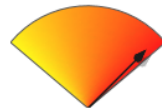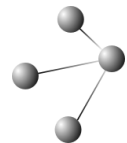# A user-friendly web-based BN interface for assessing bush fire risk

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Bayesian Intelligence

Overview

- Background: existing site
- Design goals
- System architecture
- Issues encountered
- Final design
- Site demonstration
- Future work

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Existing Site

Several issues:

- Rule-based
- High user bounce rate
- Binary advice
- Limited assessment

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Design Goals

Primary Goals:

- Assess household bush fire risk
- Assess capacity to defend against bush fire
- Make assessment easy to understand

Also:

- Make an engaging tool
- Provide progressive risk advice
- Allow users to explore consequences

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Early Mockups

System Architecture

Inputs

Outputs

Email

GIS Server	.NET Web Server (HTML/Javascript/C#)

BN HTTP Server (Java)	SQLite Database

RHF Calculator (Java)	HUGIN API (Java)

BNs (provided by CERMB)

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Setback #1: Legal Risk Rears Its Head

- As we've heard, advising the public is fraught with risk

- Our original design assumed:
  - A probabilistic model
  - Value-neutral estimates of parameters

Setback #1: Legal Risk Rears Its Head

- RFS's understandable risk aversion lead to a model that was:
  - Very conservative
  - Very deterministic

Personal Capacity Node

Setback #2: A Push to be Uber-Friendly

- Management wanted more user engagement

- Wanted significant graphical content

- Example given: WWF Footprint Calculator
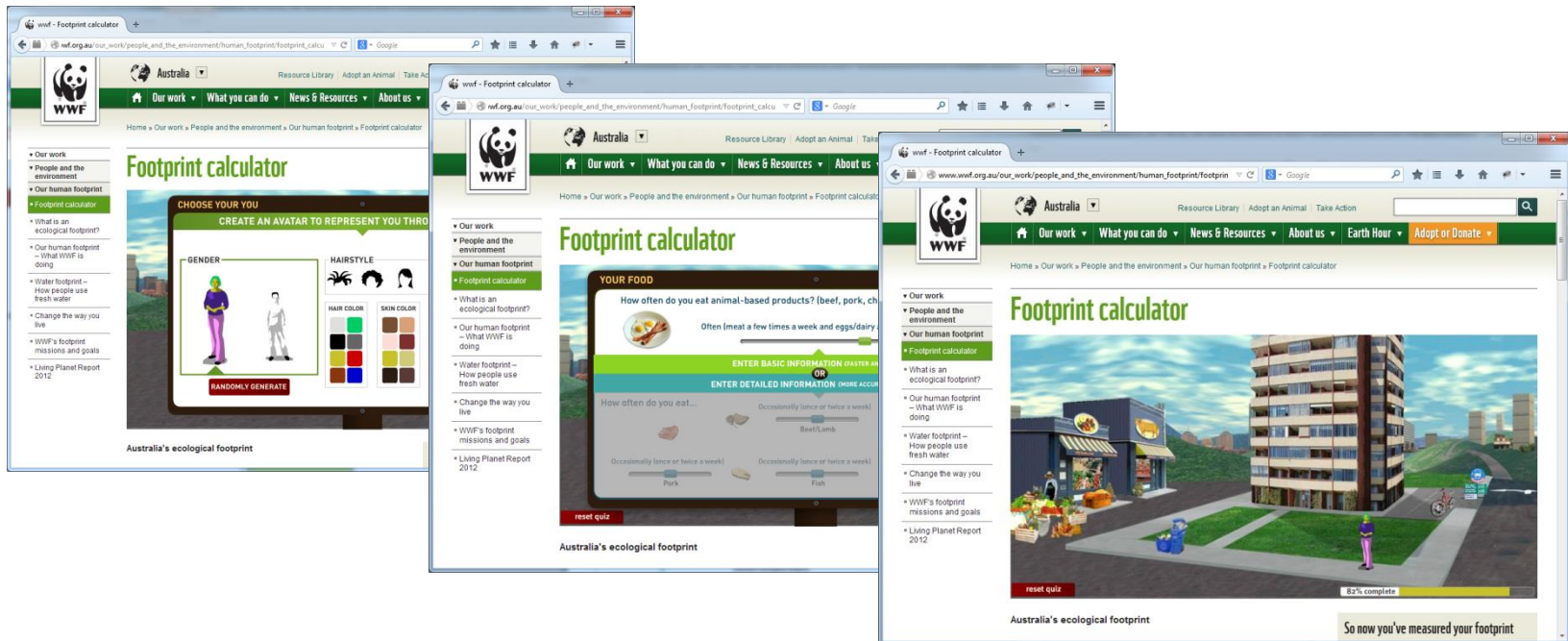
Uber-Friendliness

- Our concerns:
 - Would be taken less seriously
  - Would be a less useful tool
- Concerns not (entirely) founded:
  - Not interested in game-like interface
  - Only interested in directly relevant graphics

Final Design

- Priors
- Risk advice
- Uncertainty
- Feedback
- Followup questions
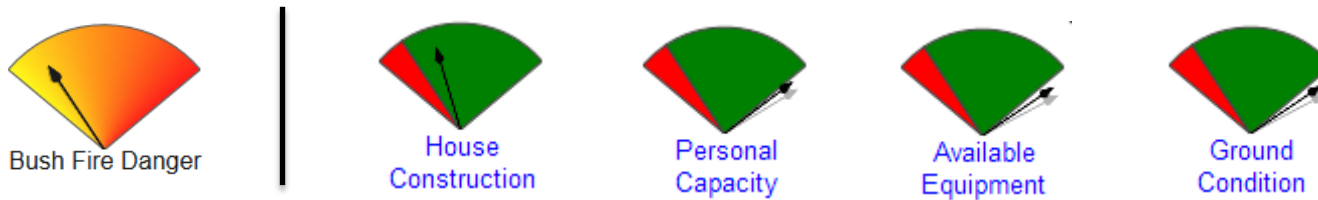- Data collection
- Scenarios

Final Design: Priors

- Conservativeness → almost always negative feedback with real priors

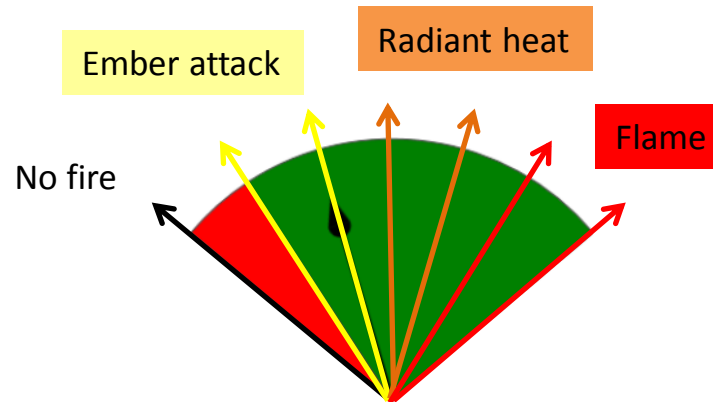- Use optimistic priors while assessment in progress
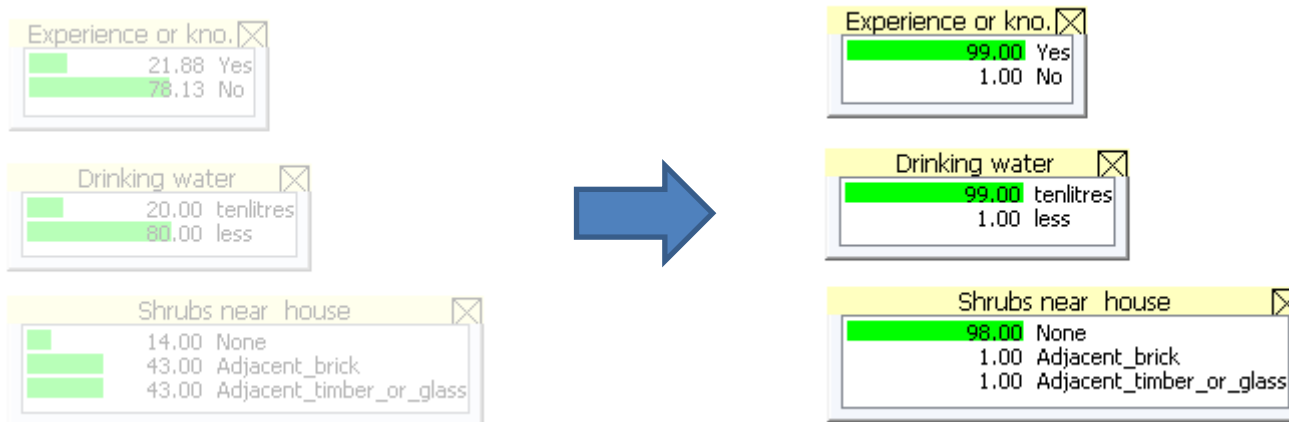
Final Design: Risk Advice

- Separate **progress indicators** from **risk advice**

- One progressive meter per category

Bush Fire Danger
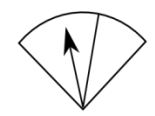
House Construction

Personal Capacity

Available Equipment

Ground Condition

- Only final meter gives overall risk assessment

Ember attack

Radiant heat

Flame

No fire

- No labels

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Final Design: Uncertainty

- Deterministic model, but some uncertainty when questions partly answered

Size of swing represents uncertainty
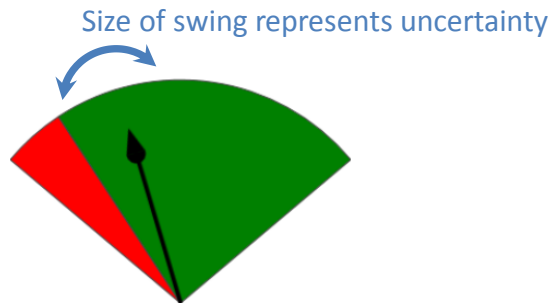
- Highest probability category shown

Ember attack

Radian Heat

Flame

No fire
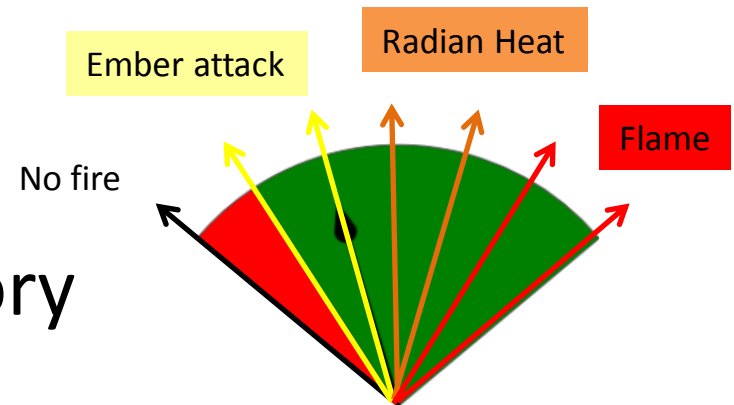
$$\arg \max_{category} P(category | answers) = \text{Ember attack}$$

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Final Design: Feedback

- Graphical feedback based on answers
- Instant feedback in several forms

What year was your house constructed?

Between 2002-2010

To what level?

Level 1

House Construction

Final Design: Followup Questions

- Good and bad is black and white

- Many answers can be easily improved

- We can use followup questions

How many residents will be defending the property in the event of a bush fire?

○ None ● One ○ Two or more

Personal Capacity

Are you able to have at least two people defending the property?

● Yes ○ No

Personal Capacity

Final Design: Data Collection

- Database originally for saving user progress

- Can double as survey data for research

- Obvious issues:
  - Self-selection bias
  - Users experimenting with responses

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Final Design: Scenarios

- Instant feedback mitigates need for scenario exploration

- No trade-offs or dependencies to explore

- Give user a checklist instead

Meet the
New RFS Assessment Tool (Almost)

Meet the
New RFS Assessment Tool (Almost)

Meet the
New RFS Assessment Tool (Almost)

Meet the
New RFS Assessment Tool (Almost)

Meet the
New RFS Assessment Tool (Almost)

The Future

- Back to uncertainty (we hope)
- Iteration on the model
  - Make use of collected data
  - Model parameter changes easy due to loose coupling
  - Model structure changes has implications for questions, help and particularly graphics