ACTIVITY MODELING FOR RISK ASSESSMENT AND EMERGENCY MANAGEMENT APPLICATIONS FOCUSING ON PERI-URBAN REGIONS

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24 May 2012

CRC

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RESEARCH QUESTIONS

Overall Risk

- In Australia nationally rural roads have 15 crashes per 100,000,000 vehicle kilometres and 1.3 per 10,000,000 intersection entries (Austroads 2010)
- What are the numbers for late evacuation?

RESEARCH QUESTIONS

Risk Contribution

- Place the following factors in correct order from least to most risk in late evacuation

Behaviour	Network	Physical

RESEARCH GAP

- Activity model of
  - Normal behaviour
  - Behaviour under threat
- Transport simulation with many crashes
- Understanding of blockages

LITERATURE REVIEW

bushfire CRC

	Preserve Property	Disregard Property
Preserve Life	1 – Stay and Defend	2 – Early Evacuation
Disregard Life		3 – Late Evacuation

LITERATURE REVIEW

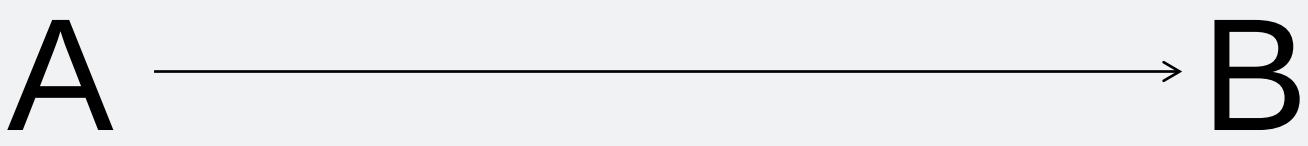
- No COTS Transport Simulation with many crashes
- When modelling behaviour need to consider the “return evacuation” for children and pets

METHODOLOGY

1. Understand a single segment
2. Work out where the people are
3. Combine single segments into a network
4. Add the people
5. Add the fire
6. Observe

SINGLE LINK

Concept



Possible results

a) Move with some delay

b) Blocked

   i. Return to A

   ii. Convert to pedestrian/casualty

SINGLE LINK

Factors to Consider - 1

- Panic
  - Route Choice
  - Leave road
- Winding road
- Wind
  - Trees
  - Powerlines

SINGLE LINK

Factors to Consider - 2

- Heat & Smoke
  - Sight distance
  - Physiological affects
- Fire front
  - Can’t cross
- Other people
  - Crashes multiply
- Ordinary risk

DISTRIBUTION OF PEOPLE
Data and Outcomes

- Data Sources
  - Census
  - Time use surveys
- Journey to:
  - Work
  - School
  - Shopping
  - Tourism

DISTRIBUTION OF PEOPLE
Groups

- It’s a group thing
- Influences on behaviour
  - Vehicle Availability
  - Age
  - Experience
- Groups are dynamic

NETWORK

- A network is a group of links
- Route choice
  - Where is a place of safety?
  - Does route choice change?

MODEL

- Put it all together
  - Link to Fire & Smoke model (FIRE-DST)
  - People activity
  - Transport Network
  - Monitoring

SIMULATION OUTPUTS

- Can observe individual outcomes
  - Paths taken
  - Time taken
  - Who incurs the risk?
    - Age
    - Location
    - Socioeconomic
    - Etc?

TIMING

- 2012 Data Collection
- 2013 Single Link/Integration
- 2014 Integration/Calibration

POSSIBLE OUTCOMES

- Guide to risk for
  - Policy makers
  - Community groups
  - Individuals
- Testing of new policies

TSUNAMI

FUTURE WORK

- Focus on risk factors
- Modelling of:
  - Denser areas with congestion
  - Non-bushfires

REFERENCES

- Austroads 2010, Road Safety Engineering Risk Assessment, Part 7: Crash Rates Database.
- Handmer & Tibbits 2005, Is staying at home the safest option during bushfires? Historical evidence for an Australian approach, Environmental Hazards 6 (2005) 81-91
- Beringer J. 2000, Community fire safety at the urban/rural interface: The bushfire risk, Fire Safety Journal 35 (2000) 1-23

QUESTIONS