bushfire&natural HAZARDSCRC

DETERMINING THRESHOLD CONDITIONS FOR EXTREME FIRE BEHAVIOUR

Initial Steps

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Australian Government
Department of Industry and Science
Business Cooperative Research Centres Programme

THE UNIVERSITY OF MELBOURNE

PROJECT BACKGROUND

1) The need to understand fire
   a) Empirical models (observations of real fires)
   b) Theoretical models (typically with some empirical parameter fitting
2) Model fitting has typically been on experimental fires under mild conditions
3) The fires that do the most damage are those that occur under the most extreme conditions
4) The occurrence of extreme fire behaviours mean this matters...

FOUR BROAD OBJECTIVES

1) Collate information on cases of extreme fire behaviour
    - Fire behaviour
    - Accessory data
2) Document cases where “extreme” fire behaviour occurred using the classification of Viegas (2014)

3) Investigate the conditions and processes under which these occur to identify environmental causes

4) Derive empirical relationships that can be implemented in fire behaviour models

PROJECT TEAM

1) Dr Thomas Duff (UOM)
2) Dr Trent Penman (UOM)
3) Dr Kevin Tolhurst (UOM)
4) .....

INTENDED COLLABORATIONS

1) Dr Jason Sharples (UNSW)
2) Dr Rodman Linn (US)
3) Dr Domingos Viegas (Portugal)
4) Dr Mark Finney (US)
5) Dr Gavril Xanthopoulos (Greece)
6) Other CRC projects

Source: Reto Stockli (NASA/GSFC)

WHAT IS THERE TO GAIN?

1) Develop/Verify models
2) Provide observations for the development of theory
3) Provide feedback on management strategies
4) Operational research
5) Economic analysis

OUTPUTS

1) A database with case study of extreme fire behaviour coupled with climatic and environmental data

2) Documented occurrence of extreme fire behaviours in Australian system

3) Empirical analysis and publication of environmental factors contributing to extreme fire behaviour

WHERE ARE WE NOW?

1) **Contract signed** – project establishment phase

2) **Recruitment** – have conducted interviews for a postdoctoral researcher – we have a preferred candidate and

3) **Collaboration**

4) **More to come soon…**

PROJECT APPROACH

INFORMATION

FIRE INFORMATION

1) We need good information to validate and verify our models and predictions
2) The wrong kind of information may make our models worse
    - **Overfitting**
3) We have the least understanding of the most important events
    - **The extreme (but rare) fires**
4) We can't create these experimentally – we have to rely on 'wild caught' information.

THE CHALLENGES

1) V
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2) F n
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3) F
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Progression Averages :

Number of Comparisons - 1

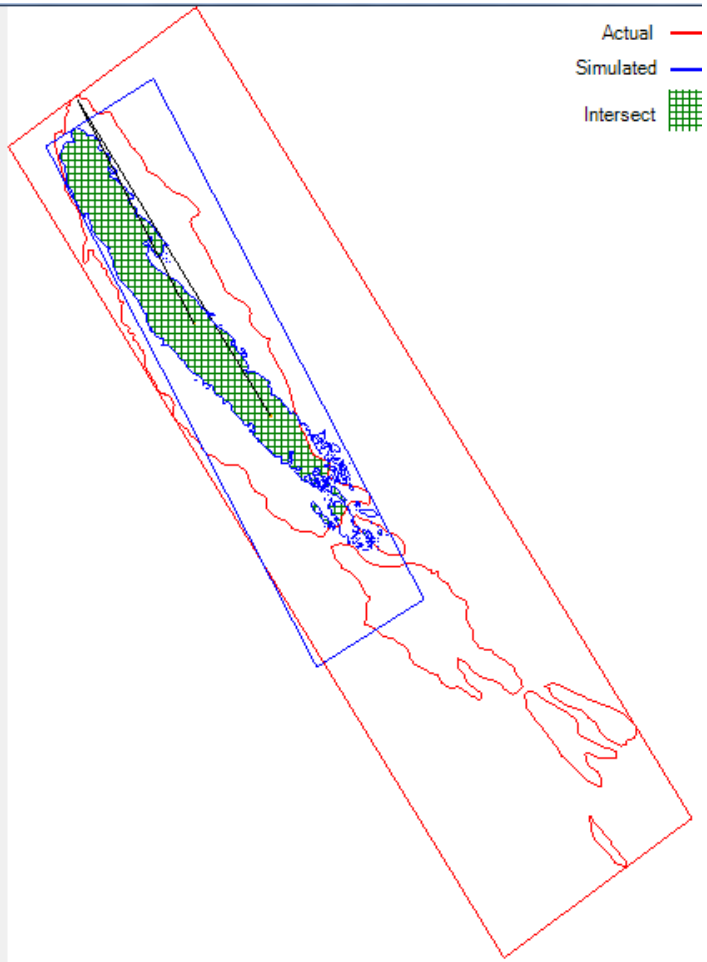
Average ADI - 2.31
Max ADI Over - 0.06
Max ADI Under - 2.25
Avg Deviation Angle- 4.16
Max Deviation Angle- 4.16

Time Step : 7/02/2009 5:00 PM

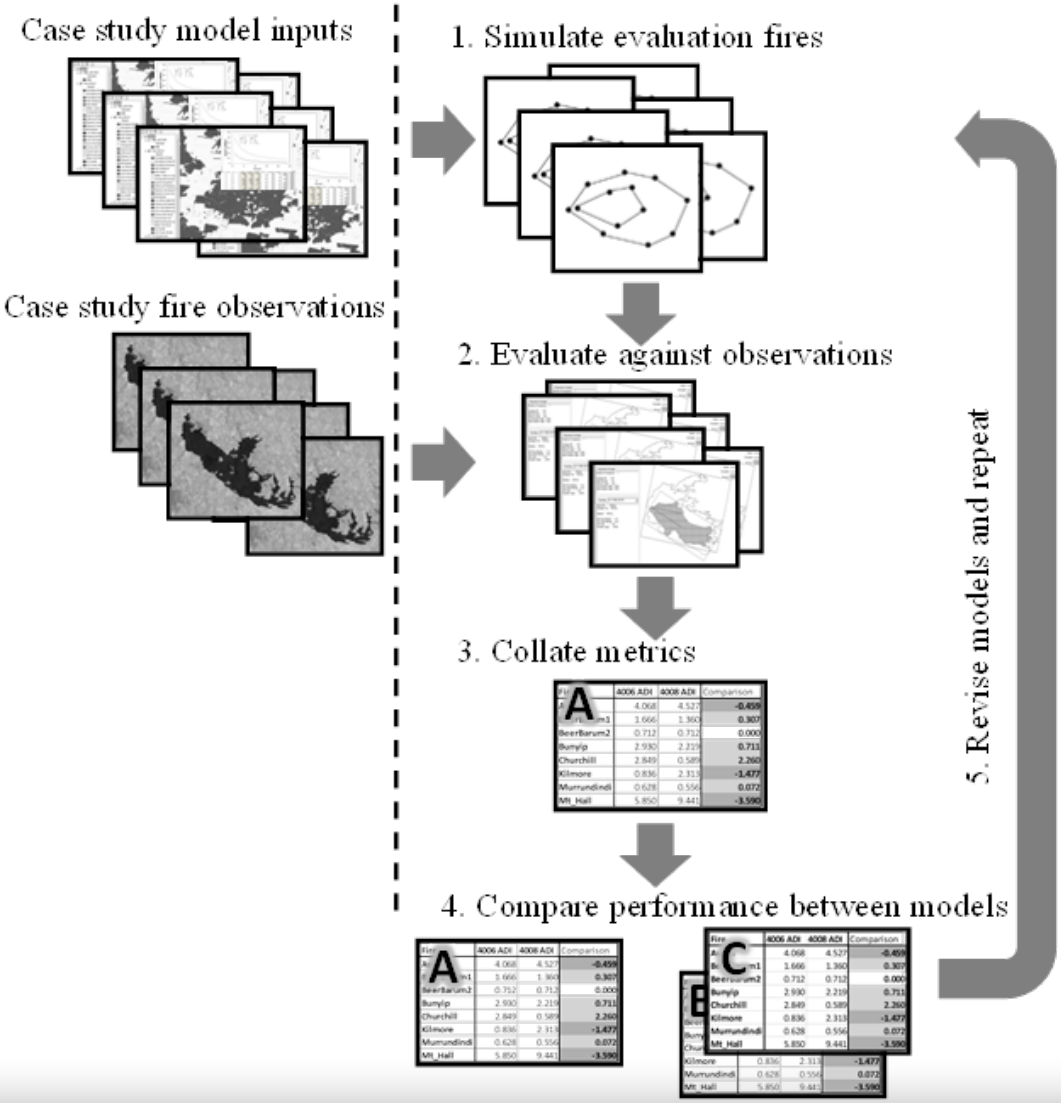
Actual Fire - 17471 ha
Simulated Fire - 5701 ha

Intersect - 5373 ha

ADI Over Extimate - 0.06
ADI Under Estimate - 2.25
ADI Total - 2.31
Deviation Angle - 4.16

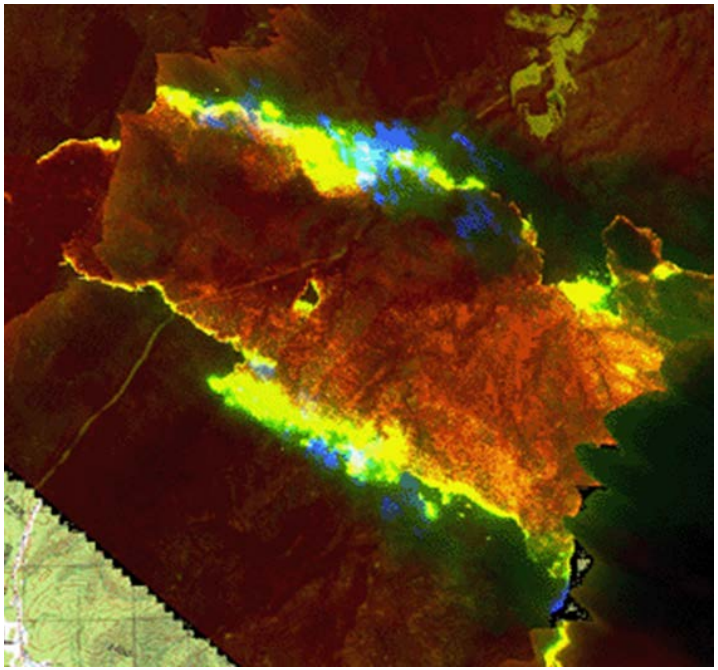


THE EVALUATION SET



EXTREME FIRE BEHAVIOUR – WHAT DO WE MEAN?

1) Domingos (2014) describes 7 behaviours
    - Eruptive fires
    - Fire Whirls
    - Horizontal Vortices
    - Spot Fires (Fire Storm)
    - Crown fires
    - Conflagrations
    - Jump fires



2) These are not independent
3) We don't have good data on when these occur

THE NEED FOR A CONSISTENT, COLLABORATIVE APPROACH

WHY?

1) Data consistency and availability
2) Allows collaboration
3) Capture more events (especially rare)
4) Reduces duplication
5) Shares research load
6) Extends research applicability
7) **Unexpected benefits?**

THE STATUS QUO

1) There is no consistent standard applied for collecting fire information during and after fires (both within and between jurisdictions)
2) While much information is generated during fire fighting operations, few attributes are stored in a way that makes them easily usable
3) Research data duplication?

State	Records available
Australian Capital Territory	48
New South Wales	42
Northern Territory	2
Queensland	65
South Australia	4
Tasmania	11
Victoria	169
Western Australia	149

WHERE TO START?

1) ***Scope***: What should be collected
2) ***Standards***: Standardisation of collection methodologies and data types, units, resolutions, formats and metadata.
3) ***Access***: How contributors and researchers access the entire data pool

SCOPE

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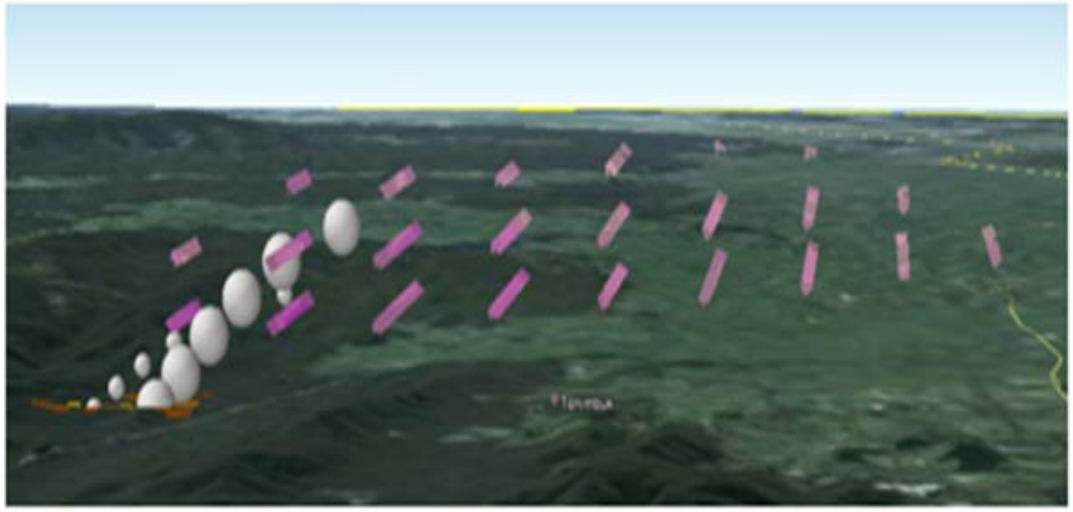

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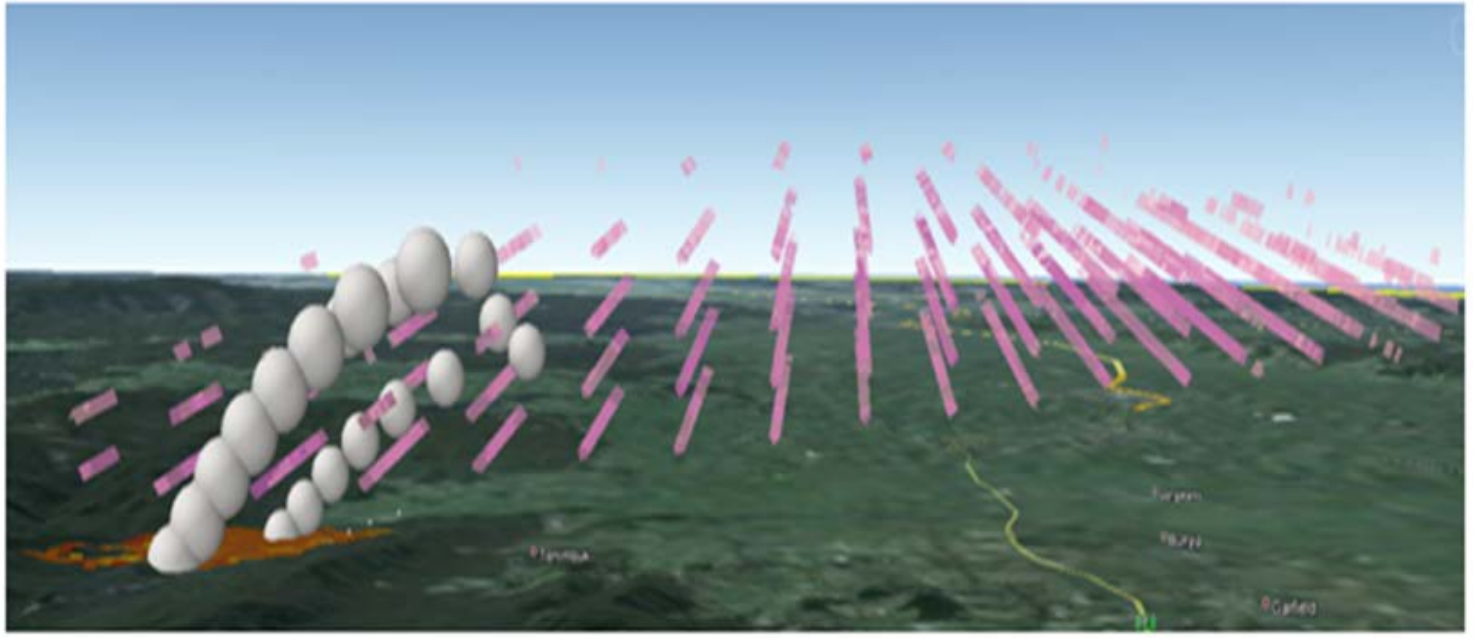

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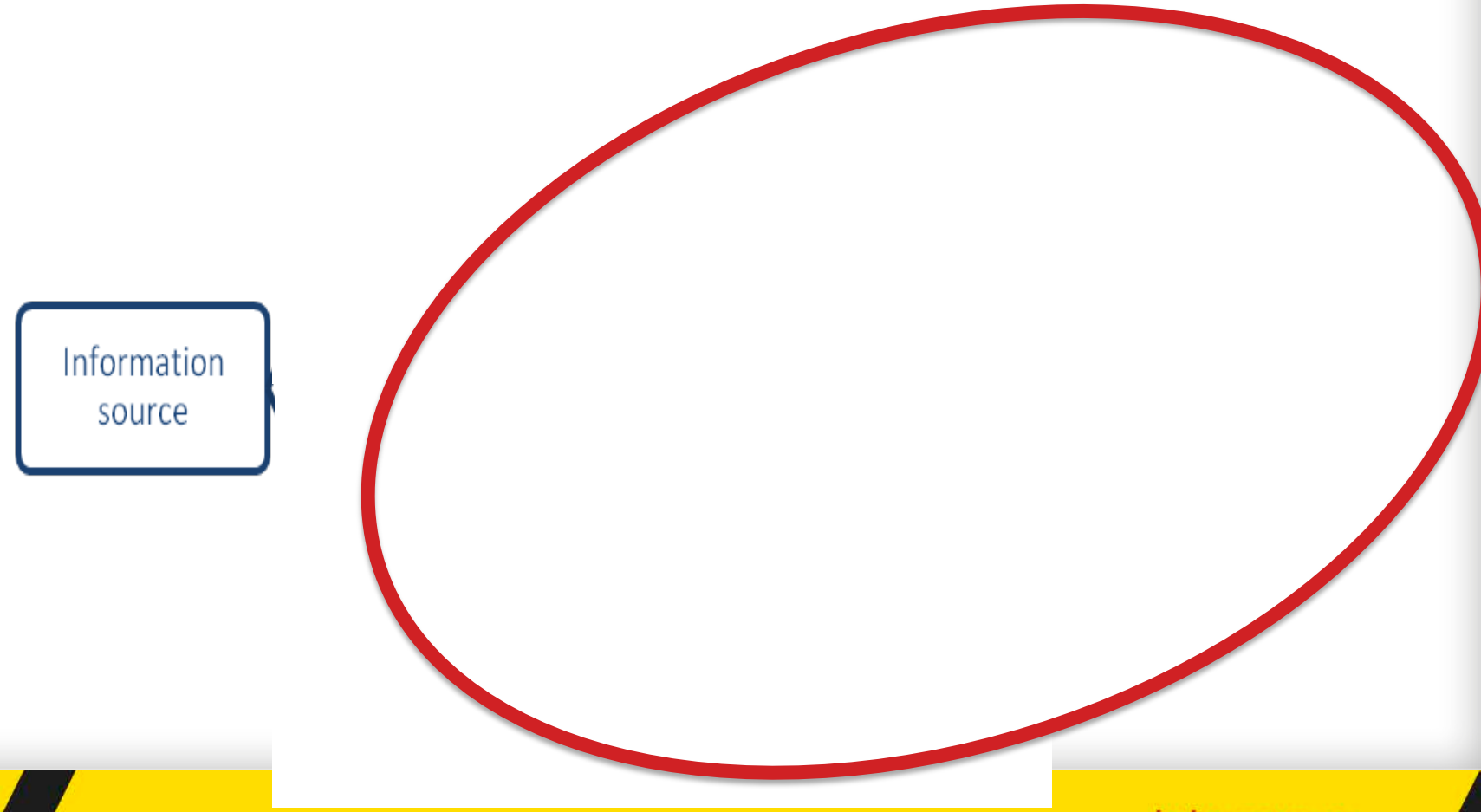
DATA HIERARCHY



STANDARDS

1) Without appropriate standards, information may have no net benefit
2) Need standards around
   a) Measurement
   b) Storage
   c) Indexing

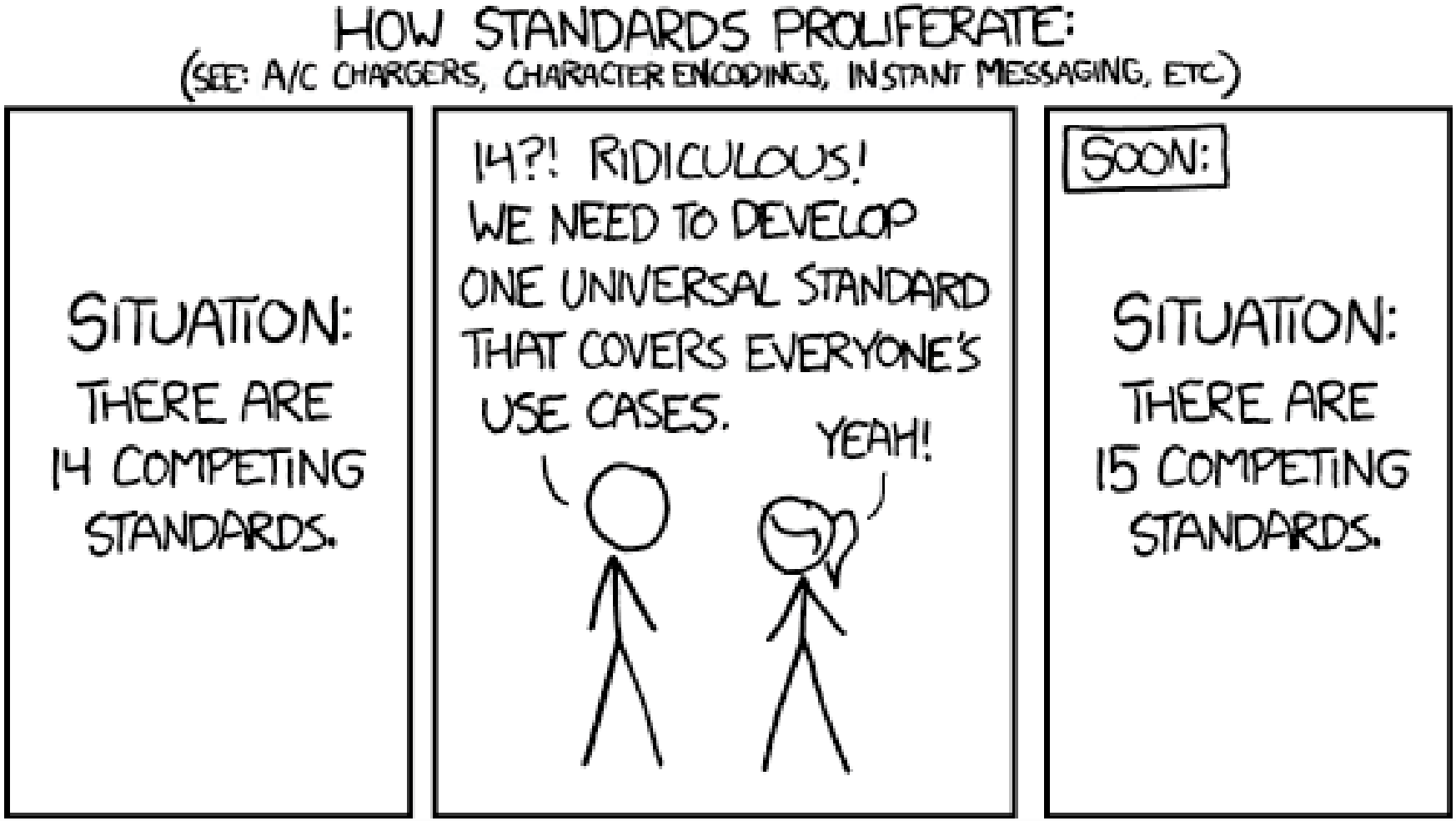
ACCESS

1) There are incentives for sharing
2) Technical issues
3) Information sensitivities

SUMMARY

- There are large benefits to learning more from extreme our events
- Improving our availability of fire information will enhance research and discovery
- Collaboration will be important
- A step towards universality?

QUESTIONS?



Monroe, R. 2011 XKCD *Standards* http://xkcd.com/927/