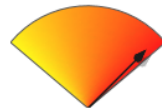
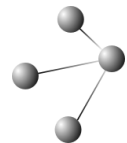


# A user-friendly web-based BN interface for assessing bush fire risk



Owen Woodberry, Steven Mascaro,  
Ann Nicholson and Kevin Korb



Bayesian Intelligence

# Overview

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

# Existing Site

NSW Rural Fire Service Bush ...

bfhat.rfs.nsw.gov.au

## Bush Fire Household Assessment Tool

- Terms & Conditions
- Bush Fire Assessment
- Householder Capacity
- Stay or Go Advice

### Terms and Conditions:

The NSW Government is committed to enhancing public safety by reducing the impact of bush fires. The Bush Fire Household Assessment Tool ("Tool") is provided by the NSW Rural Fire Service (also known as "the RFS") to help you to assess your household's level of risk from a bush fire and make informed decisions about the safety of your household.

The RFS provides the Tool as a source of information only and on the understanding that you exercise care and skill when you use it. The Tool provides information about your household's level of risk from a bush fire based on the data you provide ("Assessment Outcomes"). It cannot take in account information that you do not enter.

The RFS does not accept any responsibility for how you apply, interpret or rely on the Assessment Outcomes or the Tool. You should obtain further advice if you are uncertain about how any of the information provided, including the Assessment Outcomes, applies to your situation.

**Do you agree with the above terms and conditions?**

Yes, I agree.  No, I disagree.

### Terms and Conditions Output:

### Assessment Hints and Progress

Welcome to the NSW Online Bush Fire Household Assessment Tool. This tool is designed to help you make an informed decision regarding your 'Leave Early or Stay and Defend' choice for this bush fire season.

THE RFS BUSH FIRE HOUSEHOLD ASSESSMENT TOOL DOES NOT PROVIDE ASSESSMENT FOR FIRES THAT ARE IN THE CATASTROPHIC CATEGORY. UNDER THESE CONDITIONS, YOU ARE ADVISED TO LEAVE EARLY.

To undertake your assessment, you need to complete the following steps:

- Step 1 - Read and agree to the terms and conditions for the use of the tool.
- Step 2 - Determine the potential bush fire attack level which your property might be exposed to;
- Step 3 - Assess your personal capacity to actively defend your property.

Previous Next New Help

Several issues:

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

# 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

# Early Mockups

### Bush Fire Household Assessment Tool

Details
 House Construction
 Personal Capacity
 Available Equipment
 House Condition

#### Bush Fire Danger Assessment

These questions assess your fire danger level. It is used to...

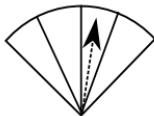
Alpine Resort Area:  Yes  No

Vegetation Type:

Slope Type:  Flat  Sloped

Slope Value:  Degrees

Distance between building and vegetation:  Meters



Bush Fire Danger

#### House Construction Assessment

These questions assess your house construction standard. It is used to...

Construction Date:

House BAL Rating:

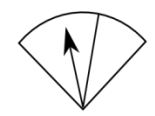
### Bush Fire Household Assessment Tool

Details
 House Construction
 Personal Capacity
 Available Equipment
 House Condition

#### Stay or Leave Advice:

Based on your questions, you are advised to Leave Early.  
This is because...


Please select a detailed information guide:





Overall Risk Assessment


### Bush Fire Household Assessment Tool

#### Saved Scenario

  
Overall Risk Assessment


  
House Construction


  
Personal Capacity


  
Available Equipment


Drinking Water Ten liters  
Gutters Yes  
Roof Sprinklers No  
...

#### Alternative Scenario

  
Overall Risk Assessment

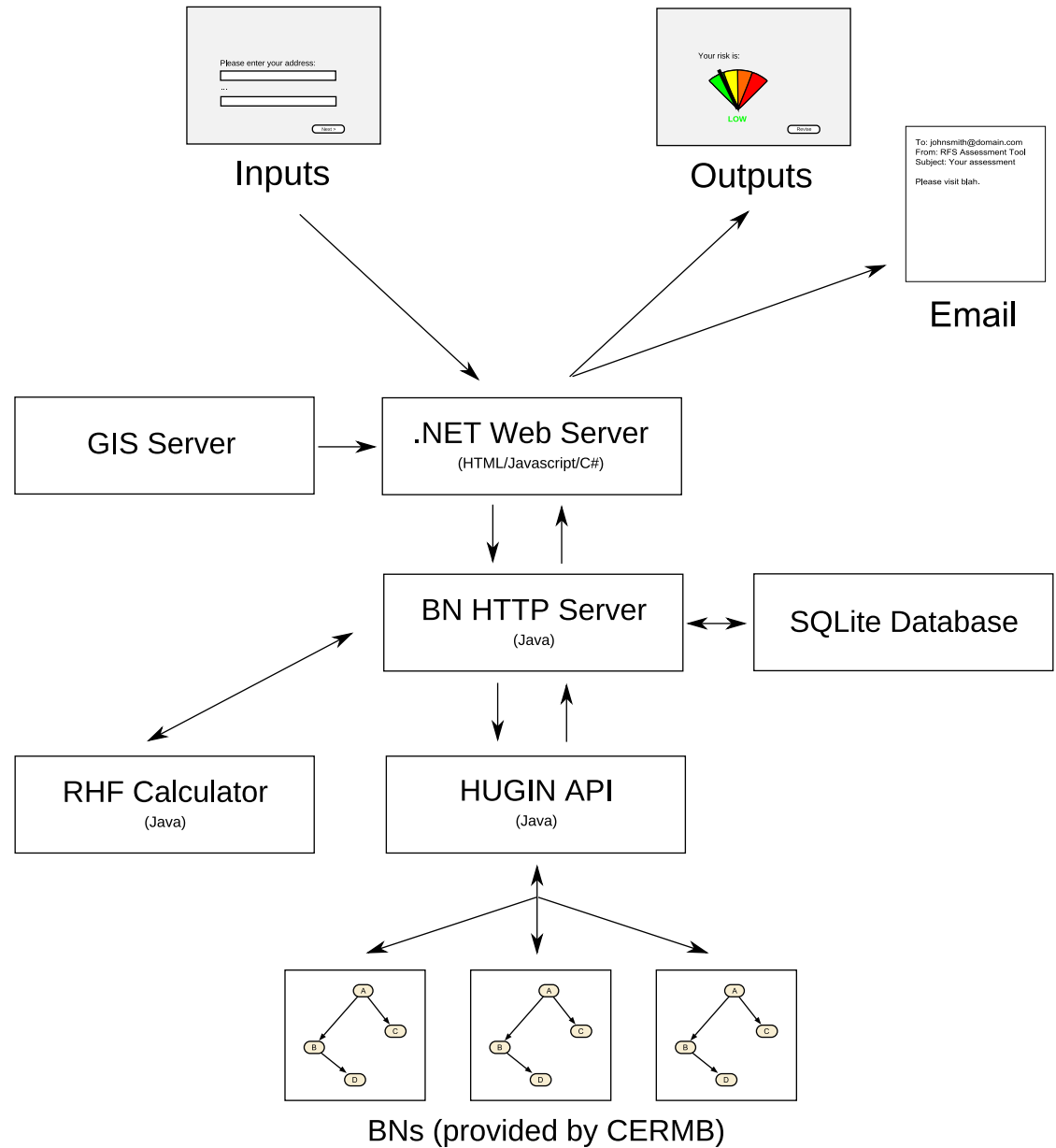
  
House Construction

  
Personal Capacity

  
Available Equipment

Drinking Water  Yes  No  
Gutters  Yes  No  
Roof Sprinklers  Yes  No  
...

# System Architecture



# Setback #1: Legal Risk Rears Its Head

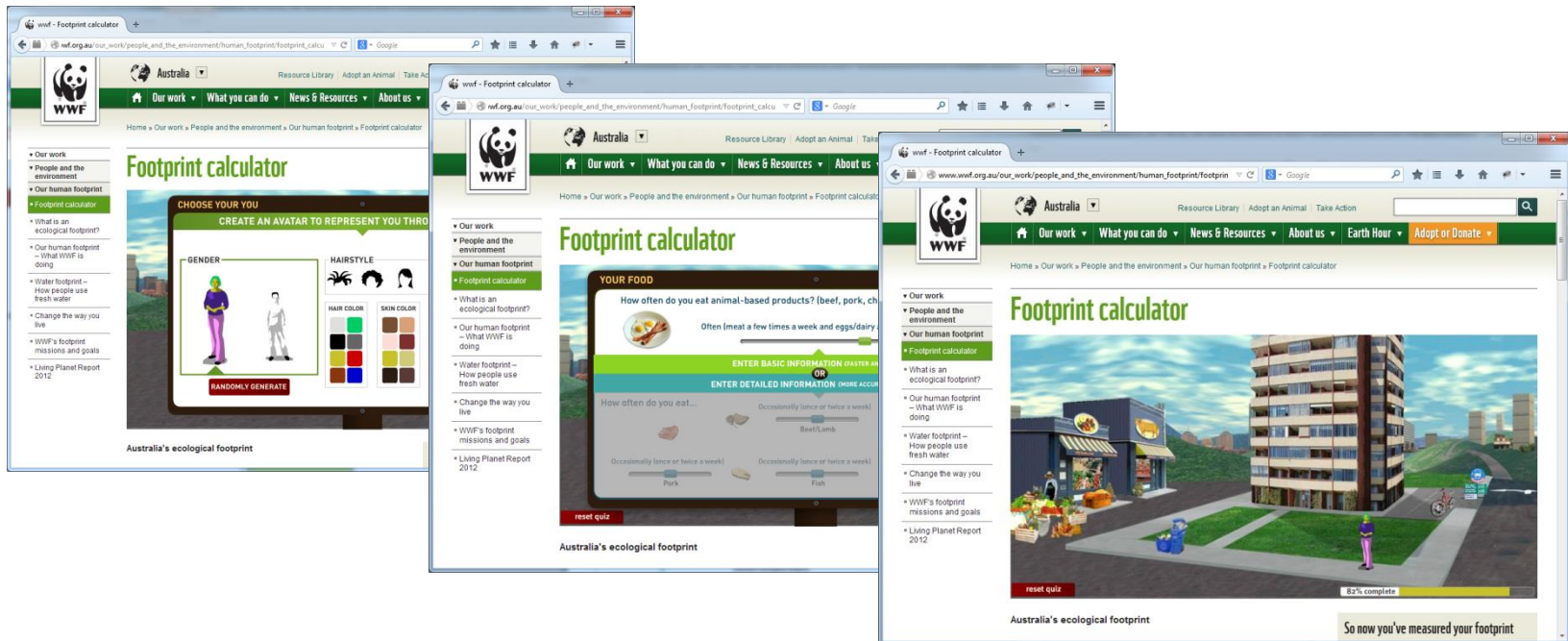
- As we've heard, advising the public is fraught with risk
- Our original design assumed:
  - A probabilistic model
  - Value-neutral estimates of parameters





# Setback #2: A Push to be Uber-Friendly

- Management wanted more user engagement
- Wanted significant graphical content
- Example given: WWF Footprint Calculator



# Uber-Friendliness

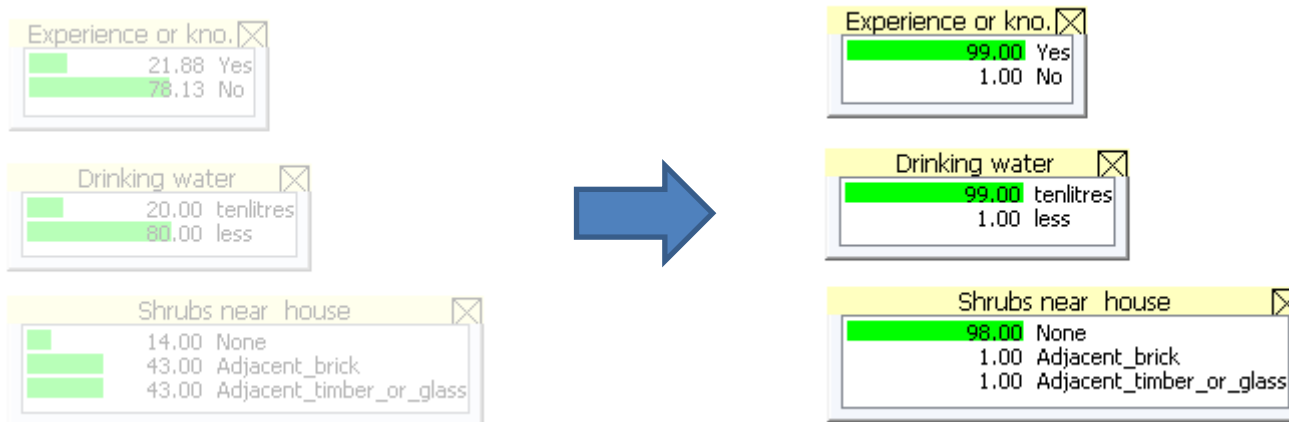
- Our concerns:
  - Would be taken less seriously
  - Would be a less useful tool
- Concerns not (entirely) founded:
  - Not interested in game-like interface
  - Only interested in directly relevant graphics

# Final Design

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

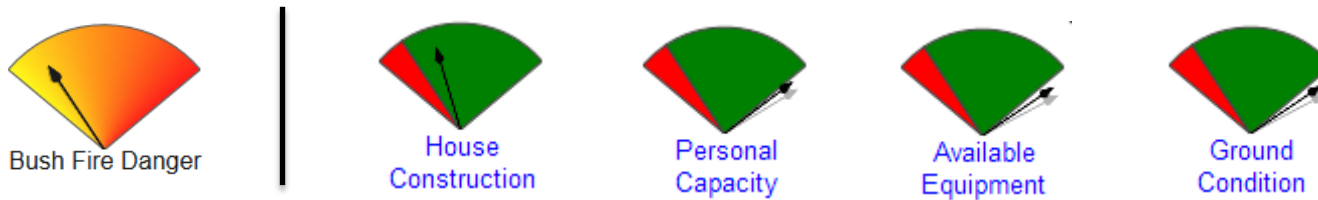
# Final Design: Priors

- Conservativeness → almost always negative feedback with real priors
- Use optimistic priors while assessment in progress

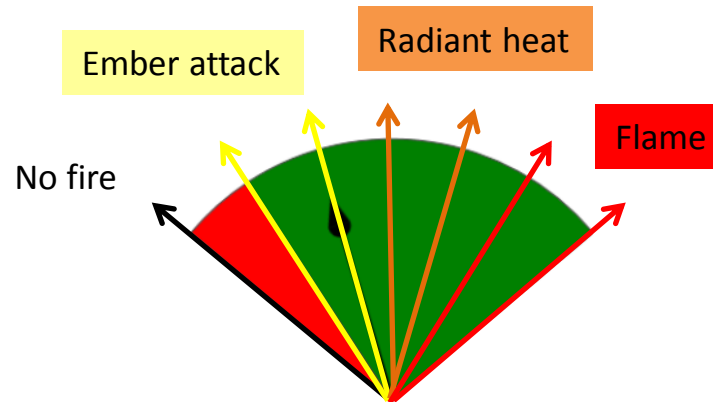


# Final Design: Risk Advice

- Separate **progress indicators** from **risk advice**
- One progressive meter per category



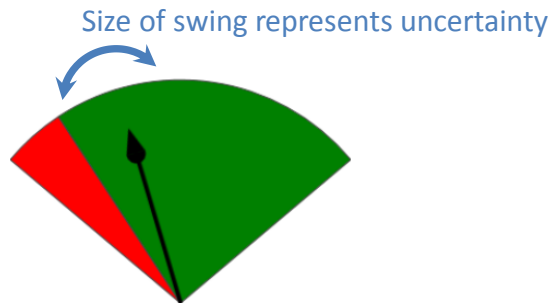
- Only final meter gives overall risk assessment



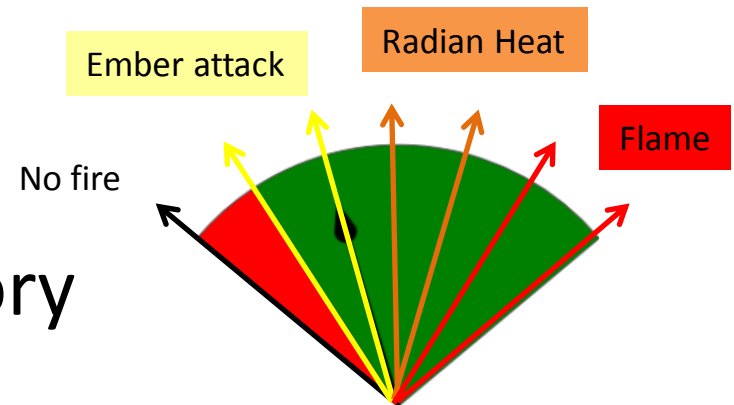
- No labels

# Final Design: Uncertainty

- Deterministic model, but some uncertainty when questions partly answered



- Highest probability category shown



$$\arg \max_{\text{category}} P(\text{category} | \text{answers}) = \text{Ember attack}$$

# 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 ▾



# 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

# 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)

The screenshot shows a web browser window with the URL <https://hat.uat.rfs.nsw.gov.au>. The page header includes the NSW Government logo and the NSW Rural Fire Service logo, with the title "NSW Rural Fire Service Bushfire Household and Personal Assessment Tool".

A progress bar at the top indicates the current step: "Personal Details" (active), "Bush Fire Danger", "Household Assessment", and "Report".

**Personal Details**

Welcome to the RFS Online Bush Fire Household Assessment Tool. The tool is designed to help you make an informed decision regarding your 'Leave Early or Stay and Defend' choice for this bush fire season.

Please enter your address and contact details. This information will be used to evaluate your bush fire risk and send you the details of this assessment. It will not be used by NSW Rural Fire Service for any other purpose.

Home Address:   ?

Email Address:

On the right side, there is a Google Map with a red pin and a text box that says "Please pinpoint your exact house location". The map shows streets including Paradise Ave, Rose Parade, New Mt Pleasant Rd, Princes Motorway, and Dobinson St. A "Map" button and "Satellite" option are visible in the top right of the map area.

At the bottom right of the page, there is a blue button labeled "Assess Me!".

At the bottom of the browser window, there are links for "Terms", "Privacy", and "Copyright & Disclaimer".

# Meet the New RFS Assessment Tool (Almost)

The screenshot shows a web browser window with the URL <https://hat.uat.rfs.nsw.gov.au>. The page header includes the NSW Government logo and the NSW Rural Fire Service logo, with the title "Bushfire Household and Personal Assessment Tool". A progress bar at the top indicates the current step is "Bush Fire Danger", with other steps being "Personal Details", "Household Assessment", and "Report".

### Bush Fire Danger Assessment

The results below have been calculated to assess the fire danger for your location. Are they correct? Modify any questions that are incorrect to show the relationship between your house and the closest bush fire hazard..


What is your council area?  ?

What is the type of bush/grass?  ?

Where is the bush/grass in relation to your house?  Downslope  Flat  Upslope ?

How steep is the land between your house and the bush/grass?  degrees ?

What is the distance between your house and the bush/grass?  meters ?



[Continue](#)

Terms | Privacy | Copyright & Disclaimer

# Meet the New RFS Assessment Tool (Almost)

The screenshot shows a web browser window with the URL <https://hat.uat.rfs.nsw.gov.au>. The page header includes the NSW Government logo and the NSW Rural Fire Service logo, with the title "Bushfire Household and Personal Assessment Tool". A progress bar at the top indicates the current step is "Household Assessment", with other steps being "Personal Details", "Bush Fire Danger", and "Report".

The main content area is titled "Household Construction" and includes the following text: "If you are unsure, continue the assessment using a low level of bush fire specific protection measures. Check with you local Council if you want to know if bush fire specific measures were required when your house was built." Below this, there are two dropdown menus: "What year was your house constructed?" set to "Between 2002-2010" and "To what level?" set to "Level 1".

On the right side of the assessment area, there are four interactive gauges, each with a red-to-green gradient and a needle: "House Construction" (selected), "Personal Capacity", "Available Equipment", and "Ground Condition". To the right of these gauges is a 3D rendering of a house. At the bottom right of the assessment area is a "Continue" button.

At the bottom of the browser window, there are links for "Terms", "Privacy", and "Copyright & Disclaimer".

# Meet the New RFS Assessment Tool (Almost)

The screenshot shows a web browser window with the URL <https://hat.uat.rfs.nsw.gov.au>. The page header includes the NSW Government logo and the NSW Rural Fire Service logo, with the title "Bushfire Household and Personal Assessment Tool".

The navigation bar has four steps: "Personal Details", "Bush Fire Danger", "Household Assessment" (which is the active step, indicated by a blue dot), and "Report".

The main content area is divided into two columns. The left column contains a list of assessment questions, each with "Yes" and "No" radio button options. The right column contains four assessment categories, each with a green and red gauge icon and a question mark icon: "House Construction", "Personal Capacity", "Available Equipment", and "Ground Condition".

Below the assessment categories, there are 3D avatars of a woman with a cane, a man, and a baby, along with icons of horses and a dog. A "Continue" button is located at the bottom right of the main content area.

At the bottom of the browser window, there are links for "Terms", "Privacy", and "Copyright & Disclaimer".

# Meet the New RFS Assessment Tool (Almost)

The screenshot shows a web browser window with the URL <https://hat.uat.rfs.nsw.gov.au>. The page header includes the NSW Government logo and the NSW Rural Fire Service logo, with the title "Bushfire Household and Personal Assessment Tool". A progress bar at the top indicates the current step is "Report", with previous steps being "Personal Details", "Bush Fire Danger", and "Household Assessment".

The main content area is divided into two columns. The left column contains the following text:

**Stay or Leave Advice: **Safe to Stay and Defend****

Based on the information you have provided, you are prepared and have the tools to safely stay and defend your property.

During the assessment you promised to take actions to prepare your house for a bush fire. Please review and print the todo list.

[To Do List](#)

Please read the following information to ensure you have considered what is required to safely stay and defend your property:

- [Staying and Defending factsheet](#)
- [Bush Fire and your Home](#)

The right column features a large green gauge with a black needle pointing towards the center. A small red segment is visible at the bottom left of the gauge.

At the bottom right of the main content area, there is a button labeled "Detailed Report".

The footer of the page contains the text "Terms | Privacy | Copyright & Disclaimer".

# 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