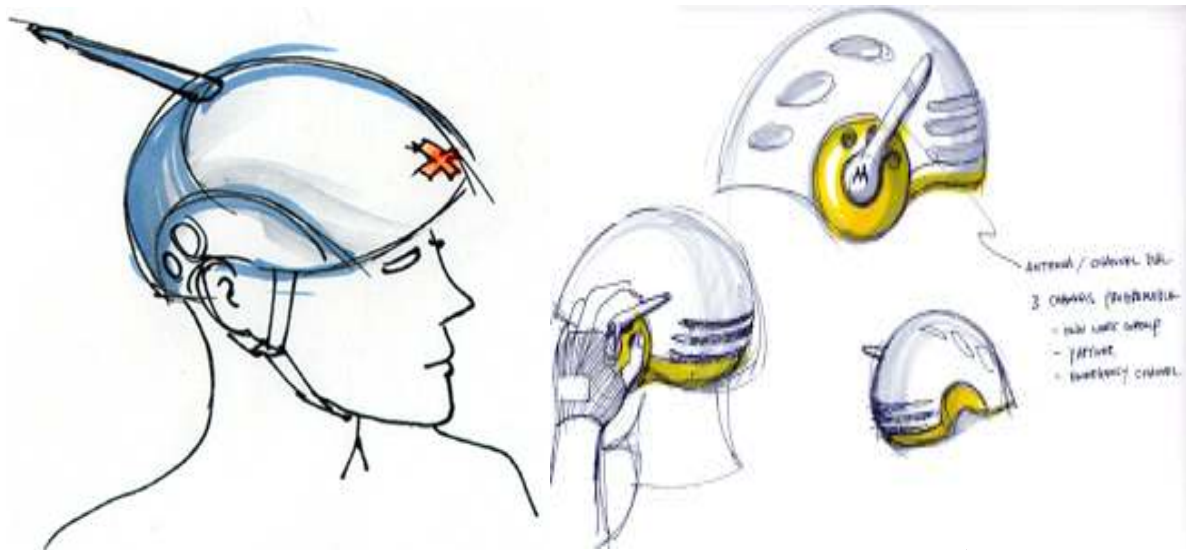
- Defibrillator Stretcher Mount

- Marine Paramedic Equipment Packs

- Paramedic Team Leader (PTL) Equipment Pack

- Paramedic Team Leader (PTL) Equipment Transport Dolly



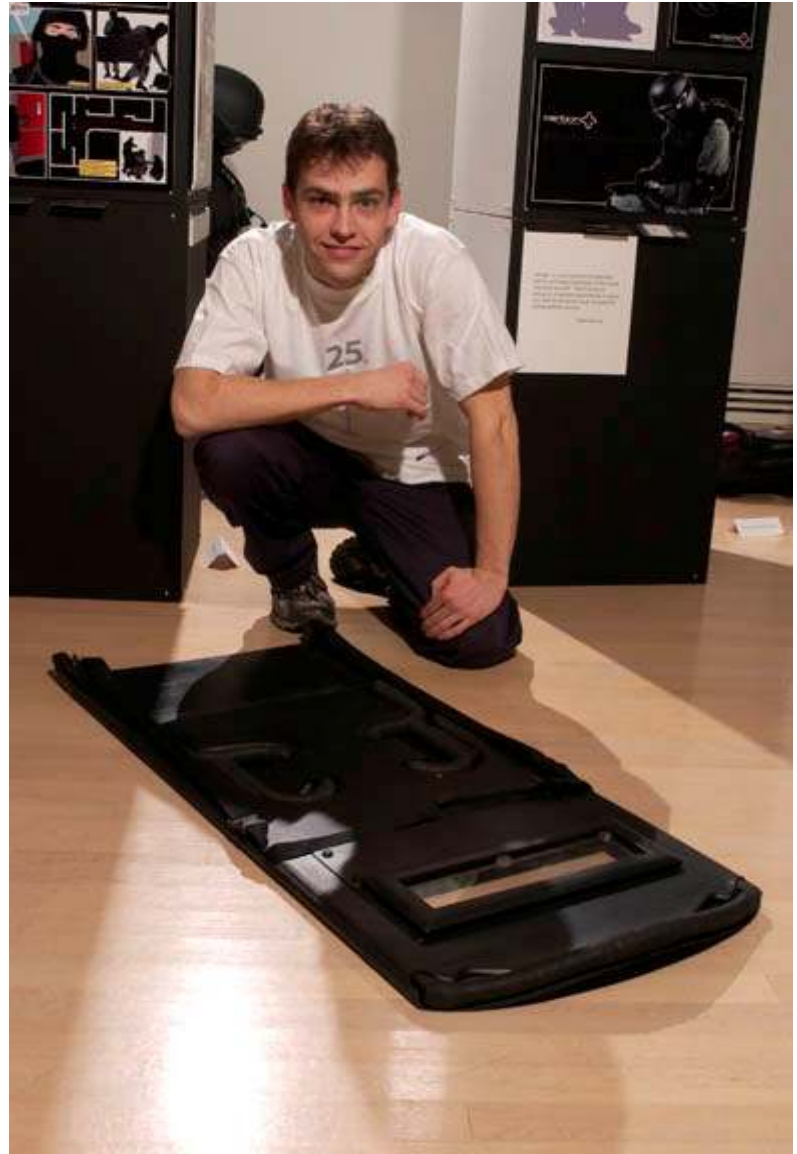


















OMNR collaborations over the years

Kim Kamo

1995-2003 Crew Leader (Thunder Bay Fire Center)

2003-05 Fire Management Technician

2000 Bachelor of Industrial Design, Carleton University

2004-2005

Pump Back Board Gabe Pell

Hose Pack Jonathan LeRoy

Chainsaw Pack Ryan Lukas





THE WOODCHUCK

Test Prototype



Top Load-Lifter Straps



Adjustable Shoulder Straps



Adjustable Hip Belt



Belt-Stabilizer Straps



Designed by: Ryan Lukas

A backpack designed to carry a chainsaw, tool-kit, gas can and axe for wildland forest fire rangers.



Tension Strap



Tight Mesh Back Panel



Exterior Pockets



Gas Can Securing Strap

FEATURES

Here are the main features of the **RINO** Hose pack.

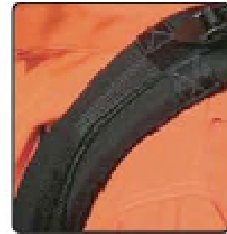
All Straps (Shoulder, hip belt, sternum, should be adjusted to a comfortable fit.

The Perforated opening should be fully opened to the indicated size to maximize the area for easier hose deployment.

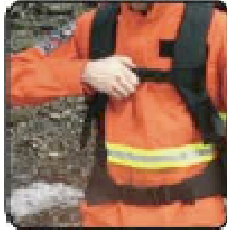
The shoulder straps and hip belt should be fastened around the hose pack when in storage or when being air dropped onto the fire line to minimize the profile.

LOAD LIFTERS

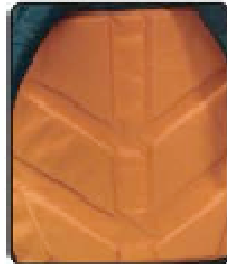
3/4 INCH SHOULDER STRAPS



STERNUM STRAP



VENTED BACK PADDING



BOX RETAINER



3/4 INCH HIP BELT



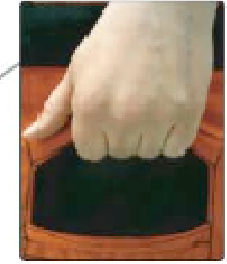
PERFORATED OPENING



2 HAND TOSS



TOP HAND GRIPS



MID CARRYING GRIP



BOTTOM LIFTING GRIP







OMNR collaborations over the years

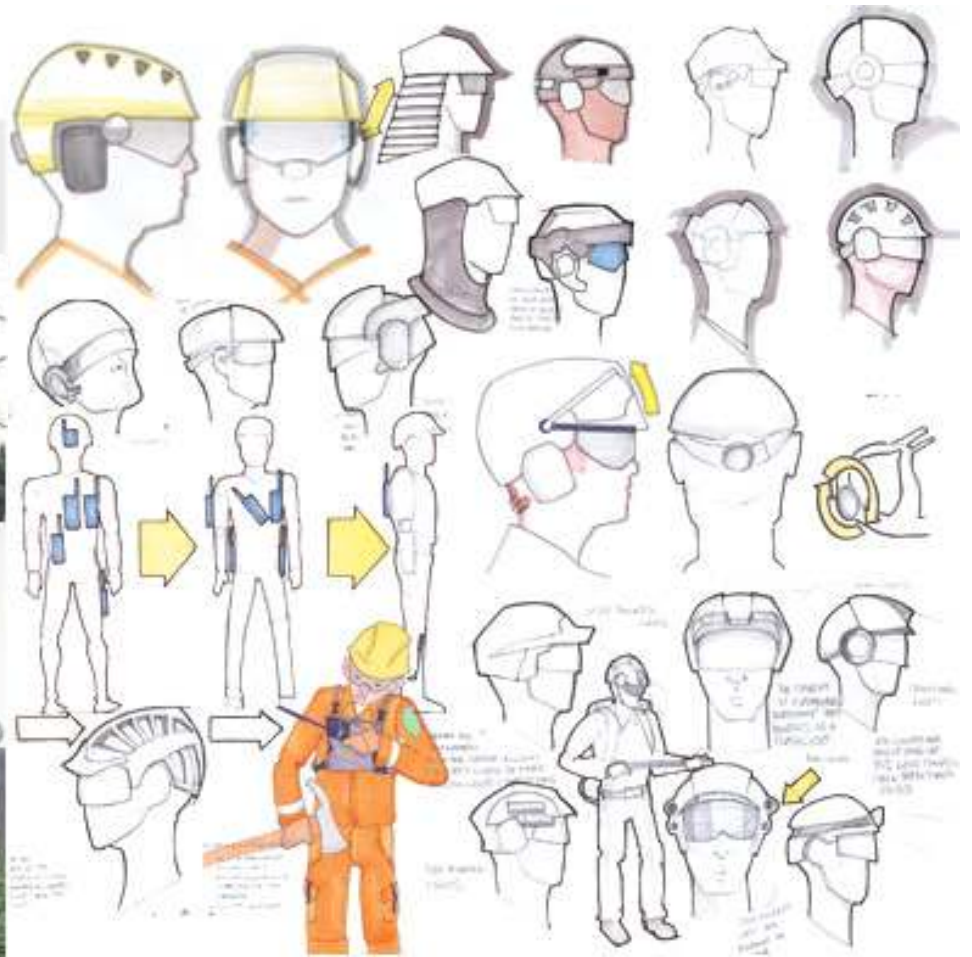
2006-07

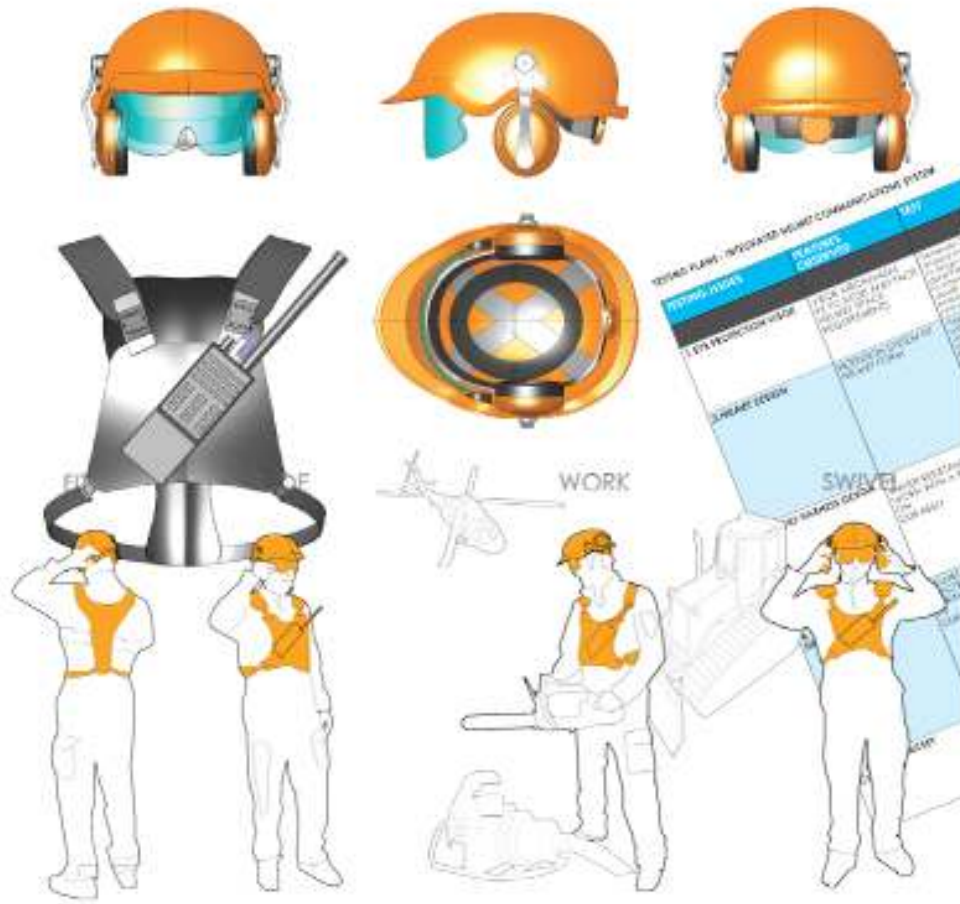
| | |
|------------------------------|----------------------|
| Helmet Communications System | Chad Harber |
| Suppression Pump Pack | Colin Roberts |
| Fire Incident Pack | Laura Mulligan |
| Chainsaw Leg Protection | Logan Taylor |
| Rooftop Sprinkler System | Jenna Stephens-Wells |



FIRE SQUAD





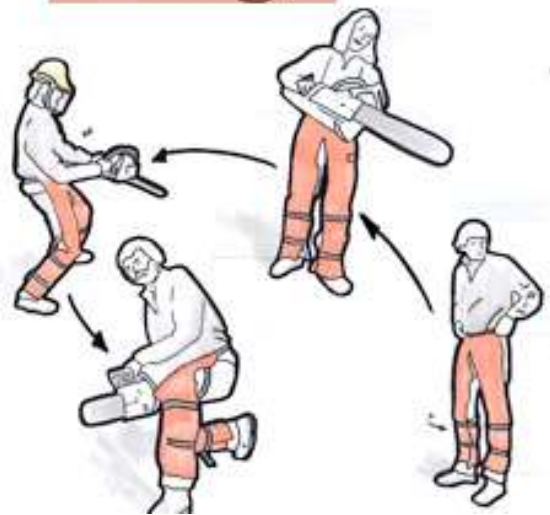
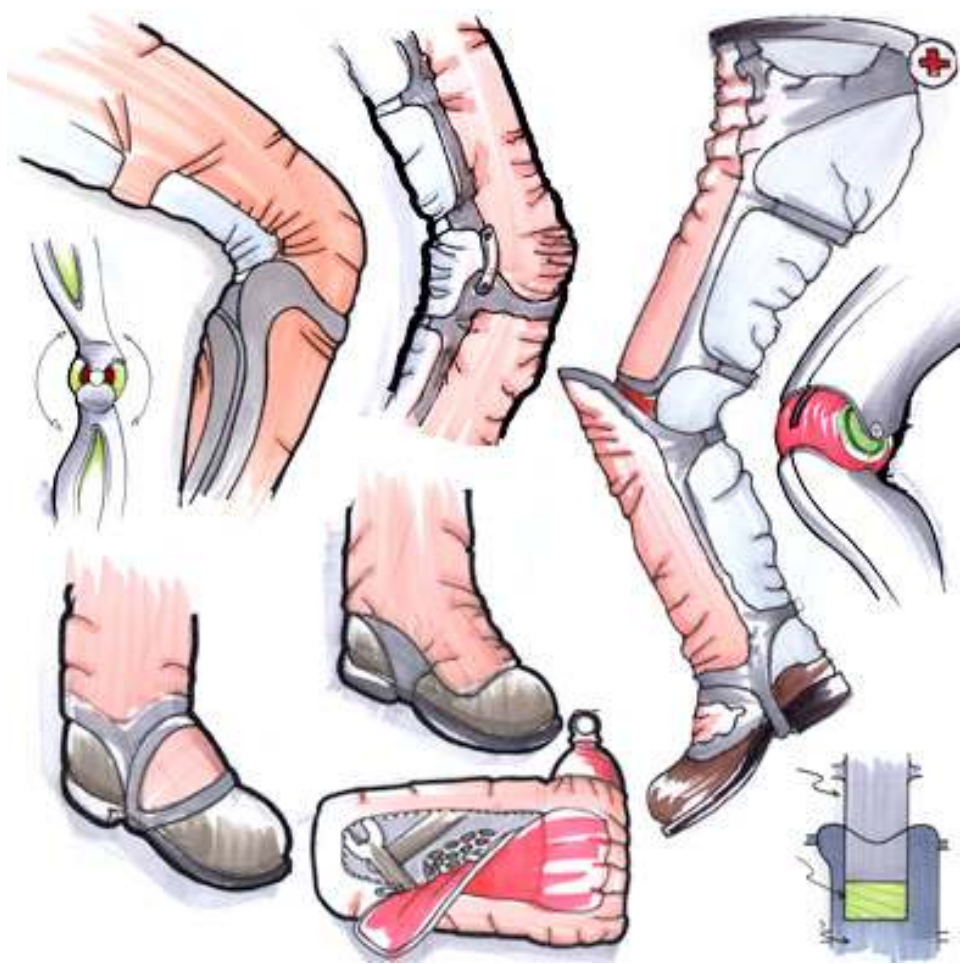
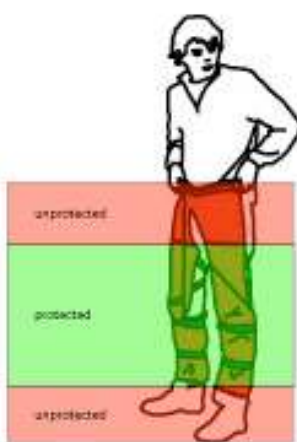


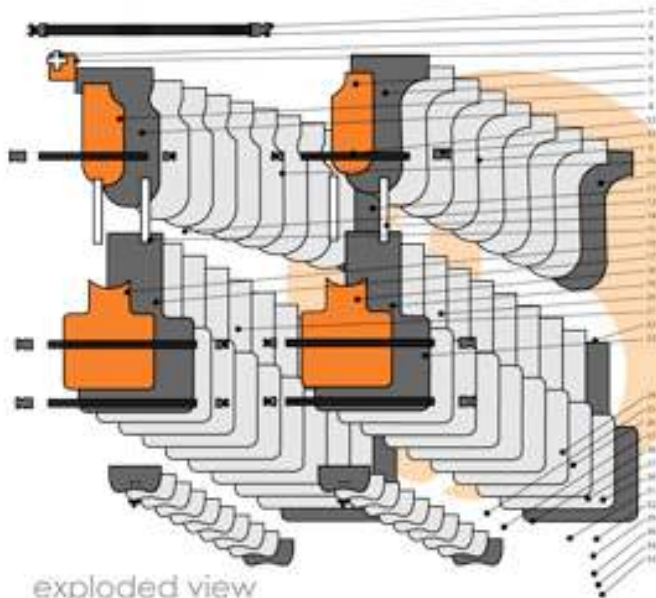








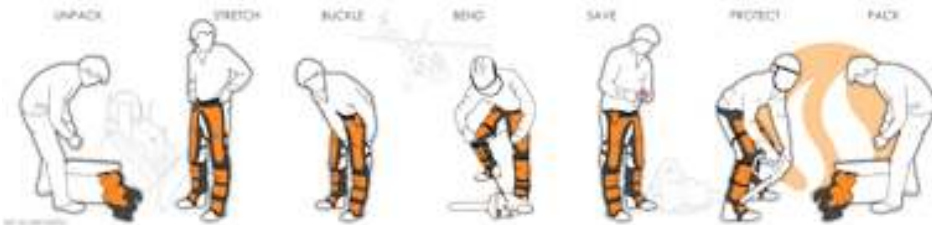




exploded view

list of materials

1. 2 inch shoulder adjuster buckle
2. 2 inch Nylon webbing through T&E
3. Handle bar in Cumbersome foot and girth
4. Cumbersome foot and girth
5. Cumbersome left leg upper coverage
6. Cumbersome left leg lower girth
7. Cumbersome right leg upper coverage
8. Cumbersome right leg lower girth
9. No Ballistic Nylon left leg upper
10. No Ballistic Nylon right leg upper
11. Polyester left leg upper lining
12. Polyester right leg upper lining
13. Mean-Loss left leg stretch fabric
14. Mean-Loss right leg stretch fabric
15. Cumbersome right leg lower coverage
16. Cumbersome right leg lower girth
17. Cumbersome left leg lower coverage
18. No Ballistic Nylon left leg lower
19. No Ballistic Nylon right leg lower
20. Polyester left leg lower lining
21. Polyester right leg lower lining
22. Cumbersome right ankle coverage
23. Cumbersome left ankle coverage
24. Cumbersome right ankle girth
25. Cumbersome left ankle girth
26. Polyester left ankle lining
27. Polyester right ankle lining
28. 2 inch Nylon webbing
29. 2 inch shoulder adjuster buckle
30. 2 inch hook









OMNR collaborations over the years

2007-08

2-part Camp Bag

Melany Bailette

Raincoat

Sarom Prom

Hose Strangler

Jess Tien

Mobile Power Unit

Bonnie Van Tassel

OMNR collaborations over the years

2009-10

Sector Response Office Design

Undergraduate students

Matt Lytle

Daniel Van Willigen

MDES Graduate students

Erin Hueston

Peter Wehrspan

Special Advisor

David Popovich (SMART Technologies)



Display - Existing Solutions

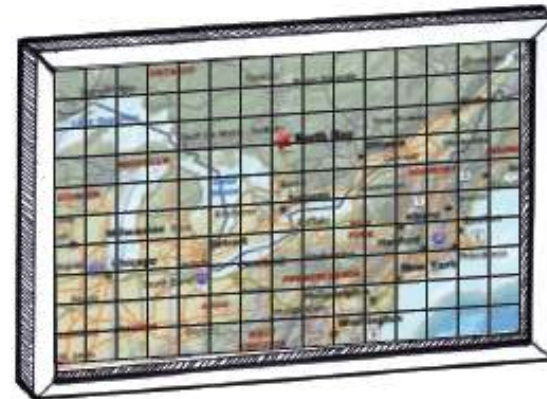
Matt Lytle



SMART Technology Board



white board



wall chart/map

In addition to a multitude of TV and computer monitors, most Sector Response Offices (SRO) are equipped with SMART Technology Boards, wall charts/maps and basic white boards as a means of communicating forest fire data.

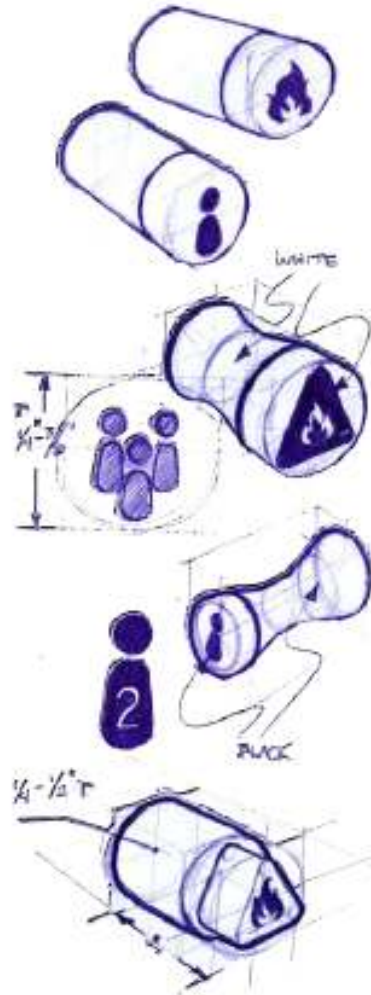
The goal of this research is to determine if a more effective process or product can be implemented for the Ontario Ministry of Natural Resources to monitor and control forest fires in the province.

Height Testing Model



Magnets

Magnet Design Development



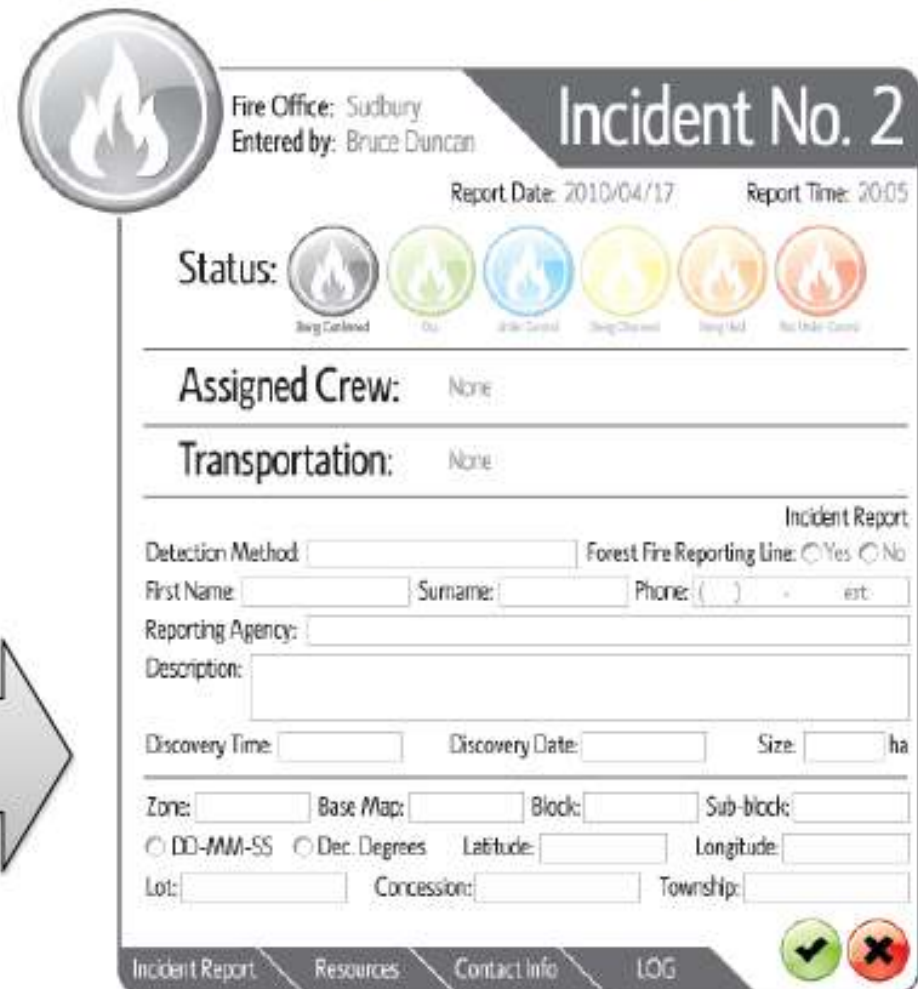
UI Design Development

UI development

As a result of testing and further research.



A mobile UI mockup for a fire report. It features a circular fire icon in the top left. The header includes 'Report From: Unknown' and 'FIRE #4'. Below the header is a 'Status:' section with five circular icons representing different fire stages: 'Being Contained', 'Out', 'Under Control', 'Being Cleared', and 'Being Held'. The main form area contains fields for 'Latitude' and 'Longitude', both set to '0° 0' 0" N'. A prominent 'LOG' button is on the right. At the bottom, there is a 'More' button with a downward arrow and two circular buttons with a green checkmark and a red 'X'.



A desktop UI mockup for a fire report. It features a circular fire icon in the top left. The header includes 'Fire Office: Sudbury' and 'Entered by: Bruce Duncan'. The main title is 'Incident No. 2'. Below the header is a 'Report Date: 2010/04/17' and 'Report Time: 20:05'. The 'Status:' section has six circular icons: 'Being Contained', 'Out', 'Under Control', 'Being Cleared', 'Being Held', and 'No Under Control'. The form includes fields for 'Assigned Crew: None' and 'Transportation: None'. The 'Incident Report' section contains fields for 'Detection Method', 'Forest Fire Reporting Line: Yes/No', 'First Name', 'Surname', 'Phone', 'Reporting Agency', and 'Description'. There are also fields for 'Discovery Time', 'Discovery Date', and 'Size: ha'. The bottom section includes fields for 'Zone', 'Base Map', 'Block', 'Sub-block', 'Latitude', 'Longitude', 'Lot', 'Concession', and 'Township'. A navigation bar at the bottom includes 'Incident Report', 'Resources', 'Contact Info', and 'LOG', along with green checkmark and red 'X' buttons.





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How does a profession develop around innovation?

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You increasingly need **teams of the right people.**

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You need to be **open-minded enough to share** the territory and you need to be **confident enough to take risk**.

*“You’ve got a bunch of smart guys.
Put ’em in a room and kick ’em in the ass ‘till they come up with something.”*

Robert F. Kennedy (paraphrased, Thirteen Days)



*To my students
and the future they will make their own*

Thomas Homer-Dixon / The Ingenuity Gap

“We wanted to push ourselves and other members of the fire community, if not outside of our individual comfort zones, at least closer to the edge of that box.”

wildland fire canada 2010, program welcome



Thank you.

Video

user concept sketch

