INJURY PREVENTION IN THE AUSTRALIAN LED OUTDOOR ACTIVITY DOMAIN - OVERVIEW OF PROJECT

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THE UPLOADS PROJECT

- ARC Linkage grant

- Development, validation and trial of an injury surveillance system for the led outdoor activity industry in Australia

- Development and validation of an accident causation model linked to the surveillance system

THE <u>UPLOADS</u> PROJECT TEAM

- Industry partners

- Academics (MIRI)
  - human factors/safety systems
  - injury surveillance/data systems
  - sport/active recreation prevention

BACKGROUND

WHAT IF……?

- We all collected detailed data on accidents and near miss incidents….

- Analysed this data using a valid, universal accident analysis framework….

- Shared these analyses with one another…

- Talked openly about accident causation and near misses….

- Reported often on countermeasures and their success….

TRANSLATING RESEARCH INTO INJURY PREVENTION PRACTICE (TRIPP)

TRIPP Stage

1 Count and describe injuries	**Injury surveillance**
2 Understand why injuries occur	**Prospective studies to establish aetiology and mechanisms of injury**
3 Develop 'potential' preventive measures	**Basic mechanistic and clinical studies to identify what could be done**
4 Understand what works under 'ideal' conditions	**Efficacy studies to determine what works in a controlled setting (e.g. RCTS)**
5 Understand the intervention implementation context	**Identifying personal, environmental, societal and sports delivery factors that may enhance or be barriers to implementation**
6 Understand what works in the 'real-world'	**Effectiveness studies in context of real-world sports delivery**

ACCIDENTS AND INJURY DURING LED OUTDOOR ACTIVITIES

- Acknowledged risk of severe and frequent injury in active pursuits (Finch et al, 2007)

- Accidents and injury occur in the led outdoor industry domain (Salmon et al, 2010)

  – exact injury rates are unknown

  – high media profile of fatal incidents

- Industry's understanding of these accidents and injury is limited

- The surveillance systems required to enhance it do not exist currently (Salmon et al, 2009)
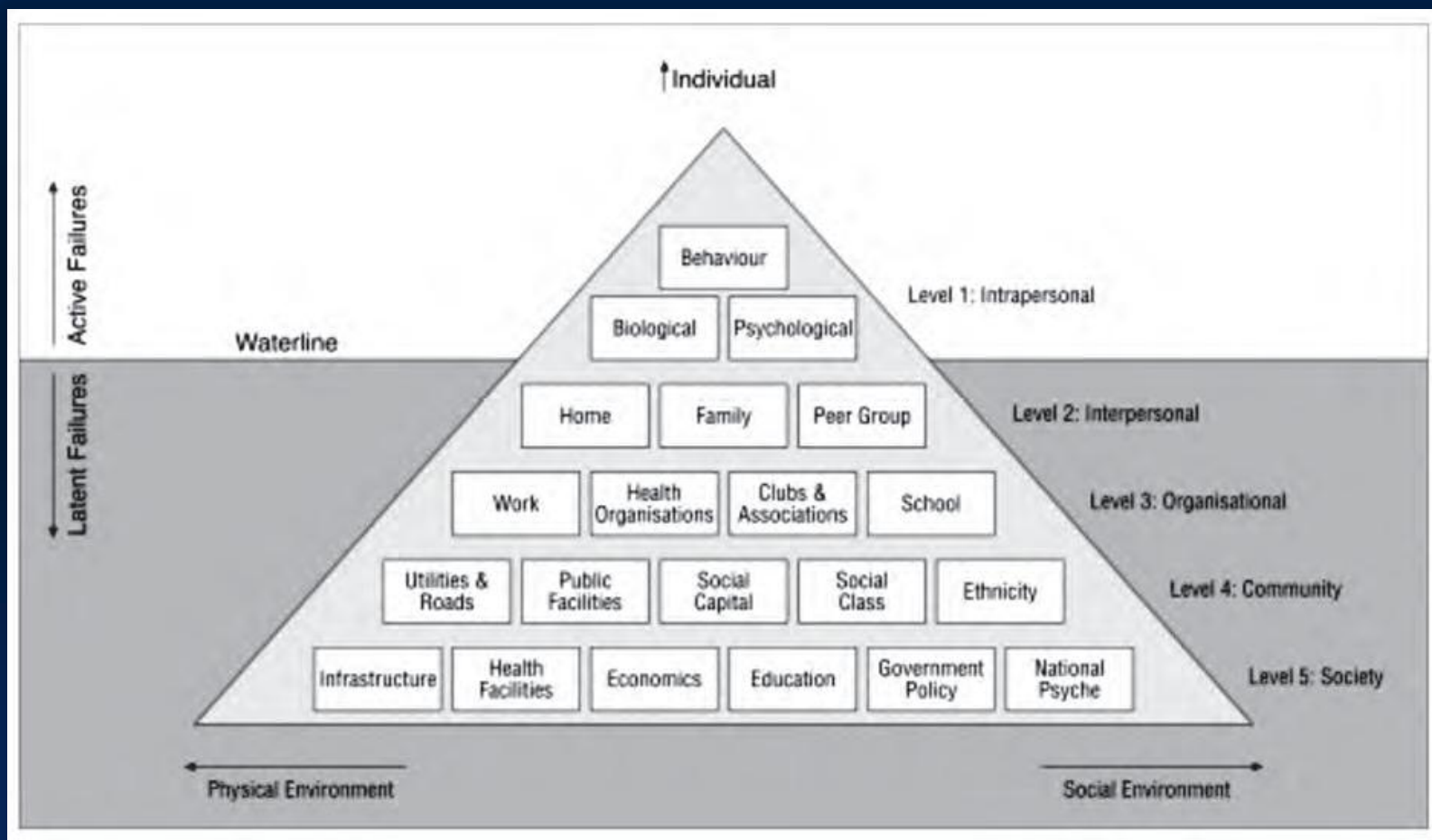
WHAT DO WE KNOW ABOUT ACCIDENTS?

- Complex, systems phenomenon

- Contributing factors reside at different levels of the system

- Factors interact with one another within and across levels of a system

- Will continue to occur within safety critical systems

INJURY OCCURS WITHIN AN ECOLOGICAL SYSTEM

WHAT DO WE KNOW ABOUT ACCIDENTS IN THE LED OUTDOOR ACTIVITY DOMAIN?

- Not a lot (Salmon et al, 2009; 2010)
- A little about the 'broken component' (e.g. instructor failures)
- Limited evidence on system-wide failures

- Poor spin-in from other domains
- No systems model

- Poor data systems
- Incident reporting limited
- Databases limited/fragmented

ADDRESSING THIS KNOWLEDGE GAP

UPLOADS will:

- Develop, trial, and validate a theoretically underpinned injury surveillance system
    - incident reporting
    - classification and coding
    - data storage
    - privacy and confidentiality
    - analysis and reporting

- Develop a systems model of incident causation that will be used to drive future injury prevention efforts
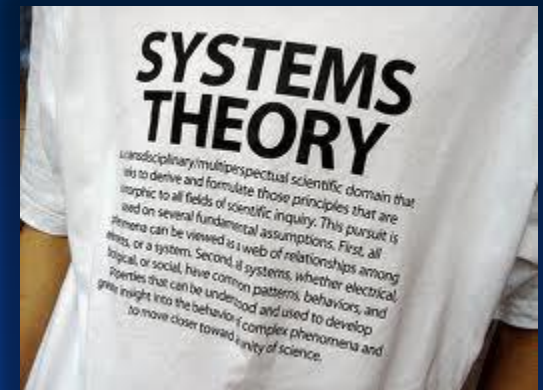
SYSTEMS THINKING

THEORY DRIVEN SYSTEMS APPROACH

- Systems approach adopted from other domains (e.g. Rasmussen, 1997; Reason, 1990)

- Human factors approach = accidents are caused by a range of interacting human and wider systemic failures (e.g. Reason, 1990).

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  - human errors made by those on the front line

    AND

  - decisions and actions taken at the higher organisational levels
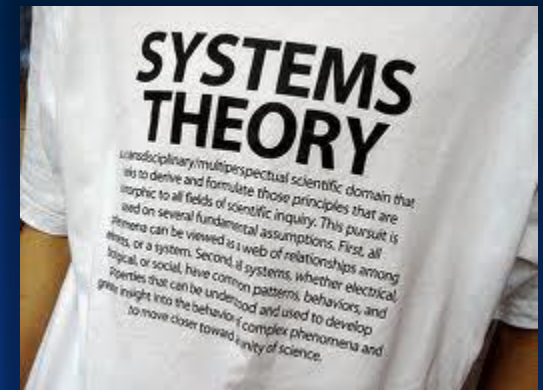
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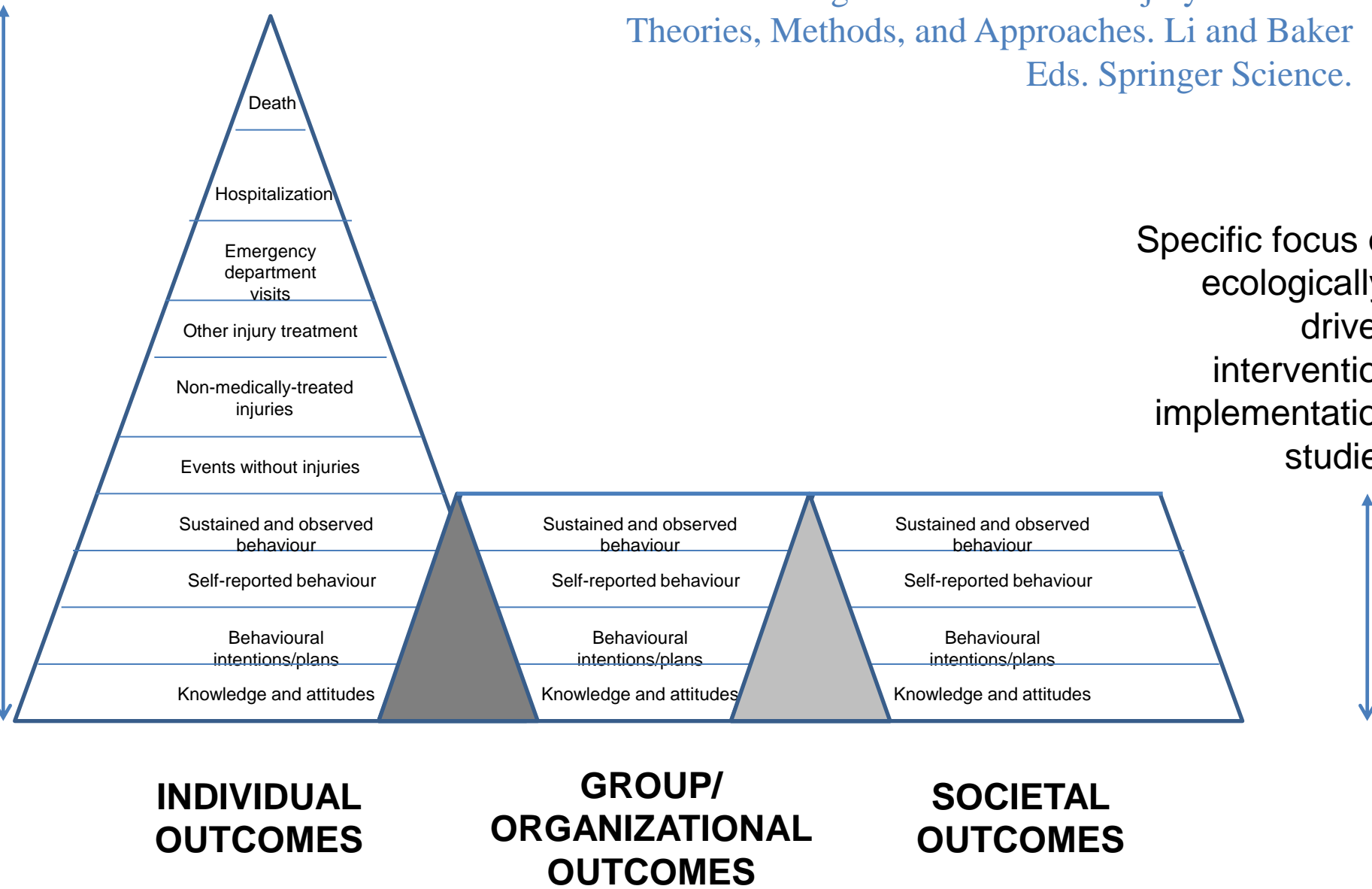- Person centric approaches commonly lead to the development of inappropriate countermeasures
  - focus on reducing variability in human behaviour
  - do not treat the incident -causing conditions present in the wider organisational system
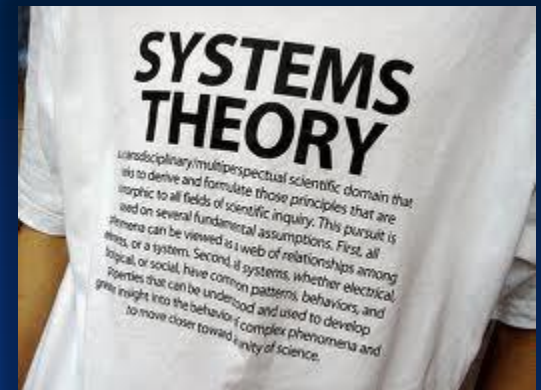
Effectiveness studies

Source: Finch (2011) Chapter 35. Implementing and evaluating interventions. In: Injury Research: Theories, Methods, and Approaches. Li and Baker Eds. Springer Science.

Specific focus of ecologically-driven intervention implementation studies

Death

Hospitalization

Emergency department visits

Other injury treatment

Non-medically-treated injuries

Events without injuries

Sustained and observed behaviour

Self-reported behaviour

Behavioural intentions/plans

Knowledge and attitudes

INDIVIDUAL OUTCOMES

GROUP/ ORGANIZATIONAL OUTCOMES

SOCIETAL OUTCOMES

THE PROJECT

PROJECT PHASES

1. *Methodological development* of prototype incident reporting, storage and analysis methods. Will form a prototype accident & injury surveillance system

2. *Methodological validation, trialling and refinement* of surveillance system methods using led outdoor activity injury incident data

3. *In-depth incident study* using injury surveillance system to explore injury causing incidents in the led outdoor activity domain in Australia

4. *Accident causation model development* based on the above

SURVEILLANCE ASPECTS

WHAT IS SURVEILLANCE?

Public health definition

- the <u>ongoing</u> and systematic collection, analysis, interpretation and dissemination of health information

STEPS IN A SURVEILLANCE SYSTEM
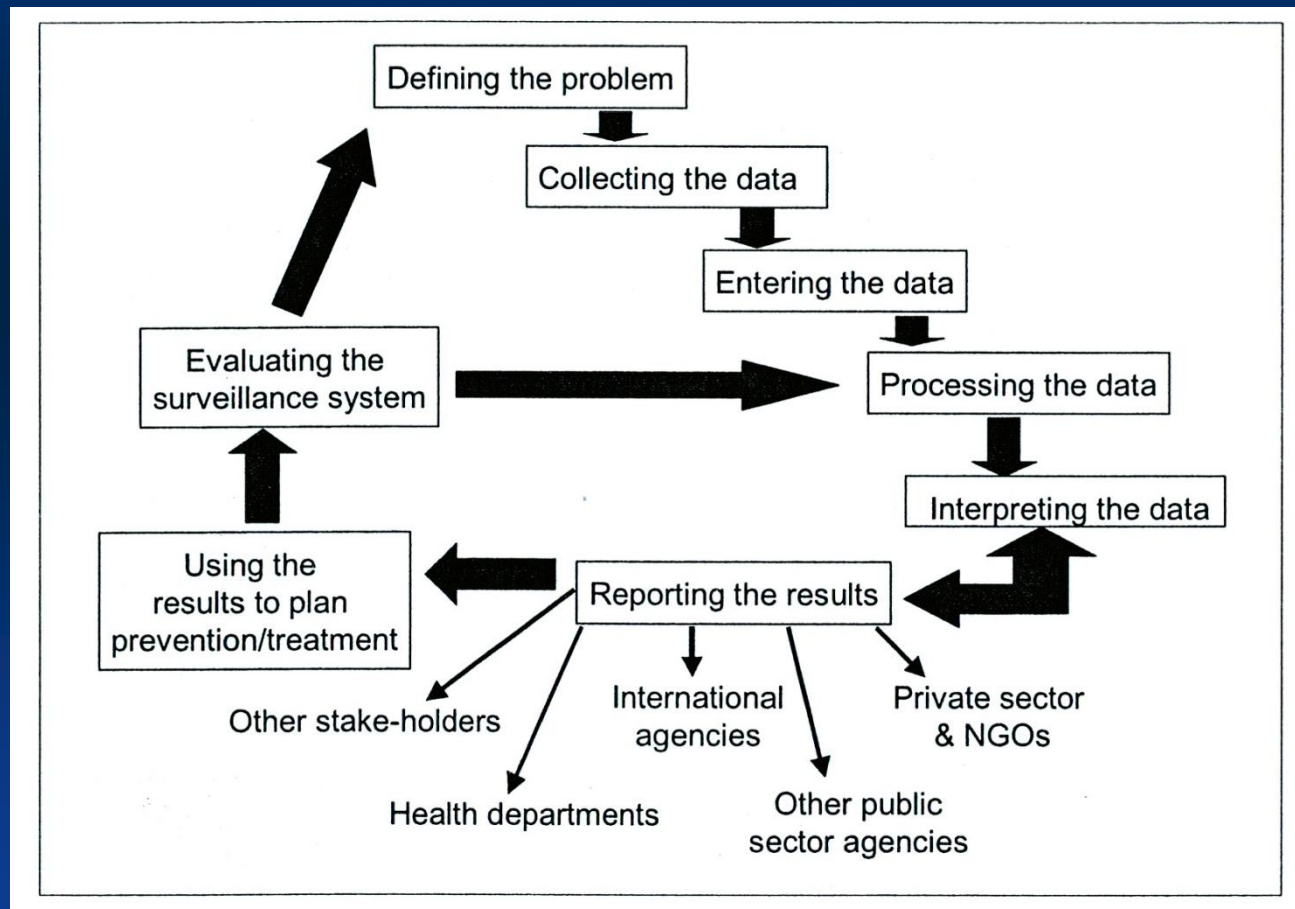
OUTPUTS FROM SURVEILLANCE

- Surveillance produces data that describe
  - the size and characteristics of the problem
  - the population at risk
  - the potential risk factors
  - the trends

- Surveillance data is used for prevention, advocacy, research and evaluation purposes

INJURY vs INCIDENT FOCUS

The availability of data items relevant to injury prevention in the main sources of data on injury

Dataset	Hospital separations	Emergency department presentations	Death records	Incident records	Insurance claims
Injury event characteristics					
Type/circumstance	?	?	?	Y	?
Date/time of injury	N	N	N	Y	Y
Type of place of occurrence	?	?	?	Y	?
Geographic location	N	N	N	Y	N
Context of activity while injured	?	?	?	N	Y
Environmental factors at time of injury	N	N	N	Y	N
Personal and demographic data					
Age/gender	Y	Y	Y	Y	Y
Area of residence	Y	?	Y	Y	Y
Ethnicity	?	?	?	N	N
Socioeconomic status	I	N	I	N	I
Outcomes of injury					
Nature of injury	Y	Y	Y	N	Y
Injury body region	Y	Y	Y	N	Y
Severity of injury	I	I	-	N	?
Costs of injury	I	I	I	N	I

Recorded on the database (Y), can be indirectly generated (I), Limited information/quality (?), not available (N), not relevant (-)

EXAMPLES OF INJURY-BASED DATA (VEMD)

THE NATIONAL MINIMUM DATASET

Demographic and administrative items (de-identified)

➢ Age, sex, postcode and suburb, COB and preferred language spoken at home
➢ time and date of ED presentation, departure status and destination

Injury surveillance items (minimum dataset – limited coding)

➢ Human intent (unintentional (accidental); intentional - self harm, assault)
➢ Major cause (falls, transport, hit/struck/crush, burn/scald etc.)
➢ Nature of injury (eg. fracture, sprain, cut/pierce etc.)
➢ Body region injured (eg, head/face/neck, upper extremity, trunk etc.)
➢ Place where injury occurred (home, school …, athletics and sports area, 'other specified place'– forest, beach, campsite,…mountain…river etc.)
➢ Activity when injured (leisure, working for income etc)

Narrative (short): What happened?

VEMD CASE NARRATIVES: EXAMPLES

Patient with teacher on school camp - coming down hill <u>abseiling</u> fallen and rolled left ankle

Inversion injury of ankle while <u>walking in mountains</u>. Wearing proper hiking boots

Outdoors, <u>hiking</u>, slip

At school camp was <u>white water rafting</u> when it hit a rock and she fell on rock now has sore foot

Pushed off <u>raft</u> and rope caught round ankle

Inversion injury to right ankle while <u>climbing a mountain</u>

Fell whilst <u>rock climbing</u> – was wearing helmet

<u>Rock climbing</u> tonight with harness, fell down onto back

DEVELOPING THE SURVEILLANCE ASPECTS

DESIGNING AND BUILDING A SURVEILLANCE SYSTEM
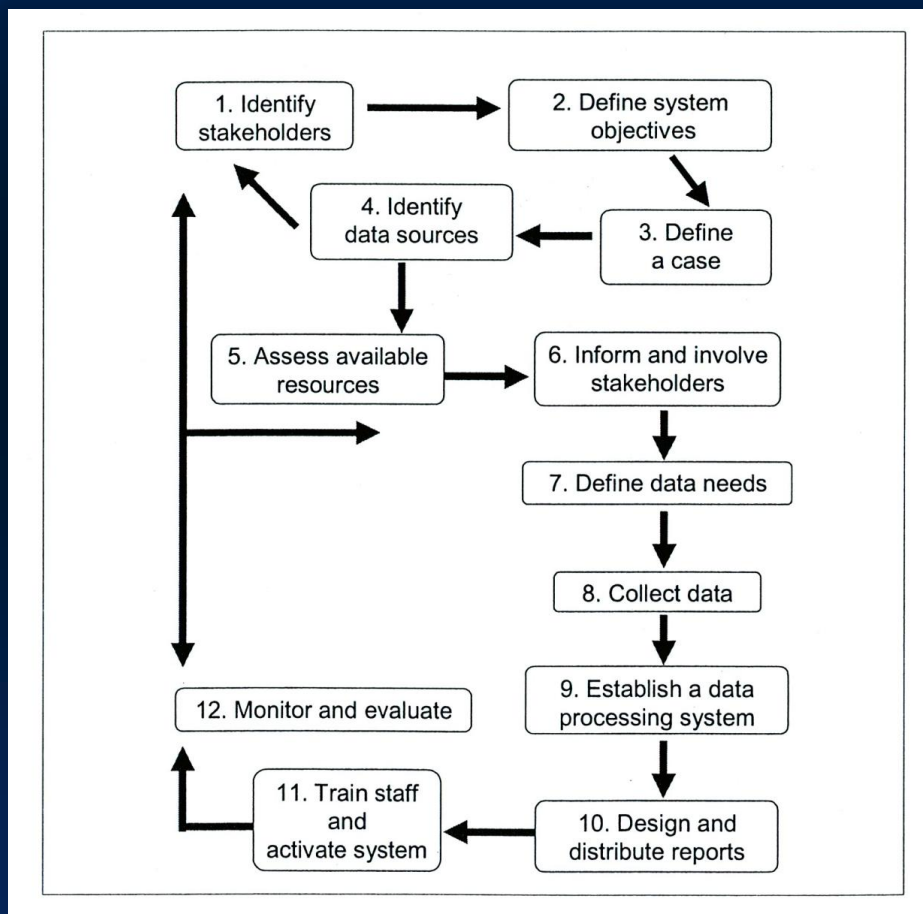
LINKS TO OTHER INITIATIVES/APPROACHES

- ICD coding and classifications systems
  - ICD-11 under review
  - activity codes

- ICECI (international classification of the external cause of injury)

- Database structure and management principles
  - Data linkage
  - Data mining
  - Statistical modelling
  - Identification of clusters in time and space

CONFIDENTIALITY AND PRIVACY

- Australia has strict laws

- System (and its trials) will undergo ethical review and approval

- Team has strong reputation for this with both routine health sector data and sports organisation/team level data

- Some information already in public domain (e.g. media)

- Confidential for both injured person and organisations
  - all data de-identified
  - data aggregated and reported in grouped form only
  - need to consider
    - lower limits of counts reportable
    - organisational-specific reports
    - access to database, custodians, etc

Confidentiality is Key

THE SYSTEMS APPROACH FOR INTERPRETATION AND PREVENTION

ACCIDENT ANALYSIS METHOD REQUIREMENTS

- Reliability
- Sound underpinning theory (e.g. Systems approach)
- Specific to led outdoor activities
- Quick and easy to learn and use
- Integration with surveillance system
- Multiple case analyses
- Outputs support identification of trends
- Outputs inform countermeasure design

METHODS COMPARISON CASE STUDY

- Existing systems-based methods applicable (Salmon et al, 2011)

- Comparison of <u>Accimap</u>, HFACS and STAMP

- Investigate potential for use in accident surveillance system

- Identify limitations of existing methods

- Mangatepopo gorge incident

Accimap
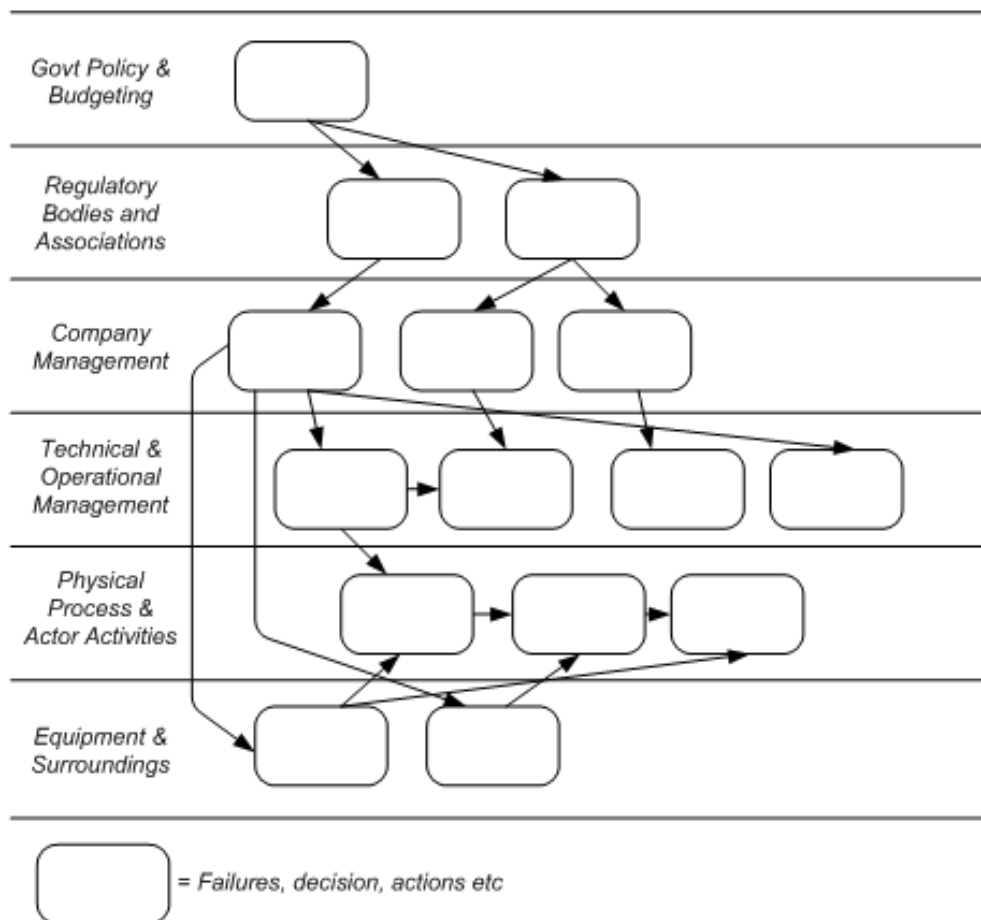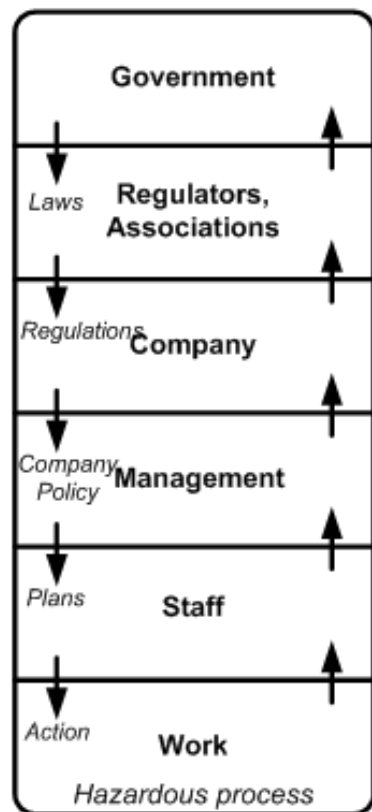
Mangatepopo Gorge incident

- 15th April 2008, Mangatepopo gorge, Tongariro National Park

- Gorge walking activity

- Six students and their teacher drowned

- Various contributory factors identified

Methodology

- Three Human Factors analysts

- Each investigated incident using either Accimap, HFACS or STAMP

- Same input data (Coroners report, Independent inquiry report)

- Analysis reviewed by industry partners

Mangatepopo Gorge Incident Accimap

Government policy and budgeting

- Lack of legislation covering health and safety at activity/ adventure tourism centres

Regulatory bodies & associations

- Lack of an outdoor industry regulator or licensing body
- Inadequate auditing system
- Failure of auditor to pick up/question risk associated with planned activity

Local area Government planning & budgeting, Company management

- Rain or shine culture
- Inadequate induction/ mentoring/ training systems
- RAMS system inadequate
- Inadequate/ unclear policies & procedures
- Allowance of routine policy violations
- Financial and production pressures
- Poorly designed Adventure program
- Inadequate/ misleading information &consent form
- Underestimation of risk/difficulty associated with upstream gorge trip
- Poor awareness/ uptake of weather information services
- High staff turnover
- Inadequate incident surveillance system
- Lack of clarity regarding FM's role and responsibilities

Technical & operational management

- Instructor lack of experience/ competence
- Failure to check maps on Metservice fax
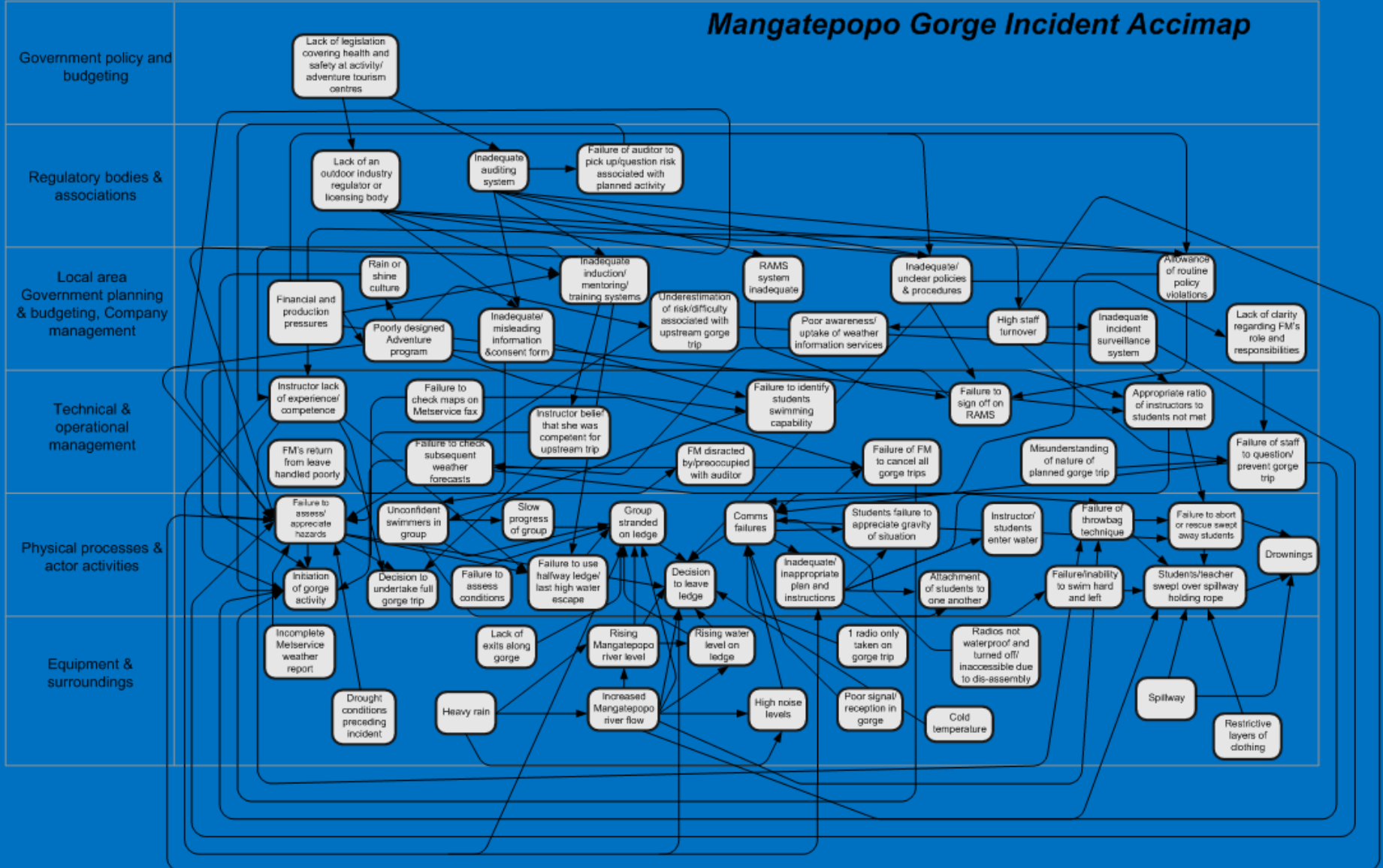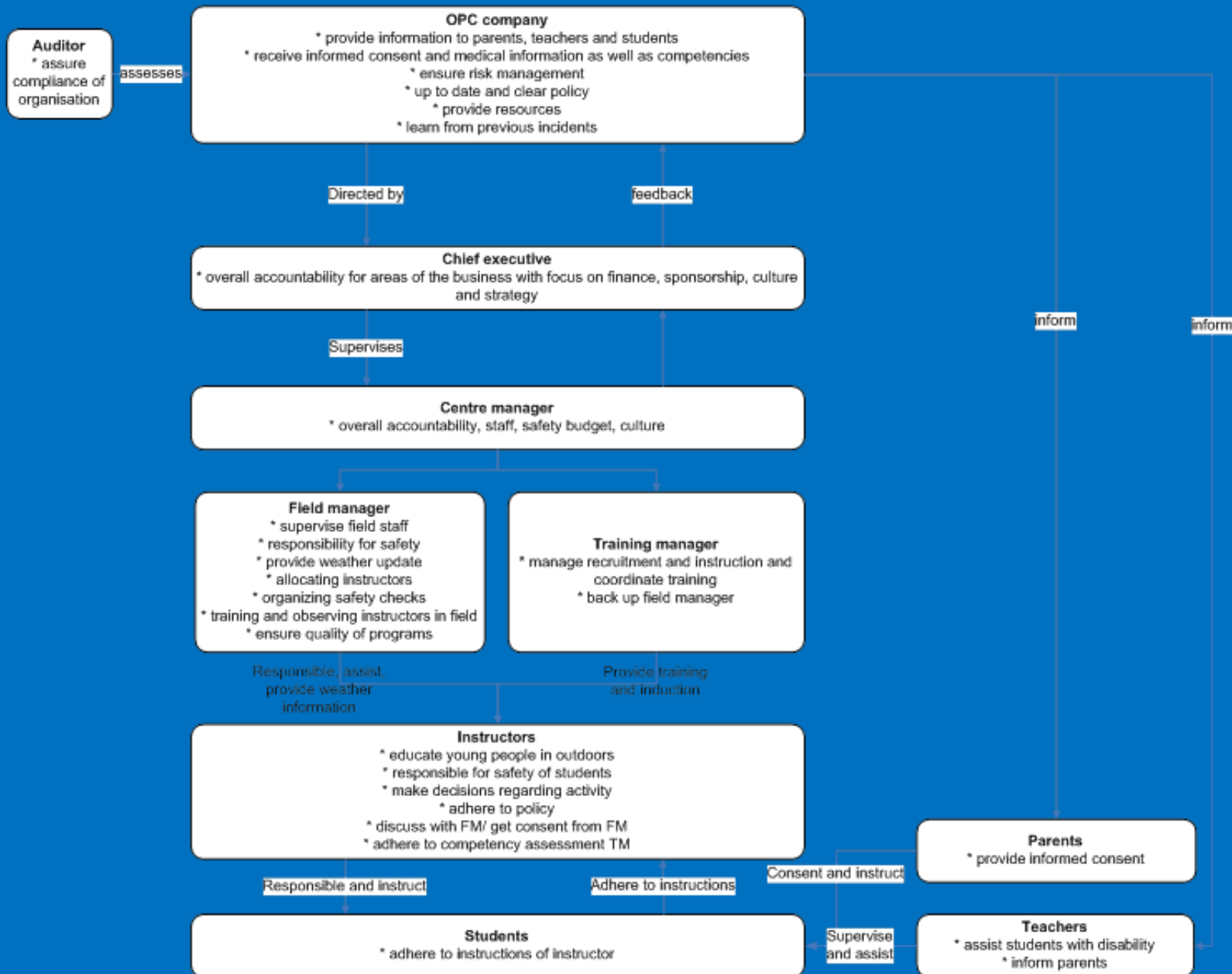- Instructor belief that she was competent for upstream trip
- Failure to identify students swimming capability
- Failure to sign off on RAMS
- Appropriate ratio of instructors to students not met
- FM's return from leave handled poorly
- Failure to check subsequent weather forecasts
- FM disracted by/preoccupied with auditor
- Failure of FM to cancel all gorge trips
- Misunderstanding of nature of planned gorge trip
- Failure of staff to question/ prevent gorge trip

Physical processes & actor activities

- Failure to assess/ appreciate hazards
- Unconfident swimmers in group
- Slow progress of group
- Group stranded on ledge
- Comms failures
- Students failure to appreciate gravity of situation
- Instructor/ students enter water
- Failure of throwbag technique
- Failure to abort or rescue swept away students
- Drownings
- Initiation of gorge activity
- Decision to undertake full gorge trip
- Failure to assess conditions
- Failure to use halfway ledge/ last high water escape
- Decision to leave ledge
- Inadequate/ inappropriate plan and instructions
- Attachment of students to one another
- Failure/inability to swim hard and left
- Students/teacher swept over spillway holding rope

Equipment & surroundings

- Incomplete Metservice weather report
- Drought conditions preceding incident
- Lack of exits along gorge
- Rising Mangatepopo river level
- Rising water level on ledge
- 1 radio only taken on gorge trip
- Radios not waterproof and turned off/ inaccessible due to dis-assembly
- Heavy rain
- Increased Mangatepopo river flow
- High noise levels
- Poor signal/ reception in gorge
- Cold temperature
- Spillway
- Restrictive layers of clothing

WHAT ACCIMAP TELLS US

- Accimap most suited to accident analysis in led outdoor activity domain; however….

- Taxonomic support required for use as part of surveillance system

- Further evidence that led outdoor activity accidents have multiple interacting contributory factors

- Incident highlights importance of accident & near miss surveillance system (Salmon et al. Safety Science, 2011)

safety science

WATCH THIS SPACE!

Over the next 3 years, UPLOADS will

- Provide a mature safety management system through better systems to track incidents

- Develop, trial and validate a theoretically underpinned, systems-based injury surveillance system that can be used to collect, classify, store and analyse incident data on a continual basis

- Generate new detailed and specific knowledge regarding injury and injury causing incidents in Australia, including their type, frequency, causes, and outcomes

- Develop a novel systems-based model of incident causation for led outdoor activity for wider applicability across Australia

Phd OPPORTUNITY

- MIRI PhD scholarships available
  - closing date 27th Jan

- Linked to UPLOADS (supervisor)
  - injury surveillance system development (Finch)
  - human factors in-depth investigations (Salmon)
  - safe systems development for led outdoor activity domain (Salmon)

- Also available
  - injury risk management in the Australian fitness industry

Monash University
Monash Injury Research Institute

FOR FURTHER INFORMATION

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(Details of the quoted references can be provided upon request)